PCTEST ENGINEERING LABORATORY, INC.
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. +1.410.290.6652 / Fax +1.410.290.6654
http://www.pctest.com

# SAR EVALUATION REPORT

**Applicant Name:**
Samsung Electronics Co., Ltd.
129, Samsung-ro, Maetan dong,
Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

**Date of Testing:**
12/17/18 - 1/21/19
**Test Site/Location:**
PCTEST Lab, Columbia, MD, USA
**Document Serial No.:**
1M1811230206-01-R2.A3L

**FCC ID:** **A3LSMG9730**

**APPLICANT:** **SAMSUNG ELECTRONICS CO., LTD.**

| | |
|---|---|
| **DUT Type:** | Portable Handset |
| **Application Type:** | Certification |
| **FCC Rule Part(s):** | CFR §2.1093 |
| **Model:** | SM-G9730 |
| **Additional Model(s):** | SM-G9738 |

| Equipment Class | Band & Mode | Tx Frequency | SAR | | | |
|---|---|---|---|---|---|---|
| | | | 1g Head (W/kg) | 1g Body-Worn (W/kg) | 1g Hotspot (W/kg) | 10g Phablet (W/kg) |
| PCE | GSM/GPRS/EDGE 850 | 824.20 - 848.80 MHz | 0.31 | 0.27 | 0.60 | N/A |
| PCE | GSM/GPRS/EDGE 1900 | 1850.20 - 1909.80 MHz | < 0.1 | 0.39 | 0.94 | 2.97 |
| PCE | UMTS 850 | 826.40 - 846.60 MHz | 0.39 | 0.32 | 0.50 | N/A |
| PCE | UMTS 1900 | 1852.4 - 1907.6 MHz | 0.20 | 0.91 | 1.32 | 3.00 |
| PCE | LTE Band 12 | 699.7 - 715.3 MHz | 0.14 | 0.20 | 0.27 | N/A |
| PCE | LTE Band 13 | 779.5 - 784.5 MHz | 0.26 | 0.34 | 0.47 | N/A |
| PCE | LTE Band 26 (Cell) | 814.7 - 848.3 MHz | 0.33 | 0.32 | 0.51 | N/A |
| PCE | LTE Band 5 (Cell) | 824.7 - 848.3 MHz | N/A | N/A | N/A | N/A |
| PCE | LTE Band 4 (AWS) | 1710.7 - 1754.3 MHz | 0.17 | 0.54 | 0.70 | 2.92 |
| PCE | LTE Band 25 (PCS) | 1850.7 - 1914.3 MHz | 0.17 | 0.96 | 0.89 | 3.25 |
| PCE | LTE Band 2 (PCS) | 1850.7 - 1909.3 MHz | N/A | N/A | N/A | N/A |
| PCE | LTE Band 41 | 2498.5 - 2687.5 MHz | < 0.1 | 0.41 | 0.59 | 1.25 |
| DTS | 2.4 GHz WLAN | 2412 -2472 MHz | 0.80 | 0.16 | 0.38 | N/A |
| NII | U-NII-1 | 5180 - 5240 MHz | N/A | N/A | N/A | N/A |
| NII | U-NII-2A | 5260 - 5320 MHz | 0.35 | 0.37 | N/A | 1.68 |
| NII | U-NII-2C | 5500 - 5720 MHz | 0.17 | 0.39 | N/A | 2.73 |
| NII | U-NII-3 | 5745 - 5825 MHz | 0.30 | 0.34 | 0.60 | N/A |
| DSS/DTS | Bluetooth | 2402 - 2480 MHz | 1.34 | < 0.1 | 0.21 | N/A |
| **Simultaneous SAR per KDB 690783 D01v01r03:** | | | 1.55 | 1.57 | 1.58 | 3.88 |

Note: This revised Test Report (S/N: 1M1811230206-01-R2.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.8 of this report; for North American frequency bands only.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. Test results reported herein relate only to the item(s) tested.

Randy Ortanez
President

© SAR ELIGIBLE

ACCREDITED
TESTING CERT#2041.01

The SAR Tick is an initiative of the Mobile & Wireless Forum (MWF). While a product may be considered eligible, use of the SAR Tick logo requires an agreement with the MWF. Further details can be obtained by emailing: sartick@mwfai.info.

# T A B L E   O F   C O N T E N T S


1 DEVICE UNDER TEST ... 3

2 LTE INFORMATION ... 16

3 INTRODUCTION ... 17

4 DOSIMETRIC ASSESSMENT ... 18

5 DEFINITION OF REFERENCE POINTS ... 19

6 TEST CONFIGURATION POSITIONS ... 20

7 RF EXPOSURE LIMITS ... 24

8 FCC MEASUREMENT PROCEDURES ... 25

9 RF CONDUCTED POWERS ... 31

10 SYSTEM VERIFICATION ... 74

11 SAR DATA SUMMARY ... 78

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS ... 98

13 SAR MEASUREMENT VARIABILITY ... 128

14 EQUIPMENT LIST ... 130

15 MEASUREMENT UNCERTAINTIES ... 134

16 CONCLUSION ... 135

17 REFERENCES ... 136

APPENDIX A: SAR TEST PLOTS

APPENDIX B: SAR DIPOLE VERIFICATION PLOTS

APPENDIX C: PROBE AND DIPOLE CALIBRATION CERTIFICATES

APPENDIX D: SAR TISSUE SPECIFICATIONS

APPENDIX E: SAR SYSTEM VALIDATION

APPENDIX F: DUT ANTENNA DIAGRAM & SAR TEST SETUP PHOTOGRAPHS

APPENDIX G: POWER REDUCTION VERIFICATION

APPENDIX H: DOWNLINK LTE CA RF CONDUCTED POWERS

APPENDIX I: IEEE 802.11AX RU SAR EXCLUSION

# 1 DEVICE UNDER TEST

## 1.1 Device Overview

| Band & Mode | Operating Modes | Tx Frequency |
|---|---|---|
| GSM/GPRS/EDGE 850 | Voice/Data | 824.20 - 848.80 MHz |
| GSM/GPRS/EDGE 1900 | Voice/Data | 1850.20 - 1909.80 MHz |
| UMTS 850 | Voice/Data | 826.40 - 846.60 MHz |
| UMTS 1900 | Voice/Data | 1852.4 - 1907.6 MHz |
| LTE Band 12 | Voice/Data | 699.7 - 715.3 MHz |
| LTE Band 13 | Voice/Data | 779.5 - 784.5 MHz |
| LTE Band 26 (Cell) | Voice/Data | 814.7 - 848.3 MHz |
| LTE Band 5 (Cell) | Voice/Data | 824.7 - 848.3 MHz |
| LTE Band 4 (AWS) | Voice/Data | 1710.7 - 1754.3 MHz |
| LTE Band 25 (PCS) | Voice/Data | 1850.7 - 1914.3 MHz |
| LTE Band 2 (PCS) | Voice/Data | 1850.7 - 1909.3 MHz |
| LTE Band 41 | Voice/Data | 2498.5 - 2687.5 MHz |
| 2.4 GHz WLAN | Voice/Data | 2412 -2472 MHz |
| U-NII-1 | Voice/Data | 5180 - 5240 MHz |
| U-NII-2A | Voice/Data | 5260 - 5320 MHz |
| U-NII-2C | Voice/Data | 5500 - 5720 MHz |
| U-NII-3 | Voice/Data | 5745 - 5825 MHz |
| Bluetooth | Data | 2402 - 2480 MHz |
| NFC | Data | 13.56 MHz |
| ANT+ | Data | 2402 - 2480 MHz |
| MST | Data | 555 Hz - 8.33 kHz |

## 1.2 Power Reduction for SAR

This device utilizes a power reduction mechanism for some wireless modes and bands for SAR compliance under portable hotspot conditions, under some conditions when the device is being used in close proximity to the user's hand, and when headphones are inserted. All hotspot SAR evaluations for this device were performed at the maximum allowed output power when hotspot is enabled. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device when being used in phablet use conditions. When headset SAR was required per KDB Publication 648474 D04, SAR was performed at the reduced output power levels. Detailed descriptions of the power reduction mechanism are included in the operational description.

This device uses an independent fixed level power reduction mechanism for WLAN operations during voice or VoIP held to ear scenarios. Per FCC Guidance, the held-to-ear exposure conditions were evaluated at reduced power according to the head SAR positions described in IEEE 1528-2013. Detailed descriptions of the power reduction mechanism are included in the operational description.

## 1.3 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.

### 1.3.1 Maximum 2G/3G/4G Output Power

| Mode / Band | | Voice (dBm) | Burst Average GMSK (dBm) | | | | Burst Average 8-PSK (dBm) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 TX Slot | *1 TX Slots* | *2 TX Slots* | *3 TX Slots* | *4 TX Slots* | *1 TX Slots* | *2 TX Slots* | *3 TX Slots* | *4 TX Slots* |
| GSM/GPRS/EDGE 850 | Maximum | **33.5** | **33.5** | **32.5** | **30.5** | **28.5** | **28.0** | **26.0** | **24.0** | **23.0** |
| | Nominal | **32.5** | **32.5** | **31.5** | **29.5** | **27.5** | **27.0** | **25.0** | **23.0** | **22.0** |
| GSM/GPRS/EDGE 1900 | Maximum | **30.5** | **30.5** | **29.5** | **27.5** | **25.5** | **27.0** | **25.0** | **23.0** | **22.0** |
| | Nominal | **29.5** | **29.5** | **28.5** | **26.5** | **24.5** | **26.0** | **24.0** | **22.0** | **21.0** |

| Mode / Band | | Modulated Average (dBm) | | | |
|---|---|---|---|---|---|
| | | *3GPP WCDMA* | *3GPP HSDPA* | *3GPP HSUPA* | *3GPP DC-HSDPA* |
| UMTS Band 5 (850 MHz) | Maximum | **25.0** | **24.0** | **24.0** | **24.0** |
| | Nominal | **24.0** | **23.0** | **23.0** | **23.0** |
| UMTS Band 2 (1900 MHz) | Maximum | **24.0** | **23.0** | **23.0** | **23.0** |
| | Nominal | **23.0** | **22.0** | **22.0** | **22.0** |

| Mode / Band | | Modulated Average (dBm) |
|---|---|---|
| LTE Band 12 | Maximum | **25.0** |
| | Nominal | **24.0** |
| LTE Band 13 | Maximum | **25.0** |
| | Nominal | **24.0** |
| LTE Band 26 (Cell) | Maximum | **25.0** |
| | Nominal | **24.0** |
| LTE Band 5 (Cell) | Maximum | **25.0** |
| | Nominal | **24.0** |
| LTE Band 4 (AWS) | Maximum | **24.0** |
| | Nominal | **23.0** |
| LTE Band 25 (PCS) | Maximum | **25.0** |
| | Nominal | **24.0** |
| LTE Band 2 (PCS) | Maximum | **24.0** |
| | Nominal | **23.0** |
| LTE Band 41 | Maximum | **25.5** |
| | Nominal | **24.5** |

### 1.3.2 Reduced 2G/3G/4G Output Power- Hotspot Mode Activated

| Mode / Band | | Burst Average GMSK (dBm) | | | | Burst Average 8-PSK (dBm) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | *1 TX Slots* | *2 TX Slots* | *3 TX Slots* | *4 TX Slots* | *1 TX Slots* | *2 TX Slots* | *3 TX Slots* | *4 TX Slots* |
| GSM/GPRS/EDGE 1900 | Maximum | **28.5** | **27.5** | **25.5** | **23.5** | **27.0** | **25.0** | **23.0** | **22.0** |
| | Nominal | **27.5** | **26.5** | **24.5** | **22.5** | **26.0** | **24.0** | **22.0** | **21.0** |

| Mode / Band | | Modulated Average (dBm) | | | |
|---|---|---|---|---|---|
| | | *3GPP WCDMA* | *3GPP HSDPA* | *3GPP HSUPA* | *3GPP DC-HSDPA* |
| UMTS Band 2 (1900 MHz) | Maximum | **20.5** | **19.5** | **19.5** | **19.5** |
| | Nominal | **19.5** | **18.5** | **18.5** | **18.5** |

| Mode / Band | | Modulated Average (dBm) |
|---|---|---|
| LTE Band 4 (AWS) | Maximum | **20.0** |
| | Nominal | **19.0** |
| LTE Band 25 (PCS) | Maximum | **20.0** |
| | Nominal | **19.0** |
| LTE Band 2 (PCS) | Maximum | **20.0** |
| | Nominal | **19.0** |
| LTE Band 41 | Maximum | **21.0** |
| | Nominal | **20.0** |

### 1.3.3 Reduced 2G/3G/4G Output Power- Grip Sensor Activated

| Mode / Band | | Voice (dBm) | Burst Average GMSK (dBm) | | | | Burst Average 8-PSK (dBm) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 TX Slot | *1 TX Slots* | *2 TX Slots* | *3 TX Slots* | *4 TX Slots* | *1 TX Slots* | *2 TX Slots* | *3 TX Slots* | *4 TX Slots* |
| GSM/GPRS/EDGE 1900 | Maximum | **28.5** | **28.5** | **27.5** | **25.5** | **23.5** | **27.0** | **25.0** | **23.0** | **22.0** |
| | Nominal | **27.5** | **27.5** | **26.5** | **24.5** | **22.5** | **26.0** | **24.0** | **22.0** | **21.0** |

| Mode / Band | | Modulated Average (dBm) | | | |
|---|---|---|---|---|---|
| | | *3GPP WCDMA* | *3GPP HSDPA* | *3GPP HSUPA* | *3GPP DC-HSDPA* |
| UMTS Band 2 (1900 MHz) | Maximum | **21.0** | **20.0** | **20.0** | **20.0** |
| | Nominal | **20.0** | **19.0** | **19.0** | **19.0** |

| Mode / Band | | Modulated Average (dBm) |
|---|---|---|
| LTE Band 4 (AWS) | Maximum | **21.0** |
| | Nominal | **20.0** |
| LTE Band 25 (PCS) | Maximum | **21.0** |
| | Nominal | **20.0** |
| LTE Band 2 (PCS) | Maximum | **21.0** |
| | Nominal | **20.0** |
| LTE Band 41 | Maximum | **21.0** |
| | Nominal | **20.0** |

### 1.3.4 Maximum Bluetooth and SISO/MIMO WLAN Output Power

Note: Targets for 802.11ax RU operations can be found in appendix I.

| Mode / Band | | Modulated Average - Single Tx Chain (dBm) | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2-10 | 11 | 12 | 13 |
| IEEE 802.11b (2.4 GHz) | Maximum | | 21.0 | | 11.5 | 10.0 |
| | Nominal | | 20.0 | | 10.5 | 9.0 |
| IEEE 802.11g (2.4 GHz) | Maximum | | 18.0 | | 11.5 | 10.0 |
| | Nominal | | 17.0 | | 10.5 | 9.0 |
| IEEE 802.11n (2.4 GHz) | Maximum | | 18.0 | | 11.5 | 10.0 |
| | Nominal | | 17.0 | | 10.5 | 9.0 |
| IEEE 802.11ax SU (2.4 GHz) | Maximum | 16.0 | 18.0 | 17.0 | 11.5 | 10.0 |
| | Nominal | 15.0 | 17.0 | 16.0 | 10.5 | 9.0 |

| Mode / Band | | Modulated Average - Single Tx Chain (dBm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 MHz Bandwidth | | | | | 40 MHz Bandwidth | | | | | 80 MHz Bandwidth | |
| | Channel | 36 | 40-60 | 64 | 100 | 104-165 | 38 | 46-54 | 62 | 102 | 110-159 | 42-106 | 122-155 |
| IEEE 802.11a (5 GHz) | Maximum | 15.5 | 18.5 | 18.0 | 17.5 | 18.5 | | | | | | | |
| | Nominal | 14.5 | 17.5 | 17.0 | 16.5 | 17.5 | | | | | | | |
| IEEE 802.11n (5 GHz) | Maximum | 15.5 | 18.5 | 18.0 | 17.5 | 18.5 | 14.0 | 17.5 | 13.5 | 14.0 | 17.5 | | |
| | Nominal | 14.5 | 17.5 | 17.0 | 16.5 | 17.5 | 13.0 | 16.5 | 12.5 | 13.0 | 16.5 | | |
| IEEE 802.11ac (5 GHz) | Maximum | 15.5 | 18.5 | 18.0 | 17.5 | 18.5 | 14.0 | 17.5 | 13.5 | 14.0 | 17.5 | 13.0 | 16.5 |
| | Nominal | 14.5 | 17.5 | 17.0 | 16.5 | 17.5 | 13.0 | 16.5 | 12.5 | 13.0 | 16.5 | 12.0 | 15.5 |
| IEEE 802.11ax SU (5 GHz) | Maximum | 16.0 | 18.5 | 16.5 | 17.5 | 18.5 | 13.5 | 17.5 | 13.5 | 12.5 | 17.5 | 12.5 | 16.5 |
| | Nominal | 15.0 | 17.5 | 15.5 | 16.5 | 17.5 | 12.5 | 16.5 | 12.5 | 11.5 | 16.5 | 11.5 | 15.5 |

| Mode / Band | | Modulated Average - MIMO (dBm) | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2-10 | 11 | 12 | 13 |
| IEEE 802.11g (2.4 GHz) | Maximum | | 21.0 | | 14.5 | 13.0 |
| | Nominal | | 20.0 | | 13.5 | 12.0 |
| IEEE 802.11n (2.4 GHz) | Maximum | | 21.0 | | 14.5 | 13.0 |
| | Nominal | | 20.0 | | 13.5 | 12.0 |
| IEEE 802.11ax SU (2.4 GHz) | Maximum | 16.0 | 21.0 | 17.0 | 14.5 | 13.0 |
| | Nominal | 15.0 | 20.0 | 16.0 | 13.5 | 12.0 |

| Mode / Band | | Modulated Average - MIMO (dBm) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 MHz Bandwidth | | | | | | 40 MHz Bandwidth | | | | | 80 MHz Bandwidth | |
| | Channel | 36 | 40-60 | 64 | 100 | 104-144 | 149-165 | 38 | 46-54 | 62 | 102 | 110-159 | 42-106 | 122-155 |
| IEEE 802.11a (5 GHz) | Maximum | 15.5 | 21.5 | 18.0 | 20.5 | 21.0 | 21.5 | | | | | | | |
| | Nominal | 14.5 | 20.5 | 17.0 | 19.5 | 20.0 | 20.5 | | | | | | | |
| IEEE 802.11n (5 GHz) | Maximum | 15.5 | 21.5 | 18.0 | 20.5 | 21.0 | 21.5 | 14.0 | 20.5 | 13.5 | 14.0 | 20.5 | | |
| | Nominal | 14.5 | 20.5 | 17.0 | 19.5 | 20.0 | 20.5 | 13.0 | 19.5 | 12.5 | 13.0 | 19.5 | | |
| IEEE 802.11ac (5 GHz) | Maximum | 15.5 | 21.5 | 18.0 | 20.5 | 21.0 | 21.5 | 14.0 | 20.5 | 13.5 | 14.0 | 20.5 | 13.0 | 19.5 |
| | Nominal | 14.5 | 20.5 | 17.0 | 19.5 | 20.0 | 20.5 | 13.0 | 19.5 | 12.5 | 13.0 | 19.5 | 12.0 | 18.5 |
| IEEE 802.11ax SU (5 GHz) | Maximum | 16.0 | 21.5 | 16.5 | 20.5 | 21.0 | 21.5 | 13.5 | 20.5 | 13.5 | 12.5 | 20.5 | 12.5 | 19.5 |
| | Nominal | 15.0 | 20.5 | 15.5 | 19.5 | 20.0 | 20.5 | 12.5 | 19.5 | 12.5 | 11.5 | 19.5 | 11.5 | 18.5 |

| Mode / Band | | Modulated Average - Single Tx Chain (dBm) |
|---|---|---|
| Bluetooth | Maximum | **18.5** |
| | Nominal | **17.5** |
| Bluetooth LE | Maximum | **10.0** |
| | Nominal | **9.0** |
| Bluetooth EDR | Maximum | **12.5** |
| | Nominal | **11.5** |

### 1.3.5 Reduced SISO/MIMO WLAN Output Power

Note: Targets for 802.11ax RU operations can be found in appendix I.

| Mode / Band | | Modulated Average - Single Tx Chain (dBm) | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2-10 | 11 | 12 | 13 |
| IEEE 802.11b (2.4 GHz) | Maximum | **17.0** | | | **11.5** | **10.0** |
| | Nominal | **16.0** | | | **10.5** | **9.0** |
| IEEE 802.11g (2.4 GHz) | Maximum | **17.0** | | | **11.5** | **10.0** |
| | Nominal | **16.0** | | | **10.5** | **9.0** |
| IEEE 802.11n (2.4 GHz) | Maximum | **17.0** | | | **11.5** | **10.0** |
| | Nominal | **16.0** | | | **10.5** | **9.0** |
| IEEE 802.11ax SU (2.4 GHz) | Maximum | **16.0** | **17.0** | | **11.5** | **10.0** |
| | Nominal | **15.0** | **16.0** | | **10.5** | **9.0** |

| Mode / Band | | Modulated Average - Single Tx Chain (dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 20 MHz Bandwidth | 40 MHz Bandwidth | | | | | 80 MHz Bandwidth | |
| | Channel | 36-165 | 38 | 46-54 | 62 | 102 | 110-159 | 42-106 | 122-155 |
| IEEE 802.11a (5 GHz) | Maximum | **14.0** | | | | | | | |
| | Nominal | **13.0** | | | | | | | |
| IEEE 802.11n (5 GHz) | Maximum | **14.0** | **14.0** | | **13.5** | **14.0** | | | |
| | Nominal | **13.0** | **13.0** | | **12.5** | **13.0** | | | |
| IEEE 802.11ac (5 GHz) | Maximum | **14.0** | **14.0** | | **13.5** | **14.0** | | **13.0** | **14.0** |
| | Nominal | **13.0** | **13.0** | | **12.5** | **13.0** | | **12.0** | **13.0** |
| IEEE 802.11ax SU (5 GHz) | Maximum | **14.0** | **13.5** | **14.0** | **13.5** | **12.5** | **14.0** | **12.5** | **14.0** |
| | Nominal | **13.0** | **12.5** | **13.0** | **12.5** | **11.5** | **13.0** | **11.5** | **13.0** |

| Mode / Band | | Modulated Average - MIMO (dBm) | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2-10 | 11 | 12 | 13 |
| IEEE 802.11g (2.4 GHz) | Maximum | 20.0 | | | 14.5 | 13.0 |
| | Nominal | 19.0 | | | 13.5 | 12.0 |
| IEEE 802.11n (2.4 GHz) | Maximum | 20.0 | | | 14.5 | 13.0 |
| | Nominal | 19.0 | | | 13.5 | 12.0 |
| IEEE 802.11ax SU (2.4 GHz) | Maximum | 16.0 | 20.0 | 17.0 | 14.5 | 13.0 |
| | Nominal | 15.0 | 19.0 | 16.0 | 13.5 | 12.0 |

| Mode / Band | | Modulated Average - MIMO (dBm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 MHz Bandwidth | | | | 40 MHz Bandwidth | | | | | 80 MHz Bandwidth | |
| | Channel | 36 | 40-60 | 64 | 100-165 | 38 | 46-54 | 62 | 102 | 110-159 | 42-106 | 122-155 |
| IEEE 802.11a (5 GHz) | Maximum | 15.5 | 17.0 | 17.0 | 17.0 | | | | | | | |
| | Nominal | 14.5 | 16.0 | 16.0 | 16.0 | | | | | | | |
| IEEE 802.11n (5 GHz) | Maximum | 15.5 | 17.0 | 17.0 | 17.0 | 14.0 | 17.0 | 13.5 | 14.0 | 17.0 | | |
| | Nominal | 14.5 | 16.0 | 16.0 | 16.0 | 13.0 | 16.0 | 12.5 | 13.0 | 16.0 | | |
| IEEE 802.11ac (5 GHz) | Maximum | 15.5 | 17.0 | 17.0 | 17.0 | 14.0 | 17.0 | 13.5 | 14.0 | 17.0 | 13.0 | 17.0 |
| | Nominal | 14.5 | 16.0 | 16.0 | 16.0 | 13.0 | 16.0 | 12.5 | 13.0 | 16.0 | 12.0 | 16.0 |
| IEEE 802.11ax SU (5 GHz) | Maximum | 16.0 | 17.0 | 16.5 | 17.0 | 13.5 | 17.0 | 13.5 | 12.5 | 17.0 | 12.5 | 17.0 |
| | Nominal | 15.0 | 16.0 | 15.5 | 16.0 | 12.5 | 16.0 | 12.5 | 11.5 | 16.0 | 11.5 | 16.0 |

### 1.3.6 Maximum Output Power During Conditions with Simultaneous 2.4 GHz WLAN and 5 GHz WLAN

Note: Targets for 802.11ax RU operations can be found in appendix I.

| Mode / Band | | Modulated Average - Single Tx Chain (dBm) | | | |
|---|---|---|---|---|---|
| | | 1 | 2-11 | 12 | 13 |
| IEEE 802.11b (2.4 GHz) | Maximum | 17.0 | | 11.5 | 10.0 |
| | Nominal | 16.0 | | 10.5 | 9.0 |
| IEEE 802.11g (2.4 GHz) | Maximum | 17.0 | | 11.5 | 10.0 |
| | Nominal | 16.0 | | 10.5 | 9.0 |
| IEEE 802.11n (2.4 GHz) | Maximum | 17.0 | | 11.5 | 10.0 |
| | Nominal | 16.0 | | 10.5 | 9.0 |
| IEEE 802.11ax SU (2.4 GHz) | Maximum | 16.0 | 17.0 | 11.5 | 10.0 |
| | Nominal | 15.0 | 16.0 | 10.5 | 9.0 |

| Mode / Band | | Modulated Average - Single Tx Chain (dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 20 MHz Bandwidth | 40 MHz Bandwidth | | | | | 80 MHz Bandwidth | |
| | Channel | 36-165 | 38 | 46-54 | 62 | 102 | 110-159 | 42-106 | 122-155 |
| IEEE 802.11a (5 GHz) | Maximum | 14.0 | | | | | | | |
| | Nominal | 13.0 | | | | | | | |
| IEEE 802.11n (5 GHz) | Maximum | 14.0 | 14.0 | | 13.5 | 14.0 | | | |
| | Nominal | 13.0 | 13.0 | | 12.5 | 13.0 | | | |
| IEEE 802.11ac (5 GHz) | Maximum | 14.0 | 14.0 | | 13.5 | 14.0 | | 13.0 | 14.0 |
| | Nominal | 13.0 | 13.0 | | 12.5 | 13.0 | | 12.0 | 13.0 |
| IEEE 802.11ax SU (5 GHz) | Maximum | 14.0 | 13.5 | 14.0 | 13.5 | 12.5 | 14.0 | 12.5 | 14.0 |
| | Nominal | 13.0 | 12.5 | 13.0 | 12.5 | 11.5 | 13.0 | 11.5 | 13.0 |

| Mode / Band | | Modulated Average - MIMO (dBm) | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2-10 | 11 | 12 | 13 |
| IEEE 802.11g (2.4 GHz) | Maximum | 20.0 | | | 14.5 | 13.0 |
| | Nominal | 19.0 | | | 13.5 | 12.0 |
| IEEE 802.11n (2.4 GHz) | Maximum | 20.0 | | | 14.5 | 13.0 |
| | Nominal | 19.0 | | | 13.5 | 12.0 |
| IEEE 802.11ax SU (2.4 GHz) | Maximum | 16.0 | 20.0 | 17.0 | 14.5 | 13.0 |
| | Nominal | 15.0 | 19.0 | 16.0 | 13.5 | 12.0 |

| Mode / Band | | Modulated Average - MIMO (dBm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 MHz Bandwidth | | | | 40 MHz Bandwidth | | | | | 80 MHz Bandwidth | |
| | Channel | 36 | 40-60 | 64 | 100-165 | 38 | 46-54 | 62 | 102 | 110-159 | 42-106 | 122-155 |
| IEEE 802.11a (5 GHz) | Maximum | 15.5 | 17.0 | 17.0 | 17.0 | | | | | | | |
| | Nominal | 14.5 | 16.0 | 16.0 | 16.0 | | | | | | | |
| IEEE 802.11n (5 GHz) | Maximum | 15.5 | 17.0 | 17.0 | 17.0 | 14.0 | 17.0 | 13.5 | 14.0 | 17.0 | | |
| | Nominal | 14.5 | 16.0 | 16.0 | 16.0 | 13.0 | 16.0 | 12.5 | 13.0 | 16.0 | | |
| IEEE 802.11ac (5 GHz) | Maximum | 15.5 | 17.0 | 17.0 | 17.0 | 14.0 | 17.0 | 13.5 | 14.0 | 17.0 | 13.0 | 17.0 |
| | Nominal | 14.5 | 16.0 | 16.0 | 16.0 | 13.0 | 16.0 | 12.5 | 13.0 | 16.0 | 12.0 | 16.0 |
| IEEE 802.11ax SU (5 GHz) | Maximum | 16.0 | 17.0 | 16.5 | 17.0 | 13.5 | 17.0 | 13.5 | 12.5 | 17.0 | 12.5 | 17.0 |
| | Nominal | 15.0 | 16.0 | 15.5 | 16.0 | 12.5 | 16.0 | 12.5 | 11.5 | 16.0 | 11.5 | 16.0 |

### 1.3.7 Reduced Output Power During Conditions with Simultaneous 2.4 GHz WLAN and 5 GHz WLAN

Note: Targets for 802.11ax RU operations can be found in appendix I.

| Mode / Band | | Modulated Average - Single Tx Chain (dBm) | | |
|---|---|---|---|---|
| | | 1-11 | 12 | 13 |
| IEEE 802.11b (2.4 GHz) | Maximum | 14.0 | 11.5 | 10.0 |
| | Nominal | 13.0 | 10.5 | 9.0 |
| IEEE 802.11g (2.4 GHz) | Maximum | 14.0 | 11.5 | 10.0 |
| | Nominal | 13.0 | 10.5 | 9.0 |
| IEEE 802.11n (2.4 GHz) | Maximum | 14.0 | 11.5 | 10.0 |
| | Nominal | 13.0 | 10.5 | 9.0 |
| IEEE 802.11ax SU (2.4 GHz) | Maximum | 14.0 | 11.5 | 10.0 |
| | Nominal | 13.0 | 10.5 | 9.0 |

| Mode / Band | | Modulated Average - Single Tx Chain (dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 20 MHz Bandwidth | 40 MHz Bandwidth | | | | | 80 MHz Bandwidth | |
| | Channel | 36-165 | 38 | 46-54 | 62 | 102 | 110-159 | 42-106 | 122-155 |
| IEEE 802.11a (5 GHz) | Maximum | 14.0 | | | | | | | |
| | Nominal | 13.0 | | | | | | | |
| IEEE 802.11n (5 GHz) | Maximum | 14.0 | 14.0 | | 13.5 | 14.0 | | | |
| | Nominal | 13.0 | 13.0 | | 12.5 | 13.0 | | | |
| IEEE 802.11ac (5 GHz) | Maximum | 14.0 | 14.0 | | 13.5 | 14.0 | | 13.0 | 14.0 |
| | Nominal | 13.0 | 13.0 | | 12.5 | 13.0 | | 12.0 | 13.0 |
| IEEE 802.11ax SU (5 GHz) | Maximum | 14.0 | 13.5 | 14.0 | 13.5 | 12.5 | 14.0 | 12.5 | 14.0 |
| | Nominal | 13.0 | 12.5 | 13.0 | 12.5 | 11.5 | 13.0 | 11.5 | 13.0 |

| Mode / Band | | Modulated Average - MIMO (dBm) | | | |
|---|---|---|---|---|---|
| | | 1 | 2-11 | 12 | 13 |
| IEEE 802.11g (2.4 GHz) | Maximum | **17.0** | | **14.5** | **13.0** |
| | Nominal | **16.0** | | **13.5** | **12.0** |
| IEEE 802.11n (2.4 GHz) | Maximum | **17.0** | | **14.5** | **13.0** |
| | Nominal | **16.0** | | **13.5** | **12.0** |
| IEEE 802.11ax SU (2.4 GHz) | Maximum | **16.0** | **17.0** | **14.5** | **13.0** |
| | Nominal | **15.0** | **16.0** | **13.5** | **12.0** |

| Mode / Band | | Modulated Average - MIMO (dBm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 MHz Bandwidth | | | | 40 MHz Bandwidth | | | | | 80 MHz Bandwidth | |
| | Channel | 36 | 40-60 | 64 | 100-165 | 38 | 46-54 | 62 | 102 | 110-159 | 42-106 | 122-155 |
| IEEE 802.11a (5 GHz) | Maximum | **15.5** | **17.0** | **17.0** | **17.0** | | | | | | | |
| | Nominal | **14.5** | **16.0** | **16.0** | **16.0** | | | | | | | |
| IEEE 802.11n (5 GHz) | Maximum | **15.5** | **17.0** | **17.0** | **17.0** | **14.0** | **17.0** | **13.5** | **14.0** | **17.0** | | |
| | Nominal | **14.5** | **16.0** | **16.0** | **16.0** | **13.0** | **16.0** | **12.5** | **13.0** | **16.0** | | |
| IEEE 802.11ac (5 GHz) | Maximum | **15.5** | **17.0** | **17.0** | **17.0** | **14.0** | **17.0** | **13.5** | **14.0** | **17.0** | **13.0** | **17.0** |
| | Nominal | **14.5** | **16.0** | **16.0** | **16.0** | **13.0** | **16.0** | **12.5** | **13.0** | **16.0** | **12.0** | **16.0** |
| IEEE 802.11ax SU (5 GHz) | Maximum | **16.0** | **17.0** | **16.5** | **17.0** | **13.5** | **17.0** | **13.5** | **12.5** | **17.0** | **12.5** | **17.0** |
| | Nominal | **15.0** | **16.0** | **15.5** | **16.0** | **12.5** | **16.0** | **12.5** | **11.5** | **16.0** | **11.5** | **16.0** |

## 1.4 DUT Antenna Locations

The overall dimensions of this device are > 9 x 5 cm. A diagram showing the location of the device antennas can be found in Appendix F. Since the diagonal dimension of this device is > 160 mm and <200 mm, it is considered a "phablet."

**Table 1-1**
**Device Edges/Sides for SAR Testing**

| Mode | Back | Front | Top | Bottom | Right | Left |
|---|---|---|---|---|---|---|
| GPRS 850 | Yes | Yes | No | Yes | Yes | Yes |
| GPRS 1900 | Yes | Yes | No | Yes | Yes | Yes |
| UMTS 850 | Yes | Yes | No | Yes | Yes | Yes |
| UMTS 1900 | Yes | Yes | No | Yes | Yes | Yes |
| LTE Band 12 | Yes | Yes | No | Yes | Yes | Yes |
| LTE Band 13 | Yes | Yes | No | Yes | Yes | Yes |
| LTE Band 26 (Cell) | Yes | Yes | No | Yes | Yes | Yes |
| LTE Band 4 (AWS) | Yes | Yes | No | Yes | Yes | Yes |
| LTE Band 25 (PCS) | Yes | Yes | No | Yes | Yes | Yes |
| LTE Band 41 | Yes | Yes | No | Yes | No | Yes |
| 2.4 GHz WLAN Ant 1 | Yes | Yes | Yes | No | No | Yes |
| 2.4 GHz WLAN Ant 2 | Yes | Yes | Yes | No | No | Yes |
| 5 GHz WLAN Ant 1 | Yes | Yes | Yes | No | No | Yes |
| 5 GHz WLAN Ant 2 | Yes | Yes | Yes | No | No | Yes |
| Bluetooth | Yes | Yes | Yes | No | No | Yes |

Note: Particular DUT edges were not required to be evaluated for wireless router SAR or phablet SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01 Section III and FCC KDB Publication 648474 D04v01r03. The distances between the transmit antennas and the edges of the device are included in the filing. When wireless router mode is enabled, U-NII-1, U-NII-2A, U-NII-2C operations are disabled.

## 1.5 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the device for this model. Therefore, all SAR tests were performed with the device which already incorporates the NFC antenna. A diagram showing the location of the NFC antenna can be found in Appendix F.

## 1.6 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v06, transmitters are considered to be operating simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds.
This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v06 4.3.2 procedures.

**Table 1-2**
**Simultaneous Transmission Scenarios**

| No. | Capable Transmit Configuration | Head | Body-Worn Accessory | Wireless Router | Phablet | Notes |
|---|---|---|---|---|---|---|
| 1 | GSM voice + 2.4 GHz WI-FI | Yes | Yes | N/A | Yes | |
| 2 | GSM voice + 5 GHz WI-FI | Yes | Yes | N/A | Yes | |
| 3 | GSM voice + 2.4 GHz Bluetooth | Yes^ | Yes | N/A | Yes | ^ Bluetooth Tethering is considered |
| 4 | GSM voice + 2.4 GHz WI-FI MIMO | Yes | Yes | N/A | Yes | |
| 5 | GSM voice + 5 GHz WI-FI MIMO | Yes | Yes | N/A | Yes | |
| 6 | GSM voice + 2.4 GHz WI-FI + 5 GHz WI-FI | Yes | Yes | N/A | Yes | |
| 7 | GSM voice + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO | Yes | Yes | N/A | Yes | |
| 8 | GSM voice + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO | Yes^ | Yes | N/A | Yes | ^ Bluetooth Tethering is considered |
| 9 | UMTS + 2.4 GHz WI-FI | Yes | Yes | Yes | Yes | |
| 10 | UMTS + 5 GHz WI-FI | Yes | Yes | Yes | Yes | |
| 11 | UMTS + 2.4 GHz Bluetooth | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 12 | UMTS + 2.4 GHz WI-FI MIMO | Yes | Yes | Yes | Yes | |
| 13 | UMTS + 5 GHz WI-FI MIMO | Yes | Yes | Yes | Yes | |
| 14 | UMTS + 2.4 GHz WI-FI + 5 GHz WI-FI | Yes | Yes | Yes | Yes | |
| 15 | UMTS + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO | Yes | Yes | Yes | Yes | |
| 16 | UMTS + 2.4 GHz Bluetooth + 5 GHZ WI-FI MIMO | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 17 | LTE + 2.4 GHz WI-FI | Yes | Yes | Yes | Yes | |
| 18 | LTE + 5 GHz WI-FI | Yes | Yes | Yes | Yes | |
| 19 | LTE + 2.4 GHz Bluetooth | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 20 | LTE + 2.4 GHz WI-FI MIMO | Yes | Yes | Yes | Yes | |
| 21 | LTE + 5 GHz WI-FI MIMO | Yes | Yes | Yes | Yes | |
| 22 | LTE + 2.4 GHz WI-FI + 5 GHz WI-FI | Yes | Yes | Yes | Yes | |
| 23 | LTE + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO | Yes | Yes | Yes | Yes | |
| 24 | LTE + 2.4 GHz Bluetooth + 5 GHZ WI-FI MIMO | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 25 | GPRS/EDGE + 2.4 GHz WI-FI | N/A | N/A | Yes | Yes | |
| 26 | GPRS/EDGE + 5 GHz WI-FI | N/A | N/A | Yes | Yes | |
| 27 | GPRS/EDGE + 2.4 GHz Bluetooth | N/A | N/A | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 28 | GPRS/EDGE + 2.4 GHz WI-FI MIMO | N/A | N/A | Yes | Yes | |
| 29 | GPRS/EDGE + 5 GHz WI-FI MIMO | N/A | N/A | Yes | Yes | |
| 30 | GPRS/EDGE + 2.4 GHz WI-FI + 5 GHz WI-FI | N/A | N/A | Yes | Yes | |
| 31 | GPRS/EDGE + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO | N/A | N/A | Yes | Yes | |
| 32 | GPRS/EDGE + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO | N/A | N/A | Yes^ | Yes | ^ Bluetooth Tethering is considered |

1. 2.4 GHz WLAN and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
2. All licensed modes share the same antenna path and cannot transmit simultaneously.
3. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
4. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
5. 5 GHz Wireless Router is only supported for the U-NII-3 by S/W, therefore U-NII-1, U-NII2A, and U-NII2C were not evaluated for wireless router conditions.
6. This device supports 2x2 MIMO Tx for WLAN 802.11a/g/n/ac/ax. 802.11a/g/n/ac/ax supports CDD and STBC and 802.11n/ac/ax additionally supports SDM. Each WLAN antenna can transmit independently or together when operating with MIMO.

7. This device supports VOLTE.
8. This device supports VoWIFI.
9. This device supports Bluetooth Tethering.

## 1.7 Miscellaneous SAR Test Considerations

**(A) WIFI/BT**

Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg, SAR is not required for U-NII-1 band according to FCC KDB Publication 248227 D01v02r02.

Since Wireless Router operations are not allowed by the chipset firmware using U-NII-1, U-NII-2A & U-NII-2C WIFI, only 2.4 GHz and U-NII-3 WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v02r01.

This device supports IEEE 802.11ax with the following features:
a) Up to 80 MHz Bandwidth only for 5 GHz
b) Up to 20 MHz Bandwidth only for 2.4 GHz
b) No aggregate channel configurations
c) 2 Tx antenna output
d) Up to 1024 QAM is supported
e) TDWR and Band gap channels are supported
f) MU-MIMO UL Operations are not supported

Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is greater than 160mm and less than 200mm. Phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg. Because wireless router operations are not supported for U-NII-1, U-NII-2A & U-NII-2C WLAN, phablet SAR tests were performed. Phablet SAR was not evaluated for 2.4 GHz and U-NII-3 WLAN operations since wireless router 1g SAR was < 1.2 W/kg.

Per FCC Guidance, SAR testing was not required for 802.11ax when applying the initial test configuration Procedures of KDB 248227, with 802.11ax considered a higher order 802.11 mode.

This device supports channel 1-13 for 2.4 GHz WLAN. However, due to the reduced output power for channels 12 and 13, channels 1, 6, and 11 were considered for SAR testing per KDB 248227 D01v02r02.

**(B) Licensed Transmitter(s)**

GSM/GPRS/EDGE DTM is not supported for US bands. Therefore, the GSM Voice modes in this report do not transmit simultaneously with GPRS/EDGE Data.

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01v03r01.

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02r04.

This device supports 64QAM on the uplink for LTE Operations. Conducted powers for 64QAM uplink configurations were measured per Section 5.1 of FCC KDB Publication 941225D05v02r05. SAR was not required for 64QAM since the highest maximum output power for 64QAM is ≤ ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45W/kg, per Section 5.2.4 of FCC KDB Publication 941225 D05v02r05.

This device supports LTE Carrier Aggregation (CA) in the downlink. All uplink communications are identical to Release 8 specifications. Per FCC KDB Publication 941225 D05A v01r02, SAR for LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive. The downlink carrier aggregation exclusion analysis can be found in Appendix H.

Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is greater than 160mm and less than 200mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg.

This device supports downlink 4x4 MIMO operations for some LTE Bands. Per May 2017 TCB Workshop Guidance, SAR for downlink 4x4 MIMO was not needed since the maximum average output power in 4x4 downlink MIMO mode was not > 0.25 dB higher than the maximum output power with downlink 4x4 MIMO inactive.

This device supports LTE capabilities with overlapping transmission frequency ranges. When the supported frequency range of an LTE Band falls completely within an LTE band with a larger transmission frequency range, both LTE bands have the same target power (or the band with the larger transmission frequency range has a higher target power), and both LTE bands share the same transmission path and signal characteristics, SAR was only assessed for the band with the larger transmission frequency range.

This device supports LTE Carrier Aggregation (CA) for LTE Band 41 with two component carriers in the uplink. SAR Measurements and conducted powers were evaluated per 2017 Fall TCB Workshop Notes.

## 1.8 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D01v03r01, D05v02r04, D05Av01r02, D06v02r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 648474 D04v01r03 (Phablet Procedures)
- FCC KDB Publication 616217 D04v01r02 (Proximity Sensor)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)
- May 2017 TCB Workshop Notes (LTE 4x4 Downlink MIMO)
- April 2018 TCB Workshop Notes (LTE Carrier Aggregation)

## 1.9 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units. The serial numbers used for each test are indicated alongside the results in Section 11.

## 2 LTE INFORMATION

| LTE Information | | | | | |
|---|---|---|---|---|---|
| Form Factor | Portable Handset | | | | |
| Frequency Range of each LTE transmission band | LTE Band 12 (699.7 - 715.3 MHz) | | | | |
| | LTE Band 13 (779.5 - 784.5 MHz) | | | | |
| | LTE Band 26 (Cell) (814.7 - 848.3 MHz) | | | | |
| | LTE Band 5 (Cell) (824.7 - 848.3 MHz) | | | | |
| | LTE Band 4 (AWS) (1710.7 - 1754.3 MHz) | | | | |
| | LTE Band 25 (PCS) (1850.7 - 1914.3 MHz) | | | | |
| | LTE Band 2 (PCS) (1850.7 - 1909.3 MHz) | | | | |
| | LTE Band 41 (2498.5 - 2687.5 MHz) | | | | |
| Channel Bandwidths | LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz | | | | |
| | LTE Band 13: 5 MHz, 10 MHz | | | | |
| | LTE Band 26 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz | | | | |
| | LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz | | | | |
| | LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz | | | | |
| | LTE Band 25 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz | | | | |
| | LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz | | | | |
| | LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz | | | | |
| Channel Numbers and Frequencies (MHz) | Low | Low-Mid | Mid | Mid-High | High |
| LTE Band 12: 1.4 MHz | 699.7 (23017) | | 707.5 (23095) | 715.3 (23173) | |
| LTE Band 12: 3 MHz | 700.5 (23025) | | 707.5 (23095) | 714.5 (23165) | |
| LTE Band 12: 5 MHz | 701.5 (23035) | | 707.5 (23095) | 713.5 (23155) | |
| LTE Band 12: 10 MHz | 704 (23060) | | 707.5 (23095) | 711 (23130) | |
| LTE Band 13: 5 MHz | 779.5 (23205) | | 782 (23230) | 784.5 (23255) | |
| LTE Band 13: 10 MHz | N/A | | 782 (23230) | N/A | |
| LTE Band 26 (Cell): 1.4 MHz | 814.7 (26697) | | 831.5 (26865) | 848.3 (27033) | |
| LTE Band 26 (Cell): 3 MHz | 815.5 (26705) | | 831.5 (26865) | 847.5 (27025) | |
| LTE Band 26 (Cell): 5 MHz | 816.5 (26715) | | 831.5 (26865) | 846.5 (27015) | |
| LTE Band 26 (Cell): 10 MHz | 819 (26740) | | 831.5 (26865) | 844 (26990) | |
| LTE Band 26 (Cell): 15 MHz | 821.5 (26765) | | 831.5 (26865) | 841.5 (26965) | |
| LTE Band 5 (Cell): 1.4 MHz | 824.7 (20407) | | 836.5 (20525) | 848.3 (20643) | |
| LTE Band 5 (Cell): 3 MHz | 825.5 (20415) | | 836.5 (20525) | 847.5 (20635) | |
| LTE Band 5 (Cell): 5 MHz | 826.5 (20425) | | 836.5 (20525) | 846.5 (20625) | |
| LTE Band 5 (Cell): 10 MHz | 829 (20450) | | 836.5 (20525) | 844 (20600) | |
| LTE Band 4 (AWS): 1.4 MHz | 1710.7 (19957) | | 1732.5 (20175) | 1754.3 (20393) | |
| LTE Band 4 (AWS): 3 MHz | 1711.5 (19965) | | 1732.5 (20175) | 1753.5 (20385) | |
| LTE Band 4 (AWS): 5 MHz | 1712.5 (19975) | | 1732.5 (20175) | 1752.5 (20375) | |
| LTE Band 4 (AWS): 10 MHz | 1715 (20000) | | 1732.5 (20175) | 1750 (20350) | |
| LTE Band 4 (AWS): 15 MHz | 1717.5 (20025) | | 1732.5 (20175) | 1747.5 (20325) | |
| LTE Band 4 (AWS): 20 MHz | 1720 (20050) | | 1732.5 (20175) | 1745 (20300) | |
| LTE Band 25 (PCS): 1.4 MHz | 1850.7 (26047) | | 1882.5 (26365) | 1914.3 (26683) | |
| LTE Band 25 (PCS): 3 MHz | 1851.5 (26055) | | 1882.5 (26365) | 1913.5 (26675) | |
| LTE Band 25 (PCS): 5 MHz | 1852.5 (26065) | | 1882.5 (26365) | 1912.5 (26665) | |
| LTE Band 25 (PCS): 10 MHz | 1855 (26090) | | 1882.5 (26365) | 1910 (26640) | |
| LTE Band 25 (PCS): 15 MHz | 1857.5 (26115) | | 1882.5 (26365) | 1907.5 (26615) | |
| LTE Band 25 (PCS): 20 MHz | 1860 (26140) | | 1882.5 (26365) | 1905 (26590) | |
| LTE Band 2 (PCS): 1.4 MHz | 1850.7 (18607) | | 1880 (18900) | 1909.3 (19193) | |
| LTE Band 2 (PCS): 3 MHz | 1851.5 (18615) | | 1880 (18900) | 1908.5 (19185) | |
| LTE Band 2 (PCS): 5 MHz | 1852.5 (18625) | | 1880 (18900) | 1907.5 (19175) | |
| LTE Band 2 (PCS): 10 MHz | 1855 (18650) | | 1880 (18900) | 1905 (19150) | |
| LTE Band 2 (PCS): 15 MHz | 1857.5 (18675) | | 1880 (18900) | 1902.5 (19125) | |
| LTE Band 2 (PCS): 20 MHz | 1860 (18700) | | 1880 (18900) | 1900 (19100) | |
| LTE Band 41: 5 MHz | 2506 (39750) | 2549.5 (40185) | 2593 (40620) | 2636.5 (41055) | 2680 (41490) |
| LTE Band 41: 10 MHz | 2506 (39750) | 2549.5 (40185) | 2593 (40620) | 2636.5 (41055) | 2680 (41490) |
| LTE Band 41: 15 MHz | 2506 (39750) | 2549.5 (40185) | 2593 (40620) | 2636.5 (41055) | 2680 (41490) |
| LTE Band 41: 20 MHz | 2506 (39750) | 2549.5 (40185) | 2593 (40620) | 2636.5 (41055) | 2680 (41490) |
| UE Category | DL UE Cat 18, UL UE Cat 13 | | | | |
| Modulations Supported in UL | QPSK, 16QAM, 64QAM | | | | |
| LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided) | YES | | | | |
| A-MPR (Additional MPR) disabled for SAR Testing? | YES | | | | |
| LTE Carrier Aggregation Possible Combinations | The technical description includes all the possible carrier aggregation combinations | | | | |
| LTE Additional Information | This device does not support full CA features on 3GPP Release 14. It supports carrier aggregation, downlink MIMO features as shown in Section 9 and Appendix H. All other uplink communications are identical to the Release 8 specifications. Uplink communications are done on the PCC unless otherwise specified. The following LTE Release 14 Features are not supported: Relay, HetNet, Enhanced eICIC, Wifi Offloading, MDH, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA. | | | | |

# 3 INTRODUCTION

The FCC and Innovation, Science, and Economic Development Canada have adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 and Health Canada Safety Code 6 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices. [1]

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [22]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

## 3.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density ($\rho$). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 3-1).

**Equation 3-1**
**SAR Mathematical Equation**

$$\boxed{SAR = \frac{d}{dt}\left(\frac{dU}{dm}\right) = \frac{d}{dt}\left(\frac{dU}{\rho dv}\right)}$$

**SAR is expressed in units of Watts per Kilogram (W/kg).**

$$SAR = \frac{\sigma \cdot E^2}{\rho}$$

where:

$\sigma$ = conductivity of the tissue-simulating material (S/m)
$\rho$ = mass density of the tissue-simulating material ($kg/m^3$)
E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relation to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

# 4 DOSIMETRIC ASSESSMENT

## 4.1 Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013:

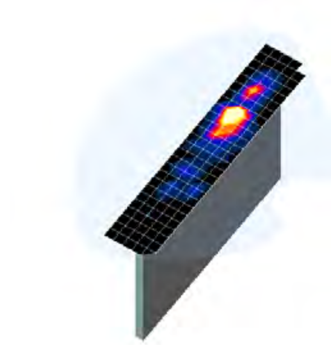


**Figure 4-1**
**Sample SAR Area Scan**

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):

   a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 4-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).

   b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

**Table 4-1**
**Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04***

| Frequency | Maximum Area Scan Resolution (mm) ($\Delta x_{area}$, $\Delta y_{area}$) | Maximum Zoom Scan Resolution (mm) ($\Delta x_{zoom}$, $\Delta y_{zoom}$) | Maximum Zoom Scan Spatial Resolution (mm) | | | Minimum Zoom Scan Volume (mm) (x,y,z) |
|---|---|---|---|---|---|---|
| | | | Uniform Grid | Graded Grid | | |
| | | | $\Delta z_{zoom}(n)$ | $\Delta z_{zoom}(1)$* | $\Delta z_{zoom}(n>1)$* | |
| ≤ 2 GHz | ≤ 15 | ≤ 8 | ≤ 5 | ≤ 4 | ≤ 1.5*$\Delta z_{zoom}(n-1)$ | ≥ 30 |
| 2-3 GHz | ≤ 12 | ≤ 5 | ≤ 5 | ≤ 4 | ≤ 1.5*$\Delta z_{zoom}(n-1)$ | ≥ 30 |
| 3-4 GHz | ≤ 12 | ≤ 5 | ≤ 4 | ≤ 3 | ≤ 1.5*$\Delta z_{zoom}(n-1)$ | ≥ 28 |
| 4-5 GHz | ≤ 10 | ≤ 4 | ≤ 3 | ≤ 2.5 | ≤ 1.5*$\Delta z_{zoom}(n-1)$ | ≥ 25 |
| 5-6 GHz | ≤ 10 | ≤ 4 | ≤ 2 | ≤ 2 | ≤ 1.5*$\Delta z_{zoom}(n-1)$ | ≥ 22 |

*Also compliant to IEEE 1528-2013 Table 6

# 5 DEFINITION OF REFERENCE POINTS

## 5.1 EAR REFERENCE POINT

Figure 5-2 shows the front, back and side views of the SAM Twin Phantom. The point "M" is the reference point for the center of the mouth, "LE" is the left ear reference point (ERP), and "RE" is the right ERP. The ERP is 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 5-1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front), also called the Reference Pivoting Line, is not perpendicular to the reference plane (see Figure 5-1). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning [5].

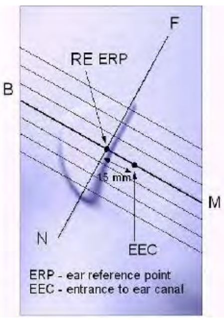



**Figure 5-1**
**Close-Up Side view of ERP**

## 5.2 HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the acoustic output located along the "vertical centerline" on the front of the device aligned to the "ear reference point" (See Figure 5-3). The acoustic output was than located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at its top and bottom edges, positioning the "ear reference point" on the outer surface of the both the left and right head phantoms on the ear reference point.


**Figure 5-2**
**Front, back and side view of SAM Twin Phantom**

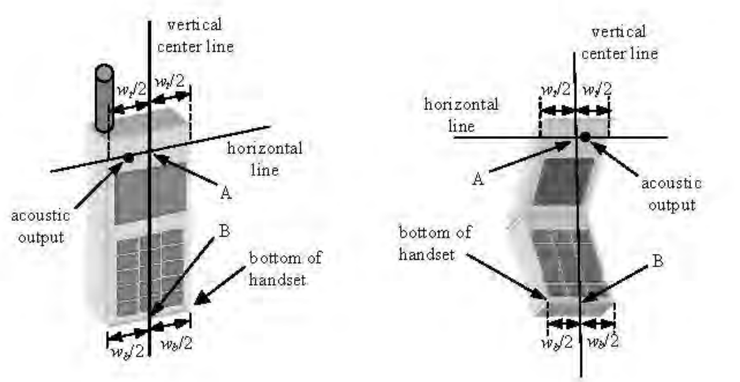



**Figure 5-3**
**Handset Vertical Center & Horizontal Line Reference Points**

# 6 TEST CONFIGURATION POSITIONS

## 6.1 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02.

## 6.2 Positioning for Cheek

1. The test device was positioned with the device close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 6-1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.


**Figure 6-1 Front, Side and Top View of Cheek Position**

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the pinna.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the reference plane.
4. The phone was then rotated around the vertical centerline until the phone (horizontal line) was symmetrical was respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the device contact with the ear, the device was rotated about the NF line until any point on the handset made contact with a phantom point below the ear (cheek) (See Figure 6-2).

## 6.3 Positioning for Ear / 15º Tilt

With the test device aligned in the “Cheek Position”:

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15degrees.
2. The phone was then rotated around the horizontal line by 15 degrees.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the handset touched the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. In this situation, the tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Figure 6-2).

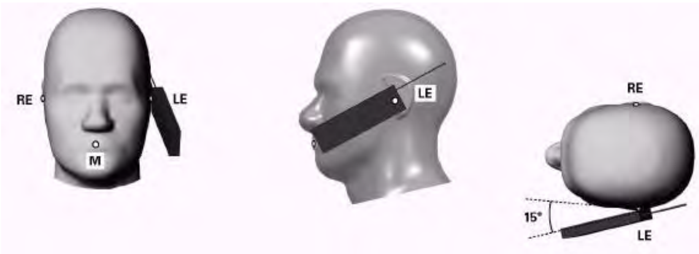



**Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position**

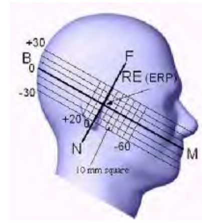



**Figure 6-3**
**Side view w/ relevant markings**

## 6.4 SAR Evaluations near the Mouth/Jaw Regions of the SAM Phantom

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones. Per IEEE 1528-2013, a rotated SAM phantom is necessary to allow probe access to such regions. Both SAM heads of the TwinSAM-Chin20 are rotated 20 degrees around the NF line. Each head can be removed from the table for emptying and cleaning.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04v01r03. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of 4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR location identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

## 6.5 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6-4). Per FCC KDB Publication 648474 D04v01r03, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

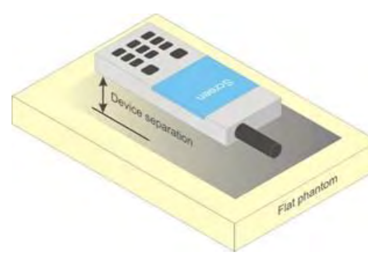



**Figure 6-4**
**Sample Body-Worn Diagram**

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented.
Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

## 6.6 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1g body and 10g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01v06 should be applied to determine SAR test requirements.

Per KDB Publication 447498 D01v06, Cell phones (handsets) are not normally designed to be used on extremities or operated in extremity only exposure conditions. The maximum output power levels of handsets generally do not require extremity SAR testing to show compliance. Therefore, extremity SAR was not evaluated for this device.

## 6.7 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06v02r01 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v06 procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

## 6.8 Phablet Configurations

For smart phones with a display diagonal dimension > 150 mm or an overall diagonal dimension > 160 mm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, the phablets procedures outlined in KDB Publication 648474 D04v01r03 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worn accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna <=25 mm from that surface or edge, in direct contact with the phantom, for 10g SAR. The UMPC mini-tablet 1g SAR at 5 mm is not required. When hotspot mode applies, 10g SAR is required only for the surfaces and edges with hotspot mode 1g SAR > 1.2 W/kg.

## 6.9 Proximity Sensor Considerations

This device uses a power reduction mechanism to reduce output powers in certain use conditions when the device is used close the user's body.

When the device's antenna is within a certain distance of the user, the sensor activates and reduces the maximum allowed output power. However, the sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, additional evaluation is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a non-reduced output power level. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional test positions. Sensor triggering distance summary data is included in Appendix G.

The sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the sensor entirely covers the antennas.

# 7 RF EXPOSURE LIMITS

## 7.1 Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

## 7.2 Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

**Table 7-1**
**SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6**

| HUMAN EXPOSURE LIMITS | | |
|---|---|---|
| | UNCONTROLLED ENVIRONMENT *General Population* (W/kg) or (mW/g) | CONTROLLED ENVIRONMENT *Occupational* (W/kg) or (mW/g) |
| **Peak Spatial Average SAR** Head | 1.6 | 8.0 |
| **Whole Body SAR** | 0.08 | 0.4 |
| **Peak Spatial Average SAR** Hands, Feet, Ankle, Wrists, etc. | 4.0 | 20 |

1. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The Spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

# 8 FCC MEASUREMENT PROCEDURES

Power measurements for licensed transmitters are performed using a base station simulator under digital average power.

## 8.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v06, when SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as *reported* SAR. The highest *reported* SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

## 8.2 3G SAR Test Reduction Procedure

In FCC KDB Publication 941225 D01v03r01, certain transmission modes within a frequency band and wireless mode evaluated for SAR are defined as primary modes. The equivalent modes considered for SAR test reduction are denoted as secondary modes. When the maximum output power including tune-up tolerance specified for production units in a secondary mode is ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is ≤ 1.2 W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

## 8.3 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01v03r01 "3G SAR Measurement Procedures."

The device is placed into a simulated call using a base station simulator in a RF shielded chamber. Establishing connections in this manner ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. Devices under test are evaluated prior to testing, with a fully charged battery and were configured to operate at maximum output power. In order to verify that the device is tested throughout the SAR test at maximum output power, the SAR measurement system measures a "point SAR" at an arbitrary reference point at the start and end of the 1 gram SAR evaluation, to assess for any power drifts during the evaluation. If the power drift deviates by more than 5%, the SAR test and drift measurements are repeated.

## 8.4 SAR Measurement Conditions for UMTS

### 8.4.1 Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC with TPC (transmit power control) set to all "1s" or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HS-DPCCH etc) are tabulated in this test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations are identified.

### 8.4.2 Head SAR Measurements

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

### 8.4.3 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all "1s". The 3G SAR test reduction procedure is applied to other spreading codes and multiple $DPDCH_n$ configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreading code or $DPDCH_n$, for the highest reported SAR configuration in 12.2 kbps RMC.

### 8.4.4 SAR Measurements with Rel 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, for the highest reported SAR configuration in 12.2 kbps RMC without HSDPA. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

### 8.4.5 SAR Measurements with Rel 6 HSUPA

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA.

When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing.

### 8.4.6 SAR Measurement Conditions for DC-HSDPA

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

## 8.5 SAR Measurement Conditions for LTE

LTE modes are tested according to FCC KDB 941225 D05v02r04 publication. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 or Anritsu MT8820C simulators are used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

### 8.5.1 Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

### 8.5.2 MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

### 8.5.3 A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

### 8.5.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r04:

a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
    i. The required channel and offset combination with the highest maximum output power is required for SAR.
    ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
    iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg.

### 8.5.5 TDD

LTE TDD testing is performed using the SAR test guidance provided in FCC KDB 941225 D05v02r04. TDD is tested at the highest duty factor using UL-DL configuration 0 with special subframe configuration 6 and applying the FDD LTE procedures in KDB 941225 D05v02r04. SAR testing is performed using the extended cyclic prefix listed in 3GPP TS 36.211 Section 4.

### 8.5.6 Downlink Only Carrier Aggregation

Conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in accordance to KDB Publication 941225 D05Av01r02. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. Additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band. Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for downlink only carrier aggregation configurations when the average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive.

## 8.6 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v02r02 for more details.

### 8.6.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters.

A periodic duty factor is required for current generation SAR systems to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

### 8.6.2 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

### 8.6.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification. Unless band gap channels are permanently disabled, SAR must be considered for these channels. Each band is tested independently according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

### 8.6.4 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

### 8.6.5 2.4 GHz SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either the fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11 g/n/ax OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is > 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

### 8.6.6 OFDM Transmission Mode and SAR Test Channel Selection

When the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. Per FCC Guidance, 802.11ax was considered a higher order 802.11 mode when compared to a/b/g/n/ac to apply KDB Publication 248227 Guidance. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

### 8.6.7 Initial Test Configuration Procedure

For OFDM, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order IEEE 802.11 mode. The channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements (See Section 8.6.6). When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

### 8.6.8 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg, no additional SAR tests for the subsequent test configurations are required. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

### 8.6.9 MIMO SAR considerations

Per KDB Publication 248227 D01v02r02, the simultaneous SAR provisions in KDB Publication 447498 D01v06 should be applied to determine simultaneous transmission SAR test exclusion for WIFI MIMO. If the sum of 1g single transmission chain SAR measurements is <1.6 W/kg, no additional SAR measurements for MIMO are required. Alternatively, SAR for MIMO can be measured with all antennas transmitting simultaneously at the specified maximum output power of MIMO operation. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

# 9 RF CONDUCTED POWERS

## 9.1 GSM Conducted Powers

**Table 9-1**
**Maximum Conducted Powers**

| Maximum Burst-Averaged Output Power | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Voice* | *GPRS/EDGE Data (GMSK)* | | | | *EDGE Data (8-PSK)* | | | |
| Band | Channel | GSM [dBm] CS (1 Slot) | GPRS [dBm] 1 Tx Slot | GPRS [dBm] 2 Tx Slot | GPRS [dBm] 3 Tx Slot | GPRS [dBm] 4 Tx Slot | EDGE [dBm] 1 Tx Slot | EDGE [dBm] 2 Tx Slot | EDGE [dBm] 3 Tx Slot | EDGE [dBm] 4 Tx Slot |
| GSM 850 | 128 | 32.33 | 32.72 | 31.52 | **29.25** | 27.44 | 26.52 | 24.91 | 23.05 | 21.66 |
| | 190 | 32.30 | 32.34 | 31.46 | **29.51** | 27.28 | 26.36 | 24.89 | 22.77 | 21.54 |
| | 251 | 32.21 | 32.44 | 31.31 | **29.21** | 27.18 | 26.44 | 24.98 | 22.87 | 21.73 |
| GSM 1900 | 512 | 28.98 | 28.87 | 28.39 | **26.25** | 24.13 | 25.26 | 23.57 | 21.42 | 20.57 |
| | 661 | 29.43 | 29.31 | 28.59 | **26.55** | 23.85 | 25.51 | 23.95 | 21.84 | 20.89 |
| | 810 | 28.96 | 28.74 | 28.27 | **26.24** | 24.05 | 25.15 | 23.47 | 21.56 | 20.19 |
| **Calculated Maximum Frame-Averaged Output Power** | | | | | | | | | | |
| | | *Voice* | *GPRS/EDGE Data (GMSK)* | | | | *EDGE Data (8-PSK)* | | | |
| Band | Channel | GSM [dBm] CS (1 Slot) | GPRS [dBm] 1 Tx Slot | GPRS [dBm] 2 Tx Slot | GPRS [dBm] 3 Tx Slot | GPRS [dBm] 4 Tx Slot | EDGE [dBm] 1 Tx Slot | EDGE [dBm] 2 Tx Slot | EDGE [dBm] 3 Tx Slot | EDGE [dBm] 4 Tx Slot |
| GSM 850 | 128 | 23.30 | 23.69 | 25.50 | **24.99** | 24.43 | 17.49 | 18.89 | 18.79 | 18.65 |
| | 190 | 23.27 | 23.31 | 25.44 | **25.25** | 24.27 | 17.33 | 18.87 | 18.51 | 18.53 |
| | 251 | 23.18 | 23.41 | 25.29 | **24.95** | 24.17 | 17.41 | 18.96 | 18.61 | 18.72 |
| GSM 1900 | 512 | 19.95 | 19.84 | 22.37 | **21.99** | 21.12 | 16.23 | 17.55 | 17.16 | 17.56 |
| | 661 | 20.40 | 20.28 | 22.57 | **22.29** | 20.84 | 16.48 | 17.93 | 17.58 | 17.88 |
| | 810 | 19.93 | 19.71 | 22.25 | **21.98** | 21.04 | 16.12 | 17.45 | 17.30 | 17.18 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| GSM 850 | Frame Avg.Targets: | 23.47 | 23.47 | 25.48 | **25.24** | 24.49 | 17.97 | 18.98 | 18.74 | 18.99 |
| GSM 1900 | | 20.47 | 20.47 | 22.48 | **22.24** | 21.49 | 16.97 | 17.98 | 17.74 | 17.99 |

**Table 9-2**
**Reduced Conducted Powers- Hotspot/Grip Sensor Active**

| Maximum Burst-Averaged Output Power | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Voice* | *GPRS/EDGE Data (GMSK)* | | | | *EDGE Data (8-PSK)* | | | |
| **Band** | **Channel** | **GSM [dBm] CS (1 Slot)** | **GPRS [dBm] 1 Tx Slot** | **GPRS [dBm] 2 Tx Slot** | **GPRS [dBm] 3 Tx Slot** | **GPRS [dBm] 4 Tx Slot** | **EDGE [dBm] 1 Tx Slot** | **EDGE [dBm] 2 Tx Slot** | **EDGE [dBm] 3 Tx Slot** | **EDGE [dBm] 4 Tx Slot** |
| **GSM 1900** | 512 | 28.20 | 28.27 | 27.25 | **24.96** | 23.16 | 26.31 | 24.78 | 22.33 | 21.26 |
| | 661 | 28.49 | 28.38 | 27.35 | **25.09** | 23.13 | 26.27 | 24.92 | 22.47 | 21.56 |
| | 810 | 27.94 | 28.00 | 26.84 | **24.63** | 22.55 | 26.06 | 24.38 | 21.95 | 20.63 |
| **Calculated Maximum Frame-Averaged Output Power** | | | | | | | | | | |
| | | *Voice* | *GPRS/EDGE Data (GMSK)* | | | | *EDGE Data (8-PSK)* | | | |
| **Band** | **Channel** | **GSM [dBm] CS (1 Slot)** | **GPRS [dBm] 1 Tx Slot** | **GPRS [dBm] 2 Tx Slot** | **GPRS [dBm] 3 Tx Slot** | **GPRS [dBm] 4 Tx Slot** | **EDGE [dBm] 1 Tx Slot** | **EDGE [dBm] 2 Tx Slot** | **EDGE [dBm] 3 Tx Slot** | **EDGE [dBm] 4 Tx Slot** |
| **GSM 1900** | 512 | 19.17 | 19.24 | 21.23 | **20.70** | 20.15 | 17.28 | 18.76 | 18.07 | 18.25 |
| | 661 | 19.46 | 19.35 | 21.33 | **20.83** | 20.12 | 17.24 | 18.90 | 18.21 | 18.55 |
| | 810 | 18.91 | 18.97 | 20.82 | **20.37** | 19.54 | 17.03 | 18.36 | 17.69 | 17.62 |
| **GSM 1900** | **Frame Avg.Targets:** | 18.47 | 18.47 | 20.48 | **20.24** | 19.49 | 16.97 | 17.98 | 17.74 | 17.99 |

Note:
1. Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
2. GPRS/EDGE (GMSK) output powers were measured with coding scheme setting of 1 (CS1) on the base station simulator. CS1 was configured to measure GPRS output power measurements and SAR to ensure GMSK modulation in the signal. Our Investigation has shown that CS1 - CS4 settings do not have any impact on the output levels or modulation in the GPRS modes.
3. EDGE (8-PSK) output powers were measured with MCS7 on the base station simulator. MCS7 coding scheme was used to measure the output powers for EDGE since investigation has shown that choosing MCS7 coding scheme will ensure 8-PSK modulation. It has been shown that MCS levels that produce 8PSK modulation do not have an impact on output power.

**GSM Class:** B
**GPRS Multislot class:** 33 (Max 4 Tx uplink slots)
**EDGE Multislot class:** 33 (Max 4 Tx uplink slots)
**DTM Multislot Class:** N/A

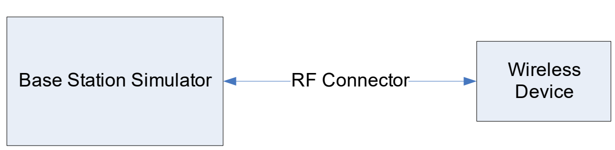



**Figure 9-1**
**Power Measurement Setup**

## 9.2 UMTS Conducted Powers

**Table 9-3**
**Maximum Conducted Powers**

| 3GPP Release Version | Mode | 3GPP 34.121 Subtest | Cellular Band [dBm] | | | PCS Band [dBm] | | | 3GPP MPR [dB] |
|---|---|---|---|---|---|---|---|---|---|
| | | | 4132 | 4183 | 4233 | 9262 | 9400 | 9538 | |
| 99 | WCDMA | 12.2 kbps RMC | 24.22 | 24.19 | 24.18 | 22.83 | 23.05 | 22.76 | - |
| 99 | | 12.2 kbps AMR | 24.32 | 24.27 | 24.25 | 22.88 | 23.14 | 22.81 | - |
| 6 | HSDPA | Subtest 1 | 23.21 | 23.16 | 23.23 | 22.00 | 22.18 | 21.87 | 0 |
| 6 | | Subtest 2 | 23.22 | 23.20 | 23.23 | 21.93 | 22.13 | 21.83 | 0 |
| 6 | | Subtest 3 | 22.74 | 22.69 | 22.72 | 21.49 | 21.68 | 21.35 | 0.5 |
| 6 | | Subtest 4 | 22.73 | 22.67 | 22.70 | 21.51 | 21.67 | 21.35 | 0.5 |
| 6 | HSUPA | Subtest 1 | 23.22 | 23.23 | 23.20 | 22.02 | 22.20 | 21.91 | 0 |
| 6 | | Subtest 2 | 21.20 | 21.20 | 21.20 | 20.07 | 20.15 | 19.85 | 2 |
| 6 | | Subtest 3 | 22.21 | 22.17 | 22.17 | 21.03 | 21.01 | 20.78 | 1 |
| 6 | | Subtest 4 | 21.19 | 21.18 | 21.21 | 19.98 | 20.04 | 19.86 | 2 |
| 6 | | Subtest 5 | 23.20 | 23.23 | 23.20 | 22.08 | 22.23 | 21.90 | 0 |
| 8 | DC-HSDPA | Subtest 1 | 23.17 | 23.17 | 23.20 | 22.00 | 22.14 | 21.86 | 0 |
| 8 | | Subtest 2 | 23.19 | 23.18 | 23.15 | 21.96 | 22.16 | 21.82 | 0 |
| 8 | | Subtest 3 | 22.70 | 22.71 | 22.70 | 21.49 | 21.66 | 21.33 | 0.5 |
| 8 | | Subtest 4 | 22.65 | 22.70 | 22.68 | 21.49 | 21.65 | 21.35 | 0.5 |

**Table 9-4**
**Reduced Conducted Powers- Hotspot Mode Active**

| 3GPP Release Version | Mode | 3GPP 34.121 Subtest | PCS Band [dBm] | | | 3GPP MPR [dB] |
|---|---|---|---|---|---|---|
| | | | 9262 | 9400 | 9538 | |
| 99 | WCDMA | 12.2 kbps RMC | 19.44 | 19.58 | 19.37 | - |
| 99 | | 12.2 kbps AMR | 19.47 | 19.59 | 19.19 | - |
| 6 | HSDPA | Subtest 1 | 19.00 | 19.15 | 18.89 | 0 |
| 6 | | Subtest 2 | 18.95 | 19.14 | 18.82 | 0 |
| 6 | | Subtest 3 | 18.50 | 18.65 | 18.30 | 0.5 |
| 6 | | Subtest 4 | 18.48 | 18.64 | 18.30 | 0.5 |
| 6 | HSUPA | Subtest 1 | 19.00 | 19.21 | 18.87 | 0 |
| 6 | | Subtest 2 | 16.94 | 17.13 | 16.83 | 2 |
| 6 | | Subtest 3 | 17.96 | 18.15 | 17.88 | 1 |
| 6 | | Subtest 4 | 17.00 | 17.15 | 16.82 | 2 |
| 6 | | Subtest 5 | 19.05 | 19.25 | 18.91 | 0 |
| 8 | DC-HSDPA | Subtest 1 | 19.00 | 19.15 | 18.82 | 0 |
| 8 | | Subtest 2 | 18.91 | 19.17 | 18.82 | 0 |
| 8 | | Subtest 3 | 18.50 | 18.62 | 18.32 | 0.5 |
| 8 | | Subtest 4 | 18.48 | 18.67 | 18.30 | 0.5 |

**Table 9-5**
**Reduced Conducted Powers- Grip Sensor Active**

| 3GPP Release Version | Mode | 3GPP 34.121 Subtest | PCS Band [dBm] | | | 3GPP MPR [dB] |
|---|---|---|---|---|---|---|
| | | | 9262 | 9400 | 9538 | |
| 99 | WCDMA | 12.2 kbps RMC | 20.86 | 20.97 | 20.56 | - |
| 99 | | 12.2 kbps AMR | 20.86 | 20.99 | 20.59 | - |
| 6 | HSDPA | Subtest 1 | 19.82 | 19.95 | 19.64 | 0 |
| 6 | | Subtest 2 | 19.77 | 19.97 | 19.60 | 0 |
| 6 | | Subtest 3 | 19.28 | 19.44 | 19.05 | 0.5 |
| 6 | | Subtest 4 | 19.28 | 19.47 | 19.11 | 0.5 |
| 6 | HSUPA | Subtest 1 | 19.90 | 19.99 | 19.66 | 0 |
| 6 | | Subtest 2 | 17.76 | 17.88 | 17.66 | 2 |
| 6 | | Subtest 3 | 18.76 | 18.96 | 18.66 | 1 |
| 6 | | Subtest 4 | 17.76 | 17.95 | 17.62 | 2 |
| 6 | | Subtest 5 | 19.83 | 20.00 | 19.72 | 0 |
| 8 | DC-HSDPA | Subtest 1 | 19.77 | 19.98 | 19.63 | 0 |
| 8 | | Subtest 2 | 19.72 | 19.98 | 19.65 | 0 |
| 8 | | Subtest 3 | 19.29 | 19.48 | 19.12 | 0.5 |
| 8 | | Subtest 4 | 19.30 | 19.47 | 19.12 | 0.5 |

DC-HSDPA considerations

- 3GPP Specification 34.121-1 Release 8 Ver 8.10.0 was used for DC-HSDPA guidance
- H-Set 12 (QPSK) was confirmed to be used during DC-HSDPA measurements
- The DUT supports UE category 24 for HSDPA

It is expected by the manufacturer that MPR for some HSPA subtests may be up to 2 dB more than specified by 3GPP, but also as low as 0 dB according to the chipset implementation in this model.

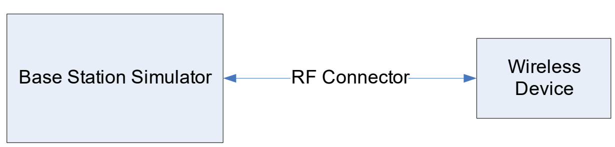



**Figure 9-2**
**Power Measurement Setup**

## 9.3 LTE Conducted Powers

### 9.3.1 LTE Band 12

**Table 9-6**
**LTE Band 12 Conducted Powers – 10 MHz Bandwidth**

| LTE Band 12 10 MHz Bandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel 23095 (707.5 MHz) Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
| QPSK | 1 | 0 | **24.36** | 0 | 0 |
| | 1 | 25 | 23.95 | | 0 |
| | 1 | 49 | 24.23 | | 0 |
| | 25 | 0 | **23.43** | 0-1 | 1 |
| | 25 | 12 | 23.40 | | 1 |
| | 25 | 25 | 23.29 | | 1 |
| | 50 | 0 | 23.38 | | 1 |
| 16QAM | 1 | 0 | 23.63 | 0-1 | 1 |
| | 1 | 25 | 23.16 | | 1 |
| | 1 | 49 | 23.44 | | 1 |
| | 25 | 0 | 22.45 | 0-2 | 2 |
| | 25 | 12 | 22.36 | | 2 |
| | 25 | 25 | 22.27 | | 2 |
| | 50 | 0 | 22.34 | | 2 |
| 64QAM | 1 | 0 | 22.57 | 0-2 | 2 |
| | 1 | 25 | 22.13 | | 2 |
| | 1 | 49 | 22.46 | | 2 |
| | 25 | 0 | 21.39 | 0-3 | 3 |
| | 25 | 12 | 21.35 | | 3 |
| | 25 | 25 | 21.23 | | 3 |
| | 50 | 0 | 21.35 | | 3 |

Note: LTE Band 12 at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

**Table 9-7**
**LTE Band 12 Conducted Powers – 5 MHz Bandwidth**

| LTE Band 12 5 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 23035 (701.5 MHz) | Mid Channel 23095 (707.5 MHz) | High Channel 23155 (713.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 24.32 | 24.11 | 24.23 | 0 | 0 |
| | 1 | 12 | 24.42 | 24.16 | 24.27 | | 0 |
| | 1 | 24 | 24.35 | 24.18 | 24.32 | | 0 |
| | 12 | 0 | 23.40 | 23.32 | 23.34 | 0-1 | 1 |
| | 12 | 6 | 23.47 | 23.38 | 23.41 | | 1 |
| | 12 | 13 | 23.43 | 23.37 | 23.44 | | 1 |
| | 25 | 0 | 23.43 | 23.38 | 23.42 | | 1 |
| 16QAM | 1 | 0 | 23.73 | 23.52 | 23.61 | 0-1 | 1 |
| | 1 | 12 | 23.79 | 23.72 | 23.71 | | 1 |
| | 1 | 24 | 23.80 | 23.63 | 23.70 | | 1 |
| | 12 | 0 | 22.39 | 22.33 | 22.37 | 0-2 | 2 |
| | 12 | 6 | 22.48 | 22.44 | 22.41 | | 2 |
| | 12 | 13 | 22.45 | 22.40 | 22.46 | | 2 |
| | 25 | 0 | 22.42 | 22.40 | 22.46 | | 2 |
| 64QAM | 1 | 0 | 22.14 | 22.52 | 22.69 | 0-2 | 2 |
| | 1 | 12 | 22.37 | 22.37 | 22.42 | | 2 |
| | 1 | 24 | 22.56 | 22.24 | 22.54 | | 2 |
| | 12 | 0 | 21.46 | 21.31 | 21.43 | 0-3 | 3 |
| | 12 | 6 | 21.42 | 21.37 | 21.41 | | 3 |
| | 12 | 13 | 21.35 | 21.40 | 21.28 | | 3 |
| | 25 | 0 | 21.40 | 21.34 | 21.44 | | 3 |

## Table 9-8
## LTE Band 12 Conducted Powers – 3 MHz Bandwidth

| LTE Band 12<br>3 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Mid Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 23025<br>(700.5 MHz) | 23095<br>(707.5 MHz) | 23165<br>(714.5 MHz) | | |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 24.21 | 24.19 | 24.12 | 0 | 0 |
| | 1 | 7 | 24.28 | 24.25 | 24.20 | | 0 |
| | 1 | 14 | 24.26 | 24.19 | 24.23 | | 0 |
| | 8 | 0 | 23.31 | 23.31 | 23.31 | 0-1 | 1 |
| | 8 | 4 | 23.41 | 23.40 | 23.42 | | 1 |
| | 8 | 7 | 23.40 | 23.36 | 23.38 | | 1 |
| | 15 | 0 | 23.38 | 23.37 | 23.35 | | 1 |
| 16QAM | 1 | 0 | 23.38 | 23.57 | 23.48 | 0-1 | 1 |
| | 1 | 7 | 23.44 | 23.63 | 23.45 | | 1 |
| | 1 | 14 | 23.39 | 23.61 | 23.51 | | 1 |
| | 8 | 0 | 22.21 | 22.30 | 22.39 | 0-2 | 2 |
| | 8 | 4 | 22.32 | 22.32 | 22.48 | | 2 |
| | 8 | 7 | 22.29 | 22.34 | 22.43 | | 2 |
| | 15 | 0 | 22.37 | 22.40 | 22.27 | | 2 |
| 64QAM | 1 | 0 | 22.52 | 22.59 | 22.66 | 0-2 | 2 |
| | 1 | 7 | 22.81 | 22.54 | 22.66 | | 2 |
| | 1 | 14 | 22.50 | 22.81 | 22.56 | | 2 |
| | 8 | 0 | 21.33 | 21.34 | 21.29 | 0-3 | 3 |
| | 8 | 4 | 21.34 | 21.30 | 21.52 | | 3 |
| | 8 | 7 | 21.38 | 21.42 | 21.38 | | 3 |
| | 15 | 0 | 21.48 | 21.25 | 21.42 | | 3 |

## Table 9-9
## LTE Band 12 Conducted Powers – 1.4 MHz Bandwidth

| LTE Band 12<br>1.4 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Mid Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 23017<br>(699.7 MHz) | 23095<br>(707.5 MHz) | 23173<br>(715.3 MHz) | | |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 24.17 | 24.26 | 24.06 | 0 | 0 |
| | 1 | 2 | 24.26 | 24.40 | 24.18 | | 0 |
| | 1 | 5 | 24.21 | 24.29 | 24.16 | | 0 |
| | 3 | 0 | 24.16 | 24.15 | 24.17 | | 0 |
| | 3 | 2 | 24.30 | 24.29 | 24.28 | | 0 |
| | 3 | 3 | 24.26 | 24.24 | 24.23 | | 0 |
| | 6 | 0 | 23.32 | 23.25 | 23.31 | 0-1 | 1 |
| 16QAM | 1 | 0 | 23.25 | 23.13 | 23.37 | 0-1 | 1 |
| | 1 | 2 | 23.40 | 23.28 | 23.49 | | 1 |
| | 1 | 5 | 23.33 | 23.19 | 23.42 | | 1 |
| | 3 | 0 | 23.42 | 23.22 | 23.09 | | 1 |
| | 3 | 2 | 23.45 | 23.28 | 23.27 | | 1 |
| | 3 | 3 | 23.37 | 23.22 | 23.23 | | 1 |
| | 6 | 0 | 22.32 | 22.37 | 22.28 | 0-2 | 2 |
| 64QAM | 1 | 0 | 22.36 | 22.33 | 22.44 | 0-2 | 2 |
| | 1 | 2 | 22.48 | 22.45 | 22.49 | | 2 |
| | 1 | 5 | 22.52 | 22.45 | 22.56 | | 2 |
| | 3 | 0 | 22.39 | 22.37 | 22.36 | | 2 |
| | 3 | 2 | 22.48 | 22.46 | 22.50 | | 2 |
| | 3 | 3 | 22.39 | 22.34 | 22.51 | | 2 |
| | 6 | 0 | 21.35 | 21.24 | 21.43 | 0-3 | 3 |

### 9.3.2 LTE Band 13

**Table 9-10**
**LTE Band 13 Conducted Powers – 10 MHz Bandwidth**

| LTE Band 13<br>10 MHz Bandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel<br>23230<br>(782.0 MHz)<br>Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
| QPSK | 1 | 0 | **24.22** | 0 | 0 |
| | 1 | 25 | 23.77 | | 0 |
| | 1 | 49 | 24.02 | | 0 |
| | 25 | 0 | **23.31** | 0-1 | 1 |
| | 25 | 12 | 23.24 | | 1 |
| | 25 | 25 | 23.12 | | 1 |
| | 50 | 0 | 23.25 | | 1 |
| 16QAM | 1 | 0 | 23.50 | 0-1 | 1 |
| | 1 | 25 | 23.01 | | 1 |
| | 1 | 49 | 23.21 | | 1 |
| | 25 | 0 | 22.27 | 0-2 | 2 |
| | 25 | 12 | 22.28 | | 2 |
| | 25 | 25 | 22.12 | | 2 |
| | 50 | 0 | 22.17 | | 2 |
| 64QAM | 1 | 0 | 22.41 | 0-2 | 2 |
| | 1 | 25 | 22.01 | | 2 |
| | 1 | 49 | 22.18 | | 2 |
| | 25 | 0 | 21.28 | 0-3 | 3 |
| | 25 | 12 | 21.25 | | 3 |
| | 25 | 25 | 21.13 | | 3 |
| | 50 | 0 | 21.21 | | 3 |

**Table 9-11**
**LTE Band 13 Conducted Powers – 5 MHz Bandwidth**

| LTE Band 13 5 MHz Bandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel 23230 (782.0 MHz) Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
| QPSK | 1 | 0 | 24.04 | 0 | 0 |
| | 1 | 12 | 24.13 | | 0 |
| | 1 | 24 | 24.12 | | 0 |
| | 12 | 0 | 23.28 | 0-1 | 1 |
| | 12 | 6 | 23.30 | | 1 |
| | 12 | 13 | 23.30 | | 1 |
| | 25 | 0 | 23.32 | | 1 |
| 16QAM | 1 | 0 | 23.51 | 0-1 | 1 |
| | 1 | 12 | 23.62 | | 1 |
| | 1 | 24 | 23.61 | | 1 |
| | 12 | 0 | 22.31 | 0-2 | 2 |
| | 12 | 6 | 22.32 | | 2 |
| | 12 | 13 | 22.35 | | 2 |
| | 25 | 0 | 22.26 | | 2 |
| 64QAM | 1 | 0 | 22.44 | 0-2 | 2 |
| | 1 | 12 | 22.47 | | 2 |
| | 1 | 24 | 22.54 | | 2 |
| | 12 | 0 | 21.29 | 0-3 | 3 |
| | 12 | 6 | 21.33 | | 3 |
| | 12 | 13 | 21.30 | | 3 |
| | 25 | 0 | 21.26 | | 3 |

Note: LTE Band 13 at 5 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

### 9.3.3 LTE Band 26 (Cell)

**Table 9-12**
**LTE Band 26 (Cell) Conducted Powers – 15 MHz Bandwidth**

| LTE Band 26 (Cell) 15 MHz Bandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel 26865 (831.5 MHz) Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
| QPSK | 1 | 0 | **24.53** | 0 | 0 |
| | 1 | 36 | 24.36 | | 0 |
| | 1 | 74 | 24.34 | | 0 |
| | 36 | 0 | **23.63** | 0-1 | 1 |
| | 36 | 18 | 23.49 | | 1 |
| | 36 | 37 | 23.48 | | 1 |
| | 75 | 0 | 23.54 | | 1 |
| 16QAM | 1 | 0 | 23.87 | 0-1 | 1 |
| | 1 | 36 | 23.74 | | 1 |
| | 1 | 74 | 23.72 | | 1 |
| | 36 | 0 | 22.62 | 0-2 | 2 |
| | 36 | 18 | 22.56 | | 2 |
| | 36 | 37 | 22.47 | | 2 |
| | 75 | 0 | 22.57 | | 2 |
| 64QAM | 1 | 0 | 22.86 | 0-2 | 2 |
| | 1 | 36 | 22.70 | | 2 |
| | 1 | 74 | 22.64 | | 2 |
| | 36 | 0 | 21.66 | 0-3 | 3 |
| | 36 | 18 | 21.60 | | 3 |
| | 36 | 37 | 21.50 | | 3 |
| | 75 | 0 | 21.57 | | 3 |

Note: LTE Band 26 (Cell) at 15 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

**Table 9-13**
**LTE Band 26 (Cell) Conducted Powers – 10 MHz Bandwidth**

| LTE Band 26 (Cell) 10 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26740 (819.0 MHz) | Mid Channel 26865 (831.5 MHz) | High Channel 26990 (844.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 24.71 | 24.46 | 24.29 | 0 | 0 |
| | 1 | 25 | 24.21 | 24.00 | 24.01 | | 0 |
| | 1 | 49 | 24.34 | 24.18 | 24.14 | | 0 |
| | 25 | 0 | 23.64 | 23.56 | 23.47 | 0-1 | 1 |
| | 25 | 12 | 23.56 | 23.42 | 23.40 | | 1 |
| | 25 | 25 | 23.54 | 23.38 | 23.30 | | 1 |
| | 50 | 0 | 23.57 | 23.44 | 23.40 | | 1 |
| 16QAM | 1 | 0 | 23.78 | 23.93 | 23.71 | 0-1 | 1 |
| | 1 | 25 | 23.79 | 23.81 | 23.37 | | 1 |
| | 1 | 49 | 23.64 | 23.83 | 23.37 | | 1 |
| | 25 | 0 | 22.67 | 22.49 | 22.45 | 0-2 | 2 |
| | 25 | 12 | 22.56 | 22.48 | 22.43 | | 2 |
| | 25 | 25 | 22.54 | 22.34 | 22.34 | | 2 |
| | 50 | 0 | 22.57 | 22.43 | 22.39 | | 2 |
| 64QAM | 1 | 0 | 22.48 | 22.75 | 22.78 | 0-2 | 2 |
| | 1 | 25 | 21.92 | 22.59 | 22.39 | | 2 |
| | 1 | 49 | 22.23 | 22.53 | 22.64 | | 2 |
| | 25 | 0 | 21.64 | 21.34 | 21.56 | 0-3 | 3 |
| | 25 | 12 | 21.63 | 21.48 | 21.46 | | 3 |
| | 25 | 25 | 21.58 | 21.42 | 21.37 | | 3 |
| | 50 | 0 | 21.58 | 21.60 | 21.45 | | 3 |

## Table 9-14
## LTE Band 26 (Cell) Conducted Powers – 5 MHz Bandwidth

| LTE Band 26 (Cell) 5 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26715 (816.5 MHz) | Mid Channel 26865 (831.5 MHz) | High Channel 27015 (846.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 24.46 | 24.33 | 24.27 | 0 | 0 |
| | 1 | 12 | 24.50 | 24.38 | 24.23 | | 0 |
| | 1 | 24 | 24.41 | 24.37 | 24.24 | | 0 |
| | 12 | 0 | 23.61 | 23.50 | 23.41 | 0-1 | 1 |
| | 12 | 6 | 23.58 | 23.56 | 23.44 | | 1 |
| | 12 | 13 | 23.59 | 23.50 | 23.35 | | 1 |
| | 25 | 0 | 23.58 | 23.52 | 23.38 | | 1 |
| 16QAM | 1 | 0 | 23.97 | 23.96 | 23.51 | 0-1 | 1 |
| | 1 | 12 | 23.73 | 23.76 | 23.60 | | 1 |
| | 1 | 24 | 23.96 | 23.48 | 23.52 | | 1 |
| | 12 | 0 | 22.53 | 22.52 | 22.47 | 0-2 | 2 |
| | 12 | 6 | 22.62 | 22.56 | 22.40 | | 2 |
| | 12 | 13 | 22.49 | 22.57 | 22.30 | | 2 |
| | 25 | 0 | 22.54 | 22.52 | 22.37 | | 2 |
| 64QAM | 1 | 0 | 22.67 | 22.74 | 22.48 | 0-2 | 2 |
| | 1 | 12 | 22.68 | 22.71 | 22.58 | | 2 |
| | 1 | 24 | 22.62 | 22.56 | 22.40 | | 2 |
| | 12 | 0 | 21.71 | 21.53 | 21.37 | 0-3 | 3 |
| | 12 | 6 | 21.77 | 21.60 | 21.53 | | 3 |
| | 12 | 13 | 21.66 | 21.66 | 21.47 | | 3 |
| | 25 | 0 | 21.67 | 21.53 | 21.34 | | 3 |

## Table 9-15
## LTE Band 26 (Cell) Conducted Powers – 3 MHz Bandwidth

| LTE Band 26 (Cell) 3 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26705 (815.5 MHz) | Mid Channel 26865 (831.5 MHz) | High Channel 27025 (847.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 24.49 | 24.44 | 24.35 | 0 | 0 |
| | 1 | 7 | 24.46 | 24.40 | 24.23 | | 0 |
| | 1 | 14 | 24.47 | 24.39 | 24.20 | | 0 |
| | 8 | 0 | 23.56 | 23.48 | 23.37 | 0-1 | 1 |
| | 8 | 4 | 23.63 | 23.56 | 23.39 | | 1 |
| | 8 | 7 | 23.58 | 23.48 | 23.38 | | 1 |
| | 15 | 0 | 23.50 | 23.56 | 23.32 | | 1 |
| 16QAM | 1 | 0 | 23.64 | 23.79 | 23.71 | 0-1 | 1 |
| | 1 | 7 | 23.55 | 23.74 | 23.34 | | 1 |
| | 1 | 14 | 23.53 | 23.80 | 23.56 | | 1 |
| | 8 | 0 | 22.62 | 22.51 | 22.48 | 0-2 | 2 |
| | 8 | 4 | 22.71 | 22.70 | 22.53 | | 2 |
| | 8 | 7 | 22.61 | 22.48 | 22.48 | | 2 |
| | 15 | 0 | 22.69 | 22.55 | 22.45 | | 2 |
| 64QAM | 1 | 0 | 22.46 | 22.64 | 22.76 | 0-2 | 2 |
| | 1 | 7 | 22.83 | 22.49 | 22.58 | | 2 |
| | 1 | 14 | 22.66 | 22.66 | 22.47 | | 2 |
| | 8 | 0 | 21.58 | 21.59 | 21.39 | 0-3 | 3 |
| | 8 | 4 | 21.67 | 21.55 | 21.54 | | 3 |
| | 8 | 7 | 21.55 | 21.70 | 21.45 | | 3 |
| | 15 | 0 | 21.62 | 21.59 | 21.47 | | 3 |

## Table 9-16
## LTE Band 26 (Cell) Conducted Powers – 1.4 MHz Bandwidth

| LTE Band 26 (Cell) 1.4 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26697 (814.7 MHz) | Mid Channel 26865 (831.5 MHz) | High Channel 27033 (848.3 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 24.32 | 24.22 | 24.37 | 0 | 0 |
| | 1 | 2 | 24.52 | 24.30 | 24.47 | | 0 |
| | 1 | 5 | 24.42 | 24.28 | 24.38 | | 0 |
| | 3 | 0 | 24.37 | 24.18 | 24.38 | | 0 |
| | 3 | 2 | 24.41 | 24.38 | 24.41 | | 0 |
| | 3 | 3 | 24.33 | 24.30 | 24.40 | | 0 |
| | 6 | 0 | 23.53 | 23.47 | 23.45 | 0-1 | 1 |
| 16QAM | 1 | 0 | 23.37 | 23.45 | 23.58 | 0-1 | 1 |
| | 1 | 2 | 23.98 | 23.48 | 23.86 | | 1 |
| | 1 | 5 | 23.68 | 23.44 | 23.57 | | 1 |
| | 3 | 0 | 23.46 | 23.35 | 23.43 | | 1 |
| | 3 | 2 | 23.61 | 23.23 | 23.55 | | 1 |
| | 3 | 3 | 23.51 | 23.40 | 23.48 | | 1 |
| | 6 | 0 | 22.59 | 22.57 | 22.70 | 0-2 | 2 |
| 64QAM | 1 | 0 | 22.33 | 22.65 | 22.23 | 0-2 | 2 |
| | 1 | 2 | 22.43 | 22.70 | 22.71 | | 2 |
| | 1 | 5 | 22.59 | 22.73 | 22.63 | | 2 |
| | 3 | 0 | 22.59 | 22.62 | 22.76 | | 2 |
| | 3 | 2 | 22.75 | 22.45 | 22.67 | | 2 |
| | 3 | 3 | 22.57 | 22.50 | 22.78 | | 2 |
| | 6 | 0 | 21.51 | 21.45 | 21.57 | 0-3 | 3 |

## 9.3.4 LTE Band 4 (AWS)

## Table 9-17
## LTE Band 4 (AWS) Max Conducted Powers – 20 MHz Bandwidth

| LTE Band 4 (AWS) 20 MHz Bandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel 20175 (1732.5 MHz) Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
| QPSK | 1 | 0 | **23.79** | 0 | 0 |
| | 1 | 50 | 23.67 | | 0 |
| | 1 | 99 | 23.64 | | 0 |
| | 50 | 0 | **22.84** | 0-1 | 1 |
| | 50 | 25 | 22.79 | | 1 |
| | 50 | 50 | 22.78 | | 1 |
| | 100 | 0 | 22.79 | | 1 |
| 16QAM | 1 | 0 | 22.99 | 0-1 | 1 |
| | 1 | 50 | 22.90 | | 1 |
| | 1 | 99 | 22.94 | | 1 |
| | 50 | 0 | 21.85 | 0-2 | 2 |
| | 50 | 25 | 21.79 | | 2 |
| | 50 | 50 | 21.74 | | 2 |
| | 100 | 0 | 21.83 | | 2 |
| 64QAM | 1 | 0 | 21.97 | 0-2 | 2 |
| | 1 | 50 | 21.85 | | 2 |
| | 1 | 99 | 21.91 | | 2 |
| | 50 | 0 | 20.86 | 0-3 | 3 |
| | 50 | 25 | 20.83 | | 3 |
| | 50 | 50 | 20.78 | | 3 |
| | 100 | 0 | 20.77 | | 3 |

Note: LTE Band 4 (AWS) at 20 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

## Table 9-18
## LTE Band 4 (AWS) Max Conducted Powers – 15 MHz Bandwidth

| LTE Band 4 (AWS) 15 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 20025 (1717.5 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20325 (1747.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 23.94 | 23.70 | 23.57 | 0 | 0 |
| | 1 | 36 | 23.71 | 23.62 | 23.38 | | 0 |
| | 1 | 74 | 23.62 | 23.53 | 23.44 | | 0 |
| | 36 | 0 | 22.82 | 22.75 | 22.53 | 0-1 | 1 |
| | 36 | 18 | 22.83 | 22.70 | 22.59 | | 1 |
| | 36 | 37 | 22.77 | 22.70 | 22.49 | | 1 |
| | 75 | 0 | 22.79 | 22.72 | 22.53 | | 1 |
| 16QAM | 1 | 0 | 22.97 | 22.94 | 22.70 | 0-1 | 1 |
| | 1 | 36 | 22.78 | 22.74 | 22.96 | | 1 |
| | 1 | 74 | 22.99 | 22.91 | 22.81 | | 1 |
| | 36 | 0 | 21.94 | 21.77 | 21.53 | 0-2 | 2 |
| | 36 | 18 | 21.76 | 21.67 | 21.62 | | 2 |
| | 36 | 37 | 21.75 | 21.64 | 21.52 | | 2 |
| | 75 | 0 | 21.85 | 21.74 | 21.51 | | 2 |
| 64QAM | 1 | 0 | 21.99 | 21.92 | 21.96 | 0-2 | 2 |
| | 1 | 36 | 21.85 | 21.94 | 21.44 | | 2 |
| | 1 | 74 | 21.95 | 21.97 | 21.49 | | 2 |
| | 36 | 0 | 20.86 | 20.70 | 20.58 | 0-3 | 3 |
| | 36 | 18 | 20.80 | 20.73 | 20.54 | | 3 |
| | 36 | 37 | 20.67 | 20.71 | 20.51 | | 3 |
| | 75 | 0 | 20.81 | 20.72 | 20.62 | | 3 |

## Table 9-19
## LTE Band 4 (AWS) Max Conducted Powers – 10 MHz Bandwidth

| LTE Band 4 (AWS) 10 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 20000 (1715.0 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20350 (1750.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 23.62 | 23.44 | 23.30 | 0 | 0 |
| | 1 | 25 | 23.59 | 23.40 | 23.07 | | 0 |
| | 1 | 49 | 23.64 | 23.44 | 23.13 | | 0 |
| | 25 | 0 | 22.69 | 22.57 | 22.32 | 0-1 | 1 |
| | 25 | 12 | 22.73 | 22.56 | 22.41 | | 1 |
| | 25 | 25 | 22.66 | 22.59 | 22.32 | | 1 |
| | 50 | 0 | 22.65 | 22.50 | 22.34 | | 1 |
| 16QAM | 1 | 0 | 22.93 | 22.91 | 22.52 | 0-1 | 1 |
| | 1 | 25 | 22.81 | 22.95 | 22.27 | | 1 |
| | 1 | 49 | 22.81 | 22.78 | 22.90 | | 1 |
| | 25 | 0 | 21.70 | 21.62 | 21.55 | 0-2 | 2 |
| | 25 | 12 | 21.76 | 21.60 | 21.44 | | 2 |
| | 25 | 25 | 21.54 | 21.50 | 21.38 | | 2 |
| | 50 | 0 | 21.70 | 21.57 | 21.41 | | 2 |
| 64QAM | 1 | 0 | 21.91 | 21.87 | 21.73 | 0-2 | 2 |
| | 1 | 25 | 21.87 | 21.79 | 21.35 | | 2 |
| | 1 | 49 | 21.74 | 21.61 | 21.37 | | 2 |
| | 25 | 0 | 20.70 | 20.60 | 20.44 | 0-3 | 3 |
| | 25 | 12 | 20.67 | 20.54 | 20.47 | | 3 |
| | 25 | 25 | 20.61 | 20.50 | 20.31 | | 3 |
| | 50 | 0 | 20.72 | 20.56 | 20.43 | | 3 |

## Table 9-20
## LTE Band 4 (AWS) Max Conducted Powers – 5 MHz Bandwidth

| LTE Band 4 (AWS) 5 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 19975 (1712.5 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20375 (1752.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 23.56 | 23.37 | 23.26 | 0 | 0 |
| | 1 | 12 | 23.53 | 23.39 | 23.22 | | 0 |
| | 1 | 24 | 23.57 | 23.25 | 23.07 | | 0 |
| | 12 | 0 | 22.64 | 22.62 | 22.43 | 0-1 | 1 |
| | 12 | 6 | 22.71 | 22.61 | 22.35 | | 1 |
| | 12 | 13 | 22.71 | 22.52 | 22.38 | | 1 |
| | 25 | 0 | 22.75 | 22.59 | 22.42 | | 1 |
| 16QAM | 1 | 0 | 22.86 | 22.99 | 22.60 | 0-1 | 1 |
| | 1 | 12 | 22.95 | 22.70 | 22.69 | | 1 |
| | 1 | 24 | 22.77 | 22.39 | 22.33 | | 1 |
| | 12 | 0 | 21.65 | 21.52 | 21.41 | 0-2 | 2 |
| | 12 | 6 | 21.81 | 21.60 | 21.44 | | 2 |
| | 12 | 13 | 21.76 | 21.56 | 21.32 | | 2 |
| | 25 | 0 | 21.71 | 21.66 | 21.35 | | 2 |
| 64QAM | 1 | 0 | 21.81 | 21.31 | 21.58 | 0-2 | 2 |
| | 1 | 12 | 21.57 | 21.66 | 21.66 | | 2 |
| | 1 | 24 | 21.51 | 21.32 | 21.52 | | 2 |
| | 12 | 0 | 20.66 | 20.60 | 20.50 | 0-3 | 3 |
| | 12 | 6 | 20.78 | 20.63 | 20.33 | | 3 |
| | 12 | 13 | 20.74 | 20.62 | 20.38 | | 3 |
| | 25 | 0 | 20.82 | 20.57 | 20.51 | | 3 |

## Table 9-21
## LTE Band 4 (AWS) Max Conducted Powers – 3 MHz Bandwidth

| LTE Band 4 (AWS) 3 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 19965 (1711.5 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20385 (1753.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 23.51 | 23.53 | 23.27 | 0 | 0 |
| | 1 | 7 | 23.62 | 23.40 | 23.18 | | 0 |
| | 1 | 14 | 23.65 | 23.36 | 23.19 | | 0 |
| | 8 | 0 | 22.75 | 22.58 | 22.37 | 0-1 | 1 |
| | 8 | 4 | 22.75 | 22.62 | 22.41 | | 1 |
| | 8 | 7 | 22.68 | 22.57 | 22.39 | | 1 |
| | 15 | 0 | 22.76 | 22.67 | 22.51 | | 1 |
| 16QAM | 1 | 0 | 22.91 | 22.70 | 22.40 | 0-1 | 1 |
| | 1 | 7 | 23.00 | 23.00 | 22.32 | | 1 |
| | 1 | 14 | 22.80 | 22.89 | 22.72 | | 1 |
| | 8 | 0 | 21.80 | 21.59 | 21.35 | 0-2 | 2 |
| | 8 | 4 | 21.81 | 21.68 | 21.44 | | 2 |
| | 8 | 7 | 21.81 | 21.69 | 21.48 | | 2 |
| | 15 | 0 | 21.79 | 21.69 | 21.49 | | 2 |
| 64QAM | 1 | 0 | 21.97 | 21.89 | 21.54 | 0-2 | 2 |
| | 1 | 7 | 21.89 | 21.48 | 21.61 | | 2 |
| | 1 | 14 | 21.94 | 21.62 | 21.54 | | 2 |
| | 8 | 0 | 20.83 | 20.60 | 20.66 | 0-3 | 3 |
| | 8 | 4 | 20.87 | 20.73 | 20.49 | | 3 |
| | 8 | 7 | 20.79 | 20.58 | 20.54 | | 3 |
| | 15 | 0 | 20.84 | 20.63 | 20.44 | | 3 |

## Table 9-22
## LTE Band 4 (AWS) Max Conducted Powers – 1.4 MHz Bandwidth

| LTE Band 4 (AWS) 1.4 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Mid Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 19957 (1710.7 MHz) | 20175 (1732.5 MHz) | 20393 (1754.3 MHz) | | |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 23.63 | 23.68 | 23.48 | 0 | 0 |
| | 1 | 2 | 23.68 | 23.64 | 23.65 | | 0 |
| | 1 | 5 | 23.65 | 23.71 | 23.56 | | 0 |
| | 3 | 0 | 23.69 | 23.65 | 23.66 | | 0 |
| | 3 | 2 | 23.68 | 23.71 | 23.59 | | 0 |
| | 3 | 3 | 23.64 | 23.67 | 23.56 | | 0 |
| | 6 | 0 | 22.82 | 22.91 | 22.65 | 0-1 | 1 |
| 16QAM | 1 | 0 | 22.94 | 22.93 | 22.98 | 0-1 | 1 |
| | 1 | 2 | 22.86 | 22.83 | 22.61 | | 1 |
| | 1 | 5 | 22.90 | 22.94 | 22.75 | | 1 |
| | 3 | 0 | 22.81 | 22.73 | 22.62 | | 1 |
| | 3 | 2 | 22.73 | 22.69 | 22.48 | | 1 |
| | 3 | 3 | 22.74 | 22.55 | 22.62 | | 1 |
| | 6 | 0 | 21.86 | 21.91 | 21.82 | 0-2 | 2 |
| 64QAM | 1 | 0 | 21.99 | 21.69 | 21.94 | 0-2 | 2 |
| | 1 | 2 | 21.93 | 21.91 | 21.77 | | 2 |
| | 1 | 5 | 21.62 | 21.60 | 21.68 | | 2 |
| | 3 | 0 | 21.97 | 21.95 | 21.62 | | 2 |
| | 3 | 2 | 21.93 | 22.00 | 21.80 | | 2 |
| | 3 | 3 | 21.83 | 21.98 | 21.75 | | 2 |
| | 6 | 0 | 20.92 | 20.79 | 20.70 | 0-3 | 3 |

## Table 9-23
## LTE Band 4 (AWS) Reduced Conducted Powers – 20 MHz Bandwidth- Hotspot Mode Active

| LTE Band 4 (AWS) 20 MHz Bandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 20175 (1732.5 MHz) | | |
| | | | Conducted Power [dBm] | | |
| QPSK | 1 | 0 | 19.23 | 0 | 0 |
| | 1 | 50 | 19.15 | | 0 |
| | 1 | 99 | **19.28** | | 0 |
| | 50 | 0 | 19.39 | 0-1 | 0 |
| | 50 | 25 | **19.40** | | 0 |
| | 50 | 50 | 19.38 | | 0 |
| | 100 | 0 | 19.27 | | 0 |
| 16QAM | 1 | 0 | 19.48 | 0-1 | 0 |
| | 1 | 50 | 19.44 | | 0 |
| | 1 | 99 | 19.53 | | 0 |
| | 50 | 0 | 19.47 | 0-2 | 0 |
| | 50 | 25 | 19.36 | | 0 |
| | 50 | 50 | 19.33 | | 0 |
| | 100 | 0 | 19.41 | | 0 |
| 64QAM | 1 | 0 | 19.27 | 0-2 | 0 |
| | 1 | 50 | 19.46 | | 0 |
| | 1 | 99 | 19.55 | | 0 |
| | 50 | 0 | 19.43 | 0-3 | 0 |
| | 50 | 25 | 19.42 | | 0 |
| | 50 | 50 | 19.39 | | 0 |
| | 100 | 0 | 19.41 | | 0 |

Note: LTE Band 4 (AWS) at 20 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

## Table 9-24
## LTE Band 4 (AWS) Reduced Conducted Powers – 15 MHz Bandwidth- Hotspot Mode Active

| LTE Band 4 (AWS) 15 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 20025 (1717.5 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20325 (1747.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 19.30 | 19.25 | 19.19 | 0 | 0 |
| | 1 | 36 | 19.24 | 19.22 | 19.06 | | 0 |
| | 1 | 74 | 19.74 | 19.25 | 19.07 | | 0 |
| | 36 | 0 | 19.45 | 19.36 | 19.25 | 0-1 | 0 |
| | 36 | 18 | 19.41 | 19.35 | 19.27 | | 0 |
| | 36 | 37 | 19.38 | 19.37 | 19.16 | | 0 |
| | 75 | 0 | 19.41 | 19.38 | 19.23 | | 0 |
| 16QAM | 1 | 0 | 19.62 | 19.49 | 19.55 | 0-1 | 0 |
| | 1 | 36 | 19.41 | 19.52 | 19.39 | | 0 |
| | 1 | 74 | 19.46 | 19.62 | 19.32 | | 0 |
| | 36 | 0 | 19.45 | 19.30 | 19.22 | 0-2 | 0 |
| | 36 | 18 | 19.42 | 19.38 | 19.24 | | 0 |
| | 36 | 37 | 19.37 | 19.35 | 19.13 | | 0 |
| | 75 | 0 | 19.44 | 19.35 | 19.48 | | 0 |
| 64QAM | 1 | 0 | 19.60 | 19.57 | 19.58 | 0-2 | 0 |
| | 1 | 36 | 19.45 | 19.59 | 19.35 | | 0 |
| | 1 | 74 | 19.50 | 19.47 | 19.33 | | 0 |
| | 36 | 0 | 19.48 | 19.44 | 19.25 | 0-3 | 0 |
| | 36 | 18 | 19.46 | 19.39 | 19.28 | | 0 |
| | 36 | 37 | 19.43 | 19.36 | 19.20 | | 0 |
| | 75 | 0 | 19.44 | 19.35 | 19.24 | | 0 |

## Table 9-25
## LTE Band 4 (AWS) Reduced Conducted Powers – 10 MHz Bandwidth- Hotspot Mode Active

| LTE Band 4 (AWS) 10 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 20000 (1715.0 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20350 (1750.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 19.22 | 19.12 | 19.00 | 0 | 0 |
| | 1 | 25 | 19.19 | 19.00 | 19.07 | | 0 |
| | 1 | 49 | 19.11 | 18.92 | 18.95 | | 0 |
| | 25 | 0 | 19.23 | 19.21 | 19.08 | 0-1 | 0 |
| | 25 | 12 | 19.23 | 19.10 | 19.08 | | 0 |
| | 25 | 25 | 19.21 | 19.04 | 19.05 | | 0 |
| | 50 | 0 | 19.27 | 19.13 | 19.10 | | 0 |
| 16QAM | 1 | 0 | 19.39 | 19.14 | 19.14 | 0-1 | 0 |
| | 1 | 25 | 19.25 | 19.16 | 19.21 | | 0 |
| | 1 | 49 | 19.35 | 19.41 | 19.24 | | 0 |
| | 25 | 0 | 19.27 | 19.08 | 19.14 | 0-2 | 0 |
| | 25 | 12 | 19.30 | 19.12 | 19.12 | | 0 |
| | 25 | 25 | 19.20 | 19.04 | 19.10 | | 0 |
| | 50 | 0 | 19.22 | 19.08 | 19.09 | | 0 |
| 64QAM | 1 | 0 | 19.45 | 19.38 | 19.34 | 0-2 | 0 |
| | 1 | 25 | 19.30 | 19.18 | 19.21 | | 0 |
| | 1 | 49 | 19.34 | 19.20 | 19.17 | | 0 |
| | 25 | 0 | 19.31 | 19.03 | 19.10 | 0-3 | 0 |
| | 25 | 12 | 19.24 | 19.12 | 19.10 | | 0 |
| | 25 | 25 | 19.26 | 19.07 | 19.07 | | 0 |
| | 50 | 0 | 19.37 | 19.10 | 19.13 | | 0 |

## Table 9-26
## LTE Band 4 (AWS) Reduced Conducted Powers – 5 MHz Bandwidth- Hotspot Mode Active

| LTE Band 4 (AWS) 5 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 19975 (1712.5 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20375 (1752.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 19.17 | 19.18 | 19.02 | 0 | 0 |
| | 1 | 12 | 19.15 | 19.25 | 19.08 | | 0 |
| | 1 | 24 | 19.28 | 19.08 | 18.89 | | 0 |
| | 12 | 0 | 19.25 | 19.33 | 19.22 | 0-1 | 0 |
| | 12 | 6 | 19.43 | 19.40 | 19.24 | | 0 |
| | 12 | 13 | 19.42 | 19.22 | 19.10 | | 0 |
| | 25 | 0 | 19.35 | 19.34 | 19.23 | | 0 |
| 16QAM | 1 | 0 | 19.42 | 19.49 | 19.30 | 0-1 | 0 |
| | 1 | 12 | 19.56 | 19.55 | 19.11 | | 0 |
| | 1 | 24 | 19.53 | 19.46 | 19.32 | | 0 |
| | 12 | 0 | 19.40 | 19.47 | 19.12 | 0-2 | 0 |
| | 12 | 6 | 19.41 | 19.39 | 19.28 | | 0 |
| | 12 | 13 | 19.40 | 19.43 | 19.16 | | 0 |
| | 25 | 0 | 19.32 | 19.36 | 19.21 | | 0 |
| 64QAM | 1 | 0 | 19.38 | 19.48 | 19.35 | 0-2 | 0 |
| | 1 | 12 | 19.47 | 19.53 | 19.24 | | 0 |
| | 1 | 24 | 19.38 | 19.40 | 19.11 | | 0 |
| | 12 | 0 | 19.39 | 19.36 | 19.38 | 0-3 | 0 |
| | 12 | 6 | 19.43 | 19.28 | 19.26 | | 0 |
| | 12 | 13 | 19.56 | 19.37 | 19.16 | | 0 |
| | 25 | 0 | 19.37 | 19.36 | 19.20 | | 0 |

## Table 9-27
## LTE Band 4 (AWS) Reduced Conducted Powers – 3 MHz Bandwidth- Hotspot Mode Active

| LTE Band 4 (AWS) 3 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 19965 (1711.5 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20385 (1753.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 19.20 | 19.24 | 19.01 | 0 | 0 |
| | 1 | 7 | 19.27 | 19.17 | 19.01 | | 0 |
| | 1 | 14 | 19.24 | 19.12 | 19.03 | | 0 |
| | 8 | 0 | 19.36 | 19.35 | 19.11 | 0-1 | 0 |
| | 8 | 4 | 19.40 | 19.33 | 19.14 | | 0 |
| | 8 | 7 | 19.32 | 19.31 | 19.14 | | 0 |
| | 15 | 0 | 19.45 | 19.36 | 19.10 | | 0 |
| 16QAM | 1 | 0 | 19.27 | 19.49 | 19.35 | 0-1 | 0 |
| | 1 | 7 | 19.47 | 19.76 | 19.40 | | 0 |
| | 1 | 14 | 19.44 | 19.44 | 19.36 | | 0 |
| | 8 | 0 | 19.35 | 19.38 | 19.10 | 0-2 | 0 |
| | 8 | 4 | 19.43 | 19.42 | 19.20 | | 0 |
| | 8 | 7 | 19.40 | 19.35 | 19.24 | | 0 |
| | 15 | 0 | 19.36 | 19.37 | 19.18 | | 0 |
| 64QAM | 1 | 0 | 19.36 | 19.43 | 19.56 | 0-2 | 0 |
| | 1 | 7 | 19.50 | 19.49 | 19.20 | | 0 |
| | 1 | 14 | 19.25 | 19.24 | 19.14 | | 0 |
| | 8 | 0 | 19.51 | 19.35 | 19.15 | 0-3 | 0 |
| | 8 | 4 | 19.40 | 19.37 | 19.11 | | 0 |
| | 8 | 7 | 19.32 | 19.24 | 19.06 | | 0 |
| | 15 | 0 | 19.39 | 19.50 | 19.09 | | 0 |

## Table 9-28
## LTE Band 4 (AWS) Reduced Conducted Powers – 1.4 MHz Bandwidth- Hotspot Mode Active

| LTE Band 4 (AWS) 1.4 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Mid Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 19957 (1710.7 MHz) | 20175 (1732.5 MHz) | 20393 (1754.3 MHz) | | |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 19.10 | 19.09 | 18.93 | 0 | 0 |
| | 1 | 2 | 19.22 | 19.10 | 18.99 | | 0 |
| | 1 | 5 | 19.12 | 19.04 | 18.90 | | 0 |
| | 3 | 0 | 19.12 | 19.13 | 19.02 | | 0 |
| | 3 | 2 | 19.25 | 19.20 | 18.97 | | 0 |
| | 3 | 3 | 19.08 | 19.11 | 18.92 | | 0 |
| | 6 | 0 | 19.17 | 19.25 | 19.10 | 0-1 | 0 |
| 16QAM | 1 | 0 | 19.21 | 19.41 | 19.05 | 0-1 | 0 |
| | 1 | 2 | 19.31 | 19.52 | 19.21 | | 0 |
| | 1 | 5 | 19.53 | 19.31 | 19.04 | | 0 |
| | 3 | 0 | 19.42 | 19.28 | 19.04 | | 0 |
| | 3 | 2 | 19.40 | 19.45 | 19.05 | | 0 |
| | 3 | 3 | 19.28 | 19.31 | 19.02 | | 0 |
| | 6 | 0 | 19.36 | 19.25 | 19.11 | 0-2 | 0 |
| 64QAM | 1 | 0 | 19.11 | 19.33 | 19.36 | 0-2 | 0 |
| | 1 | 2 | 19.39 | 19.46 | 19.22 | | 0 |
| | 1 | 5 | 19.33 | 19.47 | 19.16 | | 0 |
| | 3 | 0 | 19.20 | 19.35 | 19.11 | | 0 |
| | 3 | 2 | 19.27 | 19.26 | 19.06 | | 0 |
| | 3 | 3 | 19.40 | 19.21 | 19.09 | | 0 |
| | 6 | 0 | 19.22 | 19.17 | 19.07 | 0-3 | 0 |

## Table 9-29
## LTE Band 4 (AWS) Reduced Conducted Powers – 20 MHz Bandwidth- Grip Sensor Active

| LTE Band 4 (AWS) 20 MHz Bandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 20175 (1732.5 MHz) | | |
| | | | Conducted Power [dBm] | | |
| QPSK | 1 | 0 | **20.44** | 0 | 0 |
| | 1 | 50 | 20.33 | | 0 |
| | 1 | 99 | 20.35 | | 0 |
| | 50 | 0 | 20.52 | 0-1 | 0 |
| | 50 | 25 | **20.53** | | 0 |
| | 50 | 50 | 20.48 | | 0 |
| | 100 | 0 | 20.41 | | 0 |
| 16QAM | 1 | 0 | 20.54 | 0-1 | 0 |
| | 1 | 50 | 20.49 | | 0 |
| | 1 | 99 | 20.55 | | 0 |
| | 50 | 0 | 20.44 | 0-2 | 0 |
| | 50 | 25 | 20.44 | | 0 |
| | 50 | 50 | 20.39 | | 0 |
| | 100 | 0 | 20.41 | | 0 |
| 64QAM | 1 | 0 | 20.54 | 0-2 | 0 |
| | 1 | 50 | 20.46 | | 0 |
| | 1 | 99 | 20.53 | | 0 |
| | 50 | 0 | 20.37 | 0-3 | 0 |
| | 50 | 25 | 20.44 | | 0 |
| | 50 | 50 | 20.39 | | 0 |
| | 100 | 0 | 20.41 | | 0 |

Note: LTE Band 4 (AWS) at 20 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

## Table 9-30
## LTE Band 4 (AWS) Reduced Conducted Powers – 15 MHz Bandwidth- Grip Sensor Active

| LTE Band 4 (AWS) 15 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 20025 (1717.5 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20325 (1747.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 20.26 | 20.34 | 20.17 | 0 | 0 |
| | 1 | 36 | 20.22 | 20.12 | 20.02 | | 0 |
| | 1 | 74 | 20.33 | 20.09 | 20.09 | | 0 |
| | 36 | 0 | 20.42 | 20.34 | 20.21 | 0-1 | 0 |
| | 36 | 18 | 20.41 | 20.32 | 19.97 | | 0 |
| | 36 | 37 | 20.32 | 20.30 | 20.19 | | 0 |
| | 75 | 0 | 20.35 | 20.36 | 20.38 | | 0 |
| 16QAM | 1 | 0 | 20.63 | 20.62 | 20.38 | 0-1 | 0 |
| | 1 | 36 | 20.35 | 20.47 | 20.42 | | 0 |
| | 1 | 74 | 20.46 | 20.51 | 20.45 | | 0 |
| | 36 | 0 | 20.44 | 20.32 | 20.33 | 0-2 | 0 |
| | 36 | 18 | 20.38 | 20.33 | 20.38 | | 0 |
| | 36 | 37 | 19.89 | 20.44 | 20.21 | | 0 |
| | 75 | 0 | 20.34 | 20.27 | 20.19 | | 0 |
| 64QAM | 1 | 0 | 20.65 | 20.33 | 20.19 | 0-2 | 0 |
| | 1 | 36 | 20.29 | 20.20 | 20.51 | | 0 |
| | 1 | 74 | 20.50 | 20.15 | 20.19 | | 0 |
| | 36 | 0 | 20.45 | 20.13 | 20.46 | 0-3 | 0 |
| | 36 | 18 | 20.39 | 20.36 | 20.42 | | 0 |
| | 36 | 37 | 20.37 | 20.34 | 20.37 | | 0 |
| | 75 | 0 | 20.37 | 20.33 | 20.36 | | 0 |

## Table 9-31
## LTE Band 4 (AWS) Reduced Conducted Powers – 10 MHz Bandwidth- Grip Sensor Active

| LTE Band 4 (AWS) 10 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 20000 (1715.0 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20350 (1750.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 20.15 | 20.10 | 19.96 | 0 | 0 |
| | 1 | 25 | 20.10 | 20.04 | 19.89 | | 0 |
| | 1 | 49 | 20.03 | 20.07 | 19.98 | | 0 |
| | 25 | 0 | 20.26 | 20.19 | 20.05 | 0-1 | 0 |
| | 25 | 12 | 20.18 | 20.21 | 20.07 | | 0 |
| | 25 | 25 | 20.17 | 20.24 | 20.03 | | 0 |
| | 50 | 0 | 20.22 | 20.15 | 20.04 | | 0 |
| 16QAM | 1 | 0 | 20.41 | 20.48 | 20.24 | 0-1 | 0 |
| | 1 | 25 | 20.23 | 20.40 | 20.31 | | 0 |
| | 1 | 49 | 20.34 | 20.31 | 20.20 | | 0 |
| | 25 | 0 | 20.19 | 20.16 | 20.04 | 0-2 | 0 |
| | 25 | 12 | 20.23 | 20.17 | 20.05 | | 0 |
| | 25 | 25 | 20.20 | 20.10 | 20.04 | | 0 |
| | 50 | 0 | 20.15 | 20.17 | 20.11 | | 0 |
| 64QAM | 1 | 0 | 20.32 | 20.68 | 20.13 | 0-2 | 0 |
| | 1 | 25 | 20.18 | 20.31 | 20.17 | | 0 |
| | 1 | 49 | 20.17 | 20.30 | 20.18 | | 0 |
| | 25 | 0 | 20.23 | 20.15 | 20.03 | 0-3 | 0 |
| | 25 | 12 | 20.22 | 20.21 | 20.04 | | 0 |
| | 25 | 25 | 20.13 | 20.06 | 19.93 | | 0 |
| | 50 | 0 | 20.25 | 20.17 | 20.11 | | 0 |

## Table 9-32
## LTE Band 4 (AWS) Reduced Conducted Powers – 5 MHz Bandwidth- Grip Sensor Active

| LTE Band 4 (AWS) 5 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 19975 (1712.5 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20375 (1752.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 20.06 | 19.97 | 19.94 | 0 | 0 |
| | 1 | 12 | 20.15 | 19.94 | 19.92 | | 0 |
| | 1 | 24 | 20.07 | 19.81 | 19.86 | | 0 |
| | 12 | 0 | 20.19 | 20.11 | 20.22 | 0-1 | 0 |
| | 12 | 6 | 20.35 | 20.15 | 20.11 | | 0 |
| | 12 | 13 | 20.24 | 20.09 | 20.09 | | 0 |
| | 25 | 0 | 20.24 | 20.09 | 20.11 | | 0 |
| 16QAM | 1 | 0 | 20.34 | 20.26 | 20.23 | 0-1 | 0 |
| | 1 | 12 | 20.45 | 20.28 | 20.16 | | 0 |
| | 1 | 24 | 20.37 | 20.13 | 20.12 | | 0 |
| | 12 | 0 | 20.28 | 20.11 | 20.12 | 0-2 | 0 |
| | 12 | 6 | 20.34 | 20.15 | 20.22 | | 0 |
| | 12 | 13 | 20.34 | 20.11 | 20.04 | | 0 |
| | 25 | 0 | 20.27 | 20.09 | 20.08 | | 0 |
| 64QAM | 1 | 0 | 20.31 | 20.18 | 20.05 | 0-2 | 0 |
| | 1 | 12 | 20.29 | 20.20 | 20.25 | | 0 |
| | 1 | 24 | 20.34 | 20.08 | 20.18 | | 0 |
| | 12 | 0 | 20.26 | 20.23 | 20.17 | 0-3 | 0 |
| | 12 | 6 | 20.36 | 20.24 | 20.09 | | 0 |
| | 12 | 13 | 20.28 | 20.11 | 20.11 | | 0 |
| | 25 | 0 | 20.27 | 20.07 | 20.06 | | 0 |

## Table 9-33
## LTE Band 4 (AWS) Reduced Conducted Powers – 3 MHz Bandwidth- Grip Sensor Active

| LTE Band 4 (AWS) 3 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 19965 (1711.5 MHz) | Mid Channel 20175 (1732.5 MHz) | High Channel 20385 (1753.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 20.07 | 20.12 | 20.02 | 0 | 0 |
| | 1 | 7 | 20.12 | 20.09 | 19.94 | | 0 |
| | 1 | 14 | 20.21 | 20.02 | 19.89 | | 0 |
| | 8 | 0 | 20.24 | 20.23 | 20.07 | 0-1 | 0 |
| | 8 | 4 | 20.29 | 20.27 | 20.09 | | 0 |
| | 8 | 7 | 20.24 | 20.20 | 20.08 | | 0 |
| | 15 | 0 | 20.39 | 20.21 | 20.08 | | 0 |
| 16QAM | 1 | 0 | 20.44 | 20.35 | 20.32 | 0-1 | 0 |
| | 1 | 7 | 20.40 | 20.27 | 20.19 | | 0 |
| | 1 | 14 | 20.40 | 20.41 | 20.12 | | 0 |
| | 8 | 0 | 20.38 | 20.31 | 20.15 | 0-2 | 0 |
| | 8 | 4 | 20.49 | 20.36 | 20.18 | | 0 |
| | 8 | 7 | 20.33 | 20.30 | 20.12 | | 0 |
| | 15 | 0 | 20.29 | 20.22 | 20.14 | | 0 |
| 64QAM | 1 | 0 | 20.30 | 20.41 | 20.16 | 0-2 | 0 |
| | 1 | 7 | 20.36 | 20.22 | 20.22 | | 0 |
| | 1 | 14 | 20.42 | 20.25 | 20.20 | | 0 |
| | 8 | 0 | 20.34 | 20.23 | 20.12 | 0-3 | 0 |
| | 8 | 4 | 20.34 | 20.28 | 20.14 | | 0 |
| | 8 | 7 | 20.30 | 20.26 | 20.11 | | 0 |
| | 15 | 0 | 20.41 | 20.20 | 20.08 | | 0 |

## Table 9-34
## LTE Band 4 (AWS) Reduced Conducted Powers – 1.4 MHz Bandwidth- Grip Sensor Active

| LTE Band 4 (AWS) 1.4 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Mid Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 19957 (1710.7 MHz) | 20175 (1732.5 MHz) | 20393 (1754.3 MHz) | | |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 20.02 | 19.98 | 19.91 | 0 | 0 |
| | 1 | 2 | 20.14 | 20.03 | 19.93 | | 0 |
| | 1 | 5 | 20.02 | 20.04 | 19.85 | | 0 |
| | 3 | 0 | 20.09 | 20.02 | 19.84 | | 0 |
| | 3 | 2 | 20.12 | 20.06 | 19.89 | | 0 |
| | 3 | 3 | 20.09 | 19.98 | 19.87 | | 0 |
| | 6 | 0 | 20.18 | 20.14 | 19.98 | 0-1 | 0 |
| 16QAM | 1 | 0 | 20.31 | 20.28 | 20.15 | 0-1 | 0 |
| | 1 | 2 | 20.32 | 20.43 | 20.24 | | 0 |
| | 1 | 5 | 20.26 | 20.13 | 20.10 | | 0 |
| | 3 | 0 | 20.26 | 20.21 | 19.95 | | 0 |
| | 3 | 2 | 20.21 | 20.20 | 20.04 | | 0 |
| | 3 | 3 | 20.15 | 20.13 | 19.95 | | 0 |
| | 6 | 0 | 20.06 | 20.09 | 19.98 | 0-2 | 0 |
| 64QAM | 1 | 0 | 20.27 | 20.19 | 20.06 | 0-2 | 0 |
| | 1 | 2 | 20.26 | 20.39 | 20.22 | | 0 |
| | 1 | 5 | 20.25 | 20.33 | 20.27 | | 0 |
| | 3 | 0 | 20.20 | 20.23 | 20.02 | | 0 |
| | 3 | 2 | 20.24 | 20.28 | 20.03 | | 0 |
| | 3 | 3 | 20.25 | 20.23 | 20.00 | | 0 |
| | 6 | 0 | 20.15 | 20.22 | 20.15 | 0-3 | 0 |

### 9.3.5 LTE Band 25 (PCS)

**Table 9-35**
**LTE Band 25 (PCS) Max Conducted Powers – 20 MHz Bandwidth**

| LTE Band 25 (PCS) 20 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Mid Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 26140 (1860.0 MHz) | 26365 (1882.5 MHz) | 26590 (1905.0 MHz) | | |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | **24.65** | 24.62 | 24.52 | 0 | 0 |
| | 1 | 50 | 24.25 | 24.20 | 24.14 | | 0 |
| | 1 | 99 | 24.49 | 24.49 | 24.46 | | 0 |
| | 50 | 0 | **23.80** | 23.77 | 23.66 | 0-1 | 1 |
| | 50 | 25 | 23.75 | 23.72 | 23.61 | | 1 |
| | 50 | 50 | 23.69 | 23.68 | 23.56 | | 1 |
| | 100 | 0 | 23.71 | 23.72 | 23.64 | | 1 |
| 16QAM | 1 | 0 | 23.89 | 23.90 | 23.84 | 0-1 | 1 |
| | 1 | 50 | 23.52 | 23.40 | 23.46 | | 1 |
| | 1 | 99 | 23.80 | 23.69 | 23.78 | | 1 |
| | 50 | 0 | 22.79 | 22.77 | 22.63 | 0-2 | 2 |
| | 50 | 25 | 22.71 | 22.73 | 22.62 | | 2 |
| | 50 | 50 | 22.72 | 22.66 | 22.57 | | 2 |
| | 100 | 0 | 22.71 | 22.71 | 22.64 | | 2 |
| 64QAM | 1 | 0 | 22.83 | 22.78 | 22.73 | 0-2 | 2 |
| | 1 | 50 | 22.47 | 22.45 | 22.35 | | 2 |
| | 1 | 99 | 22.64 | 22.70 | 22.65 | | 2 |
| | 50 | 0 | 21.79 | 21.62 | 21.67 | 0-3 | 3 |
| | 50 | 25 | 21.71 | 21.69 | 21.62 | | 3 |
| | 50 | 50 | 21.66 | 21.66 | 21.56 | | 3 |
| | 100 | 0 | 21.73 | 21.71 | 21.61 | | 3 |

**Table 9-36**
**LTE Band 25 (PCS) Max Conducted Powers – 15 MHz Bandwidth**

| LTE Band 25 (PCS) 15 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Mid Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 26115 (1857.5 MHz) | 26365 (1882.5 MHz) | 26615 (1907.5 MHz) | | |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 24.42 | 24.30 | 24.22 | 0 | 0 |
| | 1 | 36 | 24.22 | 24.22 | 24.26 | | 0 |
| | 1 | 74 | 24.26 | 24.29 | 24.16 | | 0 |
| | 36 | 0 | 23.45 | 23.40 | 23.46 | 0-1 | 1 |
| | 36 | 18 | 23.36 | 23.46 | 23.50 | | 1 |
| | 36 | 37 | 23.43 | 23.37 | 23.35 | | 1 |
| | 75 | 0 | 23.32 | 23.48 | 23.42 | | 1 |
| 16QAM | 1 | 0 | 23.78 | 23.59 | 23.62 | 0-1 | 1 |
| | 1 | 36 | 23.48 | 23.58 | 23.64 | | 1 |
| | 1 | 74 | 23.44 | 23.67 | 23.85 | | 1 |
| | 36 | 0 | 22.45 | 22.45 | 22.41 | 0-2 | 2 |
| | 36 | 18 | 22.37 | 22.36 | 22.40 | | 2 |
| | 36 | 37 | 22.45 | 22.39 | 22.39 | | 2 |
| | 75 | 0 | 22.32 | 22.43 | 22.37 | | 2 |
| 64QAM | 1 | 0 | 22.47 | 22.57 | 22.30 | 0-2 | 2 |
| | 1 | 36 | 22.33 | 22.57 | 22.54 | | 2 |
| | 1 | 74 | 22.12 | 22.59 | 22.31 | | 2 |
| | 36 | 0 | 21.37 | 21.48 | 21.45 | 0-3 | 3 |
| | 36 | 18 | 21.36 | 21.42 | 21.44 | | 3 |
| | 36 | 37 | 21.38 | 21.41 | 21.28 | | 3 |
| | 75 | 0 | 21.43 | 21.44 | 21.49 | | 3 |

## Table 9-37
## LTE Band 25 (PCS) Max Conducted Powers – 10 MHz Bandwidth

| LTE Band 25 (PCS) 10 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26090 (1855.0 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26640 (1910.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 24.12 | 24.12 | 24.17 | 0 | 0 |
| | 1 | 25 | 24.18 | 24.12 | 23.73 | | 0 |
| | 1 | 49 | 24.13 | 24.12 | 24.25 | | 0 |
| | 25 | 0 | 23.29 | 23.29 | 23.21 | 0-1 | 1 |
| | 25 | 12 | 23.20 | 23.31 | 23.31 | | 1 |
| | 25 | 25 | 23.19 | 23.17 | 23.21 | | 1 |
| | 50 | 0 | 23.26 | 23.25 | 23.26 | | 1 |
| 16QAM | 1 | 0 | 23.22 | 23.41 | 23.27 | 0-1 | 1 |
| | 1 | 25 | 23.32 | 23.39 | 22.88 | | 1 |
| | 1 | 49 | 23.26 | 23.25 | 23.55 | | 1 |
| | 25 | 0 | 22.18 | 22.31 | 22.24 | 0-2 | 2 |
| | 25 | 12 | 22.19 | 22.25 | 22.24 | | 2 |
| | 25 | 25 | 22.24 | 22.20 | 22.14 | | 2 |
| | 50 | 0 | 22.24 | 22.26 | 22.24 | | 2 |
| 64QAM | 1 | 0 | 22.30 | 22.25 | 22.42 | 0-2 | 2 |
| | 1 | 25 | 22.34 | 22.35 | 22.34 | | 2 |
| | 1 | 49 | 22.42 | 22.49 | 22.25 | | 2 |
| | 25 | 0 | 21.13 | 21.25 | 21.17 | 0-3 | 3 |
| | 25 | 12 | 21.14 | 21.21 | 21.23 | | 3 |
| | 25 | 25 | 21.20 | 21.23 | 21.25 | | 3 |
| | 50 | 0 | 21.17 | 21.20 | 21.18 | | 3 |

## Table 9-38
## LTE Band 25 (PCS) Max Conducted Powers – 5 MHz Bandwidth

| LTE Band 25 (PCS) 5 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26065 (1852.5 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26665 (1912.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 24.13 | 24.12 | 24.18 | 0 | 0 |
| | 1 | 12 | 24.28 | 24.18 | 24.21 | | 0 |
| | 1 | 24 | 24.09 | 24.22 | 24.27 | | 0 |
| | 12 | 0 | 23.36 | 23.31 | 23.35 | 0-1 | 1 |
| | 12 | 6 | 23.39 | 23.29 | 23.39 | | 1 |
| | 12 | 13 | 23.31 | 23.25 | 23.28 | | 1 |
| | 25 | 0 | 23.28 | 23.26 | 23.32 | | 1 |
| 16QAM | 1 | 0 | 23.71 | 23.33 | 23.37 | 0-1 | 1 |
| | 1 | 12 | 23.51 | 23.62 | 23.53 | | 1 |
| | 1 | 24 | 23.53 | 23.32 | 23.67 | | 1 |
| | 12 | 0 | 22.40 | 22.20 | 22.45 | 0-2 | 2 |
| | 12 | 6 | 22.37 | 22.27 | 22.40 | | 2 |
| | 12 | 13 | 22.30 | 22.36 | 22.29 | | 2 |
| | 25 | 0 | 22.26 | 22.21 | 22.27 | | 2 |
| 64QAM | 1 | 0 | 22.36 | 22.37 | 22.59 | 0-2 | 2 |
| | 1 | 12 | 22.25 | 22.19 | 22.50 | | 2 |
| | 1 | 24 | 22.26 | 22.45 | 22.43 | | 2 |
| | 12 | 0 | 21.40 | 21.27 | 21.30 | 0-3 | 3 |
| | 12 | 6 | 21.37 | 21.35 | 21.37 | | 3 |
| | 12 | 13 | 21.42 | 21.29 | 21.42 | | 3 |
| | 25 | 0 | 21.31 | 21.19 | 21.30 | | 3 |

## Table 9-39
## LTE Band 25 (PCS) Max Conducted Powers – 3 MHz Bandwidth

| LTE Band 25 (PCS) 3 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26055 (1851.5 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26675 (1913.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 24.21 | 24.17 | 24.21 | 0 | 0 |
| | 1 | 7 | 24.16 | 24.16 | 24.17 | | 0 |
| | 1 | 14 | 24.26 | 24.10 | 24.21 | | 0 |
| | 8 | 0 | 23.31 | 23.26 | 23.31 | 0-1 | 1 |
| | 8 | 4 | 23.30 | 23.36 | 23.35 | | 1 |
| | 8 | 7 | 23.30 | 23.25 | 23.29 | | 1 |
| | 15 | 0 | 23.28 | 23.27 | 23.28 | | 1 |
| 16QAM | 1 | 0 | 23.56 | 23.26 | 23.41 | 0-1 | 1 |
| | 1 | 7 | 23.53 | 23.53 | 23.29 | | 1 |
| | 1 | 14 | 23.40 | 23.42 | 23.53 | | 1 |
| | 8 | 0 | 22.36 | 22.46 | 22.38 | 0-2 | 2 |
| | 8 | 4 | 22.30 | 22.45 | 22.34 | | 2 |
| | 8 | 7 | 22.38 | 22.42 | 22.65 | | 2 |
| | 15 | 0 | 22.34 | 22.20 | 22.36 | | 2 |
| 64QAM | 1 | 0 | 22.46 | 22.23 | 22.20 | 0-2 | 2 |
| | 1 | 7 | 22.55 | 22.58 | 22.31 | | 2 |
| | 1 | 14 | 22.37 | 22.40 | 22.20 | | 2 |
| | 8 | 0 | 21.41 | 21.21 | 21.33 | 0-3 | 3 |
| | 8 | 4 | 21.26 | 21.37 | 21.42 | | 3 |
| | 8 | 7 | 21.35 | 21.34 | 21.31 | | 3 |
| | 15 | 0 | 21.39 | 21.44 | 21.23 | | 3 |

## Table 9-40
## LTE Band 25 (PCS) Max Conducted Powers – 1.4 MHz Bandwidth

| LTE Band 25 (PCS) 1.4 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26047 (1850.7 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26683 (1914.3 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 24.13 | 24.12 | 24.02 | 0 | 0 |
| | 1 | 2 | 24.16 | 24.10 | 24.19 | | 0 |
| | 1 | 5 | 24.10 | 24.08 | 24.07 | | 0 |
| | 3 | 0 | 24.10 | 24.12 | 24.09 | | 0 |
| | 3 | 2 | 24.13 | 24.20 | 24.13 | | 0 |
| | 3 | 3 | 24.06 | 24.08 | 24.10 | | 0 |
| | 6 | 0 | 23.20 | 23.18 | 23.25 | 0-1 | 1 |
| 16QAM | 1 | 0 | 23.34 | 23.56 | 23.50 | 0-1 | 1 |
| | 1 | 2 | 23.38 | 23.48 | 23.33 | | 1 |
| | 1 | 5 | 23.47 | 23.40 | 23.50 | | 1 |
| | 3 | 0 | 23.17 | 23.22 | 23.27 | | 1 |
| | 3 | 2 | 23.40 | 23.24 | 23.18 | | 1 |
| | 3 | 3 | 23.16 | 23.26 | 23.22 | | 1 |
| | 6 | 0 | 22.33 | 22.24 | 22.32 | 0-2 | 2 |
| 64QAM | 1 | 0 | 22.20 | 22.35 | 22.64 | 0-2 | 2 |
| | 1 | 2 | 22.20 | 22.64 | 22.23 | | 2 |
| | 1 | 5 | 22.18 | 22.52 | 22.47 | | 2 |
| | 3 | 0 | 22.39 | 22.31 | 22.14 | | 2 |
| | 3 | 2 | 22.23 | 22.36 | 22.06 | | 2 |
| | 3 | 3 | 22.20 | 22.25 | 22.26 | | 2 |
| | 6 | 0 | 21.09 | 21.11 | 21.16 | 0-3 | 3 |

## Table 9-41
## LTE Band 25 (PCS) Reduced Conducted Powers – 20 MHz Bandwidth- Hotspot Mode Active

| LTE Band 25 (PCS) 20 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26140 (1860.0 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26590 (1905.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 19.12 | **19.30** | 19.00 | 0 | 0 |
| | 1 | 50 | 18.78 | 18.80 | 18.72 | | 0 |
| | 1 | 99 | 18.93 | 19.14 | 18.94 | | 0 |
| | 50 | 0 | 19.27 | **19.34** | 19.18 | 0-1 | 0 |
| | 50 | 25 | 19.20 | 19.30 | 19.11 | | 0 |
| | 50 | 50 | 19.17 | 19.26 | 19.08 | | 0 |
| | 100 | 0 | 19.17 | 19.26 | 19.11 | | 0 |
| 16QAM | 1 | 0 | 19.37 | 19.35 | 19.25 | 0-1 | 0 |
| | 1 | 50 | 18.99 | 18.87 | 18.88 | | 0 |
| | 1 | 99 | 19.21 | 19.32 | 19.24 | | 0 |
| | 50 | 0 | 19.38 | 19.32 | 19.12 | 0-2 | 0 |
| | 50 | 25 | 19.21 | 19.29 | 19.13 | | 0 |
| | 50 | 50 | 19.07 | 19.27 | 19.09 | | 0 |
| | 100 | 0 | 19.16 | 19.27 | 19.14 | | 0 |
| 64QAM | 1 | 0 | 19.37 | 19.35 | 19.22 | 0-2 | 0 |
| | 1 | 50 | 19.02 | 19.14 | 18.86 | | 0 |
| | 1 | 99 | 19.14 | 19.34 | 19.28 | | 0 |
| | 50 | 0 | 19.25 | 19.37 | 19.15 | 0-3 | 0 |
| | 50 | 25 | 19.29 | 19.32 | 19.16 | | 0 |
| | 50 | 50 | 19.28 | 19.25 | 19.30 | | 0 |
| | 100 | 0 | 19.18 | 19.31 | 19.16 | | 0 |

## Table 9-42
## LTE Band 25 (PCS) Reduced Conducted Powers – 15 MHz Bandwidth- Hotspot Mode Active

| LTE Band 25 (PCS) 15 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26115 (1857.5 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26615 (1907.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 19.19 | 19.10 | 19.03 | 0 | 0 |
| | 1 | 36 | 19.02 | 19.02 | 19.00 | | 0 |
| | 1 | 74 | 19.06 | 19.04 | 19.03 | | 0 |
| | 36 | 0 | 19.24 | 19.25 | 19.18 | 0-1 | 0 |
| | 36 | 18 | 19.19 | 19.21 | 19.16 | | 0 |
| | 36 | 37 | 19.15 | 19.18 | 19.13 | | 0 |
| | 75 | 0 | 19.21 | 19.19 | 19.17 | | 0 |
| 16QAM | 1 | 0 | 19.46 | 19.30 | 19.34 | 0-1 | 0 |
| | 1 | 36 | 19.28 | 19.36 | 19.29 | | 0 |
| | 1 | 74 | 19.29 | 19.36 | 19.30 | | 0 |
| | 36 | 0 | 19.22 | 19.20 | 19.21 | 0-2 | 0 |
| | 36 | 18 | 19.21 | 19.19 | 19.16 | | 0 |
| | 36 | 37 | 19.18 | 19.16 | 19.14 | | 0 |
| | 75 | 0 | 19.17 | 19.20 | 19.17 | | 0 |
| 64QAM | 1 | 0 | 19.39 | 19.28 | 19.25 | 0-2 | 0 |
| | 1 | 36 | 19.25 | 19.30 | 19.22 | | 0 |
| | 1 | 74 | 19.28 | 19.28 | 19.31 | | 0 |
| | 36 | 0 | 19.25 | 19.33 | 19.18 | 0-3 | 0 |
| | 36 | 18 | 19.23 | 19.25 | 19.20 | | 0 |
| | 36 | 37 | 19.20 | 19.20 | 19.17 | | 0 |
| | 75 | 0 | 19.20 | 19.20 | 19.16 | | 0 |

## Table 9-43
## LTE Band 25 (PCS) Reduced Conducted Powers – 10 MHz Bandwidth- Hotspot Mode Active

| LTE Band 25 (PCS) 10 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26090 (1855.0 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26640 (1910.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 19.00 | 19.05 | 18.90 | 0 | 0 |
| | 1 | 25 | 18.98 | 18.95 | 18.38 | | 0 |
| | 1 | 49 | 18.94 | 18.97 | 18.88 | | 0 |
| | 25 | 0 | 19.12 | 19.08 | 18.98 | 0-1 | 0 |
| | 25 | 12 | 19.10 | 19.06 | 19.02 | | 0 |
| | 25 | 25 | 19.07 | 19.02 | 19.01 | | 0 |
| | 50 | 0 | 19.10 | 19.05 | 19.03 | | 0 |
| 16QAM | 1 | 0 | 19.27 | 19.28 | 19.19 | 0-1 | 0 |
| | 1 | 25 | 19.30 | 19.33 | 18.85 | | 0 |
| | 1 | 49 | 19.20 | 19.25 | 19.20 | | 0 |
| | 25 | 0 | 19.14 | 19.10 | 19.01 | 0-2 | 0 |
| | 25 | 12 | 19.09 | 19.12 | 19.04 | | 0 |
| | 25 | 25 | 19.06 | 19.07 | 19.02 | | 0 |
| | 50 | 0 | 19.05 | 19.09 | 19.00 | | 0 |
| 64QAM | 1 | 0 | 19.25 | 19.18 | 19.18 | 0-2 | 0 |
| | 1 | 25 | 19.24 | 19.30 | 18.75 | | 0 |
| | 1 | 49 | 19.20 | 19.24 | 19.19 | | 0 |
| | 25 | 0 | 19.08 | 19.13 | 19.01 | 0-3 | 0 |
| | 25 | 12 | 19.09 | 19.09 | 19.02 | | 0 |
| | 25 | 25 | 19.06 | 19.11 | 19.00 | | 0 |
| | 50 | 0 | 19.10 | 19.09 | 19.03 | | 0 |

## Table 9-44
## LTE Band 25 (PCS) Reduced Conducted Powers – 5 MHz Bandwidth- Hotspot Mode Active

| LTE Band 25 (PCS) 5 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26065 (1852.5 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26665 (1912.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 19.01 | 18.98 | 18.92 | 0 | 0 |
| | 1 | 12 | 19.00 | 19.03 | 18.93 | | 0 |
| | 1 | 24 | 18.96 | 18.98 | 18.91 | | 0 |
| | 12 | 0 | 19.15 | 19.10 | 19.05 | 0-1 | 0 |
| | 12 | 6 | 19.15 | 19.03 | 19.09 | | 0 |
| | 12 | 13 | 19.11 | 19.14 | 19.03 | | 0 |
| | 25 | 0 | 19.12 | 19.08 | 19.05 | | 0 |
| 16QAM | 1 | 0 | 19.28 | 19.24 | 19.18 | 0-1 | 0 |
| | 1 | 12 | 19.24 | 19.33 | 19.24 | | 0 |
| | 1 | 24 | 19.28 | 19.21 | 19.28 | | 0 |
| | 12 | 0 | 19.22 | 19.13 | 19.13 | 0-2 | 0 |
| | 12 | 6 | 19.21 | 19.16 | 19.12 | | 0 |
| | 12 | 13 | 19.17 | 19.19 | 19.12 | | 0 |
| | 25 | 0 | 19.15 | 19.09 | 19.05 | | 0 |
| 64QAM | 1 | 0 | 19.25 | 19.19 | 19.20 | 0-2 | 0 |
| | 1 | 12 | 19.30 | 19.32 | 19.24 | | 0 |
| | 1 | 24 | 19.15 | 19.23 | 19.25 | | 0 |
| | 12 | 0 | 19.25 | 19.13 | 19.25 | 0-3 | 0 |
| | 12 | 6 | 19.19 | 19.19 | 19.09 | | 0 |
| | 12 | 13 | 19.16 | 19.17 | 19.10 | | 0 |
| | 25 | 0 | 19.14 | 19.10 | 19.06 | | 0 |

## Table 9-45
## LTE Band 25 (PCS) Reduced Conducted Powers – 3 MHz Bandwidth- Hotspot Mode Active

| LTE Band 25 (PCS) 3 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26055 (1851.5 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26675 (1913.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 19.09 | 19.02 | 18.98 | 0 | 0 |
| | 1 | 7 | 18.98 | 19.01 | 19.01 | | 0 |
| | 1 | 14 | 19.03 | 18.97 | 19.01 | | 0 |
| | 8 | 0 | 19.09 | 19.08 | 19.07 | 0-1 | 0 |
| | 8 | 4 | 19.16 | 19.17 | 19.06 | | 0 |
| | 8 | 7 | 19.13 | 19.09 | 19.11 | | 0 |
| | 15 | 0 | 19.18 | 19.10 | 19.14 | | 0 |
| 16QAM | 1 | 0 | 19.32 | 19.28 | 19.24 | 0-1 | 0 |
| | 1 | 7 | 19.31 | 19.29 | 19.32 | | 0 |
| | 1 | 14 | 19.32 | 19.36 | 19.25 | | 0 |
| | 8 | 0 | 19.26 | 19.13 | 19.21 | 0-2 | 0 |
| | 8 | 4 | 19.25 | 19.22 | 19.25 | | 0 |
| | 8 | 7 | 19.21 | 19.21 | 19.22 | | 0 |
| | 15 | 0 | 19.18 | 19.11 | 19.12 | | 0 |
| 64QAM | 1 | 0 | 19.29 | 19.22 | 19.24 | 0-2 | 0 |
| | 1 | 7 | 19.28 | 19.30 | 19.30 | | 0 |
| | 1 | 14 | 19.22 | 19.31 | 19.32 | | 0 |
| | 8 | 0 | 19.16 | 19.13 | 19.11 | 0-3 | 0 |
| | 8 | 4 | 19.18 | 19.15 | 19.22 | | 0 |
| | 8 | 7 | 19.17 | 19.18 | 19.21 | | 0 |
| | 15 | 0 | 19.18 | 19.13 | 19.14 | | 0 |

## Table 9-46
## LTE Band 25 (PCS) Reduced Conducted Powers – 1.4 MHz Bandwidth- Hotspot Mode Active

| LTE Band 25 (PCS) 1.4 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26047 (1850.7 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26683 (1914.3 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 18.92 | 18.97 | 18.81 | 0 | 0 |
| | 1 | 2 | 19.02 | 19.02 | 18.92 | | 0 |
| | 1 | 5 | 18.89 | 18.90 | 18.82 | | 0 |
| | 3 | 0 | 18.96 | 18.95 | 18.83 | | 0 |
| | 3 | 2 | 19.00 | 18.99 | 18.90 | | 0 |
| | 3 | 3 | 18.94 | 18.96 | 18.85 | | 0 |
| | 6 | 0 | 19.05 | 19.07 | 19.04 | 0-1 | 0 |
| 16QAM | 1 | 0 | 19.23 | 19.18 | 19.21 | 0-1 | 0 |
| | 1 | 2 | 19.45 | 19.47 | 19.30 | | 0 |
| | 1 | 5 | 19.26 | 19.30 | 19.19 | | 0 |
| | 3 | 0 | 19.23 | 19.11 | 19.08 | | 0 |
| | 3 | 2 | 19.15 | 19.17 | 19.06 | | 0 |
| | 3 | 3 | 18.98 | 19.25 | 19.03 | | 0 |
| | 6 | 0 | 19.11 | 19.10 | 18.89 | 0-2 | 0 |
| 64QAM | 1 | 0 | 19.20 | 19.20 | 19.14 | 0-2 | 0 |
| | 1 | 2 | 19.41 | 19.21 | 19.18 | | 0 |
| | 1 | 5 | 19.26 | 18.94 | 19.15 | | 0 |
| | 3 | 0 | 19.10 | 19.11 | 19.02 | | 0 |
| | 3 | 2 | 19.08 | 19.25 | 19.10 | | 0 |
| | 3 | 3 | 19.11 | 19.13 | 19.06 | | 0 |
| | 6 | 0 | 19.05 | 19.10 | 19.01 | 0-3 | 0 |

## Table 9-47
## LTE Band 25 (PCS) Reduced Conducted Powers – 20 MHz Bandwidth- Grip Sensor Active

| LTE Band 25 (PCS) 20 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26140 (1860.0 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26590 (1905.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 20.12 | **20.22** | 20.15 | 0 | 0 |
| | 1 | 50 | 19.79 | 19.82 | 19.80 | | 0 |
| | 1 | 99 | 19.99 | 20.04 | 20.05 | | 0 |
| | 50 | 0 | 20.23 | **20.27** | 20.25 | 0-1 | 0 |
| | 50 | 25 | 20.24 | 20.24 | 20.22 | | 0 |
| | 50 | 50 | 20.19 | 20.21 | 20.20 | | 0 |
| | 100 | 0 | 20.20 | 20.17 | 20.21 | | 0 |
| 16QAM | 1 | 0 | 20.37 | 20.22 | 20.17 | 0-1 | 0 |
| | 1 | 50 | 19.95 | 20.02 | 20.13 | | 0 |
| | 1 | 99 | 20.22 | 20.32 | 20.31 | | 0 |
| | 50 | 0 | 20.29 | 20.27 | 20.23 | 0-2 | 0 |
| | 50 | 25 | 20.23 | 20.22 | 20.26 | | 0 |
| | 50 | 50 | 20.13 | 20.22 | 20.21 | | 0 |
| | 100 | 0 | 20.20 | 20.21 | 20.19 | | 0 |
| 64QAM | 1 | 0 | 20.34 | 20.17 | 20.22 | 0-2 | 0 |
| | 1 | 50 | 19.90 | 19.96 | 19.91 | | 0 |
| | 1 | 99 | 20.05 | 20.22 | 20.30 | | 0 |
| | 50 | 0 | 20.27 | 20.25 | 20.25 | 0-3 | 0 |
| | 50 | 25 | 20.20 | 20.20 | 20.23 | | 0 |
| | 50 | 50 | 20.19 | 20.21 | 20.18 | | 0 |
| | 100 | 0 | 20.23 | 20.17 | 20.21 | | 0 |

## Table 9-48
## LTE Band 25 (PCS) Reduced Conducted Powers – 15 MHz Bandwidth- Grip Sensor Active

| LTE Band 25 (PCS) 15 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26115 (1857.5 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26615 (1907.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 20.13 | 20.14 | 20.08 | 0 | 0 |
| | 1 | 36 | 20.02 | 20.08 | 20.01 | | 0 |
| | 1 | 74 | 20.08 | 20.05 | 20.07 | | 0 |
| | 36 | 0 | 20.07 | 20.23 | 20.17 | 0-1 | 0 |
| | 36 | 18 | 20.32 | 20.24 | 20.38 | | 0 |
| | 36 | 37 | 20.19 | 20.25 | 20.15 | | 0 |
| | 75 | 0 | 20.24 | 20.27 | 20.23 | | 0 |
| 16QAM | 1 | 0 | 20.08 | 20.38 | 20.38 | 0-1 | 0 |
| | 1 | 36 | 20.36 | 20.59 | 20.36 | | 0 |
| | 1 | 74 | 20.41 | 20.34 | 20.49 | | 0 |
| | 36 | 0 | 20.22 | 20.27 | 20.20 | 0-2 | 0 |
| | 36 | 18 | 20.19 | 20.20 | 20.22 | | 0 |
| | 36 | 37 | 20.28 | 20.20 | 20.24 | | 0 |
| | 75 | 0 | 20.07 | 20.17 | 20.17 | | 0 |
| 64QAM | 1 | 0 | 20.29 | 20.30 | 20.46 | 0-2 | 0 |
| | 1 | 36 | 20.16 | 20.36 | 20.13 | | 0 |
| | 1 | 74 | 20.46 | 20.34 | 20.42 | | 0 |
| | 36 | 0 | 20.28 | 20.35 | 20.23 | 0-3 | 0 |
| | 36 | 18 | 20.32 | 20.23 | 20.23 | | 0 |
| | 36 | 37 | 20.24 | 20.24 | 20.42 | | 0 |
| | 75 | 0 | 20.25 | 20.23 | 20.17 | | 0 |

## Table 9-49
## LTE Band 25 (PCS) Reduced Conducted Powers – 10 MHz Bandwidth- Grip Sensor Active

| LTE Band 25 (PCS) 10 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Mid Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 26090 (1855.0 MHz) | 26365 (1882.5 MHz) | 26640 (1910.0 MHz) | | |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 20.00 | 20.07 | 19.88 | 0 | 0 |
| | 1 | 25 | 19.98 | 20.09 | 19.58 | | 0 |
| | 1 | 49 | 19.91 | 20.01 | 19.81 | | 0 |
| | 25 | 0 | 20.11 | 20.03 | 20.01 | 0-1 | 0 |
| | 25 | 12 | 20.12 | 20.12 | 20.03 | | 0 |
| | 25 | 25 | 20.02 | 20.08 | 20.01 | | 0 |
| | 50 | 0 | 20.09 | 20.13 | 20.05 | | 0 |
| 16QAM | 1 | 0 | 20.26 | 20.35 | 20.15 | 0-1 | 0 |
| | 1 | 25 | 20.40 | 20.47 | 19.81 | | 0 |
| | 1 | 49 | 20.31 | 20.25 | 20.18 | | 0 |
| | 25 | 0 | 20.11 | 20.10 | 20.02 | 0-2 | 0 |
| | 25 | 12 | 20.18 | 20.04 | 20.05 | | 0 |
| | 25 | 25 | 20.12 | 20.04 | 20.18 | | 0 |
| | 50 | 0 | 20.05 | 20.07 | 20.01 | | 0 |
| 64QAM | 1 | 0 | 20.35 | 20.22 | 20.04 | 0-2 | 0 |
| | 1 | 25 | 20.22 | 20.18 | 19.68 | | 0 |
| | 1 | 49 | 20.14 | 20.20 | 20.12 | | 0 |
| | 25 | 0 | 20.05 | 20.05 | 20.04 | 0-3 | 0 |
| | 25 | 12 | 20.06 | 20.05 | 20.03 | | 0 |
| | 25 | 25 | 20.06 | 20.18 | 19.99 | | 0 |
| | 50 | 0 | 20.06 | 20.03 | 20.05 | | 0 |

## Table 9-50
## LTE Band 25 (PCS) Reduced Conducted Powers – 5 MHz Bandwidth- Grip Sensor Active

| LTE Band 25 (PCS) 5 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Mid Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 26065 (1852.5 MHz) | 26365 (1882.5 MHz) | 26665 (1912.5 MHz) | | |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 20.00 | 19.99 | 19.99 | 0 | 0 |
| | 1 | 12 | 20.01 | 20.03 | 19.93 | | 0 |
| | 1 | 24 | 19.95 | 19.99 | 19.94 | | 0 |
| | 12 | 0 | 20.15 | 20.06 | 20.09 | 0-1 | 0 |
| | 12 | 6 | 20.18 | 20.14 | 20.17 | | 0 |
| | 12 | 13 | 20.16 | 20.10 | 20.14 | | 0 |
| | 25 | 0 | 20.11 | 20.08 | 20.10 | | 0 |
| 16QAM | 1 | 0 | 20.33 | 20.25 | 20.26 | 0-1 | 0 |
| | 1 | 12 | 20.37 | 20.21 | 20.57 | | 0 |
| | 1 | 24 | 20.25 | 20.29 | 20.36 | | 0 |
| | 12 | 0 | 20.19 | 20.14 | 20.12 | 0-2 | 0 |
| | 12 | 6 | 20.21 | 20.12 | 20.23 | | 0 |
| | 12 | 13 | 19.97 | 20.20 | 20.16 | | 0 |
| | 25 | 0 | 20.14 | 20.11 | 20.05 | | 0 |
| 64QAM | 1 | 0 | 20.27 | 20.19 | 20.26 | 0-2 | 0 |
| | 1 | 12 | 20.04 | 20.34 | 20.25 | | 0 |
| | 1 | 24 | 20.19 | 20.19 | 20.17 | | 0 |
| | 12 | 0 | 20.17 | 20.10 | 20.12 | 0-3 | 0 |
| | 12 | 6 | 20.16 | 20.15 | 20.11 | | 0 |
| | 12 | 13 | 20.10 | 20.17 | 20.12 | | 0 |
| | 25 | 0 | 20.15 | 20.03 | 20.09 | | 0 |

## Table 9-51
## LTE Band 25 (PCS) Reduced Conducted Powers – 3 MHz Bandwidth- Grip Sensor Active

| LTE Band 25 (PCS) 3 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26055 (1851.5 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26675 (1913.5 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 20.05 | 19.97 | 19.95 | 0 | 0 |
| | 1 | 7 | 20.13 | 20.02 | 19.96 | | 0 |
| | 1 | 14 | 20.02 | 20.05 | 19.93 | | 0 |
| | 8 | 0 | 20.12 | 20.08 | 20.05 | 0-1 | 0 |
| | 8 | 4 | 20.17 | 20.14 | 20.10 | | 0 |
| | 8 | 7 | 20.15 | 20.07 | 20.08 | | 0 |
| | 15 | 0 | 20.18 | 20.04 | 20.15 | | 0 |
| 16QAM | 1 | 0 | 20.29 | 20.23 | 20.28 | 0-1 | 0 |
| | 1 | 7 | 20.32 | 20.33 | 20.21 | | 0 |
| | 1 | 14 | 20.50 | 20.14 | 20.12 | | 0 |
| | 8 | 0 | 20.22 | 20.02 | 20.16 | 0-2 | 0 |
| | 8 | 4 | 20.23 | 20.28 | 20.14 | | 0 |
| | 8 | 7 | 20.21 | 20.21 | 20.10 | | 0 |
| | 15 | 0 | 20.18 | 20.12 | 20.22 | | 0 |
| 64QAM | 1 | 0 | 20.24 | 20.10 | 20.31 | 0-2 | 0 |
| | 1 | 7 | 20.33 | 20.27 | 20.22 | | 0 |
| | 1 | 14 | 20.01 | 20.25 | 20.13 | | 0 |
| | 8 | 0 | 20.32 | 20.16 | 20.16 | 0-3 | 0 |
| | 8 | 4 | 20.22 | 20.12 | 20.08 | | 0 |
| | 8 | 7 | 20.11 | 20.15 | 20.12 | | 0 |
| | 15 | 0 | 20.16 | 20.09 | 20.14 | | 0 |

## Table 9-52
## LTE Band 25 (PCS) Reduced Conducted Powers – 1.4 MHz Bandwidth- Grip Sensor Active

| LTE Band 25 (PCS) 1.4 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 26047 (1850.7 MHz) | Mid Channel 26365 (1882.5 MHz) | High Channel 26683 (1914.3 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 20.01 | 19.98 | 19.91 | 0 | 0 |
| | 1 | 2 | 20.02 | 19.99 | 19.94 | | 0 |
| | 1 | 5 | 19.96 | 19.92 | 19.88 | | 0 |
| | 3 | 0 | 20.05 | 19.91 | 19.91 | | 0 |
| | 3 | 2 | 20.00 | 20.00 | 19.95 | | 0 |
| | 3 | 3 | 19.90 | 19.93 | 19.86 | | 0 |
| | 6 | 0 | 20.10 | 20.02 | 20.06 | 0-1 | 0 |
| 16QAM | 1 | 0 | 20.27 | 20.29 | 20.23 | 0-1 | 0 |
| | 1 | 2 | 20.33 | 20.31 | 20.47 | | 0 |
| | 1 | 5 | 20.33 | 20.22 | 20.14 | | 0 |
| | 3 | 0 | 20.10 | 20.07 | 20.05 | | 0 |
| | 3 | 2 | 20.12 | 20.21 | 20.17 | | 0 |
| | 3 | 3 | 20.16 | 20.11 | 20.05 | | 0 |
| | 6 | 0 | 20.15 | 20.34 | 20.15 | 0-2 | 0 |
| 64QAM | 1 | 0 | 20.08 | 20.20 | 20.14 | 0-2 | 0 |
| | 1 | 2 | 20.24 | 20.35 | 20.21 | | 0 |
| | 1 | 5 | 20.21 | 20.18 | 20.01 | | 0 |
| | 3 | 0 | 20.14 | 20.10 | 20.05 | | 0 |
| | 3 | 2 | 20.28 | 20.05 | 20.12 | | 0 |
| | 3 | 3 | 20.11 | 20.07 | 20.08 | | 0 |
| | 6 | 0 | 20.06 | 20.11 | 19.95 | 0-3 | 0 |

## 9.3.6 LTE Band 41

**Table 9-53**
**LTE Band 41 Max Conducted Powers – 20 MHz Bandwidth**

| LTE Band 41 20 MHz Bandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 39750 (2506.0 MHz) | Low-Mid Channel 40185 (2549.5 MHz) | Mid Channel 40620 (2593.0 MHz) | Mid-High Channel 41055 (2636.5 MHz) | High Channel 41490 (2680.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | | | |
| QPSK | 1 | 0 | 24.08 | 24.02 | 24.07 | 23.97 | **24.19** | 0 | 0 |
| | 1 | 50 | 23.97 | 23.82 | 23.90 | 23.84 | 23.99 | | 0 |
| | 1 | 99 | 24.08 | 23.95 | 24.02 | 23.62 | 24.08 | | 0 |
| | 50 | 0 | 23.32 | 23.17 | 23.28 | 23.12 | **23.50** | 0-1 | 1 |
| | 50 | 25 | 23.34 | 23.22 | 23.27 | 23.17 | 23.39 | | 1 |
| | 50 | 50 | 23.37 | 23.11 | 23.25 | 23.02 | 23.40 | | 1 |
| | 100 | 0 | 23.33 | 23.12 | 23.22 | 23.06 | 23.45 | | 1 |
| 16QAM | 1 | 0 | 23.21 | 23.02 | 23.25 | 23.05 | 23.36 | 0-1 | 1 |
| | 1 | 50 | 23.17 | 23.13 | 23.25 | 22.92 | 23.22 | | 1 |
| | 1 | 99 | 23.19 | 22.98 | 23.19 | 22.74 | 23.55 | | 1 |
| | 50 | 0 | 22.32 | 22.16 | 22.27 | 22.19 | 22.26 | 0-2 | 2 |
| | 50 | 25 | 22.40 | 22.15 | 22.30 | 22.10 | 22.45 | | 2 |
| | 50 | 50 | 22.48 | 22.14 | 22.25 | 21.99 | 22.51 | | 2 |
| | 100 | 0 | 22.31 | 22.14 | 22.24 | 22.01 | 22.46 | | 2 |
| 64QAM | 1 | 0 | 21.95 | 21.81 | 21.79 | 21.74 | 21.84 | 0-2 | 2 |
| | 1 | 50 | 21.89 | 21.76 | 21.78 | 21.66 | 21.95 | | 2 |
| | 1 | 99 | 21.91 | 21.72 | 21.70 | 21.45 | 22.22 | | 2 |
| | 50 | 0 | 21.40 | 21.19 | 21.30 | 21.10 | 21.46 | 0-3 | 3 |
| | 50 | 25 | 21.40 | 21.20 | 21.28 | 21.25 | 21.50 | | 3 |
| | 50 | 50 | 21.42 | 21.15 | 21.27 | 21.07 | 21.60 | | 3 |
| | 100 | 0 | 21.34 | 21.12 | 21.26 | 21.07 | 21.46 | | 3 |

**Table 9-54**
**LTE Band 41 Max Conducted Powers – 15 MHz Bandwidth**

| LTE Band 41 15 MHz Bandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 39750 (2506.0 MHz) | Low-Mid Channel 40185 (2549.5 MHz) | Mid Channel 40620 (2593.0 MHz) | Mid-High Channel 41055 (2636.5 MHz) | High Channel 41490 (2680.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | | | |
| QPSK | 1 | 0 | 24.20 | 23.97 | 24.03 | 24.03 | 24.17 | 0 | 0 |
| | 1 | 36 | 24.07 | 23.99 | 23.94 | 23.94 | 24.18 | | 0 |
| | 1 | 74 | 24.16 | 23.89 | 23.97 | 23.77 | 24.46 | | 0 |
| | 36 | 0 | 23.27 | 23.19 | 23.16 | 23.12 | 23.38 | 0-1 | 1 |
| | 36 | 18 | 23.32 | 23.15 | 23.22 | 23.09 | 23.44 | | 1 |
| | 36 | 37 | 23.35 | 23.10 | 23.16 | 23.02 | 23.45 | | 1 |
| | 75 | 0 | 23.33 | 23.07 | 23.18 | 23.07 | 23.43 | | 1 |
| 16QAM | 1 | 0 | 23.22 | 23.09 | 23.02 | 23.06 | 23.20 | 0-1 | 1 |
| | 1 | 36 | 23.18 | 23.10 | 23.02 | 22.98 | 23.28 | | 1 |
| | 1 | 74 | 23.25 | 22.98 | 23.03 | 22.85 | 23.55 | | 1 |
| | 36 | 0 | 22.20 | 22.09 | 22.07 | 22.01 | 22.34 | 0-2 | 2 |
| | 36 | 18 | 22.23 | 22.10 | 22.12 | 22.02 | 22.32 | | 2 |
| | 36 | 37 | 22.26 | 22.03 | 22.08 | 22.14 | 22.37 | | 2 |
| | 75 | 0 | 22.30 | 22.13 | 22.18 | 22.08 | 22.41 | | 2 |
| 64QAM | 1 | 0 | 21.96 | 21.79 | 21.78 | 21.83 | 21.87 | 0-2 | 2 |
| | 1 | 36 | 21.91 | 21.77 | 21.76 | 21.69 | 21.97 | | 2 |
| | 1 | 74 | 22.02 | 21.70 | 21.75 | 21.54 | 22.23 | | 2 |
| | 36 | 0 | 21.24 | 21.12 | 21.13 | 21.10 | 21.36 | 0-3 | 3 |
| | 36 | 18 | 21.31 | 21.13 | 21.15 | 21.07 | 21.42 | | 3 |
| | 36 | 37 | 21.33 | 21.10 | 21.16 | 21.02 | 21.55 | | 3 |
| | 75 | 0 | 21.36 | 21.14 | 21.17 | 21.09 | 21.42 | | 3 |

## Table 9-55
## LTE Band 41 Max Conducted Powers – 10 MHz Bandwidth

| LTE Band 41 10 MHz Bandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Low-Mid Channel | Mid Channel | Mid-High Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 39750 (2506.0 MHz) | 40185 (2549.5 MHz) | 40620 (2593.0 MHz) | 41055 (2636.5 MHz) | 41490 (2680.0 MHz) | | |
| | | | Conducted Power [dBm] | | | | | | |
| QPSK | 1 | 0 | 24.31 | 24.25 | 24.30 | 24.02 | 24.43 | 0 | 0 |
| | 1 | 25 | 24.29 | 24.33 | 24.19 | 24.01 | 24.44 | | 0 |
| | 1 | 49 | 24.31 | 24.23 | 24.15 | 23.94 | 24.37 | | 0 |
| | 25 | 0 | 23.47 | 23.23 | 23.24 | 23.27 | 23.51 | 0-1 | 1 |
| | 25 | 12 | 23.45 | 23.30 | 23.36 | 23.24 | 23.59 | | 1 |
| | 25 | 25 | 23.44 | 23.35 | 23.26 | 23.11 | 23.51 | | 1 |
| | 50 | 0 | 23.49 | 23.42 | 23.37 | 23.26 | 23.60 | | 1 |
| 16QAM | 1 | 0 | 23.34 | 23.27 | 23.20 | 23.15 | 23.35 | 0-1 | 1 |
| | 1 | 25 | 23.35 | 23.18 | 23.13 | 23.10 | 23.48 | | 1 |
| | 1 | 49 | 23.37 | 23.26 | 23.12 | 23.16 | 23.33 | | 1 |
| | 25 | 0 | 22.46 | 22.29 | 22.35 | 22.20 | 22.53 | 0-2 | 2 |
| | 25 | 12 | 22.51 | 22.41 | 22.36 | 22.27 | 22.60 | | 2 |
| | 25 | 25 | 22.46 | 22.33 | 22.32 | 22.19 | 22.55 | | 2 |
| | 50 | 0 | 22.51 | 22.38 | 22.36 | 22.25 | 22.60 | | 2 |
| 64QAM | 1 | 0 | 22.16 | 21.97 | 21.91 | 21.86 | 22.25 | 0-2 | 2 |
| | 1 | 25 | 22.07 | 21.98 | 21.90 | 21.93 | 22.13 | | 2 |
| | 1 | 49 | 22.11 | 21.85 | 21.86 | 21.75 | 22.17 | | 2 |
| | 25 | 0 | 21.41 | 21.32 | 21.32 | 21.19 | 21.55 | 0-3 | 3 |
| | 25 | 12 | 21.43 | 21.27 | 21.30 | 21.22 | 21.57 | | 3 |
| | 25 | 25 | 21.38 | 21.25 | 21.31 | 21.22 | 21.49 | | 3 |
| | 50 | 0 | 21.53 | 21.41 | 21.39 | 21.30 | 21.63 | | 3 |

## Table 9-56
## LTE Band 41 Max Conducted Powers – 5 MHz Bandwidth

| LTE Band 41 5 MHz Bandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Low-Mid Channel | Mid Channel | Mid-High Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 39750 (2506.0 MHz) | 40185 (2549.5 MHz) | 40620 (2593.0 MHz) | 41055 (2636.5 MHz) | 41490 (2680.0 MHz) | | |
| | | | Conducted Power [dBm] | | | | | | |
| QPSK | 1 | 0 | 24.24 | 24.14 | 24.23 | 24.11 | 24.34 | 0 | 0 |
| | 1 | 12 | 24.25 | 24.14 | 24.15 | 24.09 | 24.39 | | 0 |
| | 1 | 24 | 24.21 | 24.11 | 24.19 | 24.04 | 24.42 | | 0 |
| | 12 | 0 | 23.37 | 23.27 | 23.25 | 23.15 | 23.44 | 0-1 | 1 |
| | 12 | 6 | 23.39 | 23.24 | 23.29 | 23.17 | 23.51 | | 1 |
| | 12 | 13 | 23.32 | 23.20 | 23.24 | 23.20 | 23.54 | | 1 |
| | 25 | 0 | 23.33 | 23.24 | 23.27 | 23.20 | 23.51 | | 1 |
| 16QAM | 1 | 0 | 23.23 | 23.26 | 23.27 | 23.14 | 23.45 | 0-1 | 1 |
| | 1 | 12 | 23.37 | 23.23 | 23.19 | 23.13 | 23.48 | | 1 |
| | 1 | 24 | 23.32 | 23.14 | 23.17 | 23.12 | 23.49 | | 1 |
| | 12 | 0 | 22.26 | 22.20 | 22.18 | 22.03 | 22.44 | 0-2 | 2 |
| | 12 | 6 | 22.31 | 22.16 | 22.20 | 22.10 | 22.43 | | 2 |
| | 12 | 13 | 22.23 | 22.11 | 22.21 | 22.15 | 22.45 | | 2 |
| | 25 | 0 | 22.30 | 22.23 | 22.25 | 22.18 | 22.56 | | 2 |
| 64QAM | 1 | 0 | 22.05 | 21.96 | 21.94 | 21.85 | 22.13 | 0-2 | 2 |
| | 1 | 12 | 22.08 | 21.92 | 21.89 | 21.83 | 22.20 | | 2 |
| | 1 | 24 | 22.04 | 21.90 | 21.85 | 21.87 | 22.20 | | 2 |
| | 12 | 0 | 21.30 | 21.23 | 21.19 | 21.12 | 21.40 | 0-3 | 3 |
| | 12 | 6 | 21.35 | 21.18 | 21.22 | 21.13 | 21.52 | | 3 |
| | 12 | 13 | 21.28 | 21.18 | 21.15 | 21.10 | 21.49 | | 3 |
| | 25 | 0 | 21.32 | 21.20 | 21.24 | 21.17 | 21.51 | | 3 |

## Table 9-57
## LTE Band 41 Reduced Conducted Powers – 20 MHz Bandwidth- Hotspot, Grip Sensor Active

| LTE Band 41 20 MHz Bandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Low-Mid Channel | Mid Channel | Mid-High Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 39750 (2506.0 MHz) | 40185 (2549.5 MHz) | 40620 (2593.0 MHz) | 41055 (2636.5 MHz) | 41490 (2680.0 MHz) | | |
| | | | Conducted Power [dBm] | | | | | | |
| QPSK | 1 | 0 | **19.96** | 19.57 | 19.49 | 19.34 | 19.32 | 0 | 0 |
| | 1 | 50 | 19.82 | 19.47 | 19.33 | 19.22 | 19.42 | | 0 |
| | 1 | 99 | 19.92 | 19.37 | 19.25 | 19.19 | 19.48 | | 0 |
| | 50 | 0 | 20.05 | 19.60 | 19.51 | 19.53 | 19.43 | 0-1 | 0 |
| | 50 | 25 | 20.00 | 19.65 | 19.48 | 19.41 | 19.42 | | 0 |
| | 50 | 50 | **20.08** | 19.45 | 19.42 | 19.31 | 19.54 | | 0 |
| | 100 | 0 | 19.95 | 19.52 | 19.41 | 19.46 | 19.48 | | 0 |
| 16QAM | 1 | 0 | 20.04 | 19.58 | 19.26 | 19.32 | 19.44 | 0-1 | 0 |
| | 1 | 50 | 19.99 | 19.49 | 19.36 | 19.15 | 19.36 | | 0 |
| | 1 | 99 | 19.98 | 19.48 | 19.26 | 19.02 | 19.61 | | 0 |
| | 50 | 0 | 20.01 | 19.65 | 19.46 | 19.50 | 19.53 | 0-2 | 0 |
| | 50 | 25 | 20.09 | 19.61 | 19.39 | 19.45 | 19.52 | | 0 |
| | 50 | 50 | 19.99 | 19.58 | 19.43 | 19.28 | 19.54 | | 0 |
| | 100 | 0 | 20.06 | 19.60 | 19.48 | 19.43 | 19.51 | | 0 |
| 64QAM | 1 | 0 | 19.87 | 19.51 | 19.19 | 19.36 | 19.32 | 0-2 | 0 |
| | 1 | 50 | 19.72 | 19.48 | 19.22 | 19.16 | 19.30 | | 0 |
| | 1 | 99 | 19.79 | 19.37 | 19.20 | 19.03 | 19.48 | | 0 |
| | 50 | 0 | 19.98 | 19.67 | 19.40 | 19.47 | 19.48 | 0-3 | 0 |
| | 50 | 25 | 20.01 | 19.55 | 19.47 | 19.38 | 19.45 | | 0 |
| | 50 | 50 | 20.04 | 19.53 | 19.41 | 19.25 | 19.53 | | 0 |
| | 100 | 0 | 19.99 | 19.63 | 19.46 | 19.34 | 19.51 | | 0 |

## Table 9-58
## LTE Band 41 Reduced Conducted Powers – 15 MHz Bandwidth- Hotspot, Grip Sensor Active

| LTE Band 41 15 MHz Bandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Low-Mid Channel | Mid Channel | Mid-High Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 39750 (2506.0 MHz) | 40185 (2549.5 MHz) | 40620 (2593.0 MHz) | 41055 (2636.5 MHz) | 41490 (2680.0 MHz) | | |
| | | | Conducted Power [dBm] | | | | | | |
| QPSK | 1 | 0 | 19.83 | 19.69 | 19.38 | 19.37 | 19.34 | 0 | 0 |
| | 1 | 36 | 19.78 | 19.65 | 19.34 | 19.28 | 19.29 | | 0 |
| | 1 | 74 | 19.86 | 19.63 | 19.35 | 19.21 | 19.65 | | 0 |
| | 36 | 0 | 19.97 | 19.87 | 19.59 | 19.53 | 19.60 | 0-1 | 0 |
| | 36 | 18 | 20.01 | 19.88 | 19.51 | 19.53 | 19.66 | | 0 |
| | 36 | 37 | 20.01 | 19.82 | 19.58 | 19.46 | 19.67 | | 0 |
| | 75 | 0 | 20.00 | 19.87 | 19.59 | 19.51 | 19.65 | | 0 |
| 16QAM | 1 | 0 | 19.94 | 19.71 | 19.44 | 19.47 | 19.34 | 0-1 | 0 |
| | 1 | 36 | 19.83 | 19.72 | 19.39 | 19.48 | 19.48 | | 0 |
| | 1 | 74 | 19.93 | 19.69 | 19.38 | 19.25 | 19.73 | | 0 |
| | 36 | 0 | 19.92 | 19.78 | 19.48 | 19.50 | 19.58 | 0-2 | 0 |
| | 36 | 18 | 19.94 | 19.79 | 19.45 | 19.44 | 19.62 | | 0 |
| | 36 | 37 | 20.00 | 19.73 | 19.47 | 19.33 | 19.63 | | 0 |
| | 75 | 0 | 20.05 | 19.63 | 19.00 | 19.53 | 19.71 | | 0 |
| 64QAM | 1 | 0 | 19.53 | 19.47 | 19.16 | 19.20 | 19.13 | 0-2 | 0 |
| | 1 | 36 | 19.59 | 19.44 | 19.18 | 19.11 | 19.19 | | 0 |
| | 1 | 74 | 19.66 | 19.40 | 19.11 | 19.00 | 19.34 | | 0 |
| | 36 | 0 | 19.93 | 19.85 | 19.56 | 19.52 | 19.60 | 0-3 | 0 |
| | 36 | 18 | 19.98 | 19.87 | 19.58 | 19.60 | 19.67 | | 0 |
| | 36 | 37 | 20.00 | 19.82 | 19.59 | 19.45 | 19.59 | | 0 |
| | 75 | 0 | 20.02 | 19.87 | 19.56 | 19.54 | 19.68 | | 0 |

## Table 9-59
## LTE Band 41 Reduced Conducted Powers – 10 MHz Bandwidth- Hotspot, Grip Sensor Active

| LTE Band 41 10 MHz Bandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Low-Mid Channel | Mid Channel | Mid-High Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 39750 (2506.0 MHz) | 40185 (2549.5 MHz) | 40620 (2593.0 MHz) | 41055 (2636.5 MHz) | 41490 (2680.0 MHz) | | |
| | | | Conducted Power [dBm] | | | | | | |
| QPSK | 1 | 0 | 19.77 | 19.69 | 19.35 | 19.43 | 19.39 | 0 | 0 |
| | 1 | 25 | 19.78 | 19.77 | 19.40 | 19.45 | 19.63 | | 0 |
| | 1 | 49 | 19.73 | 19.73 | 19.30 | 19.41 | 19.50 | | 0 |
| | 25 | 0 | 19.99 | 19.94 | 19.56 | 19.65 | 19.76 | 0-1 | 0 |
| | 25 | 12 | 20.01 | 19.91 | 19.58 | 19.68 | 19.78 | | 0 |
| | 25 | 25 | 19.91 | 19.86 | 19.59 | 19.62 | 19.80 | | 0 |
| | 50 | 0 | 20.03 | 19.92 | 19.58 | 19.70 | 19.82 | | 0 |
| 16QAM | 1 | 0 | 19.95 | 19.87 | 19.37 | 19.59 | 19.70 | 0-1 | 0 |
| | 1 | 25 | 19.88 | 19.79 | 19.43 | 19.52 | 19.50 | | 0 |
| | 1 | 49 | 19.97 | 19.78 | 19.40 | 19.60 | 19.67 | | 0 |
| | 25 | 0 | 20.05 | 19.95 | 19.59 | 19.72 | 19.88 | 0-2 | 0 |
| | 25 | 12 | 20.05 | 19.96 | 19.63 | 19.68 | 19.84 | | 0 |
| | 25 | 25 | 20.03 | 19.90 | 19.48 | 19.66 | 19.82 | | 0 |
| | 50 | 0 | 20.04 | 19.94 | 19.52 | 19.63 | 19.92 | | 0 |
| 64QAM | 1 | 0 | 19.63 | 19.52 | 19.17 | 19.33 | 19.37 | 0-2 | 0 |
| | 1 | 25 | 19.59 | 19.54 | 19.10 | 19.30 | 19.32 | | 0 |
| | 1 | 49 | 19.64 | 19.51 | 19.13 | 19.27 | 19.79 | | 0 |
| | 25 | 0 | 19.97 | 19.85 | 19.59 | 19.66 | 19.78 | 0-3 | 0 |
| | 25 | 12 | 19.98 | 19.87 | 19.49 | 19.62 | 19.86 | | 0 |
| | 25 | 25 | 19.97 | 19.87 | 19.50 | 19.62 | 19.74 | | 0 |
| | 50 | 0 | 20.04 | 19.97 | 19.57 | 19.72 | 19.86 | | 0 |

## Table 9-60
## LTE Band 41 Reduced Conducted Powers – 5 MHz Bandwidth- Hotspot, Grip Sensor Active

| LTE Band 41 5 MHz Bandwidth | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel | Low-Mid Channel | Mid Channel | Mid-High Channel | High Channel | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | 39750 (2506.0 MHz) | 40185 (2549.5 MHz) | 40620 (2593.0 MHz) | 41055 (2636.5 MHz) | 41490 (2680.0 MHz) | | |
| | | | Conducted Power [dBm] | | | | | | |
| QPSK | 1 | 0 | 19.84 | 19.43 | 19.61 | 19.37 | 19.40 | 0 | 0 |
| | 1 | 12 | 19.88 | 19.47 | 19.56 | 19.33 | 19.47 | | 0 |
| | 1 | 24 | 19.80 | 19.52 | 19.53 | 19.17 | 19.48 | | 0 |
| | 12 | 0 | 19.98 | 19.63 | 19.72 | 19.47 | 19.60 | 0-1 | 0 |
| | 12 | 6 | 19.95 | 19.61 | 19.74 | 19.50 | 19.66 | | 0 |
| | 12 | 13 | 19.93 | 19.62 | 19.49 | 19.48 | 19.59 | | 0 |
| | 25 | 0 | 19.94 | 19.60 | 19.76 | 19.50 | 19.63 | | 0 |
| 16QAM | 1 | 0 | 19.90 | 19.65 | 19.78 | 19.46 | 19.48 | 0-1 | 0 |
| | 1 | 12 | 19.99 | 19.60 | 19.71 | 19.43 | 19.51 | | 0 |
| | 1 | 24 | 19.88 | 19.59 | 19.63 | 19.41 | 19.54 | | 0 |
| | 12 | 0 | 19.84 | 19.53 | 19.69 | 19.38 | 19.46 | 0-2 | 0 |
| | 12 | 6 | 19.95 | 19.57 | 19.68 | 19.42 | 19.54 | | 0 |
| | 12 | 13 | 19.84 | 19.65 | 19.65 | 19.42 | 19.55 | | 0 |
| | 25 | 0 | 19.96 | 19.66 | 19.80 | 19.53 | 19.60 | | 0 |
| 64QAM | 1 | 0 | 19.58 | 19.29 | 19.48 | 19.21 | 18.80 | 0-2 | 0 |
| | 1 | 12 | 19.66 | 19.36 | 19.37 | 19.17 | 19.57 | | 0 |
| | 1 | 24 | 19.59 | 19.33 | 19.33 | 19.14 | 19.24 | | 0 |
| | 12 | 0 | 19.94 | 19.53 | 19.68 | 19.47 | 19.49 | 0-3 | 0 |
| | 12 | 6 | 19.95 | 19.58 | 19.70 | 19.47 | 19.58 | | 0 |
| | 12 | 13 | 19.92 | 19.62 | 19.63 | 19.45 | 19.56 | | 0 |
| | 25 | 0 | 19.91 | 19.69 | 19.72 | 19.46 | 19.59 | | 0 |

### 9.3.7 LTE Uplink Carrier Aggregation Conducted Powers

**Table 9-61**
**LTE Uplink Carrier Aggregation Max Conducted Powers**

| | PCC | | | | | | | SCC | | | | | | | Power | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Combination | PCC Band | PCC Bandwidth [MHz] | PCC (UL/DL) Channel | PCC (UL/DL) Frequency [MHz] | Modulation | PCC UL# RB | PCC UL RB Offset | SCC Band | SCC Bandwidth [MHz] | SCC (UL/DL) Channel | SCC (UL/DL) Frequency [MHz] | Modulation | SCC UL# RB | SCC UL RB Offset | LTE Tx.Power with UL CA Enabled (dBm) | LTE Single Carrier Tx Power (dBm) |
| CA_41C (1) | LTE B41 | 20 | 41490 | 2680.0 | QPSK | 1 | 0 | LTE B41 | 20 | 41292 | 2660.2 | QPSK | 1 | 99 | 24.83 | 24.19 |

**Table 9-62**
**LTE Uplink Carrier Aggregation Reduced Conducted Powers- Hotspot, Grip Sensor Active**

| | PCC | | | | | | | SCC | | | | | | | Power | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Combination | PCC Band | PCC Bandwidth [MHz] | PCC (UL/DL) Channel | PCC (UL/DL) Frequency [MHz] | Modulation | PCC UL# RB | PCC UL RB Offset | SCC Band | SCC Bandwidth [MHz] | SCC (UL/DL) Channel | SCC (UL/DL) Frequency [MHz] | Modulation | SCC UL# RB | SCC UL RB Offset | LTE Tx.Power with UL CA Enabled (dBm) | LTE Single Carrier Tx Power (dBm) |
| CA_41C (1) | LTE B41 | 20 | 39750 | 2506.0 | QPSK | 50 | 50 | LTE B41 | 20 | 39948 | 2525.8 | QPSK | 50 | 0 | 21.00 | 20.08 |

Notes:

1. This device supports uplink carrier aggregation for LTE CA_41C with a maximum of two 20 MHz component carriers. For intraband contiguous carrier aggregation scenarios, 3GPP 36.101 Table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when non-contiguous RB allocation is implemented. The conducted powers and MPR settings in this device are permanently implemented per the above 3GPP requirements.
2. Per FCC Guidance, the output power with uplink CA active was measured for the configuration with the highest reported SAR with single carrier for each exposure condition. The power was measured with wideband signal integration over both component carriers.

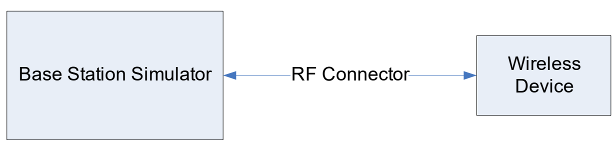



**Figure 9-3**
**Power Measurement Setup**

## 9.4 WLAN Conducted Powers

**Table 9-63**
**2.4 GHz WLAN Maximum Average RF Power – Ant 1**

| 2.4GHz Conducted Power [dBm] | | | | | |
|---|---|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | | | |
| | | 802.11b | 802.11g | 802.11n | 802.11ax |
| | | Average | Average | Average | Average |
| 2412 | 1 | 20.94 | 17.68 | 17.76 | 15.94 |
| 2417 | 2 | N/A | N/A | N/A | 17.86 |
| 2437 | 6 | 20.68 | 17.66 | 17.94 | 17.96 |
| 2457 | 10 | N/A | N/A | N/A | 17.57 |
| 2462 | 11 | 20.74 | 17.80 | 17.83 | 16.62 |

**Table 9-64**
**2.4 GHz WLAN Maximum Average RF Power – Ant 2**

| 2.4GHz Conducted Power [dBm] | | | | | |
|---|---|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | | | |
| | | 802.11b | 802.11g | 802.11n | 802.11ax |
| | | Average | Average | Average | Average |
| 2412 | 1 | 20.97 | 17.37 | 17.33 | 15.76 |
| 2417 | 2 | N/A | N/A | N/A | 17.42 |
| 2437 | 6 | 20.64 | 17.83 | 17.74 | 17.98 |
| 2457 | 10 | N/A | N/A | N/A | 17.75 |
| 2462 | 11 | 20.93 | 17.97 | 17.98 | 16.81 |

**Table 9-65**
**5 GHz WLAN Maximum Average RF Power – Ant 1**

| 5GHz (20MHz) Conducted Power [dBm] | | | | | |
|---|---|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | | | |
| | | 802.11a | 802.11n | 802.11ac | 802.11ax |
| | | Average | Average | Average | Average |
| 5180 | 36 | 15.29 | 15.20 | 15.38 | 15.57 |
| 5200 | 40 | 18.36 | 18.35 | 18.47 | 18.19 |
| 5220 | 44 | 18.35 | 18.45 | 18.40 | 18.24 |
| 5240 | 48 | 18.44 | 18.43 | 18.49 | 18.27 |
| 5260 | 52 | 18.06 | 18.41 | 18.04 | 18.41 |
| 5280 | 56 | 18.10 | 18.12 | 18.01 | 18.49 |
| 5300 | 60 | 18.18 | 18.10 | 18.19 | 17.98 |
| 5320 | 64 | 17.59 | 17.62 | 17.57 | 16.42 |
| 5500 | 100 | 17.42 | 17.36 | 17.42 | 17.22 |
| 5520 | 104 | 18.02 | 18.03 | 18.00 | 18.19 |
| 5600 | 120 | 18.20 | 18.24 | 18.26 | 18.30 |
| 5620 | 124 | 18.13 | 18.16 | 18.16 | 18.23 |
| 5720 | 144 | 18.09 | 18.15 | 18.19 | 18.21 |
| 5745 | 149 | 18.22 | 18.26 | 18.27 | 18.46 |
| 5785 | 157 | 18.20 | 18.23 | 18.23 | 18.49 |
| 5825 | 165 | 18.45 | 18.37 | 18.46 | 18.36 |

**Table 9-66**
**5 GHz WLAN Maximum Average RF Power – Ant 2**

| 5GHz (20MHz) Conducted Power [dBm] | | | | | |
|---|---|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | | | |
| | | 802.11a | 802.11n | 802.11ac | 802.11ax |
| | | Average | Average | Average | Average |
| 5180 | 36 | 15.46 | 15.47 | 15.49 | 15.77 |
| 5200 | 40 | 18.32 | 18.29 | 18.43 | 18.48 |
| 5220 | 44 | 18.28 | 18.26 | 18.37 | 18.10 |
| 5240 | 48 | 18.42 | 18.35 | 18.33 | 18.18 |
| 5260 | 52 | 18.11 | 18.11 | 18.14 | 18.07 |
| 5280 | 56 | 18.26 | 18.29 | 18.23 | 18.18 |
| 5300 | 60 | 18.37 | 18.32 | 18.39 | 18.23 |
| 5320 | 64 | 17.97 | 17.98 | 17.98 | 16.47 |
| 5500 | 100 | 17.17 | 17.44 | 17.39 | 17.11 |
| 5520 | 104 | 18.27 | 18.23 | 18.31 | 18.21 |
| 5600 | 120 | 18.34 | 18.40 | 18.40 | 18.25 |
| 5620 | 124 | 18.30 | 18.41 | 18.35 | 18.23 |
| 5720 | 144 | 18.39 | 18.38 | 18.37 | 18.26 |
| 5745 | 149 | 18.05 | 18.05 | 18.06 | 18.45 |
| 5785 | 157 | 18.24 | 18.20 | 18.20 | 18.10 |
| 5825 | 165 | 17.93 | 18.05 | 17.96 | 18.49 |

**Table 9-67**
**5 GHz WLAN Maximum Average RF Power – MIMO**

| 5GHz (20MHz) 802.11n Conducted Power [dBm] | | | | |
|---|---|---|---|---|
| Freq [MHz] | Channel | ANT1 | ANT2 | MIMO |
| 5180 | 36 | 12.01 | 12.45 | 15.25 |
| 5200 | 40 | 18.35 | 18.29 | 21.33 |
| 5220 | 44 | 18.45 | 18.26 | 21.37 |
| 5240 | 48 | 18.43 | 18.35 | 21.40 |
| 5260 | 52 | 18.41 | 18.11 | 21.27 |
| 5280 | 56 | 18.12 | 18.29 | 21.22 |
| 5300 | 60 | 18.10 | 18.32 | 21.22 |
| 5320 | 64 | 14.99 | 14.37 | 17.70 |
| 5500 | 100 | 17.36 | 17.44 | 20.41 |
| 5520 | 104 | 17.68 | 17.88 | 20.79 |
| 5600 | 120 | 17.75 | 17.85 | 20.81 |
| 5620 | 124 | 17.88 | 17.98 | 20.94 |
| 5720 | 144 | 17.69 | 17.90 | 20.81 |
| 5745 | 149 | 18.26 | 18.05 | 21.17 |
| 5785 | 157 | 18.23 | 18.20 | 21.23 |
| 5825 | 165 | 18.37 | 18.05 | 21.22 |

**Table 9-68**
**Maximum Output Powers During Conditions with 2.4 GHz and 5 GHz WLAN**

| 2.4GHz 802.11n Conducted Power [dBm] | | | |
|---|---|---|---|
| Freq [MHz] | Channel | ANT1 | ANT2 |
| 2412 | 1 | 16.40 | 16.33 |
| 2437 | 6 | 16.42 | 16.52 |
| 2462 | 11 | 16.32 | 16.22 |
| **5GHz (40MHz) 802.11n Conducted Power [dBm]** | | | |
| Freq [MHz] | Channel | ANT1 | ANT2 |
| 5190 | 38 | 10.47 | 10.15 |
| 5230 | 46 | 13.64 | 13.82 |
| 5270 | 54 | 13.47 | 13.79 |
| 5310 | 62 | 10.06 | 10.09 |
| **5GHz (80MHz) 802.11ac Conducted Power [dBm]** | | | |
| Freq [MHz] | Channel | ANT1 | ANT2 |
| 5530 | 106 | 9.56 | 9.73 |
| 5610 | 122 | 13.91 | 13.89 |
| 5690 | 138 | 13.89 | 13.81 |
| 5775 | 155 | 13.82 | 13.65 |

**Table 9-69**
**2.4 GHz WLAN Reduced Average RF Power – Ant 1**

| 2.4GHz Conducted Power [dBm] | | | | | |
|---|---|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | | | |
| | | 802.11b | 802.11g | 802.11n | 802.11ax |
| | | Average | Average | Average | Average |
| 2412 | 1 | 16.82 | 16.80 | 16.40 | 15.94 |
| 2417 | 2 | N/A | N/A | N/A | 16.99 |
| 2437 | 6 | 16.50 | 16.78 | 16.42 | 16.73 |
| 2462 | 11 | 16.64 | 16.70 | 16.32 | 16.62 |

**Table 9-70**
**2.4 GHz WLAN Reduced Average RF Power – Ant 2**

| 2.4GHz Conducted Power [dBm] | | | | | |
|---|---|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | | | |
| | | 802.11b | 802.11g | 802.11n | 802.11ax |
| | | Average | Average | Average | Average |
| 2412 | 1 | 16.85 | 16.89 | 16.33 | 15.76 |
| 2417 | 2 | N/A | N/A | N/A | 16.49 |
| 2437 | 6 | 16.91 | 16.50 | 16.52 | 16.85 |
| 2462 | 11 | 16.43 | 16.40 | 16.22 | 16.81 |

**Table 9-71**
**5 GHz WLAN Reduced Average RF Power – Ant 1**

| 5GHz (40MHz) Conducted Power [dBm] | | | | |
|---|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | | |
| | | 802.11n | 802.11ac | 802.11ax |
| | | Average | Average | Average |
| 5190 | 38 | 13.87 | 13.63 | 12.99 |
| 5230 | 46 | 13.64 | 13.57 | 13.12 |
| 5270 | 54 | 13.47 | 13.98 | 13.35 |
| 5310 | 62 | 13.46 | 13.05 | 13.22 |

| 5GHz (80MHz) Conducted Power [dBm] | | | |
|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | |
| | | 802.11ac | 802.11ax |
| | | Average | Average |
| 5530 | 106 | 12.95 | 12.44 |
| 5610 | 122 | 13.91 | 13.97 |
| 5690 | 138 | 13.89 | 13.99 |
| 5775 | 155 | 13.82 | 13.93 |

## Table 9-72
## 5 GHz WLAN Reduced Average RF Power – Ant 2

| 5GHz (40MHz) Conducted Power [dBm] | | | | |
|---|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | | |
| | | 802.11n | 802.11ac | 802.11ax |
| | | Average | Average | Average |
| 5190 | 38 | 13.93 | 13.67 | 13.12 |
| 5230 | 46 | 13.82 | 13.91 | 13.35 |
| 5270 | 54 | 13.79 | 13.82 | 13.22 |
| 5310 | 62 | 13.48 | 13.34 | 13.10 |

| 5GHz (80MHz) Conducted Power [dBm] | | | |
|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | |
| | | 802.11ac | 802.11ax |
| | | Average | Average |
| 5530 | 106 | 12.97 | 12.30 |
| 5610 | 122 | 13.89 | 13.98 |
| 5690 | 138 | 13.81 | 13.97 |
| 5775 | 155 | 13.65 | 13.94 |

## Table 9-73
## 5 GHz WLAN Reduced Average RF Power – MIMO

| 5GHz (40MHz) 802.11n Conducted Power [dBm] | | | | |
|---|---|---|---|---|
| Freq [MHz] | Channel | ANT1 | ANT2 | MIMO |
| 5190 | 38 | 10.47 | 10.15 | 13.32 |
| 5230 | 46 | 13.64 | 13.82 | 16.74 |
| 5270 | 54 | 13.47 | 13.79 | 16.64 |
| 5310 | 62 | 10.06 | 10.09 | 13.09 |

| 5GHz (80MHz) 802.11ac Conducted Power [dBm] | | | | |
|---|---|---|---|---|
| Freq [MHz] | Channel | ANT1 | ANT2 | MIMO |
| 5530 | 106 | 9.56 | 9.73 | 12.66 |
| 5610 | 122 | 13.91 | 13.89 | 16.91 |
| 5690 | 138 | 13.89 | 13.81 | 16.86 |
| 5775 | 155 | 13.82 | 13.65 | 16.75 |

**Table 9-74**
**Reduced Output Powers During Conditions with 2.4 GHz and 5 GHz WLAN**

| 2.4GHz 802.11n Conducted Power [dBm] | | | |
|---|---|---|---|
| **Freq [MHz]** | **Channel** | **ANT1** | **ANT2** |
| 2412 | 1 | 12.35 | 12.01 |
| 2437 | 6 | 12.01 | 12.32 |
| 2462 | 11 | **12.38** | **12.54** |

Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02:

- Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
- For transmission modes with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
- For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.
- For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.
- The bolded data rate and channel above were tested for SAR.

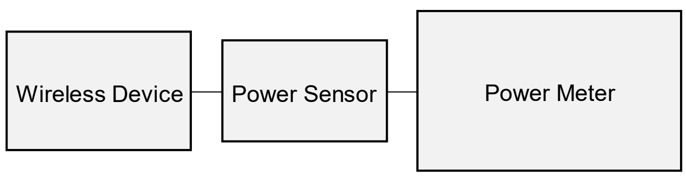



**Figure 9-4**
**Power Measurement Setup**

## 9.5 Bluetooth Conducted Powers

**Table 9-75**
**Bluetooth Average RF Power**

| Frequency [MHz] | Data Rate [Mbps] | Channel No. | Avg Conducted Power | |
|---|---|---|---|---|
| | | | [dBm] | [mW] |
| 2402 | 1.0 | 0 | 16.67 | 46.452 |
| 2441 | 1.0 | 39 | **18.13** | 64.963 |
| 2480 | 1.0 | 78 | 16.78 | 47.643 |
| 2402 | 2.0 | 0 | 10.24 | 10.563 |
| 2441 | 2.0 | 39 | 11.77 | 15.023 |
| 2480 | 2.0 | 78 | 10.51 | 11.238 |
| 2402 | 3.0 | 0 | 9.88 | 9.730 |
| 2441 | 3.0 | 39 | 11.42 | 13.859 |
| 2480 | 3.0 | 78 | 10.42 | 11.017 |

Note: The bolded data rates and channel above were tested for SAR.

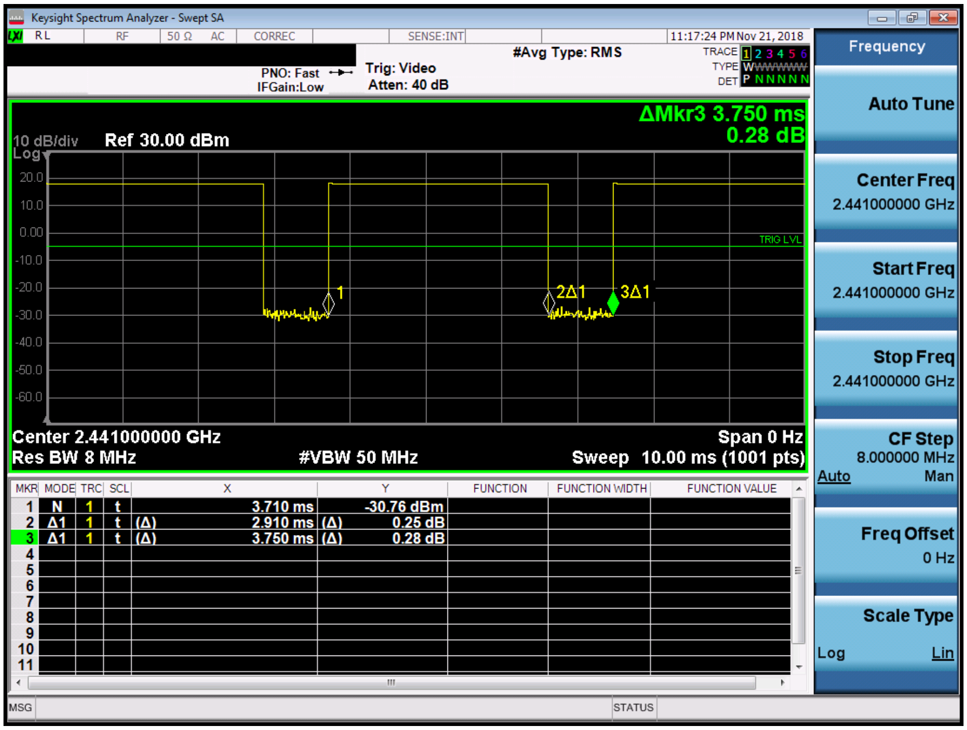



**Figure 9-5**
**Bluetooth Transmission Plot**

**Equation 9-1**
**Bluetooth Duty Cycle Calculation**

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.91ms}{3.75ms} * 100\% = 77.6\%$$

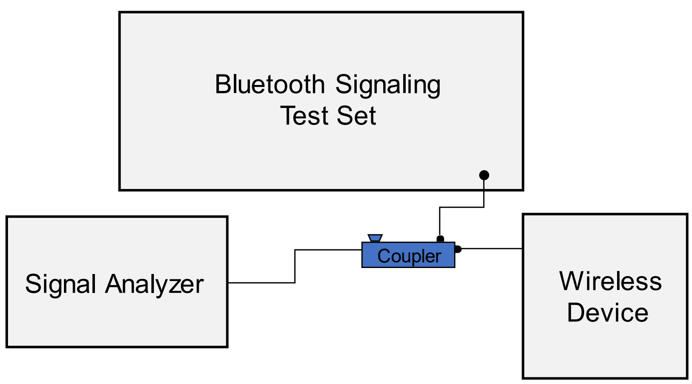



**Figure 9-6**
**Power Measurement Setup**

# 10 SYSTEM VERIFICATION

## 10.1 Tissue Verification

**Table 10-1**
**Measured Tissue Properties- Head**

| Calibrated for Tests Performed on: | Tissue Type | Tissue Temp During Calibration (˚C) | Measured Frequency (MHz) | Measured Conductivity, σ (S/m) | Measured Dielectric Constant, ε | TARGET Conductivity, σ (S/m) | TARGET Dielectric Constant, ε | % dev σ | % dev ε |
|---|---|---|---|---|---|---|---|---|---|
| 12/26/2018 | 750H | 20.8 | 700 | 0.889 | 41.338 | 0.889 | 42.201 | 0.00% | -2.04% |
| | | | 710 | 0.893 | 41.296 | 0.890 | 42.149 | 0.34% | -2.02% |
| | | | 720 | 0.897 | 41.272 | 0.891 | 42.097 | 0.67% | -1.96% |
| | | | 740 | 0.903 | 41.205 | 0.893 | 41.994 | 1.12% | -1.88% |
| | | | 755 | 0.908 | 41.156 | 0.894 | 41.916 | 1.57% | -1.81% |
| | | | 770 | 0.914 | 41.103 | 0.895 | 41.838 | 2.12% | -1.76% |
| | | | 785 | 0.920 | 41.048 | 0.896 | 41.760 | 2.68% | -1.70% |
| 12/22/2018 | 835H | 20.8 | 820 | 0.888 | 40.833 | 0.899 | 41.578 | -1.22% | -1.79% |
| | | | 835 | 0.903 | 40.650 | 0.900 | 41.500 | 0.33% | -2.05% |
| | | | 850 | 0.918 | 40.462 | 0.916 | 41.500 | 0.22% | -2.50% |
| 12/25/2018 | 1750H | 20.8 | 1710 | 1.356 | 39.031 | 1.348 | 40.142 | 0.59% | -2.77% |
| | | | 1750 | 1.382 | 38.985 | 1.371 | 40.079 | 0.80% | -2.73% |
| | | | 1790 | 1.405 | 38.885 | 1.394 | 40.016 | 0.79% | -2.83% |
| 12/19/2018 | 1900H | 21.5 | 1850 | 1.389 | 40.286 | 1.400 | 40.000 | -0.79% | 0.72% |
| | | | 1880 | 1.419 | 40.172 | 1.400 | 40.000 | 1.36% | 0.43% |
| | | | 1910 | 1.450 | 40.036 | 1.400 | 40.000 | 3.57% | 0.09% |
| 12/17/2018 | 2450H | 22.7 | 2400 | 1.805 | 38.467 | 1.756 | 39.289 | 2.79% | -2.09% |
| | | | 2450 | 1.862 | 38.272 | 1.800 | 39.200 | 3.44% | -2.37% |
| | | | 2500 | 1.914 | 38.094 | 1.855 | 39.136 | 3.18% | -2.66% |
| 12/26/2018 | 2450H | 22.0 | 2400 | 1.813 | 39.589 | 1.756 | 39.289 | 3.25% | 0.76% |
| | | | 2450 | 1.871 | 39.417 | 1.800 | 39.200 | 3.94% | 0.55% |
| | | | 2500 | 1.926 | 39.206 | 1.855 | 39.136 | 3.83% | 0.18% |
| 1/9/2019 | 2450-2600H | 21.0 | 2450 | 1.869 | 40.474 | 1.800 | 39.200 | 3.83% | 3.25% |
| | | | 2500 | 1.909 | 40.396 | 1.855 | 39.136 | 2.91% | 3.22% |
| | | | 2550 | 1.950 | 40.275 | 1.909 | 39.073 | 2.15% | 3.08% |
| | | | 2600 | 1.989 | 40.149 | 1.964 | 39.009 | 1.27% | 2.92% |
| | | | 2650 | 2.035 | 40.027 | 2.018 | 38.945 | 0.84% | 2.78% |
| | | | 2700 | 2.077 | 40.000 | 2.073 | 38.882 | 0.19% | 2.88% |
| 1/22/2019 | 2450H | 20.5 | 2400 | 1.820 | 39.385 | 1.756 | 39.289 | 3.64% | 0.24% |
| | | | 2450 | 1.860 | 39.294 | 1.800 | 39.200 | 3.33% | 0.24% |
| | | | 2500 | 1.899 | 39.204 | 1.855 | 39.136 | 2.37% | 0.17% |
| 01/07/2019 | 5200H-5800H | 20.6 | 5180 | 4.497 | 35.405 | 4.635 | 36.009 | -2.98% | -1.68% |
| | | | 5200 | 4.524 | 35.391 | 4.655 | 35.986 | -2.81% | -1.65% |
| | | | 5220 | 4.534 | 35.365 | 4.676 | 35.963 | -3.04% | -1.66% |
| | | | 5240 | 4.553 | 35.330 | 4.696 | 35.940 | -3.05% | -1.70% |
| | | | 5260 | 4.575 | 35.295 | 4.717 | 35.917 | -3.01% | -1.73% |
| | | | 5280 | 4.602 | 35.239 | 4.737 | 35.894 | -2.85% | -1.82% |
| | | | 5300 | 4.620 | 35.211 | 4.758 | 35.871 | -2.90% | -1.84% |
| | | | 5320 | 4.627 | 35.197 | 4.778 | 35.849 | -3.16% | -1.82% |
| | | | 5500 | 4.827 | 35.027 | 4.963 | 35.643 | -2.74% | -1.73% |
| | | | 5520 | 4.838 | 34.995 | 4.983 | 35.620 | -2.91% | -1.75% |
| | | | 5540 | 4.871 | 34.923 | 5.004 | 35.597 | -2.66% | -1.89% |
| | | | 5560 | 4.893 | 34.916 | 5.024 | 35.574 | -2.61% | -1.85% |
| | | | 5580 | 4.911 | 34.892 | 5.045 | 35.551 | -2.66% | -1.85% |
| | | | 5600 | 4.923 | 34.867 | 5.065 | 35.529 | -2.80% | -1.86% |
| | | | 5620 | 4.941 | 34.841 | 5.086 | 35.506 | -2.85% | -1.87% |
| | | | 5640 | 4.960 | 34.775 | 5.106 | 35.483 | -2.86% | -2.00% |
| | | | 5660 | 4.994 | 34.789 | 5.127 | 35.460 | -2.59% | -1.89% |
| | | | 5680 | 4.995 | 34.774 | 5.147 | 35.437 | -2.95% | -1.87% |
| | | | 5700 | 5.028 | 34.735 | 5.168 | 35.414 | -2.71% | -1.92% |
| | | | 5745 | 5.082 | 34.602 | 5.214 | 35.363 | -2.53% | -2.15% |
| | | | 5765 | 5.100 | 34.606 | 5.234 | 35.340 | -2.56% | -2.08% |
| | | | 5785 | 5.115 | 34.616 | 5.255 | 35.317 | -2.66% | -1.98% |
| | | | 5800 | 5.123 | 34.555 | 5.270 | 35.300 | -2.79% | -2.11% |
| | | | 5805 | 5.127 | 34.544 | 5.275 | 35.294 | -2.81% | -2.13% |
| | | | 5825 | 5.152 | 34.508 | 5.296 | 35.271 | -2.72% | -2.16% |

## Table 10-2
## Measured Tissue Properties- Body

| Calibrated for Tests Performed on: | Tissue Type | Tissue Temp During Calibration (°C) | Measured Frequency (MHz) | Measured Conductivity, σ (S/m) | Measured Dielectric Constant, ε | TARGET Conductivity, σ (S/m) | TARGET Dielectric Constant, ε | % dev σ | % dev ε |
|---|---|---|---|---|---|---|---|---|---|
| 12/19/2018 | 750B | 20.1 | 700 | 0.925 | 54.207 | 0.959 | 55.726 | -3.55% | -2.73% |
| | | | 710 | 0.927 | 54.253 | 0.960 | 55.687 | -3.44% | -2.58% |
| | | | 740 | 0.940 | 54.191 | 0.963 | 55.570 | -2.39% | -2.48% |
| | | | 755 | 0.944 | 54.125 | 0.964 | 55.512 | -2.07% | -2.50% |
| | | | 770 | 0.951 | 54.009 | 0.965 | 55.453 | -1.45% | -2.60% |
| | | | 785 | 0.956 | 53.943 | 0.966 | 55.395 | -1.04% | -2.62% |
| 12/26/2018 | 835B | 19.1 | 820 | 0.959 | 53.645 | 0.969 | 55.258 | -1.03% | -2.92% |
| | | | 835 | 0.965 | 53.598 | 0.970 | 55.200 | -0.52% | -2.90% |
| | | | 850 | 0.972 | 53.536 | 0.988 | 55.154 | -1.62% | -2.93% |
| 12/26/2018 | 1750B | 21.1 | 1710 | 1.483 | 52.686 | 1.463 | 53.537 | 1.37% | -1.59% |
| | | | 1750 | 1.531 | 52.512 | 1.488 | 53.432 | 2.89% | -1.72% |
| | | | 1790 | 1.574 | 52.325 | 1.514 | 53.326 | 3.96% | -1.88% |
| 12/26/2018 | 1900B | 21.9 | 1850 | 1.502 | 51.500 | 1.520 | 53.300 | -1.18% | -3.38% |
| | | | 1880 | 1.536 | 51.379 | 1.520 | 53.300 | 1.05% | -3.60% |
| | | | 1910 | 1.572 | 51.264 | 1.520 | 53.300 | 3.42% | -3.82% |
| 12/28/2018 | 1900B | 22.5 | 1850 | 1.499 | 52.589 | 1.520 | 53.300 | -1.38% | -1.33% |
| | | | 1880 | 1.533 | 52.466 | 1.520 | 53.300 | 0.86% | -1.56% |
| | | | 1910 | 1.564 | 52.352 | 1.520 | 53.300 | 2.89% | -1.78% |
| 12/26/2018 | 2450B | 22.7 | 2400 | 1.982 | 51.672 | 1.902 | 52.767 | 4.21% | -2.08% |
| | | | 2450 | 2.041 | 51.540 | 1.950 | 52.700 | 4.67% | -2.20% |
| | | | 2500 | 2.096 | 51.398 | 2.021 | 52.636 | 3.71% | -2.35% |
| 12/30/2018 | 2450B | 23.8 | 2400 | 1.953 | 50.822 | 1.902 | 52.767 | 2.68% | -3.69% |
| | | | 2450 | 2.007 | 50.738 | 1.950 | 52.700 | 2.92% | -3.72% |
| | | | 2500 | 2.073 | 50.562 | 2.021 | 52.636 | 2.57% | -3.94% |
| 1/2/2019 | 2450B-2600B | 23.1 | 2400 | 1.941 | 52.795 | 1.902 | 52.767 | 2.05% | 0.05% |
| | | | 2450 | 2.011 | 52.581 | 1.950 | 52.700 | 3.13% | -0.23% |
| | | | 2500 | 2.083 | 52.400 | 2.021 | 52.636 | 3.07% | -0.45% |
| | | | 2550 | 2.149 | 52.249 | 2.092 | 52.573 | 2.72% | -0.62% |
| | | | 2600 | 2.224 | 51.993 | 2.163 | 52.509 | 2.82% | -0.98% |
| | | | 2650 | 2.281 | 51.865 | 2.234 | 52.445 | 2.10% | -1.11% |
| | | | 2700 | 2.354 | 51.637 | 2.305 | 52.382 | 2.13% | -1.42% |
| 1/10/2019 | 2450B-2600B | 23.4 | 2400 | 1.980 | 51.430 | 1.902 | 52.767 | 4.10% | -2.53% |
| | | | 2450 | 2.045 | 51.331 | 1.950 | 52.700 | 4.87% | -2.60% |
| | | | 2500 | 2.103 | 51.148 | 2.021 | 52.636 | 4.06% | -2.83% |
| | | | 2550 | 2.157 | 51.005 | 2.092 | 52.573 | 3.11% | -2.98% |
| | | | 2600 | 2.220 | 50.827 | 2.163 | 52.509 | 2.64% | -3.20% |
| | | | 2650 | 2.270 | 50.706 | 2.234 | 52.445 | 1.61% | -3.32% |
| | | | 2700 | 2.337 | 50.597 | 2.305 | 52.382 | 1.39% | -3.41% |
| 1/21/2019 | 2450B | 22.0 | 2400 | 1.985 | 51.859 | 1.902 | 52.767 | 4.36% | -1.72% |
| | | | 2450 | 2.043 | 51.711 | 1.950 | 52.700 | 4.77% | -1.88% |
| | | | 2500 | 2.102 | 51.571 | 2.021 | 52.636 | 4.01% | -2.02% |
| 01/03/2019 | 5200B-5800B | 21.7 | 5180 | 5.307 | 47.482 | 5.276 | 49.041 | 0.59% | -3.18% |
| | | | 5200 | 5.321 | 47.426 | 5.299 | 49.014 | 0.42% | -3.24% |
| | | | 5220 | 5.356 | 47.399 | 5.323 | 48.987 | 0.62% | -3.24% |
| | | | 5240 | 5.377 | 47.382 | 5.346 | 48.960 | 0.58% | -3.22% |
| | | | 5260 | 5.427 | 47.316 | 5.369 | 48.933 | 1.08% | -3.30% |
| | | | 5280 | 5.466 | 47.288 | 5.393 | 48.906 | 1.35% | -3.31% |
| | | | 5300 | 5.477 | 47.257 | 5.416 | 48.879 | 1.13% | -3.32% |
| | | | 5320 | 5.494 | 47.173 | 5.439 | 48.851 | 1.01% | -3.43% |
| | | | 5500 | 5.752 | 46.860 | 5.650 | 48.607 | 1.81% | -3.59% |
| | | | 5520 | 5.779 | 46.843 | 5.673 | 48.580 | 1.87% | -3.58% |
| | | | 5540 | 5.819 | 46.752 | 5.696 | 48.553 | 2.16% | -3.71% |
| | | | 5560 | 5.852 | 46.752 | 5.720 | 48.526 | 2.31% | -3.66% |
| | | | 5580 | 5.882 | 46.729 | 5.743 | 48.499 | 2.42% | -3.65% |
| | | | 5600 | 5.888 | 46.674 | 5.766 | 48.471 | 2.12% | -3.71% |
| | | | 5620 | 5.927 | 46.624 | 5.790 | 48.444 | 2.37% | -3.76% |
| | | | 5640 | 5.967 | 46.562 | 5.813 | 48.417 | 2.65% | -3.83% |
| | | | 5660 | 6.003 | 46.584 | 5.837 | 48.390 | 2.84% | -3.73% |
| | | | 5680 | 6.013 | 46.528 | 5.860 | 48.363 | 2.61% | -3.79% |
| | | | 5700 | 6.052 | 46.454 | 5.883 | 48.336 | 2.87% | -3.89% |
| | | | 5745 | 6.132 | 46.377 | 5.936 | 48.275 | 3.30% | -3.93% |
| | | | 5765 | 6.157 | 46.380 | 5.959 | 48.248 | 3.32% | -3.87% |
| | | | 5785 | 6.173 | 46.358 | 5.982 | 48.220 | 3.19% | -3.86% |
| | | | 5800 | 6.197 | 46.298 | 6.000 | 48.200 | 3.28% | -3.95% |
| | | | 5805 | 6.204 | 46.279 | 6.006 | 48.193 | 3.30% | -3.97% |
| | | | 5825 | 6.235 | 46.256 | 6.029 | 48.166 | 3.42% | -3.97% |
| 01/08/2019 | 5750B | 22.8 | 5745 | 6.073 | 46.860 | 5.936 | 48.275 | 2.31% | -2.93% |
| | | | 5765 | 6.102 | 46.863 | 5.959 | 48.248 | 2.40% | -2.87% |
| | | | 5785 | 6.133 | 46.811 | 5.982 | 48.220 | 2.52% | -2.92% |

The above measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB Publication 865664 D01v01r04 and IEEE 1528-2013 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

## 10.2 Test System Verification

Prior to SAR assessment, the system is verified to ±10% of the SAR measurement on the reference dipole at the time of calibration by the calibration facility. Full system validation status and result summary can be found in Appendix E.

**Table 10-3**
**System Verification Results – 1g**

| System Verification TARGET & MEASURED | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAR System # | Tissue Frequency (MHz) | Tissue Type | Date | Amb. Temp (°C) | Liquid Temp (°C) | Input Power (W) | Source SN | Probe SN | Measured $SAR_{1g}$ (W/kg) | 1 W Target $SAR_{1g}$ (W/kg) | 1 W Normalized $SAR_{1g}$ (W/kg) | $Deviation_{1g}$ (%) |
| M | 750 | HEAD | 12/26/2018 | 22.5 | 19.8 | 0.200 | 1003 | 3287 | 1.670 | 8.280 | 8.350 | 0.85% |
| G | 835 | HEAD | 12/22/2018 | 21.7 | 21.1 | 0.200 | 4d047 | 7410 | 1.930 | 9.470 | 9.650 | 1.90% |
| M | 1750 | HEAD | 12/25/2018 | 19.8 | 19.8 | 0.100 | 1148 | 3287 | 3.660 | 36.400 | 36.600 | 0.55% |
| H | 1900 | HEAD | 12/19/2018 | 21.6 | 21.5 | 0.100 | 5d080 | 7409 | 4.110 | 39.800 | 41.100 | 3.27% |
| G | 2450 | HEAD | 12/17/2018 | 21.9 | 22.0 | 0.100 | 981 | 7410 | 5.250 | 52.300 | 52.500 | 0.38% |
| I | 2450 | HEAD | 12/26/2018 | 20.9 | 20.5 | 0.100 | 981 | 7406 | 5.280 | 52.300 | 52.800 | 0.96% |
| G | 2450 | HEAD | 01/09/2019 | 22.4 | 20.8 | 0.100 | 797 | 7410 | 5.450 | 52.700 | 54.500 | 3.42% |
| H | 2450 | HEAD | 01/22/2019 | 21.9 | 20.4 | 0.100 | 981 | 7409 | 5.400 | 52.300 | 54.000 | 3.25% |
| G | 2600 | HEAD | 01/09/2019 | 22.4 | 20.8 | 0.100 | 1004 | 7410 | 5.890 | 55.900 | 58.900 | 5.37% |
| H | 5250 | HEAD | 01/07/2019 | 21.2 | 20.6 | 0.050 | 1191 | 7409 | 3.650 | 78.900 | 73.000 | -7.48% |
| H | 5600 | HEAD | 01/07/2019 | 21.2 | 20.6 | 0.050 | 1191 | 7409 | 4.000 | 83.600 | 80.000 | -4.31% |
| H | 5750 | HEAD | 01/07/2019 | 21.2 | 20.6 | 0.050 | 1191 | 7409 | 3.790 | 79.100 | 75.800 | -4.17% |
| I | 750 | BODY | 12/19/2018 | 21.1 | 19.7 | 0.200 | 1054 | 7406 | 1.760 | 8.610 | 8.800 | 2.21% |
| J | 835 | BODY | 12/26/2018 | 19.9 | 19.1 | 0.200 | 4d133 | 3347 | 1.960 | 9.750 | 9.800 | 0.51% |
| D | 1750 | BODY | 12/26/2018 | 22.8 | 21.1 | 0.100 | 1148 | 7357 | 3.880 | 37.000 | 38.800 | 4.86% |
| E | 1900 | BODY | 12/26/2018 | 22.3 | 21.9 | 0.100 | 5d149 | 3332 | 4.060 | 39.400 | 40.600 | 3.05% |
| E | 1900 | BODY | 12/28/2018 | 22.5 | 22.5 | 0.100 | 5d149 | 3332 | 4.110 | 39.400 | 41.100 | 4.31% |
| K | 2450 | BODY | 12/26/2018 | 23.2 | 22.7 | 0.100 | 797 | 3319 | 5.320 | 51.100 | 53.200 | 4.11% |
| K | 2450 | BODY | 12/30/2018 | 21.9 | 22.5 | 0.100 | 797 | 3319 | 5.150 | 51.100 | 51.500 | 0.78% |
| K | 2450 | BODY | 01/10/2019 | 22.7 | 21.7 | 0.100 | 719 | 3319 | 5.310 | 50.100 | 53.100 | 5.99% |
| K | 2450 | BODY | 01/21/2019 | 21.6 | 21.0 | 0.100 | 981 | 3319 | 5.120 | 50.900 | 51.200 | 0.59% |
| K | 2600 | BODY | 01/10/2019 | 22.7 | 21.7 | 0.100 | 1126 | 3319 | 5.430 | 54.100 | 54.300 | 0.37% |
| L | 5250 | BODY | 01/03/2019 | 21.5 | 21.0 | 0.050 | 1191 | 7308 | 3.580 | 77.000 | 71.600 | -7.01% |
| L | 5600 | BODY | 01/03/2019 | 21.5 | 21.0 | 0.050 | 1191 | 7308 | 3.900 | 79.200 | 78.000 | -1.52% |
| L | 5750 | BODY | 01/03/2019 | 21.5 | 21.0 | 0.050 | 1191 | 7308 | 3.500 | 76.100 | 70.000 | -8.02% |
| D | 5750 | BODY | 01/08/2019 | 23.0 | 22.8 | 0.050 | 1191 | 7357 | 3.600 | 76.100 | 72.000 | -5.39% |

## Table 10-4
## System Verification Results – 10g

| System Verification TARGET & MEASURED | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAR System # | Tissue Frequency (MHz) | Tissue Type | Date | Amb. Temp (°C) | Liquid Temp (°C) | Input Power (W) | Source SN | Probe SN | Measured $SAR_{10g}$ (W/kg) | 1 W Target $SAR_{10g}$ (W/kg) | 1 W Normalized $SAR_{10g}$ (W/kg) | $Deviation_{10g}$ (%) |
| D | 1750 | BODY | 12/26/2018 | 22.8 | 21.1 | 0.100 | 1148 | 7357 | 2.050 | 19.800 | 20.500 | 3.54% |
| E | 1900 | BODY | 12/26/2018 | 22.3 | 21.9 | 0.100 | 5d149 | 3332 | 2.110 | 20.700 | 21.100 | 1.93% |
| E | 1900 | BODY | 12/28/2018 | 22.5 | 22.5 | 0.100 | 5d149 | 3332 | 2.130 | 20.700 | 21.300 | 2.90% |
| J | 2450 | BODY | 01/02/2019 | 21.7 | 21.9 | 0.100 | 719 | 3347 | 2.230 | 23.700 | 22.300 | -5.91% |
| J | 2600 | BODY | 01/02/2019 | 21.7 | 21.9 | 0.100 | 1126 | 3347 | 2.310 | 24.400 | 23.100 | -5.33% |
| L | 5250 | BODY | 01/03/2019 | 21.5 | 21.0 | 0.050 | 1191 | 7308 | 0.999 | 21.600 | 19.980 | -7.50% |
| L | 5600 | BODY | 01/03/2019 | 21.5 | 21.0 | 0.050 | 1191 | 7308 | 1.080 | 22.200 | 21.600 | -2.70% |
| L | 5750 | BODY | 01/03/2019 | 21.5 | 21.0 | 0.050 | 1191 | 7308 | 0.979 | 21.200 | 19.580 | -7.64% |

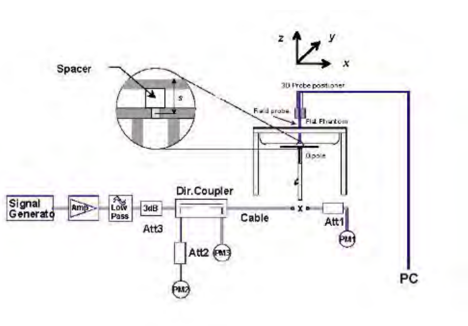



**Figure 10-1**
**System Verification Setup Diagram**

**Figure 10-2**
**System Verification Setup Photo**

# 11 SAR DATA SUMMARY

## 11.1 Standalone Head SAR Data

**Table 11-1**
**GSM 850 Head SAR**

| MEASUREMENT RESULTS | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode/Band | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side | Test Position | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.60 | 190 | GSM 850 | GSM | 33.5 | 32.30 | 0.02 | Right | Cheek | 0899M | 1:8.3 | 0.236 | 1.318 | 0.311 | A1 |
| 836.60 | 190 | GSM 850 | GSM | 33.5 | 32.30 | 0.09 | Right | Tilt | 0899M | 1:8.3 | 0.111 | 1.318 | 0.146 | |
| 836.60 | 190 | GSM 850 | GSM | 33.5 | 32.30 | 0.00 | Left | Cheek | 0899M | 1:8.3 | 0.161 | 1.318 | 0.212 | |
| 836.60 | 190 | GSM 850 | GSM | 33.5 | 32.30 | 0.05 | Left | Tilt | 0899M | 1:8.3 | 0.089 | 1.318 | 0.117 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | |

**Table 11-2**
**GSM 1900 Head SAR**

| MEASUREMENT RESULTS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode/Band | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side | Test Position | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1880.00 | 661 | GSM 1900 | GSM | 30.5 | 29.43 | 0.06 | Right | Cheek | 0899M | 1:8.3 | 0.041 | 1.279 | 0.052 | |
| 1880.00 | 661 | GSM 1900 | GSM | 30.5 | 29.43 | -0.08 | Right | Tilt | 0899M | 1:8.3 | 0.022 | 1.279 | 0.028 | |
| 1880.00 | 661 | GSM 1900 | GSM | 30.5 | 29.43 | 0.17 | Left | Cheek | 0899M | 1:8.3 | 0.064 | 1.279 | 0.082 | A2 |
| 1880.00 | 661 | GSM 1900 | GSM | 30.5 | 29.43 | 0.18 | Left | Tilt | 0899M | 1:8.3 | 0.019 | 1.279 | 0.024 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | |

**Table 11-3**
**UMTS 850 Head SAR**

| MEASUREMENT RESULTS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode/Band | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side | Test Position | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.60 | 4183 | UMTS 850 | RMC | 25.0 | 24.19 | -0.07 | Right | Cheek | 0899M | 1:1 | 0.320 | 1.205 | **0.386** | A3 |
| 836.60 | 4183 | UMTS 850 | RMC | 25.0 | 24.19 | 0.02 | Right | Tilt | 0899M | 1:1 | 0.140 | 1.205 | 0.169 | |
| 836.60 | 4183 | UMTS 850 | RMC | 25.0 | 24.19 | -0.02 | Left | Cheek | 0899M | 1:1 | 0.244 | 1.205 | 0.294 | |
| 836.60 | 4183 | UMTS 850 | RMC | 25.0 | 24.19 | 0.05 | Left | Tilt | 0899M | 1:1 | 0.135 | 1.205 | 0.163 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | |

# Table 11-4
# UMTS 1900 Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode/Band | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side | Test Position | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 24.0 | 23.05 | 0.11 | Right | Cheek | 0899M | 1:1 | 0.091 | 1.245 | 0.113 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 24.0 | 23.05 | 0.04 | Right | Tilt | 0899M | 1:1 | 0.046 | 1.245 | 0.057 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 24.0 | 23.05 | 0.06 | Left | Cheek | 0899M | 1:1 | 0.157 | 1.245 | 0.195 | A4 |
| 1880.00 | 9400 | UMTS 1900 | RMC | 24.0 | 23.05 | 0.01 | Left | Tilt | 0899M | 1:1 | 0.035 | 1.245 | 0.044 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | |

# Table 11-5
# LTE Band 12 Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Ant State | Power Drift [dB] | MPR [dB] | Side | Test Position | Modulation | RB Size | RB Offset | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 25.0 | 24.36 | 10 | 0.03 | 0 | Right | Cheek | QPSK | 1 | 0 | 1149M | 1:1 | 0.124 | 1.159 | 0.144 | A5 |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 24.0 | 23.43 | 10 | -0.02 | 1 | Right | Cheek | QPSK | 25 | 0 | 1149M | 1:1 | 0.104 | 1.140 | 0.119 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 25.0 | 24.36 | 10 | 0.21 | 0 | Right | Tilt | QPSK | 1 | 0 | 1149M | 1:1 | 0.068 | 1.159 | 0.079 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 24.0 | 23.43 | 10 | -0.05 | 1 | Right | Tilt | QPSK | 25 | 0 | 1149M | 1:1 | 0.055 | 1.140 | 0.063 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 25.0 | 24.36 | 10 | 0.06 | 0 | Left | Cheek | QPSK | 1 | 0 | 1149M | 1:1 | 0.106 | 1.159 | 0.123 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 24.0 | 23.43 | 10 | 0.07 | 1 | Left | Cheek | QPSK | 25 | 0 | 1149M | 1:1 | 0.093 | 1.140 | 0.106 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 25.0 | 24.36 | 10 | 0.08 | 0 | Left | Tilt | QPSK | 1 | 0 | 1149M | 1:1 | 0.060 | 1.159 | 0.070 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 24.0 | 23.43 | 10 | -0.03 | 1 | Left | Tilt | QPSK | 25 | 0 | 1149M | 1:1 | 0.051 | 1.140 | 0.058 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

# Table 11-6
# LTE Band 13 Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Ant State | Power Drift [dB] | MPR [dB] | Side | Test Position | Modulation | RB Size | RB Offset | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 25.0 | 24.22 | 0 | 0.01 | 0 | Right | Cheek | QPSK | 1 | 0 | 1149M | 1:1 | 0.219 | 1.197 | 0.262 | A6 |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 24.0 | 23.31 | 0 | 0.02 | 1 | Right | Cheek | QPSK | 25 | 0 | 1149M | 1:1 | 0.172 | 1.172 | 0.202 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 25.0 | 24.22 | 0 | -0.05 | 0 | Right | Tilt | QPSK | 1 | 0 | 1149M | 1:1 | 0.122 | 1.197 | 0.146 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 24.0 | 23.31 | 0 | -0.01 | 1 | Right | Tilt | QPSK | 25 | 0 | 1149M | 1:1 | 0.099 | 1.172 | 0.116 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 25.0 | 24.22 | 0 | 0.02 | 0 | Left | Cheek | QPSK | 1 | 0 | 1149M | 1:1 | 0.169 | 1.197 | 0.202 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 24.0 | 23.31 | 0 | 0.04 | 1 | Left | Cheek | QPSK | 25 | 0 | 1149M | 1:1 | 0.138 | 1.172 | 0.162 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 25.0 | 24.22 | 0 | 0.05 | 0 | Left | Tilt | QPSK | 1 | 0 | 1149M | 1:1 | 0.116 | 1.197 | 0.139 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 24.0 | 23.31 | 0 | -0.03 | 1 | Left | Tilt | QPSK | 25 | 0 | 1149M | 1:1 | 0.098 | 1.172 | 0.115 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

# Table 11-7
# LTE Band 26 (Cell) Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Ant State | Power Drift [dB] | MPR [dB] | Side | Test Position | Modulation | RB Size | RB Offset | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 25.0 | 24.53 | 76 | -0.13 | 0 | Right | Cheek | QPSK | 1 | 0 | 0899M | 1:1 | 0.294 | 1.114 | 0.328 | A7 |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 24.0 | 23.63 | 76 | 0.02 | 1 | Right | Cheek | QPSK | 36 | 0 | 0899M | 1:1 | 0.195 | 1.089 | 0.212 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 25.0 | 24.53 | 76 | 0.04 | 0 | Right | Tilt | QPSK | 1 | 0 | 0899M | 1:1 | 0.144 | 1.114 | 0.160 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 24.0 | 23.63 | 76 | 0.13 | 1 | Right | Tilt | QPSK | 36 | 0 | 0899M | 1:1 | 0.095 | 1.089 | 0.103 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 25.0 | 24.53 | 76 | -0.05 | 0 | Left | Cheek | QPSK | 1 | 0 | 0899M | 1:1 | 0.221 | 1.114 | 0.246 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 24.0 | 23.63 | 76 | 0.16 | 1 | Left | Cheek | QPSK | 36 | 0 | 0899M | 1:1 | 0.151 | 1.089 | 0.164 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 25.0 | 24.53 | 76 | 0.08 | 0 | Left | Tilt | QPSK | 1 | 0 | 0899M | 1:1 | 0.129 | 1.114 | 0.144 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 24.0 | 23.63 | 76 | 0.03 | 1 | Left | Tilt | QPSK | 36 | 0 | 0899M | 1:1 | 0.087 | 1.089 | 0.095 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | |

# Table 11-8
# LTE Band 4 (AWS) Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Ant State | Power Drift [dB] | MPR [dB] | Side | Test Position | Modulation | RB Size | RB Offset | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 24.0 | 23.79 | 16 | 0.06 | 0 | Right | Cheek | QPSK | 1 | 0 | 1149M | 1:1 | 0.087 | 1.050 | 0.091 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 23.0 | 22.84 | 16 | 0.04 | 1 | Right | Cheek | QPSK | 50 | 0 | 1149M | 1:1 | 0.080 | 1.038 | 0.083 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 24.0 | 23.79 | 16 | 0.00 | 0 | Right | Tilt | QPSK | 1 | 0 | 1149M | 1:1 | 0.088 | 1.050 | 0.092 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 23.0 | 22.84 | 16 | 0.09 | 1 | Right | Tilt | QPSK | 50 | 0 | 1149M | 1:1 | 0.064 | 1.038 | 0.066 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 24.0 | 23.79 | 16 | -0.17 | 0 | Left | Cheek | QPSK | 1 | 0 | 1149M | 1:1 | 0.166 | 1.050 | 0.174 | A8 |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 23.0 | 22.84 | 16 | 0.09 | 1 | Left | Cheek | QPSK | 50 | 0 | 1149M | 1:1 | 0.138 | 1.038 | 0.143 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 24.0 | 23.79 | 16 | -0.11 | 0 | Left | Tilt | QPSK | 1 | 0 | 1149M | 1:1 | 0.077 | 1.050 | 0.081 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 23.0 | 22.84 | 16 | 0.14 | 1 | Left | Tilt | QPSK | 50 | 0 | 1149M | 1:1 | 0.067 | 1.038 | 0.070 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | |

# Table 11-9
# LTE Band 25 (PCS) Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Ant State | Power Drift [dB] | MPR [dB] | Side | Test Position | Modulation | RB Size | RB Offset | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 25.0 | 24.65 | 16 | 0.11 | 0 | Right | Cheek | QPSK | 1 | 0 | 0899M | 1:1 | 0.129 | 1.084 | 0.140 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 24.0 | 23.80 | 16 | 0.08 | 1 | Right | Cheek | QPSK | 50 | 0 | 0899M | 1:1 | 0.074 | 1.047 | 0.077 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 25.0 | 24.65 | 16 | -0.01 | 0 | Right | Tilt | QPSK | 1 | 0 | 0899M | 1:1 | 0.058 | 1.084 | 0.063 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 24.0 | 23.80 | 16 | 0.03 | 1 | Right | Tilt | QPSK | 50 | 0 | 0899M | 1:1 | 0.033 | 1.047 | 0.035 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 25.0 | 24.65 | 16 | 0.03 | 0 | Left | Cheek | QPSK | 1 | 0 | 0899M | 1:1 | 0.159 | 1.084 | 0.172 | A9 |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 24.0 | 23.80 | 16 | 0.03 | 1 | Left | Cheek | QPSK | 50 | 0 | 0899M | 1:1 | 0.107 | 1.047 | 0.112 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 25.0 | 24.65 | 16 | 0.17 | 0 | Left | Tilt | QPSK | 1 | 0 | 0899M | 1:1 | 0.046 | 1.084 | 0.050 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 24.0 | 23.80 | 16 | 0.18 | 1 | Left | Tilt | QPSK | 50 | 0 | 0899M | 1:1 | 0.031 | 1.047 | 0.032 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | |

## Table 11-10
## LTE Band 41 Head SAR

**MEASUREMENT RESULTS**

| 1 CC Uplink \| 2 CC Uplink | Component Carrier | FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | MPR [dB] | Side | Test Position | Modulation | RB Size | RB Offset | Device Serial Number | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | Ch. | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 25.5 | 24.19 | 0.02 | 0 | Right | Cheek | QPSK | 1 | 0 | 1149M | 1:1.58 | 0.045 | 1.352 | 0.061 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 24.5 | 23.50 | 0.14 | 1 | Right | Cheek | QPSK | 50 | 0 | 1149M | 1:1.58 | 0.037 | 1.259 | 0.047 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 25.5 | 24.19 | 0.20 | 0 | Right | Tilt | QPSK | 1 | 0 | 1149M | 1:1.58 | 0.048 | 1.352 | 0.065 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 24.5 | 23.50 | 0.21 | 1 | Right | Tilt | QPSK | 50 | 0 | 1149M | 1:1.58 | 0.038 | 1.259 | 0.048 | |
| 2 CC Uplink | PCC | 2680.00 | 41490 | High | LTE Band 41 | 20 | 25.5 | 24.83 | 0.13 | 0 | Right | Tilt | QPSK | 1 | 0 | 1149M | 1:1.58 | 0.056 | 1.167 | 0.065 | A10 |
| | SCC | 2660.20 | 41292 | | | 20 | | | | | | | QPSK | 1 | 99 | | | | | | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 25.5 | 24.19 | 0.14 | 0 | Left | Cheek | QPSK | 1 | 0 | 1149M | 1:1.58 | 0.043 | 1.352 | 0.058 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 24.5 | 23.50 | 0.17 | 1 | Left | Cheek | QPSK | 50 | 0 | 1149M | 1:1.58 | 0.040 | 1.259 | 0.050 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 25.5 | 24.19 | 0.09 | 0 | Left | Tilt | QPSK | 1 | 0 | 1149M | 1:1.58 | 0.028 | 1.352 | 0.038 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 24.5 | 23.50 | 0.17 | 1 | Left | Tilt | QPSK | 50 | 0 | 1149M | 1:1.58 | 0.027 | 1.259 | 0.034 | |

| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |
|---|---|

## Table 11-11
## DTS Head SAR

**MEASUREMENT RESULTS**

| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side | Test Position | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Duty Cycle (%) | Peak SAR of Area Scan | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 2412 | 1 | 802.11b | DSSS | 22 | 17.0 | 16.82 | -0.09 | Right | Cheek | 1 | 1164M | 1 | 99.8 | 0.942 | 0.666 | 1.042 | 1.002 | 0.695 | |
| 2437 | 6 | 802.11b | DSSS | 22 | 17.0 | 16.50 | 0.17 | Right | Cheek | 1 | 1164M | 1 | 99.8 | 1.110 | 0.710 | 1.122 | 1.002 | 0.798 | A11 |
| 2462 | 11 | 802.11b | DSSS | 22 | 17.0 | 16.64 | 0.15 | Right | Cheek | 1 | 1164M | 1 | 99.8 | 0.988 | 0.619 | 1.086 | 1.002 | 0.674 | |
| 2412 | 1 | 802.11b | DSSS | 22 | 17.0 | 16.82 | 0.10 | Right | Tilt | 1 | 1164M | 1 | 99.8 | 0.764 | 0.500 | 1.042 | 1.002 | 0.522 | |
| 2412 | 1 | 802.11b | DSSS | 22 | 17.0 | 16.82 | 0.15 | Left | Cheek | 1 | 1164M | 1 | 99.8 | 0.256 | - | 1.042 | 1.002 | - | |
| 2412 | 1 | 802.11b | DSSS | 22 | 17.0 | 16.82 | 0.20 | Left | Tilt | 1 | 1164M | 1 | 99.8 | 0.252 | - | 1.042 | 1.002 | - | |
| 2437 | 6 | 802.11b | DSSS | 22 | 17.0 | 16.91 | -0.03 | Right | Cheek | 2 | 1164M | 1 | 99.8 | 0.191 | - | 1.021 | 1.002 | - | |
| 2437 | 6 | 802.11b | DSSS | 22 | 17.0 | 16.91 | 0.15 | Right | Tilt | 2 | 1164M | 1 | 99.8 | 0.225 | - | 1.021 | 1.002 | - | |
| 2437 | 6 | 802.11b | DSSS | 22 | 17.0 | 16.91 | 0.17 | Left | Cheek | 2 | 1164M | 1 | 99.8 | 0.291 | - | 1.021 | 1.002 | - | |
| 2437 | 6 | 802.11b | DSSS | 22 | 17.0 | 16.91 | 0.14 | Left | Tilt | 2 | 1164M | 1 | 99.8 | 0.483 | 0.274 | 1.021 | 1.002 | 0.280 | |

| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |
|---|---|

## Table 11-12
## DTS Head SAR for Conditions with 2.4 GHz and 5 GHz WLAN SAR

**MEASUREMENT RESULTS**

| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power (Ant 1) [dBm] | Conducted Power (Ant 1) [dBm] | Maximum Allowed Power (Ant 2) [dBm] | Conducted Power (Ant 2) [dBm] | Power Drift [dB] | Side | Test Position | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Duty Cycle (%) | Peak SAR of Area Scan | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 2462 | 11 | 802.11n | OFDM | 20 | 14.0 | 12.38 | 14.0 | 12.54 | 0.16 | Right | Cheek | MIMO | 1151M | 13 | 99.3 | 0.330 | 0.245 | 1.452 | 1.007 | 0.358 | |
| 2462 | 11 | 802.11n | OFDM | 20 | 14.0 | 12.38 | 14.0 | 12.54 | 0.20 | Right | Tilt | MIMO | 1151M | 13 | 99.3 | 0.252 | - | 1.452 | 1.007 | - | |
| 2462 | 11 | 802.11n | OFDM | 20 | 14.0 | 12.38 | 14.0 | 12.54 | 0.04 | Left | Cheek | MIMO | 1151M | 13 | 99.3 | 0.117 | - | 1.452 | 1.007 | - | |
| 2462 | 11 | 802.11n | OFDM | 20 | 14.0 | 12.38 | 14.0 | 12.54 | 0.10 | Left | Tilt | MIMO | 1151M | 13 | 99.3 | 0.120 | - | 1.452 | 1.007 | - | |

| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |
|---|---|

DTS MIMO was additionally evaluated at the maximum allowed output power during operations with Simultaneous 2.4 GHz and 5 GHz WLAN. 5 GHz WIFI was not transmitting during the above evaluations.

## Table 11-13
## NII Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side | Test Position | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Duty Cycle (%) | Peak SAR of Area Scan | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.47 | -0.16 | Right | Cheek | 1 | 0896M | 13.5 | 98.5 | 0.786 | 0.305 | 1.130 | 1.015 | 0.350 | |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.47 | 0.13 | Right | Tilt | 1 | 0896M | 13.5 | 98.5 | 0.784 | 0.309 | 1.130 | 1.015 | 0.354 | |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.47 | 0.19 | Left | Cheek | 1 | 0896M | 13.5 | 98.5 | 0.426 | - | 1.130 | 1.015 | - | |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.47 | 0.19 | Left | Tilt | 1 | 0896M | 13.5 | 98.5 | 0.457 | - | 1.130 | 1.015 | - | |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.79 | -0.13 | Right | Cheek | 2 | 0896M | 13.5 | 98.5 | 0.183 | 0.061 | 1.050 | 1.015 | 0.065 | |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.79 | 0.13 | Right | Tilt | 2 | 0896M | 13.5 | 98.5 | 0.149 | 0.042 | 1.050 | 1.015 | 0.045 | |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.79 | -0.16 | Left | Cheek | 2 | 0896M | 13.5 | 98.5 | 0.052 | - | 1.050 | 1.015 | - | |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.79 | 0.11 | Left | Tilt | 2 | 0896M | 13.5 | 98.5 | 0.048 | - | 1.050 | 1.015 | - | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.91 | 0.15 | Right | Cheek | 1 | 0896M | 29.3 | 98.4 | 0.344 | 0.135 | 1.021 | 1.016 | 0.140 | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.91 | 0.02 | Right | Tilt | 1 | 0896M | 29.3 | 98.4 | 0.349 | 0.164 | 1.021 | 1.016 | 0.170 | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.91 | 0.01 | Left | Cheek | 1 | 0896M | 29.3 | 98.4 | 0.189 | - | 1.021 | 1.016 | - | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.91 | 0.15 | Left | Tilt | 1 | 0896M | 29.3 | 98.4 | 0.229 | - | 1.021 | 1.016 | - | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.89 | 0.00 | Right | Cheek | 2 | 0896M | 29.3 | 98.4 | 0.077 | 0.022 | 1.026 | 1.016 | 0.023 | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.89 | 0.13 | Right | Tilt | 2 | 0896M | 29.3 | 98.4 | 0.109 | 0.028 | 1.026 | 1.016 | 0.029 | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.89 | 0.19 | Left | Cheek | 2 | 0896M | 29.3 | 98.4 | 0.031 | - | 1.026 | 1.016 | - | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.89 | 0.00 | Left | Tilt | 2 | 0896M | 29.3 | 98.4 | 0.028 | - | 1.026 | 1.016 | - | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | 0.12 | Right | Cheek | 1 | 0896M | 29.3 | 98.4 | 0.584 | 0.225 | 1.042 | 1.016 | 0.238 | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | 0.19 | Right | Tilt | 1 | 0896M | 29.3 | 98.4 | 0.650 | 0.286 | 1.042 | 1.016 | 0.303 | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | -0.05 | Left | Cheek | 1 | 0896M | 29.3 | 98.4 | 0.253 | - | 1.042 | 1.016 | - | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | 0.11 | Left | Tilt | 1 | 0896M | 29.3 | 98.4 | 0.302 | - | 1.042 | 1.016 | - | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.65 | 0.11 | Right | Cheek | 2 | 0896M | 29.3 | 98.4 | 0.167 | 0.061 | 1.084 | 1.016 | 0.067 | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.65 | 0.19 | Right | Tilt | 2 | 0896M | 29.3 | 98.4 | 0.139 | 0.075 | 1.084 | 1.016 | 0.083 | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.65 | -0.10 | Left | Cheek | 2 | 0896M | 29.3 | 98.4 | 0.033 | - | 1.084 | 1.016 | - | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.65 | 0.00 | Left | Tilt | 2 | 0896M | 29.3 | 98.4 | 0.046 | - | 1.084 | 1.016 | - | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | | |

## Table 11-14
## NII MIMO Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power (Ant 1) [dBm] | Conducted Power (Ant 1) [dBm] | Maximum Allowed Power (Ant 2) [dBm] | Conducted Power (Ant 2) [dBm] | Power Drift [dB] | Side | Test Position | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Duty Cycle (%) | Peak SAR of Area Scan | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.47 | 14.0 | 13.79 | 0.20 | Right | Cheek | MIMO | 0896M | 27 | 98.5 | 0.753 | 0.354 | 1.130 | 1.015 | 0.406 | |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.47 | 14.0 | 13.79 | 0.14 | Right | Tilt | MIMO | 0896M | 27 | 98.5 | 0.736 | 0.370 | 1.130 | 1.015 | 0.424 | A12 |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.47 | 14.0 | 13.79 | 0.19 | Left | Cheek | MIMO | 0896M | 27 | 98.5 | 0.489 | - | 1.130 | 1.015 | - | |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.47 | 14.0 | 13.79 | 0.20 | Left | Tilt | MIMO | 0896M | 27 | 98.5 | 0.524 | - | 1.130 | 1.015 | - | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.91 | 14.0 | 13.89 | 0.20 | Right | Cheek | MIMO | 0896M | 58.5 | 98.8 | 0.361 | 0.155 | 1.026 | 1.012 | 0.161 | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.91 | 14.0 | 13.89 | 0.18 | Right | Tilt | MIMO | 0896M | 58.5 | 98.8 | 0.378 | 0.194 | 1.026 | 1.012 | 0.201 | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.91 | 14.0 | 13.89 | 0.15 | Left | Cheek | MIMO | 0896M | 58.5 | 98.8 | 0.189 | - | 1.026 | 1.012 | - | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.91 | 14.0 | 13.89 | 0.19 | Left | Tilt | MIMO | 0896M | 58.5 | 98.8 | 0.250 | - | 1.026 | 1.012 | - | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | 14.0 | 13.65 | 0.13 | Right | Cheek | MIMO | 0896M | 58.5 | 98.8 | 0.480 | 0.189 | 1.084 | 1.012 | 0.207 | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | 14.0 | 13.65 | 0.18 | Right | Tilt | MIMO | 0896M | 58.5 | 98.8 | 0.397 | 0.216 | 1.084 | 1.012 | 0.237 | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | 14.0 | 13.65 | 0.14 | Left | Cheek | MIMO | 0896M | 58.5 | 98.8 | 0.210 | - | 1.084 | 1.012 | - | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | 14.0 | 13.65 | 0.15 | Left | Tilt | MIMO | 0896M | 58.5 | 98.8 | 0.244 | - | 1.084 | 1.012 | - | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | | |

To achieve the 17.0 dBm maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 14.0 dBm.

## Table 11-15
## DSS Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Side | Test Position | Device Serial Number | Data Rate (Mbps) | Duty Cycle (%) | SAR (1g) | Scaling Factor (Cond Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | (W/kg) | | | (W/kg) | |
| 2402.00 | 0 | Bluetooth | FHSS | 18.5 | 16.67 | -0.03 | Right | Cheek | 0896M | 1 | 77.6 | 0.627 | 1.524 | 1.289 | 1.232 | |
| 2441.00 | 39 | Bluetooth | FHSS | 18.5 | 18.13 | -0.05 | Right | Cheek | 0896M | 1 | 77.6 | 0.957 | 1.089 | 1.289 | 1.343 | A13 |
| 2480.00 | 78 | Bluetooth | FHSS | 18.5 | 16.78 | -0.04 | Right | Cheek | 0896M | 1 | 77.6 | 0.695 | 1.486 | 1.289 | 1.331 | |
| 2402.00 | 0 | Bluetooth | FHSS | 18.5 | 16.67 | 0.05 | Right | Tilt | 0896M | 1 | 77.6 | 0.420 | 1.524 | 1.289 | 0.825 | |
| 2441.00 | 39 | Bluetooth | FHSS | 18.5 | 18.13 | -0.06 | Right | Tilt | 0896M | 1 | 77.6 | 0.594 | 1.089 | 1.289 | 0.834 | |
| 2480.00 | 78 | Bluetooth | FHSS | 18.5 | 16.78 | -0.03 | Right | Tilt | 0896M | 1 | 77.6 | 0.432 | 1.486 | 1.289 | 0.827 | |
| 2441.00 | 39 | Bluetooth | FHSS | 18.5 | 18.13 | 0.04 | Left | Cheek | 0896M | 1 | 77.6 | 0.324 | 1.089 | 1.289 | 0.455 | |
| 2441.00 | 39 | Bluetooth | FHSS | 18.5 | 18.13 | 0.14 | Left | Tilt | 0896M | 1 | 77.6 | 0.263 | 1.089 | 1.289 | 0.369 | |
| 2441.00 | 39 | Bluetooth | FHSS | 18.5 | 18.13 | -0.16 | Right | Cheek | 0896M | 1 | 77.6 | 0.825 | 1.089 | 1.289 | 1.158 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | |

**Note: Blue entry represents variability measurement.**

## 11.2 Standalone Body-Worn SAR Data

## Table 11-16
## GSM/UMTS Body-Worn SAR Data

| MEASUREMENT RESULTS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Duty Cycle | Side | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.60 | 190 | GSM 850 | GSM | 33.5 | 32.30 | -0.09 | 15 mm | 1149M | 1:8.3 | back | 0.201 | 1.318 | 0.265 | A14 |
| 1880.00 | 661 | GSM 1900 | GSM | 30.5 | 29.43 | 0.00 | 15 mm | 0905M | 1:8.3 | back | 0.302 | 1.279 | 0.386 | A16 |
| 836.60 | 4183 | UMTS 850 | RMC | 25.0 | 24.19 | 0.02 | 15 mm | 1155M | 1:1 | back | 0.263 | 1.205 | 0.317 | A18 |
| 1852.40 | 9262 | UMTS 1900 | RMC | 24.0 | 22.83 | -0.01 | 15 mm | 0905M | 1:1 | back | 0.600 | 1.309 | 0.785 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 24.0 | 23.05 | -0.07 | 15 mm | 0905M | 1:1 | back | 0.659 | 1.245 | 0.820 | |
| 1907.60 | 9538 | UMTS 1900 | RMC | 24.0 | 22.76 | 0.01 | 15 mm | 0905M | 1:1 | back | 0.681 | 1.330 | 0.906 | A20 |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | |

# Table 11-17
# LTE Body-Worn SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Ant State | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Side | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 25.0 | 24.36 | 10 | -0.01 | 0 | 0905M | QPSK | 1 | 0 | 15 mm | back | 1:1 | 0.171 | 1.159 | 0.198 | A22 |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 24.0 | 23.43 | 10 | 0.04 | 1 | 0905M | QPSK | 25 | 0 | 15 mm | back | 1:1 | 0.111 | 1.140 | 0.127 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 25.0 | 24.22 | 68 | -0.01 | 0 | 0905M | QPSK | 1 | 0 | 15 mm | back | 1:1 | 0.286 | 1.197 | 0.342 | A24 |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 24.0 | 23.31 | 68 | 0.02 | 1 | 0905M | QPSK | 25 | 0 | 15 mm | back | 1:1 | 0.205 | 1.172 | 0.240 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 25.0 | 24.53 | 0 | 0.06 | 0 | 1155M | QPSK | 1 | 0 | 15 mm | back | 1:1 | 0.290 | 1.114 | 0.323 | A26 |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 24.0 | 23.63 | 0 | 0.01 | 1 | 1155M | QPSK | 36 | 0 | 15 mm | back | 1:1 | 0.223 | 1.089 | 0.243 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 24.0 | 23.79 | 17 | 0.03 | 0 | 1150M | QPSK | 1 | 0 | 15 mm | back | 1:1 | 0.517 | 1.050 | 0.543 | A28 |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 23.0 | 22.84 | 17 | -0.02 | 1 | 1150M | QPSK | 50 | 0 | 15 mm | back | 1:1 | 0.432 | 1.038 | 0.448 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 25.0 | 24.65 | 16 | 0.04 | 0 | 0905M | QPSK | 1 | 0 | 15 mm | back | 1:1 | 0.773 | 1.084 | 0.838 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 25.0 | 24.62 | 16 | -0.10 | 0 | 0905M | QPSK | 1 | 0 | 15 mm | back | 1:1 | 0.808 | 1.091 | 0.882 | |
| 1905.00 | 26590 | High | LTE Band 25 (PCS) | 20 | 25.0 | 24.52 | 16 | -0.02 | 0 | 0905M | QPSK | 1 | 0 | 15 mm | back | 1:1 | 0.860 | 1.117 | **0.961** | A30 |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 24.0 | 23.80 | 16 | -0.01 | 1 | 0905M | QPSK | 50 | 0 | 15 mm | back | 1:1 | 0.538 | 1.047 | 0.563 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 24.0 | 23.72 | 16 | 0.00 | 1 | 0905M | QPSK | 100 | 0 | 15 mm | back | 1:1 | 0.524 | 1.067 | 0.559 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | |

# Table 11-18
# LTE Band 41 Body-Worn SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 CC Uplink \| 2 CC Uplink | Component Carrier | FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Side | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| | | MHz | Ch. | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 25.5 | 24.19 | 0.01 | 0 | 1149M | QPSK | 1 | 0 | 15 mm | back | 1:1.58 | 0.292 | 1.352 | 0.395 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 24.5 | 23.50 | 0.01 | 1 | 1149M | QPSK | 50 | 0 | 15 mm | back | 1:1.58 | 0.200 | 1.259 | 0.252 | |
| 2 CC Uplink | PCC | 2680.00 | 41490 | High | LTE Band 41 | 20 | 25.5 | 24.83 | -0.05 | 0 | 1149M | QPSK | 1 | 0 | 15 mm | back | 1:1.58 | 0.350 | 1.167 | 0.408 | A32 |
| | SCC | 2660.20 | 41292 | | | 20 | | | | | | QPSK | 1 | 99 | | | | | | | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

# Table 11-19
# DTS Body-Worn SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | Peak SAR of Area Scan | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 2412 | 1 | 802.11b | DSSS | 22 | 21.0 | 20.94 | 0.02 | 15 mm | 1 | 1150M | 1 | back | 99.8 | 0.194 | 0.159 | 1.014 | 1.002 | **0.162** | A34 |
| 2412 | 1 | 802.11b | DSSS | 22 | 21.0 | 20.97 | -0.12 | 15 mm | 2 | 1150M | 1 | back | 99.8 | 0.113 | 0.112 | 1.007 | 1.002 | 0.113 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

## Table 11-20
## NII Body-Worn SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | Peak SAR of Area Scan | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 5300 | 60 | 802.11a | OFDM | 20 | 18.5 | 18.18 | -0.08 | 15 mm | 1 | 1164M | 6 | back | 98.6 | 0.626 | 0.303 | 1.076 | 1.014 | 0.331 | |
| 5300 | 60 | 802.11a | OFDM | 20 | 18.5 | 18.37 | -0.06 | 15 mm | 2 | 1164M | 6 | back | 98.8 | 0.759 | 0.355 | 1.030 | 1.012 | 0.370 | |
| 5600 | 120 | 802.11a | OFDM | 20 | 18.5 | 18.20 | -0.12 | 15 mm | 1 | 1164M | 6 | back | 98.6 | 0.437 | 0.185 | 1.072 | 1.014 | 0.201 | |
| 5720 | 144 | 802.11a | OFDM | 20 | 18.5 | 18.39 | -0.06 | 15 mm | 2 | 1164M | 6 | back | 98.8 | 0.800 | 0.372 | 1.026 | 1.012 | 0.386 | |
| 5825 | 165 | 802.11a | OFDM | 20 | 18.5 | 18.45 | 0.11 | 15 mm | 1 | 1164M | 6 | back | 98.6 | 0.440 | 0.197 | 1.012 | 1.014 | 0.202 | |
| 5785 | 157 | 802.11a | OFDM | 20 | 18.5 | 18.24 | -0.17 | 15 mm | 2 | 1164M | 6 | back | 98.8 | 0.658 | 0.317 | 1.062 | 1.012 | 0.341 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | |

## Table 11-21
## NII MIMO Body-Worn SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power (Ant 1) [dBm] | Conducted Power (Ant 1) [dBm] | Maximum Allowed Power (Ant 2) [dBm] | Conducted Power (Ant 2) [dBm] | Power Drift [dB] | Spacing | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | Peak SAR of Area Scan | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 5260 | 52 | 802.11n | OFDM | 20 | 18.5 | 18.41 | 18.5 | 18.11 | 0.04 | 15 mm | MIMO | 1164M | 13 | back | 98.6 | 1.019 | 0.476 | 1.094 | 1.014 | 0.528 | A36 |
| 5620 | 124 | 802.11n | OFDM | 20 | 18.0 | 17.88 | 18.0 | 17.98 | 0.06 | 15 mm | MIMO | 1164M | 13 | back | 98.6 | 0.919 | 0.407 | 1.028 | 1.014 | 0.424 | |
| 5785 | 157 | 802.11n | OFDM | 20 | 18.5 | 18.23 | 18.5 | 18.20 | 0.07 | 15 mm | MIMO | 1164M | 13 | back | 98.6 | 0.714 | 0.322 | 1.072 | 1.014 | 0.350 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | | |

For channels 52 and 157, to achieve the 21.5 dBm maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 18.5 dBm. For channels 124 to achieve the 21.0 dBm maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 18.0 dBm.

## Table 11-22
## NII MIMO Body-Worn SAR for Conditions with 2.4 GHz and 5 GHz WLAN SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power (Ant 1) [dBm] | Conducted Power (Ant 1) [dBm] | Maximum Allowed Power (Ant 2) [dBm] | Conducted Power (Ant 2) [dBm] | Power Drift [dB] | Spacing | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | Peak SAR of Area Scan | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 5270 | 54 | 802.11n | OFDM | 40 | 14.0 | 13.47 | 14.0 | 13.79 | 0.08 | 15 mm | MIMO | 1164M | 27 | back | 98.5 | 0.410 | 0.167 | 1.130 | 1.015 | 0.192 | |
| 5610 | 122 | 802.11ac | OFDM | 80 | 14.0 | 13.91 | 14.0 | 13.89 | 0.12 | 15 mm | MIMO | 1164M | 58.5 | back | 98.8 | 0.390 | 0.185 | 1.026 | 1.012 | 0.192 | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | 14.0 | 13.65 | 0.15 | 15 mm | MIMO | 1164M | 58.5 | back | 98.8 | 0.307 | 0.106 | 1.084 | 1.012 | 0.116 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | | |

NII MIMO was additionally evaluated at the maximum allowed output power during operations with Simultaneous 2.4 GHz and 5 GHz WLAN. 2.4 GHz WIFI was not transmitting during the above evaluations.

## Table 11-23
## DSS Body-Worn SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | SAR (1g) | Scaling Factor (Cond Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | (W/kg) | | | (W/kg) | |
| 2441 | 39 | Bluetooth | FHSS | 18.5 | 18.13 | 0.05 | 15 mm | 1150M | 1 | back | 77.6 | 0.060 | 1.089 | 1.289 | 0.084 | A38 |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | |

## 11.3 Standalone Hotspot SAR Data

**Table 11-24**
**GPRS/UMTS Hotspot SAR Data**

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | # of GPRS Slots | Duty Cycle | Side | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.60 | 190 | GSM 850 | GPRS | 30.5 | 29.51 | -0.05 | 10 mm | 1155M | 3 | 1:2.76 | back | 0.474 | 1.256 | 0.595 | A15 |
| 836.60 | 190 | GSM 850 | GPRS | 30.5 | 29.51 | -0.09 | 10 mm | 1155M | 3 | 1:2.76 | front | 0.368 | 1.256 | 0.462 | |
| 836.60 | 190 | GSM 850 | GPRS | 30.5 | 29.51 | -0.07 | 10 mm | 1155M | 3 | 1:2.76 | bottom | 0.300 | 1.256 | 0.377 | |
| 836.60 | 190 | GSM 850 | GPRS | 30.5 | 29.51 | 0.05 | 10 mm | 1155M | 3 | 1:2.76 | right | 0.338 | 1.256 | 0.425 | |
| 836.60 | 190 | GSM 850 | GPRS | 30.5 | 29.51 | 0.03 | 10 mm | 1155M | 3 | 1:2.76 | left | 0.140 | 1.256 | 0.176 | |
| 1880.00 | 661 | GSM 1900 | GPRS | 25.5 | 25.09 | 0.01 | 10 mm | 0905M | 3 | 1:2.76 | back | 0.526 | 1.099 | 0.578 | |
| 1880.00 | 661 | GSM 1900 | GPRS | 25.5 | 25.09 | 0.06 | 10 mm | 0905M | 3 | 1:2.76 | front | 0.350 | 1.099 | 0.385 | |
| 1850.20 | 512 | GSM 1900 | GPRS | 25.5 | 24.96 | 0.03 | 10 mm | 0905M | 3 | 1:2.76 | bottom | 0.711 | 1.132 | 0.805 | |
| 1880.00 | 661 | GSM 1900 | GPRS | 25.5 | 25.09 | -0.03 | 10 mm | 0905M | 3 | 1:2.76 | bottom | 0.754 | 1.099 | 0.829 | |
| 1909.80 | 810 | GSM 1900 | GPRS | 25.5 | 24.63 | -0.11 | 10 mm | 0905M | 3 | 1:2.76 | bottom | 0.772 | 1.222 | 0.943 | A17 |
| 1880.00 | 661 | GSM 1900 | GPRS | 25.5 | 25.09 | -0.02 | 10 mm | 0905M | 3 | 1:2.76 | right | 0.050 | 1.099 | 0.055 | |
| 1880.00 | 661 | GSM 1900 | GPRS | 25.5 | 25.09 | 0.01 | 10 mm | 0905M | 3 | 1:2.76 | left | 0.085 | 1.099 | 0.093 | |
| 836.60 | 4183 | UMTS 850 | RMC | 25.0 | 24.19 | 0.01 | 10 mm | 1155M | N/A | 1:1 | back | 0.413 | 1.205 | 0.498 | A19 |
| 836.60 | 4183 | UMTS 850 | RMC | 25.0 | 24.19 | 0.01 | 10 mm | 1155M | N/A | 1:1 | front | 0.370 | 1.205 | 0.446 | |
| 836.60 | 4183 | UMTS 850 | RMC | 25.0 | 24.19 | -0.01 | 10 mm | 1155M | N/A | 1:1 | bottom | 0.279 | 1.205 | 0.336 | |
| 836.60 | 4183 | UMTS 850 | RMC | 25.0 | 24.19 | -0.04 | 10 mm | 1155M | N/A | 1:1 | right | 0.353 | 1.205 | 0.425 | |
| 836.60 | 4183 | UMTS 850 | RMC | 25.0 | 24.19 | 0.00 | 10 mm | 1155M | N/A | 1:1 | left | 0.142 | 1.205 | 0.171 | |
| 1852.40 | 9262 | UMTS 1900 | RMC | 20.5 | 19.44 | -0.02 | 10 mm | 0905M | N/A | 1:1 | back | 0.666 | 1.276 | 0.850 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 20.5 | 19.58 | -0.05 | 10 mm | 0905M | N/A | 1:1 | back | 0.692 | 1.236 | 0.855 | |
| 1907.60 | 9538 | UMTS 1900 | RMC | 20.5 | 19.37 | 0.02 | 10 mm | 0905M | N/A | 1:1 | back | 0.759 | 1.297 | 0.984 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 20.5 | 19.58 | 0.00 | 10 mm | 0905M | N/A | 1:1 | front | 0.453 | 1.236 | 0.560 | |
| 1852.40 | 9262 | UMTS 1900 | RMC | 20.5 | 19.44 | -0.02 | 10 mm | 0905M | N/A | 1:1 | bottom | 0.911 | 1.276 | 1.162 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 20.5 | 19.58 | -0.04 | 10 mm | 0905M | N/A | 1:1 | bottom | 1.020 | 1.236 | 1.261 | |
| 1907.60 | 9538 | UMTS 1900 | RMC | 20.5 | 19.37 | -0.04 | 10 mm | 0905M | N/A | 1:1 | bottom | 1.020 | 1.297 | **1.323** | A21 |
| 1880.00 | 9400 | UMTS 1900 | RMC | 20.5 | 19.58 | -0.01 | 10 mm | 0905M | N/A | 1:1 | right | 0.065 | 1.236 | 0.080 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 20.5 | 19.58 | 0.03 | 10 mm | 0905M | N/A | 1:1 | left | 0.113 | 1.236 | 0.140 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 20.5 | 19.58 | -0.07 | 10 mm | 0905M | N/A | 1:1 | bottom | 0.884 | 1.236 | 1.093 | |
| **ANSI / IEEE C95.1 1992 - SAFETY LIMIT**<br>**Spatial Peak**<br>**Uncontrolled Exposure/General Population** | | | | | | | | **Body**<br>**1.6 W/kg (mW/g)**<br>averaged over 1 gram | | | | | | | |

**Note: blue entry represents variability measurement.**

## Table 11-25
## LTE Band 12 Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Ant State | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Side | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 25.0 | 24.36 | 10 | -0.06 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | back | 1:1 | 0.231 | 1.159 | 0.268 | A23 |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 24.0 | 23.43 | 10 | -0.01 | 1 | 0905M | QPSK | 25 | 0 | 10 mm | back | 1:1 | 0.147 | 1.140 | 0.168 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 25.0 | 24.36 | 10 | -0.01 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | front | 1:1 | 0.193 | 1.159 | 0.224 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 24.0 | 23.43 | 10 | 0.03 | 1 | 0905M | QPSK | 25 | 0 | 10 mm | front | 1:1 | 0.124 | 1.140 | 0.141 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 25.0 | 24.36 | 10 | -0.06 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | bottom | 1:1 | 0.103 | 1.159 | 0.119 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 24.0 | 23.43 | 10 | -0.01 | 1 | 0905M | QPSK | 25 | 0 | 10 mm | bottom | 1:1 | 0.065 | 1.140 | 0.074 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 25.0 | 24.36 | 10 | 0.00 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | right | 1:1 | 0.167 | 1.159 | 0.194 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 24.0 | 23.43 | 10 | 0.01 | 1 | 0905M | QPSK | 25 | 0 | 10 mm | right | 1:1 | 0.104 | 1.140 | 0.119 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 25.0 | 24.36 | 10 | -0.01 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | left | 1:1 | 0.152 | 1.159 | 0.176 | |
| 707.50 | 23095 | Mid | LTE Band 12 | 10 | 24.0 | 23.43 | 10 | 0.05 | 1 | 0905M | QPSK | 25 | 0 | 10 mm | left | 1:1 | 0.096 | 1.140 | 0.109 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

## Table 11-26
## LTE Band 13 Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Ant State | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Side | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 25.0 | 24.22 | 68 | -0.08 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | back | 1:1 | 0.391 | 1.197 | 0.468 | A25 |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 24.0 | 23.31 | 68 | -0.01 | 1 | 0905M | QPSK | 25 | 0 | 10 mm | back | 1:1 | 0.277 | 1.172 | 0.325 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 25.0 | 24.22 | 68 | -0.02 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | front | 1:1 | 0.348 | 1.197 | 0.417 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 24.0 | 23.31 | 68 | 0.01 | 1 | 0905M | QPSK | 25 | 0 | 10 mm | front | 1:1 | 0.245 | 1.172 | 0.287 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 25.0 | 24.22 | 68 | -0.03 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | bottom | 1:1 | 0.227 | 1.197 | 0.272 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 24.0 | 23.31 | 68 | 0.02 | 1 | 0905M | QPSK | 25 | 0 | 10 mm | bottom | 1:1 | 0.164 | 1.172 | 0.192 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 25.0 | 24.22 | 68 | 0.06 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | right | 1:1 | 0.311 | 1.197 | 0.372 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 24.0 | 23.31 | 68 | 0.02 | 1 | 0905M | QPSK | 25 | 0 | 10 mm | right | 1:1 | 0.223 | 1.172 | 0.261 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 25.0 | 24.22 | 68 | 0.02 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | left | 1:1 | 0.184 | 1.197 | 0.220 | |
| 782.00 | 23230 | Mid | LTE Band 13 | 10 | 24.0 | 23.31 | 68 | 0.01 | 1 | 0905M | QPSK | 25 | 0 | 10 mm | left | 1:1 | 0.139 | 1.172 | 0.163 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

## Table 11-27
## LTE Band 26 (Cell) Hotspot SAR

MEASUREMENT RESULTS

| FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Ant State | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Side | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 25.0 | 24.53 | 0 | 0.00 | 0 | 1155M | QPSK | 1 | 0 | 10 mm | back | 1:1 | 0.455 | 1.114 | 0.507 | A27 |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 24.0 | 23.63 | 0 | 0.00 | 1 | 1155M | QPSK | 36 | 0 | 10 mm | back | 1:1 | 0.374 | 1.089 | 0.407 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 25.0 | 24.53 | 0 | 0.02 | 0 | 1155M | QPSK | 1 | 0 | 10 mm | front | 1:1 | 0.361 | 1.114 | 0.402 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 24.0 | 23.63 | 0 | 0.00 | 1 | 1155M | QPSK | 36 | 0 | 10 mm | front | 1:1 | 0.299 | 1.089 | 0.326 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 25.0 | 24.53 | 0 | -0.01 | 0 | 1155M | QPSK | 1 | 0 | 10 mm | bottom | 1:1 | 0.259 | 1.114 | 0.289 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 24.0 | 23.63 | 0 | -0.10 | 1 | 1155M | QPSK | 36 | 0 | 10 mm | bottom | 1:1 | 0.215 | 1.089 | 0.234 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 25.0 | 24.53 | 0 | 0.01 | 0 | 1155M | QPSK | 1 | 0 | 10 mm | right | 1:1 | 0.348 | 1.114 | 0.388 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 24.0 | 23.63 | 0 | 0.00 | 1 | 1155M | QPSK | 36 | 0 | 10 mm | right | 1:1 | 0.266 | 1.089 | 0.290 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 25.0 | 24.53 | 0 | -0.05 | 0 | 1155M | QPSK | 1 | 0 | 10 mm | left | 1:1 | 0.187 | 1.114 | 0.208 | |
| 831.50 | 26865 | Mid | LTE Band 26 (Cell) | 15 | 24.0 | 23.63 | 0 | -0.05 | 1 | 1155M | QPSK | 36 | 0 | 10 mm | left | 1:1 | 0.133 | 1.089 | 0.145 | |

| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |
|---|---|

## Table 11-28
## LTE Band 4 (AWS) Hotspot SAR

MEASUREMENT RESULTS

| FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Ant State | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Side | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 20.0 | 19.28 | 17 | 0.01 | 0 | 2244M | QPSK | 1 | 99 | 10 mm | back | 1:1 | 0.383 | 1.180 | 0.452 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 20.0 | 19.40 | 17 | 0.04 | 0 | 2244M | QPSK | 50 | 25 | 10 mm | back | 1:1 | 0.403 | 1.148 | 0.463 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 20.0 | 19.28 | 17 | -0.05 | 0 | 2244M | QPSK | 1 | 99 | 10 mm | front | 1:1 | 0.331 | 1.180 | 0.391 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 20.0 | 19.40 | 17 | -0.01 | 0 | 2244M | QPSK | 50 | 25 | 10 mm | front | 1:1 | 0.342 | 1.148 | 0.393 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 20.0 | 19.28 | 17 | 0.03 | 0 | 2244M | QPSK | 1 | 99 | 10 mm | bottom | 1:1 | 0.593 | 1.180 | 0.700 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 20.0 | 19.40 | 17 | 0.00 | 0 | 2244M | QPSK | 50 | 25 | 10 mm | bottom | 1:1 | 0.608 | 1.148 | 0.698 | A29 |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 20.0 | 19.28 | 17 | 0.13 | 0 | 2244M | QPSK | 1 | 99 | 10 mm | right | 1:1 | 0.046 | 1.180 | 0.054 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 20.0 | 19.40 | 17 | 0.19 | 0 | 2244M | QPSK | 50 | 25 | 10 mm | right | 1:1 | 0.047 | 1.148 | 0.054 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 20.0 | 19.28 | 17 | 0.10 | 0 | 2244M | QPSK | 1 | 99 | 10 mm | left | 1:1 | 0.072 | 1.180 | 0.085 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 20.0 | 19.40 | 17 | -0.21 | 0 | 2244M | QPSK | 50 | 25 | 10 mm | left | 1:1 | 0.078 | 1.148 | 0.090 | |

| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram |
|---|---|

## Table 11-29
## LTE Band 25 (PCS) Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Ant State | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Side | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 20.0 | 19.30 | 16 | -0.01 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | back | 1:1 | 0.460 | 1.175 | 0.541 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 20.0 | 19.34 | 16 | -0.01 | 0 | 0905M | QPSK | 50 | 0 | 10 mm | back | 1:1 | 0.470 | 1.164 | 0.547 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 20.0 | 19.30 | 16 | 0.00 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | front | 1:1 | 0.332 | 1.175 | 0.390 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 20.0 | 19.34 | 16 | 0.01 | 0 | 0905M | QPSK | 50 | 0 | 10 mm | front | 1:1 | 0.337 | 1.164 | 0.392 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 20.0 | 19.30 | 16 | -0.08 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | bottom | 1:1 | 0.678 | 1.175 | 0.797 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 20.0 | 19.27 | 16 | -0.03 | 0 | 0905M | QPSK | 50 | 0 | 10 mm | bottom | 1:1 | 0.626 | 1.183 | 0.741 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 20.0 | 19.34 | 16 | -0.05 | 0 | 0905M | QPSK | 50 | 0 | 10 mm | bottom | 1:1 | 0.697 | 1.164 | 0.811 | |
| 1905.00 | 26590 | High | LTE Band 25 (PCS) | 20 | 20.0 | 19.18 | 16 | -0.04 | 0 | 0905M | QPSK | 50 | 0 | 10 mm | bottom | 1:1 | 0.734 | 1.208 | 0.887 | A31 |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 20.0 | 19.26 | 16 | -0.06 | 0 | 0905M | QPSK | 100 | 0 | 10 mm | bottom | 1:1 | 0.682 | 1.186 | 0.809 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 20.0 | 19.30 | 16 | 0.04 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | right | 1:1 | 0.046 | 1.175 | 0.054 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 20.0 | 19.34 | 16 | 0.06 | 0 | 0905M | QPSK | 50 | 0 | 10 mm | right | 1:1 | 0.052 | 1.164 | 0.061 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 20.0 | 19.30 | 16 | 0.04 | 0 | 0905M | QPSK | 1 | 0 | 10 mm | left | 1:1 | 0.082 | 1.175 | 0.096 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 20.0 | 19.34 | 16 | -0.01 | 0 | 0905M | QPSK | 50 | 0 | 10 mm | left | 1:1 | 0.085 | 1.164 | 0.099 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

## Table 11-30
## LTE Band 41 Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 CC Uplink \| 2 CC Uplink | Component Carrier | FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Side | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| | | MHz | Ch. | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 19.96 | -0.05 | 0 | 1149M | QPSK | 1 | 0 | 10 mm | back | 1:1.58 | 0.200 | 1.271 | 0.254 | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 20.08 | -0.01 | 0 | 1149M | QPSK | 50 | 50 | 10 mm | back | 1:1.58 | 0.198 | 1.236 | 0.245 | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 19.96 | -0.05 | 0 | 1149M | QPSK | 1 | 0 | 10 mm | front | 1:1.58 | 0.128 | 1.271 | 0.163 | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 20.08 | -0.02 | 0 | 1149M | QPSK | 50 | 50 | 10 mm | front | 1:1.58 | 0.135 | 1.236 | 0.167 | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 19.96 | 0.03 | 0 | 1149M | QPSK | 1 | 0 | 10 mm | bottom | 1:1.58 | 0.426 | 1.271 | 0.541 | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 20.08 | -0.14 | 0 | 1149M | QPSK | 50 | 50 | 10 mm | bottom | 1:1.58 | 0.464 | 1.236 | 0.574 | |
| 2 CC Uplink | PCC | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 21.00 | -0.03 | 0 | 1149M | QPSK | 50 | 50 | 10 mm | bottom | 1:1.58 | 0.592 | 1.000 | 0.592 | A33 |
| | SCC | 2525.80 | 39948 | | | 20 | | | | | | QPSK | 50 | 0 | | | | | | | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 19.96 | -0.15 | 0 | 1149M | QPSK | 1 | 0 | 10 mm | left | 1:1.58 | 0.039 | 1.271 | 0.050 | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 20.08 | -0.03 | 0 | 1149M | QPSK | 50 | 50 | 10 mm | left | 1:1.58 | 0.040 | 1.236 | 0.049 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | |

## Table 11-31
## WLAN Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | Peak SAR of Area Scan | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 2412 | 1 | 802.11b | DSSS | 22 | 21.0 | 20.94 | -0.14 | 10 mm | 1 | 1150M | 1 | back | 99.8 | 0.348 | 0.331 | 1.014 | 1.002 | 0.336 | |
| 2412 | 1 | 802.11b | DSSS | 22 | 21.0 | 20.94 | 0.17 | 10 mm | 1 | 1150M | 1 | front | 99.8 | 0.378 | - | 1.014 | 1.002 | - | |
| 2412 | 1 | 802.11b | DSSS | 22 | 21.0 | 20.94 | 0.15 | 10 mm | 1 | 1150M | 1 | top | 99.8 | 0.242 | - | 1.014 | 1.002 | - | |
| 2412 | 1 | 802.11b | DSSS | 22 | 21.0 | 20.94 | 0.01 | 10 mm | 1 | 1150M | 1 | left | 99.8 | 0.480 | 0.371 | 1.014 | 1.002 | 0.377 | A35 |
| 2412 | 1 | 802.11b | DSSS | 22 | 21.0 | 20.97 | 0.00 | 10 mm | 2 | 1150M | 1 | back | 99.8 | 0.283 | 0.228 | 1.007 | 1.002 | 0.230 | |
| 2412 | 1 | 802.11b | DSSS | 22 | 21.0 | 20.97 | -0.20 | 10 mm | 2 | 1150M | 1 | front | 99.8 | 0.110 | - | 1.007 | 1.002 | - | |
| 2412 | 1 | 802.11b | DSSS | 22 | 21.0 | 20.97 | 0.16 | 10 mm | 2 | 1150M | 1 | top | 99.8 | 0.453 | 0.309 | 1.007 | 1.002 | 0.312 | |
| 2412 | 1 | 802.11b | DSSS | 22 | 21.0 | 20.97 | 0.15 | 10 mm | 2 | 1150M | 1 | left | 99.8 | 0.037 | - | 1.007 | 1.002 | - | |
| 5825 | 165 | 802.11a | OFDM | 20 | 18.5 | 18.45 | -0.01 | 10 mm | 1 | 1164M | 6 | back | 98.6 | 0.754 | 0.303 | 1.012 | 1.014 | 0.311 | |
| 5825 | 165 | 802.11a | OFDM | 20 | 18.5 | 18.45 | -0.16 | 10 mm | 1 | 1164M | 6 | front | 98.6 | 0.234 | - | 1.012 | 1.014 | - | |
| 5825 | 165 | 802.11a | OFDM | 20 | 18.5 | 18.45 | 0.01 | 10 mm | 1 | 1164M | 6 | top | 98.6 | 0.725 | - | 1.012 | 1.014 | - | |
| 5825 | 165 | 802.11a | OFDM | 20 | 18.5 | 18.45 | -0.12 | 10 mm | 1 | 1164M | 6 | left | 98.6 | 0.431 | - | 1.012 | 1.014 | - | |
| 5785 | 157 | 802.11a | OFDM | 20 | 18.5 | 18.24 | -0.14 | 10 mm | 2 | 1164M | 6 | back | 98.8 | 1.274 | 0.554 | 1.062 | 1.012 | 0.595 | |
| 5785 | 157 | 802.11a | OFDM | 20 | 18.5 | 18.24 | 0.00 | 10 mm | 2 | 1164M | 6 | front | 98.8 | 0.055 | - | 1.062 | 1.012 | - | |
| 5785 | 157 | 802.11a | OFDM | 20 | 18.5 | 18.24 | 0.00 | 10 mm | 2 | 1164M | 6 | top | 98.8 | 0.121 | - | 1.062 | 1.012 | - | |
| 5785 | 157 | 802.11a | OFDM | 20 | 18.5 | 18.24 | 0.19 | 10 mm | 2 | 1164M | 6 | left | 98.8 | 0.254 | 0.105 | 1.062 | 1.012 | 0.113 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

## Table 11-32
## NII MIMO Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power (Ant 1) [dBm] | Conducted Power (Ant 1) [dBm] | Maximum Allowed Power (Ant 2) [dBm] | Conducted Power (Ant 2) [dBm] | Power Drift [dB] | Spacing | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | Peak SAR of Area Scan | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 5745 | 149 | 802.11n | OFDM | 20 | 18.5 | 18.26 | 18.5 | 18.05 | 0.09 | 10 mm | MIMO | 1164M | 13 | back | 98.6 | 1.383 | 0.649 | 1.109 | 1.014 | 0.730 | A37 |
| 5785 | 157 | 802.11n | OFDM | 20 | 18.5 | 18.23 | 18.5 | 18.20 | -0.07 | 10 mm | MIMO | 1164M | 13 | back | 98.6 | 1.267 | 0.602 | 1.072 | 1.014 | 0.654 | |
| 5825 | 165 | 802.11n | OFDM | 20 | 18.5 | 18.37 | 18.5 | 18.05 | 0.09 | 10 mm | MIMO | 1164M | 13 | back | 98.6 | 1.101 | 0.524 | 1.109 | 1.014 | 0.589 | |
| 5785 | 157 | 802.11n | OFDM | 20 | 18.5 | 18.23 | 18.5 | 18.20 | 0.00 | 10 mm | MIMO | 1164M | 13 | front | 98.6 | 0.155 | - | 1.072 | 1.014 | - | |
| 5785 | 157 | 802.11n | OFDM | 20 | 18.5 | 18.23 | 18.5 | 18.20 | -0.08 | 10 mm | MIMO | 1164M | 13 | top | 98.6 | 0.544 | 0.208 | 1.072 | 1.014 | 0.226 | |
| 5785 | 157 | 802.11n | OFDM | 20 | 18.5 | 18.23 | 18.5 | 18.20 | -0.20 | 10 mm | MIMO | 1164M | 13 | left | 98.6 | 0.497 | - | 1.072 | 1.014 | - | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

To achieve the 21.5 dBm maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 18.5 dBm.

## Table 11-33
## DTS MIMO Hotspot SAR for Conditions with 2.4 GHz and 5 GHz WLAN SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power (Ant 1) [dBm] | Conducted Power (Ant 1) [dBm] | Maximum Allowed Power (Ant 2) [dBm] | Conducted Power (Ant 2) [dBm] | Power Drift [dB] | Spacing | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | Peak SAR of Area Scan | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 2437 | 6 | 802.11n | OFDM | 20 | 17.0 | 16.42 | 17.0 | 16.52 | 0.19 | 10 mm | MIMO | 1150M | 13 | back | 99.3 | 0.168 | 0.149 | 1.143 | 1.007 | 0.171 | |
| 2437 | 6 | 802.11n | OFDM | 20 | 17.0 | 16.42 | 17.0 | 16.52 | 0.19 | 10 mm | MIMO | 1150M | 13 | front | 99.3 | 0.174 | - | 1.143 | 1.007 | - | |
| 2437 | 6 | 802.11n | OFDM | 20 | 17.0 | 16.42 | 17.0 | 16.52 | 0.12 | 10 mm | MIMO | 1150M | 13 | top | 99.3 | 0.235 | 0.194 | 1.143 | 1.007 | 0.223 | |
| 2437 | 6 | 802.11n | OFDM | 20 | 17.0 | 16.42 | 17.0 | 16.52 | 0.17 | 10 mm | MIMO | 1150M | 13 | left | 99.3 | 0.212 | - | 1.143 | 1.007 | - | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | |

DTS MIMO was additionally evaluated at the maximum allowed output power during operations with Simultaneous 2.4 GHz and 5 GHz WLAN. 5 GHz WIFI was not transmitting during the above evaluations.

## Table 11-34
## NII MIMO Hotspot SAR for Conditions with 2.4 GHz and 5 GHz WLAN SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power (Ant 1) [dBm] | Conducted Power (Ant 1) [dBm] | Maximum Allowed Power (Ant 2) [dBm] | Conducted Power (Ant 2) [dBm] | Power Drift [dB] | Spacing | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | Peak SAR of Area Scan | SAR (1g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | 14.0 | 13.65 | 0.08 | 10 mm | MIMO | 1164M | 58.5 | back | 98.8 | 0.429 | 0.205 | 1.084 | 1.012 | 0.225 | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | 14.0 | 13.65 | 0.00 | 10 mm | MIMO | 1164M | 58.5 | front | 98.8 | 0.038 | - | 1.084 | 1.012 | - | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | 14.0 | 13.65 | 0.18 | 10 mm | MIMO | 1164M | 58.5 | top | 98.8 | 0.178 | - | 1.084 | 1.012 | - | |
| 5775 | 155 | 802.11ac | OFDM | 80 | 14.0 | 13.82 | 14.0 | 13.65 | 0.00 | 10 mm | MIMO | 1164M | 58.5 | left | 98.8 | 0.171 | - | 1.084 | 1.012 | - | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | | | |

NII MIMO was additionally evaluated at the maximum allowed output power during operations with Simultaneous 2.4 GHz and 5 GHz WLAN. 2.4 GHz WIFI was not transmitting during the above evaluations.

## Table 11-35
## DSS Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | SAR (1g) | Scaling Factor (Cond Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | (W/kg) | | | (W/kg) | |
| 2441 | 39 | Bluetooth | FHSS | 18.5 | 18.13 | 0.05 | 10 mm | 1150M | 1 | back | 77.6 | 0.122 | 1.089 | 1.289 | 0.171 | |
| 2441 | 39 | Bluetooth | FHSS | 18.5 | 18.13 | 0.01 | 10 mm | 1150M | 1 | front | 77.6 | 0.138 | 1.089 | 1.289 | 0.194 | |
| 2441 | 39 | Bluetooth | FHSS | 18.5 | 18.13 | -0.05 | 10 mm | 1150M | 1 | top | 77.6 | 0.109 | 1.089 | 1.289 | 0.153 | |
| 2441 | 39 | Bluetooth | FHSS | 18.5 | 18.13 | -0.10 | 10 mm | 1150M | 1 | left | 77.6 | 0.152 | 1.089 | 1.289 | **0.213** | A39 |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | |

## 11.4 Standalone Phablet SAR Data

**Table 11-36**
**GPRS/UMTS Phablet SAR Data**

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Device Serial Number | # of GPRS Slots | Duty Cycle | Side | SAR (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1880.00 | 661 | GSM 1900 | GPRS | 27.5 | 26.55 | -0.15 | 6 mm | 0905M | 3 | 1:2.76 | back | 0.737 | 1.245 | 0.918 | |
| 1880.00 | 661 | GSM 1900 | GPRS | 27.5 | 26.55 | 0.08 | 4 mm | 0905M | 3 | 1:2.76 | front | 0.744 | 1.245 | 0.926 | |
| 1880.00 | 661 | GSM 1900 | GPRS | 27.5 | 26.55 | -0.04 | 8 mm | 0905M | 3 | 1:2.76 | bottom | 0.760 | 1.245 | 0.946 | |
| 1880.00 | 661 | GSM 1900 | GPRS | 27.5 | 26.55 | 0.00 | 0 mm | 0905M | 3 | 1:2.76 | right | 0.140 | 1.245 | 0.174 | |
| 1880.00 | 661 | GSM 1900 | GPRS | 27.5 | 26.55 | -0.09 | 0 mm | 0905M | 3 | 1:2.76 | left | 0.292 | 1.245 | 0.364 | |
| 1850.20 | 512 | GSM 1900 | GPRS | 25.5 | 24.96 | 0.07 | 0 mm | 0905M | 3 | 1:2.76 | back | 1.850 | 1.132 | 2.094 | |
| 1880.00 | 661 | GSM 1900 | GPRS | 25.5 | 25.09 | 0.12 | 0 mm | 0905M | 3 | 1:2.76 | back | 2.090 | 1.099 | 2.297 | |
| 1909.80 | 810 | GSM 1900 | GPRS | 25.5 | 24.63 | 0.02 | 0 mm | 0905M | 3 | 1:2.76 | back | 2.000 | 1.222 | 2.444 | |
| 1880.00 | 661 | GSM 1900 | GPRS | 25.5 | 25.09 | 0.11 | 0 mm | 0905M | 3 | 1:2.76 | front | 1.420 | 1.099 | 1.561 | |
| 1850.20 | 512 | GSM 1900 | GPRS | 25.5 | 24.96 | 0.20 | 0 mm | 0905M | 3 | 1:2.76 | bottom | 2.100 | 1.132 | 2.377 | |
| 1880.00 | 661 | GSM 1900 | GPRS | 25.5 | 25.09 | -0.12 | 0 mm | 0905M | 3 | 1:2.76 | bottom | 2.540 | 1.099 | 2.791 | A40 |
| 1909.80 | 810 | GSM 1900 | GPRS | 25.5 | 24.63 | -0.05 | 0 mm | 0905M | 3 | 1:2.76 | bottom | 2.430 | 1.222 | 2.969 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 24.0 | 23.05 | -0.06 | 6 mm | 0905M | N/A | 1:1 | back | 1.280 | 1.245 | 1.594 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 24.0 | 23.05 | 0.14 | 4 mm | 0905M | N/A | 1:1 | front | 1.300 | 1.245 | 1.619 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 24.0 | 23.05 | -0.04 | 8 mm | 0905M | N/A | 1:1 | bottom | 1.430 | 1.245 | 1.780 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 24.0 | 23.05 | 0.01 | 0 mm | 0905M | N/A | 1:1 | right | 0.221 | 1.245 | 0.275 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 24.0 | 23.05 | -0.17 | 0 mm | 0905M | N/A | 1:1 | left | 0.514 | 1.245 | 0.640 | |
| 1852.40 | 9262 | UMTS 1900 | RMC | 21.0 | 20.86 | 0.01 | 0 mm | 0905M | N/A | 1:1 | back | 2.280 | 1.033 | 2.355 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 21.0 | 20.97 | 0.01 | 0 mm | 0905M | N/A | 1:1 | back | 2.490 | 1.007 | 2.507 | |
| 1907.60 | 9538 | UMTS 1900 | RMC | 21.0 | 20.56 | -0.01 | 0 mm | 0905M | N/A | 1:1 | back | 2.280 | 1.107 | 2.524 | |
| 1852.40 | 9262 | UMTS 1900 | RMC | 21.0 | 20.86 | 0.09 | 0 mm | 0905M | N/A | 1:1 | front | 1.850 | 1.033 | 1.911 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 21.0 | 20.97 | 0.11 | 0 mm | 0905M | N/A | 1:1 | front | 2.090 | 1.007 | 2.105 | |
| 1907.60 | 9538 | UMTS 1900 | RMC | 21.0 | 20.56 | 0.10 | 0 mm | 0905M | N/A | 1:1 | front | 2.020 | 1.107 | 2.236 | |
| 1852.40 | 9262 | UMTS 1900 | RMC | 21.0 | 20.86 | -0.04 | 0 mm | 0905M | N/A | 1:1 | bottom | 2.890 | 1.033 | 2.985 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 21.0 | 20.97 | -0.05 | 0 mm | 0905M | N/A | 1:1 | bottom | 2.980 | 1.007 | 3.001 | A41 |
| 1907.60 | 9538 | UMTS 1900 | RMC | 21.0 | 20.56 | -0.04 | 0 mm | 0905M | N/A | 1:1 | bottom | 2.680 | 1.107 | 2.967 | |
| 1880.00 | 9400 | UMTS 1900 | RMC | 21.0 | 20.97 | 0.16 | 0 mm | 0905M | N/A | 1:1 | bottom | 2.710 | 1.007 | 2.729 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | Phablet<br>**4.0 W/kg (mW/g)**<br>averaged over 10 grams | | | | | | | |

**Note: blue entry represents variability measurement.**

# Table 11-37
# LTE Phablet SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Ant State | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Side | Duty Cycle | SAR (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 24.0 | 23.79 | 17 | -0.08 | 0 | 2244M | QPSK | 1 | 0 | 6 mm | back | 1:1 | 0.844 | 1.050 | 0.886 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 23.0 | 22.84 | 17 | -0.03 | 1 | 2244M | QPSK | 50 | 0 | 6 mm | back | 1:1 | 0.690 | 1.038 | 0.716 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 24.0 | 23.79 | 17 | 0.04 | 0 | 2244M | QPSK | 1 | 0 | 4 mm | front | 1:1 | 1.160 | 1.050 | 1.218 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 23.0 | 22.84 | 17 | 0.04 | 1 | 2244M | QPSK | 50 | 0 | 4 mm | front | 1:1 | 0.958 | 1.038 | 0.994 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 24.0 | 23.79 | 17 | -0.03 | 0 | 2244M | QPSK | 1 | 0 | 8 mm | bottom | 1:1 | 1.060 | 1.050 | 1.113 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 23.0 | 22.84 | 17 | -0.02 | 1 | 2244M | QPSK | 50 | 0 | 8 mm | bottom | 1:1 | 0.859 | 1.038 | 0.892 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 24.0 | 23.79 | 17 | 0.12 | 0 | 2244M | QPSK | 1 | 0 | 0 mm | right | 1:1 | 0.242 | 1.050 | 0.254 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 23.0 | 22.84 | 17 | -0.10 | 1 | 2244M | QPSK | 50 | 0 | 0 mm | right | 1:1 | 0.193 | 1.038 | 0.200 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 24.0 | 23.79 | 17 | -0.02 | 0 | 2244M | QPSK | 1 | 0 | 0 mm | left | 1:1 | 0.390 | 1.050 | 0.410 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 23.0 | 22.84 | 17 | -0.09 | 1 | 2244M | QPSK | 50 | 0 | 0 mm | left | 1:1 | 0.318 | 1.038 | 0.330 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 21.0 | 20.44 | 17 | -0.01 | 0 | 2244M | QPSK | 1 | 0 | 0 mm | back | 1:1 | 1.650 | 1.138 | 1.878 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 21.0 | 20.53 | 17 | -0.01 | 0 | 2244M | QPSK | 50 | 25 | 0 mm | back | 1:1 | 1.780 | 1.114 | 1.983 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 21.0 | 20.44 | 17 | -0.05 | 0 | 2244M | QPSK | 1 | 0 | 0 mm | front | 1:1 | 1.210 | 1.138 | 1.377 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 21.0 | 20.53 | 17 | -0.08 | 0 | 2244M | QPSK | 50 | 25 | 0 mm | front | 1:1 | 1.260 | 1.114 | 1.404 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 21.0 | 20.44 | 17 | -0.03 | 0 | 2244M | QPSK | 1 | 0 | 0 mm | bottom | 1:1 | 2.450 | 1.138 | 2.788 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 21.0 | 20.53 | 17 | -0.08 | 0 | 2244M | QPSK | 50 | 25 | 0 mm | bottom | 1:1 | 2.550 | 1.114 | 2.841 | |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 21.0 | 20.41 | 17 | -0.11 | 0 | 2244M | QPSK | 100 | 0 | 0 mm | bottom | 1:1 | 2.550 | 1.146 | 2.922 | A42 |
| 1732.50 | 20175 | Mid | LTE Band 4 (AWS) | 20 | 21.0 | 20.41 | 17 | -0.09 | 0 | 2244M | QPSK | 100 | 0 | 0 mm | bottom | 1:1 | 2.540 | 1.146 | 2.911 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 25.0 | 24.65 | 16 | -0.05 | 0 | 1150M | QPSK | 1 | 0 | 6 mm | back | 1:1 | 1.330 | 1.084 | 1.442 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 24.0 | 23.80 | 16 | -0.07 | 1 | 1150M | QPSK | 50 | 0 | 6 mm | back | 1:1 | 1.090 | 1.047 | 1.141 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 25.0 | 24.65 | 16 | -0.09 | 0 | 1150M | QPSK | 1 | 0 | 4 mm | front | 1:1 | 1.420 | 1.084 | 1.539 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 24.0 | 23.80 | 16 | 0.03 | 1 | 1150M | QPSK | 50 | 0 | 4 mm | front | 1:1 | 1.150 | 1.047 | 1.204 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 25.0 | 24.65 | 16 | 0.00 | 0 | 1150M | QPSK | 1 | 0 | 8 mm | bottom | 1:1 | 1.470 | 1.084 | 1.593 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 24.0 | 23.80 | 16 | -0.02 | 1 | 1150M | QPSK | 50 | 0 | 8 mm | bottom | 1:1 | 1.240 | 1.047 | 1.298 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 25.0 | 24.65 | 16 | -0.02 | 0 | 1150M | QPSK | 1 | 0 | 0 mm | right | 1:1 | 0.272 | 1.084 | 0.295 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 24.0 | 23.80 | 16 | -0.05 | 1 | 1150M | QPSK | 50 | 0 | 0 mm | right | 1:1 | 0.225 | 1.047 | 0.236 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 25.0 | 24.65 | 16 | -0.09 | 0 | 1150M | QPSK | 1 | 0 | 0 mm | left | 1:1 | 0.554 | 1.084 | 0.601 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 24.0 | 23.80 | 16 | -0.03 | 1 | 1150M | QPSK | 50 | 0 | 0 mm | left | 1:1 | 0.449 | 1.047 | 0.470 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 21.0 | 20.12 | 16 | -0.01 | 0 | 1160M | QPSK | 1 | 0 | 0 mm | back | 1:1 | 1.940 | 1.225 | 2.377 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 21.0 | 20.22 | 16 | 0.02 | 0 | 1160M | QPSK | 1 | 0 | 0 mm | back | 1:1 | 2.020 | 1.197 | 2.418 | |
| 1905.00 | 26590 | High | LTE Band 25 (PCS) | 20 | 21.0 | 20.15 | 16 | 0.06 | 0 | 1160M | QPSK | 1 | 0 | 0 mm | back | 1:1 | 1.990 | 1.216 | 2.420 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 21.0 | 20.24 | 16 | 0.03 | 0 | 1160M | QPSK | 50 | 25 | 0 mm | back | 1:1 | 1.980 | 1.191 | 2.358 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 21.0 | 20.27 | 16 | 0.03 | 0 | 1160M | QPSK | 50 | 0 | 0 mm | back | 1:1 | 2.020 | 1.183 | 2.390 | |
| 1905.00 | 26590 | High | LTE Band 25 (PCS) | 20 | 21.0 | 20.25 | 16 | 0.05 | 0 | 1160M | QPSK | 50 | 0 | 0 mm | back | 1:1 | 2.000 | 1.189 | 2.378 | |
| 1905.00 | 26590 | High | LTE Band 25 (PCS) | 20 | 21.0 | 20.21 | 16 | 0.05 | 0 | 1160M | QPSK | 100 | 0 | 0 mm | back | 1:1 | 2.010 | 1.199 | 2.410 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 21.0 | 20.12 | 16 | 0.05 | 0 | 1160M | QPSK | 1 | 0 | 0 mm | front | 1:1 | 1.720 | 1.225 | 2.107 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 21.0 | 20.22 | 16 | 0.05 | 0 | 1160M | QPSK | 1 | 0 | 0 mm | front | 1:1 | 1.810 | 1.197 | 2.167 | |
| 1905.00 | 26590 | High | LTE Band 25 (PCS) | 20 | 21.0 | 20.15 | 16 | 0.06 | 0 | 1160M | QPSK | 1 | 0 | 0 mm | front | 1:1 | 1.790 | 1.216 | 2.177 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 21.0 | 20.24 | 16 | 0.07 | 0 | 1160M | QPSK | 50 | 25 | 0 mm | front | 1:1 | 1.760 | 1.191 | 2.096 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 21.0 | 20.27 | 16 | 0.05 | 0 | 1160M | QPSK | 50 | 0 | 0 mm | front | 1:1 | 1.800 | 1.183 | 2.129 | |
| 1905.00 | 26590 | High | LTE Band 25 (PCS) | 20 | 21.0 | 20.25 | 16 | 0.03 | 0 | 1160M | QPSK | 50 | 0 | 0 mm | front | 1:1 | 1.780 | 1.189 | 2.116 | |
| 1905.00 | 26590 | High | LTE Band 25 (PCS) | 20 | 21.0 | 20.21 | 16 | 0.00 | 0 | 1160M | QPSK | 100 | 0 | 0 mm | front | 1:1 | 1.780 | 1.199 | 2.134 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 21.0 | 20.12 | 16 | -0.06 | 0 | 1160M | QPSK | 1 | 0 | 0 mm | bottom | 1:1 | 2.590 | 1.225 | 3.173 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 21.0 | 20.22 | 16 | -0.07 | 0 | 1160M | QPSK | 1 | 0 | 0 mm | bottom | 1:1 | 2.700 | 1.197 | 3.232 | A43 |
| 1905.00 | 26590 | High | LTE Band 25 (PCS) | 20 | 21.0 | 20.15 | 16 | -0.04 | 0 | 1160M | QPSK | 1 | 0 | 0 mm | bottom | 1:1 | 2.670 | 1.216 | 3.247 | |
| 1860.00 | 26140 | Low | LTE Band 25 (PCS) | 20 | 21.0 | 20.24 | 16 | -0.03 | 0 | 1160M | QPSK | 50 | 25 | 0 mm | bottom | 1:1 | 2.680 | 1.191 | 3.192 | |
| 1882.50 | 26365 | Mid | LTE Band 25 (PCS) | 20 | 21.0 | 20.27 | 16 | -0.03 | 0 | 1160M | QPSK | 50 | 0 | 0 mm | bottom | 1:1 | 2.690 | 1.183 | 3.182 | |
| 1905.00 | 26590 | High | LTE Band 25 (PCS) | 20 | 21.0 | 20.25 | 16 | -0.04 | 0 | 1160M | QPSK | 50 | 0 | 0 mm | bottom | 1:1 | 2.340 | 1.189 | 2.782 | |
| 1905.00 | 26590 | High | LTE Band 25 (PCS) | 20 | 21.0 | 20.21 | 16 | -0.05 | 0 | 1160M | QPSK | 100 | 0 | 0 mm | bottom | 1:1 | 2.340 | 1.199 | 2.806 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Phablet<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | | | |

**Note: Blue entries represent variability measurements.**

# Table 11-38
# LTE Band 41 Phablet SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 CC Uplink \| 2 CC Uplink | Component Carrier | FREQUENCY | | | Mode | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | MPR [dB] | Device Serial Number | Modulation | RB Size | RB Offset | Spacing | Side | Duty Cycle | SAR (10g) | Scaling Factor | Reported SAR (10g) | Plot # |
| | | MHz | Ch. | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 25.5 | 24.19 | 0.09 | 0 | 1149M | QPSK | 1 | 0 | 6 mm | back | 1:1.58 | 0.526 | 1.352 | 0.711 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 24.5 | 23.50 | 0.05 | 1 | 1149M | QPSK | 50 | 0 | 6 mm | back | 1:1.58 | 0.445 | 1.259 | 0.560 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 25.5 | 24.19 | 0.07 | 0 | 1149M | QPSK | 1 | 0 | 4 mm | front | 1:1.58 | 0.734 | 1.352 | 0.992 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 24.5 | 23.50 | 0.00 | 1 | 1149M | QPSK | 50 | 0 | 4 mm | front | 1:1.58 | 0.629 | 1.259 | 0.792 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 25.5 | 24.19 | 0.00 | 0 | 1149M | QPSK | 1 | 0 | 8 mm | bottom | 1:1.58 | 0.556 | 1.352 | 0.752 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 24.5 | 23.50 | -0.06 | 1 | 1149M | QPSK | 50 | 0 | 8 mm | bottom | 1:1.58 | 0.476 | 1.259 | 0.599 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 25.5 | 24.19 | -0.14 | 0 | 1149M | QPSK | 1 | 0 | 0 mm | left | 1:1.58 | 0.902 | 1.352 | 1.220 | |
| 1 CC Uplink | N/A | 2680.00 | 41490 | High | LTE Band 41 | 20 | 24.5 | 23.50 | -0.13 | 1 | 1149M | QPSK | 50 | 0 | 0 mm | left | 1:1.58 | 0.808 | 1.259 | 1.017 | |
| 2 CC Uplink | PCC | 2680.00 | 41490 | High | LTE Band 41 | 20 | 25.5 | 24.83 | -0.12 | 0 | 1149M | QPSK | 1 | 0 | 0 mm | left | 1:1.58 | 1.070 | 1.167 | 1.249 | A44 |
| | SCC | 2660.20 | 41292 | | | 20 | | | | | | QPSK | 1 | 99 | | | | | | | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 19.96 | -0.12 | 0 | 1155M | QPSK | 1 | 0 | 0 mm | back | 1:1.58 | 0.794 | 1.271 | 1.009 | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 20.08 | 0.09 | 0 | 1155M | QPSK | 50 | 50 | 0 mm | back | 1:1.58 | 0.826 | 1.236 | 1.021 | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 19.96 | -0.20 | 0 | 1155M | QPSK | 1 | 0 | 0 mm | front | 1:1.58 | 0.533 | 1.271 | 0.677 | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 20.08 | -0.12 | 0 | 1155M | QPSK | 50 | 50 | 0 mm | front | 1:1.58 | 0.566 | 1.236 | 0.700 | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 19.96 | 0.00 | 0 | 1155M | QPSK | 1 | 0 | 0 mm | bottom | 1:1.58 | 0.785 | 1.271 | 0.998 | |
| 1 CC Uplink | N/A | 2506.00 | 39750 | Low | LTE Band 41 | 20 | 21.0 | 20.08 | 0.04 | 0 | 1155M | QPSK | 50 | 50 | 0 mm | bottom | 1:1.58 | 0.799 | 1.236 | 0.988 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | | Phablet<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | | | |

# Table 11-39
# WLAN Phablet SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Spacing | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | Peak SAR of Area Scan | SAR (10g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 5300 | 60 | 802.11a | OFDM | 20 | 18.5 | 18.18 | 0.16 | 0 mm | 1 | 1151M | 6 | back | 98.6 | 9.044 | 1.240 | 1.076 | 1.014 | 1.353 | |
| 5300 | 60 | 802.11a | OFDM | 20 | 18.5 | 18.18 | 0.18 | 0 mm | 1 | 1151M | 6 | front | 98.6 | 3.233 | - | 1.076 | 1.014 | - | |
| 5300 | 60 | 802.11a | OFDM | 20 | 18.5 | 18.18 | 0.18 | 0 mm | 1 | 1151M | 6 | top | 98.6 | 7.739 | - | 1.076 | 1.014 | - | |
| 5300 | 60 | 802.11a | OFDM | 20 | 18.5 | 18.18 | -0.03 | 0 mm | 1 | 1151M | 6 | left | 98.6 | 13.708 | 1.360 | 1.076 | 1.014 | 1.484 | |
| 5300 | 60 | 802.11a | OFDM | 20 | 18.5 | 18.37 | -0.18 | 0 mm | 2 | 1151M | 6 | back | 98.8 | 13.951 | 1.610 | 1.030 | 1.012 | 1.678 | |
| 5300 | 60 | 802.11a | OFDM | 20 | 18.5 | 18.37 | 0.00 | 0 mm | 2 | 1151M | 6 | front | 98.8 | 0.772 | 0.090 | 1.030 | 1.012 | 0.094 | |
| 5300 | 60 | 802.11a | OFDM | 20 | 18.5 | 18.37 | -0.16 | 0 mm | 2 | 1151M | 6 | top | 98.8 | 1.071 | - | 1.030 | 1.012 | - | |
| 5300 | 60 | 802.11a | OFDM | 20 | 18.5 | 18.37 | 0.00 | 0 mm | 2 | 1151M | 6 | left | 98.8 | 1.403 | 0.156 | 1.030 | 1.012 | 0.163 | |
| 5600 | 120 | 802.11a | OFDM | 20 | 18.5 | 18.20 | 0.18 | 0 mm | 1 | 1151M | 6 | back | 98.6 | 8.735 | 0.981 | 1.072 | 1.014 | 1.066 | |
| 5600 | 120 | 802.11a | OFDM | 20 | 18.5 | 18.20 | 0.00 | 0 mm | 1 | 1151M | 6 | front | 98.6 | 2.029 | - | 1.072 | 1.014 | - | |
| 5600 | 120 | 802.11a | OFDM | 20 | 18.5 | 18.20 | -0.06 | 0 mm | 1 | 1151M | 6 | top | 98.6 | 6.192 | - | 1.072 | 1.014 | - | |
| 5600 | 120 | 802.11a | OFDM | 20 | 18.5 | 18.20 | 0.03 | 0 mm | 1 | 1151M | 6 | left | 98.6 | 7.467 | 0.707 | 1.072 | 1.014 | 0.769 | |
| 5520 | 104 | 802.11a | OFDM | 20 | 18.5 | 18.27 | -0.12 | 0 mm | 2 | 1151M | 6 | back | 98.8 | 40.086 | 2.240 | 1.054 | 1.012 | 2.389 | |
| 5600 | 120 | 802.11a | OFDM | 20 | 18.5 | 18.34 | -0.17 | 0 mm | 2 | 1151M | 6 | back | 98.8 | 23.523 | 2.600 | 1.038 | 1.012 | **2.731** | |
| 5720 | 144 | 802.11a | OFDM | 20 | 18.5 | 18.39 | -0.07 | 0 mm | 2 | 1151M | 6 | back | 98.8 | 33.560 | 2.120 | 1.026 | 1.012 | 2.201 | |
| 5720 | 144 | 802.11a | OFDM | 20 | 18.5 | 18.39 | 0.00 | 0 mm | 2 | 1151M | 6 | front | 98.8 | 0.491 | 0.046 | 1.026 | 1.012 | 0.048 | |
| 5720 | 144 | 802.11a | OFDM | 20 | 18.5 | 18.39 | 0.04 | 0 mm | 2 | 1151M | 6 | top | 98.8 | 2.775 | 0.222 | 1.026 | 1.012 | 0.231 | |
| 5720 | 144 | 802.11a | OFDM | 20 | 18.5 | 18.39 | 0.18 | 0 mm | 2 | 1151M | 6 | left | 98.8 | 1.495 | - | 1.026 | 1.012 | - | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | Phablet<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | | | | |

## Table 11-40
## WLAN MIMO Phablet SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Mode | Service | Bandwidth [MHz] | Maximum Allowed Power (Ant 1) [dBm] | Conducted Power (Ant 1) [dBm] | Maximum Allowed Power (Ant 2) [dBm] | Conducted Power (Ant 2) [dBm] | Power Drift [dB] | Spacing | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Side | Duty Cycle (%) | Peak SAR of Area Scan | SAR (10g) | Scaling Factor (Power) | Scaling Factor (Duty Cycle) | Reported SAR (10g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | W/kg | (W/kg) | | | (W/kg) | |
| 5260 | 52 | 802.11n | OFDM | 20 | 18.5 | 18.41 | 18.5 | 18.11 | -0.04 | 0 mm | MIMO | 1151M | 13 | back | 98.6 | 27.690 | 2.410 | 1.094 | 1.014 | 2.673 | |
| 5300 | 60 | 802.11n | OFDM | 20 | 18.5 | 18.10 | 18.5 | 18.32 | 0.17 | 0 mm | MIMO | 1151M | 13 | back | 98.6 | 28.323 | 2.380 | 1.096 | 1.014 | 2.645 | |
| 5260 | 52 | 802.11n | OFDM | 20 | 18.5 | 18.41 | 18.5 | 18.11 | -0.15 | 0 mm | MIMO | 1151M | 13 | front | 98.6 | 3.479 | 0.642 | 1.094 | 1.014 | 0.712 | |
| 5260 | 52 | 802.11n | OFDM | 20 | 18.5 | 18.41 | 18.5 | 18.11 | 0.10 | 0 mm | MIMO | 1151M | 13 | top | 98.6 | 7.742 | - | 1.094 | 1.014 | - | |
| 5260 | 52 | 802.11n | OFDM | 20 | 18.5 | 18.41 | 18.5 | 18.11 | 0.16 | 0 mm | MIMO | 1151M | 13 | left | 98.6 | 17.121 | 1.430 | 1.094 | 1.014 | 1.586 | |
| 5520 | 104 | 802.11n | OFDM | 20 | 18.0 | 17.68 | 18.0 | 17.88 | 0.18 | 0 mm | MIMO | 1151M | 13 | back | 98.6 | 40.882 | 2.810 | 1.076 | 1.014 | 3.066 | |
| 5600 | 120 | 802.11n | OFDM | 20 | 18.0 | 17.75 | 18.0 | 17.85 | -0.21 | 0 mm | MIMO | 1151M | 13 | back | 98.6 | 34.472 | 2.990 | 1.059 | 1.014 | 3.211 | A45 |
| 5620 | 124 | 802.11n | OFDM | 20 | 18.0 | 17.88 | 18.0 | 17.98 | -0.04 | 0 mm | MIMO | 1151M | 13 | back | 98.6 | 58.362 | 2.970 | 1.028 | 1.014 | 3.096 | |
| 5720 | 144 | 802.11n | OFDM | 20 | 18.0 | 17.69 | 18.0 | 17.90 | 0.17 | 0 mm | MIMO | 1151M | 13 | back | 98.6 | 31.020 | 2.590 | 1.074 | 1.014 | 2.821 | |
| 5620 | 124 | 802.11n | OFDM | 20 | 18.0 | 17.88 | 18.0 | 17.98 | -0.02 | 0 mm | MIMO | 1151M | 13 | front | 98.6 | 1.805 | 0.229 | 1.028 | 1.014 | 0.239 | |
| 5620 | 124 | 802.11n | OFDM | 20 | 18.0 | 17.88 | 18.0 | 17.98 | 0.15 | 0 mm | MIMO | 1151M | 13 | top | 98.6 | 6.923 | - | 1.028 | 1.014 | - | |
| 5620 | 124 | 802.11n | OFDM | 20 | 18.0 | 17.88 | 18.0 | 17.98 | 0.00 | 0 mm | MIMO | 1151M | 13 | left | 98.6 | 11.286 | 0.863 | 1.028 | 1.014 | 0.900 | |
| 5260 | 52 | 802.11n | OFDM | 20 | 18.5 | 18.41 | 18.5 | 18.11 | -0.13 | 0 mm | MIMO | 1151M | 13 | back | 98.6 | 45.916 | 2.360 | 1.094 | 1.014 | 2.618 | |
| 5600 | 120 | 802.11n | OFDM | 20 | 18.0 | 17.75 | 18.0 | 17.85 | -0.06 | 0 mm | MIMO | 1151M | 13 | back | 98.6 | 45.137 | 2.920 | 1.059 | 1.014 | 3.136 | |
| 5720 | 144 | 802.11n | OFDM | 20 | 18.0 | 17.69 | 18.0 | 17.90 | 0.21 | 0 mm | MIMO | 1151M | 13 | back | 98.6 | 51.992 | 2.840 | 1.074 | 1.014 | 3.093 | |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | | | Phablet<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | | | | | | |

Note: 1) Blue entry represents variability measurement.
2) For channels 52 and 60 to achieve the 21.5 dBm maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 18.5 dBm. For channels 104, 120, 124, and 144 to achieve the 21.0 dBm maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 18.0 dBm.

## 11.5 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 15 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01v01r04, variability SAR tests were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).
10. Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is > 160 mm and < 200 mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg.

11. This device supports dynamic antenna tuning for some bands. Per FCC Guidance, SAR was measured according to the normally required SAR measurement configurations with tuner active. The auto-tune state determined by the device was verified before and after each SAR measurement and is listed in tables above. Please see Section 14 for supplemental data.
12. This device utilizes power reduction for some wireless modes and technologies, as outlined in Section 1.3. The maximum output power allowed for each transmitter and exposure condition was evaluated for SAR compliance based on expected use conditions and simultaneous transmission scenarios.
13. Unless otherwise noted, when 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds below.
14. Additional SAR tests for phablet SAR were evaluated per KDB 616217 Section 6 (See Section 6.9 for more information).

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. Justification for reduced test configurations per KDB Publication 941225 D01v03r01 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for hotspot SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.
3. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg for 1g evaluations then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.

UMTS Notes:

1. UMTS mode in was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v03r01. AMR and HSPA SAR was not required per the 3G Test Reduction Procedure in KDB Publication 941225 D01v03r01.
2. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg for 1g evaluations then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 8.5.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 and MCC=001 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per FCC KDB Publication 447498 D01v06, when the reported LTE Band 41 SAR measured at the highest output power channel in a given a test configuration was > 0.6 W/kg for 1g evaluations, testing at the other channels was required for such test configurations.
5. TDD LTE was tested per the guidance provided in FCC KDB Publication 941225 D05v02r04. Testing was performed using UL-DL configuration 0 with 6 UL subframes and 2 S subframes using extended cyclic prefix only and special subframe configuration 6. SAR tests were performed at maximum output power

and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Section 4, the duty factor for special subframe configuration 6 using extended cyclic prefix is 0.633.

6. Per KDB Publication 941225 D05Av01r02, SAR for downlink only LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive.
7. For LTE Band 41, per FCC guidance, SAR was first measured with only a single carrier active in the uplink (carrier aggregation not active). For each exposure condition, the uplink CA scenario with two component carriers was additionally tested for the configuration with the highest SAR when carrier aggregation was not active. The SCC was configured with the closest available contiguous channel. The two component carriers were configured so the resource blocks are physically allocated side by side to achieve the maximum output power.

WLAN Notes:

1. For held-to-ear, and hotspot, and phablet operations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg for 1g evaluations, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 8.6.5 for more information.
3. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 5 GHz WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg for 1g evaluations. See Section 8.6.6 for more information.
4. Per KDB Publication 248227 D01v02r02, SAR for MIMO was evaluated by following the simultaneous SAR provisions from KDB Publication 447498 D01v06 by either evaluating the sum of the 1g SAR values of each antenna transmitting independently or making a SAR measurement with both antennas transmitting simultaneously. Please see Section 12 for complete analysis.
5. When the maximum reported 1g averaged SAR is ≤0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg for 1g evaluations or all test channels were measured.
6. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.
7. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

Bluetooth Notes

1. Bluetooth SAR was measured with the device connected to a call box with hopping disabled with DH5 operation and Tx Tests test mode type. Per October 2016 TCB Workshop Notes, the reported SAR was scaled to the 100% transmission duty factor to determine compliance. See Section 9.5 for the time domain plot and calculation for the duty factor of the device.
2. Head and hotspot Bluetooth SAR were evaluated for BT BR tethering applications.

# 12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

## 12.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v06 are applicable to devices with built-in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

## 12.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D01v06 4.3.2 and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤1.6 W/kg. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1g or 10g SAR.

(*) For test positions that were not required to be evaluated for WLAN SAR per FCC KDB Publication 248227, the worst case WLAN SAR result for the applicable exposure condition was used for simultaneous transmission analysis.

Per FCC KDB Publication 648474 D04 Handset SAR v01r01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR (“-“).

## 12.3 Head SAR Simultaneous Transmission Analysis

**Table 12-1**
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Held to Ear)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | 2.4 GHz WLAN Ant 1 SAR (W/kg) | 2.4 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2 | 1+3 | 1+2+3 |
| Head SAR | GSM 850 | 0.311 | 0.798 | 0.280 | 1.109 | 0.591 | 1.389 |
| | GSM 1900 | 0.082 | 0.798 | 0.280 | 0.880 | 0.362 | 1.160 |
| | UMTS 850 | 0.386 | 0.798 | 0.280 | 1.184 | 0.666 | **1.464** |
| | UMTS 1900 | 0.195 | 0.798 | 0.280 | 0.993 | 0.475 | 1.273 |
| | LTE Band 12 | 0.144 | 0.798 | 0.280 | 0.942 | 0.424 | 1.222 |
| | LTE Band 13 | 0.262 | 0.798 | 0.280 | 1.060 | 0.542 | 1.340 |
| | LTE Band 26 (Cell) | 0.328 | 0.798 | 0.280 | 1.126 | 0.608 | 1.406 |
| | LTE Band 4 (AWS) | 0.174 | 0.798 | 0.280 | 0.972 | 0.454 | 1.252 |
| | LTE Band 25 (PCS) | 0.172 | 0.798 | 0.280 | 0.970 | 0.452 | 1.250 |
| | LTE Band 41 | 0.065 | 0.798 | 0.280 | 0.863 | 0.345 | 1.143 |

**Table 12-2**
**Simultaneous Transmission Scenario with 5 GHz WLAN (Held to Ear)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2 | 1+3 | 1+2+3 |
| Head SAR | GSM 850 | 0.311 | 0.354 | 0.083 | 0.665 | 0.394 | 0.748 |
| | GSM 1900 | 0.082 | 0.354 | 0.083 | 0.436 | 0.165 | 0.519 |
| | UMTS 850 | 0.386 | 0.354 | 0.083 | 0.740 | 0.469 | **0.823** |
| | UMTS 1900 | 0.195 | 0.354 | 0.083 | 0.549 | 0.278 | 0.632 |
| | LTE Band 12 | 0.144 | 0.354 | 0.083 | 0.498 | 0.227 | 0.581 |
| | LTE Band 13 | 0.262 | 0.354 | 0.083 | 0.616 | 0.345 | 0.699 |
| | LTE Band 26 (Cell) | 0.328 | 0.354 | 0.083 | 0.682 | 0.411 | 0.765 |
| | LTE Band 4 (AWS) | 0.174 | 0.354 | 0.083 | 0.528 | 0.257 | 0.611 |
| | LTE Band 25 (PCS) | 0.172 | 0.354 | 0.083 | 0.526 | 0.255 | 0.609 |
| | LTE Band 41 | 0.065 | 0.354 | 0.083 | 0.419 | 0.148 | 0.502 |

**Table 12-3**
**Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO and 5 GHz WLAN MIMO (Held to Ear)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | 2.4 GHz WLAN MIMO at 16 dBm SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 1+2+3+4 |
| Head SAR | GSM 850 | 0.311 | 0.358 | 0.354 | 0.083 | 1.106 |
| | GSM 1900 | 0.082 | 0.358 | 0.354 | 0.083 | 0.877 |
| | UMTS 850 | 0.386 | 0.358 | 0.354 | 0.083 | **1.181** |
| | UMTS 1900 | 0.195 | 0.358 | 0.354 | 0.083 | 0.990 |
| | LTE Band 12 | 0.144 | 0.358 | 0.354 | 0.083 | 0.939 |
| | LTE Band 13 | 0.262 | 0.358 | 0.354 | 0.083 | 1.057 |
| | LTE Band 26 (Cell) | 0.328 | 0.358 | 0.354 | 0.083 | 1.123 |
| | LTE Band 4 (AWS) | 0.174 | 0.358 | 0.354 | 0.083 | 0.969 |
| | LTE Band 25 (PCS) | 0.172 | 0.358 | 0.354 | 0.083 | 0.967 |
| | LTE Band 41 | 0.065 | 0.358 | 0.354 | 0.083 | 0.860 |

**Table 12-4**
**Simultaneous Transmission Scenario with Bluetooth (Held to Ear)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| | | 1 | 2 | 1+2 |
| Head SAR | GSM 850 | 0.311 | 1.343 | See Table Below |
| | GSM 1900 | 0.082 | 1.343 | 1.425 |
| | UMTS 850 | 0.386 | 1.343 | See Table Below |
| | UMTS 1900 | 0.195 | 1.343 | **1.538** |
| | LTE Band 12 | 0.144 | 1.343 | 1.487 |
| | LTE Band 13 | 0.262 | 1.343 | See Table Below |
| | LTE Band 26 (Cell) | 0.328 | 1.343 | See Table Below |
| | LTE Band 4 (AWS) | 0.174 | 1.343 | 1.517 |
| | LTE Band 25 (PCS) | 0.172 | 1.343 | 1.515 |
| | LTE Band 41 | 0.065 | 1.343 | 1.408 |

| Simult Tx | Configuration | GSM 850 SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) | SPLSR |
|---|---|---|---|---|---|
| | | 1 | 2 | 1+2 | 1+2 |
| Head SAR | Right Cheek | 0.311 | 1.343 | See Note 1 | 0.03 |
| | Right Tilt | 0.146 | 0.834 | **0.980** | N/A |
| | Left Cheek | 0.212 | 0.455 | 0.667 | N/A |
| | Left Tilt | 0.117 | 0.369 | 0.486 | N/A |

| Simult Tx | Configuration | UMTS 850 SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) | SPLSR |
|---|---|---|---|---|---|
| | | 1 | 2 | 1+2 | 1+2 |
| Head SAR | Right Cheek | 0.386 | 1.343 | See Note 1 | 0.03 |
| | Right Tilt | 0.169 | 0.834 | **1.003** | N/A |
| | Left Cheek | 0.294 | 0.455 | 0.749 | N/A |
| | Left Tilt | 0.163 | 0.369 | 0.532 | N/A |

| Simult Tx | Configuration | LTE Band 13 SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) | SPLSR |
|---|---|---|---|---|---|
| | | 1 | 2 | 1+2 | 1+2 |
| Head SAR | Right Cheek | 0.262 | 1.343 | See Note 1 | 0.03 |
| | Right Tilt | 0.146 | 0.834 | **0.980** | N/A |
| | Left Cheek | 0.202 | 0.455 | 0.657 | N/A |
| | Left Tilt | 0.139 | 0.369 | 0.508 | N/A |

| Simult Tx | Configuration | LTE Band 26 (Cell) SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) | SPLSR |
|---|---|---|---|---|---|
| | | 1 | 2 | 1+2 | 1+2 |
| Head SAR | Right Cheek | 0.328 | 1.343 | See Note 1 | 0.03 |
| | Right Tilt | 0.160 | 0.834 | **0.994** | N/A |
| | Left Cheek | 0.246 | 0.455 | 0.701 | N/A |
| | Left Tilt | 0.144 | 0.369 | 0.513 | N/A |

Note 1 - No evaluation was performed to determine the aggregate 10g SAR for these configurations as the SPLSratio between the antenna pairs was not greater than 0.10 per FCC KDB 447498 D01v06. See Section 12.7 for detailed SPLS ratio analysis.

**Table 12-5**
**Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN Ant 1 (Held to Ear)**

| Simult Tx | Configuration | GSM 850 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.311 | 1.343 | 0.350 | See Note 1 |
| | Right Tilt | 0.146 | 0.834 | 0.354 | **1.334** |
| | Left Cheek | 0.212 | 0.455 | 0.354* | 1.021 |
| | Left Tilt | 0.117 | 0.369 | 0.354* | 0.840 |

| Simult Tx | Configuration | GSM 1900 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.052 | 1.343 | 0.350 | See Note 1 |
| | Right Tilt | 0.028 | 0.834 | 0.354 | **1.216** |
| | Left Cheek | 0.082 | 0.455 | 0.354* | 0.891 |
| | Left Tilt | 0.024 | 0.369 | 0.354* | 0.747 |

| Simult Tx | Configuration | UMTS 850 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.386 | 1.343 | 0.350 | See Note 1 |
| | Right Tilt | 0.169 | 0.834 | 0.354 | **1.357** |
| | Left Cheek | 0.294 | 0.455 | 0.354* | 1.103 |
| | Left Tilt | 0.163 | 0.369 | 0.354* | 0.886 |

| Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.113 | 1.343 | 0.350 | See Note 1 |
| | Right Tilt | 0.057 | 0.834 | 0.354 | **1.245** |
| | Left Cheek | 0.195 | 0.455 | 0.354* | 1.004 |
| | Left Tilt | 0.044 | 0.369 | 0.354* | 0.767 |

| Simult Tx | Configuration | LTE Band 12 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.144 | 1.343 | 0.350 | See Note 1 |
| | Right Tilt | 0.079 | 0.834 | 0.354 | **1.267** |
| | Left Cheek | 0.123 | 0.455 | 0.354* | 0.932 |
| | Left Tilt | 0.070 | 0.369 | 0.354* | 0.793 |

| Simult Tx | Configuration | LTE Band 13 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.262 | 1.343 | 0.350 | See Note 1 |
| | Right Tilt | 0.146 | 0.834 | 0.354 | **1.334** |
| | Left Cheek | 0.202 | 0.455 | 0.354* | 1.011 |
| | Left Tilt | 0.139 | 0.369 | 0.354* | 0.862 |

| Simult Tx | Configuration | LTE Band 26 (Cell) SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.328 | 1.343 | 0.350 | See Note 1 |
| | Right Tilt | 0.160 | 0.834 | 0.354 | **1.348** |
| | Left Cheek | 0.246 | 0.455 | 0.354* | 1.055 |
| | Left Tilt | 0.144 | 0.369 | 0.354* | 0.867 |

| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.091 | 1.343 | 0.350 | See Note 1 |
| | Right Tilt | 0.092 | 0.834 | 0.354 | **1.280** |
| | Left Cheek | 0.174 | 0.455 | 0.354* | 0.983 |
| | Left Tilt | 0.081 | 0.369 | 0.354* | 0.804 |

| Simult Tx | Configuration | LTE Band 25 (PCS) SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.140 | 1.343 | 0.350 | See Note 1 |
| | Right Tilt | 0.063 | 0.834 | 0.354 | **1.251** |
| | Left Cheek | 0.172 | 0.455 | 0.354* | 0.981 |
| | Left Tilt | 0.050 | 0.369 | 0.354* | 0.773 |

| Simult Tx | Configuration | LTE Band 41 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.061 | 1.343 | 0.350 | See Note 1 |
| | Right Tilt | 0.065 | 0.834 | 0.354 | **1.253** |
| | Left Cheek | 0.058 | 0.455 | 0.354* | 0.867 |
| | Left Tilt | 0.038 | 0.369 | 0.354* | 0.761 |

**Table 12-6**
**Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN Ant 2 (Held to Ear)**

| Simult Tx | Configuration | GSM 850 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.311 | 1.343 | 0.067 | See Note 1 |
| | Right Tilt | 0.146 | 0.834 | 0.083 | **1.063** |
| | Left Cheek | 0.212 | 0.455 | 0.083* | 0.750 |
| | Left Tilt | 0.117 | 0.369 | 0.083* | 0.569 |

| Simult Tx | Configuration | GSM 1900 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.052 | 1.343 | 0.067 | **1.462** |
| | Right Tilt | 0.028 | 0.834 | 0.083 | 0.945 |
| | Left Cheek | 0.082 | 0.455 | 0.083* | 0.620 |
| | Left Tilt | 0.024 | 0.369 | 0.083* | 0.476 |

| Simult Tx | Configuration | UMTS 850 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.386 | 1.343 | 0.067 | See Note 1 |
| | Right Tilt | 0.169 | 0.834 | 0.083 | **1.086** |
| | Left Cheek | 0.294 | 0.455 | 0.083* | 0.832 |
| | Left Tilt | 0.163 | 0.369 | 0.083* | 0.615 |

| Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.113 | 1.343 | 0.067 | **1.523** |
| | Right Tilt | 0.057 | 0.834 | 0.083 | 0.974 |
| | Left Cheek | 0.195 | 0.455 | 0.083* | 0.733 |
| | Left Tilt | 0.044 | 0.369 | 0.083* | 0.496 |

| Simult Tx | Configuration | LTE Band 12 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.144 | 1.343 | 0.067 | **1.554** |
| | Right Tilt | 0.079 | 0.834 | 0.083 | 0.996 |
| | Left Cheek | 0.123 | 0.455 | 0.083* | 0.661 |
| | Left Tilt | 0.070 | 0.369 | 0.083* | 0.522 |

| Simult Tx | Configuration | LTE Band 13 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.262 | 1.343 | 0.067 | See Note 1 |
| | Right Tilt | 0.146 | 0.834 | 0.083 | **1.063** |
| | Left Cheek | 0.202 | 0.455 | 0.083* | 0.740 |
| | Left Tilt | 0.139 | 0.369 | 0.083* | 0.591 |

| Simult Tx | Configuration | LTE Band 26 (Cell) SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.328 | 1.343 | 0.067 | See Note 1 |
| | Right Tilt | 0.160 | 0.834 | 0.083 | **1.077** |
| | Left Cheek | 0.246 | 0.455 | 0.083* | 0.784 |
| | Left Tilt | 0.144 | 0.369 | 0.083* | 0.596 |

| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.091 | 1.343 | 0.067 | **1.501** |
| | Right Tilt | 0.092 | 0.834 | 0.083 | 1.009 |
| | Left Cheek | 0.174 | 0.455 | 0.083* | 0.712 |
| | Left Tilt | 0.081 | 0.369 | 0.083* | 0.533 |

| Simult Tx | Configuration | LTE Band 25 (PCS) SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.140 | 1.343 | 0.067 | **1.550** |
| | Right Tilt | 0.063 | 0.834 | 0.083 | 0.980 |
| | Left Cheek | 0.172 | 0.455 | 0.083* | 0.710 |
| | Left Tilt | 0.050 | 0.369 | 0.083* | 0.502 |

| Simult Tx | Configuration | LTE Band 41 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.061 | 1.343 | 0.067 | **1.471** |
| | Right Tilt | 0.065 | 0.834 | 0.083 | 0.982 |
| | Left Cheek | 0.058 | 0.455 | 0.083* | 0.596 |
| | Left Tilt | 0.038 | 0.369 | 0.083* | 0.490 |

Note 1 - No evaluation was performed to determine the aggregate 10g SAR for these configurations as the SPLSratio between the antenna pairs was not greater than 0.10 per FCC KDB 447498 D01v06. See Section 12.7 for detailed SPLS ratio analysis.

## Table 12-7
## Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN MIMO (Held to Ear)

| Simult Tx | Configuration | GSM 850 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.311 | 1.343 | 0.406 | See Note 1 |
| | Right Tilt | 0.146 | 0.834 | 0.424 | **1.404** |
| | Left Cheek | 0.212 | 0.455 | 0.424* | 1.091 |
| | Left Tilt | 0.117 | 0.369 | 0.424* | 0.910 |

| Simult Tx | Configuration | GSM 1900 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.052 | 1.343 | 0.406 | See Note 1 |
| | Right Tilt | 0.028 | 0.834 | 0.424 | **1.286** |
| | Left Cheek | 0.082 | 0.455 | 0.424* | 0.961 |
| | Left Tilt | 0.024 | 0.369 | 0.424* | 0.817 |

| Simult Tx | Configuration | UMTS 850 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.386 | 1.343 | 0.406 | See Note 1 |
| | Right Tilt | 0.169 | 0.834 | 0.424 | **1.427** |
| | Left Cheek | 0.294 | 0.455 | 0.424* | 1.173 |
| | Left Tilt | 0.163 | 0.369 | 0.424* | 0.956 |

| Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.113 | 1.343 | 0.406 | See Note 1 |
| | Right Tilt | 0.057 | 0.834 | 0.424 | **1.315** |
| | Left Cheek | 0.195 | 0.455 | 0.424* | 1.074 |
| | Left Tilt | 0.044 | 0.369 | 0.424* | 0.837 |

| Simult Tx | Configuration | LTE Band 12 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.144 | 1.343 | 0.406 | See Note 1 |
| | Right Tilt | 0.079 | 0.834 | 0.424 | **1.337** |
| | Left Cheek | 0.123 | 0.455 | 0.424* | 1.002 |
| | Left Tilt | 0.070 | 0.369 | 0.424* | 0.863 |

| Simult Tx | Configuration | LTE Band 13 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.262 | 1.343 | 0.406 | See Note 1 |
| | Right Tilt | 0.146 | 0.834 | 0.424 | **1.404** |
| | Left Cheek | 0.202 | 0.455 | 0.424* | 1.081 |
| | Left Tilt | 0.139 | 0.369 | 0.424* | 0.932 |

| Simult Tx | Configuration | LTE Band 26 (Cell) SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.328 | 1.343 | 0.406 | See Note 1 |
| | Right Tilt | 0.160 | 0.834 | 0.424 | **1.418** |
| | Left Cheek | 0.246 | 0.455 | 0.424* | 1.125 |
| | Left Tilt | 0.144 | 0.369 | 0.424* | 0.937 |

| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.091 | 1.343 | 0.406 | See Note 1 |
| | Right Tilt | 0.092 | 0.834 | 0.424 | **1.350** |
| | Left Cheek | 0.174 | 0.455 | 0.424* | 1.053 |
| | Left Tilt | 0.081 | 0.369 | 0.424* | 0.874 |

| Simult Tx | Configuration | LTE Band 25 (PCS) SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.140 | 1.343 | 0.406 | See Note 1 |
| | Right Tilt | 0.063 | 0.834 | 0.424 | **1.321** |
| | Left Cheek | 0.172 | 0.455 | 0.424* | 1.051 |
| | Left Tilt | 0.050 | 0.369 | 0.424* | 0.843 |

| Simult Tx | Configuration | LTE Band 41 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Head SAR | Right Cheek | 0.061 | 1.343 | 0.406 | See Note 1 |
| | Right Tilt | 0.065 | 0.834 | 0.424 | **1.323** |
| | Left Cheek | 0.058 | 0.455 | 0.424* | 0.937 |
| | Left Tilt | 0.038 | 0.369 | 0.424* | 0.831 |

Note 1 - No evaluation was performed to determine the aggregate 1g SAR for these configurations as the SPLS ratio between the distribution pairs was not greater than 0.04 per FCC KDB 447498 D01v06. See Section 12.8 for detailed SPLS ratio analysis.

## 12.4 Body-Worn Simultaneous Transmission Analysis

**Table 12-8**
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 1.5 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | 2.4 GHz WLAN Ant 1 SAR (W/kg) | 2.4 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2 | 1+3 | 1+2+3 |
| Body-Worn | GSM 850 | 0.265 | 0.162 | 0.113 | 0.427 | 0.378 | 0.540 |
| | GSM 1900 | 0.386 | 0.162 | 0.113 | 0.548 | 0.499 | 0.661 |
| | UMTS 850 | 0.317 | 0.162 | 0.113 | 0.479 | 0.430 | 0.592 |
| | UMTS 1900 | 0.906 | 0.162 | 0.113 | 1.068 | 1.019 | 1.181 |
| | LTE Band 12 | 0.198 | 0.162 | 0.113 | 0.360 | 0.311 | 0.473 |
| | LTE Band 13 | 0.342 | 0.162 | 0.113 | 0.504 | 0.455 | 0.617 |
| | LTE Band 26 (Cell) | 0.323 | 0.162 | 0.113 | 0.485 | 0.436 | 0.598 |
| | LTE Band 4 (AWS) | 0.543 | 0.162 | 0.113 | 0.705 | 0.656 | 0.818 |
| | LTE Band 25 (PCS) | 0.961 | 0.162 | 0.113 | 1.123 | 1.074 | **1.236** |
| | LTE Band 41 | 0.408 | 0.162 | 0.113 | 0.570 | 0.521 | 0.683 |

**Table 12-9**
**Simultaneous Transmission Scenario with 5 GHz WLAN (Body-Worn at 1.5 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2 | 1+3 |
| Body-Worn | GSM 850 | 0.265 | 0.331 | 0.386 | 0.596 | 0.651 |
| | GSM 1900 | 0.386 | 0.331 | 0.386 | 0.717 | 0.772 |
| | UMTS 850 | 0.317 | 0.331 | 0.386 | 0.648 | 0.703 |
| | UMTS 1900 | 0.906 | 0.331 | 0.386 | 1.237 | 1.292 |
| | LTE Band 12 | 0.198 | 0.331 | 0.386 | 0.529 | 0.584 |
| | LTE Band 13 | 0.342 | 0.331 | 0.386 | 0.673 | 0.728 |
| | LTE Band 26 (Cell) | 0.323 | 0.331 | 0.386 | 0.654 | 0.709 |
| | LTE Band 4 (AWS) | 0.543 | 0.331 | 0.386 | 0.874 | 0.929 |
| | LTE Band 25 (PCS) | 0.961 | 0.331 | 0.386 | 1.292 | **1.347** |
| | LTE Band 41 | 0.408 | 0.331 | 0.386 | 0.739 | 0.794 |

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| | | 1 | 2 | 1+2 |
| Body-Worn | GSM 850 | 0.265 | 0.528 | 0.793 |
| | GSM 1900 | 0.386 | 0.528 | 0.914 |
| | UMTS 850 | 0.317 | 0.528 | 0.845 |
| | UMTS 1900 | 0.906 | 0.528 | 1.434 |
| | LTE Band 12 | 0.198 | 0.528 | 0.726 |
| | LTE Band 13 | 0.342 | 0.528 | 0.870 |
| | LTE Band 26 (Cell) | 0.323 | 0.528 | 0.851 |
| | LTE Band 4 (AWS) | 0.543 | 0.528 | 1.071 |
| | LTE Band 25 (PCS) | 0.961 | 0.528 | **1.489** |
| | LTE Band 41 | 0.408 | 0.528 | 0.936 |

**Table 12-10**
**Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO and 5 GHz WLAN MIMO (Body-Worn at 1.5 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | 2.4 GHz WLAN Ant 1 SAR (W/kg) | 2.4 GHz WLAN Ant 2 SAR (W/kg) | 5 GHz WLAN MIMO at 16 dBm SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 1+2+3+4 |
| Body-Worn | GSM 850 | 0.265 | 0.162 | 0.113 | 0.192 | 0.732 |
| | GSM 1900 | 0.386 | 0.162 | 0.113 | 0.192 | 0.853 |
| | UMTS 850 | 0.317 | 0.162 | 0.113 | 0.192 | 0.784 |
| | UMTS 1900 | 0.906 | 0.162 | 0.113 | 0.192 | 1.373 |
| | LTE Band 12 | 0.198 | 0.162 | 0.113 | 0.192 | 0.665 |
| | LTE Band 13 | 0.342 | 0.162 | 0.113 | 0.192 | 0.809 |
| | LTE Band 26 (Cell) | 0.323 | 0.162 | 0.113 | 0.192 | 0.790 |
| | LTE Band 4 (AWS) | 0.543 | 0.162 | 0.113 | 0.192 | 1.010 |
| | LTE Band 25 (PCS) | 0.961 | 0.162 | 0.113 | 0.192 | **1.428** |
| | LTE Band 41 | 0.408 | 0.162 | 0.113 | 0.192 | 0.875 |

**Table 12-11**
**Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 1.5 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| | | 1 | 2 | 1+2 |
| Body-Worn | GSM 850 | 0.265 | 0.084 | 0.349 |
| | GSM 1900 | 0.386 | 0.084 | 0.470 |
| | UMTS 850 | 0.317 | 0.084 | 0.401 |
| | UMTS 1900 | 0.906 | 0.084 | 0.990 |
| | LTE Band 12 | 0.198 | 0.084 | 0.282 |
| | LTE Band 13 | 0.342 | 0.084 | 0.426 |
| | LTE Band 26 (Cell) | 0.323 | 0.084 | 0.407 |
| | LTE Band 4 (AWS) | 0.543 | 0.084 | 0.627 |
| | LTE Band 25 (PCS) | 0.961 | 0.084 | **1.045** |
| | LTE Band 41 | 0.408 | 0.084 | 0.492 |

**Table 12-12**
**Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN Ant 1 (Body-Worn at 1.5 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Body-Worn | GSM 850 | 0.265 | 0.084 | 0.331 | 0.680 |
| | GSM 1900 | 0.386 | 0.084 | 0.331 | 0.801 |
| | UMTS 850 | 0.317 | 0.084 | 0.331 | 0.732 |
| | UMTS 1900 | 0.906 | 0.084 | 0.331 | 1.321 |
| | LTE Band 12 | 0.198 | 0.084 | 0.331 | 0.613 |
| | LTE Band 13 | 0.342 | 0.084 | 0.331 | 0.757 |
| | LTE Band 26 (Cell) | 0.323 | 0.084 | 0.331 | 0.738 |
| | LTE Band 4 (AWS) | 0.543 | 0.084 | 0.331 | 0.958 |
| | LTE Band 25 (PCS) | 0.961 | 0.084 | 0.331 | **1.376** |
| | LTE Band 41 | 0.408 | 0.084 | 0.331 | 0.823 |

**Table 12-13**
**Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN Ant 2 (Body-Worn at 1.5 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Body-Worn | GSM 850 | 0.265 | 0.084 | 0.386 | 0.735 |
| | GSM 1900 | 0.386 | 0.084 | 0.386 | 0.856 |
| | UMTS 850 | 0.317 | 0.084 | 0.386 | 0.787 |
| | UMTS 1900 | 0.906 | 0.084 | 0.386 | 1.376 |
| | LTE Band 12 | 0.198 | 0.084 | 0.386 | 0.668 |
| | LTE Band 13 | 0.342 | 0.084 | 0.386 | 0.812 |
| | LTE Band 26 (Cell) | 0.323 | 0.084 | 0.386 | 0.793 |
| | LTE Band 4 (AWS) | 0.543 | 0.084 | 0.386 | 1.013 |
| | LTE Band 25 (PCS) | 0.961 | 0.084 | 0.386 | **1.431** |
| | LTE Band 41 | 0.408 | 0.084 | 0.386 | 0.878 |

**Table 12-14**
**Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN MIMO (Body-Worn at 1.5 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Body-Worn | GSM 850 | 0.265 | 0.084 | 0.528 | 0.877 |
| | GSM 1900 | 0.386 | 0.084 | 0.528 | 0.998 |
| | UMTS 850 | 0.317 | 0.084 | 0.528 | 0.929 |
| | UMTS 1900 | 0.906 | 0.084 | 0.528 | 1.518 |
| | LTE Band 12 | 0.198 | 0.084 | 0.528 | 0.810 |
| | LTE Band 13 | 0.342 | 0.084 | 0.528 | 0.954 |
| | LTE Band 26 (Cell) | 0.323 | 0.084 | 0.528 | 0.935 |
| | LTE Band 4 (AWS) | 0.543 | 0.084 | 0.528 | 1.155 |
| | LTE Band 25 (PCS) | 0.961 | 0.084 | 0.528 | **1.573** |
| | LTE Band 41 | 0.408 | 0.084 | 0.528 | 1.020 |

## 12.5 Hotspot SAR Simultaneous Transmission Analysis

**Table 12-15**
**Simultaneous Transmission Scenario with 2.4 GHz WLAN (Hotspot at 1.0 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | 2.4 GHz WLAN Ant 1 SAR (W/kg) | 2.4 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2 | 1+3 | 1+2+3 |
| Hotspot SAR | GPRS 850 | 0.595 | 0.377 | 0.312 | 0.972 | 0.907 | 1.284 |
| | GPRS 1900 | 0.943 | 0.377 | 0.312 | 1.320 | 1.255 | See Table Below |
| | UMTS 850 | 0.498 | 0.377 | 0.312 | 0.875 | 0.810 | 1.187 |
| | UMTS 1900 | 1.323 | 0.377 | 0.312 | See Table Below | See Table Below | See Table Below |
| | LTE Band 12 | 0.268 | 0.377 | 0.312 | 0.645 | 0.580 | 0.957 |
| | LTE Band 13 | 0.468 | 0.377 | 0.312 | 0.845 | 0.780 | 1.157 |
| | LTE Band 26 (Cell) | 0.507 | 0.377 | 0.312 | 0.884 | 0.819 | 1.196 |
| | LTE Band 4 (AWS) | 0.700 | 0.377 | 0.312 | 1.077 | 1.012 | 1.389 |
| | LTE Band 25 (PCS) | 0.887 | 0.377 | 0.312 | 1.264 | 1.199 | **1.576** |
| | LTE Band 41 | 0.592 | 0.377 | 0.312 | 0.969 | 0.904 | 1.281 |

| Simult Tx | Configuration | GPRS 1900 SAR (W/kg) | 2.4 GHz WLAN Ant 1 SAR (W/kg) | 2.4 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | Back | 0.578 | 0.336 | 0.230 | **1.144** |
| | Front | 0.385 | 0.377* | 0.312* | 1.074 |
| | Top | - | 0.377* | 0.312 | 0.689 |
| | Bottom | 0.943 | - | - | 0.943 |
| | Right | 0.055 | - | - | 0.055 |
| | Left | 0.093 | 0.377 | 0.312* | 0.782 |

| Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | 2.4 GHz WLAN Ant 1 SAR (W/kg) | 2.4 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2 | 1+3 | 1+2+3 |
| Hotspot SAR | Back | 0.984 | 0.336 | 0.230 | 1.320 | 1.214 | **1.550** |
| | Front | 0.560 | 0.377* | 0.312* | 0.937 | 0.872 | 1.249 |
| | Top | - | 0.377* | 0.312 | 0.377 | 0.312 | 0.689 |
| | Bottom | 1.323 | - | - | 1.323 | 1.323 | 1.323 |
| | Right | 0.080 | - | - | 0.080 | 0.080 | 0.080 |
| | Left | 0.140 | 0.377 | 0.312* | 0.517 | 0.452 | 0.829 |

## Table 12-16
## Simultaneous Transmission Scenario with 5 GHz WLAN (Hotspot at 1.0 cm)

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2 | 1+3 |
| Hotspot SAR | GPRS 850 | 0.595 | 0.311 | 0.595 | 0.906 | 1.190 |
| | GPRS 1900 | 0.943 | 0.311 | 0.595 | 1.254 | **1.538** |
| | UMTS 850 | 0.498 | 0.311 | 0.595 | 0.809 | 1.093 |
| | UMTS 1900 | 1.323 | 0.311 | 0.595 | See Table Below | See Table Below |
| | LTE Band 12 | 0.268 | 0.311 | 0.595 | 0.579 | 0.863 |
| | LTE Band 13 | 0.468 | 0.311 | 0.595 | 0.779 | 1.063 |
| | LTE Band 26 (Cell) | 0.507 | 0.311 | 0.595 | 0.818 | 1.102 |
| | LTE Band 4 (AWS) | 0.700 | 0.311 | 0.595 | 1.011 | 1.295 |
| | LTE Band 25 (PCS) | 0.887 | 0.311 | 0.595 | 1.198 | 1.482 |
| | LTE Band 41 | 0.592 | 0.311 | 0.595 | 0.903 | 1.187 |

| Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2 | 1+3 |
| Hotspot SAR | Back | 0.984 | 0.311 | 0.595 | 1.295 | **1.579** |
| | Front | 0.560 | 0.311* | 0.595* | 0.871 | 1.155 |
| | Top | - | 0.311* | 0.595* | 0.311 | 0.595 |
| | Bottom | 1.323 | - | - | 1.323 | 1.323 |
| | Right | 0.080 | - | - | 0.080 | 0.080 |
| | Left | 0.140 | 0.311* | 0.113 | 0.451 | 0.253 |

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| | | 1 | 2 | 1+2 |
| Hotspot SAR | GPRS 850 | 0.595 | 0.730 | 1.325 |
| | GPRS 1900 | 0.943 | 0.730 | See Table Below |
| | UMTS 850 | 0.498 | 0.730 | 1.228 |
| | UMTS 1900 | 1.323 | 0.730 | See Table Below |
| | LTE Band 12 | 0.268 | 0.730 | 0.998 |
| | LTE Band 13 | 0.468 | 0.730 | 1.198 |
| | LTE Band 26 (Cell) | 0.507 | 0.730 | 1.237 |
| | LTE Band 4 (AWS) | 0.700 | 0.730 | **1.430** |
| | LTE Band 25 (PCS) | 0.887 | 0.730 | See Table Below |
| | LTE Band 41 | 0.592 | 0.730 | 1.322 |

| Simult Tx | Configuration | GPRS 1900 SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| | | 1 | 2 | 1+2 |
| Hotspot SAR | Back | 0.578 | 0.730 | **1.308** |
| | Front | 0.385 | 0.730* | 1.115 |
| | Top | - | 0.226 | 0.226 |
| | Bottom | 0.943 | - | 0.943 |
| | Right | 0.055 | - | 0.055 |
| | Left | 0.093 | 0.730* | 0.823 |

| Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) | SPLSR |
|---|---|---|---|---|---|
| | | 1 | 2 | 1+2 | 1+2 |
| Hotspot SAR | Back | 0.984 | 0.730 | See Note 1 | 0.02 |
| | Front | 0.560 | 0.730* | 1.290 | N/A |
| | Top | - | 0.226 | 0.226 | N/A |
| | Bottom | 1.323 | - | **1.323** | N/A |
| | Right | 0.080 | - | 0.080 | N/A |
| | Left | 0.140 | 0.730* | 0.870 | N/A |

| Simult Tx | Configuration | LTE Band 25 (PCS) SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| | | 1 | 2 | 1+2 |
| Hotspot SAR | Back | 0.547 | 0.730 | 1.277 |
| | Front | 0.392 | 0.730* | 1.122 |
| | Top | - | 0.226 | 0.226 |
| | Bottom | 0.887 | - | 0.887 |
| | Right | 0.061 | - | 0.061 |
| | Left | 0.099 | 0.730* | 0.829 |

**Table 12-17**
**Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO and 5 GHz WLAN MIMO (Hotspot at 1.0 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | 2.4 GHz WLAN MIMO at 19 dBm SAR (W/kg) | 5 GHz WLAN MIMO at 16 dBm SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | GPRS 850 | 0.595 | 0.223 | 0.225 | 1.043 |
| | GPRS 1900 | 0.943 | 0.223 | 0.225 | **1.391** |
| | UMTS 850 | 0.498 | 0.223 | 0.225 | 0.946 |
| | UMTS 1900 | 1.323 | 0.223 | 0.225 | See Table Below |
| | LTE Band 12 | 0.268 | 0.223 | 0.225 | 0.716 |
| | LTE Band 13 | 0.468 | 0.223 | 0.225 | 0.916 |
| | LTE Band 26 (Cell) | 0.507 | 0.223 | 0.225 | 0.955 |
| | LTE Band 4 (AWS) | 0.700 | 0.223 | 0.225 | 1.148 |
| | LTE Band 25 (PCS) | 0.887 | 0.223 | 0.225 | 1.335 |
| | LTE Band 41 | 0.592 | 0.223 | 0.225 | 1.040 |

| Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | 2.4 GHz WLAN MIMO at 19 dBm SAR (W/kg) | 5 GHz WLAN MIMO at 16 dBm SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | Back | 0.984 | 0.171 | 0.225 | **1.380** |
| | Front | 0.560 | 0.223* | 0.225* | 1.008 |
| | Top | - | 0.223 | 0.225* | 0.448 |
| | Bottom | 1.323 | - | - | 1.323 |
| | Right | 0.080 | - | - | 0.080 |
| | Left | 0.140 | 0.223* | 0.225* | 0.588 |

**Table 12-18**
**Simultaneous Transmission Scenario with Bluetooth (Hotspot at 1.0 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|
| | | 1 | 2 | 1+2 |
| Hotspot SAR | GPRS 850 | 0.595 | 0.213 | 0.808 |
| | GPRS 1900 | 0.943 | 0.213 | 1.156 |
| | UMTS 850 | 0.498 | 0.213 | 0.711 |
| | UMTS 1900 | 1.323 | 0.213 | **1.536** |
| | LTE Band 12 | 0.268 | 0.213 | 0.481 |
| | LTE Band 13 | 0.468 | 0.213 | 0.681 |
| | LTE Band 26 (Cell) | 0.507 | 0.213 | 0.720 |
| | LTE Band 4 (AWS) | 0.700 | 0.213 | 0.913 |
| | LTE Band 25 (PCS) | 0.887 | 0.213 | 1.100 |
| | LTE Band 41 | 0.592 | 0.213 | 0.805 |

**Table 12-19**
**Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN Ant 1 (Hotspot at 1.0 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | GPRS 850 | 0.595 | 0.213 | 0.311 | 1.119 |
| | GPRS 1900 | 0.943 | 0.213 | 0.311 | 1.467 |
| | UMTS 850 | 0.498 | 0.213 | 0.311 | 1.022 |
| | UMTS 1900 | 1.323 | 0.213 | 0.311 | See Table Below |
| | LTE Band 12 | 0.268 | 0.213 | 0.311 | 0.792 |
| | LTE Band 13 | 0.468 | 0.213 | 0.311 | 0.992 |
| | LTE Band 26 (Cell) | 0.507 | 0.213 | 0.311 | 1.031 |
| | LTE Band 4 (AWS) | 0.700 | 0.213 | 0.311 | 1.224 |
| | LTE Band 25 (PCS) | 0.887 | 0.213 | 0.311 | 1.411 |
| | LTE Band 41 | 0.592 | 0.213 | 0.311 | 1.116 |

| Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | Back | 0.984 | 0.171 | 0.311 | **1.466** |
| | Front | 0.560 | 0.194 | 0.311* | 1.065 |
| | Top | - | 0.153 | 0.311* | 0.464 |
| | Bottom | 1.323 | - | - | 1.323 |
| | Right | 0.080 | - | - | 0.080 |
| | Left | 0.140 | 0.213 | 0.311* | 0.664 |

**Table 12-20**
**Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN Ant 2 (Hotspot at 1.0 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | GPRS 850 | 0.595 | 0.213 | 0.595 | 1.403 |
| | GPRS 1900 | 0.943 | 0.213 | 0.595 | See Table Below |
| | UMTS 850 | 0.498 | 0.213 | 0.595 | 1.306 |
| | UMTS 1900 | 1.323 | 0.213 | 0.595 | See Table Below |
| | LTE Band 12 | 0.268 | 0.213 | 0.595 | 1.076 |
| | LTE Band 13 | 0.468 | 0.213 | 0.595 | 1.276 |
| | LTE Band 26 (Cell) | 0.507 | 0.213 | 0.595 | 1.315 |
| | LTE Band 4 (AWS) | 0.700 | 0.213 | 0.595 | **1.508** |
| | LTE Band 25 (PCS) | 0.887 | 0.213 | 0.595 | See Table Below |
| | LTE Band 41 | 0.592 | 0.213 | 0.595 | 1.400 |

| Simult Tx | Configuration | GPRS 1900 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | Back | 0.578 | 0.171 | 0.595 | **1.344** |
| | Front | 0.385 | 0.194 | 0.595* | 1.174 |
| | Top | - | 0.153 | 0.595* | 0.748 |
| | Bottom | 0.943 | - | - | 0.943 |
| | Right | 0.055 | - | - | 0.055 |
| | Left | 0.093 | 0.213 | 0.113 | 0.419 |

| Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | Back | 0.984 | 0.171 | 0.595 | See Note 1 |
| | Front | 0.560 | 0.194 | 0.595* | 1.349 |
| | Top | - | 0.153 | 0.595* | 0.748 |
| | Bottom | 1.323 | - | - | 1.323 |
| | Right | 0.080 | - | - | 0.080 |
| | Left | 0.140 | 0.213 | 0.113 | 0.466 |

| Simult Tx | Configuration | LTE Band 25 (PCS) SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | Back | 0.547 | 0.171 | 0.595 | **1.313** |
| | Front | 0.392 | 0.194 | 0.595* | 1.181 |
| | Top | - | 0.153 | 0.595* | 0.748 |
| | Bottom | 0.887 | - | - | 0.887 |
| | Right | 0.061 | - | - | 0.061 |
| | Left | 0.099 | 0.213 | 0.113 | 0.425 |

**Table 12-21**
**Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN MIMO (Hotspot at 1.0 cm)**

| Exposure Condition | Mode | 2G/3G/4G SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | GPRS 850 | 0.595 | 0.213 | 0.730 | **1.538** |
| | GPRS 1900 | 0.943 | 0.213 | 0.730 | See Table Below |
| | UMTS 850 | 0.498 | 0.213 | 0.730 | 1.441 |
| | UMTS 1900 | 1.323 | 0.213 | 0.730 | See Table Below |
| | LTE Band 12 | 0.268 | 0.213 | 0.730 | 1.211 |
| | LTE Band 13 | 0.468 | 0.213 | 0.730 | 1.411 |
| | LTE Band 26 (Cell) | 0.507 | 0.213 | 0.730 | 1.450 |
| | LTE Band 4 (AWS) | 0.700 | 0.213 | 0.730 | See Table Below |
| | LTE Band 25 (PCS) | 0.887 | 0.213 | 0.730 | See Table Below |
| | LTE Band 41 | 0.592 | 0.213 | 0.730 | 1.535 |

| Simult Tx | Configuration | GPRS 1900 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | Back | 0.578 | 0.171 | 0.730 | **1.479** |
| | Front | 0.385 | 0.194 | 0.730* | 1.309 |
| | Top | - | 0.153 | 0.226 | 0.379 |
| | Bottom | 0.943 | - | - | 0.943 |
| | Right | 0.055 | - | - | 0.055 |
| | Left | 0.093 | 0.213 | 0.730* | 1.036 |

| Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | Back | 0.984 | 0.171 | 0.730 | See Note 1 |
| | Front | 0.560 | 0.194 | 0.730* | **1.484** |
| | Top | - | 0.153 | 0.226 | 0.379 |
| | Bottom | 1.323 | - | - | 1.323 |
| | Right | 0.080 | - | - | 0.080 |
| | Left | 0.140 | 0.213 | 0.730* | 1.083 |

| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | Back | 0.463 | 0.171 | 0.730 | **1.364** |
| | Front | 0.393 | 0.194 | 0.730* | 1.317 |
| | Top | - | 0.153 | 0.226 | 0.379 |
| | Bottom | 0.700 | - | - | 0.700 |
| | Right | 0.054 | - | - | 0.054 |
| | Left | 0.090 | 0.213 | 0.730* | 1.033 |

| Simult Tx | Configuration | LTE Band 25 (PCS) SAR (W/kg) | Bluetooth SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2+3 |
| Hotspot SAR | Back | 0.547 | 0.171 | 0.730 | **1.448** |
| | Front | 0.392 | 0.194 | 0.730* | 1.316 |
| | Top | - | 0.153 | 0.226 | 0.379 |
| | Bottom | 0.887 | - | - | 0.887 |
| | Right | 0.061 | - | - | 0.061 |
| | Left | 0.099 | 0.213 | 0.730* | 1.042 |

Note 1 - No evaluation was performed to determine the aggregate 1g SAR for these configurations as the SPLS ratio between the distribution pairs was not greater than 0.04 per FCC KDB 447498 D01v06. See Section 12.8 for detailed SPLS ratio analysis.

## 12.6 Phablet Simultaneous Transmission Analysis

Per FCC KDB Publication 648474 D04 Handset SAR, Phablet SAR tests were not required if wireless router 1g SAR (scaled to the maximum output power, including tolerance) < 1.2 W/kg. Therefore, no further analysis beyond the tables included in this section was required to determine that possible simultaneous transmission scenarios would not exceed the SAR limit.

For SAR summation, the highest reported SAR across all test distances was used as the most conservative evaluation for simultaneous transmission analysis for each device edge.

**Table 12-22**
**Simultaneous Transmission Scenario with 5 GHz WLAN (Phablet)**

| Simult Tx | Configuration | GPRS 1900 SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | | SPLSR | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2 | 1+3 | 1+2 | 1+3 |
| Phablet SAR | Back | 2.444 | 1.353 | 2.731 | **3.797** | See Note 1 | N/A | 0.09 |
| | Front | 1.561 | 1.484* | 0.094 | 3.045 | 1.655 | N/A | N/A |
| | Top | - | 1.484* | 0.231 | 1.484 | 0.231 | N/A | N/A |
| | Bottom | 2.969 | - | - | 2.969 | 2.969 | N/A | N/A |
| | Right | 0.174 | - | - | 0.174 | 0.174 | N/A | N/A |
| | Left | 0.364 | 1.484 | 0.163 | 1.848 | 0.527 | N/A | N/A |
| Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | | SPLSR | |
| | | 1 | 2 | 3 | 1+2 | 1+3 | 1+2 | 1+3 |
| Phablet SAR | Back | 2.524 | 1.353 | 2.731 | **3.877** | See Note 1 | N/A | 0.09 |
| | Front | 2.236 | 1.484* | 0.094 | 3.720 | 2.330 | N/A | N/A |
| | Top | - | 1.484* | 0.231 | 1.484 | 0.231 | N/A | N/A |
| | Bottom | 3.001 | - | - | 3.001 | 3.001 | N/A | N/A |
| | Right | 0.275 | - | - | 0.275 | 0.275 | N/A | N/A |
| | Left | 0.640 | 1.484 | 0.163 | 2.124 | 0.803 | N/A | N/A |
| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | | SPLSR | |
| | | 1 | 2 | 3 | 1+2 | 1+3 | 1+2 | 1+3 |
| Phablet SAR | Back | 1.983 | 1.353 | 2.731 | **3.336** | See Note 1 | N/A | 0.07 |
| | Front | 1.404 | 1.484* | 0.094 | 2.888 | 1.498 | N/A | N/A |
| | Top | - | 1.484* | 0.231 | 1.484 | 0.231 | N/A | N/A |
| | Bottom | 2.922 | - | - | 2.922 | 2.922 | N/A | N/A |
| | Right | 0.254 | - | - | 0.254 | 0.254 | N/A | N/A |
| | Left | 0.410 | 1.484 | 0.163 | 1.894 | 0.573 | N/A | N/A |

| Simult Tx | Configuration | LTE Band 25 (PCS) SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | | SPLSR | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2 | 1+3 | 1+2 | 1+3 |
| Phablet SAR | Back | 2.420 | 1.353 | 2.731 | **3.773** | See Note 1 | N/A | 0.09 |
| | Front | 2.177 | 1.484* | 0.094 | 3.661 | 2.271 | N/A | N/A |
| | Top | - | 1.484* | 0.231 | 1.484 | 0.231 | N/A | N/A |
| | Bottom | 3.247 | - | - | 3.247 | 3.247 | N/A | N/A |
| | Right | 0.295 | - | - | 0.295 | 0.295 | N/A | N/A |
| | Left | 0.601 | 1.484 | 0.163 | 2.085 | 0.764 | N/A | N/A |

| Simult Tx | Configuration | LTE Band 41 SAR (W/kg) | 5 GHz WLAN Ant 1 SAR (W/kg) | 5 GHz WLAN Ant 2 SAR (W/kg) | Σ SAR (W/kg) | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 1+2 | 1+3 |
| Phablet SAR | Back | 1.021 | 1.353 | 2.731 | 2.374 | **3.752** |
| | Front | 0.992 | 1.484* | 0.094 | 2.476 | 1.086 |
| | Top | - | 1.484* | 0.231 | 1.484 | 0.231 |
| | Bottom | 0.998 | - | - | 0.998 | 0.998 |
| | Left | 1.249 | 1.484 | 0.163 | 2.733 | 1.412 |

## Table 12-23
## Simultaneous Transmission Scenario with 5 GHz WLAN MIMO (Phablet)

| Simult Tx | Configuration | GPRS 1900 SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) | SPLSR |
|---|---|---|---|---|---|
| | | 1 | 2 | 1+2 | 1+2 |
| Phablet SAR | Back | 2.444 | 3.211 | See Note 1 | 0.10 |
| | Front | 1.561 | 0.712 | 2.273 | N/A |
| | Top | - | 3.211* | 3.211 | N/A |
| | Bottom | 2.969 | - | **2.969** | N/A |
| | Right | 0.174 | - | 0.174 | N/A |
| | Left | 0.364 | 1.586 | 1.950 | N/A |

| Simult Tx | Configuration | UMTS 1900 SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) | SPLSR |
|---|---|---|---|---|---|
| | | 1 | 2 | 1+2 | 1+2 |
| Phablet SAR | Back | 2.524 | 3.211 | See Note 1 | 0.10 |
| | Front | 2.236 | 0.712 | 2.948 | N/A |
| | Top | - | 3.211* | 3.211 | N/A |
| | Bottom | 3.001 | - | **3.001** | N/A |
| | Right | 0.275 | - | 0.275 | N/A |
| | Left | 0.640 | 1.586 | 2.226 | N/A |

| Simult Tx | Configuration | LTE Band 4 (AWS) SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) | SPLSR |
|---|---|---|---|---|---|
| | | 1 | 2 | 1+2 | 1+2 |
| Phablet SAR | Back | 1.983 | 3.211 | See Note 1 | 0.09 |
| | Front | 1.404 | 0.712 | 2.116 | N/A |
| | Top | - | 3.211* | 3.211 | N/A |
| | Bottom | 2.922 | - | **2.922** | N/A |
| | Right | 0.254 | - | 0.254 | N/A |
| | Left | 0.410 | 1.586 | 1.996 | N/A |

| Simult Tx | Configuration | LTE Band 25 (PCS) SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) | SPLSR |
|---|---|---|---|---|---|
| | | 1 | 2 | 1+2 | 1+2 |
| Phablet SAR | Back | 2.420 | 3.211 | See Note 1 | 0.10 |
| | Front | 2.177 | 0.712 | 2.889 | N/A |
| | Top | - | 3.211* | 3.211 | N/A |
| | Bottom | 3.247 | - | 3.247 | N/A |
| | Right | 0.295 | - | 0.295 | N/A |
| | Left | 0.601 | 1.586 | 2.187 | N/A |

| Simult Tx | Configuration | LTE Band 41 SAR (W/kg) | 5 GHz WLAN MIMO SAR (W/kg) | Σ SAR (W/kg) | SPLSR |
|---|---|---|---|---|---|
| | | 1 | 2 | 1+2 | 1+2 |
| Phablet SAR | Back | 1.021 | 3.211 | See Note 1 | 0.07 |
| | Front | 0.992 | 0.712 | 1.704 | N/A |
| | Top | - | 3.211* | **3.211** | N/A |
| | Bottom | 0.998 | - | 0.998 | N/A |
| | Left | 1.249 | 1.586 | 2.835 | N/A |

Note 1 - No evaluation was performed to determine the aggregate 10g SAR for these configurations as the SPLS ratio between the antenna pairs was not greater than 0.10 per FCC KDB 447498 D01v06. See Section 12.7 for detailed SPLS ratio analysis.

## 12.7 SPLSR Evaluation and Analysis

Per FCC KDB Publication 447498 D01v06, when the sum of the standalone transmitters is more than 1.6 W/kg for 1g and 4 W/kg for 10g, the SAR sum to peak locations can be analyzed to determine SAR distribution overlaps. When the SAR peak to location ratio (shown below) for each pair of antennas is $\leq$ 0.04 for 1g and $\leq$0.10 for 10g, simultaneous SAR evaluation is not required. The distance between the transmitters was calculated using the following formula.

$$\text{Distance}_{Tx1-Tx2} = R_i = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2} \text{ (Head)}$$

$$\text{Distance}_{Tx1-Tx2} = R_i = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \text{ (Body-Worn, Hotspot, Phablet)}$$

$$\text{SPLS Ratio} = \frac{(SAR_1 + SAR_2)^{1.5}}{R_i}$$

### 12.7.1 Head SPLSR Evaluation and Analysis

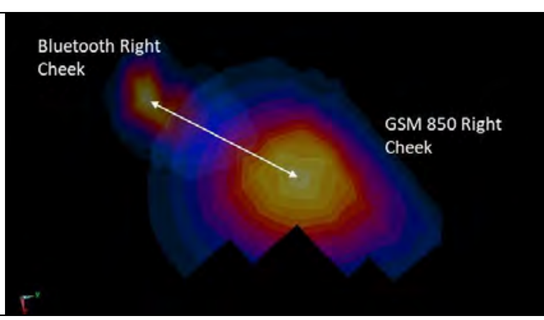
**Table 12-24**
**Peak SAR Locations for Right Cheek**

| Mode/Band | x (mm) | y (mm) | z (mm) |
|---|---|---|---|
| Bluetooth | 3.66 | -328.20 | -173.60 |
| GSM 850 | 50.51 | -262.60 | -173.96 |
| UMTS 850 | 47.56 | -266.55 | -174.71 |
| LTE Band 13 | 40.72 | -260.77 | -172.66 |
| LTE Band 26 (Cell) | 42.44 | -260.25 | -174.81 |

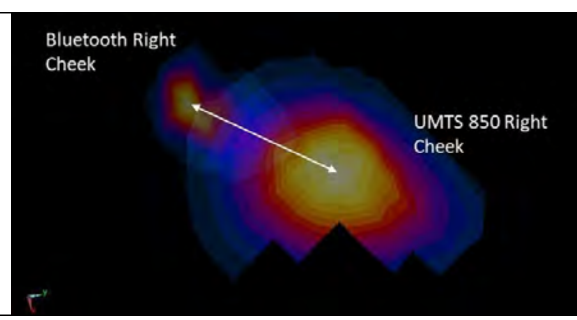
**Table 12-25**
**Right Cheek SAR to Peak Location Separation Ratio Calculations**

| Antenna Pair | | Standalone SAR (W/kg) | | Standalone SAR Sum (W/kg) | Peak SAR Separation Distance (mm) | SPLS Ratio | Plot Number |
|---|---|---|---|---|---|---|---|
| Ant "a" | Ant "b" | a | b | a+b | $D_{a-b}$ | $(a+b)^{1.5}/D_{a-b}$ | |
| Bluetooth | GSM 850 | 1.343 | 0.311 | 1.654 | 80.61 | 0.03 | 1 |
| Bluetooth | UMTS 850 | 1.343 | 0.386 | 1.729 | 75.69 | 0.03 | 2 |
| Bluetooth | LTE Band 13 | 1.343 | 0.262 | 1.605 | 76.95 | 0.03 | 3 |
| Bluetooth | LTE Band 26 (Cell) | 1.343 | 0.328 | 1.671 | 78.25 | 0.03 | 4 |

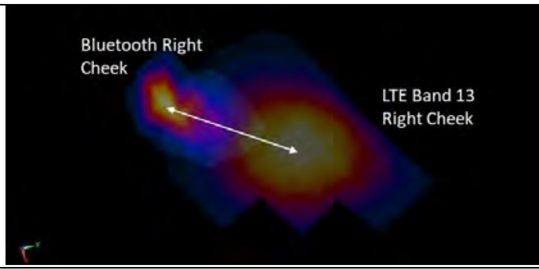
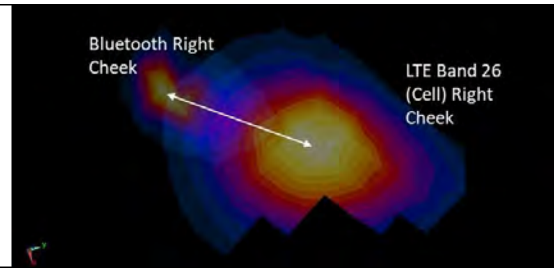
**Table 12-26**
**Right Cheek SAR to Peak Location Separation Ratio Plots**




1




2

| | |
|---|---|
|  |  |
| 3 | 4 |

### 12.7.2 Hotspot SPLSR Evaluation and Analysis

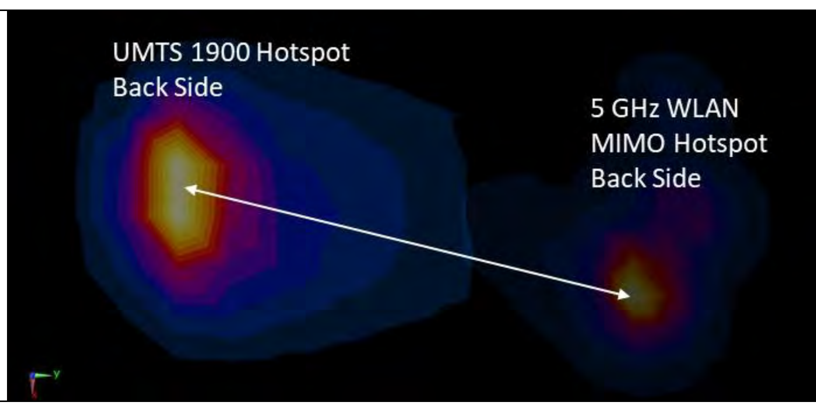
**Table 12-27**
**Peak SAR Locations for Hotspot Back Side**

| Mode/Band | x (mm) | y (mm) |
|---|---|---|
| 5 GHz WLAN MIMO | 4.00 | 52.00 |
| UMTS 1900 | -26.00 | -73.50 |

**Table 12-28**
**Hotspot Back Side SAR to Peak Location Separation Ratio Calculations**

| Antenna Pair | | Standalone SAR (W/kg) | | Standalone SAR Sum (W/kg) | Peak SAR Separation Distance (mm) | SPLS Ratio | Plot Number |
|---|---|---|---|---|---|---|---|
| Ant "a" | Ant "b" | a | b | a+b | $D_{a-b}$ | $(a+b)^{1.5}/D_{a-b}$ | |
| 5 GHz WLAN MIMO | UMTS 1900 | 0.73 | 0.984 | 1.714 | 129.04 | 0.02 | 1 |

**Table 12-29**
**Hotspot Back Side SAR to Peak Location Separation Ratio Plots**




1

### 12.7.3 Phablet SPLSR Evaluation and Analysis

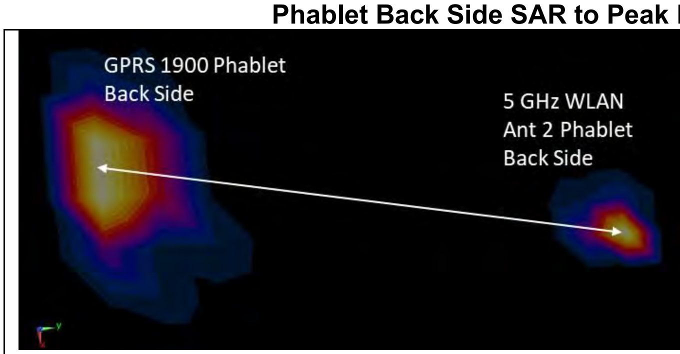
**Table 12-30**
**Peak SAR Locations for Phablet Back Side**

| Mode/Band | x (mm) | y (mm) |
|---|---|---|
| 5 GHz WLAN Ant 2 | 2.00 | 57.00 |
| 5 GHz WLAN MIMO | 5.00 | 56.00 |
| GPRS 1900 | -24.50 | -75.50 |
| UMTS 1900 | -18.50 | -73.50 |
| LTE Band 4 (AWS) | -20.00 | -78.00 |
| LTE Band 25 (PCS) | -17.00 | -73.50 |
| LTE Band 41 | 1.30 | -67.40 |

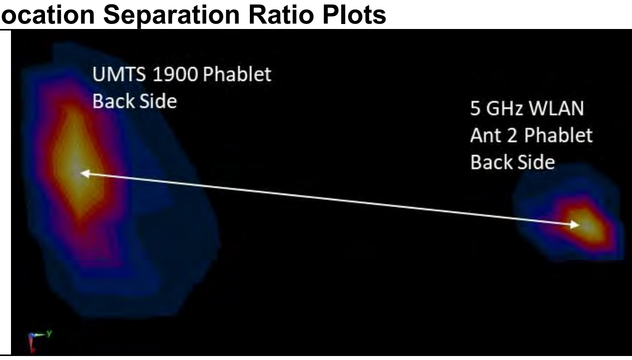
**Table 12-31**
**Phablet Back Side SAR to Peak Location Separation Ratio Calculations**

| Antenna Pair | | Standalone SAR (W/kg) | | Standalone SAR Sum (W/kg) | Peak SAR Separation Distance (mm) | SPLS Ratio | Plot Number |
|---|---|---|---|---|---|---|---|
| Ant "a" | Ant "b" | a | b | a+b | $D_{a-b}$ | $(a+b)^{1.5}/D_{a-b}$ | |
| 5 GHz WLAN Ant 2 | GPRS 1900 | 2.731 | 2.444 | 5.175 | 135.12 | 0.09 | 1 |
| 5 GHz WLAN Ant 2 | UMTS 1900 | 2.731 | 2.524 | 5.255 | 132.10 | 0.09 | 2 |
| 5 GHz WLAN Ant 2 | LTE Band 4 (AWS) | 2.731 | 1.983 | 4.714 | 136.78 | 0.07 | 3 |
| 5 GHz WLAN Ant 2 | LTE Band 25 (PCS) | 2.731 | 2.420 | 5.151 | 131.88 | 0.09 | 4 |
| 5 GHz WLAN MIMO | GPRS 1900 | 3.211 | 2.444 | 5.655 | 134.77 | 0.10 | 5 |
| 5 GHz WLAN MIMO | UMTS 1900 | 3.211 | 2.524 | 5.735 | 131.61 | 0.10 | 6 |
| 5 GHz WLAN MIMO | LTE Band 4 (AWS) | 3.211 | 1.983 | 5.194 | 136.31 | 0.09 | 7 |
| 5 GHz WLAN MIMO | LTE Band 25 (PCS) | 3.211 | 2.420 | 5.631 | 131.36 | 0.10 | 8 |
| 5 GHz WLAN MIMO | LTE Band 41 | 3.211 | 1.021 | 4.232 | 123.46 | 0.07 | 9 |

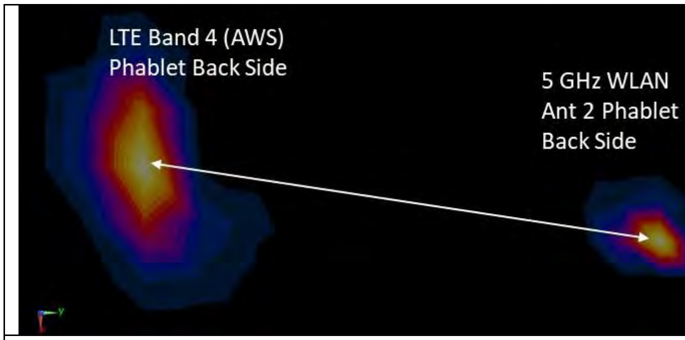
**Table 12-32**
**Phablet Back Side SAR to Peak Location Separation Ratio Plots**



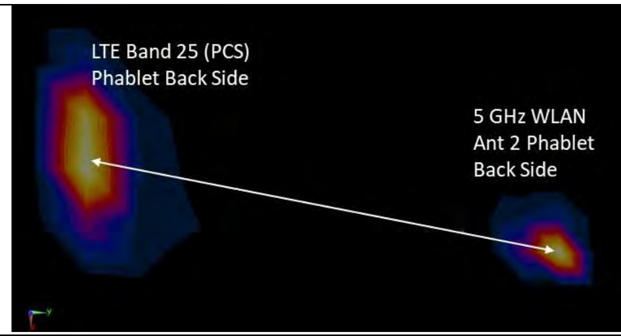

1



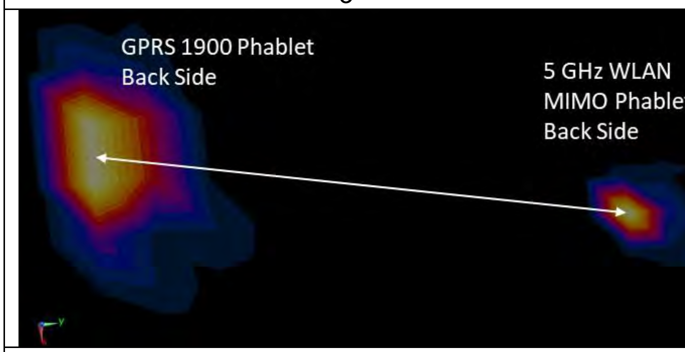

2


LTE Band 4 (AWS)
Phablet Back Side
5 GHz WLAN
Ant 2 Phablet
Back Side

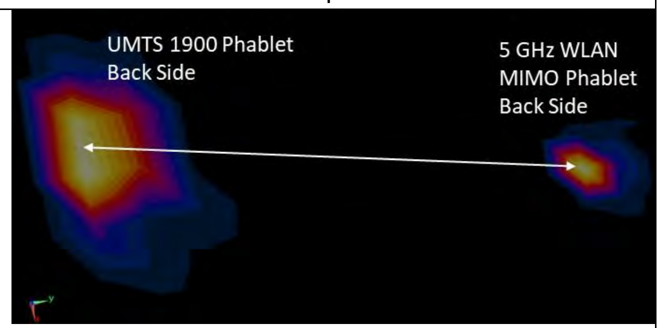
3


LTE Band 25 (PCS)
Phablet Back Side
5 GHz WLAN
Ant 2 Phablet
Back Side

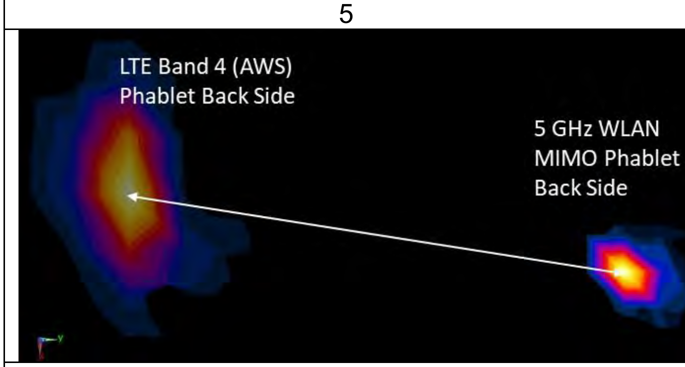
4


GPRS 1900 Phablet
Back Side
5 GHz WLAN
MIMO Phablet
Back Side

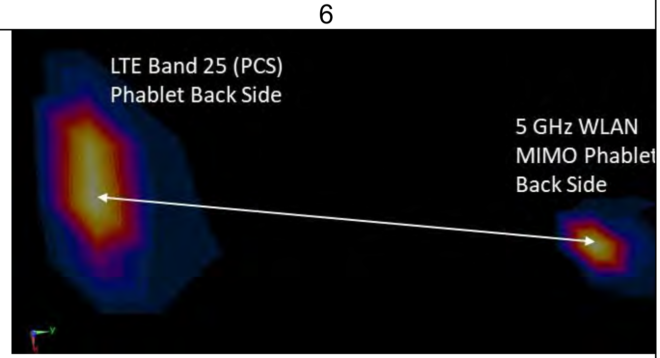
5


UMTS 1900 Phablet
Back Side
5 GHz WLAN
MIMO Phablet
Back Side

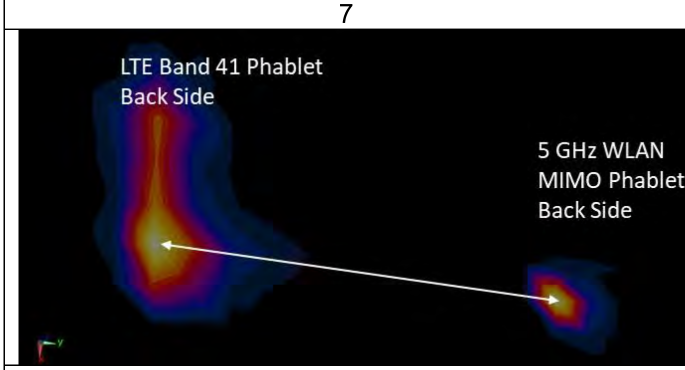
6


LTE Band 4 (AWS)
Phablet Back Side
5 GHz WLAN
MIMO Phablet
Back Side

7


LTE Band 25 (PCS)
Phablet Back Side
5 GHz WLAN
MIMO Phablet
Back Side

8


LTE Band 41 Phablet
Back Side
5 GHz WLAN
MIMO Phablet
Back Side

9

## 12.8 Additional Simultaneous SAR Evaluation and Analysis for Main Band, Bluetooth and 5 GHz WLAN Operations

Per KDB Publication 865664, when the sum of the transmitters potentially operating simultaneously is greater than the 1.6 W/kg or 4.0 W/kg and the sum to peak SAR location separation ratio between any pair of transmitters is more than 0.04 for 1g or 0.1 for 10g, SAR tests are required for simultaneous transmission to determine the aggregate 1g or 10g SAR. When required, each transmitter is tested for simultaneous transmission in the configuration, channel and operating mode that resulted in the highest SAR during the stand-alone evaluation.

The Bluetooth and 5 GHz WLAN transmitters are spatially separated from the 2G/3G/4G antenna. Therefore, simultaneous transmission SAR evaluations (Volumetric SAR Evaluations) were performed for the transmitters with the overlapping distributions - Bluetooth and 5 GHz WIFI. The SPLSR procedures in FCC KDB Publication 447498 was applied to the 2G/3G/4G transmitter and the aggregate Bluetooth and 5 GHz WLAN distribution to determine simultaneous SAR compliance.

### 12.8.1 Head Volumetric SAR Evaluation and Analysis for Bluetooth, and 5GHz WLAN Simultaneous Transmission

**Table 12-33**
**Right Cheek Simultaneous Transmission SAR Analysis**

| Band/ Mode | Configuration | Frequency [MHz] | Measured Standalone 1g SAR [W/kg] | Maximum Allowed Power [dBm] | Conducted Power (Ant 1) [dBm] | Conducted Power (Ant 2) [dBm] | Duty Cycle (%) | Scaling Factor (Cond Power) | Scaling Factor (Duty Cycle) | Volumetric 1g SAR [W/kg] | Scaled Volumetric 1g SAR [W/kg] | Volumetric SAR Plot Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bluetooth | Right Cheek, Mid ch. | 2441 | 0.957 | 18.5 | 18.13 | N/A | 77.6 | 1.089 | 1.289 | 0.86 | 1.207 | A46 |
| 5GHz WLAN Ant 1 | Right Cheek, Ch. 54, 13.5 Mbps | 5270 | 0.305 | 14.0 | 13.47 | N/A | 98.5 | 1.130 | 1.015 | 0.275 | 0.315 | A47 |
| 5GHz WLAN Ant 2 | Right Cheek, Ch. 155, 29.3 Mbps | 5775 | 0.061 | 14.0 | N/A | 13.65 | 98.4 | 1.084 | 1.016 | 0.043 | 0.047 | A48 |
| 5GHz WLAN MIMO | Right Cheek, Ch. 54, 27 Mbps | 5270 | 0.354 | 14.0 | 13.47 | 13.79 | 98.5 | 1.130 | 1.015 | 0.355 | 0.407 | A49 |

| Simultaneous Transmission Bands/Modes | | Scaled Multi-Band SAR (W/kg) | Simultaneous SAR Plot Number |
|---|---|---|---|
| Bluetooth | 5GHz WLAN Ant 1 | 1.310 | A53 |
| Bluetooth | 5 GHz WLAN Ant 2 | 1.190 | A54 |
| Bluetooth | 5GHz WLAN MIMO | 1.370 | A55 |

Note:
1. All volumetric zoom scans were performed with DASY52 SAR system version 52.10. Post processor SEMCAD X Versions 14.6.12 (7450) multiband combiner requires enlarged zoom scans to overlap but does not require measurement point resolutions within the volumes to be identical for interpolation and superposition.
2. Each antenna was evaluated independently using the channel/configuration that produced the highest measured SAR when the standalone SAR was tested.
3. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05. The simultaneous transmission SAR results of the individual transmitters were scaled using SEMCAD X during processing.
4. The Bluetooth and 5 GHz WIFI SAR values above represent the aggregate distributions from the simultaneous transmission (volumetric) SAR evaluation.

## 12.8.2 Right Cheek Volumetric SAR Evaluation and Analysis for Bluetooth, and 5GHz WLAN Simultaneous Transmission

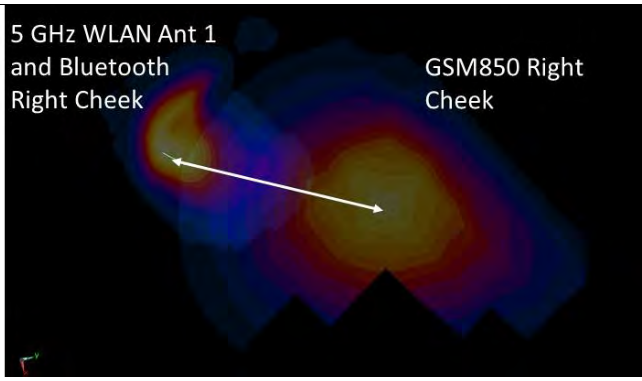
**Table 12-34**
**Peak SAR Locations for Right Cheek**

| Mode/Band | x (mm) | y (mm) | z (mm) |
|---|---|---|---|
| 5 GHz WLAN Ant 1 and Bluetooth | 16.94 | -335.03 | -175.46 |
| 5 GHz WLAN MIMO and Bluetooth | 16.94 | -335.03 | -175.56 |
| GSM 850 | 50.51 | -262.60 | -173.96 |
| UMTS 850 | 47.56 | -266.55 | -174.71 |
| LTE Band 13 | 40.72 | -260.77 | -172.66 |
| LTE Band 26 (Cell) | 42.44 | -260.25 | -174.81 |

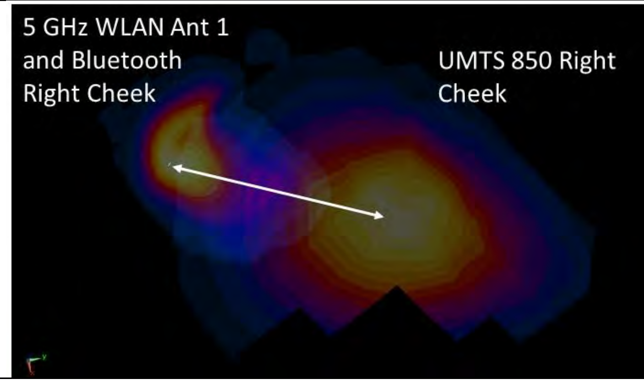
**Table 12-35**
**Right Cheek SAR to Peak Location Separation Ratio Calculations**

| Antenna Pair | | Standalone SAR (W/kg) | | Standalone SAR Sum (W/kg) | Peak SAR Separation Distance (mm) | SPLS Ratio | Plot Number |
|---|---|---|---|---|---|---|---|
| Ant "a" | Ant "b" | a | b | a+b | $D_{a-b}$ | $(a+b)^{1.5}/D_{a-b}$ | |
| 5 GHz WLAN Ant 1 and Bluetooth | GSM 850 | 1.310 | 0.311 | 1.621 | 79.85 | 0.03 | 1 |
| 5 GHz WLAN Ant 1 and Bluetooth | UMTS 850 | 1.310 | 0.386 | 1.696 | 75.02 | 0.03 | 2 |
| 5 GHz WLAN Ant 1 and Bluetooth | LTE Band 26 (Cell) | 1.310 | 0.328 | 1.638 | 79.01 | 0.03 | 3 |
| 5 GHz WLAN MIMO and Bluetooth | GSM 850 | 1.370 | 0.311 | 1.681 | 79.85 | 0.03 | 4 |
| 5 GHz WLAN MIMO and Bluetooth | UMTS 850 | 1.370 | 0.386 | 1.756 | 75.02 | 0.03 | 5 |
| 5 GHz WLAN MIMO and Bluetooth | LTE Band 13 | 1.370 | 0.262 | 1.632 | 78.03 | 0.03 | 6 |
| 5 GHz WLAN MIMO and Bluetooth | LTE Band 26 (Cell) | 1.370 | 0.328 | 1.698 | 79.01 | 0.03 | 7 |

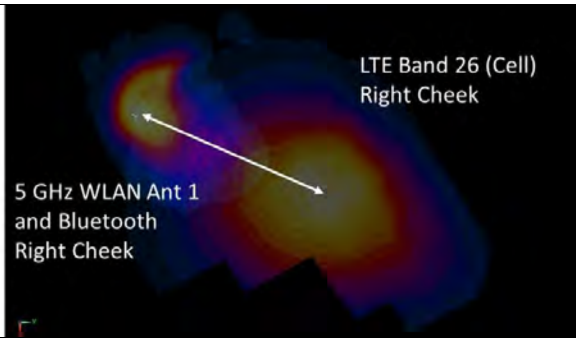
**Table 12-36**
**Right Cheek SAR to Peak Location Separation Ratio Plots**



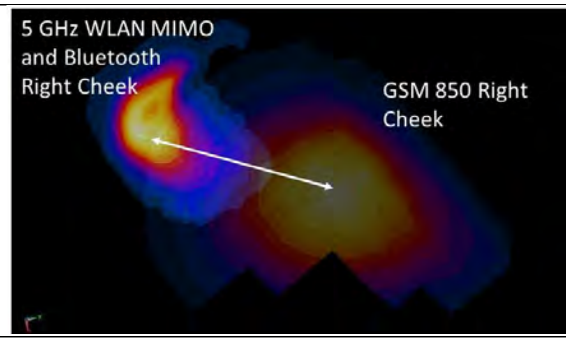

1



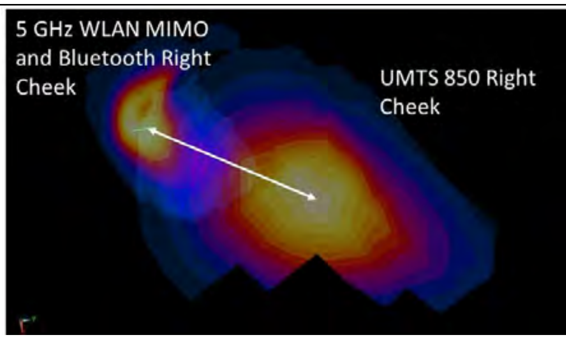

2



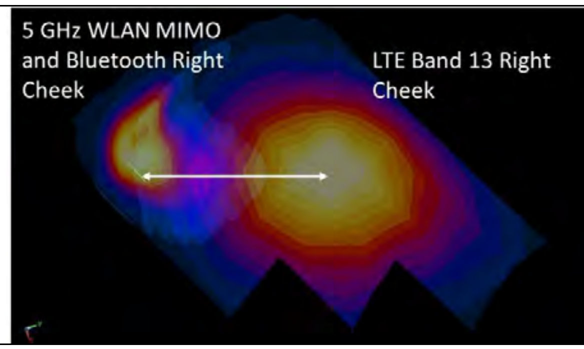

3



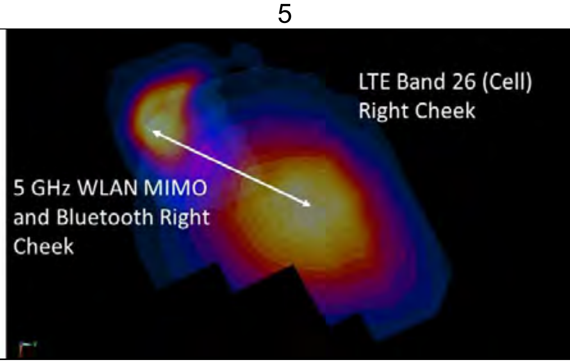

4




5




6




7

**Table 12-37**
**Right Cheek Simultaneous Transmission SAR Analysis**

| Antenna Pair | | Standalone SAR (W/kg) | | Standalone SAR Sum (W/kg) |
|---|---|---|---|---|
| Ant "a" | Ant "b" | a | b | a+b |
| 5 GHz WLAN Ant 1 and Bluetooth | GSM 1900 | 1.310 | 0.052 | 1.362 |
| 5 GHz WLAN Ant 1 and Bluetooth | UMTS 1900 | 1.310 | 0.113 | 1.423 |
| 5 GHz WLAN Ant 1 and Bluetooth | LTE Band 12 | 1.310 | 0.144 | 1.454 |
| 5 GHz WLAN Ant 1 and Bluetooth | LTE Band 13 | 1.310 | 0.262 | 1.572 |
| 5 GHz WLAN Ant 1 and Bluetooth | LTE Band 4 (AWS) | 1.310 | 0.091 | 1.401 |
| 5 GHz WLAN Ant 1 and Bluetooth | LTE Band 25 (PCS) | 1.310 | 0.14 | 1.450 |
| 5 GHz WLAN Ant 1 and Bluetooth | LTE Band 41 | 1.310 | 0.061 | 1.371 |
| 5 GHz WLAN Ant 2 and Bluetooth | GSM 850 | 1.190 | 0.311 | 1.501 |
| 5 GHz WLAN Ant 2 and Bluetooth | UMTS 850 | 1.190 | 0.386 | 1.576 |
| 5 GHz WLAN Ant 2 and Bluetooth | LTE Band 13 | 1.190 | 0.262 | 1.452 |
| 5 GHz WLAN Ant 2 and Bluetooth | LTE Band 26 (Cell) | 1.190 | 0.328 | 1.518 |
| 5 GHz WLAN MIMO and Bluetooth | GSM 1900 | 1.37 | 0.052 | 1.422 |
| 5 GHz WLAN MIMO and Bluetooth | UMTS 1900 | 1.37 | 0.113 | 1.483 |
| 5 GHz WLAN MIMO and Bluetooth | LTE Band 12 | 1.37 | 0.144 | 1.514 |
| 5 GHz WLAN MIMO and Bluetooth | LTE Band 4 (AWS) | 1.37 | 0.091 | 1.461 |
| 5 GHz WLAN MIMO and Bluetooth | LTE Band 25 (PCS) | 1.37 | 0.14 | 1.510 |
| 5 GHz WLAN MIMO and Bluetooth | LTE Band 41 | 1.37 | 0.061 | 1.431 |

### 12.8.3 Hotspot Volumetric SAR Evaluation and Analysis for Main Band, Bluetooth, and 5GHz WLAN Simultaneous Transmission

Per KDB Publication 865664, when the sum of the transmitters potentially operating simultaneously is greater than the 1.6 W/kg or 4.0 W/kg and the sum to peak SAR location separation ratio between any pair of transmitters is more than 0.04 for 1g or 0.1 for 10g, SAR tests are required for simultaneous transmission to determine the aggregate 1g or 10g SAR. When required, each transmitter is tested for simultaneous transmission in the configuration, channel and operating mode that resulted in the highest SAR during the stand-alone evaluation.

The Bluetooth and 5 GHz WLAN transmitters are spatially separated from the 2G/3G/4G antenna. Therefore, simultaneous transmission SAR evaluations (Volumetric SAR Evaluations) were performed for the transmitters with the overlapping distributions - Bluetooth and 5 GHz WIFI. The SPLSR procedures in FCC KDB Publication 447498 was applied to the 2G/3G/4G transmitter and the aggregate Bluetooth and 5 GHz WLAN distribution to determine simultaneous SAR compliance.

### 12.8.4 Hotspot Back Side Volumetric SAR Evaluation and Analysis for Main Band, Bluetooth, and 5GHz WLAN Simultaneous Transmission

**Table 12-38**
**Hotspot Back Side Simultaneous Transmission SAR Analysis**

| Band/ Mode | Configuration | Frequency [MHz] | Measured Standalone 1g SAR [W/kg] | Maximum Allowed Power [dBm] | Conducted Power (Ant 1) [dBm] | Conducted Power (Ant 2) [dBm] | Duty Cycle (%) | Scaling Factor (Cond Power) | Scaling Factor (Duty Cycle) | Volumetric 1g SAR [W/kg] | Scaled Volumetric 1g SAR [W/kg] | Volumetric SAR Plot Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bluetooth | Back Side 10 mm, Mid ch. | 2441 | 0.122 | 18.5 | 18.13 | N/A | 77.6 | 1.089 | 1.289 | 0.118 | 0.166 | A50 |
| 5 GHz WLAN Ant 2 | Back Side 10 mm, Ch. 157, 6 Mbps | 5785 | 0.554 | 18.5 | 18.24 | N/A | 98.8 | 1.062 | 1.012 | 0.619 | 0.665 | A51 |
| 5 GHz WLAN MIMO | Back Side 10 mm, Ch. 149, 13 Mbps | 5745 | 0.649 | 18.5 | 18.26 | 18.05 | 98.6 | 1.109 | 1.014 | 0.614 | 0.691 | A52 |

| Simultaneous Transmission Bands/Modes | | Scaled Multi-Band SAR (W/kg) | Simultaneous SAR Plot Number |
|---|---|---|---|
| Bluetooth | 5GHz WLAN Ant 2 | 0.828 | A56 |
| Bluetooth | 5GHz WLAN MIMO | 0.854 | A57 |

Note:
1. All volumetric zoom scans were performed with DASY52 SAR system version 52.10. Post processor SEMCAD X Versions 14.6.12 (7450) multiband combiner requires enlarged zoom scans to overlap but does not require measurement point resolutions within the volumes to be identical for interpolation and superposition.
2. Each antenna was evaluated independently using the channel/configuration that produced the highest measured SAR when the standalone SAR was tested.
3. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05. The simultaneous transmission SAR results of the individual transmitters were scaled using SEMCAD X during processing.
4. The Bluetooth and 5 GHz WIFI SAR values above represent the aggregate distributions from the simultaneous transmission (volumetric) SAR evaluation.

#### 12.8.5 Hotspot Back Side Volumetric SAR Evaluation and Analysis for Bluetooth, and 5GHz WLAN Simultaneous Transmission

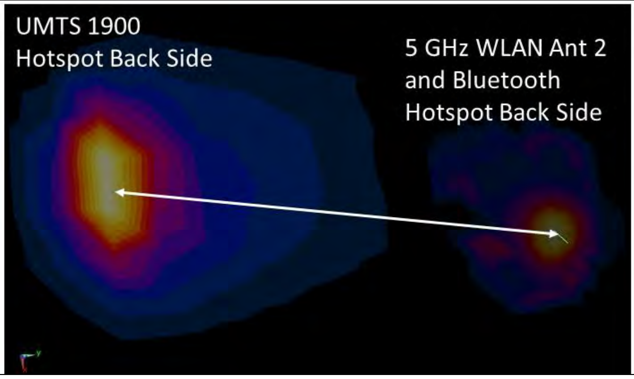
**Table 12-39**
**Peak SAR Locations for Hotspot Back Side**

| Mode/Band | x (mm) | y (mm) |
|---|---|---|
| 5 GHz WLAN Ant 2 and Bluetooth | 7.00 | 60.00 |
| 5 GHz WLAN MIMO and Bluetooth | 11.00 | 56.00 |
| UMTS 1900 | -26.00 | -73.50 |

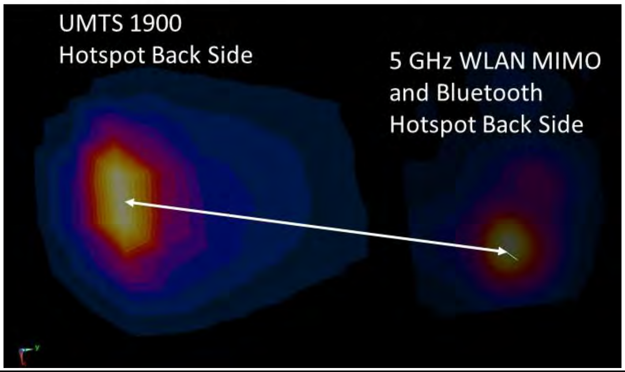
**Table 12-40**
**Hotspot Back Side SAR to Peak Location Separation Ratio Calculations**

| Antenna Pair | | Standalone SAR (W/kg) | | Standalone SAR Sum (W/kg) | Peak SAR Separation Distance (mm) | SPLS Ratio | Plot Number |
|---|---|---|---|---|---|---|---|
| Ant "a" | Ant "b" | a | b | a+b | $D_{a-b}$ | $(a+b)^{1.5}/D_{a-b}$ | |
| 5 GHz WLAN Ant 2 and Bluetooth | UMTS 1900 | 0.828 | 0.984 | 1.812 | 137.52 | 0.02 | 1 |
| 5 GHz WLAN MIMO and Bluetooth | UMTS 1900 | 0.854 | 0.984 | 1.838 | 134.68 | 0.02 | 2 |

**Table 12-41**
**Hotspot Back Side SAR to Peak Location Separation Ratio Plots**




1




2

## 12.9 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE 1528-2013 Section 6.3.4.1.2.

# 13 SAR MEASUREMENT VARIABILITY

## 13.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:

1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg
5) When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

**Table 13-1**
**Head SAR Measurement Variability Results**

| HEAD VARIABILITY RESULTS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Band | FREQUENCY | | Mode/Band | Service | Side | Test Position | Data Rate (Mbps) | Measured SAR (1g) | 1st Repeated SAR (1g) | Ratio | 2nd Repeated SAR (1g) | Ratio | 3rd Repeated SAR (1g) | Ratio |
| | MHz | Ch. | | | | | | (W/kg) | (W/kg) | | (W/kg) | | (W/kg) | |
| 2450 | 2441.00 | 39 | Bluetooth | FHSS | Right | Cheek | 1 | 0.957 | 0.825 | 1.16 | N/A | N/A | N/A | N/A |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | Head<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | | | |

**Table 13-2**
**Body SAR Measurement Variability Results**

| BODY VARIABILITY RESULTS | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Band | FREQUENCY | | Mode | Service | Side | Spacing | Measured SAR (1g) | 1st Repeated SAR (1g) | Ratio | 2nd Repeated SAR (1g) | Ratio | 3rd Repeated SAR (1g) | Ratio |
| | MHz | Ch. | | | | | (W/kg) | (W/kg) | | (W/kg) | | (W/kg) | |
| 1900 | 1880.00 | 9400 | UMTS 1900 | RMC | bottom | 10 mm | 1.020 | 0.884 | 1.15 | N/A | N/A | N/A | N/A |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | Body<br>1.6 W/kg (mW/g)<br>averaged over 1 gram | | | | | | | |

**Table 13-3**
**Phablet SAR Measurement Variability Results**

| PHABLET VARIABILITY RESULTS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Band | FREQUENCY | | Mode | Service | Data Rate (Mbps) | Side | Spacing | Measured SAR (10g) | 1st Repeated SAR (10g) | Ratio | 2nd Repeated SAR (10g) | Ratio | 3rd Repeated SAR (10g) | Ratio |
| | MHz | Ch. | | | | | | (W/kg) | (W/kg) | | (W/kg) | | (W/kg) | |
| 1900 | 1880.00 | 9400 | UMTS 1900 | RMC | N/A | bottom | 0 mm | 2.980 | 2.710 | 1.10 | N/A | N/A | N/A | N/A |
| 1750 | 1732.50 | 20175 | LTE Band 4 (AWS), 20 MHz Bandwidth | QPSK, 100 RB, 0 RB Offset | N/A | bottom | 0 mm | 2.550 | 2.540 | 1.00 | N/A | N/A | N/A | N/A |
| 5250 | 5260.00 | 52 | 802.11n, 20 MHz Bandwidth | OFDM, MIMO | 13 | back | 0 mm | 2.410 | 2.360 | 1.02 | N/A | N/A | N/A | N/A |
| 5600 | 5600.00 | 120 | 802.11n, 20 MHz Bandwidth | OFDM, MIMO | 13 | back | 0 mm | 2.990 | 2.920 | 1.02 | N/A | N/A | N/A | N/A |
| 5750 | 5720.00 | 144 | 802.11n, 20 MHz Bandwidth | OFDM, MIMO | 13 | back | 0 mm | 2.590 | 2.840 | 1.10 | N/A | N/A | N/A | N/A |
| ANSI / IEEE C95.1 1992 - SAFETY LIMIT<br>Spatial Peak<br>Uncontrolled Exposure/General Population | | | | | | | | Phablet<br>4.0 W/kg (mW/g)<br>averaged over 10 grams | | | | | | |

## 13.2 Measurement Uncertainty

The measured SAR was <1.5 W/kg for 1g and <3.75 W/kg for 10g for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04, the extended measurement uncertainty analysis per IEEE 1528-2013 was not required.

# 14 ADDITIONAL TESTING PER FCC GUIDANCE

## 14.1 Tuner Testing

The following test procedures were followed to demonstrate that the SAR results in Section 11 represented the appropriate SAR test conditions. For bands with dynamic tuning implemented, SAR was measured according to the required FCC SAR test procedures with the dynamic tuner active to allow the device to automatically tune to the antenna state for the respective RF exposure test configurations. Additional single point SAR time-sweep measurements were evaluated for other tuner states to determine that the other tuner configurations would result in equivalent or lower SAR values. The additional tuner hardware has no influence on the antenna characteristics, other than impedance matching.

To evaluate all the tuner states, the 80 tuner states were divided among the aggregate band, mode and exposure combinations so that each combination was evaluated for at least 20 tuner states and also so that at least 3 single point SAR measurements were made for every available tuner state. Single point time-sweep measurements were performed at the peak SAR location determined by the zoom scan of the configuration with the highest reported SAR for each combination. The tuner state was able to be established remotely so that the device was not moved for the entire series of single point SAR for the tuner states in each combination. The SAR probe remained stationary at the same position throughout the entire series of single point measurements for each combination. When the single point SAR or 1g SAR was > 1.2 W/kg for a particular band/mode/exposure condition, point SAR measurements were made for all 80 states.

The operational description contains more information about the design and implementation of the dynamic antenna tuning.

# Table 14-1
# LTE Supplemental Head SAR Data

| Supplemental Head SAR Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LTE Band 12 | | LTE Band 13 | | LTE Band 26 | | LTE Band 4 | | LTE Band 25 | |
| QPSK, 10 MHz Bandwidth, 1 RB, 0 RB Offsets | | QPSK, 10 MHz Bandwidth, 1 RB, 0 RB Offsets | | QPSK, 15 MHz Bandwidth, 1 RB, 0 RB Offsets | | QPSK, 20 MHz Bandwidth, 1 RB, 0 RB Offsets | | QPSK, 20 MHz Bandwidth, 1 RB, 0 RB Offsets | |
| Test Position | Right Cheek | Test Position | Right Cheek | Test Position | Right Cheek | Test Position | Left Cheek | Test Position | Left Cheek |
| Frequency (MHz) | 707.5 | Frequency (MHz) | 782 | Frequency (MHz) | 831.5 | Frequency (MHz) | 1732.5 | Frequency (MHz) | 1860 |
| Channel | 23095 | Channel | 23230 | Channel | 26865 | Channel | 20175 | Channel | 26140 |
| Measured 1g SAR (W/kg) | 0.124 | Measured 1g SAR (W/kg) | 0.219 | Measured 1g SAR (W/kg) | 0.294 | Measured 1g SAR (W/kg) | 0.166 | Measured 1g SAR (W/kg) | 0.159 |
| Average Value of Time Sweep (W/kg) | | Average Value of Time Sweep (W/kg) | | Average Value of Time Sweep (W/kg) | | Average Value of Time Sweep (W/kg) | | Average Value of Time Sweep (W/kg) | |
| Auto-tune (State 10) | 0.13 | Auto-tune (State 0) | 0.233 | Auto-tune (State 76) | 0.327 | Auto-tune (State 16) | 0.223 | Auto-tune (State 16) | 0.229 |
| Default (State 10) | 0.131 | Default (State 68) | 0.235 | Default (State 76) | 0.337 | Default (State 17) | 0.218 | Default (State 16) | 0.235 |
| State 0 | 0.069 | State 0 | 0.240 | State 7 | 0.273 | State 0 | 0.153 | State 3 | 0.158 |
| State 1 | 0.068 | State 2 | 0.194 | State 8 | 0.268 | State 1 | 0.157 | State 5 | 0.154 |
| State 2 | 0.092 | State 8 | 0.139 | State 9 | 0.230 | State 4 | 0.122 | State 10 | 0.109 |
| State 4 | 0.097 | State 12 | 0.043 | State 14 | 0.073 | State 5 | 0.120 | State 13 | 0.059 |
| State 10 | 0.131 | State 14 | 0.023 | State 21 | 0.202 | State 6 | 0.111 | State 16 | 0.235 |
| State 12 | 0.101 | State 16 | 0.155 | State 28 | 0.085 | State 11 | 0.071 | State 20 | 0.204 |
| State 14 | 0.055 | State 20 | 0.202 | State 30 | 0.036 | State 15 | 0.025 | State 23 | 0.187 |
| State 16 | 0.017 | State 24 | 0.195 | State 31 | 0.019 | State 16 | 0.216 | State 28 | 0.114 |
| State 22 | 0.020 | State 25 | 0.172 | State 34 | 0.222 | State 17 | 0.218 | State 34 | 0.042 |
| State 25 | 0.011 | State 26 | 0.141 | State 37 | 0.193 | State 21 | 0.198 | State 35 | 0.040 |
| State 29 | 0.001 | State 27 | 0.108 | State 41 | 0.117 | State 25 | 0.175 | State 38 | 0.034 |
| State 33 | 0.078 | State 32 | 0.182 | State 42 | 0.089 | State 31 | 0.085 | State 41 | 0.029 |
| State 34 | 0.065 | State 33 | 0.181 | State 43 | 0.067 | State 32 | 0.034 | State 44 | 0.013 |
| State 40 | 0.054 | State 35 | 0.132 | State 49 | 0.182 | State 36 | 0.026 | State 46 | 0.005 |
| State 42 | 0.042 | State 40 | 0.091 | State 51 | 0.238 | State 40 | 0.022 | State 50 | 0.062 |
| State 46 | 0.019 | State 45 | 0.017 | State 52 | 0.242 | State 43 | 0.011 | State 51 | 0.059 |
| State 47 | 0.014 | State 48 | 0.184 | State 57 | 0.261 | State 45 | 0.005 | State 55 | 0.048 |
| State 48 | 0.023 | State 50 | 0.204 | State 61 | 0.111 | State 48 | 0.06 | State 58 | 0.038 |
| State 52 | 0.036 | State 55 | 0.191 | State 63 | 0.043 | State 49 | 0.059 | State 62 | 0.010 |
| State 60 | 0.004 | State 64 | 0.232 | State 67 | 0.179 | State 53 | 0.044 | State 64 | 0.147 |
| State 62 | 0.001 | State 67 | 0.181 | State 70 | 0.274 | State 56 | 0.038 | State 66 | 0.032 |
| State 64 | 0.067 | State 68 | 0.235 | State 71 | 0.182 | State 59 | 0.021 | State 69 | 0.228 |
| State 68 | 0.069 | State 69 | 0.154 | State 72 | 0.338 | State 65 | 0.205 | State 74 | 0.036 |
| State 70 | 0.078 | State 73 | 0.152 | State 75 | 0.179 | State 67 | 0.046 | State 75 | 0.058 |
| State 76 | 0.067 | State 75 | 0.182 | State 76 | 0.337 | State 71 | 0.058 | State 76 | 0.187 |
| State 79 | 0.024 | State 76 | 0.235 | State 78 | 0.277 | State 77 | 0.218 | State 79 | 0.072 |

# Table 14-2
# LTE Supplemental Body SAR Data

| Supplemental Body SAR Data | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LTE Band 12 | | LTE Band 13 | | LTE Band 26 | | LTE Band 4 | | LTE Band 25 | |
| QPSK, 10 MHz Bandwidth, 1 RB, 0 RB Offsets | | QPSK, 10 MHz Bandwidth, 1 RB, 0 RB Offsets | | QPSK, 15 MHz Bandwidth, 1 RB, 0 RB Offsets | | QPSK, 20 MHz Bandwidth, 1 RB, 99 RB Offsets | | QPSK, 20 MHz Bandwidth, 1 RB, 0 RB Offsets | |
| Test Position | Back | Test Position | Back | Test Position | Back | Test Position | Bottom | Test Position | Back |
| Spacing | 10 mm | Spacing | 10 mm | Spacing | 10 mm | Spacing | 10 mm | Spacing | 15 mm |
| Frequency (MHz) | 707.5 | Frequency (MHz) | 782 | Frequency (MHz) | 831.5 | Frequency (MHz) | 1732.5 | Frequency (MHz) | 1905 |
| Channel | 23095 | Channel | 23230 | Channel | 26865 | Channel | 20175 | Channel | 26590 |
| Measured 1g SAR (W/kg) | 0.231 | Measured 1g SAR (W/kg) | 0.391 | Measured 1g SAR (W/kg) | 0.455 | Measured 1g SAR (W/kg) | 0.593 | Measured 1g SAR (W/kg) | 0.860 |
| Average Value of Time Sweep (W/kg) | | Average Value of Time Sweep (W/kg) | | Average Value of Time Sweep (W/kg) | | Average Value of Time Sweep (W/kg) | | Average Value of Time Sweep (W/kg) | |
| Auto-tune (State 10) | 0.297 | Auto-tune (State 68) | 0.561 | Auto-tune (State 0) | 0.559 | Auto-tune (State 17) | 0.731 | Auto-tune (State 16) | 1.024 |
| Default (State 10) | 0.297 | Default (State 68) | 0.542 | Default (State 76) | 0.547 | Default (State 17) | 0.737 | Default (State 16) | 1.000 |
| State 2 | 0.214 | State 2 | 0.436 | State 0 | 0.548 | State 2 | 0.486 | State 1 | 0.829 |
| State 3 | 0.221 | State 6 | 0.350 | State 2 | 0.525 | State 4 | 0.465 | State 3 | 0.730 |
| State 4 | 0.227 | State 7 | 0.328 | State 3 | 0.516 | State 6 | 0.432 | State 6 | 0.672 |
| State 5 | 0.231 | State 9 | 0.251 | State 7 | 0.481 | State 8 | 0.418 | State 13 | 0.322 |
| State 9 | 0.287 | State 11 | 0.150 | State 10 | 0.339 | State 11 | 0.294 | State 16 | 1.000 |
| State 10 | 0.297 | State 13 | 0.080 | State 13 | 0.167 | State 14 | 0.173 | State 17 | 0.993 |
| State 12 | 0.217 | State 15 | 0.038 | State 16 | 0.234 | State 15 | 0.131 | State 18 | 0.934 |
| State 15 | 0.065 | State 17 | 0.292 | State 18 | 0.329 | State 17 | 0.737 | State 19 | 0.923 |
| State 16 | 0.044 | State 18 | 0.423 | State 22 | 0.373 | State 19 | 0.707 | State 24 | 0.856 |
| State 21 | 0.056 | State 19 | 0.431 | State 23 | 0.38 | State 20 | 0.705 | State 26 | 0.737 |
| State 23 | 0.044 | State 24 | 0.416 | State 29 | 0.119 | State 22 | 0.689 | State 29 | 0.480 |
| State 27 | 0.013 | State 26 | 0.264 | State 30 | 0.078 | State 27 | 0.603 | State 30 | 0.398 |
| State 30 | 0.003 | State 29 | 0.075 | State 35 | 0.388 | State 28 | 0.556 | State 33 | 0.22 |
| State 31 | 0.002 | State 38 | 0.226 | State 42 | 0.188 | State 36 | 0.106 | State 35 | 0.211 |
| State 32 | 0.180 | State 39 | 0.207 | State 43 | 0.143 | State 37 | 0.106 | State 36 | 0.206 |
| State 39 | 0.137 | State 41 | 0.145 | State 44 | 0.097 | State 38 | 0.095 | State 37 | 0.207 |
| State 45 | 0.065 | State 44 | 0.051 | State 47 | 0.035 | State 41 | 0.081 | State 39 | 0.177 |
| State 47 | 0.039 | State 51 | 0.425 | State 53 | 0.419 | State 46 | 0.029 | State 44 | 0.098 |
| State 50 | 0.089 | State 56 | 0.399 | State 54 | 0.43 | State 52 | 0.172 | State 49 | 0.324 |
| State 53 | 0.089 | State 58 | 0.280 | State 60 | 0.243 | State 56 | 0.155 | State 54 | 0.27 |
| State 54 | 0.082 | State 59 | 0.212 | State 66 | 0.452 | State 57 | 0.133 | State 55 | 0.257 |
| State 57 | 0.053 | State 60 | 0.138 | State 69 | 0.232 | State 63 | 0.036 | State 58 | 0.218 |
| State 59 | 0.024 | State 67 | 0.339 | State 70 | 0.463 | State 65 | 0.680 | State 61 | 0.116 |
| State 61 | 0.009 | State 68 | 0.542 | State 73 | 0.228 | State 68 | 0.562 | State 63 | 0.062 |
| State 62 | 0.006 | State72 | 0.500 | State 74 | 0.455 | State 71 | 0.218 | State 65 | 0.801 |
| State 66 | 0.058 | State 73 | 0.277 | State 76 | 0.547 | State 74 | 0.117 | State 72 | 0.745 |
| State 77 | 0.044 | State 78 | 0.445 | State 78 | 0.464 | State 79 | 0.218 | State 77 | 0.994 |

# 15 EQUIPMENT LIST

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|---|---|---|---|---|---|---|
| Agilent | 85033E | 3.5mm Standard Calibration Kit | 8/13/2018 | Annual | 8/13/2019 | MY53402352 |
| Agilent | 8594A | (9kHz-2.9GHz) Spectrum Analyzer | N/A | N/A | N/A | 3051A00187 |
| Agilent | 8648D | (9kHz-4GHz) Signal Generator | CBT | N/A | CBT | 3629U00687 |
| Agilent | 8753E | (30kHz-6GHz) Network Analyzer | 9/28/2018 | Annual | 9/28/2019 | JP38020182 |
| Agilent | 8753ES | S-Parameter Network Analyzer | 2/8/2018 | Annual | 2/8/2019 | US39170122 |
| Agilent | 8753ES | Network Analyzer | 2/21/2018 | Annual | 2/21/2019 | MY40001472 |
| Agilent | 8753ES | S-Parameter Vector Network Analyzer | 8/30/2018 | Annual | 8/30/2019 | MY40003841 |
| Agilent | E4432B | ESG-D Series Signal Generator | 4/19/2018 | Annual | 4/19/2019 | US40053896 |
| Agilent | E4438C | ESG Vector Signal Generator | 3/21/2017 | Biennial | 3/21/2019 | MY45090700 |
| Agilent | E5515C | Wireless Communications Test Set | 3/4/2016 | Triennial | 3/4/2019 | GB45360985 |
| Agilent | E5515C | 8960 Series 10 Wireless Communications Test Set | 12/18/2018 | Annual | 12/18/2019 | GB42230325 |
| Agilent | N4010A | Wireless Connectivity Test Set | N/A | N/A | N/A | GB46170464 |
| Agilent | N5182A | MXG Vector Signal Generator | 1/24/2018 | Annual | 1/24/2019 | MY47420651 |
| Agilent | N9020A | MXA Signal Analyzer | 1/24/2018 | Annual | 1/24/2019 | US46470561 |
| Amplifier Research | 150A100C | Amplifier | CBT | N/A | CBT | 350132 |
| Anritsu | MA24106A | USB Power Sensor | 7/17/2018 | Annual | 7/17/2019 | 1827527 |
| Anritsu | MA24106A | USB Power Sensor | 3/12/2018 | Annual | 3/12/2019 | 1344555 |
| Anritsu | MA2411B | Pulse Power Sensor | 3/2/2018 | Annual | 3/2/2019 | 1339018 |
| Anritsu | MA2411B | Pulse Power Sensor | 10/30/2018 | Annual | 10/30/2019 | 1126066 |
| Anritsu | ML2495A | Power Meter | 10/21/2018 | Annual | 10/21/2019 | 941001 |
| Anritsu | MT8820C | Radio Communication Analyzer | 6/27/2018 | Annual | 6/27/2019 | 6201240328 |
| Anritsu | MT8862A | Wireless Connectivity Test Set | 7/3/2018 | Annual | 7/3/2019 | 6261782395 |
| Anritsu | MT8821C | Radio Communication Analyzer | 7/26/2018 | Annual | 7/26/2019 | 6201144418 |
| Anritsu | MT8821C | Radio Communication Analyzer | 3/20/2018 | Annual | 3/20/2019 | 6201144419 |
| COMTech | AR85729-5 | Solid State Amplifier | CBT | N/A | CBT | M1S5A00-009 |
| Control Company | 4040 | Therm./ Clock/ Humidity Monitor | 3/1/2017 | Biennial | 3/1/2019 | 170152009 |
| Control Company | 4352 | Ultra Long Stem Thermometer | 2/14/2017 | Biennial | 2/14/2019 | 170112507 |
| Keysight | 772D | Dual Directional Coupler | CBT | N/A | CBT | MY52180215 |
| Keysight Technologies | 85033E | Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm) | 6/4/2018 | Annual | 6/4/2019 | MY53401181 |
| Keysight Technologies | AT/N6705B | DC Power Supply | CBT | N/A | CBT | MY53001315 |
| MCL | BW-N6W5+ | 6dB Attenuator | CBT | N/A | CBT | 1139 |
| Mini Circuits | PWR-4GHS | USB Power Sensor | 1/22/2018 | Annual | 1/22/2019 | 11710030062 |
| MiniCircuits | SLP-2400+ | Low Pass Filter | CBT | N/A | CBT | R8979500903 |
| MiniCircuits | VLF-6000+ | Low Pass Filter | CBT | N/A | CBT | N/A |
| Mini-Circuits | BW-N20W5 | Power Attenuator | CBT | N/A | CBT | 1226 |
| Mini-Circuits | BW-N20W5+ | DC to 18 GHz Precision Fixed 20 dB Attenuator | CBT | N/A | CBT | N/A |
| Mini-Circuits | NLP-1200+ | Low Pass Filter DC to 1000 MHz | CBT | N/A | CBT | N/A |
| Mini-Circuits | NLP-2950+ | Low Pass Filter DC to 2700 MHz | CBT | N/A | CBT | N/A |
| Mitutoyo | CD-6"CSX | Digital Caliper | 4/18/2018 | Biennial | 4/18/2020 | 13264165 |
| Narda | 4014C-6 | 4 - 8 GHz SMA 6 dB Directional Coupler | CBT | N/A | CBT | N/A |
| Narda | 4772-3 | Attenuator (3dB) | CBT | N/A | CBT | 9406 |
| Narda | BW-S3W2 | Attenuator (3dB) | CBT | N/A | CBT | 120 |
| Pasternack | NC-100 | Torque Wrench | 4/18/2018 | Annual | 4/18/2019 | N/A |
| Pasternack | PE2208-6 | Bidirectional Coupler | CBT | N/A | CBT | N/A |
| Pasternack | PE2209-10 | Bidirectional Coupler | CBT | N/A | CBT | N/A |
| Pasternack | PE5011-1 | Torque Wrench | 7/19/2017 | Biennial | 7/19/2019 | N/A |
| Rohde & Schwarz | CMU200 | Base Station Simulator | 5/18/2018 | Annual | 5/18/2019 | 109892 |
| Rohde & Schwarz | CMW500 | Radio Communication Tester | 4/5/2018 | Annual | 4/5/2019 | 128633 |
| Rohde & Schwarz | CMW500 | Wideband Radio Communication Tester | 5/29/2018 | Annual | 5/29/2019 | 161662 |
| Seekonk | NC-100 | Torque Wrench 5/16", 8" lbs | 7/11/2018 | Annual | 7/11/2019 | N/A |
| Seekonk | NC-100 | Torque Wrench | 7/11/2018 | Annual | 7/11/2019 | N/A |
| Seekonk | NC-100 | Torque Wrench (8" lb) | 5/23/2018 | Biennial | 5/23/2020 | N/A |
| SPEAG | DAK-3.5 | Dielectric Assessment Kit | 5/15/2018 | Annual | 5/15/2019 | 1070 |
| SPEAG | D750V3 | 750 MHz SAR Dipole | 1/15/2018 | Annual | 1/15/2019 | 1003 |
| SPEAG | D835V2 | 835 MHz SAR Dipole | 10/19/2018 | Annual | 10/19/2019 | 4d047 |
| SPEAG | D1750V2 | 1750 MHz SAR Dipole | 5/9/2017 | Biennial | 5/9/2019 | 1148 |
| SPEAG | D1900V2 | 1900 MHz SAR Dipole | 10/23/2018 | Annual | 10/23/2019 | 5d080 |
| SPEAG | D2450V2 | 2450 MHz SAR Dipole | 8/16/2018 | Annual | 8/16/2019 | 981 |
| SPEAG | D2450V2 | 2450 MHz SAR Dipole | 9/11/2017 | Biennial | 9/11/2019 | 797 |
| SPEAG | D2600V2 | 2600 MHz SAR Dipole | 4/11/2018 | Annual | 4/11/2019 | 1004 |
| SPEAG | D5GHzV2 | 5 GHz SAR Dipole | 9/21/2016 | Triennial | 9/21/2019 | 1191 |
| SPEAG | D750V3 | 750 MHz Dipole | 3/7/2017 | Biennial | 3/7/2019 | 1054 |
| SPEAG | D835V2 | 835 MHz SAR Dipole | 10/19/2018 | Annual | 10/19/2019 | 4d133 |
| SPEAG | D1900V2 | 1900 MHz SAR Dipole | 10/23/2018 | Annual | 10/23/2019 | 5d149 |
| SPEAG | D2450V2 | 2450 MHz SAR Dipole | 8/17/2017 | Biennial | 8/17/2019 | 719 |
| SPEAG | D2600V2 | 2600 MHz SAR Dipole | 8/13/2018 | Annual | 8/13/2019 | 1126 |
| SPEAG | ES3DV3 | SAR Probe | 10/22/2018 | Annual | 10/22/2019 | 3287 |
| SPEAG | EX3DV4 | SAR Probe | 7/20/2018 | Annual | 7/20/2019 | 7410 |
| SPEAG | EX3DV4 | SAR Probe | 6/25/2018 | Annual | 6/25/2019 | 7409 |
| SPEAG | EX3DV4 | SAR Probe | 5/22/2018 | Annual | 5/22/2019 | 7406 |
| SPEAG | ES3DV3 | SAR Probe | 3/27/2018 | Annual | 3/27/2019 | 3347 |
| SPEAG | EX3DV4 | SAR Probe | 4/18/2018 | Annual | 4/18/2019 | 7357 |
| SPEAG | ES3DV3 | SAR Probe | 8/22/2018 | Annual | 8/22/2019 | 3332 |
| SPEAG | ES3DV3 | SAR Probe | 3/13/2018 | Annual | 3/13/2019 | 3319 |
| SPEAG | EX3DV4 | SAR Probe | 8/23/2018 | Annual | 8/23/2019 | 7308 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 7/11/2018 | Annual | 7/11/2019 | 1322 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 6/18/2018 | Annual | 6/18/2019 | 1334 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 10/18/2018 | Annual | 10/18/2019 | 1333 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 5/22/2018 | Annual | 5/22/2019 | 859 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 2/15/2018 | Annual | 2/15/2019 | 665 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 2/9/2018 | Annual | 2/9/2019 | 1272 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 4/11/2018 | Annual | 4/11/2019 | 1407 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 3/7/2018 | Annual | 3/7/2019 | 1368 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 10/3/2018 | Annual | 10/3/2019 | 1558 |

Notes:
All equipment was used within its calibration period.
CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.

# 16 MEASUREMENT UNCERTAINTIES

| a | c | d | e= f(d,k) | f | g | h = c x f/e | i = c x g/e | k |
|---|---|---|---|---|---|---|---|---|
| Uncertainty Component | Tol. (± %) | Prob. Dist. | Div. | $c_i$ 1gm | $c_i$ 10 gms | 1gm $u_i$ (± %) | 10gms $u_i$ (± %) | $v_i$ |
| **Measurement System** | | | | | | | | |
| Probe Calibration | 6.55 | N | 1 | 1.0 | 1.0 | 6.6 | 6.6 | ∞ |
| Axial Isotropy | 0.25 | N | 1 | 0.7 | 0.7 | 0.2 | 0.2 | ∞ |
| Hemishperical Isotropy | 1.3 | N | 1 | 0.7 | 0.7 | 0.9 | 0.9 | ∞ |
| Boundary Effect | 2.0 | R | 1.73 | 1.0 | 1.0 | 1.2 | 1.2 | ∞ |
| Linearity | 0.3 | N | 1 | 1.0 | 1.0 | 0.3 | 0.3 | ∞ |
| System Detection Limits | 0.25 | R | 1.73 | 1.0 | 1.0 | 0.1 | 0.1 | ∞ |
| Readout Electronics | 0.3 | N | 1 | 1.0 | 1.0 | 0.3 | 0.3 | ∞ |
| Response Time | 0.8 | R | 1.73 | 1.0 | 1.0 | 0.5 | 0.5 | ∞ |
| Integration Time | 2.6 | R | 1.73 | 1.0 | 1.0 | 1.5 | 1.5 | ∞ |
| RF Ambient Conditions - Noise | 3.0 | R | 1.73 | 1.0 | 1.0 | 1.7 | 1.7 | ∞ |
| RF Ambient Conditions - Reflections | 3.0 | R | 1.73 | 1.0 | 1.0 | 1.7 | 1.7 | ∞ |
| Probe Positioner Mechanical Tolerance | 0.4 | R | 1.73 | 1.0 | 1.0 | 0.2 | 0.2 | ∞ |
| Probe Positioning w/ respect to Phantom | 6.7 | R | 1.73 | 1.0 | 1.0 | 3.9 | 3.9 | ∞ |
| Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation | 4.0 | R | 1.73 | 1.0 | 1.0 | 2.3 | 2.3 | ∞ |
| **Test Sample Related** | | | | | | | | |
| Test Sample Positioning | 2.7 | N | 1 | 1.0 | 1.0 | 2.7 | 2.7 | 35 |
| Device Holder Uncertainty | 1.67 | N | 1 | 1.0 | 1.0 | 1.7 | 1.7 | 5 |
| Output Power Variation - SAR drift measurement | 5.0 | R | 1.73 | 1.0 | 1.0 | 2.9 | 2.9 | ∞ |
| SAR Scaling | 0.0 | R | 1.73 | 1.0 | 1.0 | 0.0 | 0.0 | ∞ |
| **Phantom & Tissue Parameters** | | | | | | | | |
| Phantom Uncertainty (Shape & Thickness tolerances) | 7.6 | R | 1.73 | 1.0 | 1.0 | 4.4 | 4.4 | ∞ |
| Liquid Conductivity - measurement uncertainty | 4.2 | N | 1 | 0.78 | 0.71 | 3.3 | 3.0 | 10 |
| Liquid Permittivity - measurement uncertainty | 4.1 | N | 1 | 0.23 | 0.26 | 1.0 | 1.1 | 10 |
| Liquid Conductivity - Temperature Uncertainty | 3.4 | R | 1.73 | 0.78 | 0.71 | 1.5 | 1.4 | ∞ |
| Liquid Permittivity - Temperature Unceritainty | 0.6 | R | 1.73 | 0.23 | 0.26 | 0.1 | 0.1 | ∞ |
| Liquid Conductivity - deviation from target values | 5.0 | R | 1.73 | 0.64 | 0.43 | 1.8 | 1.2 | ∞ |
| Liquid Permittivity - deviation from target values | 5.0 | R | 1.73 | 0.60 | 0.49 | 1.7 | 1.4 | ∞ |
| **Combined Standard Uncertainty (k=1)** | | RSS | | | | 11.5 | 11.3 | 60 |
| **Expanded Uncertainty** (95% CONFIDENCE LEVEL) | | k=2 | | | | 23.0 | 22.6 | |

# 17 CONCLUSION

## 17.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Innovation, Science, and Economic Development Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

# 18 REFERENCES


[1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.

[2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, 2006.

[3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.

[4] ANSI/IEEE C95.3-2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, December 2002.

[5] IEEE Standards Coordinating Committee 39 –Standards Coordinating Committee 34 – IEEE Std. 1528-2013, IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

[6] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for RadioFrequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.

[7] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.

[8] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 1 -124.

[9] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.

[10] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.

[11] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.

[12] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.

[13] G. Hartsgrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.

[14] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

[15] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.

[16] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

[17] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

[18] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.

[19] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hoschschule Zürich, Dosimetric Evaluation of the Cellular Phone.

[20] IEC 62209-1, Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1: Devices used next to the ear (Frequency range of 300 MHz to 6 GHz), July 2016.

[21] Innovation, Science, Economic Development Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 5, March 2015.

[22] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2015

[23] FCC SAR Test Procedures for 2G-3G Devices, Mobile Hotspot and UMPC Devices KDB Publications 941225, D01-D07

[24] SAR Measurement Guidance for IEEE 802.11 Transmitters, KDB Publication 248227 D01

[25] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publications 648474 D03-D04

[26] FCC SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers, FCC KDB Publication 616217 D04

[27] FCC SAR Measurement and Reporting Requirements for 100MHz – 6 GHz, KDB Publications 865664 D01-D02

[28] FCC General RF Exposure Guidance and SAR Procedures for Dongles, KDB Publication 447498, D01-D02

[29] Anexo à Resolução No. 533, de 10 de Septembro de 2009.

[30] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Mar. 2010.

# APPENDIX A: SAR TEST DATA

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0899M**

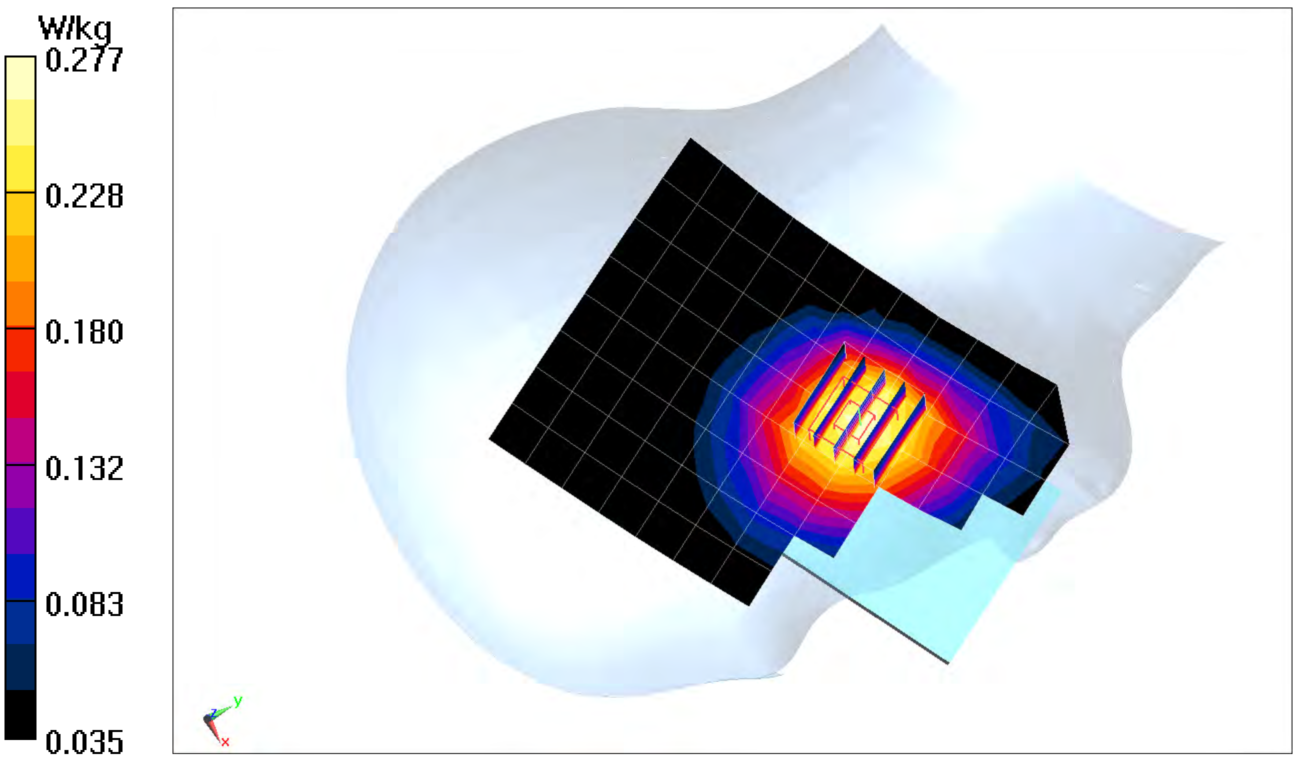
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; $\sigma$ = 0.905 S/m; $\varepsilon_r$ = 40.63; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Test Date: 12-22-2018; Ambient Temp: 21.7°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7410; ConvF(9.81, 9.81, 9.81) @ 836.6 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: GSM 850, Right Head, Cheek, Mid.ch**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.52 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.298 W/kg
**SAR(1 g) = 0.236 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0899M**

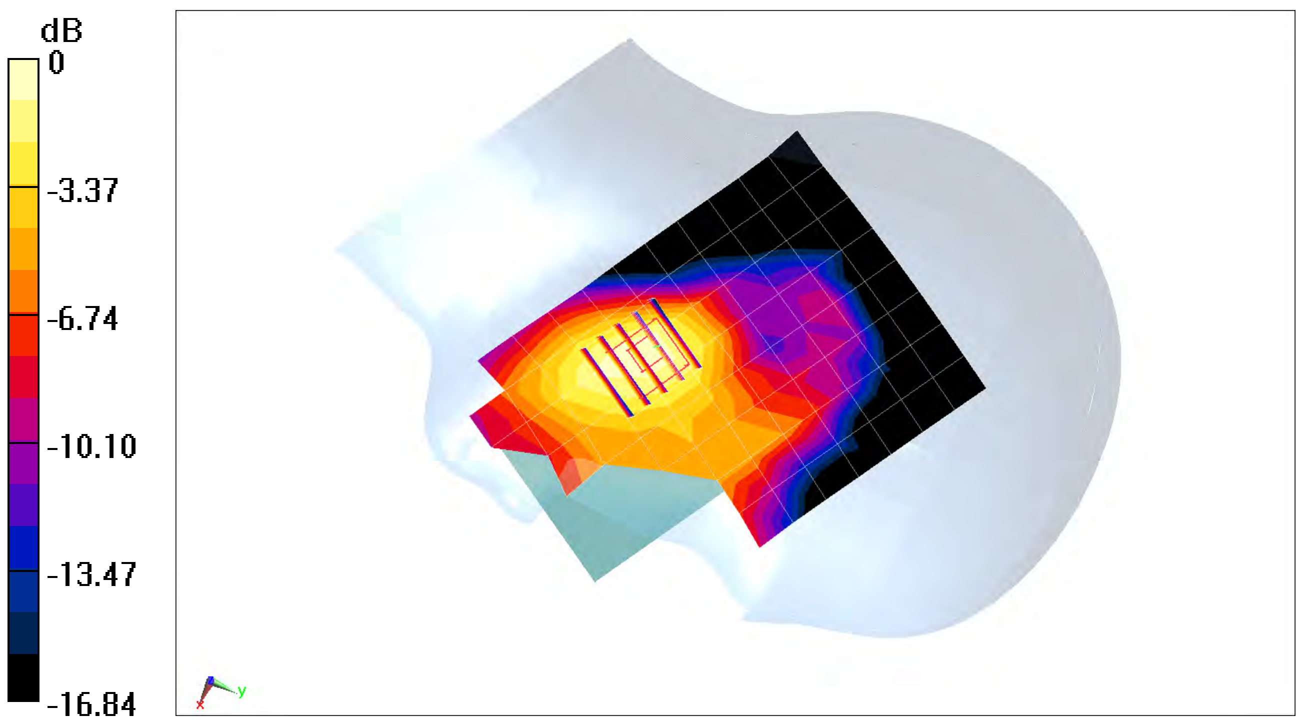
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.419 S/m; $\varepsilon_r$ = 40.172; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

Test Date: 12-19-2018; Ambient Temp: 21.6°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7409; ConvF(8.05, 8.05, 8.05) @ 1880 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: GSM 1900, Left Head, Cheek, Mid.ch**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.920 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.102 W/kg
**SAR(1 g) = 0.064 W/kg**




0 dB = 0.0859 W/kg = -10.66 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0899M**

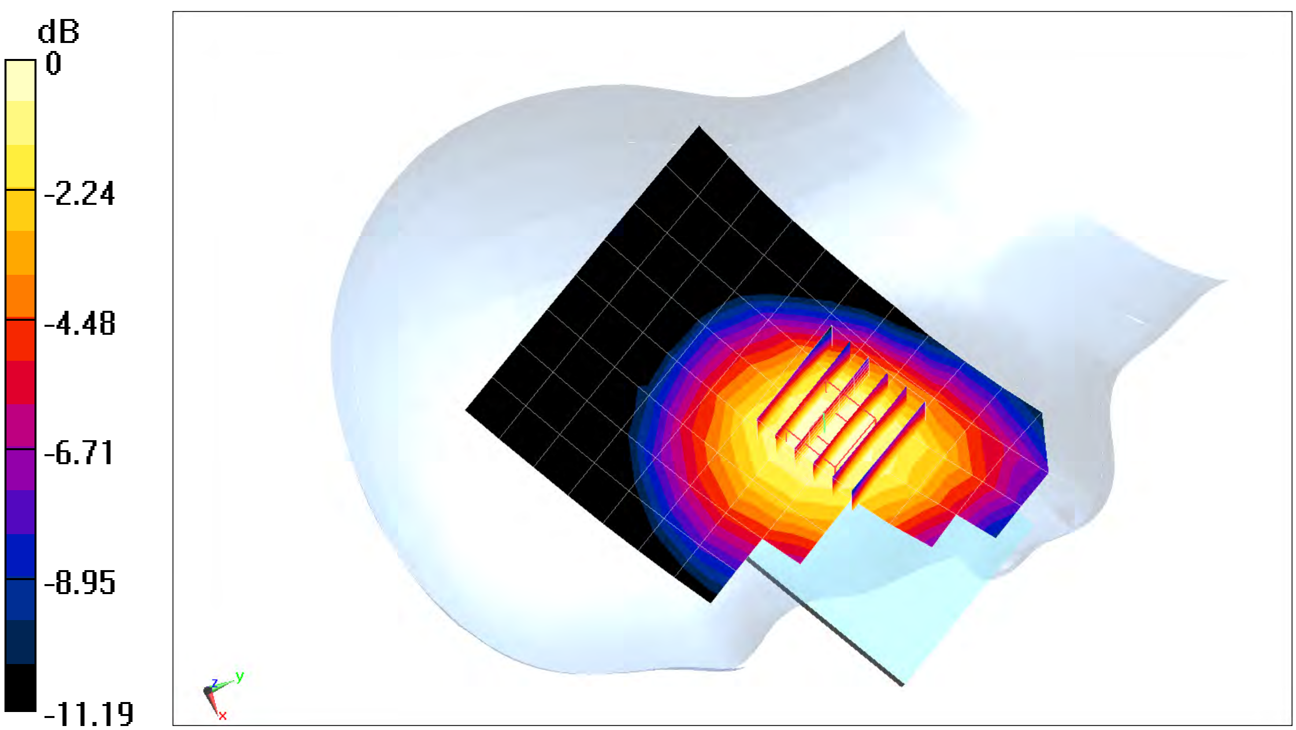
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
$f = 836.6$ MHz; $\sigma = 0.905$ S/m; $\varepsilon_r = 40.63$; $\rho = 1000$ kg/m$^3$
Phantom section: Right Section

Test Date: 12-22-2018; Ambient Temp: 21.7°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7410; ConvF(9.81, 9.81, 9.81) @ 836.6 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## Mode: UMTS 850, Right Head, Cheek, Mid.ch

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (6x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.03 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.408 W/kg
**SAR(1 g) = 0.320 W/kg**




0 dB = 0.376 W/kg = -4.25 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0899M**

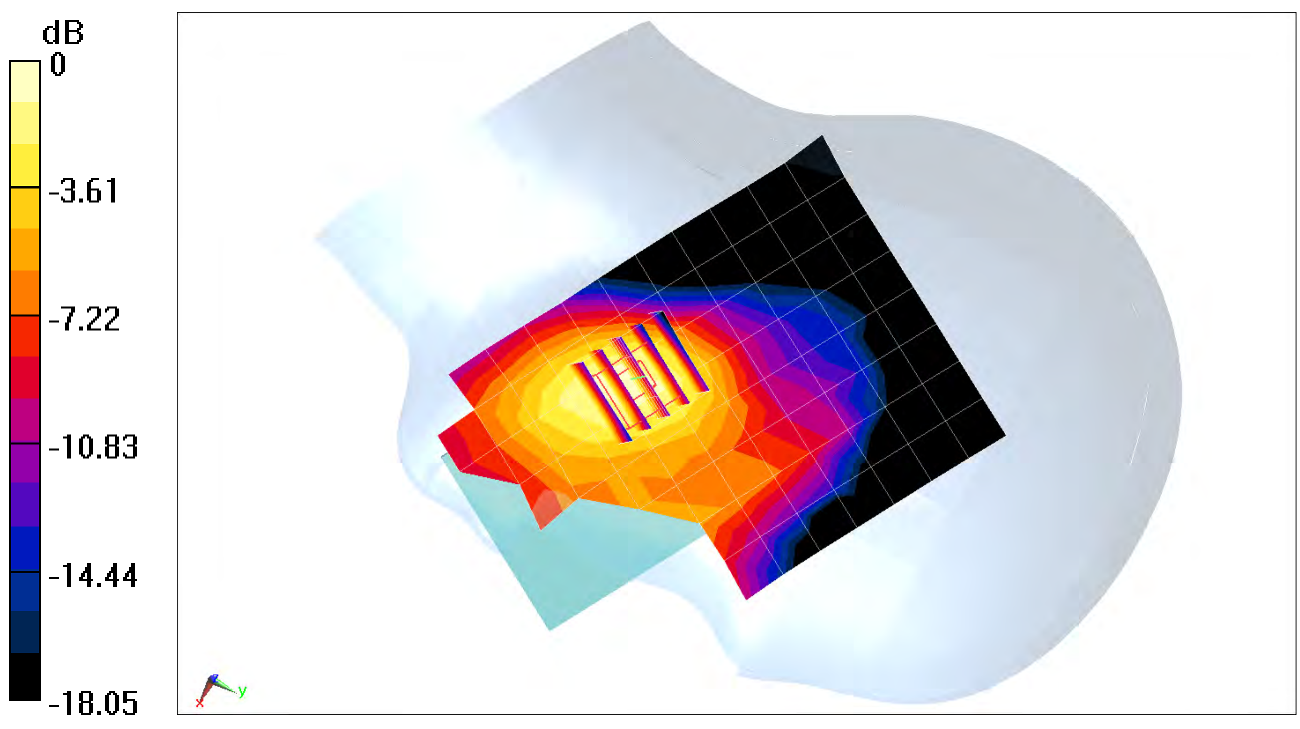
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.419 S/m; $\varepsilon_r$ = 40.172; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

Test Date: 12-19-2018; Ambient Temp: 21.6°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7409; ConvF(8.05, 8.05, 8.05) @ 1880 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: UMTS 1900, Left Head, Cheek, Mid.ch**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.97 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.258 W/kg
**SAR(1 g) = 0.157 W/kg**




0 dB = 0.222 W/kg = -6.54 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1149M**

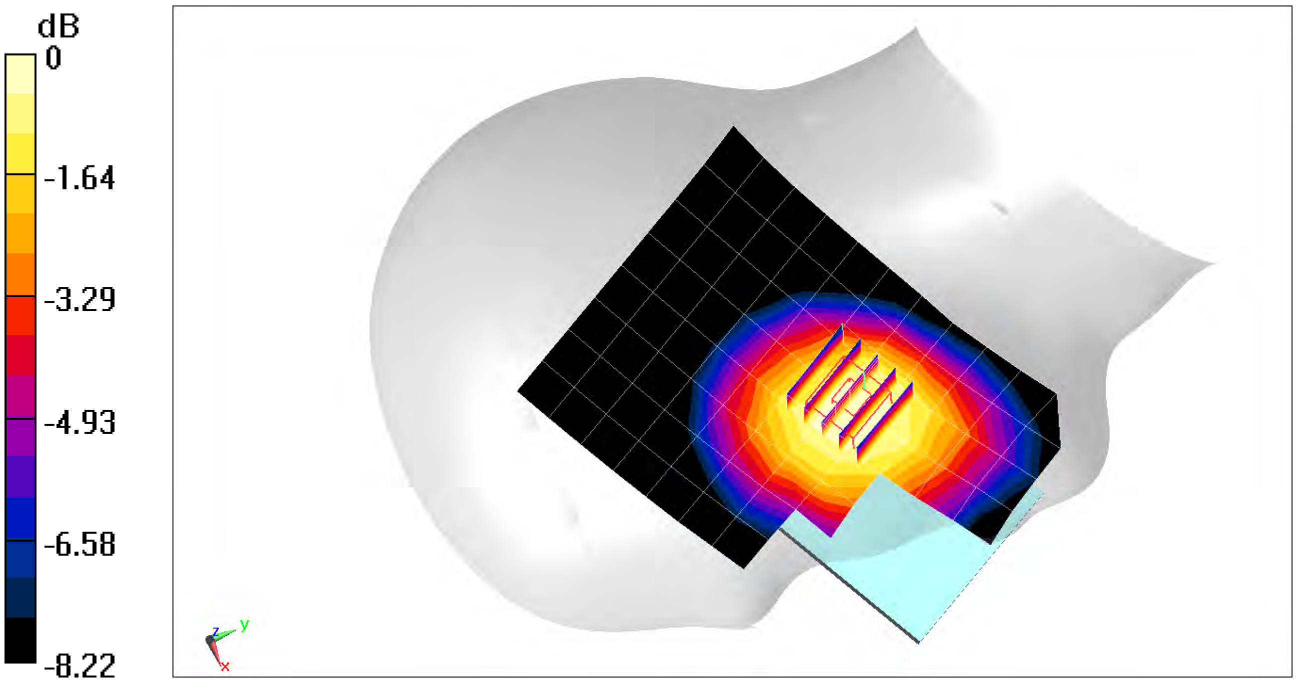
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 707.5 MHz; $\sigma$ = 0.892 S/m; $\varepsilon_r$ = 41.306; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Test Date: 12-26-2018; Ambient Temp: 22.5°C; Tissue Temp: 19.8°C

Probe: ES3DV3 - SN3287; ConvF(6.76, 6.76, 6.76) @ 707.5 MHz; Calibrated: 10/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/18/2018
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 12, Right Head, Cheek, Mid.ch,**
**10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x14x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.54 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.153 W/kg
**SAR(1 g) = 0.124 W/kg**




0 dB = 0.134 W/kg = -8.73 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1149M**

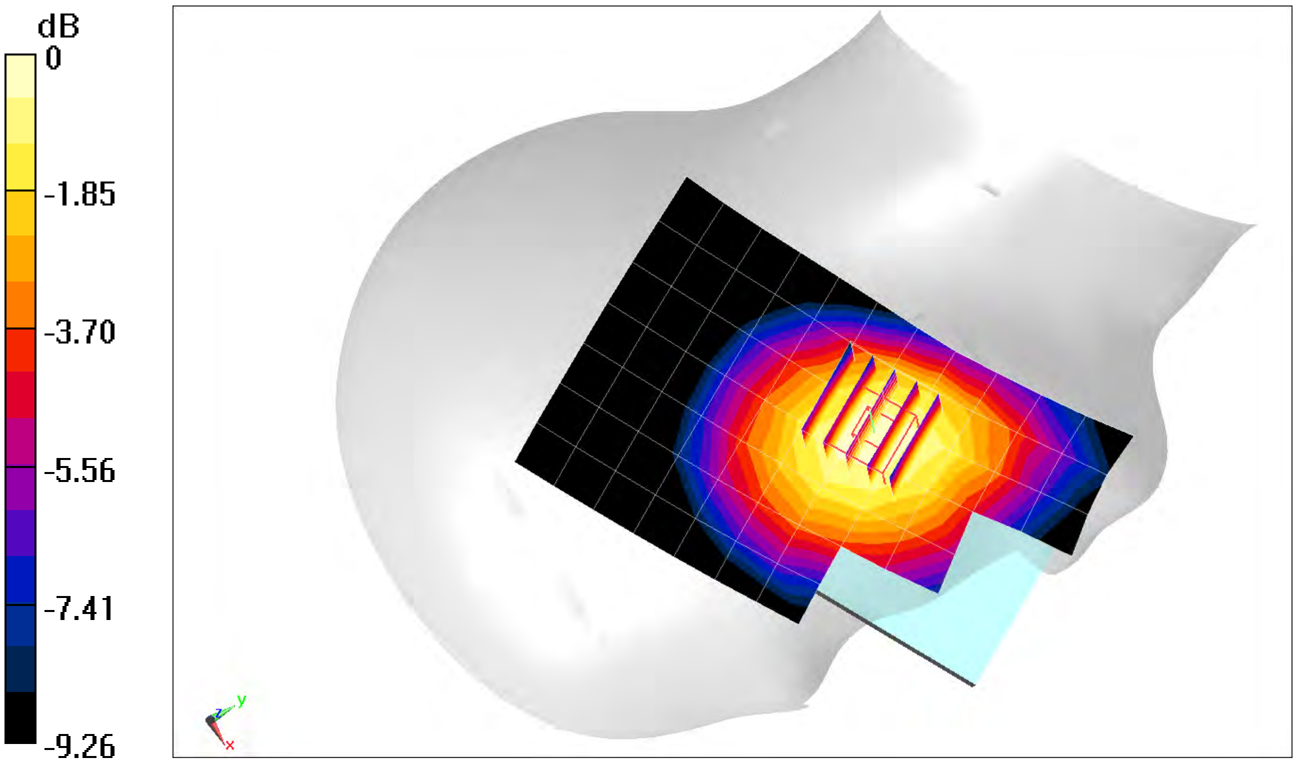
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 782 MHz; $\sigma = 0.919$ S/m; $\varepsilon_r = 41.059$; $\rho = 1000$ kg/m$^3$
Phantom section: Right Section

Test Date: 12-26-2018; Ambient Temp: 22.5°C; Tissue Temp: 19.8°C

Probe: ES3DV3 - SN3287; ConvF(6.76, 6.76, 6.76) @ 782 MHz; Calibrated: 10/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/18/2018
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 13, Right Head, Cheek, Mid.ch,**
**10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.52 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.271 W/kg
**SAR(1 g) = 0.219 W/kg**




0 dB = 0.239 W/kg = -6.22 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0899M**

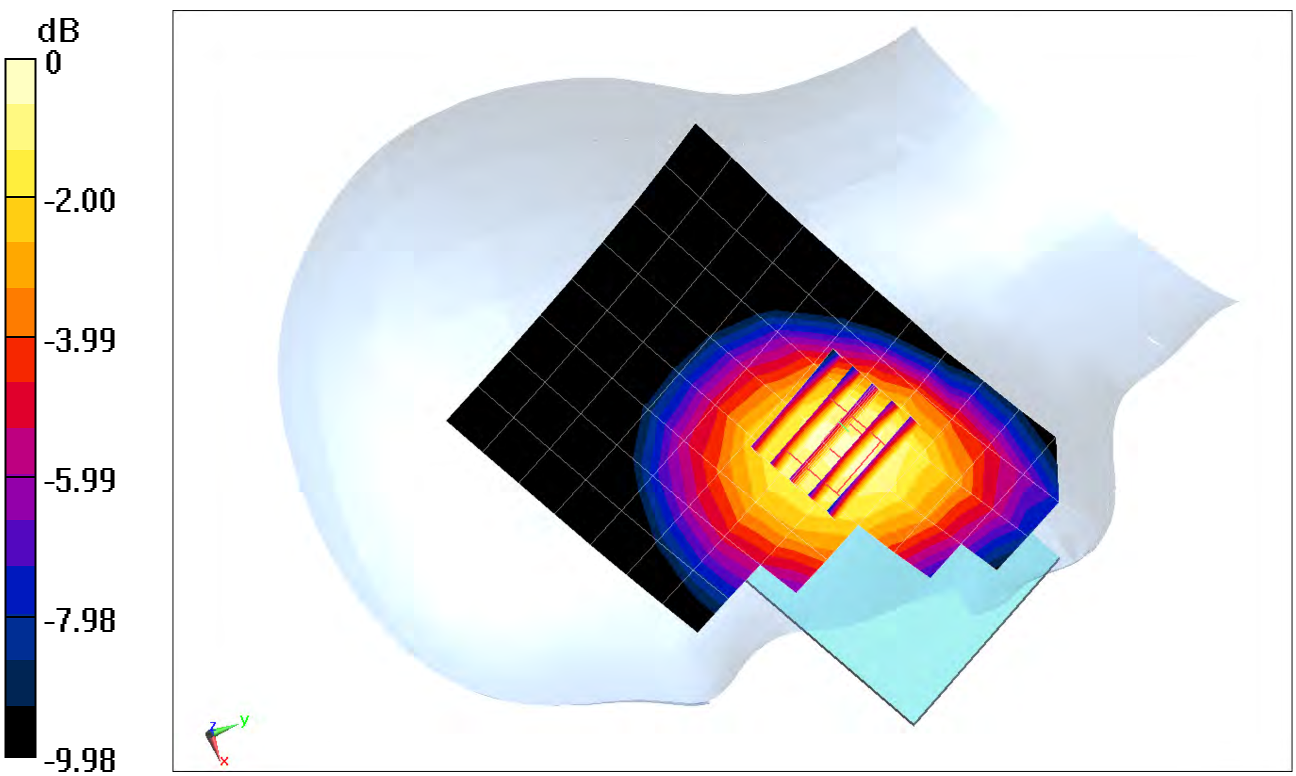
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 831.5 MHz; $\sigma$ = 0.9 S/m; $\varepsilon_r$ = 40.693; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Test Date: 12-22-2018; Ambient Temp: 21.7°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7410; ConvF(9.81, 9.81, 9.81) @ 831.5 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 26 (Cell.), Right Head, Cheek, Mid.ch,**
**15 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (6x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.94 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.380 W/kg
**SAR(1 g) = 0.294 W/kg**




0 dB = 0.351 W/kg = -4.55 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1149M**

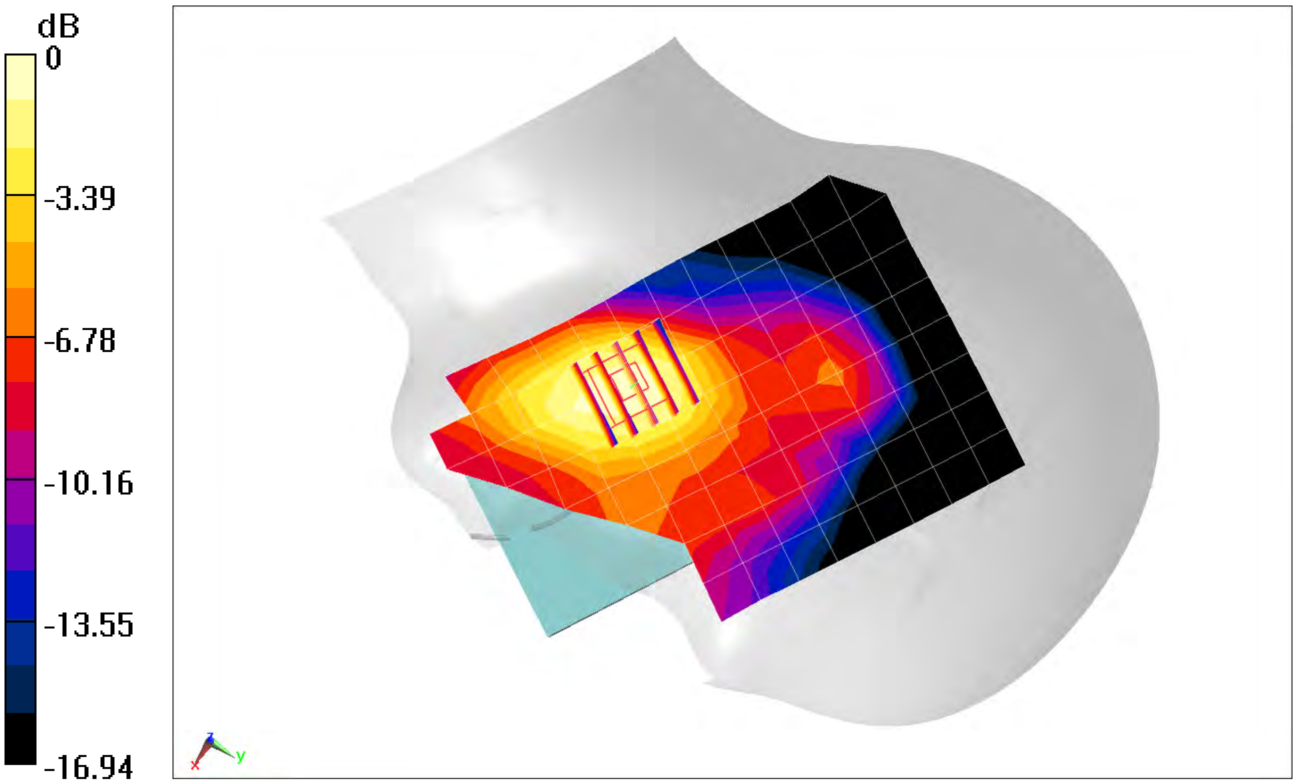
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.5 MHz; $\sigma$ = 1.371 S/m; $\varepsilon_r$ = 39.005; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

Test Date: 12-25-2018; Ambient Temp: 19.8°C; Tissue Temp: 19.8°C

Probe: ES3DV3 - SN3287; ConvF(5.48, 5.48, 5.48) @ 1732.5 MHz; Calibrated: 10/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/18/2018
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 4 (AWS), Left Head, Cheek, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.35 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.244 W/kg
**SAR(1 g) = 0.166 W/kg**




0 dB = 0.191 W/kg = -7.19 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0899M**

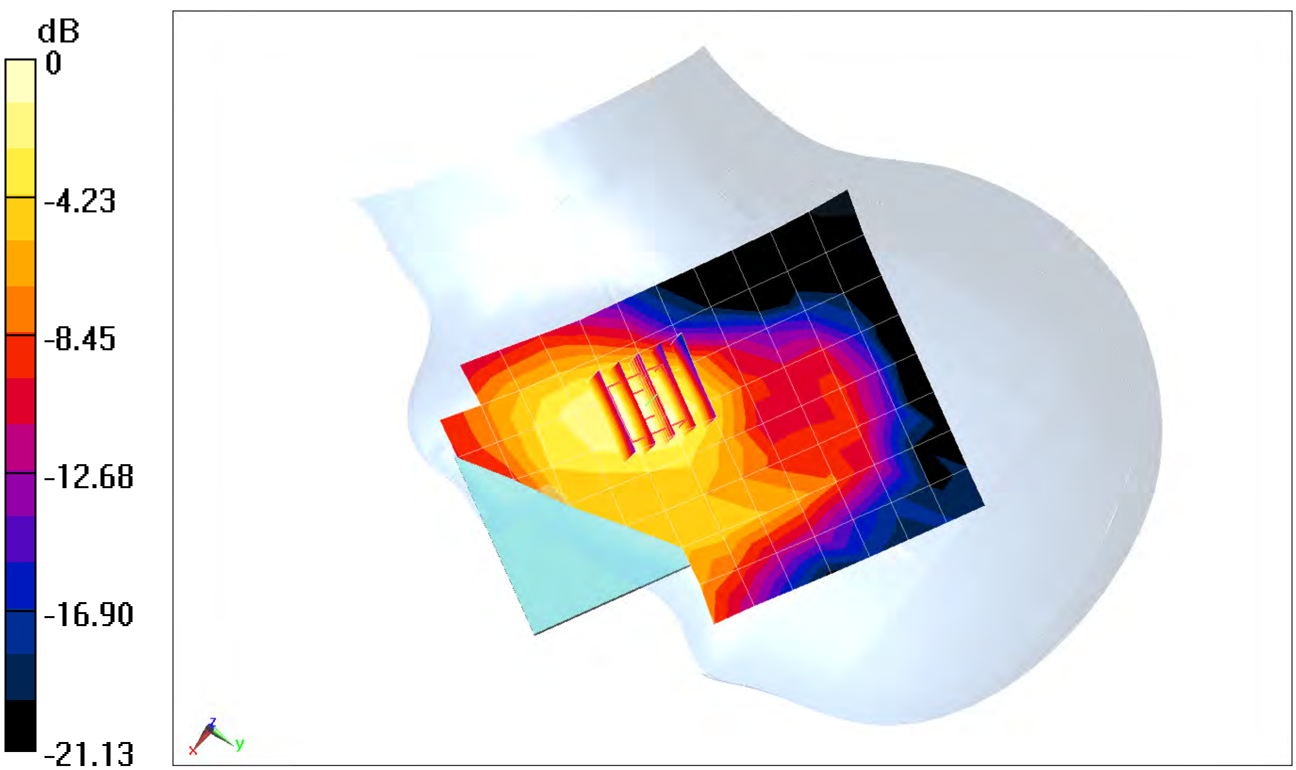
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1860 MHz; $\sigma$ = 1.399 S/m; $\varepsilon_r$ = 40.248; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

Test Date: 12-19-2018; Ambient Temp: 21.6°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7409; ConvF(8.05, 8.05, 8.05) @ 1860 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 25 (PCS), Left Head, Cheek, Low.ch,**
**20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x14x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.72 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.257 W/kg
**SAR(1 g) = 0.159 W/kg**




0 dB = 0.221 W/kg = -6.56 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1149M**

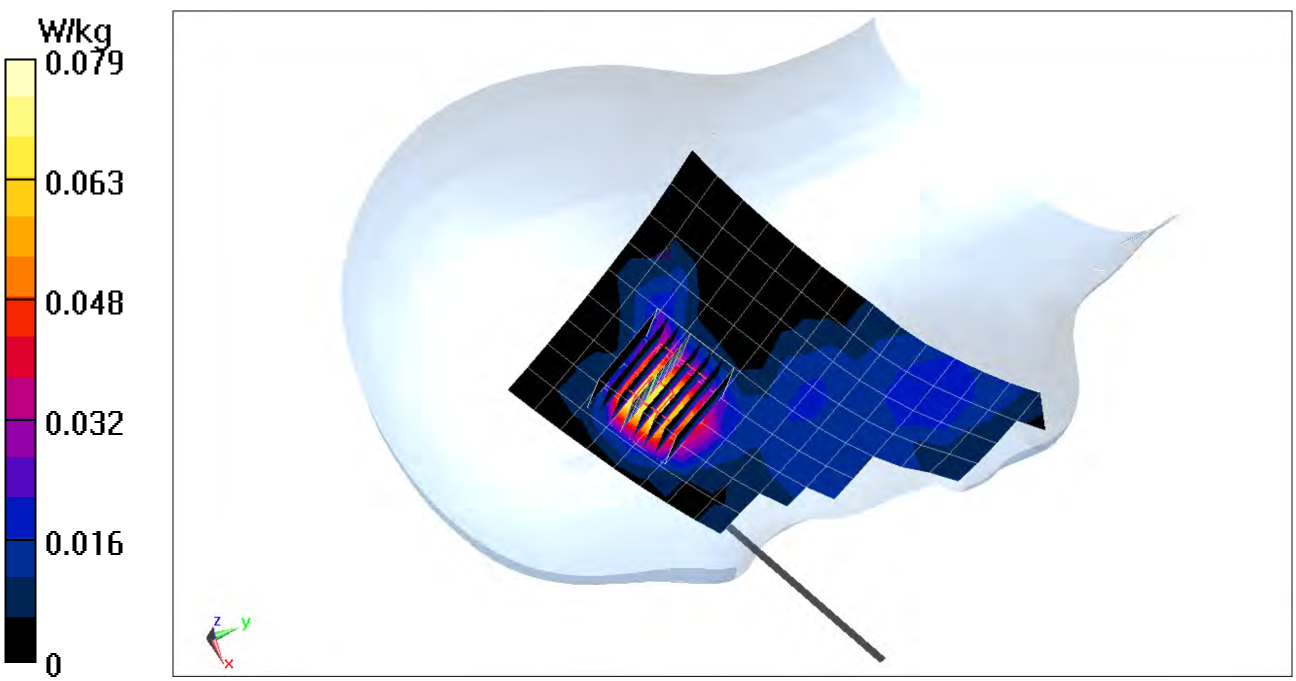
Communication System: UID 0, LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2450 Head Medium parameters used (interpolated):
f = 2680 MHz; $\sigma$ = 2.06 S/m; $\varepsilon_r$ = 40.011; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Test Date: 01-09-2019; Ambient Temp: 22.4°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7410; ConvF(7.24, 7.24, 7.24) @ 2593 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 41 ULCA, Right Head, Tilt,**
**PCC: 20 MHz Bandwidth, QPSK, Ch. 41490, 1 RB, 0 RB Offset**
**SCC: 20 MHz Bandwidth, QPSK, Ch. 41292, 1 RB, 99 RB Offset**

**Area Scan (10x17x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.934 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.104 W/kg
**SAR(1 g) = 0.056 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1164M**

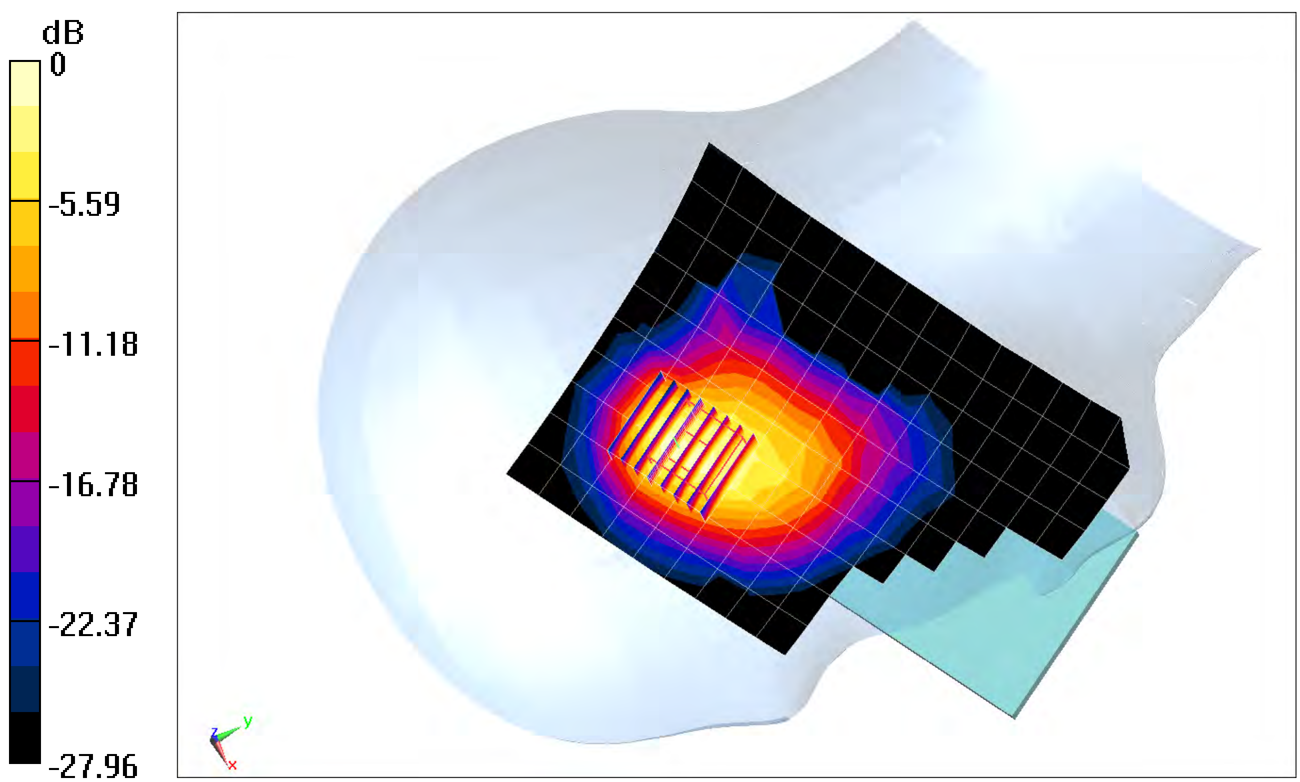
Communication System: UID 0, _IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.847 S/m; $\varepsilon_r$ = 38.323; ρ = 1000 kg/m$^3$
Phantom section: Right Section

Test Date: 12-17-2018; Ambient Temp: 21.9°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7410; ConvF(7.5, 7.5, 7.5) @ 2437 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## Mode: IEEE 802.11b Antenna 1, 22 MHz Bandwidth, Right Head, Cheek, Ch 6, 1 Mbps

**Area Scan (11x18x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x8x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.771 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 1.55 W/kg
**SAR(1 g) = 0.710 W/kg**




0 dB = 1.19 W/kg = 0.76 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0896M**

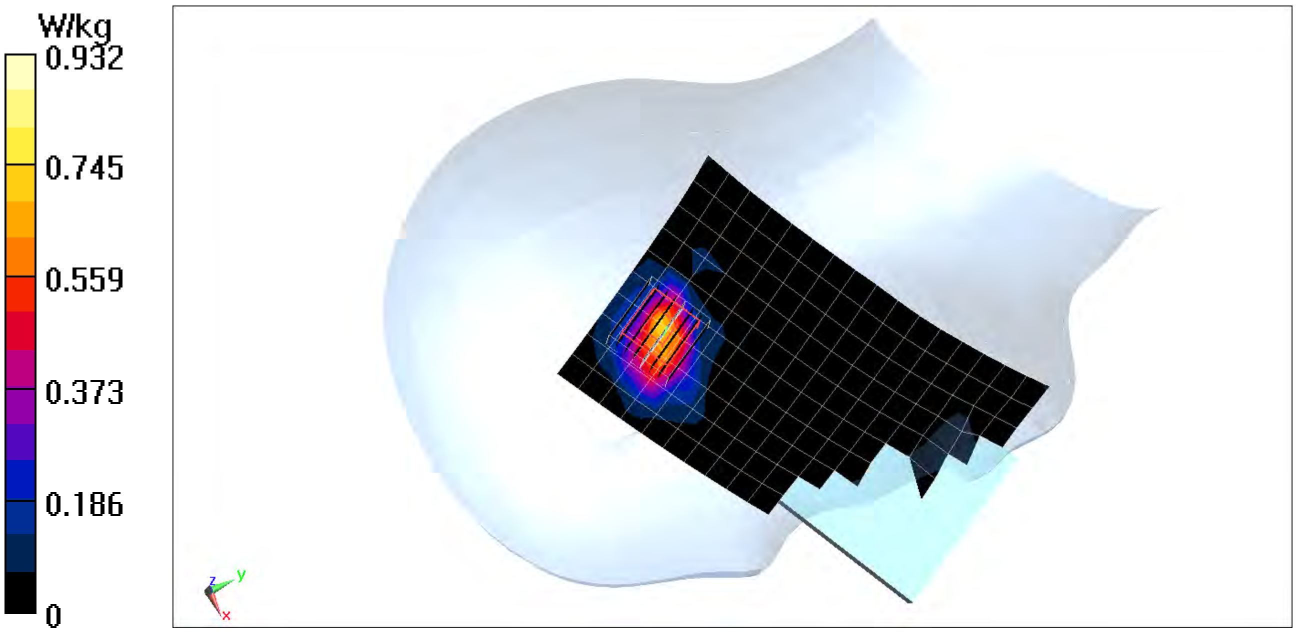
Communication System: UID 0, 802.11n; Frequency: 5270 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5270 MHz; $\sigma$ = 4.588 S/m; $\varepsilon_r$ = 35.267; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Test Date: 01-07-2019; Ambient Temp: 21.2°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7409; ConvF(5.2, 5.2, 5.2) @ 5270 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: IEEE 802.11n MIMO, U-NII-2A, 40 MHz Bandwidth, Right Head, Tilt, Ch 54, 27 Mbps**

**Area Scan (11x20x1):** Measurement grid: dx=10mm, dy=10mm
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 7.480 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 1.70 W/kg
**SAR(1 g) = 0.370 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0896M**

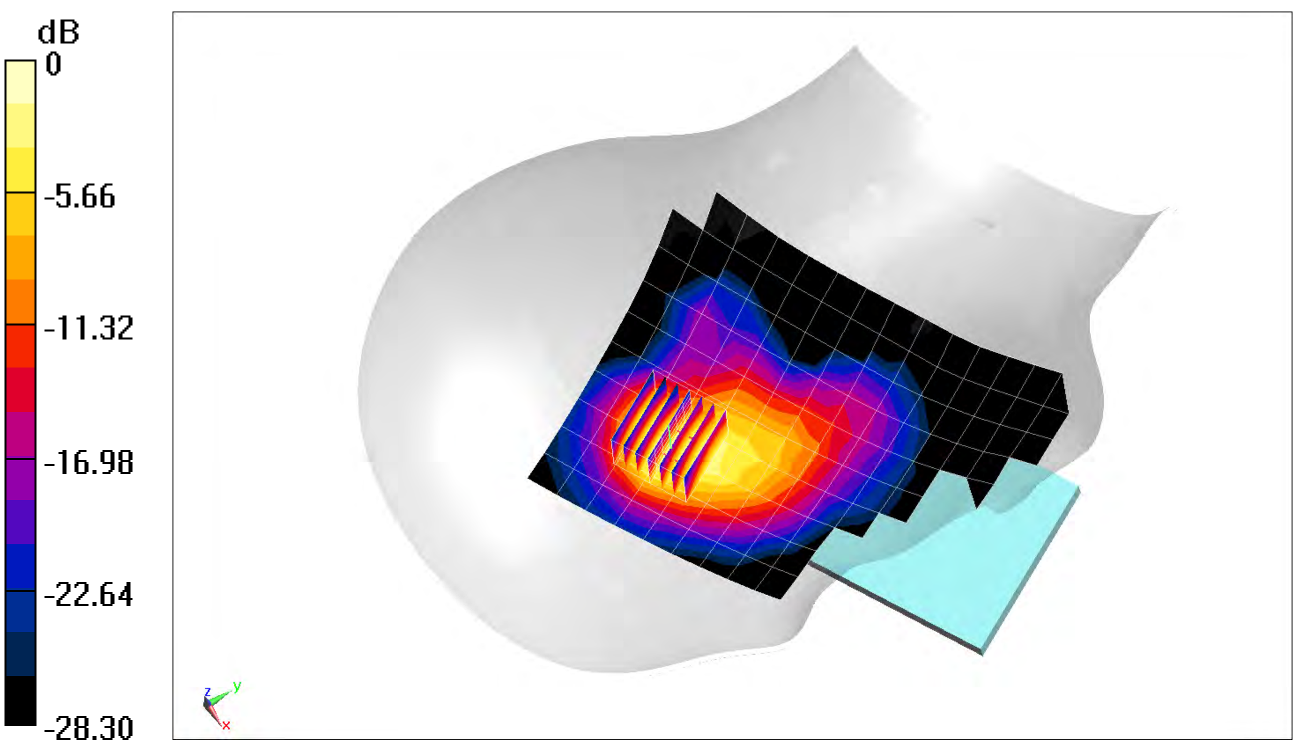
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.289
Medium: 2450 Head Medium parameters used (interpolated):
f = 2441 MHz; $\sigma$ = 1.861 S/m; $\varepsilon_r$ = 39.448; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Test Date: 12-26-2018; Ambient Temp: 20.9°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7406; ConvF(7.54, 7.54, 7.54) @ 2441 MHz; Calibrated: 5/22/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/22/2018
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## Mode: Bluetooth, Right Head, Cheek, Ch 39, 1Mbps

**Area Scan (11x19x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.49 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 2.20 W/kg
**SAR(1 g) = 0.957 W/kg**




0 dB = 1.63 W/kg = 2.12 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1149M**

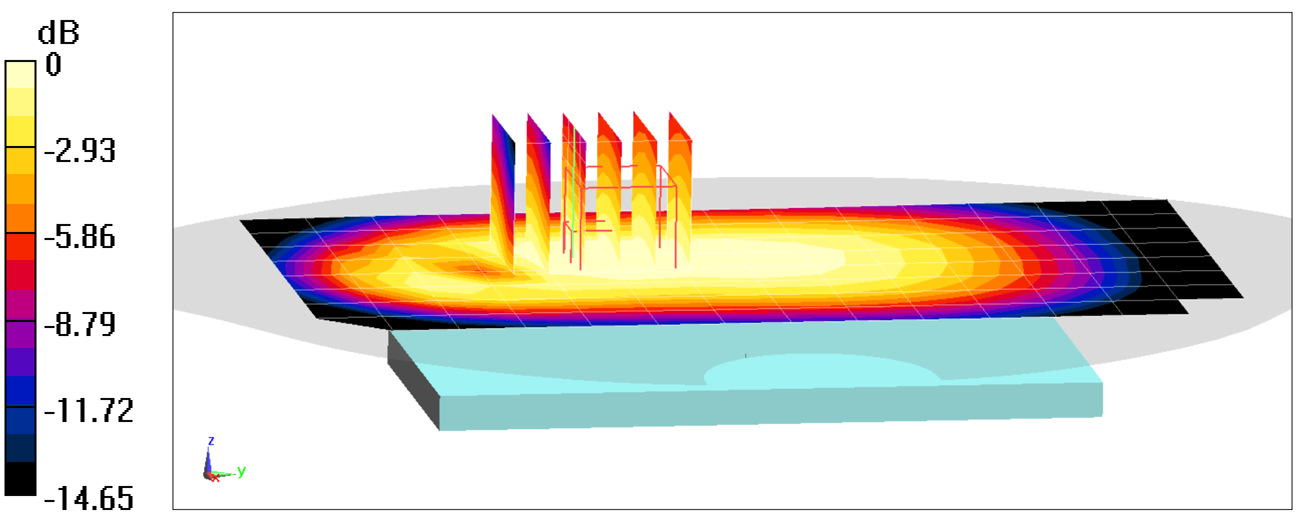
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; $\sigma$ = 0.966 S/m; $\varepsilon_r$ = 53.591; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-26-2018; Ambient Temp: 19.9°C; Tissue Temp: 19.1°C

Probe: ES3DV3 - SN3347; ConvF(6.37, 6.37, 6.37) @ 836.6 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## Mode: GSM 850, Body SAR, Back side, Mid.ch

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.95 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.259 W/kg
**SAR(1 g) = 0.201 W/kg**




0 dB = 0.221 W/kg = -6.56 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1155M**

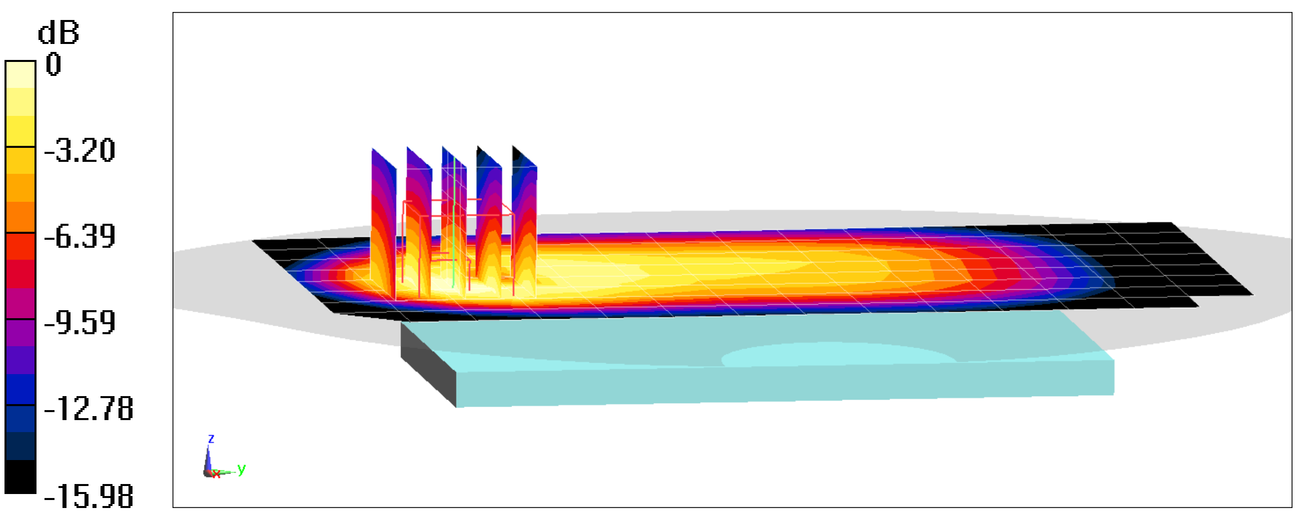
Communication System: UID 0, _GSM GPRS; 3 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.76
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; $\sigma$ = 0.966 S/m; $\varepsilon_r$ = 53.591; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-26-2018; Ambient Temp: 19.9°C; Tissue Temp: 19.1°C

Probe: ES3DV3 - SN3347; ConvF(6.37, 6.37, 6.37) @ 836.6 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: GPRS 850, Body SAR, Back side, Mid.ch, 3 Tx Slots**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.70 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.836 W/kg
**SAR(1 g) = 0.474 W/kg**




0 dB = 0.587 W/kg = -2.31 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0905M**

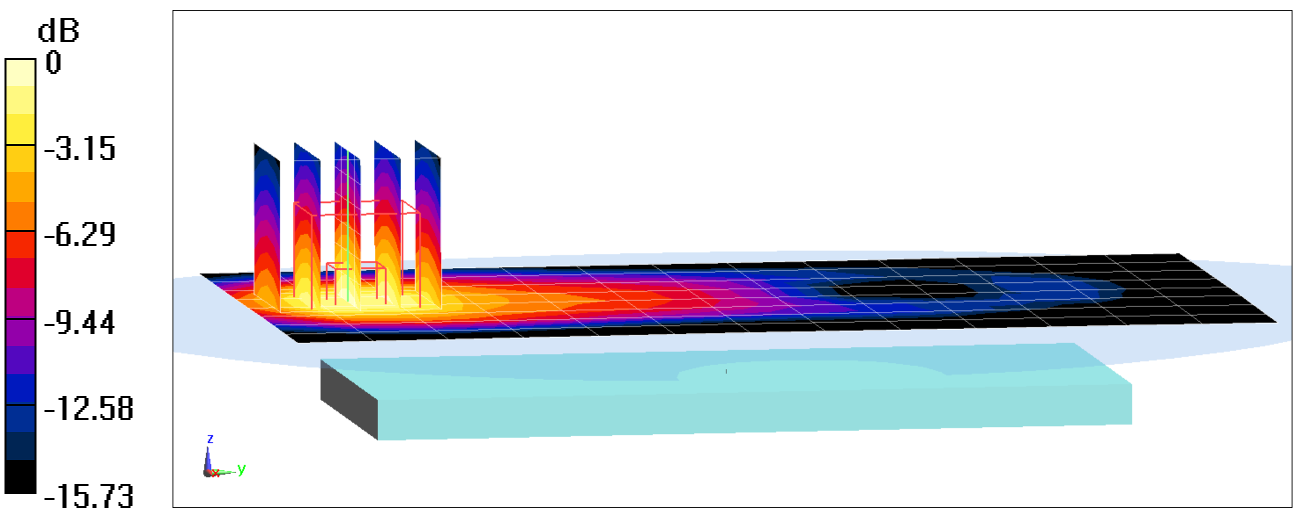
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.533 S/m; $\varepsilon_r$ = 52.466; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-28-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3332; ConvF(4.77, 4.77, 4.77) @ 1880 MHz; Calibrated: 8/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: GSM 1900, Body SAR, Back side, Mid.ch**

**Area Scan (9x14x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.03 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.482 W/kg
**SAR(1 g) = 0.302 W/kg**




0 dB = 0.363 W/kg = -4.40 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0905M**

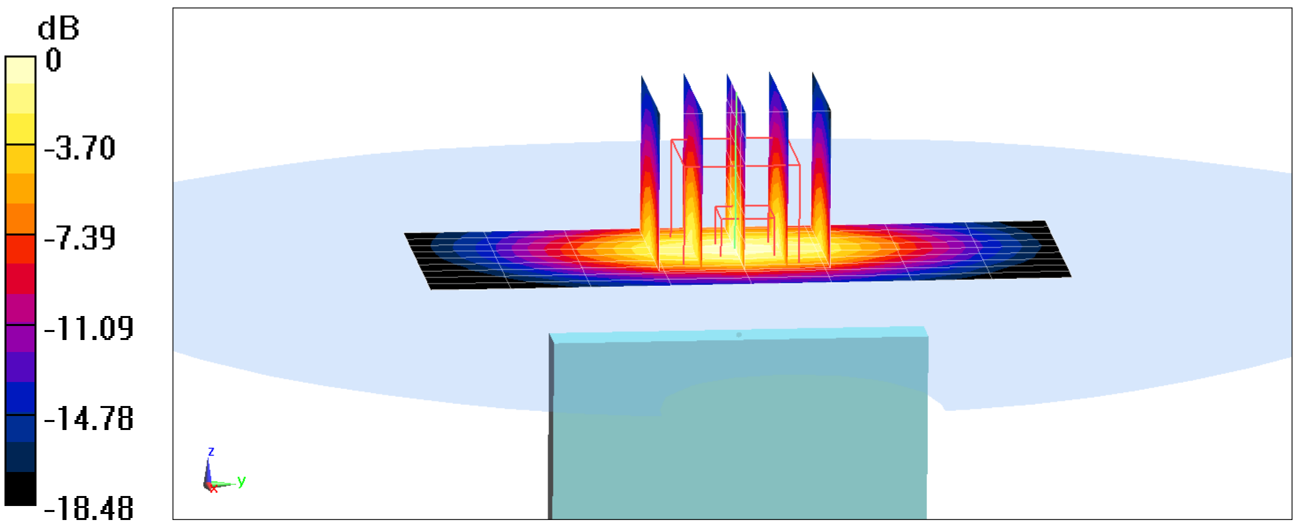
Communication System: UID 0, _GSM GPRS; 3 Tx slots; Frequency: 1909.8 MHz; Duty Cycle: 1:2.76
Medium: 1900 Body Medium parameters used:
f = 1910 MHz; $\sigma$ = 1.564 S/m; $\varepsilon_r$ = 52.352; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-28-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3332; ConvF(4.77, 4.77, 4.77) @ 1909.8 MHz; Calibrated: 8/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: GPRS 1900, Body SAR, Bottom Edge, High.ch, 3 Tx Slots**

**Area Scan (10x9x1):** Measurement grid: dx=5mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.64 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 1.29 W/kg
**SAR(1 g) = 0.772 W/kg**




0 dB = 0.995 W/kg = -0.02 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1155M**

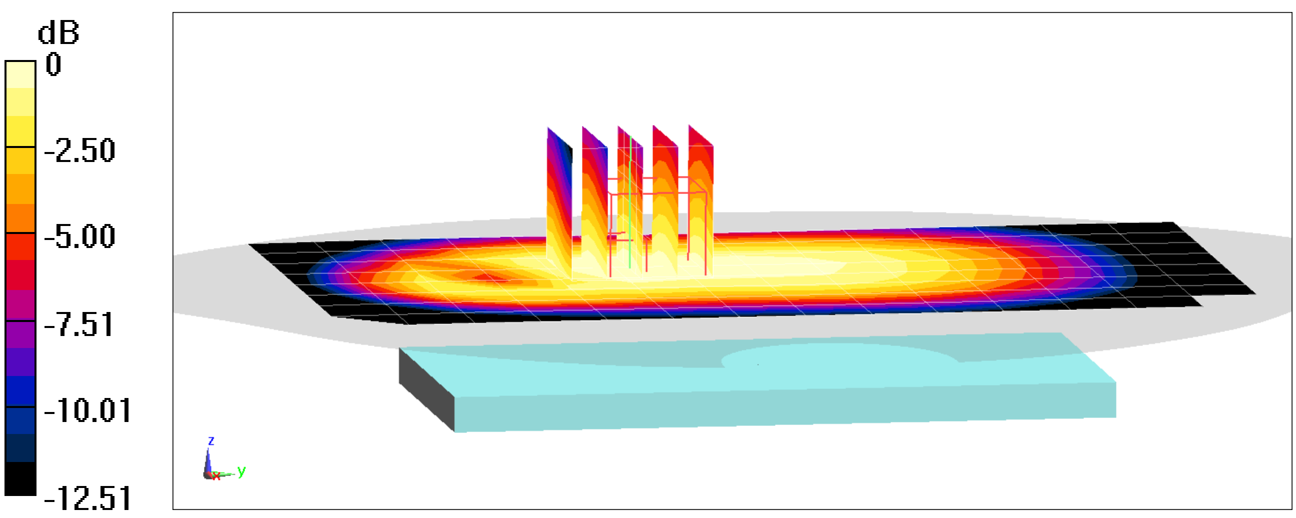
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.966 S/m; $\varepsilon_r$ = 53.591; ρ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-26-2018; Ambient Temp: 19.9°C; Tissue Temp: 19.1°C

Probe: ES3DV3 - SN3347; ConvF(6.37, 6.37, 6.37) @ 836.6 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## Mode: UMTS 850, Body SAR, Back side, Mid.ch

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.00 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.340 W/kg
**SAR(1 g) = 0.263 W/kg**




0 dB = 0.289 W/kg = -5.39 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1155M**

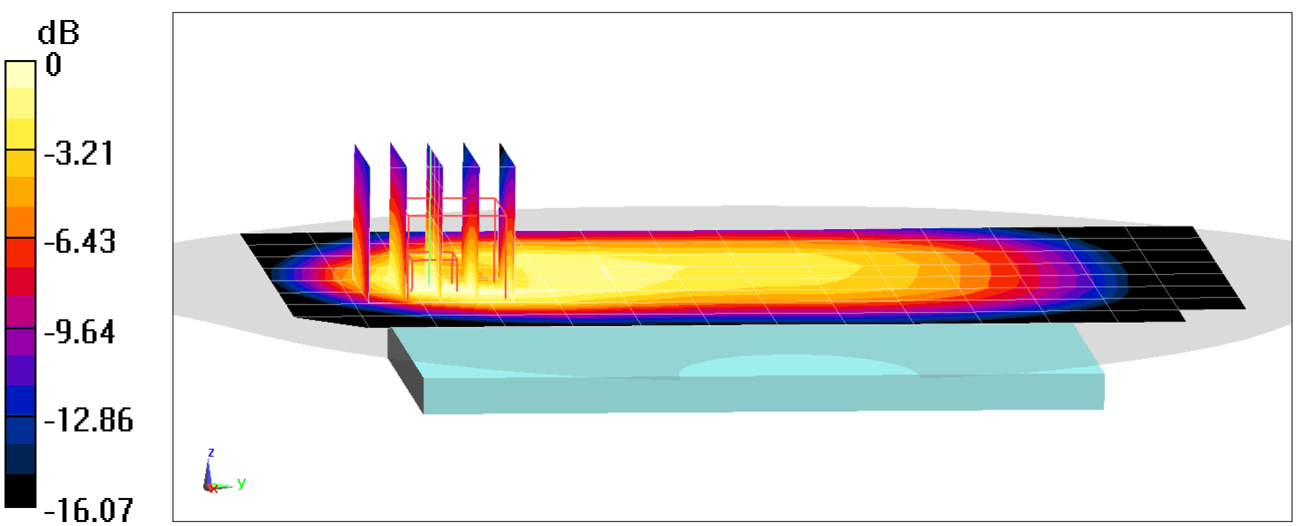
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; $\sigma = 0.966$ S/m; $\varepsilon_r = 53.591$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-26-2018; Ambient Temp: 19.9°C; Tissue Temp: 19.1°C

Probe: ES3DV3 - SN3347; ConvF(6.37, 6.37, 6.37) @ 836.6 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: UMTS 850, Body SAR, Back side, Mid.ch**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.94 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.713 W/kg
**SAR(1 g) = 0.413 W/kg**




0 dB = 0.502 W/kg = -2.99 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0905M**

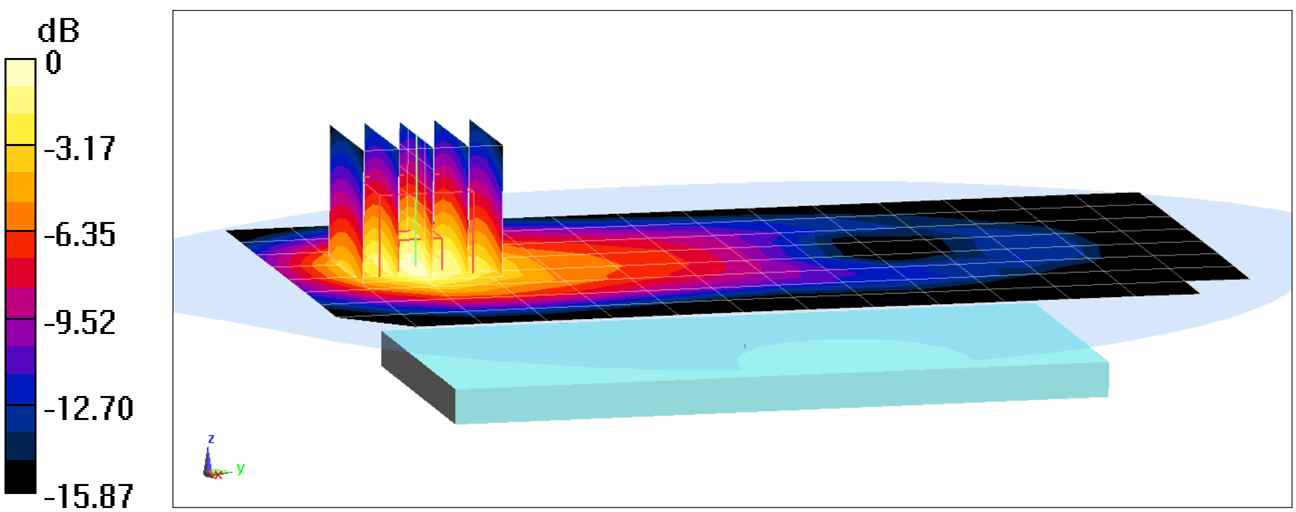
Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; $\sigma$ = 1.569 S/m; $\varepsilon_r$ = 51.273; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-26-2018; Ambient Temp: 22.3°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3332; ConvF(4.77, 4.77, 4.77) @ 1907.6 MHz; Calibrated: 8/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: UMTS 1900, Body SAR, Back side, High.ch**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.40 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.09 W/kg
**SAR(1 g) = 0.681 W/kg**




0 dB = 0.822 W/kg = -0.85 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0905M**

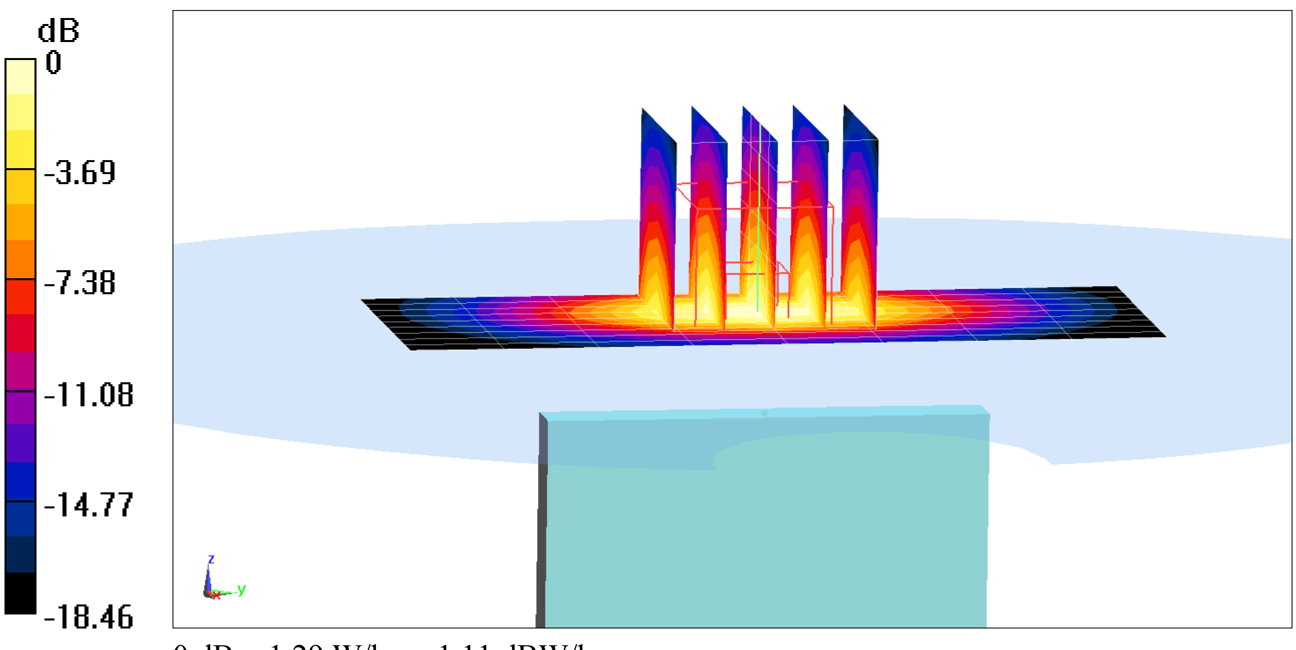
Communication System: UID 0, UMTS, Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; $\sigma$ = 1.569 S/m; $\varepsilon_r$ = 51.273; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-26-2018; Ambient Temp: 22.3°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3332; ConvF(4.77, 4.77, 4.77) @ 1907.6 MHz; Calibrated: 8/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## Mode: UMTS 1900, Body SAR, Bottom Edge, High.ch

**Area Scan (10x9x1):** Measurement grid: dx=5mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.75 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.77 W/kg
**SAR(1 g) = 1.02 W/kg**




0 dB = 1.29 W/kg = 1.11 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0905M**

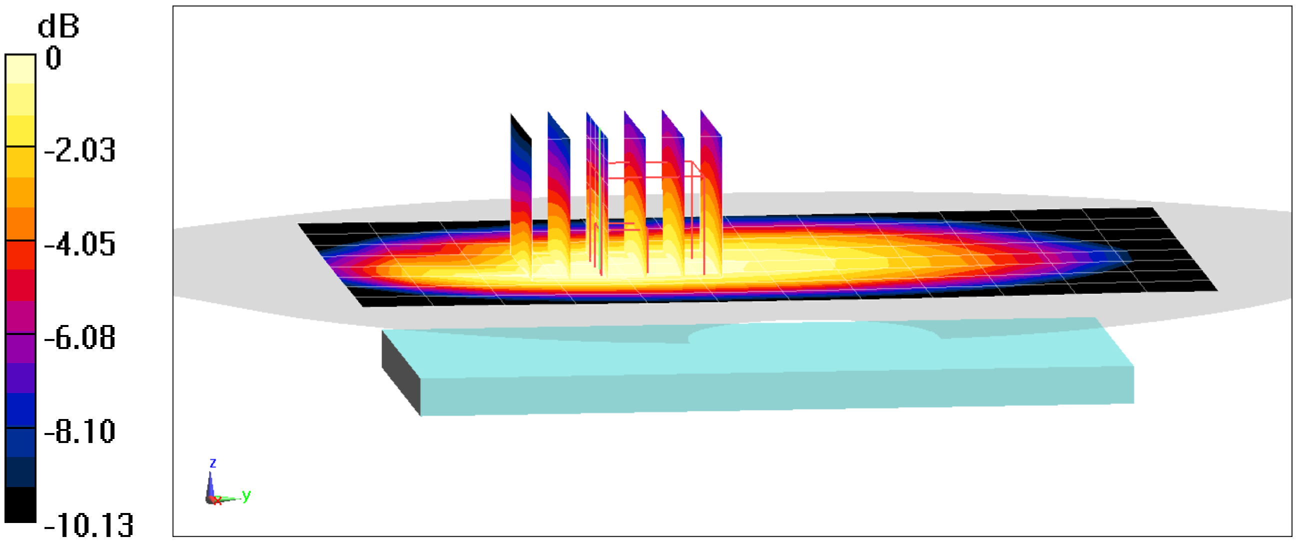
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; $\sigma$ = 0.927 S/m; $\varepsilon_r$ = 54.241; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-19-2018; Ambient Temp: 21.1°C; Tissue Temp: 19.7°C

Probe: EX3DV4 - SN7406; ConvF(9.91, 9.91, 9.91) @ 707.5 MHz; Calibrated: 5/22/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/22/2018
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 12, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x13x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (6x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.81 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.235 W/kg
**SAR(1 g) = 0.171 W/kg**




0 dB = 0.211 W/kg = -6.76 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0905M**

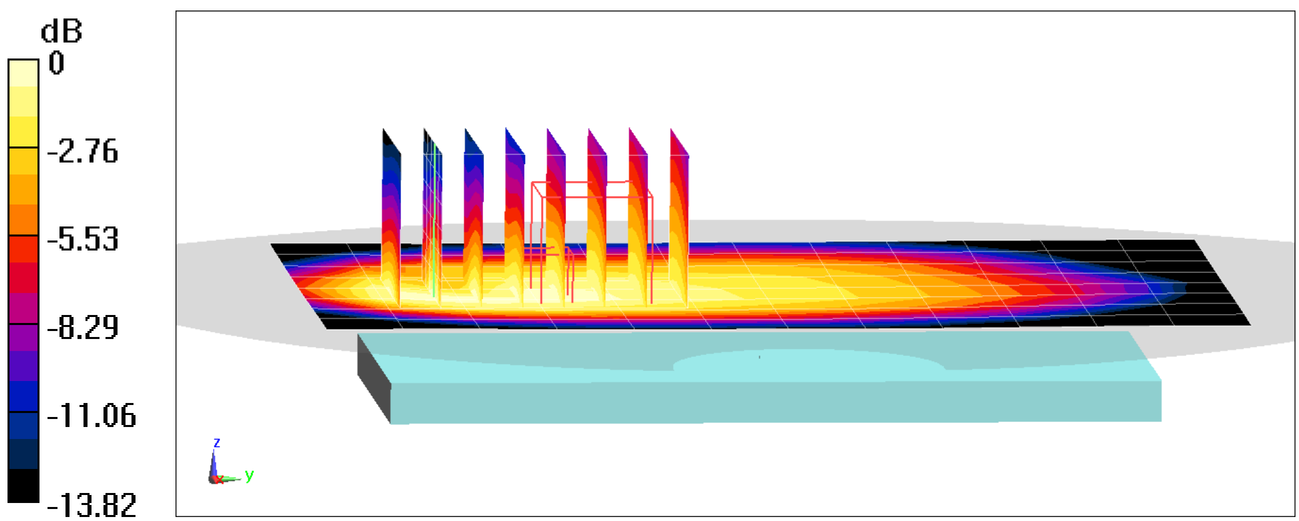
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; $\sigma$ = 0.927 S/m; $\varepsilon_r$ = 54.241; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-19-2018; Ambient Temp: 21.1°C; Tissue Temp: 19.7°C

Probe: EX3DV4 - SN7406; ConvF(9.91, 9.91, 9.91) @ 707.5 MHz; Calibrated: 5/22/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/22/2018
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 12, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x13x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (6x8x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.96 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.385 W/kg
**SAR(1 g) = 0.231 W/kg**




0 dB = 0.320 W/kg = -4.95 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0905M**

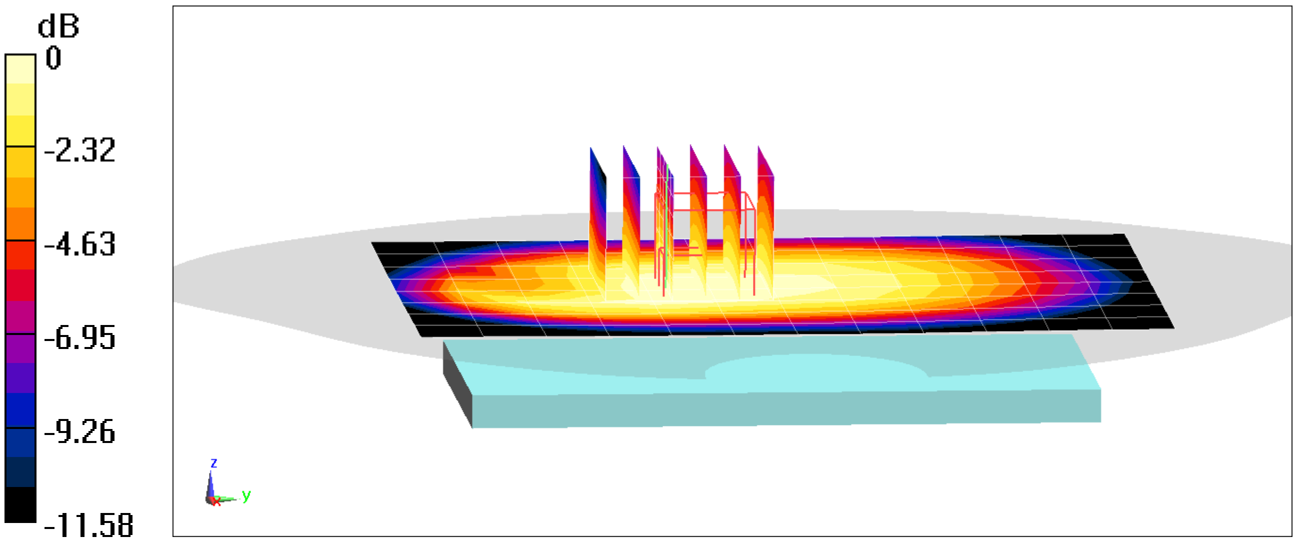
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
$f = 782$ MHz; $\sigma = 0.955$ S/m; $\varepsilon_r = 53.956$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-19-2018; Ambient Temp: 21.1°C; Tissue Temp: 19.7°C

Probe: EX3DV4 - SN7406; ConvF(9.91, 9.91, 9.91) @ 782 MHz; Calibrated: 5/22/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/22/2018
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 13, Body SAR, Back side, Mid.ch,**
**10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x13x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (6x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.58 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.391 W/kg
**SAR(1 g) = 0.286 W/kg**




0 dB = 0.352 W/kg = -4.53 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0905M**

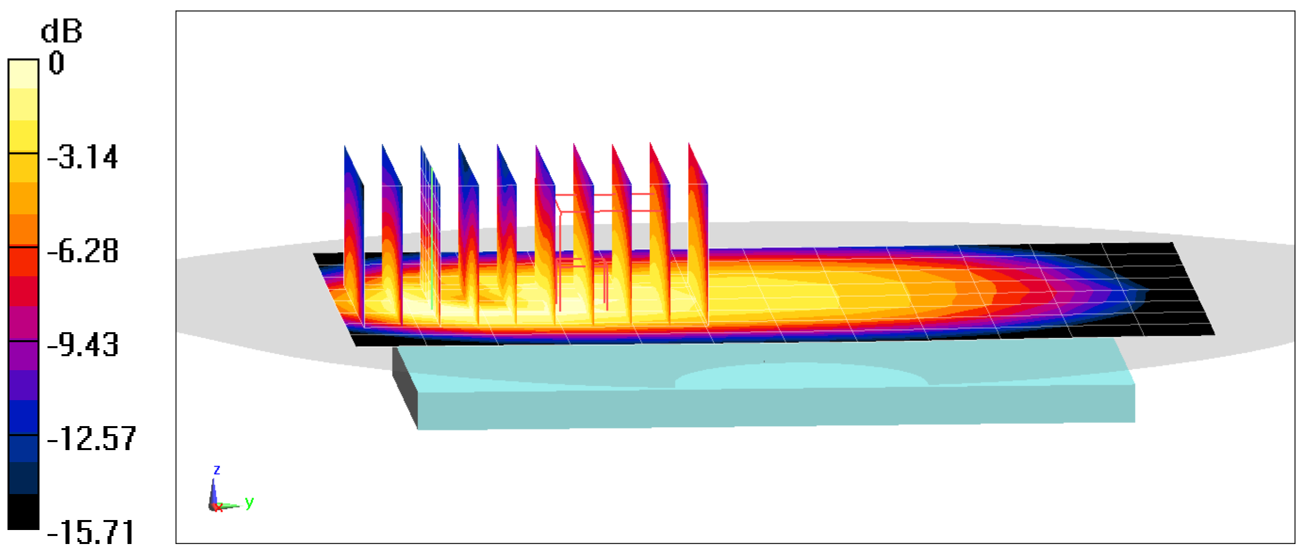
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.955 S/m; $\varepsilon_r$ = 53.956; ρ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-19-2018; Ambient Temp: 21.1°C; Tissue Temp: 19.7°C

Probe: EX3DV4 - SN7406; ConvF(9.91, 9.91, 9.91) @ 782 MHz; Calibrated: 5/22/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/22/2018
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 13, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x13x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (8x10x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.99 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.698 W/kg
**SAR(1 g) = 0.391 W/kg**




0 dB = 0.581 W/kg = -2.36 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1155M**

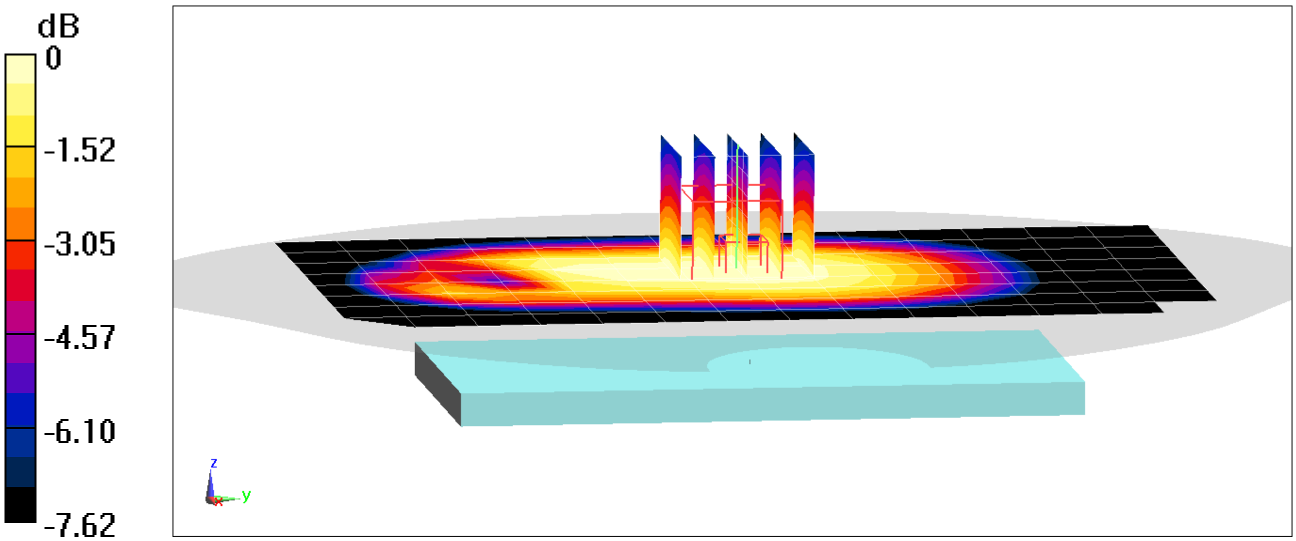
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.964 S/m; $\varepsilon_r$ = 53.609; ρ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-26-2018; Ambient Temp: 19.9°C; Tissue Temp: 19.1°C

Probe: ES3DV3 - SN3347; ConvF(6.37, 6.37, 6.37) @ 831.5 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 26 (Cell.), Body SAR, Back side, Mid.ch,**
**15 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.93 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.368 W/kg
**SAR(1 g) = 0.290 W/kg**




0 dB = 0.317 W/kg = -4.99 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1155M**

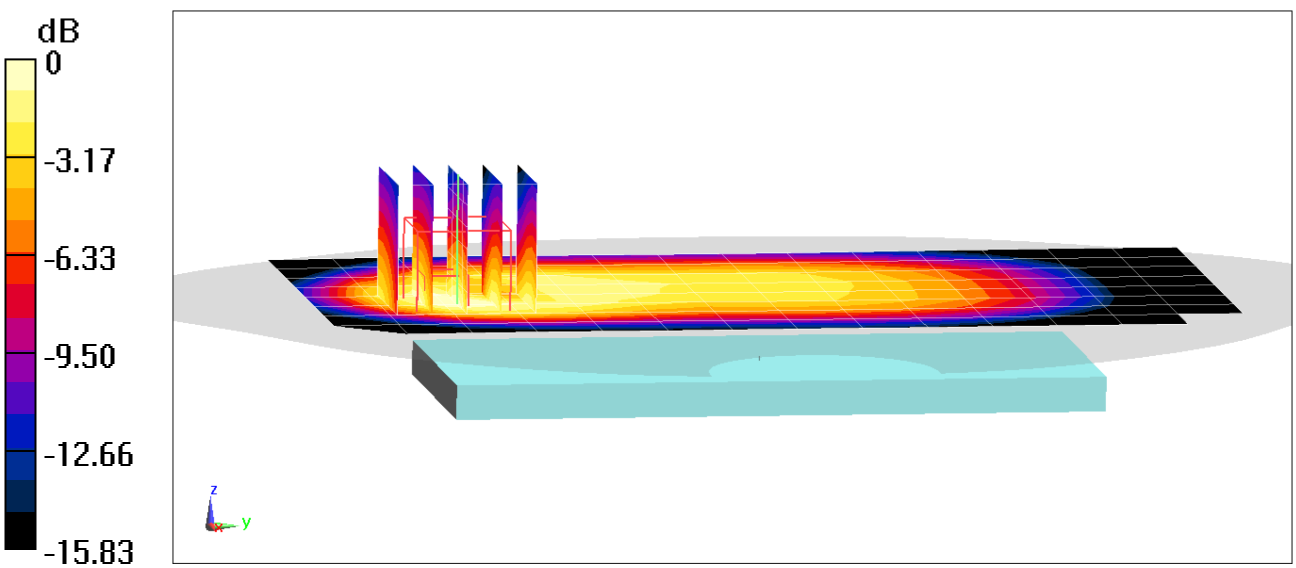
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 831.5 MHz; $\sigma$ = 0.964 S/m; $\varepsilon_r$ = 53.609; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-26-2018; Ambient Temp: 19.9°C; Tissue Temp: 19.1°C

Probe: ES3DV3 - SN3347; ConvF(6.37, 6.37, 6.37) @ 831.5 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 26 (Cell.), Body SAR, Back side, Mid.ch,
15 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.96 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.797 W/kg
**SAR(1 g) = 0.455 W/kg**




0 dB = 0.556 W/kg = -2.55 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1150M**

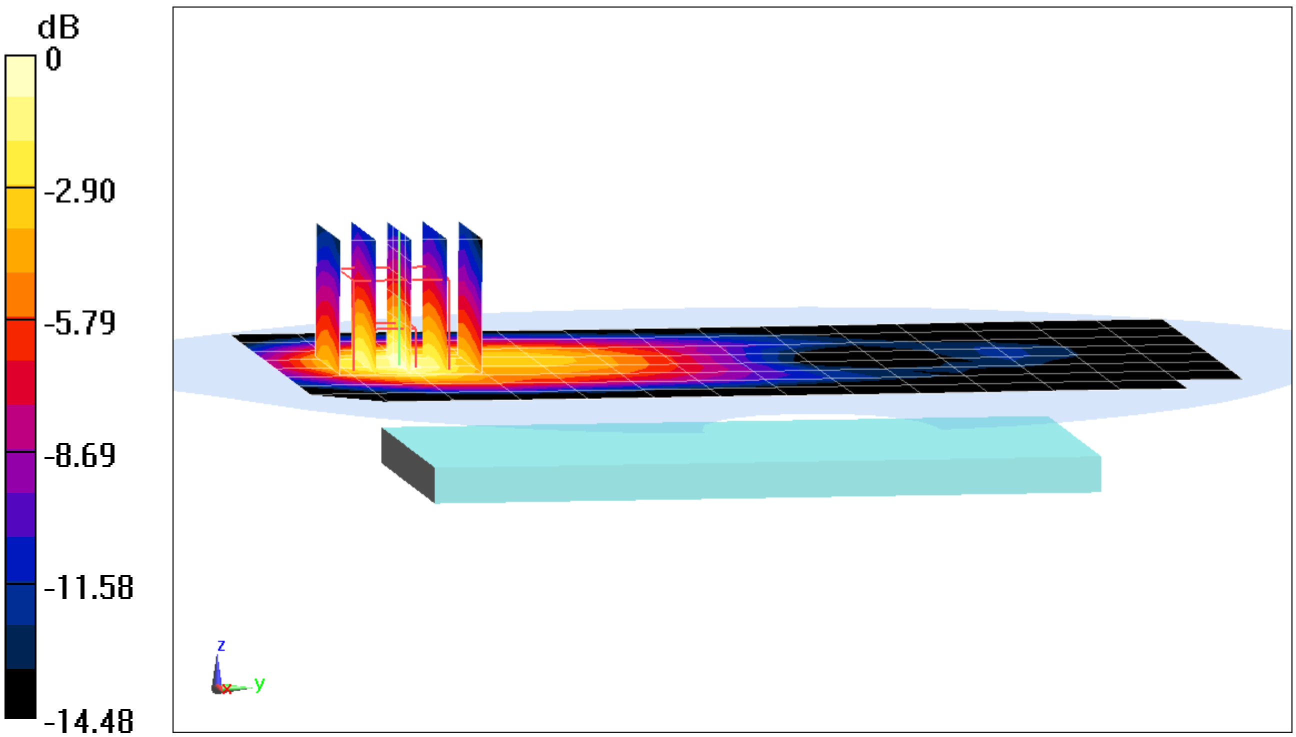
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.51 S/m; $\varepsilon_r$ = 52.588; ρ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-26-2018; Ambient Temp: 22.8°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7357; ConvF(8.43, 8.43, 8.43) @ 1732.5 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch,**
**20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.28 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.823 W/kg
**SAR(1 g) = 0.517 W/kg**




0 dB = 0.718 W/kg = -1.44 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 2244M**

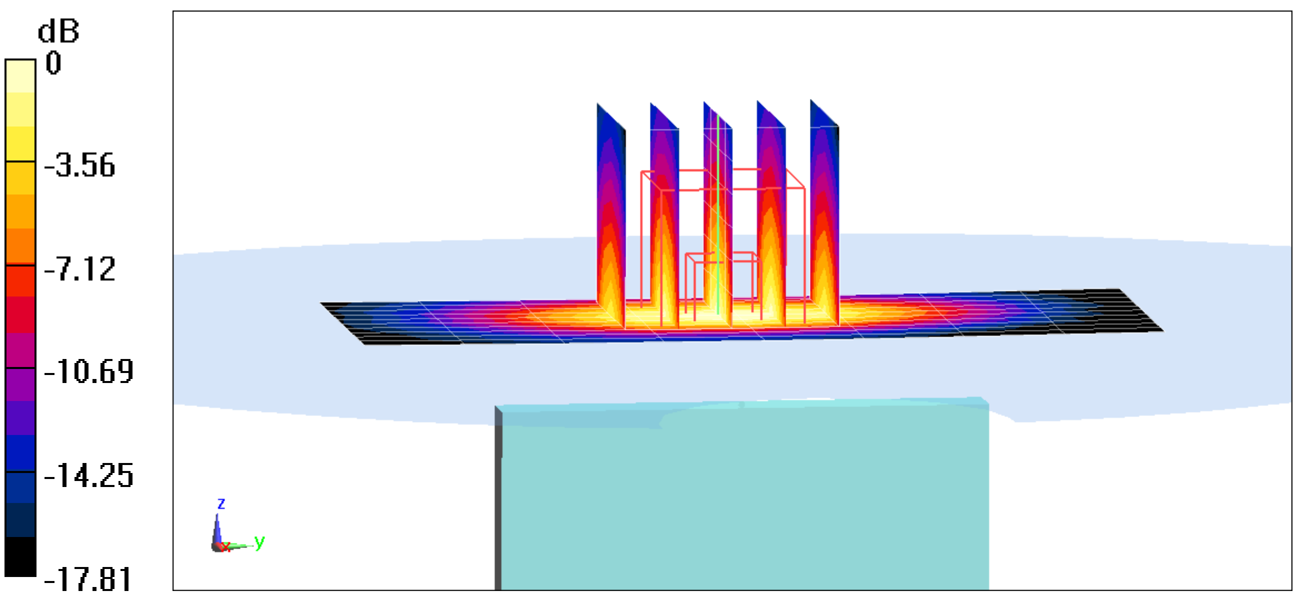
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; $\sigma$ = 1.51 S/m; $\varepsilon_r$ = 52.588; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-26-2018; Ambient Temp: 22.8°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7357; ConvF(8.43, 8.43, 8.43) @ 1732.5 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 4 (AWS), Body SAR, Bottom Edge, Mid.ch,**
**20 MHz Bandwidth, QPSK, 50 RB, 25 RB Offset**

**Area Scan (11x9x1):** Measurement grid: dx=5mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.93 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.03 W/kg
**SAR(1 g) = 0.608 W/kg**




0 dB = 0.882 W/kg = -0.55 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0905M**

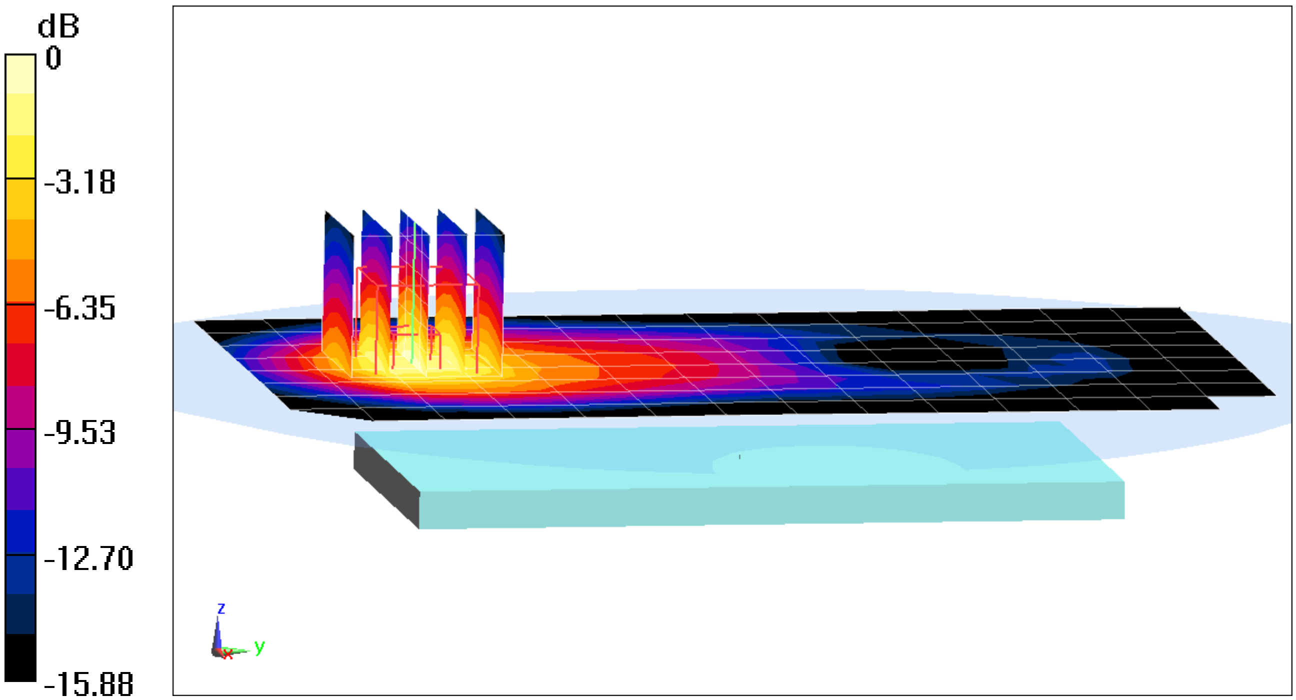
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1905 MHz; $\sigma$ = 1.566 S/m; $\varepsilon_r$ = 51.283; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-26-2018; Ambient Temp: 22.3°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3332; ConvF(4.77, 4.77, 4.77) @ 1905 MHz; Calibrated: 8/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 25 (PCS), Body SAR, Back side, High.ch,**
**20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.17 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.37 W/kg
**SAR(1 g) = 0.860 W/kg**




0 dB = 1.04 W/kg = 0.17 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0905M**

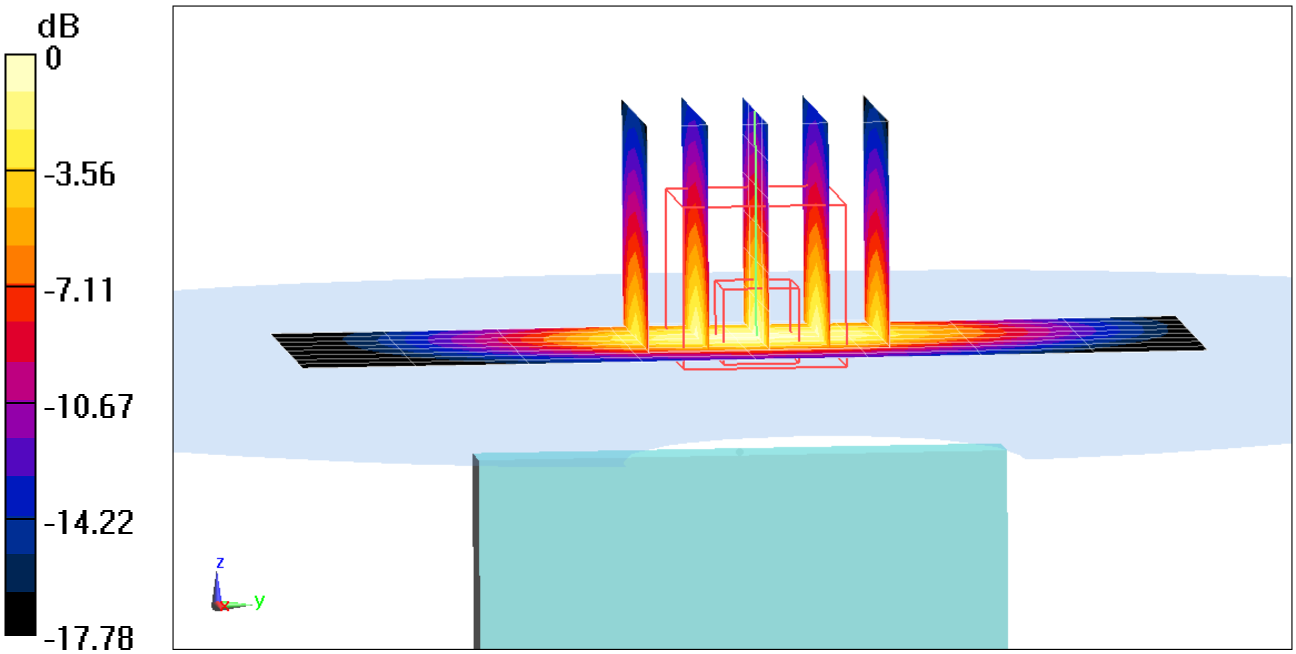
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1905 MHz; $\sigma$ = 1.566 S/m; $\varepsilon_r$ = 51.283; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-26-2018; Ambient Temp: 22.3°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3332; ConvF(4.77, 4.77, 4.77) @ 1905 MHz; Calibrated: 8/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 25 (PCS), Body SAR, Bottom Edge, High.ch,**
**20 MHz Bandwidth, QPSK, 50 RB, 0 RB Offset**

**Area Scan (9x9x1):** Measurement grid: dx=5mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.50 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.25 W/kg
**SAR(1 g) = 0.734 W/kg**




0 dB = 0.917 W/kg = -0.38 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1149M**

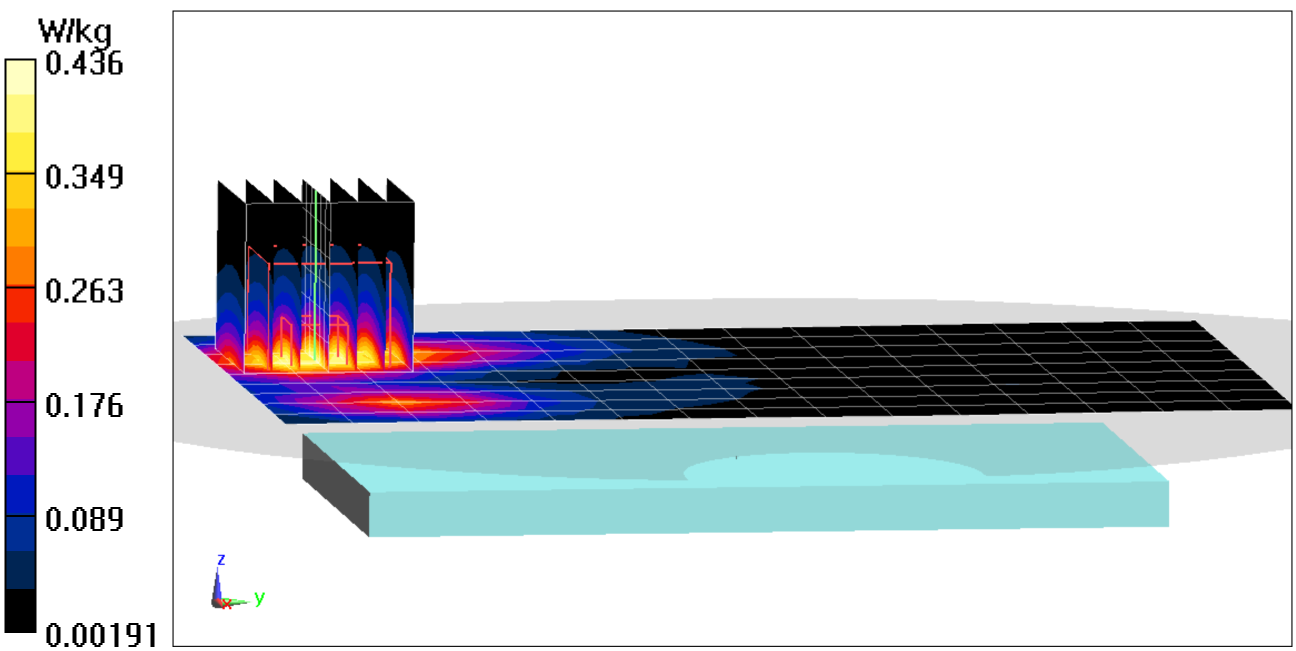
Communication System: UID 0, LTE Band 41 (Class 3); Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2450 Body Medium parameters used (interpolated):
f = 2680 MHz; $\sigma$ = 2.31 S/m; $\varepsilon_r$ = 50.641; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-10-2019; Ambient Temp: 22.7°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3319; ConvF(4.33, 4.33, 4.33) @ 2680 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 41 ULCA, Body SAR, Back side**
**PCC: 20 MHz Bandwidth, QPSK, Ch. 41490, 1 RB, 0 RB Offset**
**SCC: 20 MHz Bandwidth, QPSK, Ch. 41292, 1 RB, 99 RB Offset**

**Area Scan (10x16x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.11 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.678 W/kg
**SAR(1 g) = 0.350 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1149M**

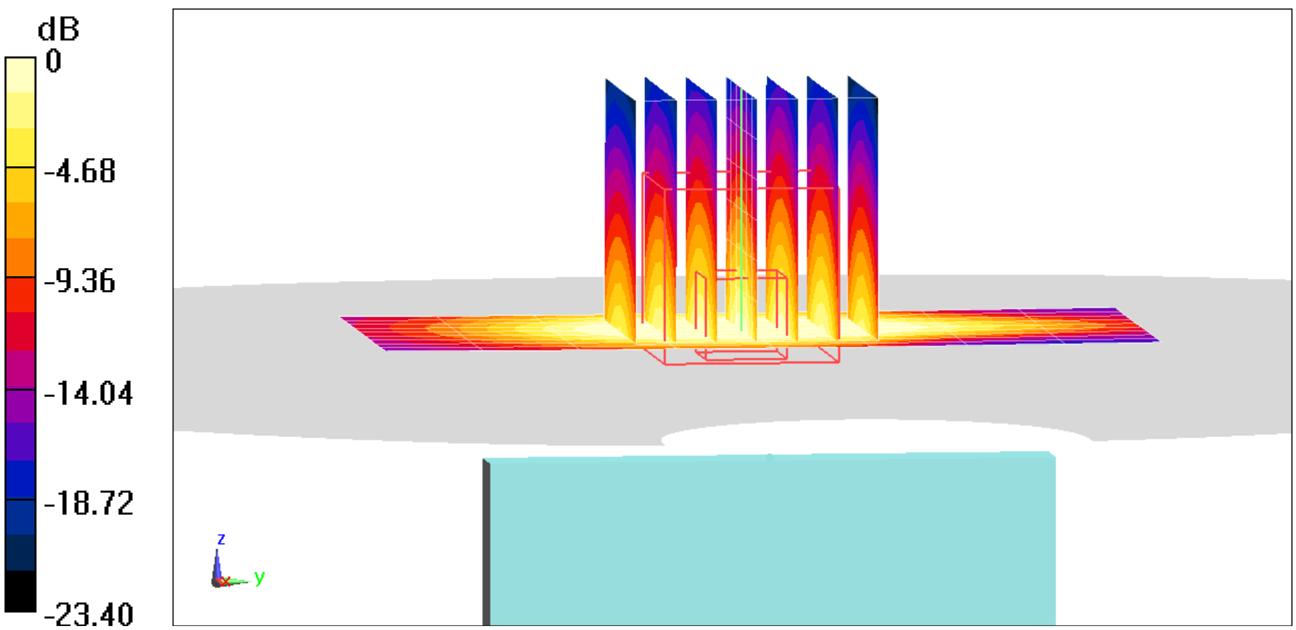
Communication System: UID 0, LTE Band 41; Frequency: 2506 MHz; Duty Cycle: 1:1.58
Medium: 2450 Body Medium parameters used (interpolated):
f = 2506 MHz; σ = 2.109 S/m; $\varepsilon_r$ = 51.131; ρ = 1000 kg/$m^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-10-2019; Ambient Temp: 22.7°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2506 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 41, Body SAR, Bottom Edge**
**PCC: 20 MHz Bandwidth, QPSK, Ch. 39750, 50 RB, 50 RB Offset**
**SCC: 20 MHz Bandwidth, QPSK, Ch. 39948, 50 RB, 0 RB Offset**

**Area Scan (10x9x1):** Measurement grid: dx=5mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.15 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.19 W/kg
**SAR(1 g) = 0.592 W/kg**




0 dB = 0.798 W/kg = -0.98 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1150M**

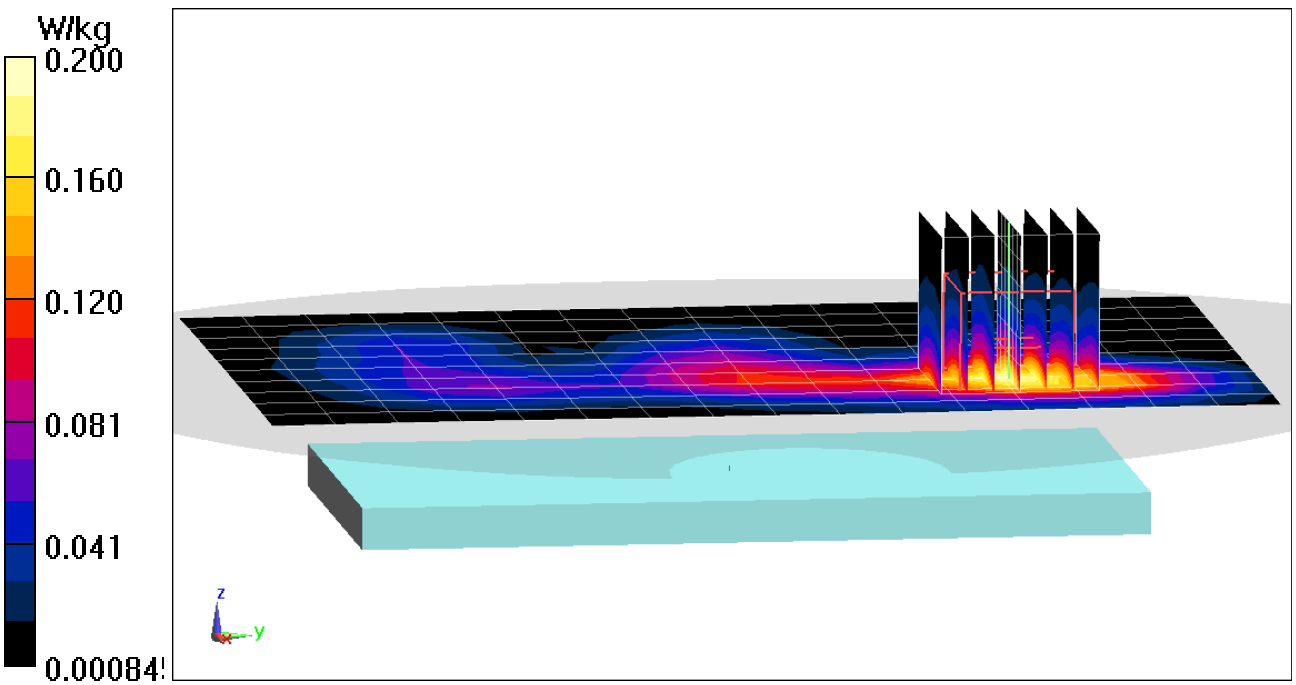
Communication System: UID 0, _IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2412 MHz; $\sigma$ = 1.996 S/m; $\varepsilon_r$ = 51.64; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-26-2018; Ambient Temp: 23.2°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2412 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: IEEE 802.11b Antenna 1, 22 MHz Bandwidth,**
**Body SAR, Ch 01, 1 Mbps, Back Side**

**Area Scan (11x17x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.524 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.301 W/kg
**SAR(1 g) = 0.159 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1150M**

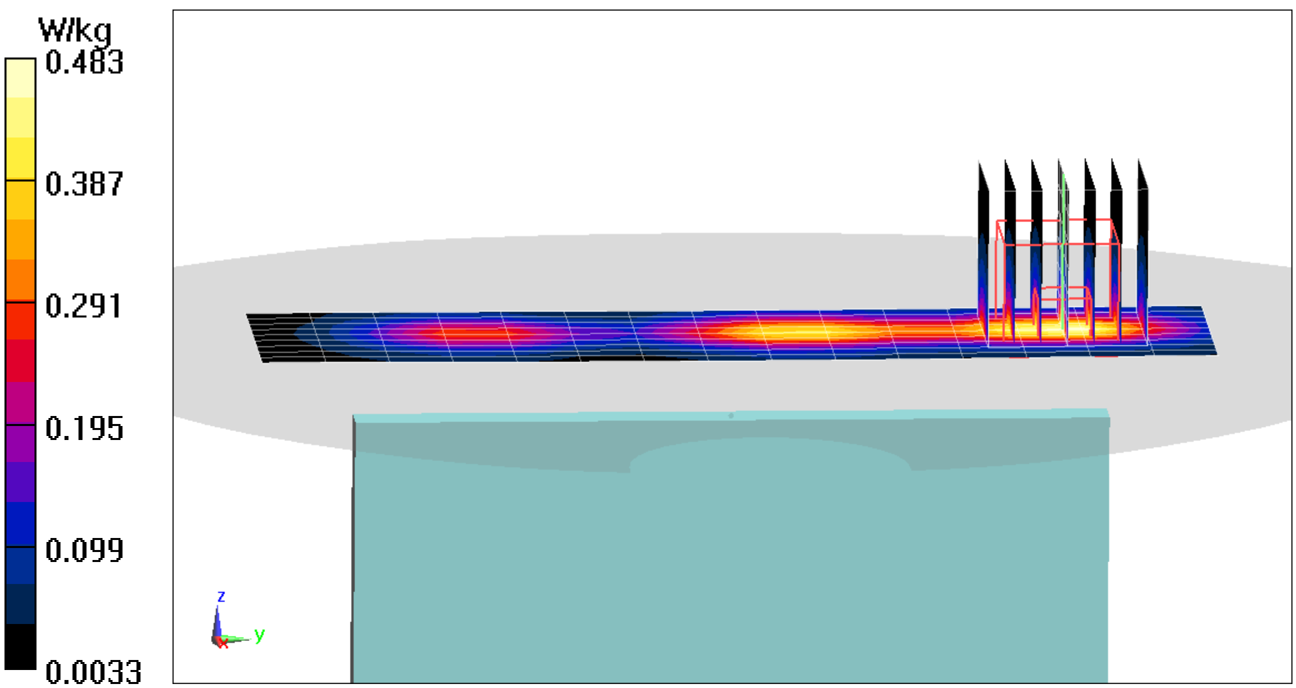
Communication System: UID 0, _IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2412 MHz; $\sigma$ = 1.996 S/m; $\varepsilon_r$ = 51.64; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-26-2018; Ambient Temp: 23.2°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2412 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: IEEE 802.11b Antenna 1, 22 MHz Bandwidth, Body SAR, Ch 01, 1 Mbps, Left Edge**

**Area Scan (10x16x1):** Measurement grid: dx=5mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.14 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.755 W/kg
**SAR(1 g) = 0.371 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1164M**

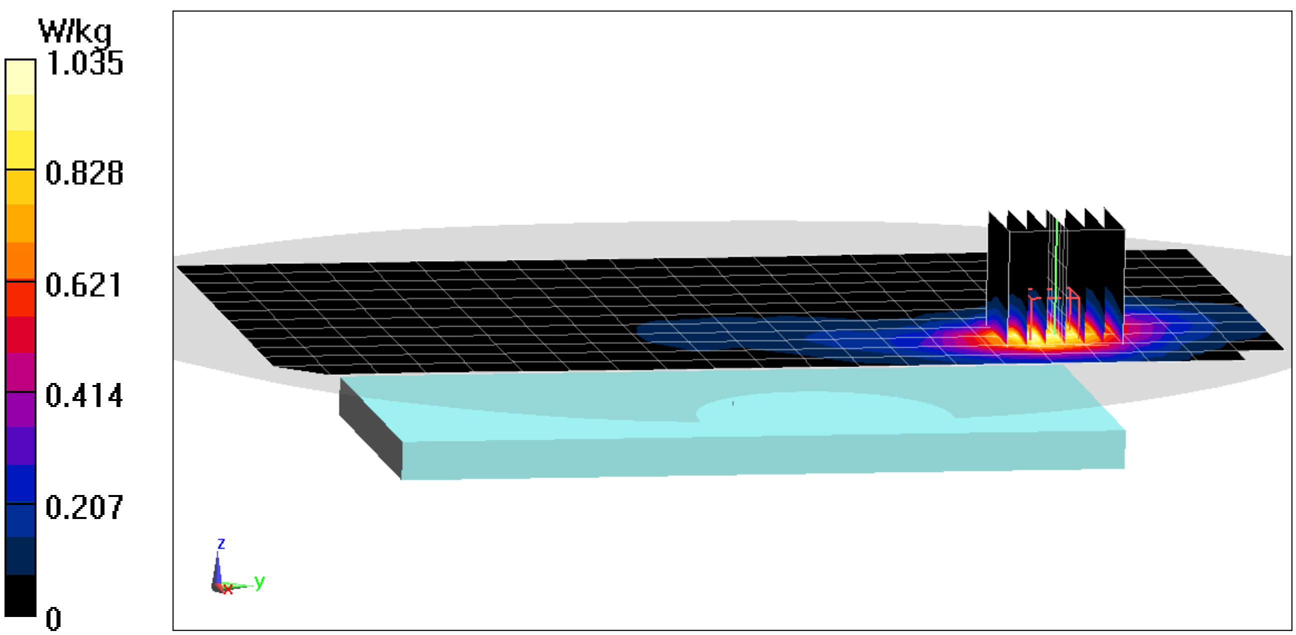
Communication System: UID 0, 802.11n 5.2-5.8 GHz Band; Frequency: 5260 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5260 MHz; $\sigma$ = 5.427 S/m; $\varepsilon_r$ = 47.316; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-03-2019; Ambient Temp: 21.5°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7308; ConvF(4.48, 4.48, 4.48) @ 5260 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: IEEE 802.11n MIMO, UNII-2A, 20 MHz Bandwidth, Body SAR, Ch 52, 13 Mbps, Back Side**

**Area Scan (13x22x1):** Measurement grid: dx=10mm, dy=10mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 9.703 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.63 W/kg
**SAR(1 g) = 0.476 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1164M**

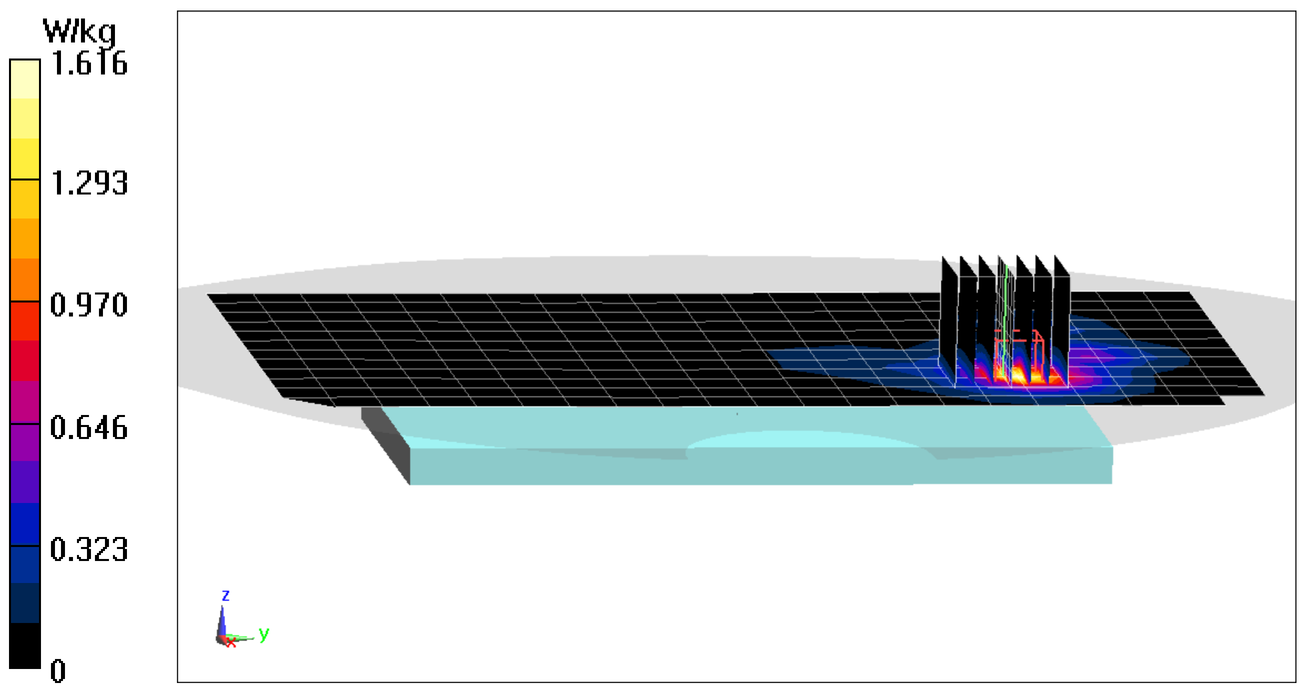
Communication System: UID 0, 802.11n; Frequency: 5745 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5745 MHz; $\sigma$ = 6.132 S/m; $\varepsilon_r$ = 46.377; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-03-2019; Ambient Temp: 21.5°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7308; ConvF(4.18, 4.18, 4.18) @ 5745 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: IEEE 802.11n MIMO, UNII-3, 20 MHz Bandwidth,**
**Body SAR, Ch 149, 13 Mbps, Back Side**

**Area Scan (13x22x1):** Measurement grid: dx=10mm, dy=10mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 10.46 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 3.00 W/kg
**SAR(1 g) = 0.649 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1150M**

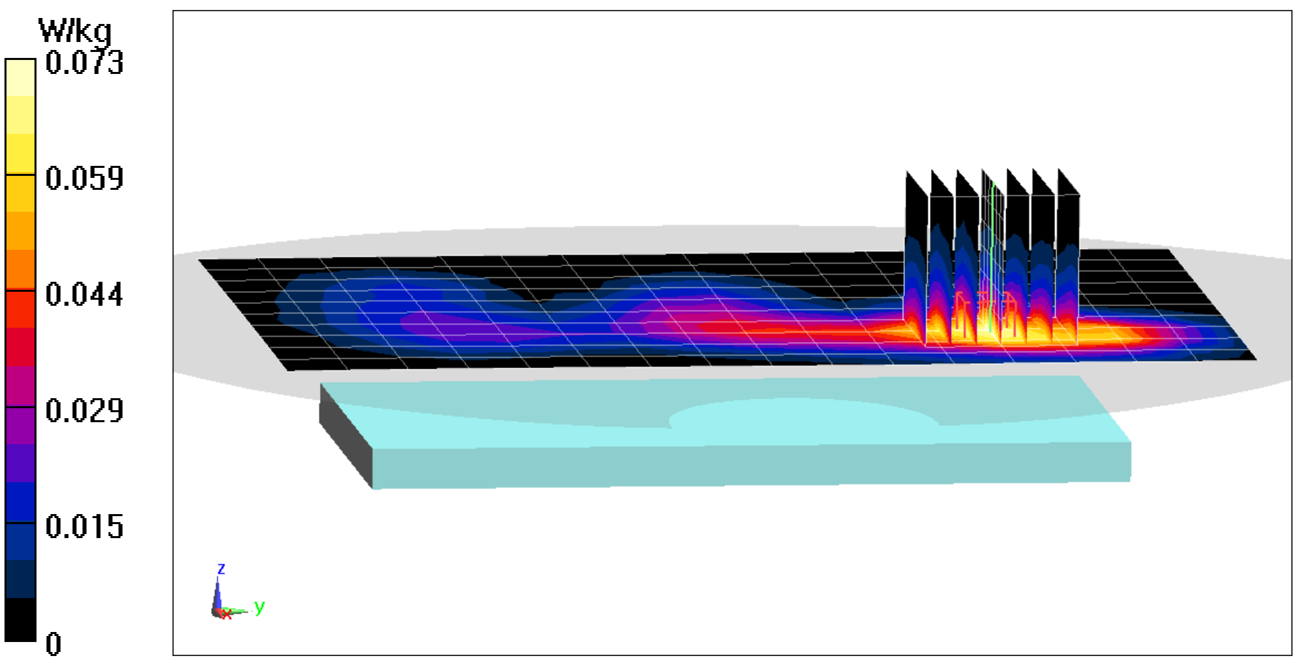
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.289
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; $\sigma$ = 1.997 S/m; $\varepsilon_r$ = 50.753; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-30-2018; Ambient Temp: 21.9°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2441 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: Bluetooth, Body SAR, Ch 39, 1 Mbps, Back Side**

**Area Scan (11x17x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.811 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.112 W/kg
**SAR(1 g) = 0.060 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1150M**

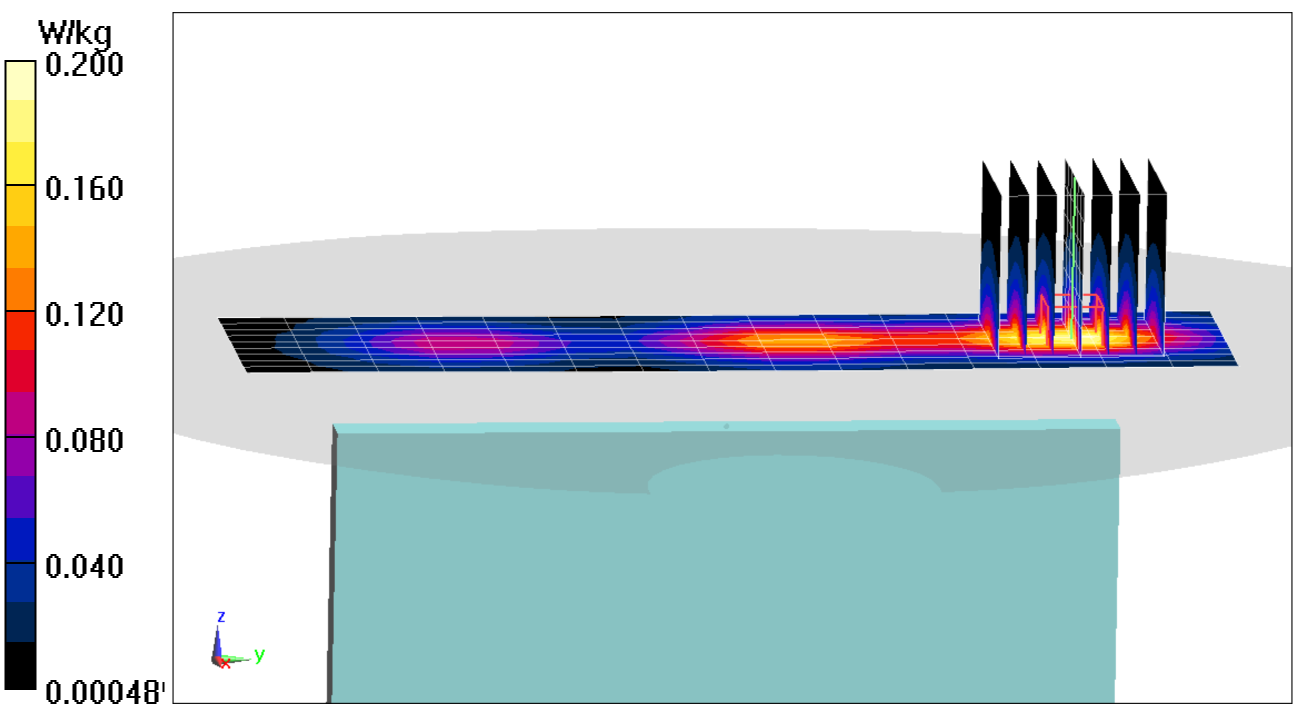
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.289
Medium: 2450 Body Medium parameters used (interpolated):
$f = 2441$ MHz; $\sigma = 1.997$ S/m; $\varepsilon_r = 50.753$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-30-2018; Ambient Temp: 21.9°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2441 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: Bluetooth, Body SAR, Ch 39, 1 Mbps, Left Edge**

**Area Scan (10x16x1):** Measurement grid: dx=5mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.542 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.316 W/kg
**SAR(1 g) = 0.152 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0905M**

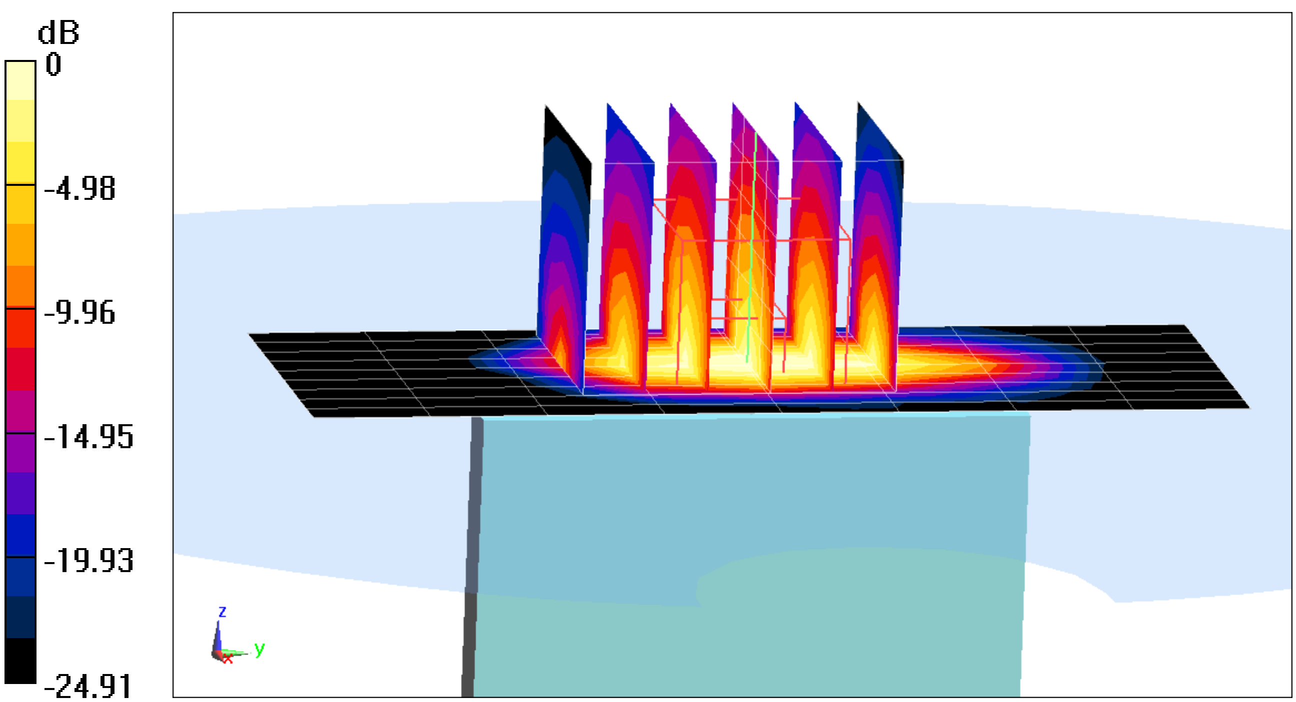
Communication System: UID 0, _GSM GPRS; 3 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.76
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.533 S/m; $\varepsilon_r$ = 52.466; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-28-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3332; ConvF(4.77, 4.77, 4.77) @ 1880 MHz; Calibrated: 8/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: GPRS 1900, Phablet SAR, Bottom Edge, Mid.ch, 3 Tx Slots**

**Area Scan (10x9x1):** Measurement grid: dx=5mm, dy=15mm
**Zoom Scan (5x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 65.96 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 11.7 W/kg
**SAR(10 g) = 2.54 W/kg**




0 dB = 7.93 W/kg = 8.99 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0905M**

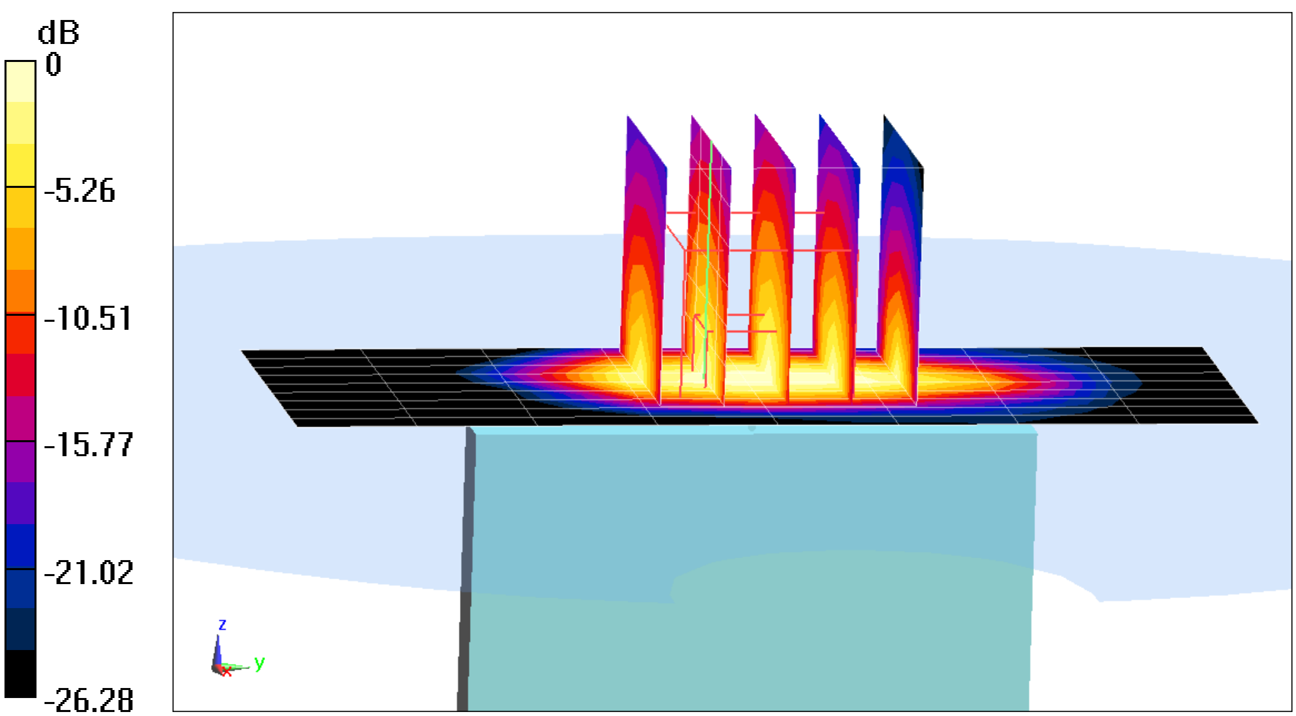
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; $\sigma$ = 1.536 S/m; $\varepsilon_r$ = 51.379; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-26-2018; Ambient Temp: 22.3°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3332; ConvF(4.77, 4.77, 4.77) @ 1880 MHz; Calibrated: 8/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: UMTS 1900, Phablet SAR, Bottom Edge, Mid.ch**

**Area Scan (10x9x1):** Measurement grid: dx=5mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 73.50 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 13.9 W/kg
**SAR(10 g) = 2.98 W/kg**




0 dB = 9.36 W/kg = 9.71 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 2244M**

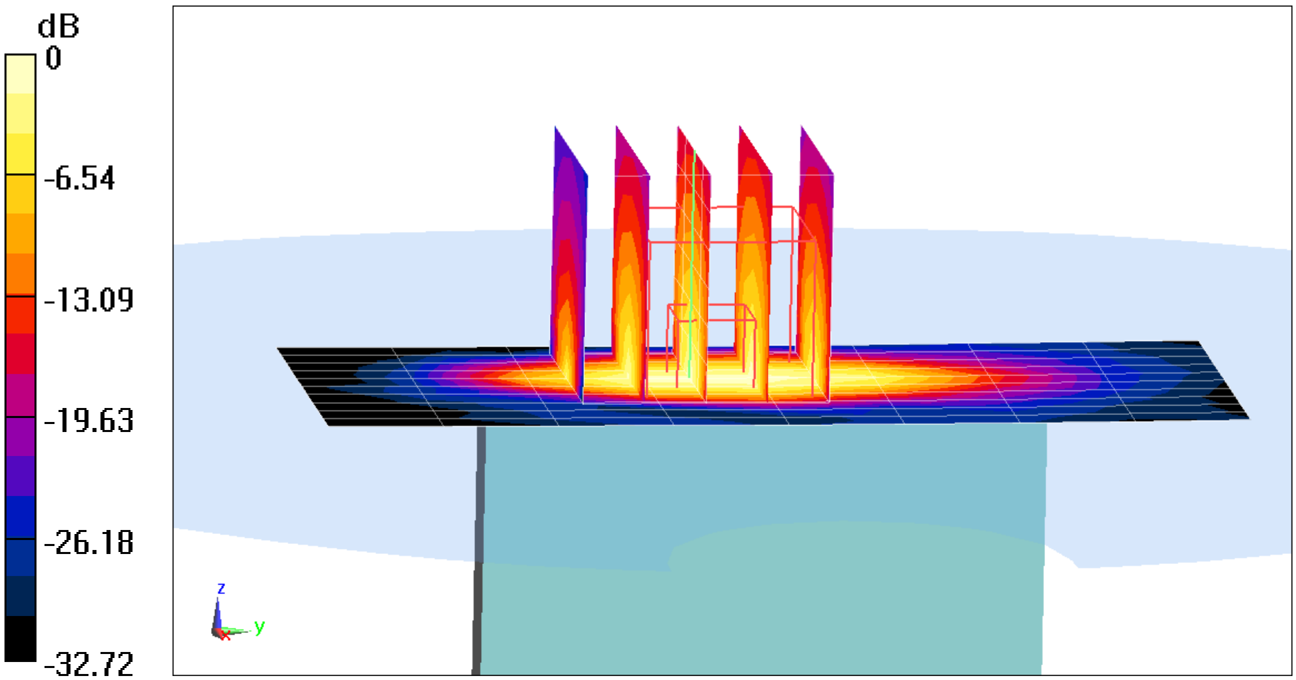
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; $\sigma$ = 1.51 S/m; $\varepsilon_r$ = 52.588; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-26-2018; Ambient Temp: 22.8°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7357; ConvF(8.43, 8.43, 8.43) @ 1732.5 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 4 (AWS), Phablet SAR, Bottom Edge, Mid.ch,**
**20 MHz Bandwidth, QPSK, 100 RB, 0 RB Offset**

**Area Scan (11x9x1):** Measurement grid: dx=5mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 69.50 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 13.7 W/kg
**SAR(10 g) = 2.55 W/kg**




0 dB = 11.4 W/kg = 10.57 dBW/kg

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1160M**

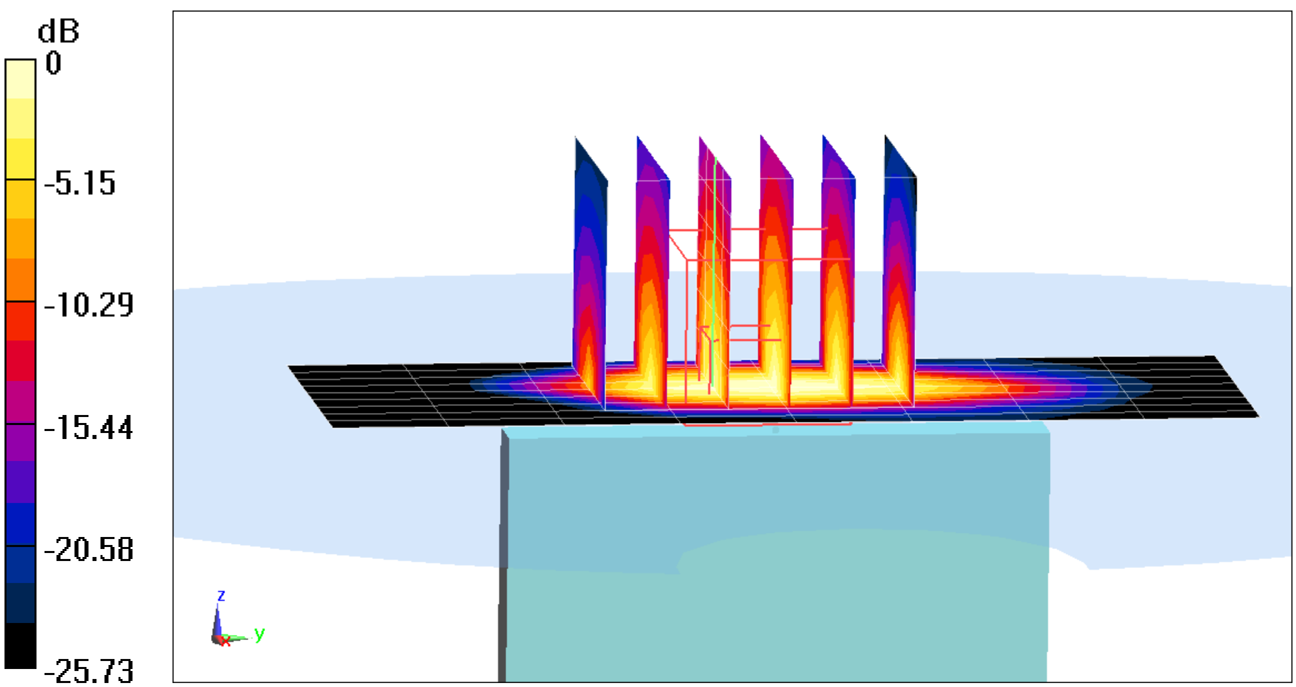
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1882.5 MHz; $\sigma$ = 1.536 S/m; $\varepsilon_r$ = 52.457; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-28-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3332; ConvF(4.77, 4.77, 4.77) @ 1882.5 MHz; Calibrated: 8/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 25 (PCS), Phablet SAR, Bottom Edge, Mid.ch,**
**20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (10x9x1):** Measurement grid: dx=5mm, dy=15mm
**Zoom Scan (5x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 70.06 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 12.5 W/kg
**SAR(10 g) = 2.7 W/kg**




0 dB = 8.45 W/kg = 9.27 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1149M**

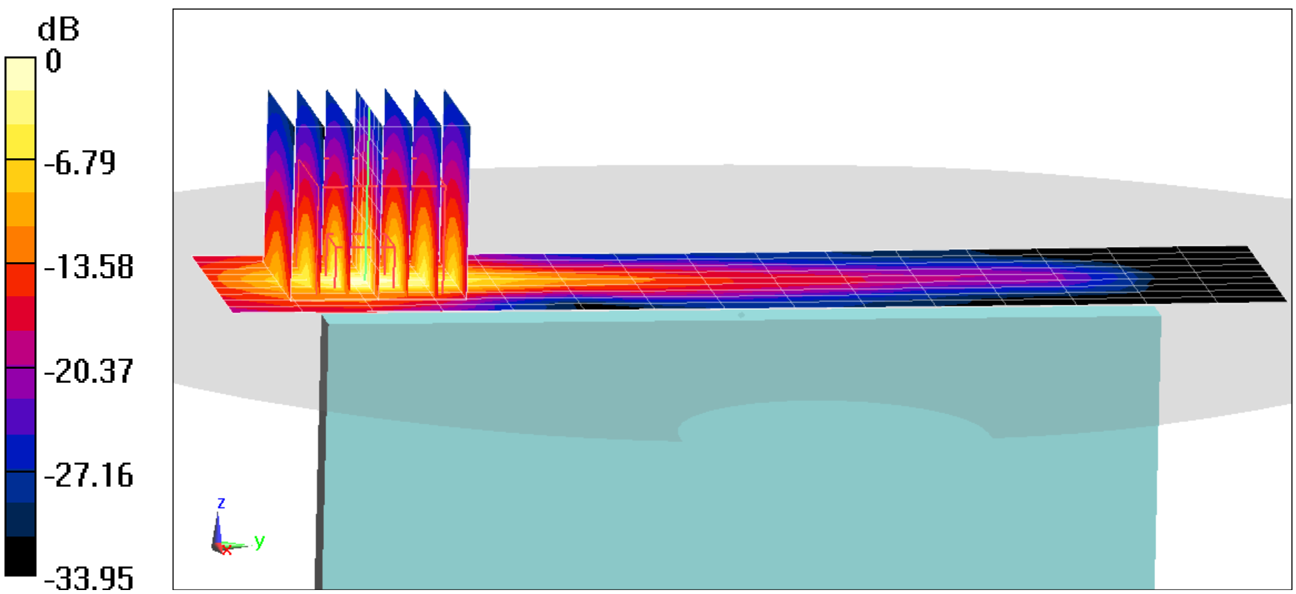
Communication System: UID 0, _LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2450 Body Medium parameters used (interpolated):
$f = 2680$ MHz; $\sigma = 2.325$ S/m; $\varepsilon_r = 51.728$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-02-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3347; ConvF(4.49, 4.49, 4.49) @ 2680 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: LTE Band 41 ULCA, Phablet SAR, Left Edge,**
**PCC: 20 MHz Bandwidth, QPSK, Ch. 41490, 1 RB, 0 RB Offset**
**SCC: 20 MHz Bandwidth, QPSK, Ch. 41292, 1 RB, 99 RB Offset**

**Area Scan (10x16x1):** Measurement grid: dx=5mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 48.08 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 16.8 W/kg
**SAR(10 g) = 1.07 W/kg**




0 dB = 7.01 W/kg = 8.46 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1151M**

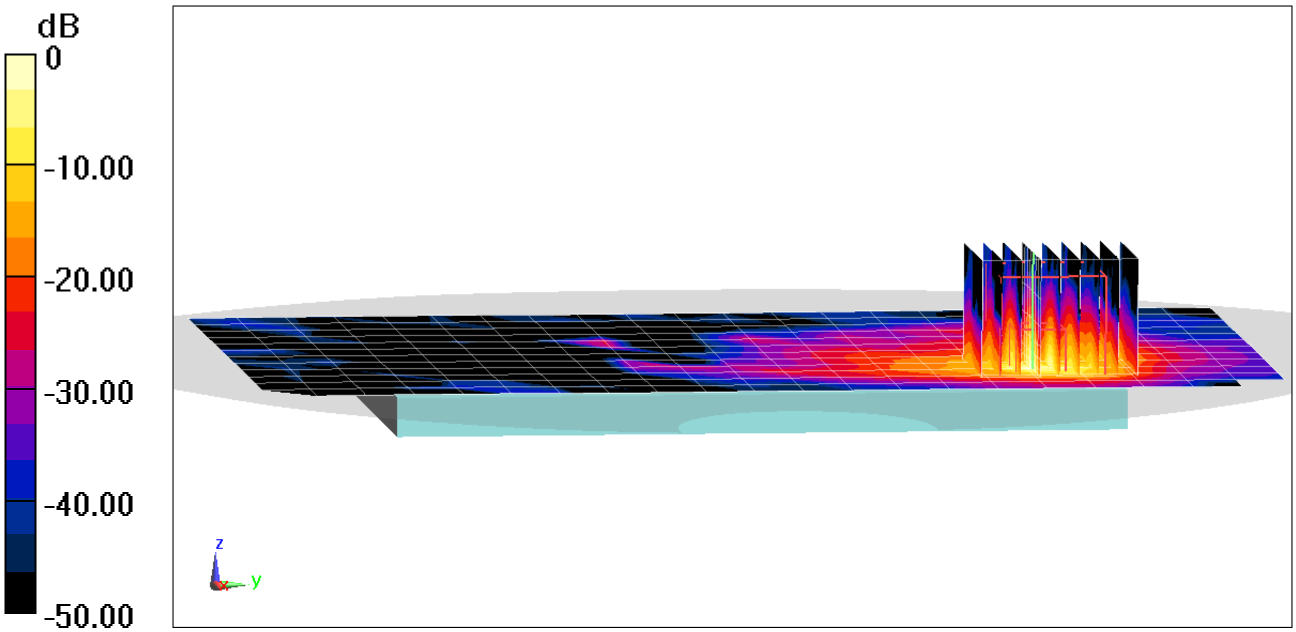
Communication System: UID 0, 802.11n 5.2-5.8 GHz Band; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5600 MHz; $\sigma$ = 5.888 S/m; $\varepsilon_r$ = 46.674; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-03-2019; Ambient Temp: 21.5°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7308; ConvF(4, 4, 4) @ 5600 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: IEEE 802.11n MIMO, U-NII-2C, 20 MHz Bandwidth, Phablet SAR, Ch 120, 13 Mbps, Back Side**

**Area Scan (13x22x1):** Measurement grid: dx=10mm, dy=10mm
**Zoom Scan (8x9x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 50.78 V/m; Power Drift = -0.21 dB
Peak SAR (extrapolated) = 149 W/kg
**SAR(10 g) = 2.99 W/kg**




0 dB = 66.9 W/kg = 18.25 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0896M**

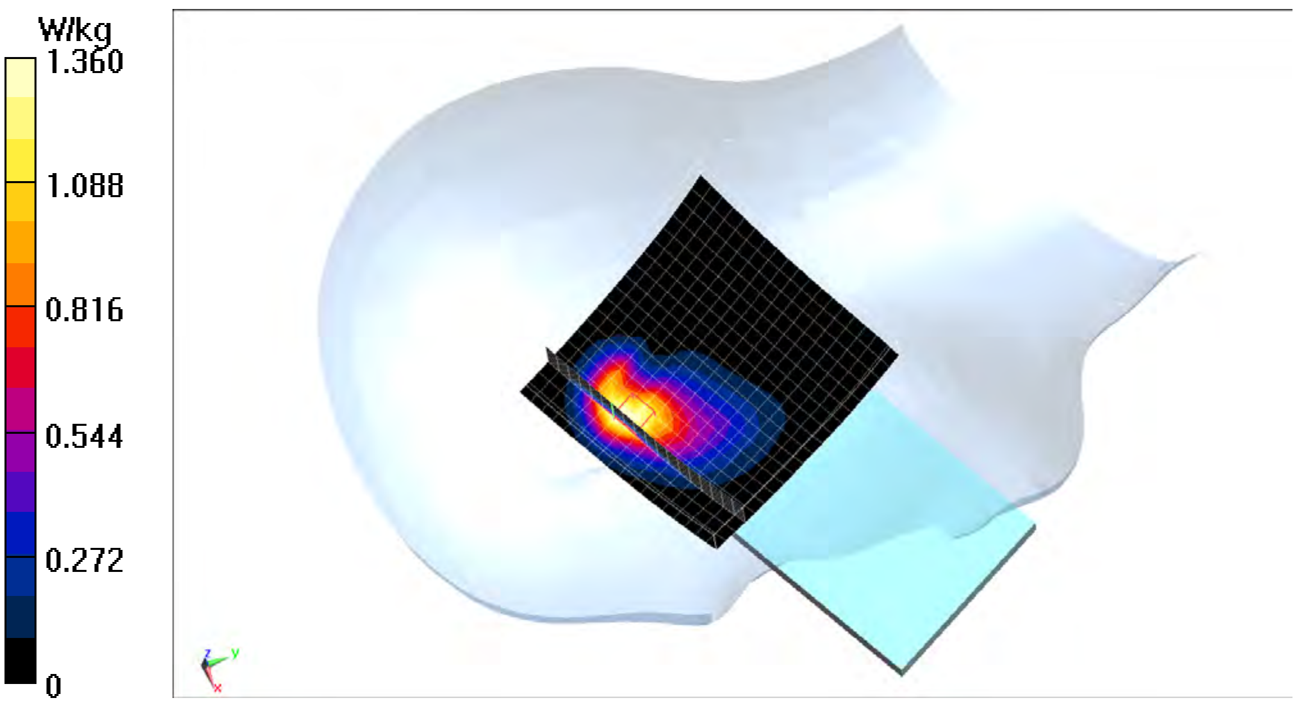
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.289
Medium: 2450 Head Medium parameters used (interpolated):
f = 2441 MHz; $\sigma$ = 1.862 S/m; $\varepsilon_r$ = 40.48; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Test Date: 01-09-2019; Ambient Temp: 22.4°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7410; ConvF(7.5, 7.5, 7.5) @ 2441 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## Mode: Bluetooth, Right Head, Cheek, Ch 39, 1 Mbps

**Zoom Scan (20x19x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.950 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.82 W/kg
**SAR(1 g) = 0.860 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0896M**

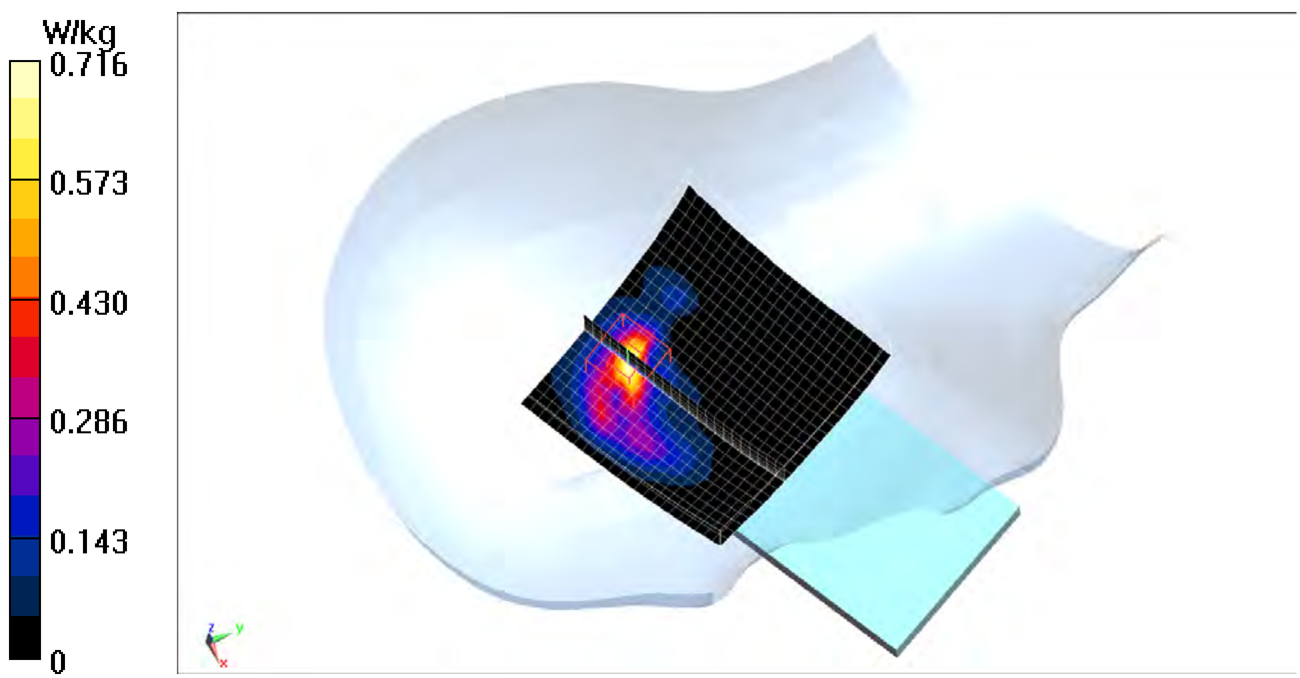
Communication System: UID 0, 802.11n; Frequency: 5270 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5270 MHz; $\sigma$ = 4.588 S/m; $\varepsilon_r$ = 35.267; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Test Date: 01-07-2019; Ambient Temp: 21.2°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7409; ConvF(5.2, 5.2, 5.2) @ 5270 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## Mode: IEEE 802.11n Antenna 1, U-NII-2A, 40 MHz Bandwidth, Right Head, Cheek, Ch 54, 13.5 Mbps

**Zoom Scan (25x24x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 3.669 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.12 W/kg
**SAR(1 g) = 0.275 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0896M**

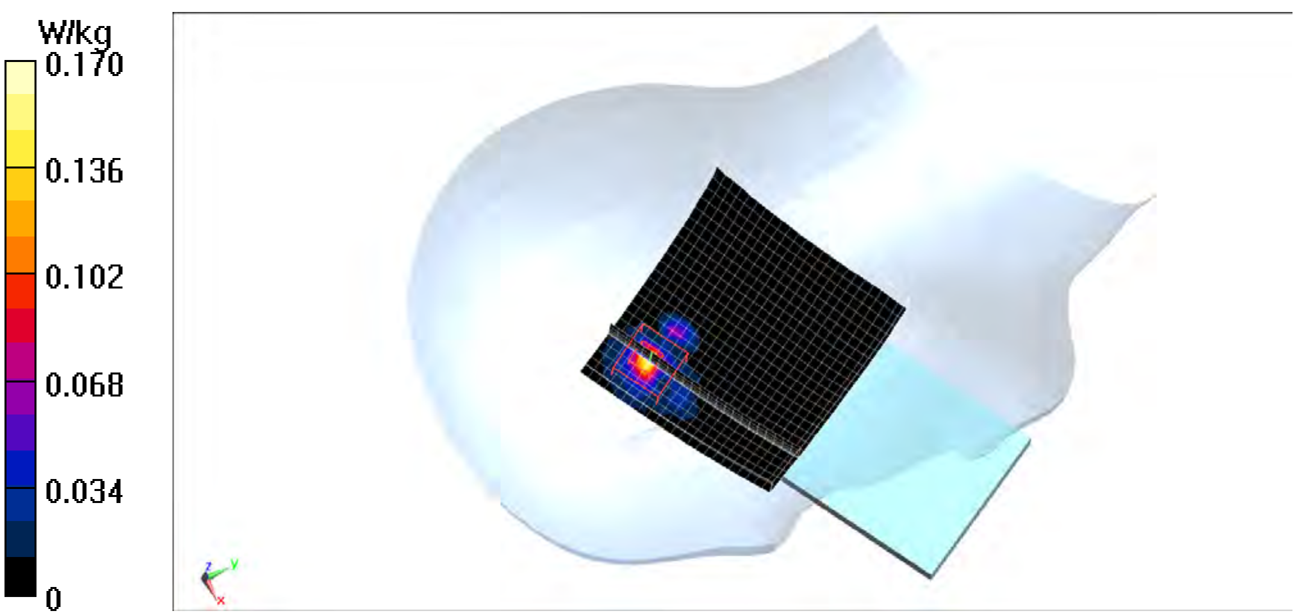
Communication System: UID 0, 802.11ac; Frequency: 5775 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5775 MHz; $\sigma$ = 5.107 S/m; $\varepsilon_r$ = 34.611; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Test Date: 01-07-2019; Ambient Temp: 21.2°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7409; ConvF(4.82, 4.82, 4.82) @ 5775 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: IEEE 802.11ac Antenna 2, U-NII-3, 80 MHz Bandwidth, Right Head, Cheek, Ch 155, 29.3 Mbps**

**Zoom Scan (25x24x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 0.4420 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.438 W/kg
**SAR(1 g) = 0.043 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 0896M**

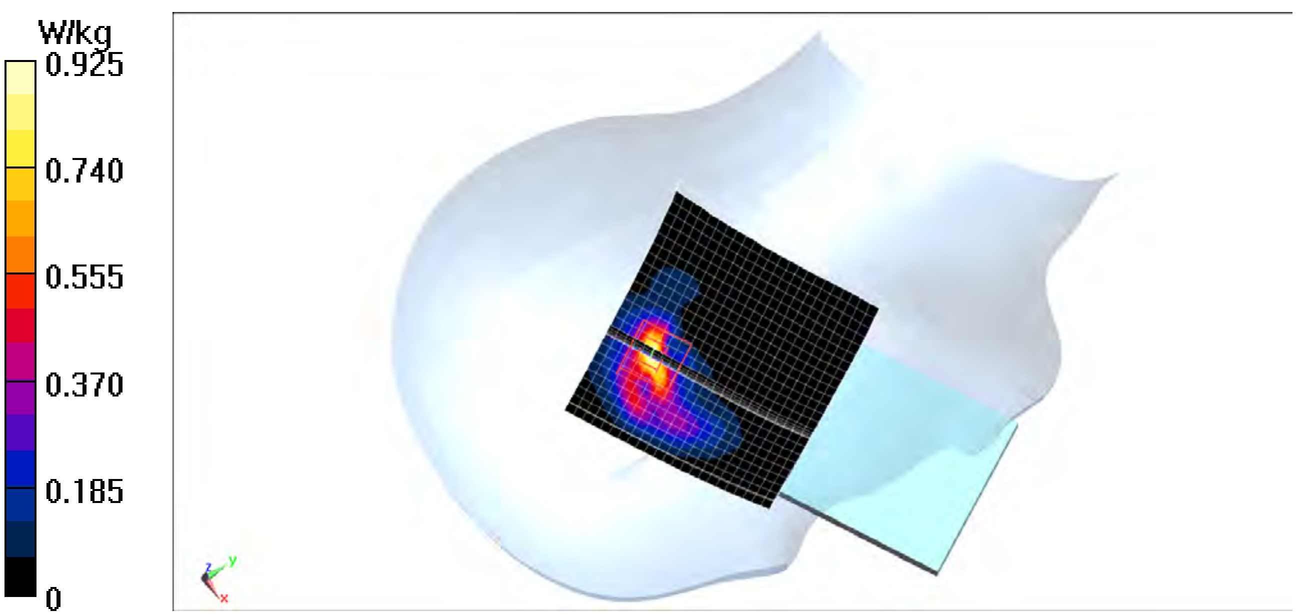
Communication System: UID 0, 802.11n; Frequency: 5270 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5270 MHz; $\sigma$ = 4.588 S/m; $\varepsilon_r$ = 35.267; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

Test Date: 01-07-2019; Ambient Temp: 21.2°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7409; ConvF(5.2, 5.2, 5.2) @ 5270 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## Mode: IEEE 802.11n MIMO, U-NII-2A, 40 MHz Bandwidth, Right Head, Cheek, Ch 54, 27 Mbps

**Zoom Scan (25x24x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 4.459 V/m; Power Drift = -0.20 dB
Peak SAR (extrapolated) = 1.47 W/kg
**SAR(1 g) = 0.355 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1150M**

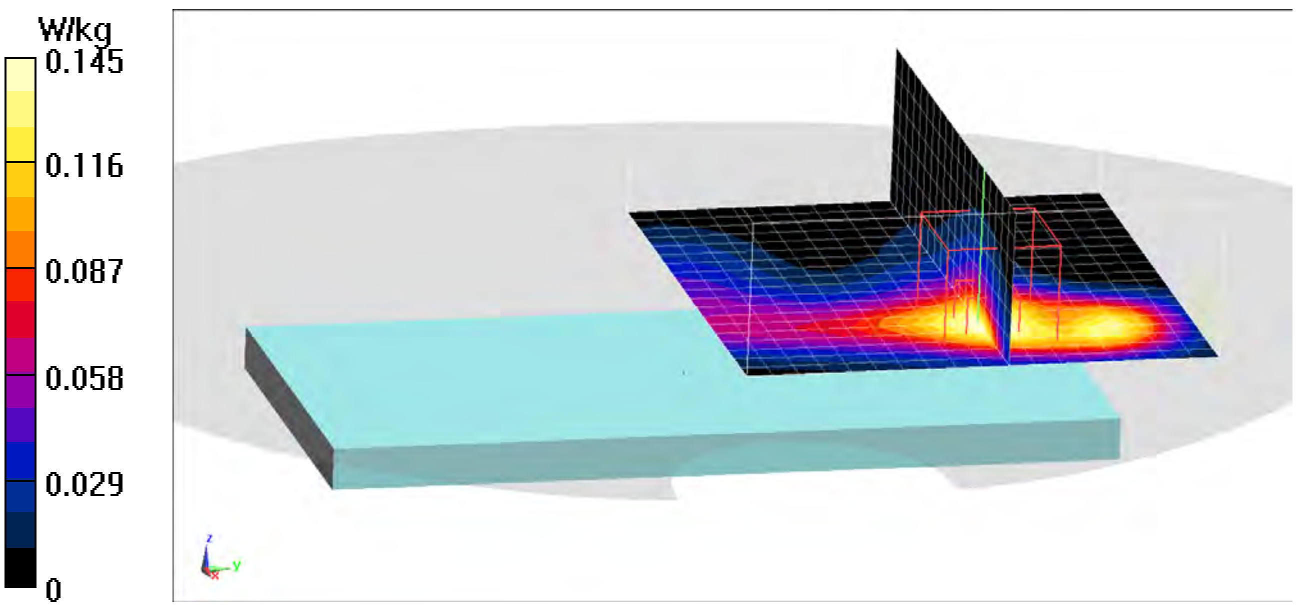
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.289
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; $\sigma$ = 2.033 S/m; $\varepsilon_r$ = 51.738; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-21-2019; Ambient Temp: 21.6°C; Tissue Temp: 21.0°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2441 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## Mode: Bluetooth, Body SAR, Ch 39, 1 Mbps, Back Side

**Zoom Scan (20x19x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.757 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.226 W/kg
**SAR(1 g) = 0.118 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1164M**

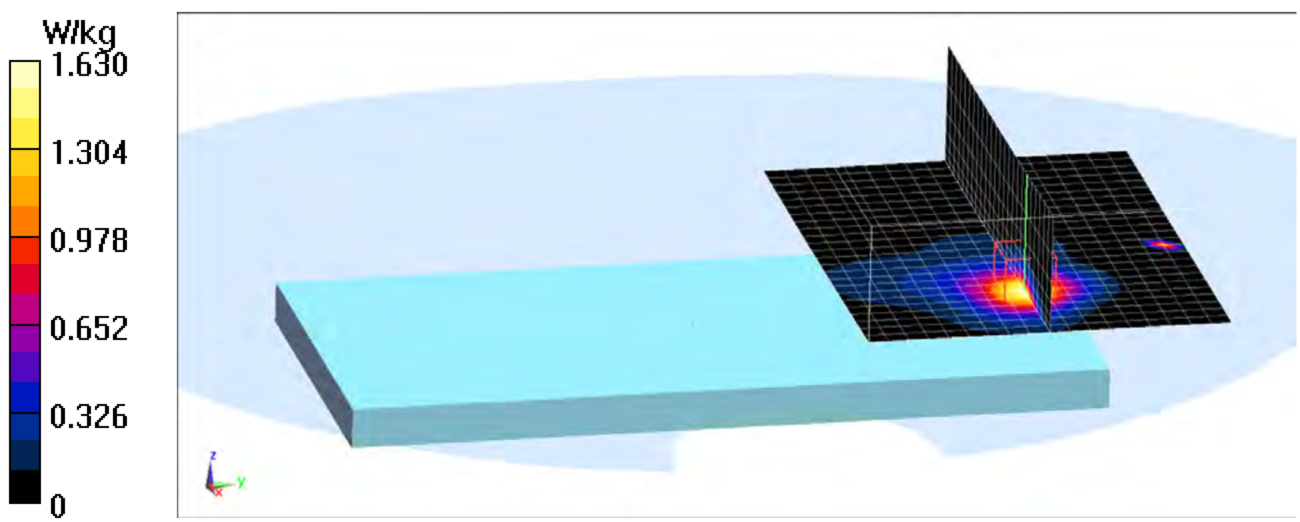
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5785 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5785 MHz; $\sigma$ = 6.133 S/m; $\varepsilon_r$ = 46.811; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-08-2019; Ambient Temp: 23.0°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN7357; ConvF(4.21, 4.21, 4.21) @ 5785 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Left; Type: QD000P40CD; Serial: 1687
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: IEEE 802.11a Antenna 2, UNII-3, 20 MHz Bandwidth,
Body SAR, Ch 157, 6 Mbps, Back Side**

**Zoom Scan (25x19x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 11.11 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.63 W/kg
**SAR(1 g) = 0.619 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset; Serial: 1164M**

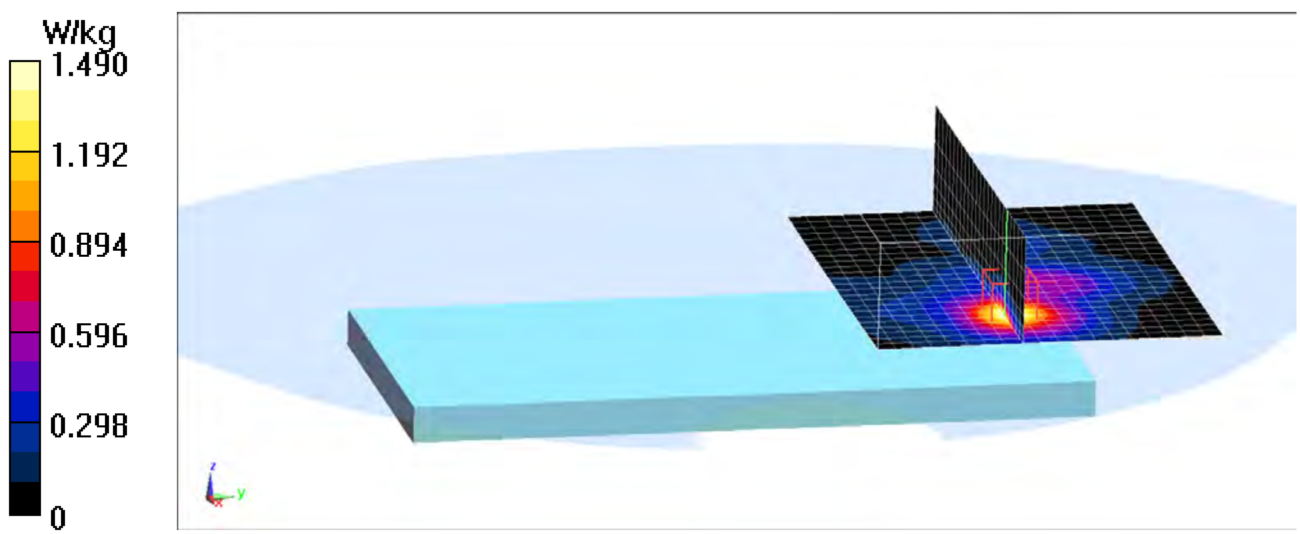
Communication System: UID 0, 802.11n; Frequency: 5745 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5745 MHz; $\sigma$ = 6.073 S/m; $\varepsilon_r$ = 46.86; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-08-2019; Ambient Temp: 23.0°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN7357; ConvF(4.21, 4.21, 4.21) @ 5745 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Left; Type: QD000P40CD; Serial: 1687
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**Mode: IEEE 802.11n MIMO, UNII-3, 20 MHz Bandwidth,**
**Body SAR, Ch 149, 13 Mbps, Back Side,**

**Zoom Scan (25x20x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 2.920 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 2.73 W/kg
**SAR(1 g) = 0.614 W/kg**



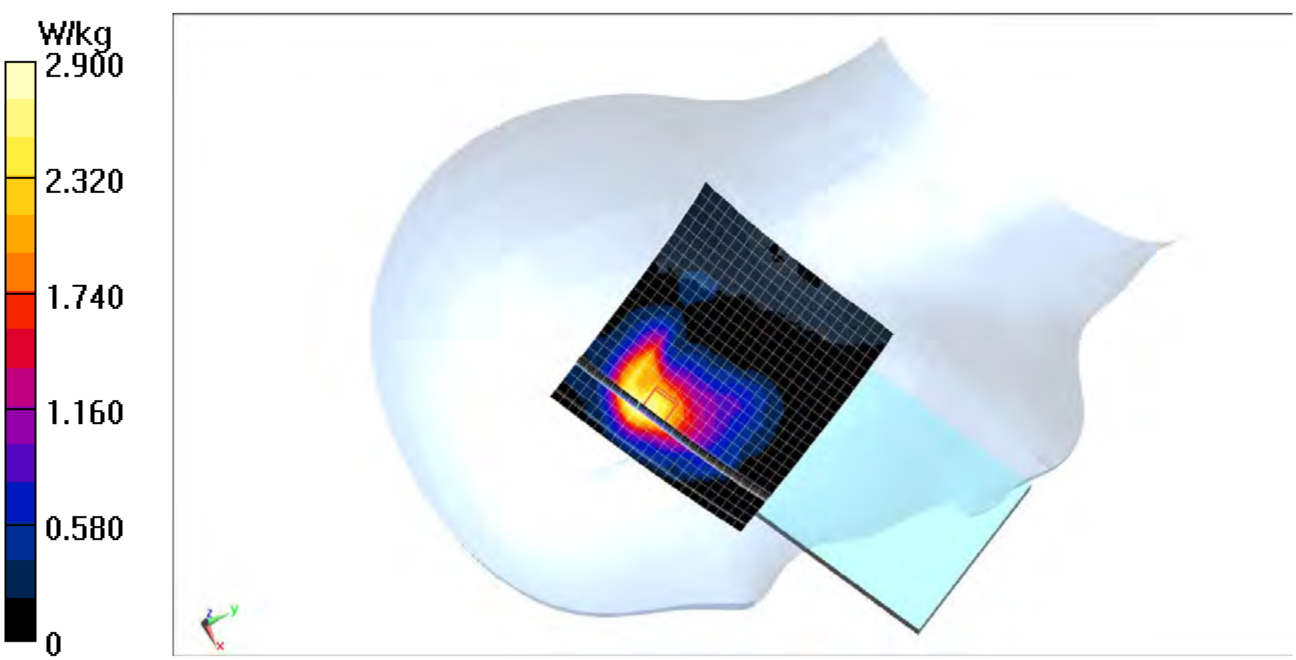
# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset**

**Mode: Bluetooth, Right Head, Cheek, Ch 39, 1 Mbps, Scaling Factor: 1.404**
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.289
Medium: 2450 Head Medium parameters used (interpolated):
f = 2441 MHz; $\sigma$ = 1.862 S/m; $\varepsilon_r$ = 40.48; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

**Mode: IEEE 802.11n Antenna 1, U-NII-2A, 40 MHz Bandwidth,**
**Right Head, Cheek, Ch 54, 13.5 Mbps, Scaling Factor: 1.147**
Communication System: UID 0, 802.11n; Frequency: 5270 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5270 MHz; $\sigma$ = 4.588 S/m; $\varepsilon_r$ = 35.267; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

**Multi Band Result:**
**SAR(1 g) = 1.31 W/kg**



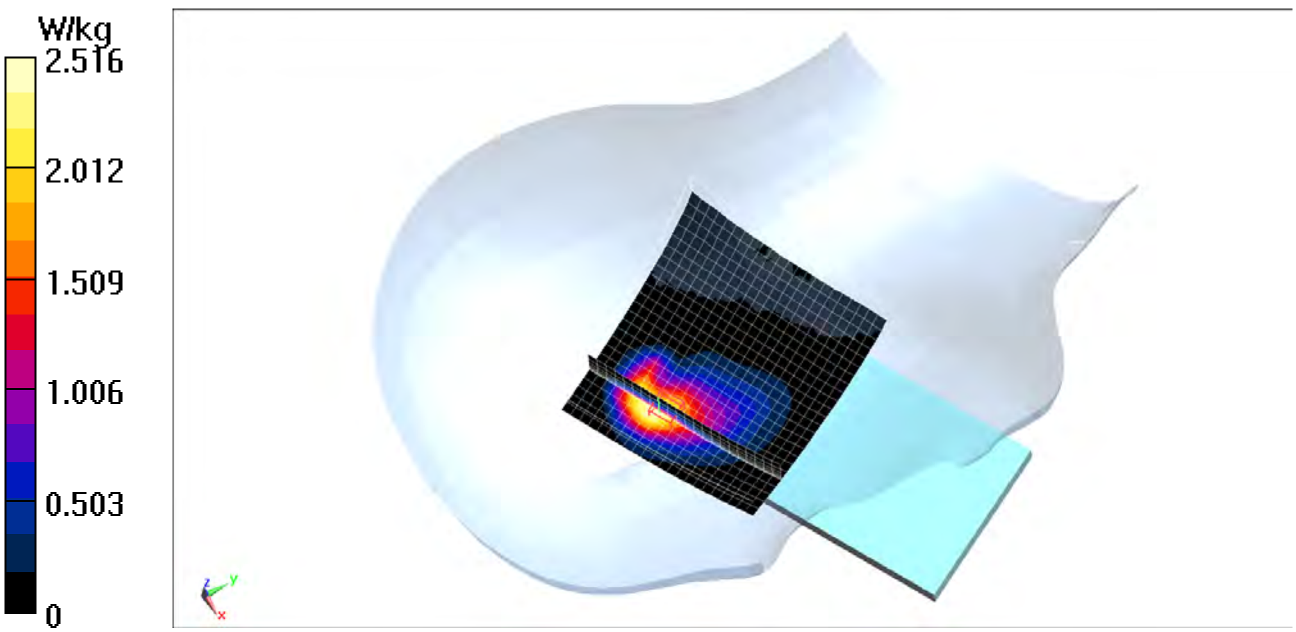
# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset**

**Mode: Bluetooth, Right Head, Cheek, Ch 39, 1 Mbps, Scaling Factor: 1.404**
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.289
Medium: 2450 Head Medium parameters used (interpolated):
$f = 2441$ MHz; $\sigma = 1.862$ S/m; $\varepsilon_r = 40.48$; $\rho = 1000$ kg/m$^3$
Phantom section: Right Section

**Mode: IEEE 802.11ac Antenna 2, U-NII-3, 80 MHz Bandwidth,**
**Right Head, Cheek, Ch 155, 29.3 Mbps, Scaling Factor: 1.101**
Communication System: UID 0, 802.11ac; Frequency: 5775 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
$f = 5775$ MHz; $\sigma = 5.107$ S/m; $\varepsilon_r = 34.611$; $\rho = 1000$ kg/m$^3$
Phantom section: Right Section

**Multi Band Result:**
**SAR(1 g) = 1.19 W/kg**



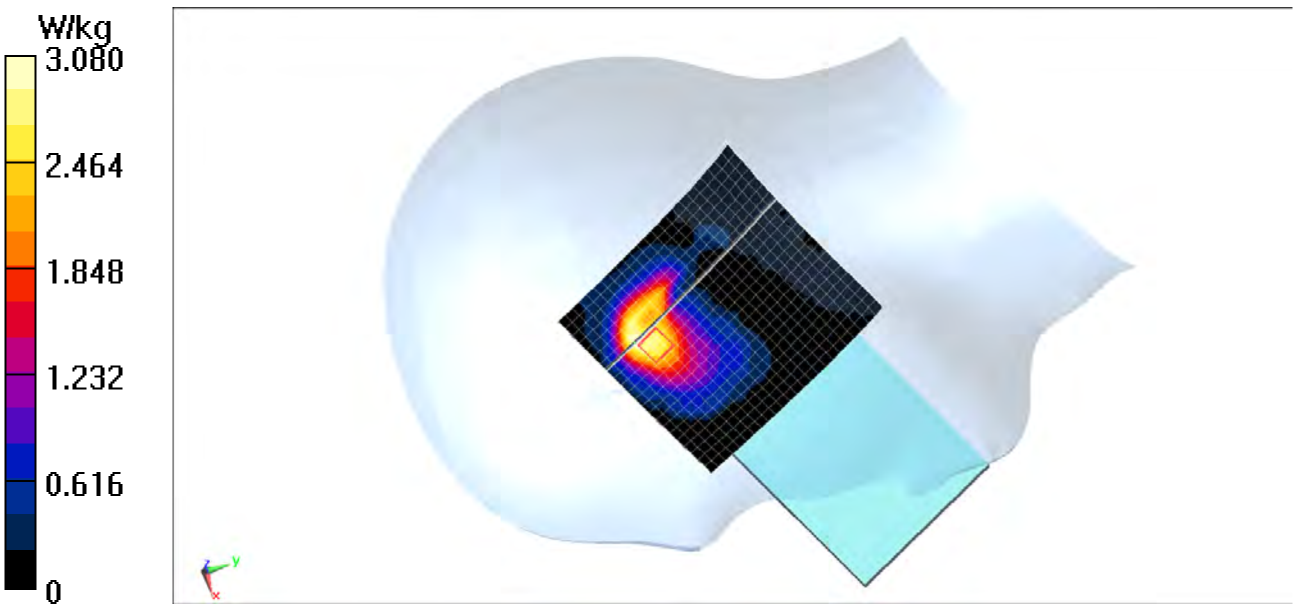
# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset**

**Mode: Bluetooth, Right Head, Cheek, Ch 39, 1 Mbps, Scaling Factor: 1.404**
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.289
Medium: 2450 Head Medium parameters used (interpolated):
f = 2441 MHz; $\sigma$ = 1.862 S/m; $\varepsilon_r$ = 40.48; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

**Mode: IEEE 802.11n MIMO, U-NII-2A, 40 MHz Bandwidth,**
**Right Head, Cheek, Ch 54, 27 Mbps, Scaling Factor: 1.147**
Communication System: UID 0, 802.11n; Frequency: 5270 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5270 MHz; $\sigma$ = 4.588 S/m; $\varepsilon_r$ = 35.267; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

**Multi Band Result:**
**SAR(1 g) = 1.37 W/kg**



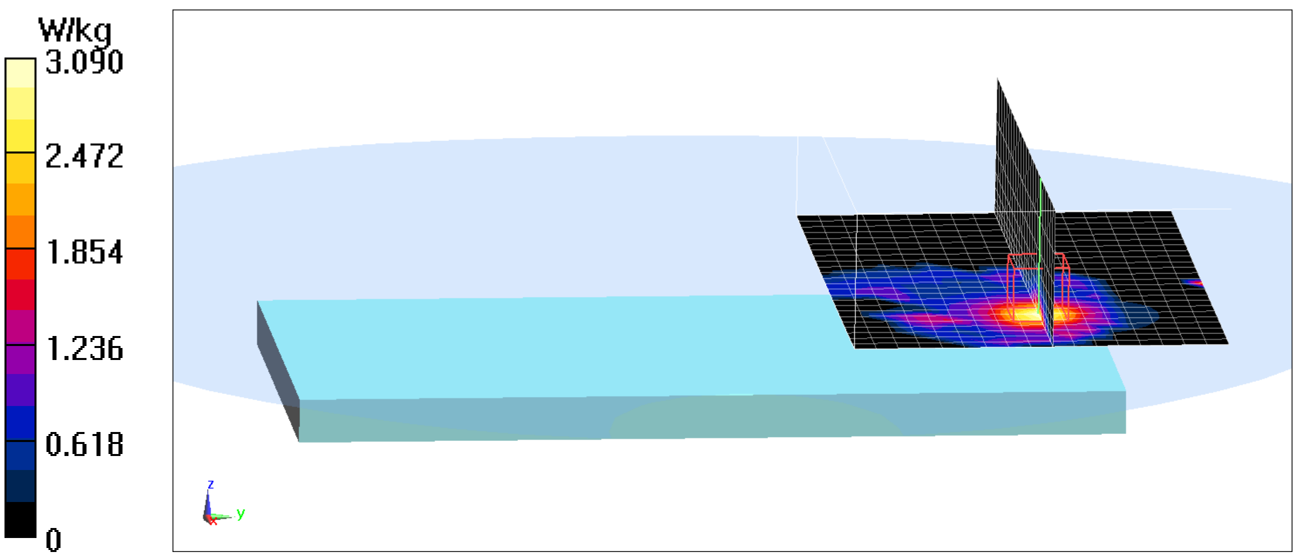
# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG9730; Type: Portable Handset**

**Mode: Bluetooth, Body SAR, Ch 39, 1 Mbps, Back Side, Scaling Factor: 1.404**
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.289
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; $\sigma$ = 2.033 S/m; $\varepsilon_r$ = 51.738; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

**Mode: IEEE 802.11a Antenna 2, UNII-3, 20 MHz Bandwidth,
Body SAR, Ch 157, 6 Mbps, Back Side, Scaling Factor: 1.075**
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5785 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5785 MHz; $\sigma$ = 6.133 S/m; $\varepsilon_r$ = 46.811; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

**Multi Band Result:**
**SAR(1 g) = 0.828 W/kg**

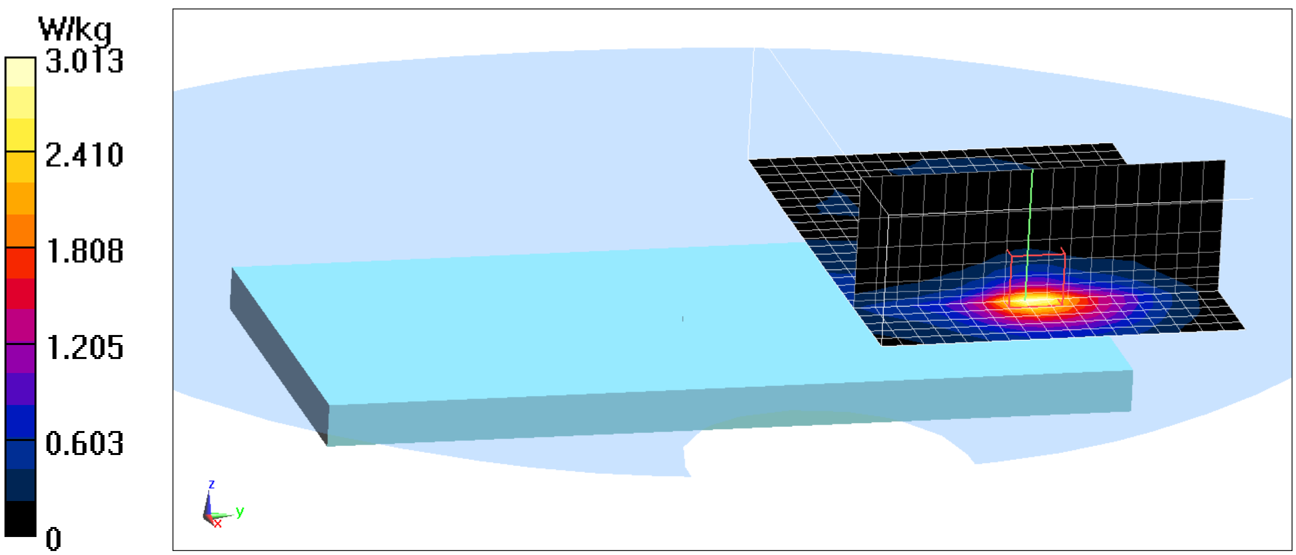


**DUT: A3LSMG9730; Type: Portable Handset**

**Mode: Bluetooth, Body SAR, Ch 39, 1 Mbps, Back Side, Scaling Factor: 1.404**
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.289
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; $\sigma$ = 2.033 S/m; $\varepsilon_r$ = 51.738; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

**Mode: IEEE 802.11n MIMO, UNII-3, 20 MHz Bandwidth,**
**Body SAR, Ch 149, 13 Mbps, Back Side, Scaling Factor: 1.125**
Communication System: UID 0, 802.11n; Frequency: 5745 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5745 MHz; $\sigma$ = 6.073 S/m; $\varepsilon_r$ = 46.86; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

**Multi Band Result:**
**SAR(1 g) = 0.854 W/kg**



# APPENDIX B: SYSTEM VERIFICATION

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 750 MHz; Type: D750V3; Serial: 1003**

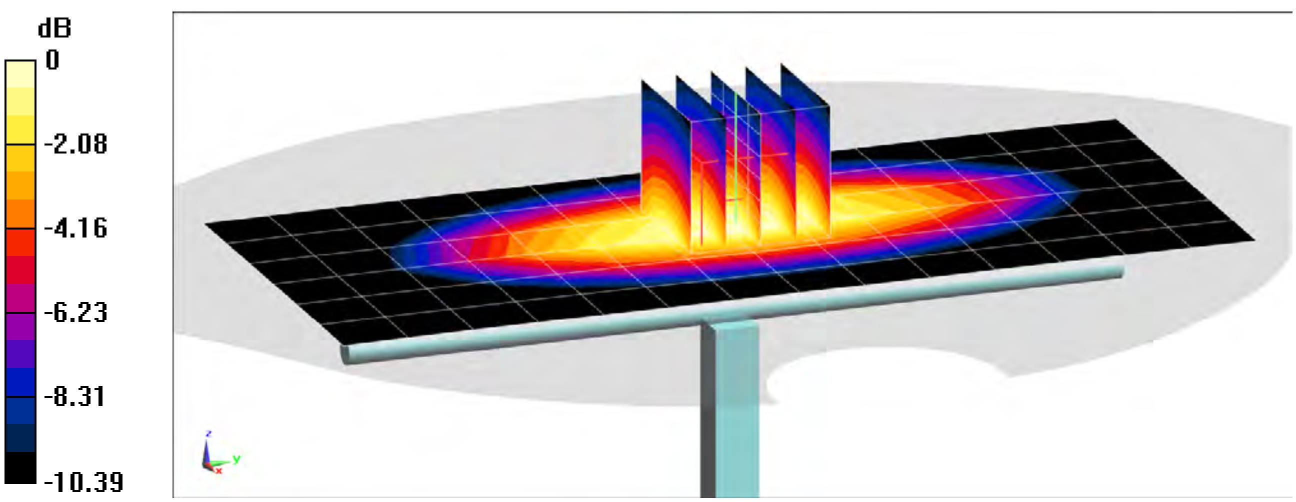
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head; Medium parameters used (interpolated):
f = 750 MHz; $\sigma$ = 0.906 S/m; $\varepsilon_r$ = 41.172; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-26-2018; Ambient Temp: 22.5°C; Tissue Temp: 19.8°C

Probe: ES3DV3 - SN3287; ConvF(6.76, 6.76, 6.76) @ 750 MHz; Calibrated: 10/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/18/2018
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 750 MHz System Verification at 23.0 dBm (200 mW)

**Area Scan (7x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.52 W/kg
**SAR(1 g) = 1.67 W/kg**
Deviation(1 g) = 0.85%




0 dB = 1.96 W/kg = 2.92 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d047**

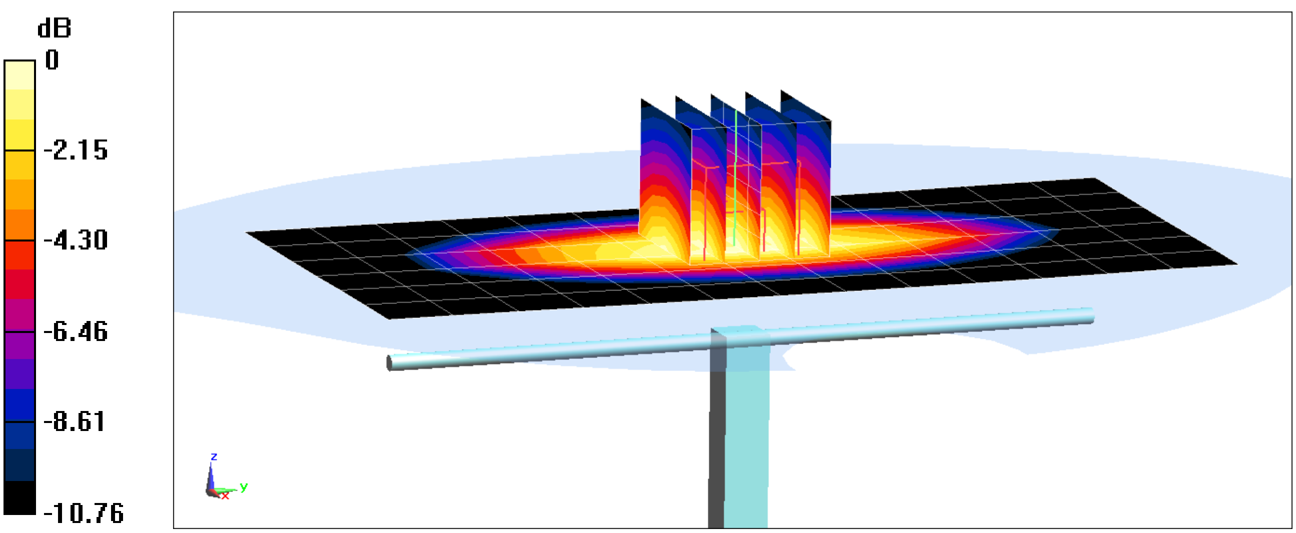
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; $\sigma$ = 0.903 S/m; $\varepsilon_r$ = 40.65; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-22-2018; Ambient Temp: 21.7°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7410; ConvF(9.81, 9.81, 9.81) @ 835 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**835 MHz System Verification at 23.0 dBm (200 mW)**

**Area Scan (7x14x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.90 W/kg
**SAR(1 g) = 1.93 W/kg**
Deviation(1 g) = 1.90%




0 dB = 2.58 W/kg = 4.12 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1148**

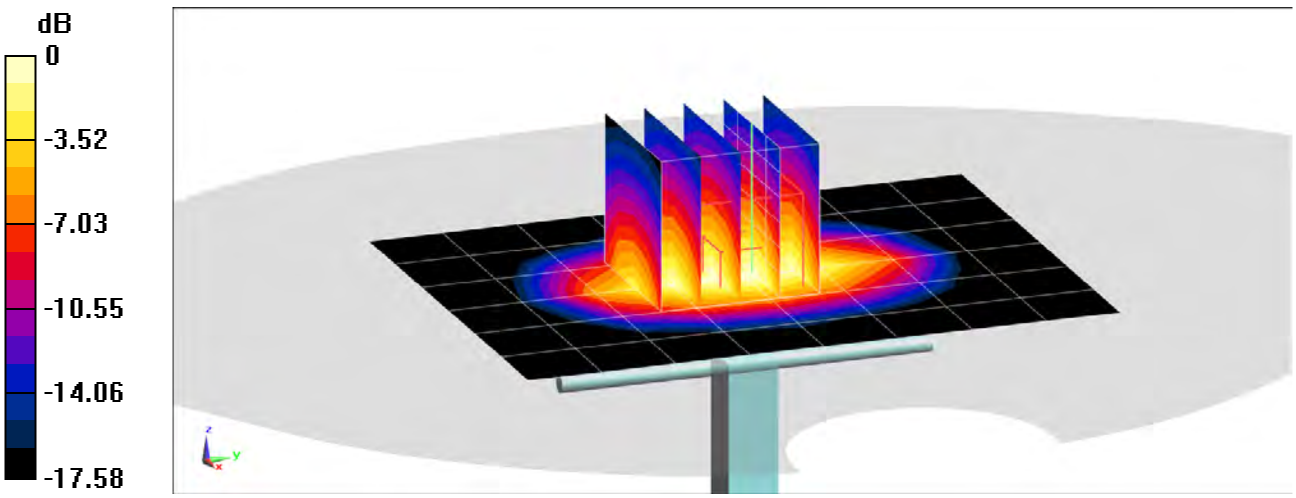
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used:
f = 1750 MHz; $\sigma$ = 1.382 S/m; $\varepsilon_r$ = 38.985; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-25-2018; Ambient Temp: 19.8°C; Tissue Temp: 19.8°C

Probe: ES3DV3 - SN3287; ConvF(5.48, 5.48, 5.48) @ 1750 MHz; Calibrated: 10/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/18/2018
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 1750 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (7x9x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.60 W/kg
**SAR(1 g) = 3.66 W/kg**
Deviation(1 g) = 0.55%




0 dB = 4.53 W/kg = 6.56 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d080**

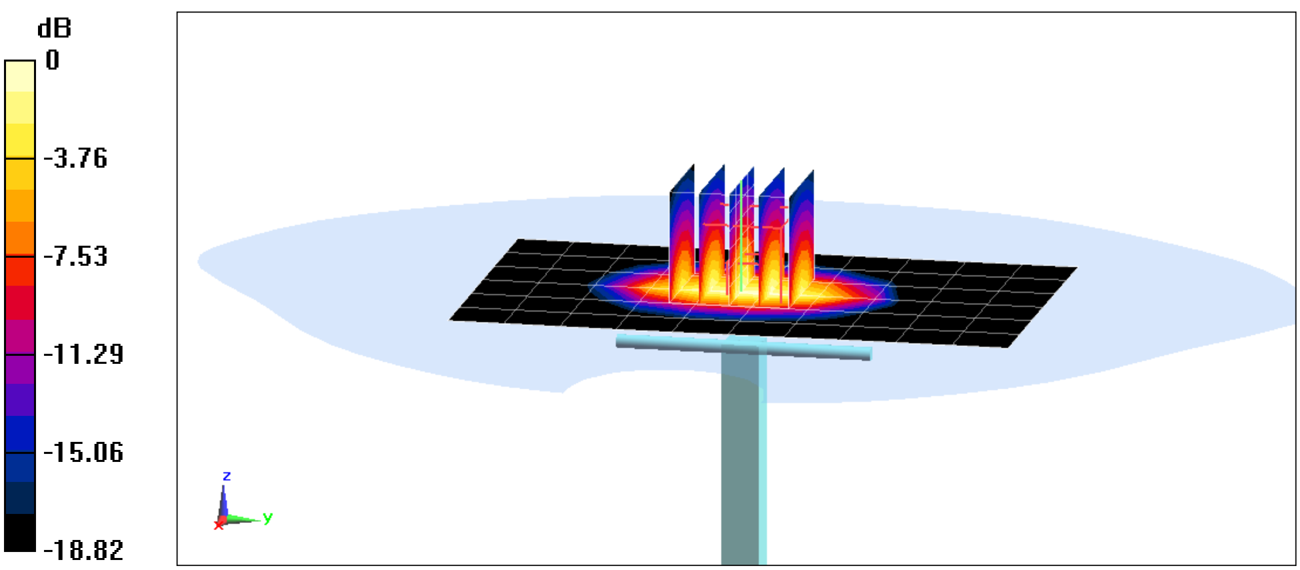
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; $\sigma$ = 1.44 S/m; $\varepsilon_r$ = 40.081; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-19-2018; Ambient Temp: 21.6°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7409; ConvF(8.05, 8.05, 8.05) @ 1900 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 1900 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (7x11x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.87 W/kg
**SAR(1 g) = 4.11 W/kg**
Deviation(1 g) = 3.27%




0 dB = 6.50 W/kg = 8.13 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981**

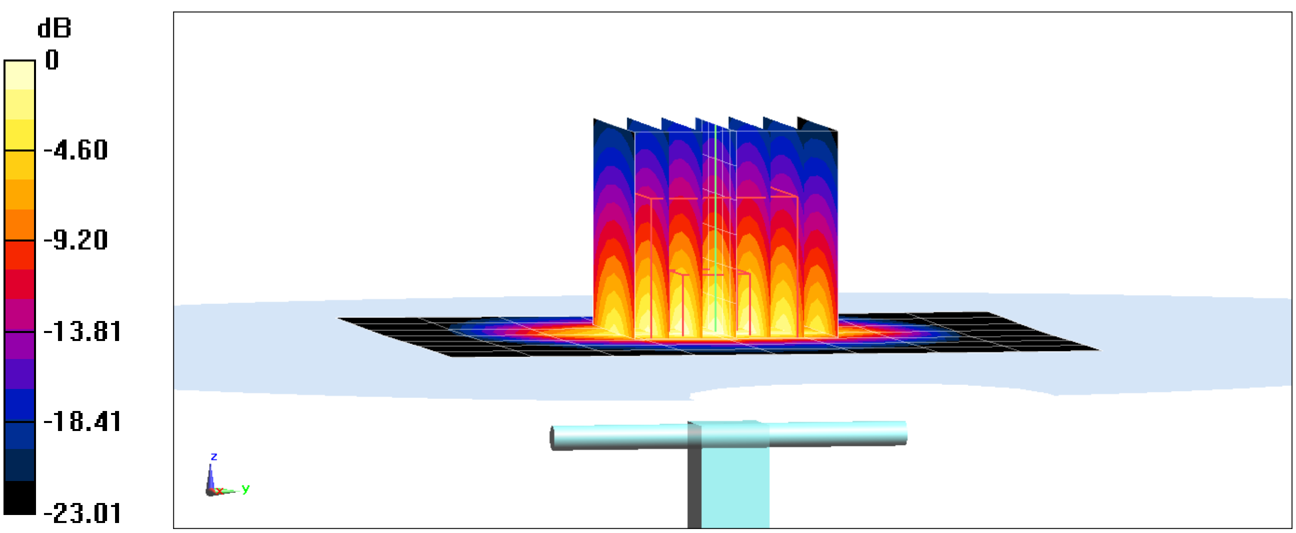
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; $\sigma$ = 1.862 S/m; $\varepsilon_r$ = 38.272; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-17-2018; Ambient Temp: 21.9°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7410; ConvF(7.5, 7.5, 7.5) @ 2450 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 2450 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.2 W/kg
**SAR(1 g) = 5.25 W/kg**
Deviation(1 g) = 0.38%




0 dB = 8.96 W/kg = 9.52 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981**

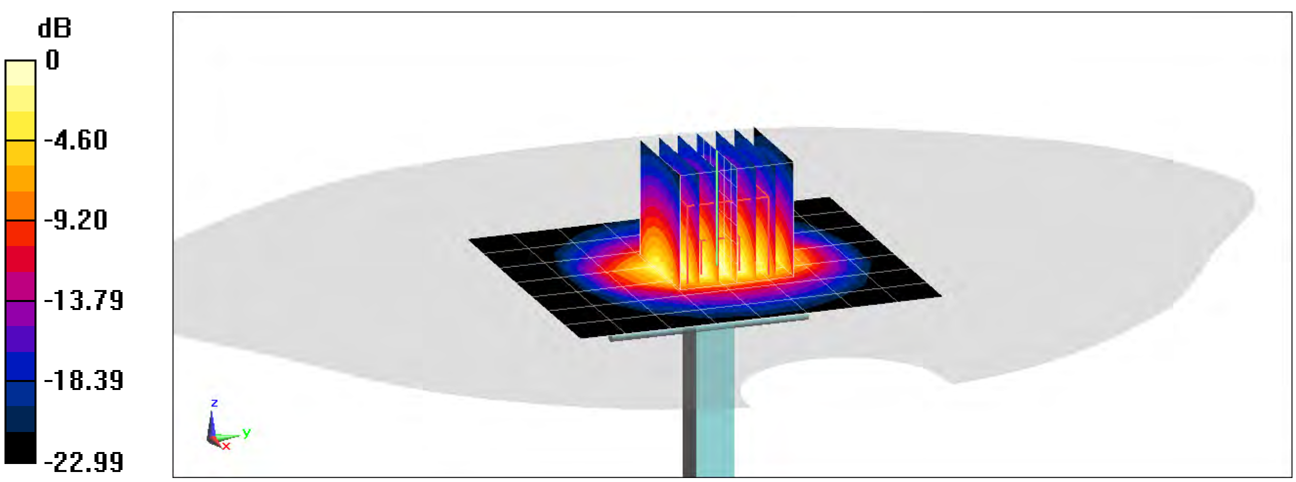
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head; Medium parameters used:
f = 2450 MHz; $\sigma = 1.871$ S/m; $\varepsilon_r = 39.417$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-26-2018; Ambient Temp: 20.9°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7406; ConvF(7.54, 7.54, 7.54) @ 2450 MHz; Calibrated: 5/22/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/22/2018
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 2450 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.4 W/kg
**SAR(1 g) = 5.28 W/kg**
Deviation(1 g) = 0.96%




0 dB = 9.04 W/kg = 9.56 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 797**

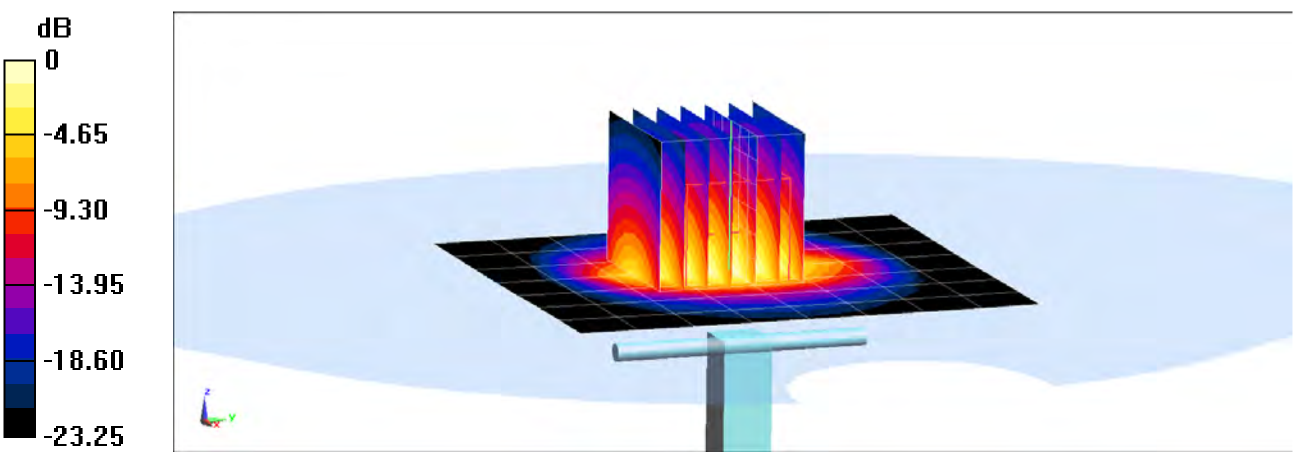
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; $\sigma$ = 1.869 S/m; $\varepsilon_r$ = 40.474; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-09-2019; Ambient Temp: 22.4°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7410; ConvF(7.5, 7.5, 7.5) @ 2450 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 2450 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.4 W/kg
**SAR(1 g) = 5.45 W/kg**
Deviation(1 g) = 3.42%




0 dB = 9.10 W/kg = 9.59 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981**

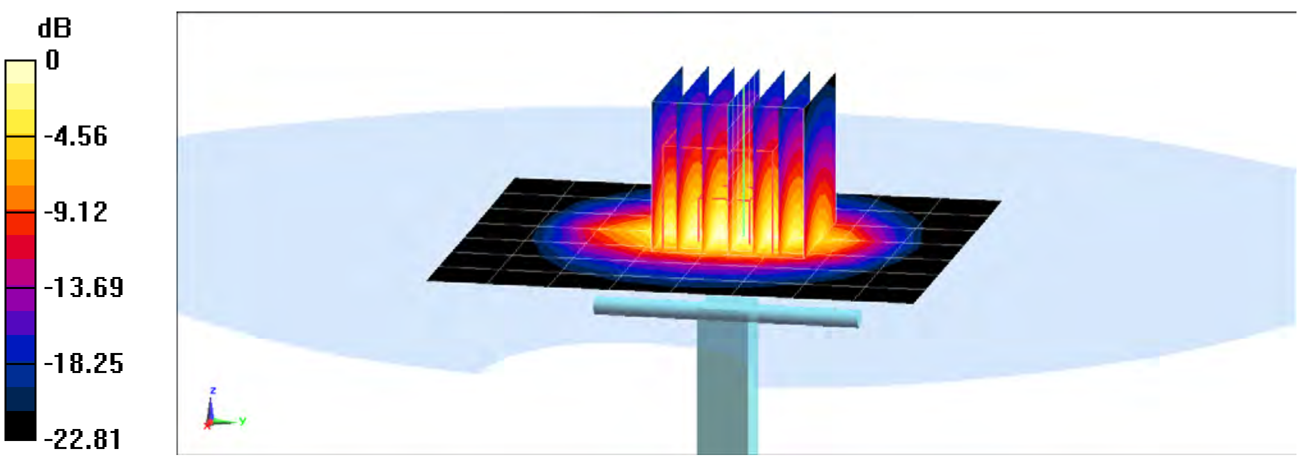
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; $\sigma$ = 1.86 S/m; $\varepsilon_r$ = 39.294; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 1-22-2019; Ambient Temp: 21.9°C; Tissue Temp: 20.4°C

Probe: EX3DV4 - SN7409; ConvF(7.23, 7.23, 7.23) @ 2450 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**2450 MHz System Verification at 20.0 dBm (100 mW)**

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.5 W/kg
**SAR(1 g) = 5.4 W/kg**
Deviation(1 g) = 3.25%




0 dB = 9.07 W/kg = 9.58 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1004**

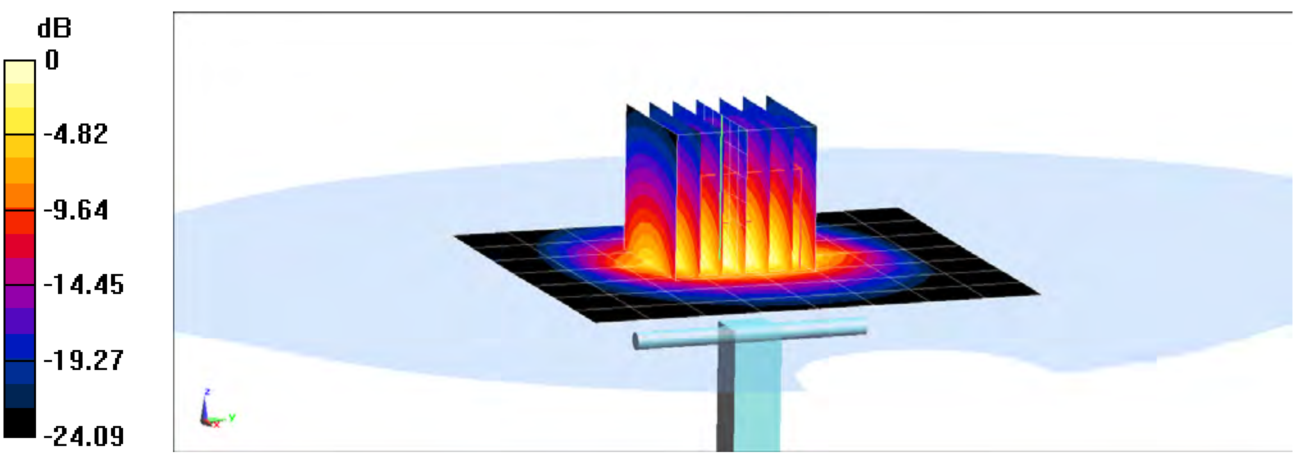
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2600 MHz; $\sigma$ = 1.989 S/m; $\varepsilon_r$ = 40.149; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-09-2019; Ambient Temp: 22.4°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7410; ConvF(7.24, 7.24, 7.24) @ 2600 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 2600 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 12.7 W/kg
**SAR(1 g) = 5.89 W/kg**
Deviation(1 g) = 5.37%




0 dB = 9.96 W/kg = 9.98 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191**

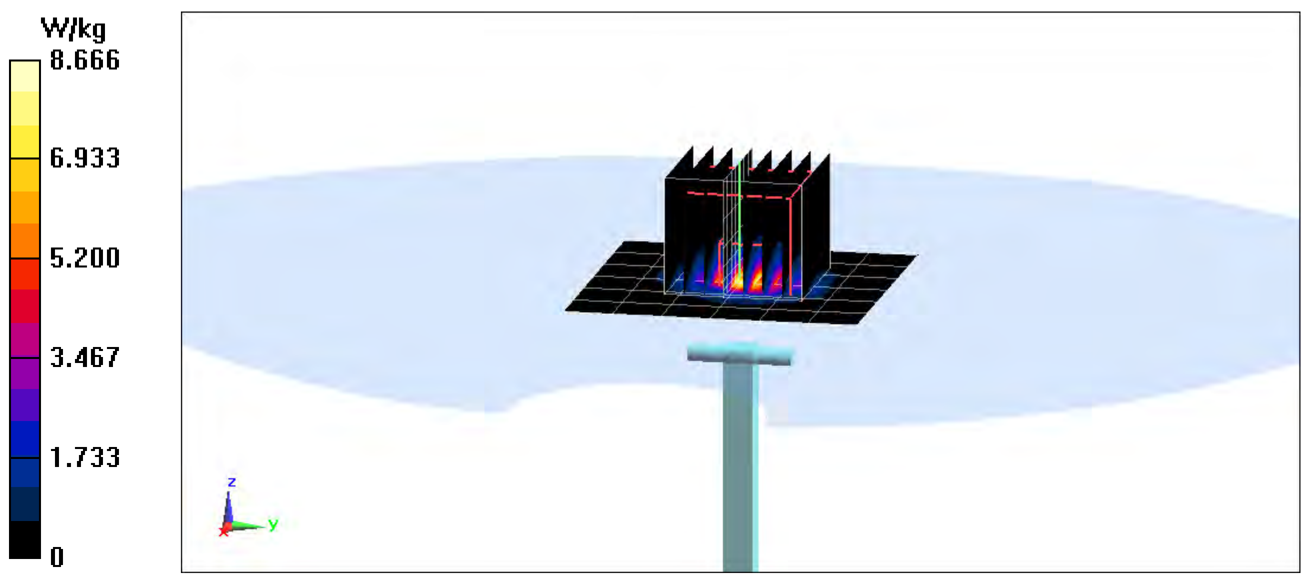
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5250 MHz; $\sigma$ = 4.564 S/m; $\varepsilon_r$ = 35.313; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-07-2019; Ambient Temp: 21.2°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7409; ConvF(5.2, 5.2, 5.2) @ 5250 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 5250 MHz System Verification at 17.0 dBm (50 mW)

**Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 15.1 W/kg
**SAR(1 g) = 3.65 W/kg**
Deviation(1 g) = -7.48%



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191**

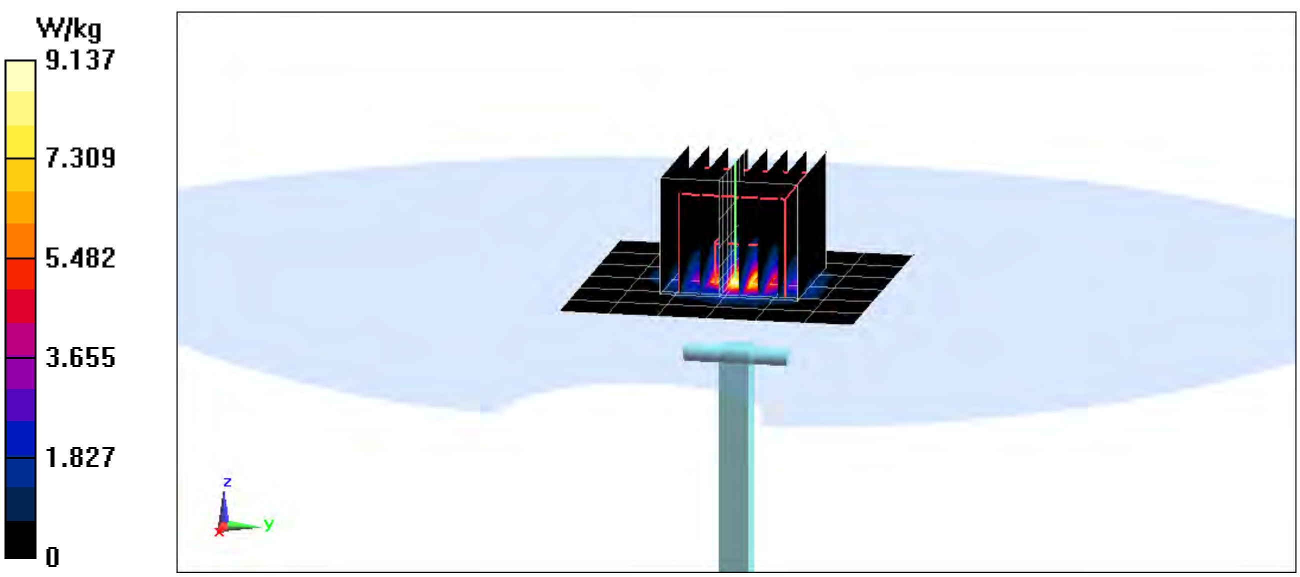
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used:
f = 5600 MHz; $\sigma$ = 4.923 S/m; $\varepsilon_r$ = 34.867; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-07-2019; Ambient Temp: 21.2°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7409; ConvF(4.77, 4.77, 4.77) @ 5600 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 5600 MHz System Verification at 17.0 dBm (50 mW)

**Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.6 W/kg
**SAR(1 g) = 4.0 W/kg**
Deviation(1 g) = -4.31%



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191**

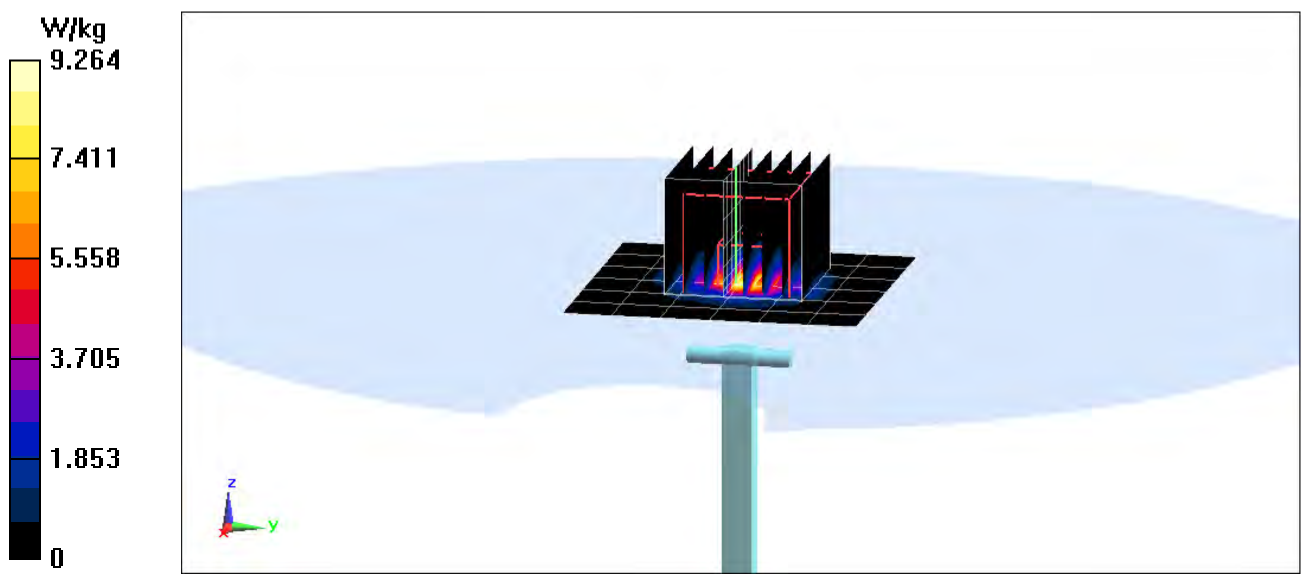
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5750 MHz; $\sigma$ = 5.087 S/m; $\varepsilon_r$ = 34.603; $\rho$ = 1000 kg/$m^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-07-2019; Ambient Temp: 21.2°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7409; ConvF(4.82, 4.82, 4.82) @ 5750 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 5750 MHz System Verification at 17.0 dBm (50 mW)

**Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 18.2 W/kg
**SAR(1 g) = 3.79 W/kg**
Deviation(1 g) = -4.17%



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 750 MHz; Type: D750V3; Serial: 1054**

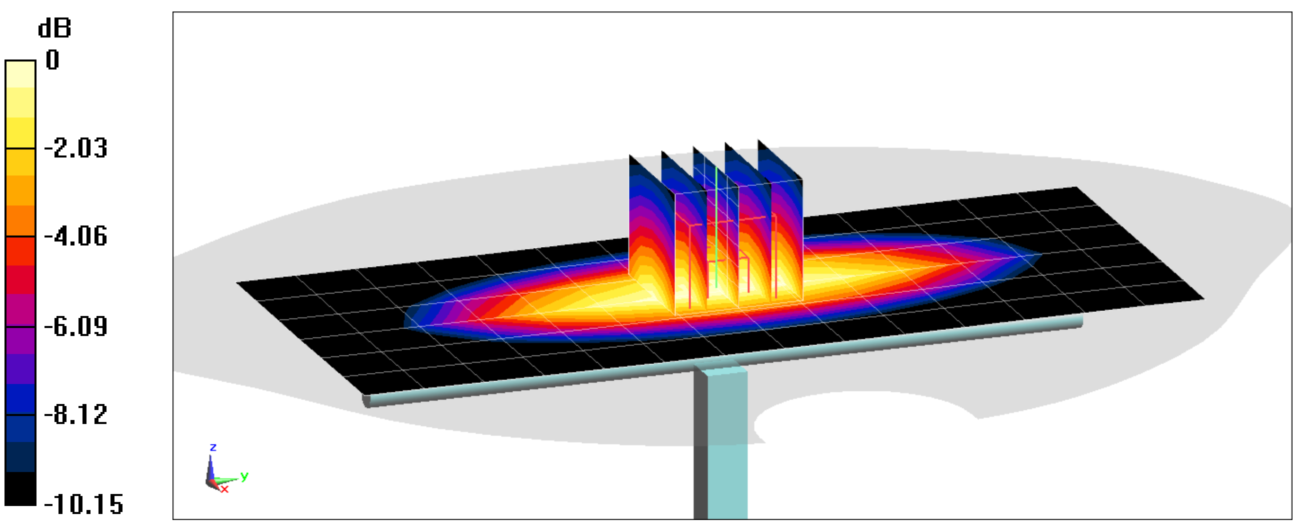
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
$f = 750$ MHz; $\sigma = 0.943$ S/m; $\varepsilon_r = 54.147$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-19-2018; Ambient Temp: 21.1°C; Tissue Temp: 19.7°C

Probe: EX3DV4 - SN7406; ConvF(9.91, 9.91, 9.91) @ 750 MHz; Calibrated: 5/22/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/22/2018
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 750 MHz System Verification at 23.0 dBm (200 mW)

**Area Scan (7x15x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.62 W/kg
**SAR(1 g) = 1.76 W/kg**
Deviation(1 g) = 2.21%




0 dB = 2.33 W/kg = 3.67 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d133**

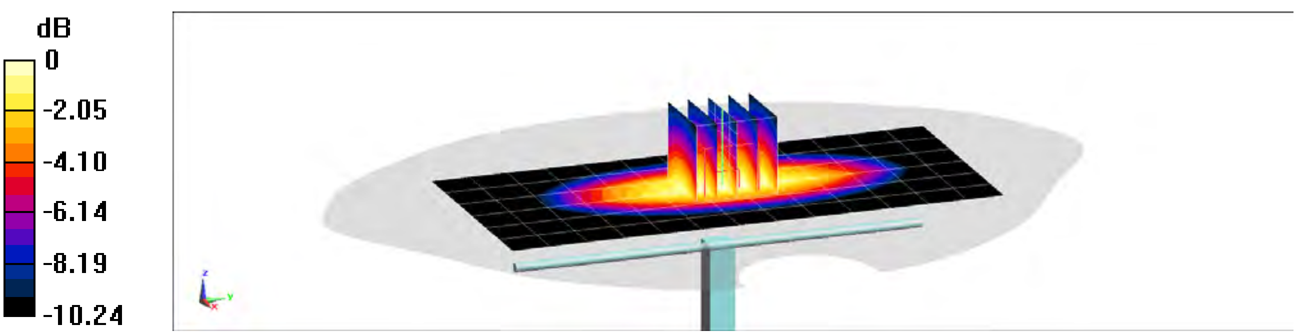
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; $\sigma$ = 0.965 S/m; $\varepsilon_r$ = 53.598; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-26-2018; Ambient Temp: 19.9°C; Tissue Temp: 19.1°C

Probe: ES3DV3 - SN3347; ConvF(6.37, 6.37, 6.37) @ 835 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 835 MHz System Verification at 23.0 dBm (200 mW)

**Area Scan (7x14x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.85 W/kg
**SAR(1 g) = 1.96 W/kg**
Deviation(1 g) = 0.51%




0 dB = 2.28 W/kg = 3.58 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1148**

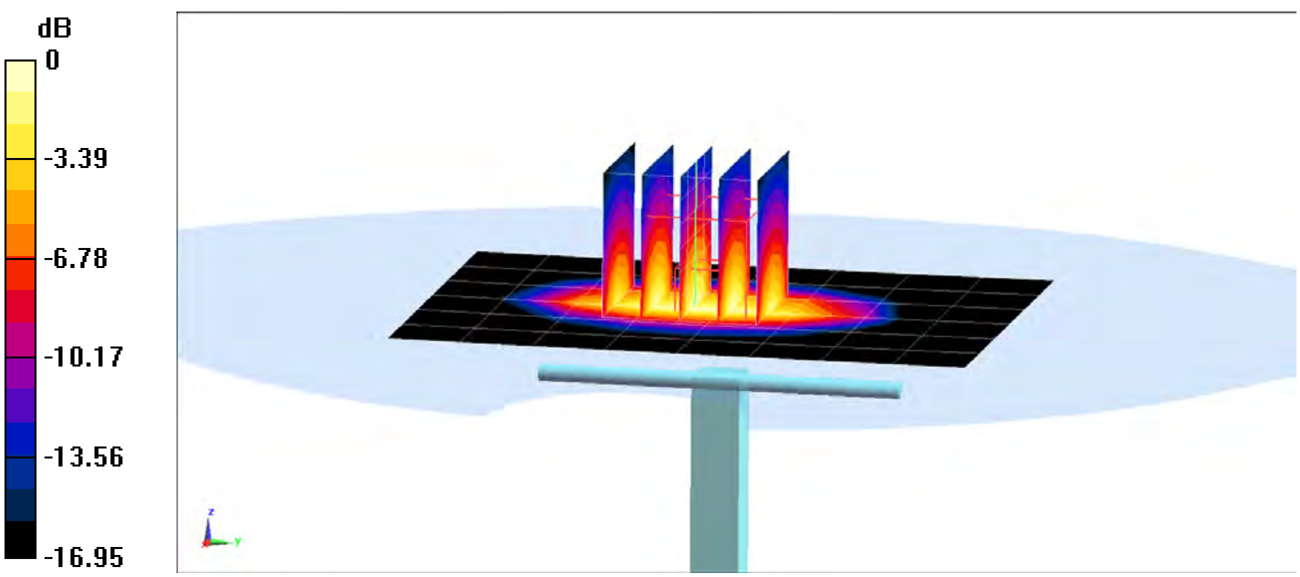
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; $\sigma$ = 1.531 S/m; $\varepsilon_r$ = 52.512; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-26-2018; Ambient Temp: 22.8°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7357; ConvF(8.43, 8.43, 8.43) @ 1750 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 1750 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (7x9x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.00 W/kg
**SAR(1 g) = 3.88 W/kg; SAR(10 g) = 2.05 W/kg**
Deviation(1 g) = 4.86%; Deviation(10 g) =3.54%




0 dB = 5.92 W/kg = 7.72 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d149**

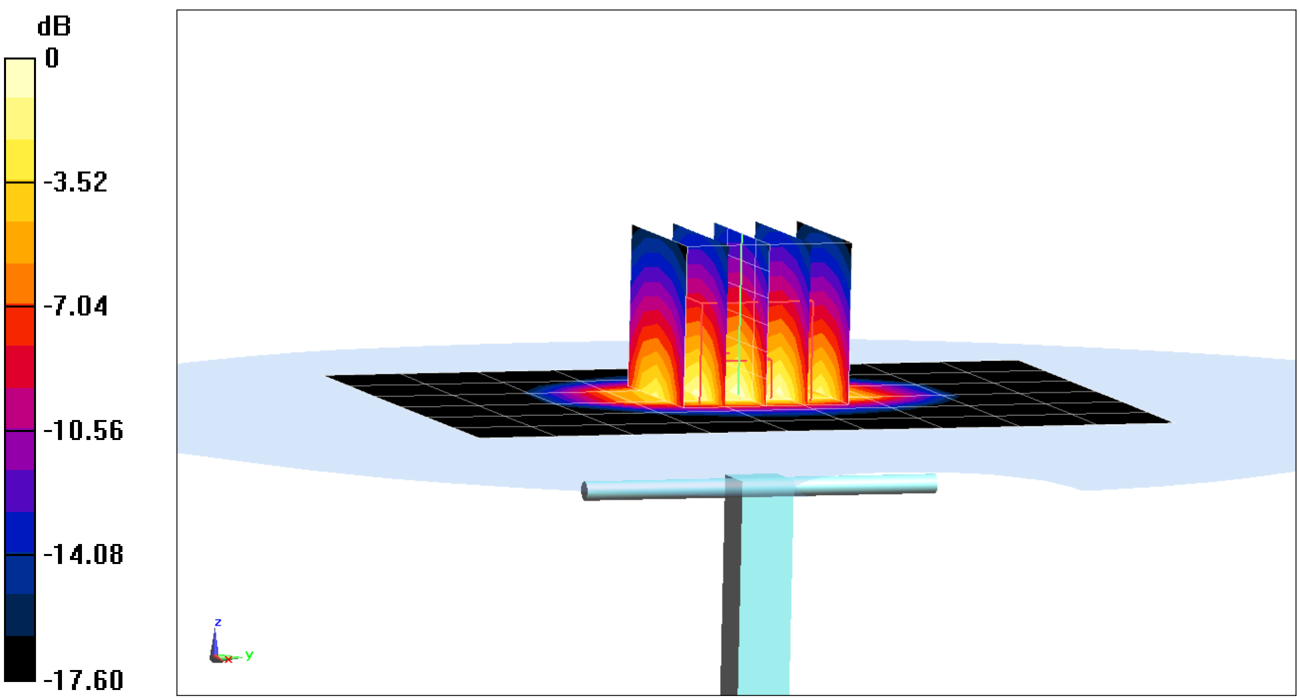
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; $\sigma$ = 1.554 S/m; $\varepsilon_r$ = 52.39; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-28-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3332; ConvF(4.77, 4.77, 4.77) @ 1900 MHz; Calibrated: 8/22/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**1900 MHz System Verification at 20.0 dBm (100 mW)**

**Area Scan (7x10x1):** Measurement grid: dx=15mm, dy=15mm
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.32 W/kg
**SAR(1 g) = 4.11 W/kg; SAR(10 g) = 2.13 W/kg**
Deviation(1 g) = 4.31%; Deviation(10 g) = 2.90%




0 dB = 5.23 W/kg = 7.19 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 797**

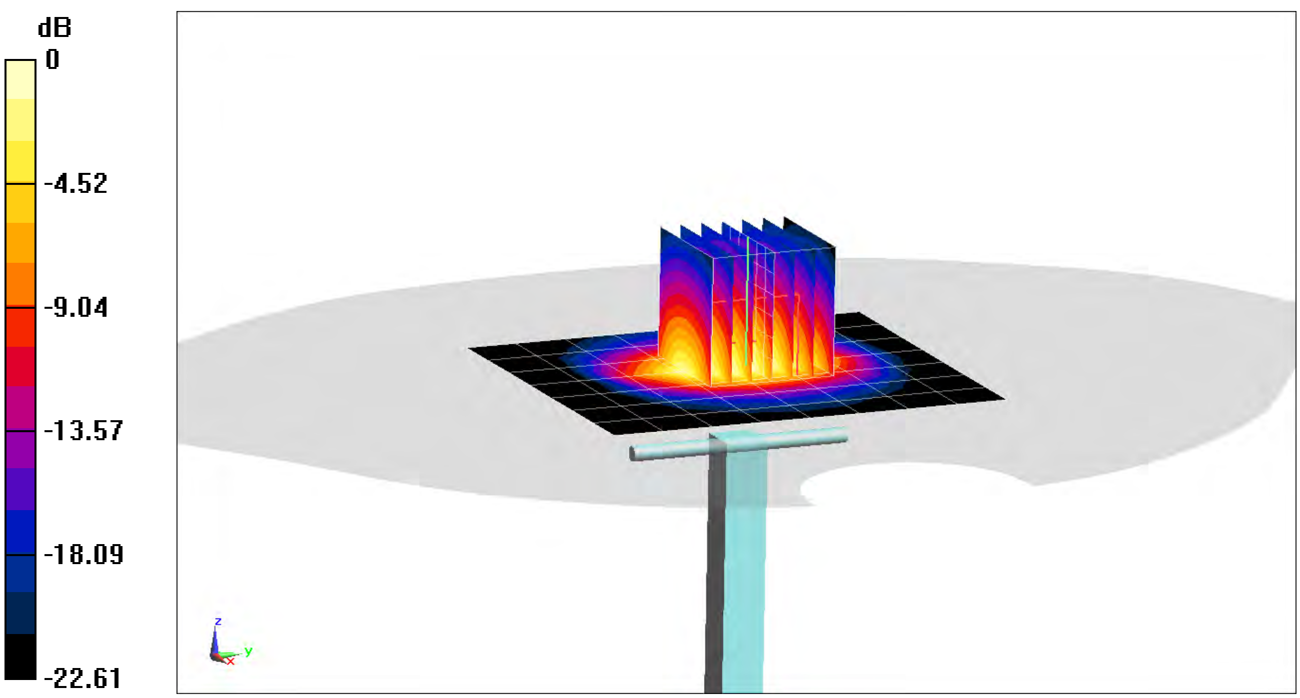
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; $\sigma$ = 2.041 S/m; $\varepsilon_r$ = 51.54; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-26-2018; Ambient Temp: 23.2°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 2450 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.2 W/kg
**SAR(1 g) = 5.32 W/kg**
Deviation(1 g) = 4.11%




0 dB = 7.00 W/kg = 8.45 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 719**

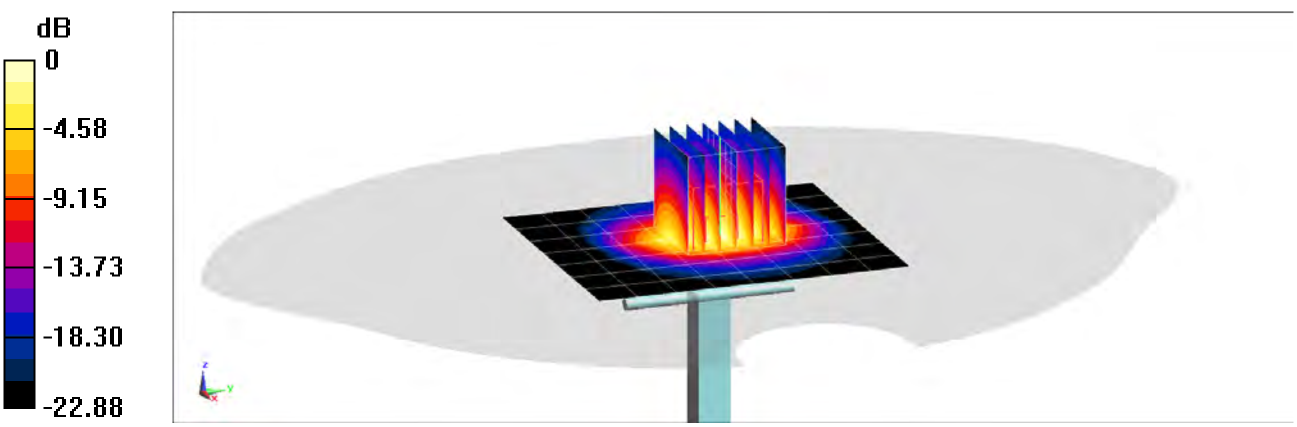
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; $\sigma = 2.011$ S/m; $\varepsilon_r = 52.581$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-02-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3347; ConvF(4.64, 4.64, 4.64) @ 2450 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 2450 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.7 W/kg
**SAR(10 g) = 2.23 W/kg**
Deviation(10 g) = -5.91%




0 dB = 6.56 W/kg = 8.17 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 719**

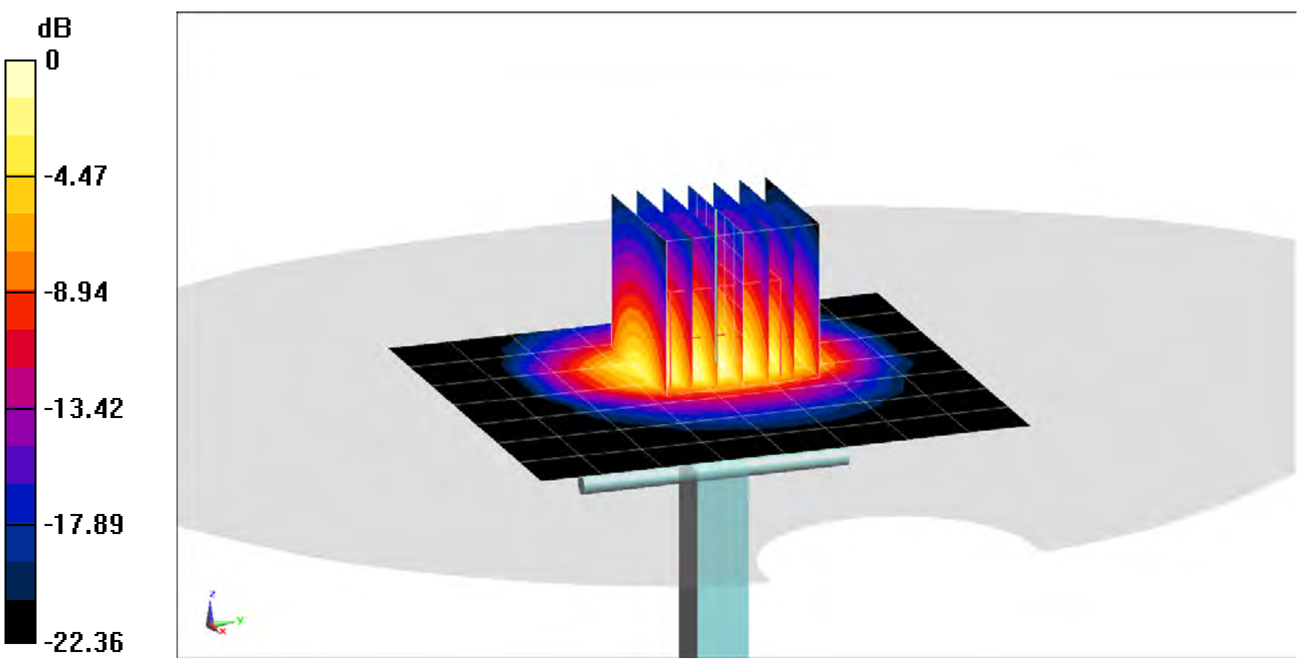
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; $\sigma$ = 2.045 S/m; $\varepsilon_r$ = 51.331; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-10-2019; Ambient Temp: 22.7°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 2450 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.1 W/kg
**SAR(1 g) = 5.31 W/kg**
Deviation(1 g) = 5.99%




0 dB = 7.05 W/kg = 8.48 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981**

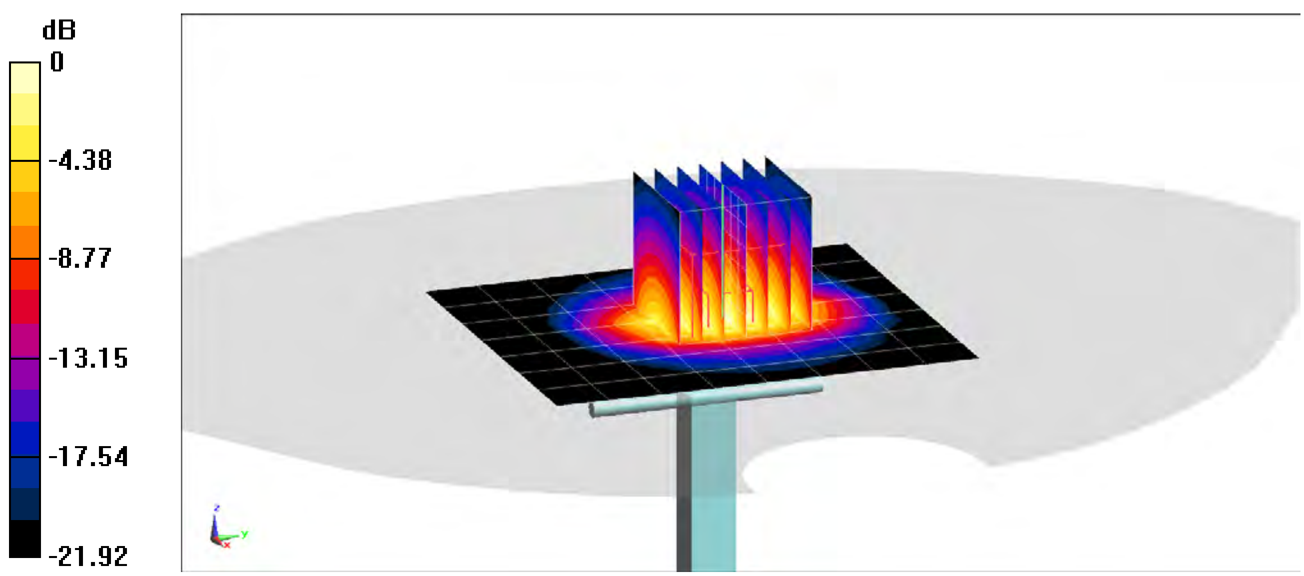
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; $\sigma$ = 2.043 S/m; $\varepsilon_r$ = 51.711; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-21-2019; Ambient Temp: 21.6°C; Tissue Temp: 21.0°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 2450 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.6 W/kg
**SAR(1 g) = 5.12 W/kg**
Deviation(1 g) = 0.59%




0 dB = 6.80 W/kg = 8.33 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1126**

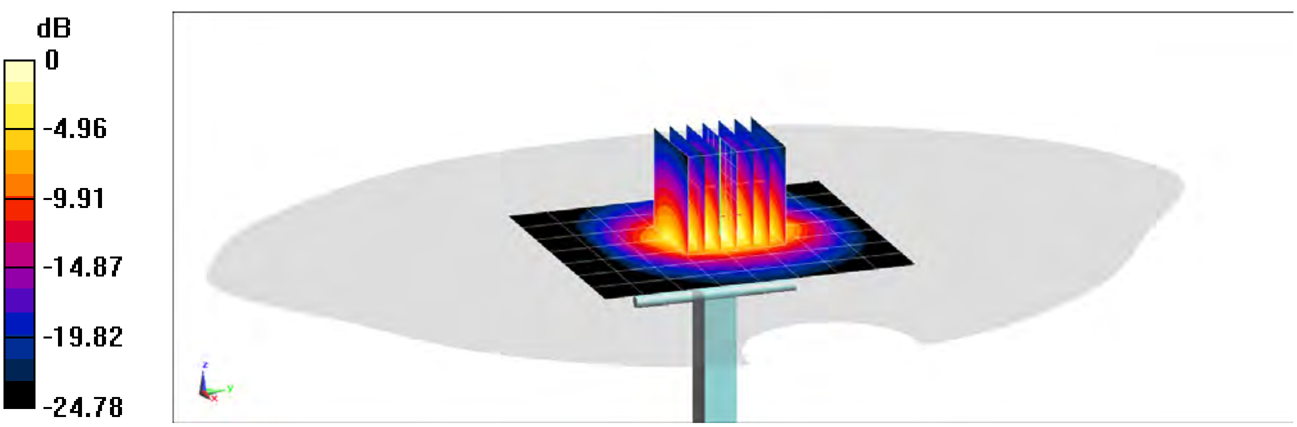
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2600 MHz; $\sigma$ = 2.224 S/m; $\varepsilon_r$ = 51.993; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-02-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3347; ConvF(4.49, 4.49, 4.49) @ 2600 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 2600 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 12.2 W/kg
**SAR(10 g) = 2.31 W/kg**
Deviation(10 g) = -5.33%




0 dB = 7.16 W/kg = 8.55 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1126**

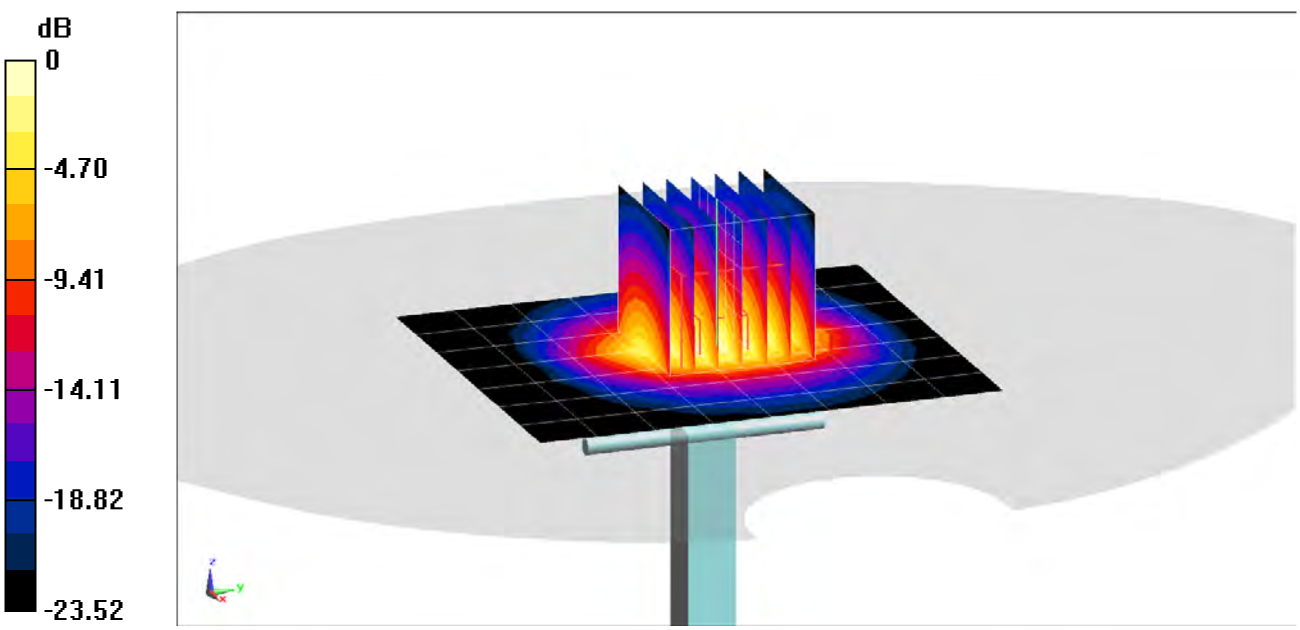
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2600 MHz; $\sigma$ = 2.22 S/m; $\varepsilon_r$ = 50.827; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-10-2019; Ambient Temp: 22.7°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3319; ConvF(4.33, 4.33, 4.33) @ 2600 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 2600 MHz System Verification at 20.0 dBm (100 mW)

**Area Scan (8x9x1):** Measurement grid: dx=12mm, dy=12mm
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.9 W/kg
**SAR(1 g) = 5.43 W/kg**
Deviation(1 g) = 0.37%




0 dB = 7.21 W/kg = 8.58 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191**

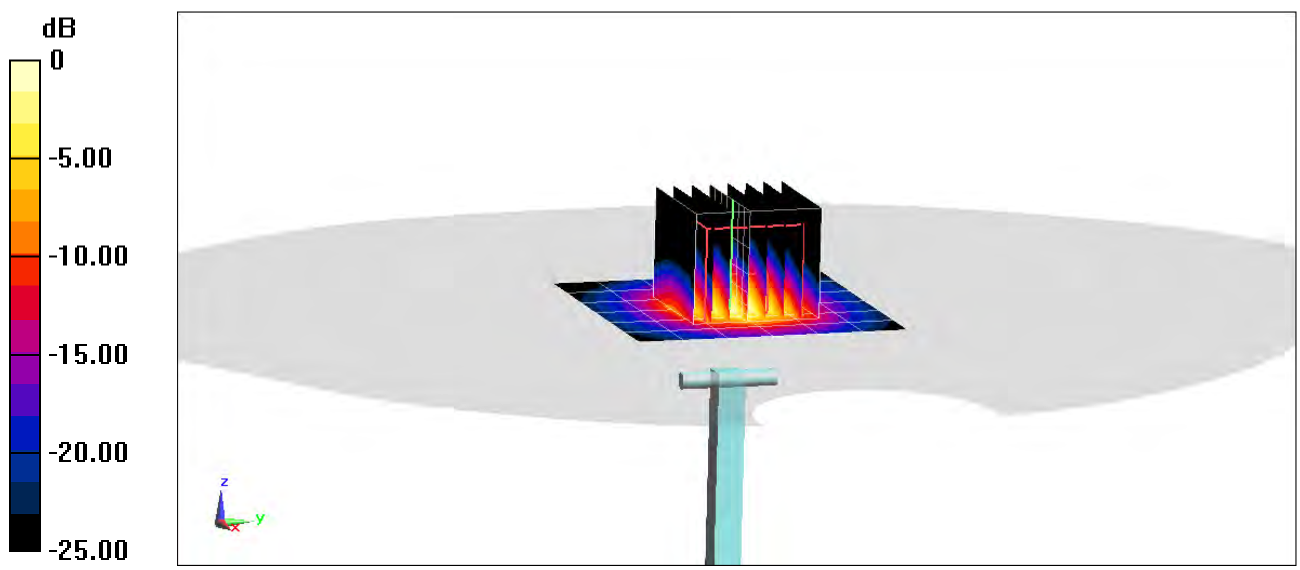
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5250 MHz; $\sigma$ = 5.402 S/m; $\varepsilon_r$ = 47.349; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-03-2019; Ambient Temp: 21.5°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7308; ConvF(4.48, 4.48, 4.48) @ 5250 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

**5250 MHz System Verification at 17.0 dBm (50 mW)**

**Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 15.1 W/kg
**SAR(1 g) = 3.58 W/kg; SAR(10 g) = 0.999 W/kg**
Deviation(1 g) = -7.01%; Deviation(10 g) = -7.50%




0 dB = 8.58 W/kg = 9.33 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191**

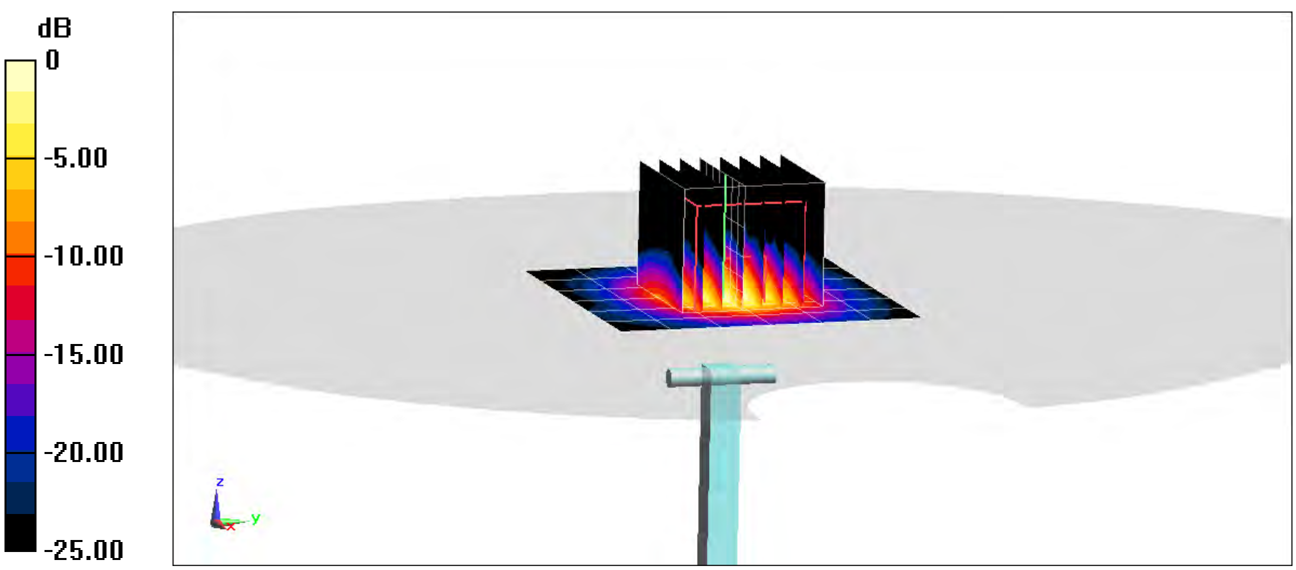
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5600 MHz; $\sigma$ = 5.888 S/m; $\varepsilon_r$ = 46.674; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-03-2019; Ambient Temp: 21.5°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7308; ConvF(4, 4, 4) @ 5600 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 5600 MHz System Verification at 17.0 dBm (50 mW)

**Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 18.5 W/kg
**SAR(1 g) = 3.9 W/kg; SAR(10 g) = 1.08 W/kg**
Deviation(1 g) = -1.52%; Deviation(10 g) = -2.70%




0 dB = 9.75 W/kg = 9.89 dBW/kg

**DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191**

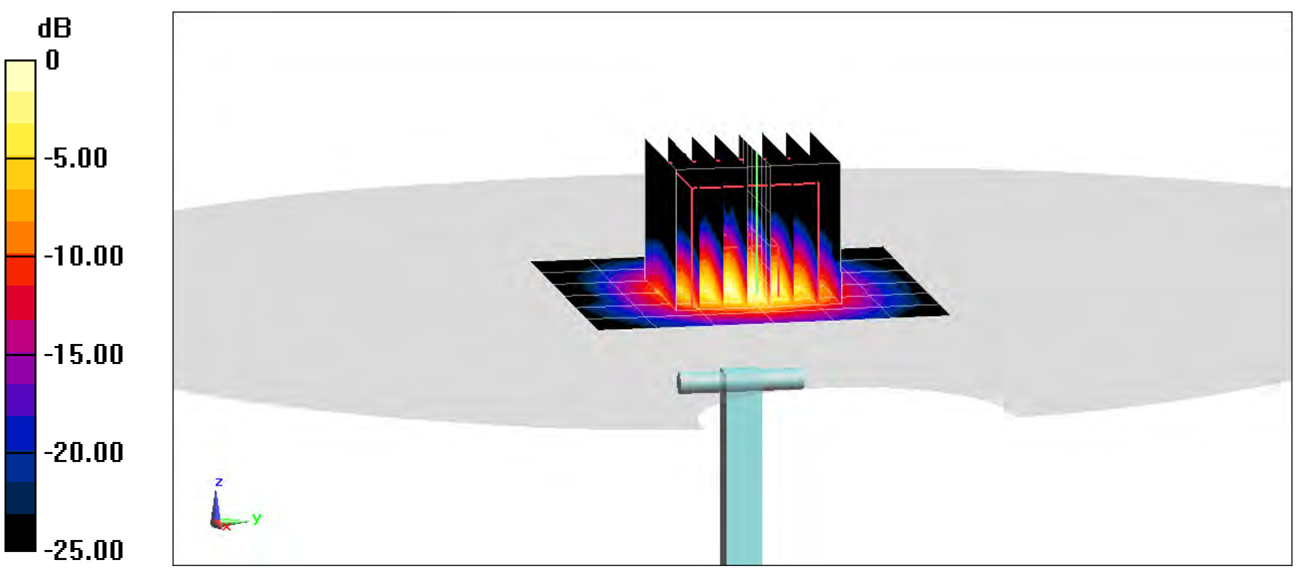
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5750 MHz; $\sigma$ = 6.138 S/m; $\varepsilon_r$ = 46.378; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-03-2019; Ambient Temp: 21.5°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7308; ConvF(4.18, 4.18, 4.18) @ 5750 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 5750 MHz System Verification at 17.0 dBm (50 mW)

**Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 17.3 W/kg
**SAR(1 g) = 3.5 W/kg; SAR(10 g) = 0.979 W/kg**
Deviation(1 g) = -8.02%; Deviation(10 g) = -7.64%




0 dB = 8.81 W/kg = 9.45 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191**

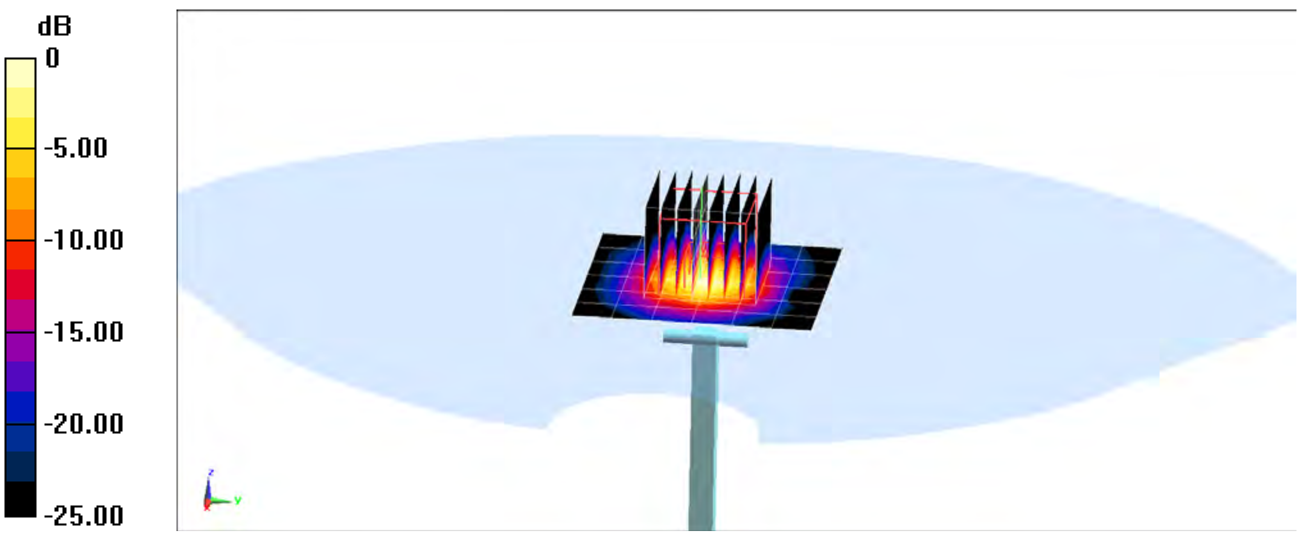
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5750 MHz; $\sigma$ = 6.08 S/m; $\varepsilon_r$ = 46.861; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-08-2019; Ambient Temp: 23.0°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN7357; ConvF(4.21, 4.21, 4.21) @ 5750 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Left; Type: QD000P40CD; Serial: 1687
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.12 (7450)

## 5750 MHz System Verification at 17.0 dBm (50 mW)

**Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.7 W/kg
**SAR(1 g) = 3.6 W/kg**
Deviation(1 g) = -5.39%




0 dB = 8.93 W/kg = 9.51 dBW/kg

# APPENDIX C: PROBE CALIBRATION

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 0108**

**Client** **PC Test**

**Certificate No: D750V3-1003_Jan18**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D750V3 - SN:1003 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | January 15, 2018 |

BN
01-25-2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 04-Apr-17 (No. 217-02521/02522) | Apr-18 |
| Power sensor NRP-Z91 | SN: 103244 | 04-Apr-17 (No. 217-02521) | Apr-18 |
| Power sensor NRP-Z91 | SN: 103245 | 04-Apr-17 (No. 217-02522) | Apr-18 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 07-Apr-17 (No. 217-02528) | Apr-18 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 07-Apr-17 (No. 217-02529) | Apr-18 |
| Reference Probe EX3DV4 | SN: 7349 | 30-Dec-17 (No. EX3-7349_Dec17) | Dec-18 |
| DAE4 | SN: 601 | 26-Oct-17 (No. DAE4-601_Oct17) | Oct-18 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Oct-16) | In house check: Oct-18 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-17) | In house check: Oct-18 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Leif Klysner | Laboratory Technician | Leif Klysner |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: January 15, 2018

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.10.0 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 15 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5.0 mm | |
| **Frequency** | 750 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 41.9 | 0.89 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 40.9 ± 6 % | 0.90 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.10 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **8.28 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.37 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **5.42 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 55.5 | 0.96 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 55.0 ± 6 % | 0.96 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.15 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **8.58 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.43 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **5.71 W/kg ± 16.5 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 53.8 Ω - 2.1 jΩ |
| Return Loss | - 27.6 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 49.2 Ω - 6.2 jΩ |
| Return Loss | - 24.0 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.043 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | January 21, 2009 |

## Appendix (Additional assessments outside the scope of SCS 0108)

## Measurement Conditions

DASY system configuration, as far as not given on page 1 and 3.

| | | |
|---|---|---|
| **Phantom** | SAM Head Phantom | For usage with cSAR3DV2-R/L |

## SAR result with SAM Head (Top)

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.98 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **7.94 W/kg ± 17.5 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.33 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **5.32 W/kg ± 16.9 % (k=2)** |

## SAR result with SAM Head (Mouth)

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.05 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **8.22 W/kg ± 17.5 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.38 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **5.52 W/kg ± 16.9 % (k=2)** |

## SAR result with SAM Head (Neck)

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.01 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **8.06 W/kg ± 17.5 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.38 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **5.52 W/kg ± 16.9 % (k=2)** |

## SAR result with SAM Head (Ear)

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.67 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **6.70 W/kg ± 17.5 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.15 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **4.60 W/kg ± 16.9 % (k=2)** |

## DASY5 Validation Report for Head TSL

Date: 12.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1003**

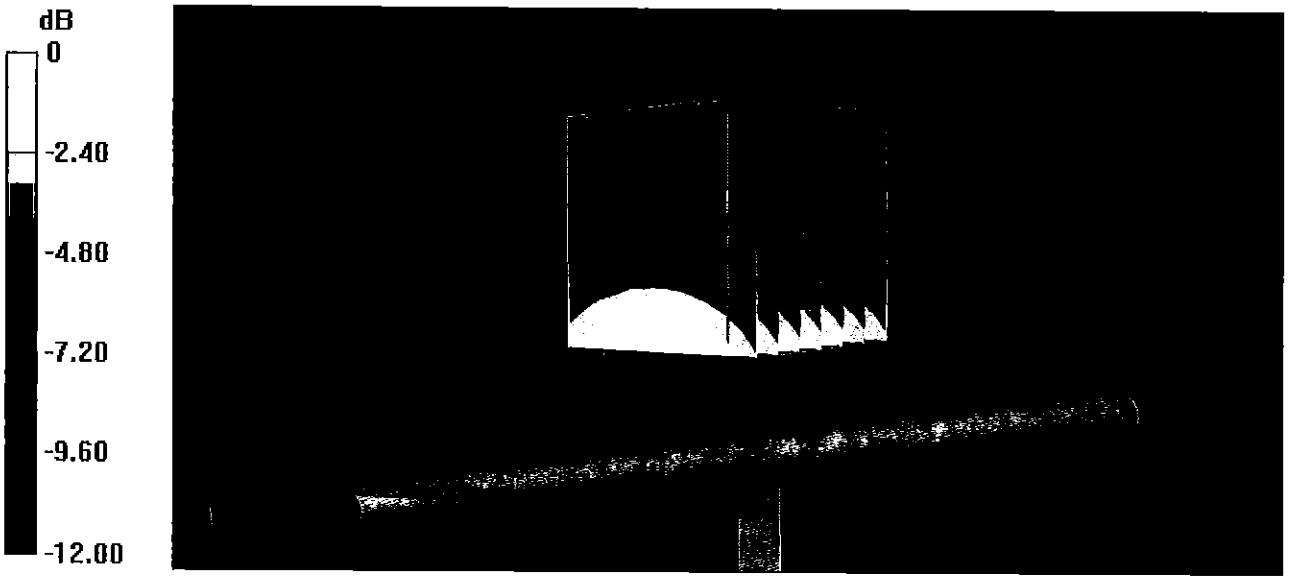
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma$ = 0.9 S/m; $\varepsilon_r$ = 40.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.22, 10.22, 10.22); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

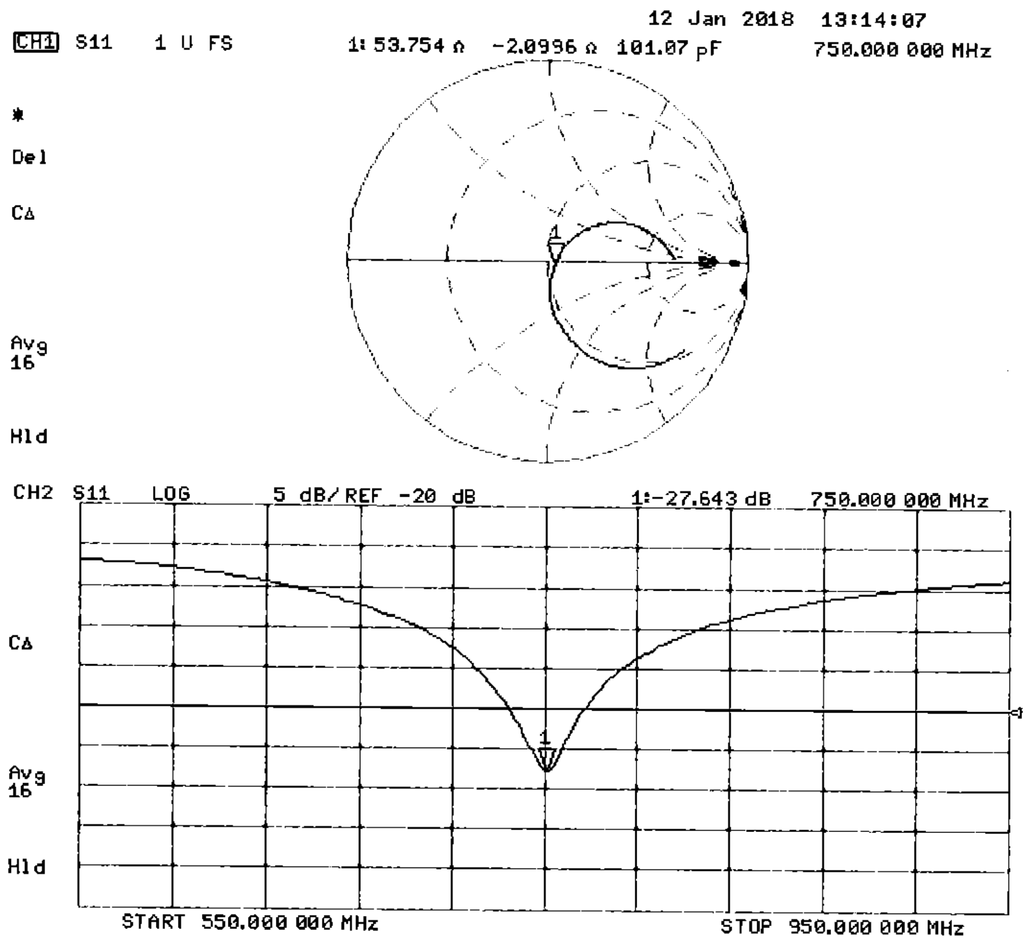
### Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.11 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.15 W/kg
**SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.37 W/kg**
Maximum value of SAR (measured) = 2.80 W/kg




0 dB = 2.80 W/kg = 4.47 dBW/kg

# Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 12.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1003**

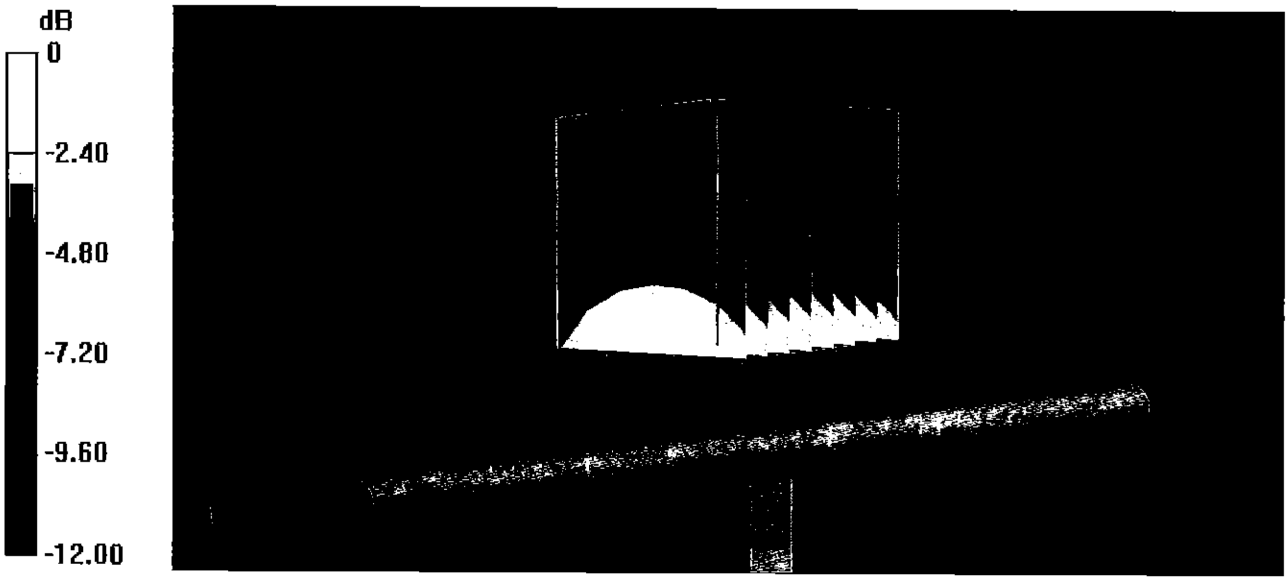
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma$ = 0.96 S/m; $\varepsilon_r$ = 55; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.19, 10.19, 10.19); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

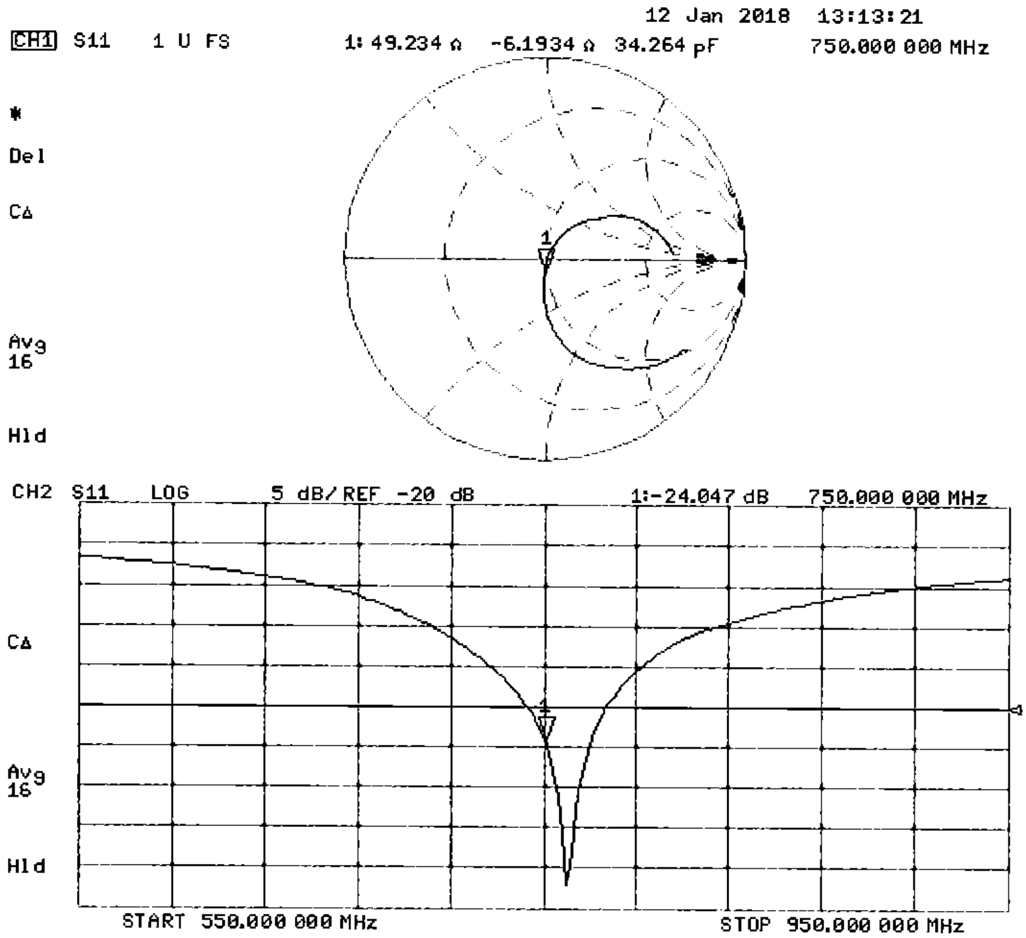
### Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x8x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.31 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.17 W/kg
**SAR(1 g) = 2.15 W/kg; SAR(10 g) = 1.43 W/kg**
Maximum value of SAR (measured) = 2.83 W/kg




0 dB = 2.83 W/kg = 4.52 dBW/kg

## Impedance Measurement Plot for Body TSL



Date: 15.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1003**

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.9$ S/m; $\varepsilon_r = 44.2$; $\rho = 1000$ kg/m$^3$
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

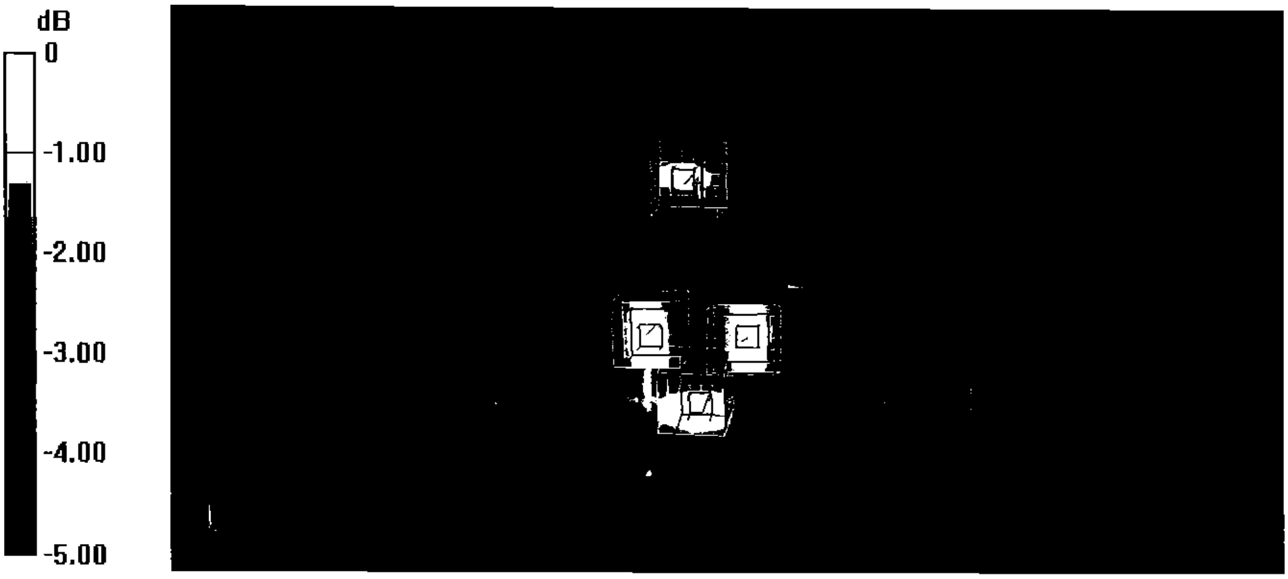
- Probe: EX3DV4 - SN7349; ConvF(10.22, 10.22, 10.22); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

**SAM Head/Top/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.79 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 2.89 W/kg
**SAR(1 g) = 1.98 W/kg; SAR(10 g) = 1.33 W/kg**
Maximum value of SAR (measured) = 2.58 W/kg

**SAM Head/Mouth/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.85 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 2.94 W/kg
**SAR(1 g) = 2.05 W/kg; SAR(10 g) = 1.38 W/kg**
Maximum value of SAR (measured) = 2.62 W/kg

**SAM Head/Neck/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.29 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.78 W/kg
**SAR(1 g) = 2.01 W/kg; SAR(10 g) = 1.38 W/kg**
Maximum value of SAR (measured) = 2.56 W/kg

**SAM Head/Ear/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.01 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 2.31 W/kg
**SAR(1 g) = 1.67 W/kg; SAR(10 g) = 1.15 W/kg**
Maximum value of SAR (measured) = 2.11 W/kg




0 dB = 2.58 W/kg = 4.12 dBW/kg

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 0108**

**Client** **PC Test**

**Certificate No: D835V2-4d047_Oct18**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D835V2 - SN:4d047 |
| Calibration procedure(s) | QA CAL-05.v10<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | October 19, 2018 |

BN ✓
10-30-2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 04-Apr-18 (No. 217-02672/02673) | Apr-19 |
| Power sensor NRP-Z91 | SN: 103244 | 04-Apr-18 (No. 217-02672) | Apr-19 |
| Power sensor NRP-Z91 | SN: 103245 | 04-Apr-18 (No. 217-02673) | Apr-19 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 04-Apr-18 (No. 217-02682) | Apr-19 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 04-Apr-18 (No. 217-02683) | Apr-19 |
| Reference Probe EX3DV4 | SN: 7349 | 30-Dec-17 (No. EX3-7349_Dec17) | Dec-18 |
| DAE4 | SN: 601 | 04-Oct-18 (No. DAE4-601_Oct18) | Oct-19 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (in house check Oct-18) | In house check: Oct-20 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (in house check Oct-18) | In house check: Oct-20 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (in house check Oct-18) | In house check: Oct-20 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Oct-18) | In house check: Oct-20 |
| Network Analyzer Agilent E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-18) | In house check: Oct-19 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Manu Seitz | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: October 22, 2018

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, June 2013
b) IEC 62209-1, “Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)”, July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, “SAR Measurement Requirements for 100 MHz to 6 GHz”

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.10.2 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 15 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 835 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 41.5 | 0.90 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 40.6 ± 6 % | 0.91 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.40 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **9.47 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.55 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **6.14 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 55.2 | 0.97 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 54.9 ± 6 % | 0.98 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.45 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **9.71 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.60 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **6.36 W/kg ± 16.5 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

## Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 51.0 Ω - 0.5 jΩ |
| Return Loss | - 39.6 dB |

## Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 45.6 Ω - 4.1 jΩ |
| Return Loss | - 24.0 dB |

## General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.387 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

## Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | August 16, 2006 |

## DASY5 Validation Report for Head TSL

Date: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d047**

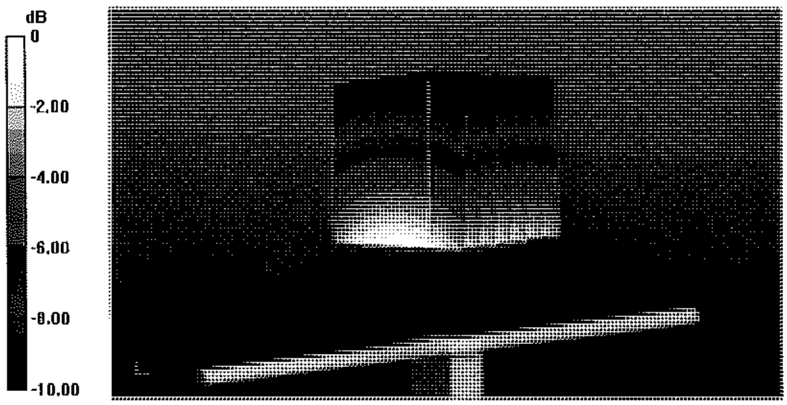
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma$ = 0.91 S/m; $\varepsilon_r$ = 40.6; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.9, 9.9, 9.9) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

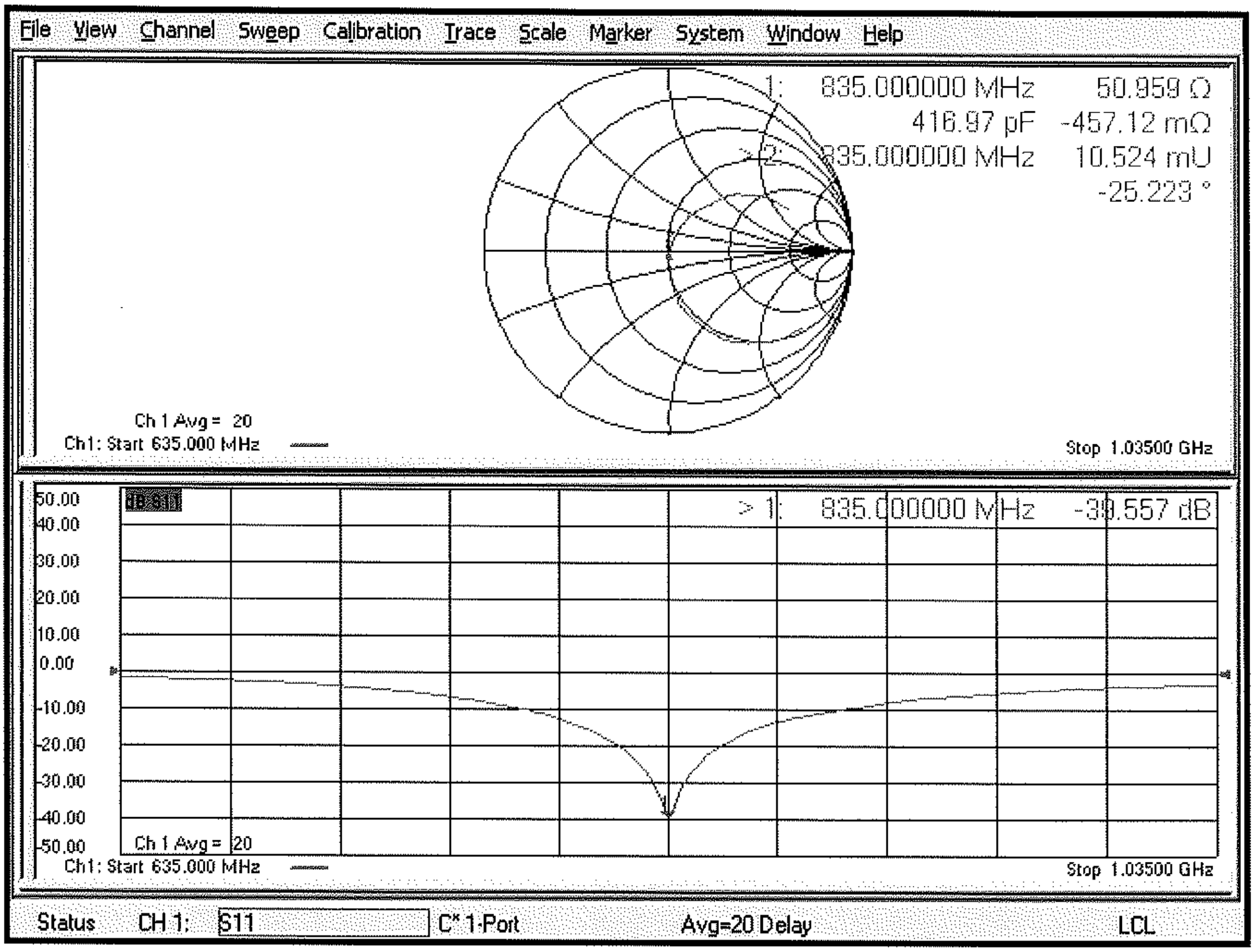
## Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.84 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.69 W/kg
**SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.55 W/kg**
Maximum value of SAR (measured) = 3.24 W/kg




0 dB = 3.24 W/kg = 5.11 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d047**

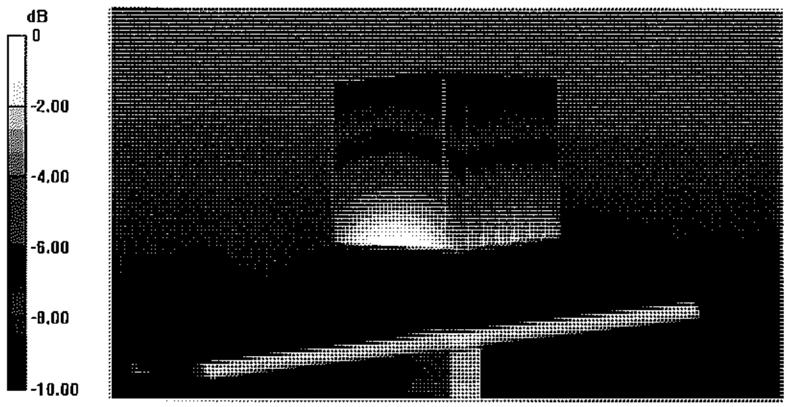
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma$ = 0.98 S/m; $\varepsilon_r$ = 54.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.05, 10.05, 10.05) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

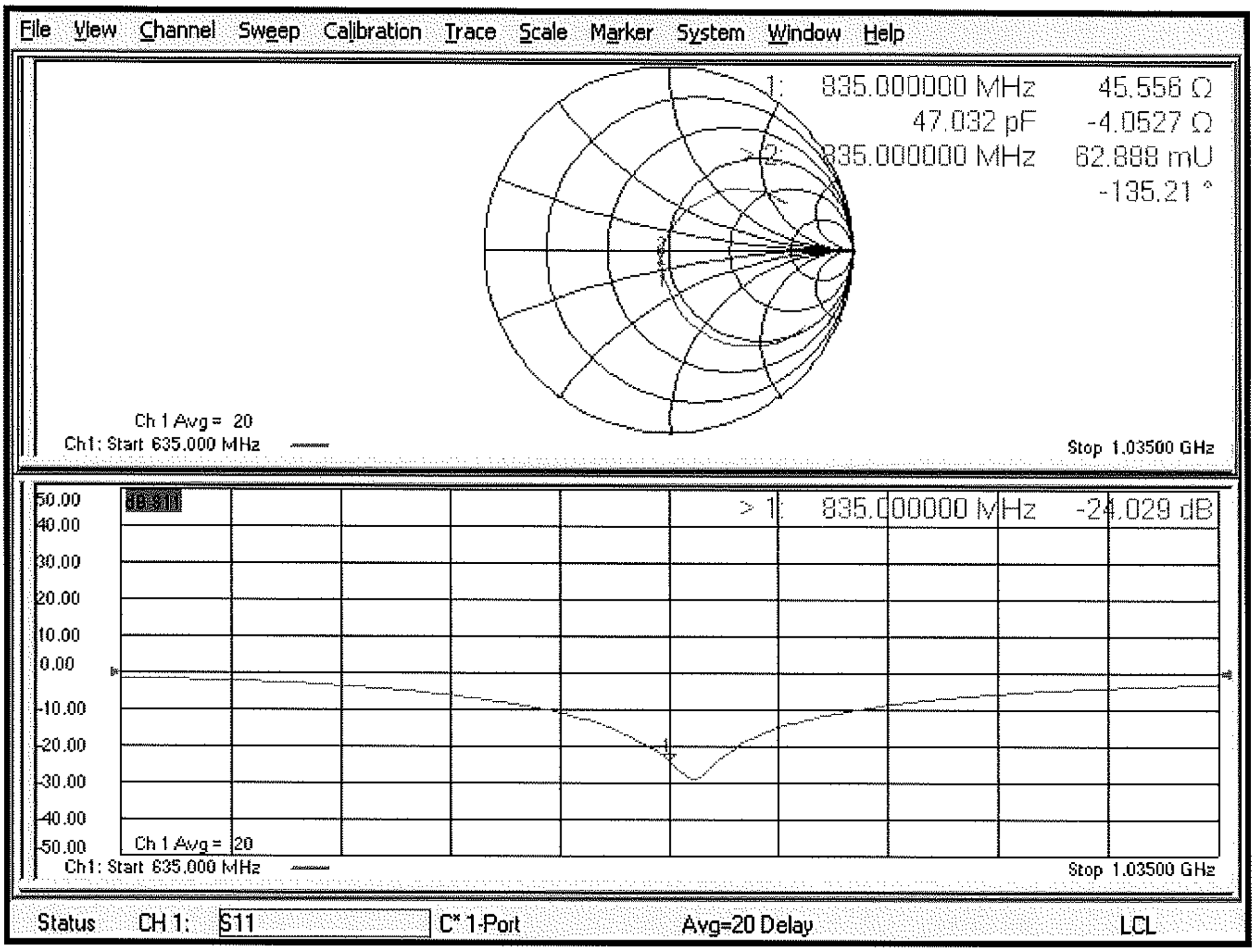
## Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 61.27 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.68 W/kg
**SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.6 W/kg**
Maximum value of SAR (measured) = 3.28 W/kg




0 dB = 3.28 W/kg = 5.16 dBW/kg

## Impedance Measurement Plot for Body TSL



**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 0108**

**Client** PC Test

**Certificate No: D1750V2-1148_May17**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D1750V2 - SN:1148 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | May 09, 2017 |

BN ✓
05-23-2017
BN ✓
05-09-2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 04-Apr-17 (No. 217-02521/02522) | Apr-18 |
| Power sensor NRP-Z91 | SN: 103244 | 04-Apr-17 (No. 217-02521) | Apr-18 |
| Power sensor NRP-Z91 | SN: 103245 | 04-Apr-17 (No. 217-02522) | Apr-18 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 07-Apr-17 (No. 217-02528) | Apr-18 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 07-Apr-17 (No. 217-02529) | Apr-18 |
| Reference Probe EX3DV4 | SN: 7349 | 31-Dec-16 (No. EX3-7349_Dec16) | Dec-17 |
| DAE4 | SN: 601 | 28-Mar-17 (No. DAE4-601_Mar17) | Mar-18 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Oct-16) | In house check: Oct-18 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-16) | In house check: Oct-17 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Claudio Leubler | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: May 11, 2017

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** **Schweizerischer Kalibrierdienst**
**C** **Service suisse d'étalonnage**
**S** **Servizio svizzero di taratura**
**Swiss Calibration Service**

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 0108**

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.10.0 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 1750 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 40.1 | 1.37 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 39.0 ± 6 % | 1.36 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.11 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **36.4 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 4.83 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **19.3 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 53.4 | 1.49 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 53.7 ± 6 % | 1.47 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.17 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **37.0 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 4.93 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **19.8 W/kg ± 16.5 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 49.8 Ω - 0.7 jΩ |
| Return Loss | - 42.9 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 45.7 Ω - 0.5 jΩ |
| Return Loss | - 26.9 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.223 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | September 30, 2014 |

## DASY5 Validation Report for Head TSL

Date: 09.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1148**

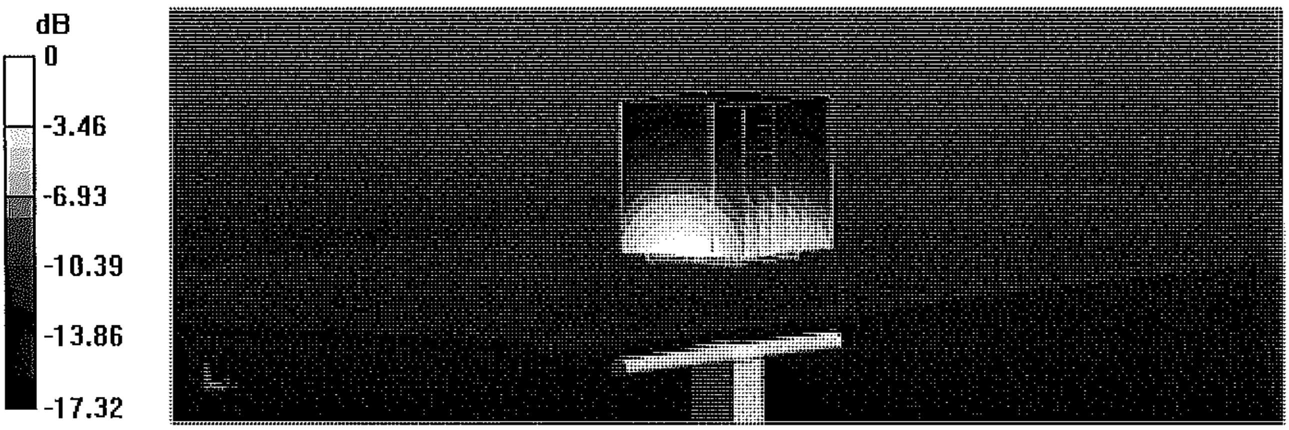
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; $\sigma$ = 1.36 S/m; $\varepsilon_r$ = 39; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.46, 8.46, 8.46); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

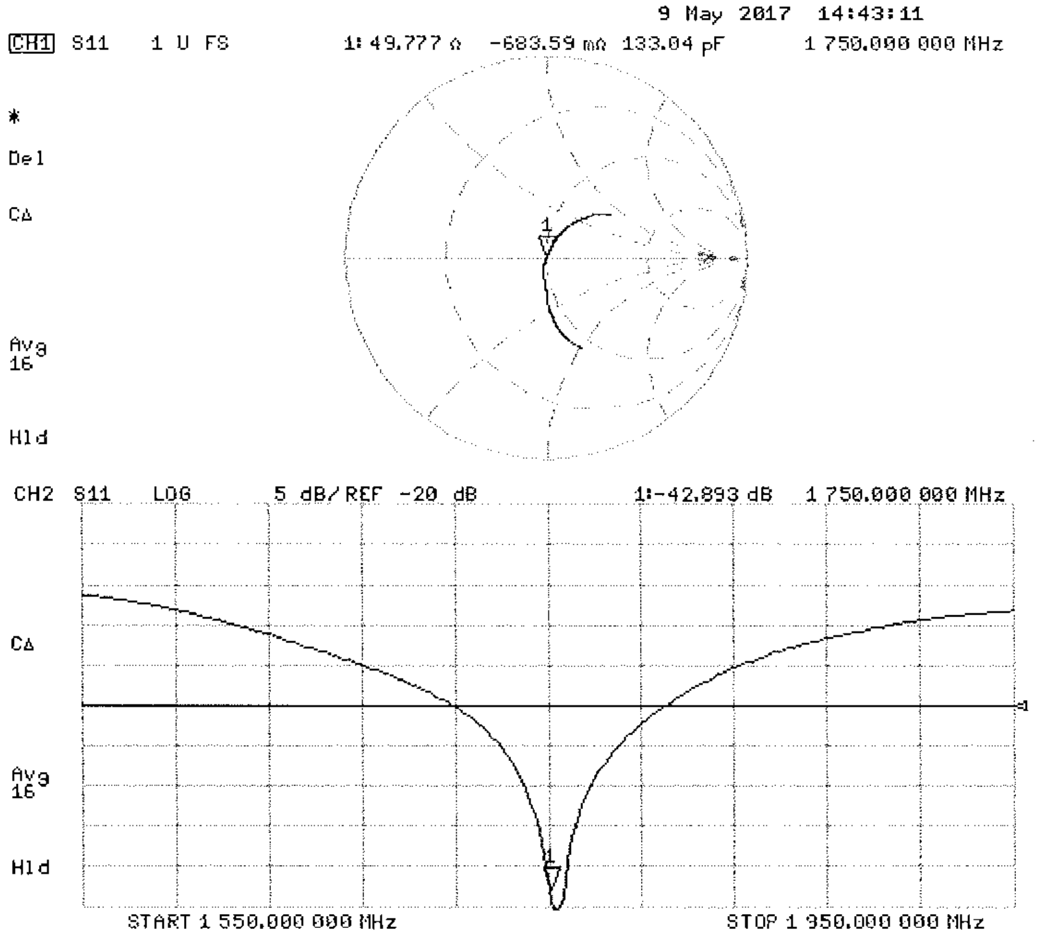
## Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.4 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 16.5 W/kg
**SAR(1 g) = 9.11 W/kg; SAR(10 g) = 4.83 W/kg**
Maximum value of SAR (measured) = 13.9 W/kg




0 dB = 13.9 W/kg = 11.43 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 09.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1148**

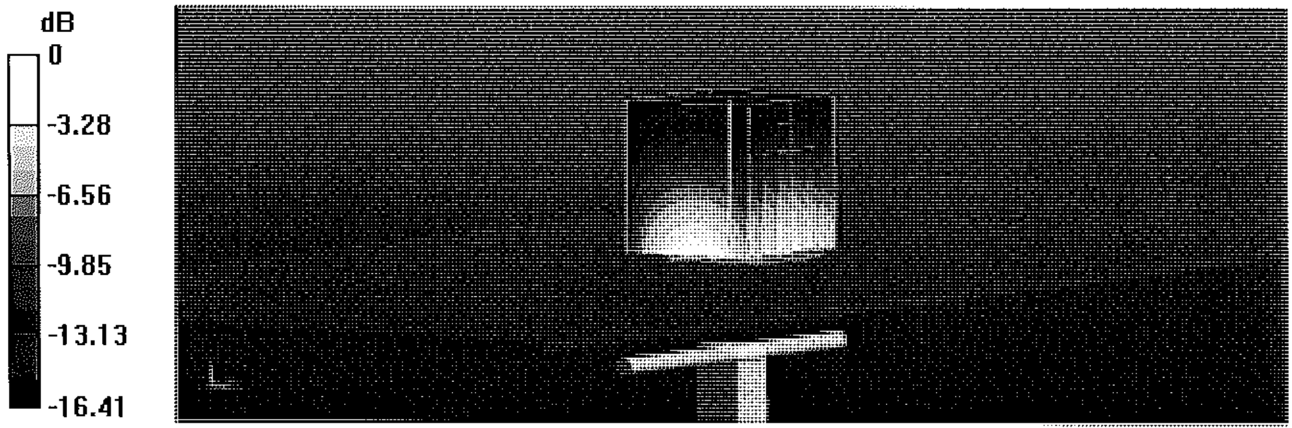
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; $\sigma = 1.47$ S/m; $\varepsilon_r = 53.7$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.25, 8.25, 8.25); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

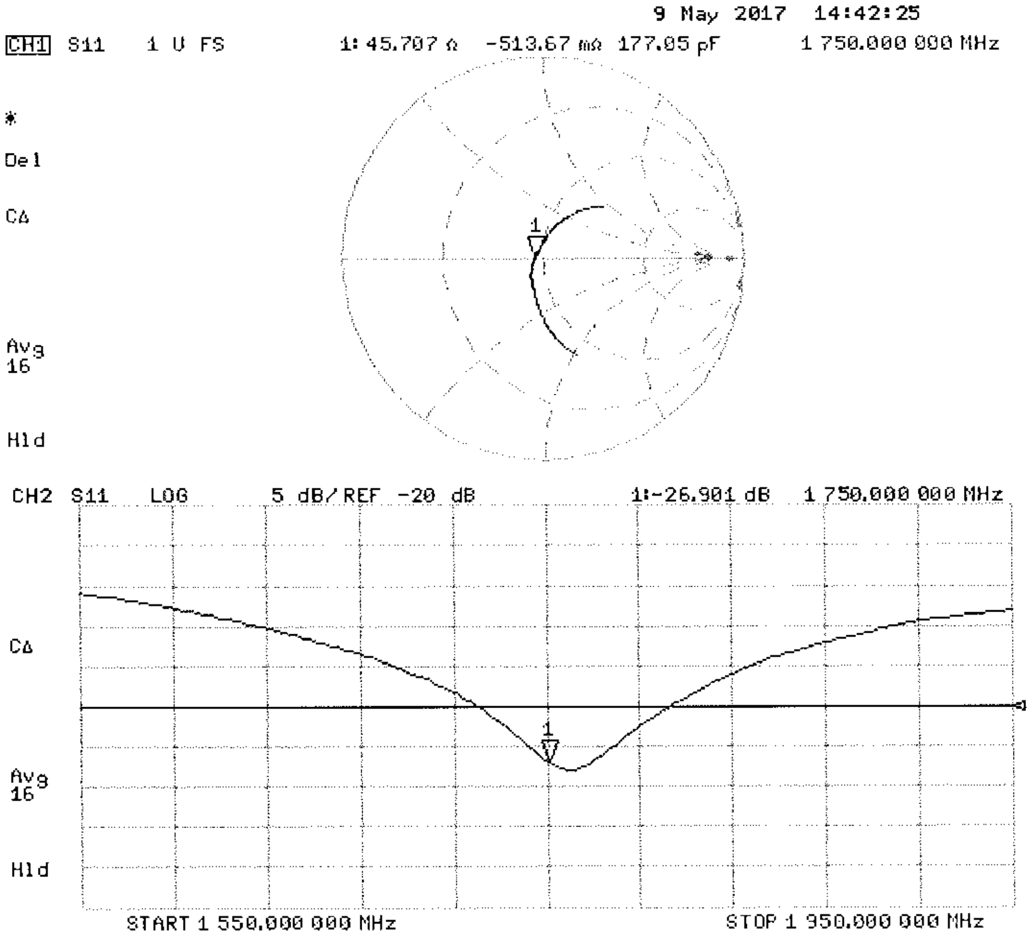
### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.49 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 15.9 W/kg
**SAR(1 g) = 9.17 W/kg; SAR(10 g) = 4.93 W/kg**
Maximum value of SAR (measured) = 13.1 W/kg




0 dB = 13.1 W/kg = 11.17 dBW/kg

# Impedance Measurement Plot for Body TSL



# Certification of Calibration

Object D1750V2 – SN: 1148

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: May 09, 2018

Description: SAR Validation Dipole at 1750 MHz.

Calibration Equipment used:

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|---|---|---|---|---|---|---|
| Control Company | 4040 | Therm./Clock/Humidity Monitor | 3/31/2017 | Biennial | 3/31/2019 | 170232394 |
| Control Company | 4352 | Ultra Long Stem Thermometer | 5/2/2017 | Biennial | 5/2/2019 | 170330156 |
| Amplifier Research | 15S1G6 | Amplifier | CBT | N/A | CBT | 433971 |
| Narda | 4772-3 | Attenuator (3dB) | CBT | N/A | CBT | 9406 |
| Keysight | 772D | Dual Directional Coupler | CBT | N/A | CBT | MY52180215 |
| Keysight Technologies | 85033E | Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm) | 6/1/2017 | Annual | 6/1/2018 | MY53401181 |
| Mini-Circuits | BW-N20W5+ | DC to 18 GHz Precision Fixed 20 dB Attenuator | CBT | N/A | CBT | N/A |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 2/9/2018 | Annual | 2/9/2019 | 1272 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 6/21/2017 | Annual | 6/21/2018 | 1333 |
| SPEAG | DAK-3.5 | Dielectric Assessment Kit | 9/12/2017 | Annual | 9/12/2018 | 1091 |
| SPEAG | ES3DV3 | SAR Probe | 9/18/2017 | Annual | 9/18/2018 | 3287 |
| SPEAG | ES3DV3 | SAR Probe | 2/13/2018 | Annual | 2/13/2019 | 3213 |
| Anritsu | MA2411B | Pulse Power Sensor | 3/2/2018 | Annual | 3/2/2019 | 1207364 |
| Anritsu | MA2411B | Pulse Power Sensor | 3/2/2018 | Annual | 3/2/2019 | 1339018 |
| Agilent | N5182A | MXG Vector Signal Generator | 4/18/2018 | Annual | 4/18/2019 | MY47420800 |
| Mini-Circuits | NLP-2950+ | Low Pass Filter DC to 2700 MHz | CBT | N/A | CBT | N/A |
| Pasternack | PE2209-10 | Bidirectional Coupler | CBT | N/A | CBT | N/A |
| Agilent | 8753ES | S-Parameter Network Analyzer | 9/14/2017 | Annual | 9/14/2018 | US39170118 |
| Pasternack | NC-100 | Torque Wrench | 4/18/2018 | Annual | 4/18/2019 | 1445 |
| Anritsu | ML2495A | Power Meter | 10/22/2017 | Annual | 10/22/2018 | 941001 |

Measurement Uncertainty = ±23% (k=2)

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated By: | Brodie Halbfoster | Test Engineer | Brodie Halbfoster |
| Approved By: | Kaitlin O'Keefe | Senior Technical Manager | KOK |

# DIPOLE CALIBRATION EXTENSION

Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

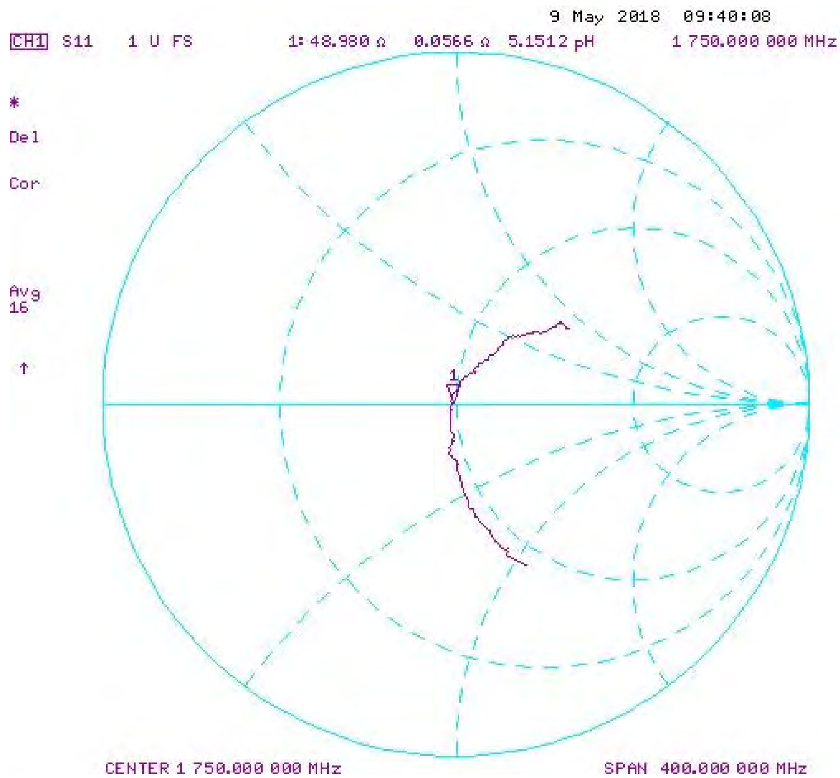
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

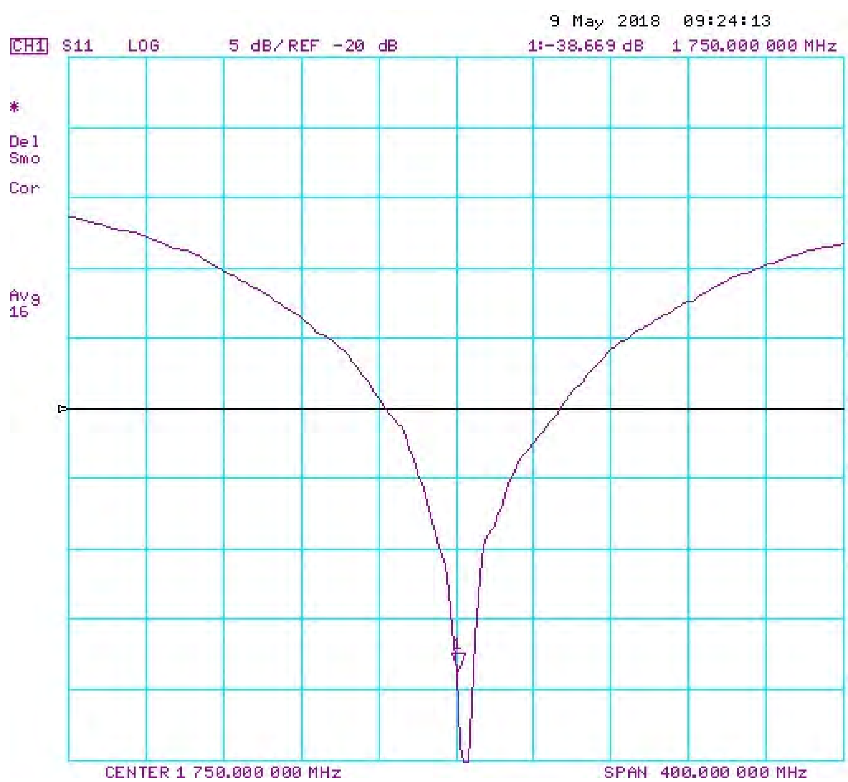
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

| Calibration Date | Extension Date | Certificate Electrical Delay (ns) | Certificate SAR Target Head (1g) W/kg @ 20.0 dBm | Measured Head SAR (1g) W/kg @ 20.0 dBm | Deviation 1g (%) | Certificate SAR Target Head (10g) W/kg @ 20.0 dBm | Measured Head SAR (10g) W/kg @ 20.0 dBm | Deviation 10g (%) | Certificate Impedance Head (Ohm) Real | Measured Impedance Head (Ohm) Real | Difference (Ohm) Real | Certificate Impedance Head (Ohm) Imaginary | Measured Impedance Head (Ohm) Imaginary | Difference (Ohm) Imaginary | Certificate Return Loss Head (dB) | Measured Return Loss Head (dB) | Deviation (%) | PASS/FAIL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5/9/2017 | 5/9/2018 | 1.223 | 3.64 | 3.59 | -1.37% | 1.93 | 1.91 | -1.04% | 49.8 | 49.0 | 0.8 | -0.7 | 0.1 | 0.8 | -42.9 | -38.7 | 9.90% | PASS |

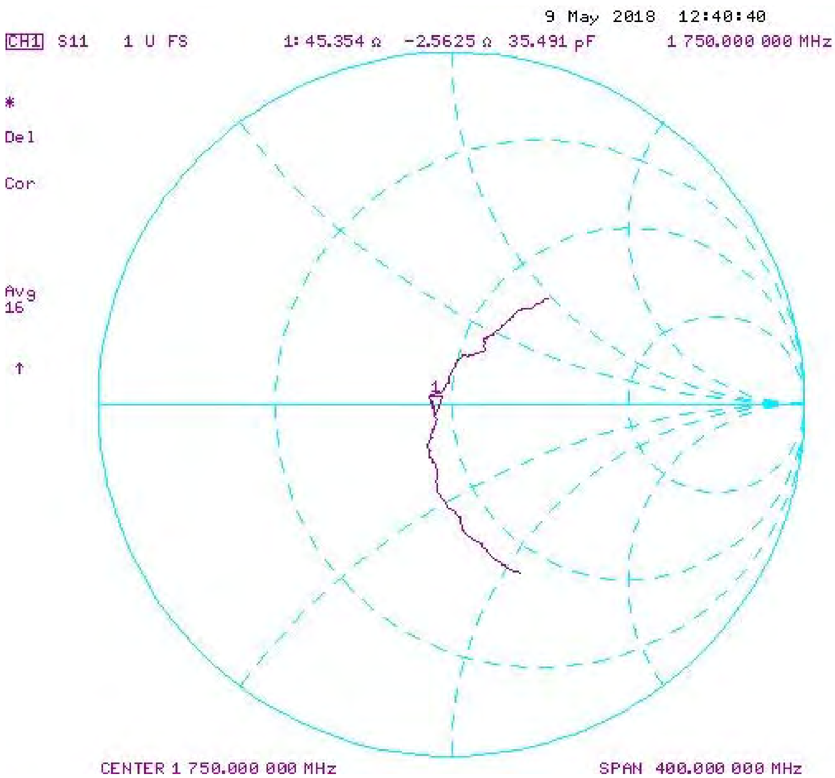
| Calibration Date | Extension Date | Certificate Electrical Delay (ns) | Certificate SAR Target Body (1g) W/kg @ 20.0 dBm | Measured Body SAR (1g) W/kg @ 20.0 dBm | Deviation 1g (%) | Certificate SAR Target Body (10g) W/kg @ 20.0 dBm | Measured Body SAR (10g) W/kg @ 20.0 dBm | Deviation 10g (%) | Certificate Impedance Body (Ohm) Real | Measured Impedance Body (Ohm) Real | Difference (Ohm) Real | Certificate Impedance Body (Ohm) Imaginary | Measured Impedance Body (Ohm) Imaginary | Difference (Ohm) Imaginary | Certificate Return Loss Body (dB) | Measured Return Loss Body (dB) | Deviation (%) | PASS/FAIL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5/9/2017 | 5/9/2018 | 1.223 | 3.7 | 3.88 | 4.86% | 1.98 | 2.06 | 4.04% | 45.7 | 45.4 | 0.3 | -0.5 | -2.6 | 2.1 | -26.9 | -25.0 | 7.20% | PASS |

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL





| Object: | Date Issued: | Page 4 of 4 |
|---|---|---|
| D1750V2 – SN: 1148 | 05/09/2018 | |

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** **Schweizerischer Kalibrierdienst**
**C** **Service suisse d'étalonnage**
**S** **Servizio svizzero di taratura**
**Swiss Calibration Service**

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 0108**

Client **PC Test**

**Certificate No: D1900V2-5d080_Oct18**

# CALIBRATION CERTIFICATE

Object D1900V2 - SN:5d080

Calibration procedure(s) QA CAL-05.v10
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: October 23, 2018

BN✓
10-30-2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 04-Apr-18 (No. 217-02672/02673) | Apr-19 |
| Power sensor NRP-Z91 | SN: 103244 | 04-Apr-18 (No. 217-02672) | Apr-19 |
| Power sensor NRP-Z91 | SN: 103245 | 04-Apr-18 (No. 217-02673) | Apr-19 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 04-Apr-18 (No. 217-02682) | Apr-19 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 04-Apr-18 (No. 217-02683) | Apr-19 |
| Reference Probe EX3DV4 | SN: 7349 | 30-Dec-17 (No. EX3-7349_Dec17) | Dec-18 |
| DAE4 | SN: 601 | 04-Oct-18 (No. DAE4-601_Oct18) | Oct-19 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (in house check Oct-18) | In house check: Oct-20 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (in house check Oct-18) | In house check: Oct-20 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (in house check Oct-18) | In house check: Oct-20 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Oct-18) | In house check: Oct-20 |
| Network Analyzer Agilent E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-18) | In house check: Oct-19 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Jeton Kastrati | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: October 23, 2018

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.10.2 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 1900 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 40.0 | 1.40 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 40.3 ± 6 % | 1.40 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.93 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **39.8 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.18 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **20.7 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 53.3 | 1.52 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 52.9 ± 6 % | 1.47 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.62 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **39.2 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.09 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **20.6 W/kg ± 16.5 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 52.5 Ω + 7.9 jΩ |
| Return Loss | - 21.8 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 48.1 Ω + 8.1 jΩ |
| Return Loss | - 21.5 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.193 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | June 28, 2006 |

## DASY5 Validation Report for Head TSL

Date: 23.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d080**

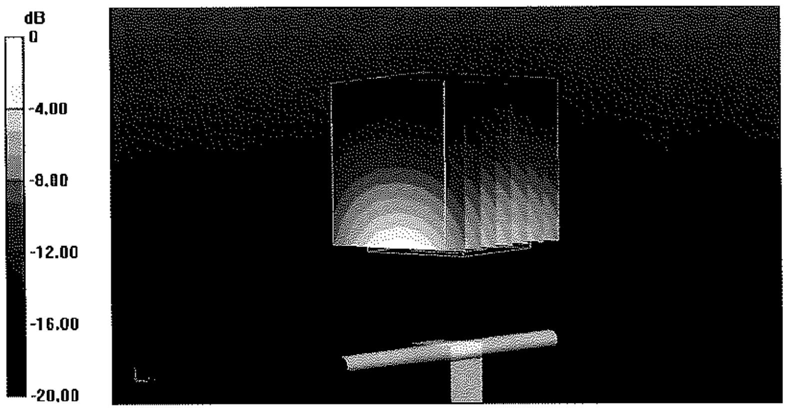
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.4 S/m; $\varepsilon_r$ = 40.3; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.18, 8.18, 8.18) @ 1900 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

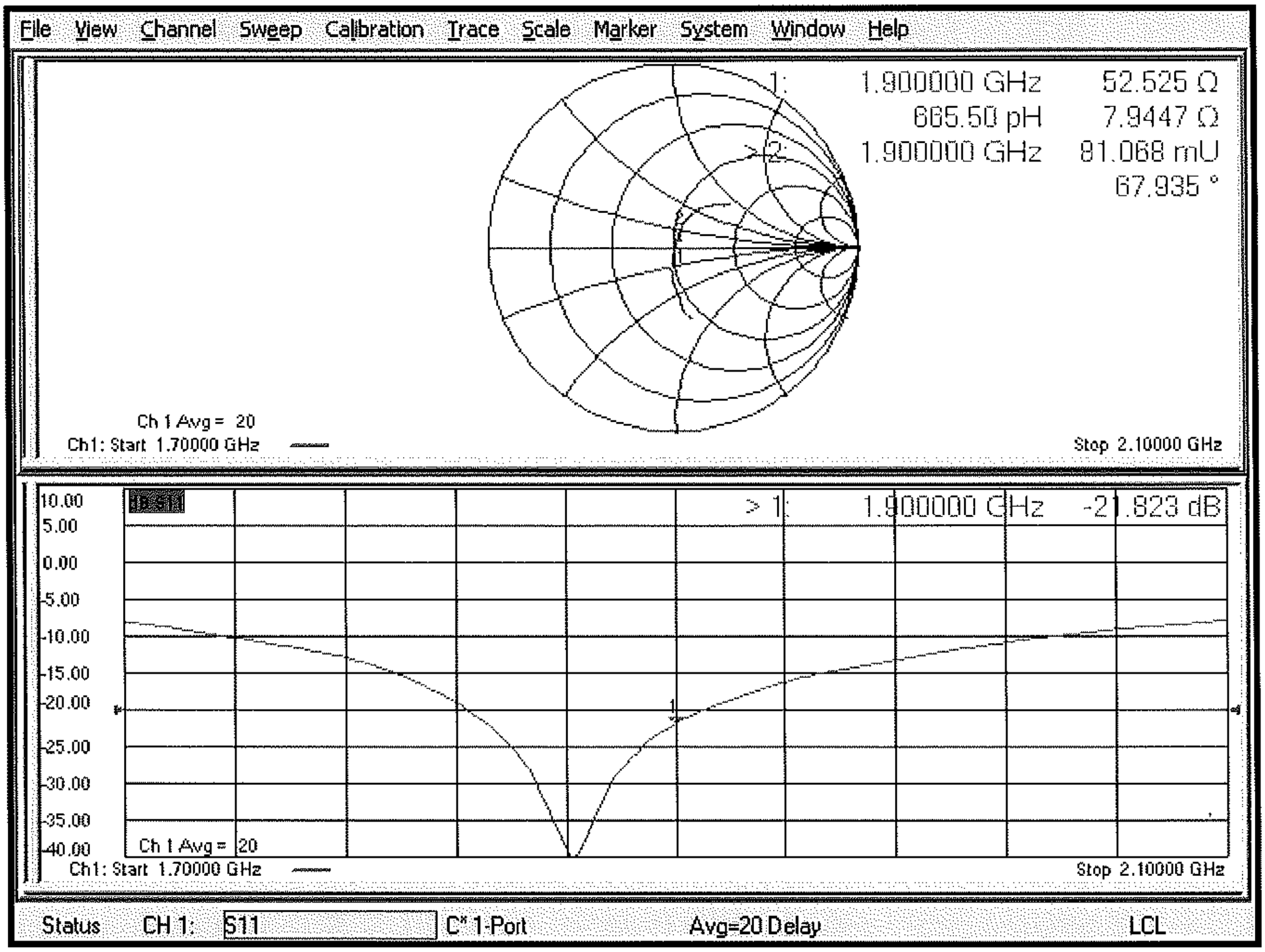
### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 110.0 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 18.7 W/kg
**SAR(1 g) = 9.93 W/kg; SAR(10 g) = 5.18 W/kg**
Maximum value of SAR (measured) = 15.6 W/kg




0 dB = 15.6 W/kg = 11.93 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 23.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d080**

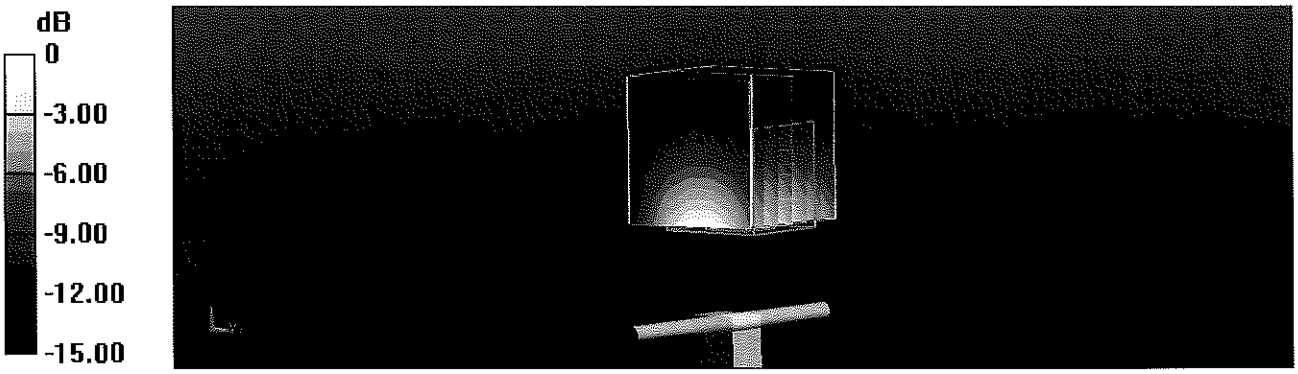
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.47 S/m; $\varepsilon_r$ = 52.9; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.15, 8.15, 8.15) @ 1900 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

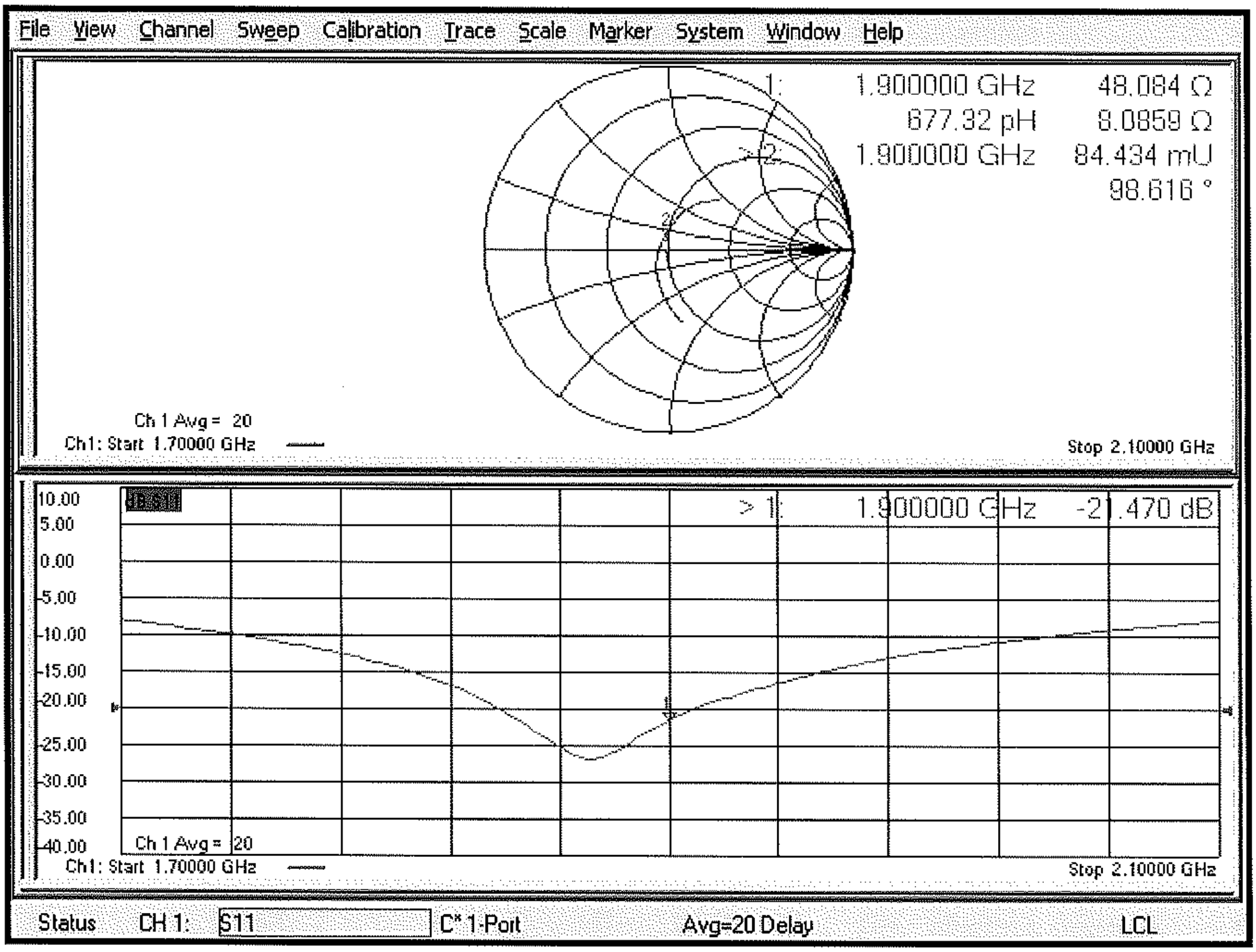
### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.86 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 17.3 W/kg
**SAR(1 g) = 9.62 W/kg; SAR(10 g) = 5.09 W/kg**
Maximum value of SAR (measured) = 14.1 W/kg




0 dB = 14.1 W/kg = 11.49 dBW/kg

## Impedance Measurement Plot for Body TSL



**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 0108**

**Client** **PC Test**

**Certificate No: D2450V2-981_Aug18**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D2450V2 - SN:981 |
| Calibration procedure(s) | QA CAL-05.v10<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | August 16, 2018 |

BN✓
09-06/2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 04-Apr-18 (No. 217-02672/02673) | Apr-19 |
| Power sensor NRP-Z91 | SN: 103244 | 04-Apr-18 (No. 217-02672) | Apr-19 |
| Power sensor NRP-Z91 | SN: 103245 | 04-Apr-18 (No. 217-02673) | Apr-19 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 04-Apr-18 (No. 217-02682) | Apr-19 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 04-Apr-18 (No. 217-02683) | Apr-19 |
| Reference Probe EX3DV4 | SN: 7349 | 30-Dec-17 (No. EX3-7349_Dec17) | Dec-18 |
| DAE4 | SN: 601 | 26-Oct-17 (No. DAE4-601_Oct17) | Oct-18 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Oct-16) | In house check: Oct-18 |
| Network Analyzer Agilent E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-17) | In house check: Oct-18 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Leif Klysner | Laboratory Technician | Leif Klysner |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: August 23, 2018

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.10.1 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5.0 mm | |
| **Frequency** | 2450 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 39.2 | 1.80 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 37.7 ± 6 % | 1.86 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.4 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **52.3 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.20 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **24.4 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 52.7 | 1.95 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 51.8 ± 6 % | 2.02 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.0 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **50.9 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.11 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **24.2 W/kg ± 16.5 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 55.0 Ω + 2.3 jΩ |
| Return Loss | - 25.6 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 50.2 Ω + 4.7 jΩ |
| Return Loss | - 26.6 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.162 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | December 30, 2014 |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Measurement Conditions

DASY system configuration, as far as not given on page 1 and 3.

| | | |
|---|---|---|
| **Phantom** | SAM Head Phantom | For usage with cSAR3DV2-R/L |

### SAR result with SAM Head (Top)

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.6 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **54.0 W/kg ± 17.5 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.33 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **25.2 W/kg ± 16.9 % (k=2)** |

### SAR result with SAM Head (Mouth)

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.6 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **54.0 W/kg ± 17.5 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.35 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **25.3 W/kg ± 16.9 % (k=2)** |

### SAR result with SAM Head (Neck)

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 12.9 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **51.2 W/kg ± 17.5 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.11 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **24.4 W/kg ± 16.9 % (k=2)** |

### SAR result with SAM Head (Ear)

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 8.74 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **34.7 W/kg ± 17.5 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 4.40 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **17.5 W/kg ± 16.9 % (k=2)** |

## DASY5 Validation Report for Head TSL

Date: 13.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

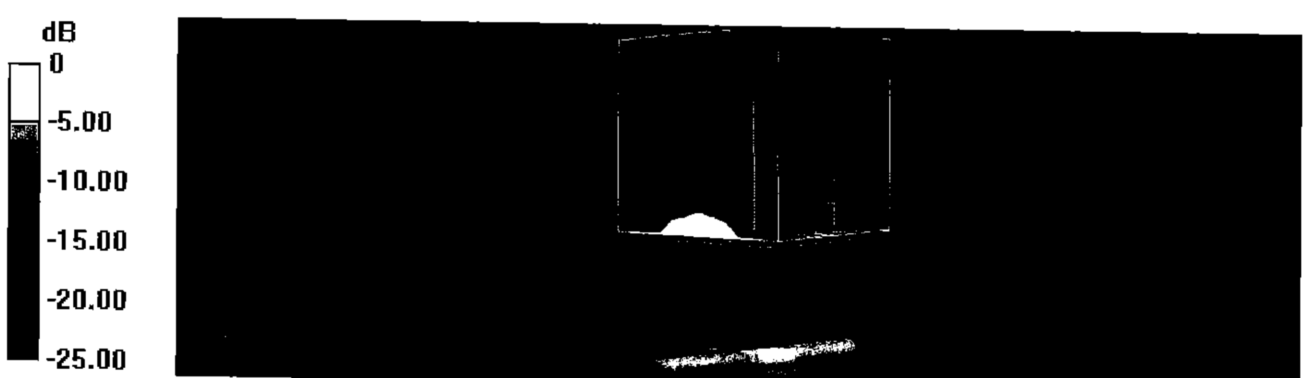
**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:981**

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.86 S/m; $\varepsilon_r$ = 37.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

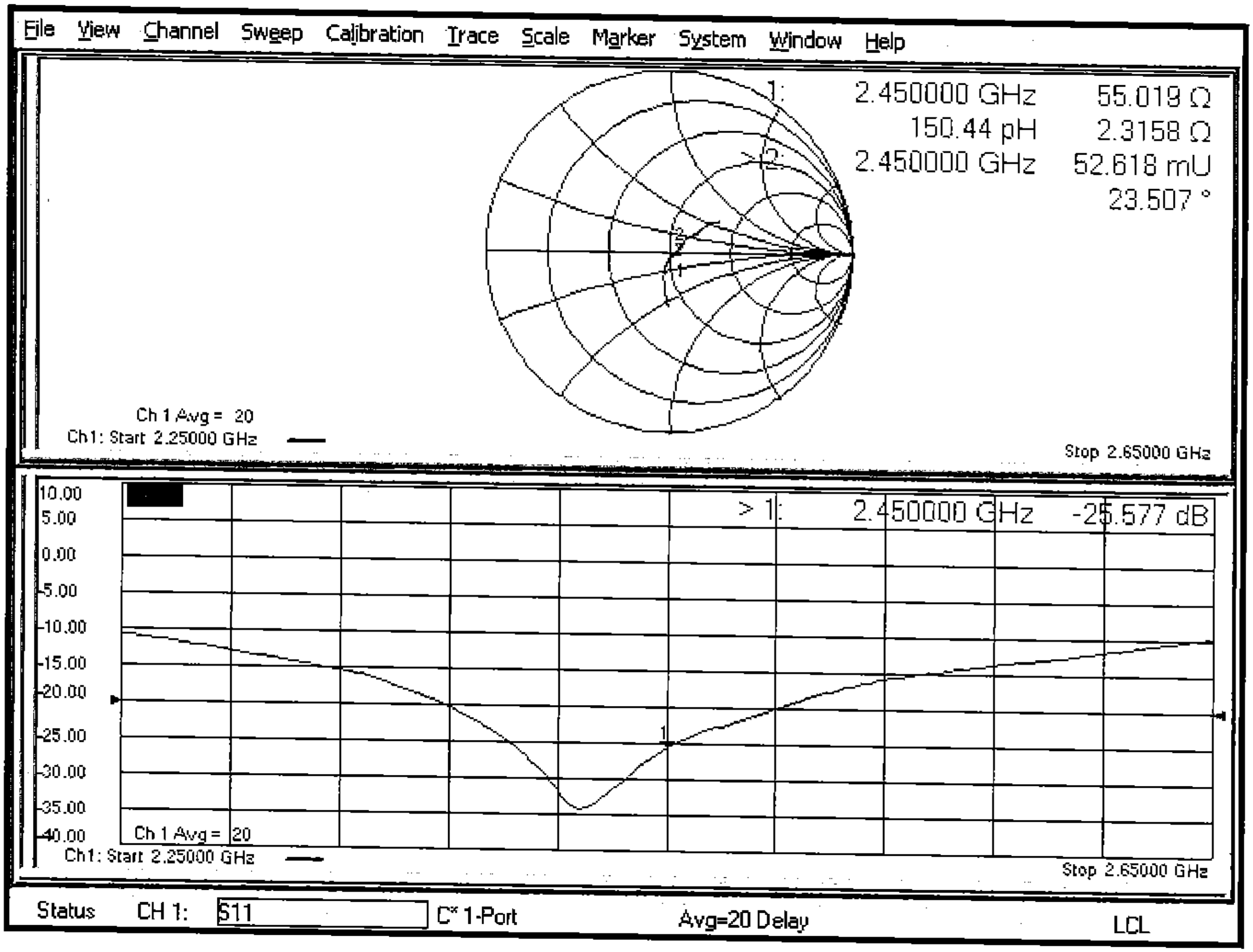
- Probe: EX3DV4 - SN7349; ConvF(7.88, 7.88, 7.88) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

**Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 116.6 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 26.7 W/kg
**SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.2 W/kg**
Maximum value of SAR (measured) = 22.1 W/kg




0 dB = 22.1 W/kg = 13.44 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 13.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

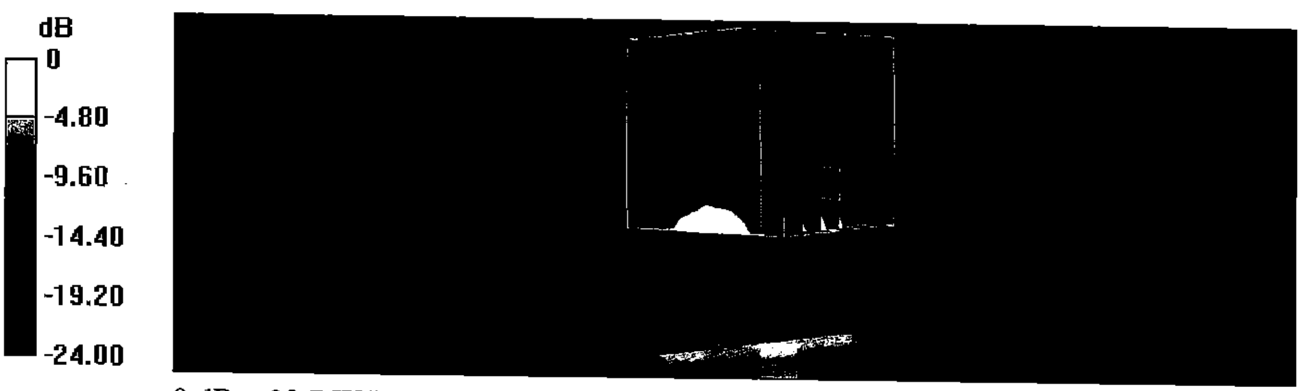
**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:981**

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma$ = 2.02 S/m; $\varepsilon_r$ = 51.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

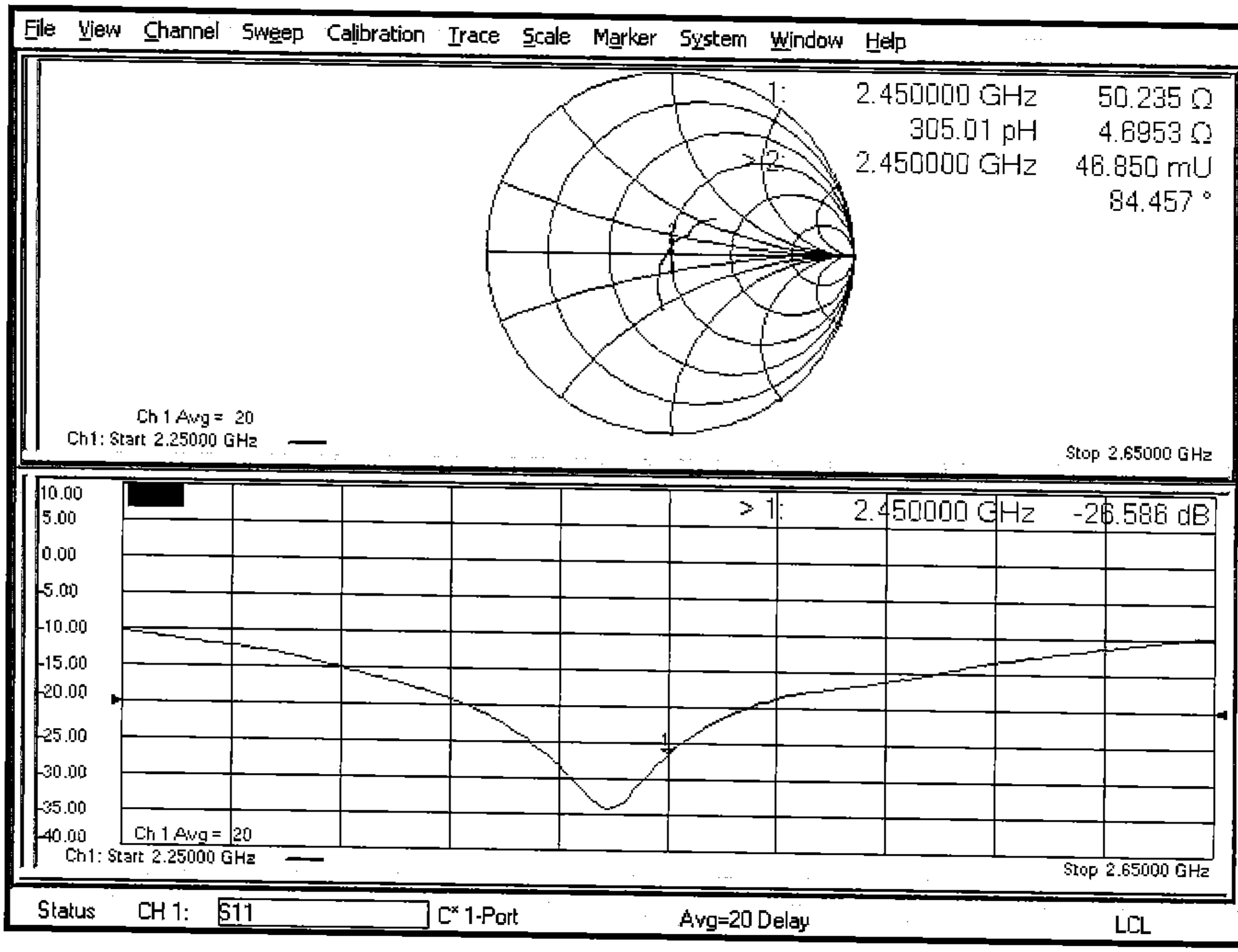
- Probe: EX3DV4 - SN7349; ConvF(8.01, 8.01, 8.01) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

**Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:**
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.0 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 25.3 W/kg
**SAR(1 g) = 13 W/kg; SAR(10 g) = 6.11 W/kg**
Maximum value of SAR (measured) = 20.7 W/kg




0 dB = 20.7 W/kg = 13.16 dBW/kg

## Impedance Measurement Plot for Body TSL



## DASY5 Validation Report for SAM Head

Date: 16.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:981**

Communication System: UID 0 - CW ; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.85 S/m; $\varepsilon_r$ = 40.2; $\rho$ = 1000 kg/m$^3$
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

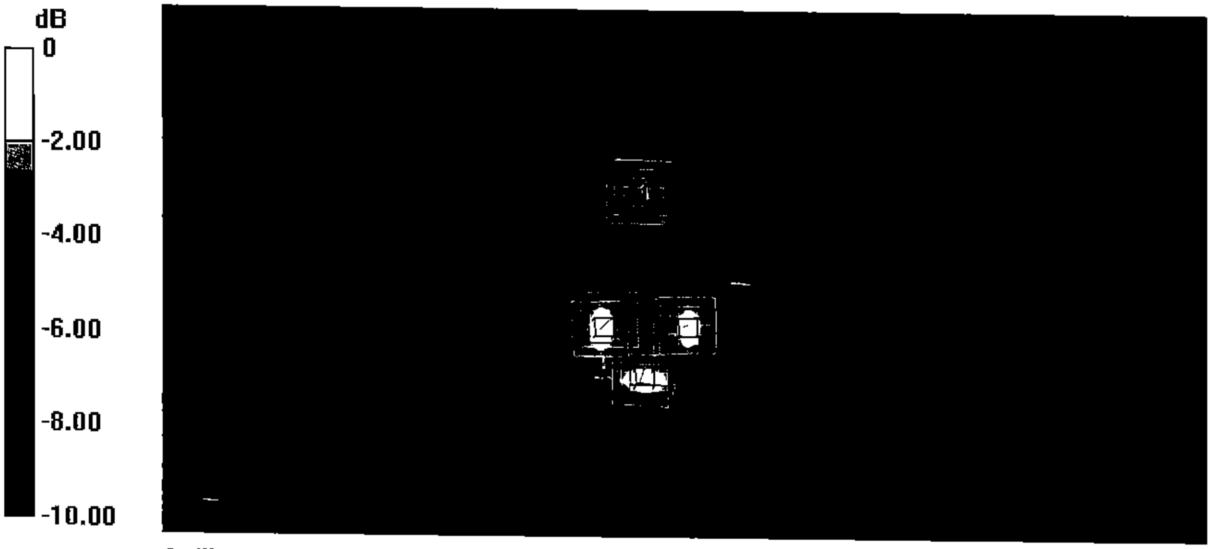
- Probe: EX3DV4 - SN7349; ConvF(7.88, 7.88, 7.88) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

**SAM Head Top/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 116.2 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 26.4 W/kg
**SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.33 W/kg**
Maximum value of SAR (measured) = 22.0 W/kg

**SAM Head Mouth/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 116.9 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 26.3 W/kg
**SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.35 W/kg**
Maximum value of SAR (measured) = 21.7 W/kg

**SAM Head Neck/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 112.0 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 24.1 W/kg
**SAR(1 g) = 12.9 W/kg; SAR(10 g) = 6.11 W/kg**
Maximum value of SAR (measured) = 20.5 W/kg

**SAM Head Ear/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.03 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 15.8 W/kg
**SAR(1 g) = 8.74 W/kg; SAR(10 g) = 4.4 W/kg**
Maximum value of SAR (measured) = 13.5 W/kg




0 dB = 22.0 W/kg = 13.42 dBW/kg

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 0108**

**Client** **PC Test**

**Certificate No: D2450V2-797_Sep17**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D2450V2 - SN:797 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | September 11, 2017 |

SC ✓
10/03/2017

Extended PM ✓
9/20/2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 04-Apr-17 (No. 217-02521/02522) | Apr-18 |
| Power sensor NRP-Z91 | SN: 103244 | 04-Apr-17 (No. 217-02521) | Apr-18 |
| Power sensor NRP-Z91 | SN: 103245 | 04-Apr-17 (No. 217-02522) | Apr-18 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 07-Apr-17 (No. 217-02528) | Apr-18 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 07-Apr-17 (No. 217-02529) | Apr-18 |
| Reference Probe EX3DV4 | SN: 7349 | 31-May-17 (No. EX3-7349_May17) | May-18 |
| DAE4 | SN: 601 | 28-Mar-17 (No. DAE4-601_Mar17) | Mar-18 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Oct-16) | In house check: Oct-18 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-16) | In house check: Oct-17 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Michael Weber | Laboratory Technician | M.Weber |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: September 11, 2017

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** Schweizerischer Kalibrierdienst
**C** Service suisse d'étalonnage
Servizio svizzero di taratura
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

Accreditation No.: **SCS 0108**

**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

**Calibration is Performed According to the Following Standards:**

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

e) DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.10.0 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 2450 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 39.2 | 1.80 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 37.8 ± 6 % | 1.86 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.5 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **52.7 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.28 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **24.8 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 52.7 | 1.95 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 51.9 ± 6 % | 2.04 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.1 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **51.1 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.14 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **24.2 W/kg ± 16.5 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 53.8 Ω + 7.4 jΩ |
| Return Loss | - 21.9 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 49.7 Ω + 9.1 jΩ |
| Return Loss | - 20.9 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.152 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | January 24, 2006 |

**DASY5 Validation Report for Head TSL**

Date: 11.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 797**

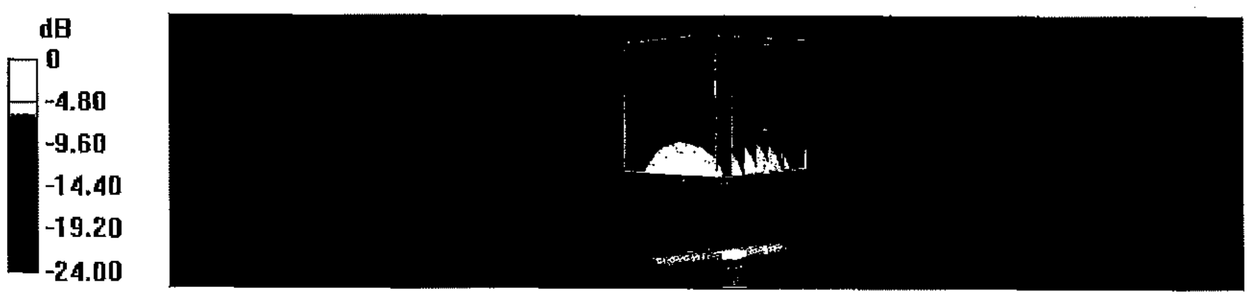
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma$ = 1.86 S/m; $\varepsilon_r$ = 37.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.12, 8.12, 8.12); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

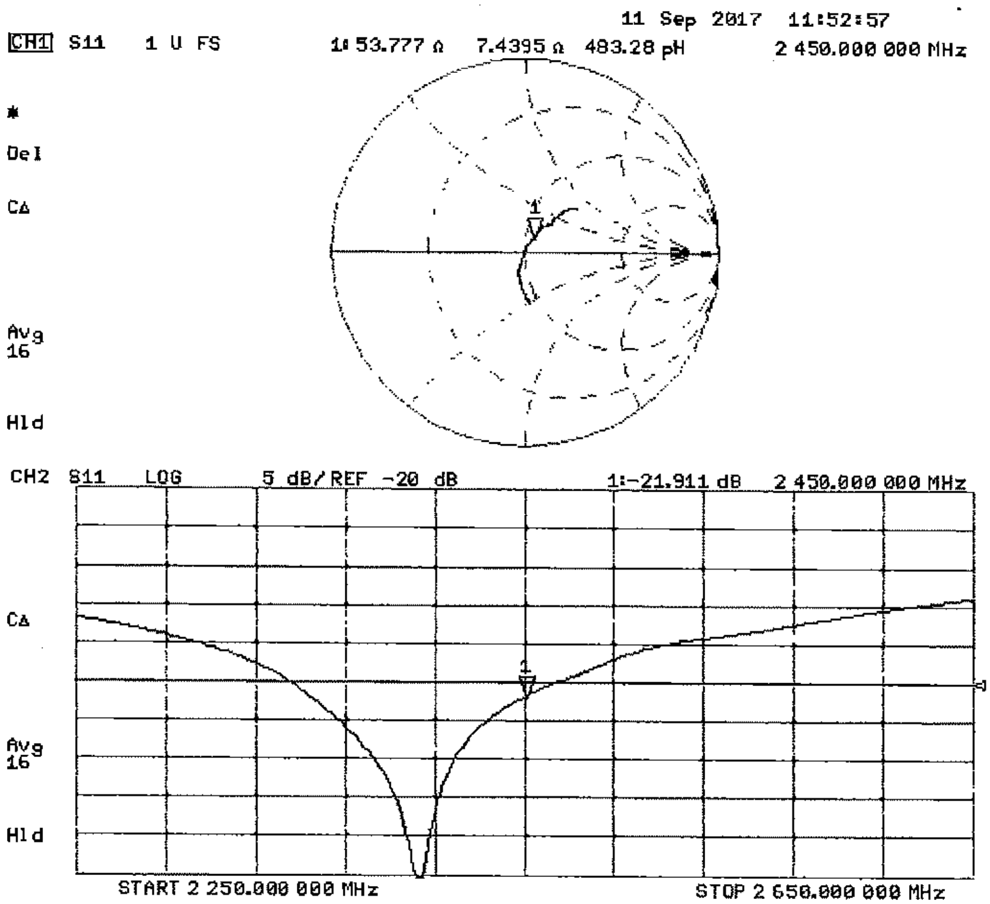
## Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 113.5 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 26.9 W/kg
**SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.28 W/kg**
Maximum value of SAR (measured) = 21.6 W/kg




0 dB = 21.6 W/kg = 13.34 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 11.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 797**

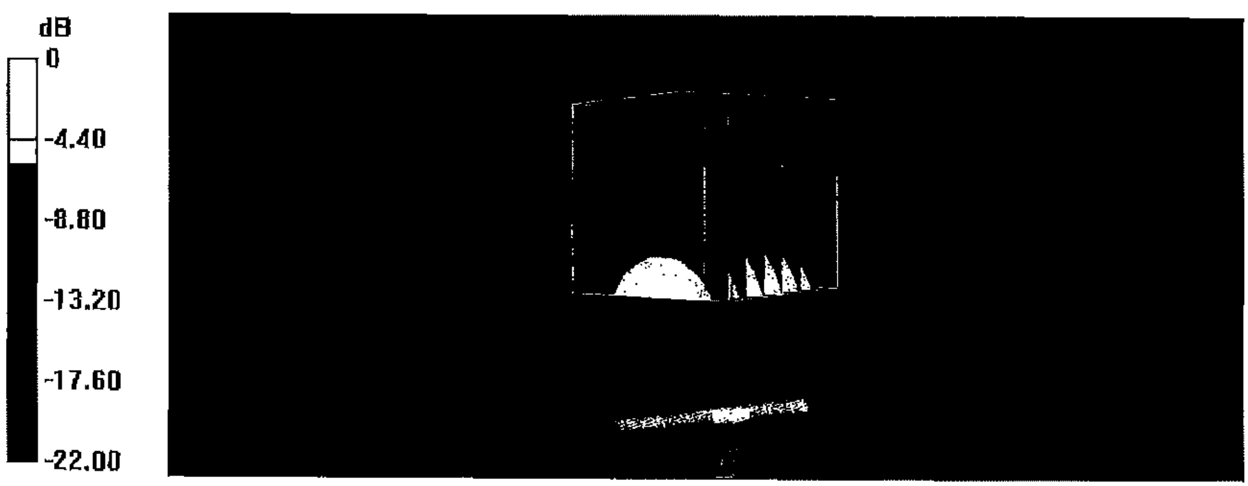
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma = 2.04$ S/m; $\varepsilon_r = 51.9$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.1, 8.1, 8.1); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

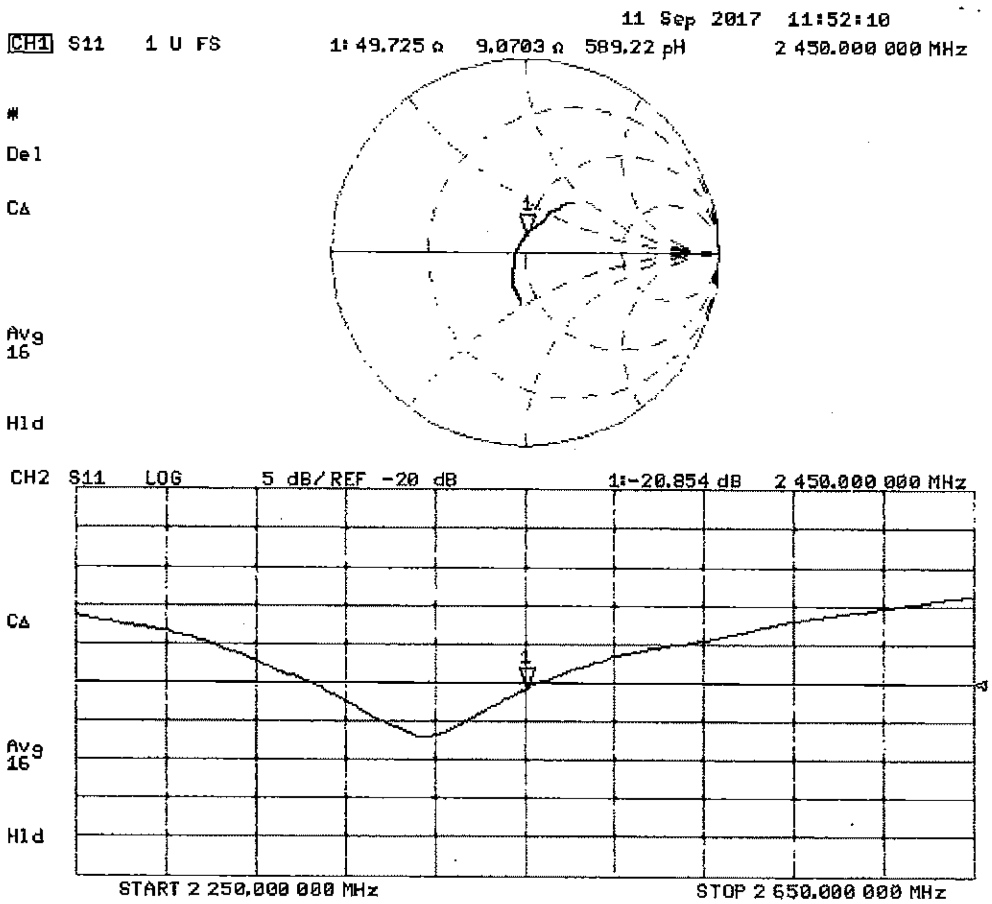
### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.4 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 25.6 W/kg
**SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.14 W/kg**
Maximum value of SAR (measured) = 20.3 W/kg




0 dB = 20.3 W/kg = 13.07 dBW/kg

## Impedance Measurement Plot for Body TSL



# Certification of Calibration

| | |
|---|---|
| Object | D2450V2 – SN: 797 |
| Calibration procedure(s) | Procedure for Calibration Extension for SAR Dipoles. |
| Extended Calibration date: | September 11, 2018 |
| Description: | SAR Validation Dipole at 2450 MHz. |

Calibration Equipment used:

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|---|---|---|---|---|---|---|
| Control Company | 4040 | Therm./Clock/Humidity Monitor | 3/31/2017 | Biennial | 3/31/2019 | 170232394 |
| Control Company | 4352 | Ultra Long Stem Thermometer | 5/2/2017 | Biennial | 5/2/2019 | 170330156 |
| Amplifier Research | 15S1G6 | Amplifier | CBT | N/A | CBT | 433971 |
| Narda | 4772-3 | Attenuator (3dB) | CBT | N/A | CBT | 9406 |
| Keysight | 772D | Dual Directional Coupler | CBT | N/A | CBT | MY52180215 |
| Keysight Technologies | 85033E | Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm) | 6/4/2018 | Annual | 6/4/2019 | MY53401181 |
| Agilent | 8753ES | S-Parameter Vector Network Analyzer | 8/30/2018 | Annual | 8/30/2019 | MY40003841 |
| Mini-Circuits | BW-N20W5+ | DC to 18 GHz Precision Fixed 20 dB Attenuator | CBT | N/A | CBT | N/A |
| SPEAG | DAK-3.5 | Dielectric Assessment Kit | 5/15/2018 | Annual | 5/15/2019 | 1070 |
| SPEAG | EX3DV4 | SAR Probe | 7/20/2018 | Annual | 7/20/2019 | 7410 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 7/11/2018 | Annual | 7/11/2019 | 1322 |
| SPEAG | ES3DV3 | SAR Probe | 3/13/2018 | Annual | 3/13/2019 | 3319 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 3/7/2018 | Annual | 3/7/2019 | 1368 |
| Anritsu | MA2411B | Pulse Power Sensor | 3/2/2018 | Annual | 3/2/2019 | 1207364 |
| Anritsu | MA2411B | Pulse Power Sensor | 3/2/2018 | Annual | 3/2/2019 | 1339018 |
| Anritsu | ML2495A | Power Meter | 10/22/2017 | Annual | 10/22/2018 | 1328004 |
| Agilent | N5182A | MXG Vector Signal Generator | 4/18/2018 | Annual | 4/18/2019 | MY47420800 |
| Seekonk | NC-100 | Torque Wrench | 7/11/2018 | Annual | 7/11/2019 | N/A |
| MiniCircuits | VLF-6000+ | Low Pass Filter | CBT | N/A | CBT | N/A |
| Narda | 4014C-6 | 4 - 8 GHz SMA 6 dB Directional Coupler | CBT | N/A | CBT | N/A |

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path.

Measurement Uncertainty = ±23% (k=2)

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated By: | Brodie Halbfoster | Team Lead Engineer | BRODIE HALBFOSTER |
| Approved By: | Kaitlin O'Keefe | Senior Technical Manager | KOK |

# DIPOLE CALIBRATION EXTENSION

Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

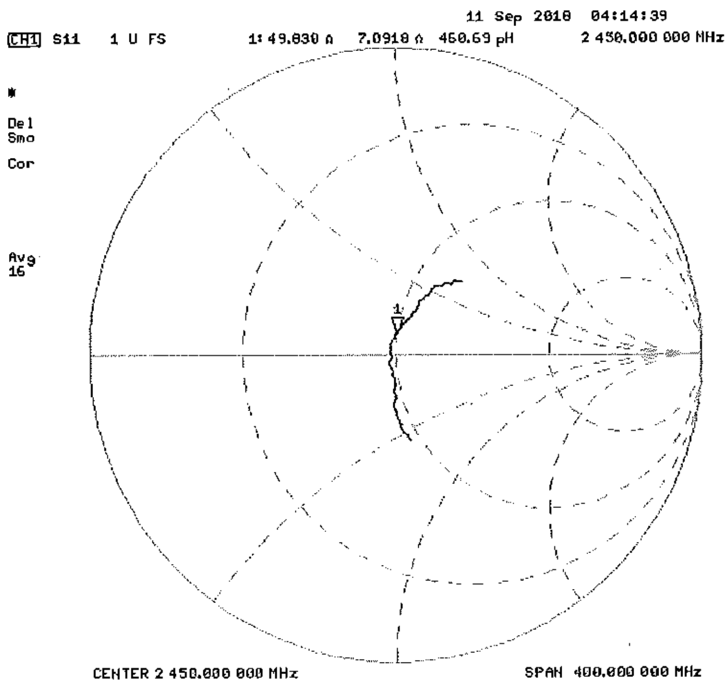
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

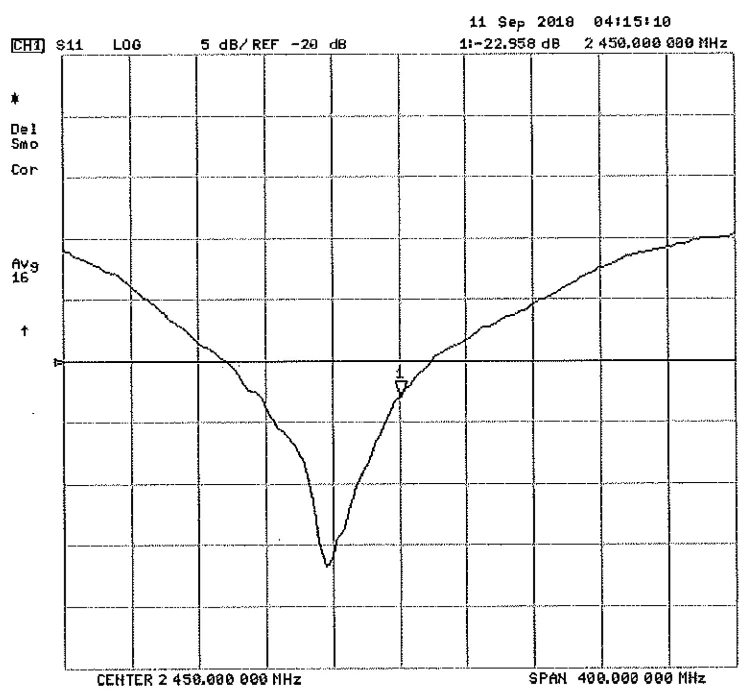
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

| Calibration Date | Extension Date | Certificate Electrical Delay (ns) | Certificate SAR Target Head (1g) W/kg @ 20.0 dBm | Measured Head SAR (1g) W/kg @ 20.0 dBm | Deviation 1g (%) | Certificate SAR Target Head (10g) W/kg @ 20.0 dBm | Measured Head SAR (10g) W/kg @ 20.0 dBm | Deviation 10g (%) | Certificate Impedance Head (Ohm) Real | Measured Impedance Head (Ohm) Real | Difference (Ohm) Real | Certificate Impedance Head (Ohm) Imaginary | Measured Impedance Head (Ohm) Imaginary | Difference (Ohm) Imaginary | Certificate Return Loss Head (dB) | Measured Return Loss Head (dB) | Deviation (%) | PASS/FAIL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9/11/2017 | 9/11/2018 | 1.152 | 5.27 | 5.52 | 4.74% | 2.48 | 2.54 | 2.42% | 53.8 | 49.8 | 4 | 7.4 | 7.1 | 0.3 | -21.9 | -23 | -4.80% | PASS |

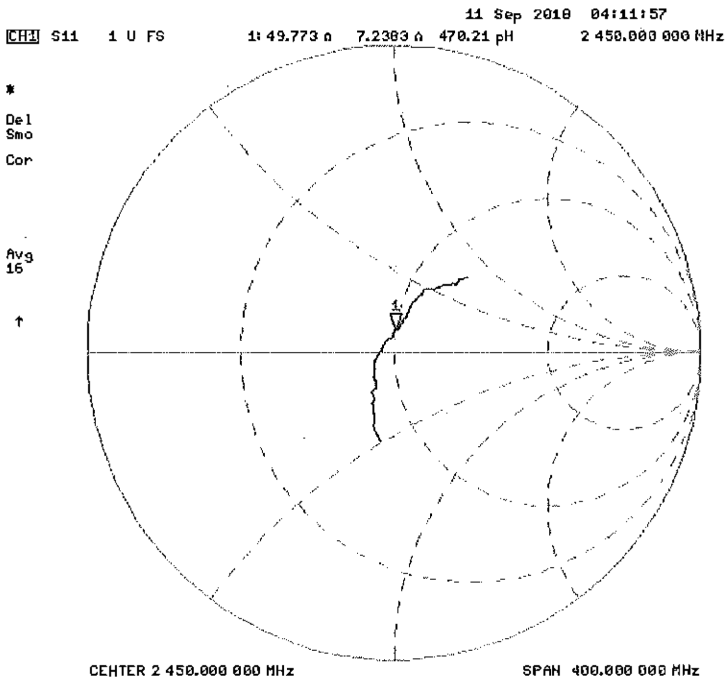
| Calibration Date | Extension Date | Certificate Electrical Delay (ns) | Certificate SAR Target Body (1g) W/kg @ 20.0 dBm | Measured Body SAR (1g) W/kg @ 20.0 dBm | Deviation 1g (%) | Certificate SAR Target Body (10g) W/kg @ 20.0 dBm | Measured Body SAR (10g) W/kg @ 20.0 dBm | Deviation 10g (%) | Certificate Impedance Body (Ohm) Real | Measured Impedance Body (Ohm) Real | Difference (Ohm) Real | Certificate Impedance Body (Ohm) Imaginary | Measured Impedance Body (Ohm) Imaginary | Difference (Ohm) Imaginary | Certificate Return Loss Body (dB) | Measured Return Loss Body (dB) | Deviation (%) | PASS/FAIL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9/11/2017 | 9/11/2018 | 1.152 | 5.11 | 5.17 | 1.17% | 2.42 | 2.37 | -2.07% | 49.7 | 49.8 | 0.1 | 9.1 | 7.2 | 1.9 | -20.9 | -22.6 | -8.20% | PASS |

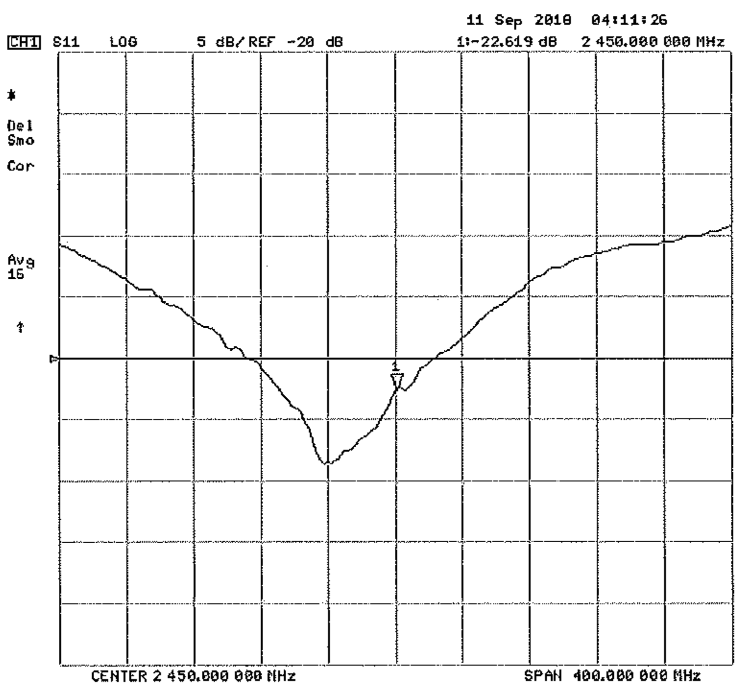
Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



**Calibration Laboratory of**
Schmid & Partner
Engineering AG
**Zeughausstrasse 43, 8004 Zurich, Switzerland**

**S** **Schweizerischer Kalibrierdienst**
**C** **Service suisse d'étalonnage**
**S** **Servizio svizzero di taratura**
**Swiss Calibration Service**

Accredited by the Swiss Accreditation Service (SAS)
**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 0108**

**Client** **PC Test**

**Certificate No: D2600V2-1004_Apr18**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D2600V2 - SN:1004 |
| Calibration procedure(s) | QA CAL-05.v10<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | April 11, 2018 |

BN ✓
05-01-2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 04-Apr-18 (No. 217-02672/02673) | Apr-19 |
| Power sensor NRP-Z91 | SN: 103244 | 04-Apr-18 (No. 217-02672) | Apr-19 |
| Power sensor NRP-Z91 | SN: 103245 | 04-Apr-18 (No. 217-02673) | Apr-19 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 04-Apr-18 (No. 217-02682) | Apr-19 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 04-Apr-18 (No. 217-02683) | Apr-19 |
| Reference Probe EX3DV4 | SN: 7349 | 30-Dec-17 (No. EX3-7349_Dec17) | Dec-18 |
| DAE4 | SN: 601 | 26-Oct-17 (No. DAE4-601_Oct17) | Oct-18 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Oct-16) | In house check: Oct-18 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-17) | In house check: Oct-18 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Michael Weber | Laboratory Technician | M.Weber |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: April 12, 2018

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.10.0 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 2600 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 39.0 | 1.96 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 37.8 ± 6 % | 2.03 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 14.3 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **55.9 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.35 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **25.1 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 52.5 | 2.16 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 52.1 ± 6 % | 2.19 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 13.8 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **54.8 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 6.20 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **24.7 W/kg ± 16.5 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

## Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 47.7 Ω - 5.7 jΩ |
| Return Loss | - 24.1 dB |

## Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 46.0 Ω - 3.8 jΩ |
| Return Loss | - 24.9 dB |

## General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.149 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

## Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | December 23, 2006 |

## DASY5 Validation Report for Head TSL

Date: 11.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1004**

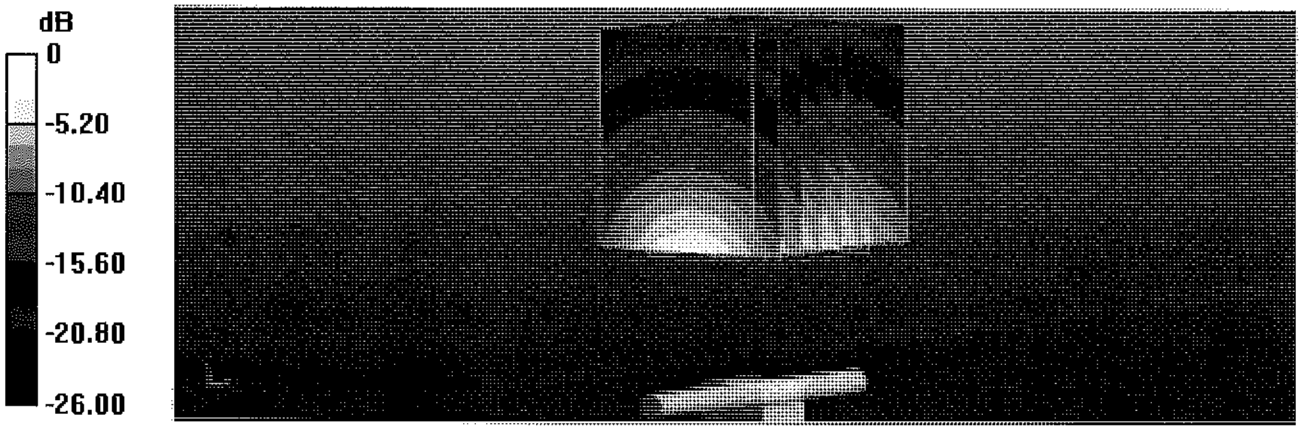
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; $\sigma$ = 2.03 S/m; $\varepsilon_r$ = 37.8; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.7, 7.7, 7.7); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

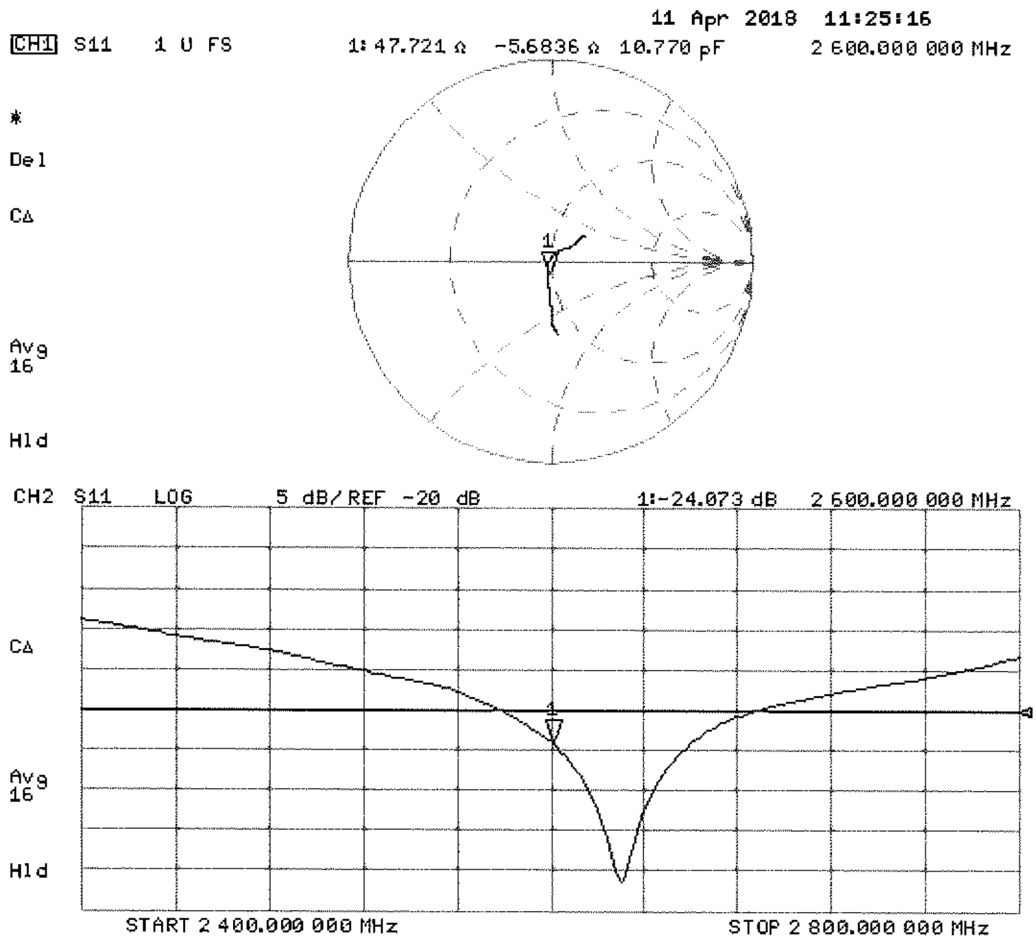
## Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 118.5 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 28.6 W/kg
**SAR(1 g) = 14.3 W/kg; SAR(10 g) = 6.35 W/kg**
Maximum value of SAR (measured) = 23.9 W/kg




0 dB = 23.9 W/kg = 13.78 dBW/kg

## Impedance Measurement Plot for Head TSL



**DASY5 Validation Report for Body TSL**

Date: 11.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1004**

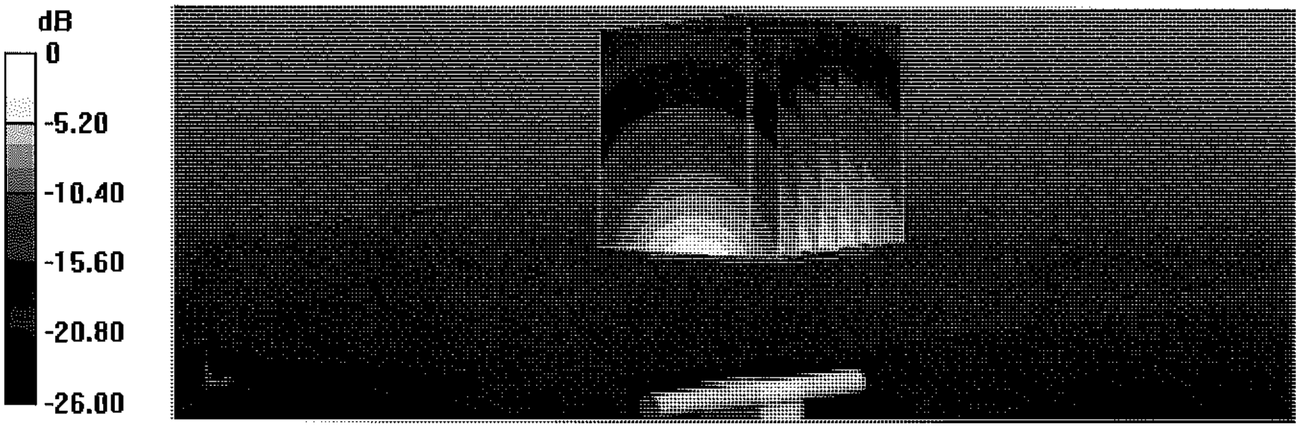
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; $\sigma$ = 2.19 S/m; $\varepsilon_r$ = 52.1; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.81, 7.81, 7.81); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

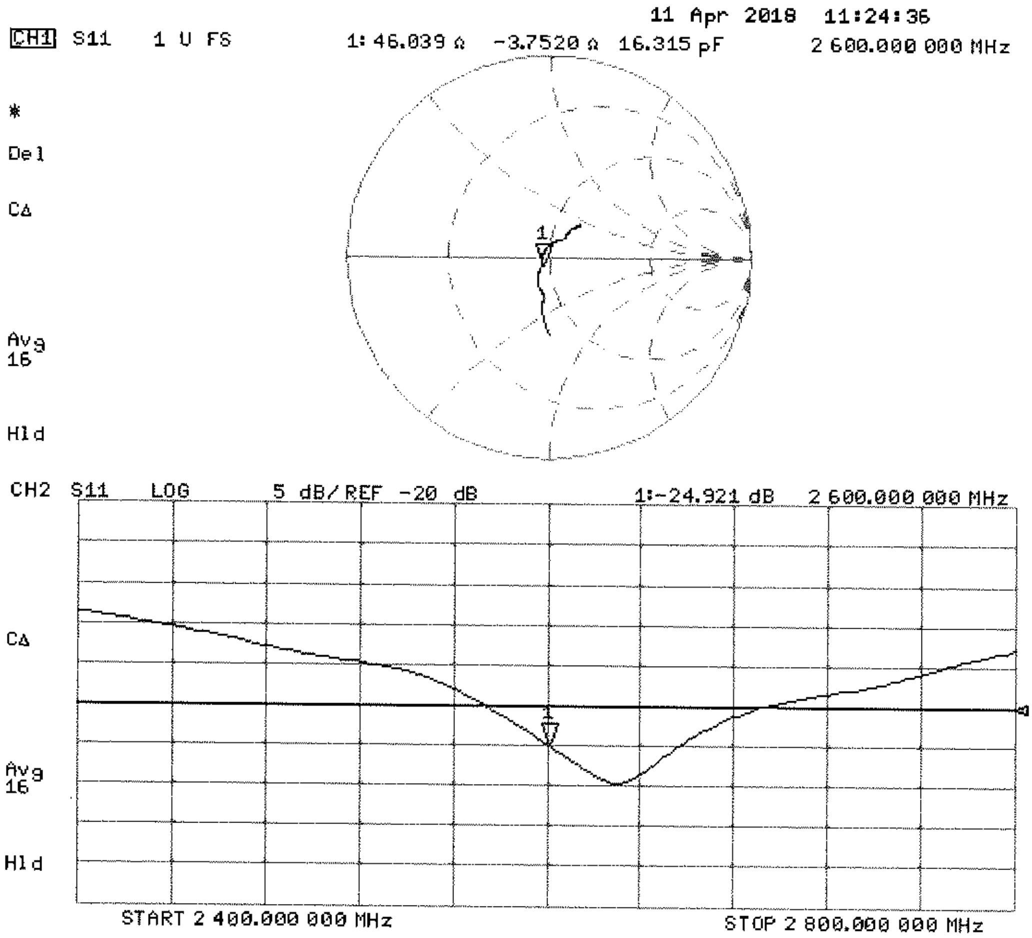
## Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 108.5 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 28.3 W/kg
**SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.2 W/kg**
Maximum value of SAR (measured) = 22.9 W/kg




0 dB = 22.9 W/kg = 13.60 dBW/kg

## Impedance Measurement Plot for Body TSL



**Calibration Laboratory of**
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D5GHzV2-1191_Sep16**

# CALIBRATION CERTIFICATE

Object D5GHzV2 - SN:1191

Calibration procedure(s) QA CAL-22.v2
Calibration procedure for dipole validation kits between 3-6 GHz

BN✓
09-28-2016

Extended PM✓
9/20/2018

Calibration date: September 21, 2016

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter NRP | SN: 104778 | 06-Apr-16 (No. 217-02288/02289) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103244 | 06-Apr-16 (No. 217-02288) | Apr-17 |
| Power sensor NRP-Z91 | SN: 103245 | 06-Apr-16 (No. 217-02289) | Apr-17 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 05-Apr-16 (No. 217-02292) | Apr-17 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 05-Apr-16 (No. 217-02295) | Apr-17 |
| Reference Probe EX3DV4 | SN: 3503 | 30-Jun-16 (No. EX3-3503_Jun16) | Jun-17 |
| DAE4 | SN: 601 | 30-Dec-15 (No. DAE4-601_Dec15) | Dec-16 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (No. 217-02222) | In house check: Oct-16 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (No. 217-02223) | In house check: Oct-16 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Jun-15) | In house check: Oct-16 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-15) | In house check: Oct-16 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Leif Klysner | Laboratory Technician | Leif Klysner |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: September 22, 2016

**Calibration Laboratory of**
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

d) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.8 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom V5.0 | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy = 4.0 mm, dz = 1.4 mm | Graded Ratio = 1.4 (Z direction) |
| **Frequency** | 5250 MHz ± 1 MHz<br>5600 MHz ± 1 MHz<br>5750 MHz ± 1 MHz | |

## Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 35.9 | 4.71 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 34.5 ± 6 % | 4.59 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL at 5250 MHz

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 7.96 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **78.9 W/kg ± 19.9 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 100 mW input power | 2.29 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **22.6 W/kg ± 19.5 % (k=2)** |

## Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 35.5 | 5.07 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 34.0 ± 6 % | 4.93 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL at 5600 MHz

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 8.45 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **83.6 W / kg ± 19.9 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 100 mW input power | 2.41 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **23.8 W/kg ± 19.5 % (k=2)** |

## Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 35.4 | 5.22 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 33.8 ± 6 % | 5.08 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL at 5750 MHz

| **SAR averaged over 1 $cm^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 7.99 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **79.1 W/kg ± 19.9 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 100 mW input power | 2.27 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **22.4 W/kg ± 19.5 % (k=2)** |

## Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 48.9 | 5.36 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 47.4 ± 6 % | 5.52 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL at 5250 MHz

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 7.74 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **77.0 W/kg ± 19.9 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 100 mW input power | 2.17 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **21.6 W/kg ± 19.5 % (k=2)** |

## Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 48.5 | 5.77 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 46.8 ± 6 % | 6.00 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL at 5600 MHz

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 7.96 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **79.2 W/kg ± 19.9 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 100 mW input power | 2.24 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **22.2 W/kg ± 19.5 % (k=2)** |

## Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 48.3 | 5.94 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 46.5 ± 6 % | 6.21 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL at 5750 MHz

| **SAR averaged over 1 $cm^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 100 mW input power | 7.65 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **76.1 W/kg ± 19.9 % (k=2)** |

| **SAR averaged over 10 $cm^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 100 mW input power | 2.14 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **21.2 W/kg ± 19.5 % (k=2)** |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL at 5250 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 55.7 Ω - 4.3 jΩ |
| Return Loss | - 23.4 dB |

### Antenna Parameters with Head TSL at 5600 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 58.3 Ω - 3.2 jΩ |
| Return Loss | - 21.8 dB |

### Antenna Parameters with Head TSL at 5750 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 58.1 Ω + 4.8 jΩ |
| Return Loss | - 21.2 dB |

### Antenna Parameters with Body TSL at 5250 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 56.1 Ω - 3.7 jΩ |
| Return Loss | - 23.4 dB |

### Antenna Parameters with Body TSL at 5600 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 58.9 Ω - 1.7 jΩ |
| Return Loss | - 21.7 dB |

### Antenna Parameters with Body TSL at 5750 MHz

| | |
|---|---|
| Impedance, transformed to feed point | 59.5 Ω + 6.9 jΩ |
| Return Loss | - 19.4 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.204 ns |

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

| | |
|---|---|
| Manufactured by | SPEAG |
| Manufactured on | August 28, 2003 |

## DASY5 Validation Report for Head TSL

Date: 21.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1191**

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; $\sigma = 4.59$ S/m; $\varepsilon_r = 34.5$; $\rho = 1000$ kg/m$^3$ , Medium parameters used: f = 5600 MHz; $\sigma = 4.93$ S/m; $\varepsilon_r = 34$; $\rho = 1000$ kg/m$^3$ , Medium parameters used: f = 5750 MHz; $\sigma = 5.08$ S/m; $\varepsilon_r = 33.8$; $\rho = 1000$ kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

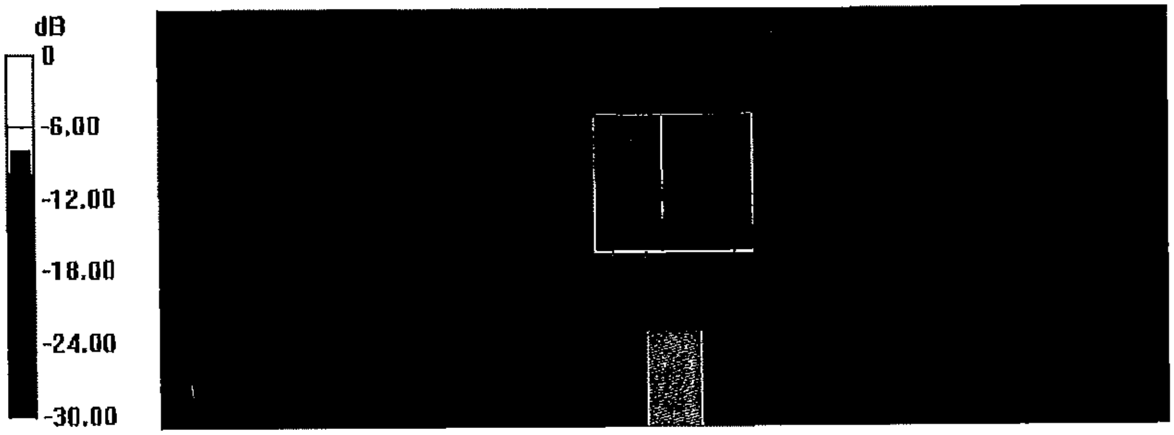
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.42, 5.42, 5.42); Calibrated: 30.06.2016, ConvF(4.89, 4.89, 4.89); Calibrated: 30.06.2016, ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 68.49 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 28.6 W/kg
**SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.29 W/kg**
Maximum value of SAR (measured) = 18.2 W/kg

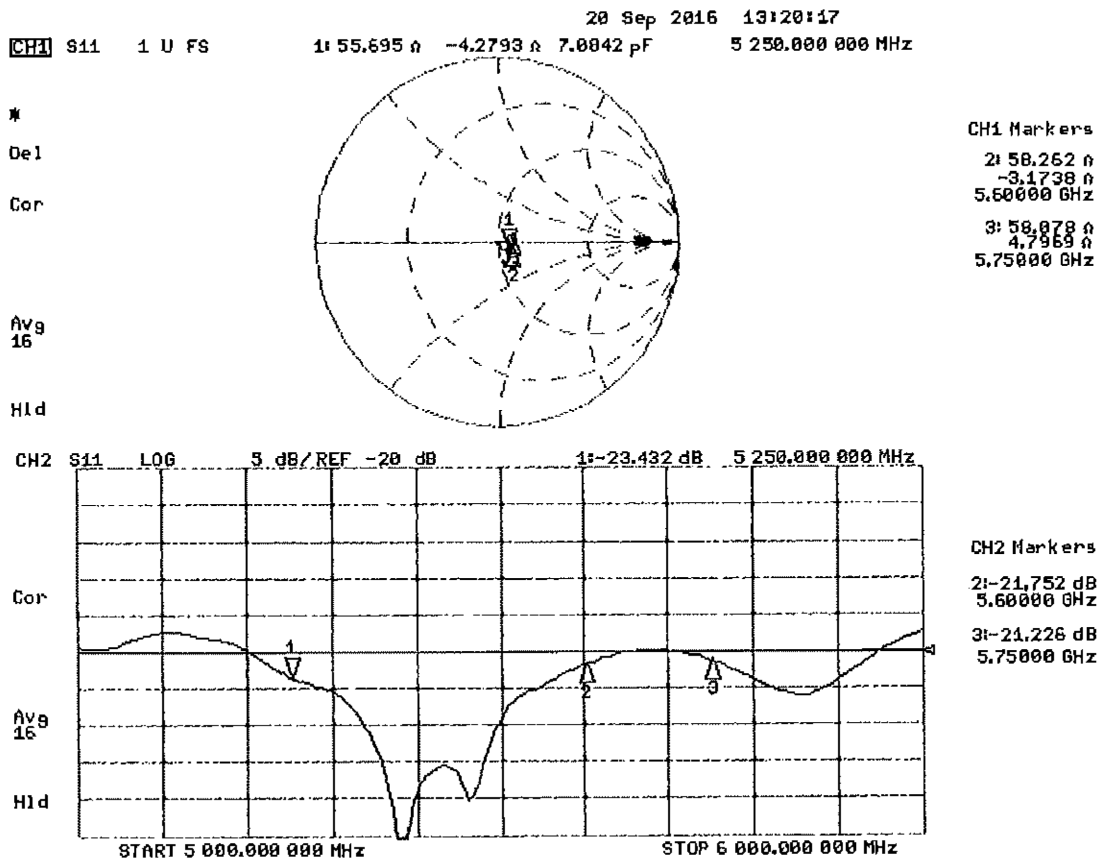
**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.34 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 32.9 W/kg
**SAR(1 g) = 8.45 W/kg; SAR(10 g) = 2.41 W/kg**
Maximum value of SAR (measured) = 20.0 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.15 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 32.3 W/kg
**SAR(1 g) = 7.99 W/kg; SAR(10 g) = 2.27 W/kg**
Maximum value of SAR (measured) = 19.3 W/kg




0 dB = 18.2 W/kg = 12.60 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 20.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1191**

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; $\sigma$ = 5.52 S/m; $\varepsilon_r$ = 47.4; $\rho$ = 1000 kg/m$^3$ , Medium parameters used: f = 5600 MHz; $\sigma$ = 6 S/m; $\varepsilon_r$ = 46.8; $\rho$ = 1000 kg/m$^3$ , Medium parameters used: f = 5750 MHz; $\sigma$ = 6.21 S/m; $\varepsilon_r$ = 46.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

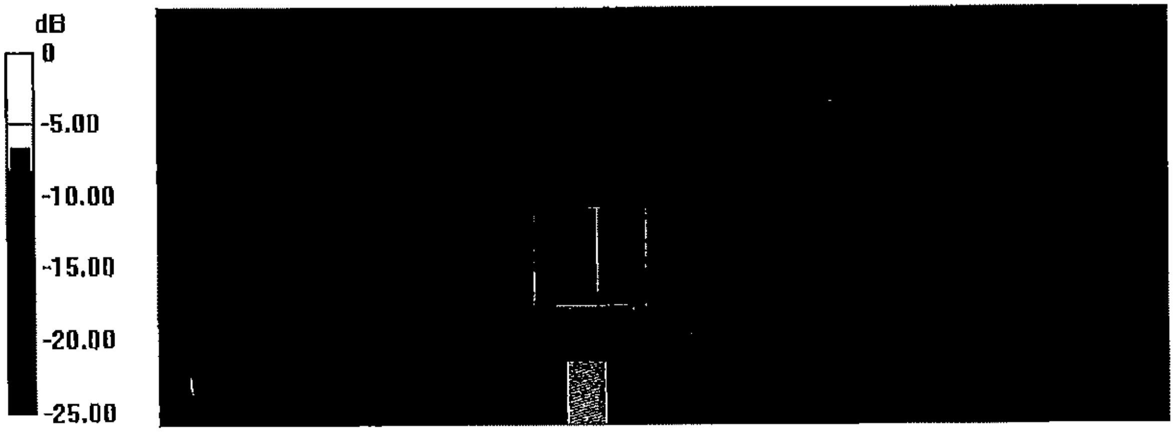
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016, ConvF(4.35, 4.35, 4.35); Calibrated: 30.06.2016, ConvF(4.3, 4.3, 4.3); Calibrated: 30.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.49 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 29.1 W/kg
**SAR(1 g) = 7.74 W/kg; SAR(10 g) = 2.17 W/kg**
Maximum value of SAR (measured) = 17.7 W/kg

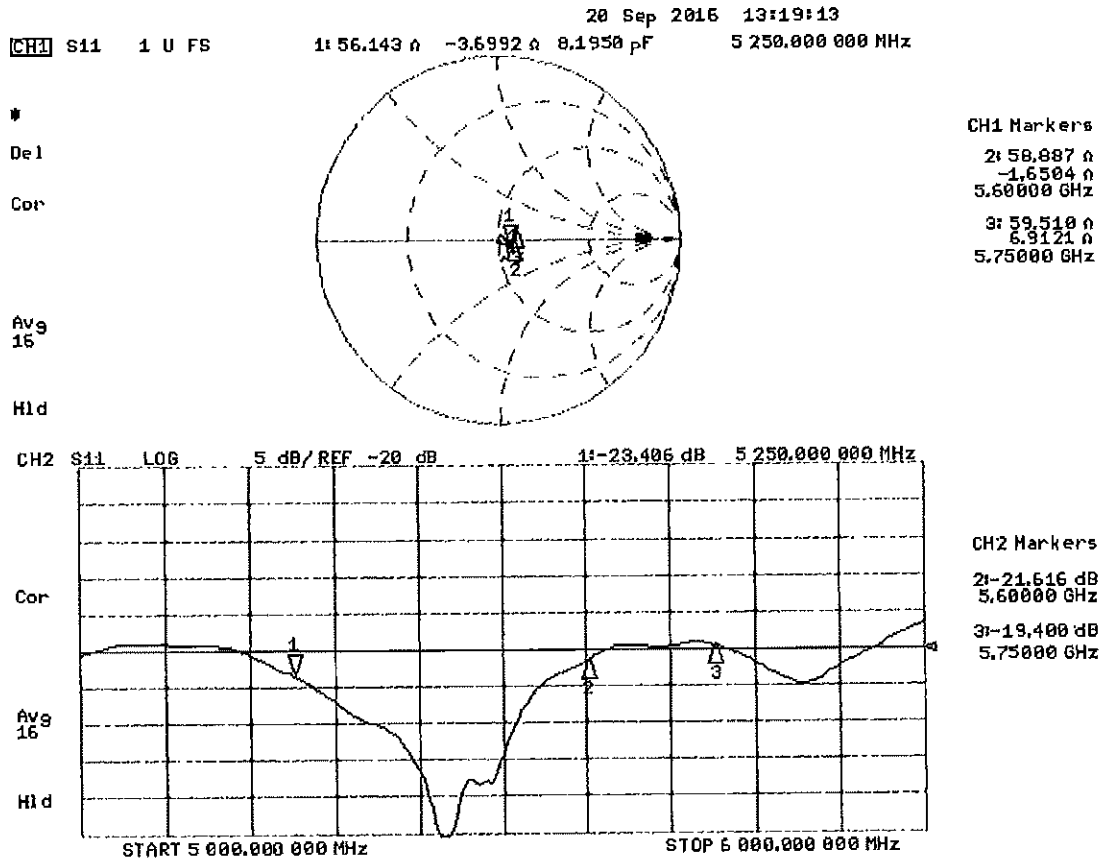
**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.85 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 32.5 W/kg
**SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.24 W/kg**
Maximum value of SAR (measured) = 18.8 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.21 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 32.7 W/kg
**SAR(1 g) = 7.65 W/kg; SAR(10 g) = 2.14 W/kg**
Maximum value of SAR (measured) = 18.5 W/kg



0 dB = 17.7 W/kg = 12.48 dBW/kg

## Impedance Measurement Plot for Body TSL



PCTEST ENGINEERING LABORATORY, INC.
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. +1.410.290.6652 / Fax +1.410.290.6654
http://www.pctest.com

# Certification of Calibration

Object D5GHzV2 – SN: 1191

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extension Calibration date: 9/19/2017

Description: SAR Validation Dipole at 5250, 5600, and 5750 MHz.

Calibration Equipment used:

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|---|---|---|---|---|---|---|
| Control Company | 4040 | Therm./Clock/Humidity Monitor | 3/31/2017 | Biennial | 3/31/2019 | 170232394 |
| Control Company | 4352 | Ultra Long Stem Thermometer | 5/2/2017 | Biennial | 5/2/2019 | 170330156 |
| Amplifier Research | 15S1G6 | Amplifier | CBT | N/A | CBT | 433971 |
| Narda | 4772-3 | Attenuator (3dB) | CBT | N/A | CBT | 9406 |
| Keysight | 772D | Dual Directional Coupler | CBT | N/A | CBT | MY52180215 |
| Keysight Technologies | 85033E | Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm) | 6/1/2017 | Annual | 6/1/2018 | MY53401181 |
| Agilent | 8753ES | S-Parameter Network Analyzer | 10/26/2016 | Annual | 10/26/2017 | US39170118 |
| Mini-Circuits | BW-N20W5+ | DC to 18 GHz Precision Fixed 20 dB Attenuator | CBT | N/A | CBT | N/A |
| SPEAG | DAK-3.5 | Dielectric Assessment Kit | 5/10/2017 | Annual | 5/10/2018 | 1070 |
| SPEAG | EX3DV4 | SAR Probe | 1/13/2017 | Annual | 1/13/2018 | 3589 |
| SPEAG | EX3DV4 | SAR Probe | 2/13/2017 | Annual | 2/13/2018 | 3914 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 1/16/2017 | Annual | 1/16/2018 | 1466 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 2/9/2017 | Annual | 2/9/2018 | 665 |
| Anritsu | MA2411B | Pulse Power Sensor | 2/10/2017 | Annual | 2/10/2018 | 1207364 |
| Anritsu | MA2411B | Pulse Power Sensor | 2/10/2017 | Annual | 2/10/2018 | 1339018 |
| Anritsu | ML2495A | Power Meter | 10/16/2015 | Biennial | 10/16/2017 | 941001 |
| Agilent | N5182A | MXG Vector Signal Generator | 2/28/2017 | Annual | 2/28/2018 | MY47420800 |
| Seekonk | NC-100 | Torque Wrench | 11/6/2015 | Biennial | 11/6/2017 | N/A |
| MiniCircuits | VLF-6000+ | Low Pass Filter | CBT | N/A | CBT | N/A |
| Narda | 4014C-6 | 4 - 8 GHz SMA 6 dB Directional Coupler | CBT | N/A | CBT | N/A |

Measurement Uncertainty = ±23% (k=2)

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated By: | Brodie Halbfoster | Test Engineer | BRODIE HALBFOSTER |
| Approved By: | Kaitlin O'Keefe | Senior Technical Manager | KOK |

# DIPOLE CALIBRATION EXTENSION

Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

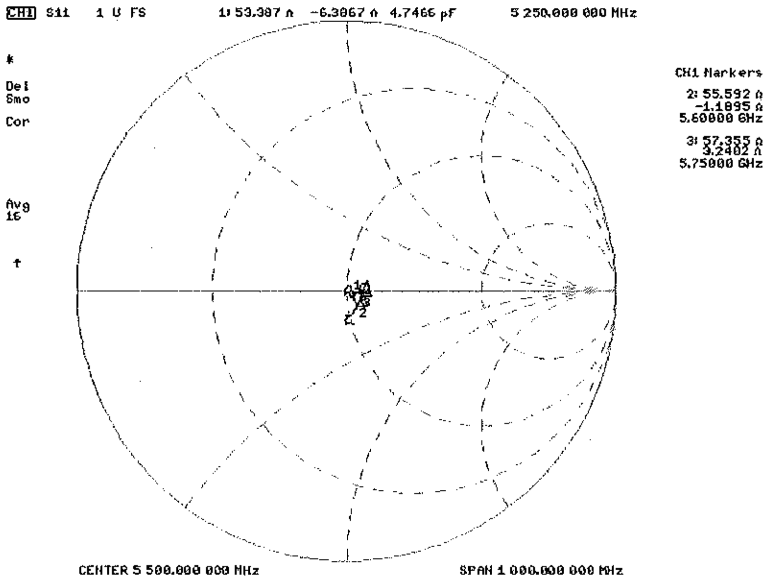
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

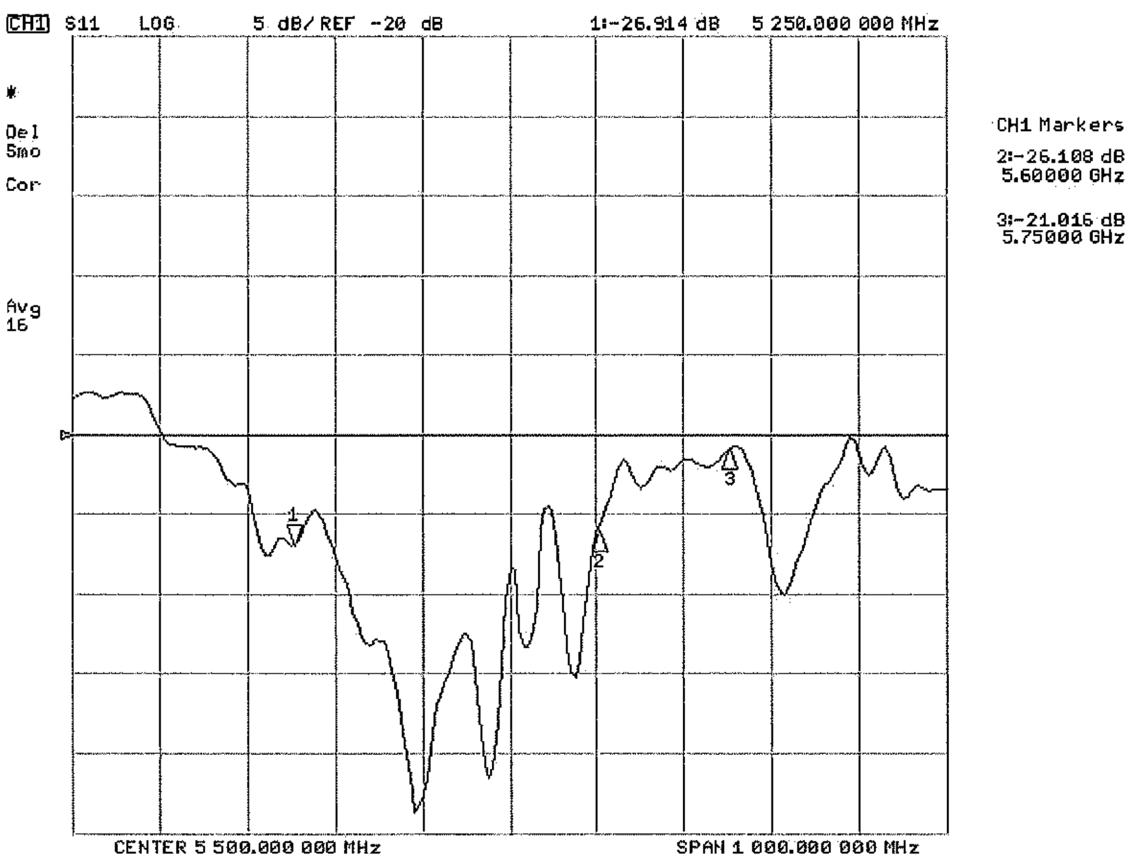
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

| Frequency (MHz) | Calibration Date | Extension Date | Certificate Electrical Delay (ns) | Certificate SAR Target Head (1g) W/kg @ 17.0 dBm | Measured Head SAR (1g) W/kg @ 17.0 dBm | Deviation 1g (%) | Certificate SAR Target Head (10g) W/kg @ 17.0 dBm | Measured Head SAR (10g) W/kg @ 17.0 dBm | Deviation 10g (%) | Certificate Impedance Head (Ohm) Real | Measured Impedance Head (Ohm) Real | Difference (Ohm) Real | Certificate Impedance Head (Ohm) Imaginary | Measured Impedance Head (Ohm) Imaginary | Difference (Ohm) Imaginary | Certificate Return Loss Head (dB) | Measured Return Loss Head (dB) | Deviation (%) | PASS/FAIL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **5250** | 9/21/2016 | 9/19/2017 | 1.204 | 3.95 | 3.70 | -6.21% | 1.13 | 1.05 | -7.08% | 55.7 | 53.4 | 2.3 | -4.3 | -6.4 | 2.1 | -23.4 | -26.9 | -15.00% | PASS |
| **5600** | 9/21/2016 | 9/19/2017 | 1.204 | 4.18 | 4.03 | -3.59% | 1.19 | 1.13 | -5.04% | 58.3 | 55.6 | 2.7 | -3.2 | -1.2 | 2.0 | -21.8 | -26.1 | -19.80% | PASS |
| **5750** | 9/21/2016 | 9/19/2017 | 1.204 | 3.96 | 3.94 | -0.38% | 1.12 | 1.10 | -1.79% | 58.1 | 57.4 | 0.7 | 4.8 | 3.2 | 1.6 | -21.2 | -21.0 | 0.90% | PASS |

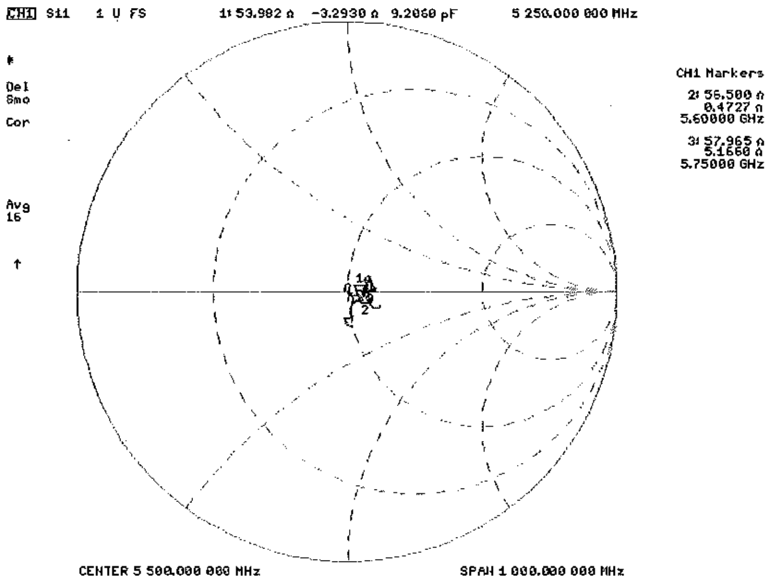
| Frequency (MHz) | Calibration Date | Extension Date | Certificate Electrical Delay (ns) | Certificate SAR Target Body (1g) W/kg @ 17.0 dBm | Measured Body SAR (1g) W/kg @ 17.0 dBm | Deviation 1g (%) | Certificate SAR Target Body (10g) W/kg @ 17.0 dBm | Measured Body SAR (10g) W/kg @ 17.0 dBm | Deviation 10g (%) | Certificate Impedance Body (Ohm) Real | Measured Impedance Body (Ohm) Real | Difference (Ohm) Real | Certificate Impedance Body (Ohm) Imaginary | Measured Impedance Body (Ohm) Imaginary | Difference (Ohm) Imaginary | Certificate Return Loss Body (dB) | Measured Return Loss Body (dB) | Deviation (%) | PASS/FAIL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **5250** | 9/21/2016 | 9/19/2017 | 1.204 | 3.85 | 3.80 | -1.30% | 1.08 | 1.06 | -1.85% | 56.1 | 54.0 | 2.1 | -3.7 | -3.3 | 0.4 | -23.4 | -26.0 | -11.10% | PASS |
| **5600** | 9/21/2016 | 9/19/2017 | 1.204 | 3.96 | 4.06 | 2.53% | 1.11 | 1.13 | 1.80% | 58.9 | 56.5 | 2.4 | -1.7 | 0.5 | 2.2 | -21.7 | -24.5 | -12.80% | PASS |
| **5750** | 9/21/2016 | 9/19/2017 | 1.204 | 3.81 | 3.66 | -3.81% | 1.06 | 1.02 | -3.77% | 59.5 | 58.0 | 1.5 | 6.9 | 5.2 | 1.7 | -19.4 | -21.1 | -8.70% | PASS |

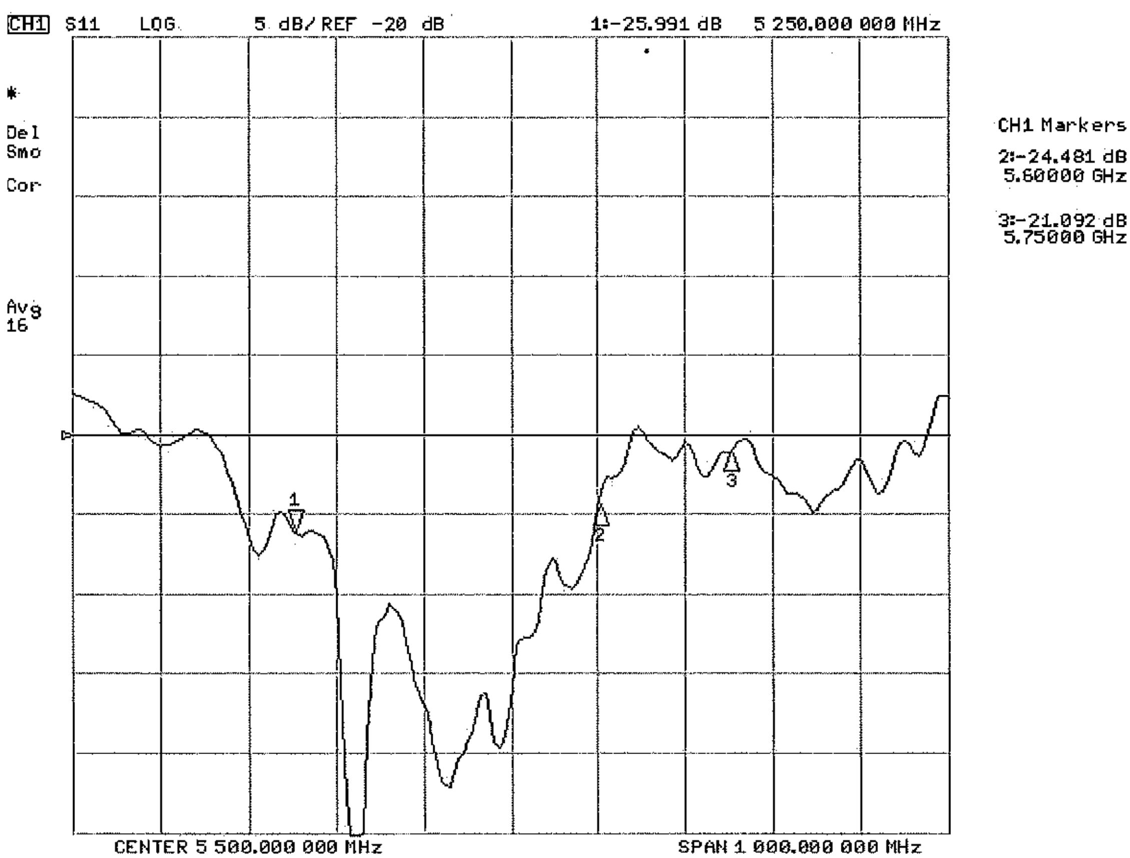
Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



PCTEST ENGINEERING LABORATORY, INC.
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. +1.410.290.6652 / Fax +1.410.290.6654
http://www.pctest.com

# Certification of Calibration

| | |
|---|---|
| Object | D5GHzV2 – SN: 1191 |
| Calibration procedure(s) | Procedure for Calibration Extension for SAR Dipoles. |
| Extension Calibration date: | 9/11/2018 |
| Description: | SAR Validation Dipole at 5250, 5600, and 5750 MHz. |

Calibration Equipment used:

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|---|---|---|---|---|---|---|
| Control Company | 4040 | Therm./Clock/Humidity Monitor | 3/31/2017 | Biennial | 3/31/2019 | 170232394 |
| Control Company | 4352 | Ultra Long Stem Thermometer | 5/2/2017 | Biennial | 5/2/2019 | 170330156 |
| Amplifier Research | 15S1G6 | Amplifier | CBT | N/A | CBT | 433971 |
| Narda | 4772-3 | Attenuator (3dB) | CBT | N/A | CBT | 9406 |
| Keysight | 772D | Dual Directional Coupler | CBT | N/A | CBT | MY52180215 |
| Keysight Technologies | 85033E | Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm) | 6/4/2018 | Annual | 6/4/2019 | MY53401181 |
| Agilent | 8753ES | S-Parameter Vector Network Analyzer | 8/30/2018 | Annual | 8/30/2019 | MY40003841 |
| Mini-Circuits | BW-N20W5+ | DC to 18 GHz Precision Fixed 20 dB Attenuator | CBT | N/A | CBT | N/A |
| SPEAG | DAK-3.5 | Dielectric Assessment Kit | 5/15/2018 | Annual | 5/15/2019 | 1070 |
| SPEAG | EX3DV4 | SAR Probe | 6/25/2018 | Annual | 6/25/2019 | 7409 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 6/18/2018 | Annual | 6/18/2019 | 1334 |
| SPEAG | EX3DV4 | SAR Probe | 4/18/2018 | Annual | 4/18/2019 | 7357 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 4/11/2018 | Annual | 4/11/2019 | 1407 |
| Anritsu | MA2411B | Pulse Power Sensor | 3/2/2018 | Annual | 3/2/2019 | 1207364 |
| Anritsu | MA2411B | Pulse Power Sensor | 3/2/2018 | Annual | 3/2/2019 | 1339018 |
| Anritsu | ML2495A | Power Meter | 10/22/2017 | Annual | 10/22/2018 | 1328004 |
| Agilent | N5182A | MXG Vector Signal Generator | 4/18/2018 | Annual | 4/18/2019 | MY47420800 |
| Seekonk | NC-100 | Torque Wrench | 7/11/2018 | Annual | 7/11/2019 | N/A |
| MiniCircuits | VLF-6000+ | Low Pass Filter | CBT | N/A | CBT | N/A |
| Narda | 4014C-6 | 4 - 8 GHz SMA 6 dB Directional Coupler | CBT | N/A | CBT | N/A |

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path.

Measurement Uncertainty = ±23% (k=2)

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated By: | Brodie Halbfoster | Test Engineer | BRODIE HALBFOSTER |
| Approved By: | Kaitlin O'Keefe | Senior Technical Manager | KOK |