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# SAR EVALUATION REPORT

**Applicant Name:**
Sony Corporation
1-7-1 Konan Minato-ku
Tokyo, 108-0075, Japan

**Date of Testing:**
06/27/2022 – 07/28/2022
**Test Site/Location:**
Element, Columbia, MD, USA
**Document Serial No.:**
1M2207200079-16.PY7

**FCC ID:** **PY7-58692W**

**APPLICANT:** **SONY CORPORATION**

**DUT Type:** Portable Handset
**Application Type:** Certification
**FCC Rule Part(s):** CFR §2.1093

| 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 | 0.21 | 0.19 | 0.22 | N/A |
| PCE | GSM/GPRS/EDGE 1900 | 1850.20 - 1909.80 MHz | < 0.1 | 0.23 | 0.35 | N/A |
| PCE | UMTS 850 | 826.40 - 846.60 MHz | 0.13 | 0.22 | 0.22 | N/A |
| PCE | UMTS 1750 | 1712.4 - 1752.6 MHz | < 0.1 | 0.25 | 0.33 | N/A |
| PCE | UMTS 1900 | 1852.4 - 1907.6 MHz | < 0.1 | 0.28 | 0.38 | N/A |
| PCE | LTE Band 12 | 699.7 - 715.3 MHz | 0.10 | 0.20 | 0.20 | N/A |
| PCE | LTE Band 17 | 706.5 - 713.5 MHz | N/A | N/A | N/A | N/A |
| PCE | LTE Band 13 | 779.5 - 784.5 MHz | < 0.1 | 0.32 | 0.32 | N/A |
| PCE | LTE Band 5 (Cell) | 824.7 - 848.3 MHz | 0.13 | 0.13 | 0.13 | N/A |
| PCE | LTE Band 66 (AWS) | 1710.7 - 1779.3 MHz | < 0.1 | 0.22 | 0.30 | N/A |
| PCE | LTE Band 4 (AWS) | 1710.7 - 1754.3 MHz | N/A | N/A | N/A | N/A |
| PCE | LTE Band 25 (PCS) | 1850.7 - 1914.3 MHz | < 0.1 | 0.23 | 0.47 | N/A |
| 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 | 0.12 | 0.21 | N/A |
| DTS | 2.4 GHz WLAN | 2412 - 2462 MHz | 0.65 | 0.12 | 0.18 | N/A |
| NII | U-NII-1 | 5180 - 5240 MHz | N/A | N/A | 0.10 | N/A |
| NII | U-NII-2A | 5260 - 5320 MHz | 0.40 | < 0.1 | N/A | 0.42 |
| NII | U-NII-2C | 5500 - 5720 MHz | 0.17 | < 0.1 | N/A | 0.52 |
| NII | U-NII-3 | 5745 - 5825 MHz | 0.23 | < 0.1 | 0.11 | N/A |
| DSS/DTS | Bluetooth | 2402 - 2480 MHz | 0.17 | < 0.1 | < 0.1 | N/A |
| DXX | NFC | 13.56 MHz | N/A | N/A | N/A | < 0.1 |
| **Simultaneous SAR per KDB 690783 D01v01r03:** | | | 1.25 | 0.67 | 0.77 | 0.92 |

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 1.7 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.

RJ Ortanez
Executive Vice President

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# 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 1750 | Voice/Data | 1712.4 - 1752.6 MHz |
| UMTS 1900 | Voice/Data | 1852.4 - 1907.6 MHz |
| LTE Band 71 | Voice/Data | 665.5 - 695.5 MHz |
| LTE Band 12 | Voice/Data | 699.7 - 715.3 MHz |
| LTE Band 17 | Voice/Data | 706.5 - 713.5 MHz |
| LTE Band 13 | Voice/Data | 779.5 - 784.5 MHz |
| LTE Band 5 (Cell) | Voice/Data | 824.7 - 848.3 MHz |
| LTE Band 66 (AWS) | Voice/Data | 1710.7 - 1779.3 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 | Data | 2412 - 2462 MHz |
| U-NII-1 | Data | 5180 - 5240 MHz |
| U-NII-2A | Data | 5260 - 5320 MHz |
| U-NII-2C | Data | 5500 - 5720 MHz |
| U-NII-3 | Data | 5745 - 5825 MHz |
| Bluetooth | Data | 2402 - 2480 MHz |
| NFC | Data | 13.56 MHz |

## 1.2 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.

### 1.2.1 2G/3G/4G Output Power

| GSM/GPRS/EDGE 850 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Voice (in dBm) | Data - Burst Average GMSK (in dBm) | | | | Data - Burst Average 8-PSK (in 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 |
| Max Allowed Power | 33.2 | 33.2 | 30.2 | 28.4 | 27.2 | 27.7 | 24.7 | 22.9 | 21.7 |
| Nominal | 32.5 | 32.5 | 29.5 | 27.7 | 26.5 | 27.0 | 24.0 | 22.2 | 21.0 |
| **GSM/GPRS/EDGE 1900** | | | | | | | | | |
| | Voice (in dBm) | Data - Burst Average GMSK (in dBm) | | | | Data - Burst Average 8-PSK (in 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 |
| Max Allowed Power | 27.7 | 27.7 | 24.7 | 22.9 | 21.7 | 26.7 | 23.7 | 21.9 | 20.7 |
| Nominal | 27.0 | 27.0 | 24.0 | 22.2 | 21.0 | 26.0 | 23.0 | 21.2 | 20.0 |

| GSM/DTM 850 | | | | | |
|---|---|---|---|---|---|
| | Voice (in dBm) | Data - Burst Average GMSK (in dBm) | | Data - Burst Average 8-PSK (in dBm) | |
| | 1 TX Slot | 2 TX Slots | 3 TX Slots | 2 TX Slots | 3 TX Slots |
| Max Allowed Power | 33.2 | 30.2 | 28.4 | 24.7 | 22.9 |
| Nominal | 32.5 | 29.5 | 27.7 | 24.0 | 22.2 |
| **GSM/DTM 1900** | | | | | |
| | Voice (in dBm) | Data - Burst Average GMSK (in dBm) | | Data - Burst Average 8-PSK (in dBm) | |
| | 1 TX Slot | 2 TX Slots | 3 TX Slots | 2 TX Slots | 3 TX Slots |
| Max Allowed Power | 27.7 | 24.7 | 22.9 | 23.7 | 21.9 |
| Nominal | 27.0 | 24.0 | 22.2 | 23.0 | 21.2 |

For GSM/DTM, the above powers listed are GSM/DTM burst average values.

| UMTS Band 5 (850 MHz) | | | | |
|---|---|---|---|---|
| | Modulated Average Output Power (in dBm) | | | |
| | 3GPP WCDMA Rel 99 | 3GPP HSDPA Rel 5 | 3GPP HSUPA Rel 6 | 3GPP DC-HSDPA Rel 8 |
| Max Allowed Power | 22.7 | 22.0 | 22.0 | 22.0 |
| Nominal | 22.0 | 21.0 | 21.0 | 21.0 |
| **UMTS Band 4 (1750 MHz)** | | | | |
| | Modulated Average Output Power (in dBm) | | | |
| | 3GPP WCDMA Rel 99 | 3GPP HSDPA Rel 5 | 3GPP HSUPA Rel 6 | 3GPP DC-HSDPA Rel 8 |
| Max Allowed Power | 18.7 | 18.0 | 18.0 | 18.0 |
| Nominal | 18.0 | 17.0 | 17.0 | 17.0 |
| **UMTS Band 2 (1900 MHz)** | | | | |
| | Modulated Average Output Power (in dBm) | | | |
| | 3GPP WCDMA Rel 99 | 3GPP HSDPA Rel 5 | 3GPP HSUPA Rel 6 | 3GPP DC-HSDPA Rel 8 |
| Max Allowed Power | 19.7 | 19.0 | 19.0 | 19.0 |
| Nominal | 19.0 | 18.0 | 18.0 | 18.0 |

| Mode / Band | Antenna | | Modulated Average Output Power (in dBm) |
|---|---|---|---|
| LTE Band 12 | Main 1 | Max Allowed Power | 22.0 |
| | | Nominal | 21.0 |
| LTE Band 17 | Main 1 | Max Allowed Power | 22.0 |
| | | Nominal | 21.0 |
| LTE Band 13 | Main 1 | Max Allowed Power | 22.0 |
| | | Nominal | 21.0 |
| LTE Band 5 (Cell) | Main 1 | Max Allowed Power | 22.0 |
| | | Nominal | 21.0 |
| LTE Band 66 (AWS) | Main 2 | Max Allowed Power | 19.0 |
| | | Nominal | 18.0 |
| LTE Band 4 | Main 2 | Max Allowed Power | 19.0 |
| | | Nominal | 18.0 |
| LTE Band 25 (PCS) | Main 2 | Max Allowed Power | 20.0 |
| | | Nominal | 19.0 |
| LTE Band 2 (PCS) | Main 2 | Max Allowed Power | 20.0 |
| | | Nominal | 19.0 |
| LTE Band 41 | Main 2 | Max Allowed Power | 20.0 |
| | | Nominal | 19.0 |

### 1.2.2 2.4 GHz Maximum SISO/MIMO WLAN Output Power

Note: Targets for 802.11ax RU operations can be found in 802.11ax RU SAR Exclusion Appendix.

| Mode | Band | IEEE 802.11 (in dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SISO | | | | MIMO | | | |
| | | Chain 0 | | | | | | | |
| | | b | g | n | ax (SU) | b (CDD+STBC) | g (CDD+STBC) | n (CDD+STBC,SDM) | ax (SU) (CDD+STBC,SDM) |
| Maximum/ Nominal Power | | Max | Max | Max | Max | Max | Max | Max | Max |
| 2.4 GHz WIFI | 2.45 GHz | 14.5 | 15.0<br>ch. 1: 14.0<br>ch. 11: 13.5 | 15.0<br>ch. 1: 13.5<br>ch. 11: 13.0 | 15.0<br>ch. 1: 13.5<br>ch. 11: 13.0 | 14.5 | 15.0<br>ch. 1: 14.0<br>ch. 11: 13.5 | 15.0<br>ch. 1: 13.5<br>ch. 11: 13.0 | 15.0<br>ch. 1: 13.5<br>ch. 11: 13.0 |

| Mode | Band | IEEE 802.11 (in dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SISO | | | | MIMO | | | |
| | | Chain 1 | | | | | | | |
| | | b | g | n | ax (SU) | b (CDD+STBC) | g (CDD+STBC) | n (CDD+STBC,SDM) | ax (SU) (CDD+STBC,SDM) |
| Maximum/ Nominal Power | | Max | Max | Max | Max | Max | Max | Max | Max |
| 2.4 GHz WIFI | 2.45 GHz | 14.5 | 15.0<br>ch. 1: 14.0<br>ch. 11: 13.5 | 15.0<br>ch. 1: 13.5<br>ch. 11: 13.0 | 15.0<br>ch. 1: 13.5<br>ch. 11: 13.0 | 14.5 | 15.0<br>ch. 1: 14.0<br>ch. 11: 13.5 | 15.0<br>ch. 1: 13.5<br>ch. 11: 13.0 | 15.0<br>ch. 1: 13.5<br>ch. 11: 13.0 |

Note: in MIMO operations, each Chain 0 and Chain 1 transmits at maximum allowed powers as indicated above.

### 1.2.3 2.4 GHz Reduced MIMO WLAN Output Powers

The below table is applicable during Simultaneous Conditions with 2.4 GHz and 5 GHz WLAN

| Mode | Band | IEEE 802.11 (in dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MIMO | | | | | | | |
| | | Chain 0 | | | | Chain 1 | | | |
| | | b (CDD+STBC) | g (CDD+STBC) | n (CDD+STBC,SDM) | ax (SU) (CDD+STBC,SDM) | b (CDD+STBC) | g (CDD+STBC) | n (CDD+STBC,SDM) | ax (SU) (CDD+STBC,SDM) |
| Maximum/ Nominal Power | | Max | Max | Max | Max | Max | Max | Max | Max |
| 2.4 GHz WIFI | 2.45 GHz | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 |

Note: in MIMO operations, each Chain 0 and Chain 1 transmits at maximum allowed powers as indicated above.

## 1.2.4 5 GHz Maximum SISO/MIMO WLAN Output Power

| Mode | Band | IEEE 802.11 (in dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SISO | | | | MIMO | | | |
| | | Chain 0 | | | | | | | |
| | | a | n (CDD+STBC, SDM) | ac (CDD+STBC, SDM) | ax (SU) (CDD+STBC, SDM) | a (CDD+STBC) | n (CDD+STBC, SDM) | ac (CDD+STBC, SDM) | ax (SU) (CDD+STBC, SDM) |
| Maximum/ Nominal Power | | Max | Max | Max | Max | Max | Max | Max | Max |
| 5 GHz WIFI (20MHz BW) | UNII-1 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| | UNII-2A | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| | UNII-2C | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| | UNII-3 | 11.5 | 11.5 ch. 149: 11.0 | 11.5 ch. 149: 11.0 | 11.5 ch. 149: 11.0 | 11.5 | 11.5 ch. 149: 11.0 | 11.5 ch. 149: 11.0 | 11.5 ch. 149: 11.0 |
| 5 GHz WIFI (40MHz BW) | UNII-1 | | 11.5 | 11.5 | 11.5 | | 11.5 | 11.5 | 11.5 |
| | UNII-2A | | 11.5 | 11.5 | 11.5 | | 11.5 | 11.5 | 11.5 |
| | UNII-2C | | 11.5 | 11.5 | 11.5 | | 11.5 | 11.5 | 11.5 |
| | UNII-3 | | 11.5 ch. 151: 11.0 | 11.5 ch. 151: 11.0 | 11.5 ch. 151: 11.0 | | 11.5 ch. 151: 11.0 | 11.5 ch. 151: 11.0 | 11.5 ch. 151: 11.0 |
| 5 GHz WIFI (80MHz BW) | UNII-1 | | | 11.5 | 11.5 | | | 11.5 | 11.5 |
| | UNII-2A | | | 11.5 | 11.5 | | | 11.5 | 11.5 |
| | UNII-2C | | | 11.5 | 11.5 | | | 11.5 | 11.5 |
| | UNII-3 | | | 11.5 | 11.5 | | | 11.5 | 11.5 |
| 5 GHz WIFI (160MHz BW) | UNII-1/2A | | | 11.5 | 11.5 | | | 11.5 | 11.5 |
| | UNII-2C | | | 11.5 | 11.5 | | | 11.5 | 11.5 |

| Mode | Band | IEEE 802.11 (in dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SISO | | | | MIMO | | | |
| | | Chain 1 | | | | | | | |
| | | a | n (CDD+STBC, SDM) | ac (CDD+STBC, SDM) | ax (SU) (CDD+STBC, SDM) | a (CDD+STBC) | n (CDD+STBC, SDM) | ac (CDD+STBC, SDM) | ax (SU) (CDD+STBC, SDM) |
| Maximum/ Nominal Power | | Max | Max | Max | Max | Max | Max | Max | Max |
| 5 GHz WIFI (20MHz BW) | UNII-1 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| | UNII-2A | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| | UNII-2C | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| | UNII-3 | 11.5 | 11.5 ch. 149: 11.0 | 11.5 ch. 149: 11.0 | 11.5 ch. 149: 11.0 | 11.5 | 11.5 ch. 149: 11.0 | 11.5 ch. 149: 11.0 | 11.5 ch. 149: 11.0 |
| 5 GHz WIFI (40MHz BW) | UNII-1 | | 11.5 | 11.5 | 11.5 | | 11.5 | 11.5 | 11.5 |
| | UNII-2A | | 11.5 | 11.5 | 11.5 | | 11.5 | 11.5 | 11.5 |
| | UNII-2C | | 11.5 | 11.5 | 11.5 | | 11.5 | 11.5 | 11.5 |
| | UNII-3 | | 11.5 ch. 151: 11.0 | 11.5 ch. 151: 11.0 | 11.5 ch. 151: 11.0 | | 11.5 ch. 151: 11.0 | 11.5 ch. 151: 11.0 | 11.5 ch. 151: 11.0 |
| 5 GHz WIFI (80MHz BW) | UNII-1 | | | 11.5 | 11.5 | | | 11.5 | 11.5 |
| | UNII-2A | | | 11.5 | 11.5 | | | 11.5 | 11.5 |
| | UNII-2C | | | 11.5 | 11.5 | | | 11.5 | 11.5 |
| | UNII-3 | | | 11.5 | 11.5 | | | 11.5 | 11.5 |
| 5 GHz WIFI (160MHz BW) | UNII-1/2A | | | 11.5 | 11.5 | | | 11.5 | 11.5 |
| | UNII-2C | | | 11.5 | 11.5 | | | 11.5 | 11.5 |

Note: in MIMO operations, each Chain 0 and Chain 1 transmits at maximum allowed powers as indicated above.

### 1.2.5 5 GHz Reduced MIMO WLAN Output Powers

The below table is applicable during Simultaneous Conditions with 2.4 GHz and 5 GHz WLAN

| Mode | Band | IEEE 802.11 (in dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MIMO | | | | | | | |
| | | Chain 0 | | | | Chain 1 | | | |
| | | a (CDD+STBC) | n (CDD+STBC, SDM) | ac (CDD+STBC, SDM) | ax (SU) (CDD+STBC, SDM) | a (CDD+STBC) | n (CDD+STBC, SDM) | ac (CDD+STBC, SDM) | ax (SU) (CDD+STBC, SDM) |
| Maximum/ Nominal Power | | Max | Max | Max | Max | Max | Max | Max | Max |
| 5 GHz WIFI (20MHz BW) | UNII-1 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 |
| | UNII-2A | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 |
| | UNII-2C | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 |
| | UNII-3 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 | 9.5 |
| 5 GHz WIFI (40MHz BW) | UNII-1 | | 9.5 | 9.5 | 9.5 | | 9.5 | 9.5 | 9.5 |
| | UNII-2A | | 9.5 | 9.5 | 9.5 | | 9.5 | 9.5 | 9.5 |
| | UNII-2C | | 9.5 | 9.5 | 9.5 | | 9.5 | 9.5 | 9.5 |
| | UNII-3 | | 9.5 | 9.5 | 9.5 | | 9.5 | 9.5 | 9.5 |
| 5 GHz WIFI (80MHz BW) | UNII-1 | | | 9.5 | 9.5 | | | 9.5 | 9.5 |
| | UNII-2A | | | 9.5 | 9.5 | | | 9.5 | 9.5 |
| | UNII-2C | | | 9.5 | 9.5 | | | 9.5 | 9.5 |
| | UNII-3 | | | 9.5 | 9.5 | | | 9.5 | 9.5 |
| 5 GHz WIFI (160MHz BW) | UNII-1/2A | | | 9.5 | 9.5 | | | 9.5 | 9.5 |
| | UNII-2C | | | 9.5 | 9.5 | | | 9.5 | 9.5 |

Note: in MIMO operations, each Chain 0 and Chain 1 transmits at maximum allowed powers as indicated above.

### 1.2.6 2.4 GHz Maximum Bluetooth Output Power

| Chain 0 / Chain 1 |
|---|
| **Bluetooth (in dBm)** |
| 14 |
| **EDR (in dBm)** |
| 13 |
| **BLE 1Mbps (in dBm)** |
| 10.79 |
| **BLE 2Mbps (in dBm)** |
| 10.79 |

## 1.3 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 the DUT Antenna Diagram and SAR Test Setup Photographs Appendix. 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 | Antenna | Back | Front | Top | Bottom | Right | Left |
|---|---|---|---|---|---|---|---|
| GPRS 850 | Main 1 | Yes | Yes | No | Yes | No | Yes |
| GPRS 1900 | Main 2 | Yes | Yes | No | Yes | Yes | No |
| UMTS 850 | Main 1 | Yes | Yes | No | Yes | No | Yes |
| UMTS 1750 | Main 2 | Yes | Yes | No | Yes | Yes | No |
| UMTS 1900 | Main 2 | Yes | Yes | No | Yes | Yes | No |
| LTE Band 12 | Main 1 | Yes | Yes | No | Yes | No | Yes |
| LTE Band 13 | Main 1 | Yes | Yes | No | Yes | No | Yes |
| LTE Band 5 (Cell) | Main 1 | Yes | Yes | No | Yes | No | Yes |
| LTE Band 66 (AWS) | Main 2 | Yes | Yes | No | Yes | Yes | No |
| LTE Band 25 (PCS) | Main 2 | Yes | Yes | No | Yes | Yes | No |
| LTE Band 41 | Main 2 | Yes | Yes | No | Yes | Yes | No |
| 2.4 GHz WLAN | WLAN Main + | Yes | Yes | Yes | No | No | Yes |
| 2.4 GHz WLAN | Wifi Sub /BT Div | Yes | Yes | No | Yes | No | Yes |
| 5 GHz WLAN | WLAN Main + | Yes | Yes | Yes | No | No | Yes |
| 5 GHz WLAN | Wifi Sub /BT Div | Yes | Yes | No | Yes | No | Yes |
| Bluetooth | WLAN Main + | Yes | Yes | Yes | No | No | Yes |
| Bluetooth | Wifi Sub /BT Div | Yes | Yes | No | Yes | No | Yes |
| NFC | NFC/Felicia | Yes | Yes | Yes | No | Yes | 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-2A, U-NII-2C operations are disabled.

## 1.4 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 the DUT Antenna Diagram and SAR Test Setup Photographs Appendix.

## 1.5 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 Bluetooth Ant 1 | Yes^ | Yes | N/A | Yes | ^ Bluetooth Tethering is considered |
| 2 | GSM voice + 2.4 GHz Bluetooth Ant 2 | Yes^ | Yes | N/A | Yes | ^ Bluetooth Tethering is considered |
| 3 | GSM voice + 2.4 GHz WLAN Ant 1 + 2.4 GHz WLAN Ant 2 | Yes | Yes | N/A | Yes | |
| 4 | GSM voice + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes | Yes | N/A | Yes | |
| 5 | GSM voice + 2.4 GHz WLAN Ant 1 + 2.4 GHz WLAN Ant 2 + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes | Yes | N/A | Yes | |
| 6 | GSM voice + 2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes^ | Yes | N/A | Yes | ^ Bluetooth Tethering is considered |
| 7 | GSM voice + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes^ | Yes | N/A | Yes | ^ Bluetooth Tethering is considered |
| 8 | UMTS + 2.4 GHz Bluetooth Ant 1 | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 9 | UMTS + 2.4 GHz Bluetooth Ant 2 | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 10 | UMTS + 2.4 GHz WLAN Ant 1 + 2.4 GHz WLAN Ant 2 | Yes | Yes | Yes | Yes | |
| 11 | UMTS + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes | Yes | Yes | Yes | |
| 12 | UMTS + 2.4 GHz WLAN Ant 1 + 2.4 GHz WLAN Ant 2 + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes | Yes | Yes | Yes | |
| 13 | UMTS + 2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 14 | UMTS + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 15 | LTE + 2.4 GHz Bluetooth Ant 1 | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 16 | LTE + 2.4 GHz Bluetooth Ant 2 | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 17 | LTE + 2.4 GHz WLAN Ant 1 + 2.4 GHz WLAN Ant 2 | Yes | Yes | Yes | Yes | |
| 18 | LTE + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes | Yes | Yes | Yes | |
| 19 | LTE + 2.4 GHz WLAN Ant 1 + 2.4 GHz WLAN Ant 2 + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes | Yes | Yes | Yes | |
| 20 | LTE + 2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 21 | LTE + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 22 | DTM/GPRS/EDGE + 2.4 GHz Bluetooth Ant 1 | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 23 | DTM/GPRS/EDGE + 2.4 GHz Bluetooth Ant 2 | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 24 | DTM/GPRS/EDGE + 2.4 GHz WLAN Ant 1 + 2.4 GHz WLAN Ant 2 | Yes | Yes | Yes | Yes | |
| 25 | DTM/GPRS/EDGE + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes | Yes | Yes | Yes | |
| 26 | DTM/GPRS/EDGE + 2.4 GHz WLAN Ant 1 + 2.4 GHz WLAN Ant 2 + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes | Yes | Yes | Yes | |
| 27 | DTM/GPRS/EDGE + 2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |
| 28 | DTM/GPRS/EDGE + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN Ant 1 + 5 GHz WLAN Ant 2 | Yes^ | Yes | Yes^ | Yes | ^ Bluetooth Tethering is considered |

1. All licensed modes share the same antenna path and cannot transmit simultaneously.
2. 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.
3. 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.
4. 5 GHz Wireless Router is only supported for the U-NII-1 and U-NII-3 by S/W, therefore U-NII-2A, and U-NII-2C were not evaluated for wireless router conditions.
5. This device supports 2x2 MIMO Tx for WLAN 802.11a/b/g/n/ac/ax. 802.11a/b/g/n/ac/ax supports CDD and STBC and 802.11n/ac/ax additionally supports SDM.
6. This device supports VoLTE.
7. This device supports Bluetooth Tethering.
8. 2.4 GHz WLAN and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
9. NFC were evaluated for phablet based on expected usage conditions.

## 1.6 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-2A and U-NII-2C WIFI, only 2.4 GHz, U-NII-1, Bluetooth 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 160 MHz Bandwidth only for 5 GHz
b) Up to 20 MHz Bandwidth only for 2.4 GHz
c) 2 Tx antenna output
d) Up to 4096 QAM is supported
e) TDWR and Band gap channels are supported for 5 GHz
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-2A and U-NII-2C WLAN, phablet SAR tests were performed. Phablet SAR was not evaluated for 2.4 GHz, Bluetooth, U-NII-1 and U-NII-3 WLAN operations since wireless router 1g SAR was < 1.2 W/kg.

Per April 2019 TCB Workshop Notes, 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.

### (B) Licensed Transmitter(s)

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 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 the Downlink LTE CA RF Conducted Powers Appendix.

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 Notes, SAR for 4x4 DL MIMO was not needed since the maximum average output power in 4x4 DL MIMO mode was not more than 0.25 dB higher than the maximum output power with 4x4 DL MIMO inactive. Additionally, SAR for 4x4 MIMO Downlink Carrier Aggregation was not needed since the maximum average output power in 4x4 MIMO Downlink Carrier Aggregation mode was not more than 0.25 dB higher than the maximum output power with 4x4 MIMO Downlink and downlink carrier aggregation 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.

## 1.7 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D01v03r01, D05v02r05, 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 648474 D04v01r03 (Phablet Procedures)
- FCC KDB Publication 616217 D04v01r02 (Proximity Sensor)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)
- November 2017, April 2018, October 2018 TCB Workshop Notes (LTE Carrier Aggregation)

## 1.8 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 AND NR INFORMATION

| LTE Information | | | | | |
|---|---|---|---|---|---|
| Form Factor | Portable Handset | | | | |
| | LTE Band 12 (699.7 - 715.3 MHz) | | | | |
| | LTE Band 17 (706.5 - 713.5 MHz) | | | | |
| | LTE Band 13 (779.5 - 784.5 MHz) | | | | |
| | LTE Band 5 (Cell) (824.7 - 848.3 MHz) | | | | |
| | LTE Band 66 (AWS) (1710.7 - 1779.3 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) | | | | |
| | LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz | | | | |
| | LTE Band 17: 5 MHz, 10 MHz | | | | |
| | LTE Band 13: 5 MHz, 10 MHz | | | | |
| | LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz | | | | |
| | LTE Band 66 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 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 17: 5 MHz | 706.5 (23755) | | 710 (23790) | 713.5 (23825) | |
| LTE Band 17: 10 MHz | 709 (23780) | | 710 (23790) | 711 (23800) | |
| 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 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 66 (AWS): 1.4 MHz | 1710.7 (131979) | | 1745 (132322) | 1779.3 (132665) | |
| LTE Band 66 (AWS): 3 MHz | 1711.5 (131987) | | 1745 (132322) | 1778.5 (132657) | |
| LTE Band 66 (AWS): 5 MHz | 1712.5 (131997) | | 1745 (132322) | 1777.5 (132647) | |
| LTE Band 66 (AWS): 10 MHz | 1715 (132022) | | 1745 (132322) | 1775 (132622) | |
| LTE Band 66 (AWS): 15 MHz | 1717.5 (132047) | | 1745 (132322) | 1772.5 (132597) | |
| LTE Band 66 (AWS): 20 MHz | 1720 (132072) | | 1745 (132322) | 1770 (132572) | |
| 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) | 2549.5 (40185) | 2593 (40620) | 2636.5 (41055) |
| LTE Band 41: 10 MHz | 2506 (39750) | 2549.5 (40185) | 2549.5 (40185) | 2593 (40620) | 2636.5 (41055) |
| LTE Band 41: 15 MHz | 2506 (39750) | 2549.5 (40185) | 2549.5 (40185) | 2593 (40620) | 2636.5 (41055) |
| LTE Band 41: 20 MHz | 2506 (39750) | 2549.5 (40185) | 2549.5 (40185) | 2593 (40620) | 2636.5 (41055) |
| UE Category | DL UE Cat 20, 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 15. It supports carrier aggregation, downlink MIMO, LAA features as shown in Downlink LTE CA RF Conductive Powers Appendix. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. The following LTE Release 15 Features are not supported: Relay, HetNet, Enhanced MIMO, eICIC, 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**

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

**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:

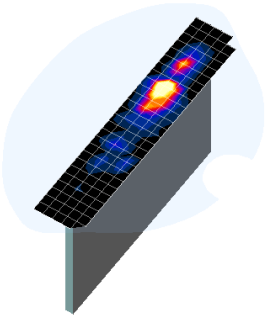

**Figure 4-1**
**Sample SAR Area Scan**

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].

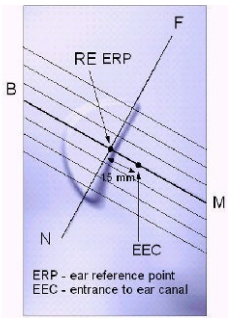


**Figure 5-1**
**Close-Up Side view of ERP**

## 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.

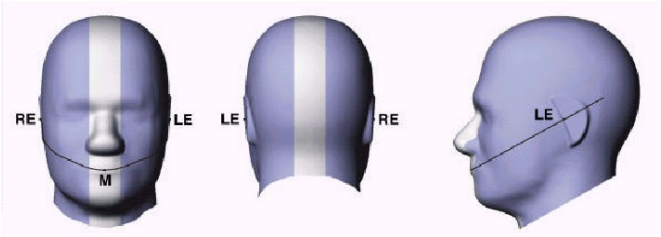


**Figure 5-2**
**Front, back and side view of SAM Twin Phantom**

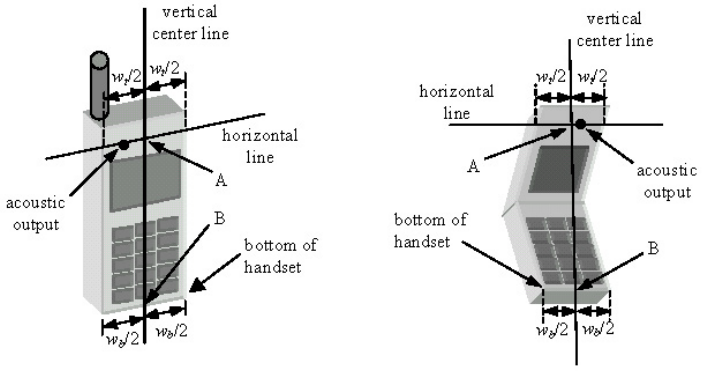


**Figure 5-3**
**Handset Vertical Center & Horizontal Line Reference Points**

# 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.

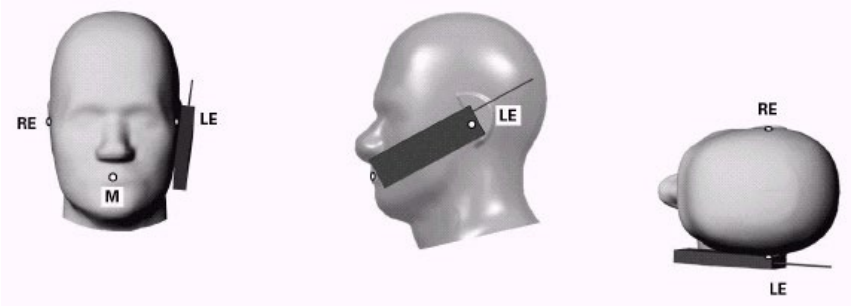


**Figure 6-1 Front, Side and Top View of Cheek Position**

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).

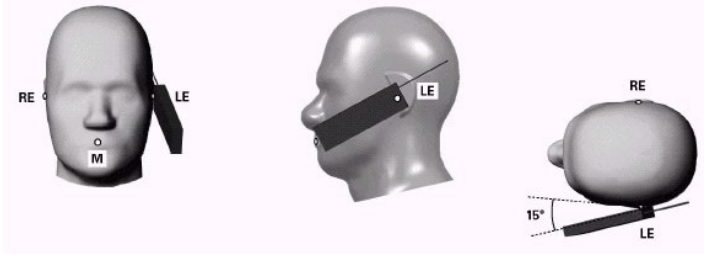


**Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position**

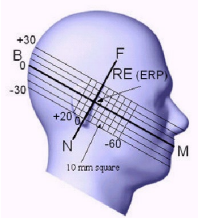


**Figure 6-3**
**Side view w/ relevant markings**

## 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.

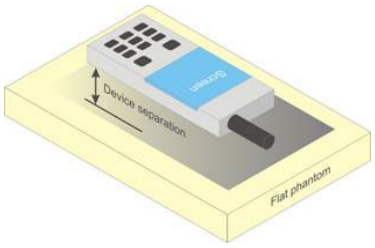


**Figure 6-4**
**Sample Body-Worn Diagram**

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.

# 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 April 2019 TCB Workshop guidance, 802.11ax was considered the highest order 802.11 mode. 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**
**GSM/GPRS/EDGE 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 | 32.15 | 32.17 | 28.91 | 27.11 | **26.00** | 26.69 | 23.53 | 21.66 | 20.60 |
| | 190 | 32.22 | 32.42 | 29.04 | 27.23 | **26.19** | 26.76 | 23.50 | 21.70 | 20.59 |
| | 251 | 32.51 | 32.55 | 29.10 | 27.26 | **26.20** | 26.78 | 23.71 | 21.79 | 20.69 |
| **GSM 1900** | 512 | 26.53 | 26.45 | 23.39 | 21.78 | **20.53** | 25.74 | 22.66 | 20.62 | 19.49 |
| | 661 | 26.42 | 26.70 | 23.46 | 21.54 | **20.54** | 25.66 | 22.44 | 20.78 | 19.44 |
| | 810 | 26.64 | 26.56 | 23.36 | 21.49 | **20.44** | 25.73 | 22.55 | 20.67 | 19.47 |

| 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 | 22.95 | 22.97 | 22.72 | 22.68 | **22.82** | 17.49 | 17.34 | 17.23 | 17.42 |
| | 190 | 23.02 | 23.22 | 22.85 | 22.80 | **23.01** | 17.56 | 17.31 | 17.27 | 17.41 |
| | 251 | 23.31 | 23.35 | 22.91 | 22.83 | **23.02** | 17.58 | 17.52 | 17.36 | 17.51 |
| **GSM 1900** | 512 | 17.33 | 17.25 | 17.20 | 17.35 | **17.35** | 16.54 | 16.47 | 16.19 | 16.31 |
| | 661 | 17.22 | 17.50 | 17.27 | 17.11 | **17.36** | 16.46 | 16.25 | 16.35 | 16.26 |
| | 810 | 17.44 | 17.36 | 17.17 | 17.06 | **17.26** | 16.53 | 16.36 | 16.24 | 16.29 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **GSM 850** | **Frame Avg.Targets:** | 23.30 | 23.30 | 23.31 | 23.27 | **23.32** | 17.80 | 17.81 | 17.77 | 17.82 |
| **GSM 1900** | | 17.80 | 17.80 | 17.81 | 17.77 | **17.82** | 16.80 | 16.81 | 16.77 | 16.82 |

**Table 9-2**
**DTM Maximum Conducted Powers**

| Maximum Burst-Averaged Output Power | | | | | |
|---|---|---|---|---|---|
| | | *DTM (GSM + GPRS)* | | *DTM (GSM + EGPRS)* | |
| **Band** | **Channel** | **DTM [dBm] CS + PS (2 Slots)** | **DTM [dBm] CS + 2PS (3 Slots)** | **DTM [dBm] CS + PS (2 Slots)** | **DTM [dBm] CS + 2PS (3 Slots)** |
| **GSM 850** | 128 | 29.26 | **27.32** | 23.81 | 21.86 |
| | 190 | 29.50 | **27.28** | 23.79 | 21.92 |
| | 251 | 29.42 | **27.44** | 23.82 | 21.91 |
| **GSM 1900** | 512 | 23.58 | **21.95** | 22.76 | 20.99 |
| | 661 | 23.61 | **21.89** | 22.74 | 20.93 |
| | 810 | 23.54 | **21.92** | 22.75 | 20.94 |

| Calculated Maximum Frame-Averaged Output Power | | | | | |
|---|---|---|---|---|---|
| | | *GPRS/EDGE Data (GMSK)* | | *EDGE Data (8-PSK)* | |
| **Band** | **Channel** | **GPRS [dBm] 2 Tx Slot** | **GPRS [dBm] 3 Tx Slot** | **EDGE [dBm] 2 Tx Slot** | **EDGE [dBm] 3 Tx Slot** |
| **GSM 850** | 128 | 23.07 | **22.89** | 17.62 | 17.43 |
| | 190 | 23.31 | **22.85** | 17.60 | 17.49 |
| | 251 | 23.23 | **23.01** | 17.63 | 17.48 |
| **GSM 1900** | 512 | 17.39 | **17.52** | 16.57 | 16.56 |
| | 661 | 17.42 | **17.46** | 16.55 | 16.50 |
| | 810 | 17.35 | **17.49** | 16.56 | 16.51 |

| | | | | | |
|---|---|---|---|---|---|
| **GSM 850** | **Frame Avg.Targets:** | 23.31 | **23.27** | 17.81 | 17.77 |
| **GSM 1900** | | 17.81 | **17.77** | 16.81 | 16.77 |

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 8-PSK modulation do not have an impact on output power.
4. DTM output powers were measured with a communication test set with DTM supported when the device was operating in DTM using one CS slot plus PS multislots. The bolded DTM modes were selected for SAR testing according to the according to the maximum CS and PS slots according to KDB 941225 D04v01.

**GSM Class:** A
**GPRS Multislot class:** 33 (Max 4 Tx uplink slots)
**EDGE Multislot class:** 33 (Max 4 Tx uplink slots)
**DTM Multislot Class:** 11 (Max 3 Tx uplink slots)


**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] | | | AWS Band [dBm] | | | PCS Band [dBm] | | | 3GPP MPR [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4132 | 4183 | 4233 | 1312 | 1412 | 1513 | 9262 | 9400 | 9538 | |
| 99 | WCDMA | 12.2 kbps RMC | 21.68 | 21.72 | 21.70 | 17.51 | 17.54 | 17.65 | 18.57 | 18.54 | 18.54 | - |
| 99 | | 12.2 kbps AMR | 21.79 | 21.60 | 21.71 | 17.50 | 17.54 | 17.64 | 18.51 | 18.57 | 18.62 | - |
| 6 | HSDPA | Subtest 1 | 20.78 | 20.87 | 20.89 | 16.62 | 16.60 | 16.69 | 17.42 | 17.60 | 17.70 | 0 |
| 6 | | Subtest 2 | 20.85 | 20.83 | 20.70 | 16.65 | 16.72 | 16.69 | 17.58 | 17.58 | 17.65 | 0 |
| 6 | | Subtest 3 | 20.35 | 20.20 | 20.34 | 16.09 | 16.22 | 16.18 | 17.09 | 17.10 | 17.19 | 0.5 |
| 6 | | Subtest 4 | 20.29 | 20.38 | 20.36 | 16.07 | 15.82 | 16.18 | 17.09 | 17.07 | 17.20 | 0.5 |
| 6 | HSUPA | Subtest 1 | 20.79 | 20.65 | 20.86 | 16.63 | 16.72 | 16.68 | 17.59 | 17.57 | 17.71 | 0 |
| 6 | | Subtest 2 | 18.79 | 18.88 | 18.90 | 14.61 | 14.65 | 14.68 | 15.56 | 15.59 | 15.67 | 2 |
| 6 | | Subtest 3 | 19.78 | 19.85 | 19.89 | 15.60 | 15.70 | 15.68 | 16.57 | 16.58 | 16.67 | 1 |
| 6 | | Subtest 4 | 18.82 | 18.87 | 18.91 | 14.64 | 14.72 | 14.70 | 15.59 | 15.61 | 15.67 | 2 |
| 6 | | Subtest 5 | 20.85 | 20.88 | 20.92 | 16.62 | 16.70 | 16.72 | 17.62 | 17.62 | 17.70 | 0 |
| 8 | DC-HSDPA | Subtest 1 | 20.76 | 20.74 | 20.77 | 16.63 | 16.73 | 16.71 | 17.61 | 17.61 | 17.71 | 0 |
| 8 | | Subtest 2 | 20.70 | 20.71 | 20.70 | 16.61 | 16.70 | 16.70 | 17.57 | 17.62 | 17.69 | 0 |
| 8 | | Subtest 3 | 20.30 | 20.34 | 20.42 | 16.10 | 16.24 | 16.20 | 17.06 | 17.09 | 17.22 | 0.5 |
| 8 | | Subtest 4 | 20.27 | 20.35 | 20.37 | 16.14 | 16.19 | 16.17 | 17.10 | 17.07 | 17.19 | 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


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

## 9.3 LTE Conducted Powers

Note: Per FCC KDB Publication 941225 D05v02r05, LTE SAR for the lower bandwidths was not required for testing 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. Lower bandwidth conducted powers for all LTE bands can be found in the LTE Lower Bandwidth Conducted Power Appendix.

Note: Some bands do 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.

### 9.3.1 LTE Band 12

**Table 9-4**
**LTE Band 12 Maximum Conducted Powers - 10 MHz Bandwidth**

| LTE Band 12<br>10 MHz Bandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel<br>23095<br>(707.5 MHz)<br>Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
| QPSK | 1 | 0 | 21.16 | 0 | 0 |
| | 1 | 25 | 21.08 | | 0 |
| | 1 | 49 | **21.17** | | 0 |
| | 25 | 0 | 21.13 | 0-1 | 0 |
| | 25 | 12 | **21.15** | | 0 |
| | 25 | 25 | 21.11 | | 0 |
| | 50 | 0 | 21.14 | | 0 |
| 16QAM | 1 | 0 | 21.50 | 0-1 | 0 |
| | 1 | 25 | 21.36 | | 0 |
| | 1 | 49 | 21.45 | | 0 |
| | 25 | 0 | 21.14 | 0-2 | 0 |
| | 25 | 12 | 21.17 | | 0 |
| | 25 | 25 | 21.12 | | 0 |
| | 50 | 0 | 21.16 | | 0 |
| 64QAM | 1 | 0 | 21.46 | 0-2 | 0 |
| | 1 | 25 | 21.34 | | 0 |
| | 1 | 49 | 21.35 | | 0 |
| | 25 | 0 | 20.67 | 0-3 | 0 |
| | 25 | 12 | 20.71 | | 0 |
| | 25 | 25 | 20.64 | | 0 |
| | 50 | 0 | 20.69 | | 0 |

### 9.3.2 LTE Band 13

**Table 9-5**
**LTE Band 13 Maximum 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 | **21.04** | 0 | 0 |
| | 1 | 25 | 21.02 | | 0 |
| | 1 | 49 | 20.98 | | 0 |
| | 25 | 0 | 21.42 | 0-1 | 0 |
| | 25 | 12 | **21.46** | | 0 |
| | 25 | 25 | 21.39 | | 0 |
| | 50 | 0 | 20.92 | | 0 |
| 16QAM | 1 | 0 | 21.53 | 0-1 | 0 |
| | 1 | 25 | 21.48 | | 0 |
| | 1 | 49 | 21.30 | | 0 |
| | 25 | 0 | 21.50 | 0-2 | 0 |
| | 25 | 12 | 21.48 | | 0 |
| | 25 | 25 | 21.46 | | 0 |
| | 50 | 0 | 21.00 | | 0 |
| 64QAM | 1 | 0 | 20.81 | 0-2 | 0 |
| | 1 | 25 | 21.26 | | 0 |
| | 1 | 49 | 21.03 | | 0 |
| | 25 | 0 | 21.09 | 0-3 | 0 |
| | 25 | 12 | 21.00 | | 0 |
| | 25 | 25 | 21.07 | | 0 |
| | 50 | 0 | 21.01 | | 0 |

### 9.3.3 LTE Band 5

**Table 9-6**
**LTE Band 5 (Cell) Maximum Conducted Powers - 10 MHz Bandwidth**

| LTE Band 5 (Cell) 10 MHz Bandwidth | | | | | |
|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Mid Channel 20525 (836.5 MHz) Conducted Power [dBm] | MPR Allowed per 3GPP [dB] | MPR [dB] |
| QPSK | 1 | 0 | 21.22 | 0 | 0 |
| | 1 | 25 | 21.24 | | 0 |
| | 1 | 49 | **21.25** | | 0 |
| | 25 | 0 | 21.22 | 0-1 | 0 |
| | 25 | 12 | 21.25 | | 0 |
| | 25 | 25 | **21.26** | | 0 |
| | 50 | 0 | 21.19 | | 0 |
| 16QAM | 1 | 0 | 21.55 | 0-1 | 0 |
| | 1 | 25 | 21.50 | | 0 |
| | 1 | 49 | 21.54 | | 0 |
| | 25 | 0 | 21.24 | 0-2 | 0 |
| | 25 | 12 | 21.25 | | 0 |
| | 25 | 25 | 21.27 | | 0 |
| | 50 | 0 | 21.22 | | 0 |
| 64QAM | 1 | 0 | 21.46 | 0-2 | 0 |
| | 1 | 25 | 21.59 | | 0 |
| | 1 | 49 | 21.53 | | 0 |
| | 25 | 0 | 20.73 | 0-3 | 0 |
| | 25 | 12 | 20.76 | | 0 |
| | 25 | 25 | 20.78 | | 0 |
| | 50 | 0 | 20.75 | | 0 |

### 9.3.4 LTE Band 66

**Table 9-7**
**LTE Band 66 (AWS) Maximum Conducted Powers - 20 MHz Bandwidth**

| LTE Band 66 (AWS) 20 MHz Bandwidth | | | | | | | |
|---|---|---|---|---|---|---|---|
| Modulation | RB Size | RB Offset | Low Channel 132072 (1720.0 MHz) | Mid Channel 132322 (1745.0 MHz) | High Channel 132572 (1770.0 MHz) | MPR Allowed per 3GPP [dB] | MPR [dB] |
| | | | Conducted Power [dBm] | | | | |
| QPSK | 1 | 0 | 18.03 | 17.78 | 17.97 | 0 | 0 |
| | 1 | 50 | **18.10** | 17.88 | 17.85 | | 0 |
| | 1 | 99 | 17.92 | 17.83 | 17.92 | | 0 |
| | 50 | 0 | 18.08 | 17.85 | 17.75 | 0-1 | 0 |
| | 50 | 25 | **18.09** | 17.92 | 17.83 | | 0 |
| | 50 | 50 | 18.06 | 17.88 | 17.83 | | 0 |
| | 100 | 0 | 18.04 | 17.87 | 17.78 | | 0 |
| 16QAM | 1 | 0 | 18.40 | 18.06 | 18.05 | 0-1 | 0 |
| | 1 | 50 | 18.50 | 18.35 | 18.38 | | 0 |
| | 1 | 99 | 18.30 | 17.92 | 18.32 | | 0 |
| | 50 | 0 | 18.18 | 17.87 | 17.81 | 0-2 | 0 |
| | 50 | 25 | 18.11 | 17.90 | 17.85 | | 0 |
| | 50 | 50 | 18.11 | 17.89 | 17.91 | | 0 |
| | 100 | 0 | 18.06 | 17.89 | 17.91 | | 0 |
| 64QAM | 1 | 0 | 18.29 | 18.00 | 18.01 | 0-2 | 0 |
| | 1 | 50 | 18.41 | 18.11 | 18.15 | | 0 |
| | 1 | 99 | 18.18 | 17.90 | 18.06 | | 0 |
| | 50 | 0 | 18.16 | 17.89 | 17.84 | 0-3 | 0 |
| | 50 | 25 | 18.13 | 17.97 | 17.79 | | 0 |
| | 50 | 50 | 18.09 | 17.86 | 17.87 | | 0 |
| | 100 | 0 | 18.04 | 17.89 | 17.94 | | 0 |

### 9.3.1 LTE Band 25

**Table 9-8**
**LTE Band 25 (PCS) Maximum Conducted Powers - 20 MHz Bandwidth**

| 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 | 18.62 | 18.40 | **18.62** | 0 | 0 |
| | 1 | 50 | 18.59 | 18.41 | 18.61 | | 0 |
| | 1 | 99 | 18.52 | 18.32 | 18.43 | | 0 |
| | 50 | 0 | 18.66 | 18.63 | **18.70** | 0-1 | 0 |
| | 50 | 25 | 18.66 | 18.65 | 18.58 | | 0 |
| | 50 | 50 | 18.64 | 18.59 | 18.52 | | 0 |
| | 100 | 0 | 18.60 | 18.61 | 18.60 | | 0 |
| 16QAM | 1 | 0 | 18.73 | 18.81 | 18.87 | 0-1 | 0 |
| | 1 | 50 | 18.81 | 18.98 | 18.86 | | 0 |
| | 1 | 99 | 18.72 | 18.87 | 18.69 | | 0 |
| | 50 | 0 | 18.66 | 18.66 | 18.61 | 0-2 | 0 |
| | 50 | 25 | 18.71 | 18.68 | 18.61 | | 0 |
| | 50 | 50 | 18.68 | 18.61 | 18.54 | | 0 |
| | 100 | 0 | 18.71 | 18.61 | 18.62 | | 0 |
| 64QAM | 1 | 0 | 18.85 | 18.72 | 18.86 | 0-2 | 0 |
| | 1 | 50 | 19.03 | 18.99 | 18.81 | | 0 |
| | 1 | 99 | 18.77 | 18.74 | 18.77 | | 0 |
| | 50 | 0 | 18.67 | 18.64 | 18.60 | 0-3 | 0 |
| | 50 | 25 | 18.73 | 18.67 | 18.61 | | 0 |
| | 50 | 50 | 18.66 | 18.60 | 18.57 | | 0 |
| | 100 | 0 | 18.73 | 18.62 | 18.62 | | 0 |

### 9.3.2 LTE Band 41

**Table 9-9**
**LTE Band 41 PC3 Maximum Conducted Powers – 20 MHz Bandwidth**

| 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 | 18.81 | 18.58 | **18.98** | 18.51 | 18.40 | 0 | 0 |
| | 1 | 50 | 18.87 | 18.65 | 18.70 | 18.71 | 18.89 | | 0 |
| | 1 | 99 | 18.70 | 18.56 | 18.81 | 18.27 | 18.86 | | 0 |
| | 50 | 0 | 18.74 | 18.67 | **18.98** | 18.70 | 18.70 | 0-1 | 0 |
| | 50 | 25 | 18.73 | 18.76 | 18.94 | 18.78 | 18.82 | | 0 |
| | 50 | 50 | 18.68 | 18.69 | 18.89 | 18.51 | 18.95 | | 0 |
| | 100 | 0 | 18.76 | 18.73 | 18.94 | 18.63 | 18.77 | | 0 |
| 16QAM | 1 | 0 | 19.16 | 18.80 | 18.91 | 18.58 | 18.56 | 0-1 | 0 |
| | 1 | 50 | 18.93 | 18.85 | 18.91 | 18.60 | 19.12 | | 0 |
| | 1 | 99 | 19.06 | 18.76 | 18.99 | 18.22 | 18.57 | | 0 |
| | 50 | 0 | 18.85 | 18.66 | 18.97 | 18.72 | 18.76 | 0-2 | 0 |
| | 50 | 25 | 18.78 | 18.77 | 18.99 | 18.71 | 18.87 | | 0 |
| | 50 | 50 | 18.67 | 18.77 | 18.94 | 18.61 | 18.93 | | 0 |
| | 100 | 0 | 18.82 | 18.76 | 18.89 | 18.73 | 18.79 | | 0 |
| 64QAM | 1 | 0 | 19.12 | 18.86 | 19.01 | 18.60 | 18.48 | 0-2 | 0 |
| | 1 | 50 | 19.01 | 18.92 | 18.88 | 18.87 | 18.91 | | 0 |
| | 1 | 99 | 18.80 | 18.64 | 18.86 | 18.38 | 18.97 | | 0 |
| | 50 | 0 | 18.89 | 18.66 | 18.98 | 18.67 | 18.61 | 0-3 | 0 |
| | 50 | 25 | 18.71 | 18.81 | 18.84 | 18.74 | 18.79 | | 0 |
| | 50 | 50 | 18.69 | 18.68 | 18.85 | 18.68 | 18.87 | | 0 |
| | 100 | 0 | 18.85 | 18.83 | 18.88 | 18.66 | 18.81 | | 0 |


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

## 9.4 WLAN Conducted Powers

**Table 9-10**
**2.4 GHz WLAN Maximum Average RF Power – Chain 0**

| 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 | 14.13 | 13.72 | 13.08 | 13.10 |
| 2417 | 2 | 14.08 | N/A | 14.42 | 14.42 |
| 2437 | 6 | 13.99 | 14.64 | 14.58 | 14.57 |
| 2457 | 10 | 13.92 | N/A | 14.66 | 14.55 |
| 2462 | 11 | 13.97 | 12.92 | 12.22 | 12.27 |

**Table 9-11**
**2.4 GHz WLAN Maximum Average RF Power – Chain 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 | 12.60 | 13.78 | 13.30 | 13.28 |
| 2417 | 2 | 12.57 | N/A | 14.50 | 14.55 |
| 2437 | 6 | 12.50 | 14.68 | 14.58 | 14.63 |
| 2457 | 10 | 12.39 | N/A | 14.77 | 14.47 |
| 2462 | 11 | 12.27 | 13.32 | 12.71 | 12.67 |

**Table 9-12**
**5 GHz WLAN Maximum Average RF Power – Chain 0**

| 5GHz (80MHz) Conducted Power [dBm] | | | |
|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | |
| | | 802.11ac | 802.11ax |
| | | Average | Average |
| 5210 | 42 | 10.96 | 11.05 |
| 5290 | 58 | 10.73 | 10.81 |
| 5530 | 106 | 10.65 | 10.71 |
| 5610 | 122 | 10.73 | 10.80 |
| 5690 | 138 | 11.28 | 11.40 |
| 5775 | 155 | 10.52 | 10.60 |

Table 9-13
5 GHz WLAN Maximum Average RF Power – Chain 1

| 5GHz (80MHz) Conducted Power [dBm] | | | |
|---|---|---|---|
| Freq [MHz] | Channel | IEEE Transmission Mode | |
| | | 802.11ac | 802.11ax |
| | | Average | Average |
| 5210 | 42 | 11.38 | 11.12 |
| 5290 | 58 | 11.20 | 10.78 |
| 5530 | 106 | 11.36 | 11.03 |
| 5610 | 122 | 11.24 | 10.71 |
| 5690 | 138 | 11.12 | 11.13 |
| 5775 | 155 | 11.22 | 10.84 |

## 9.5 Bluetooth Conducted Powers

Table 9-14
Bluetooth Average RF Power – Chain 0

| Frequency [MHz] | Data Rate [Mbps] | Mod. | Power Scheme | Channel No. | Avg Conducted Power | |
|---|---|---|---|---|---|---|
| | | | | | [dBm] | [mW] |
| 2402 | 1.0 | GFSK | ePA | 0 | 12.29 | 16.924 |
| 2441 | 1.0 | GFSK | ePA | 39 | 12.44 | 17.545 |
| 2480 | 1.0 | GFSK | ePA | 78 | 13.88 | 24.444 |

Table 9-15
Bluetooth Average RF Power – Chain 1

| Frequency [MHz] | Data Rate [Mbps] | Mod. | Power Scheme | Channel No. | Avg Conducted Power | |
|---|---|---|---|---|---|---|
| | | | | | [dBm] | [mW] |
| 2402 | 1.0 | GFSK | ePA | 0 | 12.31 | 17.006 |
| 2441 | 1.0 | GFSK | ePA | 39 | 12.08 | 16.155 |
| 2480 | 1.0 | GFSK | ePA | 78 | 13.48 | 22.274 |

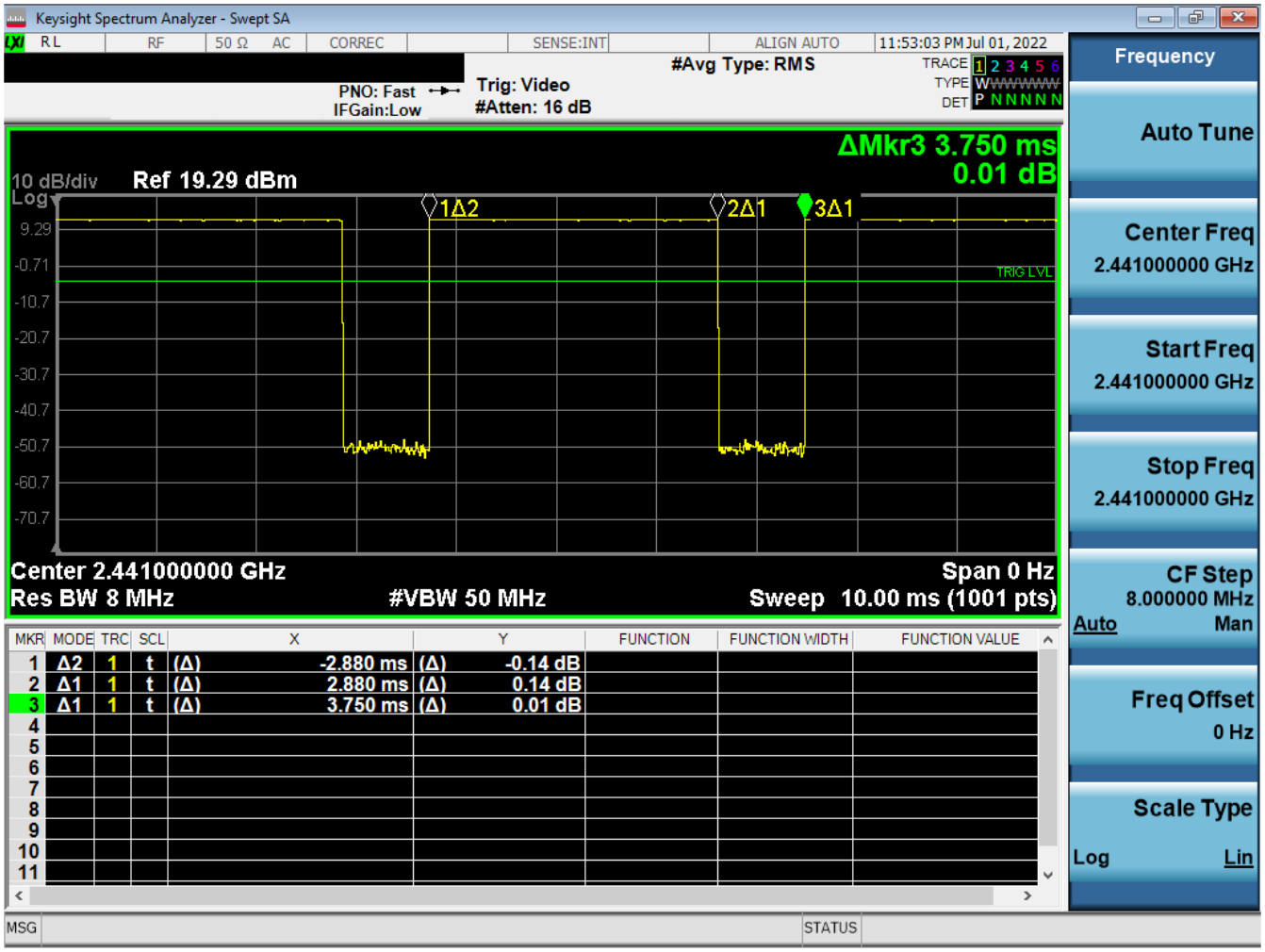


**Figure 9-4**
**Bluetooth Chain 0 Transmission Plot**

**Equation 9-1**
**Bluetooth Chain 0 Duty Cycle Calculation**

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.88ms}{3.75ms} * 100\% = 76.8\%$$

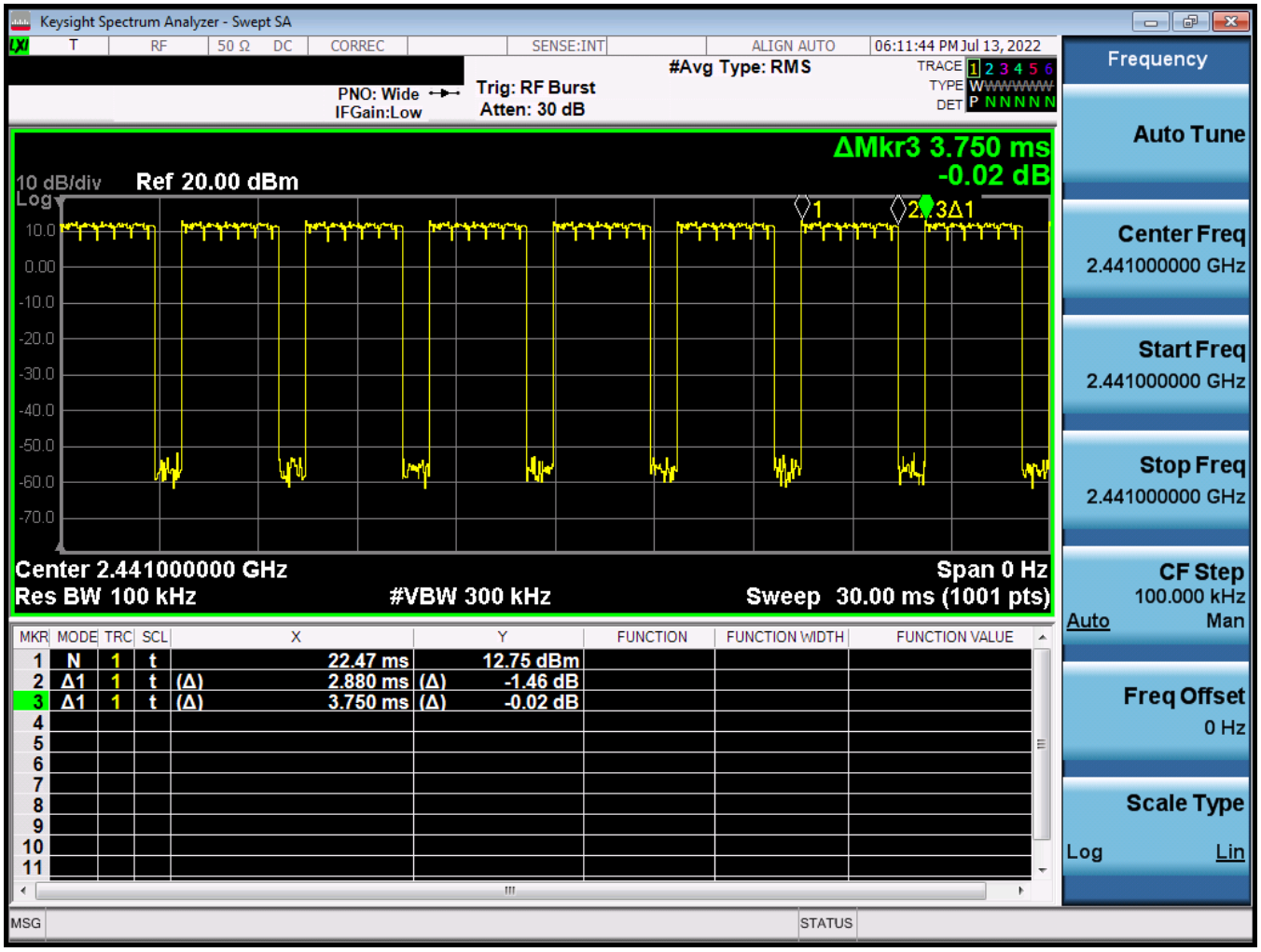


**Figure 9-5**
**Bluetooth Chain 1 Transmission Plot**

**Equation 9-2**
**Bluetooth Chain 1 Duty Cycle Calculation**

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.88ms}{3.75ms} * 100\% = 76.8\%$$

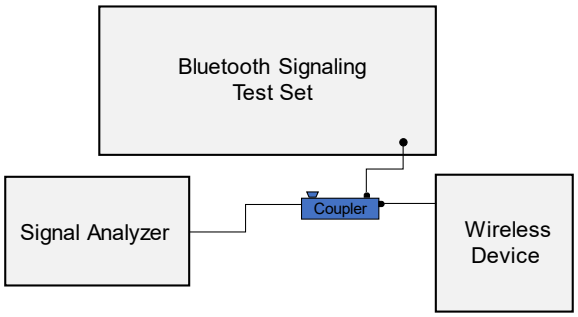


**Figure 9-6**
**Power Measurement Setup**

# 10 SYSTEM VERIFICATION

## 10.1 Tissue Verification

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

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| 07/10/2022 | 30 Head | 23.6 | 12 | 0.758 | 53.134 | 0.750 | 55.000 | 1.07% | -3.39% |
| | | | 13 | 0.758 | 53.080 | 0.750 | 55.000 | 1.07% | -3.49% |
| | | | 14 | 0.758 | 53.076 | 0.750 | 55.000 | 1.07% | -3.50% |
| | | | 30 | 0.760 | 52.804 | 0.750 | 55.000 | 1.33% | -3.99% |
| | | | 60 | 0.767 | 52.147 | 0.753 | 54.325 | 1.86% | -4.01% |
| | | | 65 | 0.768 | 52.084 | 0.753 | 54.213 | 1.99% | -3.93% |
| 07/20/2022 | 750 Head | 20.4 | 680 | 0.869 | 44.008 | 0.888 | 42.305 | -2.14% | 4.03% |
| | | | 695 | 0.875 | 43.953 | 0.889 | 42.227 | -1.57% | 4.09% |
| | | | 700 | 0.876 | 43.932 | 0.889 | 42.201 | -1.46% | 4.10% |
| | | | 710 | 0.879 | 43.892 | 0.890 | 42.149 | -1.24% | 4.14% |
| | | | 725 | 0.884 | 43.835 | 0.891 | 42.071 | -0.79% | 4.19% |
| | | | 750 | 0.892 | 43.778 | 0.894 | 41.942 | -0.22% | 4.38% |
| | | | 770 | 0.899 | 43.728 | 0.895 | 41.838 | 0.45% | 4.52% |
| | | | 785 | 0.905 | 43.674 | 0.896 | 41.760 | 1.00% | 4.58% |
| | | | 800 | 0.911 | 43.621 | 0.897 | 41.682 | 1.56% | 4.65% |
| 07/18/2022 | 835 Head | 20.0 | 815 | 0.872 | 40.595 | 0.898 | 41.594 | -2.90% | -2.40% |
| | | | 820 | 0.877 | 40.526 | 0.899 | 41.578 | -2.45% | -2.53% |
| | | | 835 | 0.892 | 40.330 | 0.900 | 41.500 | -0.89% | -2.82% |
| | | | 850 | 0.906 | 40.145 | 0.916 | 41.500 | -1.09% | -3.27% |
| 07/17/2022 | 1750 Head | 20.7 | 1710 | 1.376 | 39.830 | 1.348 | 40.142 | 2.08% | -0.78% |
| | | | 1720 | 1.387 | 39.785 | 1.354 | 40.126 | 2.44% | -0.85% |
| | | | 1745 | 1.415 | 39.686 | 1.368 | 40.087 | 3.44% | -1.00% |
| | | | 1750 | 1.420 | 39.663 | 1.371 | 40.079 | 3.57% | -1.04% |
| | | | 1770 | 1.440 | 39.560 | 1.383 | 40.047 | 4.12% | -1.22% |
| | | | 1790 | 1.459 | 39.437 | 1.394 | 40.016 | 4.66% | -1.45% |
| 07/13/2022 | 1900 Head | 22.8 | 1850 | 1.396 | 38.416 | 1.400 | 40.000 | -0.29% | -3.96% |
| | | | 1860 | 1.405 | 38.367 | 1.400 | 40.000 | 0.36% | -4.08% |
| | | | 1880 | 1.425 | 38.255 | 1.400 | 40.000 | 1.79% | -4.36% |
| | | | 1900 | 1.449 | 38.155 | 1.400 | 40.000 | 3.50% | -4.61% |
| | | | 1905 | 1.454 | 38.132 | 1.400 | 40.000 | 3.86% | -4.67% |
| | | | 1910 | 1.460 | 38.110 | 1.400 | 40.000 | 4.29% | -4.73% |
| 07/11/2022 | 2450 Head | 22.5 | 2300 | 1.595 | 40.086 | 1.670 | 39.500 | -4.49% | 1.48% |
| | | | 2310 | 1.606 | 40.059 | 1.679 | 39.480 | -4.35% | 1.47% |
| | | | 2320 | 1.616 | 40.031 | 1.687 | 39.460 | -4.21% | 1.45% |
| | | | 2400 | 1.707 | 39.747 | 1.756 | 39.289 | -2.79% | 1.17% |
| | | | 2450 | 1.757 | 39.544 | 1.800 | 39.200 | -2.39% | 0.88% |
| | | | 2480 | 1.796 | 39.441 | 1.833 | 39.162 | -2.02% | 0.71% |
| | | | 2500 | 1.818 | 39.390 | 1.855 | 39.136 | -1.99% | 0.65% |
| | | | 2510 | 1.828 | 39.359 | 1.866 | 39.123 | -2.04% | 0.60% |
| | | | 2535 | 1.852 | 39.245 | 1.893 | 39.092 | -2.17% | 0.39% |
| | | | 2550 | 1.871 | 39.173 | 1.909 | 39.073 | -1.99% | 0.26% |
| | | | 2560 | 1.884 | 39.135 | 1.920 | 39.060 | -1.88% | 0.19% |
| | | | 2600 | 1.933 | 39.030 | 1.964 | 39.009 | -1.58% | 0.05% |
| | | | 2650 | 1.989 | 38.781 | 2.018 | 38.945 | -1.44% | -0.42% |
| | | | 2680 | 2.030 | 38.708 | 2.051 | 38.907 | -1.02% | -0.51% |
| | | | 2700 | 2.048 | 38.652 | 2.073 | 38.882 | -1.21% | -0.59% |
| 07/18/2022 | 2450 Head | 22.3 | 2300 | 1.661 | 41.234 | 1.670 | 39.500 | -0.54% | 4.39% |
| | | | 2310 | 1.673 | 41.204 | 1.679 | 39.480 | -0.36% | 4.37% |
| | | | 2320 | 1.683 | 41.168 | 1.687 | 39.460 | -0.24% | 4.33% |
| | | | 2400 | 1.776 | 40.850 | 1.756 | 39.289 | 1.14% | 3.97% |
| | | | 2450 | 1.828 | 40.626 | 1.800 | 39.200 | 1.56% | 3.64% |
| | | | 2480 | 1.868 | 40.529 | 1.833 | 39.162 | 1.91% | 3.49% |
| | | | 2500 | 1.891 | 40.483 | 1.855 | 39.136 | 1.94% | 3.44% |
| | | | 2510 | 1.901 | 40.448 | 1.866 | 39.123 | 1.88% | 3.39% |
| | | | 2535 | 1.926 | 40.318 | 1.893 | 39.092 | 1.74% | 3.14% |
| | | | 2550 | 1.945 | 40.237 | 1.909 | 39.073 | 1.89% | 2.98% |
| | | | 2560 | 1.959 | 40.199 | 1.920 | 39.060 | 2.03% | 2.92% |
| | | | 2600 | 2.009 | 40.103 | 1.964 | 39.009 | 2.29% | 2.80% |
| | | | 2650 | 2.064 | 39.842 | 2.018 | 38.945 | 2.28% | 2.30% |
| | | | 2680 | 2.105 | 39.773 | 2.051 | 38.907 | 2.63% | 2.23% |
| 07/28/2022 | 2450 Head | 21.0 | 2300 | 1.749 | 40.584 | 1.670 | 39.500 | 4.73% | 2.74% |
| | | | 2310 | 1.756 | 40.567 | 1.679 | 39.480 | 4.59% | 2.75% |
| | | | 2320 | 1.764 | 40.551 | 1.687 | 39.460 | 4.56% | 2.76% |
| | | | 2400 | 1.827 | 40.433 | 1.756 | 39.289 | 4.04% | 2.91% |
| | | | 2450 | 1.866 | 40.348 | 1.800 | 39.200 | 3.67% | 2.93% |
| | | | 2480 | 1.890 | 40.300 | 1.833 | 39.162 | 3.11% | 2.91% |
| | | | 2500 | 1.906 | 40.270 | 1.855 | 39.136 | 2.75% | 2.90% |
| | | | 2510 | 1.914 | 40.254 | 1.866 | 39.123 | 2.57% | 2.89% |
| | | | 2535 | 1.934 | 40.203 | 1.893 | 39.092 | 2.17% | 2.84% |
| | | | 2550 | 1.947 | 40.171 | 1.909 | 39.073 | 1.99% | 2.81% |
| | | | 2560 | 1.956 | 40.154 | 1.920 | 39.060 | 1.88% | 2.80% |
| | | | 2600 | 1.988 | 40.104 | 1.964 | 39.009 | 1.22% | 2.81% |
| | | | 2650 | 2.030 | 39.992 | 2.018 | 38.945 | 0.59% | 2.69% |
| | | | 2680 | 2.056 | 39.960 | 2.051 | 38.907 | 0.24% | 2.71% |
| | | | 2700 | 2.070 | 39.935 | 2.073 | 38.882 | -0.14% | 2.71% |
| 07/11/2022 | 5200-5800 Head | 20.7 | 5180 | 4.475 | 35.206 | 4.635 | 36.009 | -3.45% | -2.23% |
| | | | 5190 | 4.487 | 35.181 | 4.645 | 35.998 | -3.40% | -2.27% |
| | | | 5200 | 4.500 | 35.150 | 4.655 | 35.986 | -3.33% | -2.32% |
| | | | 5210 | 4.511 | 35.126 | 4.666 | 35.975 | -3.32% | -2.36% |
| | | | 5220 | 4.525 | 35.099 | 4.676 | 35.963 | -3.23% | -2.40% |
| | | | 5240 | 4.546 | 35.072 | 4.696 | 35.940 | -3.19% | -2.42% |
| | | | 5250 | 4.558 | 35.064 | 4.706 | 35.929 | -3.14% | -2.41% |
| | | | 5260 | 4.566 | 35.042 | 4.717 | 35.917 | -3.20% | -2.44% |
| | | | 5270 | 4.577 | 35.023 | 4.727 | 35.906 | -3.17% | -2.46% |
| | | | 5280 | 4.587 | 35.008 | 4.737 | 35.894 | -3.17% | -2.47% |
| | | | 5290 | 4.597 | 34.993 | 4.748 | 35.883 | -3.18% | -2.48% |
| | | | 5300 | 4.608 | 34.975 | 4.758 | 35.871 | -3.15% | -2.50% |
| | | | 5310 | 4.616 | 34.947 | 4.768 | 35.860 | -3.19% | -2.55% |
| | | | 5320 | 4.628 | 34.930 | 4.778 | 35.849 | -3.14% | -2.56% |
| | | | 5500 | 4.829 | 34.631 | 4.963 | 35.643 | -2.70% | -2.84% |
| | | | 5510 | 4.841 | 34.617 | 4.973 | 35.632 | -2.65% | -2.85% |
| | | | 5520 | 4.851 | 34.602 | 4.983 | 35.620 | -2.65% | -2.86% |
| | | | 5530 | 4.863 | 34.593 | 4.994 | 35.609 | -2.62% | -2.85% |
| | | | 5540 | 4.875 | 34.582 | 5.004 | 35.597 | -2.58% | -2.85% |
| | | | 5550 | 4.885 | 34.566 | 5.014 | 35.586 | -2.57% | -2.87% |
| | | | 5560 | 4.896 | 34.545 | 5.024 | 35.574 | -2.55% | -2.89% |
| | | | 5580 | 4.922 | 34.493 | 5.045 | 35.551 | -2.44% | -2.98% |
| | | | 5600 | 4.944 | 34.466 | 5.065 | 35.529 | -2.39% | -2.99% |
| | | | 5610 | 4.953 | 34.453 | 5.076 | 35.518 | -2.42% | -3.00% |
| | | | 5620 | 4.966 | 34.431 | 5.086 | 35.506 | -2.36% | -3.03% |
| | | | 5640 | 4.984 | 34.403 | 5.106 | 35.483 | -2.39% | -3.04% |
| | | | 5660 | 5.007 | 34.358 | 5.127 | 35.460 | -2.34% | -3.11% |
| | | | 5670 | 5.021 | 34.343 | 5.137 | 35.449 | -2.26% | -3.12% |
| | | | 5680 | 5.036 | 34.324 | 5.147 | 35.437 | -2.16% | -3.14% |
| | | | 5690 | 5.048 | 34.311 | 5.158 | 35.426 | -2.13% | -3.15% |
| | | | 5700 | 5.061 | 34.290 | 5.168 | 35.414 | -2.07% | -3.17% |
| | | | 5710 | 5.071 | 34.275 | 5.178 | 35.403 | -2.07% | -3.19% |
| | | | 5720 | 5.085 | 34.261 | 5.188 | 35.391 | -1.99% | -3.19% |
| | | | 5745 | 5.110 | 34.207 | 5.214 | 35.363 | -1.99% | -3.27% |
| | | | 5750 | 5.114 | 34.195 | 5.219 | 35.357 | -2.01% | -3.29% |
| | | | 5755 | 5.118 | 34.188 | 5.224 | 35.351 | -2.03% | -3.29% |
| | | | 5765 | 5.128 | 34.175 | 5.234 | 35.340 | -2.03% | -3.30% |
| | | | 5775 | 5.142 | 34.164 | 5.245 | 35.329 | -1.96% | -3.30% |
| | | | 5785 | 5.153 | 34.145 | 5.255 | 35.317 | -1.94% | -3.32% |
| | | | 5795 | 5.167 | 34.131 | 5.265 | 35.305 | -1.86% | -3.33% |
| | | | 5805 | 5.178 | 34.113 | 5.275 | 35.294 | -1.84% | -3.35% |
| | | | 5825 | 5.200 | 34.066 | 5.296 | 35.271 | -1.81% | -3.42% |
| | | | 5835 | 5.212 | 34.046 | 5.305 | 35.230 | -1.75% | -3.36% |
| | | | 5845 | 5.224 | 34.033 | 5.315 | 35.210 | -1.71% | -3.34% |
| | | | 5855 | 5.235 | 34.026 | 5.325 | 35.197 | -1.69% | -3.33% |
| | | | 5875 | 5.255 | 34.012 | 5.347 | 35.183 | -1.72% | -3.33% |
| | | | 5885 | 5.269 | 33.986 | 5.357 | 35.177 | -1.64% | -3.39% |
| | | | 5905 | 5.290 | 33.946 | 5.379 | 35.163 | -1.65% | -3.46% |

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

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| 07/13/2022 | 750 Body | 22.2 | 680 | 0.912 | 56.669 | 0.958 | 55.804 | -4.80% | 1.55% |
| | | | 695 | 0.917 | 56.650 | 0.959 | 55.745 | -4.38% | 1.62% |
| | | | 700 | 0.918 | 56.644 | 0.959 | 55.726 | -4.28% | 1.65% |
| | | | 710 | 0.922 | 56.628 | 0.960 | 55.687 | -3.96% | 1.69% |
| | | | 725 | 0.927 | 56.606 | 0.961 | 55.629 | -3.54% | 1.76% |
| | | | 750 | 0.936 | 56.571 | 0.964 | 55.531 | -2.90% | 1.87% |
| | | | 770 | 0.943 | 56.523 | 0.965 | 55.453 | -2.28% | 1.93% |
| | | | 785 | 0.948 | 56.482 | 0.966 | 55.395 | -1.86% | 1.96% |
| | | | 800 | 0.954 | 56.433 | 0.967 | 55.336 | -1.34% | 1.98% |
| 07/14/2022 | 835 Body | 21.5 | 815 | 0.925 | 55.270 | 0.968 | 55.271 | -4.44% | 0.00% |
| | | | 820 | 0.930 | 55.230 | 0.969 | 55.258 | -4.02% | -0.05% |
| | | | 835 | 0.946 | 55.108 | 0.970 | 55.200 | -2.47% | -0.17% |
| | | | 850 | 0.962 | 54.974 | 0.988 | 55.154 | -2.63% | -0.33% |
| 07/07/2022 | 1750 Body | 21.4 | 1710 | 1.481 | 51.479 | 1.463 | 53.537 | 1.23% | -3.84% |
| | | | 1720 | 1.493 | 51.442 | 1.469 | 53.511 | 1.63% | -3.87% |
| | | | 1745 | 1.520 | 51.355 | 1.485 | 53.445 | 2.36% | -3.91% |
| | | | 1750 | 1.526 | 51.339 | 1.488 | 53.432 | 2.55% | -3.92% |
| | | | 1770 | 1.547 | 51.267 | 1.501 | 53.379 | 3.06% | -3.96% |
| | | | 1790 | 1.570 | 51.186 | 1.514 | 53.326 | 3.70% | -4.01% |
| 07/11/2022 | 1750 Body | 20.5 | 1710 | 1.495 | 51.438 | 1.463 | 53.537 | 2.19% | -3.92% |
| | | | 1720 | 1.507 | 51.396 | 1.469 | 53.511 | 2.59% | -3.95% |
| | | | 1745 | 1.535 | 51.294 | 1.485 | 53.445 | 3.37% | -4.02% |
| | | | 1750 | 1.540 | 51.272 | 1.488 | 53.432 | 3.49% | -4.04% |
| | | | 1770 | 1.562 | 51.183 | 1.501 | 53.379 | 4.06% | -4.11% |
| | | | 1790 | 1.583 | 51.085 | 1.514 | 53.326 | 4.56% | -4.20% |
| 06/27/2022 | 1900 Body | 22.7 | 1850 | 1.524 | 51.231 | 1.520 | 53.300 | 0.26% | -3.88% |
| | | | 1860 | 1.535 | 51.201 | 1.520 | 53.300 | 0.99% | -3.94% |
| | | | 1880 | 1.556 | 51.139 | 1.520 | 53.300 | 2.37% | -4.05% |
| | | | 1900 | 1.578 | 51.067 | 1.520 | 53.300 | 3.82% | -4.19% |
| | | | 1905 | 1.584 | 51.051 | 1.520 | 53.300 | 4.21% | -4.22% |
| | | | 1910 | 1.589 | 51.034 | 1.520 | 53.300 | 4.54% | -4.25% |
| 07/18/2022 | 1900 Body | 20.9 | 1850 | 1.508 | 52.210 | 1.520 | 53.300 | -0.79% | -2.05% |
| | | | 1860 | 1.517 | 52.158 | 1.520 | 53.300 | -0.20% | -2.14% |
| | | | 1880 | 1.542 | 52.046 | 1.520 | 53.300 | 1.45% | -2.35% |
| | | | 1900 | 1.571 | 51.983 | 1.520 | 53.300 | 3.36% | -2.47% |
| | | | 1905 | 1.577 | 51.978 | 1.520 | 53.300 | 3.75% | -2.48% |
| | | | 1910 | 1.583 | 51.976 | 1.520 | 53.300 | 4.14% | -2.48% |
| 07/20/2022 | 1900 Body | 21.8 | 1850 | 1.531 | 51.501 | 1.520 | 53.300 | 0.72% | -3.38% |
| | | | 1860 | 1.542 | 51.466 | 1.520 | 53.300 | 1.45% | -3.44% |
| | | | 1880 | 1.563 | 51.383 | 1.520 | 53.300 | 2.83% | -3.60% |
| | | | 1900 | 1.584 | 51.293 | 1.520 | 53.300 | 4.21% | -3.77% |
| | | | 1905 | 1.590 | 51.270 | 1.520 | 53.300 | 4.61% | -3.81% |
| | | | 1910 | 1.596 | 51.246 | 1.520 | 53.300 | 5.00% | -3.85% |
| 06/28/2022 | 2450 Body | 24.3 | 2300 | 1.722 | 51.414 | 1.809 | 52.900 | -4.81% | -2.81% |
| | | | 2310 | 1.735 | 51.382 | 1.816 | 52.887 | -4.46% | -2.85% |
| | | | 2320 | 1.746 | 51.351 | 1.826 | 52.873 | -4.38% | -2.88% |
| | | | 2400 | 1.849 | 51.106 | 1.902 | 52.767 | -2.79% | -3.15% |
| | | | 2450 | 1.912 | 50.902 | 1.950 | 52.700 | -1.95% | -3.41% |
| | | | 2480 | 1.954 | 50.810 | 1.993 | 52.662 | -1.96% | -3.52% |
| | | | 2500 | 1.979 | 50.756 | 2.021 | 52.636 | -2.08% | -3.57% |
| | | | 2510 | 1.991 | 50.724 | 2.035 | 52.623 | -2.16% | -3.61% |
| | | | 2535 | 2.023 | 50.604 | 2.071 | 52.592 | -2.32% | -3.78% |
| | | | 2550 | 2.046 | 50.534 | 2.092 | 52.573 | -2.20% | -3.88% |
| | | | 2560 | 2.061 | 50.499 | 2.106 | 52.560 | -2.14% | -3.92% |
| | | | 2600 | 2.114 | 50.395 | 2.163 | 52.509 | -2.27% | -4.03% |
| | | | 2650 | 2.183 | 50.145 | 2.234 | 52.445 | -2.28% | -4.39% |
| | | | 2680 | 2.226 | 50.072 | 2.277 | 52.407 | -2.24% | -4.46% |
| | | | 2700 | 2.246 | 50.004 | 2.305 | 52.382 | -2.56% | -4.54% |
| 07/12/2022 | 2450 Body | 23.0 | 2300 | 1.796 | 51.643 | 1.809 | 52.900 | -0.72% | -2.38% |
| | | | 2310 | 1.810 | 51.606 | 1.816 | 52.887 | -0.33% | -2.42% |
| | | | 2320 | 1.823 | 51.569 | 1.826 | 52.873 | -0.16% | -2.47% |
| | | | 2400 | 1.929 | 51.311 | 1.902 | 52.767 | 1.42% | -2.76% |
| | | | 2450 | 1.998 | 51.129 | 1.950 | 52.700 | 2.46% | -2.98% |
| | | | 2480 | 2.039 | 51.022 | 1.993 | 52.662 | 2.31% | -3.11% |
| | | | 2500 | 2.065 | 50.944 | 2.021 | 52.636 | 2.18% | -3.21% |
| | | | 2510 | 2.079 | 50.906 | 2.035 | 52.623 | 2.16% | -3.26% |
| | | | 2535 | 2.114 | 50.809 | 2.071 | 52.592 | 2.08% | -3.39% |
| | | | 2550 | 2.136 | 50.753 | 2.092 | 52.573 | 2.10% | -3.46% |
| | | | 2560 | 2.151 | 50.721 | 2.106 | 52.560 | 2.14% | -3.50% |
| | | | 2600 | 2.205 | 50.569 | 2.163 | 52.509 | 1.94% | -3.69% |
| | | | 2650 | 2.278 | 50.356 | 2.234 | 52.445 | 1.97% | -3.98% |
| | | | 2680 | 2.320 | 50.246 | 2.277 | 52.407 | 1.89% | -4.12% |
| | | | 2700 | 2.346 | 50.165 | 2.305 | 52.382 | 1.78% | -4.23% |
| 07/05/2022 | 5200-5800 Body | 20.8 | 5180 | 5.306 | 48.577 | 5.276 | 49.041 | 0.57% | -0.95% |
| | | | 5190 | 5.323 | 48.566 | 5.288 | 49.028 | 0.66% | -0.94% |
| | | | 5200 | 5.341 | 48.557 | 5.299 | 49.014 | 0.79% | -0.93% |
| | | | 5210 | 5.356 | 48.540 | 5.311 | 49.001 | 0.85% | -0.94% |
| | | | 5220 | 5.370 | 48.520 | 5.323 | 48.987 | 0.88% | -0.95% |
| | | | 5240 | 5.400 | 48.477 | 5.346 | 48.960 | 1.01% | -0.99% |
| | | | 5250 | 5.414 | 48.457 | 5.358 | 48.947 | 1.05% | -1.00% |
| | | | 5260 | 5.431 | 48.450 | 5.369 | 48.933 | 1.15% | -0.99% |
| | | | 5270 | 5.449 | 48.435 | 5.381 | 48.919 | 1.26% | -0.99% |
| | | | 5280 | 5.463 | 48.413 | 5.393 | 48.906 | 1.30% | -1.01% |
| | | | 5290 | 5.473 | 48.371 | 5.404 | 48.892 | 1.28% | -1.07% |
| | | | 5300 | 5.485 | 48.340 | 5.416 | 48.879 | 1.27% | -1.10% |
| | | | 5310 | 5.498 | 48.316 | 5.428 | 48.865 | 1.29% | -1.12% |
| | | | 5320 | 5.520 | 48.301 | 5.439 | 48.851 | 1.49% | -1.13% |
| | | | 5500 | 5.780 | 47.953 | 5.650 | 48.607 | 2.30% | -1.35% |
| | | | 5510 | 5.796 | 47.920 | 5.661 | 48.594 | 2.38% | -1.39% |
| | | | 5520 | 5.809 | 47.911 | 5.673 | 48.580 | 2.40% | -1.38% |
| | | | 5530 | 5.822 | 47.892 | 5.685 | 48.566 | 2.41% | -1.39% |
| | | | 5540 | 5.836 | 47.873 | 5.696 | 48.553 | 2.46% | -1.40% |
| | | | 5550 | 5.852 | 47.862 | 5.708 | 48.539 | 2.52% | -1.39% |
| | | | 5560 | 5.870 | 47.852 | 5.720 | 48.526 | 2.62% | -1.39% |
| | | | 5580 | 5.898 | 47.813 | 5.743 | 48.499 | 2.70% | -1.41% |
| | | | 5600 | 5.927 | 47.759 | 5.766 | 48.471 | 2.79% | -1.47% |
| | | | 5610 | 5.944 | 47.748 | 5.778 | 48.458 | 2.87% | -1.47% |
| | | | 5620 | 5.956 | 47.725 | 5.790 | 48.444 | 2.87% | -1.48% |
| | | | 5640 | 5.992 | 47.678 | 5.813 | 48.417 | 3.08% | -1.53% |
| | | | 5660 | 6.029 | 47.626 | 5.837 | 48.390 | 3.29% | -1.58% |
| | | | 5670 | 6.038 | 47.608 | 5.848 | 48.376 | 3.25% | -1.59% |
| | | | 5680 | 6.055 | 47.592 | 5.860 | 48.363 | 3.33% | -1.59% |
| | | | 5690 | 6.073 | 47.575 | 5.872 | 48.349 | 3.42% | -1.60% |
| | | | 5700 | 6.091 | 47.550 | 5.883 | 48.336 | 3.54% | -1.63% |
| | | | 5710 | 6.109 | 47.542 | 5.895 | 48.322 | 3.63% | -1.61% |
| | | | 5720 | 6.120 | 47.519 | 5.907 | 48.309 | 3.61% | -1.64% |
| | | | 5745 | 6.151 | 47.465 | 5.936 | 48.275 | 3.62% | -1.68% |
| | | | 5790 | 6.161 | 47.458 | 5.942 | 48.268 | 3.69% | -1.68% |
| | | | 5755 | 6.170 | 47.454 | 5.947 | 48.261 | 3.75% | -1.67% |
| | | | 5765 | 6.186 | 47.445 | 5.959 | 48.248 | 3.81% | -1.66% |
| | | | 5775 | 6.201 | 47.413 | 5.971 | 48.234 | 3.85% | -1.70% |
| | | | 5785 | 6.214 | 47.395 | 5.982 | 48.220 | 3.88% | -1.71% |
| | | | 5795 | 6.233 | 47.377 | 5.994 | 48.207 | 3.99% | -1.72% |
| | | | 5800 | 6.242 | 47.356 | 6.000 | 48.200 | 4.03% | -1.75% |
| | | | 5805 | 6.249 | 47.351 | 6.006 | 48.193 | 4.05% | -1.75% |
| | | | 5825 | 6.278 | 47.322 | 6.029 | 48.166 | 4.13% | -1.75% |
| | | | 5835 | 6.290 | 47.304 | 6.042 | 48.130 | 4.10% | -1.72% |
| | | | 5845 | 6.306 | 47.280 | 6.054 | 48.110 | 4.16% | -1.73% |
| | | | 5855 | 6.325 | 47.249 | 6.066 | 48.093 | 4.27% | -1.75% |
| | | | 5865 | 6.345 | 47.237 | 6.077 | 48.080 | 4.41% | -1.75% |
| | | | 5875 | 6.365 | 47.217 | 6.088 | 48.067 | 4.55% | -1.77% |
| | | | 5885 | 6.378 | 47.199 | 6.100 | 48.053 | 4.56% | -1.78% |
| | | | 5905 | 6.396 | 47.172 | 6.122 | 48.027 | 4.48% | -1.78% |

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 the SAR System Validation Appendix.

**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 SAR1g (W/kg) | 1W Target SAR1g (W/kg) | 1W Normalized SAR 1g (W/kg) | Deviation1g (%) |
| S | 750 | HEAD | 07/20/2022 | 21.0 | 20.5 | 0.20 | 1054 | 7552 | 1.740 | 8.52 | 8.700 | 2.11% |
| S | 835 | HEAD | 07/18/2022 | 20.7 | 20.1 | 0.20 | 4d132 | 7552 | 2.000 | 9.66 | 10.000 | 3.52% |
| S | 1750 | HEAD | 07/17/2022 | 21.0 | 20.5 | 0.10 | 1008 | 7552 | 3.790 | 37.40 | 37.900 | 1.34% |
| S | 1900 | HEAD | 07/13/2022 | 22.2 | 22.3 | 0.10 | 5d148 | 7552 | 3.970 | 40.10 | 39.700 | -1.00% |
| P | 2450 | HEAD | 07/11/2022 | 23.2 | 21.5 | 0.10 | 981 | 7409 | 5.110 | 53.90 | 51.100 | -5.19% |
| P | 2450 | HEAD | 07/18/2022 | 23.1 | 21.6 | 0.10 | 981 | 7409 | 5.430 | 53.90 | 54.300 | 0.74% |
| E | 2450 | HEAD | 07/28/2022 | 21.9 | 21.7 | 0.10 | 797 | 7538 | 5.510 | 52.40 | 55.100 | 5.15% |
| P | 2600 | HEAD | 07/18/2022 | 23.1 | 21.6 | 0.10 | 1071 | 7409 | 5.570 | 56.10 | 55.700 | -0.71% |
| O | 5250 | HEAD | 07/11/2022 | 23.3 | 21.7 | 0.05 | 1057 | 7417 | 3.710 | 81.20 | 74.200 | -8.62% |
| O | 5600 | HEAD | 07/11/2022 | 23.3 | 21.7 | 0.05 | 1057 | 7417 | 4.130 | 84.20 | 82.600 | -1.90% |
| O | 5750 | HEAD | 07/11/2022 | 23.3 | 21.7 | 0.05 | 1057 | 7417 | 3.980 | 80.80 | 79.600 | -1.49% |
| L | 750 | BODY | 07/13/2022 | 20.9 | 20.5 | 0.20 | 1054 | 7670 | 1.790 | 8.63 | 8.950 | 3.71% |
| I | 835 | BODY | 07/14/2022 | 21.9 | 21.3 | 0.20 | 4d047 | 7660 | 2.010 | 9.68 | 10.050 | 3.82% |
| I | 1750 | BODY | 07/07/2022 | 21.6 | 21.3 | 0.10 | 1150 | 7660 | 3.770 | 37.80 | 37.700 | -0.26% |
| I | 1750 | BODY | 07/11/2022 | 20.5 | 20.1 | 0.10 | 1150 | 7660 | 3.800 | 37.80 | 38.000 | 0.53% |
| E | 1900 | BODY | 06/27/2022 | 21.5 | 21.3 | 0.10 | 5d149 | 7538 | 4.040 | 40.40 | 40.400 | 0.00% |
| E | 1900 | BODY | 07/18/2022 | 21.3 | 21.1 | 0.10 | 5d080 | 7538 | 4.220 | 40.70 | 42.200 | 3.69% |
| O | 1900 | BODY | 07/20/2022 | 25.0 | 22.9 | 0.10 | 5d148 | 7417 | 4.280 | 39.90 | 42.800 | 7.27% |
| S | 2450 | BODY | 06/28/2022 | 21.3 | 24.0 | 0.10 | 981 | 7552 | 4.860 | 50.30 | 48.600 | -3.38% |
| S | 2450 | BODY | 07/12/2022 | 21.5 | 21.2 | 0.10 | 981 | 7552 | 5.030 | 50.30 | 50.300 | 0.00% |
| S | 2600 | BODY | 06/28/2022 | 21.3 | 24.0 | 0.10 | 1071 | 7552 | 5.280 | 54.30 | 52.800 | -2.76% |
| O | 5250 | BODY | 07/05/2022 | 22.1 | 20.8 | 0.05 | 1057 | 7417 | 3.380 | 74.20 | 67.600 | -8.89% |
| O | 5600 | BODY | 07/05/2022 | 22.1 | 20.8 | 0.05 | 1057 | 7417 | 3.640 | 77.00 | 72.800 | -5.45% |
| O | 5750 | BODY | 07/05/2022 | 22.1 | 20.8 | 0.05 | 1057 | 7417 | 3.390 | 74.90 | 67.800 | -9.48% |

## 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 SAR10g (W/kg) | 1W Target SAR10g (W/kg) | 1W Normalized SAR10g (W/kg) | Deviation10g (%) |
| G | 13 | HEAD | 07/10/2022 | 22.1 | 22.0 | 1.00 | 1002 | 7527 | 0.328 | 0.344 | 0.328 | -4.65% |
| O | 5250 | BODY | 07/05/2022 | 22.1 | 20.8 | 0.05 | 1057 | 7417 | 0.958 | 20.60 | 19.160 | -6.99% |
| O | 5600 | BODY | 07/05/2022 | 22.1 | 20.8 | 0.05 | 1057 | 7417 | 1.020 | 21.20 | 20.400 | -3.77% |
| O | 5750 | BODY | 07/05/2022 | 22.1 | 20.8 | 0.05 | 1057 | 7417 | 0.958 | 20.70 | 19.160 | -7.44% |

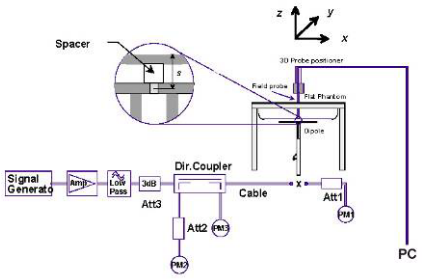


**Figure 10-1**
**System Verification Setup Diagram**

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

# 11 SAR DATA SUMMARY

## 11.1 Standalone Head SAR Data

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

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Test Position | Mode | Service | Antenna Config. | Device Serial Number | # of Time Slots | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 848.80 | 251 | Right | Cheek | GSM 850 | GSM | Main 1 | 00043 | 1 | 33.2 | 32.51 | 0.08 | 1:8.3 | 0.176 | 1.172 | **0.206** | A1 |
| 848.80 | 251 | Right | Tilt | GSM 850 | GSM | Main 1 | 00043 | 1 | 33.2 | 32.51 | 0.03 | 1:8.3 | 0.050 | 1.172 | 0.059 | |
| 848.80 | 251 | Left | Cheek | GSM 850 | GSM | Main 1 | 00043 | 1 | 33.2 | 32.51 | 0.00 | 1:8.3 | 0.166 | 1.172 | 0.195 | |
| 848.80 | 251 | Left | Tilt | GSM 850 | GSM | Main 1 | 00043 | 1 | 33.2 | 32.51 | -0.19 | 1:8.3 | 0.050 | 1.172 | 0.059 | |
| 848.80 | 251 | Right | Cheek | GSM 850 | DTM | Main 1 | 99948 | 3 | 28.4 | 27.44 | 0.00 | 1:2.76 | 0.094 | 1.247 | 0.117 | |
| 848.80 | 251 | Right | Tilt | GSM 850 | DTM | Main 1 | 99948 | 3 | 28.4 | 27.44 | -0.04 | 1:2.76 | 0.039 | 1.247 | 0.049 | |
| 848.80 | 251 | Left | Cheek | GSM 850 | DTM | Main 1 | 99948 | 3 | 28.4 | 27.44 | 0.04 | 1:2.76 | 0.129 | 1.247 | 0.161 | |
| 848.80 | 251 | Left | Tilt | GSM 850 | DTM | Main 1 | 99948 | 3 | 28.4 | 27.44 | -0.01 | 1:2.76 | 0.048 | 1.247 | 0.060 | |
| **ICNIRP 1998 - 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/DTM 1900 Head SAR**

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Test Position | Mode | Service | Antenna Config. | Device Serial Number | # of Time Slots | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1909.80 | 810 | Right | Cheek | GSM 1900 | GSM | Main 2 | 99948 | 1 | 27.7 | 26.64 | 0.04 | 1:8.3 | 0.024 | 1.276 | 0.031 | |
| 1909.80 | 810 | Right | Tilt | GSM 1900 | GSM | Main 2 | 99948 | 1 | 27.7 | 26.64 | 0.04 | 1:8.3 | 0.005 | 1.276 | 0.006 | |
| 1909.80 | 810 | Left | Cheek | GSM 1900 | GSM | Main 2 | 99948 | 1 | 27.7 | 26.64 | 0.04 | 1:8.3 | 0.020 | 1.276 | 0.026 | |
| 1909.80 | 810 | Left | Tilt | GSM 1900 | GSM | Main 2 | 99948 | 1 | 27.7 | 26.64 | 0.05 | 1:8.3 | 0.003 | 1.276 | 0.004 | |
| 1850.20 | 512 | Right | Cheek | GSM 1900 | DTM | Main 2 | 99989 | 3 | 22.9 | 21.95 | -0.12 | 1:2.76 | 0.030 | 1.245 | 0.037 | A2 |
| 1850.20 | 512 | Right | Tilt | GSM 1900 | DTM | Main 2 | 99989 | 3 | 22.9 | 21.95 | 0.02 | 1:2.76 | 0.013 | 1.245 | 0.016 | |
| 1850.20 | 512 | Left | Cheek | GSM 1900 | DTM | Main 2 | 99989 | 3 | 22.9 | 21.95 | -0.07 | 1:2.76 | 0.027 | 1.245 | 0.034 | |
| 1850.20 | 512 | Left | Tilt | GSM 1900 | DTM | Main 2 | 99989 | 3 | 22.9 | 21.95 | 0.20 | 1:2.76 | 0.014 | 1.245 | 0.017 | |
| **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 | | Side | Test Position | Mode | Service | Antenna Config. | Device Serial Number | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.60 | 4183 | Right | Cheek | UMTS 850 | RMC | Main 1 | 00043 | 22.7 | 21.72 | -0.19 | 1:1 | 0.077 | 1.253 | 0.096 | |
| 836.60 | 4183 | Right | Tilt | UMTS 850 | RMC | Main 1 | 00043 | 22.7 | 21.72 | -0.09 | 1:1 | 0.037 | 1.253 | 0.046 | |
| 836.60 | 4183 | Left | Cheek | UMTS 850 | RMC | Main 1 | 00043 | 22.7 | 21.72 | 0.04 | 1:1 | 0.107 | 1.253 | 0.134 | A3 |
| 836.60 | 4183 | Left | Tilt | UMTS 850 | RMC | Main 1 | 00043 | 22.7 | 21.72 | 0.09 | 1:1 | 0.044 | 1.253 | 0.055 | |
| 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 1750 Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Test Position | Mode | Service | Antenna Config. | Device Serial Number | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1752.60 | 1513 | Right | Cheek | UMTS 1750 | RMC | Main 2 | 99948 | 18.7 | 17.65 | -0.18 | 1:1 | 0.037 | 1.274 | 0.047 | A4 |
| 1752.60 | 1513 | Right | Tilt | UMTS 1750 | RMC | Main 2 | 99948 | 18.7 | 17.65 | 0.20 | 1:1 | 0.022 | 1.274 | 0.028 | |
| 1752.60 | 1513 | Left | Cheek | UMTS 1750 | RMC | Main 2 | 99948 | 18.7 | 17.65 | 0.11 | 1:1 | 0.020 | 1.274 | 0.025 | |
| 1752.60 | 1513 | Left | Tilt | UMTS 1750 | RMC | Main 2 | 99948 | 18.7 | 17.65 | -0.15 | 1:1 | 0.019 | 1.274 | 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 11-5
## UMTS 1900 Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Test Position | Mode | Service | Antenna Config. | Device Serial Number | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1852.40 | 9262 | Right | Cheek | UMTS 1900 | RMC | Main 2 | 99948 | 19.7 | 18.57 | 0.05 | 1:1 | 0.038 | 1.297 | 0.049 | A5 |
| 1852.40 | 9262 | Right | Tilt | UMTS 1900 | RMC | Main 2 | 99948 | 19.7 | 18.57 | 0.06 | 1:1 | 0.011 | 1.297 | 0.014 | |
| 1852.40 | 9262 | Left | Cheek | UMTS 1900 | RMC | Main 2 | 99948 | 19.7 | 18.57 | -0.13 | 1:1 | 0.028 | 1.297 | 0.036 | |
| 1852.40 | 9262 | Left | Tilt | UMTS 1900 | RMC | Main 2 | 99948 | 19.7 | 18.57 | 0.08 | 1:1 | 0.021 | 1.297 | 0.027 | |
| 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 12 Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Side | Test Position | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 707.50 | 23095 | Mid | Right | Cheek | LTE Band 12 | Main 1 | 99989 | 10 | QPSK | 1 | 49 | 22.0 | 21.17 | 0 | -0.12 | 1:1 | 0.076 | 1.211 | 0.092 | |
| 707.50 | 23095 | Mid | Right | Cheek | LTE Band 12 | Main 1 | 99989 | 10 | QPSK | 25 | 12 | 22.0 | 21.15 | 0 | 0.09 | 1:1 | 0.072 | 1.216 | 0.088 | |
| 707.50 | 23095 | Mid | Right | Tilt | LTE Band 12 | Main 1 | 99989 | 10 | QPSK | 1 | 49 | 22.0 | 21.17 | 0 | 0.00 | 1:1 | 0.032 | 1.211 | 0.039 | |
| 707.50 | 23095 | Mid | Right | Tilt | LTE Band 12 | Main 1 | 99989 | 10 | QPSK | 25 | 12 | 22.0 | 21.15 | 0 | 0.03 | 1:1 | 0.029 | 1.216 | 0.035 | |
| 707.50 | 23095 | Mid | Left | Cheek | LTE Band 12 | Main 1 | 99989 | 10 | QPSK | 1 | 49 | 22.0 | 21.17 | 0 | 0.06 | 1:1 | 0.080 | 1.211 | 0.097 | A6 |
| 707.50 | 23095 | Mid | Left | Cheek | LTE Band 12 | Main 1 | 99989 | 10 | QPSK | 25 | 12 | 22.0 | 21.15 | 0 | 0.10 | 1:1 | 0.074 | 1.216 | 0.090 | |
| 707.50 | 23095 | Mid | Left | Tilt | LTE Band 12 | Main 1 | 99989 | 10 | QPSK | 1 | 49 | 22.0 | 21.17 | 0 | 0.02 | 1:1 | 0.037 | 1.211 | 0.045 | |
| 707.50 | 23095 | Mid | Left | Tilt | LTE Band 12 | Main 1 | 99989 | 10 | QPSK | 25 | 12 | 22.0 | 21.15 | 0 | 0.08 | 1:1 | 0.032 | 1.216 | 0.039 | |
| 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 13 Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Side | Test Position | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 782.00 | 23230 | Mid | Right | Cheek | LTE Band 13 | Main 1 | 99989 | 10 | QPSK | 1 | 0 | 22.0 | 21.04 | 0 | -0.01 | 1:1 | 0.037 | 1.247 | 0.046 | A7 |
| 782.00 | 23230 | Mid | Right | Cheek | LTE Band 13 | Main 1 | 99989 | 10 | QPSK | 25 | 12 | 22.0 | 21.46 | 0 | -0.14 | 1:1 | 0.031 | 1.132 | 0.035 | |
| 782.00 | 23230 | Mid | Right | Tilt | LTE Band 13 | Main 1 | 99989 | 10 | QPSK | 1 | 0 | 22.0 | 21.04 | 0 | 0.08 | 1:1 | 0.016 | 1.247 | 0.020 | |
| 782.00 | 23230 | Mid | Right | Tilt | LTE Band 13 | Main 1 | 99989 | 10 | QPSK | 25 | 12 | 22.0 | 21.46 | 0 | 0.08 | 1:1 | 0.014 | 1.132 | 0.016 | |
| 782.00 | 23230 | Mid | Left | Cheek | LTE Band 13 | Main 1 | 99989 | 10 | QPSK | 1 | 0 | 22.0 | 21.04 | 0 | 0.06 | 1:1 | 0.037 | 1.247 | 0.046 | |
| 782.00 | 23230 | Mid | Left | Cheek | LTE Band 13 | Main 1 | 99989 | 10 | QPSK | 25 | 12 | 22.0 | 21.46 | 0 | -0.04 | 1:1 | 0.031 | 1.132 | 0.035 | |
| 782.00 | 23230 | Mid | Left | Tilt | LTE Band 13 | Main 1 | 99989 | 10 | QPSK | 1 | 0 | 22.0 | 21.04 | 0 | 0.02 | 1:1 | 0.022 | 1.247 | 0.027 | |
| 782.00 | 23230 | Mid | Left | Tilt | LTE Band 13 | Main 1 | 99989 | 10 | QPSK | 25 | 12 | 22.0 | 21.46 | 0 | 0.00 | 1:1 | 0.016 | 1.132 | 0.018 | |
| 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 5 (Cell) Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Side | Test Position | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.50 | 20525 | Mid | Right | Cheek | LTE Band 5 (Cell) | Main 1 | 84429 | 10 | QPSK | 1 | 49 | 22.0 | 21.25 | 0 | -0.11 | 1:1 | 0.075 | 1.189 | 0.089 | |
| 836.50 | 20525 | Mid | Right | Cheek | LTE Band 5 (Cell) | Main 1 | 84429 | 10 | QPSK | 25 | 25 | 22.0 | 21.26 | 0 | 0.07 | 1:1 | 0.068 | 1.186 | 0.081 | |
| 836.50 | 20525 | Mid | Right | Tilt | LTE Band 5 (Cell) | Main 1 | 84429 | 10 | QPSK | 1 | 49 | 22.0 | 21.25 | 0 | 0.10 | 1:1 | 0.023 | 1.189 | 0.027 | |
| 836.50 | 20525 | Mid | Right | Tilt | LTE Band 5 (Cell) | Main 1 | 84429 | 10 | QPSK | 25 | 25 | 22.0 | 21.26 | 0 | 0.20 | 1:1 | 0.022 | 1.186 | 0.026 | |
| 836.50 | 20525 | Mid | Left | Cheek | LTE Band 5 (Cell) | Main 1 | 84429 | 10 | QPSK | 1 | 49 | 22.0 | 21.25 | 0 | 0.02 | 1:1 | 0.109 | 1.189 | 0.130 | A8 |
| 836.50 | 20525 | Mid | Left | Cheek | LTE Band 5 (Cell) | Main 1 | 84429 | 10 | QPSK | 25 | 25 | 22.0 | 21.26 | 0 | 0.00 | 1:1 | 0.108 | 1.186 | 0.128 | |
| 836.50 | 20525 | Mid | Left | Tilt | LTE Band 5 (Cell) | Main 1 | 84429 | 10 | QPSK | 1 | 49 | 22.0 | 21.25 | 0 | -0.10 | 1:1 | 0.029 | 1.189 | 0.034 | |
| 836.50 | 20525 | Mid | Left | Tilt | LTE Band 5 (Cell) | Main 1 | 84429 | 10 | QPSK | 25 | 25 | 22.0 | 21.26 | 0 | -0.05 | 1:1 | 0.027 | 1.186 | 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 11-9
## LTE Band 66 (AWS) Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Side | Test Position | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1720.00 | 132072 | Low | Right | Cheek | LTE Band 66 (AWS) | Main 2 | 99989 | 20 | QPSK | 1 | 50 | 19.0 | 18.10 | 0 | 0.01 | 1:1 | 0.034 | 1.230 | 0.042 | |
| 1720.00 | 132072 | Low | Right | Cheek | LTE Band 66 (AWS) | Main 2 | 99989 | 20 | QPSK | 50 | 25 | 19.0 | 18.09 | 0 | 0.09 | 1:1 | 0.035 | 1.233 | 0.043 | A9 |
| 1720.00 | 132072 | Low | Right | Tilt | LTE Band 66 (AWS) | Main 2 | 99989 | 20 | QPSK | 1 | 50 | 19.0 | 18.10 | 0 | 0.04 | 1:1 | 0.018 | 1.230 | 0.022 | |
| 1720.00 | 132072 | Low | Right | Tilt | LTE Band 66 (AWS) | Main 2 | 99989 | 20 | QPSK | 50 | 25 | 19.0 | 18.09 | 0 | 0.09 | 1:1 | 0.017 | 1.233 | 0.021 | |
| 1720.00 | 132072 | Low | Left | Cheek | LTE Band 66 (AWS) | Main 2 | 99989 | 20 | QPSK | 1 | 50 | 19.0 | 18.10 | 0 | 0.02 | 1:1 | 0.020 | 1.230 | 0.025 | |
| 1720.00 | 132072 | Low | Left | Cheek | LTE Band 66 (AWS) | Main 2 | 99989 | 20 | QPSK | 50 | 25 | 19.0 | 18.09 | 0 | 0.05 | 1:1 | 0.019 | 1.233 | 0.023 | |
| 1720.00 | 132072 | Low | Left | Tilt | LTE Band 66 (AWS) | Main 2 | 99989 | 20 | QPSK | 1 | 50 | 19.0 | 18.10 | 0 | 0.06 | 1:1 | 0.013 | 1.230 | 0.016 | |
| 1720.00 | 132072 | Low | Left | Tilt | LTE Band 66 (AWS) | Main 2 | 99989 | 20 | QPSK | 50 | 25 | 19.0 | 18.09 | 0 | 0.06 | 1:1 | 0.014 | 1.233 | 0.017 | |
| 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 25 (PCS) Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Side | Test Position | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1905.00 | 26590 | High | Right | Cheek | LTE Band 25 (PCS) | Main 2 | 84429 | 20 | QPSK | 1 | 0 | 20.0 | 18.62 | 0 | 0.05 | 1:1 | 0.039 | 1.373 | 0.054 | |
| 1905.00 | 26590 | High | Right | Cheek | LTE Band 25 (PCS) | Main 2 | 84429 | 20 | QPSK | 50 | 0 | 20.0 | 18.70 | 0 | -0.12 | 1:1 | 0.042 | 1.349 | 0.057 | A10 |
| 1905.00 | 26590 | High | Right | Tilt | LTE Band 25 (PCS) | Main 2 | 84429 | 20 | QPSK | 1 | 0 | 20.0 | 18.62 | 0 | 0.18 | 1:1 | 0.015 | 1.373 | 0.021 | |
| 1905.00 | 26590 | High | Right | Tilt | LTE Band 25 (PCS) | Main 2 | 84429 | 20 | QPSK | 50 | 0 | 20.0 | 18.70 | 0 | 0.07 | 1:1 | 0.017 | 1.349 | 0.023 | |
| 1905.00 | 26590 | High | Left | Cheek | LTE Band 25 (PCS) | Main 2 | 84429 | 20 | QPSK | 1 | 0 | 20.0 | 18.62 | 0 | -0.01 | 1:1 | 0.031 | 1.373 | 0.043 | |
| 1905.00 | 26590 | High | Left | Cheek | LTE Band 25 (PCS) | Main 2 | 84429 | 20 | QPSK | 50 | 0 | 20.0 | 18.70 | 0 | -0.02 | 1:1 | 0.032 | 1.349 | 0.043 | |
| 1905.00 | 26590 | High | Left | Tilt | LTE Band 25 (PCS) | Main 2 | 84429 | 20 | QPSK | 1 | 0 | 20.0 | 18.62 | 0 | 0.08 | 1:1 | 0.023 | 1.373 | 0.032 | |
| 1905.00 | 26590 | High | Left | Tilt | LTE Band 25 (PCS) | Main 2 | 84429 | 20 | QPSK | 50 | 0 | 20.0 | 18.70 | 0 | 0.15 | 1:1 | 0.024 | 1.349 | 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 11-11
## LTE Band 41 Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Side | Test Position | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 2593.00 | 40620 | Mid | Right | Cheek | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.98 | 0 | -0.03 | 1:1.58 | 0.007 | 1.265 | 0.009 | |
| 2593.00 | 40620 | Mid | Right | Cheek | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.98 | 0 | 0.03 | 1:1.58 | 0.007 | 1.265 | 0.009 | |
| 2593.00 | 40620 | Mid | Right | Tilt | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.98 | 0 | 0.01 | 1:1.58 | 0.002 | 1.265 | 0.003 | |
| 2593.00 | 40620 | Mid | Right | Tilt | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.98 | 0 | 0.07 | 1:1.58 | 0.003 | 1.265 | 0.004 | |
| 2593.00 | 40620 | Mid | Left | Cheek | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.98 | 0 | 0.07 | 1:1.58 | 0.015 | 1.265 | 0.019 | A11 |
| 2593.00 | 40620 | Mid | Left | Cheek | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.98 | 0 | -0.15 | 1:1.58 | 0.015 | 1.265 | 0.019 | |
| 2593.00 | 40620 | Mid | Left | Tilt | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.98 | 0 | 0.05 | 1:1.58 | 0.007 | 1.265 | 0.009 | |
| 2593.00 | 40620 | Mid | Left | Tilt | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.98 | 0 | 0.08 | 1:1.58 | 0.007 | 1.265 | 0.009 | |
| 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

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Test Position | Mode | Service | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Data Rate (Mbps) | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | 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 | Right | Cheek | 802.11b | DSSS | Chain 0 | 99609 | 22 | 1 | 14.5 | 14.13 | -0.03 | 99.80 | 0.615 | 0.570 | 1.089 | 1.002 | 0.622 | |
| 2437 | 6 | Right | Cheek | 802.11b | DSSS | Chain 0 | 99609 | 22 | 1 | 14.5 | 13.99 | -0.13 | 99.80 | 0.723 | 0.538 | 1.125 | 1.002 | 0.606 | |
| 2462 | 11 | Right | Cheek | 802.11b | DSSS | Chain 0 | 99609 | 22 | 1 | 14.5 | 13.97 | 0.11 | 99.80 | 0.737 | 0.571 | 1.130 | 1.002 | **0.647** | A12 |
| 2412 | 1 | Right | Tilt | 802.11b | DSSS | Chain 0 | 99609 | 22 | 1 | 14.5 | 14.13 | -0.10 | 99.8 | 0.153 | 0.103 | 1.089 | 1.002 | 0.112 | |
| 2412 | 1 | Left | Cheek | 802.11b | DSSS | Chain 0 | 99609 | 22 | 1 | 14.5 | 14.13 | 0.01 | 99.80 | 0.137 | - | 1.089 | 1.002 | - | |
| 2412 | 1 | Left | Tilt | 802.11b | DSSS | Chain 0 | 99609 | 22 | 1 | 14.5 | 14.13 | 0.18 | 99.80 | 0.039 | - | 1.089 | 1.002 | - | |
| 2412 | 1 | Right | Cheek | 802.11b | DSSS | Chain 1 | 99567 | 22 | 1 | 12.7 | 12.60 | 0.08 | 99.50 | 0.003 | - | 1.023 | 1.005 | - | |
| 2412 | 1 | Right | Tilt | 802.11b | DSSS | Chain 1 | 99567 | 22 | 1 | 12.7 | 12.60 | 0.04 | 99.50 | 0.002 | - | 1.023 | 1.005 | - | |
| 2412 | 1 | Left | Cheek | 802.11b | DSSS | Chain 1 | 99567 | 22 | 1 | 12.7 | 12.60 | 0.03 | 99.50 | 0.005 | 0.000 | 1.023 | 1.005 | 0.000 | |
| 2412 | 1 | Left | Tilt | 802.11b | DSSS | Chain 1 | 99567 | 22 | 1 | 12.7 | 12.60 | 0.08 | 99.50 | 0.003 | - | 1.023 | 1.005 | - | |
| **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 11-13
## NII Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Test Position | Mode | Service | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Data Rate (Mbps) | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | 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) | |
| 5290 | 58 | Right | Cheek | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.73 | -0.02 | 98.90 | 0.473 | 0.332 | 1.194 | 1.011 | **0.401** | A13 |
| 5290 | 58 | Right | Tilt | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.73 | 0.05 | 98.90 | 0.106 | - | 1.194 | 1.011 | - | |
| 5290 | 58 | Left | Cheek | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.73 | -0.06 | 98.90 | 0.195 | 0.147 | 1.194 | 1.011 | 0.177 | |
| 5290 | 58 | Left | Tilt | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.73 | 0.03 | 98.90 | 0.051 | 0.030 | 1.194 | 1.011 | 0.036 | |
| 5290 | 58 | Right | Cheek | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.20 | 0.06 | 99.00 | 0.009 | 0.000 | 1.072 | 1.010 | 0.000 | |
| 5290 | 58 | Right | Tilt | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.20 | 0.08 | 99.00 | 0.003 | - | 1.072 | 1.010 | - | |
| 5290 | 58 | Left | Cheek | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.20 | 0.08 | 99.00 | 0.000 | 0.000 | 1.072 | 1.010 | 0.000 | |
| 5290 | 58 | Left | Tilt | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.20 | 0.09 | 99.00 | 0.000 | 0.000 | 1.072 | 1.010 | 0.000 | |
| 5690 | 138 | Right | Cheek | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 11.28 | 0.04 | 98.90 | 0.149 | 0.157 | 1.052 | 1.011 | 0.167 | |
| 5690 | 138 | Right | Tilt | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 11.28 | -0.20 | 98.90 | 0.074 | - | 1.052 | 1.011 | - | |
| 5690 | 138 | Left | Cheek | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 11.28 | -0.13 | 98.90 | 0.095 | 0.066 | 1.052 | 1.011 | 0.070 | |
| 5690 | 138 | Left | Tilt | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 11.28 | 0.08 | 98.90 | 0.028 | 0.014 | 1.052 | 1.011 | 0.015 | |
| 5530 | 106 | Right | Cheek | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.36 | 0.05 | 99.00 | 0.006 | - | 1.033 | 1.010 | - | |
| 5530 | 106 | Right | Tilt | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.36 | -0.03 | 99.00 | 0.011 | 0.000 | 1.033 | 1.010 | 0.000 | |
| 5530 | 106 | Left | Cheek | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.36 | 0.09 | 99.00 | 0.000 | 0.000 | 1.033 | 1.010 | 0.000 | |
| 5530 | 106 | Left | Tilt | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.36 | -0.02 | 99.00 | 0.000 | 0.000 | 1.033 | 1.010 | 0.000 | |
| 5775 | 155 | Right | Cheek | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.52 | 0.08 | 98.90 | 0.151 | 0.179 | 1.253 | 1.011 | 0.227 | |
| 5775 | 155 | Right | Tilt | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.52 | 0.04 | 98.90 | 0.060 | - | 1.253 | 1.011 | - | |
| 5775 | 155 | Left | Cheek | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.52 | 0.12 | 98.90 | 0.139 | 0.097 | 1.253 | 1.011 | 0.123 | |
| 5775 | 155 | Left | Tilt | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.52 | 0.05 | 98.90 | 0.048 | 0.031 | 1.253 | 1.011 | 0.039 | |
| 5775 | 155 | Right | Cheek | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.22 | 0.05 | 99.00 | 0.011 | - | 1.067 | 1.010 | - | |
| 5775 | 155 | Right | Tilt | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.22 | 0.02 | 99.00 | 0.013 | - | 1.067 | 1.010 | - | |
| 5775 | 155 | Left | Cheek | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.22 | 0.09 | 99.00 | 0.018 | 0.001 | 1.067 | 1.010 | 0.001 | |
| 5775 | 155 | Left | Tilt | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.22 | 0.20 | 99.00 | 0.014 | 0.000 | 1.067 | 1.010 | 0.000 | |
| **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
## DSS Head SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Test Position | Mode | Service | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Duty Cycle (%) | SAR (1g) | Scaling Factor (Cond Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | (W/kg) | | | (W/kg) | |
| 2480 | 78 | Right | Cheek | Bluetooth | FHSS | Chain 0 | 99666 | 1 | 14.0 | 13.88 | 0.00 | 76.80 | 0.148 | 1.028 | 1.085 | **0.165** | A14 |
| 2480 | 78 | Right | Tilt | Bluetooth | FHSS | Chain 0 | 99666 | 1 | 14.0 | 13.88 | -0.18 | 76.80 | 0.031 | 1.028 | 1.085 | 0.035 | |
| 2480 | 78 | Left | Cheek | Bluetooth | FHSS | Chain 0 | 99666 | 1 | 14.0 | 13.88 | -0.04 | 76.80 | 0.023 | 1.028 | 1.085 | 0.026 | |
| 2480 | 78 | Left | Tilt | Bluetooth | FHSS | Chain 0 | 99666 | 1 | 14.0 | 13.88 | 0.09 | 76.80 | 0.006 | 1.028 | 1.085 | 0.007 | |
| 2480 | 78 | Right | Cheek | Bluetooth | FHSS | Chain 1 | 99666 | 1 | 14.0 | 13.48 | 0.02 | 76.80 | 0.000 | 1.127 | 1.085 | 0.000 | |
| 2480 | 78 | Right | Tilt | Bluetooth | FHSS | Chain 1 | 99666 | 1 | 14.0 | 13.48 | 0.03 | 76.80 | 0.000 | 1.127 | 1.085 | 0.000 | |
| 2480 | 78 | Left | Cheek | Bluetooth | FHSS | Chain 1 | 99666 | 1 | 14.0 | 13.48 | 0.20 | 76.80 | 0.000 | 1.127 | 1.085 | 0.000 | |
| 2480 | 78 | Left | Tilt | Bluetooth | FHSS | Chain 1 | 99666 | 1 | 14.0 | 13.48 | 0.09 | 76.80 | 0.000 | 1.127 | 1.085 | 0.000 | |
| **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: The reported SAR was scaled to the 83.3% transmission duty factor to determine compliance since the duty factor of the device is permanently limited to 83.3% per the manufacturer.

## 11.2 Standalone Body-Worn SAR Data

## Table 11-15
## GSM/DTM Body-Worn SAR Data

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Spacing | Mode | Service | Antenna Config. | Device Serial Number | # of Time Slots | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 848.80 | 251 | back | 10 mm | GSM 850 | GSM | Main 1 | 99948 | 1 | 33.2 | 32.51 | 0.00 | 1:8.3 | 0.165 | 1.172 | 0.193 | A15 |
| 848.80 | 251 | back | 10 mm | GSM 850 | DTM | Main 1 | 99948 | 3 | 28.4 | 27.44 | -0.07 | 1:2.76 | 0.152 | 1.247 | 0.190 | |
| 1909.80 | 810 | back | 10 mm | GSM 1900 | GSM | Main 2 | 99948 | 1 | 27.7 | 26.64 | 0.01 | 1:8.3 | 0.126 | 1.276 | 0.161 | |
| 1850.20 | 512 | back | 10 mm | GSM 1900 | DTM | Main 2 | 99948 | 3 | 22.9 | 21.95 | 0.06 | 1:2.76 | 0.182 | 1.245 | 0.227 | A16 |
| **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 10 grams | | | | | | | |

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

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Spacing | Mode | Service | Antenna Config. | Device Serial Number | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.60 | 4183 | back | 10 mm | UMTS 850 | RMC | Main 1 | 99948 | 22.7 | 21.72 | -0.01 | 1:1 | 0.176 | 1.253 | 0.221 | A17 |
| 1752.60 | 1513 | back | 10 mm | UMTS 1750 | RMC | Main 2 | 99948 | 18.7 | 17.65 | 0.00 | 1:1 | 0.198 | 1.274 | 0.252 | A18 |
| 1852.40 | 9262 | back | 10 mm | UMTS 1900 | RMC | Main 2 | 99948 | 19.7 | 18.57 | -0.05 | 1:1 | 0.217 | 1.297 | 0.281 | A19 |
| **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 10 grams | | | | | | | |

## Table 11-17
## LTE Body-Worn SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Spacing | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 707.50 | 23095 | Mid | back | 10 mm | LTE Band 12 | Main 1 | 00043 | 10 | QPSK | 1 | 49 | 22.0 | 21.17 | 0 | 0.02 | 1:1 | 0.165 | 1.211 | 0.200 | A20 |
| 707.50 | 23095 | Mid | back | 10 mm | LTE Band 12 | Main 1 | 00043 | 10 | QPSK | 25 | 12 | 22.0 | 21.15 | 0 | -0.01 | 1:1 | 0.159 | 1.216 | 0.193 | |
| 782.00 | 23230 | Mid | back | 10 mm | LTE Band 13 | Main 1 | 00043 | 10 | QPSK | 1 | 0 | 22.0 | 21.04 | 0 | 0.06 | 1:1 | 0.256 | 1.247 | **0.319** | |
| 782.00 | 23230 | Mid | back | 10 mm | LTE Band 13 | Main 1 | 00043 | 10 | QPSK | 25 | 12 | 22.0 | 21.46 | 0 | -0.03 | 1:1 | 0.270 | 1.132 | 0.306 | A21 |
| 836.50 | 20525 | Mid | back | 10 mm | LTE Band 5 (Cell) | Main 1 | 99989 | 10 | QPSK | 1 | 49 | 22.0 | 21.25 | 0 | 0.00 | 1:1 | 0.103 | 1.189 | 0.122 | |
| 836.50 | 20525 | Mid | back | 10 mm | LTE Band 5 (Cell) | Main 1 | 99989 | 10 | QPSK | 25 | 25 | 22.0 | 21.26 | 0 | -0.01 | 1:1 | 0.110 | 1.186 | 0.130 | A22 |
| 1720.00 | 132072 | Low | back | 10 mm | LTE Band 66 (AWS) | Main 2 | 00043 | 20 | QPSK | 1 | 50 | 19.0 | 18.10 | 0 | 0.14 | 1:1 | 0.181 | 1.230 | 0.223 | A23 |
| 1720.00 | 132072 | Low | back | 10 mm | LTE Band 66 (AWS) | Main 2 | 00043 | 20 | QPSK | 50 | 25 | 19.0 | 18.09 | 0 | 0.02 | 1:1 | 0.176 | 1.233 | 0.217 | |
| 1905.00 | 26590 | High | back | 10 mm | LTE Band 25 (PCS) | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.62 | 0 | 0.01 | 1:1 | 0.168 | 1.373 | 0.231 | A24 |
| 1905.00 | 26590 | High | back | 10 mm | LTE Band 25 (PCS) | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.70 | 0 | -0.01 | 1:1 | 0.159 | 1.349 | 0.214 | |
| 2593.00 | 40620 | Mid | back | 10 mm | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.98 | 0 | -0.18 | 1:1.58 | 0.091 | 1.265 | 0.115 | |
| 2593.00 | 40620 | Mid | back | 10 mm | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.98 | 0 | 0.01 | 1:1.58 | 0.094 | 1.265 | 0.119 | A25 |
| **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 10 grams | | | | | | | | | |

## Table 11-18
## DTS Body-Worn SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Spacing | Mode | Service | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Data Rate (Mbps) | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | 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 | back | 10 mm | 802.11b | DSSS | Chain 0 | 99583 | 22 | 1 | 14.5 | 14.13 | -0.01 | 99.80 | 0.138 | 0.111 | 1.089 | 1.002 | **0.121** | A26 |
| 2412 | 1 | back | 10 mm | 802.11b | DSSS | Chain 1 | 99583 | 22 | 1 | 12.7 | 12.60 | 0.01 | 99.50 | 0.088 | 0.082 | 1.023 | 1.005 | 0.084 | |
| **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
## NII Body-Worn SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Spacing | Mode | Service | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Data Rate (Mbps) | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | 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) | |
| 5290 | 58 | back | 10 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.73 | 0.18 | 98.90 | 0.078 | 0.053 | 1.194 | 1.011 | **0.064** | |
| 5290 | 58 | back | 10 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.20 | 0.05 | 99.00 | 0.044 | 0.037 | 1.072 | 1.010 | 0.040 | |
| 5690 | 138 | back | 10 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 11.28 | 0.06 | 98.90 | 0.063 | 0.040 | 1.052 | 1.011 | 0.043 | |
| 5530 | 106 | back | 10 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.36 | 0.09 | 99.00 | 0.057 | 0.049 | 1.033 | 1.010 | **0.051** | |
| 5775 | 155 | back | 10 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.52 | 0.04 | 98.90 | 0.096 | 0.051 | 1.253 | 1.011 | 0.065 | |
| 5775 | 155 | back | 10 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.22 | -0.11 | 99.00 | 0.098 | 0.078 | 1.067 | 1.010 | **0.084** | A27 |
| **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
## DSS Body-Worn SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Spacing | Mode | Service | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Duty Cycle (%) | SAR (1g) | Scaling Factor (Cond Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | (W/kg) | | | (W/kg) | |
| 2480 | 78 | back | 10 mm | Bluetooth | FHSS | Chain 0 | 99583 | 1 | 14.0 | 13.88 | 0.06 | 76.80 | 0.032 | 1.028 | 1.085 | **0.036** | A28 |
| 2480 | 78 | back | 10 mm | Bluetooth | FHSS | Chain 1 | 99583 | 1 | 14.0 | 13.48 | -0.08 | 76.80 | 0.018 | 1.127 | 1.085 | 0.022 | |
| **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: The reported SAR was scaled to the 83.3% transmission duty factor to determine compliance since the duty factor of the device is permanently limited to 83.3% per the manufacturer.

## 11.3 Standalone Hotspot SAR Data

## Table 11-21
## GPRS/DTM Hotspot SAR Data

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Spacing | Mode | Service | Antenna Config. | Device Serial Number | # of Time Slots | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 848.80 | 251 | back | 10 mm | GSM 850 | GPRS | Main 1 | 99948 | 4 | 27.2 | 26.20 | 0.20 | 1:2.076 | 0.144 | 1.259 | 0.181 | |
| 848.80 | 251 | front | 10 mm | GSM 850 | GPRS | Main 1 | 99948 | 4 | 27.2 | 26.20 | -0.04 | 1:2.076 | 0.115 | 1.259 | 0.145 | |
| 848.80 | 251 | bottom | 10 mm | GSM 850 | GPRS | Main 1 | 99948 | 4 | 27.2 | 26.20 | 0.11 | 1:2.076 | 0.029 | 1.259 | 0.037 | |
| 848.80 | 251 | left | 10 mm | GSM 850 | GPRS | Main 1 | 99948 | 4 | 27.2 | 26.20 | -0.01 | 1:2.076 | 0.165 | 1.259 | 0.208 | |
| 848.80 | 251 | back | 10 mm | GSM 850 | DTM | Main 1 | 99948 | 3 | 28.4 | 27.44 | -0.07 | 1:2.76 | 0.152 | 1.247 | 0.190 | |
| 848.80 | 251 | front | 10 mm | GSM 850 | DTM | Main 1 | 99948 | 3 | 28.4 | 27.44 | 0.02 | 1:2.76 | 0.125 | 1.247 | 0.156 | |
| 848.80 | 251 | bottom | 10 mm | GSM 850 | DTM | Main 1 | 99948 | 3 | 28.4 | 27.44 | 0.04 | 1:2.76 | 0.027 | 1.247 | 0.034 | |
| 848.80 | 251 | left | 10 mm | GSM 850 | DTM | Main 1 | 99948 | 3 | 28.4 | 27.44 | -0.01 | 1:2.76 | 0.173 | 1.247 | 0.216 | A29 |
| 1880.00 | 661 | back | 10 mm | GSM 1900 | GPRS | Main 2 | 99948 | 4 | 21.7 | 20.54 | -0.03 | 1:2.076 | 0.134 | 1.306 | 0.175 | |
| 1880.00 | 661 | front | 10 mm | GSM 1900 | GPRS | Main 2 | 99948 | 4 | 21.7 | 20.54 | -0.01 | 1:2.076 | 0.133 | 1.306 | 0.174 | |
| 1880.00 | 661 | bottom | 10 mm | GSM 1900 | GPRS | Main 2 | 99948 | 4 | 21.7 | 20.54 | 0.01 | 1:2.076 | 0.264 | 1.306 | 0.345 | A30 |
| 1880.00 | 661 | right | 10 mm | GSM 1900 | GPRS | Main 2 | 99948 | 4 | 21.7 | 20.54 | 0.04 | 1:2.076 | 0.092 | 1.306 | 0.120 | |
| 1850.20 | 512 | back | 10 mm | GSM 1900 | DTM | Main 2 | 99948 | 3 | 22.9 | 21.95 | 0.06 | 1:2.76 | 0.182 | 1.245 | 0.227 | |
| 1850.20 | 512 | front | 10 mm | GSM 1900 | DTM | Main 2 | 99948 | 3 | 22.9 | 21.95 | 0.03 | 1:2.76 | 0.158 | 1.245 | 0.197 | |
| 1850.20 | 512 | bottom | 10 mm | GSM 1900 | DTM | Main 2 | 99948 | 3 | 22.9 | 21.95 | 0.00 | 1:2.76 | 0.259 | 1.245 | 0.322 | |
| 1850.20 | 512 | right | 10 mm | GSM 1900 | DTM | Main 2 | 99948 | 3 | 22.9 | 21.95 | 0.06 | 1:2.76 | 0.086 | 1.245 | 0.107 | |
| **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 10 grams | | | | | | | |

## Table 11-22
## UMTS Hotspot SAR Data

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Spacing | Mode | Service | Antenna Config. | Device Serial Number | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.60 | 4183 | back | 10 mm | UMTS 850 | RMC | Main 1 | 99948 | 22.7 | 21.72 | -0.01 | 1:1 | 0.176 | 1.253 | 0.221 | A17 |
| 836.60 | 4183 | front | 10 mm | UMTS 850 | RMC | Main 1 | 99948 | 22.7 | 21.72 | -0.04 | 1:1 | 0.125 | 1.253 | 0.157 | |
| 836.60 | 4183 | bottom | 10 mm | UMTS 850 | RMC | Main 1 | 99948 | 22.7 | 21.72 | 0.03 | 1:1 | 0.027 | 1.253 | 0.034 | |
| 836.60 | 4183 | left | 10 mm | UMTS 850 | RMC | Main 1 | 99948 | 22.7 | 21.72 | 0.00 | 1:1 | 0.166 | 1.253 | 0.208 | |
| 1752.60 | 1513 | back | 10 mm | UMTS 1750 | RMC | Main 2 | 99948 | 18.7 | 17.65 | 0.00 | 1:1 | 0.198 | 1.274 | 0.252 | |
| 1752.60 | 1513 | front | 10 mm | UMTS 1750 | RMC | Main 2 | 99948 | 18.7 | 17.65 | -0.01 | 1:1 | 0.163 | 1.274 | 0.208 | |
| 1752.60 | 1513 | bottom | 10 mm | UMTS 1750 | RMC | Main 2 | 99948 | 18.7 | 17.65 | 0.00 | 1:1 | 0.255 | 1.274 | 0.325 | A31 |
| 1752.60 | 1513 | right | 10 mm | UMTS 1750 | RMC | Main 2 | 99948 | 18.7 | 17.65 | -0.02 | 1:1 | 0.099 | 1.274 | 0.126 | |
| 1852.40 | 9262 | back | 10 mm | UMTS 1900 | RMC | Main 2 | 99948 | 19.7 | 18.57 | -0.05 | 1:1 | 0.217 | 1.297 | 0.281 | |
| 1852.40 | 9262 | front | 10 mm | UMTS 1900 | RMC | Main 2 | 99948 | 19.7 | 18.57 | -0.01 | 1:1 | 0.178 | 1.297 | 0.231 | |
| 1852.40 | 9262 | bottom | 10 mm | UMTS 1900 | RMC | Main 2 | 99948 | 19.7 | 18.57 | 0.00 | 1:1 | 0.289 | 1.297 | 0.375 | A32 |
| 1852.40 | 9262 | right | 10 mm | UMTS 1900 | RMC | Main 2 | 99948 | 19.7 | 18.57 | -0.01 | 1:1 | 0.101 | 1.297 | 0.131 | |
| 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 10 grams | | | | | | | |

## Table 11-23
## LTE Band 12 Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Side | Spacing | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 707.50 | 23095 | Mid | back | 10 mm | LTE Band 12 | Main 1 | 00043 | 10 | QPSK | 1 | 49 | 22.0 | 21.17 | 0 | 0.02 | 1:1 | 0.165 | 1.211 | 0.200 | A20 |
| 707.50 | 23095 | Mid | back | 10 mm | LTE Band 12 | Main 1 | 00043 | 10 | QPSK | 25 | 12 | 22.0 | 21.15 | 0 | -0.01 | 1:1 | 0.159 | 1.216 | 0.193 | |
| 707.50 | 23095 | Mid | front | 10 mm | LTE Band 12 | Main 1 | 00043 | 10 | QPSK | 1 | 49 | 22.0 | 21.17 | 0 | 0.02 | 1:1 | 0.119 | 1.211 | 0.144 | |
| 707.50 | 23095 | Mid | front | 10 mm | LTE Band 12 | Main 1 | 00043 | 10 | QPSK | 25 | 12 | 22.0 | 21.15 | 0 | 0.01 | 1:1 | 0.112 | 1.216 | 0.136 | |
| 707.50 | 23095 | Mid | bottom | 10 mm | LTE Band 12 | Main 1 | 00043 | 10 | QPSK | 1 | 49 | 22.0 | 21.17 | 0 | 0.07 | 1:1 | 0.035 | 1.211 | 0.042 | |
| 707.50 | 23095 | Mid | bottom | 10 mm | LTE Band 12 | Main 1 | 00043 | 10 | QPSK | 25 | 12 | 22.0 | 21.15 | 0 | 0.06 | 1:1 | 0.032 | 1.216 | 0.039 | |
| 707.50 | 23095 | Mid | left | 10 mm | LTE Band 12 | Main 1 | 00043 | 10 | QPSK | 1 | 49 | 22.0 | 21.17 | 0 | 0.01 | 1:1 | 0.144 | 1.211 | 0.174 | |
| 707.50 | 23095 | Mid | left | 10 mm | LTE Band 12 | Main 1 | 00043 | 10 | QPSK | 25 | 12 | 22.0 | 21.15 | 0 | 0.05 | 1:1 | 0.126 | 1.216 | 0.153 | |
| 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 10 grams | | | | | | | | | | | |

## Table 11-24
## LTE Band 13 Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Side | Spacing | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 782.00 | 23230 | Mid | back | 10 mm | LTE Band 13 | Main 1 | 00043 | 10 | QPSK | 1 | 0 | 22.0 | 21.04 | 0 | 0.06 | 1:1 | 0.256 | 1.247 | 0.319 | |
| 782.00 | 23230 | Mid | back | 10 mm | LTE Band 13 | Main 1 | 00043 | 10 | QPSK | 25 | 12 | 22.0 | 21.46 | 0 | -0.03 | 1:1 | 0.270 | 1.132 | 0.306 | A21 |
| 782.00 | 23230 | Mid | front | 10 mm | LTE Band 13 | Main 1 | 00043 | 10 | QPSK | 1 | 0 | 22.0 | 21.04 | 0 | -0.01 | 1:1 | 0.177 | 1.247 | 0.221 | |
| 782.00 | 23230 | Mid | front | 10 mm | LTE Band 13 | Main 1 | 00043 | 10 | QPSK | 25 | 12 | 22.0 | 21.46 | 0 | -0.02 | 1:1 | 0.178 | 1.132 | 0.201 | |
| 782.00 | 23230 | Mid | bottom | 10 mm | LTE Band 13 | Main 1 | 00043 | 10 | QPSK | 1 | 0 | 22.0 | 21.04 | 0 | -0.01 | 1:1 | 0.066 | 1.247 | 0.082 | |
| 782.00 | 23230 | Mid | bottom | 10 mm | LTE Band 13 | Main 1 | 00043 | 10 | QPSK | 25 | 12 | 22.0 | 21.46 | 0 | 0.05 | 1:1 | 0.063 | 1.132 | 0.071 | |
| 782.00 | 23230 | Mid | left | 10 mm | LTE Band 13 | Main 1 | 00043 | 10 | QPSK | 1 | 0 | 22.0 | 21.04 | 0 | -0.03 | 1:1 | 0.081 | 1.247 | 0.101 | |
| 782.00 | 23230 | Mid | left | 10 mm | LTE Band 13 | Main 1 | 00043 | 10 | QPSK | 25 | 12 | 22.0 | 21.46 | 0 | 0.02 | 1:1 | 0.071 | 1.132 | 0.080 | |
| 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 10 grams | | | | | | | | |

## Table 11-25
## LTE Band 5 (Cell) Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Side | Spacing | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 836.50 | 20525 | Mid | back | 10 mm | LTE Band 5 (Cell) | Main 1 | 99989 | 10 | QPSK | 1 | 49 | 22.0 | 21.25 | 0 | 0.00 | 1:1 | 0.103 | 1.189 | 0.122 | |
| 836.50 | 20525 | Mid | back | 10 mm | LTE Band 5 (Cell) | Main 1 | 99989 | 10 | QPSK | 25 | 25 | 22.0 | 21.26 | 0 | -0.01 | 1:1 | 0.110 | 1.186 | 0.130 | A22 |
| 836.50 | 20525 | Mid | front | 10 mm | LTE Band 5 (Cell) | Main 1 | 99989 | 10 | QPSK | 1 | 49 | 22.0 | 21.25 | 0 | 0.00 | 1:1 | 0.068 | 1.189 | 0.081 | |
| 836.50 | 20525 | Mid | front | 10 mm | LTE Band 5 (Cell) | Main 1 | 99989 | 10 | QPSK | 25 | 25 | 22.0 | 21.26 | 0 | -0.01 | 1:1 | 0.075 | 1.186 | 0.089 | |
| 836.50 | 20525 | Mid | bottom | 10 mm | LTE Band 5 (Cell) | Main 1 | 99989 | 10 | QPSK | 1 | 49 | 22.0 | 21.25 | 0 | -0.06 | 1:1 | 0.018 | 1.189 | 0.021 | |
| 836.50 | 20525 | Mid | bottom | 10 mm | LTE Band 5 (Cell) | Main 1 | 99989 | 10 | QPSK | 25 | 25 | 22.0 | 21.26 | 0 | -0.05 | 1:1 | 0.018 | 1.186 | 0.021 | |
| 836.50 | 20525 | Mid | left | 10 mm | LTE Band 5 (Cell) | Main 1 | 99989 | 10 | QPSK | 1 | 49 | 22.0 | 21.25 | 0 | 0.05 | 1:1 | 0.099 | 1.189 | 0.118 | |
| 836.50 | 20525 | Mid | left | 10 mm | LTE Band 5 (Cell) | Main 1 | 99989 | 10 | QPSK | 25 | 25 | 22.0 | 21.26 | 0 | 0.00 | 1:1 | 0.104 | 1.186 | 0.123 | |
| 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 10 grams | | | | | | | | |

## Table 11-26
## LTE Band 66 (AWS) Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Side | Spacing | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1720.00 | 132072 | Low | back | 10 mm | LTE Band 66 (AWS) | Main 2 | 00043 | 20 | QPSK | 1 | 50 | 19.0 | 18.10 | 0 | 0.14 | 1:1 | 0.181 | 1.230 | 0.223 | |
| 1720.00 | 132072 | Low | back | 10 mm | LTE Band 66 (AWS) | Main 2 | 00043 | 20 | QPSK | 50 | 25 | 19.0 | 18.09 | 0 | 0.02 | 1:1 | 0.176 | 1.233 | 0.217 | |
| 1720.00 | 132072 | Low | front | 10 mm | LTE Band 66 (AWS) | Main 2 | 00043 | 20 | QPSK | 1 | 50 | 19.0 | 18.10 | 0 | 0.04 | 1:1 | 0.144 | 1.230 | 0.177 | |
| 1720.00 | 132072 | Low | front | 10 mm | LTE Band 66 (AWS) | Main 2 | 00043 | 20 | QPSK | 50 | 25 | 19.0 | 18.09 | 0 | -0.05 | 1:1 | 0.145 | 1.233 | 0.179 | |
| 1720.00 | 132072 | Low | bottom | 10 mm | LTE Band 66 (AWS) | Main 2 | 00043 | 20 | QPSK | 1 | 50 | 19.0 | 18.10 | 0 | 0.18 | 1:1 | 0.246 | 1.230 | 0.303 | A33 |
| 1720.00 | 132072 | Low | bottom | 10 mm | LTE Band 66 (AWS) | Main 2 | 00043 | 20 | QPSK | 50 | 25 | 19.0 | 18.09 | 0 | 0.00 | 1:1 | 0.241 | 1.233 | 0.297 | |
| 1720.00 | 132072 | Low | right | 10 mm | LTE Band 66 (AWS) | Main 2 | 00043 | 20 | QPSK | 1 | 50 | 19.0 | 18.10 | 0 | -0.11 | 1:1 | 0.118 | 1.230 | 0.145 | |
| 1720.00 | 132072 | Low | right | 10 mm | LTE Band 66 (AWS) | Main 2 | 00043 | 20 | QPSK | 50 | 25 | 19.0 | 18.09 | 0 | 0.00 | 1:1 | 0.118 | 1.233 | 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 10 grams | | | | | | | | |

## Table 11-27
## LTE Band 25 (PCS) Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Side | Spacing | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 1905.00 | 26590 | High | back | 10 mm | LTE Band 25 (PCS) | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.62 | 0 | 0.01 | 1:1 | 0.168 | 1.373 | 0.231 | |
| 1905.00 | 26590 | High | back | 10 mm | LTE Band 25 (PCS) | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.70 | 0 | -0.01 | 1:1 | 0.159 | 1.349 | 0.214 | |
| 1905.00 | 26590 | High | front | 10 mm | LTE Band 25 (PCS) | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.62 | 0 | -0.04 | 1:1 | 0.194 | 1.373 | 0.266 | |
| 1905.00 | 26590 | High | front | 10 mm | LTE Band 25 (PCS) | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.70 | 0 | -0.01 | 1:1 | 0.187 | 1.349 | 0.252 | |
| 1905.00 | 26590 | High | bottom | 10 mm | LTE Band 25 (PCS) | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.62 | 0 | 0.02 | 1:1 | 0.344 | 1.373 | **0.472** | A34 |
| 1905.00 | 26590 | High | bottom | 10 mm | LTE Band 25 (PCS) | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.70 | 0 | -0.01 | 1:1 | 0.332 | 1.349 | 0.448 | |
| 1905.00 | 26590 | High | right | 10 mm | LTE Band 25 (PCS) | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.62 | 0 | 0.17 | 1:1 | 0.117 | 1.373 | 0.161 | |
| 1905.00 | 26590 | High | right | 10 mm | LTE Band 25 (PCS) | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.70 | 0 | -0.05 | 1:1 | 0.114 | 1.349 | 0.154 | |
| **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 10 grams | | | | | | | | |

## Table 11-28
## LTE Band 41 Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | | Side | Spacing | Mode | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Modulation | RB Size | RB Offset | Maximum Allowed Power [dBm] | Conducted Power [dBm] | MPR [dB] | Power Drift [dB] | Duty Cycle | SAR (1g) | Scaling Factor | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | | | | | (W/kg) | | (W/kg) | |
| 2593.00 | 40620 | Mid | back | 10 mm | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.98 | 0 | -0.18 | 1:1.58 | 0.091 | 1.265 | 0.115 | |
| 2593.00 | 40620 | Mid | back | 10 mm | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.98 | 0 | 0.01 | 1:1.58 | 0.094 | 1.265 | 0.119 | |
| 2593.00 | 40620 | Mid | front | 10 mm | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.98 | 0 | -0.06 | 1:1.58 | 0.088 | 1.265 | 0.111 | |
| 2593.00 | 40620 | Mid | front | 10 mm | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.98 | 0 | 0.03 | 1:1.58 | 0.086 | 1.265 | 0.109 | |
| 2593.00 | 40620 | Mid | bottom | 10 mm | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.98 | 0 | 0.02 | 1:1.58 | 0.165 | 1.265 | 0.209 | A35 |
| 2593.00 | 40620 | Mid | bottom | 10 mm | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.98 | 0 | 0.00 | 1:1.58 | 0.161 | 1.265 | 0.204 | |
| 2593.00 | 40620 | Mid | right | 10 mm | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 1 | 0 | 20.0 | 18.98 | 0 | -0.12 | 1:1.58 | 0.039 | 1.265 | 0.049 | |
| 2593.00 | 40620 | Mid | right | 10 mm | LTE Band 41 | Main 2 | 99989 | 20 | QPSK | 50 | 0 | 20.0 | 18.98 | 0 | 0.01 | 1:1.58 | 0.039 | 1.265 | 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 10 grams | | | | | | | | |

## Table 11-29
## WLAN Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Spacing | Mode | Service | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Data Rate (Mbps) | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | 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 | back | 10 mm | 802.11b | DSSS | Chain 0 | 99583 | 22 | 1 | 14.5 | 14.13 | -0.01 | 99.80 | 0.138 | - | 1.089 | 1.002 | - | |
| 2412 | 1 | front | 10 mm | 802.11b | DSSS | Chain 0 | 99583 | 22 | 1 | 14.5 | 14.13 | 0.00 | 99.80 | 0.076 | - | 1.089 | 1.002 | - | |
| 2412 | 1 | top | 10 mm | 802.11b | DSSS | Chain 0 | 99583 | 22 | 1 | 14.5 | 14.13 | -0.18 | 99.80 | 0.016 | - | 1.089 | 1.002 | - | |
| 2412 | 1 | left | 10 mm | 802.11b | DSSS | Chain 0 | 99583 | 22 | 1 | 14.5 | 14.13 | -0.05 | 99.80 | 0.214 | 0.161 | 1.089 | 1.002 | **0.176** | A36 |
| 2412 | 1 | back | 10 mm | 802.11b | DSSS | Chain 1 | 99583 | 22 | 1 | 12.7 | 12.60 | 0.01 | 99.50 | 0.088 | 0.082 | 1.023 | 1.005 | 0.084 | |
| 2412 | 1 | front | 10 mm | 802.11b | DSSS | Chain 1 | 99583 | 22 | 1 | 12.7 | 12.60 | 0.20 | 99.50 | 0.004 | - | 1.023 | 1.005 | - | |
| 2412 | 1 | bottom | 10 mm | 802.11b | DSSS | Chain 1 | 99583 | 22 | 1 | 12.7 | 12.60 | 0.06 | 99.50 | 0.016 | - | 1.023 | 1.005 | - | |
| 2412 | 1 | left | 10 mm | 802.11b | DSSS | Chain 1 | 99583 | 22 | 1 | 12.7 | 12.60 | 0.01 | 99.50 | 0.006 | - | 1.023 | 1.005 | - | |
| 5210 | 42 | back | 10 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.96 | 0.00 | 98.90 | 0.083 | - | 1.132 | 1.011 | - | |
| 5210 | 42 | front | 10 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.96 | 0.06 | 98.90 | 0.058 | - | 1.132 | 1.011 | - | |
| 5210 | 42 | top | 10 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.96 | 0.01 | 98.90 | 0.032 | - | 1.132 | 1.011 | - | |
| 5210 | 42 | left | 10 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.96 | 0.07 | 98.90 | 0.136 | 0.086 | 1.132 | 1.011 | 0.098 | |
| 5210 | 42 | back | 10 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.38 | 0.07 | 99.00 | 0.032 | 0.021 | 1.028 | 1.010 | 0.022 | |
| 5210 | 42 | front | 10 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.38 | 0.07 | 99.00 | 0.008 | - | 1.028 | 1.010 | - | |
| 5210 | 42 | bottom | 10 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.38 | 0.05 | 99.00 | 0.006 | - | 1.028 | 1.010 | - | |
| 5210 | 42 | left | 10 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.38 | 0.05 | 99.00 | 0.012 | - | 1.028 | 1.010 | - | |
| 5775 | 155 | back | 10 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.52 | 0.04 | 98.90 | 0.096 | - | 1.253 | 1.011 | - | |
| 5775 | 155 | front | 10 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.52 | 0.06 | 98.90 | 0.041 | - | 1.253 | 1.011 | - | |
| 5775 | 155 | top | 10 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.52 | 0.20 | 98.90 | 0.027 | - | 1.253 | 1.011 | - | |
| 5775 | 155 | left | 10 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.52 | -0.09 | 98.90 | 0.120 | 0.087 | 1.253 | 1.011 | **0.110** | A37 |
| 5775 | 155 | back | 10 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.22 | -0.11 | 99.00 | 0.098 | 0.078 | 1.067 | 1.010 | 0.084 | |
| 5775 | 155 | front | 10 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.22 | -0.11 | 99.00 | 0.018 | - | 1.067 | 1.010 | - | |
| 5775 | 155 | bottom | 10 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.22 | -0.15 | 99.00 | 0.021 | - | 1.067 | 1.010 | - | |
| 5775 | 155 | left | 10 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.22 | 0.05 | 99.00 | 0.018 | - | 1.067 | 1.010 | - | |
| **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
## DSS Hotspot SAR

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Spacing | Mode | Service | Antenna Config. | Device Serial Number | Data Rate (Mbps) | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | Duty Cycle (%) | SAR (1g) | Scaling Factor (Cond Power) | Scaling Factor (Duty Cycle) | Reported SAR (1g) | Plot # |
| MHz | Ch. | | | | | | | | | | | | (W/kg) | | | (W/kg) | |
| 2480 | 78 | back | 10 mm | Bluetooth | FHSS | Chain 0 | 99583 | 1 | 14.0 | 13.88 | 0.06 | 76.80 | 0.032 | 1.028 | 1.085 | 0.036 | |
| 2480 | 78 | front | 10 mm | Bluetooth | FHSS | Chain 0 | 99583 | 1 | 14.0 | 13.88 | -0.13 | 76.80 | 0.022 | 1.028 | 1.085 | 0.025 | |
| 2480 | 78 | top | 10 mm | Bluetooth | FHSS | Chain 0 | 99583 | 1 | 14.0 | 13.88 | 0.05 | 76.80 | 0.002 | 1.028 | 1.085 | 0.002 | |
| 2480 | 78 | left | 10 mm | Bluetooth | FHSS | Chain 0 | 99583 | 1 | 14.0 | 13.88 | -0.09 | 76.80 | 0.060 | 1.028 | 1.085 | **0.067** | A38 |
| 2480 | 78 | back | 10 mm | Bluetooth | FHSS | Chain 1 | 99583 | 1 | 14.0 | 13.48 | -0.08 | 76.80 | 0.018 | 1.127 | 1.085 | 0.022 | |
| 2480 | 78 | front | 10 mm | Bluetooth | FHSS | Chain 1 | 99583 | 1 | 14.0 | 13.48 | 0.09 | 76.80 | 0.000 | 1.127 | 1.085 | 0.000 | |
| 2480 | 78 | bottom | 10 mm | Bluetooth | FHSS | Chain 1 | 99583 | 1 | 14.0 | 13.48 | 0.07 | 76.80 | 0.001 | 1.127 | 1.085 | 0.001 | |
| 2480 | 78 | left | 10 mm | Bluetooth | FHSS | Chain 1 | 99583 | 1 | 14.0 | 13.48 | 0.04 | 76.80 | 0.000 | 1.127 | 1.085 | 0.000 | |
| **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: The reported SAR was scaled to the 83.3% transmission duty factor to determine compliance since the duty factor of the device is permanently limited to 83.3% per the manufacturer.

## 11.4 Standalone Phablet SAR Data

**Table 11-31**
**WLAN Phablet SAR**

| MEASUREMENT RESULTS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY | | Side | Spacing | Mode | Service | Antenna Config. | Device Serial Number | Bandwidth [MHz] | Data Rate (Mbps) | Maximum Allowed Power [dBm] | Conducted Power [dBm] | Power Drift [dB] | 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) | |
| 5290 | 58 | back | 0 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.73 | 0.09 | 98.90 | 2.190 | - | 1.194 | 1.011 | - | |
| 5290 | 58 | front | 0 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.73 | 0.01 | 98.90 | 1.050 | - | 1.194 | 1.011 | - | |
| 5290 | 58 | top | 0 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.73 | -0.01 | 98.90 | 0.184 | - | 1.194 | 1.011 | - | |
| 5290 | 58 | left | 0 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 10.73 | -0.01 | 98.90 | 3.380 | 0.347 | 1.194 | 1.011 | 0.419 | |
| 5290 | 58 | back | 0 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.20 | 0.00 | 99.00 | 1.270 | 0.205 | 1.072 | 1.010 | 0.222 | |
| 5290 | 58 | front | 0 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.20 | 0.09 | 99.00 | 0.079 | - | 1.072 | 1.010 | - | |
| 5290 | 58 | bottom | 0 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.20 | 0.04 | 99.00 | 0.035 | - | 1.072 | 1.010 | - | |
| 5290 | 58 | left | 0 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.20 | 0.06 | 99.00 | 0.095 | - | 1.072 | 1.010 | - | |
| 5690 | 138 | back | 0 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 11.28 | 0.18 | 98.90 | 0.992 | - | 1.052 | 1.011 | - | |
| 5690 | 138 | front | 0 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 11.28 | 0.14 | 98.90 | 0.518 | - | 1.052 | 1.011 | - | |
| 5690 | 138 | top | 0 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 11.28 | -0.04 | 98.90 | 0.121 | - | 1.052 | 1.011 | - | |
| 5690 | 138 | left | 0 mm | 802.11ac | OFDM | Chain 0 | 99823 | 80 | 29.3 | 11.5 | 11.28 | -0.09 | 98.90 | 4.010 | 0.491 | 1.052 | 1.011 | **0.522** | A39 |
| 5530 | 106 | back | 0 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.36 | 0.17 | 99.00 | 1.510 | 0.362 | 1.033 | 1.010 | 0.378 | |
| 5530 | 106 | front | 0 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.36 | 0.05 | 99.00 | 0.042 | - | 1.033 | 1.010 | - | |
| 5530 | 106 | bottom | 0 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.36 | 0.08 | 99.00 | 0.028 | - | 1.033 | 1.010 | - | |
| 5530 | 106 | left | 0 mm | 802.11ac | OFDM | Chain 1 | 99823 | 80 | 29.3 | 11.5 | 11.36 | 0.02 | 99.00 | 0.020 | - | 1.033 | 1.010 | - | |
| **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 11-32**
**NFC Phablet SAR**

| MEASUREMENT RESULTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| FREQUENCY | Side | Test Position | Mode | Device Serial Number | Power Drift | SAR (10g) | Plot # |
| MHz | | | | | | (W/kg) | |
| 13.56 | back | 10 mm | NFC | 99542 | 0.08 | **0.017** | A40 |
| 13.56 | front | 10 mm | NFC | 99542 | -0.19 | 0.000 | |
| 13.56 | top | 10 mm | NFC | 99542 | -0.12 | 0.000 | |
| 13.56 | right | 10 mm | NFC | 99542 | -0.06 | 0.000 | |
| 13.56 | left | 10 mm | NFC | 99542 | 0.20 | 0.000 | |
| **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 | | |

## 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 10 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 12 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. Additional SAR tests for phablet SAR were evaluated per KDB 616217 Section 6 (See Section 6.9 for more information).
12. Unless otherwise noted, when 10g SAR measurement is considered, a factor of 2.5 is applied to the 1g thresholds for the equivalent test cases.

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 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).
4. DTM SAR was evaluated with CMW500 Radio Communication Tester FW version 3.7.26 when the device was operating in DTM using maximum CS and PS slots according to FCC KDB 941225 D01v03r01.

UMTS Notes:

1. UMTS mode 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 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).

LTE Notes:

1. 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.

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/ax) 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 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. 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.
5. 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.
6. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

Bluetooth Notes

1. Bluetooth SAR was evaluated with a test mode with hopping disabled with DH5 operation. The reported SAR was scaled to the 83.3% transmission duty factor to determine compliance since the duty factor of the device is limited to 83.3% per the manufacturer. See Section 9 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 SAR MEASUREMENT VARIABILITY

## 12.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, variability SAR tests were not required since measured SAR results for all frequency bands were less than 0.8 W/kg for 1g SAR and less than 2.0 W/kg for 10g SAR.

## 12.2 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.

# 13 EQUIPMENT LIST

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|---|---|---|---|---|---|---|
| Agilent | E4404B | Spectrum Analyzer | N/A | N/A | N/A | MY45113242 |
| Agilent | E4438C | ESG Vector Signal Generator | 5/10/2022 | Annual | 5/10/2023 | MY42082659 |
| Agilent | E4438C | ESG Vector Signal Generator | 2/14/2022 | Annual | 2/14/2023 | MY42082385 |
| Agilent | N5182A | MXG Vector Signal Generator | 6/21/2022 | Annual | 6/21/2023 | MY47420651 |
| Agilent | 8753ES | S-Parameter Vector Network Analyzer | 2/11/2022 | Annual | 2/11/2023 | MY40003841 |
| Agilent | 8753ES | S-Parameter Vector Network Analyzer | 12/17/2021 | Annual | 12/17/2022 | MY40000670 |
| Agilent | E5515C | Wireless Communications Test Set | 5/12/2022 | Annual | 5/12/2023 | GB43304278 |
| Agilent | E5515C | Wireless Communications Test Set | 1/14/2020 | Triennial | 1/14/2023 | GB43304447 |
| Agilent | N4010A | Wireless Connectivity Test Set | N/A | N/A | N/A | GB46170464 |
| Amplifier Research | 15S1G6 | Amplifier | CBT | N/A | CBT | 433974 |
| Amplifier Research | 15S1G6 | Amplifier | 9/15/2021 | Annual | 9/15/2022 | 433971 |
| Rohde & Schwarz | NRX | Power Meter | 11/22/2021 | Annual | 11/22/2022 | 102583 |
| Anritsu | ML2496A | Power Meter | 3/31/2022 | Annual | 3/31/2023 | 1138001 |
| Anritsu | MA2411B | Pulse Power Sensor | 4/29/2022 | Annual | 4/29/2023 | 1207470 |
| Anritsu | MA2411B | Pulse Power Sensor | 9/21/2021 | Annual | 9/21/2022 | 1339008 |
| Anritsu | MT8000A | Radio Communication Test Station | 8/2/2021 | Annual | 8/2/2022 | 6272337438 |
| Anritsu | MT8000A | Radio Communication Test Station | 8/2/2021 | Annual | 8/2/2022 | 6272337436 |
| Anritsu | MT8000A | Radio Communication Test Station | 8/2/2021 | Annual | 8/2/2022 | 6272337437 |
| Anritsu | MA24106A | USB Power Sensor | 6/1/2022 | Annual | 6/1/2023 | 1349514 |
| Anritsu | MA24106A | USB Power Sensor | 3/22/2022 | Annual | 3/22/2023 | 2205501 |
| Control Company | 4353 | Long Stem Thermometer | 10/28/2020 | Biennial | 10/28/2022 | 200670623 |
| Control Company | 4353 | Long Stem Thermometer | 10/28/2020 | Biennial | 10/28/2022 | 200670633 |
| Control Company | 4353 | Long Stem Thermometer | 10/28/2020 | Biennial | 10/28/2022 | 200670635 |
| Control Company | 4040 | Therm./ Clock/ Humidity Monitor | 2/28/2018 | Biennial | CBT | 170151872 |
| Control Company | 4040 | Therm./ Clock/ Humidity Monitor | 2/28/2018 | Biennial | CBT | 170151893 |
| Mitutoyo | 500-196-30 | CD-6"ASX 6Inch Digital Caliper | 2/16/2022 | Triennial | 2/16/2025 | A20238413 |
| Keysight Technologies | N6705B | DC Power Analyzer | 5/5/2021 | Triennial | 5/5/2024 | MY53004059 |
| MCL | BW-N6W5+ | 6dB Attenuator | CBT | N/A | CBT | 1139 |
| Mini-Circuits | VLF-6000+ | Low Pass Filter DC to 6000 MHz | 7/6/2021 | Annual | 7/6/2022 | 31634 |
| Mini-Circuits | VLF-6000+ | Low Pass Filter DC to 6000 MHz | CBT | N/A | CBT | N/A |
| 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 |
| Mini-Circuits | BW-N20W5 | Power Attenuator | CBT | N/A | CBT | 1226 |
| Mini-Circuits | ZUDC10-83-S+ | Directional Coupler | CBT | N/A | CBT | 2050 |
| Mini-Circuits | ZUDC10-83-S+ | Directional Coupler | 9/15/2021 | Annual | 9/15/2022 | 2111 |
| Narda | 4772-3 | Attenuator (3dB) | CBT | N/A | CBT | 9406 |
| Narda | BW-S3W2 | Attenuator (3dB) | CBT | N/A | CBT | 120 |
| Seekonk | TSF-100 | Torque Wrench | 7/8/2021 | Annual | 7/8/2022 | 47639-29 |
| Seekonk | NC-100 | Torque Wrench (8" lb) | 8/5/2020 | Biennial | 8/5/2022 | N/A |
| Rohde & Schwarz | CMW500 | Wideband Radio Communication Tester | 4/18/2022 | Annual | 4/18/2023 | 128633 |
| Rohde & Schwarz | CMW500 | Wideband Radio Communication Tester | 3/29/2022 | Annual | 3/29/2023 | 171075 |
| Rohde & Schwarz | CMW500 | Wideband Radio Communication Tester | 4/8/2022 | Annual | 4/8/2023 | 162125 |
| Rohde & Schwarz | CMW500 | Wideband Radio Communication Tester | 4/7/2022 | Annual | 4/7/2023 | 167283 |
| SPEAG | DAK-3.5 | Dielectric Assessment Kit | 1/6/2022 | Annual | 1/6/2023 | 1278 |
| SPEAG | DAK-3.5 | Dielectric Assessment Kit | 10/20/2021 | Annual | 10/20/2022 | 1091 |
| SPEAG | DAKS-3.5 | Portable Dielectric Assessment Kit | 8/18/2021 | Annual | 8/18/2022 | 1041 |
| SPEAG | DAK-3.5 | Dielectric Assessment Kit | 1/6/2022 | Annual | 1/6/2023 | 1278 |
| SPEAG | MAIA | Modulation and Audio Interference Analyzer | N/A | N/A | N/A | 1379 |
| SPEAG | CLA13 | 13 MHz SAR Dipole | 9/16/2021 | Annual | 9/16/2022 | 1002 |
| SPEAG | D750V3 | 750 MHz SAR Dipole | 3/14/2022 | Annual | 3/14/2023 | 1054 |
| SPEAG | D835V2 | 835 MHz SAR Dipole | 1/21/2021 | Biennial | 1/21/2023 | 4d132 |
| SPEAG | D835V2 | 835 MHz SAR Dipole | 3/14/2022 | Annual | 3/14/2023 | 4d047 |
| SPEAG | D1765V2 | 1750 MHz SAR Dipole | 5/14/2021 | Biennial | 5/14/2023 | 1008 |
| SPEAG | D1750V2 | 1750 MHz SAR Dipole | 10/22/2021 | Annual | 10/22/2022 | 1150 |
| SPEAG | D1900V2 | 1900 MHz SAR Dipole | 9/21/2021 | Annual | 9/21/2022 | 5d149 |
| SPEAG | D1900V2 | 1900 MHz SAR Dipole | 10/22/2021 | Annual | 10/22/2022 | 5d080 |
| SPEAG | D1900V2 | 1900 MHz SAR Dipole | 2/21/2022 | Annual | 2/21/2023 | 5d148 |
| SPEAG | D2450V2 | 2450 MHz SAR Dipole | 11/25/2021 | Annual | 11/25/2022 | 981 |
| SPEAG | D2450V2 | 2450 MHz SAR Dipole | 9/20/2020 | Biennial | 9/20/2022 | 797 |
| SPEAG | D2600V2 | 2600 MHz SAR Dipole | 11/12/2019 | Triennial | 11/12/2022 | 1071 |
| SPEAG | D5GHzV2 | 5 GHz SAR Dipole | 1/10/2022 | Annual | 1/10/2023 | 1057 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 8/3/2021 | Annual | 8/3/2022 | 1681 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 11/10/2021 | Annual | 11/10/2022 | 1323 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 3/16/2022 | Annual | 3/16/2023 | 1272 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 5/10/2022 | Annual | 5/10/2023 | 1678 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 6/14/2022 | Annual | 6/14/2023 | 1334 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 2/22/2022 | Annual | 2/22/2023 | 665 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 8/4/2021 | Annual | 8/4/2022 | 1680 |
| SPEAG | DAE4 | Dasy Data Acquisition Electronics | 4/13/2022 | Annual | 4/13/2023 | 1407 |
| SPEAG | EX3DV4 | SAR Probe | 3/22/2022 | Annual | 3/22/2023 | 7637 |
| SPEAG | EX3DV4 | SAR Probe | 8/5/2021 | Annual | 8/5/2022 | 7670 |
| SPEAG | EX3DV4 | SAR Probe | 5/18/2022 | Annual | 5/18/2023 | 7660 |
| SPEAG | EX3DV4 | SAR Probe | 11/16/2021 | Annual | 11/16/2022 | 7538 |
| SPEAG | EX3DV4 | SAR Probe | 3/21/2022 | Annual | 3/21/2023 | 7527 |
| SPEAG | EX3DV4 | SAR Probe | 6/21/2021 | Annual | 6/21/2022 | 7409 |
| SPEAG | EX3DV4 | SAR Probe | 2/22/2022 | Annual | 2/22/2023 | 7417 |
| SPEAG | EX3DV4 | SAR Probe | 9/20/2021 | Annual | 9/20/2022 | 7552 |

Note: 1) All equipment was used solely within its respective calibration period. 2) 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.

# 14 MEASUREMENT UNCERTAINTIES

| a | b | c | d | e= f(d,k) | f | g | h = c x f/e | i = c x g/e | k |
|---|---|---|---|---|---|---|---|---|---|
| **Uncertainty Component** | IEEE 1528 Sec. | Tol. (± %) | Prob. Dist. | Div. | $c_i$ 1gm | $c_i$ 10 gms | 1gm $u_i$ (± %) | 10gms $u_i$ (± %) | $v_i$ |
| **Measurement System** | | | | | | | | | |
| Probe Calibration | E.2.1 | 7 | N | 1 | 1 | 1 | 7.0 | 7.0 | ∞ |
| Axial Isotropy | E.2.2 | 0.25 | N | 1 | 0.7 | 0.7 | 0.2 | 0.2 | ∞ |
| Hemishperical Isotropy | E.2.2 | 1.3 | N | 1 | 0.7 | 0.7 | 0.9 | 0.9 | ∞ |
| Boundary Effect | E.2.3 | 2 | R | 1.732 | 1 | 1 | 1.2 | 1.2 | ∞ |
| Linearity | E.2.4 | 0.3 | N | 1 | 1 | 1 | 0.3 | 0.3 | ∞ |
| System Detection Limits | E.2.4 | 0.25 | R | 1.732 | 1 | 1 | 0.1 | 0.1 | ∞ |
| Modulation Response | E.2.5 | 4.8 | R | 1.732 | 1 | 1 | 2.8 | 2.8 | ∞ |
| Readout Electronics | E.2.6 | 0.3 | N | 1 | 1 | 1 | 0.3 | 0.3 | ∞ |
| Response Time | E.2.7 | 0.8 | R | 1.732 | 1 | 1 | 0.5 | 0.5 | ∞ |
| Integration Time | E.2.8 | 2.6 | R | 1.732 | 1 | 1 | 1.5 | 1.5 | ∞ |
| RF Ambient Conditions - Noise | E.6.1 | 3 | R | 1.732 | 1 | 1 | 1.7 | 1.7 | ∞ |
| RF Ambient Conditions - Reflections | E.6.1 | 3 | R | 1.732 | 1 | 1 | 1.7 | 1.7 | ∞ |
| Probe Positioner Mechanical Tolerance | E.6.2 | 0.8 | R | 1.732 | 1 | 1 | 0.5 | 0.5 | ∞ |
| Probe Positioning w/ respect to Phantom | E.6.3 | 6.7 | R | 1.732 | 1 | 1 | 3.9 | 3.9 | ∞ |
| Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation | E.5 | 4 | R | 1.732 | 1 | 1 | 2.3 | 2.3 | ∞ |
| **Test Sample Related** | | | | | | | | | |
| Test Sample Positioning | E.4.2 | 3.12 | N | 1 | 1 | 1 | 3.1 | 3.1 | 35 |
| Device Holder Uncertainty | E.4.1 | 1.67 | N | 1 | 1 | 1 | 1.7 | 1.7 | 5 |
| Output Power Variation - SAR drift measurement | E.2.9 | 5 | R | 1.732 | 1 | 1 | 2.9 | 2.9 | ∞ |
| SAR Scaling | E.6.5 | 0 | R | 1.732 | 1 | 1 | 0.0 | 0.0 | ∞ |
| **Phantom & Tissue Parameters** | | | | | | | | | |
| Phantom Uncertainty (Shape & Thickness tolerances) | E.3.1 | 7.6 | R | 1.73 | 1.0 | 1.0 | 4.4 | 4.4 | ∞ |
| Liquid Conductivity - measurement uncertainty | E.3.3 | 4.3 | N | 1 | 0.78 | 0.71 | 3.3 | 3.0 | 76 |
| Liquid Permittivity - measurement uncertainty | E.3.3 | 4.2 | N | 1 | 0.23 | 0.26 | 1.0 | 1.1 | 75 |
| Liquid Conductivity - Temperature Uncertainty | E.3.4 | 3.4 | R | 1.732 | 0.78 | 0.71 | 1.5 | 1.4 | ∞ |
| Liquid Permittivity - Temperature Unceritainty | E.3.4 | 0.6 | R | 1.732 | 0.23 | 0.26 | 0.1 | 0.1 | ∞ |
| Liquid Conductivity - deviation from target values | E.3.2 | 5.0 | R | 1.73 | 0.64 | 0.43 | 1.8 | 1.2 | ∞ |
| Liquid Permittivity - deviation from target values | E.3.2 | 5.0 | R | 1.73 | 0.60 | 0.49 | 1.7 | 1.4 | ∞ |
| **Combined Standard Uncertainty (k=1)** | | | RSS | | | | 12.2 | 12.0 | 191 |
| **Expanded Uncertainty** (95% CONFIDENCE LEVEL) | | | k=2 | | | | 24.4 | 24.0 | |

The above measurement uncertainties are according to IEEE Std. 1528-2013

# 15 CONCLUSION

## 15.1 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]

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