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

SAR EVALUATION REPORT

Applicant Name:
LG Electronics U.S.A., Inc.
1000 Sylvan Avenue
Englewood Cliffs, NJ 07632
United States

Date of Testing:
02/27/19 - 03/21/19
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M1902260030-01-R1.ZNF

FCC ID: **ZNFX420QM**

APPLICANT: **LG ELECTRONICS U.S.A., INC.**

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: LM-X420QM
Additional Model(s): LMX420QM, X420QM, LM-X420QM6, LMX420QM6, X420QM6

Equipment Class	Band & Mode	Tx Frequency	SAR			
			1g Head (W/kg)	1g Body-Worn (W/kg)	1g Hotspot (W/kg)	10g Phablet (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.31	0.56	0.56	N/A
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	0.27	0.41	0.41	N/A
PCE	UMTS 850	826.40 - 846.60 MHz	0.32	0.42	0.47	N/A
PCE	UMTS 1750	1712.4 - 1752.6 MHz	0.47	0.89	0.89	3.07
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.41	0.54	0.54	2.93
PCE	Cell. CDMA/EVDO	824.70 - 848.31 MHz	0.33	0.40	0.44	N/A
PCE	PCS CDMA/EVDO	1851.25 - 1908.75 MHz	0.40	0.71	0.80	3.06
PCE	LTE Band 12	699.7 - 715.3 MHz	0.29	0.41	0.41	N/A
PCE	LTE Band 13	779.5 - 784.5 MHz	0.28	0.39	0.52	N/A
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.32	0.43	0.43	N/A
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	0.44	0.95	0.95	2.77
PCE	LTE Band 25 (PCS)	1850.7 - 1914.3 MHz	0.46	0.58	0.68	2.89
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	N/A	N/A	N/A	N/A
DTS	2.4 GHz WLAN	2412 - 2462 MHz	0.72	0.12	0.12	N/A
NII	U-NII-1	5180 - 5240 MHz	N/A	N/A	0.18	N/A
NII	U-NII-2A	5260 - 5320 MHz	0.85	0.24	N/A	0.71
NII	U-NII-2C	5500 - 5720 MHz	0.79	0.23	N/A	0.68
NII	U-NII-3	5745 - 5825 MHz	1.02	0.19	0.19	N/A
DSS/DTS	Bluetooth	2402 - 2480 MHz	0.18	< 0.1	< 0.1	N/A
Simultaneous SAR per KDB 690783 D01v01r03:			1.59	1.23	1.18	3.78

Note: This revised Test Report (S/N: 1M1902260030-01-R1.ZNF) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.7 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.

Randy Ortanez
President

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

TABLE OF CONTENTS

1 DEVICE UNDER TEST 3

2 LTE INFORMATION 11

3 INTRODUCTION 12

4 DOSIMETRIC ASSESSMENT 13

5 DEFINITION OF REFERENCE POINTS 14

6 TEST CONFIGURATION POSITIONS 15

7 RF EXPOSURE LIMITS 19

8 FCC MEASUREMENT PROCEDURES 20

9 RF CONDUCTED POWERS 27

10 SYSTEM VERIFICATION 53

11 SAR DATA SUMMARY 57

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS 75

13 SAR MEASUREMENT VARIABILITY 83

14 EQUIPMENT LIST 85

15 MEASUREMENT UNCERTAINTIES 86

16 CONCLUSION 87

17 REFERENCES 88

APPENDIX A: SAR TEST PLOTS

APPENDIX B: SAR DIPOLE VERIFICATION PLOTS

APPENDIX C: PROBE AND DIPOLE CALIBRATION CERTIFICATES

APPENDIX D: SAR TISSUE SPECIFICATIONS

APPENDIX E: SAR SYSTEM VALIDATION

APPENDIX F: DUT ANTENNA DIAGRAM & SAR TEST SETUP PHOTOGRAPHS

APPENDIX G: POWER REDUCTION VERIFICATION

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
Cell. CDMA/EVDO	Voice/Data	824.70 - 848.31 MHz
PCS CDMA/EVDO	Voice/Data	1851.25 - 1908.75 MHz
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 25 (PCS)	Voice/Data	1850.7 - 1914.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
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

1.2 Power Reduction for SAR

This device uses a power reduction mechanism for SAR compliance. The power reduction mechanism is activated when the device is used in close proximity to the user's body. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device. Detailed descriptions of the power reduction mechanism are included in the operational description.

1.3 Nominal and Maximum Output Power Specifications

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

1.3.1 Maximum Output Power

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)		Burst Average 8-PSK (dBm)	
		1 TX Slot	*1 TX Slots*	*2 TX Slots*	*1 TX Slots*	*2 TX Slots*
GSM/GPRS/EDGE 850	Maximum	**32.7**	**32.7**	**32.2**	**27.2**	**27.2**
	Nominal	**32.2**	**32.2**	**31.7**	**26.7**	**26.7**
GSM/GPRS/EDGE 1900	Maximum	**31.2**	**31.2**	**29.2**	**26.7**	**26.2**
	Nominal	**30.7**	**30.7**	**28.7**	**26.2**	**25.7**

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*
UMTS Band 5 (850 MHz)	Maximum	**25.2**	**25.2**	**25.2**
	Nominal	**24.7**	**24.7**	**24.7**
UMTS Band 4 (1750 MHz)	Maximum	**24.4**	**24.4**	**24.4**
	Nominal	**23.9**	**23.9**	**23.9**
UMTS Band 2 (1900 MHz)	Maximum	**24.4**	**24.4**	**24.4**
	Nominal	**23.9**	**23.9**	**23.9**

Mode / Band		Modulated Average (dBm)
Cell. CDMA/EVDO	Maximum	**25.2**
	Nominal	**24.7**
PCS CDMA/EVDO	Maximum	**24.4**
	Nominal	**23.9**

Mode / Band		Modulated Average (dBm)
LTE Band 12	Maximum	**25.2**
	Nominal	**24.7**
LTE Band 13	Maximum	**24.7**
	Nominal	**24.2**
LTE Band 5 (Cell)	Maximum	**25.2**
	Nominal	**24.7**
LTE Band 4 (AWS)	Maximum	**24.7**
	Nominal	**24.2**
LTE Band 25 (PCS)	Maximum	**24.4**
	Nominal	**23.9**
LTE Band 2 (PCS)	Maximum	**24.4**
	Nominal	**23.9**

Mode / Band		Modulated Average (dBm)		
		Ch. 1	Ch. 2-10	Ch. 11
IEEE 802.11b (2.4 GHz)	Maximum	**15.5**		
	Nominal	**14.5**		
IEEE 802.11g (2.4 GHz)	Maximum	**14.5**	**15.5**	**13.0**
	Nominal	**13.5**	**14.5**	**12.0**
IEEE 802.11n (2.4 GHz)	Maximum	**13.5**	**14.5**	**12.0**
	Nominal	**12.5**	**13.5**	**11.0**
Bluetooth	Maximum	**11.0**		
	Nominal	**10.0**		
Bluetooth LE	Maximum	**1.5**		
	Nominal	**0.5**		

Mode / Band		Modulated Average (dBm)			
		20 MHz Bandwidth	40 MHz Bandwidth		80 MHz Bandwidth
			Ch. 38, 62, 102	Ch. 46, 54, 110-159	
IEEE 802.11a (5 GHz)	Maximum	13.5			
	Nominal	12.5			
IEEE 802.11n (5 GHz)	Maximum	13.5	10.0	12.0	
	Nominal	12.5	9.0	11.0	
IEEE 802.11ac (5 GHz)	Maximum	13.5	10.5	12.5	12.0
	Nominal	12.5	9.5	11.5	11.0

1.3.2 Reduced Output Power

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*
UMTS Band 4 (1750 MHz)	Maximum	23.2	23.2	23.2
	Nominal	22.7	22.7	22.7
UMTS Band 2 (1900 MHz)	Maximum	23.2	23.2	23.2
	Nominal	22.7	22.7	22.7

Mode / Band		Modulated Average (dBm)
PCS CDMA/EVDO	Maximum	22.9
	Nominal	22.4

Mode / Band		Modulated Average (dBm)
LTE Band 4 (AWS)	Maximum	23.5
	Nominal	23.0
LTE Band 25 (PCS)	Maximum	23.2
	Nominal	22.7
LTE Band 2 (PCS)	Maximum	23.2
	Nominal	22.7

1.4 DUT Antenna Locations

The overall dimensions of this device are > 9 x 5 cm. The overall diagonal dimension of the device is ≤160 mm and the diagonal display is ≤150 mm. A diagram showing the location of the device antennas can be found in Appendix F.

Table 1-1
Device Edges/Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	Yes	Yes
GPRS 1900	Yes	Yes	No	Yes	No	Yes
UMTS 850	Yes	Yes	No	Yes	Yes	Yes
UMTS 1750	Yes	Yes	No	Yes	No	Yes
UMTS 1900	Yes	Yes	No	Yes	No	Yes
Cell. EVDO	Yes	Yes	No	Yes	Yes	Yes
PCS EVDO	Yes	Yes	No	Yes	No	Yes
LTE Band 12	Yes	Yes	No	Yes	Yes	Yes
LTE Band 13	Yes	Yes	No	Yes	Yes	Yes
LTE Band 5 (Cell)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 4 (AWS)	Yes	Yes	No	Yes	No	Yes
LTE Band 25 (PCS)	Yes	Yes	No	Yes	No	Yes
2.4 GHz WLAN	Yes	Yes	Yes	No	No	Yes
5 GHz WLAN	Yes	Yes	Yes	No	No	Yes
Bluetooth	Yes	Yes	Yes	No	No	Yes

Note: Particular DUT edges were not required to be evaluated for wireless router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01 Section III. 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 and U-NII-2C operations are disabled.

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	1x CDMA voice + 2.4 GHz WI-FI	Yes	Yes	N/A	Yes	
2	1x CDMA voice + 5 GHz WI-FI	Yes	Yes	N/A	Yes	
3	1x CDMA voice + 2.4 GHz Bluetooth	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
4	1x CDMA voice + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
5	GSM voice + 2.4 GHz WI-FI	Yes	Yes	N/A	Yes	
6	GSM voice + 5 GHz WI-FI	Yes	Yes	N/A	Yes	
7	GSM voice + 2.4 GHz Bluetooth	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
8	GSM voice + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
9	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
10	UMTS + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
11	UMTS + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
12	UMTS + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
13	LTE + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
14	LTE + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
15	LTE + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
16	LTE + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
17	CDMA/EVDO data + 2.4 GHz WI-FI	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
18	CDMA/EVDO data + 5 GHz WI-FI	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
19	CDMA/EVDO data + 2.4 GHz Bluetooth	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^ Bluetooth Tethering is considered
20	CDMA/EVDO data + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^ Bluetooth Tethering is considered
21	GPRS/EDGE + 2.4 GHz WI-FI	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
22	GPRS/EDGE + 5 GHz WI-FI	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
23	GPRS/EDGE + 2.4 GHz Bluetooth	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^ Bluetooth Tethering is considered
24	GPRS/EDGE + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^ Bluetooth Tethering is considered

1. 2.4 GHz WLAN and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
2. All licensed modes share the same antenna path and cannot transmit simultaneously.
3. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
4. Per the manufacturer, WIFI Direct is expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Simultaneous transmission scenarios involving WIFI direct are that listed in the above table.
5. 5 GHz Wireless Router is only supported for U-NII-1 and U-NII-3 by S/W, therefore U-NII2A and U-NII2C were not evaluated for wireless router conditions.
6. This device supports VOLTE.
7. This device supports Bluetooth Tethering.

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 & U-NII-2C WIFI, only 2.4 GHz, U-NII-1, 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 802.11ac with the following features:
a) Up to 80 MHz Bandwidth only
b) No aggregate channel configurations
c) 1 Tx antenna output
d) 256 QAM is supported
e) Band gap channels are 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 & U-NII-2C WLAN, phablet SAR tests were performed. Phablet SAR was not evaluated for 2.4 GHz, U-NII-1, and U-NII-3 WLAN operations since wireless router 1g SAR was < 1.2 W/kg.

(B) Licensed Transmitter(s)

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

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

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

This device supports 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.

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. Additional SAR tests for phablet SAR were evaluated per KDB 616217 Section 6 (See Section 6.9 for more information).

1.7 Guidance Applied

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

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 INFORMATION

LTE Information			
Form Factor	Portable Handset		
Frequency Range of each LTE transmission band	LTE Band 12 (699.7 - 715.3 MHz)		
	LTE Band 13 (779.5 - 784.5 MHz)		
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)		
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)		
	LTE Band 25 (PCS) (1850.7 - 1914.3 MHz)		
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)		
Channel Bandwidths	LTE Band 12: 1.4 MHz, 3 MHz, 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 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		
Channel Numbers and Frequencies (MHz)	Low	Mid	High
LTE Band 12: 1.4 MHz	699.7 (23017)	707.5 (23095)	715.3 (23173)
LTE Band 12: 3 MHz	700.5 (23025)	707.5 (23095)	714.5 (23165)
LTE Band 12: 5 MHz	701.5 (23035)	707.5 (23095)	713.5 (23155)
LTE Band 12: 10 MHz	704 (23060)	707.5 (23095)	711 (23130)
LTE Band 13: 5 MHz	779.5 (23205)	782 (23230)	784.5 (23255)
LTE Band 13: 10 MHz	N/A	782 (23230)	N/A
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)	836.5 (20525)	848.3 (20643)
LTE Band 5 (Cell): 3 MHz	825.5 (20415)	836.5 (20525)	847.5 (20635)
LTE Band 5 (Cell): 5 MHz	826.5 (20425)	836.5 (20525)	846.5 (20625)
LTE Band 5 (Cell): 10 MHz	829 (20450)	836.5 (20525)	844 (20600)
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)	1732.5 (20175)	1754.3 (20393)
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)	1732.5 (20175)	1753.5 (20385)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)	1732.5 (20175)	1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)	1732.5 (20175)	1750 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)	1732.5 (20175)	1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720 (20050)	1732.5 (20175)	1745 (20300)
LTE Band 25 (PCS): 1.4 MHz	1850.7 (26047)	1882.5 (26365)	1914.3 (26683)
LTE Band 25 (PCS): 3 MHz	1851.5 (26055)	1882.5 (26365)	1913.5 (26675)
LTE Band 25 (PCS): 5 MHz	1852.5 (26065)	1882.5 (26365)	1912.5 (26665)
LTE Band 25 (PCS): 10 MHz	1855 (26090)	1882.5 (26365)	1910 (26640)
LTE Band 25 (PCS): 15 MHz	1857.5 (26115)	1882.5 (26365)	1907.5 (26615)
LTE Band 25 (PCS): 20 MHz	1860 (26140)	1882.5 (26365)	1905 (26590)
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)	1880 (18900)	1909.3 (19193)
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)	1880 (18900)	1908.5 (19185)
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)	1880 (18900)	1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855 (18650)	1880 (18900)	1905 (19150)
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)	1880 (18900)	1902.5 (19125)
LTE Band 2 (PCS): 20 MHz	1860 (18700)	1880 (18900)	1900 (19100)
UE Category	6		
Modulations Supported in UL	QPSK, 16QAM		
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 Additional Information	This device does not support full CA features on 3GPP Release 10. All uplink communications are identical to the Release 8 Specifications. The following LTE Release 10 Features are not supported: Carrier Aggregation, Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, 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 (ρ). 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:

σ = conductivity of the tissue-simulating material (S/m)
ρ = 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:

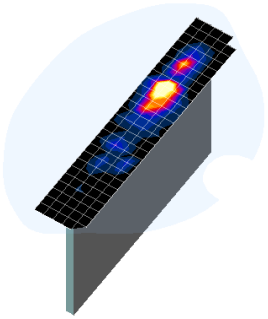


Figure 4-1
Sample SAR Area Scan

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) (Δx_{area}, Δy_{area})	Maximum Zoom Scan Resolution (mm) (Δx_{zoom}, Δy_{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].

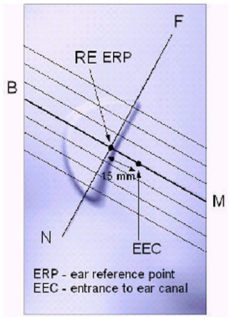


Figure 5-1
Close-Up Side view of ERP

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.

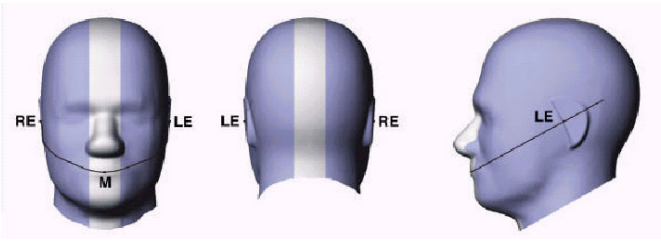


Figure 5-2
Front, back and side view of SAM Twin Phantom

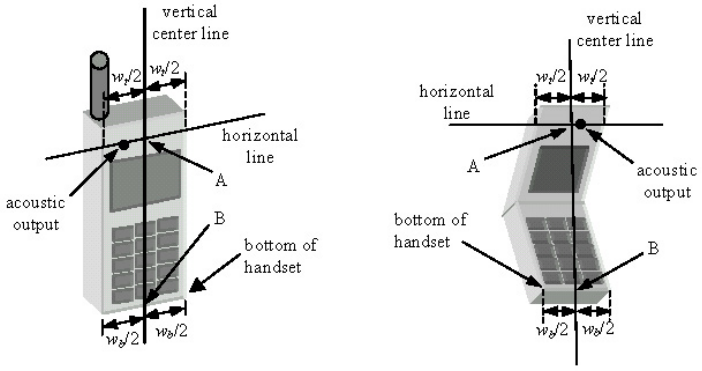


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

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.

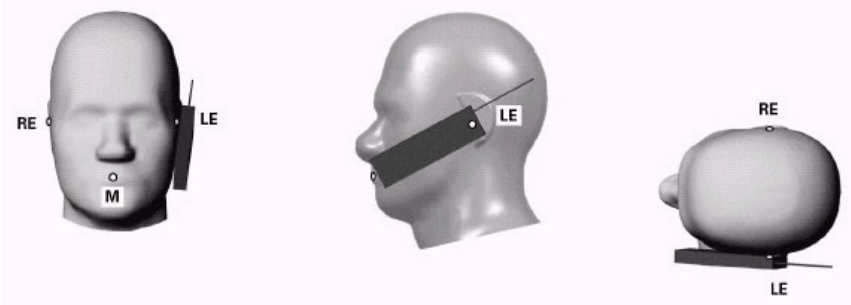


Figure 6-1 Front, Side and Top View of Cheek Position

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).

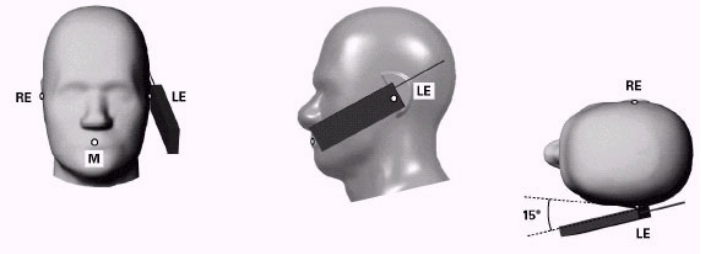


Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

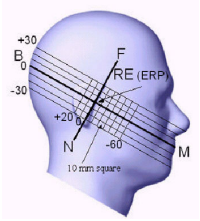


Figure 6-3
Side view w/ relevant markings

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.

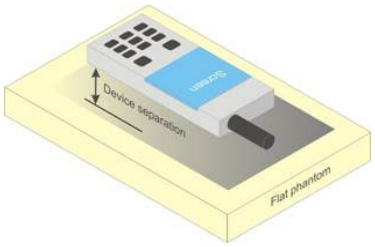


Figure 6-4
Sample Body-Worn Diagram

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 Proximity Sensor Considerations

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

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

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

7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

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

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

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

8 FCC MEASUREMENT PROCEDURES

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

8.1 Measured and Reported SAR

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

8.2 3G SAR Test Reduction Procedure

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

8.3 Procedures Used to Establish RF Signal for SAR

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

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

8.4 SAR Measurement Conditions for CDMA2000

The following procedures were performed according to FCC KDB Publication 941225 D01v03r01 “3G SAR Measurement Procedures.”

8.4.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by FCC KDB Publication 941225 D01v03r01 “3G SAR Measurement Procedures.” Maximum output power is verified on the High, Middle and Low channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in the “All Up” condition.

1. If the mobile station (MS) supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1, Table 8-1 parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH_0 and demodulation of RC 3,4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2, Table 8-2 was applied.

Table 8-1
Parameters for Max. Power for RC1

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table 8-2
Parameters for Max. Power for RC3

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-86
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

5. FCHs were configured at full rate for maximum SAR with “All Up” power control bits.

8.4.2 Head SAR Measurements

SAR for next to the ear head exposure is measured in RC3 with the handset configured to transmit at fullrate in SO55. The 3G SAR test reduction procedure is applied to RC1 with RC3 as the primary mode; otherwise, SAR is required for the channel with maximum measured output in RC1 using the head exposure configuration that results in the highest reported SAR in RC3.

Head SAR is additionally evaluated using EVDO Rev. A to support compliance for VoIP operations. See Section 8.4.5 for EVDO Rev. A configuration parameters.

8.4.3 Body-worn SAR Measurements

SAR for body-worn exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. The 3G SAR test reduction procedure is applied to the multiple code channel configuration (FCH+SCHn), with FCH only as the primary mode. Otherwise, SAR is required for multiple code channel configuration (FCH + SCHn), with FCH at full rate and SCH0 enabled at 9600 bps, using the highest reported SAR configuration for FCH only. When multiple code channels are enabled, the transmitter output can shift by more than 0.5 dB and may lead to higher SAR drifts and SCH dropouts.

The 3G SAR test reduction procedure is applied to body-worn accessory SAR in RC1 with RC3 as the primary mode. Otherwise, SAR is required for RC1, with SO55 and full rate, using the highest reported SAR configuration for body-worn accessory exposure in RC3.

8.4.4 Body-worn SAR Measurements for EVDO Devices

For handsets with EVDO capabilities, the 3G SAR test reduction procedure is applied to EVDO Rev. 0 with 1x RTT RC3 as the primary mode to determine body-worn accessory test requirements. Otherwise, body-worn accessory SAR is required for Rev. 0, at 153.6 kbps, using the highest reported SAR configuration for body-worn accessory exposure in RC3.

The 3G SAR test reduction procedure is applied to Rev. A, with Rev. 0 as the primary mode to determine body-worn accessory SAR test requirements. When SAR is not required for Rev. 0, the 3G SAR test reduction is applied with 1x RTT RC3 as the primary mode.

When SAR is required for EVDO Rev. A, SAR is measured with a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations, using the highest reported SAR configuration for body-worn accessory exposure in Rev. 0 or 1x RTT RC3, as appropriate.

8.4.5 Body SAR Measurements for EVDO Hotspot

Hotspot Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0. The 3G SAR test reduction procedure is applied to Rev. A, Subtype 2 Physical layer configuration, with Rev. 0 as the primary mode; otherwise, SAR is measured for Rev. A using the highest reported SAR configuration for body-worn accessory exposure in Rev. 0. The AT is tested with a Reverse Data Channel rate of 153.6 kbps in Subtype 0/1 Physical Layer configurations; and a Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slots in Subtype 2 Physical Layer configurations.

For EVDO data devices that also support 1x RTT voice and/or data operations, the 3G SAR test reduction procedure is applied to 1x RTT RC3 and RC1 with EVDO Rev. 0 and Rev. A as the respective primary modes. Otherwise, the 'Body-Worn Accessory SAR' procedures in the '3GPP2 CDMA 2000 1x Handsets' section are applied.

8.5 SAR Measurement Conditions for UMTS

8.5.1 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.

8.5.2 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.

8.5.3 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.

8.5.4 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.

8.5.5 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.

8.6 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).

8.6.1 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.

8.6.2 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.

8.6.3 A-MPR

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

8.6.4 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.

8.7 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.

8.7.1 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.

8.7.2 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.

8.7.3 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.

8.7.4 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.

8.7.5 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 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.

8.7.6 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. 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.

8.7.7 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 8.7.6).

8.7.8 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.

9 RF CONDUCTED POWERS

9.1 CDMA Conducted Powers

Table 9-1
Maximum Conducted Power

Band	Channel	Frequency	SO55 [dBm]	SO55 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC	MHz	RC1	RC3	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	1013	824.7	24.96	24.79	24.82	25.11	24.81	24.97
	384	836.52	24.87	24.95	24.80	25.00	24.83	25.01
	777	848.31	24.83	24.94	24.91	24.71	25.09	24.95
PCS	25	1851.25	24.33	24.14	24.15	24.22	24.35	24.19
	600	1880	24.26	24.19	24.13	24.33	24.26	24.25
	1175	1908.75	23.93	24.18	24.18	24.27	24.36	24.34

Table 9-2
Reduced Conducted Power

Band	Channel	Frequency	SO55 [dBm]	SO55 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC	MHz	RC1	RC3	FCH+SCH	FCH	(RTAP)	(RETAP)
PCS	25	1851.25	22.81	22.53	22.55	22.84	22.80	22.73
	600	1880	22.73	22.57	22.57	22.76	22.79	22.72
	1175	1908.75	22.37	22.69	22.62	22.81	22.88	22.83

Note: RC1 is only applicable for IS-95 compatibility.

Figure 9-1
Power Measurement Setup

9.2 GSM Conducted Powers

Table 9-3
Maximum Conducted Power

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**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**
GSM 850	128	32.56	32.60	**32.11**	27.13	26.76
	190	32.66	32.61	**32.16**	27.05	26.80
	251	32.51	32.50	**32.17**	27.19	26.81
GSM 1900	512	30.98	31.05	**28.90**	26.55	25.90
	661	31.10	31.11	**29.14**	26.41	25.89
	810	31.16	31.16	**29.06**	26.31	25.78

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**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**
GSM 850	128	23.53	23.57	**26.09**	18.10	20.74
	190	23.63	23.58	**26.14**	18.02	20.78
	251	23.48	23.47	**26.15**	18.16	20.79
GSM 1900	512	21.95	22.02	**22.88**	17.52	19.88
	661	22.07	22.08	**23.12**	17.38	19.87
	810	22.13	22.13	**23.04**	17.28	19.76

GSM 850	**Frame Avg.Targets:**	23.17	23.17	**25.68**	17.67	20.68
GSM 1900		21.67	21.67	**22.68**	17.17	19.68

Note:

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

GSM Class: B
GPRS Multislot class: 10 (Max 2 Tx uplink slots)
EDGE Multislot class: 10 (Max 2 Tx uplink slots)
DTM Multislot Class: N/A

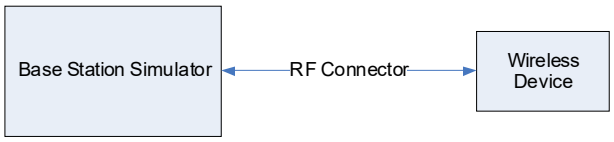


Figure 9-2
Power Measurement Setup

9.3 UMTS Conducted Powers

Table 9-4
Maximum Conducted Power

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	25.09	25.08	24.75	24.38	24.40	24.26	24.29	24.33	24.25	-
99		12.2 kbps AMR	24.77	24.99	25.00	24.21	24.18	23.91	24.19	24.28	24.09	-
6	HSDPA	Subtest 1	24.72	24.85	25.04	24.26	24.25	23.92	23.96	24.23	24.06	0
6		Subtest 2	24.93	24.98	24.92	24.07	24.28	24.23	23.99	24.07	24.14	0
6		Subtest 3	24.25	24.46	24.28	23.41	23.61	23.75	23.79	23.62	23.59	0.5
6		Subtest 4	24.39	24.21	24.22	23.67	23.76	23.43	23.79	23.62	23.70	0.5
6	HSUPA	Subtest 1	24.80	25.04	24.78	23.98	24.26	23.93	23.99	24.12	24.27	0
6		Subtest 2	22.95	22.70	22.92	22.15	22.02	21.96	22.29	22.13	22.24	2
6		Subtest 3	24.03	23.84	23.88	23.24	23.20	23.14	23.18	23.30	23.22	1
6		Subtest 4	23.09	23.04	22.89	22.13	22.05	21.96	21.97	22.13	22.22	2
6		Subtest 5	24.71	24.93	24.92	23.95	24.10	24.09	23.97	24.19	24.24	0

Table 9-5
Reduced Conducted Power

3GPP Release Version	Mode	3GPP 34.121 Subtest	AWS Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			1312	1412	1513	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	23.17	23.06	23.00	23.11	23.08	23.13	-
99		12.2 kbps AMR	22.75	22.86	22.59	22.91	23.11	23.05	-
6	HSDPA	Subtest 1	22.75	23.11	22.78	22.66	22.91	22.60	0
6		Subtest 2	22.74	22.89	22.98	22.81	22.87	22.67	0
6		Subtest 3	21.92	22.16	22.34	22.27	22.28	22.40	0.5
6		Subtest 4	22.20	22.24	21.77	22.46	22.30	22.34	0.5
6	HSUPA	Subtest 1	22.57	22.79	22.64	22.50	22.59	22.99	0
6		Subtest 2	20.59	20.44	20.74	20.97	20.51	20.70	2
6		Subtest 3	21.88	21.88	21.69	21.83	22.10	21.66	1
6		Subtest 4	20.91	20.63	20.66	20.57	20.58	21.10	2
6		Subtest 5	22.52	22.63	22.84	22.32	22.98	22.84	0

Figure 9-3
Power Measurement Setup

9.4 LTE Conducted Powers

9.4.1 LTE Band 12

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

LTE Band 12 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23095 (707.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	24.90	0	0
	1	25	24.85		0
	1	49	**24.97**		0
	25	0	23.77	0-1	1
	25	12	**23.88**		1
	25	25	23.77		1
	50	0	23.80		1
16QAM	1	0	23.77	0-1	1
	1	25	23.88		1
	1	49	23.74		1
	25	0	22.92	0-2	2
	25	12	22.78		2
	25	25	22.82		2
	50	0	22.88		2

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

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

LTE Band 12 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23035 (701.5 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23155 (713.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.76	24.96	24.84	0	0
	1	12	24.86	24.88	24.80		0
	1	24	24.80	24.83	24.86		0
	12	0	24.00	23.70	23.99	0-1	1
	12	6	23.95	23.99	23.97		1
	12	13	23.81	24.00	23.73		1
	25	0	23.86	23.87	23.97		1
16QAM	1	0	23.88	23.75	23.73	0-1	1
	1	12	23.92	23.85	24.03		1
	1	24	23.80	23.97	23.98		1
	12	0	22.73	22.83	22.93	0-2	2
	12	6	22.96	22.87	22.95		2
	12	13	22.87	23.03	23.01		2
	25	0	23.01	22.93	22.85		2

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

LTE Band 12 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23025 (700.5 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23165 (714.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.96	24.90	24.75	0	0
	1	7	24.83	24.74	24.73		0
	1	14	24.82	24.94	24.97		0
	8	0	24.02	23.80	23.91	0-1	1
	8	4	23.79	23.73	23.91		1
	8	7	23.95	23.80	23.75		1
	15	0	23.71	23.73	23.89		1
16QAM	1	0	24.03	23.89	23.79	0-1	1
	1	7	23.86	23.98	23.85		1
	1	14	23.89	23.74	24.01		1
	8	0	22.80	22.85	22.98	0-2	2
	8	4	22.92	22.86	23.01		2
	8	7	22.77	22.85	22.88		2
	15	0	22.71	22.94	22.96		2

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

LTE Band 12 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23017 (699.7 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23173 (715.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.96	24.79	24.80	0	0
	1	2	25.01	24.88	24.73		0
	1	5	24.82	24.72	24.74		0
	3	0	24.77	24.85	24.80		0
	3	2	24.95	25.02	24.78		0
	3	3	24.85	24.97	25.02		0
	6	0	23.92	23.72	24.02	0-1	1
16QAM	1	0	23.80	23.79	24.02	0-1	1
	1	2	23.94	23.99	23.95		1
	1	5	23.74	23.70	23.86		1
	3	0	24.00	23.83	23.99		1
	3	2	23.71	24.01	23.86		1
	3	3	23.89	23.74	23.83		1
	6	0	22.94	22.94	22.78	0-2	2

9.4.2 LTE Band 13

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

LTE Band 13 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	24.47	0	0
	1	25	24.40		0
	1	49	**24.53**		0
	25	0	**23.60**	0-1	1
	25	12	23.45		1
	25	25	23.31		1
	50	0	23.52		1
16QAM	1	0	23.41	0-1	1
	1	25	23.22		1
	1	49	23.29		1
	25	0	22.49	0-2	2
	25	12	22.39		2
	25	25	22.39		2
	50	0	22.51		2

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

LTE Band 13 5 MHz Bandwidth					
Modulation	**RB Size**	**RB Offset**	**Mid Channel** **23230 (782.0 MHz)** **Conducted Power [dBm]**	**MPR Allowed per 3GPP [dB]**	**MPR [dB]**
QPSK	1	0	24.23	0	0
	1	12	24.20		0
	1	24	24.52		0
	12	0	23.52	0-1	1
	12	6	23.40		1
	12	13	23.46		1
	25	0	23.37		1
16QAM	1	0	23.36	0-1	1
	1	12	23.32		1
	1	24	23.30		1
	12	0	22.24	0-2	2
	12	6	22.43		2
	12	13	22.36		2
	25	0	22.45		2

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

9.4.3 LTE Band 5 (Cell)

Table 9-12
LTE Band 5 (Cell) 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	**24.97**	0	0
	1	25	24.96		0
	1	49	24.79		0
	25	0	23.88	0-1	1
	25	12	23.93		1
	25	25	**24.07**		1
	50	0	23.89		1
16QAM	1	0	23.72	0-1	1
	1	25	23.80		1
	1	49	24.00		1
	25	0	22.71	0-2	2
	25	12	22.75		2
	25	25	22.76		2
	50	0	22.79		2

Note: LTE Band 5 (Cell) at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

Table 9-13
LTE Band 5 (Cell) Conducted Powers - 5 MHz Bandwidth

LTE Band 5 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20425 (826.5 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20625 (846.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.80	25.07	24.81	0	0
	1	12	24.93	24.72	24.84		0
	1	24	25.09	25.09	24.97		0
	12	0	23.97	23.71	23.89	0-1	1
	12	6	23.99	23.90	23.80		1
	12	13	23.86	23.74	23.87		1
	25	0	24.07	23.94	24.03		1
16QAM	1	0	23.79	23.77	23.89	0-1	1
	1	12	23.88	23.81	23.96		1
	1	24	23.81	23.83	23.95		1
	12	0	22.89	23.04	22.92	0-2	2
	12	6	22.91	22.98	22.78		2
	12	13	22.77	23.08	22.81		2
	25	0	22.89	22.85	22.94		2

Table 9-14
LTE Band 5 (Cell) Conducted Powers - 3 MHz Bandwidth

LTE Band 5 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20415 (825.5 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20635 (847.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.80	24.92	24.97	0	0
	1	7	24.91	24.84	25.05		0
	1	14	25.06	25.09	24.71		0
	8	0	24.07	23.96	23.96	0-1	1
	8	4	23.90	23.97	24.02		1
	8	7	23.70	24.01	23.80		1
	15	0	23.90	23.95	23.99		1
16QAM	1	0	24.10	23.86	23.78	0-1	1
	1	7	23.81	23.87	23.80		1
	1	14	23.96	23.91	23.99		1
	8	0	22.84	23.07	22.88	0-2	2
	8	4	22.91	22.90	22.74		2
	8	7	22.78	22.72	23.03		2
	15	0	23.04	23.04	22.93		2

Table 9-15
LTE Band 5 (Cell) Conducted Powers -1.4 MHz Bandwidth

LTE Band 5 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20407 (824.7 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20643 (848.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.93	24.80	24.96	0	0
	1	2	24.88	24.71	24.91		0
	1	5	24.92	24.94	24.76		0
	3	0	24.92	24.99	25.00		0
	3	2	25.05	24.78	25.00		0
	3	3	24.79	24.94	24.88		0
	6	0	23.84	24.01	23.82	0-1	1
16QAM	1	0	24.08	23.98	23.79	0-1	1
	1	2	24.08	23.90	24.00		1
	1	5	23.86	23.72	24.03		1
	3	0	24.00	24.01	23.86		1
	3	2	23.97	23.82	23.80		1
	3	3	23.87	23.72	23.72		1
	6	0	22.82	23.03	22.99	0-2	2

9.4.4 LTE Band 4 (AWS)

Table 9-16
LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth

LTE Band 4 (AWS) 20 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20175 (1732.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	24.40	0	0
	1	50	24.56		0
	1	99	**24.67**		0
	50	0	23.49	0-1	1
	50	25	**23.63**		1
	50	50	23.40		1
	100	0	23.62		1
16QAM	1	0	23.43	0-1	1
	1	50	23.63		1
	1	99	23.45		1
	50	0	22.55	0-2	2
	50	25	22.59		2
	50	50	22.61		2
	100	0	22.41		2

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

Table 9-17
LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth

LTE Band 4 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20025 (1717.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20325 (1747.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.40	24.44	24.53	0	0
	1	36	24.67	24.44	24.43		0
	1	74	24.53	24.63	24.57		0
	36	0	23.62	23.67	23.37	0-1	1
	36	18	23.51	23.55	23.44		1
	36	37	23.48	23.65	23.66		1
	75	0	23.65	23.50	23.65		1
16QAM	1	0	23.69	23.62	23.52	0-1	1
	1	36	23.64	23.44	23.48		1
	1	74	23.42	23.63	23.58		1
	36	0	22.51	22.45	22.63	0-2	2
	36	18	22.60	22.68	22.56		2
	36	37	22.43	22.45	22.65		2
	75	0	22.40	22.63	22.40		2

Table 9-18
LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth

LTE Band 4 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20000 (1715.0 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20350 (1750.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.60	24.56	24.48	0	0
	1	25	24.62	24.53	24.61		0
	1	49	24.55	24.69	24.48		0
	25	0	23.62	23.65	23.43	0-1	1
	25	12	23.63	23.53	23.39		1
	25	25	23.53	23.38	23.55		1
	50	0	23.43	23.41	23.47		1
16QAM	1	0	23.62	23.43	23.46	0-1	1
	1	25	23.54	23.53	23.52		1
	1	49	23.43	23.38	23.58		1
	25	0	22.50	22.37	22.54	0-2	2
	25	12	22.47	22.48	22.63		2
	25	25	22.55	22.66	22.42		2
	50	0	22.50	22.61	22.43		2

Table 9-19
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

LTE Band 4 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 19975 (1712.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20375 (1752.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.44	24.51	24.60	0	0
	1	12	24.38	24.70	24.38		0
	1	24	24.69	24.43	24.45		0
	12	0	23.44	23.43	23.43	0-1	1
	12	6	23.68	23.38	23.39		1
	12	13	23.66	23.45	23.45		1
	25	0	23.51	23.65	23.58		1
16QAM	1	0	23.67	23.58	23.60	0-1	1
	1	12	23.51	23.65	23.63		1
	1	24	23.51	23.61	23.65		1
	12	0	22.56	22.55	22.49	0-2	2
	12	6	22.44	22.56	22.46		2
	12	13	22.64	22.44	22.40		2
	25	0	22.54	22.60	22.37		2

Table 9-20
LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth

LTE Band 4 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 19965 (1711.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20385 (1753.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.60	24.63	24.54	0	0
	1	7	24.61	24.60	24.41		0
	1	14	24.68	24.64	24.43		0
	8	0	23.55	23.44	23.51	0-1	1
	8	4	23.68	23.42	23.48		1
	8	7	23.49	23.61	23.47		1
	15	0	23.66	23.49	23.49		1
16QAM	1	0	23.51	23.50	23.54	0-1	1
	1	7	23.52	23.67	23.60		1
	1	14	23.60	23.66	23.53		1
	8	0	22.49	22.44	22.52	0-2	2
	8	4	22.65	22.65	22.56		2
	8	7	22.41	22.41	22.47		2
	15	0	22.51	22.64	22.54		2

Table 9-21
LTE Band 4 (AWS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 4 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 19957 (1710.7 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20393 (1754.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.55	24.42	24.46	0	0
	1	2	24.61	24.64	24.43		0
	1	5	24.66	24.59	24.50		0
	3	0	24.48	24.66	24.64		0
	3	2	24.68	24.69	24.50		0
	3	3	24.52	24.63	24.47		0
	6	0	23.55	23.60	23.39	0-1	1
16QAM	1	0	23.63	23.44	23.63	0-1	1
	1	2	23.38	23.40	23.63		1
	1	5	23.64	23.43	23.43		1
	3	0	23.41	23.43	23.46		1
	3	2	23.62	23.60	23.42		1
	3	3	23.54	23.45	23.57		1
	6	0	22.58	22.60	22.39	0-2	2

Table 9-22
LTE Band 4 (AWS) Reduced Conducted Powers - 20 MHz Bandwidth

LTE Band 4 (AWS) 20 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20175 (1732.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	23.38	0	0
	1	50	23.27		0
	1	99	**23.50**		0
	50	0	**23.44**	0-1	0
	50	25	23.36		0
	50	50	23.26		0
	100	0	23.25		0
16QAM	1	0	23.28	0-1	0
	1	50	23.34		0
	1	99	23.39		0
	50	0	22.19	0-2	1
	50	25	22.49		1
	50	50	22.38		1
	100	0	22.38		1

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

Table 9-23
LTE Band 4 (AWS) Reduced Conducted Powers - 15 MHz Bandwidth

LTE Band 4 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20025 (1717.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20325 (1747.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.18	23.40	23.24	0	0
	1	36	23.46	23.27	23.47		0
	1	74	23.18	23.46	23.50		0
	36	0	23.33	23.17	23.29	0-1	0
	36	18	23.29	23.26	23.20		0
	36	37	23.26	23.22	23.48		0
	75	0	23.17	23.44	23.45		0
16QAM	1	0	23.22	23.19	23.24	0-1	0
	1	36	23.17	23.44	23.41		0
	1	74	23.23	23.26	23.26		0
	36	0	22.35	22.47	22.44	0-2	1
	36	18	22.27	22.43	22.31		1
	36	37	22.25	22.29	22.43		1
	75	0	22.39	22.26	22.46		1

Table 9-24
LTE Band 4 (AWS) Reduced Conducted Powers - 10 MHz Bandwidth

LTE Band 4 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20000 (1715.0 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20350 (1750.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.28	23.40	23.37	0	0
	1	25	23.35	23.27	23.21		0
	1	49	23.34	23.20	23.24		0
	25	0	23.31	23.21	23.38	0-1	0
	25	12	23.43	23.45	23.28		0
	25	25	23.18	23.41	23.20		0
	50	0	23.36	23.39	23.31		0
16QAM	1	0	23.26	23.35	23.36	0-1	0
	1	25	23.48	23.49	23.39		0
	1	49	23.44	23.46	23.38		0
	25	0	22.38	22.49	22.47	0-2	1
	25	12	22.17	22.34	22.41		1
	25	25	22.29	22.25	22.45		1
	50	0	22.48	22.23	22.23		1

Table 9-25
LTE Band 4 (AWS) Reduced Conducted Powers - 5 MHz Bandwidth

LTE Band 4 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 19975 (1712.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20375 (1752.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.46	23.18	23.17	0	0
	1	12	23.36	23.23	23.27		0
	1	24	23.25	23.19	23.21		0
	12	0	23.48	23.45	23.50	0-1	0
	12	6	23.32	23.19	23.18		0
	12	13	23.30	23.17	23.38		0
	25	0	23.35	23.25	23.32		0
16QAM	1	0	23.46	23.25	23.18	0-1	0
	1	12	23.28	23.20	23.21		0
	1	24	23.48	23.17	23.50		0
	12	0	22.35	22.27	22.37	0-2	1
	12	6	22.30	22.19	22.36		1
	12	13	22.18	22.25	22.30		1
	25	0	22.49	22.49	22.32		1

Table 9-26
LTE Band 4 (AWS) Reduced Conducted Powers - 3 MHz Bandwidth

LTE Band 4 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 19965 (1711.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20385 (1753.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.39	23.17	23.21	0	0
	1	7	23.46	23.43	23.20		0
	1	14	23.37	23.27	23.20		0
	8	0	23.36	23.41	23.22	0-1	0
	8	4	23.29	23.50	23.18		0
	8	7	23.24	23.50	23.20		0
	15	0	23.49	23.35	23.33		0
16QAM	1	0	23.37	23.47	23.20	0-1	0
	1	7	23.33	23.29	23.31		0
	1	14	23.48	23.22	23.49		0
	8	0	22.39	22.35	22.18	0-2	1
	8	4	22.41	22.38	22.40		1
	8	7	22.21	22.35	22.31		1
	15	0	22.22	22.40	22.38		1

Table 9-27
LTE Band 4 (AWS) Reduced Conducted Powers -1.4 MHz Bandwidth

LTE Band 4 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 19957 (1710.7 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20393 (1754.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.24	23.25	23.28	0	0
	1	2	23.44	23.48	23.33		0
	1	5	23.20	23.37	23.29		0
	3	0	23.35	23.35	23.42		0
	3	2	23.31	23.25	23.21		0
	3	3	23.18	23.41	23.22		0
	6	0	23.24	23.18	23.48	0-1	0
16QAM	1	0	23.48	23.39	23.31	0-1	0
	1	2	23.18	23.31	23.31		0
	1	5	23.28	23.18	23.47		0
	3	0	23.20	23.23	23.29		0
	3	2	23.24	23.44	23.27		0
	3	3	23.18	23.24	23.48		0
	6	0	22.47	22.28	22.33	0-2	1

9.4.5 LTE Band 25 (PCS)

Table 9-28
LTE Band 25 (PCS) 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	24.31	24.23	24.09	0	0
	1	50	24.23	**24.35**	24.33		0
	1	99	24.08	24.11	24.15		0
	50	0	23.11	23.15	**23.38**	0-1	1
	50	25	23.27	23.34	23.37		1
	50	50	23.26	23.27	23.21		1
	100	0	23.16	23.25	23.16		1
16QAM	1	0	23.33	23.16	23.28	0-1	1
	1	50	23.27	23.37	23.32		1
	1	99	23.28	23.33	23.21		1
	50	0	22.18	22.26	22.36	0-2	2
	50	25	22.28	22.35	22.33		2
	50	50	22.32	22.16	22.11		2
	100	0	22.16	22.19	22.24		2

Table 9-29
LTE Band 25 (PCS) Conducted Powers - 15 MHz Bandwidth

LTE Band 25 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26115 (1857.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26615 (1907.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.10	24.27	24.23	0	0
	1	36	24.19	24.25	24.37		0
	1	74	24.18	24.23	24.20		0
	36	0	23.11	23.26	23.16	0-1	1
	36	18	23.28	23.11	23.38		1
	36	37	23.36	23.31	23.29		1
	75	0	23.20	23.29	23.12		1
16QAM	1	0	23.17	23.09	23.07	0-1	1
	1	36	23.07	23.18	23.35		1
	1	74	23.10	23.38	23.13		1
	36	0	22.07	22.34	22.26	0-2	2
	36	18	22.16	22.10	22.37		2
	36	37	22.39	22.33	22.27		2
	75	0	22.09	22.30	22.27		2

Table 9-30
LTE Band 25 (PCS) Conducted Powers - 10 MHz Bandwidth

LTE Band 25 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26090 (1855.0 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26640 (1910.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.07	24.09	24.10	0	0
	1	25	24.34	24.20	24.12		0
	1	49	24.13	24.15	24.18		0
	25	0	23.18	23.16	23.14	0-1	1
	25	12	23.28	23.23	23.40		1
	25	25	23.38	23.37	23.38		1
	50	0	23.30	23.31	23.10		1
16QAM	1	0	23.32	23.32	23.25	0-1	1
	1	25	23.26	23.22	23.07		1
	1	49	23.37	23.18	23.32		1
	25	0	22.15	22.10	22.23	0-2	2
	25	12	22.22	22.21	22.37		2
	25	25	22.40	22.08	22.25		2
	50	0	22.39	22.09	22.36		2

Table 9-31
LTE Band 25 (PCS) Conducted Powers - 5 MHz Bandwidth

LTE Band 25 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26065 (1852.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26665 (1912.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.14	24.15	24.09	0	0
	1	12	24.08	24.07	24.23		0
	1	24	24.17	24.25	24.21		0
	12	0	23.39	23.18	23.21	0-1	1
	12	6	23.23	23.14	23.20		1
	12	13	23.23	23.13	23.18		1
	25	0	23.15	23.26	23.29		1
16QAM	1	0	23.22	23.17	23.30	0-1	1
	1	12	23.23	23.11	23.10		1
	1	24	23.17	23.35	23.27		1
	12	0	22.22	22.20	22.16	0-2	2
	12	6	22.22	22.37	22.19		2
	12	13	22.27	22.07	22.34		2
	25	0	22.39	22.12	22.08		2

Table 9-32
LTE Band 25 (PCS) Conducted Powers - 3 MHz Bandwidth

LTE Band 25 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26055 (1851.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26675 (1913.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.12	24.12	24.22	0	0
	1	7	24.15	24.21	24.09		0
	1	14	24.09	24.23	24.38		0
	8	0	23.37	23.36	23.16	0-1	1
	8	4	23.32	23.26	23.28		1
	8	7	23.08	23.11	23.18		1
	15	0	23.15	23.17	23.22		1
16QAM	1	0	23.13	23.31	23.31	0-1	1
	1	7	23.15	23.09	23.29		1
	1	14	23.20	23.28	23.27		1
	8	0	22.22	22.08	22.19	0-2	2
	8	4	22.17	22.24	22.12		2
	8	7	22.28	22.32	22.35		2
	15	0	22.18	22.20	22.25		2

Table 9-33
LTE Band 25 (PCS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 25 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26047 (1850.7 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26683 (1914.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.22	24.10	24.18	0	0
	1	2	24.34	24.21	24.11		0
	1	5	24.21	24.15	24.09		0
	3	0	24.27	24.25	24.07		0
	3	2	24.27	24.36	24.29		0
	3	3	24.26	24.15	24.14		0
	6	0	23.12	23.31	23.28	0-1	1
16QAM	1	0	23.39	23.18	23.16	0-1	1
	1	2	23.37	23.18	23.36		1
	1	5	23.33	23.36	23.25		1
	3	0	23.18	23.18	23.32		1
	3	2	23.12	23.36	23.25		1
	3	3	23.30	23.10	23.10		1
	6	0	22.40	22.31	22.37	0-2	2

Table 9-34
LTE Band 25 (PCS) Reduced 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	22.79	22.95	23.08	0	0
	1	50	**23.12**	23.08	22.75		0
	1	99	22.70	22.89	22.96		0
	50	0	22.73	22.92	22.70	0-1	0
	50	25	22.84	23.02	22.77		0
	50	50	22.76	22.73	**23.15**		0
	100	0	22.80	22.89	22.84		0
16QAM	1	0	22.91	22.70	22.75	0-1	0
	1	50	23.06	22.87	23.06		0
	1	99	22.70	23.07	22.89		0
	50	0	21.82	22.14	21.76	0-2	1
	50	25	21.93	22.08	22.13		1
	50	50	21.81	21.92	21.94		1
	100	0	21.83	21.81	22.01		1

Table 9-35
LTE Band 25 (PCS) Reduced Conducted Powers - 15 MHz Bandwidth

LTE Band 25 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26115 (1857.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26615 (1907.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.88	22.95	23.01	0	0
	1	36	22.96	23.07	22.86		0
	1	74	23.12	23.02	22.95		0
	36	0	23.07	22.75	23.10	0-1	0
	36	18	22.97	23.01	22.90		0
	36	37	23.14	22.81	22.98		0
	75	0	22.93	22.74	22.94		0
16QAM	1	0	22.85	23.04	22.76	0-1	0
	1	36	22.75	23.00	22.84		0
	1	74	22.76	22.96	22.86		0
	36	0	21.94	22.02	22.12	0-2	1
	36	18	22.01	21.87	21.76		1
	36	37	22.04	22.11	21.98		1
	75	0	21.94	21.79	22.04		1

Table 9-36
LTE Band 25 (PCS) Reduced Conducted Powers - 10 MHz Bandwidth

LTE Band 25 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26090 (1855.0 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26640 (1910.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.07	23.06	22.74	0	0
	1	25	22.89	22.97	22.88		0
	1	49	23.11	22.73	23.06		0
	25	0	23.04	22.85	22.80	0-1	0
	25	12	22.86	22.89	22.95		0
	25	25	22.75	22.87	22.73		0
	50	0	22.81	23.07	22.96		0
16QAM	1	0	23.07	22.78	23.01	0-1	0
	1	25	22.79	22.72	22.84		0
	1	49	23.08	22.80	22.86		0
	25	0	21.75	21.89	22.13	0-2	1
	25	12	21.75	21.96	21.81		1
	25	25	22.10	22.04	21.90		1
	50	0	21.93	22.06	22.05		1

Table 9-37
LTE Band 25 (PCS) Reduced Conducted Powers - 5 MHz Bandwidth

LTE Band 25 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26065 (1852.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26665 (1912.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.05	22.94	22.91	0	0
	1	12	22.82	22.90	22.77		0
	1	24	23.01	22.95	22.97		0
	12	0	22.77	23.09	23.06	0-1	0
	12	6	22.92	22.81	22.90		0
	12	13	23.05	22.72	22.90		0
	25	0	23.11	22.76	22.91		0
16QAM	1	0	22.72	22.98	22.96	0-1	0
	1	12	23.11	23.15	22.90		0
	1	24	22.83	23.08	23.14		0
	12	0	21.78	22.00	21.73	0-2	1
	12	6	21.72	21.70	22.02		1
	12	13	22.13	21.72	22.10		1
	25	0	21.74	22.01	22.15		1

Table 9-38
LTE Band 25 (PCS) Reduced Conducted Powers - 3 MHz Bandwidth

LTE Band 25 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26055 (1851.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26675 (1913.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.02	22.92	22.77	0	0
	1	7	22.88	22.86	23.13		0
	1	14	22.70	22.78	22.87		0
	8	0	23.04	23.13	22.86	0-1	0
	8	4	22.79	22.94	22.92		0
	8	7	22.74	22.97	22.84		0
	15	0	23.14	22.73	22.78		0
16QAM	1	0	22.86	22.86	23.15	0-1	0
	1	7	22.92	22.85	23.10		0
	1	14	23.00	23.09	23.11		0
	8	0	21.95	21.71	22.13	0-2	1
	8	4	22.13	22.05	22.00		1
	8	7	22.01	22.13	22.09		1
	15	0	21.77	21.78	21.87		1

Table 9-39
LTE Band 25 (PCS) Reduced Conducted Powers -1.4 MHz Bandwidth

LTE Band 25 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26047 (1850.7 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26683 (1914.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.15	22.75	23.14	0	0
	1	2	22.90	23.04	23.11		0
	1	5	23.02	22.88	22.81		0
	3	0	22.90	22.94	22.84		0
	3	2	22.74	22.97	23.13		0
	3	3	23.14	22.73	22.89		0
	6	0	22.75	23.00	23.11	0-1	0
16QAM	1	0	23.10	22.88	23.09	0-1	0
	1	2	22.86	22.93	23.08		0
	1	5	22.98	23.05	22.81		0
	3	0	23.00	22.74	23.13		0
	3	2	22.82	22.97	23.12		0
	3	3	23.14	23.02	22.93		0
	6	0	21.88	21.80	22.00	0-2	1

9.5 WLAN Conducted Powers

Table 9-40
2.4 GHz WLAN Maximum Average RF Power

2.4GHz Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11b	802.11g	802.11n
		Average	Average	Average
2412	1	15.02	14.22	13.14
2417	2	N/A	14.98	13.82
2437	6	15.25	15.28	14.39
2457	10	N/A	15.42	14.49
2462	11	15.46	12.80	11.78

Table 9-41
5 GHz WLAN Maximum Average RF Power

5GHz (20MHz) Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11a	802.11n	802.11ac
		Average	Average	Average
5180	36	13.12	13.07	13.17
5200	40	13.04	13.15	13.04
5220	44	13.07	13.10	13.07
5240	48	13.11	13.06	13.17
5260	52	13.17	13.09	13.10
5280	56	13.01	13.12	13.01
5300	60	13.07	13.18	13.17
5320	64	13.17	13.21	13.15
5500	100	13.21	13.14	13.16
5580	116	13.41	13.47	13.34
5660	132	13.46	13.39	13.47
5720	144	13.09	13.07	12.95
5745	149	13.25	13.37	13.37
5785	157	13.42	13.43	13.32
5825	165	13.27	13.47	13.42

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

- Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
- For transmission modes with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
- For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.
- For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.
- Per RSS-247 Section 6.2.3, transmission on channels which overlap the 5600-5650 MHz is prohibited. This device operates under these frequencies only under the control of a certified master device and does not support active scanning on these channels. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Band.

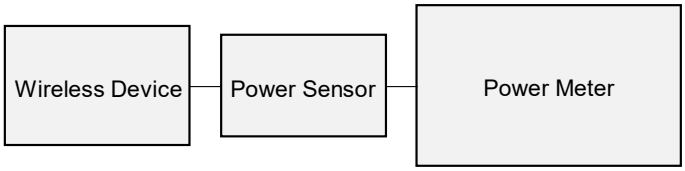


Figure 9-4
Power Measurement Setup

9.6 Bluetooth Conducted Powers

Table 9-42
Bluetooth Average RF Power

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
			[dBm]	[mW]
2402	1.0	0	9.69	9.310
2441	1.0	39	**10.77**	11.946
2480	1.0	78	9.67	9.263
2402	2.0	0	9.04	8.024
2441	2.0	39	10.12	10.275
2480	2.0	78	9.01	7.969
2402	3.0	0	9.11	8.149
2441	3.0	39	10.18	10.413
2480	3.0	78	9.08	8.083

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

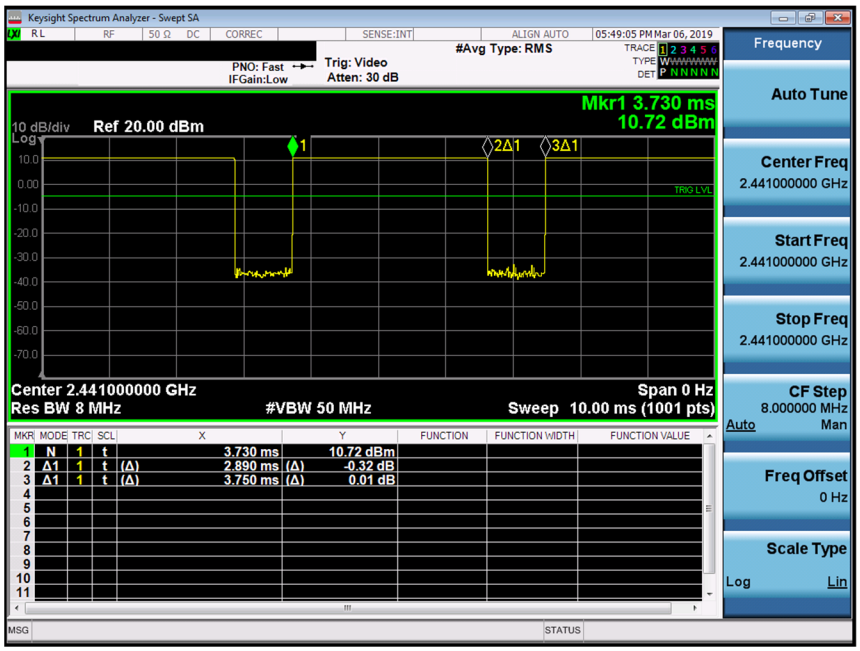


Figure 9-5
Bluetooth Transmission Plot

Equation 9-1
Bluetooth Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.89ms}{3.75ms} * 100\% = 77.1\%$$

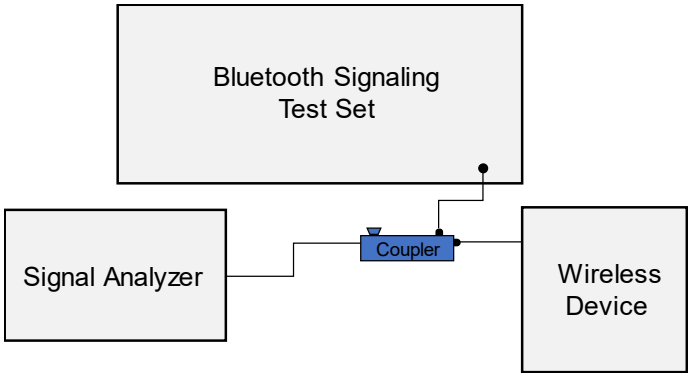


Figure 9-6
Power Measurement Setup

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Tissue Properties- Head

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (°C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
3/7/2019	750H	20.7	740	0.875	42.362	0.893	41.994	-2.02%	0.88%
			755	0.879	42.338	0.894	41.916	-1.68%	1.01%
			770	0.885	42.297	0.895	41.838	-1.12%	1.10%
			785	0.891	42.251	0.896	41.760	-0.56%	1.18%
3/14/2019	750H	20.9	700	0.876	42.197	0.889	42.201	-1.46%	-0.01%
			710	0.880	42.164	0.890	42.149	-1.12%	0.04%
			720	0.883	42.129	0.891	42.097	-0.90%	0.08%
			740	0.890	42.063	0.893	41.994	-0.34%	0.16%
			755	0.895	42.023	0.894	41.916	0.11%	0.26%
3/11/2019	835H	22.4	820	0.934	41.301	0.899	41.578	3.89%	-0.67%
			835	0.940	41.259	0.900	41.500	4.44%	-0.58%
			850	0.945	41.217	0.916	41.500	3.17%	-0.68%
3/13/2019	835H	20.9	820	0.920	41.806	0.899	41.578	2.34%	0.55%
			835	0.925	41.763	0.900	41.500	2.78%	0.63%
			850	0.930	41.727	0.916	41.500	1.53%	0.55%
3/4/2019	1750H	21.5	1710	1.361	39.054	1.348	40.142	0.96%	-2.71%
			1750	1.404	38.865	1.371	40.079	2.41%	-3.03%
			1790	1.444	38.659	1.394	40.016	3.59%	-3.39%
2/28/2019	1900H	21.8	1850	1.426	39.181	1.400	40.000	1.86%	-2.05%
			1880	1.445	39.140	1.400	40.000	3.21%	-2.15%
			1910	1.464	39.076	1.400	40.000	4.57%	-2.31%
3/14/2019	1900H	20.8	1850	1.380	38.293	1.400	40.000	-1.43%	-4.27%
			1880	1.398	38.255	1.400	40.000	-0.14%	-4.36%
			1910	1.416	38.211	1.400	40.000	1.14%	-4.47%
3/11/2019	2450H	20.2	2400	1.795	39.420	1.756	39.289	2.22%	0.33%
			2450	1.835	39.315	1.800	39.200	1.94%	0.29%
			2500	1.877	39.239	1.855	39.136	1.19%	0.26%
03/04/2019	5200H-5800H	21.7	5180	4.494	35.207	4.635	36.009	-3.04%	-2.23%
			5200	4.515	35.174	4.655	35.986	-3.01%	-2.26%
			5220	4.535	35.129	4.676	35.963	-3.02%	-2.32%
			5240	4.555	35.094	4.696	35.940	-3.00%	-2.35%
			5260	4.577	35.062	4.717	35.917	-2.97%	-2.38%
			5280	4.601	35.018	4.737	35.894	-2.87%	-2.44%
			5300	4.623	34.987	4.758	35.871	-2.84%	-2.46%
			5320	4.646	34.959	4.778	35.849	-2.76%	-2.48%
			5500	4.846	34.630	4.963	35.643	-2.36%	-2.84%
			5520	4.872	34.589	4.983	35.620	-2.23%	-2.89%
			5540	4.899	34.547	5.004	35.597	-2.10%	-2.95%
			5560	4.925	34.519	5.024	35.574	-1.97%	-2.97%
			5580	4.947	34.490	5.045	35.551	-1.94%	-2.98%
			5600	4.970	34.450	5.065	35.529	-1.88%	-3.04%
			5620	4.994	34.404	5.086	35.506	-1.81%	-3.10%
			5640	5.018	34.366	5.106	35.483	-1.72%	-3.15%
			5660	5.046	34.328	5.127	35.460	-1.58%	-3.19%
			5680	5.070	34.302	5.147	35.437	-1.50%	-3.20%
			5700	5.091	34.275	5.168	35.414	-1.49%	-3.22%
			5745	5.145	34.196	5.214	35.363	-1.32%	-3.30%
			5765	5.168	34.155	5.234	35.340	-1.26%	-3.35%
			5785	5.190	34.118	5.255	35.317	-1.24%	-3.39%
			5800	5.210	34.087	5.270	35.300	-1.14%	-3.44%
			5805	5.216	34.077	5.275	35.294	-1.12%	-3.45%
			5825	5.238	34.055	5.296	35.271	-1.10%	-3.45%
03/21/2019	5750H	20.5	5745	5.132	34.070	5.214	35.363	-1.57%	-3.66%
			5765	5.153	34.038	5.234	35.340	-1.55%	-3.68%
			5785	5.175	33.995	5.255	35.317	-1.52%	-3.74%

Table 10-2
Measured Tissue Properties- Body

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (°C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
3/12/2019	750B	20.8	700	0.939	54.905	0.959	55.726	-2.09%	-1.47%
			710	0.943	54.883	0.960	55.687	-1.77%	-1.44%
			720	0.947	54.863	0.961	55.648	-1.46%	-1.41%
			740	0.954	54.823	0.963	55.570	-0.93%	-1.34%
			755	0.960	54.790	0.964	55.512	-0.41%	-1.30%
			770	0.965	54.759	0.965	55.453	0.00%	-1.25%
			785	0.971	54.735	0.966	55.395	0.52%	-1.19%
3/6/2019	835B	21.4	820	0.948	53.490	0.969	55.258	-2.17%	-3.20%
			835	0.963	53.334	0.970	55.200	-0.72%	-3.38%
			850	0.979	53.174	0.988	55.154	-0.91%	-3.59%
3/3/2019	1750B	22.0	1710	1.485	51.614	1.463	53.537	1.50%	-3.59%
			1750	1.530	51.428	1.488	53.432	2.82%	-3.75%
			1790	1.573	51.254	1.514	53.326	3.90%	-3.89%
3/5/2019	1750B	20.5	1710	1.457	51.040	1.463	53.537	-0.41%	-4.66%
			1750	1.506	50.878	1.488	53.432	1.21%	-4.78%
			1790	1.553	50.714	1.514	53.326	2.58%	-4.90%
3/11/2019	1750B	20.8	1710	1.460	51.020	1.463	53.537	-0.21%	-4.70%
			1750	1.503	50.840	1.488	53.432	1.01%	-4.85%
			1790	1.545	50.679	1.514	53.326	2.05%	-4.96%
2/27/2019	1900B	21.1	1850	1.499	51.828	1.520	53.300	-1.38%	-2.76%
			1880	1.532	51.722	1.520	53.300	0.79%	-2.96%
			1910	1.567	51.612	1.520	53.300	3.09%	-3.17%
3/12/2019	1900B	23.0	1850	1.516	52.324	1.520	53.300	-0.26%	-1.83%
			1880	1.549	52.228	1.520	53.300	1.91%	-2.01%
			1910	1.582	52.142	1.520	53.300	4.08%	-2.17%
3/6/2019	2450B	20.6	2400	1.974	50.822	1.902	52.767	3.79%	-3.69%
			2450	2.039	50.675	1.950	52.700	4.56%	-3.84%
			2500	2.098	50.490	2.021	52.636	3.81%	-4.08%
3/10/2019	2450B	23.6	2400	1.983	51.078	1.902	52.767	4.26%	-3.20%
			2450	2.041	50.934	1.950	52.700	4.67%	-3.35%
			2500	2.098	50.788	2.021	52.636	3.81%	-3.51%
03/08/2019	5200B-5800B	19.9	5180	5.302	47.597	5.276	49.041	0.49%	-2.94%
			5200	5.334	47.561	5.299	49.014	0.66%	-2.96%
			5220	5.360	47.535	5.323	48.987	0.70%	-2.96%
			5240	5.388	47.516	5.346	48.960	0.79%	-2.95%
			5260	5.423	47.420	5.369	48.933	1.01%	-3.09%
			5280	5.445	47.417	5.393	48.906	0.96%	-3.04%
			5300	5.465	47.350	5.416	48.879	0.90%	-3.13%
			5320	5.488	47.300	5.439	48.851	0.90%	-3.17%
			5500	5.751	46.992	5.650	48.607	1.79%	-3.32%
			5520	5.783	46.965	5.673	48.580	1.94%	-3.32%
			5540	5.810	46.942	5.696	48.553	2.00%	-3.32%
			5560	5.841	46.903	5.720	48.526	2.12%	-3.34%
			5580	5.887	46.863	5.743	48.499	2.51%	-3.37%
			5600	5.901	46.781	5.766	48.471	2.34%	-3.49%
			5620	5.932	46.763	5.790	48.444	2.45%	-3.47%
			5640	5.964	46.712	5.813	48.417	2.60%	-3.52%
			5660	5.995	46.669	5.837	48.390	2.71%	-3.56%
			5680	6.021	46.638	5.860	48.363	2.75%	-3.57%
			5700	6.061	46.619	5.883	48.336	3.03%	-3.55%
			5745	6.134	46.528	5.936	48.275	3.34%	-3.62%
			5765	6.150	46.519	5.959	48.248	3.21%	-3.58%
			5785	6.177	46.468	5.982	48.220	3.26%	-3.63%
			5800	6.190	46.409	6.000	48.200	3.17%	-3.72%
			5805	6.204	46.399	6.006	48.193	3.30%	-3.72%
			5825	6.235	46.386	6.029	48.166	3.42%	-3.70%

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

10.2 Test System Verification

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

Table 10-3
System Verification Results- 1g

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	$Deviation_{1g}$ (%)
H	750	HEAD	03/14/2019	21.9	20.9	0.200	1003	7409	1.680	8.280	8.400	1.45%
H	750	HEAD	03/07/2019	21.6	20.7	0.200	1161	7409	1.580	8.030	7.900	-1.62%
H	835	HEAD	03/11/2019	20.9	22.4	0.200	4d132	7409	2.040	9.590	10.200	6.36%
H	835	HEAD	03/13/2019	21.6	20.6	0.200	4d133	7409	2.000	9.430	10.000	6.04%
D	1750	HEAD	03/04/2019	22.0	21.5	0.100	1150	7357	3.590	36.500	35.900	-1.64%
G	1900	HEAD	02/28/2019	23.8	21.8	0.100	5d080	7410	4.020	39.800	40.200	1.01%
E	1900	HEAD	03/14/2019	22.5	20.6	0.100	5d080	3589	3.880	39.800	38.800	-2.51%
E	2450	HEAD	03/11/2019	24.0	20.3	0.100	981	3589	5.180	52.300	51.800	-0.96%
H	5250	HEAD	03/04/2019	20.5	21.7	0.050	1057	7409	3.700	79.200	74.000	-6.57%
H	5600	HEAD	03/04/2019	20.5	21.7	0.050	1057	7409	3.960	84.100	79.200	-5.83%
H	5750	HEAD	03/04/2019	20.5	21.7	0.050	1057	7409	3.770	80.500	75.400	-6.34%
H	5750	HEAD	03/21/2019	21.1	20.5	0.050	1057	7409	3.830	80.500	76.600	-4.84%
L	750	BODY	03/12/2019	23.5	20.0	0.200	1161	7308	1.670	8.430	8.350	-0.95%
D	835	BODY	03/06/2019	22.3	21.4	0.200	4d132	7357	2.080	9.670	10.400	7.55%
G	1750	BODY	03/03/2019	20.7	21.5	0.100	1148	7410	3.760	37.000	37.600	1.62%
G	1750	BODY	03/05/2019	21.1	20.5	0.100	1150	7410	3.920	36.600	39.200	7.10%
J	1900	BODY	02/27/2019	23.3	21.1	0.100	5d149	7488	4.140	39.400	41.400	5.08%
K	2450	BODY	03/06/2019	22.6	20.6	0.100	719	7417	4.780	50.100	47.800	-4.59%
K	2450	BODY	03/10/2019	21.9	23.6	0.100	719	7417	4.850	50.100	48.500	-3.19%
L	5250	BODY	03/08/2019	22.2	20.5	0.050	1191	7308	3.610	77.000	72.200	-6.23%
L	5600	BODY	03/08/2019	22.2	20.5	0.050	1191	7308	4.020	79.200	80.400	1.52%
L	5750	BODY	03/08/2019	22.2	20.5	0.050	1191	7308	3.620	76.100	72.400	-4.86%

Table 10-4
System Verification Results- 10g

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR_{10g} (W/kg)	1 W Target SAR_{10g} (W/kg)	1 W Normalized SAR_{10g} (W/kg)	$Deviation_{10g}$ (%)
G	1750	BODY	03/05/2019	21.1	20.5	0.100	1150	7410	2.060	19.400	20.600	6.19%
G	1750	BODY	03/11/2019	21.3	20.8	0.100	1150	7410	1.980	19.400	19.800	2.06%
J	1900	BODY	02/27/2019	23.3	21.1	0.100	5d149	7488	2.080	20.700	20.800	0.48%
G	1900	BODY	03/12/2019	23.5	23.0	0.100	5d080	7410	2.160	20.600	21.600	4.85%
L	5250	BODY	03/08/2019	22.2	20.5	0.050	1191	7308	1.000	21.600	20.000	-7.41%
L	5600	BODY	03/08/2019	22.2	20.5	0.050	1191	7308	1.110	22.200	22.200	0.00%
L	5750	BODY	03/08/2019	22.2	20.5	0.050	1191	7308	1.010	21.200	20.200	-4.72%

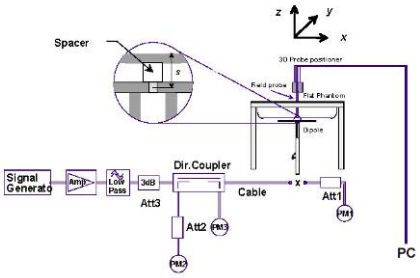


Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 850 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	32.7	32.66	-0.12	Right	Cheek	00119	1	1:8.3	0.205	1.009	0.207	
836.60	190	GSM 850	GSM	32.7	32.66	0.16	Right	Tilt	00119	1	1:8.3	0.098	1.009	0.099	
836.60	190	GSM 850	GSM	32.7	32.66	-0.08	Left	Cheek	00119	1	1:8.3	0.169	1.009	0.171	
836.60	190	GSM 850	GSM	32.7	32.66	0.11	Left	Tilt	00119	1	1:8.3	0.103	1.009	0.104	
836.60	190	GSM 850	GPRS	32.2	32.16	0.05	Right	Cheek	00119	2	1:4.15	0.303	1.009	0.306	A1
836.60	190	GSM 850	GPRS	32.2	32.16	-0.05	Right	Tilt	00119	2	1:4.15	0.163	1.009	0.164	
836.60	190	GSM 850	GPRS	32.2	32.16	-0.18	Left	Cheek	00119	2	1:4.15	0.249	1.009	0.251	
836.60	190	GSM 850	GPRS	32.2	32.16	-0.04	Left	Tilt	00119	2	1:4.15	0.162	1.009	0.163	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-2
GSM 1900 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	31.2	31.10	-0.11	Right	Cheek	00119	1	1:8.3	0.147	1.023	0.150	
1880.00	661	GSM 1900	GSM	31.2	31.10	0.02	Right	Tilt	00119	1	1:8.3	0.087	1.023	0.089	
1880.00	661	GSM 1900	GSM	31.2	31.10	0.01	Left	Cheek	00119	1	1:8.3	0.240	1.023	0.246	
1880.00	661	GSM 1900	GSM	31.2	31.10	0.03	Left	Tilt	00119	1	1:8.3	0.112	1.023	0.115	
1880.00	661	GSM 1900	GPRS	29.2	29.14	0.11	Right	Cheek	00119	2	1:4.15	0.157	1.014	0.159	
1880.00	661	GSM 1900	GPRS	29.2	29.14	0.02	Right	Tilt	00119	2	1:4.15	0.097	1.014	0.098	
1880.00	661	GSM 1900	GPRS	29.2	29.14	0.12	Left	Cheek	00119	2	1:4.15	0.265	1.014	0.269	A2
1880.00	661	GSM 1900	GPRS	29.2	29.14	-0.01	Left	Tilt	00119	2	1:4.15	0.132	1.014	0.134	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-3
UMTS 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	25.2	25.08	-0.13	Right	Cheek	00119	1:1	0.310	1.028	0.319	A3
836.60	4183	UMTS 850	RMC	25.2	25.08	0.09	Right	Tilt	00119	1:1	0.150	1.028	0.154	
836.60	4183	UMTS 850	RMC	25.2	25.08	-0.08	Left	Cheek	00119	1:1	0.237	1.028	0.244	
836.60	4183	UMTS 850	RMC	25.2	25.08	-0.06	Left	Tilt	00119	1:1	0.150	1.028	0.154	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-4
UMTS 1750 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	24.4	24.40	0.07	Right	Cheek	00130	1:1	0.246	1.000	0.246	
1732.40	1412	UMTS 1750	RMC	24.4	24.40	0.06	Right	Tilt	00130	1:1	0.371	1.000	0.371	
1732.40	1412	UMTS 1750	RMC	24.4	24.40	-0.03	Left	Cheek	00130	1:1	0.471	1.000	**0.471**	A4
1732.40	1412	UMTS 1750	RMC	24.4	24.40	0.01	Left	Tilt	00130	1:1	0.341	1.000	0.341	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-5
UMTS 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	9400	UMTS 1900	RMC	24.4	24.33	0.05	Right	Cheek	00119	1:1	0.227	1.016	0.231	
1880.00	9400	UMTS 1900	RMC	24.4	24.33	0.18	Right	Tilt	00119	1:1	0.151	1.016	0.153	
1880.00	9400	UMTS 1900	RMC	24.4	24.33	0.15	Left	Cheek	00119	1:1	0.405	1.016	0.411	A5
1880.00	9400	UMTS 1900	RMC	24.4	24.33	0.03	Left	Tilt	00119	1:1	0.192	1.016	0.195	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-6
Cell. CDMA Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.52	384	Cell. CDMA	RC3 / SO55	25.2	24.95	-0.06	Right	Cheek	00117	1:1	0.312	1.059	0.330	A6
836.52	384	Cell. CDMA	RC3 / SO55	25.2	24.95	0.05	Right	Tilt	00117	1:1	0.148	1.059	0.157	
836.52	384	Cell. CDMA	RC3 / SO55	25.2	24.95	-0.06	Left	Cheek	00117	1:1	0.262	1.059	0.277	
836.52	384	Cell. CDMA	RC3 / SO55	25.2	24.95	0.01	Left	Tilt	00117	1:1	0.161	1.059	0.170	
836.52	384	Cell. CDMA	EVDO Rev. A	25.2	25.01	0.00	Right	Cheek	00117	1:1	0.307	1.045	0.321	
836.52	384	Cell. CDMA	EVDO Rev. A	25.2	25.01	-0.03	Right	Tilt	00117	1:1	0.138	1.045	0.144	
836.52	384	Cell. CDMA	EVDO Rev. A	25.2	25.01	0.00	Left	Cheek	00117	1:1	0.262	1.045	0.274	
836.52	384	Cell. CDMA	EVDO Rev. A	25.2	25.01	0.00	Left	Tilt	00117	1:1	0.149	1.045	0.156	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-7
PCS CDMA Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	600	PCS CDMA	RC3 / SO55	24.4	24.19	0.02	Right	Cheek	00117	1:1	0.236	1.050	0.248	
1880.00	600	PCS CDMA	RC3 / SO55	24.4	24.19	0.04	Right	Tilt	00117	1:1	0.203	1.050	0.213	
1880.00	600	PCS CDMA	RC3 / SO55	24.4	24.19	-0.03	Left	Cheek	00117	1:1	0.339	1.050	0.356	
1880.00	600	PCS CDMA	RC3 / SO55	24.4	24.19	0.14	Left	Tilt	00117	1:1	0.223	1.050	0.234	
1880.00	600	PCS CDMA	EVDO Rev. A	24.4	24.25	0.08	Right	Cheek	00117	1:1	0.236	1.035	0.244	
1880.00	600	PCS CDMA	EVDO Rev. A	24.4	24.25	-0.01	Right	Tilt	00117	1:1	0.211	1.035	0.218	
1880.00	600	PCS CDMA	EVDO Rev. A	24.4	24.25	0.03	Left	Cheek	00117	1:1	0.384	1.035	0.397	A7
1880.00	600	PCS CDMA	EVDO Rev. A	24.4	24.25	-0.03	Left	Tilt	00117	1:1	0.213	1.035	0.220	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-8
LTE Band 12 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	25.2	24.97	0.15	0	Right	Cheek	QPSK	1	49	00119	1:1	0.277	1.054	0.292	A8
707.50	23095	Mid	LTE Band 12	10	24.2	23.88	0.02	1	Right	Cheek	QPSK	25	12	00119	1:1	0.196	1.076	0.211	
707.50	23095	Mid	LTE Band 12	10	25.2	24.97	-0.02	0	Right	Tilt	QPSK	1	49	00119	1:1	0.157	1.054	0.165	
707.50	23095	Mid	LTE Band 12	10	24.2	23.88	0.00	1	Right	Tilt	QPSK	25	12	00119	1:1	0.110	1.076	0.118	
707.50	23095	Mid	LTE Band 12	10	25.2	24.97	0.15	0	Left	Cheek	QPSK	1	49	00119	1:1	0.253	1.054	0.267	
707.50	23095	Mid	LTE Band 12	10	24.2	23.88	0.04	1	Left	Cheek	QPSK	25	12	00119	1:1	0.195	1.076	0.210	
707.50	23095	Mid	LTE Band 12	10	25.2	24.97	0.17	0	Left	Tilt	QPSK	1	49	00119	1:1	0.176	1.054	0.186	
707.50	23095	Mid	LTE Band 12	10	24.2	23.88	-0.04	1	Left	Tilt	QPSK	25	12	00119	1:1	0.138	1.076	0.148	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-9
LTE Band 13 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	24.7	24.53	-0.18	0	Right	Cheek	QPSK	1	49	00078	1:1	0.267	1.040	0.278	A9
782.00	23230	Mid	LTE Band 13	10	23.7	23.60	0.06	1	Right	Cheek	QPSK	25	0	00078	1:1	0.211	1.023	0.216	
782.00	23230	Mid	LTE Band 13	10	24.7	24.53	-0.04	0	Right	Tilt	QPSK	1	49	00078	1:1	0.141	1.040	0.147	
782.00	23230	Mid	LTE Band 13	10	23.7	23.60	-0.09	1	Right	Tilt	QPSK	25	0	00078	1:1	0.116	1.023	0.119	
782.00	23230	Mid	LTE Band 13	10	24.7	24.53	0.06	0	Left	Cheek	QPSK	1	49	00078	1:1	0.200	1.040	0.208	
782.00	23230	Mid	LTE Band 13	10	23.7	23.60	0.00	1	Left	Cheek	QPSK	25	0	00078	1:1	0.168	1.023	0.172	
782.00	23230	Mid	LTE Band 13	10	24.7	24.53	0.02	0	Left	Tilt	QPSK	1	49	00078	1:1	0.127	1.040	0.132	
782.00	23230	Mid	LTE Band 13	10	23.7	23.60	0.04	1	Left	Tilt	QPSK	25	0	00078	1:1	0.117	1.023	0.120	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-10
LTE Band 5 (Cell) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.2	24.97	0.12	0	Right	Cheek	QPSK	1	0	00119	1:1	0.307	1.054	0.324	A10
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.2	24.07	0.05	1	Right	Cheek	QPSK	25	25	00119	1:1	0.238	1.030	0.245	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.2	24.97	0.00	0	Right	Tilt	QPSK	1	0	00119	1:1	0.148	1.054	0.156	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.2	24.07	0.07	1	Right	Tilt	QPSK	25	25	00119	1:1	0.108	1.030	0.111	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.2	24.97	0.14	0	Left	Cheek	QPSK	1	0	00119	1:1	0.234	1.054	0.247	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.2	24.07	0.06	1	Left	Cheek	QPSK	25	25	00119	1:1	0.172	1.030	0.177	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.2	24.97	-0.18	0	Left	Tilt	QPSK	1	0	00119	1:1	0.150	1.054	0.158	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.2	24.07	0.08	1	Left	Tilt	QPSK	25	25	00119	1:1	0.115	1.030	0.118	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

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

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	0.10	0	Right	Cheek	QPSK	1	99	00130	1:1	0.207	1.007	0.208	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	0.10	1	Right	Cheek	QPSK	50	25	00130	1:1	0.172	1.016	0.175	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	0.09	0	Right	Tilt	QPSK	1	99	00130	1:1	0.312	1.007	0.314	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	0.05	1	Right	Tilt	QPSK	50	25	00130	1:1	0.256	1.016	0.260	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	-0.06	0	Left	Cheek	QPSK	1	99	00130	1:1	0.436	1.007	0.439	A11
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	-0.06	1	Left	Cheek	QPSK	50	25	00130	1:1	0.352	1.016	0.358	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	0.09	0	Left	Tilt	QPSK	1	99	00130	1:1	0.288	1.007	0.290	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	0.00	1	Left	Tilt	QPSK	50	25	00130	1:1	0.244	1.016	0.248	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-12
LTE Band 25 (PCS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	-0.17	0	Right	Cheek	QPSK	1	50	00119	1:1	0.256	1.012	0.259	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	0.17	1	Right	Cheek	QPSK	50	0	00119	1:1	0.221	1.005	0.222	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	0.15	0	Right	Tilt	QPSK	1	50	00119	1:1	0.162	1.012	0.164	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	0.13	1	Right	Tilt	QPSK	50	0	00119	1:1	0.149	1.005	0.150	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	-0.04	0	Left	Cheek	QPSK	1	50	00119	1:1	0.454	1.012	0.459	A12
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	0.07	1	Left	Cheek	QPSK	50	0	00119	1:1	0.362	1.005	0.364	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	0.09	0	Left	Tilt	QPSK	1	50	00119	1:1	0.197	1.012	0.199	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	-0.05	1	Left	Tilt	QPSK	50	0	00119	1:1	0.179	1.005	0.180	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-13
DTS Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2412	1	802.11b	DSSS	22	15.5	15.02	0.04	Right	Cheek	00136	1	99.8	1.084	0.596	1.117	1.002	0.667	
2437	6	802.11b	DSSS	22	15.5	15.25	0.05	Right	Cheek	00136	1	99.8	1.148	0.678	1.059	1.002	**0.719**	A13
2462	11	802.11b	DSSS	22	15.5	15.46	0.07	Right	Cheek	00136	1	99.8	1.044	0.625	1.009	1.002	0.632	
2462	11	802.11b	DSSS	22	15.5	15.46	0.16	Right	Tilt	00136	1	99.8	0.658	0.464	1.009	1.002	0.469	
2462	11	802.11b	DSSS	22	15.5	15.46	0.01	Left	Cheek	00136	1	99.8	0.479	-	1.009	1.002	-	
2462	11	802.11b	DSSS	22	15.5	15.46	0.08	Left	Tilt	00136	1	99.8	0.520	-	1.009	1.002	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-14
NII Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
5260	52	802.11a	OFDM	20	13.5	13.17	0.20	Right	Cheek	00136	6	99.2	1.914	0.707	1.079	1.008	0.769	
5320	64	802.11a	OFDM	20	13.5	13.17	0.20	Right	Cheek	00136	6	99.2	1.607	0.778	1.079	1.008	0.846	
5320	64	802.11a	OFDM	20	13.5	13.17	0.11	Right	Tilt	00136	6	99.2	1.271	0.570	1.079	1.008	0.620	
5320	64	802.11a	OFDM	20	13.5	13.17	0.14	Left	Cheek	00136	6	99.2	0.885	-	1.079	1.008	-	
5320	64	802.11a	OFDM	20	13.5	13.17	0.01	Left	Tilt	00136	6	99.2	0.773	-	1.079	1.008	-	
5660	132	802.11a	OFDM	20	13.5	13.46	0.18	Right	Cheek	00136	6	99.2	1.615	0.777	1.009	1.008	0.790	
5660	132	802.11a	OFDM	20	13.5	13.46	0.02	Right	Tilt	00136	6	99.2	1.259	0.619	1.009	1.008	0.630	
5660	132	802.11a	OFDM	20	13.5	13.46	-0.18	Left	Cheek	00136	6	99.2	1.136	-	1.009	1.008	-	
5660	132	802.11a	OFDM	20	13.5	13.46	0.19	Left	Tilt	00136	6	99.2	1.093	-	1.009	1.008	-	
5745	149	802.11a	OFDM	20	13.5	13.25	0.04	Right	Cheek	00136	6	99.2	1.785	0.816	1.059	1.008	0.871	
5785	157	802.11a	OFDM	20	13.5	13.42	0.17	Right	Cheek	00136	6	99.2	1.531	0.907	1.019	1.008	0.932	
5825	165	802.11a	OFDM	20	13.5	13.27	0.12	Right	Cheek	00136	6	99.2	2.151	0.964	1.054	1.008	**1.024**	A14
5785	157	802.11a	OFDM	20	13.5	13.42	-0.18	Right	Tilt	00136	6	99.2	1.375	-	1.019	1.008	-	
5785	157	802.11a	OFDM	20	13.5	13.42	0.11	Left	Cheek	00136	6	99.2	1.386	-	1.019	1.008	-	
5785	157	802.11a	OFDM	20	13.5	13.42	-0.11	Left	Tilt	00136	6	99.2	1.388	0.532	1.019	1.008	0.546	
5825	165	802.11a	OFDM	20	13.5	13.27	0.16	Right	Cheek	00136	6	99.2	2.108	0.919	1.054	1.008	0.976	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram									

Note: Blue entry represents variability measurement.

Table 11-15
DSS Head SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)			(W/kg)	
2441.00	39	Bluetooth	FHSS	11.0	10.77	-0.07	Right	Cheek	00136	1	77.1	0.134	1.054	1.297	**0.183**	A15
2441.00	39	Bluetooth	FHSS	11.0	10.77	0.05	Right	Tilt	00136	1	77.1	0.106	1.054	1.297	0.145	
2441.00	39	Bluetooth	FHSS	11.0	10.77	-0.19	Left	Cheek	00136	1	77.1	0.071	1.054	1.297	0.097	
2441.00	39	Bluetooth	FHSS	11.0	10.77	-0.15	Left	Tilt	00136	1	77.1	0.072	1.054	1.297	0.098	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram							

11.2 Standalone Body-Worn SAR Data

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

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	32.7	32.66	-0.03	10 mm	00118	1	1:8.3	back	0.325	1.009	0.328	
836.60	190	GSM 850	GPRS	32.2	32.16	-0.09	10 mm	00118	2	1:4.15	back	0.551	1.009	0.556	A16
1880.00	661	GSM 1900	GSM	31.2	31.10	-0.17	10 mm	00119	1	1:8.3	back	0.350	1.023	0.358	
1880.00	661	GSM 1900	GPRS	29.2	29.14	-0.18	10 mm	00119	2	1:4.15	back	0.399	1.014	0.405	A17
836.60	4183	UMTS 850	RMC	25.2	25.08	-0.04	10 mm	00118	N/A	1:1	back	0.406	1.028	0.417	A18
1712.40	1312	UMTS 1750	RMC	24.4	24.38	-0.07	10 mm	00119	N/A	1:1	back	0.885	1.005	0.889	A20
1732.40	1412	UMTS 1750	RMC	24.4	24.40	0.01	10 mm	00119	N/A	1:1	back	0.828	1.000	0.828	
1752.60	1513	UMTS 1750	RMC	24.4	24.26	0.04	10 mm	00119	N/A	1:1	back	0.738	1.033	0.762	
1880.00	9400	UMTS 1900	RMC	24.4	24.33	-0.20	10 mm	00117	N/A	1:1	back	0.530	1.016	0.538	A21
836.52	384	Cell. CDMA	TDSO / SO32	25.2	25.00	0.02	10 mm	00119	N/A	1:1	back	0.380	1.047	0.398	A22
1851.25	25	PCS CDMA	TDSO / SO32	24.4	24.22	-0.19	10 mm	00120	N/A	1:1	back	0.565	1.042	0.589	
1880.00	600	PCS CDMA	TDSO / SO32	24.4	24.33	-0.18	10 mm	00120	N/A	1:1	back	0.617	1.016	0.627	
1908.75	1175	PCS CDMA	TDSO / SO32	24.4	24.27	-0.20	10 mm	00120	N/A	1:1	back	0.692	1.030	0.713	A24
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-17
LTE Body-Worn SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	25.2	24.97	-0.09	0	00119	QPSK	1	49	10 mm	back	1:1	0.393	1.054	0.414	A26
707.50	23095	Mid	LTE Band 12	10	24.2	23.88	-0.04	1	00119	QPSK	25	12	10 mm	back	1:1	0.328	1.076	0.353	
782.00	23230	Mid	LTE Band 13	10	24.7	24.53	-0.01	0	00119	QPSK	1	49	10 mm	back	1:1	0.371	1.040	0.386	A27
782.00	23230	Mid	LTE Band 13	10	23.7	23.60	-0.01	1	00119	QPSK	25	0	10 mm	back	1:1	0.315	1.023	0.322	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.2	24.97	-0.01	0	00118	QPSK	1	0	10 mm	back	1:1	0.403	1.054	0.425	A29
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.2	24.07	0.06	1	00118	QPSK	25	25	10 mm	back	1:1	0.294	1.030	0.303	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	0.13	0	00118	QPSK	1	99	10 mm	back	1:1	0.942	1.007	0.949	A30
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	-0.09	1	00118	QPSK	50	25	10 mm	back	1:1	0.770	1.016	0.782	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.62	-0.06	1	00118	QPSK	100	0	10 mm	back	1:1	0.772	1.019	0.787	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	-0.03	0	00118	QPSK	1	99	10 mm	back	1:1	0.933	1.007	0.940	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	0.00	0	00120	QPSK	1	50	10 mm	back	1:1	0.570	1.012	0.577	A31
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	-0.13	1	00120	QPSK	50	0	10 mm	back	1:1	0.509	1.005	0.512	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram									

Note: Blue entry represents variability measurement.

Table 11-18
DTS Body-Worn SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2462	11	802.11b	DSSS	22	15.5	15.46	0.18	10 mm	00136	1	back	99.8	0.188	0.115	1.009	1.002	**0.116**	A33
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**								**Body** **1.6 W/kg (mW/g)** averaged over 1 gram										

Table 11-19
NII Body-Worn SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
5320	64	802.11a	OFDM	20	13.5	13.17	0.01	10 mm	00136	6	back	99.2	0.462	0.216	1.079	1.008	**0.235**	
5660	132	802.11a	OFDM	20	13.5	13.46	0.01	10 mm	00136	6	back	99.2	0.533	0.227	1.009	1.008	0.231	A34
5785	157	802.11a	OFDM	20	13.5	13.42	-0.07	10 mm	00136	6	back	99.2	0.453	0.182	1.019	1.008	0.187	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**								**Body** **1.6 W/kg (mW/g)** averaged over 1 gram										

Table 11-20
DSS Body-Worn SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)			(W/kg)	
2441	39	Bluetooth	FHSS	11.0	10.77	0.21	10 mm	00136	1	back	77.1	0.032	1.054	1.297	**0.044**	A36
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**							**Body** **1.6 W/kg (mW/g)** averaged over 1 gram									

11.3 Standalone Hotspot SAR Data

Table 11-21
GPRS/UMTS/CDMA Hotspot SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	32.2	32.16	-0.09	10 mm	00118	2	1:4.15	back	0.551	1.009	0.556	A16
836.60	190	GSM 850	GPRS	32.2	32.16	-0.03	10 mm	00118	2	1:4.15	front	0.477	1.009	0.481	
836.60	190	GSM 850	GPRS	32.2	32.16	0.08	10 mm	00118	2	1:4.15	bottom	0.246	1.009	0.248	
836.60	190	GSM 850	GPRS	32.2	32.16	0.05	10 mm	00118	2	1:4.15	right	0.451	1.009	0.455	
836.60	190	GSM 850	GPRS	32.2	32.16	-0.08	10 mm	00118	2	1:4.15	left	0.295	1.009	0.298	
1880.00	661	GSM 1900	GPRS	29.2	29.14	-0.18	10 mm	00119	2	1:4.15	back	0.399	1.014	0.405	A17
1880.00	661	GSM 1900	GPRS	29.2	29.14	-0.03	10 mm	00119	2	1:4.15	front	0.285	1.014	0.289	
1880.00	661	GSM 1900	GPRS	29.2	29.14	-0.07	10 mm	00119	2	1:4.15	bottom	0.303	1.014	0.307	
1880.00	661	GSM 1900	GPRS	29.2	29.14	-0.03	10 mm	00119	2	1:4.15	left	0.370	1.014	0.375	
836.60	4183	UMTS 850	RMC	25.2	25.08	-0.04	10 mm	00118	N/A	1:1	back	0.406	1.028	0.417	
836.60	4183	UMTS 850	RMC	25.2	25.08	0.05	10 mm	00118	N/A	1:1	front	0.361	1.028	0.371	
836.60	4183	UMTS 850	RMC	25.2	25.08	-0.02	10 mm	00118	N/A	1:1	bottom	0.215	1.028	0.221	
836.60	4183	UMTS 850	RMC	25.2	25.08	-0.04	10 mm	00118	N/A	1:1	right	0.461	1.028	0.474	A19
836.60	4183	UMTS 850	RMC	25.2	25.08	-0.02	10 mm	00118	N/A	1:1	left	0.238	1.028	0.245	
1712.40	1312	UMTS 1750	RMC	24.4	24.38	-0.07	10 mm	00119	N/A	1:1	back	0.885	1.005	0.889	A20
1732.40	1412	UMTS 1750	RMC	24.4	24.40	0.01	10 mm	00119	N/A	1:1	back	0.828	1.000	0.828	
1752.60	1513	UMTS 1750	RMC	24.4	24.26	0.04	10 mm	00119	N/A	1:1	back	0.738	1.033	0.762	
1732.40	1412	UMTS 1750	RMC	24.4	24.40	0.01	10 mm	00119	N/A	1:1	front	0.603	1.000	0.603	
1732.40	1412	UMTS 1750	RMC	24.4	24.40	0.19	10 mm	00119	N/A	1:1	bottom	0.400	1.000	0.400	
1732.40	1412	UMTS 1750	RMC	24.4	24.40	-0.02	10 mm	00119	N/A	1:1	left	0.662	1.000	0.662	
1880.00	9400	UMTS 1900	RMC	24.4	24.33	-0.20	10 mm	00117	N/A	1:1	back	0.530	1.016	0.538	A21
1880.00	9400	UMTS 1900	RMC	24.4	24.33	-0.03	10 mm	00117	N/A	1:1	front	0.445	1.016	0.452	
1880.00	9400	UMTS 1900	RMC	24.4	24.33	0.00	10 mm	00117	N/A	1:1	bottom	0.392	1.016	0.398	
1880.00	9400	UMTS 1900	RMC	24.4	24.33	-0.05	10 mm	00117	N/A	1:1	left	0.514	1.016	0.522	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.2	24.83	-0.01	10 mm	00119	N/A	1:1	back	0.373	1.089	0.406	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.2	24.83	0.01	10 mm	00119	N/A	1:1	front	0.340	1.089	0.370	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.2	24.83	-0.07	10 mm	00119	N/A	1:1	bottom	0.185	1.089	0.201	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.2	24.83	0.00	10 mm	00119	N/A	1:1	right	0.403	1.089	0.439	A23
836.52	384	Cell. CDMA	EVDO Rev. 0	25.2	24.83	0.00	10 mm	00119	N/A	1:1	left	0.194	1.089	0.211	
1851.25	25	PCS CDMA	EVDO Rev. 0	24.4	24.35	-0.07	10 mm	00120	N/A	1:1	back	0.643	1.012	0.651	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.4	24.26	-0.17	10 mm	00120	N/A	1:1	back	0.629	1.033	0.650	
1908.75	1175	PCS CDMA	EVDO Rev. 0	24.4	24.36	-0.17	10 mm	00120	N/A	1:1	back	0.795	1.009	0.802	A25
1880.00	600	PCS CDMA	EVDO Rev. 0	24.4	24.26	-0.02	10 mm	00120	N/A	1:1	front	0.514	1.033	0.531	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.4	24.26	0.15	10 mm	00120	N/A	1:1	bottom	0.475	1.033	0.491	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.4	24.26	0.12	10 mm	00120	N/A	1:1	left	0.583	1.033	0.602	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-22
LTE Band 12 Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	25.2	24.97	-0.09	0	00119	QPSK	1	49	10 mm	back	1:1	0.393	1.054	0.414	A26
707.50	23095	Mid	LTE Band 12	10	24.2	23.88	-0.04	1	00119	QPSK	25	12	10 mm	back	1:1	0.328	1.076	0.353	
707.50	23095	Mid	LTE Band 12	10	25.2	24.97	-0.04	0	00119	QPSK	1	49	10 mm	front	1:1	0.337	1.054	0.355	
707.50	23095	Mid	LTE Band 12	10	24.2	23.88	-0.02	1	00119	QPSK	25	12	10 mm	front	1:1	0.288	1.076	0.310	
707.50	23095	Mid	LTE Band 12	10	25.2	24.97	-0.12	0	00119	QPSK	1	49	10 mm	bottom	1:1	0.139	1.054	0.147	
707.50	23095	Mid	LTE Band 12	10	24.2	23.88	0.02	1	00119	QPSK	25	12	10 mm	bottom	1:1	0.122	1.076	0.131	
707.50	23095	Mid	LTE Band 12	10	25.2	24.97	-0.05	0	00119	QPSK	1	49	10 mm	right	1:1	0.362	1.054	0.382	
707.50	23095	Mid	LTE Band 12	10	24.2	23.88	0.16	1	00119	QPSK	25	12	10 mm	right	1:1	0.306	1.076	0.329	
707.50	23095	Mid	LTE Band 12	10	25.2	24.97	-0.04	0	00119	QPSK	1	49	10 mm	left	1:1	0.220	1.054	0.232	
707.50	23095	Mid	LTE Band 12	10	24.2	23.88	-0.07	1	00119	QPSK	25	12	10 mm	left	1:1	0.196	1.076	0.211	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-23
LTE Band 13 Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	24.7	24.53	-0.01	0	00119	QPSK	1	49	10 mm	back	1:1	0.371	1.040	0.386	
782.00	23230	Mid	LTE Band 13	10	23.7	23.60	-0.01	1	00119	QPSK	25	0	10 mm	back	1:1	0.315	1.023	0.322	
782.00	23230	Mid	LTE Band 13	10	24.7	24.53	-0.05	0	00119	QPSK	1	49	10 mm	front	1:1	0.345	1.040	0.359	
782.00	23230	Mid	LTE Band 13	10	23.7	23.60	0.04	1	00119	QPSK	25	0	10 mm	front	1:1	0.283	1.023	0.290	
782.00	23230	Mid	LTE Band 13	10	24.7	24.53	-0.06	0	00119	QPSK	1	49	10 mm	bottom	1:1	0.166	1.040	0.173	
782.00	23230	Mid	LTE Band 13	10	23.7	23.60	-0.16	1	00119	QPSK	25	0	10 mm	bottom	1:1	0.134	1.023	0.137	
782.00	23230	Mid	LTE Band 13	10	24.7	24.53	0.08	0	00119	QPSK	1	49	10 mm	right	1:1	0.500	1.040	0.520	A28
782.00	23230	Mid	LTE Band 13	10	23.7	23.60	-0.12	1	00119	QPSK	25	0	10 mm	right	1:1	0.416	1.023	0.426	
782.00	23230	Mid	LTE Band 13	10	24.7	24.53	-0.04	0	00119	QPSK	1	49	10 mm	left	1:1	0.278	1.040	0.289	
782.00	23230	Mid	LTE Band 13	10	23.7	23.60	-0.12	1	00119	QPSK	25	0	10 mm	left	1:1	0.241	1.023	0.247	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-24
LTE Band 5 (Cell) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.2	24.97	-0.01	0	00118	QPSK	1	0	10 mm	back	1:1	0.403	1.054	0.425	A29
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.2	24.07	0.06	1	00118	QPSK	25	25	10 mm	back	1:1	0.294	1.030	0.303	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.2	24.97	-0.03	0	00118	QPSK	1	0	10 mm	front	1:1	0.347	1.054	0.366	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.2	24.07	0.04	1	00118	QPSK	25	25	10 mm	front	1:1	0.256	1.030	0.264	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.2	24.97	0.07	0	00118	QPSK	1	0	10 mm	bottom	1:1	0.191	1.054	0.201	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.2	24.07	0.15	1	00118	QPSK	25	25	10 mm	bottom	1:1	0.151	1.030	0.156	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.2	24.97	-0.07	0	00118	QPSK	1	0	10 mm	right	1:1	0.397	1.054	0.418	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.2	24.07	0.03	1	00118	QPSK	25	25	10 mm	right	1:1	0.312	1.030	0.321	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.2	24.97	0.00	0	00118	QPSK	1	0	10 mm	left	1:1	0.235	1.054	0.248	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.2	24.07	0.04	1	00118	QPSK	25	25	10 mm	left	1:1	0.157	1.030	0.162	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-25
LTE Band 4 (AWS) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	0.13	0	00118	QPSK	1	99	10 mm	back	1:1	0.942	1.007	**0.949**	A30
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	-0.09	1	00118	QPSK	50	25	10 mm	back	1:1	0.770	1.016	0.782	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.62	-0.06	1	00118	QPSK	100	0	10 mm	back	1:1	0.772	1.019	0.787	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	-0.02	0	00118	QPSK	1	99	10 mm	front	1:1	0.712	1.007	0.717	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	-0.11	1	00118	QPSK	50	25	10 mm	front	1:1	0.603	1.016	0.613	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	0.07	0	00118	QPSK	1	99	10 mm	bottom	1:1	0.525	1.007	0.529	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	-0.05	1	00118	QPSK	50	25	10 mm	bottom	1:1	0.401	1.016	0.407	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	-0.07	0	00118	QPSK	1	99	10 mm	left	1:1	0.656	1.007	0.661	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	0.00	1	00118	QPSK	50	25	10 mm	left	1:1	0.558	1.016	0.567	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	-0.03	0	00118	QPSK	1	99	10 mm	back	1:1	0.933	1.007	0.940	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram										

Note: Blue entry represents variability measurement.

Table 11-26
LTE Band 25 (PCS) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	0.00	0	00120	QPSK	1	50	10 mm	back	1:1	0.570	1.012	0.577	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	-0.13	1	00120	QPSK	50	0	10 mm	back	1:1	0.509	1.005	0.512	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	0.13	0	00120	QPSK	1	50	10 mm	front	1:1	0.542	1.012	0.549	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	0.02	1	00120	QPSK	50	0	10 mm	front	1:1	0.473	1.005	0.475	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	0.03	0	00120	QPSK	1	50	10 mm	bottom	1:1	0.490	1.012	0.496	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	-0.03	1	00120	QPSK	50	0	10 mm	bottom	1:1	0.404	1.005	0.406	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.4	24.31	0.14	0	00120	QPSK	1	0	10 mm	left	1:1	0.640	1.021	0.653	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	0.01	0	00120	QPSK	1	50	10 mm	left	1:1	0.632	1.012	0.640	
1905.00	26590	High	LTE Band 25 (PCS)	20	24.4	24.33	0.10	0	00120	QPSK	1	50	10 mm	left	1:1	0.664	1.016	0.675	A32
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	0.12	1	00120	QPSK	50	0	10 mm	left	1:1	0.525	1.005	0.528	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population													Body 1.6 W/kg (mW/g) averaged over 1 gram						

Table 11-27
WLAN Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2462	11	802.11b	DSSS	22	15.5	15.46	0.18	10 mm	00136	1	back	99.8	0.188	0.115	1.009	1.002	**0.116**	A33
2462	11	802.11b	DSSS	22	15.5	15.46	0.21	10 mm	00136	1	front	99.8	0.181	-	1.009	1.002	-	
2462	11	802.11b	DSSS	22	15.5	15.46	0.18	10 mm	00136	1	top	99.8	0.109	-	1.009	1.002	-	
2462	11	802.11b	DSSS	22	15.5	15.46	0.14	10 mm	00136	1	left	99.8	0.111	-	1.009	1.002	-	
5180	36	802.11a	OFDM	20	13.5	13.12	0.05	10 mm	00136	6	back	99.2	0.350	0.163	1.091	1.008	0.179	
5180	36	802.11a	OFDM	20	13.5	13.12	-0.17	10 mm	00136	6	front	99.2	0.248	-	1.091	1.008	-	
5180	36	802.11a	OFDM	20	13.5	13.12	0.03	10 mm	00136	6	top	99.2	0.253	-	1.091	1.008	-	
5180	36	802.11a	OFDM	20	13.5	13.12	-0.19	10 mm	00136	6	left	99.2	0.187	-	1.091	1.008	-	
5785	157	802.11a	OFDM	20	13.5	13.42	-0.07	10 mm	00136	6	back	99.2	0.453	0.182	1.019	1.008	**0.187**	A35
5785	157	802.11a	OFDM	20	13.5	13.42	-0.18	10 mm	00136	6	front	99.2	0.309	-	1.019	1.008	-	
5785	157	802.11a	OFDM	20	13.5	13.42	0.04	10 mm	00136	6	top	99.2	0.349	-	1.019	1.008	-	
5785	157	802.11a	OFDM	20	13.5	13.42	-0.14	10 mm	00136	6	left	99.2	0.217	-	1.019	1.008	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population													Body 1.6 W/kg (mW/g) averaged over 1 gram						

Table 11-28
DSS Hotspot SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)			(W/kg)	
2441	39	Bluetooth	FHSS	11.0	10.77	0.21	10 mm	00136	1	back	77.1	0.032	1.054	1.297	**0.044**	A36
2441	39	Bluetooth	FHSS	11.0	10.77	0.04	10 mm	00136	1	front	77.1	0.031	1.054	1.297	0.042	
2441	39	Bluetooth	FHSS	11.0	10.77	0.16	10 mm	00136	1	top	77.1	0.020	1.054	1.297	0.027	
2441	39	Bluetooth	FHSS	11.0	10.77	0.01	10 mm	00136	1	left	77.1	0.022	1.054	1.297	0.030	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**							**Body** **1.6 W/kg (mW/g)** averaged over 1 gram									

11.4 Standalone Phablet SAR Data

Table 11-29
UMTS/CDMA Phablet SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Duty Cycle	Side	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	24.4	24.40	0.07	2 mm	00119	1:1	back	1.790	1.000	1.790	
1732.40	1412	UMTS 1750	RMC	24.4	24.40	0.02	4 mm	00119	1:1	front	0.931	1.000	0.931	
1732.40	1412	UMTS 1750	RMC	24.4	24.40	-0.12	4 mm	00119	1:1	bottom	0.674	1.000	0.674	
1712.40	1312	UMTS 1750	RMC	24.4	24.38	-0.12	0 mm	00119	1:1	left	2.890	1.005	2.904	
1732.40	1412	UMTS 1750	RMC	24.4	24.40	-0.05	0 mm	00119	1:1	left	2.980	1.000	2.980	
1752.60	1513	UMTS 1750	RMC	24.4	24.26	0.00	0 mm	00119	1:1	left	2.970	1.033	**3.068**	
1712.40	1312	UMTS 1750	RMC	23.2	23.17	-0.18	0 mm	00119	1:1	back	2.550	1.007	2.568	
1732.40	1412	UMTS 1750	RMC	23.2	23.06	-0.12	0 mm	00119	1:1	back	2.580	1.033	2.665	
1752.60	1513	UMTS 1750	RMC	23.2	23.00	-0.16	0 mm	00119	1:1	back	2.550	1.047	2.670	
1732.40	1412	UMTS 1750	RMC	23.2	23.06	0.14	0 mm	00119	1:1	front	1.810	1.033	1.870	
1732.40	1412	UMTS 1750	RMC	23.2	23.06	-0.06	0 mm	00119	1:1	bottom	1.350	1.033	1.395	
1732.40	1412	UMTS 1750	RMC	24.4	24.40	-0.07	0 mm	00119	1:1	left	2.990	1.000	2.990	A37
1880.00	9400	UMTS 1900	RMC	24.4	24.33	-0.16	2 mm	00117	1:1	back	0.923	1.016	0.938	
1880.00	9400	UMTS 1900	RMC	24.4	24.33	0.04	4 mm	00117	1:1	front	1.490	1.016	1.514	
1880.00	9400	UMTS 1900	RMC	24.4	24.33	0.03	4 mm	00117	1:1	bottom	0.665	1.016	0.676	
1852.40	9262	UMTS 1900	RMC	24.4	24.29	-0.03	0 mm	00117	1:1	left	2.190	1.026	2.247	
1880.00	9400	UMTS 1900	RMC	24.4	24.33	-0.05	0 mm	00117	1:1	left	2.320	1.016	2.357	
1907.60	9538	UMTS 1900	RMC	24.4	24.25	0.02	0 mm	00117	1:1	left	2.830	1.035	2.929	A38
1852.40	9262	UMTS 1900	RMC	23.2	23.11	-0.19	0 mm	00117	1:1	back	2.450	1.021	2.501	
1880.00	9400	UMTS 1900	RMC	23.2	23.08	-0.17	0 mm	00117	1:1	back	2.670	1.028	2.745	
1907.60	9538	UMTS 1900	RMC	23.2	23.13	-0.17	0 mm	00117	1:1	back	2.720	1.016	2.764	
1852.40	9262	UMTS 1900	RMC	23.2	23.11	0.08	0 mm	00117	1:1	front	2.050	1.021	2.093	
1880.00	9400	UMTS 1900	RMC	23.2	23.08	-0.19	0 mm	00117	1:1	front	2.240	1.028	2.303	
1907.60	9538	UMTS 1900	RMC	23.2	23.13	0.09	0 mm	00117	1:1	front	2.370	1.016	2.408	
1880.00	9400	UMTS 1900	RMC	23.2	23.08	-0.04	0 mm	00117	1:1	bottom	1.180	1.028	1.213	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.4	24.26	-0.16	2 mm	00120	1:1	back	1.470	1.033	1.519	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.4	24.26	-0.11	4 mm	00120	1:1	front	0.910	1.033	0.940	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.4	24.26	0.02	4 mm	00120	1:1	bottom	0.802	1.033	0.828	
1851.25	25	PCS CDMA	EVDO Rev. 0	24.4	24.35	0.10	0 mm	00120	1:1	left	2.740	1.012	2.773	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.4	24.26	0.04	0 mm	00120	1:1	left	2.820	1.033	2.913	
1908.75	1175	PCS CDMA	EVDO Rev. 0	24.4	24.36	0.01	0 mm	00120	1:1	left	2.940	1.009	2.966	
1851.25	25	PCS CDMA	EVDO Rev. 0	22.9	22.80	-0.18	0 mm	00120	1:1	back	1.860	1.023	1.903	
1880.00	600	PCS CDMA	EVDO Rev. 0	22.9	22.79	-0.19	0 mm	00120	1:1	back	2.020	1.026	2.073	
1908.75	1175	PCS CDMA	EVDO Rev. 0	22.9	22.88	-0.19	0 mm	00120	1:1	back	1.980	1.005	1.990	
1880.00	600	PCS CDMA	EVDO Rev. 0	22.9	22.79	0.16	0 mm	00120	1:1	front	1.920	1.026	1.970	
1880.00	600	PCS CDMA	EVDO Rev. 0	22.9	22.79	-0.02	0 mm	00120	1:1	bottom	1.110	1.026	1.139	
1908.75	1175	PCS CDMA	EVDO Rev. 0	24.4	24.36	-0.08	0 mm	00120	1:1	left	3.030	1.009	3.057	A39
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**							**Phablet** **4.0 W/kg (mW/g)** averaged over 10 grams							

Table 11-30
LTE Phablet SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	-0.01	0	00118	QPSK	1	99	2 mm	back	1:1	1.920	1.007	1.933	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	-0.11	1	00118	QPSK	50	25	2 mm	back	1:1	1.530	1.016	1.554	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	-0.17	0	00118	QPSK	1	99	4 mm	front	1:1	0.893	1.007	0.899	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	0.05	1	00118	QPSK	50	25	4 mm	front	1:1	0.722	1.016	0.734	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	-0.14	0	00118	QPSK	1	99	4 mm	bottom	1:1	0.707	1.007	0.712	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	-0.03	1	00118	QPSK	50	25	4 mm	bottom	1:1	0.530	1.016	0.538	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.7	24.67	-0.18	0	00118	QPSK	1	99	0 mm	left	1:1	2.750	1.007	2.769	A40
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.63	0.00	1	00118	QPSK	50	25	0 mm	left	1:1	2.190	1.016	2.225	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.7	23.62	0.03	1	00118	QPSK	100	0	0 mm	left	1:1	2.200	1.019	2.242	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.50	-0.13	0	00118	QPSK	1	99	0 mm	back	1:1	2.440	1.000	2.440	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.44	-0.18	0	00118	QPSK	50	0	0 mm	back	1:1	2.500	1.014	2.535	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.25	-0.18	0	00118	QPSK	100	0	0 mm	back	1:1	2.460	1.059	2.605	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.50	0.09	0	00118	QPSK	1	99	0 mm	front	1:1	2.070	1.000	2.070	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.44	0.08	0	00118	QPSK	50	0	0 mm	front	1:1	2.130	1.014	2.160	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.25	0.13	0	00118	QPSK	100	0	0 mm	front	1:1	2.090	1.059	2.213	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.50	-0.05	0	00118	QPSK	1	99	0 mm	bottom	1:1	1.480	1.000	1.480	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.44	0.01	0	00118	QPSK	50	0	0 mm	bottom	1:1	1.460	1.014	1.480	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	-0.18	0	00120	QPSK	1	50	2 mm	back	1:1	1.540	1.012	1.558	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	-0.17	1	00120	QPSK	50	0	2 mm	back	1:1	1.300	1.005	1.307	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	-0.10	0	00120	QPSK	1	50	4 mm	front	1:1	0.828	1.012	0.838	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	0.08	1	00120	QPSK	50	0	4 mm	front	1:1	0.714	1.005	0.718	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	0.08	0	00120	QPSK	1	50	4 mm	bottom	1:1	0.746	1.012	0.755	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	-0.06	1	00120	QPSK	50	0	4 mm	bottom	1:1	0.616	1.005	0.619	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.4	24.31	0.00	0	00120	QPSK	1	0	0 mm	left	1:1	2.560	1.021	2.614	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.4	24.35	-0.04	0	00120	QPSK	1	50	0 mm	left	1:1	2.420	1.012	2.449	
1905.00	26590	High	LTE Band 25 (PCS)	20	24.4	24.33	-0.09	0	00120	QPSK	1	50	0 mm	left	1:1	2.490	1.016	2.530	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.4	23.27	0.08	1	00120	QPSK	50	25	0 mm	left	1:1	1.980	1.030	2.039	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.4	23.34	0.18	1	00120	QPSK	50	25	0 mm	left	1:1	1.960	1.014	1.987	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.4	23.38	0.19	1	00120	QPSK	50	0	0 mm	left	1:1	2.040	1.005	2.050	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.4	23.25	0.03	1	00120	QPSK	100	0	0 mm	left	1:1	1.970	1.035	2.039	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	23.12	-0.12	0	00120	QPSK	1	50	0 mm	back	1:1	2.510	1.019	2.558	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.2	23.08	-0.12	0	00120	QPSK	1	50	0 mm	back	1:1	2.550	1.028	2.621	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.2	23.08	-0.19	0	00120	QPSK	1	0	0 mm	back	1:1	2.700	1.028	2.776	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.84	-0.14	0	00120	QPSK	50	25	0 mm	back	1:1	2.660	1.086	2.889	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.2	23.02	-0.20	0	00120	QPSK	50	25	0 mm	back	1:1	2.630	1.042	2.740	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.2	23.15	-0.16	0	00120	QPSK	50	50	0 mm	back	1:1	2.710	1.012	2.743	A41
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.2	22.89	-0.17	0	00120	QPSK	100	0	0 mm	back	1:1	2.660	1.074	2.857	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	23.12	0.14	0	00120	QPSK	1	50	0 mm	front	1:1	2.190	1.019	2.232	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.2	23.08	0.18	0	00120	QPSK	1	50	0 mm	front	1:1	2.240	1.028	2.303	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.2	23.08	0.13	0	00120	QPSK	1	0	0 mm	front	1:1	2.340	1.028	2.406	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.84	0.16	0	00120	QPSK	50	25	0 mm	front	1:1	2.310	1.086	2.509	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.2	23.02	0.13	0	00120	QPSK	50	25	0 mm	front	1:1	2.300	1.042	2.397	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.2	23.15	0.21	0	00120	QPSK	50	50	0 mm	front	1:1	2.390	1.012	2.419	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.2	22.89	0.14	0	00120	QPSK	100	0	0 mm	front	1:1	2.330	1.074	2.502	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	23.12	-0.12	0	00120	QPSK	1	50	0 mm	bottom	1:1	1.050	1.019	1.070	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.2	23.15	0.03	0	00120	QPSK	50	50	0 mm	bottom	1:1	1.110	1.012	1.123	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																Phablet 4.0 W/kg (mW/g) averaged over 10 grams			

Table 11-31
WLAN Phablet SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (10g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (10g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
5320	64	802.11a	OFDM	20	13.5	13.17	-0.01	0 mm	00136	6	back	99.2	8.426	0.651	1.079	1.008	0.708	
5320	64	802.11a	OFDM	20	13.5	13.17	0.00	0 mm	00136	6	front	99.2	4.208	-	1.079	1.008	-	
5320	64	802.11a	OFDM	20	13.5	13.17	-0.14	0 mm	00136	6	top	99.2	2.464	-	1.079	1.008	-	
5320	64	802.11a	OFDM	20	13.5	13.17	0.00	0 mm	00136	6	left	99.2	1.663	-	1.079	1.008	-	
5660	132	802.11a	OFDM	20	13.5	13.46	-0.15	0 mm	00136	6	back	99.2	8.132	0.666	1.009	1.008	0.677	A42
5660	132	802.11a	OFDM	20	13.5	13.46	-0.13	0 mm	00136	6	front	99.2	3.117	-	1.009	1.008	-	
5660	132	802.11a	OFDM	20	13.5	13.46	0.05	0 mm	00136	6	top	99.2	2.242	-	1.009	1.008	-	
5660	132	802.11a	OFDM	20	13.5	13.46	0.06	0 mm	00136	6	left	99.2	1.349	-	1.009	1.008	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Phablet 4.0 W/kg (mW/g) 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 13 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).
10. This device utilizes power reduction for some wireless modes and technologies, as outlined in Section 1.3. The maximum output power allowed for each transmitter and exposure condition was evaluated for SAR compliance based on expected use conditions and simultaneous transmission scenarios.
11. 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. Additional SAR tests for phablet SAR were evaluated per KDB 616217 Section 6 (See Section 6.8 for additional information)
12. Unless otherwise noted, when 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds below.

GSM Test Notes:

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

CDMA Notes:

1. Head SAR for CDMA2000 mode was tested under RC3/SO55 per FCC KDB Publication 941225 D01v03r01.
2. Body-Worn SAR was tested with 1x RTT with TDSO / SO32 FCH Only. EVDO Rev0 and RevA and TDSO / SO32 FCH+SCH SAR tests were not required per the 3G SAR Test Reduction Procedure in FCC KDB Publication 941225 D01v03r01.
3. CDMA Wireless Router SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 according to KDB 941225 D01v03r01 procedures for data devices. Wireless Router SAR tests for Subtype 2 of Rev.A and 1x RTT configurations were not required per the 3G SAR Test Reduction Policy in KDB Publication 941225 D01v03r01.
4. Head SAR was additionally evaluated using EVDO Rev. A to determine compliance for VoIP operations.
5. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg for 1g evaluations then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.

UMTS Notes:

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

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 8.6.4.
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 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).

WLAN Notes:

1. For held-to-ear and hotspot 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 operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 8.7.5 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 8.7.6 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.

Bluetooth Notes

1. Bluetooth SAR was measured with the device connected to a call box with hopping disabled with DH5 operation and Tx Tests test mode type. Per October 2016 TCB Workshop Notes, the reported SAR was scaled to the 100% transmission duty factor to determine compliance. See Section 9.6 for the time domain plot and calculation for the duty factor of the device.

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 Introduction

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

12.2 Simultaneous Transmission Procedures

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

12.3 Head SAR Simultaneous Transmission Analysis

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM/GPRS 850	0.306	0.719	1.025
	GSM/GPRS 1900	0.269	0.719	0.988
	UMTS 850	0.319	0.719	1.038
	UMTS 1750	0.471	0.719	**1.190**
	UMTS 1900	0.411	0.719	1.130
	Cell. CDMA/EVDO	0.330	0.719	1.049
	PCS CDMA/EVDO	0.397	0.719	1.116
	LTE Band 12	0.292	0.719	1.011
	LTE Band 13	0.278	0.719	0.997
	LTE Band 5 (Cell)	0.324	0.719	1.043
	LTE Band 4 (AWS)	0.439	0.719	1.158
	LTE Band 25 (PCS)	0.459	0.719	1.178

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM/GPRS 850	0.306	1.024	1.330
	GSM/GPRS 1900	0.269	1.024	1.293
	UMTS 850	0.319	1.024	1.343
	UMTS 1750	0.471	1.024	**1.495**
	UMTS 1900	0.411	1.024	1.435
	Cell. CDMA/EVDO	0.330	1.024	1.354
	PCS CDMA/EVDO	0.397	1.024	1.421
	LTE Band 12	0.292	1.024	1.316
	LTE Band 13	0.278	1.024	1.302
	LTE Band 5 (Cell)	0.324	1.024	1.348
	LTE Band 4 (AWS)	0.439	1.024	1.463
	LTE Band 25 (PCS)	0.459	1.024	1.483

Table 12-3
Simultaneous Transmission Scenario with Bluetooth (Held to Ear)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM/GPRS 850	0.306	0.183	0.489
	GSM/GPRS 1900	0.269	0.183	0.452
	UMTS 850	0.319	0.183	0.502
	UMTS 1750	0.471	0.183	**0.654**
	UMTS 1900	0.411	0.183	0.594
	Cell. CDMA/EVDO	0.330	0.183	0.513
	PCS CDMA/EVDO	0.397	0.183	0.580
	LTE Band 12	0.292	0.183	0.475
	LTE Band 13	0.278	0.183	0.461
	LTE Band 5 (Cell)	0.324	0.183	0.507
	LTE Band 4 (AWS)	0.439	0.183	0.622
	LTE Band 25 (PCS)	0.459	0.183	0.642

Table 12-4
Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN (Held to Ear)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	GSM/GPRS 850	0.306	0.183	1.024	1.513
	GSM/GPRS 1900	0.269	0.183	1.024	1.476
	UMTS 850	0.319	0.183	1.024	1.526
	UMTS 1750	0.471	0.183	1.024	See Table Below
	UMTS 1900	0.411	0.183	1.024	See Table Below
	Cell. CDMA/EVDO	0.330	0.183	1.024	**1.537**
	PCS CDMA/EVDO	0.397	0.183	1.024	See Table Below
	LTE Band 12	0.292	0.183	1.024	1.499
	LTE Band 13	0.278	0.183	1.024	1.485
	LTE Band 5 (Cell)	0.324	0.183	1.024	1.531
	LTE Band 4 (AWS)	0.439	0.183	1.024	See Table Below
	LTE Band 25 (PCS)	0.459	0.183	1.024	See Table Below

Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.246	0.183	1.024	1.453
	Right Tilt	0.371	0.145	0.630	1.146
	Left Cheek	0.471	0.097	1.024*	**1.592**
	Left Tilt	0.341	0.098	0.546	0.985

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.231	0.183	1.024	1.438
	Right Tilt	0.153	0.145	0.630	0.928
	Left Cheek	0.411	0.097	1.024*	**1.532**
	Left Tilt	0.195	0.098	0.546	0.839

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.244	0.183	1.024	1.451
	Right Tilt	0.218	0.145	0.630	0.993
	Left Cheek	0.397	0.097	1.024*	**1.518**
	Left Tilt	0.220	0.098	0.546	0.864

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.248	0.183	1.024	1.455
	Right Tilt	0.213	0.145	0.630	0.988
	Left Cheek	0.356	0.097	1.024*	**1.477**
	Left Tilt	0.234	0.098	0.546	0.878

Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.208	0.183	1.024	1.415
	Right Tilt	0.314	0.145	0.630	1.089
	Left Cheek	0.439	0.097	1.024*	**1.560**
	Left Tilt	0.290	0.098	0.546	0.934

Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.259	0.183	1.024	1.466
	Right Tilt	0.164	0.145	0.630	0.939
	Left Cheek	0.459	0.097	1.024*	**1.580**
	Left Tilt	0.199	0.098	0.546	0.843

12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-5
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM/GPRS 850	0.556	0.116	0.672
	GSM/GPRS 1900	0.405	0.116	0.521
	UMTS 850	0.417	0.116	0.533
	UMTS 1750	0.889	0.116	1.005
	UMTS 1900	0.538	0.116	0.654
	Cell. CDMA	0.398	0.116	0.514
	PCS CDMA	0.713	0.116	0.829
	LTE Band 12	0.414	0.116	0.530
	LTE Band 13	0.386	0.116	0.502
	LTE Band 5 (Cell)	0.425	0.116	0.541
	LTE Band 4 (AWS)	0.949	0.116	**1.065**
	LTE Band 25 (PCS)	0.577	0.116	0.693

Table 12-6
Simultaneous Transmission Scenario with 5 GHz WLAN (Body-Worn at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM/GPRS 850	0.556	0.235	0.791
	GSM/GPRS 1900	0.405	0.235	0.640
	UMTS 850	0.417	0.235	0.652
	UMTS 1750	0.889	0.235	1.124
	UMTS 1900	0.538	0.235	0.773
	Cell. CDMA	0.398	0.235	0.633
	PCS CDMA	0.713	0.235	0.948
	LTE Band 12	0.414	0.235	0.649
	LTE Band 13	0.386	0.235	0.621
	LTE Band 5 (Cell)	0.425	0.235	0.660
	LTE Band 4 (AWS)	0.949	0.235	**1.184**
	LTE Band 25 (PCS)	0.577	0.235	0.812

Table 12-7
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM/GPRS 850	0.556	0.044	0.600
	GSM/GPRS 1900	0.405	0.044	0.449
	UMTS 850	0.417	0.044	0.461
	UMTS 1750	0.889	0.044	0.933
	UMTS 1900	0.538	0.044	0.582
	Cell. CDMA	0.398	0.044	0.442
	PCS CDMA	0.713	0.044	0.757
	LTE Band 12	0.414	0.044	0.458
	LTE Band 13	0.386	0.044	0.430
	LTE Band 5 (Cell)	0.425	0.044	0.469
	LTE Band 4 (AWS)	0.949	0.044	**0.993**
	LTE Band 25 (PCS)	0.577	0.044	0.621

Table 12-8
Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN (Body-Worn at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body-Worn	GSM/GPRS 850	0.556	0.044	0.235	0.835
	GSM/GPRS 1900	0.405	0.044	0.235	0.684
	UMTS 850	0.417	0.044	0.235	0.696
	UMTS 1750	0.889	0.044	0.235	1.168
	UMTS 1900	0.538	0.044	0.235	0.817
	Cell. CDMA	0.398	0.044	0.235	0.677
	PCS CDMA	0.713	0.044	0.235	0.992
	LTE Band 12	0.414	0.044	0.235	0.693
	LTE Band 13	0.386	0.044	0.235	0.665
	LTE Band 5 (Cell)	0.425	0.044	0.235	0.704
	LTE Band 4 (AWS)	0.949	0.044	0.235	**1.228**
	LTE Band 25 (PCS)	0.577	0.044	0.235	0.856

12.5 Hotspot SAR Simultaneous Transmission Analysis

Table 12-9
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.556	0.116	0.672
	GPRS 1900	0.405	0.116	0.521
	UMTS 850	0.474	0.116	0.590
	UMTS 1750	0.889	0.116	1.005
	UMTS 1900	0.538	0.116	0.654
	Cell. EVDO	0.439	0.116	0.555
	PCS EVDO	0.802	0.116	0.918
	LTE Band 12	0.414	0.116	0.530
	LTE Band 13	0.520	0.116	0.636
	LTE Band 5 (Cell)	0.425	0.116	0.541
	LTE Band 4 (AWS)	0.949	0.116	**1.065**
	LTE Band 25 (PCS)	0.675	0.116	0.791

Table 12-10
Simultaneous Transmission Scenario with 5 GHz WLAN (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.556	0.187	0.743
	GPRS 1900	0.405	0.187	0.592
	UMTS 850	0.474	0.187	0.661
	UMTS 1750	0.889	0.187	1.076
	UMTS 1900	0.538	0.187	0.725
	Cell. EVDO	0.439	0.187	0.626
	PCS EVDO	0.802	0.187	0.989
	LTE Band 12	0.414	0.187	0.601
	LTE Band 13	0.520	0.187	0.707
	LTE Band 5 (Cell)	0.425	0.187	0.612
	LTE Band 4 (AWS)	0.949	0.187	**1.136**
	LTE Band 25 (PCS)	0.675	0.187	0.862

Table 12-11
Simultaneous Transmission Scenario with Bluetooth (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.556	0.044	0.600
	GPRS 1900	0.405	0.044	0.449
	UMTS 850	0.474	0.044	0.518
	UMTS 1750	0.889	0.044	0.933
	UMTS 1900	0.538	0.044	0.582
	Cell. EVDO	0.439	0.044	0.483
	PCS EVDO	0.802	0.044	0.846
	LTE Band 12	0.414	0.044	0.458
	LTE Band 13	0.520	0.044	0.564
	LTE Band 5 (Cell)	0.425	0.044	0.469
	LTE Band 4 (AWS)	0.949	0.044	**0.993**
	LTE Band 25 (PCS)	0.675	0.044	0.719

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	GPRS 850	0.556	0.044	0.187	0.787
	GPRS 1900	0.405	0.044	0.187	0.636
	UMTS 850	0.474	0.044	0.187	0.705
	UMTS 1750	0.889	0.044	0.187	1.120
	UMTS 1900	0.538	0.044	0.187	0.769
	Cell. EVDO	0.439	0.044	0.187	0.670
	PCS EVDO	0.802	0.044	0.187	1.033
	LTE Band 12	0.414	0.044	0.187	0.645
	LTE Band 13	0.520	0.044	0.187	0.751
	LTE Band 5 (Cell)	0.425	0.044	0.187	0.656
	LTE Band 4 (AWS)	0.949	0.044	0.187	**1.180**
	LTE Band 25 (PCS)	0.675	0.044	0.187	0.906

12.6 Phablet Simultaneous Transmission Analysis

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

Table 12-13
Simultaneous Transmission Scenario with 5 GHz WLAN (Phablet)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	UMTS 1750	3.068	0.708	**3.776**
	UMTS 1900	2.929	0.708	3.637
	PCS EVDO	3.057	0.708	3.765
	LTE Band 4 (AWS)	2.769	0.708	3.477
	LTE Band 25 (PCS)	2.889	0.708	3.597

12.7 Simultaneous Transmission Conclusion

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

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

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

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

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

Table 13-1
Head SAR Measurement Variability Results

HEAD VARIABILITY RESULTS														
Band	FREQUENCY		Mode/Band	Service	Side	Test Position	Data Rate (Mbps)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.						(W/kg)	(W/kg)		(W/kg)		(W/kg)	
5750	5825.00	165	802.11a, 20 MHz Bandwidth	OFDM	Right	Cheek	6	0.964	0.919	1.05	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Head 1.6 W/kg (mW/g) averaged over 1 gram									

Table 13-2
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS														
Band	FREQUENCY		Mode	Service	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio	
	MHz	Ch.					(W/kg)	(W/kg)		(W/kg)		(W/kg)		
1750	1732.50	20175	LTE Band 4 (AWS), 20 MHz Bandwidth	QPSK, 1 RB, 99 RB Offset	back	10 mm	0.942	0.933	1.01	N/A	N/A	N/A	N/A	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Body 1.6 W/kg (mW/g) averaged over 1 gram									

Table 13-3
Phablet SAR Measurement Variability Results

PHABLET VARIABILITY RESULTS													
Band	FREQUENCY		Mode	Service	Side	Spacing	Measured SAR (10g)	1st Repeated SAR (10g)	Ratio	2nd Repeated SAR (10g)	Ratio	3rd Repeated SAR (10g)	Ratio
	MHz	Ch.					(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1750	1732.40	1412	UMTS 1750	RMC	left	0 mm	2.980	2.990	1.00	N/A	N/A	N/A	N/A
1900	1908.75	1175	PCS CDMA	EVDO Rev. 0	left	0 mm	2.940	3.030	1.03	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Phablet 4.0 W/kg (mW/g) averaged over 10 grams							

13.2 Measurement Uncertainty

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

14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753E	(30kHz-6GHz) Network Analyzer	9/28/2018	Annual	9/28/2019	JP38020182
Agilent	8753ES	S-Parameter Vector Network Analyzer	8/30/2018	Annual	8/30/2019	MY40003841
Agilent	E4432B	ESG-D Series Signal Generator	4/19/2018	Annual	4/19/2019	US40053896
Agilent	E4438C	ESG Vector Signal Generator	3/23/2017	Biennial	3/23/2019	MY42082659
Agilent	E4440A	PSA Series Spectrum Analyzer	11/14/2018	Annual	11/14/2019	MY46186272
Agilent	E5515C	8960 Series 10 Wireless Communications Test Set	12/18/2018	Annual	12/18/2019	GB42230325
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Amplifier Research	150A100C	Amplifier	CBT	N/A	CBT	350132
Amplifier Research	150A100C	DC Amplifier	CBT	N/A	CBT	348812
Anritsu	MA24106A	USB Power Sensor	6/5/2018	Annual	6/5/2019	1231538
Anritsu	MA24106A	USB Power Sensor	10/30/2018	Annual	10/30/2019	846215
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1126066
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MT8820C	Radio Communication Analyzer	6/27/2018	Annual	6/27/2019	6201240328
Anritsu	MT8862A	Wireless Connectivity Test Set	7/3/2018	Annual	7/3/2019	6261782395
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
Control Company	4040	Therm./ Clock/ Humidity Monitor	2/28/2018	Biennial	2/28/2020	130448366
Control Company	4352	Ultra Long Stem Thermometer	5/2/2017	Biennial	5/2/2019	170330144
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Keysight Technologies	AT/N6705B	DC Power Supply	CBT	N/A	CBT	MY53001315
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mitutoyo	CD-6"CSX	Digital Caliper	4/18/2018	Biennial	4/18/2020	13264165
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	NC-100	Torque Wrench	4/18/2018	Annual	4/18/2019	N/A
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	4/11/2017	Annual	4/11/2018	836371/0079
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	7/20/2017	Annual	7/20/2018	132885
Rohde & Schwarz	CMW500	Radio Communication Tester	4/5/2018	Annual	4/5/2019	128633
Seekonk	NC-100	Torque Wrench (8" lb)	8/30/2016	Biennial	8/30/2018	N/A
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	7/11/2018	Annual	7/11/2019	N/A
Seekonk	NC-100	Torque Wrench	7/11/2018	Annual	7/11/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	D750V3	750 MHz SAR Dipole	1/15/2018	Biennial	1/15/2020	1003
SPEAG	D750V3	750 MHz SAR Dipole	10/19/2018	Annual	10/19/2019	1161
SPEAG	D835V2	835 MHz SAR Dipole	1/22/2019	Annual	1/22/2020	4d132
SPEAG	D835V2	835 MHz SAR Dipole	10/19/2018	Annual	10/19/2019	4d133
SPEAG	D1750V2	1750 MHz SAR Dipole	10/22/2018	Annual	10/22/2019	1150
SPEAG	D1900V2	1900 MHz SAR Dipole	10/23/2018	Annual	10/23/2019	5d080
SPEAG	D2450V2	2450 MHz SAR Dipole	8/16/2018	Annual	8/16/2019	981
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/16/2018	Biennial	1/16/2020	1057
SPEAG	D1750V2	1750 MHz SAR Dipole	5/9/2017	Biennial	5/9/2019	1148
SPEAG	D1900V2	1900 MHz SAR Dipole	10/23/2018	Annual	10/23/2019	5d149
SPEAG	D2450V2	2450 MHz SAR Dipole	8/17/2017	Biennial	8/17/2019	719
SPEAG	D5GHzV2	5 GHz SAR Dipole	9/21/2016	Triennial	9/21/2019	1191
SPEAG	EX3DV4	SAR Probe	6/25/2018	Annual	6/25/2019	7409
SPEAG	EX3DV4	SAR Probe	4/18/2018	Annual	4/18/2019	7357
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7410
SPEAG	EX3DV4	SAR Probe	1/25/2019	Annual	1/25/2020	3589
SPEAG	EX3DV4	SAR Probe	8/23/2018	Annual	8/23/2019	7308
SPEAG	EX3DV4	SAR Probe	1/24/2019	Annual	1/24/2020	7488
SPEAG	EX3DV4	SAR Probe	2/19/2019	Annual	2/19/2020	7417
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/18/2018	Annual	6/18/2019	1334
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/11/2018	Annual	4/11/2019	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/11/2018	Annual	7/11/2019	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/22/2018	Annual	8/22/2019	1450
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/3/2018	Annual	10/3/2019	1558
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/15/2019	Annual	1/15/2020	1530
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/13/2019	Annual	2/13/2020	665

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. 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.

15 MEASUREMENT UNCERTAINTIES

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

16 CONCLUSION

16.1 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]

17 REFERENCES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

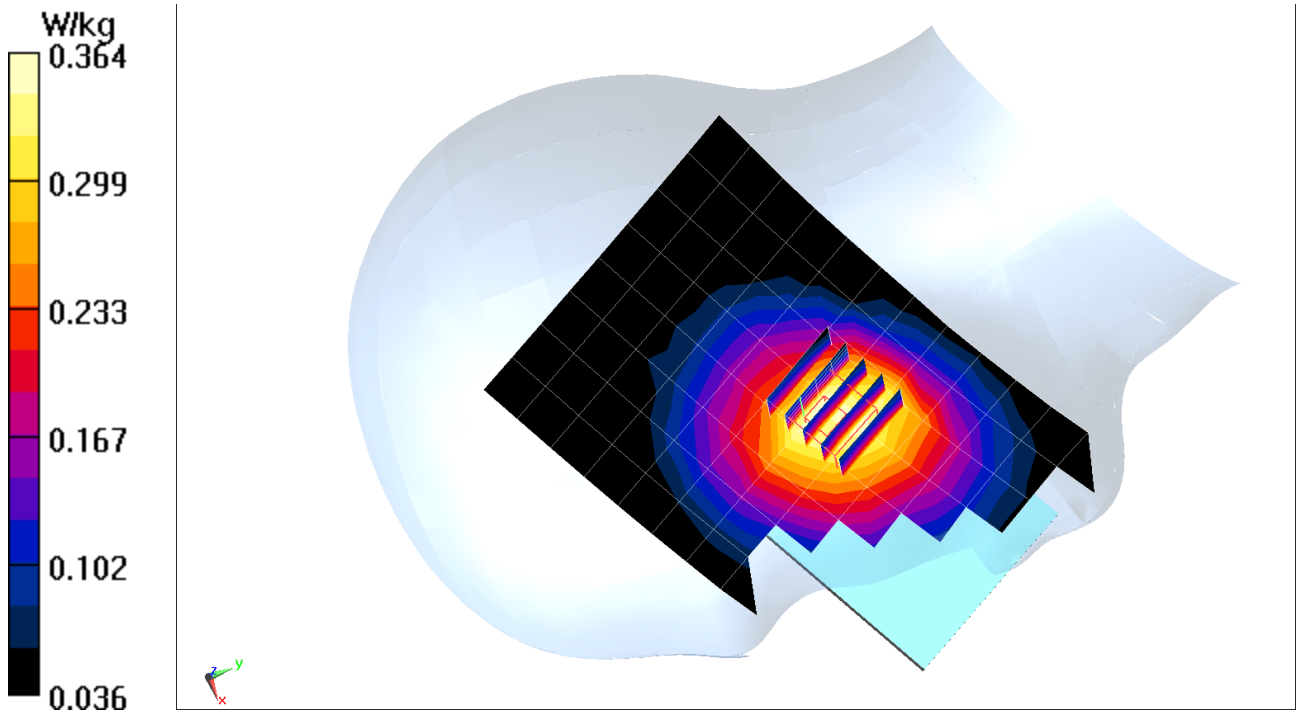
Communication System: UID 0, GSM GPRS; 2 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium: 835 Head Medium parameters used (interpolated):
$f = 836.6$ MHz; $\sigma = 0.941$ S/m; $\varepsilon_r = 41.255$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 03-11-2019; Ambient Temp: 20.9°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7409; ConvF(9.67, 9.67, 9.67) @ 836.6 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP.1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: GPRS 850, Right Head, Cheek, Mid.ch, 2 Tx slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.12 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.412 W/kg
SAR(1 g) = 0.303 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

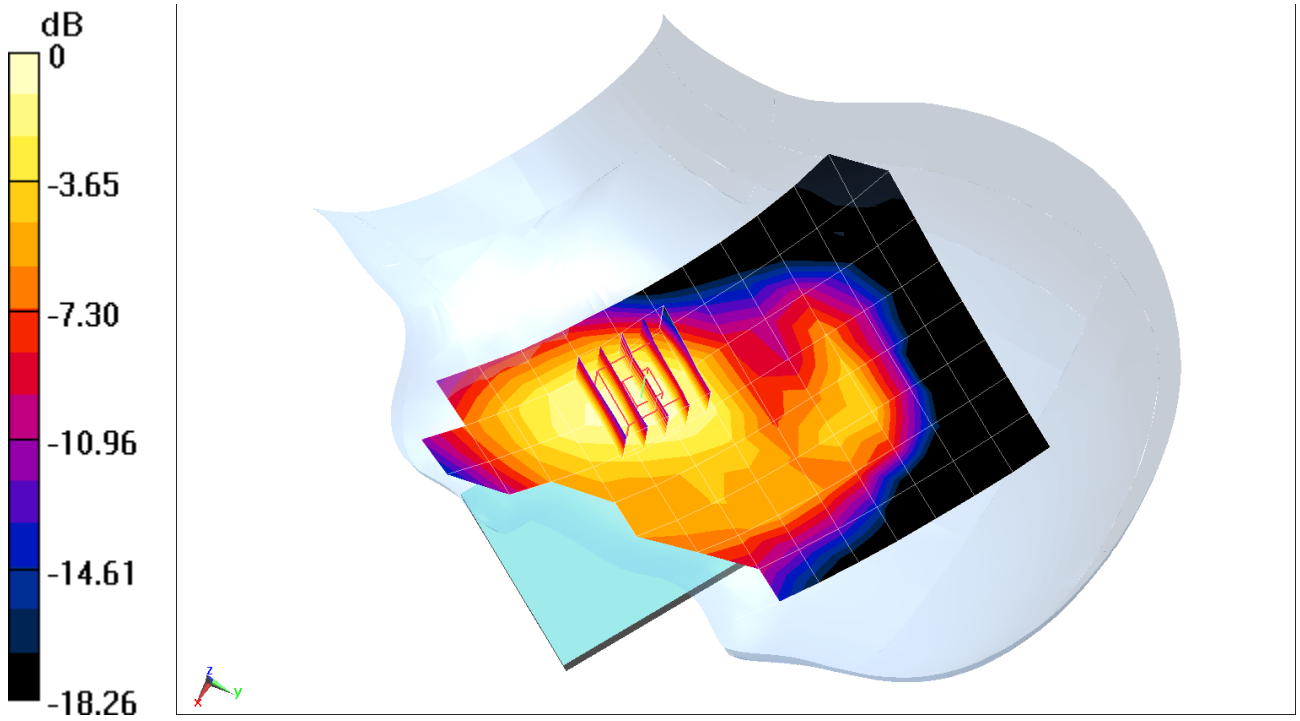
Communication System: UID 0, _GSM GPRS; 2 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.445 S/m; ε_r = 39.14; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 02-28-2019; Ambient Temp:23.8°C; Tissue Temp:21.8°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1880 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front 30 degree; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: GPRS 1900, Left Head, Cheek, Mid.ch, 2 Tx slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.26 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.404 W/kg
SAR(1 g) = 0.265 W/kg



0 dB = 0.340 W/kg = -4.69 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

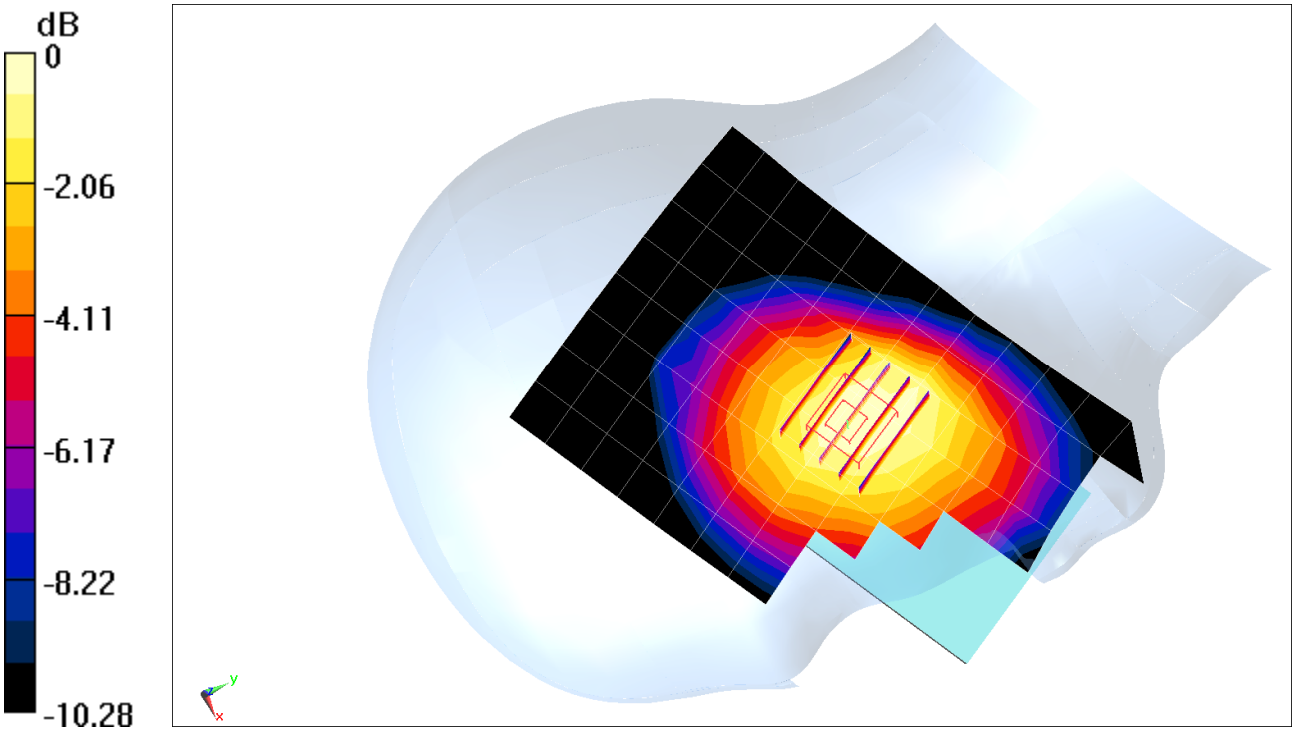
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 850 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.941 S/m; ε_r = 41.255; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-11-2019; Ambient Temp: 20.9°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7409; ConvF(9.67, 9.67, 9.67) @ 836.6 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.65 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.415 W/kg
SAR(1 g) = 0.310 W/kg



0 dB = 0.372 W/kg = -4.29 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00130

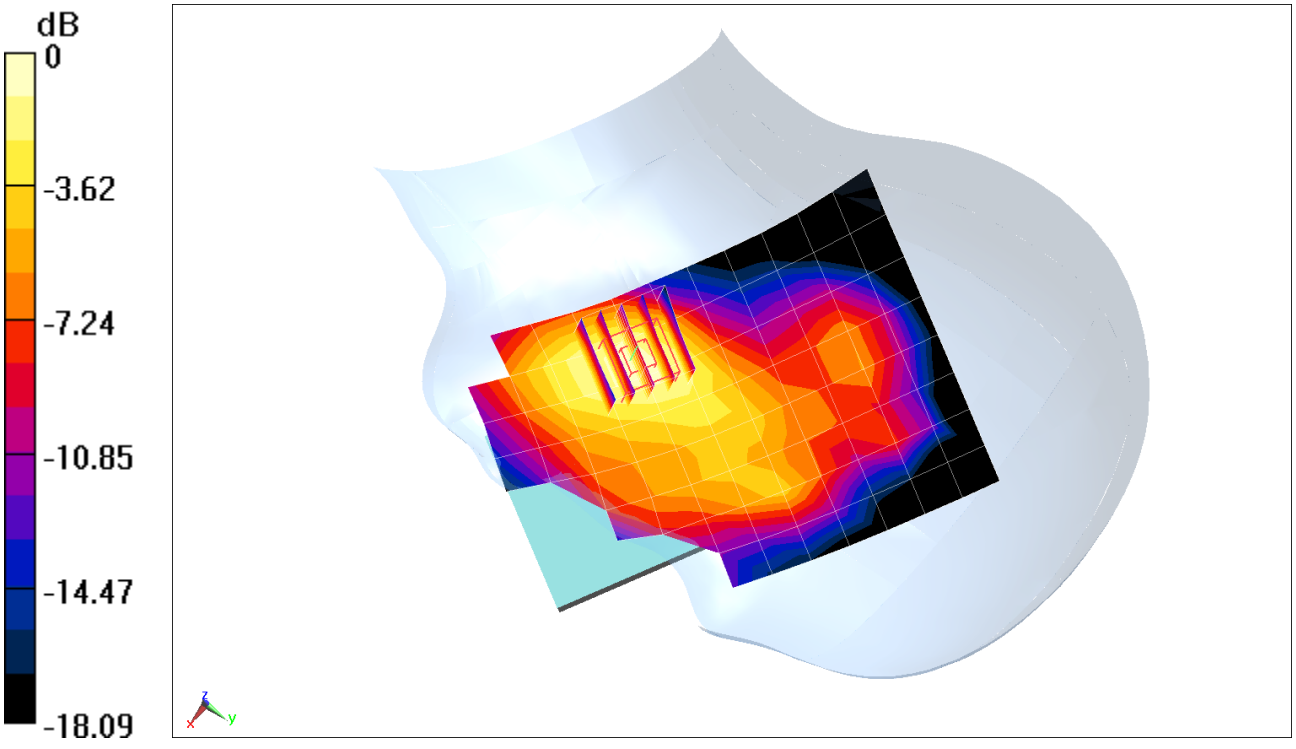
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.385 S/m; ε_r = 38.948; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-04-2019; Ambient Temp: 22.0°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7357; ConvF(8.8, 8.8, 8.8) @ 1732.4 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: Left For Head SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD; Serial: TP:1687
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: UMTS 1750, Left Head, Cheek, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.20 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.726 W/kg
SAR(1 g) = 0.471 W/kg



0 dB = 0.639 W/kg = -1.94 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

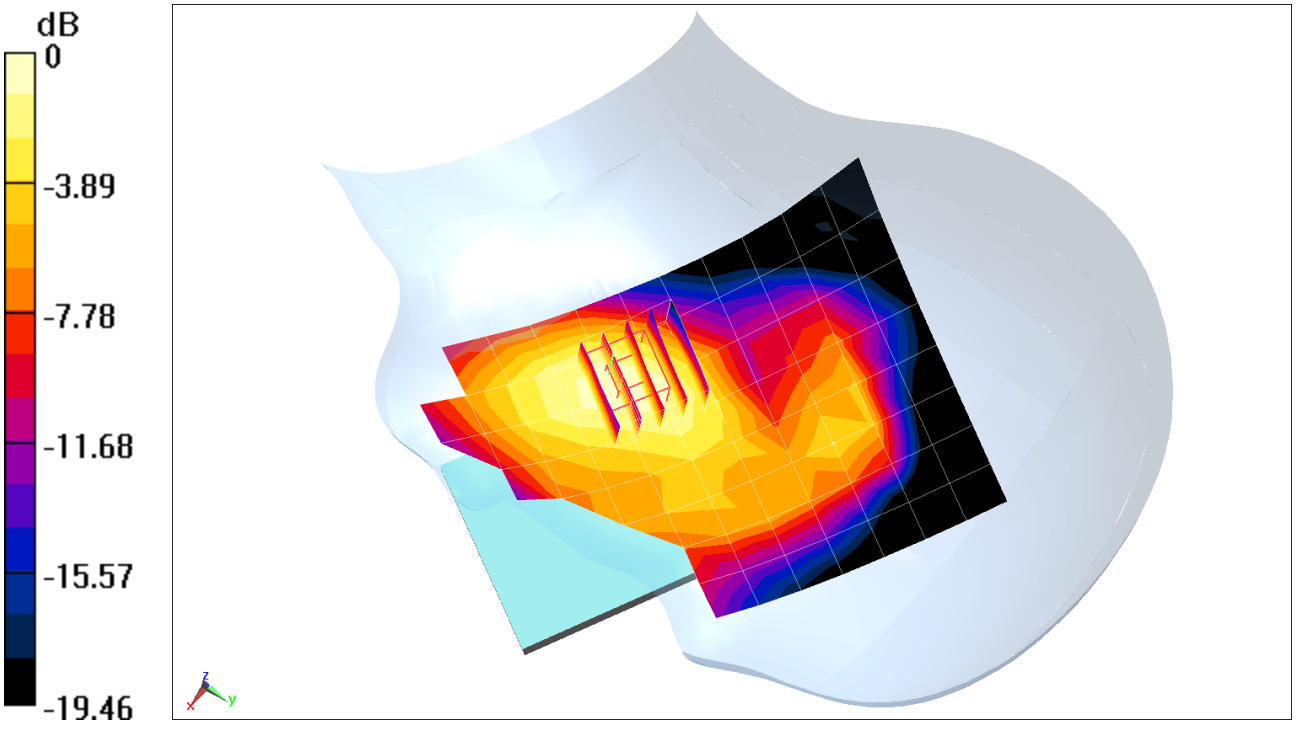
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.445 S/m; ε_r = 39.14; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 02-28-2019; Ambient Temp:23.8°C; Tissue Temp:21.8°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1880 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front 30 degree; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.15 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.644 W/kg
SAR(1 g) = 0.405 W/kg



0 dB = 0.537 W/kg = -2.70 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00117

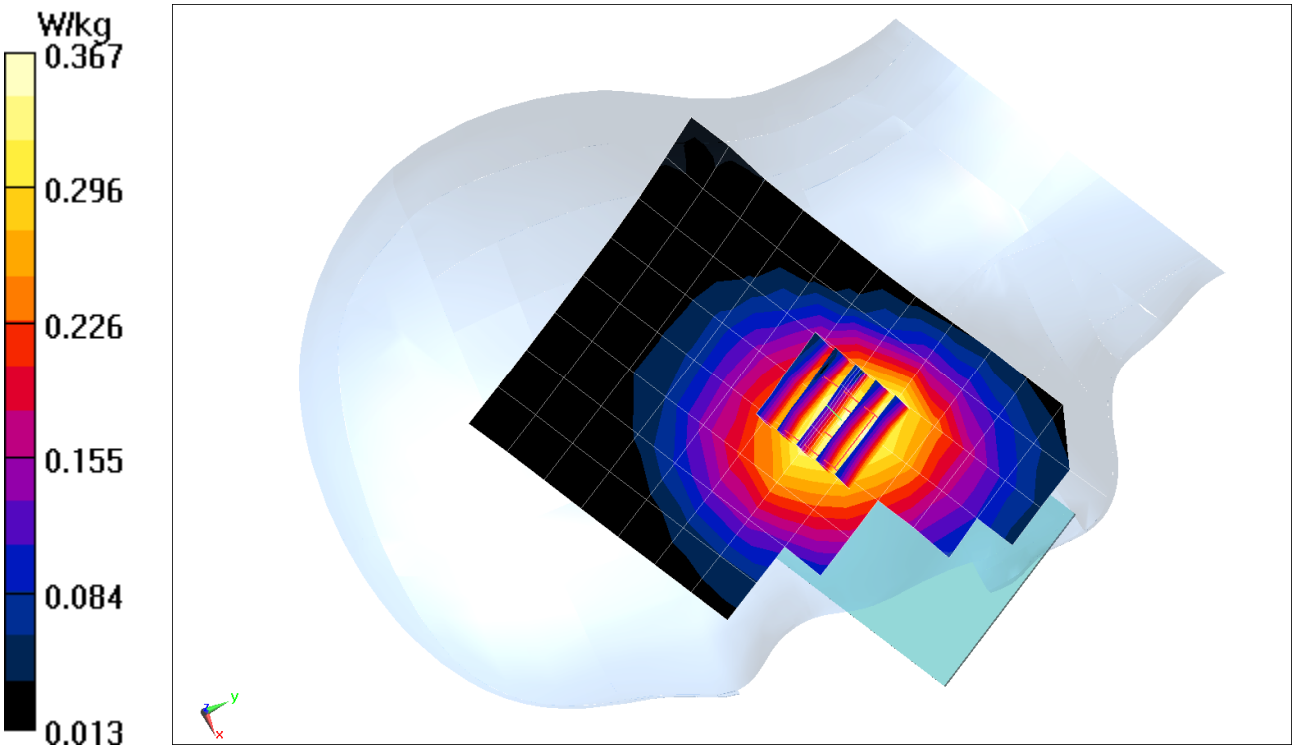
Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.926 S/m; ε_r = 41.759; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-13-2019; Ambient Temp: 21.6°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7409; ConvF(9.67, 9.67, 9.67) @ 836.52 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: Cell. CDMA, Right Head, Cheek, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.84 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.409 W/kg
SAR(1 g) = 0.312 W/kg



DUT: ZNFX420QM; Type: Portable Handset; Serial: 00117

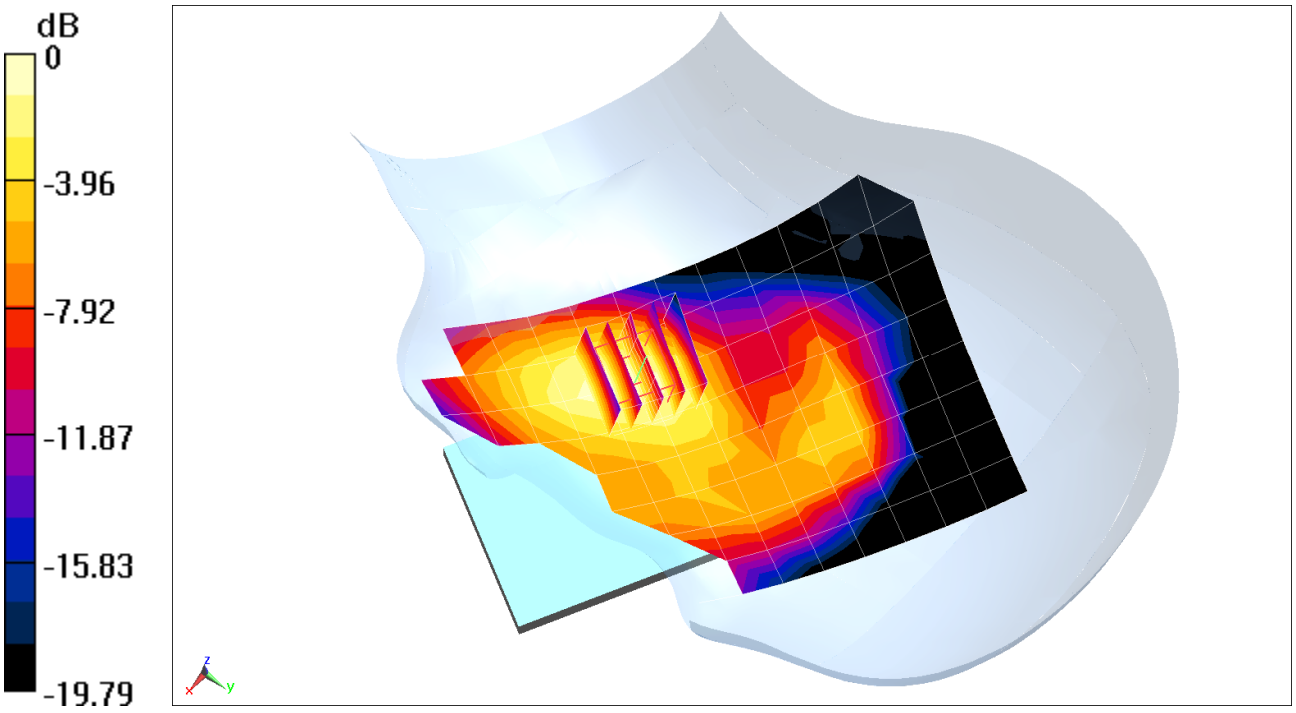
Communication System: UID 0, PCS CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.398 S/m; ε_r = 38.255; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-14-2019; Ambient Temp: 22.5°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN3589; ConvF(7.08, 7.08, 7.08) @ 1880 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: PCS EVDO Rev A, Left Head, Cheek, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.22 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.632 W/kg
SAR(1 g) = 0.384 W/kg



0 dB = 0.518 W/kg = -2.86 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

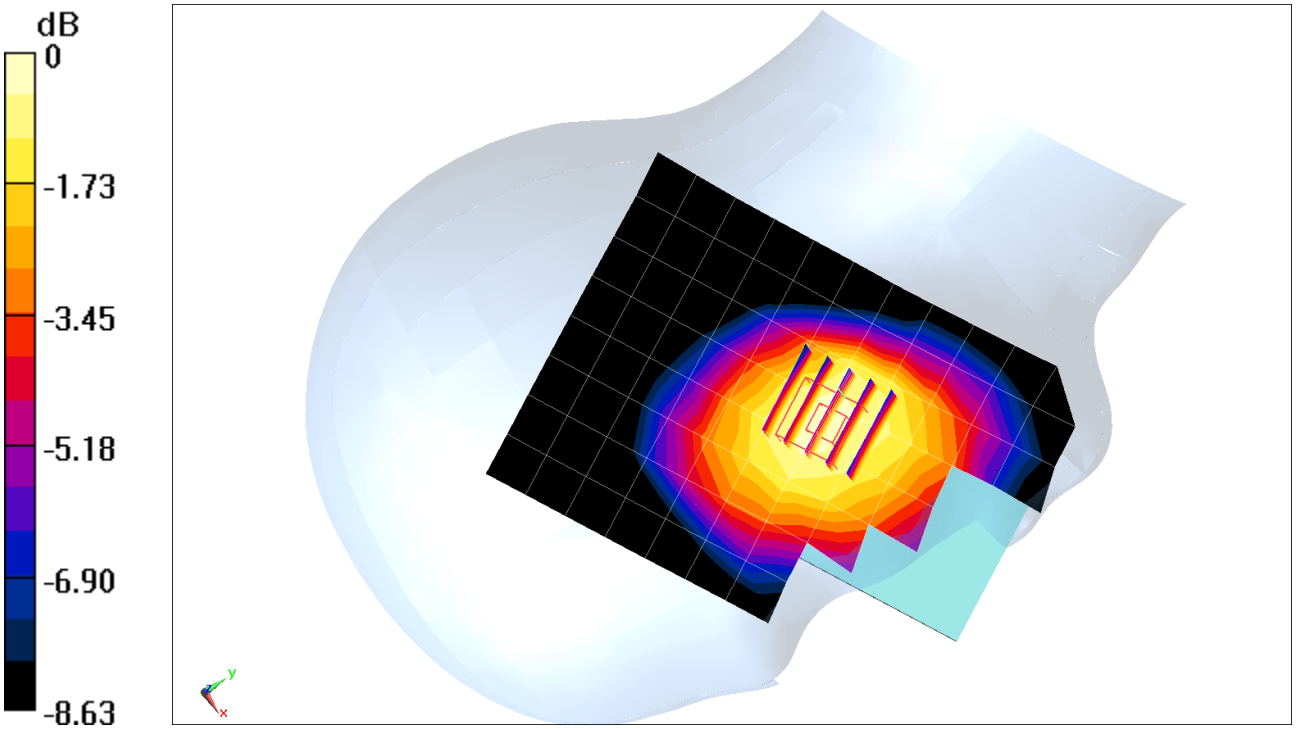
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.879 S/m; ε_r = 42.172; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-14-2019; Ambient Temp: 21.9°C; Tissue Temp: 20.9°C

Probe: EX3DV4 - SN7409; ConvF(9.91, 9.91, 9.91) @ 707.5 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 12, Right Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.53 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.363 W/kg
SAR(1 g) = 0.277 W/kg



0 dB = 0.323 W/kg = -4.91 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00078

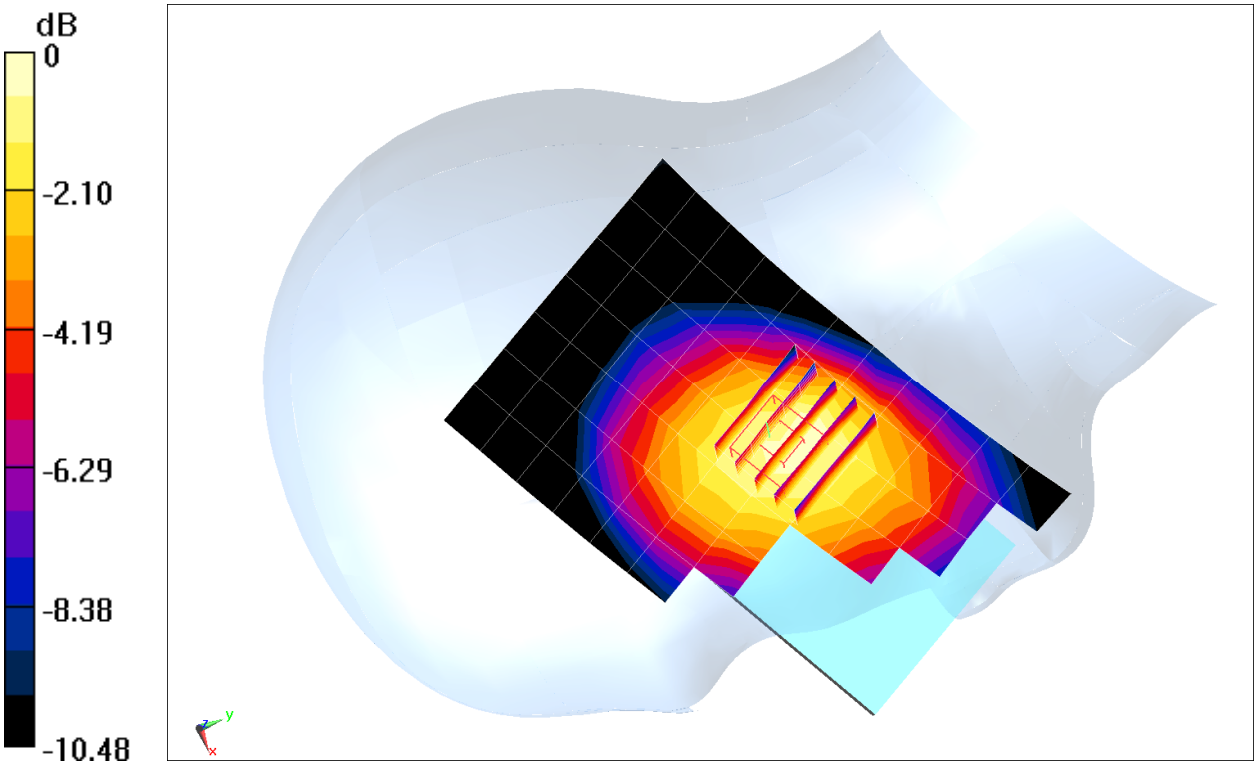
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 MHz Head Medium parameters used (interpolated):
f = 782 MHz; σ = 0.89 S/m; ε_r = 42.26; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-07-2019; Ambient Temp: 21.6°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN7409; ConvF(9.91, 9.91, 9.91) @ 782 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 13, Right Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.97 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.351 W/kg
SAR(1 g) = 0.267 W/kg



0 dB = 0.319 W/kg = -4.96 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

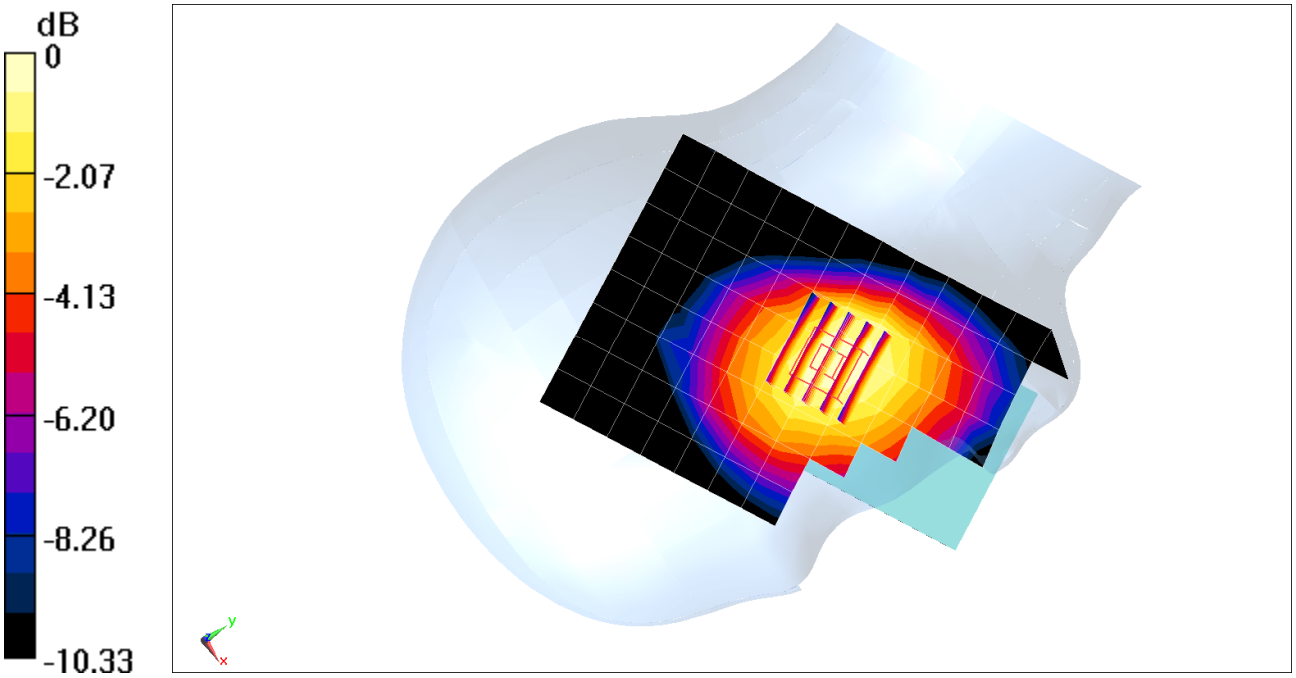
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 850 Head Medium parameters used (interpolated):
$f = 836.5$ MHz; $\sigma = 0.941$ S/m; $\varepsilon_r = 41.255$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 03-11-2019; Ambient Temp: 20.9°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7409; ConvF(9.67, 9.67, 9.67) @ 836.5 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 5 (Cell.), Right Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.84 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.400 W/kg
SAR(1 g) = 0.307 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00130

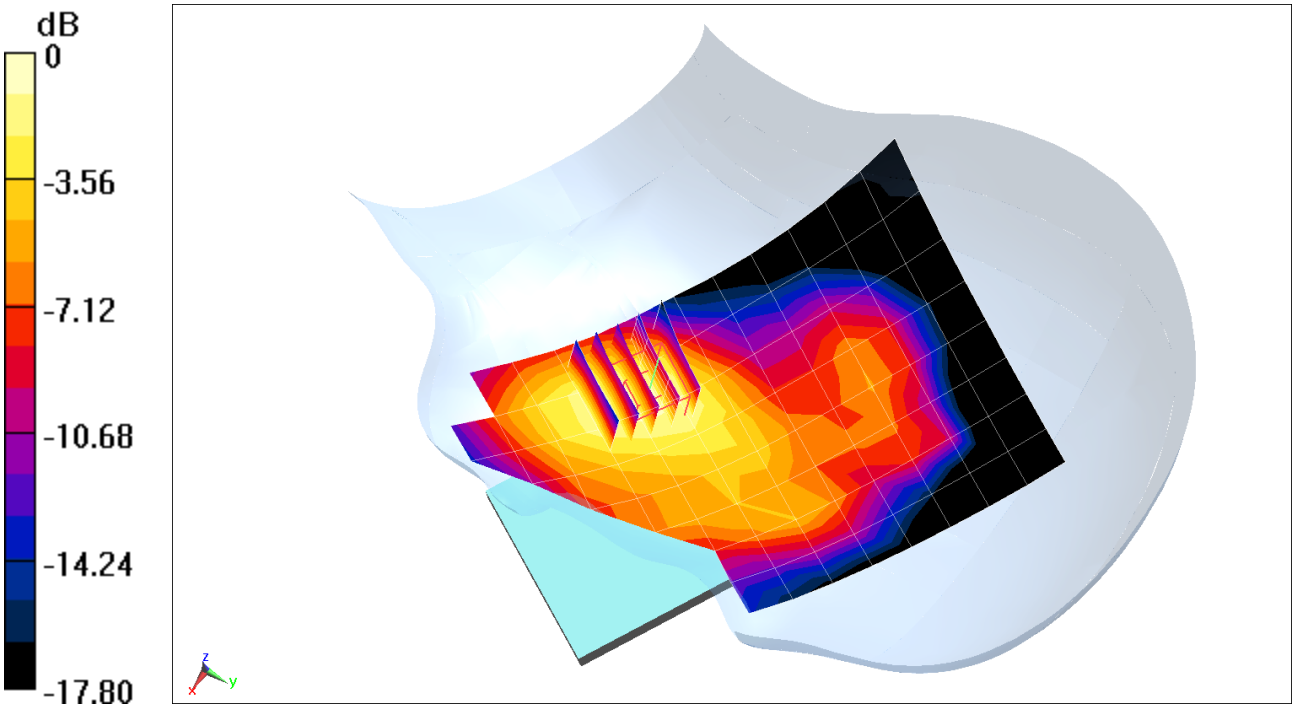
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.385 S/m; ε_r = 38.948; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-04-2019; Ambient Temp: 22.0°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7357; ConvF(8.8, 8.8, 8.8) @ 1732.5 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: Left For Head SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD; Serial: TP:1687
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 4 (AWS), Left Head, Cheek, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.26 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.688 W/kg
SAR(1 g) = 0.436 W/kg



0 dB = 0.596 W/kg = -2.25 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

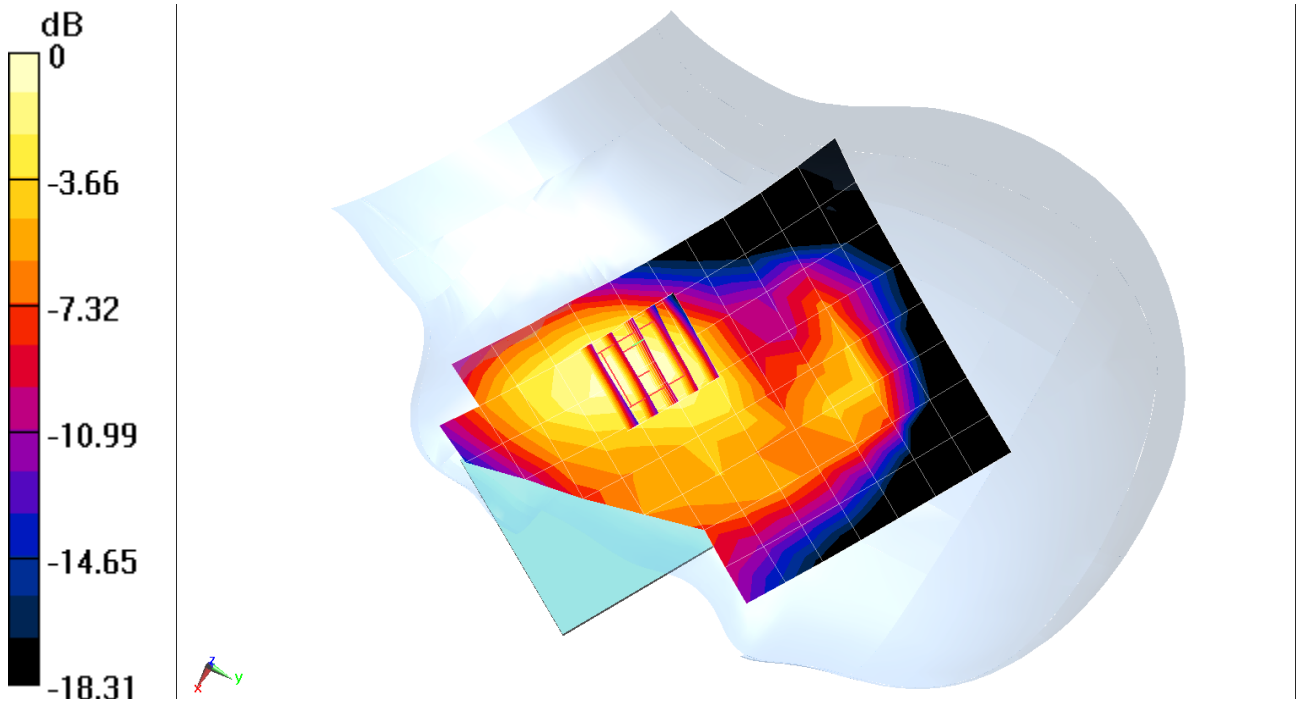
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1882.5 MHz; σ = 1.447 S/m; ε_r = 39.135; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 02-28-2019; Ambient Temp:23.8°C; Tissue Temp:21.8°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1882.5 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front 30 degree; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 25 (PCS), Left Head, Cheek, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.12 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.709 W/kg
SAR(1 g) = 0.454 W/kg



0 dB = 0.586 W/kg = -2.32 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00136

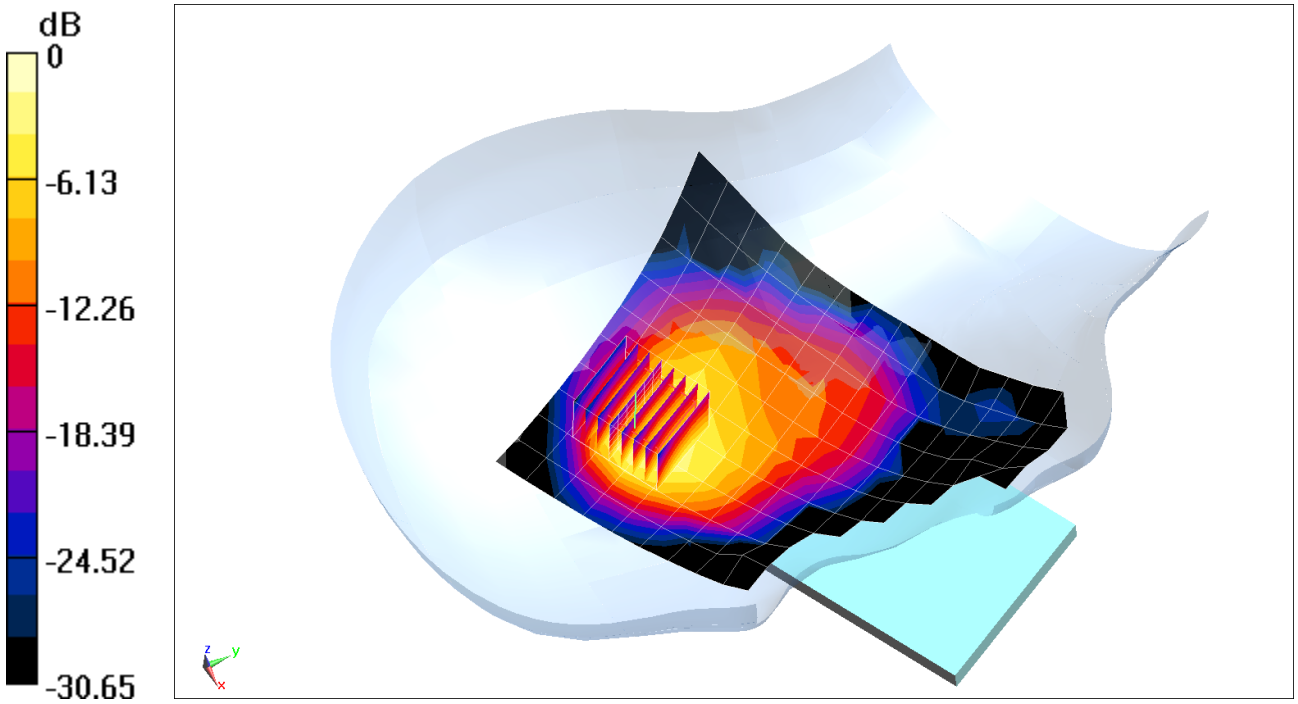
Communication System: UID 0, _IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
$f = 2437$ MHz; $\sigma = 1.825$ S/m; $\varepsilon_r = 39.342$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 03-11-2019; Ambient Temp: 24.0°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN3589; ConvF(6.46, 6.46, 6.46) @ 2437 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.61 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.57 W/kg
SAR(1 g) = 0.678 W/kg



0 dB = 1.12 W/kg = 0.49 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00136

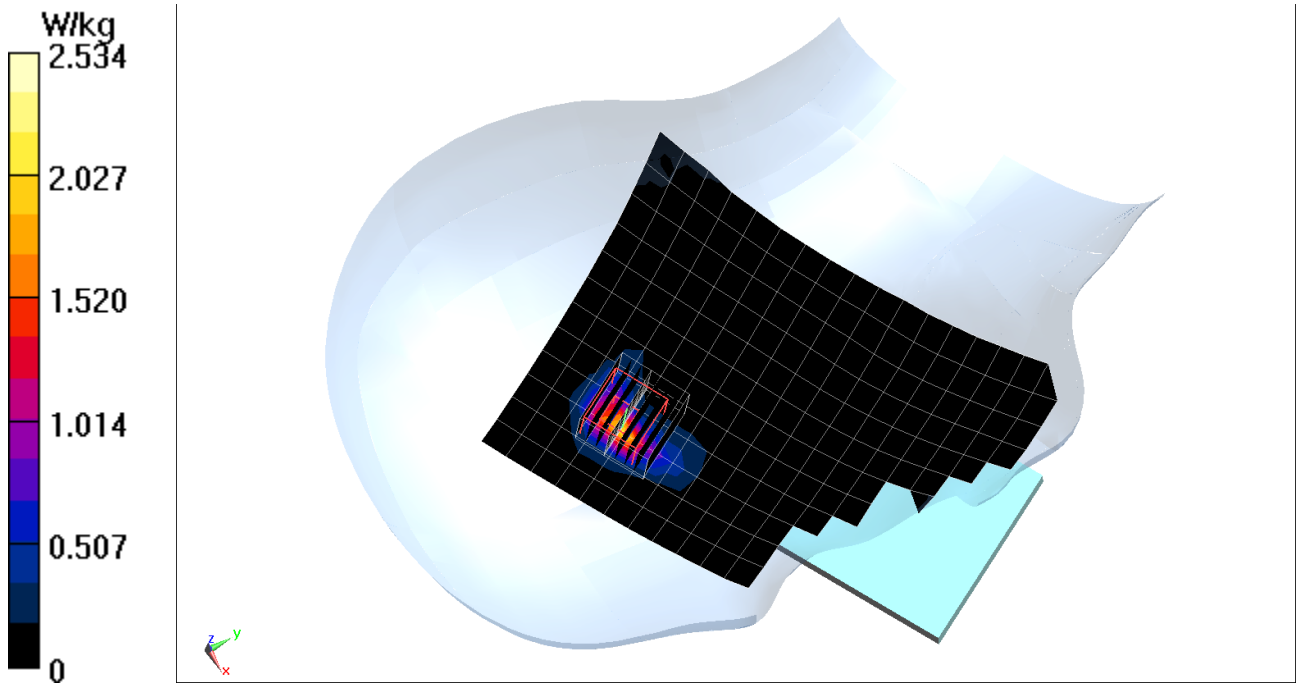
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5825 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used:
f = 5825 MHz; σ = 5.238 S/m; ε_r = 34.055; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-04-2019; Ambient Temp: 20.5°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7409; ConvF(4.82, 4.82, 4.82) @ 5825 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11a, U-NII-3, 20 MHz Bandwidth, Right Head, Cheek, Ch 165, 6 Mbps

Area Scan (13x20x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 4.198 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 5.01 W/kg
SAR(1 g) = 0.964 W/kg



DUT: ZNFX420QM; Type: Portable Handset; Serial: 00136

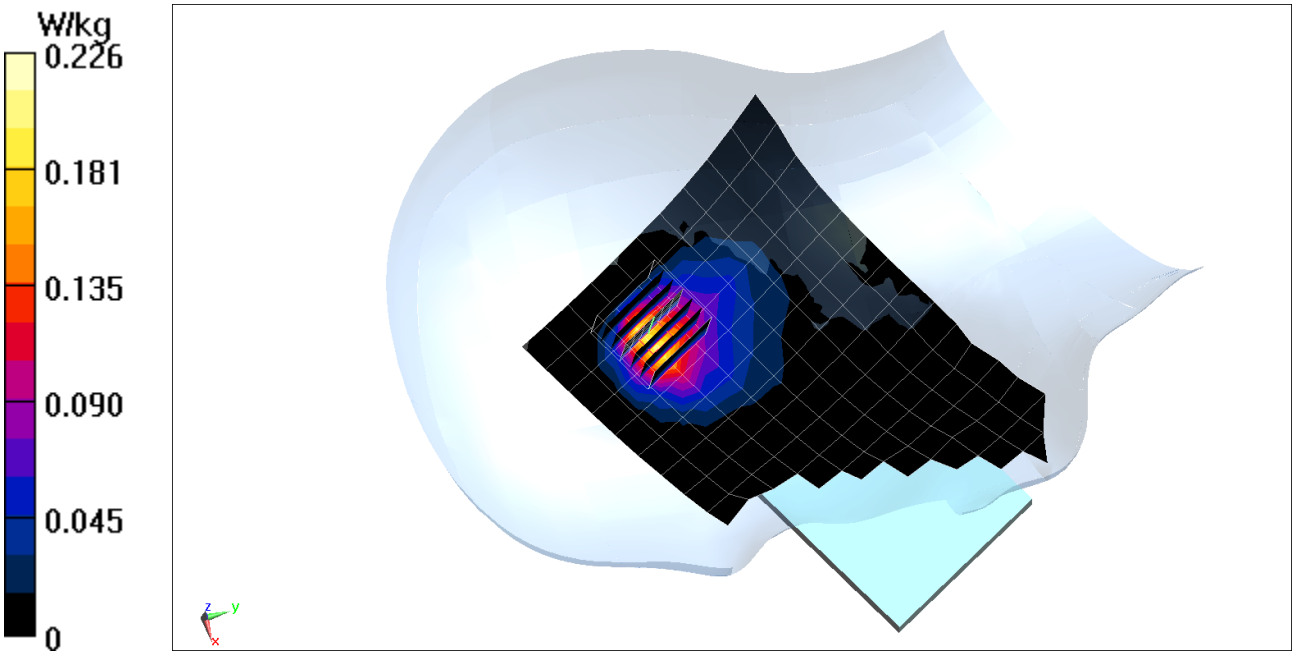
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.297
Medium: 2450 Head Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.828 S/m; ε_r = 39.334; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-11-2019; Ambient Temp: 24.0°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN3589; ConvF(6.46, 6.46, 6.46) @ 2441 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (11x19x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.928 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.314 W/kg
SAR(1 g) = 0.134 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00118

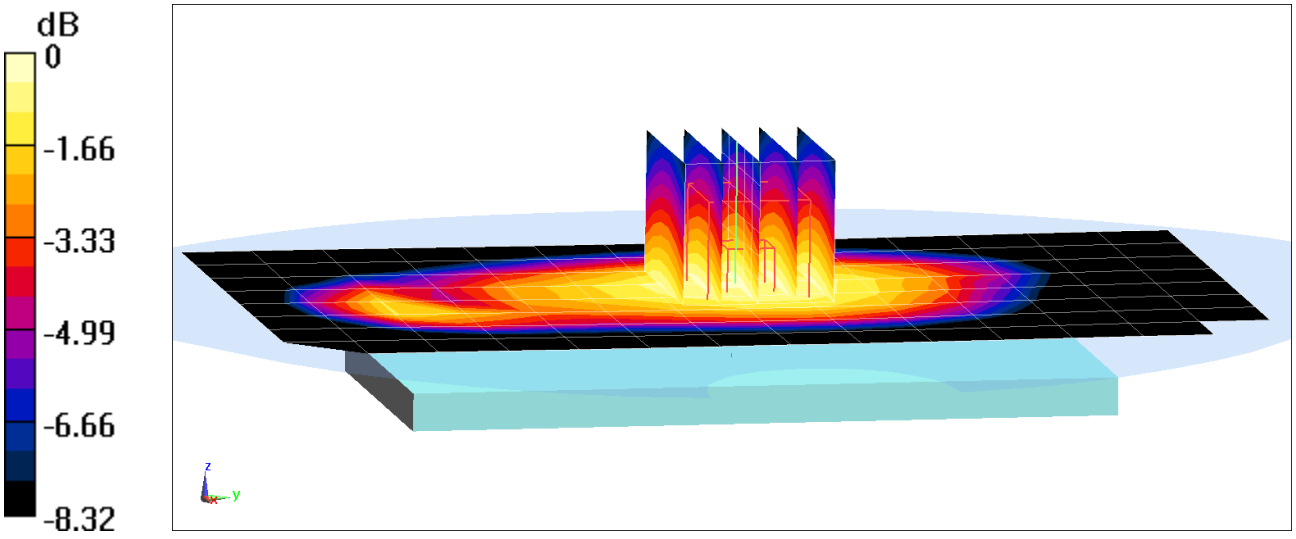
Communication System: UID 0, GSM GPRS; 2 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.965 S/m; ε_r = 53.317; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-06-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 836.6 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: GPRS 850, Body SAR, Back side, Mid.ch, 2 Tx Slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.49 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.722 W/kg
SAR(1 g) = 0.551 W/kg



0 dB = 0.664 W/kg = -1.78 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

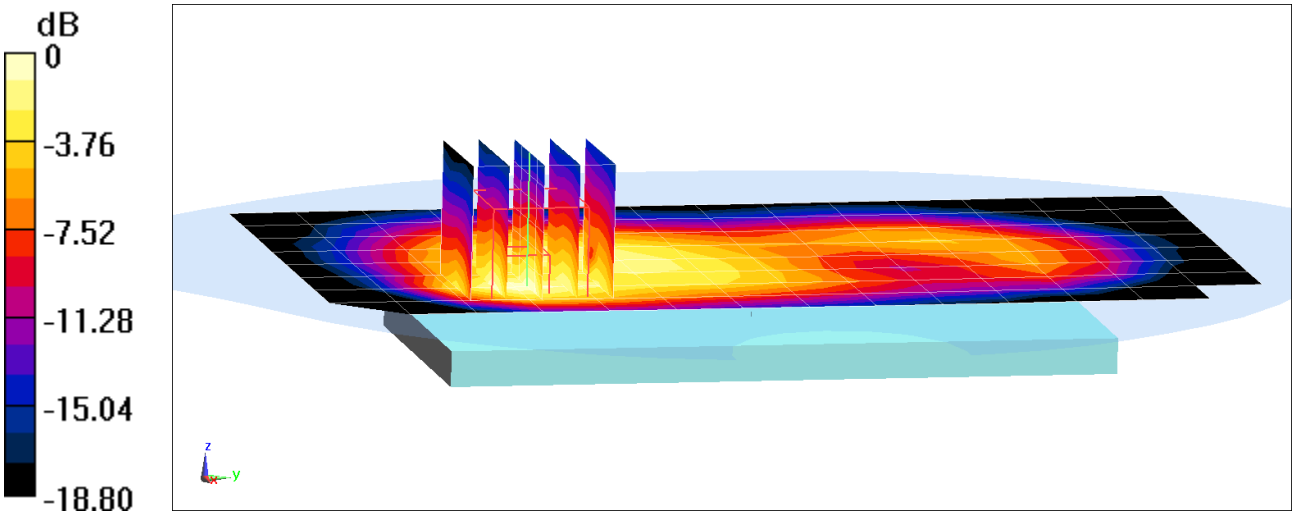
Communication System: UID 0, GSM GPRS; 2 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.532 S/m; ε_r = 51.722; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date:02-27-2019; Ambient Temp:23.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1880 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: GPRS 1900, Body SAR, Back side, Mid.ch, 2 Tx Slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.28 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.786 W/kg
SAR(1 g) = 0.399 W/kg



0 dB = 0.576 W/kg = -2.40 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00118

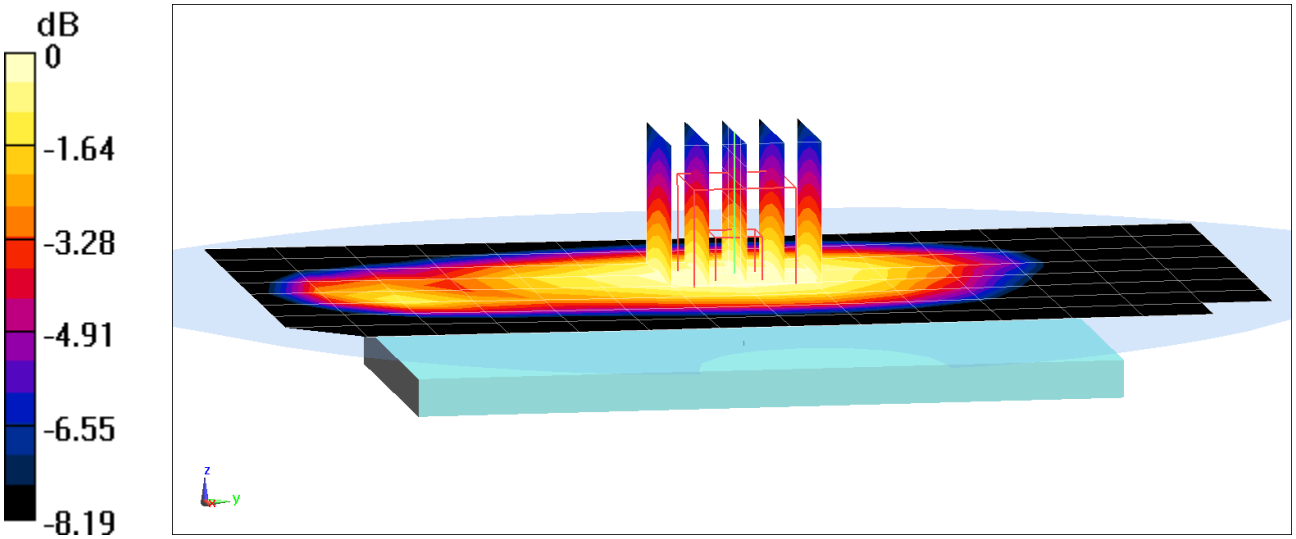
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.965 S/m; ε_r = 53.317; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-06-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 836.6 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.01 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.533 W/kg
SAR(1 g) = 0.406 W/kg



0 dB = 0.490 W/kg = -3.10 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00118

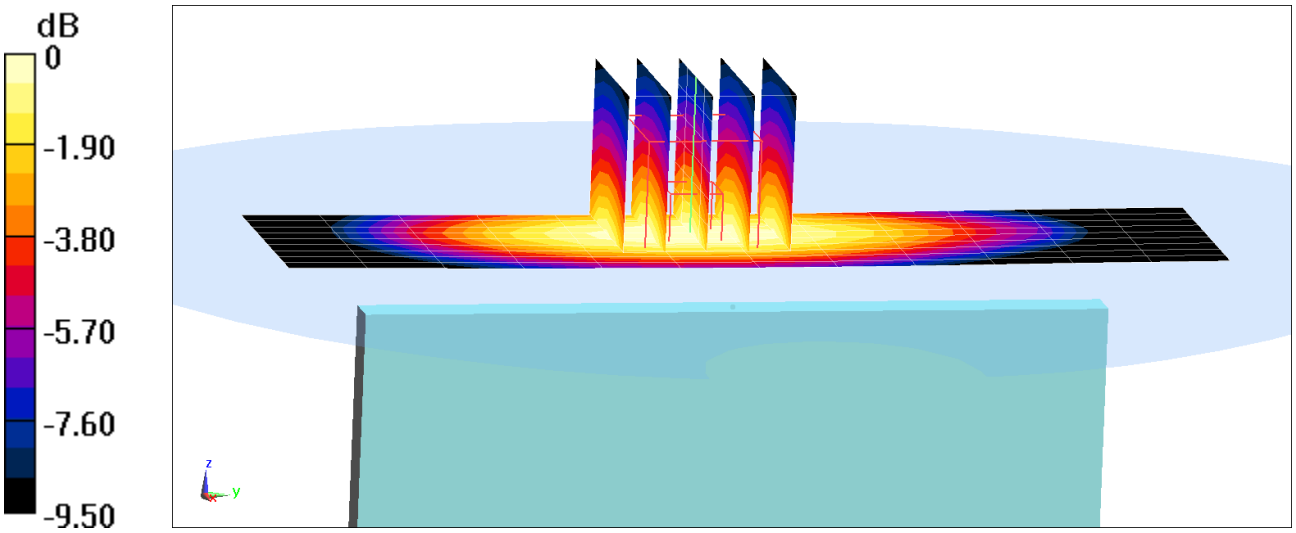
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.965 S/m; ε_r = 53.317; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-06-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 836.6 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: UMTS 850, Body SAR, Right Edge, Mid.ch

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.58 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.676 W/kg
SAR(1 g) = 0.461 W/kg



0 dB = 0.601 W/kg = -2.21 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

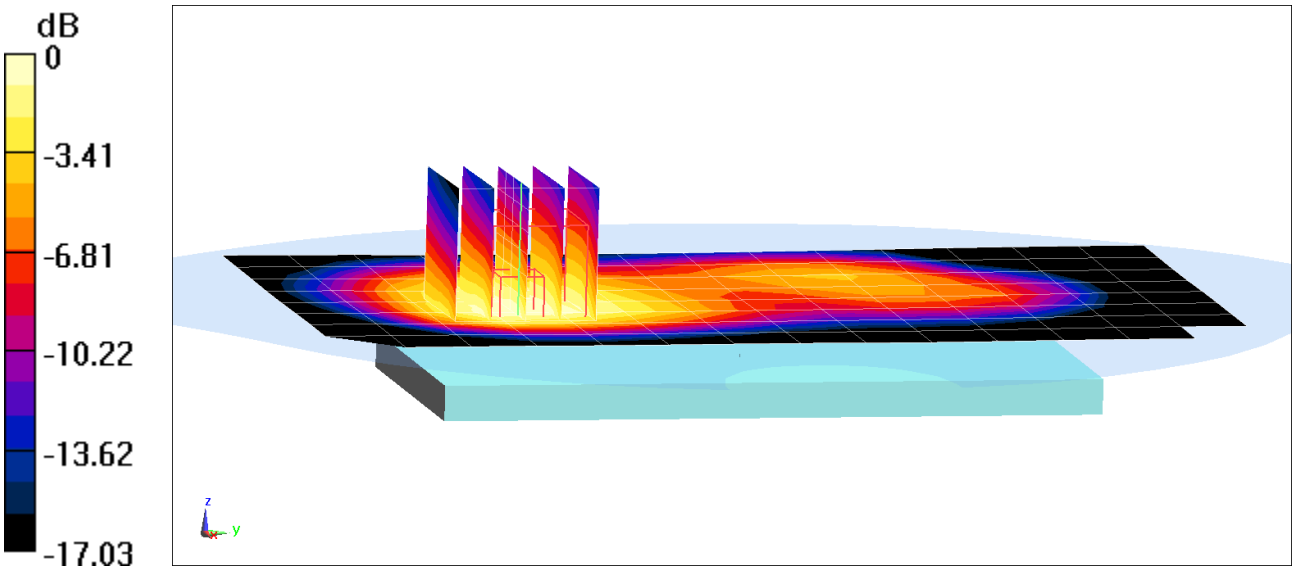
Communication System: UID 0, UMTS; Frequency: 1712.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1712.4 MHz; σ = 1.488 S/m; ε_r = 51.603; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-03-2019; Ambient Temp: 20.7°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7410; ConvF(8.06, 8.06, 8.06) @ 1712.4 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: UMTS 1750, Body SAR, Back side, Low.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.00 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 0.885 W/kg



0 dB = 1.23 W/kg = 0.90 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00117

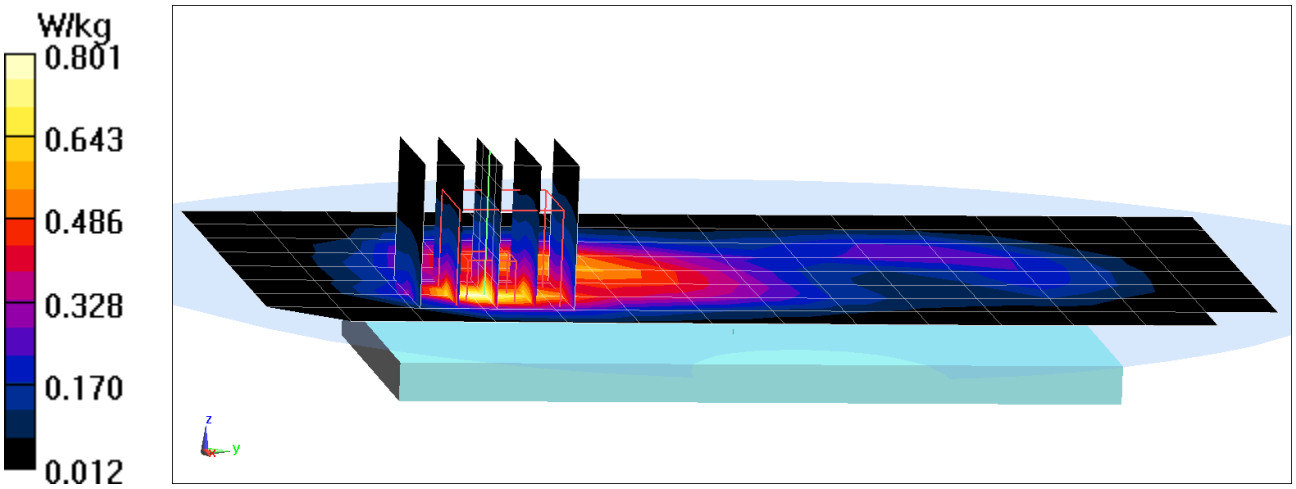
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.532 S/m; ε_r = 51.722; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date:02-27-2019; Ambient Temp:23.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1880 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: UMTS 1900, Body SAR, Back side, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.23 V/m; Power Drift = -0.20 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.530 W/kg



DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

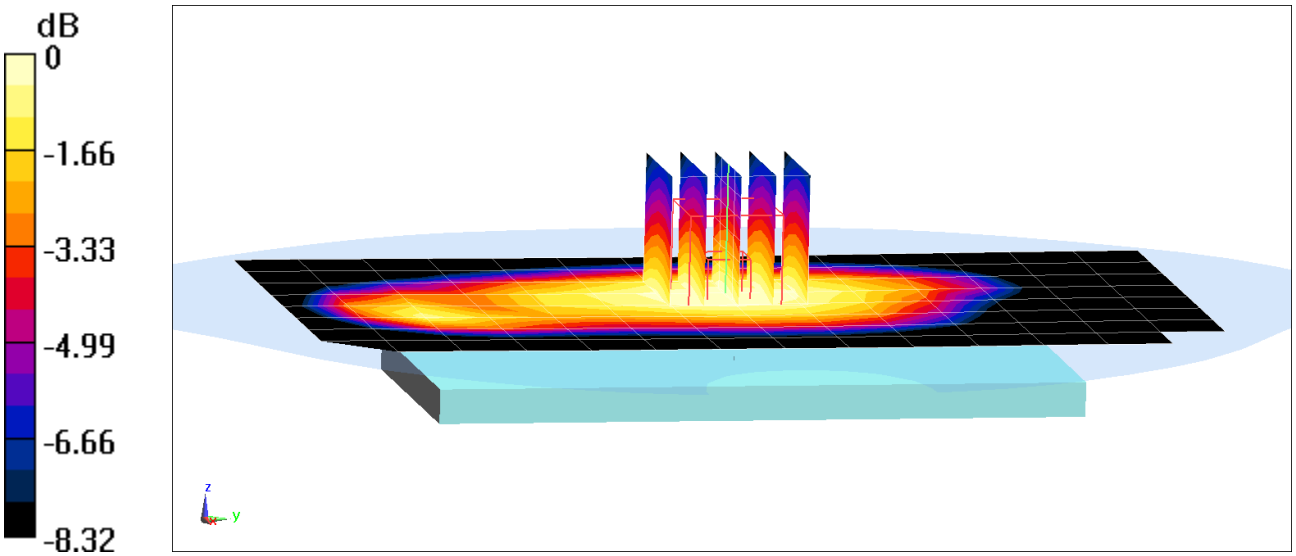
Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.965 S/m; ε_r = 53.318; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-06-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 836.52 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: Cell. CDMA, Body SAR, Back side, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.20 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.504 W/kg
SAR(1 g) = 0.380 W/kg



0 dB = 0.462 W/kg = -3.35 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

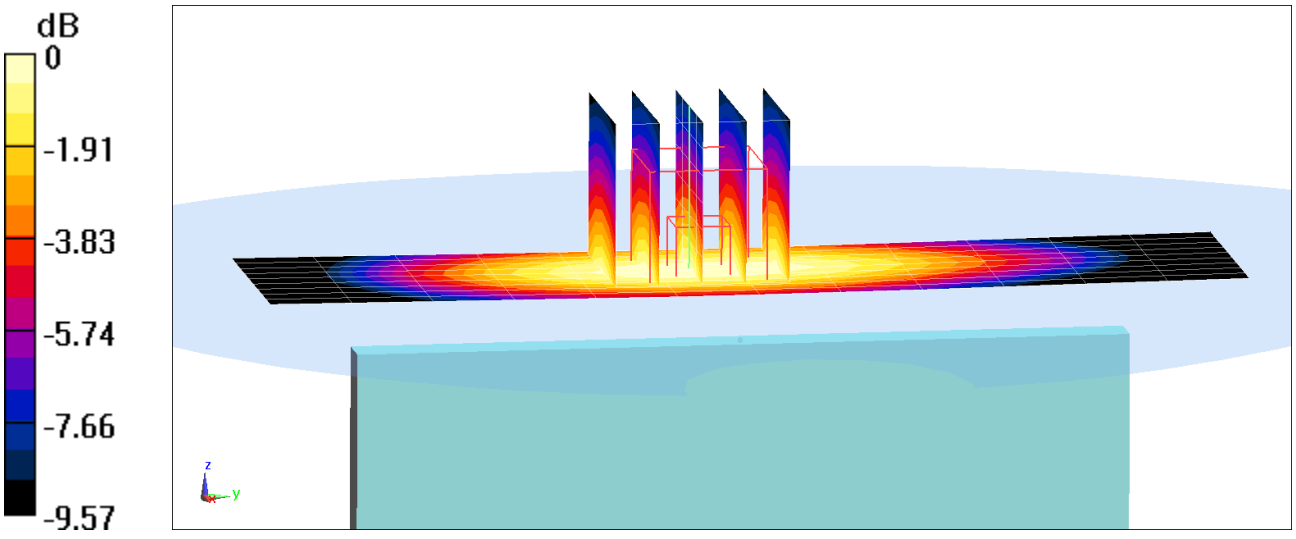
Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.965 S/m; ε_r = 53.318; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-06-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 836.52 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: Cell. EVDO, Body SAR, Right Edge, Mid.ch

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.03 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.591 W/kg
SAR(1 g) = 0.403 W/kg



0 dB = 0.524 W/kg = -2.81 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00120

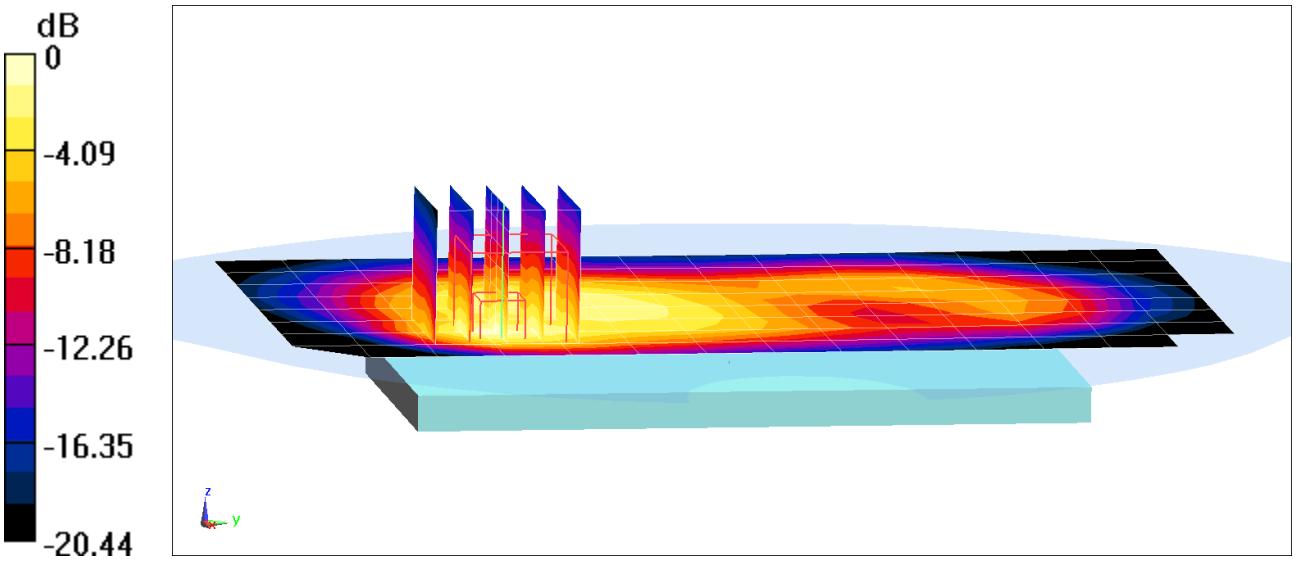
Communication System: UID 0, CDMA; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1908.75 MHz; σ = 1.566 S/m; ε_r = 51.617; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date:02-27-2019; Ambient Temp:23.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1908.75 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: PCS CDMA, Body SAR, Back side, High.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.02 V/m; Power Drift = -0.20 dB
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.692 W/kg



0 dB = 1.02 W/kg = 0.09 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00120

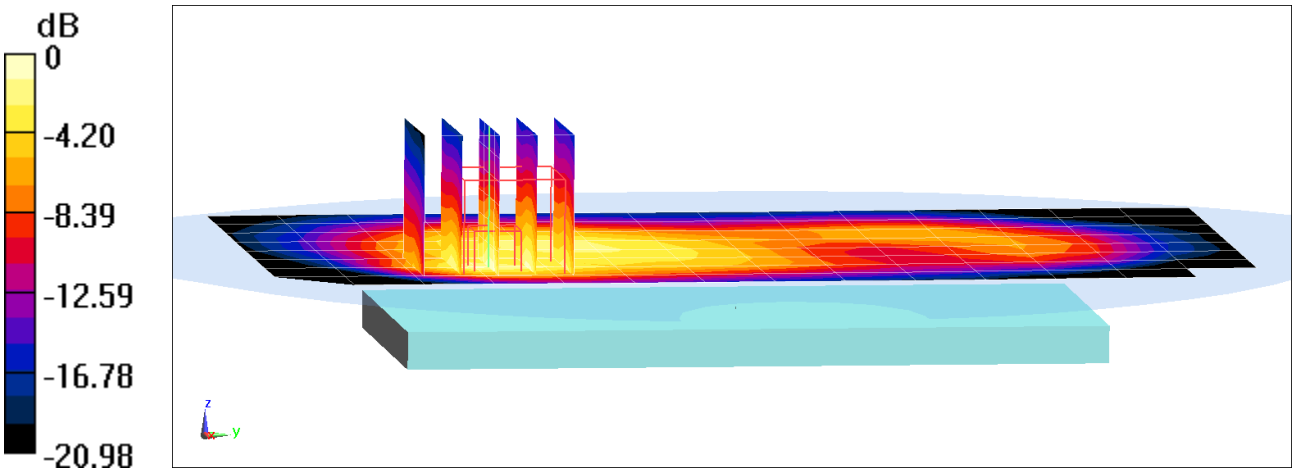
Communication System: UID 0, CDMA; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1908.75 MHz; σ = 1.566 S/m; ε_r = 51.617; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date:02-27-2019; Ambient Temp:23.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1908.75 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: PCS EVDO, Body SAR, Back side, High.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.35 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 1.55 W/kg
SAR(1 g) = 0.795 W/kg



0 dB = 1.21 W/kg = 0.83 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

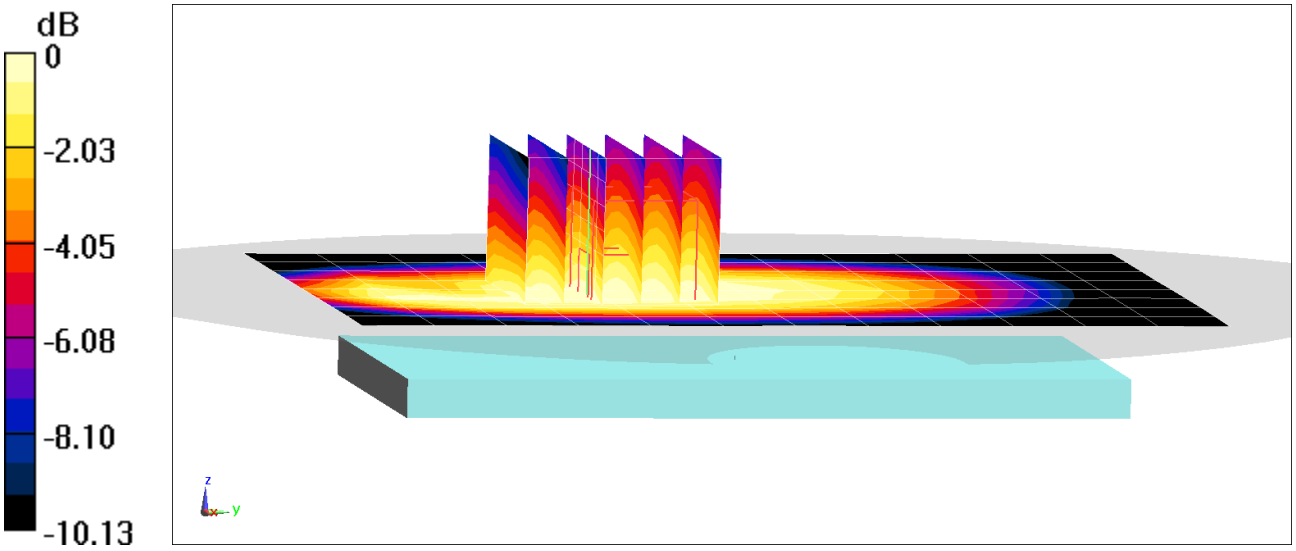
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 MHz Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.942 S/m; ε_r = 54.889; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2019; Ambient Temp: 23.5°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7308; ConvF(10.38, 10.38, 10.38) @ 707.5 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 12, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.87 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.519 W/kg
SAR(1 g) = 0.393 W/kg



0 dB = 0.472 W/kg = -3.26 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

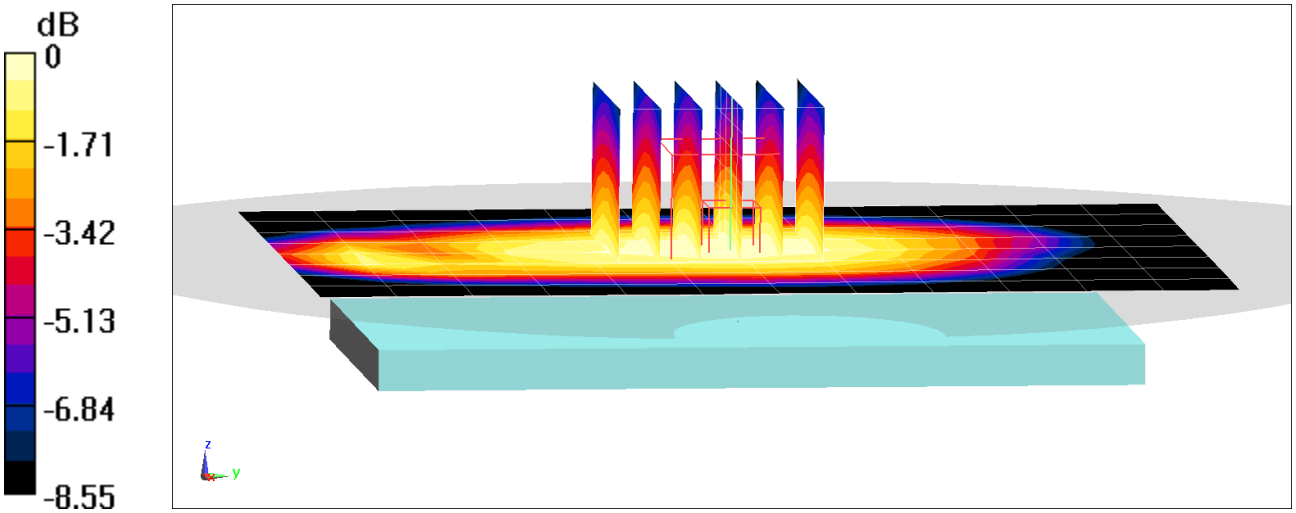
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 MHz Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.97 S/m; ε_r = 54.74; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2019; Ambient Temp: 23.5°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7308; ConvF(10.38, 10.38, 10.38) @ 782 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 13, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.51 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.481 W/kg
SAR(1 g) = 0.371 W/kg



0 dB = 0.442 W/kg = -3.55 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

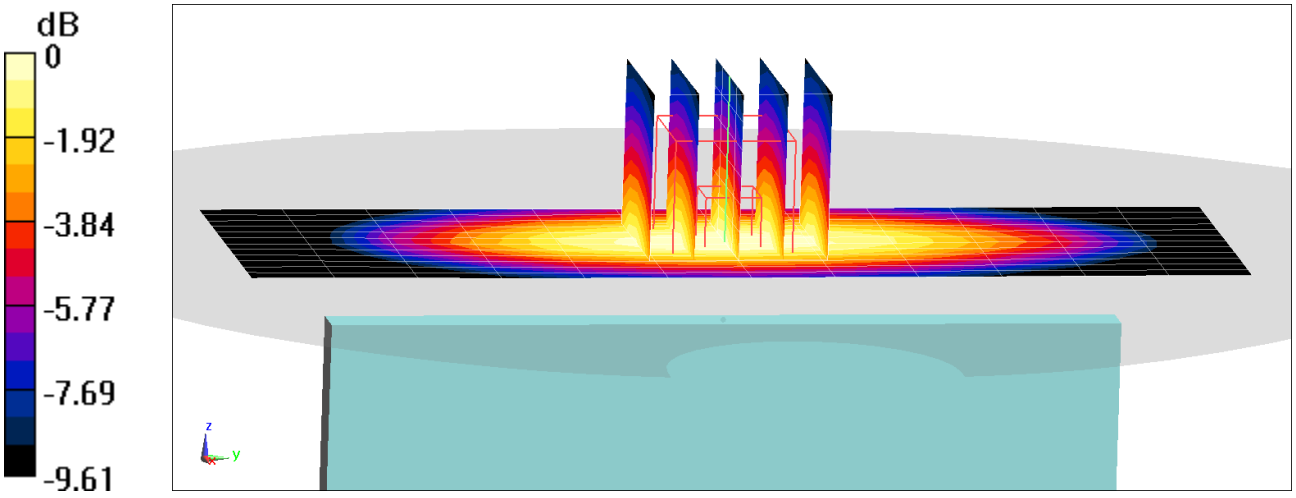
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 MHz Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.97 S/m; ε_r = 54.74; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2019; Ambient Temp: 23.5°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7308; ConvF(10.38, 10.38, 10.38) @ 782 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 13, Body SAR, Right Edge, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (13x10x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x10x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.91 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.47 W/kg
SAR(1 g) = 0.500 W/kg



0 dB = 0.652 W/kg = -1.86 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00118

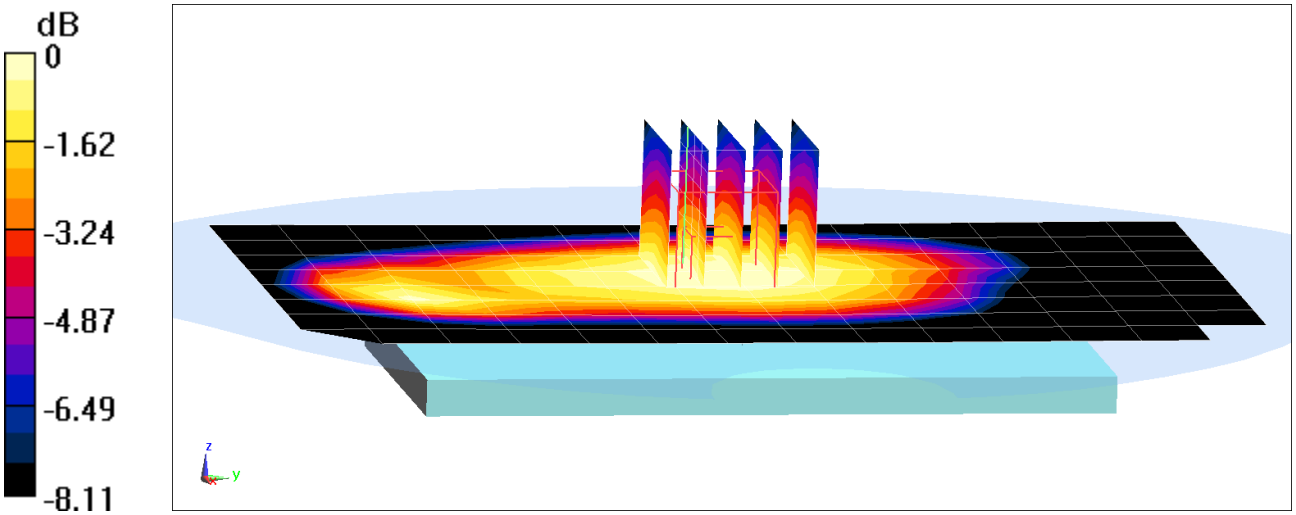
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.965 S/m; ε_r = 53.318; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-06-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 836.5 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 5 (Cell.), Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.84 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.539 W/kg
SAR(1 g) = 0.403 W/kg



0 dB = 0.484 W/kg = -3.15 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00118

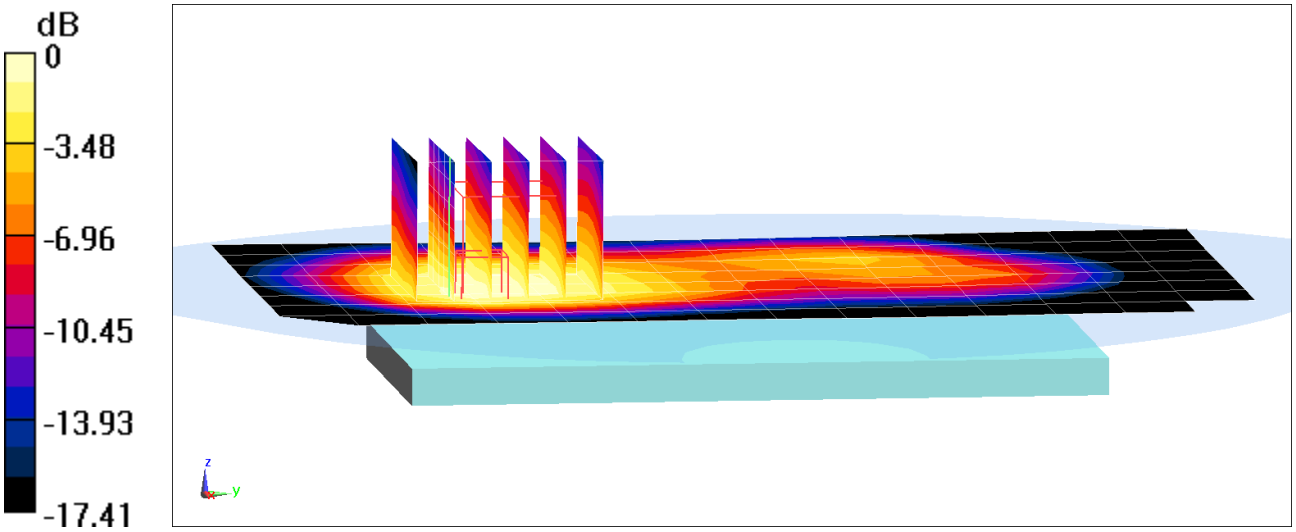
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.51 S/m; ε_r = 51.509; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-03-2019; Ambient Temp: 20.7°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7410; ConvF(8.06, 8.06, 8.06) @ 1732.5 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.36 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 0.942 W/kg



0 dB = 1.34 W/kg = 1.27 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00120

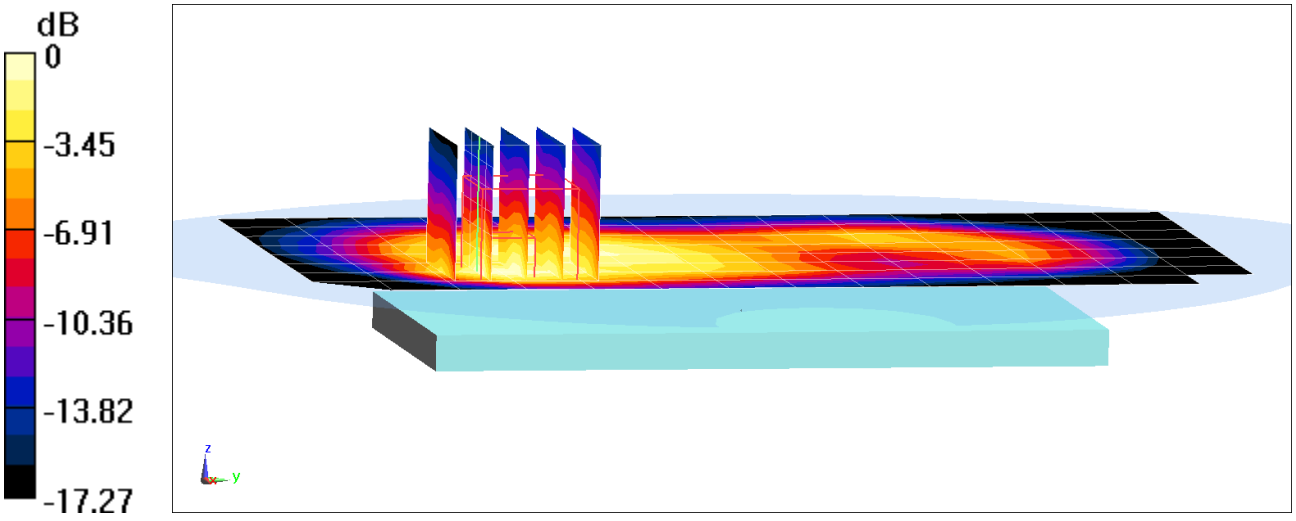
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1882.5 MHz; σ = 1.535 S/m; ε_r = 51.713; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date:02-27-2019; Ambient Temp:23.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1882.5 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 25 (PCS), Body SAR, Back side, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.23 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.07 W/kg
SAR(1 g) = 0.570 W/kg



0 dB = 0.804 W/kg = -0.95 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00120

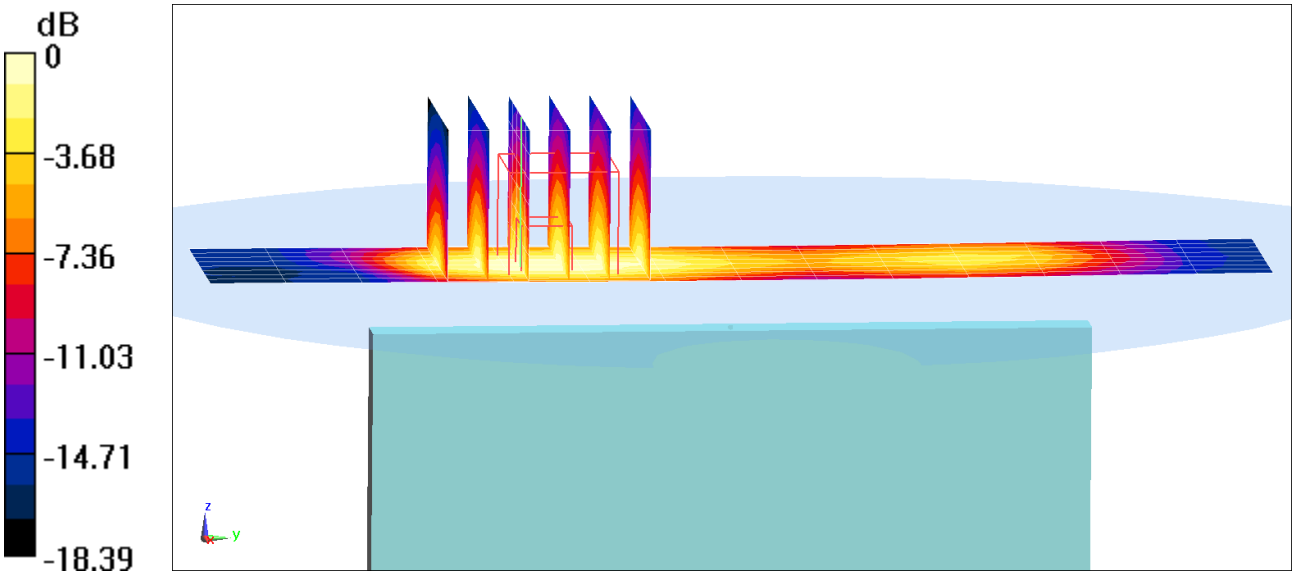
Communication System: UID 0, _LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
$f = 1905$ MHz; $\sigma = 1.561$ S/m; $\varepsilon_r = 51.63$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date:02-27-2019; Ambient Temp:23.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1905 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 25 (PCS), Body SAR, Left Edge, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (9x15x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.13 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 1.17 W/kg
SAR(1 g) = 0.664 W/kg



0 dB = 0.960 W/kg = -0.18 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00136

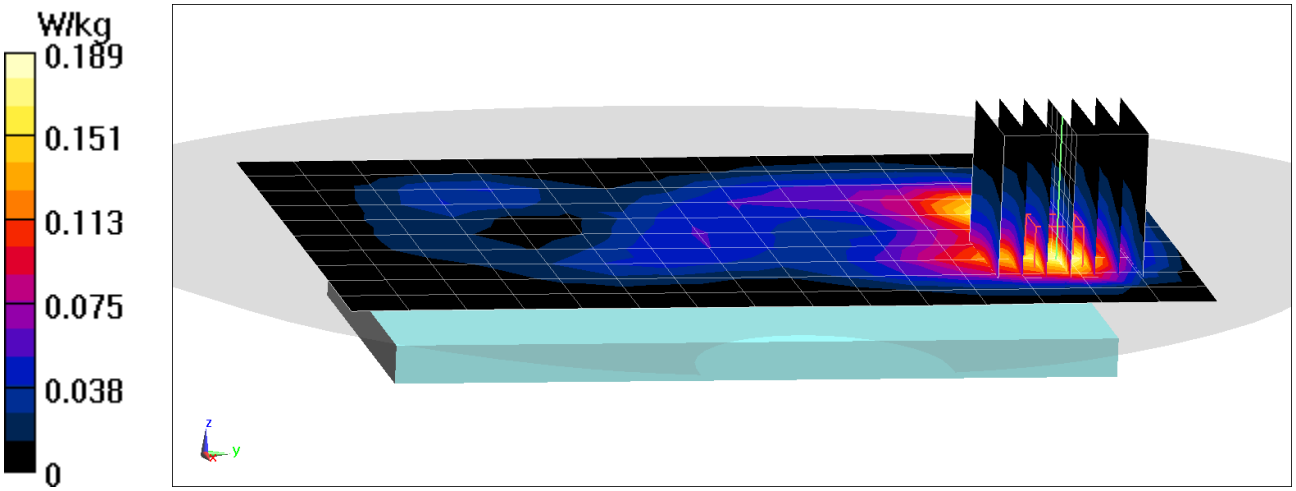
Communication System: UID 0, _IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
$f = 2462$ MHz; $\sigma = 2.053$ S/m; $\varepsilon_r = 50.631$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-06-2019; Ambient Temp: 22.6°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7417; ConvF(7.51, 7.51, 7.51) @ 2462 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11b, 22 MHz Bandwidth, Body SAR, Ch 11, 1 Mbps, Back Side

Area Scan (11x16x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.208 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.245 W/kg
SAR(1 g) = 0.115 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00136

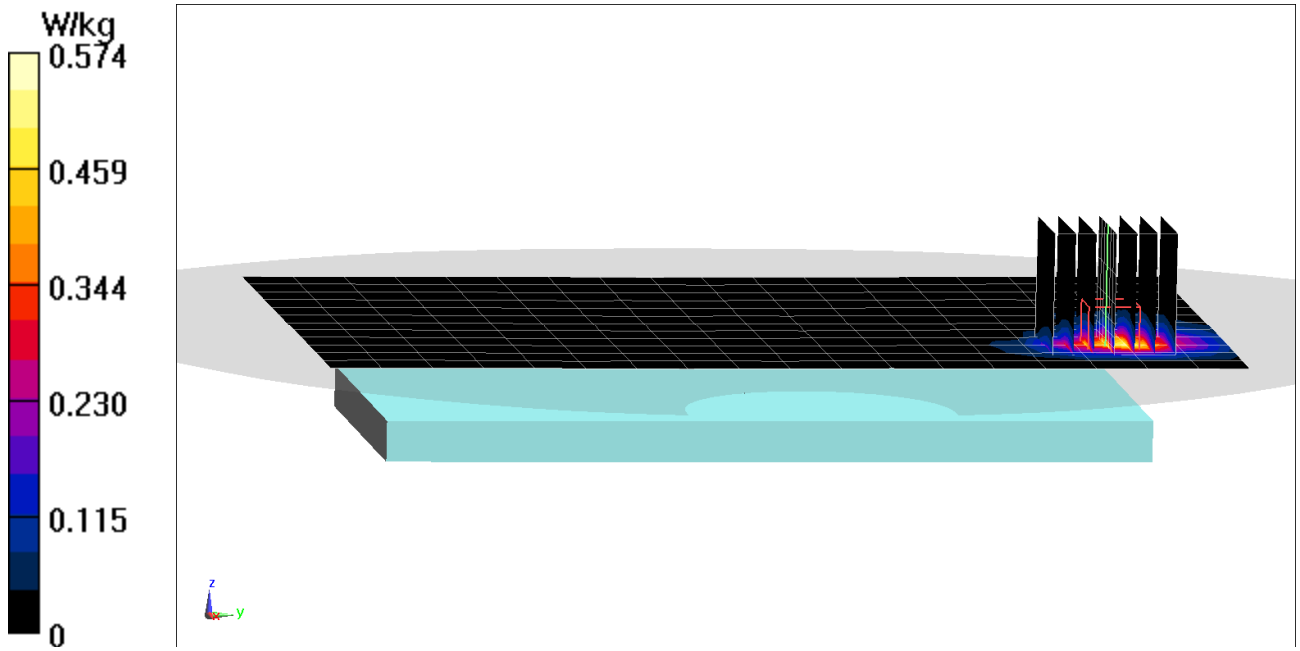
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5660 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used:
f = 5660 MHz; σ = 5.995 S/m; ε_r = 46.669; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-08-2019; Ambient Temp: 22.2°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7308; ConvF(4, 4, 4) @ 5660 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11a, UNII-2C, 20 MHz Bandwidth, Body SAR, Ch 132, 6 Mbps, Back Side

Area Scan (13x19x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 6.453 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.988 W/kg
SAR(1 g) = 0.227 W/kg



DUT: ZNFX420QM; Type: Portable Handset; Serial: 00136

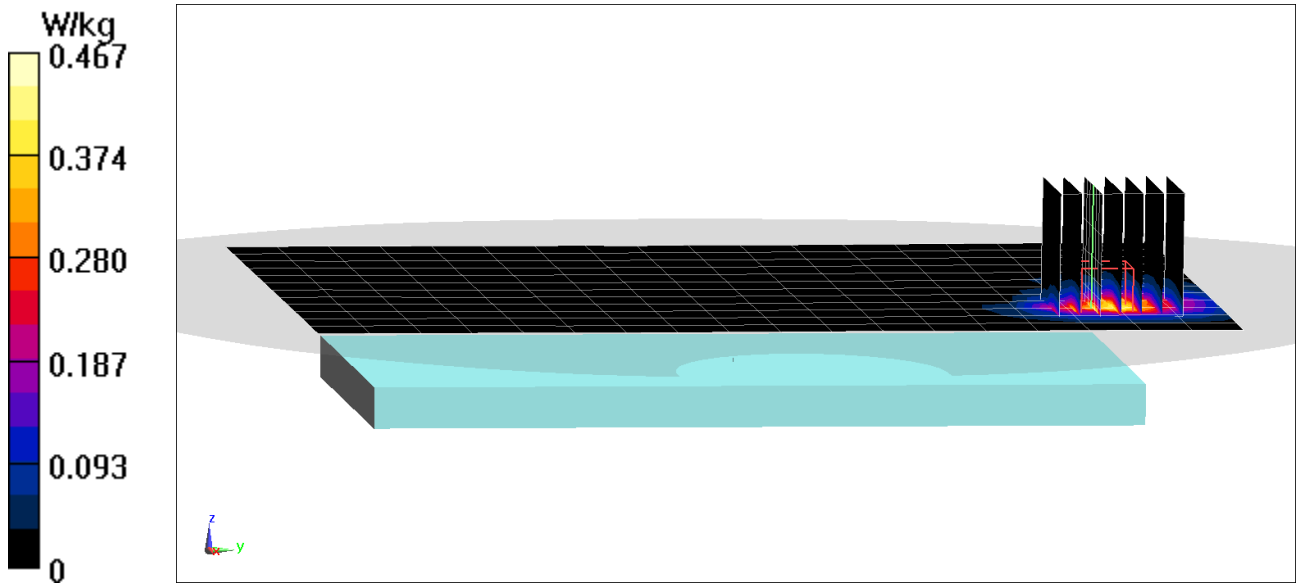
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5785 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used:
f = 5785 MHz; σ = 6.177 S/m; ε_r = 46.468; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-08-2019; Ambient Temp: 22.2°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7308; ConvF(4.18, 4.18, 4.18) @ 5785 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11a, UNII-3, 20 MHz Bandwidth, Body SAR, Ch 157, 6 Mbps, Back Side

Area Scan (13x19x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 5.644 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.834 W/kg
SAR(1 g) = 0.182 W/kg



DUT: ZNFX420QM; Type: Portable Handset; Serial: 00136

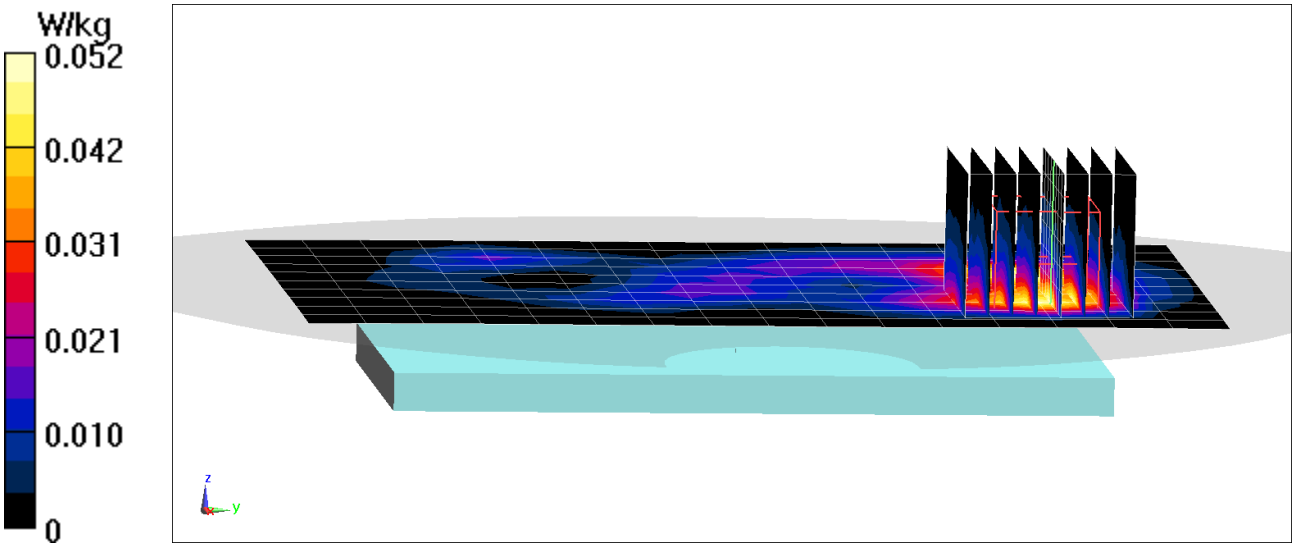
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.297
Medium: 2450 Body Medium parameters used (interpolated):
$f = 2441$ MHz; $\sigma = 2.031$ S/m; $\varepsilon_r = 50.96$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-10-2019; Ambient Temp: 21.9°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN7417; ConvF(7.51, 7.51, 7.51) @ 2441 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: Bluetooth, Body SAR, Ch 39, 1 Mbps, Back Side

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (9x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.860 V/m; Power Drift = 0.21 dB
Peak SAR (extrapolated) = 0.0680 W/kg
SAR(1 g) = 0.032 W/kg



DUT: ZNFX420QM; Type: Portable Handset; Serial: 00119

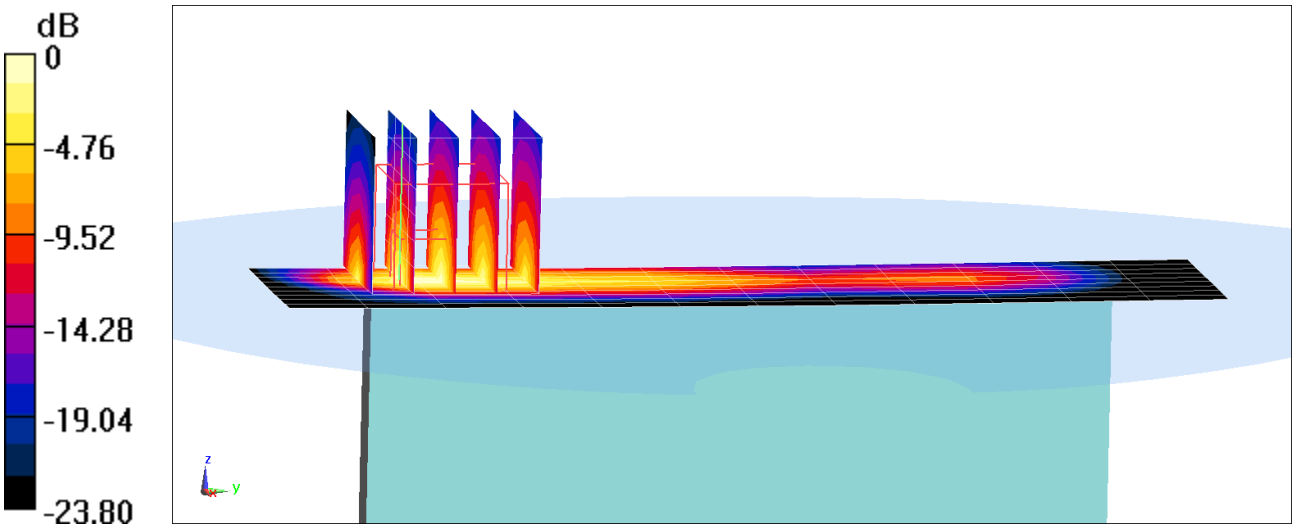
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.484 S/m; ε_r = 50.919; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 03-11-2019; Ambient Temp: 21.3°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7410; ConvF(8.06, 8.06, 8.06) @ 1732.4 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: UMTS 1750, Phablet SAR, Left Edge, Mid.ch

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 71.60 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 17.2 W/kg
SAR(10 g) = 2.99 W/kg



0 dB = 13.3 W/kg = 11.24 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00117

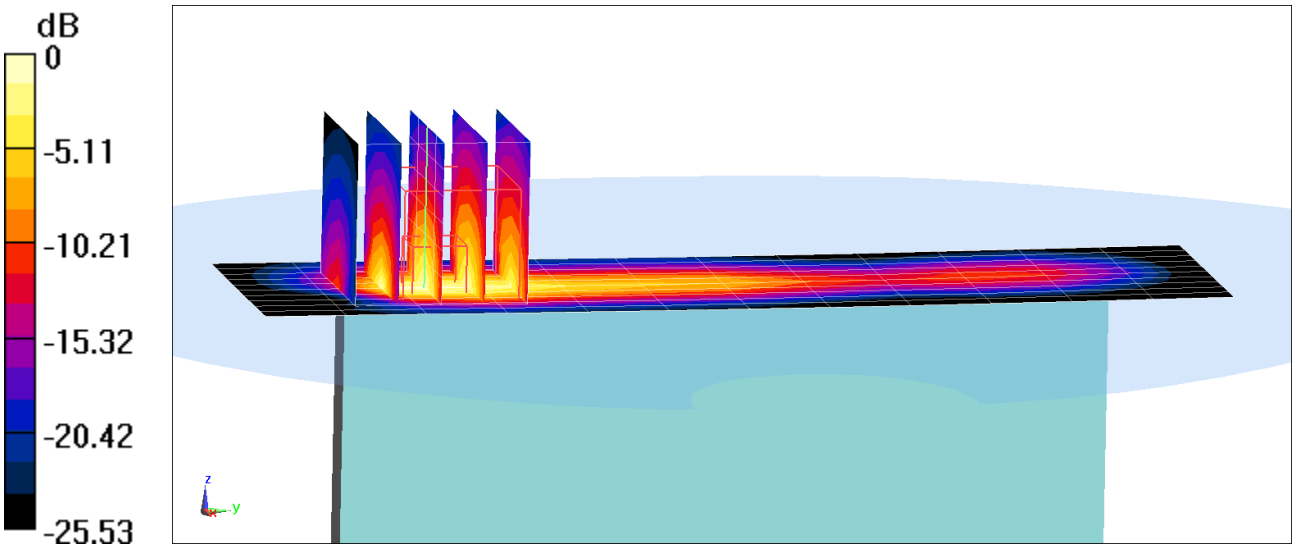
Communication System: UID 0, _UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.564 S/m; ε_r = 51.621; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date:02-27-2019; Ambient Temp:23.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1907.6 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: UMTS 1900, Phablet SAR, Left Edge, High.ch

Area Scan (11x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 71.01 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 18.5 W/kg
SAR(10 g) = 2.83 W/kg



0 dB = 13.0 W/kg = 11.14 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00120

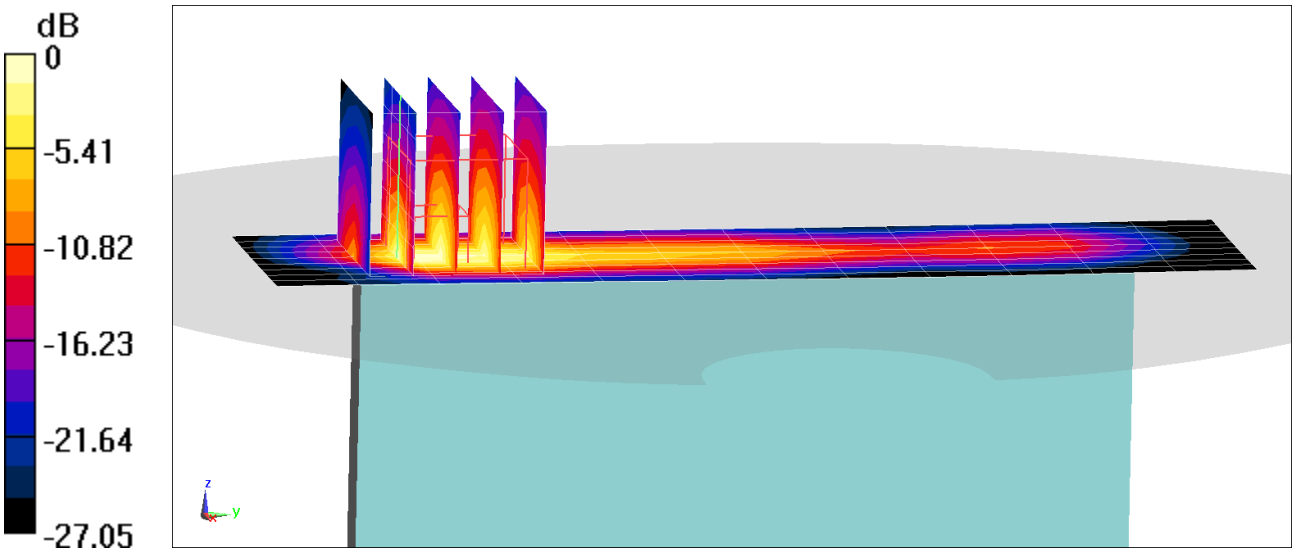
Communication System: UID 0, CDMA; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1908.75 MHz; σ = 1.581 S/m; ε_r = 52.146; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 03-12-2019; Ambient Temp: 23.5°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN7410; ConvF(7.78, 7.78, 7.78) @ 1908.75 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front 30 degreee; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: PCS EVDO, Phablet SAR, Left Edge, High.ch

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 73.71 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 21.4 W/kg
SAR(10 g) = 3.03 W/kg



0 dB = 14.6 W/kg = 11.64 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00118

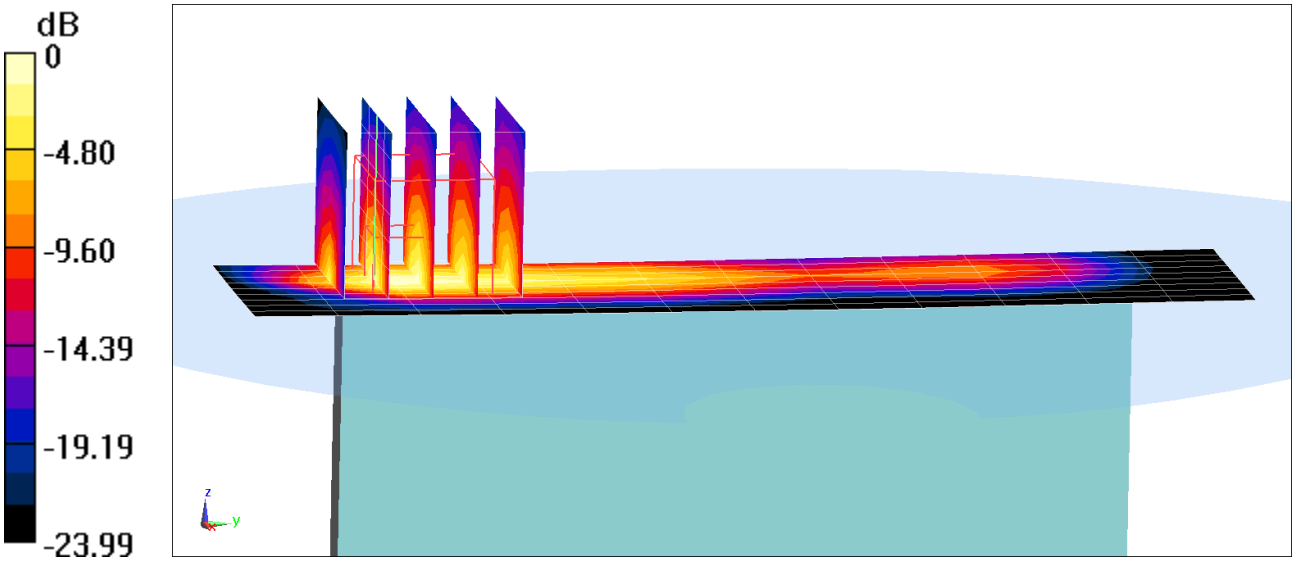
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.485 S/m; ε_r = 50.949; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 03-05-2019; Ambient Temp: 21.1°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7410; ConvF(8.06, 8.06, 8.06) @ 1732.5 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 4 (AWS), Phablet SAR, Left Edge, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 75.17 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 15.4 W/kg
SAR(10 g) = 2.75 W/kg



0 dB = 11.8 W/kg = 10.72 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00120

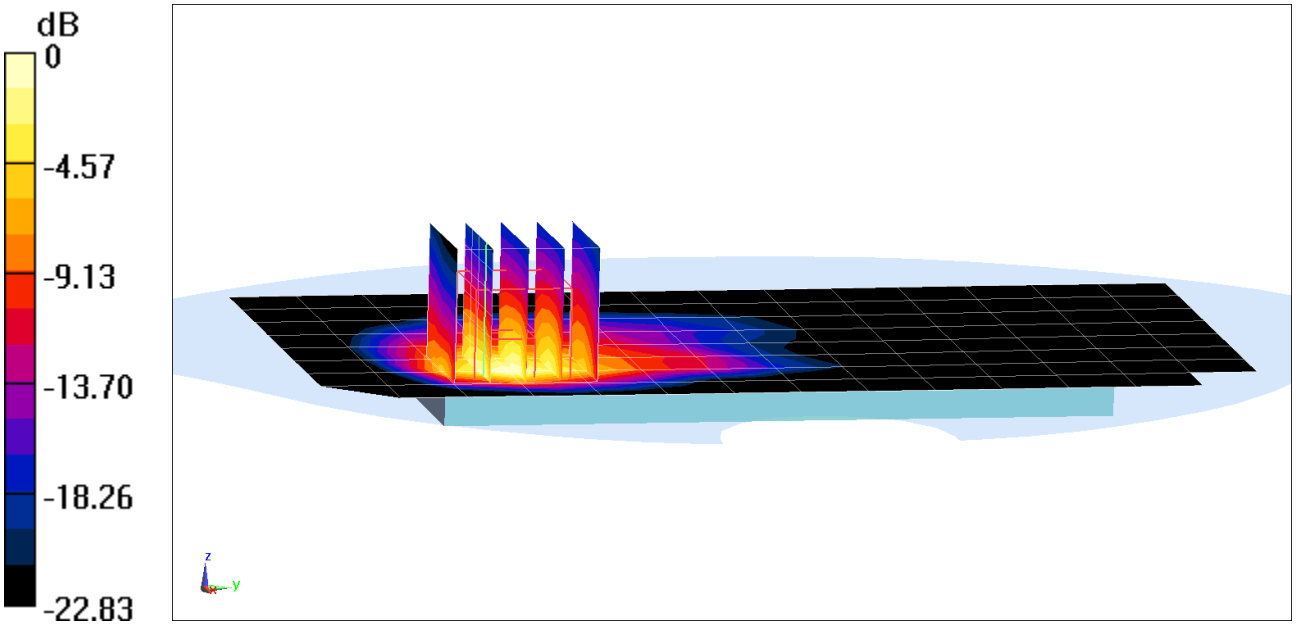
Communication System: UID 0, _LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1905 MHz; σ = 1.561 S/m; ε_r = 51.63; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date:02-27-2019; Ambient Temp:23.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1905 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

RMode: LTE Band 25 (PCS), Phablet SAR, Back side, High.ch,
20 MHz Bandwidth, QPSK, 50 RB, 50 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 60.83 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 15.5 W/kg
SAR(10 g) = 2.71 W/kg



0 dB = 9.73 W/kg = 9.88 dBW/kg

DUT: ZNFX420QM; Type: Portable Handset; Serial: 00136

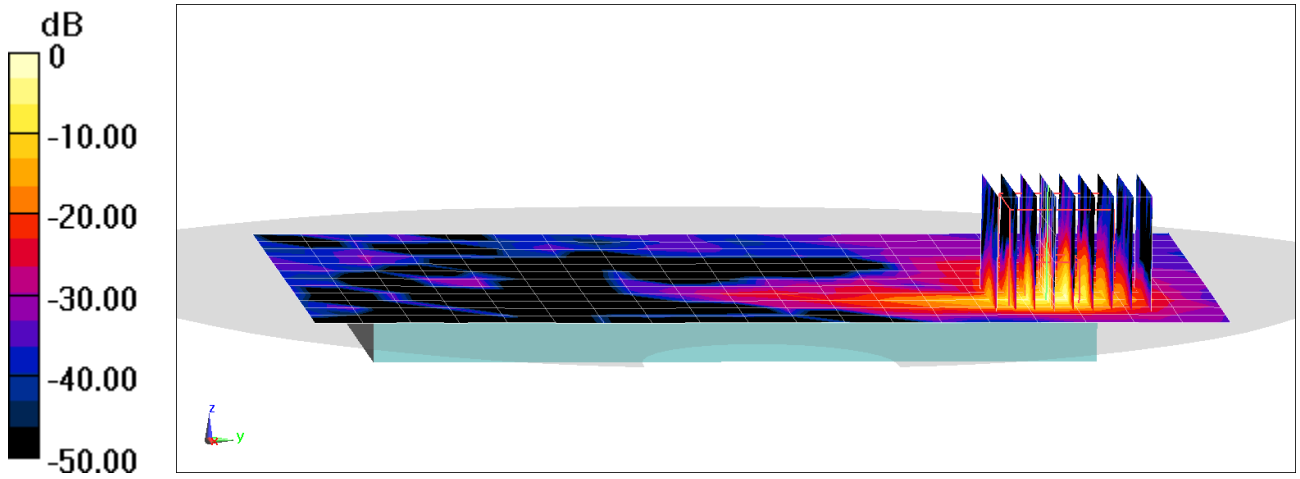
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5660 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used:
f = 5660 MHz; σ = 5.995 S/m; ε_r = 46.669; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 03-08-2019; Ambient Temp: 22.2°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7308; ConvF(4, 4, 4) @ 5660 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11a, U-NII-2C, 20 MHz Bandwidth,
Phablet SAR, Ch 132, 6 Mbps, Back Side

Area Scan (13x20x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 28.42 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 30.1 W/kg
SAR(10 g) = 0.666 W/kg



0 dB = 14.3 W/kg = 11.55 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1161

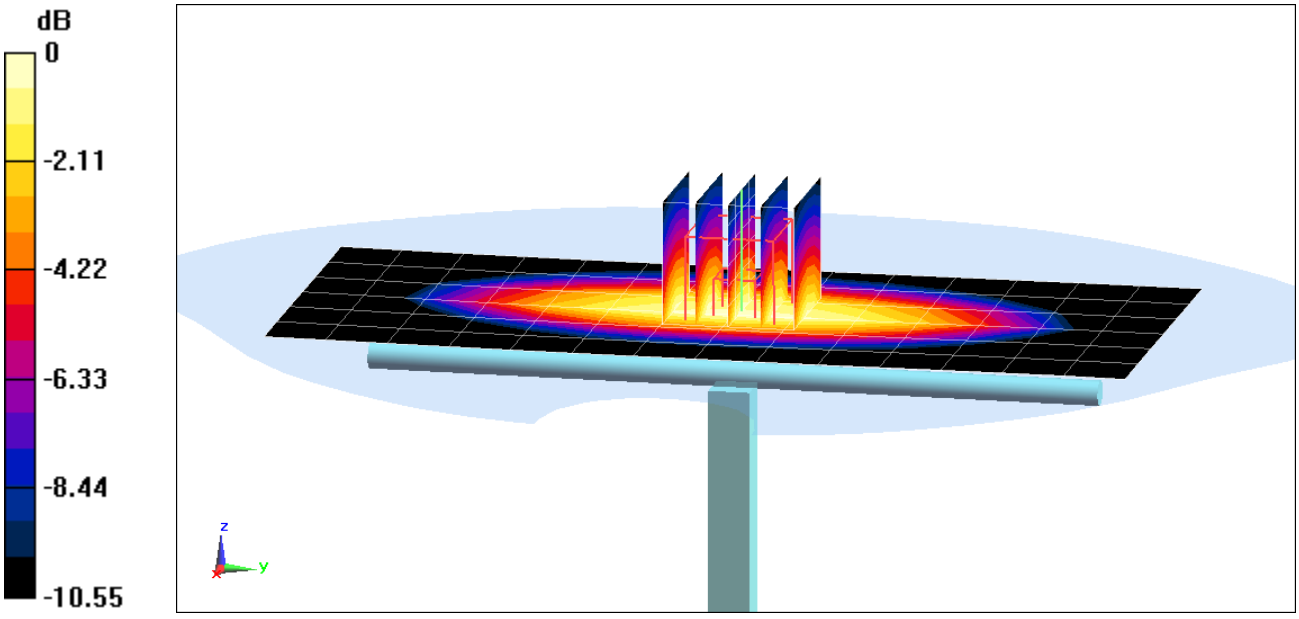
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 MHz Head Medium parameters used (interpolated):
$f = 750$ MHz; $\sigma = 0.878$ S/m; $\varepsilon_r = 42.346$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-07-2019; Ambient Temp: 21.6°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN7409; ConvF(9.91, 9.91, 9.91) @ 750 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.40 W/kg
SAR(1 g) = 1.58 W/kg
Deviation(1 g) = -1.62%



0 dB = 2.11 W/kg = 3.24 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1003

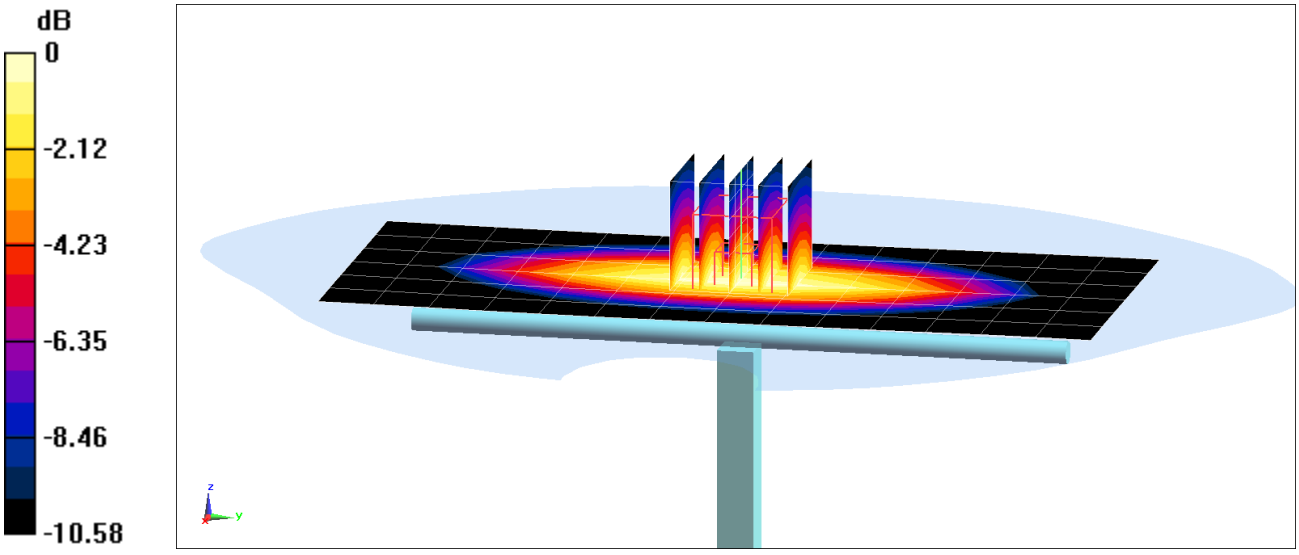
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head; Medium parameters used (interpolated):
f = 750 MHz; σ = 0.893 S/m; ε_r = 42.036; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-14-2019; Ambient Temp: 21.9°C; Tissue Temp: 20.9°C

Probe: EX3DV4 - SN7409; ConvF(9.91, 9.91, 9.91) @ 750 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.56 W/kg
SAR(1 g) = 1.68 W/kg
Deviation(1 g) = 1.45%



0 dB = 2.25 W/kg = 3.52 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d132

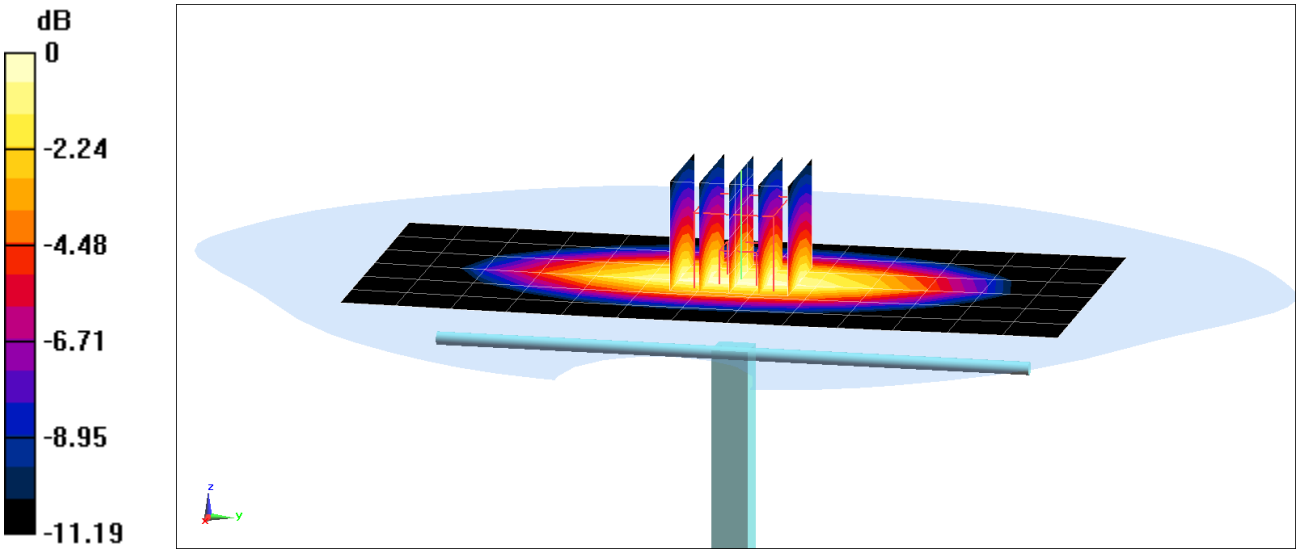
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used:
f = 835 MHz; σ = 0.94 S/m; ε_r = 41.259; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-11-2019; Ambient Temp: 20.9°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7409; ConvF(9.67, 9.67, 9.67) @ 835 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.26 W/kg
SAR(1 g) = 2.04 W/kg
Deviation(1 g) = 6.36%



0 dB = 2.82 W/kg = 4.50 dBW/kg

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d133

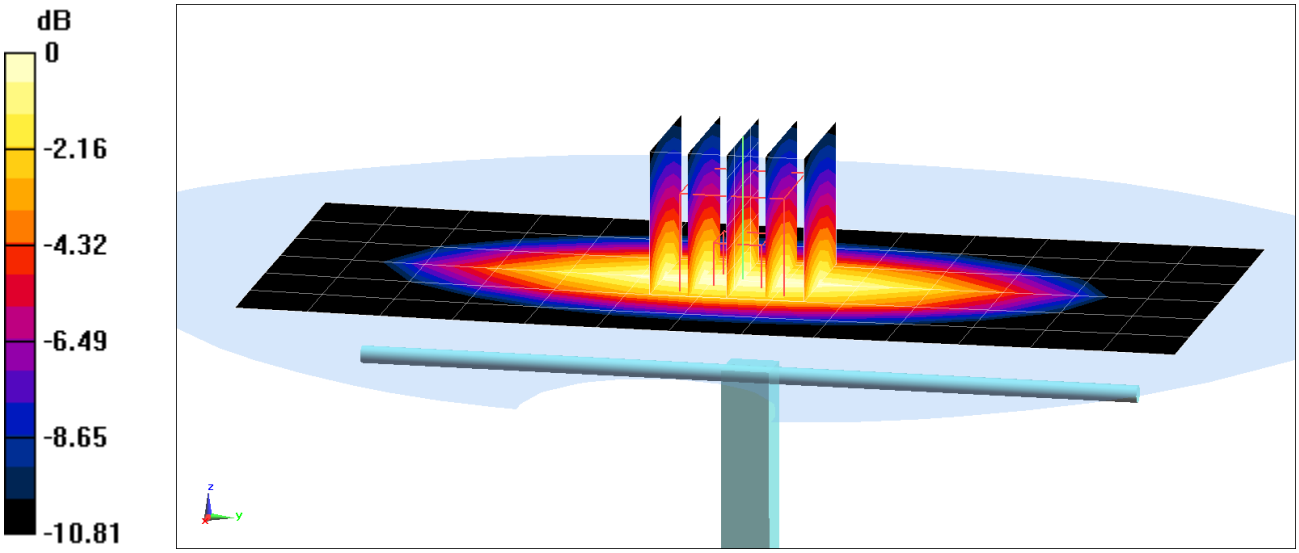
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used:
f = 835 MHz; σ = 0.925 S/m; ε_r = 41.763; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-13-2019; Ambient Temp: 21.6°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7409; ConvF(9.67, 9.67, 9.67) @ 835 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.08 W/kg
SAR(1 g) = 2 W/kg
Deviation(1 g) = 6.04%



0 dB = 2.71 W/kg = 4.33 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1150

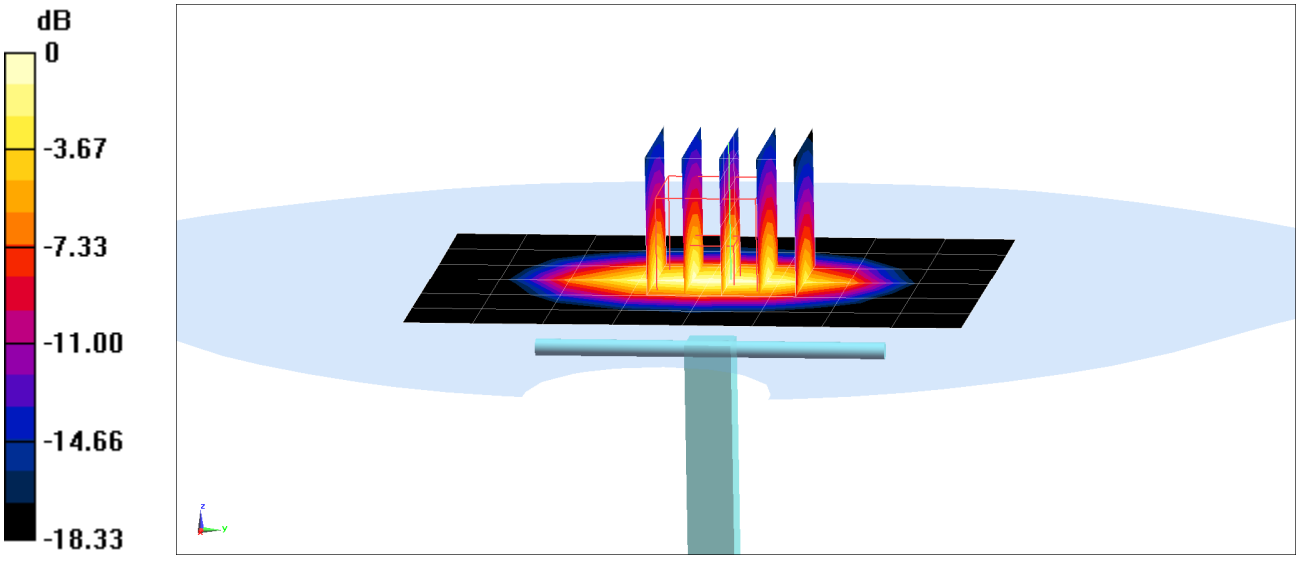
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.404 S/m; ε_r = 38.865; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-04-2019; Ambient Temp: 22.0°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7357; ConvF(8.8, 8.8, 8.8) @ 1750 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: Left For Head SAM (30deg probe tilt) with CRP v5.0; Type: QD000P40CD; Serial: TP:1687
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.66 W/kg
SAR(1 g) = 3.59 W/kg
Deviation(1 g) = -1.64%



0 dB = 5.52 W/kg = 7.42 dBW/kg

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d080

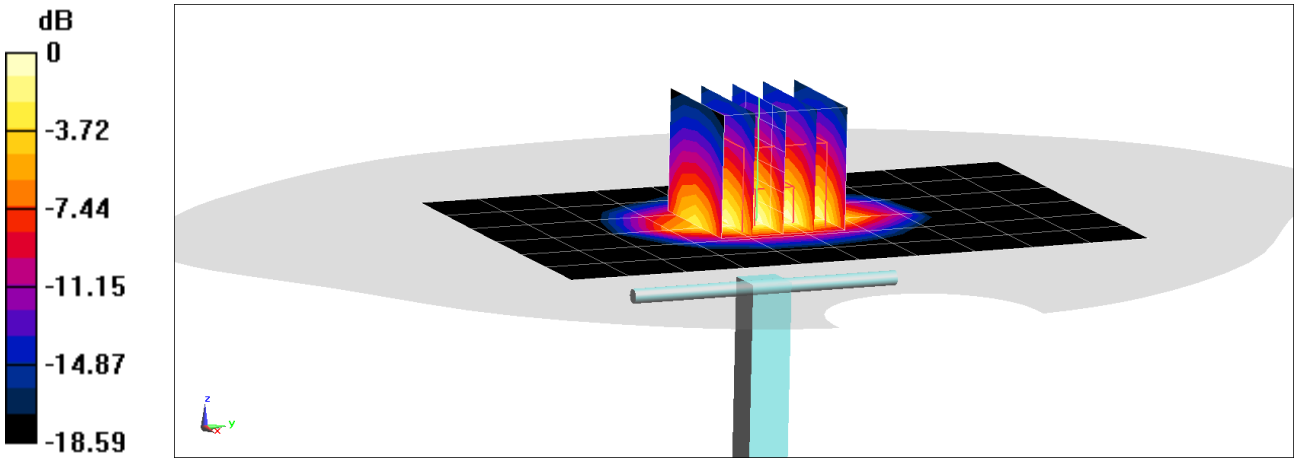
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.458 S/m; ε_r = 39.097; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-28-2019; Ambient Temp: 23.8°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1900 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front 30 degree; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.24 W/kg
SAR(1 g) = 4.02 W/kg
Deviation(1 g) = 1.01%



0 dB = 6.10 W/kg = 7.85 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d080

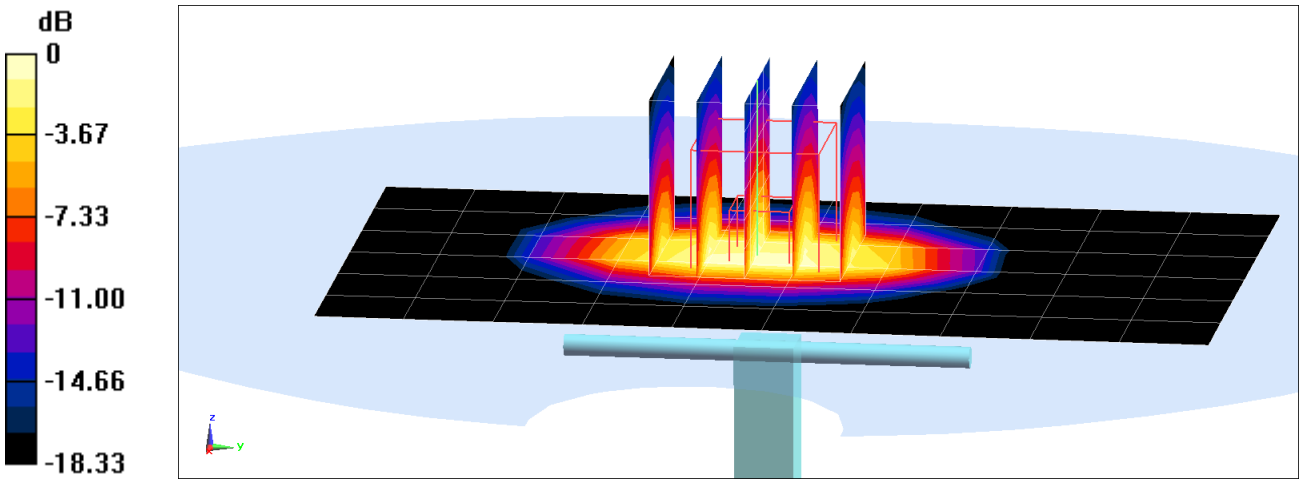
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.41 S/m; ε_r = 38.226; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2019; Ambient Temp: 22.5°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN3589; ConvF(7.08, 7.08, 7.08) @ 1900 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.37 W/kg
SAR(1 g) = 3.88 W/kg
Deviation(1 g) = -2.51%



0 dB = 6.10 W/kg = 7.85 dBW/kg

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981

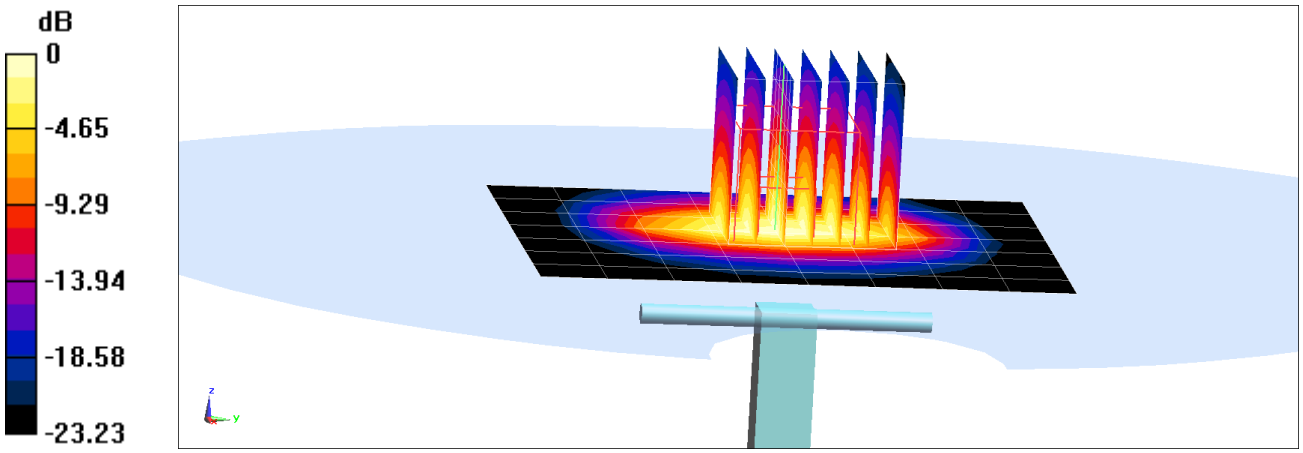
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.835 S/m; ε_r = 39.315; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-11-2019; Ambient Temp: 24.0°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN3589; ConvF(6.46, 6.46, 6.46) @ 2450 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.2 W/kg
SAR(1 g) = 5.18 W/kg
Deviation(1 g) = -0.96%



0 dB = 8.79 W/kg = 9.44 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1057

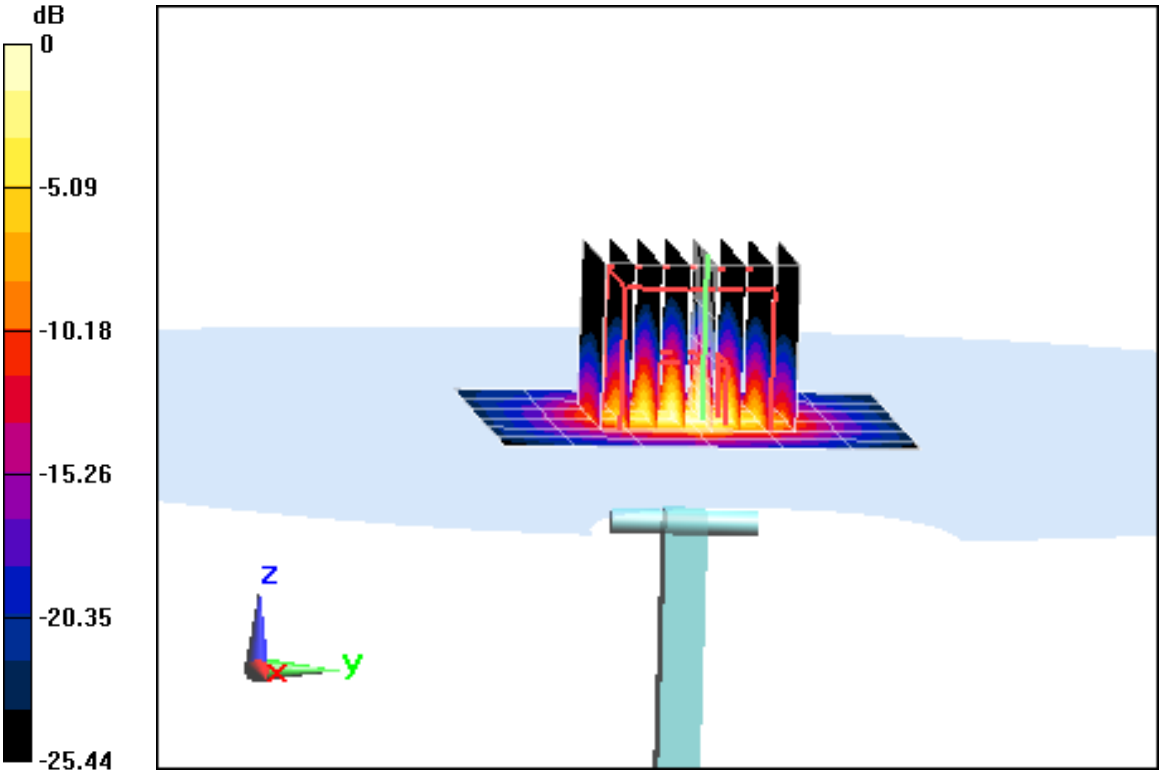
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5250 MHz; σ = 4.566 S/m; ε_r = 35.078; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-04-2019; Ambient Temp: 20.5°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7409; ConvF(5.2, 5.2, 5.2) @ 5250 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5250 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 15.7 W/kg
SAR(1 g) = 3.7 W/kg
Deviation(1 g) = -6.57%



0 dB = 8.98 W/kg = 9.53 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1057

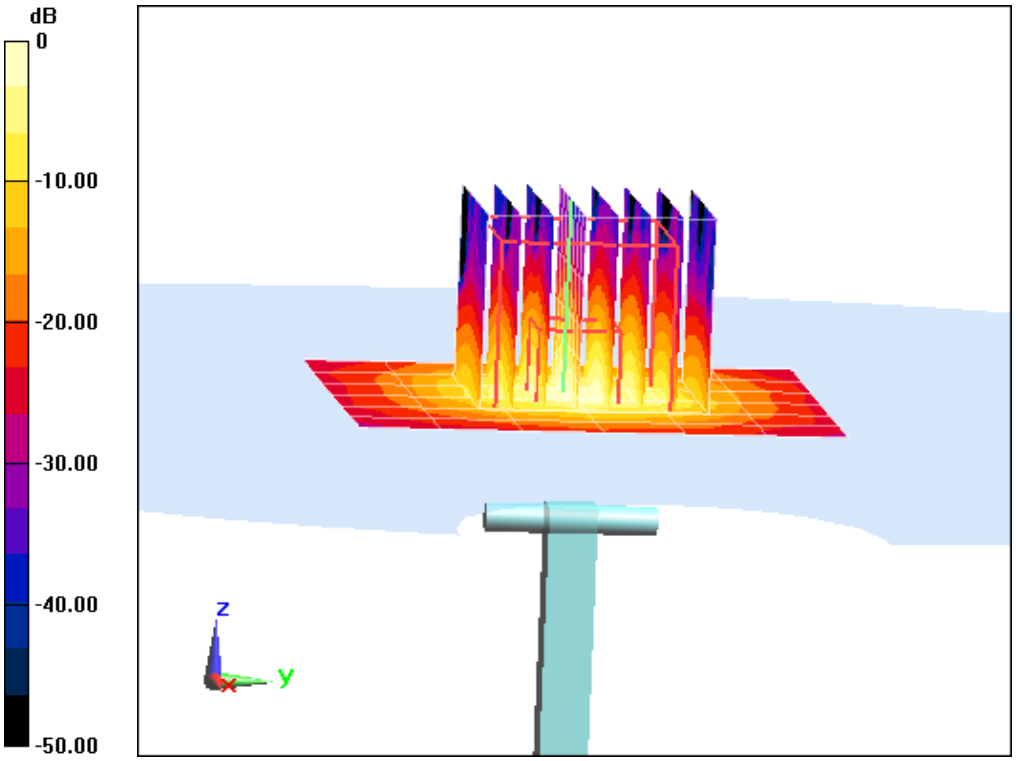
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used:
f = 5600 MHz; σ = 4.97 S/m; ε_r = 34.45; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-04-2019; Ambient Temp: 20.5°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7409; ConvF(4.77, 4.77, 4.77) @ 5600 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5600 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 3.96 W/kg
Deviation(1 g) = -5.83%



DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1057

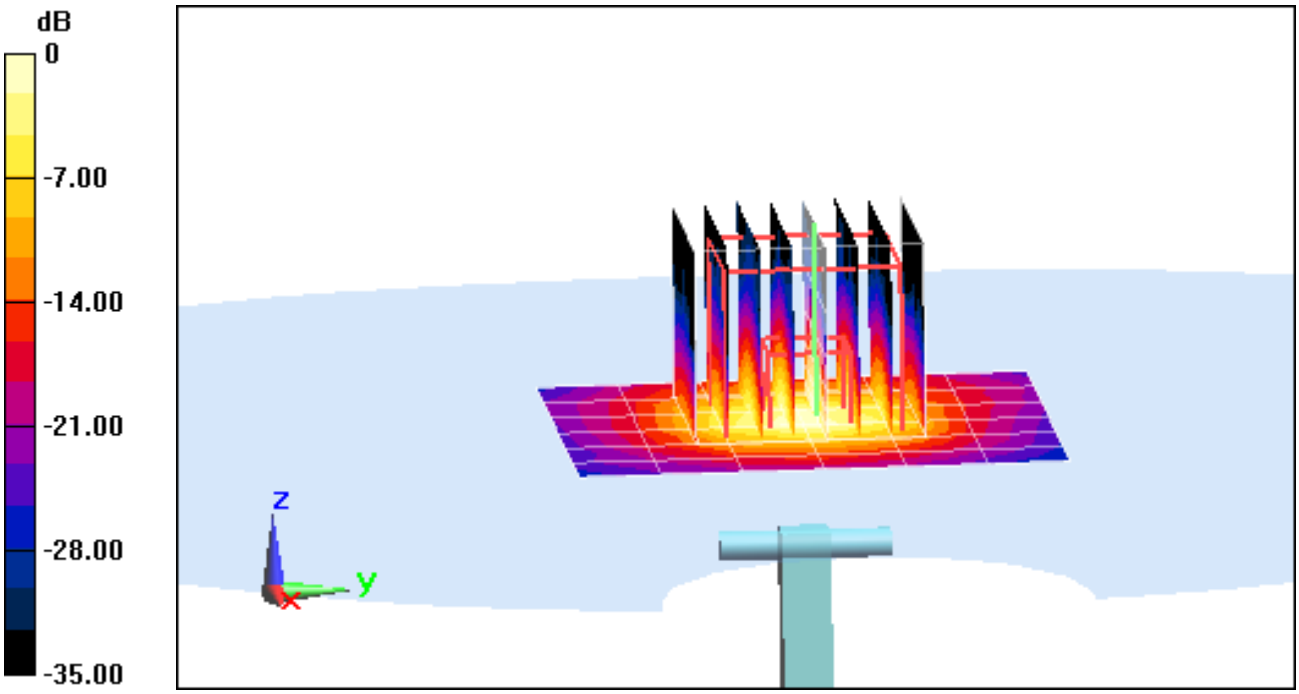
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5750 MHz; σ = 5.151 S/m; ε_r = 34.186; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-04-2019; Ambient Temp: 20.5°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7409; ConvF(4.82, 4.82, 4.82) @ 5750 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5750 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 18.0 W/kg
SAR(1 g) = 3.77 W/kg
Deviation(1 g) = -6.34%



0 dB = 9.78 W/kg = 9.90 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1057

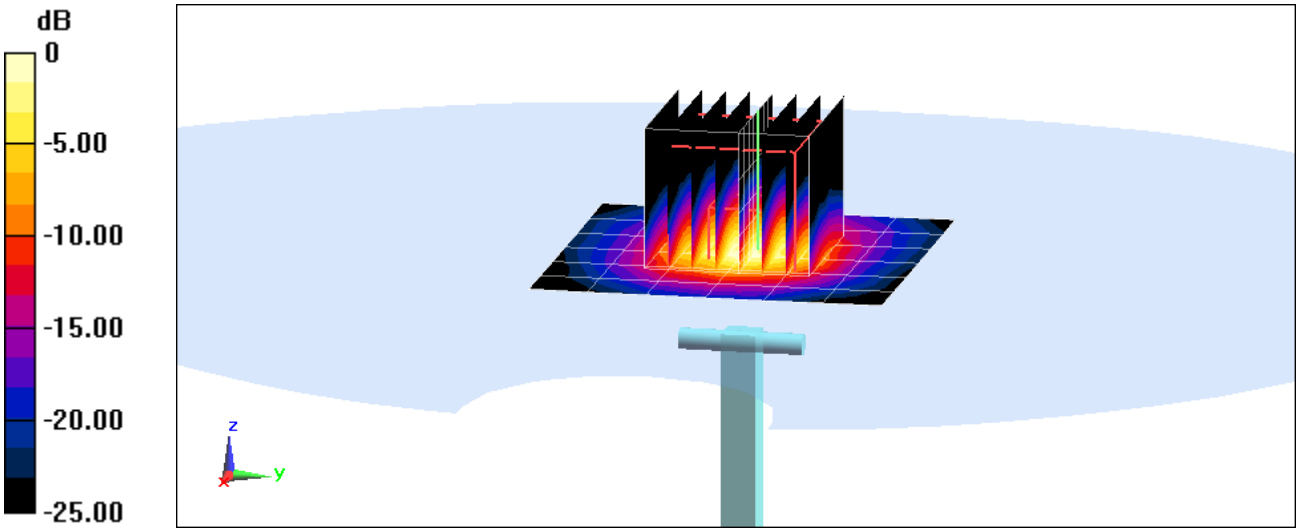
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head; Medium parameters used (interpolated):
f = 5750 MHz; σ = 5.137 S/m; ε_r = 34.062; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-21-2019; Ambient Temp: 21.1°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7409; ConvF(4.82, 4.82, 4.82) @ 5750 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5750 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 18.0 W/kg
SAR(1 g) = 3.83 W/kg
Deviation(1 g) =-4.84%



0 dB = 9.54 W/kg = 9.80 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1161

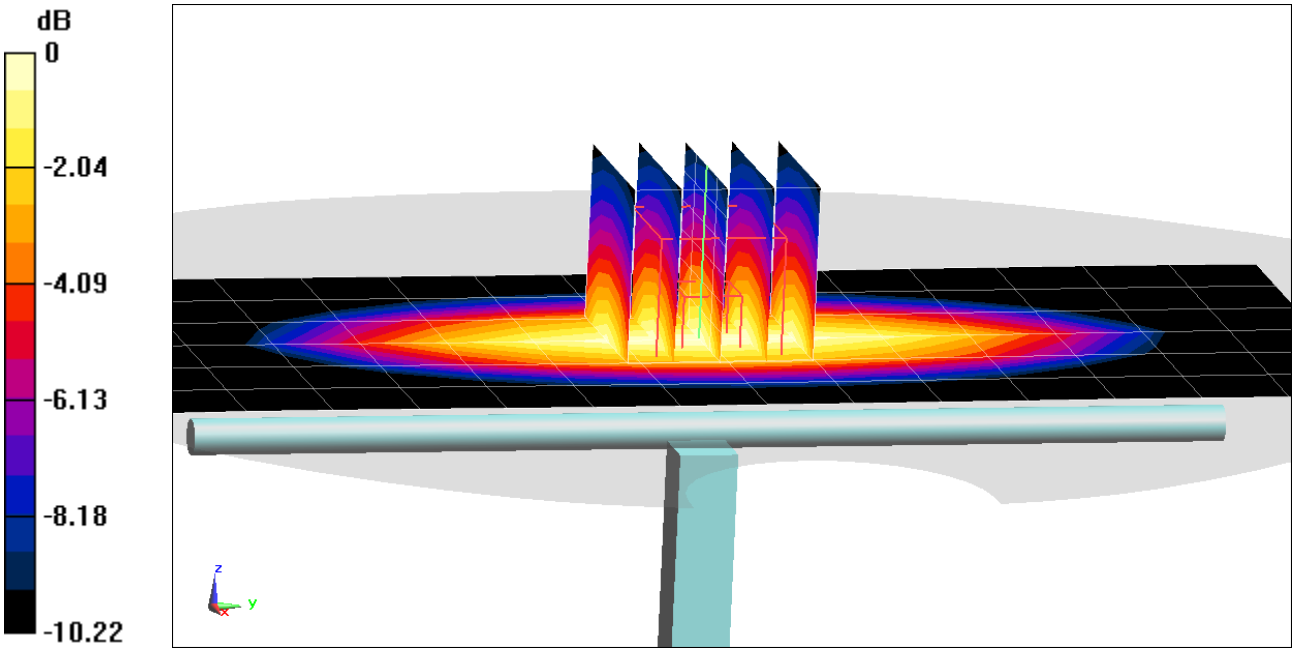
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 MHz Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.958 S/m; ε_r = 54.801; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-12-2019; Ambient Temp: 23.5°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7308; ConvF(10.38, 10.38, 10.38) @ 750 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.54 W/kg
SAR(1 g) = 1.67 W/kg
Deviation(1 g) = -0.95%



0 dB = 2.24 W/kg = 3.50 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d132

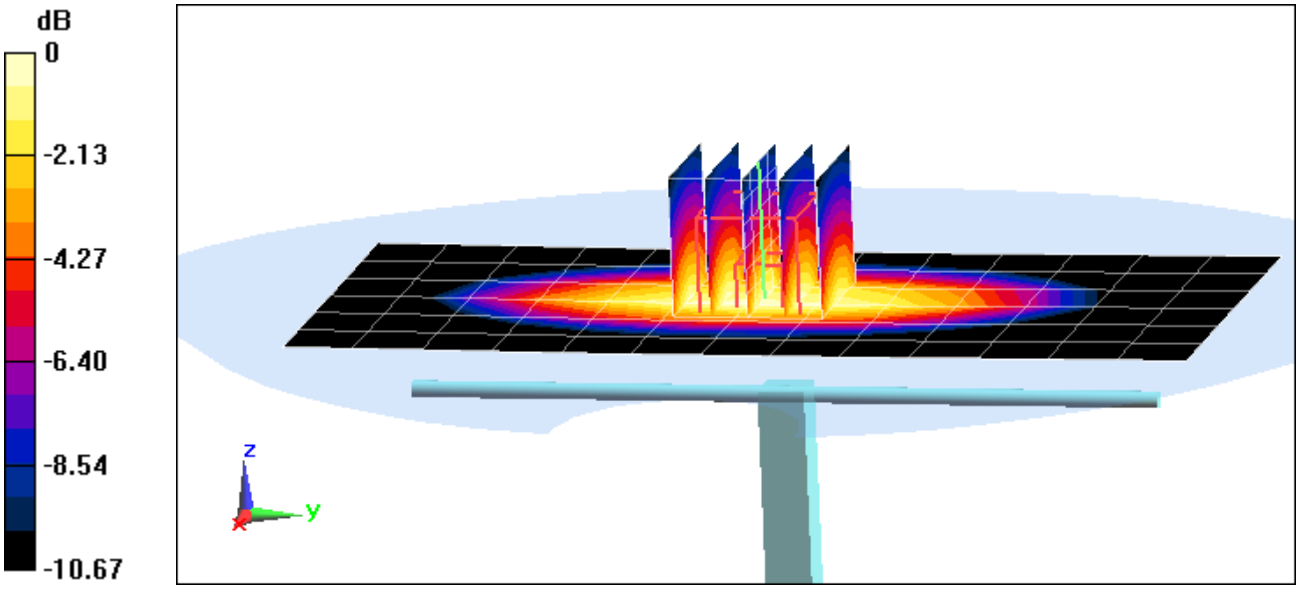
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.963 S/m; ε_r = 53.334; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-06-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 835 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.13 W/kg
SAR(1 g) = 2.08 W/kg
Deviation(1 g) = 7.55%



0 dB = 2.78 W/kg = 4.44 dBW/kg

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1148

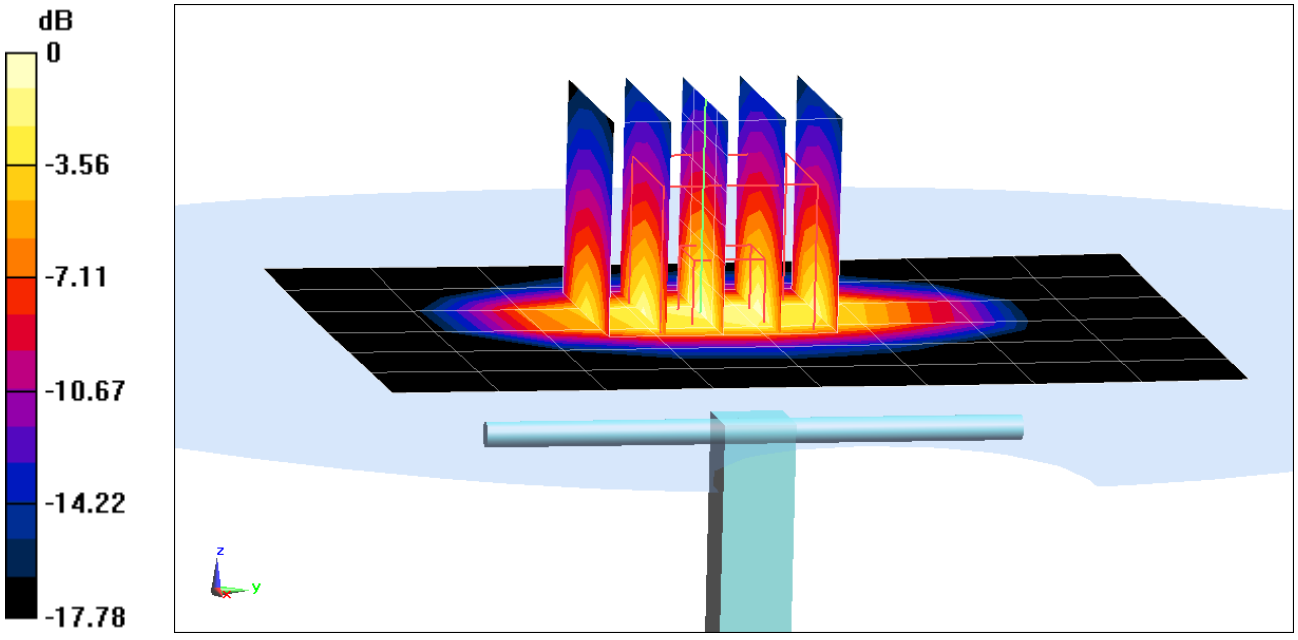
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.53 S/m; ε_r = 51.428; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-03-2019; Ambient Temp: 20.7°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7410; ConvF(8.06, 8.06, 8.06) @ 1750 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.87 W/kg
SAR(1 g) = 3.76 W/kg
Deviation(1 g) = 1.62%



0 dB = 5.78 W/kg = 7.62 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1150

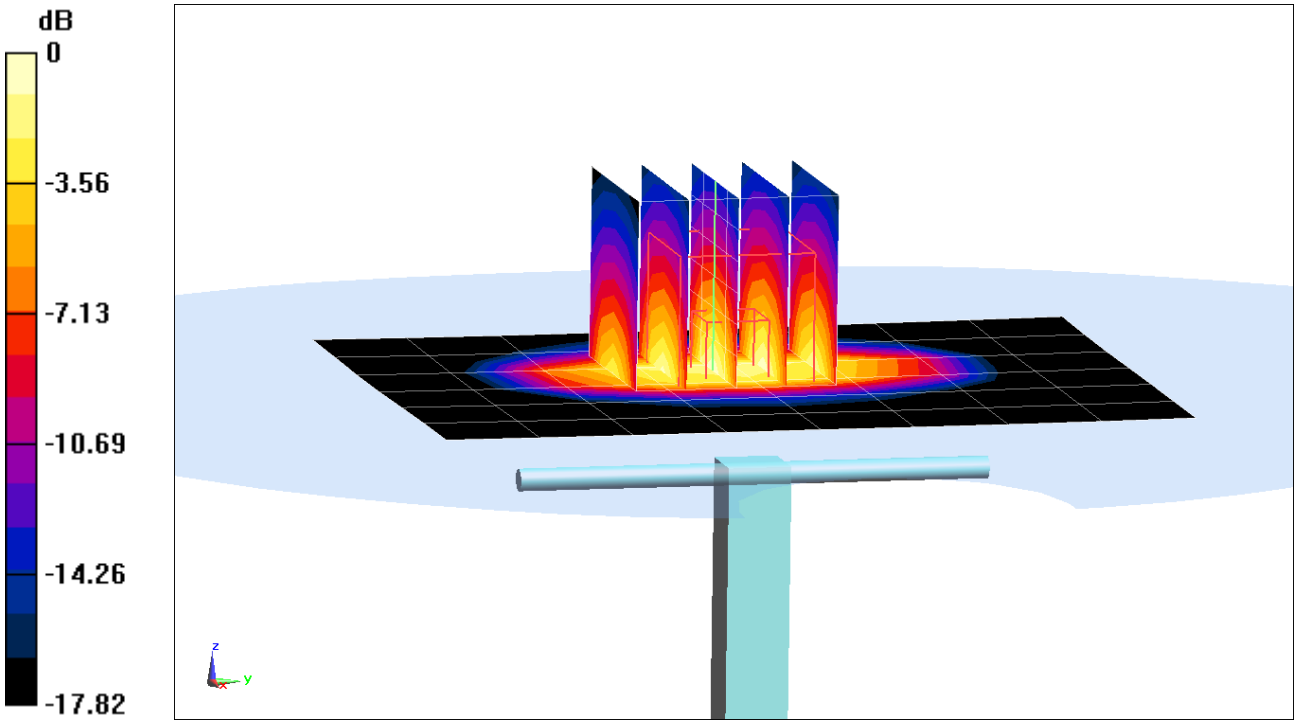
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.506 S/m; ε_r = 50.878; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-05-2019; Ambient Temp: 21.1°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7410; ConvF(8.06, 8.06, 8.06) @ 1750 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.13 W/kg
SAR(1 g) = 3.92 W/kg; SAR(10 g) = 2.06 W/kg
Deviation(1 g) = 7.10%; Deviation(10 g) = 6.19%



0 dB = 6.01 W/kg = 7.79 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1150

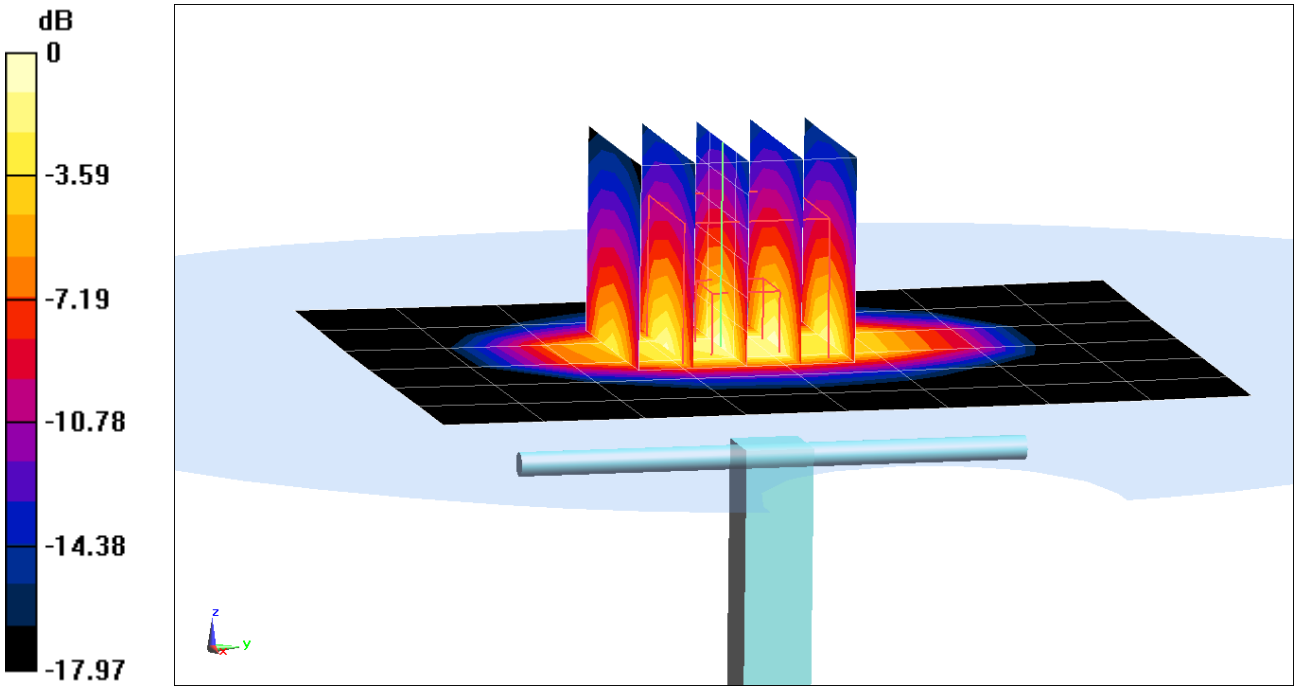
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.503 S/m; ε_r = 50.84; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-11-2019; Ambient Temp: 21.3°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7410; ConvF(8.06, 8.06, 8.06) @ 1750 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.95 W/kg
SAR(10 g) = 1.98 W/kg
Deviation(10 g) = 2.06%



0 dB = 5.79 W/kg = 7.63 dBW/kg

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

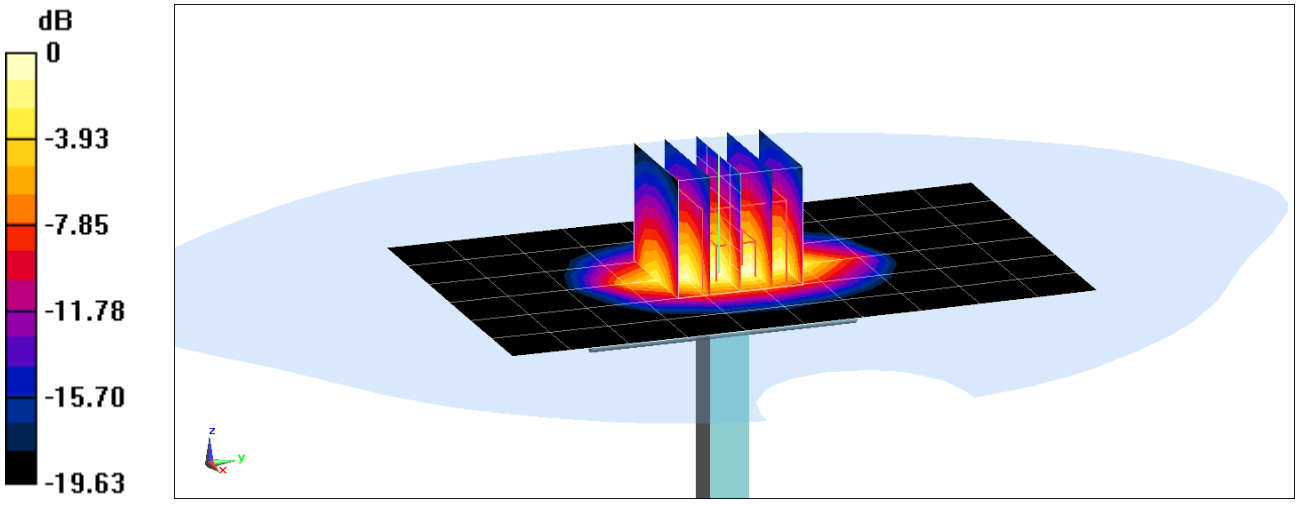
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.555 S/m; ε_r = 51.649; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-27-2019; Ambient Temp: 23.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1900 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.88 W/kg
SAR(1 g) = 4.14 W/kg; SAR(10 g) = 2.08 W/kg
Deviation(1 g) = 5.08%; Deviation(10 g) = 0.48%



0 dB = 6.52 W/kg = 8.14 dBW/kg

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d080

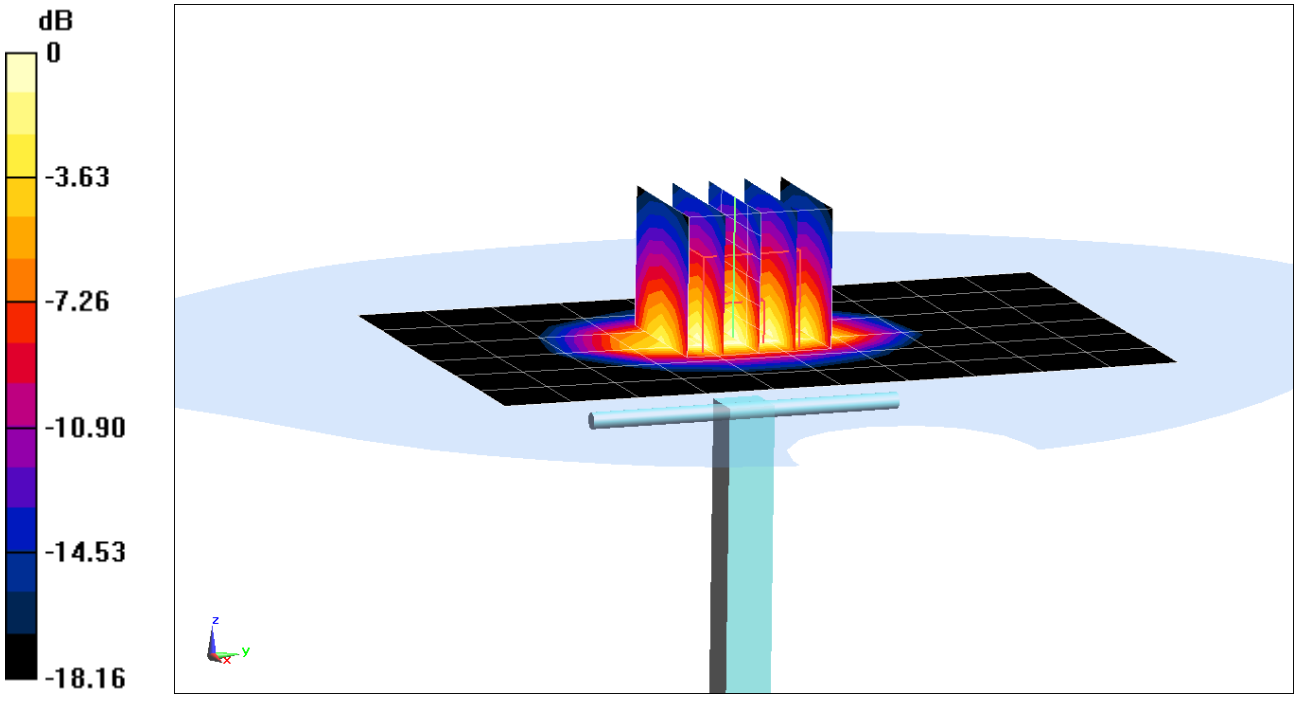
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.571 S/m; ε_r = 52.171; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2019; Ambient Temp: 23.5°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN7410; ConvF(7.78, 7.78, 7.78) @ 1900 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.83 W/kg
SAR(10 g) = 2.16 W/kg
Deviation(10 g) = 4.85%



0 dB = 6.59 W/kg = 8.19 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 719

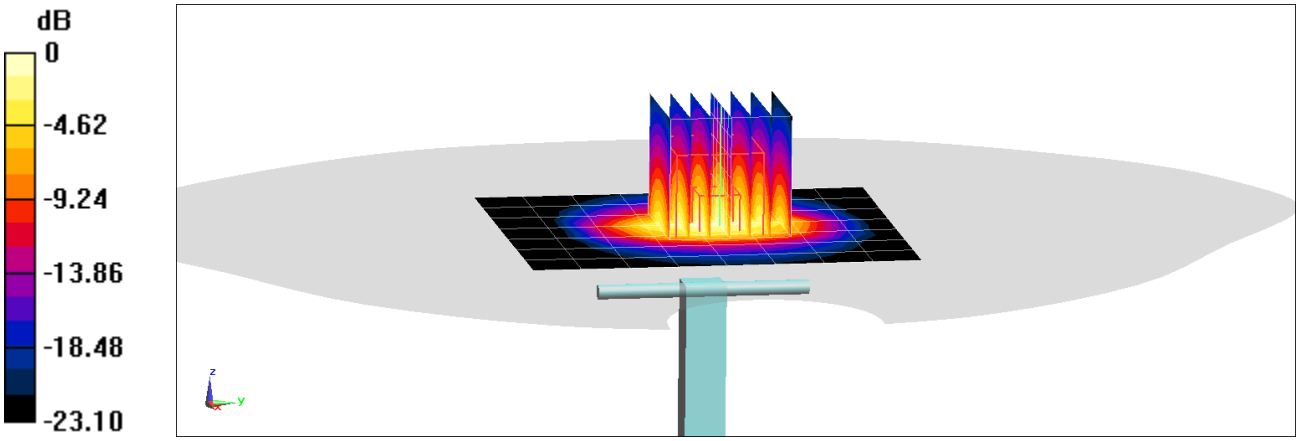
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.039 S/m; ε_r = 50.675; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-06-2019; Ambient Temp: 22.6°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7417; ConvF(7.51, 7.51, 7.51) @ 2450 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.1 W/kg
SAR(1 g) = 4.78 W/kg
Deviation(1 g) = -4.59%



0 dB = 8.07 W/kg = 9.07 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 719

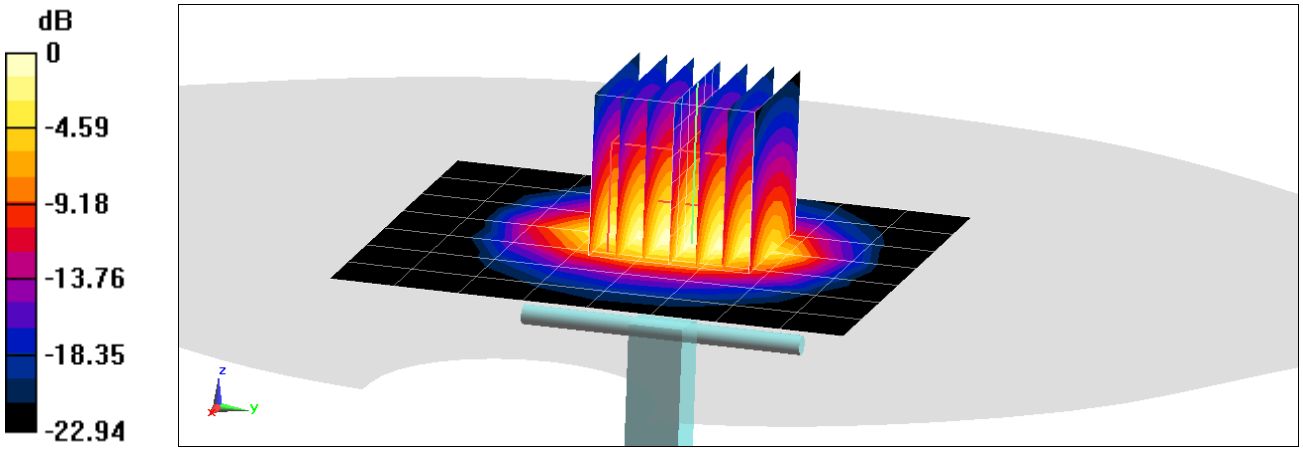
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.041 S/m; ε_r = 50.934; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-10-2019; Ambient Temp: 21.9°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN7417; ConvF(7.51, 7.51, 7.51) @ 2450 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 9.98 W/kg
SAR(1 g) = 4.85 W/kg
Deviation(1 g) = -3.19%



0 dB = 8.05 W/kg = 9.06 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191

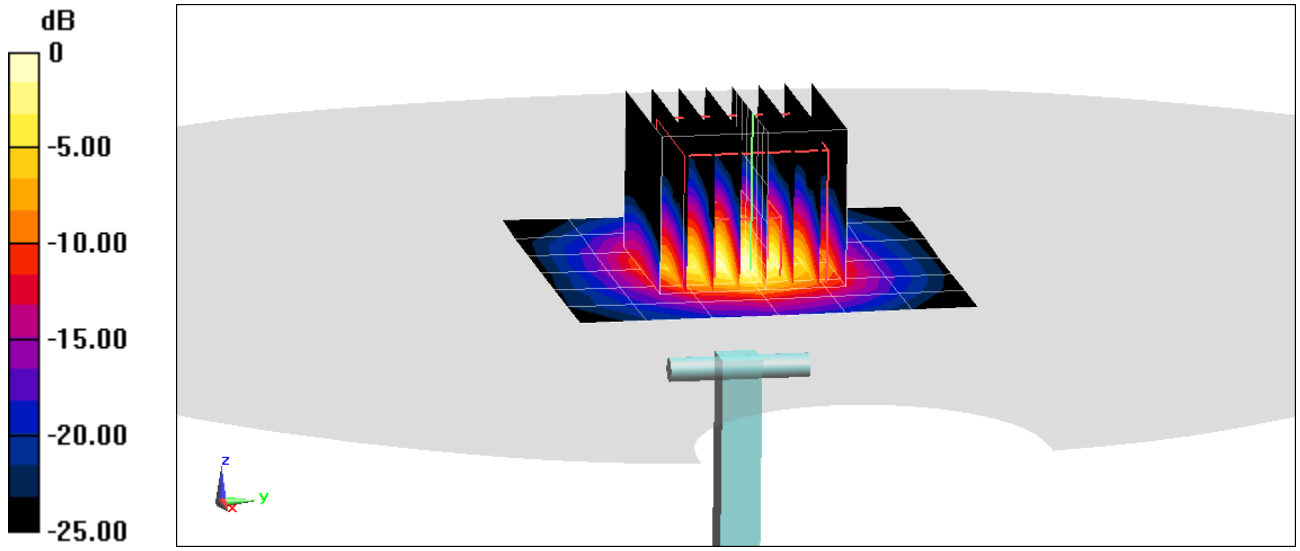
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used (interpolated):
f = 5250 MHz; σ = 5.406 S/m; ε_r = 47.468; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-08-2019; Ambient Temp: 22.2°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7308; ConvF(4.48, 4.48, 4.48) @ 5250 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5250 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 14.8 W/kg
SAR(1 g) = 3.61 W/kg; SAR(10 g) = 1 W/kg
Deviation(1 g) = -6.23%; Deviation(10 g) = -7.41%



0 dB = 8.70 W/kg = 9.40 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191

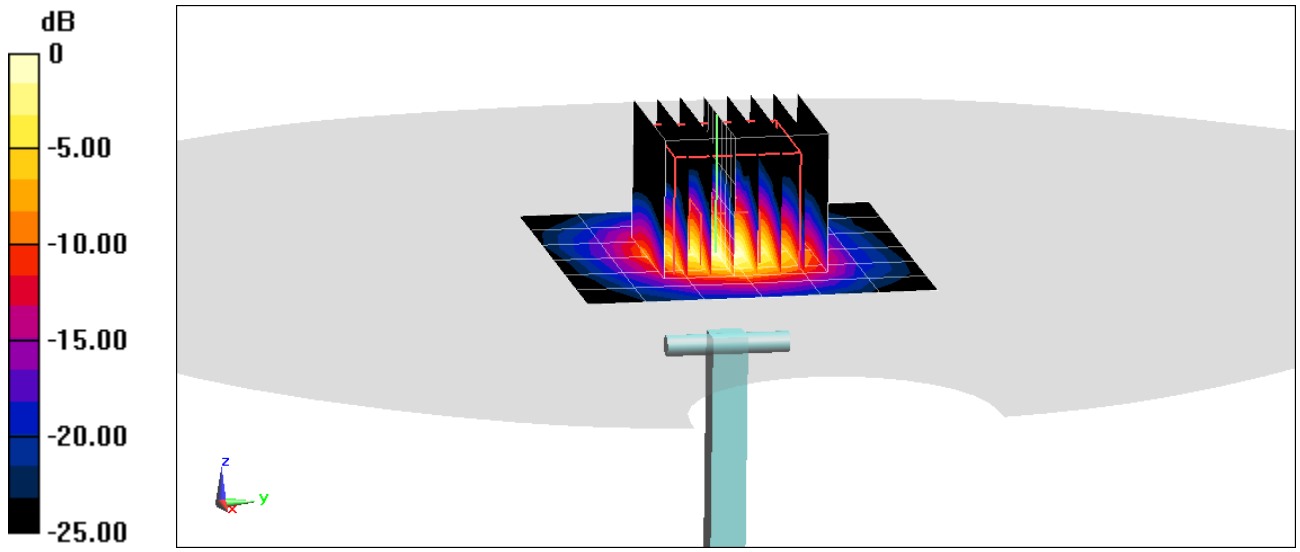
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used:
f = 5600 MHz; σ = 5.901 S/m; ε_r = 46.781; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-08-2019; Ambient Temp: 22.2°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7308; ConvF(4, 4, 4) @ 5600 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5600 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 4.02 W/kg; SAR(10 g) = 1.11 W/kg
Deviation(1 g) = 1.52%; Deviation(10 g) = 0.00%



0 dB = 9.98 W/kg = 9.99 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191

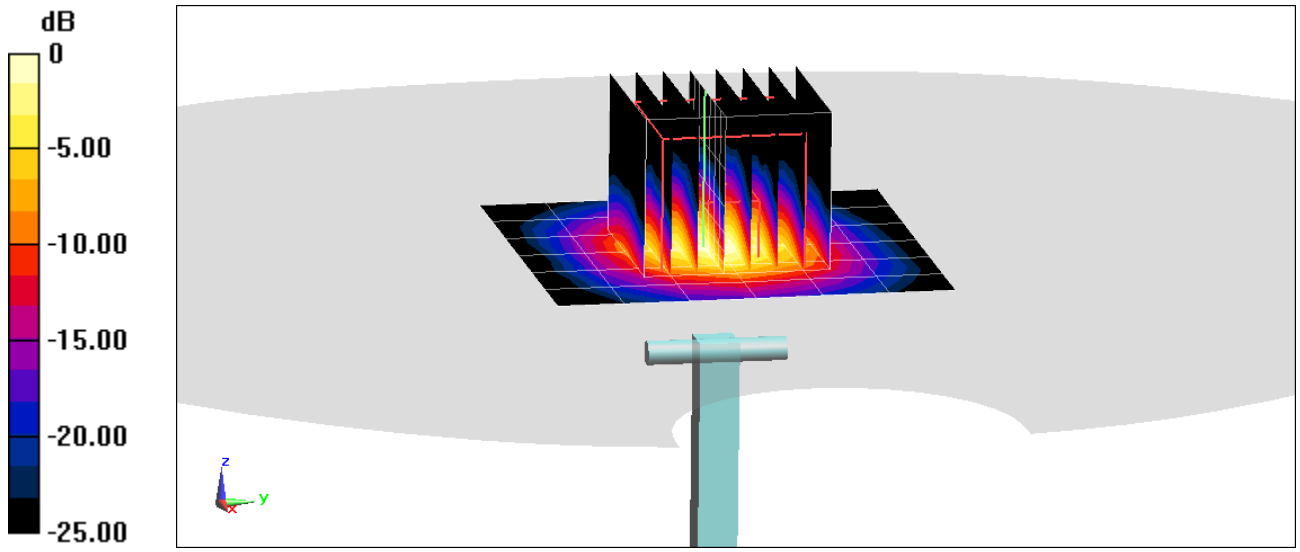
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used (interpolated):
f = 5750 MHz; σ = 6.138 S/m; ε_r = 46.526; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-08-2019; Ambient Temp: 22.2°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7308; ConvF(4.18, 4.18, 4.18) @ 5750 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5750 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 3.62 W/kg; SAR(10 g) = 1.01 W/kg
Deviation(1 g) = -4.86%; Deviation(10 g) = -4.72%



0 dB = 8.96 W/kg = 9.52 dBW/kg

APPENDIX C: PROBE CALIBRATION

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client PC Test

Certificate No: D5GHzV2-1057_Jan18

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN:1057
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	January 16, 2018

BN ✓
01-25-2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

BN ✓
02/06/2019

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 3503	30-Dec-17 (No. EX3-3503_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 18, 2018

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	36.2 ± 6 %	4.55 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.91 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.8 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.8 ± 6 %	4.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**84.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.0 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.5 ± 6 %	5.06 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.0 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.3 ± 6 %	5.41 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.36 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**73.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.06 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.4 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.2 ± 6 %	5.48 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.64 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.6 ± 6 %	5.94 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.05 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**79.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.25 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.3 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.3 ± 6 %	6.15 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.72 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.2 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.2 ± 6 %	6.22 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.68 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.1 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	50.0 Ω - 5.5 jΩ
Return Loss	- 25.2 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	54.7 Ω - 2.1 jΩ
Return Loss	- 26.2 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	52.7 Ω + 0.0 jΩ
Return Loss	- 31.5 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	49.3 Ω - 6.7 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	48.4 Ω - 3.9 jΩ
Return Loss	- 27.4 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	55.3 Ω - 1.6 jΩ
Return Loss	- 25.6 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	52.6 Ω + 1.1 jΩ
Return Loss	- 31.2 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	51.8 Ω - 0.4 jΩ
Return Loss	- 34.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.203 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 27, 2006

Appendix (Additional assessments outside the scope of SCS 0108)

Measurement Conditions (f=5200 MHz)

DASY system configuration, as far as not given on page 1 and 3.

Phantom	SAM Head Phantom	For usage with cSAR3DV2-R/L

SAR result with SAM Head (Top)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.24 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**82.6 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.6 W/kg ± 19.9 % (k=2)**

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**85.6 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.7 W/kg ± 19.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.6 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.7 W/kg ± 19.9 % (k=2)**

SAR result with SAM Head (Ear)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	5.16 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**51.7 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	1.76 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**17.7 W/kg ± 19.9 % (k=2)**

Measurement Conditions (f=5800 MHz)

DASY system configuration, as far as not given on page 1 and 3.

Phantom	SAM Head Phantom	For usage with cSAR3DV2-R/L

SAR result with SAM Head (Top)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.62 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**86.3 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.1 W/kg ± 19.9 % (k=2)**

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.88 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**88.9 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.44 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.4 W/kg ± 19.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.4 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.5 W/kg ± 19.9 % (k=2)**

SAR result with SAM Head (Ear)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	5.68 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**56.8 W/kg ± 20.3 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	1.89 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**18.9 W/kg ± 19.9 % (k=2)**

DASY5 Validation Report for Head TSL

Date: 11.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1057

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.55 S/m; ε_r = 36.2; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 4.9 S/m; ε_r = 35.8; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5750 MHz; σ = 5.06 S/m; ε_r = 35.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.51, 5.51, 5.51); Calibrated: 30.12.2017, ConvF(5.05, 5.05, 5.05); Calibrated: 30.12.2017, ConvF(4.98, 4.98, 4.98); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601 - modified; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

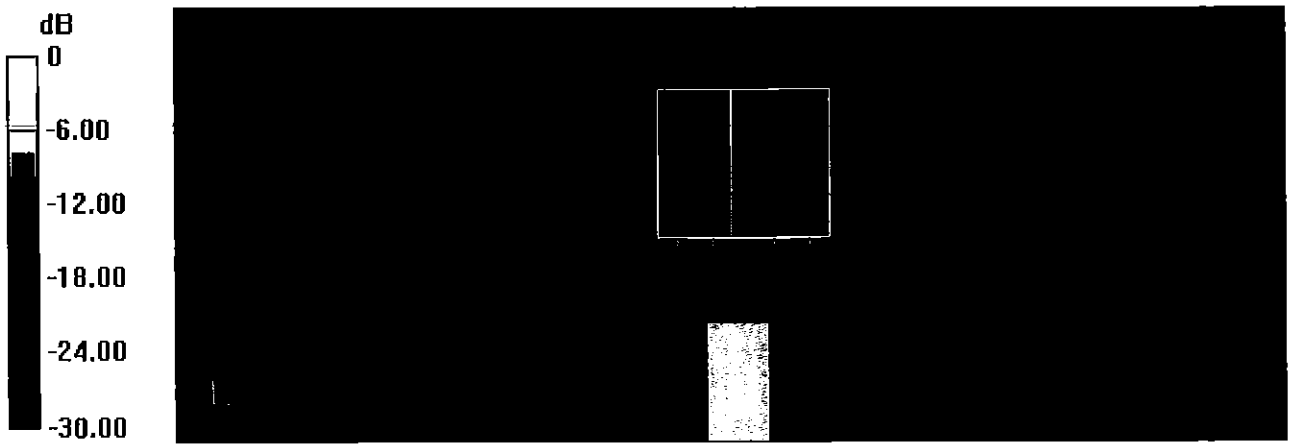
Reference Value = 72.54 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 27.5 W/kg
SAR(1 g) = 7.91 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 17.7 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 72.77 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 32.2 W/kg
SAR(1 g) = 8.41 W/kg; SAR(10 g) = 2.4 W/kg
Maximum value of SAR (measured) = 19.7 W/kg

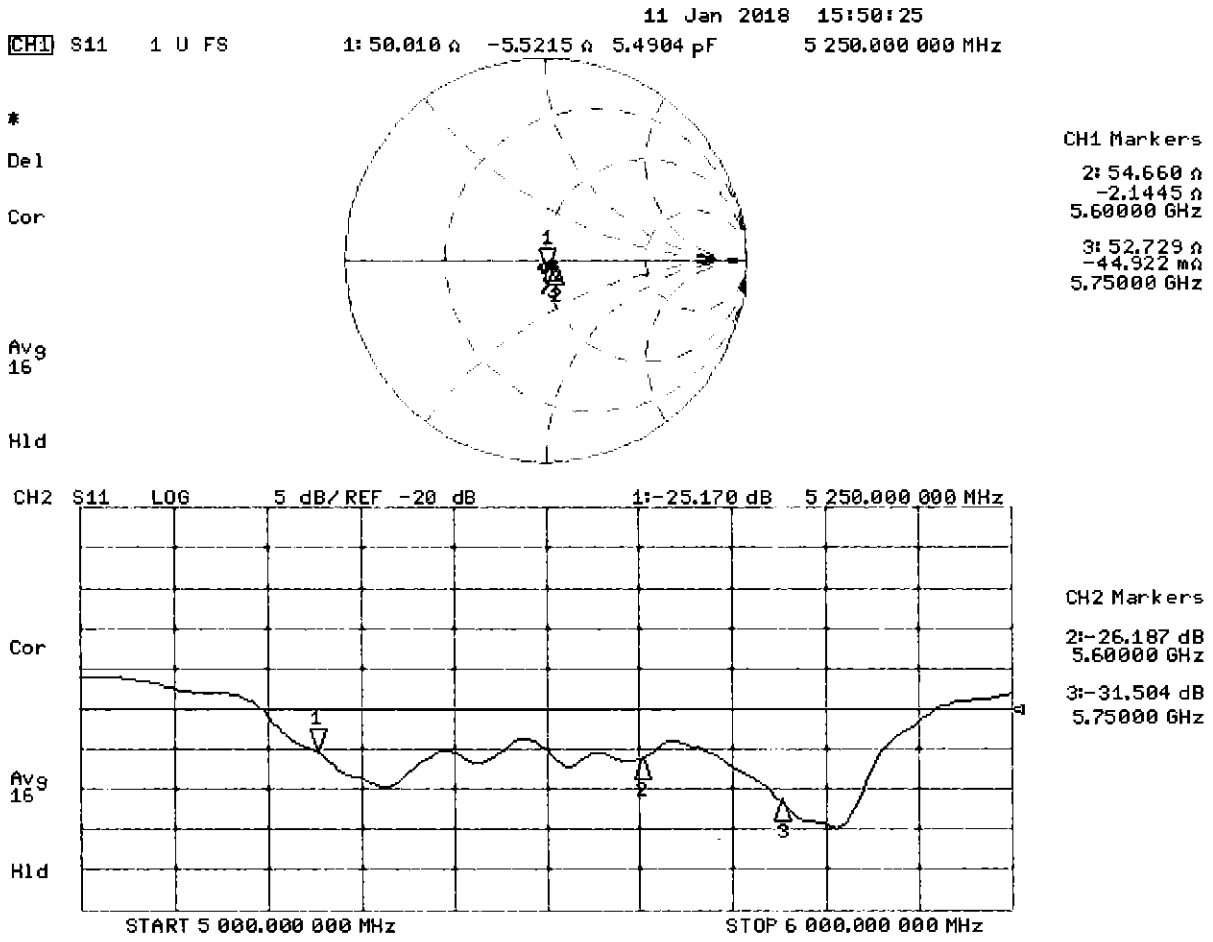
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 70.93 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 31.4 W/kg
SAR(1 g) = 8.06 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 18.9 W/kg



0 dB = 18.9 W/kg = 12.76 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 10.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1057

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz, Frequency: 5800 MHz
Medium parameters used:f = 5200 MHz; σ = 5.41 S/m; ε_r = 47.3; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5250 MHz; σ = 5.48 S/m; ε_r = 47.2; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 5.94 S/m; ε_r = 46.6; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5750 MHz; σ = 6.15 S/m; ε_r = 46.3; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5800 MHz; σ = 6.22 S/m; ε_r = 46.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.35, 5.35, 5.35); Calibrated: 30.12.2017, ConvF(5.26, 5.26, 5.26); Calibrated: 30.12.2017, ConvF(4.65, 4.65, 4.65); Calibrated: 30.12.2017, ConvF(4.57, 4.57, 4.57); Calibrated: 30.12.2017, ConvF(4.53, 4.53, 4.53); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

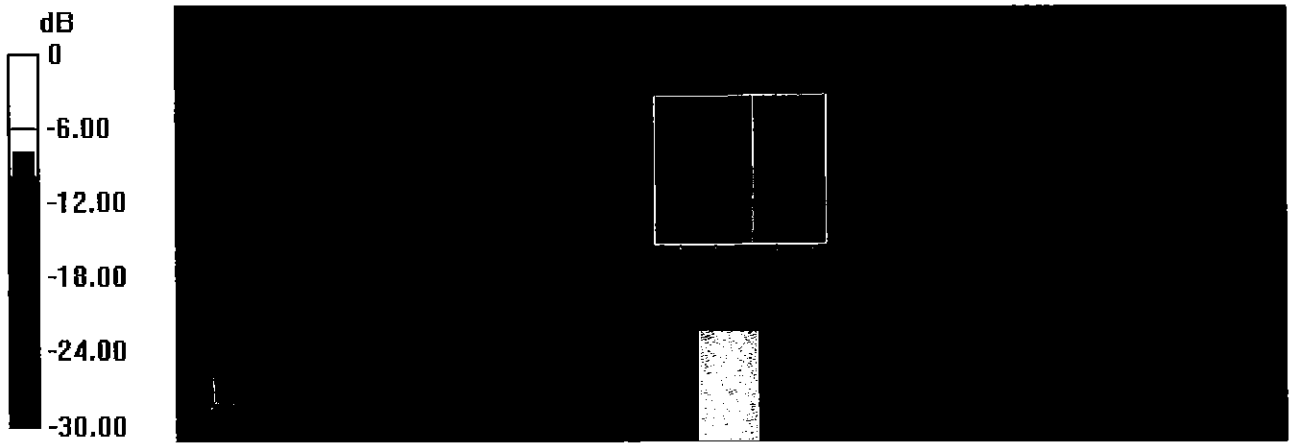
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.05 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 27.6 W/kg
SAR(1 g) = 7.36 W/kg; SAR(10 g) = 2.06 W/kg
Maximum value of SAR (measured) = 17.1 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.53 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 29.4 W/kg
SAR(1 g) = 7.64 W/kg; SAR(10 g) = 2.13 W/kg
Maximum value of SAR (measured) = 17.9 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.09 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 34.0 W/kg
SAR(1 g) = 8.05 W/kg; SAR(10 g) = 2.25 W/kg
Maximum value of SAR (measured) = 19.5 W/kg

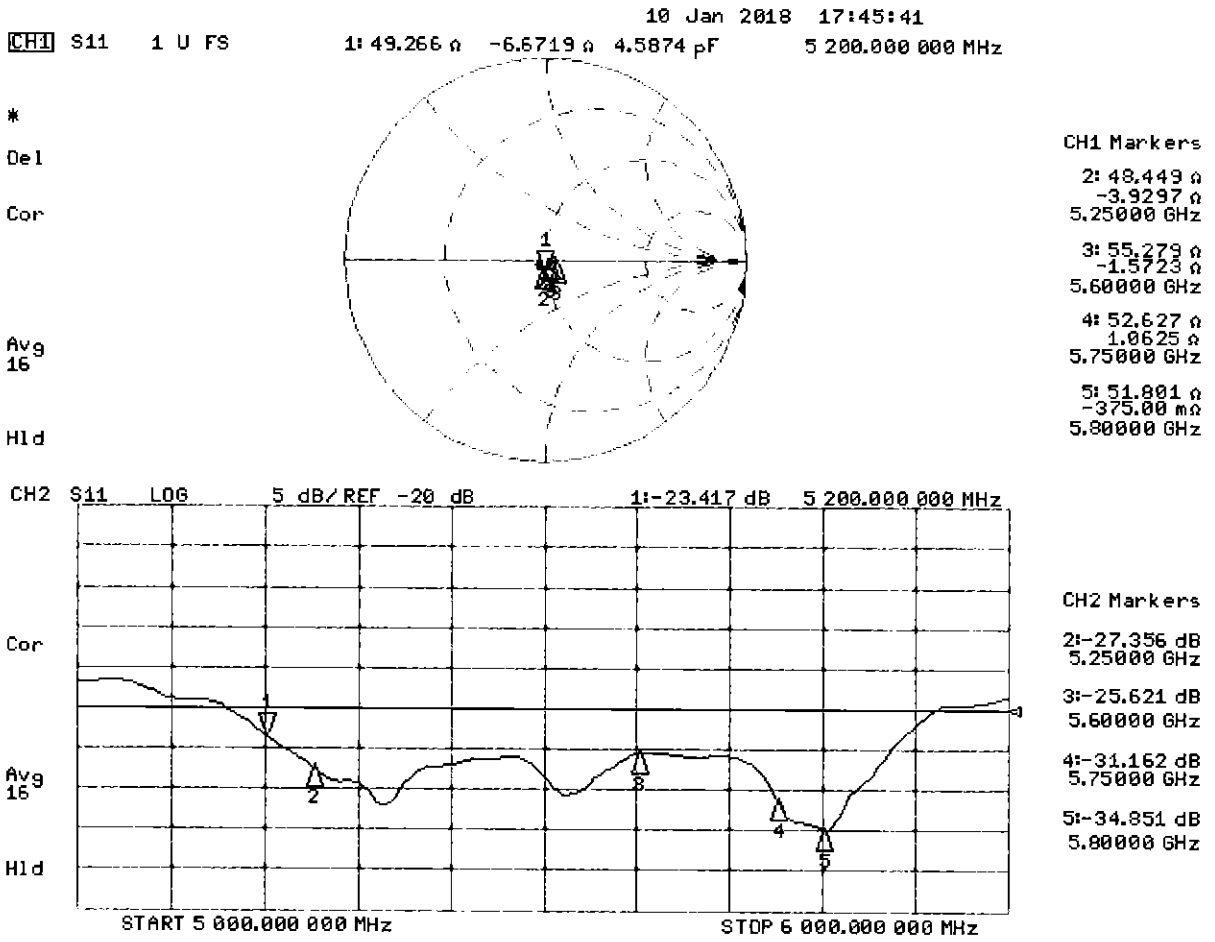
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.45 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 32.9 W/kg
SAR(1 g) = 7.72 W/kg; SAR(10 g) = 2.14 W/kg
Maximum value of SAR (measured) = 18.9 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.14 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 33.3 W/kg
SAR(1 g) = 7.68 W/kg; SAR(10 g) = 2.13 W/kg



0 dB = 18.9 W/kg = 12.76 dBW/kg

Impedance Measurement Plot for Body TSL



DASY5 Validation Report for SAM Head

Date: 16.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN:1057

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.59 S/m; εr = 36.5; ρ = 1000 kg/m3 ,
Medium parameters used: f = 5800 MHz; σ = 5.28 S/m; εr = 35.4; ρ = 1000 kg/m3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.75, 5.75, 5.75); Calibrated: 30.12.2017, ConvF(4.96, 4.96, 4.96); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

SAM Head/Top - 5200/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.99 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 30.6 W/kg
SAR(1 g) = 8.24 W/kg; SAR(10 g) = 2.35 W/kg
Maximum value of SAR (measured) = 19.7 W/kg

SAM Head/Top - 5800/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 73.00 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 36.5 W/kg
SAR(1 g) = 8.62 W/kg; SAR(10 g) = 2.41 W/kg
Maximum value of SAR (measured) = 21.9 W/kg

SAM Head/Mouth - 5200/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.79 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 29.5 W/kg
SAR(1 g) = 8.54 W/kg; SAR(10 g) = 2.37 W/kg
Maximum value of SAR (measured) = 20.7 W/kg

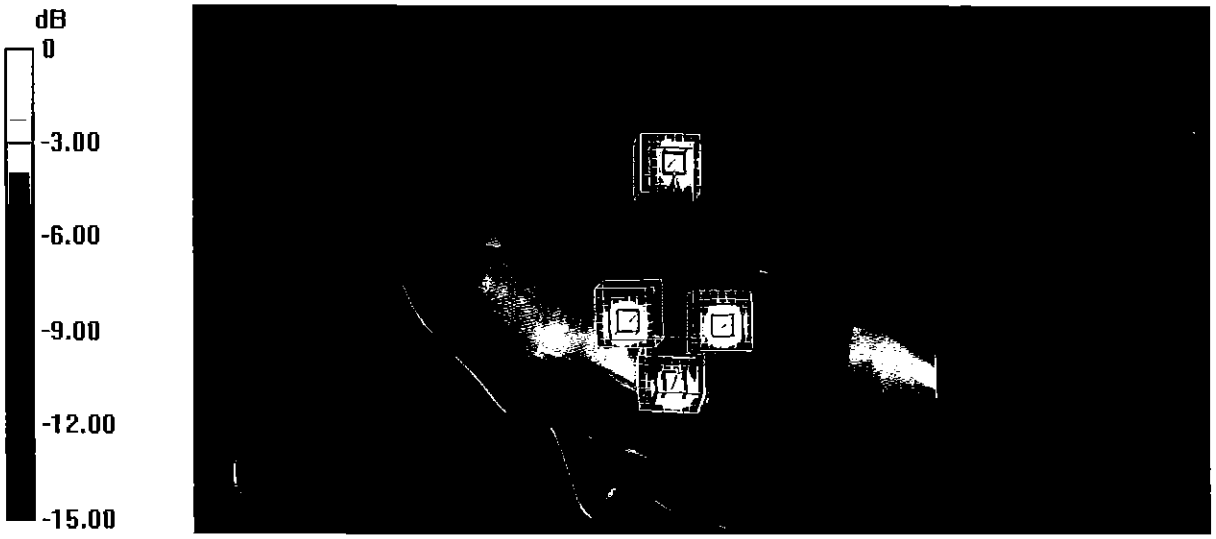
SAM Head/Mouth - 5800/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.69 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 34.9 W/kg
SAR(1 g) = 8.88 W/kg; SAR(10 g) = 2.44 W/kg
Maximum value of SAR (measured) = 23.0 W/kg

SAM Head/Neck - 5200/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.48 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 27.9 W/kg
SAR(1 g) = 8.14 W/kg; SAR(10 g) = 2.37 W/kg
Maximum value of SAR (measured) = 19.3 W/kg

SAM Head/Neck - 5800/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.90 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 33.4 W/kg
SAR(1 g) = 8.33 W/kg; SAR(10 g) = 2.35 W/kg
Maximum value of SAR (measured) = 21.8 W/kg

SAM Head/Ear - 5200/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 54.68 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 5.16 W/kg; SAR(10 g) = 1.76 W/kg
Maximum value of SAR (measured) = 11.1 W/kg

SAM Head/Ear - 5800/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 56.96 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 21.2 W/kg
SAR(1 g) = 5.68 W/kg; SAR(10 g) = 1.89 W/kg
Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg = 11.40 dBW/kg

Certification of Calibration

Object	D5GHzV2 – SN: 1057
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	1/16/2019
Description:	SAR Validation Dipole at 5250, 5600, and 5750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	2/8/2018	Annual	2/8/2019	US39170122
Agilent	N5182A	MXG Vector Signal Generator	4/18/2018	Annual	4/18/2019	MY47420800
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1207364
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1339018
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Control Company	4040	Therm./Clock/Humidity Monitor	3/31/2017	Biennial	3/31/2019	170232394
Control Company	4352	Ultra Long Stem Thermometer	5/2/2017	Biennial	5/2/2019	170330156
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
MiniCircuits	VLF-6000+	Low Pass Filter	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
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Seekonk	NC-100	Torque Wrench	7/11/2018	Annual	7/11/2019	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/3/2018	Annual	10/3/2019	1558
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/18/2018	Annual	6/18/2019	1334
SPEAG	DAK-3.5	Dielectric Assessment Kit	9/11/2018	Annual	9/11/2019	1091
SPEAG	EX3DV4	SAR Probe	8/23/2018	Annual	8/23/2019	7308
SPEAG	EX3DV4	SAR Probe	6/25/2018	Annual	6/25/2019	7409

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	

DIPOLE CALIBRATION EXTENSION

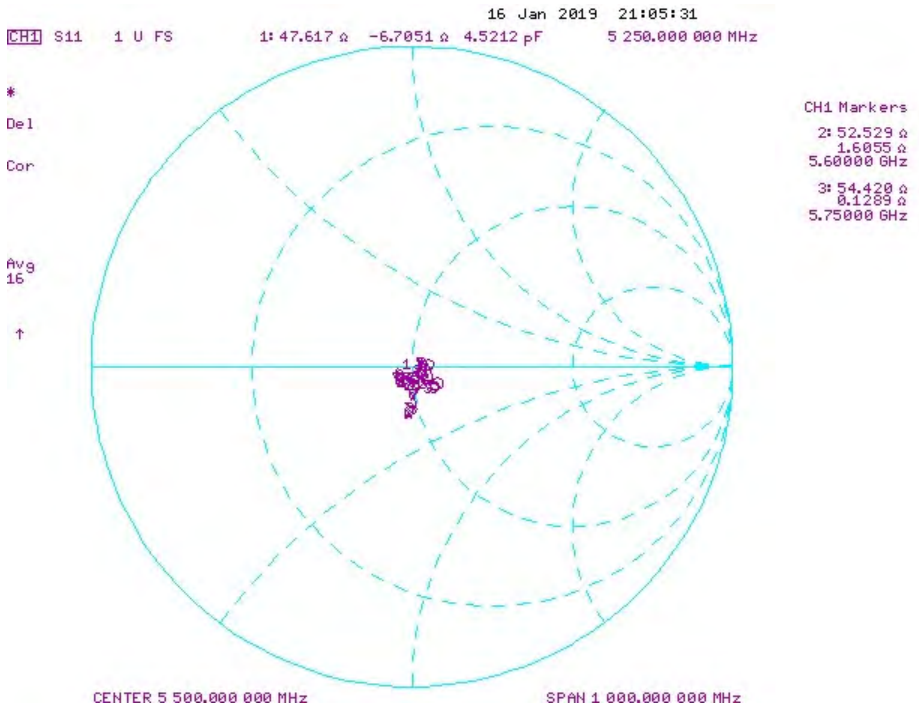
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

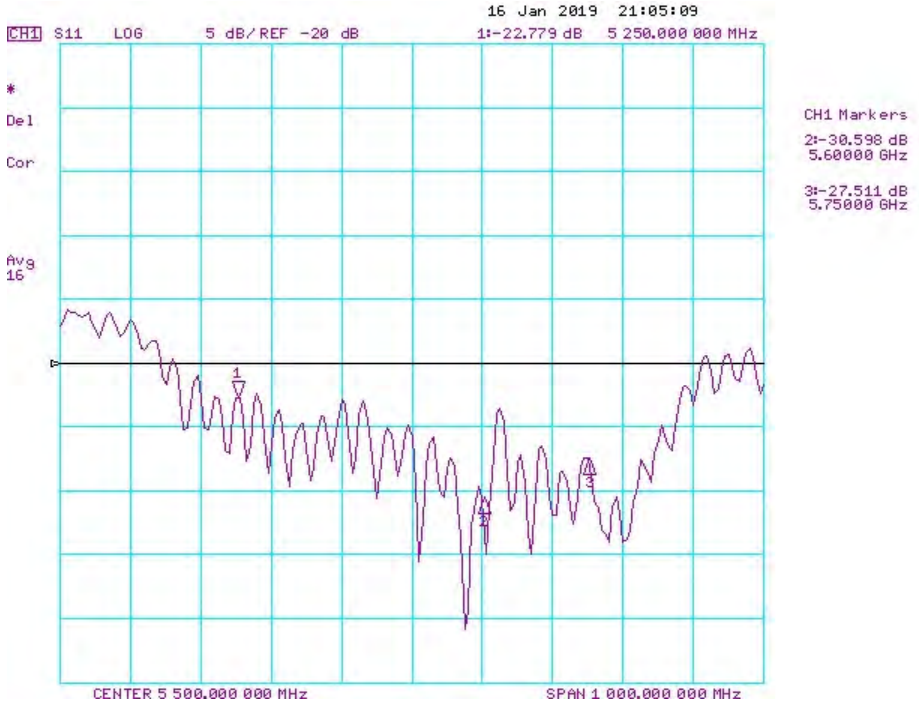
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

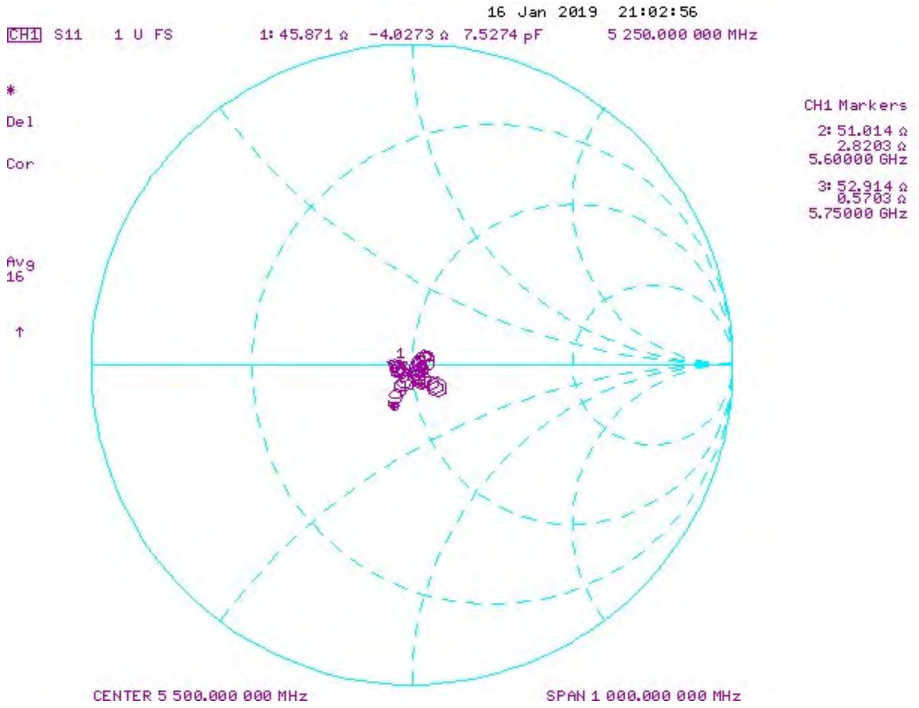
Frequency (MHz)	Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 17.0 dBm	Measured Head SAR (1g) W/kg @ 17.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 17.0 dBm	Measured Head SAR (10g) W/kg @ 17.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5250	1/16/2018	1/16/2019	1.203	3.96	3.63	-8.33%	1.14	1.04	-8.77%	50	47.6	2.4	-5.5	-6.7	1.2	-25.2	-22.8	9.60%	PASS
5600	1/16/2018	1/16/2019	1.203	4.205	3.84	-8.68%	1.2	1.09	-9.17%	54.7	52.5	2.2	-2.1	1.6	3.7	-26.2	-30.6	-16.80%	PASS
5750	1/16/2018	1/16/2019	1.203	4.025	3.76	-6.58%	1.15	1.07	-6.96%	52.7	54.4	1.7	0	0.1	0.1	-31.5	-27.5	12.70%	PASS
Frequency (MHz)	Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 17.0 dBm	Measured Body SAR (1g) W/kg @ 17.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 17.0 dBm	Measured Body SAR (10g) W/kg @ 17.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5250	1/16/2018	1/16/2019	1.203	3.795	3.73	-1.71%	1.06	1.03	-2.37%	48.4	45.9	2.5	-3.9	-4	0.1	-27.4	-24.5	10.50%	PASS
5600	1/16/2018	1/16/2019	1.203	3.995	4.06	1.63%	1.12	1.12	0.45%	55.3	51	4.3	-1.6	2.8	4.4	-25.6	-30.7	-20.00%	PASS
5750	1/16/2018	1/16/2019	1.203	3.835	3.65	-4.82%	1.06	1.02	-3.77%	52.6	52.9	0.3	1.1	0.6	0.5	-31.2	-30.7	1.60%	PASS

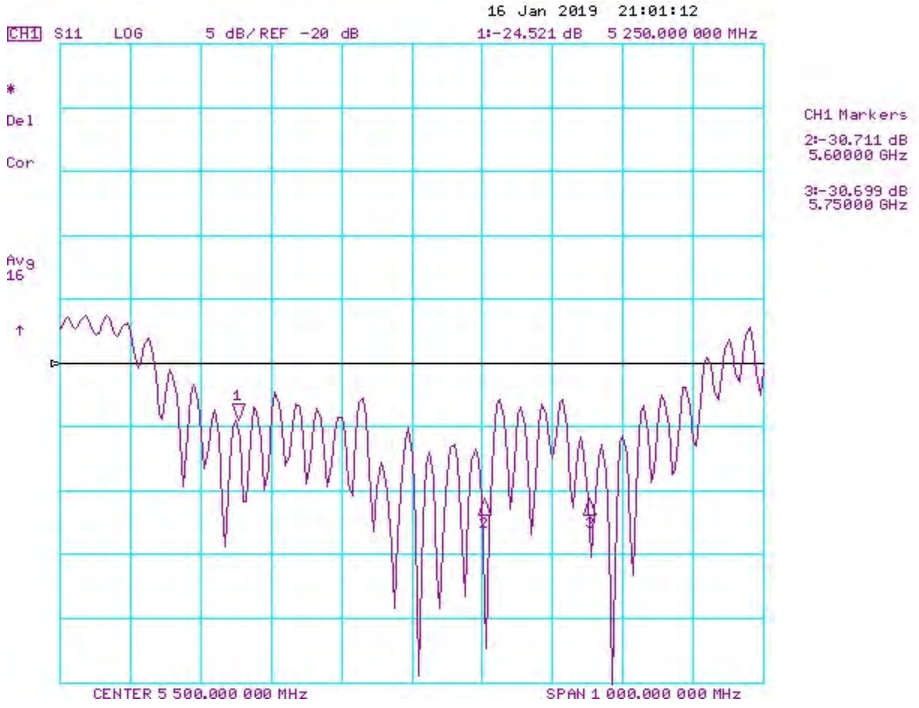
Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D5GHzV2-1191_Sep16**

CALIBRATION CERTIFICATE

Object D5GHzV2 - SN:1191

Calibration procedure(s) QA CAL-22.v2
Calibration procedure for dipole validation kits between 3-6 GHz

BN✓ 09-28-2016

Extended PM✓ 9/20/2018

Calibration date: September 21, 2016

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 3503	30-Jun-16 (No. EX3-3503_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	Leif Klysner
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 22, 2016

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.5 ± 6 %	4.59 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.96 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**78.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.29 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.6 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.0 ± 6 %	4.93 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.45 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.6 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.8 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.8 ± 6 %	5.08 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.99 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.27 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.4 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.4 ± 6 %	5.52 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.74 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**77.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.6 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	6.00 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.96 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**79.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.24 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.2 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.5 ± 6 %	6.21 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.65 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.2 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	55.7 Ω - 4.3 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	58.3 Ω - 3.2 jΩ
Return Loss	- 21.8 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	58.1 Ω + 4.8 jΩ
Return Loss	- 21.2 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	56.1 Ω - 3.7 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	58.9 Ω - 1.7 jΩ
Return Loss	- 21.7 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	59.5 Ω + 6.9 jΩ
Return Loss	- 19.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.204 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 28, 2003

DASY5 Validation Report for Head TSL

Date: 21.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1191

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.59 S/m; ε_r = 34.5; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 4.93 S/m; ε_r = 34; ρ = 1000 kg/m^3 , Medium parameters used: f = 5750 MHz; σ = 5.08 S/m; ε_r = 33.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

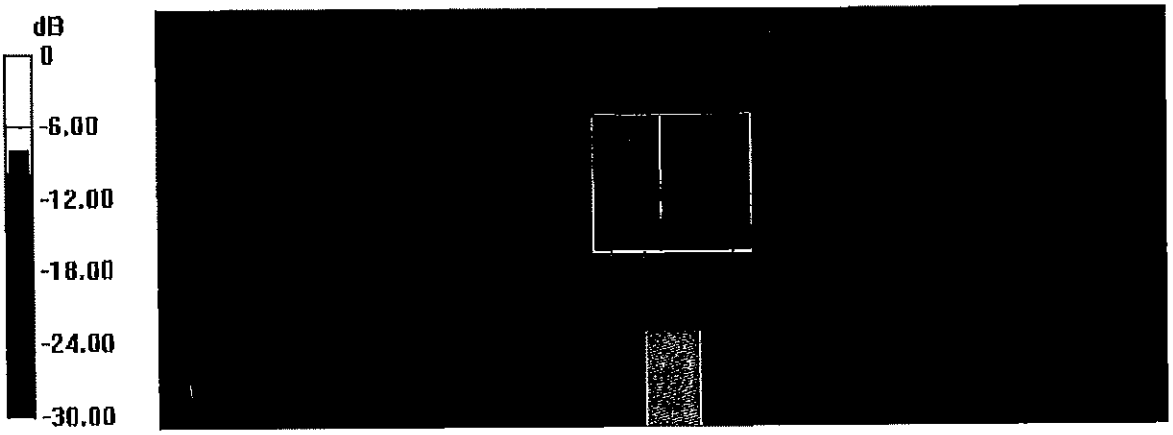
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.42, 5.42, 5.42); Calibrated: 30.06.2016, ConvF(4.89, 4.89, 4.89); Calibrated: 30.06.2016, ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 68.49 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 28.6 W/kg
SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.29 W/kg
Maximum value of SAR (measured) = 18.2 W/kg

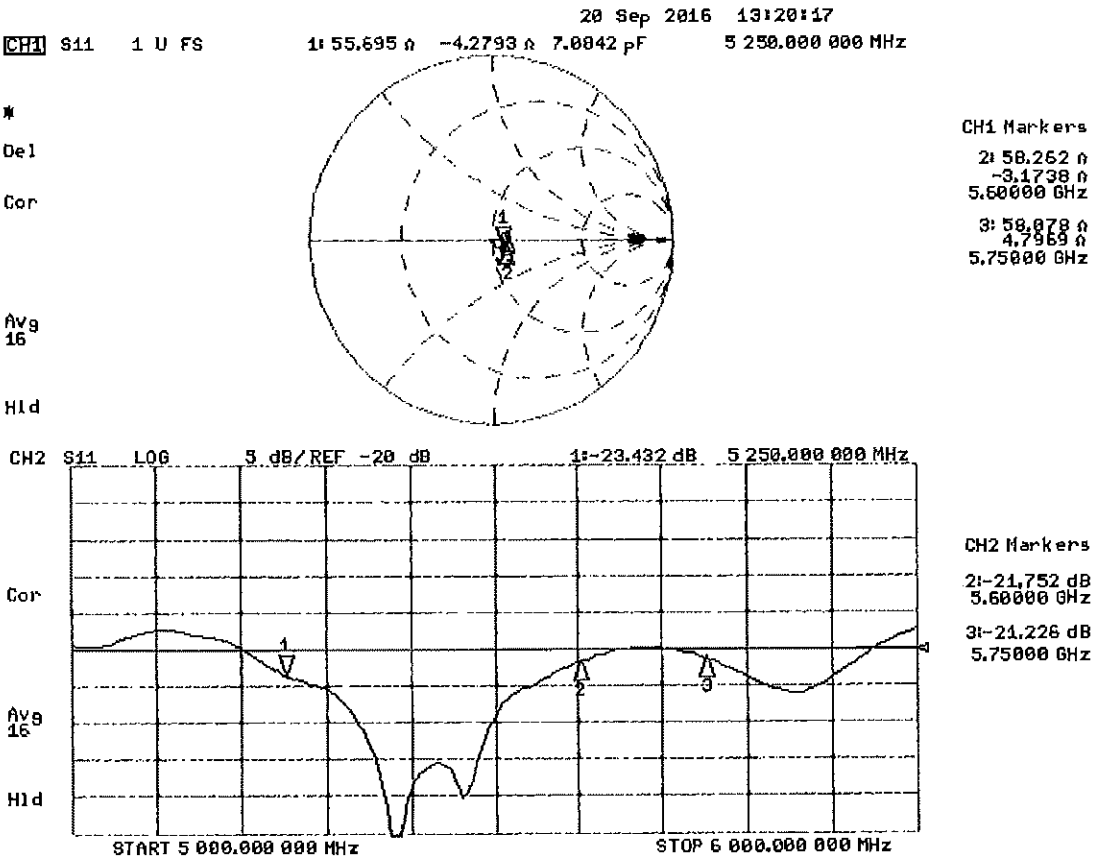
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.34 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 32.9 W/kg
SAR(1 g) = 8.45 W/kg; SAR(10 g) = 2.41 W/kg
Maximum value of SAR (measured) = 20.0 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.15 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 32.3 W/kg
SAR(1 g) = 7.99 W/kg; SAR(10 g) = 2.27 W/kg
Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 18.2 W/kg = 12.60 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 20.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1191

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.52 S/m; ε_r = 47.4; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 6 S/m; ε_r = 46.8; ρ = 1000 kg/m^3 , Medium parameters used: f = 5750 MHz; σ = 6.21 S/m; ε_r = 46.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

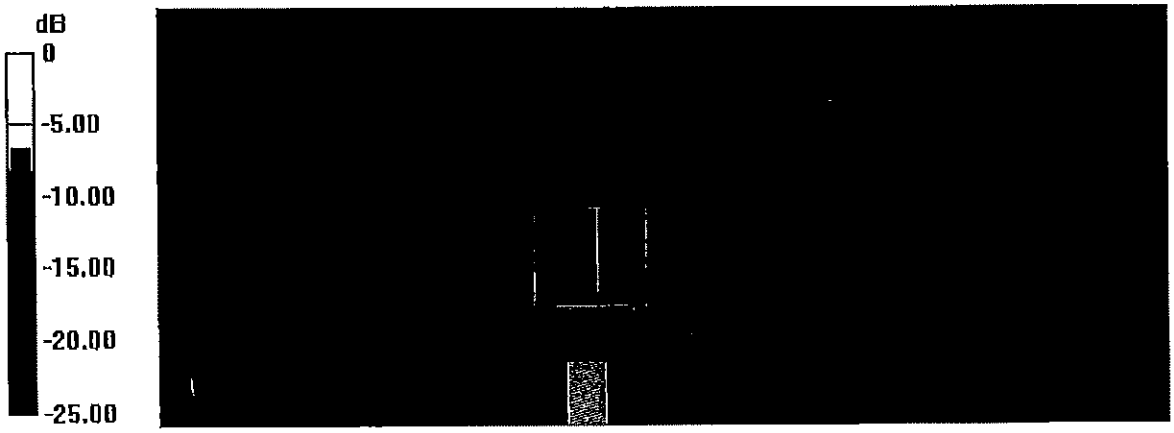
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016, ConvF(4.35, 4.35, 4.35); Calibrated: 30.06.2016, ConvF(4.3, 4.3, 4.3); Calibrated: 30.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.49 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 7.74 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 17.7 W/kg

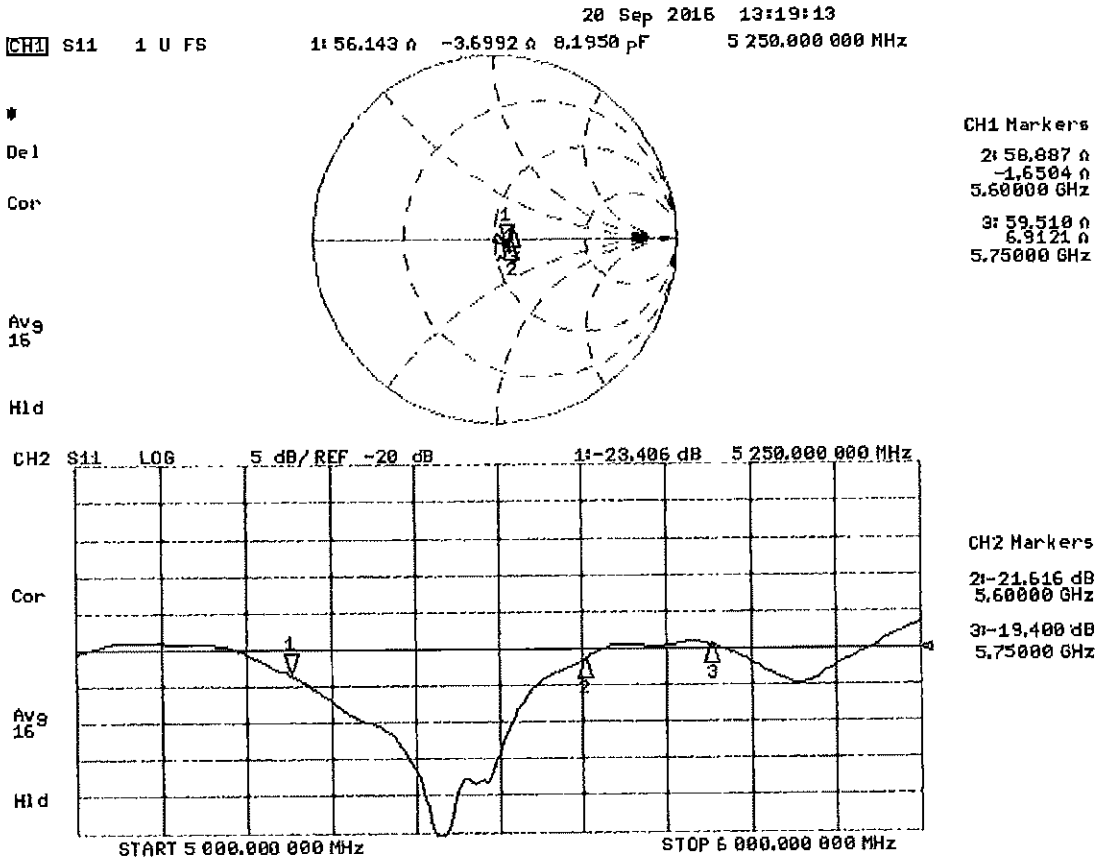
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.85 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 32.5 W/kg
SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.24 W/kg
Maximum value of SAR (measured) = 18.8 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.21 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 32.7 W/kg
SAR(1 g) = 7.65 W/kg; SAR(10 g) = 2.14 W/kg
Maximum value of SAR (measured) = 18.5 W/kg



0 dB = 17.7 W/kg = 12.48 dBW/kg

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object	D5GHzV2 – SN: 1191
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	9/19/2017
Description:	SAR Validation Dipole at 5250, 5600, and 5750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	3/31/2017	Biennial	3/31/2019	170232394
Control Company	4352	Ultra Long Stem Thermometer	5/2/2017	Biennial	5/2/2019	170330156
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/1/2017	Annual	6/1/2018	MY53401181
Agilent	8753ES	S-Parameter Network Analyzer	10/26/2016	Annual	10/26/2017	US39170118
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/10/2017	Annual	5/10/2018	1070
SPEAG	EX3DV4	SAR Probe	1/13/2017	Annual	1/13/2018	3589
SPEAG	EX3DV4	SAR Probe	2/13/2017	Annual	2/13/2018	3914
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/16/2017	Annual	1/16/2018	1466
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/9/2017	Annual	2/9/2018	665
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1207364
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1339018
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Agilent	N5182A	MXG Vector Signal Generator	2/28/2017	Annual	2/28/2018	MY47420800
Seekonk	NC-100	Torque Wrench	11/6/2015	Biennial	11/6/2017	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	KOK

DIPOLE CALIBRATION EXTENSION

Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

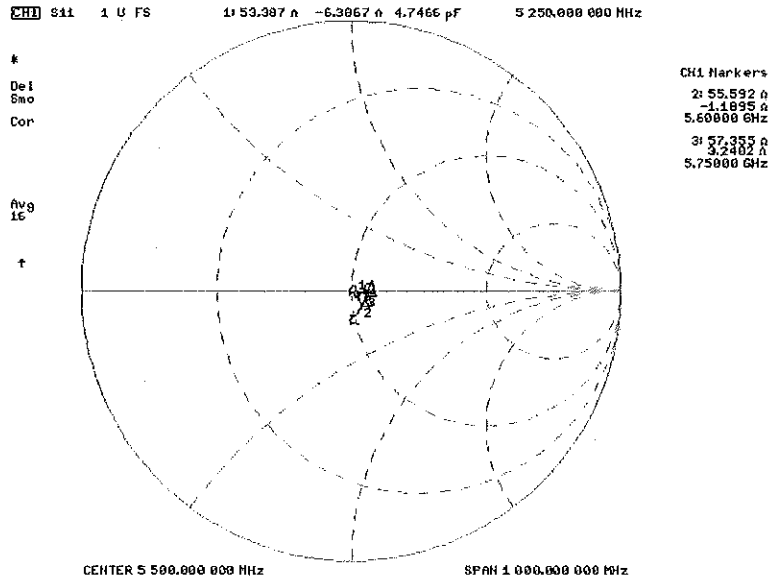
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

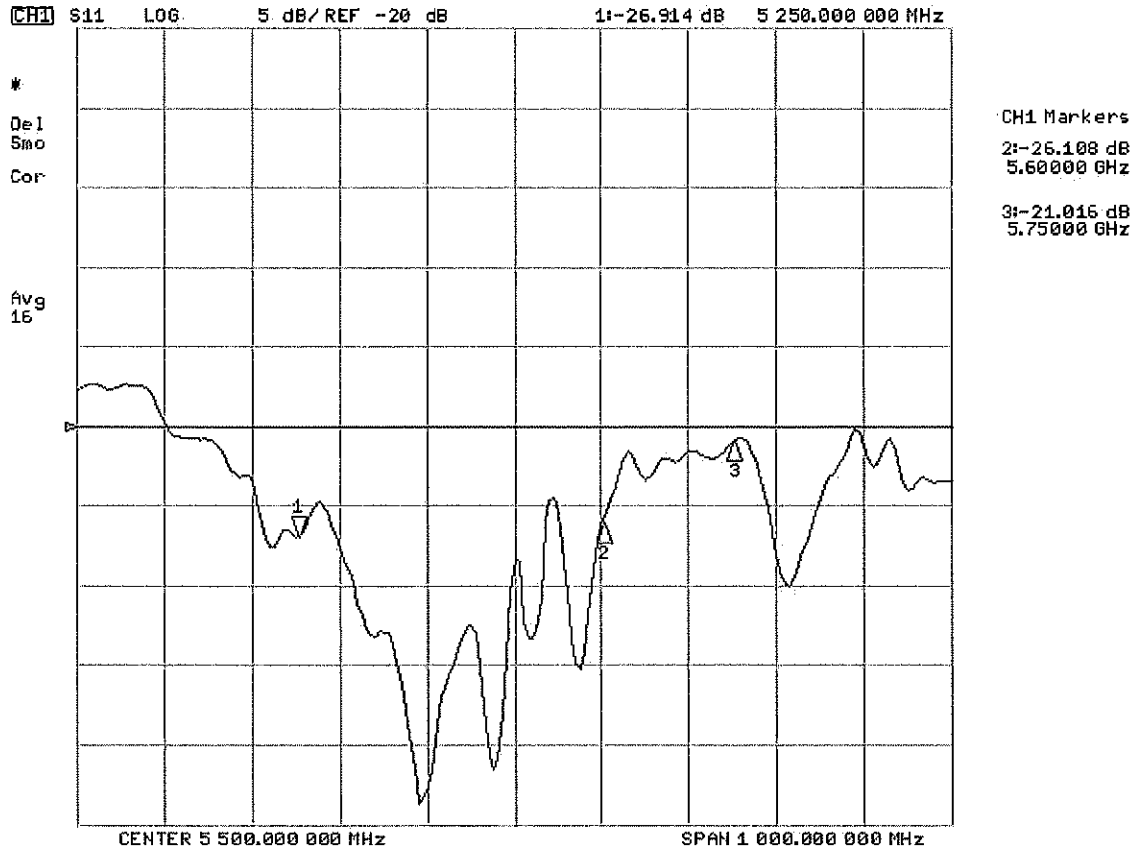
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Frequency (MHz)	Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 17.0 dBm	Measured Head SAR (1g) W/kg @ 17.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 17.0 dBm	Measured Head SAR (10g) W/kg @ 17.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5250	9/21/2016	9/19/2017	1.204	3.95	3.70	-6.21%	1.13	1.05	-7.08%	55.7	53.4	2.3	-4.3	-6.4	2.1	-23.4	-26.9	-15.00%	PASS
5600	9/21/2016	9/19/2017	1.204	4.18	4.03	-3.59%	1.19	1.13	-5.04%	58.3	55.6	2.7	-3.2	-1.2	2.0	-21.8	-26.1	-19.80%	PASS
5750	9/21/2016	9/19/2017	1.204	3.96	3.94	-0.38%	1.12	1.10	-1.79%	58.1	57.4	0.7	4.8	3.2	1.6	-21.2	-21.0	0.90%	PASS

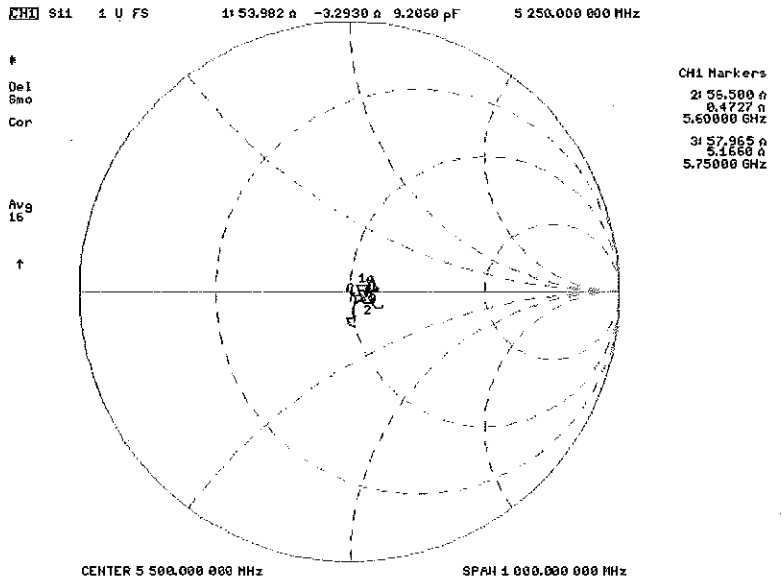
Frequency (MHz)	Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 17.0 dBm	Measured Body SAR (1g) W/kg @ 17.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 17.0 dBm	Measured Body SAR (10g) W/kg @ 17.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5250	9/21/2016	9/19/2017	1.204	3.85	3.80	-1.30%	1.08	1.06	-1.85%	56.1	54.0	2.1	-3.7	-3.3	0.4	-23.4	-26.0	-11.10%	PASS
5600	9/21/2016	9/19/2017	1.204	3.96	4.06	2.53%	1.11	1.13	1.80%	58.9	56.5	2.4	-1.7	0.5	2.2	-21.7	-24.5	-12.80%	PASS
5750	9/21/2016	9/19/2017	1.204	3.81	3.66	-3.81%	1.06	1.02	-3.77%	59.5	58.0	1.5	6.9	5.2	1.7	-19.4	-21.1	-8.70%	PASS

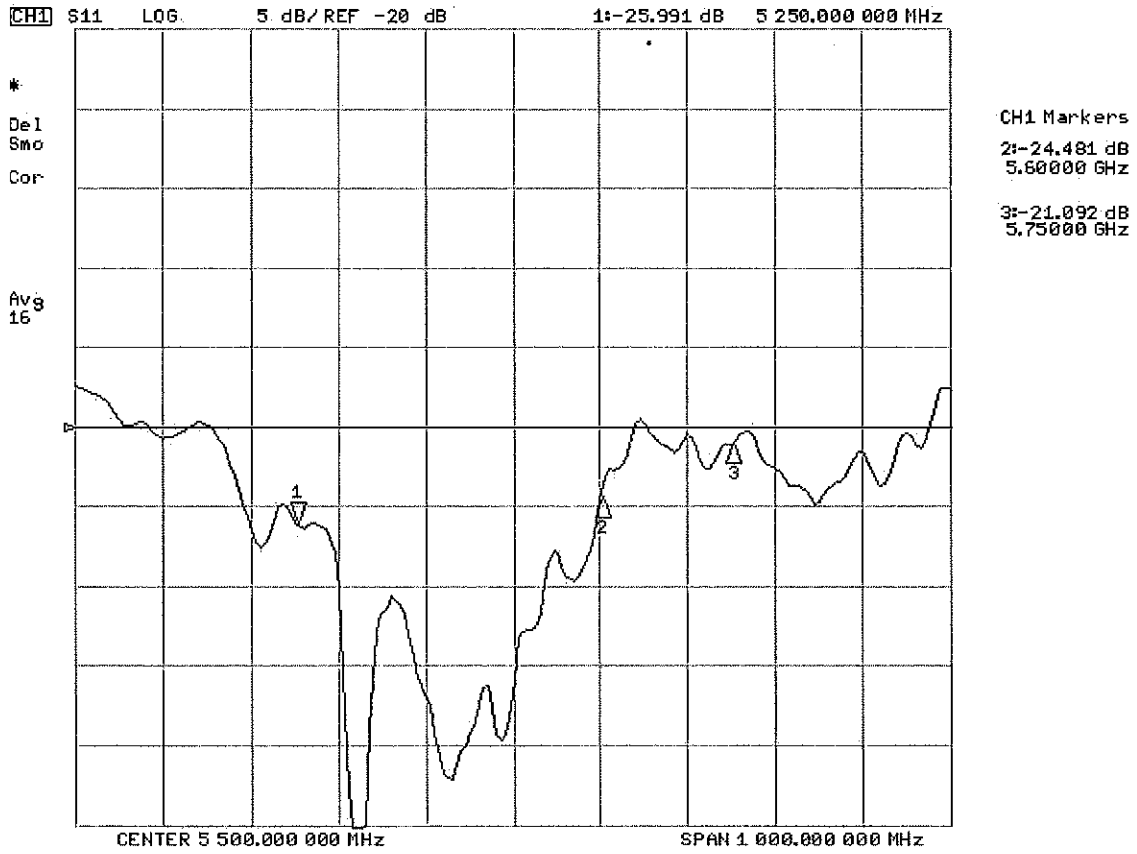
Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





Certification of Calibration

Object	D5GHzV2 – SN: 1191
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	9/11/2018
Description:	SAR Validation Dipole at 5250, 5600, and 5750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	3/31/2017	Biennial	3/31/2019	170232394
Control Company	4352	Ultra Long Stem Thermometer	5/2/2017	Biennial	5/2/2019	170330156
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Agilent	8753ES	S-Parameter Vector Network Analyzer	8/30/2018	Annual	8/30/2019	MY40003841
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	EX3DV4	SAR Probe	6/25/2018	Annual	6/25/2019	7409
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/18/2018	Annual	6/18/2019	1334
SPEAG	EX3DV4	SAR Probe	4/18/2018	Annual	4/18/2019	7357
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/11/2018	Annual	4/11/2019	1407
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1207364
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1339018
Anritsu	ML2495A	Power Meter	10/22/2017	Annual	10/22/2018	1328004
Agilent	N5182A	MXG Vector Signal Generator	4/18/2018	Annual	4/18/2019	MY47420800
Seekonk	NC-100	Torque Wrench	7/11/2018	Annual	7/11/2019	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path.

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	KOK

DIPOLE CALIBRATION EXTENSION

Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

Frequency (MHz)	Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 17.0 dBm	Measured Head SAR (1g) W/kg @ 17.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 17.0 dBm	Measured Head SAR (10g) W/kg @ 17.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5250	9/21/2016	9/11/2018	1.204	3.945	3.9	-1.14%	1.13	1.11	-1.77%	55.7	54.9	0.8	-4.3	-7.7	3.4	-23.4	-21.3	9.10%	PASS
5600	9/21/2016	9/11/2018	1.204	4.18	4.19	0.24%	1.19	1.18	-0.84%	58.3	54.6	3.7	-3.2	-6.2	3	-21.8	-22.7	-4.30%	PASS
5750	9/21/2016	9/11/2018	1.204	3.955	3.82	-3.41%	1.12	1.08	-3.57%	58.1	58.7	0.6	4.8	7.4	2.6	-21.2	-19.5	7.80%	PASS

Frequency (MHz)	Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 17.0 dBm	Measured Body SAR (1g) W/kg @ 17.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 17.0 dBm	Measured Body SAR (10g) W/kg @ 17.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5250	9/21/2016	9/11/2018	1.204	3.85	3.6	-6.49%	1.08	1.01	-6.48%	56.1	53.6	2.5	-3.7	-5.5	1.8	-23.4	-24	-2.40%	PASS
5600	9/21/2016	9/11/2018	1.204	3.96	4.01	1.26%	1.11	1.1	-0.90%	58.9	57	1.9	-1.7	0.1	1.8	-21.7	-23.8	-9.70%	PASS
5750	9/21/2016	9/11/2018	1.204	3.805	3.88	1.97%	1.06	1.06	0.00%	59.5	60.3	0.8	6.9	6.1	0.8	-19.4	-19.2	1.00%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL