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SAR EVALUATION REPORT

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

Date of Testing:
03/07/18 - 03/31/18
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M1803050034-03-R1.ZNF

FCC ID: ZNFL713DL

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: LML713DL
Additional Model(s): L713DL

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	0.20	0.45	0.57	N/A
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	< 0.1	0.41	0.80	N/A
PCE	UMTS 850	826.40 - 846.60 MHz	0.20	0.55	0.70	N/A
PCE	UMTS 1750	1712.4 - 1752.6 MHz	< 0.1	0.40	0.65	2.78
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.16	0.62	1.19	3.16
PCE	Cell. CDMA/EVDO	824.70 - 848.31 MHz	0.21	0.57	0.74	N/A
PCE	PCS CDMA/EVDO	1851.25 - 1908.75 MHz	0.16	0.64	1.26	3.11
PCE	LTE Band 71	665.5 - 695.5 MHz	< 0.1	0.45	0.45	N/A
PCE	LTE Band 12	699.7 - 715.3 MHz	0.18	0.66	0.78	N/A
PCE	LTE Band 13	779.5 - 784.5 MHz	0.19	0.64	0.85	N/A
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.20	0.55	0.62	N/A
PCE	LTE Band 66 (AWS)	1710.7 - 1779.3 MHz	0.10	0.42	0.70	2.89
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	N/A	N/A	N/A	N/A
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	0.12	0.59	1.14	3.09
DTS	2.4 GHz WLAN	2412 - 2462 MHz	1.09	0.47	0.73	N/A
DSS/DTS	Bluetooth	2402 - 2480 MHz	0.14	N/A	N/A	N/A
Simultaneous SAR per KDB 690783 D01v01r03:			1.30	1.13	1.44	3.39

Note: This revised Test Report (S/N: 1M1803050034-03-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.

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TABLE OF CONTENTS

1 DEVICE UNDER TEST 3

2 LTE INFORMATION 9

3 INTRODUCTION 10

4 DOSIMETRIC ASSESSMENT 11

5 DEFINITION OF REFERENCE POINTS 12

6 TEST CONFIGURATION POSITIONS 13

7 RF EXPOSURE LIMITS 17

8 FCC MEASUREMENT PROCEDURES 18

9 RF CONDUCTED POWERS 25

10 SYSTEM VERIFICATION 54

11 SAR DATA SUMMARY 56

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS 71

13 SAR MEASUREMENT VARIABILITY 76

14 EQUIPMENT LIST 78

15 MEASUREMENT UNCERTAINTIES 79

16 CONCLUSION 80

17 REFERENCES 81

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

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1750	Voice/Data	1712.4 - 1752.6 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
Cell. CDMA/EVDO	Voice/Data	824.70 - 848.31 MHz
PCS CDMA/EVDO	Voice/Data	1851.25 - 1908.75 MHz
LTE Band 71	Voice/Data	665.5 - 695.5 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 66 (AWS)	Voice/Data	1710.7 - 1779.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
2.4 GHz WLAN	Voice/Data	2412 - 2462 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.

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

1.3 Nominal and Maximum Output Power Specifications

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

1.3.1 Maximum Output Power

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)				Burst Average 8-PSK (dBm)			
		1 TX Slot	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*
GSM/GPRS/EDGE 850	Maximum	**33.7**	**33.7**	**32.2**	**30.7**	**29.2**	**27.7**	**27.7**	**27.2**	**27.2**
	Nominal	**33.2**	**33.2**	**31.7**	**30.2**	**28.7**	**27.2**	**27.2**	**26.7**	**26.7**
GSM/GPRS/EDGE 1900	Maximum	**30.7**	**30.7**	**29.2**	**27.2**	**25.7**	**26.2**	**26.2**	**25.7**	**25.7**
	Nominal	**30.2**	**30.2**	**28.7**	**26.7**	**25.2**	**25.7**	**25.7**	**25.2**	**25.2**

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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	**24.5**	**24.5**	**24.5**
	Nominal	**24.0**	**24.0**	**24.0**
UMTS Band 2 (1900 MHz)	Maximum	**24.5**	**24.5**	**24.5**
	Nominal	**24.0**	**24.0**	**24.0**

Mode / Band		Modulated Average (dBm)
Cell. CDMA/EVDO	Maximum	**25.2**
	Nominal	**24.7**
PCS CDMA/EVDO	Maximum	**24.5**
	Nominal	**24.0**

Mode / Band		Modulated Average (dBm)
LTE Band 71	Maximum	**25.0**
	Nominal	**24.5**
LTE Band 12	Maximum	**25.5**
	Nominal	**25.0**
LTE Band 13	Maximum	**25.5**
	Nominal	**25.0**
LTE Band 5 (Cell)	Maximum	**25.5**
	Nominal	**25.0**
LTE Band 66 (AWS)	Maximum	**24.5**
	Nominal	**24.0**
LTE Band 4 (AWS)	Maximum	**24.5**
	Nominal	**24.0**
LTE Band 2 (PCS)	Maximum	**24.5**
	Nominal	**24.0**

Mode / Band		Modulated Average (dBm)				
	Channel	1	2	3 - 9	10	11
IEEE 802.11b (2.4 GHz)	Maximum	**23.0**				
	Nominal	**22.0**				
IEEE 802.11g (2.4 GHz)	Maximum	**19.0**	**20.0**	**22.0**	**20.0**	**18.5**
	Nominal	**18.0**	**19.0**	**21.0**	**19.0**	**17.5**
IEEE 802.11n (2.4 GHz)	Maximum	**17.0**	**18.0**	**20.0**	**18.0**	**16.5**
	Nominal	**16.0**	**17.0**	**19.0**	**17.0**	**15.5**

Mode/Band		Modulated Average (dBm)
Bluetooth (DH5)	Maximum	**11.5**
	Nominal	**10.5**
Bluetooth (2-DH5)	Maximum	**11.0**
	Nominal	**10.0**
Bluetooth (3-DH5)	Maximum	**11.0**
	Nominal	**10.0**
Bluetooth LE	Maximum	**2.0**
	Nominal	**1.0**

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1.3.2 Reduced Output Power

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*
UMTS Band 4 (1750 MHz)	Maximum	**23.5**	**23.5**	**23.5**
	Nominal	**23.0**	**23.0**	**23.0**
UMTS Band 2 (1900 MHz)	Maximum	**23.5**	**23.5**	**23.5**
	Nominal	**23.0**	**23.0**	**23.0**

Mode / Band		Modulated Average (dBm)
PCS CDMA/EVDO	Maximum	**23.5**
	Nominal	**23.0**

Mode / Band		Modulated Average (dBm)
LTE Band 66 (AWS)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 4 (AWS)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 2 (PCS)	Maximum	**23.5**
	Nominal	**23.0**

Mode / Band		Modulated Average (dBm)				
	Channel	1	2	3 - 9	10	11
IEEE 802.11b (2.4 GHz)	Maximum	**19.0**				
	Nominal	**18.0**				
IEEE 802.11g (2.4 GHz)	Maximum	**16.0**	**17.0**	**19.0**	**17.0**	**15.5**
	Nominal	**15.0**	**16.0**	**18.0**	**16.0**	**14.5**
IEEE 802.11n (2.4 GHz)	Maximum	**16.0**	**17.0**	**19.0**	**17.0**	**15.5**
	Nominal	**15.0**	**16.0**	**18.0**	**16.0**	**14.5**

1.4 DUT Antenna Locations

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

Table 1-1
Device Edges/Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	No	Yes
GPRS 1900	Yes	Yes	No	Yes	No	Yes
UMTS 850	Yes	Yes	No	Yes	No	Yes
UMTS 1750	Yes	Yes	No	Yes	No	Yes
UMTS 1900	Yes	Yes	No	Yes	No	Yes
Cell. EVDO	Yes	Yes	No	Yes	No	Yes
PCS EVDO	Yes	Yes	No	Yes	No	Yes
LTE Band 71	Yes	Yes	No	Yes	No	Yes
LTE Band 12	Yes	Yes	No	Yes	No	Yes
LTE Band 13	Yes	Yes	No	Yes	No	Yes
LTE Band 5 (Cell)	Yes	Yes	No	Yes	No	Yes
LTE Band 66 (AWS)	Yes	Yes	No	Yes	No	Yes
LTE Band 2 (PCS)	Yes	Yes	No	Yes	No	Yes
2.4 GHz WLAN	Yes	Yes	Yes	No	No	Yes

Note: Particular DUT edges were not required to be evaluated for wireless router SAR or phablet SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01 Section III and FCC KDB Publication 648474 D04v01r03. The distances between the transmit antennas and the edges of the device are included in the filing.

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1.5 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v06, transmitters are considered to be transmitting 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 + 2.4 GHz Bluetooth	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
3	GSM voice + 2.4 GHz WI-FI	Yes	Yes	N/A	Yes	
4	GSM voice + 2.4 GHz Bluetooth	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
5	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
6	UMTS + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
7	LTE + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
8	LTE + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
9	CDMA/EVDO data + 2.4 GHz WI-FI	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
10	CDMA/EVDO data + 2.4 GHz Bluetooth	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^Bluetooth Tethering is considered
11	GPRS/EDGE + 2.4 GHz WI-FI	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
12	GPRS/EDGE + 2.4 GHz Bluetooth	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 listed in the above table.
5. This device supports VOLTE and VOWIFI.

1.6 Miscellaneous SAR Test Considerations

(A) WIFI/BT

Per FCC KDB 447498 D01v06, the 1g SAR exclusion threshold for distances <50mm is defined by the following equation:

$$\frac{Max\ Power\ of\ Channel\ (mW)}{Test\ Separation\ Dist\ (mm)} * \sqrt{Frequency(GHz)} \leq 3.0$$

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, body-worn and hotspot Bluetooth SAR were not required; [(14/10)* √2.480] = 2.2< 3.0. Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

Per FCC KDB 447498 D01v06, the 10g SAR exclusion threshold for distances <50mm is defined by the following equation:

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$$\frac{Max\ Power\ of\ Channel\ (mW)}{Test\ Separation\ Dist\ (mm)} * \sqrt{Frequency(GHz)} \leq 7.5$$

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, phablet Bluetooth SAR was not required; [(14/ 5)* √2.480] = 4.4< 7.5. Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

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. Phablet SAR was not evaluated for 2.4 GHz 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 Carrier Aggregation (CA) in the downlink only. All uplink communications are identical to Release 8 specifications. Per FCC KDB Publication 941225 D05A v01r02, SAR for LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive.

Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is greater than 160mm and less than 200mm.

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

This device supports 64QAM on the uplink and on the downlink for LTE Operations. Conducted powers for 64QAM uplink configurations were measured per Section 5.1 of FCC KDB Publication 941225 D05v02r05. SAR was not required for 64QAM since the highest maximum output power for 64 QAM is $\leq \frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is $\leq$ 1.45 W/kg, per Section 5.2.4 of FCC KDB Publication 941225 D05v02r05.

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1.7 Guidance Applied

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

1.8 Device Serial Numbers

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

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2 LTE INFORMATION

LTE Information			
FCC ID	**ZNFL713DL**		
Form Factor	Portable Handset		
Frequency Range of each LTE transmission band	LTE Band 71 (665.5 - 695.5 MHz)		
	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 66 (AWS) (1710.7 - 1779.3 MHz)		
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)		
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)		
Channel Bandwidths	LTE Band 71: 5 MHz, 10 MHz, 15 MHz, 20 MHz		
	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 66 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz		
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz		
	LTE Band 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 71: 5 MHz	665.5 (133147)	680.5 (133297)	695.5 (133447)
LTE Band 71: 10 MHz	668 (133172)	680.5 (133297)	693 (133422)
LTE Band 71: 15 MHz	670.5 (133197)	680.5 (133297)	690.5 (133397)
LTE Band 71: 20 MHz	673 (133222)	680.5 (133297)	688 (133372)
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 66 (AWS): 1.4 MHz	1710.7 (131979)	1745 (132322)	1779.3 (132665)
LTE Band 66 (AWS): 3 MHz	1711.5 (131987)	1745 (132322)	1778.5 (132657)
LTE Band 66 (AWS): 5 MHz	1712.5 (131997)	1745 (132322)	1777.5 (132647)
LTE Band 66 (AWS): 10 MHz	1715 (132022)	1745 (132322)	1775 (132622)
LTE Band 66 (AWS): 15 MHz	1717.5 (132047)	1745 (132322)	1772.5 (132597)
LTE Band 66 (AWS): 20 MHz	1720 (132072)	1745 (132322)	1770 (132572)
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)	1732.5 (20175)	1754.3 (20393)
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)	1732.5 (20175)	1753.5 (20385)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)	1732.5 (20175)	1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)	1732.5 (20175)	1750 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)	1732.5 (20175)	1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720 (20050)	1732.5 (20175)	1745 (20300)
LTE Band 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)
DL UE Category	6		
UL UE Category	5		
Modulations Supported in UL	QPSK, 16QAM, 64QAM		
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES		
A-MPR (Additional MPR) disabled for SAR Testing?	YES		
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations		
LTE Additional Information	This device does not support full CA features on 3GPP Release 10. It supports a maximum of 2 carriers in the downlink. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. The following LTE Release 10 Features are not supported: Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, MDH, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.		

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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]

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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:

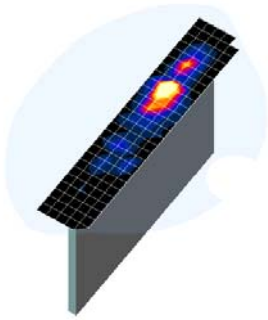

Figure 4-1
Sample SAR Area Scan

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

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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].

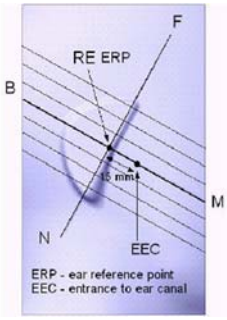

Figure 5-1
Close-Up Side view of ERP

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

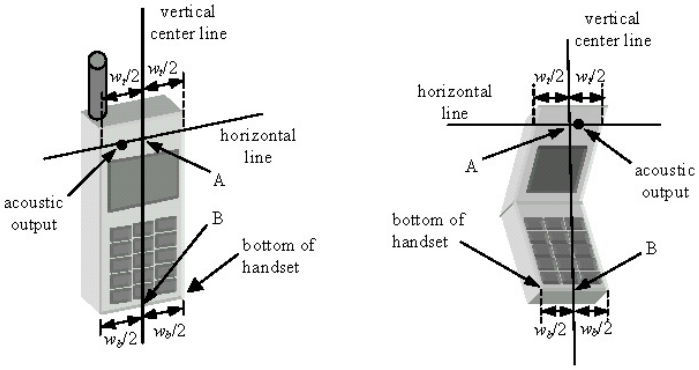

Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

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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).

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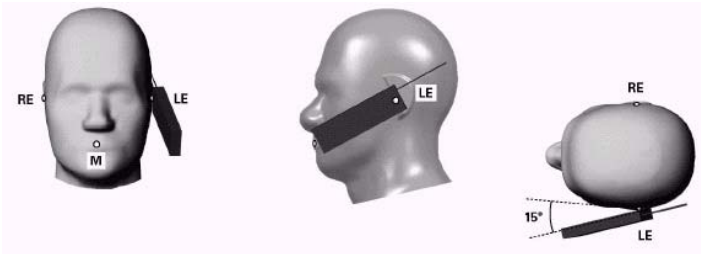

Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

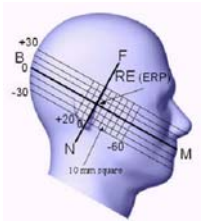

Figure 6-3
Side view w/ relevant markings

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.

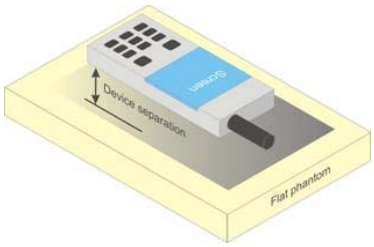

Figure 6-4
Sample Body-Worn Diagram

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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.

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6.8 Phablet Configurations

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

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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.

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8 FCC MEASUREMENT PROCEDURES

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

8.1 Measured and Reported SAR

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

8.2 3G SAR Test Reduction Procedure

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

8.3 Procedures Used to Establish RF Signal for SAR

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

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

8.4 SAR Measurement Conditions for UMTS

8.4.1 Output Power Verification

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

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8.4.2 Head SAR Measurements

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

8.4.3 Body SAR Measurements

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

8.4.4 SAR Measurements with Rel 5 HSDPA

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

8.4.5 SAR Measurements with Rel 6 HSUPA

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

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

8.5 SAR Measurement Conditions for CDMA2000

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

8.5.1 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.

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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
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
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.

8.5.2 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 8.5.5 for EVDO Rev. A configuration parameters.

8.5.3 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.

8.5.4 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.

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8.5.5 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.

8.6 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.

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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.

8.6.5 Downlink Only Carrier Aggregation

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

8.7 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 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

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mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8.7.3 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. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8.7.4 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, 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 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.

8.7.5 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 8.7.4). When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

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8.7.6 Subsequent Test Configuration Procedures

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

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9 RF CONDUCTED POWERS

9.1 GSM Conducted Powers

Table 9-1
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**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 850	128	33.67	33.68	32.05	**30.65**	29.19	27.69	27.59	27.08	27.17
	190	33.57	33.58	32.02	**30.52**	29.07	27.59	27.64	27.19	27.01
	251	33.57	33.63	32.07	**30.52**	29.18	27.57	27.58	27.18	27.01
GSM 1900	512	30.62	30.56	29.12	**27.20**	25.60	26.04	26.08	25.54	25.53
	661	30.54	30.58	29.16	**27.07**	25.58	26.06	26.08	25.55	25.65
	810	30.58	30.67	29.04	**27.06**	25.50	26.08	26.08	25.68	25.65

Calculated Maximum Frame-Averaged Output Power										
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 850	128	24.64	24.65	26.03	**26.39**	26.18	18.66	21.57	22.82	24.16
	190	24.54	24.55	26.00	**26.26**	26.06	18.56	21.62	22.93	24.00
	251	24.54	24.60	26.05	**26.26**	26.17	18.54	21.56	22.92	24.00
GSM 1900	512	21.59	21.53	23.10	**22.94**	22.59	17.01	20.06	21.28	22.52
	661	21.51	21.55	23.14	**22.81**	22.57	17.03	20.06	21.29	22.64
	810	21.55	21.64	23.02	**22.80**	22.49	17.05	20.06	21.42	22.64

GSM 850	**Frame Avg.Targets:**	24.17	24.17	25.68	**25.94**	25.69	18.17	21.18	22.44	23.69
GSM 1900		21.17	21.17	22.68	**22.44**	22.19	16.67	19.68	20.94	22.19

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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: 12 (Max 4 Tx uplink slots)
EDGE Multislot class: 12 (Max 4 Tx uplink slots)
DTM Multislot Class: N/A

Figure 9-1
Power Measurement Setup

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9.2 UMTS Conducted Powers

Table 9-2
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	25.03	25.12	25.06	24.44	24.47	24.43	24.48	24.49	24.42	-
99		12.2 kbps AMR	25.14	25.10	25.18	24.43	24.50	24.37	24.39	24.50	24.30	-
6	HSDPA	Subtest 1	25.09	25.15	25.16	24.39	24.32	24.38	24.45	24.46	24.33	0
6		Subtest 2	25.02	25.01	25.08	24.38	24.34	24.37	24.38	24.40	24.45	0
6		Subtest 3	24.62	24.61	24.54	23.82	23.97	23.86	23.99	24.00	23.85	0.5
6		Subtest 4	24.55	24.65	24.54	23.84	23.80	23.96	23.88	23.91	23.95	0.5
6	HSUPA	Subtest 1	25.13	25.12	25.16	24.43	24.30	24.30	24.48	24.44	24.41	0
6		Subtest 2	23.04	23.01	23.04	22.46	22.44	22.48	22.46	22.48	22.42	2
6		Subtest 3	24.13	24.00	24.20	23.33	23.49	23.46	23.36	23.47	23.50	1
6		Subtest 4	23.07	23.20	23.19	22.36	22.35	22.33	22.30	22.37	22.32	2
6		Subtest 5	25.10	25.14	25.19	24.40	24.40	24.38	24.50	24.43	24.45	0

Table 9-3
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	23.50	23.49	23.37	23.45	23.44	23.34	-
99		12.2 kbps AMR	23.47	23.46	23.30	23.43	23.46	23.40	-
6	HSDPA	Subtest 1	23.38	23.31	23.43	23.43	23.42	23.46	0
6		Subtest 2	23.34	23.33	23.31	23.41	23.49	23.36	0
6		Subtest 3	22.86	22.83	22.94	22.95	22.82	22.99	0.5
6		Subtest 4	22.81	22.92	22.83	22.99	22.86	22.94	0.5
6	HSUPA	Subtest 1	23.38	23.46	23.50	23.36	23.44	23.50	0
6		Subtest 2	21.46	21.34	21.42	21.47	21.31	21.46	2
6		Subtest 3	22.39	22.46	22.34	22.30	22.35	22.43	1
6		Subtest 4	21.40	21.37	21.34	21.30	21.35	21.44	2
6		Subtest 5	23.48	23.40	23.47	23.50	23.35	23.44	0

This device does not support DC-HSDPA.

Figure 9-2
Power Measurement Setup

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9.3 CDMA Conducted Powers

Table 9-4
Maximum Conducted Power

Band	Channel	Rule Part	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	22H	824.7	25.03	25.07	25.02	25.08	25.02	25.09
	384	22H	836.52	25.02	25.02	25.18	25.12	25.04	25.16
	777	22H	848.31	25.19	25.08	25.07	25.15	25.15	25.07
PCS	25	24E	1851.25	24.31	24.40	24.39	24.36	24.46	24.40
	600	24E	1880	24.38	24.39	24.35	24.38	24.47	24.40
	1175	24E	1908.75	24.38	24.30	24.42	24.43	24.45	24.48

Table 9-5
Reduced Conducted Power

Band	Channel	Rule Part	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	24E	1851.25	23.33	23.40	23.46	23.42	23.30	23.25
	600	24E	1880	23.41	23.22	23.48	23.40	23.21	23.26
	1175	24E	1908.75	23.44	23.40	23.45	23.39	23.25	23.24

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

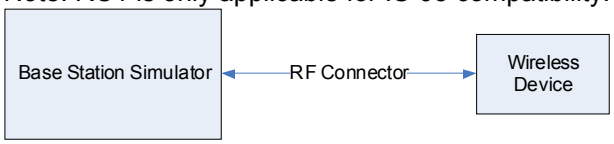

Figure 9-3
Power Measurement Setup

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9.4 LTE Conducted Powers

9.4.1 LTE Band 71

Table 9-6
LTE Band 71 Conducted Powers - 20 MHz Bandwidth

LTE Band 71 20 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 133297 (680.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**24.98**	0	0
	1	50	24.87		0
	1	99	24.97		0
	50	0	**23.96**	0-1	1
	50	25	23.90		1
	50	50	23.88		1
	100	0	23.88		1
16QAM	1	0	23.84	0-1	1
	1	50	23.82		1
	1	99	23.81		1
	50	0	22.81	0-2	2
	50	25	23.00		2
	50	50	22.89		2
	100	0	22.80		2
64QAM	1	0	22.73	0-2	2
	1	50	22.75		2
	1	99	22.75		2
	50	0	21.71	0-3	3
	50	25	21.97		3
	50	50	21.85		3
	100	0	21.68		3

Note: LTE Band 71 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.

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Table 9-7
LTE Band 71 Conducted Powers - 15 MHz Bandwidth

LTE Band 71 15 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 133297 (680.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	24.90	0	0
	1	36	24.90		0
	1	74	25.00		0
	36	0	23.97	0-1	1
	36	18	23.83		1
	36	37	23.87		1
	75	0	23.92		1
16QAM	1	0	23.89	0-1	1
	1	36	23.87		1
	1	74	23.82		1
	36	0	22.83	0-2	2
	36	18	22.98		2
	36	37	22.90		2
	75	0	22.89		2
64QAM	1	0	22.77	0-2	2
	1	36	22.82		2
	1	74	22.80		2
	36	0	21.81	0-3	3
	36	18	21.96		3
	36	37	21.83		3
	75	0	21.78		3

Note: LTE Band 71 at 15 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

Table 9-8
LTE Band 71 Conducted Powers - 10 MHz Bandwidth

LTE Band 71 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 133172 (668.0 MHz)	Mid Channel 133297 (680.5 MHz)	High Channel 133422 (693.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.96	24.97	24.90	0	0
	1	25	24.84	24.88	24.82		0
	1	49	24.94	24.97	24.86		0
	25	0	23.88	24.00	23.86	0-1	1
	25	12	23.92	23.88	23.92		1
	25	25	23.90	23.91	23.98		1
	50	0	24.00	23.89	23.88		1
16QAM	1	0	23.86	23.88	23.82	0-1	1
	1	25	23.80	23.96	23.96		1
	1	49	23.87	24.00	23.99		1
	25	0	22.95	22.80	22.95	0-2	2
	25	12	22.96	22.98	22.86		2
	25	25	22.86	22.86	22.96		2
	50	0	22.81	22.99	23.00		2
64QAM	1	0	22.75	22.77	22.84	0-2	2
	1	25	22.77	22.75	22.74		2
	1	49	22.80	22.82	22.79		2
	25	0	21.86	21.89	21.95	0-3	3
	25	12	21.87	21.87	21.89		3
	25	25	21.76	21.74	21.81		3
	50	0	21.79	21.72	21.70		3

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Table 9-9
LTE Band 71 Conducted Powers - 5 MHz Bandwidth

LTE Band 71 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 133147 (665.5 MHz)	Mid Channel 133297 (680.5 MHz)	High Channel 133447 (695.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.80	24.91	24.85	0	0
	1	12	25.00	24.81	24.85		0
	1	24	24.84	24.91	24.93		0
	12	0	23.95	23.94	23.99	0-1	1
	12	6	23.92	23.95	23.82		1
	12	13	23.81	23.85	23.88		1
	25	0	23.88	23.94	23.85		1
16QAM	1	0	23.96	23.82	23.95	0-1	1
	1	12	23.98	23.81	23.95		1
	1	24	23.90	23.95	23.99		1
	12	0	22.82	22.96	22.92	0-2	2
	12	6	23.00	22.94	22.89		2
	12	13	23.00	22.86	22.99		2
	25	0	22.89	22.94	22.92		2
64QAM	1	0	22.90	22.90	22.87	0-2	2
	1	12	22.94	22.92	22.91		2
	1	24	22.83	22.89	22.78		2
	12	0	21.80	21.75	21.82	0-3	3
	12	6	21.89	21.99	21.91		3
	12	13	21.89	21.90	21.94		3
	25	0	21.88	21.83	21.78		3

9.4.2 LTE Band 12

Table 9-10
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	25.37	0	0
	1	25	25.30		0
	1	49	**25.44**		0
	25	0	24.43	0-1	1
	25	12	24.44		1
	25	25	**24.47**		1
	50	0	24.46		1
16QAM	1	0	24.41	0-1	1
	1	25	24.31		1
	1	49	24.32		1
	25	0	23.36	0-2	2
	25	12	23.49		2
	25	25	23.45		2
	50	0	23.40		2
64QAM	1	0	23.41	0-2	2
	1	25	23.30		2
	1	49	23.23		2
	25	0	22.25	0-3	3
	25	12	22.40		3
	25	25	22.44		3
	50	0	22.31		3

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

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Table 9-11
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	25.48	25.45	25.50	0	0
	1	12	25.40	25.32	25.44		0
	1	24	25.40	25.49	25.43		0
	12	0	24.33	24.36	24.34	0-1	1
	12	6	24.37	24.50	24.45		1
	12	13	24.34	24.43	24.35		1
	25	0	24.42	24.35	24.34		1
16QAM	1	0	24.32	24.47	24.37	0-1	1
	1	12	24.47	24.48	24.40		1
	1	24	24.33	24.34	24.32		1
	12	0	23.48	23.39	23.42	0-2	2
	12	6	23.34	23.30	23.47		2
	12	13	23.33	23.45	23.33		2
	25	0	23.45	23.49	23.41		2
64QAM	1	0	23.21	23.36	23.29	0-2	2
	1	12	23.37	23.45	23.31		2
	1	24	23.25	23.22	23.31		2
	12	0	22.44	22.27	22.30	0-3	3
	12	6	22.26	22.20	22.43		3
	12	13	22.32	22.43	22.28		3
	25	0	22.40	22.47	22.37		3

Table 9-12
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	25.42	25.44	25.30	0	0
	1	7	25.50	25.34	25.49		0
	1	14	25.42	25.38	25.47		0
	8	0	24.43	24.46	24.48	0-1	1
	8	4	24.33	24.45	24.35		1
	8	7	24.31	24.40	24.48		1
	15	0	24.32	24.34	24.31		1
16QAM	1	0	24.37	24.38	24.39	0-1	1
	1	7	24.34	24.44	24.47		1
	1	14	24.47	24.42	24.46		1
	8	0	23.49	23.33	23.43	0-2	2
	8	4	23.37	23.42	23.34		2
	8	7	23.45	23.50	23.34		2
	15	0	23.42	23.41	23.34		2
64QAM	1	0	23.29	23.32	23.33	0-2	2
	1	7	23.26	23.43	23.40		2
	1	14	23.45	23.40	23.37		2
	8	0	22.44	22.32	22.35	0-3	3
	8	4	22.28	22.38	22.32		3
	8	7	22.33	22.40	22.23		3
	15	0	22.37	22.37	22.29		3

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Table 9-13
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	25.30	25.40	25.45	0	0
	1	2	25.44	25.41	25.33		0
	1	5	25.38	25.45	25.30		0
	3	0	25.49	25.35	25.32		0
	3	2	25.32	25.45	25.49		0
	3	3	25.30	25.30	25.39		0
	6	0	24.37	24.48	24.33	0-1	1
16QAM	1	0	24.42	24.37	24.45	0-1	1
	1	2	24.48	24.47	24.43		1
	1	5	24.42	24.37	24.49		1
	3	0	24.40	24.45	24.41		1
	3	2	24.30	24.43	24.33		1
	3	3	24.50	24.42	24.42		1
	6	0	23.40	23.46	23.34	0-2	2
64QAM	1	0	23.33	23.28	23.34	0-2	2
	1	2	23.42	23.44	23.33		2
	1	5	23.40	23.32	23.41		2
	3	0	23.28	23.33	23.39		2
	3	2	23.26	23.41	23.32		2
	3	3	23.47	23.38	23.40		2
	6	0	22.30	22.43	22.29	0-3	3

9.4.3 LTE Band 13

Table 9-14
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	25.30	0	0
	1	25	**25.37**		0
	1	49	25.33		0
	25	0	**24.48**	0-1	1
	25	12	24.35		1
	25	25	24.44		1
	50	0	24.44		1
16QAM	1	0	24.45	0-1	1
	1	25	24.30		1
	1	49	24.39		1
	25	0	23.36	0-2	2
	25	12	23.38		2
	25	25	23.34		2
	50	0	23.46		2
64QAM	1	0	23.30	0-2	2
	1	25	23.35		2
	1	49	23.20		2
	25	0	22.16	0-3	3
	25	12	22.31		3
	25	25	22.15		3
	50	0	22.20		3

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Table 9-15
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	25.31	0	0
	1	12	25.32		0
	1	24	25.39		0
	12	0	24.46	0-1	1
	12	6	24.42		1
	12	13	24.43		1
	25	0	24.42		1
16QAM	1	0	24.30	0-1	1
	1	12	24.36		1
	1	24	24.39		1
	12	0	23.40	0-2	2
	12	6	23.48		2
	12	13	23.45		2
	25	0	23.35		2
64QAM	1	0	23.36	0-2	2
	1	12	23.31		2
	1	24	23.21		2
	12	0	22.22	0-3	3
	12	6	22.21		3
	12	13	22.35		3
	25	0	22.15		3

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

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9.4.4 LTE Band 5 (Cell)

Table 9-16
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	25.42	0	0
	1	25	**25.50**		0
	1	49	25.42		0
	25	0	**24.43**	0-1	1
	25	12	24.33		1
	25	25	24.31		1
	50	0	24.32		1
16QAM	1	0	24.37	0-1	1
	1	25	24.34		1
	1	49	24.47		1
	25	0	23.49	0-2	2
	25	12	23.37		2
	25	25	23.45		2
	50	0	23.42		2
64QAM	1	0	23.26	0-2	2
	1	25	23.32		2
	1	49	23.45		2
	25	0	22.42	0-3	3
	25	12	22.32		3
	25	25	22.38		3
	50	0	22.36		3

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 9-17
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	25.33	25.50	25.42	0	0
	1	12	25.39	25.34	25.38		0
	1	24	25.37	25.36	25.46		0
	12	0	24.34	24.45	24.35	0-1	1
	12	6	24.47	24.48	24.30		1
	12	13	24.49	24.48	24.37		1
	25	0	24.35	24.32	24.38		1
16QAM	1	0	24.31	24.37	24.39	0-1	1
	1	12	24.39	24.39	24.46		1
	1	24	24.32	24.31	24.42		1
	12	0	23.45	23.47	23.50	0-2	2
	12	6	23.40	23.30	23.37		2
	12	13	23.33	23.30	23.50		2
	25	0	23.42	23.48	23.36		2
64QAM	1	0	23.22	23.32	23.36	0-2	2
	1	12	23.34	23.38	23.35		2
	1	24	23.29	23.25	23.41		2
	12	0	22.39	22.44	22.41	0-3	3
	12	6	22.37	22.20	22.28		3
	12	13	22.31	22.19	22.43		3
	25	0	22.40	22.45	22.33		3

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Table 9-18
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	25.41	25.43	25.31	0	0
	1	7	25.36	25.40	25.45		0
	1	14	25.39	25.42	25.44		0
	8	0	24.32	24.30	24.48	0-1	1
	8	4	24.41	24.49	24.39		1
	8	7	24.30	24.45	24.46		1
	15	0	24.36	24.45	24.43		1
16QAM	1	0	24.47	24.47	24.50	0-1	1
	1	7	24.34	24.30	24.48		1
	1	14	24.38	24.31	24.45		1
	8	0	23.41	23.46	23.34	0-2	2
	8	4	23.49	23.47	23.34		2
	8	7	23.42	23.39	23.43		2
	15	0	23.35	23.38	23.43		2
64QAM	1	0	23.35	23.47	23.39	0-2	2
	1	7	23.33	23.18	23.38		2
	1	14	23.31	23.26	23.33		2
	8	0	22.32	22.39	22.29	0-3	3
	8	4	22.41	22.46	22.24		3
	8	7	22.37	22.37	22.34		3
	15	0	22.23	22.30	22.32		3

Table 9-19
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	25.39	25.39	25.38	0	0
	1	2	25.44	25.34	25.39		0
	1	5	25.41	25.33	25.50		0
	3	0	25.40	25.47	25.37		0
	3	2	25.47	25.35	25.39		0
	3	3	25.31	25.37	25.45		0
	6	0	24.35	24.46	24.33	0-1	1
16QAM	1	0	24.34	24.30	24.48	0-1	1
	1	2	24.48	24.40	24.33		1
	1	5	24.38	24.49	24.46		1
	3	0	24.36	24.39	24.43		1
	3	2	24.42	24.42	24.45		1
	3	3	24.37	24.44	24.31		1
	6	0	23.40	23.50	23.40	0-2	2
64QAM	1	0	23.30	23.19	23.43	0-2	2
	1	2	23.39	23.39	23.25		2
	1	5	23.37	23.38	23.37		2
	3	0	23.32	23.37	23.36		2
	3	2	23.40	23.32	23.45		2
	3	3	23.34	23.38	23.28		2
	6	0	22.33	22.49	22.35	0-3	3

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9.4.5 Maximum LTE Band 66 (AWS)

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

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132072 (1720.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132572 (1770.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.48	24.33	**24.49**	0	0
	1	50	24.39	24.37	24.46		0
	1	99	24.47	24.43	24.31		0
	50	0	23.45	23.31	**23.50**	0-1	1
	50	25	23.46	23.38	23.33		1
	50	50	23.38	23.36	23.46		1
	100	0	23.34	23.30	23.37		1
16QAM	1	0	23.43	23.41	23.30	0-1	1
	1	50	23.31	23.50	23.36		1
	1	99	23.43	23.36	23.42		1
	50	0	22.36	22.36	22.39	0-2	2
	50	25	22.37	22.41	22.36		2
	50	50	22.43	22.39	22.38		2
	100	0	22.34	22.39	22.41		2
64QAM	1	0	22.31	22.32	22.25	0-2	2
	1	50	22.28	22.48	22.27		2
	1	99	22.37	22.27	22.30		2
	50	0	21.31	21.34	21.34	0-3	3
	50	25	21.36	21.36	21.24		3
	50	50	21.41	21.38	21.34		3
	100	0	21.26	21.36	21.39		3

Table 9-21
Maximum LTE Band 66 (AWS) Conducted Powers - 15 MHz Bandwidth

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132047 (1717.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132597 (1772.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.30	24.34	24.36	0	0
	1	36	24.46	24.35	24.41		0
	1	74	24.43	24.48	24.32		0
	36	0	23.41	23.44	23.39	0-1	1
	36	18	23.34	23.35	23.46		1
	36	37	23.50	23.33	23.48		1
	75	0	23.40	23.43	23.31		1
16QAM	1	0	23.31	23.34	23.33	0-1	1
	1	36	23.45	23.39	23.31		1
	1	74	23.38	23.41	23.34		1
	36	0	22.38	22.43	22.44	0-2	2
	36	18	22.46	22.33	22.36		2
	36	37	22.32	22.45	22.35		2
	75	0	22.36	22.43	22.33		2
64QAM	1	0	22.21	22.32	22.27	0-2	2
	1	36	22.35	22.35	22.26		2
	1	74	22.35	22.34	22.25		2
	36	0	21.32	21.38	21.32	0-3	3
	36	18	21.41	21.30	21.26		3
	36	37	21.24	21.34	21.34		3
	75	0	21.34	21.35	21.30		3

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Table 9-22
Maximum LTE Band 66 (AWS) Conducted Powers - 10 MHz Bandwidth

LTE Band 66 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132022 (1715.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132622 (1775.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.39	24.39	24.32	0	0
	1	25	24.50	24.40	24.50		0
	1	49	24.30	24.31	24.36		0
	25	0	23.35	23.35	23.31	0-1	1
	25	12	23.41	23.36	23.40		1
	25	25	23.47	23.33	23.39		1
	50	0	23.45	23.42	23.37		1
16QAM	1	0	23.37	23.39	23.35	0-1	1
	1	25	23.31	23.45	23.33		1
	1	49	23.39	23.48	23.38		1
	25	0	22.46	22.30	22.34	0-2	2
	25	12	22.48	22.35	22.41		2
	25	25	22.46	22.33	22.37		2
	50	0	22.41	22.34	22.37		2
64QAM	1	0	22.32	22.38	22.31	0-2	2
	1	25	22.31	22.40	22.27		2
	1	49	22.34	22.37	22.36		2
	25	0	21.34	21.25	21.26	0-3	3
	25	12	21.47	21.29	21.40		3
	25	25	21.45	21.32	21.32		3
	50	0	21.31	21.23	21.27		3

Table 9-23
Maximum LTE Band 66 (AWS) Conducted Powers - 5 MHz Bandwidth

LTE Band 66 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131997 (1712.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132647 (1777.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.41	24.36	24.45	0	0
	1	12	24.47	24.41	24.41		0
	1	24	24.32	24.32	24.30		0
	12	0	23.31	23.44	23.31	0-1	1
	12	6	23.44	23.30	23.47		1
	12	13	23.37	23.42	23.35		1
	25	0	23.30	23.34	23.41		1
16QAM	1	0	23.48	23.39	23.30	0-1	1
	1	12	23.34	23.47	23.47		1
	1	24	23.35	23.34	23.46		1
	12	0	22.36	22.37	22.48	0-2	2
	12	6	22.42	22.43	22.38		2
	12	13	22.48	22.42	22.41		2
	25	0	22.50	22.47	22.42		2
64QAM	1	0	22.44	22.32	22.19	0-2	2
	1	12	22.28	22.45	22.44		2
	1	24	22.23	22.23	22.44		2
	12	0	21.35	21.25	21.46	0-3	3
	12	6	21.42	21.36	21.35		3
	12	13	21.36	21.31	21.41		3
	25	0	21.47	21.35	21.40		3

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Table 9-24
Maximum LTE Band 66 (AWS) Conducted Powers - 3 MHz Bandwidth

LTE Band 66 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131987 (1711.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132657 (1778.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.32	24.48	24.46	0	0
	1	7	24.35	24.35	24.36		0
	1	14	24.46	24.32	24.31		0
	8	0	23.43	23.44	23.36	0-1	1
	8	4	23.45	23.37	23.48		1
	8	7	23.31	23.45	23.43		1
	15	0	23.42	23.46	23.40		1
16QAM	1	0	23.44	23.35	23.36	0-1	1
	1	7	23.48	23.46	23.42		1
	1	14	23.33	23.47	23.32		1
	8	0	22.36	22.44	22.36	0-2	2
	8	4	22.47	22.33	22.36		2
	8	7	22.41	22.46	22.47		2
	15	0	22.32	22.42	22.48		2
64QAM	1	0	22.42	22.23	22.29	0-2	2
	1	7	22.40	22.41	22.39		2
	1	14	22.31	22.38	22.23		2
	8	0	21.34	21.43	21.33	0-3	3
	8	4	21.45	21.25	21.24		3
	8	7	21.29	21.42	21.42		3
	15	0	21.21	21.40	21.43		3

Table 9-25
Maximum LTE Band 66 (AWS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 66 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131979 (1710.7 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132665 (1779.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.48	24.46	24.32	0	0
	1	2	24.49	24.37	24.39		0
	1	5	24.50	24.30	24.50		0
	3	0	24.32	24.31	24.38		0
	3	2	24.33	24.47	24.45		0
	3	3	24.49	24.43	24.30		0
	6	0	23.50	23.43	23.34	0-1	1
16QAM	1	0	23.40	23.48	23.46	0-1	1
	1	2	23.30	23.41	23.32		1
	1	5	23.47	23.32	23.49		1
	3	0	23.46	23.32	23.35		1
	3	2	23.47	23.30	23.30		1
	3	3	23.33	23.30	23.34		1
	6	0	22.32	22.34	22.30	0-2	2
64QAM	1	0	22.38	22.45	22.43	0-2	2
	1	2	22.25	22.31	22.22		2
	1	5	22.36	22.26	22.43		2
	3	0	22.40	22.32	22.31		2
	3	2	22.38	22.27	22.18		2
	3	3	22.23	22.29	22.23		2
	6	0	21.21	21.27	21.27	0-3	3

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9.4.1 Reduced LTE Band 66 (AWS)

Table 9-26
Reduced LTE Band 66 (AWS) Conducted Powers - 20 MHz Bandwidth

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132072 (1720.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132572 (1770.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.37	23.35	23.34	0	0
	1	50	23.38	23.36	23.37		0
	1	99	23.41	23.47	**23.48**		0
	50	0	23.40	23.42	23.37	0-1	0
	50	25	23.42	23.39	**23.50**		0
	50	50	23.32	23.31	23.31		0
	100	0	23.40	23.39	23.47		0
16QAM	1	0	23.49	23.40	23.32	0-1	0
	1	50	23.50	23.30	23.46		0
	1	99	23.39	23.35	23.30		0
	50	0	22.45	22.48	22.48	0-2	1
	50	25	22.35	22.35	22.46		1
	50	50	22.42	22.41	22.32		1
	100	0	22.48	22.39	22.37		1
64QAM	1	0	22.39	22.33	22.24	0-2	1
	1	50	22.49	22.30	22.42		1
	1	99	22.28	22.27	22.20		1
	50	0	21.37	21.47	21.43	0-3	2
	50	25	21.34	21.31	21.45		2
	50	50	21.30	21.29	21.27		2
	100	0	21.43	21.29	21.32		2

Table 9-27
Reduced LTE Band 66 (AWS) Conducted Powers - 15 MHz Bandwidth

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132047 (1717.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132597 (1772.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.46	23.33	23.47	0	0
	1	36	23.42	23.46	23.50		0
	1	74	23.40	23.48	23.33		0
	36	0	23.30	23.46	23.40	0-1	0
	36	18	23.43	23.34	23.31		0
	36	37	23.39	23.50	23.42		0
	75	0	23.30	23.48	23.48		0
16QAM	1	0	23.32	23.33	23.33	0-1	0
	1	36	23.32	23.31	23.39		0
	1	74	23.31	23.41	23.41		0
	36	0	22.33	22.50	22.34	0-2	1
	36	18	22.38	22.36	22.48		1
	36	37	22.33	22.48	22.41		1
	75	0	22.30	22.31	22.31		1
64QAM	1	0	22.23	22.23	22.31	0-2	1
	1	36	22.23	22.26	22.34		1
	1	74	22.20	22.33	22.40		1
	36	0	21.29	21.46	21.25	0-3	2
	36	18	21.33	21.30	21.40		2
	36	37	21.23	21.46	21.36		2
	75	0	21.27	21.26	21.31		2

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Table 9-28
Reduced LTE Band 66 (AWS) Conducted Powers - 10 MHz Bandwidth

LTE Band 66 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132022 (1715.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132622 (1775.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.49	23.46	23.36	0	0
	1	25	23.37	23.42	23.41		0
	1	49	23.46	23.50	23.39		0
	25	0	23.31	23.46	23.44	0-1	0
	25	12	23.32	23.35	23.34		0
	25	25	23.34	23.50	23.34		0
	50	0	23.37	23.49	23.38		0
16QAM	1	0	23.49	23.33	23.32	0-1	0
	1	25	23.39	23.44	23.42		0
	1	49	23.49	23.47	23.49		0
	25	0	22.31	22.48	22.32	0-2	1
	25	12	22.34	22.49	22.39		1
	25	25	22.39	22.30	22.37		1
	50	0	22.49	22.38	22.48		1
64QAM	1	0	22.43	22.29	22.21	0-2	1
	1	25	22.33	22.43	22.31		1
	1	49	22.49	22.36	22.37		1
	25	0	21.20	21.45	21.26	0-3	2
	25	12	21.33	21.39	21.28		2
	25	25	21.30	21.18	21.25		2
	50	0	21.45	21.31	21.40		2

Table 9-29
Reduced LTE Band 66 (AWS) Conducted Powers - 5 MHz Bandwidth

LTE Band 66 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131997 (1712.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132647 (1777.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.33	23.49	23.35	0	0
	1	12	23.43	23.30	23.36		0
	1	24	23.37	23.35	23.49		0
	12	0	23.45	23.45	23.30	0-1	0
	12	6	23.42	23.39	23.49		0
	12	13	23.50	23.48	23.46		0
	25	0	23.32	23.46	23.44		0
16QAM	1	0	23.40	23.43	23.35	0-1	0
	1	12	23.46	23.33	23.46		0
	1	24	23.50	23.36	23.34		0
	12	0	22.38	22.44	22.35	0-2	1
	12	6	22.34	22.37	22.44		1
	12	13	22.43	22.37	22.32		1
	25	0	22.41	22.45	22.49		1
64QAM	1	0	22.37	22.36	22.32	0-2	1
	1	12	22.44	22.21	22.41		1
	1	24	22.47	22.24	22.31		1
	12	0	21.27	21.35	21.25	0-3	2
	12	6	21.31	21.31	21.39		2
	12	13	21.31	21.32	21.23		2
	25	0	21.40	21.34	21.37		2

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Table 9-30
Reduced LTE Band 66 (AWS) Conducted Powers - 3 MHz Bandwidth

LTE Band 66 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131987 (1711.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132657 (1778.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.44	23.40	23.41	0	0
	1	7	23.42	23.44	23.38		0
	1	14	23.31	23.32	23.39		0
	8	0	23.41	23.32	23.45	0-1	0
	8	4	23.42	23.49	23.33		0
	8	7	23.42	23.34	23.48		0
	15	0	23.30	23.30	23.44		0
16QAM	1	0	23.50	23.47	23.33	0-1	0
	1	7	23.35	23.38	23.34		0
	1	14	23.39	23.30	23.40		0
	8	0	22.39	22.40	22.37	0-2	1
	8	4	22.49	22.47	22.35		1
	8	7	22.42	22.36	22.44		1
	15	0	22.30	22.50	22.44		1
64QAM	1	0	22.40	22.41	22.21	0-2	1
	1	7	22.29	22.33	22.24		1
	1	14	22.34	22.27	22.34		1
	8	0	21.37	21.34	21.36	0-3	2
	8	4	21.38	21.35	21.23		2
	8	7	21.39	21.35	21.44		2
	15	0	21.30	21.49	21.36		2

Table 9-31
Reduced LTE Band 66 (AWS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 66 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131979 (1710.7 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132665 (1779.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.47	23.33	23.44	0	0
	1	2	23.35	23.41	23.39		0
	1	5	23.48	23.43	23.48		0
	3	0	23.45	23.47	23.33		0
	3	2	23.44	23.31	23.50		0
	3	3	23.36	23.48	23.46		0
	6	0	23.46	23.48	23.41	0-1	0
16QAM	1	0	23.45	23.45	23.32	0-1	0
	1	2	23.44	23.34	23.42		0
	1	5	23.30	23.35	23.33		0
	3	0	23.49	23.44	23.50		0
	3	2	23.42	23.44	23.47		0
	3	3	23.30	23.46	23.48		0
	6	0	22.44	22.35	22.44	0-2	1
64QAM	1	0	22.37	22.43	22.28	0-2	1
	1	2	22.42	22.29	22.34		1
	1	5	22.21	22.29	22.31		1
	3	0	22.45	22.35	22.44		1
	3	2	22.32	22.35	22.38		1
	3	3	22.26	22.34	22.43		1
	6	0	21.41	21.34	21.33	0-3	2

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9.4.2 Maximum LTE Band 2 (PCS)

Table 9-32
Maximum LTE Band 2 (PCS) Conducted Powers - 20 MHz Bandwidth

LTE Band 2 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18700 (1860.0 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19100 (1900.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	**24.50**	24.32	24.49	0	0
	1	50	24.33	24.49	24.38		0
	1	99	24.32	24.30	24.45		0
	50	0	23.47	23.45	23.41	0-1	1
	50	25	**23.50**	23.32	23.40		1
	50	50	23.31	23.40	23.35		1
	100	0	23.41	23.32	23.37		1
16QAM	1	0	23.30	23.50	23.38	0-1	1
	1	50	23.46	23.49	23.40		1
	1	99	23.48	23.43	23.34		1
	50	0	22.41	22.36	22.33	0-2	2
	50	25	22.44	22.46	22.35		2
	50	50	22.42	22.41	22.46		2
	100	0	22.46	22.42	22.38		2
64QAM	1	0	22.18	22.45	22.27	0-2	2
	1	50	22.36	22.44	22.34		2
	1	99	22.36	22.31	22.31		2
	50	0	21.37	21.33	21.31	0-3	3
	50	25	21.42	21.45	21.33		3
	50	50	21.39	21.37	21.34		3
	100	0	21.36	21.41	21.29		3

Table 9-33
Maximum LTE Band 2 (PCS) Conducted Powers - 15 MHz Bandwidth

LTE Band 2 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18675 (1857.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19125 (1902.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.49	24.37	24.35	0	0
	1	36	24.36	24.37	24.43		0
	1	74	24.41	24.50	24.48		0
	36	0	23.45	23.30	23.40	0-1	1
	36	18	23.34	23.30	23.46		1
	36	37	23.40	23.35	23.47		1
	75	0	23.31	23.44	23.32		1
16QAM	1	0	23.33	23.39	23.33	0-1	1
	1	36	23.38	23.40	23.31		1
	1	74	23.47	23.31	23.33		1
	36	0	22.33	22.38	22.34	0-2	2
	36	18	22.31	22.45	22.31		2
	36	37	22.38	22.46	22.47		2
	75	0	22.45	22.49	22.47		2
64QAM	1	0	22.23	22.35	22.24	0-2	2
	1	36	22.28	22.35	22.24		2
	1	74	22.40	22.27	22.29		2
	36	0	21.26	21.37	21.25	0-3	3
	36	18	21.26	21.34	21.21		3
	36	37	21.32	21.34	21.40		3
	75	0	21.37	21.38	21.42		3

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Table 9-34
Maximum LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth

LTE Band 2 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18650 (1855.0 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19150 (1905.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.33	24.34	24.40	0	0
	1	25	24.43	24.39	24.38		0
	1	49	24.44	24.45	24.31		0
	25	0	23.37	23.40	23.34	0-1	1
	25	12	23.36	23.31	23.36		1
	25	25	23.48	23.49	23.43		1
	50	0	23.35	23.40	23.46		1
16QAM	1	0	23.35	23.42	23.48	0-1	1
	1	25	23.42	23.37	23.40		1
	1	49	23.31	23.33	23.44		1
	25	0	22.50	22.34	22.43	0-2	2
	25	12	22.39	22.35	22.37		2
	25	25	22.33	22.33	22.37		2
	50	0	22.40	22.48	22.41		2
64QAM	1	0	22.23	22.31	22.45	0-2	2
	1	25	22.38	22.33	22.33		2
	1	49	22.26	22.26	22.32		2
	25	0	21.38	21.30	21.41	0-3	3
	25	12	21.28	21.27	21.25		3
	25	25	21.31	21.25	21.27		3
	50	0	21.40	21.40	21.40		3

Table 9-35
Maximum LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth

LTE Band 2 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18625 (1852.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19175 (1907.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.31	24.39	24.43	0	0
	1	12	24.50	24.35	24.36		0
	1	24	24.38	24.39	24.47		0
	12	0	23.37	23.38	23.34	0-1	1
	12	6	23.48	23.30	23.34		1
	12	13	23.48	23.38	23.30		1
	25	0	23.32	23.33	23.40		1
16QAM	1	0	23.35	23.49	23.46	0-1	1
	1	12	23.50	23.41	23.39		1
	1	24	23.39	23.47	23.44		1
	12	0	22.46	22.48	22.37	0-2	2
	12	6	22.37	22.37	22.50		2
	12	13	22.35	22.40	22.41		2
	25	0	22.42	22.42	22.48		2
64QAM	1	0	22.35	22.40	22.44	0-2	2
	1	12	22.43	22.34	22.31		2
	1	24	22.37	22.43	22.41		2
	12	0	21.35	21.37	21.29	0-3	3
	12	6	21.27	21.25	21.39		3
	12	13	21.26	21.38	21.39		3
	25	0	21.42	21.37	21.47		3

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Table 9-36
Maximum LTE Band 2 (PCS) Conducted Powers - 3 MHz Bandwidth

LTE Band 2 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18615 (1851.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19185 (1908.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.41	24.32	24.44	0	0
	1	7	24.37	24.50	24.46		0
	1	14	24.47	24.44	24.33		0
	8	0	23.48	23.39	23.49	0-1	1
	8	4	23.44	23.34	23.43		1
	8	7	23.38	23.30	23.32		1
	15	0	23.45	23.31	23.49		1
16QAM	1	0	23.31	23.33	23.37	0-1	1
	1	7	23.42	23.43	23.30		1
	1	14	23.36	23.42	23.49		1
	8	0	22.39	22.42	22.41	0-2	2
	8	4	22.31	22.42	22.44		2
	8	7	22.32	22.44	22.38		2
	15	0	22.49	22.32	22.40		2
64QAM	1	0	22.27	22.26	22.34	0-2	2
	1	7	22.31	22.42	22.22		2
	1	14	22.25	22.37	22.46		2
	8	0	21.29	21.32	21.36	0-3	3
	8	4	21.26	21.32	21.38		3
	8	7	21.21	21.37	21.37		3
	15	0	21.45	21.24	21.34		3

Table 9-37
Maximum LTE Band 2 (PCS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 2 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18607 (1850.7 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19193 (1909.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.46	24.50	24.33	0	0
	1	2	24.41	24.30	24.45		0
	1	5	24.34	24.40	24.46		0
	3	0	24.31	24.33	24.38		0
	3	2	24.35	24.31	24.31		0
	3	3	24.47	24.44	24.48		0
	6	0	23.44	23.49	23.30	0-1	1
16QAM	1	0	23.46	23.30	23.46	0-1	1
	1	2	23.34	23.32	23.38		1
	1	5	23.40	23.34	23.32		1
	3	0	23.40	23.34	23.34		1
	3	2	23.39	23.40	23.36		1
	3	3	23.45	23.32	23.31		1
	6	0	22.50	22.48	22.42	0-2	2
64QAM	1	0	22.43	22.29	22.43	0-2	2
	1	2	22.22	22.26	22.37		2
	1	5	22.39	22.22	22.22		2
	3	0	22.36	22.31	22.28		2
	3	2	22.35	22.32	22.27		2
	3	3	22.36	22.23	22.30		2
	6	0	21.42	21.46	21.34	0-3	3

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9.4.1 Reduced LTE Band 2 (PCS)

Table 9-38
Reduced LTE Band 2 (PCS) Conducted Powers - 20 MHz Bandwidth

LTE Band 2 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18700 (1860.0 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19100 (1900.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.34	23.38	**23.48**	0	0
	1	50	23.47	23.43	23.38		0
	1	99	23.42	23.37	23.34		0
	50	0	23.39	23.48	**23.49**	0-1	0
	50	25	23.46	23.40	23.34		0
	50	50	23.33	23.44	23.31		0
	100	0	23.31	23.34	23.39		0
16QAM	1	0	23.36	23.40	23.47	0-1	0
	1	50	23.46	23.34	23.44		0
	1	99	23.40	23.31	23.38		0
	50	0	22.45	22.44	22.40	0-2	1
	50	25	22.41	22.44	22.49		1
	50	50	22.49	22.35	22.34		1
	100	0	22.44	22.49	22.46		1
64QAM	1	0	22.24	22.38	22.38	0-2	1
	1	50	22.46	22.27	22.32		1
	1	99	22.37	22.24	22.35		1
	50	0	21.33	21.36	21.28	0-3	2
	50	25	21.31	21.38	21.43		2
	50	50	21.37	21.31	21.29		2
	100	0	21.36	21.48	21.45		2

Table 9-39
Reduced LTE Band 2 (PCS) Conducted Powers - 15 MHz Bandwidth

LTE Band 2 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18675 (1857.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19125 (1902.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.40	23.34	23.32	0	0
	1	36	23.43	23.48	23.45		0
	1	74	23.38	23.32	23.41		0
	36	0	23.33	23.42	23.33	0-1	0
	36	18	23.43	23.32	23.30		0
	36	37	23.37	23.36	23.36		0
	75	0	23.35	23.43	23.41		0
16QAM	1	0	23.43	23.30	23.30	0-1	0
	1	36	23.47	23.37	23.38		0
	1	74	23.42	23.44	23.37		0
	36	0	22.48	22.38	22.37	0-2	1
	36	18	22.38	22.34	22.38		1
	36	37	22.38	22.44	22.30		1
	75	0	22.41	22.46	22.40		1
64QAM	1	0	22.32	22.23	22.25	0-2	1
	1	36	22.36	22.30	22.38		1
	1	74	22.30	22.34	22.32		1
	36	0	21.38	21.30	21.31	0-3	2
	36	18	21.32	21.23	21.28		2
	36	37	21.27	21.39	21.25		2
	75	0	21.38	21.44	21.40		2

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Table 9-40
Reduced LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth

LTE Band 2 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18650 (1855.0 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19150 (1905.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.47	23.37	23.33	0	0
	1	25	23.38	23.49	23.32		0
	1	49	23.50	23.47	23.49		0
	25	0	23.48	23.50	23.49	0-1	0
	25	12	23.49	23.46	23.40		0
	25	25	23.32	23.35	23.46		0
	50	0	23.48	23.41	23.40		0
16QAM	1	0	23.31	23.39	23.35	0-1	0
	1	25	23.30	23.39	23.44		0
	1	49	23.48	23.30	23.50		0
	25	0	22.46	22.36	22.33	0-2	1
	25	12	22.31	22.47	22.34		1
	25	25	22.35	22.38	22.39		1
	50	0	22.35	22.37	22.32		1
64QAM	1	0	22.25	22.38	22.27	0-2	1
	1	25	22.25	22.37	22.42		1
	1	49	22.42	22.21	22.42		1
	25	0	21.37	21.35	21.31	0-3	2
	25	12	21.27	21.45	21.27		2
	25	25	21.33	21.37	21.32		2
	50	0	21.29	21.32	21.22		2

Table 9-41
Reduced LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth

LTE Band 2 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18625 (1852.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19175 (1907.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.39	23.49	23.37	0	0
	1	12	23.38	23.33	23.37		0
	1	24	23.33	23.44	23.43		0
	12	0	23.47	23.38	23.33	0-1	0
	12	6	23.42	23.45	23.34		0
	12	13	23.48	23.43	23.43		0
	25	0	23.43	23.38	23.34		0
16QAM	1	0	23.48	23.45	23.41	0-1	0
	1	12	23.38	23.42	23.34		0
	1	24	23.33	23.42	23.49		0
	12	0	22.50	22.49	22.38	0-2	1
	12	6	22.49	22.46	22.35		1
	12	13	22.31	22.30	22.50		1
	25	0	22.39	22.46	22.43		1
64QAM	1	0	22.46	22.45	22.38	0-2	1
	1	12	22.26	22.39	22.27		1
	1	24	22.31	22.34	22.43		1
	12	0	21.45	21.43	21.26	0-3	2
	12	6	21.42	21.36	21.29		2
	12	13	21.21	21.22	21.47		2
	25	0	21.35	21.38	21.39		2

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Table 9-42
Reduced LTE Band 2 (PCS) Conducted Powers - 3 MHz Bandwidth

LTE Band 2 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18615 (1851.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19185 (1908.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.32	23.45	23.47	0	0
	1	7	23.44	23.37	23.43		0
	1	14	23.38	23.45	23.46		0
	8	0	23.31	23.47	23.31	0-1	0
	8	4	23.37	23.41	23.33		0
	8	7	23.43	23.40	23.47		0
	15	0	23.34	23.45	23.39		0
16QAM	1	0	23.42	23.42	23.38	0-1	0
	1	7	23.45	23.48	23.50		0
	1	14	23.46	23.32	23.50		0
	8	0	22.34	22.38	22.37	0-2	1
	8	4	22.33	22.48	22.35		1
	8	7	22.45	22.44	22.38		1
	15	0	22.47	22.42	22.41		1
64QAM	1	0	22.34	22.32	22.37	0-2	1
	1	7	22.44	22.36	22.42		1
	1	14	22.44	22.29	22.48		1
	8	0	21.33	21.36	21.25	0-3	2
	8	4	21.27	21.39	21.26		2
	8	7	21.33	21.36	21.37		2
	15	0	21.37	21.31	21.31		2

Table 9-43
Reduced LTE Band 2 (PCS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 2 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18607 (1850.7 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19193 (1909.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.30	23.41	23.30	0	0
	1	2	23.45	23.45	23.45		0
	1	5	23.42	23.30	23.41		0
	3	0	23.31	23.35	23.41		0
	3	2	23.42	23.41	23.30		0
	3	3	23.47	23.41	23.45		0
	6	0	23.38	23.36	23.45	0-1	0
16QAM	1	0	23.35	23.45	23.39	0-1	0
	1	2	23.49	23.31	23.32		0
	1	5	23.37	23.44	23.33		0
	3	0	23.42	23.40	23.34		0
	3	2	23.48	23.48	23.34		0
	3	3	23.39	23.45	23.50		0
	6	0	22.47	22.33	22.43	0-2	1
64QAM	1	0	22.35	22.33	22.32	0-2	1
	1	2	22.48	22.31	22.30		1
	1	5	22.30	22.34	22.27		1
	3	0	22.40	22.32	22.29		1
	3	2	22.39	22.39	22.24		1
	3	3	22.31	22.44	22.49		1
	6	0	21.46	21.25	21.43	0-3	2

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9.4.2 LTE Carrier Aggregation Conducted Powers

Table 9-44
Maximum LTE Carrier Aggregation Conducted Powers

	PCC									SCC				Power	
Combination	PCC Band	PCC BW [MHz]	PCC (UL) Channel	PCC (UL) Freq. [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_2A-2A	LTE B2	20	18700	1860	QPSK	1	0	700	1940	LTE B2	20	1100	1980	24.47	24.50
CA_2A-4A	LTE B2	20	18700	1860	QPSK	1	0	700	1940	LTE B4	20	2175	2132.5	24.50	24.50
CA_2A-4A	LTE B4	10	20000	1715	QPSK	1	25	2000	2115	LTE B2	20	900	1960	24.50	24.50
CA_2A-5A	LTE B2	20	18700	1860	QPSK	1	0	700	1940	LTE B5	10	2525	881.5	24.42	24.50
CA_2A-5A	LTE B5	10	20525	836.5	QPSK	1	25	2525	881.5	LTE B2	20	900	1960	25.20	25.50
CA_2A-12A (1)	LTE B2	20	18700	1860	QPSK	1	0	700	1940	LTE B12	10	5095	737.5	24.22	24.50
CA_2A-12A (1)	LTE B12	5	23155	713.5	QPSK	1	0	5155	743.5	LTE B2	20	900	1960	25.50	25.50
CA_2A-13A	LTE B2	20	18700	1860	QPSK	1	0	700	1940	LTE B13	10	5230	751	24.50	24.50
CA_2A-13A	LTE B13	10	23230	782	QPSK	1	25	5230	751	LTE B2	20	900	1960	25.42	25.37
CA_2A-66A	LTE B2	20	18700	1860	QPSK	1	0	700	1940	LTE B66	20	66786	2145	24.50	24.50
CA_2A-66A	LTE B66	10	132022	1715	QPSK	1	25	66486	2115	LTE B2	20	900	1960	24.43	24.50
CA_2A-71A	LTE B2	20	18700	1860	QPSK	1	0	700	1940	LTE B71	20	68761	634.5	24.45	24.50
CA_2A-71A	LTE B71	15	133297	680.5	QPSK	1	74	68761	634.5	LTE B2	20	900	1960	25.00	25.00
CA_4A-4A	LTE B4	10	20000	1715	QPSK	1	25	2000	2115	LTE B4	20	2300	2145	24.50	24.50
CA_4A-5A (1)	LTE B4	10	20000	1715	QPSK	1	25	2000	2115	LTE B5	10	2525	881.5	24.50	24.50
CA_4A-5A (1)	LTE B5	10	20525	836.5	QPSK	1	25	2525	881.5	LTE B4	20	2175	2132.5	24.92	25.50
CA_4A-12A (1)	LTE B4	10	20000	1715	QPSK	1	25	2000	2115	LTE B12	10	5095	737.5	24.36	24.50
CA_4A-12A (1)	LTE B12	5	23155	713.5	QPSK	1	0	5155	743.5	LTE B4	20	2175	2132.5	25.10	25.50
CA_4A-12A (2)	LTE B4	10	20000	1715	QPSK	1	25	2000	2115	LTE B12	10	5095	737.5	24.36	24.50
CA_4A-12A (2)	LTE B12	5	23155	713.5	QPSK	1	0	5155	743.5	LTE B4	20	2175	2132.5	25.10	25.50
CA_4A-13A	LTE B4	10	20000	1715	QPSK	1	25	2000	2115	LTE B13	10	5230	751	24.48	24.50
CA_4A-13A	LTE B13	10	23230	782	QPSK	1	25	5230	751	LTE B4	20	2175	2132.5	25.34	25.37
CA_4A-71A	LTE B4	10	20000	1715	QPSK	1	25	2000	2115	LTE B71	20	68761	634.5	24.50	24.50
CA_4A-71A	LTE B71	15	133297	680.5	QPSK	1	74	68761	634.5	LTE B4	20	2175	2132.5	25.00	25.00
CA_12A-66A (1)	LTE B12	5	23155	713.5	QPSK	1	0	5155	743.5	LTE B66	20	66786	2145	25.10	25.50
CA_12A-66A (1)	LTE B66	10	132022	1715	QPSK	1	25	66486	2115	LTE B12	10	5095	737.5	24.50	24.50
CA_12A-66A (2)	LTE B12	5	23155	713.5	QPSK	1	0	5155	743.5	LTE B66	20	66786	2145	25.10	25.50
CA_12A-66A (2)	LTE B66	10	132022	1715	QPSK	1	25	66486	2115	LTE B12	10	5095	737.5	24.50	24.50
CA_66A-66A	LTE B66	10	132022	1715	QPSK	1	25	66486	2115	LTE B66	20	67236	2190	24.42	24.50
CA_66B	LTE B66	10	132022	1715	QPSK	1	25	66486	2115	LTE B66	10	66585	2124.9	24.47	24.50
CA_66C	LTE B66	10	132022	1715	QPSK	1	25	66486	2115	LTE B66	20	66630	2129.4	24.45	24.50
CA_66A-71A	LTE B66	10	132022	1715	QPSK	1	25	66486	2115	LTE B71	20	68761	634.5	24.36	24.50
CA_66A-71A	LTE B71	15	133297	680.5	QPSK	1	74	68761	634.5	LTE B66	20	66786	2145	24.76	25.00

Table 9-45
Reduced LTE Carrier Aggregation Conducted Powers

	PCC									SCC				Power	
Combination	PCC Band	PCC BW [MHz]	PCC (UL) Channel	PCC (UL) Freq. [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_2A-2A	LTE B2	10	18650	1855	QPSK	1	49	650	1935	LTE B2	20	1100	1980	23.50	23.50
CA_2A-4A	LTE B2	10	18650	1855	QPSK	1	49	650	1935	LTE B4	20	2175	2132.5	23.50	23.50
CA_2A-4A	LTE B4	20	20050	1720	16QAM	1	50	2050	2120	LTE B2	20	900	1960	23.40	23.50
CA_2A-5A	LTE B2	10	18650	1855	QPSK	1	49	650	1935	LTE B5	10	2525	881.5	23.48	23.50
CA_2A-71A	LTE B2	10	18650	1855	QPSK	1	49	650	1935	LTE B71	20	68761	634.5	23.50	23.50
CA_2A-12A (1)	LTE B2	10	18650	1855	QPSK	1	49	650	1935	LTE B12	10	5095	737.5	23.22	23.50
CA_2A-13A	LTE B2	10	18650	1855	QPSK	1	49	650	1935	LTE B13	10	5230	751	23.50	23.50
CA_2A-66A	LTE B2	10	18650	1855	QPSK	1	49	650	1935	LTE B66	20	66786	2145	23.50	23.50
CA_2A-66A	LTE B66	20	132072	1720	16QAM	1	50	66536	2120	LTE B2	20	900	1960	23.46	23.50
CA_4A-4A	LTE B4	20	20050	1720	16QAM	1	50	2050	2120	LTE B4	20	2300	2145	23.35	23.50
CA_4A-5A (1)	LTE B4	20	20050	1720	16QAM	1	50	2050	2120	LTE B5	10	2525	881.5	23.45	23.50
CA_4A-12A (1)	LTE B4	20	20050	1720	16QAM	1	50	2050	2120	LTE B12	10	5095	737.5	23.14	23.50
CA_4A-12A (2)	LTE B4	20	20050	1720	16QAM	1	50	2050	2120	LTE B12	10	5095	737.5	23.14	23.50
CA_4A-13A	LTE B4	20	20050	1720	16QAM	1	50	2050	2120	LTE B13	10	5230	751	23.38	23.50
CA_4A-71A	LTE B4	20	20050	1720	16QAM	1	50	2050	2120	LTE B71	20	68761	634.5	23.48	23.50
CA_12A-66A (1)	LTE B66	20	132072	1720	16QAM	1	50	66536	2120	LTE B12	10	5095	737.5	23.50	23.50
CA_12A-66A (2)	LTE B66	20	132072	1720	16QAM	1	50	66536	2120	LTE B12	10	5095	737.5	23.50	23.50
CA_66A-66A	LTE B66	20	132072	1720	16QAM	1	50	66536	2120	LTE B66	20	67236	2190	23.37	23.50
CA_66B	LTE B66	15	132322	1745	QPSK	36	37	66786	2145	LTE B66	5	66693	2135.7	23.11	23.50
CA_66C	LTE B66	20	132072	1720	16QAM	1	50	66536	2120	LTE B66	20	66734	2139.8	23.46	23.50
CA_66A-71A	LTE B66	20	132072	1720	16QAM	1	50	66536	2120	LTE B71	20	68761	634.5	23.38	23.50

Notes:

1. For every supported combination of downlink carrier aggregation, power measurements were performed with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band.
2. All control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.

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3. For downlink carrier aggregation combinations, PCC uplink channel was selected based on section C)3)b)ii) of KBD 941225 D05 V01r02. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation. For inter-band CA, the SCC downlink channels were selected near the middle of their transmission bands. For contiguous intra-band CA, the downlink channel spacing between the component carriers was set to multiple of 300 kHz less than the nominal channel spacing defined in section 5.4.1A of 3GPP TS 36.521. For non-contiguous intra-band CA, the downlink channel spacing between the component carriers was set to be larger than the nominal channel spacing and provided maximum separation between the component carriers. All selected downlink channels remained fully within the downlink transmission band of the respective component carrier.
4. When a device supports LTE capabilities with overlapping transmission frequency ranges, the standalone powers from the band with a larger transmission frequency range can be used to select measurement configurations for the band with the fully covered transmission frequency range

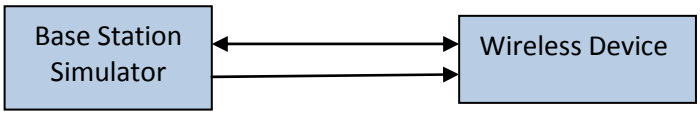

Figure 9-4
Power Measurement Setup

9.5 WLAN Conducted Powers

Table 9-46
2.4 GHz WLAN Maximum Average RF Power

2.4GHz Conducted Power [dBm]		
Freq [MHz]	Channel	IEEE Transmission Mode
		802.11b
		Average
2412	1	22.21
2437	6	22.15
2462	11	22.17

2.4GHz Conducted Power [dBm]			
Freq [MHz]	Channel	IEEE Transmission Mode	
		802.11g	802.11n
		Average	Average
2412	1	18.69	16.27
2417	2	19.55	17.33
2422	3	21.52	19.12
2437	6	21.73	19.10
2452	9	21.42	19.05
2457	10	19.46	17.10
2462	11	18.06	15.61

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Table 9-47
2.4 GHz WLAN Reduced Average RF Power

2.4GHz Conducted Power [dBm]		
Freq [MHz]	Channel	IEEE Transmission Mode
		802.11b
		Average
2412	1	18.70
2437	6	18.57
2462	11	18.47

2.4GHz Conducted Power [dBm]			
Freq [MHz]	Channel	IEEE Transmission Mode	
		802.11g	802.11n
		Average	Average
2412	1	15.92	15.76
2417	2	16.88	16.95
2422	3	18.62	18.73
2437	6	18.60	18.60
2452	9	18.44	18.39
2457	10	16.67	16.64
2462	11	15.18	15.11

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.

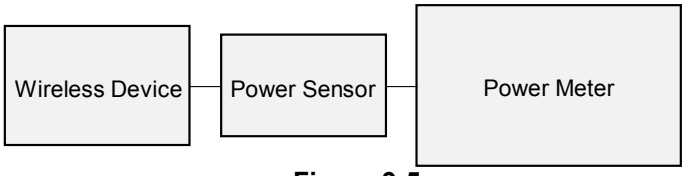

Figure 9-5
Power Measurement Setup

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9.6 Bluetooth Conducted Powers

Table 9-48
Bluetooth Average RF Power

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
			[dBm]	[mW]
2402	1.0	0	9.81	9.575
2441	1.0	39	11.27	13.389
2480	1.0	78	10.10	10.226
2402	2.0	0	9.15	8.231
2441	2.0	39	10.62	11.547
2480	2.0	78	9.47	8.845
2402	3.0	0	9.21	8.341
2441	3.0	39	10.67	11.675
2480	3.0	78	9.52	8.948

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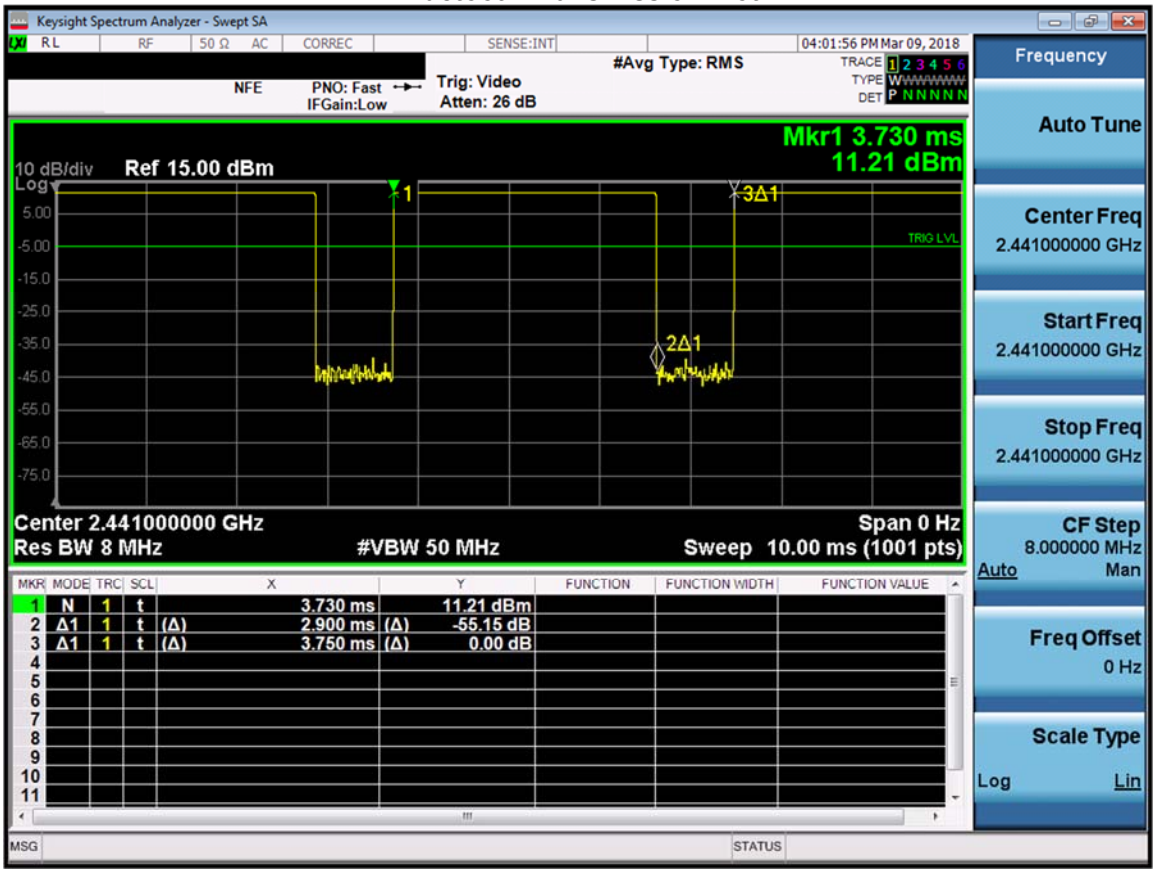
Figure 9-6
Bluetooth Transmission Plot



Equation 9-1
Bluetooth Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.90\ ms}{3.75\ ms} * 100\% = 77.33\%$$

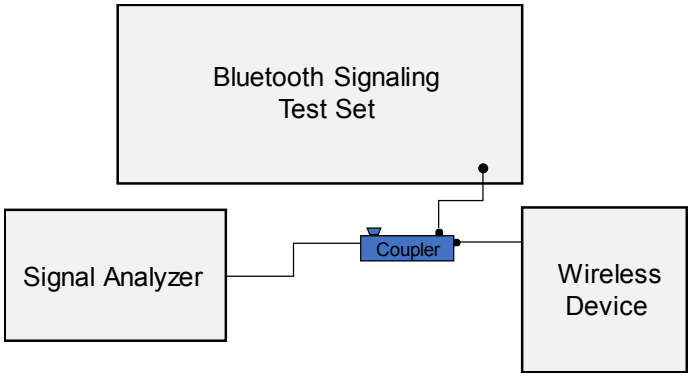


Figure 9-7
Power Measurement Setup

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10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
3/11/2018	750H	21.4	740	0.887	40.813	0.893	41.994	-0.67%	-2.81%
			755	0.892	40.775	0.894	41.916	-0.22%	-2.72%
			770	0.898	40.725	0.895	41.838	0.34%	-2.66%
			785	0.904	40.690	0.896	41.760	0.89%	-2.56%
3/14/2018	750H	20.3	680	0.855	40.954	0.888	42.305	-3.72%	-3.19%
			695	0.859	40.888	0.889	42.227	-3.37%	-3.17%
			700	0.860	40.818	0.889	42.201	-3.26%	-3.28%
			710	0.864	40.817	0.890	42.149	-2.92%	-3.16%
			740	0.874	40.715	0.893	41.994	-2.13%	-3.05%
			755	0.879	40.699	0.894	41.916	-1.68%	-2.90%
3/13/2018	835H	20.8	820	0.935	39.820	0.899	41.578	4.00%	-4.23%
			835	0.940	39.773	0.900	41.500	4.44%	-4.16%
			850	0.945	39.722	0.916	41.500	3.17%	-4.28%
3/31/2018	835H	21.2	820	0.892	42.653	0.899	41.578	-0.78%	2.59%
			835	0.907	42.478	0.900	41.500	0.78%	2.36%
			850	0.922	42.293	0.916	41.500	0.66%	1.91%
3/13/2018	1750H	21.1	1710	1.362	39.383	1.348	40.142	1.04%	-1.89%
			1750	1.404	39.175	1.371	40.079	2.41%	-2.26%
			1790	1.445	38.977	1.394	40.016	3.66%	-2.60%
3/15/2018	1900H	21.5	1850	1.386	39.734	1.400	40.000	-1.00%	-0.66%
			1880	1.418	39.593	1.400	40.000	1.29%	-1.02%
			1910	1.449	39.464	1.400	40.000	3.50%	-1.34%
3/30/2018	1900H	22.2	1850	1.379	40.050	1.400	40.000	-1.50%	0.12%
			1880	1.413	39.917	1.400	40.000	0.93%	-0.21%
			1910	1.445	39.769	1.400	40.000	3.21%	-0.58%
3/18/2018	2450H	23.5	2400	1.795	40.195	1.756	39.289	2.22%	2.31%
			2450	1.856	39.999	1.800	39.200	3.11%	2.04%
			2500	1.913	39.830	1.855	39.136	3.13%	1.77%
3/25/2018	2450H	23.5	2400	1.710	40.716	1.756	39.289	-2.62%	3.63%
			2450	1.764	40.568	1.800	39.200	-2.00%	3.49%
			2500	1.818	40.397	1.855	39.136	-1.99%	3.22%
3/12/2018	750B	21.0	695	0.958	56.222	0.959	55.745	-0.10%	0.86%
			710	0.964	56.200	0.960	55.687	0.42%	0.92%
			740	0.975	56.142	0.963	55.570	1.25%	1.03%
			755	0.980	56.089	0.964	55.512	1.66%	1.04%
3/14/2018	750B	21.0	740	0.968	53.175	0.963	55.570	0.52%	-4.31%
			755	0.973	53.125	0.964	55.512	0.93%	-4.30%
			770	0.978	53.080	0.965	55.453	1.35%	-4.28%
			785	0.984	53.050	0.966	55.395	1.86%	-4.23%
3/19/2018	750B	21.5	680	0.950	53.838	0.958	55.804	-0.84%	-3.52%
			695	0.955	53.829	0.959	55.745	-0.42%	-3.44%
			740	0.971	53.749	0.963	55.570	0.83%	-3.28%
			755	0.976	53.711	0.964	55.512	1.24%	-3.24%
3/7/2018	835B	20.7	820	0.969	53.678	0.969	55.258	0.00%	-2.86%
			835	0.985	53.465	0.970	55.200	1.55%	-3.14%
			850	0.999	53.377	0.988	55.154	1.11%	-3.22%
3/28/2018	835B	21.2	820	0.946	54.045	0.969	55.258	-2.37%	-2.20%
			835	0.964	53.907	0.970	55.200	-0.62%	-2.34%
			850	0.976	53.775	0.988	55.154	-1.21%	-2.50%
3/20/2018	1750B	21.4	1710	1.463	51.439	1.463	53.537	0.00%	-3.92%
			1750	1.510	51.282	1.488	53.432	1.48%	-4.02%
			1790	1.556	51.120	1.514	53.326	2.77%	-4.14%
3/17/2018	1900B	22.4	1850	1.515	53.696	1.520	53.300	-0.33%	0.74%
			1880	1.547	53.618	1.520	53.300	1.78%	0.60%
			1910	1.583	53.567	1.520	53.300	4.14%	0.50%
3/19/2018	1900B	22.3	1850	1.520	52.874	1.520	53.300	0.00%	-0.80%
			1880	1.558	52.748	1.520	53.300	2.50%	-1.04%
			1910	1.592	52.674	1.520	53.300	4.74%	-1.17%
3/30/2018	1900B	22.3	1850	1.521	53.710	1.520	53.300	0.07%	0.77%
			1880	1.553	53.605	1.520	53.300	2.17%	0.57%
			1910	1.592	53.490	1.520	53.300	4.74%	0.36%
3/15/2018	2450B	22.4	2400	1.958	52.017	1.902	52.767	2.94%	-1.42%
			2450	2.006	51.873	1.950	52.700	2.87%	-1.57%
			2500	2.067	51.679	2.021	52.636	2.28%	-1.82%

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.

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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 10-2
System Verification Results – 1g

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)	$Deviation_{1g}$ (%)
E	750	HEAD	03/11/2018	21.0	21.4	0.200	1003	3213	1.560	8.280	7.800	-5.80%
E	750	HEAD	03/14/2018	23.9	20.7	0.200	1003	3213	1.550	8.280	7.750	-6.40%
E	835	HEAD	03/13/2018	23.4	21.2	0.200	4d132	3213	2.010	9.360	10.050	7.37%
E	835	HEAD	03/31/2018	23.8	21.4	0.200	4d132	3213	1.900	9.360	9.500	1.50%
J	1750	HEAD	03/13/2018	22.3	21.5	0.100	1150	3914	3.690	36.100	36.900	2.22%
J	1900	HEAD	03/15/2018	21.5	21.5	0.100	5d080	3914	4.140	39.300	41.400	5.34%
G	1900	HEAD	03/30/2018	22.4	22.1	0.100	5d148	3332	4.230	40.100	42.300	5.49%
G	2450	HEAD	03/18/2018	21.7	21.5	0.100	797	3332	5.220	52.700	52.200	-0.95%
G	2450	HEAD	03/25/2018	23.2	23.1	0.100	797	3332	4.920	52.700	49.200	-6.64%
K	750	BODY	03/12/2018	21.9	21.0	0.200	1161	7406	1.800	8.430	9.000	6.76%
I	750	BODY	03/14/2018	23.0	21.7	0.200	1046	3287	1.790	8.590	8.950	4.19%
I	750	BODY	03/19/2018	22.2	21.0	0.200	1046	3287	1.820	8.590	9.100	5.94%
J	835	BODY	03/07/2018	21.0	20.7	0.200	4d133	3914	1.830	9.410	9.150	-2.76%
E	835	BODY	03/28/2018	20.8	21.2	0.200	4d132	3213	2.060	9.710	10.300	6.08%
K	1750	BODY	03/20/2018	23.0	21.4	0.100	1148	7406	3.790	37.000	37.900	2.43%
J	1900	BODY	03/17/2018	22.0	22.4	0.100	5d080	3914	4.280	39.100	42.800	9.46%
J	1900	BODY	03/19/2018	20.7	22.3	0.100	5d080	3914	4.180	39.100	41.800	6.91%
J	1900	BODY	03/30/2018	22.9	22.0	0.100	5d148	3914	4.250	39.600	42.500	7.32%
G	2450	BODY	03/15/2018	22.6	21.4	0.100	797	3332	5.260	51.100	52.600	2.94%

Table 10-3
System Verification Results – 10g

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)	$Deviation_{10g}$ (%)
K	1750	BODY	03/20/2018	23.0	21.4	0.100	1148	7406	2.010	19.800	20.100	1.52%
J	1900	BODY	03/19/2018	20.7	22.3	0.100	5d080	3914	2.140	20.700	21.400	3.38%
J	1900	BODY	03/30/2018	22.9	22.0	0.100	5d148	3914	2.190	20.900	21.900	4.78%

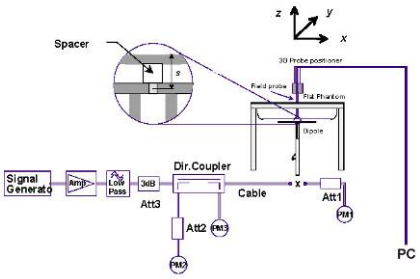

Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

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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	33.7	33.57	-0.01	Right	Cheek	19019	1	1:8.3	0.082	1.030	0.084	
836.60	190	GSM 850	GSM	33.7	33.57	0.01	Right	Tilt	19019	1	1:8.3	0.052	1.030	0.054	
836.60	190	GSM 850	GSM	33.7	33.57	-0.07	Left	Cheek	19019	1	1:8.3	0.137	1.030	0.141	
836.60	190	GSM 850	GSM	33.7	33.57	-0.09	Left	Tilt	19019	1	1:8.3	0.062	1.030	0.064	
836.60	190	GSM 850	GPRS	30.7	30.52	0.05	Right	Cheek	19019	3	1:2.76	0.109	1.042	0.114	
836.60	190	GSM 850	GPRS	30.7	30.52	-0.20	Right	Tilt	19019	3	1:2.76	0.072	1.042	0.075	
836.60	190	GSM 850	GPRS	30.7	30.52	-0.16	Left	Cheek	19019	3	1:2.76	0.190	1.042	0.198	A1
836.60	190	GSM 850	GPRS	30.7	30.52	-0.06	Left	Tilt	19019	3	1:2.76	0.090	1.042	0.094	
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	30.7	30.54	0.17	Right	Cheek	19019	1	1:8.3	0.068	1.038	0.071	
1880.00	661	GSM 1900	GSM	30.7	30.54	0.02	Right	Tilt	19019	1	1:8.3	0.031	1.038	0.032	
1880.00	661	GSM 1900	GSM	30.7	30.54	-0.10	Left	Cheek	19019	1	1:8.3	0.088	1.038	0.091	
1880.00	661	GSM 1900	GSM	30.7	30.54	0.16	Left	Tilt	19019	1	1:8.3	0.040	1.038	0.042	
1880.00	661	GSM 1900	GPRS	27.2	27.07	0.10	Right	Cheek	19019	3	1:2.76	0.078	1.030	0.080	
1880.00	661	GSM 1900	GPRS	27.2	27.07	0.19	Right	Tilt	19019	3	1:2.76	0.035	1.030	0.036	
1880.00	661	GSM 1900	GPRS	27.2	27.07	0.13	Left	Cheek	19019	3	1:2.76	0.091	1.030	0.094	A2
1880.00	661	GSM 1900	GPRS	27.2	27.07	0.07	Left	Tilt	19019	3	1:2.76	0.040	1.030	0.041	
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	25.12	-0.02	Right	Cheek	19019	1:1	0.114	1.019	0.116		
836.60	4183	UMTS 850	RMC	25.2	25.12	-0.04	Right	Tilt	19019	1:1	0.074	1.019	0.075		
836.60	4183	UMTS 850	RMC	25.2	25.12	0.02	Left	Cheek	19019	1:1	0.196	1.019	0.200	A3	
836.60	4183	UMTS 850	RMC	25.2	25.12	0.09	Left	Tilt	19019	1:1	0.091	1.019	0.093		
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

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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	24.5	24.47	0.04	Right	Cheek	19019	1:1	0.090	1.007	0.091	A4
1732.40	1412	UMTS 1750	RMC	24.5	24.47	-0.09	Right	Tilt	19019	1:1	0.043	1.007	0.043	
1732.40	1412	UMTS 1750	RMC	24.5	24.47	-0.15	Left	Cheek	19019	1:1	0.083	1.007	0.084	
1732.40	1412	UMTS 1750	RMC	24.5	24.47	0.11	Left	Tilt	19019	1:1	0.043	1.007	0.043	
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	24.5	24.49	0.09	Right	Cheek	19019	1:1	0.117	1.002	0.117	
1880.00	9400	UMTS 1900	RMC	24.5	24.49	0.16	Right	Tilt	19019	1:1	0.055	1.002	0.055	
1880.00	9400	UMTS 1900	RMC	24.5	24.49	0.01	Left	Cheek	19019	1:1	0.155	1.002	0.155	A5
1880.00	9400	UMTS 1900	RMC	24.5	24.49	-0.06	Left	Tilt	19019	1:1	0.067	1.002	0.067	
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	25.02	0.06	Right	Cheek	19019	1:1	0.115	1.042	0.120	
836.52	384	Cell. CDMA	RC3 / SO55	25.2	25.02	0.16	Right	Tilt	19019	1:1	0.068	1.042	0.071	
836.52	384	Cell. CDMA	RC3 / SO55	25.2	25.02	0.01	Left	Cheek	19019	1:1	0.203	1.042	**0.212**	A6
836.52	384	Cell. CDMA	RC3 / SO55	25.2	25.02	0.03	Left	Tilt	19019	1:1	0.083	1.042	0.086	
836.52	384	Cell. CDMA	EVDO Rev. A	25.2	25.16	-0.19	Right	Cheek	19076	1:1	0.101	1.009	0.102	
836.52	384	Cell. CDMA	EVDO Rev. A	25.2	25.16	0.10	Right	Tilt	19076	1:1	0.080	1.009	0.081	
836.52	384	Cell. CDMA	EVDO Rev. A	25.2	25.16	-0.03	Left	Cheek	19076	1:1	0.180	1.009	0.182	
836.52	384	Cell. CDMA	EVDO Rev. A	25.2	25.16	0.16	Left	Tilt	19076	1:1	0.082	1.009	0.083	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

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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	24.5	24.39	0.09	Right	Cheek	19019	1:1	0.132	1.026	0.135	
1880.00	600	PCS CDMA	RC3 / SO55	24.5	24.39	-0.05	Right	Tilt	19019	1:1	0.054	1.026	0.055	
1880.00	600	PCS CDMA	RC3 / SO55	24.5	24.39	0.08	Left	Cheek	19019	1:1	0.128	1.026	0.131	
1880.00	600	PCS CDMA	RC3 / SO55	24.5	24.39	0.13	Left	Tilt	19019	1:1	0.061	1.026	0.063	
1880.00	600	PCS CDMA	EVDO Rev. A	24.5	24.40	0.14	Right	Cheek	19019	1:1	0.128	1.023	0.131	
1880.00	600	PCS CDMA	EVDO Rev. A	24.5	24.40	0.01	Right	Tilt	19019	1:1	0.064	1.023	0.065	
1880.00	600	PCS CDMA	EVDO Rev. A	24.5	24.40	-0.03	Left	Cheek	19019	1:1	0.153	1.023	0.157	A7
1880.00	600	PCS CDMA	EVDO Rev. A	24.5	24.40	0.12	Left	Tilt	19019	1:1	0.064	1.023	0.065	
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 71 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)	
680.50	133297	Mid	LTE Band 71	20	25.0	24.98	0.15	0	Right	Cheek	QPSK	1	0	19035	1:1	0.051	1.005	0.051	
680.50	133297	Mid	LTE Band 71	20	24.0	23.96	0.19	1	Right	Cheek	QPSK	50	0	19035	1:1	0.048	1.009	0.048	
680.50	133297	Mid	LTE Band 71	20	25.0	24.98	0.00	0	Right	Tilt	QPSK	1	0	19035	1:1	0.037	1.005	0.037	
680.50	133297	Mid	LTE Band 71	20	24.0	23.96	-0.10	1	Right	Tilt	QPSK	50	0	19035	1:1	0.033	1.009	0.033	
680.50	133297	Mid	LTE Band 71	20	25.0	24.98	0.10	0	Left	Cheek	QPSK	1	0	19035	1:1	0.069	1.005	0.069	A8
680.50	133297	Mid	LTE Band 71	20	24.0	23.96	0.17	1	Left	Cheek	QPSK	50	0	19035	1:1	0.067	1.009	0.068	
680.50	133297	Mid	LTE Band 71	20	25.0	24.98	-0.17	0	Left	Tilt	QPSK	1	0	19035	1:1	0.039	1.005	0.039	
680.50	133297	Mid	LTE Band 71	20	24.0	23.96	0.16	1	Left	Tilt	QPSK	50	0	19035	1:1	0.033	1.009	0.033	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

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Table 11-9
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	25.5	25.44	-0.15	0	Right	Cheek	QPSK	1	49	19035	1:1	0.125	1.014	0.127	
707.50	23095	Mid	LTE Band 12	10	24.5	24.47	-0.03	1	Right	Cheek	QPSK	25	25	19035	1:1	0.113	1.007	0.114	
707.50	23095	Mid	LTE Band 12	10	25.5	25.44	0.10	0	Right	Tilt	QPSK	1	49	19035	1:1	0.074	1.014	0.075	
707.50	23095	Mid	LTE Band 12	10	24.5	24.47	-0.01	1	Right	Tilt	QPSK	25	25	19035	1:1	0.073	1.007	0.074	
707.50	23095	Mid	LTE Band 12	10	25.5	25.44	0.18	0	Left	Cheek	QPSK	1	49	19035	1:1	0.181	1.014	0.184	A9
707.50	23095	Mid	LTE Band 12	10	24.5	24.47	-0.07	1	Left	Cheek	QPSK	25	25	19035	1:1	0.162	1.007	0.163	
707.50	23095	Mid	LTE Band 12	10	25.5	25.44	0.12	0	Left	Tilt	QPSK	1	49	19035	1:1	0.081	1.014	0.082	
707.50	23095	Mid	LTE Band 12	10	24.5	24.47	-0.11	1	Left	Tilt	QPSK	25	25	19035	1:1	0.068	1.007	0.068	
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 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	25.5	25.37	-0.18	0	Right	Cheek	QPSK	1	25	19035	1:1	0.141	1.030	0.145	
782.00	23230	Mid	LTE Band 13	10	24.5	24.48	0.04	1	Right	Cheek	QPSK	25	0	19035	1:1	0.112	1.005	0.113	
782.00	23230	Mid	LTE Band 13	10	25.5	25.37	-0.03	0	Right	Tilt	QPSK	1	25	19035	1:1	0.094	1.030	0.097	
782.00	23230	Mid	LTE Band 13	10	24.5	24.48	0.11	1	Right	Tilt	QPSK	25	0	19035	1:1	0.077	1.005	0.077	
782.00	23230	Mid	LTE Band 13	10	25.5	25.37	0.10	0	Left	Cheek	QPSK	1	25	19035	1:1	0.184	1.030	0.190	A10
782.00	23230	Mid	LTE Band 13	10	24.5	24.48	0.05	1	Left	Cheek	QPSK	25	0	19035	1:1	0.171	1.005	0.172	
782.00	23230	Mid	LTE Band 13	10	25.5	25.37	0.16	0	Left	Tilt	QPSK	1	25	19035	1:1	0.082	1.030	0.084	
782.00	23230	Mid	LTE Band 13	10	24.5	24.48	0.10	1	Left	Tilt	QPSK	25	0	19035	1:1	0.073	1.005	0.073	
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 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	25.5	25.50	-0.11	0	Right	Cheek	QPSK	1	25	19035	1:1	0.113	1.000	0.113	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.43	-0.09	1	Right	Cheek	QPSK	25	0	19035	1:1	0.097	1.016	0.099	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.50	0.15	0	Right	Tilt	QPSK	1	25	19035	1:1	0.086	1.000	0.086	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.43	0.11	1	Right	Tilt	QPSK	25	0	19035	1:1	0.070	1.016	0.071	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.50	-0.03	0	Left	Cheek	QPSK	1	25	19035	1:1	0.197	1.000	0.197	A11
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.43	0.09	1	Left	Cheek	QPSK	25	0	19035	1:1	0.162	1.016	0.165	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.50	0.00	0	Left	Tilt	QPSK	1	25	19035	1:1	0.087	1.000	0.087	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.43	0.04	1	Left	Tilt	QPSK	25	0	19035	1:1	0.071	1.016	0.072	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

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Table 11-12
LTE Band 66 (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)	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	0.11	0	Right	Cheek	QPSK	1	0	19027	1:1	0.096	1.002	0.096	A12
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	0.01	1	Right	Cheek	QPSK	50	0	19027	1:1	0.082	1.000	0.082	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	-0.06	0	Right	Tilt	QPSK	1	0	19027	1:1	0.040	1.002	0.040	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	-0.08	1	Right	Tilt	QPSK	50	0	19027	1:1	0.034	1.000	0.034	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	-0.02	0	Left	Cheek	QPSK	1	0	19027	1:1	0.081	1.002	0.081	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	0.11	1	Left	Cheek	QPSK	50	0	19027	1:1	0.061	1.000	0.061	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	0.13	0	Left	Tilt	QPSK	1	0	19027	1:1	0.074	1.002	0.074	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	0.14	1	Left	Tilt	QPSK	50	0	19027	1:1	0.060	1.000	0.060	
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
LTE Band 2 (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)	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	0.00	0	Right	Cheek	QPSK	1	0	19027	1:1	0.110	1.000	0.110	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	-0.07	1	Right	Cheek	QPSK	50	25	19027	1:1	0.082	1.000	0.082	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	-0.11	0	Right	Tilt	QPSK	1	0	19027	1:1	0.062	1.000	0.062	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	-0.12	1	Right	Tilt	QPSK	50	25	19027	1:1	0.038	1.000	0.038	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	-0.04	0	Left	Cheek	QPSK	1	0	19027	1:1	0.118	1.000	0.118	A13
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	0.04	1	Left	Cheek	QPSK	50	25	19027	1:1	0.094	1.000	0.094	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	-0.09	0	Left	Tilt	QPSK	1	0	19027	1:1	0.115	1.000	0.115	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	0.05	1	Left	Tilt	QPSK	50	25	19027	1:1	0.081	1.000	0.081	
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
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	19.0	18.70	0.19	Right	Cheek	19100	1	99.8	1.127	1.010	1.072	1.002	**1.085**	A14
2437	6	802.11b	DSSS	22	19.0	18.57	0.09	Right	Cheek	19100	1	99.8	1.111	0.907	1.104	1.002	1.003	
2462	11	802.11b	DSSS	22	19.0	18.47	0.20	Right	Cheek	19100	1	99.8	1.106	0.908	1.130	1.002	1.028	
2412	1	802.11b	DSSS	22	19.0	18.70	0.14	Right	Tilt	19100	1	99.8	1.104	0.883	1.072	1.002	0.948	
2437	6	802.11b	DSSS	22	19.0	18.57	0.16	Right	Tilt	19100	1	99.8	1.107	0.776	1.104	1.002	0.858	
2412	1	802.11b	DSSS	22	19.0	18.70	-0.13	Left	Cheek	19100	1	99.8	0.403	0.340	1.072	1.002	0.365	
2412	1	802.11b	DSSS	22	19.0	18.70	-0.04	Left	Tilt	19100	1	99.8	0.338	-	1.072	1.002	-	
2412	1	802.11b	DSSS	22	19.0	18.70	0.07	Right	Cheek	19100	1	99.8	1.043	0.945	1.072	1.002	1.015	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram										

Blue entry represents variability measurement.

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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	11.5	11.27	0.03	Right	Cheek	19100	1	77.3	0.104	1.054	1.294	**0.142**	A15
2441.00	39	Bluetooth	FHSS	11.5	11.27	0.09	Right	Tilt	19100	1	77.3	0.087	1.054	1.294	0.119	
2441.00	39	Bluetooth	FHSS	11.5	11.27	0.20	Left	Cheek	19100	1	77.3	0.039	1.054	1.294	0.053	
2441.00	39	Bluetooth	FHSS	11.5	11.27	0.01	Left	Tilt	19100	1	77.3	0.039	1.054	1.294	0.053	
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 Body-Worn SAR Data

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.7	33.57	0.13	10 mm	19019	1:8.3	back	0.383	1.030	0.394	
836.60	190	GSM 850	GPRS	30.7	30.52	0.15	10 mm	19019	1:2.76	back	0.431	1.042	0.449	A16
1880.00	661	GSM 1900	GSM	30.7	30.54	-0.02	10 mm	19019	1:8.3	back	0.345	1.038	0.358	
1880.00	661	GSM 1900	GPRS	27.2	27.07	0.01	10 mm	19019	1:2.76	back	0.398	1.030	0.410	A18
836.60	4183	UMTS 850	RMC	25.2	25.12	0.02	10 mm	19019	1:1	back	0.541	1.019	0.551	A20
1732.40	1412	UMTS 1750	RMC	24.5	24.47	0.12	10 mm	19019	1:1	back	0.396	1.007	0.399	A22
1880.00	9400	UMTS 1900	RMC	24.5	24.49	-0.02	10 mm	19019	1:1	back	0.619	1.002	0.620	A24
836.52	384	Cell. CDMA	TDSO / SO32	25.2	25.12	0.01	10 mm	19019	1:1	back	0.562	1.019	0.573	A26
1851.25	25	PCS CDMA	TDSO / SO32	24.5	24.36	-0.01	10 mm	19019	1:1	back	0.487	1.033	0.503	
1880.00	600	PCS CDMA	TDSO / SO32	24.5	24.38	0.00	10 mm	19019	1:1	back	0.597	1.028	0.614	
1908.75	1175	PCS CDMA	TDSO / SO32	24.5	24.43	-0.06	10 mm	19019	1:1	back	0.632	1.016	0.642	A28
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram							

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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)	
680.50	133297	Mid	LTE Band 71	20	25.0	24.98	-0.14	0	19035	QPSK	1	0	10 mm	back	1:1	0.444	1.005	0.446	A30
680.50	133297	Mid	LTE Band 71	20	24.0	23.96	-0.18	1	19035	QPSK	50	0	10 mm	back	1:1	0.325	1.009	0.328	
707.50	23095	Mid	LTE Band 12	10	25.5	25.44	-0.19	0	19027	QPSK	1	49	10 mm	back	1:1	0.651	1.014	**0.660**	A31
707.50	23095	Mid	LTE Band 12	10	24.5	24.47	0.09	1	19027	QPSK	25	25	10 mm	back	1:1	0.537	1.007	0.541	
782.00	23230	Mid	LTE Band 13	10	25.5	25.37	-0.14	0	19035	QPSK	1	25	10 mm	back	1:1	0.621	1.030	0.640	A33
782.00	23230	Mid	LTE Band 13	10	24.5	24.48	-0.07	1	19035	QPSK	25	0	10 mm	back	1:1	0.557	1.005	0.560	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.50	0.14	0	19027	QPSK	1	25	10 mm	back	1:1	0.551	1.000	0.551	A35
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.43	0.00	1	19027	QPSK	25	0	10 mm	back	1:1	0.508	1.016	0.516	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	-0.04	0	19027	QPSK	1	0	10 mm	back	1:1	0.418	1.002	0.419	A37
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	0.10	1	19027	QPSK	50	0	10 mm	back	1:1	0.340	1.000	0.340	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	0.16	0	19027	QPSK	1	0	10 mm	back	1:1	0.594	1.000	0.594	A39
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	0.00	1	19027	QPSK	50	25	10 mm	back	1:1	0.445	1.000	0.445	
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 11-18
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)	
2412	1	802.11b	DSSS	22	23.0	22.21	0.00	10 mm	19100	1	back	99.8	0.400	0.388	1.199	1.002	**0.466**	A41
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram										

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11.3 Standalone Hotspot SAR Data

Table 11-19
GPRS/UMTS/EVDO Hotspot SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	30.7	30.52	0.15	10 mm	19019	3	1:2.76	back	0.431	1.042	0.449	
836.60	190	GSM 850	GPRS	30.7	30.52	0.02	10 mm	19019	3	1:2.76	front	0.550	1.042	0.573	A17
836.60	190	GSM 850	GPRS	30.7	30.52	0.05	10 mm	19019	3	1:2.76	bottom	0.265	1.042	0.276	
836.60	190	GSM 850	GPRS	30.7	30.52	0.10	10 mm	19019	3	1:2.76	left	0.230	1.042	0.240	
1880.00	661	GSM 1900	GPRS	27.2	27.07	0.01	10 mm	19019	3	1:2.76	back	0.398	1.030	0.410	
1880.00	661	GSM 1900	GPRS	27.2	27.07	0.00	10 mm	19019	3	1:2.76	front	0.365	1.030	0.376	
1850.20	512	GSM 1900	GPRS	27.2	27.20	0.09	10 mm	19019	3	1:2.76	bottom	0.460	1.000	0.460	
1880.00	661	GSM 1900	GPRS	27.2	27.07	-0.10	10 mm	19019	3	1:2.76	bottom	0.619	1.030	0.638	
1909.80	810	GSM 1900	GPRS	27.2	27.06	-0.06	10 mm	19019	3	1:2.76	bottom	0.777	1.033	0.803	A19
1880.00	661	GSM 1900	GPRS	27.2	27.07	-0.03	10 mm	19019	3	1:2.76	left	0.172	1.030	0.177	
836.60	4183	UMTS 850	RMC	25.2	25.12	0.02	10 mm	19019	N/A	1:1	back	0.541	1.019	0.551	
826.40	4132	UMTS 850	RMC	25.2	25.03	-0.04	10 mm	19019	N/A	1:1	front	0.675	1.040	0.702	A21
836.60	4183	UMTS 850	RMC	25.2	25.12	0.00	10 mm	19019	N/A	1:1	front	0.651	1.019	0.663	
846.60	4233	UMTS 850	RMC	25.2	25.06	-0.07	10 mm	19019	N/A	1:1	front	0.606	1.033	0.626	
836.60	4183	UMTS 850	RMC	25.2	25.12	0.01	10 mm	19019	N/A	1:1	bottom	0.332	1.019	0.338	
836.60	4183	UMTS 850	RMC	25.2	25.12	0.17	10 mm	19019	N/A	1:1	left	0.269	1.019	0.274	
1732.40	1412	UMTS 1750	RMC	24.5	24.47	0.12	10 mm	19019	N/A	1:1	back	0.396	1.007	0.399	
1732.40	1412	UMTS 1750	RMC	24.5	24.47	0.05	10 mm	19019	N/A	1:1	front	0.402	1.007	0.405	
1712.40	1312	UMTS 1750	RMC	24.5	24.44	-0.11	10 mm	19019	N/A	1:1	bottom	0.482	1.014	0.489	
1732.40	1412	UMTS 1750	RMC	24.5	24.47	-0.01	10 mm	19019	N/A	1:1	bottom	0.644	1.007	0.649	A23
1752.60	1513	UMTS 1750	RMC	24.5	24.43	-0.15	10 mm	19019	N/A	1:1	bottom	0.622	1.016	0.632	
1732.40	1412	UMTS 1750	RMC	24.5	24.47	0.00	10 mm	19019	N/A	1:1	left	0.190	1.007	0.191	
1880.00	9400	UMTS 1900	RMC	24.5	24.49	-0.02	10 mm	19019	N/A	1:1	back	0.619	1.002	0.620	
1880.00	9400	UMTS 1900	RMC	24.5	24.49	-0.03	10 mm	19019	N/A	1:1	front	0.565	1.002	0.566	
1852.40	9262	UMTS 1900	RMC	24.5	24.48	0.02	10 mm	19019	N/A	1:1	bottom	0.843	1.005	0.847	
1880.00	9400	UMTS 1900	RMC	24.5	24.49	-0.01	10 mm	19019	N/A	1:1	bottom	1.030	1.002	1.032	
1907.60	9538	UMTS 1900	RMC	24.5	24.42	-0.01	10 mm	19019	N/A	1:1	bottom	1.170	1.019	1.192	A25
1880.00	9400	UMTS 1900	RMC	24.5	24.49	-0.01	10 mm	19019	N/A	1:1	left	0.274	1.002	0.275	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.2	25.04	0.06	10 mm	19076	N/A	1:1	back	0.482	1.038	0.500	
824.70	1013	Cell. CDMA	EVDO Rev. 0	25.2	25.02	-0.05	10 mm	19076	N/A	1:1	front	0.713	1.042	0.743	A27
836.52	384	Cell. CDMA	EVDO Rev. 0	25.2	25.04	0.01	10 mm	19076	N/A	1:1	front	0.696	1.038	0.722	
848.31	777	Cell. CDMA	EVDO Rev. 0	25.2	25.15	0.09	10 mm	19076	N/A	1:1	front	0.636	1.012	0.644	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.2	25.04	-0.02	10 mm	19076	N/A	1:1	bottom	0.301	1.038	0.312	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.2	25.04	-0.05	10 mm	19076	N/A	1:1	left	0.211	1.038	0.219	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.5	24.47	-0.18	10 mm	19167	N/A	1:1	back	0.750	1.007	0.755	
1851.25	25	PCS CDMA	EVDO Rev. 0	24.5	24.46	-0.15	10 mm	19167	N/A	1:1	front	0.723	1.009	0.730	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.5	24.47	-0.01	10 mm	19167	N/A	1:1	front	0.832	1.007	0.838	
1908.75	1175	PCS CDMA	EVDO Rev. 0	24.5	24.45	-0.08	10 mm	19167	N/A	1:1	front	0.888	1.012	0.899	
1851.25	25	PCS CDMA	EVDO Rev. 0	24.5	24.46	-0.09	10 mm	19167	N/A	1:1	bottom	0.891	1.009	0.899	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.5	24.47	-0.02	10 mm	19167	N/A	1:1	bottom	1.000	1.007	1.007	
1908.75	1175	PCS CDMA	EVDO Rev. 0	24.5	24.45	-0.04	10 mm	19167	N/A	1:1	bottom	1.240	1.012	**1.255**	A29
1880.00	600	PCS CDMA	EVDO Rev. 0	24.5	24.47	-0.14	10 mm	19167	N/A	1:1	left	0.296	1.007	0.298	
1908.75	1175	PCS CDMA	EVDO Rev. 0	24.5	24.45	-0.01	10 mm	19167	N/A	1:1	bottom	1.110	1.012	1.123	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram								

Blue entry represents variability measurement.

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Table 11-20
LTE Band 71 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)	
680.50	133297	Mid	LTE Band 71	20	25.0	24.98	-0.14	0	19035	QPSK	1	0	10 mm	back	1:1	0.444	1.005	0.446	A30
680.50	133297	Mid	LTE Band 71	20	24.0	23.96	-0.18	1	19035	QPSK	50	0	10 mm	back	1:1	0.325	1.009	0.328	
680.50	133297	Mid	LTE Band 71	20	25.0	24.98	-0.15	0	19035	QPSK	1	0	10 mm	front	1:1	0.439	1.005	0.441	
680.50	133297	Mid	LTE Band 71	20	24.0	23.96	-0.03	1	19035	QPSK	50	0	10 mm	front	1:1	0.315	1.009	0.318	
680.50	133297	Mid	LTE Band 71	20	25.0	24.98	-0.11	0	19035	QPSK	1	0	10 mm	bottom	1:1	0.272	1.005	0.273	
680.50	133297	Mid	LTE Band 71	20	24.0	23.96	0.11	1	19035	QPSK	50	0	10 mm	bottom	1:1	0.194	1.009	0.196	
680.50	133297	Mid	LTE Band 71	20	25.0	24.98	-0.17	0	19035	QPSK	1	0	10 mm	left	1:1	0.235	1.005	0.236	
680.50	133297	Mid	LTE Band 71	20	24.0	23.96	-0.06	1	19035	QPSK	50	0	10 mm	left	1:1	0.159	1.009	0.160	
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 11-21
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	25.5	25.44	-0.19	0	19027	QPSK	1	49	10 mm	back	1:1	0.651	1.014	0.660	
707.50	23095	Mid	LTE Band 12	10	24.5	24.47	0.09	1	19027	QPSK	25	25	10 mm	back	1:1	0.537	1.007	0.541	
707.50	23095	Mid	LTE Band 12	10	25.5	25.44	-0.06	0	19027	QPSK	1	49	10 mm	front	1:1	0.765	1.014	0.776	A32
707.50	23095	Mid	LTE Band 12	10	24.5	24.47	0.06	1	19027	QPSK	25	25	10 mm	front	1:1	0.641	1.007	0.645	
707.50	23095	Mid	LTE Band 12	10	25.5	25.44	0.19	0	19027	QPSK	1	49	10 mm	bottom	1:1	0.414	1.014	0.420	
707.50	23095	Mid	LTE Band 12	10	24.5	24.47	-0.02	1	19027	QPSK	25	25	10 mm	bottom	1:1	0.374	1.007	0.377	
707.50	23095	Mid	LTE Band 12	10	25.5	25.44	-0.03	0	19027	QPSK	1	49	10 mm	left	1:1	0.399	1.014	0.405	
707.50	23095	Mid	LTE Band 12	10	24.5	24.47	-0.11	1	19027	QPSK	25	25	10 mm	left	1:1	0.323	1.007	0.325	
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 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	25.5	25.37	-0.14	0	19035	QPSK	1	25	10 mm	back	1:1	0.621	1.030	0.640	
782.00	23230	Mid	LTE Band 13	10	24.5	24.48	-0.07	1	19035	QPSK	25	0	10 mm	back	1:1	0.557	1.005	0.560	
782.00	23230	Mid	LTE Band 13	10	25.5	25.37	0.01	0	19035	QPSK	1	25	10 mm	front	1:1	0.821	1.030	0.846	A34
782.00	23230	Mid	LTE Band 13	10	24.5	24.48	-0.11	1	19035	QPSK	25	0	10 mm	front	1:1	0.729	1.005	0.733	
782.00	23230	Mid	LTE Band 13	10	24.5	24.44	-0.07	1	19035	QPSK	50	0	10 mm	front	1:1	0.752	1.014	0.763	
782.00	23230	Mid	LTE Band 13	10	25.5	25.37	0.12	0	19035	QPSK	1	25	10 mm	bottom	1:1	0.450	1.030	0.464	
782.00	23230	Mid	LTE Band 13	10	24.5	24.48	-0.11	1	19035	QPSK	25	0	10 mm	bottom	1:1	0.404	1.005	0.406	
782.00	23230	Mid	LTE Band 13	10	25.5	25.37	-0.03	0	19035	QPSK	1	25	10 mm	left	1:1	0.312	1.030	0.321	
782.00	23230	Mid	LTE Band 13	10	24.5	24.48	-0.04	1	19035	QPSK	25	0	10 mm	left	1:1	0.291	1.005	0.292	
782.00	23230	Mid	LTE Band 13	10	25.5	25.37	0.06	0	19035	QPSK	1	25	10 mm	front	1:1	0.760	1.030	0.783	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Blue entry represents variability measurement.

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Table 11-23
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	25.5	25.50	0.14	0	19027	QPSK	1	25	10 mm	back	1:1	0.551	1.000	0.551	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.43	0.00	1	19027	QPSK	25	0	10 mm	back	1:1	0.508	1.016	0.516	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.50	0.00	0	19027	QPSK	1	25	10 mm	front	1:1	0.623	1.000	0.623	A36
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.43	0.06	1	19027	QPSK	25	0	10 mm	front	1:1	0.567	1.016	0.576	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.50	0.20	0	19027	QPSK	1	25	10 mm	bottom	1:1	0.313	1.000	0.313	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.43	0.02	1	19027	QPSK	25	0	10 mm	bottom	1:1	0.302	1.016	0.307	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.50	0.17	0	19027	QPSK	1	25	10 mm	left	1:1	0.232	1.000	0.232	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.43	0.05	1	19027	QPSK	25	0	10 mm	left	1:1	0.219	1.016	0.223	
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 66 (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)	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	-0.04	0	19027	QPSK	1	0	10 mm	back	1:1	0.418	1.002	0.419	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	0.10	1	19027	QPSK	50	0	10 mm	back	1:1	0.340	1.000	0.340	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	-0.08	0	19027	QPSK	1	0	10 mm	front	1:1	0.456	1.002	0.457	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	-0.08	1	19027	QPSK	50	0	10 mm	front	1:1	0.372	1.000	0.372	
1720.00	132072	Low	LTE Band 66 (AWS)	20	24.5	24.48	0.01	0	19027	QPSK	1	0	10 mm	bottom	1:1	0.596	1.005	0.599	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.5	24.43	-0.01	0	19027	QPSK	1	99	10 mm	bottom	1:1	0.637	1.016	0.647	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	0.11	0	19027	QPSK	1	0	10 mm	bottom	1:1	0.699	1.002	0.700	A38
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	0.06	1	19027	QPSK	50	0	10 mm	bottom	1:1	0.573	1.000	0.573	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	-0.21	0	19027	QPSK	1	0	10 mm	left	1:1	0.228	1.002	0.228	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	-0.14	1	19027	QPSK	50	0	10 mm	left	1:1	0.177	1.000	0.177	
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 2 (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)	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	0.16	0	19027	QPSK	1	0	10 mm	back	1:1	0.594	1.000	0.594	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	0.00	1	19027	QPSK	50	25	10 mm	back	1:1	0.445	1.000	0.445	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	-0.03	0	19027	QPSK	1	0	10 mm	front	1:1	0.519	1.000	0.519	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	0.06	1	19027	QPSK	50	25	10 mm	front	1:1	0.391	1.000	0.391	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	-0.10	0	19027	QPSK	1	0	10 mm	bottom	1:1	0.942	1.000	0.942	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	24.5	24.49	0.05	0	19027	QPSK	1	50	10 mm	bottom	1:1	1.000	1.002	1.002	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.5	24.49	-0.02	0	19027	QPSK	1	0	10 mm	bottom	1:1	1.140	1.002	1.142	A40
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	-0.01	1	19027	QPSK	50	25	10 mm	bottom	1:1	0.748	1.000	0.748	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.41	0.05	1	19027	QPSK	100	0	10 mm	bottom	1:1	0.778	1.021	0.794	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	-0.03	0	19027	QPSK	1	0	10 mm	left	1:1	0.261	1.000	0.261	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	0.00	1	19027	QPSK	50	25	10 mm	left	1:1	0.193	1.000	0.193	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

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Table 11-26
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)	
2412	1	802.11b	DSSS	22	23.0	22.21	0.00	10 mm	19100	1	back	99.8	0.400	0.388	1.199	1.002	0.466	
2412	1	802.11b	DSSS	22	23.0	22.21	0.02	10 mm	19100	1	front	99.8	0.465	0.418	1.199	1.002	0.502	
2412	1	802.11b	DSSS	22	23.0	22.21	0.11	10 mm	19100	1	top	99.8	0.521	0.325	1.199	1.002	0.390	
2412	1	802.11b	DSSS	22	23.0	22.21	0.19	10 mm	19100	1	left	99.8	0.729	0.581	1.199	1.002	0.698	
2437	6	802.11b	DSSS	22	23.0	22.15	0.13	10 mm	19100	1	left	99.8	0.635	0.490	1.216	1.002	0.597	
2462	11	802.11b	DSSS	22	23.0	22.17	0.15	10 mm	19100	1	left	99.8	0.787	0.598	1.211	1.002	0.726	A42
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 11-27
UMTS Phablet SAR Data

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Duty Cycle	Side	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	24.5	24.47	0.04	3 mm	19019	1:1	back	0.695	1.007	0.700	
1732.40	1412	UMTS 1750	RMC	24.5	24.47	-0.05	2 mm	19019	1:1	front	1.090	1.007	1.098	
1712.40	1312	UMTS 1750	RMC	24.5	24.44	-0.07	0 mm	19019	1:1	bottom	1.970	1.014	1.998	
1732.40	1412	UMTS 1750	RMC	24.5	24.47	-0.06	0 mm	19019	1:1	bottom	2.760	1.007	2.779	A43
1752.60	1513	UMTS 1750	RMC	24.5	24.43	0.13	0 mm	19019	1:1	bottom	2.250	1.016	2.286	
1732.40	1412	UMTS 1750	RMC	24.5	24.47	-0.10	0 mm	19019	1:1	left	0.508	1.007	0.512	
1732.40	1412	UMTS 1750	RMC	23.5	23.49	0.09	0 mm	19019	1:1	back	1.730	1.002	1.733	
1732.40	1412	UMTS 1750	RMC	23.5	23.49	0.17	0 mm	19019	1:1	front	1.910	1.002	1.914	
1880.00	9400	UMTS 1900	RMC	24.5	24.49	-0.05	3 mm	19019	1:1	back	0.875	1.002	0.877	
1880.00	9400	UMTS 1900	RMC	24.5	24.49	-0.18	2 mm	19019	1:1	front	1.500	1.002	1.503	
1852.40	9262	UMTS 1900	RMC	24.5	24.48	-0.01	0 mm	19019	1:1	bottom	3.020	1.005	3.035	
1880.00	9400	UMTS 1900	RMC	24.5	24.49	0.00	0 mm	19019	1:1	bottom	3.120	1.002	3.126	A44
1907.60	9538	UMTS 1900	RMC	24.5	24.42	0.03	0 mm	19019	1:1	bottom	3.100	1.019	3.159	
1880.00	9400	UMTS 1900	RMC	24.5	24.49	-0.03	0 mm	19019	1:1	left	0.713	1.002	0.714	
1880.00	9400	UMTS 1900	RMC	23.5	23.44	0.12	0 mm	19019	1:1	back	1.570	1.014	1.592	
1880.00	9400	UMTS 1900	RMC	23.5	23.44	-0.16	0 mm	19019	1:1	front	1.770	1.014	1.795	
1880.00	9400	UMTS 1900	RMC	24.5	24.49	0.03	0 mm	19019	1:1	bottom	3.100	1.002	3.106	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.5	24.47	-0.01	3 mm	19167	1:1	back	0.957	1.007	0.964	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.5	24.47	-0.14	2 mm	19167	1:1	front	1.470	1.007	1.480	
1851.25	25	PCS CDMA	EVDO Rev. 0	24.5	24.46	-0.01	0 mm	19167	1:1	bottom	2.910	1.009	2.936	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.5	24.47	-0.04	0 mm	19167	1:1	bottom	3.000	1.007	3.021	
1908.75	1175	PCS CDMA	EVDO Rev. 0	24.5	24.45	-0.03	0 mm	19167	1:1	bottom	3.070	1.012	3.107	A45
1880.00	600	PCS CDMA	EVDO Rev. 0	24.5	24.47	-0.03	0 mm	19167	1:1	left	0.771	1.007	0.776	
1851.25	25	PCS CDMA	EVDO Rev. 0	23.5	23.30	0.00	0 mm	19167	1:1	back	2.030	1.047	2.125	
1880.00	600	PCS CDMA	EVDO Rev. 0	23.5	23.21	0.03	0 mm	19167	1:1	back	1.960	1.069	2.095	
1908.75	1175	PCS CDMA	EVDO Rev. 0	23.5	23.25	-0.02	0 mm	19167	1:1	back	1.960	1.059	2.076	
1851.25	25	PCS CDMA	EVDO Rev. 0	23.5	23.30	-0.10	0 mm	19167	1:1	front	2.560	1.047	2.680	
1880.00	600	PCS CDMA	EVDO Rev. 0	23.5	23.21	-0.14	0 mm	19167	1:1	front	2.770	1.069	2.961	
1908.75	1175	PCS CDMA	EVDO Rev. 0	23.5	23.25	-0.13	0 mm	19167	1:1	front	2.940	1.059	3.113	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Phablet 4.0 W/kg (mW/g) averaged over 10 grams							

Blue entry represents variability measurement.

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Table 11-28
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)	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	0.09	0	19027	QPSK	1	0	3 mm	back	1:1	0.880	1.002	0.882	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	0.15	1	19027	QPSK	50	0	3 mm	back	1:1	0.736	1.000	0.736	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	0.14	0	19027	QPSK	1	0	2 mm	front	1:1	0.914	1.002	0.916	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	0.05	1	19027	QPSK	50	0	2 mm	front	1:1	0.782	1.000	0.782	
1720.00	132072	Low	LTE Band 66 (AWS)	20	24.5	24.48	0.09	0	19027	QPSK	1	0	0 mm	bottom	1:1	2.810	1.005	2.824	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.5	24.43	-0.21	0	19027	QPSK	1	99	0 mm	bottom	1:1	2.730	1.016	2.774	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	-0.03	0	19027	QPSK	1	0	0 mm	bottom	1:1	2.880	1.002	2.886	A46
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.5	23.46	-0.09	1	19027	QPSK	50	25	0 mm	bottom	1:1	2.280	1.009	2.301	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.5	23.38	0.00	1	19027	QPSK	50	25	0 mm	bottom	1:1	2.320	1.028	2.385	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	-0.09	1	19027	QPSK	50	0	0 mm	bottom	1:1	2.400	1.000	2.400	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.37	0.04	1	19027	QPSK	100	0	0 mm	bottom	1:1	2.440	1.030	2.513	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	-0.15	0	19027	QPSK	1	0	0 mm	left	1:1	0.618	1.002	0.619	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	-0.14	1	19027	QPSK	50	0	0 mm	left	1:1	0.511	1.000	0.511	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.48	0.18	0	19035	QPSK	1	99	0 mm	back	1:1	1.760	1.005	1.769	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	0.16	0	19035	QPSK	50	25	0 mm	back	1:1	1.770	1.000	1.770	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.5	23.41	0.00	0	19035	QPSK	1	99	0 mm	front	1:1	1.100	1.021	1.123	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.5	23.47	-0.18	0	19035	QPSK	1	99	0 mm	front	1:1	1.570	1.007	1.581	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.48	-0.11	0	19035	QPSK	1	99	0 mm	front	1:1	2.260	1.005	2.271	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.5	23.42	0.03	0	19035	QPSK	50	25	0 mm	front	1:1	1.210	1.019	1.233	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.5	23.42	-0.04	0	19035	QPSK	50	0	0 mm	front	1:1	1.440	1.019	1.467	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.50	-0.07	0	19035	QPSK	50	25	0 mm	front	1:1	2.060	1.000	2.060	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	23.47	0.03	0	19035	QPSK	100	0	0 mm	front	1:1	1.500	1.007	1.511	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.5	24.49	-0.11	0	19027	QPSK	1	0	0 mm	bottom	1:1	2.850	1.002	2.856	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	-0.08	0	19027	QPSK	1	0	3 mm	back	1:1	1.160	1.000	1.160	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	-0.03	1	19027	QPSK	50	25	3 mm	back	1:1	0.865	1.000	0.865	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	-0.20	0	19027	QPSK	1	0	2 mm	front	1:1	1.560	1.000	1.560	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	-0.17	1	19027	QPSK	50	25	2 mm	front	1:1	1.180	1.000	1.180	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	-0.08	0	19027	QPSK	1	0	0 mm	bottom	1:1	2.990	1.000	2.990	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	24.5	24.49	-0.17	0	19027	QPSK	1	50	0 mm	bottom	1:1	3.040	1.002	3.046	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.5	24.49	-0.17	0	19027	QPSK	1	0	0 mm	bottom	1:1	3.080	1.002	3.086	A47
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	-0.14	1	19027	QPSK	50	25	0 mm	bottom	1:1	2.260	1.000	2.260	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	23.5	23.45	-0.17	1	19027	QPSK	50	0	0 mm	bottom	1:1	2.400	1.012	2.429	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	23.41	-0.13	1	19027	QPSK	50	0	0 mm	bottom	1:1	2.260	1.021	2.307	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.41	0.19	1	19027	QPSK	100	0	0 mm	bottom	1:1	2.230	1.021	2.277	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.5	24.50	-0.06	0	19027	QPSK	1	0	0 mm	left	1:1	0.659	1.000	0.659	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.50	0.00	1	19027	QPSK	50	25	0 mm	left	1:1	0.535	1.000	0.535	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.47	0.10	0	19027	QPSK	1	50	0 mm	back	1:1	2.150	1.007	2.165	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	23.5	23.43	-0.02	0	19027	QPSK	1	50	0 mm	back	1:1	2.140	1.016	2.174	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	23.48	0.00	0	19027	QPSK	1	0	0 mm	back	1:1	2.210	1.005	2.221	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	23.49	0.01	0	19027	QPSK	50	0	0 mm	back	1:1	1.710	1.002	1.713	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	23.39	0.01	0	19027	QPSK	100	0	0 mm	back	1:1	1.740	1.026	1.785	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.47	-0.13	0	19027	QPSK	1	50	0 mm	front	1:1	2.200	1.007	2.215	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	23.5	23.43	-0.12	0	19027	QPSK	1	50	0 mm	front	1:1	2.310	1.016	2.347	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	23.48	-0.12	0	19027	QPSK	1	0	0 mm	front	1:1	2.520	1.005	2.533	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	23.49	-0.18	0	19027	QPSK	50	0	0 mm	front	1:1	1.950	1.002	1.954	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	23.39	-0.12	0	19027	QPSK	100	0	0 mm	front	1:1	2.000	1.026	2.052	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Phablet 4.0 W/kg (mW/g) averaged over 10 grams											

Blue entry represents variability measurement.

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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.
12. Additional SAR tests for phablet SAR were evaluated per KDB 616217 Section 6 (See Section 6.8 for more information).
13. Unless otherwise noted, when 10g SAR measurement is considered, a factor of 2.5 is applied to the 1g thresholds.

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.

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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.

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.

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).
4. Per KDB Publication 941225 D05Av01r02, SAR for downlink only LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive.

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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 8.7.3 for more information.
3. 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.
4. 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 0 for the time domain plot and calculation for the duty factor of the device.

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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.

When standalone SAR is not required to be measured, per FCC KDB 447498 D01v06 4.3.2 b), the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission assessment involving that transmitter.

$$\text{Estimated SAR} = \frac{\sqrt{f(GHz)}}{7.5} * \frac{(\text{Max Power of channel, mW})}{\text{Min. Separation Distance, mm}}$$

When standalone SAR is not required to be measured, per FCC KDB 447498 D01v06 4.3.2 b), the following equation must be used to estimate the standalone 10g SAR for simultaneous transmission assessment involving that transmitter.

$$\text{Estimated SAR} = \frac{\sqrt{f(GHz)}}{18.75} * \frac{(\text{Max Power of channel, mW})}{\text{Min. Separation Distance, mm}}$$

Table 12-1
Estimated SAR

Mode	Frequency	Maximum Allowed Power	Separation Distance (Body)	Estimated SAR (Body)	Separation Distance (Phablet)	Estimated SAR (Phablet)
	[MHz]	[dBm]	[mm]	[W/kg]	[mm]	[W/kg]
Bluetooth	2480	11.50	10	0.294	5	0.235

Note: Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

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12.3 Head SAR Simultaneous Transmission Analysis

Table 12-2
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)
Head SAR	GSM/GPRS 850	0.198	1.085	1.283
	GSM/GPRS 1900	0.094	1.085	1.179
	UMTS 850	0.200	1.085	1.285
	UMTS 1750	0.091	1.085	1.176
	UMTS 1900	0.155	1.085	1.240
	Cell. CDMA/EVDO	0.212	1.085	**1.297**
	PCS CDMA/EVDO	0.157	1.085	1.242
	LTE Band 71	0.069	1.085	1.154
	LTE Band 12	0.184	1.085	1.269
	LTE Band 13	0.190	1.085	1.275
	LTE Band 5 (Cell)	0.197	1.085	1.282
	LTE Band 66 (AWS)	0.096	1.085	1.181
	LTE Band 2 (PCS)	0.118	1.085	1.203

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)
Head SAR	GSM/GPRS 850	0.198	0.142	0.340
	GSM/GPRS 1900	0.094	0.142	0.236
	UMTS 850	0.200	0.142	0.342
	UMTS 1750	0.091	0.142	0.233
	UMTS 1900	0.155	0.142	0.297
	Cell. CDMA/EVDO	0.212	0.142	**0.354**
	PCS CDMA/EVDO	0.157	0.142	0.299
	LTE Band 71	0.069	0.142	0.211
	LTE Band 12	0.184	0.142	0.326
	LTE Band 13	0.190	0.142	0.332
	LTE Band 5 (Cell)	0.197	0.142	0.339
	LTE Band 66 (AWS)	0.096	0.142	0.238
	LTE Band 2 (PCS)	0.118	0.142	0.260

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12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-4
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)
Body-Worn	GSM/GPRS 850	0.449	0.466	0.915
	GSM/GPRS 1900	0.410	0.466	0.876
	UMTS 850	0.551	0.466	1.017
	UMTS 1750	0.399	0.466	0.865
	UMTS 1900	0.620	0.466	1.086
	Cell. CDMA	0.573	0.466	1.039
	PCS CDMA	0.642	0.466	1.108
	LTE Band 71	0.446	0.466	0.912
	LTE Band 12	0.660	0.466	**1.126**
	LTE Band 13	0.640	0.466	1.106
	LTE Band 5 (Cell)	0.551	0.466	1.017
	LTE Band 66 (AWS)	0.419	0.466	0.885
	LTE Band 2 (PCS)	0.594	0.466	1.060

Table 12-5
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)
Body-Worn	GSM/GPRS 850	0.449	0.294	0.743
	GSM/GPRS 1900	0.410	0.294	0.704
	UMTS 850	0.551	0.294	0.845
	UMTS 1750	0.399	0.294	0.693
	UMTS 1900	0.620	0.294	0.914
	Cell. CDMA	0.573	0.294	0.867
	PCS CDMA	0.642	0.294	0.936
	LTE Band 71	0.446	0.294	0.740
	LTE Band 12	0.660	0.294	**0.954**
	LTE Band 13	0.640	0.294	0.934
	LTE Band 5 (Cell)	0.551	0.294	0.845
	LTE Band 66 (AWS)	0.419	0.294	0.713
	LTE Band 2 (PCS)	0.594	0.294	0.888

Note: Bluetooth SAR was not required to be measured per FCC KDB Publication 447498 D01v06. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

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12.5 Hotspot SAR Simultaneous Transmission Analysis

Per FCC KDB Publication 941225 D06v02r01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR ("-").

Table 12-6
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)
Hotspot SAR	GPRS 850	0.573	0.726	1.299
	GPRS 1900	0.803	0.726	See Table Below
	UMTS 850	0.702	0.726	**1.428**
	UMTS 1750	0.649	0.726	1.375
	UMTS 1900	1.192	0.726	See Table Below
	Cell. EVDO	0.743	0.726	See Table Below
	PCS EVDO	1.255	0.726	See Table Below
	LTE Band 71	0.446	0.726	1.172
	LTE Band 12	0.776	0.726	See Table Below
	LTE Band 13	0.846	0.726	See Table Below
	LTE Band 5 (Cell)	0.623	0.726	1.349
	LTE Band 66 (AWS)	0.700	0.726	1.426
	LTE Band 2 (PCS)	1.142	0.726	See Table Below

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	Back	0.410	0.466	0.876
	Front	0.376	0.502	0.878
	Top	-	0.390	0.390
	Bottom	0.803	-	0.803
	Right	-	-	0.000
	Left	0.177	0.726	0.903

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	Back	0.620	0.466	1.086
	Front	0.566	0.502	1.068
	Top	-	0.390	0.390
	Bottom	1.192	-	1.192
	Right	-	-	0.000
	Left	0.275	0.726	1.001

Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	Back	0.500	0.466	0.966
	Front	0.743	0.502	**1.245**
	Top	-	0.390	0.390
	Bottom	0.312	-	0.312
	Right	-	-	0.000
	Left	0.219	0.726	0.945

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	Back	0.755	0.466	1.221
	Front	0.899	0.502	**1.401**
	Top	-	0.390	0.390
	Bottom	1.255	-	1.255
	Right	-	-	0.000
	Left	0.298	0.726	1.024

Simult Tx	Configuration	LTE Band 12 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	Back	0.660	0.466	1.126
	Front	0.776	0.502	1.278
	Top	-	0.390	0.390
	Bottom	0.420	-	0.420
	Right	-	-	0.000
	Left	0.405	0.726	1.131

Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	Back	0.640	0.466	1.106
	Front	0.846	0.502	1.348
	Top	-	0.390	0.390
	Bottom	0.464	-	0.464
	Right	-	-	0.000
	Left	0.321	0.726	1.047

Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	Back	0.594	0.466	1.060
	Front	0.519	0.502	1.021
	Top	-	0.390	0.390
	Bottom	1.142	-	1.142
	Right	-	-	0.000
	Left	0.261	0.726	0.987

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Table 12-7
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)
Hotspot SAR	GPRS 850	0.573	0.294	0.867
	GPRS 1900	0.803	0.294	1.097
	UMTS 850	0.702	0.294	0.996
	UMTS 1750	0.649	0.294	0.943
	UMTS 1900	1.192	0.294	See Table Below
	Cell. EVDO	0.743	0.294	1.037
	PCS EVDO	1.255	0.294	See Table Below
	LTE Band 71	0.446	0.294	0.740
	LTE Band 12	0.776	0.294	1.070
	LTE Band 13	0.846	0.294	1.140
	LTE Band 5 (Cell)	0.623	0.294	0.917
	LTE Band 66 (AWS)	0.700	0.294	0.994
	LTE Band 2 (PCS)	1.142	0.294	**1.436**

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	Back	0.620	0.294	0.914
	Front	0.566	0.294	0.860
	Top	-	0.294	0.294
	Bottom	1.192	-	1.192
	Right	-	-	0.000
	Left	0.275	0.294	0.569

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	Back	0.755	0.294	1.049
	Front	0.899	0.294	1.193
	Top	-	0.294	0.294
	Bottom	1.255	-	**1.255**
	Right	-	-	0.000
	Left	0.298	0.294	0.592

Note: Bluetooth SAR was not required to be measured per FCC KDB Publication 447498 D01v06. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

12.6 Phablet Simultaneous Transmission Analysis

Table 12-8
Simultaneous Transmission Scenario with Bluetooth (Phablet)

Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
UMTS 1750	2.779	0.235	3.014
UMTS 1900	3.159	0.235	**3.394**
PCS EVDO	3.113	0.235	3.348
LTE Band 66 (AWS)	2.886	0.235	3.121
LTE Band 2 (PCS)	3.086	0.235	3.321

Note: Bluetooth SAR was not required to be measured per FCC KDB Publication 447498 D01v06. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

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.

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13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

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

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

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

Table 13-1
Head SAR Measurement Variability Results

HEAD VARIABILITY RESULTS															
Band	FREQUENCY		Mode/Band	Service	Side	Test Position	Data Rate (Mbps)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.						(W/kg)	(W/kg)		(W/kg)		(W/kg)	
2450	2412.00	1	802.11b, 22 MHz Bandwidth	DSSS	Right	Cheek	1	1.010	0.945	1.07	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)	
1900	1908.75	1175	PCS CDMA	EVDO Rev. 0	bottom	10 mm	1.240	1.110	1.12	N/A	N/A	N/A	N/A
750	782.00	23230	LTE Band 13, 10 MHz Bandwidth	QPSK, 1 RB, 25 RB Offset	front	10 mm	0.821	0.760	1.08	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								

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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)	
1900	1880.00	9400	UMTS 1900	RMC	bottom	0 mm	3.120	3.100	1.01	N/A	N/A	N/A	N/A
1750	1770.00	132572	LTE Band 66 (AWS), 20 MHz Bandwidth	QPSK, 1 RB, 0 RB Offset	bottom	0 mm	2.880	2.850	1.01	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.

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14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Vector Network Analyzer	8/17/2017	Annual	8/17/2018	MY40003841
Agilent	8753ES	S-Parameter Network Analyzer	9/14/2017	Annual	9/14/2018	US39170118
Agilent	8753ES	S-Parameter Network Analyzer	2/8/2018	Annual	2/8/2019	US39170122
Agilent	E4438C	ESG Vector Signal Generator	3/24/2017	Biennial	3/24/2019	MY42082385
Agilent	E4438C	ESG Vector Signal Generator	3/23/2017	Biennial	3/23/2019	MY42082659
Agilent	E4438C	ESG Vector Signal Generator	3/21/2017	Biennial	3/21/2019	MY45090700
Agilent	E5515C	Wireless Communications Test Set	5/31/2017	Annual	5/31/2018	GB43304278
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Agilent	N5182A	MXG Vector Signal Generator	11/1/2017	Annual	11/1/2018	MY47420603
Agilent	N9020A	MXA Signal Analyzer	1/24/2018	Annual	1/24/2019	US46470561
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Anritsu	MA24106A	USB Power Sensor	6/7/2017	Annual	6/7/2018	1231535
Anritsu	MA24106A	USB Power Sensor	6/7/2017	Annual	6/7/2018	1231538
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1339018
Anritsu	ML2495A	Power Meter	10/22/2017	Annual	10/22/2018	941001
Anritsu	MT8820C	Radio Communication Analyzer	1/5/2018	Annual	1/5/2019	6201144418
Anritsu	MT8821C	Radio Communication Analyzer	11/17/2017	Annual	11/17/2018	6201381794
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	1/8/2018	Annual	1/8/2019	160473909
Control Company	4352	Ultra Long Stem Thermometer	1/8/2018	Annual	1/8/2019	160508097
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
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
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
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	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	Radio Communication Tester	11/3/2017	Annual	11/3/2018	100976
Seekonk	NC-100	Torque Wrench (8" lb)	9/1/2016	Biennial	9/1/2018	21053
SPEAG	D1750V2	1750 MHz SAR Dipole	5/9/2017	Annual	5/9/2018	1148
SPEAG	D1750V2	1750 MHz SAR Dipole	7/14/2016	Biennial	7/14/2018	1150
SPEAG	D1900V2	1900 MHz SAR Dipole	7/8/2016	Biennial	7/8/2018	5d080
SPEAG	D1900V2	1900 MHz SAR Dipole	2/7/2018	Annual	2/7/2019	5d148
SPEAG	D2450V2	2450 MHz SAR Dipole	9/11/2017	Annual	9/11/2018	797
SPEAG	D750V3	750 MHz SAR Dipole	1/15/2018	Annual	1/15/2019	1003
SPEAG	D750V3	750 MHz SAR Dipole	2/7/2018	Annual	2/7/2019	1046
SPEAG	D750V3	750 MHz SAR Dipole	7/13/2016	Biennial	7/13/2018	1161
SPEAG	D835V2	835 MHz SAR Dipole	1/15/2018	Annual	1/15/2019	4d132
SPEAG	D835V2	835 MHz SAR Dipole	7/11/2017	Annual	7/11/2018	4d133
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/15/2018	Annual	2/15/2019	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/9/2018	Annual	2/9/2019	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/9/2017	Annual	8/9/2018	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/21/2017	Annual	6/21/2018	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/11/2017	Annual	4/11/2018	1407
SPEAG	DAK-3.5	Dielectric Assessment Kit	9/12/2017	Annual	9/12/2018	1091
SPEAG	ES3DV3	SAR Probe	2/13/2018	Annual	2/13/2019	3213
SPEAG	ES3DV3	SAR Probe	8/14/2017	Annual	8/14/2018	3332
SPEAG	EX3DV4	SAR Probe	2/14/2018	Annual	2/14/2019	3914
SPEAG	EX3DV4	SAR Probe	4/18/2017	Annual	4/18/2018	7406
SPEAG	ES3DV3	SAR Probe	9/18/2017	Annual	9/18/2018	3287

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.

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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	

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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]

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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.

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[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.

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APPENDIX A: SAR TEST DATA

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PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

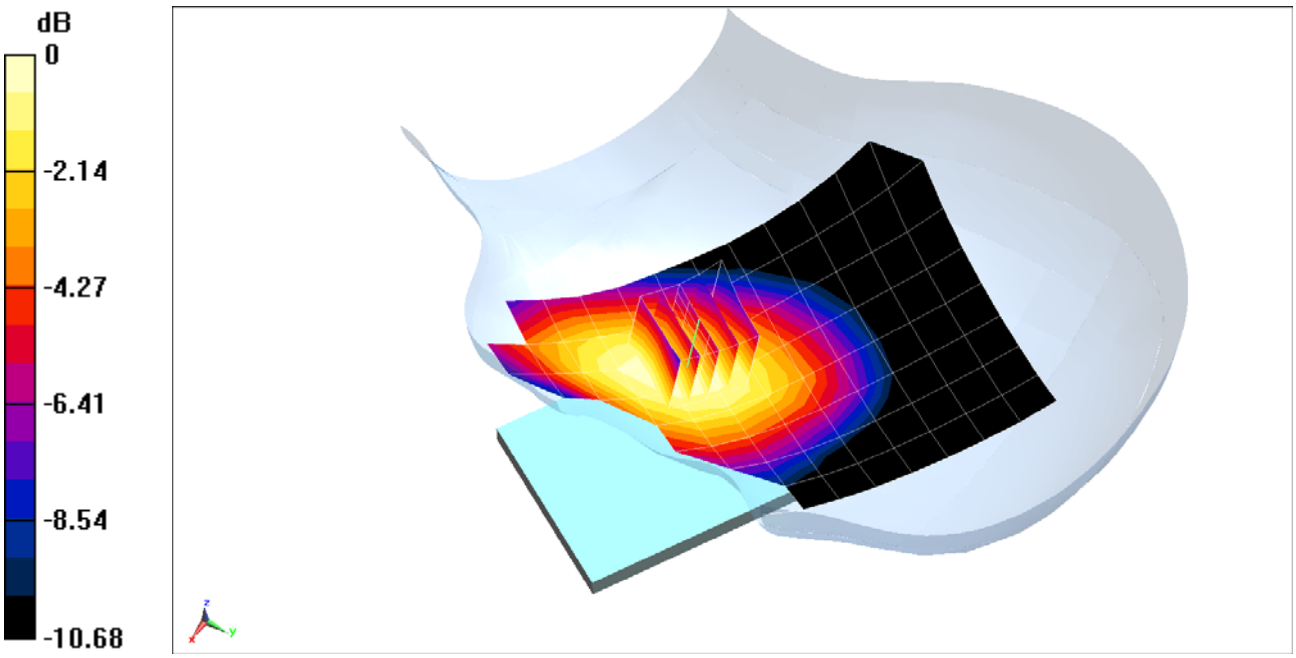
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.76
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.941 S/m; ε_r = 39.768; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-13-2018; Ambient Temp: 23.4°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.42, 6.42, 6.42); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: GPRS 850, Left Head, Cheek, Mid.ch, 3 Tx slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.11 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.242 W/kg
SAR(1 g) = 0.190 W/kg



0 dB = 0.206 W/kg = -6.86 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

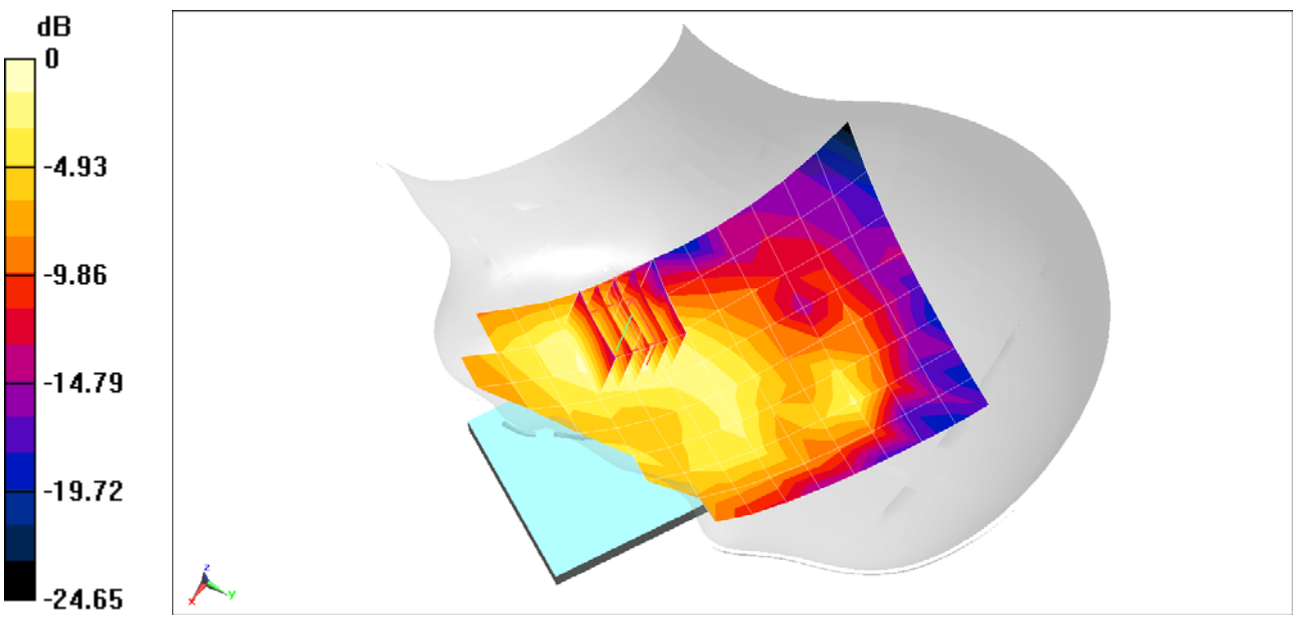
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.76
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.418 S/m; ε_r = 39.593; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-15-2018; Ambient Temp: 21.5°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3914; ConvF(7.98, 7.98, 7.98); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: GPRS 1900, Left Head, Cheek, Mid.ch, 3 Tx slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.350 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.146 W/kg
SAR(1 g) = 0.091 W/kg



0 dB = 0.126 W/kg = -9.00 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

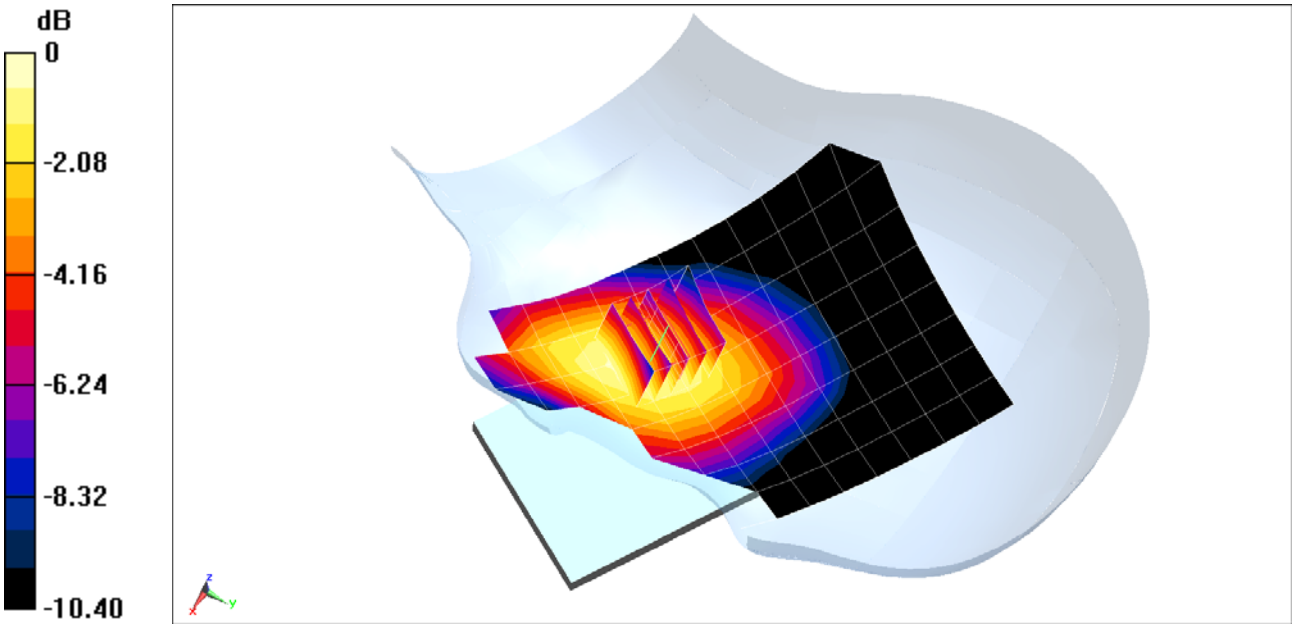
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.941 S/m; ε_r = 39.768; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-13-2018; Ambient Temp: 23.4°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.42, 6.42, 6.42); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: UMTS 850, 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 = 14.93 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.243 W/kg
SAR(1 g) = 0.196 W/kg



0 dB = 0.214 W/kg = -6.70 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

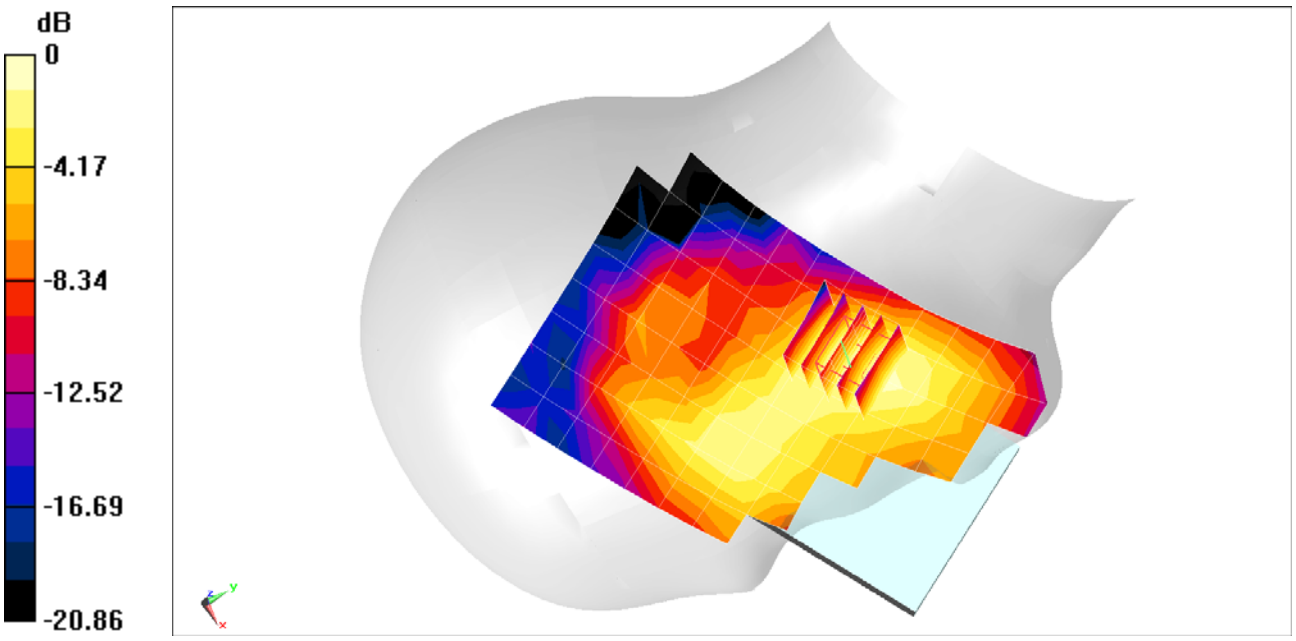
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.386 S/m; ε_r = 39.267; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-13-2018; Ambient Temp: 22.3°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3914; ConvF(8.34, 8.34, 8.34); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: UMTS 1750, 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 = 8.358 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.135 W/kg
SAR(1 g) = 0.090 W/kg



0 dB = 0.116 W/kg = -9.36 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

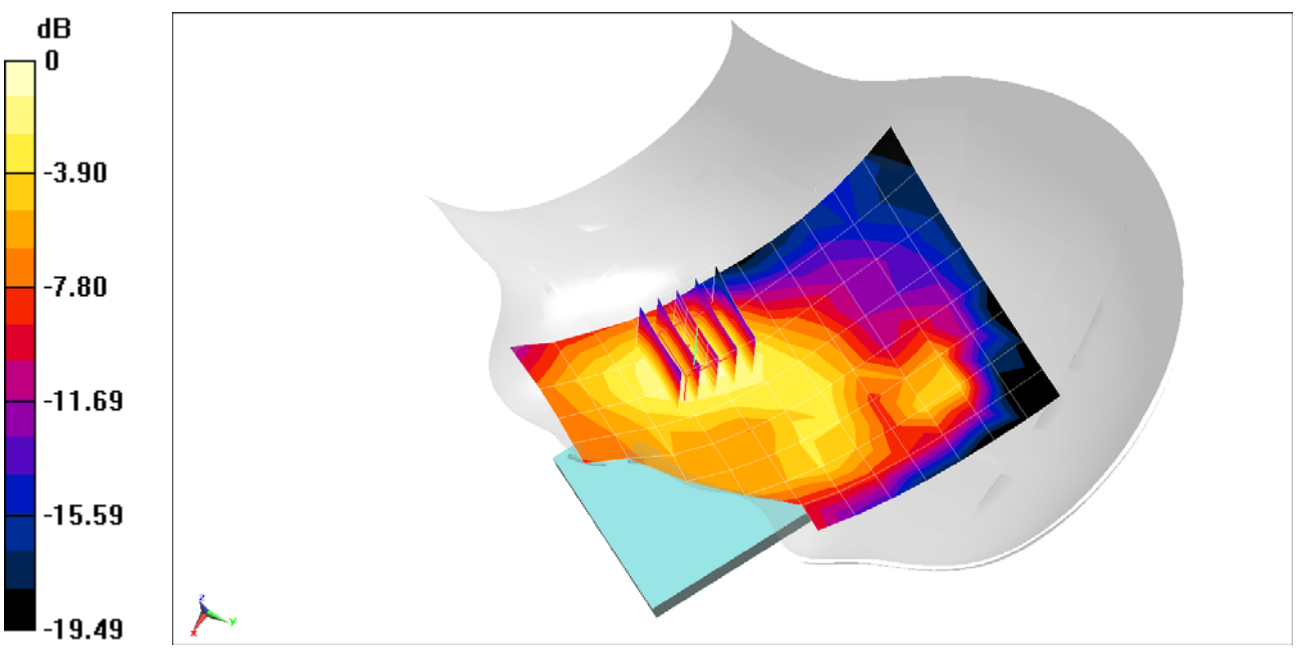
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.418 S/m; ε_r = 39.593; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-15-2018; Ambient Temp: 21.5°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3914; ConvF(7.98, 7.98, 7.98); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.91 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.249 W/kg
SAR(1 g) = 0.155 W/kg



0 dB = 0.218 W/kg = -6.62 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

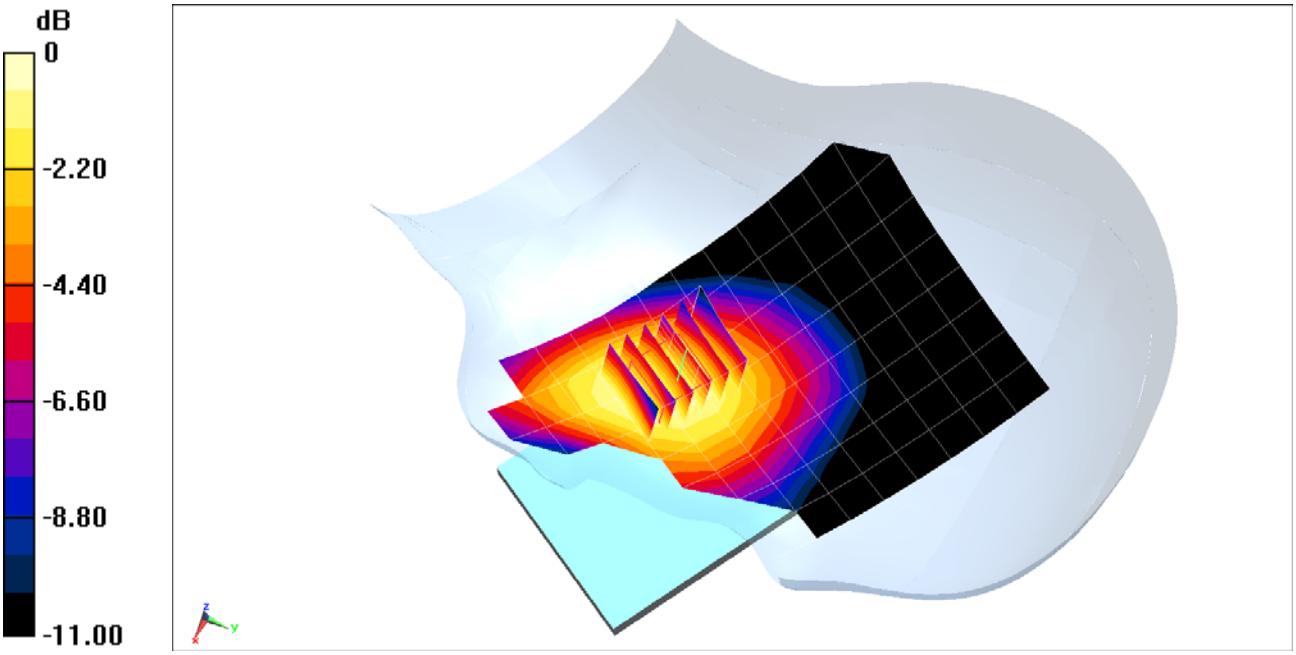
Communication System: UID 0, Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.909 S/m; ε_r = 42.459; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-31-2018; Ambient Temp: 23.8°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3213; ConvF(6.42, 6.42, 6.42); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.47 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.255 W/kg
SAR(1 g) = 0.203 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

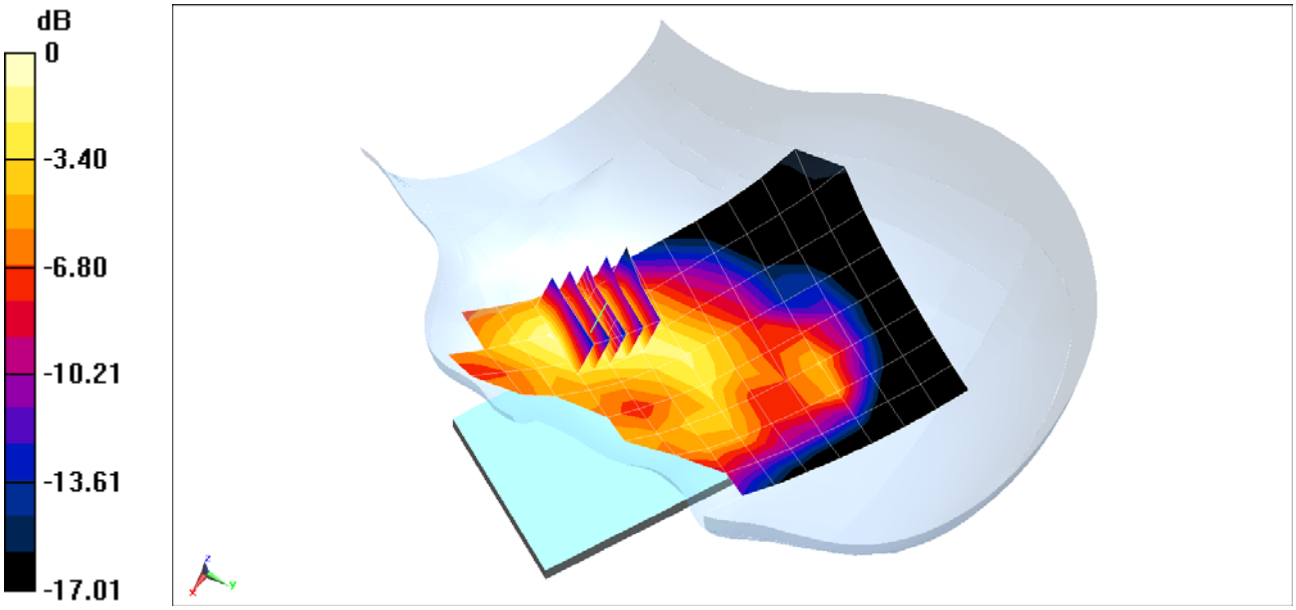
Communication System: UID 0, PCS CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.413 S/m; ε_r = 39.917; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-30-2018; Ambient Temp: 22.4°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3332; ConvF(5.33, 5.33, 5.33); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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 = 11.00 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.243 W/kg
SAR(1 g) = 0.153 W/kg



0 dB = 0.175 W/kg = -7.57 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19035

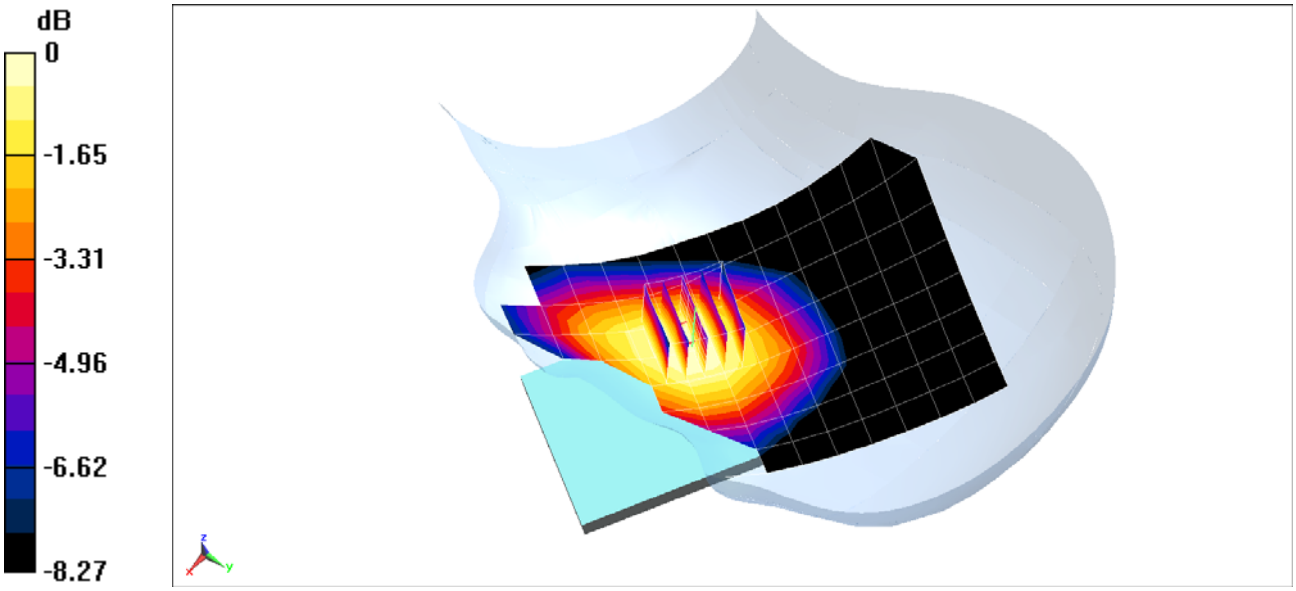
Communication System: UID 0, LTE Band 71; Frequency: 680.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 680.5 MHz; σ = 0.855 S/m; ε_r = 40.952; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-14-2018; Ambient Temp: 23.9°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3213; ConvF(6.75, 6.75, 6.75); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 71, Left Head, Cheek, Mid.ch
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.578 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.0860 W/kg
SAR(1 g) = 0.069 W/kg



0 dB = 0.0744 W/kg = -11.28 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19035

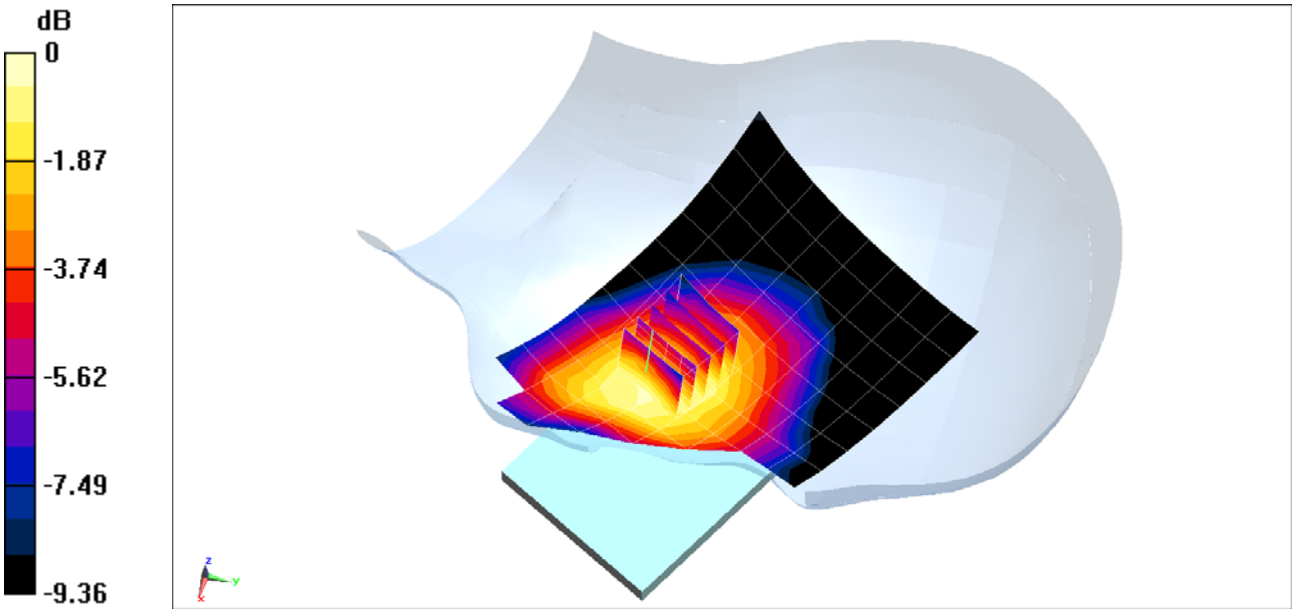
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.863 S/m; ε_r = 40.817; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-14-2018; Ambient Temp: 23.9°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3213; ConvF(6.75, 6.75, 6.75); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 12, Left Head, Cheek, Mid.ch, QPSK
10 MHz Bandwidth 1 RB, 49 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 = 15.25 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.231 W/kg
SAR(1 g) = 0.181 W/kg



0 dB = 0.198 W/kg = -7.03 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19035

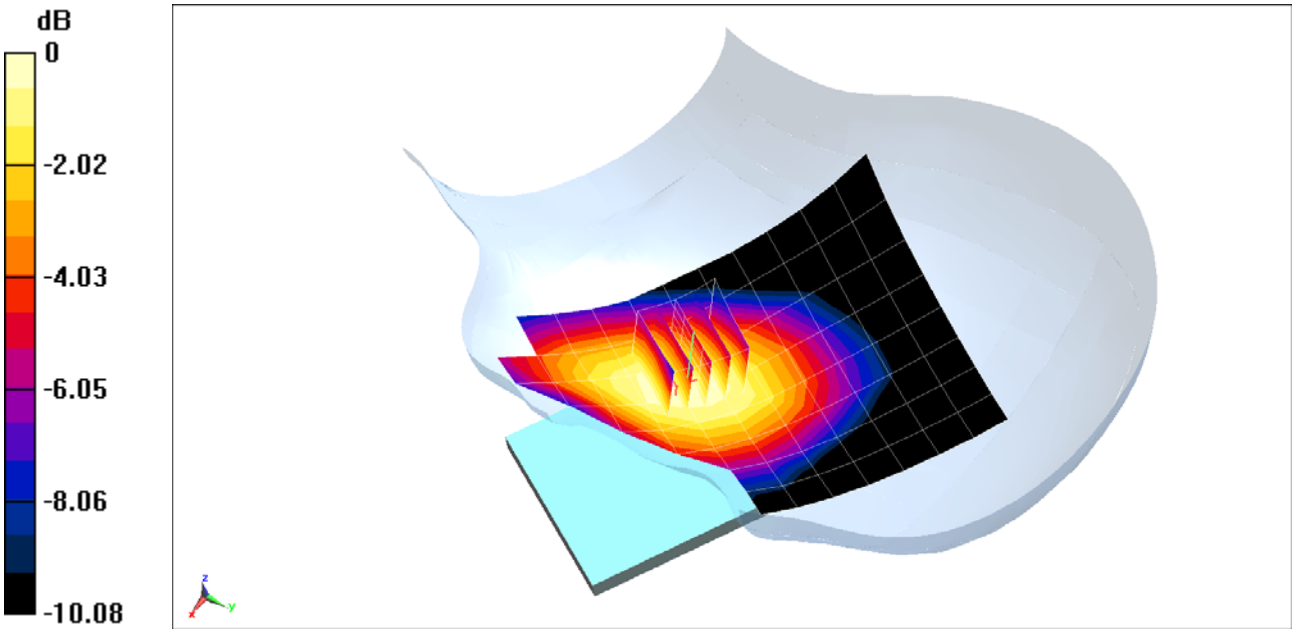
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 782 MHz; σ = 0.903 S/m; ε_r = 40.697; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-11-2018; Ambient Temp: 21.0°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3213; ConvF(6.75, 6.75, 6.75); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 13, Left Head, Cheek, Mid.ch, QPSK
10 MHz Bandwidth, 1 RB, 25 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 = 15.36 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.226 W/kg
SAR(1 g) = 0.184 W/kg



0 dB = 0.198 W/kg = -7.03 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19035

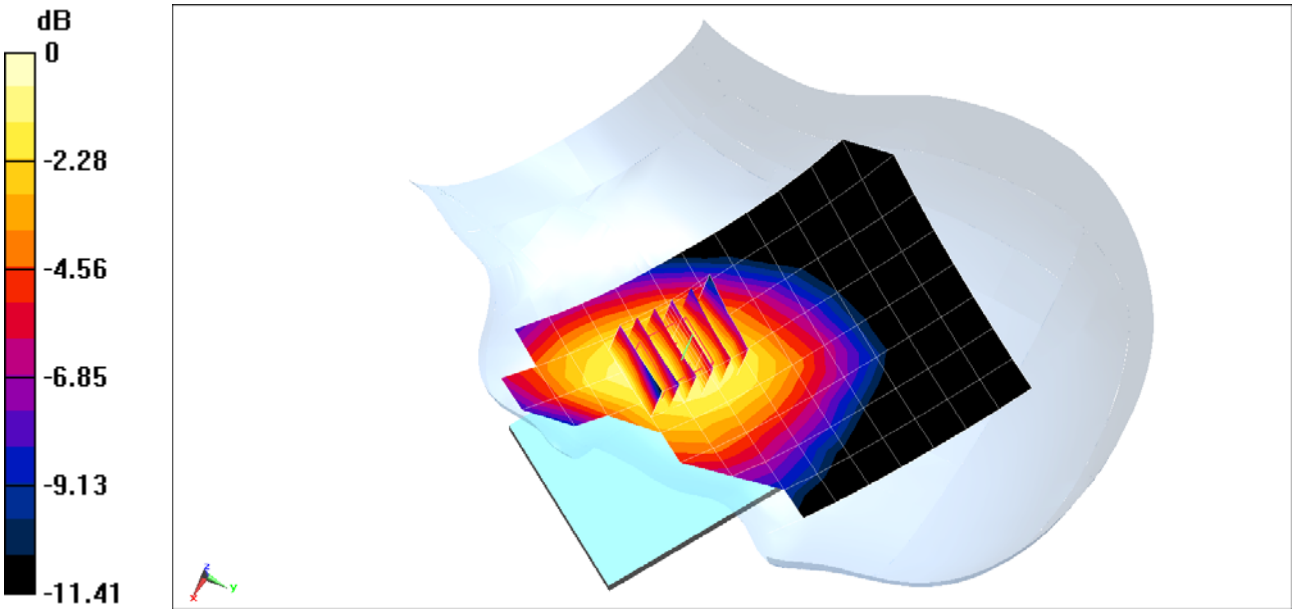
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.941 S/m; ε_r = 39.768; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-13-2018; Ambient Temp: 23.4°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.42, 6.42, 6.42); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 5 (Cell.), Left Head, Cheek, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.16 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.260 W/kg
SAR(1 g) = 0.197 W/kg



0 dB = 0.227 W/kg = -6.44 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19027

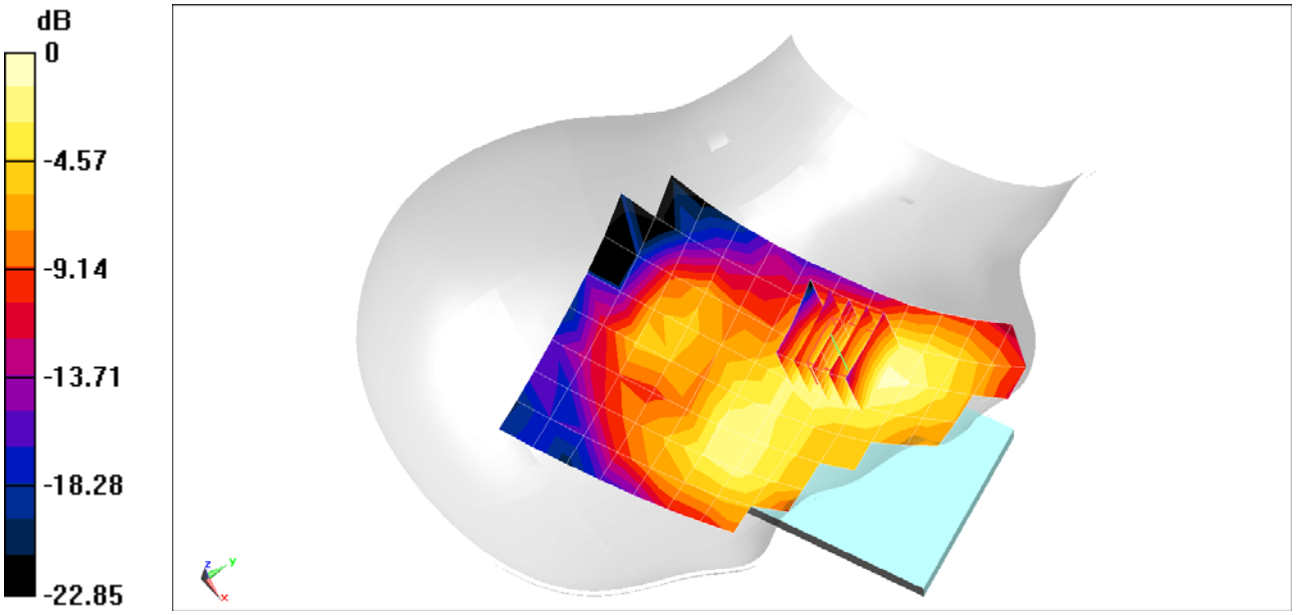
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1770 MHz; σ = 1.425 S/m; ε_r = 39.076; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-13-2018; Ambient Temp: 22.3°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3914; ConvF(8.34, 8.34, 8.34); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 66 (AWS), Right Head, Cheek, High.ch
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.763 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.149 W/kg
SAR(1 g) = 0.096 W/kg



0 dB = 0.125 W/kg = -9.03 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19027

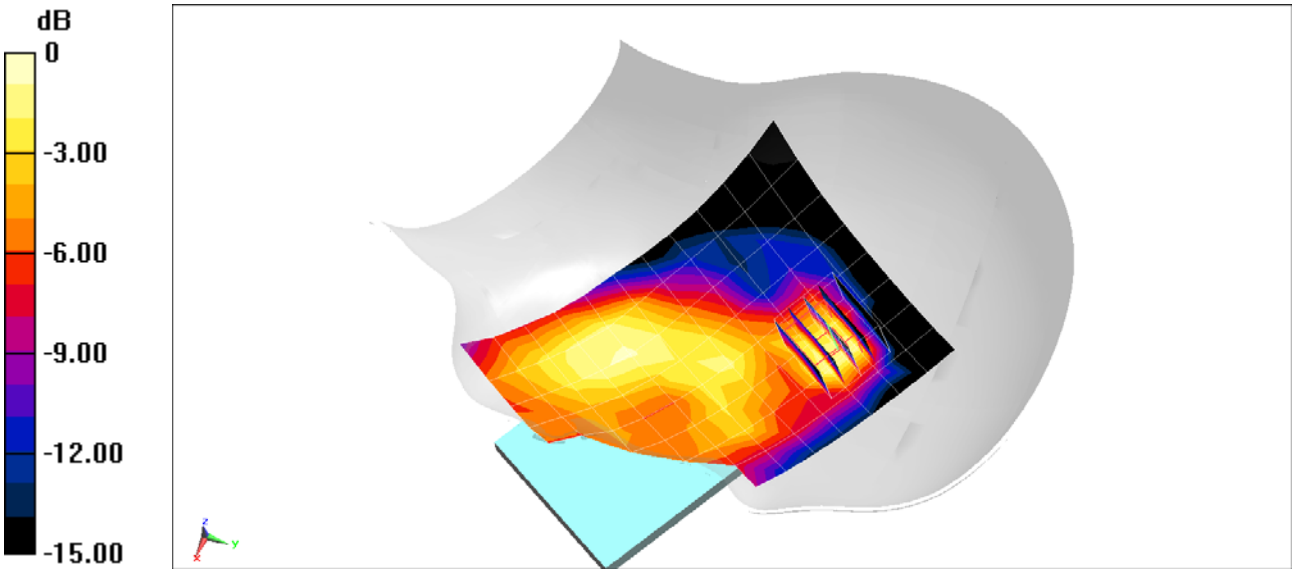
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1860 MHz; σ = 1.397 S/m; ε_r = 39.687; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-15-2018; Ambient Temp: 21.5°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3914; ConvF(7.98, 7.98, 7.98); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 2 (PCS), Left Head, Cheek, Low.ch
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.36 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.196 W/kg
SAR(1 g) = 0.118 W/kg



0 dB = 0.167 W/kg = -7.77 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19100

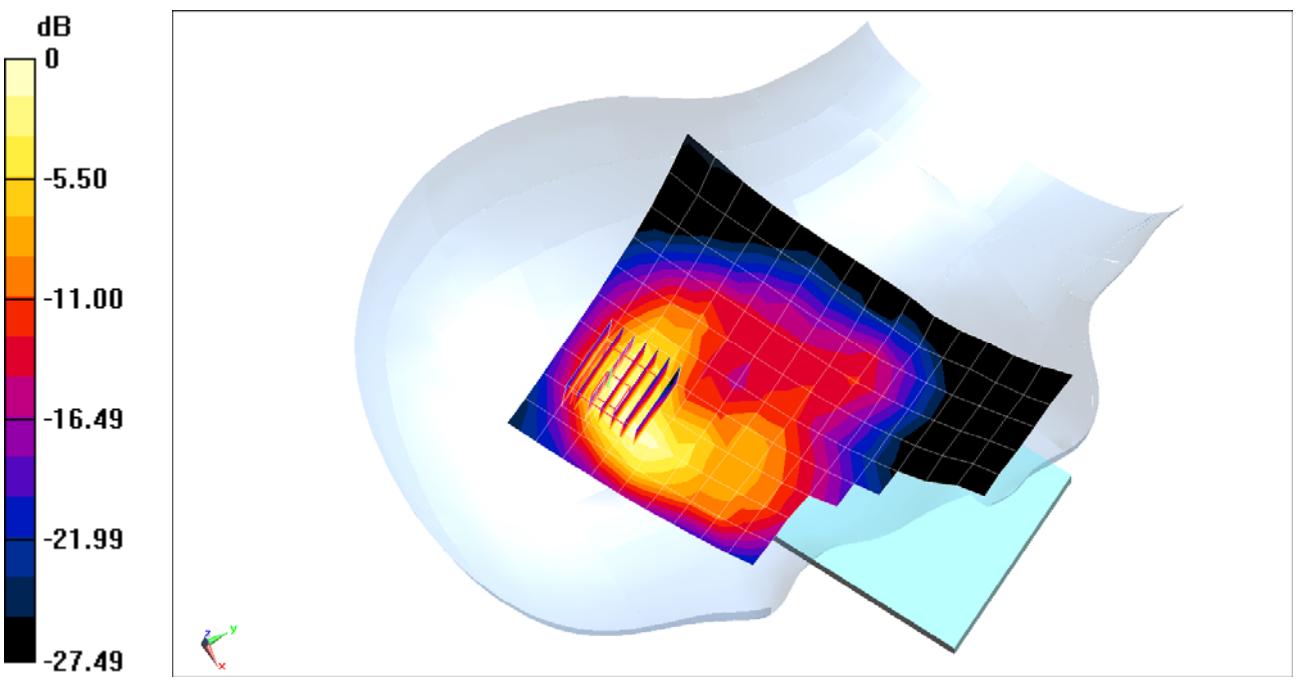
Communication System: UID 0, _IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.81 S/m; ε_r = 40.148; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-18-2018; Ambient Temp: 21.7°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3332; ConvF(4.68, 4.68, 4.68); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.20 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 2.27 W/kg
SAR(1 g) = 1.01 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19100

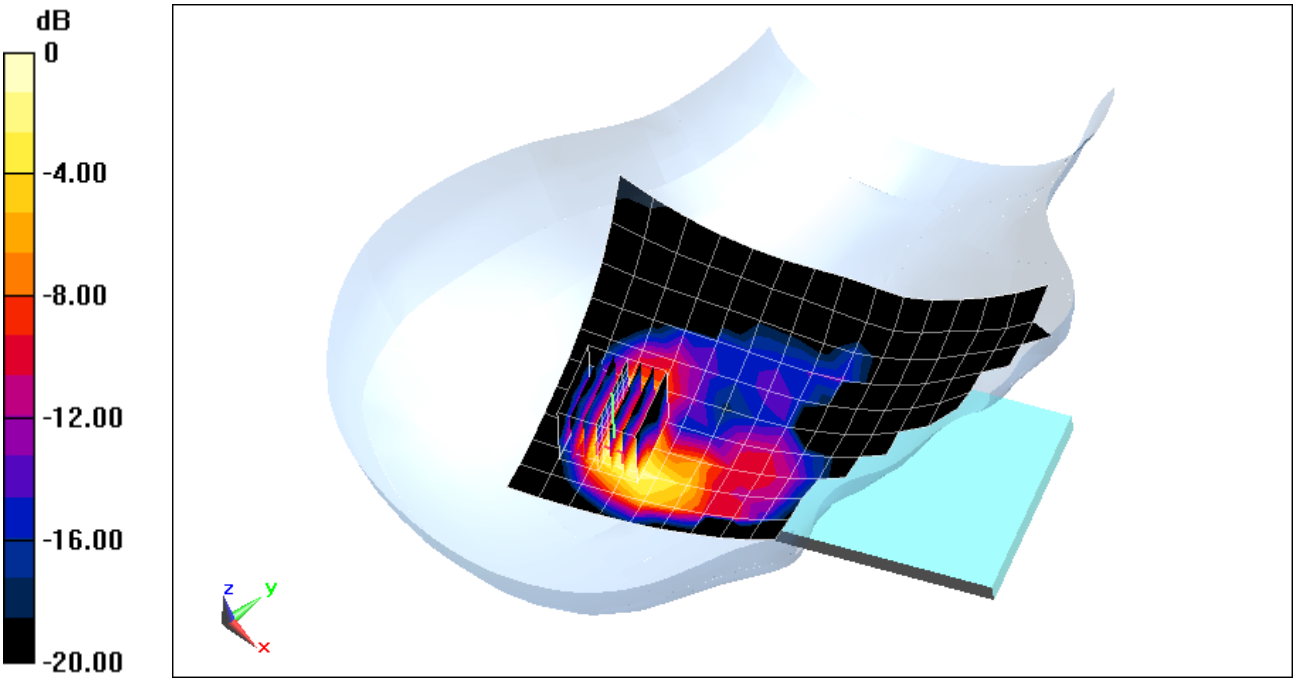
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.294
Medium: 2450 Head Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.754 S/m; ε_r = 40.595; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-25-2018; Ambient Temp: 23.2C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3332; ConvF(4.68, 4.68, 4.68); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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 = 8.500 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.237 W/kg
SAR(1 g) = 0.104 W/kg



0 dB = 0.142 W/kg = -8.48 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

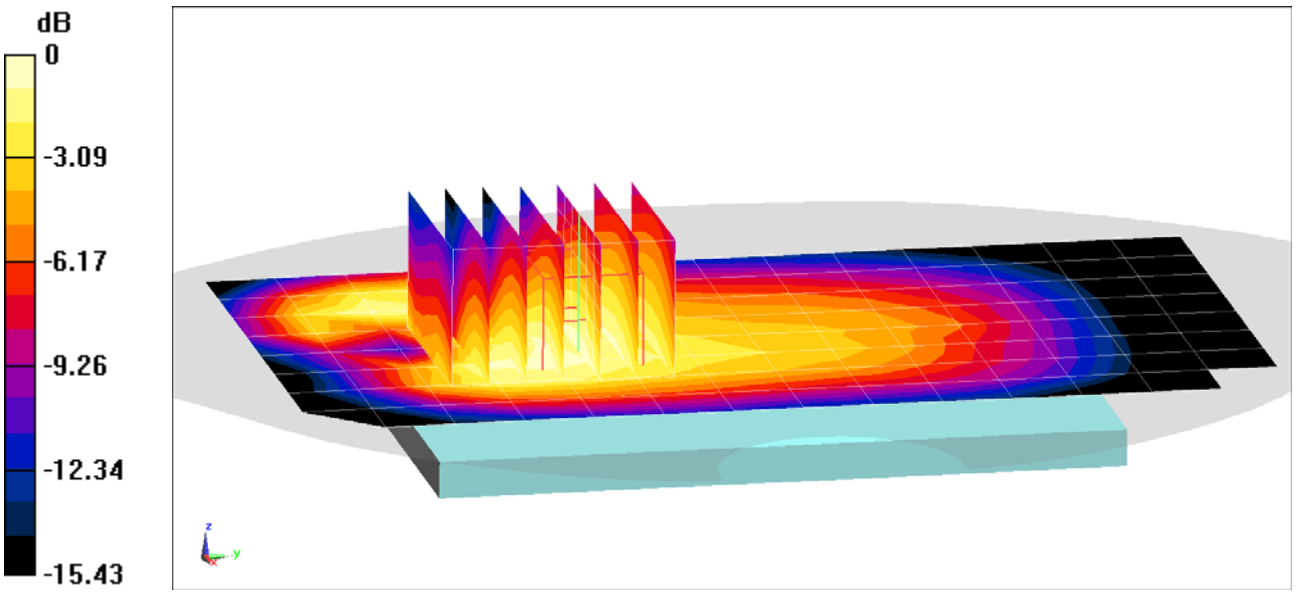
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.76
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.986 S/m; ε_r = 53.456; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-07-2018; Ambient Temp: 21.0°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN3914; ConvF(9.57, 9.57, 9.57); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.83 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.575 W/kg
SAR(1 g) = 0.431 W/kg



0 dB = 0.527 W/kg = -2.78 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

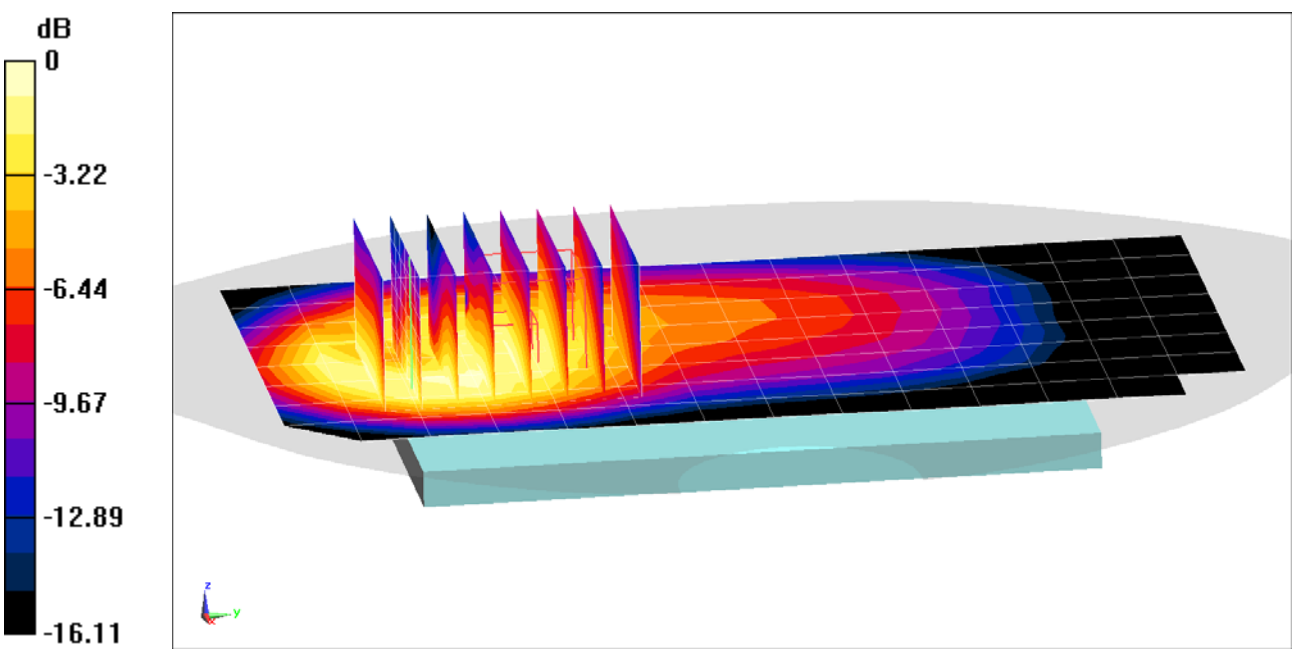
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.76
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.986 S/m; ε_r = 53.456; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-07-2018; Ambient Temp: 21.0°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN3914; ConvF(9.57, 9.57, 9.57); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.26 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.894 W/kg
SAR(1 g) = 0.550 W/kg



0 dB = 0.761 W/kg = -1.19 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

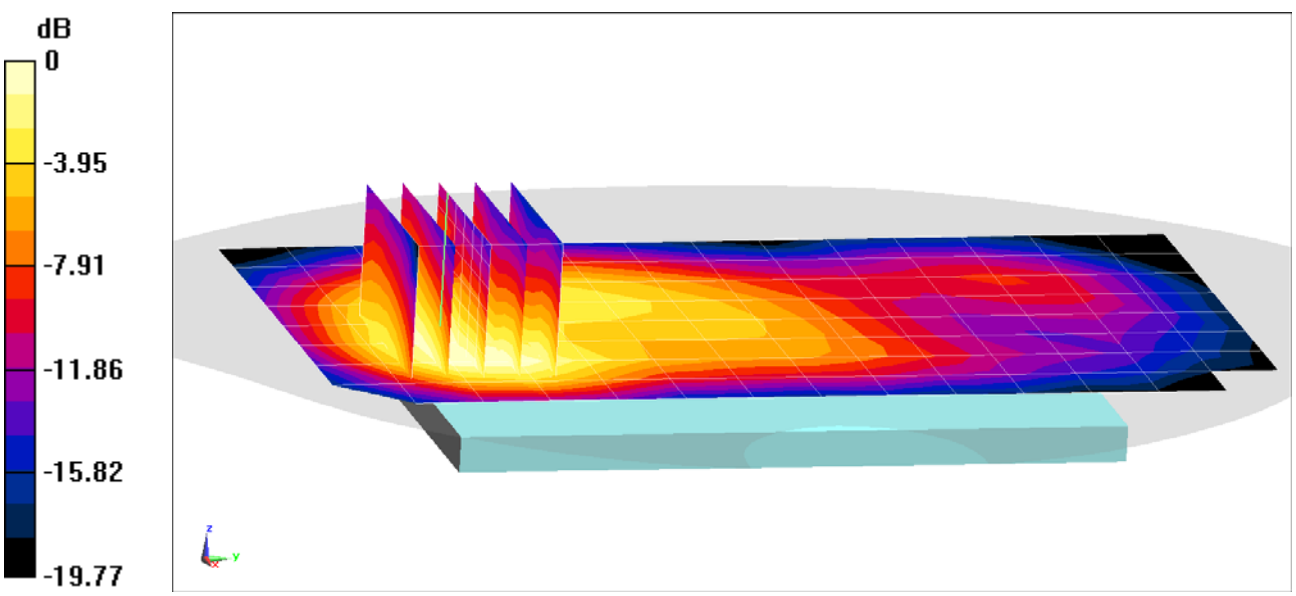
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.76
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.547 S/m; ε_r = 53.618; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-17-2018; Ambient Temp: 22.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: GPRS 1900, Body SAR, Back side, Mid.ch, 3 Tx Slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (7x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.28 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.647 W/kg
SAR(1 g) = 0.398 W/kg



0 dB = 0.542 W/kg = -2.66 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

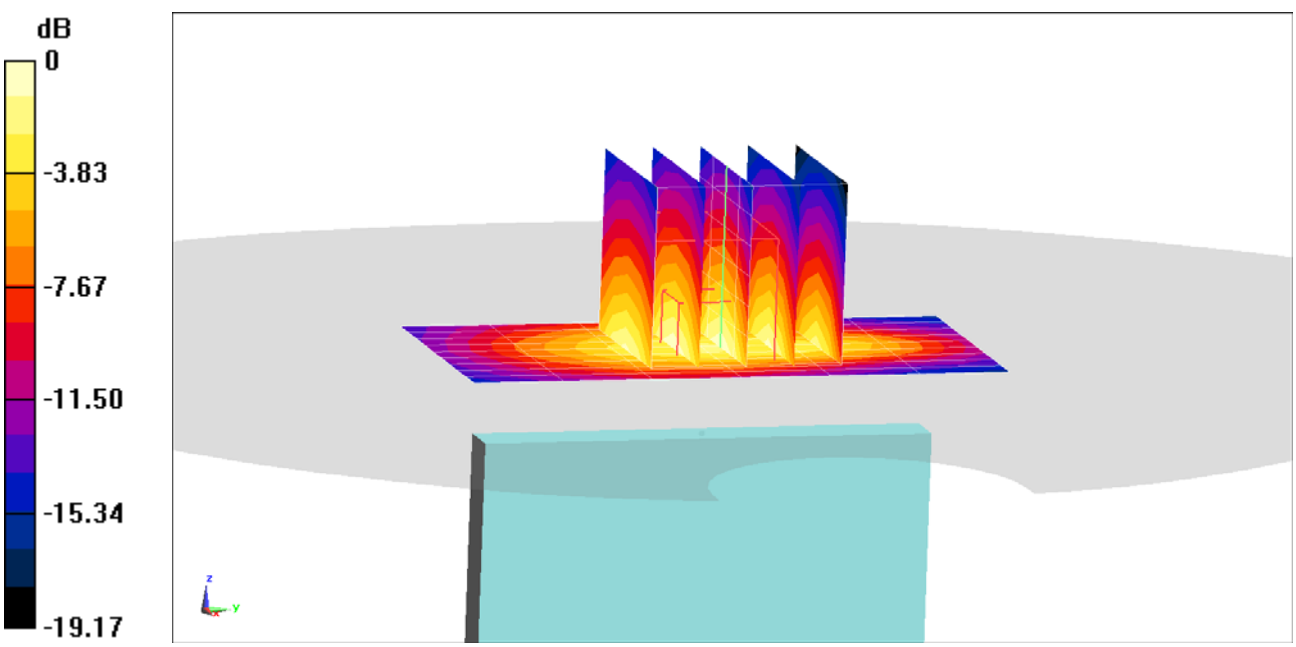
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 1909.8 MHz; Duty Cycle: 1:2.76
Medium: 1900 Body Medium parameters used:
f = 1910 MHz; σ = 1.592 S/m; ε_r = 52.674; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 3-19-2018; Ambient Temp: 20.7°C; Tissue Temp: 22.3°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.06 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.777 W/kg



0 dB = 1.14 W/kg = 0.57 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

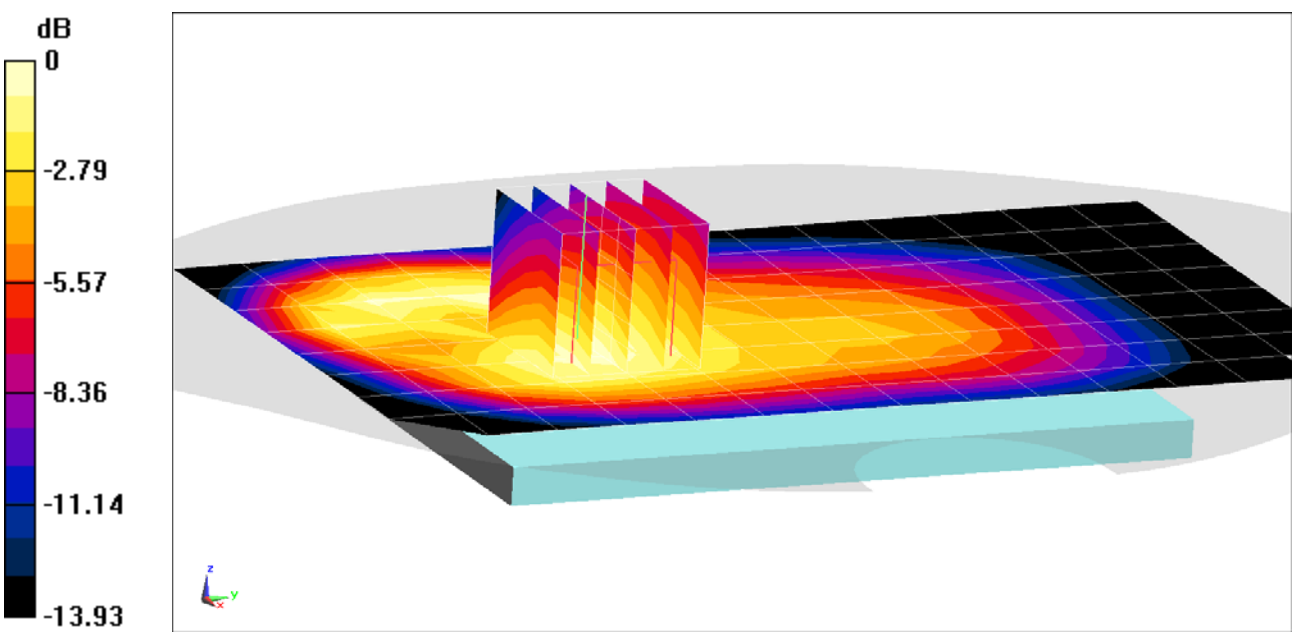
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.986 S/m; ε_r = 53.456; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-07-2018; Ambient Temp: 21.0°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN3914; ConvF(9.57, 9.57, 9.57); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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 = 24.04 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.755 W/kg
SAR(1 g) = 0.541 W/kg



0 dB = 0.680 W/kg = -1.67 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

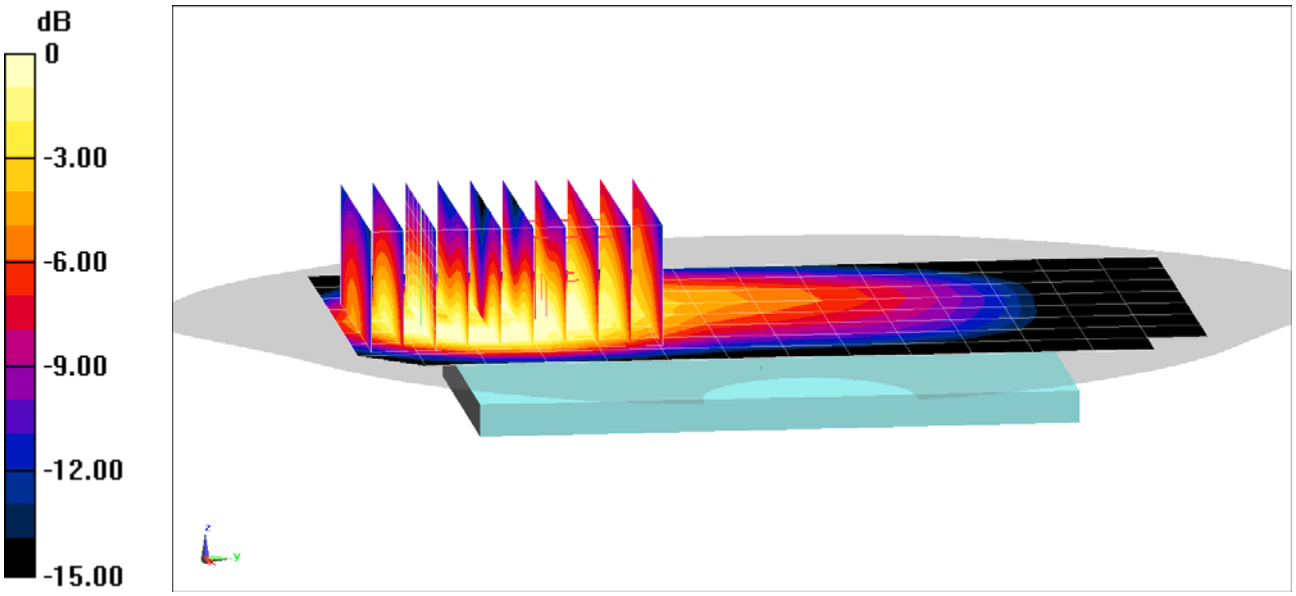
Communication System: UID 0, UMTS; Frequency: 826.4 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 826.4 MHz; σ = 0.976 S/m; ε_r = 53.587; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-07-2018; Ambient Temp: 21.0°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN3914; ConvF(9.57, 9.57, 9.57); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: UMTS 850, Body SAR, Front side, Low.ch

Area Scan (9x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (9x10x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.14 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.675 W/kg



0 dB = 0.799 W/kg = -0.97 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

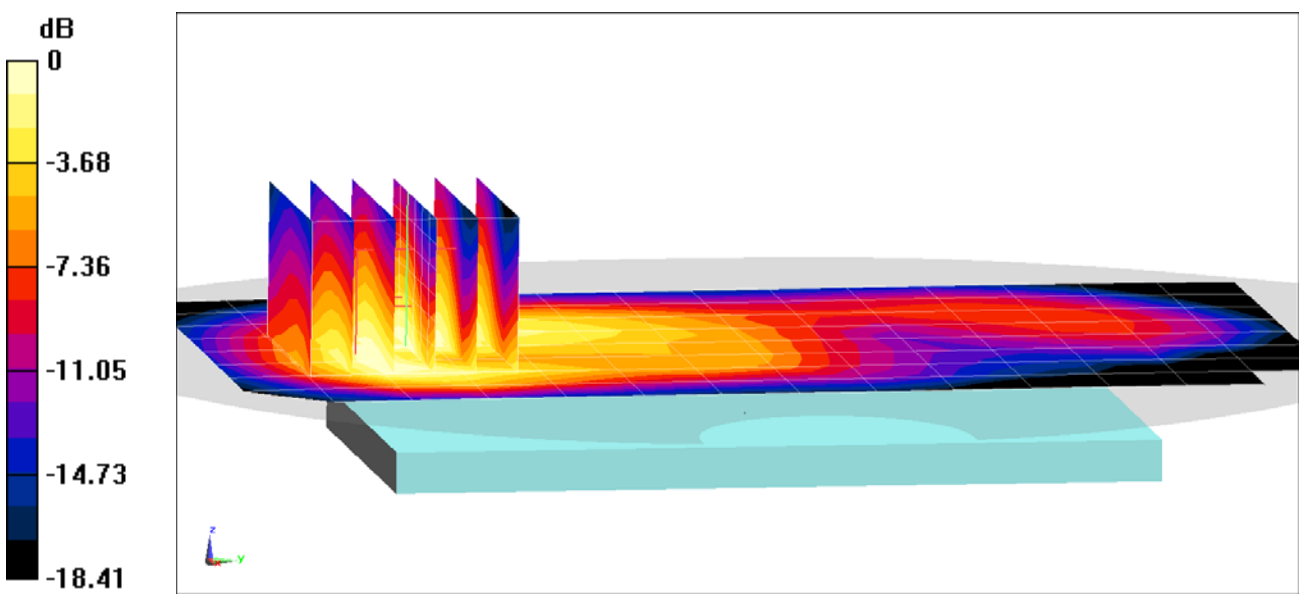
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.489 S/m; ε_r = 51.351; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-20-2018; Ambient Temp: 23.0°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7406; ConvF(8.08, 8.08, 8.08); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (7x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.17 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.630 W/kg
SAR(1 g) = 0.396 W/kg



0 dB = 0.536 W/kg = -2.71 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

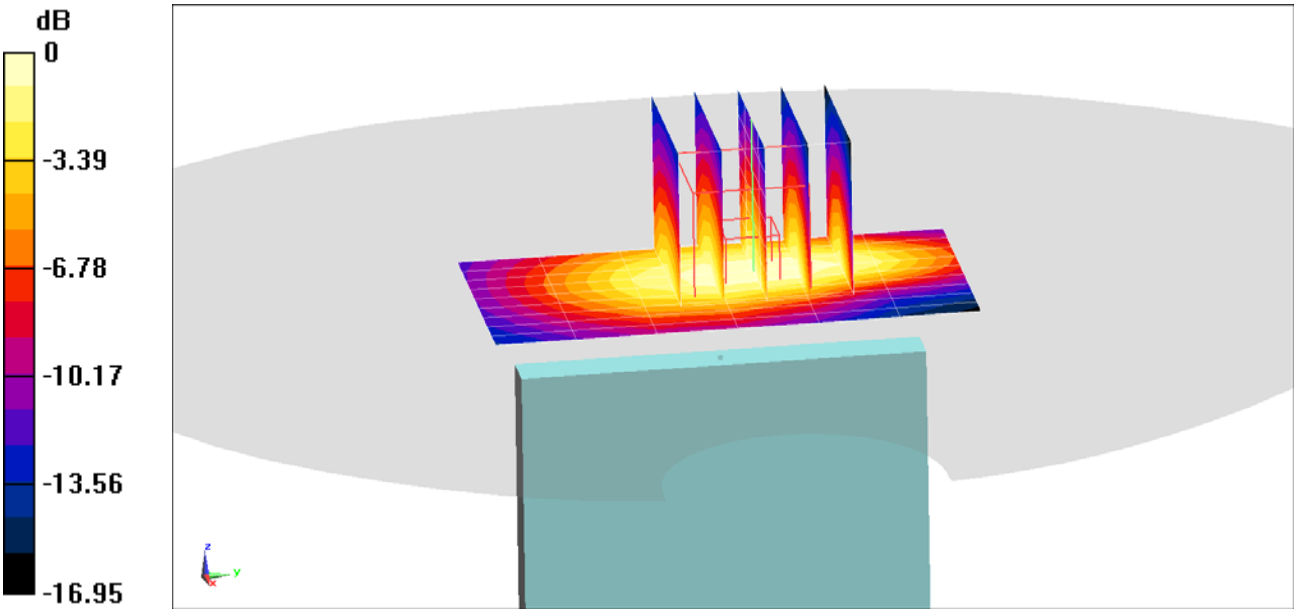
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.489 S/m; ε_r = 51.351; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-20-2018; Ambient Temp: 23.0°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7406; ConvF(8.08, 8.08, 8.08); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: UMTS 1750, Body SAR, Bottom Edge, Mid.ch

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.85 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.644 W/kg



0 dB = 0.930 W/kg = -0.32 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

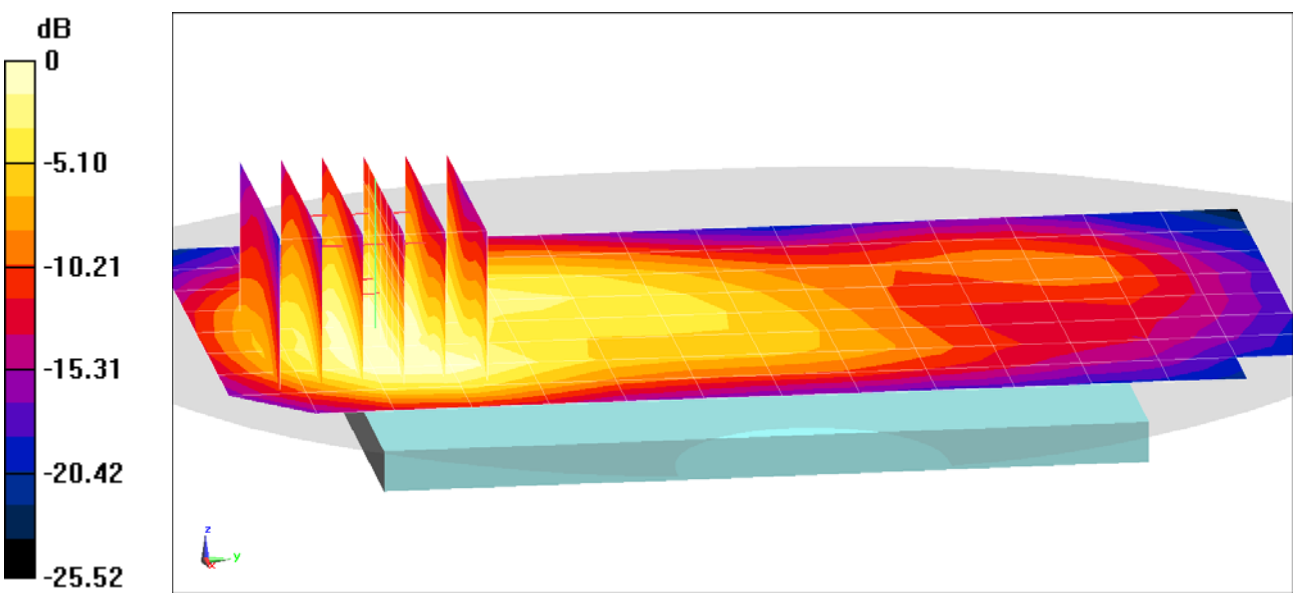
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.547 S/m; ε_r = 53.618; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-17-2018; Ambient Temp: 22.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (8x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.87 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.987 W/kg
SAR(1 g) = 0.619 W/kg



0 dB = 0.839 W/kg = -0.76 dBW/kg

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

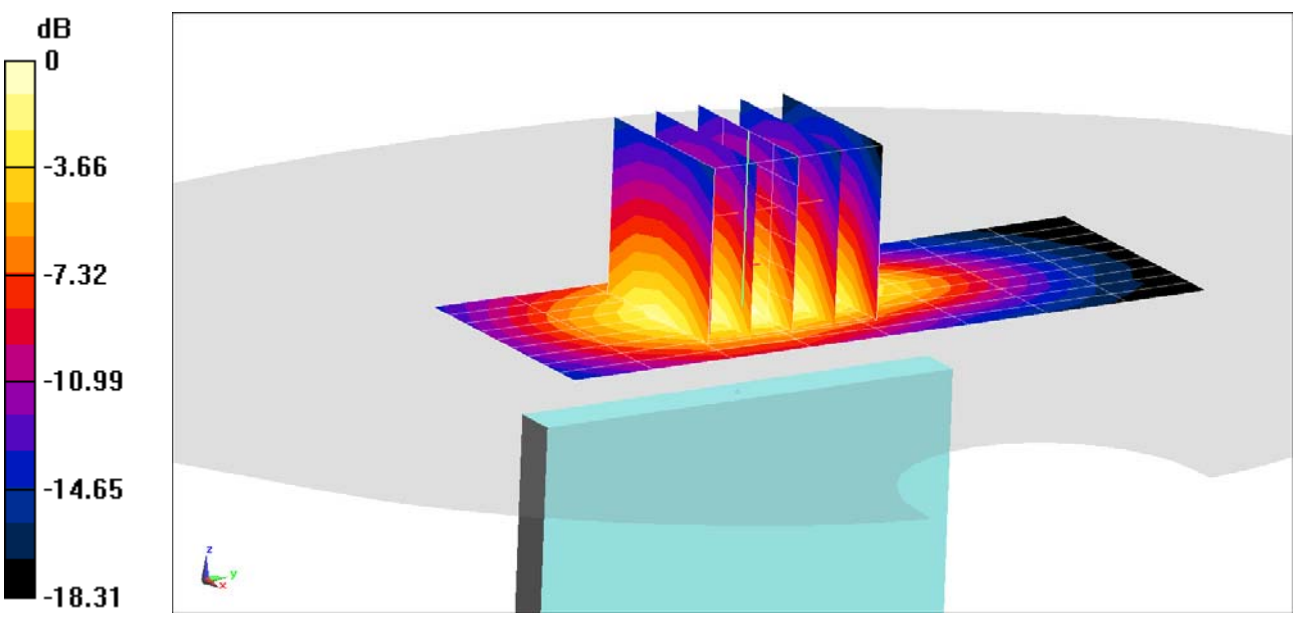
Communication System: UID 0, UMTS, Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.58 S/m; ε_r = 53.571; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-17-2018; Ambient Temp: 22.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: UMTS 1900, Body SAR, Bottom Edge, High.ch

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.57 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 2.01 W/kg
SAR(1 g) = 1.17 W/kg



0 dB = 1.72 W/kg = 2.36 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

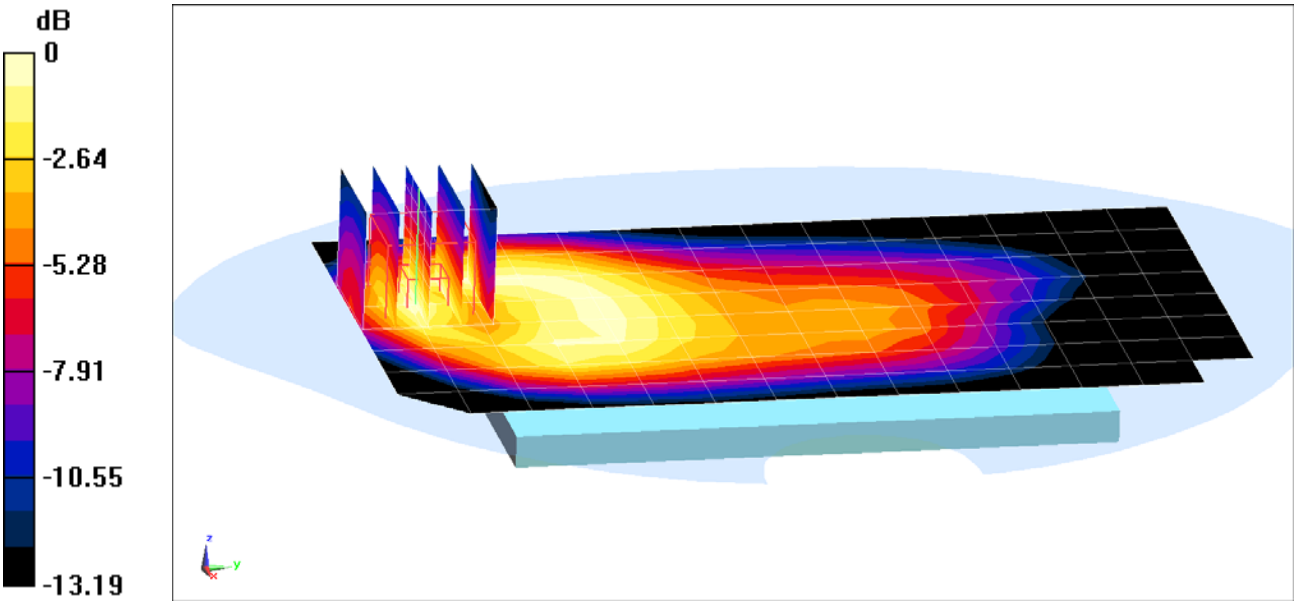
Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.965 S/m; ε_r = 53.894; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-28-2018; Ambient Temp: 20.8°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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 = 25.40 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.943 W/kg
SAR(1 g) = 0.562 W/kg



0 dB = 0.659 W/kg = -1.81 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19076

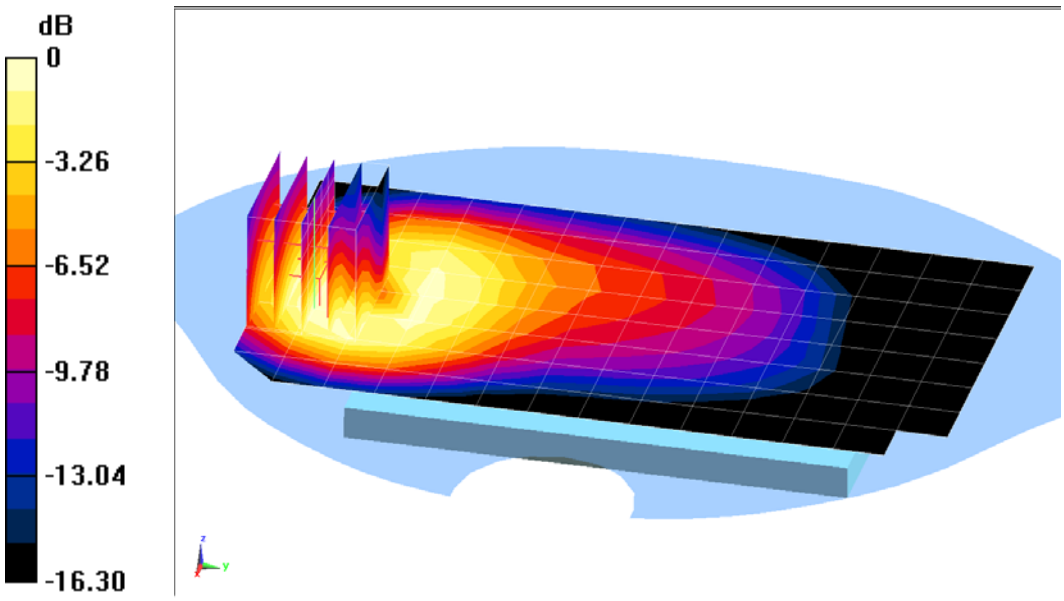
Communication System: UID 0, CDMA, Frequency: 824.7 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 824.7 MHz; σ = 0.952 S/m; ε_r = 54.002; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-28-2018; Ambient Temp: 20.8°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: Cell. EVDO, Body SAR, Front side, Low ch.

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.63 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.21 W/kg
SAR(1 g) = 0.713 W/kg



0 dB = 0.834 W/kg = -0.79 dBW/kg

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19019

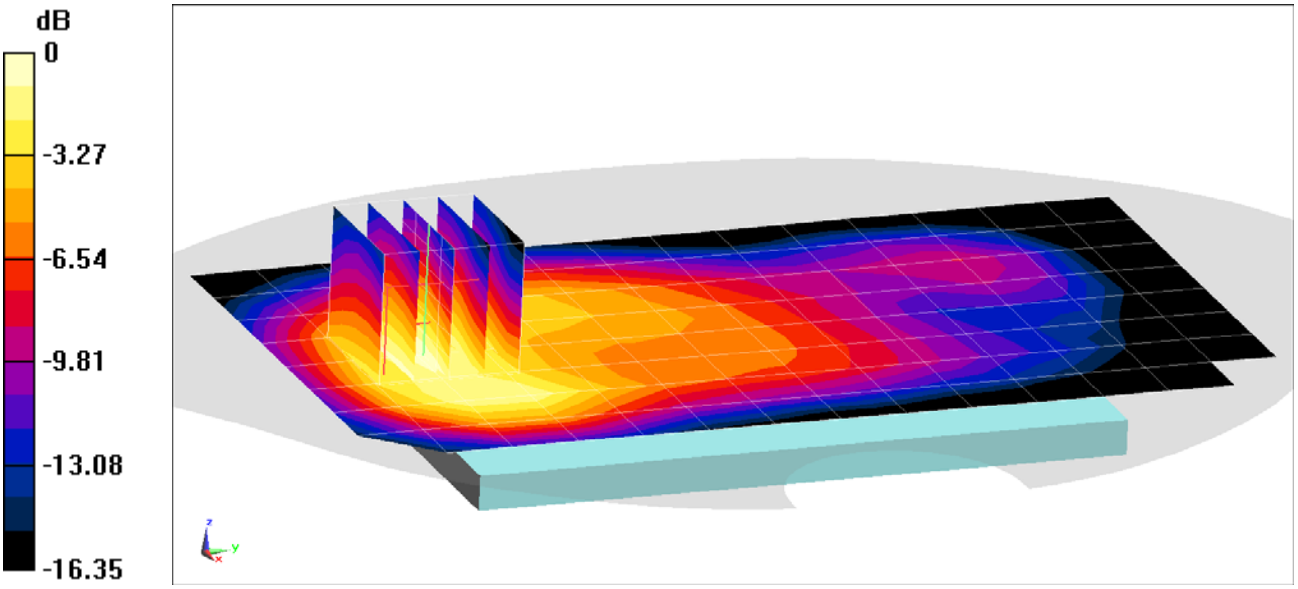
Communication System: UID 0, CDMA; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1908.75 MHz; σ = 1.59 S/m; ε_r = 53.495; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-30-2018; Ambient Temp: 22.9°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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 = 20.83 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.994 W/kg
SAR(1 g) = 0.632 W/kg



0 dB = 0.855 W/kg = -0.68 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19167

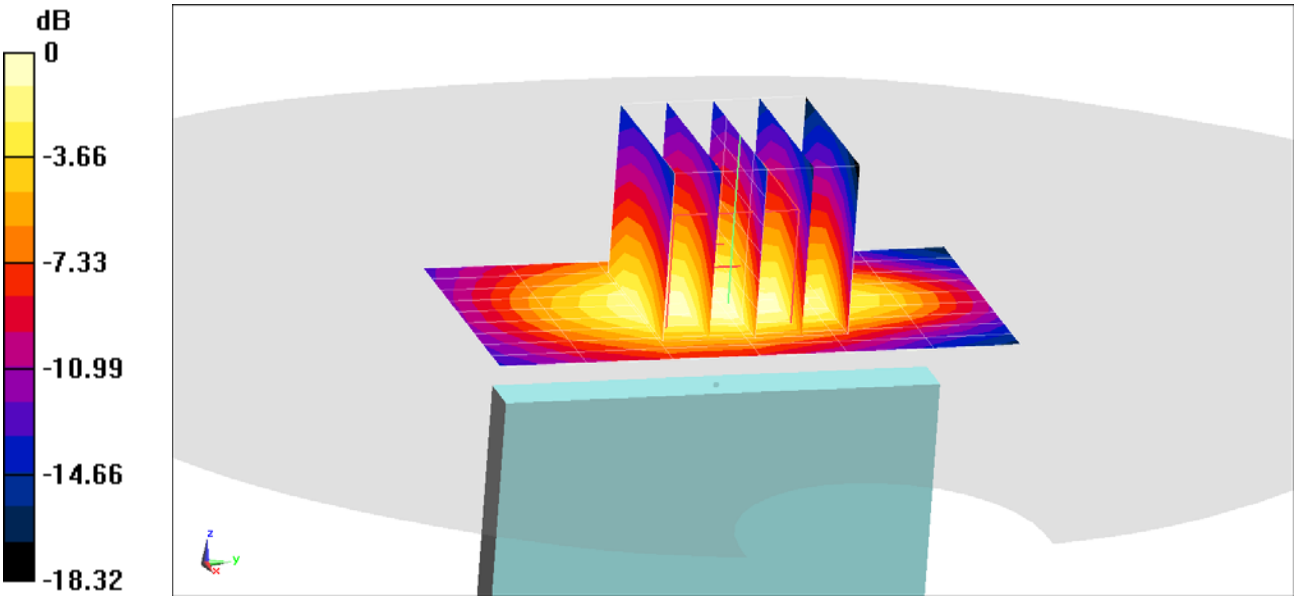
Communication System: UID 0, CDMA; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1908.75 MHz; σ = 1.59 S/m; ε_r = 53.495; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-30-2018; Ambient Temp: 22.9°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: PCS EVDO, Body SAR, Bottom Edge, High.ch

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.51 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 2.13 W/kg
SAR(1 g) = 1.24 W/kg



0 dB = 1.81 W/kg = 2.58 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19035

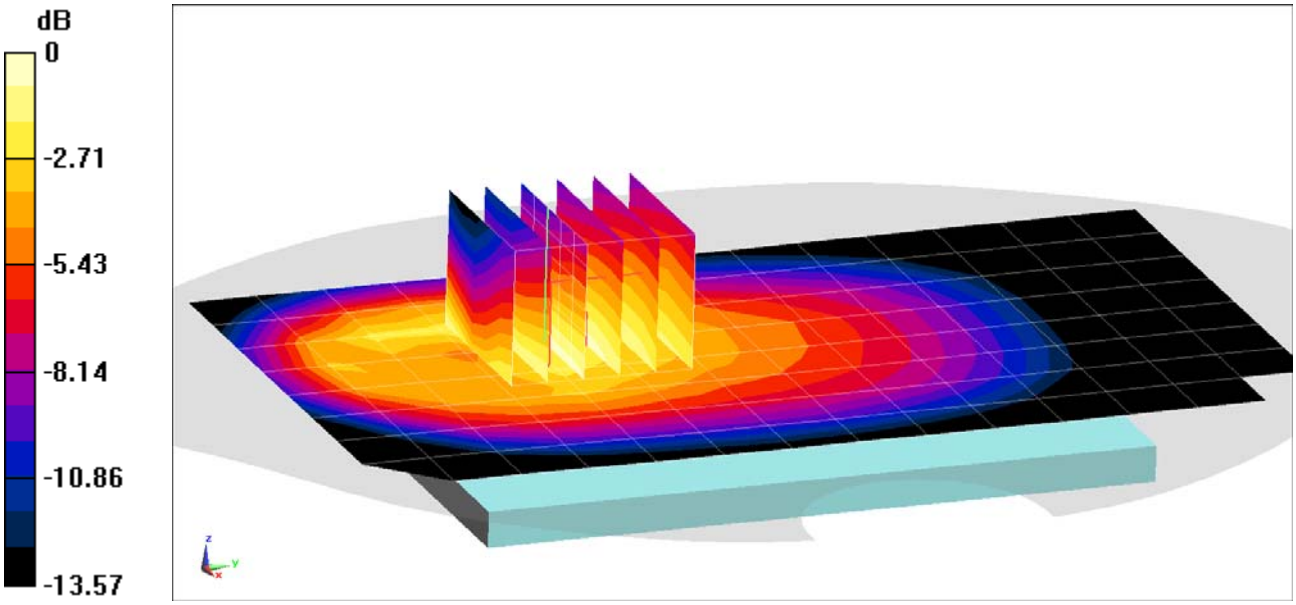
Communication System: UID 0, LTE Band 71; Frequency: 680.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 680.5 MHz; σ = 0.95 S/m; ε_r = 53.838; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-19-2018; Ambient Temp: 22.2°C; Tissue Temp: 21.0°C

Probe: ES3DV3 - SN3287; ConvF(6.71, 6.71, 6.71); Calibrated: 9/18/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 6/21/2017
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 71, Body SAR, Back side, Mid.ch
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.24 V/m; Power Drift = -0.14dB
Peak SAR (extrapolated) = 0.648 W/kg
SAR(1 g) = 0.444 W/kg



0 dB = 0.503 W/kg = -2.98 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19027

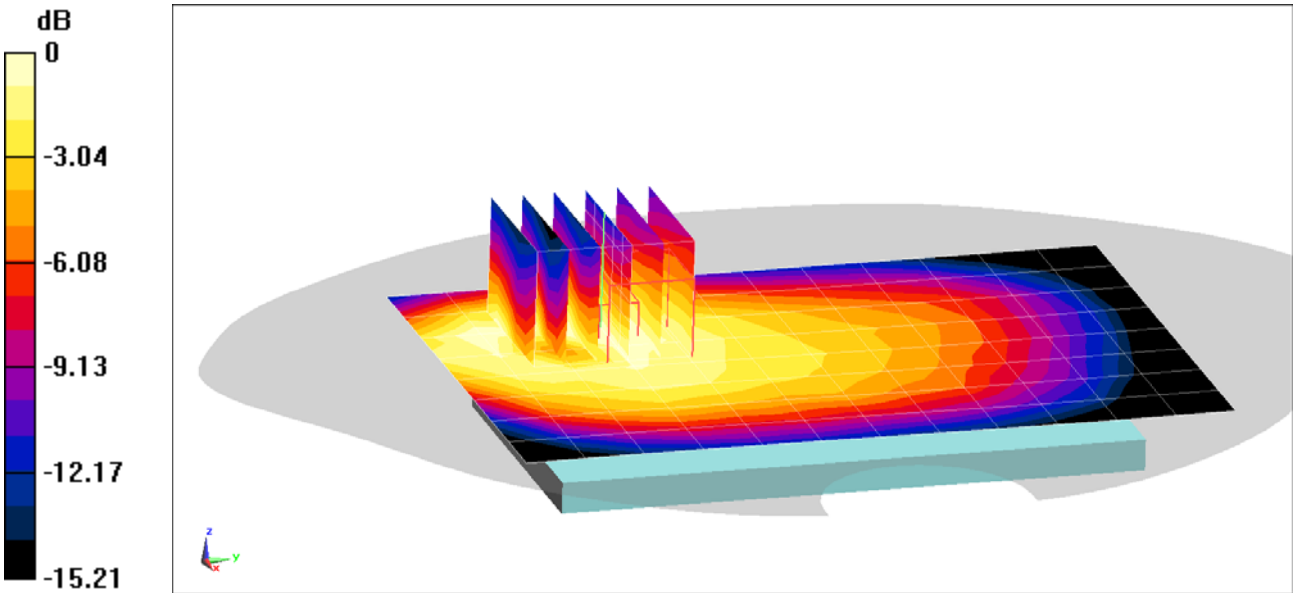
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.963 S/m; ε_r = 56.202; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2018; Ambient Temp: 21.9°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7406; ConvF(9.9, 9.9, 9.9); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: Right Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1797
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.74 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.651 W/kg



0 dB = 0.895 W/kg = -0.48 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19027

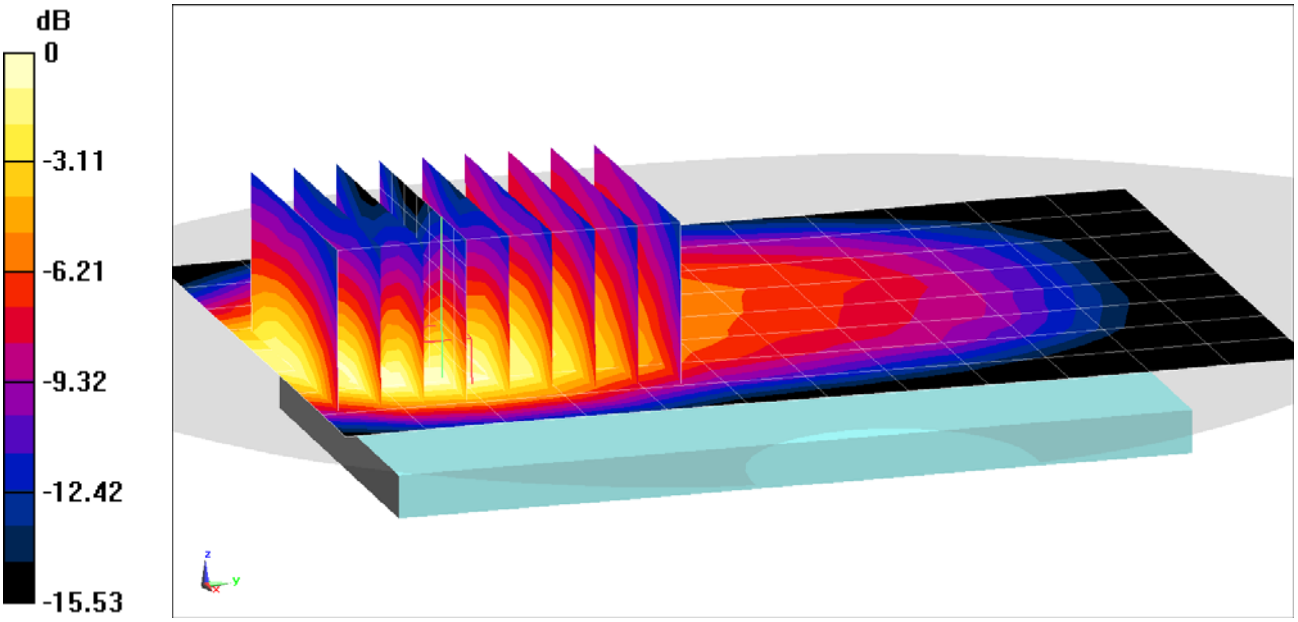
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.963 S/m; ε_r = 56.202; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2018; Ambient Temp: 21.9°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7406; ConvF(9.9, 9.9, 9.9); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: Right Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1797
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (8x9x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.03 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 0.765 W/kg



0 dB = 1.13 W/kg = 0.53 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19035

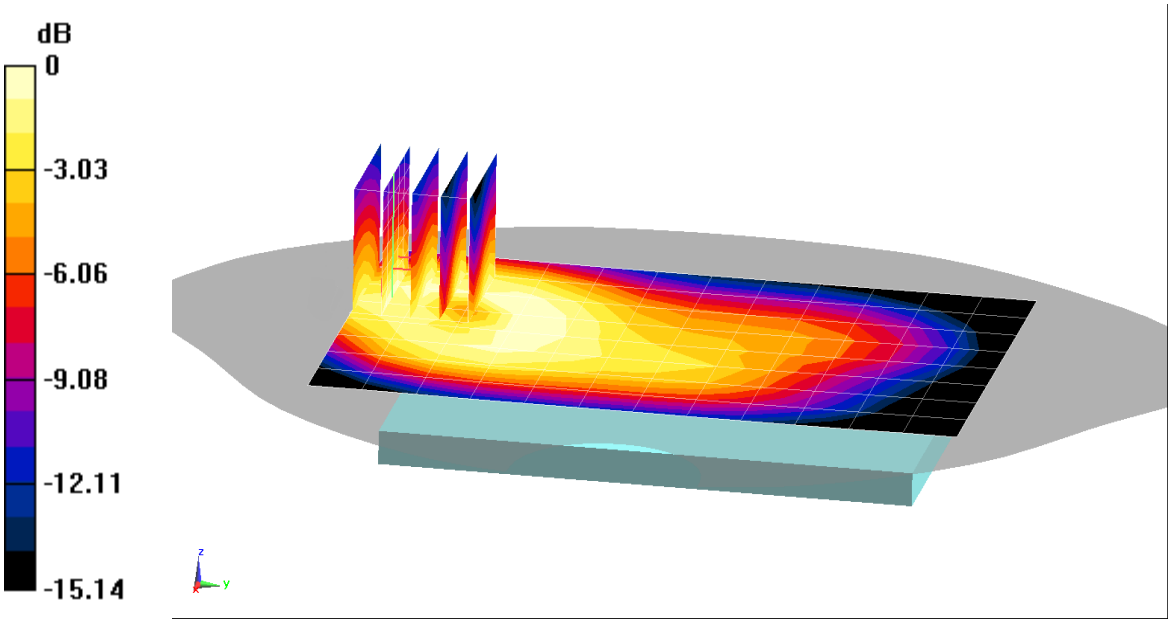
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.983 S/m; ε_r = 53.056; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2018; Ambient Temp: 23.0°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3287; ConvF(6.71, 6.71, 6.71); Calibrated: 9/18/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 6/21/2017
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD;
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 13, Body SAR, Back side, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 25 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 = 25.41 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.621 W/kg



0 dB = 0.743 W/kg = -1.29 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19035

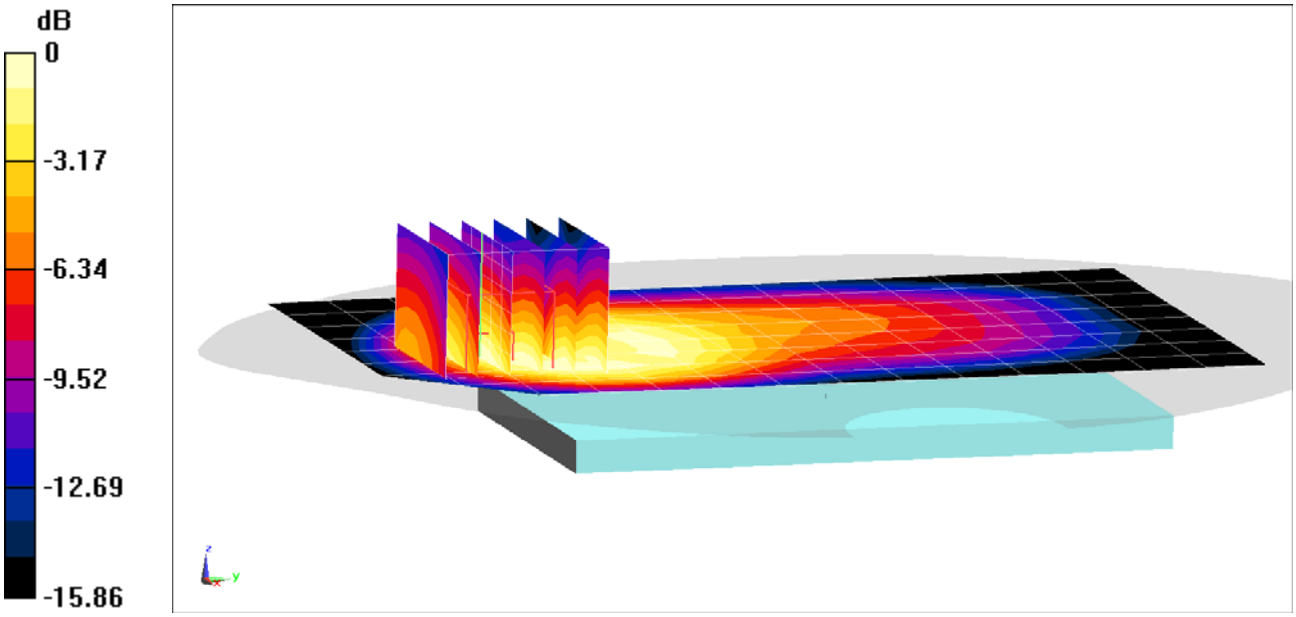
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.983 S/m; ε_r = 53.056; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2018; Ambient Temp: 23.0°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3287; ConvF(6.71, 6.71, 6.71); Calibrated: 9/18/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 6/21/2017
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD;
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 13, Body SAR, Front side, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 25 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 = 30.33 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.43 W/kg
SAR(1 g) = 0.821 W/kg



0 dB = 0.889 W/kg = -0.51 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19027

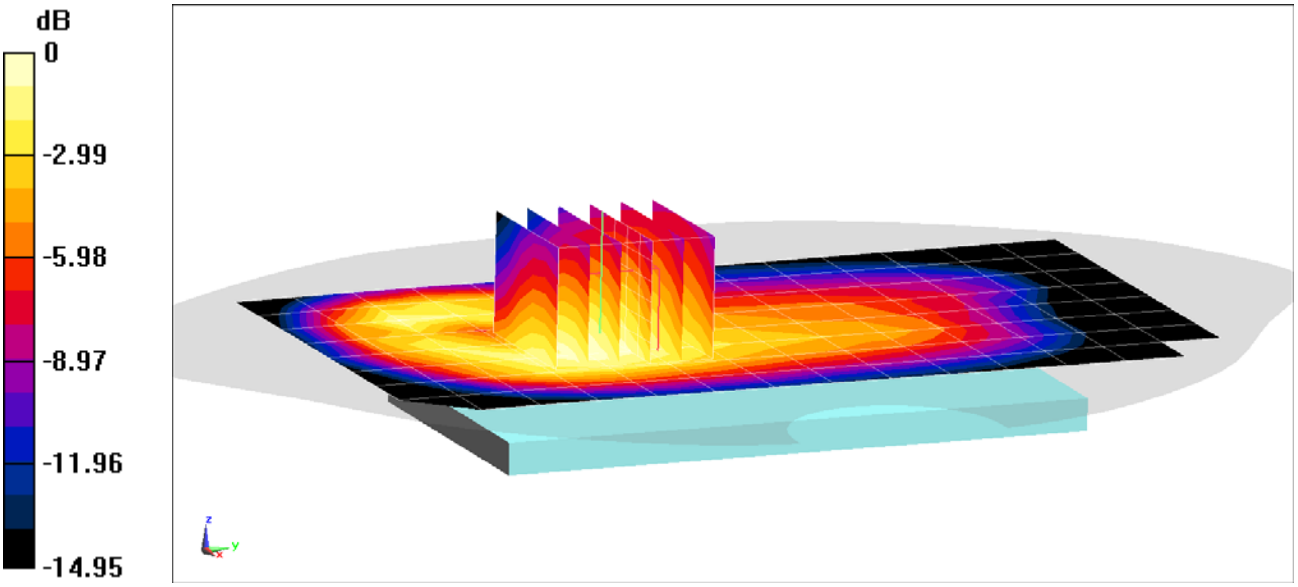
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.986 S/m; ε_r = 53.456; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-07-2018; Ambient Temp: 21.0°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN3914; ConvF(9.57, 9.57, 9.57); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 5 (Cell.), Body SAR, Back side, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 25 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 = 23.38 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.749 W/kg
SAR(1 g) = 0.551 W/kg



0 dB = 0.684 W/kg = -1.65 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19027

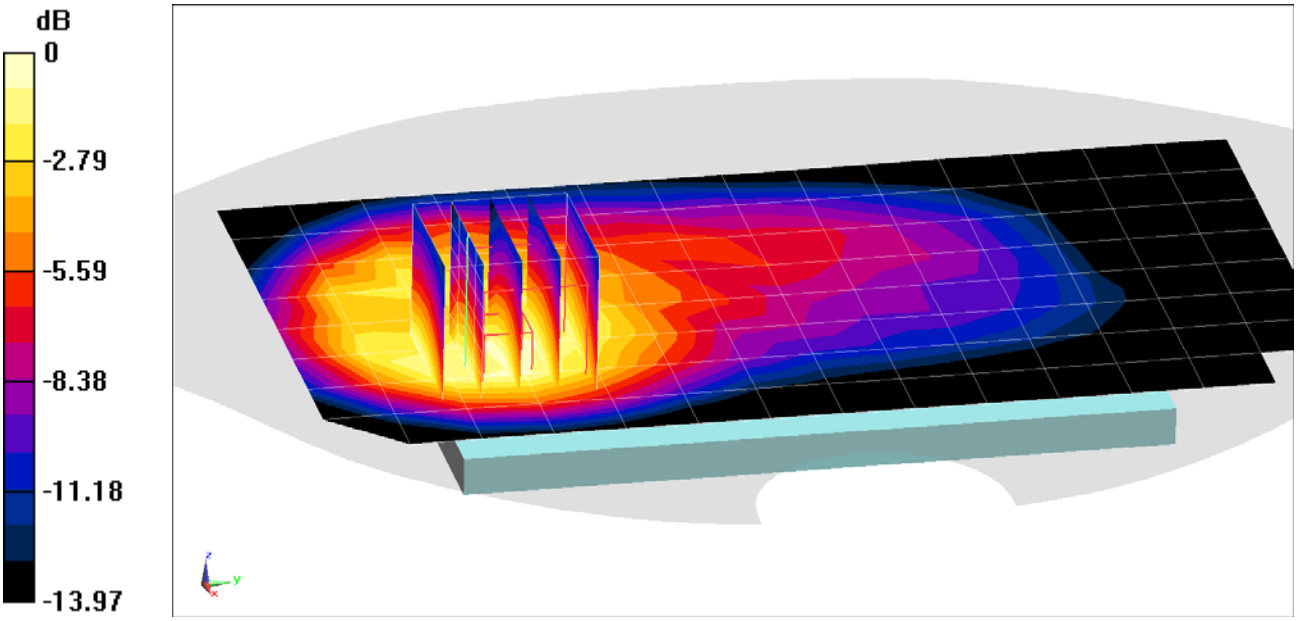
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.986 S/m; ε_r = 53.456; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-07-2018; Ambient Temp: 21.0°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN3914; ConvF(9.57, 9.57, 9.57); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 5 (Cell.), Body SAR, Front side, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 25 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 = 26.15 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.01 W/kg
SAR(1 g) = 0.623 W/kg



0 dB = 0.862 W/kg = -0.64 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19027

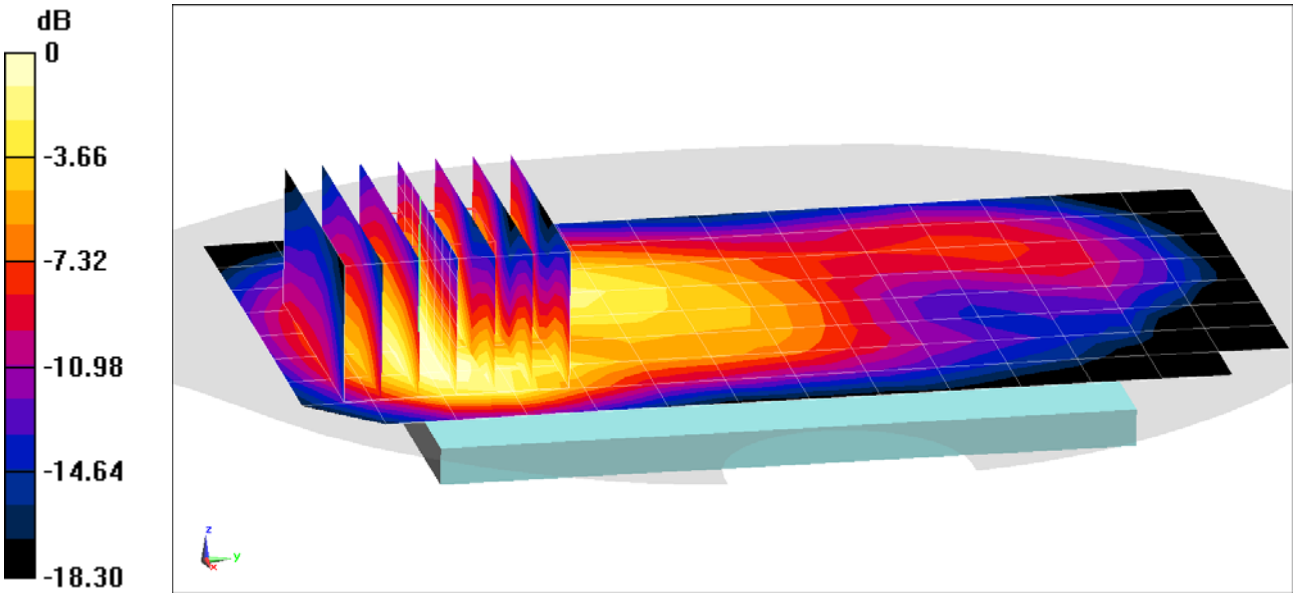
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1770 MHz; σ = 1.533 S/m; ε_r = 51.201; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-20-2018; Ambient Temp: 23.0°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7406; ConvF(8.08, 8.08, 8.08); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 66 (AWS), Body SAR, Back side, High.ch
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (9x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.73 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.654 W/kg
SAR(1 g) = 0.418 W/kg



0 dB = 0.569 W/kg = -2.45 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFL713DL; Type: Portable Handset; Serial: 19027

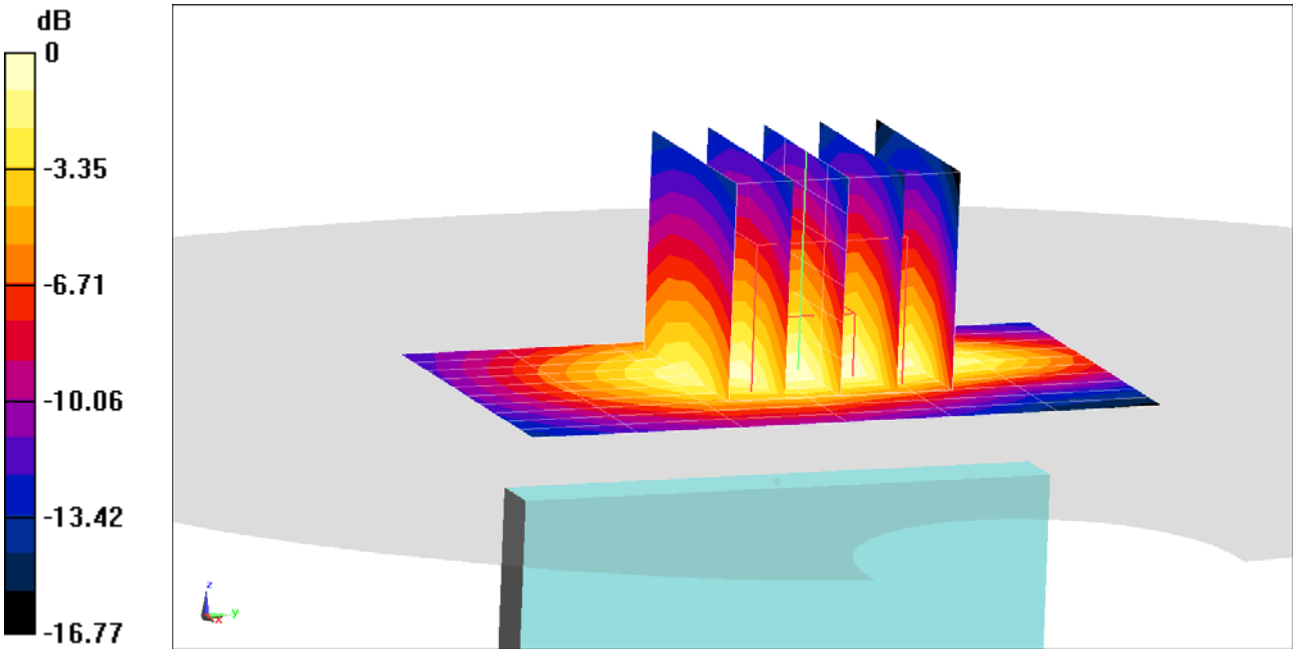
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1770 MHz; σ = 1.533 S/m; ε_r = 51.201; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-20-2018; Ambient Temp: 23.0°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7406; ConvF(8.08, 8.08, 8.08); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 66 (AWS), Body SAR, Bottom Edge, High.ch
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (11x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.36 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 1.15 W/kg
SAR(1 g) = 0.699 W/kg



0 dB = 1.00 W/kg = 0.00 dBW/kg