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SAR EVALUATION REPORT

Applicant Name:
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Yeongtong-gu, Suwon-si
Gyeonggi-do 443-742, Korea

Date of Testing:
07/21/14 - 07/31/14
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
0Y1407181398.A3L

FCC ID: **A3LSMG850A**

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): SM-G850A

Equipment Class	Band & Mode	Tx Frequency	SAR		
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.16	0.44	0.67
PCE	UMTS 850	826.40 - 846.60 MHz	0.16	0.42	0.43
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	0.40	0.62	1.03
PCE	UMTS 1900	1852.4 - 1907.6 MHz	1.08	0.69	1.01
PCE	LTE Band 17	706.5 - 713.5 MHz	0.15	0.26	0.26
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.20	0.53	0.53
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	0.84	0.72	1.05
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	1.07	0.69	0.75
DTS	2.4 GHz WLAN	2412 - 2462 MHz	0.41	< 0.1	< 0.1
DTS	Bluetooth LE	2402 - 2480 MHz	N/A		
DTS	5.8 GHz WLAN	5745 - 5825 MHz	0.61	0.14	0.14
NII	5.2 GHz WLAN	5180 - 5240 MHz	0.31	< 0.1	
NII	5.3 GHz WLAN	5260 - 5320 MHz	0.29	< 0.1	
NII	5.5 GHz WLAN	5500 - 5700 MHz	0.63	0.11	
DSS	Bluetooth	2402 - 2480 MHz	N/A	<0.1	N/A
Simultaneous SAR per KDB 690783 D01v01r03:			1.25	0.87	1.05

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

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

Randy Ortanez
President

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

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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
UMTS 850	Voice/Data	826.40 - 846.60 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 17	Data	706.5 - 713.5 MHz
LTE Band 5 (Cell)	Data	824.7 - 848.3 MHz
LTE Band 4 (AWS)	Data	1710.7 - 1754.3 MHz
LTE Band 2 (PCS)	Data	1850.7 - 1909.3 MHz
2.4 GHz WLAN	Data	2412 - 2462 MHz
5.8 GHz WLAN	Data	5745 - 5825 MHz
5.2 GHz WLAN	Data	5180 - 5240 MHz
5.3 GHz WLAN	Data	5260 - 5320 MHz
5.5 GHz WLAN	Data	5500 - 5700 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2402 - 2480 MHz

1.2 Power Reduction for SAR

This device requires power reduction for SAR compliance. It always applies power reduction in voice or VOIP held to ear scenarios on the WIFI transmitter, and does not impact any other transmitter in the device. Therefore, WIFI Head SAR was evaluated at reduced power.

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 D01v05.

Maximum Power

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)		Burst Average 8-PSK (dBm)	
		1 TX Slot	*1 TX Slots*	*2 TX Slots*	*1 TX Slots*	*2 TX Slots*
GSM/GPRS/EDGE 850	Maximum	**33.5**	**33.5**	**32.3**	**27.0**	**27.0**
	Nominal	**33.0**	**33.0**	**31.8**	**26.5**	**26.5**
GSM/GPRS/EDGE 1900	Maximum	**30.5**	**30.5**	**29.2**	**25.5**	**25.5**
	Nominal	**30.0**	**30.0**	**28.7**	**25.0**	**25.0**

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA Rel 99	*3GPP HSDPA Rel 5*	*3GPP HSUPA Rel 6*
UMTS Band 5 (850 MHz)	Maximum	**24.0**	**23.0**	**22.5**
	Nominal	**23.5**	**22.5**	**22.0**
UMTS Band 2 (1900 MHz)	Maximum	**23.5**	**22.5**	**22.5**
	Nominal	**23.0**	**22.0**	**22.0**

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Mode / Band		Modulated Average (dBm)
LTE Band 17	Maximum	**24.5**
	Nominal	**24.0**
LTE Band 5 (Cell)	Maximum	**24.5**
	Nominal	**24.0**
LTE Band 4 (AWS)	Maximum	**24.0**
	Nominal	**23.5**
LTE Band 2 (PCS)	Maximum	**23.5**
	Nominal	**23.0**
Mode / Band		Modulated Average (dBm)
SISO - IEEE 802.11b (2.4 GHz)	Maximum	**17.5**
	Nominal	**17.0**
SISO - IEEE 802.11g (2.4 GHz)	Maximum	**16.5**
	Nominal	**16.0**
SISO - IEEE 802.11n (2.4 GHz)	Maximum	**15.5**
	Nominal	**15.0**
MIMO - IEEE 802.11n (2.4 GHz)	Maximum	**18.5**
	Nominal	**18.0**
SISO - IEEE 802.11a/n (5 GHz, 20 MHz)	Maximum	**14.5**
	Nominal	**14.0**
SISO - IEEE 802.11ac (5 GHz, 20 MHz)	Maximum	**13.5**
	Nominal	**13.0**
MIMO - IEEE 802.11n (5 GHz, 20 MHz)	Maximum	**17.5**
	Nominal	**17.0**
MIMO - IEEE 802.11ac (5 GHz, 20 MHz)	Maximum	**16.5**
	Nominal	**16.0**
SISO - IEEE 802.11n/ac (5 GHz, 40 MHz)	Maximum	**12.5**
	Nominal	**12.0**
MIMO - IEEE 802.11n/ac (5 GHz, 40 MHz)	Maximum	**15.5**
	Nominal	**15.0**
SISO - IEEE 802.11ac (5 GHz, 80 MHz)	Maximum	**11.5**
	Nominal	**11.0**
MIMO - IEEE 802.11ac (5 GHz, 80 MHz)	Maximum	**14.5**
	Nominal	**14.0**
Bluetooth	Maximum	**9.5**
	Nominal	**9.0**
Bluetooth LE	Maximum	**8.0**
	Nominal	**7.5**

Reduced Power - Held-to-Ear

Mode / Band		Modulated Average (dBm)
SISO - IEEE 802.11b/g/n (2.4 GHz)	Maximum	**12.5**
	Nominal	**12.0**
MIMO - IEEE 802.11n (2.4 GHz)	Maximum	**15.5**
	Nominal	**15.0**
SISO - IEEE 802.11a/n/ac (5 GHz, 20 MHz)	Maximum	**9.5**
	Nominal	**9.0**
MIMO - IEEE 802.11n/ac (5 GHz, 20 MHz)	Maximum	**12.5**
	Nominal	**12.0**
SISO - IEEE 802.11n/ac (5 GHz, 40 MHz)	Maximum	**8.5**
	Nominal	**8.0**
MIMO - IEEE 802.11n/ac (5 GHz, 40 MHz)	Maximum	**11.5**
	Nominal	**11.0**
SISO - IEEE 802.11ac (5 GHz, 80 MHz)	Maximum	**8.5**
	Nominal	**8.0**
MIMO - IEEE 802.11ac (5 GHz, 80 MHz)	Maximum	**11.5**
	Nominal	**11.0**

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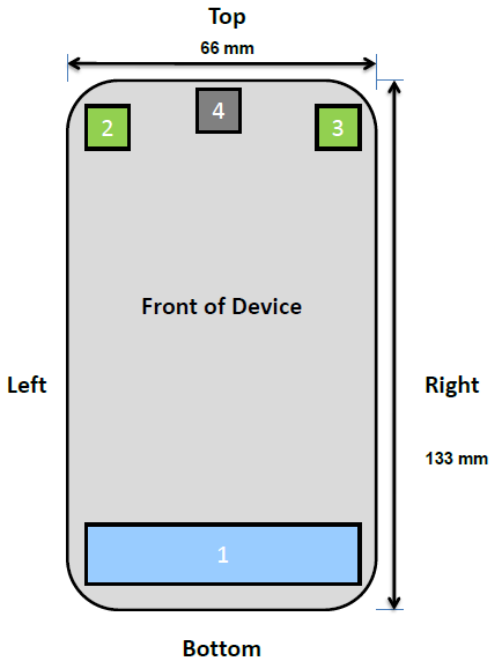
1.4 DUT Antenna Locations



1. Main Antenna
   - 850/1900 MHz GSM/GPRS/EDGE (Tx/Rx)
   - 850/1900 MHz UMTS (Tx/Rx)
   - LTE B17/5/4/2 (Tx/Rx)
   - LTE B29 (Rx Only)
2. BT/WIFI Antenna 1
   - 2.4/5 GHz WIFI (Tx/Rx)
   - 2.4 GHz BT (Tx/Rx)
3. WIFI Antenna 2
   - 2.4/5 GHz WIFI (Tx/Rx)
4. Antenna 4
   - GPS (Rx only)
   - 850/1900 MHz UMTS (Rx only)
   - LTE B29/17/5/4/2 (Rx only)

Note: Exact antenna dimensions and separation distances are shown in the Technical Descriptions.

Figure 1-1
DUT Antenna Locations

Table 1-1
Sides for SAR Testing

Sides for SAR Testing						
Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	Yes	Yes
UMTS 850	Yes	Yes	No	Yes	Yes	Yes
GPRS 1900	Yes	Yes	No	Yes	Yes	Yes
UMTS 1900	Yes	Yes	No	Yes	Yes	Yes
LTE Band 17	Yes	Yes	No	Yes	Yes	Yes
LTE Band 5 (Cell)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 4 (AWS)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 2 (PCS)	Yes	Yes	No	Yes	Yes	Yes
2.4 GHz WLAN Ant. 1	Yes	Yes	Yes	No	No	Yes
2.4 GHz WLAN Ant. 2	Yes	Yes	Yes	No	Yes	No
2.4 GHz WLAN MIMO	Yes	Yes	Yes	No	Yes	Yes
5.8 GHz WLAN Ant. 1	Yes	Yes	Yes	No	No	Yes
5.8 GHz WLAN Ant. 2	Yes	Yes	Yes	No	Yes	No
5.8 GHz WLAN MIMO	Yes	Yes	Yes	No	Yes	Yes

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v01 guidance, page 2. The distances between the transmit antennas and the edges of the device are included in the filing. When wireless router mode is enabled, 5.2-5.7 GHz WLAN operations are disabled. Therefore 5.2-5.7 GHz WLAN operations are not considered in this section.

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1.5 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the specialized battery. The SAR tests were performed with the specialized battery (model: EB-BG850BBU).

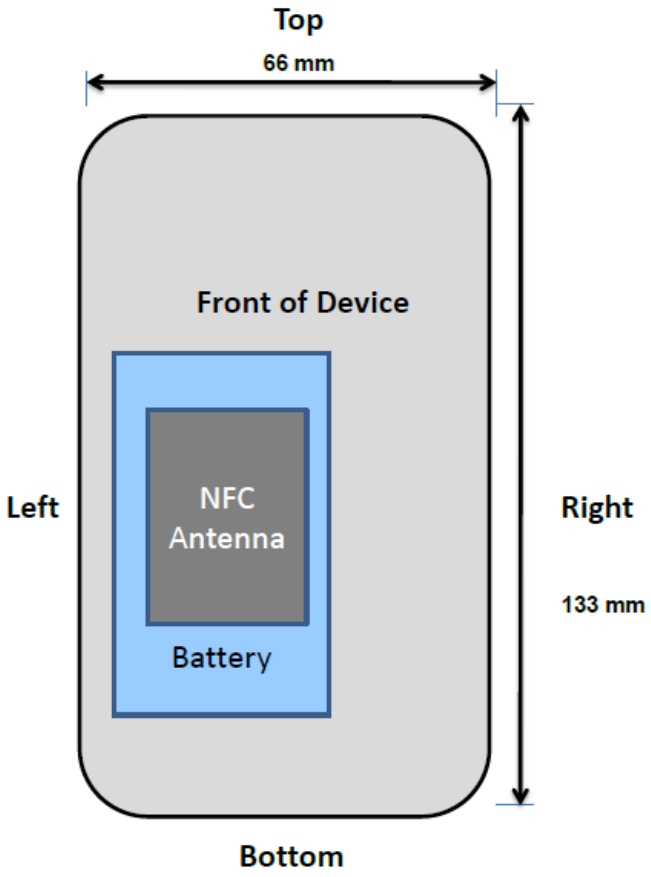

Figure 1-2
NFC Antenna Locations

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1.6 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D05v01, 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. Possible transmission paths for the DUT are shown in Figure 1-3 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

Figure 1-3
Simultaneous Transmission Paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v05 3) procedures.

Table 1-2
Simultaneous Transmission Scenarios

No.	Capable Transmit Configuration	Head	Body-Worn Accessory	Wireless Router	Notes
1	GSM voice + 2.4 GHz WI-FI	Yes	Yes	N/A	
2	GSM voice + 5 GHz WI-FI	Yes	Yes	N/A	
3	GSM voice + 2.4 GHz Bluetooth	N/A	Yes	N/A	
4	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	
5	UMTS + 5 GHz WI-FI	Yes	Yes	Yes	
6	UMTS + 2.4 GHz Bluetooth	N/A	Yes	N/A	
7	LTE + 2.4 GHz WI-FI	Yes*	Yes*	Yes	*-Pre-installed VOIP applications are considered.
8	LTE + 5 GHz WI-FI	Yes*	Yes*	Yes	*-Pre-installed VOIP applications are considered.
9	LTE + 2.4 GHz Bluetooth	N/A	Yes*	N/A	*-Pre-installed VOIP applications are considered.
10	GPRS/EDGE + 2.4 GHz WI-FI	N/A	N/A	Yes	
11	GPRS/EDGE + 5 GHz WI-FI	N/A	N/A	Yes	

1. 2.4 GHz WLAN, 5 GHz WLAN, and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
2. All licensed modes share the same antenna path and cannot transmit simultaneously.
3. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
4. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
5. 5 GHz Wireless Router is only supported for the 5.8 GHz Band by S/W, therefore 5.2-5.7 GHz Bands were not evaluated for wireless router conditions.
6. This device supports 2x2 MIMO Tx for WLAN 802.11n/ac. Each WLAN antenna can transmit independently or together when operating with MIMO.

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1.7 SAR Test Exclusions Applied

(A) WIFI/BT

Since Wireless Router operations are not allowed by the chipset firmware using 5.2-5.7 GHz WIFI, only 2.4 GHz and 5.8 GHz WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v01.

Per FCC KDB 447498 D01v05, 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 Bluetooth SAR was not required; [(9/10)* √2.480] = 1.4< 3.0. Per KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.

This device supports 40 MHz Bandwidths for IEEE 802.11n for 5 GHz WIFI only.

This device supports IEEE 802.11ac with the following features:

a) Up to 80 MHz Bandwidth only
b) No aggregate channel configurations
c) 2 Tx antenna output
d) 256 QAM is supported
e) No new 5 GHz channels

Per April 2013 TCB Workshop notes, full SAR tests for all SISO IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than SISO IEEE 802.11a mode. SISO IEEE 802.11ac was evaluated for the highest SISO IEEE 802.11a position in each 5 GHz band and exposure condition.

(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 D01v02.

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 D05v02.

This device supports inter-band LTE Carrier Aggregation (CA) in the downlink only. All uplink communications are identical to Release 8 specifications. Per FCC Guidance, LTE CA SAR was not needed for testing since the data sent by uplink on uplink physical channels does not change between Rel 8 and Rel 10.

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1.8 Guidance Applied

- IEEE 1528-2003
- FCC KDB Publication 941225 D01v02, D03v01, D05v02r03, D06v01r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v01r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v05r02 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r03, D02v01r01 (SAR Measurements up to 6 GHz)
- April 2013 TCB Workshop Notes (IEEE 802.11ac)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)

1.9 Device Serial Numbers

Several samples were used with identical hardware 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.

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	Head Serial Number	Body-Worn Serial Number	Hotspot Serial Number
GSM/GPRS/EDGE 850	1107-2	1107-2	1107-2
UMTS 850	1107-2	1107-2	1107-2
GSM/GPRS/EDGE 1900	1107-2	1107-2	1107-2
UMTS 1900	1107-5	1107-5	1107-5
LTE Band 17	1107-5	1107-5	1107-5
LTE Band 5 (Cell)	1107-3	1107-3	1107-3
LTE Band 4 (AWS)	1107-6	1107-6	1107-6
LTE Band 2 (PCS)	1107-5	1107-4	1107-4
2.4 GHz WLAN	1107-2	1107-5	1107-5
5 GHz WLAN	1107-2	1107-5	1107-5
Bluetooth	-	1107-5	-

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2 LTE INFORMATION

LTE Information					
FCC ID	**A3LSMG850A**				
Form Factor	Portable Handset				
Frequency Range of each LTE transmission band	LTE Band 17 (706.5 - 713.5 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)				
Channel Bandwidths	LTE Band 17: 5 MHz, 10 MHz				
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 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 17: 5 MHz	706.5 (23755)		710 (23790)		713.5 (23825)
LTE Band 17: 10 MHz	709 (23780)		710 (23790)		711 (23800)
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)		836.5 (20525)		848.3 (20643)
LTE Band 5 (Cell): 3 MHz	825.5 (20415)		836.5 (20525)		847.5 (20635)
LTE Band 5 (Cell): 5 MHz	826.5 (20425)		836.5 (20525)		846.5 (20625)
LTE Band 5 (Cell): 10 MHz	829 (20450)		836.5 (20525)		844 (20600)
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)		1732.5 (20175)		1754.3 (20393)
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)		1732.5 (20175)		1753.5 (20385)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)		1732.5 (20175)		1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)		1732.5 (20175)		1750 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)		1732.5 (20175)		1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720 (20050)		1732.5 (20175)		1745 (20300)
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)		1880 (18900)		1909.3 (19193)
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)		1880 (18900)		1908.5 (19185)
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)		1880 (18900)		1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855 (18650)		1880 (18900)		1905 (19150)
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)		1880 (18900)		1902.5 (19125)
LTE Band 2 (PCS): 20 MHz	1860 (18700)		1880 (18900)		1900 (19100)
UE Category	4				
Modulations Supported in UL	QPSK, 16QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
LTE Carrier Aggregation Possible Combinations	B2 (PCC) + B17 (SCC)	B17 (PCC) + B2 (SCC)	B4 (PCC) + B17 (SCC)	B2 (PCC) + B29 (SCC)	B4 (PCC) + B29 (SCC)
	5MHz (B2) + 5MHz (B17)	5MHz (B17) + 5MHz (B2)	5MHz (B4) + 5MHz (B17)	5MHz (B2) + 5MHz (B29)	5MHz (B4) + 5MHz (B29)
	5MHz (B2) + 10MHz (B17)	5MHz (B17) + 10MHz (B2)	5MHz (B4) + 10MHz (B17)	5MHz (B2) + 10MHz (B29)	5MHz (B4) + 10MHz (B29)
	10MHz (B2) + 5MHz (B17)	10MHz (B17) + 5MHz (B2)	10MHz (B4) + 5MHz (B17)	10MHz (B2) + 5MHz (B29)	10MHz (B4) + 5MHz (B29)
	10MHz (B2) + 10MHz (B17)	10MHz (B17) + 10MHz (B2)	10MHz (B4) + 10MHz (B17)	10MHz (B2) + 10MHz (B29)	10MHz (B4) + 10MHz (B29)
LTE Carrier Aggregation Additional Information	This device does not support full CA features on 3GPP Release 10. It supports a maximum of 2 carriers in the downlink with a total maximum bandwidth of 10 MHz of the spectrum. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. Due to carrier capability, only the combinations listed above are supported. The following LTE Release 10 Features are not supported: Relay, HetNet, Enhanced MIMO, eICI, WIFI Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

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3 INTRODUCTION

The FCC and Industry 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 D01v01 and IEEE 1528-2013:

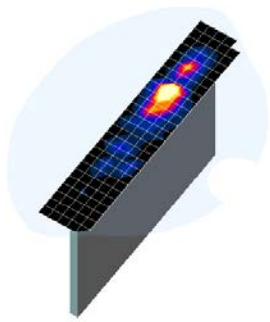

Figure 4-1
Sample SAR Area Scan

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 D01v01 (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 D01v01 (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 D01v01*

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].

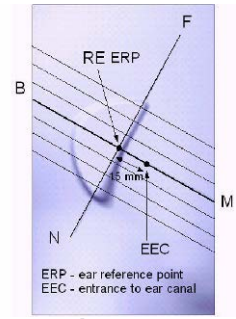

Figure 5-1
Close-Up Side view of ERP

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

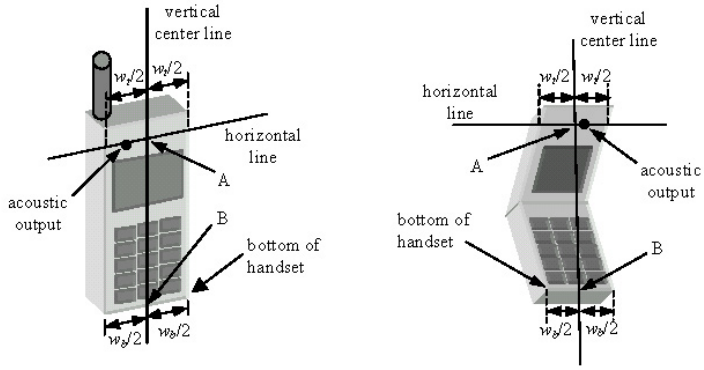

Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

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6 TEST CONFIGURATION POSITIONS FOR HANDSETS

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.

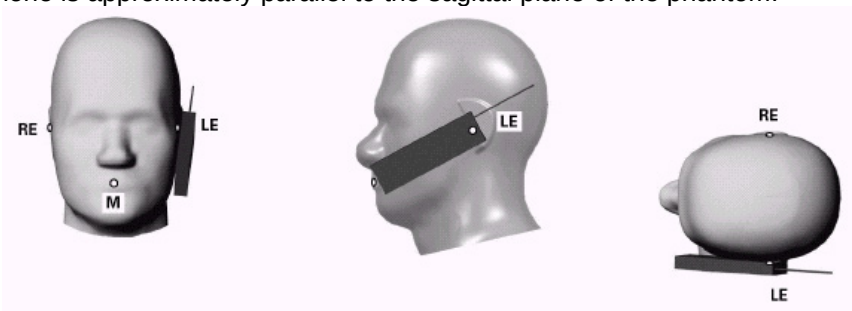

Figure 6-1 Front, Side and Top View of Cheek Position

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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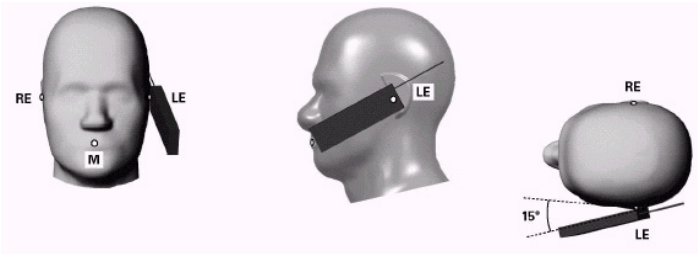

Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

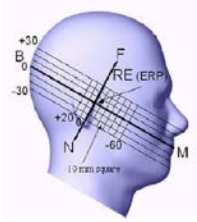

Figure 6-3
Side view w/ relevant markings

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 D04_v01. 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 D04v01, 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 D01v05 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.

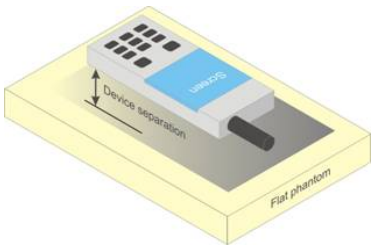

Figure 6-4
Sample Body-Worn Diagram

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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 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 44798 D01v05 should be applied to determine SAR test requirements.

Per KDB Publication 447498 D01v05, 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 D06 v01 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 D01v05 publication 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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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

8.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v05, 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 D01v01r02.

8.2 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01 "SAR Measurement Procedures for 3G Devices" v02, October 2007.

The device was 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 were 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 was 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 deviated by more than 5%, the SAR test and drift measurements were repeated.

8.3 SAR Measurement Conditions for UMTS

8.3.1 Output Power Verification

Maximum output power is measured on the High, Middle and Low channels for each applicable transmission band according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1s".

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 (release 5), using the appropriate RMC with TPC (transmit power control) set to all "1s" or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HS-DPCCH etc) are tabulated in this test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations are identified.

8.3.2 Head SAR Measurements for Handsets

SAR for head exposure configurations is measured using the 12.2 kbps RMC with TPC bits configured to all "1s". SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than 0.25 dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2 AMR with a 3.4 kbps SRB (signaling radio bearer) using the exposure configuration that resulted in the highest SAR for that RF channel in the 12.2 kbps RMC mode.

8.3.3 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all "1s".

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8.3.4 SAR Measurements for Handsets with Rel 5 HSDPA

Body SAR for HSDPA is not required for handsets with HSDPA capabilities when the maximum average output power of each RF channel with HSDPA active is less than 0.25 dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75% of the SAR limit. Otherwise, SAR is measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration measured in 12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that resulted in the highest SAR in 12.2 kbps RMC mode for that RF channel.

The H-set used in FRC for HSDPA should be configured according to the UE category of a test device. The number of HS-DSCH/HSPDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the applicable H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the FRC for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 2 ms to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors of βc=9 and βd=15, and power offset parameters of ΔACK= ΔNACK =5 and ΔCQI=2 is used. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the FRC.

Sub-Test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c = 30/15$ ⇔ $\beta_{hs} = 30/15 * \beta_c$.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 8 (A_{hs} = 30/15) with $\beta_{hs} = 30/15 * \beta_c$, and Δ_{CQI} = 7 (A_{hs} = 24/15) with $\beta_{hs} = 24/15 * \beta_c$.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Figure 8-1
Table C.10.1.4 of TS 234.121-1

8.3.5 SAR Measurements for Handsets with Rel 6 HSUPA

Body SAR for HSUPA is not required when the maximum average output of each RF channel with HSUPA/HSDPA active is less than 0.25 dB higher than as measured without HSUPA/HSDPA using 12.2 kbps RMC and maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Otherwise SAR is measured on the maximum output channel for the body exposure configuration produced highest SAR in 12.2 kbps RMC for that RF channel, using the additional procedures under “Release 6 HSPA data devices”

Head SAR for VOIP operations under HSPA is not required when maximum average output of each RF channel with HSPA is less than 0.25 dB higher than as measured using 12.2 kbps RMC. Otherwise SAR is measured using same HSPA configuration as used for body SAR.

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Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}: 47/15 β_{ed2}: 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

8.4 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05v02 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was 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).

8.4.1 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.

8.4.2 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.

8.4.3 A-MPR

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

8.4.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r01:

a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
   i. The required channel and offset combination with the highest maximum output power is required for SAR.
   ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
   iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.

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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

8.4.5 Carrier Aggregation

LTE Carrier Aggregation (CA) measurements were made in accordance to 3GPP TS 36.521-1 V10.4.0 (2012-12). 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 the Secondary component carrier (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to release 8 specifications on the PCC. Additional output powers were measured using two carriers in the downlink for the release 8 configurations with the highest output power among all channels, RB configurations and bandwidths for each uplink band. Per FCC Guidance, no SAR measurements were required.

8.5 SAR Testing with 802.11 Transmitters

Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g/n/ac transmitters. 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 D01v01r02 for more details.

8.5.1 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. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

8.5.2 Frequency Channel Configurations [24]

For 2.4 GHz, the highest average RF output power channel between the low, mid and high channel at the lowest data rate was selected for SAR evaluation in 802.11b mode. 802.11g/n modes and higher data rates for 802.11b were additionally evaluated for SAR if the output power of the respective mode was 0.25 dB or higher than the powers of the SAR configurations tested in the 802.11b mode.

For 5 GHz, the highest average RF output power channel across the default test channels at the lowest data rate was selected for SAR evaluation in 802.11a. When the adjacent channels are higher in power then the default channels, these “required channels” were considered instead of the default channels for SAR testing. 802.11n modes and higher data rates for 802.11a/n were evaluated only if the respective mode was higher than 0.25 dB or more than the 802.11a mode. 802.11ac SAR was evaluated for highest 802.11a configuration in each 5 GHz band and each exposure condition. 802.11ac modes were additionally evaluated for SAR if the output power for the respective mode was more than 0.25 dB higher than powers of 802.11a modes.

If the maximum extrapolated peak SAR of the zoom scan for the highest output channel was less than 1.6 W/kg and if the 1g averaged SAR was less than 0.8 W/kg, SAR testing was not required for the other test channels in the band.

8.5.3 MIMO SAR considerations

Per KDB 248227, SAR for MIMO was measured with both transmitting simultaneously and was evaluated independently of SISO operation. For 2.4 and 5 GHz MIMO, 20 MHz Bandwidth 802.11n was evaluated. Other IEEE 802.11 modes and bandwidths were not investigated for MIMO operations since the maximum allowed output power (including tolerance) was not higher for these modes.

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9 RF CONDUCTED POWERS

9.1 GSM Conducted Powers

		Maximum Burst-Averaged Output Power				
		Voice	*GPRS/ EDGE Data (GMSK)*		*EDGE Data (8-PSK)*	
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**
GSM 850	128	33.29	33.39	**31.81**	26.50	26.39
	190	33.32	33.44	**32.22**	26.46	26.34
	251	33.21	33.50	**32.12**	26.35	26.23
GSM 1900	512	30.39	30.21	**29.20**	25.42	25.45
	661	30.27	30.32	**29.10**	25.15	25.12
	810	30.00	30.10	**28.89**	24.91	24.84
		Frame-Averaged Output Power				
		Voice	*GPRS/ EDGE Data (GMSK)*		*EDGE Data (8-PSK)*	
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**
GSM 850	128	24.26	24.36	**25.79**	17.47	20.37
	190	24.29	24.41	**26.20**	17.43	20.32
	251	24.18	24.47	**26.10**	17.32	20.21
GSM 1900	512	21.36	21.18	**23.18**	16.39	19.43
	661	21.24	21.29	**23.08**	16.12	19.10
	810	20.97	21.07	**22.87**	15.88	18.82
GSM 850	**Frame Avg.Targets**	23.97	23.97	**25.78**	17.47	20.48
GSM 1900		20.97	20.97	**22.68**	15.97	18.98

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. 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. 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.
4. EDGE (8-PSK) output powers were measured with MCS7 on the base station simulator. MCS7 coding scheme was used to measure the output powers for EDGE since investigation has shown that choosing MCS7 coding scheme will ensure 8-PSK modulation. It has been shown that MCS levels that produce 8PSK modulation do not have an impact on output power.

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

Figure 9-1
Power Measurement Setup

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9.2 UMTS Conducted Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	23.50	23.54	23.59	22.92	23.30	22.80	-
99		12.2 kbps AMR	23.51	23.56	23.60	23.00	22.75	22.63	-
6	HSDPA	Subtest 1	21.92	21.98	21.97	21.34	21.69	21.53	0
6		Subtest 2	21.91	22.03	22.02	21.41	21.64	21.62	0
6		Subtest 3	21.54	21.52	21.50	20.91	21.12	21.08	0.5
6		Subtest 4	21.50	21.68	21.47	20.93	21.11	21.14	0.5
6	HSUPA	Subtest 1	21.98	21.32	21.27	21.33	21.02	21.18	0
6		Subtest 2	20.99	21.08	21.00	20.39	20.58	20.61	2
6		Subtest 3	20.61	20.89	21.08	20.37	20.66	19.92	1
6		Subtest 4	20.91	20.78	20.69	20.52	20.62	20.68	2
6		Subtest 5	21.99	21.59	21.71	21.22	21.14	21.13	0

UMTS SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v02. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

This device does not support DC-HSDPA.

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

Figure 9-2
Power Measurement Setup

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9.3 LTE Conducted Powers

9.3.1 LTE Band 17

Table 9-1
LTE Band 17 Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	710.0	23790	10	QPSK	1	0	**24.35**	0	0
	710.0	23790	10	QPSK	1	25	24.20	0	0
	710.0	23790	10	QPSK	1	49	24.10	0	0
	710.0	23790	10	QPSK	25	0	**23.04**	0-1	1
	710.0	23790	10	QPSK	25	12	22.95	0-1	1
	710.0	23790	10	QPSK	25	25	22.99	0-1	1
	710.0	23790	10	QPSK	50	0	23.01	0-1	1
	710.0	23790	10	16QAM	1	0	23.13	0-1	1
	710.0	23790	10	16QAM	1	25	22.90	0-1	1
	710.0	23790	10	16QAM	1	49	23.05	0-1	1
	710.0	23790	10	16QAM	25	0	22.15	0-2	2
	710.0	23790	10	16QAM	25	12	22.05	0-2	2
	710.0	23790	10	16QAM	25	25	22.09	0-2	2
	710.0	23790	10	16QAM	50	0	22.09	0-2	2

Table 9-2
LTE Band 17 Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	710.0	23790	5	QPSK	1	0	24.07	0	0
	710.0	23790	5	QPSK	1	12	24.13	0	0
	710.0	23790	5	QPSK	1	24	24.08	0	0
	710.0	23790	5	QPSK	12	0	22.95	0-1	1
	710.0	23790	5	QPSK	12	6	22.94	0-1	1
	710.0	23790	5	QPSK	12	13	22.99	0-1	1
	710.0	23790	5	QPSK	25	0	22.95	0-1	1
	710.0	23790	5	16-QAM	1	0	22.97	0-1	1
	710.0	23790	5	16-QAM	1	12	23.00	0-1	1
	710.0	23790	5	16-QAM	1	24	23.01	0-1	1
	710.0	23790	5	16-QAM	12	0	21.93	0-2	2
	710.0	23790	5	16-QAM	12	6	21.97	0-2	2
	710.0	23790	5	16-QAM	12	13	22.01	0-2	2
	710.0	23790	5	16-QAM	25	0	22.05	0-2	2

Note: LTE Band 17 at 5 MHz and 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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9.3.2 LTE Band 5 (Cell)

Table 9-3
LTE Band 5 (Cell) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	836.5	20525	10	QPSK	1	0	**24.50**	0	0
	836.5	20525	10	QPSK	1	25	24.48	0	0
	836.5	20525	10	QPSK	1	49	24.49	0	0
	836.5	20525	10	QPSK	25	0	23.24	0-1	1
	836.5	20525	10	QPSK	25	12	**23.40**	0-1	1
	836.5	20525	10	QPSK	25	25	23.23	0-1	1
	836.5	20525	10	QPSK	50	0	23.39	0-1	1
	836.5	20525	10	16QAM	1	0	23.40	0-1	1
	836.5	20525	10	16QAM	1	25	23.44	0-1	1
	836.5	20525	10	16QAM	1	49	23.34	0-1	1
	836.5	20525	10	16QAM	25	0	22.37	0-2	2
	836.5	20525	10	16QAM	25	12	22.37	0-2	2
	836.5	20525	10	16QAM	25	25	22.35	0-2	2
	836.5	20525	10	16QAM	50	0	22.28	0-2	2

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

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	826.5	20425	5	QPSK	1	0	24.11	0	0
	826.5	20425	5	QPSK	1	12	24.25	0	0
	826.5	20425	5	QPSK	1	24	24.46	0	0
	826.5	20425	5	QPSK	12	0	23.22	0-1	1
	826.5	20425	5	QPSK	12	6	23.29	0-1	1
	826.5	20425	5	QPSK	12	13	23.34	0-1	1
	826.5	20425	5	QPSK	25	0	23.24	0-1	1
	826.5	20425	5	16-QAM	1	0	23.38	0-1	1
	826.5	20425	5	16-QAM	1	12	23.36	0-1	1
	826.5	20425	5	16-QAM	1	24	23.27	0-1	1
	826.5	20425	5	16-QAM	12	0	22.20	0-2	2
	826.5	20425	5	16-QAM	12	6	22.31	0-2	2
	826.5	20425	5	16-QAM	12	13	22.33	0-2	2
	826.5	20425	5	16-QAM	25	0	22.25	0-2	2
Mid	836.5	20525	5	QPSK	1	0	24.47	0	0
	836.5	20525	5	QPSK	1	12	24.48	0	0
	836.5	20525	5	QPSK	1	24	24.50	0	0
	836.5	20525	5	QPSK	12	0	23.34	0-1	1
	836.5	20525	5	QPSK	12	6	23.30	0-1	1
	836.5	20525	5	QPSK	12	13	23.34	0-1	1
	836.5	20525	5	QPSK	25	0	23.33	0-1	1
	836.5	20525	5	16-QAM	1	0	23.42	0-1	1
	836.5	20525	5	16-QAM	1	12	23.40	0-1	1
	836.5	20525	5	16-QAM	1	24	23.48	0-1	1
	836.5	20525	5	16-QAM	12	0	22.40	0-2	2
	836.5	20525	5	16-QAM	12	6	22.38	0-2	2
	836.5	20525	5	16-QAM	12	13	22.34	0-2	2
	836.5	20525	5	16-QAM	25	0	22.39	0-2	2
High	846.5	20625	5	QPSK	1	0	24.50	0	0
	846.5	20625	5	QPSK	1	12	24.50	0	0
	846.5	20625	5	QPSK	1	24	24.45	0	0
	846.5	20625	5	QPSK	12	0	23.30	0-1	1
	846.5	20625	5	QPSK	12	6	23.28	0-1	1
	846.5	20625	5	QPSK	12	13	23.38	0-1	1
	846.5	20625	5	QPSK	25	0	23.30	0-1	1
	846.5	20625	5	16-QAM	1	0	23.46	0-1	1
	846.5	20625	5	16-QAM	1	12	23.36	0-1	1
	846.5	20625	5	16-QAM	1	24	23.44	0-1	1
	846.5	20625	5	16-QAM	12	0	22.33	0-2	2
	846.5	20625	5	16-QAM	12	6	22.34	0-2	2
	846.5	20625	5	16-QAM	12	13	22.42	0-2	2
	846.5	20625	5	16-QAM	25	0	22.38	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	825.5	20415	3	QPSK	1	0	24.21	0	0
	825.5	20415	3	QPSK	1	7	24.30	0	0
	825.5	20415	3	QPSK	1	14	24.23	0	0
	825.5	20415	3	QPSK	8	0	23.22	0-1	1
	825.5	20415	3	QPSK	8	4	23.26	0-1	1
	825.5	20415	3	QPSK	8	7	23.26	0-1	1
	825.5	20415	3	QPSK	15	0	23.23	0-1	1
	825.5	20415	3	16-QAM	1	0	23.44	0-1	1
	825.5	20415	3	16-QAM	1	7	23.34	0-1	1
	825.5	20415	3	16-QAM	1	14	23.35	0-1	1
	825.5	20415	3	16-QAM	8	0	22.26	0-2	2
	825.5	20415	3	16-QAM	8	4	22.32	0-2	2
	825.5	20415	3	16-QAM	8	7	22.30	0-2	2
	825.5	20415	3	16-QAM	15	0	22.19	0-2	2
Mid	836.5	20525	3	QPSK	1	0	24.42	0	0
	836.5	20525	3	QPSK	1	7	24.46	0	0
	836.5	20525	3	QPSK	1	14	24.50	0	0
	836.5	20525	3	QPSK	8	0	23.37	0-1	1
	836.5	20525	3	QPSK	8	4	23.31	0-1	1
	836.5	20525	3	QPSK	8	7	23.33	0-1	1
	836.5	20525	3	QPSK	15	0	23.35	0-1	1
	836.5	20525	3	16-QAM	1	0	23.41	0-1	1
	836.5	20525	3	16-QAM	1	7	23.40	0-1	1
	836.5	20525	3	16-QAM	1	14	23.50	0-1	1
	836.5	20525	3	16-QAM	8	0	22.32	0-2	2
	836.5	20525	3	16-QAM	8	4	22.32	0-2	2
	836.5	20525	3	16-QAM	8	7	22.35	0-2	2
	836.5	20525	3	16-QAM	15	0	22.44	0-2	2
High	847.5	20635	3	QPSK	1	0	24.49	0	0
	847.5	20635	3	QPSK	1	7	24.48	0	0
	847.5	20635	3	QPSK	1	14	24.46	0	0
	847.5	20635	3	QPSK	8	0	23.28	0-1	1
	847.5	20635	3	QPSK	8	4	23.30	0-1	1
	847.5	20635	3	QPSK	8	7	23.32	0-1	1
	847.5	20635	3	QPSK	15	0	23.28	0-1	1
	847.5	20635	3	16-QAM	1	0	23.40	0-1	1
	847.5	20635	3	16-QAM	1	7	23.45	0-1	1
	847.5	20635	3	16-QAM	1	14	23.50	0-1	1
	847.5	20635	3	16-QAM	8	0	22.29	0-2	2
	847.5	20635	3	16-QAM	8	4	22.41	0-2	2
	847.5	20635	3	16-QAM	8	7	22.37	0-2	2
	847.5	20635	3	16-QAM	15	0	22.41	0-2	2

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Table 9-6
LTE Band 5 (Cell) Conducted Powers -1.4 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	824.7	20407	1.4	QPSK	1	0	24.11	0	0
	824.7	20407	1.4	QPSK	1	2	24.24	0	0
	824.7	20407	1.4	QPSK	1	5	24.14	0	0
	824.7	20407	1.4	QPSK	3	0	24.17	0	0
	824.7	20407	1.4	QPSK	3	2	24.25	0	0
	824.7	20407	1.4	QPSK	3	3	24.20	0	0
	824.7	20407	1.4	QPSK	6	0	23.18	0-1	1
	824.7	20407	1.4	16-QAM	1	0	23.38	0-1	1
	824.7	20407	1.4	16-QAM	1	2	23.35	0-1	1
	824.7	20407	1.4	16-QAM	1	5	23.38	0-1	1
	824.7	20407	1.4	16-QAM	3	0	23.31	0-1	1
	824.7	20407	1.4	16-QAM	3	2	23.32	0-1	1
	824.7	20407	1.4	16-QAM	3	3	23.32	0-1	1
	824.7	20407	1.4	16-QAM	6	0	22.26	0-2	2
Mid	836.5	20525	1.4	QPSK	1	0	24.48	0	0
	836.5	20525	1.4	QPSK	1	2	24.50	0	0
	836.5	20525	1.4	QPSK	1	5	24.47	0	0
	836.5	20525	1.4	QPSK	3	0	24.45	0	0
	836.5	20525	1.4	QPSK	3	2	24.43	0	0
	836.5	20525	1.4	QPSK	3	3	24.36	0	0
	836.5	20525	1.4	QPSK	6	0	23.33	0-1	1
	836.5	20525	1.4	16-QAM	1	0	23.49	0-1	1
	836.5	20525	1.4	16-QAM	1	2	23.45	0-1	1
	836.5	20525	1.4	16-QAM	1	5	23.42	0-1	1
	836.5	20525	1.4	16-QAM	3	0	23.36	0-1	1
	836.5	20525	1.4	16-QAM	3	2	23.41	0-1	1
	836.5	20525	1.4	16-QAM	3	3	23.40	0-1	1
	836.5	20525	1.4	16-QAM	6	0	22.40	0-2	2
High	848.3	20643	1.4	QPSK	1	0	24.50	0	0
	848.3	20643	1.4	QPSK	1	2	24.48	0	0
	848.3	20643	1.4	QPSK	1	5	24.47	0	0
	848.3	20643	1.4	QPSK	3	0	24.49	0	0
	848.3	20643	1.4	QPSK	3	2	24.41	0	0
	848.3	20643	1.4	QPSK	3	3	24.42	0	0
	848.3	20643	1.4	QPSK	6	0	23.39	0-1	1
	848.3	20643	1.4	16-QAM	1	0	23.47	0-1	1
	848.3	20643	1.4	16-QAM	1	2	23.49	0-1	1
	848.3	20643	1.4	16-QAM	1	5	23.49	0-1	1
	848.3	20643	1.4	16-QAM	3	0	23.40	0-1	1
	848.3	20643	1.4	16-QAM	3	2	23.39	0-1	1
	848.3	20643	1.4	16-QAM	3	3	23.43	0-1	1
	848.3	20643	1.4	16-QAM	6	0	22.43	0-2	2

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9.3.3 LTE Band 4 (AWS)

Table 9-7
LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	1732.5	20175	20	QPSK	1	0	**23.96**	0	0
	1732.5	20175	20	QPSK	1	50	23.89	0	0
	1732.5	20175	20	QPSK	1	99	23.86	0	0
	1732.5	20175	20	QPSK	50	0	**22.96**	0-1	1
	1732.5	20175	20	QPSK	50	25	22.89	0-1	1
	1732.5	20175	20	QPSK	50	50	22.84	0-1	1
	1732.5	20175	20	QPSK	100	0	22.86	0-1	1
	1732.5	20175	20	16QAM	1	0	22.76	0-1	1
	1732.5	20175	20	16QAM	1	50	22.98	0-1	1
	1732.5	20175	20	16QAM	1	99	22.96	0-1	1
	1732.5	20175	20	16QAM	50	0	21.99	0-2	2
	1732.5	20175	20	16QAM	50	25	21.86	0-2	2
	1732.5	20175	20	16QAM	50	50	21.91	0-2	2
	1732.5	20175	20	16QAM	100	0	21.88	0-2	2

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

Table 9-8
LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1717.5	20025	15	QPSK	1	0	23.91	0	0
	1717.5	20025	15	QPSK	1	36	23.78	0	0
	1717.5	20025	15	QPSK	1	74	23.72	0	0
	1717.5	20025	15	QPSK	36	0	22.80	0-1	1
	1717.5	20025	15	QPSK	36	18	22.74	0-1	1
	1717.5	20025	15	QPSK	36	37	22.64	0-1	1
	1717.5	20025	15	QPSK	75	0	22.77	0-1	1
	1717.5	20025	15	16QAM	1	0	22.81	0-1	1
	1717.5	20025	15	16QAM	1	36	22.73	0-1	1
	1717.5	20025	15	16QAM	1	74	22.66	0-1	1
	1717.5	20025	15	16QAM	36	0	21.75	0-2	2
	1717.5	20025	15	16QAM	36	18	21.70	0-2	2
	1717.5	20025	15	16QAM	36	37	21.59	0-2	2
	1717.5	20025	15	16QAM	75	0	21.71	0-2	2
Mid	1732.5	20175	15	QPSK	1	0	23.74	0	0
	1732.5	20175	15	QPSK	1	36	23.58	0	0
	1732.5	20175	15	QPSK	1	74	23.52	0	0
	1732.5	20175	15	QPSK	36	0	22.61	0-1	1
	1732.5	20175	15	QPSK	36	18	22.54	0-1	1
	1732.5	20175	15	QPSK	36	37	22.55	0-1	1
	1732.5	20175	15	QPSK	75	0	22.60	0-1	1
	1732.5	20175	15	16QAM	1	0	22.75	0-1	1
	1732.5	20175	15	16QAM	1	36	22.56	0-1	1
	1732.5	20175	15	16QAM	1	74	22.49	0-1	1
	1732.5	20175	15	16QAM	36	0	21.52	0-2	2
	1732.5	20175	15	16QAM	36	18	21.57	0-2	2
	1732.5	20175	15	16QAM	36	37	21.54	0-2	2
	1732.5	20175	15	16QAM	75	0	21.62	0-2	2
High	1747.5	20325	15	QPSK	1	0	23.62	0	0
	1747.5	20325	15	QPSK	1	36	23.65	0	0
	1747.5	20325	15	QPSK	1	74	23.58	0	0
	1747.5	20325	15	QPSK	36	0	22.50	0-1	1
	1747.5	20325	15	QPSK	36	18	22.56	0-1	1
	1747.5	20325	15	QPSK	36	37	22.57	0-1	1
	1747.5	20325	15	QPSK	75	0	22.65	0-1	1
	1747.5	20325	15	16QAM	1	0	22.55	0-1	1
	1747.5	20325	15	16QAM	1	36	22.59	0-1	1
	1747.5	20325	15	16QAM	1	74	22.53	0-1	1
	1747.5	20325	15	16QAM	36	0	21.45	0-2	2
	1747.5	20325	15	16QAM	36	18	21.55	0-2	2
	1747.5	20325	15	16QAM	36	37	21.51	0-2	2
	1747.5	20325	15	16QAM	75	0	21.62	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1715	20000	10	QPSK	1	0	23.93	0	0
	1715	20000	10	QPSK	1	25	23.83	0	0
	1715	20000	10	QPSK	1	49	23.70	0	0
	1715	20000	10	QPSK	25	0	22.76	0-1	1
	1715	20000	10	QPSK	25	12	22.77	0-1	1
	1715	20000	10	QPSK	25	25	22.69	0-1	1
	1715	20000	10	QPSK	50	0	22.75	0-1	1
	1715	20000	10	16QAM	1	0	22.82	0-1	1
	1715	20000	10	16QAM	1	25	22.72	0-1	1
	1715	20000	10	16QAM	1	49	22.61	0-1	1
	1715	20000	10	16QAM	25	0	21.83	0-2	2
	1715	20000	10	16QAM	25	12	21.78	0-2	2
	1715	20000	10	16QAM	25	25	21.74	0-2	2
	1715	20000	10	16QAM	50	0	21.71	0-2	2
Mid	1732.5	20175	10	QPSK	1	0	23.56	0	0
	1732.5	20175	10	QPSK	1	25	23.51	0	0
	1732.5	20175	10	QPSK	1	49	23.53	0	0
	1732.5	20175	10	QPSK	25	0	22.33	0-1	1
	1732.5	20175	10	QPSK	25	12	22.31	0-1	1
	1732.5	20175	10	QPSK	25	25	22.30	0-1	1
	1732.5	20175	10	QPSK	50	0	22.39	0-1	1
	1732.5	20175	10	16QAM	1	0	22.47	0-1	1
	1732.5	20175	10	16QAM	1	25	22.41	0-1	1
	1732.5	20175	10	16QAM	1	49	22.42	0-1	1
	1732.5	20175	10	16QAM	25	0	21.40	0-2	2
	1732.5	20175	10	16QAM	25	12	21.44	0-2	2
	1732.5	20175	10	16QAM	25	25	21.41	0-2	2
	1732.5	20175	10	16QAM	50	0	21.42	0-2	2
High	1750	20350	10	QPSK	1	0	23.50	0	0
	1750	20350	10	QPSK	1	25	23.58	0	0
	1750	20350	10	QPSK	1	49	23.49	0	0
	1750	20350	10	QPSK	25	0	22.48	0-1	1
	1750	20350	10	QPSK	25	12	22.43	0-1	1
	1750	20350	10	QPSK	25	25	22.44	0-1	1
	1750	20350	10	QPSK	50	0	22.55	0-1	1
	1750	20350	10	16QAM	1	0	22.45	0-1	1
	1750	20350	10	16QAM	1	25	22.48	0-1	1
	1750	20350	10	16QAM	1	49	22.43	0-1	1
	1750	20350	10	16QAM	25	0	21.50	0-2	2
	1750	20350	10	16QAM	25	12	21.54	0-2	2
	1750	20350	10	16QAM	25	25	21.48	0-2	2
	1750	20350	10	16QAM	50	0	21.50	0-2	2

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Table 9-10
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1712.5	19975	5	QPSK	1	0	23.90	0	0
	1712.5	19975	5	QPSK	1	12	23.89	0	0
	1712.5	19975	5	QPSK	1	24	23.92	0	0
	1712.5	19975	5	QPSK	12	0	22.83	0-1	1
	1712.5	19975	5	QPSK	12	6	22.75	0-1	1
	1712.5	19975	5	QPSK	12	13	22.77	0-1	1
	1712.5	19975	5	QPSK	25	0	22.76	0-1	1
	1712.5	19975	5	16-QAM	1	0	22.85	0-1	1
	1712.5	19975	5	16-QAM	1	12	22.80	0-1	1
	1712.5	19975	5	16-QAM	1	24	22.77	0-1	1
	1712.5	19975	5	16-QAM	12	0	21.73	0-2	2
	1712.5	19975	5	16-QAM	12	6	21.72	0-2	2
	1712.5	19975	5	16-QAM	12	13	21.69	0-2	2
	1712.5	19975	5	16-QAM	25	0	21.75	0-2	2
Mid	1732.5	20175	5	QPSK	1	0	23.55	0	0
	1732.5	20175	5	QPSK	1	12	23.52	0	0
	1732.5	20175	5	QPSK	1	24	23.56	0	0
	1732.5	20175	5	QPSK	12	0	22.39	0-1	1
	1732.5	20175	5	QPSK	12	6	22.40	0-1	1
	1732.5	20175	5	QPSK	12	13	22.32	0-1	1
	1732.5	20175	5	QPSK	25	0	22.41	0-1	1
	1732.5	20175	5	16-QAM	1	0	22.45	0-1	1
	1732.5	20175	5	16-QAM	1	12	22.38	0-1	1
	1732.5	20175	5	16-QAM	1	24	22.40	0-1	1
	1732.5	20175	5	16-QAM	12	0	21.34	0-2	2
	1732.5	20175	5	16-QAM	12	6	21.37	0-2	2
	1732.5	20175	5	16-QAM	12	13	21.38	0-2	2
	1732.5	20175	5	16-QAM	25	0	21.40	0-2	2
High	1752.5	20375	5	QPSK	1	0	23.63	0	0
	1752.5	20375	5	QPSK	1	12	23.59	0	0
	1752.5	20375	5	QPSK	1	24	23.55	0	0
	1752.5	20375	5	QPSK	12	0	22.43	0-1	1
	1752.5	20375	5	QPSK	12	6	22.41	0-1	1
	1752.5	20375	5	QPSK	12	13	22.50	0-1	1
	1752.5	20375	5	QPSK	25	0	22.49	0-1	1
	1752.5	20375	5	16-QAM	1	0	22.48	0-1	1
	1752.5	20375	5	16-QAM	1	12	22.46	0-1	1
	1752.5	20375	5	16-QAM	1	24	22.41	0-1	1
	1752.5	20375	5	16-QAM	12	0	21.43	0-2	2
	1752.5	20375	5	16-QAM	12	6	21.46	0-2	2
	1752.5	20375	5	16-QAM	12	13	21.46	0-2	2
	1752.5	20375	5	16-QAM	25	0	21.51	0-2	2

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Table 9-11
LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1711.5	19965	3	QPSK	1	0	23.89	0	0
	1711.5	19965	3	QPSK	1	7	23.90	0	0
	1711.5	19965	3	QPSK	1	14	23.90	0	0
	1711.5	19965	3	QPSK	8	0	22.83	0-1	1
	1711.5	19965	3	QPSK	8	4	22.80	0-1	1
	1711.5	19965	3	QPSK	8	7	22.82	0-1	1
	1711.5	19965	3	QPSK	15	0	22.81	0-1	1
	1711.5	19965	3	16-QAM	1	0	22.77	0-1	1
	1711.5	19965	3	16-QAM	1	7	22.78	0-1	1
	1711.5	19965	3	16-QAM	1	14	22.86	0-1	1
	1711.5	19965	3	16-QAM	8	0	21.70	0-2	2
	1711.5	19965	3	16-QAM	8	4	21.68	0-2	2
	1711.5	19965	3	16-QAM	8	7	21.67	0-2	2
	1711.5	19965	3	16-QAM	15	0	21.79	0-2	2
Mid	1732.5	20175	3	QPSK	1	0	23.51	0	0
	1732.5	20175	3	QPSK	1	7	23.50	0	0
	1732.5	20175	3	QPSK	1	14	23.51	0	0
	1732.5	20175	3	QPSK	8	0	22.42	0-1	1
	1732.5	20175	3	QPSK	8	4	22.31	0-1	1
	1732.5	20175	3	QPSK	8	7	22.39	0-1	1
	1732.5	20175	3	QPSK	15	0	22.43	0-1	1
	1732.5	20175	3	16-QAM	1	0	22.50	0-1	1
	1732.5	20175	3	16-QAM	1	7	22.37	0-1	1
	1732.5	20175	3	16-QAM	1	14	22.45	0-1	1
	1732.5	20175	3	16-QAM	8	0	21.34	0-2	2
	1732.5	20175	3	16-QAM	8	4	21.33	0-2	2
	1732.5	20175	3	16-QAM	8	7	21.32	0-2	2
	1732.5	20175	3	16-QAM	15	0	21.44	0-2	2
High	1753.5	20385	3	QPSK	1	0	23.64	0	0
	1753.5	20385	3	QPSK	1	7	23.56	0	0
	1753.5	20385	3	QPSK	1	14	23.55	0	0
	1753.5	20385	3	QPSK	8	0	22.44	0-1	1
	1753.5	20385	3	QPSK	8	4	22.49	0-1	1
	1753.5	20385	3	QPSK	8	7	22.38	0-1	1
	1753.5	20385	3	QPSK	15	0	22.50	0-1	1
	1753.5	20385	3	16-QAM	1	0	22.53	0-1	1
	1753.5	20385	3	16-QAM	1	7	22.43	0-1	1
	1753.5	20385	3	16-QAM	1	14	22.50	0-1	1
	1753.5	20385	3	16-QAM	8	0	21.44	0-2	2
	1753.5	20385	3	16-QAM	8	4	21.41	0-2	2
	1753.5	20385	3	16-QAM	8	7	21.32	0-2	2
	1753.5	20385	3	16-QAM	15	0	21.50	0-2	2

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Table 9-12
LTE Band 4 (AWS) Conducted Powers -1.4 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1710.7	19957	1.4	QPSK	1	0	23.86	0	0
	1710.7	19957	1.4	QPSK	1	2	23.87	0	0
	1710.7	19957	1.4	QPSK	1	5	23.88	0	0
	1710.7	19957	1.4	QPSK	3	0	23.80	0	0
	1710.7	19957	1.4	QPSK	3	2	23.79	0	0
	1710.7	19957	1.4	QPSK	3	3	23.75	0	0
	1710.7	19957	1.4	QPSK	6	0	22.84	0-1	1
	1710.7	19957	1.4	16-QAM	1	0	22.85	0-1	1
	1710.7	19957	1.4	16-QAM	1	2	22.87	0-1	1
	1710.7	19957	1.4	16-QAM	1	5	22.90	0-1	1
	1710.7	19957	1.4	16-QAM	3	0	22.81	0-1	1
	1710.7	19957	1.4	16-QAM	3	2	22.80	0-1	1
	1710.7	19957	1.4	16-QAM	3	3	22.82	0-1	1
	1710.7	19957	1.4	16-QAM	6	0	21.76	0-2	2
Mid	1732.5	20175	1.4	QPSK	1	0	23.55	0	0
	1732.5	20175	1.4	QPSK	1	2	23.52	0	0
	1732.5	20175	1.4	QPSK	1	5	23.51	0	0
	1732.5	20175	1.4	QPSK	3	0	23.45	0	0
	1732.5	20175	1.4	QPSK	3	2	23.44	0	0
	1732.5	20175	1.4	QPSK	3	3	23.40	0	0
	1732.5	20175	1.4	QPSK	6	0	22.38	0-1	1
	1732.5	20175	1.4	16-QAM	1	0	22.55	0-1	1
	1732.5	20175	1.4	16-QAM	1	2	22.47	0-1	1
	1732.5	20175	1.4	16-QAM	1	5	22.48	0-1	1
	1732.5	20175	1.4	16-QAM	3	0	22.39	0-1	1
	1732.5	20175	1.4	16-QAM	3	2	22.40	0-1	1
	1732.5	20175	1.4	16-QAM	3	3	22.39	0-1	1
	1732.5	20175	1.4	16-QAM	6	0	21.41	0-2	2
High	1754.3	20393	1.4	QPSK	1	0	23.54	0	0
	1754.3	20393	1.4	QPSK	1	2	23.53	0	0
	1754.3	20393	1.4	QPSK	1	5	23.53	0	0
	1754.3	20393	1.4	QPSK	3	0	23.44	0	0
	1754.3	20393	1.4	QPSK	3	2	23.40	0	0
	1754.3	20393	1.4	QPSK	3	3	23.38	0	0
	1754.3	20393	1.4	QPSK	6	0	22.41	0-1	1
	1754.3	20393	1.4	16-QAM	1	0	22.54	0-1	1
	1754.3	20393	1.4	16-QAM	1	2	22.45	0-1	1
	1754.3	20393	1.4	16-QAM	1	5	22.54	0-1	1
	1754.3	20393	1.4	16-QAM	3	0	22.40	0-1	1
	1754.3	20393	1.4	16-QAM	3	2	22.39	0-1	1
	1754.3	20393	1.4	16-QAM	3	3	22.38	0-1	1
	1754.3	20393	1.4	16-QAM	6	0	21.41	0-2	2

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9.3.4 LTE Band 2 (PCS)

Table 9-13
LTE Band 2 (PCS) Conducted Powers - 20 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1860	18700	20	QPSK	1	0	23.07	0	0
	1860	18700	20	QPSK	1	50	**23.36**	0	0
	1860	18700	20	QPSK	1	99	23.08	0	0
	1860	18700	20	QPSK	50	0	**22.39**	0-1	1
	1860	18700	20	QPSK	50	25	22.36	0-1	1
	1860	18700	20	QPSK	50	50	22.35	0-1	1
	1860	18700	20	QPSK	100	0	22.37	0-1	1
	1860	18700	20	16QAM	1	0	22.34	0-1	1
	1860	18700	20	16QAM	1	50	22.27	0-1	1
	1860	18700	20	16QAM	1	99	22.22	0-1	1
	1860	18700	20	16QAM	50	0	21.32	0-2	2
	1860	18700	20	16QAM	50	25	21.32	0-2	2
	1860	18700	20	16QAM	50	50	21.29	0-2	2
	1860	18700	20	16QAM	100	0	21.24	0-2	2
Mid	1880.0	18900	20	QPSK	1	0	23.35	0	0
	1880.0	18900	20	QPSK	1	50	23.35	0	0
	1880.0	18900	20	QPSK	1	99	23.33	0	0
	1880.0	18900	20	QPSK	50	0	22.38	0-1	1
	1880.0	18900	20	QPSK	50	25	22.34	0-1	1
	1880.0	18900	20	QPSK	50	50	22.22	0-1	1
	1880.0	18900	20	QPSK	100	0	22.24	0-1	1
	1880.0	18900	20	16QAM	1	0	22.40	0-1	1
	1880.0	18900	20	16QAM	1	50	22.33	0-1	1
	1880.0	18900	20	16QAM	1	99	22.32	0-1	1
	1880.0	18900	20	16QAM	50	0	21.39	0-2	2
	1880.0	18900	20	16QAM	50	25	21.33	0-2	2
	1880.0	18900	20	16QAM	50	50	21.31	0-2	2
	1880.0	18900	20	16QAM	100	0	21.30	0-2	2
High	1900	19100	20	QPSK	1	0	23.07	0	0
	1900	19100	20	QPSK	1	50	23.00	0	0
	1900	19100	20	QPSK	1	99	23.19	0	0
	1900	19100	20	QPSK	50	0	22.12	0-1	1
	1900	19100	20	QPSK	50	25	22.00	0-1	1
	1900	19100	20	QPSK	50	50	21.98	0-1	1
	1900	19100	20	QPSK	100	0	22.02	0-1	1
	1900	19100	20	16QAM	1	0	22.30	0-1	1
	1900	19100	20	16QAM	1	50	22.26	0-1	1
	1900	19100	20	16QAM	1	99	22.32	0-1	1
	1900	19100	20	16QAM	50	0	21.31	0-2	2
	1900	19100	20	16QAM	50	25	21.29	0-2	2
	1900	19100	20	16QAM	50	50	21.24	0-2	2
	1900	19100	20	16QAM	100	0	21.22	0-2	2

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Table 9-14
LTE Band 2 (PCS) Conducted Powers - 15 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1857.5	18675	15	QPSK	1	0	23.18	0	0
	1857.5	18675	15	QPSK	1	36	23.14	0	0
	1857.5	18675	15	QPSK	1	74	23.25	0	0
	1857.5	18675	15	QPSK	36	0	22.33	0-1	1
	1857.5	18675	15	QPSK	36	18	22.35	0-1	1
	1857.5	18675	15	QPSK	36	37	22.34	0-1	1
	1857.5	18675	15	QPSK	75	0	22.35	0-1	1
	1857.5	18675	15	16QAM	1	0	22.28	0-1	1
	1857.5	18675	15	16QAM	1	36	22.25	0-1	1
	1857.5	18675	15	16QAM	1	74	22.02	0-1	1
	1857.5	18675	15	16QAM	36	0	21.37	0-2	2
	1857.5	18675	15	16QAM	36	18	21.30	0-2	2
	1857.5	18675	15	16QAM	36	37	21.48	0-2	2
	1857.5	18675	15	16QAM	75	0	21.04	0-2	2
Mid	1880.0	18900	15	QPSK	1	0	23.40	0	0
	1880.0	18900	15	QPSK	1	36	23.26	0	0
	1880.0	18900	15	QPSK	1	74	23.33	0	0
	1880.0	18900	15	QPSK	36	0	22.39	0-1	1
	1880.0	18900	15	QPSK	36	18	22.16	0-1	1
	1880.0	18900	15	QPSK	36	37	22.32	0-1	1
	1880.0	18900	15	QPSK	75	0	22.35	0-1	1
	1880.0	18900	15	16QAM	1	0	22.45	0-1	1
	1880.0	18900	15	16QAM	1	36	22.29	0-1	1
	1880.0	18900	15	16QAM	1	74	22.13	0-1	1
	1880.0	18900	15	16QAM	36	0	21.25	0-2	2
	1880.0	18900	15	16QAM	36	18	21.22	0-2	2
	1880.0	18900	15	16QAM	36	37	21.35	0-2	2
	1880.0	18900	15	16QAM	75	0	21.50	0-2	2
High	1902.5	19125	15	QPSK	1	0	23.25	0	0
	1902.5	19125	15	QPSK	1	36	23.07	0	0
	1902.5	19125	15	QPSK	1	74	23.06	0	0
	1902.5	19125	15	QPSK	36	0	22.04	0-1	1
	1902.5	19125	15	QPSK	36	18	21.92	0-1	1
	1902.5	19125	15	QPSK	36	37	22.07	0-1	1
	1902.5	19125	15	QPSK	75	0	22.00	0-1	1
	1902.5	19125	15	16QAM	1	0	22.15	0-1	1
	1902.5	19125	15	16QAM	1	36	22.06	0-1	1
	1902.5	19125	15	16QAM	1	74	22.47	0-1	1
	1902.5	19125	15	16QAM	36	0	21.16	0-2	2
	1902.5	19125	15	16QAM	36	18	21.42	0-2	2
	1902.5	19125	15	16QAM	36	37	21.20	0-2	2
	1902.5	19125	15	16QAM	75	0	21.08	0-2	2

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Table 9-15
LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1855	18650	10	QPSK	1	0	23.12	0	0
	1855	18650	10	QPSK	1	25	23.17	0	0
	1855	18650	10	QPSK	1	49	23.04	0	0
	1855	18650	10	QPSK	25	0	22.19	0-1	1
	1855	18650	10	QPSK	25	12	22.29	0-1	1
	1855	18650	10	QPSK	25	25	22.18	0-1	1
	1855	18650	10	QPSK	50	0	22.14	0-1	1
	1855	18650	10	16QAM	1	0	22.50	0-1	1
	1855	18650	10	16QAM	1	25	22.40	0-1	1
	1855	18650	10	16QAM	1	49	22.27	0-1	1
	1855	18650	10	16QAM	25	0	21.21	0-2	2
	1855	18650	10	16QAM	25	12	21.20	0-2	2
	1855	18650	10	16QAM	25	25	21.25	0-2	2
	1855	18650	10	16QAM	50	0	21.26	0-2	2
Mid	1880.0	18900	10	QPSK	1	0	23.14	0	0
	1880.0	18900	10	QPSK	1	25	23.20	0	0
	1880.0	18900	10	QPSK	1	49	23.33	0	0
	1880.0	18900	10	QPSK	25	0	22.26	0-1	1
	1880.0	18900	10	QPSK	25	12	22.00	0-1	1
	1880.0	18900	10	QPSK	25	25	22.12	0-1	1
	1880.0	18900	10	QPSK	50	0	22.35	0-1	1
	1880.0	18900	10	16QAM	1	0	22.48	0-1	1
	1880.0	18900	10	16QAM	1	25	22.43	0-1	1
	1880.0	18900	10	16QAM	1	49	22.47	0-1	1
	1880.0	18900	10	16QAM	25	0	21.37	0-2	2
	1880.0	18900	10	16QAM	25	12	21.13	0-2	2
	1880.0	18900	10	16QAM	25	25	21.06	0-2	2
	1880.0	18900	10	16QAM	50	0	21.16	0-2	2
High	1905	19150	10	QPSK	1	0	23.39	0	0
	1905	19150	10	QPSK	1	25	23.22	0	0
	1905	19150	10	QPSK	1	49	23.00	0	0
	1905	19150	10	QPSK	25	0	22.00	0-1	1
	1905	19150	10	QPSK	25	12	22.04	0-1	1
	1905	19150	10	QPSK	25	25	22.16	0-1	1
	1905	19150	10	QPSK	50	0	22.19	0-1	1
	1905	19150	10	16QAM	1	0	22.31	0-1	1
	1905	19150	10	16QAM	1	25	22.23	0-1	1
	1905	19150	10	16QAM	1	49	22.15	0-1	1
	1905	19150	10	16QAM	25	0	21.12	0-2	2
	1905	19150	10	16QAM	25	12	21.17	0-2	2
	1905	19150	10	16QAM	25	25	21.16	0-2	2
	1905	19150	10	16QAM	50	0	21.30	0-2	2

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Table 9-16
LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1852.5	18625	5	QPSK	1	0	23.15	0	0
	1852.5	18625	5	QPSK	1	12	23.11	0	0
	1852.5	18625	5	QPSK	1	24	23.04	0	0
	1852.5	18625	5	QPSK	12	0	22.27	0-1	1
	1852.5	18625	5	QPSK	12	6	22.24	0-1	1
	1852.5	18625	5	QPSK	12	13	22.20	0-1	1
	1852.5	18625	5	QPSK	25	0	22.24	0-1	1
	1852.5	18625	5	16-QAM	1	0	22.45	0-1	1
	1852.5	18625	5	16-QAM	1	12	22.42	0-1	1
	1852.5	18625	5	16-QAM	1	24	22.36	0-1	1
	1852.5	18625	5	16-QAM	12	0	21.30	0-2	2
	1852.5	18625	5	16-QAM	12	6	21.29	0-2	2
	1852.5	18625	5	16-QAM	12	13	21.28	0-2	2
	1852.5	18625	5	16-QAM	25	0	21.26	0-2	2
Mid	1880.0	18900	5	QPSK	1	0	23.15	0	0
	1880.0	18900	5	QPSK	1	12	23.25	0	0
	1880.0	18900	5	QPSK	1	24	23.26	0	0
	1880.0	18900	5	QPSK	12	0	22.20	0-1	1
	1880.0	18900	5	QPSK	12	6	22.03	0-1	1
	1880.0	18900	5	QPSK	12	13	22.06	0-1	1
	1880.0	18900	5	QPSK	25	0	22.30	0-1	1
	1880.0	18900	5	16-QAM	1	0	22.48	0-1	1
	1880.0	18900	5	16-QAM	1	12	22.44	0-1	1
	1880.0	18900	5	16-QAM	1	24	22.48	0-1	1
	1880.0	18900	5	16-QAM	12	0	21.45	0-2	2
	1880.0	18900	5	16-QAM	12	6	21.09	0-2	2
	1880.0	18900	5	16-QAM	12	13	21.13	0-2	2
	1880.0	18900	5	16-QAM	25	0	21.22	0-2	2
High	1907.5	19175	5	QPSK	1	0	23.38	0	0
	1907.5	19175	5	QPSK	1	12	23.17	0	0
	1907.5	19175	5	QPSK	1	24	23.00	0	0
	1907.5	19175	5	QPSK	12	0	22.08	0-1	1
	1907.5	19175	5	QPSK	12	6	22.07	0-1	1
	1907.5	19175	5	QPSK	12	13	22.08	0-1	1
	1907.5	19175	5	QPSK	25	0	22.11	0-1	1
	1907.5	19175	5	16-QAM	1	0	22.30	0-1	1
	1907.5	19175	5	16-QAM	1	12	22.13	0-1	1
	1907.5	19175	5	16-QAM	1	24	22.16	0-1	1
	1907.5	19175	5	16-QAM	12	0	21.17	0-2	2
	1907.5	19175	5	16-QAM	12	6	21.16	0-2	2
	1907.5	19175	5	16-QAM	12	13	21.12	0-2	2
	1907.5	19175	5	16-QAM	25	0	21.20	0-2	2

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Table 9-17
LTE Band 2 (PCS) Conducted Powers - 3 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1851.5	18615	3	QPSK	1	0	23.17	0	0
	1851.5	18615	3	QPSK	1	7	23.14	0	0
	1851.5	18615	3	QPSK	1	14	23.12	0	0
	1851.5	18615	3	QPSK	8	0	22.21	0-1	1
	1851.5	18615	3	QPSK	8	4	22.25	0-1	1
	1851.5	18615	3	QPSK	8	7	22.22	0-1	1
	1851.5	18615	3	QPSK	15	0	22.22	0-1	1
	1851.5	18615	3	16-QAM	1	0	22.49	0-1	1
	1851.5	18615	3	16-QAM	1	7	22.47	0-1	1
	1851.5	18615	3	16-QAM	1	14	22.48	0-1	1
	1851.5	18615	3	16-QAM	8	0	21.31	0-2	2
	1851.5	18615	3	16-QAM	8	4	21.32	0-2	2
	1851.5	18615	3	16-QAM	8	7	21.29	0-2	2
	1851.5	18615	3	16-QAM	15	0	21.23	0-2	2
Mid	1880.0	18900	3	QPSK	1	0	23.21	0	0
	1880.0	18900	3	QPSK	1	7	23.27	0	0
	1880.0	18900	3	QPSK	1	14	23.25	0	0
	1880.0	18900	3	QPSK	8	0	22.21	0-1	1
	1880.0	18900	3	QPSK	8	4	22.07	0-1	1
	1880.0	18900	3	QPSK	8	7	22.12	0-1	1
	1880.0	18900	3	QPSK	15	0	22.40	0-1	1
	1880.0	18900	3	16-QAM	1	0	22.50	0-1	1
	1880.0	18900	3	16-QAM	1	7	22.35	0-1	1
	1880.0	18900	3	16-QAM	1	14	22.43	0-1	1
	1880.0	18900	3	16-QAM	8	0	21.46	0-2	2
	1880.0	18900	3	16-QAM	8	4	21.16	0-2	2
	1880.0	18900	3	16-QAM	8	7	21.15	0-2	2
	1880.0	18900	3	16-QAM	15	0	21.23	0-2	2
High	1908.5	19185	3	QPSK	1	0	23.27	0	0
	1908.5	19185	3	QPSK	1	7	23.07	0	0
	1908.5	19185	3	QPSK	1	14	23.00	0	0
	1908.5	19185	3	QPSK	8	0	22.26	0-1	1
	1908.5	19185	3	QPSK	8	4	22.07	0-1	1
	1908.5	19185	3	QPSK	8	7	22.05	0-1	1
	1908.5	19185	3	QPSK	15	0	22.15	0-1	1
	1908.5	19185	3	16-QAM	1	0	22.23	0-1	1
	1908.5	19185	3	16-QAM	1	7	22.24	0-1	1
	1908.5	19185	3	16-QAM	1	14	22.15	0-1	1
	1908.5	19185	3	16-QAM	8	0	21.10	0-2	2
	1908.5	19185	3	16-QAM	8	4	21.13	0-2	2
	1908.5	19185	3	16-QAM	8	7	21.11	0-2	2
	1908.5	19185	3	16-QAM	15	0	21.23	0-2	2

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Table 9-18
LTE Band 2 (PCS) Conducted Powers -1.4 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1850.7	18607	1.4	QPSK	1	0	23.09	0	0
	1850.7	18607	1.4	QPSK	1	2	23.19	0	0
	1850.7	18607	1.4	QPSK	1	5	23.10	0	0
	1850.7	18607	1.4	QPSK	3	0	23.11	0	0
	1850.7	18607	1.4	QPSK	3	2	23.17	0	0
	1850.7	18607	1.4	QPSK	3	3	23.12	0	0
	1850.7	18607	1.4	QPSK	6	0	22.22	0-1	1
	1850.7	18607	1.4	16-QAM	1	0	22.41	0-1	1
	1850.7	18607	1.4	16-QAM	1	2	22.50	0-1	1
	1850.7	18607	1.4	16-QAM	1	5	22.37	0-1	1
	1850.7	18607	1.4	16-QAM	3	0	22.32	0-1	1
	1850.7	18607	1.4	16-QAM	3	2	22.33	0-1	1
	1850.7	18607	1.4	16-QAM	3	3	22.28	0-1	1
	1850.7	18607	1.4	16-QAM	6	0	21.30	0-2	2
Mid	1880.0	18900	1.4	QPSK	1	0	23.29	0	0
	1880.0	18900	1.4	QPSK	1	2	23.17	0	0
	1880.0	18900	1.4	QPSK	1	5	23.23	0	0
	1880.0	18900	1.4	QPSK	3	0	23.11	0	0
	1880.0	18900	1.4	QPSK	3	2	22.98	0	0
	1880.0	18900	1.4	QPSK	3	3	23.12	0	0
	1880.0	18900	1.4	QPSK	6	0	22.34	0-1	1
	1880.0	18900	1.4	16-QAM	1	0	22.40	0-1	1
	1880.0	18900	1.4	16-QAM	1	2	22.41	0-1	1
	1880.0	18900	1.4	16-QAM	1	5	22.50	0-1	1
	1880.0	18900	1.4	16-QAM	3	0	22.44	0-1	1
	1880.0	18900	1.4	16-QAM	3	2	22.14	0-1	1
	1880.0	18900	1.4	16-QAM	3	3	22.21	0-1	1
	1880.0	18900	1.4	16-QAM	6	0	21.15	0-2	2
High	1909.3	19193	1.4	QPSK	1	0	23.02	0	0
	1909.3	19193	1.4	QPSK	1	2	23.04	0	0
	1909.3	19193	1.4	QPSK	1	5	23.00	0	0
	1909.3	19193	1.4	QPSK	3	0	23.03	0	0
	1909.3	19193	1.4	QPSK	3	2	23.05	0	0
	1909.3	19193	1.4	QPSK	3	3	23.00	0	0
	1909.3	19193	1.4	QPSK	6	0	22.02	0-1	1
	1909.3	19193	1.4	16-QAM	1	0	22.26	0-1	1
	1909.3	19193	1.4	16-QAM	1	2	22.20	0-1	1
	1909.3	19193	1.4	16-QAM	1	5	22.05	0-1	1
	1909.3	19193	1.4	16-QAM	3	0	22.14	0-1	1
	1909.3	19193	1.4	16-QAM	3	2	22.11	0-1	1
	1909.3	19193	1.4	16-QAM	3	3	22.02	0-1	1
	1909.3	19193	1.4	16-QAM	6	0	21.16	0-2	2

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9.4 LTE Carrier Aggregation Conducted Powers

Table 9-19
LTE Carrier Aggregation Conducted Powers - Band 2 (PCC) + Band 17 (SCC) 10 MHz BW

Band 2 (PCC) + Band 17 (SCC), 10 MHz				
1905 MHz / ch.19150 + 740 MHz / ch. 5790	PCC UL# RB	PCC UL RB Offset	LTE Rel 10 Tx.Power (dBm)	LTE Rel 8 Tx.Power (dBm)
	1	0	23.44	23.39

Table 9-20
LTE Carrier Aggregation Conducted Powers - Band 2 (PCC) + Band 29 (SCC) 10 MHz BW

Band 2 (PCC) + Band 29 (SCC), 10 MHz				
1905 MHz / ch.19150 + 722.7 MHz / ch. 9715	PCC UL# RB	PCC UL RB Offset	LTE Rel 10 Tx.Power (dBm)	LTE Rel 8 Tx.Power (dBm)
	1	0	23.45	23.39

Table 9-21
LTE Carrier Aggregation Conducted Powers - Band 4 (PCC) + Band 17 (SCC) 10 MHz BW

Band 4 (PCC) + Band 17 (SCC), 10 MHz				
1715 MHz / ch.20000 + 740 MHz / ch. 5790	PCC UL# RB	PCC UL RB Offset	LTE Rel 10 Tx.Power (dBm)	LTE Rel 8 Tx.Power (dBm)
	1	0	24.00	23.93

Table 9-22
LTE Carrier Aggregation Conducted Powers - Band 4 (PCC) + Band 29 (SCC) 10 MHz BW

Band 4 (PCC) + Band 29 (SCC), 10 MHz				
1715 MHz / ch.20000 + 722.7 MHz / ch. 9715	PCC UL# RB	PCC UL RB Offset	LTE Rel 10 Tx.Power (dBm)	LTE Rel 8 Tx.Power (dBm)
	1	0	23.99	23.93

Table 9-23
LTE Carrier Aggregation Conducted Powers - Band 17 (PCC) + Band 2 (SCC) 10 MHz BW

Band 17 (PCC) + Band 2 (SCC), 10 MHz				
710 MHz / ch.23790 + 1960 MHz / ch. 900	PCC UL# RB	PCC UL RB Offset	LTE Rel 10 Tx.Power (dBm)	LTE Rel 8 Tx.Power (dBm)
	1	0	24.39	24.35

Notes:

1. The device does not support all Rel. 10 Carrier Aggregation features due to modem chipset limitation.
2. The device only supports downlink Carrier Aggregation. Uplink Carrier Aggregation is not supported. Power measurements were performed with two DL carriers for the Release 8 configuration that had the highest output power (across all bandwidths, channels and RB Configurations) for each band
3. This device only supports inter-band CA with 2 carriers (B2+B17, B2+B29, B4+B17, B4+B29, B17+B2) with a maximum of 10 MHz of spectrum.
4. All control and acknowledge data is sent on uplink channels that operate identical to release 8 specifications.
5. LTE B29 is only supported on the downlink for this device; LTE B2, B4, B17 are supported on both the uplink and downlink for this device.

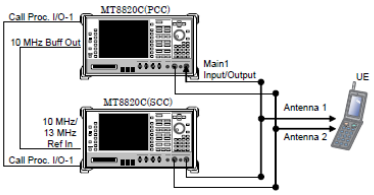

Figure 9-3
Power Measurement Setup

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9.5 WLAN/ BT Conducted Powers

9.5.1 Antenna 1 WLAN Conducted Powers

Maximum Conducted Powers

Table 9-24
IEEE 802.11b Average RF Power

Mode	Freq [MHz]	Channel	802.11b Conducted Power [dBm]			
			Data Rate [Mbps]			
			1	2	5.5	11
802.11b	2412	1*	16.65	17.20	16.85	17.07
802.11b	2437	6*	17.26	16.34	16.31	16.28
802.11b	2462	11*	**17.41**	16.44	16.40	16.45

Table 9-25
IEEE 802.11g Average RF Power

Mode	Freq [MHz]	Channel	802.11g Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11g	2412	1	16.32	16.49	16.32	16.36	16.41	16.24	16.49	16.26
802.11g	2437	6	15.97	16.12	15.91	16.00	16.06	15.82	16.07	15.92
802.11g	2462	11	16.02	16.19	16.04	16.08	16.12	16.02	16.27	15.93

Table 9-26
IEEE 802.11n Average RF Power

Mode	Freq [MHz]	Channel	802.11n (2.4GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	2412	1	15.21	15.19	15.05	15.29	15.34	15.32	15.31	15.40
802.11n	2437	6	14.84	14.91	14.64	14.99	14.97	15.04	14.93	15.06
802.11n	2462	11	14.71	14.62	14.56	14.74	14.83	14.86	14.77	14.85

Table 9-27
IEEE 802.11a Average RF Power

Mode	Freq [MHz]	Channel	802.11a Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11a	5180	36*	**13.55**	13.49	13.41	13.32	13.62	13.51	13.67	13.51
802.11a	5200	40	13.51	13.43	13.37	13.24	13.58	13.49	13.69	13.54
802.11a	5220	44	13.38	13.39	13.29	13.12	13.41	13.36	13.47	13.28
802.11a	5240	48*	13.33	13.23	13.19	13.16	13.36	13.32	13.48	13.31
802.11a	5260	52*	**14.30**	14.16	14.12	13.95	14.09	14.11	14.24	13.91
802.11a	5280	56	14.14	14.05	14.02	13.85	13.91	13.94	13.99	13.73
802.11a	5300	60	14.15	14.07	13.94	13.77	13.92	14.03	14.11	13.78
802.11a	5320	64*	13.89	13.70	13.74	13.57	13.67	13.77	13.80	13.53
802.11a	5500	100	14.42	13.74	13.78	13.70	13.91	13.80	14.19	13.84
802.11a	5520	104*	**14.48**	13.75	13.91	13.75	13.97	13.77	14.23	13.89
802.11a	5540	108	14.35	13.69	13.66	13.59	13.83	13.79	14.14	13.73
802.11a	5560	112	14.17	13.47	13.48	13.46	13.61	13.49	13.91	13.59
802.11a	5580	116*	14.15	13.49	13.45	13.41	13.65	13.57	13.88	13.61
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	14.04	13.37	13.43	13.26	13.53	13.41	13.76	13.48
802.11a	5680	136*	14.19	13.58	13.53	13.44	13.68	13.58	14.02	13.61
802.11a	5700	140	14.05	13.42	13.45	13.30	13.52	13.47	13.89	13.52
802.11a	5745	149*	13.69	13.65	13.30	13.48	13.58	13.52	13.82	13.30
802.11a	5765	153	13.63	13.61	13.15	13.35	13.49	13.45	13.81	13.33
802.11a	5785	157*	13.63	13.53	13.24	13.46	13.50	13.49	13.71	13.25
802.11a	5805	161	**13.72**	13.63	13.32	13.55	13.61	13.54	13.84	13.34
802.11a	5825	165*	13.60	13.52	13.20	13.42	13.52	13.46	13.75	13.27

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Band.

(*) – indicates default channels per KDB Publication 248227 D01v01r02. When the adjacent channels are higher in power then the default channels, these "required channels" are considered for SAR testing instead of the default channels.

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Table 9-28
IEEE 802.11n Average RF Power – 20 MHz Bandwidth

Mode	Freq [MHz]	Channel	20MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	5180	36	13.39	13.21	13.24	13.54	13.50	13.57	13.49	13.48
802.11n	5200	40	13.31	13.25	13.14	13.42	13.41	13.55	13.37	13.38
802.11n	5220	44	13.23	13.24	13.22	13.38	13.34	13.43	13.40	13.35
802.11n	5240	48	13.32	13.28	13.29	13.28	13.20	13.26	13.23	13.25
802.11n	5260	52	14.12	13.79	13.88	13.99	14.01	14.19	14.20	14.24
802.11n	5280	56	14.21	13.89	13.96	14.13	14.03	14.27	14.25	14.37
802.11n	5300	60	13.83	13.55	13.56	13.75	13.77	13.89	13.88	13.95
802.11n	5320	64	13.84	13.46	13.56	13.63	13.68	13.88	13.86	13.96
802.11n	5500	100	14.40	14.12	14.20	14.31	14.34	14.38	14.48	14.38
802.11n	5520	104	14.36	14.07	14.23	14.32	14.23	14.34	14.42	14.31
802.11n	5540	108	14.15	13.95	13.95	14.00	14.03	14.12	14.24	14.15
802.11n	5560	112	14.12	13.82	13.96	14.10	14.06	14.08	14.20	14.09
802.11n	5580	116	14.15	13.83	13.94	14.04	14.05	14.21	14.17	14.19
802.11n	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	13.86	13.58	13.66	13.82	13.84	13.78	13.95	13.88
802.11n	5680	136	13.88	13.64	13.69	13.75	13.79	13.87	13.91	13.83
802.11n	5700	140	14.00	13.81	13.90	13.94	14.03	13.96	14.04	13.91
802.11n	5745	149	13.47	13.29	13.39	13.49	13.42	13.52	13.51	13.56
802.11n	5765	153	13.62	13.44	13.61	13.71	13.56	13.70	13.62	13.69
802.11n	5785	157	13.58	13.31	13.53	13.57	13.60	13.65	13.56	13.61
802.11n	5805	161	13.64	13.46	13.57	13.67	13.65	13.76	13.71	13.73
802.11n	5825	165	13.63	13.52	13.52	13.66	13.58	13.72	13.70	13.75

Table 9-29
IEEE 802.11ac Average RF Power – 20 MHz Bandwidth

20MHz BW 802.11ac (5GHz) Conducted Power [dBm]			
Mode	Freq [MHz]	Channel	Data Rate
			6.5 Mbps
802.11ac	5180	36	13.22
802.11ac	5200	40	13.17
802.11ac	5240	48	13.06
802.11ac	5260	52	12.92
802.11ac	5280	56	13.01
802.11ac	5320	64	13.08
802.11ac	5500	100	13.35
802.11ac	5580	116	13.19
802.11ac	5600	120	N/A
802.11ac	5620	124	N/A
802.11ac	5640	128	N/A
802.11ac	5700	140	13.09
802.11ac	5745	149	13.35
802.11ac	5785	157	13.40
802.11ac	5825	165	13.42

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Table 9-30
IEEE 802.11n Average RF Power – 40 MHz Bandwidth

Mode	Freq [MHz]	Channel	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			13.5	27	40.5	54	81	108	121.5	135
802.11n	5190	38	12.08	11.76	11.78	12.02	12.00	11.84	11.87	11.94
802.11n	5230	46	12.14	11.81	11.90	12.09	12.08	11.88	11.92	12.03
802.11n	5270	54	11.83	11.56	11.54	11.77	11.92	11.90	11.71	11.84
802.11n	5310	62	11.69	11.42	11.38	11.60	11.76	11.73	11.63	11.69
802.11n	5510	102	12.03	11.88	11.94	12.14	12.08	12.11	12.02	12.15
802.11n	5550	110	11.94	11.83	11.88	12.02	11.90	11.97	11.89	12.01
802.11n	5590	118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5630	126	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5670	134	11.74	11.62	11.61	11.82	11.74	11.89	11.73	11.86
802.11n	5755	151	12.17	12.15	12.19	12.38	12.27	12.37	12.08	12.08
802.11n	5795	159	12.10	12.17	12.03	12.29	12.16	12.30	11.95	11.96

Table 9-31
IEEE 802.11ac Average RF Power – 40 MHz Bandwidth

40MHz BW 802.11ac (5GHz) Conducted Power [dBm]			
Mode	Freq [MHz]	Channel	Data Rate
			13.5 Mbps
802.11ac	5190	38	11.89
802.11ac	5230	46	12.02
802.11ac	5270	54	11.52
802.11ac	5310	62	12.37
802.11ac	5510	102	12.02
802.11ac	5550	110	11.84
802.11n	5590	118	N/A
802.11n	5630	126	N/A
802.11ac	5670	134	11.69
802.11ac	5755	151	12.14
802.11ac	5795	159	12.28

Table 9-32
IEEE 802.11ac Average RF Power – 80 MHz Bandwidth

Mode	Freq [MHz]	Channel	80MHz BW 802.11ac (5GHz) Conducted Power [dBm]									
			Data Rate [Mbps]									
			29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
802.11ac	5210	42	**10.98**	11.19	11.05	10.55	10.62	10.58	10.69	10.65	10.56	10.77
802.11ac	5290	58	**11.05**	11.01	10.91	11.21	11.26	11.20	11.22	11.24	11.27	11.29
802.11ac	5530	106	**11.34**	10.81	10.67	11.08	10.80	10.82	10.84	10.89	10.92	10.95
802.11ac	5775	155	**10.60**	10.74	10.64	10.67	10.76	10.81	10.68	10.57	10.65	10.75

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Reduced Conducted Powers – Held-to-Ear

Table 9-33
IEEE 802.11b Average RF Power

Mode	Freq [MHz]	Channel	802.11b Conducted Power [dBm]
			Data Rate [Mbps]
			1
802.11b	2412	1*	11.87
802.11b	2437	6*	12.03
802.11b	2462	11*	**12.43**

Table 9-34
IEEE 802.11g Average RF Power

Mode	Freq [MHz]	Channel	802.11g Conducted Power [dBm]
			Data Rate [Mbps]
			6
802.11g	2412	1	12.19
802.11g	2437	6	12.12
802.11g	2462	11	12.02

Table 9-35
IEEE 802.11n Average RF Power

Mode	Freq [MHz]	Channel	802.11n Conducted Power [dBm]
			Data Rate [Mbps]
			6.5
802.11n	2412	1	12.44
802.11n	2437	6	12.06
802.11n	2462	11	12.02

Table 9-36
IEEE 802.11a Average RF Power

Mode	Freq [MHz]	Channel	802.11a Conducted Power [dBm]
			Data Rate [Mbps]
			6
802.11a	5180	36*	**9.26**
802.11a	5200	40	8.83
802.11a	5220	44	9.04
802.11a	5240	48*	9.16
802.11a	5260	52*	9.14
802.11a	5280	56	9.46
802.11a	5300	60	**9.47**
802.11a	5320	64*	9.44
802.11a	5500	100	**9.46**
802.11a	5520	104*	9.44
802.11a	5540	108	9.22
802.11a	5560	112	9.37
802.11a	5580	116*	9.06
802.11a	5600	120	N/A
802.11a	5620	124	N/A
802.11a	5640	128	N/A
802.11a	5660	132	9.04
802.11a	5680	136*	9.02
802.11a	5700	140	9.43
802.11a	5745	149*	9.25
802.11a	5765	153	9.33
802.11a	5785	157*	9.11
802.11a	5805	161	9.21
802.11a	5825	165*	**9.42**

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Band.

(*) – indicates default channels per KDB Publication 248227 D01v01r02. When the adjacent channels are higher in power then the default channels, these “required channels” are considered for SAR testing instead of the default channels

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Table 9-37
IEEE 802.11n Average RF Power – 20 MHz Bandwidth

Mode	Freq [MHz]	Channel	20MHz BW 802.11n Conducted Power [dBm]
			Data Rate [Mbps]
			6.5
802.11n	5180	36	9.22
802.11n	5200	40	9.29
802.11n	5220	44	9.41
802.11n	5240	48	9.33
802.11n	5260	52	9.42
802.11n	5280	56	9.19
802.11n	5300	60	9.23
802.11n	5320	64	9.20
802.11n	5500	100	9.49
802.11n	5520	104	9.36
802.11n	5540	108	9.32
802.11n	5560	112	9.12
802.11n	5580	116	9.01
802.11n	5600	120	N/A
802.11n	5620	124	N/A
802.11n	5640	128	N/A
802.11n	5660	132	8.94
802.11n	5680	136	8.75
802.11n	5700	140	8.92
802.11n	5745	149	9.10
802.11n	5765	153	9.16
802.11n	5785	157	9.28
802.11n	5805	161	9.29
802.11n	5825	165	9.12

Table 9-38
IEEE 802.11ac Average RF Power – 20 MHz Bandwidth

Mode	Freq [MHz]	Channel	20 MHz BW 802.11ac Conducted Power [dBm]
			Data Rate [Mbps]
			6.5 Mbps
802.11ac	5180	36	9.23
802.11ac	5200	40	9.15
802.11ac	5240	48	9.22
802.11ac	5260	52	9.10
802.11ac	5280	56	9.01
802.11ac	5320	64	9.15
802.11ac	5500	100	9.40
802.11ac	5580	116	9.24
802.11ac	5600	120	N/A
802.11ac	5620	124	N/A
802.11ac	5640	128	N/A
802.11ac	5700	140	8.99
802.11ac	5745	149	9.05
802.11ac	5785	157	9.00
802.11ac	5825	165	8.84

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Table 9-39
IEEE 802.11n Average RF Power – 40 MHz Bandwidth

Mode	Freq [MHz]	Channel	40MHz BW 802.11n Conducted Power [dBm]
			Data Rate [Mbps]
			13.5
802.11n	5190	38	7.75
802.11n	5230	46	7.63
802.11n	5270	54	7.39
802.11n	5310	62	7.59
802.11n	5510	102	8.11
802.11n	5550	110	7.82
802.11n	5590	118	N/A
802.11n	5630	126	N/A
802.11n	5670	134	7.69
802.11n	5755	151	8.11
802.11n	5795	159	8.01

Table 9-40
IEEE 802.11ac Average RF Power – 40 MHz Bandwidth

Mode	Freq [MHz]	Channel	40MHz BW 802.11ac Conducted Power [dBm]
			Data Rate [Mbps]
			13.5
802.11ac	5190	38	8.02
802.11ac	5230	46	7.99
802.11ac	5270	54	7.65
802.11ac	5310	62	7.63
802.11ac	5510	102	8.02
802.11ac	5550	110	8.10
802.11n	5590	118	N/A
802.11n	5630	126	N/A
802.11ac	5670	134	8.06
802.11ac	5755	151	8.12
802.11ac	5795	159	7.88

Table 9-41
IEEE 802.11ac Average RF Power – 80 MHz Bandwidth

Mode	Freq [MHz]	Channel	80MHz BW 802.11ac Conducted Power [dBm]
			Data Rate [Mbps]
			29.3
802.11ac	5210	42	**7.84**
802.11ac	5290	58	**8.31**
802.11ac	5530	106	**8.49**
802.11ac	5775	155	**7.93**

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Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012/April 2013 FCC/TCB Meeting Notes:

- For 2.4 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11) b were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11g/nwere not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
- For 5 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11a were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n 20 MHz and 40 MHz) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
- Full SAR tests for all IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.
- When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the reported 1g averaged SAR is <0.8 W/kg, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.
- The bolded data rate and channel above were tested for SAR.

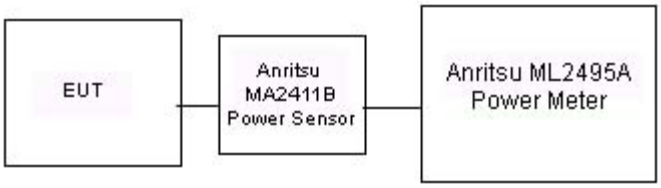

Figure 9-4
Power Measurement Setup for Bandwidths < 50 MHz

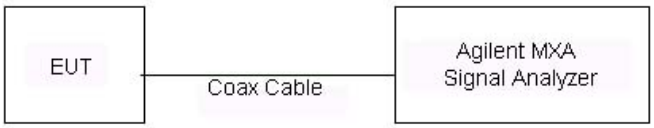

Figure 9-5
Power Measurement Setup for Bandwidths > 50 MHz

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9.5.2 Antenna 2 WLAN Conducted Powers

Maximum Conducted Powers

Table 9-42
IEEE 802.11b Average RF Power

Mode	Freq [MHz]	Channel	802.11b Conducted Power [dBm]			
			Data Rate [Mbps]			
			1	2	5.5	11
802.11b	2412	1*	16.86	16.97	17.07	17.08
802.11b	2437	6*	16.45	16.54	16.49	16.52
802.11b	2462	11*	**17.24**	17.47	17.39	17.45

Table 9-43
IEEE 802.11g Average RF Power

Mode	Freq [MHz]	Channel	802.11g Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11g	2412	1	15.27	15.24	15.29	15.42	15.38	15.42	15.37	15.45
802.11g	2437	6	16.33	16.30	16.38	16.45	16.41	16.45	16.40	16.48
802.11g	2462	11	15.67	15.63	15.68	15.87	15.82	15.86	15.77	15.85

Table 9-44
IEEE 802.11n Average RF Power

Mode	Freq [MHz]	Channel	802.11n (2.4GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	2412	1	15.29	15.12	15.14	15.27	15.35	15.32	15.34	15.30
802.11n	2437	6	15.01	14.85	14.83	15.02	15.00	14.95	15.01	15.02
802.11n	2462	11	14.67	14.57	14.50	14.65	14.75	14.66	14.72	14.70

Table 9-45
IEEE 802.11a Average RF Power

Mode	Freq [MHz]	Channel	802.11a Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11a	5180	36*	**13.51**	13.42	13.22	13.48	13.56	13.51	13.67	13.65
802.11a	5200	40	13.34	13.24	13.06	13.30	13.40	13.32	13.46	13.53
802.11a	5220	44	13.40	13.31	13.12	13.38	13.45	13.34	13.61	13.60
802.11a	5240	48*	13.18	13.10	12.94	13.20	13.25	13.13	13.41	13.36
802.11a	5260	52*	14.36	14.34	14.41	14.31	14.37	14.48	14.49	14.46
802.11a	5280	56	**14.37**	14.36	14.36	14.28	14.32	14.49	14.41	14.49
802.11a	5300	60	14.24	14.20	14.29	14.18	14.33	14.32	14.35	14.36
802.11a	5320	64*	14.27	14.25	14.31	14.28	14.26	14.33	14.38	14.39
802.11a	5500	100	13.28	13.20	13.24	13.29	13.34	13.42	13.51	13.48
802.11a	5520	104*	13.33	13.20	13.39	13.30	13.38	13.45	13.57	13.53
802.11a	5540	108	13.20	13.10	13.16	13.23	13.23	13.32	13.39	13.40
802.11a	5560	112	13.36	13.26	13.24	13.39	13.44	13.49	13.53	13.51
802.11a	5580	116*	13.26	13.19	13.19	13.32	13.35	13.36	13.44	13.44
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	13.55	13.40	13.46	13.56	13.62	13.73	13.83	13.79
802.11a	5680	136*	13.50	13.44	13.51	13.48	13.55	13.66	13.75	13.65
802.11a	5700	140	**13.68**	13.48	13.56	13.59	13.62	13.68	13.73	13.77
802.11a	5745	149*	14.30	14.27	14.25	14.34	14.32	14.49	14.42	14.48
802.11a	5765	153	14.27	14.22	14.27	14.27	14.38	14.43	14.38	14.47
802.11a	5785	157*	14.28	14.18	14.25	14.31	14.28	14.48	14.45	14.46
802.11a	5805	161	14.34	14.32	14.24	14.38	14.35	14.45	14.40	14.41
802.11a	5825	165*	**14.35**	14.30	14.34	14.44	14.43	14.44	14.46	14.45

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Band.

(*) – indicates default channels per KDB Publication 248227 D01v01r02. When the adjacent channels are higher in power then the default channels, these "required channels" are considered for SAR testing instead of the default channels.

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Table 9-46
IEEE 802.11n Average RF Power – 20 MHz Bandwidth

Mode	Freq [MHz]	Channel	20MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	5180	36	13.37	13.28	13.35	13.61	13.56	13.58	13.57	13.52
802.11n	5200	40	13.27	13.19	13.28	13.54	13.40	13.41	13.46	13.32
802.11n	5220	44	13.18	13.03	13.22	13.46	13.37	13.37	13.32	13.36
802.11n	5240	48	13.13	13.10	13.11	13.28	13.28	13.33	13.34	13.30
802.11n	5260	52	14.30	14.45	14.20	14.48	14.49	14.36	14.44	14.42
802.11n	5280	56	14.16	14.30	14.08	14.29	14.35	14.18	14.34	14.28
802.11n	5300	60	14.17	14.33	14.01	14.28	14.38	14.20	14.26	14.30
802.11n	5320	64	14.14	14.30	14.09	14.29	14.36	14.16	14.30	14.30
802.11n	5500	100	13.20	13.32	13.37	13.60	13.58	13.41	13.67	13.37
802.11n	5520	104	13.14	13.18	13.31	13.48	13.54	13.40	13.65	13.34
802.11n	5540	108	13.17	13.28	13.35	13.57	13.48	13.29	13.65	13.36
802.11n	5560	112	13.27	13.33	13.45	13.67	13.63	13.40	13.73	13.38
802.11n	5580	116	13.26	13.36	13.47	13.70	13.66	13.55	13.76	13.44
802.11n	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	13.53	13.62	13.73	13.84	13.88	13.70	13.91	13.78
802.11n	5680	136	13.38	13.52	13.53	13.81	13.72	13.61	13.87	13.51
802.11n	5700	140	13.40	13.47	13.54	13.75	13.77	13.65	13.86	13.61
802.11n	5745	149	14.22	14.27	14.20	14.38	14.41	14.28	14.42	14.37
802.11n	5765	153	14.23	14.21	14.23	14.42	14.44	14.32	14.44	14.46
802.11n	5785	157	14.21	14.22	14.25	14.45	14.42	14.25	14.38	14.39
802.11n	5805	161	14.30	14.28	14.21	14.47	14.43	14.30	14.46	14.38
802.11n	5825	165	14.42	14.48	14.46	14.46	14.48	14.40	14.43	14.46

Table 9-47
IEEE 802.11ac Average RF Power – 20 MHz Bandwidth

20MHz BW 802.11ac (5GHz) Conducted Power [dBm]			
Mode	Freq [MHz]	Channel	Data Rate
			6.5 Mbps
802.11ac	5180	36	13.42
802.11ac	5200	40	13.19
802.11ac	5240	48	13.12
802.11ac	5260	52	13.22
802.11ac	5280	56	13.19
802.11ac	5320	64	12.90
802.11ac	5500	100	13.24
802.11ac	5580	116	13.22
802.11ac	5600	120	N/A
802.11ac	5620	124	N/A
802.11ac	5640	128	N/A
802.11ac	5700	140	12.69
802.11ac	5745	149	13.22
802.11ac	5785	157	13.24
802.11ac	5825	165	13.36

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Table 9-48
IEEE 802.11n Average RF Power – 40 MHz Bandwidth

Mode	Freq [MHz]	Channel	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			13.5	27	40.5	54	81	108	121.5	135
802.11n	5190	38	11.64	11.42	11.65	11.67	11.80	11.64	11.68	11.62
802.11n	5230	46	11.62	11.37	11.71	11.69	11.77	11.68	11.67	11.60
802.11n	5270	54	11.65	11.42	11.60	11.58	11.61	11.65	11.79	11.96
802.11n	5310	62	11.48	11.20	11.45	11.48	11.42	11.50	11.57	11.85
802.11n	5510	102	11.76	11.78	11.79	11.92	11.75	11.78	11.82	11.97
802.11n	5550	110	11.78	11.86	11.83	11.89	11.77	11.74	11.86	11.98
802.11n	5590	118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5630	126	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5670	134	12.11	12.21	12.20	12.28	12.19	12.18	12.13	12.34
802.11n	5755	151	11.99	11.97	11.82	11.98	12.04	12.02	12.15	12.17
802.11n	5795	159	12.02	11.98	11.94	12.06	12.14	12.04	12.14	12.24

Table 9-49
IEEE 802.11ac Average RF Power – 40 MHz Bandwidth

40MHz BW 802.11ac (5GHz) Conducted Power [dBm]			
Mode	Freq [MHz]	Channel	Data Rate
			13.5 Mbps
802.11ac	5190	38	11.45
802.11ac	5230	46	11.21
802.11ac	5270	54	11.35
802.11ac	5310	62	11.26
802.11ac	5510	102	11.65
802.11ac	5550	110	11.62
802.11n	5590	118	N/A
802.11n	5630	126	N/A
802.11ac	5670	134	12.02
802.11ac	5755	151	11.81
802.11ac	5795	159	11.72

Table 9-50
IEEE 802.11ac Average RF Power – 80 MHz Bandwidth

Mode	Freq [MHz]	Channel	80MHz BW 802.11ac (5GHz) Conducted Power [dBm]									
			Data Rate [Mbps]									
			29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
802.11ac	5210	42	**10.99**	10.86	10.79	11.19	11.22	11.14	11.18	11.15	11.20	11.17
802.11ac	5290	58	**10.96**	10.86	10.91	10.76	10.82	10.80	10.75	10.84	10.95	10.92
802.11ac	5530	106	**11.08**	11.30	11.19	11.21	11.25	11.28	11.18	11.24	11.12	11.05
802.11ac	5775	155	**11.36**	11.44	11.39	11.45	11.47	11.38	11.41	11.38	11.35	11.37

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Reduced Conducted Powers – Held-to-Ear

Table 9-51
IEEE 802.11b Average RF Power

Mode	Freq [MHz]	Channel	802.11b Conducted Power [dBm]
			Data Rate [Mbps]
			1
802.11b	2412	1*	11.77
802.11b	2437	6*	11.96
802.11b	2462	11*	**12.33**

Table 9-52
IEEE 802.11g Average RF Power

Mode	Freq [MHz]	Channel	802.11g Conducted Power [dBm]
			Data Rate [Mbps]
			6
802.11g	2412	1	11.82
802.11g	2437	6	12.13
802.11g	2462	11	12.48

Table 9-53
IEEE 802.11n Average RF Power

Mode	Freq [MHz]	Channel	802.11n Conducted Power [dBm]
			Data Rate [Mbps]
			6.5
802.11n	2412	1	11.94
802.11n	2437	6	12.07
802.11n	2462	11	12.40

Table 9-54
IEEE 802.11a Average RF Power

Mode	Freq [MHz]	Channel	802.11a Conducted Power [dBm]
			Data Rate [Mbps]
			6
802.11a	5180	36*	9.22
802.11a	5200	40	**9.24**
802.11a	5220	44	9.14
802.11a	5240	48*	9.15
802.11a	5260	52*	9.33
802.11a	5280	56	**9.45**
802.11a	5300	60	8.79
802.11a	5320	64*	8.94
802.11a	5500	100	9.15
802.11a	5520	104*	**9.26**
802.11a	5540	108	9.05
802.11a	5560	112	9.17
802.11a	5580	116*	9.10
802.11a	5600	120	N/A
802.11a	5620	124	N/A
802.11a	5640	128	N/A
802.11a	5660	132	9.12
802.11a	5680	136*	9.12
802.11a	5700	140	9.16
802.11a	5745	149*	9.32
802.11a	5765	153	**9.44**
802.11a	5785	157*	9.43
802.11a	5805	161	8.77
802.11a	5825	165*	8.85

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Band.

(*) – indicates default channels per KDB Publication 248227 D01v01r02. When the adjacent channels are higher in power then the default channels, these “required channels” are considered for SAR testing instead of the default channels

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Table 9-55
IEEE 802.11n Average RF Power – 20 MHz Bandwidth

Mode	Freq [MHz]	Channel	20MHz BW 802.11n Conducted Power [dBm]
			Data Rate [Mbps]
			6.5
802.11n	5180	36	9.42
802.11n	5200	40	9.31
802.11n	5220	44	9.41
802.11n	5240	48	9.23
802.11n	5260	52	9.47
802.11n	5280	56	9.35
802.11n	5300	60	9.45
802.11n	5320	64	9.23
802.11n	5500	100	9.32
802.11n	5520	104	9.44
802.11n	5540	108	9.43
802.11n	5560	112	9.15
802.11n	5580	116	9.17
802.11n	5600	120	N/A
802.11n	5620	124	N/A
802.11n	5640	128	N/A
802.11n	5660	132	9.22
802.11n	5680	136	9.27
802.11n	5700	140	9.31
802.11n	5745	149	8.90
802.11n	5765	153	8.75
802.11n	5785	157	8.69
802.11n	5805	161	8.84
802.11n	5825	165	8.65

Table 9-56
IEEE 802.11ac Average RF Power – 20 MHz Bandwidth

Mode	Freq [MHz]	Channel	20 MHz BW 802.11ac Conducted Power [dBm]
			Data Rate [Mbps]
			6.5 Mbps
802.11ac	5180	36	9.32
802.11ac	5200	40	9.22
802.11ac	5240	48	9.43
802.11ac	5260	52	9.40
802.11ac	5280	56	9.34
802.11ac	5320	64	9.32
802.11ac	5500	100	9.41
802.11ac	5580	116	9.32
802.11ac	5600	120	N/A
802.11ac	5620	124	N/A
802.11ac	5640	128	N/A
802.11ac	5700	140	9.11
802.11ac	5745	149	8.92
802.11ac	5785	157	8.88
802.11ac	5825	165	8.76

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Table 9-57
IEEE 802.11n Average RF Power – 40 MHz Bandwidth

Mode	Freq [MHz]	Channel	40MHz BW 802.11n Conducted Power [dBm]
			Data Rate [Mbps]
			13.5
802.11n	5190	38	7.79
802.11n	5230	46	7.98
802.11n	5270	54	8.16
802.11n	5310	62	8.12
802.11n	5510	102	8.06
802.11n	5550	110	7.77
802.11n	5590	118	N/A
802.11n	5630	126	N/A
802.11n	5670	134	7.58
802.11n	5755	151	7.92
802.11n	5795	159	7.80

Table 9-58
IEEE 802.11ac Average RF Power – 40 MHz Bandwidth

Mode	Freq [MHz]	Channel	40MHz BW 802.11ac Conducted Power [dBm]
			Data Rate [Mbps]
			13.5
802.11ac	5190	38	7.71
802.11ac	5230	46	8.03
802.11ac	5270	54	8.11
802.11ac	5310	62	8.20
802.11ac	5510	102	8.02
802.11ac	5550	110	7.89
802.11n	5590	118	N/A
802.11n	5630	126	N/A
802.11ac	5670	134	7.63
802.11ac	5755	151	7.90
802.11ac	5795	159	7.82

Table 9-59
IEEE 802.11ac Average RF Power – 80 MHz Bandwidth

Mode	Freq [MHz]	Channel	80MHz BW 802.11ac Conducted Power [dBm]
			Data Rate [Mbps]
			29.3
802.11ac	5210	42	**8.34**
802.11ac	5290	58	**8.26**
802.11ac	5530	106	**8.44**
802.11ac	5775	155	**8.07**

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Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012/April 2013 FCC/TCB Meeting Notes:

- For 2.4 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11) b were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11g/nwere not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
- For 5 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11a were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n 20 MHz and 40 MHz) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
- Full SAR tests for all IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.
- When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the reported 1g averaged SAR is <0.8 W/kg, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.
- The bolded data rate and channel above were tested for SAR.

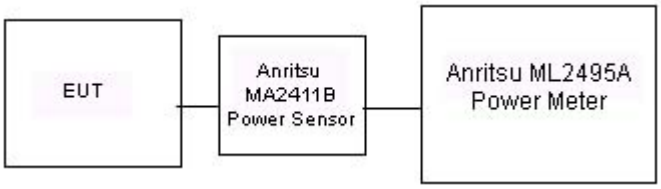

Figure 9-6
Power Measurement Setup for Bandwidths < 50 MHz

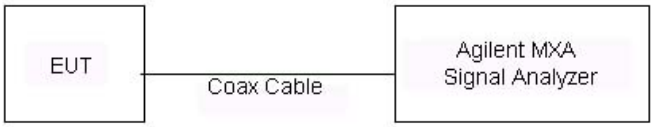

Figure 9-7
Power Measurement Setup for Bandwidths > 50 MHz

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9.5.3 MIMO WLAN Conducted Powers

Maximum Conducted Powers

Table 9-60
IEEE 802.11n Average RF Power MIMO

Mode	Freq [MHz]	Channel	802.11n (2.4 GHz) Conducted Power [dBm]
			Data Rate [Mbps]
			13
802.11n	2412	1	**18.26**
802.11n	2437	6	17.94
802.11n	2462	11	17.70

Table 9-61
IEEE 802.11n Average RF Power – 20 MHz Bandwidth MIMO

Mode	Freq [MHz]	Channel	802.11n (5 GHz) Conducted Power [dBm]
			Data Rate [Mbps]
			13
802.11n	5180	36*	**16.39**
802.11n	5200	40	16.30
802.11n	5220	44	16.22
802.11n	5240	48*	16.24
802.11n	5260	52*	**17.22**
802.11n	5280	56	17.19
802.11n	5300	60	17.01
802.11n	5320	64*	17.00
802.11n	5500	100	**16.85**
802.11n	5520	104*	16.80
802.11n	5540	108	16.70
802.11n	5560	112	16.73
802.11n	5580	116*	16.74
802.11n	5600	120	N/A
802.11n	5620	124	N/A
802.11n	5640	128	N/A
802.11n	5660	132	16.71
802.11n	5680	136*	16.65
802.11n	5700	140	16.72
802.11n	5745	149*	16.87
802.11n	5765	153	16.95
802.11n	5785	157*	16.92
802.11n	5805	161	16.99
802.11n	5825	165*	**17.05**

(*) – indicates default channels per KDB Publication 248227 D01v01r02. When the adjacent channels are higher in power then the default channels, these "required channels" are considered for SAR testing instead of the default channels.

Table 9-62
IEEE 802.11ac Average RF Power – 20 MHz Bandwidth MIMO

Mode	Freq [MHz]	Channel	802.11ac (5 GHz) Conducted Power [dBm]
			Data Rate [Mbps]
			13
802.11ac	5180	36	16.33
802.11ac	5200	40	16.19
802.11ac	5240	48	16.10
802.11ac	5260	52	16.08
802.11ac	5280	56	16.11
802.11ac	5320	64	16.00
802.11ac	5500	100	16.31
802.11ac	5580	116	16.22
802.11ac	5600	120	N/A
802.11ac	5620	124	N/A
802.11ac	5640	128	N/A
802.11ac	5700	140	15.90
802.11ac	5745	149	16.30
802.11ac	5785	157	16.33
802.11ac	5825	165	16.40

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Table 9-63
IEEE 802.11n Average RF Power – 40 MHz Bandwidth MIMO

Mode	Freq [MHz]	Channel	802.11n (5 GHz) Conducted Power [dBm]
			Data Rate [Mbps]
			27
802.11n	5190	38	14.88
802.11n	5230	46	14.90
802.11n	5270	54	14.75
802.11n	5310	62	14.60
802.11n	5510	102	14.91
802.11n	5550	110	14.87
802.11n	5590	118	N/A
802.11n	5630	126	N/A
802.11n	5670	134	14.94
802.11n	5755	151	15.09
802.11n	5795	159	15.07

Table 9-64
IEEE 802.11ac Average RF Power – 40 MHz Bandwidth MIMO

Mode	Freq [MHz]	Channel	802.11ac (5 GHz) Conducted Power [dBm]
			Data Rate [Mbps]
			27
802.11ac	5190	38	14.69
802.11ac	5230	46	14.64
802.11ac	5270	54	14.45
802.11ac	5310	62	14.86
802.11ac	5510	102	14.85
802.11ac	5550	110	14.74
802.11n	5590	118	N/A
802.11n	5630	126	N/A
802.11ac	5670	134	14.87
802.11ac	5755	151	14.99
802.11ac	5795	159	15.02

Table 9-65
IEEE 802.11ac Average RF Power – 80 MHz Bandwidth MIMO

Mode	Freq [MHz]	Channel	802.11ac (5 GHz) Conducted Power [dBm]
			Data Rate [Mbps]
			58.5
802.11ac	5210	42	14.00
802.11ac	5290	58	14.02
802.11ac	5530	106	14.22
802.11ac	5775	155	14.01

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Reduced Conducted Powers – Held-to-Ear

Table 9-66
IEEE 802.11n Average RF Power MIMO

Mode	Freq [MHz]	Channel	802.11n (2.4 GHz) Conducted Power [dBm]
			Data Rate [Mbps]
			13
802.11n	2412	1	15.00
802.11n	2437	6	15.02
802.11n	2462	11	**15.13**

Table 9-67
IEEE 802.11n Average RF Power – 20 MHz Bandwidth MIMO

Mode	Freq [MHz]	Channel	802.11n (5 GHz) Conducted Power [dBm]
			Data Rate [Mbps]
			13
802.11n	5180	36*	12.33
802.11n	5200	40	12.31
802.11n	5220	44	**12.42**
802.11n	5240	48*	12.29
802.11n	5260	52*	**12.46**
802.11n	5280	56	12.28
802.11n	5300	60	12.35
802.11n	5320	64*	12.23
802.11n	5500	100	**12.42**
802.11n	5520	104*	12.41
802.11n	5540	108	12.39
802.11n	5560	112	12.15
802.11n	5580	116*	12.10
802.11n	5600	120	N/A
802.11n	5620	124	N/A
802.11n	5640	128	N/A
802.11n	5660	132	12.09
802.11n	5680	136*	12.03
802.11n	5700	140	12.13
802.11n	5745	149*	12.01
802.11n	5765	153	11.97
802.11n	5785	157*	12.01
802.11n	5805	161	**12.08**
802.11n	5825	165*	11.90

(*) – indicates default channels per KDB Publication 248227 D01v01r02. When the adjacent channels are higher in power then the default channels, these “required channels” are considered for SAR testing instead of the default channels.

Table 9-68
IEEE 802.11ac Average RF Power – 20 MHz Bandwidth MIMO

Mode	Freq [MHz]	Channel	802.11ac (5 GHz) Conducted Power [dBm]
			Data Rate [Mbps]
			13
802.11ac	5180	36	12.29
802.11ac	5200	40	12.20
802.11ac	5240	48	12.34
802.11ac	5260	52	12.26
802.11ac	5280	56	12.19
802.11ac	5320	64	12.25
802.11ac	5500	100	12.42
802.11ac	5580	116	12.29
802.11ac	5600	120	N/A
802.11ac	5620	124	N/A
802.11ac	5640	128	N/A
802.11ac	5700	140	12.06
802.11ac	5785	157	11.95
802.11ac	5825	165	11.81

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Table 9-69
IEEE 802.11n Average RF Power – 40 MHz Bandwidth MIMO

Mode	Freq [MHz]	Channel	802.11n (5 GHz) Conducted Power [dBm]
			Data Rate [Mbps]
			27
802.11n	5190	38	10.78
802.11n	5230	46	10.82
802.11n	5270	54	10.80
802.11n	5310	62	10.87
802.11n	5510	102	11.10
802.11n	5550	110	10.81
802.11n	5590	118	N/A
802.11n	5630	126	N/A
802.11n	5670	134	10.65
802.11n	5755	151	10.98
802.11n	5795	159	10.97

Table 9-70
IEEE 802.11ac Average RF Power – 40 MHz Bandwidth MIMO

Mode	Freq [MHz]	Channel	802.11ac (5 GHz) Conducted Power [dBm]
			Data Rate [Mbps]
			27
802.11ac	5190	38	10.92
802.11ac	5230	46	11.00
802.11ac	5270	54	10.92
802.11ac	5310	62	10.89
802.11ac	5510	102	11.05
802.11ac	5550	110	10.95
802.11n	5590	118	N/A
802.11n	5630	126	N/A
802.11ac	5670	134	10.84
802.11ac	5755	151	11.03
802.11ac	5795	159	10.85

Table 9-71
IEEE 802.11ac Average RF Power – 80 MHz Bandwidth MIMO

Mode	Freq [MHz]	Channel	802.11ac (5 GHz) Conducted Power [dBm]
			Data Rate [Mbps]
			58.5
802.11ac	5210	42	11.11
802.11ac	5290	58	11.30
802.11ac	5530	106	11.48
802.11ac	5775	155	11.01

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012/April 2013 FCC/TCB Meeting Notes:

- Per KDB 662911 D01v02r01, the individual spectra for each 2x2 MIMO WIFI Antenna were summed mathematically in linear power units for the MIMO output power measurements.
- For 2.4 GHz MIMO, 802.11n was evaluated.
- For 5 GHz MIMO, 20 MHz BW 802.11n was evaluated. Additional evaluations for 40 MHz bandwidth 802.11n and 802.11ac were not required since the maximum allowed output power was not higher than 802.11n 20 MHz Bandwidth.
- When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the reported 1g averaged SAR is <0.8 W/kg, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.
- The bolded data rate and channel above were tested for SAR.

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9.5.4 Bluetooth Conducted Powers

Table 9-72
Bluetooth RF Conducted Powers

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
			[dBm]	[mW]
2402	1.0	0	7.79	6.006
2441	1.0	39	**9.06**	8.045
2480	1.0	78	5.93	3.921
2402	2.0	0	6.15	4.118
2441	2.0	39	7.48	5.598
2480	2.0	78	4.51	2.823
2402	3.0	0	6.21	4.174
2441	3.0	39	7.48	5.592
2480	3.0	78	4.30	2.694

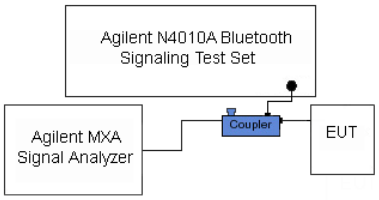

Figure 9-8
Power Measurement Setup

The bolded data rate and channel above were tested for SAR.

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10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Head 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
07/22/2014	750H	21.0	710	0.886	41.923	0.890	42.149	-0.45%	-0.54%
			725	0.899	41.683	0.891	42.071	0.90%	-0.92%
			740	0.914	41.484	0.893	41.994	2.35%	-1.21%
			755	0.927	41.264	0.894	41.916	3.69%	-1.56%
07/23/2014	835H	22.9	820	0.920	42.818	0.899	41.578	2.34%	2.98%
			835	0.934	42.634	0.900	41.500	3.78%	2.73%
			850	0.945	42.468	0.916	41.500	3.17%	2.33%
07/24/2014	1750H	23.4	1710	1.320	40.046	1.348	40.142	-2.08%	-0.24%
			1750	1.359	39.861	1.371	40.079	-0.88%	-0.54%
			1790	1.399	39.679	1.394	40.016	0.36%	-0.84%
07/21/2014	1900H	23.0	1850	1.355	38.774	1.400	40.000	-3.21%	-3.07%
			1880	1.386	38.654	1.400	40.000	-1.00%	-3.36%
			1910	1.415	38.506	1.400	40.000	1.07%	-3.74%
07/24/2014	1900H	23.4	1850	1.399	39.824	1.400	40.000	-0.07%	-0.44%
			1880	1.430	39.705	1.400	40.000	2.14%	-0.74%
			1910	1.461	39.572	1.400	40.000	4.36%	-1.07%
07/23/2014	2450H	23.5	2401	1.717	38.560	1.756	39.287	-2.22%	-1.85%
			2450	1.772	38.379	1.800	39.200	-1.56%	-2.09%
			2499	1.822	38.209	1.853	39.138	-1.67%	-2.37%
07/28/2014	5200H - 5800H	23.6	5180	4.456	36.120	4.635	36.009	-3.86%	0.31%
			5200	4.476	36.038	4.655	35.986	-3.85%	0.14%
			5220	4.502	35.993	4.676	35.963	-3.72%	0.08%
			5260	4.549	36.007	4.717	35.917	-3.56%	0.25%
			5280	4.557	35.971	4.737	35.894	-3.80%	0.21%
			5300	4.560	35.928	4.758	35.871	-4.16%	0.16%
			5320	4.583	35.904	4.778	35.849	-4.08%	0.15%
			5500	4.774	35.652	4.963	35.643	-3.81%	0.03%
			5520	4.798	35.641	4.983	35.620	-3.71%	0.06%
			5540	4.800	35.662	5.004	35.597	-4.08%	0.18%
			5560	4.821	35.612	5.024	35.574	-4.04%	0.11%
			5600	4.868	35.514	5.065	35.529	-3.89%	-0.04%
			5700	4.960	35.400	5.168	35.414	-4.02%	-0.04%
			5745	5.045	35.364	5.214	35.363	-3.24%	0.00%
			5765	5.060	35.353	5.234	35.340	-3.32%	0.04%
			5785	5.055	35.339	5.255	35.317	-3.81%	0.06%
			5800	5.067	35.278	5.270	35.300	-3.85%	-0.06%
			5805	5.059	35.280	5.275	35.294	-4.09%	-0.04%
			5825	5.098	35.248	5.296	35.271	-3.74%	-0.07%

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Table 10-2
Body 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
07/28/2014	750B	23.1	710	0.920	54.338	0.960	55.687	-4.17%	-2.42%
			725	0.935	54.206	0.961	55.629	-2.71%	-2.56%
			740	0.948	54.049	0.963	55.570	-1.56%	-2.74%
			755	0.961	53.881	0.964	55.512	-0.31%	-2.94%
07/21/2014	835B	23.2	820	0.992	53.366	0.969	55.258	2.37%	-3.42%
			835	1.007	53.195	0.970	55.200	3.81%	-3.63%
			850	1.021	53.049	0.988	55.154	3.34%	-3.82%
07/24/2014	1750B	22.2	1710	1.430	51.607	1.463	53.537	-2.26%	-3.60%
			1750	1.473	51.438	1.488	53.432	-1.01%	-3.73%
			1790	1.516	51.301	1.514	53.326	0.13%	-3.80%
07/21/2014	1900B	23.2	1850	1.455	52.660	1.520	53.300	-4.28%	-1.20%
			1880	1.489	52.551	1.520	53.300	-2.04%	-1.41%
			1910	1.521	52.442	1.520	53.300	0.07%	-1.61%
07/24/2014	1900B	23.6	1850	1.452	52.178	1.520	53.300	-4.47%	-2.11%
			1880	1.484	52.080	1.520	53.300	-2.37%	-2.29%
			1910	1.518	51.978	1.520	53.300	-0.13%	-2.48%
07/24/2014	2450B	23.2	2401	1.911	51.692	1.903	52.765	0.42%	-2.03%
			2450	1.982	51.513	1.950	52.700	1.64%	-2.25%
			2499	2.043	51.330	2.019	52.638	1.19%	-2.48%
07/31/2014	2450B	23.6	2401	1.865	54.036	1.903	52.765	-2.00%	2.41%
			2450	1.940	53.858	1.950	52.700	-0.51%	2.20%
			2499	1.996	53.672	2.019	52.638	-1.14%	1.96%
07/28/2014	5200B - 5800B	24.0	5180	5.222	48.082	5.276	49.041	-1.02%	-1.96%
			5200	5.265	48.007	5.299	49.014	-0.64%	-2.05%
			5220	5.288	47.986	5.323	48.987	-0.66%	-2.04%
			5240	5.313	48.004	5.346	48.960	-0.62%	-1.95%
			5260	5.333	47.932	5.369	48.933	-0.67%	-2.05%
			5280	5.367	47.884	5.393	48.906	-0.48%	-2.09%
			5300	5.387	47.819	5.416	48.879	-0.54%	-2.17%
			5320	5.428	47.777	5.439	48.851	-0.20%	-2.20%
			5500	5.666	47.408	5.650	48.607	0.28%	-2.47%
			5520	5.703	47.349	5.673	48.580	0.53%	-2.53%
			5540	5.731	47.285	5.696	48.553	0.61%	-2.61%
			5600	5.797	47.268	5.766	48.471	0.54%	-2.48%
			5620	5.824	47.213	5.790	48.444	0.59%	-2.54%
			5660	5.875	47.109	5.837	48.390	0.65%	-2.65%
			5680	5.913	47.113	5.860	48.363	0.90%	-2.58%
			5700	5.932	47.154	5.883	48.336	0.83%	-2.45%
			5745	5.961	47.063	5.936	48.275	0.42%	-2.51%
			5765	6.012	46.976	5.959	48.248	0.89%	-2.64%
			5785	6.028	47.045	5.982	48.220	0.77%	-2.44%
			5800	6.048	47.032	6.000	48.200	0.80%	-2.42%
			5805	6.059	47.064	6.006	48.193	0.88%	-2.34%
			5825	6.074	47.024	6.029	48.166	0.75%	-2.37%

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 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 10-3
System Verification Results

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	$Deviation_{1g}$ (%)
I	750	HEAD	07/22/2014	24.5	22.5	0.100	1003	3209	0.891	8.370	8.910	6.45%
H	835	HEAD	07/23/2014	23.3	22.9	0.100	4d119	3319	0.931	9.220	9.310	0.98%
E	1750	HEAD	07/24/2014	24.3	23.5	0.100	1051	3914	3.560	36.200	35.600	-1.66%
D	1900	HEAD	07/21/2014	24.0	23.0	0.100	5d141	3022	3.760	40.100	37.600	-6.23%
I	1900	HEAD	07/24/2014	24.0	23.4	0.100	5d141	3209	4.220	40.100	42.200	5.24%
E	2450	HEAD	07/23/2014	24.3	23.7	0.100	797	3914	5.480	51.800	54.800	5.79%
E	5200	HEAD	07/28/2014	24.4	23.6	0.100	1057	3914	7.420	78.000	74.200	-4.87%
E	5300	HEAD	07/28/2014	24.4	23.7	0.100	1057	3914	7.650	83.000	76.500	-7.83%
E	5500	HEAD	07/28/2014	24.5	23.7	0.100	1057	3914	8.110	84.300	81.100	-3.80%
E	5600	HEAD	07/28/2014	24.5	23.7	0.100	1057	3914	7.690	83.500	76.900	-7.90%
E	5800	HEAD	07/28/2014	24.5	23.8	0.100	1057	3914	7.480	79.300	74.800	-5.67%
K	750	BODY	07/28/2014	24.5	23.1	0.100	1003	3287	0.896	8.770	8.960	2.17%
D	835	BODY	07/21/2014	24.5	23.2	0.100	4d119	3022	0.972	9.340	9.720	4.07%
H	1750	BODY	07/24/2014	24.2	22.2	0.100	1051	3319	3.760	37.400	37.600	0.53%
K	1900	BODY	07/21/2014	24.5	23.2	0.100	5d141	3287	4.070	40.600	40.700	0.25%
K	1900	BODY	07/24/2014	24.3	23.2	0.100	5d141	3287	4.080	40.600	40.800	0.49%
D	2450	BODY	07/24/2014	24.4	23.2	0.100	797	3022	4.820	49.400	48.200	-2.43%
H	2450	BODY	07/31/2014	24.3	22.8	0.100	797	3319	4.800	49.400	48.000	-2.83%
A	5200	BODY	07/28/2014	24.5	23.8	0.100	1007	3920	7.730	72.600	77.300	6.47%
A	5300	BODY	07/28/2014	24.4	23.8	0.100	1007	3920	7.850	74.700	78.500	5.09%
A	5500	BODY	07/28/2014	24.4	23.8	0.100	1007	3920	7.890	75.900	78.900	3.95%
A	5600	BODY	07/28/2014	24.4	23.8	0.100	1007	3920	7.630	77.300	76.300	-1.29%
A	5800	BODY	07/28/2014	24.5	23.8	0.100	1007	3920	7.180	72.900	71.800	-1.51%

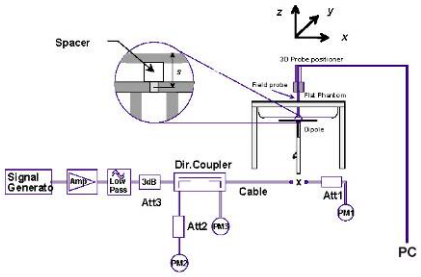

Figure 10-1
System Verification Setup Diagram

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	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.5	33.32	0.00	Right	Cheek	1107-2	1:8.3	0.144	1.042	0.150	
836.60	190	GSM 850	GSM	33.5	33.32	-0.06	Right	Tilt	1107-2	1:8.3	0.084	1.042	0.088	
836.60	190	GSM 850	GSM	33.5	33.32	0.00	Left	Cheek	1107-2	1:8.3	0.152	1.042	0.158	A1
836.60	190	GSM 850	GSM	33.5	33.32	-0.02	Left	Tilt	1107-2	1:8.3	0.080	1.042	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							

Table 11-2
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	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	24.0	23.54	0.12	Right	Cheek	1107-2	1:1	0.117	1.112	0.130	
836.60	4183	UMTS 850	RMC	24.0	23.54	0.02	Right	Tilt	1107-2	1:1	0.071	1.112	0.079	
836.60	4183	UMTS 850	RMC	24.0	23.54	-0.13	Left	Cheek	1107-2	1:1	0.139	1.112	0.155	A2
836.60	4183	UMTS 850	RMC	24.0	23.54	0.10	Left	Tilt	1107-2	1:1	0.078	1.112	0.087	
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
GSM 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	30.5	30.27	-0.12	Right	Cheek	1107-2	1:8.3	0.306	1.054	0.323	
1880.00	661	GSM 1900	GSM	30.5	30.27	-0.07	Right	Tilt	1107-2	1:8.3	0.198	1.054	0.209	
1880.00	661	GSM 1900	GSM	30.5	30.27	0.05	Left	Cheek	1107-2	1:8.3	0.382	1.054	0.403	A3
1880.00	661	GSM 1900	GSM	30.5	30.27	0.13	Left	Tilt	1107-2	1:8.3	0.202	1.054	0.213	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-4
UMTS 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	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	9400	UMTS 1900	RMC	23.5	23.30	0.20	Right	Cheek	1107-5	1:1	0.595	1.047	0.623	
1880.00	9400	UMTS 1900	RMC	23.5	23.30	-0.05	Right	Tilt	1107-5	1:1	0.246	1.047	0.258	
1852.40	9262	UMTS 1900	RMC	23.5	22.92	0.02	Left	Cheek	1107-5	1:1	0.811	1.143	0.927	
1880.00	9400	UMTS 1900	RMC	23.5	23.30	0.12	Left	Cheek	1107-5	1:1	0.904	1.047	0.946	
1907.60	9538	UMTS 1900	RMC	23.5	22.80	-0.02	Left	Cheek	1107-5	1:1	0.919	1.175	1.080	A4
1880.00	9400	UMTS 1900	RMC	23.5	23.30	0.08	Left	Tilt	1107-5	1:1	0.366	1.047	0.383	
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 11-5
LTE Band 17 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	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
710.00	23790	Mid	LTE Band 17	10	24.5	24.35	0.15	0	Right	Cheek	QPSK	1	0	1107-5	1:1	0.116	1.035	0.120	
710.00	23790	Mid	LTE Band 17	10	23.5	23.04	0.05	1	Right	Cheek	QPSK	25	0	1107-5	1:1	0.092	1.112	0.102	
710.00	23790	Mid	LTE Band 17	10	24.5	24.35	0.08	0	Right	Tilt	QPSK	1	0	1107-5	1:1	0.085	1.035	0.088	
710.00	23790	Mid	LTE Band 17	10	23.5	23.04	0.08	1	Right	Tilt	QPSK	25	0	1107-5	1:1	0.069	1.112	0.077	
710.00	23790	Mid	LTE Band 17	10	24.5	24.35	0.09	0	Left	Cheek	QPSK	1	0	1107-5	1:1	0.149	1.035	0.154	A5
710.00	23790	Mid	LTE Band 17	10	23.5	23.04	0.06	1	Left	Cheek	QPSK	25	0	1107-5	1:1	0.122	1.112	0.136	
710.00	23790	Mid	LTE Band 17	10	24.5	24.35	0.19	0	Left	Tilt	QPSK	1	0	1107-5	1:1	0.082	1.035	0.085	
710.00	23790	Mid	LTE Band 17	10	23.5	23.04	0.07	1	Left	Tilt	QPSK	25	0	1107-5	1:1	0.065	1.112	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										

Table 11-6
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	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.50	0.09	0	Right	Cheek	QPSK	1	0	1107-3	1:1	0.163	1.000	0.163	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.40	0.00	1	Right	Cheek	QPSK	25	12	1107-3	1:1	0.124	1.023	0.127	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.50	-0.03	0	Right	Tilt	QPSK	1	0	1107-3	1:1	0.126	1.000	0.126	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.40	0.07	1	Right	Tilt	QPSK	25	12	1107-3	1:1	0.101	1.023	0.103	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.50	0.05	0	Left	Cheek	QPSK	1	0	1107-3	1:1	0.204	1.000	0.204	A6
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.40	-0.06	1	Left	Cheek	QPSK	25	12	1107-3	1:1	0.151	1.023	0.154	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.50	0.06	0	Left	Tilt	QPSK	1	0	1107-3	1:1	0.118	1.000	0.118	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.40	0.06	1	Left	Tilt	QPSK	25	12	1107-3	1:1	0.085	1.023	0.087	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-7
LTE Band 4 (AWS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.96	-0.11	0	Right	Cheek	QPSK	1	0	1107-6	1:1	0.559	1.009	0.564	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.96	-0.11	1	Right	Cheek	QPSK	50	0	1107-6	1:1	0.455	1.009	0.459	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.96	-0.02	0	Right	Tilt	QPSK	1	0	1107-6	1:1	0.291	1.009	0.294	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.96	0.00	1	Right	Tilt	QPSK	50	0	1107-6	1:1	0.232	1.009	0.234	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.96	0.03	0	Left	Cheek	QPSK	1	0	1107-6	1:1	0.829	1.009	0.836	A7
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.96	0.11	1	Left	Cheek	QPSK	50	0	1107-6	1:1	0.676	1.009	0.682	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.86	0.14	1	Left	Cheek	QPSK	100	0	1107-6	1:1	0.666	1.033	0.688	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.96	-0.01	0	Left	Tilt	QPSK	1	0	1107-6	1:1	0.401	1.009	0.405	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.96	-0.09	1	Left	Tilt	QPSK	50	0	1107-6	1:1	0.323	1.009	0.326	
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 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	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.36	-0.07	0	Right	Cheek	QPSK	1	50	1107-5	1:1	0.444	1.033	0.459	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.5	22.39	-0.01	1	Right	Cheek	QPSK	50	0	1107-5	1:1	0.353	1.026	0.362	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.36	0.04	0	Right	Tilt	QPSK	1	50	1107-5	1:1	0.316	1.033	0.326	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.5	22.39	-0.03	1	Right	Tilt	QPSK	50	0	1107-5	1:1	0.259	1.026	0.266	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.36	0.03	0	Left	Cheek	QPSK	1	50	1107-5	1:1	0.849	1.033	0.877	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	23.5	23.35	0.00	0	Left	Cheek	QPSK	1	0	1107-5	1:1	0.944	1.035	0.977	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	23.19	0.01	0	Left	Cheek	QPSK	1	99	1107-5	1:1	0.995	1.074	1.069	A8
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.5	22.39	-0.03	1	Left	Cheek	QPSK	50	0	1107-5	1:1	0.638	1.026	0.655	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.5	22.37	0.03	1	Left	Cheek	QPSK	100	0	1107-5	1:1	0.716	1.030	0.737	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.36	-0.02	0	Left	Tilt	QPSK	1	50	1107-5	1:1	0.376	1.033	0.388	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.5	22.39	0.01	1	Left	Tilt	QPSK	50	0	1107-5	1:1	0.309	1.026	0.317	
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
DTS Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Bandwidth [MHz]	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
2462	11	IEEE 802.11b	20	DSSS	12.5	12.43	0.08	Right	Cheek	1	1107-2	1	1:1	0.404	1.016	0.410	A9
2412	1	IEEE 802.11n	20	OFDM	12.5	12.44	0.00	Right	Cheek	1	1107-2	6.5	1:1	0.393	1.014	0.399	
2462	11	IEEE 802.11b	20	DSSS	12.5	12.43	-0.03	Right	Tilt	1	1107-2	1	1:1	0.306	1.016	0.311	
2462	11	IEEE 802.11b	20	DSSS	12.5	12.43	-0.03	Left	Cheek	1	1107-2	1	1:1	0.159	1.016	0.162	
2462	11	IEEE 802.11b	20	DSSS	12.5	12.43	0.10	Left	Tilt	1	1107-2	1	1:1	0.120	1.016	0.122	
2462	11	IEEE 802.11b	20	DSSS	12.5	12.33	0.03	Right	Cheek	2	1107-2	1	1:1	0.094	1.040	0.098	
2462	11	IEEE 802.11b	20	DSSS	12.5	12.33	0.07	Right	Tilt	2	1107-2	1	1:1	0.054	1.040	0.056	
2462	11	IEEE 802.11b	20	DSSS	12.5	12.33	0.19	Left	Cheek	2	1107-2	1	1:1	0.116	1.040	0.121	
2412	11	IEEE 802.11n	20	OFDM	12.5	12.40	0.07	Left	Cheek	2	1107-3	6.5	1:1	0.132	1.023	0.135	
2462	11	IEEE 802.11b	20	DSSS	12.5	12.33	0.02	Left	Tilt	2	1107-2	1	1:1	0.085	1.040	0.088	
2462	11	IEEE 802.11n	20	OFDM	15.5	15.13	0.08	Right	Cheek	MIMO	1107-2	13	1:1	0.377	1.089	0.411	
2462	11	IEEE 802.11n	20	OFDM	15.5	15.13	0.02	Right	Tilt	MIMO	1107-2	13	1:1	0.252	1.089	0.274	
2462	11	IEEE 802.11n	20	OFDM	15.5	15.13	-0.05	Left	Cheek	MIMO	1107-2	13	1:1	0.128	1.089	0.139	
2462	11	IEEE 802.11n	20	OFDM	15.5	15.13	0.17	Left	Tilt	MIMO	1107-2	13	1:1	0.108	1.089	0.118	
5765	153	IEEE 802.11a	20	OFDM	9.5	9.33	0.08	Right	Cheek	1	1107-2	6	1:1	0.565	1.040	0.588	A10
5805	161	IEEE 802.11a	20	OFDM	9.5	9.21	-0.11	Right	Cheek	1	1107-2	6	1:1	0.410	1.069	0.438	
5825	165	IEEE 802.11a	20	OFDM	9.5	9.42	0.12	Right	Cheek	1	1107-2	6	1:1	0.419	1.019	0.427	
5775	155	IEEE 802.11ac	80	OFDM	8.5	7.93	0.04	Right	Cheek	1	1107-2	29.3	1:1	0.233	1.140	0.266	
5745	149	IEEE 802.11ac	20	OFDM	9.5	9.05	0.04	Right	Cheek	1	1107-2	6.5	1:1	0.548	1.109	**0.608**	
5755	151	IEEE 802.11n	40	OFDM	8.5	8.11	0.07	Right	Cheek	1	1107-2	13.5	1:1	0.472	1.094	0.516	
5805	161	IEEE 802.11n	20	OFDM	9.5	9.29	0.00	Right	Cheek	1	1107-2	6.5	1:1	0.414	1.050	0.435	
5765	153	IEEE 802.11a	20	OFDM	9.5	9.33	0.11	Right	Tilt	1	1107-2	6	1:1	0.482	1.040	0.501	
5805	161	IEEE 802.11a	20	OFDM	9.5	9.21	0.18	Right	Tilt	1	1107-2	6	1:1	0.365	1.069	0.390	
5825	165	IEEE 802.11a	20	OFDM	9.5	9.42	0.20	Right	Tilt	1	1107-2	6	1:1	0.336	1.019	0.342	
5745	149	IEEE 802.11ac	20	OFDM	9.5	9.05	0.06	Right	Tilt	1	1107-2	6.5	1:1	0.467	1.109	0.518	
5755	151	IEEE 802.11n	40	OFDM	8.5	8.11	-0.02	Right	Tilt	1	1107-2	13.5	1:1	0.333	1.094	0.364	
5805	161	IEEE 802.11n	20	OFDM	9.5	9.29	0.15	Right	Tilt	1	1107-2	6.5	1:1	0.295	1.050	0.310	
5825	165	IEEE 802.11a	20	OFDM	9.5	9.42	-0.12	Left	Cheek	1	1107-2	6	1:1	0.144	1.019	0.147	
5825	165	IEEE 802.11a	20	OFDM	9.5	9.42	0.08	Left	Tilt	1	1107-2	6	1:1	0.126	1.019	0.128	
5765	153	IEEE 802.11a	20	OFDM	9.5	9.44	0.06	Right	Cheek	2	1107-2	6	1:1	0.054	1.014	0.055	
5765	153	IEEE 802.11a	20	OFDM	9.5	9.44	0.01	Right	Tilt	2	1107-2	6	1:1	0.039	1.014	0.040	
5765	153	IEEE 802.11a	20	OFDM	9.5	9.44	-0.05	Left	Cheek	2	1107-2	6	1:1	0.121	1.014	0.123	
5775	155	IEEE 802.11ac	80	OFDM	8.5	8.07	-0.12	Left	Cheek	2	1107-2	29.3	1:1	0.100	1.104	0.110	
5745	149	IEEE 802.11ac	20	OFDM	9.5	8.92	-0.05	Left	Cheek	2	1107-2	6.5	1:1	0.119	1.143	0.136	
5755	151	IEEE 802.11n	40	OFDM	8.5	7.92	0.02	Left	Cheek	2	1107-2	13.5	1:1	0.124	1.143	0.142	
5745	149	IEEE 802.11n	20	OFDM	9.5	8.90	0.16	Left	Cheek	2	1107-2	6.5	1:1	0.116	1.148	0.133	
5765	153	IEEE 802.11a	20	OFDM	9.5	9.44	-0.01	Left	Tilt	2	1107-2	6	1:1	0.113	1.014	0.115	
5805	161	IEEE 802.11n	20	OFDM	12.5	12.08	0.14	Right	Cheek	MIMO	1107-2	13	1:1	0.184	1.102	0.203	
5805	161	IEEE 802.11n	20	OFDM	12.5	12.08	-0.01	Right	Tilt	MIMO	1107-2	13	1:1	0.151	1.102	0.166	
5805	161	IEEE 802.11n	20	OFDM	12.5	12.08	0.18	Left	Cheek	MIMO	1107-2	13	1:1	0.146	1.102	0.161	
5805	161	IEEE 802.11n	20	OFDM	12.5	12.08	0.07	Left	Tilt	MIMO	1107-2	13	1:1	0.095	1.102	0.105	
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 11-10
NII Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Bandwidth [MHz]	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
5180	36	IEEE 802.11a	20	OFDM	9.5	9.26	0.01	Right	Cheek	1	1107-2	6	1:1	0.243	1.057	0.257	
5180	36	IEEE 802.11a	20	OFDM	9.5	9.26	-0.07	Right	Tilt	1	1107-2	6	1:1	0.297	1.057	0.314	
5210	42	IEEE 802.11ac	80	OFDM	8.5	7.84	-0.05	Right	Tilt	1	1107-2	29.3	1:1	0.098	1.164	0.114	
5180	36	IEEE 802.11a	20	OFDM	9.5	9.26	-0.07	Left	Cheek	1	1107-2	6	1:1	0.058	1.057	0.061	
5180	36	IEEE 802.11a	20	OFDM	9.5	9.26	-0.04	Left	Tilt	1	1107-2	6	1:1	0.058	1.057	0.061	
5300	60	IEEE 802.11a	20	OFDM	9.5	9.47	0.14	Right	Cheek	1	1107-2	6	1:1	0.289	1.007	0.291	
5290	58	IEEE 802.11ac	80	OFDM	8.5	8.31	0.03	Right	Cheek	1	1107-2	29.3	1:1	0.127	1.045	0.133	
5320	64	IEEE 802.11ac	20	OFDM	9.5	9.15	0.07	Right	Cheek	1	1107-2	6.5	1:1	0.190	1.084	0.206	
5310	62	IEEE 802.11n	40	OFDM	8.5	7.59	-0.20	Right	Cheek	1	1107-2	13.5	1:1	0.148	1.233	0.182	
5260	52	IEEE 802.11n	20	OFDM	9.5	9.42	0.00	Right	Cheek	1	1107-2	6.5	1:1	0.270	1.019	0.275	
5300	60	IEEE 802.11a	20	OFDM	9.5	9.47	-0.01	Right	Tilt	1	1107-2	6	1:1	0.211	1.007	0.212	
5300	60	IEEE 802.11a	20	OFDM	9.5	9.47	-0.02	Left	Cheek	1	1107-2	6	1:1	0.055	1.007	0.055	
5300	60	IEEE 802.11a	20	OFDM	9.5	9.47	0.03	Left	Tilt	1	1107-2	6	1:1	0.049	1.007	0.049	
5500	100	IEEE 802.11a	20	OFDM	9.5	9.46	-0.04	Right	Cheek	1	1107-2	6	1:1	0.476	1.009	0.480	
5560	112	IEEE 802.11a	20	OFDM	9.5	9.37	0.06	Right	Cheek	1	1107-2	6	1:1	0.475	1.030	0.489	
5700	140	IEEE 802.11a	20	OFDM	9.5	9.43	-0.02	Right	Cheek	1	1107-2	6	1:1	0.616	1.016	**0.626**	A11
5510	102	IEEE 802.11n	40	OFDM	8.5	8.11	-0.01	Right	Cheek	1	1107-2	13.5	1:1	0.269	1.094	0.294	
5500	100	IEEE 802.11n	20	OFDM	9.5	9.49	-0.13	Right	Cheek	1	1107-2	6.5	1:1	0.358	1.002	0.359	
5530	106	IEEE 802.11ac	80	OFDM	8.5	8.49	0.09	Right	Cheek	1	1107-2	29.3	1:1	0.294	1.002	0.295	
5500	100	IEEE 802.11ac	20	OFDM	9.5	9.40	0.01	Right	Cheek	1	1107-2	6.5	1:1	0.347	1.023	0.355	
5500	100	IEEE 802.11a	20	OFDM	9.5	9.46	0.20	Right	Tilt	1	1107-2	6	1:1	0.309	1.009	0.312	
5500	100	IEEE 802.11a	20	OFDM	9.5	9.46	0.00	Left	Cheek	1	1107-2	6	1:1	0.100	1.009	0.101	
5500	100	IEEE 802.11a	20	OFDM	9.5	9.46	0.04	Left	Tilt	1	1107-2	6	1:1	0.120	1.009	0.121	
5200	40	IEEE 802.11a	20	OFDM	9.5	9.24	-0.17	Right	Cheek	2	1107-2	6	1:1	0.035	1.062	0.037	
5200	40	IEEE 802.11a	20	OFDM	9.5	9.24	0.03	Right	Tilt	2	1107-2	6	1:1	0.037	1.062	0.039	
5200	40	IEEE 802.11a	20	OFDM	9.5	9.24	0.02	Left	Cheek	2	1107-2	6	1:1	0.076	1.062	0.081	
5200	40	IEEE 802.11a	20	OFDM	9.5	9.24	0.06	Left	Tilt	2	1107-2	6	1:1	0.090	1.062	0.096	
5210	42	IEEE 802.11ac	80	OFDM	8.5	8.34	0.09	Left	Tilt	2	1107-2	29.3	1:1	0.067	1.038	0.070	
5280	56	IEEE 802.11a	20	OFDM	9.5	9.45	0.04	Right	Cheek	2	1107-2	6	1:1	0.019	1.012	0.019	
5280	56	IEEE 802.11a	20	OFDM	9.5	9.45	0.06	Right	Tilt	2	1107-2	6	1:1	0.022	1.012	0.022	
5280	56	IEEE 802.11a	20	OFDM	9.5	9.45	0.04	Left	Cheek	2	1107-2	6	1:1	0.048	1.012	0.049	
5290	58	IEEE 802.11ac	80	OFDM	8.5	8.26	0.07	Left	Cheek	2	1107-2	29.3	1:1	0.045	1.057	0.048	
5260	52	IEEE 802.11ac	20	OFDM	9.5	9.40	-0.05	Left	Cheek	2	1107-2	6.5	1:1	0.056	1.023	0.057	
5270	54	IEEE 802.11n	40	OFDM	8.5	8.16	0.07	Left	Cheek	2	1107-2	13.5	1:1	0.065	1.081	0.070	
5260	52	IEEE 802.11n	20	OFDM	9.5	9.47	-0.04	Left	Cheek	2	1107-2	6.5	1:1	0.066	1.007	0.066	
5280	56	IEEE 802.11a	20	OFDM	9.5	9.45	-0.09	Left	Tilt	2	1107-2	6	1:1	0.041	1.012	0.041	
5520	104	IEEE 802.11a	20	OFDM	9.5	9.26	-0.02	Right	Cheek	2	1107-2	6	1:1	0.020	1.057	0.021	
5520	104	IEEE 802.11a	20	OFDM	9.5	9.26	0.08	Right	Tilt	2	1107-2	6	1:1	0.017	1.057	0.018	
5520	104	IEEE 802.11a	20	OFDM	9.5	9.26	0.04	Left	Cheek	2	1107-2	6	1:1	0.068	1.057	0.072	
5530	106	IEEE 802.11ac	80	OFDM	8.5	8.44	-0.10	Left	Cheek	2	1107-2	29.3	1:1	0.038	1.014	0.039	
5500	100	IEEE 802.11ac	20	OFDM	9.5	9.41	-0.05	Left	Cheek	2	1107-2	6.5	1:1	0.041	1.021	0.042	
5510	102	IEEE 802.11n	40	OFDM	8.5	8.06	0.06	Left	Cheek	2	1107-2	13.5	1:1	0.079	1.107	0.087	
5520	104	IEEE 802.11n	20	OFDM	9.5	9.44	0.05	Left	Cheek	2	1107-2	6.5	1:1	0.065	1.014	0.066	
5520	104	IEEE 802.11a	20	OFDM	9.5	9.26	0.05	Left	Tilt	2	1107-2	6	1:1	0.051	1.057	0.054	
5220	44	IEEE 802.11n	20	OFDM	12.5	12.42	0.08	Right	Cheek	MIMO	1107-2	13	1:1	0.251	1.019	0.256	
5220	44	IEEE 802.11n	20	OFDM	12.5	12.42	0.04	Right	Tilt	MIMO	1107-2	13	1:1	0.169	1.019	0.172	
5220	44	IEEE 802.11n	20	OFDM	12.5	12.42	0.07	Left	Cheek	MIMO	1107-2	13	1:1	0.136	1.019	0.139	
5220	44	IEEE 802.11n	20	OFDM	12.5	12.42	0.18	Left	Tilt	MIMO	1107-2	13	1:1	0.129	1.019	0.131	
5260	52	IEEE 802.11n	20	OFDM	12.5	12.46	-0.10	Right	Cheek	MIMO	1107-2	13	1:1	0.244	1.009	0.246	
5260	52	IEEE 802.11n	20	OFDM	12.5	12.46	-0.02	Right	Tilt	MIMO	1107-2	13	1:1	0.189	1.009	0.191	
5260	52	IEEE 802.11n	20	OFDM	12.5	12.46	0.09	Left	Cheek	MIMO	1107-2	13	1:1	0.109	1.009	0.110	
5260	52	IEEE 802.11n	20	OFDM	12.5	12.46	0.14	Left	Tilt	MIMO	1107-2	13	1:1	0.114	1.009	0.115	
5500	100	IEEE 802.11n	20	OFDM	12.5	12.42	-0.10	Right	Cheek	MIMO	1107-2	13	1:1	0.497	1.019	0.506	
5560	112	IEEE 802.11n	20	OFDM	12.5	12.15	0.10	Right	Cheek	MIMO	1107-2	13	1:1	0.400	1.084	0.434	
5700	140	IEEE 802.11n	20	OFDM	12.5	12.13	0.00	Right	Cheek	MIMO	1107-2	13	1:1	0.433	1.089	0.472	
5500	100	IEEE 802.11n	20	OFDM	12.5	12.42	0.07	Right	Tilt	MIMO	1107-2	13	1:1	0.270	1.019	0.275	
5500	100	IEEE 802.11n	20	OFDM	12.5	12.42	0.07	Left	Cheek	MIMO	1107-2	13	1:1	0.113	1.019	0.115	
5500	100	IEEE 802.11n	20	OFDM	12.5	12.42	0.02	Left	Tilt	MIMO	1107-2	13	1:1	0.103	1.019	0.105	
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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11.2 Standalone Body-Worn SAR Data

Table 11-11
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	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.5	33.32	-0.01	10 mm	1107-2	1	1:8.3	back	0.423	1.042	0.441	A12
836.60	4183	UMTS 850	RMC	24.0	23.54	-0.01	10 mm	1107-2	N/A	1:1	back	0.378	1.112	0.420	A14
1880.00	661	GSM 1900	GSM	30.5	30.27	-0.01	10 mm	1107-2	1	1:8.3	back	0.588	1.054	0.620	A16
1880.00	9400	UMTS 1900	RMC	23.5	23.30	0.04	10 mm	1107-5	N/A	1:1	back	0.659	1.047	0.690	A18
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 11-12
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	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
710.00	23790	Mid	LTE Band 17	10	24.5	24.35	0.05	0	1107-5	QPSK	1	0	10 mm	back	1:1	0.252	1.035	0.261	A20
710.00	23790	Mid	LTE Band 17	10	23.5	23.04	-0.02	1	1107-5	QPSK	25	0	10 mm	back	1:1	0.200	1.112	0.222	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.50	0.00	0	1107-3	QPSK	1	0	10 mm	back	1:1	0.525	1.000	0.525	A21
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.40	0.00	1	1107-3	QPSK	25	12	10 mm	back	1:1	0.403	1.023	0.412	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.96	-0.05	0	1107-6	QPSK	1	0	10 mm	back	1:1	0.717	1.009	**0.723**	A22
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.96	-0.01	1	1107-6	QPSK	50	0	10 mm	back	1:1	0.552	1.009	0.557	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.36	-0.07	0	1107-4	QPSK	1	50	10 mm	back	1:1	0.672	1.033	0.694	A24
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.5	22.39	0.01	1	1107-4	QPSK	50	0	10 mm	back	1:1	0.530	1.026	0.544	
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 11-13
DTS Body-Worn SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Bandwidth [MHz]	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
2462	11	IEEE 802.11b	20	DSSS	17.5	17.41	0.06	10 mm	1	1107-5	1	back	1:1	0.054	1.021	0.055	
2412	1	IEEE 802.11n	20	ODFM	15.5	15.21	-0.08	10 mm	1	1107-5	6.5	back	1:1	0.034	1.069	0.036	
2462	11	IEEE 802.11b	20	DSSS	17.5	17.24	-0.09	10 mm	2	1107-5	1	back	1:1	0.057	1.062	0.061	
2412	1	IEEE 802.11n	20	OFDM	15.5	15.29	-0.06	10 mm	2	1107-5	6.5	back	1:1	0.055	1.050	0.058	
2412	1	IEEE 802.11n	20	OFDM	18.5	18.26	0.06	10 mm	MIMO	1107-5	13	back	1:1	0.081	1.057	0.086	A26
5805	161	IEEE 802.11a	20	OFDM	14.5	13.72	-0.01	10 mm	1	1107-5	6	back	1:1	0.097	1.197	0.116	
5775	155	IEEE 802.11ac	80	OFDM	11.5	10.60	0.13	10 mm	1	1107-5	29.3	back	1:1	0.059	1.230	0.073	
5795	159	IEEE 802.11ac	40	OFDM	12.5	12.28	0.05	10 mm	1	1107-5	13.5	back	1:1	0.070	1.052	0.074	
5825	165	IEEE 802.11ac	20	OFDM	13.5	13.42	0.10	10 mm	1	1107-5	6.5	back	1:1	0.091	1.019	0.093	
5755	151	IEEE 802.11n	40	OFDM	12.5	12.17	0.05	10 mm	1	1107-5	13.5	back	1:1	0.080	1.079	0.086	
5805	161	IEEE 802.11n	20	OFDM	14.5	13.64	0.02	10 mm	1	1107-5	6.5	back	1:1	0.083	1.219	0.101	
5825	165	IEEE 802.11a	20	OFDM	14.5	14.35	0.03	10 mm	2	1107-5	6	back	1:1	0.121	1.035	0.125	
5775	155	IEEE 802.11ac	80	OFDM	11.5	11.36	-0.07	10 mm	2	1107-5	29.3	back	1:1	0.056	1.033	0.058	
5755	151	IEEE 802.11ac	40	OFDM	12.5	11.81	-0.06	10 mm	2	1107-5	13.5	back	1:1	0.057	1.172	0.067	
5825	165	IEEE 802.11ac	20	OFDM	13.5	13.36	-0.08	10 mm	2	1107-5	6.5	back	1:1	0.119	1.033	0.123	
5795	159	IEEE 802.11n	40	OFDM	12.5	12.02	-0.20	10 mm	2	1107-5	13.5	back	1:1	0.072	1.117	0.080	
5825	165	IEEE 802.11n	20	OFDM	14.5	14.42	-0.01	10 mm	2	1107-5	6.5	back	1:1	0.132	1.019	**0.135**	A27
5825	165	IEEE 802.11n	20	OFDM	17.5	17.05	-0.03	10 mm	MIMO	1107-5	13	back	1:1	0.090	1.109	0.100	
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 11-14
DSS Body-Worn SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
2441	39	Bluetooth	FHSS	8.0	9.06	-0.08	10 mm	1107-5	1	back	1:1	0.000	0.783	0.000	A29
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 11-15
NII Body-Worn SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Bandwidth [MHz]	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
5180	36	IEEE 802.11a	20	OFDM	14.5	13.55	-0.04	10 mm	1	1107-5	6	back	1:1	0.050	1.245	0.062	
5210	42	IEEE 802.11ac	80	OFDM	11.5	10.98	0.01	10 mm	1	1107-5	29.3	back	1:1	0.022	1.127	0.025	
5260	52	IEEE 802.11a	20	OFDM	14.5	14.30	-0.02	10 mm	1	1107-5	6	back	1:1	0.052	1.047	0.054	
5290	58	IEEE 802.11ac	80	OFDM	11.5	11.05	0.08	10 mm	1	1107-5	29.3	back	1:1	0.023	1.109	0.026	
5310	62	IEEE 802.11ac	40	OFDM	12.5	12.37	-0.01	10 mm	1	1107-5	13.5	back	1:1	0.031	1.030	0.032	
5320	64	IEEE 802.11ac	20	OFDM	13.5	13.08	0.11	10 mm	1	1107-5	6.5	back	1:1	0.040	1.102	0.044	
5270	54	IEEE 802.11n	40	OFDM	12.5	11.83	-0.03	10 mm	1	1107-5	13.5	back	1:1	0.026	1.167	0.030	
5280	56	IEEE 802.11n	20	OFDM	14.5	14.21	0.20	10 mm	1	1107-5	6.5	back	1:1	0.053	1.069	0.057	
5520	104	IEEE 802.11a	20	OFDM	14.5	14.48	0.09	10 mm	1	1107-5	6	back	1:1	0.111	1.005	**0.112**	
5530	106	IEEE 802.11ac	80	OFDM	11.5	11.34	0.09	10 mm	1	1107-5	29.3	back	1:1	0.058	1.038	0.060	
5510	102	IEEE 802.11ac	40	OFDM	12.5	12.02	0.01	10 mm	1	1107-5	13.5	back	1:1	0.061	1.117	0.068	
5500	100	IEEE 802.11ac	20	OFDM	13.5	13.35	0.06	10 mm	1	1107-5	6.5	back	1:1	0.081	1.035	0.084	
5510	102	IEEE 802.11n	40	OFDM	12.5	12.03	0.08	10 mm	1	1107-5	13.5	back	1:1	0.062	1.114	0.069	
5500	100	IEEE 802.11n	20	OFDM	14.5	14.40	0.01	10 mm	1	1107-5	6.5	back	1:1	0.101	1.023	0.103	
5180	36	IEEE 802.11a	20	OFDM	14.5	13.51	0.06	10 mm	2	1107-5	6	back	1:1	0.052	1.256	0.065	
5210	42	IEEE 802.11ac	80	OFDM	11.5	10.99	-0.06	10 mm	2	1107-5	29.3	back	1:1	0.042	1.125	0.047	
5280	56	IEEE 802.11a	20	OFDM	14.5	14.37	0.01	10 mm	2	1107-5	6	back	1:1	0.050	1.030	0.052	
5290	58	IEEE 802.11ac	80	OFDM	11.5	10.96	-0.02	10 mm	2	1107-5	29.3	back	1:1	0.023	1.132	0.026	
5270	54	IEEE 802.11ac	40	OFDM	12.5	11.35	-0.06	10 mm	2	1107-5	13.5	back	1:1	0.025	1.303	0.033	
5260	52	IEEE 802.11ac	20	OFDM	13.5	13.22	-0.09	10 mm	2	1107-5	6.5	back	1:1	0.037	1.067	0.039	
5270	54	IEEE 802.11n	40	OFDM	12.5	11.65	0.00	10 mm	2	1107-5	13.5	back	1:1	0.025	1.216	0.030	
5260	52	IEEE 802.11n	20	OFDM	14.5	14.30	-0.07	10 mm	2	1107-5	6.5	back	1:1	0.047	1.047	0.049	
5700	140	IEEE 802.11a	20	OFDM	14.5	13.68	0.08	10 mm	2	1107-5	6	back	1:1	0.082	1.208	0.099	
5530	106	IEEE 802.11ac	80	OFDM	11.5	11.08	0.02	10 mm	2	1107-5	29.3	back	1:1	0.028	1.102	0.031	
5670	134	IEEE 802.11ac	40	OFDM	12.5	12.02	-0.08	10 mm	2	1107-5	13.5	back	1:1	0.050	1.117	0.056	
5500	100	IEEE 802.11ac	20	OFDM	13.5	13.24	-0.05	10 mm	2	1107-5	6.5	back	1:1	0.042	1.062	0.045	
5670	134	IEEE 802.11n	40	OFDM	12.5	12.11	-0.06	10 mm	2	1107-5	13.5	back	1:1	0.044	1.094	0.048	
5660	132	IEEE 802.11n	20	OFDM	14.5	13.53	-0.06	10 mm	2	1107-5	6.5	back	1:1	0.067	1.250	0.084	
5180	36	IEEE 802.11n	20	OFDM	17.5	16.39	-0.02	10 mm	MIMO	1107-5	13	back	1:1	0.072	1.291	0.093	
5260	52	IEEE 802.11n	20	OFDM	17.5	17.22	-0.12	10 mm	MIMO	1107-5	13	back	1:1	0.052	1.067	0.055	
5500	100	IEEE 802.11n	20	OFDM	17.5	16.85	-0.06	10 mm	MIMO	1107-5	13	back	1:1	0.122	1.161	0.142	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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11.3 Standalone Wireless Router SAR Data

Table 11-16
GPRS/UMTS Hotspot SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	32.3	32.22	-0.08	10 mm	1107-2	2	1:4.15	back	0.636	1.019	0.648	
836.60	190	GSM 850	GPRS	32.3	32.22	0.03	10 mm	1107-2	2	1:4.15	front	0.656	1.019	0.668	A13
836.60	190	GSM 850	GPRS	32.3	32.22	-0.03	10 mm	1107-2	2	1:4.15	bottom	0.166	1.019	0.169	
836.60	190	GSM 850	GPRS	32.3	32.22	-0.05	10 mm	1107-2	2	1:4.15	right	0.350	1.019	0.357	
836.60	190	GSM 850	GPRS	32.3	32.22	0.02	10 mm	1107-2	2	1:4.15	left	0.507	1.019	0.517	
836.60	4183	UMTS 850	RMC	24.0	23.54	-0.01	10 mm	1107-2	N/A	1:1	back	0.378	1.112	0.420	
836.60	4183	UMTS 850	RMC	24.0	23.54	0.00	10 mm	1107-2	N/A	1:1	front	0.388	1.112	0.431	A15
836.60	4183	UMTS 850	RMC	24.0	23.54	0.11	10 mm	1107-2	N/A	1:1	bottom	0.099	1.112	0.110	
836.60	4183	UMTS 850	RMC	24.0	23.54	0.09	10 mm	1107-2	N/A	1:1	right	0.222	1.112	0.247	
836.60	4183	UMTS 850	RMC	24.0	23.54	-0.02	10 mm	1107-2	N/A	1:1	left	0.308	1.112	0.342	
1880.00	661	GSM 1900	GPRS	29.2	29.10	-0.06	10 mm	1107-2	2	1:4.15	back	0.667	1.023	0.682	
1880.00	661	GSM 1900	GPRS	29.2	29.10	-0.05	10 mm	1107-2	2	1:4.15	front	0.773	1.023	0.791	
1850.20	512	GSM 1900	GPRS	29.2	29.20	-0.16	10 mm	1107-2	2	1:4.15	bottom	1.030	1.000	1.030	A17
1880.00	661	GSM 1900	GPRS	29.2	29.10	-0.07	10 mm	1107-2	2	1:4.15	bottom	0.861	1.023	0.881	
1909.80	810	GSM 1900	GPRS	29.2	28.89	-0.07	10 mm	1107-2	2	1:4.15	bottom	0.617	1.074	0.663	
1880.00	661	GSM 1900	GPRS	29.2	29.10	-0.12	10 mm	1107-2	2	1:4.15	right	0.179	1.023	0.183	
1880.00	661	GSM 1900	GPRS	29.2	29.10	-0.01	10 mm	1107-2	2	1:4.15	left	0.106	1.023	0.108	
1850.20	512	GSM 1900	GPRS	29.2	29.20	-0.05	10 mm	1107-2	2	1:4.15	bottom	0.965	1.000	0.965	
1880.00	9400	UMTS 1900	RMC	23.5	23.30	0.04	10 mm	1107-5	N/A	1:1	back	0.659	1.047	0.690	
1880.00	9400	UMTS 1900	RMC	23.5	23.30	0.06	10 mm	1107-5	N/A	1:1	front	0.596	1.047	0.624	
1852.40	9262	UMTS 1900	RMC	23.5	22.92	0.12	10 mm	1107-5	N/A	1:1	bottom	0.886	1.143	1.013	A19
1880.00	9400	UMTS 1900	RMC	23.5	23.30	0.00	10 mm	1107-5	N/A	1:1	bottom	0.808	1.047	0.846	
1907.60	9538	UMTS 1900	RMC	23.5	22.80	0.01	10 mm	1107-5	N/A	1:1	bottom	0.629	1.175	0.739	
1880.00	9400	UMTS 1900	RMC	23.5	23.30	-0.05	10 mm	1107-5	N/A	1:1	right	0.189	1.047	0.198	
1880.00	9400	UMTS 1900	RMC	23.5	23.30	-0.20	10 mm	1107-5	N/A	1:1	left	0.018	1.047	0.019	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram								

Note: Variability highlighted in blue.

Table 11-17
LTE Band 17 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	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
710.00	23790	Mid	LTE Band 17	10	24.5	24.35	0.05	0	1107-5	QPSK	1	0	10 mm	back	1:1	0.252	1.035	0.261	A20
710.00	23790	Mid	LTE Band 17	10	23.5	23.04	-0.02	1	1107-5	QPSK	25	0	10 mm	back	1:1	0.200	1.112	0.222	
710.00	23790	Mid	LTE Band 17	10	24.5	24.35	0.04	0	1107-5	QPSK	1	0	10 mm	front	1:1	0.239	1.035	0.247	
710.00	23790	Mid	LTE Band 17	10	23.5	23.04	0.03	1	1107-5	QPSK	25	0	10 mm	front	1:1	0.192	1.112	0.214	
710.00	23790	Mid	LTE Band 17	10	24.5	24.35	0.05	0	1107-5	QPSK	1	0	10 mm	bottom	1:1	0.070	1.035	0.072	
710.00	23790	Mid	LTE Band 17	10	23.5	23.04	0.04	1	1107-5	QPSK	25	0	10 mm	bottom	1:1	0.052	1.112	0.058	
710.00	23790	Mid	LTE Band 17	10	24.5	24.35	0.08	0	1107-5	QPSK	1	0	10 mm	right	1:1	0.074	1.035	0.077	
710.00	23790	Mid	LTE Band 17	10	23.5	23.04	0.06	1	1107-5	QPSK	25	0	10 mm	right	1:1	0.059	1.112	0.066	
710.00	23790	Mid	LTE Band 17	10	24.5	24.35	-0.05	0	1107-5	QPSK	1	0	10 mm	left	1:1	0.125	1.035	0.129	
710.00	23790	Mid	LTE Band 17	10	23.5	23.04	-0.16	1	1107-5	QPSK	25	0	10 mm	left	1:1	0.096	1.112	0.107	
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 11-18
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	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.50	0.00	0	1107-3	QPSK	1	0	10 mm	back	1:1	0.525	1.000	0.525	A21
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.40	0.00	1	1107-3	QPSK	25	12	10 mm	back	1:1	0.403	1.023	0.412	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.50	-0.01	0	1107-3	QPSK	1	0	10 mm	front	1:1	0.502	1.000	0.502	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.40	0.06	1	1107-3	QPSK	25	12	10 mm	front	1:1	0.390	1.023	0.399	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.50	0.04	0	1107-3	QPSK	1	0	10 mm	bottom	1:1	0.084	1.000	0.084	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.40	-0.03	1	1107-3	QPSK	25	12	10 mm	bottom	1:1	0.071	1.023	0.073	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.50	0.03	0	1107-3	QPSK	1	0	10 mm	right	1:1	0.245	1.000	0.245	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.40	-0.03	1	1107-3	QPSK	25	12	10 mm	right	1:1	0.224	1.023	0.229	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.50	-0.06	0	1107-3	QPSK	1	0	10 mm	left	1:1	0.381	1.000	0.381	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.40	-0.03	1	1107-3	QPSK	25	12	10 mm	left	1:1	0.327	1.023	0.335	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram													

Table 11-19
LTE Band 4 (AWS) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.96	-0.05	0	1107-6	QPSK	1	0	10 mm	back	1:1	0.717	1.009	0.723	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.96	-0.01	1	1107-6	QPSK	50	0	10 mm	back	1:1	0.552	1.009	0.557	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.96	-0.02	0	1107-6	QPSK	1	0	10 mm	front	1:1	0.732	1.009	0.739	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.96	-0.06	1	1107-6	QPSK	50	0	10 mm	front	1:1	0.558	1.009	0.563	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.96	0.01	0	1107-6	QPSK	1	0	10 mm	bottom	1:1	1.040	1.009	**1.049**	A23
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.96	0.00	1	1107-6	QPSK	50	0	10 mm	bottom	1:1	0.881	1.009	0.889	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.86	-0.02	1	1107-6	QPSK	100	0	10 mm	bottom	1:1	0.870	1.033	0.899	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.96	0.03	0	1107-6	QPSK	1	0	10 mm	right	1:1	0.103	1.009	0.104	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.96	0.00	1	1107-6	QPSK	50	0	10 mm	right	1:1	0.082	1.009	0.083	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.96	0.03	0	1107-6	QPSK	1	0	10 mm	left	1:1	0.098	1.009	0.099	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.0	22.96	0.10	1	1107-6	QPSK	50	0	10 mm	left	1:1	0.072	1.009	0.073	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.0	23.96	0.00	0	1107-6	QPSK	1	0	10 mm	bottom	1:1	1.040	1.009	**1.049**	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram													

Note: Variability highlighted in blue.

Table 11-20
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	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.36	-0.07	0	1107-4	QPSK	1	50	10 mm	back	1:1	0.672	1.033	0.694	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.5	22.39	0.01	1	1107-4	QPSK	50	0	10 mm	back	1:1	0.530	1.026	0.544	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.36	0.00	0	1107-4	QPSK	1	50	10 mm	front	1:1	0.728	1.033	0.752	A25
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.5	22.39	0.02	1	1107-4	QPSK	50	0	10 mm	front	1:1	0.603	1.026	0.619	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.36	0.02	0	1107-4	QPSK	1	50	10 mm	bottom	1:1	0.582	1.033	0.601	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.5	22.39	0.02	1	1107-4	QPSK	50	0	10 mm	bottom	1:1	0.491	1.026	0.504	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.36	-0.02	0	1107-4	QPSK	1	50	10 mm	right	1:1	0.160	1.033	0.165	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.5	22.39	-0.04	1	1107-4	QPSK	50	0	10 mm	right	1:1	0.130	1.026	0.133	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.5	23.36	0.00	0	1107-4	QPSK	1	50	10 mm	left	1:1	0.047	1.033	0.049	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.5	22.39	-0.05	1	1107-4	QPSK	50	0	10 mm	left	1:1	0.035	1.026	0.036	
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 11-21
WLAN Hotspot SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Bandwidth [MH]	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
2462	11	IEEE 802.11b	20	DSSS	17.5	17.41	0.06	10 mm	1	1107-5	1	back	1:1	0.054	1.021	0.055	
2462	11	IEEE 802.11b	20	DSSS	17.5	17.41	0.03	10 mm	1	1107-5	1	front	1:1	0.040	1.021	0.041	
2462	11	IEEE 802.11b	20	DSSS	17.5	17.41	0.02	10 mm	1	1107-5	1	top	1:1	0.033	1.021	0.034	
2462	11	IEEE 802.11b	20	DSSS	17.5	17.41	0.01	10 mm	1	1107-5	1	left	1:1	0.065	1.021	0.066	
2412	1	IEEE 802.11n	20	OFDM	15.5	15.21	0.04	10 mm	1	1107-5	6.5	left	1:1	0.051	1.069	0.055	
2462	11	IEEE 802.11b	20	DSSS	17.5	17.24	-0.09	10 mm	2	1107-5	1	back	1:1	0.057	1.062	0.061	
2462	11	IEEE 802.11b	20	DSSS	17.5	17.24	0.03	10 mm	2	1107-5	1	front	1:1	0.072	1.062	0.076	
2412	1	IEEE 802.11n	20	OFDM	15.5	15.29	0.06	10 mm	2	1107-5	6.5	front	1:1	0.047	1.050	0.049	
2462	11	IEEE 802.11b	20	DSSS	17.5	17.24	0.04	10 mm	2	1107-5	1	top	1:1	0.046	1.062	0.049	
2462	11	IEEE 802.11b	20	DSSS	17.5	17.24	-0.01	10 mm	2	1107-5	1	right	1:1	0.037	1.062	0.039	
2412	1	IEEE 802.11n	20	OFDM	18.5	18.26	0.06	10 mm	MIMO	1107-5	13	back	1:1	0.081	1.057	0.086	A26
2412	1	IEEE 802.11n	20	OFDM	18.5	18.26	-0.10	10 mm	MIMO	1107-5	13	front	1:1	0.062	1.057	0.066	
2412	1	IEEE 802.11n	20	OFDM	18.5	18.26	0.14	10 mm	MIMO	1107-5	13	top	1:1	0.037	1.057	0.039	
2412	1	IEEE 802.11n	20	OFDM	18.5	18.26	0.00	10 mm	MIMO	1107-5	13	right	1:1	0.024	1.057	0.025	
2412	1	IEEE 802.11n	20	OFDM	18.5	18.26	0.06	10 mm	MIMO	1107-5	13	left	1:1	0.052	1.057	0.055	
5805	161	IEEE 802.11a	20	OFDM	14.5	13.72	-0.01	10 mm	1	1107-5	6	back	1:1	0.097	1.197	0.116	
5775	155	IEEE 802.11ac	80	OFDM	11.5	10.60	0.13	10 mm	1	1107-5	29.3	back	1:1	0.059	1.230	0.073	
5795	159	IEEE 802.11ac	40	OFDM	12.5	12.28	0.05	10 mm	1	1107-5	13.5	back	1:1	0.070	1.052	0.074	
5825	165	IEEE 802.11ac	20	OFDM	13.5	13.42	0.01	10 mm	1	1107-5	6.5	back	1:1	0.091	1.019	0.093	
5755	151	IEEE 802.11n	40	OFDM	12.5	12.17	0.05	10 mm	1	1107-5	13.5	back	1:1	0.080	1.079	0.086	
5805	161	IEEE 802.11n	20	OFDM	14.5	13.64	0.02	10 mm	1	1107-5	6.5	back	1:1	0.083	1.219	0.101	
5805	161	IEEE 802.11a	20	OFDM	14.5	13.72	-0.01	10 mm	1	1107-5	6	front	1:1	0.050	1.197	0.060	
5805	161	IEEE 802.11a	20	OFDM	14.5	13.72	-0.01	10 mm	1	1107-5	6	top	1:1	0.037	1.197	0.044	
5805	161	IEEE 802.11a	20	OFDM	14.5	13.72	-0.06	10 mm	1	1107-5	6	left	1:1	0.054	1.197	0.065	
5825	165	IEEE 802.11a	20	OFDM	14.5	14.35	0.03	10 mm	2	1107-5	6	back	1:1	0.121	1.035	0.125	
5775	155	IEEE 802.11ac	80	OFDM	11.5	11.36	-0.07	10 mm	2	1107-5	29.3	back	1:1	0.056	1.033	0.058	
5755	151	IEEE 802.11ac	40	OFDM	12.5	11.81	-0.06	10 mm	2	1107-5	13.5	back	1:1	0.057	1.172	0.067	
5825	165	IEEE 802.11ac	20	OFDM	13.5	13.36	-0.08	10 mm	2	1107-5	6.5	back	1:1	0.119	1.033	0.123	
5795	159	IEEE 802.11n	40	OFDM	12.5	12.02	-0.20	10 mm	2	1107-5	13.5	back	1:1	0.072	1.117	0.080	
5825	165	IEEE 802.11n	20	OFDM	14.5	14.42	-0.01	10 mm	2	1107-5	6.5	back	1:1	0.132	1.019	0.135	A27
5825	165	IEEE 802.11a	20	OFDM	14.5	14.35	0.09	10 mm	2	1107-5	6	front	1:1	0.041	1.035	0.042	
5825	165	IEEE 802.11a	20	OFDM	14.5	14.35	0.06	10 mm	2	1107-5	6	top	1:1	0.044	1.035	0.046	
5825	165	IEEE 802.11a	20	OFDM	14.5	14.35	0.07	10 mm	2	1107-5	6	right	1:1	0.041	1.035	0.042	
5825	165	IEEE 802.11n	20	OFDM	17.5	17.05	-0.03	10 mm	MIMO	1107-5	13	back	1:1	0.090	1.109	0.100	
5825	165	IEEE 802.11n	20	OFDM	17.5	17.05	0.02	10 mm	MIMO	1107-5	13	front	1:1	0.050	1.109	0.055	
5825	165	IEEE 802.11n	20	OFDM	17.5	17.05	0.04	10 mm	MIMO	1107-5	13	top	1:1	0.055	1.109	0.061	
5825	165	IEEE 802.11n	20	OFDM	17.5	17.05	-0.02	10 mm	MIMO	1107-5	13	right	1:1	0.041	1.109	0.045	
5825	165	IEEE 802.11n	20	OFDM	17.5	17.05	0.07	10 mm	MIMO	1107-5	13	left	1:1	0.054	1.109	0.060	
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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11.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, and FCC KDB Publication 447498 D01v05.
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 D01v05.
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 D04v01, 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 D01 v01, variability SAR tests was performed since the measured SAR results for a frequency band were greater than 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 D06v01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).

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 D03v01 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 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.

UMTS Notes:

1. UMTS mode in was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v02. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg 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.

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LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r01. The general test procedures used for testing can be found in Section 8.4.4.
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 FCC Guidance, LTE CA SAR was not needed for testing since the data sent by uplink on uplink physical channels does not change between Rel 8 and Rel 10.

BT/WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 2.4 GHz WIFI SISO operations: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other SISO IEEE 802.11 modes (including 802.11g/n) were not required to be evaluated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode. Some additional IEEE 802.11n SAR tests for the highest measured SAR positions were included in this report, per manufacturer request.
2. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for SISO 5 GHz WIFI operations: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE SISO 802.11 modes (including 802.11n 20 MHz and 40 MHz bandwidths) were not required to be evaluated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode. Some additional IEEE 802.11n and IEEE 802.11ac SAR tests for the highest measured SAR positions were included in this report, per manufacturer request.
3. Per April 2013 TCB Workshop notes, full SISO SAR tests for all IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac SISO was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.
4. When Hotspot is enabled, 5.2-5.7 GHz bands are disabled. Therefore no 5.2 – 5.7 GHz WIFI Wireless Router SAR Data was required.
5. Per KDB 248227, SAR for MIMO was measured with both transmitting simultaneously and was evaluated in dependently of SISO operation. For 2.4 GHz MIMO, 802.11n was evaluated. For 5 GHz MIMO, 802.11n was evaluated.
6. WIFI transmission was verified using an uncalibrated spectrum analyzer.
7. When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is >1.6 W/kg or the reported 1g averaged SAR is >0.8 W/kg, SAR testing on other default channels was required.
8. For SAR compliance, this device uses power reduction when the device is in a held-to-ear RF exposure condition with WIFI data modes. Therefore, WIFI Head SAR was evaluated at reduced power levels.
9. The channel and data rate with the highest average output power were evaluated for Bluetooth.

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12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v05 are applicable to handsets with built-in unlicensed transmitters such as 802.11a/b/g/n/ac 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 447498 D01v05 IV.C.1.iii and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤1.6 W/kg. When standalone SAR is not required to be measured, per FCC KDB 447498 D01v05 4.3.2 2), the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission assessment involving that transmitter.

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

Table 12-1
Estimated SAR

Mode	Frequency	Maximum Allowed Power	Separation Distance (Body)	Estimated SAR (Body)
	[MHz]	[dBm]	[mm]	[W/kg]
Bluetooth LE	2480	8.00	10	0.126

Note: Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission. Per KDB Publication 447498 D01v05, 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 Ant 1 (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.150	0.410	**0.560**
	Right Tilt	0.088	0.311	0.399
	Left Cheek	0.158	0.162	0.320
	Left Tilt	0.083	0.122	0.205

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.130	0.410	**0.540**
	Right Tilt	0.079	0.311	0.390
	Left Cheek	0.155	0.162	0.317
	Left Tilt	0.087	0.122	0.209

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.323	0.410	**0.733**
	Right Tilt	0.209	0.311	0.520
	Left Cheek	0.403	0.162	0.565
	Left Tilt	0.213	0.122	0.335

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.623	0.410	1.033
	Right Tilt	0.258	0.311	0.569
	Left Cheek	1.080	0.162	**1.242**
	Left Tilt	0.383	0.122	0.505

Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.120	0.410	**0.530**
	Right Tilt	0.088	0.311	0.399
	Left Cheek	0.154	0.162	0.316
	Left Tilt	0.085	0.122	0.207

Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.163	0.410	**0.573**
	Right Tilt	0.126	0.311	0.437
	Left Cheek	0.204	0.162	0.366
	Left Tilt	0.118	0.122	0.240

Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.564	0.410	0.974
	Right Tilt	0.294	0.311	0.605
	Left Cheek	0.836	0.162	**0.998**
	Left Tilt	0.405	0.122	0.527

Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.459	0.410	0.869
	Right Tilt	0.326	0.311	0.637
	Left Cheek	1.069	0.162	**1.231**
	Left Tilt	0.388	0.122	0.510

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Table 12-3
Simultaneous Transmission Scenario with 2.4 GHz WLAN Ant 2 (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.150	0.098	0.248	Head SAR	Right Cheek	0.130	0.098	0.228
	Right Tilt	0.088	0.056	0.144		Right Tilt	0.079	0.056	0.135
	Left Cheek	0.158	0.135	**0.293**		Left Cheek	0.155	0.135	**0.290**
	Left Tilt	0.083	0.088	0.171		Left Tilt	0.087	0.088	0.175
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.323	0.098	0.421	Head SAR	Right Cheek	0.623	0.098	0.721
	Right Tilt	0.209	0.056	0.265		Right Tilt	0.258	0.056	0.314
	Left Cheek	0.403	0.135	**0.538**		Left Cheek	1.080	0.135	**1.215**
	Left Tilt	0.213	0.088	0.301		Left Tilt	0.383	0.088	0.471
Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.120	0.098	0.218	Head SAR	Right Cheek	0.163	0.098	0.261
	Right Tilt	0.088	0.056	0.144		Right Tilt	0.126	0.056	0.182
	Left Cheek	0.154	0.135	**0.289**		Left Cheek	0.204	0.135	**0.339**
	Left Tilt	0.085	0.088	0.173		Left Tilt	0.118	0.088	0.206
Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.564	0.098	0.662	Head SAR	Right Cheek	0.459	0.098	0.557
	Right Tilt	0.294	0.056	0.350		Right Tilt	0.326	0.056	0.382
	Left Cheek	0.836	0.135	**0.971**		Left Cheek	1.069	0.135	**1.204**
	Left Tilt	0.405	0.088	0.493		Left Tilt	0.388	0.088	0.476

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Table 12-4
Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.150	0.411	**0.561**	Head SAR	Right Cheek	0.130	0.411	**0.541**
	Right Tilt	0.088	0.274	0.362		Right Tilt	0.079	0.274	0.353
	Left Cheek	0.158	0.139	0.297		Left Cheek	0.155	0.139	0.294
	Left Tilt	0.083	0.118	0.201		Left Tilt	0.087	0.118	0.205
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.323	0.411	**0.734**	Head SAR	Right Cheek	0.623	0.411	1.034
	Right Tilt	0.209	0.274	0.483		Right Tilt	0.258	0.274	0.532
	Left Cheek	0.403	0.139	0.542		Left Cheek	1.080	0.139	**1.219**
	Left Tilt	0.213	0.118	0.331		Left Tilt	0.383	0.118	0.501
Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.120	0.411	**0.531**	Head SAR	Right Cheek	0.163	0.411	**0.574**
	Right Tilt	0.088	0.274	0.362		Right Tilt	0.126	0.274	0.400
	Left Cheek	0.154	0.139	0.293		Left Cheek	0.204	0.139	0.343
	Left Tilt	0.085	0.118	0.203		Left Tilt	0.118	0.118	0.236
Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.564	0.411	**0.975**	Head SAR	Right Cheek	0.459	0.411	0.870
	Right Tilt	0.294	0.274	0.568		Right Tilt	0.326	0.274	0.600
	Left Cheek	0.836	0.139	**0.975**		Left Cheek	1.069	0.139	**1.208**
	Left Tilt	0.405	0.118	0.523		Left Tilt	0.388	0.118	0.506

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

Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.150	0.626	**0.776**	Head SAR	Right Cheek	0.130	0.626	**0.756**
	Right Tilt	0.088	0.518	0.606		Right Tilt	0.079	0.518	0.597
	Left Cheek	0.158	0.147	0.305		Left Cheek	0.155	0.147	0.302
	Left Tilt	0.083	0.128	0.211		Left Tilt	0.087	0.128	0.215
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.323	0.626	**0.949**	Head SAR	Right Cheek	0.623	0.626	**1.249**
	Right Tilt	0.209	0.518	0.727		Right Tilt	0.258	0.518	0.776
	Left Cheek	0.403	0.147	0.550		Left Cheek	1.080	0.147	1.227
	Left Tilt	0.213	0.128	0.341		Left Tilt	0.383	0.128	0.511
Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.120	0.626	**0.746**	Head SAR	Right Cheek	0.163	0.626	**0.789**
	Right Tilt	0.088	0.518	0.606		Right Tilt	0.126	0.518	0.644
	Left Cheek	0.154	0.147	0.301		Left Cheek	0.204	0.147	0.351
	Left Tilt	0.085	0.128	0.213		Left Tilt	0.118	0.128	0.246
Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.564	0.626	**1.190**	Head SAR	Right Cheek	0.459	0.626	1.085
	Right Tilt	0.294	0.518	0.812		Right Tilt	0.326	0.518	0.844
	Left Cheek	0.836	0.147	0.983		Left Cheek	1.069	0.147	**1.216**
	Left Tilt	0.405	0.128	0.533		Left Tilt	0.388	0.128	0.516

The worst case 5 GHz WIFI reported SAR for each head configuration was considered for simultaneous SAR exclusion via summation of standalone SAR, regardless of whether the WIFI channel has WIFI Hotspot capability, for simplicity to determine compliance. Please note that the actual simultaneous transmission SAR will not exceed the summed levels indicated.

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

Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.150	0.055	0.205	Head SAR	Right Cheek	0.130	0.055	0.185
	Right Tilt	0.088	0.040	0.128		Right Tilt	0.079	0.040	0.119
	Left Cheek	0.158	0.142	**0.300**		Left Cheek	0.155	0.142	**0.297**
	Left Tilt	0.083	0.115	0.198		Left Tilt	0.087	0.115	0.202
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.323	0.055	0.378	Head SAR	Right Cheek	0.623	0.055	0.678
	Right Tilt	0.209	0.040	0.249		Right Tilt	0.258	0.040	0.298
	Left Cheek	0.403	0.142	**0.545**		Left Cheek	1.080	0.142	**1.222**
	Left Tilt	0.213	0.115	0.328		Left Tilt	0.383	0.115	0.498
Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.120	0.055	0.175	Head SAR	Right Cheek	0.163	0.055	0.218
	Right Tilt	0.088	0.040	0.128		Right Tilt	0.126	0.040	0.166
	Left Cheek	0.154	0.142	**0.296**		Left Cheek	0.204	0.142	**0.346**
	Left Tilt	0.085	0.115	0.200		Left Tilt	0.118	0.115	0.233
Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.564	0.055	0.619	Head SAR	Right Cheek	0.459	0.055	0.514
	Right Tilt	0.294	0.040	0.334		Right Tilt	0.326	0.040	0.366
	Left Cheek	0.836	0.142	**0.978**		Left Cheek	1.069	0.142	**1.211**
	Left Tilt	0.405	0.115	0.520		Left Tilt	0.388	0.115	0.503

The worst case 5 GHz WIFI reported SAR for each head configuration was considered for simultaneous SAR exclusion via summation of standalone SAR, regardless of whether the WIFI channel has WIFI Hotspot capability, for simplicity to determine compliance. Please note that the actual simultaneous transmission SAR will not exceed the summed levels indicated.

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

Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.150	0.506	**0.656**	Head SAR	Right Cheek	0.130	0.506	**0.636**
	Right Tilt	0.088	0.275	0.363		Right Tilt	0.079	0.275	0.354
	Left Cheek	0.158	0.161	0.319		Left Cheek	0.155	0.161	0.316
	Left Tilt	0.083	0.131	0.214		Left Tilt	0.087	0.131	0.218
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.323	0.506	**0.829**	Head SAR	Right Cheek	0.623	0.506	1.129
	Right Tilt	0.209	0.275	0.484		Right Tilt	0.258	0.275	0.533
	Left Cheek	0.403	0.161	0.564		Left Cheek	1.080	0.161	**1.241**
	Left Tilt	0.213	0.131	0.344		Left Tilt	0.383	0.131	0.514
Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.120	0.506	**0.626**	Head SAR	Right Cheek	0.163	0.506	**0.669**
	Right Tilt	0.088	0.275	0.363		Right Tilt	0.126	0.275	0.401
	Left Cheek	0.154	0.161	0.315		Left Cheek	0.204	0.161	0.365
	Left Tilt	0.085	0.131	0.216		Left Tilt	0.118	0.131	0.249
Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.564	0.506	**1.070**	Head SAR	Right Cheek	0.459	0.506	0.965
	Right Tilt	0.294	0.275	0.569		Right Tilt	0.326	0.275	0.601
	Left Cheek	0.836	0.161	0.997		Left Cheek	1.069	0.161	**1.230**
	Left Tilt	0.405	0.131	0.536		Left Tilt	0.388	0.131	0.519

The worst case 5 GHz WIFI reported SAR for each head configuration was considered for simultaneous SAR exclusion via summation of standalone SAR, regardless of whether the WIFI channel has WIFI Hotspot capability, for simplicity to determine compliance. Please note that the actual simultaneous transmission SAR will not exceed the summed levels indicated.

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12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-8
Simultaneous Transmission Scenario with 2.4 GHz WLAN Ant 1 (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.441	0.055	0.496
Back Side	UMTS 850	0.420	0.055	0.475
Back Side	GSM 1900	0.620	0.055	0.675
Back Side	UMTS 1900	0.690	0.055	0.745
Back Side	LTE Band 17	0.261	0.055	0.316
Back Side	LTE Band 5 (Cell)	0.525	0.055	0.580
Back Side	LTE Band 4 (AWS)	0.723	0.055	**0.778**
Back Side	LTE Band 2 (PCS)	0.694	0.055	0.749

Table 12-9
Simultaneous Transmission Scenario with 2.4 GHz WLAN Ant 2 (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.441	0.061	0.502
Back Side	UMTS 850	0.420	0.061	0.481
Back Side	GSM 1900	0.620	0.061	0.681
Back Side	UMTS 1900	0.690	0.061	0.751
Back Side	LTE Band 17	0.261	0.061	0.322
Back Side	LTE Band 5 (Cell)	0.525	0.061	0.586
Back Side	LTE Band 4 (AWS)	0.723	0.061	**0.784**
Back Side	LTE Band 2 (PCS)	0.694	0.061	0.755

Table 12-10
Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.441	0.086	0.527
Back Side	UMTS 850	0.420	0.086	0.506
Back Side	GSM 1900	0.620	0.086	0.706
Back Side	UMTS 1900	0.690	0.086	0.776
Back Side	LTE Band 17	0.261	0.086	0.347
Back Side	LTE Band 5 (Cell)	0.525	0.086	0.611
Back Side	LTE Band 4 (AWS)	0.723	0.086	**0.809**
Back Side	LTE Band 2 (PCS)	0.694	0.086	0.780

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Table 12-11
Simultaneous Transmission Scenario with 5 GHz WLAN Ant 1 (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.441	0.116	0.557
Back Side	UMTS 850	0.420	0.116	0.536
Back Side	GSM 1900	0.620	0.116	0.736
Back Side	UMTS 1900	0.690	0.116	0.806
Back Side	LTE Band 17	0.261	0.116	0.377
Back Side	LTE Band 5 (Cell)	0.525	0.116	0.641
Back Side	LTE Band 4 (AWS)	0.723	0.116	**0.839**
Back Side	LTE Band 2 (PCS)	0.694	0.116	0.810

The worst case 5 GHz WIFI reported SAR for each body-worn configuration was considered for simultaneous SAR exclusion via summation of standalone SAR, regardless of whether the WIFI channel has WIFI Hotspot capability, for simplicity to determine compliance. Please note that the actual simultaneous transmission SAR will not exceed the summed levels indicated.

Table 12-12
Simultaneous Transmission Scenario with 5 GHz WLAN Ant 2 (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.441	0.135	0.576
Back Side	UMTS 850	0.420	0.135	0.555
Back Side	GSM 1900	0.620	0.135	0.755
Back Side	UMTS 1900	0.690	0.135	0.825
Back Side	LTE Band 17	0.261	0.135	0.396
Back Side	LTE Band 5 (Cell)	0.525	0.135	0.660
Back Side	LTE Band 4 (AWS)	0.723	0.135	**0.858**
Back Side	LTE Band 2 (PCS)	0.694	0.135	0.829

The worst case 5 GHz WIFI reported SAR for each body-worn configuration was considered for simultaneous SAR exclusion via summation of standalone SAR, regardless of whether the WIFI channel has WIFI Hotspot capability, for simplicity to determine compliance. Please note that the actual simultaneous transmission SAR will not exceed the summed levels indicated.

Table 12-13
Simultaneous Transmission Scenario with 5 GHz WLAN MIMO (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.441	0.142	0.583
Back Side	UMTS 850	0.420	0.142	0.562
Back Side	GSM 1900	0.620	0.142	0.762
Back Side	UMTS 1900	0.690	0.142	0.832
Back Side	LTE Band 17	0.261	0.142	0.403
Back Side	LTE Band 5 (Cell)	0.525	0.142	0.667
Back Side	LTE Band 4 (AWS)	0.723	0.142	**0.865**
Back Side	LTE Band 2 (PCS)	0.694	0.142	0.836

The worst case 5 GHz WIFI reported SAR for each body-worn configuration was considered for simultaneous SAR exclusion via summation of standalone SAR, regardless of whether the WIFI channel has WIFI Hotspot capability, for simplicity to determine compliance. Please note that the actual simultaneous transmission SAR will not exceed the summed levels indicated.

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Table 12-14
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	Bluetooth LE SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.441	0.126	0.567
Back Side	UMTS 850	0.420	0.126	0.546
Back Side	GSM 1900	0.620	0.126	0.746
Back Side	UMTS 1900	0.690	0.126	0.816
Back Side	LTE Band 17	0.261	0.126	0.387
Back Side	LTE Band 5 (Cell)	0.525	0.126	0.651
Back Side	LTE Band 4 (AWS)	0.723	0.126	**0.849**
Back Side	LTE Band 2 (PCS)	0.694	0.126	0.820

Note: Bluetooth LE SAR was not required to be measured per FCC KDB 447498. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion. BT LE Estimated SAR was used because it is more conservative than BT measured SAR.

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12.5 Hotspot SAR Simultaneous Transmission Analysis

Per FCC KDB Publication 941225 D06v01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR ("-").

Table 12-15
Simultaneous Transmission Scenario (2.4 GHz WLAN Ant 1 at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.648	0.055	0.703	Body SAR	Back	0.420	0.055	**0.475**
	Front	0.668	0.041	**0.709**		Front	0.431	0.041	0.472
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	0.169	-	0.169		Bottom	0.110	-	0.110
	Right	0.357	-	0.357		Right	0.247	-	0.247
	Left	0.517	0.066	0.583		Left	0.342	0.066	0.408
Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.682	0.055	0.737	Body SAR	Back	0.690	0.055	0.745
	Front	0.791	0.041	0.832		Front	0.624	0.041	0.665
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	1.030	-	**1.030**		Bottom	1.013	-	**1.013**
	Right	0.183	-	0.183		Right	0.198	-	0.198
	Left	0.108	0.066	0.174		Left	0.019	0.066	0.085
Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.261	0.055	**0.316**	Body SAR	Back	0.525	0.055	**0.580**
	Front	0.247	0.041	0.288		Front	0.502	0.041	0.543
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	0.072	-	0.072		Bottom	0.084	-	0.084
	Right	0.077	-	0.077		Right	0.245	-	0.245
	Left	0.129	0.066	0.195		Left	0.381	0.066	0.447
Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.723	0.055	0.778	Body SAR	Back	0.694	0.055	0.749
	Front	0.739	0.041	0.780		Front	0.752	0.041	**0.793**
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	1.049	-	**1.049**		Bottom	0.601	-	0.601
	Right	0.104	-	0.104		Right	0.165	-	0.165
	Left	0.099	0.066	0.165		Left	0.049	0.066	0.115

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Table 12-16
Simultaneous Transmission Scenario (2.4 GHz WLAN Ant 2 at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.648	0.061	0.709	Body SAR	Back	0.420	0.061	0.481
	Front	0.668	0.076	**0.744**		Front	0.431	0.076	**0.507**
	Top	-	0.049	0.049		Top	-	0.049	0.049
	Bottom	0.169	-	0.169		Bottom	0.110	-	0.110
	Right	0.357	0.039	0.396		Right	0.247	0.039	0.286
	Left	0.517	-	0.517		Left	0.342	-	0.342
Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.682	0.061	0.743	Body SAR	Back	0.690	0.061	0.751
	Front	0.791	0.076	0.867		Front	0.624	0.076	0.700
	Top	-	0.049	0.049		Top	-	0.049	0.049
	Bottom	1.030	-	**1.030**		Bottom	1.013	-	**1.013**
	Right	0.183	0.039	0.222		Right	0.198	0.039	0.237
	Left	0.108	-	0.108		Left	0.019	-	0.019
Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.261	0.061	0.322	Body SAR	Back	0.525	0.061	**0.586**
	Front	0.247	0.076	**0.323**		Front	0.502	0.076	0.578
	Top	-	0.049	0.049		Top	-	0.049	0.049
	Bottom	0.072	-	0.072		Bottom	0.084	-	0.084
	Right	0.077	0.039	0.116		Right	0.245	0.039	0.284
	Left	0.129	-	0.129		Left	0.381	-	0.381
Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.723	0.061	0.784	Body SAR	Back	0.694	0.061	0.755
	Front	0.739	0.076	0.815		Front	0.752	0.076	**0.828**
	Top	-	0.049	0.049		Top	-	0.049	0.049
	Bottom	1.049	-	**1.049**		Bottom	0.601	-	0.601
	Right	0.104	0.039	0.143		Right	0.165	0.039	0.204
	Left	0.099	-	0.099		Left	0.049	-	0.049

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Table 12-17
Simultaneous Transmission Scenario (2.4 GHz WLAN MIMO at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.648	0.086	**0.734**	Body SAR	Back	0.420	0.086	**0.506**
	Front	0.668	0.066	**0.734**		Front	0.431	0.066	0.497
	Top	-	0.039	0.039		Top	-	0.039	0.039
	Bottom	0.169	-	0.169		Bottom	0.110	-	0.110
	Right	0.357	0.025	0.382		Right	0.247	0.025	0.272
	Left	0.517	0.055	0.572		Left	0.342	0.055	0.397
Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.682	0.086	0.768	Body SAR	Back	0.690	0.086	0.776
	Front	0.791	0.066	0.857		Front	0.624	0.066	0.690
	Top	-	0.039	0.039		Top	-	0.039	0.039
	Bottom	1.030	-	**1.030**		Bottom	1.013	-	**1.013**
	Right	0.183	0.025	0.208		Right	0.198	0.025	0.223
	Left	0.108	0.055	0.163		Left	0.019	0.055	0.074
Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.261	0.086	**0.347**	Body SAR	Back	0.525	0.086	**0.611**
	Front	0.247	0.066	0.313		Front	0.502	0.066	0.568
	Top	-	0.039	0.039		Top	-	0.039	0.039
	Bottom	0.072	-	0.072		Bottom	0.084	-	0.084
	Right	0.077	0.025	0.102		Right	0.245	0.025	0.270
	Left	0.129	0.055	0.184		Left	0.381	0.055	0.436
Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.723	0.086	0.809	Body SAR	Back	0.694	0.086	0.780
	Front	0.739	0.066	0.805		Front	0.752	0.066	**0.818**
	Top	-	0.039	0.039		Top	-	0.039	0.039
	Bottom	1.049	-	**1.049**		Bottom	0.601	-	0.601
	Right	0.104	0.025	0.129		Right	0.165	0.025	0.190
	Left	0.099	0.055	0.154		Left	0.049	0.055	0.104

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Table 12-18
Simultaneous Transmission Scenario (5 GHz WLAN Ant 1 at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.648	0.116	**0.764**	Body SAR	Back	0.420	0.116	**0.536**
	Front	0.668	0.060	0.728		Front	0.431	0.060	0.491
	Top	-	0.044	0.044		Top	-	0.044	0.044
	Bottom	0.169	-	0.169		Bottom	0.110	-	0.110
	Right	0.357	-	0.357		Right	0.247	-	0.247
	Left	0.517	0.065	0.582		Left	0.342	0.065	0.407
Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.682	0.116	0.798	Body SAR	Back	0.690	0.116	0.806
	Front	0.791	0.060	0.851		Front	0.624	0.060	0.684
	Top	-	0.044	0.044		Top	-	0.044	0.044
	Bottom	1.030	-	**1.030**		Bottom	1.013	-	**1.013**
	Right	0.183	-	0.183		Right	0.198	-	0.198
	Left	0.108	0.065	0.173		Left	0.019	0.065	0.084
Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.261	0.116	**0.377**	Body SAR	Back	0.525	0.116	**0.641**
	Front	0.247	0.060	0.307		Front	0.502	0.060	0.562
	Top	-	0.044	0.044		Top	-	0.044	0.044
	Bottom	0.072	-	0.072		Bottom	0.084	-	0.084
	Right	0.077	-	0.077		Right	0.245	-	0.245
	Left	0.129	0.065	0.194		Left	0.381	0.065	0.446
Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.723	0.116	0.839	Body SAR	Back	0.694	0.116	0.810
	Front	0.739	0.060	0.799		Front	0.752	0.060	**0.812**
	Top	-	0.044	0.044		Top	-	0.044	0.044
	Bottom	1.049	-	**1.049**		Bottom	0.601	-	0.601
	Right	0.104	-	0.104		Right	0.165	-	0.165
	Left	0.099	0.065	0.164		Left	0.049	0.065	0.114

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Table 12-19
Simultaneous Transmission Scenario (5 GHz WLAN Ant 2 at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.648	0.135	**0.783**	Body SAR	Back	0.420	0.135	**0.555**
	Front	0.668	0.042	0.710		Front	0.431	0.042	0.473
	Top	-	0.046	0.046		Top	-	0.046	0.046
	Bottom	0.169	-	0.169		Bottom	0.110	-	0.110
	Right	0.357	0.042	0.399		Right	0.247	0.042	0.289
	Left	0.517	-	0.517		Left	0.342	-	0.342
Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.682	0.135	0.817	Body SAR	Back	0.690	0.135	0.825
	Front	0.791	0.042	0.833		Front	0.624	0.042	0.666
	Top	-	0.046	0.046		Top	-	0.046	0.046
	Bottom	1.030	-	**1.030**		Bottom	1.013	-	**1.013**
	Right	0.183	0.042	0.225		Right	0.198	0.042	0.240
	Left	0.108	-	0.108		Left	0.019	-	0.019
Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.261	0.135	**0.396**	Body SAR	Back	0.525	0.135	**0.660**
	Front	0.247	0.042	0.289		Front	0.502	0.042	0.544
	Top	-	0.046	0.046		Top	-	0.046	0.046
	Bottom	0.072	-	0.072		Bottom	0.084	-	0.084
	Right	0.077	0.042	0.119		Right	0.245	0.042	0.287
	Left	0.129	-	0.129		Left	0.381	-	0.381
Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.723	0.135	0.858	Body SAR	Back	0.694	0.135	**0.829**
	Front	0.739	0.042	0.781		Front	0.752	0.042	0.794
	Top	-	0.046	0.046		Top	-	0.046	0.046
	Bottom	1.049	-	**1.049**		Bottom	0.601	-	0.601
	Right	0.104	0.042	0.146		Right	0.165	0.042	0.207
	Left	0.099	-	0.099		Left	0.049	-	0.049

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Table 12-20
Simultaneous Transmission Scenario (5 GHz WLAN MIMO at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.648	0.100	**0.748**	Body SAR	Back	0.420	0.100	**0.520**
	Front	0.668	0.055	0.723		Front	0.431	0.055	0.486
	Top	-	0.061	0.061		Top	-	0.061	0.061
	Bottom	0.169	-	0.169		Bottom	0.110	-	0.110
	Right	0.357	0.045	0.402		Right	0.247	0.045	0.292
	Left	0.517	0.060	0.577		Left	0.342	0.060	0.402
Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.682	0.100	0.782	Body SAR	Back	0.690	0.100	0.790
	Front	0.791	0.055	0.846		Front	0.624	0.055	0.679
	Top	-	0.061	0.061		Top	-	0.061	0.061
	Bottom	1.030	-	**1.030**		Bottom	1.013	-	**1.013**
	Right	0.183	0.045	0.228		Right	0.198	0.045	0.243
	Left	0.108	0.060	0.168		Left	0.019	0.060	0.079
Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.261	0.100	**0.361**	Body SAR	Back	0.525	0.100	**0.625**
	Front	0.247	0.055	0.302		Front	0.502	0.055	0.557
	Top	-	0.061	0.061		Top	-	0.061	0.061
	Bottom	0.072	-	0.072		Bottom	0.084	-	0.084
	Right	0.077	0.045	0.122		Right	0.245	0.045	0.290
	Left	0.129	0.060	0.189		Left	0.381	0.060	0.441
Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.723	0.100	0.823	Body SAR	Back	0.694	0.100	0.794
	Front	0.739	0.055	0.794		Front	0.752	0.055	**0.807**
	Top	-	0.061	0.061		Top	-	0.061	0.061
	Bottom	1.049	-	**1.049**		Bottom	0.601	-	0.601
	Right	0.104	0.045	0.149		Right	0.165	0.045	0.210
	Left	0.099	0.060	0.159		Left	0.049	0.060	0.109

12.6 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 D01v05 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 D01v01, 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 preformed 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 1-g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

Table 13-1
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS														
Band	FREQUENCY		Mode	Service	# of Time Slots	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.						(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1750	1732.50	20175	LTE Band 4 (AWS)	QPSK, 1 RB, 0 RB Offset	N/A	bottom	10 mm	1.040	1.040	1.00	N/A	N/A	N/A	N/A
1900	1850.20	512	GSM 1900	GPRS	2	bottom	10 mm	1.030	0.965	1.07	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							

13.2 Measurement Uncertainty

The measured SAR was <1.5 W/kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01, the extended measurement uncertainty analysis per IEEE 1528-2003 was not required.

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14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/30/2013	Annual	10/30/2014	1833460
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/15/2014	Annual	4/15/2015	MY45470194
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8648D	(9kHz-4GHz) Signal Generator	4/15/2014	Annual	4/15/2015	3629U00687
SPEAG	D1750V2	1750 MHz SAR Dipole	4/10/2014	Annual	4/10/2015	1051
SPEAG	D1900V2	1900 MHz SAR Dipole	4/9/2014	Annual	4/9/2015	5d141
SPEAG	D2450V2	2450 MHz SAR Dipole	1/21/2014	Annual	1/21/2015	797
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
SPEAG	D5GHzV2	5 GHz SAR Dipole	9/23/2013	Annual	9/23/2014	1007
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/27/2014	Annual	1/27/2015	1057
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
SPEAG	D750V3	750 MHz Dipole	1/20/2014	Annual	1/20/2015	1003
SPEAG	D835V2	835 MHz SAR Dipole	4/7/2014	Annual	4/7/2015	4d119
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433972
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/21/2013	Annual	8/21/2014	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/19/2013	Annual	11/19/2014	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/19/2013	Annual	11/19/2014	1408
SPEAG	DAE4	Dasy Data Acquisition Electronics	12/12/2013	Annual	12/12/2014	649
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/17/2014	Annual	3/17/2015	1334
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/11/2014	Annual	4/11/2015	1368
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	11/13/2013	Annual	11/13/2014	1091
Mitutoyo	CD-6"CSX	Digital Caliper	5/8/2014	Biennial	5/8/2016	13264162
Fisher Scientific	15-077-960	Digital Thermometer	11/6/2012	Biennial	11/6/2014	122640025
Rohde & Schwarz	NRVD	Dual Channel Power Meter	10/12/2012	Biennial	10/12/2014	101695
Agilent	E4438C	ESG Vector Signal Generator	3/31/2014	Annual	3/31/2015	MY42082659
Agilent	E4438C	ESG Vector Signal Generator	4/1/2014	Annual	4/1/2015	MY47270002
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB44450273
Fisher Scientific	15-078J	Long Stem Thermometer	10/30/2012	Biennial	10/30/2014	122626059
Fisher Scientific	15-078J	Long Stem Thermometer	1/7/2013	Biennial	1/7/2015	130018204
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
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
Agilent	N9020A	MXA Signal Analyzer	10/29/2013	Annual	10/29/2014	US46470561
Agilent	N5182A	MXG Vector Signal Generator	4/15/2014	Annual	4/15/2015	MY47420800
Agilent	N5182A	MXG Vector Signal Generator	4/15/2014	Annual	4/15/2015	MY47420651
Rohde & Schwarz	NRV-Z32	Peak Power Sensor	10/12/2012	Biennial	10/12/2014	836019/013
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Anritsu	ML2495A	Power Meter	10/31/2013	Annual	10/31/2014	1039008
Anritsu	ML2469A	Power Meter	3/14/2014	Annual	3/14/2015	1306009
Anritsu	MA2411B	Pulse Power Sensor	11/14/2013	Annual	11/14/2014	1126066
Anritsu	MA2411B	Pulse Power Sensor	2/3/2014	Annual	2/3/2015	1339018
Anritsu	MT8820C	Radio Communication Analyzer	12/12/2013	Annual	12/12/2014	6200901190
Anritsu	MT8820C	Radio Communication Analyzer	12/12/2013	Annual	12/12/2014	6201300731
Rohde & Schwarz	CMW500	Radio Communication Tester	10/4/2013	Annual	10/4/2014	108798
Rohde & Schwarz	CMW500	Radio Communication Tester	10/18/2013	Annual	10/18/2014	100976
Tektronix	RSA6114A	Real Time Spectrum Analyzer	4/16/2014	Annual	4/16/2015	B010177
SPEAG	ES3DV2	SAR Probe	8/22/2013	Annual	8/22/2014	3022
SPEAG	EX3DV4	SAR Probe	10/23/2013	Annual	10/23/2014	3914
SPEAG	ES3DV3	SAR Probe	11/20/2013	Annual	11/20/2014	3287
SPEAG	EX3DV4	SAR Probe	12/18/2013	Annual	12/18/2014	3920
SPEAG	ES3DV3	SAR Probe	3/19/2014	Annual	3/19/2015	3209
SPEAG	ES3DV3	SAR Probe	4/17/2014	Annual	4/17/2015	3319
Rohde & Schwarz	SME06	Signal Generator	10/30/2013	Annual	10/30/2014	832026
Rohde & Schwarz	NRVS	Single Channel Power Meter	10/31/2013	Annual	10/31/2014	835360/0079
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
Agilent	8753ES	S-Parameter Network Analyzer	10/29/2013	Annual	10/29/2014	US39170122
Fisher Scientific	S97611	Thermometer	4/12/2013	Biennial	4/12/2015	130219303
Fisher Scientific	S97611	Thermometer	4/12/2013	Biennial	4/12/2015	130219304
Seekonk	NC-100	Torque Wrench	3/18/2014	Biennial	3/18/2016	N/A
Seekonk	NC-100	Torque Wrench	3/18/2014	Biennial	3/18/2016	N/A
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/18/2014	Biennial	3/18/2016	N/A
Gigatronics	8651A	Universal Power Meter	10/30/2013	Annual	10/30/2014	8650319
Anritsu	MA24106A	USB Power Sensor	12/18/2013	Annual	12/18/2014	1344555
Anritsu	MA24106A	USB Power Sensor	12/18/2013	Annual	12/18/2014	1344556
VWR	36934-158	Wall-Mounted Thermometer	8/8/2013	Biennial	8/8/2015	130477877
VWR	36934-158	Wall-Mounted Thermometer	8/8/2013	Biennial	8/8/2015	130477866

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

Applicable for frequencies less than 3000 MHz:

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	**IEEE 1528 Sec.**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i 1gm**	**c_i 10 gms**	**1gm u_i (± %)**	**10gms u_i (± %)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	6.0	N	1	1.0	1.0	6.0	6.0	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)			RSS				12.1	11.7	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				24.2	23.5	

The above measurement uncertainties are according to IEEE Std. 1528-2003

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Applicable for frequencies up to 6 GHz:

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	**IEEE 1528 Sec.**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i 1gm**	**c_i 10 gms**	**1gm u_i (± %)**	**10gms u_i (± %)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	6.55	N	1	1.0	1.0	6.6	6.6	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)			RSS				12.4	12.0	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				24.7	24.0	

The above measurement uncertainties are according to IEEE Std. 1528-2003

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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 Industry 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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APPENDIX A: SAR TEST DATA

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PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-2

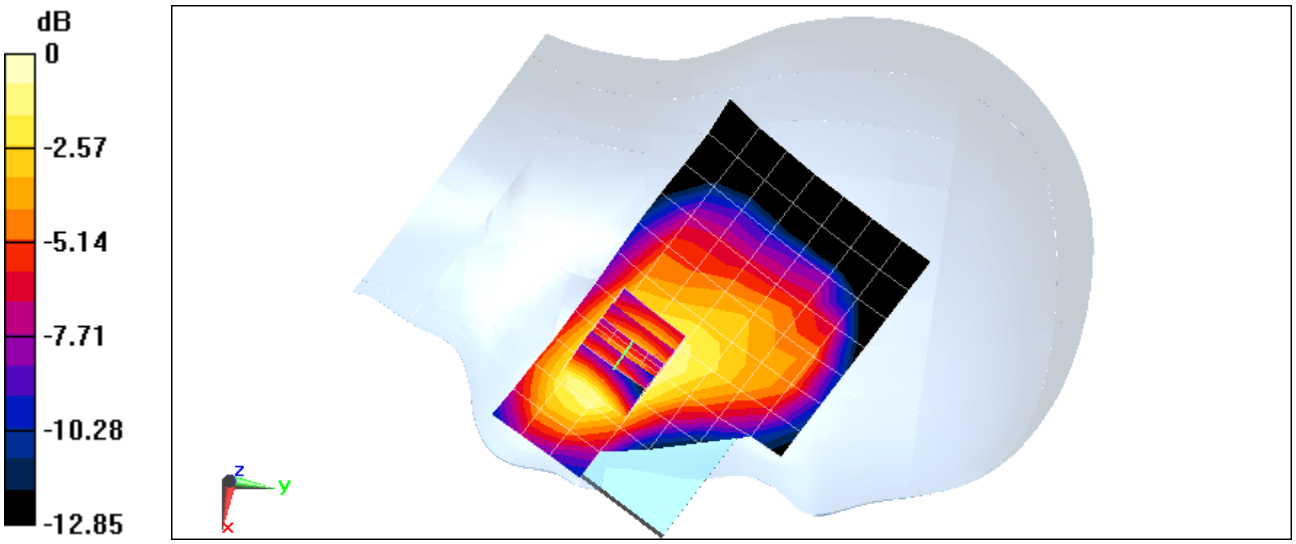
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Head, Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.935 S/m; ε_r = 42.616; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-23-2014; Ambient Temp: 23.3°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3319; ConvF(6.27, 6.27, 6.27); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: SAM; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GSM 850, Left Head, Cheek, Mid.ch

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.11 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.199 W/kg
SAR(1 g) = 0.152 W/kg



0 dB = 0.170 W/kg = -7.70 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-2

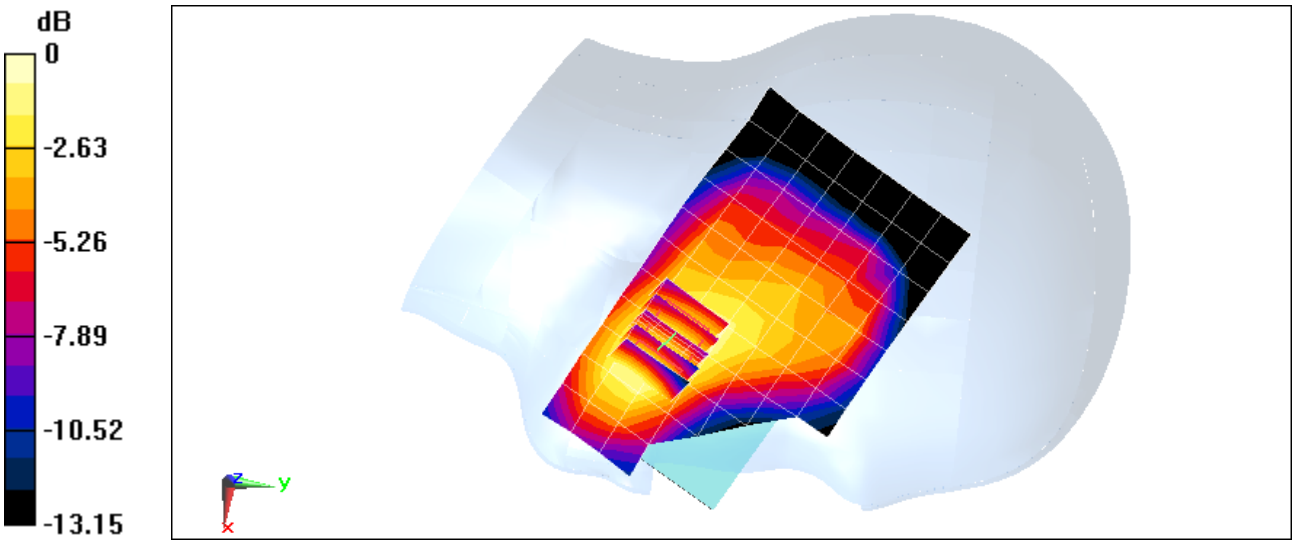
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head, Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.935 S/m; ε_r = 42.616; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-23-2014; Ambient Temp: 23.3°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3319; ConvF(6.27, 6.27, 6.27); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: SAM; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.55 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.181 W/kg
SAR(1 g) = 0.139 W/kg



0 dB = 0.155 W/kg = -8.10 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-2

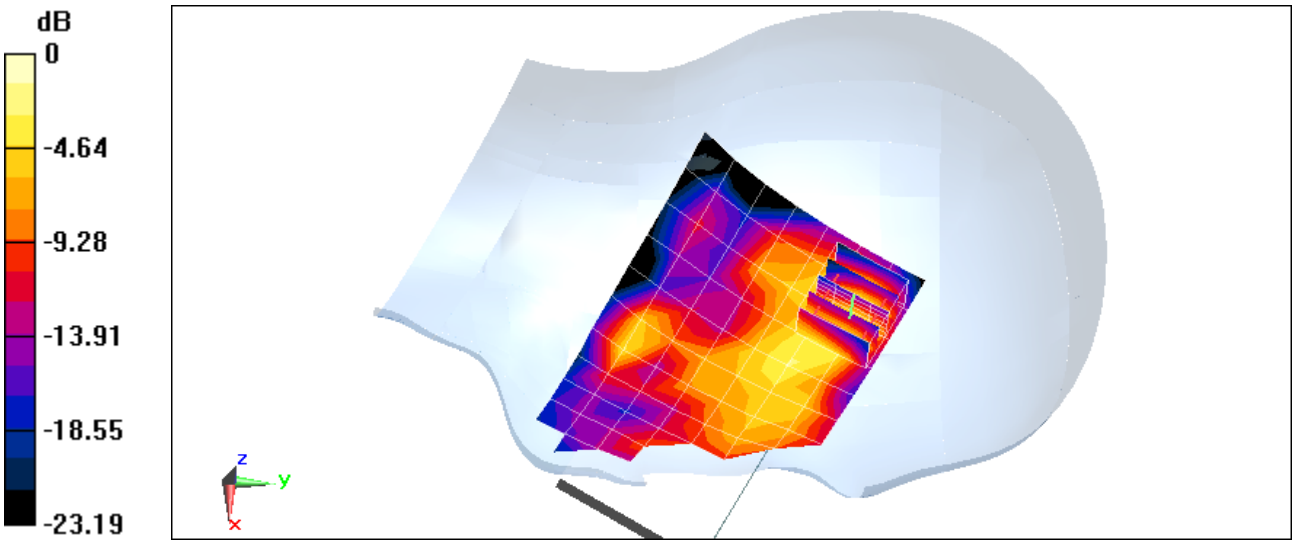
Communication System: UID 0, GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Head, Medium parameters used:
f = 1880 MHz; σ = 1.386 S/m; ε_r = 38.654; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-21-2014; Ambient Temp: 24.0°C; Tissue Temp: 23.0°C

Probe: ES3DV2 - SN3022; ConvF(5.03, 5.03, 5.03); Calibrated: 8/22/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.68 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.788 W/kg
SAR(1 g) = 0.382 W/kg



0 dB = 0.523 W/kg = -2.81 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-5

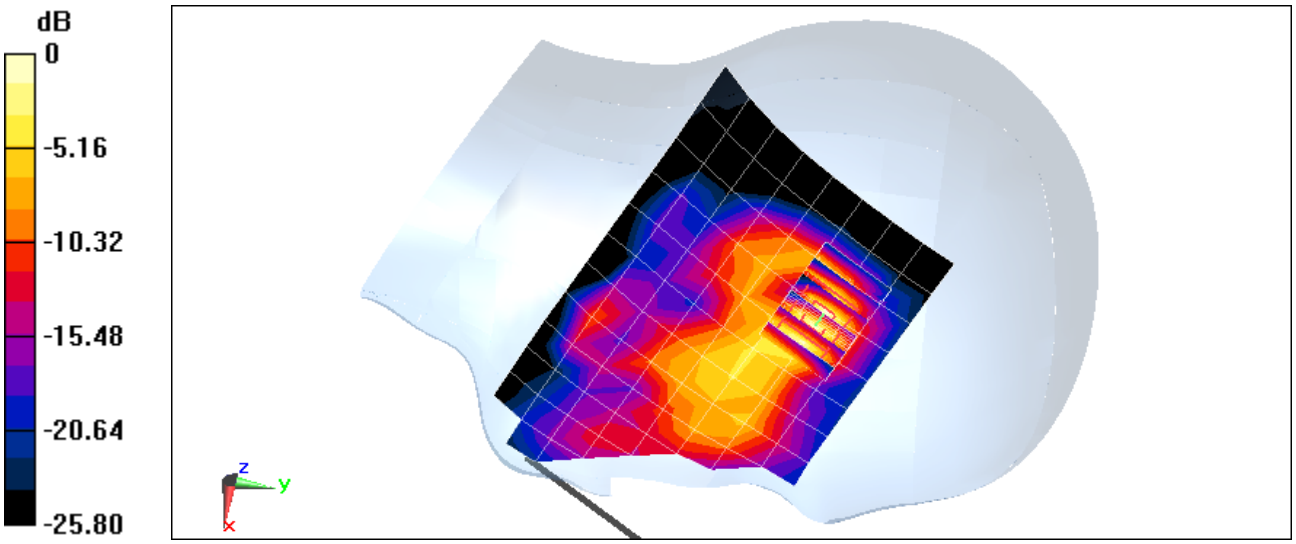
Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Head, Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.459 S/m; ε_r = 39.583; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-24-2014; Ambient Temp: 24.0°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3209; ConvF(5.13, 5.13, 5.13); Calibrated: 3/19/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/17/2014
Phantom: SAM front; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1900, Left Head, Cheek, High.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 = 25.98 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 2.04 W/kg
SAR(1 g) = 0.919 W/kg



0 dB = 1.24 W/kg = 0.93 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-5

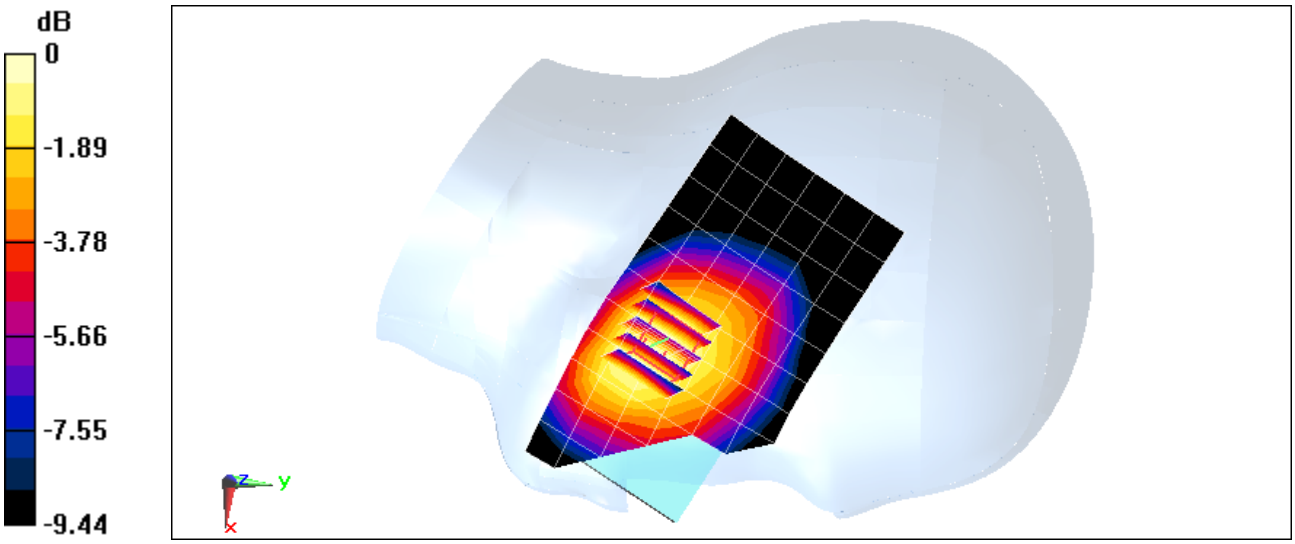
Communication System: UID 0, LTE Band 17; Frequency: 710 MHz; Duty Cycle: 1:1
Medium: 750 Head, Medium parameters used:
f = 710 MHz; σ = 0.886 S/m; ε_r = 41.923; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-22-2014; Ambient Temp: 24.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.43, 6.43, 6.43); Calibrated: 3/19/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/17/2014
Phantom: SAM front; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 17, Left Head, Cheek, Mid.ch, QPSK,
10 MHz Bandwidth, 1 RB, 0 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.76 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.186 W/kg
SAR(1 g) = 0.149 W/kg



0 dB = 0.164 W/kg = -7.85 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-3

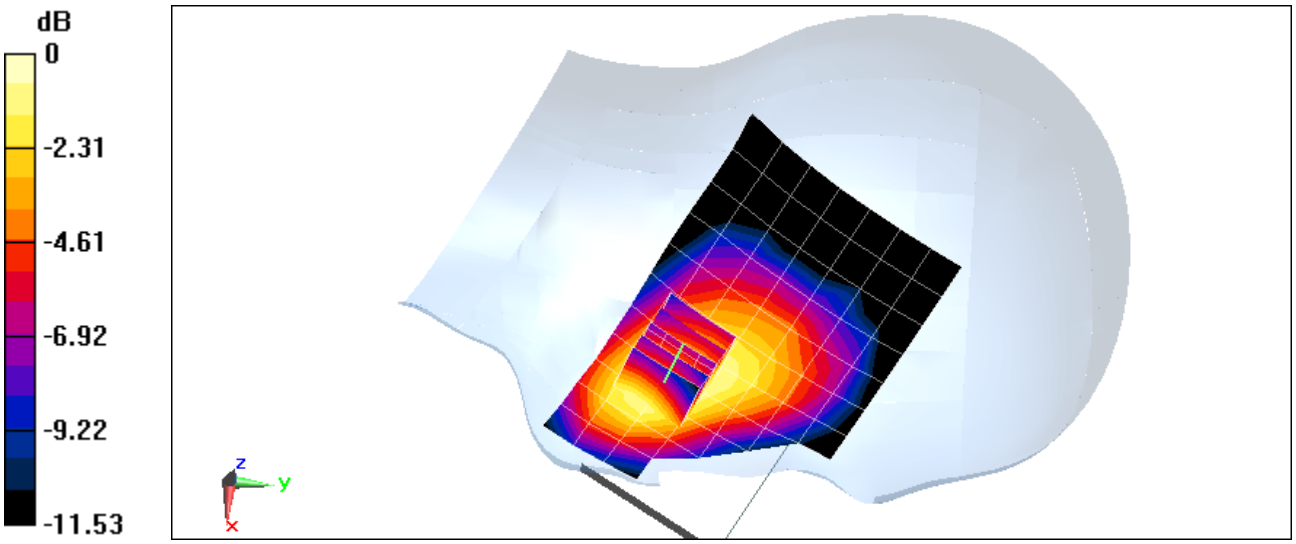
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Head, Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.935 S/m; ε_r = 42.617; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-23-2014; Ambient Temp: 23.3° C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3319; ConvF(6.27, 6.27, 6.27); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: SAM; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.97 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.263 W/kg
SAR(1 g) = 0.204 W/kg



0 dB = 0.225 W/kg = -6.48 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-6

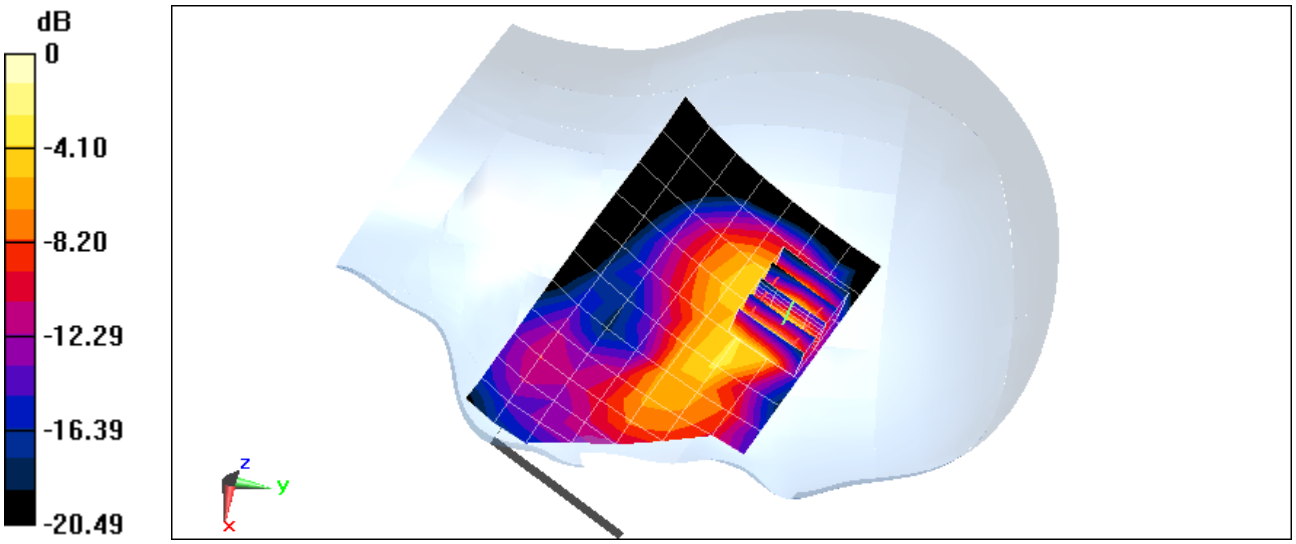
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Head, Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.342 S/m; ε_r = 39.942; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-24-2014; Ambient Temp: 24.3°C; Tissue Temp: 23.5°C

Probe: EX3DV4 - SN3914; ConvF(7.99, 7.99, 7.99); Calibrated: 10/23/2013;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.18 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 0.829 W/kg



0 dB = 1.29 W/kg = 1.11 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-5

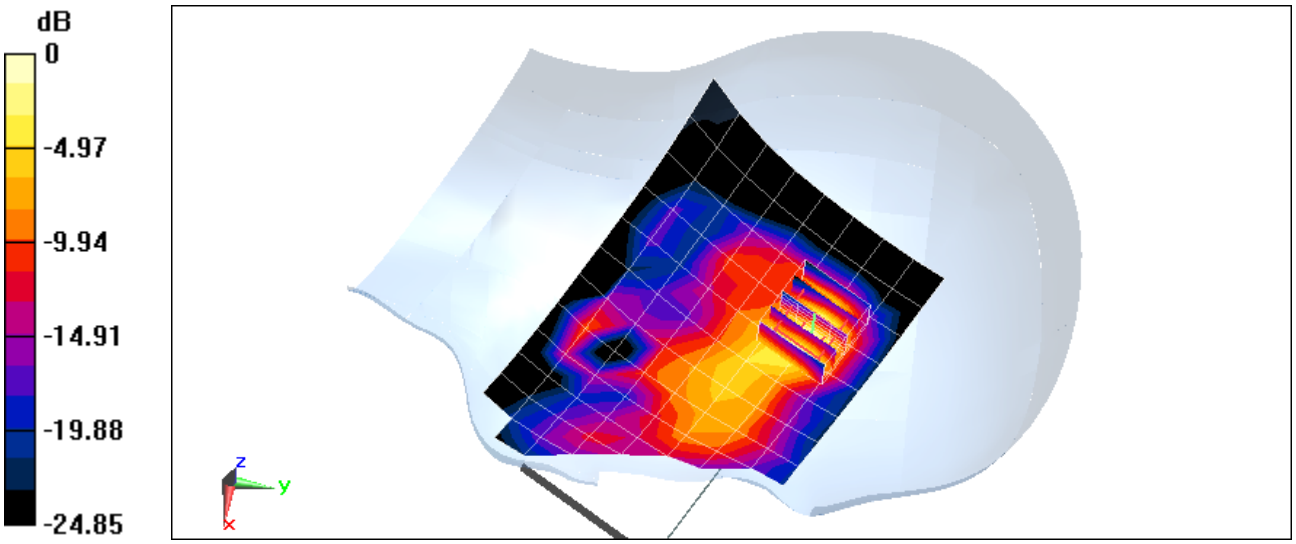
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head, Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.451 S/m; ε_r = 39.616; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-24-2014; Ambient Temp: 24.0° C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3209; ConvF(5.13, 5.13, 5.13); Calibrated: 3/19/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/17/2014
Phantom: SAM front; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 2 (PCS), Left Head, Cheek, High.ch, QPSK, 20 MHz Bandwidth, 1 RB, 99 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.35 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.24 W/kg
SAR(1 g) = 0.995 W/kg



0 dB = 1.42 W/kg = 1.52 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-2

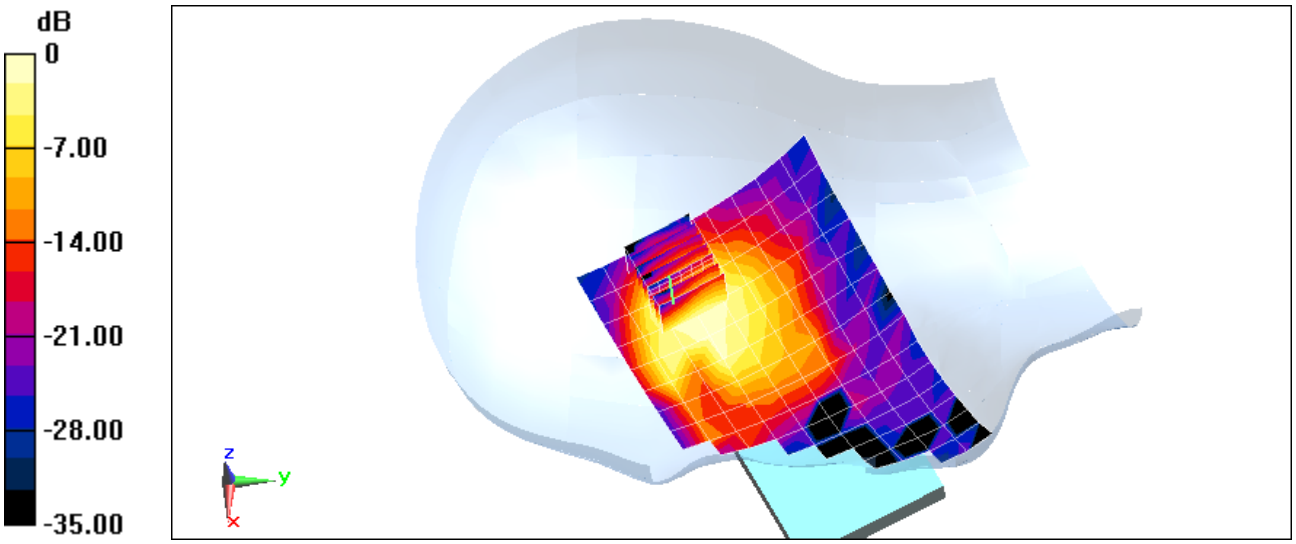
Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Head, Medium parameters used (interpolated):
f = 2462 MHz; σ = 1.784 S/m; ε_r = 38.337; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 07-23-2014; Ambient Temp: 24.3°C; Tissue Temp: 23.7°C

Probe: EX3DV4 - SN3914; ConvF(6.95, 6.95, 6.95); Calibrated: 10/23/2013;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11b, Right Head, Cheek, Ch 11, 1 Mbps, Antenna 1

Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.07 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.00 W/kg
SAR(1 g) = 0.404 W/kg



0 dB = 0.648 W/kg = -1.88 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-2

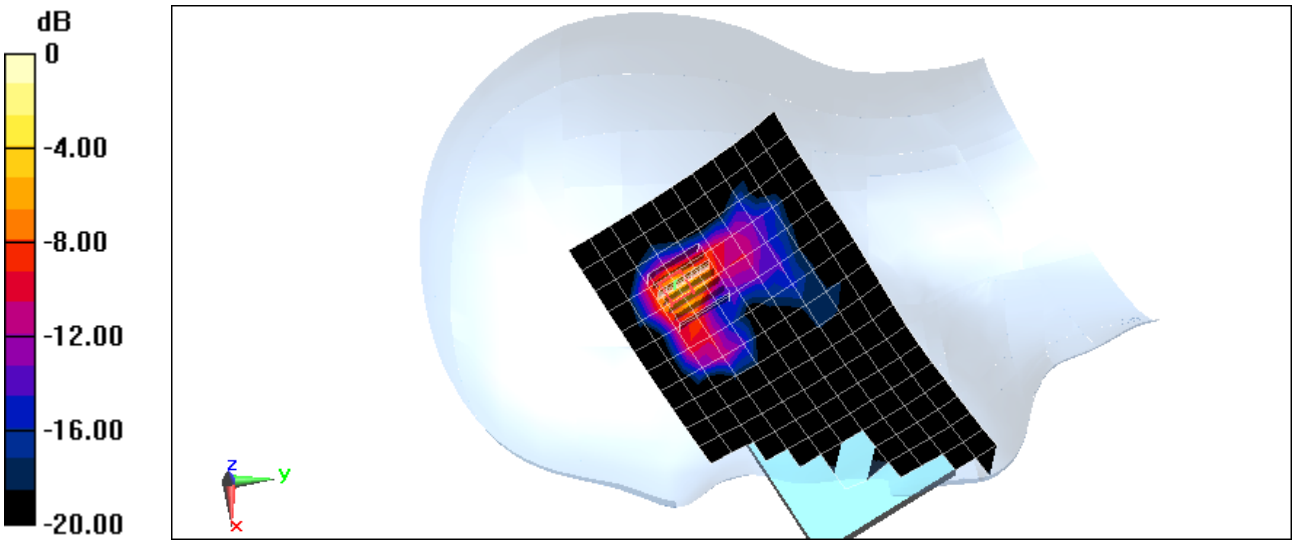
Communication System: UID 0, IEEE 802.11a; Frequency: 5765 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5765 MHz; σ = 5.06 S/m; ε_r = 35.353; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 07-28-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3914; ConvF(4.52, 4.52, 4.52); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11a, 5.8 GHz, Right Head, Cheek, Ch 153, 6 Mbps, Antenna 1

Area Scan (11x19x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 9.489 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 2.69 W/kg
SAR(1 g) = 0.565 W/kg



0 dB = 1.54 W/kg = 1.88 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-2

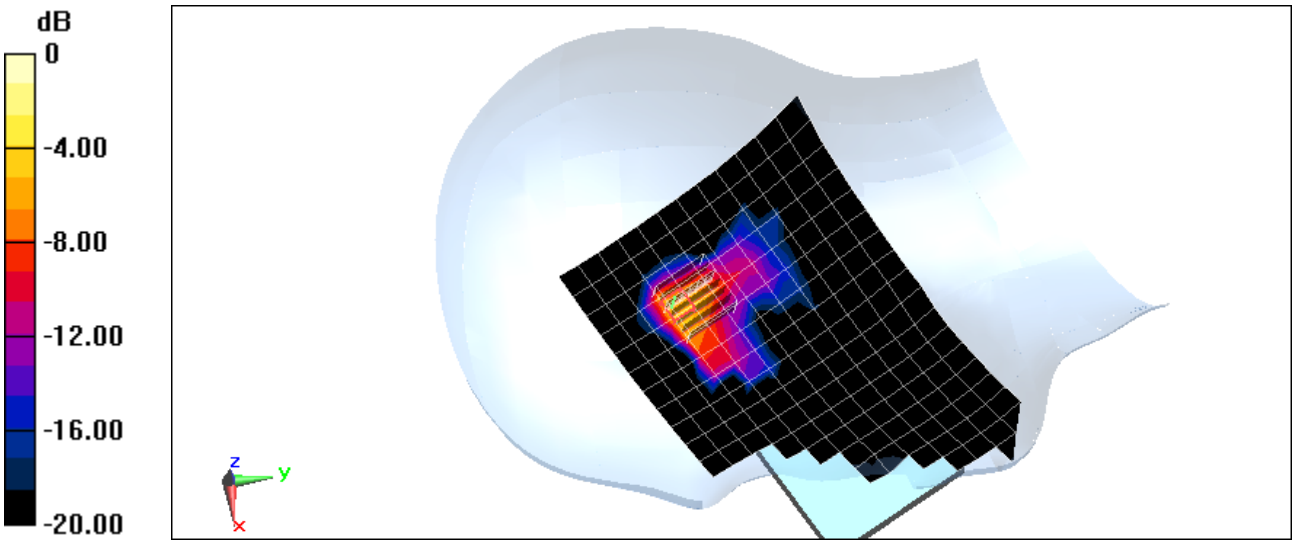
Communication System: UID 0, IEEE 802.11a; Frequency: 5700 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5700 MHz; σ = 4.96 S/m; ε_r = 35.4; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 07-28-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.7°C

Probe: EX3DV4 - SN3914; ConvF(4.37, 4.37, 4.37); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11a, 5.5 - 5.7 GHz, Right Head, Cheek, Ch 140, 6 Mbps, Antenna 1

Area Scan (13x22x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 8.736 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.04 W/kg
SAR(1 g) = 0.616 W/kg



0 dB = 1.67 W/kg = 2.23 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-2

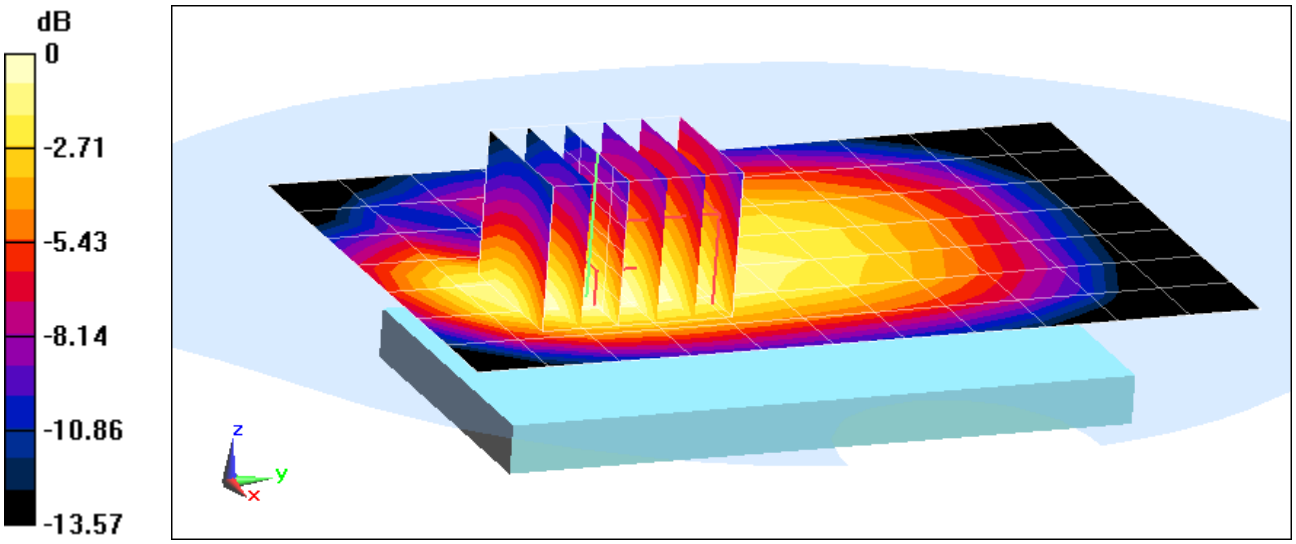
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Body, Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.008 S/m; ε_r = 53.179; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-21-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.2°C

Probe: ES3DV2 - SN3022; ConvF(5.91, 5.91, 5.91); Calibrated: 8/22/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.67 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.606 W/kg
SAR(1 g) = 0.423 W/kg



0 dB = 0.485 W/kg = -3.14 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-2

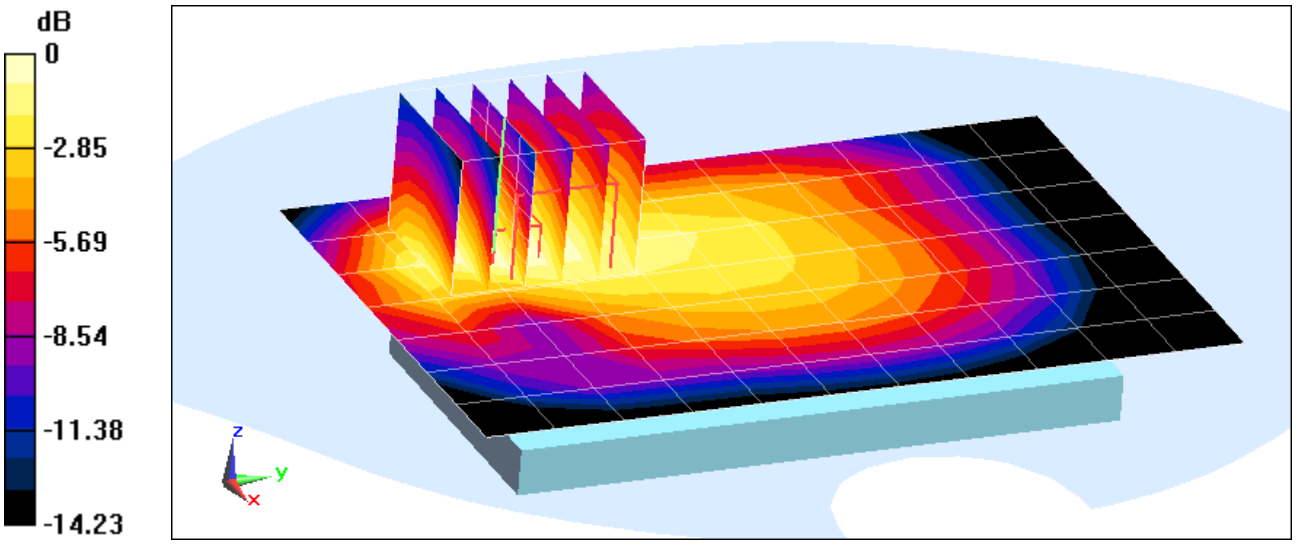
Communication System: UID 0, GSM GPRS; 2 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium: 835 Body, Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.008 S/m; ε_r = 53.179; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-21-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.2°C

Probe: ES3DV2 - SN3022; ConvF(5.91, 5.91, 5.91); Calibrated: 8/22/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.18 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.945 W/kg
SAR(1 g) = 0.656 W/kg



0 dB = 0.756 W/kg = -1.21 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-2

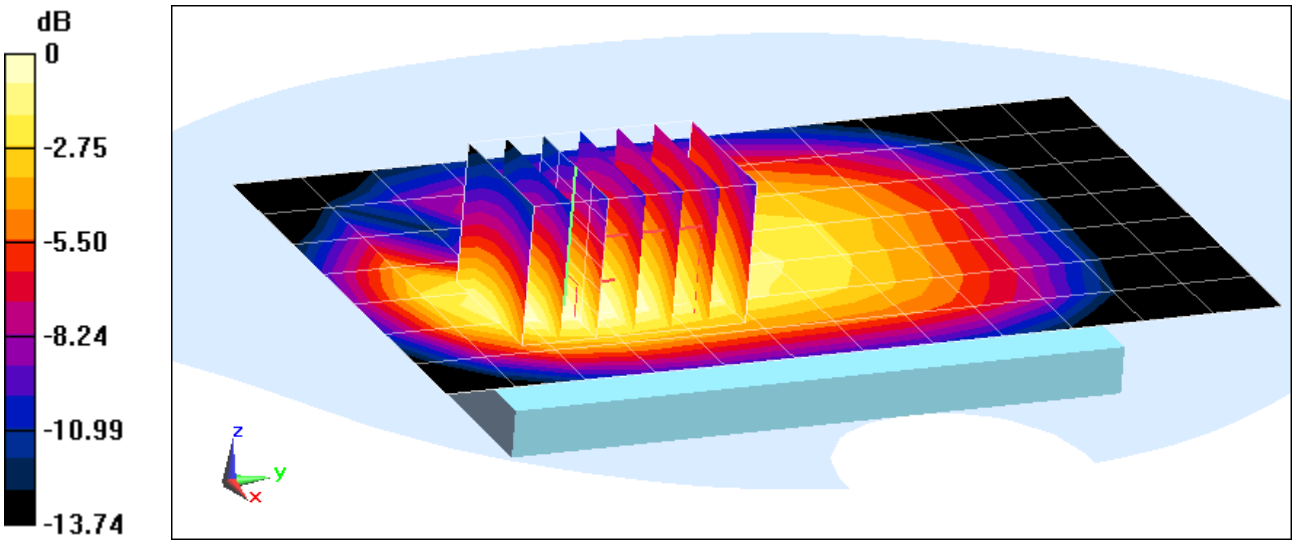
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body, Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.008 S/m; ε_r = 53.179; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-21-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.2°C

Probe: ES3DV2 - SN3022; ConvF(5.91, 5.91, 5.91); Calibrated: 8/22/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.04 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.546 W/kg
SAR(1 g) = 0.378 W/kg



0 dB = 0.434 W/kg = -3.63 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-2

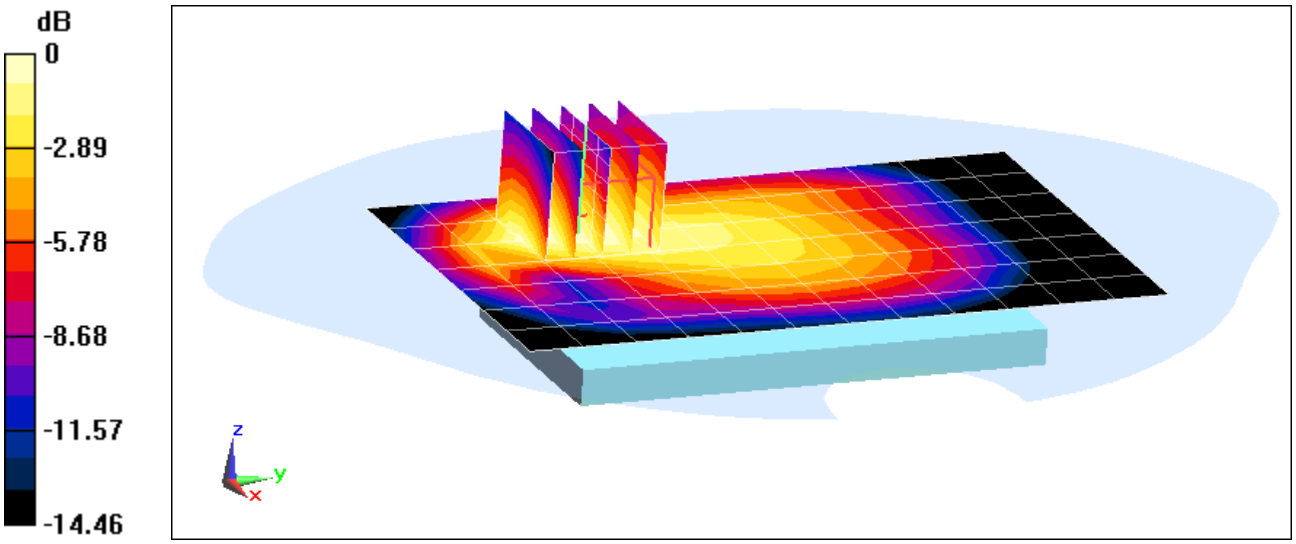
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body, Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.008 S/m; ε_r = 53.179; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-21-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.2°C

Probe: ES3DV2 - SN3022; ConvF(5.91, 5.91, 5.91); Calibrated: 8/22/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.66 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.560 W/kg
SAR(1 g) = 0.388 W/kg



0 dB = 0.445 W/kg = -3.52 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-2

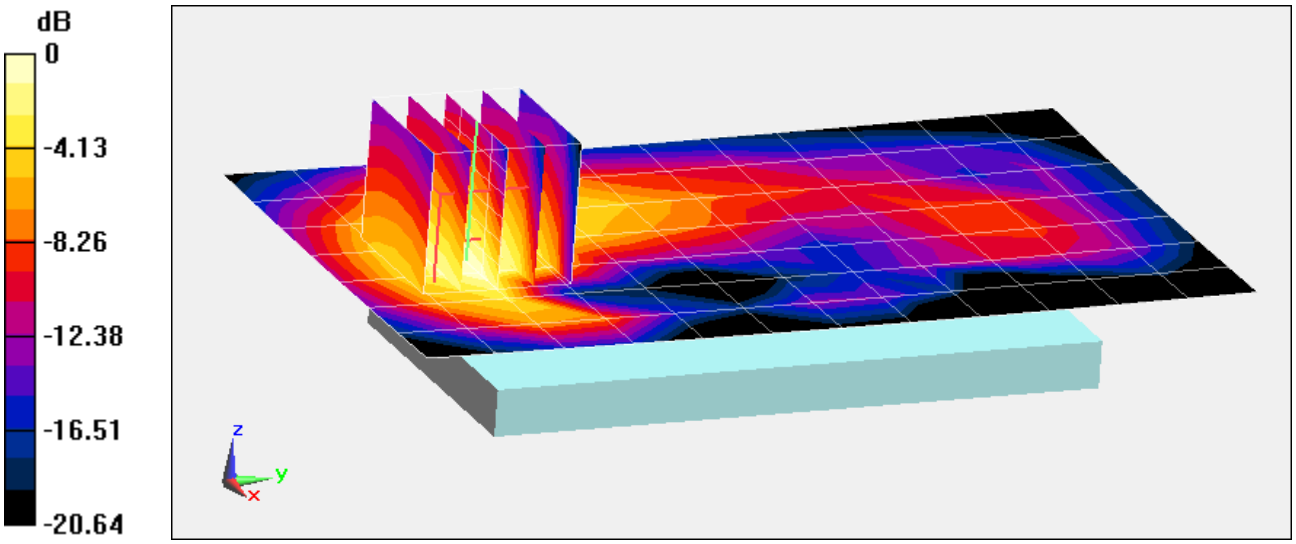
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Body, Medium parameters used:
f = 1880 MHz; σ = 1.489 S/m; ε_r = 52.551; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-21-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 11/19/2013
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GSM 1900, Body SAR, Back Side, Mid.ch

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.60 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.964 W/kg
SAR(1 g) = 0.588 W/kg



0 dB = 0.709 W/kg = -1.49 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-2

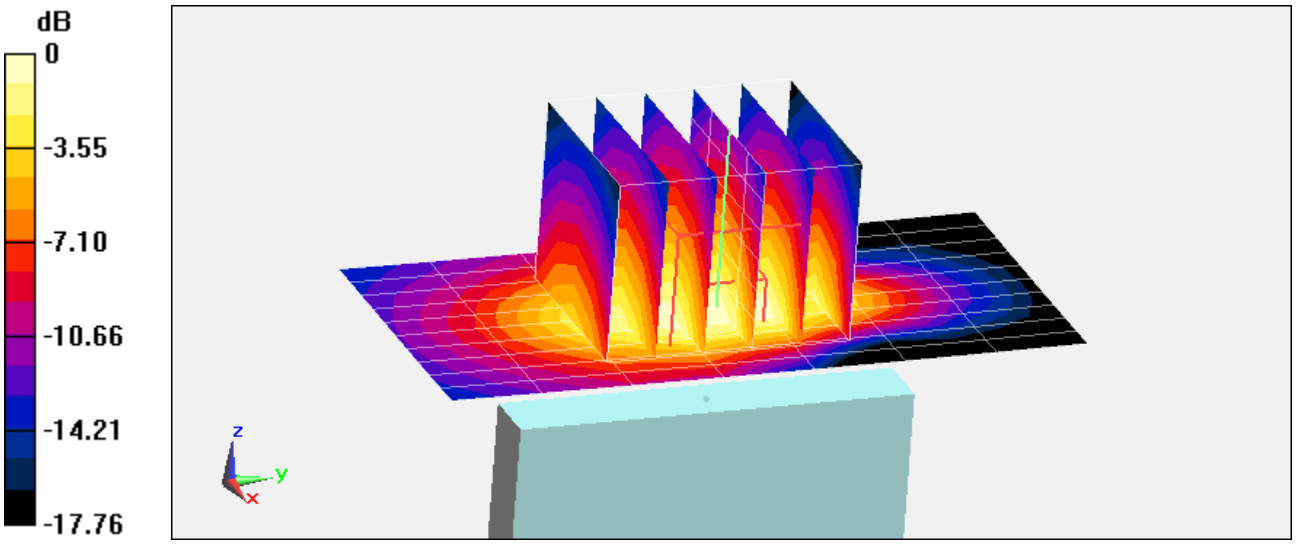
Communication System: UID 0, GSM GPRS; 2 Tx slots, Frequency: 1850.2 MHz; Duty Cycle: 1:4.15
Medium: 1900 Body, Medium parameters used (interpolated):
f = 1850.2 MHz; σ = 1.455 S/m; ε_r = 52.659; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-21-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 11/19/2013
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GPRS 1900, Body SAR, Bottom Edge, Low.ch, 2 Tx Slots

Area Scan (11x8x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.63 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.70 W/kg
SAR(1 g) = 1.03 W/kg



0 dB = 1.26 W/kg = 1.00 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-5

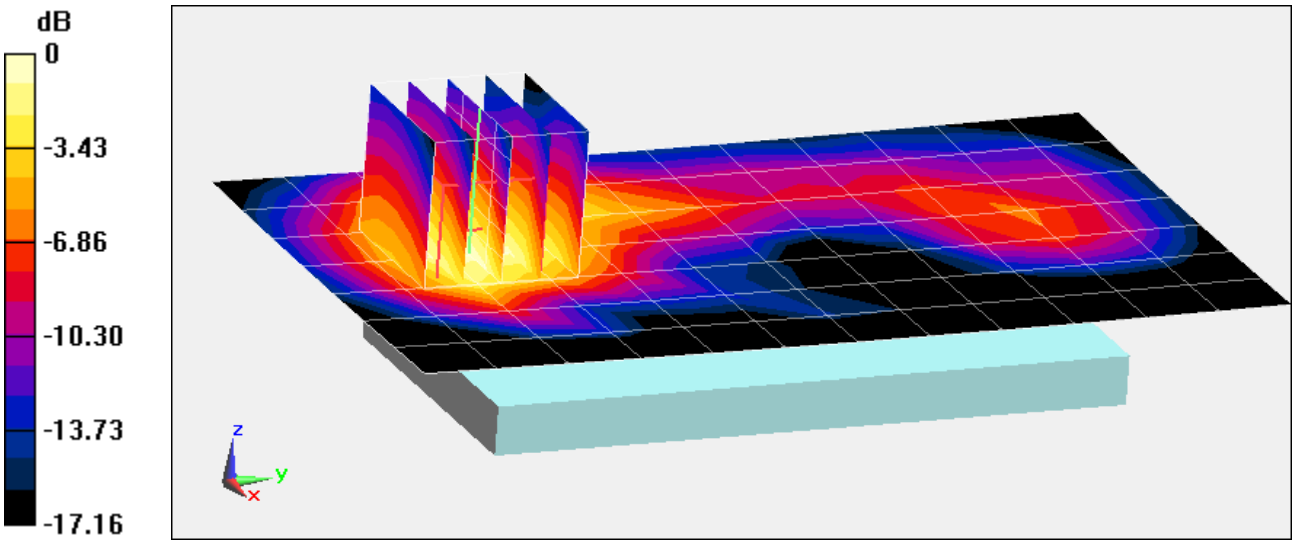
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body, Medium parameters used:
f = 1880 MHz; σ = 1.484 S/m; ε_r = 52.08; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-24-2014; Ambient Temp: 24.3°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 11/19/2013
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.86 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.659 W/kg



0 dB = 0.794 W/kg = -1.00 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-5

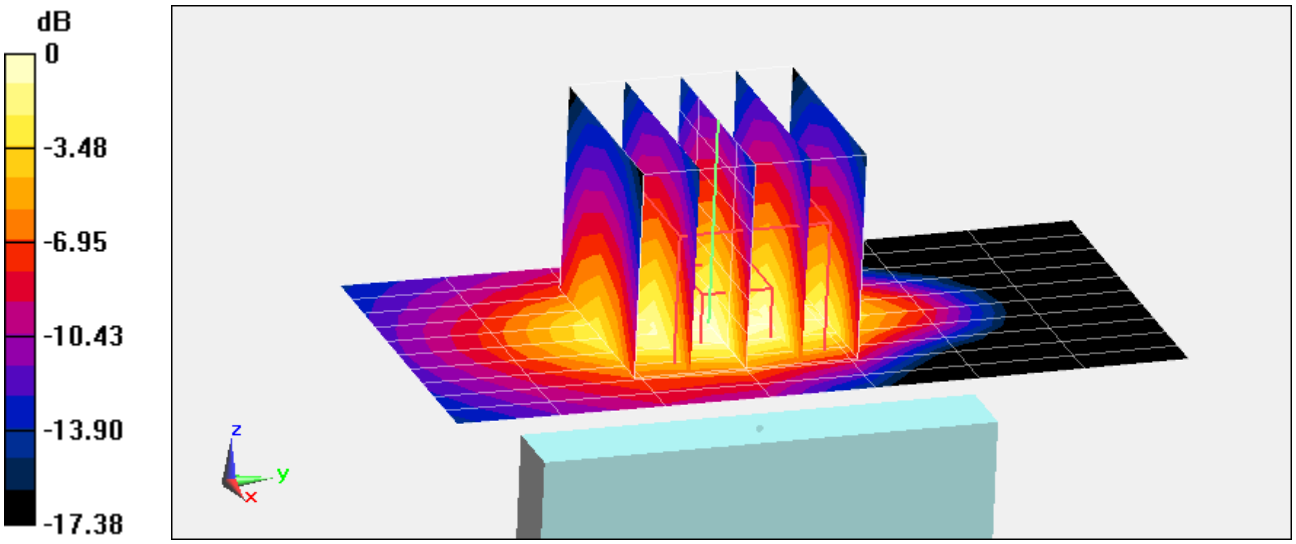
Communication System: UID 0, UMTS; Frequency: 1852.4 MHz; Duty Cycle: 1:1
Medium: 1900 Body, Medium parameters used (interpolated):
f = 1852.4 MHz; σ = 1.455 S/m; ε_r = 52.17; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-24-2014; Ambient Temp: 24.3°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 11/19/2013
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (11x8x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.37 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.44 W/kg
SAR(1 g) = 0.886 W/kg



0 dB = 1.08 W/kg = 0.33 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-5

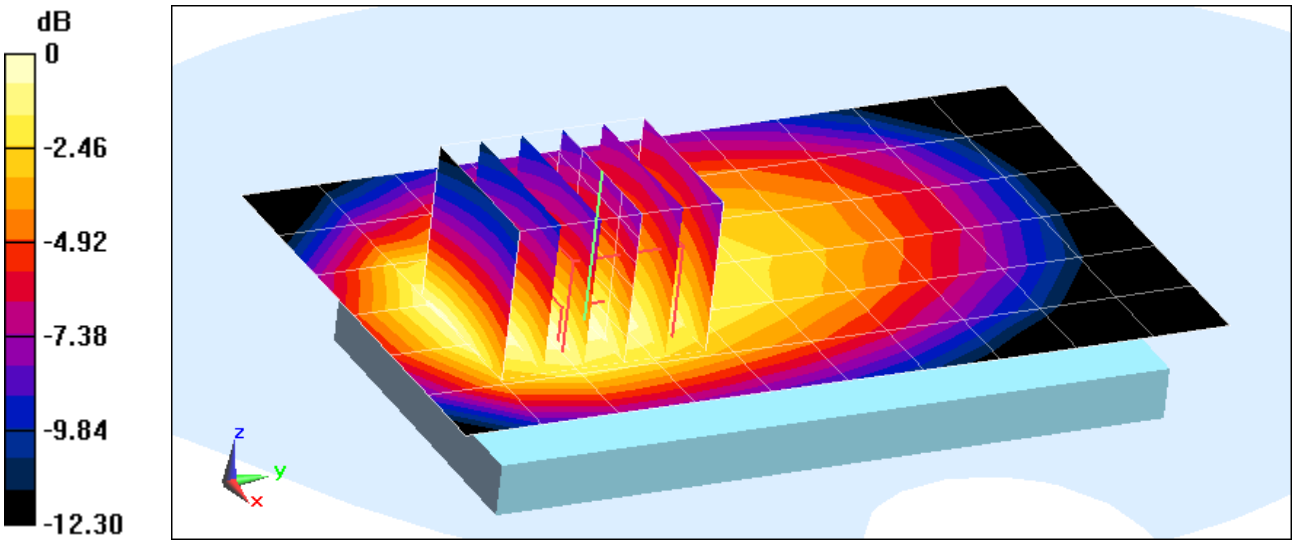
Communication System: UID 0, LTE Band 17; Frequency: 710 MHz; Duty Cycle: 1:1
Medium: 750 Body, Medium parameters used:
f = 710 MHz; σ = 0.92 S/m; ε_r = 54.338; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3287; ConvF(6.09, 6.09, 6.09); Calibrated: 11/20/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 11/19/2013
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1797
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 17, Body SAR, Back Side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.11 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.351 W/kg
SAR(1 g) = 0.252 W/kg



0 dB = 0.284 W/kg = -5.47 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-3

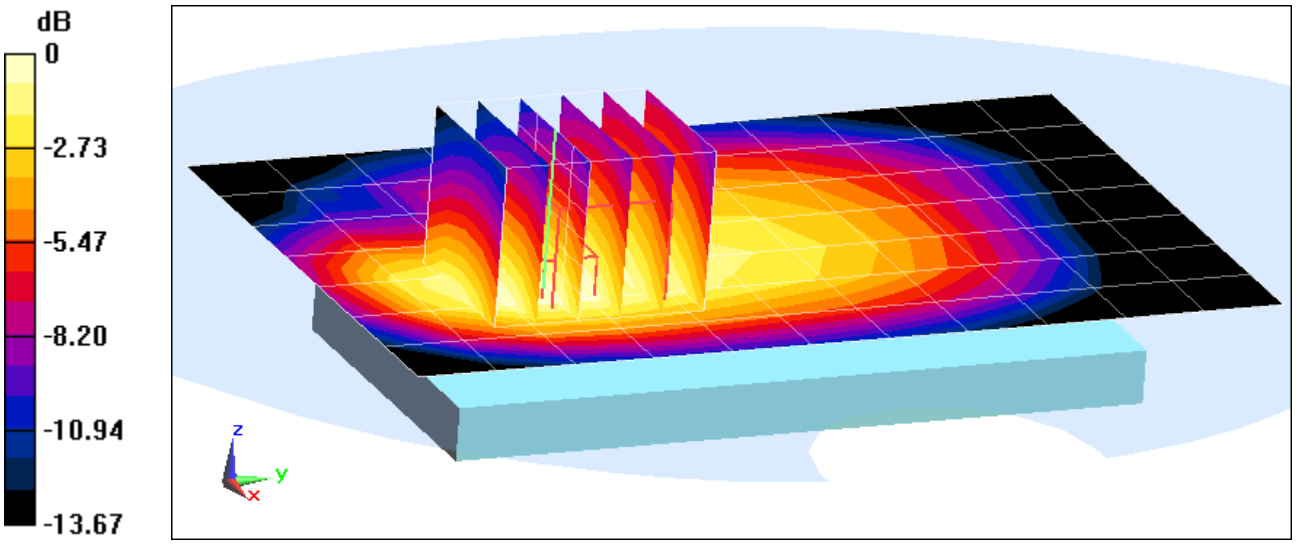
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body, Medium parameters used (interpolated):
f = 836.5 MHz; σ = 1.008 S/m; ε_r = 53.18; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-21-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.2°C

Probe: ES3DV2 - SN3022; ConvF(5.91, 5.91, 5.91); Calibrated: 8/22/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.87 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.729 W/kg
SAR(1 g) = 0.525 W/kg



0 dB = 0.599 W/kg = -2.23 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-6

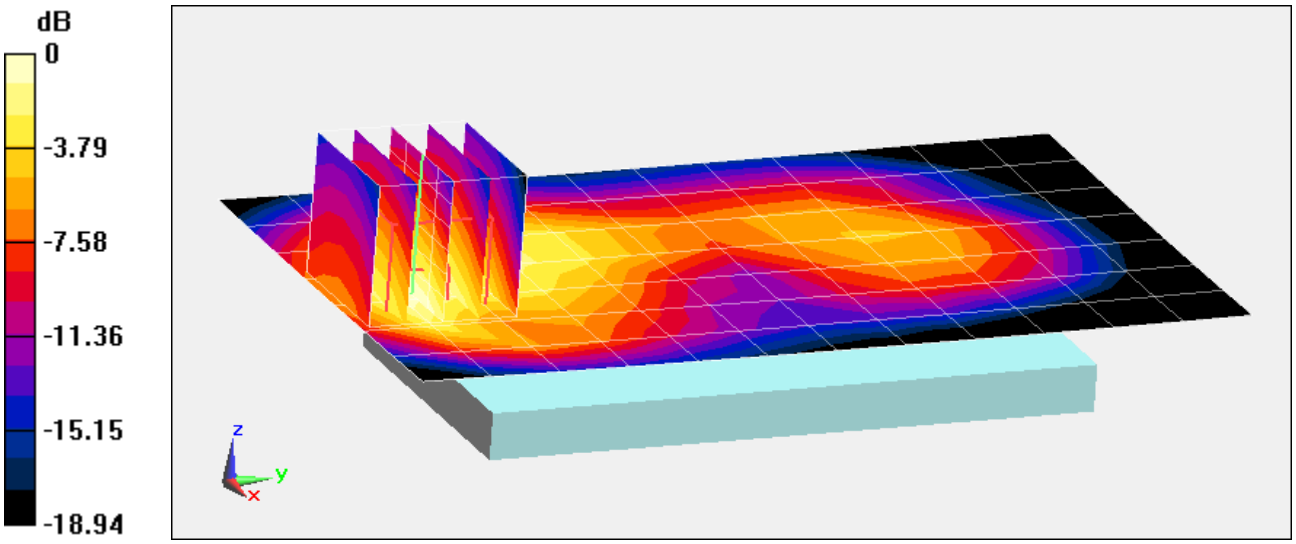
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body, Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.454 S/m; ε_r = 51.512; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-24-2014; Ambient Temp: 24.2°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3319; ConvF(4.85, 4.85, 4.85); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: ELI left; Type: QDOVA002AA; Serial: TP:1202
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.10 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.717 W/kg



0 dB = 0.872 W/kg = -0.59 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-6

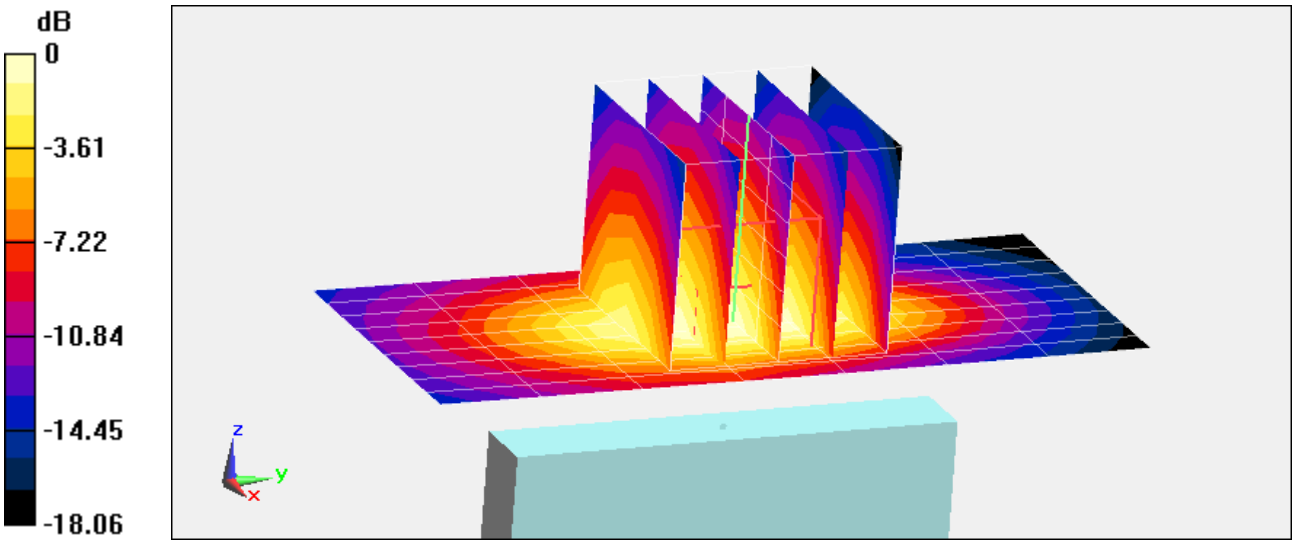
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body, Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.454 S/m; ε_r = 51.512; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-24-2014; Ambient Temp: 24.2°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3319; ConvF(4.85, 4.85, 4.85); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: ELI left; Type: QDOVA002AA; Serial: TP:1202
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 4 (AWS), Body SAR, Bottom Edge, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (10x8x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.75 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.64 W/kg
SAR(1 g) = 1.04 W/kg



0 dB = 1.27 W/kg = 1.04 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-4

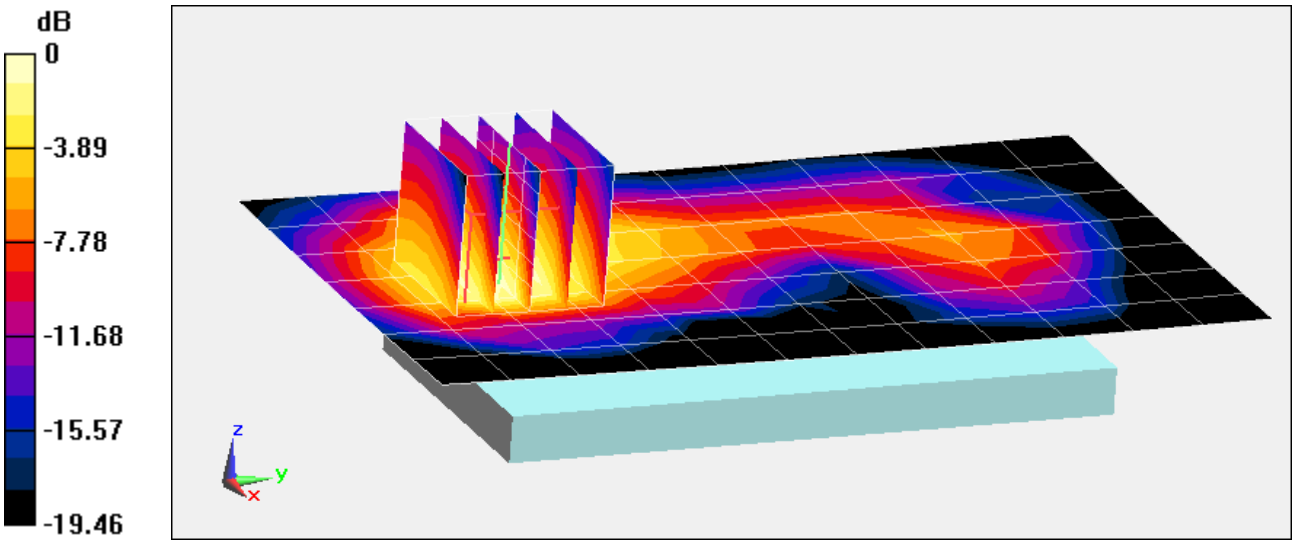
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Body, Medium parameters used (interpolated):
f = 1860 MHz; σ = 1.466 S/m; ε_r = 52.624; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-21-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 11/19/2013
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 2 (PCS), Body SAR, Back Side, Low.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.83 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.10 W/kg
SAR(1 g) = 0.672 W/kg



0 dB = 0.802 W/kg = -0.96 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-4

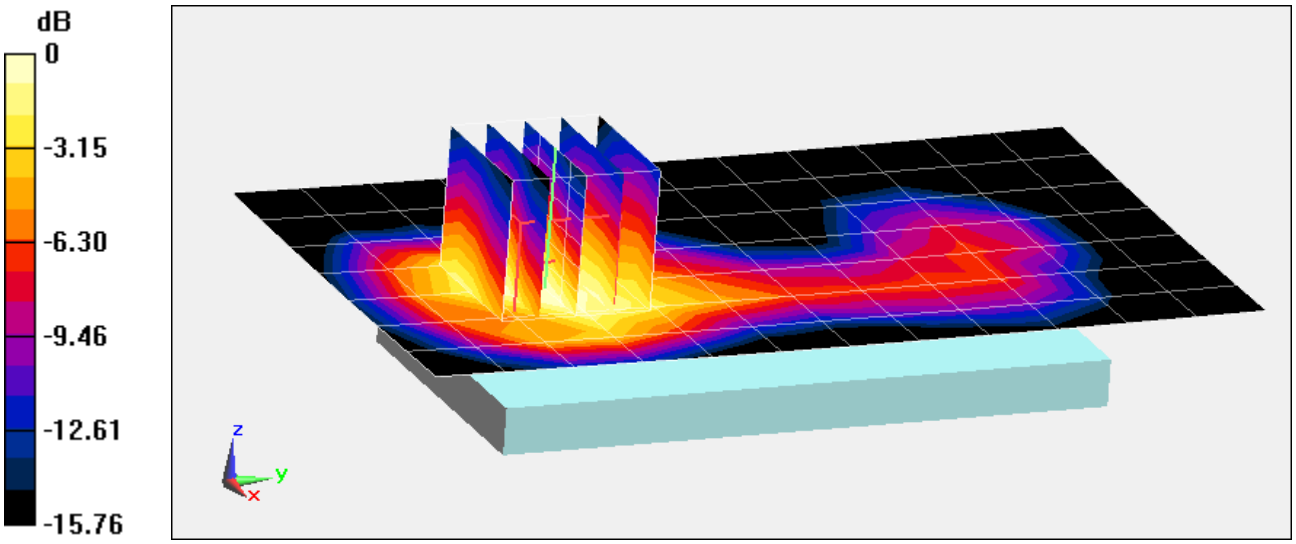
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Body, Medium parameters used (interpolated):
f = 1860 MHz; σ = 1.466 S/m; ε_r = 52.624; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-21-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 11/19/2013
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 2 (PCS), Body SAR, Front Side, Low.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.88 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.22 W/kg
SAR(1 g) = 0.728 W/kg



0 dB = 0.892 W/kg = -0.50 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-5

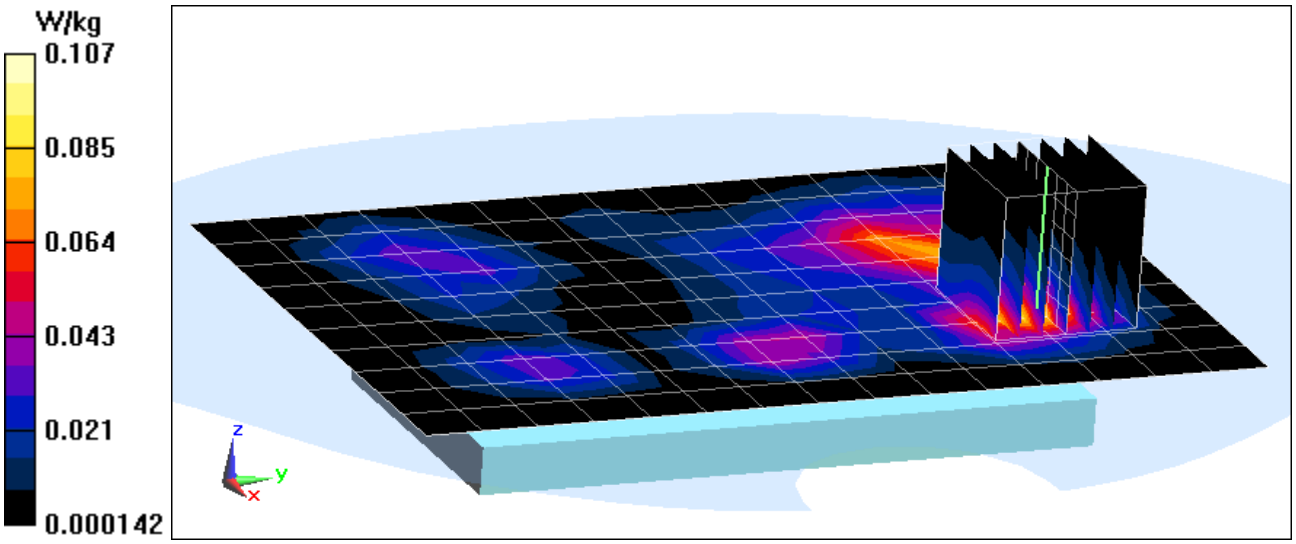
Communication System: UID 0, IEEE 802.11n; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Body, Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.927 S/m; ε_r = 51.652; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-24-2014; Ambient Temp: 24.4°C; Tissue Temp: 23.2°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/22/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11n, Body SAR, Ch 1, 13 Mbps, Back Side, MIMO

Area Scan (11x16x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.412 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.178 W/kg
SAR(1 g) = 0.081 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-5

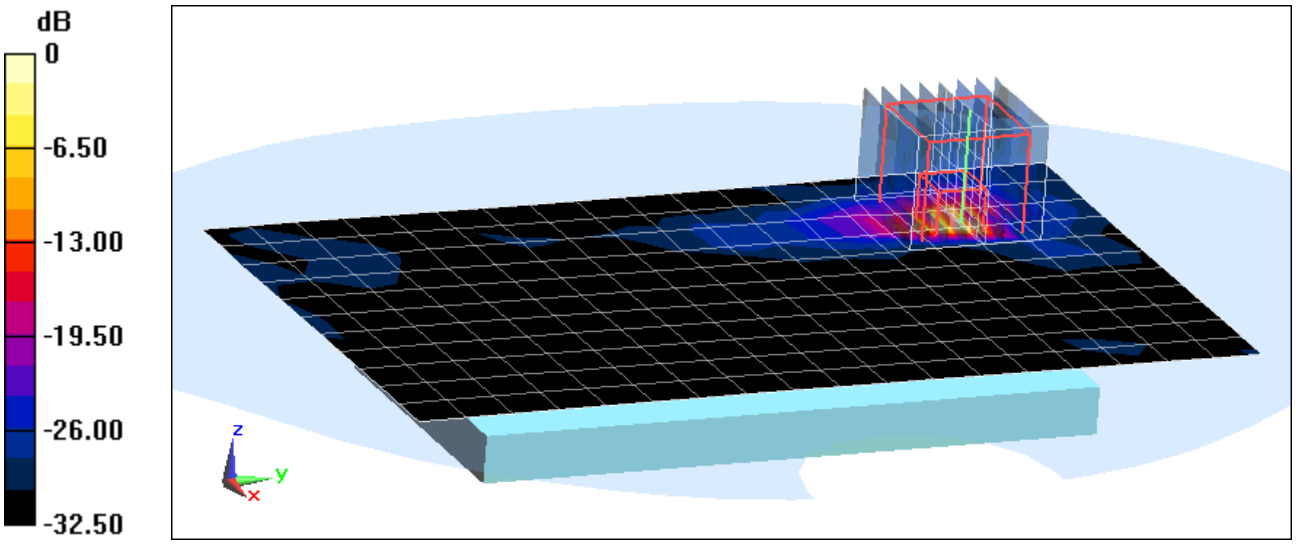
Communication System: UID 0, IEEE 802.11n; Frequency: 5825 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5825 MHz; σ = 6.074 S/m; ε_r = 47.024; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(4, 4, 4); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11n, 5.8 GHz, Body SAR, Ch 165, 20 MHz Bandwidth, 6.5 Mbps, Back Side, Antenna 2

Area Scan (11x8x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 4.249 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.634 W/kg
SAR(1 g) = 0.132 W/kg



0 dB = 0.322 W/kg = -4.92 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-5

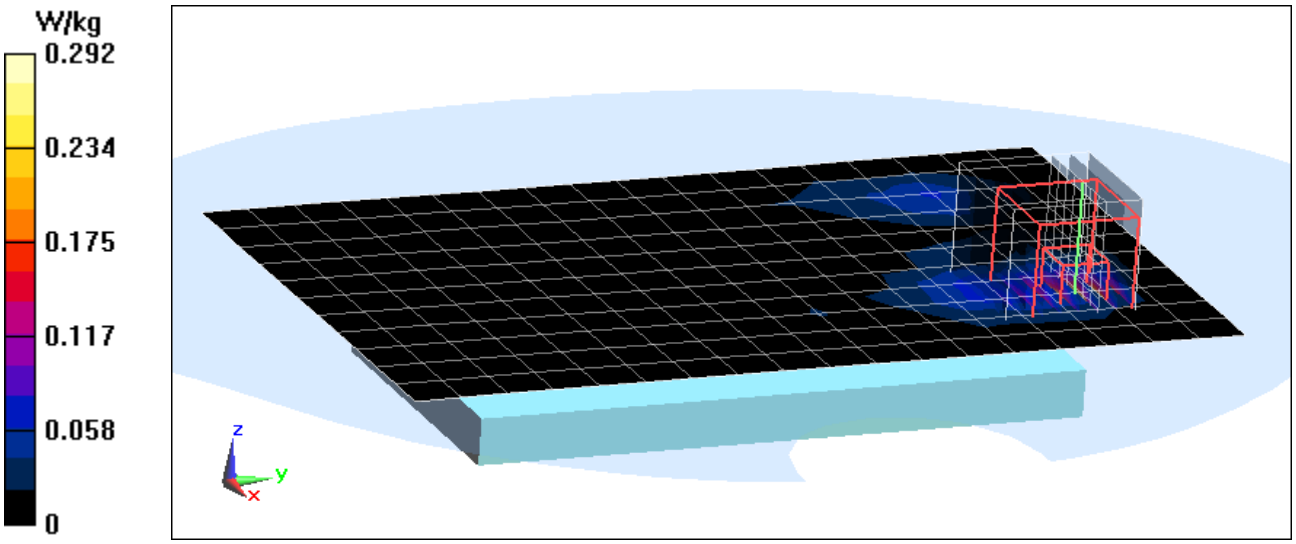
Communication System: UID 0, IEEE 802.11n; Frequency: 5500 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5500 MHz; σ = 5.666 S/m; ε_r = 47.408; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.4°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(3.8, 3.8, 3.8); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11n, 5.5 - 5.7 GHz, Body SAR, Ch 100, 20 MHz Bandwidth, 13 Mbps, Back Side, MIMO

Area Scan (12x19x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 3.443 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.588 W/kg
SAR(1 g) = 0.122 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG850A; Type: Portable Handset; Serial: 1107-5

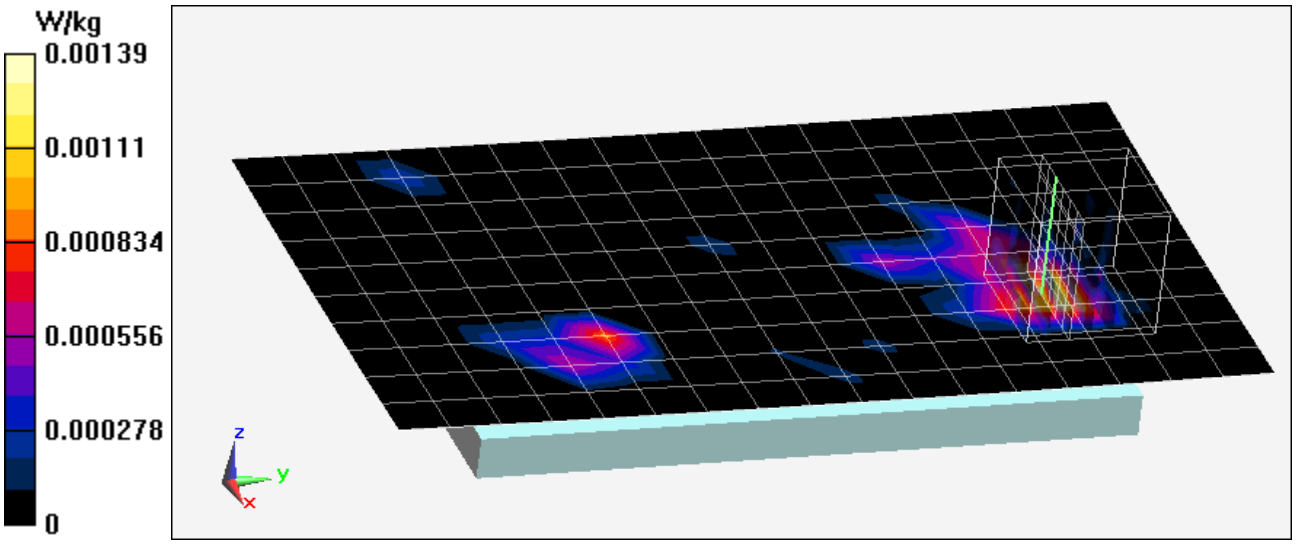
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1
Medium: 2450 Body, Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.926 S/m; ε_r = 53.891; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2014; Ambient Temp: 24.3°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3319; ConvF(4.24, 4.24, 4.24); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: ELI left; Type: QDOVA002AA; Serial: TP:1202
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.5220 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0 W/kg
SAR(1 g) = 0.000 W/kg



APPENDIX B: SYSTEM VERIFICATION

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PCTEST ENGINEERING LABORATORY, INC.

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

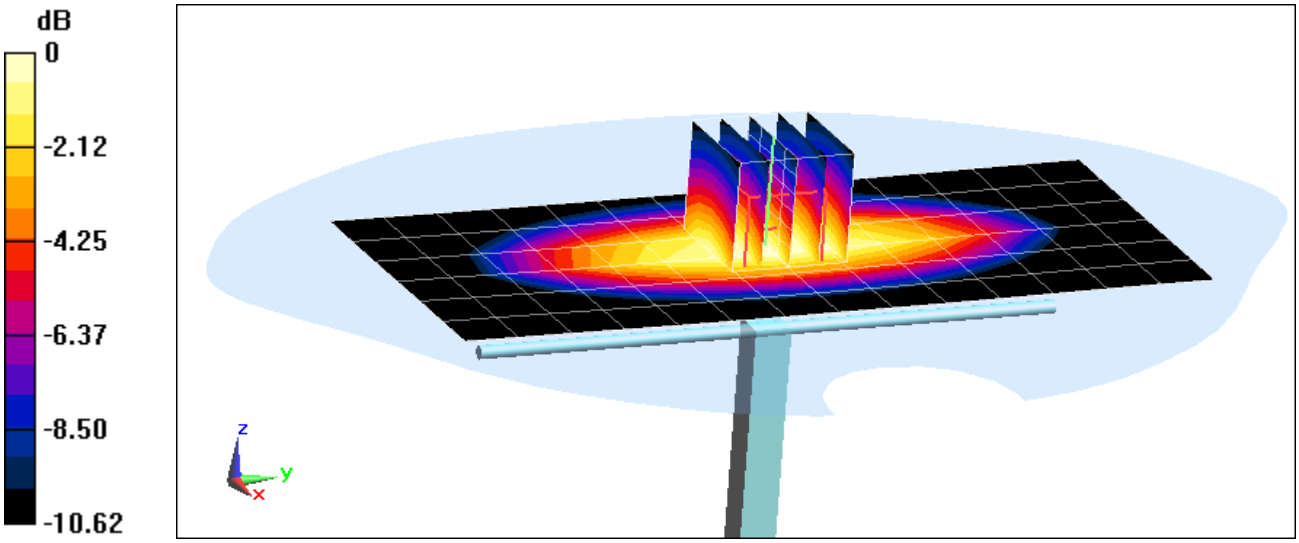
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head, Medium parameters used (interpolated):
f = 750 MHz; σ = 0.923 S/m; ε_r = 41.337; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 07-22-2014; Ambient Temp: 24.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.43, 6.43, 6.43); Calibrated: 3/19/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/17/2014
Phantom: SAM front; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.32 W/kg
SAR(1 g) = 0.891 W/kg
Deviation = 6.45%



0 dB = 1.04 W/kg = 0.17 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d119

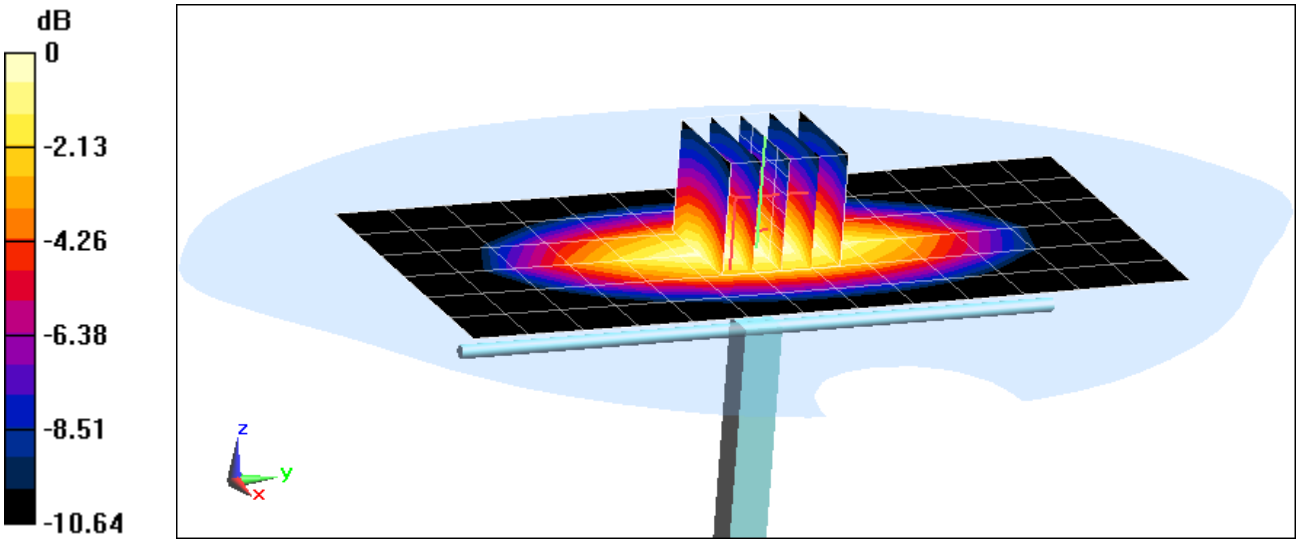
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head, Medium parameters used:
f = 835 MHz; σ = 0.934 S/m; ε_r = 42.634; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 07-23-2014; Ambient Temp: 23.3°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3319; ConvF(6.27, 6.27, 6.27); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: SAM; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.39 W/kg
SAR(1 g) = 0.931 W/kg
Deviation = 0.98%



0 dB = 1.09 W/kg = 0.37 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1051

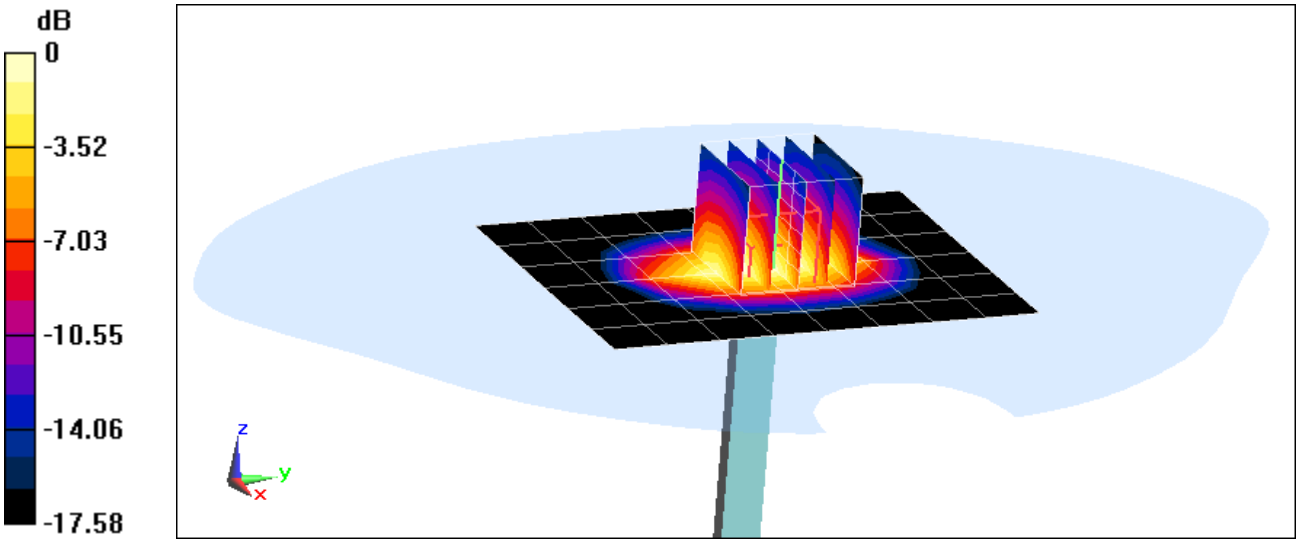
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head, Medium parameters used:
f = 1750 MHz; σ = 1.359 S/m; ε_r = 39.861; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-24-2014; Ambient Temp: 24.3°C; Tissue Temp: 23.5°C

Probe: EX3DV4 - SN3914; ConvF(7.99, 7.99, 7.99); Calibrated: 10/23/2013;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 6.45 W/kg
SAR(1 g) = 3.56 W/kg
Deviation = -1.66%



0 dB = 4.99 W/kg = 6.98 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d141

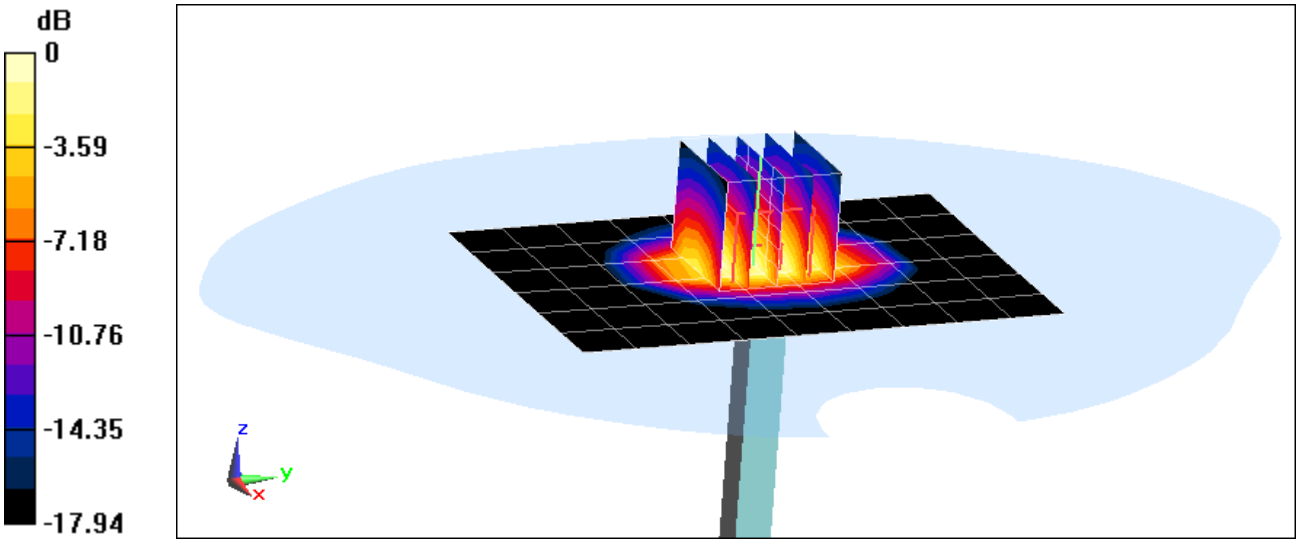
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head, Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.405 S/m; ε_r = 38.555; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-21-2014; Ambient Temp: 24.0°C; Tissue Temp: 23.0°C

Probe: ES3DV2 - SN3022; ConvF(5.03, 5.03, 5.03); Calibrated: 8/22/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 6.71 W/kg
SAR(1 g) = 3.76 W/kg
Deviation = -6.23%



0 dB = 4.75 W/kg = 6.77 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d141

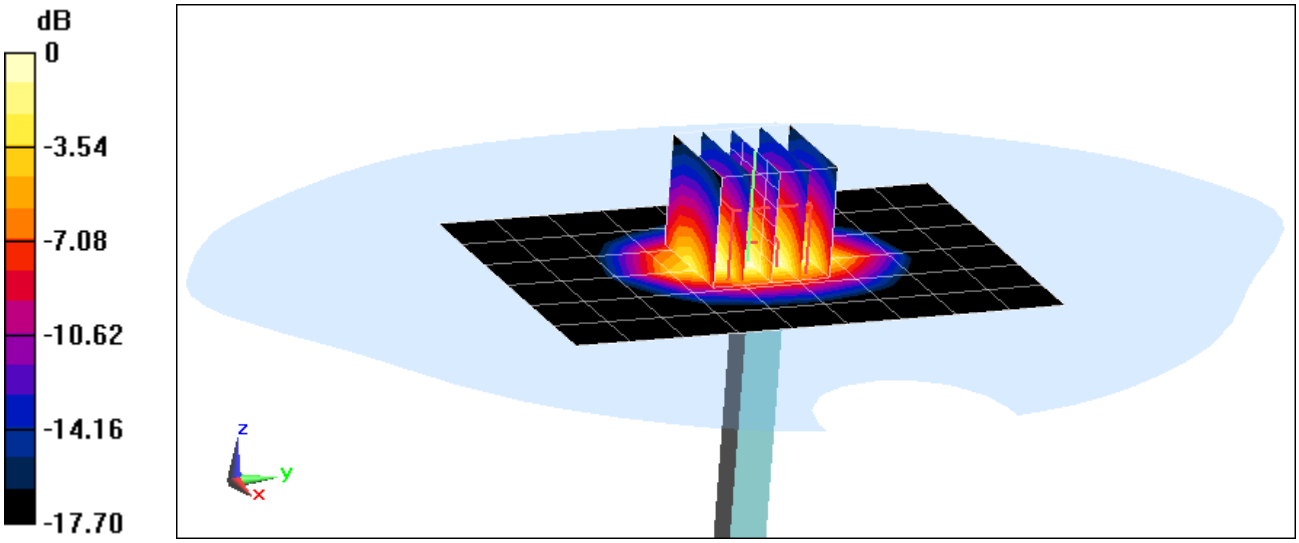
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head, Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.451 S/m; ε_r = 39.616; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-24-2014; Ambient Temp: 24.0°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3209; ConvF(5.13, 5.13, 5.13); Calibrated: 3/19/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/17/2014
Phantom: SAM front; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.88 W/kg
SAR(1 g) = 4.22 W/kg
Deviation = 5.24%



0 dB = 5.50 W/kg = 7.40 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 797

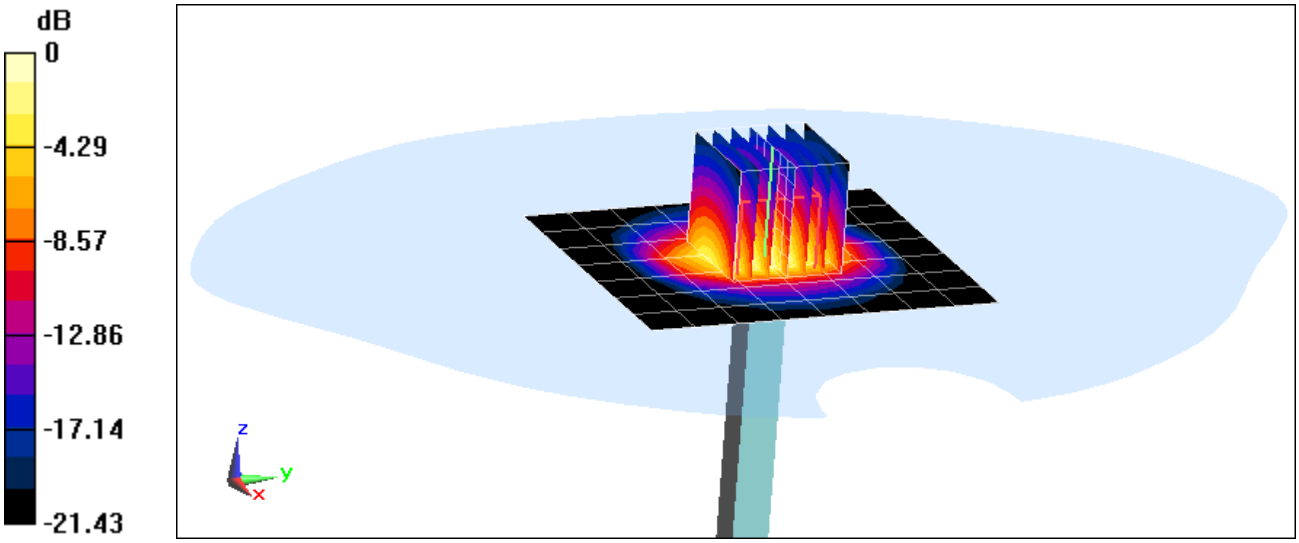
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head, Medium parameters used:
f = 2450 MHz; σ = 1.772 S/m; ε_r = 38.379; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-23-2014; Ambient Temp: 24.3°C; Tissue Temp: 23.7°C

Probe: EX3DV4 - SN3914; ConvF(6.95, 6.95, 6.95); Calibrated: 10/23/2013;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 11.1 W/kg
SAR(1 g) = 5.48 W/kg
Deviation = 5.79%



0 dB = 8.25 W/kg = 9.16 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5200 MHz; Type: D5GHzV2; Serial: 1057

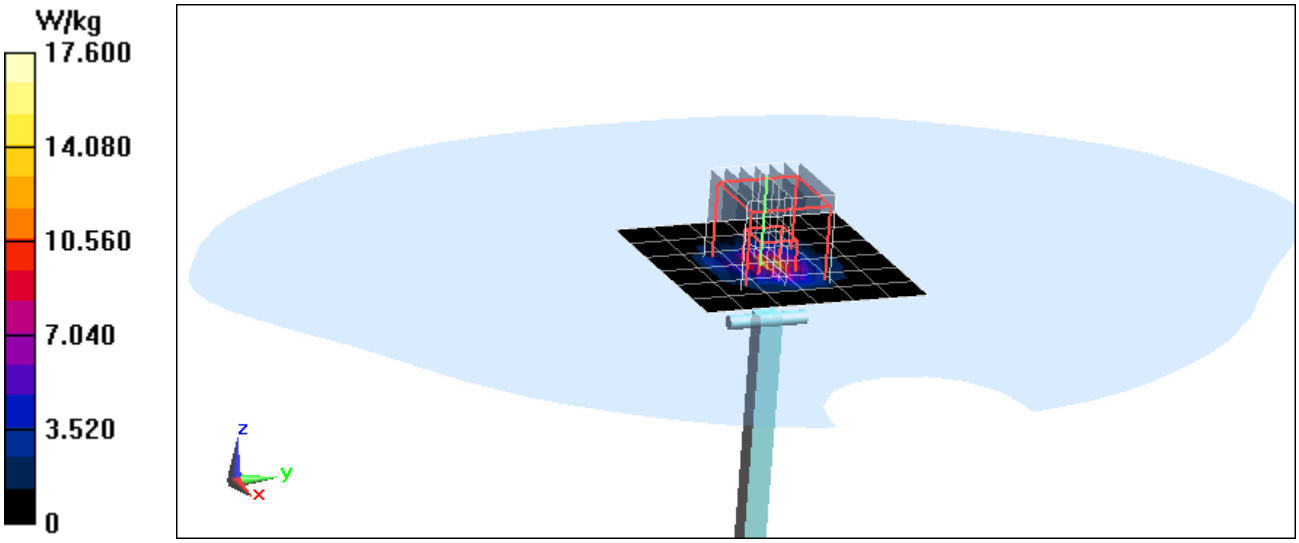
Communication System: UID 0, CW; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5200 MHz; σ = 4.476 S/m; ε_r = 36.038; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.4°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3914; ConvF(4.99, 4.99, 4.99); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5200 MHz System Verification

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 31.4 W/kg
SAR(1 g) = 7.42 W/kg
Deviation = -4.87%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5300 MHz; Type: D5GHzV2; Serial: 1057

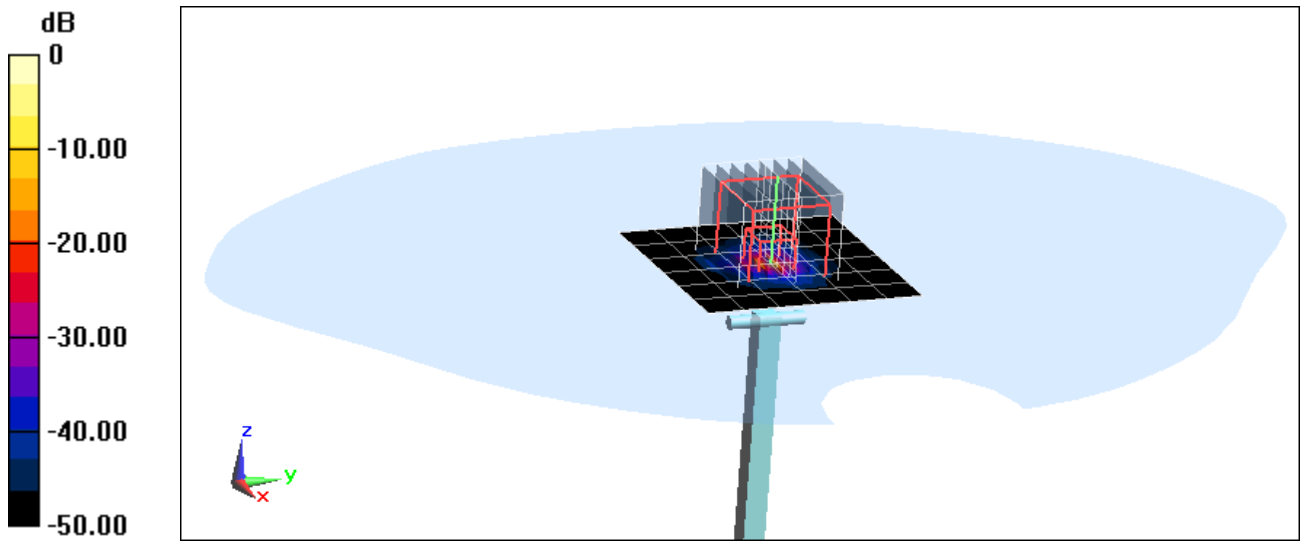
Communication System: UID 0, CW; Frequency: 5300 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5300 MHz; σ = 4.56 S/m; ε_r = 35.928; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.4°C; Tissue Temp: 23.7°C

Probe: EX3DV4 - SN3914; ConvF(4.82, 4.82, 4.82); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5300 MHz System Verification

Area Scan (7x8x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 33.0 W/kg
SAR(1 g) = 7.65 W/kg
Deviation = -7.83%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5500 MHz; Type: D5GHzV2; Serial: 1057

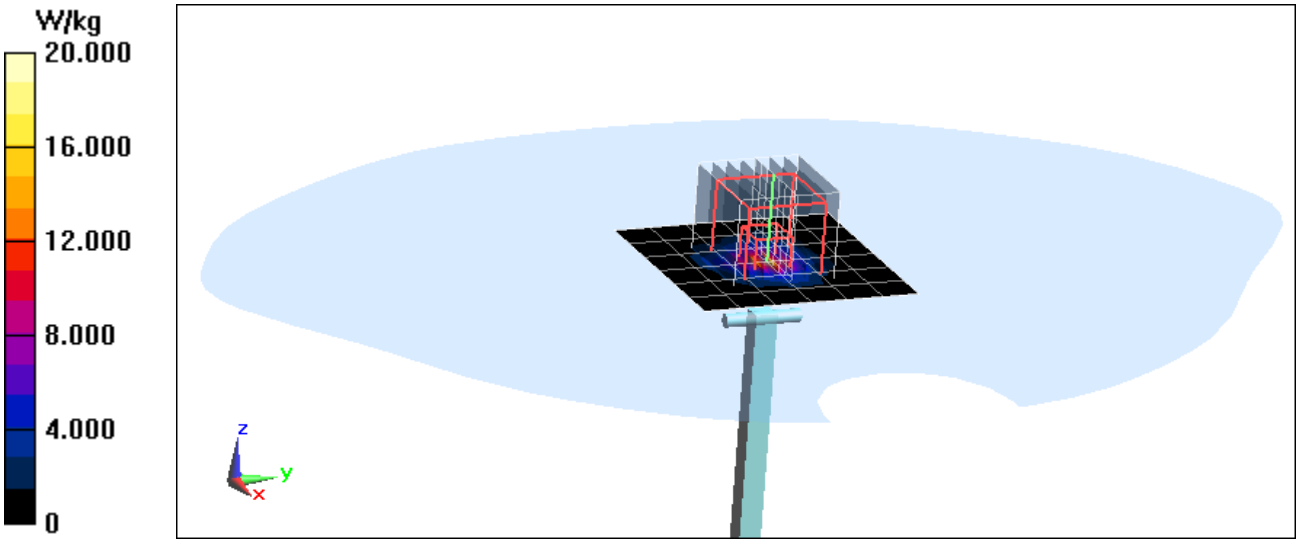
Communication System: UID 0, CW; Frequency: 5500 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5500 MHz; σ = 4.774 S/m; ε_r = 35.652; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.7°C

Probe: EX3DV4 - SN3914; ConvF(4.55, 4.55, 4.55); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5500 MHz System Verification

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 35.6 W/kg
SAR(1 g) = 8.11 W/kg
Deviation = -3.80%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5600 MHz; Type: D5GHzV2; Serial: 1057

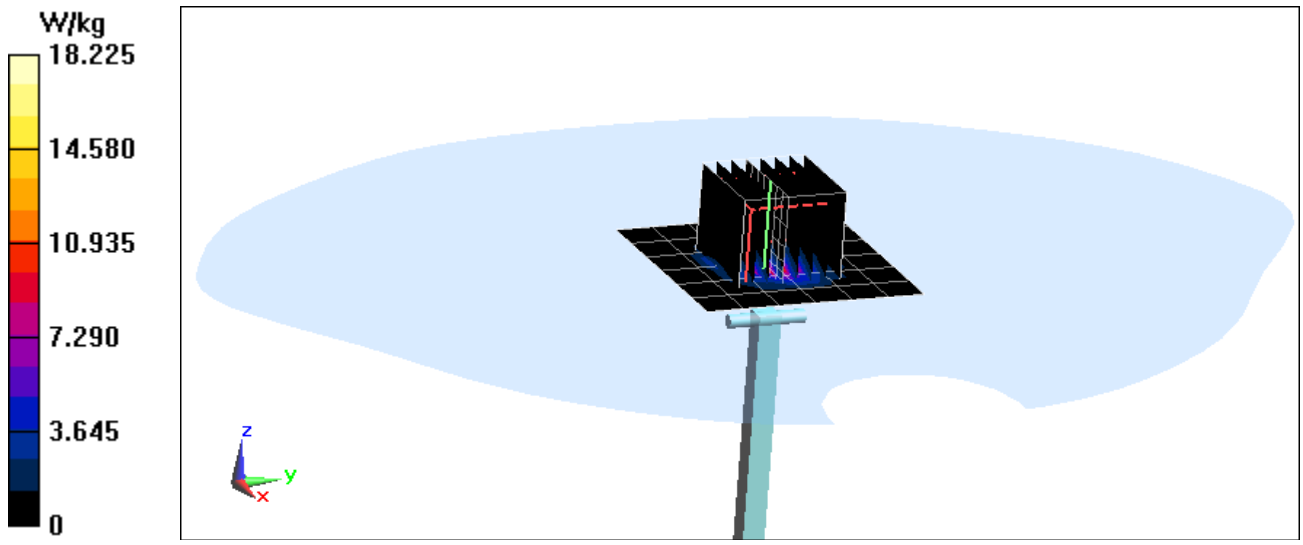
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5600 MHz; σ = 4.868 S/m; ε_r = 35.514; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.7°C

Probe: EX3DV4 - SN3914; ConvF(4.37, 4.37, 4.37); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5600 MHz System Verification

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 34.3 W/kg
SAR(1 g) = 7.69 W/kg
Deviation = -7.90%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1057

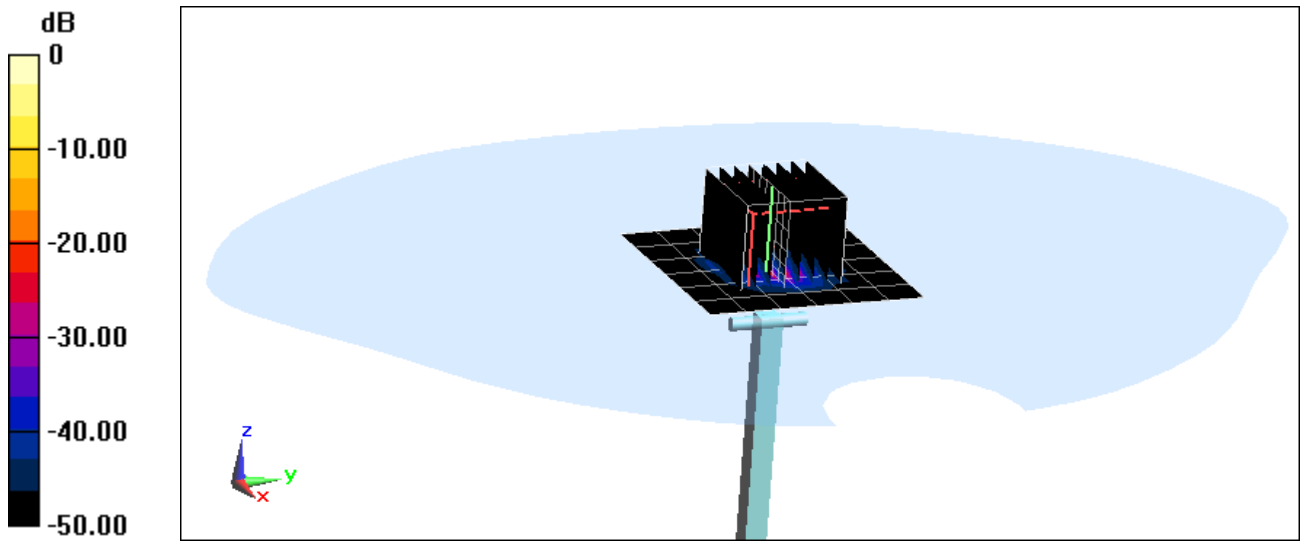
Communication System: UID 0, CW; Frequency: 5800 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5800 MHz; σ = 5.067 S/m; ε_r = 35.278; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3914; ConvF(4.52, 4.52, 4.52); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5800 MHz System Verification

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 34.8 W/kg
SAR(1 g) = 7.48 W/kg
Deviation = -5.67%



PCTEST ENGINEERING LABORATORY, INC.

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

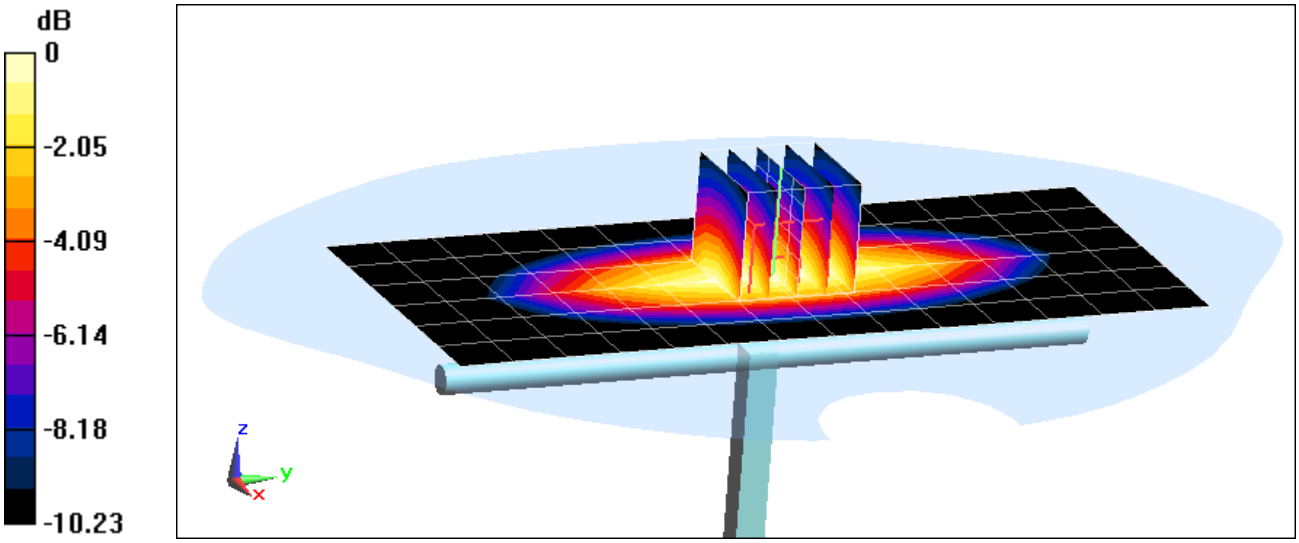
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body, Medium parameters used (interpolated):
f = 750 MHz; σ = 0.957 S/m; ε_r = 53.937; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 07-28-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3287; ConvF(6.09, 6.09, 6.09); Calibrated: 11/20/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 11/19/2013
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1797
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.32 W/kg
SAR(1 g) = 0.896 W/kg
Deviation = 2.17%



0 dB = 1.05 W/kg = 0.21 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d119

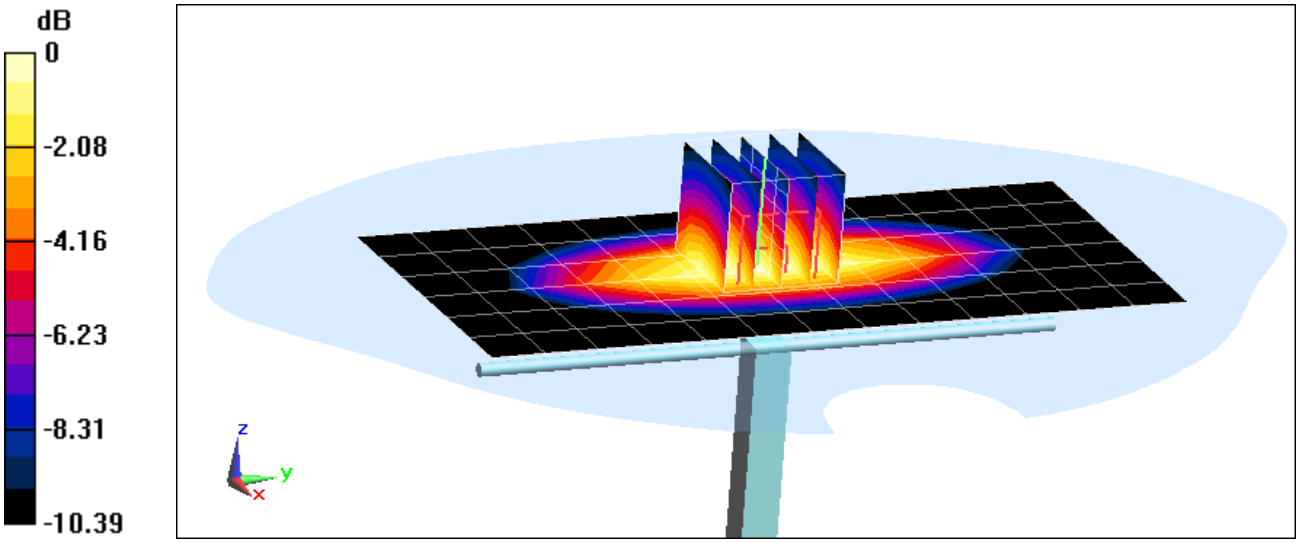
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body, Medium parameters used:
f = 835 MHz; σ = 1.007 S/m; ε_r = 53.195; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 07-21-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.2°C

Probe: ES3DV2 - SN3022; ConvF(5.91, 5.91, 5.91); Calibrated: 8/22/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.41 W/kg
SAR(1 g) = 0.972 W/kg
Deviation = 4.07%



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1051

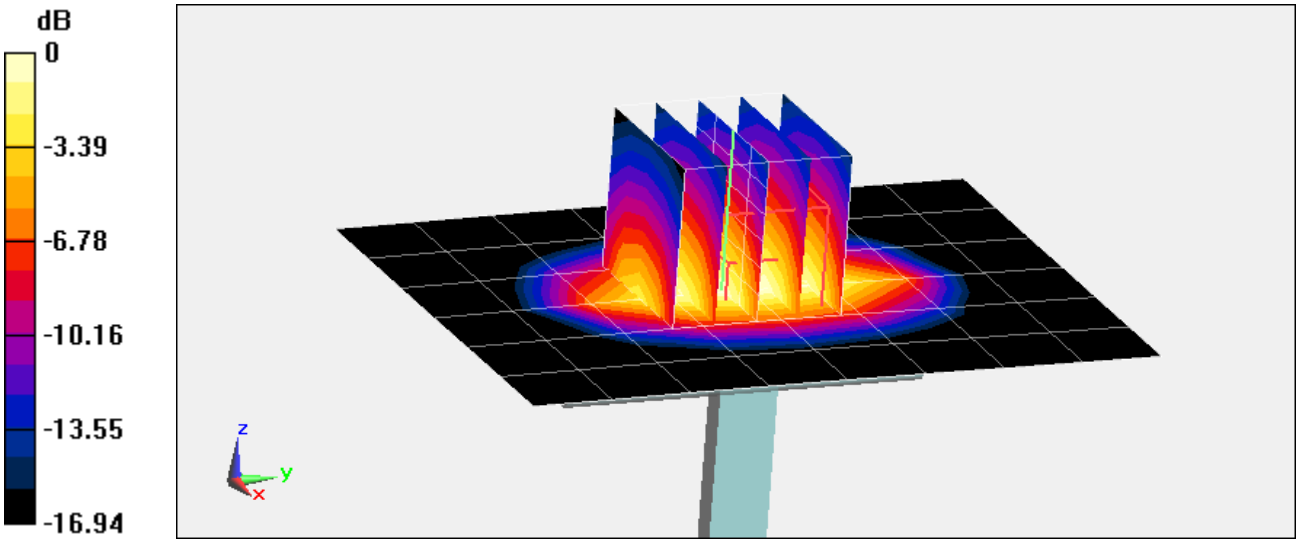
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body, Medium parameters used:
f = 1750 MHz; σ = 1.473 S/m; ε_r = 51.438; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-24-2014; Ambient Temp: 24.2°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3319; ConvF(4.85, 4.85, 4.85); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: ELI left; Type: QDOVA002AA; Serial: TP:1202
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 6.35 W/kg
SAR(1 g) = 3.76 W/kg
Deviation = 0.53%



0 dB = 4.53 W/kg = 6.56 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d141

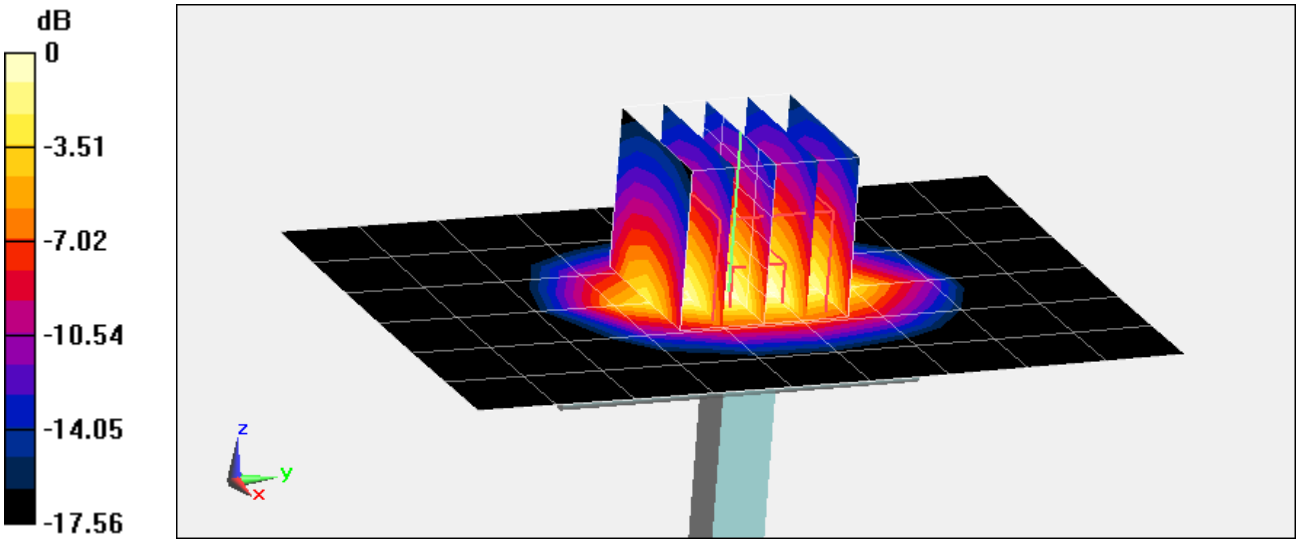
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body, Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.507 S/m; ε_r = 52.012; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-24-2014; Ambient Temp: 24.3°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 11/19/2013
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.18 W/kg
SAR(1 g) = 4.08 W/kg
Deviation = 0.49%



0 dB = 5.11 W/kg = 7.08 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 797

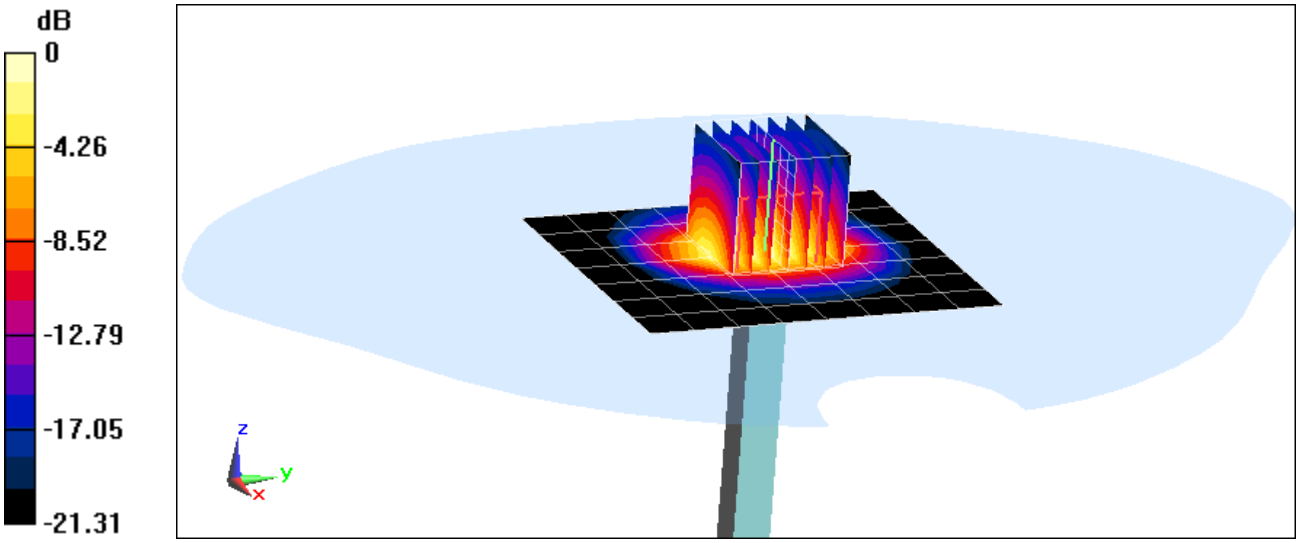
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body, Medium parameters used:
f = 2450 MHz; σ = 1.982 S/m; ε_r = 51.513; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-24-2014; Ambient Temp: 24.4°C; Tissue Temp: 23.2°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/22/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 10.2 W/kg
SAR(1 g) = 4.82 W/kg
Deviation = -2.43%



0 dB = 6.25 W/kg = 7.96 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 797

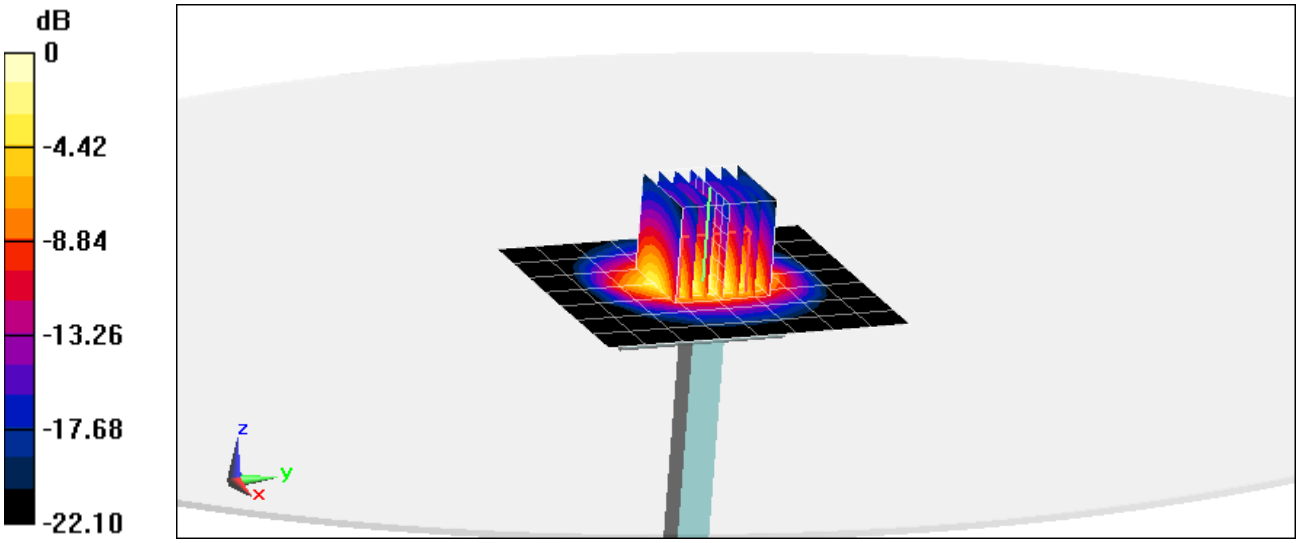
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body, Medium parameters used:
f = 2450 MHz; σ = 1.94 S/m; ε_r = 53.858; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2014; Ambient Temp: 24.3°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3319; ConvF(4.24, 4.24, 4.24); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: ELI left; Type: QDOVA002AA; Serial: TP:1202
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 10.1 W/kg
SAR(1 g) = 4.8 W/kg
Deviation = -2.83%



0 dB = 6.21 W/kg = 7.93 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5200 MHz; Type: D5GHzV2; Serial: 1007

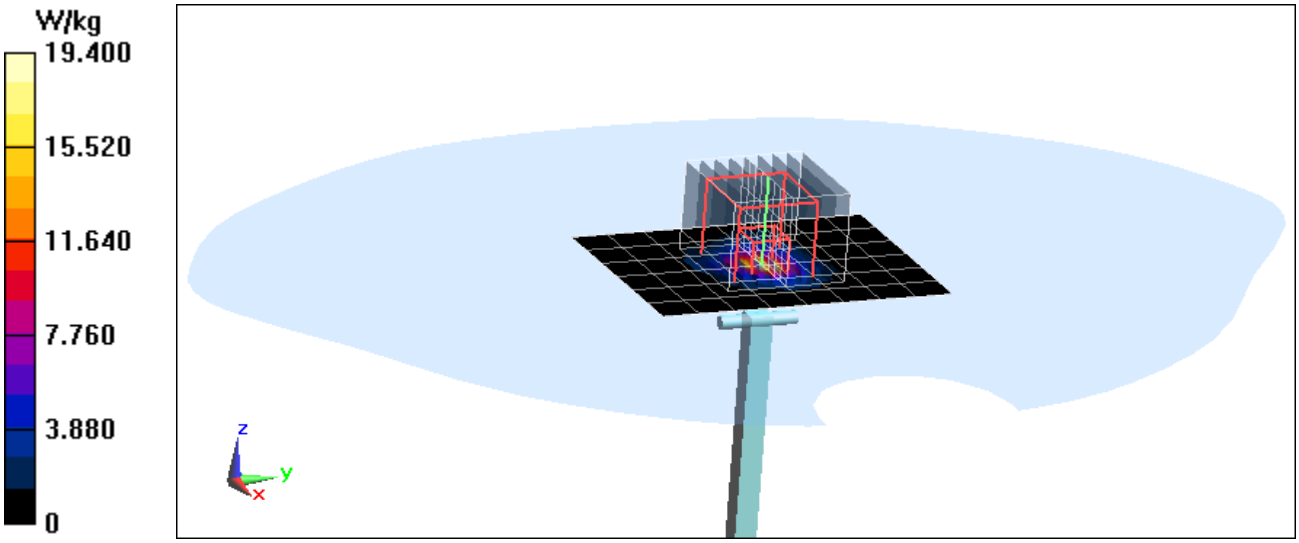
Communication System: UID 0, CW; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5200 MHz; σ = 5.265 S/m; ε_r = 48.007; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(4.23, 4.23, 4.23); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

5200 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 28.7 W/kg
SAR(1 g) = 7.73 W/kg
Deviation = 6.47%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5300 MHz; Type: D5GHzV2; Serial: 1007

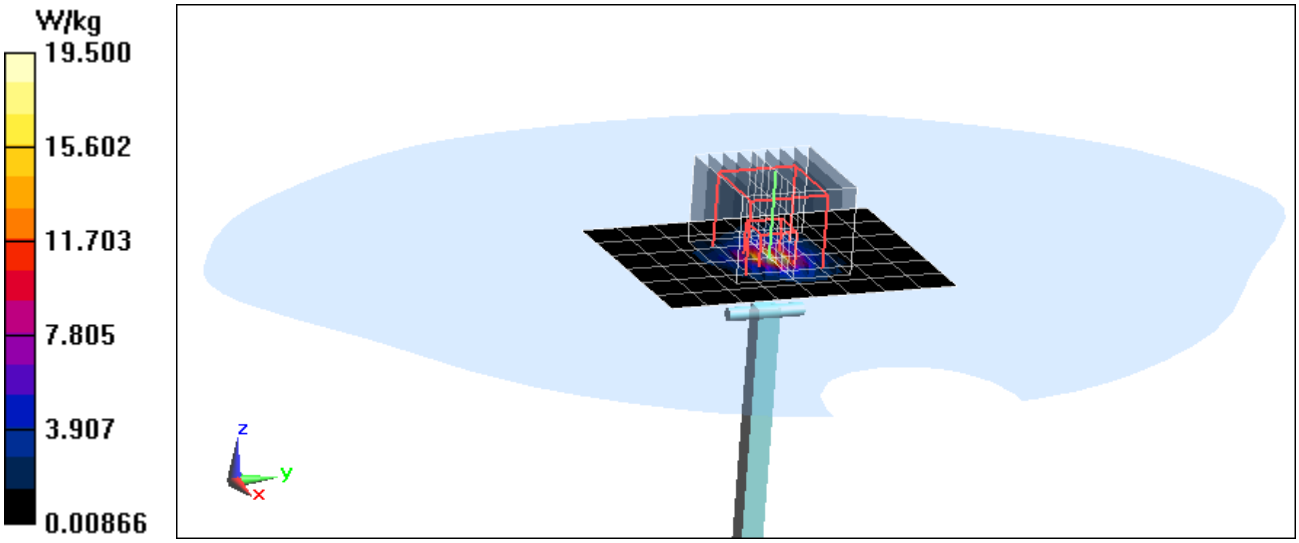
Communication System: UID 0, CW; Frequency: 5300 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5300 MHz; σ = 5.387 S/m; ε_r = 47.819; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.4°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(4.11, 4.11, 4.11); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

5300 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 29.8 W/kg
SAR(1 g) = 7.85 W/kg
Deviation = 5.09%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5500 MHz; Type: D5GHzV2; Serial: 1007

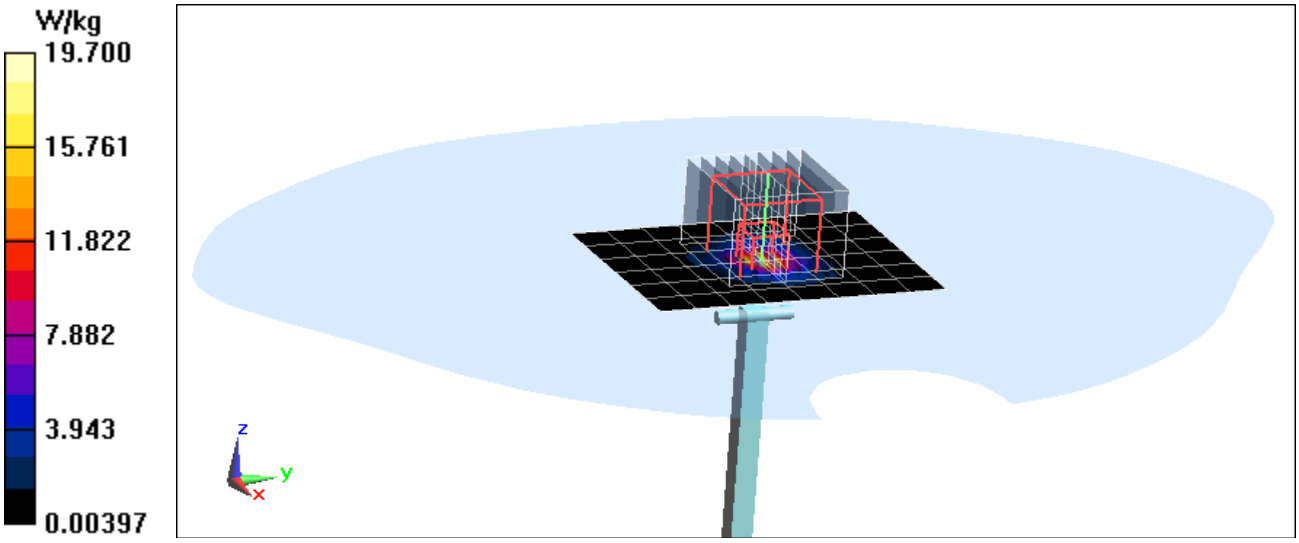
Communication System: UID 0, CW; Frequency: 5500 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5500 MHz; σ = 5.666 S/m; ε_r = 47.408; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.4°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(3.8, 3.8, 3.8); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

5500 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 33.2 W/kg
SAR(1 g) = 7.89 W/kg
Deviation = 3.95%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5600 MHz; Type: D5GHzV2; Serial: 1007

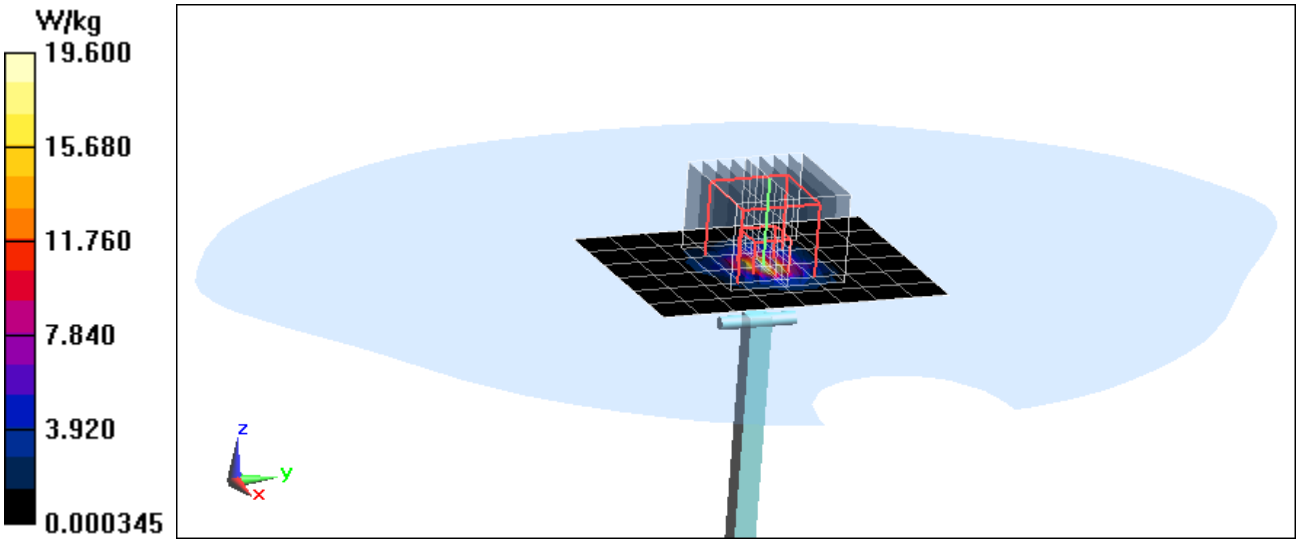
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5600 MHz; σ = 5.797 S/m; ε_r = 47.268; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.4°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(3.62, 3.62, 3.62); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

5600 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 34.0 W/kg
SAR(1 g) = 7.63 W/kg
Deviation = -1.29%



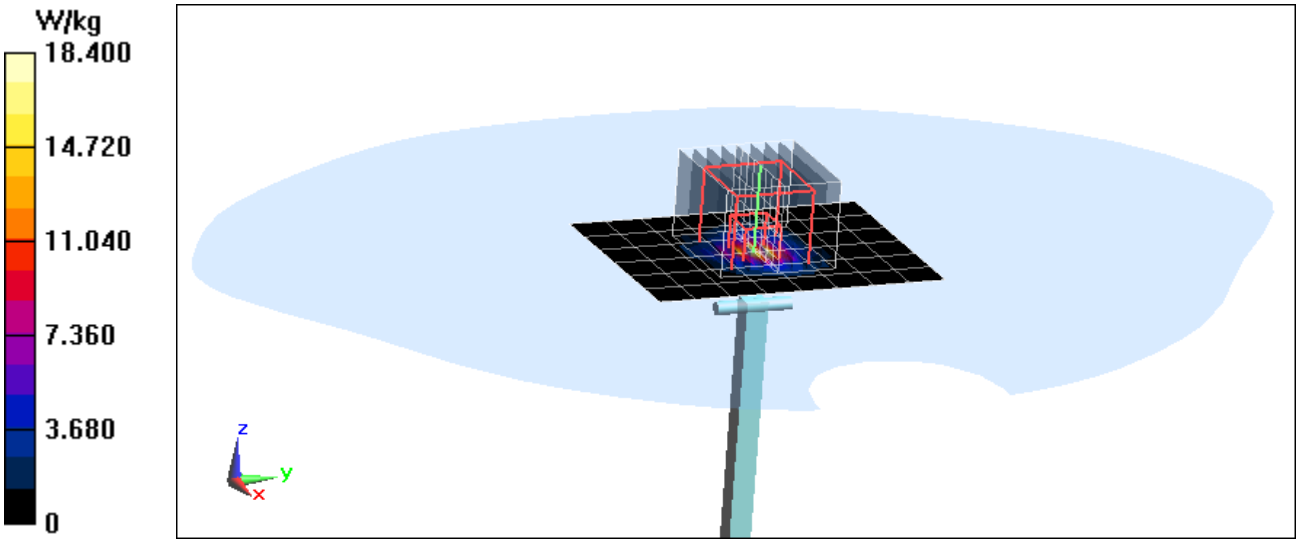
PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1007

Communication System: UID 0, CW; Frequency: 5800 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5800 MHz; σ = 6.048 S/m; ε_r = 47.032; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-28-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(4, 4, 4); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

5800 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 32.9 W/kg
SAR(1 g) = 7.18 W/kg
Deviation = -1.51%