



## SAR EVALUATION REPORT

**Applicant Name:**  
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**Date of Testing:**  
 12/29/14 - 01/12/15  
**Test Site/Location:**  
 PCTEST Lab, Columbia, MD, USA  
**Document Serial No.:**  
 0Y1412292335-R1.A3L

<b>FCC ID:</b>	<b>A3LSMG925KOR</b>
<b>APPLICANT:</b>	<b>SAMSUNG ELECTRONICS, CO. LTD.</b>

**DUT Type:** Portable Handset  
**Application Type:** Certification  
**FCC Rule Part(s):** CFR §2.1093  
**Model(s):** SM-G925S, SM-G925K, SM-G925L

Equipment Class	Band & Mode	Tx Frequency	SAR		
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
PCE	UMTS 850	826.40 - 846.60 MHz	0.22	0.23	0.36
PCE	GSM/GPRS 1900	1850.20 - 1909.80 MHz	< 0.1	0.60	1.07
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.16	0.69	1.09
PCE	LTE Band 17	706.5 - 713.5 MHz	< 0.1	0.11	0.11
PCE	LTE Band 26 (Cell)	814.7 - 848.3 MHz	0.21	0.41	0.41
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	0.14	0.80	1.08
DTS	2.4 GHz WLAN	2412 - 2462 MHz	0.53	< 0.1	< 0.1
NII	U-NII-1	5180 - 5240 MHz	N/A		
NII	U-NII-2A	5260 - 5320 MHz	0.55	< 0.1	
NII	U-NII-2C < 5.65 GHz	5500 - 5580 MHz	0.53	< 0.1	
NII	U-NII-2C > 5.65 GHz + U-NII-3	5660 - 5825 MHz	0.31	< 0.1	< 0.1
DSS/DTS	Bluetooth	2402 - 2480 MHz		N/A	
<b>Simultaneous SAR per KDB 690783 D01v01r03:</b>			0.95	1.07	1.14

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.

This revised Test Report (S/N: 0Y1412292335-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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





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# 1 DEVICE UNDER TEST

## 1.1 Device Overview



Band & Mode	Operating Modes	Tx Frequency
UMTS 850	Voice/Data	826.40 - 846.60 MHz
GSM/GPRS 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 17	Voice/Data	706.5 - 713.5 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 26 (Cell)	Voice/Data	814.7 - 848.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
2.4 GHz WLAN	Data	2412 - 2462 MHz
U-NII-1	Data	5180 - 5240 MHz
U-NII-2A	Data	5260 - 5320 MHz
U-NII-2C < 5.65 GHz	Data	5500 - 5580 MHz
U-NII-2C > 5.65 GHz + U-NII-3	Data	5660 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2402 - 2480 MHz
MST	Data	1 - 8.3 kHz

## 1.2 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v05.

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)	
		1 TX Slot	1 TX Slots	2 TX Slots
GSM/GPRS 1900	Maximum	<b>30.5</b>	<b>30.5</b>	<b>28.5</b>
	Nominal	<b>30.0</b>	<b>30.0</b>	<b>28.0</b>

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

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Mode / Band		Modulated Average (dBm)
LTE Band 17	Maximum	<b>23.5</b>
	Nominal	<b>23.0</b>
LTE Band 26/5 (Cell)	Maximum	<b>23.5</b>
	Nominal	<b>23.0</b>
LTE Band 2 (PCS)	Maximum	<b>23.0</b>
	Nominal	<b>22.5</b>



Single Transmission Chain WLAN

Mode / Band		Modulated Average (dBm)
IEEE 802.11b (2.4 GHz)	Maximum	<b>17.5</b>
	Nominal	<b>17.0</b>
IEEE 802.11g (2.4 GHz)	Maximum	<b>14.5</b>
	Nominal	<b>14.0</b>
IEEE 802.11n (2.4 GHz)	Maximum	<b>12.5</b>
	Nominal	<b>12.0</b>
Bluetooth	Maximum	<b>11.0</b>
	Nominal	<b>10.5</b>
Bluetooth LE	Maximum	<b>8.0</b>
	Nominal	<b>7.5</b>

Mode / Band		Modulated Average (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	<b>12.5</b>		
	Nominal	<b>12.0</b>		
IEEE 802.11n (5 GHz)	Maximum	<b>12.5</b>	<b>10.0</b>	
	Nominal	<b>12.0</b>	<b>9.5</b>	
IEEE 802.11ac (5 GHz)	Maximum	<b>10.5</b>	<b>10.0</b>	<b>10.0</b>
	Nominal	<b>10.0</b>	<b>9.5</b>	<b>9.5</b>

MIMO WLAN

Mode / Band		Modulated Average (dBm)		
IEEE 802.11n (2.4 GHz)	Maximum	<b>11.5</b>		
	Nominal	<b>11.0</b>		
Mode / Band		Modulated Average (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11n (5 GHz)	Maximum	<b>10.5</b>	<b>8.5</b>	
	Nominal	<b>10.0</b>	<b>8.0</b>	
IEEE 802.11ac (5 GHz)	Maximum	<b>8.5</b>	<b>8.5</b>	<b>8.5</b>
	Nominal	<b>8.0</b>	<b>8.0</b>	<b>8.0</b>

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### 1.3 DUT Antenna Locations

- A diagram showing the location of the device antennas can be found in Appendix F. Exact antenna dimensions and separation distances are shown in the Technical Descriptions in the FCC filing.
- The overall dimensions of this device are > 9 x 5 cm. The overall diagonal dimension of the device is <160 mm and the diagonal display is <150 mm.

**Table 1-1  
Mobile Hotspot Sides for SAR Testing**

Mode	Back	Front	Top	Bottom	Right	Left
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 26	Yes	Yes	No	Yes	Yes	Yes
LTE Band 2 (PCS)	Yes	Yes	No	Yes	Yes	Yes
2.4 GHz WLAN	Yes	Yes	Yes	No	No	Yes
U-NII-3	Yes	Yes	Yes	No	No	Yes

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 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, U-NII-1, U-NII-2A & U-NII-2C WLAN operations are disabled. Therefore U-NII-1, U-NII-2A & U-NII-2C WLAN operations are not considered in this section.

### 1.4 Near Field Communications (NFC) Antenna

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



### 1.5 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 1-1  
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.

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**Table 1-2  
Simultaneous Transmission Scenarios**

No.	Capable Transmit Configuration	Head	Body-Worn Accessory	Wireless Router
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
8	LTE + 5 GHz WI-FI	Yes	Yes	Yes
9	LTE + 2.4 GHz Bluetooth	N/A	Yes	N/A
10	GPRS + 2.4 GHz WI-FI	N/A	N/A	Yes
11	GPRS + 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 U-NII-3 Band by S/W, therefore U-NII1, U-NII-2A, & U-NII-2C 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.
7. This device supports VoLTE.

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## 1.6 Miscellaneous SAR Test Considerations

### (A) WIFI/BT

Since Wireless Router operations are not allowed by the chipset firmware using U-NII-1, U-NII-2A & U-NII-2C WIFI, only 2.4 GHz and UNII-3 WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v02.

Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg, SAR is not required for U-NII-1 band according to FCC KDB 248227 D01 DR02-41929.

Since this device supports the band gap channels, the channels in the U-NII-2C band above 5.65 GHz were grouped with the channels in the U-NII-3 as a single aggregate band. The channels in U-NII-2C below 5.65 GHz were considered separately for SAR evaluation.

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) Band gap channels are supported

Per FCC KDB 447498 D01v05, the 1g SAR exclusion threshold for distances <50mm is defined by the following equation:

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

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;  $[(13/10)^* \sqrt{2.480}] = 2.0 < 3.0$ . Per KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.



### (B) Licensed Transmitter(s)

GSM/GPRS DTM is not supported for US bands. Therefore, the GSM Voice modes in this report do not transmit simultaneously with GPRS 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 D01v03.

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 both LTE Band 5 (Cell) and LTE Band 26 (Cell). Since the supported frequency span for LTE Band 5 (Cell) falls completely within the supported frequency span for LTE Band 26 (Cell), both LTE bands have the same target power, and both LTE bands share the same transmission path, SAR was only assessed for LTE Band 26 (Cell).

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## 1.7 Power Reduction for SAR

There is no power reduction used for any band/mode implemented in this device for SAR purposes.



## 1.8 Guidance Applied

- IEEE 1528-2003
- FCC KDB Publication 941225 D01v03, D05v02r03, D06v01r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01 DR02-41929 (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)
- 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.



	Head Serial Number	Body-Worn Serial Number	Hotspot Serial Number
UMTS 850	0496B	0496B	0496B
GSM/GPRS 1900	04309	04309	04309
UMTS 1900	04309	04309	04309
LTE Band 17	02FA5	02FA5	02FA5
LTE Band 26 (Cell)	0496B	0496B	0496B
LTE Band 2 (PCS)	02FA5	04309	04309
2.4 GHz WLAN	04309	04309	04309
U-NII-2A & U-NII-2C	02FA5	02FA5	-
U-NII-3	02FA5	02FA5	02FA5

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## 2

## LTE INFORMATION

LTE Information			
<b>FCC ID</b>	<b>A3LSMG925KOR</b>		
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 26 (Cell) (814.7 - 848.3 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 26 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 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 26 (Cell): 1.4 MHz	814.7 (26697)	831.5 (26865)	848.3 (27033)
LTE Band 26 (Cell): 3 MHz	815.5 (26705)	831.5 (26865)	847.5 (27025)
LTE Band 26 (Cell): 5 MHz	816.5 (26715)	831.5 (26865)	846.5 (27015)
LTE Band 26 (Cell): 10 MHz	819 (26740)	831.5 (26865)	844 (26990)
LTE Band 26 (Cell): 15 MHz	831.5 (26865)	836.5 (26915)	841.5 (26965)
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	9		
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	Not Supported in the US		
LTE Carrier Aggregation Additional Information	This device does not support full LTE Release 10 operations in the US. The following LTE Release 10 Features are not supported in the US: Carrier Aggregation, Relay, HetNet, Enhanced MIMO, eICI, WFI 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<sup>3</sup>)
- 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]

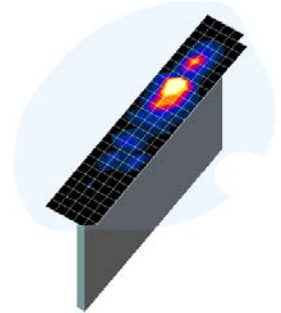
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## 4 DOSIMETRIC ASSESSMENT

### 4.1 Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01 and IEEE 1528-2013:

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.





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

**Table 4-1**  
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01\*

Frequency	Maximum Area Scan Resolution (mm) ( $\Delta x_{area}$ , $\Delta y_{area}$ )	Maximum Zoom Scan Resolution (mm) ( $\Delta x_{zoom}$ , $\Delta y_{zoom}$ )	Maximum Zoom Scan Spatial Resolution (mm)			Minimum Zoom Scan Volume (mm) (x,y,z)
			Uniform Grid $\Delta z_{zoom}(n)$	Graded Grid		
				$\Delta z_{zoom}(1)^*$	$\Delta z_{zoom}(n>1)^*$	
≤ 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

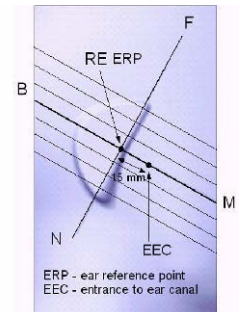
\*Also compliant to IEEE 1528-2013 Table 6

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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].



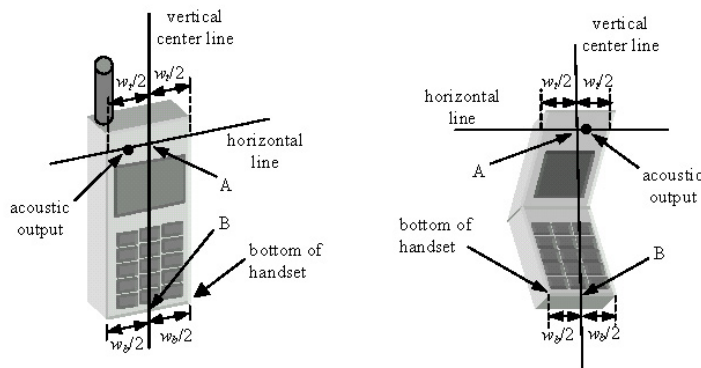
**Figure 5-1**  
Close-Up Side view of ERP

## 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 then 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  $\epsilon = 3$  and loss tangent  $\delta = 0.02$ .

### 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.

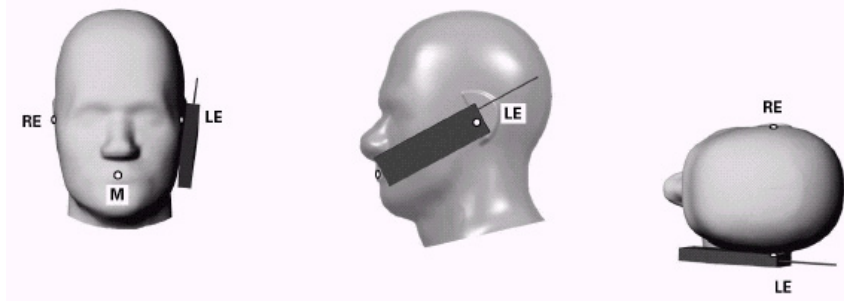




Figure 6-1 Front, Side and Top View of Cheek Position

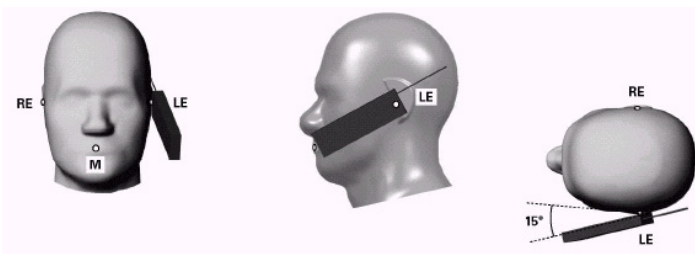
2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the pinna.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the reference plane.
4. The phone was then rotated around the vertical centerline until the phone (horizontal line) was symmetrical with 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 / 15° Tilt

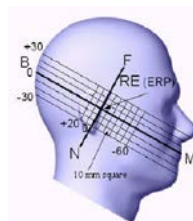
With the test device aligned in the “Cheek Position”:

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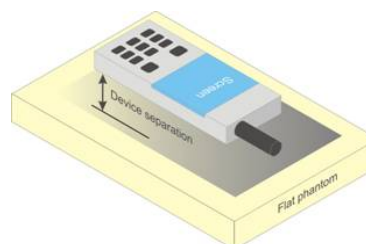
**Figure 6-2 Front, Side and Top View of Ear/15° Tilt Position**



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

## 6.4 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  $> 1.2 \text{ W/kg}$ , the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.



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

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

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

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## 6.5 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.

## 6.6 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 ( $L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$ ) 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 <i>General Population</i> (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT <i>Occupational</i> (W/kg) or (mW/g)
<b>Peak Spatial Average SAR</b> Head	1.6	8.0
<b>Whole Body SAR</b>	0.08	0.4
<b>Peak Spatial Average SAR</b> Hands, Feet, Ankle, Wrists, etc.	4.0	20

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

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## 8 FCC MEASUREMENT PROCEDURES

Power measurements were performed using a base station simulator under digital average power.

### 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 3G SAR Test Reduction Procedure

In FCC KDB Publication 941225 D01v03, certain transmission modes within a frequency band and wireless mode evaluated for SAR are defined as primary modes. The equivalent modes considered for SAR test reduction are denoted as secondary modes. When the maximum output power including tune-up tolerance specified for production units in a secondary mode is  $\leq 0.25$  dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is  $\leq 1.2$  W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

### 8.3 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01v03 “3G SAR Measurement Procedures.”

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

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## 8.4 SAR Measurement Conditions for UMTS

### 8.4.1 Output Power Verification

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

### 8.4.2 Head SAR Measurements

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

### 8.4.3 Body SAR Measurements

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



### 8.4.4 SAR Measurements for Handsets with Rel 5 HSDPA

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

### 8.4.5 SAR Measurements for Handsets with Rel 6 HSUPA

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

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

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## 8.5 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).

### 8.5.1 Spectrum Plots for RB Configurations

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

### 8.5.2 MPR

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



### 8.5.3 A-MPR

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

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

According to FCC KDB 941225 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  $\leq 0.8$  W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
  - iii. When the reported SAR for a required test channel is  $> 1.45$  W/kg, SAR is required for all RB offset configurations for that channel.
- b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
- c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is  $< 0.8$  W/kg.
- d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to  $\frac{1}{2}$  dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is  $< 1.45$  W/kg.

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## 8.6 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 D01v DR02-41929 for more details.

### 8.6.1 General Device Setup

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

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



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

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

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

The frequency range covered by U-NII-2C and U-NII-3 is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification.

Unless band gap channels are permanently disabled, SAR must be considered for these channels. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz are grouped with the 5.8 GHz channels in U-NII-3 band or §15.247 5.8 GHz band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels. When band gap channels are disabled, each band is tested independently according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

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### 8.6.4 Initial Test Position Procedure

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

### 8.6.5 2.4 GHz SAR Test Requirements



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

- 1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is  $\leq 0.8$  W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
- 2) When the reported SAR is  $> 0.8$  W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is  $> 1.2$  W/kg, SAR is required for the third channel; i.e., all channels require testing.

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

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

For the 2.4 GHz and 5 GHz bands, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

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### 8.6.7 Initial Test Configuration Procedure

For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output power is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.



When the reported SAR is  $\leq 0.8$  W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is  $\leq 1.2$  W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements (See Section 8.6.6)

### 8.6.8 Subsequent Test Configuration Procedures

For OFDM configurations, in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure, when applicable. When the highest reported SAR for the initial test configuration, adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power, is  $\leq 1.2$  W/kg, no additional SAR testing for the subsequent test configurations is required.

### 8.6.9 MIMO SAR considerations

Per KDB 248227 D01 DR02-41929, the simultaneous SAR provisions in KDB Publication 447498 should be applied to determine simultaneous transmission SAR test exclusion for WIFI MIMO. If the sum of 1g single transmission chain SAR measurements is  $< 1.6$  W/kg, no additional SAR measurements for MIMO are required. Alternatively, SAR for MIMO can be measured with all antennas transmitting simultaneously at the specified maximum output power of MIMO operation.

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# 9 RF CONDUCTED POWERS

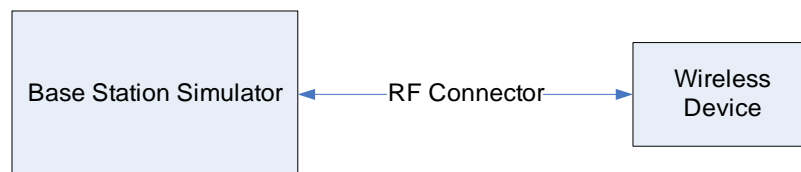
## 9.1 GSM Conducted Powers

		Maximum Burst-Averaged Output Power		
		Voice	GPRS Data (GMSK)	
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot
GSM 1900	512	29.67	29.73	28.50
	661	29.36	29.19	28.19
	810	29.13	29.17	27.84
		Calculated Maximum Frame-Averaged Output Power		
		Voice	GPRS Data (GMSK)	
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot
GSM 1900	512	20.64	20.70	22.48
	661	20.33	20.16	22.17
	810	20.10	20.14	21.82
GSM 1900	Frame Avg. Targets:	20.97	20.97	21.98



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. GPRS (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.

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



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

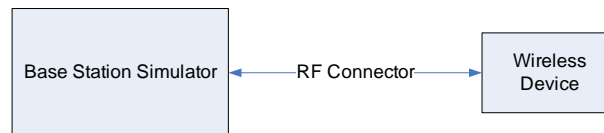
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## 9.2 UMTS Conducted Powers



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	22.65	22.59	22.40	22.74	22.75	22.74	-
99		12.2 kbps AMR	22.70	22.65	22.50	22.76	22.80	22.83	-
6	HSDPA	Subtest 1	22.76	22.56	22.76	22.76	22.73	22.57	0
6		Subtest 2	21.93	21.75	21.87	21.65	21.52	21.32	0
6		Subtest 3	21.00	20.84	20.99	21.08	20.94	20.81	0.5
6		Subtest 4	21.10	20.92	21.07	21.15	21.02	21.36	0.5
6	HSUPA	Subtest 1	21.89	21.75	21.92	21.92	21.87	22.10	0
6		Subtest 2	18.52	18.50	18.57	18.79	18.77	18.82	2
6		Subtest 3	21.16	21.00	21.12	21.14	21.03	21.31	1
6		Subtest 4	18.51	18.50	18.65	18.58	18.51	18.50	2
6		Subtest 5	22.13	21.92	22.02	22.04	21.98	22.30	0

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	22.72	0	0
	710.0	23790	10	QPSK	1	25	<b>22.87</b>	0	0
	710.0	23790	10	QPSK	1	49	22.51	0	0
	710.0	23790	10	QPSK	25	0	<b>21.84</b>	0-1	1
	710.0	23790	10	QPSK	25	12	21.77	0-1	1
	710.0	23790	10	QPSK	25	25	21.69	0-1	1
	710.0	23790	10	QPSK	50	0	21.83	0-1	1
	710.0	23790	10	16QAM	1	0	21.99	0-1	1
	710.0	23790	10	16QAM	1	25	22.09	0-1	1
	710.0	23790	10	16QAM	1	49	21.65	0-1	1
	710.0	23790	10	16QAM	25	0	20.76	0-2	2
	710.0	23790	10	16QAM	25	12	20.74	0-2	2
	710.0	23790	10	16QAM	25	25	20.73	0-2	2
	710.0	23790	10	16QAM	50	0	20.82	0-2	2

Note: LTE Band 17 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 9-2  
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	22.88	0	0
	710.0	23790	5	QPSK	1	12	23.16	0	0
	710.0	23790	5	QPSK	1	24	22.88	0	0
	710.0	23790	5	QPSK	12	0	21.64	0-1	1
	710.0	23790	5	QPSK	12	6	21.81	0-1	1
	710.0	23790	5	QPSK	12	13	22.04	0-1	1
	710.0	23790	5	QPSK	25	0	21.91	0-1	1
	710.0	23790	5	16-QAM	1	0	22.02	0-1	1
	710.0	23790	5	16-QAM	1	12	22.16	0-1	1
	710.0	23790	5	16-QAM	1	24	21.76	0-1	1
	710.0	23790	5	16-QAM	12	0	20.59	0-2	2
	710.0	23790	5	16-QAM	12	6	20.84	0-2	2
	710.0	23790	5	16-QAM	12	13	20.67	0-2	2
	710.0	23790	5	16-QAM	25	0	21.09	0-2	2

Note: LTE Band 17 at 5 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

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### 9.3.2

### LTE Band 26 (Cell)



**Table 9-3**  
**LTE Band 26 (Cell) 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]
Mid	836.5	26915	15	QPSK	1	0	22.91	0	0
	836.5	26915	15	QPSK	1	36	22.88	0	0
	836.5	26915	15	QPSK	1	74	22.84	0	0
	836.5	26915	15	QPSK	36	0	22.43	0-1	1
	836.5	26915	15	QPSK	36	18	21.74	0-1	1
	836.5	26915	15	QPSK	36	37	21.75	0-1	1
	836.5	26915	15	QPSK	75	0	21.85	0-1	1
	836.5	26915	15	16QAM	1	0	21.74	0-1	1
	836.5	26915	15	16QAM	1	36	21.79	0-1	1
	836.5	26915	15	16QAM	1	74	21.53	0-1	1
	836.5	26915	15	16QAM	36	0	20.83	0-2	2
	836.5	26915	15	16QAM	36	18	20.59	0-2	2
	836.5	26915	15	16QAM	36	37	20.71	0-2	2
	836.5	26915	15	16QAM	75	0	20.66	0-2	2

Note: LTE Band 26 at 15 MHz bandwidth is only supported for FCC Rule Part 22H. There are not three non-overlapping channels within FCC Rule Part 22H. 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 26 (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]
Low	819	26740	10	QPSK	1	0	22.52	0	0
	819	26740	10	QPSK	1	25	23.07	0	0
	819	26740	10	QPSK	1	49	22.65	0	0
	819	26740	10	QPSK	25	0	22.11	0-1	1
	819	26740	10	QPSK	25	12	21.60	0-1	1
	819	26740	10	QPSK	25	25	21.91	0-1	1
	819	26740	10	QPSK	50	0	21.52	0-1	1
	819	26740	10	16QAM	1	0	22.09	0-1	1
	819	26740	10	16QAM	1	25	22.03	0-1	1
	819	26740	10	16QAM	1	49	21.52	0-1	1
	819	26740	10	16QAM	25	0	20.58	0-2	2
	819	26740	10	16QAM	25	12	20.83	0-2	2
	819	26740	10	16QAM	25	25	20.66	0-2	2
	819	26740	10	16QAM	50	0	20.54	0-2	2
Mid	831.5	26865	10	QPSK	1	0	22.79	0	0
	831.5	26865	10	QPSK	1	25	22.79	0	0
	831.5	26865	10	QPSK	1	49	22.86	0	0
	831.5	26865	10	QPSK	25	0	22.01	0-1	1
	831.5	26865	10	QPSK	25	12	21.79	0-1	1
	831.5	26865	10	QPSK	25	25	21.93	0-1	1
	831.5	26865	10	QPSK	50	0	21.72	0-1	1
	831.5	26865	10	16QAM	1	0	21.83	0-1	1
	831.5	26865	10	16QAM	1	25	21.80	0-1	1
	831.5	26865	10	16QAM	1	49	21.56	0-1	1
	831.5	26865	10	16QAM	25	0	20.88	0-2	2
	831.5	26865	10	16QAM	25	12	20.53	0-2	2
	831.5	26865	10	16QAM	25	25	20.80	0-2	2
	831.5	26865	10	16QAM	50	0	20.57	0-2	2
High	844	26990	10	QPSK	1	0	22.82	0	0
	844	26990	10	QPSK	1	25	22.71	0	0
	844	26990	10	QPSK	1	49	23.10	0	0
	844	26990	10	QPSK	25	0	21.89	0-1	1
	844	26990	10	QPSK	25	12	21.75	0-1	1
	844	26990	10	QPSK	25	25	21.78	0-1	1
	844	26990	10	QPSK	50	0	21.60	0-1	1
	844	26990	10	16QAM	1	0	21.70	0-1	1
	844	26990	10	16QAM	1	25	21.64	0-1	1
	844	26990	10	16QAM	1	49	21.82	0-1	1
	844	26990	10	16QAM	25	0	20.94	0-2	2
	844	26990	10	16QAM	25	12	20.65	0-2	2
	844	26990	10	16QAM	25	25	20.94	0-2	2
	844	26990	10	16QAM	50	0	20.74	0-2	2

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**Table 9-5  
LTE Band 26 (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	816.5	26715	5	QPSK	1	0	22.86	0	0
	816.5	26715	5	QPSK	1	12	23.39	0	0
	816.5	26715	5	QPSK	1	24	22.97	0	0
	816.5	26715	5	QPSK	12	0	22.14	0-1	1
	816.5	26715	5	QPSK	12	6	21.92	0-1	1
	816.5	26715	5	QPSK	12	13	22.27	0-1	1
	816.5	26715	5	QPSK	25	0	21.71	0-1	1
	816.5	26715	5	16-QAM	1	0	22.42	0-1	1
	816.5	26715	5	16-QAM	1	12	22.19	0-1	1
	816.5	26715	5	16-QAM	1	24	21.69	0-1	1
	816.5	26715	5	16-QAM	12	0	20.75	0-2	2
	816.5	26715	5	16-QAM	12	6	20.90	0-2	2
Mid	831.5	26865	5	QPSK	12	13	20.72	0-2	2
	831.5	26865	5	16-QAM	25	0	20.82	0-2	2
	831.5	26865	5	QPSK	1	0	23.09	0	0
	831.5	26865	5	QPSK	1	12	22.83	0	0
	831.5	26865	5	QPSK	1	24	23.25	0	0
	831.5	26865	5	QPSK	12	0	22.13	0-1	1
	831.5	26865	5	QPSK	12	6	22.09	0-1	1
	831.5	26865	5	QPSK	12	13	21.90	0-1	1
	831.5	26865	5	QPSK	25	0	21.84	0-1	1
	831.5	26865	5	16-QAM	1	0	21.82	0-1	1
	831.5	26865	5	16-QAM	1	12	21.77	0-1	1
	831.5	26865	5	16-QAM	1	24	21.50	0-1	1
High	846.5	27015	5	16-QAM	12	0	20.79	0-2	2
	846.5	27015	5	16-QAM	12	6	20.72	0-2	2
	846.5	27015	5	16-QAM	12	13	21.18	0-2	2
	846.5	27015	5	16-QAM	25	0	20.68	0-2	2
	846.5	27015	5	QPSK	1	0	22.77	0	0
	846.5	27015	5	QPSK	1	12	22.76	0	0
	846.5	27015	5	QPSK	1	24	23.03	0	0
	846.5	27015	5	QPSK	12	0	22.07	0-1	1
	846.5	27015	5	QPSK	12	6	21.84	0-1	1
	846.5	27015	5	QPSK	12	13	22.15	0-1	1
	846.5	27015	5	QPSK	25	0	21.76	0-1	1
	846.5	27015	5	16-QAM	1	0	21.87	0-1	1
846.5	27015	5	16-QAM	1	12	21.95	0-1	1	
846.5	27015	5	16-QAM	1	24	21.94	0-1	1	
846.5	27015	5	16-QAM	12	0	21.28	0-2	2	
846.5	27015	5	16-QAM	12	6	20.60	0-2	2	
846.5	27015	5	16-QAM	12	13	21.02	0-2	2	
846.5	27015	5	16-QAM	25	0	20.78	0-2	2	

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**Table 9-6  
LTE Band 26 (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	815.5	26705	3	QPSK	1	0	22.68	0	0
	815.5	26705	3	QPSK	1	7	23.40	0	0
	815.5	26705	3	QPSK	1	14	23.02	0	0
	815.5	26705	3	QPSK	8	0	22.01	0-1	1
	815.5	26705	3	QPSK	8	4	22.08	0-1	1
	815.5	26705	3	QPSK	8	7	22.41	0-1	1
	815.5	26705	3	QPSK	15	0	21.55	0-1	1
	815.5	26705	3	16-QAM	1	0	22.01	0-1	1
	815.5	26705	3	16-QAM	1	7	22.35	0-1	1
	815.5	26705	3	16-QAM	1	14	21.71	0-1	1
	815.5	26705	3	16-QAM	8	0	20.74	0-2	2
	815.5	26705	3	16-QAM	8	4	21.04	0-2	2
815.5	26705	3	16-QAM	8	7	20.61	0-2	2	
815.5	26705	3	16-QAM	15	0	20.63	0-2	2	
Mid	831.5	26865	3	QPSK	1	0	23.23	0	0
	831.5	26865	3	QPSK	1	7	22.90	0	0
	831.5	26865	3	QPSK	1	14	23.27	0	0
	831.5	26865	3	QPSK	8	0	22.15	0-1	1
	831.5	26865	3	QPSK	8	4	22.26	0-1	1
	831.5	26865	3	QPSK	8	7	22.00	0-1	1
	831.5	26865	3	QPSK	15	0	21.88	0-1	1
	831.5	26865	3	16-QAM	1	0	21.98	0-1	1
	831.5	26865	3	16-QAM	1	7	21.62	0-1	1
	831.5	26865	3	16-QAM	1	14	21.64	0-1	1
	831.5	26865	3	16-QAM	8	0	20.59	0-2	2
	831.5	26865	3	16-QAM	8	4	20.70	0-2	2
831.5	26865	3	16-QAM	8	7	21.09	0-2	2	
831.5	26865	3	16-QAM	15	0	20.80	0-2	2	
High	847.5	27025	3	QPSK	1	0	22.95	0	0
	847.5	27025	3	QPSK	1	7	22.75	0	0
	847.5	27025	3	QPSK	1	14	23.13	0	0
	847.5	27025	3	QPSK	8	0	22.13	0-1	1
	847.5	27025	3	QPSK	8	4	21.89	0-1	1
	847.5	27025	3	QPSK	8	7	22.25	0-1	1
	847.5	27025	3	QPSK	15	0	21.72	0-1	1
	847.5	27025	3	16-QAM	1	0	21.79	0-1	1
	847.5	27025	3	16-QAM	1	7	21.87	0-1	1
	847.5	27025	3	16-QAM	1	14	21.93	0-1	1
	847.5	27025	3	16-QAM	8	0	21.11	0-2	2
	847.5	27025	3	16-QAM	8	4	20.59	0-2	2
847.5	27025	3	16-QAM	8	7	20.91	0-2	2	
847.5	27025	3	16-QAM	15	0	20.86	0-2	2	

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**Table 9-7  
LTE Band 26 (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	814.7	26697	1.4	QPSK	1	0	22.79	0	0
	814.7	26697	1.4	QPSK	1	2	23.40	0	0
	814.7	26697	1.4	QPSK	1	5	22.87	0	0
	814.7	26697	1.4	QPSK	3	0	22.72	0	0
	814.7	26697	1.4	QPSK	3	2	22.95	0	0
	814.7	26697	1.4	QPSK	3	3	22.98	0	0
	814.7	26697	1.4	QPSK	6	0	21.70	0-1	1
	814.7	26697	1.4	16-QAM	1	0	21.74	0-1	1
	814.7	26697	1.4	16-QAM	1	2	22.45	0-1	1
	814.7	26697	1.4	16-QAM	1	5	21.57	0-1	1
	814.7	26697	1.4	16-QAM	3	0	21.62	0-1	1
	814.7	26697	1.4	16-QAM	3	2	21.95	0-1	1
Mid	831.5	26865	1.4	QPSK	3	3	21.65	0-1	1
	831.5	26865	1.4	QPSK	6	0	20.84	0-2	2
	831.5	26865	1.4	QPSK	1	0	23.40	0	0
	831.5	26865	1.4	QPSK	1	2	22.77	0	0
	831.5	26865	1.4	QPSK	1	5	23.18	0	0
	831.5	26865	1.4	QPSK	3	0	23.37	0	0
	831.5	26865	1.4	QPSK	3	2	23.24	0	0
	831.5	26865	1.4	QPSK	3	3	23.11	0	0
	831.5	26865	1.4	QPSK	6	0	21.62	0-1	1
	831.5	26865	1.4	16-QAM	1	0	21.98	0-1	1
	831.5	26865	1.4	16-QAM	1	2	21.78	0-1	1
	831.5	26865	1.4	16-QAM	1	5	21.68	0-1	1
High	848.3	27033	1.4	16-QAM	3	0	21.79	0-1	1
	848.3	27033	1.4	16-QAM	3	2	21.64	0-1	1
	848.3	27033	1.4	16-QAM	3	3	21.98	0-1	1
	848.3	27033	1.4	16-QAM	6	0	20.85	0-2	2
	848.3	27033	1.4	QPSK	1	0	22.86	0	0
	848.3	27033	1.4	QPSK	1	2	22.79	0	0
	848.3	27033	1.4	QPSK	1	5	23.15	0	0
	848.3	27033	1.4	QPSK	3	0	22.95	0	0
	848.3	27033	1.4	QPSK	3	2	23.03	0	0
	848.3	27033	1.4	QPSK	3	3	22.95	0	0
	848.3	27033	1.4	QPSK	6	0	21.65	0-1	1
	848.3	27033	1.4	16-QAM	1	0	21.60	0-1	1
848.3	27033	1.4	16-QAM	1	2	22.16	0-1	1	
848.3	27033	1.4	16-QAM	1	5	22.15	0-1	1	
848.3	27033	1.4	16-QAM	3	0	22.26	0-1	1	
848.3	27033	1.4	16-QAM	3	2	21.83	0-1	1	
848.3	27033	1.4	16-QAM	3	3	22.01	0-1	1	
848.3	27033	1.4	16-QAM	6	0	20.81	0-2	2	

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### 9.3.3

### LTE Band 2 (PCS)

Table 9-8



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	22.49	0	0
	1860	18700	20	QPSK	1	50	22.79	0	0
	1860	18700	20	QPSK	1	99	22.45	0	0
	1860	18700	20	QPSK	50	0	21.64	0-1	1
	1860	18700	20	QPSK	50	25	21.58	0-1	1
	1860	18700	20	QPSK	50	50	21.61	0-1	1
	1860	18700	20	QPSK	100	0	21.54	0-1	1
	1860	18700	20	16QAM	1	0	21.94	0-1	1
	1860	18700	20	16QAM	1	50	21.98	0-1	1
	1860	18700	20	16QAM	1	99	21.95	0-1	1
	1860	18700	20	16QAM	50	0	20.53	0-2	2
	1860	18700	20	16QAM	50	25	20.53	0-2	2
Mid	1880.0	18900	20	QPSK	1	0	22.59	0	0
	1880.0	18900	20	QPSK	1	50	22.50	0	0
	1880.0	18900	20	QPSK	1	99	22.42	0	0
	1880.0	18900	20	QPSK	50	0	21.57	0-1	1
	1880.0	18900	20	QPSK	50	25	21.63	0-1	1
	1880.0	18900	20	QPSK	50	50	21.56	0-1	1
	1880.0	18900	20	QPSK	100	0	21.60	0-1	1
	1880.0	18900	20	16QAM	1	0	21.97	0-1	1
	1880.0	18900	20	16QAM	1	50	22.00	0-1	1
	1880.0	18900	20	16QAM	1	99	21.94	0-1	1
	1880.0	18900	20	16QAM	50	0	20.60	0-2	2
	1880.0	18900	20	16QAM	50	25	20.51	0-2	2
High	1900	19100	20	QPSK	1	0	22.54	0	0
	1900	19100	20	QPSK	1	50	22.57	0	0
	1900	19100	20	QPSK	1	99	22.48	0	0
	1900	19100	20	QPSK	50	0	21.60	0-1	1
	1900	19100	20	QPSK	50	25	21.57	0-1	1
	1900	19100	20	QPSK	50	50	21.51	0-1	1
	1900	19100	20	QPSK	100	0	21.51	0-1	1
	1900	19100	20	16QAM	1	0	21.81	0-1	1
	1900	19100	20	16QAM	1	50	21.91	0-1	1
	1900	19100	20	16QAM	1	99	21.89	0-1	1
	1900	19100	20	16QAM	50	0	20.56	0-2	2
	1900	19100	20	16QAM	50	25	20.53	0-2	2
1900	19100	20	16QAM	50	50	20.52	0-2	2	
1900	19100	20	16QAM	100	0	20.50	0-2	2	

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**Table 9-9  
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	22.57	0	0
	1857.5	18675	15	QPSK	1	36	22.49	0	0
	1857.5	18675	15	QPSK	1	74	22.54	0	0
	1857.5	18675	15	QPSK	36	0	21.79	0-1	1
	1857.5	18675	15	QPSK	36	18	21.75	0-1	1
	1857.5	18675	15	QPSK	36	37	21.75	0-1	1
	1857.5	18675	15	QPSK	75	0	21.59	0-1	1
	1857.5	18675	15	16QAM	1	0	22.00	0-1	1
	1857.5	18675	15	16QAM	1	36	21.90	0-1	1
	1857.5	18675	15	16QAM	1	74	21.86	0-1	1
	1857.5	18675	15	16QAM	36	0	20.39	0-2	2
	1857.5	18675	15	16QAM	36	18	20.54	0-2	2
1857.5	18675	15	16QAM	36	37	20.39	0-2	2	
1857.5	18675	15	16QAM	75	0	20.51	0-2	2	
Mid	1880.0	18900	15	QPSK	1	0	22.40	0	0
	1880.0	18900	15	QPSK	1	36	22.40	0	0
	1880.0	18900	15	QPSK	1	74	22.33	0	0
	1880.0	18900	15	QPSK	36	0	21.67	0-1	1
	1880.0	18900	15	QPSK	36	18	21.53	0-1	1
	1880.0	18900	15	QPSK	36	37	21.40	0-1	1
	1880.0	18900	15	QPSK	75	0	21.54	0-1	1
	1880.0	18900	15	16QAM	1	0	21.86	0-1	1
	1880.0	18900	15	16QAM	1	36	21.99	0-1	1
	1880.0	18900	15	16QAM	1	74	21.91	0-1	1
	1880.0	18900	15	16QAM	36	0	20.76	0-2	2
	1880.0	18900	15	16QAM	36	18	20.64	0-2	2
1880.0	18900	15	16QAM	36	37	20.32	0-2	2	
1880.0	18900	15	16QAM	75	0	20.34	0-2	2	
High	1902.5	19125	15	QPSK	1	0	22.54	0	0
	1902.5	19125	15	QPSK	1	36	22.73	0	0
	1902.5	19125	15	QPSK	1	74	22.44	0	0
	1902.5	19125	15	QPSK	36	0	21.80	0-1	1
	1902.5	19125	15	QPSK	36	18	21.51	0-1	1
	1902.5	19125	15	QPSK	36	37	21.70	0-1	1
	1902.5	19125	15	QPSK	75	0	21.34	0-1	1
	1902.5	19125	15	16QAM	1	0	21.82	0-1	1
	1902.5	19125	15	16QAM	1	36	21.74	0-1	1
	1902.5	19125	15	16QAM	1	74	21.81	0-1	1
	1902.5	19125	15	16QAM	36	0	20.37	0-2	2
	1902.5	19125	15	16QAM	36	18	20.54	0-2	2
1902.5	19125	15	16QAM	36	37	20.51	0-2	2	
1902.5	19125	15	16QAM	75	0	20.45	0-2	2	

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**Table 9-10**  
**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	22.81	0	0
	1855	18650	10	QPSK	1	25	22.52	0	0
	1855	18650	10	QPSK	1	49	22.70	0	0
	1855	18650	10	QPSK	25	0	21.82	0-1	1
	1855	18650	10	QPSK	25	12	21.75	0-1	1
	1855	18650	10	QPSK	25	25	21.38	0-1	1
	1855	18650	10	QPSK	50	0	21.37	0-1	1
	1855	18650	10	16QAM	1	0	21.88	0-1	1
	1855	18650	10	16QAM	1	25	21.88	0-1	1
	1855	18650	10	16QAM	1	49	21.74	0-1	1
	1855	18650	10	16QAM	25	0	20.42	0-2	2
	1855	18650	10	16QAM	25	12	20.49	0-2	2
Mid	1880.0	18900	10	QPSK	1	0	22.63	0	0
	1880.0	18900	10	QPSK	1	25	22.68	0	0
	1880.0	18900	10	QPSK	1	49	22.60	0	0
	1880.0	18900	10	QPSK	25	0	21.62	0-1	1
	1880.0	18900	10	QPSK	25	12	21.56	0-1	1
	1880.0	18900	10	QPSK	25	25	21.48	0-1	1
	1880.0	18900	10	QPSK	50	0	21.50	0-1	1
	1880.0	18900	10	16QAM	1	0	21.96	0-1	1
	1880.0	18900	10	16QAM	1	25	21.97	0-1	1
	1880.0	18900	10	16QAM	1	49	21.92	0-1	1
	1880.0	18900	10	16QAM	25	0	20.61	0-2	2
	1880.0	18900	10	16QAM	25	12	20.62	0-2	2
High	1905	19150	10	QPSK	1	0	22.79	0	0
	1905	19150	10	QPSK	1	25	22.74	0	0
	1905	19150	10	QPSK	1	49	22.65	0	0
	1905	19150	10	QPSK	25	0	21.70	0-1	1
	1905	19150	10	QPSK	25	12	21.42	0-1	1
	1905	19150	10	QPSK	25	25	21.62	0-1	1
	1905	19150	10	QPSK	50	0	21.40	0-1	1
	1905	19150	10	16QAM	1	0	21.94	0-1	1
	1905	19150	10	16QAM	1	25	21.83	0-1	1
	1905	19150	10	16QAM	1	49	21.73	0-1	1
	1905	19150	10	16QAM	25	0	20.76	0-2	2
	1905	19150	10	16QAM	25	12	20.73	0-2	2
1905	19150	10	16QAM	25	25	20.72	0-2	2	
1905	19150	10	16QAM	50	0	20.49	0-2	2	

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**Table 9-11**  
**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	22.93	0	0
	1852.5	18625	5	QPSK	1	12	22.33	0	0
	1852.5	18625	5	QPSK	1	24	22.61	0	0
	1852.5	18625	5	QPSK	12	0	21.99	0-1	1
	1852.5	18625	5	QPSK	12	6	21.77	0-1	1
	1852.5	18625	5	QPSK	12	13	21.31	0-1	1
	1852.5	18625	5	QPSK	25	0	21.33	0-1	1
	1852.5	18625	5	16-QAM	1	0	21.83	0-1	1
	1852.5	18625	5	16-QAM	1	12	21.85	0-1	1
	1852.5	18625	5	16-QAM	1	24	21.72	0-1	1
	1852.5	18625	5	16-QAM	12	0	20.61	0-2	2
	1852.5	18625	5	16-QAM	12	6	20.61	0-2	2
Mid	1852.5	18625	5	16-QAM	12	13	20.72	0-2	2
	1852.5	18625	5	16-QAM	25	0	20.38	0-2	2
	1880.0	18900	5	QPSK	1	0	22.65	0	0
	1880.0	18900	5	QPSK	1	12	22.64	0	0
	1880.0	18900	5	QPSK	1	24	22.42	0	0
	1880.0	18900	5	QPSK	12	0	21.67	0-1	1
	1880.0	18900	5	QPSK	12	6	21.63	0-1	1
	1880.0	18900	5	QPSK	12	13	21.39	0-1	1
	1880.0	18900	5	QPSK	25	0	21.55	0-1	1
	1880.0	18900	5	16-QAM	1	0	21.86	0-1	1
	1880.0	18900	5	16-QAM	1	12	21.97	0-1	1
	1880.0	18900	5	16-QAM	1	24	21.96	0-1	1
High	1880.0	18900	5	16-QAM	12	0	20.54	0-2	2
	1880.0	18900	5	16-QAM	12	6	20.45	0-2	2
	1880.0	18900	5	16-QAM	12	13	20.64	0-2	2
	1880.0	18900	5	16-QAM	25	0	20.42	0-2	2
	1907.5	19175	5	QPSK	1	0	22.65	0	0
	1907.5	19175	5	QPSK	1	12	22.62	0	0
	1907.5	19175	5	QPSK	1	24	22.55	0	0
	1907.5	19175	5	QPSK	12	0	21.65	0-1	1
	1907.5	19175	5	QPSK	12	6	21.36	0-1	1
	1907.5	19175	5	QPSK	12	13	21.54	0-1	1
	1907.5	19175	5	QPSK	25	0	21.50	0-1	1
	1907.5	19175	5	16-QAM	1	0	21.75	0-1	1
1907.5	19175	5	16-QAM	1	12	21.91	0-1	1	
1907.5	19175	5	16-QAM	1	24	21.80	0-1	1	
1907.5	19175	5	16-QAM	12	0	20.66	0-2	2	
1907.5	19175	5	16-QAM	12	6	20.60	0-2	2	
1907.5	19175	5	16-QAM	12	13	20.60	0-2	2	
1907.5	19175	5	16-QAM	25	0	20.41	0-2	2	

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**Table 9-12**  
**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	22.72	0	0
	1851.5	18615	3	QPSK	1	7	22.34	0	0
	1851.5	18615	3	QPSK	1	14	22.71	0	0
	1851.5	18615	3	QPSK	8	0	21.90	0-1	1
	1851.5	18615	3	QPSK	8	4	21.59	0-1	1
	1851.5	18615	3	QPSK	8	7	21.44	0-1	1
	1851.5	18615	3	QPSK	15	0	21.35	0-1	1
	1851.5	18615	3	16-QAM	1	0	21.72	0-1	1
	1851.5	18615	3	16-QAM	1	7	21.57	0-1	1
	1851.5	18615	3	16-QAM	1	14	21.72	0-1	1
	1851.5	18615	3	16-QAM	8	0	20.60	0-2	2
	1851.5	18615	3	16-QAM	8	4	20.38	0-2	2
	1851.5	18615	3	16-QAM	8	7	20.68	0-2	2
	1851.5	18615	3	16-QAM	15	0	20.61	0-2	2
Mid	1880.0	18900	3	QPSK	1	0	22.61	0	0
	1880.0	18900	3	QPSK	1	7	22.60	0	0
	1880.0	18900	3	QPSK	1	14	22.34	0	0
	1880.0	18900	3	QPSK	8	0	21.46	0-1	1
	1880.0	18900	3	QPSK	8	4	21.62	0-1	1
	1880.0	18900	3	QPSK	8	7	21.38	0-1	1
	1880.0	18900	3	QPSK	15	0	21.71	0-1	1
	1880.0	18900	3	16-QAM	1	0	21.98	0-1	1
	1880.0	18900	3	16-QAM	1	7	21.99	0-1	1
	1880.0	18900	3	16-QAM	1	14	21.92	0-1	1
	1880.0	18900	3	16-QAM	8	0	20.59	0-2	2
	1880.0	18900	3	16-QAM	8	4	20.53	0-2	2
	1880.0	18900	3	16-QAM	8	7	20.37	0-2	2
	1880.0	18900	3	16-QAM	15	0	20.31	0-2	2
High	1908.5	19185	3	QPSK	1	0	22.58	0	0
	1908.5	19185	3	QPSK	1	7	22.52	0	0
	1908.5	19185	3	QPSK	1	14	22.64	0	0
	1908.5	19185	3	QPSK	8	0	21.35	0-1	1
	1908.5	19185	3	QPSK	8	4	21.53	0-1	1
	1908.5	19185	3	QPSK	8	7	21.30	0-1	1
	1908.5	19185	3	QPSK	15	0	21.53	0-1	1
	1908.5	19185	3	16-QAM	1	0	21.59	0-1	1
	1908.5	19185	3	16-QAM	1	7	21.67	0-1	1
	1908.5	19185	3	16-QAM	1	14	21.67	0-1	1
	1908.5	19185	3	16-QAM	8	0	20.41	0-2	2
	1908.5	19185	3	16-QAM	8	4	20.55	0-2	2
	1908.5	19185	3	16-QAM	8	7	20.67	0-2	2
	1908.5	19185	3	16-QAM	15	0	20.52	0-2	2

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**Table 9-13  
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	22.55	0	0
	1850.7	18607	1.4	QPSK	1	2	22.47	0	0
	1850.7	18607	1.4	QPSK	1	5	22.77	0	0
	1850.7	18607	1.4	QPSK	3	0	22.86	0	0
	1850.7	18607	1.4	QPSK	3	2	22.69	0	0
	1850.7	18607	1.4	QPSK	3	3	22.56	0	0
	1850.7	18607	1.4	QPSK	6	0	21.44	0-1	1
	1850.7	18607	1.4	16-QAM	1	0	21.57	0-1	1
	1850.7	18607	1.4	16-QAM	1	2	21.76	0-1	1
	1850.7	18607	1.4	16-QAM	1	5	21.89	0-1	1
	1850.7	18607	1.4	16-QAM	3	0	21.67	0-1	1
	1850.7	18607	1.4	16-QAM	3	2	21.37	0-1	1
Mid	1850.7	18607	1.4	16-QAM	3	3	21.62	0-1	1
	1850.7	18607	1.4	16-QAM	6	0	20.44	0-2	2
	1880.0	18900	1.4	QPSK	1	0	22.51	0	0
	1880.0	18900	1.4	QPSK	1	2	22.65	0	0
	1880.0	18900	1.4	QPSK	1	5	22.45	0	0
	1880.0	18900	1.4	QPSK	3	0	22.47	0	0
	1880.0	18900	1.4	QPSK	3	2	22.58	0	0
	1880.0	18900	1.4	QPSK	3	3	22.50	0	0
	1880.0	18900	1.4	QPSK	6	0	21.75	0-1	1
	1880.0	18900	1.4	16-QAM	1	0	21.96	0-1	1
	1880.0	18900	1.4	16-QAM	1	2	21.92	0-1	1
	1880.0	18900	1.4	16-QAM	1	5	21.74	0-1	1
High	1880.0	18900	1.4	16-QAM	3	0	21.55	0-1	1
	1880.0	18900	1.4	16-QAM	3	2	21.71	0-1	1
	1880.0	18900	1.4	16-QAM	3	3	21.39	0-1	1
	1880.0	18900	1.4	16-QAM	6	0	20.35	0-2	2
	1909.3	19193	1.4	QPSK	1	0	22.54	0	0
	1909.3	19193	1.4	QPSK	1	2	22.33	0	0
	1909.3	19193	1.4	QPSK	1	5	22.77	0	0
	1909.3	19193	1.4	QPSK	3	0	22.42	0	0
	1909.3	19193	1.4	QPSK	3	2	22.56	0	0
	1909.3	19193	1.4	QPSK	3	3	22.38	0	0
	1909.3	19193	1.4	QPSK	6	0	21.42	0-1	1
	1909.3	19193	1.4	16-QAM	1	0	21.44	0-1	1
1909.3	19193	1.4	16-QAM	1	2	21.47	0-1	1	
1909.3	19193	1.4	16-QAM	1	5	21.73	0-1	1	
1909.3	19193	1.4	16-QAM	3	0	21.59	0-1	1	
1909.3	19193	1.4	16-QAM	3	2	21.65	0-1	1	
1909.3	19193	1.4	16-QAM	3	3	21.74	0-1	1	
1909.3	19193	1.4	16-QAM	6	0	20.71	0-2	2	

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## 9.4 WLAN Conducted Powers

**Table 9-14**  
**2.4 GHz Average RF Power – Antenna 1**



Freq [MHz]	Channel	2.4GHz Conducted Power [dBm]	
		IEEE Transmission Mode	
		802.11b	
2412	1	16.38	
2437	6	16.74	
2462	11	16.81	

**Table 9-15**  
**2.4 GHz Average RF Power – Antenna 2**

Freq [MHz]	Channel	2.4GHz Conducted Power [dBm]	
		IEEE Transmission Mode	
		802.11b	
2412	1	16.49	
2437	6	16.79	
2462	11	16.50	

**Table 9-16**  
**5 GHz (20 MHz Bandwidth) Average RF Power – Antenna 1**

Freq [MHz]	Channel	5GHz (20MHz) Conducted Power [dBm]	
		IEEE Transmission Mode	
		802.11a	802.11n
5180	36	12.18	11.63
5200	40	12.17	11.56
5220	44	12.23	11.48
5240	48	12.24	11.52
5260	52	11.40	11.50
5280	56	11.67	11.61
5300	60	11.70	11.59
5320	64	11.78	11.49
5500	100	11.84	11.57
5540	108	11.69	11.45
5580	116	11.39	11.29
5660	132	11.32	11.16
5745	149	11.40	11.23
5825	165	11.16	11.20

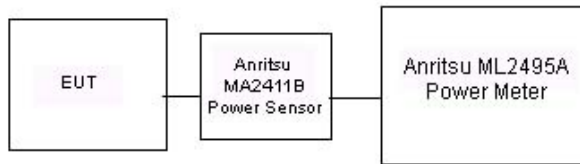
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**Table 9-17**  
**5 GHz (20 MHz Bandwidth) Average RF Power – Antenna 2**

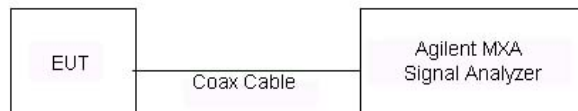
Freq [MHz]	Channel	5GHz (20MHz) Conducted Power [dBm]	
		IEEE Transmission Mode	
		802.11a	802.11n
5180	36	12.05	12.05
5200	40	12.02	11.97
5220	44	12.03	12.03
5240	48	11.95	11.90
5260	52	12.08	12.07
5280	56	12.06	12.00
5300	60	<b>12.16</b>	11.93
5320	64	11.96	11.96
5500	100	11.44	11.45
5540	108	<b>11.82</b>	11.69
5580	116	11.33	11.44
5660	132	11.63	11.66
5745	149	11.80	11.78
5825	165	12.22	<b>12.27</b>

Justification for test configurations for WLAN per KDB Publication 248227 D01DR02-41929:



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



**Figure 9-3**  
**Power Measurement Setup for Bandwidths < 50 MHz**



**Figure 9-4**  
**Power Measurement Setup for Bandwidths > 50 MHz**

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# 10 SYSTEM VERIFICATION

## 10.1 Tissue Verification

**Table 10-1  
Measured Tissue Properties**

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, $\sigma$ (S/m)	Measured Dielectric Constant, $\epsilon$	TARGET Conductivity, $\sigma$ (S/m)	TARGET Dielectric Constant, $\epsilon$	% dev $\sigma$	% dev $\epsilon$
12/31/2014	750H	23.4	710	0.888	42.586	0.890	42.149	-0.22%	1.04%
			725	0.901	42.401	0.891	42.071	1.12%	0.78%
			740	0.916	42.250	0.893	41.994	2.58%	0.61%
			755	0.931	42.057	0.894	41.916	4.14%	0.34%
01/02/2015	835H	22.5	820	0.924	43.602	0.899	41.578	2.78%	4.87%
			835	0.939	43.405	0.900	41.500	4.33%	4.59%
			850	0.953	43.249	0.916	41.500	4.04%	4.21%
01/05/2015	1900H	23.1	1850	1.344	39.441	1.400	40.000	-4.00%	-1.40%
			1880	1.374	39.346	1.400	40.000	-1.86%	-1.64%
			1910	1.403	39.238	1.400	40.000	0.21%	-1.91%
12/31/2014	2450H	22.1	2401	1.732	38.648	1.756	39.287	-1.37%	-1.63%
			2450	1.771	38.468	1.800	39.200	-1.61%	-1.87%
			2499	1.825	38.328	1.853	39.138	-1.51%	-2.07%
			5300	4.912	37.146	4.758	35.871	3.24%	3.55%
01/12/2015	5200H-5800H	18.7	5320	4.937	37.110	4.778	35.849	3.33%	3.52%
			5500	5.124	36.806	4.963	35.643	3.24%	3.26%
			5540	5.172	36.771	5.004	35.597	3.36%	3.30%
			5745	5.398	36.426	5.214	35.363	3.53%	3.01%
			5800	5.458	36.337	5.270	35.300	3.57%	2.94%
			5825	5.494	36.285	5.296	35.271	3.74%	2.87%
			710	0.931	56.175	0.960	55.687	-3.02%	0.88%
01/06/2015	750B	23.0	725	0.942	55.996	0.961	55.629	-1.98%	0.66%
			740	0.955	55.830	0.963	55.570	-0.83%	0.47%
			755	0.970	55.660	0.964	55.512	0.62%	0.27%
			820	0.989	55.172	0.969	55.258	2.06%	-0.16%
12/29/2014	835B	20.9	835	1.003	54.978	0.970	55.200	3.40%	-0.40%
			850	1.017	54.840	0.988	55.154	2.94%	-0.57%
			1850	1.491	53.057	1.520	53.300	-1.91%	-0.46%
12/29/2014	1900B	22.6	1880	1.522	52.964	1.520	53.300	0.13%	-0.63%
			1910	1.555	52.860	1.520	53.300	2.30%	-0.83%
			1850	1.496	51.326	1.520	53.300	-1.58%	-3.70%
01/05/2015	1900B	21.9	1880	1.527	51.272	1.520	53.300	0.46%	-3.80%
			1910	1.551	51.246	1.520	53.300	2.04%	-3.85%
			2401	1.928	52.577	1.903	52.765	1.31%	-0.36%
12/31/2014	2450B	22.4	2450	1.977	52.472	1.950	52.700	1.38%	-0.43%
			2499	2.037	52.314	2.019	52.638	0.89%	-0.62%
			5300	5.542	47.287	5.416	48.879	2.33%	-3.26%
01/05/2015	5200B-5800B	23.3	5320	5.577	47.249	5.439	48.851	2.54%	-3.28%
			5500	5.829	46.997	5.650	48.607	3.17%	-3.31%
			5540	5.869	46.931	5.696	48.553	3.04%	-3.34%
			5745	6.176	46.603	5.936	48.275	4.04%	-3.46%
			5800	6.230	46.494	6.000	48.200	3.83%	-3.54%
			5825	6.257	46.392	6.029	48.166	3.78%	-3.68%

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.

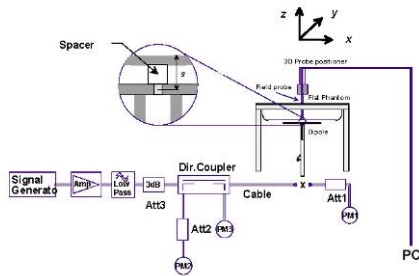
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## 10.2 Test System Verification

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

**Table 10-2**  
**System Verification Results**



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 <sub>1g</sub> (W/kg)	1 W Target SAR <sub>1g</sub> (W/kg)	1 W Normalized SAR <sub>1g</sub> (W/kg)	Deviation <sub>1g</sub> (%)
D	750	HEAD	12/31/2014	23.2	23.4	0.100	1003	3263	0.834	8.370	8.340	-0.36%
K	835	HEAD	01/02/2015	24.3	22.5	0.100	4d133	3288	0.925	9.200	9.250	0.54%
G	1900	HEAD	01/05/2015	24.0	22.5	0.100	5d141	3258	4.100	40.100	41.000	2.24%
G	2450	HEAD	12/31/2014	22.1	23.0	0.100	797	3258	4.960	51.800	49.600	-4.25%
E	5300	HEAD	01/12/2015	22.0	20.5	0.100	1120	7308	7.710	83.400	77.100	-7.55%
E	5500	HEAD	01/12/2015	22.4	20.5	0.100	1120	7308	8.050	84.900	80.500	-5.18%
E	5800	HEAD	01/12/2015	22.3	20.5	0.100	1120	7308	7.290	79.100	72.900	-7.84%
D	750	BODY	01/06/2015	23.3	22.5	0.100	1054	3263	0.948	8.640	9.480	9.72%
K	835	BODY	12/29/2014	23.0	21.3	0.100	4d133	3288	0.948	9.350	9.480	1.39%
J	1900	BODY	12/29/2014	20.8	22.5	0.100	5d141	3022	4.000	40.600	40.000	-1.48%
G	1900	BODY	01/05/2015	24.5	22.8	0.100	5d141	3258	3.910	40.600	39.100	-3.69%
G	2450	BODY	12/31/2014	23.2	22.9	0.100	797	3258	5.050	49.400	50.500	2.23%
H	5300	BODY	01/05/2015	23.4	23.0	0.100	1057	3920	7.360	77.400	73.600	-4.91%
H	5500	BODY	01/05/2015	23.4	23.1	0.100	1057	3920	7.160	79.100	71.600	-9.48%
H	5800	BODY	01/05/2015	23.5	23.2	0.100	1057	3920	7.200	74.300	72.000	-3.10%



**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  
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	23.5	22.59	0.11	Right	Cheek	0496B	1:1	0.137	1.233	0.169	
836.60	4183	UMTS 850	RMC	23.5	22.59	0.17	Right	Tilt	0496B	1:1	0.080	1.233	0.099	
836.60	4183	UMTS 850	RMC	23.5	22.59	0.17	Left	Cheek	0496B	1:1	0.182	1.233	0.224	A1
836.60	4183	UMTS 850	RMC	23.5	22.59	0.16	Left	Tilt	0496B	1:1	0.090	1.233	0.111	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-2  
GSM 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1850.20	512	GSM 1900	GSM	30.5	29.67	-0.10	Right	Cheek	04309	1:8.3	0.059	1.211	0.071	A2
1850.20	512	GSM 1900	GSM	30.5	29.67	-0.20	Right	Tilt	04309	1:8.3	0.037	1.211	0.045	
1850.20	512	GSM 1900	GSM	30.5	29.67	0.09	Left	Cheek	04309	1:8.3	0.052	1.211	0.063	
1850.20	512	GSM 1900	GSM	30.5	29.67	0.20	Left	Tilt	04309	1:8.3	0.022	1.211	0.027	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-3  
UMTS 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	23.0	22.75	-0.16	Right	Cheek	04309	1:1	0.147	1.059	0.156	A3
1880.00	9400	UMTS 1900	RMC	23.0	22.75	0.02	Right	Tilt	04309	1:1	0.067	1.059	0.071	
1880.00	9400	UMTS 1900	RMC	23.0	22.75	0.03	Left	Cheek	04309	1:1	0.120	1.059	0.127	
1880.00	9400	UMTS 1900	RMC	23.0	22.75	0.07	Left	Tilt	04309	1:1	0.057	1.059	0.060	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

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**Table 11-4  
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) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #	
MHz	Ch.																		
710.00	23790	Mid	LTE Band 17	10	23.5	22.87	0.20	0	Right	Cheek	QPSK	1	25	02FA5	1:1	0.027	1.156	0.031	
710.00	23790	Mid	LTE Band 17	10	22.5	21.84	0.06	1	Right	Cheek	QPSK	25	0	02FA5	1:1	0.019	1.164	0.022	
710.00	23790	Mid	LTE Band 17	10	23.5	22.87	0.08	0	Right	Tilt	QPSK	1	25	02FA5	1:1	0.012	1.156	0.014	
710.00	23790	Mid	LTE Band 17	10	22.5	21.84	0.09	1	Right	Tilt	QPSK	25	0	02FA5	1:1	0.007	1.164	0.008	
710.00	23790	Mid	LTE Band 17	10	23.5	22.87	0.13	0	Left	Cheek	QPSK	1	25	02FA5	1:1	0.031	1.156	0.036	A4
710.00	23790	Mid	LTE Band 17	10	22.5	21.84	0.13	1	Left	Cheek	QPSK	25	0	02FA5	1:1	0.025	1.164	0.029	
710.00	23790	Mid	LTE Band 17	10	23.5	22.87	0.06	0	Left	Tilt	QPSK	1	25	02FA5	1:1	0.009	1.156	0.010	
710.00	23790	Mid	LTE Band 17	10	22.5	21.84	0.08	1	Left	Tilt	QPSK	25	0	02FA5	1:1	0.007	1.164	0.008	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram									

**Table 11-5  
LTE Band 26 (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) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #	
MHz	Ch.																		
836.50	26915	Mid	LTE Band 26 (Cell)	15	23.5	22.91	0.12	0	Right	Cheek	QPSK	1	0	0496B	1:1	0.156	1.146	0.179	
836.50	26915	Mid	LTE Band 26 (Cell)	15	22.5	22.43	0.01	1	Right	Cheek	QPSK	36	0	0496B	1:1	0.115	1.016	0.117	
836.50	26915	Mid	LTE Band 26 (Cell)	15	23.5	22.91	-0.04	0	Right	Tilt	QPSK	1	0	0496B	1:1	0.106	1.146	0.121	
836.50	26915	Mid	LTE Band 26 (Cell)	15	22.5	22.43	-0.02	1	Right	Tilt	QPSK	36	0	0496B	1:1	0.072	1.016	0.073	
836.50	26915	Mid	LTE Band 26 (Cell)	15	23.5	22.91	0.08	0	Left	Cheek	QPSK	1	0	0496B	1:1	0.179	1.146	0.205	A5
836.50	26915	Mid	LTE Band 26 (Cell)	15	22.5	22.43	-0.02	1	Left	Cheek	QPSK	36	0	0496B	1:1	0.140	1.016	0.142	
836.50	26915	Mid	LTE Band 26 (Cell)	15	23.5	22.91	0.20	0	Left	Tilt	QPSK	1	0	0496B	1:1	0.096	1.146	0.110	
836.50	26915	Mid	LTE Band 26 (Cell)	15	22.5	22.43	0.08	1	Left	Tilt	QPSK	36	0	0496B	1:1	0.079	1.016	0.080	
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 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) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #	
MHz	Ch.																		
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.79	-0.20	0	Right	Cheek	QPSK	1	50	02FA5	1:1	0.136	1.050	0.143	A6
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.64	-0.07	1	Right	Cheek	QPSK	50	0	02FA5	1:1	0.108	1.086	0.117	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.79	-0.10	0	Right	Tilt	QPSK	1	50	02FA5	1:1	0.051	1.050	0.054	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.64	0.01	1	Right	Tilt	QPSK	50	0	02FA5	1:1	0.042	1.086	0.046	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.79	0.04	0	Left	Cheek	QPSK	1	50	02FA5	1:1	0.084	1.050	0.088	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.64	-0.08	1	Left	Cheek	QPSK	50	0	02FA5	1:1	0.071	1.086	0.077	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.79	0.18	0	Left	Tilt	QPSK	1	50	02FA5	1:1	0.014	1.050	0.015	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.64	0.20	1	Left	Tilt	QPSK	50	0	02FA5	1:1	0.014	1.086	0.015	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram									



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**Table 11-7  
DTS Head SAR**

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)	(W/kg)	(W/kg)		
2462	11	802.11b	DSSS	22	17.5	16.81	0.00	Right	Cheek	1	04309	1	100.0	0.552	0.449	1.172	1.000	0.526	A7
2462	11	802.11b	DSSS	22	17.5	16.81	0.17	Right	Tilt	1	04309	1	100.0	0.329	0.210	1.172	1.000	0.246	
2462	11	802.11b	DSSS	22	17.5	16.81	-	Left	Cheek	1	04309	1	100.0	0.204	-	1.172	1.000	-	
2462	11	802.11b	DSSS	22	17.5	16.81	-	Left	Tilt	1	04309	1	100.0	0.039	-	1.172	1.000	-	
2437	6	802.11b	DSSS	22	17.5	16.79	0.07	Right	Cheek	2	04309	1	99.9	0.018	0.010	1.178	1.001	0.012	
2437	6	802.11b	DSSS	22	17.5	16.79	-	Right	Tilt	2	04309	1	99.9	0.012	-	1.178	1.001	-	
2437	6	802.11b	DSSS	22	17.5	16.79	-	Left	Cheek	2	04309	1	99.9	0.015	-	1.178	1.001	-	
2437	6	802.11b	DSSS	22	17.5	16.79	-	Left	Tilt	2	04309	1	99.9	0.005	-	1.178	1.001	-	
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  
NII Head SAR**

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)	(W/kg)	(W/kg)		
5320	64	802.11a	OFDM	20	12.5	11.78	0.00	Right	Cheek	1	02FAS	6	99.0	0.821	0.464	1.180	1.010	0.553	A8
5320	64	802.11a	OFDM	20	12.5	11.78	0.02	Right	Tilt	1	02FAS	6	99.0	0.656	0.323	1.180	1.010	0.385	
5320	64	802.11a	OFDM	20	12.5	11.78	-	Left	Cheek	1	02FAS	6	99.0	0.561	-	1.180	1.010	-	
5320	64	802.11a	OFDM	20	12.5	11.78	-	Left	Tilt	1	02FAS	6	99.0	0.451	-	1.180	1.010	-	
5300	60	802.11a	OFDM	20	12.5	12.16	0.04	Right	Cheek	2	02FAS	6	98.9	0.320	0.158	1.081	1.011	0.173	
5300	60	802.11a	OFDM	20	12.5	12.16	-	Right	Tilt	2	02FAS	6	98.9	0.246	-	1.081	1.011	-	
5300	60	802.11a	OFDM	20	12.5	12.16	-	Left	Cheek	2	02FAS	6	98.9	0.206	-	1.081	1.011	-	
5300	60	802.11a	OFDM	20	12.5	12.16	-	Left	Tilt	2	02FAS	6	98.9	0.200	-	1.081	1.011	-	
5500	100	802.11a	OFDM	20	12.5	11.84	0.16	Right	Cheek	1	02FAS	6	99.0	0.971	0.449	1.164	1.010	0.528	
5500	100	802.11a	OFDM	20	12.5	11.84	0.20	Right	Tilt	1	02FAS	6	99.0	0.775	0.400	1.164	1.010	0.471	
5500	100	802.11a	OFDM	20	12.5	11.84	-	Left	Cheek	1	02FAS	6	99.0	0.519	-	1.164	1.010	-	
5500	100	802.11a	OFDM	20	12.5	11.84	-	Left	Tilt	1	02FAS	6	99.0	0.494	-	1.164	1.010	-	
5540	108	802.11a	OFDM	20	12.5	11.82	0.05	Right	Cheek	2	02FAS	6	98.9	0.156	0.069	1.169	1.011	0.082	
5540	108	802.11a	OFDM	20	12.5	11.82	-	Right	Tilt	2	02FAS	6	98.9	0.144	-	1.169	1.011	-	
5540	108	802.11a	OFDM	20	12.5	11.82	-	Left	Cheek	2	02FAS	6	98.9	0.051	-	1.169	1.011	-	
5540	108	802.11a	OFDM	20	12.5	11.82	-	Left	Tilt	2	02FAS	6	98.9	0.049	-	1.169	1.011	-	
5745	149	802.11a	OFDM	20	12.5	11.40	0.04	Right	Cheek	1	02FAS	6	99.0	0.455	0.236	1.288	1.010	0.307	
5745	149	802.11a	OFDM	20	12.5	11.40	-	Right	Tilt	1	02FAS	6	99.0	0.410	-	1.288	1.010	-	
5745	149	802.11a	OFDM	20	12.5	11.40	-	Left	Cheek	1	02FAS	6	99.0	0.274	-	1.288	1.010	-	
5745	149	802.11a	OFDM	20	12.5	11.40	-	Left	Tilt	1	02FAS	6	99.0	0.219	-	1.288	1.010	-	
5825	165	802.11n	OFDM	20	12.5	12.27	-	Right	Cheek	2	02FAS	6.5	98.9	0.098	-	1.054	1.011	-	
5825	165	802.11n	OFDM	20	12.5	12.27	-	Right	Tilt	2	02FAS	6.5	98.9	0.068	-	1.054	1.011	-	
5825	165	802.11n	OFDM	20	12.5	12.27	0.03	Left	Cheek	2	02FAS	6.5	98.9	0.128	0.059	1.054	1.011	0.063	
5825	165	802.11n	OFDM	20	12.5	12.27	-	Left	Tilt	2	02FAS	6.5	98.9	0.024	-	1.054	1.011	-	
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 11-9  
GSM/UMTS Body-Worn SAR Data**

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	23.5	22.59	0.03	10 mm	0496B	1:1	back	0.183	1.233	0.226	A9
1850.20	512	GSM 1900	GSM	30.5	29.67	-0.01	10 mm	04309	1:8.3	back	0.492	1.211	0.596	A11
1880.00	9400	UMTS 1900	RMC	23.0	22.75	-0.05	10 mm	04309	1:1	back	0.647	1.059	0.685	A13
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 11-10  
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	23.5	22.87	0.02	0	02FA5	QPSK	1	25	10 mm	back	1:1	0.094	1.156	0.109	A15
710.00	23790	Mid	LTE Band 17	10	22.5	21.84	0.05	1	02FA5	QPSK	25	0	10 mm	back	1:1	0.071	1.164	0.083	
836.50	26915	Mid	LTE Band 26 (Cell)	15	23.5	22.91	-0.02	0	0496B	QPSK	1	0	10 mm	back	1:1	0.359	1.146	0.411	A16
836.50	26915	Mid	LTE Band 26 (Cell)	15	22.5	22.43	0.05	1	0496B	QPSK	36	0	10 mm	back	1:1	0.273	1.016	0.277	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.79	-0.03	0	04309	QPSK	1	50	10 mm	back	1:1	0.757	1.050	0.795	A17
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.64	0.02	1	04309	QPSK	50	0	10 mm	back	1:1	0.568	1.086	0.617	
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 11-11  
DTS Body-Worn SAR**

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.													(W/kg)	(W/kg)			(W/kg)	
2462	11	802.11b	DSSS	22	17.5	16.81	0.07	10 mm	1	04309	1	back	100.0	0.048	0.038	1.172	1.000	0.045	A19
2437	6	802.11b	DSSS	22	17.5	16.79	0.10	10 mm	2	04309	1	back	99.9	0.002	0.001	1.178	1.001	0.001	
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  
NII Body-Worn SAR**

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.													(W/kg)	(W/kg)			(W/kg)	
5320	64	802.11a	OFDM	20	12.5	11.78	0.04	10 mm	1	02FA5	6	back	99.0	0.132	0.069	1.180	1.010	0.082	A20
5300	60	802.11a	OFDM	20	12.5	12.16	-0.02	10 mm	2	02FA5	6	back	98.9	0.139	0.068	1.081	1.011	0.075	
5500	100	802.11a	OFDM	20	12.5	11.84	0.10	10 mm	1	02FA5	6	back	99.0	0.064	0.028	1.164	1.010	0.033	
5540	108	802.11a	OFDM	20	12.5	11.82	0.03	10 mm	2	02FA5	6	back	98.9	0.008	0.005	1.169	1.011	0.006	
5745	148	802.11a	OFDM	20	12.5	11.40	0.20	10 mm	1	02FA5	6	back	99.0	0.017	0.004	1.288	1.010	0.005	
5825	165	802.11n	OFDM	20	12.5	12.27	0.03	10 mm	2	02FA5	6.5	back	98.9	0.009	0.002	1.054	1.011	0.002	
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 11-13  
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	4183	UMTS 850	RMC	23.5	22.59	0.03	10 mm	0496B	N/A	1:1	back	0.183	1.233	0.226	
836.60	4183	UMTS 850	RMC	23.5	22.59	0.03	10 mm	0496B	N/A	1:1	front	0.170	1.233	0.210	
836.60	4183	UMTS 850	RMC	23.5	22.59	0.02	10 mm	0496B	N/A	1:1	bottom	0.069	1.233	0.085	
836.60	4183	UMTS 850	RMC	23.5	22.59	0.04	10 mm	0496B	N/A	1:1	right	0.169	1.233	0.208	
836.60	4183	UMTS 850	RMC	23.5	22.59	-0.03	10 mm	0496B	N/A	1:1	left	0.291	1.233	0.359	A10
1850.20	512	GSM 1900	GPRS	28.5	28.50	0.03	10 mm	04309	2	1:4.15	back	0.688	1.000	0.688	
1850.20	512	GSM 1900	GPRS	28.5	28.50	-0.07	10 mm	04309	2	1:4.15	front	0.716	1.000	0.716	
1850.20	512	GSM 1900	GPRS	28.5	28.50	-0.01	10 mm	04309	2	1:4.15	bottom	0.888	1.000	0.888	
1880.00	661	GSM 1900	GPRS	28.5	28.19	0.01	10 mm	04309	2	1:4.15	bottom	0.996	1.074	1.070	A12
1909.80	810	GSM 1900	GPRS	28.5	27.84	0.09	10 mm	04309	2	1:4.15	bottom	0.861	1.164	1.002	
1850.20	512	GSM 1900	GPRS	28.5	28.50	0.08	10 mm	04309	2	1:4.15	right	0.065	1.000	0.065	
1850.20	512	GSM 1900	GPRS	28.5	28.50	-0.12	10 mm	04309	2	1:4.15	left	0.154	1.000	0.154	
1880.00	9400	UMTS 1900	RMC	23.0	22.75	-0.05	10 mm	04309	N/A	1:1	back	0.647	1.059	0.685	
1880.00	9400	UMTS 1900	RMC	23.0	22.75	-0.02	10 mm	04309	N/A	1:1	front	0.681	1.059	0.721	
1852.40	9262	UMTS 1900	RMC	23.0	22.74	-0.05	10 mm	04309	N/A	1:1	bottom	1.030	1.062	1.094	A14
1880.00	9400	UMTS 1900	RMC	23.0	22.75	-0.10	10 mm	04309	N/A	1:1	bottom	0.792	1.059	0.839	
1907.60	9538	UMTS 1900	RMC	23.0	22.74	-0.13	10 mm	04309	N/A	1:1	bottom	0.882	1.062	0.937	
1880.00	9400	UMTS 1900	RMC	23.0	22.75	-0.03	10 mm	04309	N/A	1:1	right	0.027	1.059	0.029	
1880.00	9400	UMTS 1900	RMC	23.0	22.75	-0.03	10 mm	04309	N/A	1:1	left	0.210	1.059	0.222	
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 11-14  
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	Md	LTE Band 17	10	23.5	22.87	0.02	0	02FA5	QPSK	1	25	10 mm	back	1:1	0.094	1.156	0.109	A15
710.00	23790	Md	LTE Band 17	10	22.5	21.84	0.05	1	02FA5	QPSK	25	0	10 mm	back	1:1	0.071	1.164	0.083	
710.00	23790	Md	LTE Band 17	10	23.5	22.87	0.06	0	02FA5	QPSK	1	25	10 mm	front	1:1	0.089	1.156	0.103	
710.00	23790	Md	LTE Band 17	10	22.5	21.84	0.04	1	02FA5	QPSK	25	0	10 mm	front	1:1	0.067	1.164	0.078	
710.00	23790	Md	LTE Band 17	10	23.5	22.87	0.15	0	02FA5	QPSK	1	25	10 mm	bottom	1:1	0.025	1.156	0.029	
710.00	23790	Md	LTE Band 17	10	22.5	21.84	-0.01	1	02FA5	QPSK	25	0	10 mm	bottom	1:1	0.019	1.164	0.022	
710.00	23790	Md	LTE Band 17	10	23.5	22.87	0.04	0	02FA5	QPSK	1	25	10 mm	right	1:1	0.027	1.156	0.031	
710.00	23790	Md	LTE Band 17	10	22.5	21.84	0.04	1	02FA5	QPSK	25	0	10 mm	right	1:1	0.011	1.164	0.013	
710.00	23790	Md	LTE Band 17	10	23.5	22.87	-0.02	0	02FA5	QPSK	1	25	10 mm	left	1:1	0.044	1.156	0.051	
710.00	23790	Md	LTE Band 17	10	22.5	21.84	0.07	1	02FA5	QPSK	25	0	10 mm	left	1:1	0.031	1.164	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 11-15  
LTE Band 26 (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	26915	Mid	LTE Band 26 (Cell)	15	23.5	22.91	-0.02	0	0496B	QPSK	1	0	10 mm	back	1:1	0.359	1.146	0.411	A16
836.50	26915	Mid	LTE Band 26 (Cell)	15	22.5	22.43	0.05	1	0496B	QPSK	36	0	10 mm	back	1:1	0.273	1.016	0.277	
836.50	26915	Mid	LTE Band 26 (Cell)	15	23.5	22.91	-0.01	0	0496B	QPSK	1	0	10 mm	front	1:1	0.346	1.146	0.397	
836.50	26915	Mid	LTE Band 26 (Cell)	15	22.5	22.43	-0.08	1	0496B	QPSK	36	0	10 mm	front	1:1	0.261	1.016	0.265	
836.50	26915	Mid	LTE Band 26 (Cell)	15	23.5	22.91	0.03	0	0496B	QPSK	1	0	10 mm	bottom	1:1	0.064	1.146	0.073	
836.50	26915	Mid	LTE Band 26 (Cell)	15	22.5	22.43	0.08	1	0496B	QPSK	36	0	10 mm	bottom	1:1	0.050	1.016	0.051	
836.50	26915	Mid	LTE Band 26 (Cell)	15	23.5	22.91	0.14	0	0496B	QPSK	1	0	10 mm	right	1:1	0.187	1.146	0.214	
836.50	26915	Mid	LTE Band 26 (Cell)	15	22.5	22.43	0.10	1	0496B	QPSK	36	0	10 mm	right	1:1	0.147	1.016	0.149	
836.50	26915	Mid	LTE Band 26 (Cell)	15	23.5	22.91	0.03	0	0496B	QPSK	1	0	10 mm	left	1:1	0.325	1.146	0.372	
836.50	26915	Mid	LTE Band 26 (Cell)	15	22.5	22.43	0.05	1	0496B	QPSK	36	0	10 mm	left	1:1	0.252	1.016	0.256	
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 11-16  
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	23.0	22.79	-0.03	0	04309	QPSK	1	50	10 mm	back	1:1	0.757	1.050	0.795	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.64	0.02	1	04309	QPSK	50	0	10 mm	back	1:1	0.568	1.086	0.617	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.79	-0.01	0	04309	QPSK	1	50	10 mm	front	1:1	0.844	1.050	0.886	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	23.0	22.59	0.04	0	04309	QPSK	1	0	10 mm	front	1:1	0.855	1.099	0.940	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	22.57	0.02	0	04309	QPSK	1	50	10 mm	front	1:1	0.740	1.104	0.817	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.64	0.07	1	04309	QPSK	50	0	10 mm	front	1:1	0.661	1.086	0.718	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	22.0	21.60	0.03	1	04309	QPSK	100	0	10 mm	front	1:1	0.612	1.096	0.671	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.79	0.04	0	04309	QPSK	1	50	10 mm	bottom	1:1	1.030	1.050	1.082	A18
1880.00	18900	Mid	LTE Band 2 (PCS)	20	23.0	22.59	0.00	0	04309	QPSK	1	0	10 mm	bottom	1:1	0.962	1.099	1.057	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	22.57	0.05	0	04309	QPSK	1	50	10 mm	bottom	1:1	0.850	1.104	0.938	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.64	-0.05	1	04309	QPSK	50	0	10 mm	bottom	1:1	0.750	1.086	0.815	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	22.0	21.63	0.01	1	04309	QPSK	50	25	10 mm	bottom	1:1	0.682	1.089	0.743	
1900.00	19100	High	LTE Band 2 (PCS)	20	22.0	21.60	0.00	1	04309	QPSK	50	0	10 mm	bottom	1:1	0.632	1.096	0.693	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	22.0	21.60	0.12	1	04309	QPSK	100	0	10 mm	bottom	1:1	0.729	1.096	0.799	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.79	0.08	0	04309	QPSK	1	50	10 mm	right	1:1	0.162	1.050	0.170	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.64	-0.01	1	04309	QPSK	50	0	10 mm	right	1:1	0.155	1.086	0.168	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.79	-0.13	0	04309	QPSK	1	50	10 mm	left	1:1	0.376	1.050	0.395	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.64	0.13	1	04309	QPSK	50	0	10 mm	left	1:1	0.340	1.086	0.369	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.79	0.05	0	04309	QPSK	1	50	10 mm	bottom	1:1	0.990	1.050	1.040	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Blue entry represents variability measurement.

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**Table 11-17  
WLAN Hotspot SAR**

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
2462	11	802.11b	DSSS	22	17.5	16.81	0.07	10 mm	1	04309	1	back	100.0	0.048	0.038	1.172	1.000	0.045	A19
2462	11	802.11b	DSSS	22	17.5	16.81	-	10 mm	1	04309	1	front	100.0	0.040	-	1.172	1.000	-	
2462	11	802.11b	DSSS	22	17.5	16.81	-	10 mm	1	04309	1	top	100.0	0.016	-	1.172	1.000	-	
2462	11	802.11b	DSSS	22	17.5	16.81	-	10 mm	1	04309	1	left	100.0	0.025	-	1.172	1.000	-	
2437	6	802.11b	DSSS	22	17.5	16.79	-	10 mm	2	04309	1	back	99.9	0.002	-	1.178	1.001	-	
2437	6	802.11b	DSSS	22	17.5	16.79	-	10 mm	2	04309	1	front	99.9	0.002	-	1.178	1.001	-	
2437	6	802.11b	DSSS	22	17.5	16.79	-0.10	10 mm	2	04309	1	top	99.9	0.002	0.002	1.178	1.001	0.002	
2437	6	802.11b	DSSS	22	17.5	16.79	-	10 mm	2	04309	1	left	99.9	0.001	-	1.178	1.001	-	
5745	149	802.11a	OFDM	20	12.5	11.40	-	10 mm	1	02FA5	6	back	99.0	0.017	-	1.288	1.010	-	
5745	149	802.11a	OFDM	20	12.5	11.40	0.10	10 mm	1	02FA5	6	front	99.0	0.038	0.019	1.288	1.010	0.024	A21
5745	149	802.11a	OFDM	20	12.5	11.40	-	10 mm	1	02FA5	6	top	99.0	0.020	-	1.288	1.010	-	
5745	149	802.11a	OFDM	20	12.5	11.40	-	10 mm	1	02FA5	6	left	99.0	0.017	-	1.288	1.010	-	
5825	165	802.11n	OFDM	20	12.5	12.27	-	10 mm	2	02FA5	6.5	back	98.9	0.009	-	1.054	1.011	-	
5825	165	802.11n	OFDM	20	12.5	12.27	-0.10	10 mm	2	02FA5	6.5	front	98.9	0.013	0.004	1.054	1.011	0.004	
5825	165	802.11n	OFDM	20	12.5	12.27	-	10 mm	2	02FA5	6.5	top	98.9	0.009	-	1.054	1.011	-	
5825	165	802.11n	OFDM	20	12.5	12.27	-	10 mm	2	02FA5	6.5	left	98.9	0.008	-	1.054	1.011	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT								Body											
Spatial Peak								1.6 W/kg (mW/g)											
Uncontrolled Exposure/General Population								averaged over 1 gram											

## 11.4 SAR Test Notes

### General Notes:

- 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.
- Batteries are fully charged at the beginning of the SAR measurements.
- Liquid tissue depth was at least 15.0 cm for all frequencies.
- 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.
- SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05.
- 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.
- 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  $\leq 1.2$  W/kg, no additional body-worn SAR evaluations using a headset cable were required.
- Per FCC KDB 865664 D01 v01, variability SAR tests were performed when 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.
- 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).

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**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 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  $\leq 0.8$  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  $> \frac{1}{2}$  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  $\leq 0.8$  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  $> \frac{1}{2}$  dB, instead of the middle channel, the highest output power channel was used.



**LTE Notes:**

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 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).

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WLAN Notes:

1. For held-to-ear and hotspot operations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When reported SAR for the initial test position is  $\leq 0.4$  W/kg, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is  $\leq 0.8$  W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01DR02-41929 for 2.4 GHz WIFI single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 8.6.5 for more information.
3. Justification for test configurations for WLAN per KDB Publication 248227 D01DR02-41929 for 5 GHz WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg. See Section 8.6.6 for more information.
4. Per KDB Publication 248227 D01DR02-41929, SAR for MIMO was evaluated by following the simultaneous SAR provisions from KDB Publication 447498. Please see Section 12 for complete analysis. Per KDB Publication 248227 D01DR02-41929, MIMO SAR was measured with both antennas transmitting simultaneously at the specified maximum output power in MIMO mode following the initial test configuration procedures.
5. When the maximum reported 1g averaged SAR is  $\leq 0.8$  W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was  $\leq 1.20$  W/kg or all test channels were measured.
6. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.
7. Only channels in the U-NII-2C (> 5.65 GHz WIFI) & U-NII-3 aggregate band that support wireless router were considered for hotspot SAR tests.

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# 12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

## 12.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v05r02 are applicable to devices with built-in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

## 12.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 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  $\leq 1.6$  W/kg. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1-g or 10-g SAR.

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.



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

**Table 12-1  
Estimated SAR**

Mode	Frequency	Maximum Allowed Power	Separation Distance (Body)	Estimated SAR (Body)
	[MHz]	[dBm]	[mm]	[W/kg]
Bluetooth	2480	11.00	10	0.273

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.
- Since the sum of 1g single transmission chain SAR measurements is  $< 1.6$  W/kg, MIMO SAR is determined by the sum of 1g single transmission chain SAR values because the summation represents higher output power and yields more conservative result per KDB 248227 D01 DR02-41929.
- The highest Reported SAR for each exposure condition is used for SAR summation purpose.

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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)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Held to Ear	UMTS 850	0.224	0.526	<b>0.750</b>
	GSM 1900	0.071	0.526	0.597
	UMTS 1900	0.156	0.526	0.682
	LTE Band 17	0.036	0.526	0.562
	LTE Band 26 (Cell)	0.205	0.526	0.731
	LTE Band 2 (PCS)	0.143	0.526	0.669

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



Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Held to Ear	UMTS 850	0.224	0.012	<b>0.236</b>
	GSM 1900	0.071	0.012	0.083
	UMTS 1900	0.156	0.012	0.168
	LTE Band 17	0.036	0.012	0.048
	LTE Band 26 (Cell)	0.205	0.012	0.217
	LTE Band 2 (PCS)	0.143	0.012	0.155

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Held to Ear	UMTS 850	0.224	0.526	0.012	<b>0.762</b>
	GSM 1900	0.071	0.526	0.012	0.609
	UMTS 1900	0.156	0.526	0.012	0.694
	LTE Band 17	0.036	0.526	0.012	0.574
	LTE Band 26 (Cell)	0.205	0.526	0.012	0.743
	LTE Band 2 (PCS)	0.143	0.526	0.012	0.681

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Held to Ear	UMTS 850	0.224	0.553	<b>0.777</b>
	GSM 1900	0.071	0.553	0.624
	UMTS 1900	0.156	0.553	0.709
	LTE Band 17	0.036	0.553	0.589
	LTE Band 26 (Cell)	0.205	0.553	0.758
	LTE Band 2 (PCS)	0.143	0.553	0.696

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Held to Ear	UMTS 850	0.224	0.173	<b>0.397</b>
	GSM 1900	0.071	0.173	0.244
	UMTS 1900	0.156	0.173	0.329
	LTE Band 17	0.036	0.173	0.209
	LTE Band 26 (Cell)	0.205	0.173	0.378
	LTE Band 2 (PCS)	0.143	0.173	0.316

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Held to Ear	UMTS 850	0.224	0.553	0.173	<b>0.950</b>
	GSM 1900	0.071	0.553	0.173	0.797
	UMTS 1900	0.156	0.553	0.173	0.882
	LTE Band 17	0.036	0.553	0.173	0.762
	LTE Band 26 (Cell)	0.205	0.553	0.173	0.931
	LTE Band 2 (PCS)	0.143	0.553	0.173	0.869



## 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)**

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body-worn	UMTS 850	0.226	0.045	0.271
	GSM 1900	0.596	0.045	0.641
	UMTS 1900	0.685	0.045	0.730
	LTE Band 17	0.109	0.045	0.154
	LTE Band 26 (Cell)	0.411	0.045	0.456
	LTE Band 2 (PCS)	0.795	0.045	<b>0.840</b>

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body-worn	UMTS 850	0.226	0.001	0.227
	GSM 1900	0.596	0.001	0.597
	UMTS 1900	0.685	0.001	0.686
	LTE Band 17	0.109	0.001	0.110
	LTE Band 26 (Cell)	0.411	0.001	0.412
	LTE Band 2 (PCS)	0.795	0.001	<b>0.796</b>

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body-worn	UMTS 850	0.226	0.045	0.001	0.272
	GSM 1900	0.596	0.045	0.001	0.642
	UMTS 1900	0.685	0.045	0.001	0.731
	LTE Band 17	0.109	0.045	0.001	0.155
	LTE Band 26 (Cell)	0.411	0.045	0.001	0.457
	LTE Band 2 (PCS)	0.795	0.045	0.001	<b>0.841</b>

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



Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body-worn	UMTS 850	0.226	0.082	0.308
	GSM 1900	0.596	0.082	0.678
	UMTS 1900	0.685	0.082	0.767
	LTE Band 17	0.109	0.082	0.191
	LTE Band 26 (Cell)	0.411	0.082	0.493
	LTE Band 2 (PCS)	0.795	0.082	<b>0.877</b>

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body-worn	UMTS 850	0.226	0.075	0.301
	GSM 1900	0.596	0.075	0.671
	UMTS 1900	0.685	0.075	0.760
	LTE Band 17	0.109	0.075	0.184
	LTE Band 26 (Cell)	0.411	0.075	0.486
	LTE Band 2 (PCS)	0.795	0.075	<b>0.870</b>

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body-worn	UMTS 850	0.226	0.082	0.075	0.383
	GSM 1900	0.596	0.082	0.075	0.753
	UMTS 1900	0.685	0.082	0.075	0.842
	LTE Band 17	0.109	0.082	0.075	0.266
	LTE Band 26 (Cell)	0.411	0.082	0.075	0.568
	LTE Band 2 (PCS)	0.795	0.082	0.075	<b>0.952</b>

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Body-worn	UMTS 850	0.226	0.273	0.499
	GSM 1900	0.596	0.273	0.869
	UMTS 1900	0.685	0.273	0.958
	LTE Band 17	0.109	0.273	0.382
	LTE Band 26 (Cell)	0.411	0.273	0.684
	LTE Band 2 (PCS)	0.795	0.273	<b>1.068</b>

## 12.5 Hotspot SAR Simultaneous Transmission Analysis

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



Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Hotspot	UMTS 850	0.359	0.045	0.404
	GSM 1900	1.070	0.045	1.115
	UMTS 1900	1.094	0.045	<b>1.139</b>
	LTE Band 17	0.109	0.045	0.154
	LTE Band 26 (Cell)	0.411	0.045	0.456
	LTE Band 2 (PCS)	1.082	0.045	1.127

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Hotspot	UMTS 850	0.359	0.002	0.361
	GSM 1900	1.070	0.002	1.072
	UMTS 1900	1.094	0.002	<b>1.096</b>
	LTE Band 17	0.109	0.002	0.111
	LTE Band 26 (Cell)	0.411	0.002	0.413
	LTE Band 2 (PCS)	1.082	0.002	1.084

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Hotspot	UMTS 850	0.359	0.045	0.002	0.406
	GSM 1900	1.070	0.045	0.002	1.117
	UMTS 1900	1.094	0.045	0.002	<b>1.141</b>
	LTE Band 17	0.109	0.045	0.002	0.156
	LTE Band 26 (Cell)	0.411	0.045	0.002	0.458
	LTE Band 2 (PCS)	1.082	0.045	0.002	1.129

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Hotspot	UMTS 850	0.359	0.024	0.383
	GSM 1900	1.070	0.024	1.094
	UMTS 1900	1.094	0.024	<b>1.118</b>
	LTE Band 17	0.109	0.024	0.133
	LTE Band 26 (Cell)	0.411	0.024	0.435
	LTE Band 2 (PCS)	1.082	0.024	1.106

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



Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Hotspot	UMTS 850	0.359	0.004	0.363
	GSM 1900	1.070	0.004	1.074
	UMTS 1900	1.094	0.004	<b>1.098</b>
	LTE Band 17	0.109	0.004	0.113
	LTE Band 26 (Cell)	0.411	0.004	0.415
	LTE Band 2 (PCS)	1.082	0.004	1.086

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Hotspot	UMTS 850	0.359	0.024	0.004	0.387
	GSM 1900	1.070	0.024	0.004	1.098
	UMTS 1900	1.094	0.024	0.004	<b>1.122</b>
	LTE Band 17	0.109	0.024	0.004	0.137
	LTE Band 26 (Cell)	0.411	0.024	0.004	0.439
	LTE Band 2 (PCS)	1.082	0.024	0.004	1.110

## 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  $\geq 0.80$  W/kg, the measurement was repeated once.
- 2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was  $> 1.20$  or when the original or repeated measurement was  $\geq 1.45$  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  $\geq 1.5$  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	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.					(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1900	1860.00	18700	LTE Band 2 (PCS)	QPSK, 1 RB, 50 RB Offset	bottom	10 mm	1.030	0.990	1.04	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
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/15/2014	Annual	4/15/2015	MY45470194
Agilent	8753E	(30kHz-6GHz) Network Analyzer	12/30/2014	Annual	12/30/2015	JP38020182
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
Agilent	N9020A	MXA Signal Analyzer	10/27/2014	Annual	10/27/2015	US46470561
Agilent	N5182A	MXG Vector Signal Generator	4/15/2014	Annual	4/15/2015	MY47420800
Agilent	8753ES	S-Parameter Network Analyzer	5/22/2014	Annual	5/22/2015	US39170118
Agilent	E5515C	Wireless Communications Test Set	3/18/2014	Annual	3/18/2015	GB46110872
Amplifier Research	1551G6	Amplifier	CBT	N/A	CBT	433971
Anritsu	ML2495A	Power Meter	7/12/2013	Biennial	7/12/2015	1328004
Anritsu	MA2411B	Pulse Power Sensor	3/25/2014	Annual	3/25/2015	1207470
Anritsu	MT8820C	Radio Communication Analyzer	5/6/2014	Annual	5/6/2015	6201144419
Anritsu	MA24106A	USB Power Sensor	5/15/2014	Annual	5/15/2015	1244524
Anritsu	MA24106A	USB Power Sensor	5/15/2014	Annual	5/15/2015	1244512
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
COMTECH	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M155A00-009
Control Company	4052	Long Stem Thermometer	9/27/2013	Biennial	9/27/2015	130567447
Control Company	61220-416	Long-Stem Thermometer	4/29/2014	Biennial	4/29/2016	111331323
Control Company	36934-158	Wall-Mounted Thermometer	4/29/2014	Biennial	4/29/2016	122014488
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/30/2014	Annual	10/30/2015	1833460
Gigatronics	8651A	Universal Power Meter	10/30/2014	Annual	10/30/2015	8650319
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	VLFP-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mitutoyo	CD-6"CSX	Digital Caliper	5/8/2014	Biennial	5/8/2016	13264162
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMW500	Radio Communication Tester	10/4/2013	Biennial	10/4/2015	108798
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
SPEAG	D1900V2	1900 MHz SAR Dipole	4/9/2014	Annual	4/9/2015	56141
SPEAG	D2450V2	2450 MHz SAR Dipole	1/21/2014	Annual	1/21/2015	797
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/27/2014	Annual	1/27/2015	1057
SPEAG	D5GHzV2	5 GHz SAR Dipole	2/26/2014	Annual	2/26/2015	1120
SPEAG	D750V3	750 MHz Dipole	1/20/2014	Annual	1/20/2015	1003
SPEAG	D750V3	750 MHz Dipole	3/17/2014	Annual	3/17/2015	1054
SPEAG	D835V2	835 MHz SAR Dipole	7/24/2014	Annual	7/24/2015	4d133
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/26/2014	Annual	2/26/2015	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/11/2014	Annual	4/11/2015	1368
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/14/2014	Annual	5/14/2015	859
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/12/2014	Annual	8/12/2015	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/17/2014	Annual	9/17/2015	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/18/2014	Annual	9/18/2015	1364
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/6/2014	Annual	5/6/2015	1070
SPEAG	ES3DV3	SAR Probe	2/25/2014	Annual	2/25/2015	3258
SPEAG	ES3DV3	SAR Probe	5/15/2014	Annual	5/15/2015	3263
SPEAG	EX3DV4	SAR Probe	7/16/2014	Annual	7/16/2015	7308
SPEAG	ES3DV2	SAR Probe	8/19/2014	Annual	8/19/2015	3022
SPEAG	ES3DV3	SAR Probe	9/24/2014	Annual	9/24/2015	3288
SPEAG	EX3DV4	SAR Probe	12/12/2014	Annual	12/12/2015	3920
Tektronix	RSA6114A	Real Time Spectrum Analyzer	4/16/2014	Annual	4/16/2015	8010177

Note:

1. 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.
2. Each equipment item was used solely within its respective calibration period.



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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 <sub>i</sub> 1gm	c <sub>i</sub> 10 gms	1gm u <sub>i</sub> (± %)	10gms u <sub>i</sub> (± %)	v <sub>i</sub>	
<b>Measurement System</b>										
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	∞	
<b>Test Sample Related</b>										
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	∞	
<b>Phantom &amp; Tissue Parameters</b>										
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	
<b>Combined Standard Uncertainty (k=1)</b>							RSS	12.1	11.7	299
<b>Expanded Uncertainty</b> (95% CONFIDENCE LEVEL)							k=2	24.2	23.5	



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

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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 <sub>i</sub> 1gm	c <sub>i</sub> 10 gms	1gm u <sub>i</sub> (± %)	10gms u <sub>i</sub> (± %)	v <sub>i</sub>	
<b>Measurement System</b>										
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	∞	
<b>Test Sample Related</b>										
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	∞	
<b>Phantom &amp; Tissue Parameters</b>										
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	
<b>Combined Standard Uncertainty (k=1)</b>							RSS	12.4	12.0	299
<b>Expanded Uncertainty</b> (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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<b>FCC ID:</b> A3LSMG925KOR	 <b>PCTEST</b> ENGINEERING LABORATORY, INC.	<b>SAR EVALUATION REPORT</b>		<b>Reviewed by:</b> Quality Manager
<b>Document S/N:</b> 0Y1412292335-R1.A3L	<b>Test Dates:</b> 12/29/14 - 01/12/15	<b>DUT Type:</b> Portable Handset	Page 61 of 61	

## APPENDIX A: SAR TEST DATA

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 0496B**

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium: 835 Head Medium parameters used (interpolated):  
 $f = 836.6 \text{ MHz}$ ;  $\sigma = 0.940 \text{ S/m}$ ;  $\epsilon_r = 43.388$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section

Test Date: 01-02-2015; Ambient Temp: 24.3°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3288; ConvF(6.51, 6.51, 6.51); Calibrated: 9/24/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1364; Calibrated: 9/18/2014  
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: UMTS 850, Left Head, Cheek, Mid.ch**

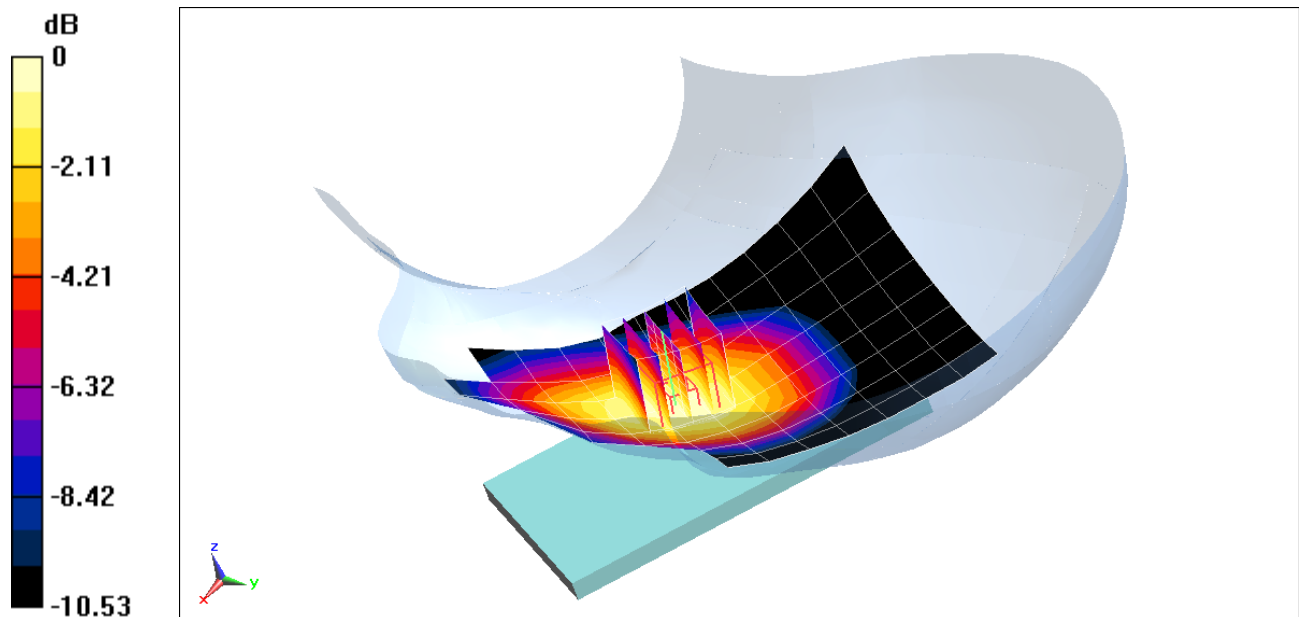
**Area Scan (9x14x1):** Measurement grid: dx=15mm, dy=15mm

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.05 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.236 W/kg

**SAR(1 g) = 0.182 W/kg**



0 dB = 0.200 W/kg = -6.99 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 04309**

Communication System: UID 0, GSM1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3  
Medium: 1900 Head Medium parameters used (interpolated):  
 $f = 1850.2 \text{ MHz}$ ;  $\sigma = 1.344 \text{ S/m}$ ;  $\epsilon_r = 39.440$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section

Test Date: 01-05-2015; Ambient Temp: 24.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3258; ConvF(5.04, 5.04, 5.04); Calibrated: 2/25/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn665; Calibrated: 2/26/2014  
Phantom: SAM Front; Type: SAM; Serial: 1686  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: GSM 1900, Right Head, Cheek, Low.ch**

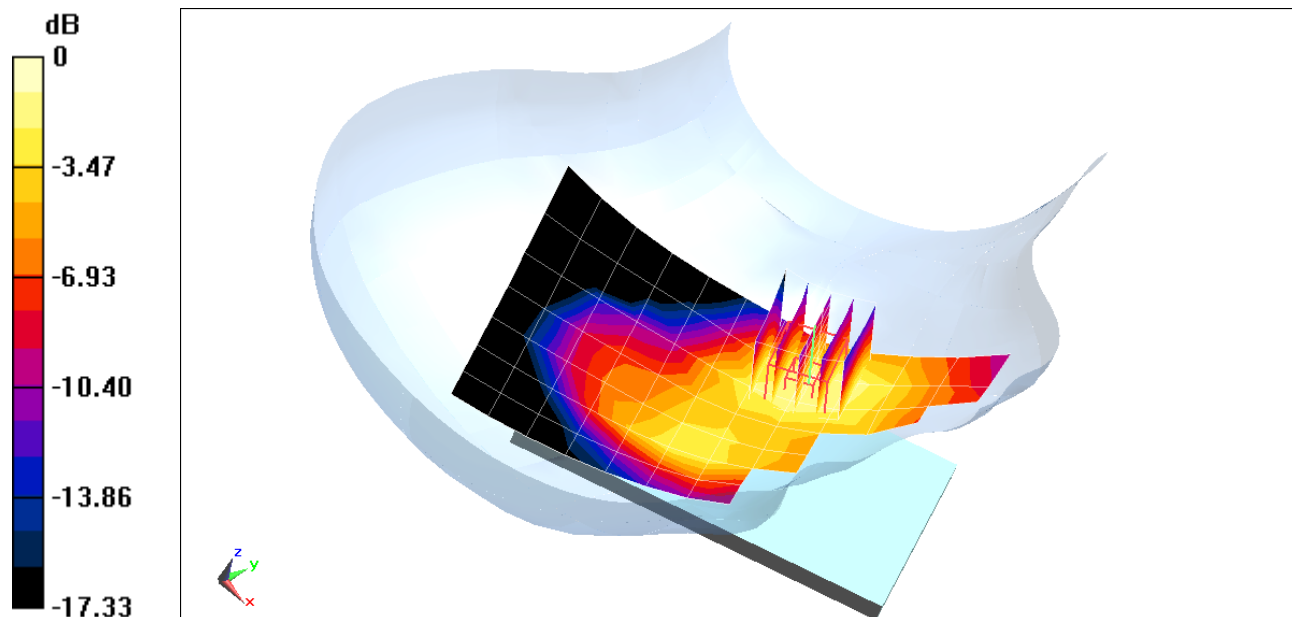
**Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.206 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.0910 W/kg

**SAR(1 g) = 0.059 W/kg**



0 dB = 0.0712 W/kg = -11.48 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 04309**

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium: 1900 Head Medium parameters used:  
 $f = 1880 \text{ MHz}$ ;  $\sigma = 1.374 \text{ S/m}$ ;  $\epsilon_r = 39.346$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section

Test Date: 01-05-2015; Ambient Temp: 24.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3258; ConvF(5.04, 5.04, 5.04); Calibrated: 2/25/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn665; Calibrated: 2/26/2014  
Phantom: SAM Front; Type: SAM; Serial: 1686  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

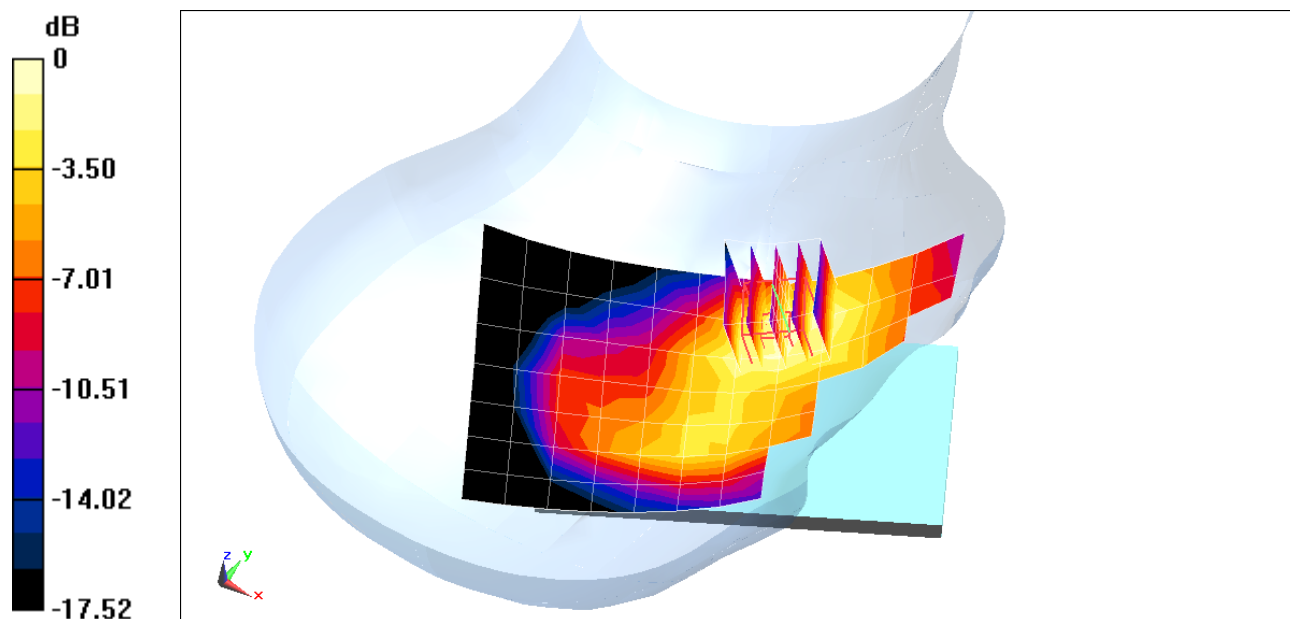
**Area Scan (8x13x1):** Measurement grid: dx=15mm, dy=15mm

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.41 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 0.230 W/kg

**SAR(1 g) = 0.147 W/kg**



0 dB = 0.173 W/kg = -7.62 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 02FA5**

Communication System: UID 0, LTE Band 17; Frequency: 710 MHz; Duty Cycle: 1:1

Medium: 750 Head Medium parameters used:

$f = 710 \text{ MHz}$ ;  $\sigma = 0.888 \text{ S/m}$ ;  $\epsilon_r = 42.586$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 12-31-2014; Ambient Temp: 23.2°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3263; ConvF(6.42, 6.42, 6.42); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

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: LTE Band 17, Left Head, Cheek, Mid.ch**  
**10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset**

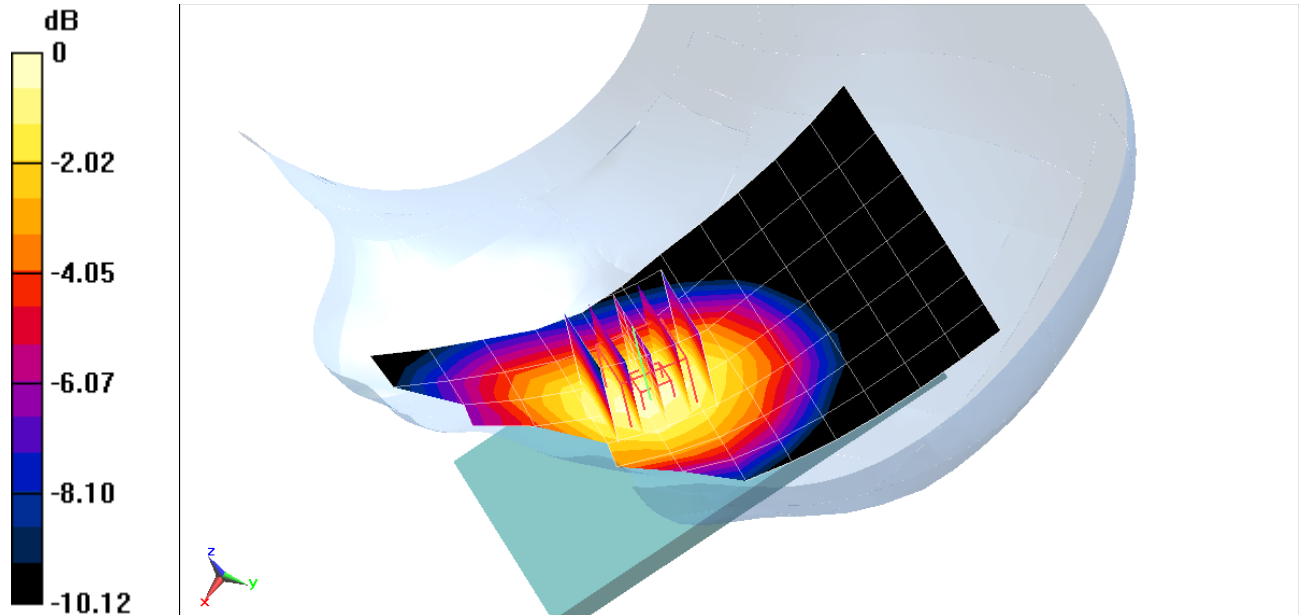
**Area Scan (8x14x1):** Measurement grid: dx=15mm, dy=15mm

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.326 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.0390 W/kg

**SAR(1 g) = 0.031 W/kg**



0 dB = 0.0340 W/kg = -14.69 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 0496B**

Communication System: UID 0, LTE Band 26 (Cell); Frequency: 836.5 MHz; Duty Cycle: 1:1  
Medium: 835 Head Medium parameters used (interpolated):  
 $f = 836.5 \text{ MHz}$ ;  $\sigma = 0.940 \text{ S/m}$ ;  $\epsilon_r = 43.389$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Left Section

Test Date: 01-02-2015; Ambient Temp: 24.3°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3288; ConvF(6.51, 6.51, 6.51); Calibrated: 9/24/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

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 26 (Cell), Left Head, Cheek, Mid.ch**  
**15 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

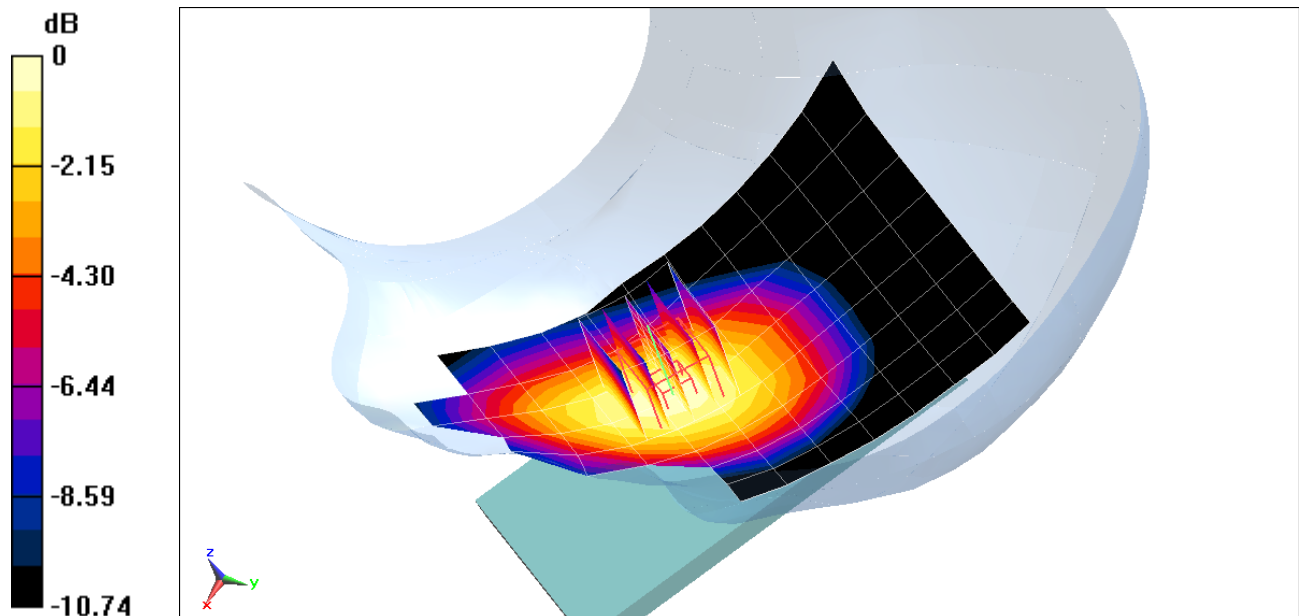
**Area Scan (9x14x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 14.54 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.233 W/kg

**SAR(1 g) = 0.179 W/kg**



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

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 02FA5**

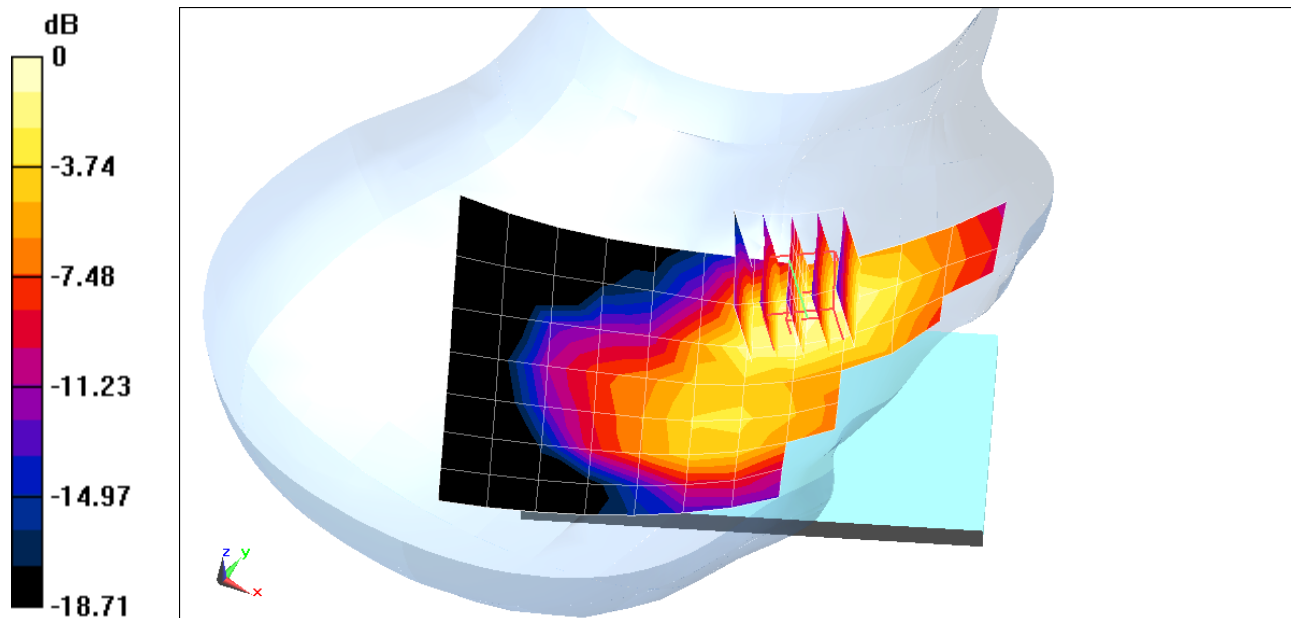
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1  
Medium: 1900 Head Medium parameters used (interpolated):  
 $f = 1860 \text{ MHz}$ ;  $\sigma = 1.354 \text{ S/m}$ ;  $\epsilon_r = 39.409$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section

Test Date: 01-05-2015; Ambient Temp: 24.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3258; ConvF(5.04, 5.04, 5.04); Calibrated: 2/25/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn665; Calibrated: 2/26/2014  
Phantom: SAM Front; Type: SAM; Serial: 1686  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 2 (PCS), Right Head, Cheek, Low.ch**  
**QPSK, 20 MHz Bandwidth, 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 = 10.54 V/m; Power Drift = -0.20 dB  
Peak SAR (extrapolated) = 0.213 W/kg  
**SAR(1 g) = 0.136 W/kg**



0 dB = 0.166 W/kg = -7.80 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 04309**

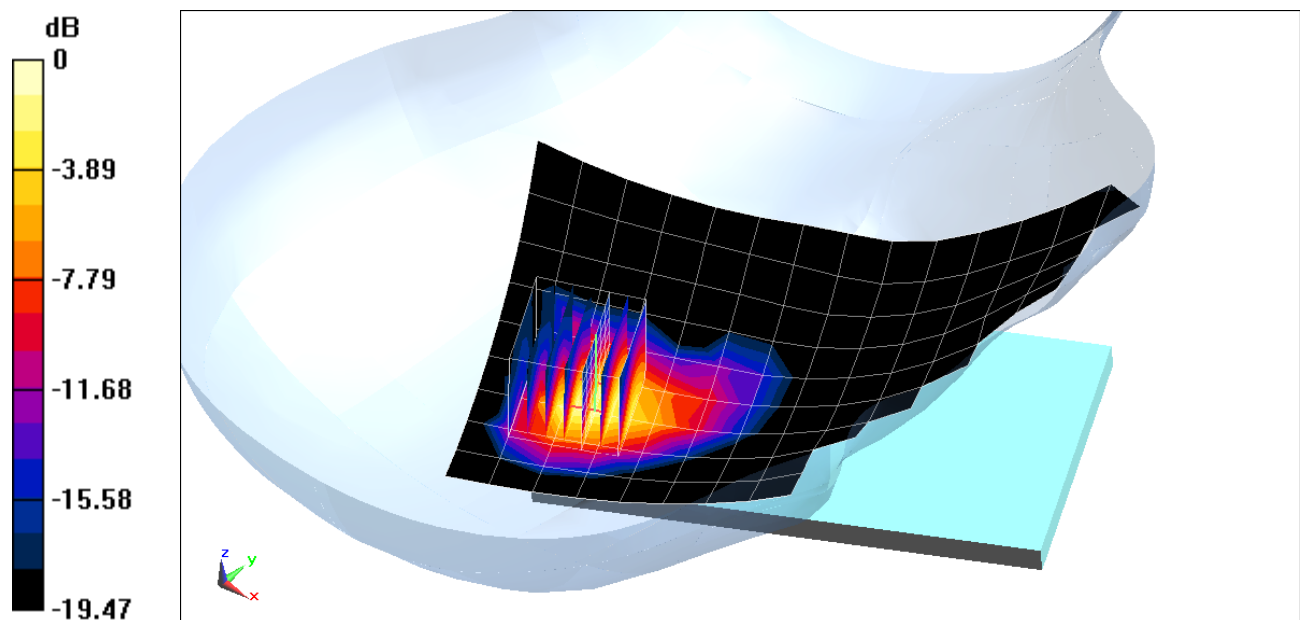
Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1  
Medium: 2450 Head Medium parameters used (interpolated):  
 $f = 2462 \text{ MHz}$ ;  $\sigma = 1.784 \text{ S/m}$ ;  $\epsilon_r = 38.434$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section

Test Date: 12-31-2014; Ambient Temp: 22.1°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3258; ConvF(4.52, 4.52, 4.52); Calibrated: 2/25/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn665; Calibrated: 2/26/2014  
Phantom: SAM Front; Type: SAM; Serial: 1686  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11b, 22 MHz Bandwidth, Ant 1, Right Head, Cheek, Ch 11, 1 Mbps**

**Area Scan (10x16x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$   
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$   
Reference Value = 14.71 V/m; Power Drift = 0.00 dB  
Peak SAR (extrapolated) = 0.968 W/kg  
**SAR(1 g) = 0.449 W/kg**



0 dB = 0.572 W/kg = -2.43 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 02FA5**

Communication System: UID 0, 802.11a; Frequency: 5320 MHz; Duty Cycle: 1:1  
Medium: 5 GHz Head Medium parameters used:  
 $f = 5320 \text{ MHz}$ ;  $\sigma = 4.937 \text{ S/m}$ ;  $\epsilon_r = 37.110$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Right Section

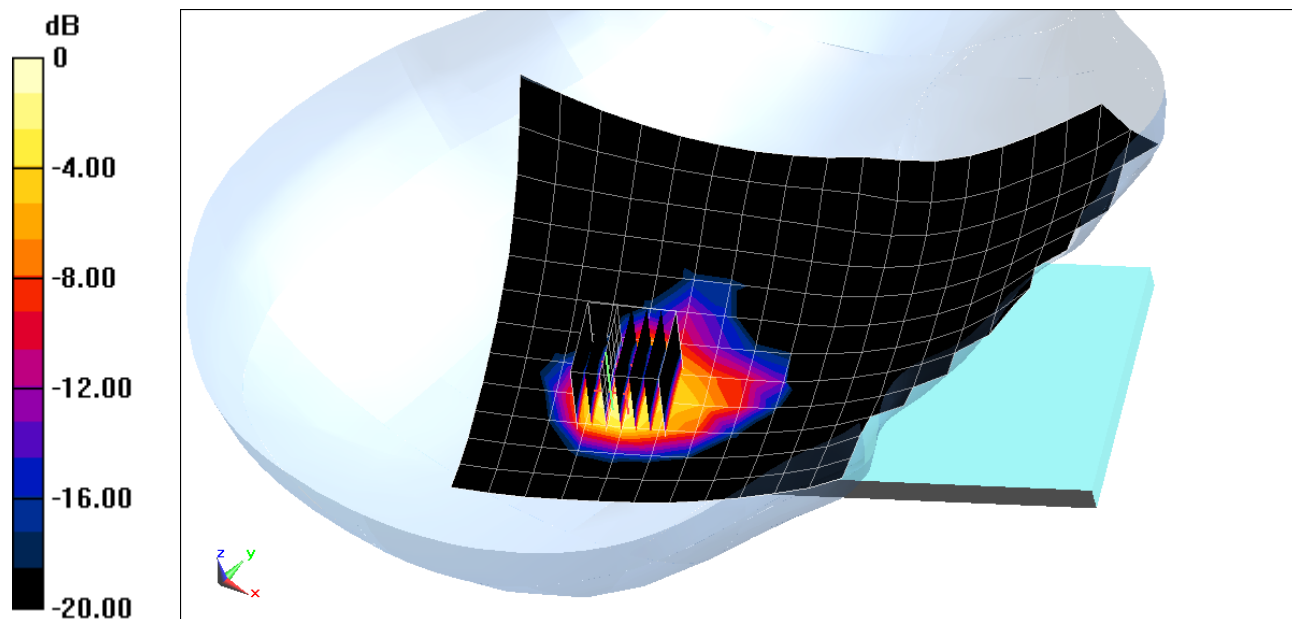
Test Date: 01-12-2015; Ambient Temp: 22.0°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7308; ConvF(5.37, 5.37, 5.37); Calibrated: 7/16/2014;  
Sensor-Surface: 1.4mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1323; Calibrated: 9/17/2014  
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, U-NII-2A, 20 MHz Bandwidth, Ant 1  
Right Head, Cheek, Ch 64, 6 Mbps**

**Area Scan (13x19x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4  
Reference Value = 8.420 V/m; Power Drift = 0.00 dB  
Peak SAR (extrapolated) = 2.09 W/kg  
**SAR(1 g) = 0.464 W/kg**



0 dB = 1.16 W/kg = 0.64 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 0496B**

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium: 835 Body Medium parameters used (interpolated):  
 $f = 836.6 \text{ MHz}$ ;  $\sigma = 1.004 \text{ S/m}$ ;  $\epsilon_r = 54.963$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-29-2014; Ambient Temp: 23.0°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3288; ConvF(6.32, 6.32, 6.32); Calibrated: 9/24/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1364; Calibrated: 9/18/2014  
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

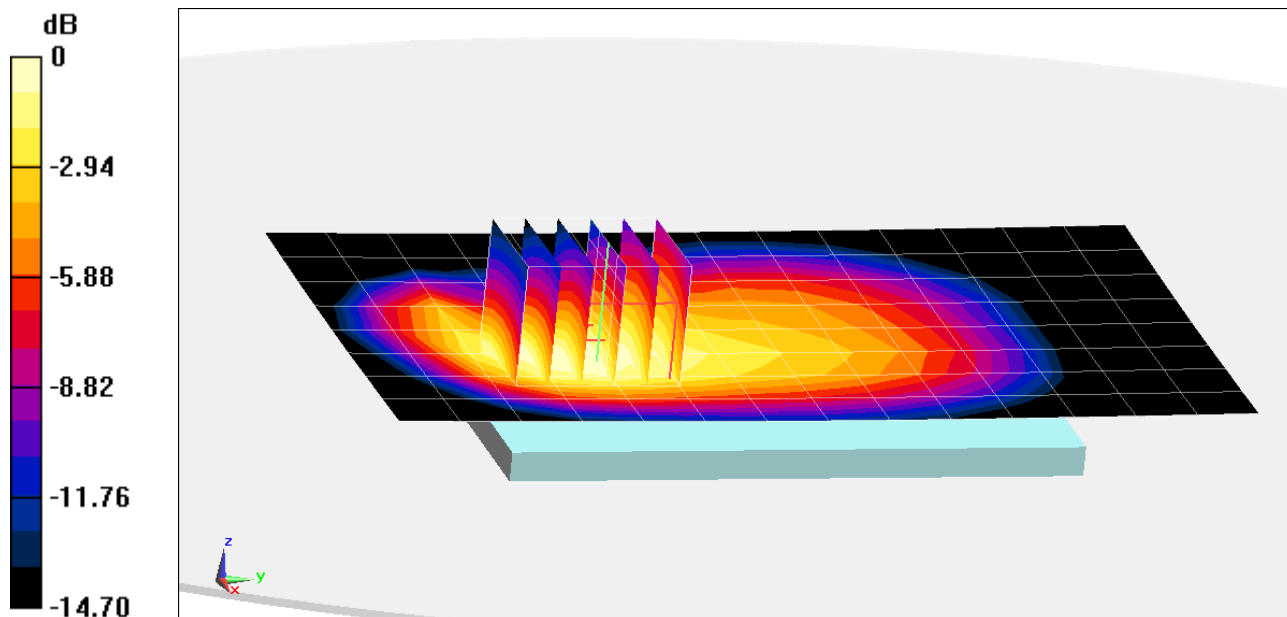
**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm

**Zoom Scan (5x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.97 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.310 W/kg

**SAR(1 g) = 0.183 W/kg**



0 dB = 0.211 W/kg = -6.76 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 0496B**

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1  
Medium: 835 Body Medium parameters used (interpolated):  
 $f = 836.6 \text{ MHz}$ ;  $\sigma = 1.004 \text{ S/m}$ ;  $\epsilon_r = 54.963$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-29-2014; Ambient Temp: 23.0°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3288; ConvF(6.32, 6.32, 6.32); Calibrated: 9/24/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1364; Calibrated: 9/18/2014  
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: UMTS 850, Body SAR, Left Edge, Mid.ch**

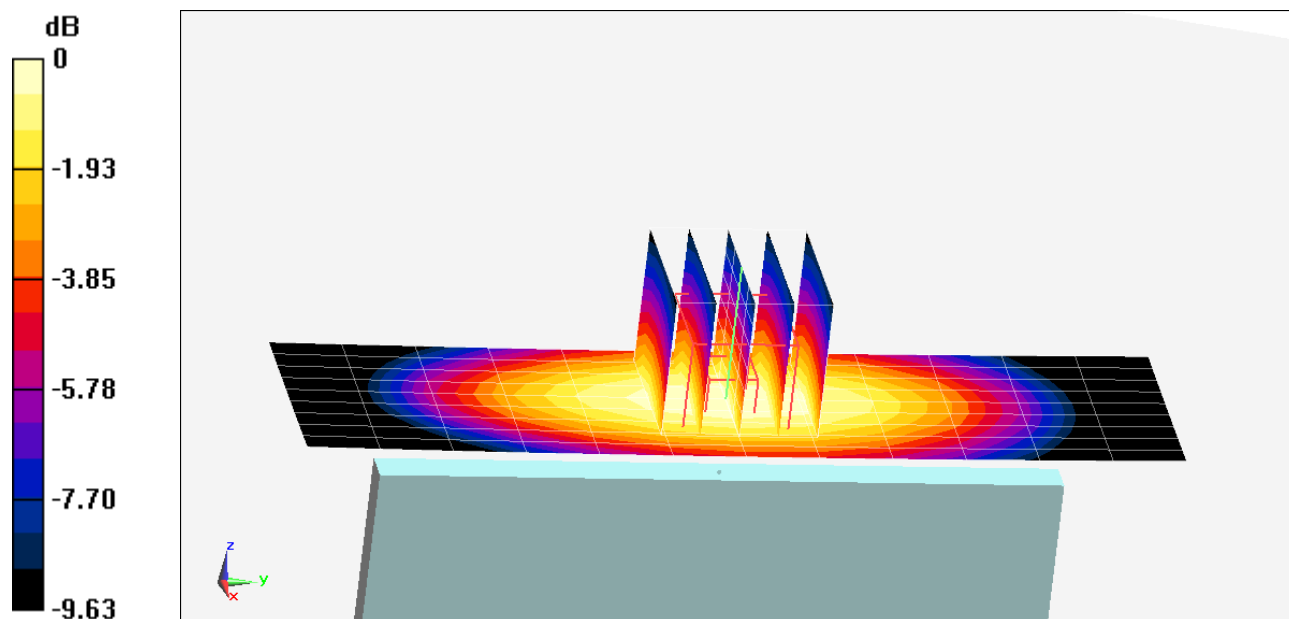
**Area Scan (10x13x1):** Measurement grid: dx=5mm, dy=15mm

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.80 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.414 W/kg

**SAR(1 g) = 0.291 W/kg**



0 dB = 0.334 W/kg = -4.76 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 04309**

Communication System: UID 0, GSM; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3  
Medium: 1900 Body Medium parameters used (interpolated):  
 $f = 1850.2 \text{ MHz}$ ;  $\sigma = 1.491 \text{ S/m}$ ;  $\epsilon_r = 53.056$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-29-2014; Ambient Temp: 20.8°C; Tissue Temp: 22.5°C

Probe: ES3DV2 - SN3022; ConvF(4.49, 4.49, 4.49); Calibrated: 8/19/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1322; Calibrated: 8/12/2014  
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

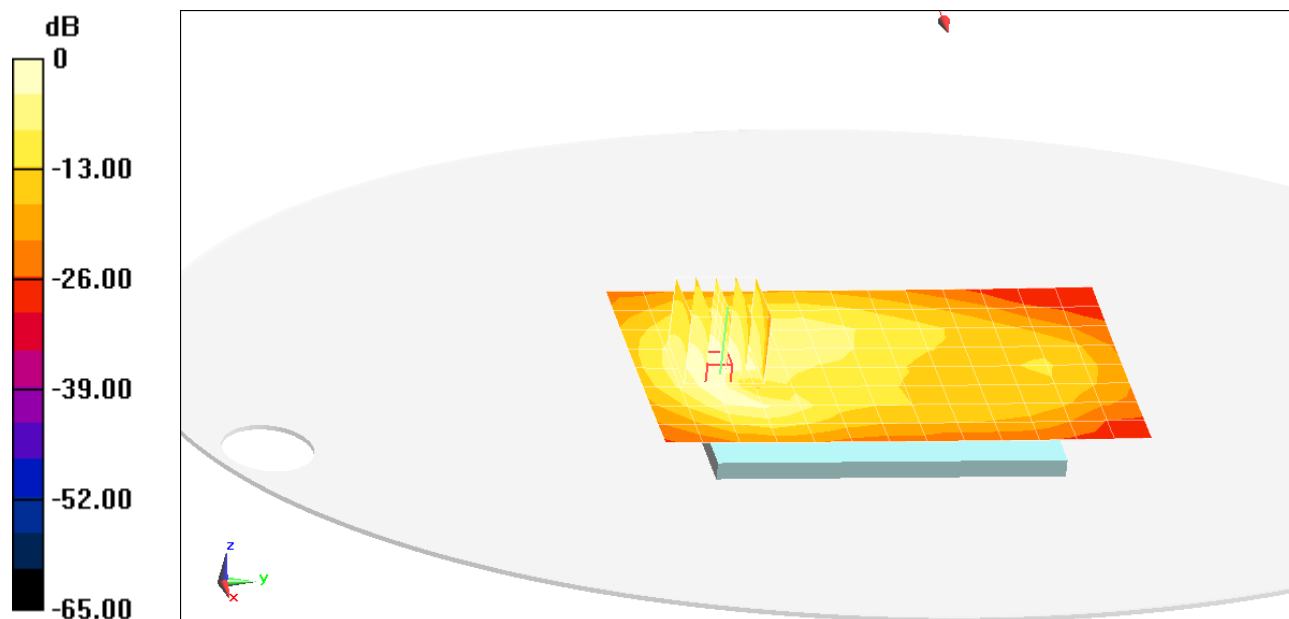
**Area Scan (9x14x1):** Measurement grid: dx=15mm, dy=15mm

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.93 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.828 W/kg

**SAR(1 g) = 0.492 W/kg**



0 dB = 0.616 W/kg = -2.10 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 04309**

Communication System: UID 0, GSM GPRS; 2 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$ ;  $\sigma = 1.522 \text{ S/m}$ ;  $\epsilon_r = 52.964$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-29-2014; Ambient Temp: 20.8°C; Tissue Temp: 22.5°C

Probe: ES3DV2 - SN3022; ConvF(4.49, 4.49, 4.49); Calibrated: 8/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

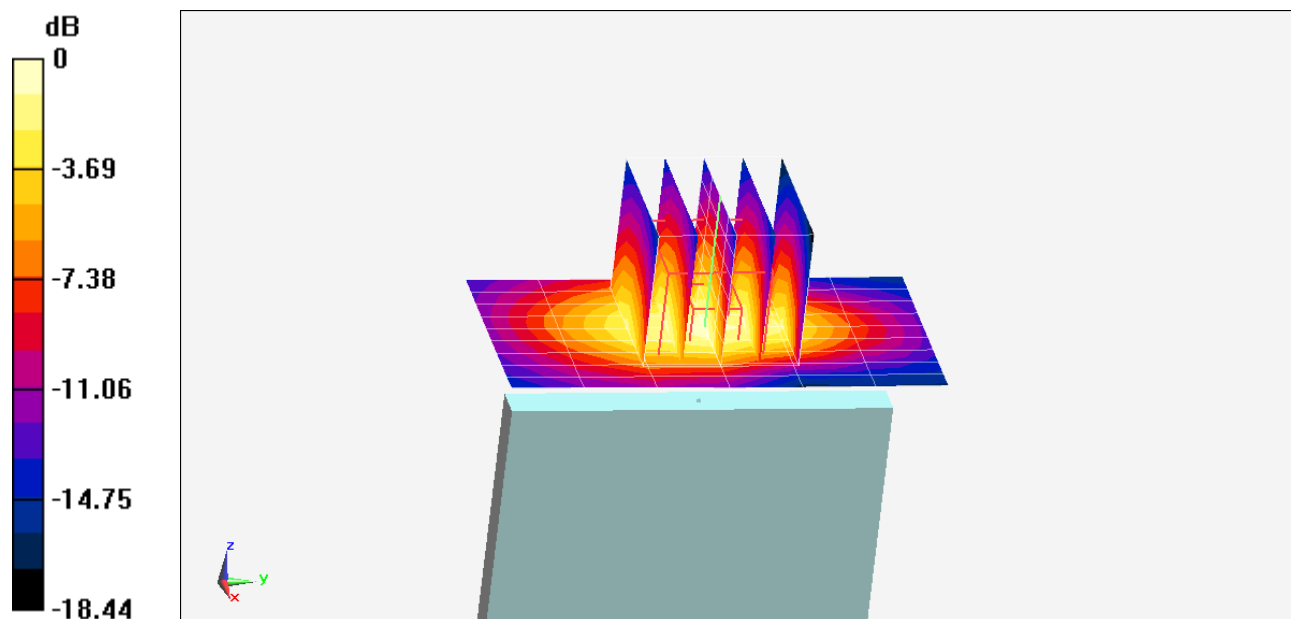
**Area Scan (10x7x1):** Measurement grid: dx=5mm, dy=15mm

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 27.73 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.62 W/kg

**SAR(1 g) = 0.996 W/kg**



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

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 04309**

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium: 1900 Body Medium parameters used:  
 $f = 1880 \text{ MHz}$ ;  $\sigma = 1.522 \text{ S/m}$ ;  $\epsilon_r = 52.964$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-29-2014; Ambient Temp: 20.8°C; Tissue Temp: 22.5°C

Probe: ES3DV2 - SN3022; ConvF(4.49, 4.49, 4.49); Calibrated: 8/19/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1322; Calibrated: 8/12/2014  
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

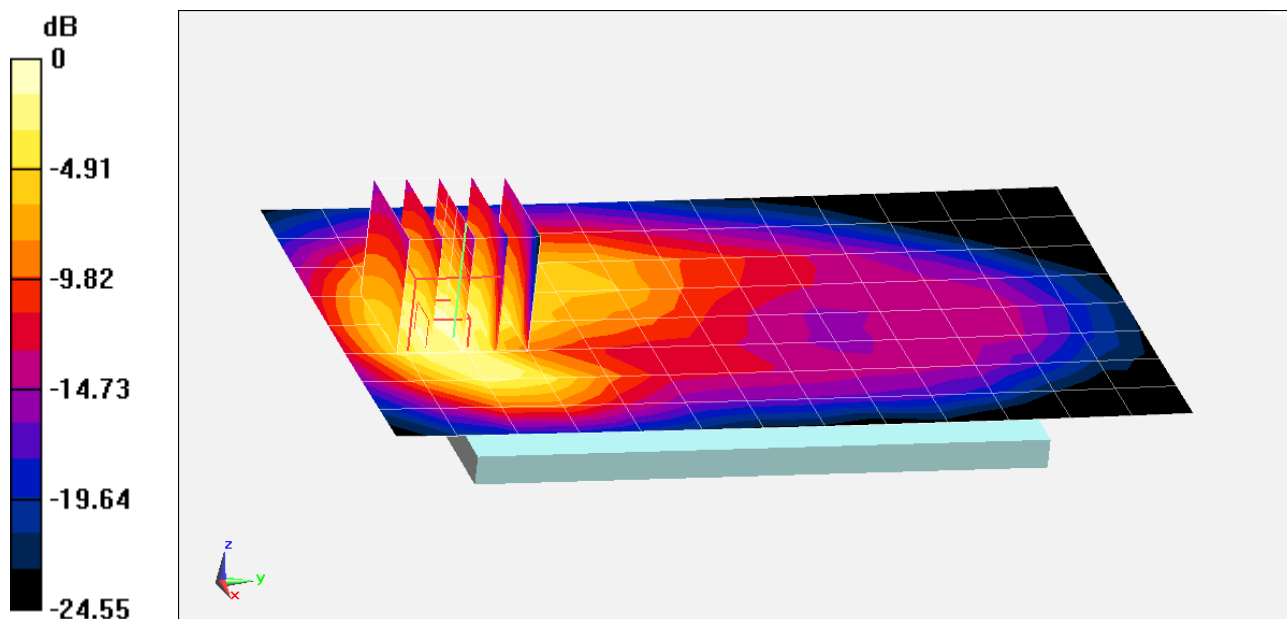
**Area Scan (9x14x1):** Measurement grid: dx=15mm, dy=15mm

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.39 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.12 W/kg

**SAR(1 g) = 0.647 W/kg**



0 dB = 0.785 W/kg = -1.05 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 04309**

Communication System: UID 0, UMTS; Frequency: 1852.4 MHz; Duty Cycle: 1:1  
Medium: 1900 Body Medium parameters used: (interpolated):  
 $f = 1852.4 \text{ MHz}$ ;  $\sigma = 1.493 \text{ S/m}$ ;  $\epsilon_r = 53.050$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-29-2014; Ambient Temp: 20.8°C; Tissue Temp: 22.5°C

Probe: ES3DV2 - SN3022; ConvF(4.49, 4.49, 4.49); Calibrated: 8/19/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1322; Calibrated: 8/12/2014  
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

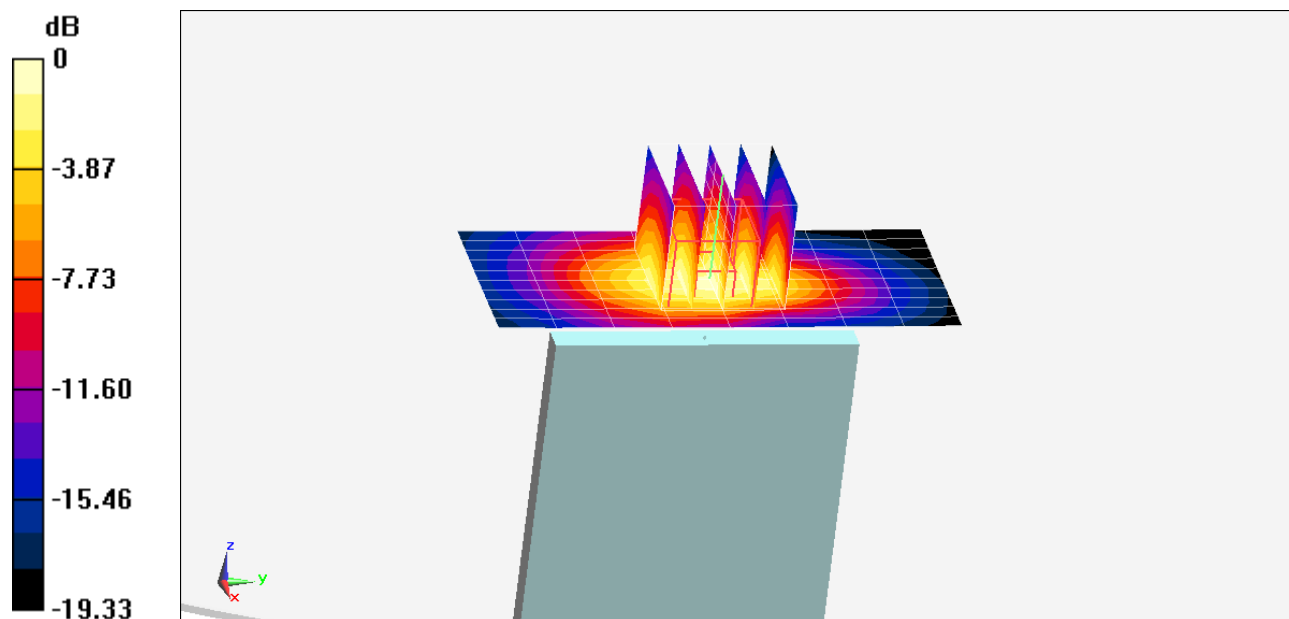
**Area Scan (11x9x1):** Measurement grid: dx=5mm, dy=15mm

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 29.04 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.66 W/kg

**SAR(1 g) = 1.03 W/kg**



0 dB = 1.16 W/kg = 0.64 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 02FA5**

Communication System: UID 0, LTE Band 17; Frequency: 710 MHz; Duty Cycle: 1:1

Medium: 750 Body Medium parameters used:

$f = 710 \text{ MHz}$ ;  $\sigma = 0.931 \text{ S/m}$ ;  $\epsilon_r = 56.175$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-06-2015; Ambient Temp: 23.3°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3263; ConvF(6.19, 6.19, 6.19); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

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 17, Body SAR, Back side, Mid.ch**  
**10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset**

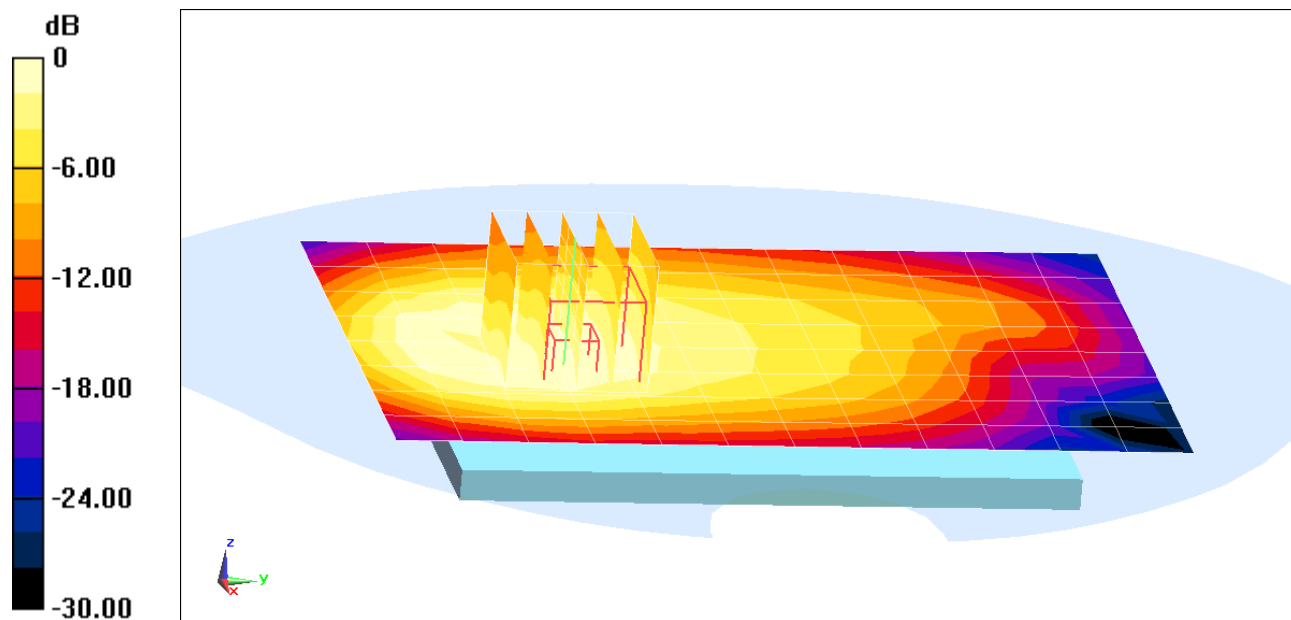
**Area Scan (9x13x1):** Measurement grid: dx=15mm, dy=15mm

**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.46 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.132 W/kg

**SAR(1 g) = 0.094 W/kg**



0 dB = 0.107 W/kg = -9.71 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 0496B**

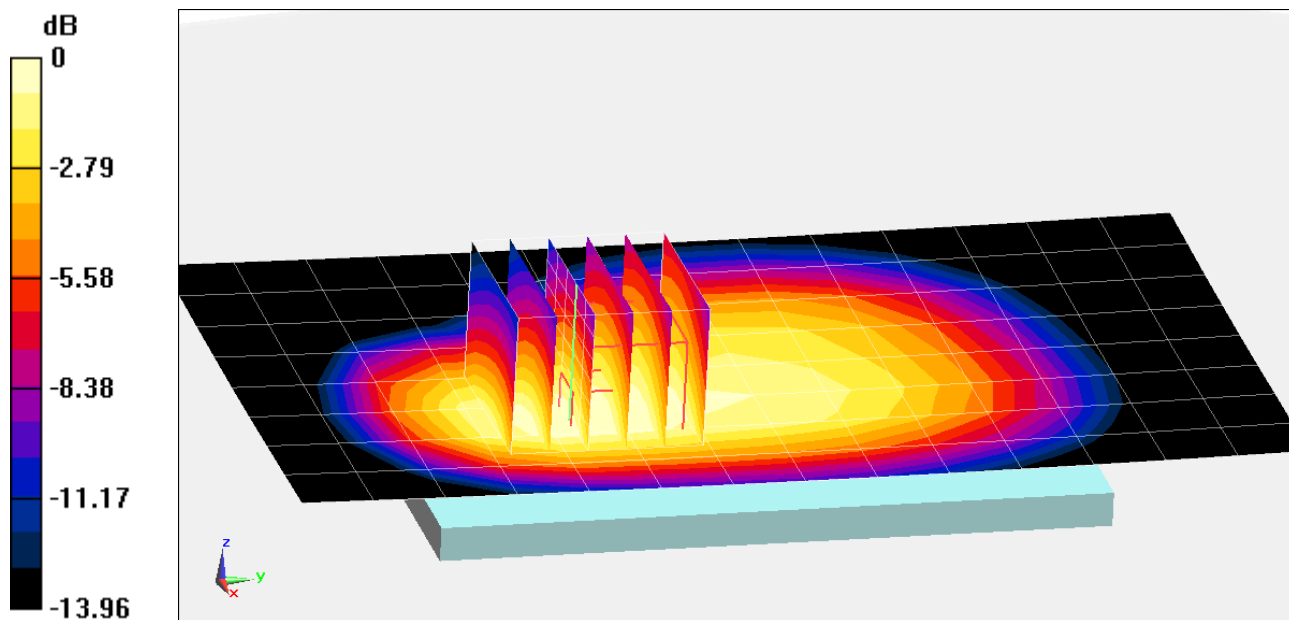
Communication System: UID 0, LTE Band 26 (Cell); Frequency: 836.5 MHz; Duty Cycle: 1:1  
Medium: 835 Body Medium parameters used (interpolated):  
 $f = 836.5 \text{ MHz}$ ;  $\sigma = 1.004 \text{ S/m}$ ;  $\epsilon_r = 54.964$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-29-2014; Ambient Temp: 23.0°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3288; ConvF(6.32, 6.32, 6.32); Calibrated: 9/24/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn1364; Calibrated: 9/18/2014  
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 26 (Cell), Body SAR, Back side, Mid.ch**  
**15 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

**Area Scan (9x15x1):** Measurement grid: dx=15mm, dy=15mm  
**Zoom Scan (6x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 19.60 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 0.482 W/kg  
**SAR(1 g) = 0.359 W/kg**



0 dB = 0.399 W/kg = -3.99 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 04309**

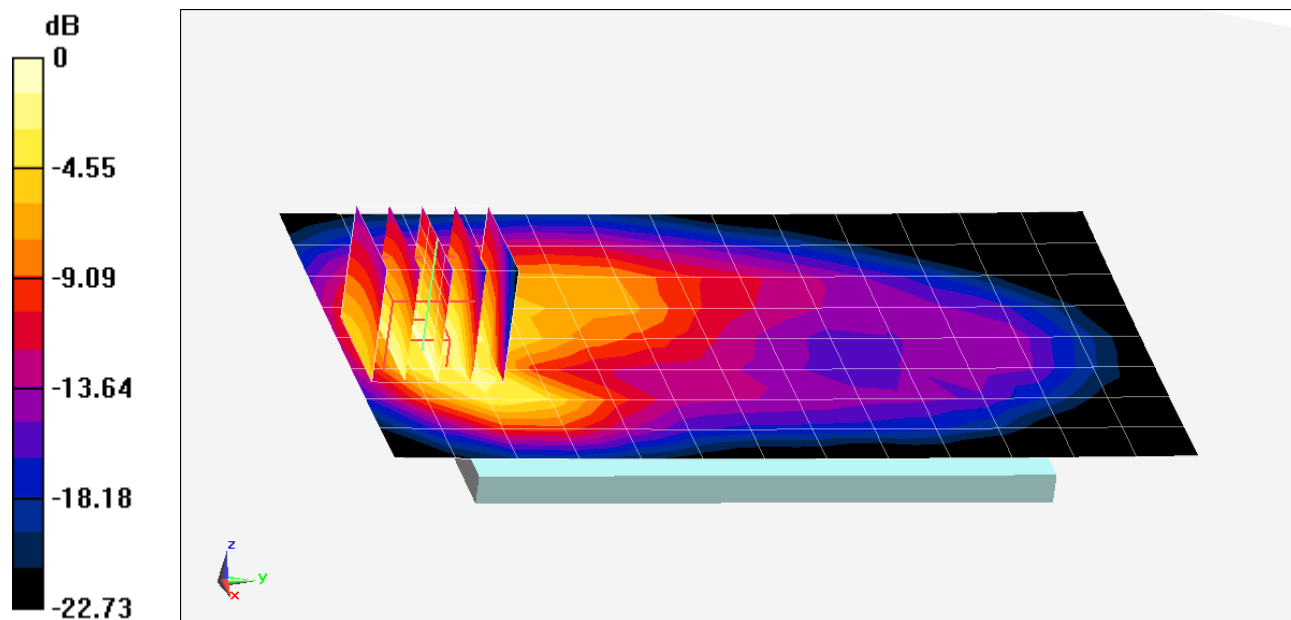
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1  
Medium: 1900 Body Medium parameters used (interpolated):  
 $f = 1860 \text{ MHz}$ ;  $\sigma = 1.506 \text{ S/m}$ ;  $\epsilon_r = 51.308$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-05-2015; Ambient Temp: 24.5°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3258; ConvF(4.61, 4.61, 4.61); Calibrated: 2/25/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn665; Calibrated: 2/26/2014  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158  
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 = 23.46 V/m; Power Drift = -0.03 dB  
Peak SAR (extrapolated) = 1.25 W/kg  
**SAR(1 g) = 0.757 W/kg**



0 dB = 0.916 W/kg = -0.38 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 04309**

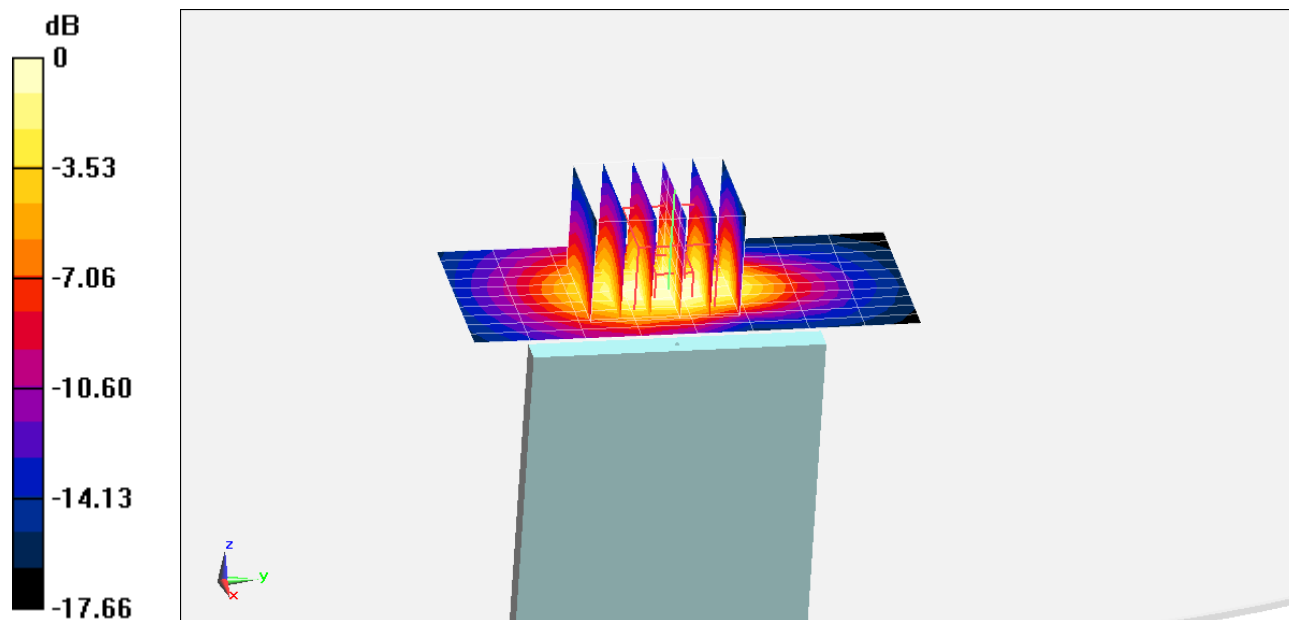
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1  
Medium: 1900 Body Medium parameters used (interpolated):  
 $f = 1860 \text{ MHz}$ ;  $\sigma = 1.506 \text{ S/m}$ ;  $\epsilon_r = 51.308$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-05-2015; Ambient Temp: 24.5°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3258; ConvF(4.61, 4.61, 4.61); Calibrated: 2/25/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn665; Calibrated: 2/26/2014  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

**Area Scan (11x9x1):** Measurement grid: dx=5mm, dy=15mm  
**Zoom Scan (5x6x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 27.74 V/m; Power Drift = 0.04 dB  
Peak SAR (extrapolated) = 1.67 W/kg  
**SAR(1 g) = 1.03 W/kg**



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

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 04309**

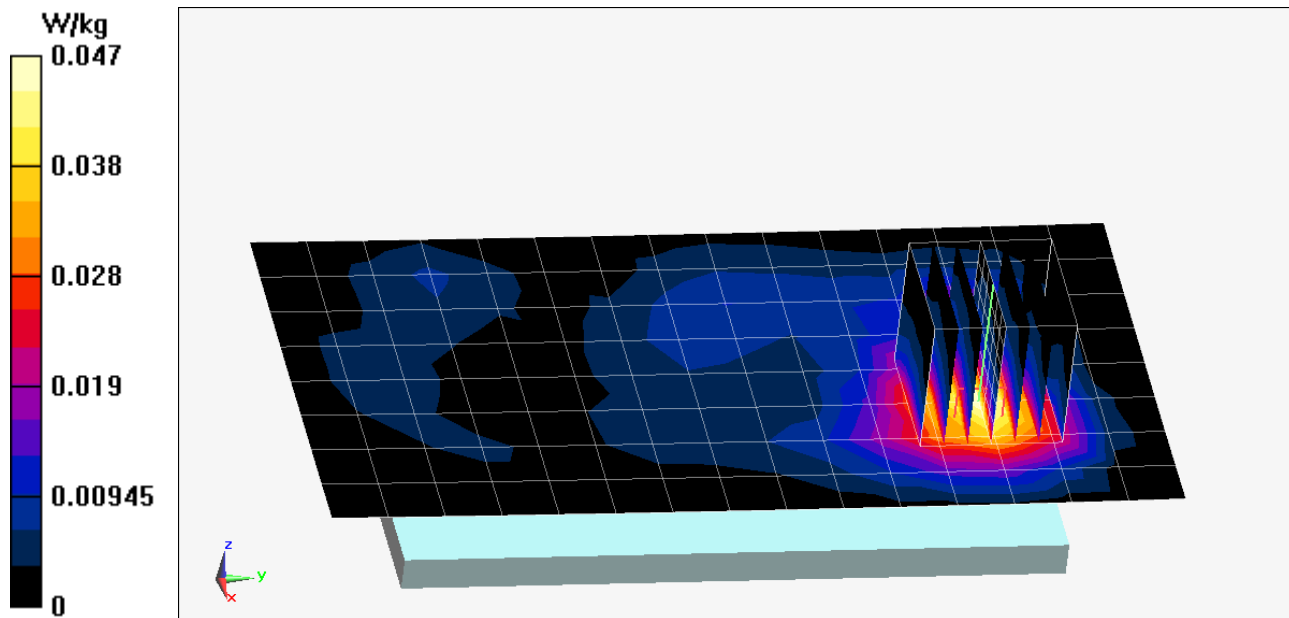
Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1  
Medium: 2450 Body Medium parameters used (interpolated):  
 $f = 2462 \text{ MHz}$ ;  $\sigma = 1.992 \text{ S/m}$ ;  $\epsilon_r = 52.433$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-31-2014; Ambient Temp: 23.2°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3258; ConvF(4.14, 4.14, 4.14); Calibrated: 2/25/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn665; Calibrated: 2/26/2014  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

**Area Scan (9x16x1):** Measurement grid: dx=12mm, dy=12mm  
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 4.649 V/m; Power Drift = 0.07 dB  
Peak SAR (extrapolated) = 0.0760 W/kg  
**SAR(1 g) = 0.038 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 02FA5**

Communication System: UID 0, 802.11a; Frequency: 5320 MHz; Duty Cycle: 1:1  
Medium: 5 GHz Body Medium parameters used:  
 $f = 5320 \text{ MHz}$ ;  $\sigma = 5.577 \text{ S/m}$ ;  $\epsilon_r = 47.249$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-05-2015; Ambient Temp: 23.4°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3920; ConvF(4.16, 4.16, 4.16); Calibrated: 12/12/2014;  
Sensor-Surface: 1.4mm (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: IEEE 802.11a, U-NII-2A, 20 MHz Bandwidth, Ant1**  
**Body SAR, Back Side, Ch 64, 6 Mbps**

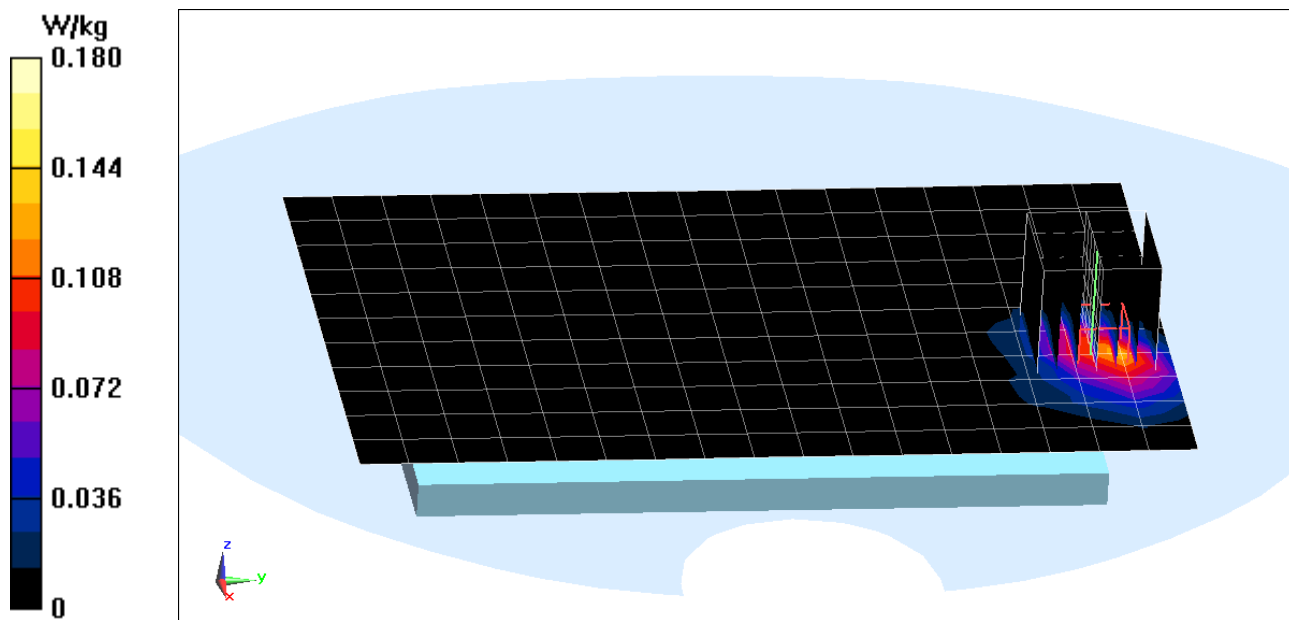
**Area Scan (12x18x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 3.599 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.287 W/kg

**SAR(1 g) = 0.069 W/kg**



# PCTEST ENGINEERING LABORATORY, INC.

**DUT: A3LSMG925KOR; Type: Portable Handset; Serial: 02FA5**

Communication System: UID 0, IEEE 802.11a; Frequency: 5745 MHz; Duty Cycle: 1:1  
Medium: 5 GHz Body Medium parameters used:  
 $f = 5745 \text{ MHz}$ ;  $\sigma = 6.176 \text{ S/m}$ ;  $\epsilon_r = 46.603$ ;  $\rho = 1000 \text{ kg/m}^3$   
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-05-2015; Ambient Temp: 23.5°C; Tissue Temp: 23.2°C

Probe: EX3DV4 - SN3920; ConvF(3.93, 3.93, 3.93); Calibrated: 12/12/2014;  
Sensor-Surface: 1.4mm (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: IEEE 802.11a, U-NII-3, 20 MHz Bandwidth, Ant1**  
**Body SAR, Front Side, Ch 149, 6 Mbps**

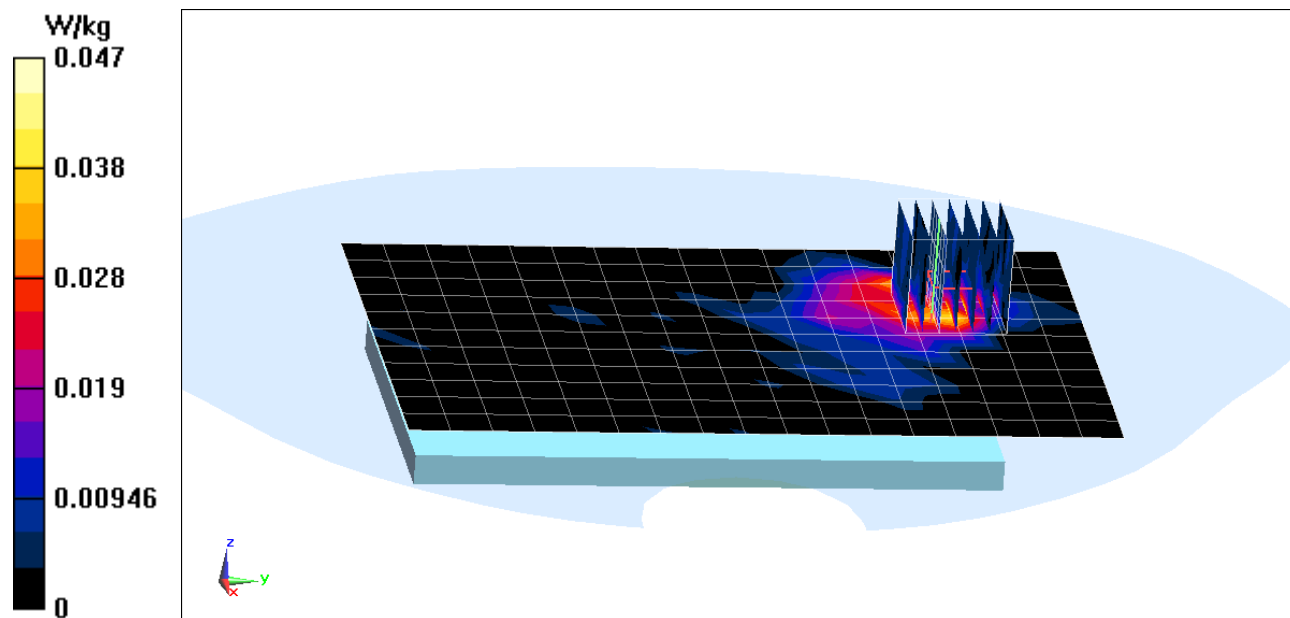
**Area Scan (12x18x1):** Measurement grid: dx=10mm, dy=10mm

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 0.9700 V/m; Power Drift = 0.10dB

Peak SAR (extrapolated) = 0.0960 W/kg

**SAR(1 g) = 0.019 W/kg**



## APPENDIX B: SYSTEM VERIFICATION

# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Head Medium parameters used (interpolated):

$f = 750 \text{ MHz}$ ;  $\sigma = 0.926 \text{ S/m}$ ;  $\epsilon_r = 42.121$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-31-2014; Ambient Temp: 23.2°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3263; ConvF(6.42, 6.42, 6.42); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

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

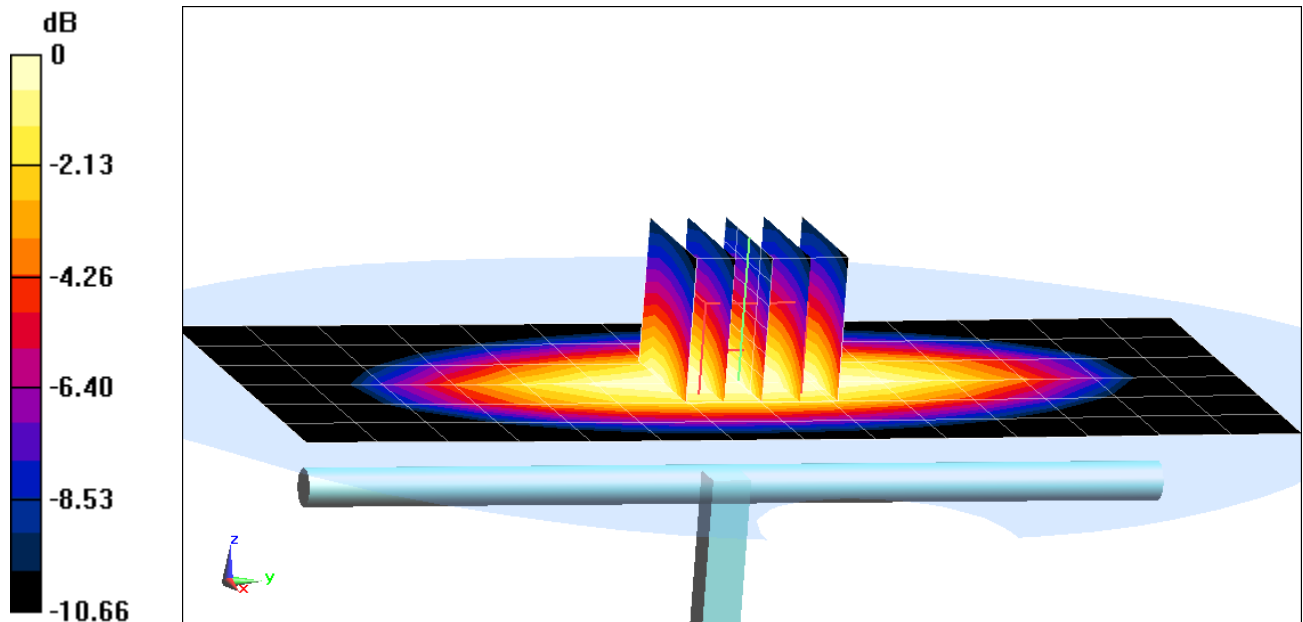
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.26 W/kg

**SAR(1 g) = 0.834 W/kg**

Deviation = -0.36%



0 dB = 0.950 W/kg = -0.22 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Head Medium parameters used:

$f = 835 \text{ MHz}$ ;  $\sigma = 0.939 \text{ S/m}$ ;  $\epsilon_r = 43.405$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-02-2015; Ambient Temp: 24.3°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3288; ConvF(6.51, 6.51, 6.51); Calibrated: 9/24/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

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)

## 835 MHz System Verification

**Area Scan (7x14x1):** Measurement grid: dx=15mm, dy=15mm

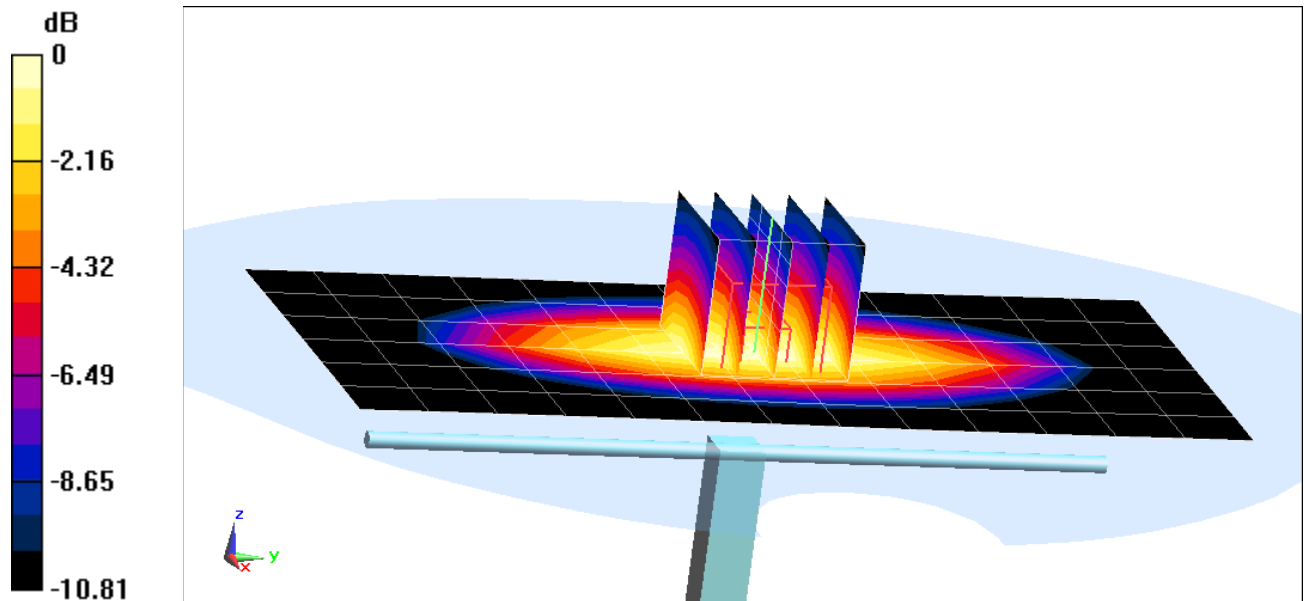
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.41 W/kg

**SAR(1 g) = 0.925 W/kg**

Deviation = 0.54%



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

# PCTEST ENGINEERING LABORATORY, INC.

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

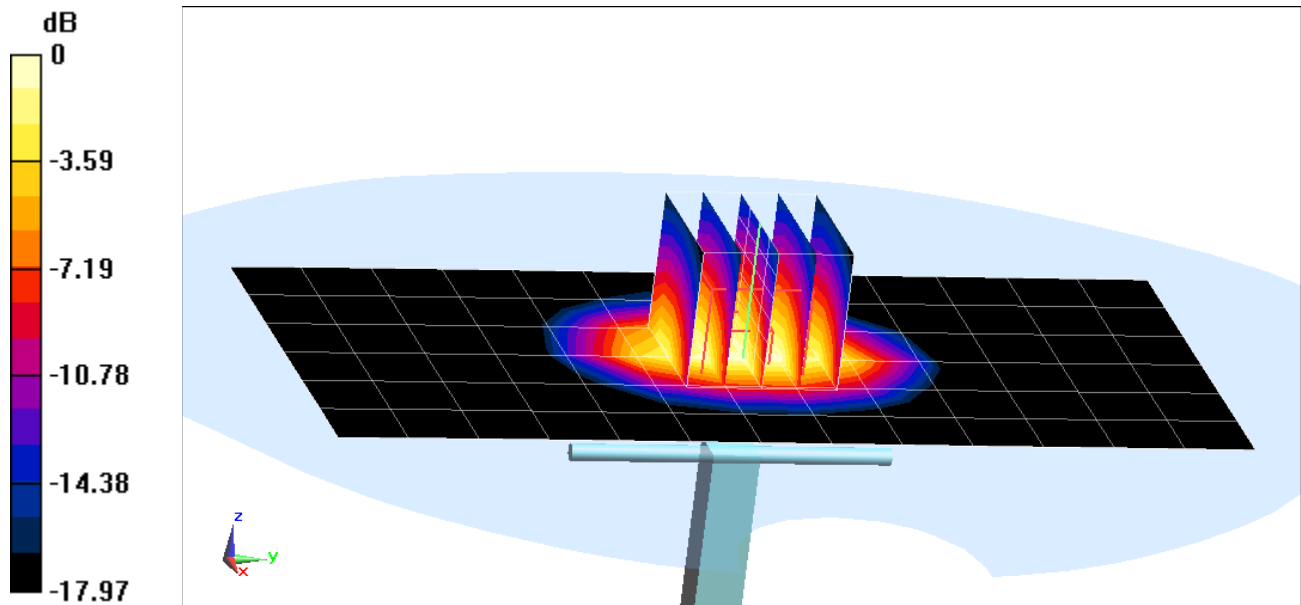
Communication System: UID 0, CW (0); Frequency: 1900 MHz; Duty Cycle: 1:1  
Medium: 1900 Head Medium parameters used (interpolated):  
 $f = 1900$  MHz;  $\sigma = 1.393$  S/m;  $\epsilon_r = 39.274$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-05-2015; Ambient Temp: 24.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3258; ConvF(5.04, 5.04, 5.04); Calibrated: 2/25/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn665; Calibrated: 2/26/2014  
Phantom: SAM Front; Type: SAM; Serial: 1686  
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

## 1900 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  
Power Input = 20 dBm (100 mW)  
Peak SAR (extrapolated) = 7.51 W/kg  
**SAR(1 g) = 4.10 W/kg**  
Deviation = 2.24%



0 dB = 4.96 W/kg = 6.95 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Head Medium parameters used:

$f = 2450$  MHz;  $\sigma = 1.771$  S/m;  $\epsilon_r = 38.468$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-31-2014; Ambient Temp: 22.1°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3258; ConvF(4.52, 4.52, 4.52); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: SAM Front; Type: SAM; Serial: 1686

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

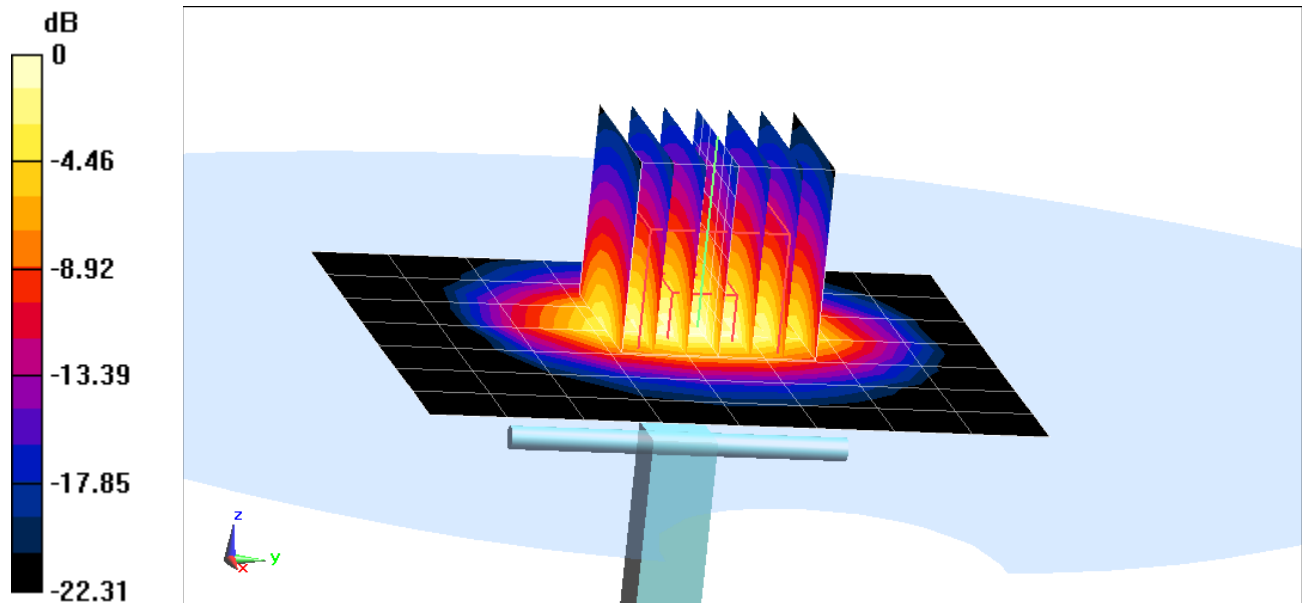
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 10.3 W/kg

**SAR(1 g) = 4.96 W/kg**

Deviation = -4.25%



0 dB = 6.56 W/kg = 8.17 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5300 MHz; Type: D5GHzV2; Serial: 1120**

Communication System: UID 0, CW (0); Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5300 \text{ MHz}$ ;  $\sigma = 4.912 \text{ S/m}$ ;  $\epsilon_r = 37.146$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-12-2015; Ambient Temp: 22.0°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7308; ConvF(5.37, 5.37, 5.37); Calibrated: 7/16/2014;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

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

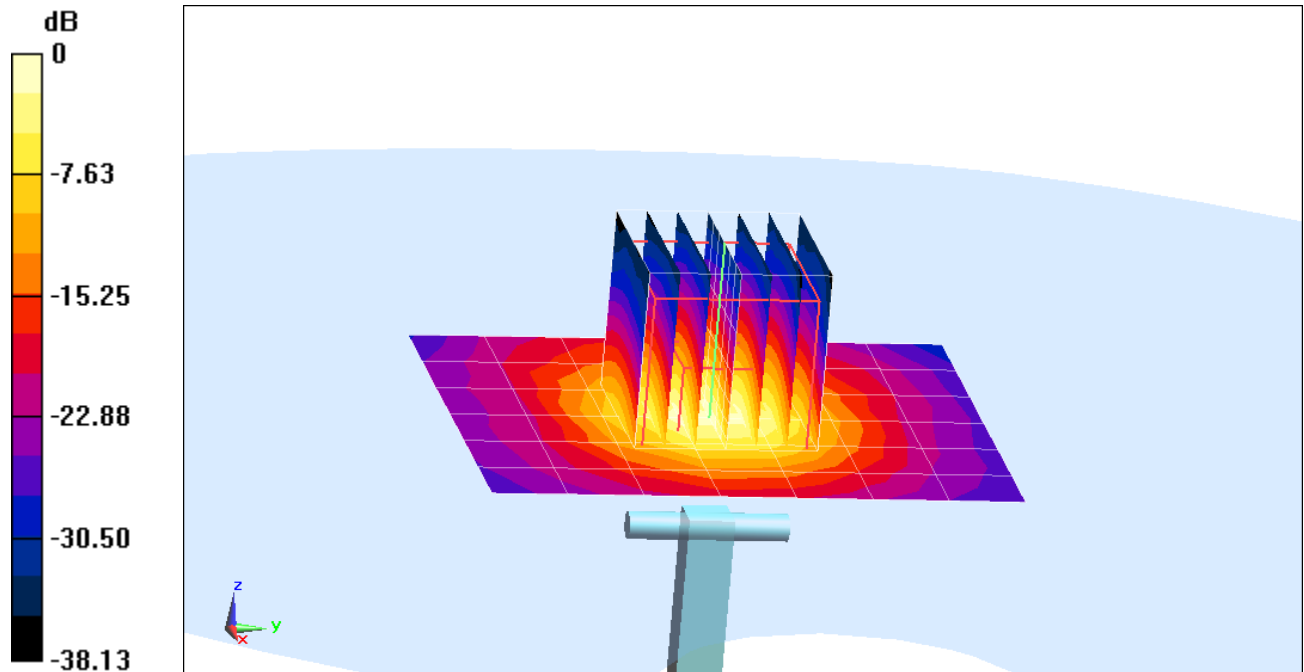
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 32.8 W/kg

**SAR(1 g) = 7.71 W/kg**

Deviation = -7.55%



0 dB = 19.8 W/kg = 12.97 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5500 MHz; Type: D5GHzV2; Serial: 1120**

Communication System: UID 0, CW (0); Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5500$  MHz;  $\sigma = 5.124$  S/m;  $\epsilon_r = 36.806$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-12-2015; Ambient Temp: 22.4°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7308; ConvF(4.64, 4.64, 4.64); Calibrated: 7/16/2014;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

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

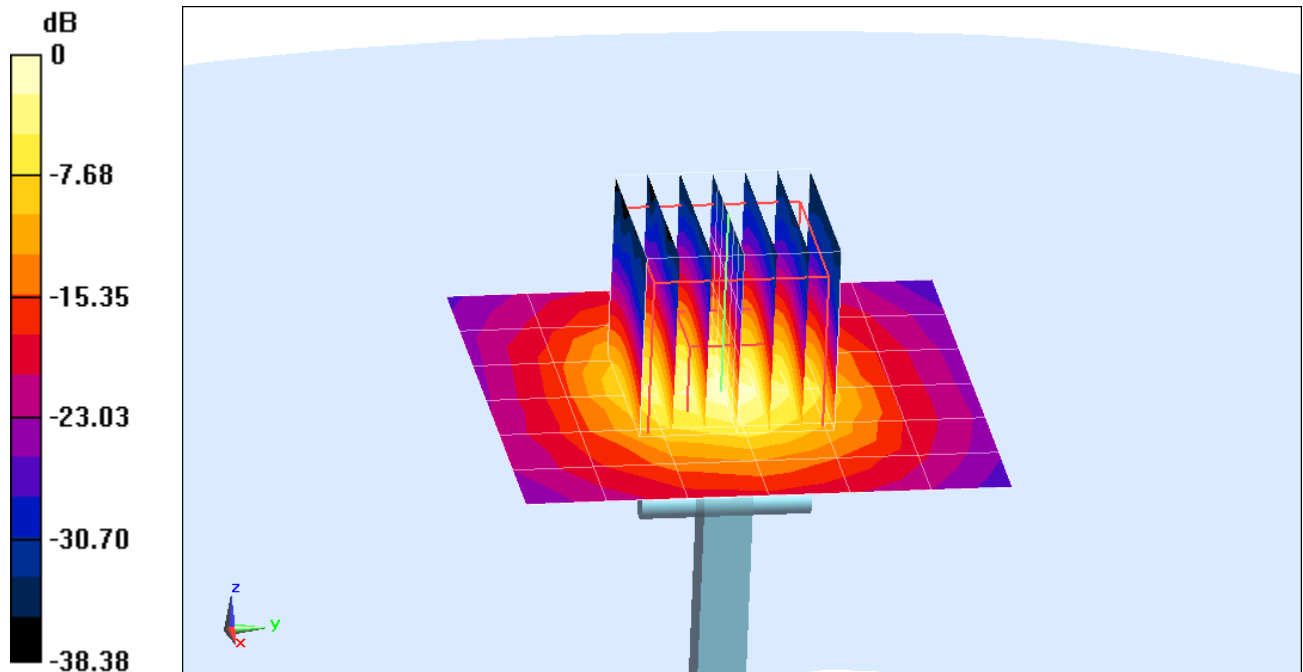
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 34.9 W/kg

**SAR(1 g) = 8.05 W/kg**

Deviation = -5.18%



0 dB = 20.9 W/kg = 13.20 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1120**

Communication System: UID 0, CW (0); Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5800 \text{ MHz}$ ;  $\sigma = 5.458 \text{ S/m}$ ;  $\epsilon_r = 36.337$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-12-2015; Ambient Temp: 22.3°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7308; ConvF(4.81, 4.81, 4.81); Calibrated: 7/16/2014;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

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

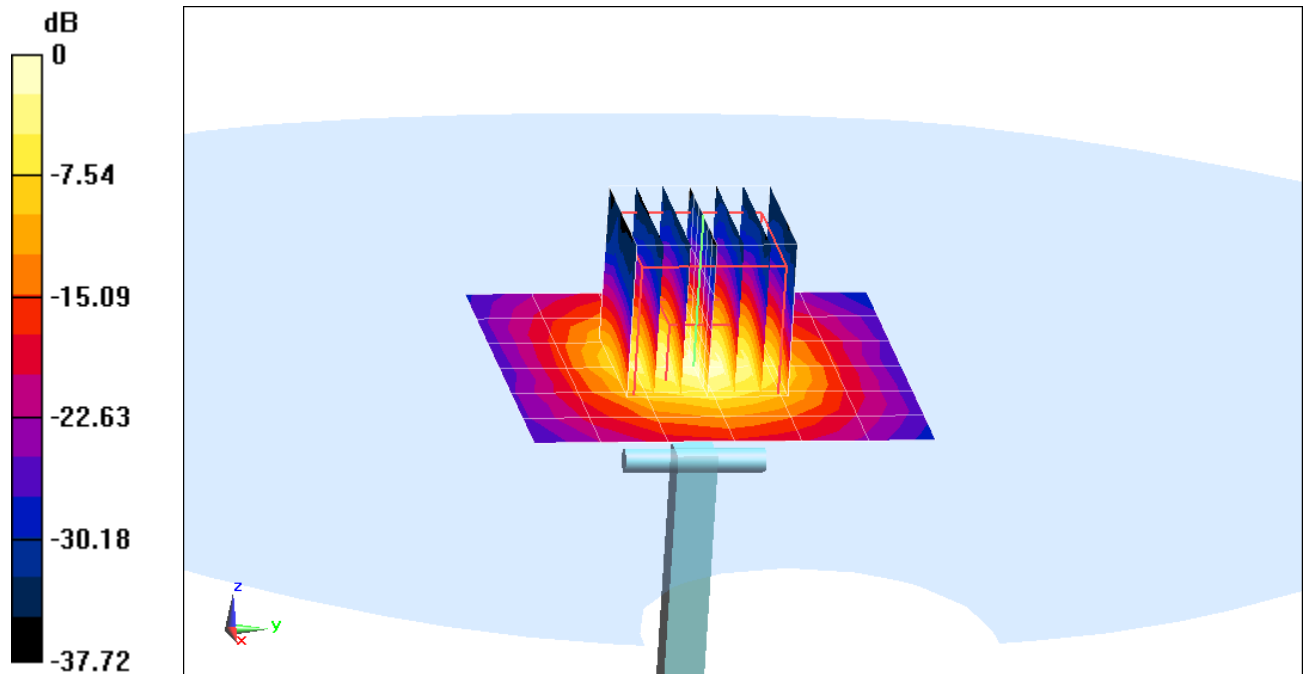
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 32.4 W/kg

**SAR(1 g) = 7.29 W/kg**

Deviation = -7.84%



0 dB = 19.1 W/kg = 12.81 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

**DUT: Dipole 750 MHz; Type: D750V3; Serial: 1054**

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Body Medium parameters used (interpolated):

$f = 750 \text{ MHz}$ ;  $\sigma = 0.965 \text{ S/m}$ ;  $\epsilon_r = 55.717$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-06-2015; Ambient Temp: 23.3°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3263; ConvF(6.19, 6.19, 6.19); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

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

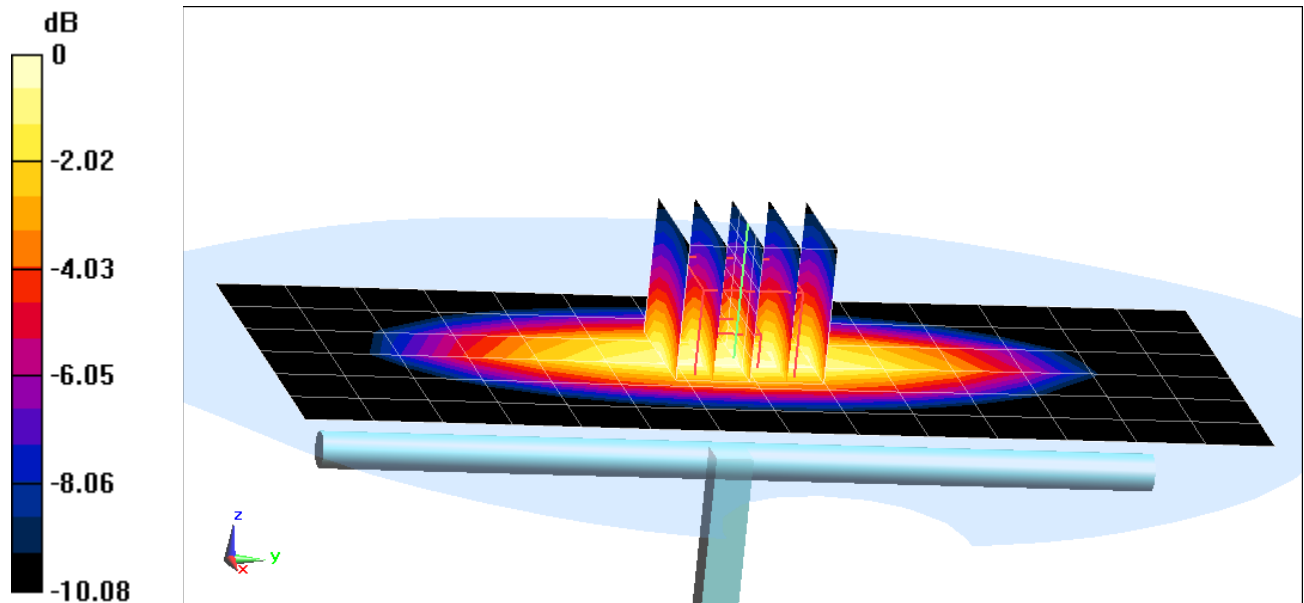
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.41 W/kg

**SAR(1 g) = 0.948 W/kg**

Deviation = 9.72%



0 dB = 1.11 W/kg = 0.45 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used:

$f = 835 \text{ MHz}$ ;  $\sigma = 1.003 \text{ S/m}$ ;  $\epsilon_r = 54.978$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-29-2014; Ambient Temp: 23.0°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3288; ConvF(6.32, 6.32, 6.32); Calibrated: 9/24/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

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

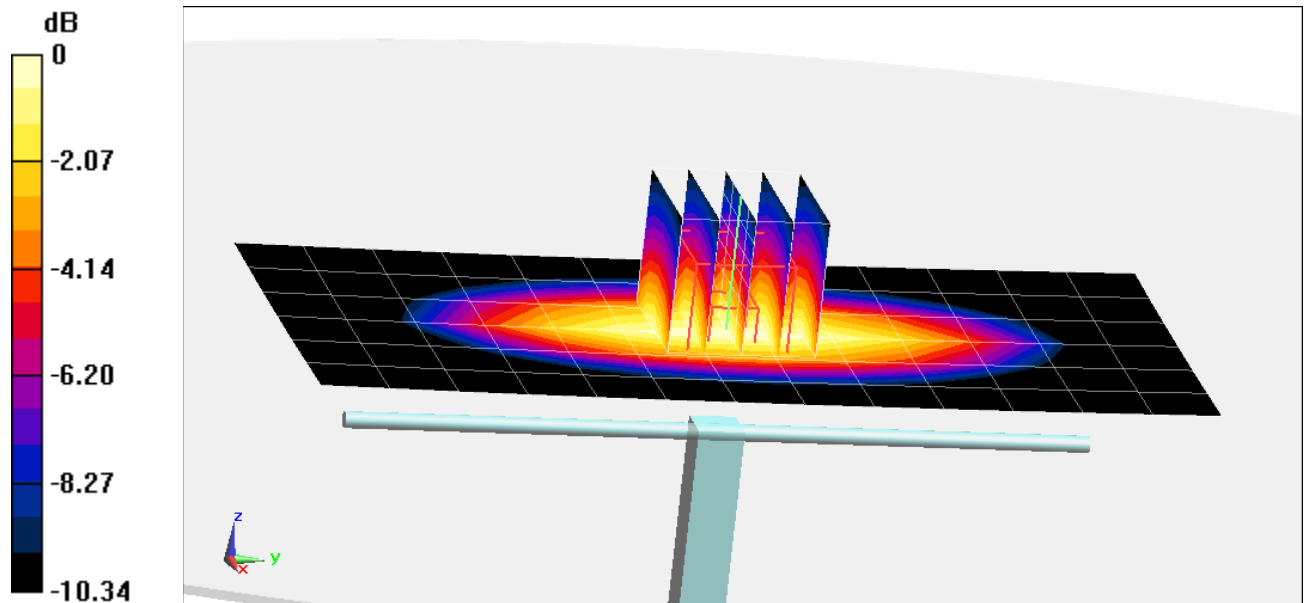
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.39 W/kg

**SAR(1 g) = 0.948 W/kg**

Deviation = 1.39%



0 dB = 1.11 W/kg = 0.45 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;  $\sigma = 1.544$  S/m;  $\epsilon_r = 52.895$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-29-2014; Ambient Temp: 20.8°C; Tissue Temp: 22.5°C

Probe: ES3DV2 - SN3022; ConvF(4.49, 4.49, 4.49); Calibrated: 8/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226

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

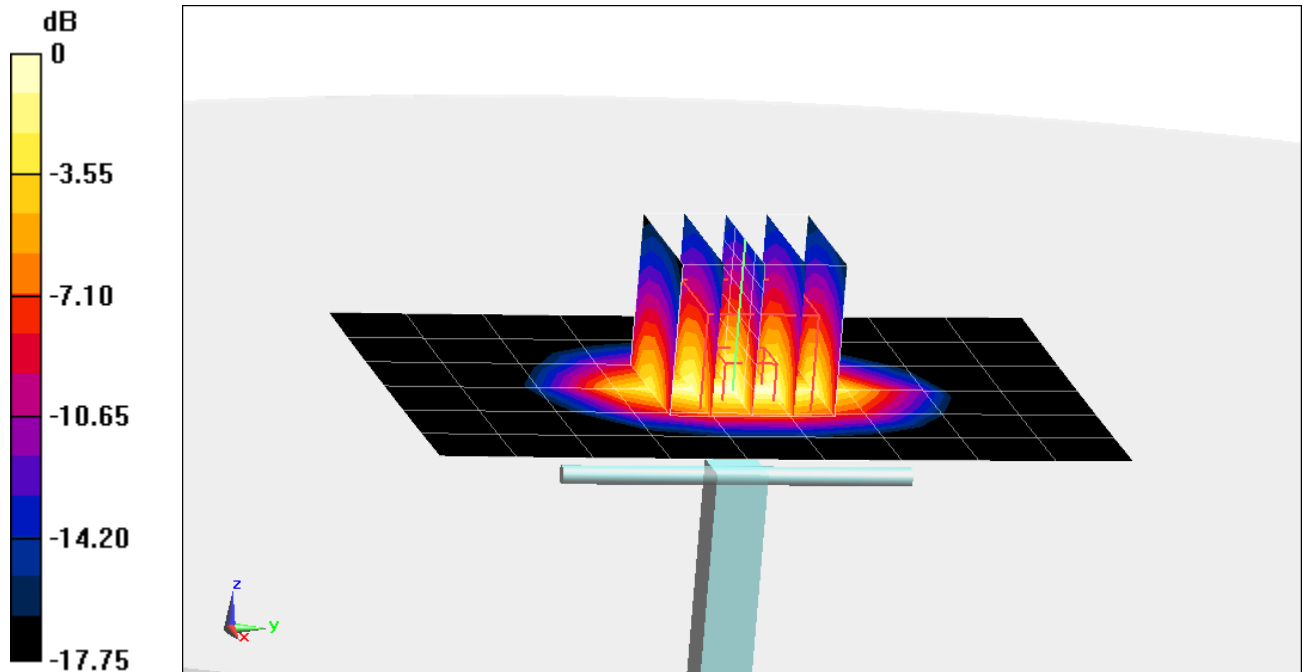
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 7.03 W/kg

**SAR(1 g) = 4.00 W/kg**

Deviation = -1.48%



0 dB = 5.02 W/kg = 7.01 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;  $\sigma = 1.543$  S/m;  $\epsilon_r = 51.255$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-05-2015; Ambient Temp: 24.5°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3258; ConvF(4.61, 4.61, 4.61); Calibrated: 2/25/2014;  
Sensor-Surface: 3mm (Mechanical Surface Detection)  
Electronics: DAE4 Sn665; Calibrated: 2/26/2014  
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158  
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

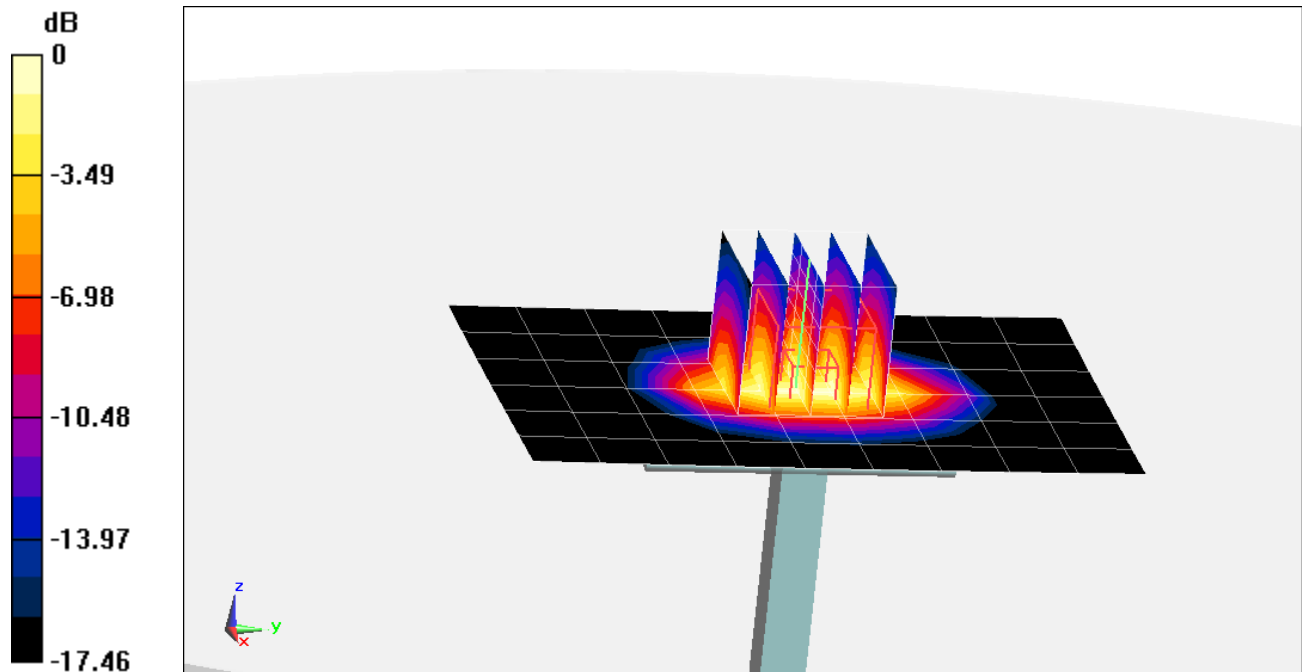
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 6.74 W/kg

**SAR(1 g) = 3.91 W/kg**

Deviation = -3.69%



0 dB = 4.88 W/kg = 6.88 dBW/kg

# PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used:

$f = 2450$  MHz;  $\sigma = 1.977$  S/m;  $\epsilon_r = 52.472$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-31-2014; Ambient Temp: 23.2°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3258; ConvF(4.14, 4.14, 4.14); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

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

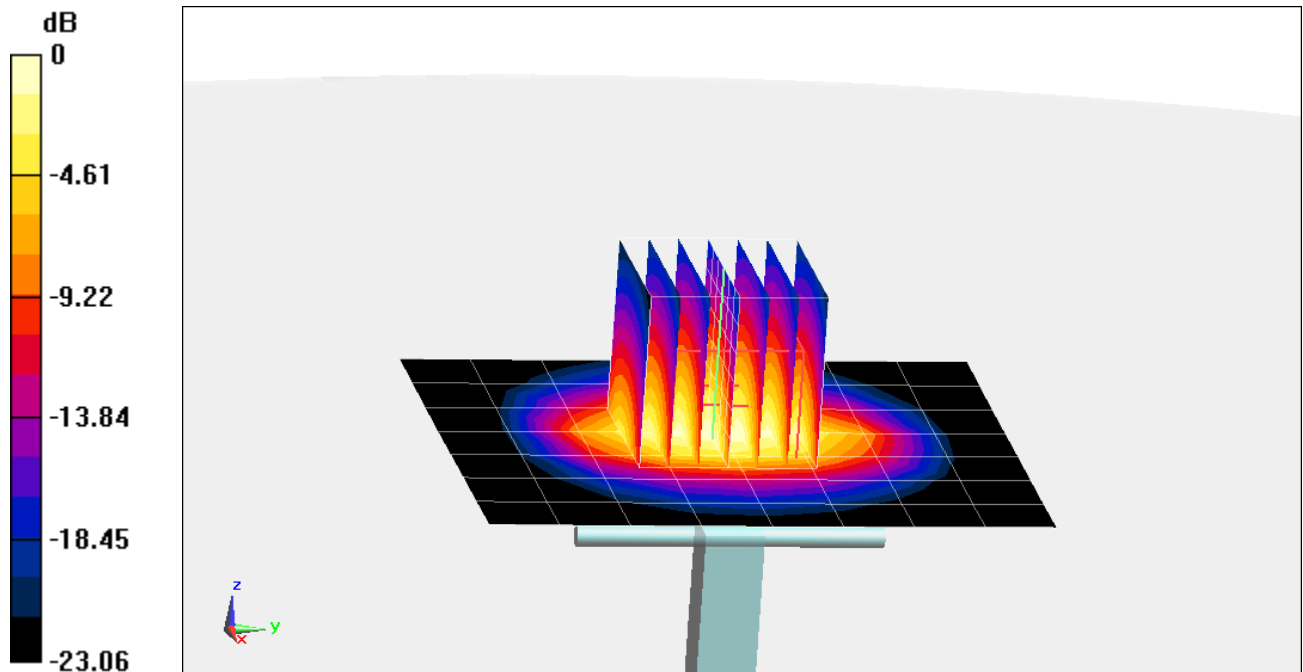
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 10.8 W/kg

**SAR(1 g) = 5.05 W/kg**

Deviation = 2.23%



0 dB = 6.43 W/kg = 8.08 dBW/kg

# 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 Body Medium parameters used:

$f = 5300 \text{ MHz}$ ;  $\sigma = 5.542 \text{ S/m}$ ;  $\epsilon_r = 47.287$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-05-2015; Ambient Temp: 23.4°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3920; ConvF(4.16, 4.16, 4.16); Calibrated: 12/12/2014;

Sensor-Surface: 1.4mm (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)

## 5300 MHz System Verification

**Area Scan (7x8x1):** Measurement grid: dx=10mm, dy=10mm

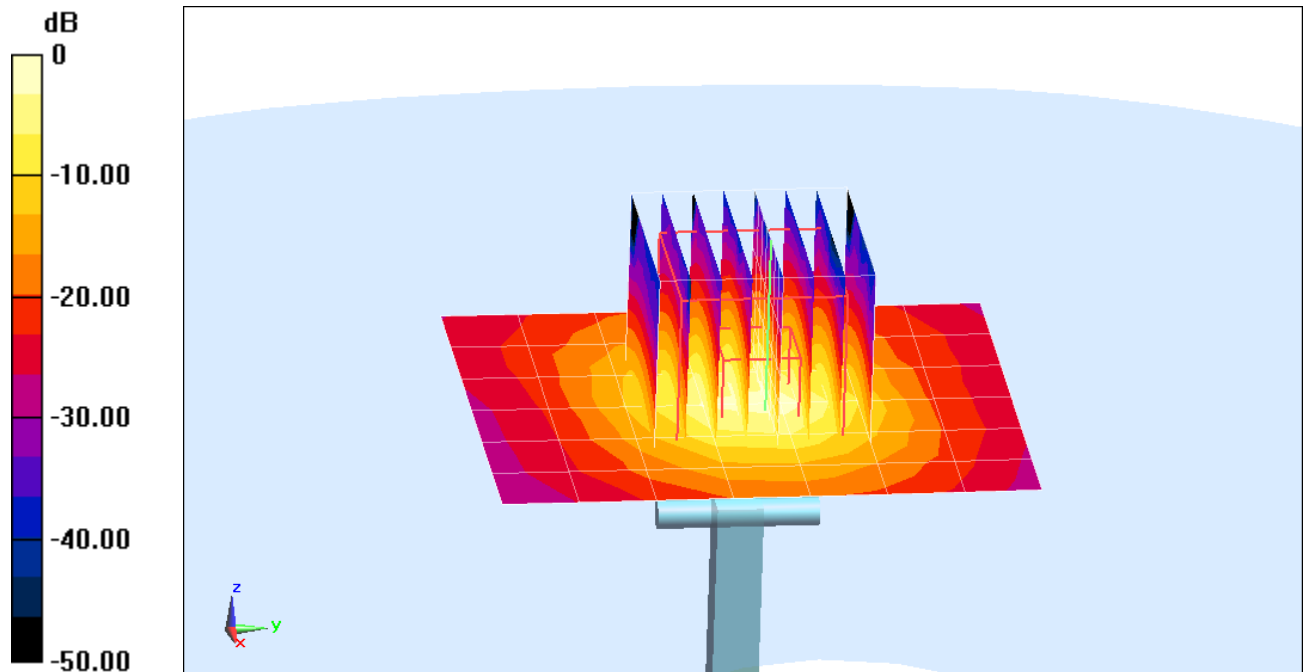
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 30.4 W/kg

**SAR(1 g) = 7.36 W/kg**

Deviation = -4.91%



0 dB = 17.8 W/kg = 12.50 dBW/kg

# 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 Body Medium parameters used:

$f = 5500$  MHz;  $\sigma = 5.829$  S/m;  $\epsilon_r = 46.997$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-05-2015; Ambient Temp: 23.4°C; Tissue Temp: 23.1°C

Probe: EX3DV4 - SN3920; ConvF(3.79, 3.79, 3.79); Calibrated: 12/12/2014;

Sensor-Surface: 1.4mm (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)

## 5500 MHz System Verification

**Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm

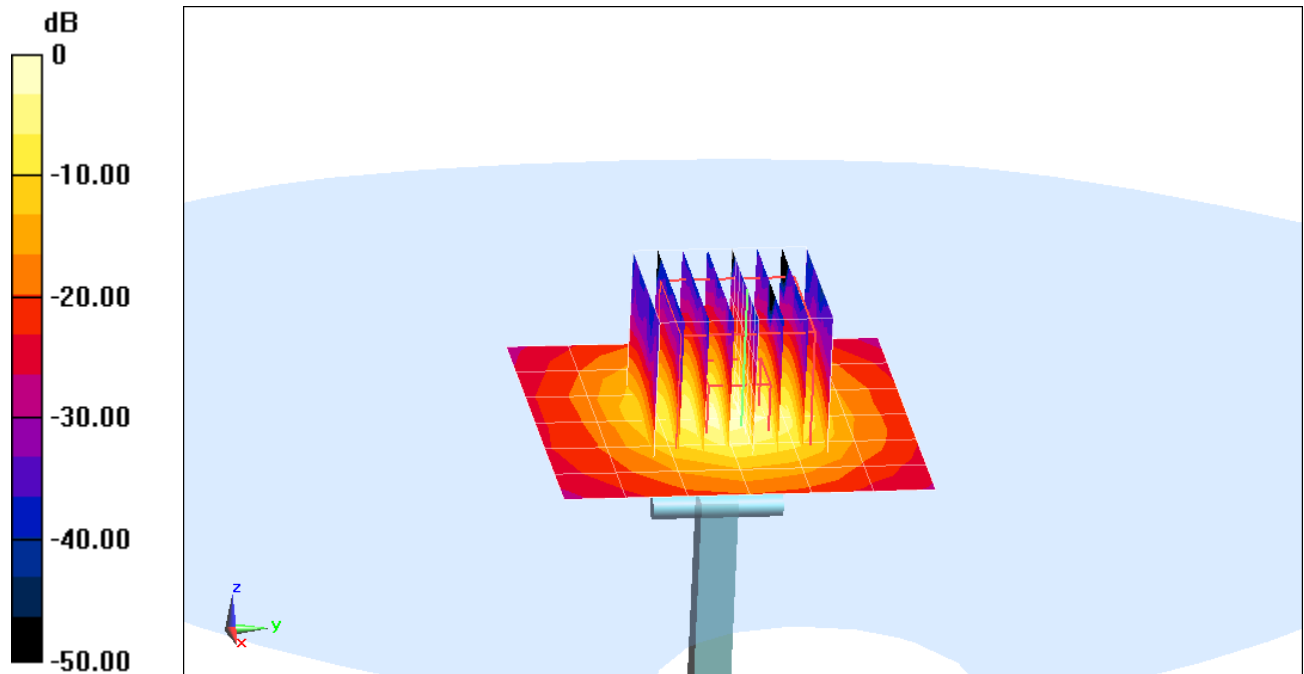
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 30.2 W/kg

**SAR(1 g) = 7.16 W/kg**

Deviation = -9.48%



0 dB = 17.3 W/kg = 12.38 dBW/kg

# 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 Body Medium parameters used:

$f = 5800 \text{ MHz}$ ;  $\sigma = 6.23 \text{ S/m}$ ;  $\epsilon_r = 46.494$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-05-2015; Ambient Temp: 23.5°C; Tissue Temp: 23.2°C

Probe: EX3DV4 - SN3920; ConvF(3.93, 3.93, 3.93); Calibrated: 12/12/2014;

Sensor-Surface: 1.4mm (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)

## 5800 MHz System Verification

**Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm

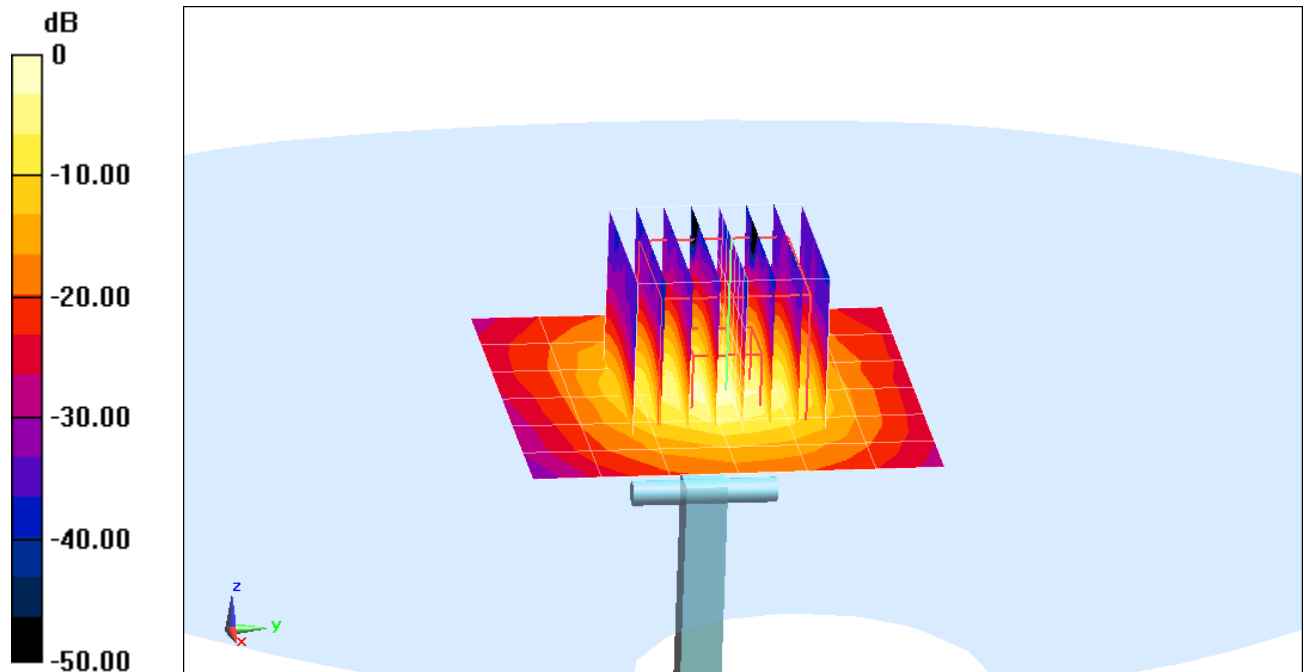
**Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Power Input = 20 dBm (100 mW)

Peak SAR (extrapolated) = 32.7 W/kg

**SAR(1 g) = 7.20 W/kg**

Deviation = -3.10%



0 dB = 17.8 W/kg = 12.50 dBW/kg