



SAR EVALUATION REPORT

Applicant Name:

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Gyeonggi-do 16677, Korea

Date of Testing:

08/10/2015–08/18/2015

Test Site/Location:

PCTEST Lab, Columbia, MD, USA

Document Serial No.:

0Y1508101475-R1.A3L

FCC ID:

A3LSMA500W

APPLICANT:

SAMSUNG ELECTRONICS, CO. LTD.

DUT Type:

Portable Handset

Application Type:

Certification

FCC Rule Part(s):

CFR §2.1093

Model(s):

SM-A500W

Equipment Class	Band & Mode	Tx Frequency	SAR		
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.18	0.38	0.38
PCE	UMTS 850	826.40 - 846.60 MHz	< 0.1	0.19	0.19
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	0.21	0.39	0.59
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.23	0.68	1.09
PCE	LTE Band 17	706.5 - 713.5 MHz	0.15	0.33	0.33
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.19	0.34	0.34
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	0.14	0.57	0.80
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	0.37	0.62	0.91
DTS	2.4 GHz WLAN	2412 - 2462 MHz	0.47	< 0.1	< 0.1
NII	U-NII-1	5180 - 5240 MHz	N/A		
NII	U-NII-2A	5260 - 5320 MHz	0.59	0.16	
NII	U-NII-2C	5500 - 5720 MHz	0.68	0.26	
NII	U-NII-3	5745 - 5825 MHz	0.71	0.27	0.27
DSS/DTS	Bluetooth	2402 - 2480 MHz	N/A	<0.1	N/A
Simultaneous SAR per KDB 690783 D01v01r03:			1.08	0.95	1.36

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.

Note: This revised Test Report (S/N: 0Y1508101475-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
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 17	Data	706.5 - 713.5 MHz
LTE Band 5 (Cell)	Data	824.7 - 848.3 MHz
LTE Band 4 (AWS)	Data	1710.7 - 1754.3 MHz
LTE Band 2 (PCS)	Data	1850.7 - 1909.3 MHz
2.4 GHz WLAN	Data	2412 - 2462 MHz
U-NII-1	Data	5180 - 5240 MHz
U-NII-2A	Data	5260 - 5320 MHz
U-NII-2C	Data	5500 - 5720 MHz
U-NII-3	Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2402 - 2480 MHz

1.2 Nominal and Maximum Output Power Specifications

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

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)				Burst Average 8-PSK (dBm)			
		1 TX Slot	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
GSM/GPRS/EDGE 850	Maximum	33.5	33.5	32.0	30.5	29.0	27.5	26.0	25.0	23.5
	Nominal	33.0	33.0	31.5	30.0	28.5	27.0	25.5	24.5	23.0
GSM/GPRS/EDGE 1900	Maximum	30.5	30.5	27.0	25.5	24.5	27.0	25.0	24.0	23.0
	Nominal	30.0	30.0	26.5	25.0	24.0	26.5	24.5	23.5	22.5

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Mode / Band		Modulated Average (dBm)			
		3GPP WCDMA	3GPP HSDPA	3GPP HSUPA	3GPP DC-HSDPA
UMTS Band 5 (850 MHz)	Maximum	23.5	22.5	22.5	22.5
	Nominal	23.0	22.0	22.0	22.0
UMTS Band 2 (1900 MHz)	Maximum	22.5	22.5	22.5	22.5
	Nominal	22.0	22.0	22.0	22.0

Mode / Band		Modulated Average (dBm)
LTE Band 17	Maximum	23.5
	Nominal	23.0
LTE Band 5 (Cell)	Maximum	23.5
	Nominal	23.0
LTE Band 4 (AWS)	Maximum	23.5
	Nominal	23.0
LTE Band 2 (PCS)	Maximum	23.0
	Nominal	22.5

Mode / Band		Modulated Average (dBm)
IEEE 802.11b (2.4 GHz)	Maximum	17.5
	Nominal	17.0
IEEE 802.11g (2.4 GHz)	Maximum	13.5
	Nominal	13.0
IEEE 802.11n (2.4 GHz)	Maximum	12.5
	Nominal	12.0
Bluetooth	Maximum	12.5
	Nominal	12.0
Bluetooth LE	Maximum	3.5
	Nominal	3.0

Mode / Band		Modulated Average (dBm)	
		20 MHz Bandwidth	40 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	11.5	
	Nominal	11.0	
IEEE 802.11n (5 GHz)	Maximum	11.5	11.5
	Nominal	11.0	11.0

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1.3 DUT Antenna Locations

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

Table 1-1
Device Edges/Sides for SAR Testing

Device Sides/Edges for SAR Testing						
Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	No	Yes
UMTS 850	Yes	Yes	No	Yes	No	Yes
GPRS 1900	Yes	Yes	No	Yes	No	Yes
UMTS 1900	Yes	Yes	No	Yes	No	Yes
LTE Band 17	Yes	Yes	No	Yes	No	Yes
LTE Band 5 (Cell)	Yes	Yes	No	Yes	No	Yes
LTE Band 4 (AWS)	Yes	Yes	No	Yes	No	Yes
LTE Band 2 (PCS)	Yes	Yes	No	Yes	No	Yes
2.4 GHz WLAN	Yes	Yes	Yes	No	Yes	No
U-NII-3	Yes	Yes	Yes	No	Yes	No

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 D06v02 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 through U-NII-2C WLAN operations are disabled. Therefore U-NII-1 through 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.

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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 1-1 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.

Table 1-2
Simultaneous Transmission Scenarios

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

- 2.4 GHz WLAN, 5 GHz WLAN, and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
- All licensed modes share the same antenna path and cannot transmit simultaneously.
- 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.
- 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 GHz Wireless Router is only supported for the U-NII-3 by S/W, therefore U-NII-1, U-NII2A, and U-NII2C were not evaluated for wireless router conditions.

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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 U-NII-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 for 1g SAR, SAR is not required for U-NII-1 band according to FCC KDB 248227 D01v02r01.

(B) Licensed Transmitter(s)

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

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 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 D05v02r03.

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, D05Av01, D06v02 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v02r01 (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)

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1.9 Device Serial Numbers

	Head Serial Number	Body-Worn Serial Number	Hotspot Serial Number
GSM/GPRS/EDGE 850	2494	2486	2486
UMTS 850	2502	2502	2502
GSM/GPRS/EDGE 1900	2494	2494	2494
UMTS 1900	2502	2502	2502
LTE Band 17	2536	2536	2536
LTE Band 5 (Cell)	2536	2536	2536
LTE Band 4 (AWS)	2460	2460	2460
LTE Band 2 (PCS)	2486	2486	2486
2.4 GHz WLAN	2502	2502	2502
5 GHz WLAN	2502	2502	2502
Bluetooth	-	2460	-

Several samples with identical hardware were used to support SAR testing. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.

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LTE INFORMATION

LTE Information			
FCC ID	A3LSMA500W		
Form Factor	Portable Handset		
Frequency Range of each LTE transmission band	LTE Band 17 (706.5 - 713.5 MHz)		
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)		
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)		
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)		
Channel Bandwidths	LTE Band 17: 5 MHz, 10 MHz		
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz		
	LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz		
Channel Numbers and Frequencies (MHz)	Low	Mid	High
LTE Band 17: 5 MHz	706.5 (23755)	710 (23790)	713.5 (23825)
LTE Band 17: 10 MHz	709 (23780)	710 (23790)	711 (23800)
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)	836.5 (20525)	848.3 (20643)
LTE Band 5 (Cell): 3 MHz	825.5 (20415)	836.5 (20525)	847.5 (20635)
LTE Band 5 (Cell): 5 MHz	826.5 (20425)	836.5 (20525)	846.5 (20625)
LTE Band 5 (Cell): 10 MHz	829 (20450)	836.5 (20525)	844 (20600)
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)	1732.5 (20175)	1754.3 (20393)
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)	1732.5 (20175)	1753.5 (20385)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)	1732.5 (20175)	1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)	1732.5 (20175)	1750 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)	1732.5 (20175)	1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720 (20050)	1732.5 (20175)	1745 (20300)
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)	1880 (18900)	1909.3 (19193)
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)	1880 (18900)	1908.5 (19185)
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)	1880 (18900)	1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855 (18650)	1880 (18900)	1905 (19150)
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)	1880 (18900)	1902.5 (19125)
LTE Band 2 (PCS): 20 MHz	1860 (18700)	1880 (18900)	1900 (19100)
UE Category	4		
Modulations Supported in UL	QPSK, 16QAM		
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES		
A-MPR (Additional MPR) disabled for SAR Testing?	YES		

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3 INTRODUCTION

The FCC and Industry Canada have adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 and Health Canada Safety Code 6 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices. [1]

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [22]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,” Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

3.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 3-1).

Equation 3-1
SAR Mathematical Equation

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

SAR is expressed in units of Watts per Kilogram (W/kg).

$$SAR = \frac{\sigma \cdot E^2}{\rho}$$

where:

- σ = conductivity of the tissue-simulating material (S/m)
- ρ = mass density of the tissue-simulating material (kg/m^3)
- E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relation to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

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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.

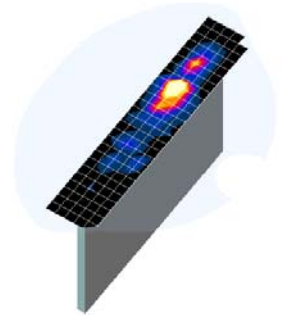


Figure 4-1
Sample SAR Area Scan

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

Frequency	Maximum Area Scan Resolution (mm) ($\Delta x_{\text{area}}, \Delta y_{\text{area}}$)	Maximum Zoom Scan Resolution (mm) ($\Delta x_{\text{zoom}}, \Delta y_{\text{zoom}}$)	Maximum Zoom Scan Spatial Resolution (mm)			Minimum Zoom Scan Volume (mm) (x,y,z)
			Uniform Grid	Graded Grid		
			$\Delta z_{\text{zoom}}(n)$	$\Delta z_{\text{zoom}}(1)^*$	$\Delta z_{\text{zoom}}(n>1)^*$	
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≤ 4	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≤ 4	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≤ 3	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≤ 2.5	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≤ 2	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 22

*Also compliant to IEEE 1528-2013 Table 6

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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].

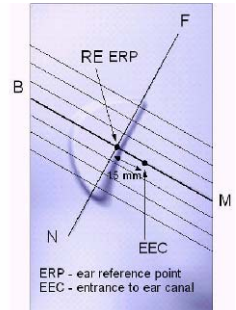


Figure 5-1
Close-Up Side view
of ERP

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

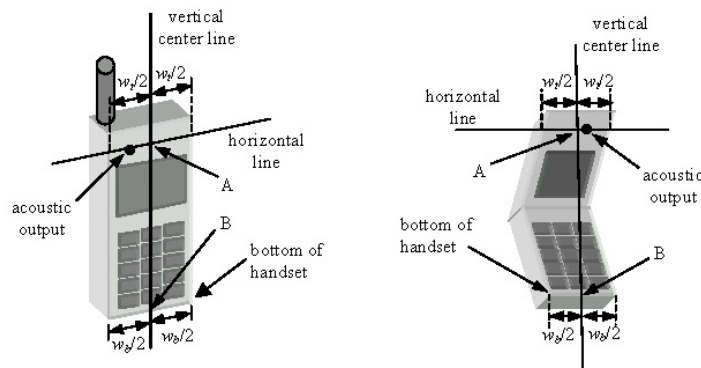


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

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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.

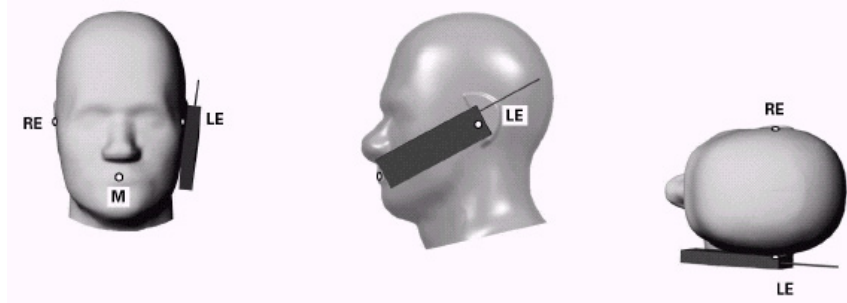


Figure 6-1 Front, Side and Top View of Cheek Position

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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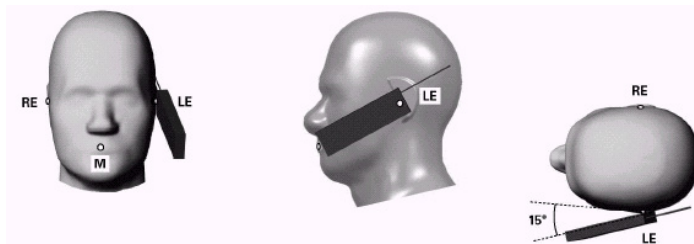


Figure 6-2 Front, Side and Top View of Ear/15° Tilt Position

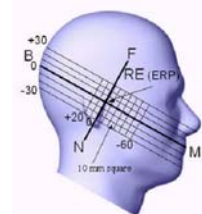


Figure 6-3 Side view w/ relevant markings

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 D04v01r02, 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.

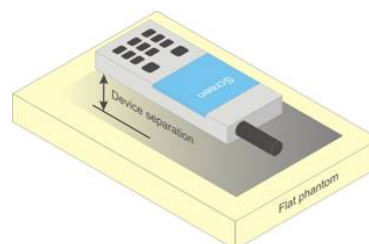


Figure 6-4 Sample Body-Worn Diagram

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.

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 447498 D01v05 should be applied to determine SAR test requirements.

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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 D06v02 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)
Peak Spatial Average SAR Head	1.6	8.0
Whole Body SAR	0.08	0.4
Peak Spatial Average SAR Hands, Feet, Ankle, Wrists, etc.	4.0	20

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

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8.1 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 ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is ≤ 1.2 W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

8.3 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 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.

8.4 SAR Measurement Conditions for UMTS

8.4.1 Output Power Verification

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

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8.4.2 Head SAR Measurements

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

8.4.3 Body SAR Measurements

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

8.4.4 SAR Measurements with Rel 5 HSDPA

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

8.4.5 SAR Measurements with Rel 6 HSUPA

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

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

8.4.6 SAR Measurement Conditions for DC-HSDPA

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

8.5 SAR Measurement Conditions for LTE

LTE modes are tested according to FCC KDB 941225 D05v02r03 publication. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 or Anritsu MT8820C simulators are used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

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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 D05v02r03:

- a. Per Section 4.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
 - i. The required channel and offset combination with the highest maximum output power is required for SAR.
 - ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
 - iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
- b. Per Section 4.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 4.2.1.
- c. Per Section 4.2.3, 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 4.2.4 and 4.3, 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 4.2.1 through 4.2.3 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.

8.6 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v02r01 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

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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.

8.6.4 Initial Test Position Procedure

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

8.6.5 2.4 GHz SAR Test Requirements

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

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

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

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

8.6.8 Subsequent Test Configuration Procedures

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

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9

RF CONDUCTED POWERS

9.1 GSM Conducted Powers

		Maximum Burst-Averaged Output Power								
		Voice	GPRS/EDGE Data (GMSK)				EDGE Data (8-PSK)			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 850	128	32.88	33.08	31.26	30.03	28.17	26.64	25.14	24.13	22.91
	190	32.80	33.01	31.16	29.80	27.91	26.47	25.00	23.96	22.81
	251	32.78	32.94	31.11	29.76	28.12	26.48	25.02	23.97	22.75
GSM 1900	512	29.64	29.63	26.27	25.16	24.13	25.92	24.35	23.29	22.75
	661	29.39	29.37	26.09	25.01	23.96	25.54	24.04	23.07	22.48
	810	29.92	29.92	26.46	25.44	24.23	25.83	24.25	23.18	22.68
		Calculated Maximum Frame-Averaged Output Power								
		Voice	GPRS/EDGE Data (GMSK)				EDGE Data (8-PSK)			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 850	128	23.85	24.05	25.24	25.77	25.16	17.61	19.12	19.87	19.90
	190	23.77	23.98	25.14	25.54	24.90	17.44	18.98	19.70	19.80
	251	23.75	23.91	25.09	25.50	25.11	17.45	19.00	19.71	19.74
GSM 1900	512	20.61	20.60	20.25	20.90	21.12	16.89	18.33	19.03	19.74
	661	20.36	20.34	20.07	20.75	20.95	16.51	18.02	18.81	19.47
	810	20.89	20.89	20.44	21.18	21.22	16.80	18.23	18.92	19.67
GSM 850	Frame	23.97	23.97	25.48	25.74	25.49	17.97	19.48	20.24	19.99
GSM 1900	Avg.Targets:	20.97	20.97	20.48	20.74	20.99	17.47	18.48	19.24	19.49

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Note:

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

GSM Class: B
GPRS Multislot class: 33 (Max 4 Tx uplink slots)
EDGE Multislot class: 33 (Max 4 Tx uplink slots)
DTM Multislot Class: N/A



Figure 9-1
Power Measurement Setup

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9.2 UMTS Conducted Powers

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	22.62	22.58	22.63	22.29	22.09	22.42	-
99		12.2 kbps AMR	22.61	22.48	22.51	22.03	21.82	22.12	-
6	HSDPA	Subtest 1	21.99	21.88	21.87	21.63	21.48	21.56	0
6		Subtest 2	21.98	21.91	21.90	21.58	21.47	21.58	0
6		Subtest 3	21.46	21.34	21.44	21.09	20.99	21.09	0.5
6		Subtest 4	21.44	21.38	21.45	21.14	21.01	21.17	0.5
6	HSUPA	Subtest 1	21.40	21.33	21.47	21.36	20.76	21.45	0
6		Subtest 2	20.78	20.76	20.56	20.27	20.32	20.24	2
6		Subtest 3	20.72	20.57	20.69	20.24	19.93	20.18	1
6		Subtest 4	20.63	20.77	20.87	20.41	20.40	20.67	2
6		Subtest 5	21.99	21.87	21.96	21.61	21.52	21.69	0
8	DC-HSDPA	Subtest 1	21.58	21.56	21.51	21.15	20.98	21.13	0
8		Subtest 2	21.63	21.55	21.66	21.22	21.03	21.22	0
8		Subtest 3	21.14	21.02	21.00	20.77	20.56	20.64	0.5
8		Subtest 4	21.13	21.00	21.13	20.78	20.57	20.67	0.5

DC-HSDPA considerations

- 3GPP Specification 34.121-1 Release 8 Ver 8.10.0 was used for DC-HSDPA guidance
- H-Set 12 (QPSK) was confirmed to be used during DC-HSDPA measurements
- The DUT supports UE category 24 for HSDPA

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.

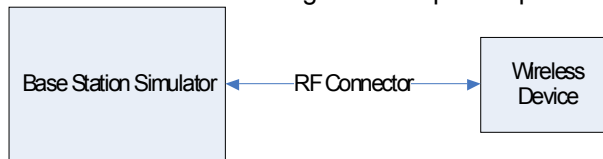


Figure 9-2
Power Measurement Setup

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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	22.87	0	0
	710.0	23790	10	QPSK	1	25	22.74	0	0
	710.0	23790	10	QPSK	1	49	22.76	0	0
	710.0	23790	10	QPSK	25	0	21.77	0-1	1
	710.0	23790	10	QPSK	25	12	21.83	0-1	1
	710.0	23790	10	QPSK	25	25	21.86	0-1	1
	710.0	23790	10	QPSK	50	0	21.78	0-1	1
	710.0	23790	10	16QAM	1	0	22.19	0-1	1
	710.0	23790	10	16QAM	1	25	22.05	0-1	1
	710.0	23790	10	16QAM	1	49	21.97	0-1	1
	710.0	23790	10	16QAM	25	0	20.87	0-2	2
	710.0	23790	10	16QAM	25	12	20.94	0-2	2
	710.0	23790	10	16QAM	25	25	20.83	0-2	2
	710.0	23790	10	16QAM	50	0	20.76	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	22.74	0	0
	710.0	23790	5	QPSK	1	12	22.72	0	0
	710.0	23790	5	QPSK	1	24	22.78	0	0
	710.0	23790	5	QPSK	12	0	21.90	0-1	1
	710.0	23790	5	QPSK	12	6	21.93	0-1	1
	710.0	23790	5	QPSK	12	13	21.88	0-1	1
	710.0	23790	5	QPSK	25	0	21.91	0-1	1
	710.0	23790	5	16-QAM	1	0	22.00	0-1	1
	710.0	23790	5	16-QAM	1	12	22.04	0-1	1
	710.0	23790	5	16-QAM	1	24	22.08	0-1	1
	710.0	23790	5	16-QAM	12	0	20.97	0-2	2
	710.0	23790	5	16-QAM	12	6	20.94	0-2	2
	710.0	23790	5	16-QAM	12	13	20.93	0-2	2
	710.0	23790	5	16-QAM	25	0	20.91	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 5 (Cell)

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	836.5	20525	10	QPSK	1	0	23.08	0	0
	836.5	20525	10	QPSK	1	25	22.96	0	0
	836.5	20525	10	QPSK	1	49	23.05	0	0
	836.5	20525	10	QPSK	25	0	21.99	0-1	1
	836.5	20525	10	QPSK	25	12	21.97	0-1	1
	836.5	20525	10	QPSK	25	25	22.01	0-1	1
	836.5	20525	10	QPSK	50	0	21.93	0-1	1
	836.5	20525	10	16QAM	1	0	22.37	0-1	1
	836.5	20525	10	16QAM	1	25	22.30	0-1	1
	836.5	20525	10	16QAM	1	49	22.44	0-1	1
	836.5	20525	10	16QAM	25	0	20.89	0-2	2
	836.5	20525	10	16QAM	25	12	20.76	0-2	2
	836.5	20525	10	16QAM	25	25	20.88	0-2	2
	836.5	20525	10	16QAM	50	0	20.81	0-2	2

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

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	826.5	20425	5	QPSK	1	0	23.24	0	0
	826.5	20425	5	QPSK	1	12	23.22	0	0
	826.5	20425	5	QPSK	1	24	23.12	0	0
	826.5	20425	5	QPSK	12	0	22.25	0-1	1
	826.5	20425	5	QPSK	12	6	22.22	0-1	1
	826.5	20425	5	QPSK	12	13	22.14	0-1	1
	826.5	20425	5	QPSK	25	0	22.17	0-1	1
	826.5	20425	5	16-QAM	1	0	22.20	0-1	1
	826.5	20425	5	16-QAM	1	12	22.16	0-1	1
	826.5	20425	5	16-QAM	1	24	22.07	0-1	1
	826.5	20425	5	16-QAM	12	0	21.18	0-2	2
	826.5	20425	5	16-QAM	12	6	21.21	0-2	2
	826.5	20425	5	16-QAM	12	13	21.15	0-2	2
	826.5	20425	5	16-QAM	25	0	21.13	0-2	2
Mid	836.5	20525	5	QPSK	1	0	22.83	0	0
	836.5	20525	5	QPSK	1	12	22.87	0	0
	836.5	20525	5	QPSK	1	24	22.93	0	0
	836.5	20525	5	QPSK	12	0	21.89	0-1	1
	836.5	20525	5	QPSK	12	6	21.87	0-1	1
	836.5	20525	5	QPSK	12	13	21.85	0-1	1
	836.5	20525	5	QPSK	25	0	21.87	0-1	1
	836.5	20525	5	16-QAM	1	0	21.80	0-1	1
	836.5	20525	5	16-QAM	1	12	21.83	0-1	1
	836.5	20525	5	16-QAM	1	24	21.93	0-1	1
	836.5	20525	5	16-QAM	12	0	20.86	0-2	2
	836.5	20525	5	16-QAM	12	6	20.81	0-2	2
	836.5	20525	5	16-QAM	12	13	20.77	0-2	2
	836.5	20525	5	16-QAM	25	0	20.87	0-2	2
High	846.5	20625	5	QPSK	1	0	22.82	0	0
	846.5	20625	5	QPSK	1	12	22.89	0	0
	846.5	20625	5	QPSK	1	24	22.97	0	0
	846.5	20625	5	QPSK	12	0	21.97	0-1	1
	846.5	20625	5	QPSK	12	6	22.01	0-1	1
	846.5	20625	5	QPSK	12	13	22.00	0-1	1
	846.5	20625	5	QPSK	25	0	22.01	0-1	1
	846.5	20625	5	16-QAM	1	0	22.07	0-1	1
	846.5	20625	5	16-QAM	1	12	22.14	0-1	1
	846.5	20625	5	16-QAM	1	24	22.24	0-1	1
	846.5	20625	5	16-QAM	12	0	20.91	0-2	2
	846.5	20625	5	16-QAM	12	6	20.98	0-2	2
	846.5	20625	5	16-QAM	12	13	21.04	0-2	2
	846.5	20625	5	16-QAM	25	0	20.96	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	825.5	20415	3	QPSK	1	0	23.20	0	0
	825.5	20415	3	QPSK	1	7	23.14	0	0
	825.5	20415	3	QPSK	1	14	23.17	0	0
	825.5	20415	3	QPSK	8	0	22.25	0-1	1
	825.5	20415	3	QPSK	8	4	22.21	0-1	1
	825.5	20415	3	QPSK	8	7	22.18	0-1	1
	825.5	20415	3	QPSK	15	0	22.16	0-1	1
	825.5	20415	3	16-QAM	1	0	22.00	0-1	1
	825.5	20415	3	16-QAM	1	7	21.94	0-1	1
	825.5	20415	3	16-QAM	1	14	21.91	0-1	1
	825.5	20415	3	16-QAM	8	0	20.90	0-2	2
	825.5	20415	3	16-QAM	8	4	20.94	0-2	2
	825.5	20415	3	16-QAM	8	7	20.92	0-2	2
Mid	825.5	20415	3	16-QAM	15	0	21.11	0-2	2
	836.5	20525	3	QPSK	1	0	22.69	0	0
	836.5	20525	3	QPSK	1	7	22.72	0	0
	836.5	20525	3	QPSK	1	14	22.84	0	0
	836.5	20525	3	QPSK	8	0	21.91	0-1	1
	836.5	20525	3	QPSK	8	4	21.83	0-1	1
	836.5	20525	3	QPSK	8	7	21.83	0-1	1
	836.5	20525	3	QPSK	15	0	21.89	0-1	1
	836.5	20525	3	16-QAM	1	0	21.52	0-1	1
	836.5	20525	3	16-QAM	1	7	21.53	0-1	1
	836.5	20525	3	16-QAM	1	14	21.61	0-1	1
	836.5	20525	3	16-QAM	8	0	20.83	0-2	2
	836.5	20525	3	16-QAM	8	4	20.81	0-2	2
High	836.5	20525	3	16-QAM	8	7	20.76	0-2	2
	836.5	20525	3	16-QAM	15	0	20.78	0-2	2
	847.5	20635	3	QPSK	1	0	22.88	0	0
	847.5	20635	3	QPSK	1	7	22.91	0	0
	847.5	20635	3	QPSK	1	14	22.95	0	0
	847.5	20635	3	QPSK	8	0	22.02	0-1	1
	847.5	20635	3	QPSK	8	4	22.06	0-1	1
	847.5	20635	3	QPSK	8	7	22.06	0-1	1
	847.5	20635	3	QPSK	15	0	22.08	0-1	1
	847.5	20635	3	16-QAM	1	0	22.14	0-1	1
	847.5	20635	3	16-QAM	1	7	22.21	0-1	1
	847.5	20635	3	16-QAM	1	14	22.26	0-1	1
	847.5	20635	3	16-QAM	8	0	20.81	0-2	2
	847.5	20635	3	16-QAM	8	4	20.83	0-2	2
	847.5	20635	3	16-QAM	8	7	20.86	0-2	2
	847.5	20635	3	16-QAM	15	0	20.99	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	824.7	20407	1.4	QPSK	1	0	23.23	0	0
	824.7	20407	1.4	QPSK	1	2	23.26	0	0
	824.7	20407	1.4	QPSK	1	5	23.26	0	0
	824.7	20407	1.4	QPSK	3	0	23.25	0	0
	824.7	20407	1.4	QPSK	3	2	23.21	0	0
	824.7	20407	1.4	QPSK	3	3	23.26	0	0
	824.7	20407	1.4	QPSK	6	0	22.23	0-1	1
	824.7	20407	1.4	16-QAM	1	0	21.96	0-1	1
	824.7	20407	1.4	16-QAM	1	2	21.94	0-1	1
	824.7	20407	1.4	16-QAM	1	5	21.97	0-1	1
	824.7	20407	1.4	16-QAM	3	0	22.22	0-1	1
	824.7	20407	1.4	16-QAM	3	2	22.18	0-1	1
	824.7	20407	1.4	16-QAM	3	3	22.21	0-1	1
	824.7	20407	1.4	16-QAM	6	0	20.99	0-2	2
Mid	836.5	20525	1.4	QPSK	1	0	22.79	0	0
	836.5	20525	1.4	QPSK	1	2	22.76	0	0
	836.5	20525	1.4	QPSK	1	5	22.76	0	0
	836.5	20525	1.4	QPSK	3	0	22.82	0	0
	836.5	20525	1.4	QPSK	3	2	22.88	0	0
	836.5	20525	1.4	QPSK	3	3	22.86	0	0
	836.5	20525	1.4	QPSK	6	0	21.82	0-1	1
	836.5	20525	1.4	16-QAM	1	0	21.53	0-1	1
	836.5	20525	1.4	16-QAM	1	2	21.52	0-1	1
	836.5	20525	1.4	16-QAM	1	5	21.54	0-1	1
	836.5	20525	1.4	16-QAM	3	0	21.86	0-1	1
	836.5	20525	1.4	16-QAM	3	2	21.88	0-1	1
	836.5	20525	1.4	16-QAM	3	3	21.93	0-1	1
	836.5	20525	1.4	16-QAM	6	0	20.62	0-2	2
High	848.3	20643	1.4	QPSK	1	0	23.16	0	0
	848.3	20643	1.4	QPSK	1	2	23.06	0	0
	848.3	20643	1.4	QPSK	1	5	23.19	0	0
	848.3	20643	1.4	QPSK	3	0	23.04	0	0
	848.3	20643	1.4	QPSK	3	2	23.04	0	0
	848.3	20643	1.4	QPSK	3	3	23.09	0	0
	848.3	20643	1.4	QPSK	6	0	22.07	0-1	1
	848.3	20643	1.4	16-QAM	1	0	21.63	0-1	1
	848.3	20643	1.4	16-QAM	1	2	21.69	0-1	1
	848.3	20643	1.4	16-QAM	1	5	21.73	0-1	1
	848.3	20643	1.4	16-QAM	3	0	21.99	0-1	1
	848.3	20643	1.4	16-QAM	3	2	22.01	0-1	1
	848.3	20643	1.4	16-QAM	3	3	22.02	0-1	1
	848.3	20643	1.4	16-QAM	6	0	21.01	0-2	2

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9.3.3 LTE Band 4 (AWS)

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	1732.5	20175	20	QPSK	1	0	22.50	0	0
	1732.5	20175	20	QPSK	1	50	22.35	0	0
	1732.5	20175	20	QPSK	1	99	22.21	0	0
	1732.5	20175	20	QPSK	50	0	21.22	0-1	1
	1732.5	20175	20	QPSK	50	25	21.17	0-1	1
	1732.5	20175	20	QPSK	50	50	21.13	0-1	1
	1732.5	20175	20	QPSK	100	0	21.21	0-1	1
	1732.5	20175	20	16QAM	1	0	21.34	0-1	1
	1732.5	20175	20	16QAM	1	50	21.45	0-1	1
	1732.5	20175	20	16QAM	1	99	21.33	0-1	1
	1732.5	20175	20	16QAM	50	0	20.21	0-2	2
	1732.5	20175	20	16QAM	50	25	20.28	0-2	2
	1732.5	20175	20	16QAM	50	50	20.19	0-2	2
	1732.5	20175	20	16QAM	100	0	20.22	0-2	2

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

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1717.5	20025	15	QPSK	1	0	22.43	0	0
	1717.5	20025	15	QPSK	1	36	22.45	0	0
	1717.5	20025	15	QPSK	1	74	22.39	0	0
	1717.5	20025	15	QPSK	36	0	21.54	0-1	1
	1717.5	20025	15	QPSK	36	18	21.51	0-1	1
	1717.5	20025	15	QPSK	36	37	21.40	0-1	1
	1717.5	20025	15	QPSK	75	0	21.46	0-1	1
	1717.5	20025	15	16QAM	1	0	21.71	0-1	1
	1717.5	20025	15	16QAM	1	36	21.69	0-1	1
	1717.5	20025	15	16QAM	1	74	21.70	0-1	1
	1717.5	20025	15	16QAM	36	0	20.60	0-2	2
	1717.5	20025	15	16QAM	36	18	20.59	0-2	2
Mid	1717.5	20025	15	16QAM	36	37	20.47	0-2	2
	1717.5	20025	15	16QAM	75	0	20.44	0-2	2
	1732.5	20175	15	QPSK	1	0	22.35	0	0
	1732.5	20175	15	QPSK	1	36	22.26	0	0
	1732.5	20175	15	QPSK	1	74	22.21	0	0
	1732.5	20175	15	QPSK	36	0	21.34	0-1	1
	1732.5	20175	15	QPSK	36	18	21.44	0-1	1
	1732.5	20175	15	QPSK	36	37	21.33	0-1	1
	1732.5	20175	15	QPSK	75	0	21.30	0-1	1
	1732.5	20175	15	16QAM	1	0	21.70	0-1	1
	1732.5	20175	15	16QAM	1	36	21.67	0-1	1
	1732.5	20175	15	16QAM	1	74	21.65	0-1	1
High	1732.5	20175	15	16QAM	36	0	20.46	0-2	2
	1732.5	20175	15	16QAM	36	18	20.43	0-2	2
	1732.5	20175	15	16QAM	36	37	20.38	0-2	2
	1732.5	20175	15	16QAM	75	0	20.30	0-2	2
	1747.5	20325	15	QPSK	1	0	22.28	0	0
	1747.5	20325	15	QPSK	1	36	22.18	0	0
	1747.5	20325	15	QPSK	1	74	22.23	0	0
	1747.5	20325	15	QPSK	36	0	21.37	0-1	1
	1747.5	20325	15	QPSK	36	18	21.23	0-1	1
	1747.5	20325	15	QPSK	36	37	21.28	0-1	1
	1747.5	20325	15	QPSK	75	0	21.25	0-1	1
	1747.5	20325	15	16QAM	1	0	21.70	0-1	1
	1747.5	20325	15	16QAM	1	36	21.67	0-1	1
	1747.5	20325	15	16QAM	1	74	21.69	0-1	1
	1747.5	20325	15	16QAM	36	0	20.37	0-2	2
	1747.5	20325	15	16QAM	36	18	20.34	0-2	2
	1747.5	20325	15	16QAM	36	37	20.31	0-2	2
	1747.5	20325	15	16QAM	75	0	20.27	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1715	20000	10	QPSK	1	0	22.37	0	0
	1715	20000	10	QPSK	1	25	22.39	0	0
	1715	20000	10	QPSK	1	49	22.41	0	0
	1715	20000	10	QPSK	25	0	21.59	0-1	1
	1715	20000	10	QPSK	25	12	21.45	0-1	1
	1715	20000	10	QPSK	25	25	21.61	0-1	1
	1715	20000	10	QPSK	50	0	21.46	0-1	1
	1715	20000	10	16QAM	1	0	21.86	0-1	1
	1715	20000	10	16QAM	1	25	21.87	0-1	1
	1715	20000	10	16QAM	1	49	21.92	0-1	1
	1715	20000	10	16QAM	25	0	20.50	0-2	2
	1715	20000	10	16QAM	25	12	20.49	0-2	2
	1715	20000	10	16QAM	25	25	20.50	0-2	2
Mid	1715	20000	10	16QAM	50	0	20.43	0-2	2
	1732.5	20175	10	QPSK	1	0	22.44	0	0
	1732.5	20175	10	QPSK	1	25	22.32	0	0
	1732.5	20175	10	QPSK	1	49	22.28	0	0
	1732.5	20175	10	QPSK	25	0	21.44	0-1	1
	1732.5	20175	10	QPSK	25	12	21.44	0-1	1
	1732.5	20175	10	QPSK	25	25	21.45	0-1	1
	1732.5	20175	10	QPSK	50	0	21.40	0-1	1
	1732.5	20175	10	16QAM	1	0	21.91	0-1	1
	1732.5	20175	10	16QAM	1	25	21.80	0-1	1
	1732.5	20175	10	16QAM	1	49	21.81	0-1	1
	1732.5	20175	10	16QAM	25	0	20.40	0-2	2
	1732.5	20175	10	16QAM	25	12	20.42	0-2	2
	1732.5	20175	10	16QAM	25	25	20.38	0-2	2
High	1732.5	20175	10	16QAM	50	0	20.36	0-2	2
	1750	20350	10	QPSK	1	0	22.22	0	0
	1750	20350	10	QPSK	1	25	22.21	0	0
	1750	20350	10	QPSK	1	49	22.22	0	0
	1750	20350	10	QPSK	25	0	21.40	0-1	1
	1750	20350	10	QPSK	25	12	21.41	0-1	1
	1750	20350	10	QPSK	25	25	21.31	0-1	1
	1750	20350	10	QPSK	50	0	21.36	0-1	1
	1750	20350	10	16QAM	1	0	21.69	0-1	1
	1750	20350	10	16QAM	1	25	21.71	0-1	1
	1750	20350	10	16QAM	1	49	21.70	0-1	1
	1750	20350	10	16QAM	25	0	20.33	0-2	2
	1750	20350	10	16QAM	25	12	20.32	0-2	2
	1750	20350	10	16QAM	25	25	20.33	0-2	2
	1750	20350	10	16QAM	50	0	20.29	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1712.5	19975	5	QPSK	1	0	22.41	0	0
	1712.5	19975	5	QPSK	1	12	22.42	0	0
	1712.5	19975	5	QPSK	1	24	22.46	0	0
	1712.5	19975	5	QPSK	12	0	21.53	0-1	1
	1712.5	19975	5	QPSK	12	6	21.62	0-1	1
	1712.5	19975	5	QPSK	12	13	21.64	0-1	1
	1712.5	19975	5	QPSK	25	0	21.55	0-1	1
	1712.5	19975	5	16-QAM	1	0	21.38	0-1	1
	1712.5	19975	5	16-QAM	1	12	21.48	0-1	1
	1712.5	19975	5	16-QAM	1	24	21.51	0-1	1
	1712.5	19975	5	16-QAM	12	0	20.59	0-2	2
	1712.5	19975	5	16-QAM	12	6	20.59	0-2	2
	1712.5	19975	5	16-QAM	12	13	20.67	0-2	2
Mid	1732.5	20175	5	QPSK	1	0	22.30	0	0
	1732.5	20175	5	QPSK	1	12	22.26	0	0
	1732.5	20175	5	QPSK	1	24	22.28	0	0
	1732.5	20175	5	QPSK	12	0	21.41	0-1	1
	1732.5	20175	5	QPSK	12	6	21.39	0-1	1
	1732.5	20175	5	QPSK	12	13	21.37	0-1	1
	1732.5	20175	5	QPSK	25	0	21.29	0-1	1
	1732.5	20175	5	16-QAM	1	0	21.36	0-1	1
	1732.5	20175	5	16-QAM	1	12	21.32	0-1	1
	1732.5	20175	5	16-QAM	1	24	21.34	0-1	1
	1732.5	20175	5	16-QAM	12	0	20.43	0-2	2
	1732.5	20175	5	16-QAM	12	6	20.42	0-2	2
	1732.5	20175	5	16-QAM	12	13	20.44	0-2	2
	1732.5	20175	5	16-QAM	25	0	20.36	0-2	2
High	1752.5	20375	5	QPSK	1	0	22.23	0	0
	1752.5	20375	5	QPSK	1	12	22.21	0	0
	1752.5	20375	5	QPSK	1	24	22.36	0	0
	1752.5	20375	5	QPSK	12	0	21.35	0-1	1
	1752.5	20375	5	QPSK	12	6	21.35	0-1	1
	1752.5	20375	5	QPSK	12	13	21.47	0-1	1
	1752.5	20375	5	QPSK	25	0	21.46	0-1	1
	1752.5	20375	5	16-QAM	1	0	21.30	0-1	1
	1752.5	20375	5	16-QAM	1	12	21.28	0-1	1
	1752.5	20375	5	16-QAM	1	24	21.36	0-1	1
	1752.5	20375	5	16-QAM	12	0	20.44	0-2	2
	1752.5	20375	5	16-QAM	12	6	20.41	0-2	2
	1752.5	20375	5	16-QAM	12	13	20.47	0-2	2
	1752.5	20375	5	16-QAM	25	0	20.48	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1711.5	19965	3	QPSK	1	0	22.31	0	0
	1711.5	19965	3	QPSK	1	7	22.21	0	0
	1711.5	19965	3	QPSK	1	14	22.27	0	0
	1711.5	19965	3	QPSK	8	0	21.45	0-1	1
	1711.5	19965	3	QPSK	8	4	21.35	0-1	1
	1711.5	19965	3	QPSK	8	7	21.36	0-1	1
	1711.5	19965	3	QPSK	15	0	21.30	0-1	1
	1711.5	19965	3	16-QAM	1	0	21.71	0-1	1
	1711.5	19965	3	16-QAM	1	7	21.67	0-1	1
	1711.5	19965	3	16-QAM	1	14	21.70	0-1	1
	1711.5	19965	3	16-QAM	8	0	20.50	0-2	2
	1711.5	19965	3	16-QAM	8	4	20.35	0-2	2
Mid	1711.5	19965	3	16-QAM	8	7	20.36	0-2	2
	1711.5	19965	3	16-QAM	15	0	20.35	0-2	2
	1732.5	20175	3	QPSK	1	0	22.26	0	0
	1732.5	20175	3	QPSK	1	7	22.26	0	0
	1732.5	20175	3	QPSK	1	14	22.29	0	0
	1732.5	20175	3	QPSK	8	0	21.41	0-1	1
	1732.5	20175	3	QPSK	8	4	21.41	0-1	1
	1732.5	20175	3	QPSK	8	7	21.39	0-1	1
	1732.5	20175	3	QPSK	15	0	21.40	0-1	1
	1732.5	20175	3	16-QAM	1	0	21.68	0-1	1
	1732.5	20175	3	16-QAM	1	7	21.70	0-1	1
	1732.5	20175	3	16-QAM	1	14	21.71	0-1	1
High	1732.5	20175	3	16-QAM	8	0	20.49	0-2	2
	1732.5	20175	3	16-QAM	8	4	20.41	0-2	2
	1732.5	20175	3	16-QAM	8	7	20.43	0-2	2
	1732.5	20175	3	16-QAM	15	0	20.45	0-2	2
	1753.5	20385	3	QPSK	1	0	22.16	0	0
	1753.5	20385	3	QPSK	1	7	22.19	0	0
	1753.5	20385	3	QPSK	1	14	22.17	0	0
	1753.5	20385	3	QPSK	8	0	21.21	0-1	1
	1753.5	20385	3	QPSK	8	4	21.36	0-1	1
	1753.5	20385	3	QPSK	8	7	21.27	0-1	1
	1753.5	20385	3	QPSK	15	0	21.30	0-1	1
	1753.5	20385	3	16-QAM	1	0	21.57	0-1	1
	1753.5	20385	3	16-QAM	1	7	21.68	0-1	1
	1753.5	20385	3	16-QAM	1	14	21.69	0-1	1
	1753.5	20385	3	16-QAM	8	0	20.30	0-2	2
	1753.5	20385	3	16-QAM	8	4	20.38	0-2	2
	1753.5	20385	3	16-QAM	8	7	20.35	0-2	2
	1753.5	20385	3	16-QAM	15	0	20.33	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1710.7	19957	1.4	QPSK	1	0	22.48	0	0
	1710.7	19957	1.4	QPSK	1	2	22.44	0	0
	1710.7	19957	1.4	QPSK	1	5	22.46	0	0
	1710.7	19957	1.4	QPSK	3	0	22.44	0	0
	1710.7	19957	1.4	QPSK	3	2	22.41	0	0
	1710.7	19957	1.4	QPSK	3	3	22.38	0	0
	1710.7	19957	1.4	QPSK	6	0	21.49	0-1	1
	1710.7	19957	1.4	16-QAM	1	0	21.02	0-1	1
	1710.7	19957	1.4	16-QAM	1	2	21.07	0-1	1
	1710.7	19957	1.4	16-QAM	1	5	21.09	0-1	1
	1710.7	19957	1.4	16-QAM	3	0	21.48	0-1	1
	1710.7	19957	1.4	16-QAM	3	2	21.50	0-1	1
	1710.7	19957	1.4	16-QAM	3	3	21.49	0-1	1
Mid	1710.7	19957	1.4	16-QAM	6	0	20.47	0-2	2
	1732.5	20175	1.4	QPSK	1	0	22.45	0	0
	1732.5	20175	1.4	QPSK	1	2	22.39	0	0
	1732.5	20175	1.4	QPSK	1	5	22.41	0	0
	1732.5	20175	1.4	QPSK	3	0	22.35	0	0
	1732.5	20175	1.4	QPSK	3	2	22.35	0	0
	1732.5	20175	1.4	QPSK	3	3	22.39	0	0
	1732.5	20175	1.4	QPSK	6	0	21.43	0-1	1
	1732.5	20175	1.4	16-QAM	1	0	21.27	0-1	1
	1732.5	20175	1.4	16-QAM	1	2	21.24	0-1	1
	1732.5	20175	1.4	16-QAM	1	5	21.24	0-1	1
	1732.5	20175	1.4	16-QAM	3	0	21.28	0-1	1
	1732.5	20175	1.4	16-QAM	3	2	21.27	0-1	1
	1732.5	20175	1.4	16-QAM	3	3	21.28	0-1	1
High	1732.5	20175	1.4	16-QAM	6	0	20.37	0-2	2
	1754.3	20393	1.4	QPSK	1	0	22.34	0	0
	1754.3	20393	1.4	QPSK	1	2	22.29	0	0
	1754.3	20393	1.4	QPSK	1	5	22.30	0	0
	1754.3	20393	1.4	QPSK	3	0	22.26	0	0
	1754.3	20393	1.4	QPSK	3	2	22.25	0	0
	1754.3	20393	1.4	QPSK	3	3	22.21	0	0
	1754.3	20393	1.4	QPSK	6	0	21.34	0-1	1
	1754.3	20393	1.4	16-QAM	1	0	21.16	0-1	1
	1754.3	20393	1.4	16-QAM	1	2	21.10	0-1	1
	1754.3	20393	1.4	16-QAM	1	5	21.12	0-1	1
	1754.3	20393	1.4	16-QAM	3	0	21.24	0-1	1
	1754.3	20393	1.4	16-QAM	3	2	21.23	0-1	1
	1754.3	20393	1.4	16-QAM	3	3	21.27	0-1	1
	1754.3	20393	1.4	16-QAM	6	0	20.28	0-2	2

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9.3.4 LTE Band 2 (PCS)

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1860	18700	20	QPSK	1	0	21.64	0	0
	1860	18700	20	QPSK	1	50	21.53	0	0
	1860	18700	20	QPSK	1	99	21.20	0	0
	1860	18700	20	QPSK	50	0	20.42	0-1	1
	1860	18700	20	QPSK	50	25	20.34	0-1	1
	1860	18700	20	QPSK	50	50	20.41	0-1	1
	1860	18700	20	QPSK	100	0	20.38	0-1	1
	1860	18700	20	16QAM	1	0	20.51	0-1	1
	1860	18700	20	16QAM	1	50	20.84	0-1	1
	1860	18700	20	16QAM	1	99	20.30	0-1	1
	1860	18700	20	16QAM	50	0	19.45	0-2	2
	1860	18700	20	16QAM	50	25	19.36	0-2	2
	1860	18700	20	16QAM	50	50	19.31	0-2	2
	1860	18700	20	16QAM	100	0	19.44	0-2	2
Mid	1880.0	18900	20	QPSK	1	0	21.70	0	0
	1880.0	18900	20	QPSK	1	50	21.75	0	0
	1880.0	18900	20	QPSK	1	99	21.72	0	0
	1880.0	18900	20	QPSK	50	0	20.98	0-1	1
	1880.0	18900	20	QPSK	50	25	20.45	0-1	1
	1880.0	18900	20	QPSK	50	50	20.45	0-1	1
	1880.0	18900	20	QPSK	100	0	20.44	0-1	1
	1880.0	18900	20	16QAM	1	0	20.65	0-1	1
	1880.0	18900	20	16QAM	1	50	20.40	0-1	1
	1880.0	18900	20	16QAM	1	99	20.16	0-1	1
	1880.0	18900	20	16QAM	50	0	19.37	0-2	2
	1880.0	18900	20	16QAM	50	25	19.36	0-2	2
	1880.0	18900	20	16QAM	50	50	19.22	0-2	2
	1880.0	18900	20	16QAM	100	0	19.39	0-2	2
High	1900	19100	20	QPSK	1	0	21.64	0	0
	1900	19100	20	QPSK	1	50	21.82	0	0
	1900	19100	20	QPSK	1	99	21.79	0	0
	1900	19100	20	QPSK	50	0	20.51	0-1	1
	1900	19100	20	QPSK	50	25	20.68	0-1	1
	1900	19100	20	QPSK	50	50	20.63	0-1	1
	1900	19100	20	QPSK	100	0	20.56	0-1	1
	1900	19100	20	16QAM	1	0	20.75	0-1	1
	1900	19100	20	16QAM	1	50	20.88	0-1	1
	1900	19100	20	16QAM	1	99	20.58	0-1	1
	1900	19100	20	16QAM	50	0	19.44	0-2	2
	1900	19100	20	16QAM	50	25	19.56	0-2	2
	1900	19100	20	16QAM	50	50	19.61	0-2	2
	1900	19100	20	16QAM	100	0	19.76	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1857.5	18675	15	QPSK	1	0	21.54	0	0
	1857.5	18675	15	QPSK	1	36	21.50	0	0
	1857.5	18675	15	QPSK	1	74	21.44	0	0
	1857.5	18675	15	QPSK	36	0	20.44	0-1	1
	1857.5	18675	15	QPSK	36	18	20.37	0-1	1
	1857.5	18675	15	QPSK	36	37	20.41	0-1	1
	1857.5	18675	15	QPSK	75	0	20.34	0-1	1
	1857.5	18675	15	16QAM	1	0	20.56	0-1	1
	1857.5	18675	15	16QAM	1	36	20.49	0-1	1
	1857.5	18675	15	16QAM	1	74	20.44	0-1	1
	1857.5	18675	15	16QAM	36	0	19.42	0-2	2
	1857.5	18675	15	16QAM	36	18	19.34	0-2	2
	1857.5	18675	15	16QAM	36	37	19.43	0-2	2
Mid	1857.5	18675	15	16QAM	75	0	19.31	0-2	2
	1880.0	18900	15	QPSK	1	0	21.34	0	0
	1880.0	18900	15	QPSK	1	36	21.36	0	0
	1880.0	18900	15	QPSK	1	74	21.39	0	0
	1880.0	18900	15	QPSK	36	0	20.44	0-1	1
	1880.0	18900	15	QPSK	36	18	20.35	0-1	1
	1880.0	18900	15	QPSK	36	37	20.32	0-1	1
	1880.0	18900	15	QPSK	75	0	20.36	0-1	1
	1880.0	18900	15	16QAM	1	0	20.84	0-1	1
	1880.0	18900	15	16QAM	1	36	20.79	0-1	1
	1880.0	18900	15	16QAM	1	74	20.85	0-1	1
	1880.0	18900	15	16QAM	36	0	19.53	0-2	2
	1880.0	18900	15	16QAM	36	18	19.42	0-2	2
	1880.0	18900	15	16QAM	36	37	19.37	0-2	2
High	1880.0	18900	15	16QAM	75	0	19.37	0-2	2
	1902.5	19125	15	QPSK	1	0	21.68	0	0
	1902.5	19125	15	QPSK	1	36	21.70	0	0
	1902.5	19125	15	QPSK	1	74	21.54	0	0
	1902.5	19125	15	QPSK	36	0	20.70	0-1	1
	1902.5	19125	15	QPSK	36	18	20.62	0-1	1
	1902.5	19125	15	QPSK	36	37	20.54	0-1	1
	1902.5	19125	15	QPSK	75	0	20.56	0-1	1
	1902.5	19125	15	16QAM	1	0	21.02	0-1	1
	1902.5	19125	15	16QAM	1	36	21.09	0-1	1
	1902.5	19125	15	16QAM	1	74	21.01	0-1	1
	1902.5	19125	15	16QAM	36	0	19.72	0-2	2
	1902.5	19125	15	16QAM	36	18	19.71	0-2	2
	1902.5	19125	15	16QAM	36	37	19.58	0-2	2
	1902.5	19125	15	16QAM	75	0	19.52	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1855	18650	10	QPSK	1	0	21.41	0	0
	1855	18650	10	QPSK	1	25	21.37	0	0
	1855	18650	10	QPSK	1	49	21.40	0	0
	1855	18650	10	QPSK	25	0	20.47	0-1	1
	1855	18650	10	QPSK	25	12	20.51	0-1	1
	1855	18650	10	QPSK	25	25	20.46	0-1	1
	1855	18650	10	QPSK	50	0	20.42	0-1	1
	1855	18650	10	16QAM	1	0	20.86	0-1	1
	1855	18650	10	16QAM	1	25	20.88	0-1	1
	1855	18650	10	16QAM	1	49	20.87	0-1	1
	1855	18650	10	16QAM	25	0	19.44	0-2	2
	1855	18650	10	16QAM	25	12	19.40	0-2	2
Mid	1855	18650	10	16QAM	25	25	19.42	0-2	2
	1855	18650	10	16QAM	50	0	19.42	0-2	2
	1880.0	18900	10	QPSK	1	0	21.45	0	0
	1880.0	18900	10	QPSK	1	25	21.46	0	0
	1880.0	18900	10	QPSK	1	49	21.47	0	0
	1880.0	18900	10	QPSK	25	0	20.42	0-1	1
	1880.0	18900	10	QPSK	25	12	20.41	0-1	1
	1880.0	18900	10	QPSK	25	25	20.33	0-1	1
	1880.0	18900	10	QPSK	50	0	20.33	0-1	1
	1880.0	18900	10	16QAM	1	0	20.34	0-1	1
	1880.0	18900	10	16QAM	1	25	20.32	0-1	1
	1880.0	18900	10	16QAM	1	49	20.33	0-1	1
High	1880.0	18900	10	16QAM	25	0	19.51	0-2	2
	1880.0	18900	10	16QAM	25	12	19.40	0-2	2
	1880.0	18900	10	16QAM	25	25	19.42	0-2	2
	1880.0	18900	10	16QAM	50	0	19.34	0-2	2
	1905	19150	10	QPSK	1	0	21.65	0	0
	1905	19150	10	QPSK	1	25	21.56	0	0
	1905	19150	10	QPSK	1	49	21.54	0	0
	1905	19150	10	QPSK	25	0	20.61	0-1	1
	1905	19150	10	QPSK	25	12	20.62	0-1	1
	1905	19150	10	QPSK	25	25	20.60	0-1	1
	1905	19150	10	QPSK	50	0	20.58	0-1	1
	1905	19150	10	16QAM	1	0	21.07	0-1	1
	1905	19150	10	16QAM	1	25	21.06	0-1	1
	1905	19150	10	16QAM	1	49	21.02	0-1	1
	1905	19150	10	16QAM	25	0	19.54	0-2	2
	1905	19150	10	16QAM	25	12	19.57	0-2	2
	1905	19150	10	16QAM	25	25	19.53	0-2	2
	1905	19150	10	16QAM	50	0	19.56	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1852.5	18625	5	QPSK	1	0	21.46	0	0
	1852.5	18625	5	QPSK	1	12	21.37	0	0
	1852.5	18625	5	QPSK	1	24	21.35	0	0
	1852.5	18625	5	QPSK	12	0	20.64	0-1	1
	1852.5	18625	5	QPSK	12	6	20.58	0-1	1
	1852.5	18625	5	QPSK	12	13	20.58	0-1	1
	1852.5	18625	5	QPSK	25	0	20.51	0-1	1
	1852.5	18625	5	16-QAM	1	0	20.46	0-1	1
	1852.5	18625	5	16-QAM	1	12	20.47	0-1	1
	1852.5	18625	5	16-QAM	1	24	20.42	0-1	1
	1852.5	18625	5	16-QAM	12	0	19.59	0-2	2
	1852.5	18625	5	16-QAM	12	6	19.64	0-2	2
Mid	1852.5	18625	5	16-QAM	12	13	19.62	0-2	2
	1852.5	18625	5	16-QAM	25	0	19.53	0-2	2
	1880.0	18900	5	QPSK	1	0	21.44	0	0
	1880.0	18900	5	QPSK	1	12	21.46	0	0
	1880.0	18900	5	QPSK	1	24	21.55	0	0
	1880.0	18900	5	QPSK	12	0	20.51	0-1	1
	1880.0	18900	5	QPSK	12	6	20.50	0-1	1
	1880.0	18900	5	QPSK	12	13	20.48	0-1	1
	1880.0	18900	5	QPSK	25	0	20.43	0-1	1
	1880.0	18900	5	16-QAM	1	0	20.35	0-1	1
	1880.0	18900	5	16-QAM	1	12	20.46	0-1	1
	1880.0	18900	5	16-QAM	1	24	20.42	0-1	1
High	1880.0	18900	5	16-QAM	12	0	19.52	0-2	2
	1880.0	18900	5	16-QAM	12	6	19.48	0-2	2
	1880.0	18900	5	16-QAM	12	13	19.46	0-2	2
	1880.0	18900	5	16-QAM	25	0	19.48	0-2	2
	1907.5	19175	5	QPSK	1	0	21.66	0	0
	1907.5	19175	5	QPSK	1	12	21.58	0	0
	1907.5	19175	5	QPSK	1	24	21.63	0	0
	1907.5	19175	5	QPSK	12	0	20.71	0-1	1
	1907.5	19175	5	QPSK	12	6	20.64	0-1	1
	1907.5	19175	5	QPSK	12	13	20.71	0-1	1
	1907.5	19175	5	QPSK	25	0	20.63	0-1	1
	1907.5	19175	5	16-QAM	1	0	20.61	0-1	1
	1907.5	19175	5	16-QAM	1	12	20.48	0-1	1
	1907.5	19175	5	16-QAM	1	24	20.57	0-1	1
	1907.5	19175	5	16-QAM	12	0	19.67	0-2	2
	1907.5	19175	5	16-QAM	12	6	19.61	0-2	2
	1907.5	19175	5	16-QAM	12	13	19.69	0-2	2
	1907.5	19175	5	16-QAM	25	0	19.62	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1851.5	18615	3	QPSK	1	0	21.41	0	0
	1851.5	18615	3	QPSK	1	7	21.37	0	0
	1851.5	18615	3	QPSK	1	14	21.35	0	0
	1851.5	18615	3	QPSK	8	0	20.59	0-1	1
	1851.5	18615	3	QPSK	8	4	20.53	0-1	1
	1851.5	18615	3	QPSK	8	7	20.50	0-1	1
	1851.5	18615	3	QPSK	15	0	20.58	0-1	1
	1851.5	18615	3	16-QAM	1	0	20.88	0-1	1
	1851.5	18615	3	16-QAM	1	7	20.87	0-1	1
	1851.5	18615	3	16-QAM	1	14	20.86	0-1	1
	1851.5	18615	3	16-QAM	8	0	19.58	0-2	2
	1851.5	18615	3	16-QAM	8	4	19.57	0-2	2
Mid	1851.5	18615	3	16-QAM	8	7	19.52	0-2	2
	1851.5	18615	3	16-QAM	15	0	19.56	0-2	2
	1880.0	18900	3	QPSK	1	0	21.47	0	0
	1880.0	18900	3	QPSK	1	7	21.42	0	0
	1880.0	18900	3	QPSK	1	14	21.50	0	0
	1880.0	18900	3	QPSK	8	0	20.45	0-1	1
	1880.0	18900	3	QPSK	8	4	20.48	0-1	1
	1880.0	18900	3	QPSK	8	7	20.44	0-1	1
	1880.0	18900	3	QPSK	15	0	20.45	0-1	1
	1880.0	18900	3	16-QAM	1	0	20.34	0-1	1
	1880.0	18900	3	16-QAM	1	7	20.33	0-1	1
	1880.0	18900	3	16-QAM	1	14	20.28	0-1	1
High	1880.0	18900	3	16-QAM	8	0	19.30	0-2	2
	1880.0	18900	3	16-QAM	8	4	19.34	0-2	2
	1880.0	18900	3	16-QAM	8	7	19.35	0-2	2
	1880.0	18900	3	16-QAM	15	0	19.43	0-2	2
	1908.5	19185	3	QPSK	1	0	21.46	0	0
	1908.5	19185	3	QPSK	1	7	21.48	0	0
	1908.5	19185	3	QPSK	1	14	21.61	0	0
	1908.5	19185	3	QPSK	8	0	20.74	0-1	1
	1908.5	19185	3	QPSK	8	4	20.72	0-1	1
	1908.5	19185	3	QPSK	8	7	20.71	0-1	1
	1908.5	19185	3	QPSK	15	0	20.69	0-1	1
	1908.5	19185	3	16-QAM	1	0	20.40	0-1	1
	1908.5	19185	3	16-QAM	1	7	20.46	0-1	1
	1908.5	19185	3	16-QAM	1	14	20.48	0-1	1
	1908.5	19185	3	16-QAM	8	0	19.64	0-2	2
	1908.5	19185	3	16-QAM	8	4	19.67	0-2	2
	1908.5	19185	3	16-QAM	8	7	19.69	0-2	2
	1908.5	19185	3	16-QAM	15	0	19.70	0-2	2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1850.7	18607	1.4	QPSK	1	0	21.53	0	0
	1850.7	18607	1.4	QPSK	1	2	21.56	0	0
	1850.7	18607	1.4	QPSK	1	5	21.57	0	0
	1850.7	18607	1.4	QPSK	3	0	21.50	0	0
	1850.7	18607	1.4	QPSK	3	2	21.54	0	0
	1850.7	18607	1.4	QPSK	3	3	21.51	0	0
	1850.7	18607	1.4	QPSK	6	0	20.63	0-1	1
	1850.7	18607	1.4	16-QAM	1	0	20.21	0-1	1
	1850.7	18607	1.4	16-QAM	1	2	20.21	0-1	1
	1850.7	18607	1.4	16-QAM	1	5	20.18	0-1	1
	1850.7	18607	1.4	16-QAM	3	0	20.60	0-1	1
	1850.7	18607	1.4	16-QAM	3	2	20.61	0-1	1
Mid	1850.7	18607	1.4	16-QAM	3	3	20.61	0-1	1
	1850.7	18607	1.4	16-QAM	6	0	19.61	0-2	2
	1880.0	18900	1.4	QPSK	1	0	21.52	0	0
	1880.0	18900	1.4	QPSK	1	2	21.46	0	0
	1880.0	18900	1.4	QPSK	1	5	21.48	0	0
	1880.0	18900	1.4	QPSK	3	0	21.50	0	0
	1880.0	18900	1.4	QPSK	3	2	21.54	0	0
	1880.0	18900	1.4	QPSK	3	3	21.50	0	0
	1880.0	18900	1.4	QPSK	6	0	20.52	0-1	1
	1880.0	18900	1.4	16-QAM	1	0	20.26	0-1	1
	1880.0	18900	1.4	16-QAM	1	2	20.34	0-1	1
	1880.0	18900	1.4	16-QAM	1	5	20.33	0-1	1
High	1880.0	18900	1.4	16-QAM	3	0	20.37	0-1	1
	1880.0	18900	1.4	16-QAM	3	2	20.38	0-1	1
	1880.0	18900	1.4	16-QAM	3	3	20.34	0-1	1
	1880.0	18900	1.4	16-QAM	6	0	19.49	0-2	2
	1909.3	19193	1.4	QPSK	1	0	21.52	0	0
	1909.3	19193	1.4	QPSK	1	2	21.54	0	0
	1909.3	19193	1.4	QPSK	1	5	21.56	0	0
	1909.3	19193	1.4	QPSK	3	0	21.59	0	0
	1909.3	19193	1.4	QPSK	3	2	21.64	0	0
	1909.3	19193	1.4	QPSK	3	3	21.66	0	0
	1909.3	19193	1.4	QPSK	6	0	20.72	0-1	1
	1909.3	19193	1.4	16-QAM	1	0	20.47	0-1	1
	1909.3	19193	1.4	16-QAM	1	2	20.48	0-1	1
	1909.3	19193	1.4	16-QAM	1	5	20.50	0-1	1
	1909.3	19193	1.4	16-QAM	3	0	20.59	0-1	1
	1909.3	19193	1.4	16-QAM	3	2	20.64	0-1	1
	1909.3	19193	1.4	16-QAM	3	3	20.70	0-1	1
	1909.3	19193	1.4	16-QAM	6	0	19.64	0-2	2

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9.4 WLAN Conducted Powers

Table 9-19
2.4 GHz WLAN Average RF Power

Freq [MHz]	Channel	802.11 Conducted Power [dBm]	
		IEEE Transmission Mode	
		802.11b	802.11g
2412	1	16.55	12.69
2437	6	17.04	13.42
2462	11	16.71	12.80

Table 9-20
5 GHz WLAN Average RF Power- 40 MHz Bandwidth

Freq [MHz]	Channel	5GHz (40MHz) Conducted Power
		IEEE
		802.11n
5190	38	10.53
5230	46	10.56
5270	54	10.53
5310	62	10.55
5510	102	10.65
5590	118	10.64
5630	126	10.70
5710	142	10.51
5755	151	10.53
5795	159	10.57

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Justification for test configurations for WLAN per KDB Publication 248227 D01v02r01:

- 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, lowest data rate, and lowest order 802.11 a/g/n modes.
- 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.

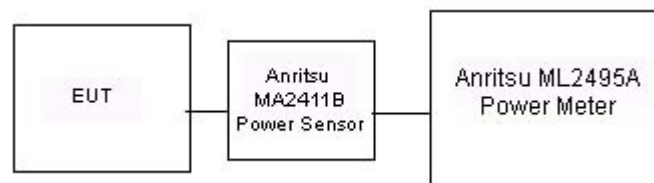


Figure 9-3
Power Measurement Setup

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9.5 Bluetooth Conducted Powers

Table 9-21
Bluetooth Average RF Power

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
			[dBm]	[mW]
2402	1.0	0	11.95	15.661
2441	1.0	39	11.83	15.255
2480	1.0	78	12.05	16.024
2402	2.0	0	9.60	9.113
2441	2.0	39	9.55	9.011
2480	2.0	78	9.71	9.357
2402	3.0	0	9.66	9.244
2441	3.0	39	9.60	9.112
2480	3.0	78	9.80	9.560

Note: The bolded data rate and channel above was tested for SAR.

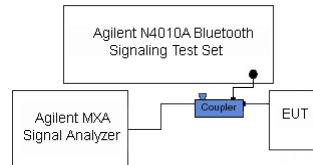


Figure 9-4
Power Measurement Setup

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10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ϵ	% dev σ	% dev ϵ
8/13/2015	750H	22.3	710	0.863	43.592	0.890	42.149	-3.03%	3.42%
			725	0.878	43.275	0.891	42.071	-1.46%	2.86%
			740	0.890	43.129	0.893	41.994	-0.34%	2.70%
			755	0.904	42.934	0.894	41.916	1.12%	2.43%
8/13/2015	835H	22.4	820	0.870	40.492	0.899	41.578	-3.23%	-2.61%
			835	0.884	40.302	0.900	41.500	-1.78%	-2.89%
			850	0.898	40.120	0.916	41.500	-1.97%	-3.33%
8/10/2015	1750H	22.1	1710	1.316	38.470	1.348	40.142	-2.37%	-4.17%
			1750	1.354	38.300	1.371	40.079	-1.24%	-4.44%
			1790	1.393	38.121	1.394	40.016	-0.07%	-4.74%
8/13/2015	1900H	22.1	1850	1.398	38.904	1.400	40.000	-0.14%	-2.74%
			1880	1.430	38.784	1.400	40.000	2.14%	-3.04%
			1910	1.462	38.642	1.400	40.000	4.43%	-3.39%
8/17/2015	2450H	23.5	2400	1.784	39.356	1.756	39.289	1.59%	0.17%
			2450	1.843	39.175	1.800	39.200	2.39%	-0.06%
			2500	1.903	38.970	1.855	39.136	2.59%	-0.42%
8/17/2015	5200H-5800H	22.6	5300	4.583	34.998	4.758	35.871	-3.68%	-2.43%
			5320	4.624	34.961	4.778	35.849	-3.22%	-2.48%
			5600	4.900	34.646	5.065	35.529	-3.26%	-2.49%
			5620	4.904	34.528	5.086	35.506	-3.58%	-2.75%
			5640	4.884	34.559	5.106	35.483	-4.35%	-2.60%
			5785	5.074	34.349	5.255	35.317	-3.44%	-2.74%
			5800	5.101	34.402	5.270	35.300	-3.21%	-2.54%
8/13/2015	750B	22.0	710	0.928	54.742	0.960	55.687	-3.33%	-1.70%
			725	0.941	54.608	0.961	55.629	-2.08%	-1.84%
			740	0.955	54.460	0.963	55.570	-0.83%	-2.00%
			755	0.970	54.287	0.964	55.512	0.62%	-2.21%
8/10/2015	835B	21.8	820	0.979	53.787	0.969	55.258	1.03%	-2.66%
			835	0.991	53.624	0.970	55.200	2.16%	-2.86%
			850	1.008	53.504	0.988	55.154	2.02%	-2.99%
8/11/2015	1750B	22.2	1710	1.421	51.795	1.463	53.537	-2.87%	-3.25%
			1750	1.464	51.658	1.488	53.432	-1.61%	-3.32%
			1790	1.506	51.521	1.514	53.326	-0.53%	-3.38%
8/10/2015	1900B	21.6	1850	1.481	51.698	1.520	53.300	-2.57%	-3.01%
			1880	1.515	51.588	1.520	53.300	-0.33%	-3.21%
			1910	1.553	51.509	1.520	53.300	2.17%	-3.36%
8/13/2015	1900B	21.8	1850	1.491	52.661	1.520	53.300	-1.91%	-1.20%
			1880	1.526	52.552	1.520	53.300	0.39%	-1.40%
			1910	1.561	52.447	1.520	53.300	2.70%	-1.60%
8/17/2015	2450B	21.7	2400	1.970	51.898	1.902	52.767	3.58%	-1.65%
			2450	2.039	51.754	1.950	52.700	4.56%	-1.80%
			2500	2.105	51.511	2.021	52.636	4.16%	-2.14%
8/17/2015	5200B-5800B	23.0	5300	5.431	47.120	5.416	48.879	0.28%	-3.60%
			5320	5.521	47.133	5.439	48.851	1.51%	-3.52%
			5600	5.823	46.859	5.766	48.471	0.99%	-3.33%
			5620	5.875	46.542	5.790	48.444	1.47%	-3.93%
			5640	5.841	46.500	5.813	48.417	0.48%	-3.96%
			5785	6.065	46.485	5.982	48.220	1.39%	-3.60%
			5800	6.141	46.449	6.000	48.200	2.35%	-3.63%

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 _{1g} (W/kg)	1 W Target SAR _{1g} (W/kg)	1 W Normalized SAR _{1g} (W/kg)	Deviation _{1g} (%)
H	750	HEAD	08/13/2015	23.1	23.0	0.200	1003	3263	1.680	8.090	8.400	3.83%
G	835	HEAD	08/13/2015	22.5	22.4	0.100	4d119	3318	0.964	9.380	9.640	2.77%
G	1750	HEAD	08/10/2015	22.7	22.1	0.100	1051	3318	3.630	36.200	36.300	0.28%
K	1900	HEAD	08/13/2015	23.1	22.1	0.100	5d141	3288	4.200	39.900	42.000	5.26%
H	2450	HEAD	08/17/2015	23.3	23.5	0.100	882	3263	5.330	52.300	53.300	1.91%
D	5300	HEAD	08/17/2015	22.9	22.5	0.050	1057	7357	4.020	84.700	80.400	-5.08%
D	5600	HEAD	08/17/2015	22.9	22.5	0.050	1057	7357	4.170	83.800	83.400	-0.48%
D	5800	HEAD	08/17/2015	22.9	22.5	0.050	1057	7357	3.770	81.100	75.400	-7.03%
G	750	BODY	08/13/2015	22.3	21.3	0.200	1003	3318	1.600	8.460	8.000	-5.44%
G	835	BODY	08/10/2015	22.9	22.4	0.200	4d119	3318	1.850	9.200	9.250	0.54%
H	1750	BODY	08/11/2015	22.3	22.2	0.100	1051	3263	3.840	37.100	38.400	3.50%
K	1900	BODY	08/10/2015	22.1	21.7	0.100	5d149	3288	4.080	40.400	40.800	0.99%
K	1900	BODY	08/13/2015	23.3	21.8	0.100	5d141	3288	4.180	40.000	41.800	4.50%
G	2450	BODY	08/17/2015	22.3	21.1	0.100	882	3318	5.330	50.700	53.300	5.13%
E	5300	BODY	08/18/2015	23.8	22.0	0.050	1057	3589	3.880	74.200	77.600	4.58%
E	5600	BODY	08/18/2015	23.6	22.0	0.050	1057	3589	3.990	77.700	79.800	2.70%
E	5800	BODY	08/18/2015	23.2	22.1	0.050	1057	3589	3.570	75.100	71.400	-4.93%

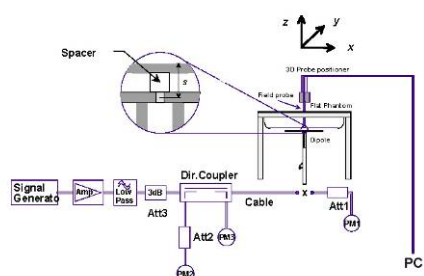


Figure 10-1
System Verification Setup Diagram



Figure 10-2
System Verification Setup Photo

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11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

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

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.5	32.80	0.05	Right	Cheek	2494	1:8.3	0.155	1.175	0.182	A1
836.60	190	GSM 850	GSM	33.5	32.80	0.05	Right	Tilt	2494	1:8.3	0.099	1.175	0.116	
836.60	190	GSM 850	GSM	33.5	32.80	0.09	Left	Cheek	2494	1:8.3	0.118	1.175	0.139	
836.60	190	GSM 850	GSM	33.5	32.80	0.05	Left	Tilt	2494	1:8.3	0.094	1.175	0.110	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram						

**Table 11-2
UMTS 850 Head SAR**

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	23.5	22.58	0.11	Right	Cheek	2502	1:1	0.049	1.236	0.061	A2
836.60	4183	UMTS 850	RMC	23.5	22.58	0.12	Right	Tilt	2502	1:1	0.024	1.236	0.030	
836.60	4183	UMTS 850	RMC	23.5	22.58	0.19	Left	Cheek	2502	1:1	0.029	1.236	0.036	
836.60	4183	UMTS 850	RMC	23.5	22.58	0.02	Left	Tilt	2502	1:1	0.023	1.236	0.028	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram						

**Table 11-3
GSM 1900 Head SAR**

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1909.80	810	GSM 1900	GSM	30.5	29.92	-0.03	Right	Cheek	2494	1:8.3	0.138	1.143	0.158	
1909.80	810	GSM 1900	GSM	30.5	29.92	0.03	Right	Tilt	2494	1:8.3	0.046	1.143	0.053	
1909.80	810	GSM 1900	GSM	30.5	29.92	0.07	Left	Cheek	2494	1:8.3	0.181	1.143	0.207	A3
1909.80	810	GSM 1900	GSM	30.5	29.92	0.06	Left	Tilt	2494	1:8.3	0.035	1.143	0.040	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram						

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Table 11-4
UMTS 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	22.5	22.09	0.04	Right	Cheek	2502	1:1	0.165	1.099	0.181	
1880.00	9400	UMTS 1900	RMC	22.5	22.09	0.04	Right	Tilt	2502	1:1	0.088	1.099	0.097	
1880.00	9400	UMTS 1900	RMC	22.5	22.09	0.11	Left	Cheek	2502	1:1	0.212	1.099	0.233	A4
1880.00	9400	UMTS 1900	RMC	22.5	22.09	0.08	Left	Tilt	2502	1:1	0.035	1.099	0.038	
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 17 Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
710.00	23790	Mid	LTE Band 17	10	23.5	22.87	-0.03	0	Right	Cheek	QPSK	1	0	2536	1:1	0.109	1.156	0.126	
710.00	23790	Mid	LTE Band 17	10	22.5	21.86	-0.05	1	Right	Cheek	QPSK	25	25	2536	1:1	0.097	1.159	0.112	
710.00	23790	Mid	LTE Band 17	10	23.5	22.87	-0.06	0	Right	Tilt	QPSK	1	0	2536	1:1	0.076	1.156	0.088	
710.00	23790	Mid	LTE Band 17	10	22.5	21.86	0.00	1	Right	Tilt	QPSK	25	25	2536	1:1	0.073	1.159	0.085	
710.00	23790	Mid	LTE Band 17	10	23.5	22.87	0.00	0	Left	Cheek	QPSK	1	0	2536	1:1	0.125	1.156	0.145	A5
710.00	23790	Mid	LTE Band 17	10	22.5	21.86	0.01	1	Left	Cheek	QPSK	25	25	2536	1:1	0.094	1.159	0.109	
710.00	23790	Mid	LTE Band 17	10	23.5	22.87	-0.06	0	Left	Tilt	QPSK	1	0	2536	1:1	0.089	1.156	0.103	
710.00	23790	Mid	LTE Band 17	10	22.5	21.86	0.03	1	Left	Tilt	QPSK	25	25	2536	1:1	0.069	1.159	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 5 (Cell) Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.08	-0.07	0	Right	Cheek	QPSK	1	0	2536	1:1	0.173	1.102	0.191	A6
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.01	-0.11	1	Right	Cheek	QPSK	25	25	2536	1:1	0.118	1.119	0.132	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.08	0.01	0	Right	Tilt	QPSK	1	0	2536	1:1	0.111	1.102	0.122	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.01	0.10	1	Right	Tilt	QPSK	25	25	2536	1:1	0.081	1.119	0.091	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.08	0.08	0	Left	Cheek	QPSK	1	0	2536	1:1	0.129	1.102	0.142	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.01	0.06	1	Left	Cheek	QPSK	25	25	2536	1:1	0.089	1.119	0.100	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.08	0.14	0	Left	Tilt	QPSK	1	0	2536	1:1	0.110	1.102	0.121	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.01	-0.18	1	Left	Tilt	QPSK	25	25	2536	1:1	0.079	1.119	0.088	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT									Head										
Spatial Peak									1.6 W/kg (mW/g)										
Uncontrolled Exposure/General Population									averaged over 1 gram										

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

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.50	-0.09	0	Right	Cheek	QPSK	1	0	2460	1:1	0.075	1.259	0.094	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.22	0.12	1	Right	Cheek	QPSK	50	0	2460	1:1	0.053	1.343	0.071	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.50	-0.04	0	Right	Tilt	QPSK	1	0	2460	1:1	0.029	1.259	0.037	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.22	0.09	1	Right	Tilt	QPSK	50	0	2460	1:1	0.025	1.343	0.034	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.50	0.03	0	Left	Cheek	QPSK	1	0	2460	1:1	0.108	1.259	0.136	A7
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.22	0.10	1	Left	Cheek	QPSK	50	0	2460	1:1	0.079	1.343	0.106	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.50	0.09	0	Left	Tilt	QPSK	1	0	2460	1:1	0.025	1.259	0.031	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.22	0.03	1	Left	Tilt	QPSK	50	0	2460	1:1	0.018	1.343	0.024	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-8
LTE Band 2 (PCS) Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	21.82	0.02	0	Right	Cheek	QPSK	1	50	2486	1:1	0.208	1.312	0.273	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	22.0	20.98	0.03	1	Right	Cheek	QPSK	50	0	2486	1:1	0.151	1.265	0.191	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	21.82	-0.10	0	Right	Tilt	QPSK	1	50	2486	1:1	0.074	1.312	0.097	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	22.0	20.98	-0.05	1	Right	Tilt	QPSK	50	0	2486	1:1	0.053	1.265	0.067	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	21.82	0.07	0	Left	Cheek	QPSK	1	50	2486	1:1	0.282	1.312	0.370	A8
1880.00	18900	Mid	LTE Band 2 (PCS)	20	22.0	20.98	0.08	1	Left	Cheek	QPSK	50	0	2486	1:1	0.205	1.265	0.259	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	21.82	0.00	0	Left	Tilt	QPSK	1	50	2486	1:1	0.053	1.312	0.070	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	22.0	20.98	0.13	1	Left	Tilt	QPSK	50	0	2486	1:1	0.038	1.265	0.048	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-9
DTS Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2437	6	802.11b	DSSS	22	17.5	17.04	-	Right	Cheek	2502	1	100.0	0.261	-	1.112	1.000	-	
2437	6	802.11b	DSSS	22	17.5	17.04	-	Right	Tilt	2502	1	100.0	0.201	-	1.112	1.000	-	
2437	6	802.11b	DSSS	22	17.5	17.04	0.00	Left	Cheek	2502	1	100.0	0.533	0.424	1.112	1.000	0.471	A9
2437	6	802.11b	DSSS	22	17.5	17.04	0.00	Left	Tilt	2502	1	100.0	0.388	0.282	1.112	1.000	0.314	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram									

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Table 11-10
NII Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
5310	62	802.11n	OFDM	40	11.5	10.55	-	Right	Cheek	2502	13.5	98.0	0.257	-	-	-	-	
5310	62	802.11n	OFDM	40	11.5	10.55	-	Right	Tilt	2502	13.5	98.0	0.242	-	-	-	-	
5310	62	802.11n	OFDM	40	11.5	10.55	0.07	Left	Cheek	2502	13.5	98.0	1.079	0.462	1.245	1.020	0.587	
5310	62	802.11n	OFDM	40	11.5	10.55	0.16	Left	Tilt	2502	13.5	98.0	0.720	0.371	1.245	1.020	0.471	
5630	126	802.11n	OFDM	40	11.5	10.70	-	Right	Cheek	2502	13.5	98.0	0.582	-	-	-	-	
5630	126	802.11n	OFDM	40	11.5	10.70	-	Right	Tilt	2502	13.5	98.0	0.449	-	-	-	-	
5630	126	802.11n	OFDM	40	11.5	10.70	0.20	Left	Cheek	2502	13.5	98.0	0.974	0.558	1.202	1.020	0.684	
5630	126	802.11n	OFDM	40	11.5	10.70	-0.20	Left	Tilt	2502	13.5	98.0	0.859	0.364	1.202	1.020	0.447	
5795	159	802.11n	OFDM	40	11.5	10.57	-	Right	Cheek	2502	13.5	98.0	0.697	-	-	-	-	
5795	159	802.11n	OFDM	40	11.5	10.57	-	Right	Tilt	2502	13.5	98.0	0.450	-	-	-	-	
5795	159	802.11n	OFDM	40	11.5	10.57	0.05	Left	Cheek	2502	13.5	98.0	1.151	0.561	1.239	1.020	0.709	A10
5795	159	802.11n	OFDM	40	11.5	10.57	-0.15	Left	Tilt	2502	13.5	98.0	0.709	0.353	1.239	1.020	0.446	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram									

11.2 Standalone Body-Worn SAR Data

Table 11-11
GSM/UMTS Body-Worn SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.5	32.80	-0.05	10 mm	2486	1	1:8.3	back	0.326	1.175	0.383	A11
836.60	4183	UMTS 850	RMC	23.5	22.58	0.02	10 mm	2502	N/A	1:1	back	0.150	1.236	0.185	A13
1909.80	810	GSM 1900	GSM	30.5	29.92	-0.05	10 mm	2494	1	1:8.3	back	0.345	1.143	0.394	A14
1880.00	9400	UMTS 1900	RMC	22.5	22.09	0.09	10 mm	2502	N/A	1:1	back	0.620	1.099	0.681	A16
ANSI / IEEE C95.1 1992 - SAFETY LIMIT							Body								
Spatial Peak							1.6 W/kg (mW/g)								
Uncontrolled Exposure/General Population							averaged over 1 gram								

Table 11-12
LTE Body-Worn SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
710	23790	Mid	LTE Band 17	10	23.5	22.87	-0.05	0	2536	QPSK	1	0	10 mm	back	1:1	0.285	1.156	0.329	A18
710	23790	Mid	LTE Band 17	10	22.5	21.86	-0.04	1	2536	QPSK	25	25	10 mm	back	1:1	0.223	1.159	0.258	
836.5	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.08	0.01	0	2536	QPSK	1	0	10 mm	back	1:1	0.310	1.102	0.342	A19
836.5	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.01	0.03	1	2536	QPSK	25	25	10 mm	back	1:1	0.236	1.119	0.264	
1732.5	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.5	-0.01	0	2460	QPSK	1	0	10 mm	back	1:1	0.450	1.259	0.567	A20
1732.5	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.22	-0.05	1	2460	QPSK	50	0	10 mm	back	1:1	0.353	1.343	0.474	
1900	19100	High	LTE Band 2 (PCS)	20	23.0	21.82	0.09	0	2486	QPSK	1	50	10 mm	back	1:1	0.471	1.312	0.618	A22
1880	18900	Mid	LTE Band 2 (PCS)	20	22.0	20.98	0.02	1	2486	QPSK	50	0	10 mm	back	1:1	0.316	1.265	0.400	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT									Body										
Spatial Peak									1.6 W/kg (mW/g)										
Uncontrolled Exposure/General Population									averaged over 1 gram										

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**Table 11-13
DTS Body-Worn SAR**

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2437	6	802.11b	DSSS	22	17.5	17.04	-0.07	10 mm	2502	1	back	100.0	0.048	0.044	1.112	1.000	0.049	A24
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram									

**Table 11-14
NII Body-Worn SAR**

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
5310	62	802.11n	OFDM	40	11.5	10.55	0.06	10 mm	2502	13.5	back	98.0	0.305	0.125	1.245	1.020	0.159	
5630	126	802.11n	OFDM	40	11.5	10.70	0.00	10 mm	2502	13.5	back	98.0	0.474	0.214	1.202	1.020	0.262	
5795	159	802.11n	OFDM	40	11.5	10.57	0.05	10 mm	2502	13.5	back	98.0	0.489	0.214	1.239	1.020	0.270	A26
ANSI / IEEE C95.1 1992 - SAFETY LIMIT								Body										
Spatial Peak								1.6 W/kg (mW/g)										
Uncontrolled Exposure/General Population								averaged over 1 gram										

**Table 11-15
Bluetooth Body-Worn SAR**

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
2480	78	Bluetooth	FHSS	12.5	12.05	0.12	10 mm	2460	1	back	1:1	0.006	1.109	0.007	A27
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram								

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11.3 Standalone Wireless Router SAR Data

Table 11-16
GPRS/UMTS Hotspot SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	30.5	29.80	-0.18	10 mm	2486	3	1:2.76	back	0.366	1.175	0.383	A12
836.60	190	GSM 850	GPRS	30.5	29.80	-0.14	10 mm	2486	3	1:2.76	front	0.253	1.175	0.297	
836.60	190	GSM 850	GPRS	30.5	29.80	0.02	10 mm	2486	3	1:2.76	bottom	0.145	1.175	0.170	
836.60	190	GSM 850	GPRS	30.5	29.80	0.15	10 mm	2486	3	1:2.76	left	0.152	1.175	0.179	
836.60	4183	UMTS 850	RMC	23.5	22.58	0.02	10 mm	2502	N/A	1:1	back	0.150	1.236	0.185	A13
836.60	4183	UMTS 850	RMC	23.5	22.58	0.00	10 mm	2502	N/A	1:1	front	0.120	1.236	0.148	
836.60	4183	UMTS 850	RMC	23.5	22.58	0.07	10 mm	2502	N/A	1:1	bottom	0.077	1.236	0.095	
836.60	4183	UMTS 850	RMC	23.5	22.58	0.03	10 mm	2502	N/A	1:1	left	0.028	1.236	0.035	
1880.00	661	GSM 1900	GPRS	24.5	23.96	0.02	10 mm	2494	4	1:2.076	back	0.376	1.132	0.426	
1880.00	661	GSM 1900	GPRS	24.5	23.96	0.06	10 mm	2494	4	1:2.076	front	0.425	1.132	0.481	
1880.00	661	GSM 1900	GPRS	24.5	23.96	0.01	10 mm	2494	4	1:2.076	bottom	0.517	1.132	0.585	A15
1880.00	661	GSM 1900	GPRS	24.5	23.96	-0.02	10 mm	2494	4	1:2.076	left	0.210	1.132	0.238	
1880.00	9400	UMTS 1900	RMC	22.5	22.09	0.09	10 mm	2502	N/A	1:1	back	0.620	1.099	0.681	
1880.00	9400	UMTS 1900	RMC	22.5	22.09	0.11	10 mm	2502	N/A	1:1	front	0.516	1.099	0.567	
1852.40	9262	UMTS 1900	RMC	22.5	22.29	-0.09	10 mm	2502	N/A	1:1	bottom	0.773	1.050	0.812	
1880.00	9400	UMTS 1900	RMC	22.5	22.09	-0.01	10 mm	2502	N/A	1:1	bottom	0.906	1.099	0.996	
1907.60	9538	UMTS 1900	RMC	22.5	22.42	-0.06	10 mm	2502	N/A	1:1	bottom	1.070	1.019	1.090	A17
1880.00	9400	UMTS 1900	RMC	22.5	22.09	0.06	10 mm	2502	N/A	1:1	left	0.133	1.099	0.146	
1907.60	9538	UMTS 1900	RMC	22.5	22.42	0.01	10 mm	2502	N/A	1:1	bottom	1.010	1.019	1.029	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram								

Note: Blue entries represent variability measurements.

Table 11-17
LTE Band 17 Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
710.00	23790	Mid	LTE Band 17	10	23.5	22.87	-0.05	0	2536	QPSK	1	0	10 mm	back	1:1	0.285	1.156	0.329	A18
710.00	23790	Mid	LTE Band 17	10	22.5	21.86	-0.04	1	2536	QPSK	25	25	10 mm	back	1:1	0.223	1.159	0.258	
710.00	23790	Mid	LTE Band 17	10	23.5	22.87	0.01	0	2536	QPSK	1	0	10 mm	front	1:1	0.250	1.156	0.289	
710.00	23790	Mid	LTE Band 17	10	22.5	21.86	0.03	1	2536	QPSK	25	25	10 mm	front	1:1	0.205	1.159	0.238	
710.00	23790	Mid	LTE Band 17	10	23.5	22.87	-0.11	0	2536	QPSK	1	0	10 mm	bottom	1:1	0.104	1.156	0.120	
710.00	23790	Mid	LTE Band 17	10	22.5	21.86	0.03	1	2536	QPSK	25	25	10 mm	bottom	1:1	0.083	1.159	0.096	
710.00	23790	Mid	LTE Band 17	10	23.5	22.87	0.05	0	2536	QPSK	1	0	10 mm	left	1:1	0.115	1.156	0.133	
710.00	23790	Mid	LTE Band 17	10	22.5	21.86	-0.10	1	2536	QPSK	25	25	10 mm	left	1:1	0.100	1.159	0.116	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak								Body 1.6 W/kg (mW/g) averaged over 1 gram											
Uncontrolled Exposure/General Population																			

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Table 11-18
LTE Band 5 (Cell) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.	(W/kg)														(W/kg)			
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.08	0.01	0	2536	QPSK	1	0	10 mm	back	1:1	0.310	1.102	0.342	A19
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.01	0.03	1	2536	QPSK	25	25	10 mm	back	1:1	0.236	1.119	0.264	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.08	0.14	0	2536	QPSK	1	0	10 mm	front	1:1	0.261	1.102	0.288	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.01	0.08	1	2536	QPSK	25	25	10 mm	front	1:1	0.195	1.119	0.218	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.08	0.05	0	2536	QPSK	1	0	10 mm	bottom	1:1	0.129	1.102	0.142	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.01	-0.02	1	2536	QPSK	25	25	10 mm	bottom	1:1	0.109	1.119	0.122	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.08	-0.11	0	2536	QPSK	1	0	10 mm	left	1:1	0.200	1.102	0.220	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.01	-0.01	1	2536	QPSK	25	25	10 mm	left	1:1	0.135	1.119	0.151	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

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

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.50	-0.01	0	2460	QPSK	1	0	10 mm	back	1:1	0.450	1.259	0.567	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.22	-0.05	1	2460	QPSK	50	0	10 mm	back	1:1	0.353	1.343	0.474	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.50	-0.06	0	2460	QPSK	1	0	10 mm	front	1:1	0.410	1.259	0.516	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.22	0.09	1	2460	QPSK	50	0	10 mm	front	1:1	0.317	1.343	0.426	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.50	0.05	0	2460	QPSK	1	0	10 mm	bottom	1:1	0.633	1.259	0.797	A21
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.22	0.01	1	2460	QPSK	50	0	10 mm	bottom	1:1	0.489	1.343	0.657	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.50	0.00	0	2460	QPSK	1	0	10 mm	left	1:1	0.065	1.259	0.082	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.22	0.02	1	2460	QPSK	50	0	10 mm	left	1:1	0.049	1.343	0.066	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT								Body											
Spatial Peak								1.6 W/kg (mW/g)											
Uncontrolled Exposure/General Population								averaged over 1 gram											

Table 11-20
LTE Band 2 (PCS) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	21.82	0.09	0	2486	QPSK	1	50	10 mm	back	1:1	0.471	1.312	0.618	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	22.0	20.98	0.02	1	2486	QPSK	50	0	10 mm	back	1:1	0.316	1.265	0.400	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	21.82	0.04	0	2486	QPSK	1	50	10 mm	front	1:1	0.579	1.312	0.760	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	22.0	20.98	0.11	1	2486	QPSK	50	0	10 mm	front	1:1	0.383	1.265	0.484	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	21.64	-0.04	0	2486	QPSK	1	0	10 mm	bottom	1:1	0.577	1.368	0.789	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	23.0	21.75	-0.02	0	2486	QPSK	1	50	10 mm	bottom	1:1	0.656	1.334	0.875	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	21.82	0.00	0	2486	QPSK	1	50	10 mm	bottom	1:1	0.695	1.312	0.912	A23
1880.00	18900	Mid	LTE Band 2 (PCS)	20	22.0	20.98	-0.02	1	2486	QPSK	50	0	10 mm	bottom	1:1	0.500	1.265	0.633	
1900.00	19100	High	LTE Band 2 (PCS)	20	22.0	20.56	0.01	1	2486	QPSK	100	0	10 mm	bottom	1:1	0.507	1.393	0.706	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	21.82	0.10	0	2486	QPSK	1	50	10 mm	left	1:1	0.278	1.312	0.365	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	22.0	20.98	-0.03	1	2486	QPSK	50	0	10 mm	left	1:1	0.206	1.265	0.261	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

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**Table 11-21
WLAN Hotspot SAR**

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2437	6	802.11b	DSSS	22	17.5	17.04	-	10 mm	2502	1	back	100.0	0.048	-	1.112	1.000	-	
2437	6	802.11b	DSSS	22	17.5	17.04	0.06	10 mm	2502	1	front	100.0	0.057	0.046	1.112	1.000	0.051	A25
2437	6	802.11b	DSSS	22	17.5	17.04	-	10 mm	2502	1	top	100.0	0.032	-	1.112	1.000	-	
2437	6	802.11b	DSSS	22	17.5	17.04	-	10 mm	2502	1	right	100.0	0.018	-	1.112	1.000	-	
5755	159	802.11n	OFDM	40	11.5	10.57	0.05	10 mm	2502	13.5	back	98.0	0.489	0.214	1.239	1.020	0.270	A26
5755	159	802.11n	OFDM	40	11.5	10.57	-	10 mm	2502	13.5	front	98.0	0.292	-	1.239	1.020	-	
5755	159	802.11n	OFDM	40	11.5	10.57	-	10 mm	2502	13.5	top	98.0	0.168	-	1.239	1.020	-	
5755	159	802.11n	OFDM	40	11.5	10.57	-	10 mm	2502	13.5	right	98.0	0.167	-	1.239	1.020	-	
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:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, and FCC KDB Publication 447498 D01v05.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r02, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01 v01, variability SAR tests 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.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.6 for more details).

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. Justification for reduced test configurations per KDB Publication 941225 D01v03 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for hotspot SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.
3. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output

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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 was tested under RMC 12.2 kbps with HSPA inactive per KDB Publication 941225 D01v03. AMR and HSPA SAR was not required per the 3G Test Reduction Procedure in KDB Publication 941225 D01v03.
2. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is $> \frac{1}{2}$ 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 D05v02r03. The general test procedures used for testing can be found in Section 8.5.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

WLAN Notes:

1. For held-to-ear and hotspot operations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r01 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 D01v02r01 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. When the maximum reported 1g averaged SAR is ≤ 0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
5. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.

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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 physical test configuration is ≤ 1.6 W/kg. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1-g or 10-g SAR.

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12.3 Head SAR Simultaneous Transmission Analysis

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM 850	0.182	0.471	0.653
	UMTS 850	0.061	0.471	0.532
	GSM 1900	0.207	0.471	0.678
	UMTS 1900	0.233	0.471	0.704
	LTE Band 17	0.145	0.471	0.616
	LTE Band 5 (Cell)	0.191	0.471	0.662
	LTE Band 4 (AWS)	0.136	0.471	0.607
	LTE Band 2 (PCS)	0.370	0.471	0.841

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM 850	0.182	0.709	0.891
	UMTS 850	0.061	0.709	0.770
	GSM 1900	0.207	0.709	0.916
	UMTS 1900	0.233	0.709	0.942
	LTE Band 17	0.145	0.709	0.854
	LTE Band 5 (Cell)	0.191	0.709	0.900
	LTE Band 4 (AWS)	0.136	0.709	0.845
	LTE Band 2 (PCS)	0.370	0.709	1.079

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

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12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-3
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM 850	0.383	0.049	0.432
	UMTS 850	0.185	0.049	0.234
	GSM 1900	0.394	0.049	0.443
	UMTS 1900	0.681	0.049	0.730
	LTE Band 17	0.329	0.049	0.378
	LTE Band 5 (Cell)	0.342	0.049	0.391
	LTE Band 4 (AWS)	0.567	0.049	0.616
	LTE Band 2 (PCS)	0.618	0.049	0.667

Table 12-4
Simultaneous Transmission Scenario with 5 GHz WLAN (Body-Worn at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM 850	0.383	0.270	0.653
	UMTS 850	0.185	0.270	0.455
	GSM 1900	0.394	0.270	0.664
	UMTS 1900	0.681	0.270	0.951
	LTE Band 17	0.329	0.270	0.599
	LTE Band 5 (Cell)	0.342	0.270	0.612
	LTE Band 4 (AWS)	0.567	0.270	0.837
	LTE Band 2 (PCS)	0.618	0.270	0.888

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

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

Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
	1	2	1+2
GSM 850	0.383	0.007	0.390
UMTS 850	0.185	0.007	0.192
GSM 1900	0.394	0.007	0.401
UMTS 1900	0.681	0.007	0.688
LTE Band 17	0.329	0.007	0.336
LTE Band 5 (Cell)	0.342	0.007	0.349
LTE Band 4 (AWS)	0.567	0.007	0.574
LTE Band 2 (PCS)	0.618	0.007	0.625

12.4 Hotspot SAR Simultaneous Transmission Analysis

Table 12-6
Simultaneous Transmission Scenario (2.4 GHz Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.383	0.051	0.434
	UMTS 850	0.185	0.051	0.236
	GPRS 1900	0.585	0.051	0.636
	UMTS 1900	1.090	0.051	1.141
	LTE Band 17	0.329	0.051	0.380
	LTE Band 5 (Cell)	0.342	0.051	0.393
	LTE Band 4 (AWS)	0.797	0.051	0.848
	LTE Band 2 (PCS)	0.912	0.051	0.963

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Table 12-7
Simultaneous Transmission Scenario (5 GHz Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.383	0.270	0.653
	UMTS 850	0.185	0.270	0.455
	GPRS 1900	0.585	0.270	0.855
	UMTS 1900	1.090	0.270	1.360
	LTE Band 17	0.329	0.270	0.599
	LTE Band 5 (Cell)	0.342	0.270	0.612
	LTE Band 4 (AWS)	0.797	0.270	1.067
	LTE Band 2 (PCS)	0.912	0.270	1.182

12.5 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v05 and IEEE 1528-2013 Section 6.3.4.1.2.

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13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

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

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

Table 13-1
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS													
Band	FREQUENCY		Mode	Service	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	1907.60	9538	UMTS 1900	RMC	bottom	10 mm	1.070	1.010	1.06	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT						Body							
Spatial Peak						1.6 W/kg (mW/g)							
Uncontrolled Exposure/General Population						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	8753ES	S-Parameter Network Analyzer	1/20/2015	Annual	1/20/2016	US39170122
Agilent	8753ES	Network Analyzer	3/20/2015	Annual	3/20/2016	MY40001472
Agilent	E4438C	ESG Vector Signal Generator	3/13/2015	Annual	3/13/2016	MY42082385
Agilent	E4438C	ESG Vector Signal Generator	4/1/2014	Biennial	4/1/2016	MY47270002
Agilent	E5515C	Wireless Communications Test Set	5/16/2015	Biennial	5/16/2017	GB43304447
Agilent	N5182A	MXG Vector Signal Generator	3/16/2015	Annual	3/16/2016	MY47420800
Agilent	N4010A	Wireless Connectivity Test Set	CBT	N/A	CBT	GB46170464
Agilent	N9020A	MXA Signal Analyzer	10/27/2014	Annual	10/27/2015	US46470561
Amplifier Research	1551G6	Amplifier	CBT	N/A	CBT	433971
Amplifier Research	1551G6	Amplifier	CBT	N/A	CBT	433972
Amplifier Research	1551G6	Amplifier	CBT	N/A	CBT	433974
Anritsu	MA24106A	USB Power Sensor	5/29/2015	Annual	5/29/2016	1231538
Anritsu	MA24106A	USB Power Sensor	5/29/2015	Annual	5/29/2016	1231535
Anritsu	MA2411B	Pulse Power Sensor	11/17/2014	Annual	11/17/2015	1207364
Anritsu	MA2411B	Pulse Power Sensor	11/17/2014	Annual	11/17/2015	1126066
Anritsu	MA2481A	Power Sensor	3/10/2015	Annual	3/10/2016	2400
Anritsu	ML2495A	Power Meter	10/31/2013	Annual	10/31/2015	941001
Anritsu	ML2496A	Power Meter	3/13/2015	Annual	7/14/2016	1306009
Anritsu	MT8820C	Radio Communication Analyzer	7/24/2015	Annual	7/24/2016	6200901190
Anritsu	MT8820C	Radio Communication Analyzer	6/12/2015	Annual	6/12/2016	6201240328
COMTECH	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M155A00-009
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
Control Company	4040	Digital Thermometer	3/15/2015	Biennial	3/15/2017	150194929
Control Company	4040	Digital Thermometer	3/18/2015	Biennial	3/18/2017	150194987
Control Company	4353	Long Stem Thermometer	1/22/2015	Biennial	1/22/2017	150053081
Control Company	4353	Long Stem Thermometer	1/22/2015	Biennial	1/22/2017	150053059
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R897950903
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mitutoyo	CD-6"CSX	Digital Caliper	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	NC-100	Torque Wrench	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	5/21/2015	Biennial	5/21/2017	N/A
Rohde & Schwarz	CMW500	Radio Communication Tester	5/15/2015	Annual	5/15/2016	112347
Rohde & Schwarz	CMW500	Radio Communication Tester	4/22/2015	Annual	4/22/2016	101699
Seekonk	NC-100	Torque Wrench	3/18/2014	Biennial	3/18/2016	22313
SPEAG	D1750V2	1750 MHz SAR Dipole	4/15/2015	Annual	4/15/2016	1051
SPEAG	D1900V2	1900 MHz SAR Dipole	4/14/2015	Annual	4/14/2016	5d141
SPEAG	D1900V2	1900 MHz SAR Dipole	7/14/2015	Annual	7/10/2016	5d149
SPEAG	D2450V2	2450 MHz SAR Dipole	2/18/2015	Annual	2/18/2016	882
SPEAG	D835V2	835 MHz SAR Dipole	4/13/2015	Annual	4/13/2016	4d119
SPEAG	D750V3	750 MHz Dipole	1/16/2015	Annual	1/16/2016	1003
SPEAG	DSGHZV2	5 GHz SAR Dipole	1/21/2015	Annual	1/21/2016	1057
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/14/2015	Annual	1/14/2016	1272
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	DAE4	Dasy Data Acquisition Electronics	6/17/2015	Annual	6/17/2016	859
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/13/2015	Annual	3/13/2016	1334
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/12/2015	Annual	5/12/2016	1070
SPEAG	ES3DV3	SAR Probe	5/20/2015	Annual	5/20/2016	3263
SPEAG	ES3DV3	SAR Probe	9/24/2014	Annual	9/24/2015	3288
SPEAG	ES3DV3	SAR Probe	1/23/2015	Annual	1/23/2016	3318
SPEAG	EX3DV4	SAR Probe	1/22/2015	Annual	1/22/2016	3589
SPEAG	EX3DV4	SAR Probe	4/23/2015	Annual	4/23/2016	7357
VWR	36934-158	Wall-Mounted Thermometer	4/29/2014	Biennial	4/29/2016	111859323

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.

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15 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz.

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

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

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Applicable for frequencies up to 6 GHz.

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

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

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16 CONCLUSION

16.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2494

Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: 835 Head; Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.885 \text{ S/m}$; $\epsilon_r = 40.283$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-13-2015; Ambient Temp: 22.5°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3318; ConvF(6.39, 6.39, 6.39); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

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

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

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

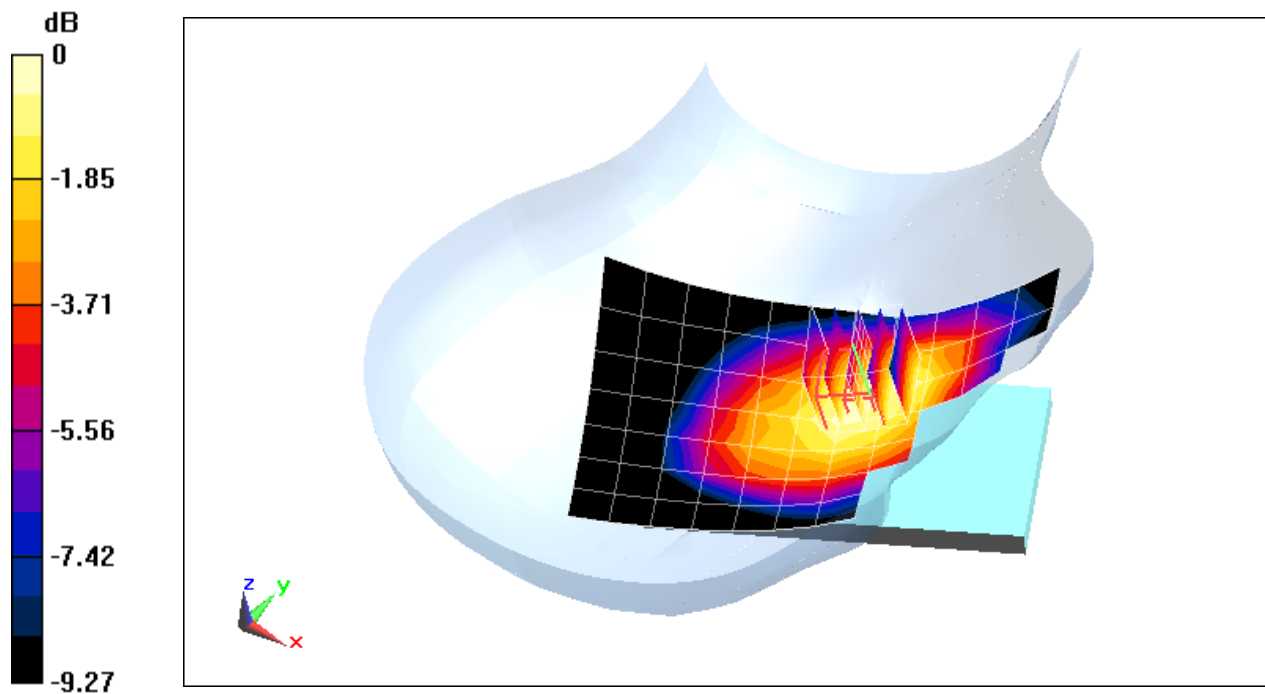
Area Scan (8x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 13.40 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.199 W/kg

SAR(1 g) = 0.155 W/kg



0 dB = 0.169 W/kg = -7.72 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2502

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium: 835 Head; Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.885 \text{ S/m}$; $\epsilon_r = 40.283$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-13-2015; Ambient Temp: 22.5°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3318; ConvF(6.39, 6.39, 6.39); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

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

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

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

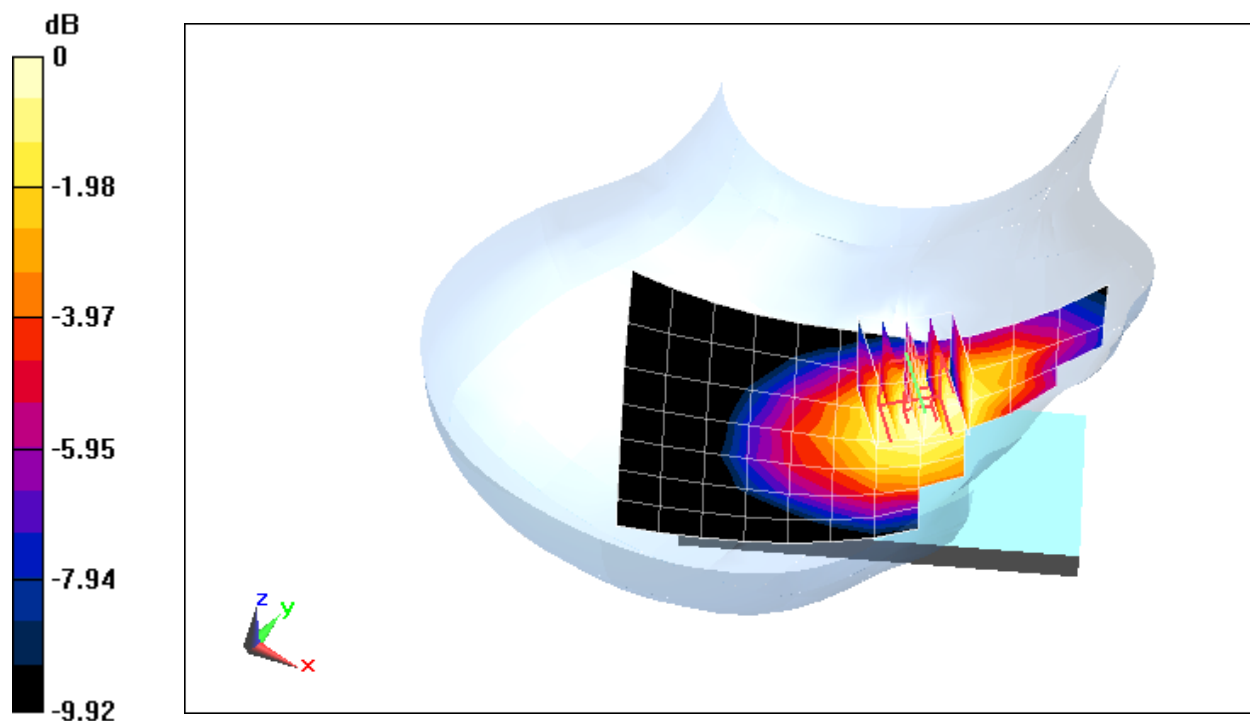
Area Scan (8x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 7.717 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.0630 W/kg

SAR(1 g) = 0.049 W/kg



0 dB = 0.0529 W/kg = -12.77 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2494

Communication System: UID 0, GSM; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: 1900 Head; Medium parameters used:

$f = 1910$ MHz; $\sigma = 1.462$ S/m; $\epsilon_r = 38.642$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Test Date: 08-13-2015; Ambient Temp: 23.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3288; ConvF(5.17, 5.17, 5.17); 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: GSM 1900, Left Head, Cheek, High.ch

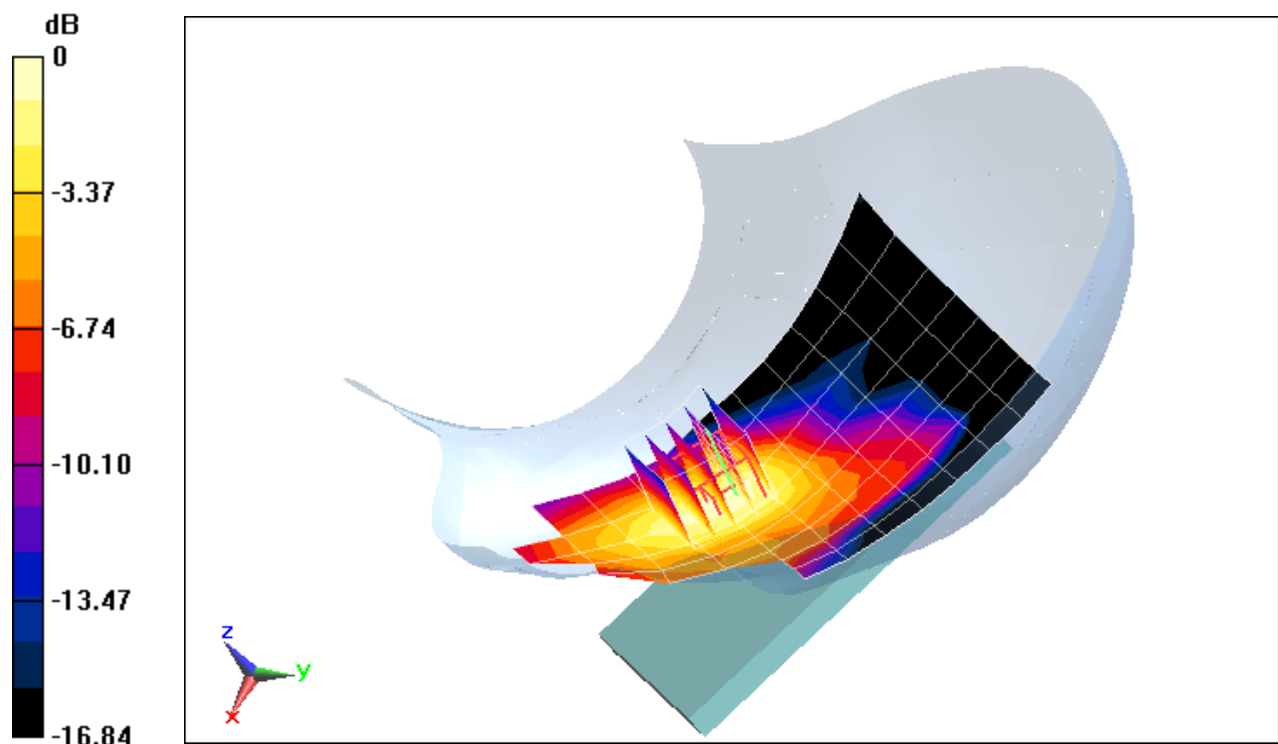
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 11.49 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.276 W/kg

SAR(1 g) = 0.181 W/kg



0 dB = 0.207 W/kg = -6.84 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2502

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Head; Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.43 \text{ S/m}$; $\epsilon_r = 38.784$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-13-2015; Ambient Temp: 23.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3288; ConvF(5.17, 5.17, 5.17); 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 1900, Left Head, Cheek, Mid.ch

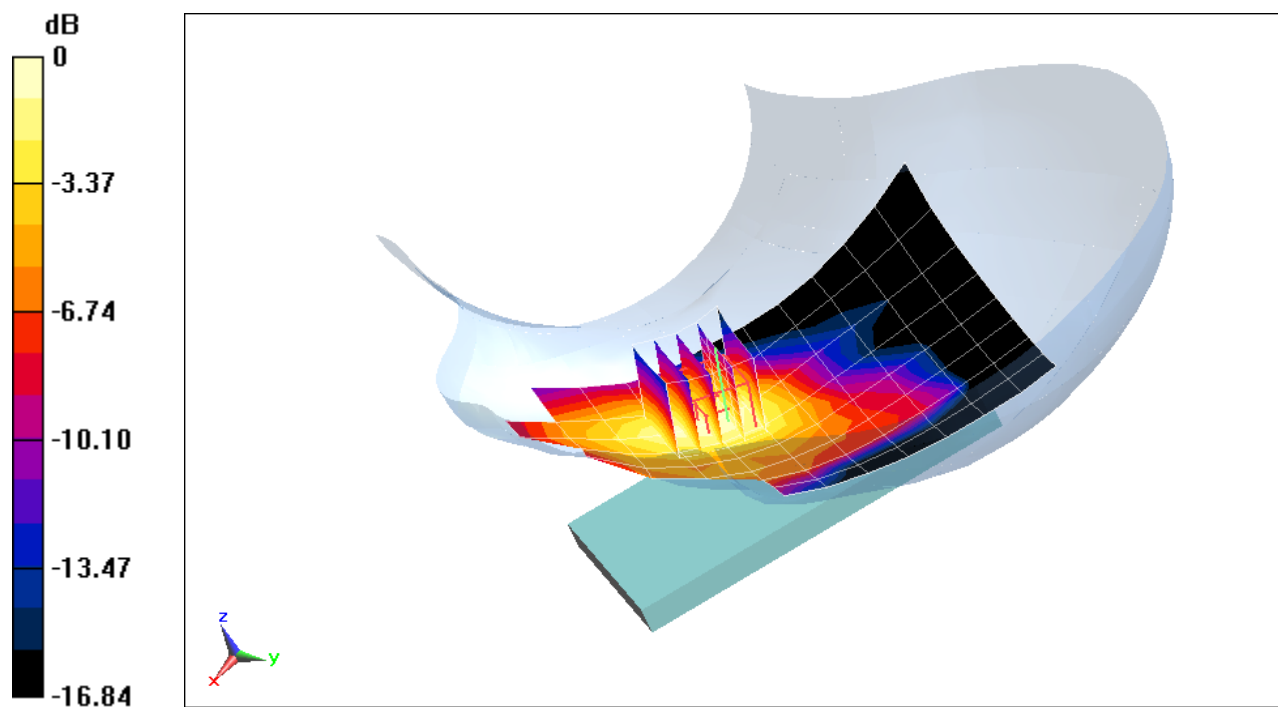
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 12.73 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.326 W/kg

SAR(1 g) = 0.212 W/kg



0 dB = 0.207 W/kg = -6.84 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2536

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

Medium: 750 Head; Medium parameters used:

$f = 710 \text{ MHz}$; $\sigma = 0.863 \text{ S/m}$; $\epsilon_r = 43.592$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-13-2015; Ambient Temp: 23.1°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3263; ConvF(6.27, 6.27, 6.27); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 6/17/2015

Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715

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, 0 RB Offset**

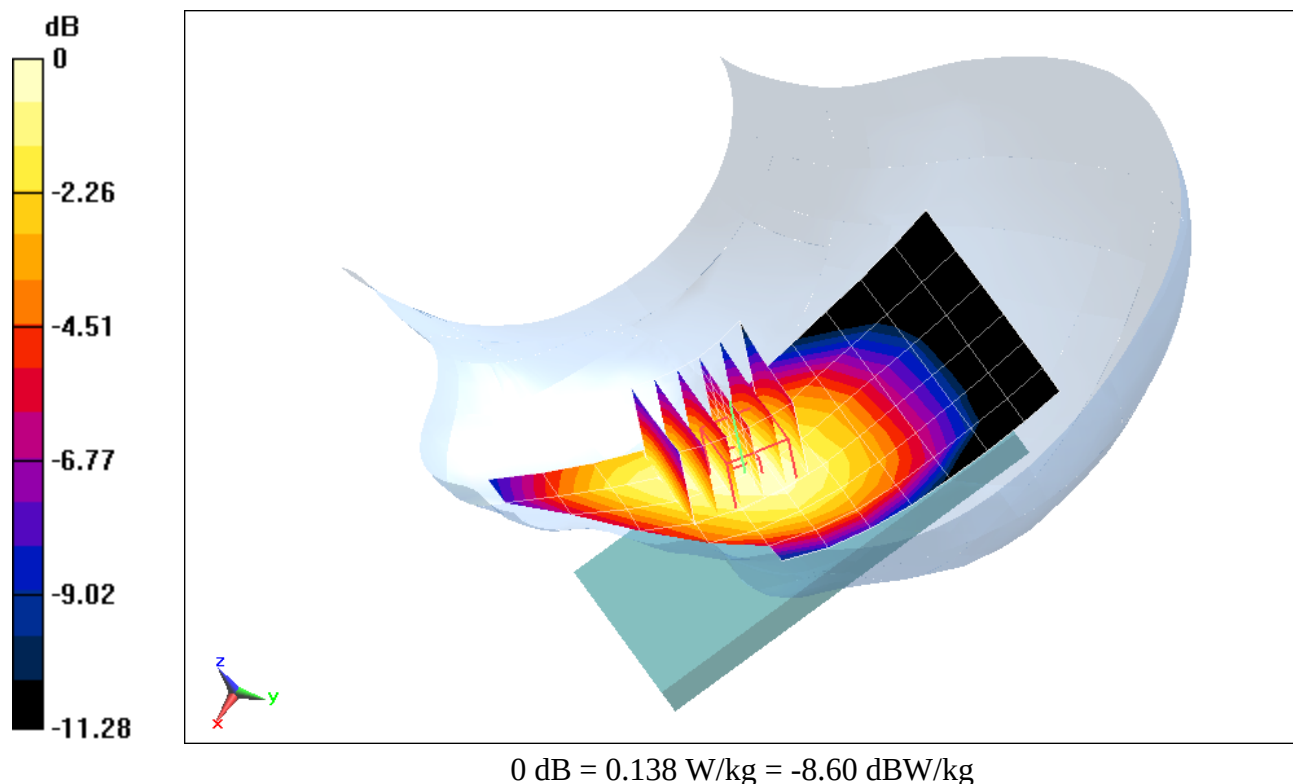
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.69 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.158 W/kg

SAR(1 g) = 0.125 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2536

Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1

Medium: 835 Head; Medium parameters used (interpolated):

$f = 836.5 \text{ MHz}$; $\sigma = 0.885 \text{ S/m}$; $\epsilon_r = 40.284$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-13-2015; Ambient Temp: 22.5°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3318; ConvF(6.39, 6.39, 6.39); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

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

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

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

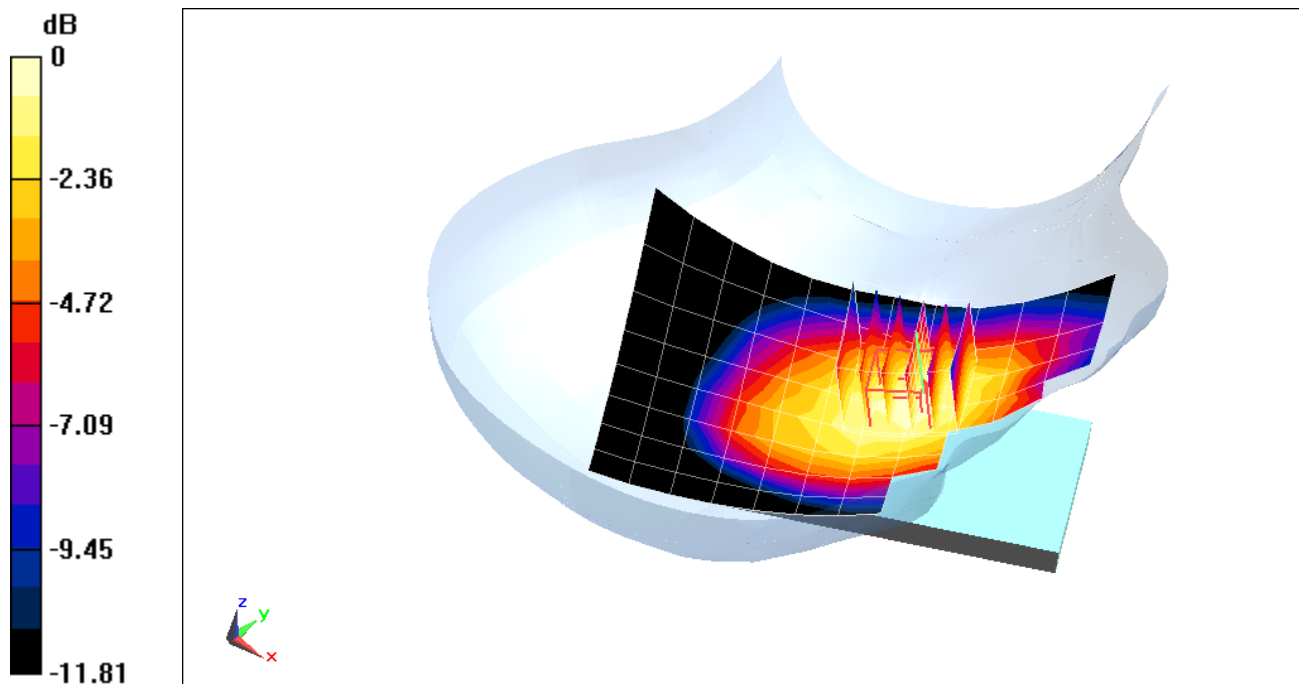
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.93 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.220 W/kg

SAR(1 g) = 0.173 W/kg



0 dB = 0.188 W/kg = -7.26 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2460

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: 1750 Head; Medium parameters used (interpolated):

$f = 1732.5 \text{ MHz}$; $\sigma = 1.337 \text{ S/m}$; $\epsilon_r = 38.374$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-10-2015; Ambient Temp: 22.7°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3318; ConvF(5.27, 5.27, 5.27); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

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

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

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

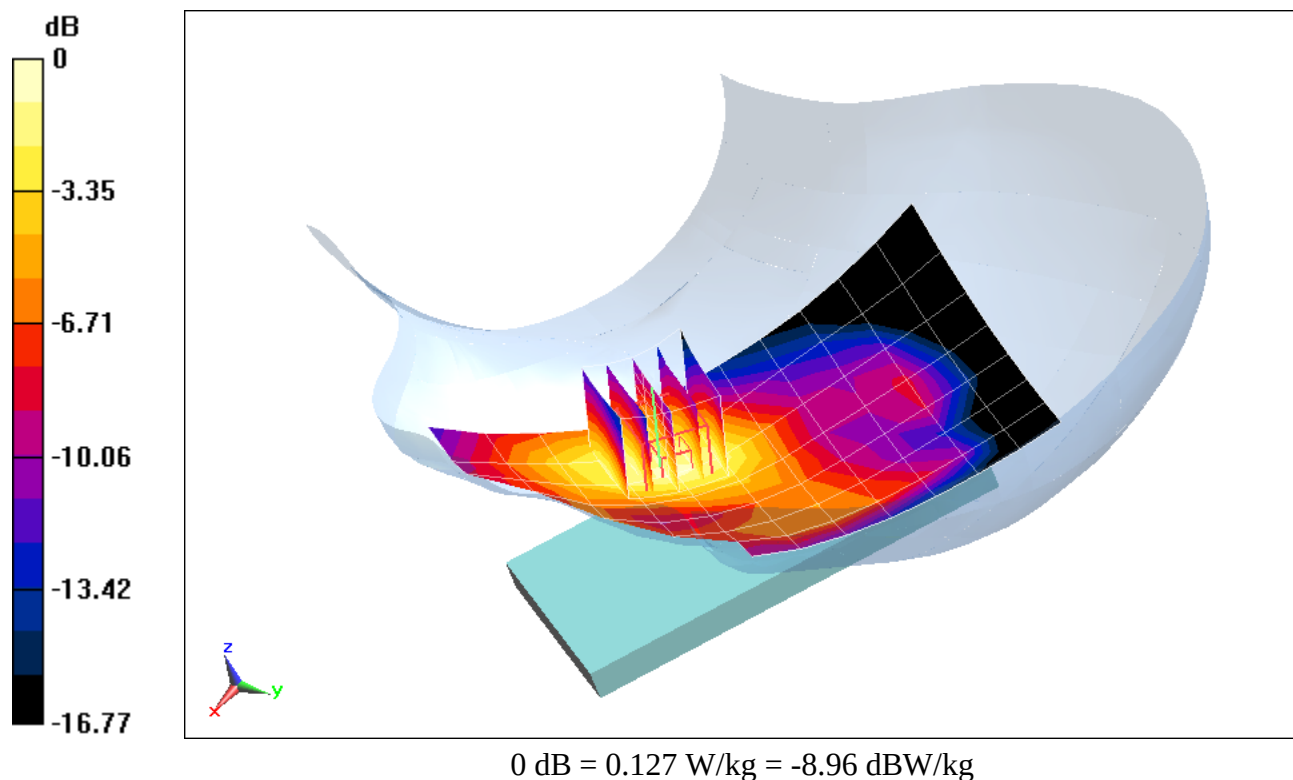
Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 10.09 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.166 W/kg

SAR(1 g) = 0.108 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2486

Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Head; Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.451 \text{ S/m}$; $\epsilon_r = 38.689$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-13-2015; Ambient Temp: 23.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3288; ConvF(5.17, 5.17, 5.17); 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 2 (PCS), Left Head, Cheek, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset**

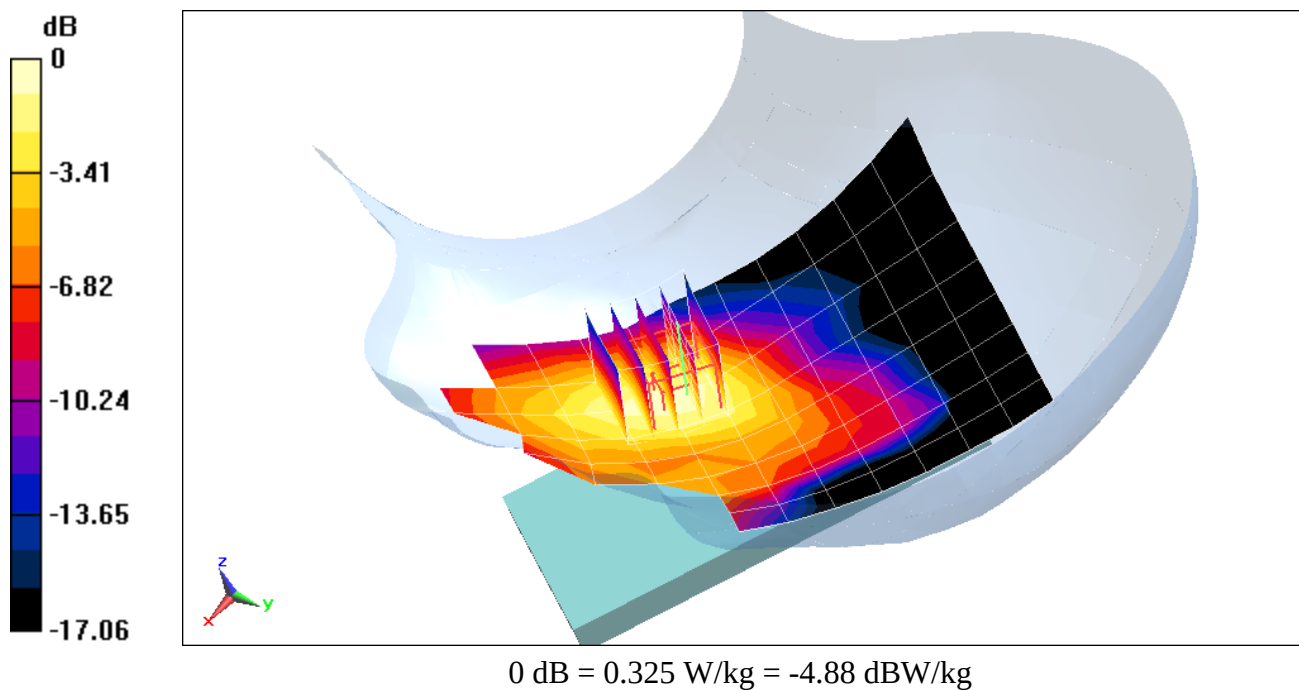
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 15.37 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.430 W/kg

SAR(1 g) = 0.282 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2502

Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: 2450 Head; Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 1.828 \text{ S/m}$; $\epsilon_r = 39.222$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-17-2015; Ambient Temp: 23.3°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3263; ConvF(4.4, 4.4, 4.4); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 6/17/2015

Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715

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

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

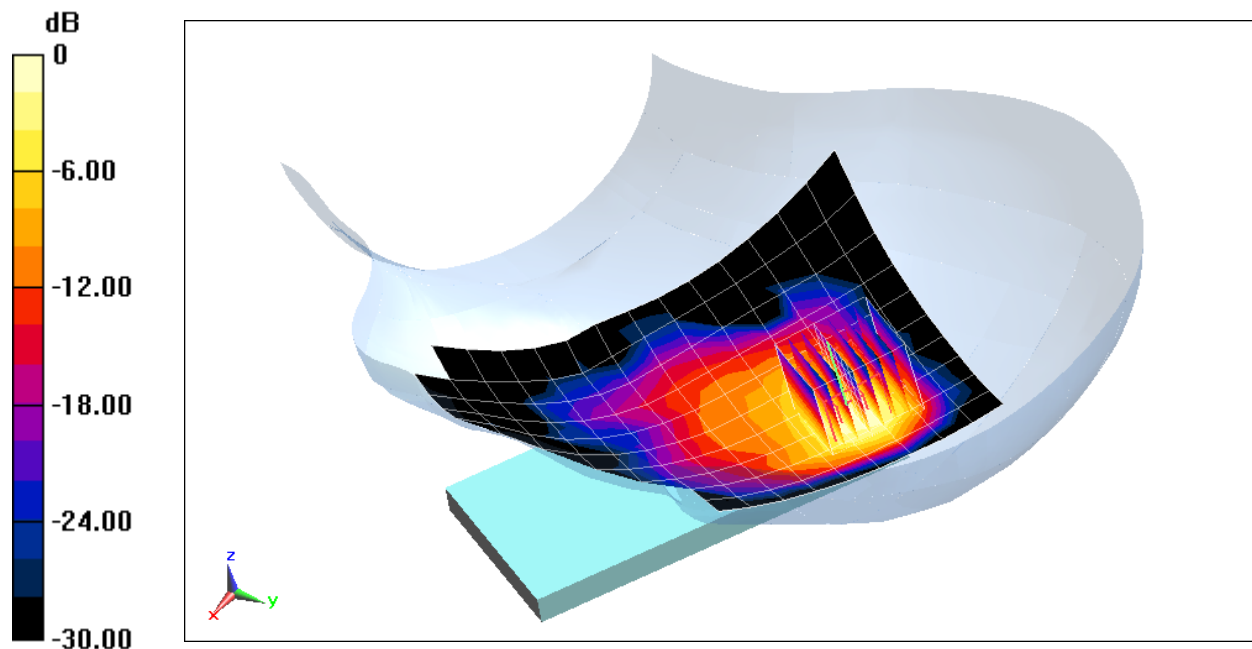
Area Scan (11x18x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Zoom Scan (7x8x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 15.80 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.909 W/kg

SAR(1 g) = 0.424 W/kg



0 dB = 0.556 W/kg = -2.55 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2502

Communication System: UID 0, 802.11n 5.2-5.8 GHz Band; Frequency: 5795 MHz; Duty Cycle: 1:1

Medium: 5GHz Head; Medium parameters used (interpolated):

$f = 5795 \text{ MHz}$; $\sigma = 5.092 \text{ S/m}$; $\epsilon_r = 34.384$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-17-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN7357; ConvF(4.41, 4.41, 4.41); Calibrated: 4/23/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/13/2015

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: IEEE 802.11n, U-NII-3, 40 MHz Bandwidth, Left Head, Cheek, Ch 159, 13.5 Mbps

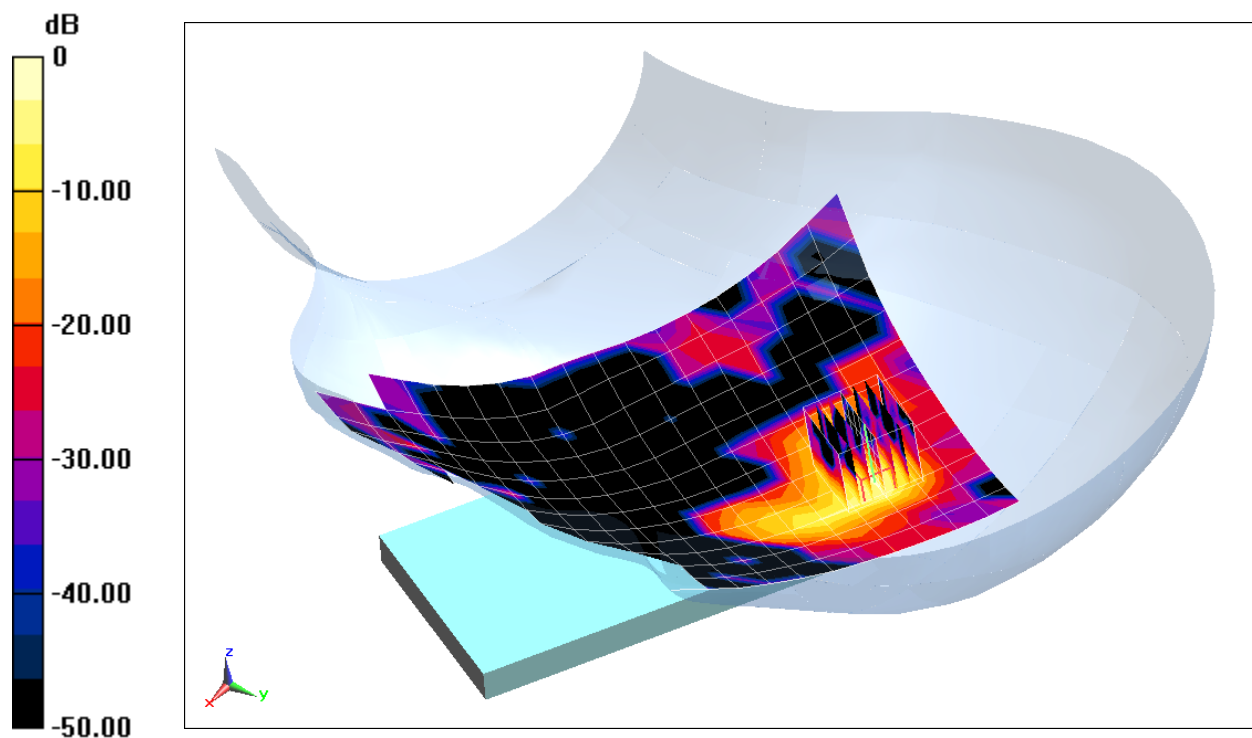
Area Scan (13x20x1): Measurement grid: dx=10mm, dy=10mm

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

Reference Value = 10.15 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 3.37 W/kg

SAR(1 g) = 0.561 W/kg



0 dB = 1.88 W/kg = 2.74 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2486

Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: 835 Body; Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.993 \text{ S/m}$; $\epsilon_r = 53.611$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3318; ConvF(6.23, 6.23, 6.23); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

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

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

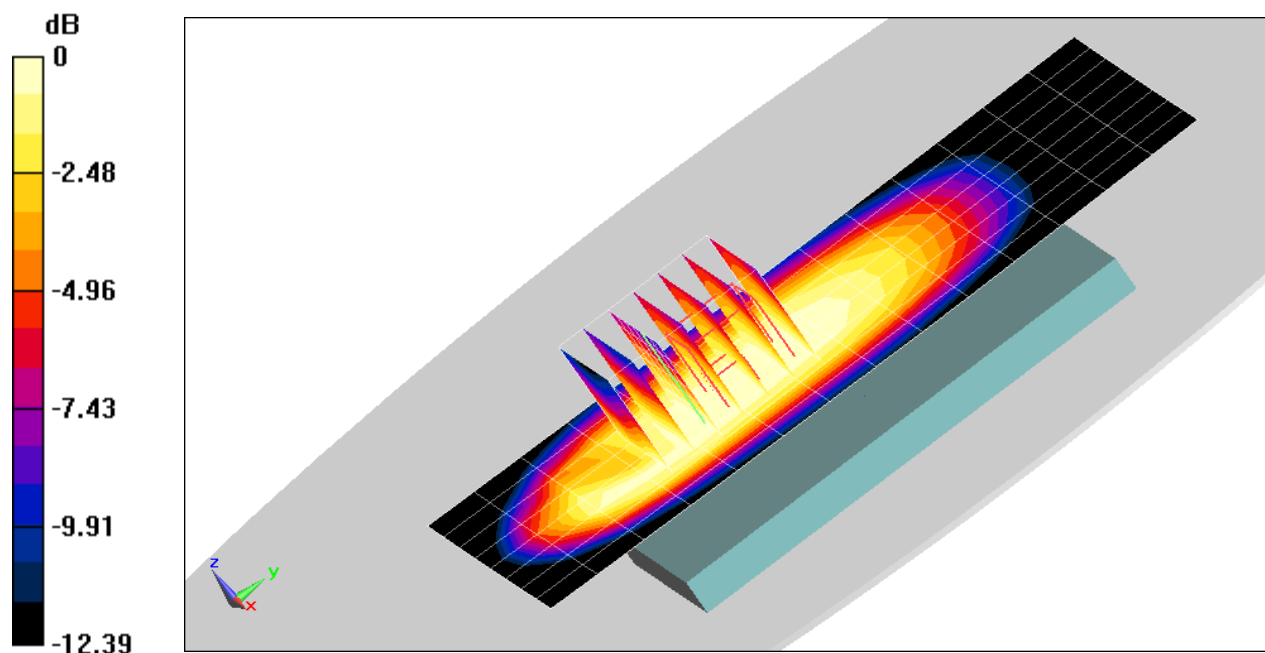
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 18.70 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.459 W/kg

SAR(1 g) = 0.326 W/kg



0 dB = 0.358 W/kg = -4.46 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2486

Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.76

Medium: 835 Body; Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.993 \text{ S/m}$; $\epsilon_r = 53.611$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3318; ConvF(6.23, 6.23, 6.23); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

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

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

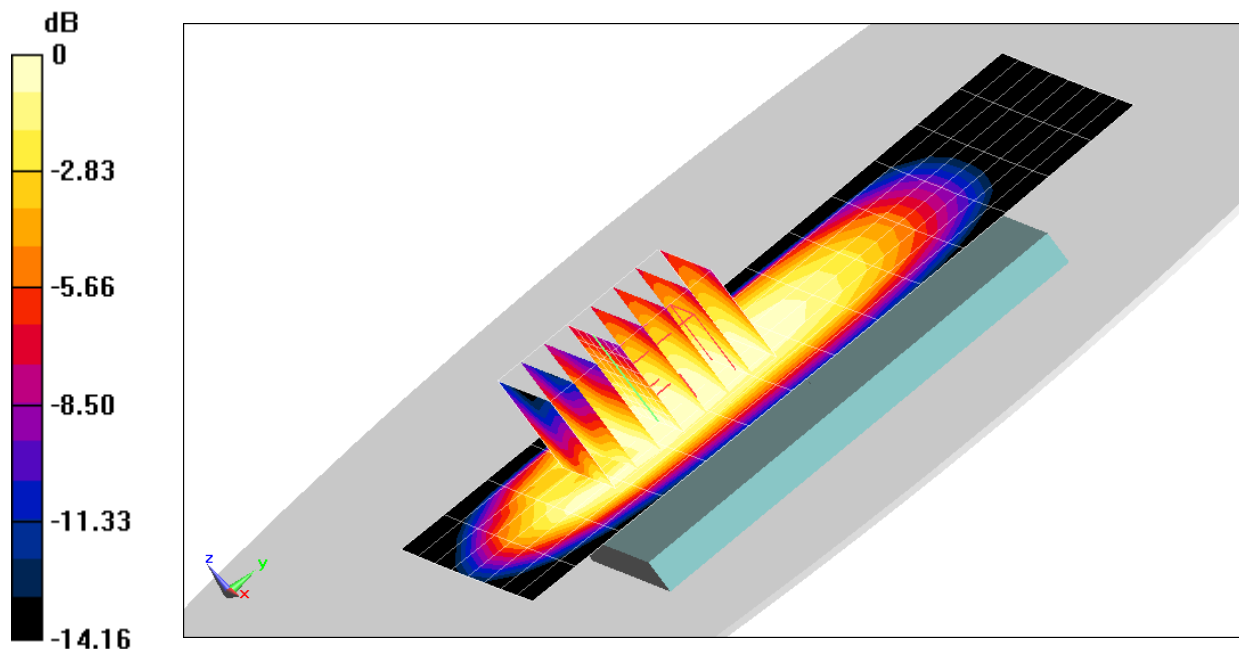
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (7x8x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 20.05 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 0.483 W/kg

SAR(1 g) = 0.366 W/kg



0 dB = 0.402 W/kg = -3.96 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2502

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium: 835 Body; Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.993 \text{ S/m}$; $\epsilon_r = 53.611$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3318; ConvF(6.23, 6.23, 6.23); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

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

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

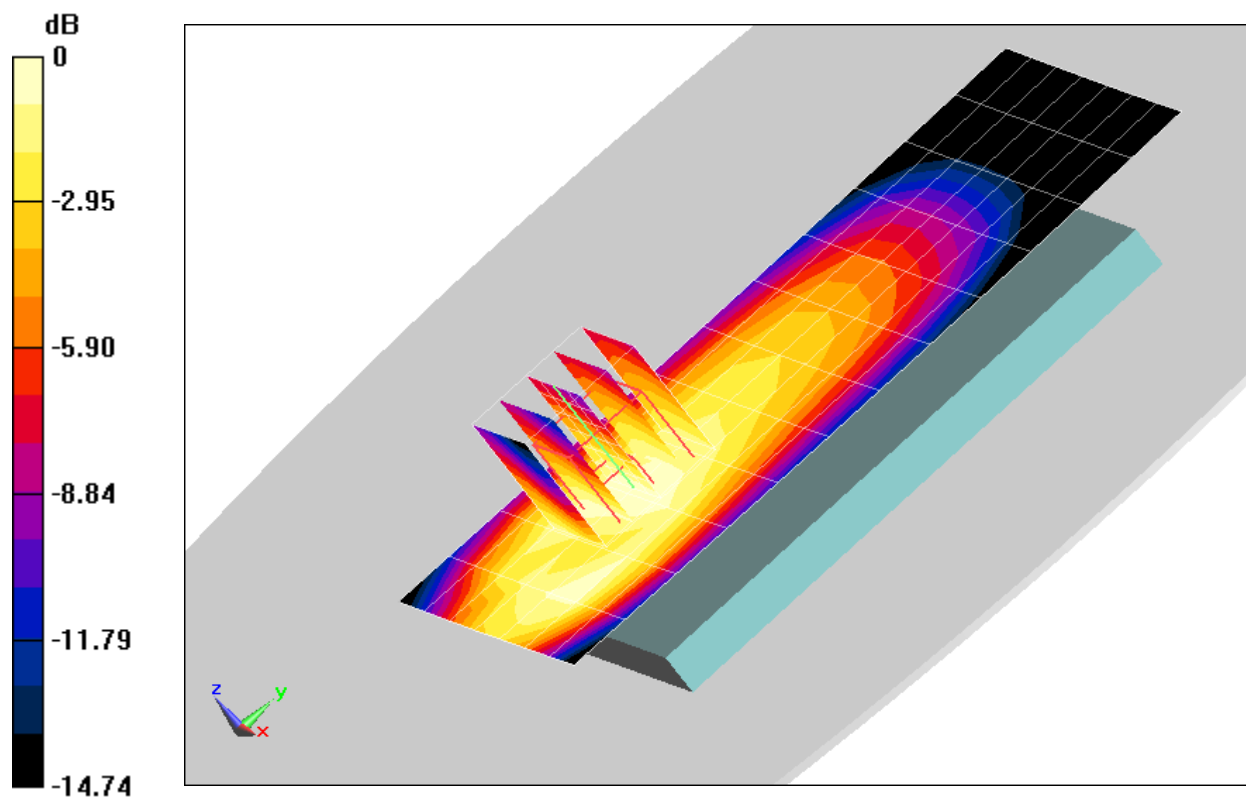
Area Scan (8x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 12.87 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.213 W/kg

SAR(1 g) = 0.150 W/kg



0 dB = 0.168 W/kg = -7.75 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2494

Communication System: UID 0, GSM; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: 1900 Body; Medium parameters used:

$f = 1910$ MHz; $\sigma = 1.553$ S/m; $\epsilon_r = 51.509$; $\rho = 1000$ kg/m³

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); 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: GSM 1900, Body SAR, Back Side, High.ch

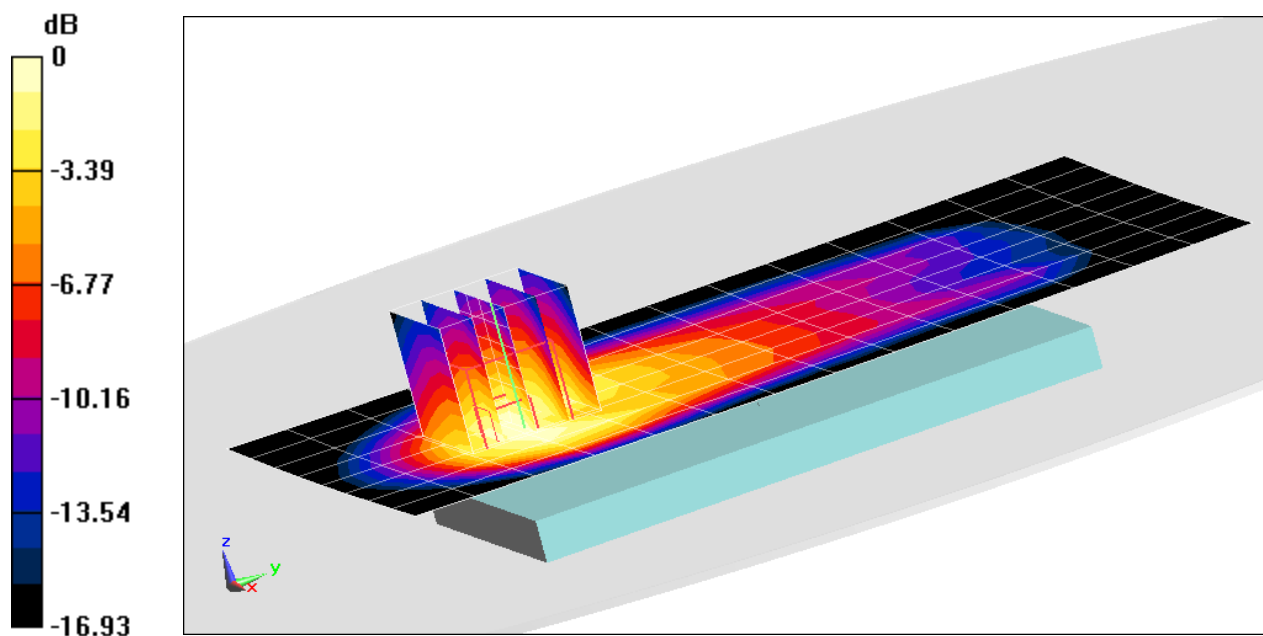
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 15.55 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.560 W/kg

SAR(1 g) = 0.345 W/kg



0 dB = 0.396 W/kg = -4.02 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2494

Communication System: UID 0, GSM GPRS; 4 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.076

Medium: 1900 Body; Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.515 \text{ S/m}$; $\epsilon_r = 51.588$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); 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: GPRS 1900, Body SAR, Bottom Edge, Mid.ch, 4 Tx Slots

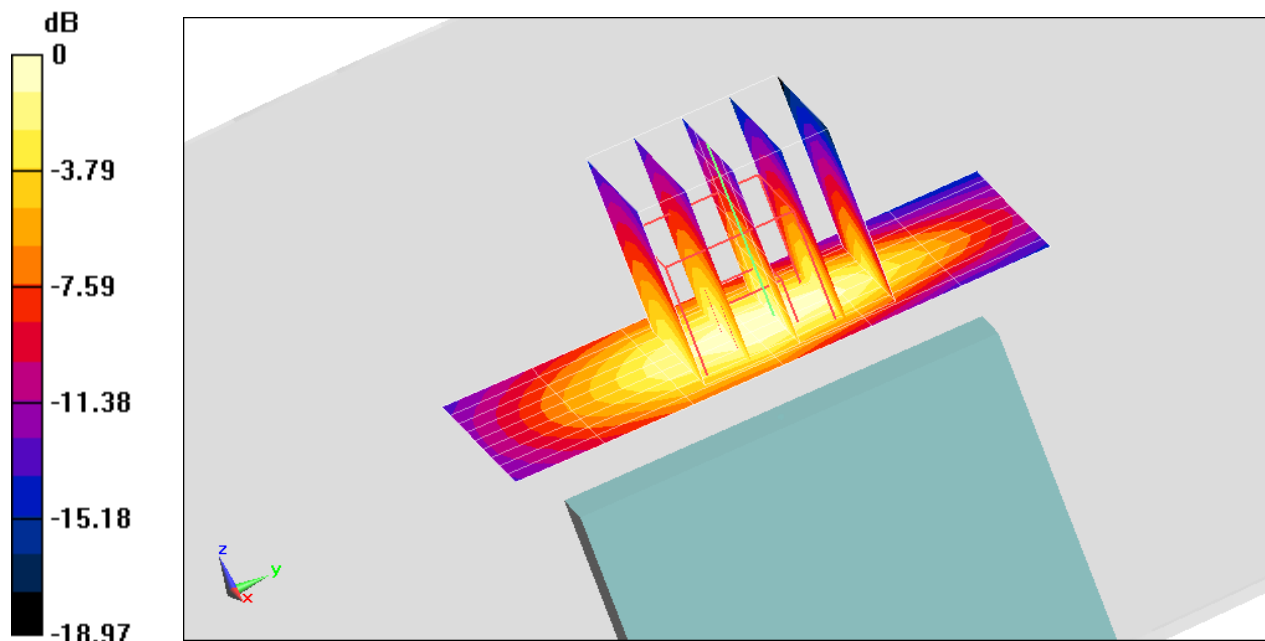
Area Scan (10x7x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 19.71 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.858 W/kg

SAR(1 g) = 0.517 W/kg



0 dB = 0.632 W/kg = -1.99 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2502

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body; Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.515 \text{ S/m}$; $\epsilon_r = 51.588$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); 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 1900, Body SAR, Back side, Mid.ch

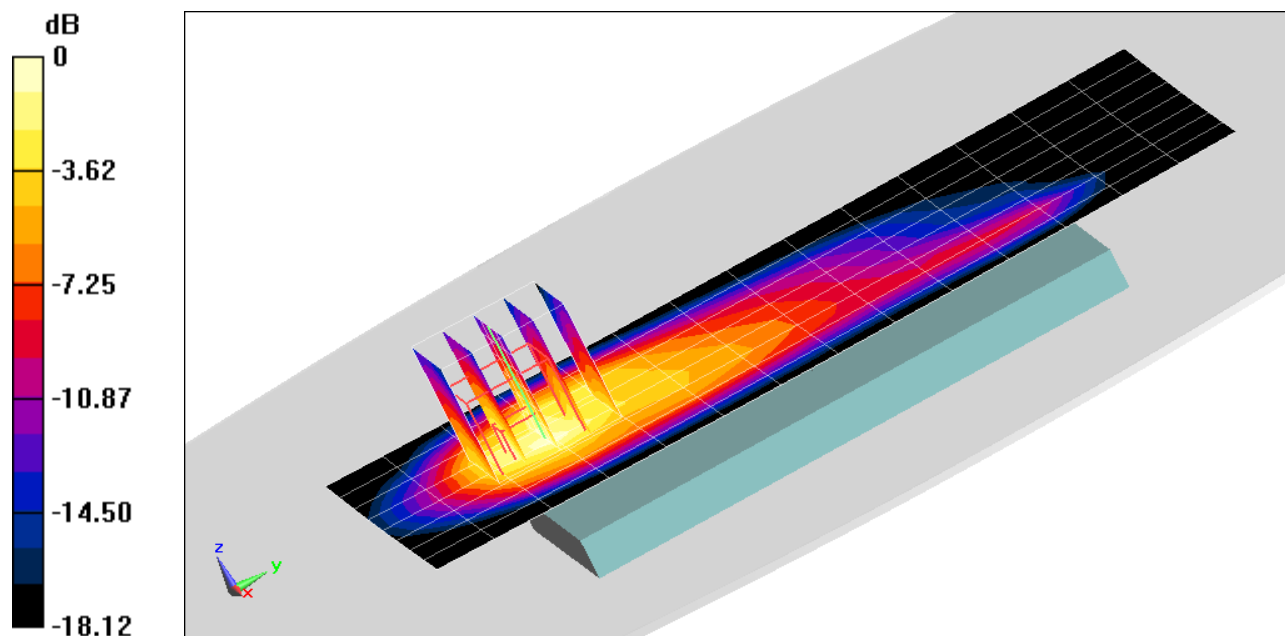
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 20.38 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 1.02 W/kg

SAR(1 g) = 0.620 W/kg



0 dB = 0.731 W/kg = -1.36 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2502

Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1

Medium: 1900 Body; Medium parameters used (interpolated):

$f = 1907.6 \text{ MHz}$; $\sigma = 1.55 \text{ S/m}$; $\epsilon_r = 51.515$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); 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 1900, Body SAR, Bottom Edge, High.ch

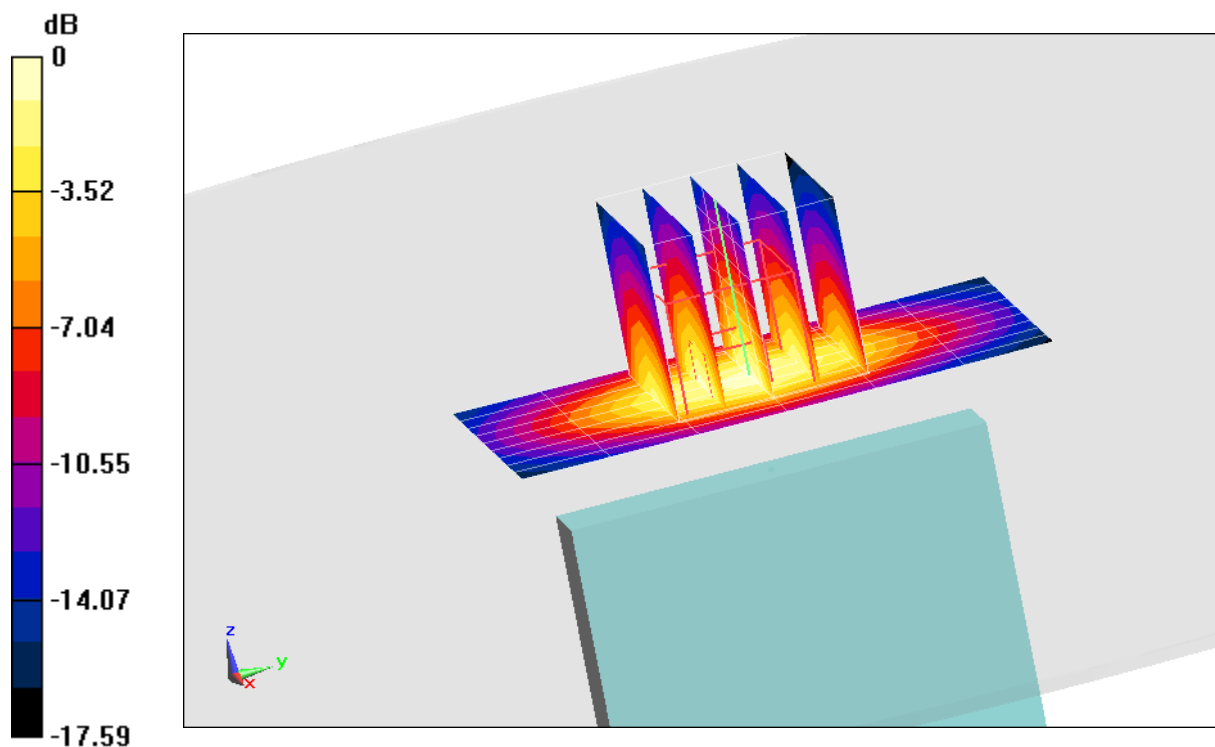
Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 28.04 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.79 W/kg

SAR(1 g) = 1.07 W/kg



0 dB = 1.30 W/kg = 1.14 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2536

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

Medium: 750 Body; Medium parameters used:

$f = 710 \text{ MHz}$; $\sigma = 0.928 \text{ S/m}$; $\epsilon_r = 54.742$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-13-2015; Ambient Temp: 22.3°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3318; ConvF(6.22, 6.22, 6.22); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

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

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

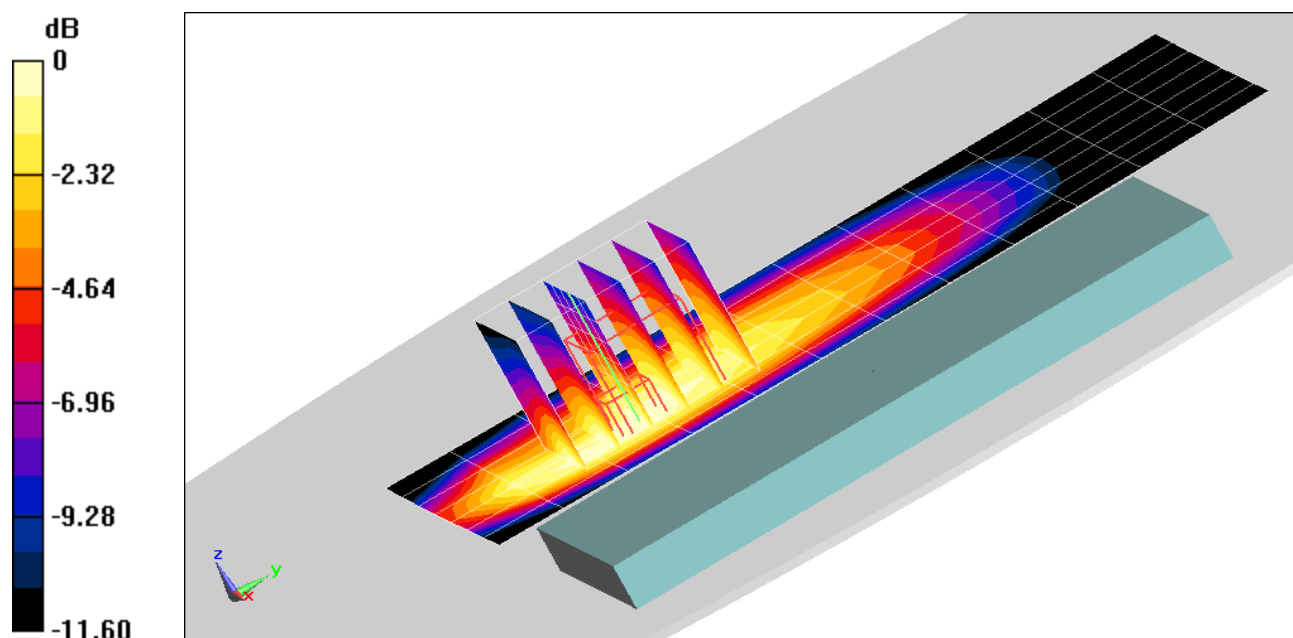
Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.15 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.430 W/kg

SAR(1 g) = 0.285 W/kg



0 dB = 0.325 W/kg = -4.88 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2536

Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1

Medium: 835 Body; Medium parameters used (interpolated):

$f = 836.5 \text{ MHz}$; $\sigma = 0.993 \text{ S/m}$; $\epsilon_r = 53.612$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3318; ConvF(6.23, 6.23, 6.23); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

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

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

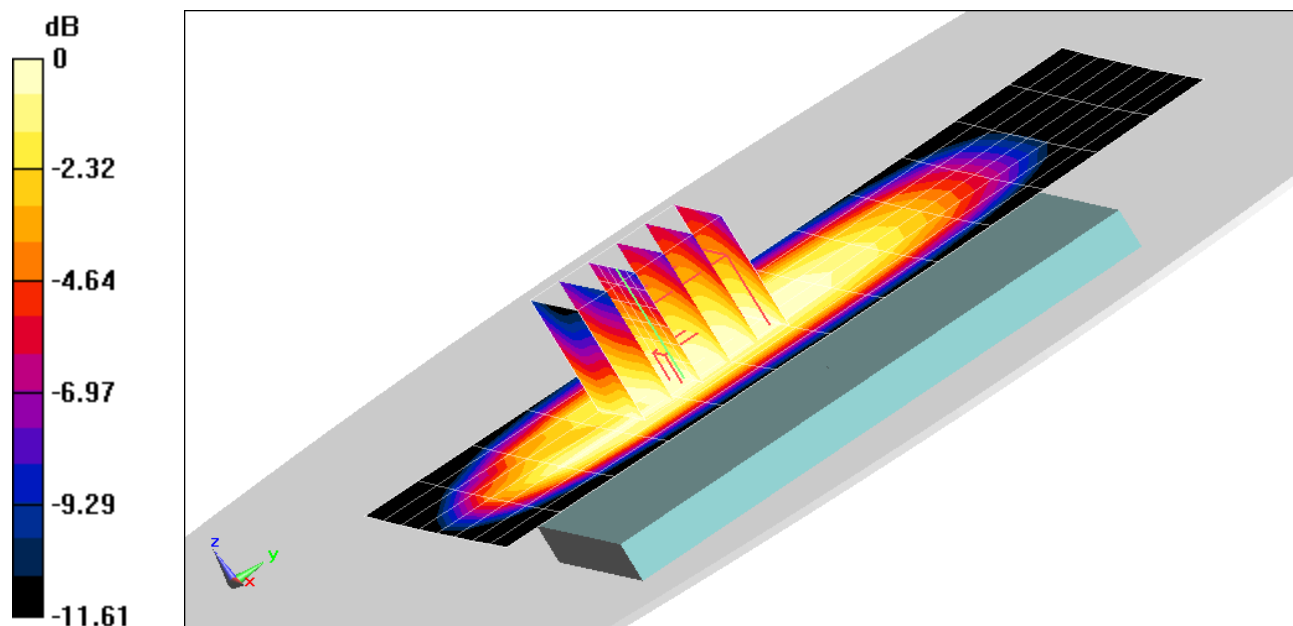
Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.34 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.426 W/kg

SAR(1 g) = 0.310 W/kg



0 dB = 0.342 W/kg = -4.66 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2460

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: 1750 Body; Medium parameters used (interpolated):

$f = 1732.5 \text{ MHz}$; $\sigma = 1.445 \text{ S/m}$; $\epsilon_r = 51.718$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-11-2015; Ambient Temp: 22.3°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3263; ConvF(4.88, 4.88, 4.88); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 6/17/2015

Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759

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

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

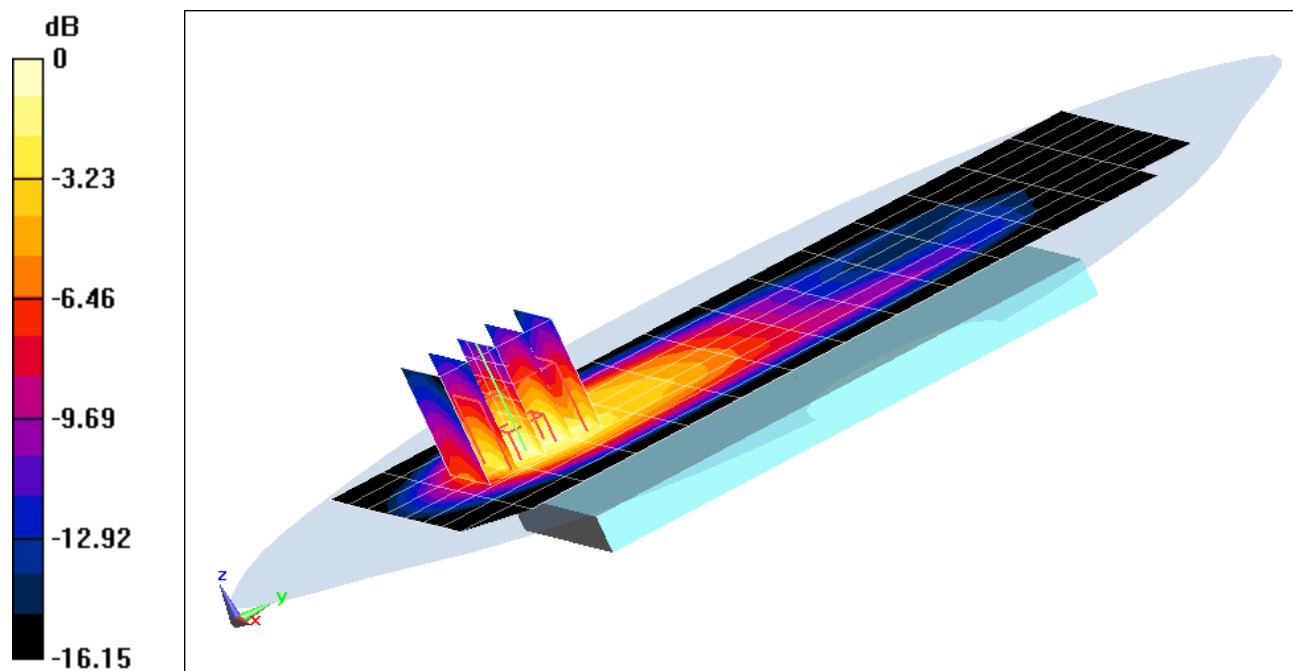
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 17.42 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.716 W/kg

SAR(1 g) = 0.450 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2460

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: 1750 Body; Medium parameters used (interpolated):

$f = 1732.5 \text{ MHz}$; $\sigma = 1.445 \text{ S/m}$; $\epsilon_r = 51.718$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-11-2015; Ambient Temp: 22.3°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3263; ConvF(4.88, 4.88, 4.88); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 6/17/2015

Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759

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

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

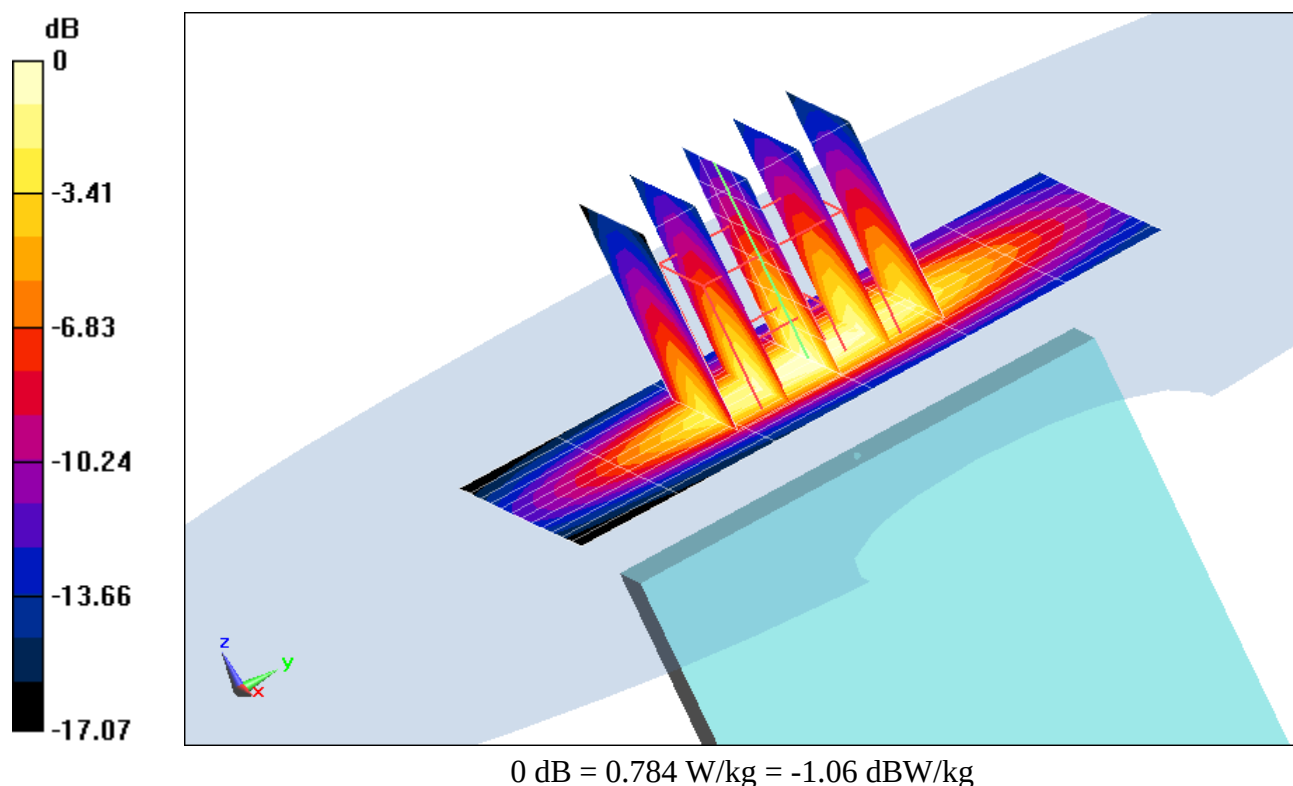
Area Scan (13x7x1): Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 22.56 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.04 W/kg

SAR(1 g) = 0.633 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2486

Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body; Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.54 \text{ S/m}$; $\epsilon_r = 51.535$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); 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 2 (PCS), Body SAR, Back Side, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset**

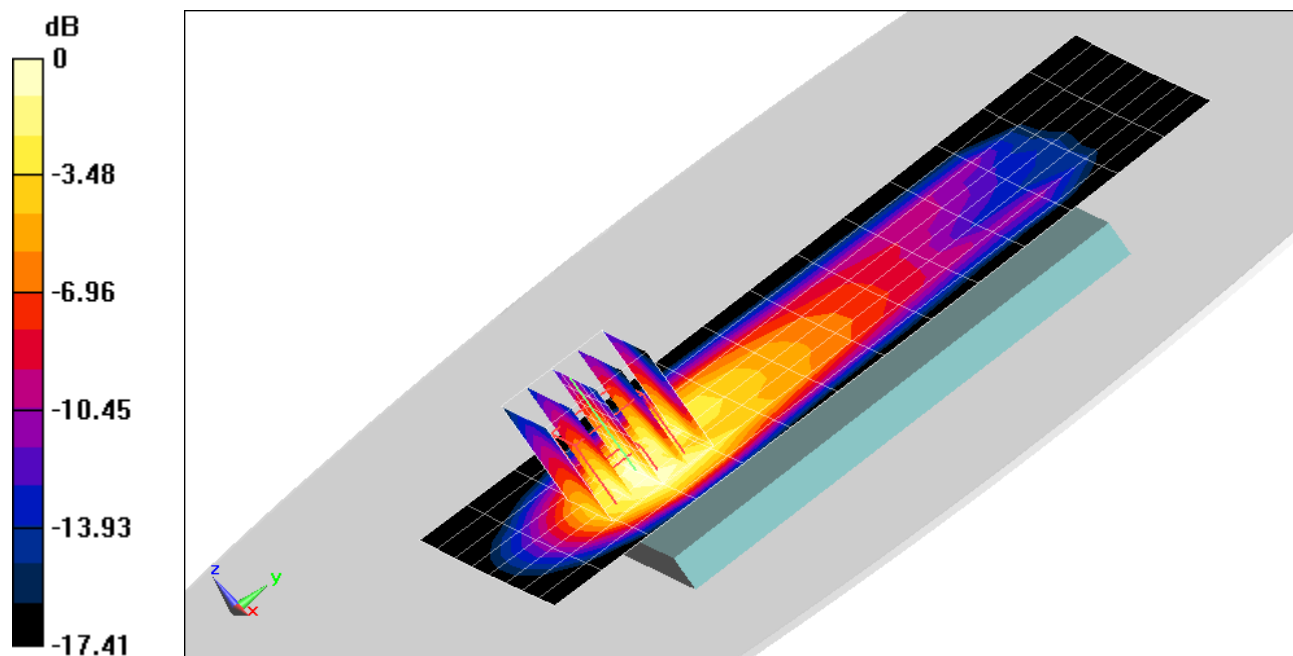
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.34 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.760 W/kg

SAR(1 g) = 0.471 W/kg



0 dB = 0.550 W/kg = -2.60 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2486

Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body; Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.54 \text{ S/m}$; $\epsilon_r = 51.535$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); 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 2 (PCS), Body SAR, Bottom Edge, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset**

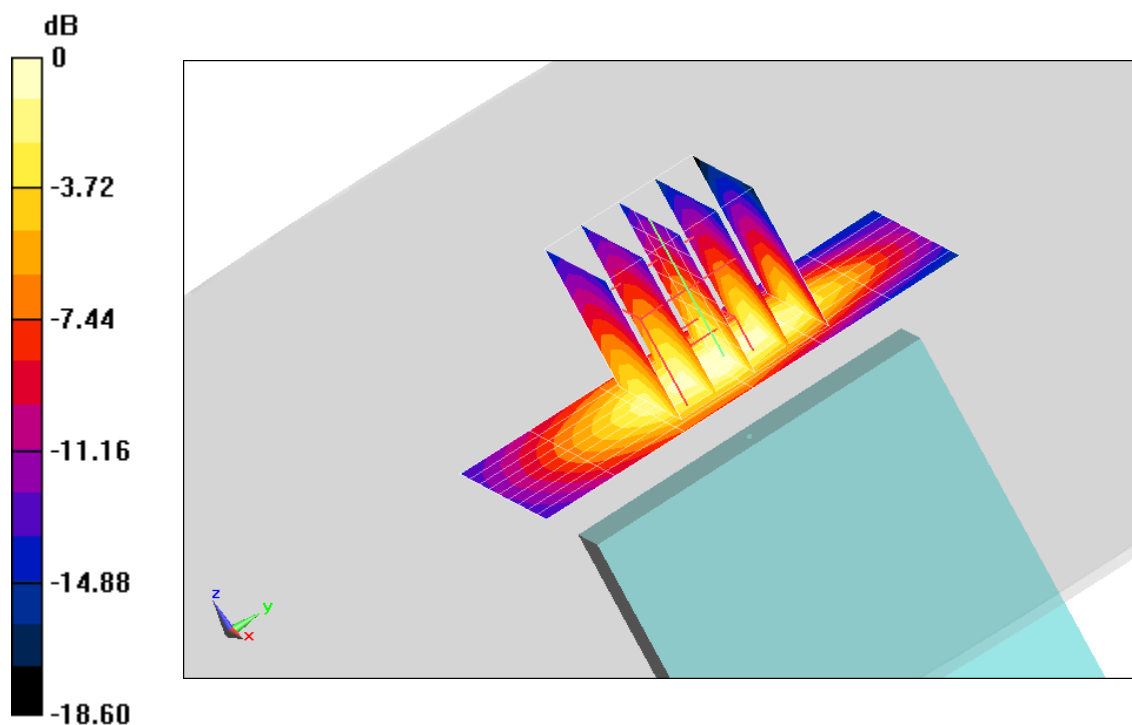
Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 22.82 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 1.16 W/kg

SAR(1 g) = 0.695 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2502

Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: 2450 Body; Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 2.021 \text{ S/m}$; $\epsilon_r = 51.791$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.3°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3318; ConvF(4.37, 4.37, 4.37); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

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

Mode: IEEE 802.11b, 22 MHz Bandwidth, Body SAR, Ch 6, 1 Mbps, Back Side

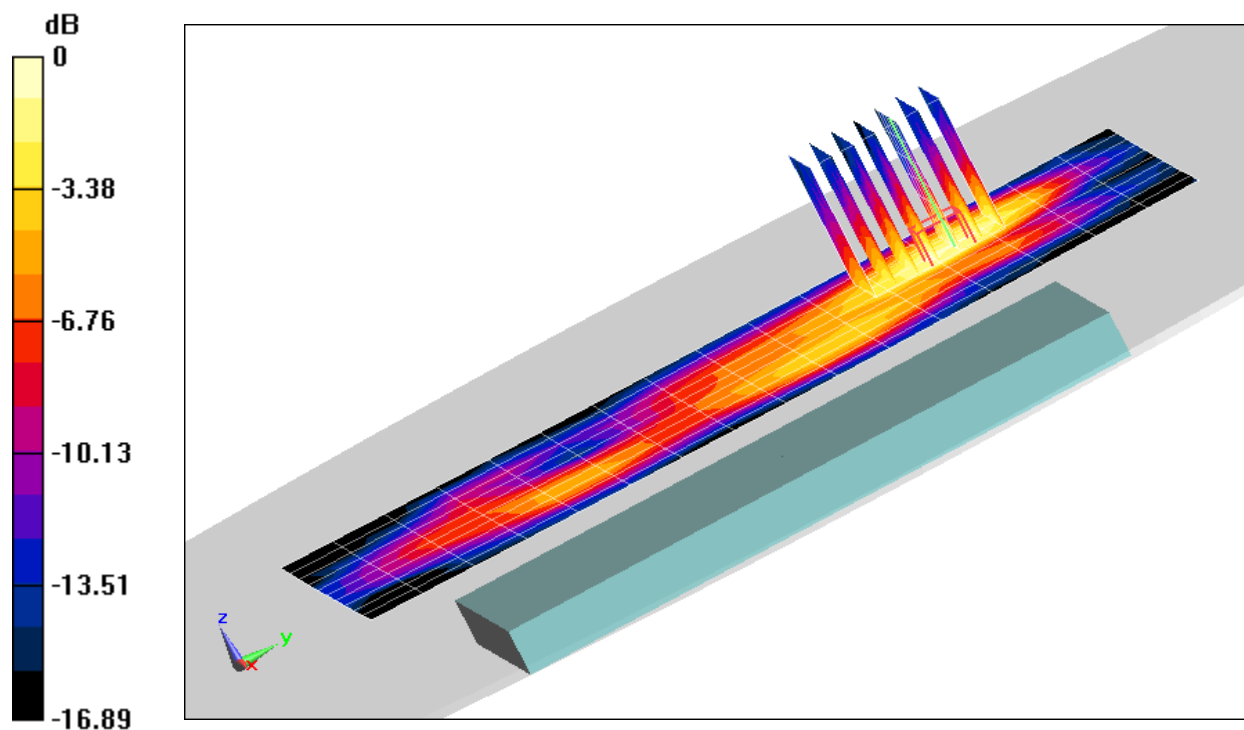
Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm

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

Reference Value = 4.642 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.0870 W/kg

SAR(1 g) = 0.044 W/kg



0 dB = 0.0567 W/kg = -12.46 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2502

Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: 2450 Body; Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 2.021 \text{ S/m}$; $\epsilon_r = 51.791$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.3°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3318; ConvF(4.37, 4.37, 4.37); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

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

Mode: IEEE 802.11b, 22 MHz Bandwidth, Body SAR, Ch 6, 1 Mbps, Front Side

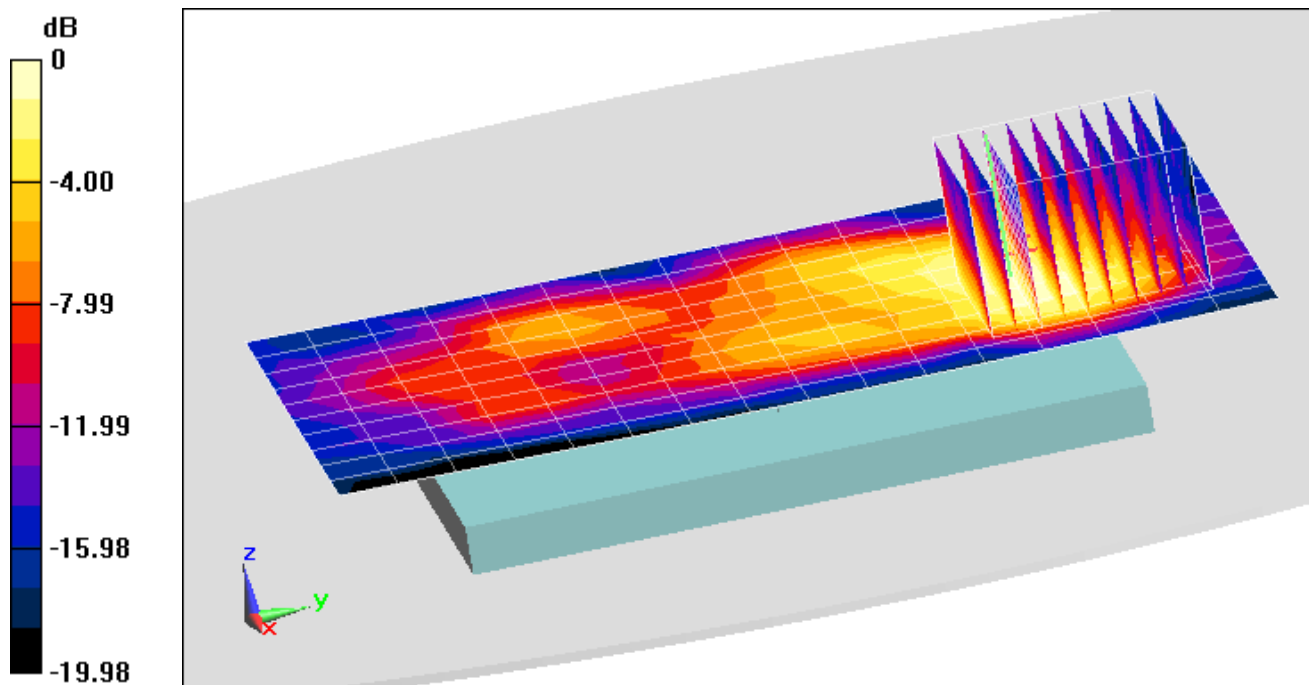
Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm

Zoom Scan (10x10x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.064 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.0900 W/kg

SAR(1 g) = 0.046 W/kg



0 dB = 0.0569 W/kg = -12.45 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2502

Communication System: UID 0, IEEE 802.11n; Frequency: 5795 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body; Medium parameters used (interpolated):

$f = 5795 \text{ MHz}$; $\sigma = 6.116 \text{ S/m}$; $\epsilon_r = 46.461$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-18-2015; Ambient Temp: 23.2°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN3589; ConvF(3.79, 3.79, 3.79); Calibrated: 1/22/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

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

**Mode: IEEE 802.11n, U-NII-3, 40 MHz Bandwidth, Body SAR,
Ch 159, 13.5 Mbps, Back Side**

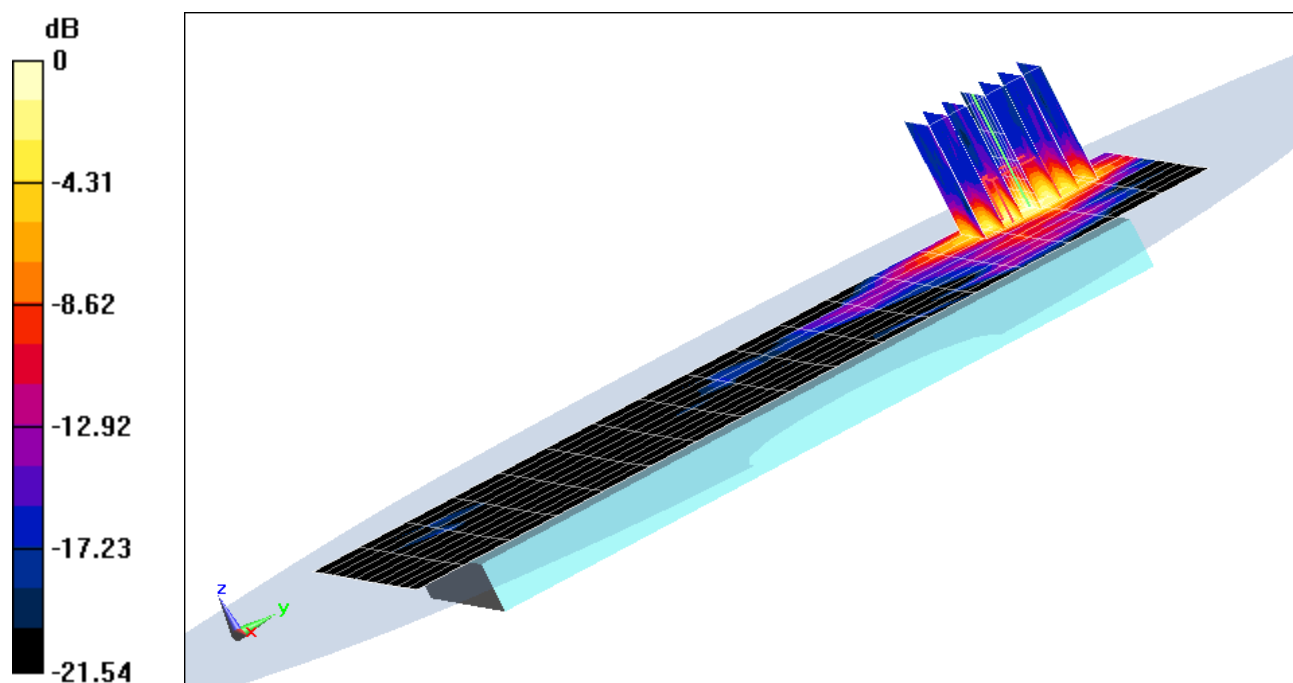
Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm

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

Reference Value = 5.906 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.869 W/kg

SAR(1 g) = 0.214 W/kg



0 dB = 0.512 W/kg = -2.91 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA500W; Type: Portable Handset; Serial: 2460

Communication System: UID 0, Bluetooth; Frequency: 2480 MHz; Duty Cycle: 1:1

Medium: 2450 Body; Medium parameters used (interpolated):

$f = 2480 \text{ MHz}$; $\sigma = 2.079 \text{ S/m}$; $\epsilon_r = 51.608$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.3°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3318; ConvF(4.37, 4.37, 4.37); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

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

Mode: Bluetooth, Body SAR, Ch 78, 1 Mbps, Back Side

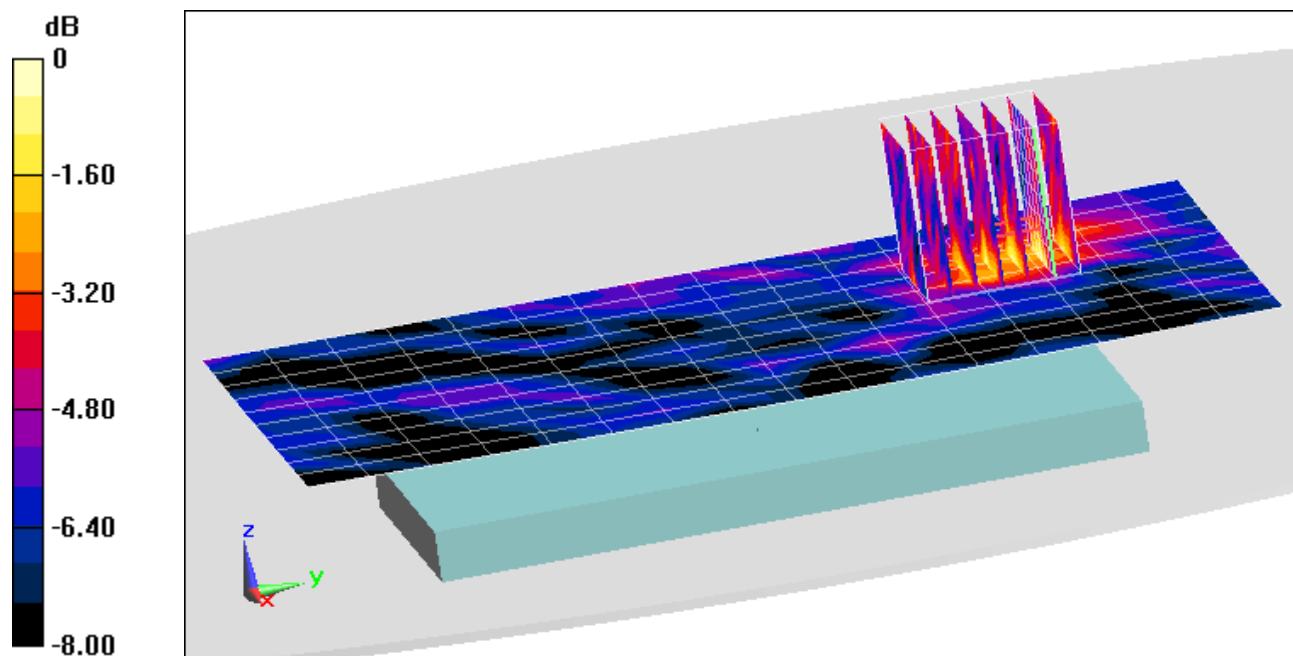
Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm

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

Reference Value = 1.716 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.0120 W/kg

SAR(1 g) = 0.006 W/kg



0 dB = 0.00812 W/kg = -20.90 dBW/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):

$f = 750 \text{ MHz}$; $\sigma = 0.899 \text{ S/m}$; $\epsilon_r = 42.999$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-13-2015; Ambient Temp: 23.1°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3263; ConvF(6.27, 6.27, 6.27); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 6/17/2015

Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715

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

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

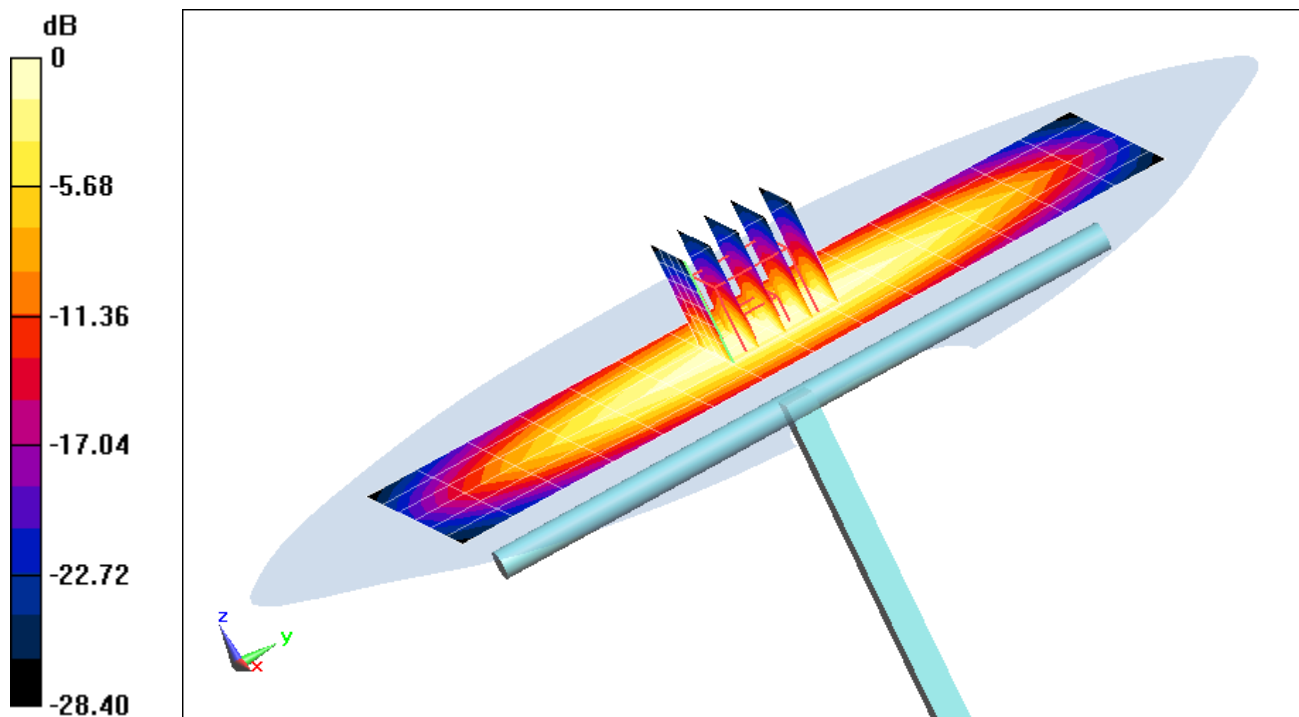
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 23 dBm (200 mW)

Peak SAR (extrapolated) = 2.49 W/kg

SAR(1 g) = 1.68 W/kg

Deviation = 3.83%



0 dB = 1.96 W/kg = 2.91 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 835 Head; Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.884 \text{ S/m}$; $\epsilon_r = 40.302$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-13-2015; Ambient Temp: 22.5°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3318; ConvF(6.39, 6.39, 6.39); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

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

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

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

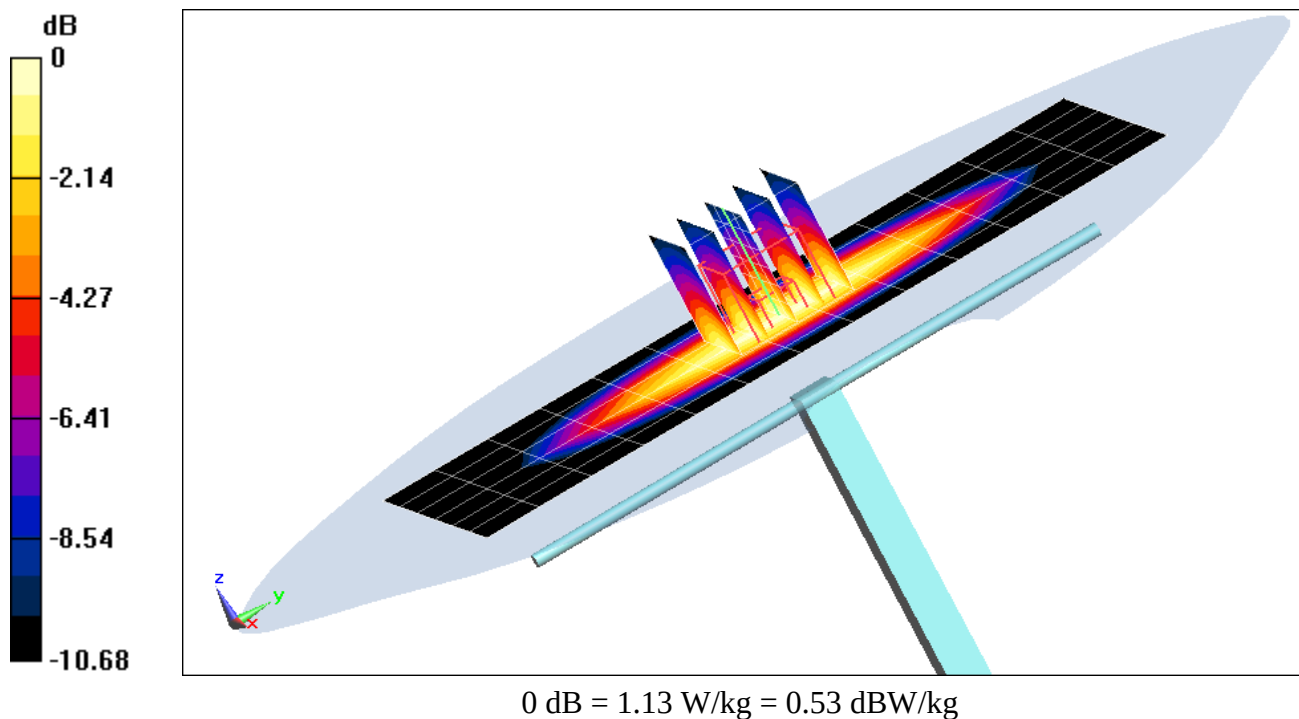
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.45 W/kg

SAR(1 g) = 0.964 W/kg

Deviation = 2.77%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Head; Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.354 \text{ S/m}$; $\epsilon_r = 38.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.7°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3318; ConvF(5.27, 5.27, 5.27); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

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

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

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

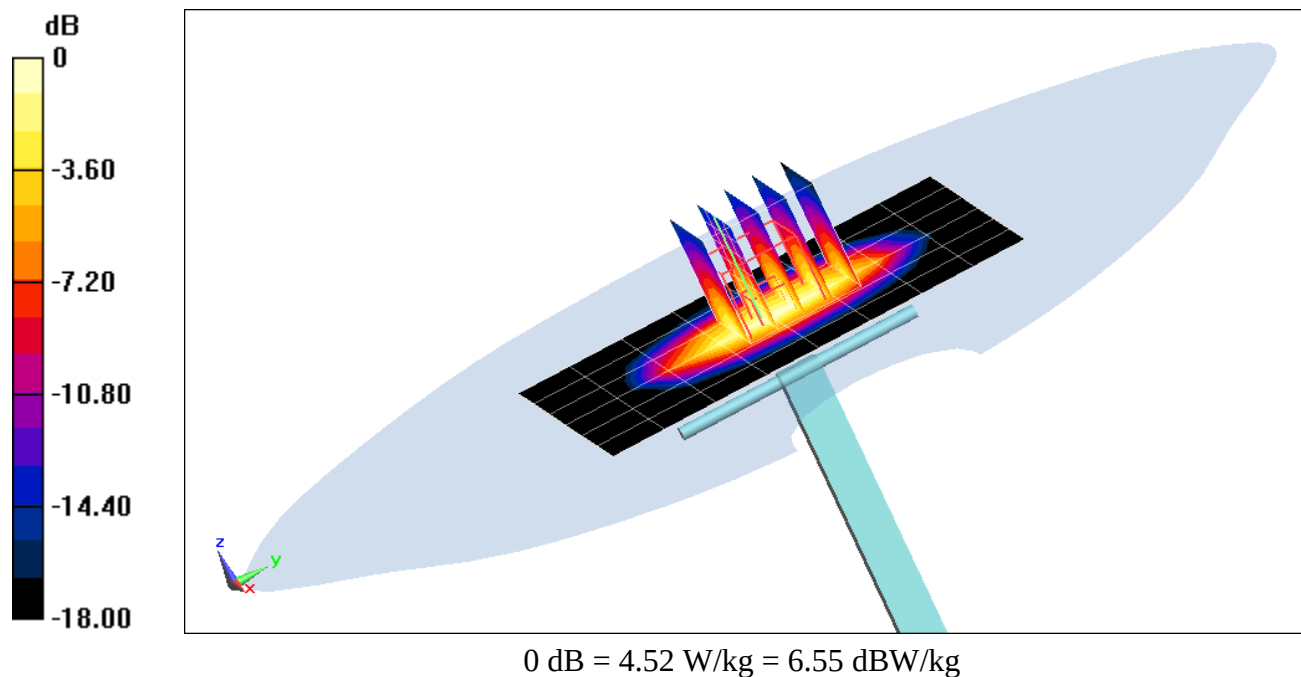
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 6.62 W/kg

SAR(1 g) = 3.63 W/kg

Deviation = 0.28%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Head; Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.451 \text{ S/m}$; $\epsilon_r = 38.689$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-13-2015; Ambient Temp: 23.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3288; ConvF(5.17, 5.17, 5.17); 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)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

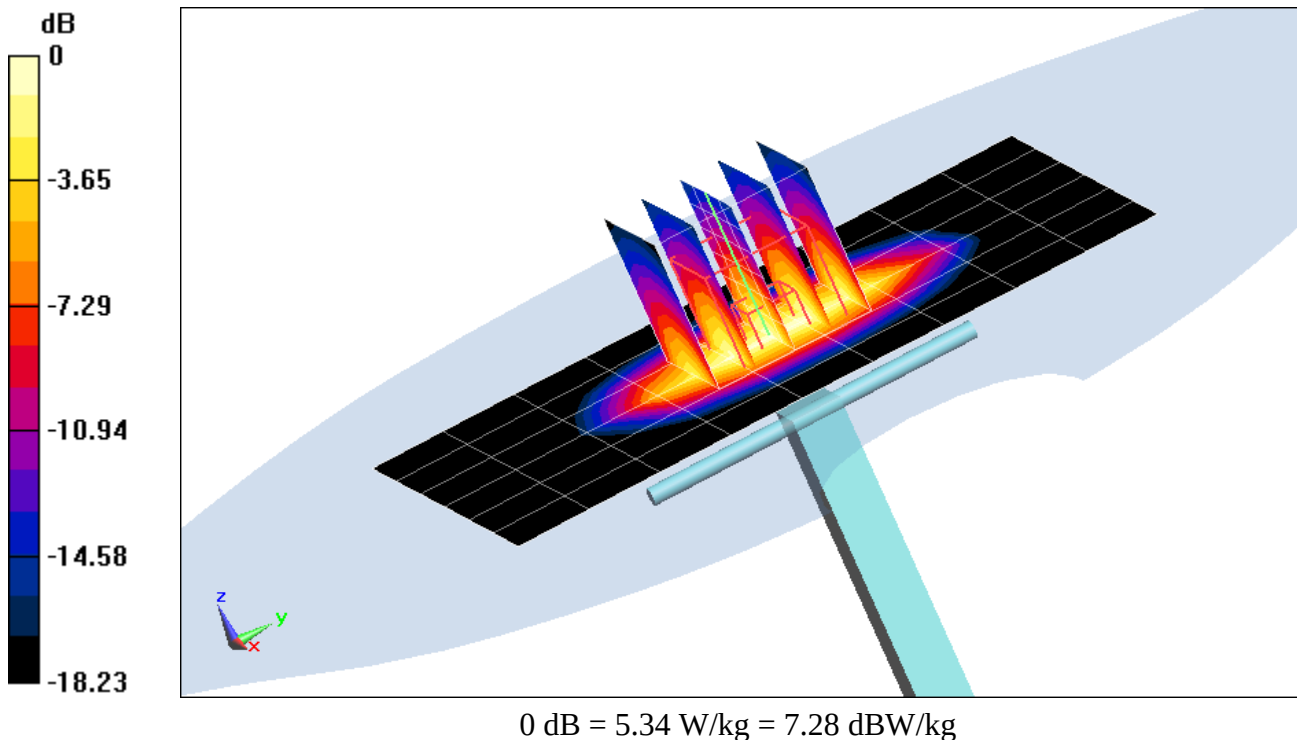
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 7.80 W/kg

SAR(1 g) = 4.2 W/kg

Deviation = 5.26%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 882

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

Medium: 2450 Head; Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 1.843 \text{ S/m}$; $\epsilon_r = 39.175$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 23.3°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3263; ConvF(4.4, 4.4, 4.4); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 6/17/2015

Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715

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

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

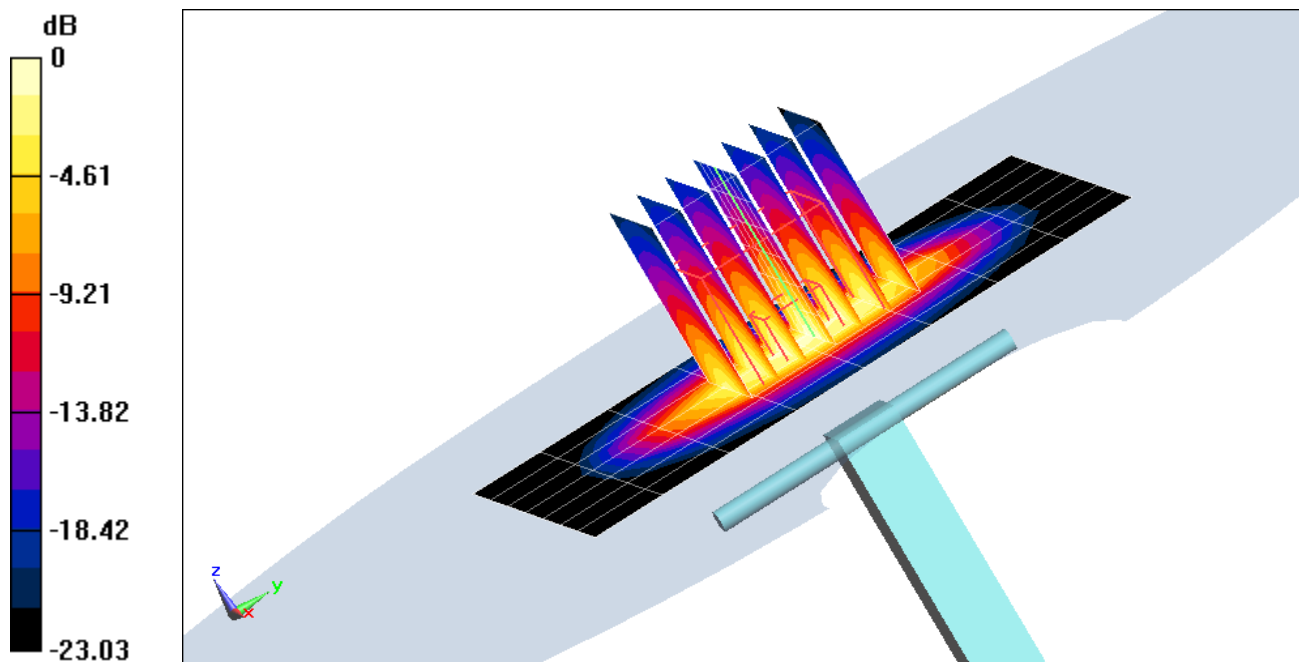
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 11.1 W/kg

SAR(1 g) = 5.33 W/kg

Deviation = 1.91%



0 dB = 7.01 W/kg = 8.46 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: 5GHz Head; Medium parameters used:

$f = 5300 \text{ MHz}$; $\sigma = 4.583 \text{ S/m}$; $\epsilon_r = 34.998$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN7357; ConvF(4.93, 4.93, 4.93); Calibrated: 4/23/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/13/2015

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

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

5300 MHz System Verification

Area Scan (7x8x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

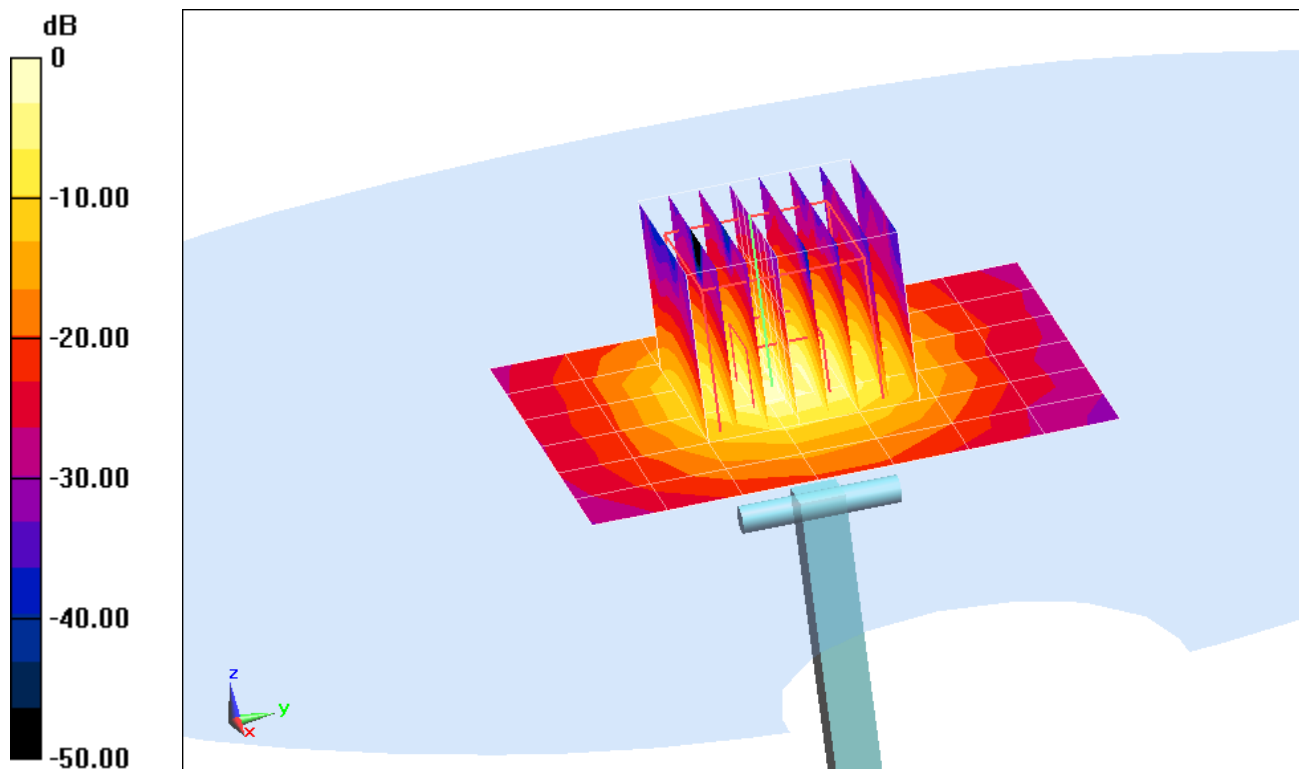
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio = 1.4

Input Power = 17 dBm (50 mW)

Peak SAR (extrapolated) = 16.3 W/kg

SAR(1 g) = 4.02 W/kg

Deviation = -5.08%



0 dB = 9.51 W/kg = 9.78 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: 5GHz Head; Medium parameters used:

$f = 5600 \text{ MHz}$; $\sigma = 4.9 \text{ S/m}$; $\epsilon_r = 34.646$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN7357; ConvF(4.38, 4.38, 4.38); Calibrated: 4/23/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/13/2015

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

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

5600 MHz System Verification

Area Scan (7x7x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

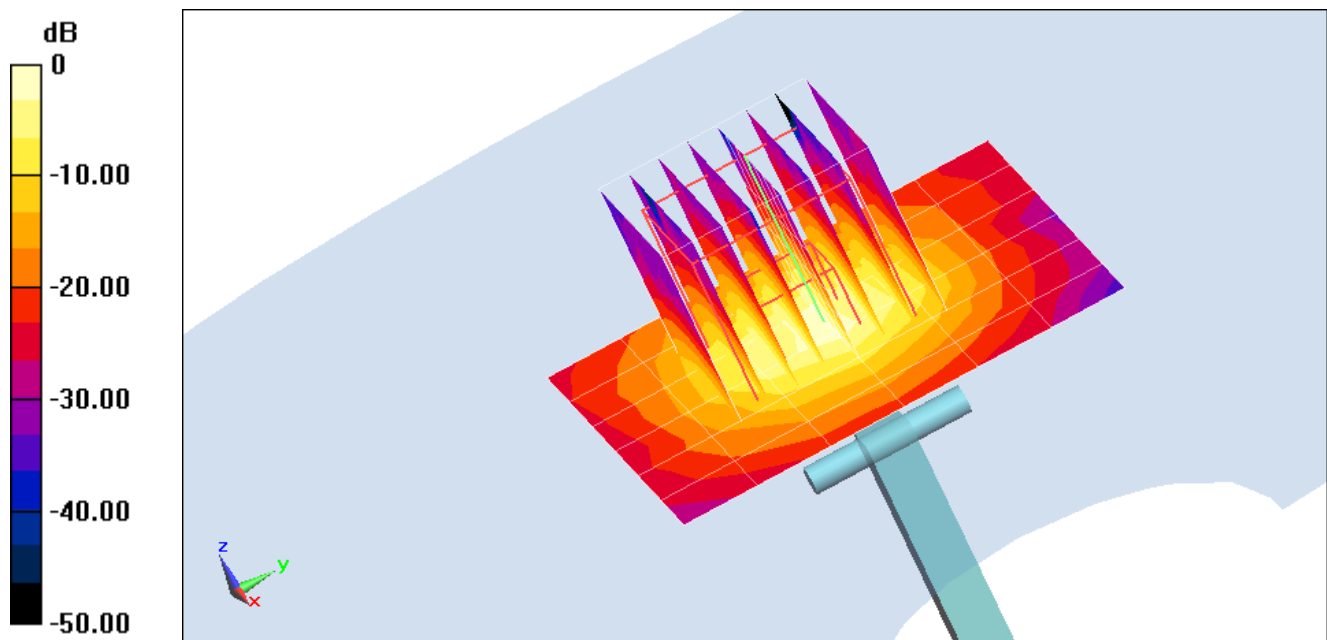
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio = 1.4

Input Power = 17 dBm (50 mW)

Peak SAR (extrapolated) = 17.4 W/kg

SAR(1 g) = 4.17 W/kg

Deviation = -0.48%



0 dB = 9.94 W/kg = 9.97 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: 5GHz Head; Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 5.101 \text{ S/m}$; $\epsilon_r = 34.402$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN7357; ConvF(4.41, 4.41, 4.41); Calibrated: 4/23/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/13/2015

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

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

5800 MHz System Verification

Area Scan (7x7x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

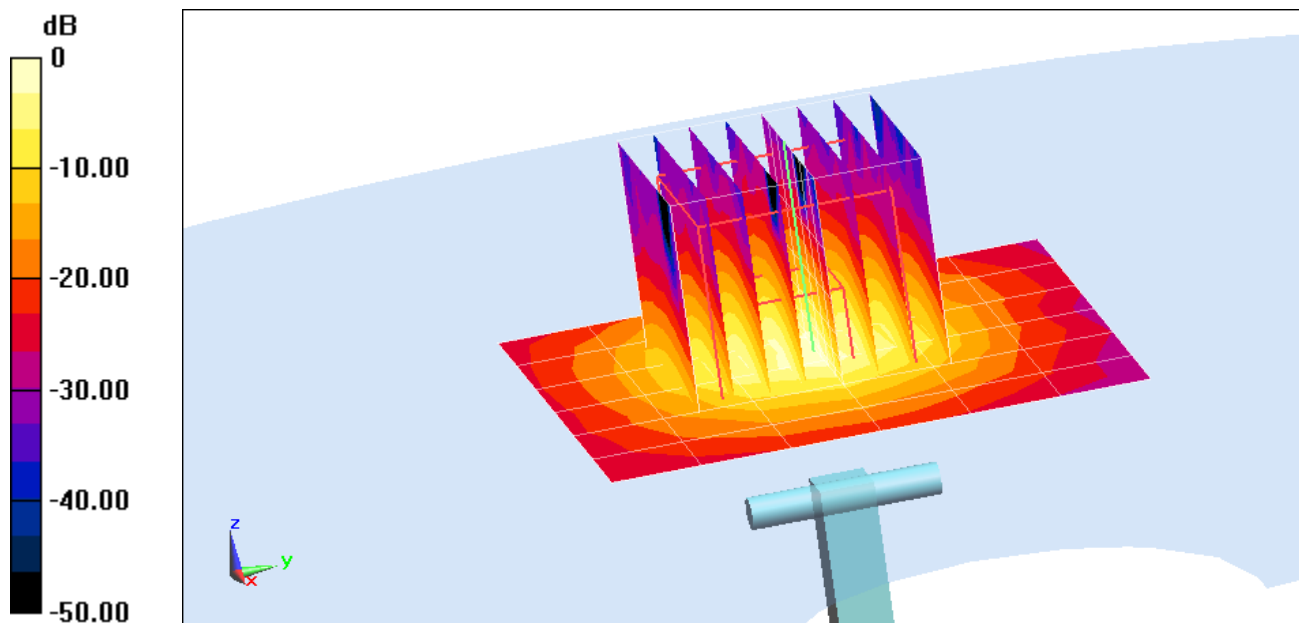
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio = 1.4

Input Power = 17 dBm (50 mW)

Peak SAR (extrapolated) = 16.5 W/kg

SAR(1 g) = 3.77 W/kg

Deviation = -7.03%



0 dB = 9.08 W/kg = 9.58 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 750 Body; Medium parameters used (interpolated):

$f = 750 \text{ MHz}$; $\sigma = 0.965 \text{ S/m}$; $\epsilon_r = 54.345$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-13-2015; Ambient Temp: 22.3°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3318; ConvF(6.22, 6.22, 6.22); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

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

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

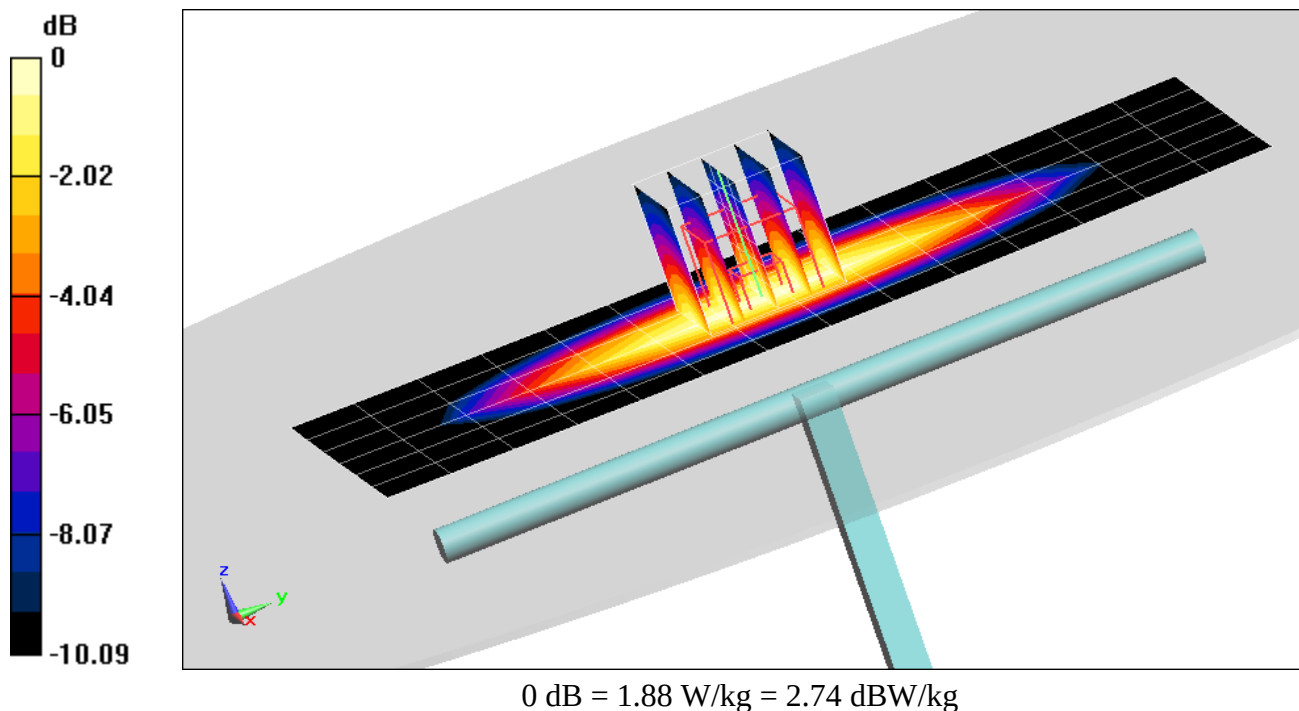
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 23 dBm (200 mW)

Peak SAR (extrapolated) = 2.36 W/kg

SAR(1 g) = 1.6 W/kg

Deviation = -5.44%



PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 835 Body; Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.991 \text{ S/m}$; $\epsilon_r = 53.624$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-10-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3318; ConvF(6.23, 6.23, 6.23); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

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

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

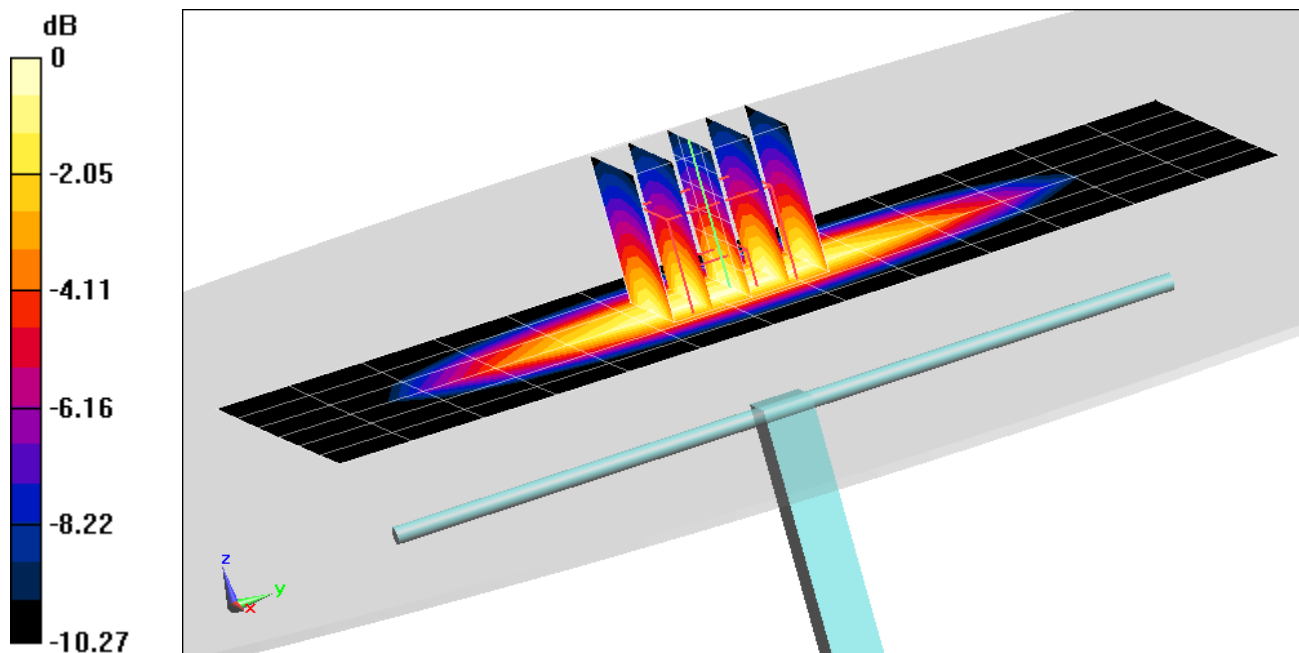
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 23 dBm (200 mW)

Peak SAR (extrapolated) = 2.72 W/kg

SAR(1 g) = 1.85 W/kg

Deviation = 0.54%



0 dB = 2.17 W/kg = 3.36 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Body; Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.464 \text{ S/m}$; $\epsilon_r = 51.658$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-11-2015; Ambient Temp: 22.3°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3263; ConvF(4.88, 4.88, 4.88); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 6/17/2015

Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759

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

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

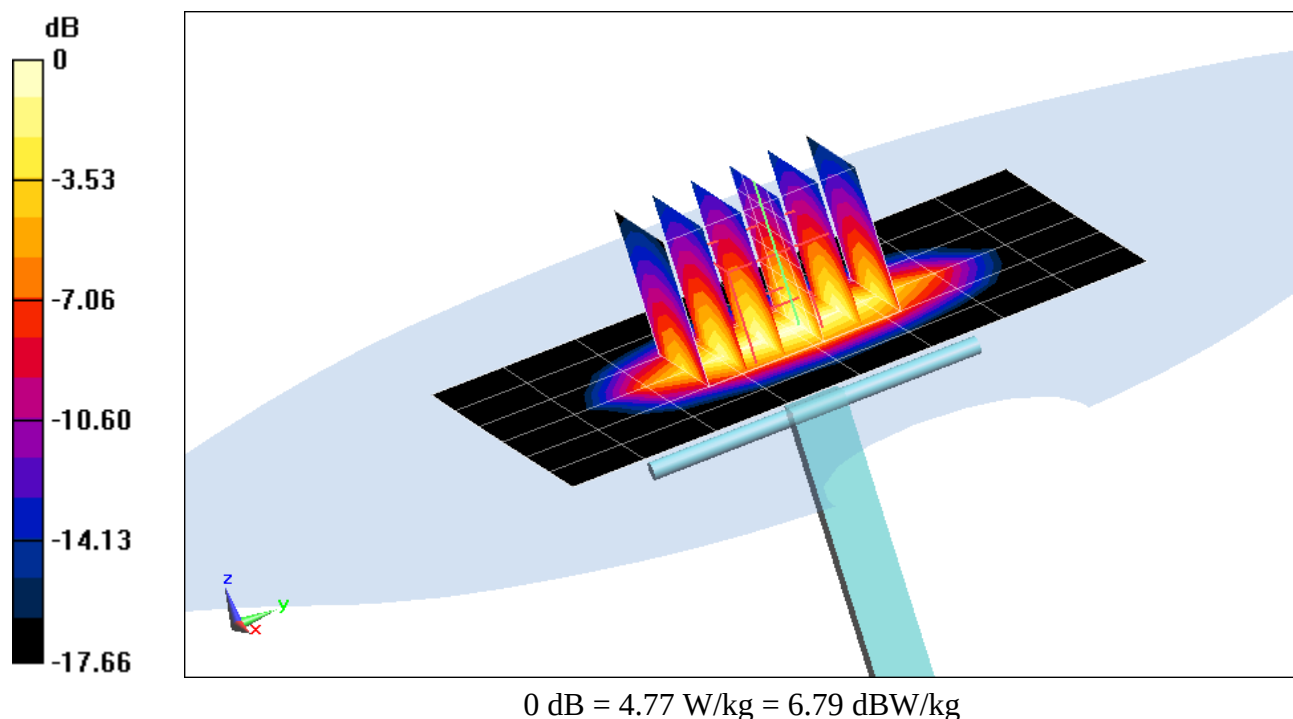
Zoom Scan (5x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 6.63 W/kg

SAR(1 g) = 3.84 W/kg

Deviation = 3.50%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body; Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.54 \text{ S/m}$; $\epsilon_r = 51.535$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); 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)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

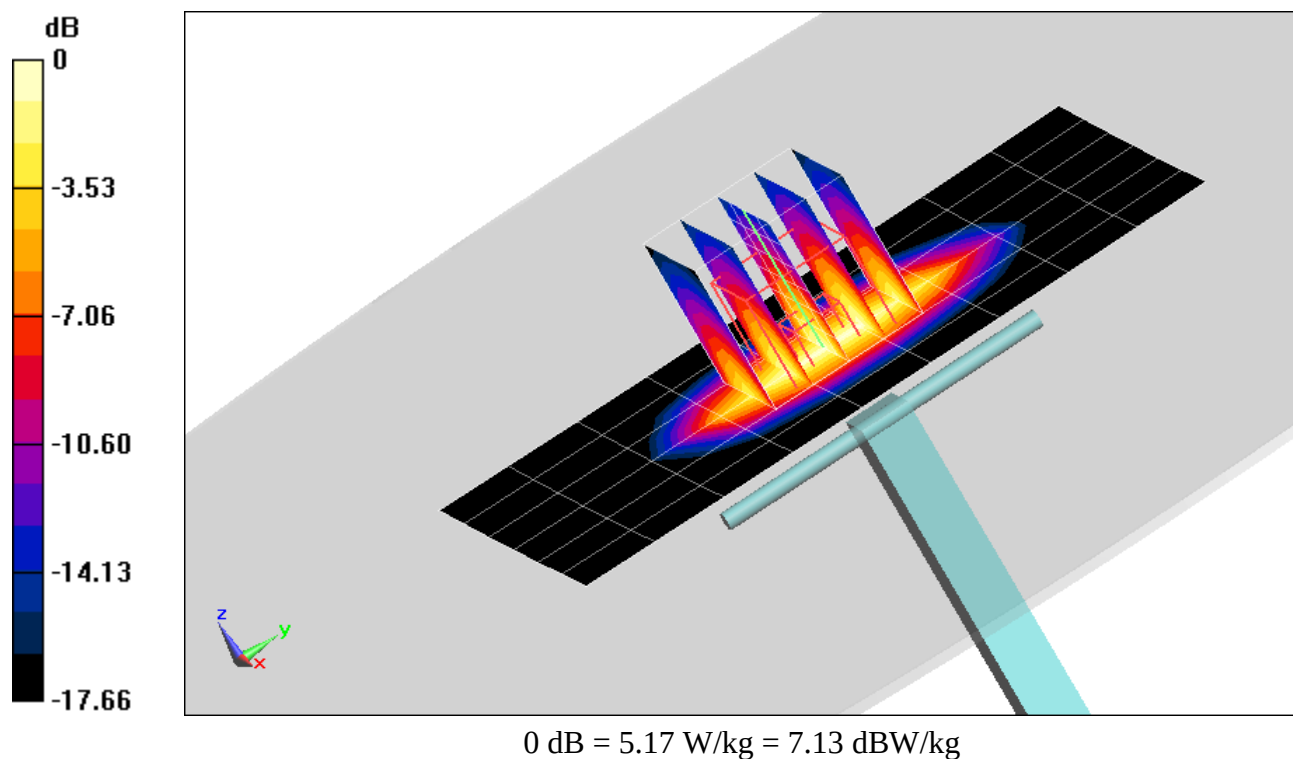
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 7.26 W/kg

SAR(1 g) = 4.08 W/kg

Deviation = 0.99%



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):

$f = 1900 \text{ MHz}$; $\sigma = 1.549 \text{ S/m}$; $\epsilon_r = 52.482$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-13-2015; Ambient Temp: 23.3°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); 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)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

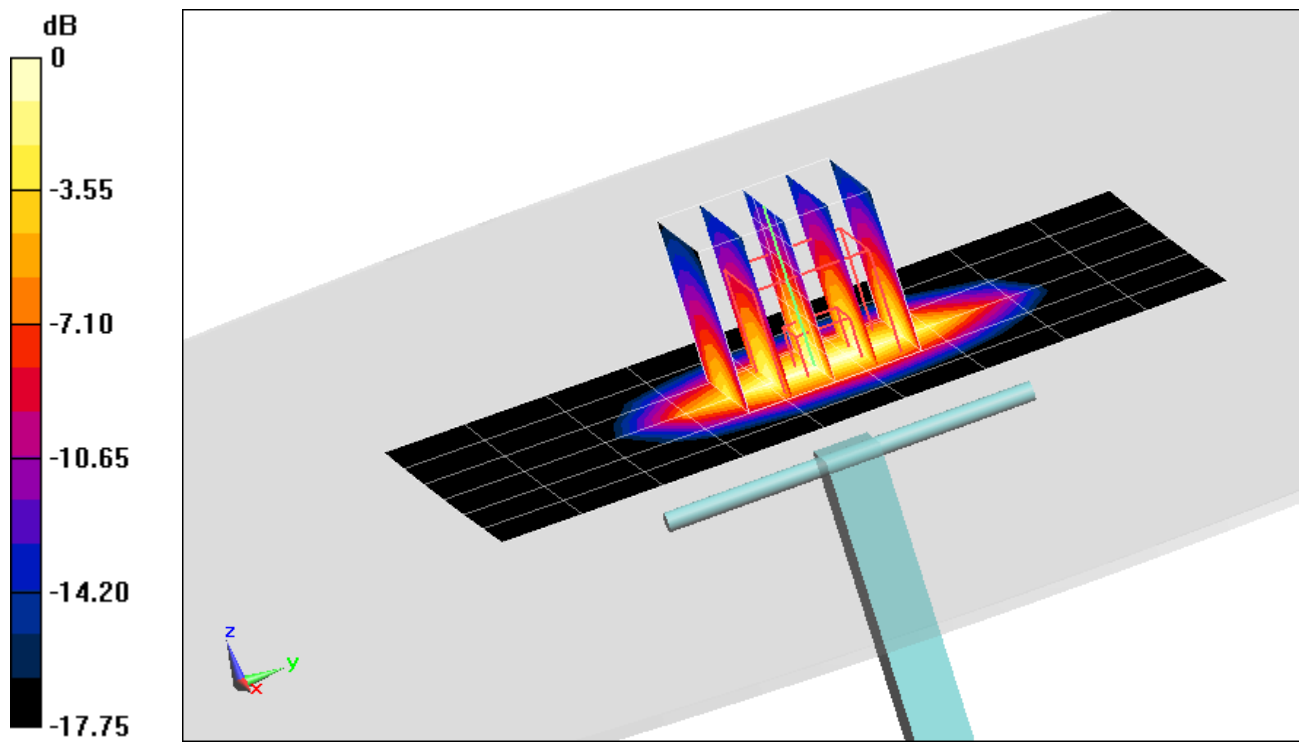
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 7.40 W/kg

SAR(1 g) = 4.18 W/kg

Deviation = 4.50%



0 dB = 5.23 W/kg = 7.19 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 882

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

Medium: 2450 Body Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 2.039 \text{ S/m}$; $\epsilon_r = 51.754$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.3°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3318; ConvF(4.37, 4.37, 4.37); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

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

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

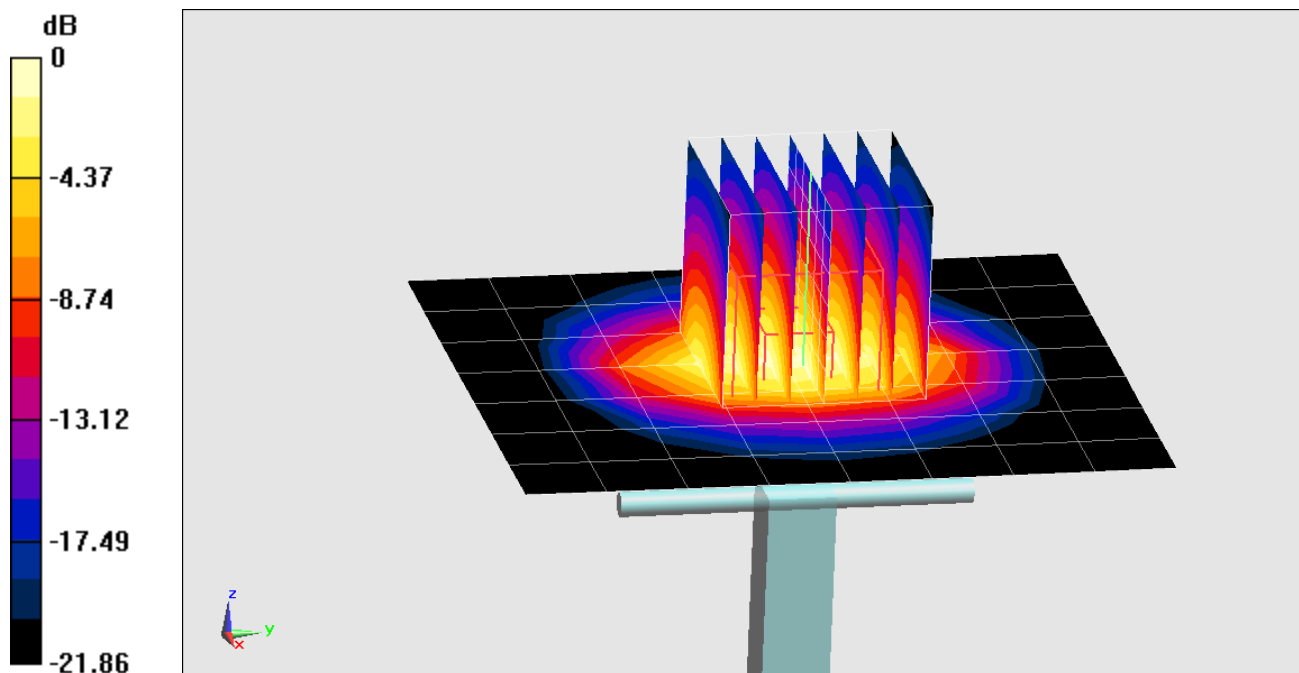
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 11.2 W/kg

SAR(1 g) = 5.33 W/kg

Deviation = 5.13%



0 dB = 6.99 W/kg = 8.44 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:

$f = 5300 \text{ MHz}$; $\sigma = 5.431 \text{ S/m}$; $\epsilon_r = 47.12$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-18-2015; Ambient Temp: 23.8°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN3589; ConvF(3.79, 3.79, 3.79); Calibrated: 1/22/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

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

5300 MHz System Verification

Area Scan (7x8x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

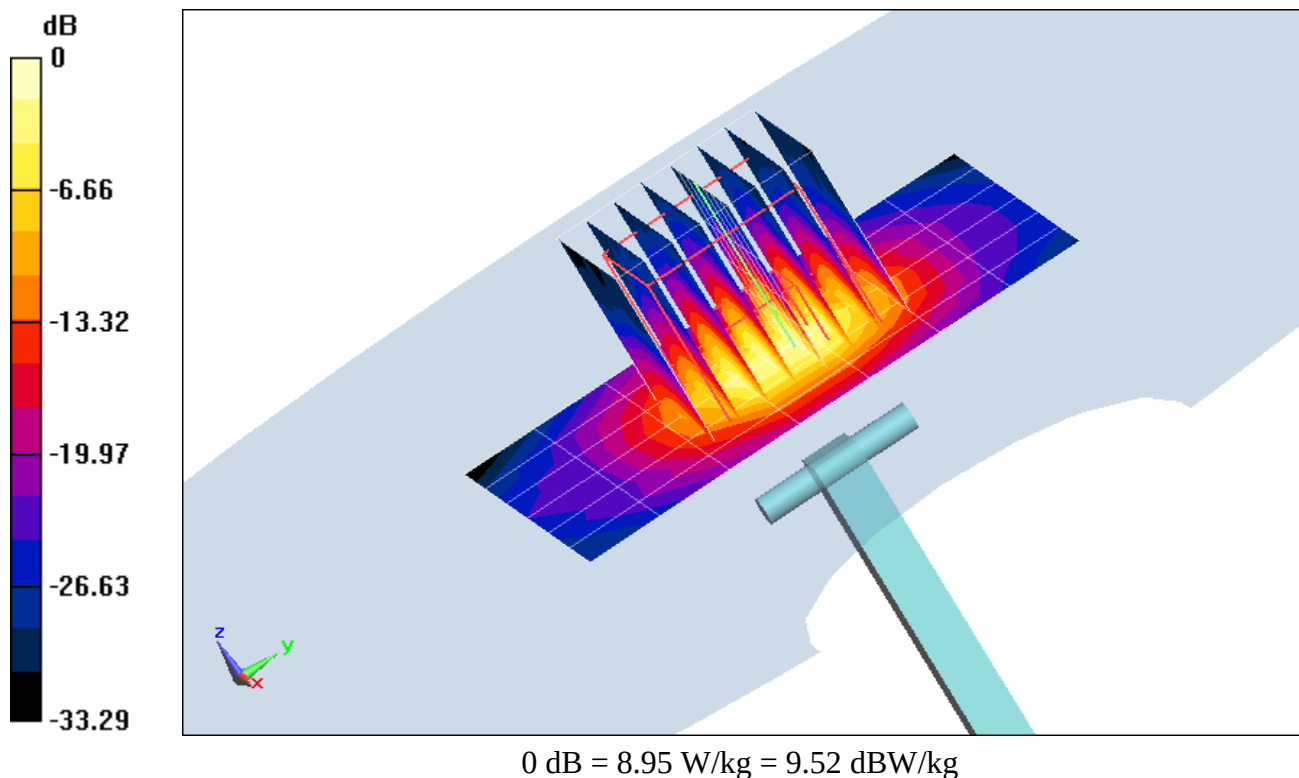
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio = 1.4

Input Power = 17 dBm (50 mW)

Peak SAR (extrapolated) = 15.9 W/kg

SAR(1 g) = 3.88 W/kg

Deviation = 4.58%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body; Medium parameters used:

$f = 5600 \text{ MHz}$; $\sigma = 5.823 \text{ S/m}$; $\epsilon_r = 46.859$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-18-2015; Ambient Temp: 23.6°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN3589; ConvF(3.42, 3.42, 3.42); Calibrated: 1/22/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

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

5600 MHz System Verification

Area Scan (7x7x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

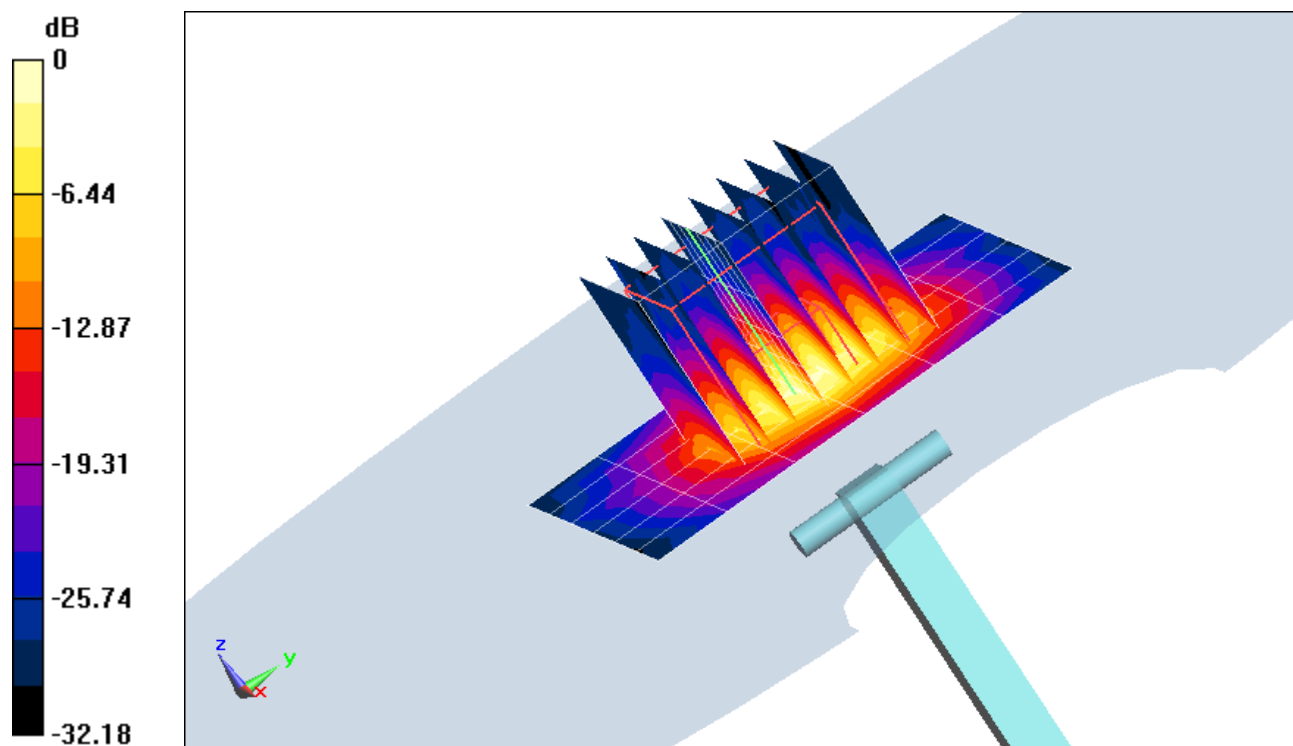
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio = 1.4

Input Power = 17 dBm (50 mW)

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 3.99 W/kg

Deviation = 2.70%



0 dB = 9.32 W/kg = 9.69 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:

$f = 5800 \text{ MHz}$; $\sigma = 6.141 \text{ S/m}$; $\epsilon_r = 46.449$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-18-2015; Ambient Temp: 23.2°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN3589; ConvF(3.79, 3.79, 3.79); Calibrated: 1/22/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

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

5800 MHz System Verification

Area Scan (7x7x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

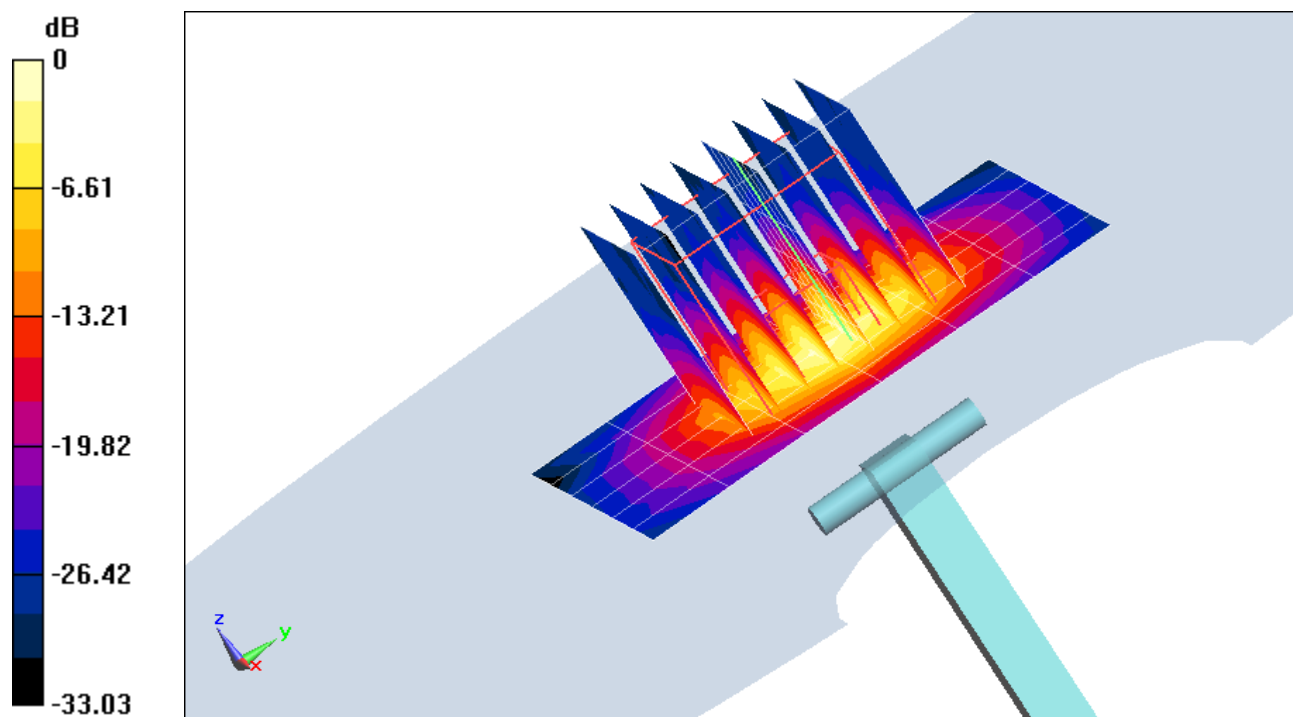
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio = 1.4

Input Power = 17 dBm (50 mW)

Peak SAR (extrapolated) = 16.0 W/kg

SAR(1 g) = 3.57 W/kg

Deviation = -4.93%



0 dB = 8.84 W/kg = 9.46 dBW/kg

APPENDIX C: PROBE CALIBRATION



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **ES3-3263_May15**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3263**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6**
Calibration procedure for dosimetric E-field probes

Calibration date: **May 20, 2015**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	01-Apr-15 (No. 217-02128)	Mar-16
Power sensor E4412A	MY41498087	01-Apr-15 (No. 217-02128)	Mar-16
Reference 3 dB Attenuator	SN: S5054 (3c)	01-Apr-15 (No. 217-02129)	Mar-16
Reference 20 dB Attenuator	SN: S5277 (20x)	01-Apr-15 (No. 217-02132)	Mar-16
Reference 30 dB Attenuator	SN: S5129 (30b)	01-Apr-15 (No. 217-02133)	Mar-16
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

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

Issued: May 19, 2015

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

BN ✓
5/28/15



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM_x (no uncertainty required).

Probe ES3DV3

SN:3263

Manufactured: January 25, 2010
Calibrated: May 20, 2015

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3263

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.21	1.25	1.13	$\pm 10.1 \%$
DCP (mV) ^B	106.1	103.6	108.3	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	205.3	$\pm 3.3 \%$
		Y	0.0	0.0	1.0		207.3	
		Z	0.0	0.0	1.0		199.5	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	1.83	58.4	9.4	10.00	41.2	$\pm 1.4 \%$
		Y	3.88	63.3	12.9		47.5	
		Z	1.42	56.8	8.7		39.5	
10011-CAB	UMTS-FDD (WCDMA)	X	3.27	67.4	18.6	2.91	140.1	$\pm 0.7 \%$
		Y	3.39	67.5	18.7		142.7	
		Z	3.32	67.6	18.6		136.9	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	2.85	68.8	18.8	1.87	142.2	$\pm 0.7 \%$
		Y	3.38	70.7	19.5		144.8	
		Z	3.07	70.0	19.1		138.1	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	10.99	70.8	23.4	9.46	135.9	$\pm 2.5 \%$
		Y	11.36	70.3	22.8		124.7	
		Z	10.57	70.0	22.9		129.4	
10021-DAB	GSM-FDD (TDMA, GMSK)	X	9.38	84.7	22.1	9.39	139.8	$\pm 1.9 \%$
		Y	27.79	100.0	28.7		129.4	
		Z	9.29	86.8	23.8		134.5	
10023-DAB	GPRS-FDD (TDMA, GMSK, TN 0)	X	9.63	84.9	22.1	9.57	134.1	$\pm 2.5 \%$
		Y	25.29	98.2	28.2		124.0	
		Z	9.65	87.7	24.3		128.2	
10024-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	16.20	88.9	21.0	6.56	145.2	$\pm 1.4 \%$
		Y	41.82	99.7	25.6		128.5	
		Z	24.57	96.8	24.1		142.0	
10027-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	55.77	99.6	22.1	4.80	138.5	$\pm 2.2 \%$
		Y	53.39	99.7	23.9		140.5	
		Z	40.28	99.6	23.2		134.3	
10028-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	81.43	99.8	20.7	3.55	148.6	$\pm 1.7 \%$
		Y	60.49	99.7	22.9		146.0	
		Z	62.69	99.6	21.2		145.0	
10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	96.06	93.7	16.0	1.16	140.3	$\pm 1.9 \%$
		Y	77.08	99.9	20.1		149.0	
		Z	99.64	99.9	18.6		138.0	
10100-CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	6.24	67.2	19.6	5.67	131.7	$\pm 1.4 \%$
		Y	6.39	67.3	19.5		133.8	
		Z	6.19	67.2	19.6		126.8	

10103-CAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	10.13	76.3	26.6	9.29	142.6	±2.7 %
		Y	12.07	77.9	26.6		138.9	
		Z	9.41	74.3	25.6		134.1	
10108-CAC	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	6.13	66.9	19.5	5.80	129.6	±1.4 %
		Y	6.35	67.1	19.5		133.7	
		Z	6.39	68.0	20.1		150.0	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	10.34	69.6	21.7	8.07	147.0	±1.9 %
		Y	10.05	68.3	20.9		123.4	
		Z	10.08	69.1	21.3		138.2	
10151-CAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	9.44	75.3	26.3	9.28	137.0	±3.5 %
		Y	11.36	76.9	26.3		134.5	
		Z	8.85	73.5	25.3		130.3	
10154-CAC	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	5.79	66.2	19.2	5.75	126.9	±1.2 %
		Y	6.05	66.5	19.3		130.9	
		Z	5.92	66.9	19.5		145.5	
10160-CAB	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	6.25	66.9	19.5	5.82	131.8	±1.4 %
		Y	6.47	67.0	19.5		135.4	
		Z	6.09	66.5	19.3		127.5	
10169-CAB	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	4.78	66.7	19.7	5.73	130.0	±1.2 %
		Y	5.14	66.7	19.5		135.0	
		Z	4.83	67.1	19.9		147.9	
10172-CAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	8.63	80.4	29.1	9.21	147.7	±2.7 %
		Y	9.72	78.5	27.2		123.9	
		Z	7.63	76.7	27.2		142.5	
10175-CAC	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	4.75	66.6	19.6	5.72	128.2	±1.2 %
		Y	5.12	66.6	19.5		134.3	
		Z	4.87	67.1	19.9		148.0	
10181-CAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	4.76	66.6	19.6	5.72	127.9	±1.2 %
		Y	5.12	66.6	19.5		134.5	
		Z	4.87	67.3	20.0		147.0	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	9.87	69.1	21.6	8.10	135.8	±2.2 %
		Y	10.19	69.1	21.4		145.3	
		Z	9.65	68.8	21.3		130.5	
10225-CAB	UMTS-FDD (HSPA+)	X	6.90	67.2	19.5	5.97	139.2	±1.7 %
		Y	7.22	67.3	19.6		148.0	
		Z	6.75	67.0	19.4		134.1	
10237-CAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	8.68	80.6	29.2	9.21	148.0	±3.0 %
		Y	9.82	78.8	27.3		125.0	
		Z	7.85	77.6	27.7		143.5	
10252-CAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	8.56	73.7	25.6	9.24	126.6	±3.5 %
		Y	10.58	76.0	25.9		126.3	
		Z	8.84	74.8	26.1		146.7	
10267-CAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	9.24	74.6	25.9	9.30	133.6	±3.3 %
		Y	11.38	76.9	26.2		134.3	
		Z	8.79	73.2	25.1		128.6	

10275-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	X	4.39	67.0	18.9	3.96	143.8	±0.9 %
		Y	4.55	67.1	18.8		147.3	
		Z	4.42	67.4	19.0		139.9	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	3.59	67.2	18.9	3.46	132.2	±0.5 %
		Y	3.68	66.7	18.5		136.0	
		Z	3.57	67.1	18.6		128.5	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	3.50	67.0	18.7	3.39	134.0	±0.7 %
		Y	3.62	66.6	18.4		138.6	
		Z	3.50	67.2	18.7		129.8	
10297-AAA	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	6.11	66.8	19.4	5.81	127.7	±1.4 %
		Y	6.33	67.0	19.5		132.1	
		Z	6.28	67.6	19.9		146.6	
10311-AAA	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	6.71	67.5	19.9	6.06	134.2	±1.7 %
		Y	6.93	67.7	19.9		138.0	
		Z	6.57	67.2	19.6		128.0	
10400-AAC	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	X	10.17	69.5	21.9	8.37	138.5	±2.5 %
		Y	10.55	69.5	21.8		148.0	
		Z	9.92	69.0	21.6		132.5	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	4.79	69.2	19.1	3.76	144.1	±0.7 %
		Y	4.71	67.0	18.2		129.2	
		Z	4.72	69.3	19.2		139.3	
10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	4.69	69.2	19.2	3.77	142.1	±0.7 %
		Y	4.71	67.5	18.5		126.7	
		Z	4.51	68.6	18.8		137.3	
10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	2.55	68.0	18.5	1.54	141.7	±0.7 %
		Y	2.67	68.4	18.6		144.0	
		Z	2.98	70.8	19.5		138.0	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	10.01	69.3	21.8	8.23	137.3	±2.5 %
		Y	10.31	69.3	21.6		146.0	
		Z	9.69	68.8	21.4		129.9	

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

^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 7 and 8).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3263

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	41.9	0.89	6.27	6.27	6.27	0.29	1.87	± 12.0 %
835	41.5	0.90	6.18	6.18	6.18	0.49	1.42	± 12.0 %
1750	40.1	1.37	5.27	5.27	5.27	0.49	1.46	± 12.0 %
1900	40.0	1.40	4.96	4.96	4.96	0.66	1.28	± 12.0 %
2300	39.5	1.67	4.63	4.63	4.63	0.58	1.41	± 12.0 %
2450	39.2	1.80	4.40	4.40	4.40	0.71	1.34	± 12.0 %
2600	39.0	1.96	4.25	4.25	4.25	0.80	1.25	± 12.0 %

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3263

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	55.5	0.96	6.07	6.07	6.07	0.53	1.42	± 12.0 %
835	55.2	0.97	6.08	6.08	6.08	0.57	1.36	± 12.0 %
1750	53.4	1.49	4.88	4.88	4.88	0.54	1.50	± 12.0 %
1900	53.3	1.52	4.66	4.66	4.66	0.56	1.51	± 12.0 %
2300	52.9	1.81	4.42	4.42	4.42	0.69	1.33	± 12.0 %
2450	52.7	1.95	4.28	4.28	4.28	0.80	1.08	± 12.0 %
2600	52.5	2.16	4.11	4.11	4.11	0.80	1.09	± 12.0 %

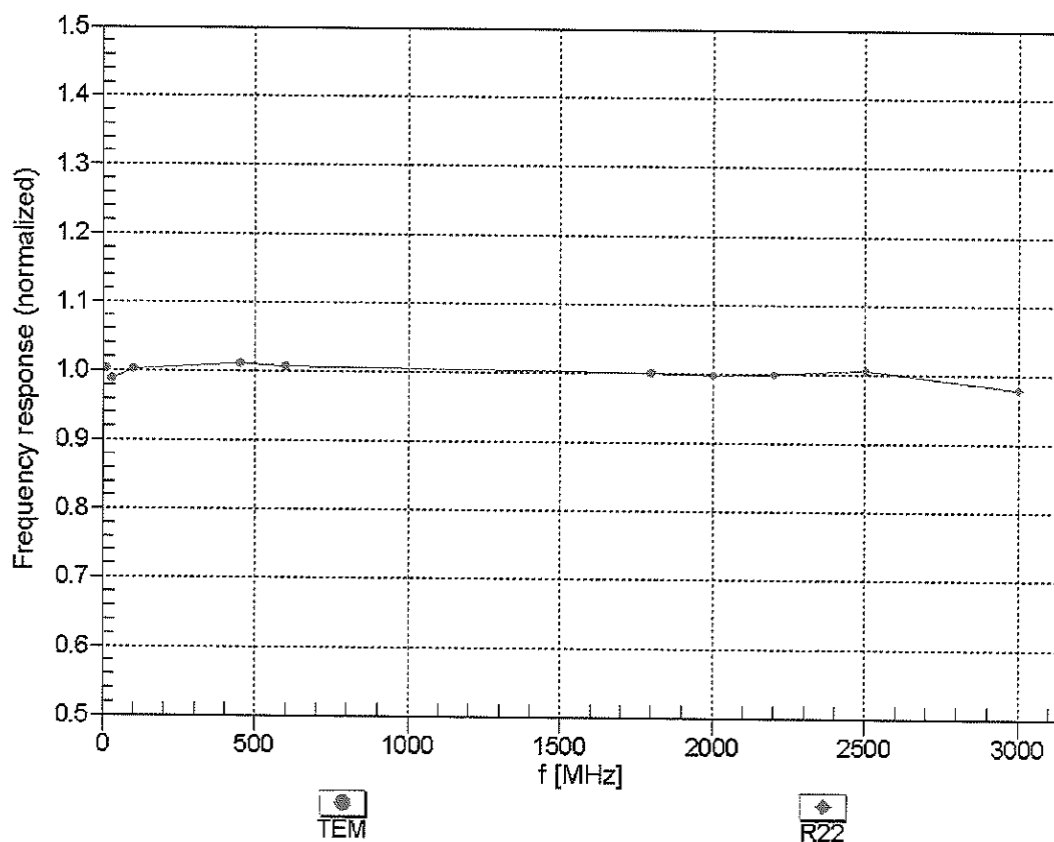
^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Frequency Response of E-Field

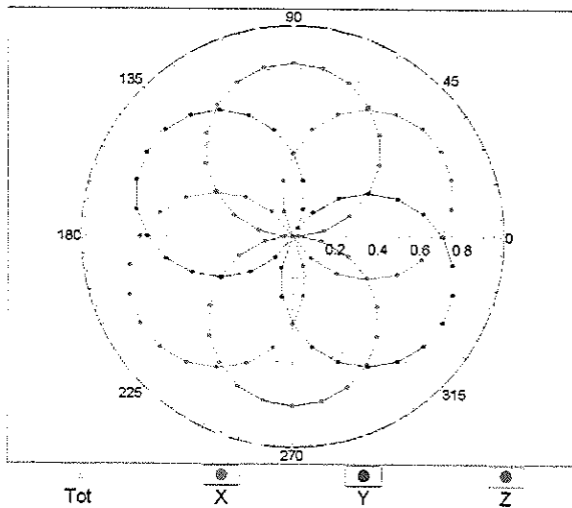
(TEM-Cell:ifi110 EXX, Waveguide: R22)



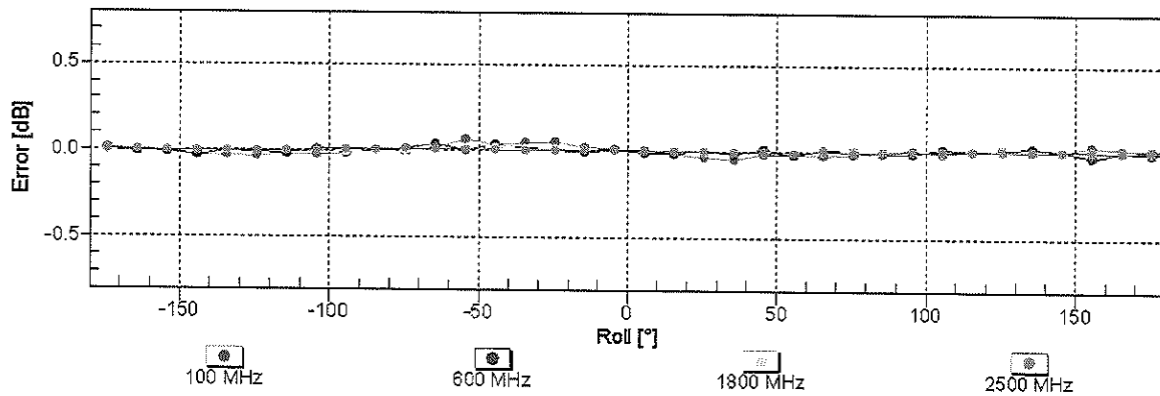
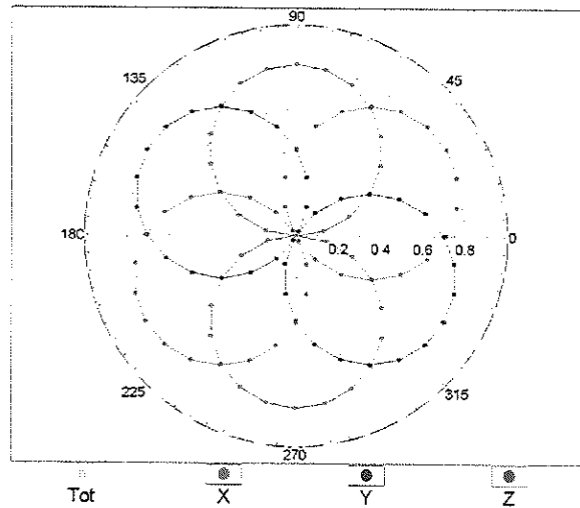
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz,TEM

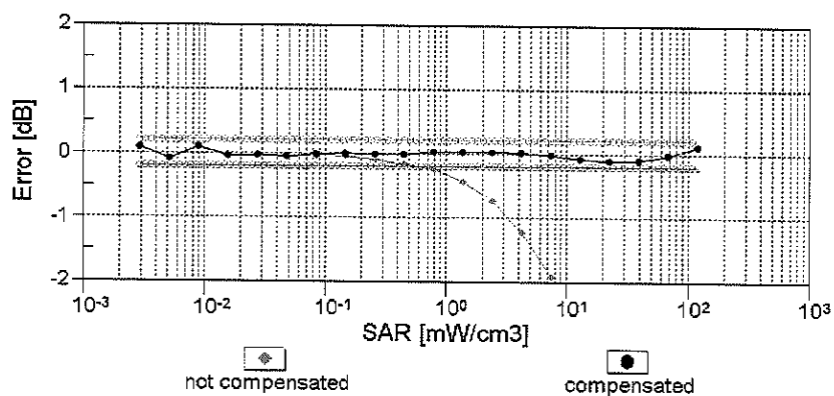
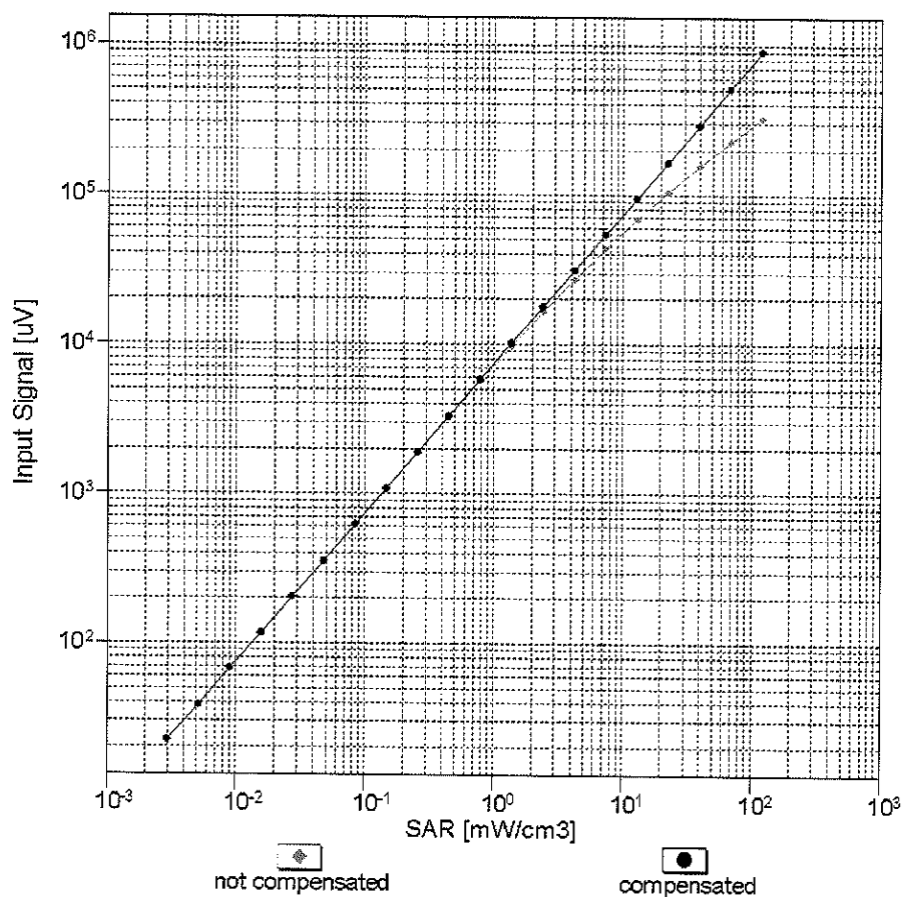


f=1800 MHz,R22



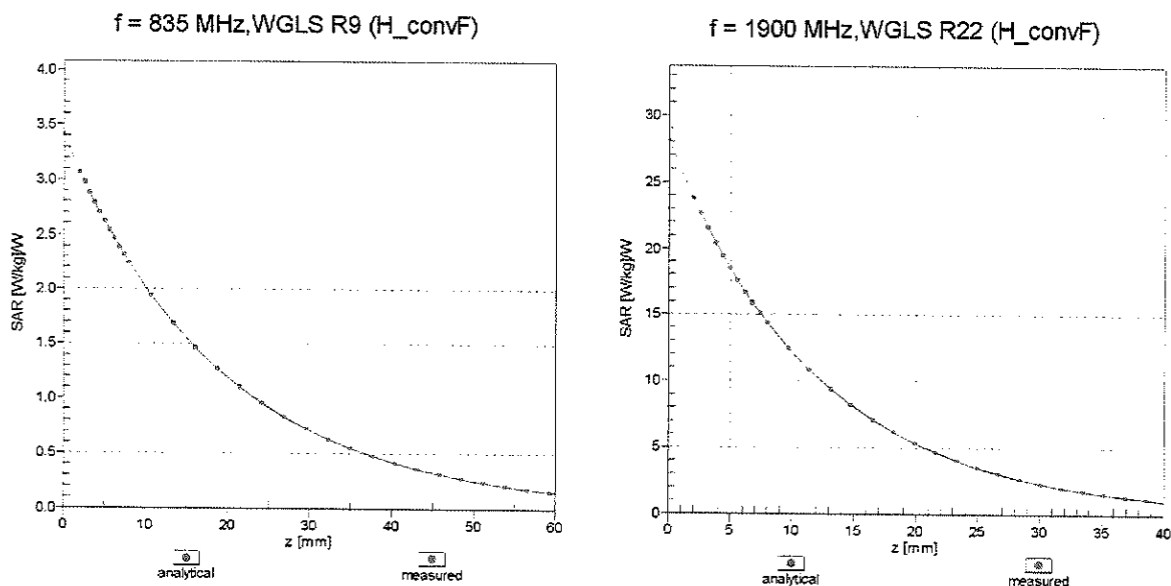
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f_{\text{eval}} = 1900 \text{ MHz}$)



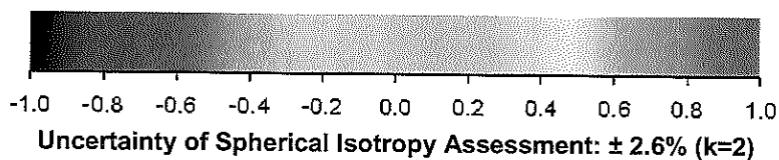
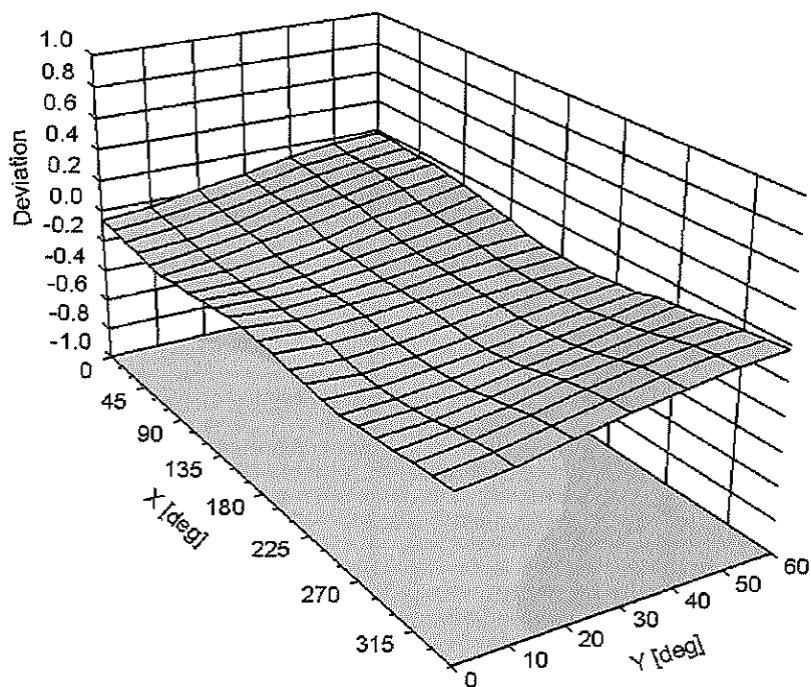
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3263

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	65.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm