SAR EVALUATION REPORT

Applicant Name:
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FCC ID: **A3LSCHR860U**

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): SCH-R860U

Equipment Class	Band & Mode	Tx Frequency	Measured Conducted Power [dBm]	SAR		
				1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
PCE	Cell. CDMA/EVDO	824.70 - 848.31 MHz	24.79	0.42	0.61	0.76
PCE	AWS CDMA/EVDO	1711.25 - 1753.75 MHz	24.64	0.25	0.51	0.51
PCE	PCS CDMA/EVDO	1851.25 - 1908.75 MHz	24.75	0.37	0.59	0.63
PCE	LTE Band 12	701.5 - 713.5 MHz	23.30	0.19	0.29	0.29
PCE	LTE Band 5 (Cell)	826.5 - 846.5 MHz	23.50	0.52	0.20	0.20
PCE	LTE Band 4 (AWS)	1712.5 - 1752.5 MHz	23.50	0.30	0.65	0.65
PCE	LTE Band 2 (PCS)	1852.5 - 1907.5 MHz	23.28	0.41	0.59	0.59
DTS	2.4 GHz WLAN	2412 - 2462 MHz	15.60	0.35	< 0.1	< 0.1
DTS	5.8 GHz WLAN	5745 - 5825 MHz	13.65	0.10	< 0.1	
UNII	5.2 GHz WLAN	5180 - 5240 MHz	12.80	0.43	0.19	
UNII	5.3 GHz WLAN	5260 - 5320 MHz	12.95	0.44	0.19	
UNII	5.5 GHz WLAN	5500 - 5700 MHz	13.65	0.12	< 0.1	
DSS	Bluetooth	2402 - 2480 MHz	6.86	N/A		
Simultaneous SAR per KDB 690783 D01v01r02:				1.22	1.36	1.34

Note: Powers in the above table represent output powers for the SAR test configurations and may not represent the highest output powers for all configurations for each mode.

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

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

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
Cell. CDMA/EVDO	Voice/Data	824.70 - 848.31 MHz
AWS CDMA/EVDO	Voice/Data	1711.25 - 1753.75 MHz
PCS CDMA/EVDO	Voice/Data	1851.25 - 1908.75 MHz
LTE Band 12	Data	701.5 - 713.5 MHz
LTE Band 5 (Cell)	Data	826.5 - 846.5 MHz
LTE Band 4 (AWS)	Data	1712.5 - 1752.5 MHz
LTE Band 2 (PCS)	Data	1852.5 - 1907.5 MHz
2.4 GHz WLAN	Data	2412 - 2462 MHz
5.8 GHz WLAN	Data	5745 - 5825 MHz
5.2 GHz WLAN	Data	5180 - 5240 MHz
5.3 GHz WLAN	Data	5260 - 5320 MHz
5.5 GHz WLAN	Data	5500 - 5700 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz

1.2 Nominal and Maximum Output Power Specifications

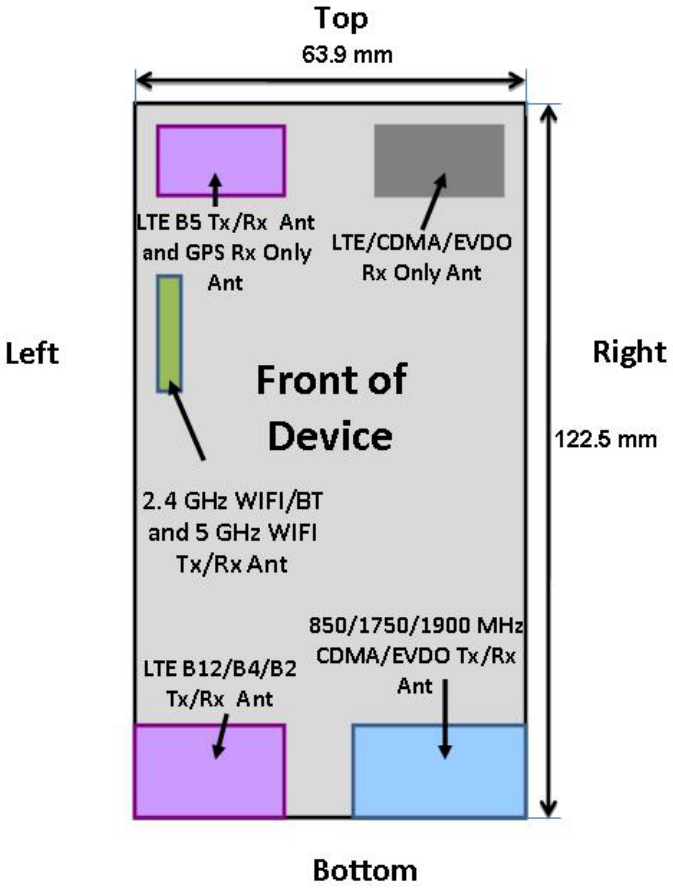
This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v05.

Mode / Band		Modulated Average (dBm)
Cell. CDMA/EVDO	Maximum	**25.0**
	Nominal	**24.5**
PCS CDMA/EVDO	Maximum	**25.0**
	Nominal	**24.5**
AWS CDMA/EVDO	Maximum	**25.0**
	Nominal	**24.5**

Mode / Band		Modulated Average (dBm)
LTE Band 12	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	**23.5**
	Nominal	**23.0**

Mode / Band		Modulated Average (dBm)
IEEE 802.11b (2.4 GHz)	Maximum	**16.0**
	Nominal	**15.5**
IEEE 802.11g (2.4 GHz)	Maximum	**13.0**
	Nominal	**12.5**
IEEE 802.11n (2.4 GHz)	Maximum	**13.0**
	Nominal	**12.5**
IEEE 802.11a (5 GHz)	Maximum	**14.0**
	Nominal	**13.5**
IEEE 802.11n (5 GHz)	Maximum	**14.0**
	Nominal	**13.5**
Bluetooth	Maximum	**7.0**
	Nominal	**6.5**

1.3 DUT Antenna Locations



Note: Specific antenna dimensions and separation distances are shown in the antenna distance document.

Figure 1-1
DUT Antenna Locations

Table 1-1
Mobile Hotspot Sides for SAR Testing

Mobile Hotspot Sides for SAR Testing						
Mode	Back	Front	Top	Bottom	Right	Left
Cell. EVDO	Yes	Yes	No	Yes	Yes	No
AWS EVDO	Yes	Yes	No	Yes	Yes	No
PCS EVDO	Yes	Yes	No	Yes	Yes	No
LTE Band 12	Yes	Yes	No	Yes	No	Yes
LTE Band 5 (Cell)	Yes	Yes	Yes	No	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	No	No	No	Yes

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v01 guidance, page 2. The antenna document shows the distances between the transmit antennas and the edges of the device. When the wireless router mode is enabled, all 5 GHz bands are disabled. Therefore 5 GHz WIFI is not considered in this section.

1.4 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the standard battery. The SAR tests were performed with the standard battery (model: EB-L1G6LLA).

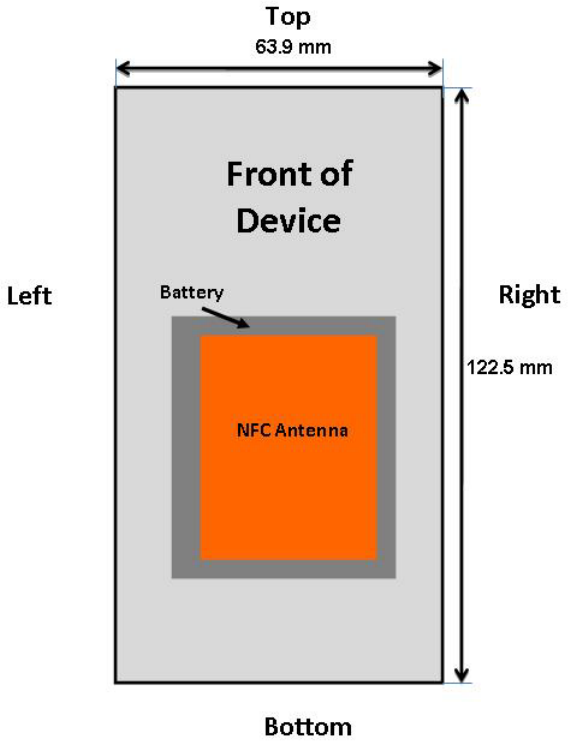


Figure 1-2
NFC Antenna Locations

1.5 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D05v01, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure 1-3 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

Figure 1-3
Simultaneous Transmission Paths

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

Table 1-2
Simultaneous Transmission Scenarios

No.	Capable Transmit Configurations	Head	Body-worn Accessory	Hotspot	Note
		IEEE 1528, Supp C	Supp C	FCC KDB 941225 D06 edges/sides	
1	1X CDMA 850/1750/1900 MHz Voice + LTE 700/800/1700/1900 MHz Data	Yes	Yes	N/A	SVLTE
2	1X CDMA 850/1750/1900 MHz Voice + LTE 700/800/1700/1900 MHz Data + 2.4 GHz WIFI	Yes	Yes	Yes	SVLTE + WIFI Hotspot
3	1X CDMA 850/1750/1900 MHz Voice + 2.4 GHz WIFI	Yes	Yes	N/A	1X voice and WIFI Data
4	1X CDMA 850/1750/1900 MHz Voice + 5 GHz WIFI	Yes	Yes	N/A	1X voice and WIFI Data
5	1X/EVDO 850/1750/1900 MHz Data + 2.4 GHz WIFI	Yes*	Yes*	Yes	EVDO + WIFI Hotspot
6	LTE 700/800/1700/1900 MHz Data + 2.4 GHz WIFI	Yes*	Yes*	Yes	LTE + WIFI Hotspot
7	1X CDMA 850/1750/1900 MHz Voice + 2.4 GHz Bluetooth	N/A	Yes	N/A	
8	EVDO 850/1750/1900 MHz Data + 2.4 GHz Bluetooth	N/A	Yes*	N/A	
9	LTE 700/800/1700/1900 MHz Data + 2.4 GHz Bluetooth	N/A	Yes*	N/A	
10	1X CDMA 850/1750/1900 MHz Voice + LTE 700/800/1700/1900 MHz Data + 2.4 GHz Bluetooth	N/A	Yes	N/A	SVLTE + Bluetooth
11	LTE 700/800/1700/1900 MHz Data + 5 GHz WIFI	N/A	N/A	N/A	5GHz WIFI Hotspot not available by SW
12	1X/EVDO 850/1750/1900 MHz Data + 5 GHz WIFI	N/A	N/A	N/A	5GHz WIFI Hotspot not available by SW
13	1X CDMA 850/1750/1900 MHz Voice + LTE 700/800/1700/1900 MHz Data + 5 GHz WIFI	N/A	N/A	N/A	5GHz WIFI Hotspot not available by SW
14	1X CDMA 850/1750/1900 MHz Voice + EVDO	N/A	N/A	N/A	Not available by HW (Non-SVDO)
15	EVDO 850/1750/1900 MHz Data + LTE 700/800/1700/1900 MHz Data	N/A	N/A	N/A	Not available by SW

Notes:
1. CDMA and EVDO share the same antenna path and cannot transmit simultaneously. (Non-SVDO)
2. Bluetooth and 2.4 / 5 GHz WLAN share the same antenna path and cannot transmit simultaneously.
3. (*) = for VOIP 3rd party applications possibly installed and used by the end-user.

1.6 SAR Test Exclusions Applied

(A) WIFI/BT

Since Wireless Router operations are not allowed by the chipset firmware using 5 GHz WIFI, only 2.4 GHz WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v01.

Per FCC KDB 447498 D01 v05, the SAR exclusion threshold for distances <50mm is defined by the following equation:

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

Based on the maximum average conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, Bluetooth SAR was not required; [(5/10)* √2.441] = 0.8< 3.0.

This device supports 20 MHz and 40 MHz Bandwidths for IEEE 802.11n for 5 GHz WIFI only. IEEE 802.11n was not evaluated for SAR since the average output power of 20 MHz and 40 MHz bandwidths was not more than 0.25 dB higher than the average output power of IEEE 802.11a.

(B) Licensed Transmitter(s)

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02.

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

- FCC OET Bulletin 65 Supplement C [June 2001]
- IEEE 1528-2003
- FCC KDB Publication 941225 D01-D06 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v01r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v05 (General SAR Guidance)
- FCC KDB Publication 865664 D01-D02 (SAR Measurements up to 6 GHz)

1.9 Device Serial Numbers

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

Band/Mode	Device Serial Number
Cell. CDMA/EVDO	77
AWS CDMA/EVDO	78
PCS CDMA/EVDO	73
LTE Band 12	85
LTE Band 5 (Cell)	89
LTE Band 4 (AWS)	91
LTE Band 2 (PCS)	90
2.4 GHz WLAN	78, 85
5 GHz WLAN	85

2 LTE INFORMATION

LTE Information			
FCC ID	**A3LSCHR860U**		
Form Factor	Portable Handset		
Frequency Range of each LTE transmission band	LTE Band 12 (701.5 - 713.5 MHz)		
	LTE Band 5 (Cell) (826.5 - 846.5 MHz)		
	LTE Band 4 (AWS) (1712.5 - 1752.5 MHz)		
	LTE Band 2 (PCS) (1852.5 - 1907.5 MHz)		
Channel Bandwidths	LTE Band 12: 5 MHz, 10 MHz		
	LTE Band 5 (Cell): 5 MHz, 10 MHz		
	LTE Band 4 (AWS): 5 MHz, 10 MHz		
	LTE Band 2 (PCS): 5 MHz, 10 MHz		
Channel Numbers and Frequencies (MHz)	Low	Mid	High
LTE Band 12: 5 MHz	701.5 (23035)	707.5 (23095)	713.5 (23155)
LTE Band 12: 10 MHz	704 (23060)	707.5 (23095)	711 (23130)
LTE Band 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): 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 2 (PCS): 5 MHz	1852.5 (18625)	1880 (18900)	1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855 (18650)	1880 (18900)	1905 (19150)
UE Category	3		
Modulations Supported in UL	QPSK, 16QAM		
LTE Transmitter and Antenna Implementation	LTE and CDMA/EVDO operate on separate transmission paths		
Description of LTE Tx and Ant. Implementation	1 Tx/Rx Ant for LTE B2,4,12, 1 Tx/Rx Ant for LTE B5, 1 Tx/Rx Ant for CDMA/EVDO, and 1 Rx Only Ant		
Hotspot with LTE+WIFI	YES		
Hotspot with LTE+WIFI active with 1XVoice sessions?	YES		
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		
Conducted power Table provided for 1RB (low, mid and high offset), 50% RB (low, mid, and high offset), and 100% RB	YES		

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 [24]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

3.1 SAR Definition

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

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

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

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

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

The evaluation was performed using the following procedure:

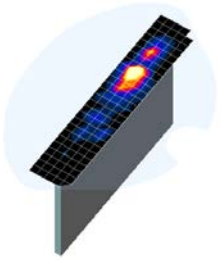


Figure 4-1
Sample SAR Area Scan

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01 (See Table 4-1).

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). 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. The data was extrapolated to the surface of the outer-shell of the phantom. The combined distance extrapolated was the combined distance from the center of the dipoles 2.7mm away from the tip of the probe housing plus the 1.2 mm distance between the surface and the lowest measuring point. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).

   b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

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

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

5 DEFINITION OF REFERENCE POINTS

5.1 EAR REFERENCE POINT

Figure 5-2 shows the front, back and side views of the SAM Twin Phantom. The point "M" is the reference point for the center of the mouth, "LE" is the left ear reference point (ERP), and "RE" is the right ERP. The ERP is 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 5-1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front) is perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting Line (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].

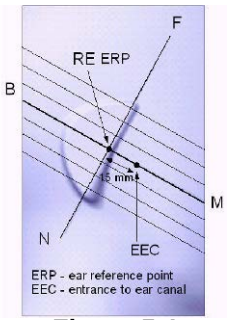


Figure 5-1
Close-Up Side view of ERP

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 "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point" (See Figure 5-3). The "test device reference point" was than located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at its top and bottom edges, positioning the "ear reference point" on the outer surface of the both the left and right head phantoms on the ear reference point.

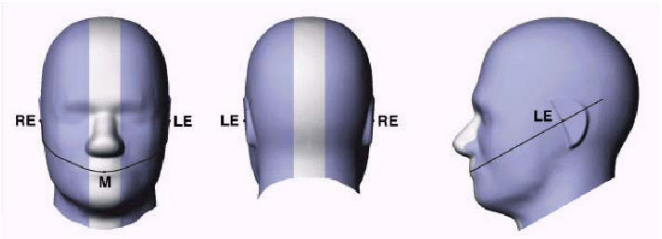


Figure 5-2
Front, back and side view of SAM Twin Phantom

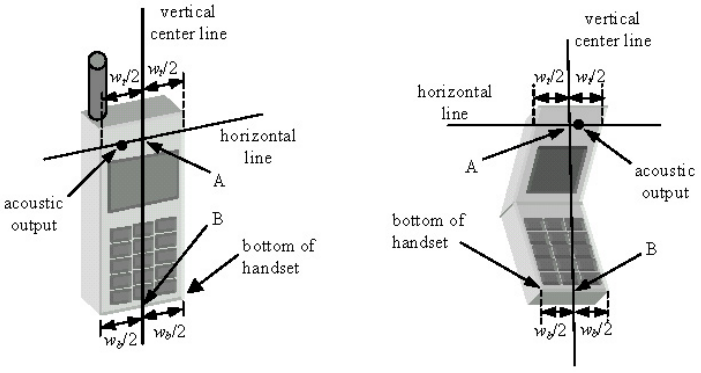


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

6 TEST CONFIGURATION POSITIONS FOR HANDSETS

6.1 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02.

6.2 Positioning for Cheek

1. The test device was positioned with the device close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 6-1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

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

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the ear.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the plane normal to MB-NF including the line MB (reference plane).
4. The phone was then rotated around the vertical centerline until the phone (horizontal line) was symmetrical was respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the device contact with the ear, the device was rotated about the NF line until any point on the handset made contact with a phantom point below the ear (cheek) (See Figure 6-2).

6.3 Positioning for Ear / 15º Tilt

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

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 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. The tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Figure 6-2).

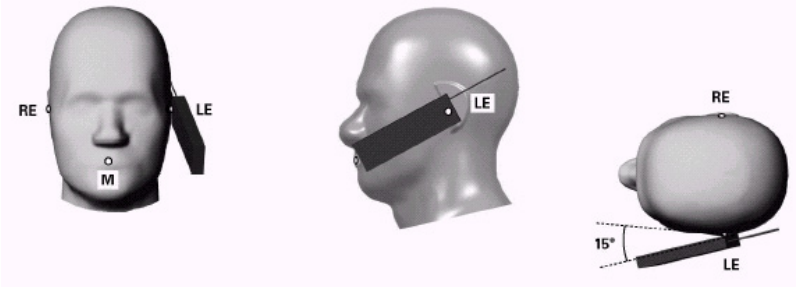


Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

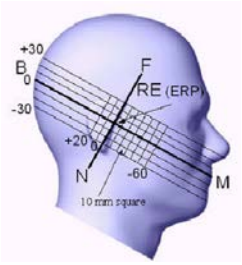


Figure 6-3
Side view w/ relevant markings

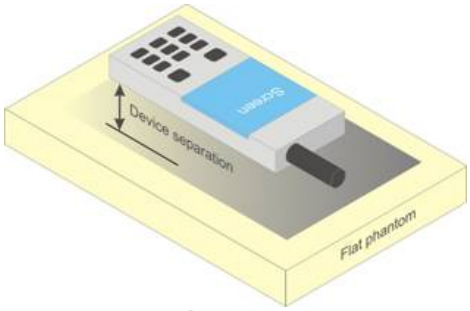


Figure 6-4
Sample Body-Worn Diagram

6.4 SAR Evaluations near the Mouth/Jaw Regions of the SAM Phantom

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04_v01. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of 4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR location identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

The latest IEEE 1528 committee developments propose the usage of a tilted phantom when the antenna of the phone is mounted at the bottom or in all cases the peak absorption is in the chin region. Both SAM heads of the TwinSAM-Chin20 are rotated 20 degrees around the NF line. Each head can be removed individually from the table for emptying and cleaning.

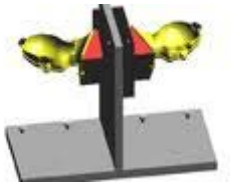


Figure 6-5 Twin SAM Chin20

6.5 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6-4). Per FCC KDB Publication 648474 D04_v01, 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 D01_v05 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

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

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

6.6 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 v01 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v05 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

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

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT *General Population* (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT *Occupational* (W/kg) or (mW/g)
SPATIAL PEAK SAR Brain	1.6	8.0
SPATIAL AVERAGE SAR Whole Body	0.08	0.4
SPATIAL PEAK SAR Hands, Feet, Ankles, Wrists	4.0	20

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

8 FCC MEASUREMENT PROCEDURES

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

8.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v05, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as *reported* SAR. The highest *reported* SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r02.

8.2 Procedures Used to Establish RF Signal for SAR

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

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

8.3 SAR Measurement Conditions for CDMA2000

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

8.3.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by "SAR Measurement Procedures for 3G Devices" v02, October 2007. Maximum output power is verified on the High, Middle and Low channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in the "All Up" condition.

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

Table 8-1
Parameters for Max. Power for RC1

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

Table 8-2
Parameters for Max. Power for RC3

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

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

8.3.2 Head SAR Measurements

SAR for head exposure configurations is measured in RC3 with the DUT configured to transmit at full rate using Loopback Service Option SO55. SAR for RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3.

Head SAR was additionally evaluated using EVDO Rev. A to support compliance for VoIP operations. See Section 8.3.4 for EVDO Rev. A configuration parameters.

8.3.3 Body SAR Measurements

SAR for body exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + SCH_n) is not required when the maximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only. Otherwise, SAR is measured on the maximum output channel (FCH + SCH_n) with FCH at full rate and SCH_0 enabled at 9600 bps using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts. Body SAR was measured using TDSO / SO32 with power control bits in the "All Up"

Body SAR in RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1; with Loopback Service Option SO55, at full rate, using the body exposure configuration that results in the highest SAR for that channel in RC3.

8.3.4 Handsets with EVDO

For handsets with Ev-Do capabilities, when the maximum average output of each channel in Rev. 0 is less than ¼ dB higher than that measured in RC3 (1x RTT), body SAR for EV-DO is not required. Otherwise, SAR for Rev. 0 is measured on the maximum output channel at 153.6 kbps using the body exposure configuration that results in the highest SAR for that channel in RC3. SAR for Rev. A is not required when the maximum average output of each channel is less than that measured in Rev. 0 or less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel for Rev. A using a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations. A Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots would be configured in the downlink for both Rev. 0 and Rev. A.

8.3.5 Body SAR Measurements for EVDO Hotspot

Hotspot Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 per KDB Publication 941225 D01 procedures for "1x Ev-Do data Devices". SAR for Subtype 2 Physical layer configurations is not required for Rev. A when the maximum average output of each RF channels is less than that measured in Subtype 0/1 Physical layer configurations. Otherwise, SAR is measured on the maximum output channel for Rev. A using the exposure configuration that results in the highest SAR for the RF channels in Rev. 0. The AT is tested with a Reverse Data Channel rate of 153.6 kbps in Subtype 0/1 Physical Layer configurations; and a Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slots in Subtype 2 Physical Layer configurations.

SAR is not required for 1x RTT for Ev-Do devices that also support 1x RTT voice and/or data operations, when the maximum average output of each channel is less than ¼ dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev. 0. Otherwise, CDMA "Body-SAR Measurement" procedures for "CDMA 2000 1x Handsets" were applied.

8.4 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05v02 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing.

8.4.1 Spectrum Plots for RB Configurations

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

8.4.2 MPR

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

8.4.3 A-MPR

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

8.4.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r01:

a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
   i. The required channel and offset combination with the highest maximum output power is required for SAR.
   ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
   iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.

b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg.

8.5 SAR Testing with 802.11 Transmitters

Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g/n transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v01r02 for more details.

8.5.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

8.5.2 Frequency Channel Configurations [27]

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

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

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

9 RF CONDUCTED POWERS

9.1 CDMA Conducted Powers

Band	Channel	Rule Part	Frequency	SO55 [dBm]	SO55 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC		MHz	RC1	RC3	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	1013	22H	824.7	24.81	24.78	24.79	24.77	24.76	24.74
	384	22H	836.52	24.73	24.76	24.76	24.79	24.75	24.74
	777	22H	848.31	24.94	24.92	24.91	24.95	24.88	24.87
AWS	25	27L	1711.25	24.79	24.80	24.71	24.70	24.78	24.73
	450	27L	1732.5	24.65	24.61	24.55	24.60	24.64	24.58
	875	27L	1753.75	24.76	24.76	24.74	24.72	24.74	24.73
PCS	25	24E	1851.25	24.57	24.68	24.65	24.75	24.77	24.73
	600	24E	1880	24.50	24.53	24.47	24.50	24.57	24.50
	1175	24E	1908.75	24.22	24.22	24.18	24.21	24.30	24.24

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

Per KDB Publication 941225 D01v02:

1. Head SAR was tested with SO55 RC3. SO55 RC1 was not required since the average output power was not more than 0.25 dB than the SO55 RC3 powers.
2. Body-Worn SAR was tested with 1x RTT with TDSO / SO32 FCH Only. Ev-Do and TDSO / SO32 FCH+SCH SAR tests were not required since the average output power was not more than 0.25 dB higher than the TDSO / SO32 FCH only powers.
3. Hotspot SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0. If the average output power of Subtype 2 for Rev. A is less than the Rev. 0 power levels, then Rev. A SAR is not required. Otherwise, SAR is measured on the maximum output channel for Rev. A using the exposure configuration that results in the highest SAR for that RF channel in Rev. 0. SAR is not required for 1x RTT for Ev-Do hotspot devices when the maximum average output of each channel is less than ¼ dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev. 0
4. CDMA 1x-RTT SAR was additionally required to be evaluated for Hotspot exposure conditions to support simultaneous transmission capabilities.
5. Head SAR was additionally evaluated with EVDO Rev. A to determine compliance for held-to-ear VoIP operations.

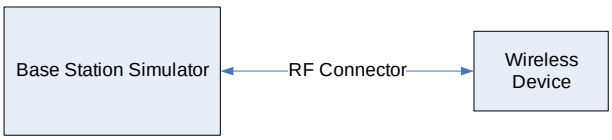


Figure 9-1
Power Measurement Setup

9.2 LTE Conducted Powers

9.2.1 LTE Band 12

Table 9-1
LTE Band 12 Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Mid	707.5	23095	10	QPSK	1	0	**23.30**	0	0
	707.5	23095	10	QPSK	1	25	23.04	0	0
	707.5	23095	10	QPSK	1	49	23.08	0	0
	707.5	23095	10	QPSK	25	0	**22.00**	1	0-1
	707.5	23095	10	QPSK	25	12	21.97	1	0-1
	707.5	23095	10	QPSK	25	25	21.96	1	0-1
	707.5	23095	10	QPSK	50	0	21.69	1	0-1
	707.5	23095	10	16QAM	1	0	22.02	1	0-1
	707.5	23095	10	16QAM	1	25	21.89	1	0-1
	707.5	23095	10	16QAM	1	49	21.84	1	0-1
	707.5	23095	10	16QAM	25	0	20.99	2	0-2
	707.5	23095	10	16QAM	25	12	20.90	2	0-2
	707.5	23095	10	16QAM	25	25	20.86	2	0-2
	707.5	23095	10	16QAM	50	0	20.71	2	0-2

Note: LTE Band 12 at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB 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 12 Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	701.5	23035	5	QPSK	1	0	23.03	0	0
	701.5	23035	5	QPSK	1	12	23.20	0	0
	701.5	23035	5	QPSK	1	24	23.12	0	0
	701.5	23035	5	QPSK	12	0	22.09	1	0-1
	701.5	23035	5	QPSK	12	6	22.16	1	0-1
	701.5	23035	5	QPSK	12	13	22.29	1	0-1
	701.5	23035	5	QPSK	25	0	22.01	1	0-1
	701.5	23035	5	16-QAM	1	0	21.77	1	0-1
	701.5	23035	5	16-QAM	1	12	21.91	1	0-1
	701.5	23035	5	16-QAM	1	24	21.93	1	0-1
	701.5	23035	5	16-QAM	12	0	21.23	2	0-2
	701.5	23035	5	16-QAM	12	6	21.22	2	0-2
	701.5	23035	5	16-QAM	12	13	21.35	2	0-2
	701.5	23035	5	16-QAM	25	0	20.94	2	0-2
Mid	707.5	23095	5	QPSK	1	0	23.03	0	0
	707.5	23095	5	QPSK	1	12	23.08	0	0
	707.5	23095	5	QPSK	1	24	23.12	0	0
	707.5	23095	5	QPSK	12	0	22.02	1	0-1
	707.5	23095	5	QPSK	12	6	22.02	1	0-1
	707.5	23095	5	QPSK	12	13	22.02	1	0-1
	707.5	23095	5	QPSK	25	0	21.88	1	0-1
	707.5	23095	5	16-QAM	1	0	21.97	1	0-1
	707.5	23095	5	16-QAM	1	12	21.99	1	0-1
	707.5	23095	5	16-QAM	1	24	22.11	1	0-1
	707.5	23095	5	16-QAM	12	0	21.02	2	0-2
	707.5	23095	5	16-QAM	12	6	20.96	2	0-2
	707.5	23095	5	16-QAM	12	13	21.02	2	0-2
	707.5	23095	5	16-QAM	25	0	20.79	2	0-2
High	713.5	23155	5	QPSK	1	0	23.02	0	0
	713.5	23155	5	QPSK	1	12	22.88	0	0
	713.5	23155	5	QPSK	1	24	23.11	0	0
	713.5	23155	5	QPSK	12	0	21.99	1	0-1
	713.5	23155	5	QPSK	12	6	21.94	1	0-1
	713.5	23155	5	QPSK	12	13	21.96	1	0-1
	713.5	23155	5	QPSK	25	0	21.76	1	0-1
	713.5	23155	5	16-QAM	1	0	21.97	1	0-1
	713.5	23155	5	16-QAM	1	12	21.80	1	0-1
	713.5	23155	5	16-QAM	1	24	21.91	1	0-1
	713.5	23155	5	16-QAM	12	0	20.94	2	0-2
	713.5	23155	5	16-QAM	12	6	20.91	2	0-2
	713.5	23155	5	16-QAM	12	13	20.97	2	0-2
	713.5	23155	5	16-QAM	25	0	20.74	2	0-2

9.2.2 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]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Mid	836.5	20525	10	QPSK	1	0	**23.50**	0	0
	836.5	20525	10	QPSK	1	25	23.42	0	0
	836.5	20525	10	QPSK	1	49	23.48	0	0
	836.5	20525	10	QPSK	25	0	22.32	1	0-1
	836.5	20525	10	QPSK	25	12	**22.42**	1	0-1
	836.5	20525	10	QPSK	25	25	22.33	1	0-1
	836.5	20525	10	QPSK	50	0	22.25	1	0-1
	836.5	20525	10	16QAM	1	0	22.38	1	0-1
	836.5	20525	10	16QAM	1	25	22.16	1	0-1
	836.5	20525	10	16QAM	1	49	22.25	1	0-1
	836.5	20525	10	16QAM	25	0	21.34	2	0-2
	836.5	20525	10	16QAM	25	12	21.35	2	0-2
	836.5	20525	10	16QAM	25	25	21.36	2	0-2
	836.5	20525	10	16QAM	50	0	21.20	2	0-2

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

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	826.5	20425	5	QPSK	1	0	23.45	0	0
	826.5	20425	5	QPSK	1	12	23.44	0	0
	826.5	20425	5	QPSK	1	24	23.50	0	0
	826.5	20425	5	QPSK	12	0	22.43	1	0-1
	826.5	20425	5	QPSK	12	6	22.43	1	0-1
	826.5	20425	5	QPSK	12	13	22.26	1	0-1
	826.5	20425	5	QPSK	25	0	22.36	1	0-1
	826.5	20425	5	16-QAM	1	0	22.42	1	0-1
	826.5	20425	5	16-QAM	1	12	22.34	1	0-1
	826.5	20425	5	16-QAM	1	24	22.41	1	0-1
	826.5	20425	5	16-QAM	12	0	21.50	2	0-2
	826.5	20425	5	16-QAM	12	6	21.50	2	0-2
	826.5	20425	5	16-QAM	12	13	21.32	2	0-2
	826.5	20425	5	16-QAM	25	0	21.28	2	0-2
Mid	836.5	20525	5	QPSK	1	0	23.49	0	0
	836.5	20525	5	QPSK	1	12	23.32	0	0
	836.5	20525	5	QPSK	1	24	23.48	0	0
	836.5	20525	5	QPSK	12	0	22.48	1	0-1
	836.5	20525	5	QPSK	12	6	22.47	1	0-1
	836.5	20525	5	QPSK	12	13	22.44	1	0-1
	836.5	20525	5	QPSK	25	0	22.33	1	0-1
	836.5	20525	5	16-QAM	1	0	22.47	1	0-1
	836.5	20525	5	16-QAM	1	12	22.25	1	0-1
	836.5	20525	5	16-QAM	1	24	22.35	1	0-1
	836.5	20525	5	16-QAM	12	0	21.48	2	0-2
	836.5	20525	5	16-QAM	12	6	21.43	2	0-2
	836.5	20525	5	16-QAM	12	13	21.48	2	0-2
	836.5	20525	5	16-QAM	25	0	21.28	2	0-2
High	846.5	20625	5	QPSK	1	0	23.30	0	0
	846.5	20625	5	QPSK	1	12	23.39	0	0
	846.5	20625	5	QPSK	1	24	23.23	0	0
	846.5	20625	5	QPSK	12	0	22.37	1	0-1
	846.5	20625	5	QPSK	12	6	22.39	1	0-1
	846.5	20625	5	QPSK	12	13	22.30	1	0-1
	846.5	20625	5	QPSK	25	0	22.20	1	0-1
	846.5	20625	5	16-QAM	1	0	22.25	1	0-1
	846.5	20625	5	16-QAM	1	12	22.32	1	0-1
	846.5	20625	5	16-QAM	1	24	22.15	1	0-1
	846.5	20625	5	16-QAM	12	0	21.34	2	0-2
	846.5	20625	5	16-QAM	12	6	21.41	2	0-2
	846.5	20625	5	16-QAM	12	13	21.35	2	0-2
	846.5	20625	5	16-QAM	25	0	21.18	2	0-2

9.2.3 LTE Band 4 (AWS)

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1715	20000	10	QPSK	1	0	23.50	0	0
	1715	20000	10	QPSK	1	25	23.45	0	0
	1715	20000	10	QPSK	1	49	23.41	0	0
	1715	20000	10	QPSK	25	0	22.40	1	0-1
	1715	20000	10	QPSK	25	12	22.35	1	0-1
	1715	20000	10	QPSK	25	25	22.34	1	0-1
	1715	20000	10	QPSK	50	0	22.20	1	0-1
	1715	20000	10	16QAM	1	0	22.34	1	0-1
	1715	20000	10	16QAM	1	25	22.30	1	0-1
	1715	20000	10	16QAM	1	49	22.21	1	0-1
	1715	20000	10	16QAM	25	0	21.29	2	0-2
	1715	20000	10	16QAM	25	12	21.34	2	0-2
	1715	20000	10	16QAM	25	25	21.30	2	0-2
	1715	20000	10	16QAM	50	0	21.15	2	0-2
Mid	1732.5	20175	10	QPSK	1	0	23.45	0	0
	1732.5	20175	10	QPSK	1	25	**23.50**	0	0
	1732.5	20175	10	QPSK	1	49	23.49	0	0
	1732.5	20175	10	QPSK	25	0	22.37	1	0-1
	1732.5	20175	10	QPSK	25	12	22.43	1	0-1
	1732.5	20175	10	QPSK	25	25	**22.48**	1	0-1
	1732.5	20175	10	QPSK	50	0	22.32	1	0-1
	1732.5	20175	10	16QAM	1	0	22.35	1	0-1
	1732.5	20175	10	16QAM	1	25	22.49	1	0-1
	1732.5	20175	10	16QAM	1	49	22.39	1	0-1
	1732.5	20175	10	16QAM	25	0	21.40	2	0-2
	1732.5	20175	10	16QAM	25	12	21.36	2	0-2
	1732.5	20175	10	16QAM	25	25	21.44	2	0-2
	1732.5	20175	10	16QAM	50	0	21.25	2	0-2
High	1750	20350	10	QPSK	1	0	23.47	0	0
	1750	20350	10	QPSK	1	25	23.45	0	0
	1750	20350	10	QPSK	1	49	23.48	0	0
	1750	20350	10	QPSK	25	0	22.33	1	0-1
	1750	20350	10	QPSK	25	12	22.32	1	0-1
	1750	20350	10	QPSK	25	25	22.38	1	0-1
	1750	20350	10	QPSK	50	0	22.22	1	0-1
	1750	20350	10	16QAM	1	0	22.36	1	0-1
	1750	20350	10	16QAM	1	25	22.30	1	0-1
	1750	20350	10	16QAM	1	49	22.10	1	0-1
	1750	20350	10	16QAM	25	0	21.25	2	0-2
	1750	20350	10	16QAM	25	12	21.24	2	0-2
	1750	20350	10	16QAM	25	25	21.22	2	0-2
	1750	20350	10	16QAM	50	0	21.08	2	0-2

Table 9-6
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1712.5	19975	5	QPSK	1	0	23.49	0	0
	1712.5	19975	5	QPSK	1	12	23.46	0	0
	1712.5	19975	5	QPSK	1	24	23.36	0	0
	1712.5	19975	5	QPSK	12	0	22.35	1	0-1
	1712.5	19975	5	QPSK	12	6	22.48	1	0-1
	1712.5	19975	5	QPSK	12	13	22.49	1	0-1
	1712.5	19975	5	QPSK	25	0	22.44	1	0-1
	1712.5	19975	5	16-QAM	1	0	22.41	1	0-1
	1712.5	19975	5	16-QAM	1	12	22.36	1	0-1
	1712.5	19975	5	16-QAM	1	24	22.33	1	0-1
	1712.5	19975	5	16-QAM	12	0	21.41	2	0-2
	1712.5	19975	5	16-QAM	12	6	21.40	2	0-2
	1712.5	19975	5	16-QAM	12	13	21.48	2	0-2
	1712.5	19975	5	16-QAM	25	0	21.27	2	0-2
Mid	1732.5	20175	5	QPSK	1	0	23.47	0	0
	1732.5	20175	5	QPSK	1	12	23.50	0	0
	1732.5	20175	5	QPSK	1	24	23.49	0	0
	1732.5	20175	5	QPSK	12	0	22.49	1	0-1
	1732.5	20175	5	QPSK	12	6	22.48	1	0-1
	1732.5	20175	5	QPSK	12	13	22.50	1	0-1
	1732.5	20175	5	QPSK	25	0	22.48	1	0-1
	1732.5	20175	5	16-QAM	1	0	22.45	1	0-1
	1732.5	20175	5	16-QAM	1	12	22.50	1	0-1
	1732.5	20175	5	16-QAM	1	24	22.48	1	0-1
	1732.5	20175	5	16-QAM	12	0	21.49	2	0-2
	1732.5	20175	5	16-QAM	12	6	21.46	2	0-2
	1732.5	20175	5	16-QAM	12	13	21.50	2	0-2
	1732.5	20175	5	16-QAM	25	0	21.40	2	0-2
High	1752.5	20375	5	QPSK	1	0	23.48	0	0
	1752.5	20375	5	QPSK	1	12	23.50	0	0
	1752.5	20375	5	QPSK	1	24	23.46	0	0
	1752.5	20375	5	QPSK	12	0	22.50	1	0-1
	1752.5	20375	5	QPSK	12	6	22.50	1	0-1
	1752.5	20375	5	QPSK	12	13	22.48	1	0-1
	1752.5	20375	5	QPSK	25	0	22.45	1	0-1
	1752.5	20375	5	16-QAM	1	0	22.46	1	0-1
	1752.5	20375	5	16-QAM	1	12	22.44	1	0-1
	1752.5	20375	5	16-QAM	1	24	22.42	1	0-1
	1752.5	20375	5	16-QAM	12	0	21.50	2	0-2
	1752.5	20375	5	16-QAM	12	6	21.49	2	0-2
	1752.5	20375	5	16-QAM	12	13	21.40	2	0-2
	1752.5	20375	5	16-QAM	25	0	21.30	2	0-2

9.2.4 LTE Band 2 (PCS)

Table 9-7
LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1855	18650	10	QPSK	1	0	23.26	0	0
	1855	18650	10	QPSK	1	25	23.18	0	0
	1855	18650	10	QPSK	1	49	23.15	0	0
	1855	18650	10	QPSK	25	0	22.13	1	0-1
	1855	18650	10	QPSK	25	12	22.05	1	0-1
	1855	18650	10	QPSK	25	25	22.14	1	0-1
	1855	18650	10	QPSK	50	0	22.08	1	0-1
	1855	18650	10	16QAM	1	0	22.47	1	0-1
	1855	18650	10	16QAM	1	25	22.45	1	0-1
	1855	18650	10	16QAM	1	49	22.39	1	0-1
	1855	18650	10	16QAM	25	0	21.10	2	0-2
	1855	18650	10	16QAM	25	12	21.09	2	0-2
	1855	18650	10	16QAM	25	25	21.14	2	0-2
	1855	18650	10	16QAM	50	0	21.15	2	0-2
Mid	1880.0	18900	10	QPSK	1	0	**23.28**	0	0
	1880.0	18900	10	QPSK	1	25	23.19	0	0
	1880.0	18900	10	QPSK	1	49	23.13	0	0
	1880.0	18900	10	QPSK	25	0	**22.27**	1	0-1
	1880.0	18900	10	QPSK	25	12	22.08	1	0-1
	1880.0	18900	10	QPSK	25	25	22.07	1	0-1
	1880.0	18900	10	QPSK	50	0	22.14	1	0-1
	1880.0	18900	10	16QAM	1	0	22.05	1	0-1
	1880.0	18900	10	16QAM	1	25	22.02	1	0-1
	1880.0	18900	10	16QAM	1	49	21.95	1	0-1
	1880.0	18900	10	16QAM	25	0	21.27	2	0-2
	1880.0	18900	10	16QAM	25	12	21.11	2	0-2
	1880.0	18900	10	16QAM	25	25	21.03	2	0-2
	1880.0	18900	10	16QAM	50	0	21.04	2	0-2
High	1905	19150	10	QPSK	1	0	23.10	0	0
	1905	19150	10	QPSK	1	25	23.13	0	0
	1905	19150	10	QPSK	1	49	23.18	0	0
	1905	19150	10	QPSK	25	0	22.08	1	0-1
	1905	19150	10	QPSK	25	12	22.25	1	0-1
	1905	19150	10	QPSK	25	25	22.26	1	0-1
	1905	19150	10	QPSK	50	0	22.16	1	0-1
	1905	19150	10	16QAM	1	0	21.78	1	0-1
	1905	19150	10	16QAM	1	25	22.00	1	0-1
	1905	19150	10	16QAM	1	49	22.02	1	0-1
	1905	19150	10	16QAM	25	0	21.00	2	0-2
	1905	19150	10	16QAM	25	12	21.19	2	0-2
	1905	19150	10	16QAM	25	25	21.16	2	0-2
	1905	19150	10	16QAM	50	0	21.10	2	0-2

Table 9-8
LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1852.5	18625	5	QPSK	1	0	23.26	0	0
	1852.5	18625	5	QPSK	1	12	23.31	0	0
	1852.5	18625	5	QPSK	1	24	23.08	0	0
	1852.5	18625	5	QPSK	12	0	22.40	1	0-1
	1852.5	18625	5	QPSK	12	6	22.34	1	0-1
	1852.5	18625	5	QPSK	12	13	22.17	1	0-1
	1852.5	18625	5	QPSK	25	0	22.16	1	0-1
	1852.5	18625	5	16-QAM	1	0	22.36	1	0-1
	1852.5	18625	5	16-QAM	1	12	22.22	1	0-1
	1852.5	18625	5	16-QAM	1	24	22.04	1	0-1
	1852.5	18625	5	16-QAM	12	0	21.36	2	0-2
	1852.5	18625	5	16-QAM	12	6	21.23	2	0-2
	1852.5	18625	5	16-QAM	12	13	21.19	2	0-2
	1852.5	18625	5	16-QAM	25	0	21.11	2	0-2
Mid	1880.0	18900	5	QPSK	1	0	23.24	0	0
	1880.0	18900	5	QPSK	1	12	23.15	0	0
	1880.0	18900	5	QPSK	1	24	23.14	0	0
	1880.0	18900	5	QPSK	12	0	22.34	1	0-1
	1880.0	18900	5	QPSK	12	6	22.16	1	0-1
	1880.0	18900	5	QPSK	12	13	22.05	1	0-1
	1880.0	18900	5	QPSK	25	0	22.15	1	0-1
	1880.0	18900	5	16-QAM	1	0	22.22	1	0-1
	1880.0	18900	5	16-QAM	1	12	22.03	1	0-1
	1880.0	18900	5	16-QAM	1	24	22.18	1	0-1
	1880.0	18900	5	16-QAM	12	0	21.24	2	0-2
	1880.0	18900	5	16-QAM	12	6	21.12	2	0-2
	1880.0	18900	5	16-QAM	12	13	21.03	2	0-2
	1880.0	18900	5	16-QAM	25	0	21.01	2	0-2
High	1907.5	19175	5	QPSK	1	0	23.19	0	0
	1907.5	19175	5	QPSK	1	12	23.24	0	0
	1907.5	19175	5	QPSK	1	24	23.22	0	0
	1907.5	19175	5	QPSK	12	0	22.42	1	0-1
	1907.5	19175	5	QPSK	12	6	22.37	1	0-1
	1907.5	19175	5	QPSK	12	13	22.35	1	0-1
	1907.5	19175	5	QPSK	25	0	22.29	1	0-1
	1907.5	19175	5	16-QAM	1	0	22.16	1	0-1
	1907.5	19175	5	16-QAM	1	12	22.33	1	0-1
	1907.5	19175	5	16-QAM	1	24	22.07	1	0-1
	1907.5	19175	5	16-QAM	12	0	21.34	2	0-2
	1907.5	19175	5	16-QAM	12	6	21.36	2	0-2
	1907.5	19175	5	16-QAM	12	13	21.32	2	0-2
	1907.5	19175	5	16-QAM	25	0	21.23	2	0-2

9.3 WLAN Conducted Powers

Table 9-9
IEEE 802.11b Average RF Power

Mode	Freq	Channel	802.11b (2.4 GHz) Conducted Power [dBm]			
			Data Rate [Mbps]			
	[MHz]		1	2	5.5	11
802.11b	2412	1	15.60	15.62	15.80	15.80
802.11b	2437	6	**15.60**	15.45	15.60	15.67
802.11b	2462	11	15.55	15.61	15.70	15.76

Table 9-10
IEEE 802.11g Average RF Power

Mode	Freq	Channel	802.11g (2.4 GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6	9	12	18	24	36	48	54
802.11g	2412	1	12.50	12.55	12.45	12.48	12.37	12.55	12.20	12.10
802.11g	2437	6	12.55	12.44	12.53	12.45	12.50	12.47	12.40	12.45
802.11g	2462	11	12.65	12.72	12.82	12.70	12.66	12.62	12.60	12.55

Table 9-11
IEEE 802.11n Average RF Power

Mode	Freq	Channel	802.11n (2.4 GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6.5	13	20	26	39	52	58	65
802.11n	2412	1	12.56	12.50	12.51	12.35	12.25	12.30	12.40	12.20
802.11n	2437	6	12.71	12.55	12.56	12.55	12.40	12.48	12.61	12.50
802.11n	2462	11	12.80	12.73	12.75	12.63	12.58	12.75	12.55	12.80

Table 9-12
IEEE 802.11a Average RF Power

Mode	Freq	Channel	802.11a (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6	9	12	18	24	36	48	54
802.11a	5180	36*	12.73	12.76	12.95	12.83	12.66	12.88	12.67	12.76
802.11a	5200	40	12.67	12.66	12.82	12.71	12.74	12.77	12.79	12.80
802.11a	5220	44	**12.80**	12.75	12.78	12.77	12.73	12.89	12.70	12.76
802.11a	5240	48*	12.78	12.92	12.89	12.82	12.78	12.89	12.76	12.72
802.11a	5260	52*	12.79	12.69	12.53	12.65	12.76	12.84	12.74	12.81
802.11a	5280	56	12.92	12.87	12.98	12.93	12.80	12.70	12.86	12.73
802.11a	5300	60	**12.95**	12.83	12.87	12.81	12.82	12.83	12.85	12.70
802.11a	5320	64*	12.79	12.70	12.83	12.85	12.80	12.84	12.85	12.83
802.11a	5500	100	13.34	13.34	13.41	13.44	13.50	13.42	13.34	13.32
802.11a	5520	104*	13.38	13.45	13.48	13.58	13.51	13.47	13.47	13.51
802.11a	5540	108	13.44	13.36	13.42	13.50	13.54	13.30	13.33	13.43
802.11a	5560	112	13.36	13.51	13.60	13.56	13.59	13.39	13.28	13.34
802.11a	5580	116*	13.54	13.68	13.60	13.54	13.52	13.49	13.55	13.45
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	13.41	13.54	13.61	13.47	13.38	13.46	13.42	13.29
802.11a	5680	136*	**13.65**	13.58	13.54	13.55	13.53	13.53	13.47	13.47
802.11a	5700	140	13.56	13.62	13.68	13.65	13.57	13.51	13.54	13.62
802.11a	5745	149*	**13.65**	13.67	13.57	13.65	13.58	13.67	13.55	13.42
802.11a	5765	153	13.65	13.52	13.63	13.55	13.44	13.40	13.47	13.46
802.11a	5785	157*	13.48	13.42	13.48	13.49	13.37	13.46	13.29	13.31
802.11a	5805	161*	13.32	13.40	13.27	13.32	13.30	13.25	13.31	13.16
802.11a	5825	165	13.25	13.23	13.19	13.18	13.18	13.10	13.14	13.14

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

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

Table 9-13
IEEE 802.11n Average RF Power – 20 MHz Bandwidth

Mode	Freq	Channel	20MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6.5	13	20	26	39	52	58	65
802.11n	5180	36	12.84	12.86	12.80	12.73	12.78	12.84	12.80	12.54
802.11n	5200	40	12.75	12.77	12.78	12.73	12.83	12.79	12.76	12.42
802.11n	5220	44	12.82	12.76	12.61	12.70	12.60	12.55	12.63	12.43
802.11n	5240	48	12.93	13.01	12.79	12.73	12.84	12.66	12.84	12.34
802.11n	5260	52	12.79	12.75	12.76	12.66	12.76	12.80	12.73	12.34
802.11n	5280	56	12.87	12.81	12.86	12.73	12.69	12.69	12.84	12.38
802.11n	5300	60	12.92	12.64	12.68	12.72	12.93	12.70	12.91	12.35
802.11n	5320	64	12.72	12.61	12.59	12.75	12.68	12.82	12.73	12.39
802.11n	5500	100	13.39	13.50	13.34	13.23	13.24	13.16	13.20	12.90
802.11n	5520	104	13.34	13.33	13.34	13.29	13.37	13.38	13.28	12.98
802.11n	5540	108	13.35	13.34	13.47	13.26	13.38	13.28	13.35	12.86
802.11n	5560	112	13.37	13.38	13.39	13.34	13.37	13.44	13.33	13.01
802.11n	5580	116	13.37	13.42	13.48	13.49	13.49	13.37	13.36	13.06
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	13.49	13.39	13.22	13.23	13.16	13.24	13.20	12.89
802.11n	5680	136	13.47	13.46	13.46	13.43	13.36	13.26	13.40	13.05
802.11n	5700	140	13.41	13.33	13.46	13.31	13.44	13.37	13.35	13.05
802.11n	5745	149	13.46	13.44	13.45	13.43	13.34	13.40	13.33	13.03
802.11n	5765	153	13.51	13.52	13.46	13.41	13.32	13.38	13.22	12.91
802.11n	5785	157	13.33	13.35	13.25	13.38	13.30	13.28	13.29	12.86
802.11n	5805	161	13.30	13.22	13.31	13.24	13.37	13.32	13.42	13.02
802.11n	5825	165	13.39	13.32	13.16	13.26	13.27	13.21	13.29	12.88

Table 9-14
IEEE 802.11n Average RF Power – 40 MHz Bandwidth

Mode	Freq	Channel	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		13.5/15	27/30	40.5/45	54/60	81/90	108/120	121.5/135	135/150
802.11n	5190	38	13.04	12.97	13.01	13.03	13.01	12.97	12.80	13.01
802.11n	5230	46	12.73	12.96	13.04	13.02	13.04	12.98	13.04	12.96
802.11n	5270	54	13.08	13.05	12.88	13.12	13.16	13.04	13.11	13.04
802.11n	5310	62	13.09	13.04	13.08	13.19	12.96	13.19	13.05	13.07
802.11n	5510	102	12.91	13.09	12.60	13.06	12.70	12.84	13.31	12.98
802.11n	5550	110	13.00	13.47	13.40	13.24	12.78	13.55	13.11	12.91
802.11n	5590	118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5630	126	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5670	134	13.28	13.36	13.43	13.39	13.66	13.08	12.88	13.16
802.11n	5755	151	12.99	12.32	12.90	13.03	12.89	12.95	13.59	12.87
802.11n	5795	159	12.71	13.30	13.03	13.51	12.44	12.57	12.99	12.97

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

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

Figure 9-2
Power Measurement Setup

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
2/11/2013	750H	23.2	695	0.853	41.389	0.886	42.193	-3.72%	-1.91%
			710	0.867	41.148	0.887	42.113	-2.25%	-2.29%
			725	0.880	40.945	0.888	42.033	-0.90%	-2.59%
			740	0.895	40.756	0.889	41.953	0.67%	-2.85%
			755	0.908	40.528	0.891	41.876	1.91%	-3.22%
2/13/2013	835H	23.4	820	0.894	40.158	0.898	41.571	-0.45%	-3.40%
			835	0.908	39.969	0.900	41.500	0.89%	-3.69%
			850	0.923	39.759	0.916	41.500	0.76%	-4.20%
2/12/2013	1750H	23.4	1710	1.326	40.488	1.348	40.136	-1.63%	0.88%
			1750	1.367	40.278	1.370	40.100	-0.22%	0.44%
			1790	1.402	40.090	1.394	40.020	0.57%	0.17%
2/14/2013	1900H	23.0	1850	1.355	39.452	1.400	40.000	-3.21%	-1.37%
			1880	1.385	39.316	1.400	40.000	-1.07%	-1.71%
			1910	1.416	39.151	1.400	40.000	1.14%	-2.12%
2/15/2013	2450H	23.6	2401	1.806	38.739	1.758	39.298	2.73%	-1.42%
			2450	1.866	38.557	1.800	39.200	3.67%	-1.64%
			2499	1.922	38.326	1.852	39.135	3.78%	-2.07%
02/11/2013	5200H-5800H	23.7	5200	4.723	35.49	4.660	36.000	1.35%	-1.42%
			5220	4.743	35.44	4.680	35.980	1.35%	-1.50%
			5300	4.839	35.23	4.760	35.900	1.66%	-1.86%
			5600	5.187	34.51	5.070	35.500	2.31%	-2.79%
			5680	5.275	34.31	5.150	35.420	2.43%	-3.13%
			5745	5.372	34.19	5.215	35.355	3.01%	-3.28%
			5800	5.418	34.04	5.270	35.300	2.81%	-3.58%
2/12/2013	750B	22.8	695	0.926	53.699	0.959	55.745	-3.44%	-3.67%
			710	0.942	53.564	0.960	55.687	-1.88%	-3.81%
			725	0.955	53.420	0.961	55.629	-0.62%	-3.97%
			740	0.970	53.239	0.963	55.570	0.73%	-4.19%
			755	0.982	53.107	0.964	55.512	1.87%	-4.33%
2/13/2013	835B	24.3	820	0.984	53.933	0.969	55.258	1.55%	-2.40%
			835	0.998	53.789	0.970	55.200	2.89%	-2.56%
			850	1.016	53.567	0.988	55.154	2.83%	-2.88%
2/13/2013	1750B	23.0	1710	1.411	52.011	1.460	53.540	-3.36%	-2.86%
			1750	1.454	51.829	1.490	53.430	-2.42%	-3.00%
			1790	1.500	51.698	1.510	53.330	-0.66%	-3.06%
2/13/2013	1900B	23.8	1850	1.472	52.178	1.520	53.300	-3.16%	-2.11%
			1880	1.507	52.045	1.520	53.300	-0.86%	-2.35%
			1910	1.540	51.917	1.520	53.300	1.32%	-2.59%
2/18/2013	1900B	22.1	1850	1.502	51.954	1.520	53.300	-1.18%	-2.53%
			1880	1.536	51.841	1.520	53.300	1.05%	-2.74%
			1910	1.568	51.711	1.520	53.300	3.16%	-2.98%
2/14/2013	2450B	23.2	2401	1.872	50.829	1.903	52.765	-1.63%	-3.67%
			2450	1.932	50.597	1.950	52.700	-0.92%	-3.99%
			2499	1.998	50.442	2.019	52.638	-1.04%	-4.17%
02/13/2013	5200B-5800B	24.5	5200	5.237	47.61	5.299	49.014	-1.17%	-2.87%
			5220	5.290	47.71	5.323	48.987	-0.62%	-2.61%
			5300	5.352	47.71	5.416	48.851	-1.18%	-2.34%
			5600	5.882	46.78	5.766	48.444	2.01%	-3.43%
			5680	5.938	46.96	5.860	48.336	1.33%	-2.85%
			5745	6.068	46.35	5.936	48.248	2.22%	-3.93%
			5800	6.146	46.73	6.000	48.200	2.43%	-3.06%

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 IEEE 1528 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

10.2 Test System Verification

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

Table 10-2
System Verification Results

System Verification TARGET & MEASURED											
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 (%)
750	HEAD	02/11/2013	21.9	22.0	0.170	1003	3022	1.430	8.460	8.412	-0.57%
835	HEAD	02/13/2013	24.4	23.4	0.100	4d119	3022	0.984	9.420	9.840	4.46%
1750	HEAD	02/12/2013	23.9	22.2	0.100	1051	3288	3.440	36.600	34.400	-6.01%
1900	HEAD	02/14/2013	24.2	22.8	0.100	5d149	3263	4.030	39.300	40.300	2.54%
2450	HEAD	02/15/2013	24.7	23.3	0.100	719	3022	5.350	52.700	53.500	1.52%
5200	HEAD	02/11/2013	24.3	23.6	0.100	1007	3589	7.430	79.800	74.300	-6.89%
5300	HEAD	02/11/2013	24.1	23.5	0.100	1007	3589	7.800	83.100	78.000	-6.14%
5600	HEAD	02/11/2013	24.3	23.7	0.100	1007	3589	8.150	84.500	81.500	-3.55%
5800	HEAD	02/11/2013	24.2	23.8	0.100	1007	3589	7.510	79.800	75.100	-5.89%
750	BODY	02/12/2013	23.9	23.3	0.100	1003	3287	0.887	8.830	8.870	0.45%
835	BODY	02/13/2013	24.7	24.2	0.100	4d133	3213	0.957	9.600	9.570	-0.31%
1750	BODY	02/13/2013	24.4	23.9	0.100	1051	3288	3.490	37.600	34.900	-7.18%
1900	BODY	02/13/2013	24.1	22.1	0.100	5d149	3263	4.040	39.300	40.400	2.80%
1900	BODY	02/18/2013	24.3	21.9	0.100	5d149	3263	4.000	39.300	40.000	1.78%
2450	BODY	02/14/2013	24.3	22.7	0.100	797	3288	4.790	49.600	47.900	-3.43%
5200	BODY	02/13/2013	24.4	24.5	0.100	1057	3589	7.030	75.500	70.300	-6.89%
5300	BODY	02/13/2013	24.5	24.2	0.100	1057	3589	7.430	75.300	74.300	-1.33%
5600	BODY	02/13/2013	24.2	24.3	0.100	1057	3589	8.330	80.300	83.300	3.74%
5800	BODY	02/13/2013	24.3	24.4	0.100	1057	3589	7.380	75.100	73.800	-1.73%

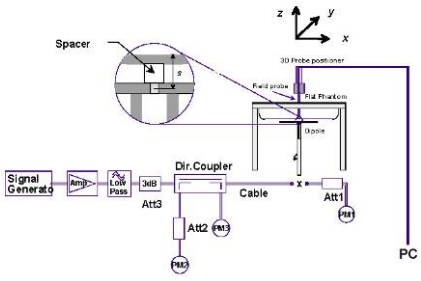


Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
Cell. CDMA Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.52	384	Cell. CDMA	RC3 / SO55	25.0	24.76	-0.12	Right	Cheek	77	1:1	0.335	1.057	0.354	
836.52	384	Cell. CDMA	RC3 / SO55	25.0	24.76	0.00	Right	Tilt	77	1:1	0.145	1.057	0.153	
836.52	384	Cell. CDMA	RC3 / SO55	25.0	24.76	-0.02	Left	Cheek	77	1:1	0.288	1.057	0.304	
836.52	384	Cell. CDMA	RC3 / SO55	25.0	24.76	-0.06	Left	Tilt	77	1:1	0.143	1.057	0.151	
836.52	384	Cell. CDMA	EVDO Rev. A	25.0	24.74	-0.07	Right	Cheek	77	1:1	0.394	1.062	0.418	A2
836.52	384	Cell. CDMA	EVDO Rev. A	25.0	24.74	0.02	Right	Tilt	77	1:1	0.171	1.062	0.182	
836.52	384	Cell. CDMA	EVDO Rev. A	25.0	24.74	-0.04	Left	Cheek	77	1:1	0.343	1.062	0.364	
836.52	384	Cell. CDMA	EVDO Rev. A	25.0	24.74	-0.03	Left	Tilt	77	1:1	0.166	1.062	0.176	
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
AWS CDMA Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1732.50	450	AWS CDMA	RC3 / SO55	25.0	24.61	0.16	Right	Cheek	78	1:1	0.161	1.094	0.176	
1732.50	450	AWS CDMA	RC3 / SO55	25.0	24.61	0.03	Right	Tilt	78	1:1	0.111	1.094	0.121	
1732.50	450	AWS CDMA	RC3 / SO55	25.0	24.61	-0.06	Left	Cheek	78	1:1	0.224	1.094	0.245	A4
1732.50	450	AWS CDMA	RC3 / SO55	25.0	24.61	0.06	Left	Tilt	78	1:1	0.100	1.094	0.109	
1732.50	450	AWS CDMA	EVDO Rev. A	25.0	24.58	0.04	Right	Cheek	78	1:1	0.077	1.102	0.085	
1732.50	450	AWS CDMA	EVDO Rev. A	25.0	24.58	0.15	Right	Tilt	78	1:1	0.069	1.102	0.076	
1732.50	450	AWS CDMA	EVDO Rev. A	25.0	24.58	-0.06	Left	Cheek	78	1:1	0.151	1.102	0.166	
1732.50	450	AWS CDMA	EVDO Rev. A	25.0	24.58	-0.01	Left	Tilt	78	1:1	0.058	1.102	0.064	
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
PCS CDMA Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.53	0.02	Right	Cheek	73	1:1	0.174	1.114	0.194	
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.53	0.09	Right	Tilt	73	1:1	0.082	1.114	0.092	
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.53	-0.10	Left	Cheek	73	1:1	0.257	1.114	0.286	
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.53	0.10	Left	Tilt	73	1:1	0.085	1.114	0.094	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.50	0.02	Right	Cheek	73	1:1	0.226	1.122	0.254	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.50	0.00	Right	Tilt	73	1:1	0.105	1.122	0.118	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.50	0.14	Left	Cheek	73	1:1	0.333	1.122	0.374	A6
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.50	-0.07	Left	Tilt	73	1:1	0.103	1.122	0.116	

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Head 1.6 W/kg (mW/g) averaged over 1 gram

Table 11-4
LTE Band 12 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	23.5	23.30	0.03	0	Right	Cheek	QPSK	1	0	85	1:1	0.114	1.047	0.119	
707.50	23095	Mid	LTE Band 12	10	22.5	22.00	0.14	1	Right	Cheek	QPSK	25	0	85	1:1	0.084	1.122	0.094	
707.50	23095	Mid	LTE Band 12	10	23.5	23.30	-0.01	0	Right	Tilt	QPSK	1	0	85	1:1	0.074	1.047	0.077	
707.50	23095	Mid	LTE Band 12	10	22.5	22.00	0.13	1	Right	Tilt	QPSK	25	0	85	1:1	0.055	1.122	0.061	
707.50	23095	Mid	LTE Band 12	10	23.5	23.30	-0.10	0	Left	Cheek	QPSK	1	0	85	1:1	0.179	1.047	0.187	A1
707.50	23095	Mid	LTE Band 12	10	22.5	22.00	0.07	1	Left	Cheek	QPSK	25	0	85	1:1	0.128	1.122	0.144	
707.50	23095	Mid	LTE Band 12	10	23.5	23.30	0.08	0	Left	Tilt	QPSK	1	0	85	1:1	0.089	1.047	0.093	
707.50	23095	Mid	LTE Band 12	10	22.5	22.00	0.08	1	Left	Tilt	QPSK	25	0	85	1:1	0.065	1.122	0.073	

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Head 1.6 W/kg (mW/g) averaged over 1 gram

Table 11-5
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	23.50	-0.07	0	Right	Cheek	QPSK	1	0	89	1:1	0.516	1.000	**0.516**	A3
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.42	0.02	1	Right	Cheek	QPSK	25	12	89	1:1	0.321	1.019	0.327	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.50	0.07	0	Right	Tilt	QPSK	1	0	89	1:1	0.465	1.000	0.465	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.42	0.11	1	Right	Tilt	QPSK	25	12	89	1:1	0.296	1.019	0.302	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.50	-0.02	0	Left	Cheek	QPSK	1	0	89	1:1	0.392	1.000	0.392	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.42	0.01	1	Left	Cheek	QPSK	25	12	89	1:1	0.246	1.019	0.251	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.50	-0.02	0	Left	Tilt	QPSK	1	0	89	1:1	0.356	1.000	0.356	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.42	0.03	1	Left	Tilt	QPSK	25	12	89	1:1	0.225	1.019	0.229	

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 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)	10	23.5	23.50	0.12	0	Right	Cheek	QPSK	1	25	91	1:1	0.250	1.000	0.250	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.5	22.48	-0.10	1	Right	Cheek	QPSK	25	25	91	1:1	0.199	1.005	0.200	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.5	23.50	0.08	0	Right	Tilt	QPSK	1	25	91	1:1	0.127	1.000	0.127	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.5	22.48	0.02	1	Right	Tilt	QPSK	25	25	91	1:1	0.098	1.005	0.098	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.5	23.50	0.00	0	Left	Cheek	QPSK	1	25	91	1:1	0.304	1.000	0.304	A5
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.5	22.48	0.10	1	Left	Cheek	QPSK	25	25	91	1:1	0.222	1.005	0.223	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.5	23.50	-0.03	0	Left	Tilt	QPSK	1	25	91	1:1	0.098	1.000	0.098	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.5	22.48	0.05	1	Left	Tilt	QPSK	25	25	91	1:1	0.097	1.005	0.098	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population												Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-7
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)	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.5	23.28	0.09	0	Right	Cheek	QPSK	1	0	90	1:1	0.334	1.052	0.351	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.5	22.27	0.16	1	Right	Cheek	QPSK	25	0	90	1:1	0.240	1.054	0.253	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.5	23.28	0.16	0	Right	Tilt	QPSK	1	0	90	1:1	0.152	1.052	0.160	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.5	22.27	0.06	1	Right	Tilt	QPSK	25	0	90	1:1	0.116	1.054	0.122	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.5	23.28	-0.06	0	Left	Cheek	QPSK	1	0	90	1:1	0.390	1.052	0.410	A7
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.5	22.27	0.06	1	Left	Cheek	QPSK	25	0	90	1:1	0.302	1.054	0.318	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.5	23.28	-0.08	0	Left	Tilt	QPSK	1	0	90	1:1	0.159	1.052	0.167	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.5	22.27	0.08	1	Left	Tilt	QPSK	25	0	90	1:1	0.135	1.054	0.142	
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
DTS Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
2437	6	IEEE 802.11b	DSSS	16.0	15.60	-0.02	Right	Cheek	85	1	1:1	0.322	1.096	**0.353**	A8
2437	6	IEEE 802.11b	DSSS	16.0	15.60	-0.06	Right	Tilt	85	1	1:1	0.093	1.096	0.101	
2437	6	IEEE 802.11b	DSSS	16.0	15.60	-0.02	Left	Cheek	85	1	1:1	0.322	1.096	**0.353**	
2437	6	IEEE 802.11b	DSSS	16.0	15.60	0.09	Left	Tilt	85	1	1:1	0.072	1.096	0.079	
5745	149	IEEE 802.11a	OFDM	14.0	13.65	0.19	Right	Cheek	85	6	1:1	0.084	1.084	0.091	
5745	149	IEEE 802.11a	OFDM	14.0	13.65	-1.42	Right	Tilt	85	6	1:1	0.011	1.084	0.011	
5745	149	IEEE 802.11a	OFDM	14.0	13.65	0.17	Left	Cheek	85	6	1:1	0.089	1.084	0.096	A10
5745	149	IEEE 802.11a	OFDM	14.0	0.00	0.00	Left	Tilt	85	6	1:1	0.000	25.119	0.000	
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
NII Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.														
5220	44	IEEE 802.11a	OFDM	14.0	12.80	0.06	Right	Cheek	85	6	1:1	0.324	1.318	0.427	
5220	44	IEEE 802.11a	OFDM	14.0	12.80	-0.10	Right	Tilt	85	6	1:1	0.032	1.318	0.042	
5220	44	IEEE 802.11a	OFDM	14.0	12.80	0.07	Left	Cheek	85	6	1:1	0.269	1.318	0.355	
5220	44	IEEE 802.11a	OFDM	14.0	12.80	0.11	Left	Tilt	85	6	1:1	0.024	1.318	0.032	
5300	60	IEEE 802.11a	OFDM	14.0	12.95	0.16	Right	Cheek	85	6	1:1	0.346	1.274	**0.441**	A9
5300	60	IEEE 802.11a	OFDM	14.0	12.95	0.14	Right	Tilt	85	6	1:1	0.033	1.274	0.042	
5300	60	IEEE 802.11a	OFDM	14.0	12.95	-0.19	Left	Cheek	85	6	1:1	0.317	1.274	0.404	
5300	60	IEEE 802.11a	OFDM	14.0	12.95	0.17	Left	Tilt	85	6	1:1	0.027	1.274	0.034	
5680	136	IEEE 802.11a	OFDM	14.0	13.65	0.13	Right	Cheek	85	6	1:1	0.107	1.084	0.116	
5680	136	IEEE 802.11a	OFDM	14.0	13.65	0.14	Right	Tilt	85	6	1:1	0.011	1.084	0.012	
5680	136	IEEE 802.11a	OFDM	14.0	13.65	0.18	Left	Cheek	85	6	1:1	0.114	1.084	0.124	
5680	136	IEEE 802.11a	OFDM	14.0	13.65	0.00	Left	Tilt	85	6	1:1	0.002	1.084	0.002	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Head 1.6 W/kg (mW/g) averaged over 1 gram**								

11.2 Standalone Body-Worn SAR Data

Table 11-10
CDMA Body-Worn SAR Data

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Duty Cycle	Side	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.													
836.52	384	Cell. CDMA	TDSO / SO32	25.0	24.79	-0.04	10 mm	77	1:1	back	0.581	1.050	0.610	A12
1732.50	450	AWS CDMA	TDSO / SO32	25.0	24.60	-0.12	10 mm	78	1:1	back	0.468	1.096	0.513	A15
1851.25	25	PCS CDMA	TDSO / SO32	25.0	24.75	-0.10	10 mm	73	1:1	back	0.555	1.059	0.588	A17
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Body 1.6 W/kg (mW/g) averaged over 1 gram**							

Table 11-11
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) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
707.50	23095	Mid	LTE Band 12	10	23.5	23.30	-0.10	0	85	QPSK	1	0	10 mm	back	1:1	0.275	1.047	0.288	A11
707.50	23095	Mid	LTE Band 12	10	22.5	22.00	-0.20	1	85	QPSK	25	0	10 mm	back	1:1	0.196	1.122	0.220	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.50	-0.13	0	89	QPSK	1	0	10 mm	back	1:1	0.201	1.000	0.201	A14
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.42	0.03	1	89	QPSK	25	12	10 mm	back	1:1	0.123	1.019	0.125	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.5	23.50	-0.12	0	91	QPSK	1	25	10 mm	back	1:1	0.646	1.000	**0.646**	A16
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.5	22.48	-0.02	1	91	QPSK	25	25	10 mm	back	1:1	0.496	1.005	0.498	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.5	23.28	0.12	0	90	QPSK	1	0	10 mm	back	1:1	0.563	1.052	0.592	A19
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.5	22.27	0.01	1	90	QPSK	25	0	10 mm	back	1:1	0.543	1.054	0.572	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**														**Body** **1.6 W/kg (mW/g)** averaged over 1 gram					

Table 11-12
DTS 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) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.														
2437	6	IEEE 802.11b	DSSS	16.0	15.60	-0.07	10 mm	78	1	back	1:1	0.076	1.096	**0.083**	A20
5745	149	IEEE 802.11a	OFDM	14.0	13.65	0.15	10 mm	85	6	back	1:1	0.026	1.084	0.028	A22
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**										**Body** **1.6 W/kg (mW/g)** averaged over 1 gram					

Table 11-13
NII 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) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.														
5220	44	IEEE 802.11a	OFDM	14.0	12.80	0.20	10 mm	85	6	back	1:1	0.140	1.318	0.185	
5300	60	IEEE 802.11a	OFDM	14.0	12.95	0.08	10 mm	85	6	back	1:1	0.151	1.274	**0.192**	A21
5680	136	IEEE 802.11a	OFDM	14.0	13.65	-0.18	10 mm	85	6	back	1:1	0.042	1.084	0.046	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**										**Body** **1.6 W/kg (mW/g)** averaged over 1 gram					

11.3 Standalone Wireless Router SAR Data

Table 11-14
CDMA Hotspot SAR Data

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.52	384	Cell. CDMA	TDSO / SO32	25.0	24.79	-0.04	10 mm	77	1:1	back	0.581	1.050	0.610	
836.52	384	Cell. CDMA	TDSO / SO32	25.0	24.79	0.00	10 mm	77	1:1	front	0.336	1.050	0.353	
836.52	384	Cell. CDMA	TDSO / SO32	25.0	24.79	0.02	10 mm	77	1:1	bottom	0.165	1.050	0.173	
836.52	384	Cell. CDMA	TDSO / SO32	25.0	24.79	0.00	10 mm	77	1:1	right	0.416	1.050	0.437	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.0	24.75	-0.02	10 mm	77	1:1	back	0.713	1.059	**0.755**	A13
836.52	384	Cell. CDMA	EVDO Rev. 0	25.0	24.75	0.03	10 mm	77	1:1	front	0.427	1.059	0.452	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.0	24.75	0.12	10 mm	77	1:1	bottom	0.238	1.059	0.252	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.0	24.75	-0.10	10 mm	77	1:1	right	0.499	1.059	0.528	
1732.50	450	AWS CDMA	TDSO / SO32	25.0	24.60	-0.12	10 mm	78	1:1	back	0.468	1.096	0.513	A15
1732.50	450	AWS CDMA	TDSO / SO32	25.0	24.60	-0.07	10 mm	78	1:1	front	0.330	1.096	0.362	
1732.50	450	AWS CDMA	TDSO / SO32	25.0	24.60	0.04	10 mm	78	1:1	bottom	0.352	1.096	0.386	
1732.50	450	AWS CDMA	TDSO / SO32	25.0	24.60	-0.04	10 mm	78	1:1	right	0.096	1.096	0.106	
1732.50	450	AWS CDMA	EVDO Rev. 0	25.0	24.64	0.02	10 mm	78	1:1	back	0.402	1.086	0.437	
1732.50	450	AWS CDMA	EVDO Rev. 0	25.0	24.64	0.05	10 mm	78	1:1	front	0.207	1.086	0.225	
1732.50	450	AWS CDMA	EVDO Rev. 0	25.0	24.64	-0.02	10 mm	78	1:1	bottom	0.181	1.086	0.197	
1732.50	450	AWS CDMA	EVDO Rev. 0	25.0	24.64	0.03	10 mm	78	1:1	right	0.056	1.086	0.060	
1851.25	25	PCS CDMA	TDSO / SO32	25.0	24.75	-0.10	10 mm	73	1:1	back	0.555	1.059	0.588	
1851.25	25	PCS CDMA	TDSO / SO32	25.0	24.75	-0.10	10 mm	73	1:1	front	0.307	1.059	0.325	
1851.25	25	PCS CDMA	TDSO / SO32	25.0	24.75	-0.02	10 mm	73	1:1	bottom	0.451	1.059	0.478	
1851.25	25	PCS CDMA	TDSO / SO32	25.0	24.75	-0.07	10 mm	73	1:1	right	0.106	1.059	0.112	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.57	-0.06	10 mm	73	1:1	back	0.568	1.104	0.627	A18
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.57	0.03	10 mm	73	1:1	front	0.357	1.104	0.394	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.57	0.04	10 mm	73	1:1	bottom	0.482	1.104	0.532	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.57	0.15	10 mm	73	1:1	right	0.111	1.104	0.123	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**											**Body** **1.6 W/kg (mW/g)** averaged over 1 gram			

Table 11-15
LTE Band 12 Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	23.5	23.30	-0.10	0	85	QPSK	1	0	10 mm	back	1:1	0.275	1.047	0.288	A11
707.50	23095	Mid	LTE Band 12	10	22.5	22.00	-0.20	1	85	QPSK	25	0	10 mm	back	1:1	0.196	1.122	0.220	
707.50	23095	Mid	LTE Band 12	10	23.5	23.30	-0.04	0	85	QPSK	1	0	10 mm	front	1:1	0.155	1.047	0.162	
707.50	23095	Mid	LTE Band 12	10	22.5	22.00	0.18	1	85	QPSK	25	0	10 mm	front	1:1	0.112	1.122	0.126	
707.50	23095	Mid	LTE Band 12	10	23.5	23.30	-0.01	0	85	QPSK	1	0	10 mm	bottom	1:1	0.113	1.047	0.118	
707.50	23095	Mid	LTE Band 12	10	22.5	22.00	-0.02	1	85	QPSK	25	0	10 mm	bottom	1:1	0.075	1.122	0.084	
707.50	23095	Mid	LTE Band 12	10	23.5	23.30	0.13	0	85	QPSK	1	0	10 mm	left	1:1	0.180	1.047	0.188	
707.50	23095	Mid	LTE Band 12	10	22.5	22.00	-0.08	1	85	QPSK	25	0	10 mm	left	1:1	0.129	1.122	0.145	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**														**Body** **1.6 W/kg (mW/g)** averaged over 1 gram					

Table 11-16
LTE Band 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	23.50	-0.13	0	89	QPSK	1	0	10 mm	back	1:1	0.201	1.000	0.201	A14
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.42	0.03	1	89	QPSK	25	12	10 mm	back	1:1	0.123	1.019	0.125	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.50	-0.03	0	89	QPSK	1	0	10 mm	front	1:1	0.176	1.000	0.176	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.42	0.11	1	89	QPSK	25	12	10 mm	front	1:1	0.106	1.019	0.108	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.50	0.02	0	89	QPSK	1	0	10 mm	top	1:1	0.141	1.000	0.141	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.42	0.07	1	89	QPSK	25	12	10 mm	top	1:1	0.089	1.019	0.091	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	23.50	-0.05	0	89	QPSK	1	0	10 mm	left	1:1	0.168	1.000	0.168	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	22.42	0.04	1	89	QPSK	25	12	10 mm	left	1:1	0.097	1.019	0.098	

ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**	**Body** **1.6 W/kg (mW/g)** averaged over 1 gram

Table 11-17
LTE 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)	10	23.5	23.50	-0.12	0	91	QPSK	1	25	10 mm	back	1:1	0.646	1.000	0.646	A16
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.5	22.48	-0.02	1	91	QPSK	25	25	10 mm	back	1:1	0.496	1.005	0.498	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.5	23.50	0.10	0	91	QPSK	1	25	10 mm	front	1:1	0.310	1.000	0.310	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.5	22.48	0.12	1	91	QPSK	25	25	10 mm	front	1:1	0.267	1.005	0.268	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.5	23.50	-0.01	0	91	QPSK	1	25	10 mm	bottom	1:1	0.503	1.000	0.503	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.5	22.48	-0.01	1	91	QPSK	25	25	10 mm	bottom	1:1	0.386	1.005	0.388	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.5	23.50	0.01	0	91	QPSK	1	25	10 mm	left	1:1	0.190	1.000	0.190	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.5	22.48	-0.02	1	91	QPSK	25	25	10 mm	left	1:1	0.141	1.005	0.142	

ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**	**Body** **1.6 W/kg (mW/g)** averaged over 1 gram

Table 11-18
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)	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.5	23.28	0.12	0	90	QPSK	1	0	10 mm	back	1:1	0.563	1.052	0.592	A19
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.5	22.27	0.01	1	90	QPSK	25	0	10 mm	back	1:1	0.543	1.054	0.572	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.5	23.28	0.08	0	90	QPSK	1	0	10 mm	front	1:1	0.329	1.052	0.346	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.5	22.27	-0.15	1	90	QPSK	25	0	10 mm	front	1:1	0.333	1.054	0.351	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.5	23.28	-0.18	0	90	QPSK	1	0	10 mm	bottom	1:1	0.451	1.052	0.474	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.5	22.27	0.00	1	90	QPSK	25	0	10 mm	bottom	1:1	0.417	1.054	0.440	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.5	23.28	0.09	0	90	QPSK	1	0	10 mm	left	1:1	0.134	1.052	0.141	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.5	22.27	0.44	1	90	QPSK	25	0	10 mm	left	1:1	0.133	1.054	0.140	

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
WLAN Hotspot SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.														
2437	6	IEEE 802.11b	DSSS	16.0	15.60	-0.07	10 mm	78	1	back	1:1	0.076	1.096	**0.083**	A20
2437	6	IEEE 802.11b	DSSS	16.0	15.60	-0.02	10 mm	78	1	front	1:1	0.058	1.096	0.064	
2437	6	IEEE 802.11b	DSSS	16.0	15.60	-0.06	10 mm	78	1	left	1:1	0.069	1.096	0.075	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**							**Body** **1.6 W/kg (mW/g)** averaged over 1 gram								

11.4 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, FCC/OET Bulletin 65, Supplement C [June 2001] and FCC KDB Publication 447498 D01v05.
2. Batteries are fully charged at the beginning of the SAR measurements. A standard battery was used for all SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01, SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was ≤ 1.2 W/kg, no additional SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01 v01, variability SAR tests were not required since the measured SAR results for each frequency band were less than 0.8 W/kg. Please see Section 13 for more information.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.6 for more details).
10. This DUT has NFC operations. The NFC antenna is integrated into the standard battery. The SAR tests were performed with the standard battery (model: EB-L1G6LLA).

CDMA Notes:

1. Head SAR for CDMA2000 mode was tested under RC3/SO55 per FCC KDB Publication 941225 D01v02.
2. Body-Worn SAR was tested with 1x RTT with TDSO / SO32 FCH Only. EVDO and TDSO / SO32 FCH+SCH SAR tests were not required since the average output power was not more than 0.25 dB higher than the TDSO / SO32 FCH only powers, per FCC KDB Publication 941225 D01v02.
3. CDMA Wireless Router SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 according to KDB 941225 D01 procedures for data devices. If the average output power of Subtype 2 for Rev. A is less than the Rev. 0 power levels, then EVDO Rev. A SAR is not

required. Otherwise, SAR is measured on the maximum output channel for Rev. A using the exposure configuration that results in the highest SAR for that RF channel in Rev. 0. SAR is not required for 1x RTT for Ev-Do hotspot devices when the maximum average output of each channel is less than 1/4 dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev. 0.

4. Head SAR was additionally evaluated using EVDO Rev. A to determine compliance for VoIP operations.
5. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.
6. CDMA 1x-RTT Hotspot SAR was additionally evaluated for Hotspot exposure to support simultaneous capabilities.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r01. Implementation of the general test procedures can be found in Section 8.4.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.

WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 5 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE 802.11 modes (including 802.11n 20 MHz and 40 MHz bandwidths) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
3. When Hotspot is enabled, all 5 GHz bands are disabled. Therefore no 5 GHz WIFI Wireless Router SAR Data was required.
4. WIFI transmission was verified using an uncalibrated spectrum analyzer.
5. Since the maximum extrapolated peak SAR of the zoom scan for the maximum output channel was <1.6 W/kg and the reported 1g averaged SAR is <0.8 W/kg, SAR testing on other channels was not required.

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 Introduction

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

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

Table 12-1
Estimated SAR

Mode	Frequency	Maximum Allowed Power	Estimated SAR (Held-to-Ear)	Separation Distance (Body)	Estimated SAR (Body)
	[MHz]	[dBm]	[W/kg]	[mm]	[W/kg]
Bluetooth	2441	7.00	N/A	10	**0.104**

Note: Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission.

12.3 Head SAR Simultaneous Transmission Analysis

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

Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	AWS CDMA SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.354	0.353	**0.707**	Head SAR	Right Cheek	0.176	0.353	0.529
	Right Tilt	0.153	0.101	0.254		Right Tilt	0.121	0.101	0.222
	Left Cheek	0.304	0.353	0.657		Left Cheek	0.245	0.353	**0.598**
	Left Tilt	0.151	0.079	0.230		Left Tilt	0.109	0.079	0.188

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.194	0.353	0.547
	Right Tilt	0.092	0.101	0.193
	Left Cheek	0.286	0.353	**0.639**
	Left Tilt	0.094	0.079	0.173

Simult Tx	Configuration	LTE Band 12 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.119	0.353	0.472
	Right Tilt	0.077	0.101	0.178
	Left Cheek	0.187	0.353	**0.540**
	Left Tilt	0.093	0.079	0.172

Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.516	0.353	**0.869**
	Right Tilt	0.465	0.101	0.566
	Left Cheek	0.392	0.353	0.745
	Left Tilt	0.356	0.079	0.435

Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.250	0.353	0.603
	Right Tilt	0.127	0.101	0.228
	Left Cheek	0.304	0.353	**0.657**
	Left Tilt	0.098	0.079	0.177

Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.351	0.353	0.704
	Right Tilt	0.160	0.101	0.261
	Left Cheek	0.410	0.353	**0.763**
	Left Tilt	0.167	0.079	0.246

Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.418	0.353	**0.771**
	Right Tilt	0.182	0.101	0.283
	Left Cheek	0.364	0.353	0.717
	Left Tilt	0.176	0.079	0.255

Simult Tx	Configuration	AWS EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.085	0.353	0.438
	Right Tilt	0.076	0.101	0.177
	Left Cheek	0.166	0.353	**0.519**
	Left Tilt	0.064	0.079	0.143

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.254	0.353	0.607
	Right Tilt	0.118	0.101	0.219
	Left Cheek	0.374	0.353	**0.727**
	Left Tilt	0.116	0.079	0.195

Table 12-3
Simultaneous Transmission Scenario with 5 GHz WLAN (Held to Ear)

Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.354	0.441	**0.795**
	Right Tilt	0.153	0.042	0.195
	Left Cheek	0.304	0.404	0.708
	Left Tilt	0.151	0.034	0.185

Simult Tx	Configuration	AWS CDMA SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.176	0.441	0.617
	Right Tilt	0.121	0.042	0.163
	Left Cheek	0.245	0.404	**0.649**
	Left Tilt	0.109	0.034	0.143

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.194	0.441	0.635
	Right Tilt	0.092	0.042	0.134
	Left Cheek	0.286	0.404	**0.690**
	Left Tilt	0.094	0.034	0.128

12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-4
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 10 mm)

Configuration	Mode	CDMA/LTE SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	Cell. CDMA	0.610	0.083	0.693
Back Side	AWS CDMA	0.513	0.083	0.596
Back Side	PCS CDMA	0.588	0.083	0.671
Back Side	LTE Band 12	0.288	0.083	0.371
Back Side	LTE Band 5 (Cell)	0.201	0.083	0.284
Back Side	LTE Band 4 (AWS)	0.646	0.083	**0.729**
Back Side	LTE Band 2 (PCS)	0.592	0.083	0.675

Note: Per KDB 941225, when the maximum output power of each channel in EVDO is less than 0.25 dB higher than measured in TDSO, body SAR for EVDO is not required. Therefore, 1x-RTT CDMA body-worn SAR summations additionally show compliance for EVDO Rev. A VoIP body-worn simultaneous transmission scenarios.

Table 12-5
Simultaneous Transmission Scenario with 5 GHz WLAN (Body-Worn at 10 mm)

Configuration	Mode	CDMA SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	Cell. CDMA	0.610	0.192	**0.802**
Back Side	AWS CDMA	0.513	0.192	0.705
Back Side	PCS CDMA	0.588	0.192	0.780

Note: Per KDB 941225, when the maximum output power of each channel in EVDO is less than 0.25 dB higher than measured in TDSO, body SAR for EVDO is not required.

Table 12-6
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 10 mm)

Configuration	Mode	CDMA/LTE SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Back Side	Cell. CDMA	0.610	0.104	0.714
Back Side	AWS CDMA	0.513	0.104	0.617
Back Side	PCS CDMA	0.588	0.104	0.692
Back Side	LTE Band 12	0.288	0.104	0.392
Back Side	LTE Band 5 (Cell)	0.201	0.104	0.305
Back Side	LTE Band 4 (AWS)	0.646	0.104	**0.750**
Back Side	LTE Band 2 (PCS)	0.592	0.104	0.696

Note:

1. Bluetooth SAR was not required to be measured per FCC KDB 447498. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.
2. Per KDB 941225, when the maximum output power of each channel in EVDO is less than 0.25 dB higher than measured in TDSO, body SAR for EVDO is not required. Therefore, 1x-RTT CDMA body-worn SAR summations additionally show compliance for EVDO Rev. A VoIP body-worn simultaneous transmission scenarios.

12.5 Hotspot SAR Simultaneous Transmission Analysis

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

Table 12-7
Simultaneous Transmission Scenario (Hotspot at 10 mm)

Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.755	0.083	**0.838**
	Front	0.452	0.064	0.516
	Top	-	-	0.000
	Bottom	0.252	-	0.252
	Right	0.528	-	0.528
	Left	-	0.075	0.075

Simult Tx	Configuration	AWS EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.437	0.083	**0.520**
	Front	0.225	0.064	0.289
	Top	-	-	0.000
	Bottom	0.197	-	0.197
	Right	0.060	-	0.060
	Left	-	0.075	0.075

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.627	0.083	**0.710**
	Front	0.394	0.064	0.458
	Top	-	-	0.000
	Bottom	0.532	-	0.532
	Right	0.123	-	0.123
	Left	-	0.075	0.075

Simult Tx	Configuration	LTE Band 12 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.288	0.083	**0.371**
	Front	0.162	0.064	0.226
	Top	-	-	0.000
	Bottom	0.118	-	0.118
	Right	-	-	0.000
	Left	0.188	0.075	0.263

Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.201	0.083	**0.284**
	Front	0.176	0.064	0.240
	Top	0.141	-	0.141
	Bottom	-	-	0.000
	Right	-	-	0.000
	Left	0.168	0.075	0.243

Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.646	0.083	**0.729**
	Front	0.310	0.064	0.374
	Top	-	-	0.000
	Bottom	0.503	-	0.503
	Right	-	-	0.000
	Left	0.190	0.075	0.265

Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.592	0.083	**0.675**
	Front	0.351	0.064	0.415
	Top	-	-	0.000
	Bottom	0.474	-	0.474
	Right	-	-	0.000
	Left	0.141	0.075	0.216

12.6 SVLTE Simultaneous Transmission Scenario Analysis

Table 12-8
Simultaneous Transmission Scenario (Held to Ear)

Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	LTE Band 12 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Head SAR	Right Cheek	0.354	0.119	0.353	0.473	0.826
	Right Tilt	0.153	0.077	0.101	0.230	0.331
	Left Cheek	0.304	0.187	0.353	0.491	**0.844**
	Left Tilt	0.151	0.093	0.079	0.244	0.323

Simult Tx	Configuration	AWS CDMA SAR (W/kg)	LTE Band 12 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Head SAR	Right Cheek	0.176	0.119	0.353	0.295	0.648
	Right Tilt	0.121	0.077	0.101	0.198	0.299
	Left Cheek	0.245	0.187	0.353	0.432	**0.785**
	Left Tilt	0.109	0.093	0.079	0.202	0.281

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	LTE Band 12 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Head SAR	Right Cheek	0.194	0.119	0.353	0.313	0.666
	Right Tilt	0.092	0.077	0.101	0.169	0.270
	Left Cheek	0.286	0.187	0.353	0.473	**0.826**
	Left Tilt	0.094	0.093	0.079	0.187	0.266

Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Head SAR	Right Cheek	0.354	0.516	0.353	0.870	**1.223**
	Right Tilt	0.153	0.465	0.101	0.618	0.719
	Left Cheek	0.304	0.392	0.353	0.696	1.049
	Left Tilt	0.151	0.356	0.079	0.507	0.586

Simult Tx	Configuration	AWS CDMA SAR (W/kg)	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Head SAR	Right Cheek	0.176	0.516	0.353	0.692	**1.045**
	Right Tilt	0.121	0.465	0.101	0.586	0.687
	Left Cheek	0.245	0.392	0.353	0.637	0.990
	Left Tilt	0.109	0.356	0.079	0.465	0.544

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Head SAR	Right Cheek	0.194	0.516	0.353	0.710	**1.063**
	Right Tilt	0.092	0.465	0.101	0.557	0.658
	Left Cheek	0.286	0.392	0.353	0.678	1.031
	Left Tilt	0.094	0.356	0.079	0.450	0.529

Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Head SAR	Right Cheek	0.354	0.250	0.353	0.604	0.957
	Right Tilt	0.153	0.127	0.101	0.280	0.381
	Left Cheek	0.304	0.304	0.353	0.608	**0.961**
	Left Tilt	0.151	0.098	0.079	0.249	0.328

Simult Tx	Configuration	AWS CDMA SAR (W/kg)	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Head SAR	Right Cheek	0.176	0.250	0.353	0.426	0.779
	Right Tilt	0.121	0.127	0.101	0.248	0.349
	Left Cheek	0.245	0.304	0.353	0.549	**0.902**
	Left Tilt	0.109	0.098	0.079	0.207	0.286

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Head SAR	Right Cheek	0.194	0.250	0.353	0.444	0.797
	Right Tilt	0.092	0.127	0.101	0.219	0.320
	Left Cheek	0.286	0.304	0.353	0.590	**0.943**
	Left Tilt	0.094	0.098	0.079	0.192	0.271

Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Head SAR	Right Cheek	0.354	0.351	0.353	0.705	1.058
	Right Tilt	0.153	0.160	0.101	0.313	0.414
	Left Cheek	0.304	0.410	0.353	0.714	**1.067**
	Left Tilt	0.151	0.167	0.079	0.318	0.397

Simult Tx	Configuration	AWS CDMA SAR (W/kg)	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Head SAR	Right Cheek	0.176	0.351	0.353	0.527	0.880
	Right Tilt	0.121	0.160	0.101	0.281	0.382
	Left Cheek	0.245	0.410	0.353	0.655	**1.008**
	Left Tilt	0.109	0.167	0.079	0.276	0.355

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Head SAR	Right Cheek	0.194	0.351	0.353	0.545	0.898
	Right Tilt	0.092	0.160	0.101	0.252	0.353
	Left Cheek	0.286	0.410	0.353	0.696	**1.049**
	Left Tilt	0.094	0.167	0.079	0.261	0.340

Table 12-9
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 10 mm)

Configuration	Mode	CDMA SAR (W/kg)	LTE Band 12 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Back Side	Cell. CDMA	0.610	0.288	0.083	0.898	**0.981**
Back Side	AWS CDMA	0.513	0.288	0.083	0.801	0.884
Back Side	PCS CDMA	0.588	0.288	0.083	0.876	0.959

Configuration	Mode	CDMA SAR (W/kg)	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Back Side	Cell. CDMA	0.610	0.201	0.083	0.811	**0.894**
Back Side	AWS CDMA	0.513	0.201	0.083	0.714	0.797
Back Side	PCS CDMA	0.588	0.201	0.083	0.789	0.872

Configuration	Mode	CDMA SAR (W/kg)	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Back Side	Cell. CDMA	0.610	0.646	0.083	1.256	**1.339**
Back Side	AWS CDMA	0.513	0.646	0.083	1.159	1.242
Back Side	PCS CDMA	0.588	0.646	0.083	1.234	1.317
Configuration	Mode	CDMA SAR (W/kg)	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Back Side	Cell. CDMA	0.610	0.592	0.083	1.202	**1.285**
Back Side	AWS CDMA	0.513	0.592	0.083	1.105	1.188
Back Side	PCS CDMA	0.588	0.592	0.083	1.180	1.263

Table 12-10
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 10 mm)

Configuration	Mode	CDMA SAR (W/kg)	LTE Band 12 SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Back Side	Cell. CDMA	0.610	0.288	0.104	0.898	**1.002**
Back Side	AWS CDMA	0.513	0.288	0.104	0.801	0.905
Back Side	PCS CDMA	0.588	0.288	0.104	0.876	0.980
Configuration	Mode	CDMA SAR (W/kg)	LTE Band 5 (Cell) SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Back Side	Cell. CDMA	0.610	0.201	0.104	0.811	**0.915**
Back Side	AWS CDMA	0.513	0.201	0.104	0.714	0.818
Back Side	PCS CDMA	0.588	0.201	0.104	0.789	0.893
Configuration	Mode	CDMA SAR (W/kg)	LTE Band 4 (AWS) SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Back Side	Cell. CDMA	0.610	0.646	0.104	1.256	**1.360**
Back Side	AWS CDMA	0.513	0.646	0.104	1.159	1.263
Back Side	PCS CDMA	0.588	0.646	0.104	1.234	1.338
Configuration	Mode	CDMA SAR (W/kg)	LTE Band 2 (PCS) SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	
	Tx Antenna	1	2	3	1+2	1+2+3
Back Side	Cell. CDMA	0.610	0.592	0.104	1.202	**1.306**
Back Side	AWS CDMA	0.513	0.592	0.104	1.105	1.209
Back Side	PCS CDMA	0.588	0.592	0.104	1.180	1.284

Table 12-11
Simultaneous Transmission Scenario (Hotspot at 10 mm)

Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	LTE Band 12 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	AWS CDMA SAR (W/kg)	LTE Band 12 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.610	0.288	0.083	**0.981**	Body SAR	Back	0.513	0.288	0.083	**0.884**
	Front	0.353	0.162	0.064	0.579		Front	0.362	0.162	0.064	0.588
	Top	-	-	-	0.000		Top	-	-	-	0.000
	Bottom	0.173	0.118	-	0.291		Bottom	0.386	0.118	-	0.504
	Right	0.437	-	-	0.437		Right	0.106	-	-	0.106
	Left	-	0.188	0.075	0.263		Left	-	0.188	0.075	0.263
Simult Tx	Configuration	PCS CDMA SAR (W/kg)	LTE Band 12 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.588	0.288	0.083	**0.959**	Body SAR	Back	0.610	0.201	0.083	**0.894**
	Front	0.325	0.162	0.064	0.551		Front	0.353	0.176	0.064	0.593
	Top	-	-	-	0.000		Top	-	0.141	-	0.141
	Bottom	0.478	0.118	-	0.596		Bottom	0.173	-	-	0.173
	Right	0.112	-	-	0.112		Right	0.437	-	-	0.437
	Left	-	0.188	0.075	0.263		Left	-	0.168	0.075	0.243
Simult Tx	Configuration	AWS CDMA SAR (W/kg)	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS CDMA SAR (W/kg)	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.513	0.201	0.083	**0.797**	Body SAR	Back	0.588	0.201	0.083	**0.872**
	Front	0.362	0.176	0.064	0.602		Front	0.325	0.176	0.064	0.565
	Top	-	0.141	-	0.141		Top	-	0.141	-	0.141
	Bottom	0.386	-	-	0.386		Bottom	0.478	-	-	0.478
	Right	0.106	-	-	0.106		Right	0.112	-	-	0.112
	Left	-	0.168	0.075	0.243		Left	-	0.168	0.075	0.243
Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	AWS CDMA SAR (W/kg)	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.610	0.646	0.083	**1.339**	Body SAR	Back	0.513	0.646	0.083	**1.242**
	Front	0.353	0.310	0.064	0.727		Front	0.362	0.310	0.064	0.736
	Top	-	-	-	0.000		Top	-	-	-	0.000
	Bottom	0.173	0.503	-	0.676		Bottom	0.386	0.503	-	0.889
	Right	0.437	-	-	0.437		Right	0.106	-	-	0.106
	Left	-	0.190	0.075	0.265		Left	-	0.190	0.075	0.265
Simult Tx	Configuration	PCS CDMA SAR (W/kg)	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.588	0.646	0.083	**1.317**	Body SAR	Back	0.610	0.592	0.083	**1.285**
	Front	0.325	0.310	0.064	0.699		Front	0.353	0.351	0.064	0.768
	Top	-	-	-	0.000		Top	-	-	-	0.000
	Bottom	0.478	0.503	-	0.981		Bottom	0.173	0.474	-	0.647
	Right	0.112	-	-	0.112		Right	0.437	-	-	0.437
	Left	-	0.190	0.075	0.265		Left	-	0.141	0.075	0.216
Simult Tx	Configuration	AWS CDMA SAR (W/kg)	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS CDMA SAR (W/kg)	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.513	0.592	0.083	**1.188**	Body SAR	Back	0.588	0.592	0.083	**1.263**
	Front	0.362	0.351	0.064	0.777		Front	0.325	0.351	0.064	0.740
	Top	-	-	-	0.000		Top	-	-	-	0.000
	Bottom	0.386	0.474	-	0.860		Bottom	0.478	0.474	-	0.952
	Right	0.106	-	-	0.106		Right	0.112	-	-	0.112
	Left	-	0.141	0.075	0.216		Left	-	0.141	0.075	0.216

12.7 Simultaneous Transmission Conclusion

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

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01, SAR measurement variability is assessed when measured SAR is > 0.8 W/kg. Since highest measured SAR for this device was < 0.8 W/kg, measurement variability was not assessed.

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.

14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	MA24106A	USB Power Sensor	12/6/2012	Annual	12/6/2013	1248508
Agilent	E5515C	Wireless Communications Test Set	9/24/2012	Annual	9/24/2013	GB43163447
Agilent	E5515C	Wireless Communications Tester	4/4/2012	Annual	4/4/2013	US41140256
Agilent	85070E	Dielectric Probe Kit	3/8/2012	Annual	3/8/2013	MY44300633
Agilent	E5515C	Wireless Communications Test Set	10/18/2012	Biennial	10/18/2014	GB43193563
Agilent	85047A	S-Parameter Test Set	N/A	N/A	N/A	2904A00579
Agilent	8648D	Signal Generator	4/3/2012	Annual	4/3/2013	3629U00687
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/10/2012	Annual	10/10/2013	3613A00315
Agilent	MA24106A	USB Power Sensor	12/7/2012	Annual	12/7/2013	1244515
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/4/2012	Annual	4/4/2013	JP38020182
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/3/2012	Annual	4/3/2013	US37390350
Amplifier Research	5S1G4	5W, 800MHz-4.2GHz	CBT	N/A	CBT	21910
Anritsu	MA2481A	Power Sensor	4/5/2012	Annual	4/5/2013	5605
Anritsu	MA2411B	Power Sensor	3/5/2012	Annual	3/5/2013	846215
Anritsu	MA24106A	USB Power Sensor	8/22/2012	Annual	8/22/2013	1231538
Anritsu	MT8820C	Radio Communication Tester	11/6/2012	Annual	11/6/2013	6200901190
Anritsu	MA2411B	Pulse Power Sensor	12/4/2012	Annual	12/4/2013	1207364
Anritsu	ML2496A	Power Meter	11/28/2012	Annual	11/28/2013	1138001
Anritsu	ML2495A	Power Meter	10/11/2012	Annual	10/11/2013	1039008
Anritsu	MA2481D	Universal Sensor	12/17/2012	Annual	12/17/2013	1204343
Anritsu	MA2411B	Pulse Sensor	9/19/2012	Annual	9/19/2013	1027293
Anritsu	ML2438A	Power Meter	12/4/2012	Annual	12/4/2013	1070030
Anritsu	MA2481D	Universal Sensor	12/17/2012	Annual	12/17/2013	1204419
Anritsu	MA24106A	USB Power Sensor	8/22/2012	Annual	8/22/2013	1231535
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
Control Company	36934-158	Wall-Mounted Thermometer	1/4/2012	Biennial	1/4/2014	122014497
Control Company	4353	Long Stem Thermometer	9/25/2012	Biennial	9/25/2014	122541143
Control Company	36934-158	Wall-Mounted Thermometer	1/4/2012	Biennial	1/4/2014	122014488
Control Company	4353	Long Stem Thermometer	9/25/2012	Biennial	9/25/2014	122541139
Control Company	4353	Long Stem Thermometer	9/25/2012	Biennial	9/25/2014	122539615
Control Company	61220-416	Long-Stem Thermometer	7/1/2011	Biennial	7/1/2013	111642834
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/10/2012	Annual	10/10/2013	1833460
Gigatronics	8651A	Universal Power Meter	10/10/2012	Annual	10/10/2013	8650319
Intelligent Weigh	PD-3000	Electronic Balance	3/27/2012	Annual	3/27/2013	11081534
Intelligent Weighing	PD-3000	Electronic Balance	6/29/2012	Annual	6/29/2013	120405017
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	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	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Rohde & Schwarz	NRVD	Dual Channel Power Meter	10/12/2012	Biennial	10/12/2014	101695
Rohde & Schwarz	SMIQ03B	Signal Generator	4/5/2012	Annual	4/5/2013	DE27259
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	9/26/2012	Annual	9/26/2013	108798
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	2/8/2013	Annual	2/8/2014	101699
Rohde & Schwarz	NRV-Z32	Peak Power Sensor	10/12/2012	Biennial	10/12/2014	836019/013
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	3/5/2012	Annual	3/5/2013	102060
Rohde & Schwarz	SME06	Signal Generator	10/11/2012	Annual	10/11/2013	832026
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	10/7/2011	Biennial	10/7/2013	103962
Seekonk	NC-100	Torque Wrench (8" lb)	11/29/2011	Triennial	11/29/2014	21053
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
SPEAG	ES3DV3	SAR Probe	11/15/2012	Annual	11/15/2013	3287
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/24/2012	Annual	8/24/2013	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/7/2012	Annual	5/7/2013	1334
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/11/2013	Annual	1/11/2014	1057
SPEAG	ES3DV2	SAR Probe	8/28/2012	Annual	8/28/2013	3022
SPEAG	D2450V2	2450 MHz SAR Dipole	8/23/2012	Annual	8/23/2013	719
SPEAG	D2450V2	2450 MHz SAR Dipole	1/8/2013	Annual	1/8/2014	797
SPEAG	D5GHzV2	5 GHz SAR Dipole	10/30/2012	Annual	10/30/2013	1007
SPEAG	EX3DV4	SAR Probe	1/17/2013	Annual	1/17/2014	3589
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/19/2012	Annual	4/19/2013	665
SPEAG	D1900V2	1900 MHz SAR Dipole	2/22/2012	Annual	2/22/2013	5d149
SPEAG	ES3DV3	SAR Probe	5/18/2012	Annual	5/18/2013	3263
SPEAG	ES3DV3	SAR Probe	9/20/2012	Annual	9/20/2013	3288
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/19/2012	Annual	9/19/2013	1323
SPEAG	D750V3	750 MHz Dipole	1/7/2013	Annual	1/7/2014	1003
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/17/2013	Annual	1/17/2014	1272
SPEAG	D835V2	835 MHz SAR Dipole	4/20/2012	Annual	4/20/2013	4d119
SPEAG	ES3DV3	SAR Probe	4/24/2012	Annual	4/24/2013	3213
SPEAG	D835V2	835 MHz SAR Dipole	2/17/2012	Annual	2/17/2013	4d133
SPEAG	D1750V2	1750 MHz SAR Dipole	4/24/2012	Annual	4/24/2013	1051
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/13/2012	Annual	11/13/2013	1333
Tektronix	RSA-6114A	Real Time Spectrum Analyzer	4/5/2012	Annual	4/5/2013	B010177
VWR	36934-158	Wall-Mounted Thermometer	9/30/2011	Biennial	9/30/2013	111859332
VWR	36934-158	Wall-Mounted Thermometer	9/30/2011	Biennial	9/30/2013	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.
SPEAG SAR Probe serial number 4d133 was used within its period of calibration.

15 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz.

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

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

Applicable for frequencies up to 6 GHz.

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

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

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]

17 REFERENCES

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

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

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

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

[5] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, June 2001.

[6] IEEE Standards Coordinating Committee 34 – IEEE Std. 1528-2003, Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices.

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

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

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

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

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

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

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

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

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

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

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

[18] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Supplement C, Dec. 1997.

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

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

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

[22] IEC 62209-1, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz), Feb. 2005.

[23] Industry Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 4, March 2010.

[24] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2009

[25] FCC Public Notice DA-02-1438. Office of Engineering and Technology Announces a Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65, June 19, 2002

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

[27] SAR Measurement procedures for IEEE 802.11a/b/g KDB Publication 248227 D01v01r02

[28] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publications 648474 D02-D04

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

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

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

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

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

APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 85

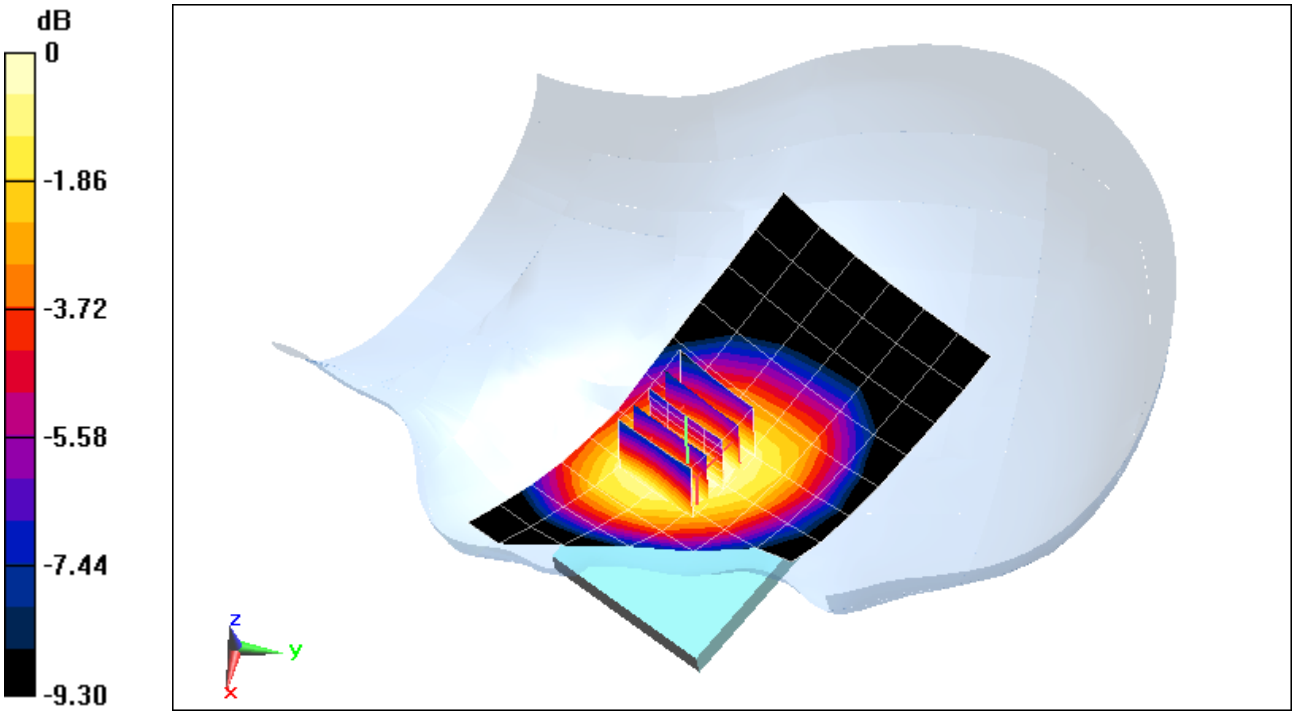
Communication System: LTE RF; Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium: 740 Head Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.865 S/m; ε_r = 41.188; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 02-11-2013; Ambient Temp: 21.9°C; Tissue Temp: 22.0°C

Probe: ES3DV2 - SN3022; ConvF(6.3, 6.3, 6.3); Calibrated: 8/28/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 12, Left Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.572 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.228 W/kg
SAR(1 g) = 0.179 W/kg; SAR(10 g) = 0.133 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 77

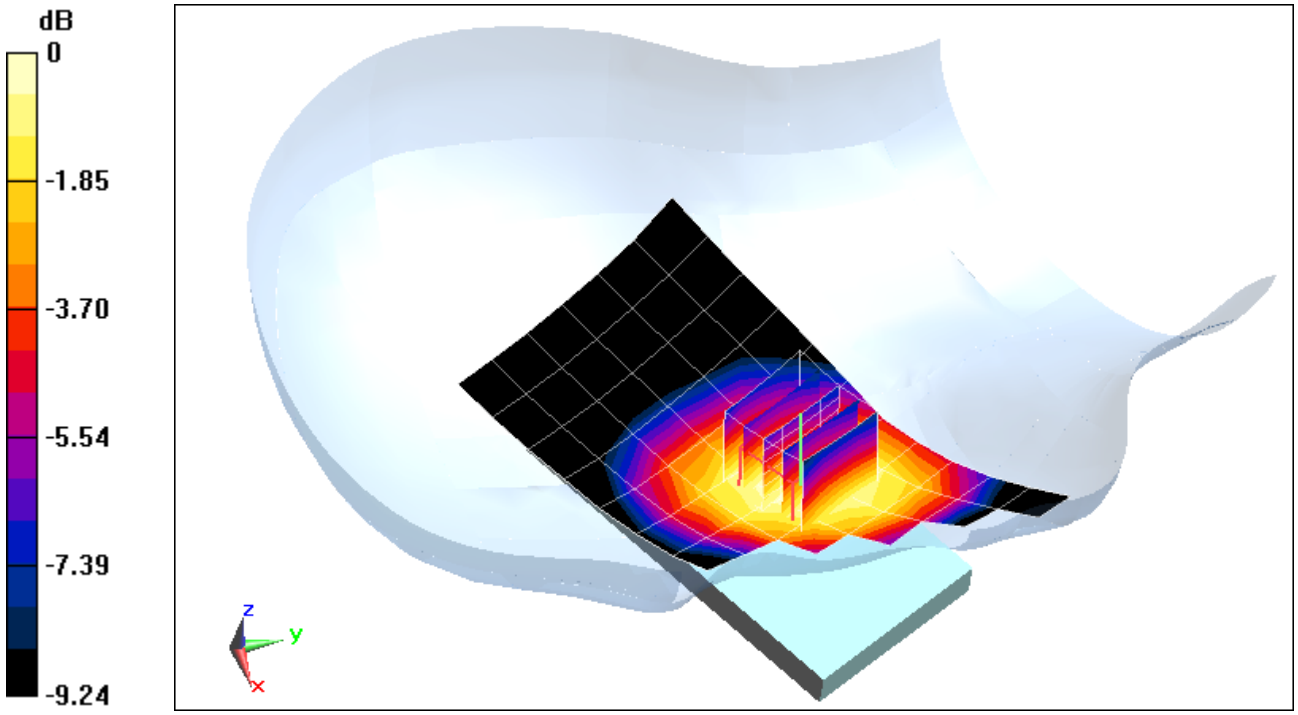
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
$f = 836.52$ MHz; $\sigma = 0.91$ S/m; $\varepsilon_r = 39.948$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 02-13-2013; Ambient Temp: 24.4°C; Tissue Temp: 23.4°C

Probe: ES3DV2 - SN3022; ConvF(6.03, 6.03, 6.03); Calibrated: 8/28/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

Mode: Cellular EVDO Rev A, Right Head, Cheek, Mid.ch

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.418 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.515 W/kg
SAR(1 g) = 0.394 W/kg; SAR(10 g) = 0.296 W/kg



0 dB = 0.414 W/kg = -3.83 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 89

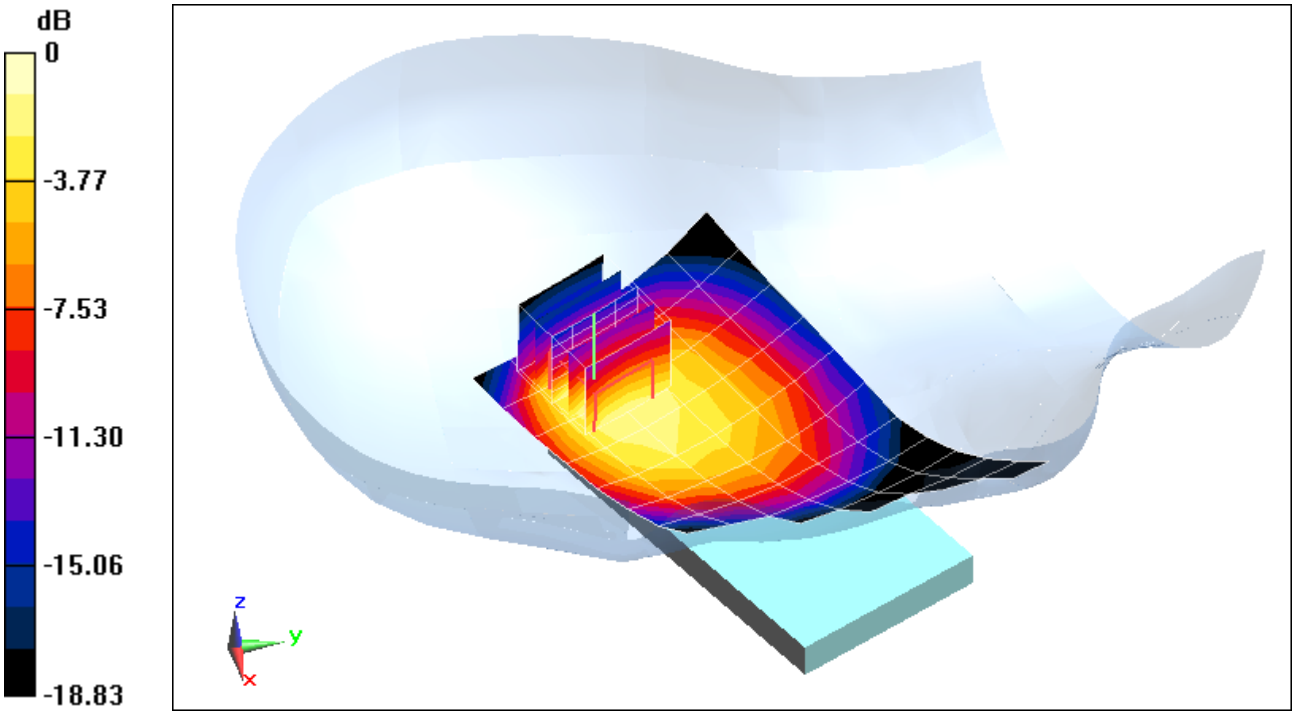
Communication System: LTE BAND 5; Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
$f = 836.5$ MHz; $\sigma = 0.91$ S/m; $\varepsilon_r = 39.948$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 02-13-2013; Ambient Temp: 24.4°C; Tissue Temp: 23.4°C

Probe: ES3DV2 - SN3022; ConvF(6.03, 6.03, 6.03); Calibrated: 8/28/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

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

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.335 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.22 W/kg
SAR(1 g) = 0.516 W/kg; SAR(10 g) = 0.278 W/kg



0 dB = 0.565 W/kg = -2.48 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 78

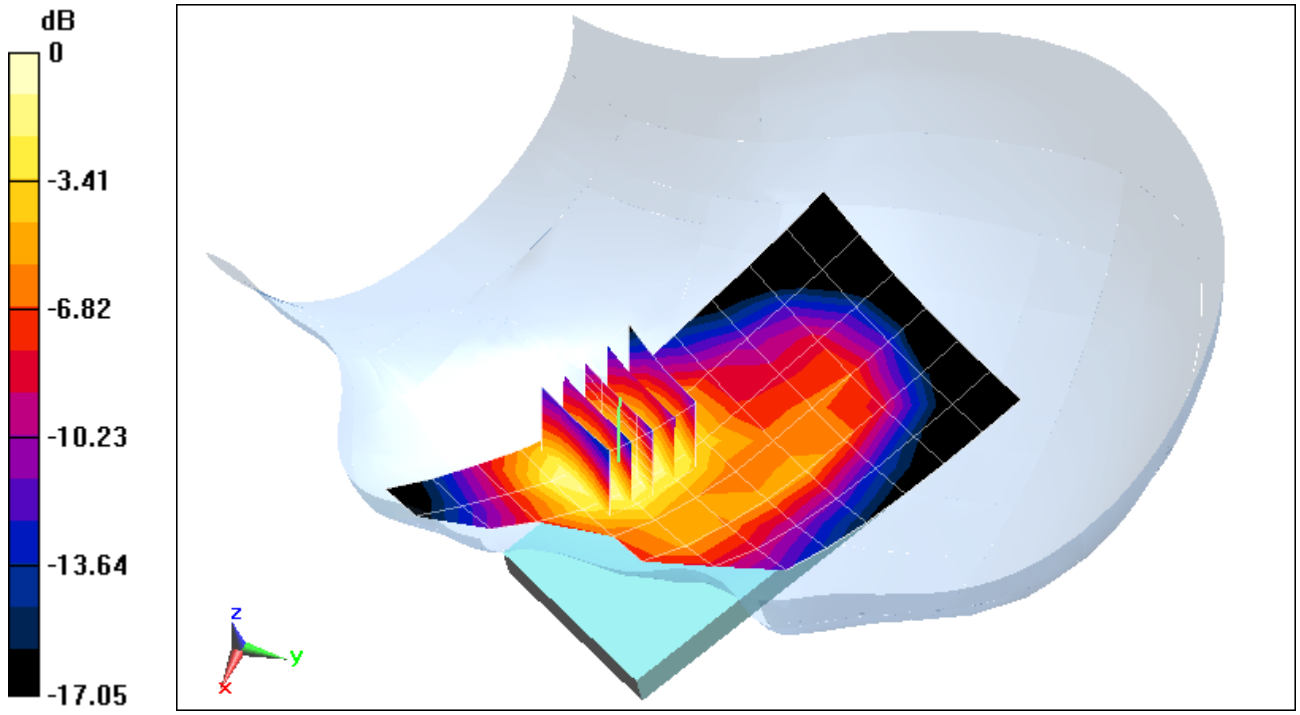
Communication System: AWS CDMA; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
$f = 1732.5$ MHz; $\sigma = 1.349$ S/m; $\varepsilon_r = 40.37$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Test Date: 02-12-2013; Ambient Temp: 23.9°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3288; ConvF(5.51, 5.51, 5.51); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.856 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.323 W/kg
SAR(1 g) = 0.224 W/kg



0 dB = 0.241 W/kg = -6.18 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 91

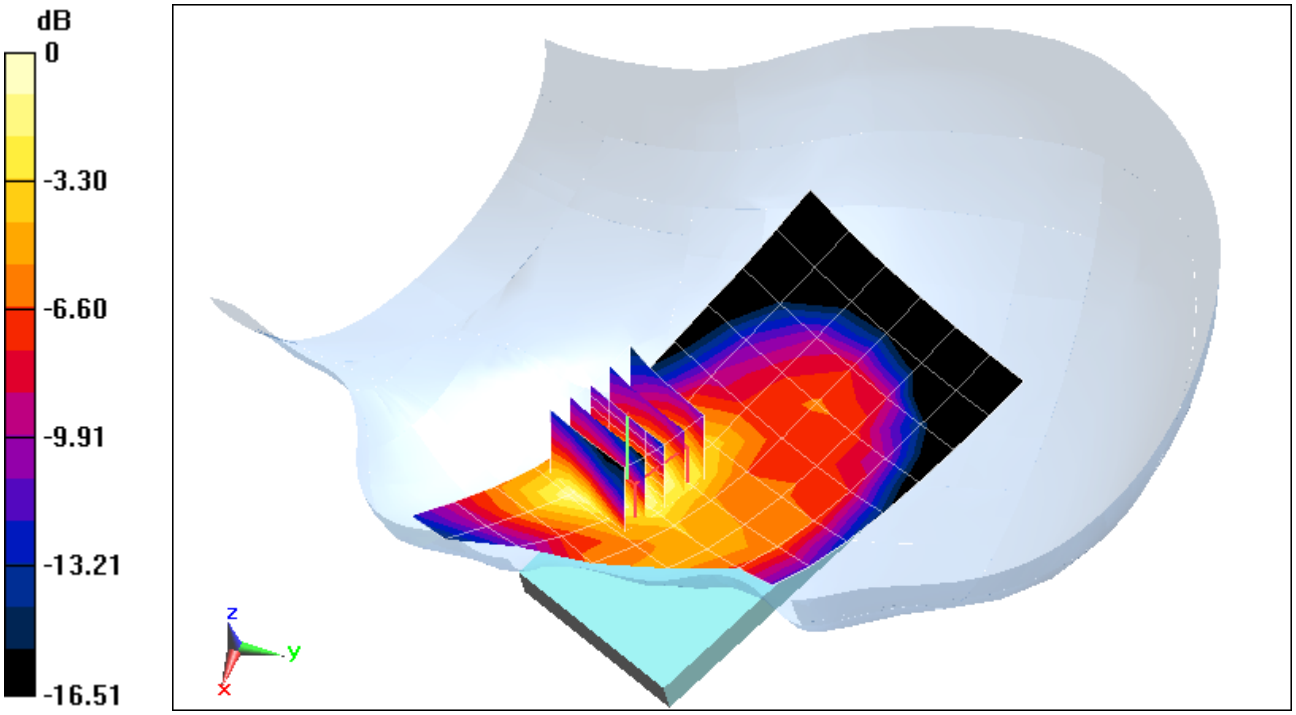
Communication System: LTE Band 4 (AWS); Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
$f = 1732.5$ MHz; $\sigma = 1.349$ S/m; $\varepsilon_r = 40.37$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Test Date: 02-12-2013; Ambient Temp: 23.9°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3288; ConvF(5.51, 5.51, 5.51); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 4 (AWS), Left Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.689 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.472 W/kg
SAR(1 g) = 0.304 W/kg; SAR(10 g) = 0.182 W/kg



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

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 73

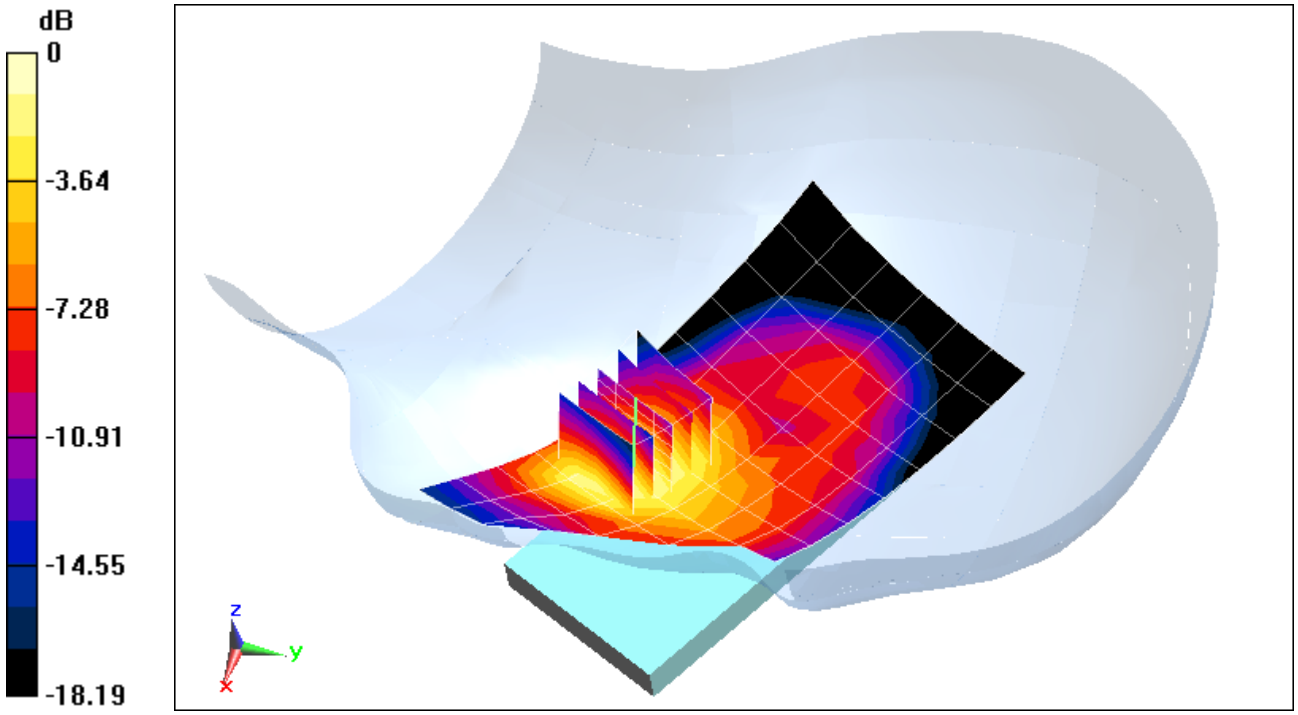
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.385 S/m; ε_r = 39.316; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 02-14-2013; Ambient Temp: 24.2°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3263; ConvF(5.09, 5.09, 5.09); Calibrated: 5/18/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.850 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.494 W/kg
SAR(1 g) = 0.333 W/kg



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

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 90

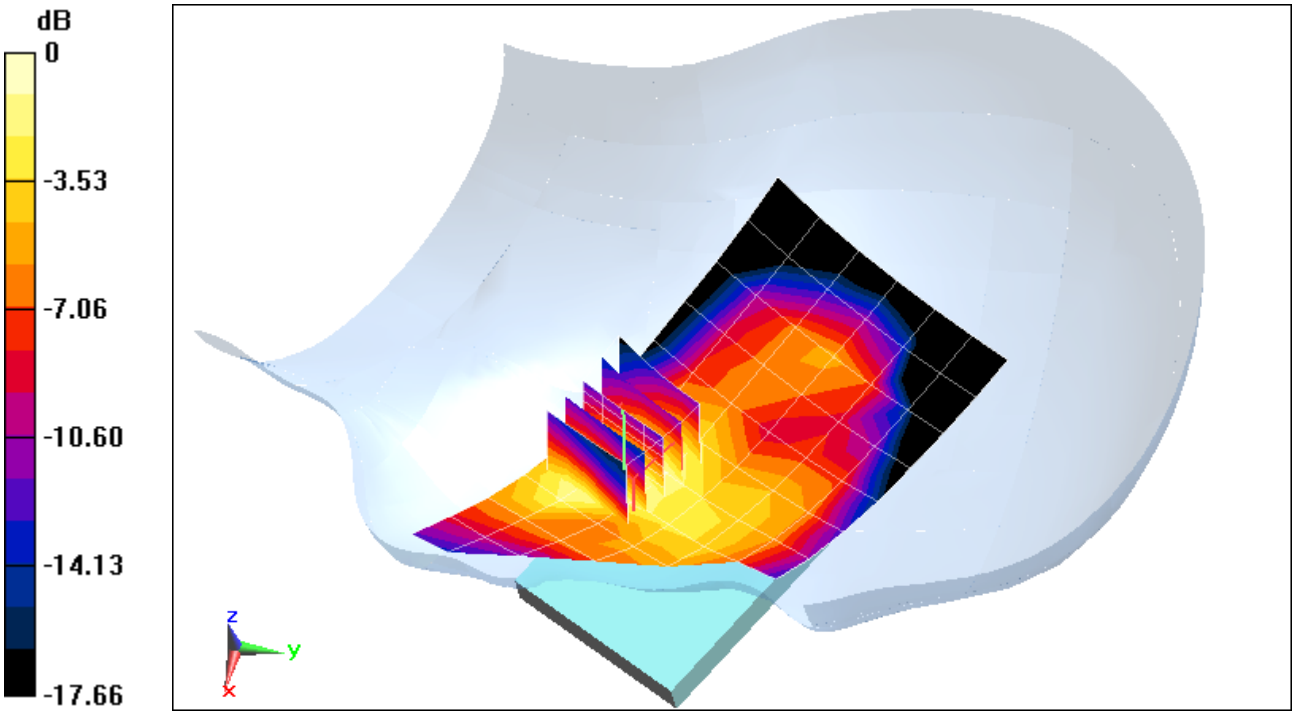
Communication System: LTE Band 2; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.385 S/m; ε_r = 39.316; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 02-14-2013; Ambient Temp: 24.2°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3263; ConvF(5.09, 5.09, 5.09); Calibrated: 5/18/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.053 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.617 W/kg
SAR(1 g) = 0.390 W/kg; SAR(10 g) = 0.233 W/kg



0 dB = 0.422 W/kg = -3.75 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 85

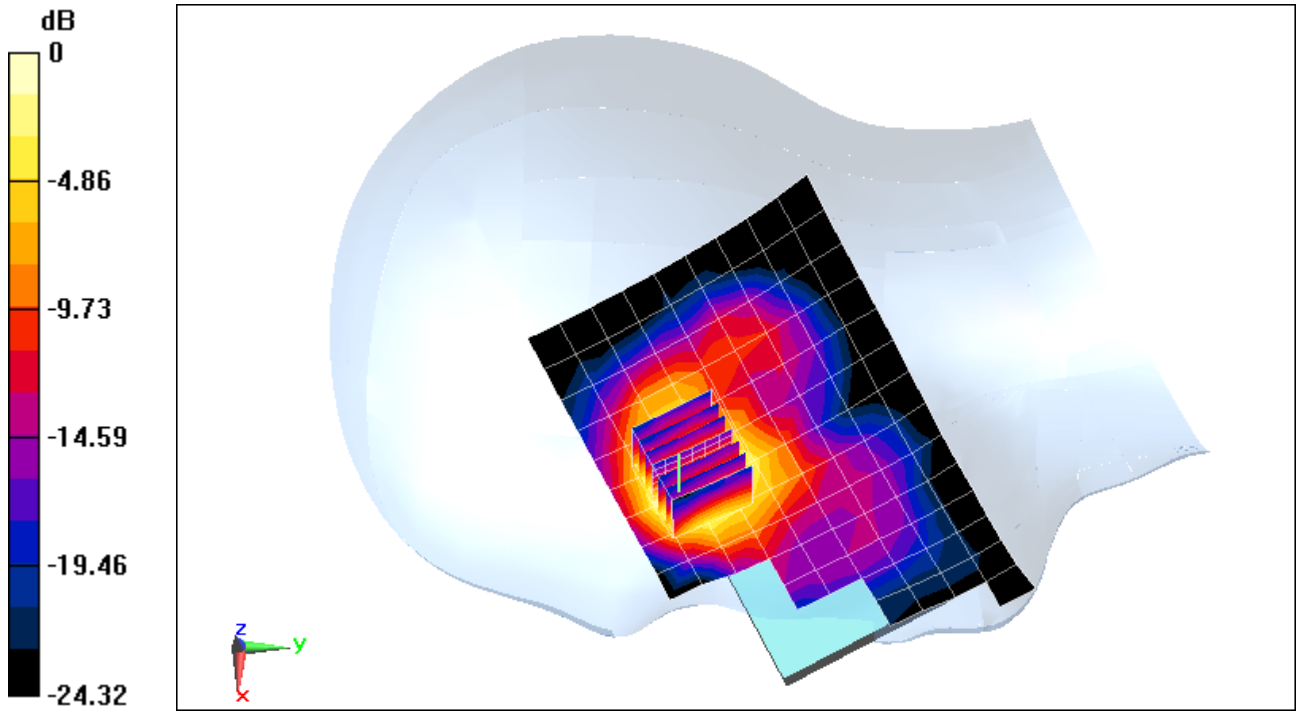
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.85 S/m; ε_r = 38.605; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 02-15-2013; Ambient Temp: 24.7°C; Tissue Temp: 23.3°C

Probe: ES3DV2 - SN3022; ConvF(4.23, 4.23, 4.23); Calibrated: 8/28/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

Mode: IEEE 802.11b, Right Head, Cheek, Ch 06, 1 Mbps

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.148 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.672 W/kg
SAR(1 g) = 0.322 W/kg; SAR(10 g) = 0.164 W/kg



0 dB = 0.404 W/kg = -3.94 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 85

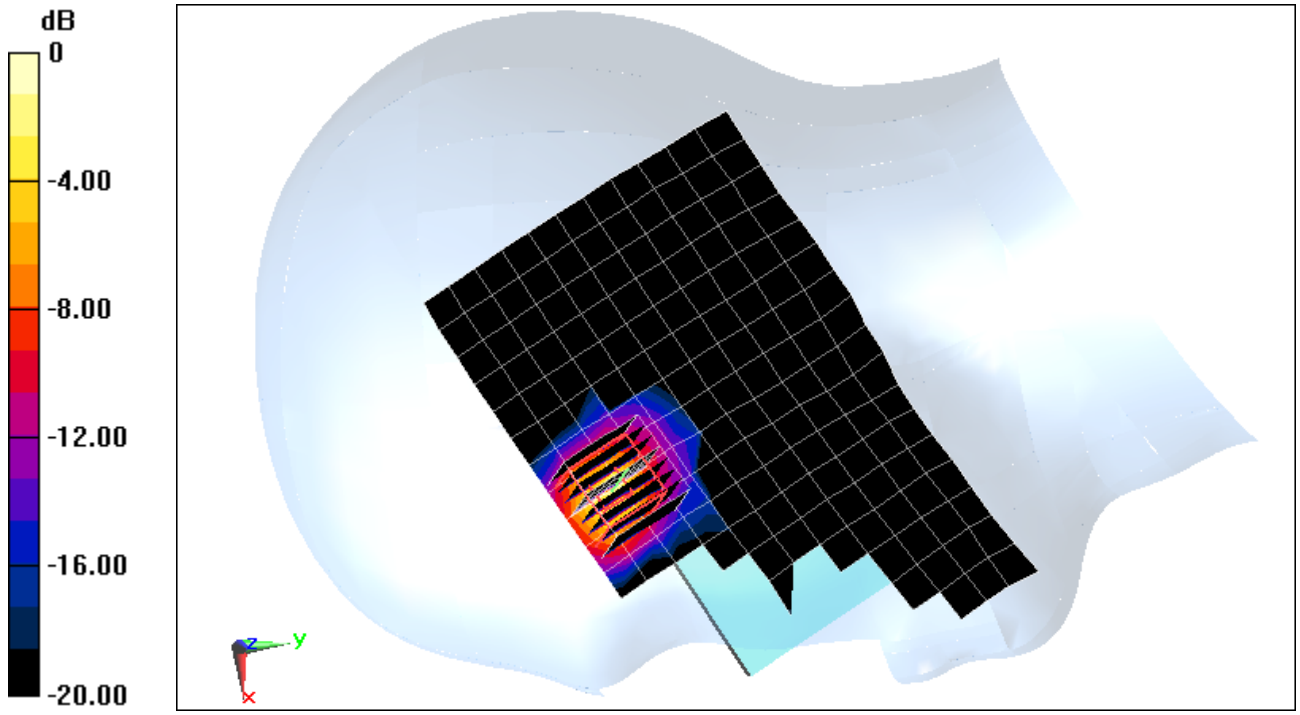
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5300 MHz; σ = 4.839 S/m; ε_r = 35.233; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 02-11-2013; Ambient Temp: 24.1°C; Tissue Temp: 23.5°C

Probe: EX3DV4 - SN3589; ConvF(4.27, 4.27, 4.27); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

Mode: IEEE 802.11a 5.3 GHz, Right Head, Cheek, Ch 60, 6 Mbps

Area Scan (12x18x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 9.393 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 1.57 W/kg
SAR(1 g) = 0.346 W/kg; SAR(10 g) = 0.088 W/kg



0 dB = 0.939 W/kg = -0.27 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 85

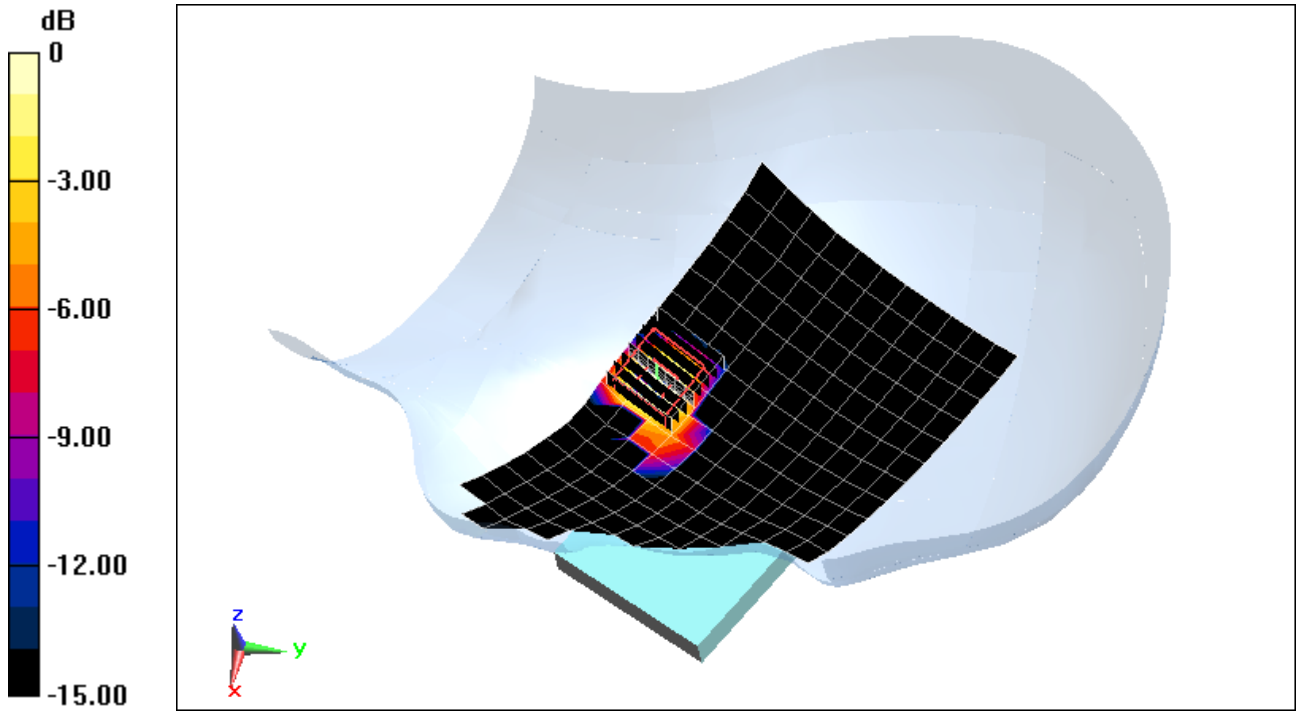
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5745 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5745 MHz; σ = 5.372 S/m; ε_r = 34.194; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 02-11-2013; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3589; ConvF(3.85, 3.85, 3.85); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

Mode: IEEE 802.11a, 5.8 GHz Left Head, Cheek, Ch 149, 6 Mbps

Area Scan (12x18x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 3.847 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.749 W/kg
SAR(1 g) = 0.089 W/kg; SAR(10 g) = 0.025 W/kg



0 dB = 0.307 W/kg = -5.13 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 85

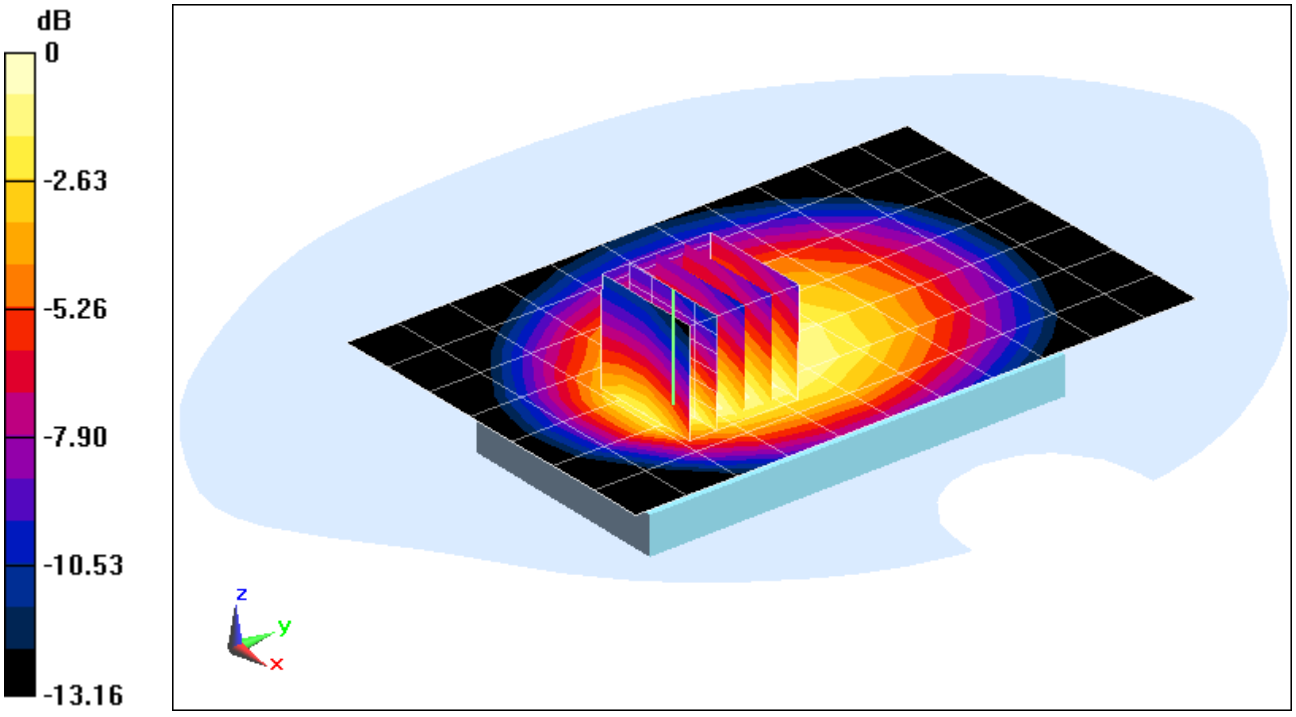
Communication System: LTE RF; Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium: 740 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.939 S/m; ε_r = 53.586; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-12-2013; Ambient Temp: 23.9°C; Tissue Temp: 23.3°C

Probe: ES3DV3 - SN3287; ConvF(6.14, 6.14, 6.14); Calibrated: 11/15/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/13/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 12, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.076 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.409 W/kg
SAR(1 g) = 0.275 W/kg; SAR(10 g) = 0.194 W/kg



0 dB = 0.289 W/kg = -5.39 dBW/kg

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 77

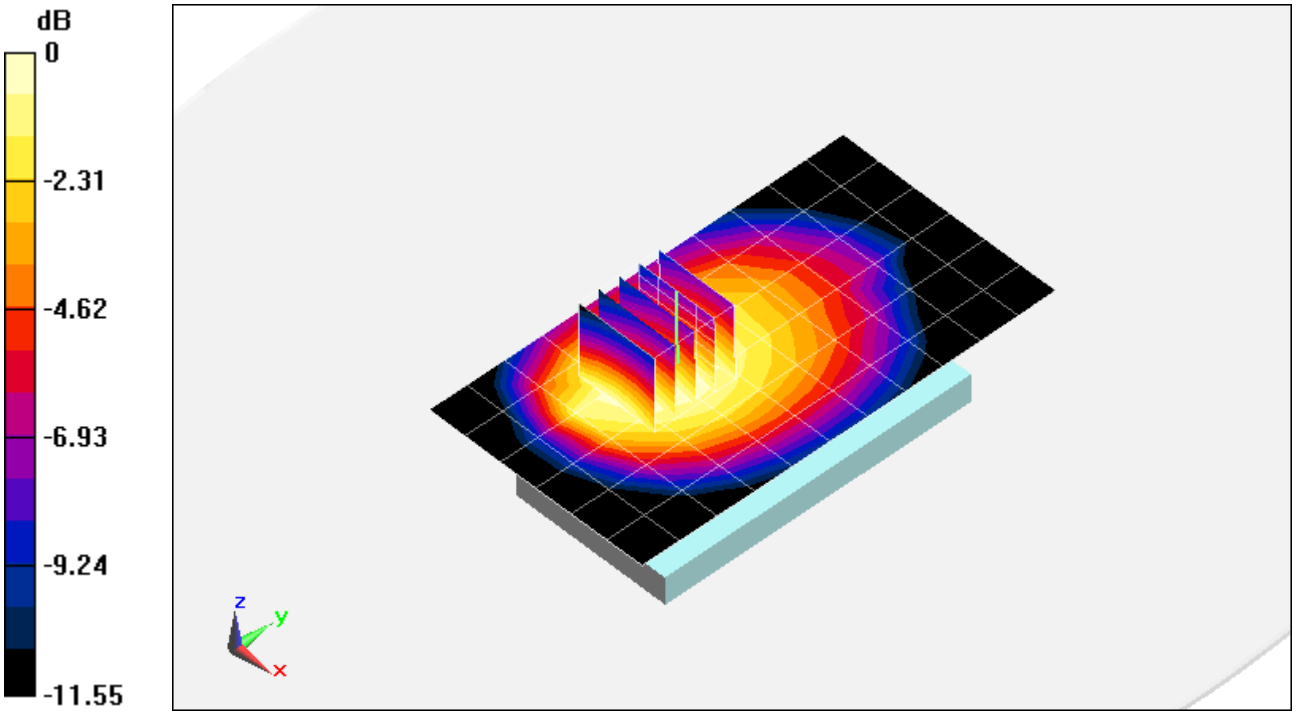
Communication System: CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; σ = 1 S/m; ε_r = 53.767; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.7°C; Tissue Temp: 24.2°C

Probe: ES3DV3 - SN3213; ConvF(6.07, 6.07, 6.07); Calibrated: 4/24/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: ELI v5.0 Door; Type: QDOVA002BB; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.903 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.786 W/kg
SAR(1 g) = 0.581 W/kg



0 dB = 0.608 W/kg = -2.16 dBW/kg

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 77

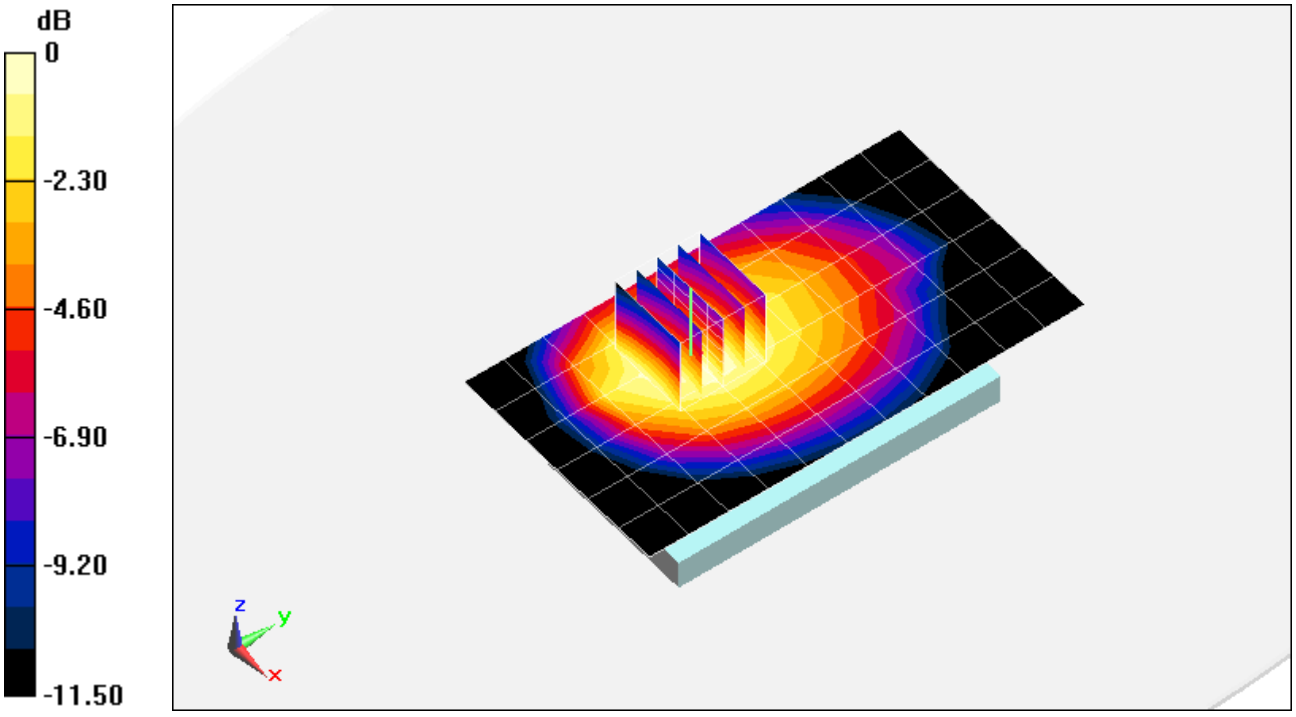
Communication System: CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; σ = 1 S/m; ε_r = 53.767; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.7°C; Tissue Temp: 24.2°C

Probe: ES3DV3 - SN3213; ConvF(6.07, 6.07, 6.07); Calibrated: 4/24/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: ELI v5.0 Door; Type: QDOVA002BB; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Mode: Cell. EVDO Rev 0, Body SAR, Back side, Mid.ch

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.001 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.980 W/kg
SAR(1 g) = 0.713 W/kg



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

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 89

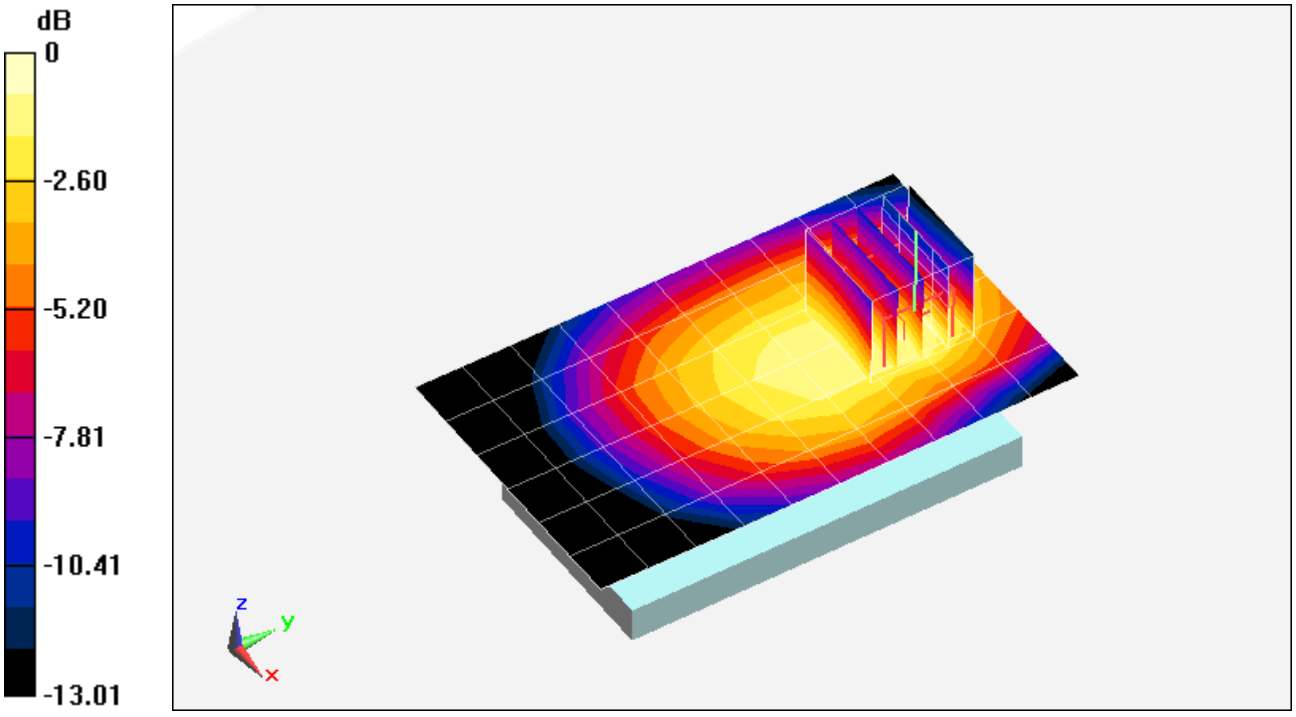
Communication System: LTE Band 5 (Cell.); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
$f = 836.5$ MHz; $\sigma = 1$ S/m; $\varepsilon_r = 53.767$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.7°C; Tissue Temp: 24.2°C

Probe: ES3DV3 - SN3213; ConvF(6.07, 6.07, 6.07); Calibrated: 4/24/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: ELI v5.0 Door; Type: QDOVA002BB; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.219 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.338 W/kg
SAR(1 g) = 0.201 W/kg; SAR(10 g) = 0.125 W/kg



0 dB = 0.222 W/kg = -6.54 dBW/kg

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 78

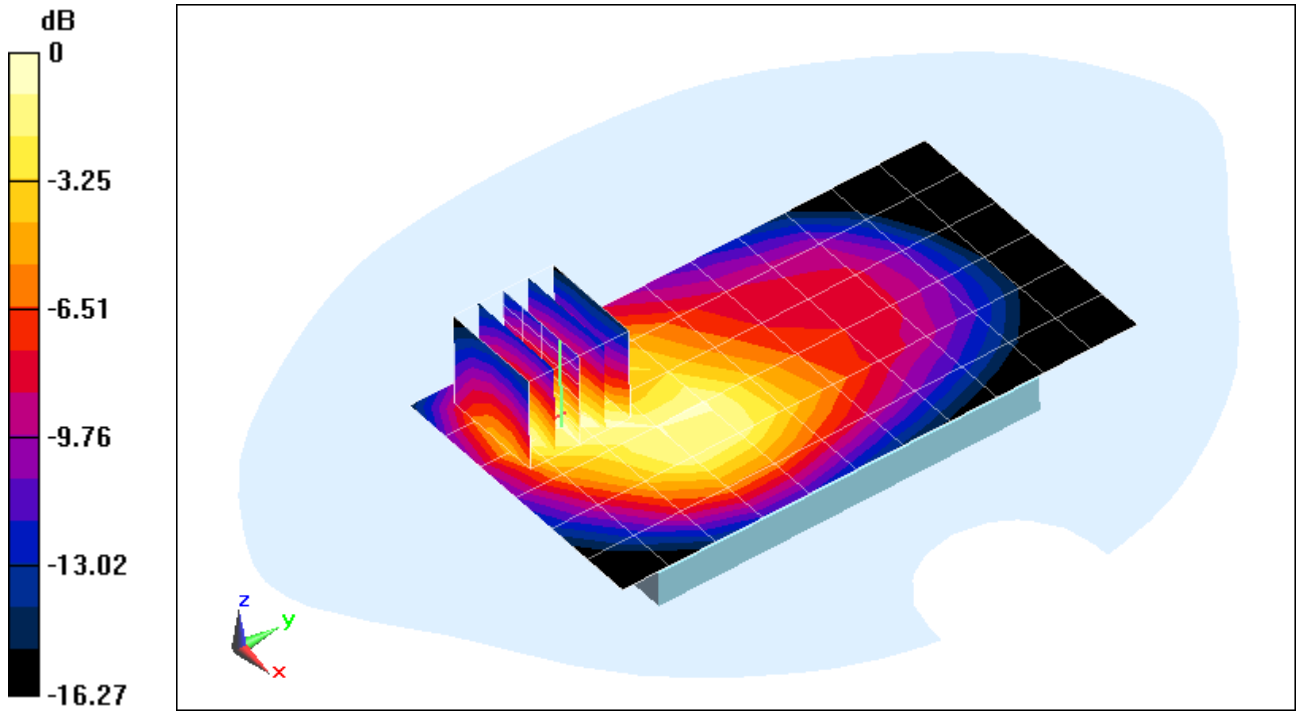
Communication System: CDMA; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.435 S/m; ε_r = 51.909; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.4°C; Tissue Temp: 23.9°C

Probe: ES3DV3 - SN3288; ConvF(5.18, 5.18, 5.18); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.843 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.777 W/kg
SAR(1 g) = 0.468 W/kg



0 dB = 0.519 W/kg = -2.85 dBW/kg

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 91

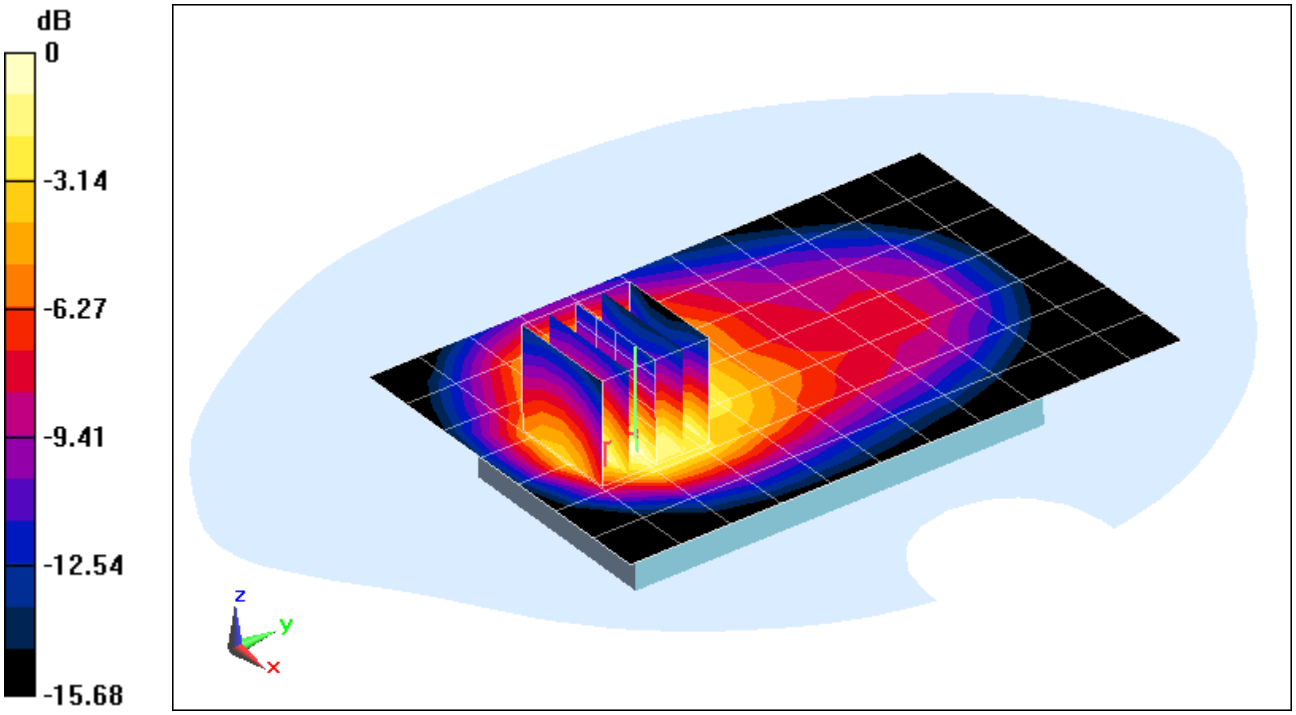
Communication System: LTE Band 4 (AWS); Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.435 S/m; ε_r = 51.909; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.4°C; Tissue Temp: 23.9°C

Probe: ES3DV3 - SN3288; ConvF(5.18, 5.18, 5.18); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.056 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 1.12 W/kg
SAR(1 g) = 0.646 W/kg



0 dB = 0.707 W/kg = -1.51 dBW/kg

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 73

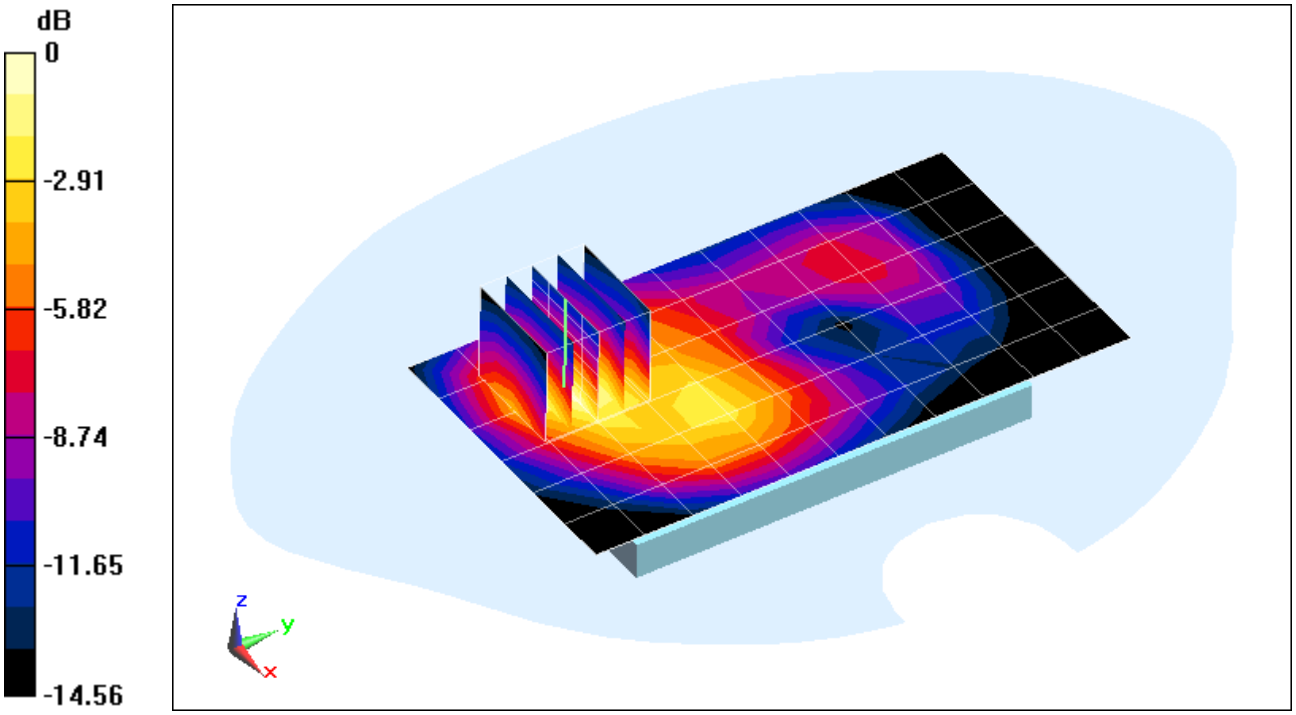
Communication System: CDMA; Frequency: 1851.25 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
$f = 1851.25$ MHz; $\sigma = 1.473$ S/m; $\varepsilon_r = 52.172$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3263; ConvF(4.76, 4.76, 4.76); Calibrated: 5/18/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.745 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.953 W/kg
SAR(1 g) = 0.555 W/kg



0 dB = 0.614 W/kg = -2.12 dBW/kg

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 73

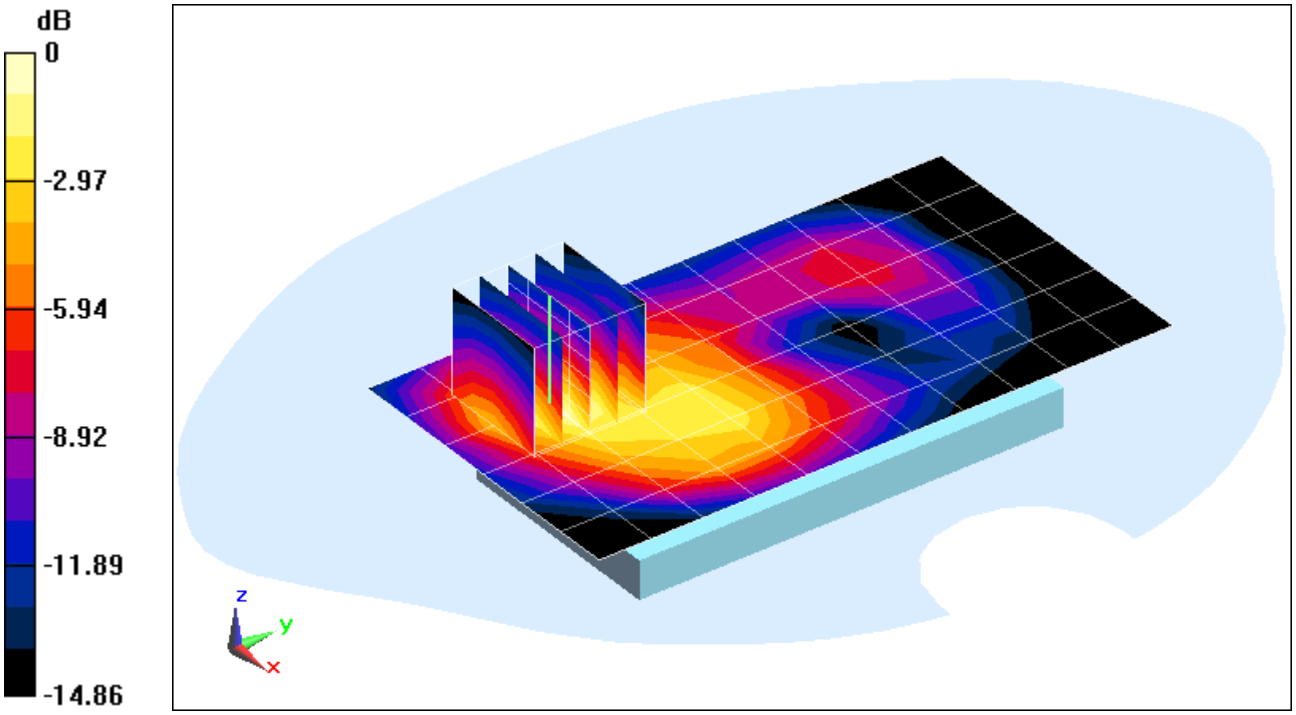
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.536 S/m; ε_r = 51.841; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-18-2013; Ambient Temp: 24.3°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3263; ConvF(4.76, 4.76, 4.76); Calibrated: 5/18/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Mode: PCS EVDO Rev 0, Body SAR, Back side, Mid.ch

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.864 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.975 W/kg
SAR(1 g) = 0.568 W/kg



0 dB = 0.626 W/kg = -2.03 dBW/kg

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 90

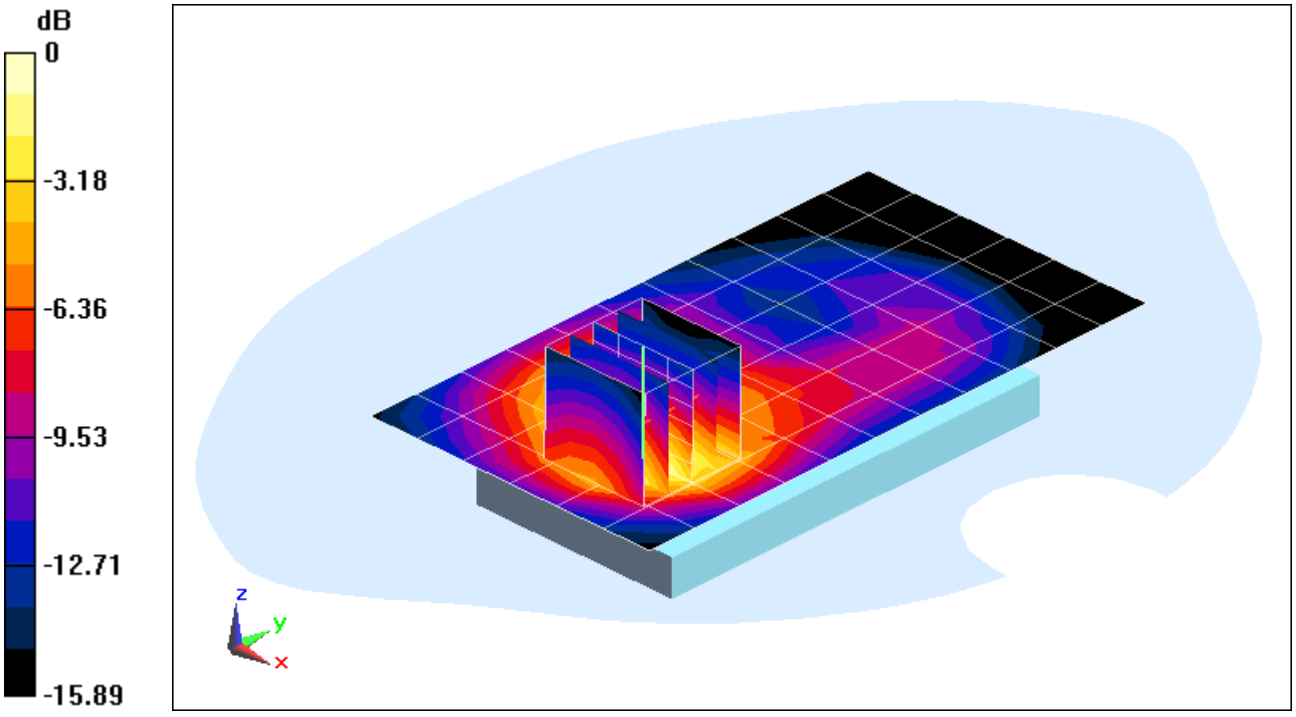
Communication System: LTE Band 2; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.536 S/m; ε_r = 51.841; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-18-2013; Ambient Temp: 24.3°C; Tissue Temp: 21.9°C

Probe: ES3DV3 - SN3263; ConvF(4.76, 4.76, 4.76); Calibrated: 5/18/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 2 (PCS), Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.267 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.00 W/kg
SAR(1 g) = 0.563 W/kg; SAR(10 g) = 0.297 W/kg



0 dB = 0.629 W/kg = -2.01 dBW/kg

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 78

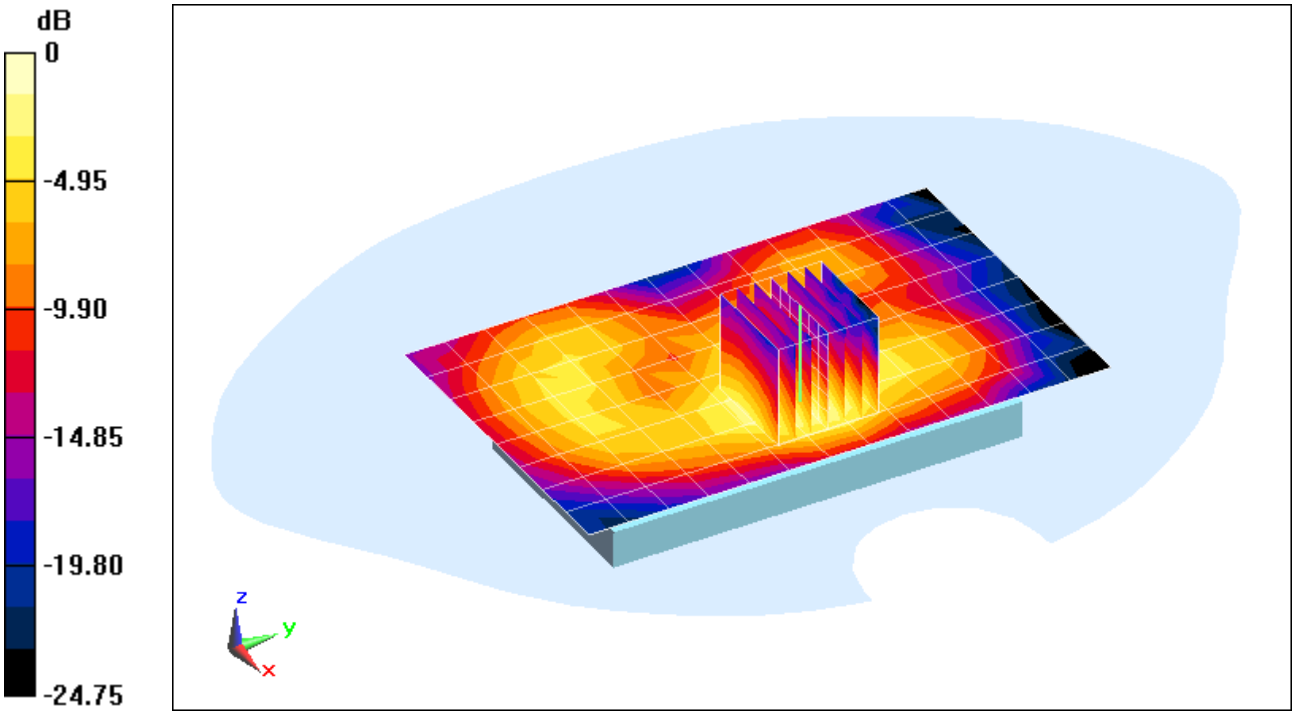
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.916 S/m; ε_r = 50.659; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-14-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3288; ConvF(4.35, 4.35, 4.35); Calibrated: 9/20/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

Mode: IEEE 802.11b, Body SAR, Ch 06, 1 Mbps, Back Side

Area Scan (9x14x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.354 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.154 W/kg
SAR(1 g) = 0.076 W/kg



0 dB = 0.0959 W/kg = -10.18 dBW/kg

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 85

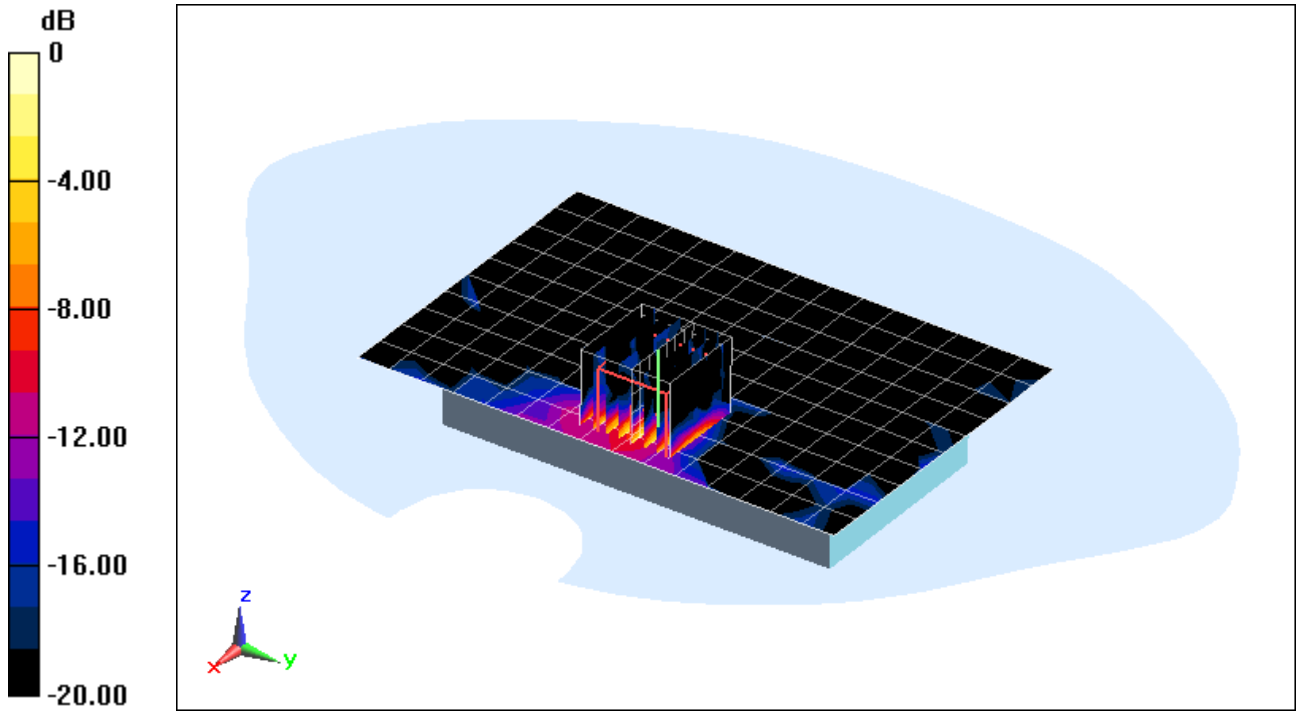
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5300 MHz; σ = 5.352 S/m; ε_r = 47.707; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.5°C; Tissue Temp: 24.2°C

Probe: EX3DV4 - SN3589; ConvF(3.81, 3.81, 3.81); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

Mode: IEEE 802.11a, 5.3 GHz, Body SAR, Ch 60, 6 Mbps, Back Side

Area Scan (11x16x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 5.342 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.19 W/kg
SAR(1 g) = 0.151 W/kg; SAR(10 g) = 0.048 W/kg



0 dB = 0.373 W/kg = -4.28 dBW/kg

DUT: A3LSCHR860U; Type: Portable Handset; Serial: 85

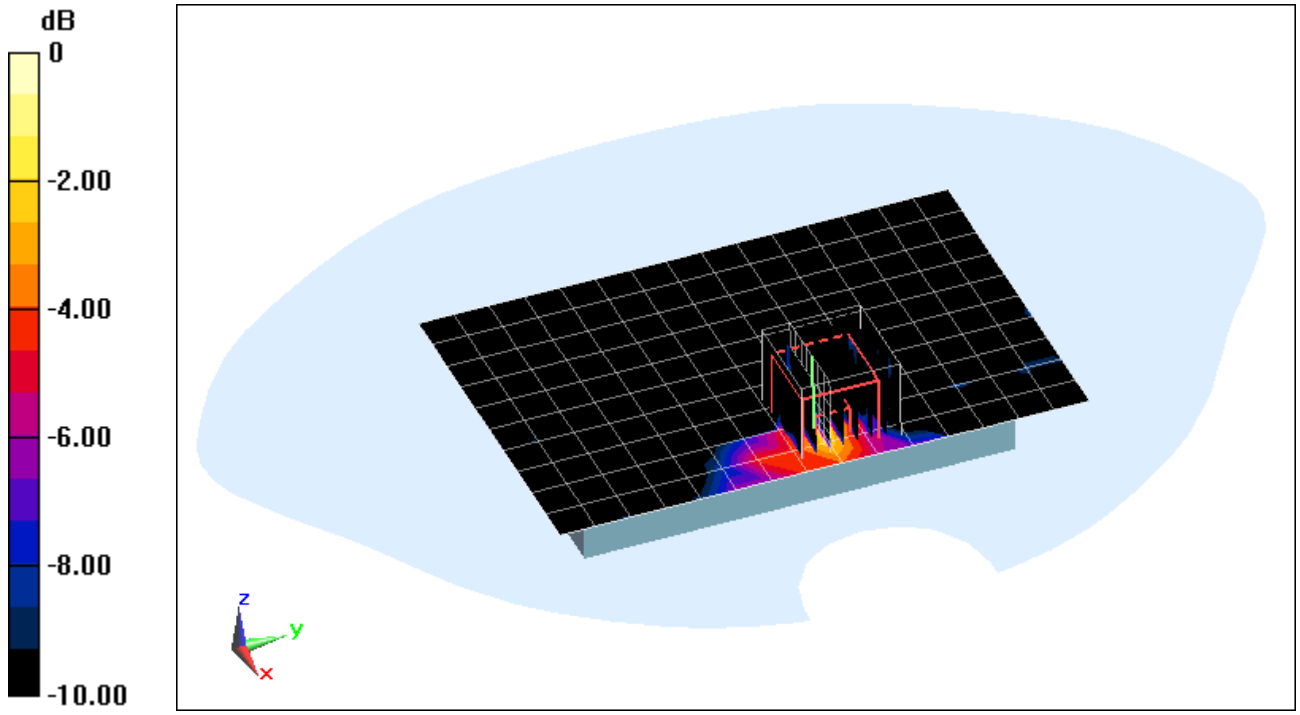
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5745 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5745 MHz; σ = 6.068 S/m; ε_r = 46.354; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.3°C; Tissue Temp: 24.4°C

Probe: EX3DV4 - SN3589; ConvF(3.66, 3.66, 3.66); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

Mode: IEEE 802.11a, 5.8 GHz, Body SAR, Ch 149, 6 Mbps, Back Side

Area Scan (11x16x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 2.006 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.158 W/kg
SAR(1 g) = 0.026 W/kg; SAR(10 g) = 0.00744 W/kg



0 dB = 0.0813 W/kg = -10.90 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

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

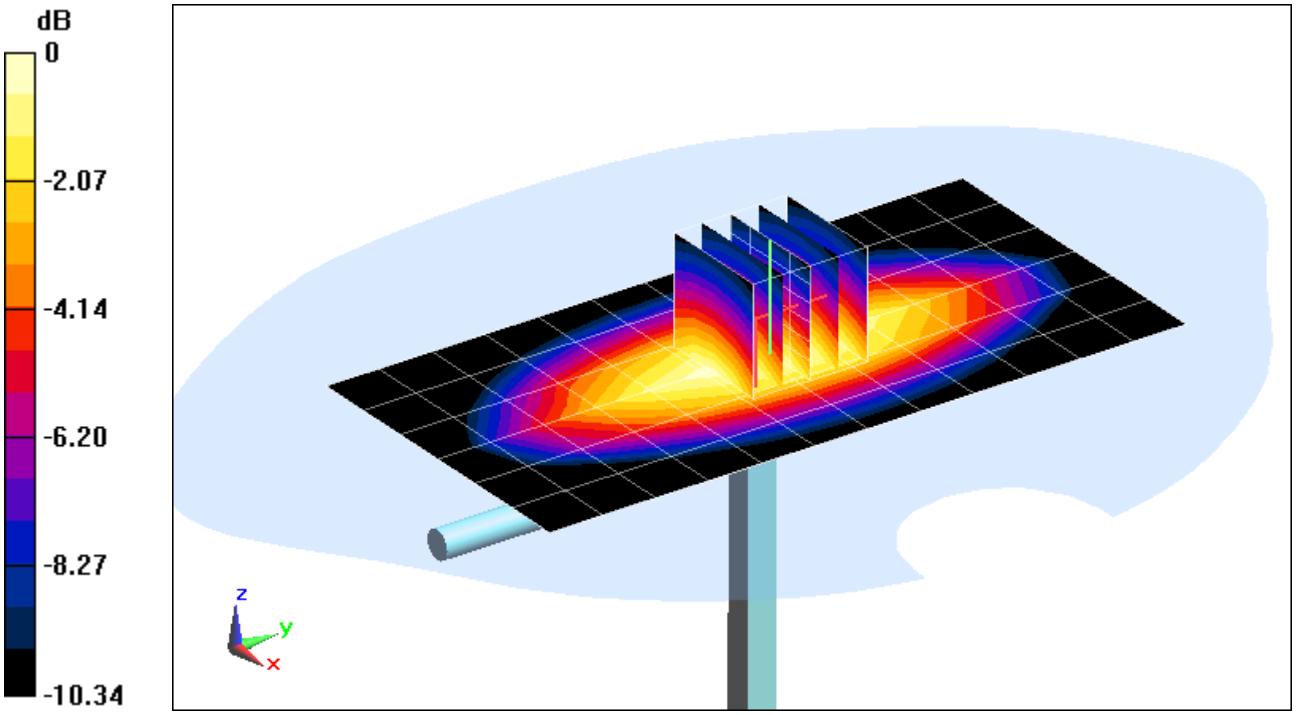
Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: 740 Head Medium parameters used (interpolated):
$f = 750$ MHz; $\sigma = 0.904$ S/m; $\varepsilon_r = 40.604$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-11-2013; Ambient Temp: 21.9°C; Tissue Temp: 22.0°C

Probe: ES3DV2 - SN3022; ConvF(6.3, 6.3, 6.3); Calibrated: 8/28/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

750 MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 22.3 dBm (170 mW)
Peak SAR (extrapolated) = 2.10 W/kg
SAR(1 g) = 1.43 W/kg; SAR(10 g) = 0.941 W/kg
Deviation: -0.57%



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

PCTEST ENGINEERING LABORATORY, INC.

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

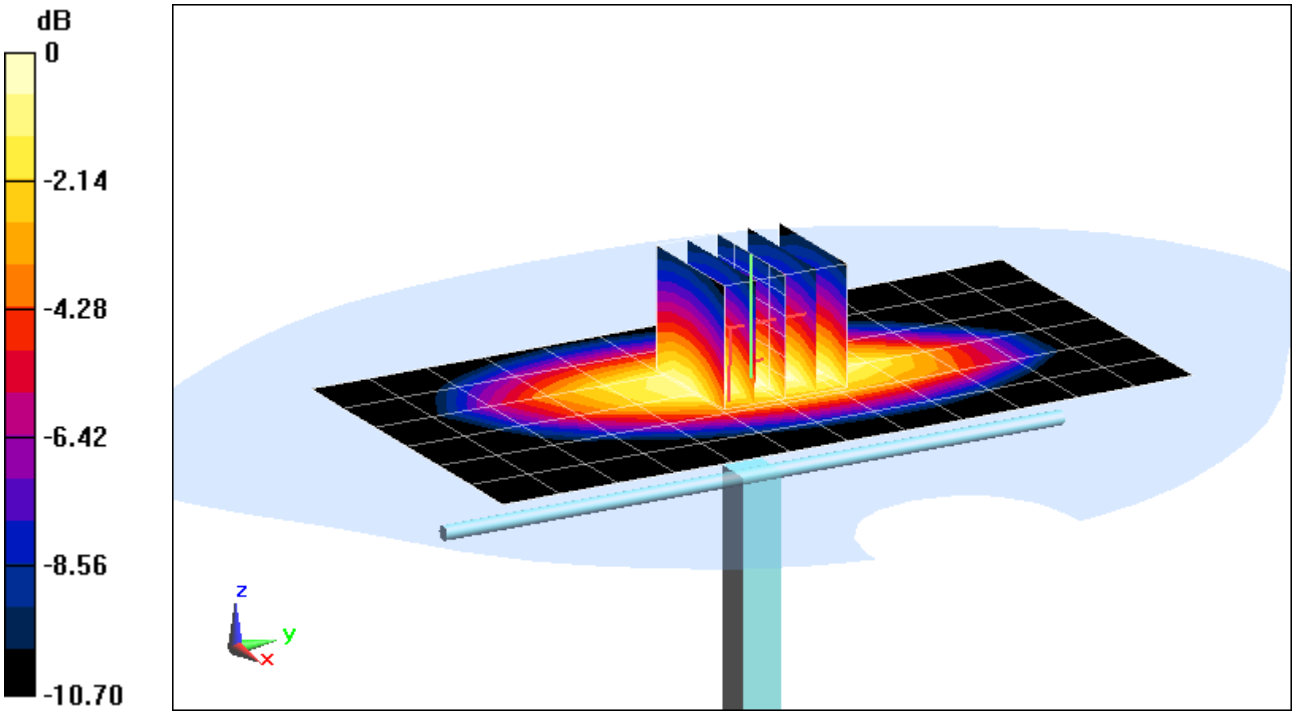
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.908 S/m; ε_r = 39.969; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-13-2013; Ambient Temp: 24.4°C; Tissue Temp: 23.4°C

Probe: ES3DV2 - SN3022; ConvF(6.03, 6.03, 6.03); Calibrated: 8/28/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

835 MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.45 W/kg
SAR(1 g) = 0.984 W/kg; SAR(10 g) = 0.646 W/kg
Deviation: 4.46%



0 dB = 1.07 W/kg = 0.29 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

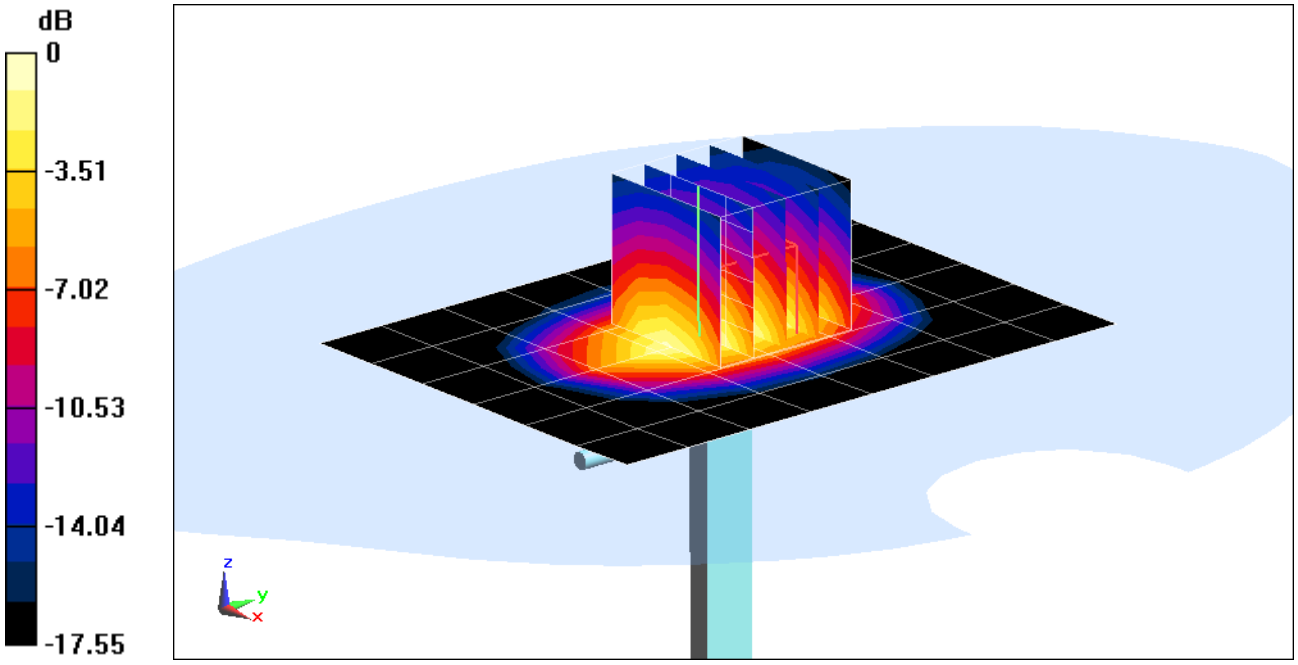
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.367 S/m; ε_r = 40.278; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 02-12-2013; Ambient Temp: 23.9°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3288; ConvF(5.51, 5.51, 5.51); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (5);SEMCAD X Version 14.6.8 (7028)

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 6.23 W/kg
SAR(1 g) = 3.44 W/kg; SAR(10 g) = 1.82 W/kg
Deviation: -6.01%



0 dB = 3.78 W/kg = 5.77 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

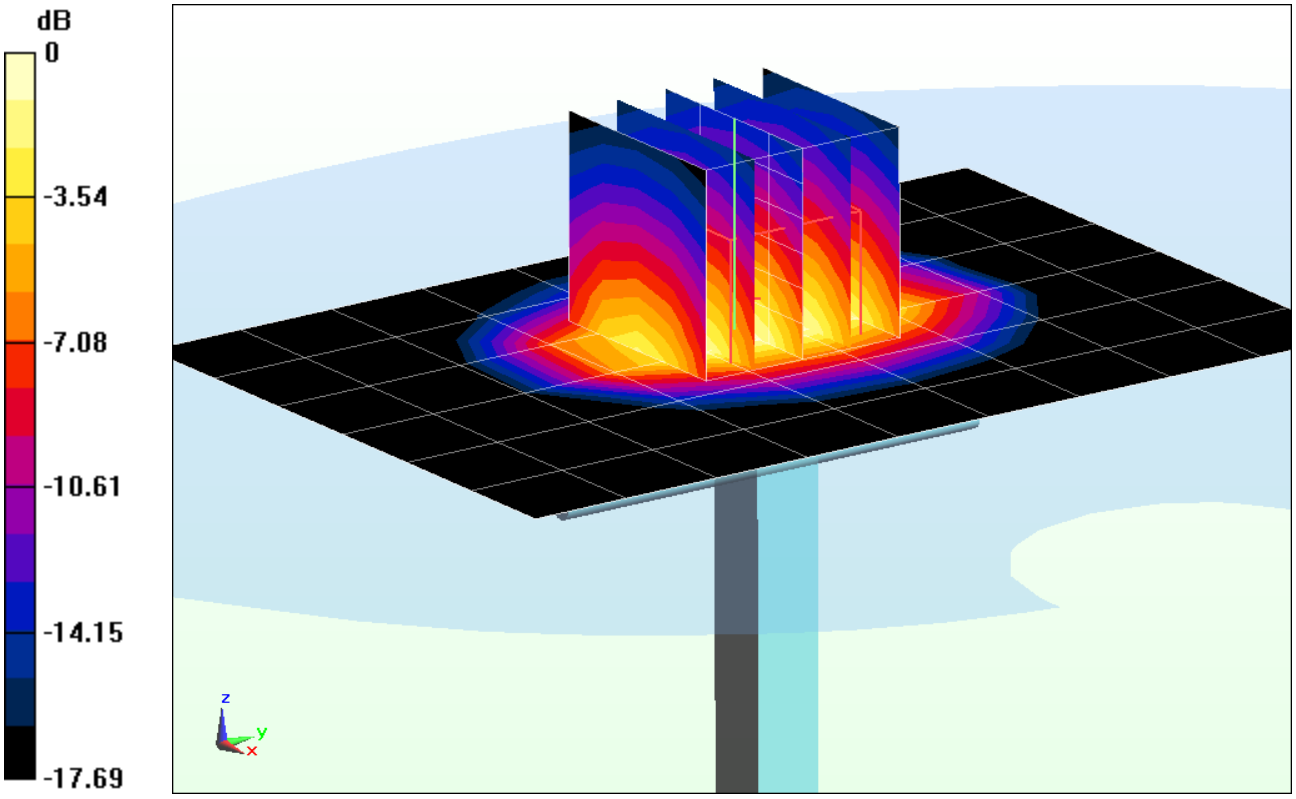
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.406 S/m; ε_r = 39.206; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-14-2013; Ambient Temp: 24.2°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3263; ConvF(5.09, 5.09, 5.09); Calibrated: 5/18/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (5);SEMCAD X Version 14.6.8 (7028)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.46 W/kg
SAR(1 g) = 4.03 W/kg; SAR(10 g) = 2.1 W/kg
Deviation: 2.54%



0 dB = 4.50 W/kg = 6.53 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

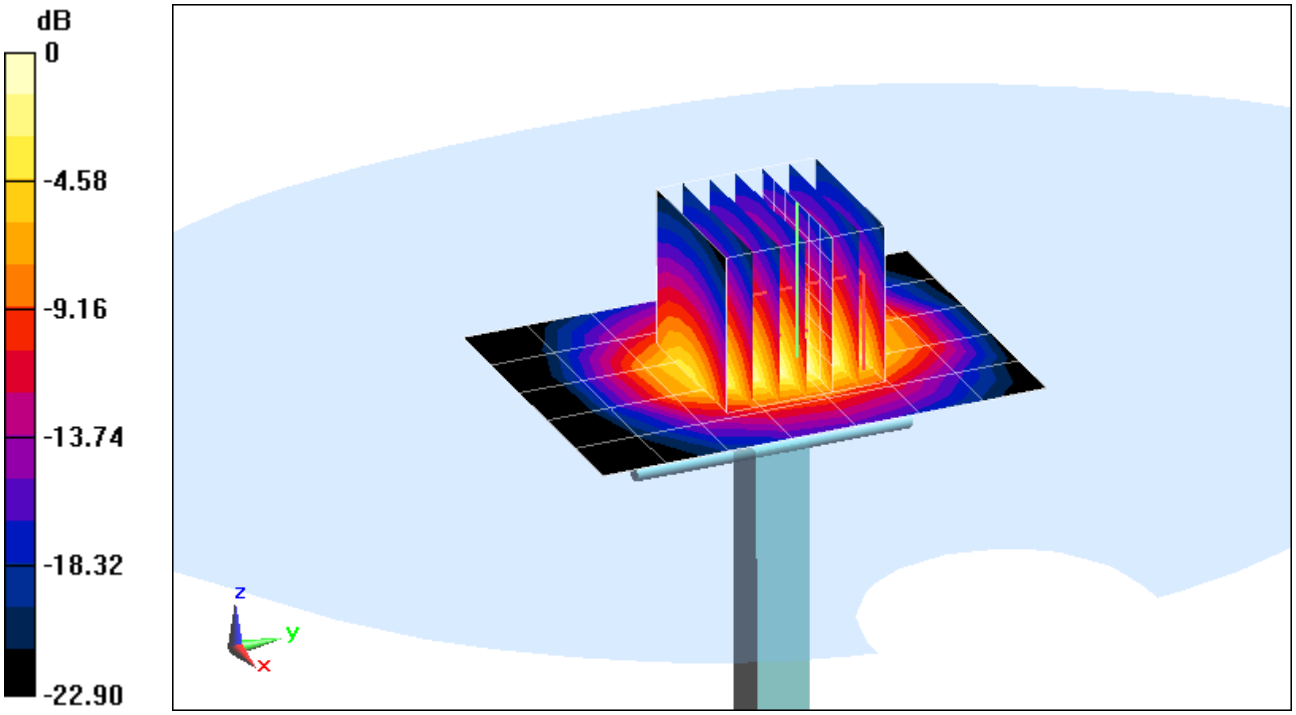
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.866 S/m; ε_r = 38.557; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-15-2013; Ambient Temp: 24.7°C; Tissue Temp: 23.3°C

Probe: ES3DV2 - SN3022; ConvF(4.23, 4.23, 4.23); Calibrated: 8/28/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

2450 MHz System Verification

Area Scan (6x8x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 10.9 W/kg
SAR(1 g) = 5.35 W/kg; SAR(10 g) = 2.5 W/kg
Deviation: 1.52%



0 dB = 6.84 W/kg = 8.35 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

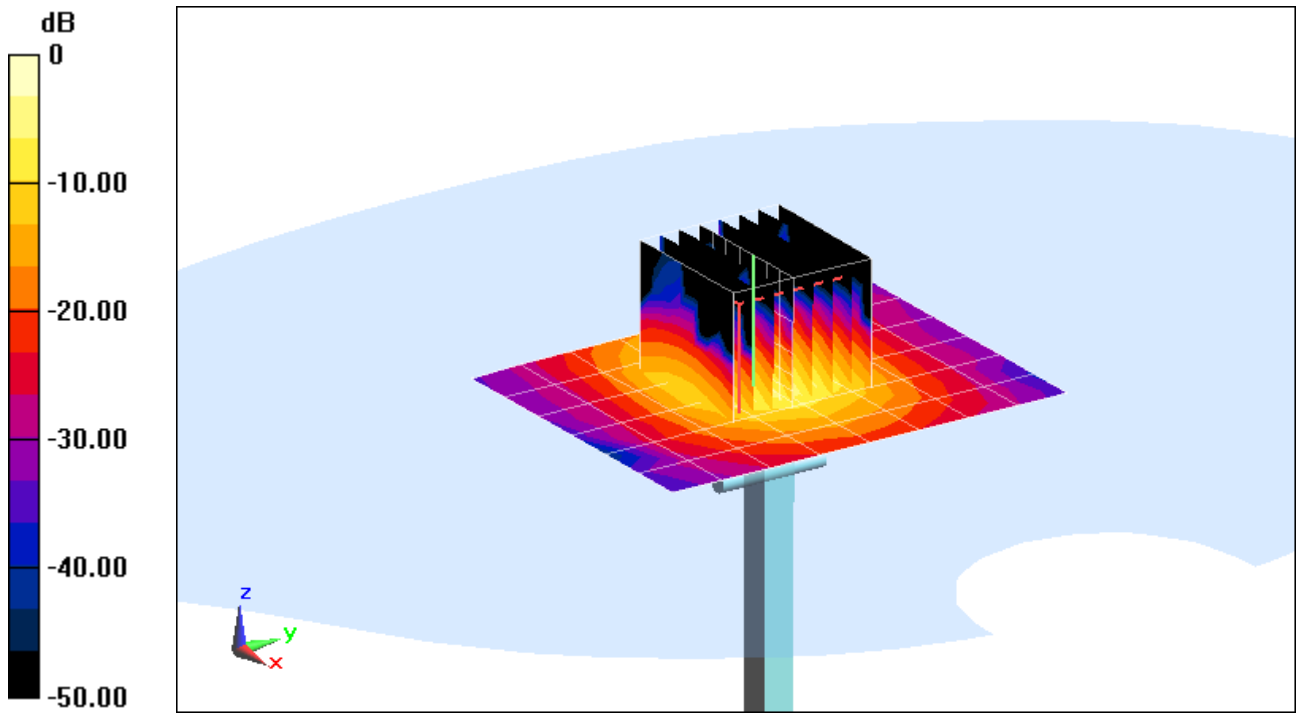
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5200 MHz; σ = 4.723 S/m; ε_r = 35.488; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-11-2013; Ambient Temp: 24.3°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(4.48, 4.48, 4.48); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

5200 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 33.3 W/kg
SAR(1 g) = 7.43 W/kg; SAR(10 g) = 2.1 W/kg
Deviation: -6.89%



0 dB = 17.5 W/kg = 12.43 dBW/kg

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

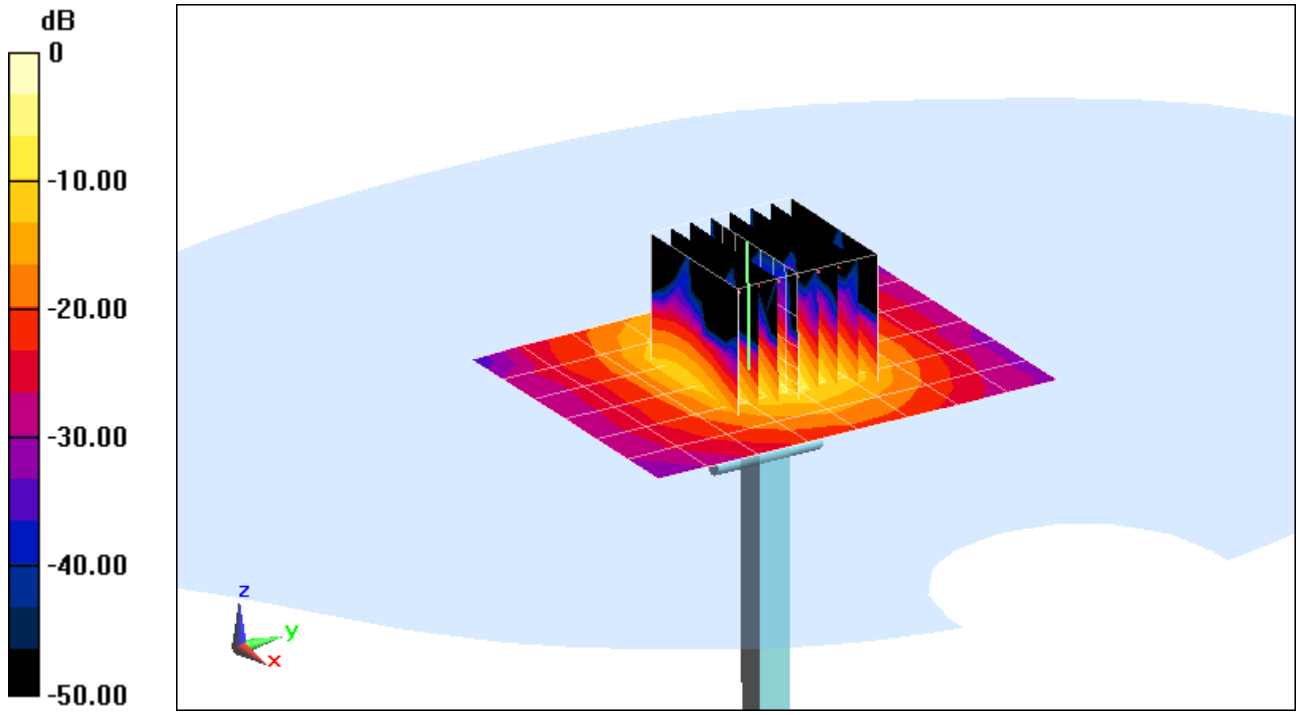
Communication System: CW; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5300 MHz; σ = 4.839 S/m; ε_r = 35.233; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-11-2013; Ambient Temp: 24.1°C; Tissue Temp: 23.5°C

Probe: EX3DV4 - SN3589; ConvF(4.27, 4.27, 4.27); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

5300 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 36.1 W/kg
SAR(1 g) = 7.8 W/kg; SAR(10 g) = 2.18 W/kg
Deviation: -6.14%



0 dB = 19.5 W/kg = 12.90 dBW/kg

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

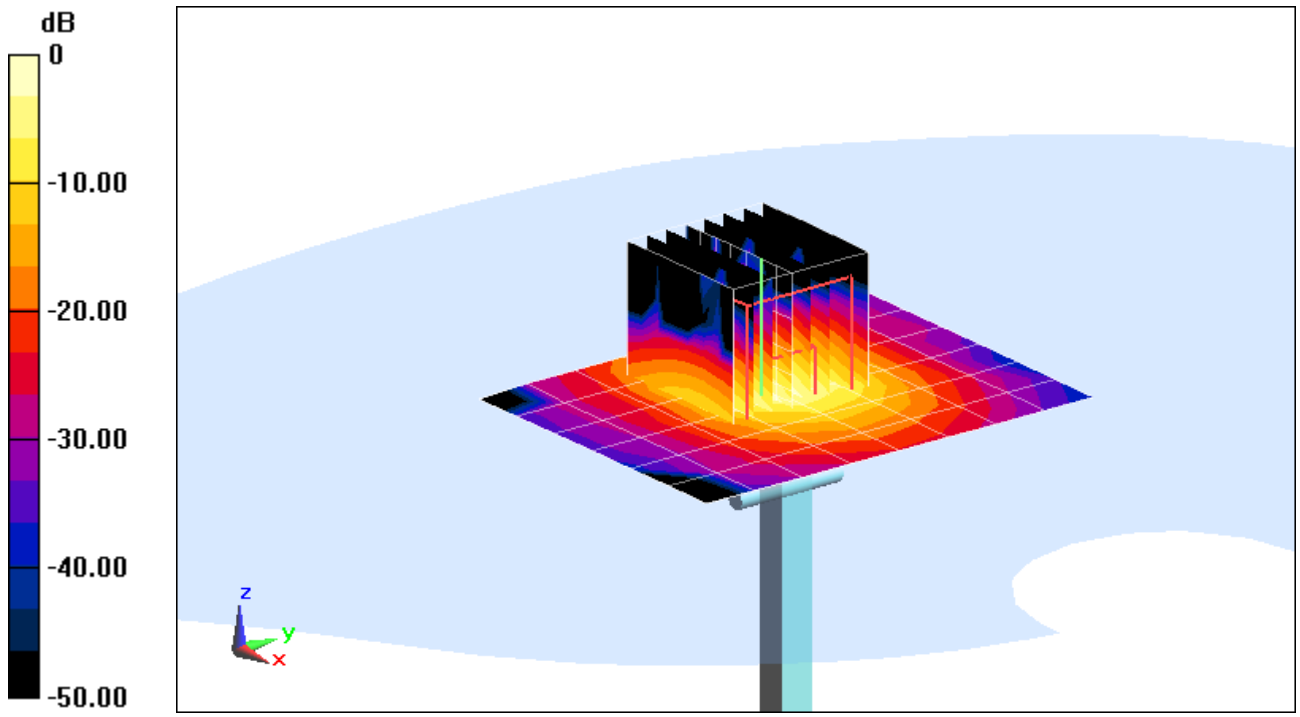
Communication System: CW; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5600 MHz; σ = 5.187 S/m; ε_r = 34.508; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-11-2013; Ambient Temp: 24.3°C; Tissue Temp: 23.7°C

Probe: EX3DV4 - SN3589; ConvF(3.81, 3.81, 3.81); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

5600 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 37.6 W/kg
SAR(1 g) = 8.15 W/kg; SAR(10 g) = 2.19 W/kg
Deviation: -3.55%



0 dB = 20.8 W/kg = 13.18 dBW/kg

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

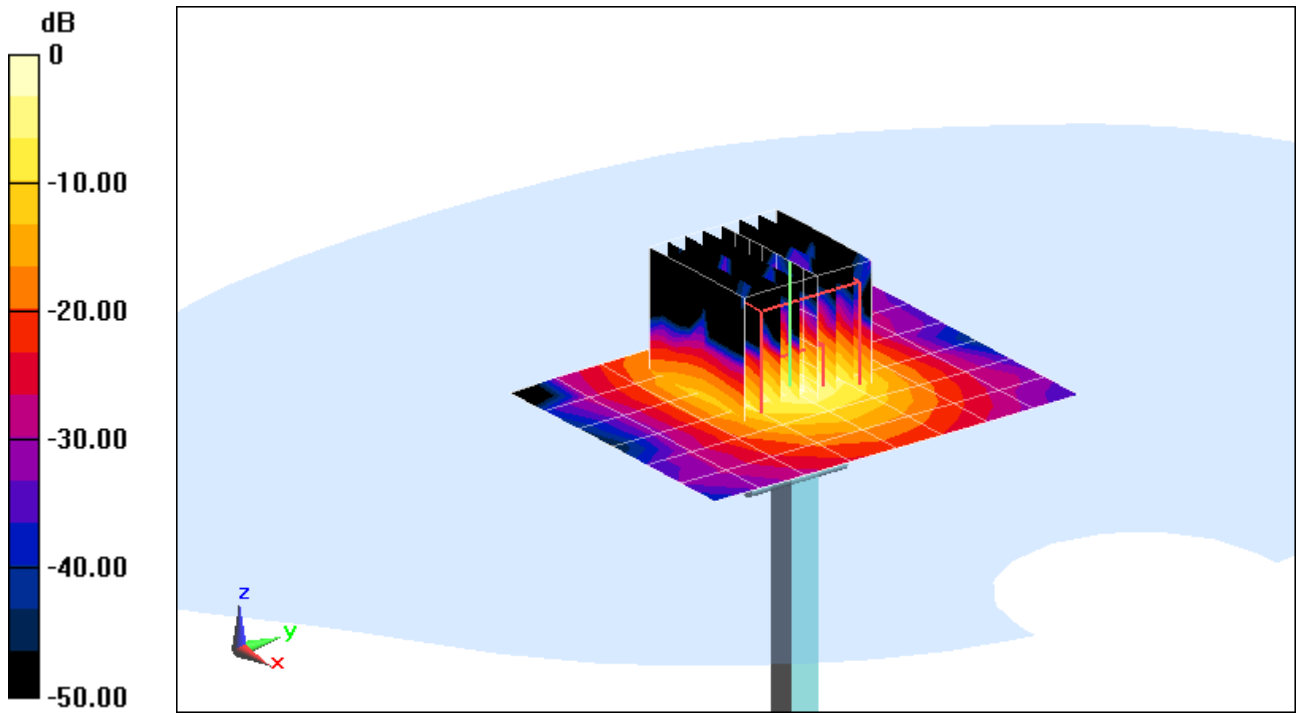
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5800 MHz; σ = 5.418 S/m; ε_r = 34.035; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-11-2013; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3589; ConvF(3.85, 3.85, 3.85); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

5800 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 37.1 W/kg
SAR(1 g) = 7.51 W/kg; SAR(10 g) = 2.04 W/kg
Deviation: -5.89%



0 dB = 20.4 W/kg = 13.10 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

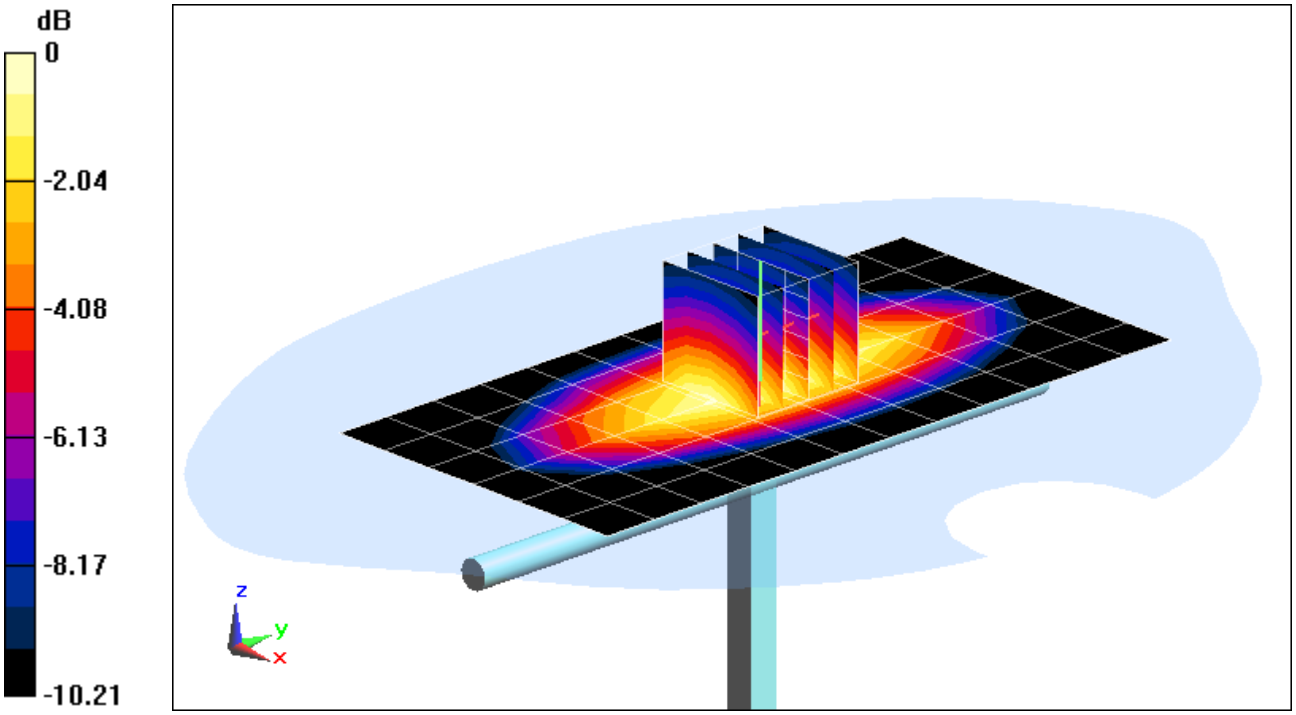
Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: 740 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.978 S/m; ε_r = 53.151; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-12-2013; Ambient Temp: 23.9°C; Tissue Temp: 23.3°C

Probe: ES3DV3 - SN3287; ConvF(6.14, 6.14, 6.14); Calibrated: 11/15/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/13/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

750 MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.27 W/kg
SAR(1 g) = 0.887 W/kg; SAR(10 g) = 0.590 W/kg
Deviation: 0.45%



0 dB = 0.961 W/kg = -0.17 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

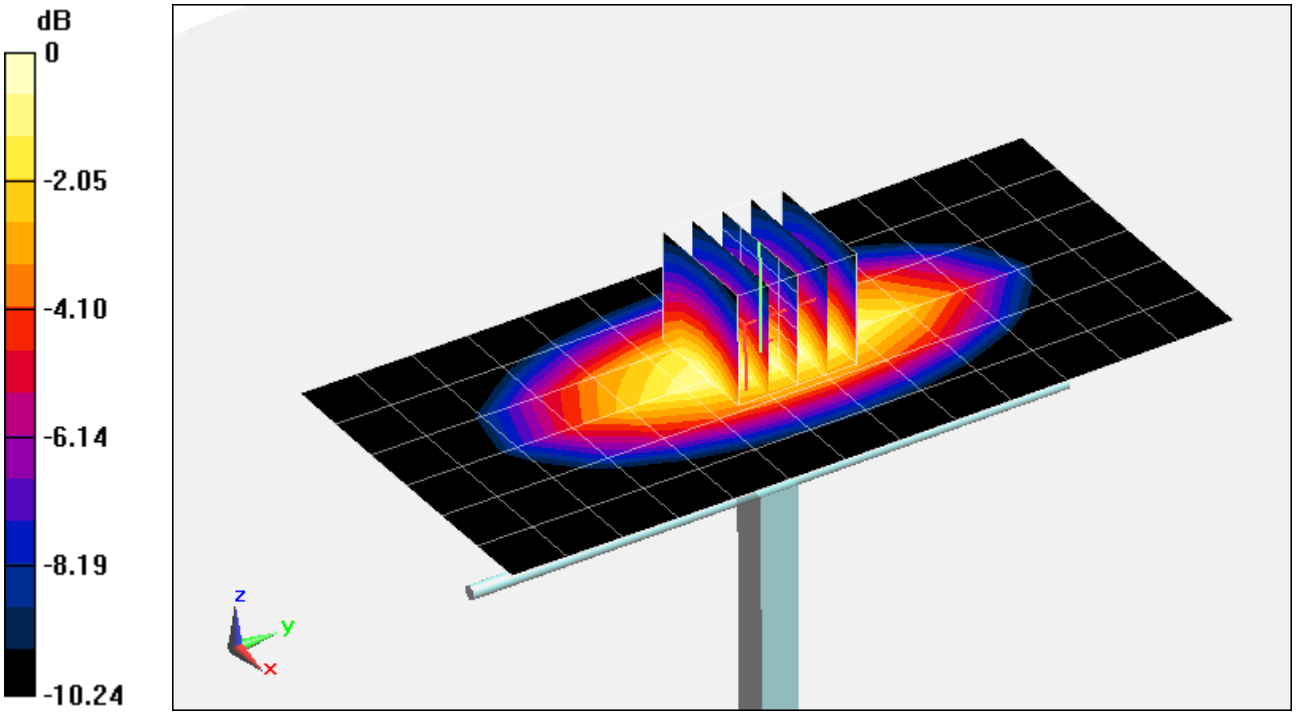
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.998 S/m; ε_r = 53.789; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-13-2013; Ambient Temp: 24.7°C; Tissue Temp: 24.2°C

Probe: ES3DV3 - SN3213; ConvF(6.07, 6.07, 6.07); Calibrated: 4/24/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: ELI v5.0 Door; Type: QDOVA002BB; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 0.957 W/kg; SAR(10 g) = 0.631 W/kg
Deviation: -0.31%



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

PCTEST ENGINEERING LABORATORY, INC.

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

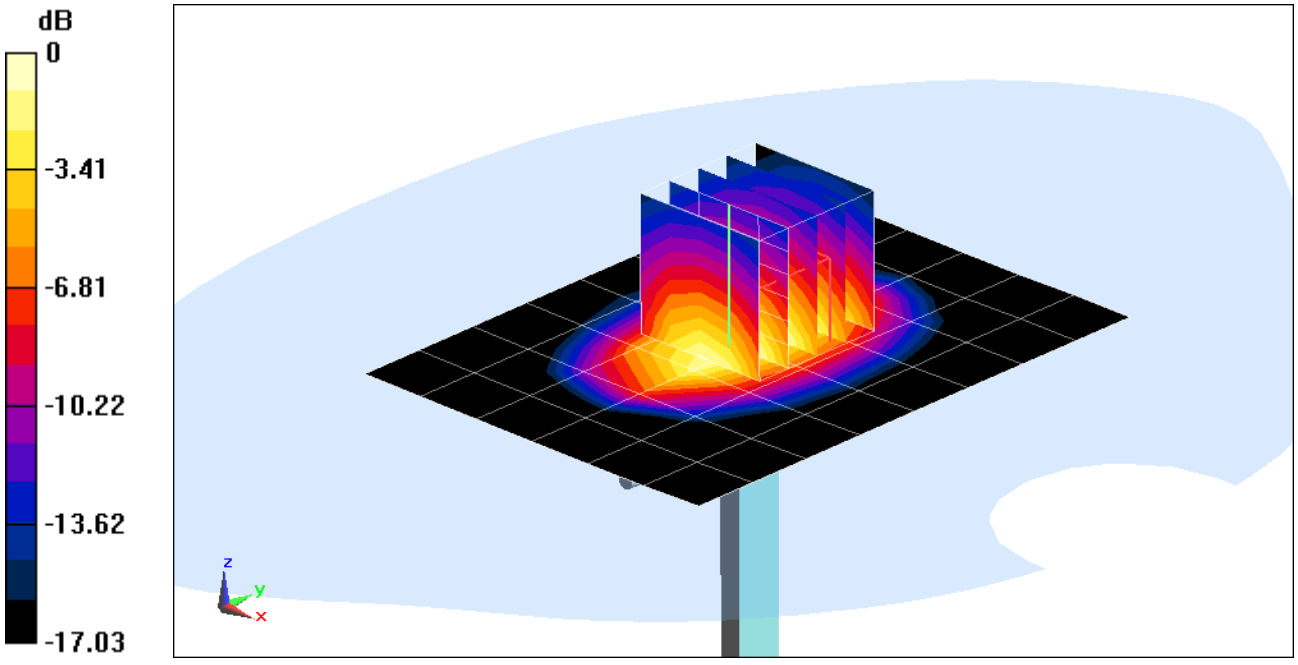
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.454 S/m; ε_r = 51.829; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.4°C; Tissue Temp: 23.9°C

Probe: ES3DV3 - SN3288; ConvF(5.18, 5.18, 5.18); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (5);SEMCAD X Version 14.6.8 (7028)

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 6.14 W/kg
SAR(1 g) = 3.49 W/kg; SAR(10 g) = 1.88 W/kg
Deviation: -7.18%



0 dB = 3.76 W/kg = 5.75 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

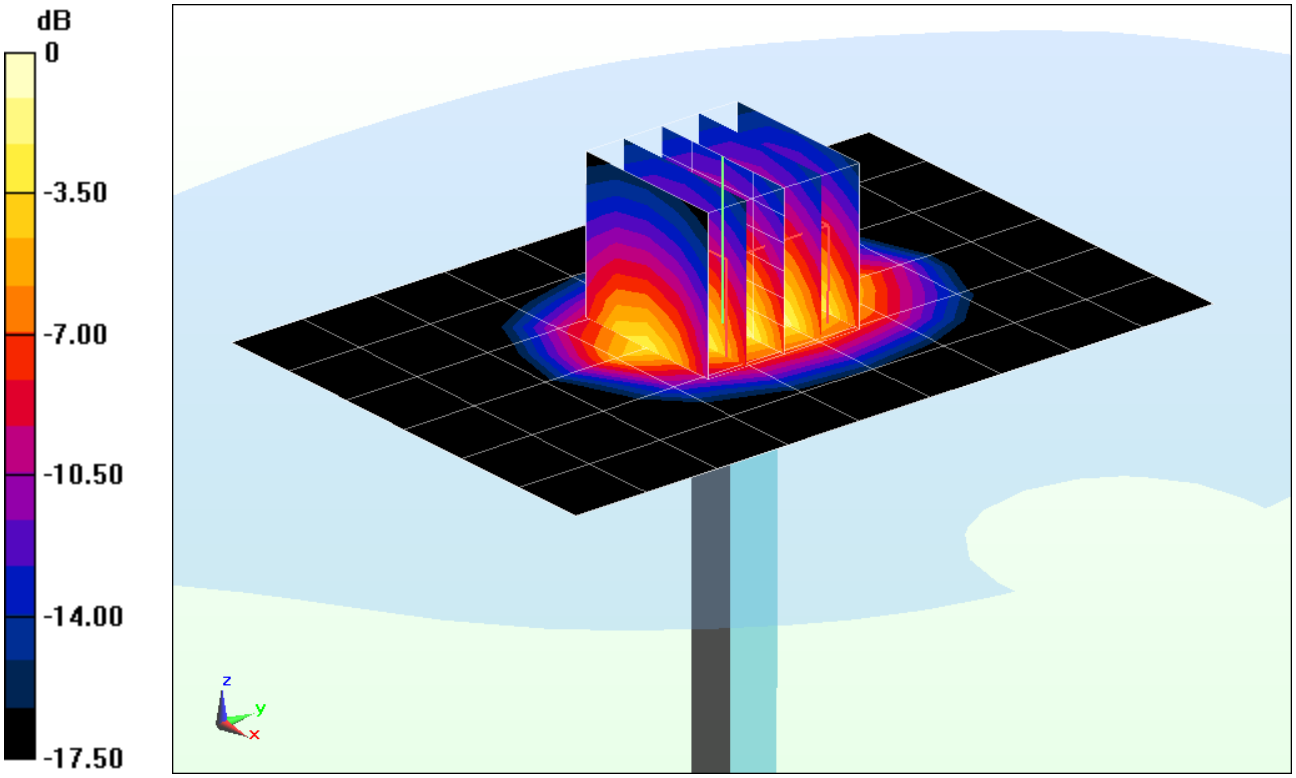
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.529 S/m; ε_r = 51.96; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3263; ConvF(4.76, 4.76, 4.76); Calibrated: 5/18/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (5);SEMCAD X Version 14.6.8 (7028)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.33 W/kg
SAR(1 g) = 4.04 W/kg; SAR(10 g) = 2.11 W/kg
Deviation: 2.80%



0 dB = 4.49 W/kg = 6.52 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

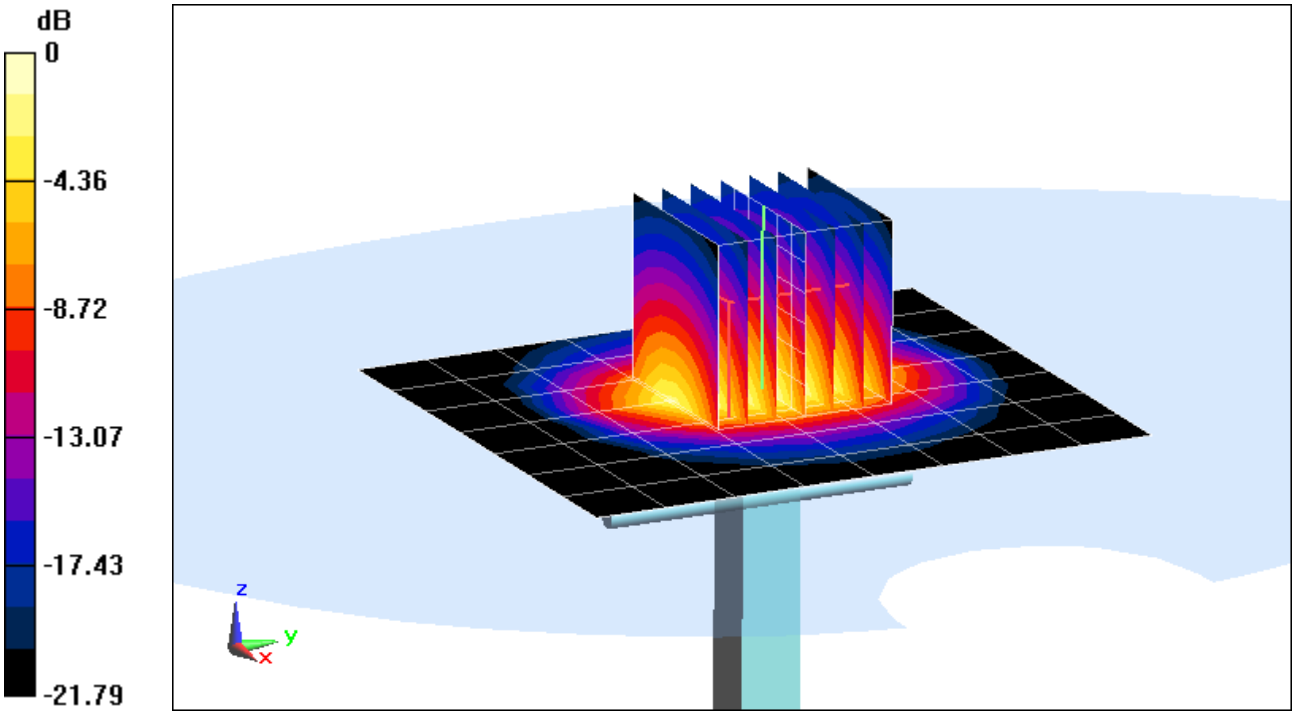
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 1.932 S/m; ε_r = 50.597; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-14-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3288; ConvF(4.35, 4.35, 4.35); Calibrated: 9/20/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 10.0 W/kg
SAR(1 g) = 4.79 W/kg; SAR(10 g) = 2.21 W/kg
Deviation: -3.43%



0 dB = 6.28 W/kg = 7.98 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

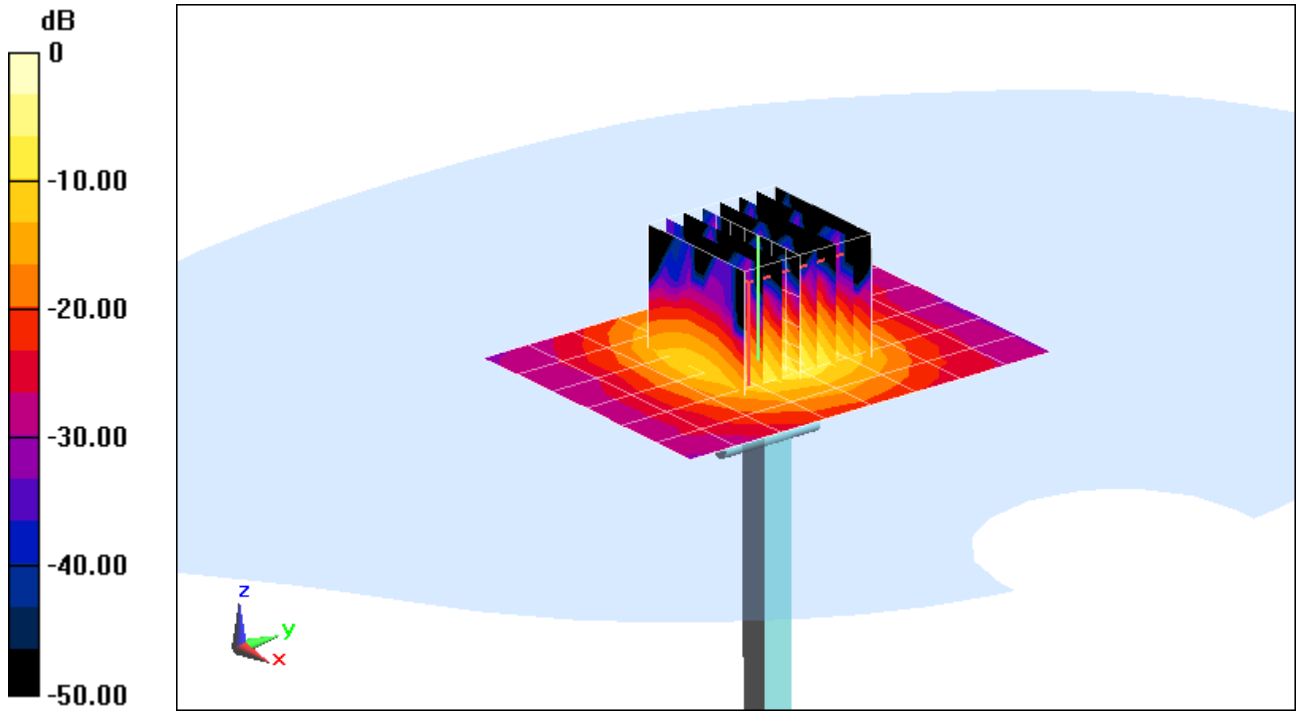
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5200 MHz; σ = 5.237 S/m; ε_r = 47.608; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.4°C; Tissue Temp: 24.5°C

Probe: EX3DV4 - SN3589; ConvF(3.99, 3.99, 3.99); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

5200 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 29.9 W/kg
SAR(1 g) = 7.03 W/kg; SAR(10 g) = 1.98 W/kg
Deviation: -6.89%



0 dB = 15.9 W/kg = 12.01 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

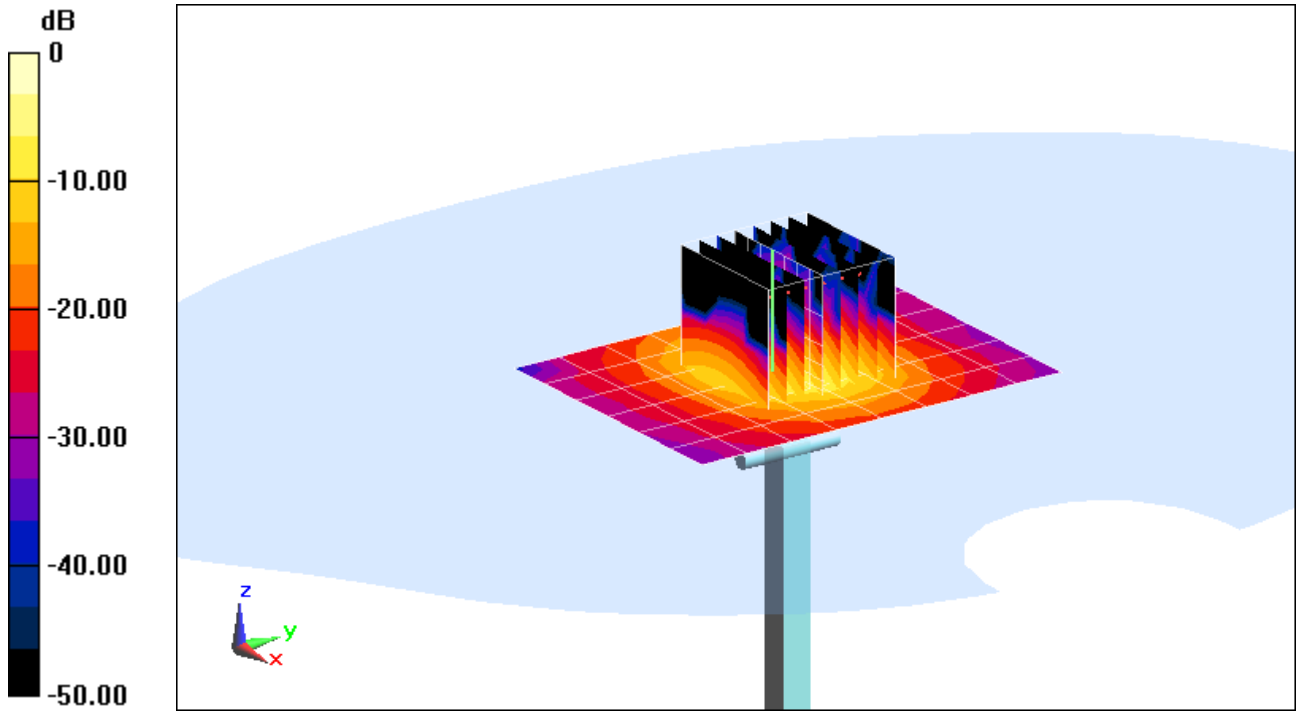
Communication System: CW; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5300 MHz; σ = 5.352 S/m; ε_r = 47.707; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.5°C; Tissue Temp: 24.2°C

Probe: EX3DV4 - SN3589; ConvF(3.81, 3.81, 3.81); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

5300 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 28.6 W/kg
SAR(1 g) = 7.43 W/kg; SAR(10 g) = 2.07 W/kg
Deviation: -1.33%



0 dB = 17.7 W/kg = 12.48 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

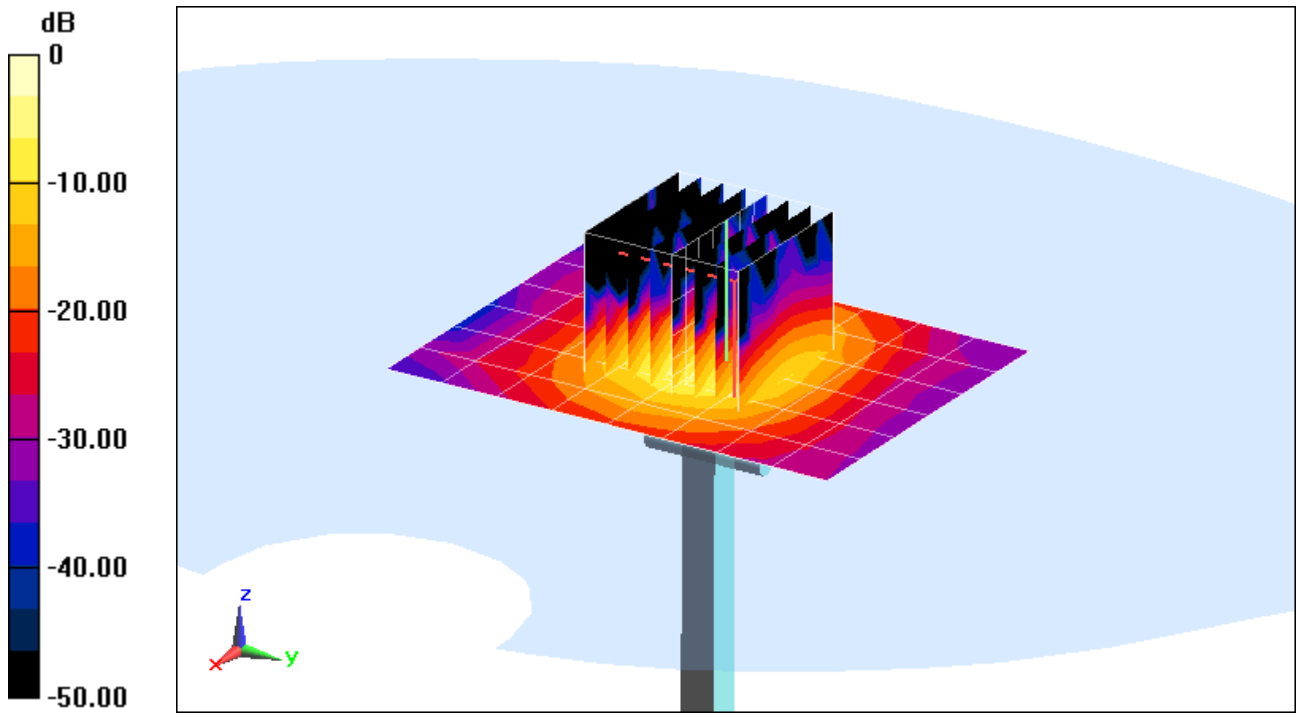
Communication System: CW; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5600 MHz; σ = 5.882 S/m; ε_r = 46.781; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.2°C; Tissue Temp: 24.3°C

Probe: EX3DV4 - SN3589; ConvF(3.32, 3.32, 3.32); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

5600 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 41.1 W/kg
SAR(1 g) = 8.33 W/kg; SAR(10 g) = 2.27 W/kg
Deviation: 3.74%



0 dB = 20.3 W/kg = 13.07 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

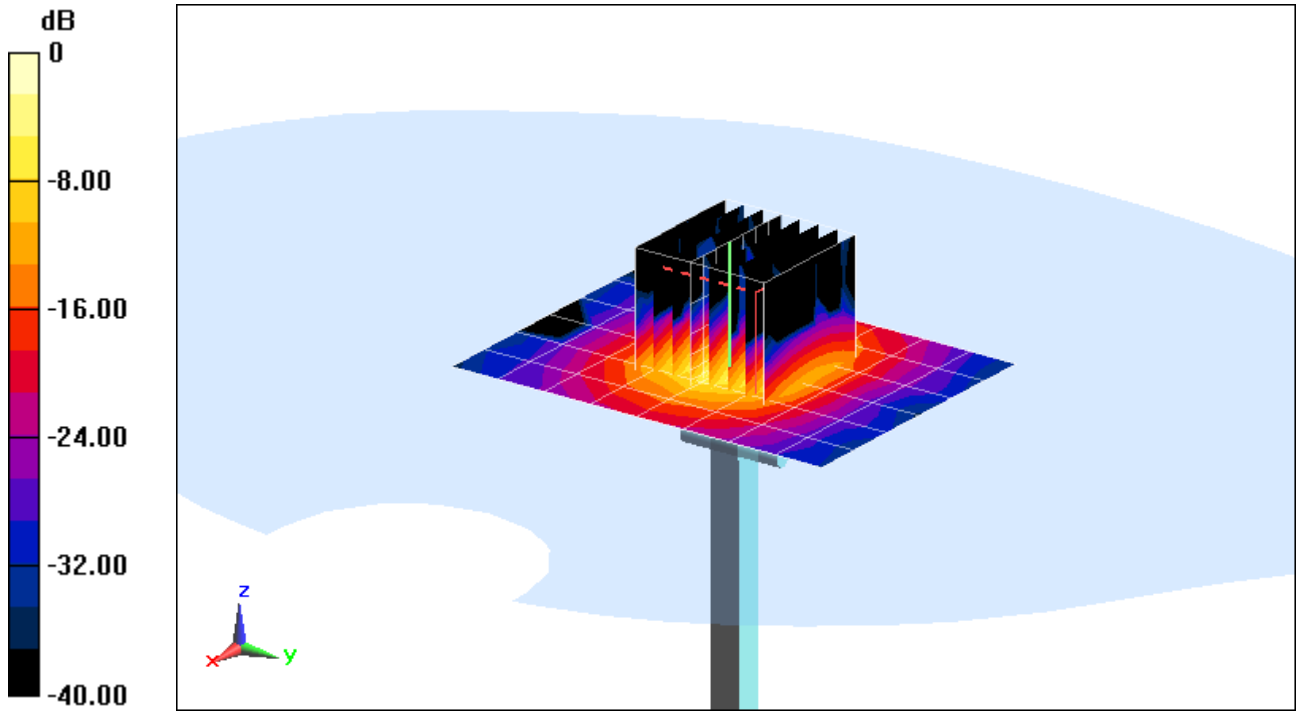
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5800 MHz; σ = 6.146 S/m; ε_r = 46.727; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2013; Ambient Temp: 24.3°C; Tissue Temp: 24.4°C

Probe: EX3DV4 - SN3589; ConvF(3.66, 3.66, 3.66); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.8 (7028)

5800 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 38.4 W/kg
SAR(1 g) = 7.38 W/kg; SAR(10 g) = 2.02 W/kg
Deviation: -1.73%



0 dB = 18.0 W/kg = 12.55 dBW/kg

APPENDIX C: PROBE CALIBRATION

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

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

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

Accreditation No.: SCS 108

Client PC Test

Certificate No: D1750V2-1051_Apr12

CALIBRATION CERTIFICATE

Object	D1750V2 - SN: 1051
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 24, 2012

VKOK 5/4/12

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 EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 24, 2012

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) 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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 6 %	1.35 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.03 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**36.6 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.83 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**19.5 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.9 ± 6 %	1.47 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.33 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**37.6 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.03 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.2 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.7 Ω - 0.2 jΩ
Return Loss	- 42.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.0 Ω + 0.0 jΩ
Return Loss	- 27.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.222 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	February 19, 2010

Date: 24.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

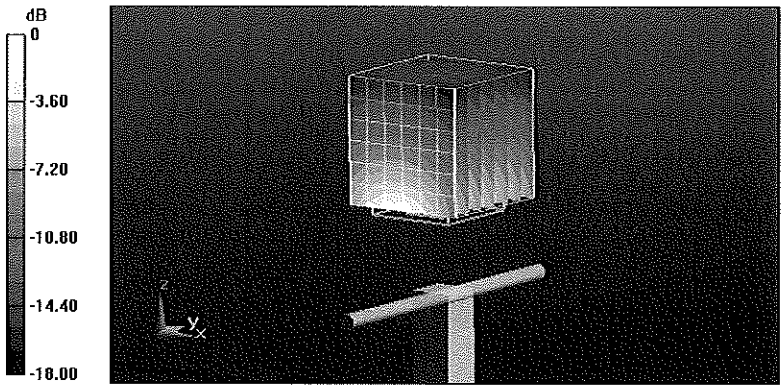
Communication System: CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.35 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.22, 5.22, 5.22); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

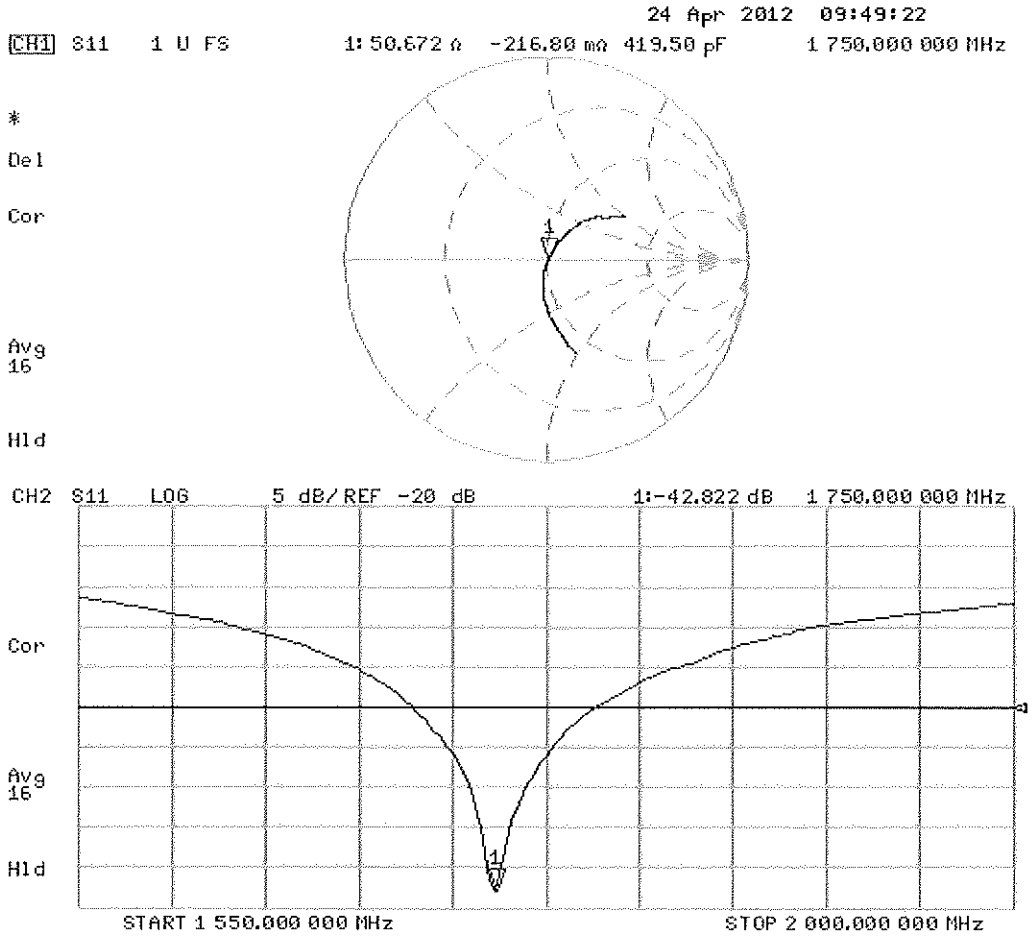
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.857 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 16.022 mW/g
SAR(1 g) = 9.03 mW/g; SAR(10 g) = 4.83 mW/g
Maximum value of SAR (measured) = 11.2 mW/g



0 dB = 11.2 mW/g = 20.98 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 24.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

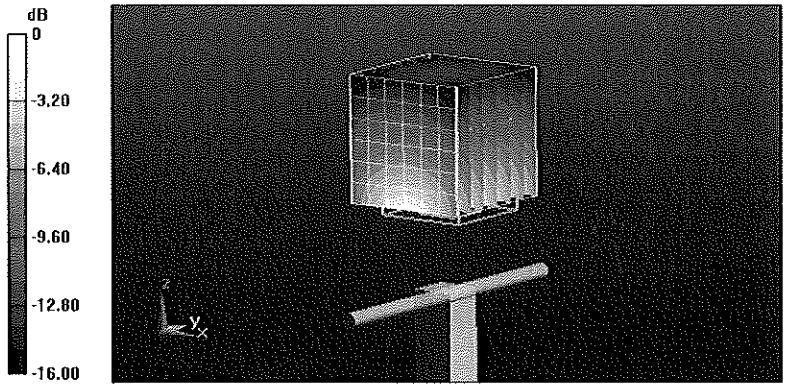
Communication System: CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.47 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.85, 4.85, 4.85); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

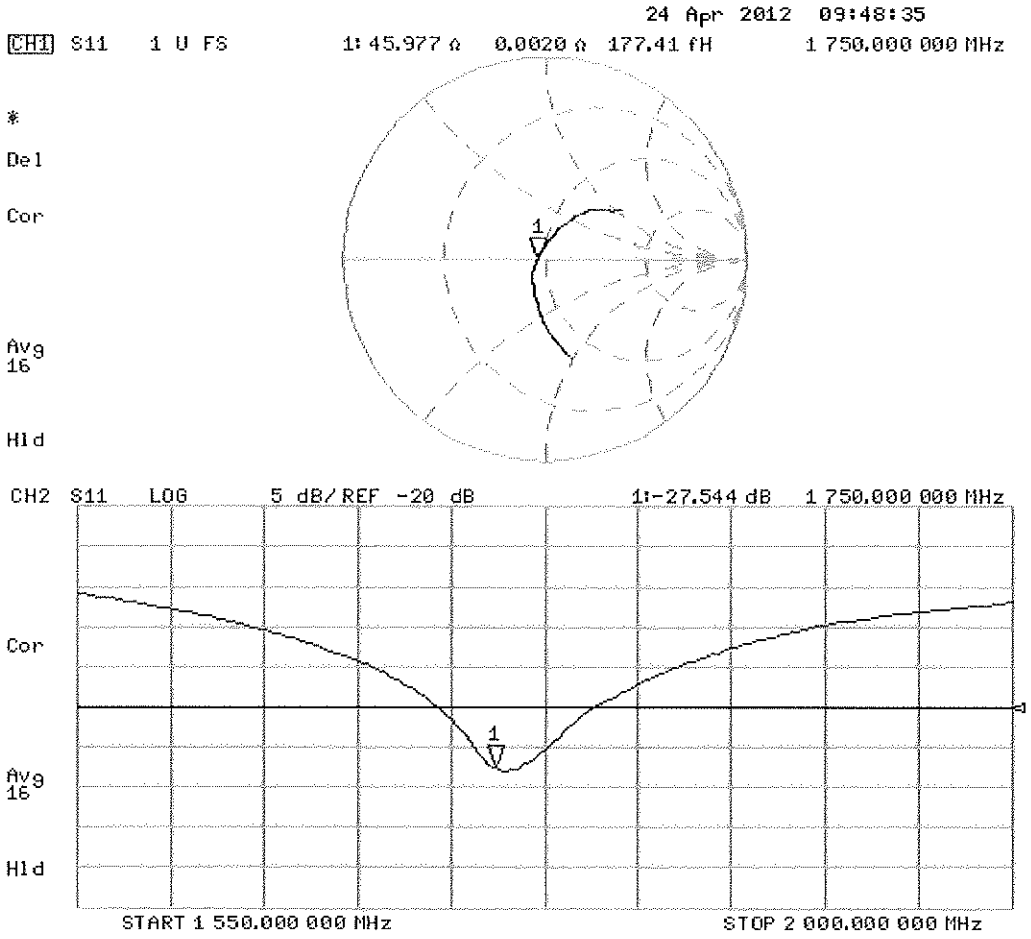
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.394 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 15.953 mW/g
SAR(1 g) = 9.33 mW/g; SAR(10 g) = 5.03 mW/g
Maximum value of SAR (measured) = 11.7 mW/g



0 dB = 11.7 mW/g = 21.36 dB mW/g

Impedance Measurement Plot for Body TSL



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

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S Swiss Calibration Service

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Accreditation No.: SCS 108

Client PC Test

Certificate No: D1900V2-5d149_Feb12

CALIBRATION CERTIFICATE

Object: D1900V2 - SN: 5d149

Calibration procedure(s): QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: February 22, 2012

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 EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 23, 2012

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

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S Swiss Calibration Service

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

Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) 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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.4 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.80 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**39.3 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.7 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.0 ± 6 %	1.56 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.99 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**39.3 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.23 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.7 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.4 Ω + 5.5 jΩ
Return Loss	- 24.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.0 Ω + 6.7 jΩ
Return Loss	- 23.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 11, 2011

Date: 22.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

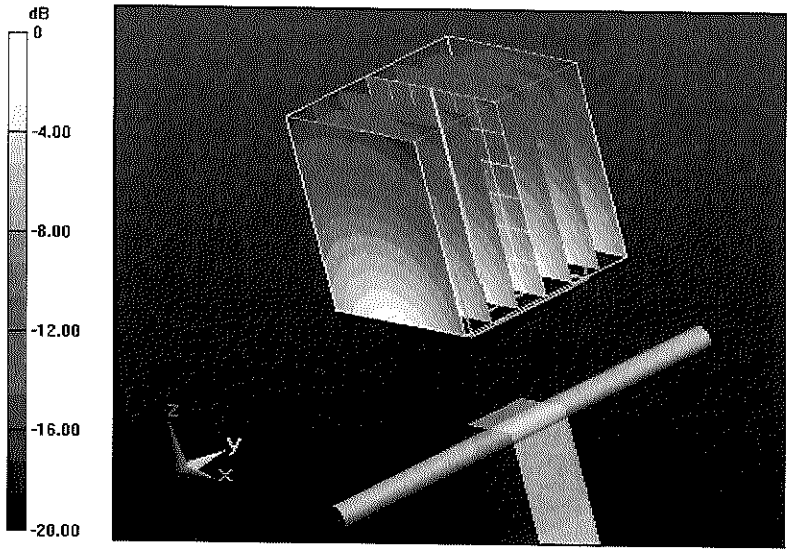
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

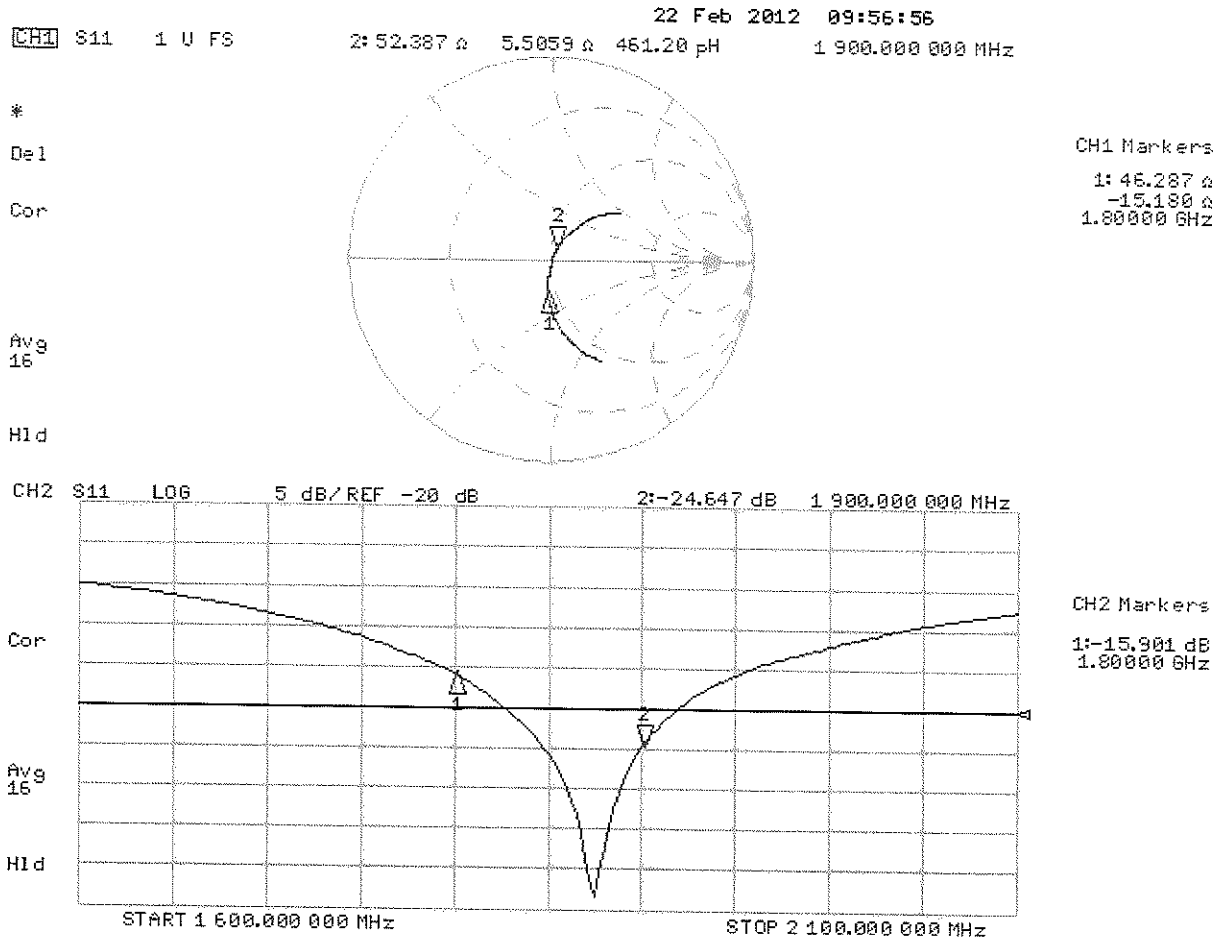
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.685 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 17.4710
SAR(1 g) = 9.8 mW/g; SAR(10 g) = 5.18 mW/g
Maximum value of SAR (measured) = 12.114 mW/g



0 dB = 12.110mW/g = 21.66 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 06.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

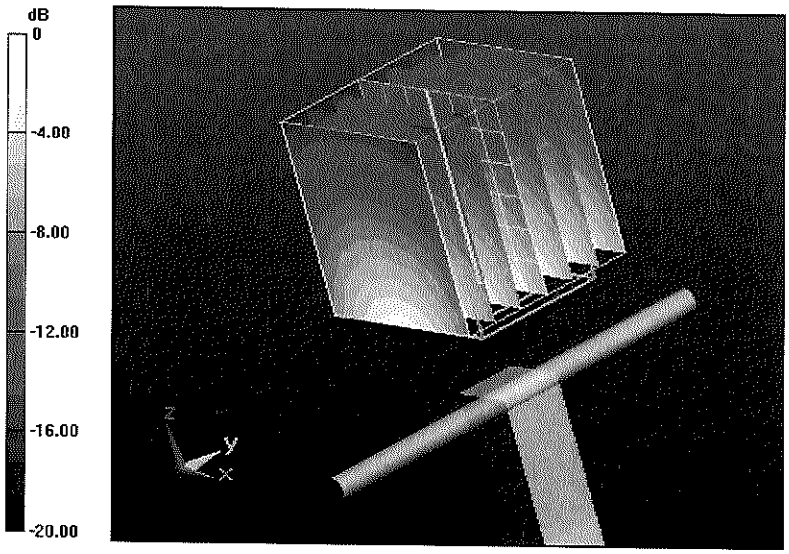
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.56 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

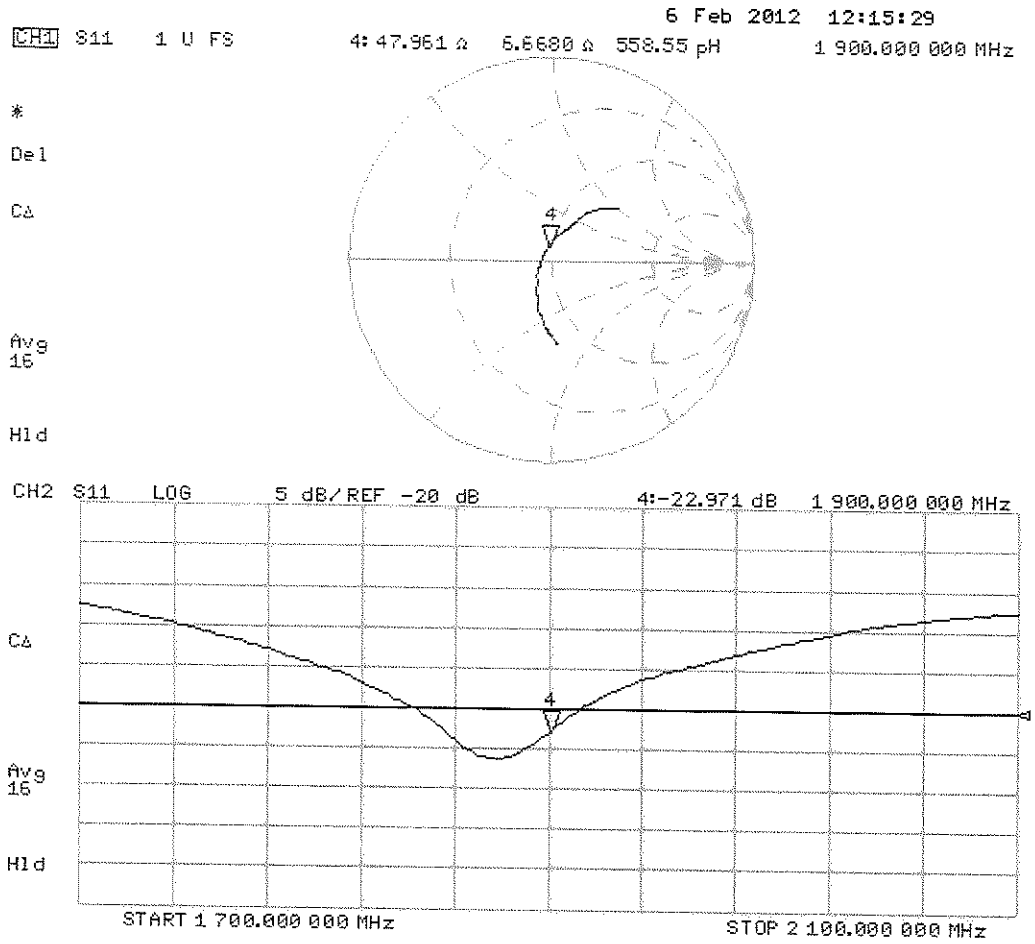
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.047 V/m; Power Drift = 0.0017 dB
Peak SAR (extrapolated) = 18.1310
SAR(1 g) = 9.99 mW/g; SAR(10 g) = 5.23 mW/g
Maximum value of SAR (measured) = 12.672 mW/g



0 dB = 12.670mW/g = 22.06 dB mW/g

Impedance Measurement Plot for Body TSL



Calibration Laboratory of
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Accreditation No.: SCS 108

Client **PC Test**

Certificate No: D2450V2-719_Aug12

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 719
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 23, 2012

kot 9/17/12

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 EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	Israe El-Naouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 23, 2012

Calibration Laboratory of
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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) 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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.2 ± 6 %	1.81 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**52.7 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.19 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.7 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.3 ± 6 %	1.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**51.6 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.16 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**24.4 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.4 Ω + 3.8 jΩ
Return Loss	- 25.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.7 Ω + 5.9 jΩ
Return Loss	- 24.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.150 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 10, 2002

DASY5 Validation Report for Head TSL

Date: 23.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

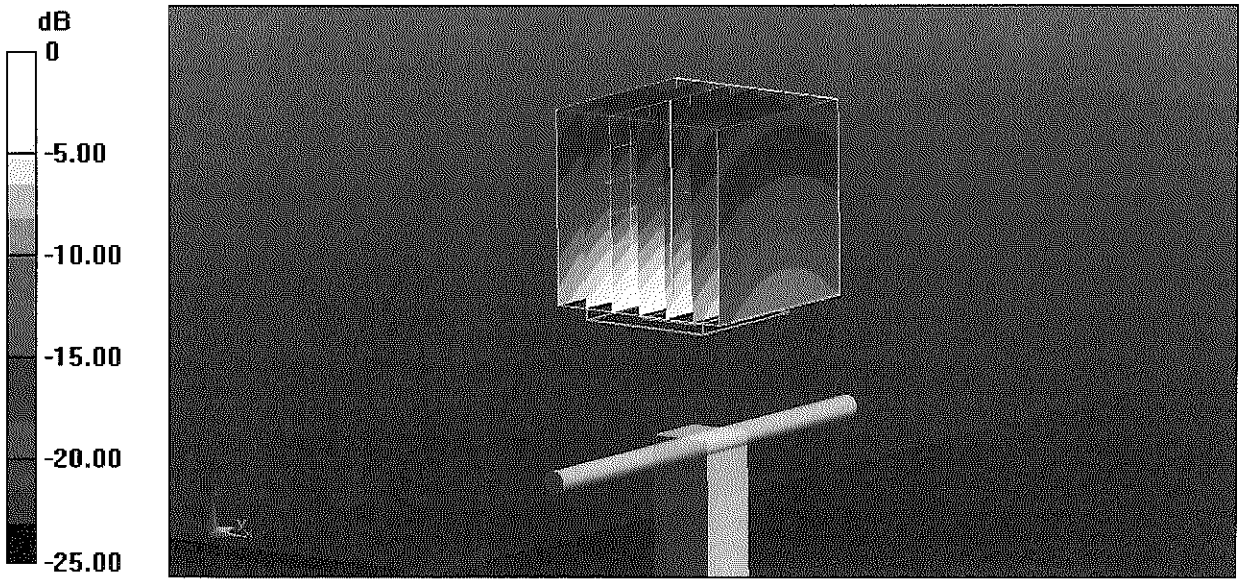
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.81 mho/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

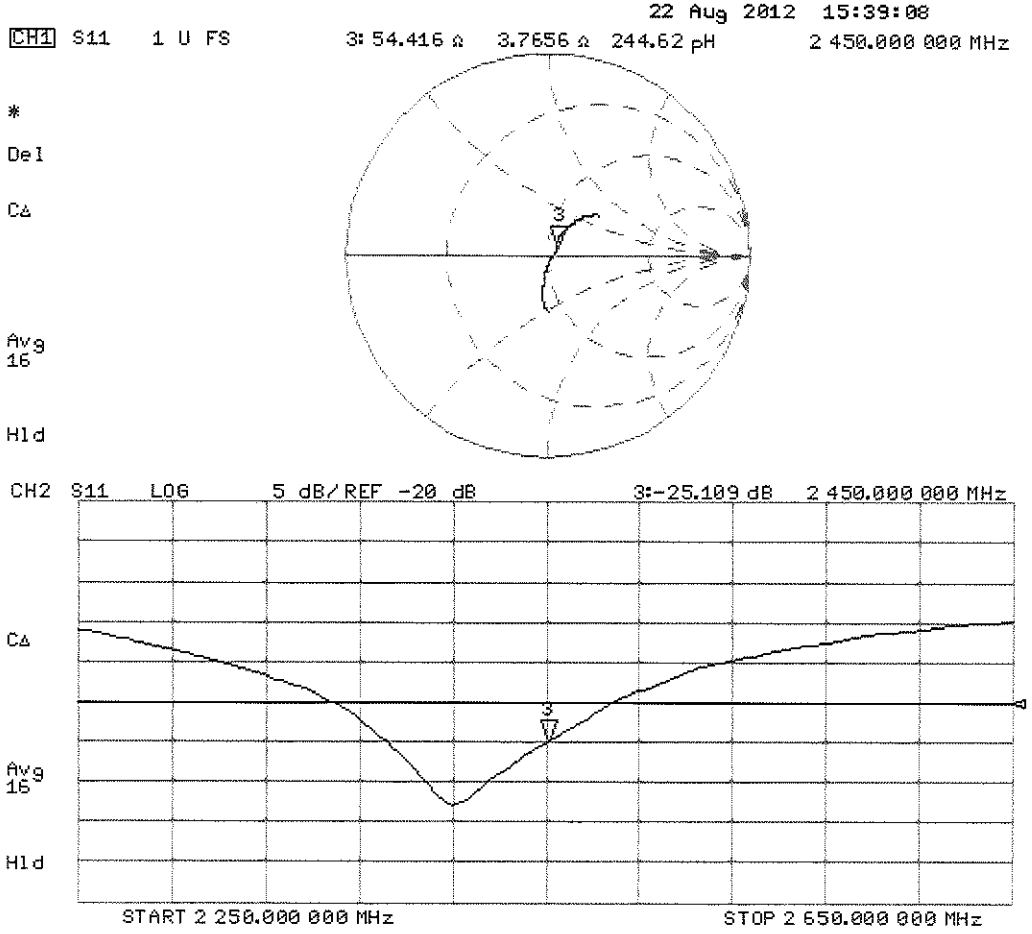
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.219 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 26.633 mW/g
SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.19 mW/g
Maximum value of SAR (measured) = 16.5 W/kg



0 dB = 16.5 W/kg = 24.35 dB W/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 22.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

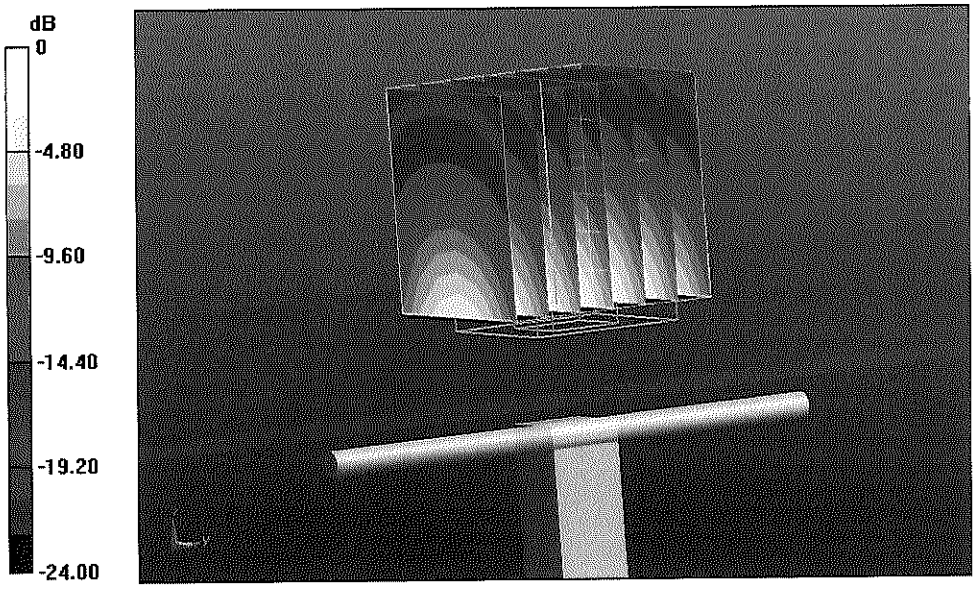
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.99 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.970 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 26.692 mW/g
SAR(1 g) = 13.1 mW/g; SAR(10 g) = 6.16 mW/g
Maximum value of SAR (measured) = 17.1 W/kg



0 dB = 17.1 W/kg = 24.66 dB W/kg

Impedance Measurement Plot for Body TSL