PCTEST ENGINEERING LABORATORY, INC.
6660-B Dobbin Road, Columbia, MD 21045 USA
Tel. +1.410.290.6652 / Fax +1.410.290.6654
http://www.pctestlab.com

SAR EVALUATION REPORT

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

Date of Testing:
08/09/12 - 08/23/12
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
0Y1208061095.ZNF

FCC ID: **ZNFLS970**

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

DUT Type: Portable Handset
Application Type: Class II Permissive Change
FCC Rule Part(s): CFR §2.1093
Model(s): LG-LS970, LGLS970, LS970
Permissive Change(s): See FCC Change Document
Date of Original Certification: 08/10/2012

Band & Mode	Tx Frequency	Conducted Power [dBm]	SAR		
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
Cell. CDMA/EVDO - FCC Rule Part 90S	817.90 - 823.10 MHz	25.13	0.53	0.85	0.91
Cell. CDMA/EVDO - FCC Rule Part 22H	824.70 - 848.31 MHz	25.19	0.52	0.73	0.94
PCS CDMA/EVDO - FCC Rule Part 24E	1851.25 - 1908.75 MHz	25.16	0.42	0.76	1.15
LTE Band 25 (PCS) - FCC Rule Part	1852.5 - 1912.5 MHz	23.50	1.26	0.66	0.66
2.4 GHz WLAN - FCC Rule Part 15C	2412 - 2462 MHz	16.64	0.07	0.07	0.07
5.8 GHz WLAN - FCC Rule Part 15C	5745 - 5825 MHz	12.88	0.08	0.07	
5.2 GHz WLAN - FCC Rule Part 15E	5180 - 5240 MHz	12.96	0.15	0.23	
5.3 GHz WLAN - FCC Rule Part 15E	5260 - 5320 MHz	12.97	0.18	0.18	
5.5 GHz WLAN - FCC Rule Part 15E	5500 - 5700 MHz	12.65	0.08	0.06	
Bluetooth - FCC Rule Part 15C	2402 - 2480 MHz	8.11	N/A		
Simultaneous SAR per KDB 690783 D01:			1.33	1.58	1.58

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 FCC/OET Bulletin 65 Supplement C (2001), IEEE 1528-2003 and in applicable Industry Canada Radio Standards Specifications (RSS); 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.

PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

TABLE OF CONTENTS

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Tx Frequency
Cell. CDMA/EVDO - FCC Rule Part 90S	817.90 - 823.10 MHz
Cell. CDMA/EVDO - FCC Rule Part 22H	824.70 - 848.31 MHz
PCS CDMA/EVDO - FCC Rule Part 24E	1851.25 - 1908.75 MHz
LTE Band 25 (PCS) - FCC Rule Part	1852.5 - 1912.5 MHz
2.4 GHz WLAN - FCC Rule Part 15C	2412 - 2462 MHz
5.8 GHz WLAN - FCC Rule Part 15C	5745 - 5825 MHz
5.2 GHz WLAN - FCC Rule Part 15E	5180 - 5240 MHz
5.3 GHz WLAN - FCC Rule Part 15E	5260 - 5320 MHz
5.5 GHz WLAN - FCC Rule Part 15E	5500 - 5700 MHz
Bluetooth - FCC Rule Part 15C	2402 - 2480 MHz
NFC - FCC Rule Part 15C	13.56 MHz

1.2 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the standard battery cover and will be the only battery cover available from the manufacturer for this model. Therefore all SAR tests were performed with the standard battery cover which already integrates the NFC antenna.

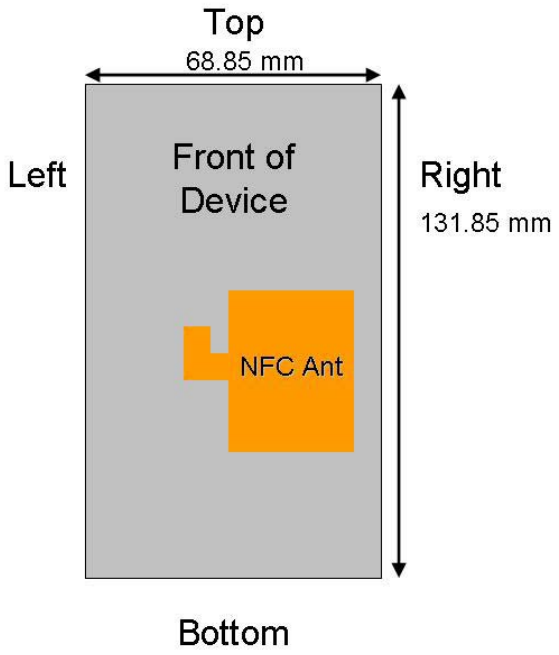


Figure 1-1
NFC Antenna Locations

1.3 DUT Antenna Locations

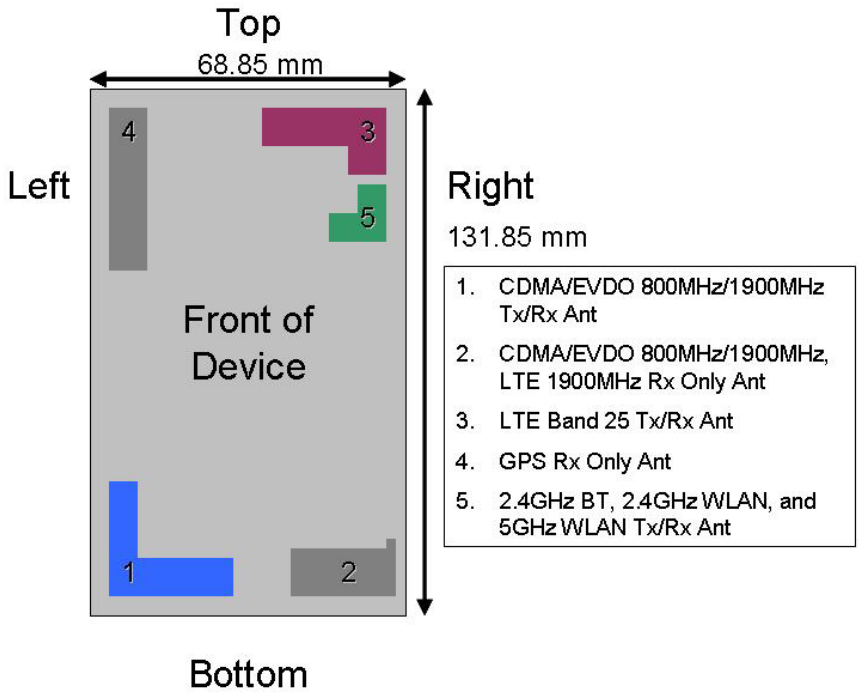


Figure 1-2
DUT Antenna Locations

Table 1-1
Mobile Hotspot Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
Cell. 1x CDMA/EVDO – FCC Rule Part 90S	Yes	Yes	No	Yes	No	Yes
Cell. 1x CDMA/EVDO – FCC Rule Part 22H	Yes	Yes	No	Yes	No	Yes
PCS 1x CDMA/EVDO – FCC Rule Part 24E	Yes	Yes	No	Yes	No	Yes
LTE Band 25 (PCS) – FCC Rule Part 24E	Yes	Yes	Yes	No	Yes	No
2.4 GHz WLAN – FCC Rule Part 15C	Yes	Yes	Yes	No	Yes	No

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR if the edges were
greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06 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 Power Reduction for SAR

This device uses power reduction mechanisms for LTE during SVLTE (voice + LTE data) operation, but power reduction was not required for SAR compliance. See Section 11 for more details.

1.5 Simultaneous Transmission Capabilities

According to KDB 648474, 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 KDB 447498 3) procedures.

Table 1-2
Possible Simultaneous Transmission Scenarios Supported by DUT

No.	Capable Transmit Configurations	Head SAR	Body-worn SAR	Hotspot SAR	Note
1	CDMA BC0/BC1/BC10 Voice + 2.4GHz WLAN Data	Yes	Yes	No	
2	CDMA BC0/BC1/BC10 Voice + 5GHz WLAN Data	Yes	Yes	No	
3	CDMA BC0/BC1/BC10 1xData/EVDO + 2.4GHz WLAN Data	Yes	Yes	Yes	CDMA Hotspot
4	LTE B25 Data + 2.4GHz WLAN data	Yes	Yes	Yes	LTE Hotspot
5	CDMA BC0/BC1/BC10 Voice + LTE B25 Data	Yes	Yes	No	SVLTE
6	CDMA BC0/BC1/BC10 Voice + LTE B25 Data + 2.4GHz WLAN Data	Yes	Yes	Yes	WiFi Hotspot (SVLTE)
7	CDMA BC0/BC1/BC10 1xData/EVDO + 5GHz WLAN Data	No	No	No	
8	LTE B25 Data + 5GHz WLAN data	No	No	No	
9	CDMA BC0/BC1/BC10 EVDO + LTE B25 Data + 2.4GHz WLAN Data	No	No	No	

- The simultaneous transmission between BT and WiFi is not supported.
- The simultaneous transmission between CDMA 1xData/EVDO and LTE data is not supported.
- SVLTE are supported only. (SVDO is not supported.)
- 1x Advanced capability for CDMA BC0/BC1/BC10 is supported.
- VoIP is supported.
- Maximum output power will be used for SAR compliance.
- Hotspot for 5GHz WiFi is not supported.

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 in KDB 941225 D06.

The separation distance between the CDMA/EVDO antenna and the Bluetooth/WLAN antenna is 87.6 mm. The separation distance between the LTE antenna and the Bluetooth/WLAN antenna is 0.3 mm.

RF Conducted Power of Bluetooth Tx is 6.467 mW (Please refer to the EMC DSS Report for a full set of Bluetooth conducted powers).

2.4 GHz and 5 GHz WIFI and Bluetooth share the same antenna path and cannot transmit simultaneously.

Per KDB Publication 648474, **Bluetooth SAR was not required** based on the maximum conducted power, the Bluetooth/WLAN to main antenna separation distance and Body-SAR of the main antenna.

(B) Licensed Transmitter(s)

LTE SAR for the lower BWs was not tested since the maximum average output power of all channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and LTE SAR for the highest BW was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05.

1.7 Guidance Applied

- FCC OET Bulletin 65 Supplement C [June 2001]
- IEEE 1528-2003
- FCC KDB 941225 (2G/3G/4G and Hotspot)
- FCC KDB 248227 (802.11)
- FCC KDB 648474 (Simultaneous)
- April 2012 TCB Workshop Notes (Simultaneous)
- FCC KDB 865664 (5 GHz)
- October 2011 TCB Workshop Notes (1x Advanced)

1.8 Samples Used for SAR Testing

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

Band & Mode	FCC Rule Part	Sample Serial Number
Cell. CDMA/EVDO	90S	#1, #2
Cell. CDMA/EVDO	22H	#1, #2
PCS CDMA/EVDO	24E	#2
LTE Band 25 (PCS)	24E	#1
2.4 GHz WLAN	15C	#1, #10
5 GHz WLAN	15C, 15E	#1

2 LTE CHECKLIST PER KDB 941225 D05

KDB 941225 Pub LTE Information				
KDB 941225 Section	FCC ID	ZNFLS970		
	Form Factor	Portable Handset		
1)	Frequency Range of each LTE transmission band	BAND 25: frequency range - 1852.5 MHz to 1912.5 MHz		
2)	Channel Bandwidths	Channel Bandwidth is 5, 10 MHz		
3)	Channel Numbers and Frequencies (MHz)	Low	Mid	High
	LTE Band 25, BW 5MHz	1852.5MHz (26065)	1882.5 MHz (26365)	1912.5 MHz (26665)
	LTE Band 25, BW 10Mhz	1855 MHz(26090)	1882.5 MHz(26365)	1910 MHz(26640)
4)(a)	UE Category	3		
(b)	Modulations Supported in UL	QPSK, 16QAM		
	LTE Transmitter and Antenna Implementation	CDMA/EVDO and LTE do not share the same transmitter		
5)	Description of LTE Tx and Ant. Implementation	1 Main TX/RX Ant and 1 Diversity RX Ant		
6)	LTE Voice available?	No		
	Hotspot with LTE+WIFI	Yes		
	Hotspot with LTE+WIFI active with 1XVoice sessions?	Yes		
7)	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		
8)	Conducted power Table provided for 1RB (low and high offset), 50% RB (centered), 100% RB	Yes		
9-10)	Non-LTE US Wireless Operating Modes/Band	RF Output Power	RF Exposure Configurations	
	850 MHz CDMA - FCC Rule Part 90S	See Page 1		
	850 MHz CDMA - FCC Rule Part 22H			
	1900 MHz CDMA - FCC Rule Part 24E			
	2.4GHz WI-FI - FCC Rule Part 15C			
	2.4GHz Bluetooth - FCC Rule Part 15C			
	5GHz WI-FI - FCC Rule Parts 15C & 15E			
11)	Simultaneous Tx Conditions (Voice and Data Configurations)	See Section 1.5		
12)	Power Reduction used for SAR Compliance?	No		
13)	Describe Power Reduction (LTE Modes)	See Section 11		
14)	SAR Test Plan	See Section 11		
15)	SAR test data	See Section 13		

3 INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 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 SAR MEASUREMENT SETUP

4.1 Automated SAR Measurement System

Measurements are performed using the DASY automated dosimetric SAR assessment system. The DASY is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the SAM phantom containing the head or body equivalent material. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). See www.speag.com for more information about the specification of the SAR assessment system.

Figure 4-1
SAR Measurement System

Figure 4-2
Near-Field Probe

Table 4-1
Composition of the Tissue Equivalent Matter

Frequency (MHz)	835	835	1900	1900	2450	2450	5200-5800	5200-5800
Tissue	Head	Body	Head	Body	Head	Body	Head	Body
Ingredients (% by weight)								
Bactericide	0.1	0.1						
DGBE			44.92	29.44	7.99	26.7		
HEC	1	1						
NaCl	1.45	0.94	0.18	0.39	0.16	0.1		
Sucrose	57	44.9						
Triton X-100					19.97		17.24	
Diethylenglycol monohexylether							17.24	
Polysorbate (Tween) 80								20
Water	40.45	53.06	54.9	70.17	71.88	73.2	65.52	80

5 DOSIMETRIC ASSESSMENT

5.1 Measurement Procedure

The evaluation was performed using the following procedure:

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 interface and the horizontal grid resolution was 15mm and 15mm for frequencies < 3 GHz in the x and y directions respectively. When applicable, for frequencies above 3 GHz, a 10 mm by 10 mm resolution was used.
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 1 gram cube evaluation. SAR at this fixed point was measured and used as a reference value.

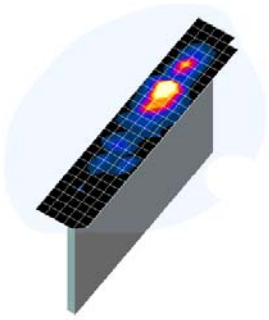


Figure 5-1
Sample SAR Area Scan

3. Based on the area scan data, the peak area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 30mm (fine resolution volume scan, zoom scan) was assessed by measuring at least 5 x 5 x 7 points. On this 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.
5. For testing 5 GHz devices, finer resolution zoom scans were performed as specified by FCC SAR Measurement Requirements for 3 – 6 GHz, KDB 865664 publication. The 5 GHz zoom scan requires a minimum volume of 24mm x 24mm x 20mm and 7 x 7 x 11 points.

6 DEFINITION OF REFERENCE POINTS

6.1 EAR REFERENCE POINT

Figure 6-2 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 6-1. 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 6-2). 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].

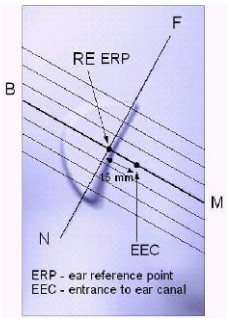


Figure 6-1
Close-Up Side view of ERP

6.2 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 6-3). 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 it's 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 6-2
Front, back and side view of SAM Twin Phantom

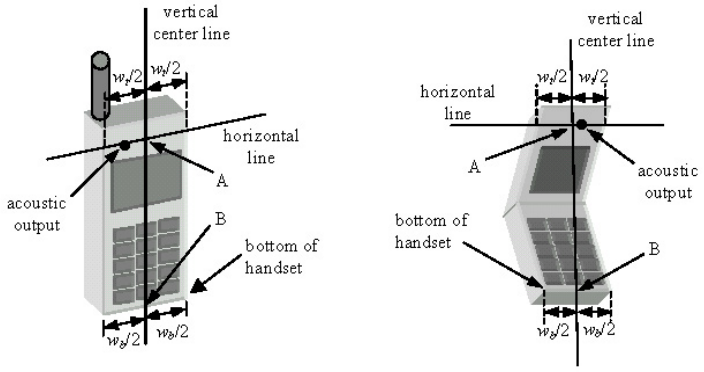


Figure 6-3
Handset Vertical Center & Horizontal Line Reference Points

7 TEST CONFIGURATION POSITIONS FOR HANDSETS

7.1 Device Holder

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

7.2 Positioning for Cheek/Touch

1. The test device was positioned with the handset 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 7-1), 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.

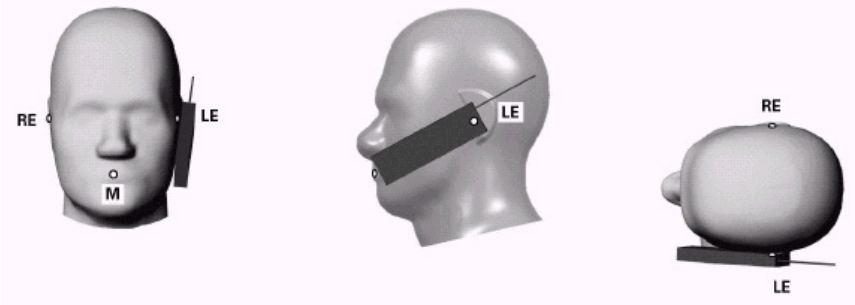


Figure 7-1 Front, Side and Top View of Cheek/Touch Position

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 phone contact with the ear, the handset was rotated about the line NF until any point on the handset made contact with a phantom point below the ear (cheek) (See Figure 7-2).

7.3 Positioning for Ear / 15º Tilt

With the test device aligned in the “Cheek/Touch 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 15degree.
2. The phone was then rotated around the horizontal line by 15 degree.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the phone touches 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 7-2).

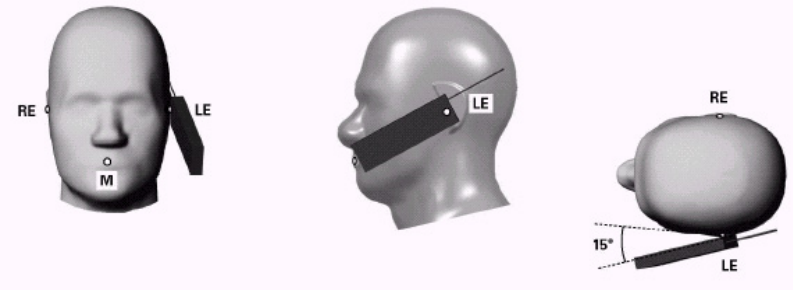


Figure 7-2 Front, Side and Top View of Ear/15º Tilt Position

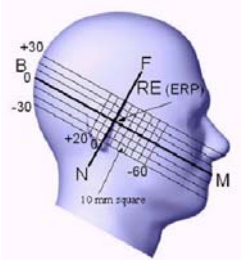


Figure 7-3
Side view w/ relevant markings

Figure 7-4 Body SAR Sample Photo
(Not Actual EUT)

7.4 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 publication 648474. The SAR required in these regions of SAM should be measured using a flat phantom. **Rectangular shaped phones** should be positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM. The ear reference point (ERP, as defined for SAM) of the phone should be positioned ½ cm from the flat phantom shell. **Clam-shell phones** should be positioned with the hinge against a smooth edge of the flat phantom where the upper half of the phone is unfolded and extended beyond the phantom side wall. The lower half of the phone is secured in the test device holder at a fixed distance below the flat phantom determined by the minimum separation along the lower edge of the phone in the cheek touching position using SAM. Any case with substantial variation in separation distance along the lower edge of a clam shell is discussed with the FCC for best-to-use methodology.

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.

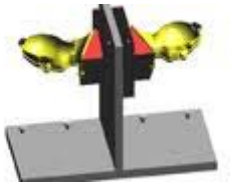


Figure 7-5 Twin SAM Chin20

7.5 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 7-4). A device with a headset output is tested with a headset connected to the device.

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.

7.6 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive internet connectivity through simultaneous transmission of WIFI in conjunction with a separate licensed transmitter. The FCC has provided guidance in KDB Publication 941225 D06 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 with antennas 2.5 cm or closer to the edge of the device, 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. Therefore, SAR must be evaluated for each frequency transmission and mode separately and summed with the WIFI transmitter according to KDB 648474 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

8 FCC RF EXPOSURE LIMITS

8.1 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.

8.2 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 8-1
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.

9 FCC MEASUREMENT PROCEDURES

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

9.1 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.

9.2 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.

9.2.1 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 9-1 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 9-2 was applied.
5. FCHs were configured at full rate for maximum SAR with "All Up" power control bits.

Table 9-1
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 9-2
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

9.2.2 CDMA2000 1x Advanced

This device additionally supports 1x Advanced. Conducted powers were measured using SO75 with RC8 on the uplink and RC11 on the downlink per Oct 2011 TCB Workshop notes. Smart blanking was disabled for all measurements. The EUT was configured with forward power control Mode 000 and reverse power control at 400 bps. Conducted powers were measured on an Agilent 8960 Series

10 Wireless Communications Test Set, Model E5515C using the CDMA2000 1x Advanced application, Option E1962B-410.

Based on the maximum output power measured for 1x Advanced, SAR would have to be evaluated for 1x advanced if the maximum output for 1x Advanced is more than 0.25 dB higher than the maximum measured for 1x. Also, if the measured SAR in any 1x mode exposure conditions (head, body etc.) is larger than 1.2 W/kg, the highest of those configurations above 1.2 W/kg for each exposure condition in 1x Advanced has to be repeated. All measured SAR in 1x mode higher than 1.5 W/kg must be repeated for 1x Advanced.

9.2.3 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 for EVDO Rev. A to determine VoIP compliance. See Section 9.2.5 for EVDO Rev. A configuration parameters.

9.2.4 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.

9.2.5 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.

9.2.6 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. Both FTAP and FETAP are configured with a Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots. AT power control should be in "All Bits Up" conditions for TAP/ETAP

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.

9.3 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes following 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.

9.3.1 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. See Section 10.2 for MPR targets.

9.3.2 A-MPR

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

9.3.3 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05:

a. Per Page 4, 3) A), QPSK with 50% RB is required for the highest bandwidth.
b. Per Page 4, footnote 2, when the maximum output power across high, mid., and low channels is < 0.5 dB, mid channel is tested. Low and high channel SAR tests are not required for QPSK, 50% RB allocation when the SAR is < 0.8 W/kg.
c. Per Page 4, 3) B), QPSK with 1 RB for both channel edges are required for the highest bandwidth.
d. Per Page 4, footnote 6, QPSK 1 RB allocation SAR tests were performed on the highest output power channel for the RB allocation when the average output power of the 1 RB allocation was > 0.5 dB higher than the 50% RB allocation for QPSK. Otherwise, SAR tests are performed on the channel that produced the highest SAR for QPSK with 50% RB. 1 RB low and high offset configurations are considered together for a single channel selection.
e. Per Page 4, 3) B), I), when the SAR for QPSK 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
f. Per Page 4, 4) A), 16QAM with 50% RB is required for the highest bandwidth on the channel with the highest measured SAR for QPSK with 50% RB allocation.
g. Per Page 4, 4) A), I), when the SAR for 16 QAM, 50 % allocation tests is <1.45 W/kg, testing on the other channels is not required.

h. Per Page 4, 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth on the highest output power channel for the 1 RB allocation when the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation for 16 QAM. Otherwise, SAR tests are performed on the channel that produced the highest SAR for 16 QAM with 50% RB. 1 RB low and high offset configurations are considered together for a single channel selection.
i. Per Page 5, 4) B), I), when the SAR for 16 QAM 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
j. Per Page 4, 4), A) I) and Page 5, 4), A)I, 100% RB Allocation is not required to be tested when the SAR is not > 1.45 W/kg for the highest bandwidth.
k. Per Page 5, 5) B) I), smaller bandwidths are not required to be tested when SAR is not > 1.45 W/kg for the highest bandwidth and the maximum average output power of the smaller bandwidths across all channels and configurations is not more than 0.5 dB higher than the higher bandwidths.

9.4 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 for more details.

9.4.1 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.

9.4.2 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.

10 STANDALONE RF CONDUCTED POWERS

10.1 Standalone CDMA Conducted Powers

Band	Channel	Frequency	SO55 [dBm]	SO55 [dBm]	SO75 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC	MHz	RC1	RC3	RC11	FCH+SCH	FCH	(RTAP)	(RETAP)
Cell. CDMA/EVDO - FCC Rule Part 90S	564	820.1	25.14	25.06	25.13	25.09	25.09	25.13	25.08
Cell. CDMA/EVDO - FCC Rule Part 22H	1013	824.7	25.15	25.06	24.95	25.04	24.99	25.13	25.12
	384	836.52	25.14	25.07	25.01	24.97	24.95	25.19	25.16
	777	848.31	25.06	24.96	24.98	24.99	24.98	25.09	25.08
PCS CDMA/EVDO - FCC Rule Part 24E	25	1851.25	25.02	25.09	25.12	25.02	25.02	24.95	24.94
	600	1880	25.11	25.06	25.17	25.07	25.05	25.02	25.01
	1175	1908.75	25.19	25.06	25.18	25.19	25.10	25.16	25.13

Note: RC1 is only applicable for IS-95 compatibility. For FCC Rule Part 90S, per FCC KDB Publication 447498 6) c), only one channel is required since the transmission band is from 817.90 – 823.10 MHz.

Per KDB Publication 941225 D01:

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. EVDO SAR (Hotspot) is measured using Subtype 0/1 Physical Layer configurations for Rev. 0. When the maximum output power of Rev. A for each channel is greater than the Rev. 0 power, Rev. A must additionally be tested using the highest output channel for the configuration that resulted in the highest SAR for Rev. 0.
4. CDMA 1x-RTT SAR was required to be evaluated for Hotspot exposure conditions to support simultaneous capabilities per **Table 1-2**.
5. Head SAR was additionally evaluated for EVDO Rev. A to determine SAR compliance for VoIP over EVDO.

Per Oct 2011 TCB Workshop:

1. The maximum output powers for 1x Advanced was not more than 0.25 dB higher than the maximum measured powers for 1x. CDMA 1x Advanced was required for SAR only when the measured 1x SAR for an exposure condition was more than 1.2 W/kg. When required, 1x Advanced SAR was measured using the highest configuration above 1.2 W/kg for each exposure condition. See Section 9.2.2 for 1x Advanced test set up.
2. CDMA 1x Advanced SO75 power measurement was used with RC8 on the uplink and RC11 on the downlink.

Figure 10-1
Power Measurement Setup

10.2 Standalone LTE Conducted Powers

10.2.1 LTE Band 25 (PCS)

Table 10-1
LTE Band 25 (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	26065	5	QPSK	1	0	23.26	0	0
	1852.5	26065	5	QPSK	1	24	23.44	0	0
	1852.5	26065	5	QPSK	12	6	22.48	1	0-1
	1852.5	26065	5	QPSK	25	0	22.35	1	0-1
	1852.5	26065	5	16-QAM	1	0	22.43	1	0-1
	1852.5	26065	5	16-QAM	1	24	22.49	1	0-1
	1852.5	26065	5	16-QAM	12	6	21.45	2	0-2
	1852.5	26065	5	16-QAM	25	0	21.30	2	0-2
Mid	1882.5	26365	5	QPSK	1	0	23.22	0	0
	1882.5	26365	5	QPSK	1	24	23.49	0	0
	1882.5	26365	5	QPSK	12	6	22.50	1	0-1
	1882.5	26365	5	QPSK	25	0	22.33	1	0-1
	1882.5	26365	5	16-QAM	1	0	22.46	1	0-1
	1882.5	26365	5	16-QAM	1	24	22.48	1	0-1
	1882.5	26365	5	16-QAM	12	6	21.50	2	0-2
	1882.5	26365	5	16-QAM	25	0	21.34	2	0-2
High	1912.5	26665	5	QPSK	1	0	23.50	0	0
	1912.5	26665	5	QPSK	1	24	23.46	0	0
	1912.5	26665	5	QPSK	12	6	22.41	1	0-1
	1912.5	26665	5	QPSK	25	0	22.37	1	0-1
	1912.5	26665	5	16-QAM	1	0	22.41	1	0-1
	1912.5	26665	5	16-QAM	1	24	22.40	1	0-1
	1912.5	26665	5	16-QAM	12	6	21.45	2	0-2
	1912.5	26665	5	16-QAM	25	0	21.40	2	0-2

Table 10-2
LTE Band 25 (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	26090	10	QPSK	1	0	23.40	0	0
	1855	26090	10	QPSK	1	49	23.44	0	0
	1855	26090	10	QPSK	25	12	22.24	1	0-1
	1855	26090	10	QPSK	50	0	22.15	1	0-1
	1855	26090	10	16QAM	1	0	22.43	1	0-1
	1855	26090	10	16QAM	1	49	22.42	1	0-1
	1855	26090	10	16QAM	25	12	21.31	2	0-2
	1855	26090	10	16QAM	50	0	21.15	2	0-2
Mid	1882.5	26365	10	QPSK	1	0	23.49	0	0
	1882.5	26365	10	QPSK	1	49	23.46	0	0
	1882.5	26365	10	QPSK	25	12	**22.30**	1	0-1
	1882.5	26365	10	QPSK	50	0	22.17	1	0-1
	1882.5	26365	10	16QAM	1	0	22.28	1	0-1
	1882.5	26365	10	16QAM	1	49	22.29	1	0-1
	1882.5	26365	10	16QAM	25	12	**21.47**	2	0-2
	1882.5	26365	10	16QAM	50	0	21.32	2	0-2
High	1910	26640	10	QPSK	1	0	**23.30**	0	0
	1910	26640	10	QPSK	1	49	**23.50**	0	0
	1910	26640	10	QPSK	25	12	22.43	1	0-1
	1910	26640	10	QPSK	50	0	22.38	1	0-1
	1910	26640	10	16QAM	1	0	**22.32**	1	0-1
	1910	26640	10	16QAM	1	49	**22.48**	1	0-1
	1910	26640	10	16QAM	25	12	21.49	2	0-2
	1910	26640	10	16QAM	50	0	21.38	2	0-2

Notes:

1. Please refer to Section 9.3.3 for LTE testing requirements per FCC KDB 941225 D05.
2. The bolded powers were tested for SAR.

Figure 10-2
Power Measurement Setup

10.3 WLAN Conducted Powers

Table 10-3
IEEE 802.11b Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 1	2	5.5	11
802.11b	2412	1	16.58	16.80	16.81	16.88
802.11b	2437	6	**16.64**	16.21	16.66	16.49
802.11b	2462	11	16.20	15.96	16.06	16.07

Table 10-4
IEEE 802.11g Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 6	9	12	18	24	36	48	54
802.11g	2412	1	12.80	12.13	10.84	10.54	12.45	10.55	11.12	11.75
802.11g	2437	6	12.75	12.29	11.30	10.50	12.69	12.65	11.44	12.00
802.11g	2462	11	12.73	12.47	11.53	11.24	12.71	11.62	11.68	12.13

Table 10-5
IEEE 802.11n Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 6.5	13	20	26	39	52	58	65
802.11n	2412	1	10.83	10.70	10.00	9.95	9.82	10.33	10.86	11.92
802.11n	2437	6	11.05	11.22	10.19	9.85	9.82	11.08	11.79	11.76
802.11n	2462	11	11.11	11.33	10.24	9.47	9.36	11.01	11.58	11.61

Table 10-6
IEEE 802.11a Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 6	9	12	18	24	36	48	54
802.11a	5180	36*	12.17	12.18	12.20	12.21	12.16	12.19	12.11	12.18
802.11a	5200	40	12.15	12.23	12.02	12.13	12.13	12.13	12.20	12.17
802.11a	5220	44	12.17	12.19	12.18	11.93	11.95	12.09	12.06	12.11
802.11a	5240	48*	**12.96**	12.93	12.93	12.79	12.88	12.81	12.83	12.86
802.11a	5260	52*	12.87	12.83	12.80	12.80	12.86	12.76	12.94	12.73
802.11a	5280	56	12.94	12.92	12.86	12.87	12.90	12.90	12.97	12.93
802.11a	5300	60	**12.97**	12.94	12.94	12.96	12.91	12.91	12.85	12.97
802.11a	5320	64*	12.25	12.23	12.34	12.17	12.31	12.17	12.19	12.19
802.11a	5500	100	12.20	12.44	12.18	12.06	12.12	12.20	12.11	12.17
802.11a	5520	104*	12.46	12.46	12.39	12.26	12.42	12.27	12.46	12.52
802.11a	5540	108	12.34	12.41	12.35	12.25	12.31	12.37	12.36	12.36
802.11a	5560	112	11.77	11.72	11.90	11.72	11.78	11.77	11.77	11.83
802.11a	5580	116*	11.52	11.57	11.41	11.46	11.60	11.57	11.48	11.36
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	11.40	11.28	11.17	11.03	11.43	11.24	11.12	11.19
802.11a	5680	136*	11.49	11.31	10.90	10.77	11.42	10.91	10.86	11.33
802.11a	5700	140	**12.65**	12.69	12.10	11.67	12.52	12.13	12.19	12.57
802.11a	5745	149*	12.19	12.16	11.80	11.87	12.25	11.99	11.83	11.85
802.11a	5765	153	12.38	12.09	11.67	11.59	12.24	11.85	11.75	12.14
802.11a	5785	157*	**12.88**	12.82	12.51	12.54	12.95	12.41	12.50	12.90
802.11a	5805	161*	12.02	12.05	11.64	11.68	12.20	11.66	11.78	12.25
802.11a	5825	165	12.10	12.03	11.92	11.88	12.20	11.95	11.66	12.24

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. When the adjacent channels are higher in power then the default channels, these “required channels” are considered instead of the default channels for SAR testing.

Table 10-7
IEEE 802.11n Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 6.5	13	20	26	39	52	58	65
802.11n	5180	36*	10.89	10.81	10.85	10.80	10.78	10.80	10.81	10.89
802.11n	5200	40	10.85	10.92	10.91	10.83	10.86	10.92	10.85	10.84
802.11n	5220	44	10.88	10.83	10.87	10.79	10.81	10.81	10.83	10.84
802.11n	5240	48*	11.94	11.98	11.76	11.63	11.78	11.94	11.96	11.93
802.11n	5260	52*	11.89	11.93	11.55	11.57	11.47	11.91	11.83	11.94
802.11n	5280	56	11.91	11.88	11.83	11.86	11.87	11.94	11.96	11.98
802.11n	5300	60	11.95	11.91	11.90	11.90	11.94	11.94	11.84	11.97
802.11n	5320	64*	10.88	11.02	11.04	10.99	10.89	11.06	10.99	10.98
802.11n	5500	100	10.96	11.10	10.83	10.86	10.80	11.15	11.02	11.23
802.11n	5520	104*	11.33	11.30	11.31	11.34	11.40	11.31	11.30	11.28
802.11n	5540	108	11.24	11.19	11.37	11.24	11.14	11.18	11.22	11.10
802.11n	5560	112	10.87	10.85	10.55	10.64	10.52	10.92	10.99	11.02
802.11n	5580	116*	10.51	10.61	10.30	10.32	10.21	10.53	10.74	10.75
802.11n	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	10.61	10.72	10.29	9.99	9.85	10.52	10.70	10.80
802.11n	5680	136*	10.34	10.25	9.98	10.08	9.79	10.48	10.52	10.55
802.11n	5700	140	11.39	11.51	11.13	11.36	10.89	11.42	11.48	11.60
802.11n	5745	149*	10.98	11.06	10.92	10.88	10.89	10.91	10.97	10.98
802.11n	5765	153	11.06	11.22	10.74	10.63	10.75	11.19	11.26	11.30
802.11n	5785	157*	11.33	11.09	10.94	10.89	10.84	11.13	11.52	11.35
802.11n	5805	161*	10.92	10.96	10.71	10.51	10.52	10.84	10.91	11.99
802.11n	5825	165	11.10	11.18	10.65	10.42	10.36	11.10	11.24	11.34

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 Bands. (*) – indicates default channels per KDB Publication 248227. When the adjacent channels are higher in power then the default channels, these “required channels” are considered instead of the default channels for SAR testing.
Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 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) 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 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 10-3
Power Measurement Setup

11 LTE POWER REDUCTION

11.1 Introduction to LTE Power Reduction

This device is capable of Simultaneous Voice and LTE (SVLTE) calls, with the voice call supported by a CDMA 1xRTT transmitter and the data connection supported by a separate LTE transmitter. A LTE power reduction scheme is applied during a LTE connection operating simultaneously with 1xRTT voice calls. The maximum transmit power of LTE is limited depending on the CDMA 1x voice transmit power level. When CDMA 1x Voice is operating at a certain range of high power levels, the maximum LTE transmit power is limited. When CDMA 1x Voice transmit power is below a certain threshold transmit power level, LTE can transmit at the maximum power. Target levels of power reduction and CDMA voice threshold levels are provided in Table 11-1.

Table 11-1
SVLTE Power Reduction Scheme

Mode	CDMA Current Voice Power for BC0, BC1, & BC10	LTE Max Power for B25
SVLTE	P < 17.5	22.8
	P ≥ 17.5	18.8

11.2 Output Power Verification

Per KDB Publication 941225 D05, 5) B), output powers were measured in SVLTE mode to determine that the power reduction mechanism was operating reliably and consistently. The power reduction was investigated by simultaneously connecting the device to both LTE and CDMA base station simulators. LTE output powers were measured through conducted RF connections by first connecting the device in a LTE data call and subsequently a CDMA 1x-RTT call. CDMA powers were controlled by configuring the CDMA base station simulator to active bits. The LTE output power was monitored while changing the cell output power level.

The power reduction targets and threshold level described in **Table 11-1** were confirmed. Please see results in Table 11-2.

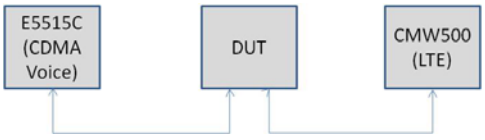


Figure 11-1
SVLTE Conducted Test Setup Diagram

Table 11-2
SVLTE Power Reduction Verification Results

BC10 1x-RTT CDMA Voice Channel	BC10 1x-RTT CDMA Voice Tx(dBm)	LTE Band 25 channel 26365 (Mid) Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
564 (Mid)	24	19.48	19.35	19.35	19.28	19.21	19.13	19.32	19.32
	18	19.41	19.36	19.18	19.13	19.15	19.13	19.22	19.32
	17.5	19.44	19.28	19.16	19.25	19.11	19.14	19.19	19.21
	17	23.17	23.11	22.35	22.33	22.11	22.22	21.32	21.14
	11	23.15	23.12	22.15	22.13	22.21	22.22	21.15	21.22

BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx(dBm)	LTE Band 25 channel 26365 (Mid) Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
1013 (Low)	24	19.21	19.15	19.27	19.30	19.25	19.28	19.33	19.23
	18	19.52	19.41	19.28	19.10	19.10	19.11	19.27	19.29
	17.5	19.27	19.48	19.31	19.19	19.28	19.27	19.11	19.41
	17	23.41	23.32	22.34	22.45	22.17	22.41	21.18	21.18
	11	23.35	23.31	22.29	22.25	22.28	22.37	21.46	21.44

BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx(dBm)	LTE Band 25 channel 26365 (Mid) Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
384 (Mid)	24	19.35	19.45	19.27	19.19	19.33	19.29	19.32	19.28
	18	19.44	19.37	19.28	19.49	19.50	19.42	19.17	19.40
	17.5	19.36	19.46	19.15	19.38	19.37	19.28	19.17	19.46
	17	23.09	23.22	22.17	22.38	22.45	22.51	21.24	21.54
	11	23.37	23.41	22.45	22.43	22.53	22.42	20.57	21.49

BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx(dBm)	LTE Band 25 channel 26365 (Mid) Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
777 (High)	24	19.49	19.58	19.35	19.34	19.23	19.32	19.32	19.23
	18	19.53	19.54	19.32	19.35	19.38	19.32	19.46	19.23
	17.5	19.48	19.37	19.35	19.28	19.20	19.41	19.36	19.28
	17	23.31	23.43	22.33	22.30	22.34	22.54	21.49	21.53
	11	23.38	23.40	22.45	22.47	22.47	22.46	21.47	21.58

BC1 1x-RTT CDMA Voice Channel	BC1 1x-RTT CDMA Voice Tx(dBm)	LTE Band 25 channel 26365 (Mid) Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
25 (Low)	24	19.33	19.48	19.35	19.38	19.33	19.51	19.23	19.33
	18	19.50	19.42	19.38	19.25	19.20	19.23	19.30	19.24
	17.5	19.54	19.43	19.33	19.27	19.30	19.24	19.32	19.38
	17	23.46	23.47	22.45	22.33	22.23	22.33	21.33	21.29
	11	23.46	23.47	22.37	22.47	22.45	22.37	21.48	21.44

BC1 1x-RTT CDMA Voice Channel	BC1 1x-RTT CDMA Voice Tx(dBm)	LTE Band 25 channel 26365 (Mid) Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
600 (Mid)	24	19.36	19.38	19.35	19.47	19.33	19.53	19.22	19.28
	18	19.41	19.47	19.38	19.27	19.32	19.42	19.22	19.51
	17.5	19.45	19.36	19.35	19.38	19.29	19.27	19.31	19.35
	17	23.38	23.41	22.37	22.38	22.47	22.38	21.46	21.51
	11	22.41	23.41	22.47	22.43	22.50	22.42	21.46	21.49

BC1 1x-RTT CDMA Voice Channel	BC1 1x-RTT CDMA Voice Tx(dBm)	LTE Band 25 channel 26365 (Mid) Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
1175 (High)	24	19.39	19.51	19.35	19.34	19.31	19.32	19.32	19.47
	18	19.45	19.46	19.32	19.35	19.42	19.32	19.46	19.23
	17.5	19.51	19.53	19.38	19.24	19.45	19.34	19.45	19.41
	17	23.31	23.50	22.33	22.34	22.43	22.56	21.49	21.50
	11	23.38	23.40	22.47	22.45	22.47	22.49	21.47	21.50

11.3 SVLTE SAR Testing Procedures

Per KDB 941225 D05, additional SAR testing was not required for the devices with power reduction mechanisms active for LTE and 1x-RTT CDMA modes with respect to the simultaneous transmission scenarios. Additional SAR testing at reduced power levels was excluded based upon the simultaneous SAR sums and simultaneous transmission SAR evaluations for standalone LTE and standalone 1x-RTT CDMA SAR at the maximum output power levels (see Section 14).

12 SYSTEM VERIFICATION

12.1 Tissue Verification

Table 12-1
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
08/12/2012	835H	24.9	820	0.885	41.65	0.898	41.571	-1.45%	0.19%
			835	0.900	41.47	0.900	41.500	0.00%	-0.07%
			850	0.916	41.31	0.916	41.500	0.00%	-0.46%
8/20/2012	835H	22.9	820	0.868	40.78	0.898	41.571	-3.34%	-1.90%
			835	0.881	40.72	0.900	41.500	-2.11%	-1.88%
			850	0.892	40.54	0.916	41.500	-2.62%	-2.31%
8/22/2012	835H	24.3	820	0.878	39.83	0.898	41.571	-2.23%	-4.19%
			835	0.892	39.60	0.900	41.500	-0.89%	-4.58%
			850	0.907	39.47	0.916	41.500	-0.98%	-4.89%
08/09/2012	1900H	22.9	1850	1.334	38.38	1.400	40.000	-4.71%	-4.05%
			1880	1.364	38.34	1.400	40.000	-2.57%	-4.15%
			1910	1.410	38.21	1.400	40.000	0.71%	-4.48%
08/12/2012	1900H	22.9	1850	1.359	39.07	1.400	40.000	-2.93%	-2.33%
			1880	1.386	38.93	1.400	40.000	-1.00%	-2.68%
			1910	1.416	38.84	1.400	40.000	1.14%	-2.90%
8/16/2012	1900H	22.8	1850	1.367	39.37	1.400	40.000	-2.36%	-1.58%
			1880	1.419	39.36	1.400	40.000	1.36%	-1.60%
			1910	1.439	39.17	1.400	40.000	2.79%	-2.08%
8/23/2012	1900H	22.5	1850	1.373	41.19	1.400	40.000	-1.93%	2.97%
			1880	1.419	41.00	1.400	40.000	1.36%	2.50%
			1910	1.455	40.90	1.400	40.000	3.93%	2.25%
8/14/2012	2450H	22.3	2401	1.784	38.85	1.758	39.298	1.48%	-1.14%
			2450	1.850	38.64	1.800	39.200	2.78%	-1.43%
			2499	1.905	38.50	1.852	39.135	2.86%	-1.62%
8/21/2012	2450H	23.9	2401	1.816	39.10	1.758	39.298	3.30%	-0.50%
			2450	1.860	39.12	1.800	39.200	3.33%	-0.20%
			2499	1.939	38.93	1.852	39.135	4.70%	-0.52%
08/13/2012	5200H-5800H	24.8	5200	4.576	37.11	4.660	36.000	-1.80%	3.08%
			5240	4.594	37.00	4.700	35.960	-2.26%	2.89%
			5300	4.681	36.89	4.760	35.900	-1.66%	2.76%
			5500	4.826	36.73	4.965	35.650	-2.80%	3.03%
			5700	5.052	36.34	5.170	35.400	-2.28%	2.66%
			5785	5.103	36.27	5.255	35.315	-2.89%	2.70%
			5800	5.136	36.21	5.270	35.300	-2.54%	2.58%
8/9/2012	835B	23.4	820	0.992	55.35	0.969	55.284	2.37%	0.12%
			835	1.006	55.24	0.970	55.200	3.71%	0.07%
			850	1.021	55.10	0.988	55.154	3.34%	-0.10%
8/10/2012	1900B	22.3	1850	1.498	51.61	1.520	53.300	-1.45%	-3.17%
			1880	1.523	51.59	1.520	53.300	0.20%	-3.21%
			1910	1.561	51.31	1.520	53.300	2.70%	-3.73%
8/12/2012	1900B	23.2	1850	1.486	52.93	1.520	53.300	-2.24%	-0.69%
			1880	1.507	52.82	1.520	53.300	-0.86%	-0.90%
			1910	1.540	52.68	1.520	53.300	1.32%	-1.16%
8/15/2012	2450B	22.9	2401	1.866	51.56	1.903	52.765	-1.94%	-2.28%
			2450	1.964	51.27	1.950	52.700	0.72%	-2.71%
			2499	2.017	51.05	2.019	52.638	-0.10%	-3.02%
08/14/2012	5200B-5800B	23.2	5200	5.284	47.68	5.299	49.014	-0.28%	-2.72%
			5240	5.347	47.53	5.346	48.933	0.02%	-2.87%
			5300	5.439	47.40	5.416	48.851	0.42%	-2.97%
			5500	5.727	46.87	5.650	48.580	1.36%	-3.52%
			5700	6.054	46.43	5.880	48.275	2.96%	-3.82%
			5785	6.188	46.23	5.982	48.242	3.44%	-4.17%
			5800	6.210	46.17	6.000	48.200	3.50%	-4.21%

Note: KDB Publication 450824 was ensured to be applied for probe calibration frequencies greater than or equal to 50 MHz of the DUT frequencies.

The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies (per IEEE 1528 6.6.1.2).

Probe calibration used within ±100 MHz of the test frequency in either 5.725 - 5.85 or 5.47-5.725 GHz is acceptable per KDB Publication 865664 since the design of the SAR probe supports the extended frequency, provided the DASY software version recommended is used for the tests, and the expanded calibration uncertainty (k=2) is less than or equal to 15% (See SAR probe calibration certificate for this information). The dielectric and conductivities measured are within 10% and 5% respectively of the target parameters specified in Supplement C 01-01.

12.2 Measurement Procedure for Tissue verification

1) The network analyzer and probe system was configured and calibrated.
2) The probe was immersed in the sample which was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
3) The complex admittance with respect to the probe aperture was measured
4) The complex relative permittivity ε' can be calculated from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\varepsilon_r\varepsilon_0}{\left[\ln\left(b/a\right)\right]^2}\int_a^b\int_a^b\int_0^\pi \cos\phi' \frac{\exp\left[-j\omega r(\mu_0\varepsilon_r^{'}\varepsilon_0)^{1/2}\right]}{r} d\phi' d\rho' d\rho$$

where *Y* is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively, $r^2 = \rho^2 + \rho'^2 - 2\rho\rho'\cos\phi'$, ω is the angular frequency, and $j = \sqrt{-1}$.

12.3 Test System Verification

Prior to assessment, the system is verified to ±10% of the manufacturer SAR measurement on the reference dipole at the time of calibration.

Table 12-2
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 (%)
835	Head	08/12/2012	24.4	23.1	0.100	4d119	3258	0.944	9.420	9.440	0.21%
835	Head	08/20/2012	23.5	22.8	0.100	4d047	3287	0.994	9.410	9.940	5.63%
835	Head	08/22/2012	24.7	23.7	0.100	4d119	3258	0.962	9.420	9.620	2.12%
1900	Head	08/09/2012	22.5	22.3	0.100	5d149	3287	3.90	39.300	39.000	-0.76%
1900	Head	08/12/2012	23.3	23.0	0.100	502	3022	3.88	39.200	38.800	-1.02%
1900	Head	08/16/2012	23.9	23.0	0.100	5d148	3213	4.13	40.500	41.300	1.98%
1900	Head	08/23/2012	23.9	22.7	0.100	5d149	3287	4.18	39.300	41.800	6.36%
2450	Head	08/14/2012	22.1	22.2	0.100	882	3288	5.58	53.500	55.800	4.30%
2450	Head	08/21/2012	24.6	22.7	0.100	882	3288	5.75	53.500	57.500	7.48%
5200	Head	08/13/2012	24.4	23.6	0.100	1057	3589	7.44	79.100	74.400	-5.94%
5500	Head	08/13/2012	24.6	23.6	0.100	1057	3589	8.14	84.900	81.400	-4.12%
5800	Head	08/13/2012	24.6	23.8	0.100	1057	3589	7.59	79.500	75.900	-4.53%
835	Body	08/09/2012	21.6	21.4	0.100	4d119	3258	0.994	9.560	9.940	3.97%
1900	Body	08/10/2012	20.4	20.7	0.100	5d149	3287	3.99	39.300	39.900	1.53%
1900	Body	08/12/2012	22.9	22.7	0.100	502	3022	3.68	38.900	36.800	-5.40%
2450	Body	08/15/2012	22.1	22.1	0.100	882	3288	5.19	50.300	51.900	3.18%
5200	Body	08/14/2012	23.4	22.3	0.100	1057	3589	7.59	73.400	75.900	3.41%
5500	Body	08/14/2012	23.5	22.4	0.100	1057	3589	7.64	78.900	76.400	-3.17%
5800	Body	08/14/2012	23.5	22.4	0.100	1057	3589	7.21	74.300	72.100	-2.96%

Note: Per KDB Publication 865664, when a reference dipole is not defined within ±100MHz of the test frequency, the system verification may be conducted within ± 200 MHz of the center frequency of the measurement frequencies if the SAR probe calibration is valid and the same tissue-equivalent matter is used for verification and test measurements.

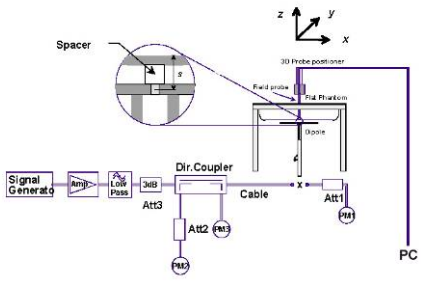


Figure 12-1
System Verification Setup Diagram

Figure 12-2
System Verification Setup Photo

13 SAR DATA SUMMARY

13.1 Standalone Head SAR Data

Table 13-1
Cell. CDMA/EVDO - FCC Rule Part 90S Head SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Mode/Band	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.								(W/kg)
820.10	564	Cell. CDMA - FCC Rule Part 90S	CDMA SO55	25.06	0.03	Right	Cheek	#2	0.406
820.10	564	Cell. CDMA - FCC Rule Part 90S	CDMA SO55	25.06	-0.02	Right	Tilt	#2	0.254
820.10	564	Cell. CDMA - FCC Rule Part 90S	CDMA SO55	25.06	0.03	Left	Cheek	#2	**0.533**
820.10	564	Cell. CDMA - FCC Rule Part 90S	CDMA SO55	25.06	0.01	Left	Tilt	#2	0.282
820.10	564	Cell. EVDO - FCC Rule Part 90S	EVDO Rev. A	25.08	-0.04	Right	Cheek	#1	0.288
820.10	564	Cell. EVDO - FCC Rule Part 90S	EVDO Rev. A	25.08	-0.03	Right	Tilt	#1	0.230
820.10	564	Cell. EVDO - FCC Rule Part 90S	EVDO Rev. A	25.08	0.05	Left	Cheek	#1	**0.472**
820.10	564	Cell. EVDO - FCC Rule Part 90S	EVDO Rev. A	25.08	0.07	Left	Tilt	#1	0.259
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g) averaged over 1 gram**			

Table 13-2
Cell. CDMA/EVDO - FCC Rule Part 22H Head SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Mode/Band	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.								(W/kg)
836.52	384	Cell. CDMA - FCC Rule Part 22H	CDMA SO55	25.07	0.05	Right	Cheek	#2	0.351
836.52	384	Cell. CDMA - FCC Rule Part 22H	CDMA SO55	25.07	-0.06	Right	Tilt	#2	0.203
836.52	384	Cell. CDMA - FCC Rule Part 22H	CDMA SO55	25.07	0.00	Left	Cheek	#2	**0.456**
836.52	384	Cell. CDMA - FCC Rule Part 22H	CDMA SO55	25.07	-0.08	Left	Tilt	#2	0.248
836.52	384	Cell. EVDO - FCC Rule Part 22H	EVDO Rev. A	25.16	0.00	Right	Cheek	#1	0.383
836.52	384	Cell. EVDO - FCC Rule Part 22H	EVDO Rev. A	25.16	-0.10	Right	Tilt	#1	0.264
836.52	384	Cell. EVDO - FCC Rule Part 22H	EVDO Rev. A	25.16	-0.02	Left	Cheek	#1	**0.517**
836.52	384	Cell. EVDO - FCC Rule Part 22H	EVDO Rev. A	25.16	-0.06	Left	Tilt	#1	0.279
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g) averaged over 1 gram**			

Table 13-3
PCS CDMA/EVDO - FCC Rule Part 24E Head SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Mode/Band	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.								(W/kg)
1880.00	600	PCS CDMA - FCC Rule Part 24E	CDMA SO55	25.06	-0.06	Right	Cheek	#2	0.355
1880.00	600	PCS CDMA - FCC Rule Part 24E	CDMA SO55	25.06	0.04	Right	Tilt	#2	0.182
1880.00	600	PCS CDMA - FCC Rule Part 24E	CDMA SO55	25.06	0.04	Left	Cheek	#2	**0.422**
1880.00	600	PCS CDMA - FCC Rule Part 24E	CDMA SO55	25.06	-0.03	Left	Tilt	#2	0.196
1880.00	600	PCS EVDO - FCC Rule Part 24E	EVDO Rev. A	25.01	-0.07	Right	Cheek	#2	0.322
1880.00	600	PCS EVDO - FCC Rule Part 24E	EVDO Rev. A	25.01	-0.06	Right	Tilt	#2	0.192
1880.00	600	PCS EVDO - FCC Rule Part 24E	EVDO Rev. A	25.01	0.02	Left	Cheek	#2	**0.402**
1880.00	600	PCS EVDO - FCC Rule Part 24E	EVDO Rev. A	25.01	-0.11	Left	Tilt	#2	0.198
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g) averaged over 1 gram**			

Table 13-4
LTE Band 25 (PCS) – FCC Rule Part 24E Head SAR Results

MEASUREMENT RESULTS															
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	# of RB	RB Offset	Device Serial Number	SAR (1g)
MHz	Ch.													(W/kg)
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.30	-0.06	1	Right	Cheek	QPSK	25	12	#1	0.439
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.30	-0.01	0	Right	Cheek	QPSK	1	0	#1	**0.522**
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.50	-0.15	0	Right	Cheek	QPSK	1	49	#1	0.516
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	21.47	-0.03	2	Right	Cheek	16 QAM	25	12	#1	0.380
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.32	0.07	1	Right	Cheek	16 QAM	1	0	#1	0.404
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.48	-0.20	1	Right	Cheek	16 QAM	1	49	#1	0.450
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.30	-0.03	1	Right	Tilt	QPSK	25	12	#1	0.496
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.30	-0.10	0	Right	Tilt	QPSK	1	0	#1	**0.561**
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.50	-0.02	0	Right	Tilt	QPSK	1	49	#1	0.526
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	21.47	-0.06	2	Right	Tilt	16 QAM	25	12	#1	0.410
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.32	0.05	1	Right	Tilt	16 QAM	1	0	#1	0.465
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.48	0.02	1	Right	Tilt	16 QAM	1	49	#1	0.464
1855.00	26090	Low	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.24	0.09	1	Left	Cheek	QPSK	25	12	#1	0.800
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.30	0.01	1	Left	Cheek	QPSK	25	12	#1	0.947
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.43	0.04	1	Left	Cheek	QPSK	25	12	#1	1.100
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.30	-0.05	0	Left	Cheek	QPSK	1	0	#1	**1.260**
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.50	-0.15	0	Left	Cheek	QPSK	1	49	#1	1.250
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	21.49	0.01	2	Left	Cheek	16 QAM	25	12	#1	0.858
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.32	0.02	1	Left	Cheek	16 QAM	1	0	#1	0.976
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.48	-0.18	1	Left	Cheek	16 QAM	1	49	#1	1.000
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.30	-0.03	1	Left	Tilt	QPSK	25	12	#1	0.529
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.30	-0.13	0	Left	Tilt	QPSK	1	0	#1	**0.700**
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.50	-0.11	0	Left	Tilt	QPSK	1	49	#1	0.694
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	21.47	-0.01	2	Left	Tilt	16 QAM	25	12	#1	0.459
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.32	-0.20	1	Left	Tilt	16 QAM	1	0	#1	0.561
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.48	-0.12	1	Left	Tilt	16 QAM	1	49	#1	0.580
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								**Head 1.6 W/kg (mW/g) averaged over 1 gram**						

Note: Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% RB allocation, the highest output power for the 1 RB allocations is tested. Therefore, high channel was tested for the QPSK and 16QAM, 1 RB allocation configurations. 16QAM 50% RB allocation was tested on the highest measured SAR for QPSK 50% RB allocation.

Table 13-5
IEEE 802.11b – FCC Rule Part 15C, 2.4 GHz WLAN Head SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	SAR (1g)
MHz	Ch.									(W/kg)
2437	6	IEEE 802.11b - FCC Rule Part 15C	DSSS	16.64	0.09	Right	Cheek	#10	1	0.028
2437	6	IEEE 802.11b - FCC Rule Part 15C	DSSS	16.64	0.12	Right	Tilt	#10	1	0.014
2437	6	IEEE 802.11b - FCC Rule Part 15C	DSSS	16.64	0.05	Left	Cheek	#10	1	**0.073**
2437	6	IEEE 802.11b - FCC Rule Part 15C	DSSS	16.64	-0.14	Left	Tilt	#10	1	0.016
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g) averaged over 1 gram**				

Table 13-6
IEEE 802.11a – FCC Rule Part 15C, 5.8 GHz WLAN Head SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	SAR (1g)
MHz	Ch.									(W/kg)
5785	157	IEEE 802.11a - FCC Rule Part 15C	OFDM	12.88	0.13	Right	Cheek	#1	6	0.007
5785	157	IEEE 802.11a - FCC Rule Part 15C	OFDM	12.88	0.11	Right	Tilt	#1	6	0.027
5785	157	IEEE 802.11a - FCC Rule Part 15C	OFDM	12.88	0.18	Left	Cheek	#1	6	**0.077**
5785	157	IEEE 802.11a - FCC Rule Part 15C	OFDM	12.88	0.19	Left	Tilt	#1	6	0.005
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g) averaged over 1 gram**				

Table 13-7
IEEE 802.11a – FCC Rule Part 15E, 5.2 GHz WLAN Head SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	SAR (1g)
MHz	Ch.									(W/kg)
5240	48	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.96	0.12	Right	Cheek	#1	6	0.008
5240	48	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.96	0.14	Right	Tilt	#1	6	0.059
5240	48	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.96	0.04	Left	Cheek	#1	6	**0.149**
5240	48	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.96	-0.17	Left	Tilt	#1	6	0.096
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g) averaged over 1 gram**				

Table 13-8
IEEE 802.11a – FCC Rule Part 15E, 5.3 GHz WLAN Head SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	SAR (1g)
MHz	Ch.									(W/kg)
5300	60	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.97	-0.16	Right	Cheek	#1	6	0.003
5300	60	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.97	0.15	Right	Tilt	#1	6	0.070
5300	60	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.97	0.17	Left	Cheek	#1	6	**0.183**
5300	60	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.97	-0.11	Left	Tilt	#1	6	0.120
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g) **averaged over 1 gram				

Table 13-9
IEEE 802.11a – FCC Rule Part 15E, 5.5 - 5.7 GHz WLAN Head SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	SAR (1g)
MHz	Ch.									(W/kg)
5700	140	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.65	0.20	Right	Cheek	#1	6	0.003
5700	140	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.65	0.13	Right	Tilt	#1	6	0.021
5700	140	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.65	0.17	Left	Cheek	#1	6	**0.079**
5700	140	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.65	0.11	Left	Tilt	#1	6	0.028
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g) **averaged over 1 gram				

13.2 Standalone Body-Worn SAR Data

Table 13-10
CDMA Body-Worn SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Side	SAR (1g)
MHz	Ch.								(W/kg)
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.09	0.04	1.0 cm	#2	back	0.851
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	24.95	0.05	1.0 cm	#2	back	0.732
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.05	-0.03	1.0 cm	#2	back	0.757
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g) **averaged over 1 gram			

Note:

1. When the measured Hotspot SAR is less than 1.2 W/kg for the same device orientation and device transmission configurations, separate body-worn accessory data taken with a headset cable is not required. Therefore, hotspot back side SAR data was considered to determine body-worn SAR compliance.
2. CDMA 1x-RTT SAR was required to be evaluated for hotspot exposure configurations since there are simultaneous combinations (see **Table 1-2**) that allow hotspot transmissions using CDMA 1x-RTT.

Table 13-11
LTE Body-Worn SAR Results

MEASUREMENT RESULTS															
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.													(W/kg)
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.30	-0.04	1	#1	QPSK	25	12	1.0 cm	back	0.594
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.30	0.01	0	#1	QPSK	1	0	1.0 cm	back	**0.658**
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.50	-0.09	0	#1	QPSK	1	49	1.0 cm	back	0.647
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	21.47	0.03	2	#1	16 QAM	25	12	1.0 cm	back	0.491
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.32	0.04	1	#1	16 QAM	1	0	1.0 cm	back	0.502
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.48	-0.19	1	#1	16 QAM	1	49	1.0 cm	back	0.515
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								**Body 1.6 W/kg (mW/g) averaged over 1 gram**						

Note:

1. When the measured Hotspot SAR is less than 1.2 W/kg for the same device orientation and device transmission configurations, separate body-worn accessory data taken with a headset cable is not required. Therefore, hotspot back side SAR data was considered to determine body-worn SAR compliance.
2. Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% RB allocation, the highest output power for the 1 RB allocations is tested. Therefore, high channel was tested for the QPSK and 16 QAM, 1 RB allocation configurations.

Table 13-12
WLAN Body-Worn SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	SAR (1g)
MHz	Ch.									(W/kg)
2437	6	IEEE 802.11b - FCC Rule Part 15C	DSSS	16.64	-0.01	1.0 cm	#1	1	back	0.067
5785	157	IEEE 802.11a - FCC Rule Part 15C	OFDM	12.88	-0.14	1.0 cm	#1	6	back	0.073
5240	48	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.96	-0.18	1.0 cm	#1	6	back	**0.229**
5300	60	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.97	-0.07	1.0 cm	#1	6	back	0.177
5700	140	IEEE 802.11a - FCC Rule Part 15E	OFDM	12.65	-0.11	1.0 cm	#1	6	back	0.060
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g) averaged over 1 gram**				

Note: When the measured Hotspot SAR is less than 1.2 W/kg for the same device orientation and device transmission configurations, separate body-worn accessory data taken with a headset cable is not required. Therefore, hotspot back side SAR data was considered to determine IEEE 802.11b body-worn SAR compliance. IEEE 802.11a body-worn data was taken with headset cable attached.

13.3 Standalone Wireless Router SAR Data

Table 13-13
CDMA/EVDO Transmitter Hotspot SAR Data

MEASUREMENT RESULTS									
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Side	SAR (1g)
MHz	Ch.								(W/kg)
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.09	0.04	1.0 cm	#2	back	0.851
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.09	0.03	1.0 cm	#2	front	0.665
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.09	0.10	1.0 cm	#2	bottom	0.223
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.09	-0.02	1.0 cm	#2	left	**0.909**
820.10	564	Cell. EVDO - FCC Rule Part 90S	EVDO Rev. 0	25.13	-0.04	1.0 cm	#2	back	0.899
820.10	564	Cell. EVDO - FCC Rule Part 90S	EVDO Rev. 0	25.13	-0.03	1.0 cm	#2	front	0.644
820.10	564	Cell. EVDO - FCC Rule Part 90S	EVDO Rev. 0	25.13	-0.02	1.0 cm	#2	bottom	0.227
820.10	564	Cell. EVDO - FCC Rule Part 90S	EVDO Rev. 0	25.13	-0.12	1.0 cm	#2	left	0.898
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	24.95	0.05	1.0 cm	#2	back	0.732
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	24.95	-0.02	1.0 cm	#2	front	0.564
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	24.95	-0.02	1.0 cm	#2	bottom	0.255
824.70	1013	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	24.99	-0.03	1.0 cm	#2	left	0.923
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	24.95	0.01	1.0 cm	#2	left	0.838
848.31	777	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	24.98	-0.03	1.0 cm	#2	left	0.754
836.52	384	Cell. EVDO - FCC Rule Part 22H	EVDO Rev. 0	25.19	-0.09	1.0 cm	#2	back	0.772
836.52	384	Cell. EVDO - FCC Rule Part 22H	EVDO Rev. 0	25.19	-0.06	1.0 cm	#2	front	0.537
836.52	384	Cell. EVDO - FCC Rule Part 22H	EVDO Rev. 0	25.19	0.01	1.0 cm	#2	bottom	0.269
824.70	1013	Cell. EVDO - FCC Rule Part 22H	EVDO Rev. 0	25.13	-0.18	1.0 cm	#2	left	**0.939**
836.52	384	Cell. EVDO - FCC Rule Part 22H	EVDO Rev. 0	25.19	-0.13	1.0 cm	#2	left	0.850
848.31	777	Cell. EVDO - FCC Rule Part 22H	EVDO Rev. 0	25.09	-0.08	1.0 cm	#2	left	0.711
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.05	-0.03	1.0 cm	#2	back	0.757
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.05	-0.02	1.0 cm	#2	front	0.459
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.05	-0.08	1.0 cm	#2	bottom	0.376
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.05	0.00	1.0 cm	#2	left	0.324
1851.25	25	PCS EVDO - FCC Rule Part 24E	EVDO Rev. 0	24.95	0.03	1.0 cm	#2	back	0.796
1880.00	600	PCS EVDO - FCC Rule Part 24E	EVDO Rev. 0	25.02	0.00	1.0 cm	#2	back	0.998
1908.75	1175	PCS EVDO - FCC Rule Part 24E	EVDO Rev. 0	25.16	-0.03	1.0 cm	#2	back	**1.150**
1880.00	600	PCS EVDO - FCC Rule Part 24E	EVDO Rev. 0	25.02	0.06	1.0 cm	#2	front	0.526
1880.00	600	PCS EVDO - FCC Rule Part 24E	EVDO Rev. 0	25.02	0.09	1.0 cm	#2	bottom	0.403
1880.00	600	PCS EVDO - FCC Rule Part 24E	EVDO Rev. 0	25.02	0.03	1.0 cm	#2	left	0.416
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**						**Body** **1.6 W/kg (mW/g)** averaged over 1 gram			

Note: CDMA 1x-RTT SAR was required to be evaluated for Hotspot exposure conditions to support simultaneous transmission capabilities per **Table 1-2**.

Table 13-14
LTE Band 25 Hotspot SAR Data

MEASUREMENT RESULTS														
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.	High												(W/kg)
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.30	-0.04	1	#1	QPSK	25	12	1.0 cm	back	0.594
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.30	0.01	0	#1	QPSK	1	0	1.0 cm	back	**0.658**
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.50	-0.09	0	#1	QPSK	1	49	1.0 cm	back	0.647
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	21.47	0.03	2	#1	16 QAM	25	12	1.0 cm	back	0.491
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.32	0.04	1	#1	16 QAM	1	0	1.0 cm	back	0.502
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.48	-0.19	1	#1	16 QAM	1	49	1.0 cm	back	0.515
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.30	0.00	1	#1	QPSK	25	12	1.0 cm	front	0.271
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.30	-0.01	0	#1	QPSK	1	0	1.0 cm	front	**0.273**
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.50	-0.10	0	#1	QPSK	1	49	1.0 cm	front	0.250
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	21.47	0.00	2	#1	16 QAM	25	12	1.0 cm	front	0.220
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.32	0.06	1	#1	16 QAM	1	0	1.0 cm	front	0.210
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.48	-0.11	1	#1	16 QAM	1	49	1.0 cm	front	0.214
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.30	-0.01	1	#1	QPSK	25	12	1.0 cm	top	0.223
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.30	-0.04	0	#1	QPSK	1	0	1.0 cm	top	**0.285**
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.50	-0.10	0	#1	QPSK	1	49	1.0 cm	top	0.263
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	21.47	0.00	2	#1	16 QAM	25	12	1.0 cm	top	0.187
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.32	0.00	1	#1	16 QAM	1	0	1.0 cm	top	0.235
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.48	0.04	1	#1	16 QAM	1	49	1.0 cm	top	0.227
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.30	0.08	1	#1	QPSK	25	12	1.0 cm	right	0.158
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.30	0.09	0	#1	QPSK	1	0	1.0 cm	right	**0.235**
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	23.50	-0.06	0	#1	QPSK	1	49	1.0 cm	right	0.181
1882.50	26365	Mid	LTE Band 25 (PCS) - FCC Rule Part 24E	10	21.47	0.05	2	#1	16 QAM	25	12	1.0 cm	right	0.195
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.32	-0.06	1	#1	16 QAM	1	0	1.0 cm	right	0.195
1910.00	26640	High	LTE Band 25 (PCS) - FCC Rule Part 24E	10	22.48	-0.08	1	#1	16 QAM	1	49	1.0 cm	right	0.166
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram					

Note: Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% RB allocation, the highest output power for the 1 RB allocations is tested. Therefore, high channel was tested for the QPSK and 16 QAM, 1 RB allocation configurations.

Table 13-15
WLAN Hotspot SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	SAR (1g)
MHz	Ch.									(W/kg)
2437	6	2.4 GHz WLAN - FCC Rule Part 15C	DSSS	16.64	-0.01	1.0 cm	#1	1	back	**0.067**
2437	6	2.4 GHz WLAN - FCC Rule Part 15C	DSSS	16.64	-0.13	1.0 cm	#1	1	front	0.012
2437	6	2.4 GHz WLAN - FCC Rule Part 15C	DSSS	16.64	-0.09	1.0 cm	#1	1	top	0.007
2437	6	2.4 GHz WLAN - FCC Rule Part 15C	DSSS	16.64	0.04	1.0 cm	#1	1	right	0.044
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram				

13.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001] and IEEE 1528-2003.
2. Batteries are fully charged for all readings. The standard battery was used.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm. To confirm the proper SAR liquid depth, the z-axis plots from the system verifications were included since the system verifications were performed using the same liquid, probe and DAE as the SAR tests in the same time period.
5. 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.
6. Per FCC/OET Bulletin 65 Supplement C and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

CDMA Notes:

1. Head SAR for CDMA2000 mode was tested under RC3/SO55 per KDB Publication 941225 D01.
2. Head SAR for EVDO Rev. A was tested to cover VOIP operations.
3. 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.
4. 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 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.
5. CDMA 1x-RTT SAR was required to be evaluated for Hotspot exposure conditions to support simultaneous capabilities per **Table 1-2**.
6. Per FCC guidance, when the measured Hotspot SAR is less than 1.2 W/kg for the same device orientation and device transmission configurations, separate body-worn accessory data taken with a headset cable is not required. Therefore, hotspot back side SAR data was considered to determine body-worn SAR compliance.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Test Considerations for LTE handsets and Data Modems KDB 941225 D05 Publication and were evaluated independently for each position. General test procedures can be found in Section 9.3.3.
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.
4. Per FCC guidance, when the measured Hotspot SAR is less than 1.2 W/kg for the same device orientation and device transmission configurations, separate body-worn accessory data taken with a headset cable is not required. Therefore, hotspot back side SAR data was considered to determine body-worn SAR compliance.

WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 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 and April 2010 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) 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.
4. WLAN transmission was verified using an uncalibrated spectrum analyzer.
5. Since the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the 1g averaged SAR is <0.8 W/kg, SAR testing on other channels were not required.
6. For 5 GHz WIFI: 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 guidance, when the measured Hotspot SAR is less than 1.2 W/kg for the same device orientation and device transmission configurations, separate body-worn accessory data taken with a headset cable is not required. Therefore, hotspot back side SAR data was considered to determine body-worn SAR compliance for 2.4 GHz WIFI.

Hotspot Notes:

1. Top Edge and Right Edge for the CDMA/EVDO transmitter were not tested since the antenna distance from the edges was greater than 2.5 cm per FCC KDB Publication 941225 D06 guidance (see Section 1.3).
2. Bottom Edge and Left Edge for the LTE transmitter were not tested since the antenna distance from the edges was greater than 2.5 cm per FCC KDB Publication 941225 D06 (see Section 1.3).
3. Bottom Edge and Left Edge for the WLAN transmitter were not tested since the antenna distance from the edges was greater than 2.5 cm per FCC KDB Publication 941225 D06 (see Section 1.3).
4. During SAR Testing for the Wireless Router conditions per KDB 941225 D06, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 7.6.)

14 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

14.1 Introduction

The following procedures adopted from "FCC SAR Considerations for Cell Phones with Multiple Transmitters" FCC KDB Publication 648474 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.

14.2 FCC Power Tables & Conditions

	2.45	5.15 - 5.35	5.47 - 5.85	GHz
P_{Ref}	12	6	5	mW
Device output power should be rounded to the nearest mW to compare with values specified in this table.				

Figure 14-1
Output Power Thresholds for Unlicensed Transmitters

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	Routine evaluation required	SAR not required: Unlicensed only ○ when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas Licensed & Unlicensed ○ when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas ○ when SAR to peak location separation ratio of simultaneous transmitting antenna pair is < 0.3 SAR required: Licensed & Unlicensed antenna pairs with SAR to peak location separation ratio ≥ 0.3; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply
Unlicensed Transmitters	When there is no simultaneous transmission – ○ output ≤ 60/f: SAR not required ○ output > 60/f: stand-alone SAR required When there is simultaneous transmission – Stand-alone SAR not required when ○ output ≤ 2·P_{Ref} and antenna is ≥ 5.0 cm from other antennas ○ output ≤ P_{Ref} and antenna is ≥ 2.5 cm from other antennas ○ output ≤ P_{Ref} and antenna is < 2.5 cm from other antennas, each with either output power ≤ P_{Ref} or 1-g SAR < 1.2 W/kg Otherwise stand-alone SAR is required When stand-alone SAR is required ○ test SAR on highest output channel for each wireless mode and exposure condition ○ if SAR for highest output channel is > 50% of SAR limit, evaluate all channels according to normal procedures	

Figure 14-2
SAR Evaluation Requirements for Multiple Transmitter Handsets

According to Figure 14-1 and Figure 14-2, simultaneous transmission analysis of SAR may be required for this device for the licensed and unlicensed transmitters. Possible simultaneous transmissions for this device indicated in **Table 1-2** were numerically summed using stand-alone SAR data and are shown in the following tables.

14.3 Head SAR Simultaneous Transmission Analysis

Table 14-1
Simultaneous Transmission Scenario (Held to Ear)

Simult Tx	Configuration	Cell. CDMA - FCC Rule Part 90S SAR (W/kg)	LTE Band 25 FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)			SPLSR			Volumetric SAR (W/kg)
		1	2	3	1+2	1+3	1+2+3	1+2	2+3	1+3	1+2+3
Head SAR	Right Cheek	0.406	0.522	0.028	0.928	0.434	0.956	N/A	N/A	N/A	N/A
	Right Tilt	0.254	0.561	0.014	0.815	0.268	0.829	N/A	N/A	N/A	N/A
	Left Cheek	0.533	1.260	0.073	See note 1	0.606	See note 2	0.27	See note 2	0.11	**1.23**
	Left Tilt	0.282	0.700	0.016	0.982	0.298	0.998	N/A	N/A	N/A	N/A
Simult Tx	Configuration	Cell. CDMA - FCC Rule Part 22H SAR (W/kg)	LTE Band 25 FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)			SPLSR			Volumetric SAR (W/kg)
		1	2	3	1+2	1+3	1+2+3	1+2	2+3	1+3	1+2+3
Head SAR	Right Cheek	0.351	0.522	0.028	0.873	0.379	0.901	N/A	N/A	N/A	N/A
	Right Tilt	0.203	0.561	0.014	0.764	0.217	0.778	N/A	N/A	N/A	N/A
	Left Cheek	0.456	1.260	0.073	See note 1	0.529	See note 2	0.27	See note 2	0.11	**1.24**
	Left Tilt	0.248	0.700	0.016	0.948	0.264	0.964	N/A	N/A	N/A	N/A
Simult Tx	Configuration	PCS CDMA - FCC Rule Part 24E SAR (W/kg)	LTE Band 25 FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)			SPLSR			Volumetric SAR (W/kg)
		1	2	3	1+2	1+3	1+2+3	1+2	2+3	1+3	1+2+3
Head SAR	Right Cheek	0.355	0.522	0.028	0.877	0.383	0.905	N/A	N/A	N/A	N/A
	Right Tilt	0.182	0.561	0.014	0.743	0.196	0.757	N/A	N/A	N/A	N/A
	Left Cheek	0.422	1.260	0.073	See note 1	0.495	See note 2	0.21	See note 2	0.07	**1.21**
	Left Tilt	0.196	0.700	0.016	0.896	0.212	0.912	N/A	N/A	N/A	N/A

Note:

1. No evaluation was performed to determined aggregate 1-g SAR in this configuration as the SPLSR of antenna pairs was below 0.3 per FCC KDB Publication 648474 D01. See Section 14.6 for detailed SPLSR analysis.
2. Since the SPLSR in this configuration was not below 0.3 further analysis was performed to determine the aggregate 1-g SAR. The aggregate volumetric SAR evaluation was less than 1.6 W/kg. See Section 14.7 for detailed volumetric evaluation analysis.

Table 14-2
Simultaneous Transmission Scenario (Held to Ear)

Simult Tx	Configuration	Cell. EVDO - FCC Rule Part 90S SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.288	0.028	0.316
	Right Tilt	0.230	0.014	0.244
	Left Cheek	0.472	0.073	**0.545**
	Left Tilt	0.259	0.015	0.274

Simult Tx	Configuration	Cell. EVDO - FCC Rule Part 22H SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.383	0.028	0.411
	Right Tilt	0.264	0.014	0.278
	Left Cheek	0.517	0.073	**0.590**
	Left Tilt	0.279	0.015	0.294

Simult Tx	Configuration	PCS. EVDO - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.322	0.028	0.350
	Right Tilt	0.192	0.014	0.206
	Left Cheek	0.402	0.073	**0.475**
	Left Tilt	0.198	0.015	0.213

Simult Tx	Configuration	LTE Band 25 FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.522	0.028	0.550
	Right Tilt	0.561	0.014	0.575
	Left Cheek	1.260	0.073	**1.333**
	Left Tilt	0.700	0.016	0.716

Note: For numerical sums below 1.6 W/kg, no SPLSR analysis or aggregate volumetric SAR evaluations for the transmitters were required.

Table 14-3
Simultaneous Transmission Scenario (Held to Ear)

Simult Tx	Configuration	Cell. CDMA - FCC Rule Part 90S SAR (W/kg)	5 GHz WLAN - FCC Rule Part 15C/15E SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.406	0.008	0.414
	Right Tilt	0.254	0.070	0.324
	Left Cheek	0.533	0.183	**0.716**
	Left Tilt	0.282	0.120	0.402

Simult Tx	Configuration	Cell. CDMA - FCC Rule Part 22H SAR (W/kg)	5 GHz WLAN - FCC Rule Part 15C/15E SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.351	0.008	0.359
	Right Tilt	0.203	0.070	0.273
	Left Cheek	0.456	0.183	**0.639**
	Left Tilt	0.248	0.120	0.368

Simult Tx	Configuration	PCS CDMA - FCC Rule Part 24E SAR (W/kg)	5 GHz WLAN - FCC Rule Part 15C/15E SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.355	0.008	0.363
	Right Tilt	0.182	0.070	0.252
	Left Cheek	0.422	0.183	**0.605**
	Left Tilt	0.196	0.120	0.316

Note: For numerical sums below 1.6 W/kg, no SPLSR analysis or aggregate volumetric SAR evaluations for the transmitters were required.

14.4 Body-Worn Simultaneous Transmission Analysis

Table 14-4
Simultaneous Transmission Scenario (Body-Worn at 1.0 cm)

Configuration	Mode	CDMA SAR (W/kg)	LTE Band 25 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)			
		1	2	3	1+2	1+3	2+3	1+2+3
Back Side	Cell. CDMA - FCC Rule Part 90S	0.851	0.658	0.067	1.509	0.918	0.725	**1.576**
Back Side	Cell. CDMA - FCC Rule Part 22H	0.732	0.658	0.067	1.390	0.799	0.725	1.457
Back Side	PCS CDMA - FCC Rule Part 24E	0.757	0.658	0.067	1.415	0.824	0.725	1.482

Note: For numerical sums below 1.6 W/kg, no SPLSR analysis or aggregate volumetric SAR evaluations for the transmitters were required.

Table 14-5
Simultaneous Transmission Scenario (Body-Worn at 1.0 cm)

Configuration	Mode	CDMA SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	Cell. CDMA - FCC Rule Part 90S	0.851	0.229	**1.080**
Back Side	Cell. CDMA - FCC Rule Part 22H	0.732	0.229	0.961
Back Side	PCS CDMA - FCC Rule Part 24E	0.757	0.229	0.986

Note: For numerical sums below 1.6 W/kg, no SPLSR analysis or aggregate volumetric SAR evaluations for the transmitters were required.

14.5 Hotspot SAR Simultaneous Transmission Analysis

Table 14-6
Simultaneous Transmission Scenario (Hotspot at 1.0 cm)

Simult Tx	Configuration	Cell. EVDO - FCC Rule Part 90S SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.899	0.067	**0.966**
	Front	0.644	0.012	0.656
	Top	-	0.007	0.007
	Bottom	0.227	-	0.227
	Right	-	0.044	0.044
	Left	0.898	-	0.898

Simult Tx	Configuration	Cell. EVDO - FCC Rule Part 22H SAR (W/kg)	2.4 GHz WIFI - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.772	0.067	0.839
	Front	0.537	0.012	0.549
	Top	-	0.007	0.007
	Bottom	0.269	-	0.269
	Right	-	0.044	0.044
	Left	0.939	-	**0.939**

Simult Tx	Configuration	PCS EVDO - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WIFI - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	1.150	0.067	**1.217**
	Front	0.526	0.012	0.538
	Top	-	0.007	0.007
	Bottom	0.403	-	0.403
	Right	-	0.044	0.044
	Left	0.416	-	0.416

Simult Tx	Configuration	LTE Band 25 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.658	0.067	**0.725**
	Front	0.273	0.012	0.285
	Top	0.285	0.007	0.292
	Bottom	-	-	0.000
	Right	0.235	0.044	0.279
	Left	-	-	0.000

Note: Per FCC KDB Publication 941225 D06, the edges with antennas more than 2.5 cm are not required to be evaluated for SAR ("-"). The above tables represent a portable hotspot condition.

Table 14-7
Simultaneous Transmission Scenario (Hotspot with Voice Call at 1.0 cm)

Simult Tx	Configuration	Cell. CDMA - FCC Rule Part 90S SAR (W/kg)	LTE Band 25 (PCS) - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.851	0.658	0.067	**1.576**
	Front	0.665	0.273	0.012	0.950
	Top	-	0.285	0.007	0.292
	Bottom	0.223	-	-	0.223
	Right	-	0.235	0.044	0.279
	Left	0.909	-	-	0.909
Simult Tx	Configuration	Cell. CDMA - FCC Rule Part 22H SAR (W/kg)	LTE Band 25 (PCS) - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.732	0.658	0.067	**1.457**
	Front	0.564	0.273	0.012	0.849
	Top	-	0.285	0.007	0.292
	Bottom	0.255	-	-	0.255
	Right	-	0.235	0.044	0.279
	Left	0.923	-	-	0.923

Simult Tx	Configuration	PCS CDMA - FCC Rule Part 24E SAR (W/kg)	LTE Band 25 (PCS) - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.757	0.658	0.067	**1.482**
	Front	0.459	0.273	0.012	0.744
	Top	-	0.285	0.007	0.292
	Bottom	0.376	-	-	0.376
	Right	-	0.235	0.044	0.279
	Left	0.324	-	-	0.324

Note: Per FCC KDB Publication 941225 D06, the edges with antennas more than 2.5 cm are not required to be evaluated for SAR ("-"). The above tables represent a portable hotspot condition potentially simultaneously operating with a voice call.

14.6 SPLSR Evaluation Analysis

Per FCC KDB Publication 648474 D01, when the sum of the standalone transmitters is more than 1.6 W/kg, the SAR sum to peak locations can be analyzed to determine SAR distribution overlaps. Based on the 1-g SAR limit and a separation distance of 5 cm, when the SAR peak to location ratio for each pair of antennas is < 0.3, simultaneous SAR evaluation is not required. The distance between the transmitters was calculated using the following formula.

$$\text{Distance}_{Tx1\text{-}Tx2} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$$

14.6.1 Left Cheek

The sum of the standalone SAR values was above 1.6 W/kg for the held-to-ear voice call with each CDMA mode potentially operating with LTE Band 25 (PCS) Data and each CDMA mode potentially operating with LTE Band 25 (PCS) Hotspot for the left cheek configuration.

Table 14-8
Peak SAR locations for Left Cheek

Mode/Band	x (cm)	y (cm)	z (cm)
Cell. CDMA - FCC Rule Part 90S	6.17	26.60	-16.90
Cell. CDMA - FCC Rule Part 22H	5.92	27.00	-16.90
PCS CDMA - FCC Rule Part 24E	6.12	25.10	-17.10
LTE Band 25 (PCS) - FCC Rule Part 24E	4.04	33.00	-17.10
2.4 GHz WLAN - FCC Rule Part 15C	6.12	31.90	-17.20

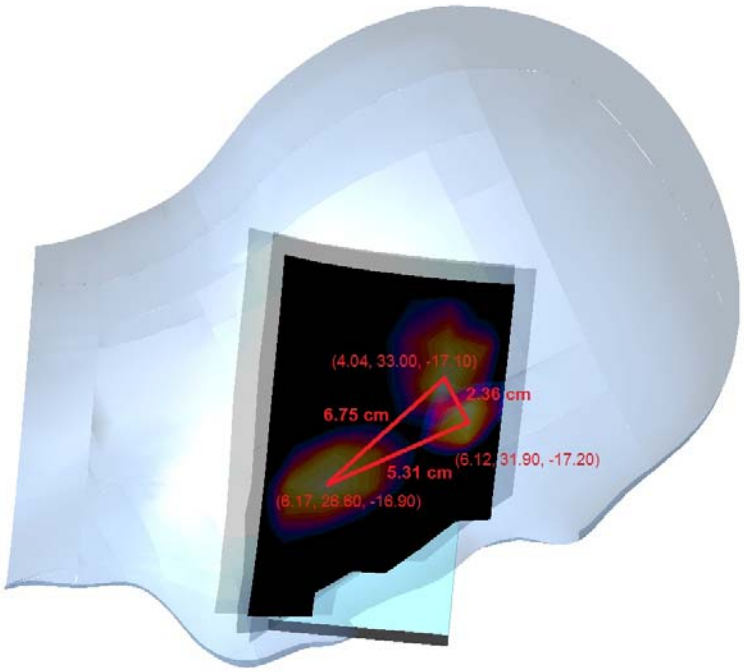


Figure 14-3
Peak SAR Location Plot of Cell. CDMA – FCC Rule Part 90S,
LTE Band 25 (PCS) – FCC Rule Part 24E, and 2.4 GHz WLAN – FCC Rule Part 15C

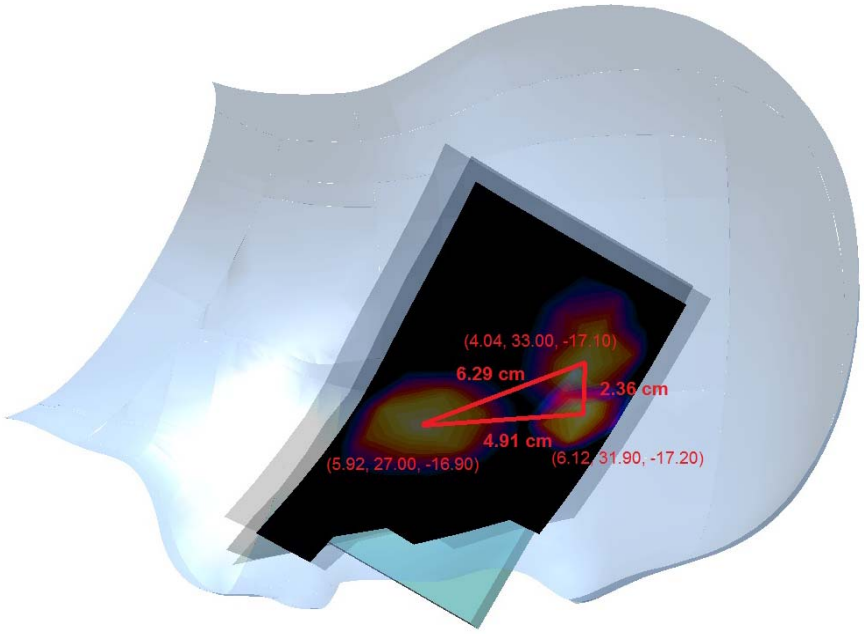


Figure 14-4
Peak SAR Location Plot of Cell. CDMA – FCC Rule Part 22H,
LTE Band 25 (PCS) – FCC Rule Part 24E, and 2.4 GHz WLAN – FCC Rule Part 15C

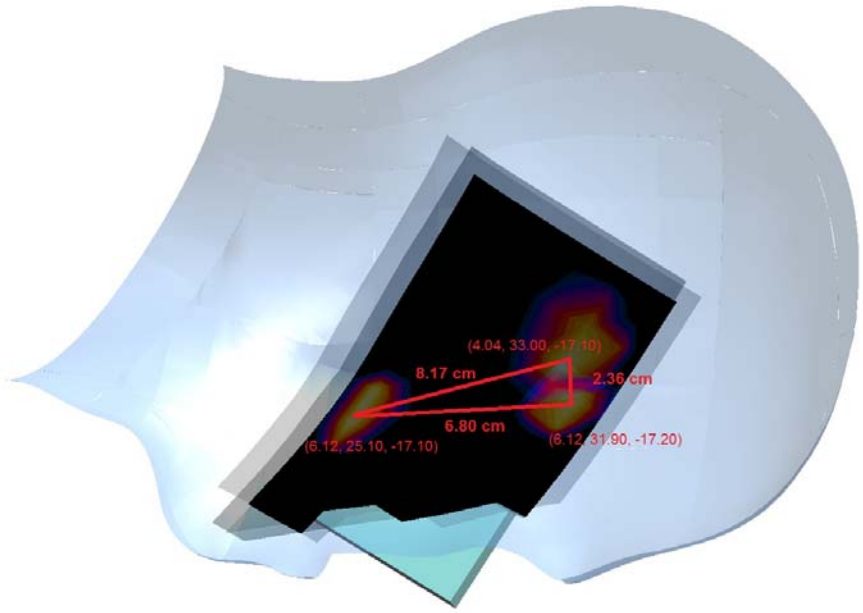


Figure 14-5
Peak SAR Location Plot of PCS CDMA – FCC Rule Part 24E,
LTE Band 25 (PCS) – FCC Rule Part 24E, and 2.4 GHz WLAN – FCC Rule Part 15C

Table 14-9
SAR Sum to Peak Location Separation Ratio Calculation

Antenna Pair		Standalone 1g SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (cm)	SPLSR
Antenna "a"	Antenna "b"	a	b	a+b	$D_{(a-b)}$	$(a+b) / D_{(a-b)}$
Cell. CDMA - FCC Rule Part 90S	LTE Band 25 (PCS) - FCC Rule Part 24E	0.533	1.26	1.793	6.75	0.27
Cell. CDMA - FCC Rule Part 22H	LTE Band 25 (PCS) - FCC Rule Part 24E	0.456	1.26	1.716	6.29	0.27
PCS CDMA - FCC Rule Part 24E	LTE Band 25 (PCS) - FCC Rule Part 24E	0.422	1.26	1.682	8.17	0.21
LTE Band 25 (PCS) - FCC Rule Part 24E	2.4 GHz WLAN - FCC Rule Part 15C	1.26	0.073	1.333	2.36	See Note 1
Cell. CDMA - FCC Rule Part 90S	2.4 GHz WLAN - FCC Rule Part 15C	0.533	0.073	0.606	5.31	0.11
Cell. CDMA - FCC Rule Part 22H	2.4 GHz WLAN - FCC Rule Part 15C	0.456	0.073	0.529	4.91	0.11
PCS CDMA - FCC Rule Part 24E	2.4 GHz WLAN - FCC Rule Part 15C	0.422	0.073	0.495	6.80	0.07

Note:

1. When considering a CDMA voice call potentially simultaneously operating with LTE Band 25 Hotspot, the SPLSR for each ratio pair is not less than 0.3. Please see Section 14.7 for volumetric SAR evaluation details.
2. For a CDMA voice call potentially operating with LTE Band 25, the SPLSR between the transmitters was less than 0.3. Therefore, no volumetric simultaneous transmission SAR is required.

14.7 Volumetric SAR Evaluation Analysis

Per KDB Publication 648474, when the sum of the transmitters potentially operating simultaneously is greater than 1.6 W/kg and the sum to peak SAR location separation ratio between any pair of transmitters is more than 0.3, SAR tests are required for simultaneous transmission to determine the aggregate 1-g SAR. When required, each transmitter should be tested for simultaneous transmission in the configuration, channel and operating mode that resulted in the highest SAR during the stand-alone evaluation.

Simultaneous Transmission SAR was required for the left cheek configuration when evaluating a CDMA voice call potentially operating with LTE Band 25 (PCS) – FCC Rule Part 24E hotspot.

Table 14-10
Simultaneous Transmission SAR Analysis

Band & Mode	Standalone 1g SAR (W/kg)	Standalone SAR Plot Number	Simultaneous Transmission SAR (W/kg)	Simultaneous Transmission SAR Plot Number
Cell. CDMA - FCC Rule Part 90S	0.533	A3	0.483	A46
Cell. CDMA - FCC Rule Part 22H	0.456	-	0.491	A47
PCS CDMA - FCC Rule Part 24E	0.422	A11	0.427	A48
LTE Band 25 (PCS) - FCC Rule Part 24E	1.26	A15	1.12	A49
2.4 GHz WLAN - FCC Rule Part 15C	0.073	A19	0.046	A50

Simultaneous Transmission Bands & Modes			Multi-Band SAR (W/kg)	Simultaneous SAR Plot Number
Cell. CDMA - FCC Rule Part 90S	LTE Band 25 (PCS) - FCC Rule Part 24E	2.4 GHz WLAN - FCC Rule Part 15C	1.23	A51
Cell. CDMA - FCC Rule Part 22H	LTE Band 25 (PCS) - FCC Rule Part 24E	2.4 GHz WLAN - FCC Rule Part 15C	**1.24**	A52
PCS CDMA - FCC Rule Part 24E	LTE Band 25 (PCS) - FCC Rule Part 24E	2.4 GHz WLAN - FCC Rule Part 15C	1.21	A53

Test Notes:

1. Each antenna was evaluated independently using the channel/configuration that produced the highest measured SAR when the standalone SAR was tested.
2. LTE and CDMA SAR volume scans were evaluated with a resolution of Δx = 8mm, Δy = 8mm, and Δz = 5mm with a grid of 13 × 19 × 7 points.
3. WLAN SAR volume scan was evaluated with a resolution of Δx = 5mm, Δy = 5mm, and Δz = 5mm with a grid of 21 × 31 × 7 points.
4. DASY52.8 (1) and SEMCAD X 14.6.5 multiband combiner required scans to overlap but does not require measurement point resolutions within the volumes to be identical for interpolation and superposition.

14.8 Simultaneous Transmission Conclusion

Based on the simultaneous transmission analysis guidance described in FCC KDB 648474 and the April 2012 TCB/FCC Workshop, the above simultaneous transmission SAR analyses indicate that the device operating in any of the simultaneous transmission scenarios will not exceed the SAR limit.

15 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	8753E	(30kHz-6GHz) Network Analyzer	4/3/2012	Annual	4/3/2013	US37390350
Agilent	E5515C	Wireless Communications Test Set	2/12/2012	Annual	2/12/2013	GB45360985
Agilent	85070E	Dielectric Probe Kit	3/8/2012	Annual	3/8/2013	MY44300633
Agilent	E5515C	Wireless Communications Test Set	2/9/2012	Annual	2/9/2013	GB43460554
Agilent	85047A	S-Parameter Test Set	N/A	N/A	N/A	2904A00579
Agilent	E5515C	Wireless Communications Test Set	10/14/2011	Annual	10/14/2012	GB41450275
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/5/2012	Annual	4/5/2013	MY45470194
Agilent	E5515C	Wireless Communications Test Set	10/10/2011	Annual	10/10/2012	GB46110872
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/4/2012	Annual	4/4/2013	JP38020182
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/10/2011	Annual	10/10/2012	3613A00315
Agilent	8648D	Signal Generator	4/3/2012	Annual	4/3/2013	3629U00687
Amplifier Research	5S1G4	5W, 800MHz-4.2GHz	CBT	N/A	CBT	21910
Anritsu	ML2495A	Power Meter	10/13/2011	Annual	10/13/2012	1039008
Anritsu	MA2411B	Pulse Sensor	10/13/2011	Annual	10/13/2012	1027293
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	5318
Anritsu	MA2481A	Power Sensor	4/5/2012	Annual	4/5/2013	5605
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	5821
Anritsu	ML2438A	Power Meter	10/13/2011	Annual	10/13/2012	1070030
Anritsu	MT8820C	Radio Communication Tester	11/11/2011	Annual	11/11/2012	6200901190
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	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331322
Control Company	61220-416	Long-Stem Thermometer	7/1/2011	Biennial	7/1/2013	111642834
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/12/2011	Annual	10/12/2012	1833460
Gigatronics	8651A	Universal Power Meter	10/12/2011	Annual	10/12/2012	8650319
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	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Rohde & Schwarz	NRVD	Dual Channel Power Meter	4/8/2011	Biennial	4/8/2013	101695
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	3/5/2012	Annual	3/5/2013	102060
Rohde & Schwarz	SMIQ03B	Signal Generator	4/5/2012	Annual	4/5/2013	DE27259
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
SPEAG	ES3DV3	SAR Probe	2/7/2012	Annual	2/7/2013	3287
SPEAG	D1900V2	1900 MHz SAR Dipole	2/8/2012	Annual	2/8/2013	5d148
SPEAG	D1900V2	1900 MHz SAR Dipole	2/22/2012	Annual	2/22/2013	5d149
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/7/2012	Annual	5/7/2013	1334
SPEAG	D1900V2	1900 MHz SAR Dipole	2/22/2012	Annual	2/22/2013	502
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/12/2012	Annual	4/12/2013	1333
SPEAG	ES3DV3	SAR Probe	2/7/2012	Annual	2/7/2013	3288
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/15/2012	Annual	2/15/2013	1323
SPEAG	D2450V2	2450 MHz SAR Dipole	2/7/2012	Annual	2/7/2013	882
SPEAG	ES3DV3	SAR Probe	4/24/2012	Annual	4/24/2013	3213
SPEAG	ES3DV3	SAR Probe	2/21/2012	Annual	2/21/2013	3258
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/20/2012	Annual	2/20/2013	649
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/19/2012	Annual	4/19/2013	665
SPEAG	ES3DV2	SAR Probe	8/25/2011	Annual	8/25/2012	3022
SPEAG	EX3DV4	SAR Probe	1/27/2012	Annual	1/27/2013	3589
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/19/2012	Annual	1/19/2013	1057
SPEAG	D835V2	835 MHz SAR Dipole	1/25/2012	Annual	1/25/2013	4d047
SPEAG	D835V2	835 MHz SAR Dipole	4/20/2012	Annual	4/20/2013	4d119
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/18/2012	Annual	1/18/2013	1272
Tektronix	RSA-6114A	Real Time Spectrum Analyzer	4/5/2012	Annual	4/5/2013	B010177
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886430
VWR	36934-158	Wall-Mounted Thermometer	9/30/2011	Biennial	9/30/2013	111859332
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286454

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, attenuator, amplifier, 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.

16 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

17 CONCLUSION

17.1 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]

18 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. 120-124.

[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 Head 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 Measurement Procedures for 3G Devices KDB Publication 941225

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

[28] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publication 648474

[29] FCC Application Note for SAR Probe Calibration and System Verification Consideration for Measurements at 150 MHz – 3 GHz, KDB Publication 450824

[30] FCC SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens, KDB Publication 616217

[31] FCC SAR Measurement Requirements for 3 – 6 GHz, KDB Publication 865664

[32] FCC Mobile Portable RF Exposure Procedure, KDB Publication 447498

[33] FCC SAR Procedures for Dongle Transmitters, KDB Publication 447498

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

[35] FCC SAR Test Considerations for LTE Handsets and Data Modems, KDB Publication 941225.

[36] 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.

[37] FCC Hot Spot SAR v01, KDB Publication 941225 D06.

APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

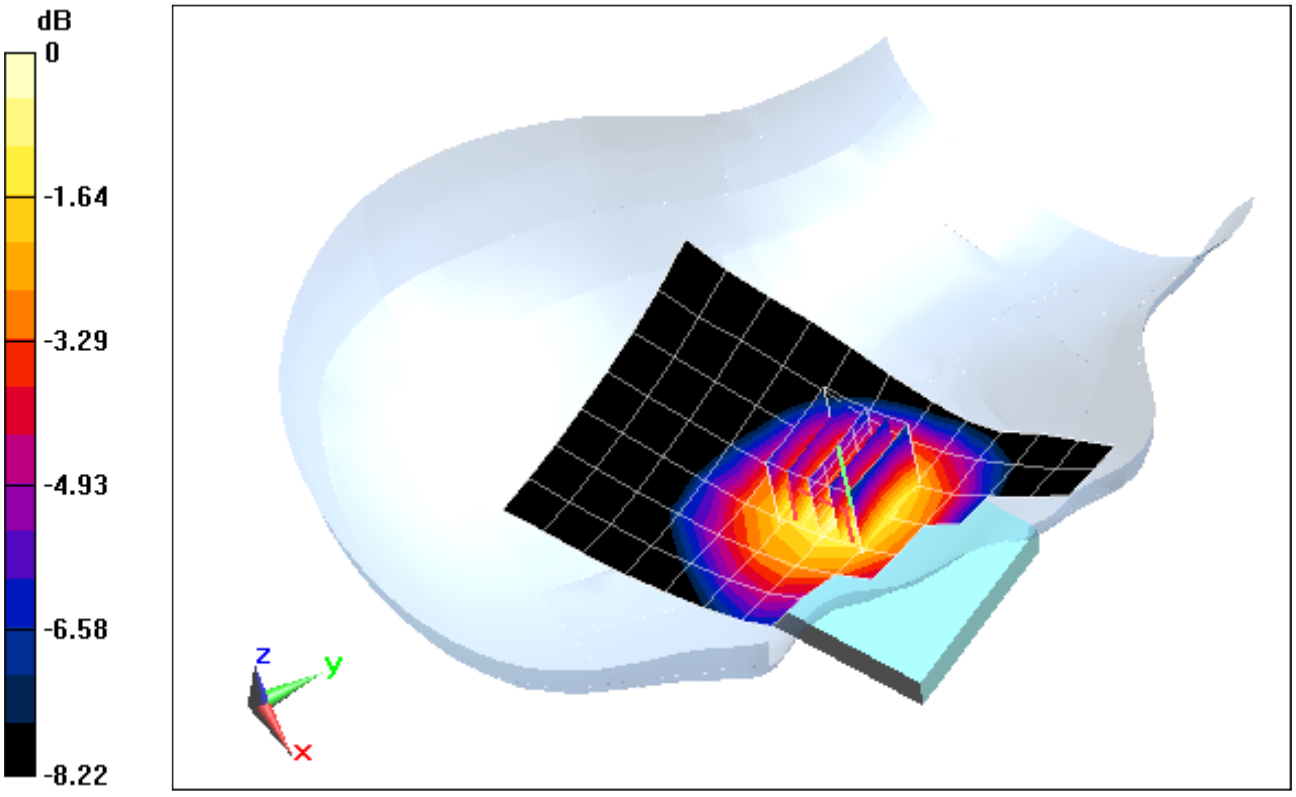
Communication System: Cellular CDMA; Frequency: 820.1 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 820.1 MHz; σ = 0.885 mho/m; ε_r = 41.649; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-12-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.5 (6469)

Mode: Cellular CDMA - FCC Rule Part 90S, Right Head, Cheek, Mid.ch

Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.094 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.484 mW/g
SAR(1 g) = 0.406 mW/g; SAR(10 g) = 0.316 mW/g



0 dB = 0.426 mW/g = -7.41 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

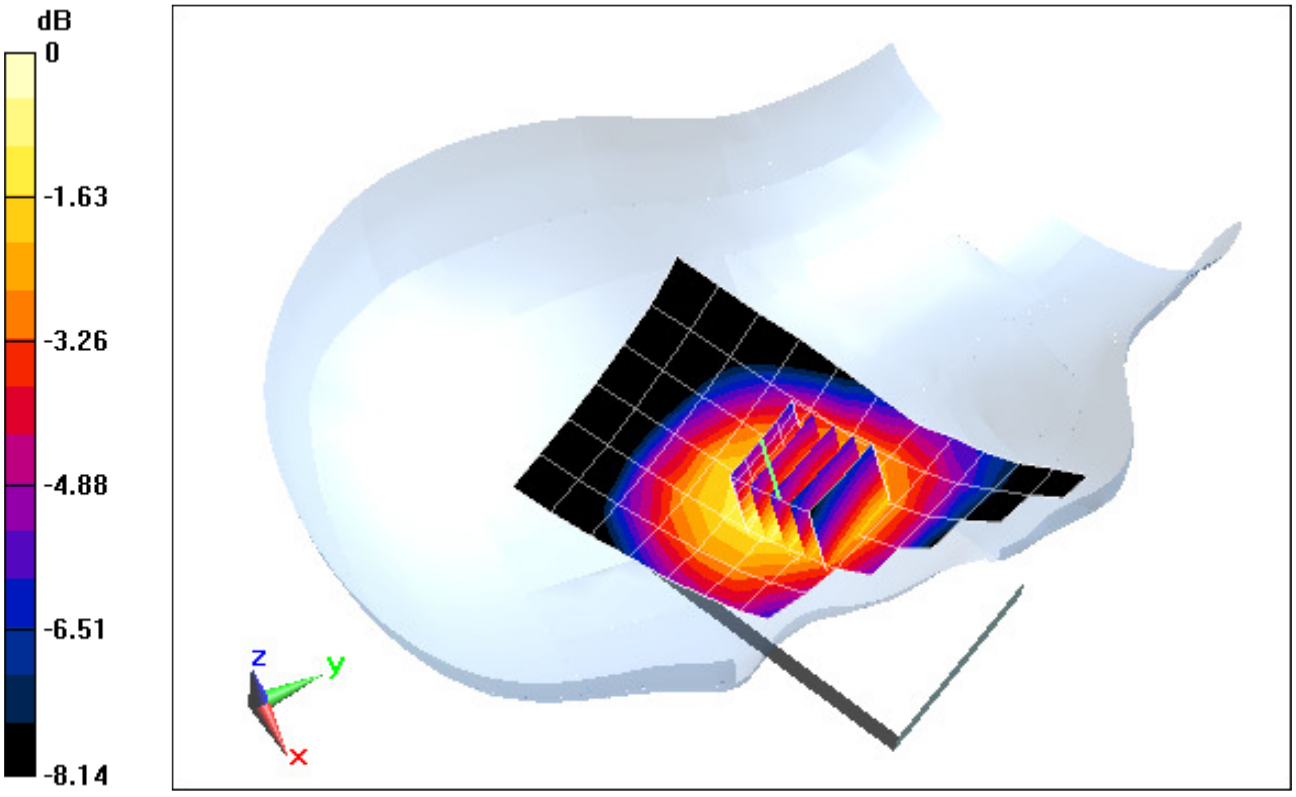
Communication System: Cellular CDMA; Frequency: 820.1 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 820.1 MHz; σ = 0.885 mho/m; ε_r = 41.649; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-12-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.5 (6469)

Mode: Cellular CDMA - FCC Rule Part 90S, Right Head, Tilt, 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 = 18.171 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.296 mW/g
SAR(1 g) = 0.254 mW/g; SAR(10 g) = 0.196 mW/g



0 dB = 0.263 mW/g = -11.60 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

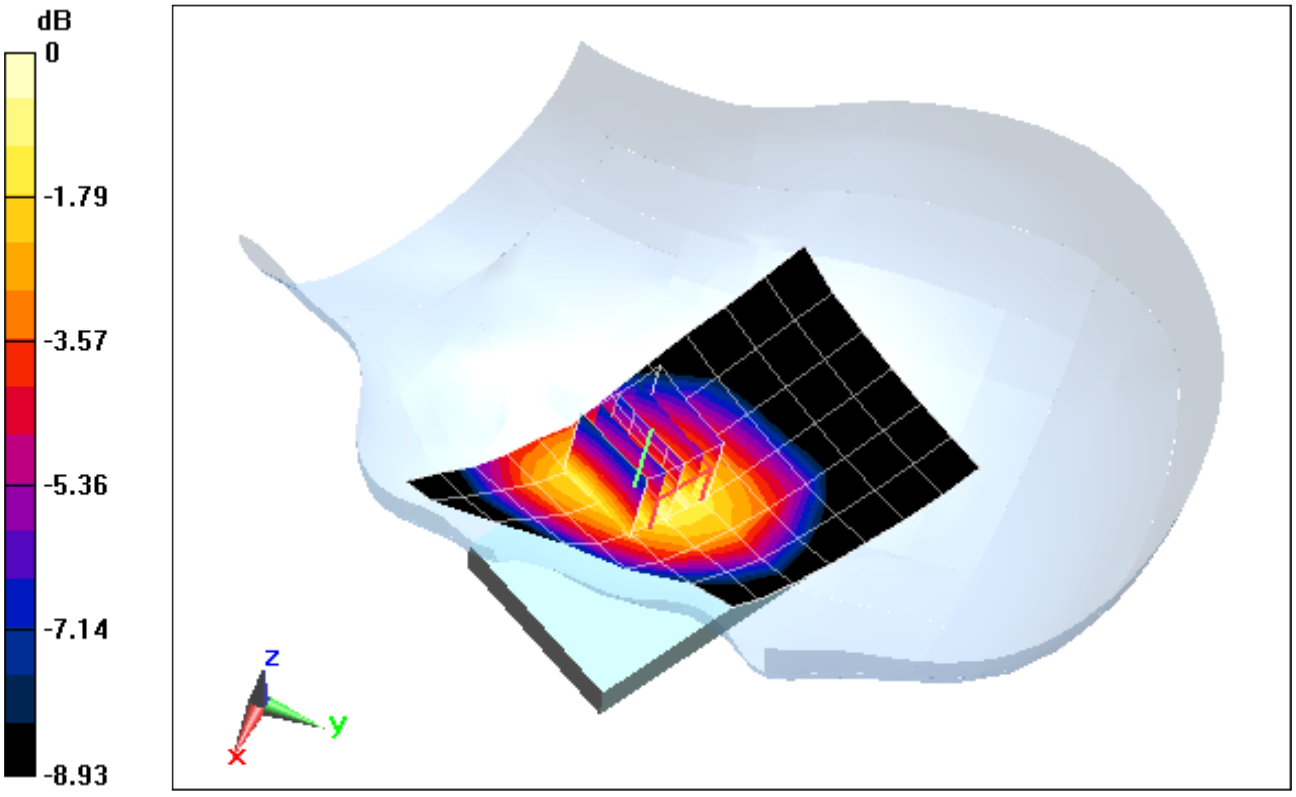
Communication System: Cellular CDMA; Frequency: 820.1 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 820.1 MHz; σ = 0.885 mho/m; ε_r = 41.649; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-12-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.5 (6469)

Mode: Cellular CDMA - FCC Rule Part 90S, 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 = 26.713 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.672 mW/g
SAR(1 g) = 0.533 mW/g; SAR(10 g) = 0.408 mW/g



0 dB = 0.559 mW/g = -5.05 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

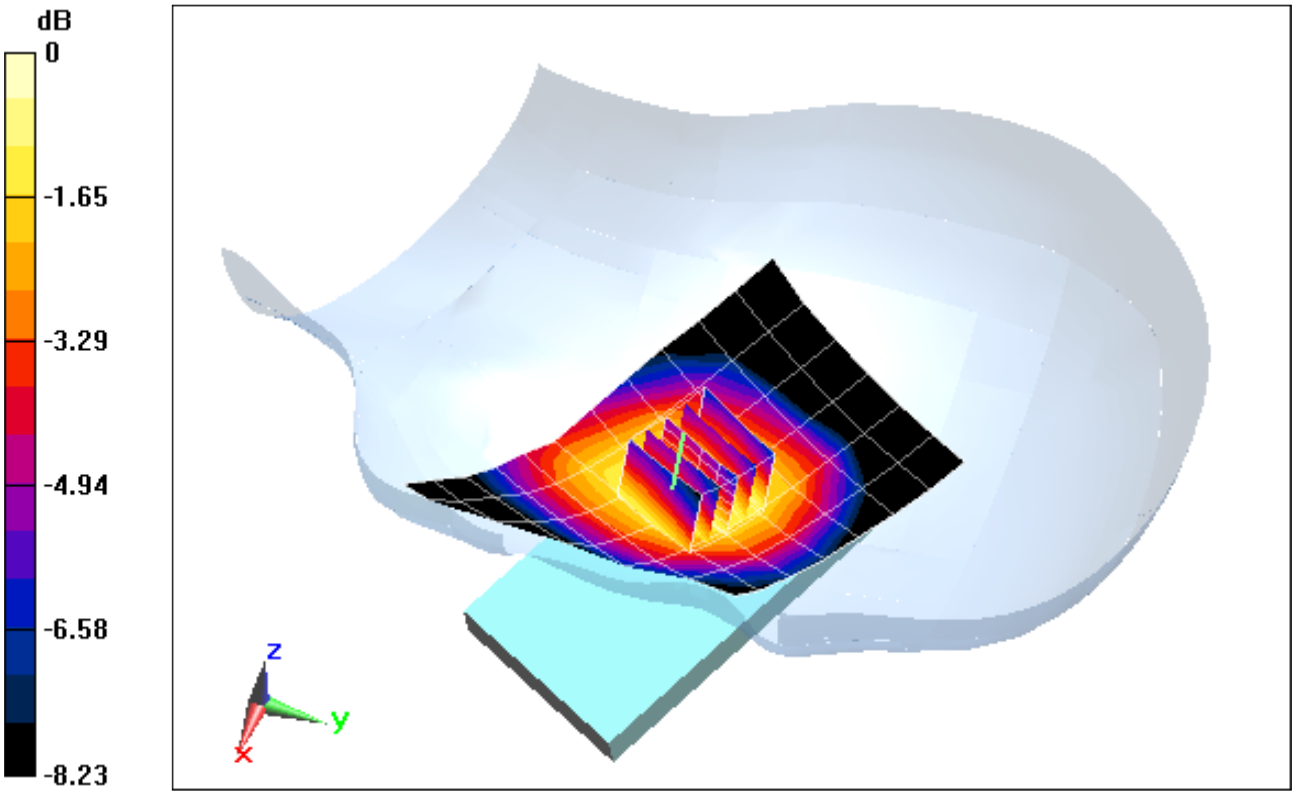
Communication System: Cellular CDMA; Frequency: 820.1 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 820.1 MHz; σ = 0.885 mho/m; ε_r = 41.649; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-12-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.5 (6469)

Mode: Cellular CDMA - FCC Rule Part 90S, Left Head, Tilt, 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 = 19.014 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.327 mW/g
SAR(1 g) = 0.282 mW/g; SAR(10 g) = 0.225 mW/g



0 dB = 0.292 mW/g = -10.69 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

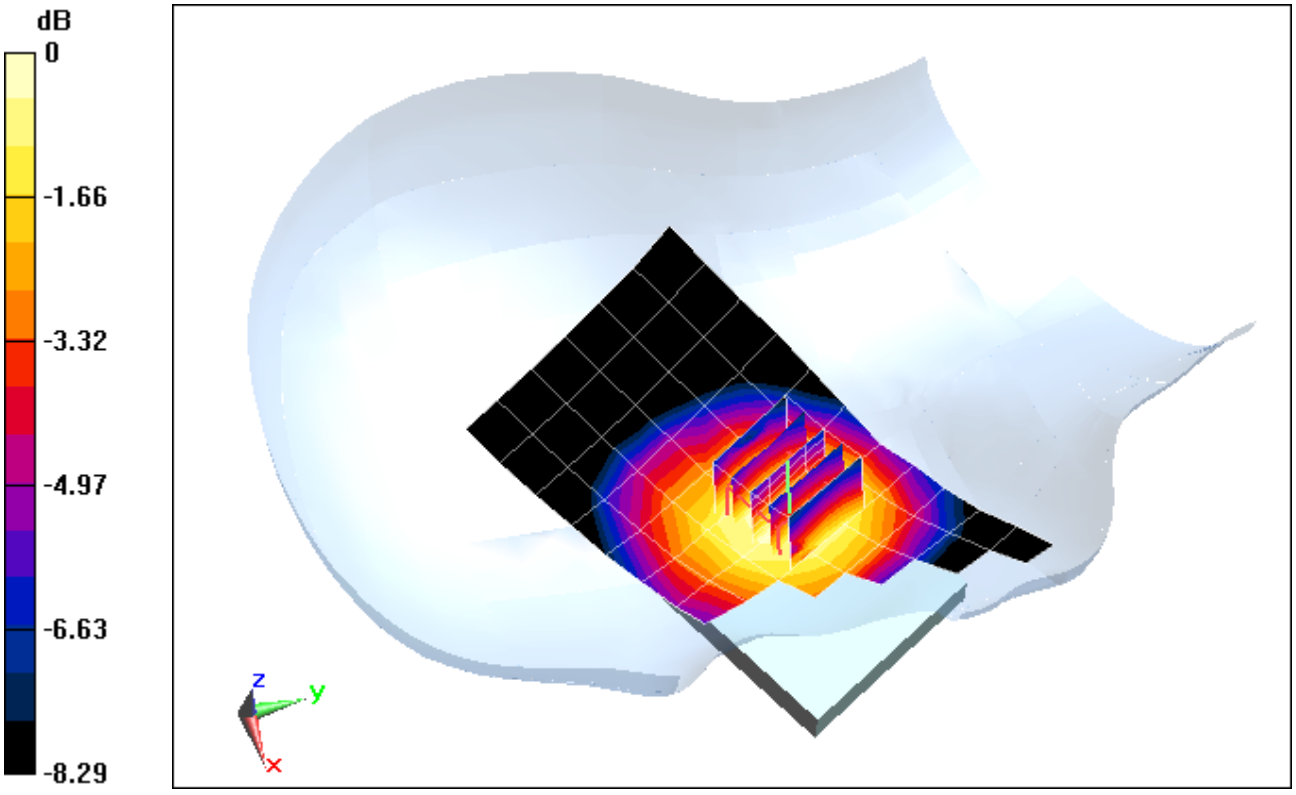
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
$f = 836.52$ MHz; $\sigma = 0.894$ mho/m; $\varepsilon_r = 39.587$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 08-22-2012; Ambient Temp: 24.7°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO Rev. A - FCC Rule Part 22H, 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 = 21.943 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 0.460 mW/g
SAR(1 g) = 0.383 mW/g; SAR(10 g) = 0.293 mW/g



0 dB = 0.399 mW/g = -7.98 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

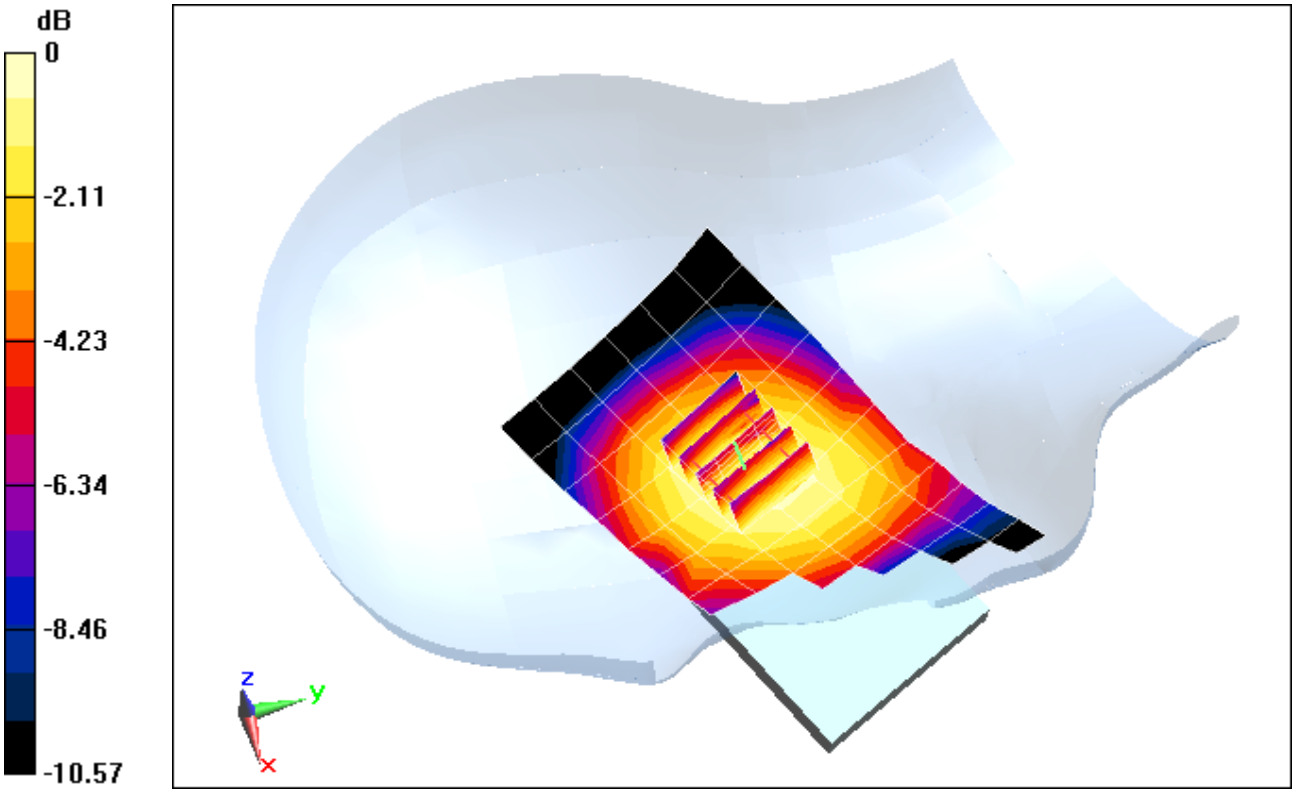
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.894 mho/m; ε_r = 39.587; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-22-2012; Ambient Temp: 24.7°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO Rev. A - FCC Rule Part 22H, Right Head, Tilt, 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 = 18.531 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.310 mW/g
SAR(1 g) = 0.264 mW/g; SAR(10 g) = 0.201 mW/g



0 dB = 0.273 mW/g = -11.28 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

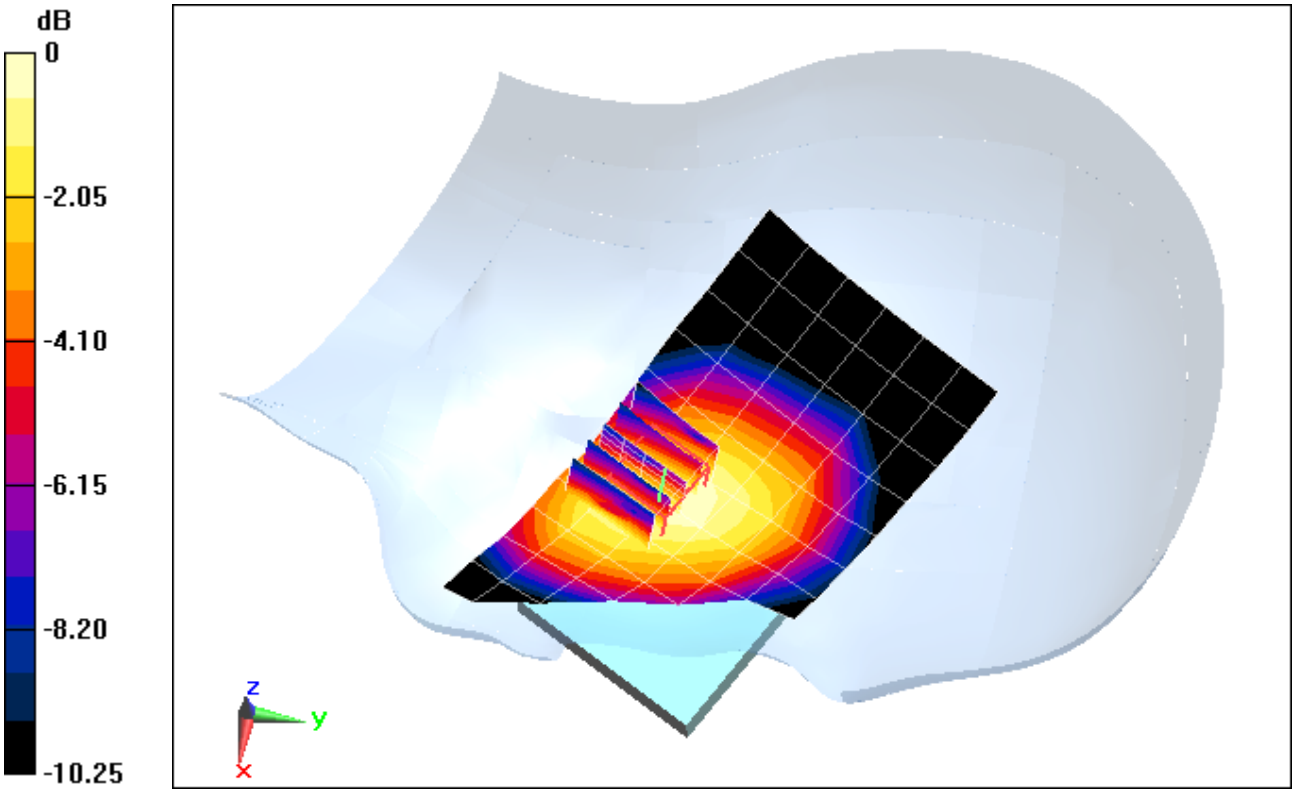
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.894 mho/m; ε_r = 39.587; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-22-2012; Ambient Temp: 24.7°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO Rev. A - FCC Rule Part 22H, 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 = 26.162 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.672 mW/g
SAR(1 g) = 0.517 mW/g; SAR(10 g) = 0.374 mW/g



0 dB = 0.540 mW/g = -5.35 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

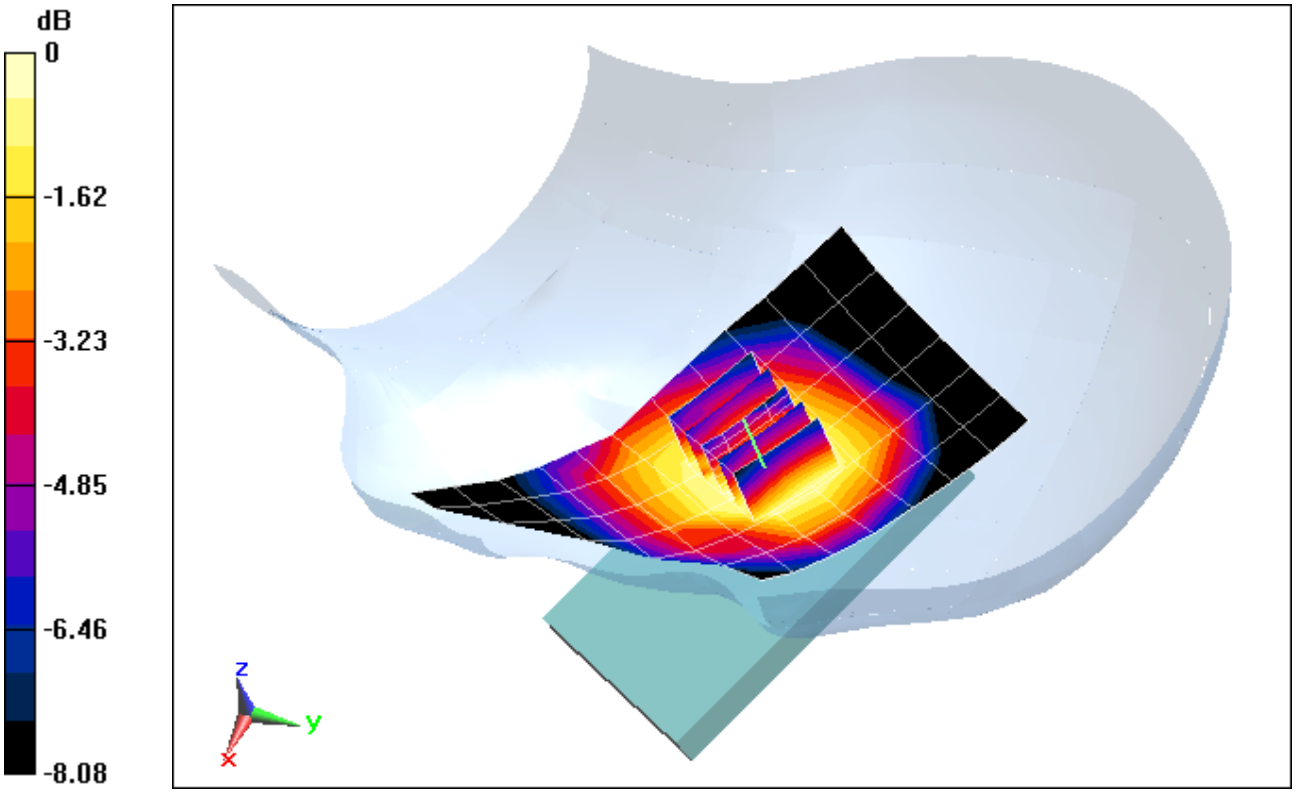
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.894 mho/m; ε_r = 39.587; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-22-2012; Ambient Temp: 24.7°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO Rev. A - FCC Rule Part 22H, Left Head, Tilt, 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 = 19.172 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.508 mW/g
SAR(1 g) = 0.279 mW/g; SAR(10 g) = 0.218 mW/g



0 dB = 0.291 mW/g = -10.72 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

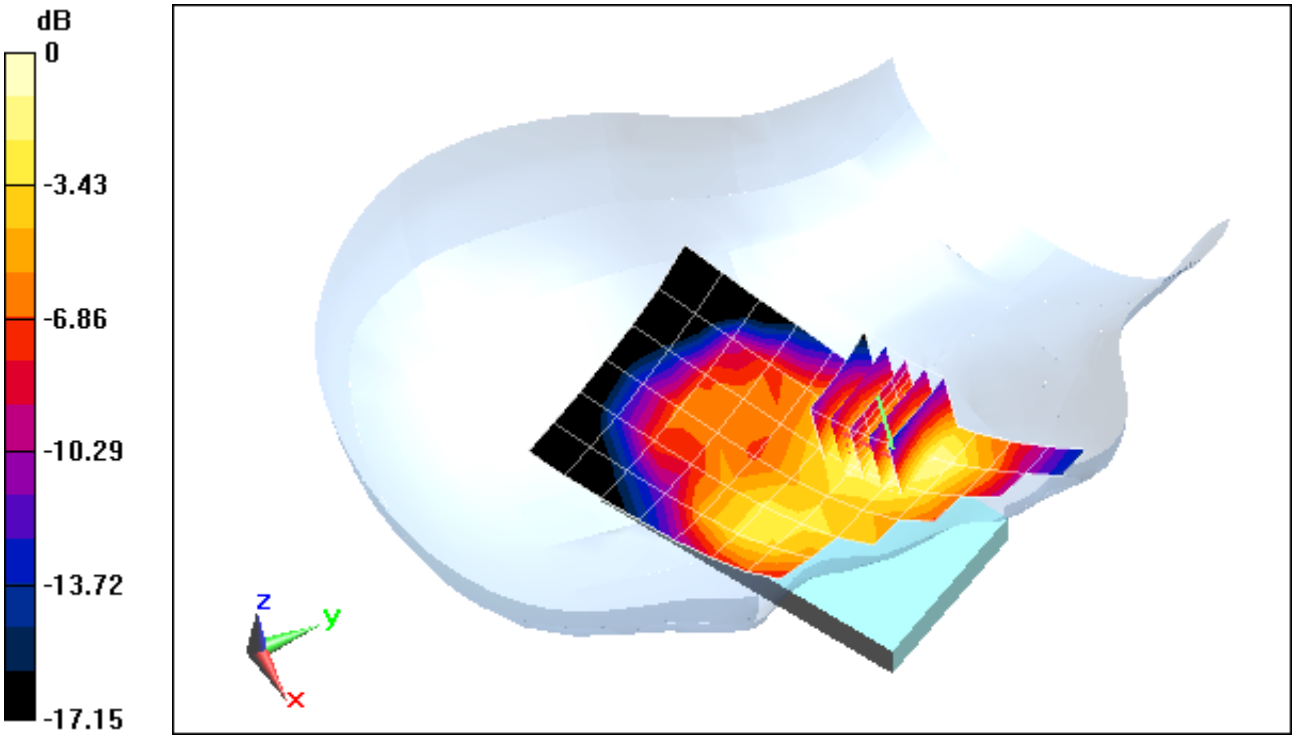
Communication System: PCS CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.386 mho/m; ε_r = 38.93; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-12-2012; Ambient Temp: 23.3°C; Tissue Temp: 23.0°C

Probe: ES3DV2 - SN3022; ConvF(4.98, 4.98, 4.98); Calibrated: 8/25/2011;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: PCS CDMA - FCC Rule Part 24E, 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 = 17.442 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.518 mW/g
SAR(1 g) = 0.355 mW/g; SAR(10 g) = 0.228 mW/g



0 dB = 0.384 mW/g = -8.31 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

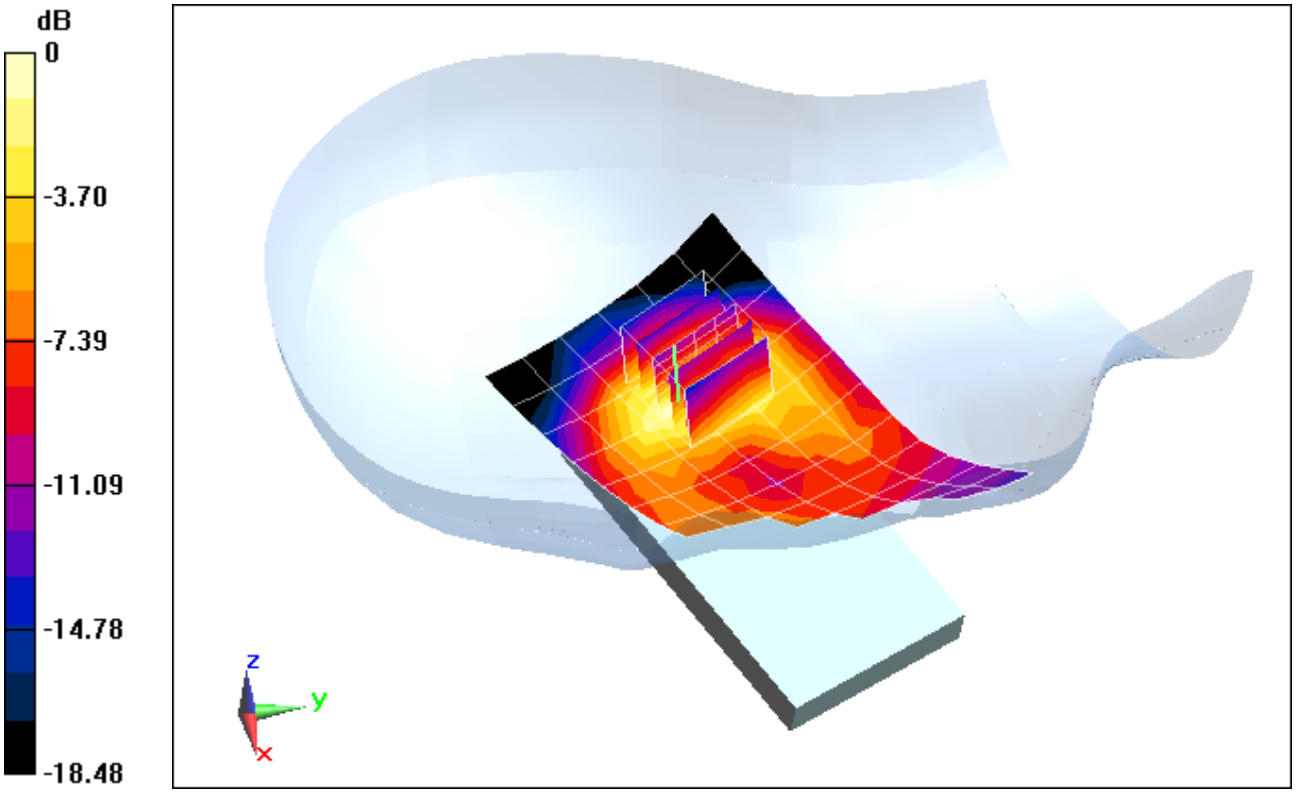
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.419 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-23-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: PCS EVDO Rev. A - FCC Rule Part 24E, Right Head, Tilt, 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 = 12.241 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.343 mW/g
SAR(1 g) = 0.192 mW/g; SAR(10 g) = 0.111 mW/g



0 dB = 0.207 mW/g = -13.68 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

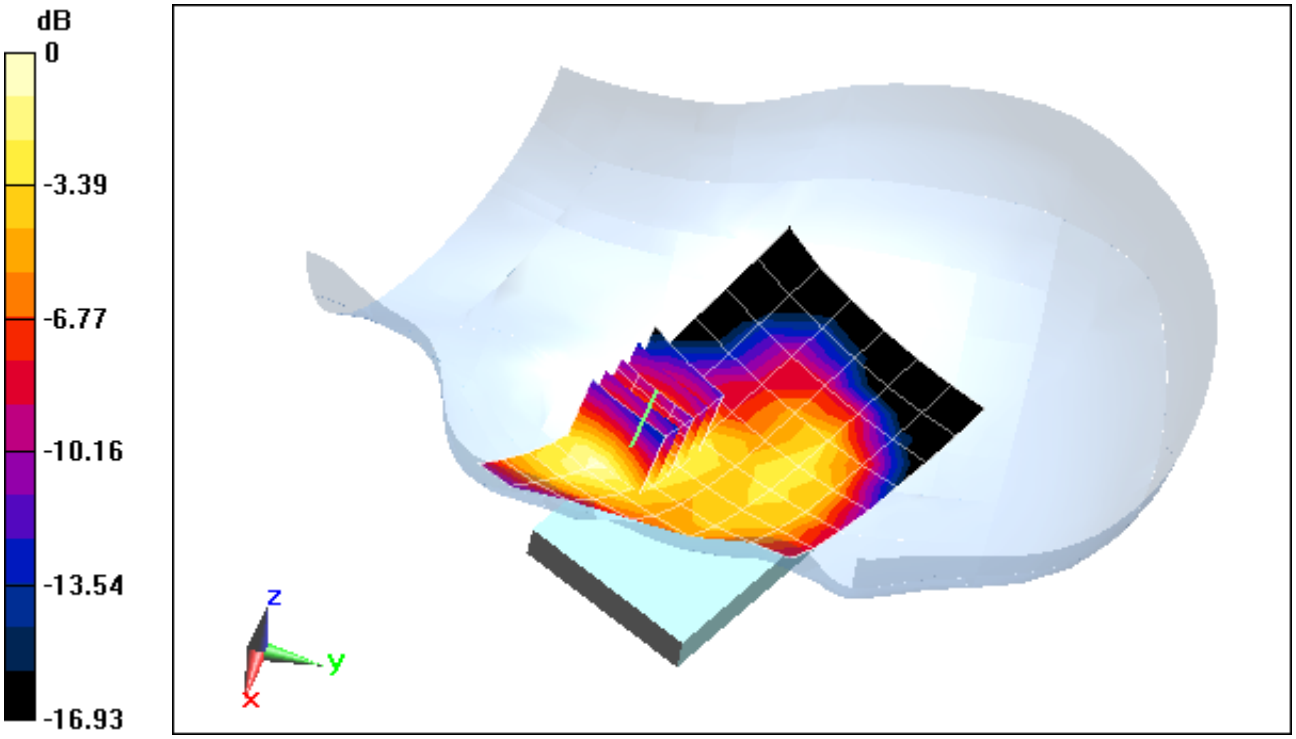
Communication System: PCS CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.386 mho/m; ε_r = 38.93; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-12-2012; Ambient Temp: 23.3°C; Tissue Temp: 23.0°C

Probe: ES3DV2 - SN3022; ConvF(4.98, 4.98, 4.98); Calibrated: 8/25/2011;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: PCS CDMA - FCC Rule Part 24E, 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 = 19.361 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.648 mW/g
SAR(1 g) = 0.422 mW/g; SAR(10 g) = 0.262 mW/g



0 dB = 0.460 mW/g = -6.74 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

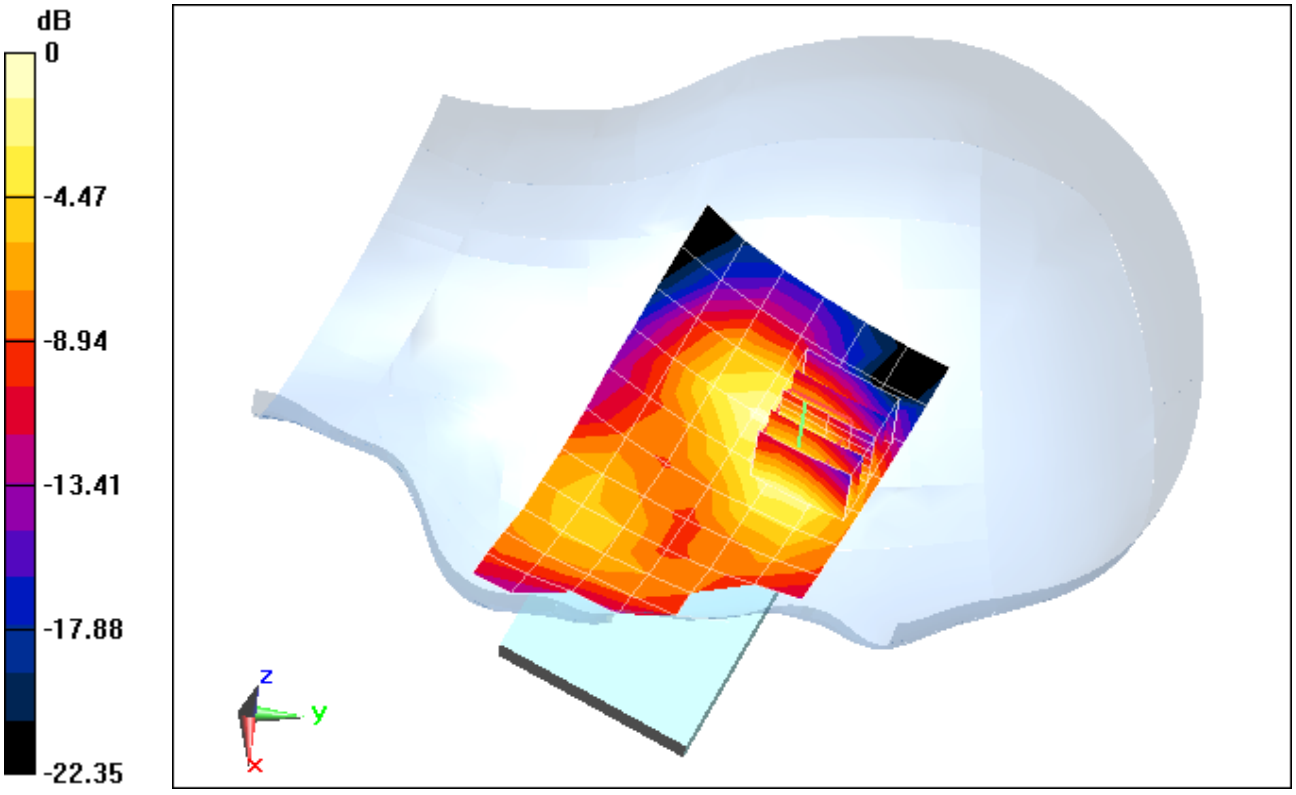
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.419 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-23-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: PCS EVDO Rev. A - FCC Rule Part 24E, Left Head, Tilt, 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 = 11.202 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.290 mW/g
SAR(1 g) = 0.198 mW/g; SAR(10 g) = 0.121 mW/g



0 dB = 0.211 mW/g = -13.51 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

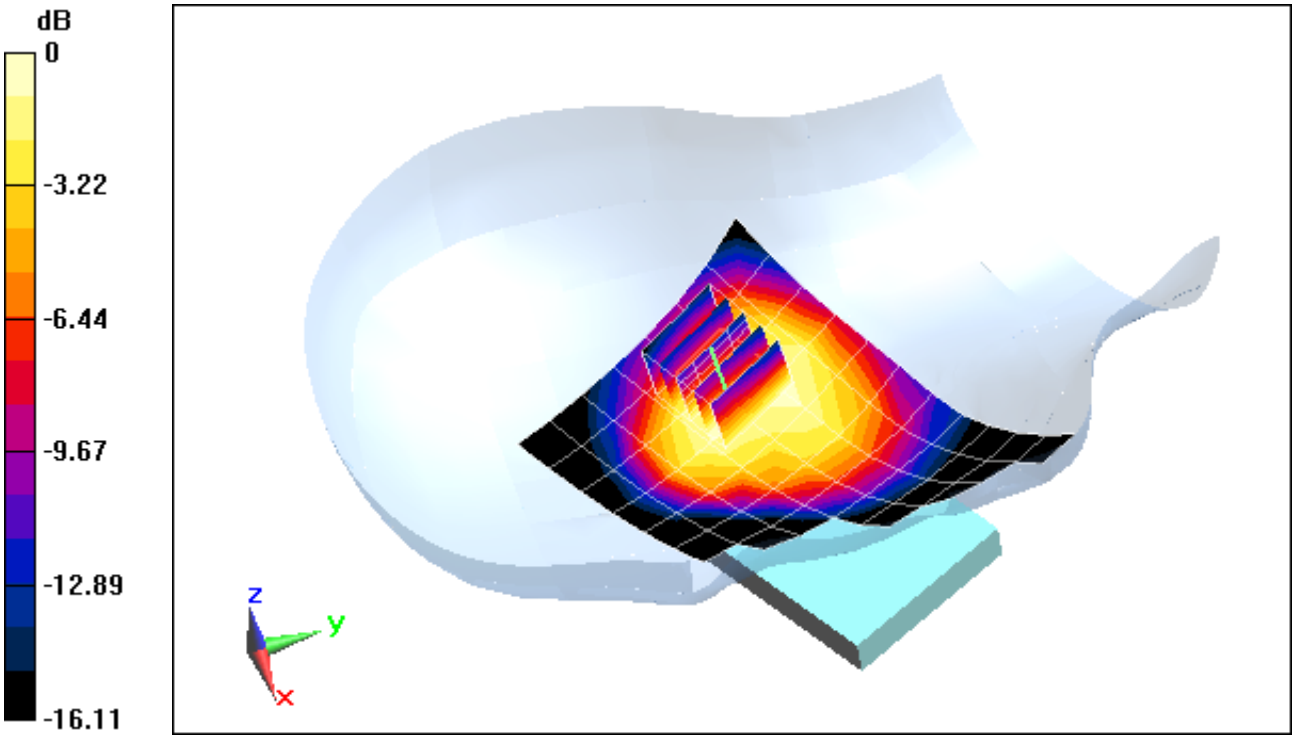
Communication System: LTE Band 25 (PCS); Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1910 MHz; σ = 1.41 mho/m; ε_r = 38.21; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-09-2012; Ambient Temp: 22.5°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Right Head, Cheek, High.ch
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.345 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.898 mW/g
SAR(1 g) = 0.522 mW/g; SAR(10 g) = 0.326 mW/g



0 dB = 0.571 mW/g = -4.87 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

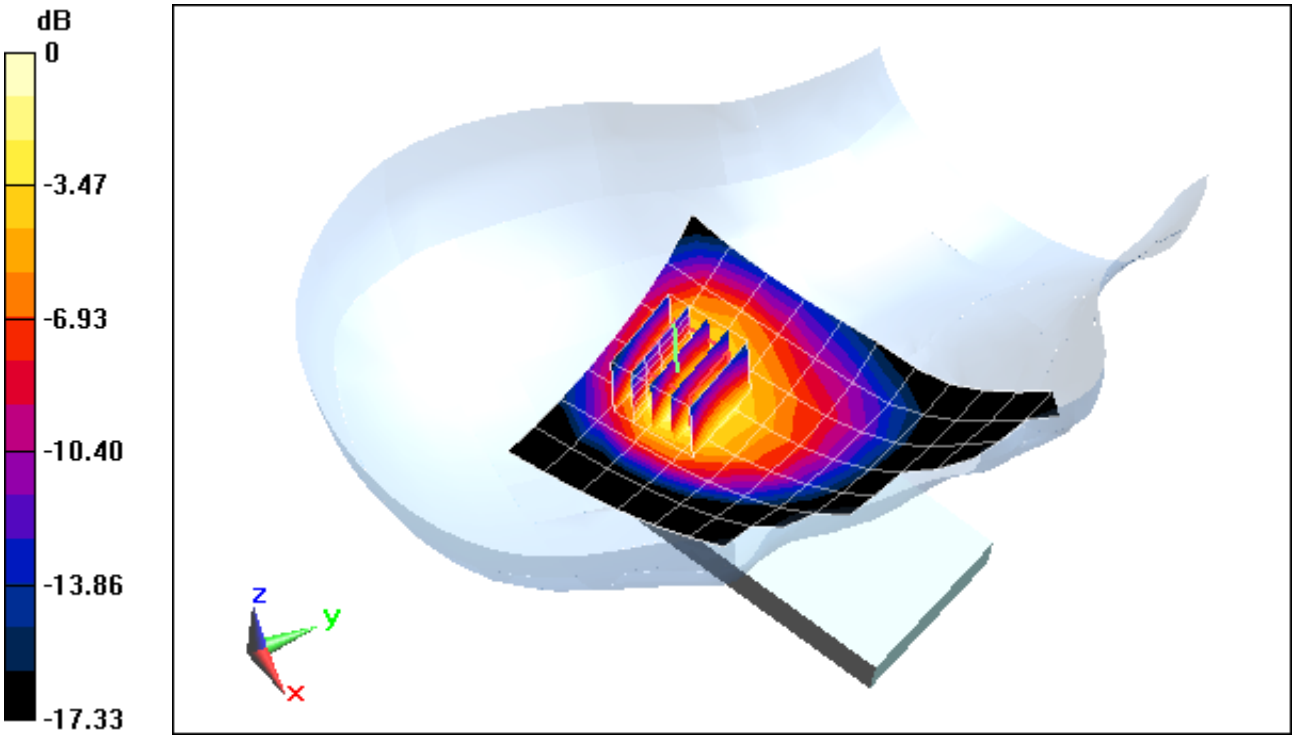
Communication System: LTE Band 25 (PCS); Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1910 MHz; σ = 1.41 mho/m; ε_r = 38.21; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-09-2012; Ambient Temp: 22.5°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Right Head, Tilt, High.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 = 22.432 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.922 mW/g
SAR(1 g) = 0.561 mW/g; SAR(10 g) = 0.327 mW/g



0 dB = 0.603 mW/g = -4.39 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

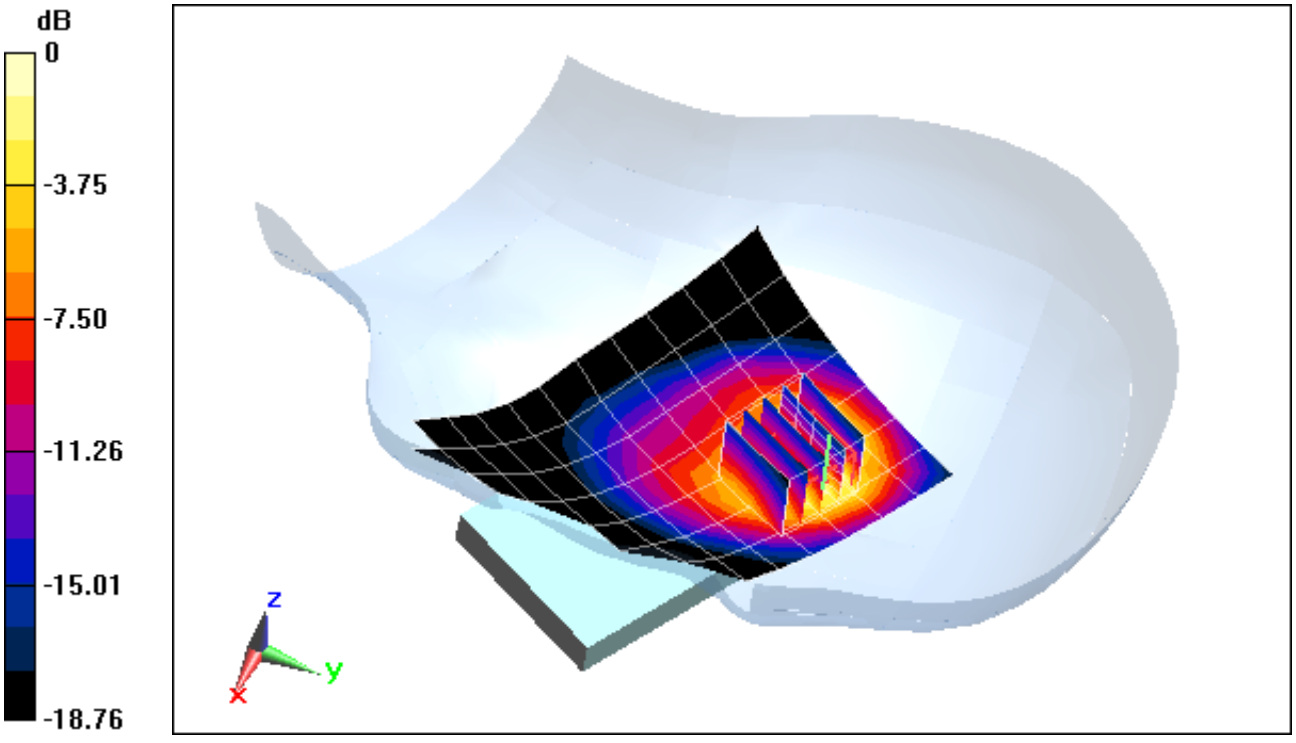
Communication System: LTE Band 25 (PCS); Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1910 MHz; σ = 1.41 mho/m; ε_r = 38.21; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-09-2012; Ambient Temp: 22.5°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Left Head, Cheek, High.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 = 32.194 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 2.602 mW/g
SAR(1 g) = 1.26 mW/g; SAR(10 g) = 0.611 mW/g



0 dB = 1.35 mW/g = 2.61 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

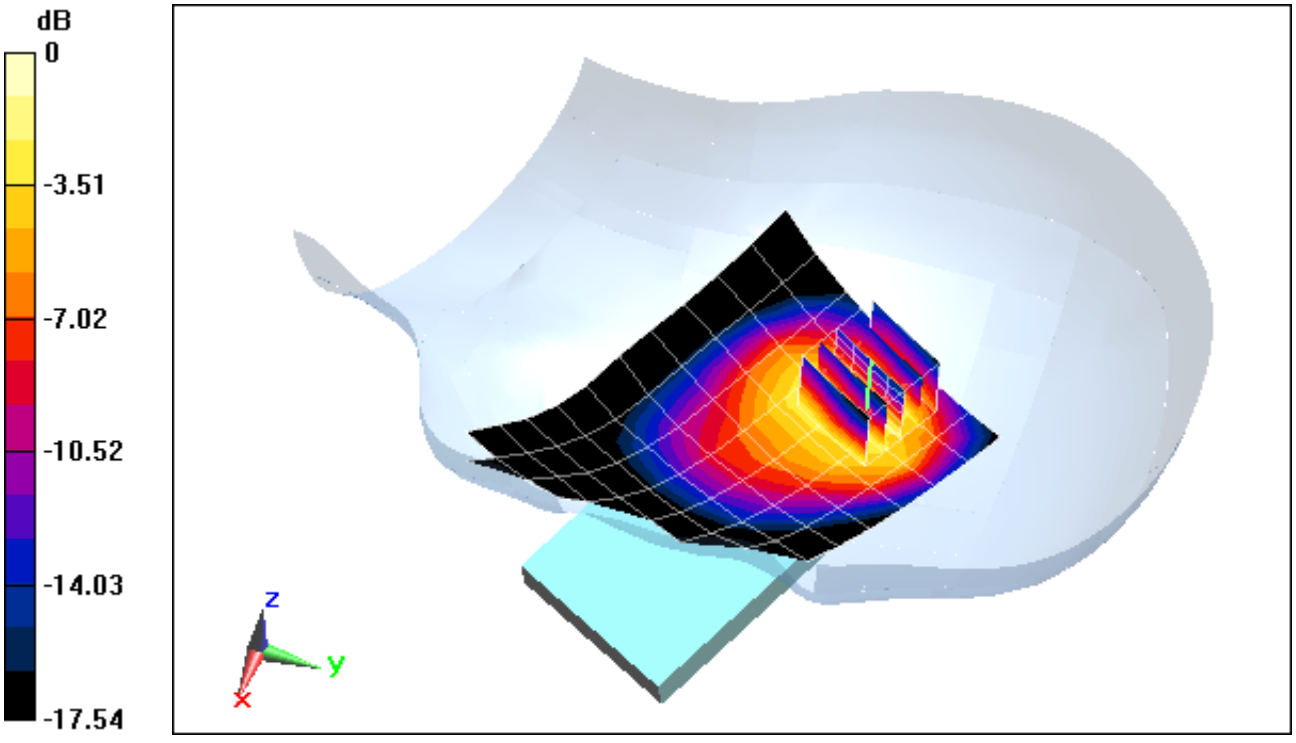
Communication System: LTE Band 25 (PCS); Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1910 MHz; σ = 1.41 mho/m; ε_r = 38.21; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-09-2012; Ambient Temp: 22.5°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Left Head, Tilt, High.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 = 22.617 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.220 mW/g
SAR(1 g) = 0.700 mW/g; SAR(10 g) = 0.387 mW/g



0 dB = 0.773 mW/g = -2.24 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #10

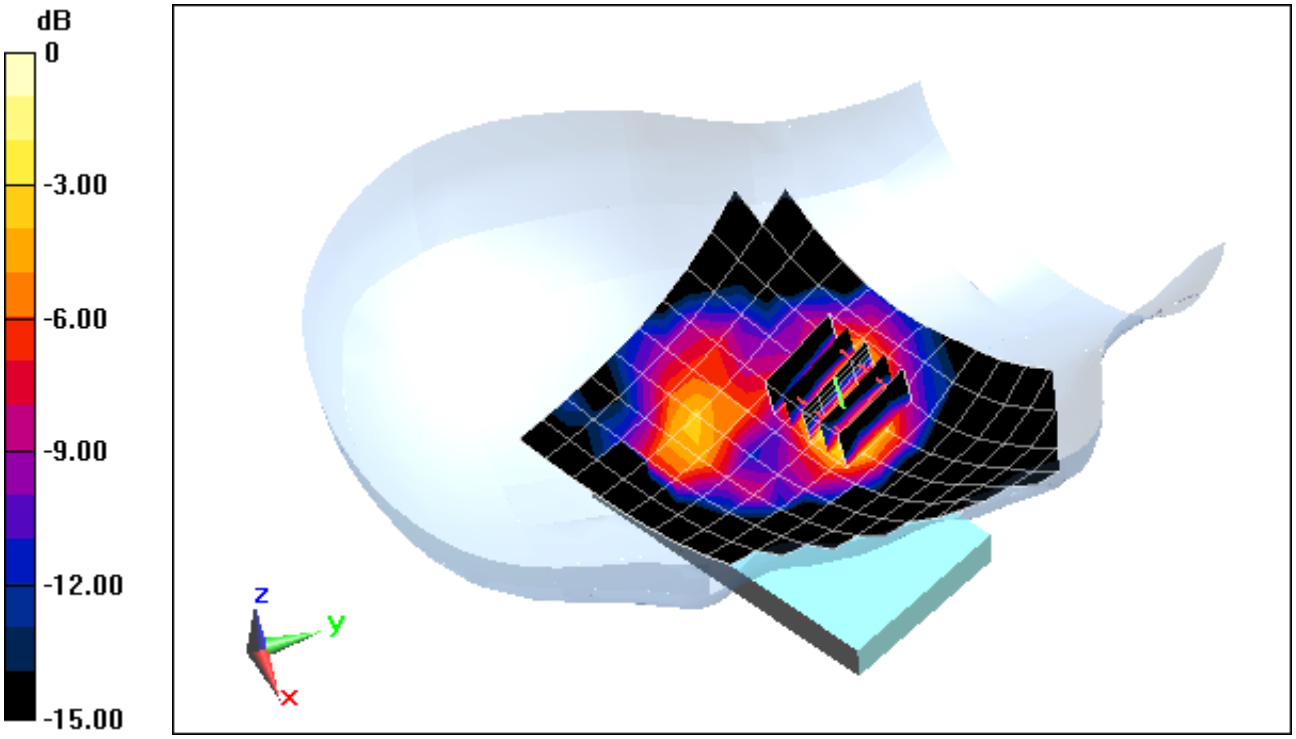
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.832 mho/m; ε_r = 38.696; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-14-2012; Ambient Temp: 22.1°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3288; ConvF(4.54, 4.54, 4.54); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11b - FCC Rule Part 15C, Right Head, Cheek, Ch 06, 1 Mbps

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.012 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.068 mW/g
SAR(1 g) = 0.028 mW/g; SAR(10 g) = 0.013 mW/g



0 dB = 0.0358 mW/g = -28.92 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #10

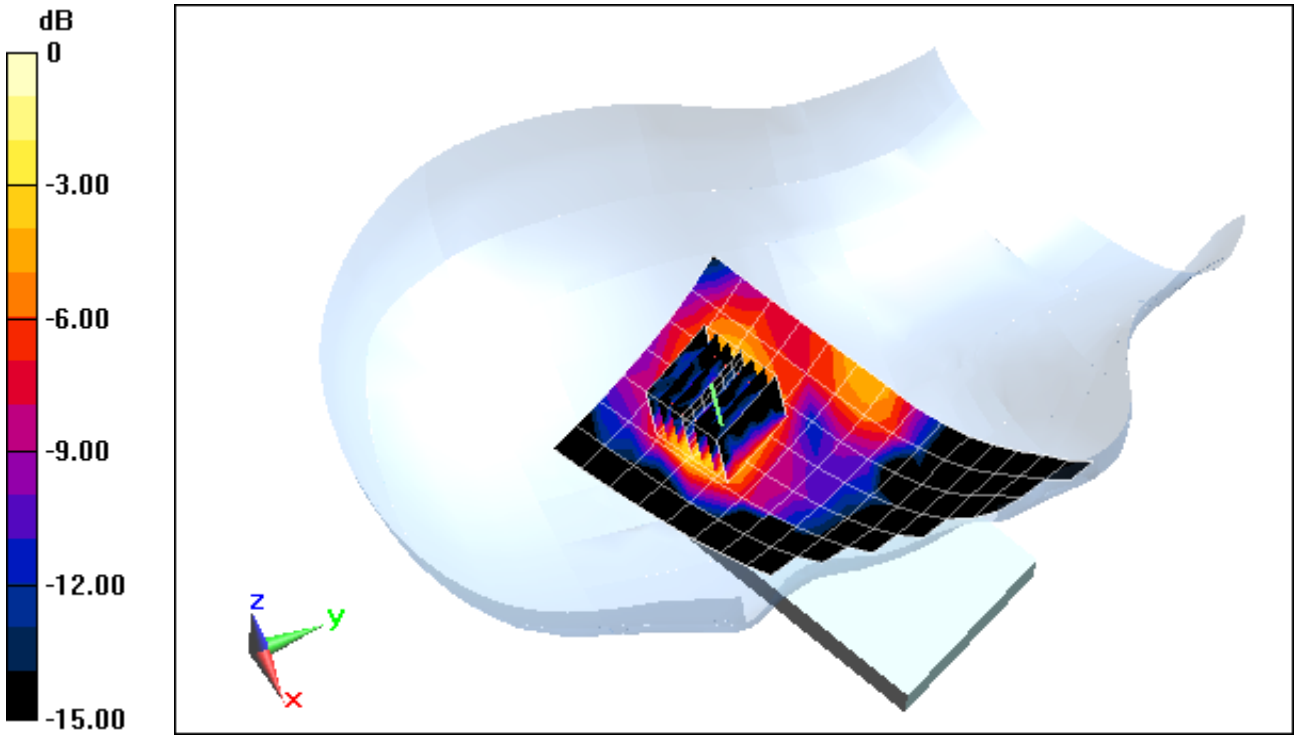
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
$f = 2437$ MHz; $\sigma = 1.832$ mho/m; $\varepsilon_r = 38.696$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 08-14-2012; Ambient Temp: 22.1°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3288; ConvF(4.54, 4.54, 4.54); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11b - FCC Rule Part 15C, Right Head, Tilt, Ch 06, 1 Mbps

Area Scan (8x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.893 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.027 mW/g
SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.00666 mW/g



0 dB = 0.0187 mW/g = -34.56 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #10

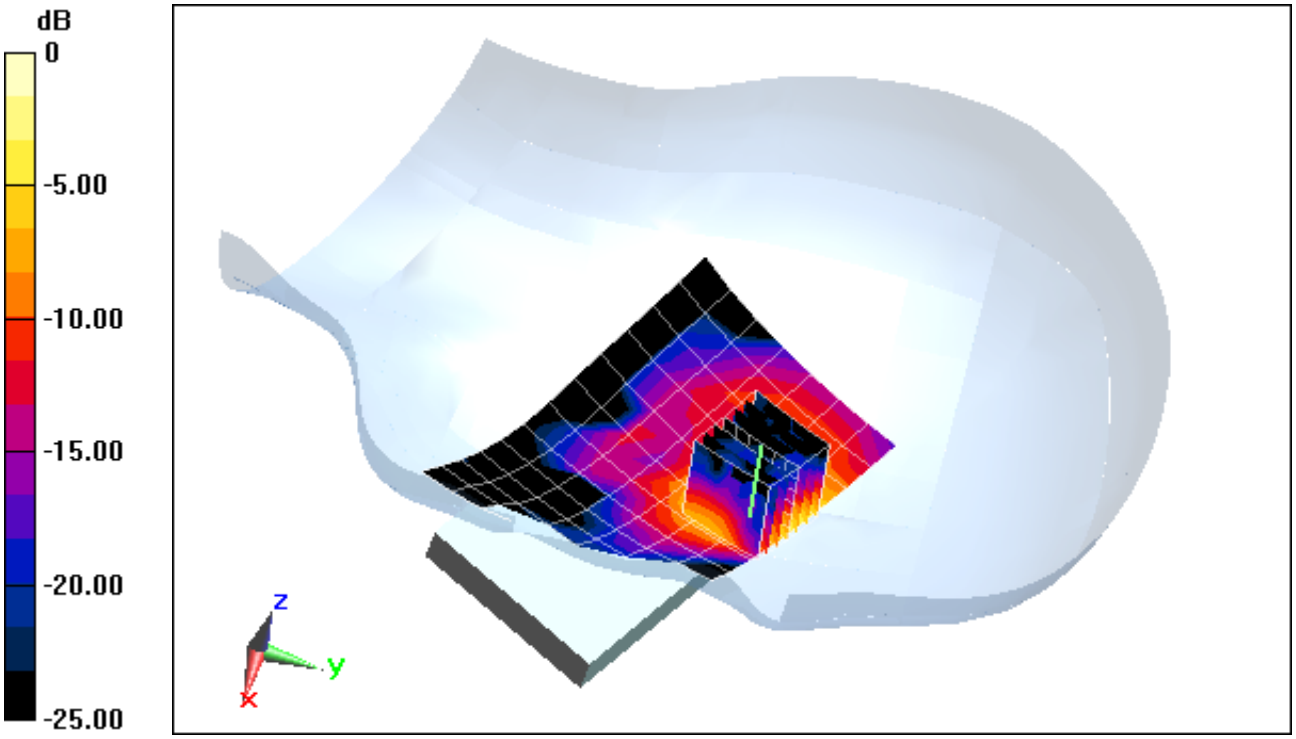
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.832 mho/m; ε_r = 38.696; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-14-2012; Ambient Temp: 22.1°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3288; ConvF(4.54, 4.54, 4.54); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11b - FCC Rule Part 15C, Left Head, Cheek, Ch 06, 1 Mbps

Area Scan (8x13x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.108 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.191 mW/g
SAR(1 g) = 0.073 mW/g; SAR(10 g) = 0.029 mW/g



0 dB = 0.0995 mW/g = -20.04 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #10

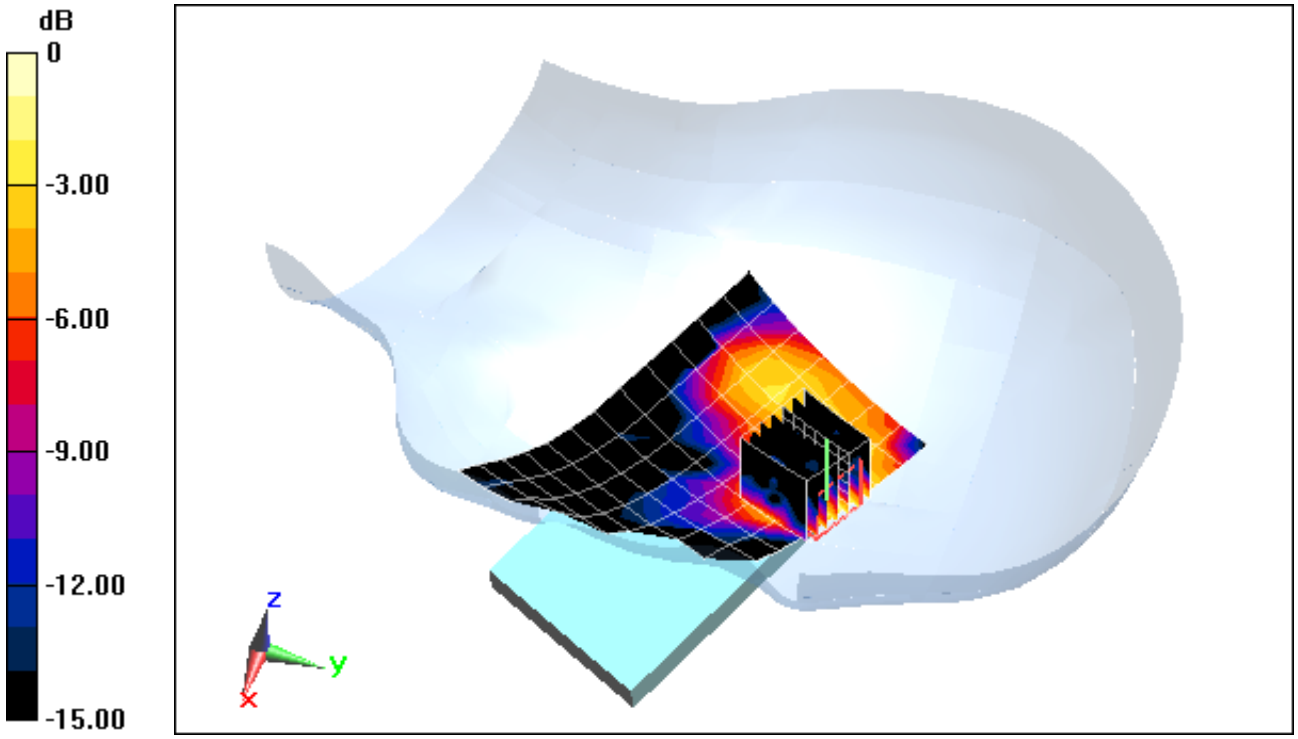
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.832 mho/m; ε_r = 38.696; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-14-2012; Ambient Temp: 22.1°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3288; ConvF(4.54, 4.54, 4.54); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11b - FCC Rule Part 15C, Left Head, Tilt, Ch 06, 1 Mbps

Area Scan (8x13x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.134 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.043 mW/g
SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.00698 mW/g



0 dB = 0.0205 mW/g = -33.76 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

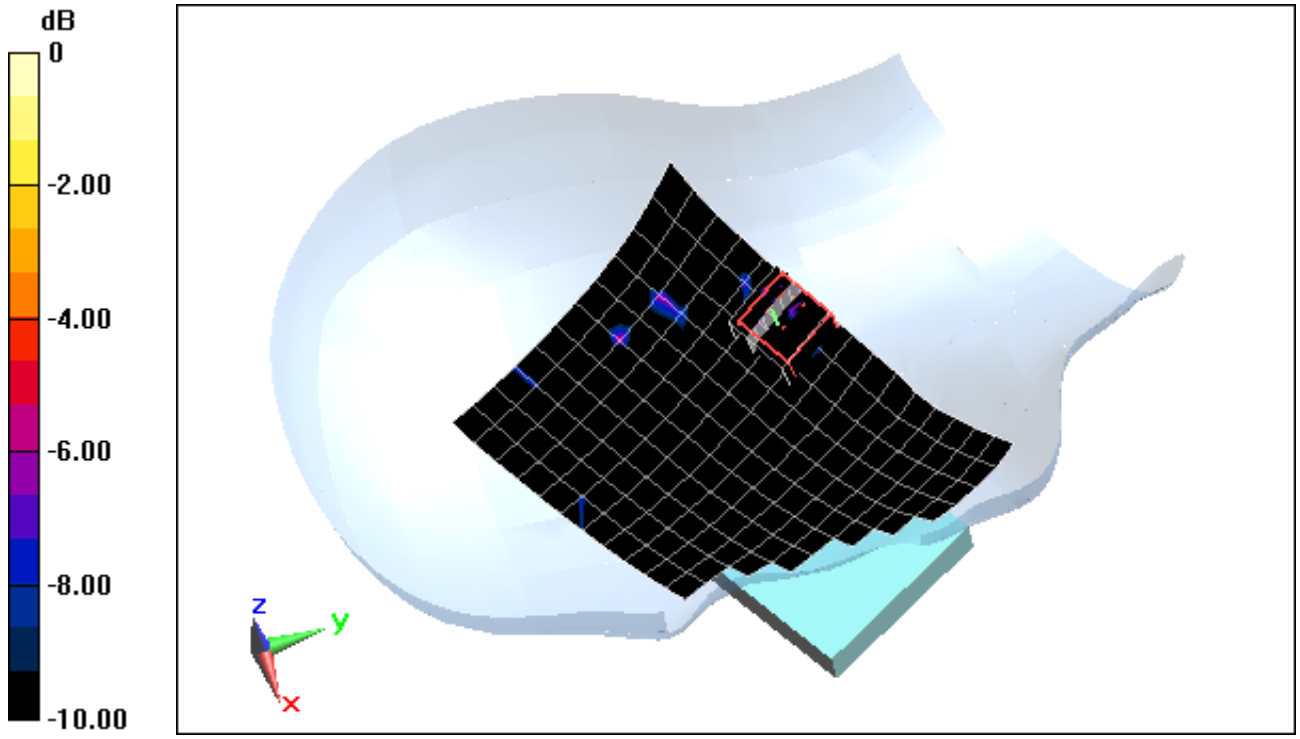
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5240 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5240 MHz; σ = 4.594 mho/m; ε_r = 37; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-13-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(4.59, 4.59, 4.59); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11a 5.2 GHz - FCC Rule Part 15E, Right Head, Cheek, Ch 48, 6 Mbps

Area Scan (12x17x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.278 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.143 mW/g
SAR(1 g) = 0.0084 mW/g; SAR(10 g) = 0.00245 mW/g



0 dB = 0.143 mW/g = -16.90 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

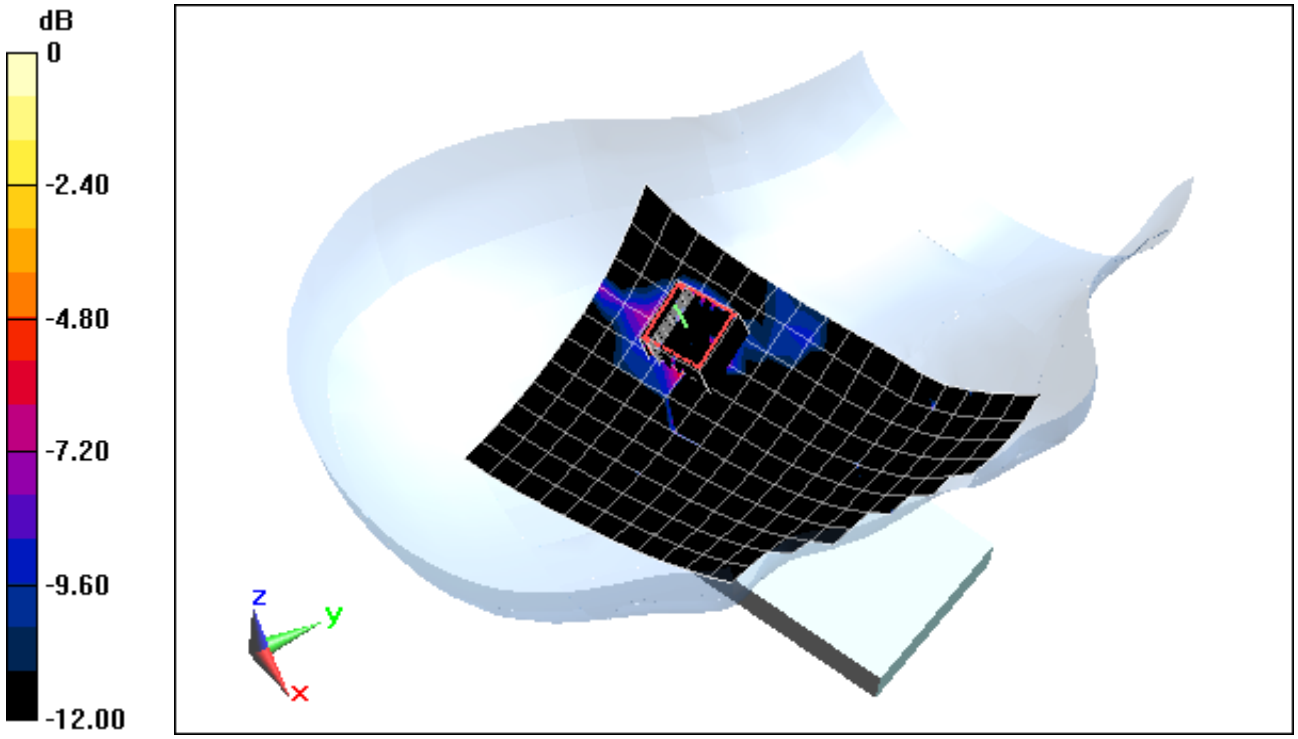
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5300 MHz; σ = 4.681 mho/m; ε_r = 36.89; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-13-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(4.36, 4.36, 4.36); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11a 5.3 GHz - FCC Rule Part 15E, Right Head, Tilt Ch 60, 6 Mbps

Area Scan (12x17x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.869 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.481 mW/g
SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.017 mW/g



0 dB = 0.158 mW/g = -16.03 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

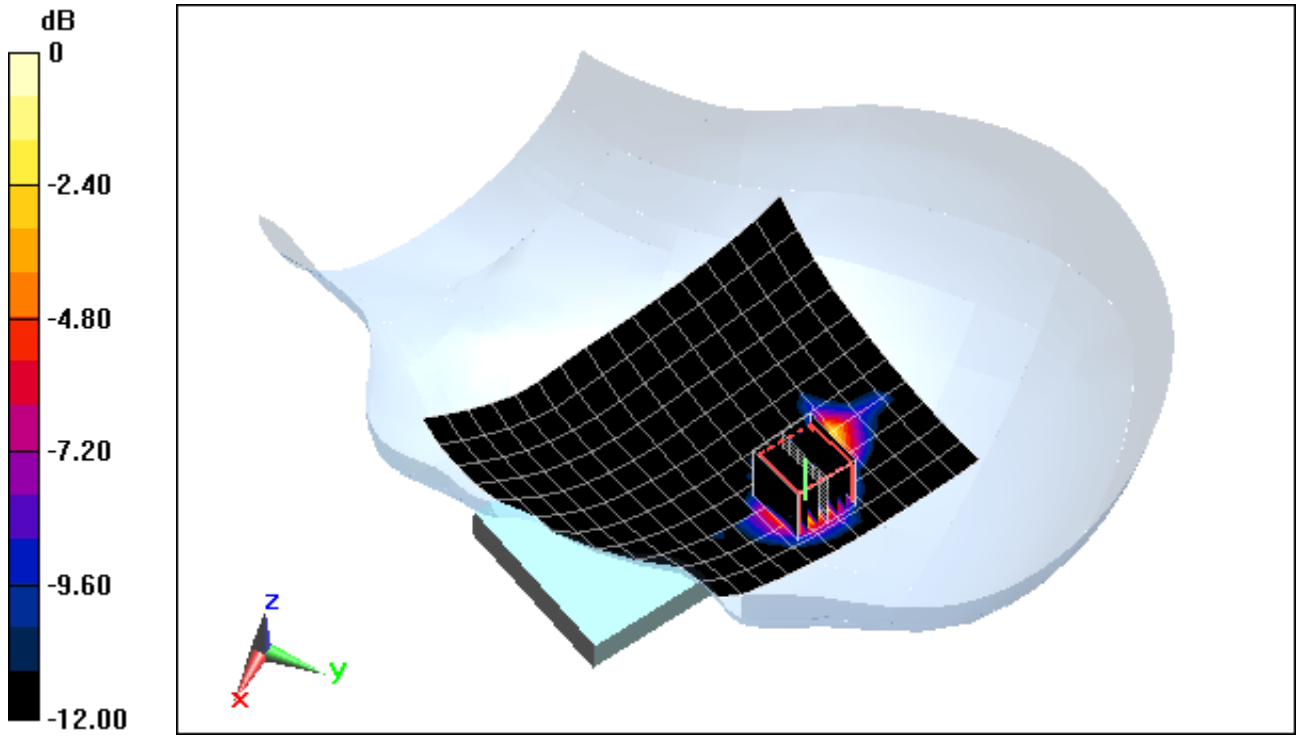
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5300 MHz; σ = 4.681 mho/m; ε_r = 36.89; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-13-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(4.36, 4.36, 4.36); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11a, 5.3 GHz - FCC Rule Part 15E, Left Head, Cheek, Ch 60, 6 Mbps

Area Scan (12x16x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 6.889 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.701 mW/g
SAR(1 g) = 0.183 mW/g; SAR(10 g) = 0.051 mW/g



0 dB = 0.397 mW/g = -8.02 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

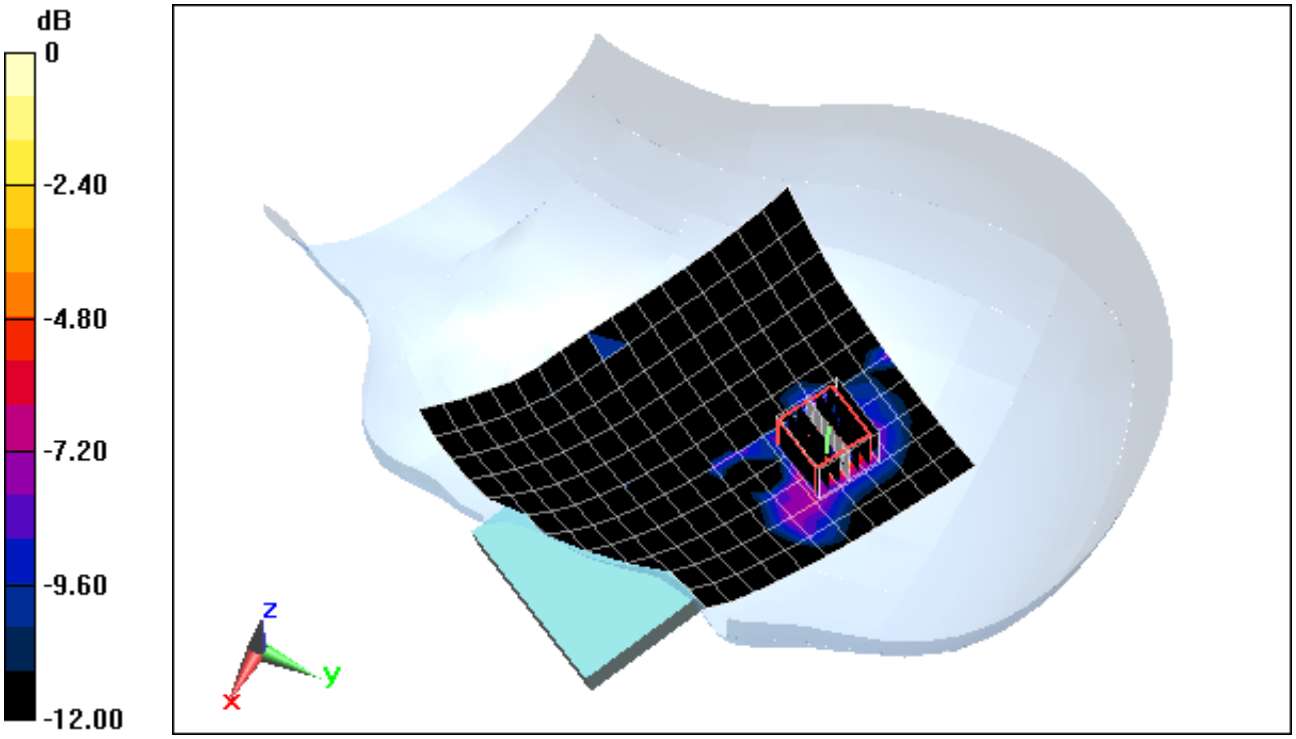
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5300 MHz; σ = 4.681 mho/m; ε_r = 36.89; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-13-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(4.36, 4.36, 4.36); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11a, 5.3 GHz - FCC Rule Part 15E, Left Head, Tilt, Ch 60, 6 Mbps

Area Scan (12x16x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 5.642 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.829 mW/g
SAR(1 g) = 0.120 mW/g; SAR(10 g) = 0.032 mW/g



0 dB = 0.260 mW/g = -11.70 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

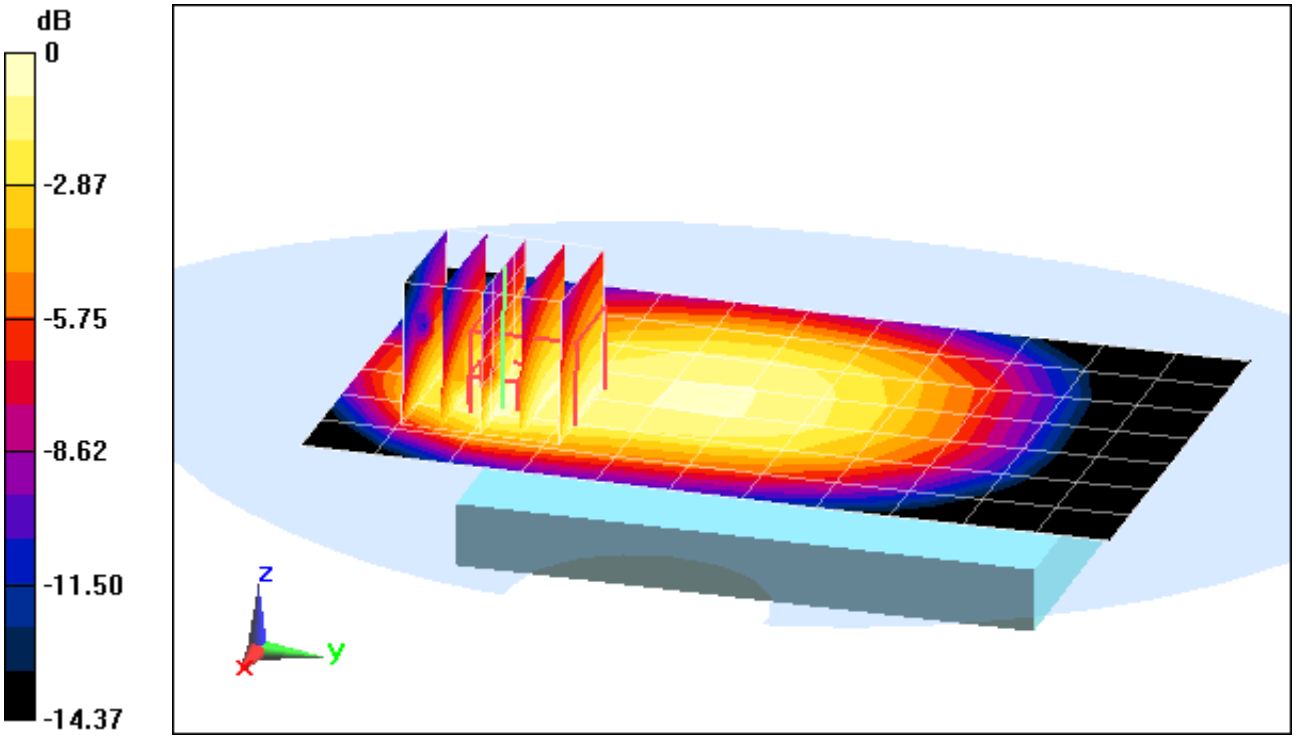
Communication System: Cellular CDMA; Frequency: 820.1 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
$f = 820.1$ MHz; $\sigma = 0.992$ mho/m; $\varepsilon_r = 55.349$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-09-2012; Ambient Temp: 21.6°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO Rev. 0 - FCC Rule Part 90S, Body SAR, Back side, Mid.ch

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.006 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.793 mW/g
SAR(1 g) = 0.899 mW/g; SAR(10 g) = 0.632 mW/g



0 dB = 0.934 mW/g = -0.59 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

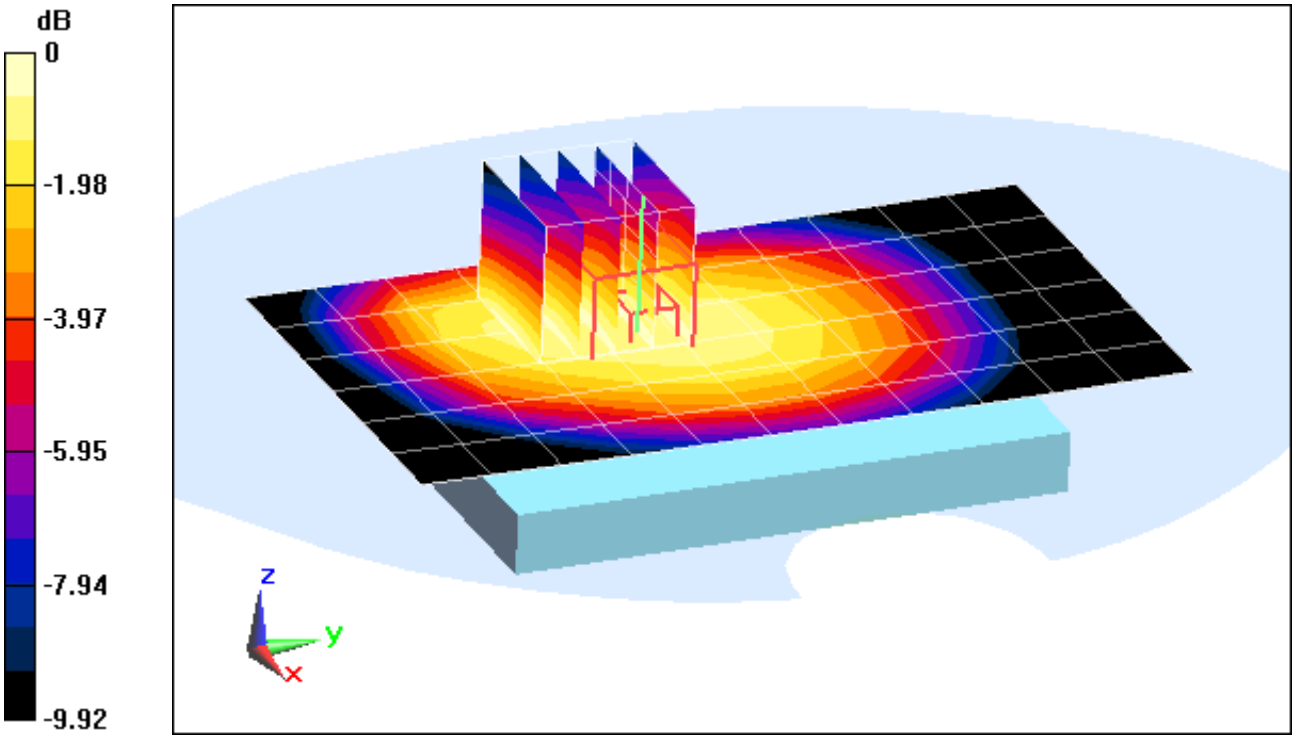
Communication System: Cellular CDMA; Frequency: 820.1 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
$f = 820.1$ MHz; $\sigma = 0.992$ mho/m; $\varepsilon_r = 55.349$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-09-2012; Ambient Temp: 21.6°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular CDMA - FCC Rule Part 90S, Body SAR, Front 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 = 27.943 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.868 mW/g
SAR(1 g) = 0.665 mW/g; SAR(10 g) = 0.505 mW/g



0 dB = 0.694 mW/g = -3.17 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

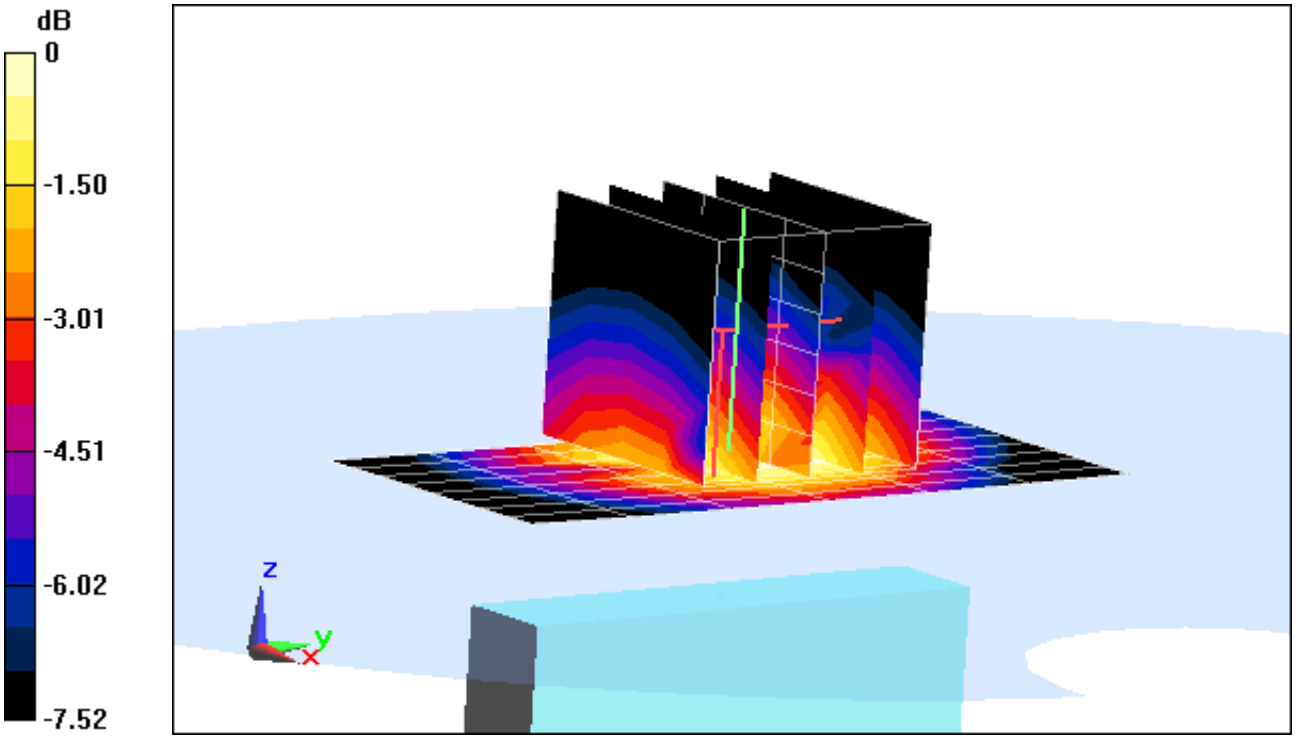
Communication System: Cellular CDMA; Frequency: 820.1 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 820.1 MHz; σ = 0.992 mho/m; ε_r = 55.349; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-09-2012; Ambient Temp: 21.6°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO Rev. 0 - FCC Rule Part 90S, Body SAR, Bottom Edge, Mid.ch

Area Scan (9x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.922 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.476 mW/g
SAR(1 g) = 0.227 mW/g; SAR(10 g) = 0.148 mW/g



0 dB = 0.248 mW/g = -12.11 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

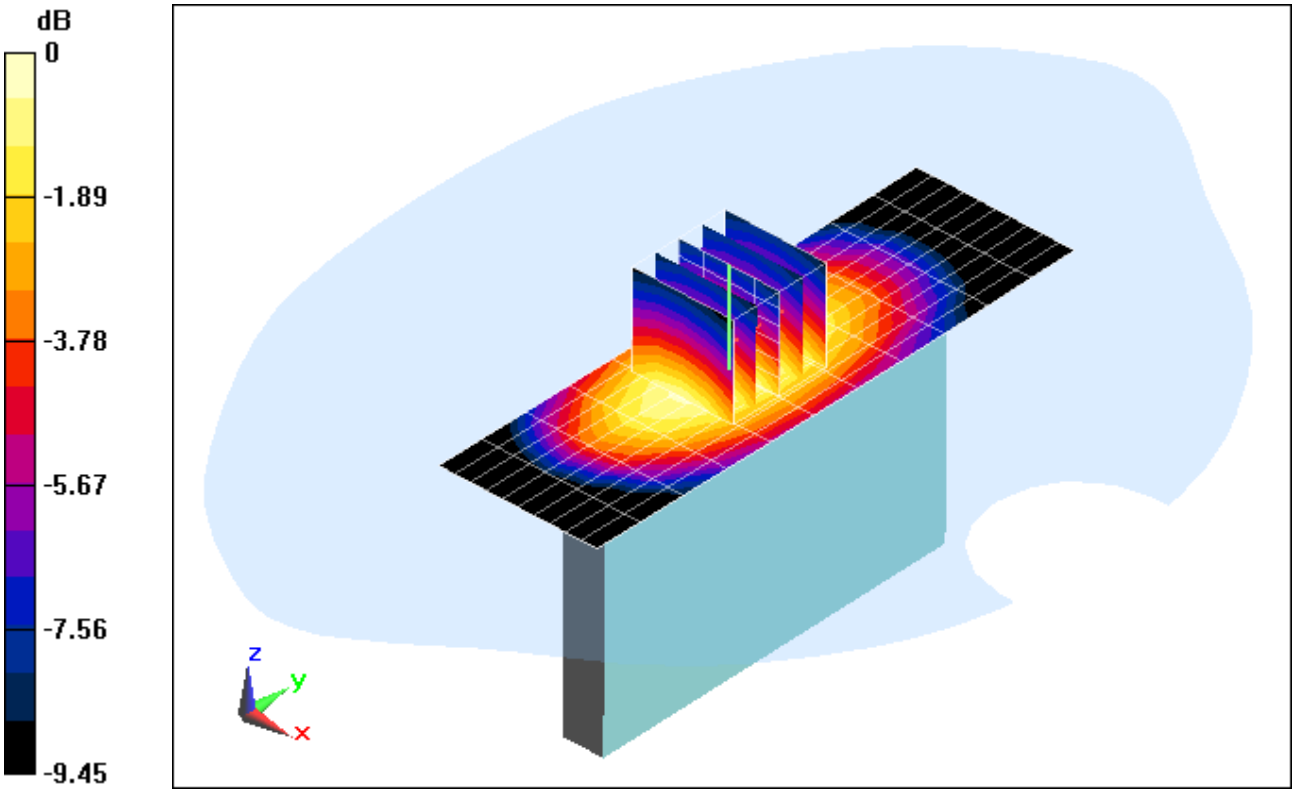
Communication System: Cellular CDMA; Frequency: 820.1 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
$f = 820.1$ MHz; $\sigma = 0.992$ mho/m; $\varepsilon_r = 55.349$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-09-2012; Ambient Temp: 21.6°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular CDMA - FCC Rule Part 90S, Body SAR, Left side, Mid.ch

Area Scan (11x12x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.734 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.259 mW/g
SAR(1 g) = 0.909 mW/g; SAR(10 g) = 0.634 mW/g



0 dB = 0.972 mW/g = -0.25 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

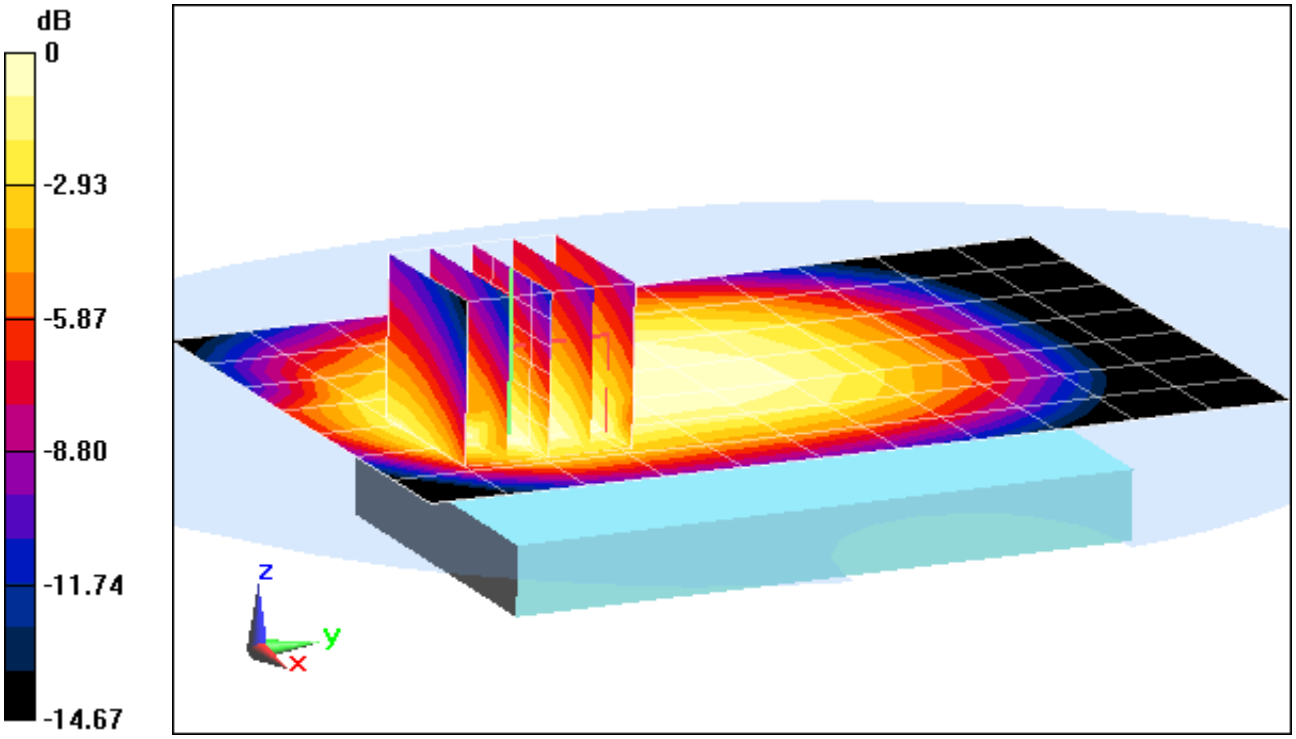
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; σ = 1.008 mho/m; ε_r = 55.226; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-09-2012; Ambient Temp: 21.6°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO Rev. 0 - FCC Rule Part 22H, Body SAR, Back side, Mid.ch

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.723 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 1.509 mW/g
SAR(1 g) = 0.772 mW/g; SAR(10 g) = 0.533 mW/g



0 dB = 0.800 mW/g = -1.94 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

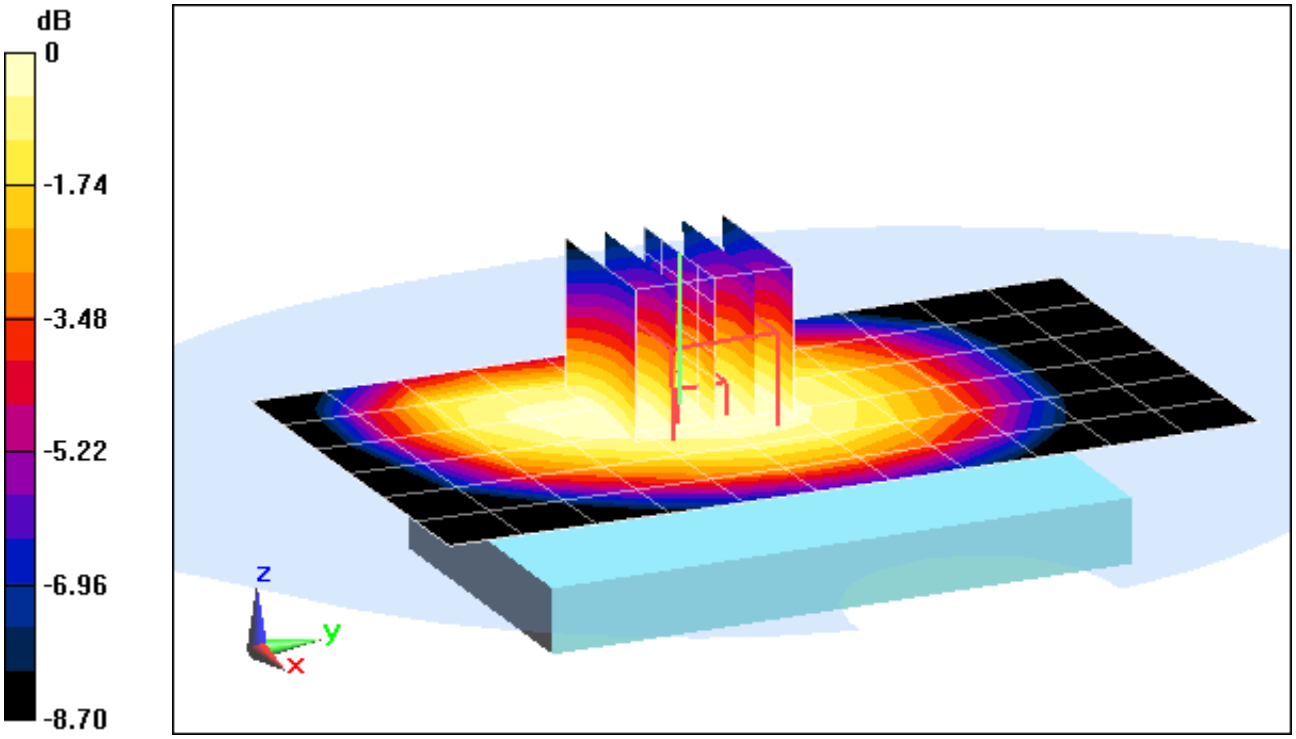
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; σ = 1.008 mho/m; ε_r = 55.226; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-09-2012; Ambient Temp: 21.6°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular CDMA - FCC Rule Part 22H, Body SAR, Front 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 = 25.613 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.721 mW/g
SAR(1 g) = 0.564 mW/g; SAR(10 g) = 0.435 mW/g



0 dB = 0.588 mW/g = -4.61 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

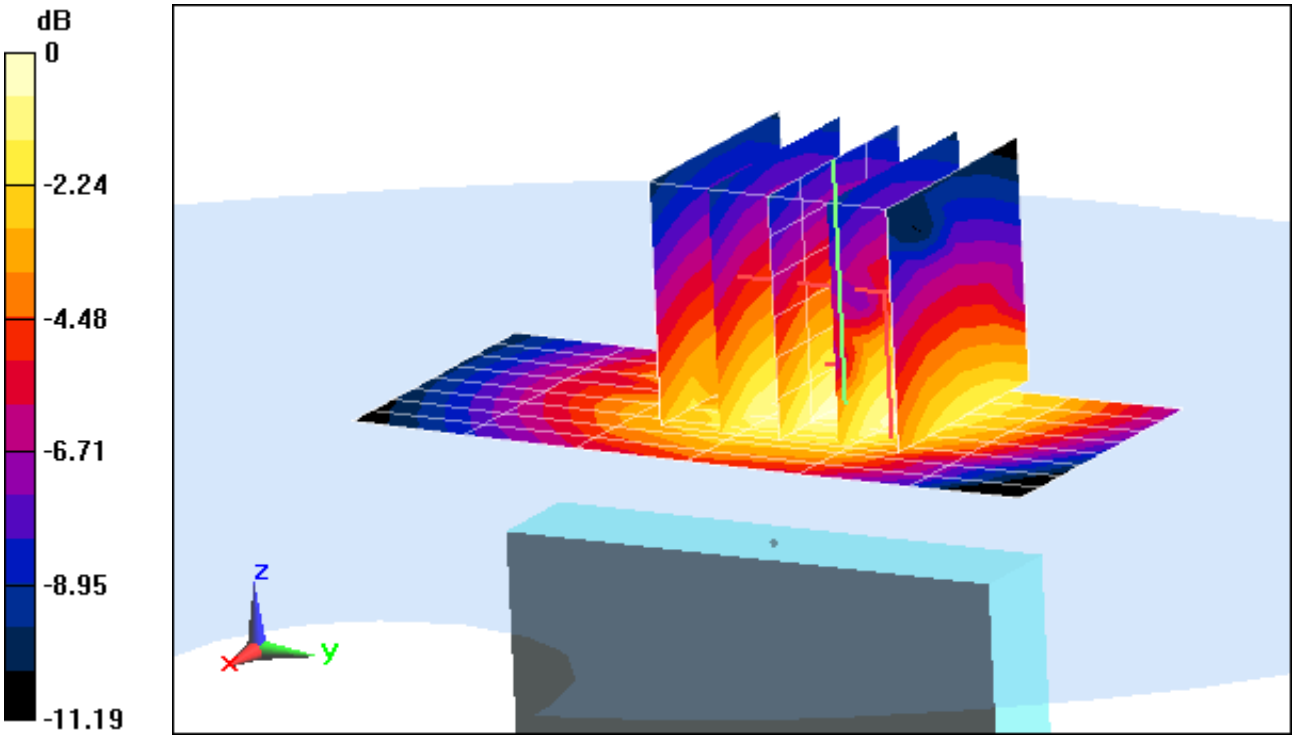
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; σ = 1.008 mho/m; ε_r = 55.226; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-09-2012; Ambient Temp: 21.6°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO Rev. 0 - FCC Rule Part 22H, Body SAR, Bottom Edge, Mid.ch

Area Scan (9x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.332 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.367 mW/g
SAR(1 g) = 0.269 mW/g; SAR(10 g) = 0.180 mW/g



0 dB = 0.289 mW/g = -10.78 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

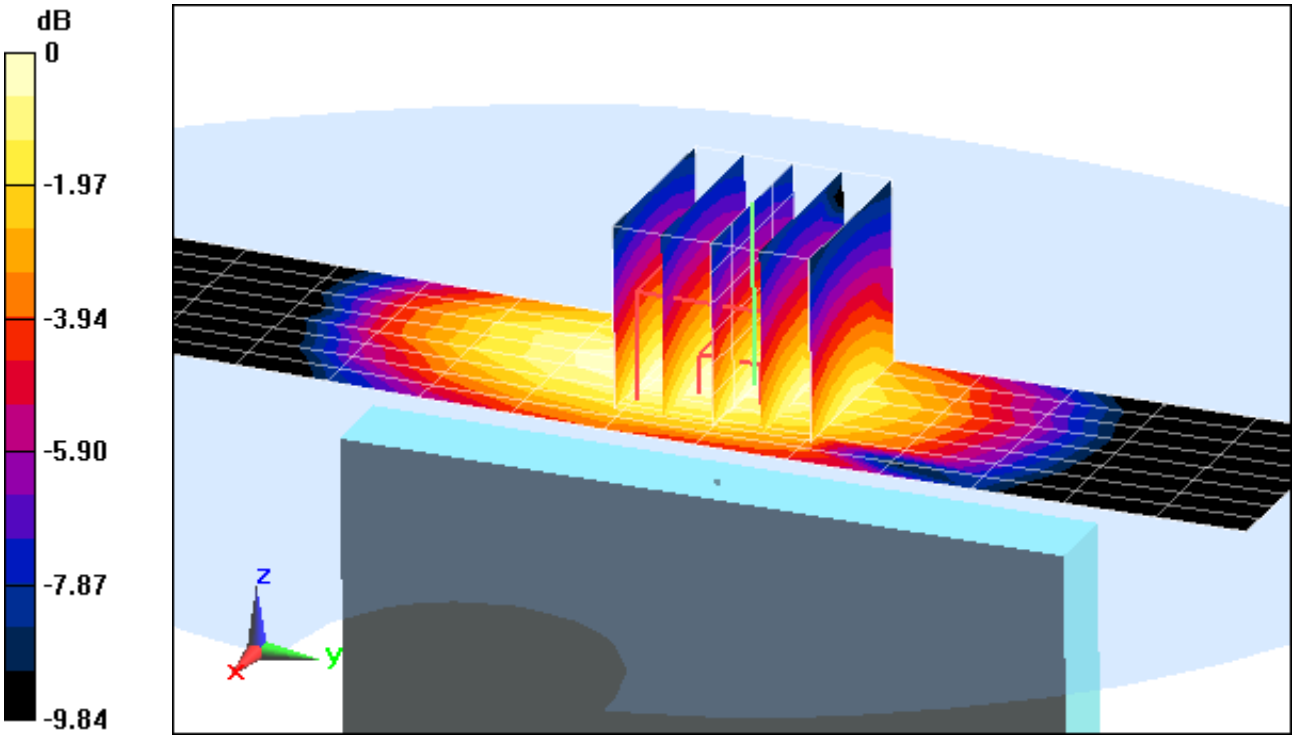
Communication System: Cellular CDMA; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 824.7 MHz; σ = 0.996 mho/m; ε_r = 55.316; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-09-2012; Ambient Temp: 21.6°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO Rev. 0 - FCC Rule Part 22H Body SAR, Left Edge, Low.ch

Area Scan (9x14x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.983 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.475 mW/g
SAR(1 g) = 0.939 mW/g; SAR(10 g) = 0.650 mW/g



0 dB = 0.996 mW/g = -0.03 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

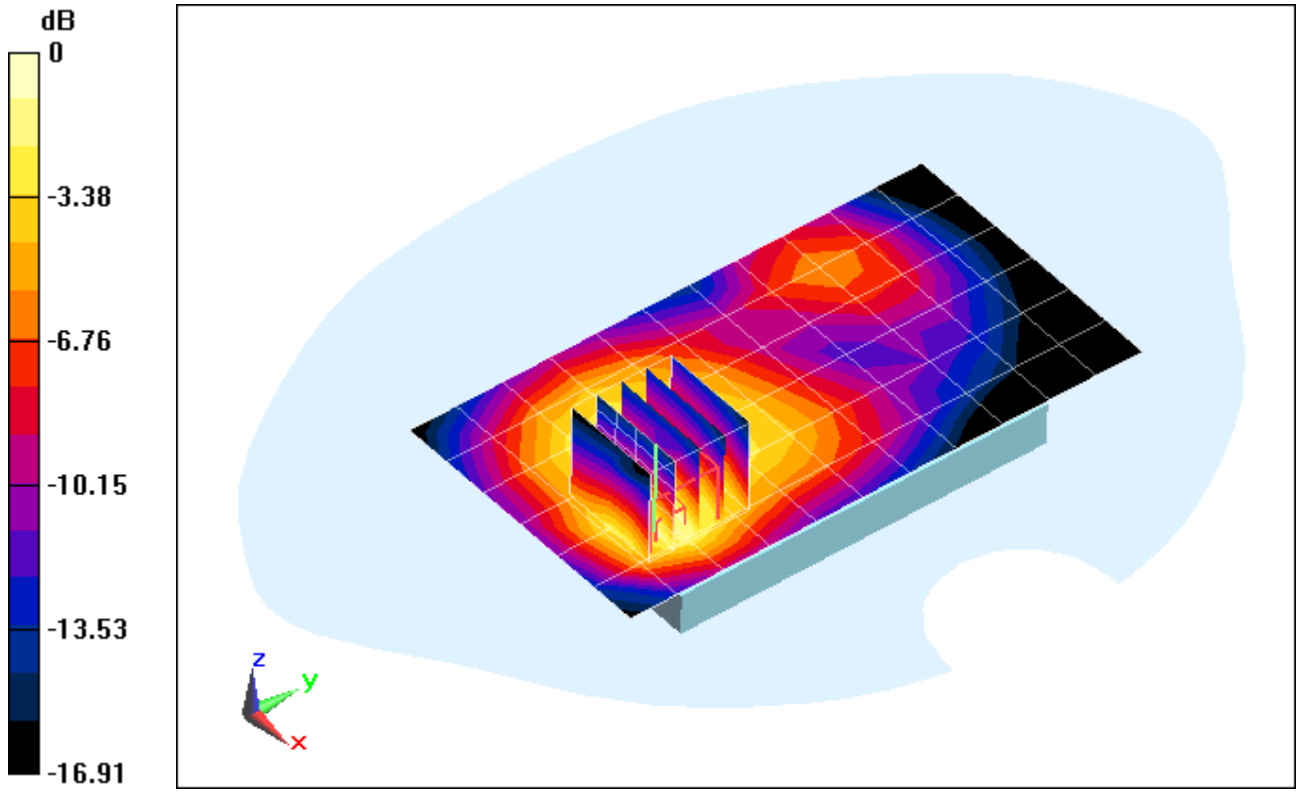
Communication System: CDMA; Frequency: 1908.75 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1908.75 MHz; σ = 1.559 mho/m; ε_r = 51.322; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2012; Ambient Temp: 20.4°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: PCS EVDO Rev. 0 - FCC Rule Part 24E, Body SAR, Back side, High.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 = 28.166 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.125 mW/g
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.599 mW/g



0 dB = 1.24 mW/g = 1.87 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

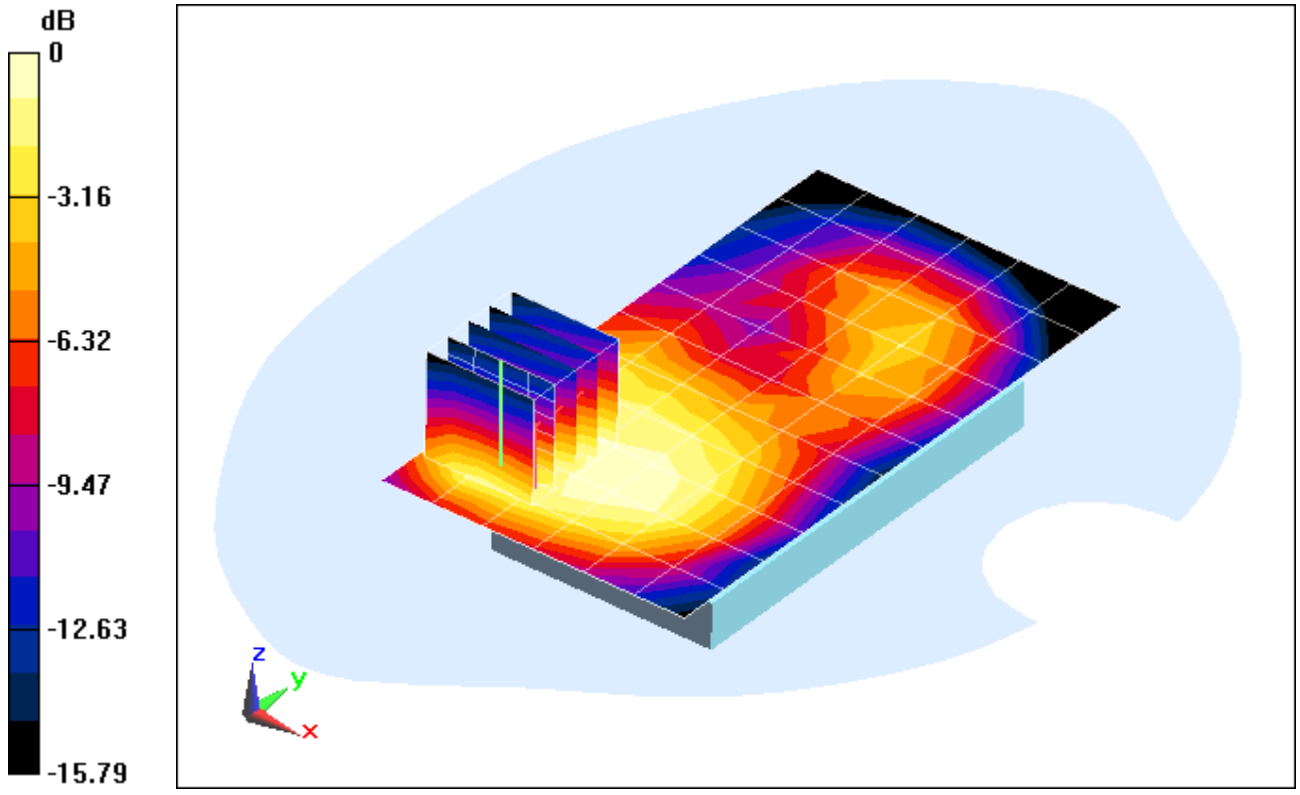
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.523 mho/m; ε_r = 51.59; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2012; Ambient Temp: 20.4°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: PCS EVDO Rev. 0 - FCC Rule Part 24E, Body SAR, Front 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 = 18.926 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.920 mW/g
SAR(1 g) = 0.526 mW/g; SAR(10 g) = 0.278 mW/g



0 dB = 0.543 mW/g = -5.30 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

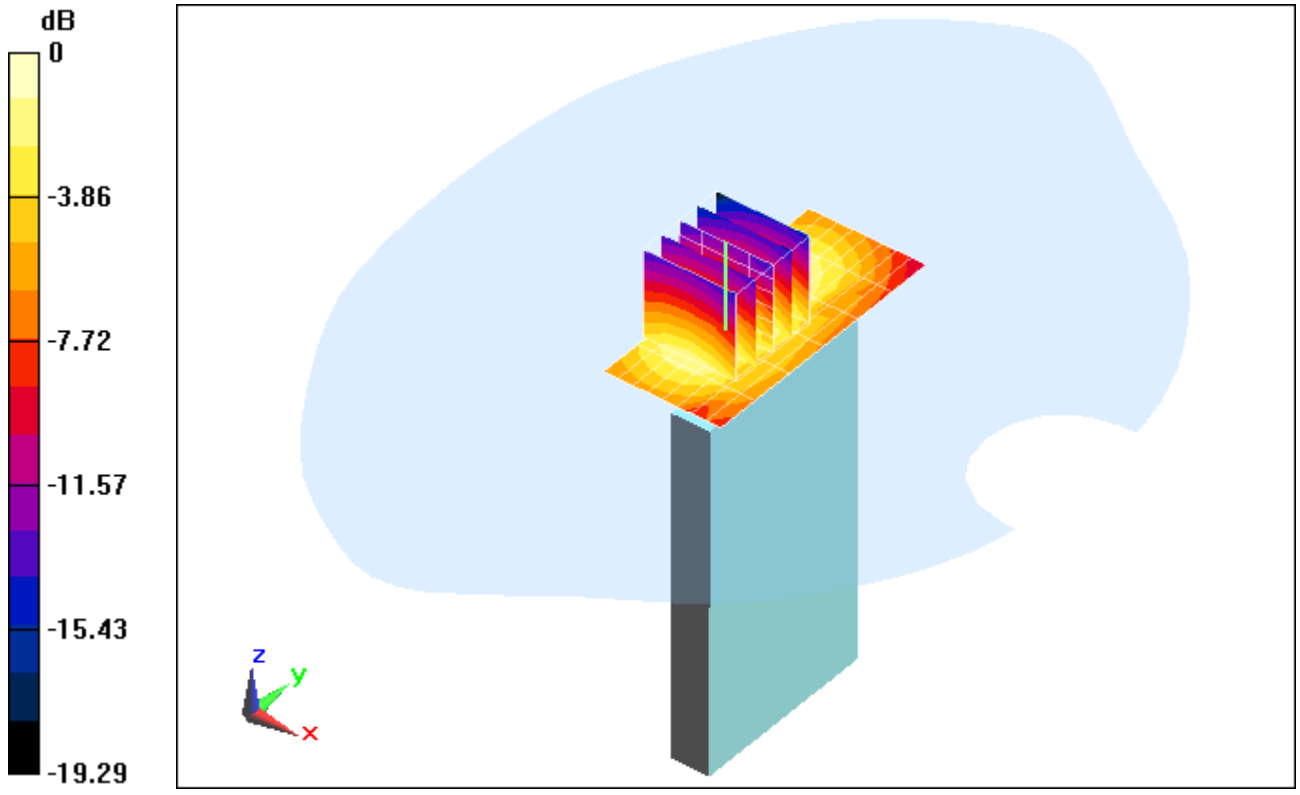
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.523 mho/m; ε_r = 51.59; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2012; Ambient Temp: 20.4°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: PCS EVDO Rev. 0 - FCC Rule Part 24E, Body SAR, Bottom Edge, Mid.ch

Area Scan (9x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.416 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.670 mW/g
SAR(1 g) = 0.403 mW/g; SAR(10 g) = 0.237 mW/g



0 dB = 0.454 mW/g = -6.86 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

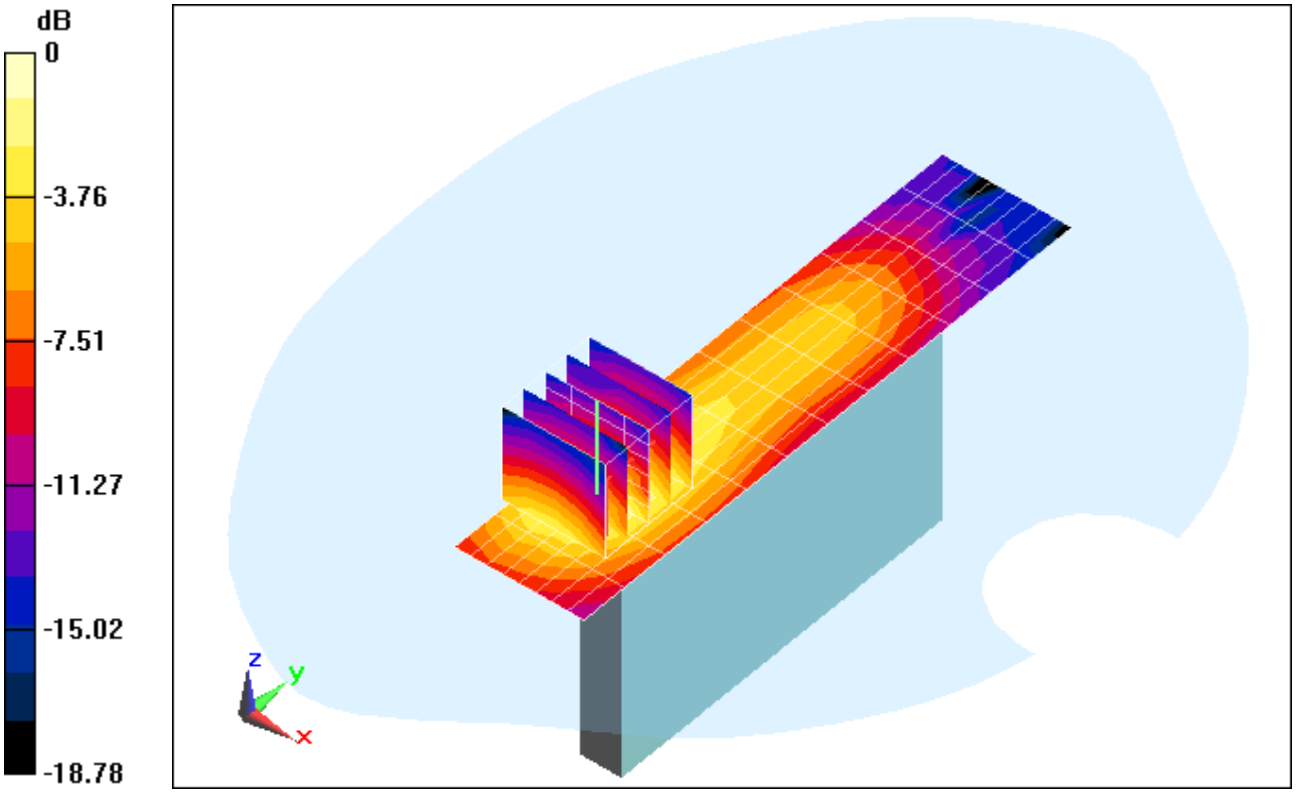
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.523 mho/m; ε_r = 51.59; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-10-2012; Ambient Temp: 20.4°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: PCS EVDO Rev. 0 - FCC Rule Part 24E, Body SAR, Left Edge, Mid.ch

Area Scan (9x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.721 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.285 mW/g
SAR(1 g) = 0.416 mW/g; SAR(10 g) = 0.227 mW/g



0 dB = 0.431 mW/g = -7.31 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

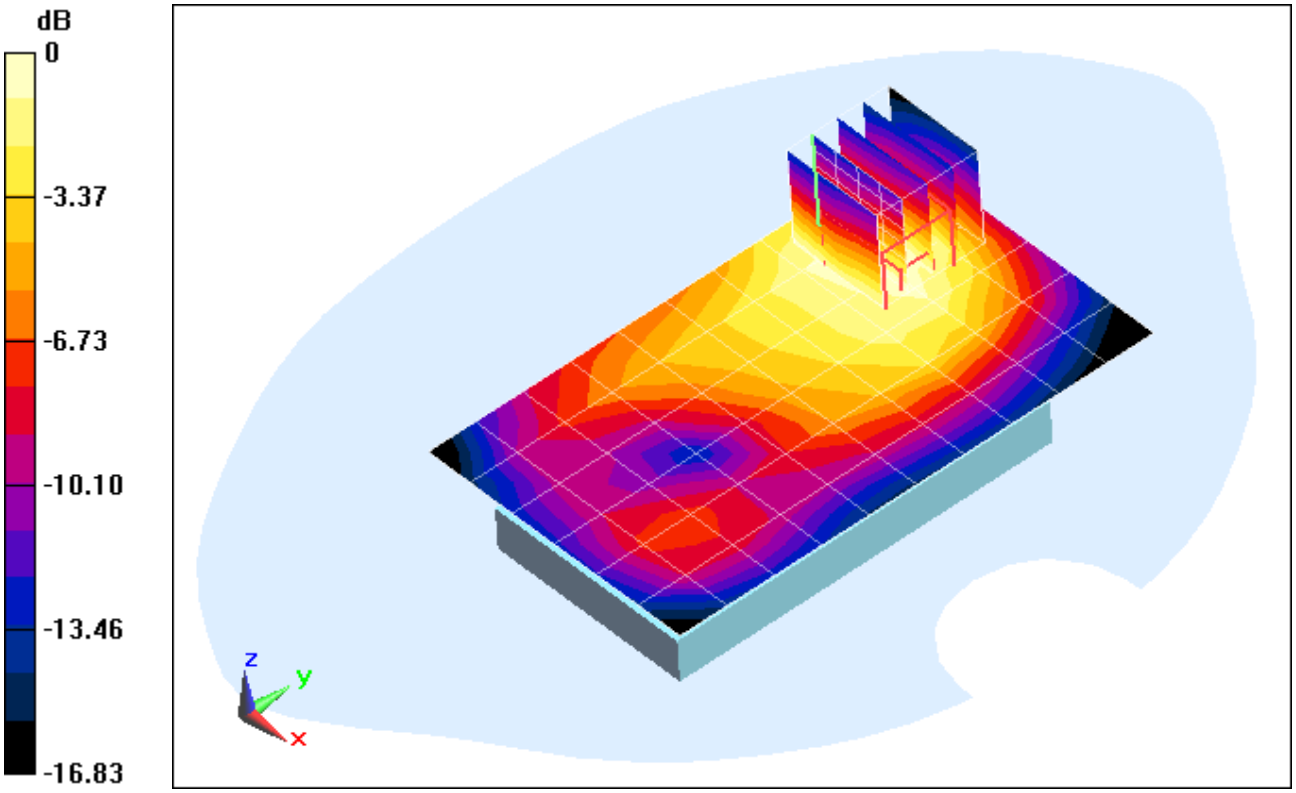
Communication System: LTE BAND 25; Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1910 MHz; σ = 1.54 mho/m; ε_r = 52.68; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2012; Ambient Temp: 22.9°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Body SAR, Back side, High.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 = 21.890 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.132 mW/g
SAR(1 g) = 0.658 mW/g; SAR(10 g) = 0.403 mW/g



0 dB = 0.711 mW/g = -2.96 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

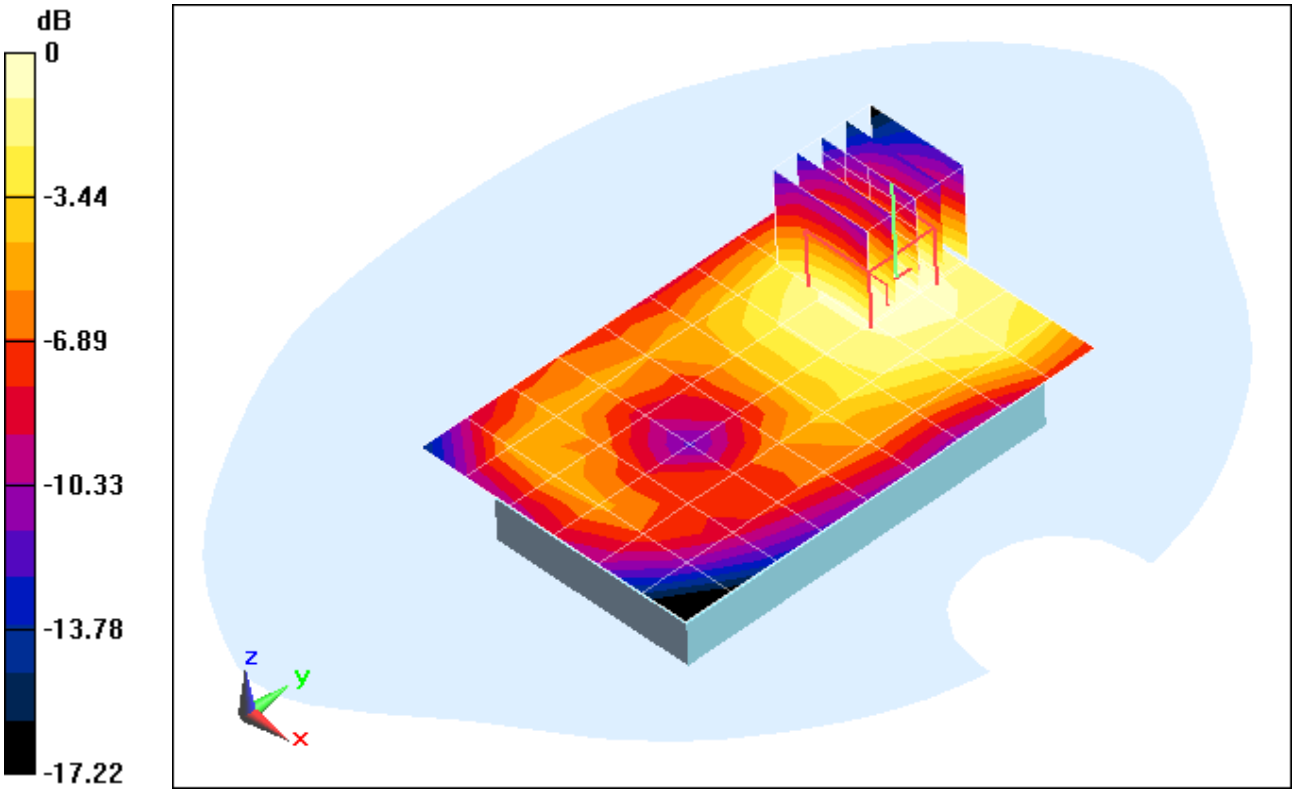
Communication System: LTE BAND 25; Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1910 MHz; σ = 1.54 mho/m; ε_r = 52.68; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2012; Ambient Temp: 22.9°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Body SAR, Front side, High.ch, 10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.460 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.409 mW/g
SAR(1 g) = 0.273 mW/g; SAR(10 g) = 0.177 mW/g



0 dB = 0.294 mW/g = -10.63 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

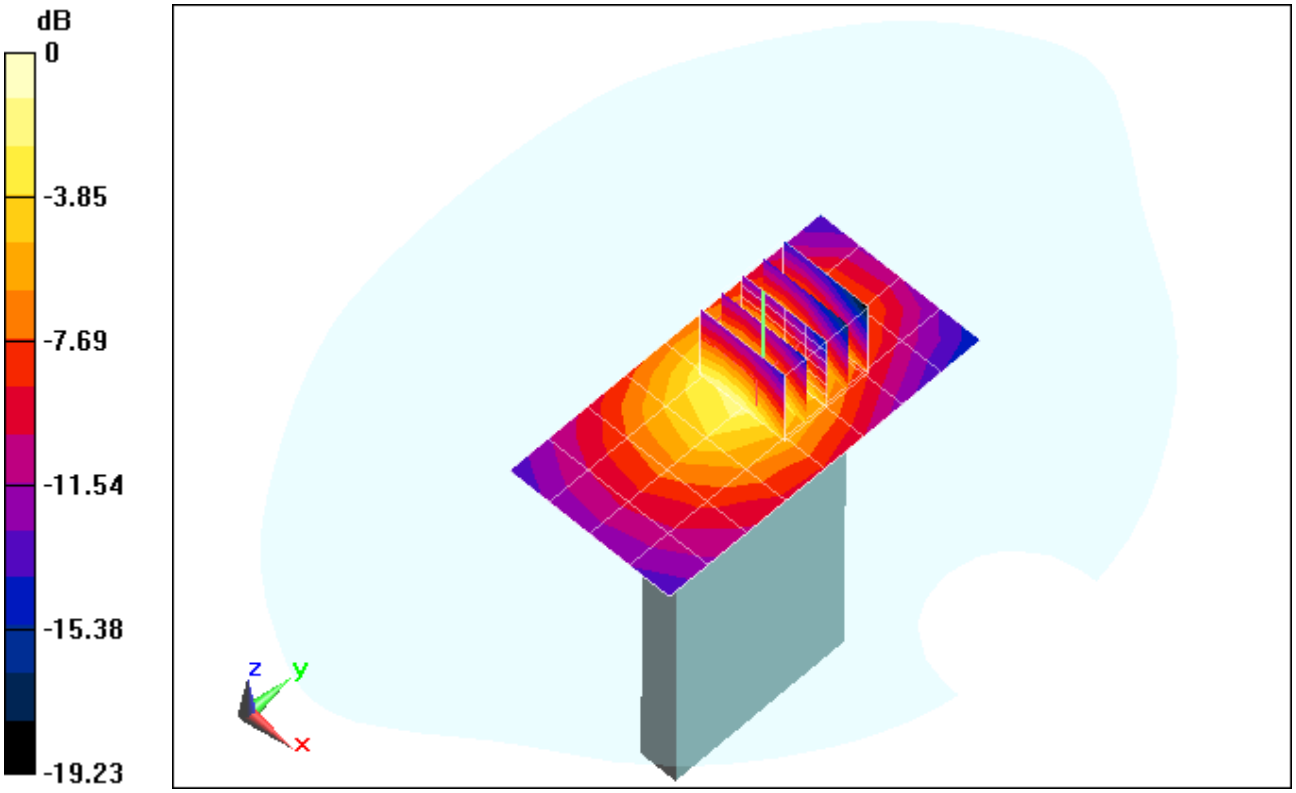
Communication System: LTE BAND 25; Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1910 MHz; σ = 1.54 mho/m; ε_r = 52.68; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2012; Ambient Temp: 22.9°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Body SAR, Top Edge, High.ch, 10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.446 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.465 mW/g
SAR(1 g) = 0.285 mW/g; SAR(10 g) = 0.164 mW/g



0 dB = 0.306 mW/g = -10.29 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

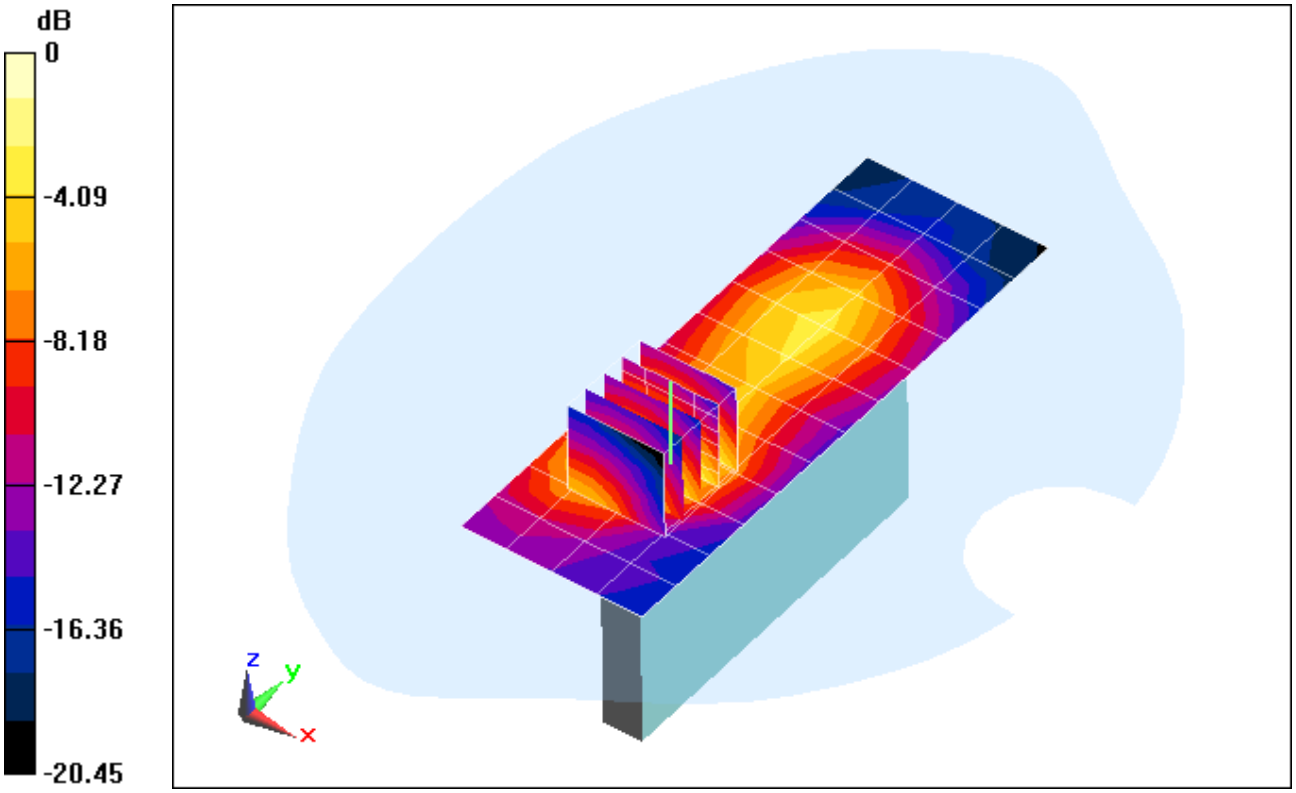
Communication System: LTE BAND 25; Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1910 MHz; σ = 1.54 mho/m; ε_r = 52.68; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2012; Ambient Temp: 22.9°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Body SAR, Right Edge, High.ch, 10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (5x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.964 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.396 mW/g
SAR(1 g) = 0.235 mW/g; SAR(10 g) = 0.132 mW/g



0 dB = 0.241 mW/g = -12.36 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

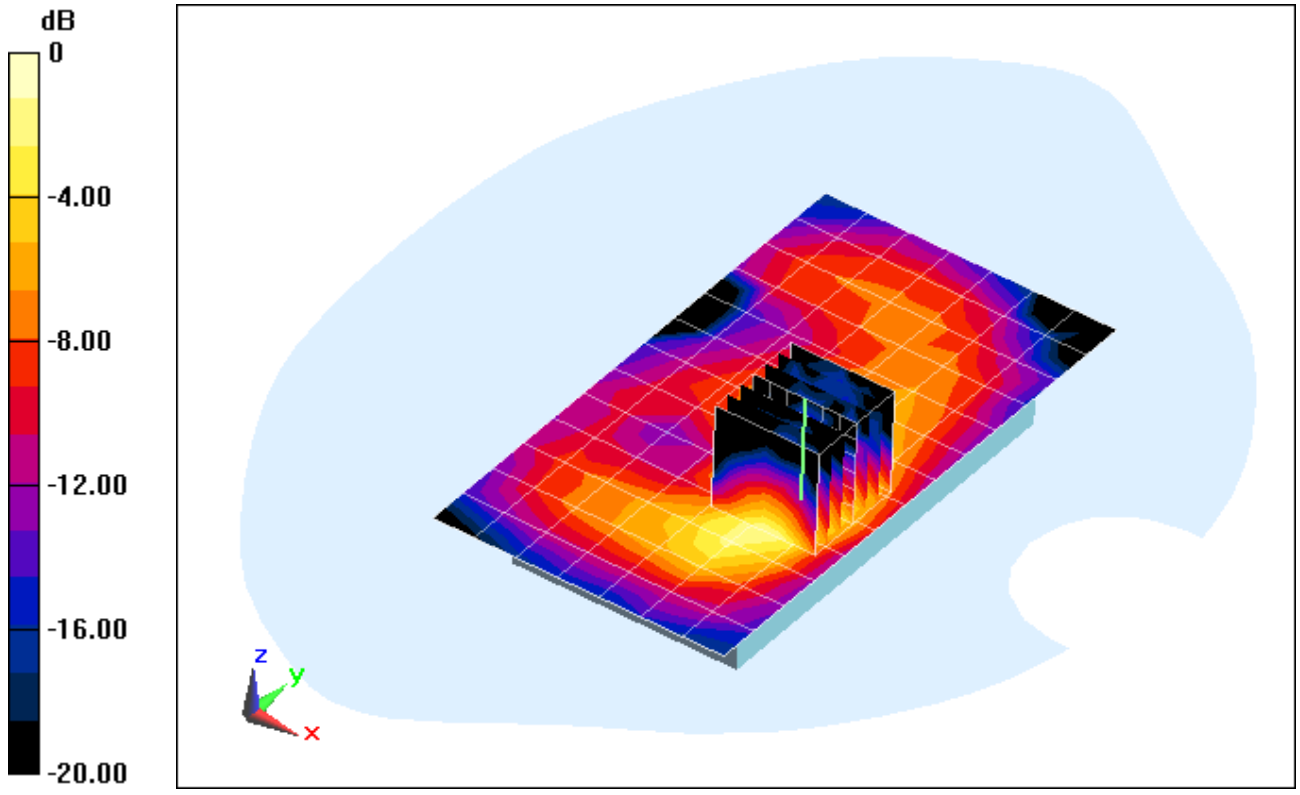
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.938 mho/m; ε_r = 51.347; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-15-2012; Ambient Temp: 22.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3288; ConvF(4.47, 4.47, 4.47); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11b - FCC Rule Part 15C, Body SAR, Ch 06, 1 Mbps, Back Side

Area Scan (8x14x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.116 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.143 mW/g
SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.031 mW/g



0 dB = 0.0869 mW/g = -21.22 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

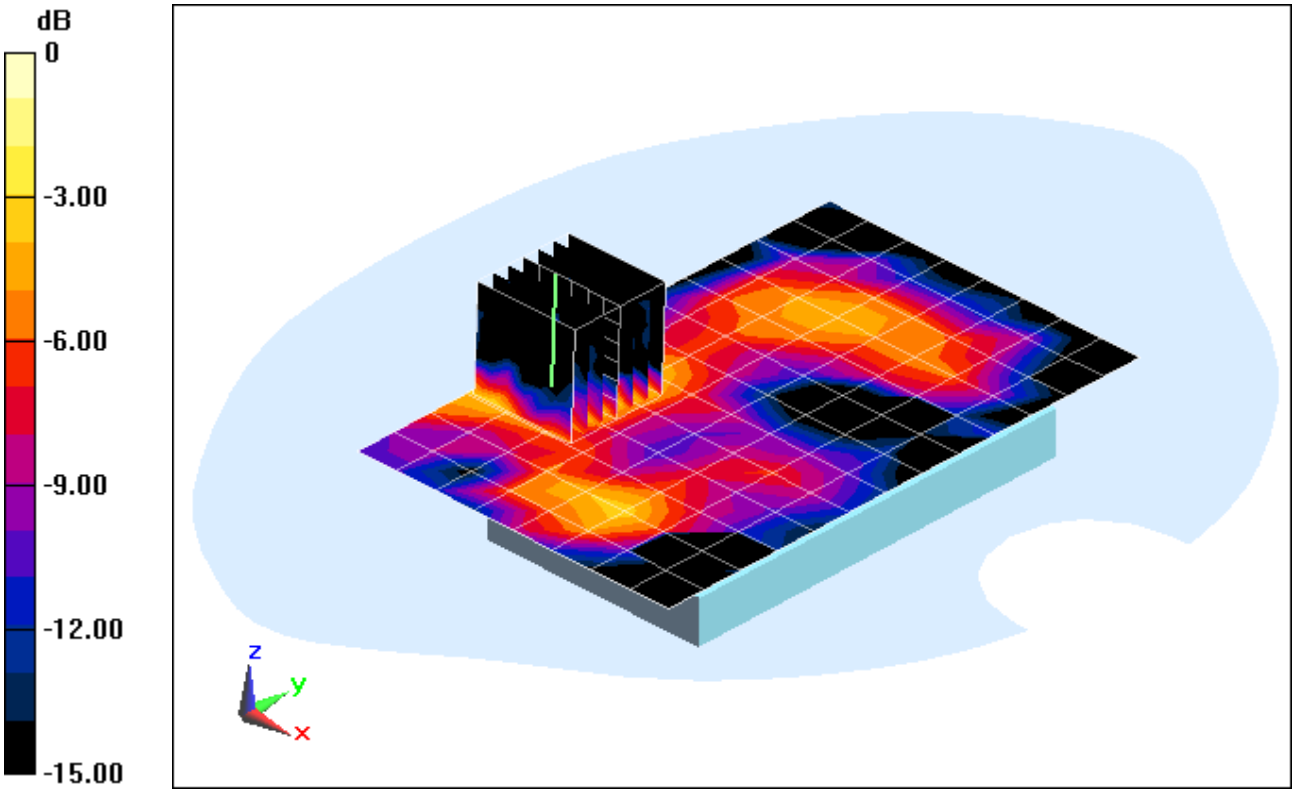
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.938 mho/m; ε_r = 51.347; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-15-2012; Ambient Temp: 22.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3288; ConvF(4.47, 4.47, 4.47); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11b - FCC Rule Part 15C, Body SAR, Ch 06, 1 Mbps, Front 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 = 2.760 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.028 mW/g
SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.00474 mW/g



0 dB = 0.0179 mW/g = -34.94 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

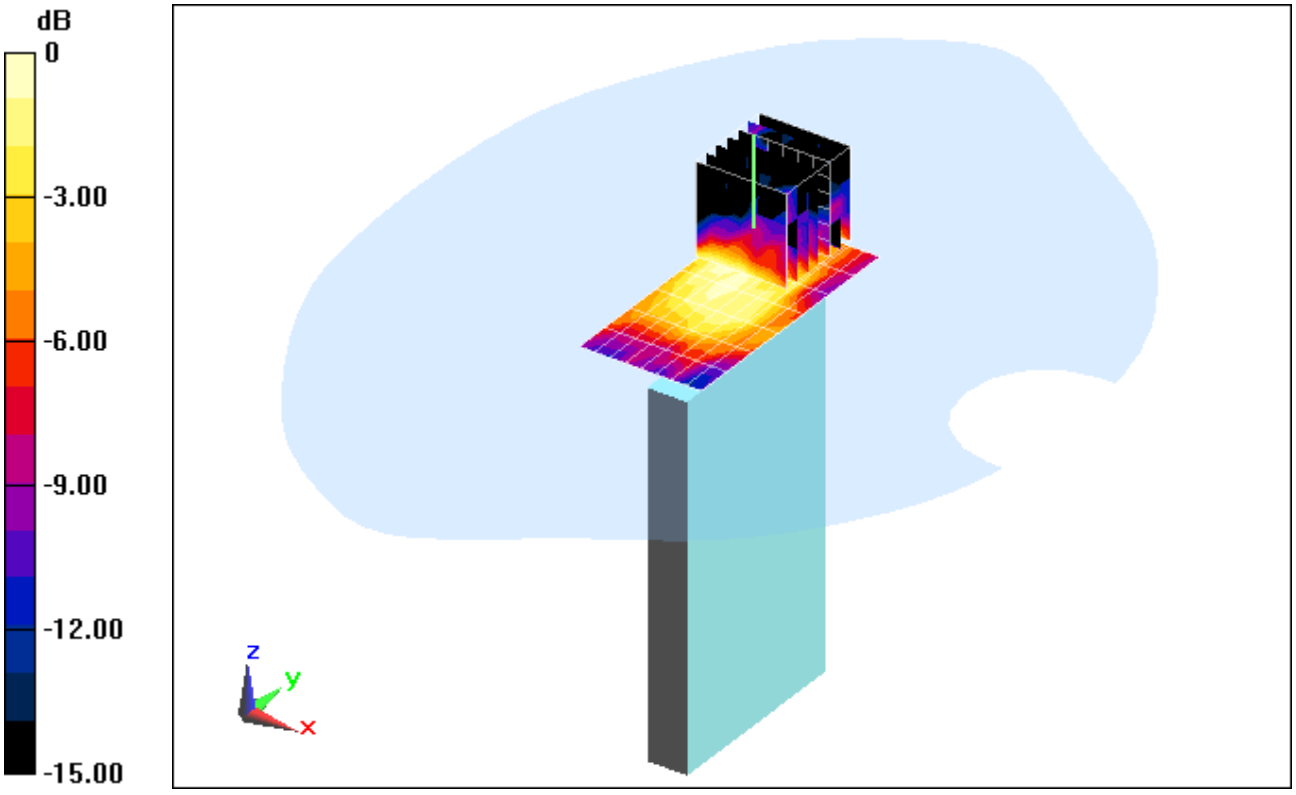
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.938 mho/m; ε_r = 51.347; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-15-2012; Ambient Temp: 22.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3288; ConvF(4.47, 4.47, 4.47); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11b - FCC Rule Part 15C, Body SAR, Ch 06, 1 Mbps, Top Edge

Area Scan (9x8x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.865 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.015 mW/g
SAR(1 g) = 0.00711 mW/g; SAR(10 g) = 0.00338 mW/g



0 dB = 0.00937 mW/g = -40.57 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

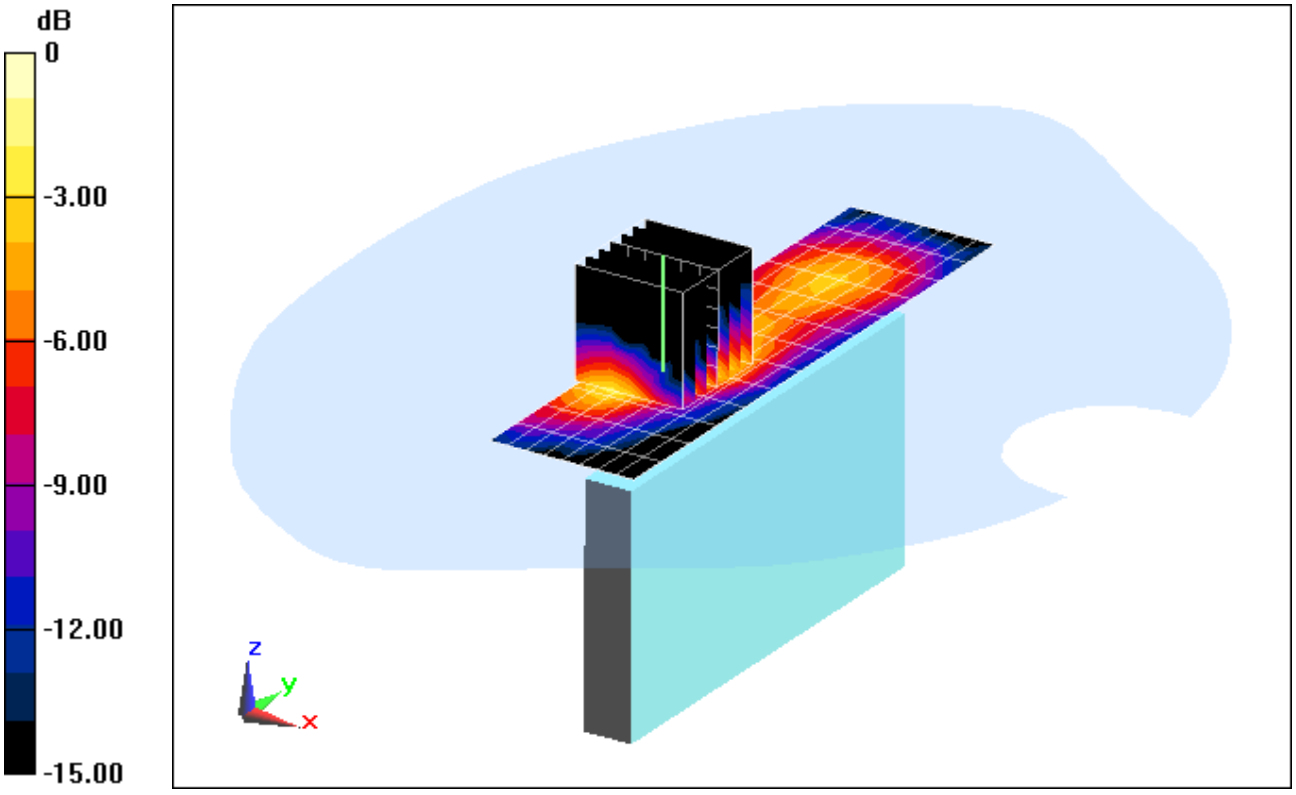
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.938 mho/m; ε_r = 51.347; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-15-2012; Ambient Temp: 22.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3288; ConvF(4.47, 4.47, 4.47); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11b - FCC Rule Part 15C, Body SAR, Ch 06, 1 Mbps, Right Edge

Area Scan (9x14x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.969 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.095 mW/g
SAR(1 g) = 0.044 mW/g; SAR(10 g) = 0.021 mW/g



0 dB = 0.0575 mW/g = -24.81 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

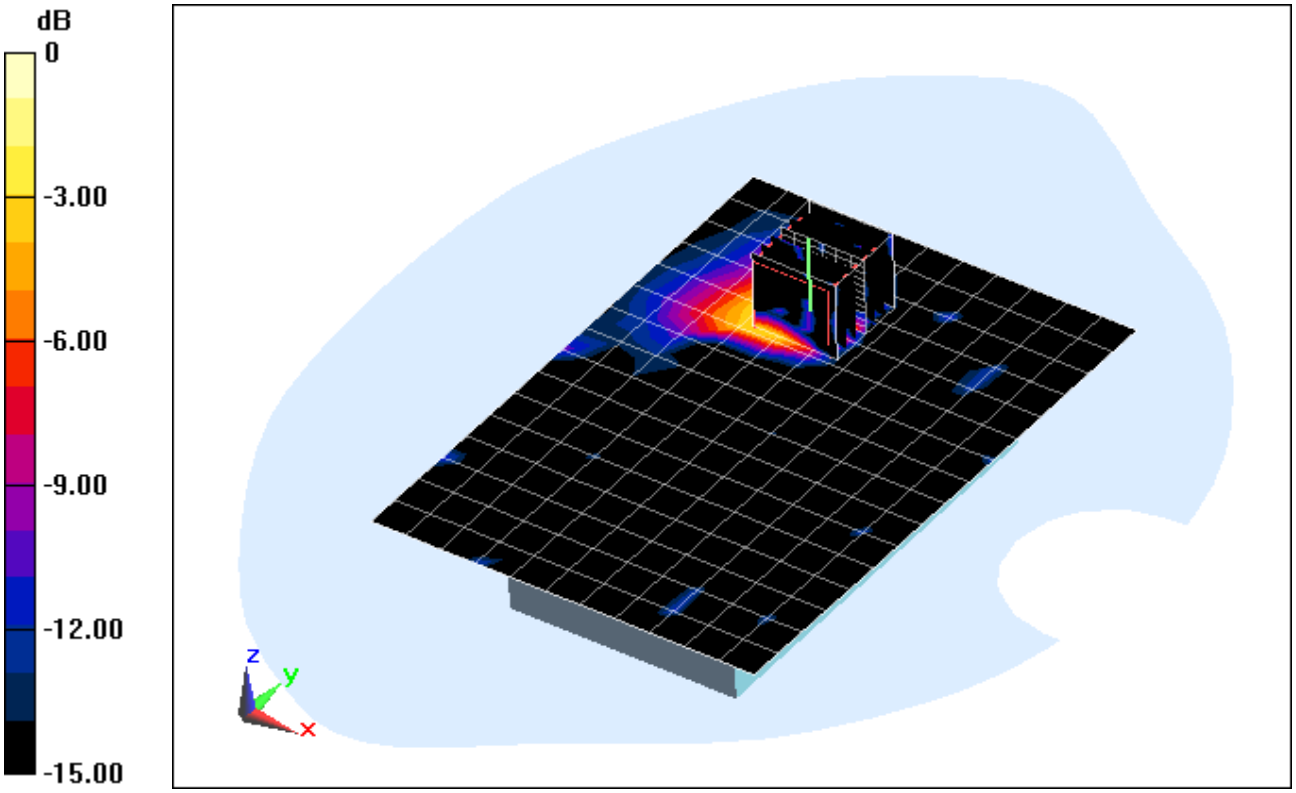
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5240 MHz;Duty Cycle: 1:1
Medium: 5 GHz Medium parameters used:
f = 5240 MHz; σ = 5.347 mho/m; ε_r = 47.53; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-14-2012; Ambient Temp: 23.4°C; Tissue Temp: 22.3°C

Probe: EX3DV4 - SN3589; ConvF(3.92, 3.92, 3.92); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11a - FCC Rule Part 15E, 5.2 GHz,
Body SAR, Ch 48, 6 Mbps, Back Side

Area Scan (12x17x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 7.171 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.884 mW/g
SAR(1 g) = 0.229 mW/g; SAR(10 g) = 0.064 mW/g



0 dB = 0.513 mW/g = -5.80 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

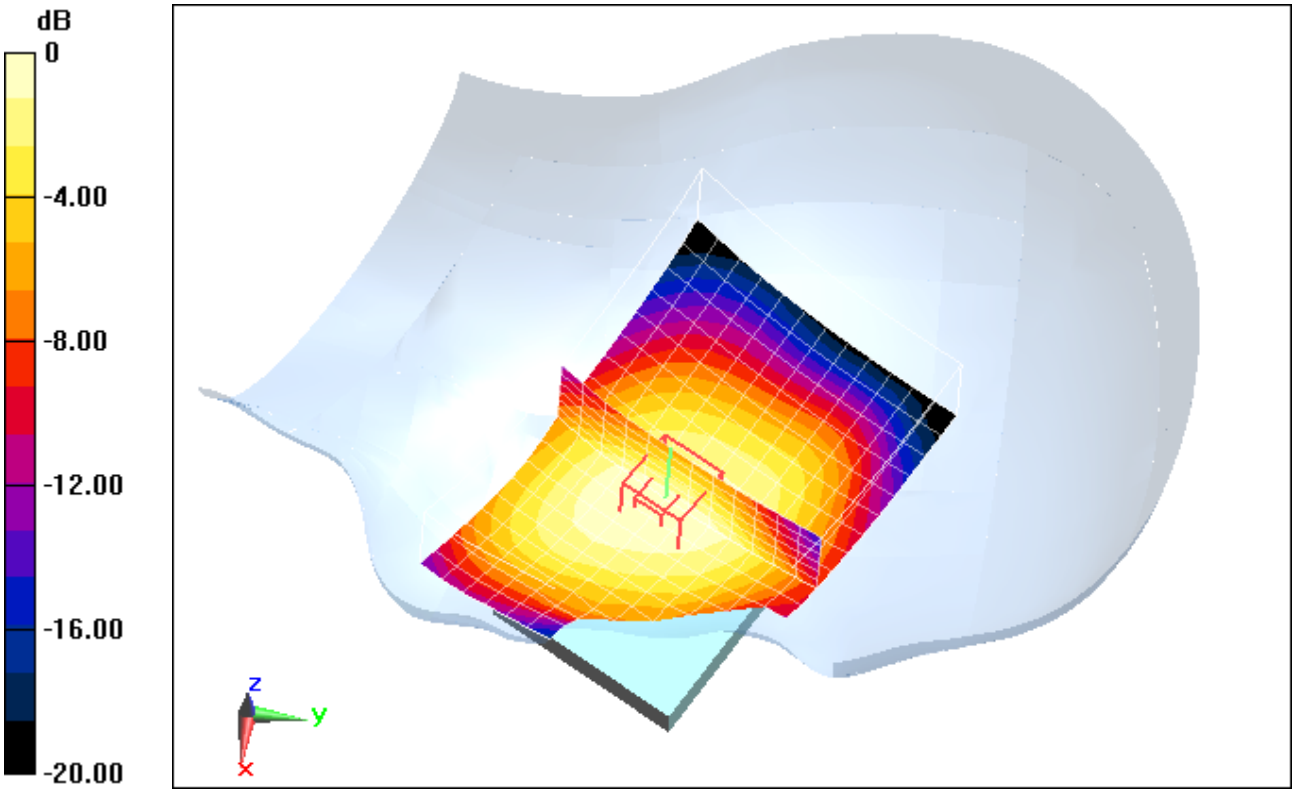
Communication System: CDMA; Frequency: 820.1 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
$f = 820.1$ MHz; $\sigma = 0.868$ mho/m; $\varepsilon_r = 40.78$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Test Date: 08-20-2012; Ambient Temp: 23.5°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3287; ConvF(6.06, 6.06, 6.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: Cell. CDMA - FCC Rule Part 90S, Left Head, Cheek, Mid.ch

Zoom Scan (13x19x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.977 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.611 mW/g
SAR(1 g) = 0.483 mW/g; SAR(10 g) = 0.368 mW/g



0 dB = 0.503 mW/g = -5.97 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

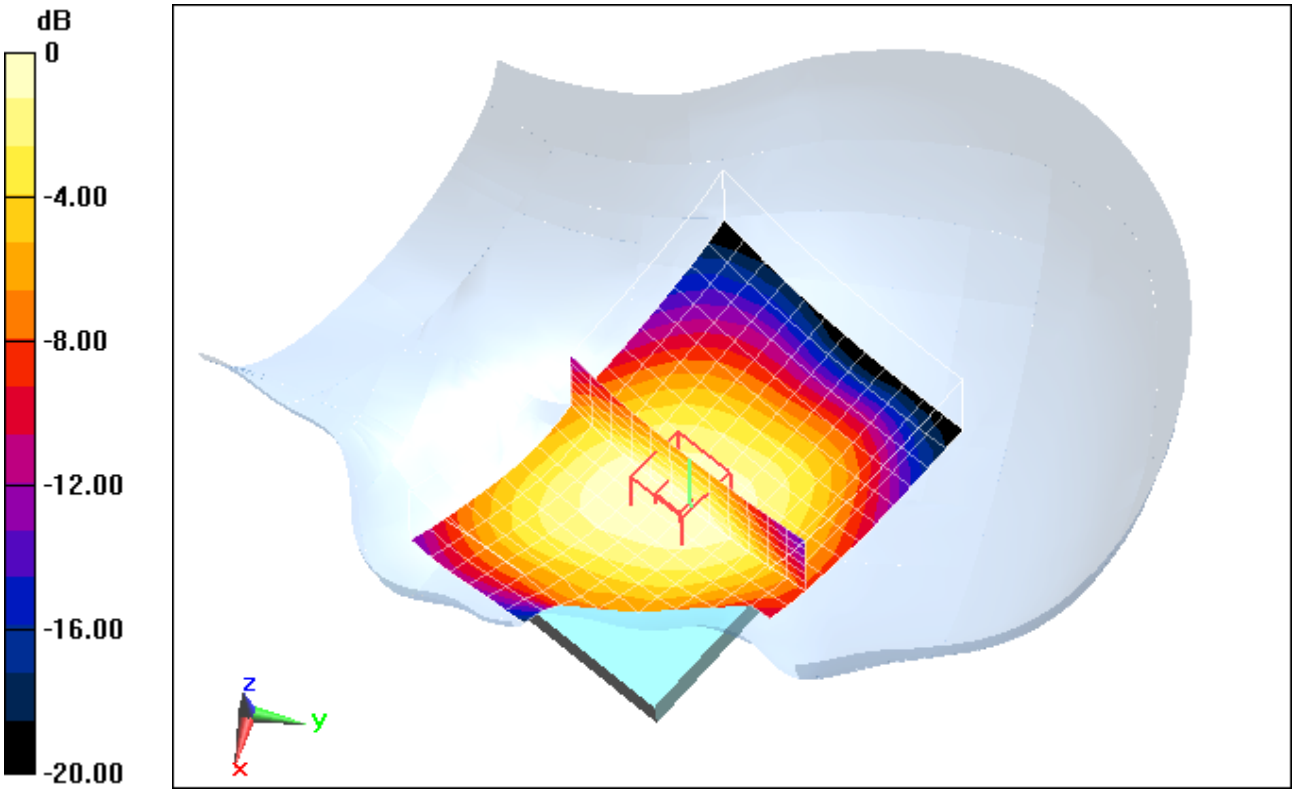
Communication System: CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.882 mho/m; ε_r = 40.702; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-20-2012; Ambient Temp: 23.5°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3287; ConvF(6.06, 6.06, 6.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: Cell. CDMA - FCC Rule Part 22H, Left Head, Cheek, Mid.ch

Zoom Scan (13x19x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.096 V/m; Power Drift = -0.20 dB
Peak SAR (extrapolated) = 0.624 mW/g
SAR(1 g) = 0.491 mW/g; SAR(10 g) = 0.378 mW/g



0 dB = 0.511 mW/g = -5.83 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #2

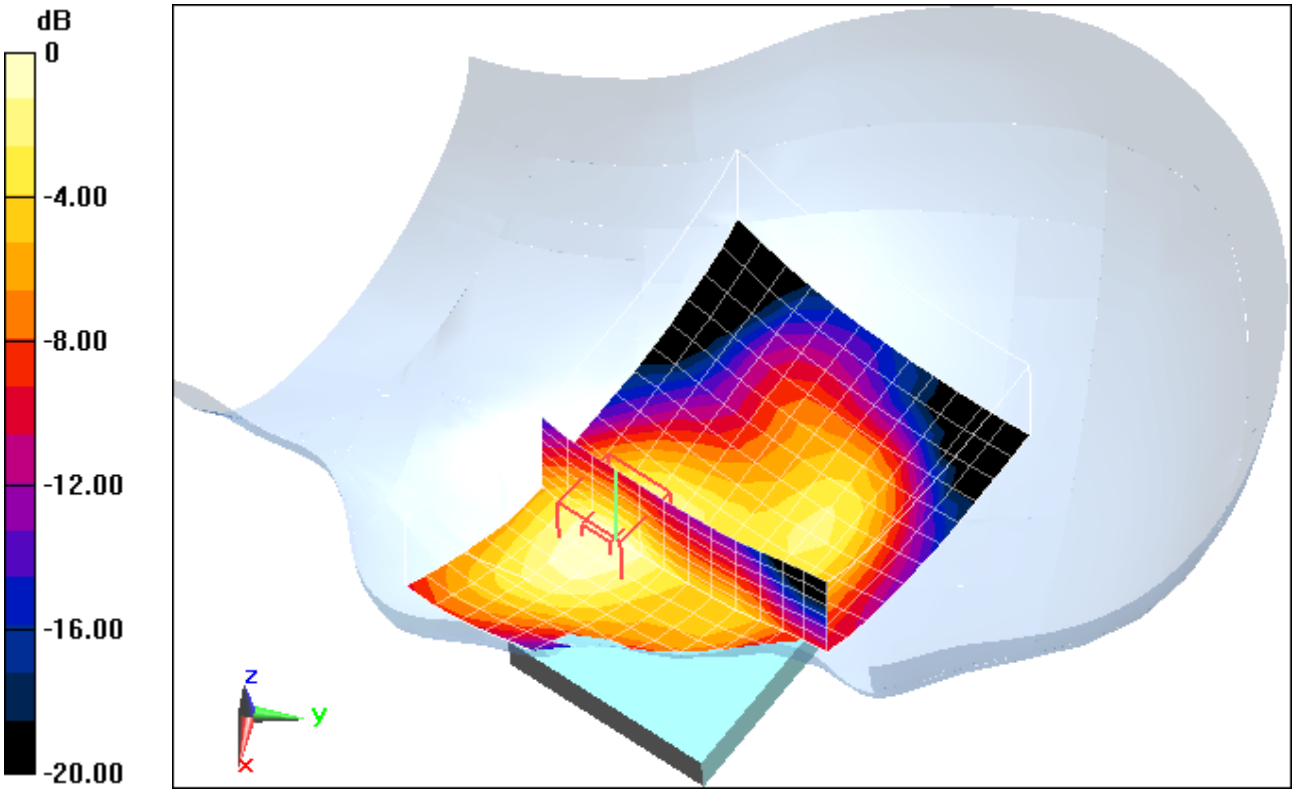
Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.419 mho/m; ε_r = 39.36; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-16-2012; Ambient Temp: 23.9°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3213; ConvF(5.02, 5.02, 5.02); Calibrated: 4/24/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: PCS CDMA - FCC Rule Part 24E, Left Head, Cheek, Mid.ch

Zoom Scan (13x19x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.145 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.638 mW/g
SAR(1 g) = 0.427 mW/g; SAR(10 g) = 0.266 mW/g



0 dB = 0.456 mW/g = -6.82 dB mW/g

DUT: ZNFLS970; Type: Portable Handset; Serial: #1

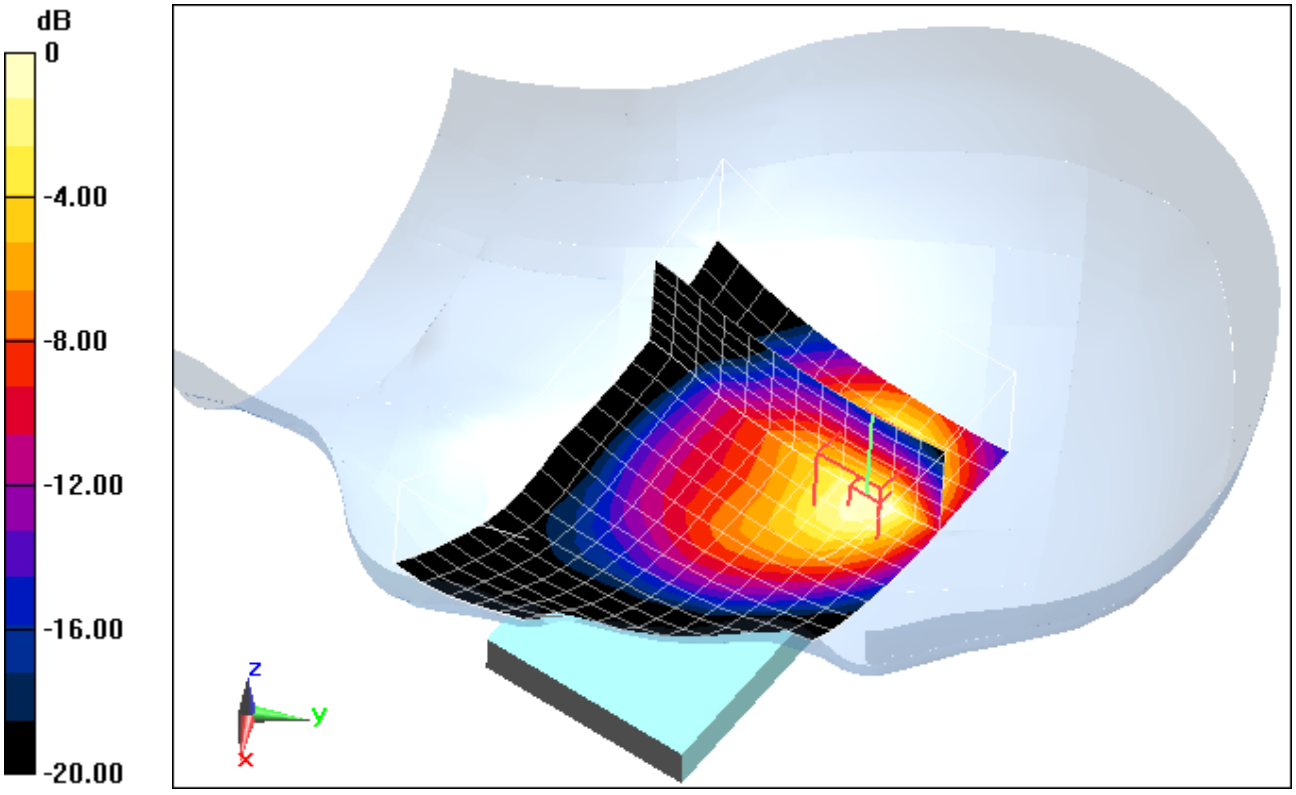
Communication System: LTE Band 25 (PCS); Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1910 MHz; σ = 1.439 mho/m; ε_r = 39.17; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-16-2012; Ambient Temp: 23.9°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3213; ConvF(5.02, 5.02, 5.02); Calibrated: 4/24/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS) - FCC Rule Part 24E, Left Head, Cheek, High.ch, 10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Zoom Scan (13x19x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.952 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.922 mW/g
SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.562 mW/g



0 dB = 1.27 mW/g = 2.08 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS970; Type: Portable Handset; Serial: #10

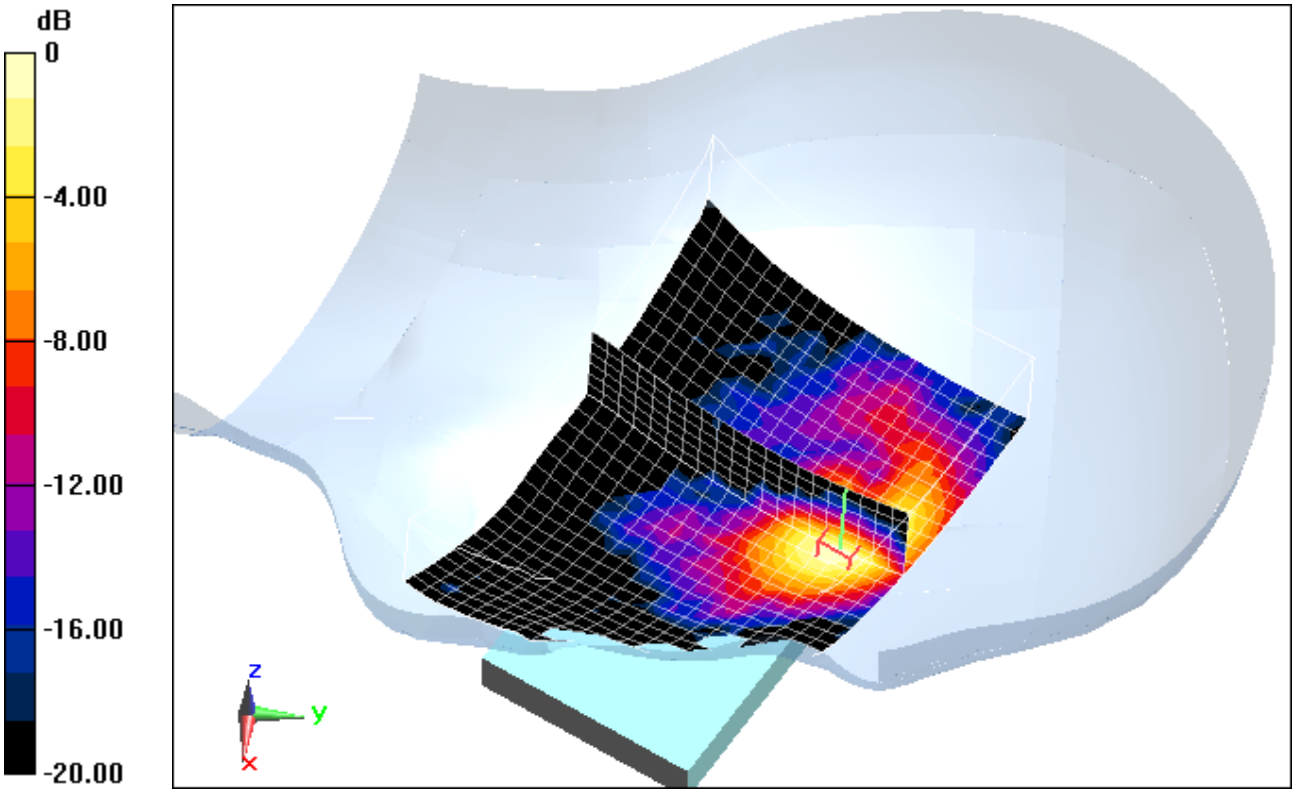
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
$f = 2437$ MHz; $\sigma = 1.848$ mho/m; $\varepsilon_r = 39.115$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Test Date: 08-21-2012; Ambient Temp: 24.6°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3288; ConvF(4.54, 4.54, 4.54); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11b - FCC Rule Part 15C, Left Head, Cheek, Ch 06, 1 Mbps

Zoom Scan (21x31x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.107 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.105 mW/g
SAR(1 g) = 0.046 mW/g



0 dB = 0.0664 mW/g = -23.56 dB mW/g

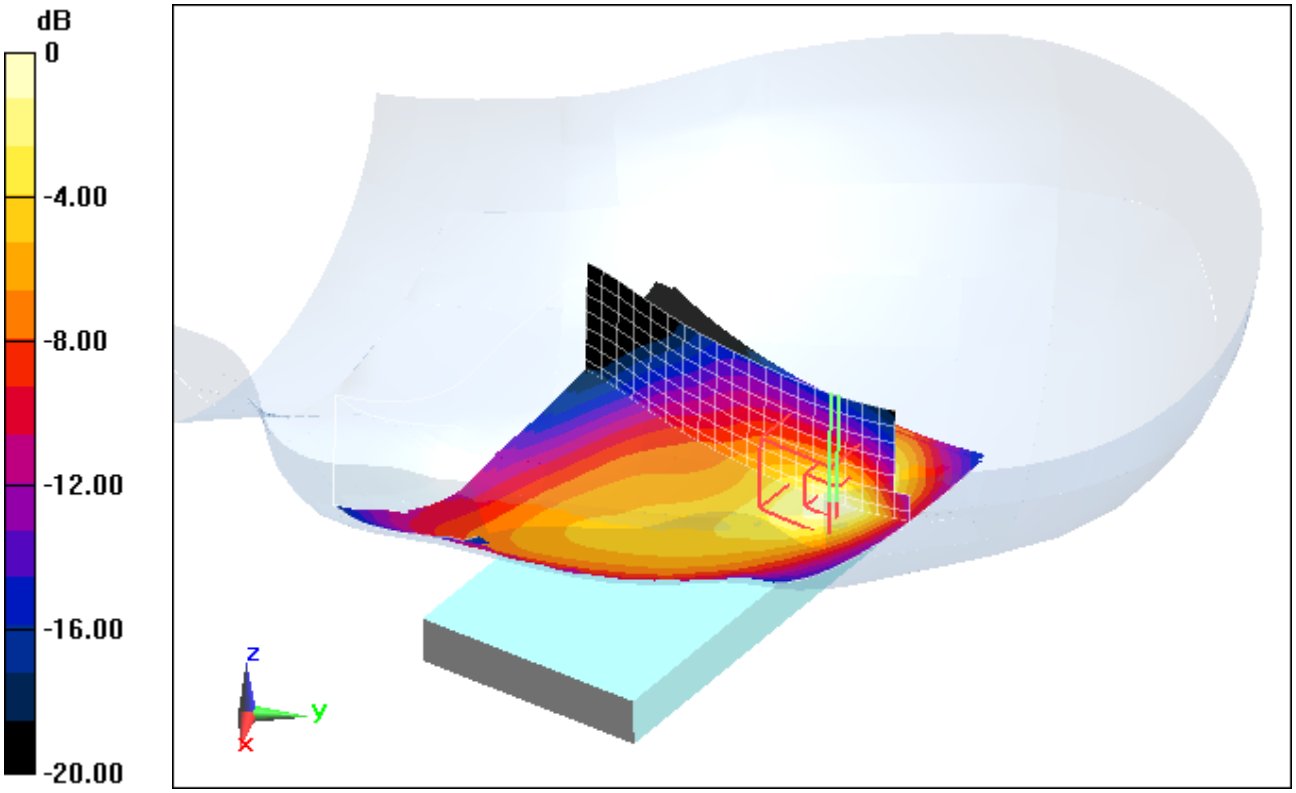
DUT: ZNFLS970; Type: Portable Handset

Communication System: CDMA; Frequency: 820.1 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
$f = 820.1$ MHz; $\sigma = 0.868$ mho/m; $\varepsilon_r = 40.78$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Communication System: LTE Band 25 (PCS); Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
$f = 1910$ MHz; $\sigma = 1.439$ mho/m; $\varepsilon_r = 39.17$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
$f = 2437$ MHz; $\sigma = 1.848$ mho/m; $\varepsilon_r = 39.115$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Multi Band Modes: Cell. CDMA - FCC Rule Part 90S,
LTE Band 25 (PCS) - FCC Rule Part 24E, and IEEE 802.11b - FCC Rule Part 15C
SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.647 mW/g



0 dB = 2.17 mW/g = 6.73 dB mW/g

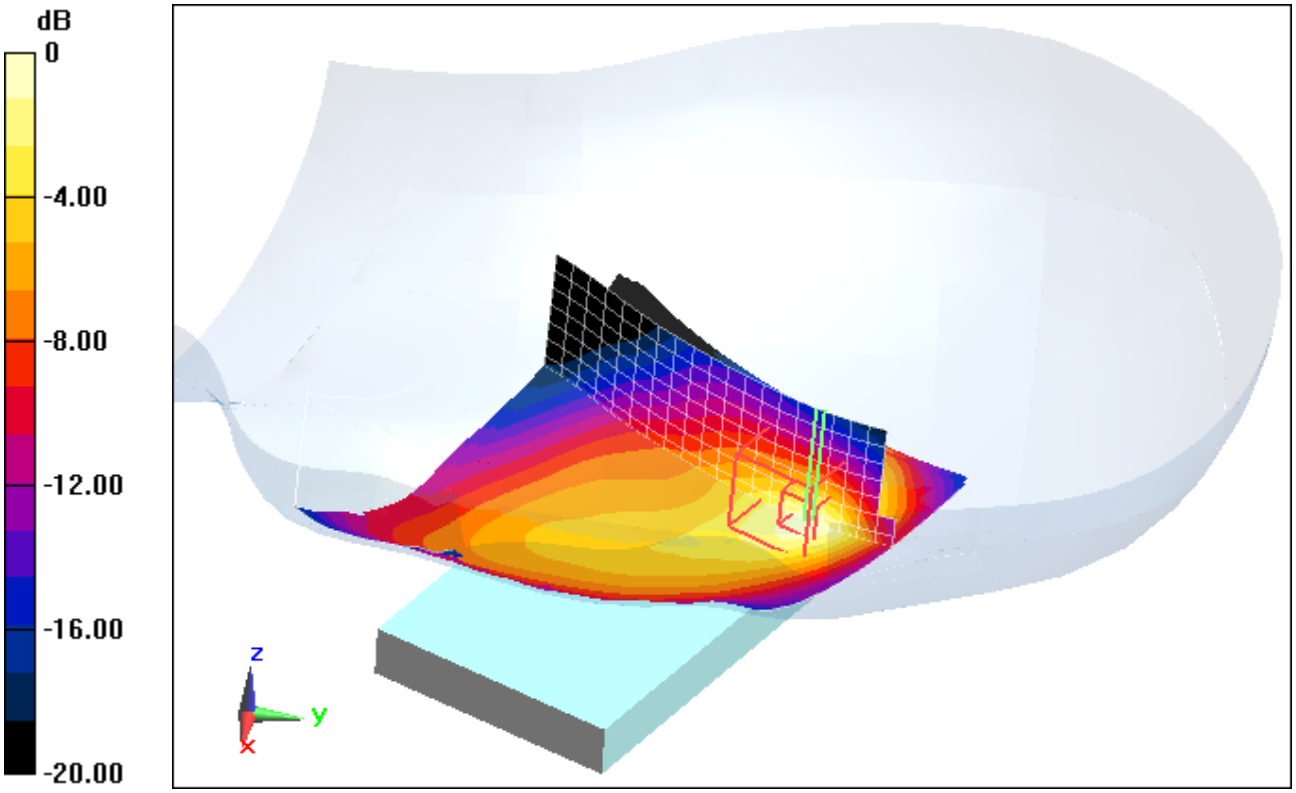
DUT: ZNFLS970; Type: Portable Handset

Communication System: CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
$f = 836.52$ MHz; $\sigma = 0.882$ mho/m; $\varepsilon_r = 40.702$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Communication System: LTE Band 25 (PCS); Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
$f = 1910$ MHz; $\sigma = 1.439$ mho/m; $\varepsilon_r = 39.17$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
$f = 2437$ MHz; $\sigma = 1.848$ mho/m; $\varepsilon_r = 39.115$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Multi Band Modes: Cell. CDMA - FCC Rule Part 22H,
LTE Band 25 (PCS) - FCC Rule Part 24E, and IEEE 802.11b - FCC Rule Part 15C
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.655 mW/g



0 dB = 2.18 mW/g = 6.77 dB mW/g

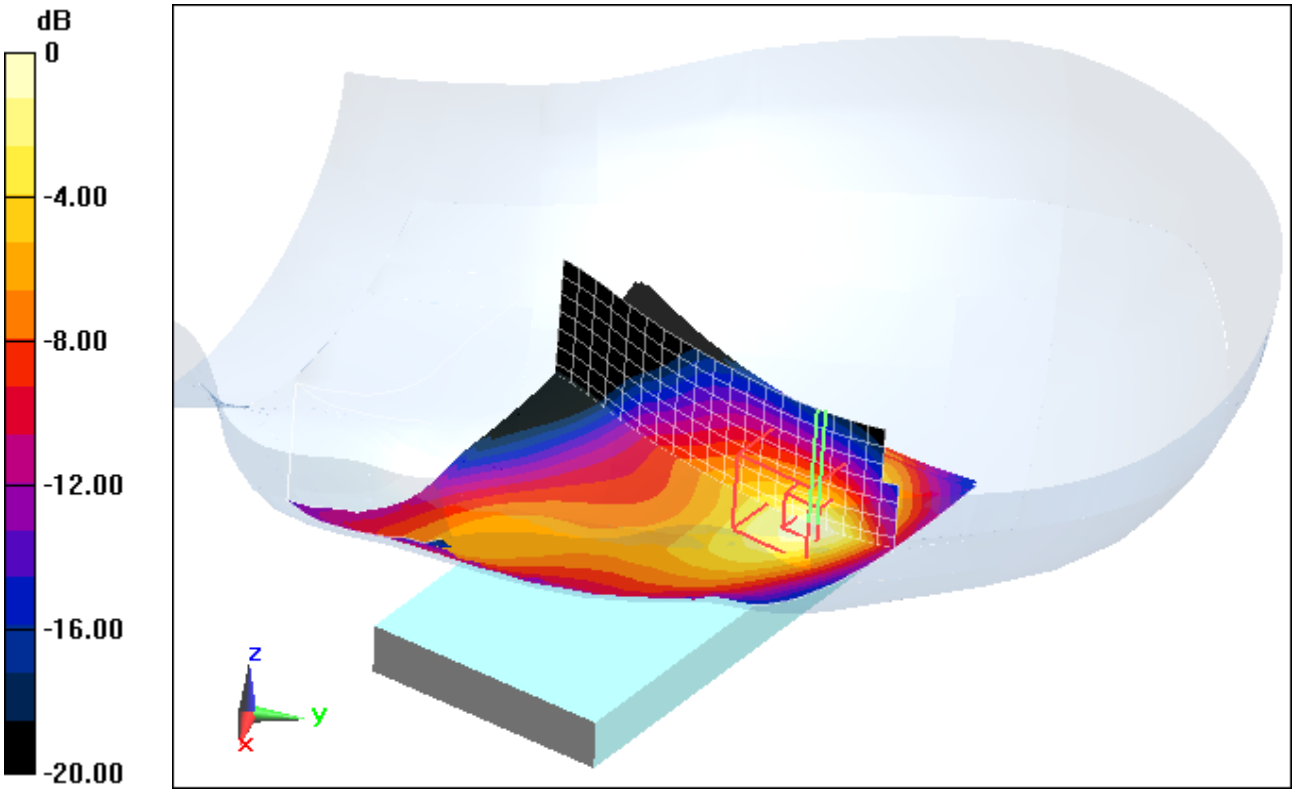
DUT: ZNFLS970; Type: Portable Handset

Communication System: CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.419 mho/m; ε_r = 39.36; ρ = 1000 kg/m^3
Phantom section: Left Section

Communication System: LTE Band 25 (PCS); Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1910 MHz; σ = 1.439 mho/m; ε_r = 39.17; ρ = 1000 kg/m^3
Phantom section: Left Section

Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.848 mho/m; ε_r = 39.115; ρ = 1000 kg/m^3
Phantom section: Left Section

Multi Band Modes: PCS CDMA - FCC Rule Part 24E,
LTE Band 25 (PCS) - FCC Rule Part 24E, and IEEE 802.11b - FCC Rule Part 15C
SAR(1 g) = 1.21 mW/g; SAR(10 g) = 0.635 mW/g



0 dB = 2.15 mW/g = 6.65 dB mW/g

APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

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

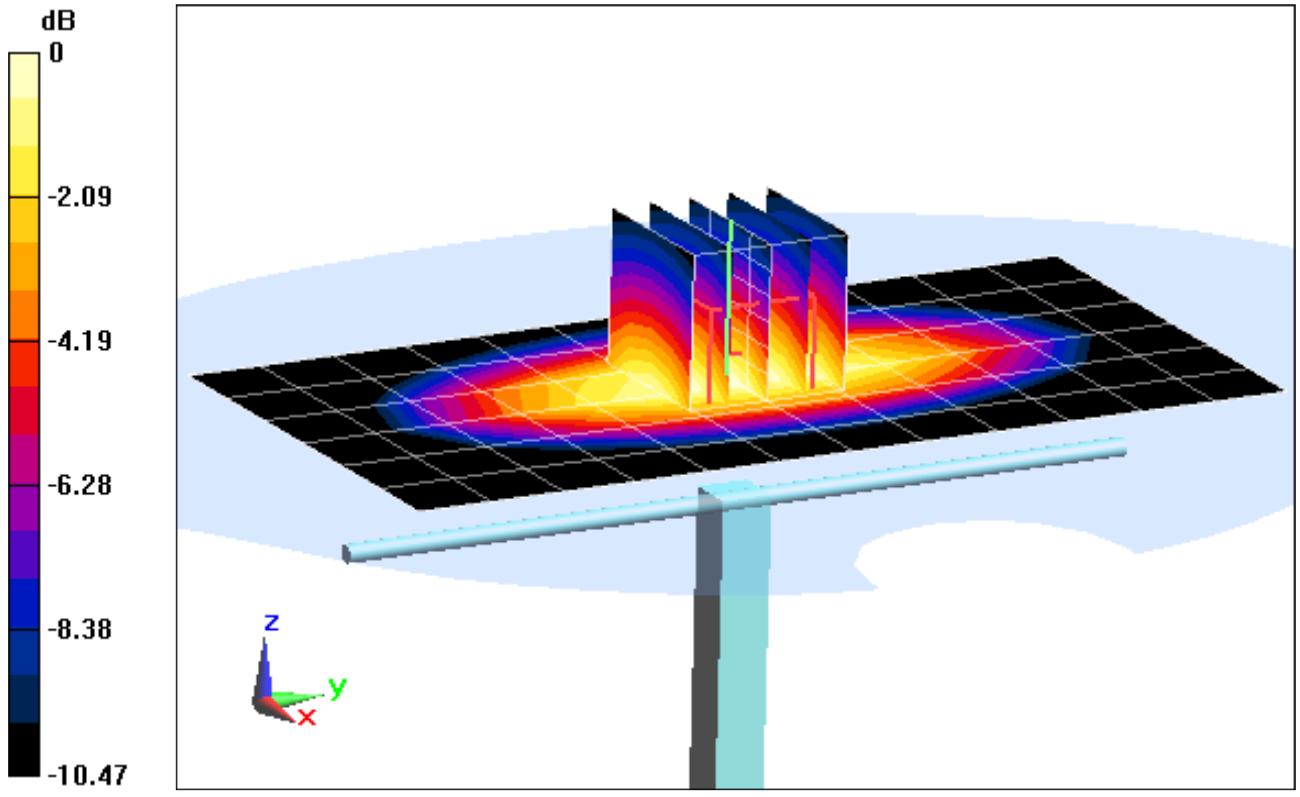
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.9 mho/m; ε_r = 41.47; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-12-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.5 (6469)

835MHz 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 dBm (100 mW)
Peak SAR (extrapolated) = 1.381 mW/g
SAR(1 g) = 0.944 mW/g; SAR(10 g) = 0.621 mW/g
Deviation = 0.21%



0 dB = 1.02 mW/g = 0.17 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

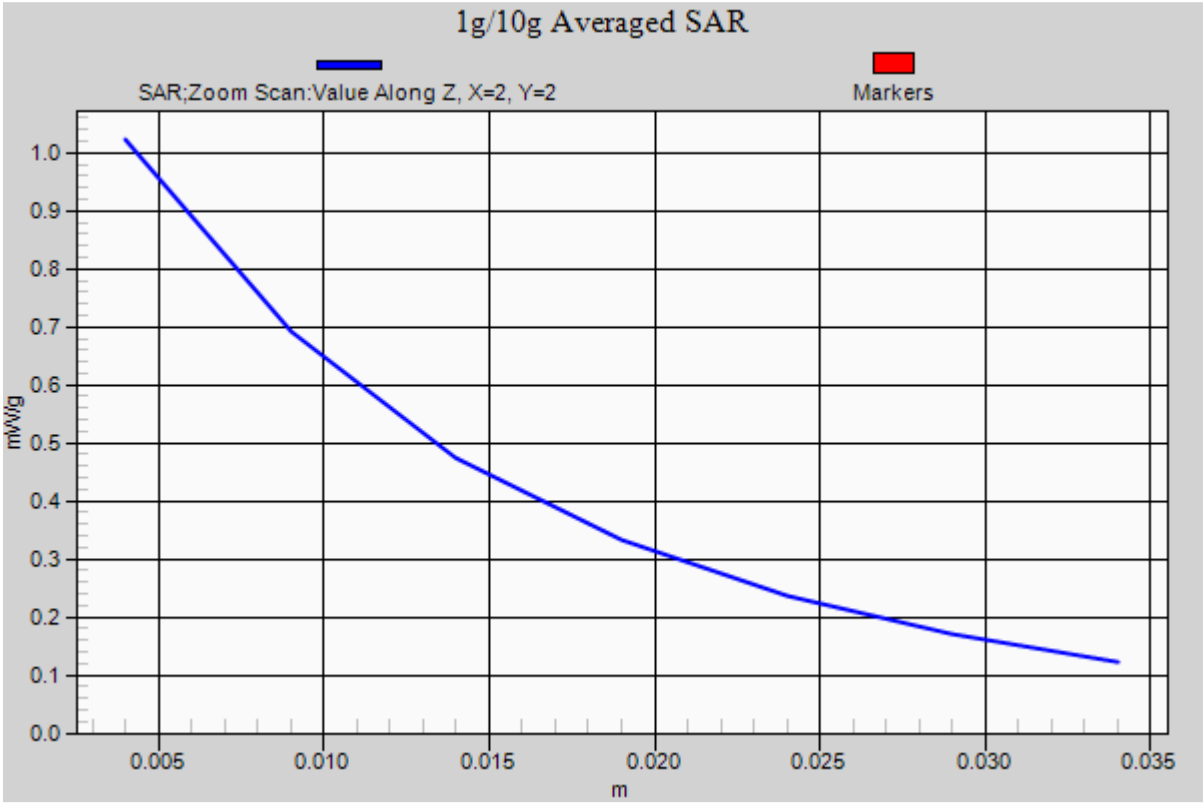
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.9 mho/m; ε_r = 41.47; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-12-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.5 (6469)

835MHz 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 dBm (100 mW)
Peak SAR (extrapolated) = 1.381 mW/g
SAR(1 g) = 0.944 mW/g; SAR(10 g) = 0.621 mW/g
Deviation = 0.21%



PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 835 MHz; Type: D835V2; Serial: 4d047

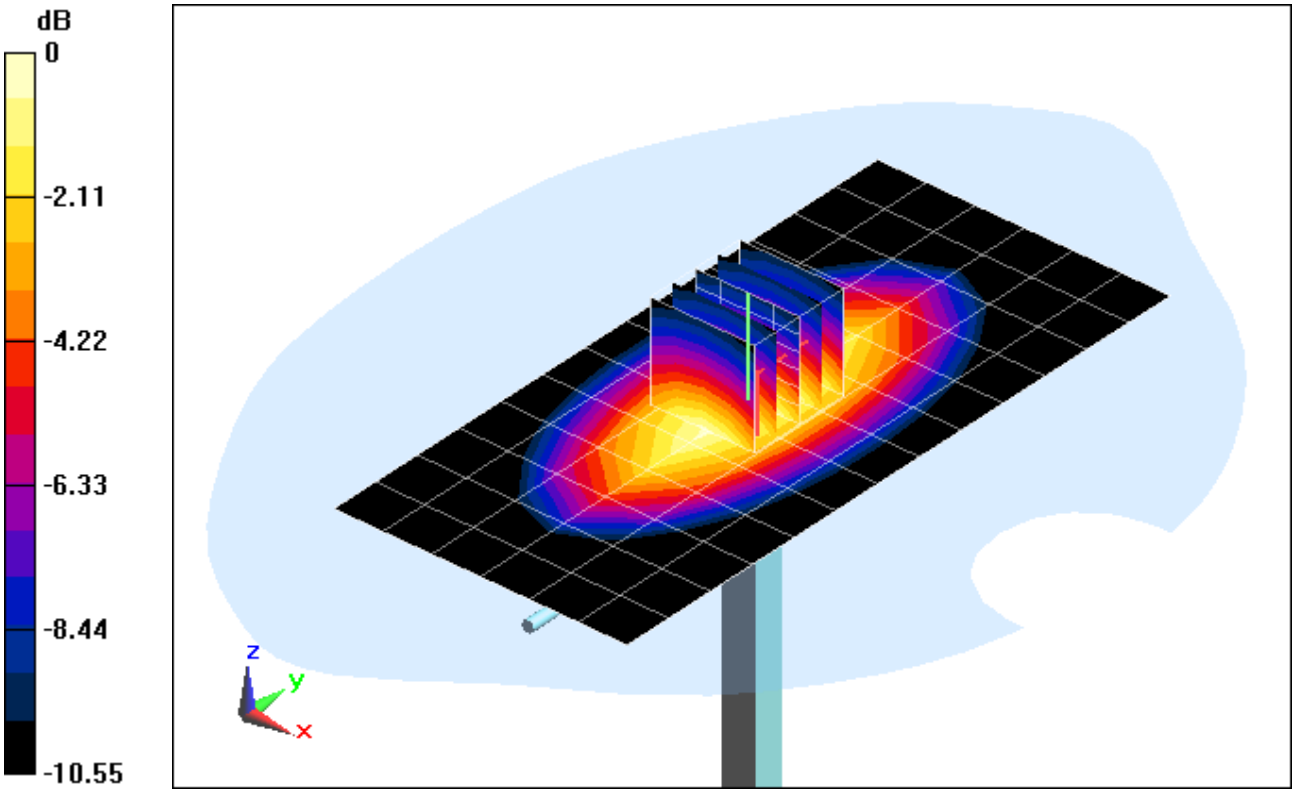
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.881 mho/m; ε_r = 40.72; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-20-2012; Ambient Temp: 23.5°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3287; ConvF(6.06, 6.06, 6.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

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) = 1.469 mW/g
SAR(1 g) = 0.994 mW/g; SAR(10 g) = 0.650 mW/g
Deviation: 5.63%



0 dB = 1.07 mW/g = 0.59 dB mW/g

DUT: SAR Dipole 835 MHz; Type: D835V2; Serial: 4d047

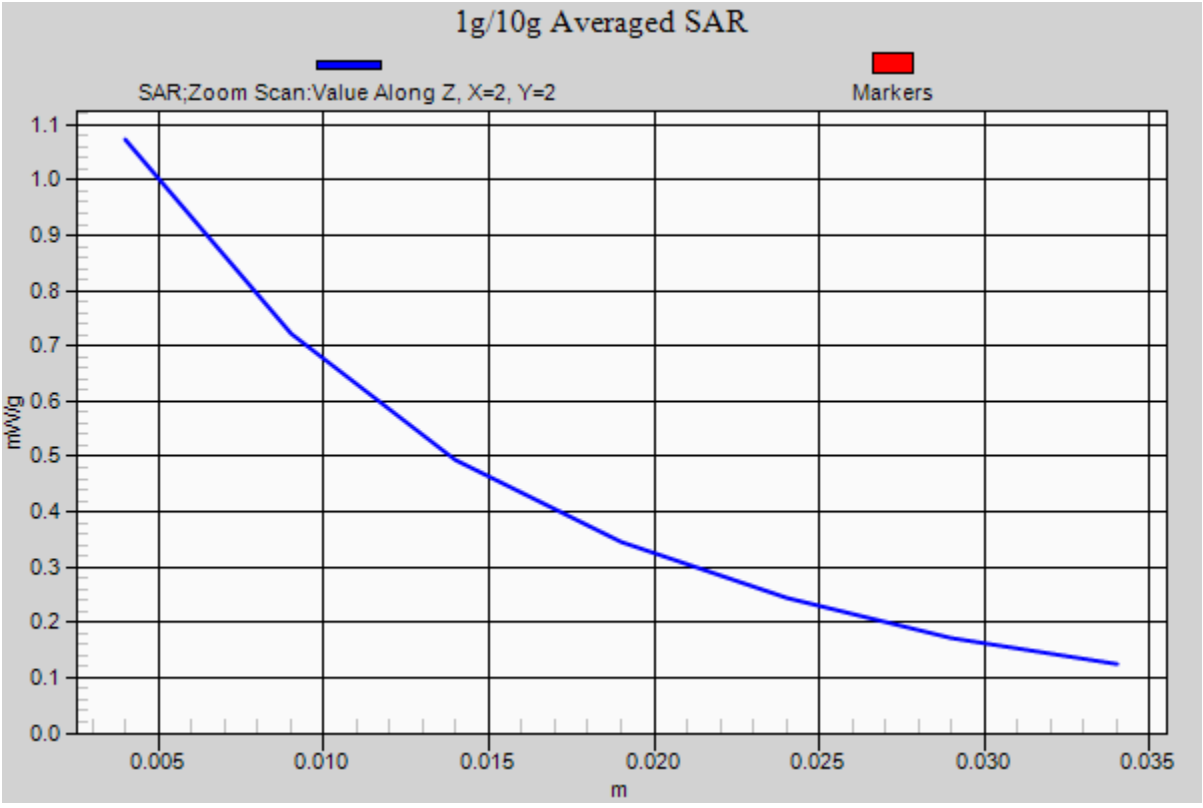
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.881 mho/m; ε_r = 40.72; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-20-2012; Ambient Temp: 23.5°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3287; ConvF(6.06, 6.06, 6.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

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) = 1.469 mW/g
SAR(1 g) = 0.994 mW/g; SAR(10 g) = 0.650 mW/g
Deviation: 5.63%



PCTEST ENGINEERING LABORATORY, INC.

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

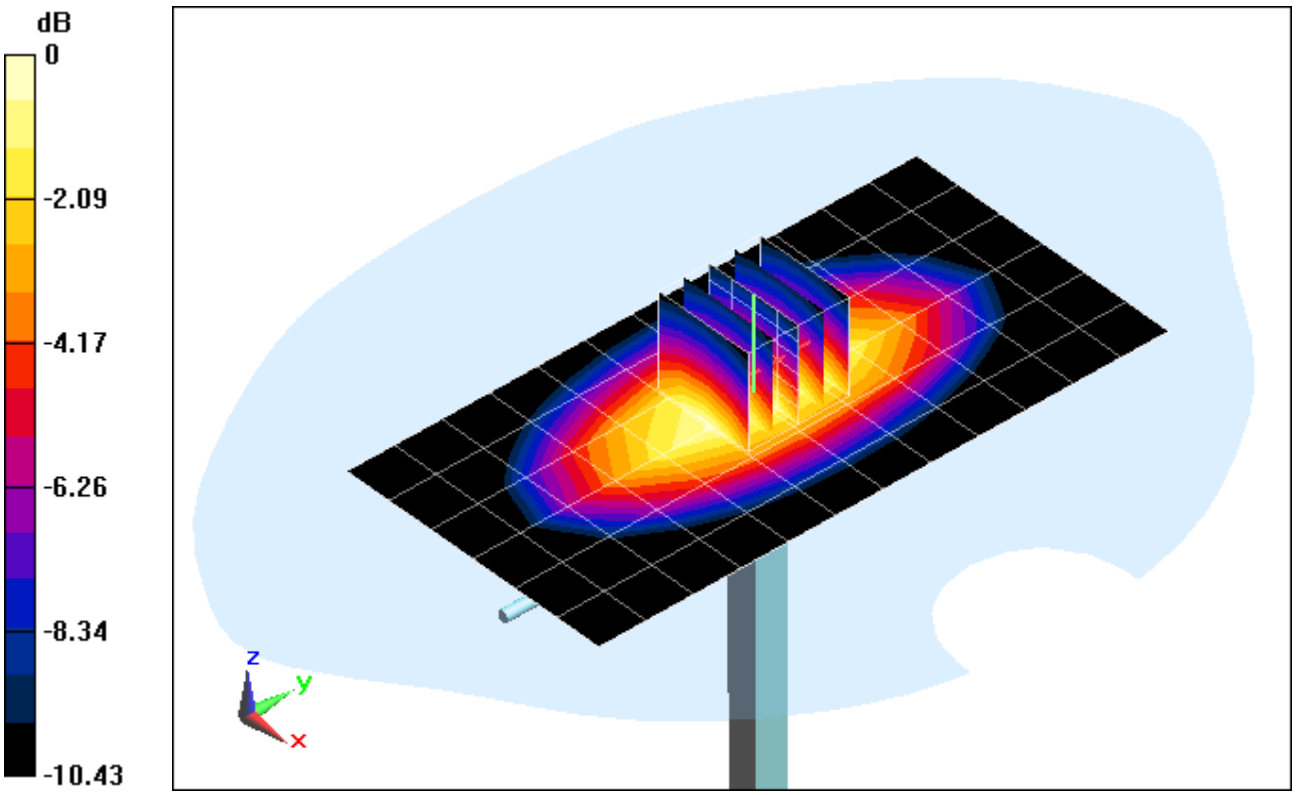
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.892 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-22-2012; Ambient Temp: 24.7°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

835MHz 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) = 1.418 mW/g
SAR(1 g) = 0.962 mW/g; SAR(10 g) = 0.631 mW/g
Deviation: 2.12%



0 dB = 1.04 mW/g = 0.34 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

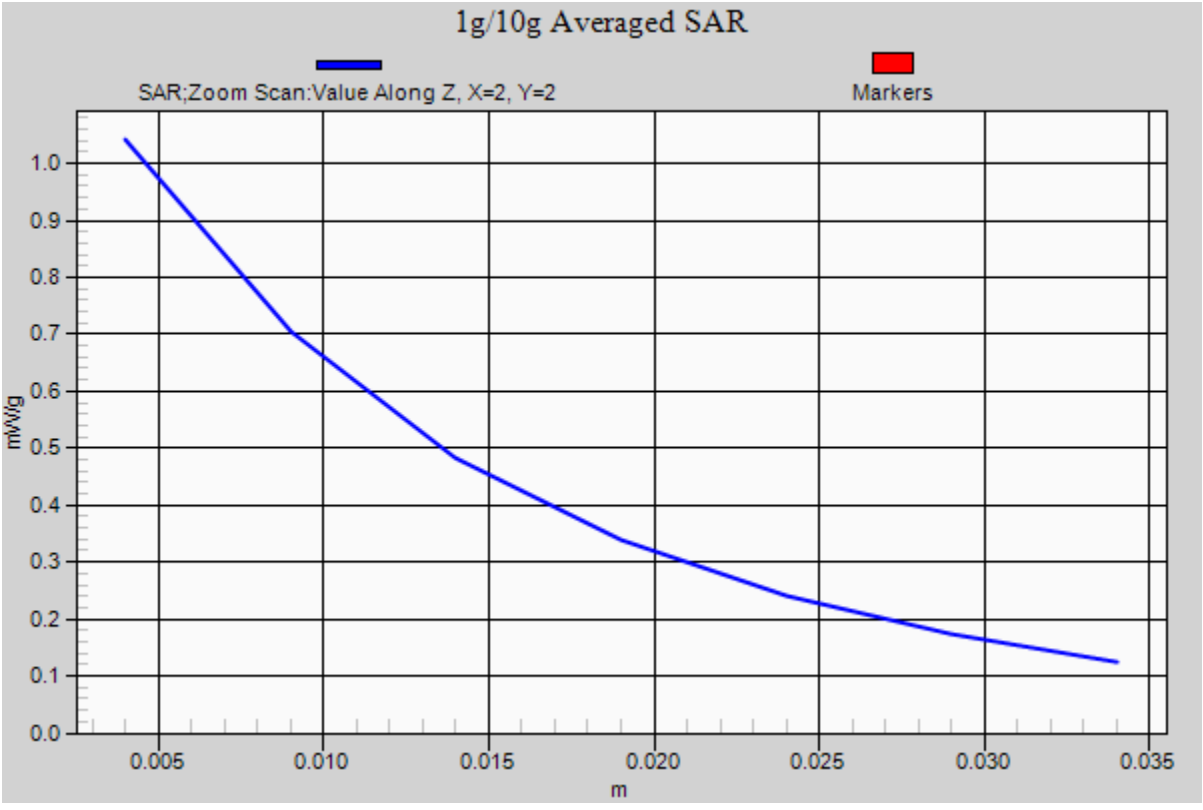
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.892 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-22-2012; Ambient Temp: 24.7°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

835MHz 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) = 1.418 mW/g
SAR(1 g) = 0.962 mW/g; SAR(10 g) = 0.631 mW/g
Deviation: 2.12%



PCTEST ENGINEERING LABORATORY, INC.

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

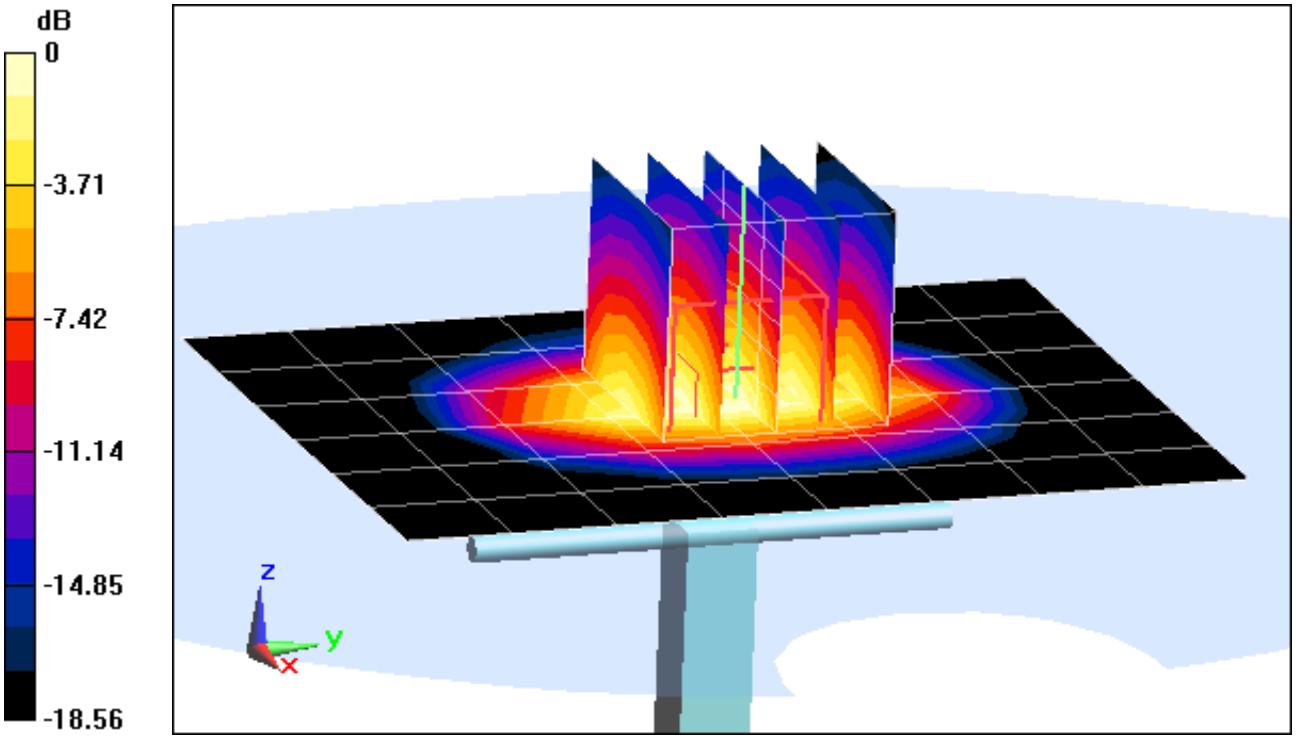
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.395 mho/m; ε_r = 38.253; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-09-2012; Ambient Temp: 22.5°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

1900 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20 dBm (100 mW)
Peak SAR (extrapolated) = 7.288 mW/g
SAR(1 g) = 3.9 mW/g; SAR(10 g) = 2.01 mW/g
Deviation = -0.76%



0 dB = 4.31 mW/g = 12.69 dB mW/g

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

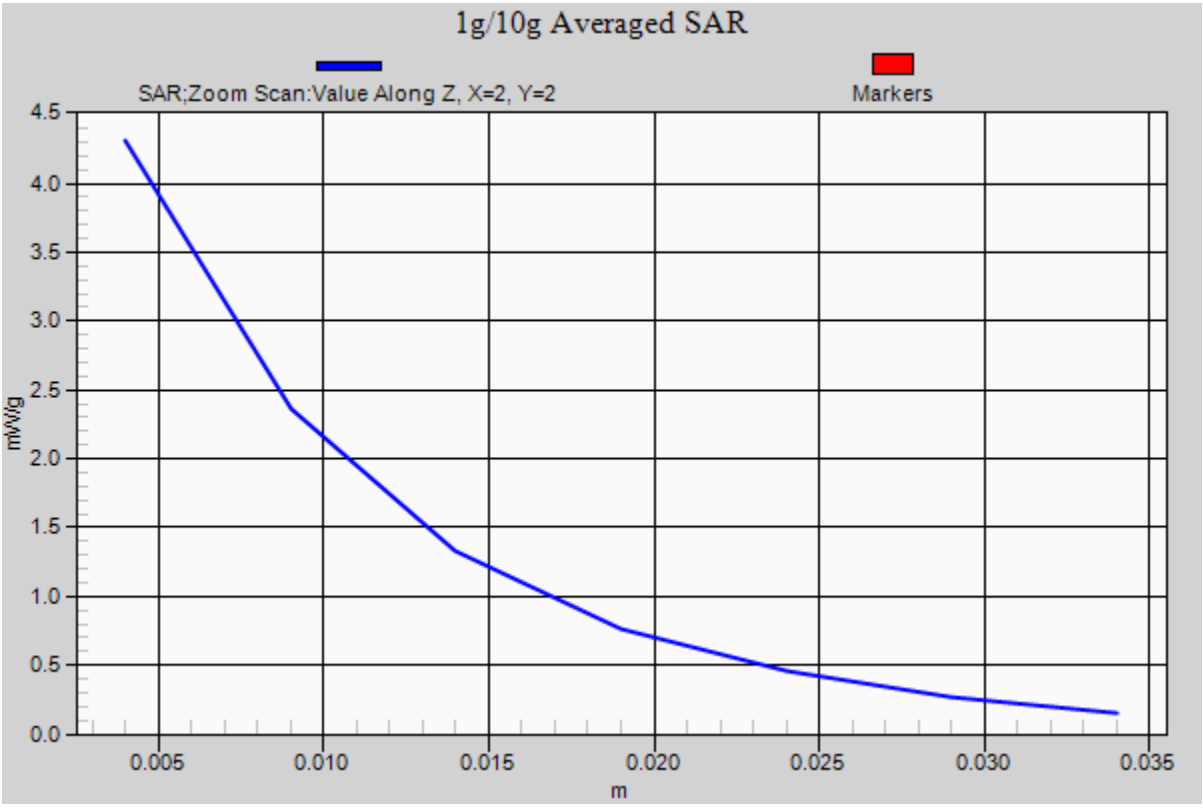
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.395 mho/m; ε_r = 38.253; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-09-2012; Ambient Temp: 22.5°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

1900 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20 dBm (100 mW)
Peak SAR (extrapolated) = 7.288 mW/g
SAR(1 g) = 3.9 mW/g; SAR(10 g) = 2.01 mW/g
Deviation = -0.76%



PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 502

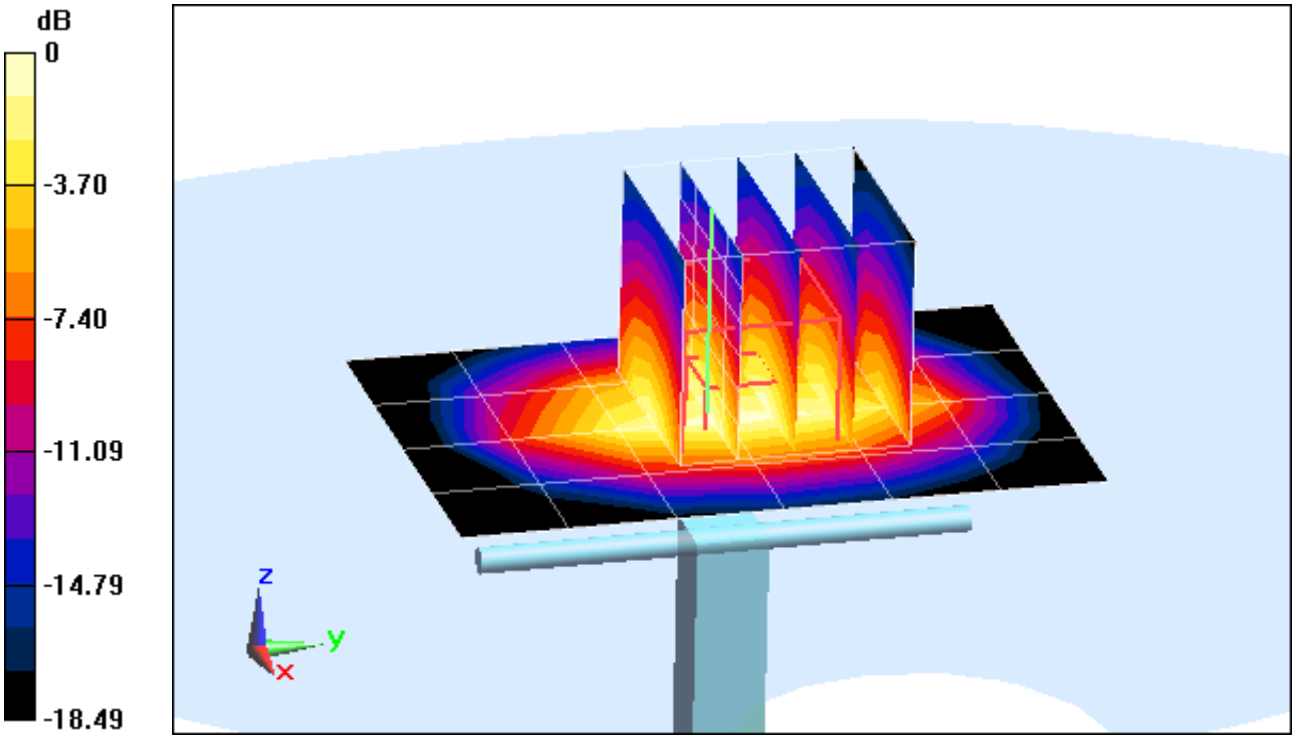
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.406 mho/m; ε_r = 38.87; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2012; Ambient Temp: 23.3°C; Tissue Temp: 23.0°C

Probe: ES3DV2 - SN3022; ConvF(4.98, 4.98, 4.98); Calibrated: 8/25/2011;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

1900MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20 dBm (100 mW)
Peak SAR (extrapolated) = 7.143 mW/g
SAR(1 g) = 3.88 mW/g; SAR(10 g) = 2.03 mW/g
Deviation = -1.02%



0 dB = 4.31 mW/g = 12.69 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 502

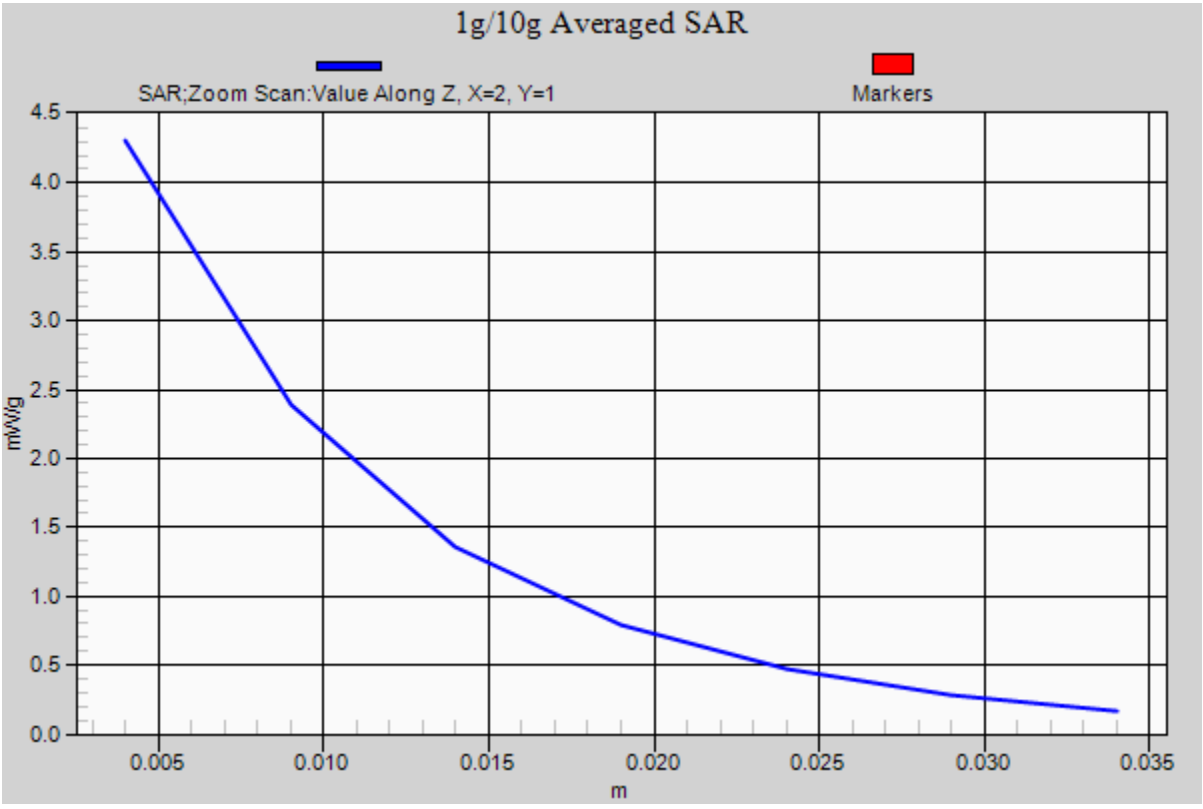
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.406 mho/m; ε_r = 38.87; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2012; Ambient Temp: 23.3°C; Tissue Temp: 23.0°C

Probe: ES3DV2 - SN3022; ConvF(4.98, 4.98, 4.98); Calibrated: 8/25/2011;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

1900MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20 dBm (100 mW)
Peak SAR (extrapolated) = 7.143 mW/g
SAR(1 g) = 3.88 mW/g; SAR(10 g) = 2.03 mW/g
Deviation = -1.02%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d148

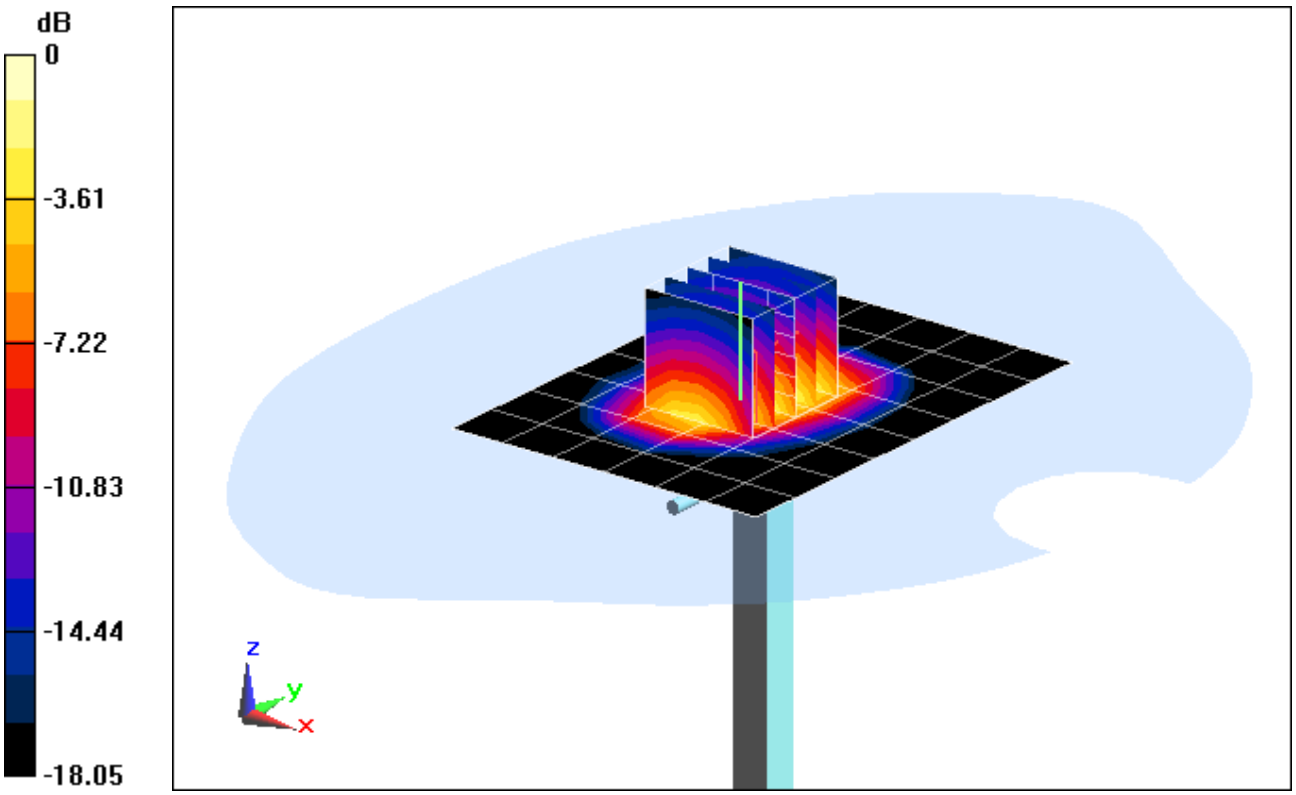
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.432 mho/m; ε_r = 39.233; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-16-2012; Ambient Temp: 23.9°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3213; ConvF(5.02, 5.02, 5.02); Calibrated: 4/24/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

1900 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) = 7.673 mW/g
SAR(1 g) = 4.13 mW/g; SAR(10 g) = 2.14 mW/g
Deviation: 1.98%



0 dB = 5.21 mW/g = 14.34 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d148

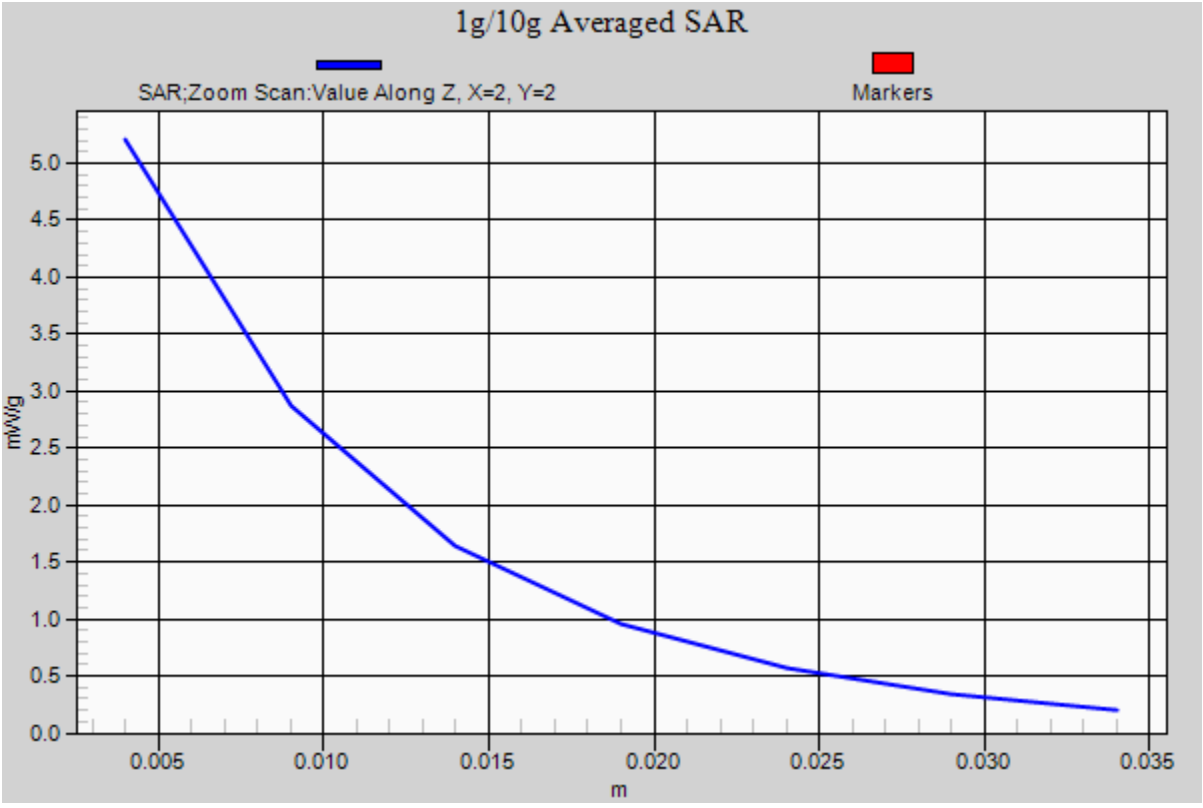
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.432 mho/m; ε_r = 39.233; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-16-2012; Ambient Temp: 23.9°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3213; ConvF(5.02, 5.02, 5.02); Calibrated: 4/24/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

1900 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) = 7.673 mW/g
SAR(1 g) = 4.13 mW/g; SAR(10 g) = 2.14 mW/g
Deviation: 1.98%



PCTEST ENGINEERING LABORATORY, INC.

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

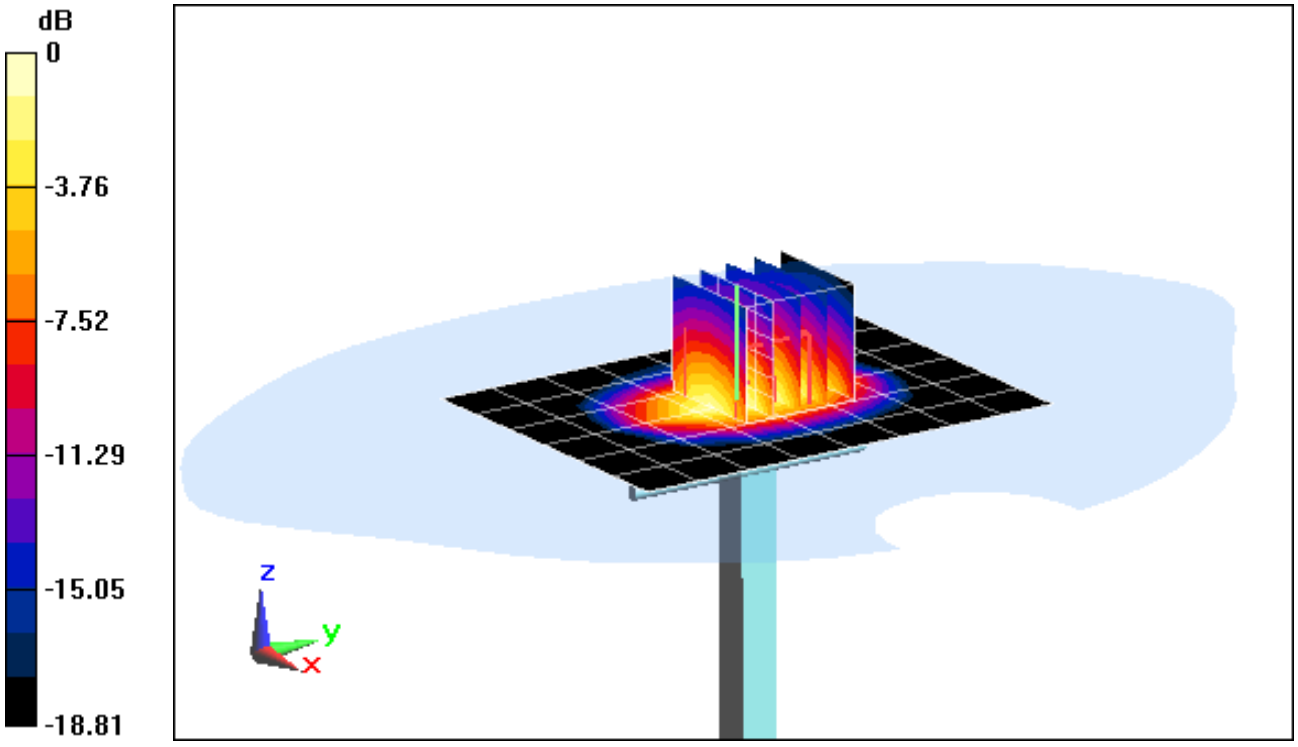
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.443 mho/m; ε_r = 40.933; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-23-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (1);SEMCAD X Version 14.6.5 (6469)

1900 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) = 7.789 mW/g
SAR(1 g) = 4.18 mW/g; SAR(10 g) = 2.17 mW/g
Deviation: 6.36%



0 dB = 4.64 mW/g = 13.33 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

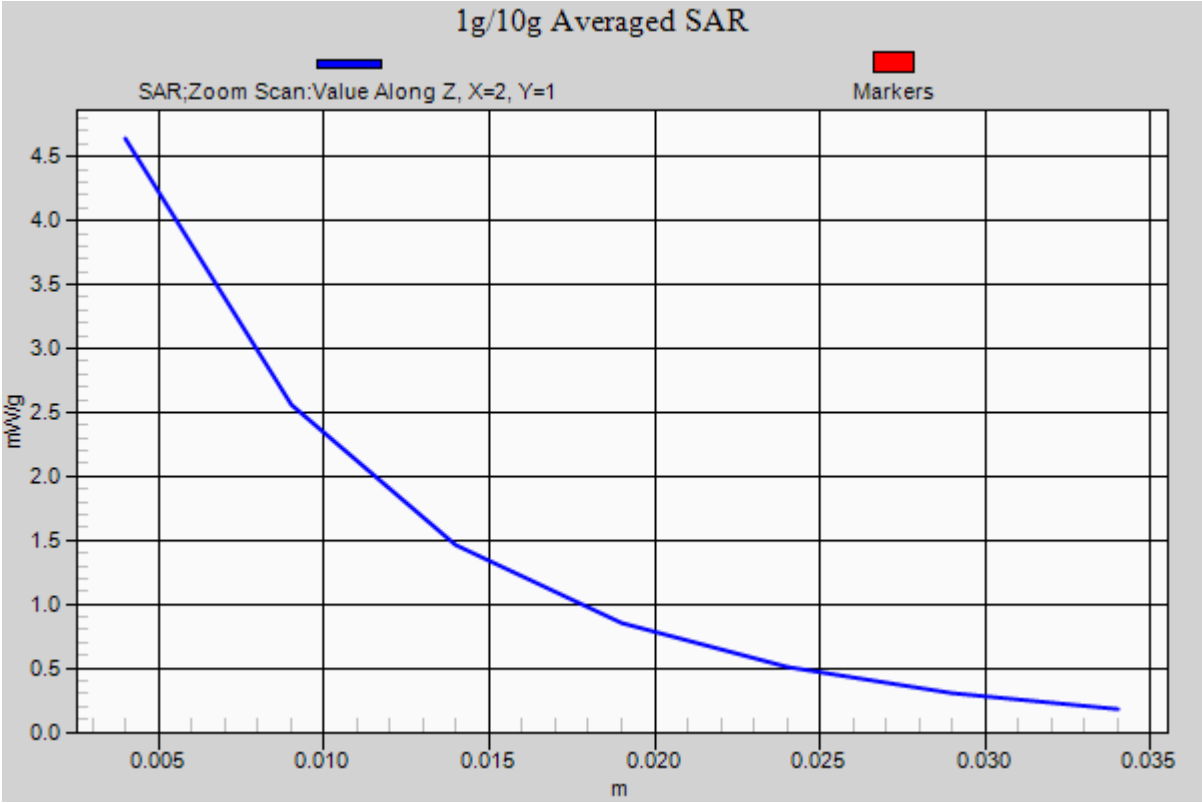
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.443 mho/m; ε_r = 40.933; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-23-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (1);SEMCAD X Version 14.6.5 (6469)

1900 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) = 7.789 mW/g
SAR(1 g) = 4.18 mW/g; SAR(10 g) = 2.17 mW/g
Deviation: 6.36%



PCTEST ENGINEERING LABORATORY, INC.

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

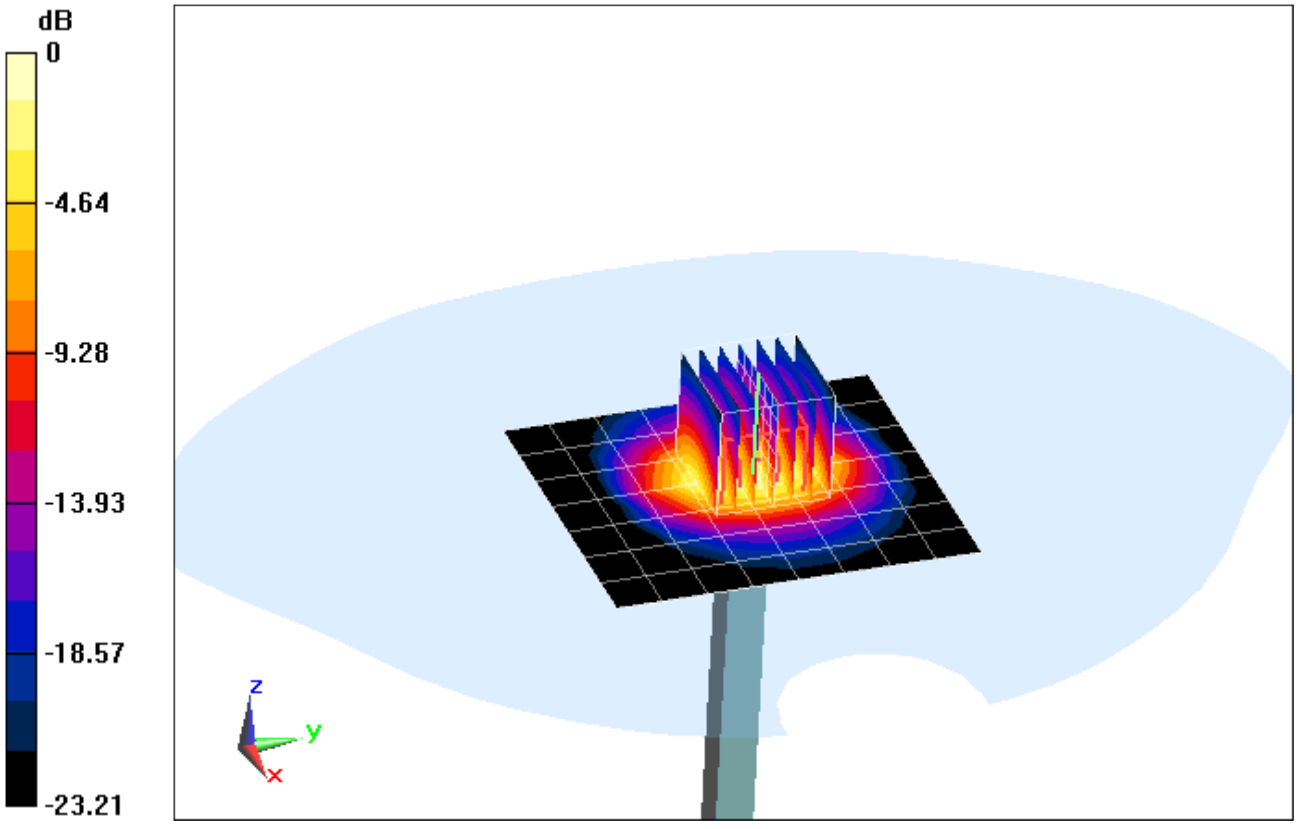
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.85 mho/m; ε_r = 38.64; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-14-2012; Ambient Temp: 22.1°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3288; ConvF(4.54, 4.54, 4.54); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (1);SEMCAD X Version 14.6.5 (6469)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power= 20 dBm (100 mW)
Peak SAR (extrapolated) = 11.825 mW/g
SAR(1 g) = 5.58 mW/g; SAR(10 g) = 2.55 mW/g
Deviation= 4.30%



0 dB = 7.37 mW/g = 17.35 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

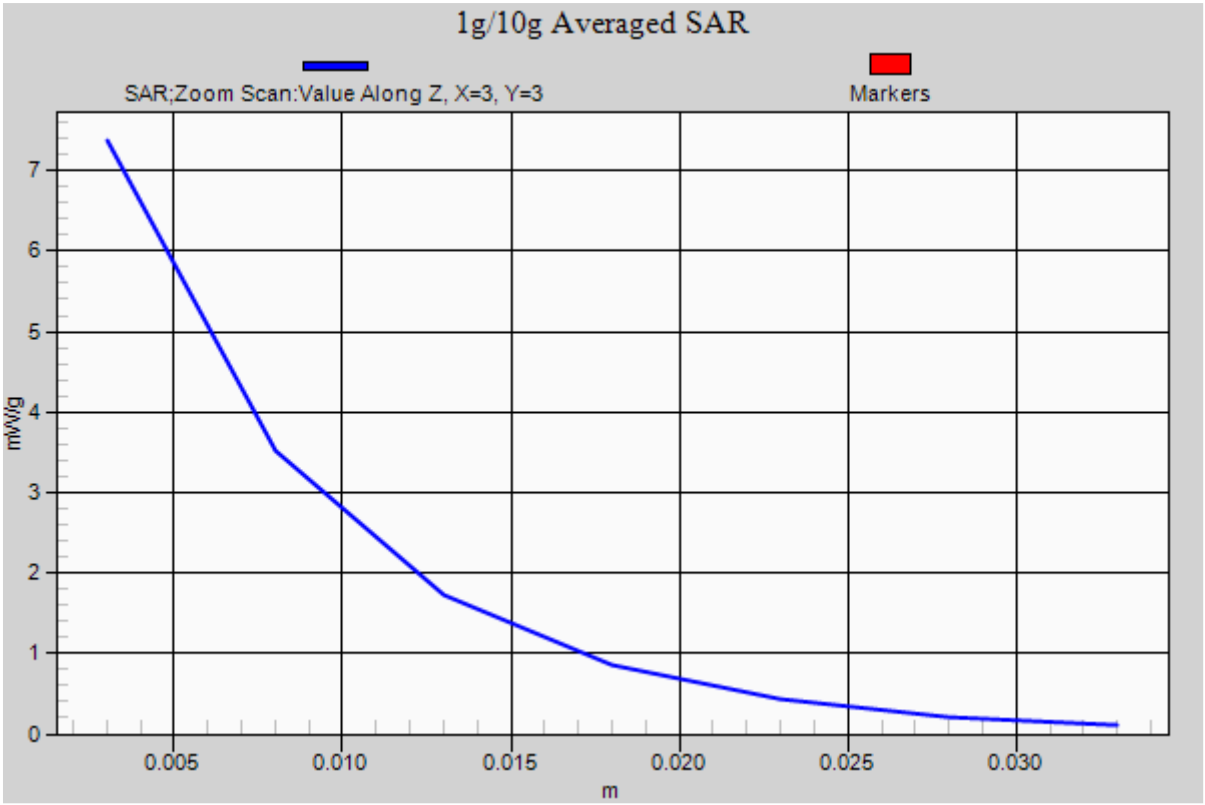
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.85 mho/m; ε_r = 38.64; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-14-2012; Ambient Temp: 22.1°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3288; ConvF(4.54, 4.54, 4.54); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power: 20 dBm (100 mW)
Peak SAR (extrapolated) = 11.825 mW/g
SAR(1 g) = 5.58 mW/g; SAR(10 g) = 2.55 mW/g
Deviation= 4.30%



PCTEST ENGINEERING LABORATORY, INC.

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

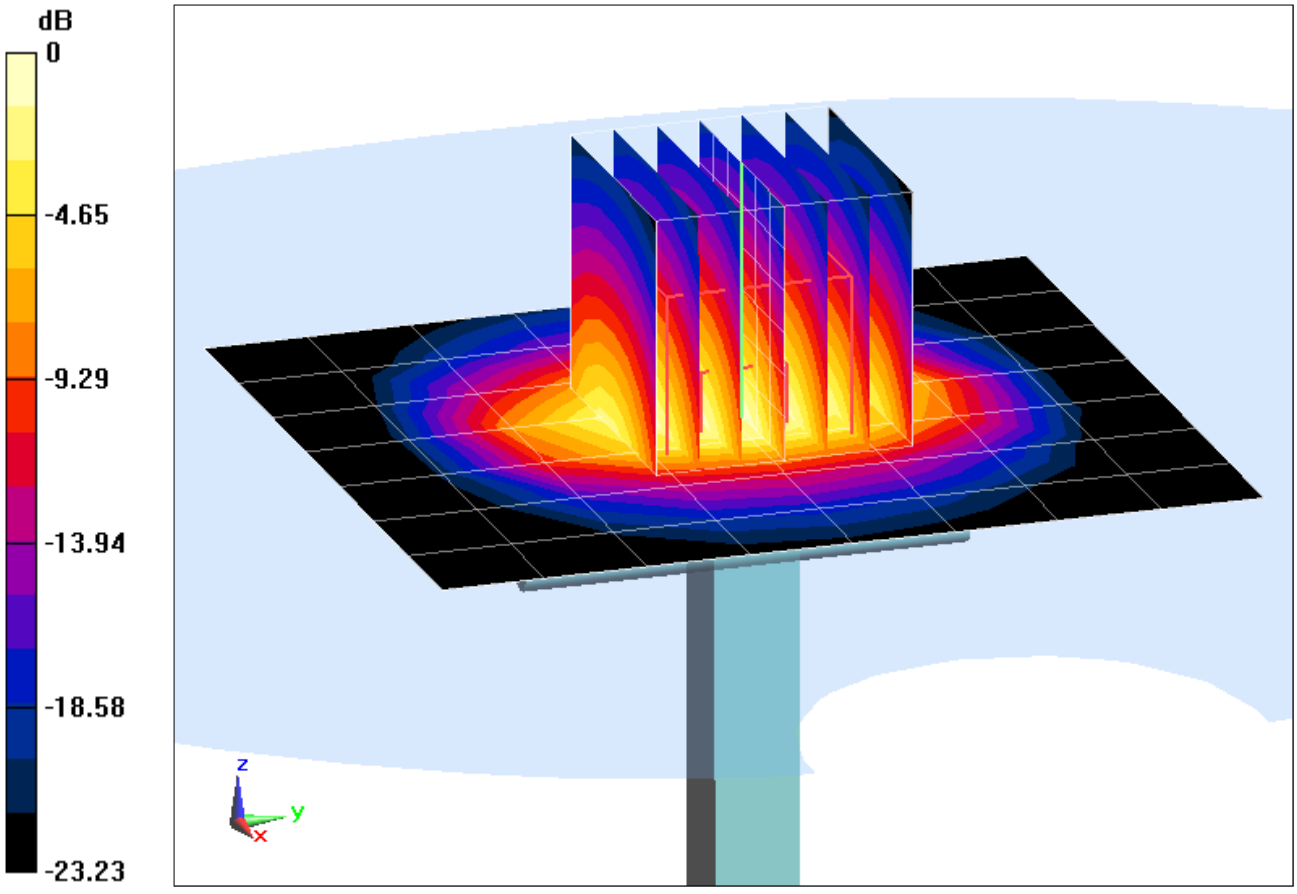
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head; Medium parameters used:
f = 2450 MHz; σ = 1.86 mho/m; ε_r = 39.12; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-21-2012; Ambient Temp: 24.6°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3288; ConvF(4.54, 4.54, 4.54); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (1);SEMCAD X Version 14.6.5 (6469)

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) = 12.190 mW/g
SAR(1 g) = 5.75 mW/g; SAR(10 g) = 2.62 mW/g
Deviation = 7.48%



0 dB = 7.37 mW/g = 17.35 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

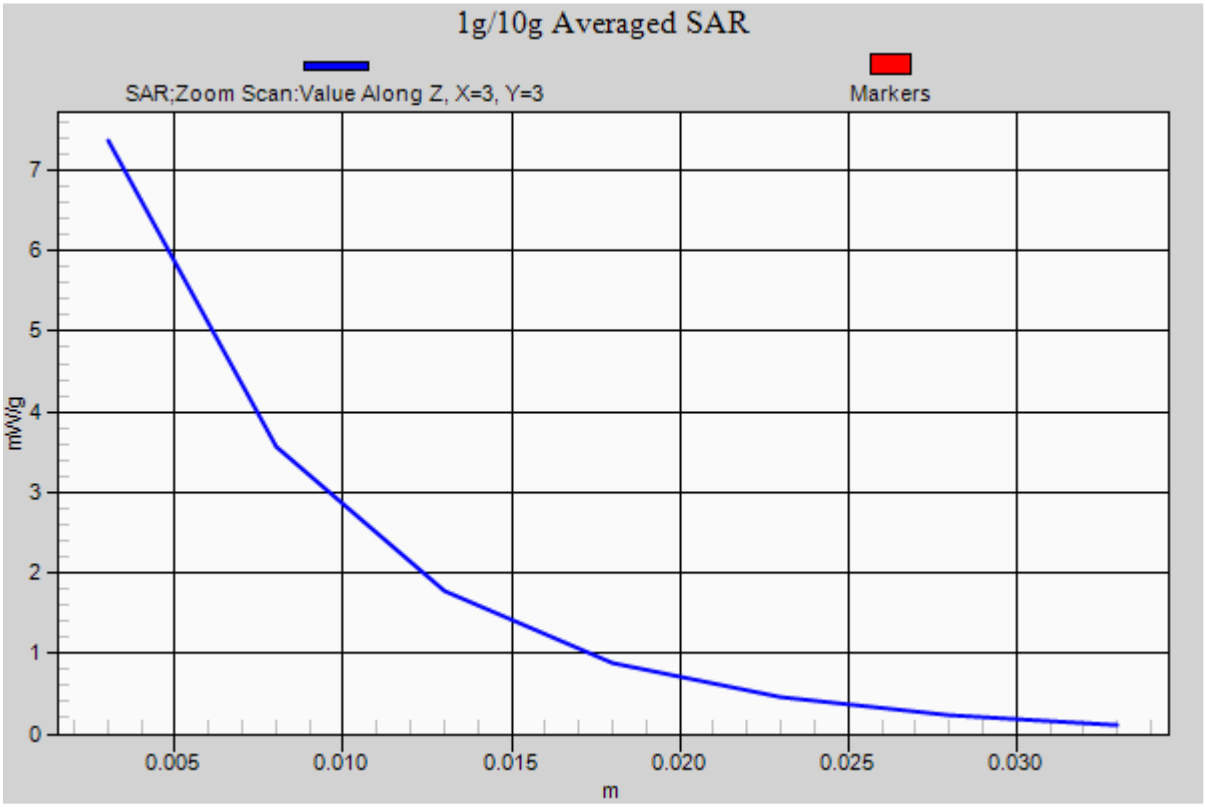
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head; Medium parameters used:
f = 2450 MHz; σ = 1.86 mho/m; ε_r = 39.12; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-21-2012; Ambient Temp: 24.6°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3288; ConvF(4.54, 4.54, 4.54); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (1);SEMCAD X Version 14.6.5 (6469)

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) = 12.190 mW/g
SAR(1 g) = 5.75 mW/g; SAR(10 g) = 2.62 mW/g
Deviation = 7.48%



PCTEST ENGINEERING LABORATORY, INC.

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

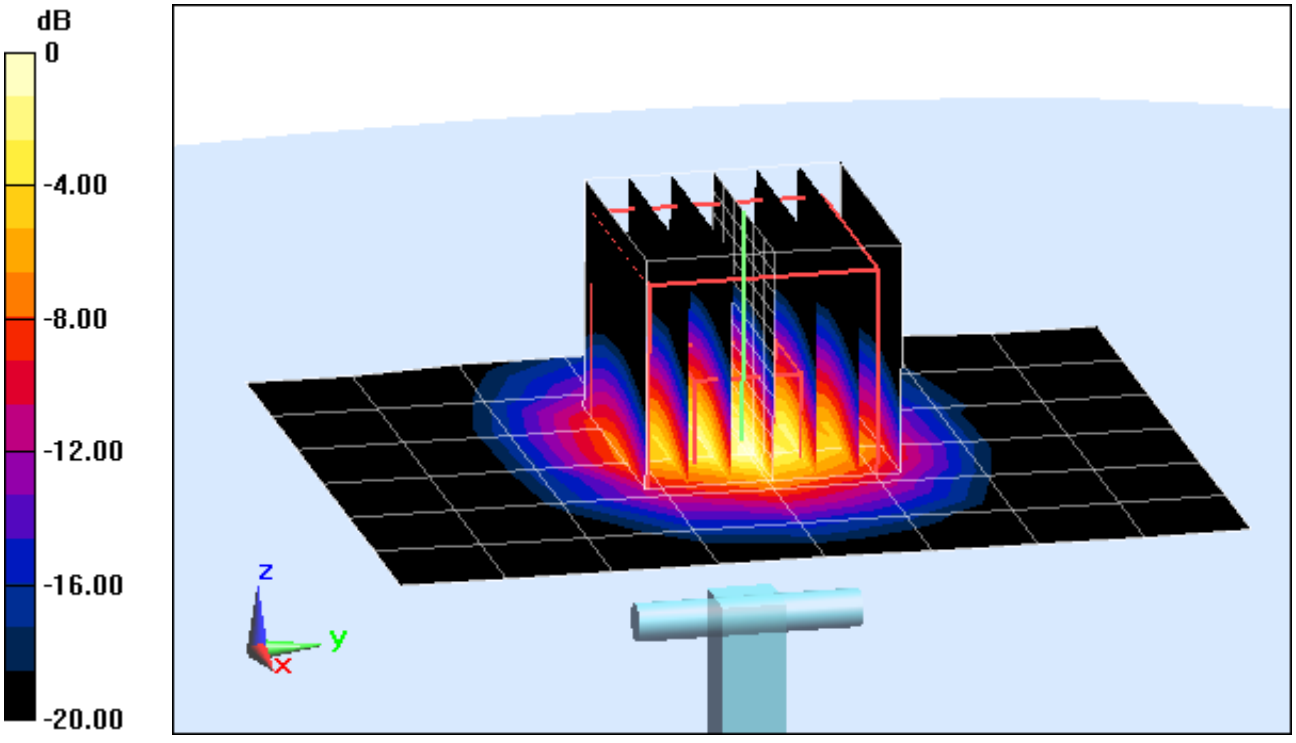
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5200 MHz; σ = 4.576 mho/m; ε_r = 37.11; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-13-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(4.59, 4.59, 4.59); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5200MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power = 20 dBm (100 mW)
Peak SAR (extrapolated) = 33.573 mW/g
SAR(1 g) = 7.44 mW/g; SAR(10 g) = 2.1 mW/g
Deviation = -5.94%



0 dB = 15.2 mW/g = 23.64 dB mW/g

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

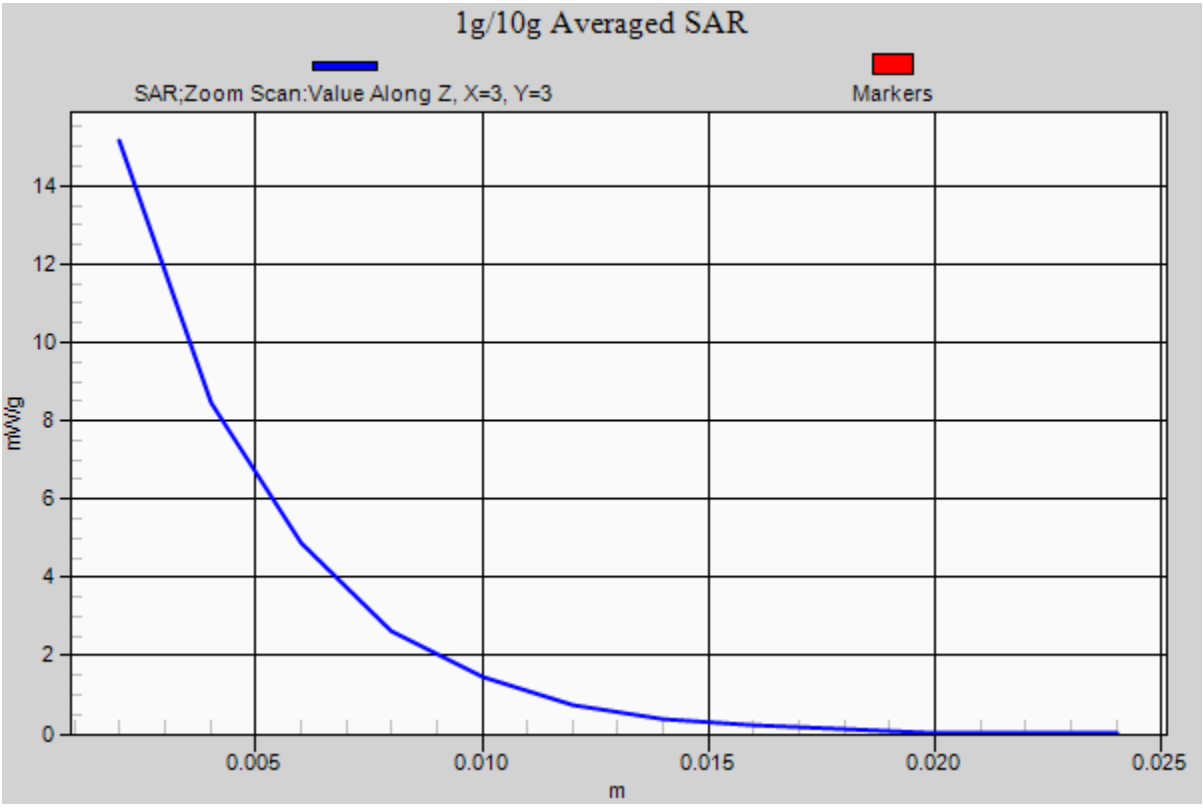
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5200 MHz; σ = 4.576 mho/m; ε_r = 37.11; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-13-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(4.59, 4.59, 4.59); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5200MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power = 20 dBm (100 mW)
Peak SAR (extrapolated) = 33.573 mW/g
SAR(1 g) = 7.44 mW/g; SAR(10 g) = 2.1 mW/g
Deviation = -5.94%



PCTEST ENGINEERING LABORATORY, INC.

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

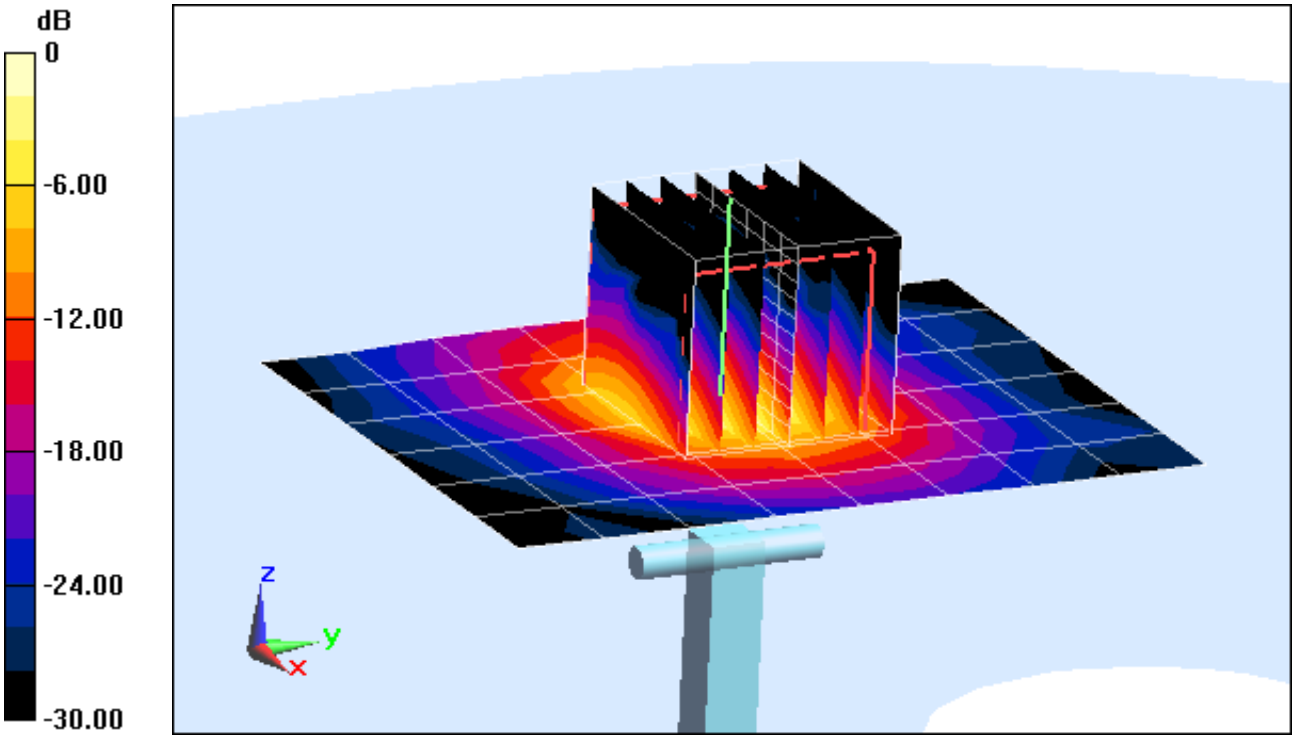
Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5500 MHz; σ = 4.826 mho/m; ε_r = 36.73; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-13-2012; Ambient Temp: 24.6°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(4.33, 4.33, 4.33); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5500MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power = 20 dBm (100 mW)
Peak SAR (extrapolated) = 33.411 mW/g
SAR(1 g) = 8.14 mW/g; SAR(10 g) = 2.23 mW/g
Deviation = -4.12%



0 dB = 16.3 mW/g = 24.24 dB mW/g

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

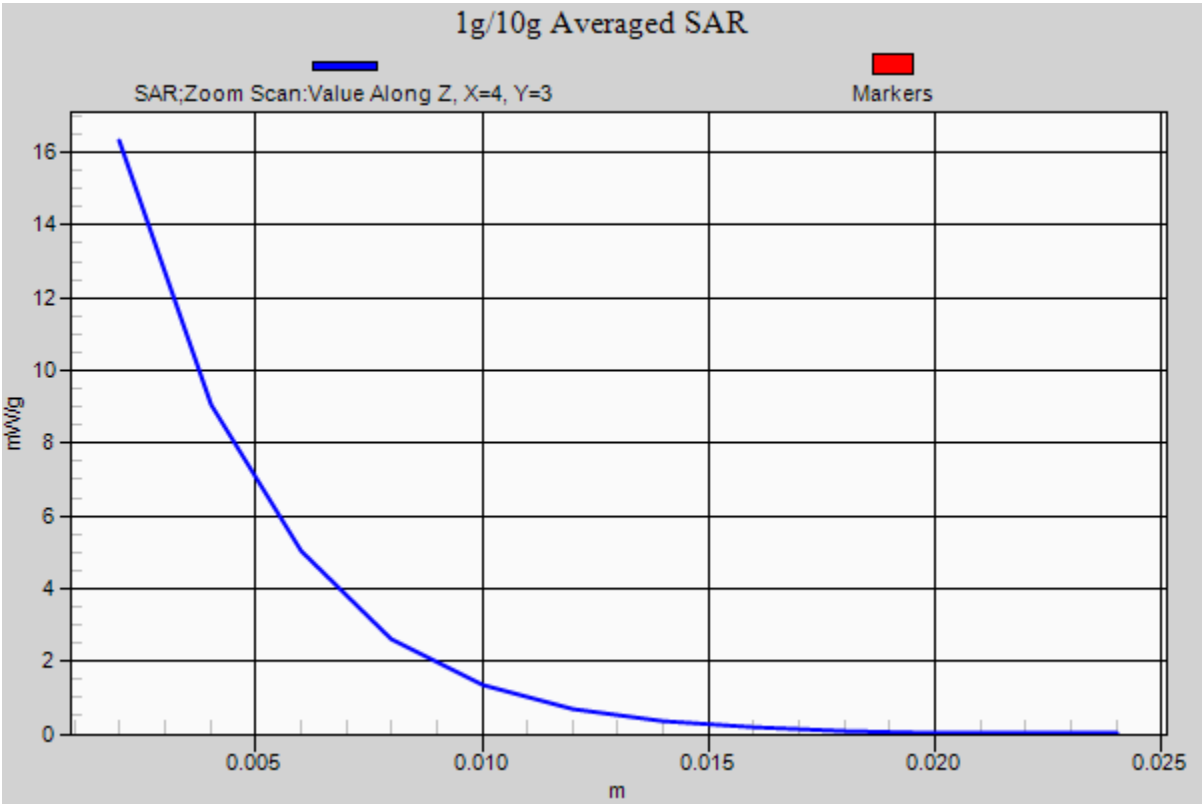
Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5500 MHz; σ = 4.826 mho/m; ε_r = 36.73; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-13-2012; Ambient Temp: 24.6°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(4.33, 4.33, 4.33); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5500MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power = 20 dBm (100 mW)
Peak SAR (extrapolated) = 33.411 mW/g
SAR(1 g) = 8.14 mW/g; SAR(10 g) = 2.23 mW/g
Deviation = -4.12%



PCTEST ENGINEERING LABORATORY, INC.

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

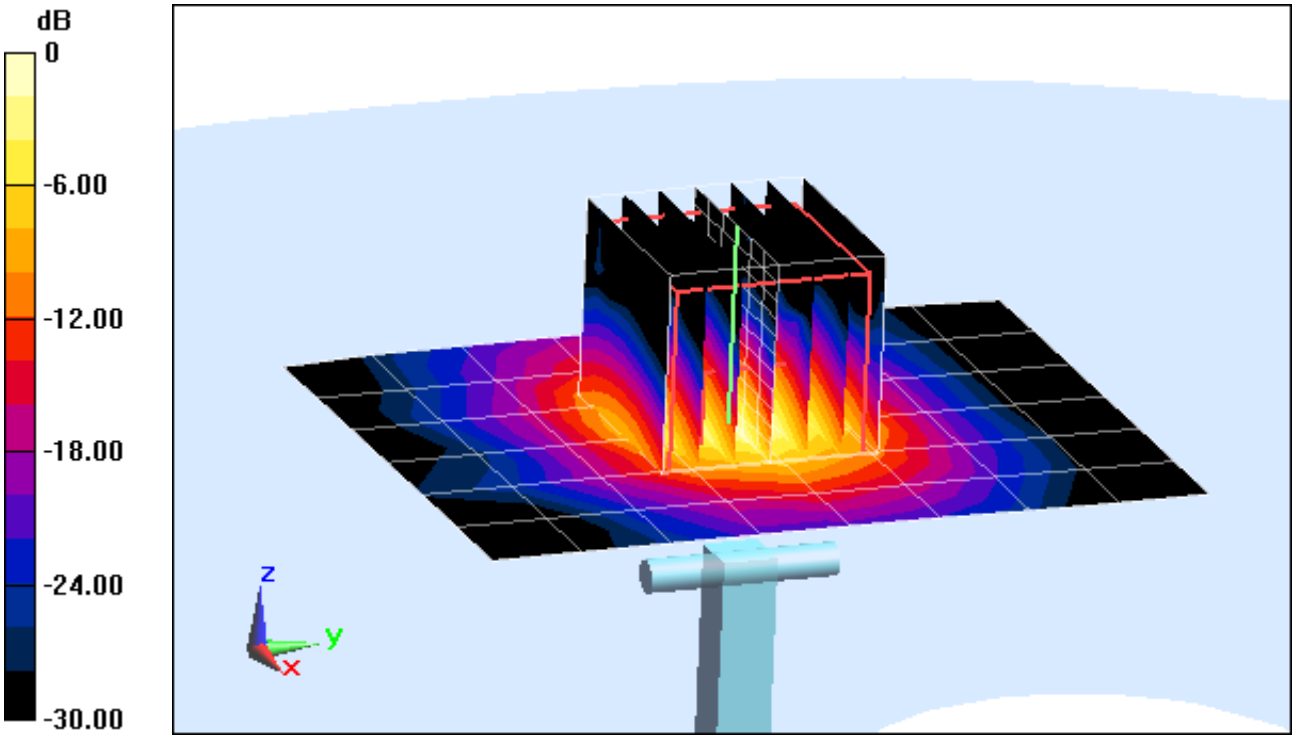
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5800 MHz; σ = 5.136 mho/m; ε_r = 36.21; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-13-2012; Ambient Temp: 24.6°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3589; ConvF(4.05, 4.05, 4.05); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5800MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10m m
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power = 20 dBm (100 mW)
Peak SAR (extrapolated) = 34.989 mW/g
SAR(1 g) = 7.59 mW/g; SAR(10 g) = 2.08 mW/g
Deviation = -4.53%



0 dB = 15.9 mW/g = 24.03 dB mW/g

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

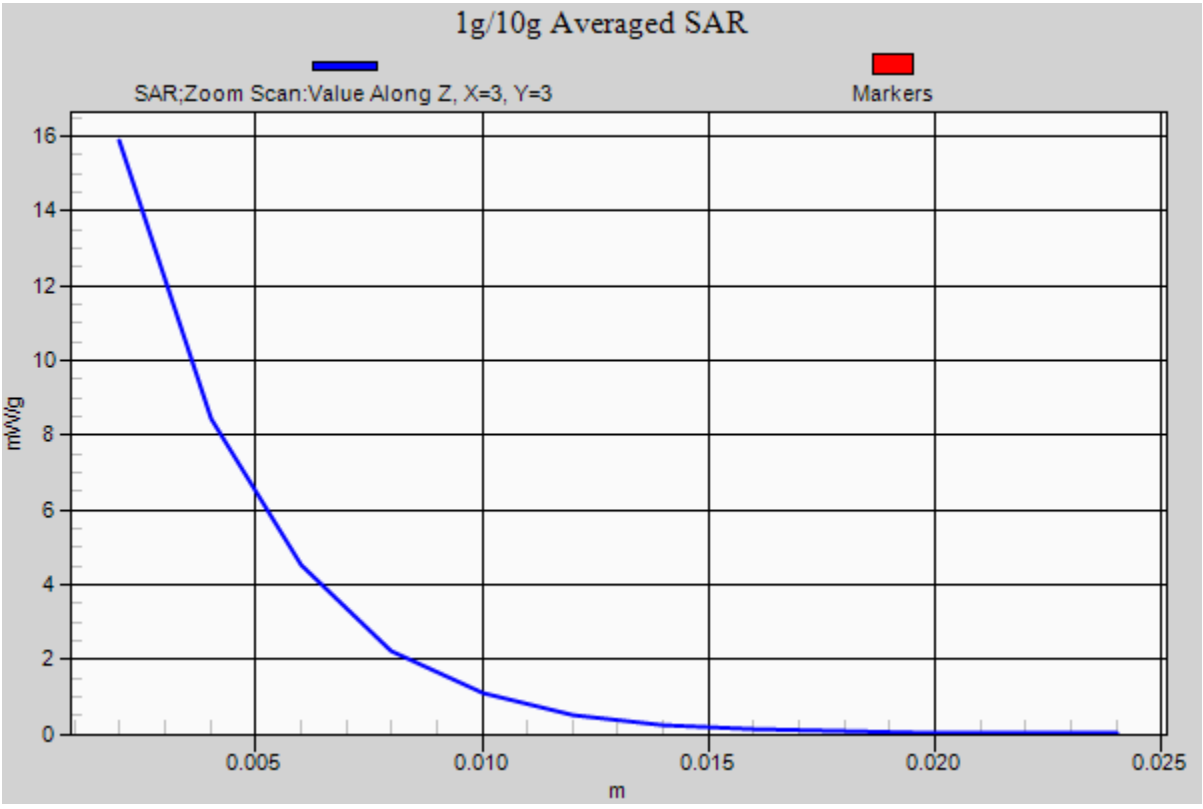
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5800 MHz; σ = 5.136 mho/m; ε_r = 36.21; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-13-2012; Ambient Temp: 24.6°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3589; ConvF(4.05, 4.05, 4.05); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5800MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power = 20 dBm (100 mW)
Peak SAR (extrapolated) = 34.989 mW/g
SAR(1 g) = 7.59 mW/g; SAR(10 g) = 2.08 mW/g
Deviation = -4.53%



PCTEST ENGINEERING LABORATORY, INC.

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

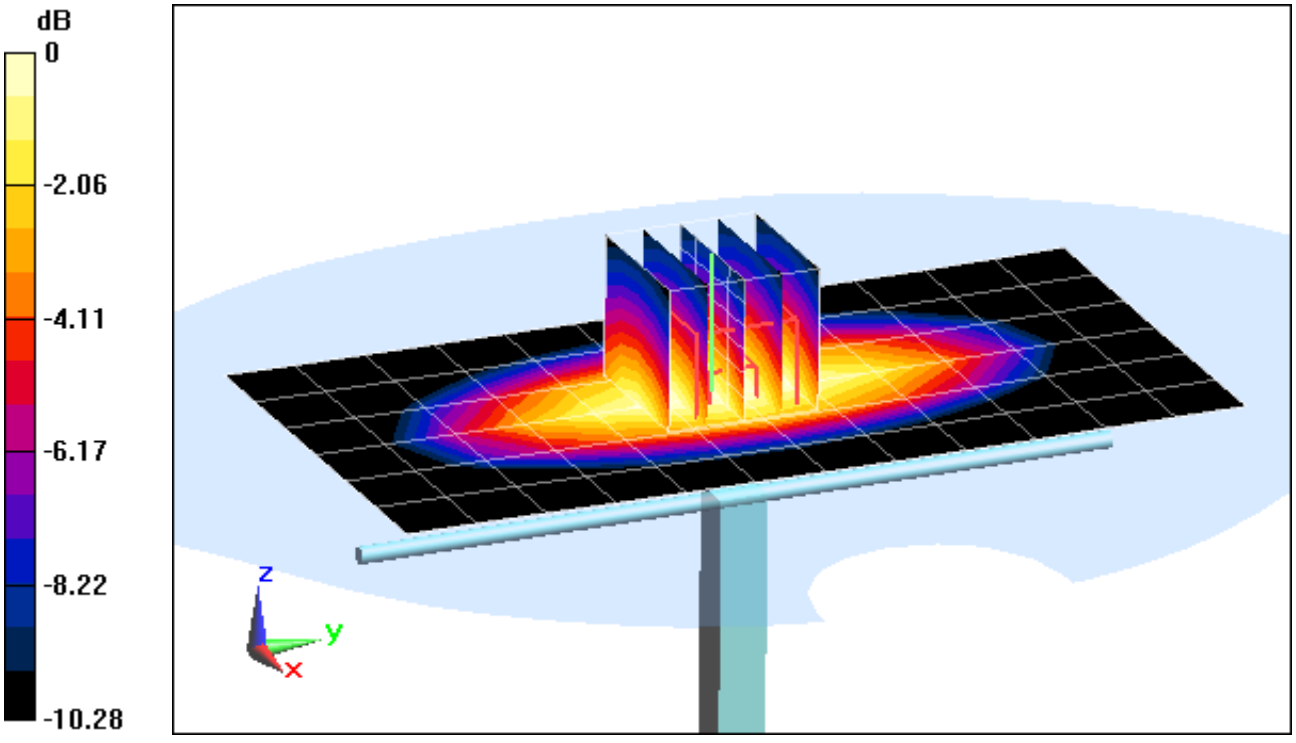
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 1.006 mho/m; ε_r = 55.24; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-09-2012; Ambient Temp: 21.6°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

835MHz 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 dBm (100 mW)
Peak SAR (extrapolated) = 1.441 mW/g
SAR(1 g) = 0.994 mW/g; SAR(10 g) = 0.655 mW/g
Deviation = 3.97%



0 dB = 1.07 mW/g = 0.59 dB mW/g

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

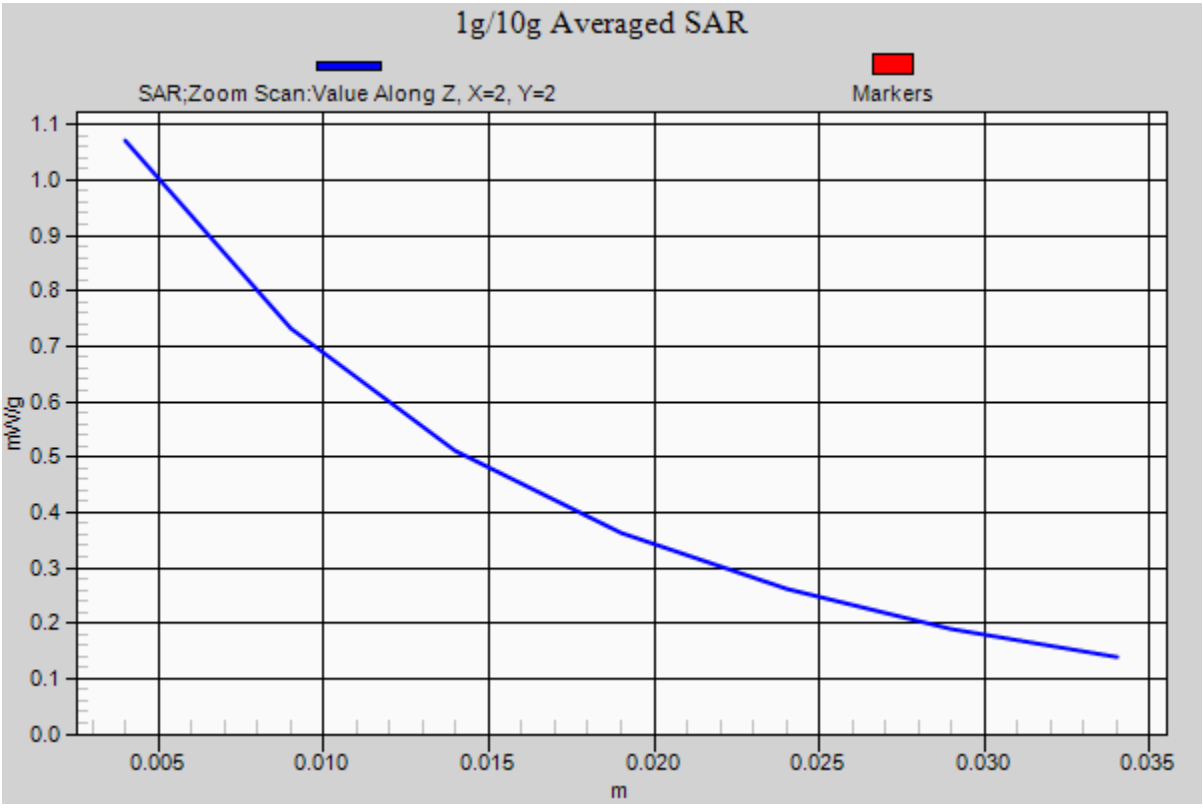
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 1.006 mho/m; ε_r = 55.24; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-09-2012; Ambient Temp: 21.6°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

835MHz 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 dBm (100 mW)
Peak SAR (extrapolated) = 1.441 mW/g
SAR(1 g) = 0.994 mW/g; SAR(10 g) = 0.655 mW/g
Deviation = 3.97%



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

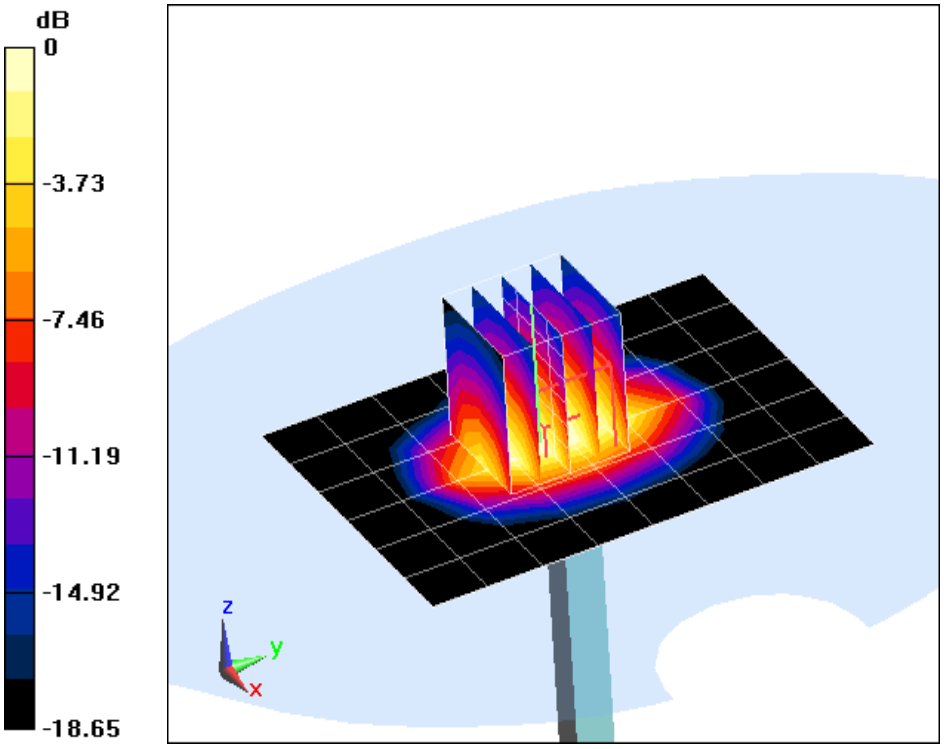
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.548 mho/m; ε_r = 51.403; ρ = 1000 kg/m^3
Phantom section: Flat Section: Space = 1.0 cm

Test Date: 08-10-2012; Ambient Temp: 20.4°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (1);SEMCAD X Version 14.6.5 (6469)

1900 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) = 7.194 mW/g
SAR(1 g) = 3.99 mW/g; SAR(10 g) = 2.06 mW/g
Deviation = 1.53%



0 dB = 4.40 mW/g = 12.87 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

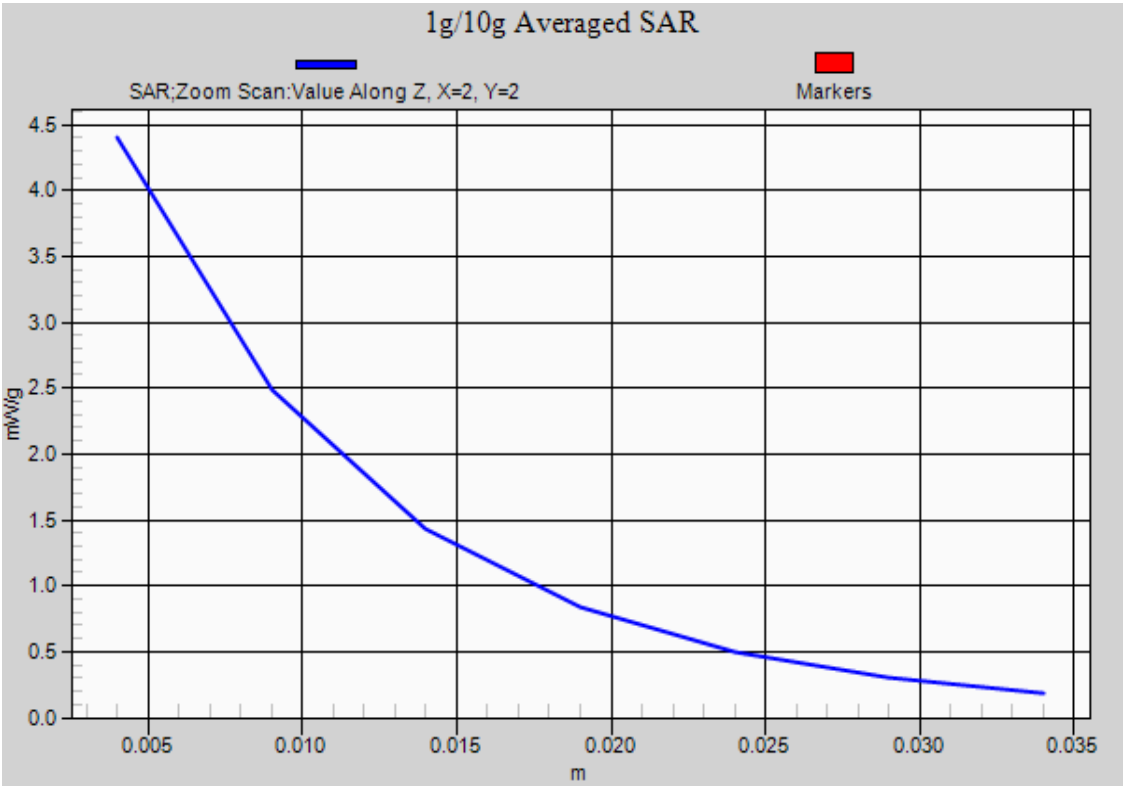
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.548 mho/m; ε_r = 51.403; ρ = 1000 kg/m^3
Phantom section: Flat Section: Space: 1.0 cm

Test Date: 08-10-2012; Ambient Temp: 20.4°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3287; ConvF(4.76, 4.76, 4.76); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

1900 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20 dBm (100 mW)
Peak SAR (extrapolated) = 7.194 mW/g
SAR(1 g) = 3.99 mW/g; SAR(10 g) = 2.06 mW/g
Deviation = 1.53%



PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 502

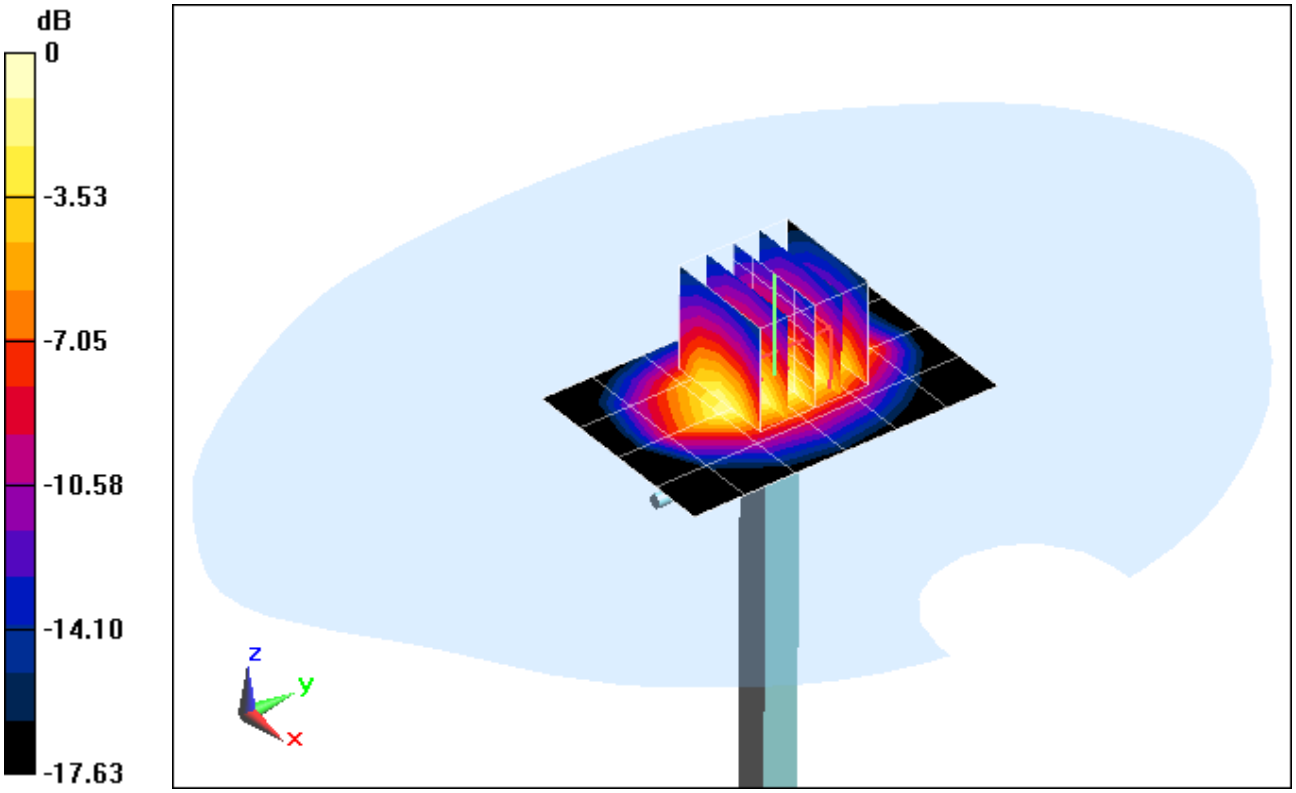
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.529 mho/m; ε_r = 52.727; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2012; Ambient Temp: 22.9°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

1900MHz System Verification

Area Scan (5x7x1): 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) = 6.421 mW/g
SAR(1 g) = 3.68 mW/g; SAR(10 g) = 1.98 mW/g
Deviation: -5.40%



0 dB = 4.06 mW/g = 12.17 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 502

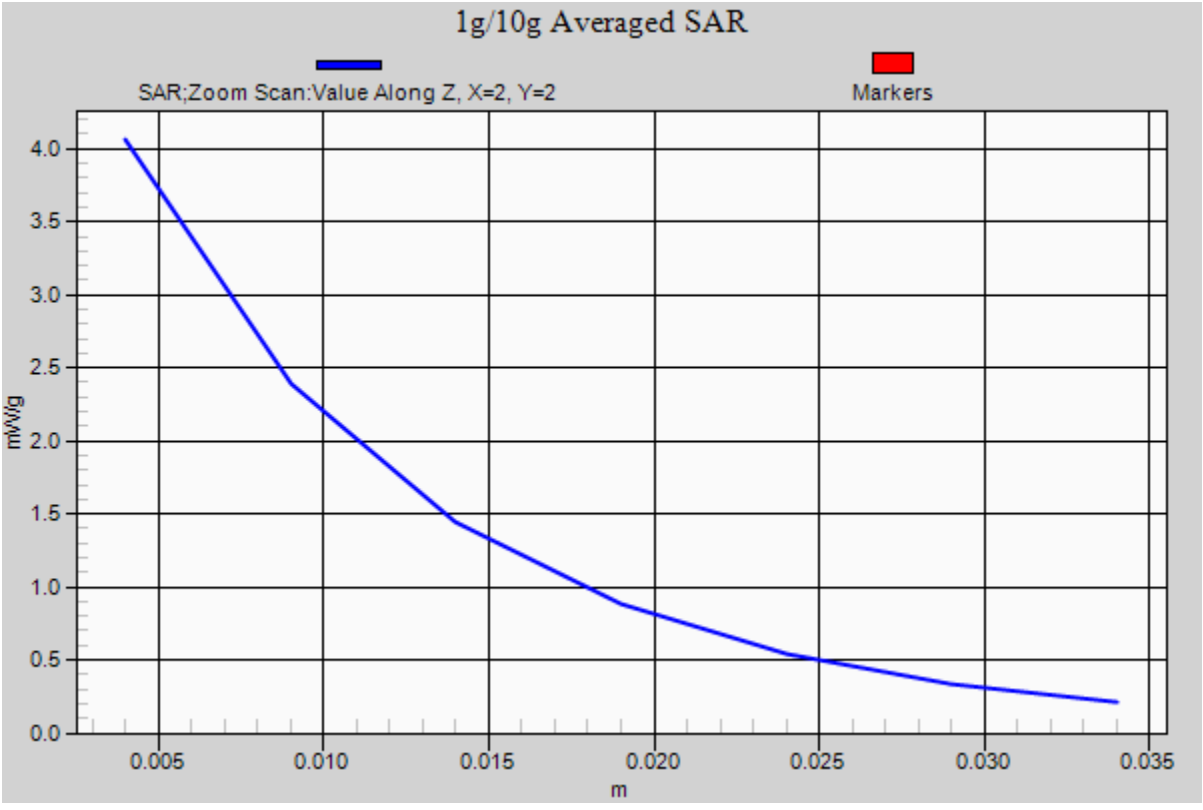
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.529 mho/m; ε_r = 52.727; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2012; Ambient Temp: 22.9°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

1900MHz System Verification

Area Scan (5x7x1): 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) = 6.421 mW/g
SAR(1 g) = 3.68 mW/g; SAR(10 g) = 1.98 mW/g
Deviation: -5.40%



PCTEST ENGINEERING LABORATORY, INC.

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

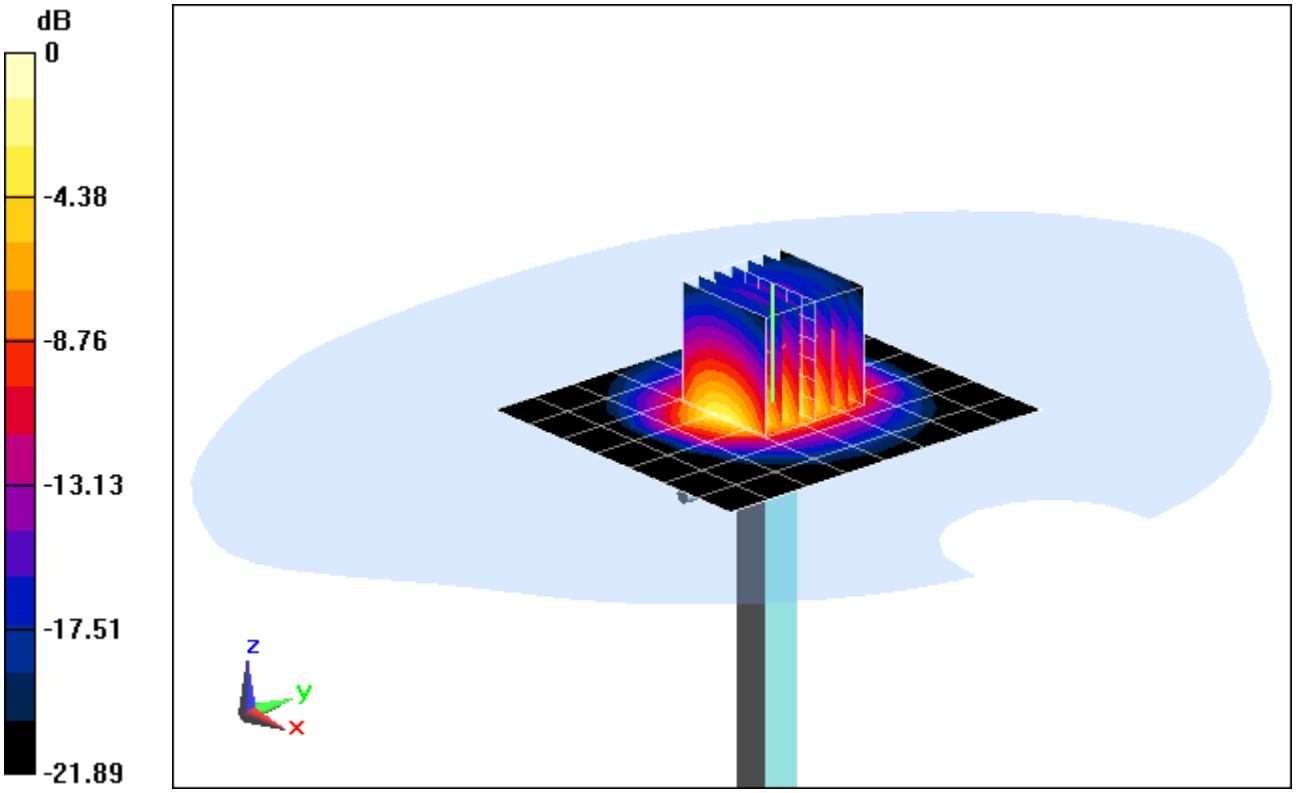
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 1.964 mho/m; ε_r = 51.27; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-15-2012; Ambient Temp: 22.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3288; ConvF(4.47, 4.47, 4.47); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 11.064 mW/g
SAR(1 g) = 5.19 mW/g; SAR(10 g) = 2.39 mW/g
Deviation: 3.18%



0 dB = 6.80 mW/g = 16.65 dB mW/g

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

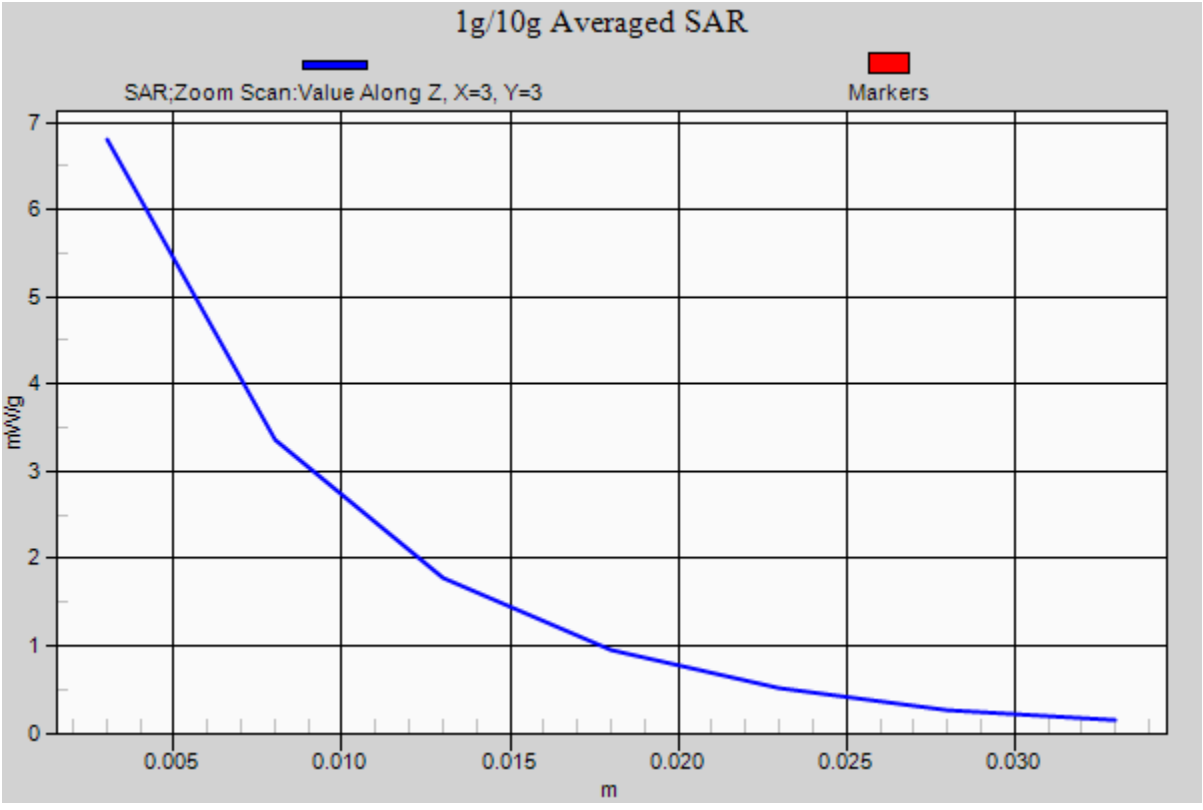
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 1.964 mho/m; ε_r = 51.27; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-15-2012; Ambient Temp: 22.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3288; ConvF(4.47, 4.47, 4.47); Calibrated: 2/7/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 4/12/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 11.064 mW/g
SAR(1 g) = 5.19 mW/g; SAR(10 g) = 2.39 mW/g
Deviation: 3.18%



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

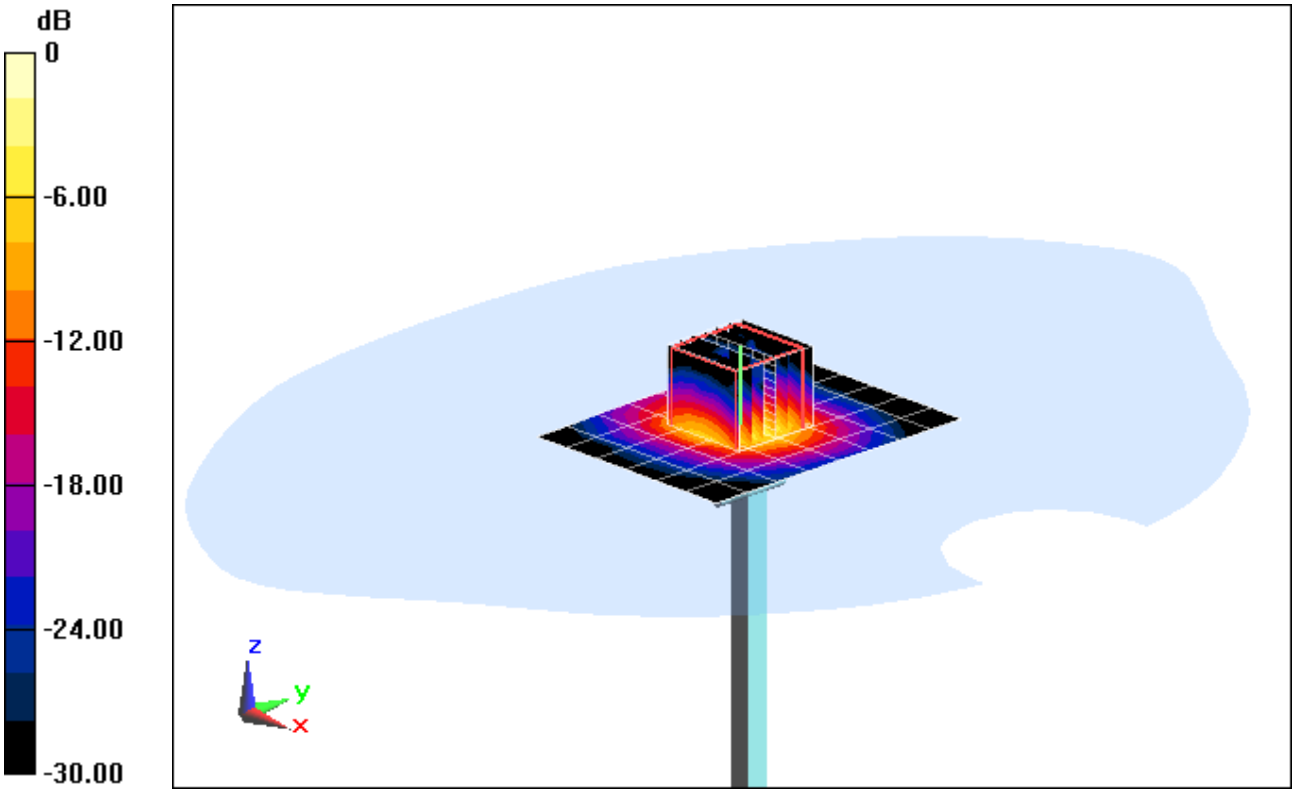
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5 GHz Medium parameters used:
f = 5200 MHz; σ = 5.284 mho/m; ε_r = 47.68; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-14-2012; Ambient Temp: 23.4°C; Tissue Temp: 22.3°C

Probe: EX3DV4 - SN3589; ConvF(3.92, 3.92, 3.92); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5200MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 28.398 mW/g
SAR(1 g) = 7.59 mW/g; SAR(10 g) = 2.12 mW/g
Deviation: 3.41%



0 dB = 15.4 mW/g = 23.75 dB mW/g

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

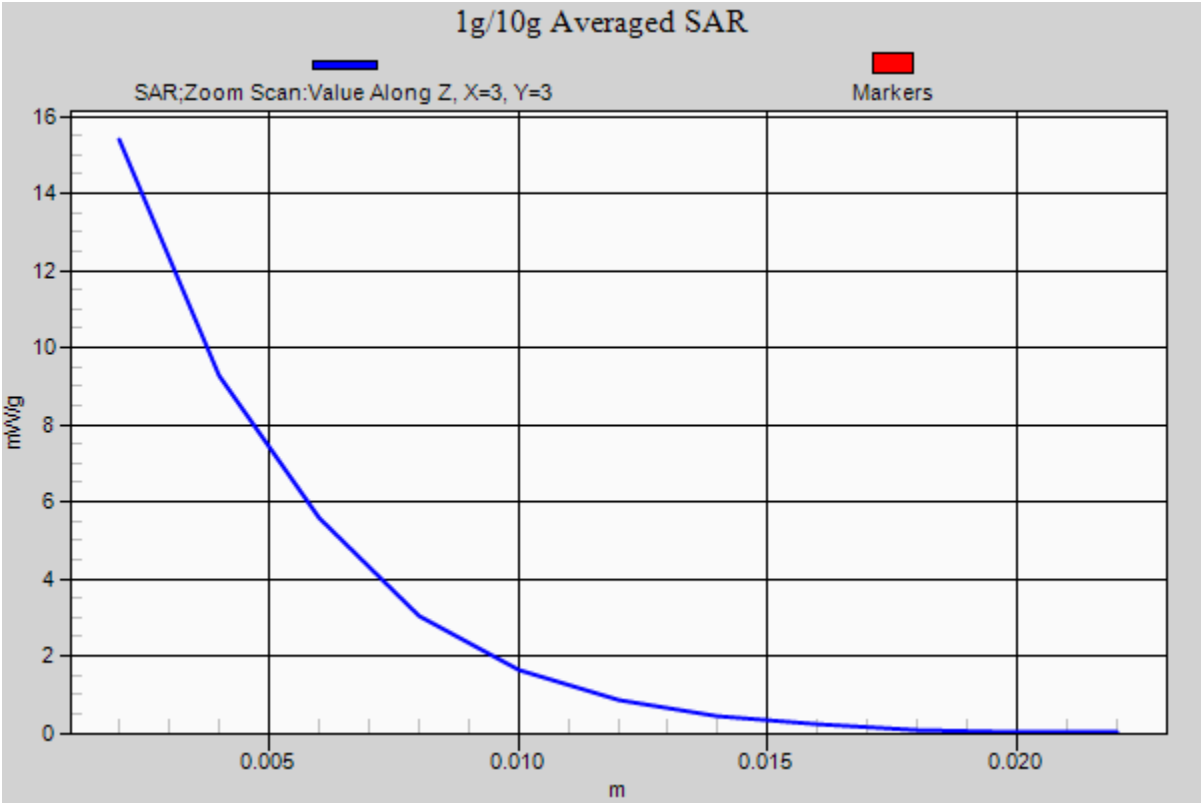
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5 GHz Medium parameters used:
f = 5200 MHz; σ = 5.284 mho/m; ε_r = 47.68; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-14-2012; Ambient Temp: 23.4°C; Tissue Temp: 22.3°C

Probe: EX3DV4 - SN3589; ConvF(3.92, 3.92, 3.92); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5200MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 28.398 mW/g
SAR(1 g) = 7.59 mW/g; SAR(10 g) = 2.12 mW/g
Deviation: 3.41%



PCTEST ENGINEERING LABORATORY, INC.

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

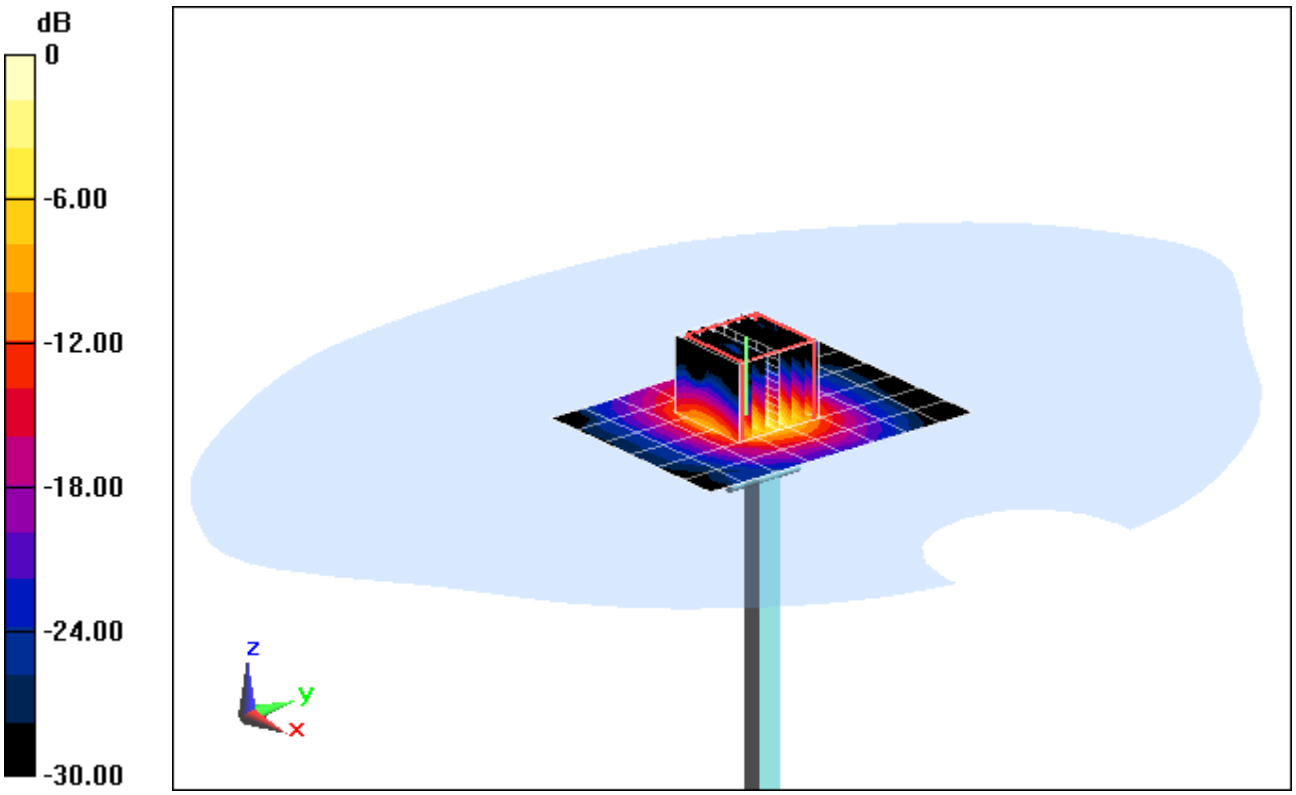
Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5 GHz Medium parameters used:
f = 5500 MHz; σ = 5.727 mho/m; ε_r = 46.87; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-14-2012; Ambient Temp: 23.5°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3589; ConvF(3.4, 3.4, 3.4); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5500MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 33.687 mW/g
SAR(1 g) = 7.64 mW/g; SAR(10 g) = 2.08 mW/g
Deviation: -3.17%



0 dB = 16.2 mW/g = 24.19 dB mW/g

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

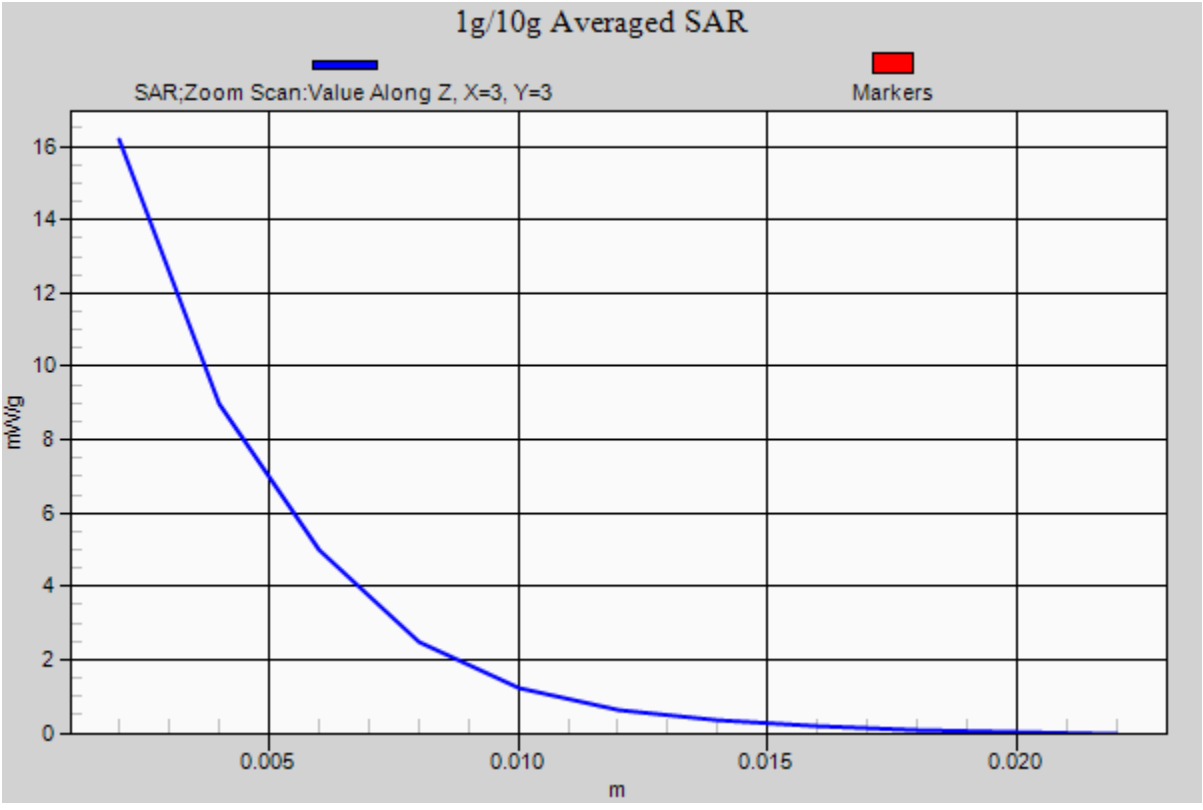
Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5 GHz Medium parameters used:
f = 5500 MHz; σ = 5.727 mho/m; ε_r = 46.87; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-14-2012; Ambient Temp: 23.5°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3589; ConvF(3.4, 3.4, 3.4); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5500MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 33.687 mW/g
SAR(1 g) = 7.64 mW/g; SAR(10 g) = 2.08 mW/g
Deviation: -3.17%



PCTEST ENGINEERING LABORATORY, INC.

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

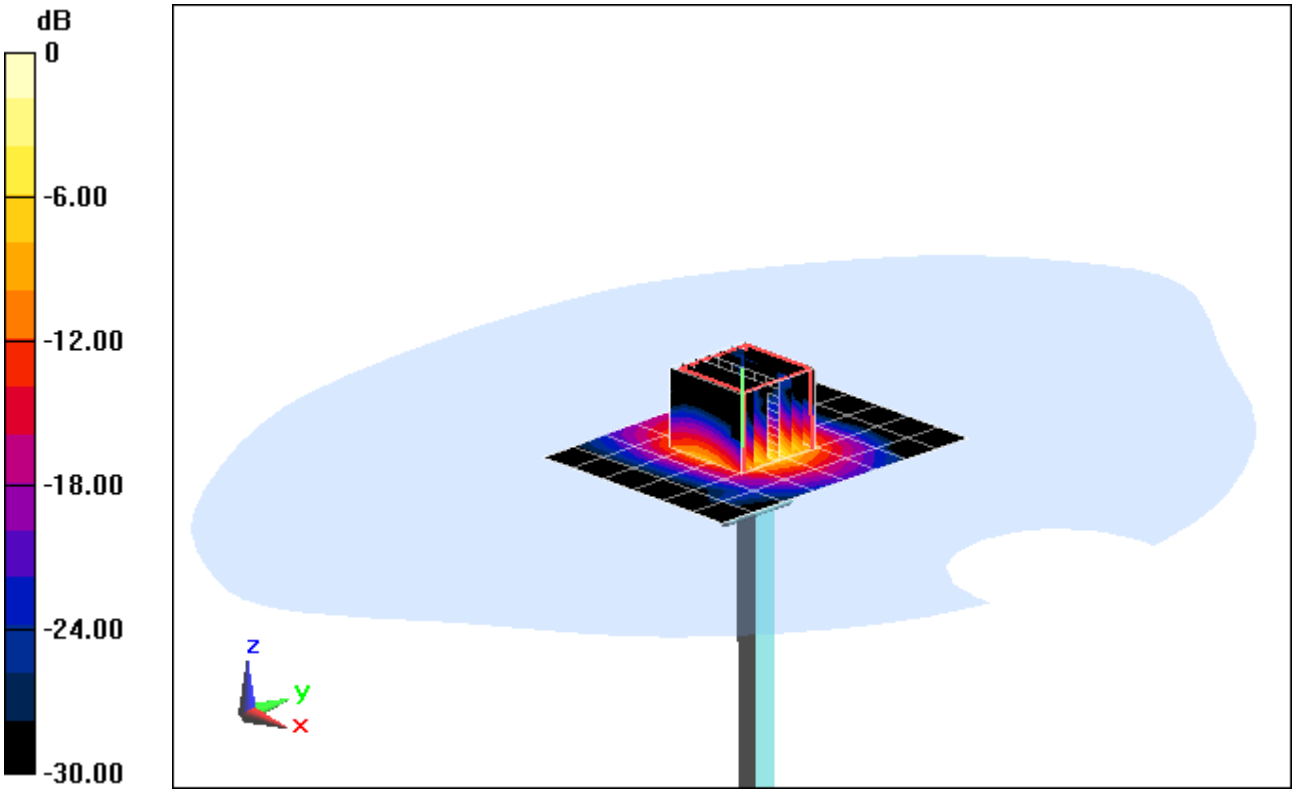
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5 GHz Medium parameters used:
f = 5800 MHz; σ = 6.21 mho/m; ε_r = 46.17; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-14-2012; Ambient Temp: 23.5°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3589; ConvF(3.59, 3.59, 3.59); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5800MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 27.977 mW/g
SAR(1 g) = 7.21 mW/g; SAR(10 g) = 1.98 mW/g
Deviation: -2.96%



0 dB = 15.2 mW/g = 23.64 dB mW/g

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

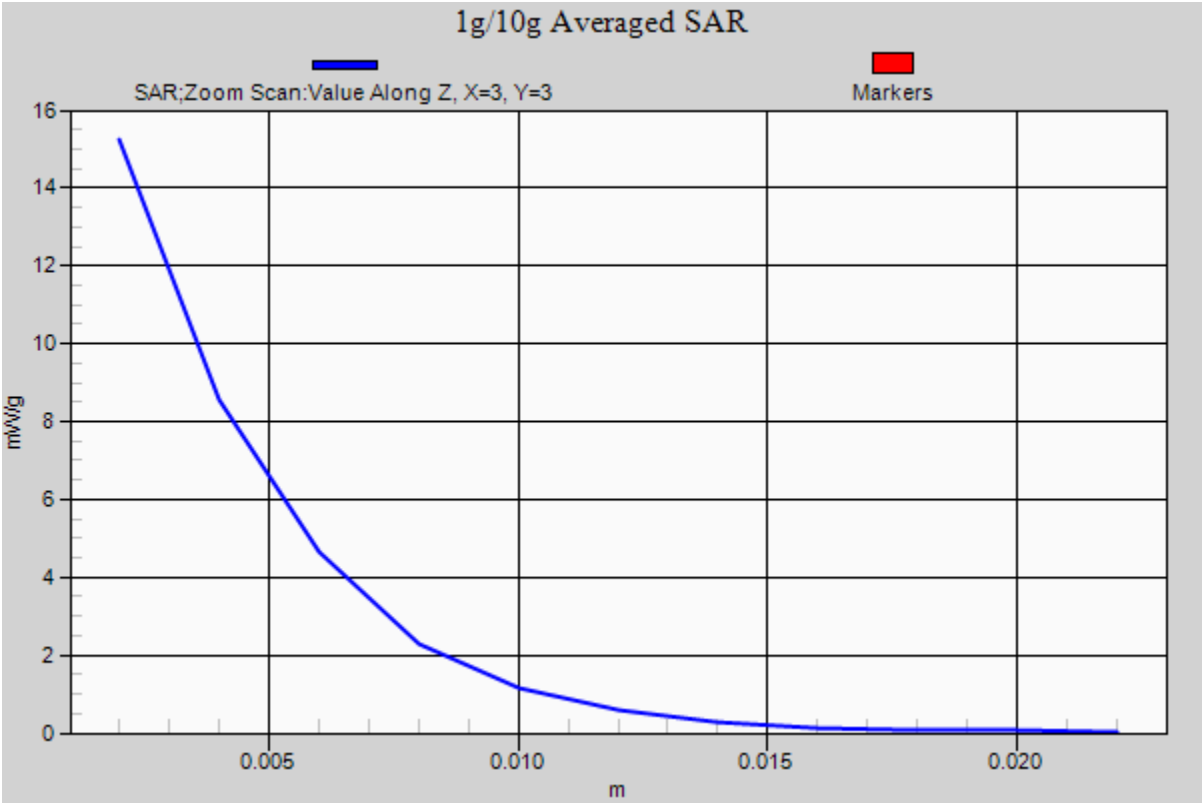
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5 GHz Medium parameters used:
f = 5800 MHz; σ = 6.21 mho/m; ε_r = 46.17; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-14-2012; Ambient Temp: 23.5°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3589; ConvF(3.59, 3.59, 3.59); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5800MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 27.977 mW/g
SAR(1 g) = 7.21 mW/g; SAR(10 g) = 1.98 mW/g
Deviation: -2.96%



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: D1900V2-5d148_Feb12

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d148
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	February 08, 2012

✓ 5/4/12
100K

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:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 8, 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.

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	10.1 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**40.5 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.35 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**21.4 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	9.95 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**39.1 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.25 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.8 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.7 Ω + 4.9 jΩ
Return Loss	- 25.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.9 Ω + 6.3 jΩ
Return Loss	- 23.4 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

DASY5 Validation Report for Head TSL

Date: 08.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d148

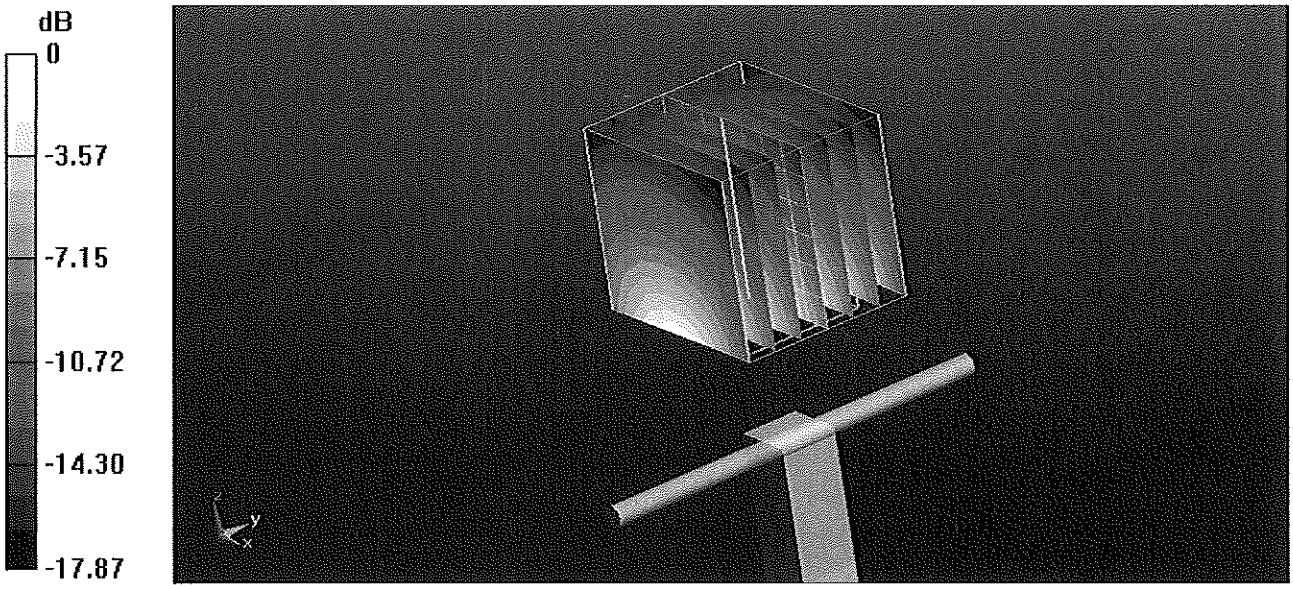
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

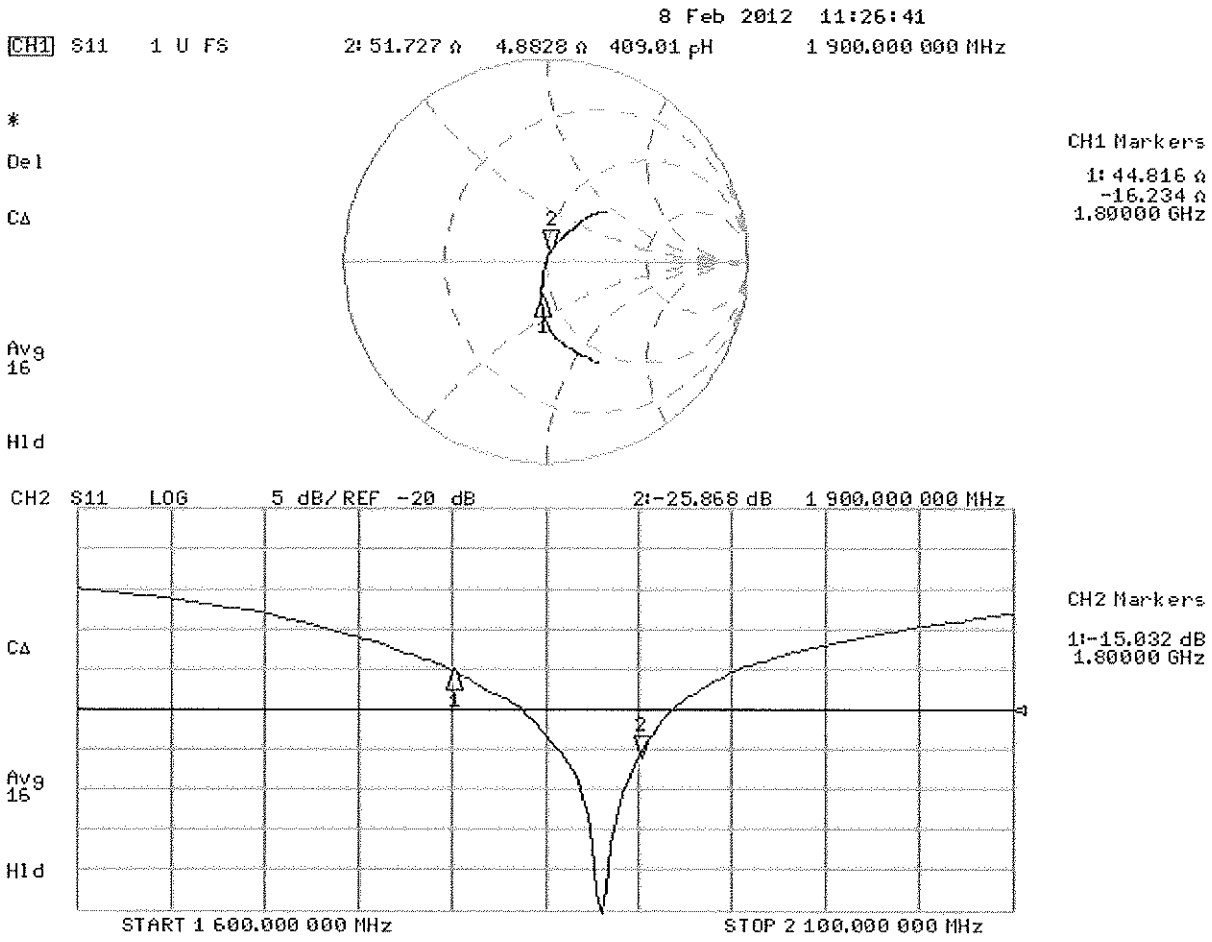
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (8x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.284 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 18.0570
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.35 mW/g
Maximum value of SAR (measured) = 12.808 mW/g



0 dB = 12.810mW/g = 22.15 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: 5d148

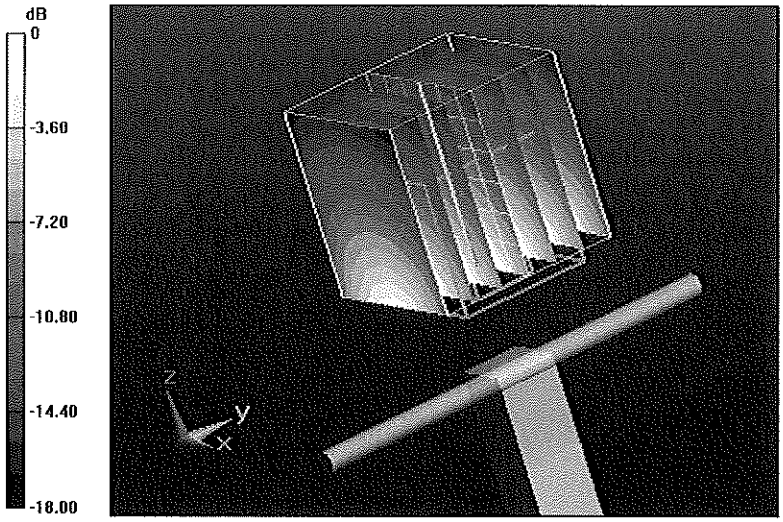
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.56 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

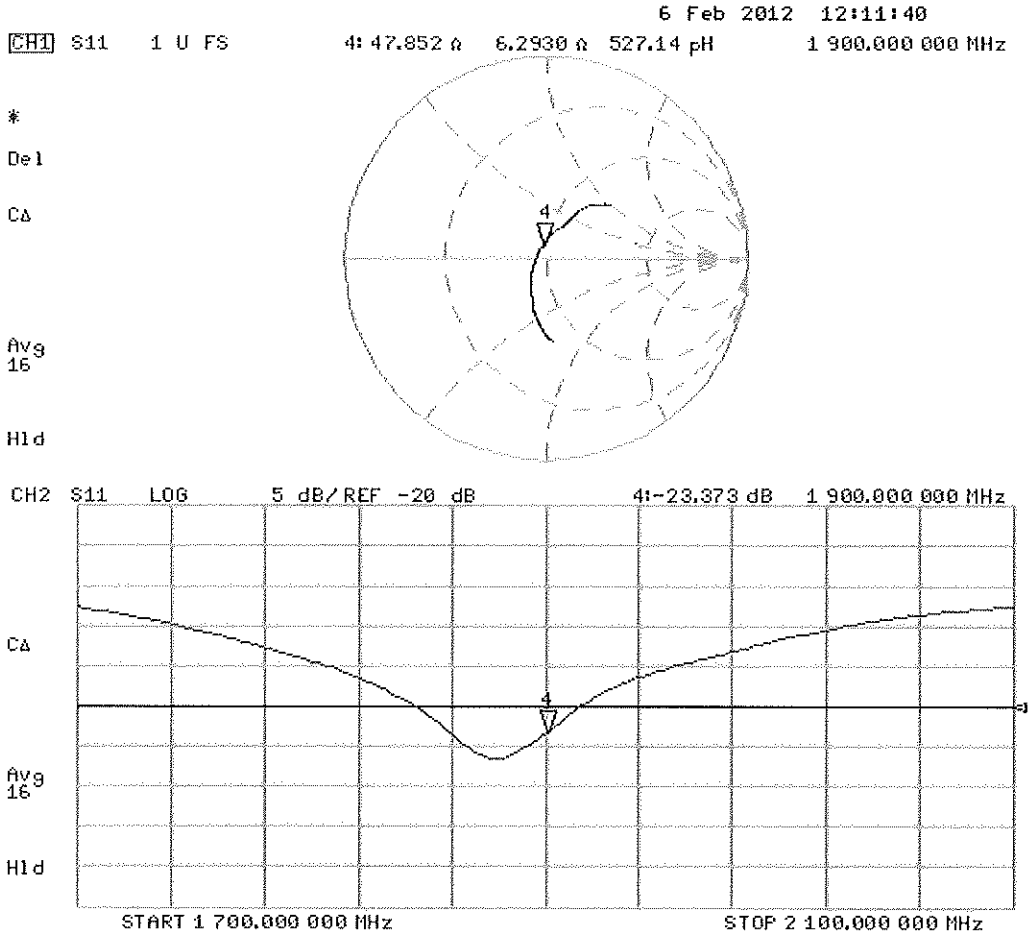
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.855 V/m; Power Drift = 0.006 dB
Peak SAR (extrapolated) = 17.7160
SAR(1 g) = 9.95 mW/g; SAR(10 g) = 5.25 mW/g
Maximum value of SAR (measured) = 12.606 mW/g



0 dB = 12.610mW/g = 22.01 dB mW/g

Impedance Measurement Plot for Body TSL



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: 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

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

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

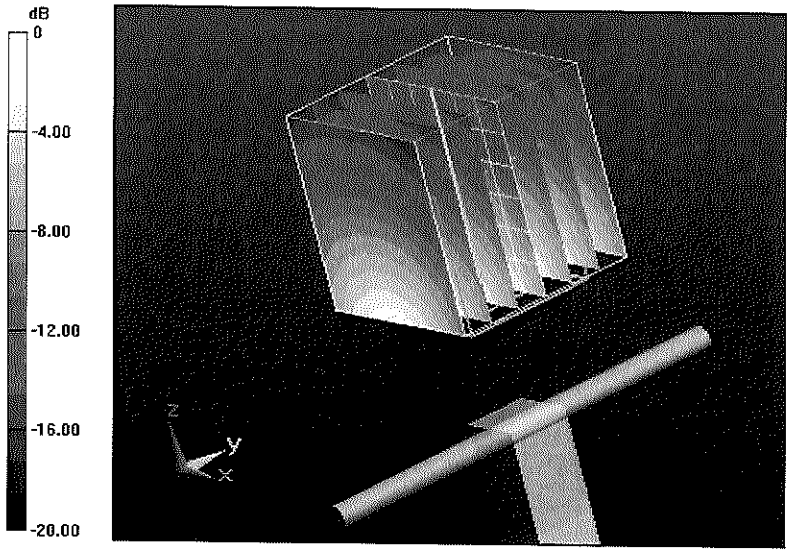
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

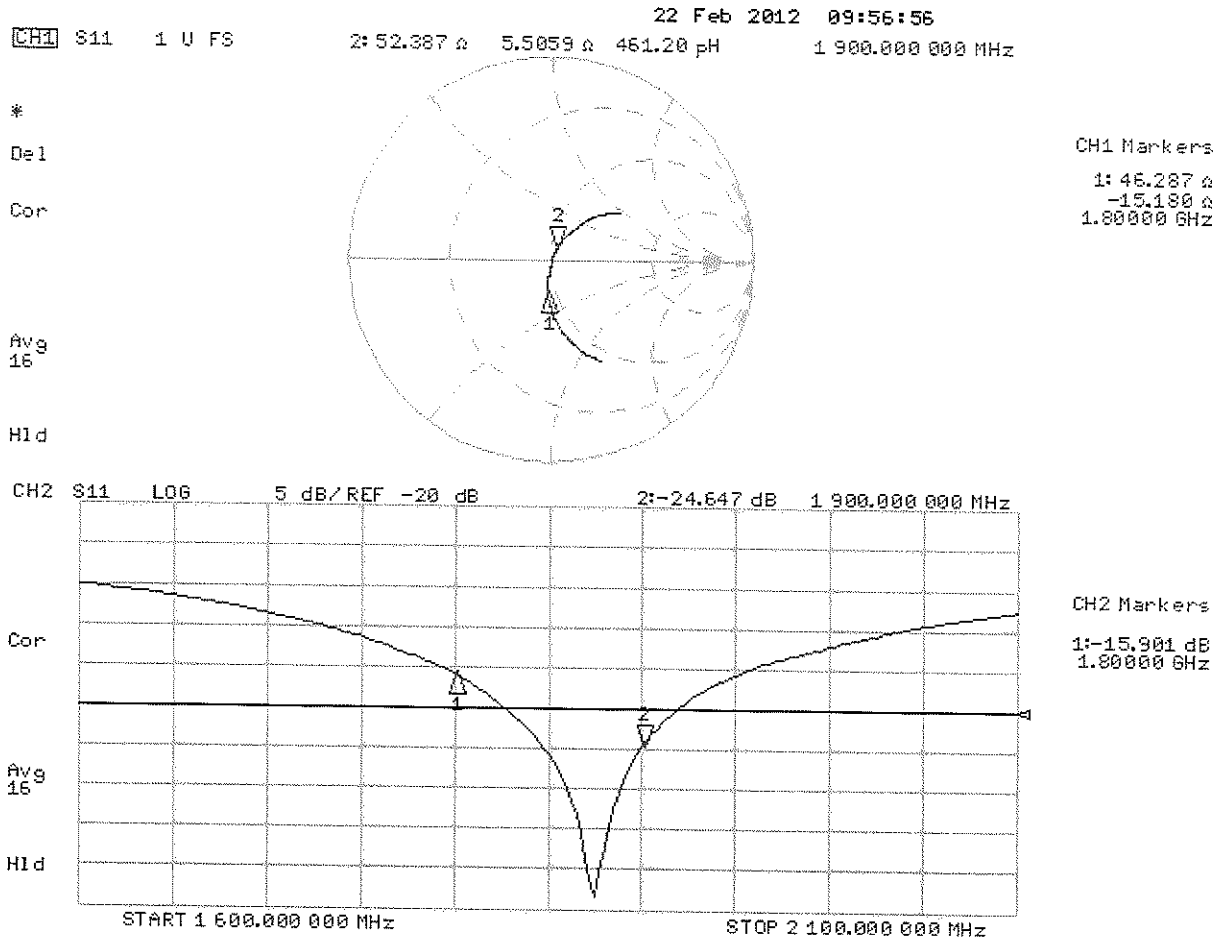
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

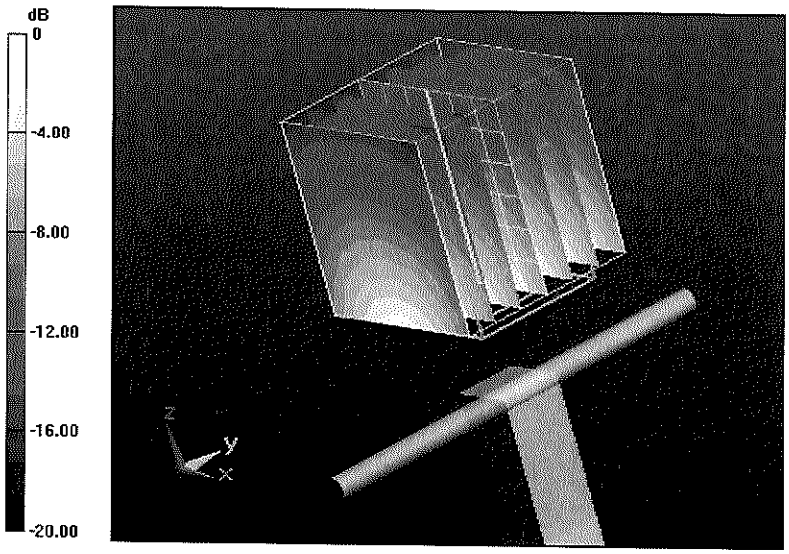
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.56 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

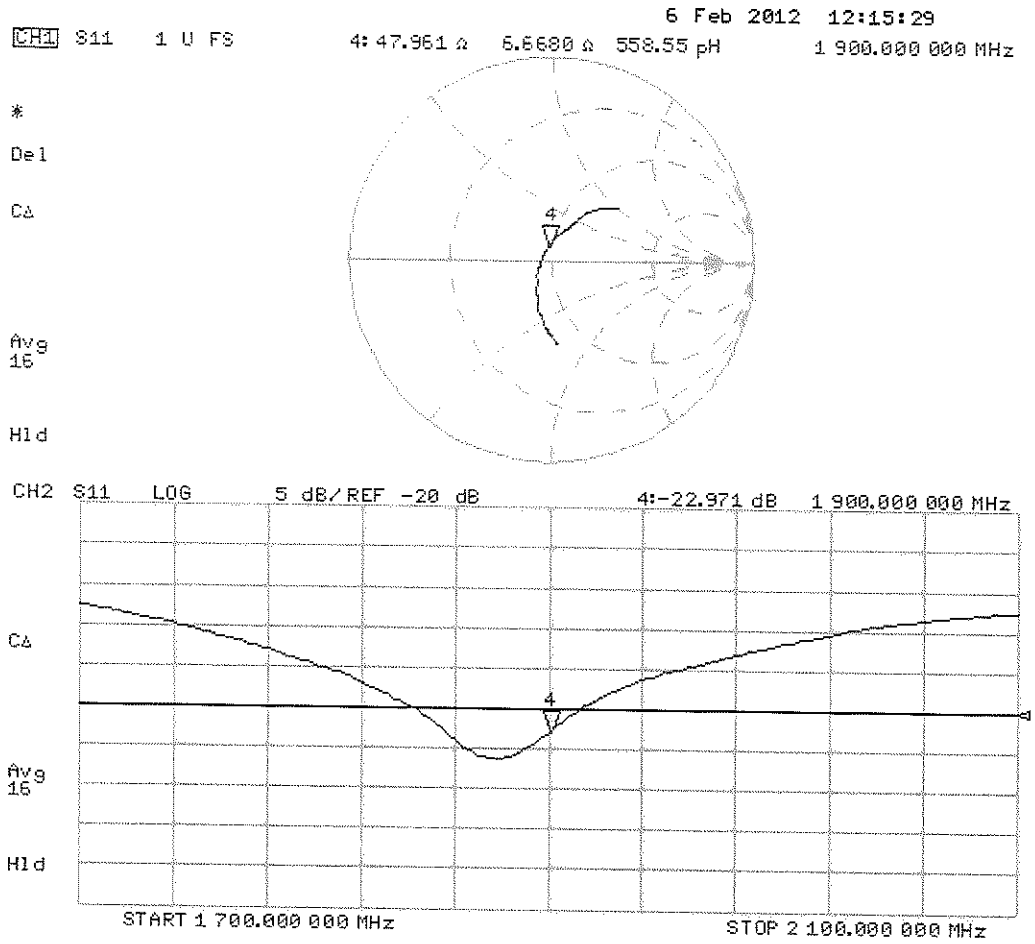
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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
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) **Accreditation No.: SCS 108**

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

Client **PC Test** **Certificate No: D1900V2-502_Feb12**

CALIBRATION CERTIFICATE

Object D1900V2 - SN: 502

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

Calibration date: February 22, 2012

KOK 2/27/12

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: 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	Israe El-Naouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 22, 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.

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	9.79 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**39.2 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.17 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	9.88 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**38.9 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.17 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.5 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.7 Ω + 7.2 jΩ
Return Loss	- 22.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.2 Ω + 7.6 jΩ
Return Loss	- 21.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.206 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	November 14, 1998

Date: 22.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 502

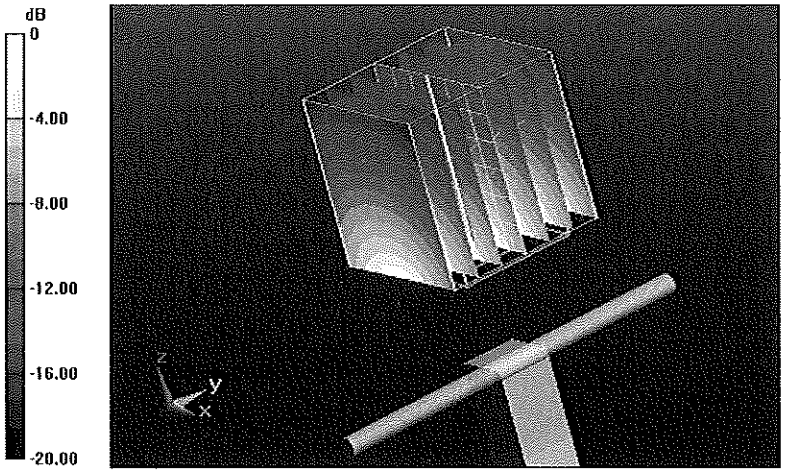
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

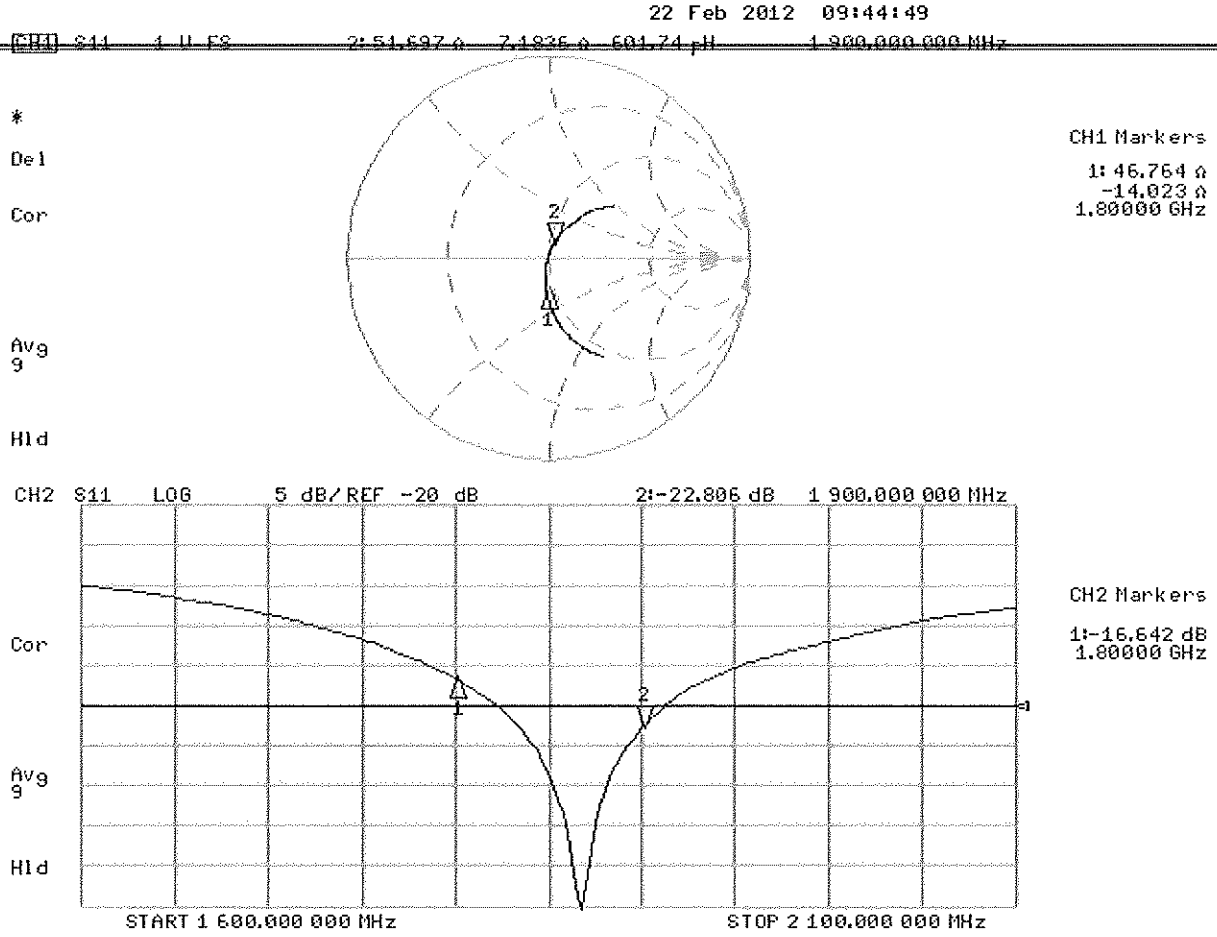
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.315 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 17.4000
SAR(1 g) = 9.79 mW/g; SAR(10 g) = 5.17 mW/g
Maximum value of SAR (measured) = 12.015 mW/g



0 dB = 12.020mW/g = 21.60 dB mW/g

Impedance Measurement Plot for Head TSL



Date: 22.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 502

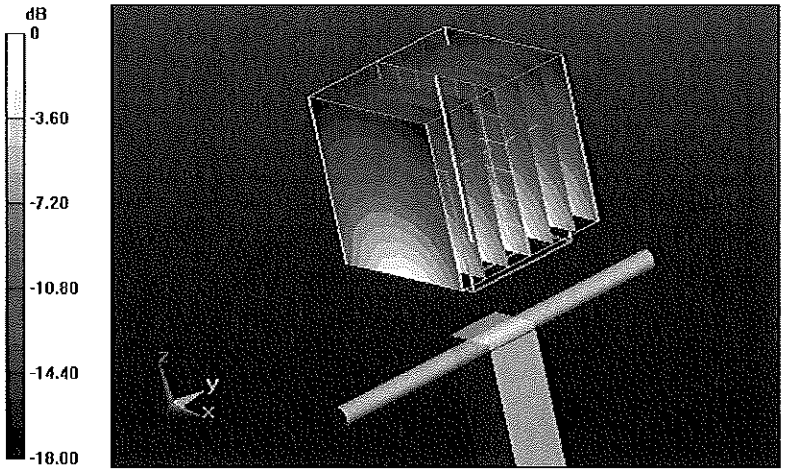
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.56 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

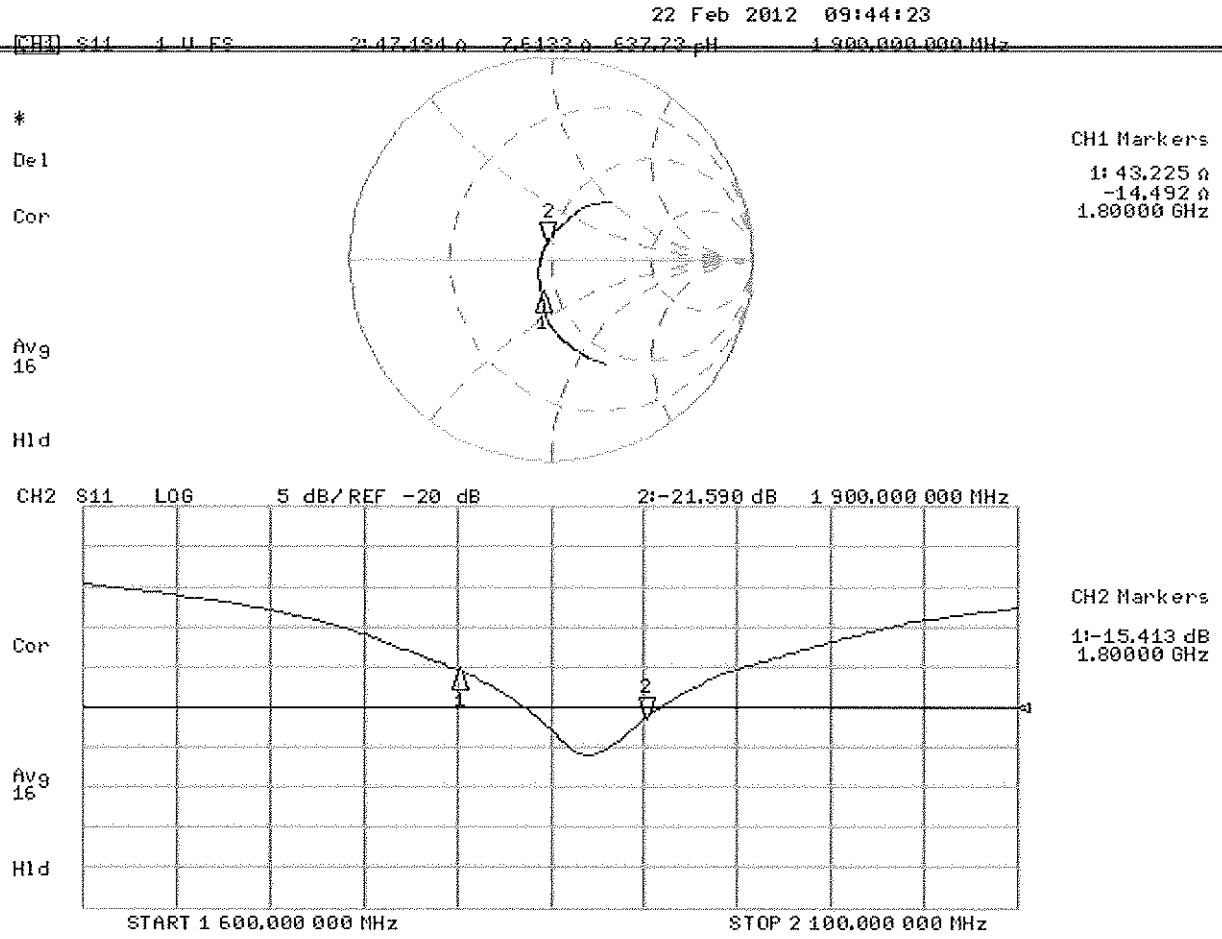
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.607 V/m; Power Drift = 0.0093 dB
Peak SAR (extrapolated) = 17.4260
SAR(1 g) = 9.88 mW/g; SAR(10 g) = 5.17 mW/g
Maximum value of SAR (measured) = 12.532 mW/g



0 dB = 12.530mW/g = 21.96 dB mW/g

Impedance Measurement Plot for Body TSL



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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
C 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: D2450V2-882_Feb12

CALIBRATION CERTIFICATE

Object: D2450V2 - SN: 882

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

Calibration date: February 07, 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 15, 2012

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

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	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	38.9 ± 6 %	1.86 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	13.6 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**53.5 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.27 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.8 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	52.3 ± 6 %	2.02 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	12.8 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**50.3 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.94 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**23.5 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.7 Ω + 1.1 jΩ
Return Loss	- 28.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.0 Ω + 3.2 jΩ
Return Loss	- 29.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.156 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	October 06, 2011