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SAR EVALUATION REPORT

Applicant Name:
Samsung Electronics, Co. Ltd.
18600 Broadwick St.
Rancho Dominguez, CA 90220
United States

Date of Testing:
03/12/12 - 03/15/12
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
0Y1203140296.A3L

FCC ID: **A3LGTI9050**

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): GT-I9050
Test Device Serial No.: Pre-Production [S/N: FJ-070-A, FJ-070-B]

Band & Mode	Tx Frequency	Conducted Power [dBm]	SAR		
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	30.10	0.06	0.35	0.35
2.4 GHz WLAN	2412 - 2462 MHz	17.25	0.10	0.12	0.13
5.8 GHz WLAN	5745 - 5825 MHz	12.40	0.01	0.03	
5.2 GHz WLAN	5180 - 5240 MHz	12.15	0.00	0.03	
5.3 GHz WLAN	5260 - 5320 MHz	12.80	0.00	0.03	
5.5 GHz WLAN	5500 - 5700 MHz	13.21	0.01	0.03	
Bluetooth	2402 - 2480 MHz	8.31	N/A		
Simultaneous SAR per KDB 690783 D01:			0.14	0.31	0.47

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

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Tx Frequency
GSM/GPRS 1900	1850.20 - 1909.80 MHz
2.4 GHz WLAN	2412 - 2462 MHz
5.8 GHz WLAN	5745 - 5825 MHz
5.2 GHz WLAN	5180 - 5240 MHz
5.3 GHz WLAN	5260 - 5320 MHz
5.5 GHz WLAN	5500 - 5700 MHz
Bluetooth	2402 - 2480 MHz

1.2 DUT Antenna Locations

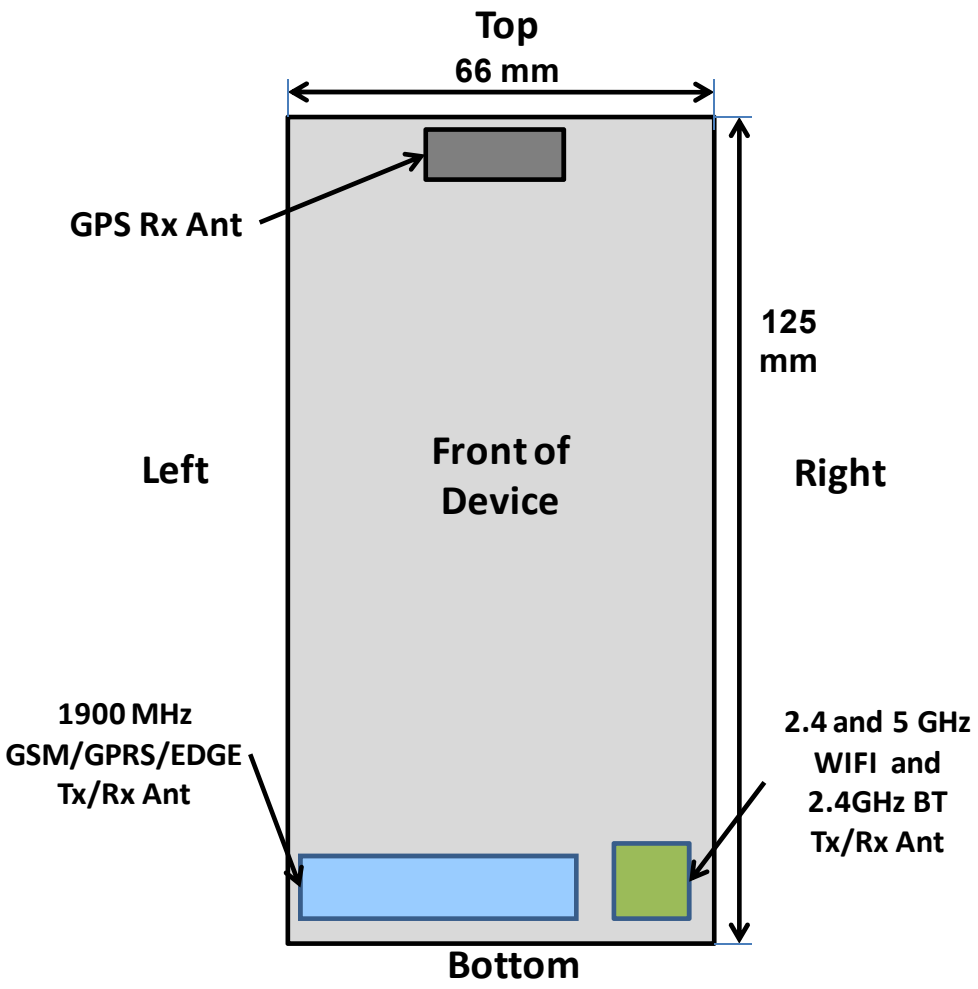

Figure 1-1
DUT Antenna Locations

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Table 1-1
Mobile Hotspot Sides for SAR Testing

Mobile Hotspot Sides for SAR Testing						
Mode	Back	Front	Top	Bottom	Right	Left
GPRS 1900	Yes	Yes	No	Yes	Yes	Yes
2.4 GHz WLAN	Yes	Yes	No	Yes	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.

1.3 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 between the main antenna and the Bluetooth and WLAN antennas is 1.6 mm. RF Conducted Power of Bluetooth Tx is 6.778 mW (please reference the DSS EMC report filed for this EUT for a complete set of Bluetooth powers). RF Conducted Power of WLAN is 53.70 mW.

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)

GSM/GPRS/EDGE DTM is not supported. Therefore GSM Voice cannot transmit simultaneously with GPRS/EDGE Data.

1.4 Power Reduction for SAR

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

1.5 FCC Guidance Applied

- FCC OET Bulletin 65 Supplement C [June 2001]
- IEEE 1528-2003
- FCC KDB 941225 (SAR Testing for 2G and Hotspot Devices)
- FCC KDB 248227 (SAR Testing for 802.11 Devices)
- FCC KDB 648474 (Simultaneous SAR)
- FCC KDB 865664 (SAR Testing for 5 GHz Devices)

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2 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.

2.1 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 2-1).

Equation 2-1
SAR Mathematical Equation

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

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

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

where:

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

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

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3 SAR MEASUREMENT SETUP

3.1 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 3-1
SAR Measurement System

Figure 3-2
Near-Field Probe

Table 3-1
Composition of the Tissue Equivalent Matter

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

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4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

The evaluation was performed using the following procedure:

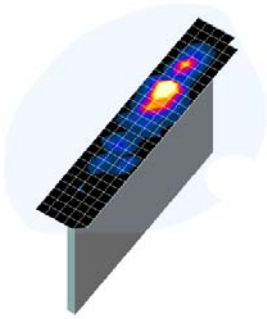

Figure 4-1
Sample SAR Area Scan

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head 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.
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.

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5 DEFINITION OF REFERENCE POINTS

5.1 EAR REFERENCE POINT

Figure 8-1 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 8-1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front) is perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting Line (see Figure 5-2). 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].

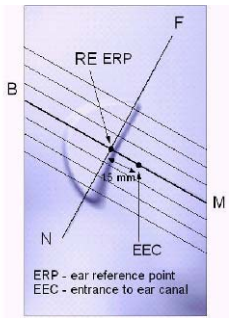

Figure 5-1
Close-Up Side view of ERP

5.2 HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point" (See Figure 5-3). The "test device reference point" was than located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at 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 5-2
Front, back and side view of SAM Twin Phantom

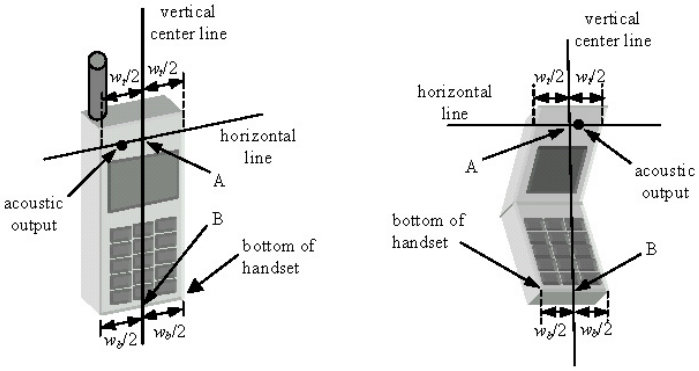

Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

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6 TEST CONFIGURATION POSITIONS FOR HANDSETS

6.1 Device Holder

The 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.

6.2 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 6-1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

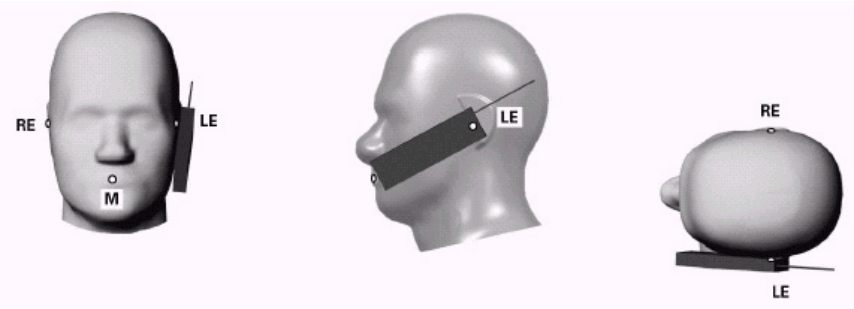

Figure 6-1 Front, Side and Top View of Cheek/Touch Position

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 6-2).

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6.3 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 6-2).

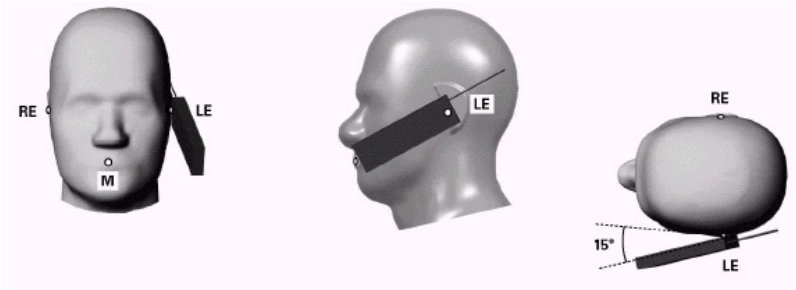

Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

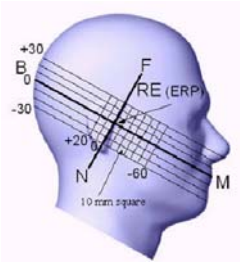

Figure 6-3
Side view w/ relevant markings

Figure 6-4 Body SAR Sample Photo
(Not Actual EUT)

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6.4 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6-4). 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.

6.5 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.

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7 FCC RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

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

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

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

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8 FCC MEASUREMENT PROCEDURES

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

8.1 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.

8.2 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.

8.2.1 General Device Setup

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

8.2.2 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.

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9 RF CONDUCTED POWERS

9.1 GSM Conducted Powers

		Maximum Burst-Averaged Output Power						
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*	
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**
PCS	512	30.01	30.04	**30.03**	26.56	26.53	26.50	26.44
	661	30.24	30.25	**30.10**	26.60	26.52	26.45	26.50
	810	29.98	29.98	**30.00**	26.45	26.42	26.35	26.32

		Calculated Maximum Frame-Averaged Output Power						
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*	
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**
PCS	512	20.98	21.01	**24.01**	22.30	23.52	17.47	20.42
	661	21.21	21.22	**24.08**	22.34	23.51	17.42	20.48
	810	20.95	20.95	**23.98**	22.19	23.41	17.32	20.30

Note: Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.

The bolded GPRS modes were selected according to the highest frame-averaged output power table according to KDB 941225 D03.

CS1 coding scheme was used in GPRS output power measurements and SAR Testing, as a condition where GMSK modulation was ensured. It was investigated that CS1 - CS4 settings do not have any impact on the output levels in the GPRS modes.

MCS7 coding scheme was used to measure the output powers for EDGE since It was investigated that choosing MCS7 coding scheme will ensure 8-PSK modulation.

GSM Class: B
GPRS Multislot class: 12 (max 4 Tx Uplink slots)
EDGE Multislot class: 10 (max 2 Tx Uplink slots)
DTM Multislot Class: N/A

Figure 9-1
Power Measurement Setup

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9.2 WLAN Conducted Powers

Table 9-1
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	16.70	16.60	16.60	16.69
802.11b	2437	6	17.00	16.95	16.95	16.90
802.11b	2462	11	**17.25**	17.30	17.25	17.23

Table 9-2
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	10.49	10.47	10.51	10.43	10.39	10.49	10.45	10.50
802.11g	2437	6	10.54	10.59	10.59	10.59	10.61	10.55	10.55	10.59
802.11g	2462	11	10.99	10.99	10.84	10.99	10.94	10.94	10.89	11.23

Table 9-3
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	10.17	10.12	10.07	10.22	10.13	10.13	10.12	10.12
802.11n	2437	6	10.57	10.65	10.62	10.67	10.52	10.57	10.57	10.54
802.11n	2462	11	11.02	11.10	11.07	11.05	10.90	11.03	11.12	11.12

Table 9-4
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*	11.92	12.04	12.01	11.92	12.00	12.14	11.99	12.00
802.11a	5200	40	11.98	12.00	12.11	12.00	11.99	12.07	12.11	12.05
802.11a	5220	44	12.10	12.08	12.05	12.08	12.02	12.02	12.09	12.12
802.11a	5240	48*	**12.15**	11.94	12.09	12.15	12.15	12.02	12.11	12.15
802.11a	5260	52*	12.20	12.25	12.44	12.40	12.32	12.36	12.41	12.40
802.11a	5280	56	12.50	12.40	12.43	12.45	12.47	12.45	12.46	12.50
802.11a	5300	60	12.62	12.25	12.45	12.67	12.68	12.75	12.60	12.75
802.11a	5320	64*	**12.80**	12.29	12.25	12.95	12.85	12.82	12.90	12.92
802.11a	5500	100	11.75	11.70	11.80	11.82	11.69	11.75	11.82	11.80
802.11a	5520	104*	12.01	11.95	11.90	12.00	11.95	12.02	12.00	12.05
802.11a	5540	108	12.23	12.00	12.25	12.22	12.12	12.13	12.14	12.15
802.11a	5560	112	12.43	12.40	12.38	12.30	12.35	12.32	12.40	12.42
802.11a	5580	116*	12.50	12.45	12.48	12.50	12.60	12.55	12.61	12.62
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	13.00	12.89	12.95	12.90	12.98	12.95	13.00	13.00
802.11a	5680	136*	13.10	13.05	13.11	13.00	13.09	13.00	13.05	13.15
802.11a	5700	140	**13.21**	13.15	13.16	13.12	13.10	13.00	13.12	13.15
802.11a	5745	149*	**12.40**	12.35	12.30	12.20	12.30	12.36	12.44	12.30
802.11a	5765	153	12.40	12.39	12.30	12.30	12.35	12.37	12.36	12.32
802.11a	5785	157*	12.34	12.33	12.27	12.27	12.31	12.36	12.36	12.28
802.11a	5805	161*	12.35	12.26	12.21	12.36	12.41	12.27	12.27	12.45
802.11a	5825	165	12.30	12.33	12.37	12.25	12.35	12.35	12.25	12.26

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

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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 9-5
IEEE 802.11n Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps]							
			mcs0	mcs1	mcs2	mcs3	mcs4	mcs5	mcs6	mcs7
802.11n	5180	36*	9.70	9.75	9.80	9.82	9.70	9.72	9.73	9.74
802.11n	5200	40	9.80	9.81	9.79	9.85	9.71	9.75	9.76	9.75
802.11n	5220	44	9.88	9.95	9.86	9.86	9.75	9.78	9.82	9.80
802.11n	5240	48*	9.78	9.80	9.85	9.81	9.90	9.92	9.80	9.85
802.11n	5260	52*	9.80	9.87	9.90	9.91	9.96	9.98	9.95	9.90
802.11n	5280	56	10.00	10.01	9.95	10.00	10.01	10.02	10.00	9.90
802.11n	5300	60	10.11	10.05	9.99	10.10	10.15	10.20	10.09	10.11
802.11n	5320	64*	10.40	10.42	10.38	10.40	10.43	10.45	10.42	10.39
802.11n	5500	100	9.60	9.65	9.62	9.60	9.45	9.47	9.50	9.50
802.11n	5520	104*	9.77	9.76	9.72	9.75	9.83	9.86	9.50	9.67
802.11n	5540	108	10.00	10.01	9.95	9.92	9.90	9.75	9.53	9.85
802.11n	5560	112	10.11	10.15	10.22	10.20	10.12	10.20	10.05	10.10
802.11n	5580	116*	10.35	10.36	10.45	10.40	10.20	10.10	10.27	10.25
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	10.83	10.82	10.85	10.80	10.70	10.75	10.81	10.77
802.11n	5680	136*	10.80	10.83	10.83	10.90	10.90	10.90	10.95	10.91
802.11n	5700	140	11.00	11.00	11.09	11.01	11.00	10.93	10.99	10.95
802.11n	5745	149*	10.41	10.35	10.47	10.25	10.27	10.25	10.20	10.22
802.11n	5765	153	10.32	10.25	10.40	10.32	10.10	10.30	10.49	10.40
802.11n	5785	157*	10.35	10.30	10.32	10.25	10.21	10.25	10.41	10.40
802.11n	5805	161*	10.40	10.42	10.30	10.25	10.27	10.25	10.30	10.22
802.11n	5825	165	10.30	10.32	10.36	10.35	10.40	10.47	10.23	10.21

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 9-2
Power Measurement Setup

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10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Tissue Properties

Calibrated for Test 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
3/14/2012	1900H	23.5	1850	1.360	41.28	1.400	40.000	-2.86%	3.20%
			1880	1.391	41.16	1.400	40.000	-0.64%	2.90%
			1910	1.419	41.06	1.400	40.000	1.36%	2.65%
3/15/2012	2450H	23.9	2401	1.787	39.70	1.758	39.298	1.65%	1.02%
			2450	1.853	39.55	1.800	39.200	2.94%	0.89%
			2499	1.900	39.33	1.852	39.135	2.59%	0.50%
03/14/2012	5200H-5800H	24.6	5200	4.450	36.88	4.660	36.000	-4.51%	2.44%
			5240	4.491	36.84	4.700	35.960	-4.45%	2.45%
			5320	4.568	36.81	4.780	35.880	-4.44%	2.59%
			5500	4.728	36.48	4.965	35.650	-4.77%	2.33%
			5700	4.944	36.31	5.170	35.400	-4.37%	2.57%
			5745	4.961	36.23	5.215	35.355	-4.87%	2.47%
			5800	5.038	36.17	5.270	35.300	-4.40%	2.46%
3/14/2012	1900B	22.8	1850	1.503	51.16	1.520	53.300	-1.12%	-4.02%
			1880	1.533	50.94	1.520	53.300	0.86%	-4.43%
			1910	1.573	50.85	1.520	53.300	3.49%	-4.60%
3/15/2012	2450B	23.8	2401	1.953	50.37	1.903	52.765	2.63%	-4.54%
			2450	2.004	50.21	1.950	52.700	2.77%	-4.72%
			2499	2.070	50.05	2.019	52.638	2.53%	-4.92%
03/12/2012	5200B-5800B	24.2	5200	5.229	47.71	5.299	49.014	-1.32%	-2.66%
			5240	5.304	47.66	5.346	48.933	-0.79%	-2.60%
			5320	5.422	47.47	5.439	48.607	-0.31%	-2.34%
			5500	5.690	47.02	5.650	48.580	0.71%	-3.21%
			5700	5.995	46.53	5.880	48.275	1.96%	-3.61%
			5745	6.060	46.39	5.936	48.248	2.09%	-3.85%
			5800	6.169	46.28	6.000	48.200	2.82%	-3.98%

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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). The SAR test plots may slightly differ from the table above since the DASY software rounds to three significant digits.

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.

10.2 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 , for example from the below equation (Pournaropoulos and Misra):

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

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 $j = \sqrt{-1}$.

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10.3 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 10-2
System Verification Results

System Verification TARGET & MEASURED											
Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	Deviation (%)
1900	Head	03/14/2012	23.7	22.4	0.100	5d080	3561	4.07	39.900	40.700	2.01%
2450	Head	03/15/2012	23.6	22.9	0.100	797	3263	5.38	52.100	53.800	3.26%
5200	Head	03/14/2012	23.7	22.6	0.100	1007	3589	7.31	79.800	73.100	-8.40%
5500	Head	03/14/2012	23.8	22.8	0.100	1007	3589	8.14	86.300	81.400	-5.68%
5800	Head	03/14/2012	24.0	22.9	0.100	1007	3589	7.99	79.400	79.900	0.63%
1900	Body	03/14/2012	23.6	22.5	0.040	5d141	3022	1.7	41.400	42.500	2.66%
2450	Body	03/15/2012	24.4	23.8	0.100	719	3022	5.31	51.300	53.100	3.51%
5200	Body	03/12/2012	24.6	23.1	0.100	1007	3589	7.59	75.500	75.900	0.53%
5500	Body	03/12/2012	24.4	23.0	0.100	1007	3589	8.15	81.300	81.500	0.25%
5800	Body	03/12/2012	24.8	23.2	0.100	1007	3589	7.17	75.300	71.700	-4.78%

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.

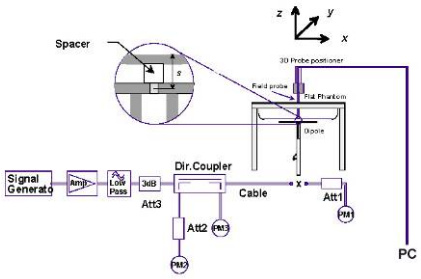

Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

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11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 1900 Head SAR Results

MEASUREMENT RESULTS								
FREQUENCY		Mode/Band	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.							(W/kg)
1880.00	661	GSM 1900	30.24	-0.07	Right	Touch	FJ-070-A	**0.059**
1880.00	661	GSM 1900	30.24	0.00	Right	Tilt	FJ-070-A	0.024
1880.00	661	GSM 1900	30.24	-0.01	Left	Touch	FJ-070-A	0.042
1880.00	661	GSM 1900	30.24	0.21	Left	Tilt	FJ-070-A	0.021
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**Head 1.6 W/kg (mW/g)** averaged over 1 gram			

Table 11-2
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)
2462	11	IEEE 802.11b	DSSS	17.25	0.16	Right	Touch	FJ-070-B	1	0.072
2462	11	IEEE 802.11b	DSSS	17.25	0.01	Right	Tilt	FJ-070-B	1	0.031
2462	11	IEEE 802.11b	DSSS	17.25	0.06	Left	Touch	FJ-070-B	1	**0.099**
2462	11	IEEE 802.11b	DSSS	17.25	-0.14	Left	Tilt	FJ-070-B	1	0.029
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g)** averaged over 1 gram				

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Table 11-3
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)
5745	149	IEEE 802.11a	OFDM	12.40	0.20	Right	Touch	FJ-070-B	6	0.000
5745	149	IEEE 802.11a	OFDM	12.40	-0.17	Right	Tilt	FJ-070-B	6	0.000
5745	149	IEEE 802.11a	OFDM	12.40	0.11	Left	Touch	FJ-070-B	6	**0.014**
5745	149	IEEE 802.11a	OFDM	12.40	-0.19	Left	Tilt	FJ-070-B	6	0.000
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g)** averaged over 1 gram				

Table 11-4
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	OFDM	12.15	0.00	Right	Touch	FJ-070-B	6	0.000
5240	48	IEEE 802.11a	OFDM	12.15	0.19	Right	Tilt	FJ-070-B	6	0.000
5240	48	IEEE 802.11a	OFDM	12.15	0.21	Left	Touch	FJ-070-B	6	0.000
5240	48	IEEE 802.11a	OFDM	12.15	0.00	Left	Tilt	FJ-070-B	6	0.000
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g)** averaged over 1 gram				

Table 11-5
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)
5320	64	IEEE 802.11a	OFDM	12.80	-0.16	Right	Touch	FJ-070-B	6	0.000
5320	64	IEEE 802.11a	OFDM	12.80	0.00	Right	Tilt	FJ-070-B	6	0.000
5320	64	IEEE 802.11a	OFDM	12.80	0.16	Left	Touch	FJ-070-B	6	0.000
5320	64	IEEE 802.11a	OFDM	12.80	0.00	Left	Tilt	FJ-070-B	6	0.000
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g)** averaged over 1 gram				

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Table 11-6
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	OFDM	13.21	0.20	Right	Touch	FJ-070-B	6	0.000
5700	140	IEEE 802.11a	OFDM	13.21	0.15	Right	Tilt	FJ-070-B	6	0.000
5700	140	IEEE 802.11a	OFDM	13.21	0.19	Left	Touch	FJ-070-B	6	**0.010**
5700	140	IEEE 802.11a	OFDM	13.21	0.21	Left	Tilt	FJ-070-B	6	0.000
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Head 1.6 W/kg (mW/g) averaged over 1 gram				

11.2 Standalone Body-Worn SAR Data

Table 11-7
Licensed Transmitter Body-Worn SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Side	SAR (1g)
MHz	Ch.									(W/kg)
1880.00	661	GSM 1900	GSM	30.24	0.05	1.0 cm	FJ-070-A	1	back	0.188
1880.00	661	GSM 1900	GPRS	30.10	0.03	1.0 cm	FJ-070-A	2	back	**0.351**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram				

Table 11-8
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)
2462	11	IEEE 802.11b	DSSS	17.25	0.08	1.0 cm	FJ-070-B	1	back	**0.123**
5745	149	IEEE 802.11a	OFDM	12.40	0.15	1.0 cm	FJ-070-B	6	back	0.026
5240	48	IEEE 802.11a	OFDM	12.15	-0.17	1.0 cm	FJ-070-B	6	back	0.028
5320	64	IEEE 802.11a	OFDM	12.80	-0.16	1.0 cm	FJ-070-B	6	back	0.031
5700	140	IEEE 802.11a	OFDM	13.21	0.11	1.0 cm	FJ-070-B	6	back	0.025
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram				

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11.3 Standalone Wireless Router SAR Data

Table 11-9
Licensed Transmitter Hotspot SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of GPRS Slots	Side	SAR (1g)
MHz	Ch.									(W/kg)
1880.00	661	GSM 1900	GPRS	30.10	0.03	1.0 cm	FJ-070-A	2	back	**0.351**
1880.00	661	GSM 1900	GPRS	30.10	-0.09	1.0 cm	FJ-070-A	2	front	0.149
1880.00	661	GSM 1900	GPRS	30.10	0.11	1.0 cm	FJ-070-A	2	bottom	0.337
1880.00	661	GSM 1900	GPRS	30.10	0.13	1.0 cm	FJ-070-A	2	right	0.057
1880.00	661	GSM 1900	GPRS	30.10	-0.10	1.0 cm	FJ-070-A	2	left	0.030
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g)** averaged over 1 gram				

Table 11-10
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)
2462	11	IEEE 802.11b	DSSS	17.25	0.08	1.0 cm	FJ-070-B	1	back	0.123
2462	11	IEEE 802.11b	DSSS	17.25	0.00	1.0 cm	FJ-070-B	1	front	0.082
2462	11	IEEE 802.11b	DSSS	17.25	-0.17	1.0 cm	FJ-070-B	1	bottom	**0.131**
2462	11	IEEE 802.11b	DSSS	17.25	-0.13	1.0 cm	FJ-070-B	1	right	0.052
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g)** averaged over 1 gram				

11.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
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. All samples tested were electrically identical per the applicant.

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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).
7. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was tested because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore body-worn SAR testing was additionally performed in GSM voice mode. GPRS Data mode is covered in the Hotspot SAR Testing at the same test distance
2. Per FCC KDB Publication 941225 D06, when the same wireless modes and device transmission configurations are required for body-worn accessories and hotspot mode (GPRS), it is not necessary to additionally test body-worn accessory SAR for the same device orientation. Therefore, the hotspot data for the back side configuration additionally shows body-worn compliance at the same distance.
3. Justification for reduced test configurations per KDB Publication 941225 D03: The source-based time-averaged output power was evaluated for all multi-slot operations. In addition to the worst-case reported, all source-based time-averaged powers within 10% of the worst-case were additionally included in the evaluation for data modes.

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. 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.
6. Per FCC KDB Publication 941225 D06, when the same wireless modes and device transmission configurations are required for body-worn accessories and hotspot mode, it is not necessary to additionally test body-worn accessory SAR for the same device orientation. Therefore, the hotspot data for the back side configuration additionally shows body-worn compliance at the same distance.

Hotspot Notes:

1. Top Edge for the licensed transmitter was not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 guidance (see Section 1.2).
2. Top and Left Edge for the WLAN transmitter were not tested since the antenna distance from the edges were greater than 2.5 cm per FCC KDB Publication 941225 D06 (see Section 1.2).
3. 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 6.5.)

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12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 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.

12.2 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 12-1
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 ≤ $2 \cdot P_{Ref}$ 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 12-2
SAR Evaluation Requirements for Multiple Transmitter Handsets

According to Figure 12-1 and Figure 12-2, 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 12-2 were numerically summed using stand-alone SAR data and are shown in the following tables.

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12.3 Head SAR Simultaneous Transmission Analysis

Table 12-1
Simultaneous Transmission Scenario (Held to Ear)

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.059	0.072	0.131
	Right Tilt	0.024	0.031	0.055
	Left Cheek	0.042	0.099	**0.141**
	Left Tilt	0.021	0.029	0.050

The above tables represent a held to ear voice call potentially simultaneously operating with 2.4 GHz WLAN.

Table 12-2
Simultaneous Transmission Scenario (Held to Ear)

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.059	0.000	**0.059**
	Right Tilt	0.024	0.000	0.024
	Left Cheek	0.042	0.014	0.056
	Left Tilt	0.021	0.000	0.021

The above tables represent a held to ear voice call potentially simultaneously operating with 5 GHz WLAN.

12.1 Body-Worn Simultaneous Transmission Analysis

Table 12-3
Simultaneous Transmission Scenario (Body-Worn at 1.0 cm)

Configuration	Mode	GSM 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 1900	0.188	0.123	**0.311**

The above tables represent a body-worn voice call potentially simultaneously operating with 2.4 GHz WLAN.

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Table 12-4
Simultaneous Transmission Scenario (Body-Worn at 1.0 cm)

Configuration	Mode	GSM 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 1900	0.188	0.031	**0.219**

The above tables represent a body-worn voice call potentially simultaneously operating with 5 GHz WLAN.

12.2 Hotspot SAR Simultaneous Transmission Analysis

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

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.351	0.123	**0.474**
	Front	0.149	0.082	0.231
	Top	-	-	0.000
	Bottom	0.337	0.131	0.468
	Right	0.057	0.052	0.109
	Left	0.030	-	0.030

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.

12.3 Simultaneous Transmission Conclusion

The above numerical summed SAR was below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. No volumetric SAR summation is required per FCC KDB Publication 648474.

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13 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	8648D	Signal Generator	4/5/2011	Annual	4/5/2012	3629U00687
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/10/2011	Annual	10/10/2012	3613A00315
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/21/2011	Annual	4/21/2012	JP38020182
Agilent	E5515C	Wireless Communications Tester	4/21/2011	Annual	4/21/2012	US41140256
Agilent	E5515C	Wireless Communications Test Set	10/10/2011	Annual	10/10/2012	GB46110872
Agilent	E5515C	Wireless Communications Test Set	10/14/2011	Annual	10/14/2012	GB41450275
Agilent	E5515C	Wireless Communications Test Set	10/20/2011	Annual	10/20/2012	GB46310798
Agilent	E5515C	Wireless Communications Test Set	2/9/2012	Annual	2/9/2013	GB43460554
Agilent	E5515C	Wireless Communications Test Set	2/12/2012	Annual	2/12/2013	GB45360985
Agilent	E5515C	Wireless Communications Test Set	2/14/2012	Annual	2/14/2013	GB43304447
Agilent	E5515C	Wireless Communications Test Set	2/14/2012	Annual	2/14/2013	GB43163447
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/8/2011	Annual	4/8/2012	MY45470194
Amplifier Research	5S1G4	5W, 800MHz-4.2GHz	N/A	N/A	N/A	21910
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	2/14/2012	Annual	2/14/2013	5442
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	5821
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	8013
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	2400
Anritsu	ML2438A	Power Meter	10/13/2011	Annual	10/13/2012	1070030
Anritsu	ML2438A	Power Meter	2/14/2012	Annual	2/14/2013	1190013
Anritsu	ML2438A	Power Meter	2/14/2012	Annual	2/14/2013	98150041
Anritsu	ML2495A	Power Meter	10/13/2011	Annual	10/13/2012	1039008
Anritsu	MT8820C	Radio Communication Tester	11/11/2011	Annual	11/11/2012	6200901190
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331322
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331323
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331330
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331332
Control Company	61220-416	Long-Stem Thermometer	3/16/2011	Biennial	3/16/2013	111391601
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
Index SAR	IXTL-010	Dielectric Measurement Kit	N/A	N/A	N/A	N/A
Index SAR	IXTL-030	30MM TEM line for 6 GHz	N/A	N/A	N/A	N/A
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	N/A	R8979500903
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	N/A	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	N/A	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	N/A	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	N/A	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	N/A	N/A
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	N/A	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	N/A	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	N/A	120
Pasternack	PE2208-6	Bidirectional Coupler	6/3/2011	Annual	6/3/2012	N/A
Pasternack	PE2209-10	Bidirectional Coupler	6/3/2011	Annual	6/3/2012	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	4/19/2011	Annual	4/19/2012	107826
Rohde & Schwarz	CMU200	Base Station Simulator	6/1/2011	Annual	6/1/2012	833855/0010
Rohde & Schwarz	NRVD	Dual Channel Power Meter	4/8/2011	Biennial	4/8/2013	101695
Rohde & Schwarz	SMIQ03B	Signal Generator	4/6/2011	Annual	4/6/2012	DE27259
SPEAG	D1900V2	1900 MHz SAR Dipole	7/22/2011	Annual	7/22/2011	5d080
SPEAG	D1900V2	1900 MHz SAR Dipole	7/11/2011	Annual	7/11/2012	5d141
SPEAG	D2450V2	2450 MHz SAR Dipole	8/19/2011	Annual	8/19/2011	719
SPEAG	D2450V2	2450 MHz SAR Dipole	1/24/2012	Annual	1/24/2013	797
SPEAG	D5GHzV2	5 GHz SAR Dipole	7/26/2011	Annual	7/26/2012	1007
SPEAG	DAE3	Dasy Data Acquisition Electronics	11/9/2012	Annual	11/9/2012	455
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/20/2011	Annual	4/20/2012	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/19/2011	Annual	5/19/2012	859
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/20/2012	Annual	2/20/2013	649
SPEAG	ES3DV2	SAR Probe	8/25/2011	Annual	8/25/2012	3022
SPEAG	ES3DV3	SAR Probe	11/18/2011	Annual	11/18/2012	3263
SPEAG	EX3DV4	SAR Probe	7/27/2011	Annual	7/27/2011	3561
SPEAG	EX3DV4	SAR Probe	1/27/2012	Annual	1/27/2013	3589
Tektronix	RSA-6114A	Real Time Spectrum Analyzer	4/7/2011	Annual	4/7/2012	B010177
VWR	36934-158	Wall-Mounted Thermometer	5/26/2010	Biennial	5/26/2012	101718589
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286445
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286460
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286454
VWR	36934-158	Wall Thermometer	9/30/2011	Biennial	9/30/2013	111859323
VWR	36934-158	Wall Thermometer	9/30/2011	Biennial	9/30/2013	111859332
VWR	61220-416	Long Stem Thermometer	7/1/2011	Biennial	7/1/2013	111642834
VWR	61220-416	Long stem thermometer	7/1/2011	Biennial	7/1/2013	111642916
VWR	61220-416	Long Stem Thermometer	7/1/2011	Biennial	7/1/2013	111642941

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

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14 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz.

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

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

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Applicable for frequencies up to 6 GHz.

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

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

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15 CONCLUSION

15.1 Measurement Conclusion

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

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

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APPENDIX A: SAR TEST DATA

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PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-A

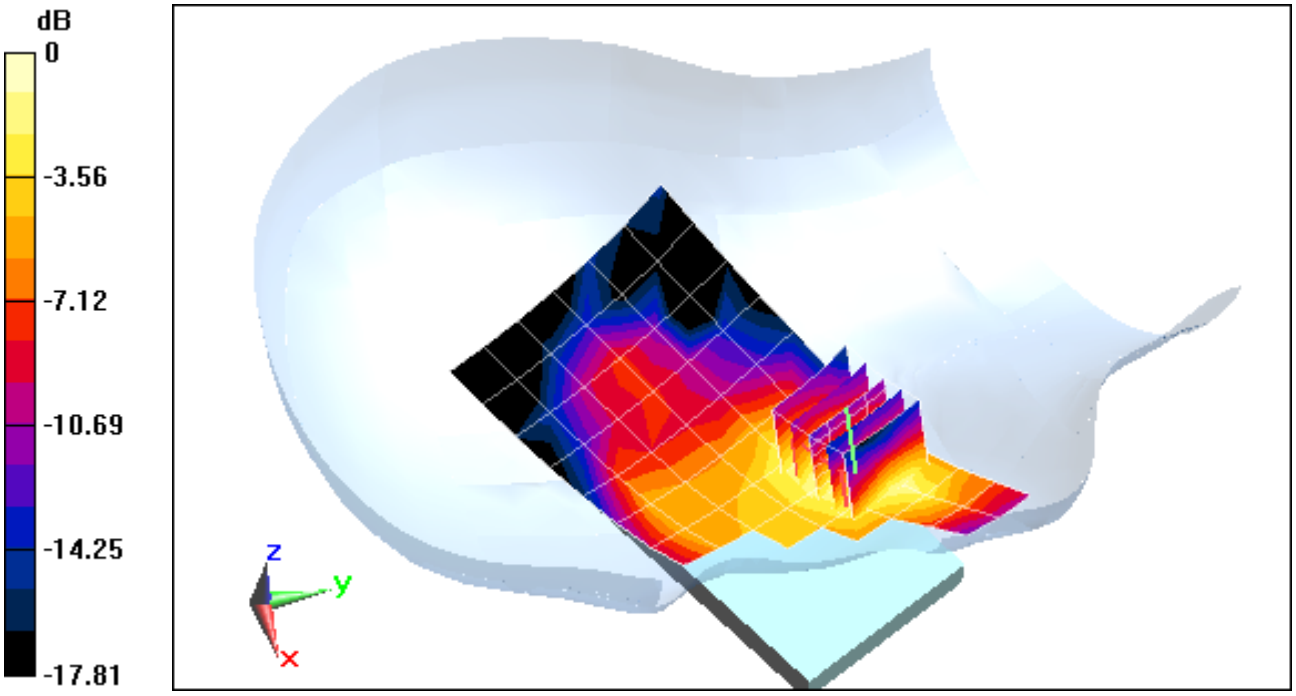
Communication System: GSM; Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.391 mho/m; ε_r = 41.16; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-14-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3561; ConvF(7.16, 7.16, 7.16); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Mode: GSM 1900, Right Head, Touch, 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 = 6.403 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.0960
SAR(1 g) = 0.059 mW/g; SAR(10 g) = 0.035 mW/g



0 dB = 0.060mW/g = -24.44 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-A

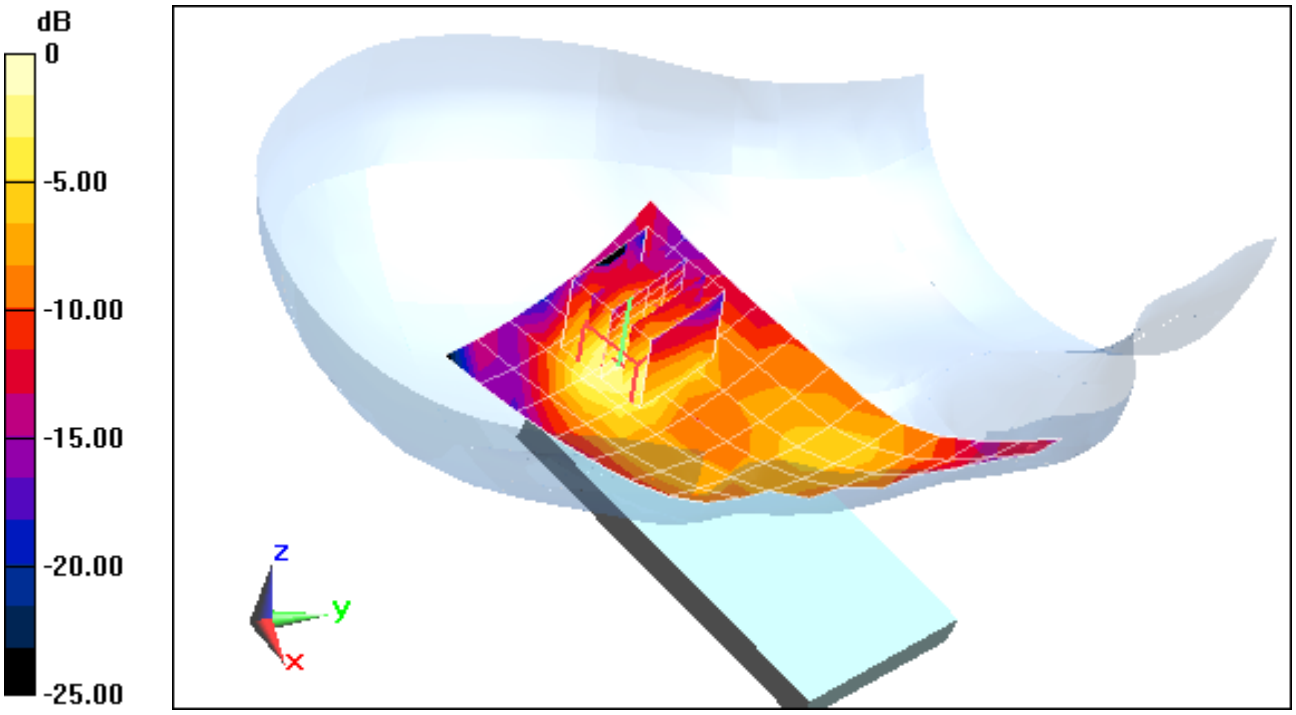
Communication System: GSM; Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.391 mho/m; ε_r = 41.16; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-14-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3561; ConvF(7.16, 7.16, 7.16); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Mode: GSM 1900, 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 = 4.295 V/m; Power Drift = -0.0013 dB
Peak SAR (extrapolated) = 0.0410
SAR(1 g) = 0.024 mW/g; SAR(10 g) = 0.013 mW/g



0 dB = 0.030mW/g = -30.46 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-A

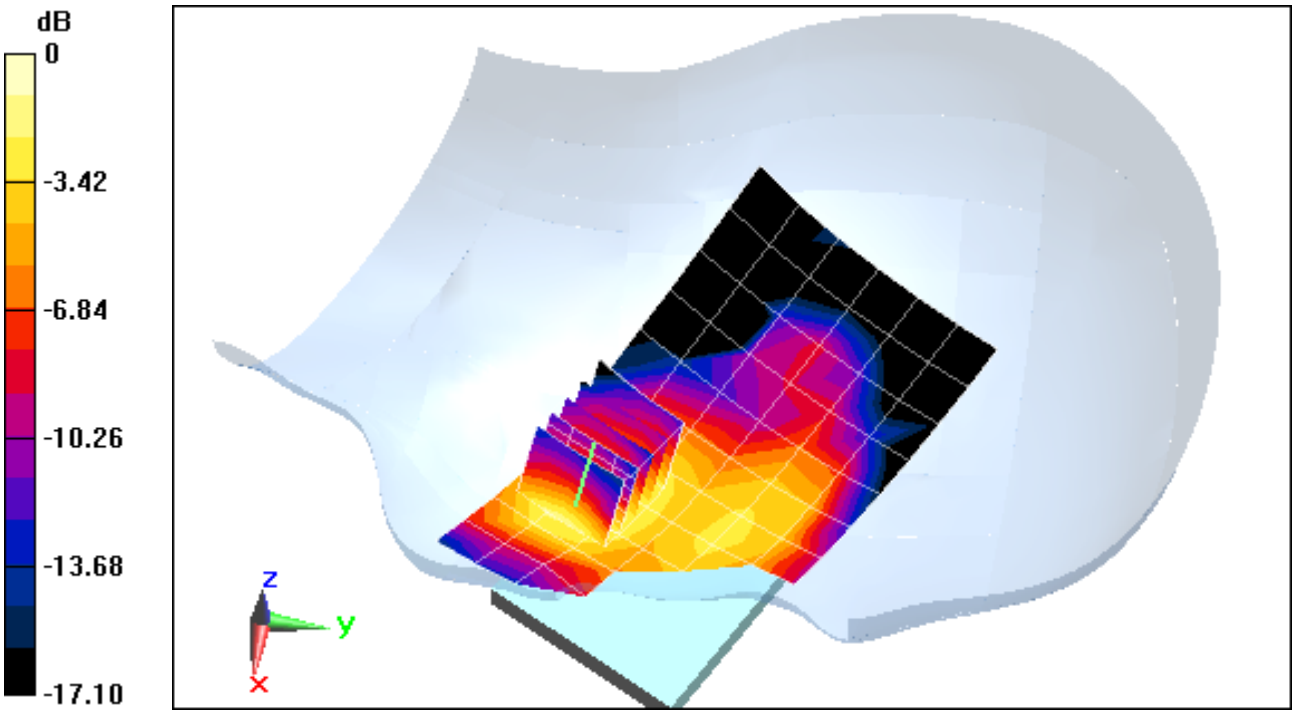
Communication System: GSM; Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.391 mho/m; ε_r = 41.16; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-14-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3561; ConvF(7.16, 7.16, 7.16); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Mode: GSM 1900, Left Head, Touch, 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 = 5.573 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.0650
SAR(1 g) = 0.042 mW/g; SAR(10 g) = 0.027 mW/g



0 dB = 0.050mW/g = -26.02 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-A

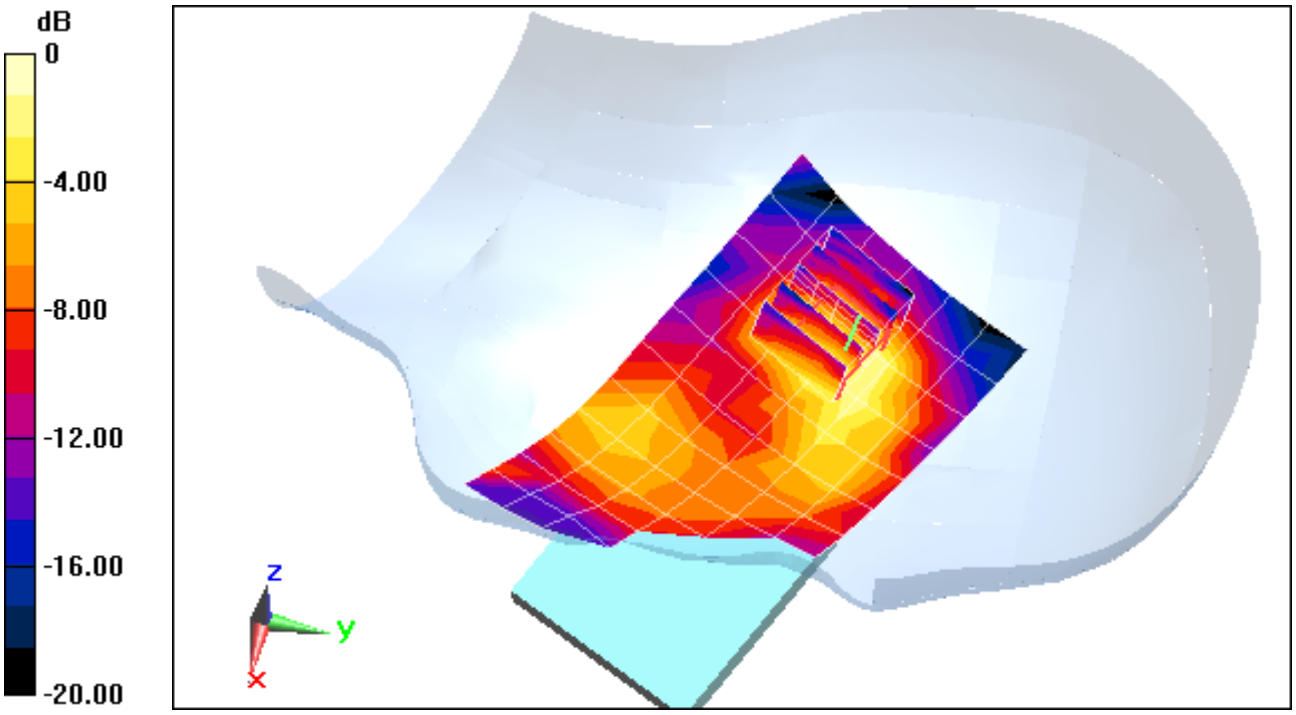
Communication System: GSM; Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.391 mho/m; ε_r = 41.16; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-14-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3561; ConvF(7.16, 7.16, 7.16); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Mode: GSM 1900, 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 = 3.636 V/m; Power Drift = 0.21 dB
Peak SAR (extrapolated) = 0.0370
SAR(1 g) = 0.021 mW/g; SAR(10 g) = 0.011 mW/g



0 dB = 0.020mW/g = -33.98 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

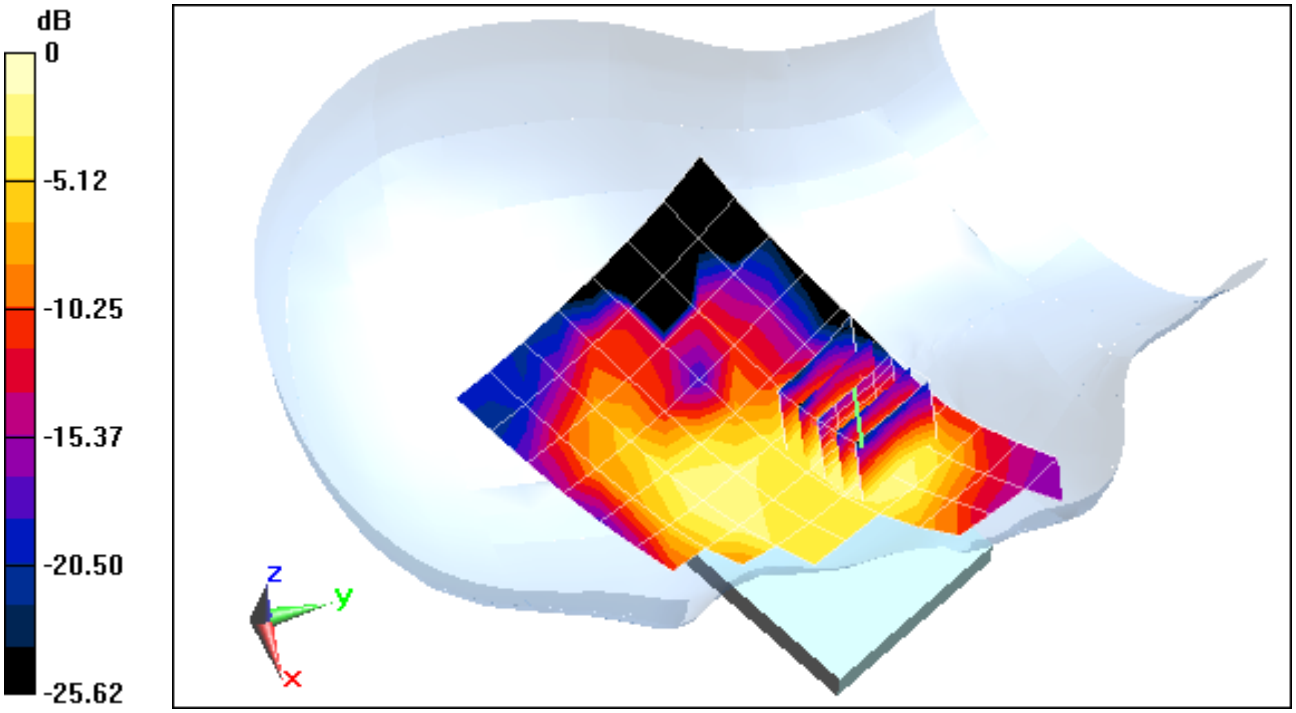
Communication System: IEEE 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2462 MHz; σ = 1.865 mho/m; ε_r = 39.496; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-15-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3263; ConvF(4.55, 4.55, 4.55); Calibrated: 11/18/2011
Sensor-Surface: 3mm (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 (0); SEMCAD X Version 14.6.4 (4989)

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

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.416 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.1320
SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.038 mW/g



0 dB = 0.090mW/g = -20.92 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

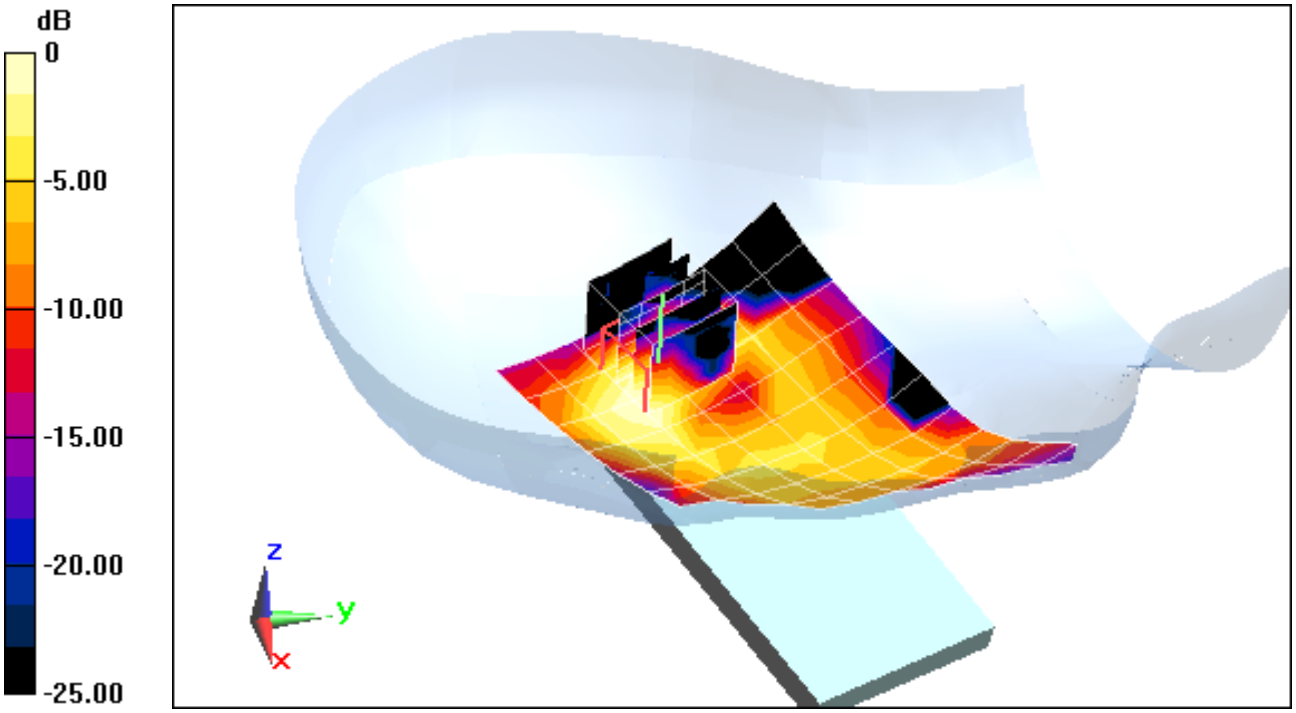
Communication System: IEEE 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2462 MHz; σ = 1.865 mho/m; ε_r = 39.496; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-15-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3263; ConvF(4.55, 4.55, 4.55); Calibrated: 11/18/2011
Sensor-Surface: 3mm (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 (0); SEMCAD X Version 14.6.4 (4989)

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

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.504 V/m; Power Drift = 0.0081 dB
Peak SAR (extrapolated) = 0.0610
SAR(1 g) = 0.031 mW/g; SAR(10 g) = 0.015 mW/g



0 dB = 0.040mW/g = -27.96 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

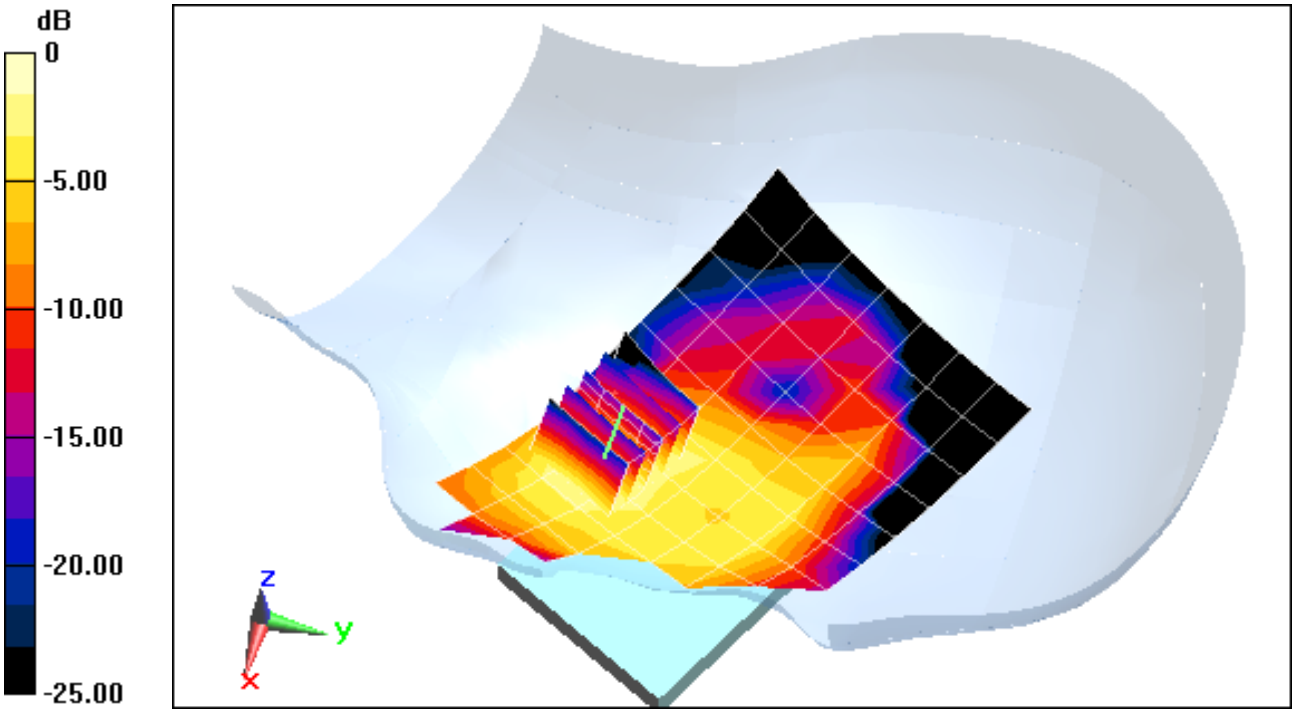
Communication System: IEEE 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2462 MHz; σ = 1.865 mho/m; ε_r = 39.496; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-15-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3263; ConvF(4.55, 4.55, 4.55); Calibrated: 11/18/2011
Sensor-Surface: 3mm (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 (0); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11b, Left Head, Touch, Ch 11, 1 Mbps

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.858 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.1820
SAR(1 g) = 0.099 mW/g; SAR(10 g) = 0.053 mW/g



0 dB = 0.120mW/g = -18.42 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

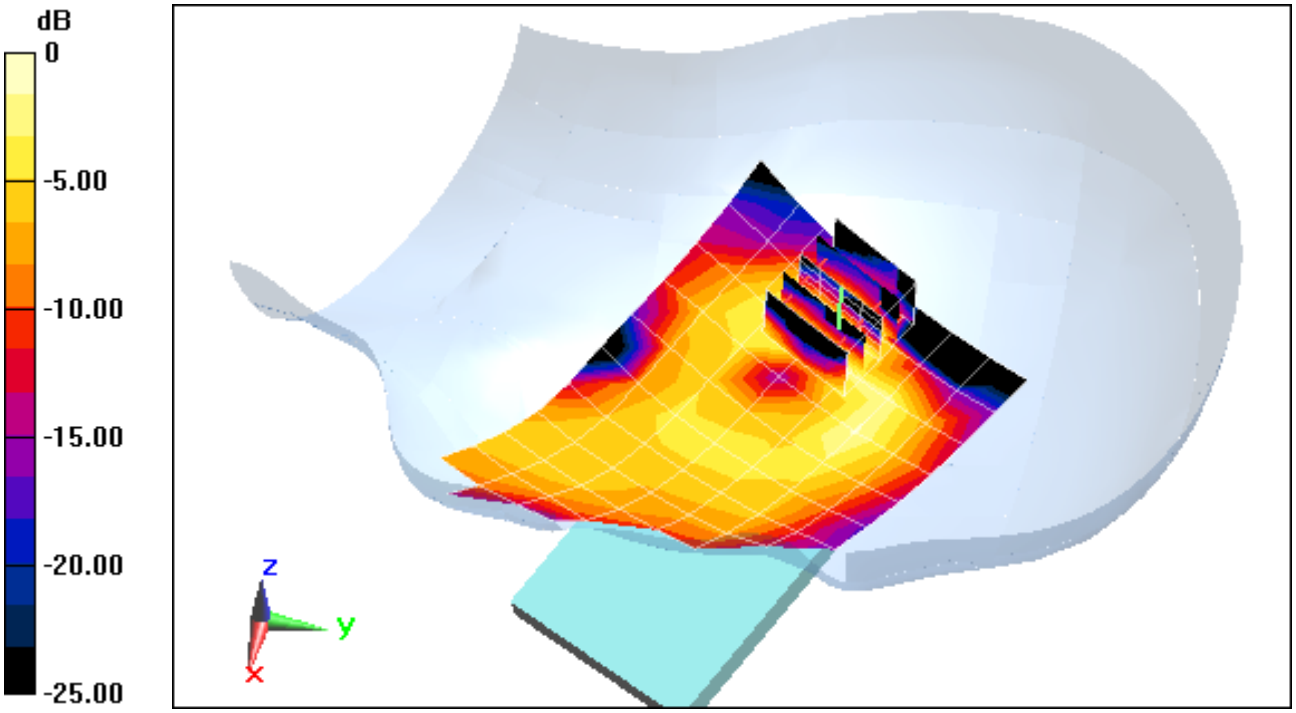
Communication System: IEEE 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2462 MHz; σ = 1.865 mho/m; ε_r = 39.496; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-15-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3263; ConvF(4.55, 4.55, 4.55); Calibrated: 11/18/2011
Sensor-Surface: 3mm (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 (0); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11b, Left Head, Tilt, Ch 11, 1 Mbps

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.940 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.0550
SAR(1 g) = 0.029 mW/g; SAR(10 g) = 0.013 mW/g



0 dB = 0.040mW/g = -27.96 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

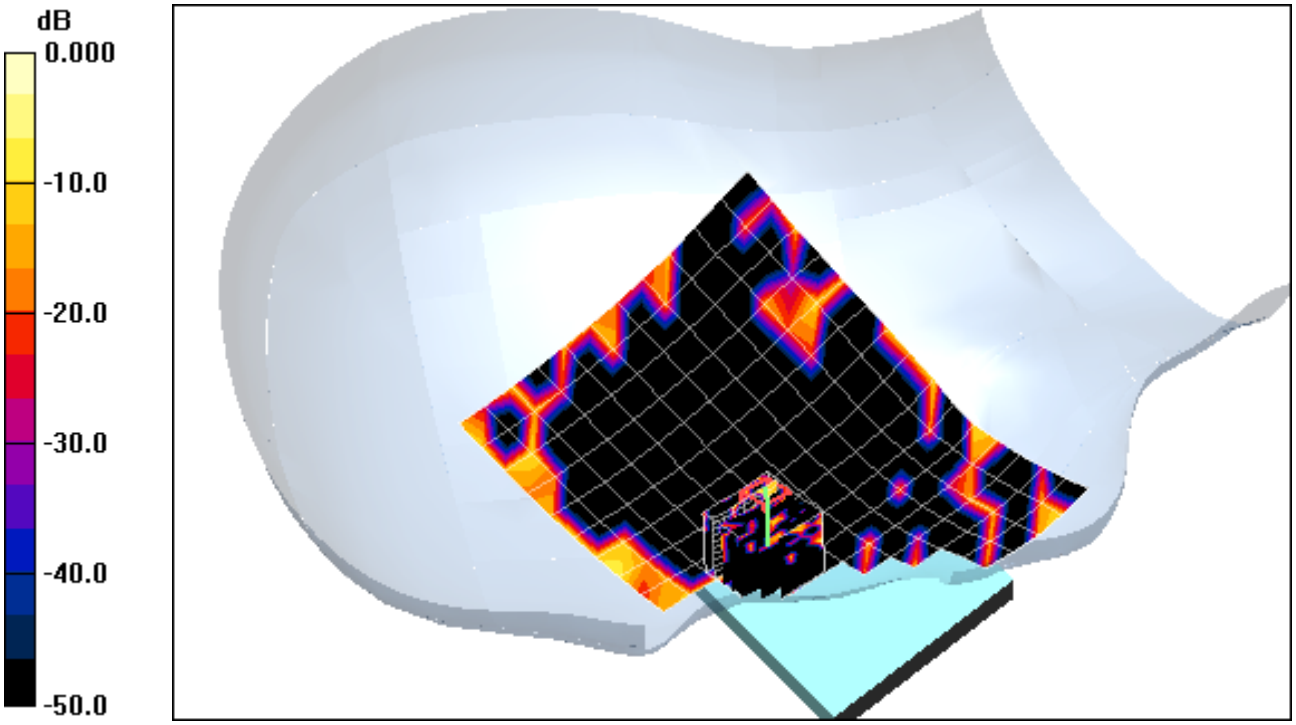
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5745 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5745 MHz; σ = 4.961 mho/m; ε_r = 36.23; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-14-2012; Ambient Temp: 24.0°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3589; ConvF(4.05, 4.05, 4.05); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11a 5.8 GHz, Right Head, Touch, Ch 149, 6 Mbps

Area Scan (12x16x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.000 V/m; Power Drift = 0.199 dB
Peak SAR (extrapolated) = 0.051 W/kg
SAR(1 g) = 0.00 mW/g; SAR(10 g) = 0.00 mW/g



0 dB = 0.051mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

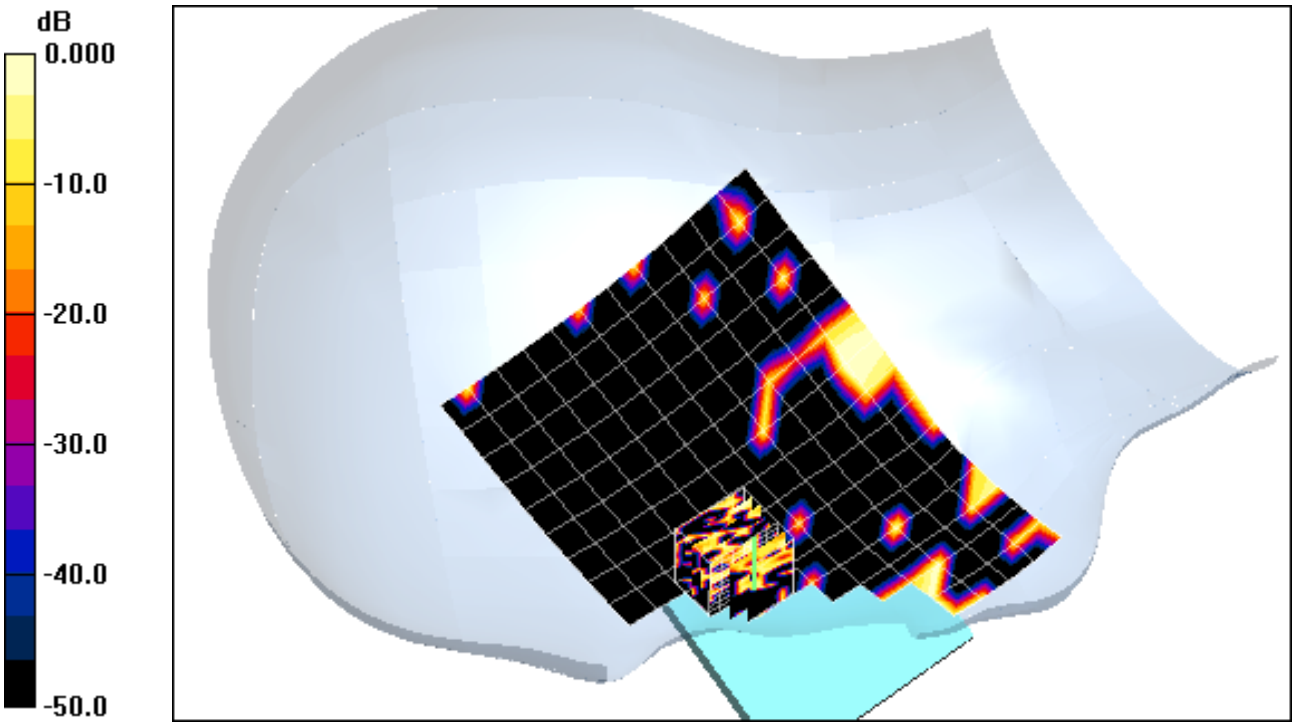
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5240 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5240 MHz; σ = 4.491 mho/m; ε_r = 36.84; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-14-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN3589; ConvF(4.59, 4.59, 4.59); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11a 5.2 GHz, Right Head, Tilt, Ch 48, 6 Mbps

Area Scan (12x16x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.000 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.000 W/kg
SAR(1 g) = 0.00 mW/g; SAR(10 g) = 0.00 mW/g



0 dB = 0.007mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

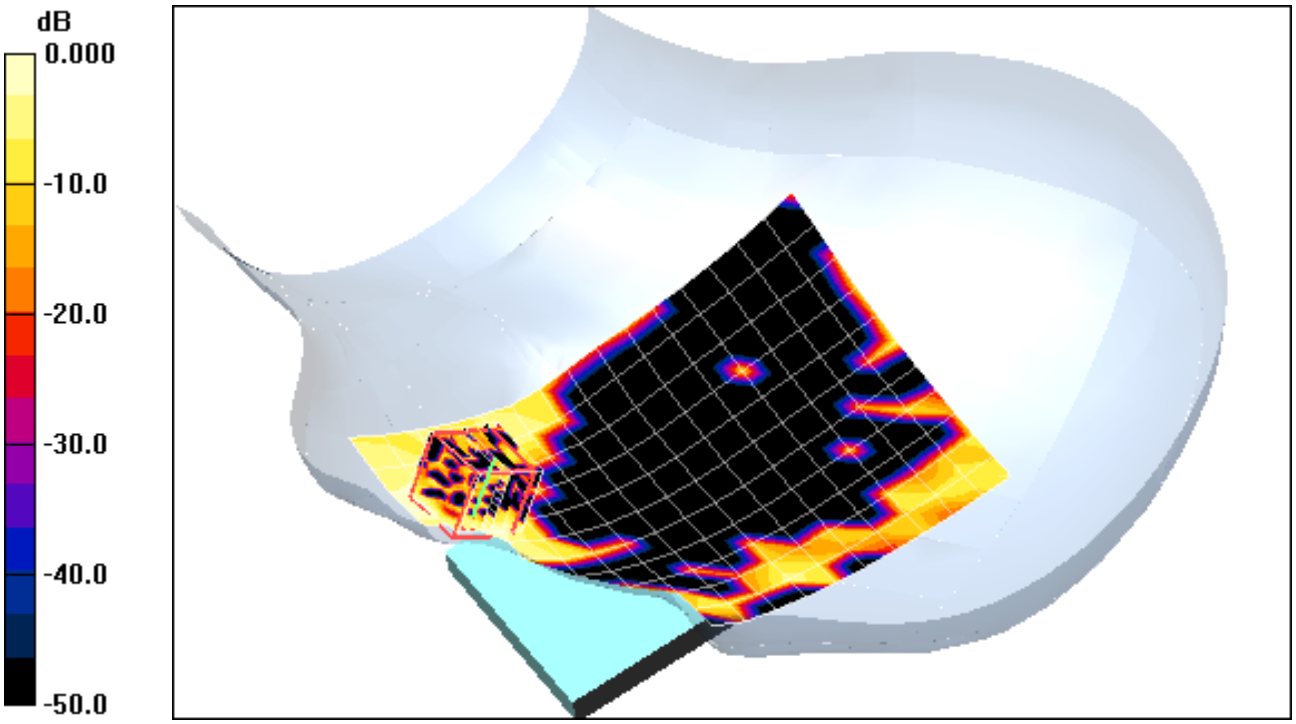
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5745 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5745 MHz; σ = 4.961 mho/m; ε_r = 36.23; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-14-2012; Ambient Temp: 24.0°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3589; ConvF(4.05, 4.05, 4.05); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Area Scan (12x16x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.40 V/m; Power Drift = 0.112 dB
Peak SAR (extrapolated) = 0.187 W/kg
SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.0046 mW/g



0 dB = 0.025mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

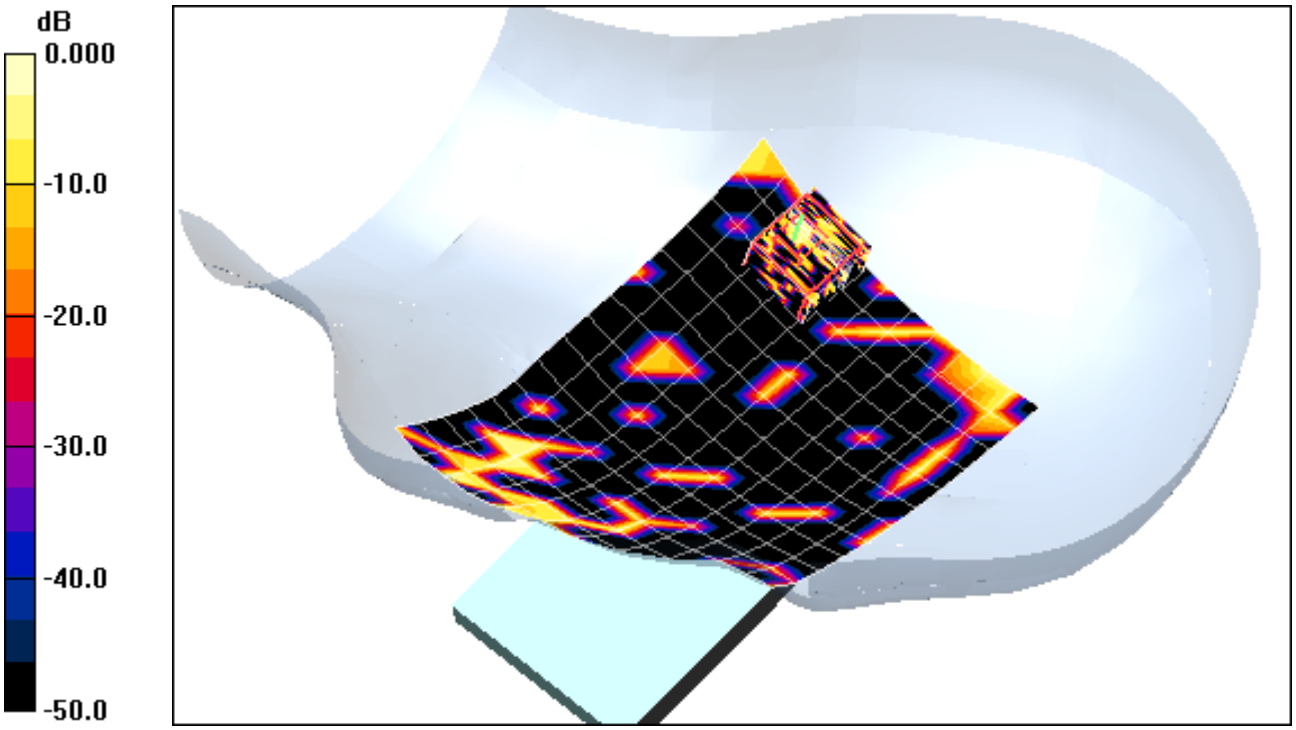
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5745 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5745 MHz; σ = 4.961 mho/m; ε_r = 36.23; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-14-2012; Ambient Temp: 24.0°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3589; ConvF(4.05, 4.05, 4.05); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Area Scan (12x16x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.467 V/m; Power Drift = -0.187 dB
Peak SAR (extrapolated) = 0.010 W/kg
SAR(1 g) = 0.00 mW/g; SAR(10 g) = 0.00 mW/g



0 dB = 0.010mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-A

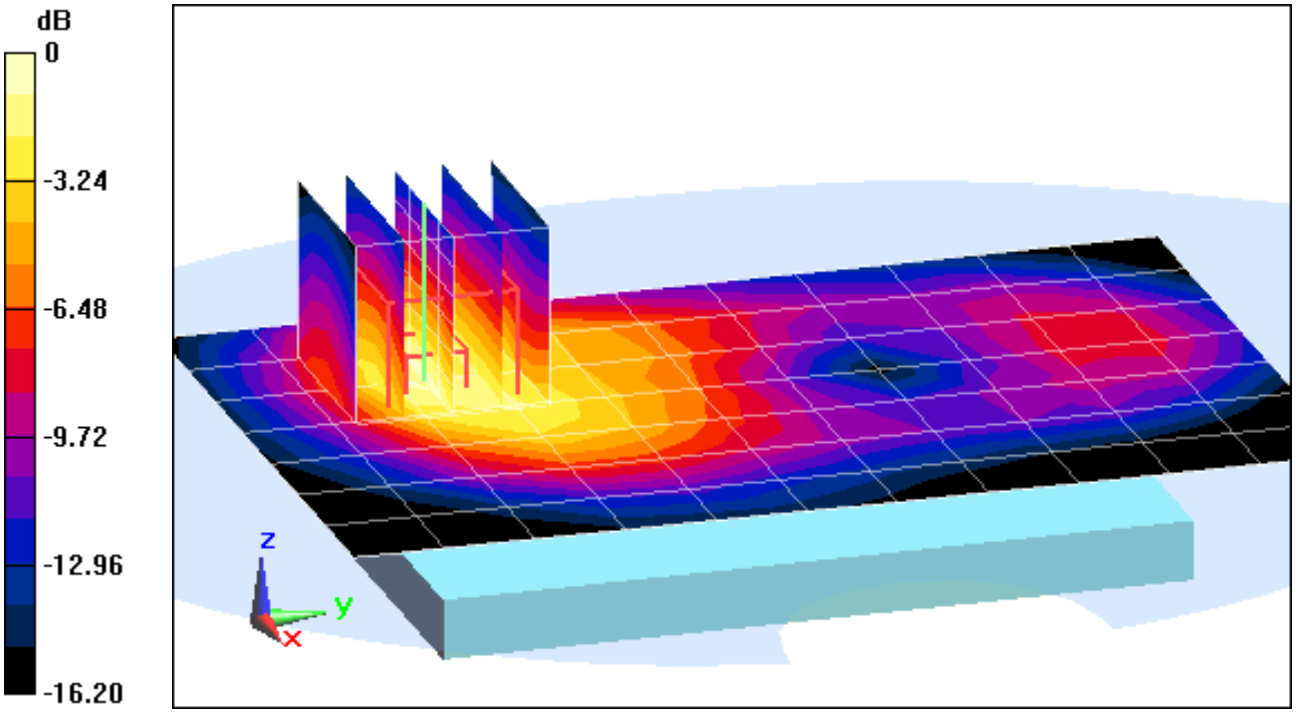
Communication System: GSM1900 GPRS; 2 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.533 mho/m; ε_r = 50.94; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.5°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: GPRS 1900, Body SAR, Back side, Mid.ch, 2 Tx Slots

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.028 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.5730
SAR(1 g) = 0.351 mW/g; SAR(10 g) = 0.195 mW/g



0 dB = 0.400mW/g = -7.96 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-A

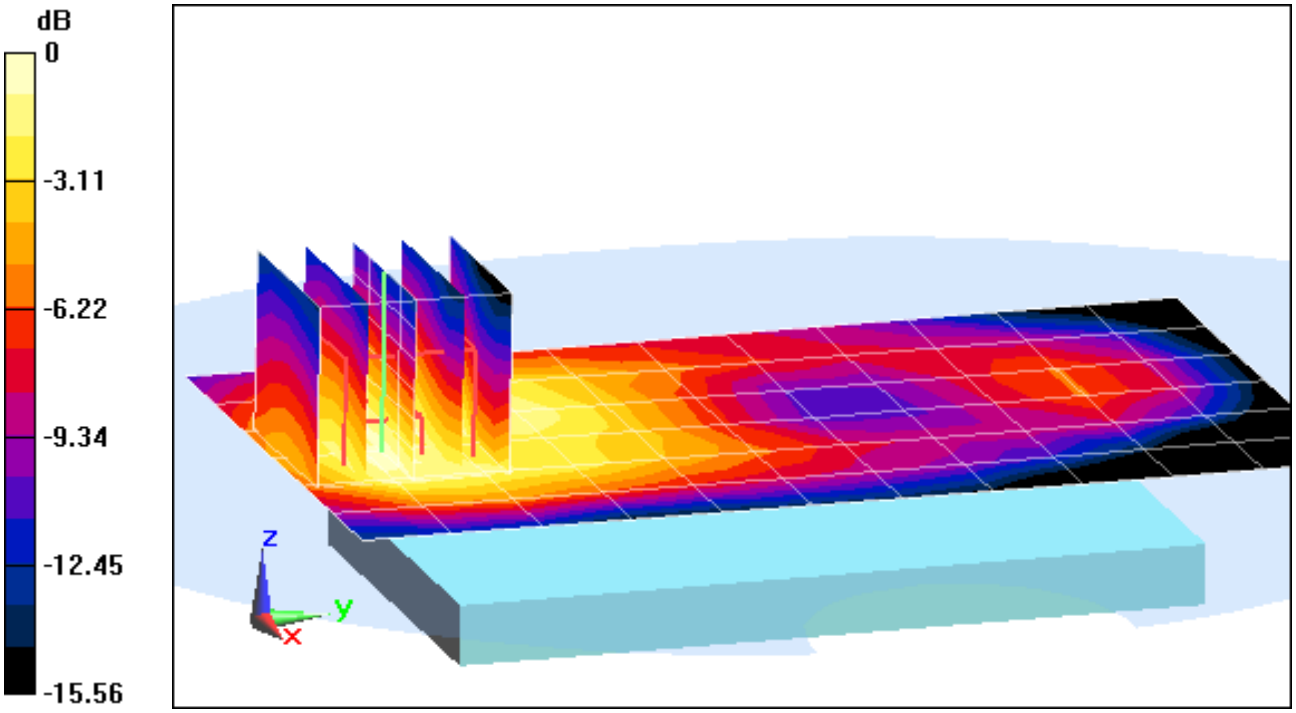
Communication System: GSM1900 GPRS; 2 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.533 mho/m; ε_r = 50.94; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.5°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: GPRS 1900, Body SAR, Front side, Mid.ch, 2 Tx Slots

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.417 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.2350
SAR(1 g) = 0.149 mW/g; SAR(10 g) = 0.091 mW/g



0 dB = 0.170mW/g = -15.39 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-A

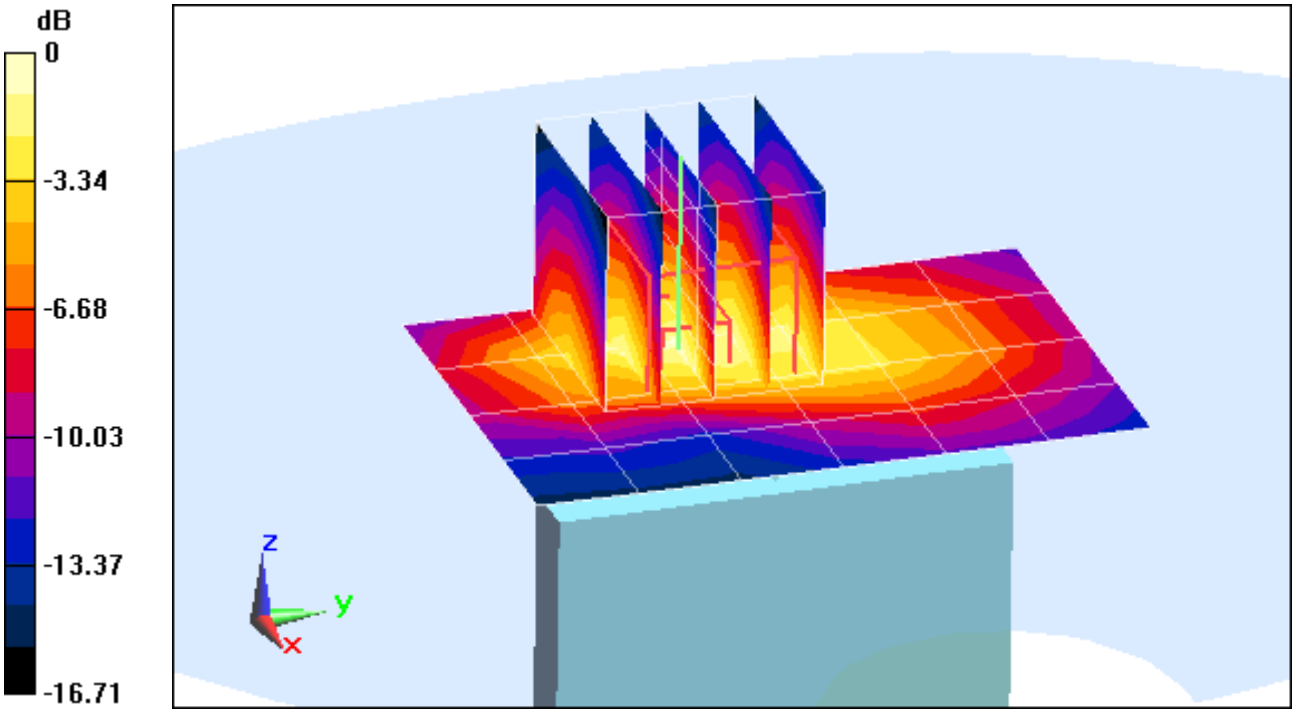
Communication System: GSM1900 GPRS; 2 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.533 mho/m; ε_r = 50.94; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.5°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

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

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.853 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.5760
SAR(1 g) = 0.337 mW/g; SAR(10 g) = 0.182 mW/g



0 dB = 0.390mW/g = -8.18 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-A

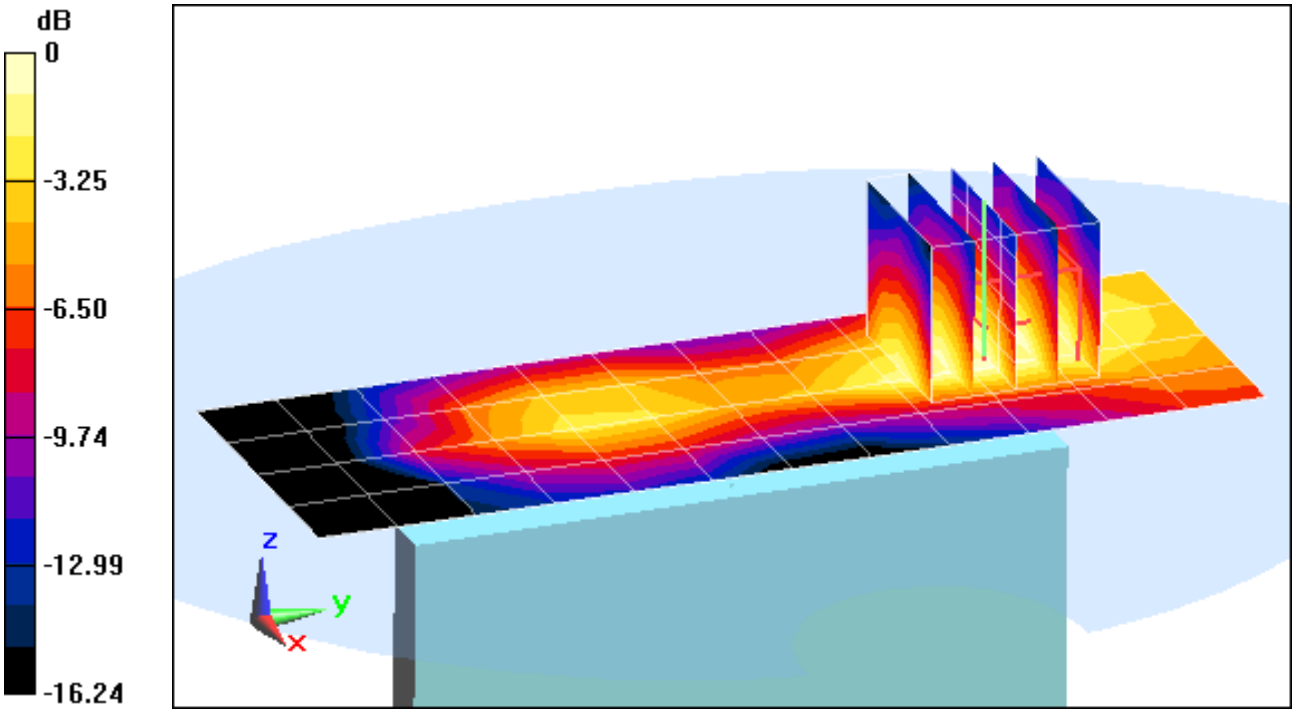
Communication System: GSM1900 GPRS; 2 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.533 mho/m; ε_r = 50.94; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.5°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

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

Area Scan (5x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.003 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.0920
SAR(1 g) = 0.057 mW/g; SAR(10 g) = 0.033 mW/g



0 dB = 0.060mW/g = -24.44 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-A

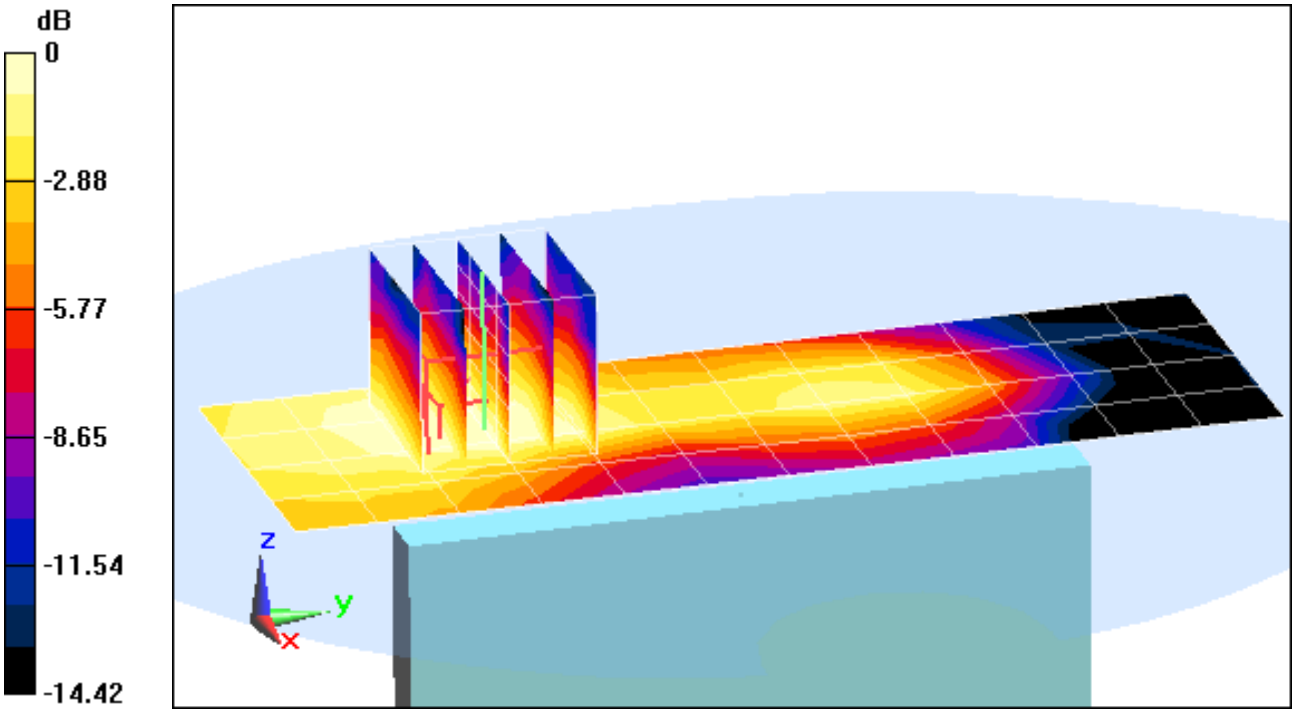
Communication System: GSM1900 GPRS; 2 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.533 mho/m; ε_r = 50.94; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.5°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

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

Area Scan (5x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.583 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.0470
SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.019 mW/g



0 dB = 0.030mW/g = -30.46 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

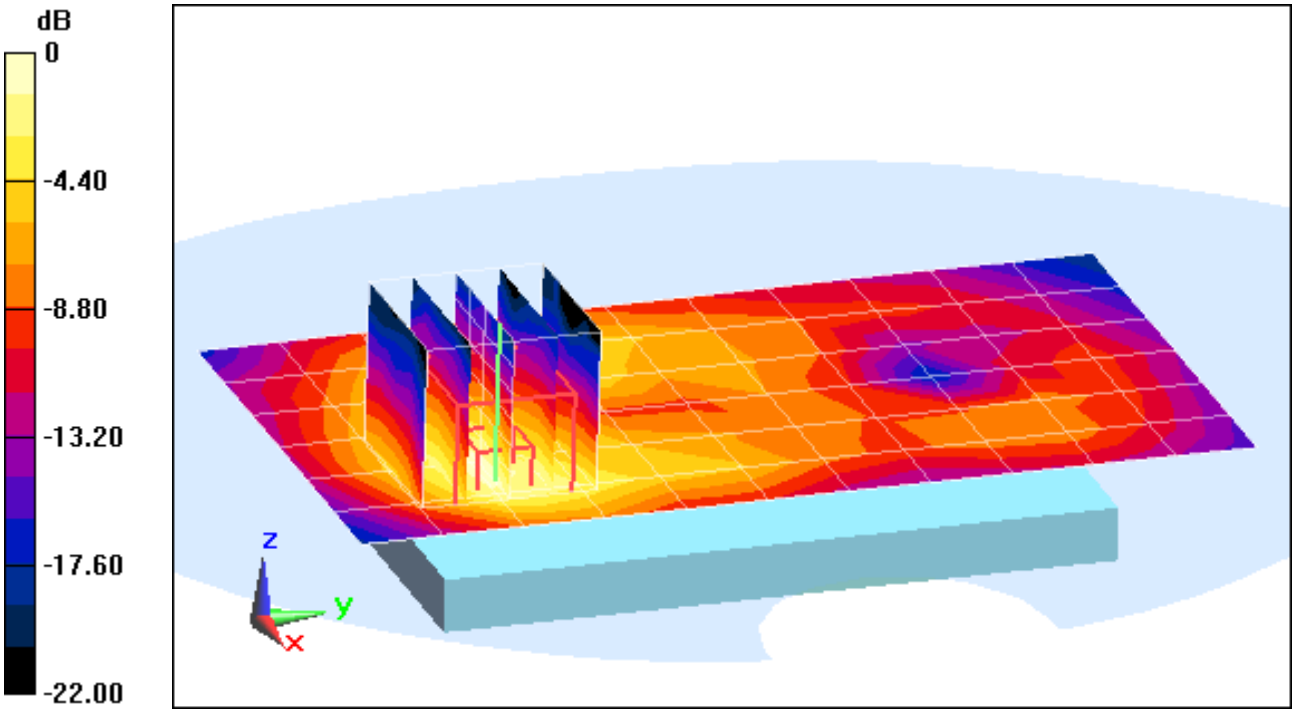
Communication System: IEEE 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2462 MHz; σ = 2.02 mho/m; ε_r = 50.171; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-15-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.8°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/25/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11b, Body SAR, Ch 11, 1 Mbps, Back Side

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.674 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.2520
SAR(1 g) = 0.123 mW/g; SAR(10 g) = 0.058 mW/g



0 dB = 0.160mW/g = -15.92 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

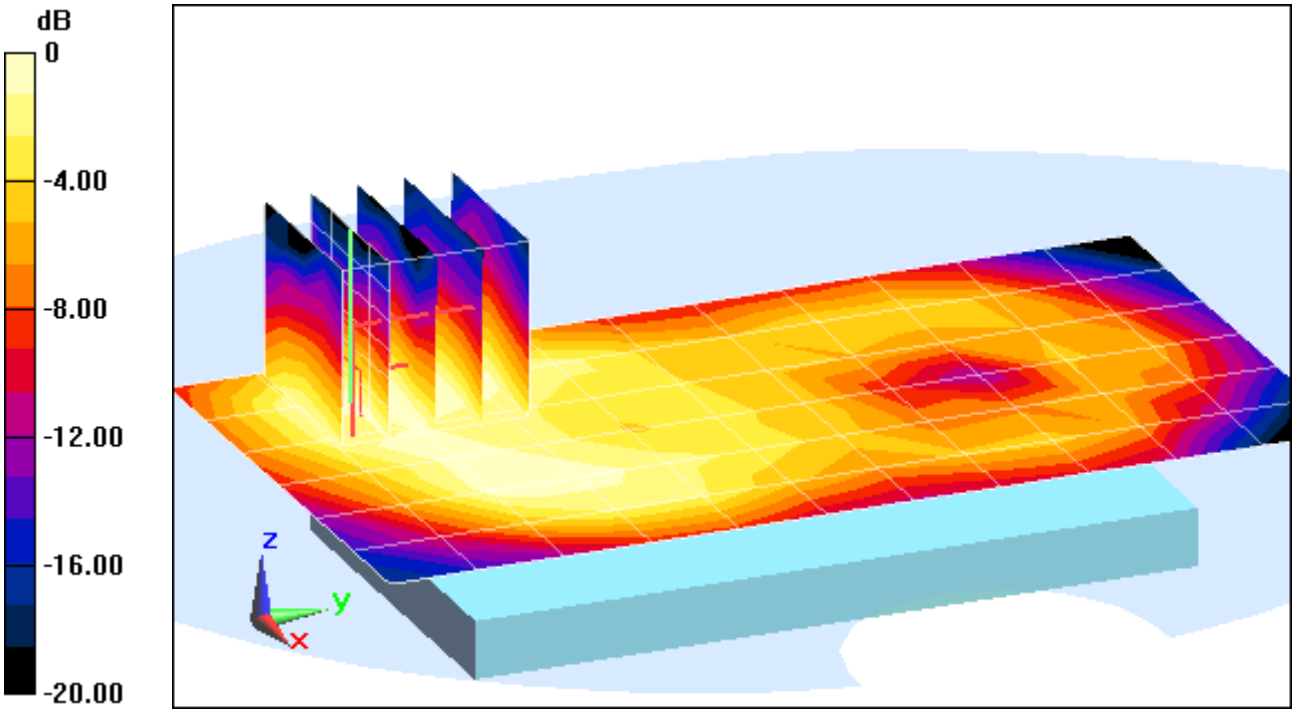
Communication System: IEEE 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2462 MHz; σ = 2.02 mho/m; ε_r = 50.171; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-15-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.8°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/25/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11b, Body SAR, Ch 11, 1 Mbps, Front Side

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.913 V/m; Power Drift = -0.0027 dB
Peak SAR (extrapolated) = 0.1680
SAR(1 g) = 0.082 mW/g; SAR(10 g) = 0.045 mW/g



0 dB = 0.100mW/g = -20.00 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

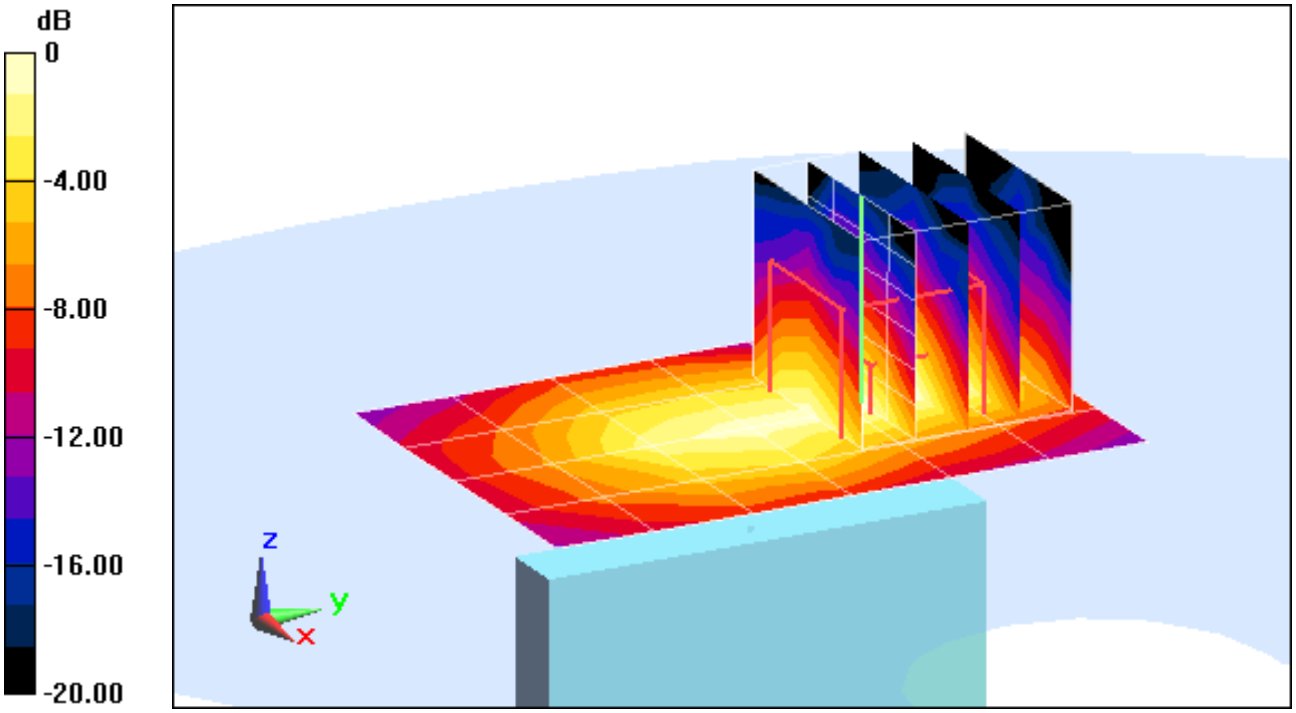
Communication System: IEEE 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2462 MHz; σ = 2.02 mho/m; ε_r = 50.171; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-15-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.8°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/25/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11b, Body SAR, Ch 11, 1 Mbps, Bottom Edge

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.286 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.2850
SAR(1 g) = 0.131 mW/g; SAR(10 g) = 0.062 mW/g



0 dB = 0.170mW/g = -15.39 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

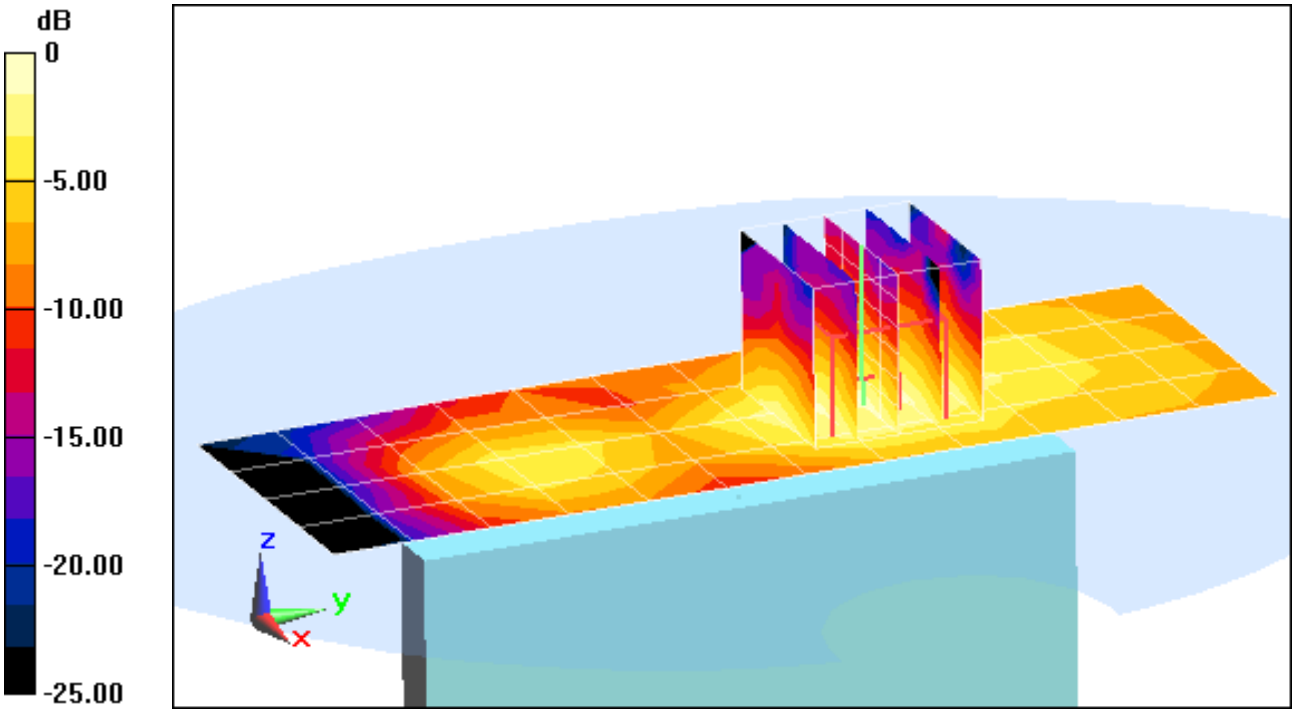
Communication System: IEEE 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2462 MHz; σ = 2.02 mho/m; ε_r = 50.171; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-15-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.8°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/25/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11b, Body SAR, Ch 11, 1 Mbps, Right Edge

Area Scan (5x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.093 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.1000
SAR(1 g) = 0.052 mW/g; SAR(10 g) = 0.027 mW/g



0 dB = 0.070mW/g = -23.10 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTI9050; Type: Portable Handset; Serial: FJ-070-B

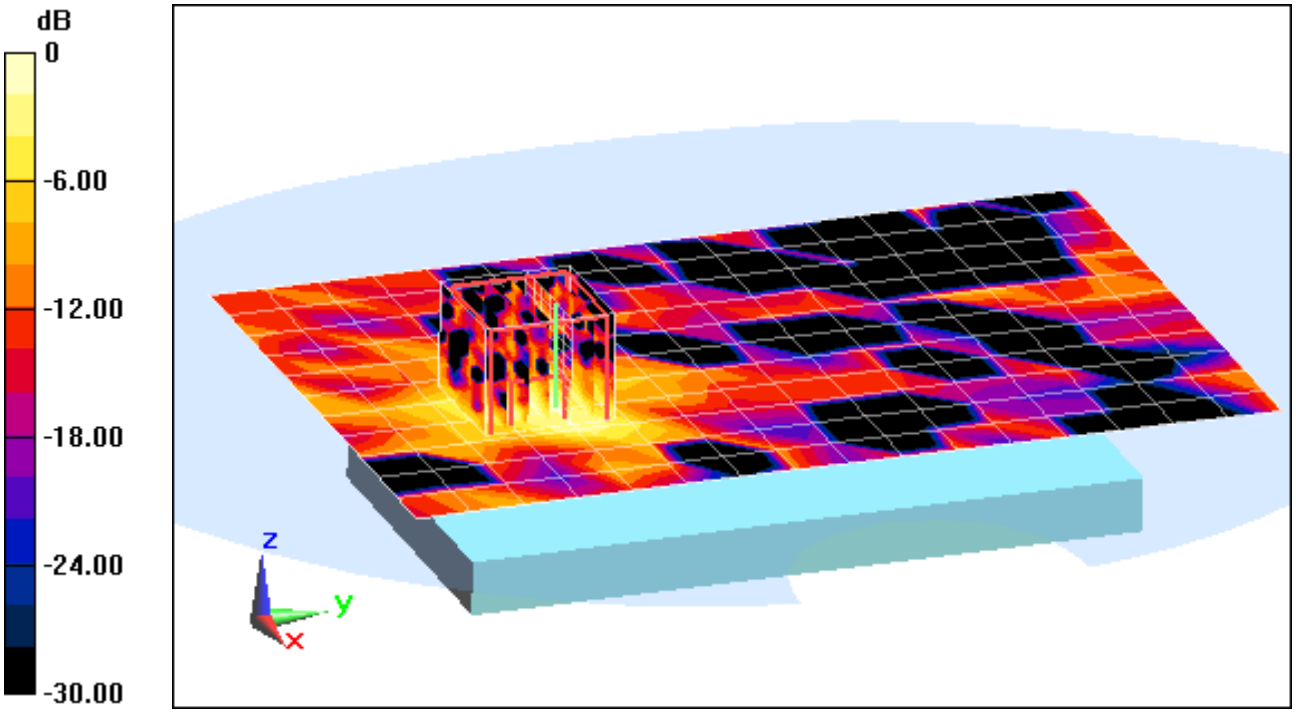
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5320 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5320 MHz; σ = 5.371 mho/m; ε_r = 47.58; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2012; Ambient Temp: 24.6°C; Tissue Temp: 23.1°C

Probe: EX3DV4 - SN3589; ConvF(3.72, 3.72, 3.72); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11a, 5.3 GHz, Body SAR, Ch 64, 6 Mbps, Back Side

Area Scan (12x17x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.992 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.2820
SAR(1 g) = 0.031 mW/g; SAR(10 g) = 0.010 mW/g



0 dB = 0.070mW/g = -23.10 dB mW/g

APPENDIX B: SYSTEM VERIFICATION

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PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d080

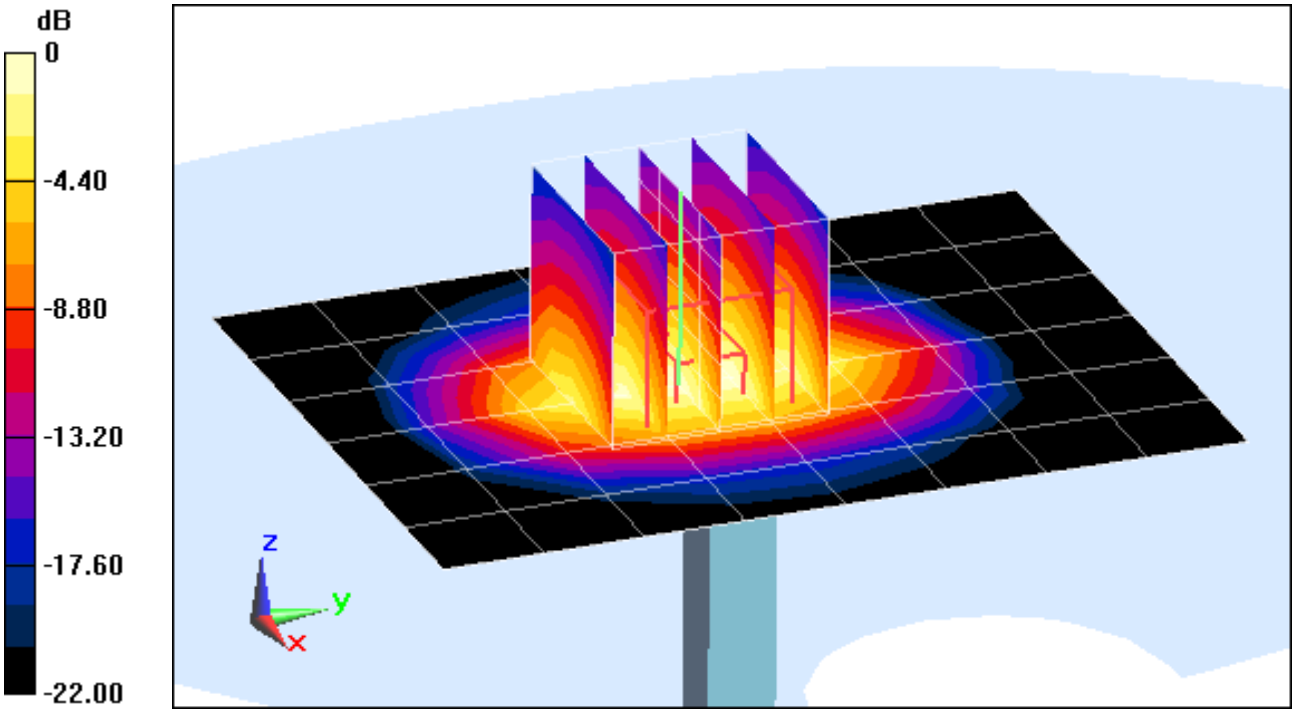
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.41 mho/m; ε_r = 41.093; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3561; ConvF(7.16, 7.16, 7.16); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

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 (100mW)
SAR(1 g) = 4.07 mW/g; SAR(10 g) = 2.1 mW/g
Deviation = 2.01 %



0 dB = 4.520mW/g = 13.10 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d080

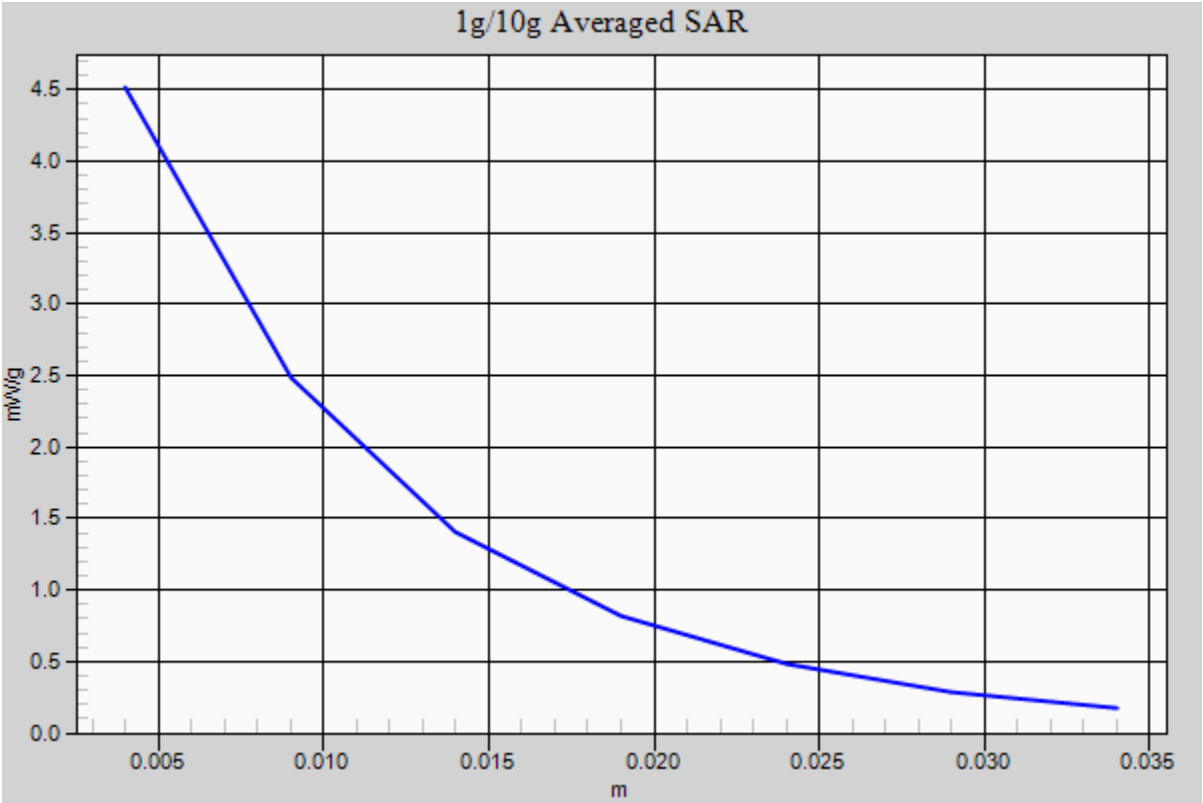
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.41 mho/m; ε_r = 41.093; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN3561; ConvF(7.16, 7.16, 7.16); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/9/2011
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

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 (100mW)
SAR(1 g) = 4.07 mW/g; SAR(10 g) = 2.1 mW/g
Deviation = 2.01 %



PCTEST ENGINEERING LABORATORY, INC.

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

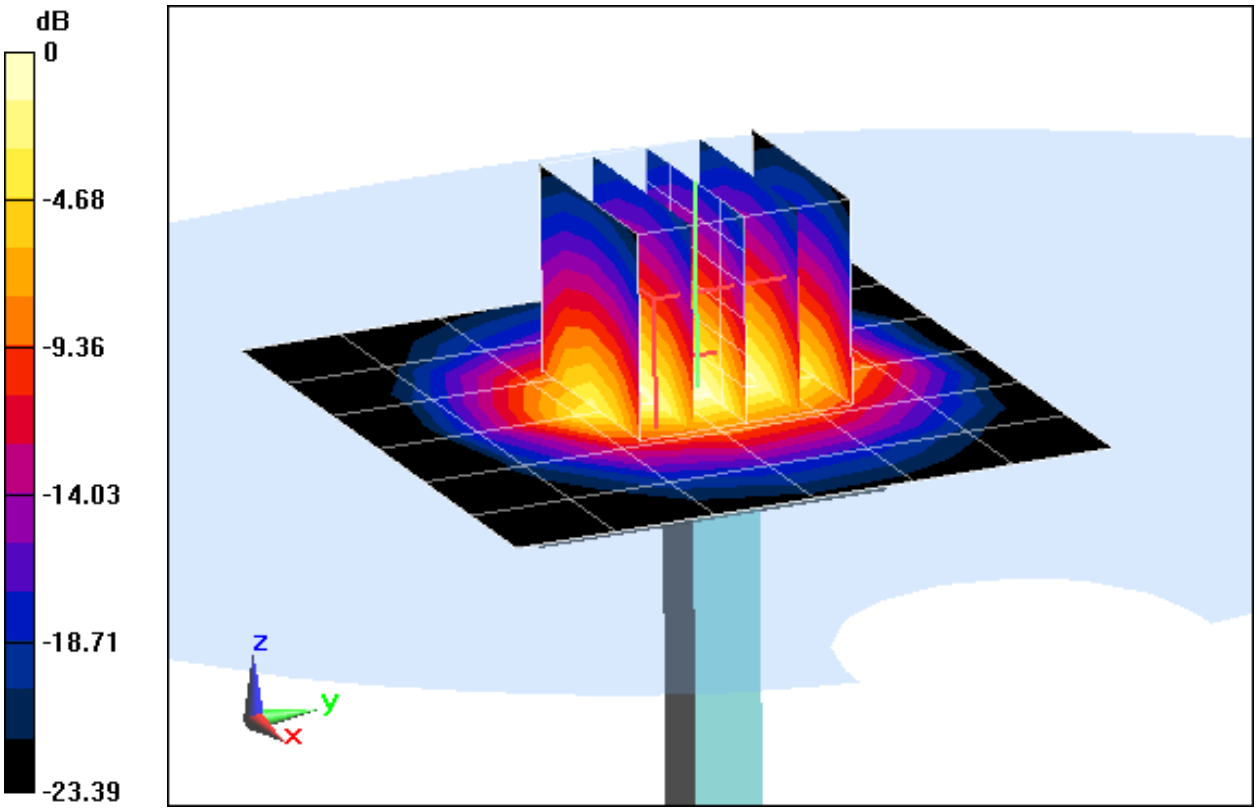
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head; Medium parameters used:
f = 2450 MHz; σ = 1.853 mho/m; ε_r = 39.55; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-15-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3263; ConvF(4.55, 4.55, 4.55); Calibrated: 11/18/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 front; Type: SAM v5.0; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (0);SEMCAD X Version 14.6.4 (4989)

2450 MHz System Verification

Area Scan (7x7x1): 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)
SAR(1 g) = 5.38 mW/g; SAR(10 g) = 2.46 mW/g
Deviation = 3.26%



0 dB = 7.090mW/g = 17.01 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

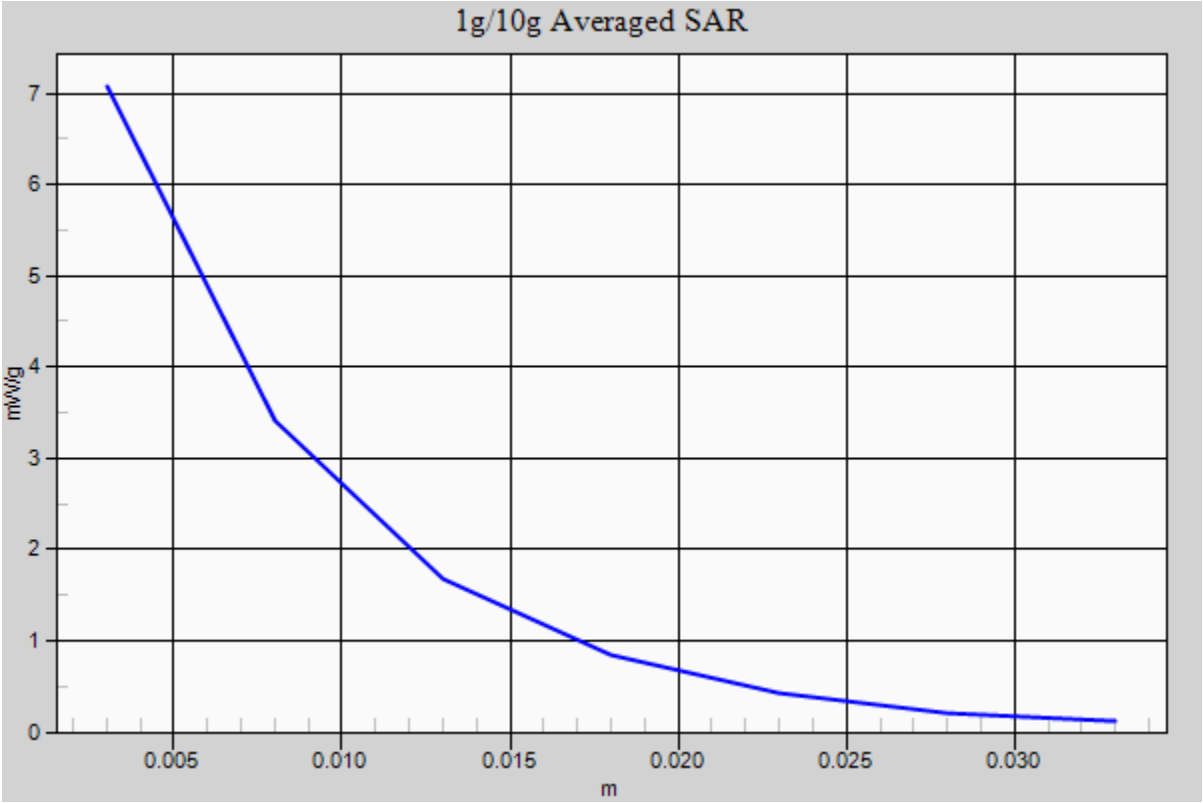
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.853 mho/m; ε_r = 39.55; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-15-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3263; ConvF(4.55, 4.55, 4.55); Calibrated: 11/18/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM v5.0 front; Type: SAM v5.0; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

2450 MHz System Verification

Area Scan (7x7x1): 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)
SAR(1 g) = 5.38 mW/g; SAR(10 g) = 2.46 mW/g
Deviation = 3.26 %



PCTEST ENGINEERING LABORATORY, INC.

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

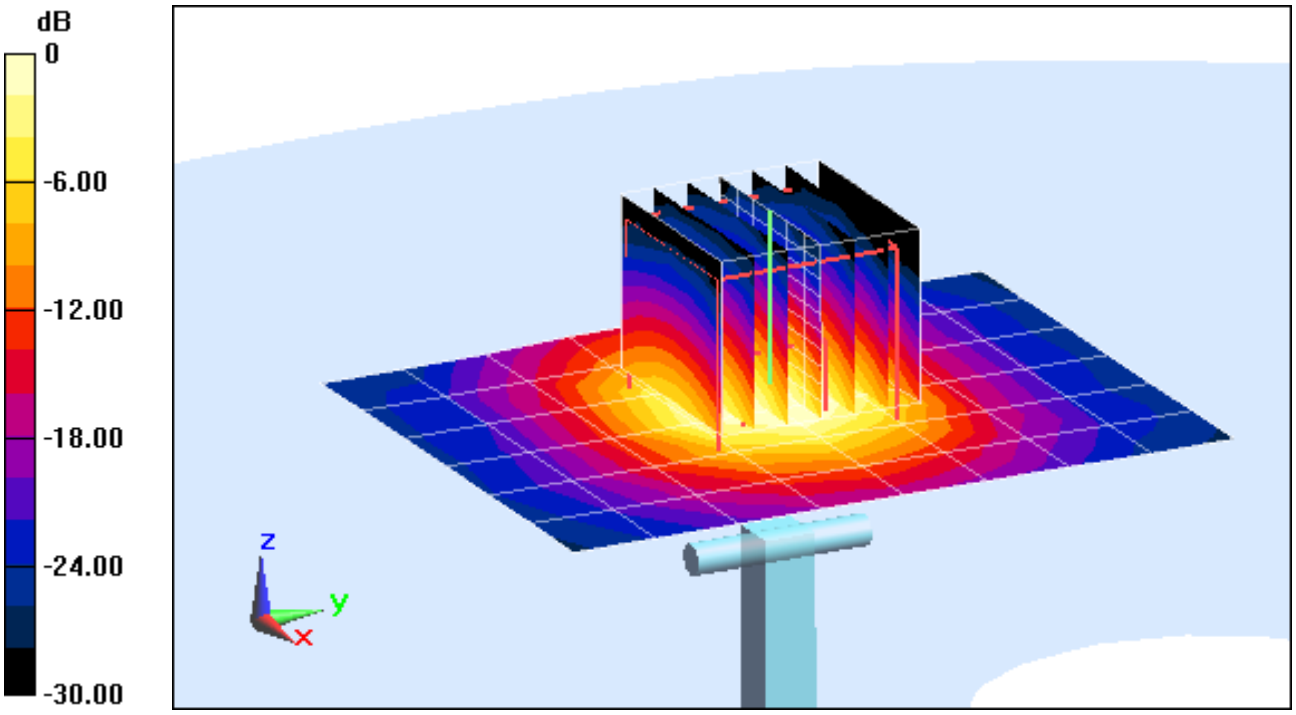
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5200 MHz; σ = 4.45 mho/m; ε_r = 36.88; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN3589; ConvF(4.59, 4.59, 4.59); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

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)
SAR(1 g) = 7.31 mW/g; SAR(10 g) = 2.1 mW/g
Deviation = -8.40 %



0 dB = 9.180mW/g = 19.26 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

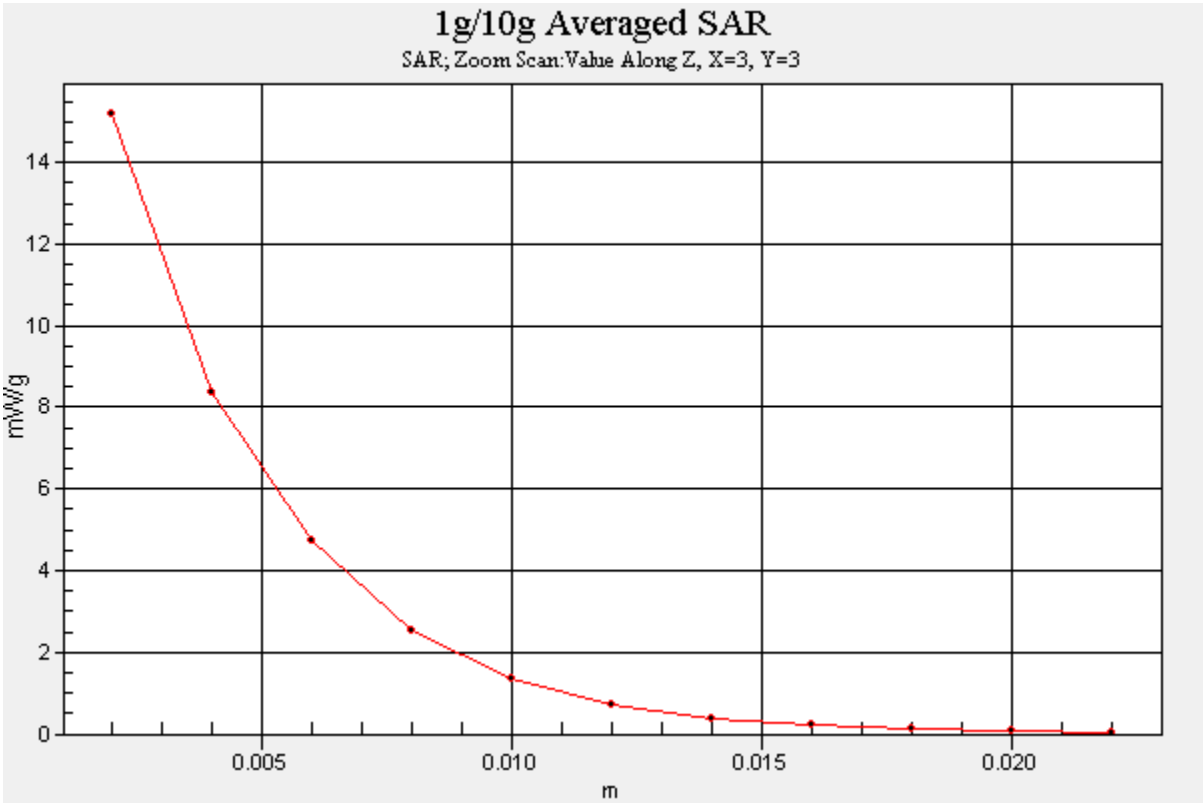
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5200 MHz; σ = 4.45 mho/m; ε_r = 36.88; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN3589; ConvF(4.59, 4.59, 4.59); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

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)
SAR(1 g) = 7.31 mW/g; SAR(10 g) = 2.1 mW/g
Deviation = -8.40 %



PCTEST ENGINEERING LABORATORY, INC.

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

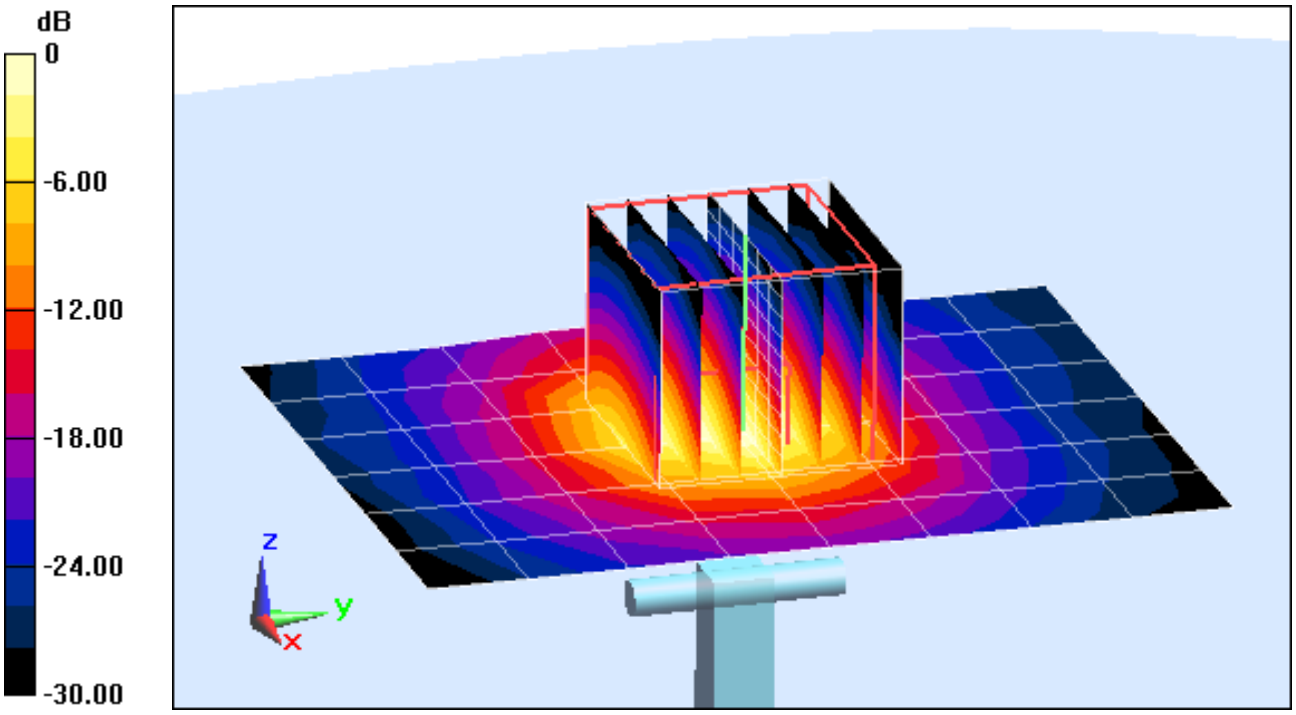
Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5500 MHz; σ = 4.728 mho/m; ε_r = 36.48; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.8°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN3589; ConvF(4.33, 4.33, 4.33); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

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)
SAR(1 g) = 8.14 mW/g; SAR(10 g) = 2.27 mW/g
Deviation = -5.68 %



0 dB = 15.880mW/g = 24.02 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

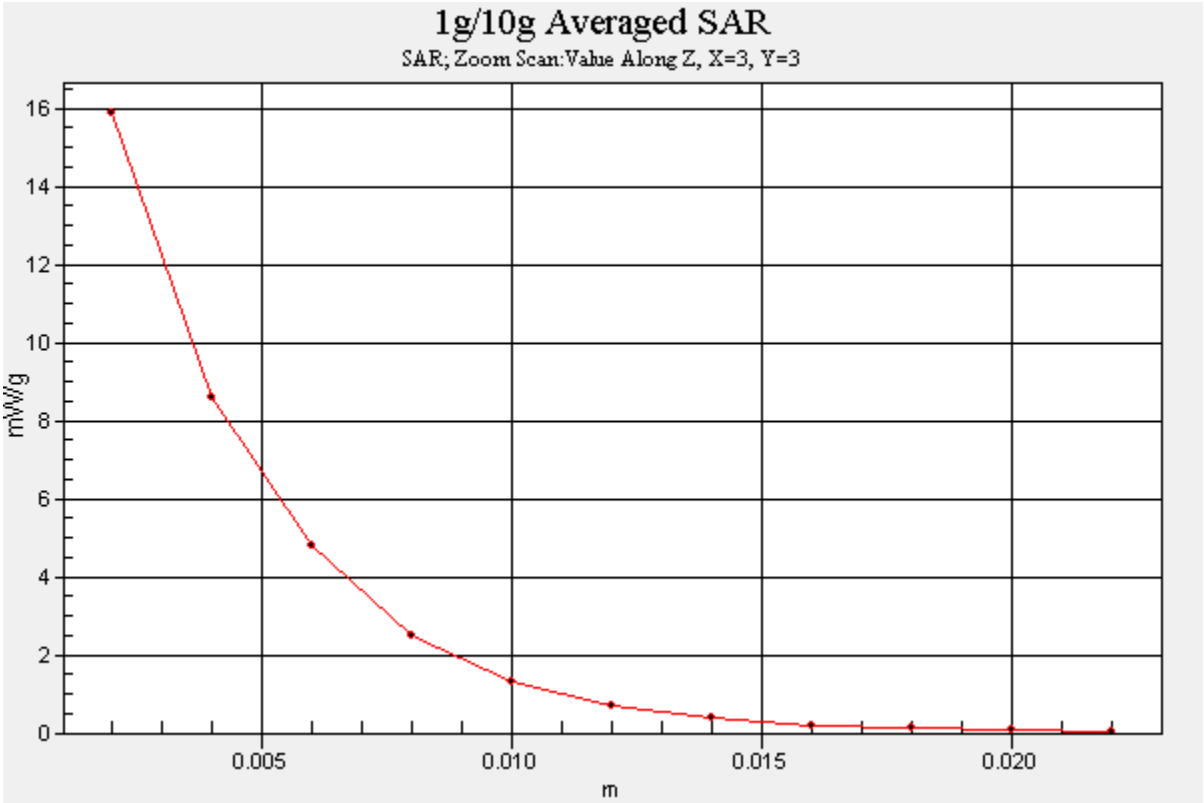
Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5500 MHz; σ = 4.728 mho/m; ε_r = 36.48; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.8°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN3589; ConvF(4.33, 4.33, 4.33); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

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)
SAR(1 g) = 8.14 mW/g; SAR(10 g) = 2.27 mW/g
Deviation = -5.68 %



PCTEST ENGINEERING LABORATORY, INC.

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

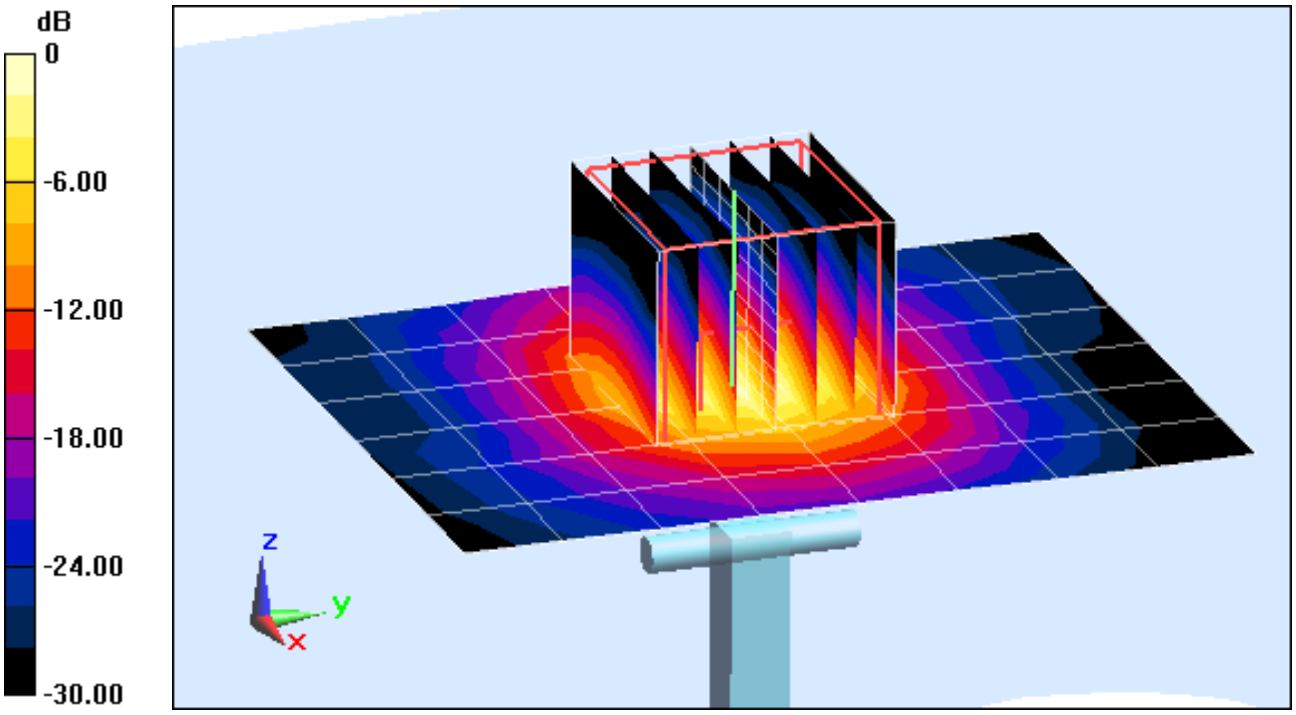
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5800 MHz; σ = 5.038 mho/m; ε_r = 36.17; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 24.0°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3589; ConvF(4.05, 4.05, 4.05); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

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)
SAR(1 g) = 7.99 mW/g; SAR(10 g) = 2.22 mW/g
Deviation = 0.63 %



0 dB = 16.990mW/g = 24.60 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

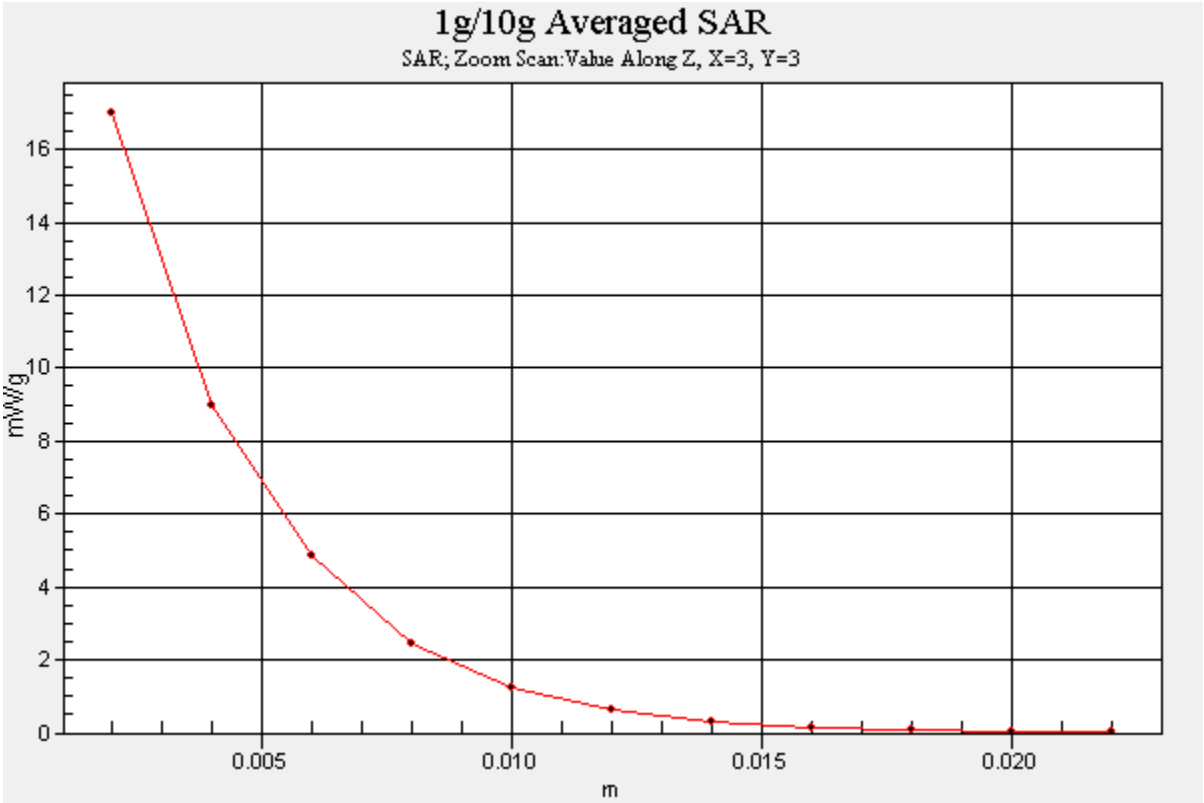
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5800 MHz; σ = 5.038 mho/m; ε_r = 36.17; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 24.0°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3589; ConvF(4.05, 4.05, 4.05); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

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)
SAR(1 g) = 7.99 mW/g; SAR(10 g) = 2.22 mW/g
Deviation = 0.63 %



PCTEST ENGINEERING LABORATORY, INC.

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

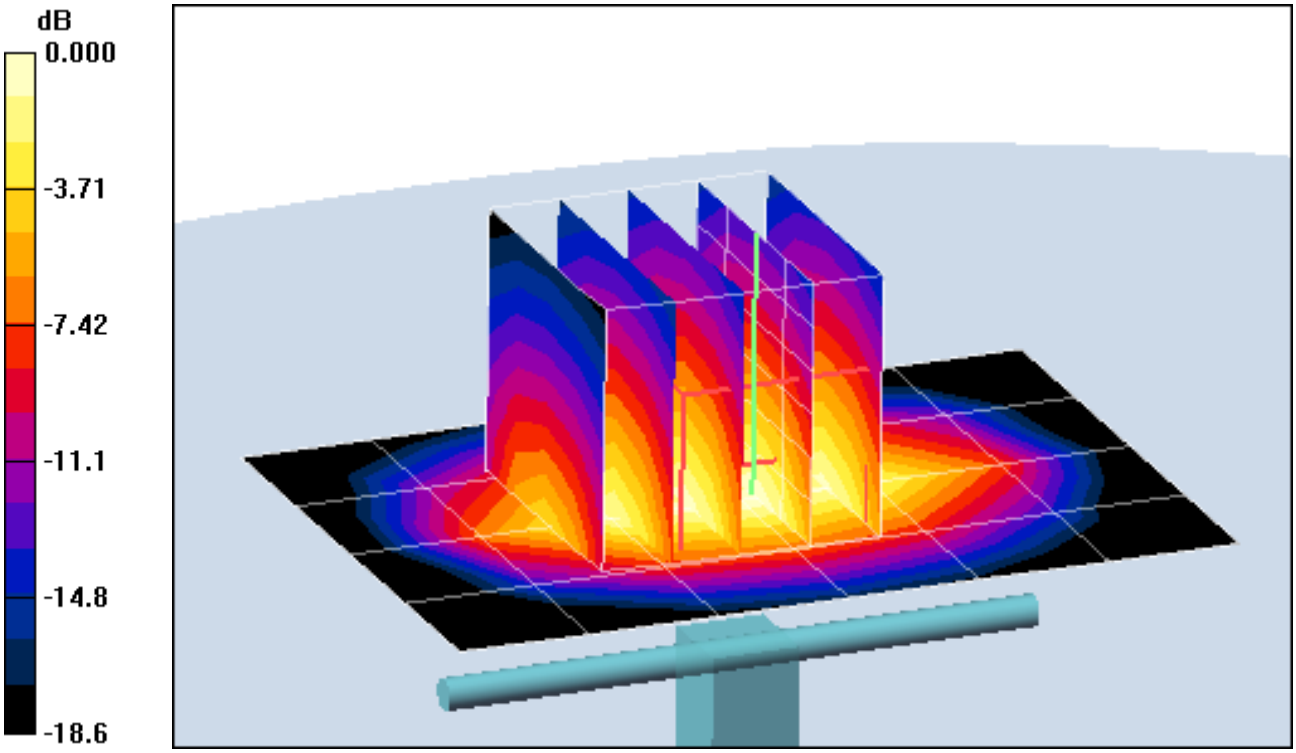
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.56 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.5°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 16.0 dBm (40 mW)
SAR(1 g) = 1.7 mW/g; SAR(10 g) = 0.899 mW/g
Deviation = 2.66 %



0 dB = 1.90mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

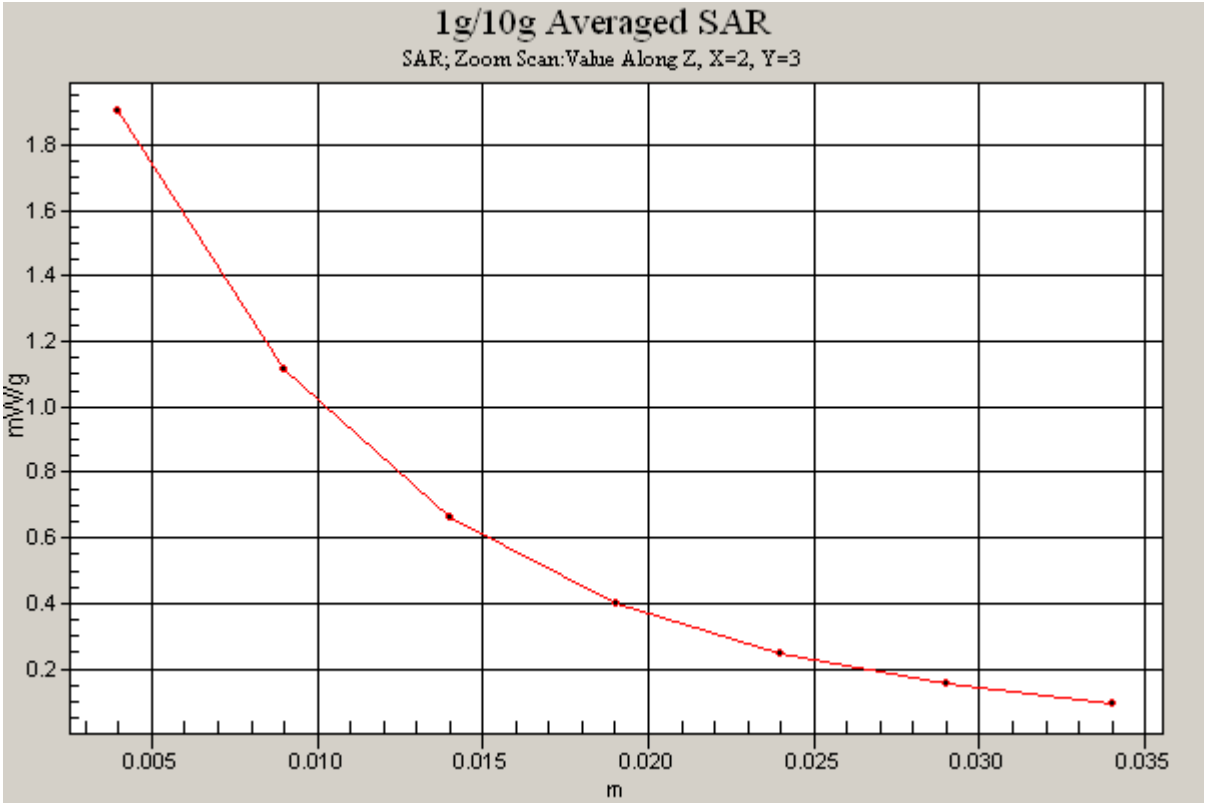
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.56 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-14-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.5°C

Probe: ES3DV2 - SN3022; ConvF(4.41, 4.41, 4.41); Calibrated: 8/25/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 16.0 dBm (40 mW)
SAR(1 g) = 1.7 mW/g; SAR(10 g) = 0.899 mW/g
Deviation = 2.66 %



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

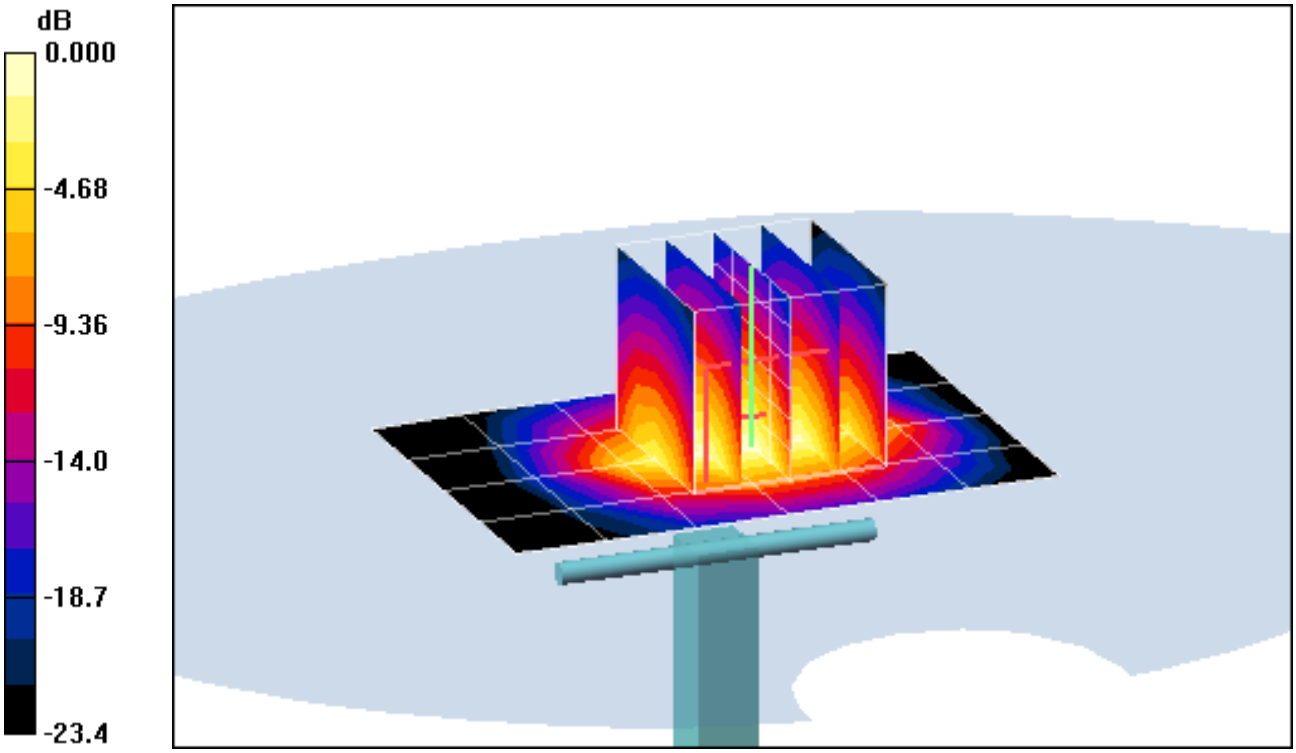
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.004 mho/m; ε_r = 50.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-15-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.8°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/25/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

2450MHz 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)
SAR(1 g) = 5.31 mW/g; SAR(10 g) = 2.43 mW/g
Deviation = 3.51 %



0 dB = 7.04mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

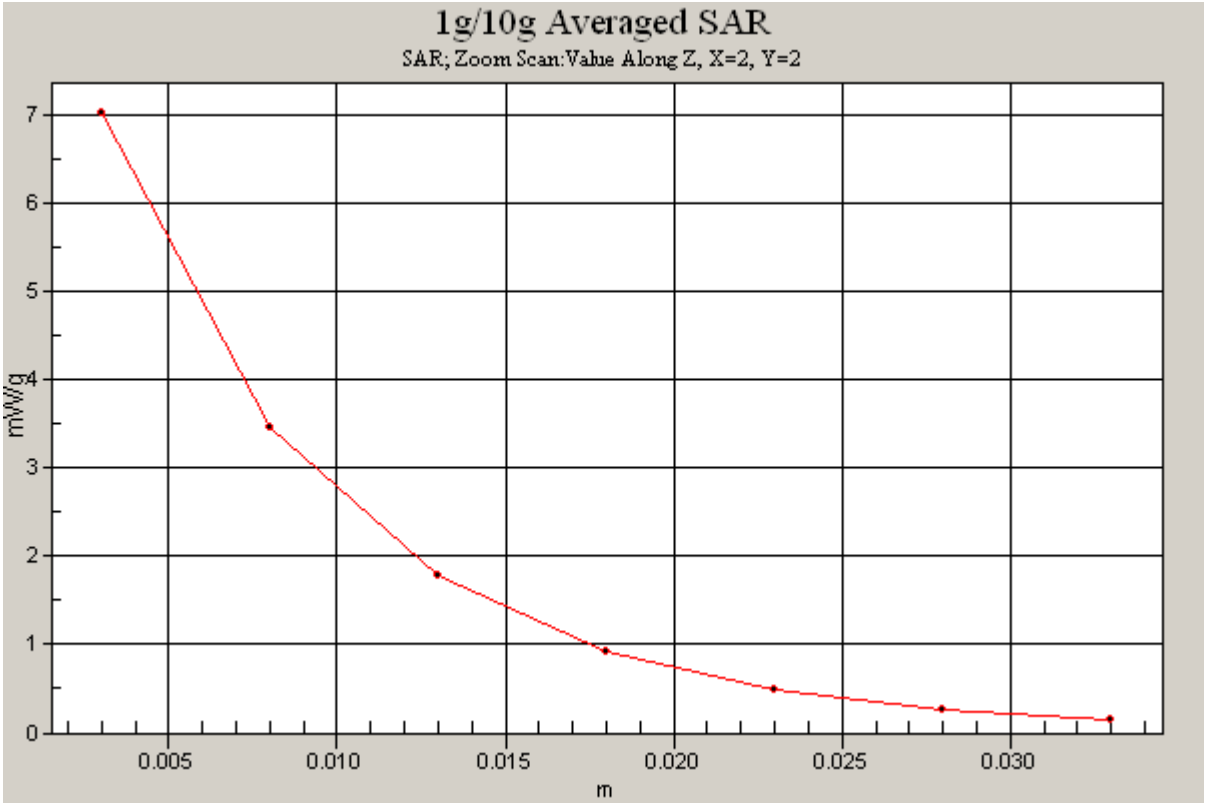
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.004 mho/m; ε_r = 50.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-15-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.8°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/25/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

2450MHz 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)
SAR(1 g) = 5.31 mW/g; SAR(10 g) = 2.43 mW/g
Deviation = 3.51 %



PCTEST ENGINEERING LABORATORY, INC.

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

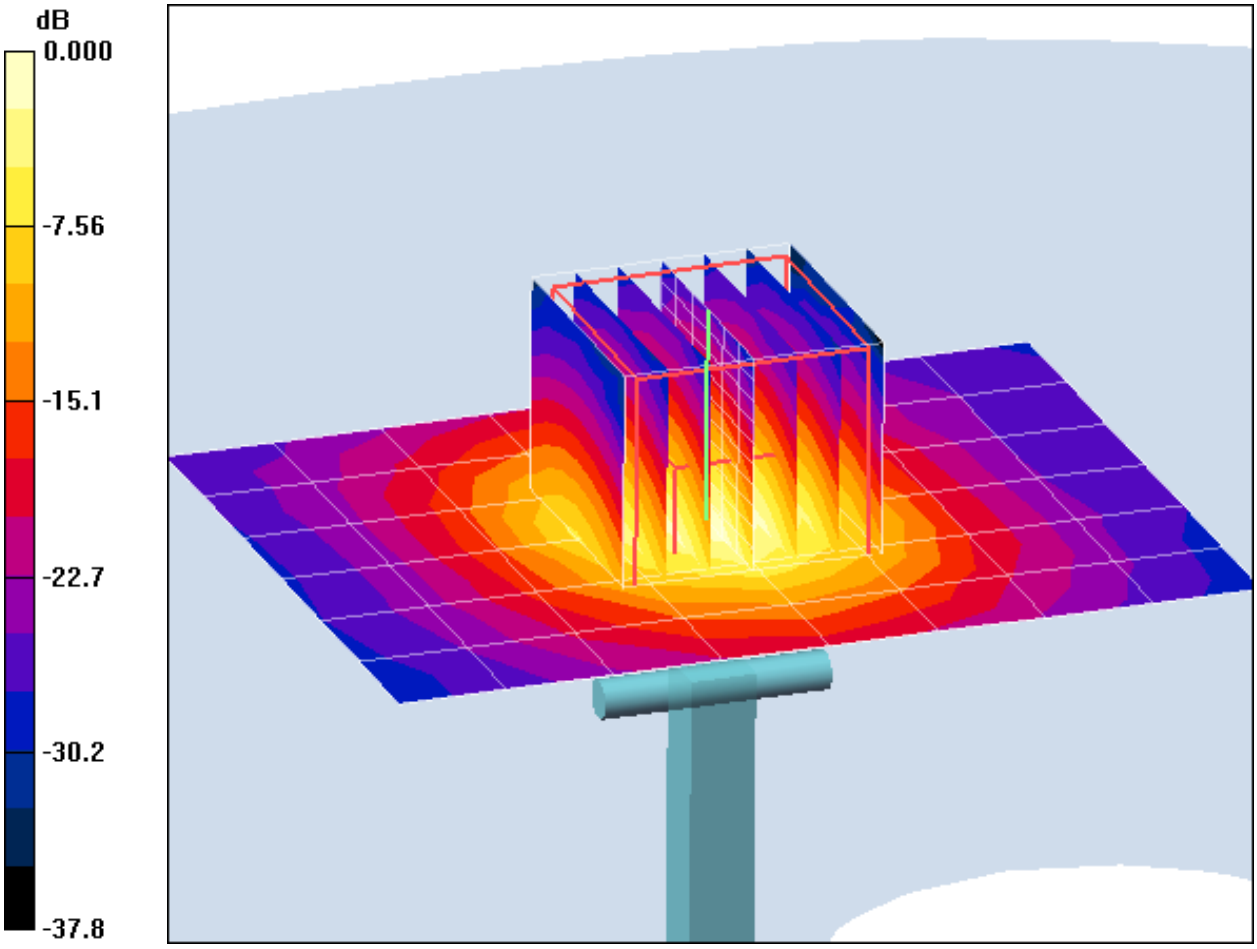
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5200 MHz; σ = 5.229 mho/m; ε_r = 47.71; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2012; Ambient Temp: 24.6°C; Tissue Temp: 23.1°C

Probe: EX3DV4 - SN3589; ConvF(3.92, 3.92, 3.92); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 dBm (100 mW)
SAR(1 g) = 7.59 mW/g; SAR(10 g) = 2.13 mW/g
Deviation = 0.53%



0 dB = 15.5mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

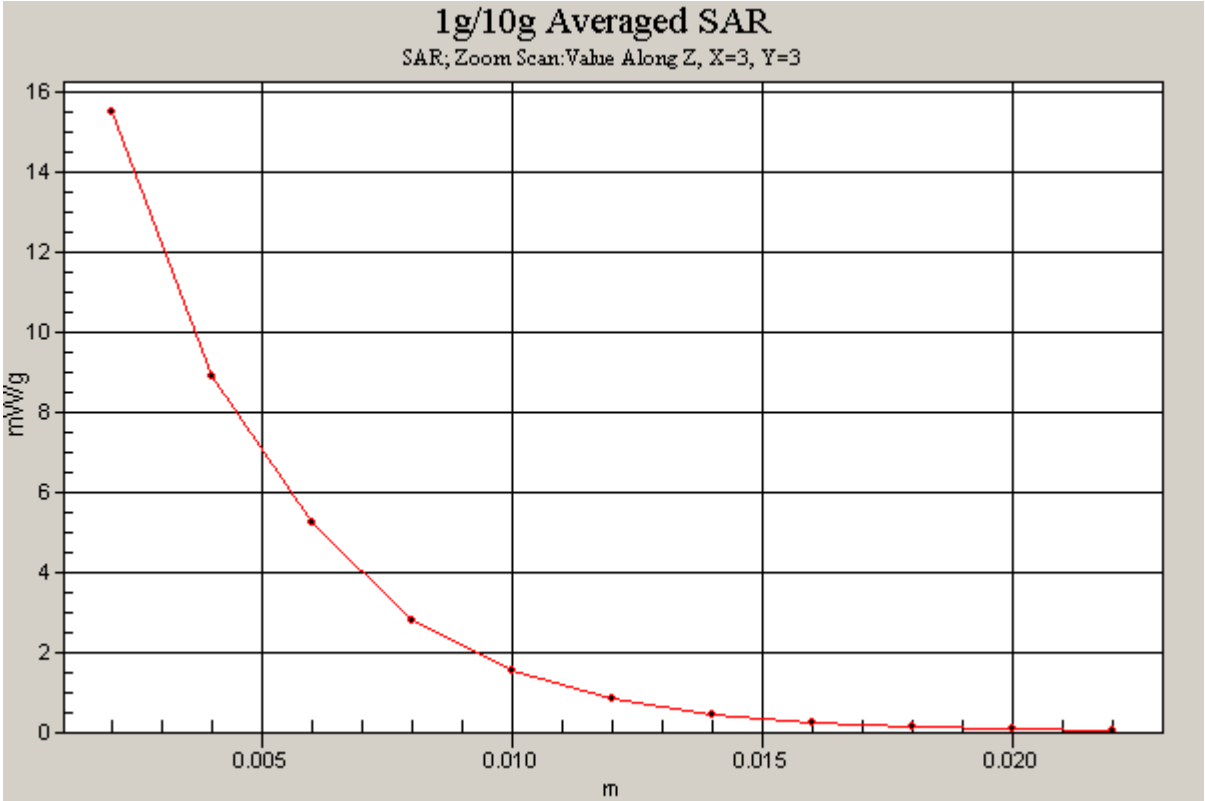
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5200 MHz; σ = 5.229 mho/m; ε_r = 47.71; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2012; Ambient Temp: 24.6°C; Tissue Temp: 23.1°C

Probe: EX3DV4 - SN3589; ConvF(3.92, 3.92, 3.92); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 dBm (100 mW)
SAR(1 g) = 7.59 mW/g; SAR(10 g) = 2.13 mW/g
Deviation = 0.53%



PCTEST ENGINEERING LABORATORY, INC.

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

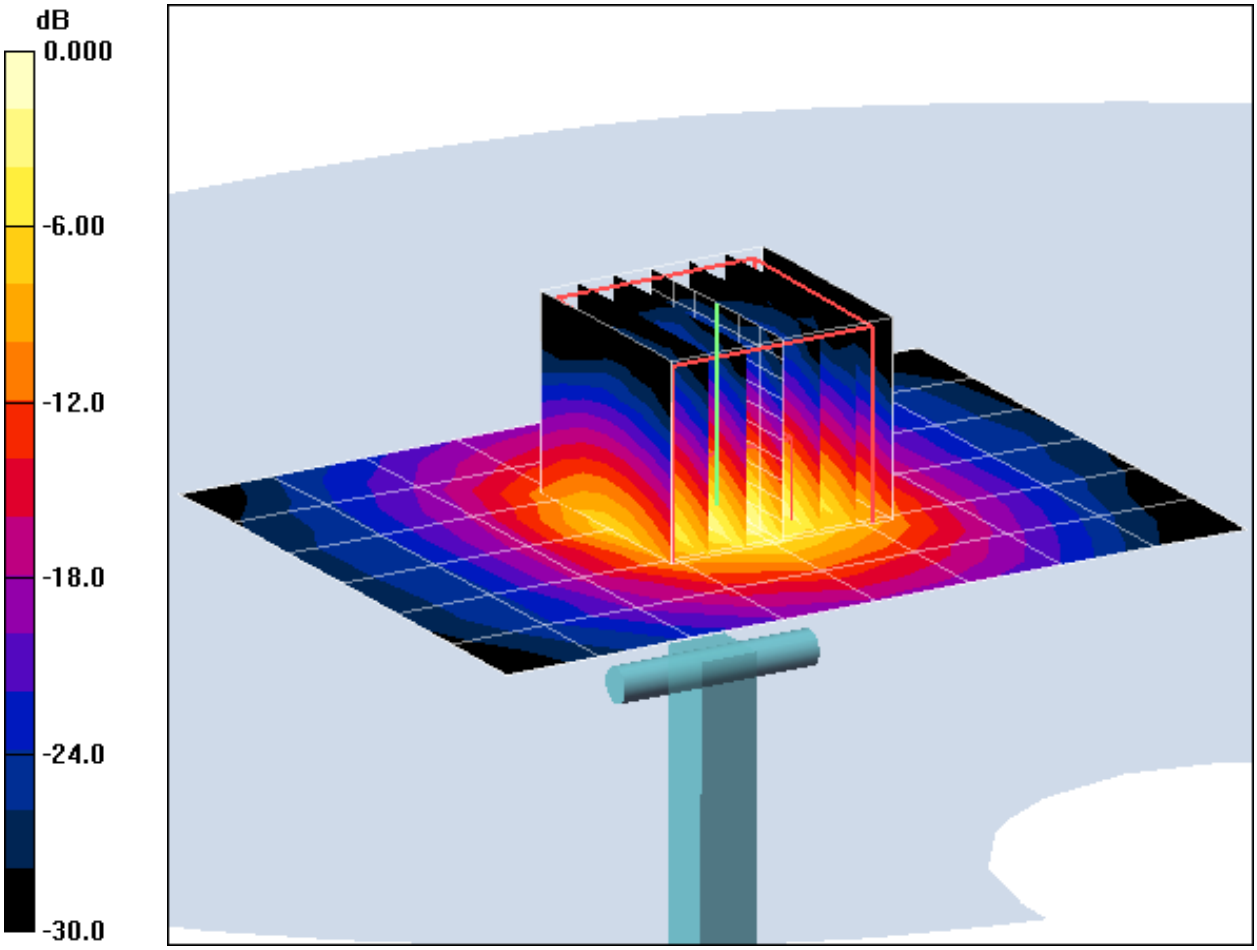
Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5500 MHz; σ = 5.69 mho/m; ε_r = 47.02; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3589; ConvF(3.4, 3.4, 3.4); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 dBm (100 mW)
SAR(1 g) = 8.15 mW/g; SAR(10 g) = 2.27 mW/g
Deviation = 0.25%



0 dB = 16.9mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

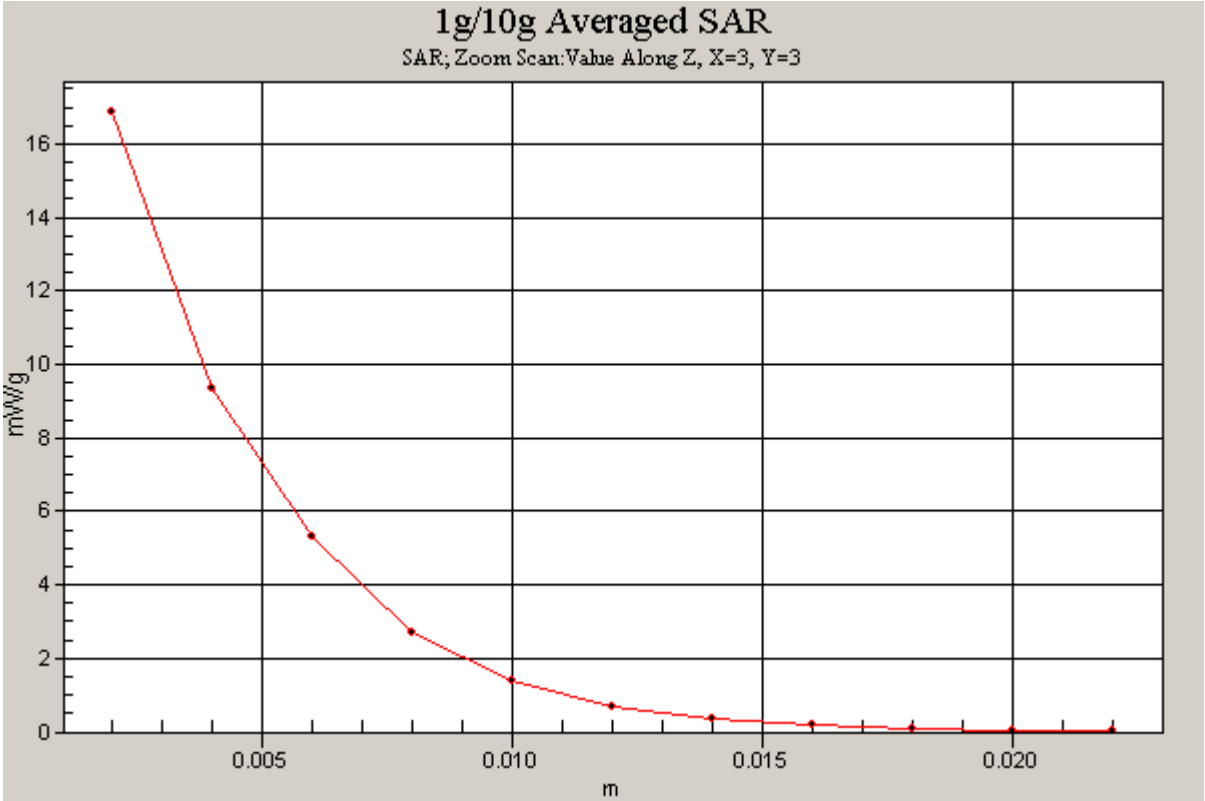
Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5500 MHz; σ = 5.69 mho/m; ε_r = 47.02; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3589; ConvF(3.4, 3.4, 3.4); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 dBm (100 mW)
SAR(1 g) = 8.15 mW/g; SAR(10 g) = 2.27 mW/g
Deviation = 0.25%



PCTEST ENGINEERING LABORATORY, INC.

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

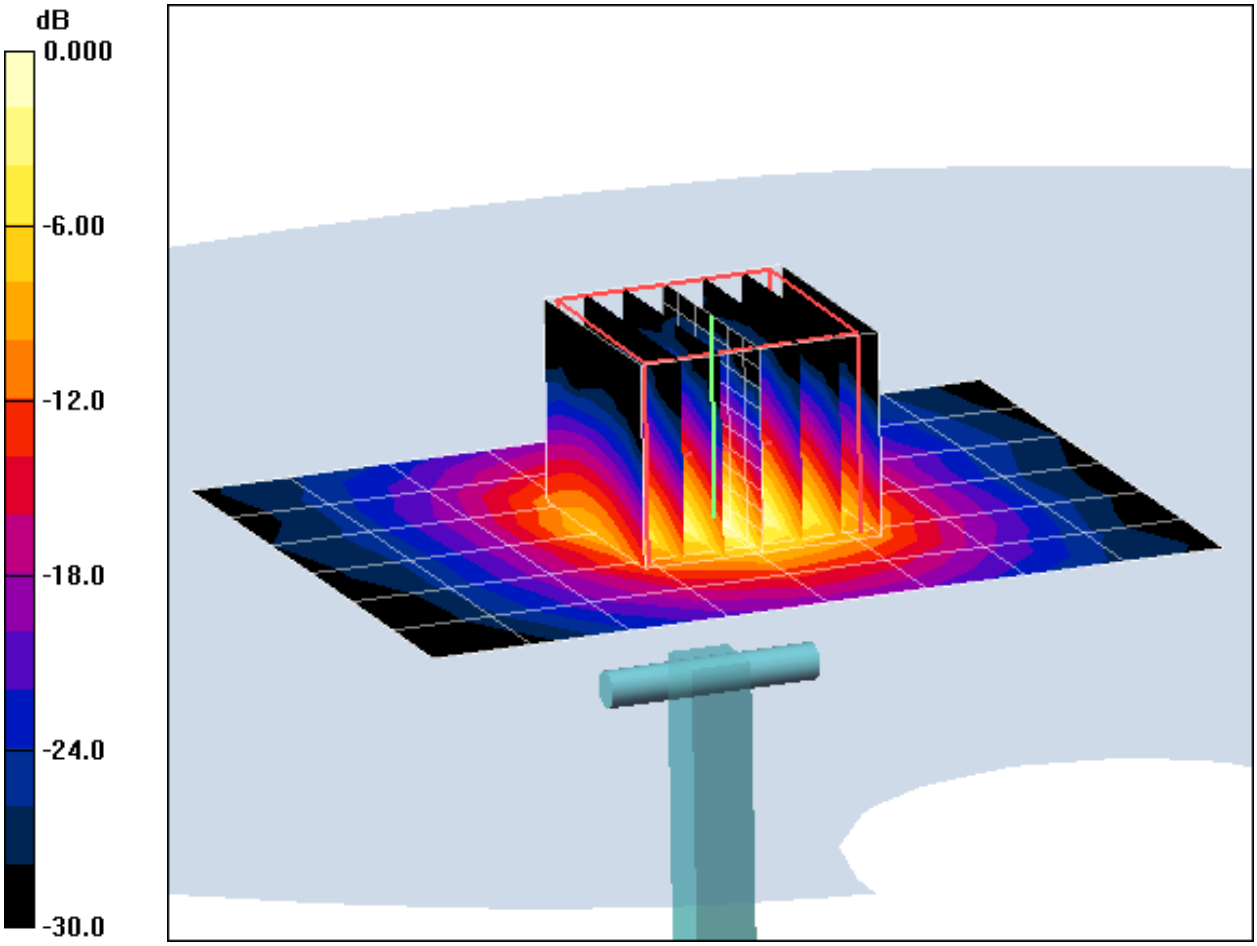
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5800 MHz; σ = 6.169 mho/m; ε_r = 46.28; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2012; Ambient Temp: 24.8°C; Tissue Temp: 23.2°C

Probe: EX3DV4 - SN3589; ConvF(3.59, 3.59, 3.59); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 dBm (100 mW)
SAR(1 g) = 7.17 mW/g; SAR(10 g) = 1.97 mW/g
Deviation = -4.78%



0 dB = 15.2mW/g

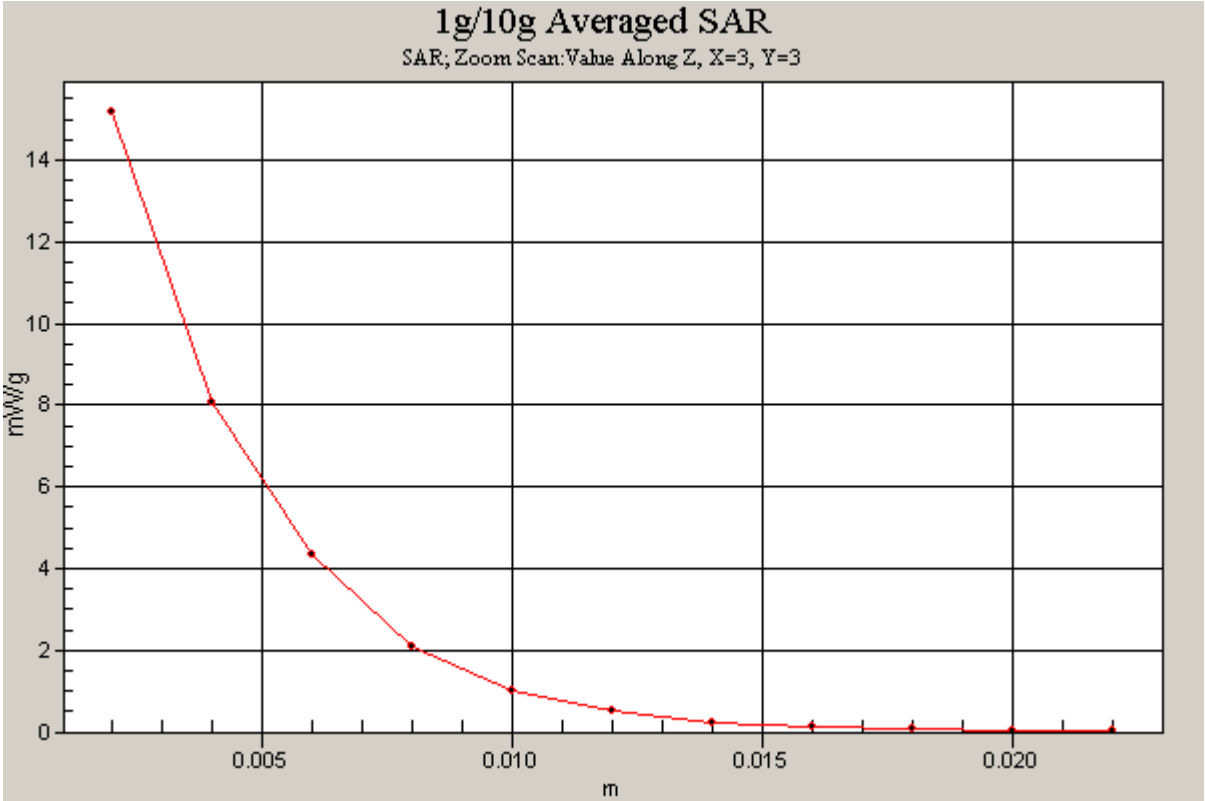
PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5800 MHz; σ = 6.169 mho/m; ε_r = 46.28; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-12-2012; Ambient Temp: 24.8°C; Tissue Temp: 23.2°C

Probe: EX3DV4 - SN3589; ConvF(3.59, 3.59, 3.59); Calibrated: 1/27/2012
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 dBm (100 mW)
SAR(1 g) = 7.17 mW/g; SAR(10 g) = 1.97 mW/g
Deviation = -4.78%