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SAR COMPLIANCE EVALUATION REPORT

Applicant Name:

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

Date of Testing:

11/17/10 - 12/14/10

Test Site/Location:

PCTEST Lab, Columbia, MD, USA

Test Report Serial No.:

0Y1011221878-R12.A3L

FCC ID:

A3LSCHI510

APPLICANT:

SAMSUNG ELECTRONICS, CO. LTD.

EUT Type:

Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE Certification

Application Type:**FCC Rule Part(s):**

CFR §2.1093; FCC/OET Bulletin 65 Supplement C [June 2001]

FCC Classification:

Licensed Transmitter Held to Ear (PCE) / Digital Transmission System (DTS)
FCC Part 15 Frequency Hopping Spread Spectrum Transceiver (DSS)

Model(s):

SCH-I510

Tx Frequency:

824.70 - 848.31 MHz (Cellular CDMA) / 1851.25 - 1908.75 MHz (PCS CDMA)
782 MHz (LTE) / 2412 - 2462 MHz (WLAN)
2402 - 2480 MHz (Bluetooth)

Conducted Power:

24.82 dBm Cell. CDMA / 25.37 dBm PCS CDMA
17.26 dBm 2.4 GHz WLAN / 23.12 dBm LTE
11.09 dBm Bluetooth

Max. SAR Measurement:

0.41 W/kg Cell. CDMA Head SAR / 0.85 W/kg Cell. CDMA Body SAR
1.01 W/kg PCS CDMA Head SAR / 1.00 W/kg PCS CDMA Body SAR
0.01 W/kg 2.4 GHz WLAN Head SAR / 0.07 W/kg 2.4 GHz WLAN Body SAR
0.39 W/kg LTE Head SAR / 0.23 W/kg LTE Body SAR
0.00 W/kg Bluetooth Body SAR

Test Device Serial No.:

Pre-Production [S/N: FCC SAR #1, FCC SAR #3, FCC SAR#4]

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.

Note: This revised Test Report (S/N: 0Y1011221878-R12.A3L) supersedes and replaces the previously issued test report on the same subject EUT for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly

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

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



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1 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.

1.1 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 Fig. 1-1).

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

Figure 1-1
SAR Mathematical Equation

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/m³)
- 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 Robotic System

Measurements are performed using the DASY4 automated dosimetric assessment system. The DASY4 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 Figure 3-1).

3.2 System Hardware

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and a remote control used to drive the robot motors. The PC consists of the SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing, A/D conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal from the DAE and transfers data to the PC card.

3.3 System Electronics

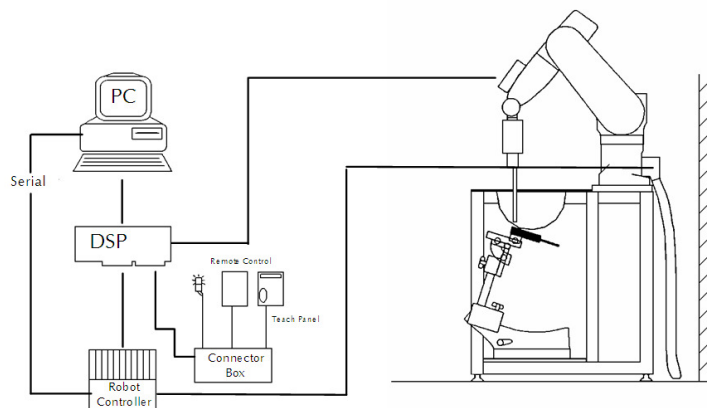


Figure 3-1
SAR Measurement System Setup

The DAE consists of a highly sensitive electrometer-grade auto-zeroing preamplifier, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

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3.4 Automated Test System Specifications

Test Software: SPEAG DASY4 version 4.7 Measurement Software
Robot: Stäubli Unimation Corp. Robot RX60L
Repeatability: 0.02 mm
No. of Axes: 6

Data Acquisition Electronic System (DAE)

Data Converter

Features: Signal Amplifier, multiplexer, A/D converter & control logic
Software: SEMCAD software
Connecting Lines: Optical Downlink for data and status info
Optical upload for commands and clock

PC Interface Card

Function: Link to DAE
16-bit A/D converter for surface detection system
Two Serial & Ethernet link to robotics
Direct emergency stop output for robot

Phantom

Type: SAM Twin Phantom (V4.0)
Shell Material: Composite
Thickness: 2.0 ± 0.2 mm



Figure 3-2
SAR Measurement System

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4 DASY E-FIELD PROBE SYSTEM

4.1 Probe Measurement System



**Figure 4-1
SAR System**

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration (see Figure 4-3) and optimized for dosimetric evaluation [9]. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multi-fiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order curve fitting (see Figure 5-1). The approach is stopped at reaching the maximum.

4.2 Probe Specifications

Model(s):	ES3DV2, ES3DV3, EX3DV4
Frequency Range:	10 MHz – 6.0 GHz (EX3DV4) 10 MHz – 4 GHz (ES3DV3)
Calibration:	In head and body simulating tissue at Frequencies from 300 up to 6000MHz
Linearity:	± 0.2 dB (30 MHz to 6 GHz) for EX3DV4 ± 0.2 dB (30 MHz to 4 GHz) for ES3DV3
Dynamic Range:	10 mW/kg – 100 W/kg
Probe Length:	330 mm
Probe Tip Length:	20 mm
Body Diameter:	12 mm
Tip Diameter:	2.5 mm (3.9mm for ES3DV3)
Tip-Center:	1 mm (2.0 mm for ES3DV3)
Application:	SAR Dosimetry Testing Compliance tests of mobile phones Dosimetry in strong gradient fields



**Figure 4-2
Near-Field Probe**



**Figure 4-3
Triangular Probe
Configuration**

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5 PROBE CALIBRATION PROCESS

5.1 Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm²) using an RF Signal generator, TEM cell, and RF Power Meter.

5.2 Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm².

5.3 Temperature Assessment

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C \frac{\Delta T}{\Delta t}$$

where:

Δt = exposure time (30 seconds),
 C = heat capacity of tissue (brain or muscle),
 ΔT = temperature increase due to RF exposure.

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

where:

σ = simulated tissue conductivity,
 ρ = Tissue density (1.25 g/cm³ for brain tissue)

SAR is proportional to $\Delta T/\Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

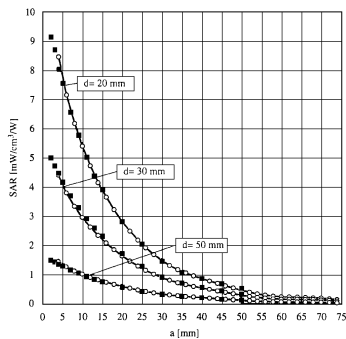


Figure 5-1 E-Field and Temperature measurements at 900MHz [9]

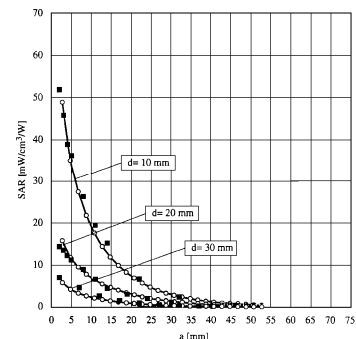


Figure 5-2 E-Field and temperature measurements at 1.9GHz [9]

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6 PHANTOM AND EQUIVALENT TISSUES

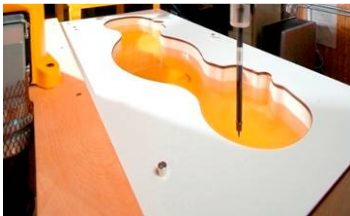
6.1 SAM Phantoms



**Figure 6-1
SAM Phantoms**

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to represent the 90th percentile of the population [12][13]. The phantom enables the dosimetric evaluation of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

6.2 Tissue Simulating Mixture Characterization



**Figure 6-2
SAM Phantom with
Simulating Tissue**

The mixture is characterized to obtain proper dielectric constant (permittivity) and conductivity of the tissue of interest. The tissue dielectric parameters recommended in IEEE 1528 and IEC 62209 have been used as targets for the compositions, and are to match within 5%, per the FCC recommendations.

**Table 6-1
Composition of the Tissue Equivalent Matter**

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

Note: See next page for 750 MHz information

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Table 6-2
Composition of the 750MHz Head and Body Tissue Equivalent Matter

2 Composition / Information on ingredients

The Item is composed of the following ingredients:

H ₂ O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40 – 60%
NaCl	Sodium Chloride, 0 – 6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-82-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1 – 0.7%
	Relevant for safety; Refer to the respective Safety Data Sheet ⁹ .

Note: 750MHz Head and Body liquid recipes are proprietary SPEAG. The composition is approximate to the actual liquids utilized. Thus the manufacturer production sheet is provided below.

Figure 6-3
750MHz Body Tissue Equivalent Matter

f [MHz]	HP-e'	HP-e''	sigma	P/N:	SL AAM 075	TARGET PARAMETERS		
300	61.02	35.43	0.59	Charge:	090224-1	f [MHz]	eps	sigma
350	60.21	32.13	0.63	Mea Date:	05-Mrz-09	700	55.7	0.96
400	59.50	29.71	0.66	Temp [°C]	22	750	55.5	0.96
450	58.79	28.00	0.70			800	55.3	0.97
500	58.16	26.60	0.74					
550	57.57	25.54	0.78					
600	56.99	24.68	0.82					
650	56.43	23.97	0.87					
700	55.88	23.46	0.91					
750	55.35	22.91	0.96					
800	55.02	22.56	1.00					
850	54.50	22.31	1.06					
900	54.02	22.08	1.11					
950	53.55	21.89	1.16					
1000	53.05	21.70	1.21					

Figure 6-4
750MHz Head Tissue Equivalent Matter

f [MHz]	HP-e'	HP-e''	sigma	P/N:	SL AAH 075	TARGET PARAMETERS		
300	50.56	30.29	0.51	Charge:	090224-2	f [MHz]	eps	sigma
350	49.28	28.08	0.55	Mea Date:	05-Mrz-09	700	42.2	0.89
400	48.08	26.44	0.59	Temp [°C]	22	750	41.9	0.89
450	47.00	25.25	0.63			800	41.7	0.90
500	46.03	24.24	0.67					
550	45.14	23.46	0.72					
600	44.32	22.89	0.78					
650	43.51	22.32	0.81					
700	42.78	21.89	0.85					
750	42.07	21.44	0.89					
800	41.53	21.13	0.94					
850	40.88	20.89	0.99					
900	40.28	20.65	1.03					
950	39.68	20.42	1.08					
1000	39.11	20.20	1.12					

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7 DOSIMETRIC ASSESSMENT & PHANTOM SPECS

7.1 Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR distribution at the exposed side of the head 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 head and the horizontal grid spacing was 15mm x 15mm.
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 testing the 1 gram cube. This fixed point was measured and used as a reference value.
3. Based on the area scan data, the 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 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 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. If the value deviated by more than 5%, the evaluation was repeated.
5. For 5 GHz testing finer resolution zoom scans were performed as specified by FCC SAR Measurement Requirements for 3 – 6 GHz, KDB pub 865664. The 5 GHz zoom scan requires a minimum volume of 24mm x 24mm x 20mm and 7 x 7 x 11 points.

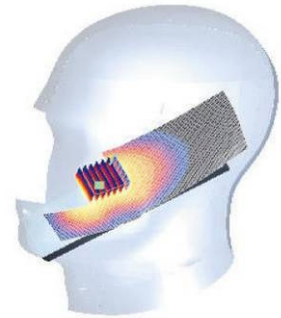


Figure 7-1
Sample SAR Area Scan

7.2 Specific Anthropomorphic Mannequin (SAM) Specifications

The phantom for handset SAR assessment testing is a low-loss dielectric shell, with shape and dimensions derived from the anthropometric data of the 90th percentile adult male head dimensions as tabulated by the US Army. The SAM Twin Phantom shell is bisected along the mid-sagittal plane into right and left halves (see Figure 7-2). The perimeter sidewalls of each phantom halves are extended to allow filling with liquid to a depth that is sufficient to minimize reflections from the upper surface. The liquid depth is maintained at a minimum depth of 15 cm.



Figure 7-2
SAM Twin Phantom Shell

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8.1 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 8-2)

Front, back and side view of SAM Twin Phantom (see Figure 8-2). 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].

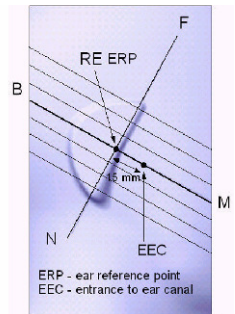


Figure 8-1
Close-Up Side view
of ERP

8.2 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 8-3). The "test device reference point" was then located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at its top and bottom edges, positioning the "ear reference point" on the outer surface of the both the left and right head phantoms on the ear reference point.

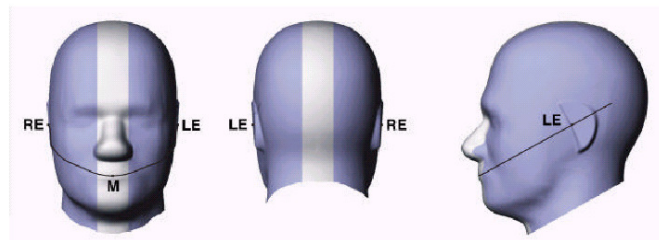


Figure 8-2
Front, back and side view of SAM Twin Phantom

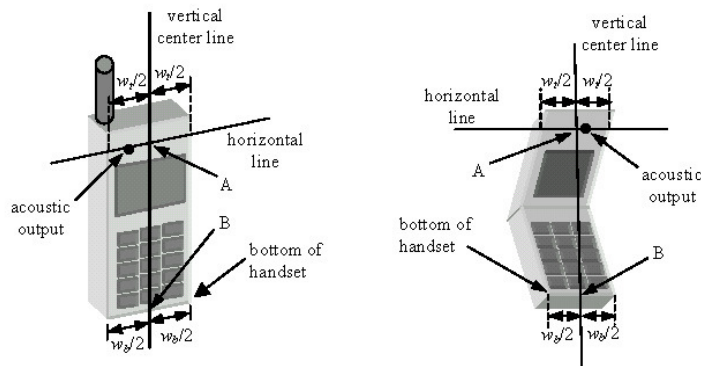


Figure 8-3
Handset Vertical Center & Horizontal Line Reference Points

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9 TEST CONFIGURATION POSITIONS

9.1 Device Holder

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

9.2 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 9-1), 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.

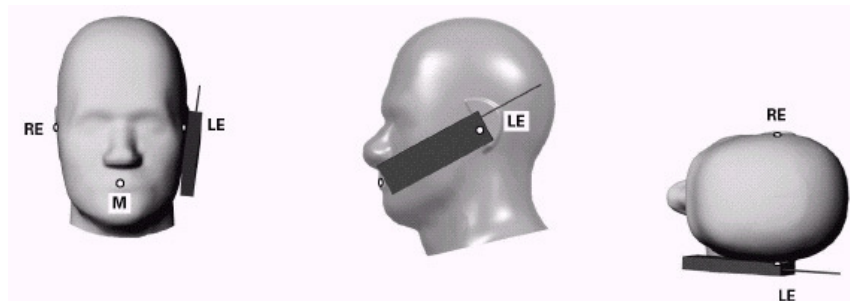


Figure 9-1 Front, Side and Top View of Cheek/Touch Position

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 with respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the 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 9-2).

9.3 Positioning for Ear / 15° 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 15 degrees.
2. The phone was then rotated around the horizontal line by 15 degrees.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the 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 9-2).

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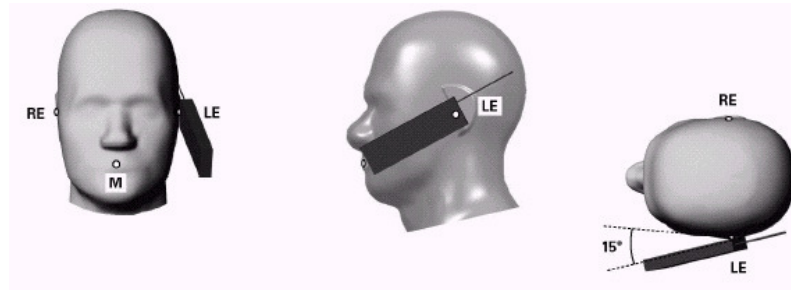


Figure 9-2 Front, Side and Top View of Ear/15° Tilt Position

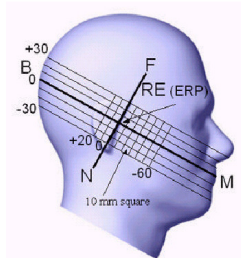


Figure 9-3
Side view w/ relevant markings



Figure 9-4 Body SAR Sample Photo
(Not Actual EUT)

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

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones. It has been known for some time that there are SAR measurement difficulties in these regions of the SAM phantom. SAR probes are calibrated in tissue equivalent liquids with sufficient separation between the probe sensors and nearby physical boundaries to ensure scattering does not affect probe calibration. When the probe tip is moved into tight regions with multiple boundaries surrounding its sensors, probe calibration and measurement accuracy can become questionable. In addition, these measurement locations often require a probe to be tilted at steep angles, where it may no longer comply with calibration requirements and measurement protocols, or satisfy the required measurement uncertainty. In some situations it is not feasible to tilt the probe or rotate the phantom, as suggested by measurement standards, to conduct these measurements.

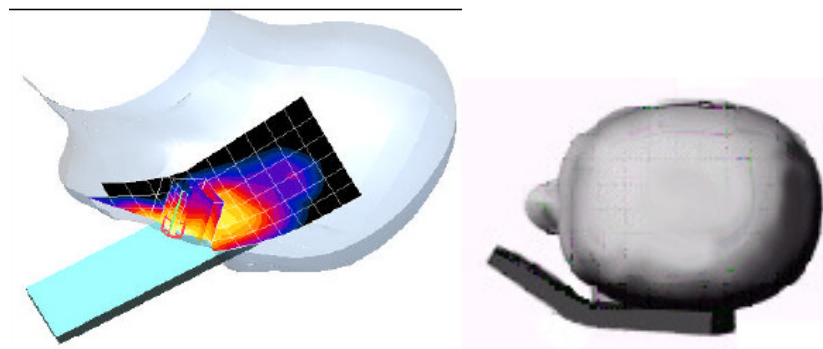


Figure 9-5
SAR Scans near the Jaw/Mouth

In order to ensure there is sufficient conservativeness for ensuring compliance until practical solutions are available, additional measurement considerations are necessary to address these technical difficulties. When measurements are required near the mouth, nose, jaw or similar tight regions of the SAM phantom,

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area or zoom scans are often unable to fully enclose the peak SAR location as required by IEEE 1528 and Supplement C, due to probe orientation and positioning difficulties. Even when limited measurements are possible, the test results could be questionable due to probe calibration and measurement uncertainty issues. Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document publication 648474. The SAR required in these regions of SAM should be measured using a flat phantom. **Rectangular shaped phones** should be positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM. The ear reference point (ERP, as defined for SAM) of the phone should be positioned ½ cm from the flat phantom shell. **Clam-shell phones** should be positioned with the hinge against a smooth edge of the flat phantom where the upper half of the phone is unfolded and extended beyond the phantom side wall. The lower half of the phone is secured in the test device holder at a fixed distance below the flat phantom determined by the minimum separation along the lower edge of the phone in the cheek touching position using SAM. Any case with substantial variation in separation distance along the lower edge of a clam shell is discussed with the FCC for best-to-use methodology.

The flat phantom data should allow test results to be compared uniformly across measurement systems, until suitable solutions are available in measurement standards to address certain probe calibration and positioning issues, due to implementation differences between horizontal and upright SAM configurations. These flat phantom procedures are only applicable for stand-alone SAR evaluation in tight regions of the SAM phantom, where measurement is not feasible or test results can be questionable due to probe calibration and accessibility issues. Details on device positioning and photos showing how separation distances are determined are included in the SAR report Photographs. SAR for other regions of the head must be evaluated using SAM; therefore, a phone with antennas at different locations may require flat and SAM phantom evaluation for the different antennas.

9.5 Body Holster /Belt Clip 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 9-4). 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.

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10 RF EXPOSURE LIMITS

10.1 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.

10.2 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 10-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT <i>General Population</i> (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT <i>Occupational</i> (W/kg) or (mW/g)
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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11 FCC 3G MEASUREMENT PROCEDURES

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

11.1 Procedures Used to Establish RF Signal for SAR

The device was placed into a simulated call using a base station simulator in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR [4]. SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, it was configured with the base station simulator. The SAR measurement software calculates a reference point at the start and end of the test to check for power drifts. If SAR deviations of more than 5% occurred, the tests were repeated.

11.2 SAR Measurement Conditions for CDMA2000

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

11.2.1 Output Power Verification

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

1. If the mobile station (MS) supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1, Table 11-1 parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH₀ and demodulation of RC 3,4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH₀ data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2, Table 13-2 was applied.
5. FCHs were configured at full rate for maximum SAR with "All Up" power control bits.

Table 11-1
Parameters for Max. Power for RC1

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

Table 11-2
Parameters for Max. Power for RC3

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

11.2.2 Head SAR Measurements

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

11.2.3 Body SAR Measurements

SAR for body exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + SCH_n) is not required when the maximum average output of each RF channel is

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less than ¼ dB higher than that measured with FCH only. Otherwise, SAR is measured on the maximum output channel (FCH + SCH_n) with FCH at full rate and SCH₀ enabled at 9600 bps using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts. Body SAR was measured using TDSO / SO32 with power control bits in the “All Up”

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

11.2.4 Handsets with EVDO

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

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11.3 RF Conducted Powers

11.3.1 CDMA Conducted Powers

Band	Channel	Loopback		Data			
		SO55 [dBm]	SO55 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC	RC1	RC3	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	1013	24.52	24.73	24.57	24.72	24.60	24.53
	384	24.65	24.82	24.76	24.81	24.75	24.42
	777	24.32	24.53	24.51	24.63	24.57	24.01
PCS	25	25.23	25.03	24.49	25.00	25.06	23.78
	600	24.65	24.80	24.83	24.77	24.69	24.58
	1175	25.19	25.09	25.27	25.13	25.37	24.91

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



Figure 11-1
Power Measurement Setup

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12 SAR TESTING WITH IEEE 802.11 TRANSMITTERS

Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g 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.

12.1 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.



12.2 Frequency Channel Configurations [27]

802.11 a/b/g and 4.9 GHz operating modes are tested independently according to the service requirements in each frequency band. 802.11 b/g modes are tested on channels 1, 6 and 11. 802.11a is tested for UNII operations on channels 36 and 48 in the 5.15-5.25 GHz band; channels 52 and 64 in the 5.25-5.35 GHz band; channels 104, 116, 124 and 136 in the 5.470-5.725 GHz band; and channels 149 and 161 in the 5.8 GHz band. When 5.8 GHz §15.247 is also available, channels 149, 157 and 165 should be tested instead of the UNII channels. 4.9 GHz is tested on channels 1, 10 and 5 or 6, whichever has the higher output power, for 5 MHz channels; channels 11, 15 and 19 for 10 MHz channels; and channels 21 and 25 for 20 MHz channels. These are referred to as the “default test channels”. 802.11g mode was evaluated only if the output power was 0.25 dB higher than the 802.11b mode.

Table 12-1
802.11 Test Channels per FCC Requirements

Mode	GHz	Channel	Turbo Channel	“Default Test Channels”		
				§15.247	802.11g	UNII
802.11 b/g	2.412	1		✓	✓	
	2.437	6		✓	✓	
	2.462	11		✓	✓	
802.11a	5.18	36				✓
	5.20	40	42 (5.21 GHz)			*
	5.22	44				*
	5.24	48				✓
	5.26	52	50 (5.25 GHz)			✓
	5.28	56				*
	5.30	60	58 (5.29 GHz)			*
	5.32	64				✓
	5.500	100	Unknown			*
	5.520	104				✓
	5.540	108				*
	5.560	112				*
	5.580	116				✓
	5.600	120				*
	5.620	124				✓
	5.640	128				*
	5.660	132				*
	5.680	136				✓
UNII or §15.247	5.700	140				*
	5.745	149		✓	✓	✓
	5.765	153	152 (5.76 GHz)		*	*
	5.785	157		✓		*
	5.805	161	160 (5.80 GHz)		*	✓
§15.247	5.825	165		✓		

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Table 12-2
IEEE 802.11b Average RF Power

Freq [MHz]	Channel	Data Rate [Mbps]	Average Power (dBm)
2412	1	1	16.80
		2	17.00
		5.5	17.02
		11	16.98
2437	6	1	17.26
		2	17.23
		5.5	17.02
		11	17.18
2462	11	1	17.23
		2	17.18
		5.5	17.22
		11	17.15

Table 12-3
IEEE 802.11g Average RF Power

Freq [MHz]	Channel	Data Rate [Mbps]	Average Power (dBm)
2412	1	6	13.70
		9	13.72
		12	13.71
		18	13.68
		24	13.67
		36	13.65
		48	13.71
		54	13.66
2437	6	6	13.87
		9	13.81
		12	13.79
		18	13.83
		24	13.80
		36	13.78
		48	13.72
		54	13.72
2462	11	6	14.01
		9	13.92
		12	13.93
		18	13.89
		24	13.91
		36	13.88
		48	13.81
		54	13.93

Table 12-4
IEEE 802.11n Average RF Power

Freq [MHz]	Channel	Data Rate [Mbps]	Average Power (dBm)
2412	1	6.5/7.2	11.72
		13/14.40	11.75
		19.5/21.70	11.67
		26/28.90	11.69
		29/43.3	11.51
		52/57.80	11.51
		58.50/65	11.50
		65/72.2	11.52
2437	6	6.5/7.2	11.86
		13/14.40	11.76
		19.5/21.70	11.81
		26/28.90	11.64
		29/43.3	11.63
		52/57.80	11.59
		58.50/65	11.41
		65/72.2	11.56
2462	11	6.5/7.2	11.99
		13/14.40	11.92
		19.5/21.70	11.92
		26/28.90	11.87
		29/43.3	11.85
		52/57.80	11.77
		58.50/65	11.74
		65/72.2	11.70



Figure 12-1
Power Measurement Setup

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13 4G LTE TEST CONFIGURATIONS

13.1 Frequency of Operation per 27.5

Per FCC Rule 27.5(b)(3): “(3) Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands.”

13.2 Device Specifications

Sec.	FCC ID			A3LSCHI510	
	Form Factor			Handset	
1)	Frequency Range of each LTE transmission band			Band 13: 782 MHz	
2)	Channel Bandwidths			10 MHz BW	
3)	H, M, L channel numbers and frequencies				
	Low	Mid	High		
	NA	782 MHz (CH:23230)	NA	Band 13, 10 MHz BW:	
4)(a)	UE Category			3	
(b)	Modulations Supported in UL			QPSK, 16QAM	
	LTE Transmitter and Antenna Implementation			See Operational Description	
5)	Description of LTE Tx and Ant. Implementation			1 TX/RX Ant; 1 Rx Ant	
6)	LTE Voice available?			No	
	Hotspot with LTE+WIFI			Yes	
	Hotspot with LTE+WIFI active with 1XVoice sessions?			Yes	
7)	LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)			Yes	
	A-MPR (Additional MPR) disabled for SAR Testing?			Yes	
8)	Conducted power Table provided for 1RB (low and high offset), 50% RB (centered), 100% RB			Yes	
9-10)	Non-LTE US Wireless Operating Modes/Band			RF Output Power	RF Exposure Configurations
	835 MHz CDMA			25 dBm	Head and Body
	1900 MHz CDMA			25 dBm	Head and Body
	2.4 GHz Bluetooth			11 dBm	Body
	2.4 GHz WI-FI			17 dBm	Head and Body
11)	Simultaneous Tx conditions			See SAR Report: Sec. 17	
12)	Power Reduction used for SAR Compliance?			No	
13-15)	N/A				

13.3 Test Conditions

SAR tests for LTE were performed with a base station simulator, Rohde & Schwarz CMW500. Closed loop power control was used so the UE transmits with maximum output power during SAR testing.

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13.4 LTE Measured Maximum RF Output Conducted Powers

There is only one channel (782 MHz) and one BW (10 MHz) for LTE Band 13 on this device.

There is a permanently applied MPR implemented by the manufacturer. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1. See Table 13-1 for specific MPR per mode and configuration which are within tolerances allowed by 3GPP.

A-MPR has been disabled for all SAR Tests.

LTE modes were selected according to LTE procedures in FCC KDB 941225 publication. Please see notes following SAR data for required test configurations.

Table 13-1
Measured LTE RF Output Powers

Frequency	BW	Modulation	RB Size	RB Offset	Maximum Average Power [dBm]	MPR Target [dB]	MPR per 3GPP [dB]
782 MHz	10 MHz	QPSK	1	0	23.12	0	0
		16QAM	1	0	22.52	0.5	0-1
		QPSK	1	49	22.99	0	0
		16QAM	1	49	22.36	0.5	0-1
		QPSK	25	13	22.66	0.5	0-1
		16QAM	25	13	22.15	1	0-2
		QPSK	50	0	22.75	0.5	0-1
		16QAM	50	0	22.12	1	0-2

Note: Differences from expected MPR levels are a result of measurement uncertainty. Per the manufacturer, the measured powers are acceptable for use within the intended network infrastructure.

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14 ADDITIONAL SAR CONSIDERATIONS

14.1 Hotspot SAR Test Configurations

Table 14-1
Mobile Hotspot Sides for SAR Testing

Mobile Hotspot Side for SAR Testing						
Mode	Back	Front	Side A	Side B	Side C	Side D
Cellular EVDO	Yes	Yes	Yes	No	No	Yes
PCS EVDO	Yes	Yes	Yes	No	No	Yes
Band 13 LTE	Yes	Yes	Yes	No	Yes	No
2.4 GHz WIFI	Yes	Yes	No	Yes	No	No

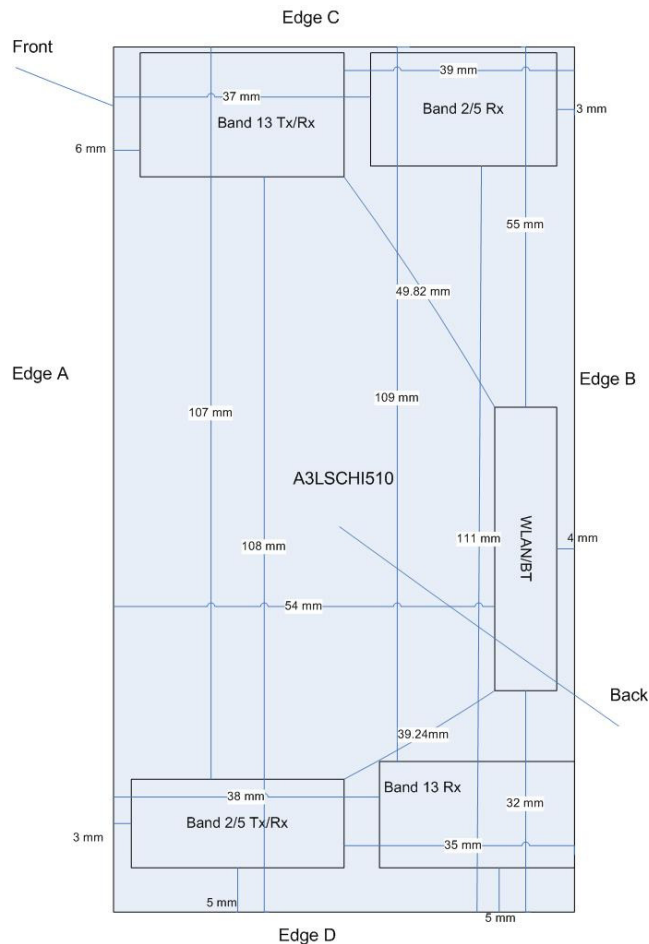


Figure 14-1 Identification of Sides for SAR Testing

Note: Per Oct 2010 TCB FCC Workshop, the edges with antennas within 2.5 cm are required to be evaluated for SAR. See Figure 14-1 for distances of the actual device.

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14.2 Inductive Battery Cover Considerations

Inductive battery accessory was evaluated for SAR at the worst case SAR to take into consideration the additional optional manufacturer charging component accessory for RF exposure compliance. See Figure 14-2 for receiver diagram.

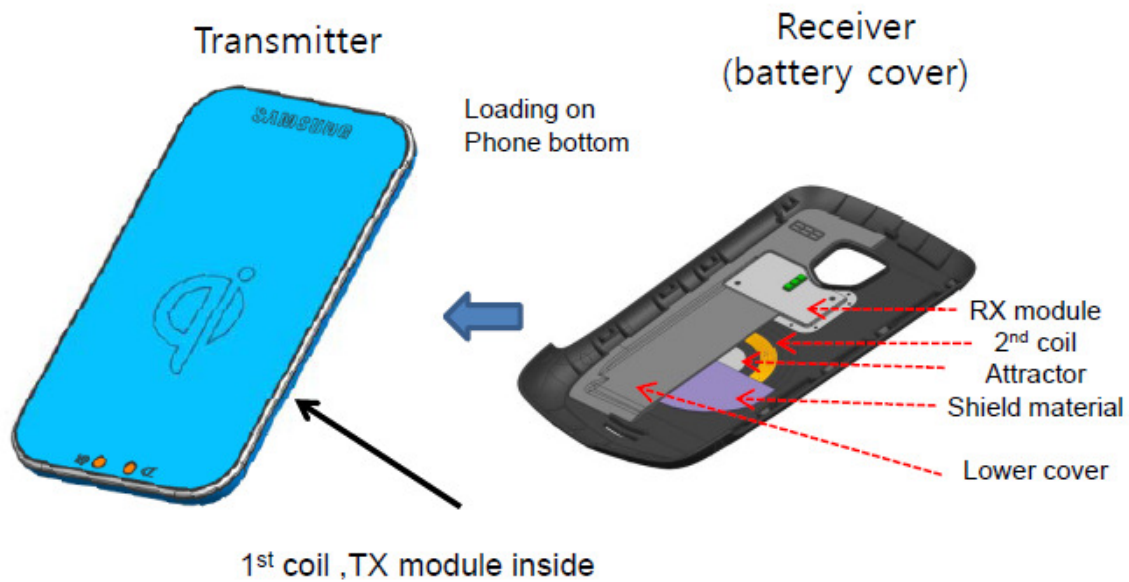


Figure 14-2
Inductive Battery Cover Diagram

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15 SYSTEM VERIFICATION

15.1 Tissue Verification

Table 15-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	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
11/18/2010	835H	820	0.862	40.38	0.898	41.571	-4.01%	-2.86%
		835	0.869	40.13	0.900	41.500	-3.44%	-3.30%
		850	0.886	40.06	0.916	41.500	-3.28%	-3.47%
11/17/2010	1900H	1850	1.414	40.59	1.400	40.000	1.00%	1.48%
		1880	1.439	40.50	1.400	40.000	2.79%	1.25%
		1910	1.468	40.35	1.400	40.000	4.86%	0.88%
11/22/2010	1900B	1850	1.519	53.03	1.520	53.300	-0.07%	-0.51%
		1880	1.536	52.93	1.520	53.300	1.05%	-0.69%
		1910	1.574	52.88	1.520	53.300	3.55%	-0.79%
11/23/2010	2450H	2401	1.809	38.48	1.758	39.298	2.90%	-2.08%
		2450	1.840	38.48	1.800	39.200	2.22%	-1.84%
		2499	1.896	37.89	1.852	39.135	2.38%	-3.18%
12/01/2010	835H	820	0.897	42.42	0.898	41.571	-0.11%	2.04%
		835	0.884	42.40	0.900	41.500	-1.78%	2.17%
		850	0.902	42.60	0.916	41.500	-1.53%	2.65%
12/01/2010	835B	820	0.993	56.74	0.969	55.284	2.48%	2.63%
		835	1.007	56.21	0.970	55.200	3.81%	1.83%
		850	1.012	56.52	0.988	55.154	2.43%	2.48%
12/02/2010	750H	725	0.855	41.88	0.888	42.033	-3.72%	-0.36%
		740	0.866	41.75	0.889	41.953	-2.59%	-0.48%
		755	0.880	41.66	0.891	41.876	-1.23%	-0.52%
		770	0.891	41.29	0.892	41.806	-0.11%	-1.23%
		785	0.908	41.10	0.894	41.735	1.57%	-1.52%
12/02/2010	750B	800	0.922	40.87	0.896	41.665	2.90%	-1.91%
		760	0.945	54.31	0.963	55.621	-1.84%	-2.36%
		775	0.954	54.25	0.964	55.536	-1.05%	-2.32%
		790	0.974	54.07	0.966	55.452	0.82%	-2.49%
		790	0.974	54.07	0.966	55.452	0.82%	-2.49%
12/03/2010	1900H	1850	1.371	40.72	1.400	40.000	-2.07%	1.80%
		1880	1.399	40.62	1.400	40.000	-0.07%	1.55%
		1910	1.428	40.53	1.400	40.000	2.00%	1.33%
12/03/2010	1900B	1850	1.533	53.07	1.520	53.300	0.86%	-0.43%
		1880	1.557	53.13	1.520	53.300	2.43%	-0.32%
		1910	1.595	52.97	1.520	53.300	4.93%	-0.62%
12/04/2010	2450B	2401	1.923	53.37	1.903	52.765	1.05%	1.15%
		2450	1.986	53.09	1.950	52.700	1.85%	0.74%
		2499	2.070	52.93	2.019	52.638	2.53%	0.55%
12/14/2010	2450H	2401	1.841	37.92	1.758	39.298	4.72%	-3.51%
		2450	1.880	37.68	1.800	39.200	4.44%	-3.88%
		2499	1.937	37.43	1.852	39.135	4.59%	-4.36%
12/14/2010	2450B	2401	1.839	50.60	1.903	52.765	-3.36%	-4.10%
		2450	1.903	50.42	1.950	52.700	-2.41%	-4.33%
		2499	1.961	50.23	2.019	52.638	-2.87%	-4.57%

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.

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15.2 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):

$$Y = \frac{j2\omega\epsilon_r\epsilon_0}{[\ln(b/a)]^2} \int_a^b \int_a^b \int_0^\pi \cos\phi' \frac{\exp[-j\omega r(\mu_0\epsilon_r'\epsilon_0)^{1/2}]}{r} d\phi' d\rho' d\rho$$

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 $j = \sqrt{-1}$.

15.3 Justification for Extended SAR Dipole Calibrations

Usage of SAR dipoles calibrated less than 2 years ago but more than 1 year ago were confirmed in maintaining return loss (< -20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB Publication 450824:

D835V2 SN: 4d047				
Date of Measurement	Return Loss (dB)	Δ %	Impedance (Ω)	$\Delta\Omega$
1/19/2009	-28.4		50.9	
8/19/2010	-25.6	-10%	48.9	-2

D1900V2 SN:5d080				
Date of Measurement	Return Loss (dB)	Δ %	Impedance (Ω)	$\Delta\Omega$
8/18/2009	-24.3		50	
8/19/2010	-22.4	-7.8%	51	1.0

D2450V2 SN: 719				
Date of Measurement	Return Loss (dB)	Δ %	Impedance (Ω)	$\Delta\Omega$
8/27/2009	-28.6		53.4	
8/19/2010	-27.5	-3.8%	51	-2.4

D2450V2 SN: 797				
Date of Measurement	Return Loss (dB)	Δ %	Impedance (Ω)	$\Delta\Omega$
1/8/2009	-25		55.1	
8/19/2010	-22.4	-10.4%	52.3	-2.8

D750V2 SN: 1003				
Date of Measurement	Return Loss (dB)	Δ %	Impedance (Ω)	$\Delta\Omega$
2/19/2009	-26		48.9	
8/29/2010	-24.5	-6%	49.9	1.0

D835V2 SN: 4d026				
Date of Measurement	Return Loss (dB)	Δ %	Impedance (Ω)	$\Delta\Omega$
8/24/2009	-22.5		51	
8/19/2010	-21.4	-5%	50.1	-0.9

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15.4 Test System Verification

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

Table 15-2
System Verification Results

System Verification TARGET & MEASURED										
Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Tissue Frequency (MHz)	Dipole SN	Tissue Type	Measured SAR _{1g} (W/kg)	1 W Target SAR _{1g} (W/kg)	1 W Normalized SAR _{1g} (W/kg)	Deviation (%)
11/18/2010	24.1	22.5	0.100	835	4d047	Head	0.966	9.700	9.66	-0.41%
11/17/2010	23.2	22.1	0.0746	1900	5d080	Head	3.00	40.100	40.1903	0.23%
12/01/2010	23.9	22.0	0.100	835	4d026	Head	0.929	9.460	9.29	-1.80%
11/23/2010	23.7	21.8	0.040	2450	719	Head	2.17	53.500	54.25	1.40%
12/04/2010	23.6	22.0	0.025	2450	797	Body	1.34	53.000	53.60	1.13%
12/02/2010	24.3	22.4	0.063	750	1003	Head	0.51	8.520	8.095	-4.99%
11/22/2010	23.6	21.8	0.100	1900	5d080	Body	4.35	40.500	43.50	7.41%
12/03/2010	23.8	22.2	0.025	1900	5d080	Body	1.04	40.500	41.60	2.72%
12/14/2010	22.7	21.4	0.025	2450	797	Body	1.28	53.000	51.20	-3.40%

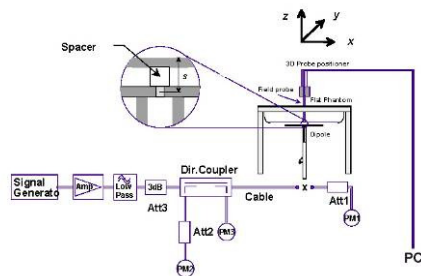


Figure 15-1
System Verification Setup Diagram



Figure 15-2
System Verification Setup Photo

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16 SAR DATA SUMMARY

Table 16-1
Cell. CDMA Head SAR Results

MEASUREMENT RESULTS							
FREQUENCY		Mode/Band	C_Power[dBm]		Side	Test Position	SAR (1g)
MHz	Ch.		Start	End			(W/kg)
836.52	384	Cell. CDMA	24.82	24.87	Right	Touch	0.393
836.52	384	Cell. CDMA	24.82	24.73	Right	Tilt	0.271
836.52	384	Cell. CDMA	24.82	24.91	Left	Touch	0.412
836.52	384	Cell. CDMA	24.82	24.79	Left	Touch	0.402*
836.52	384	Cell. CDMA	24.82	24.85	Left	Tilt	0.283
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Brain 1.6 W/kg (mW/g) averaged over 1 gram		

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. All modes of operation were investigated, and worst-case results are reported.
3. Batteries are fully charged for all readings. Standard battery was used.
4. Tissue parameters and temperatures are listed on the SAR plots.
5. Liquid tissue depth was at least 15.0 cm.
6. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration (left, right, cheek/touch, tilt/ear, extended and retracted) 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. CDMA2000 mode was tested under RC3/SO55.
8. Inductive battery accessory was evaluated for SAR at the worst case SAR to take into consideration the additional optional manufacturer charging component accessory for RF exposure compliance (See Section 14.2). Asterisk (*) denotes that sample was tested with an inductive battery cover.

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Table 16-2
PCS CDMA Head SAR Results

MEASUREMENT RESULTS							
FREQUENCY		Mode/Band	C_Power[dBm]		Side	Test Position	SAR (1g)
MHz	Ch.		Start	End			(W/kg)
1851.25	25	PCS CDMA	25.03	25.01	Right	Touch	0.644
1880.00	600	PCS CDMA	24.80	24.85	Right	Touch	1.010
1908.75	1175	PCS CDMA	25.09	25.01	Right	Touch	0.983
1880.00	600	PCS CDMA	24.80	24.83	Right	Touch	0.668*
1880.00	600	PCS CDMA	24.80	24.80	Right	Tilt	0.370
1880.00	600	PCS CDMA	24.80	24.76	Left	Touch	0.521
1880.00	600	PCS CDMA	24.80	24.74	Left	Tilt	0.352
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Brain 1.6 W/kg (mW/g) averaged over 1 gram		

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. All modes of operation were investigated, and worst-case results are reported.
3. Batteries are fully charged for all readings. Standard battery was used.
4. Tissue parameters and temperatures are listed on the SAR plots.
5. Liquid tissue depth was at least 15.0 cm.
6. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration (left, right, cheek/touch, tilt/ear, extended and retracted) 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. CDMA2000 mode was tested under RC3/SO55.
8. Inductive battery accessory was evaluated for SAR at the worst case SAR to take into consideration the additional optional manufacturer charging component accessory for RF exposure compliance (See Section 14.2). Asterisk (*) denotes that sample was tested with an inductive battery cover.

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Table 16-3
2.4 GHz WLAN Head SAR Results

MEASUREMENT RESULTS								
FREQUENCY		Mode	C_Power[dBm]		Side	Test Position	Data Rate (Mbps)	SAR (1g)
MHz	Ch.		Start	End				(W/kg)
2437	6	IEEE 802.11b	17.26	17.17	Right	Touch	1	0.010
2437	6	IEEE 802.11b	17.26	17.34	Right	Tilt	1	0.007
2437	6	IEEE 802.11b	17.26	17.33	Left	Touch	1	0.014
2437	6	IEEE 802.11b	17.26	17.31	Left	Touch	1	0.0104*
2437	6	IEEE 802.11b	17.26	17.21	Left	Tilt	1	0.002
ANSI / IEEE C95.1 1992 - SAFETY LIMIT					Brain			
Spatial Peak					1.6 W/kg (mW/g)			
Uncontrolled Exposure/General Population					averaged over 1 gram			

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. All modes of operation were investigated, and worst-case results are reported.
3. Batteries are fully charged for all readings. Standard battery was used.
4. Tissue parameters and temperatures are listed on the SAR plots.
5. Liquid tissue depth was at least 15.0 cm.
6. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes: Highest average RF output power channel for the lowest data rate were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n) were not investigated since the average output powers were not greater than 0.25 dB than that of the corresponding channel in the lowest data rate IEEE 802.11b mode.
7. WLAN transmission was verified using a spectrum analyzer.
8. Inductive battery accessory was evaluated for SAR at the worst case SAR to take into consideration the additional optional manufacturer charging component accessory for RF exposure compliance (See Section 14.2). Asterisk (*) denotes that sample was tested with an inductive battery cover.

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Table 16-4
LTE QPSK Head SAR Results

MEASUREMENT RESULTS											
FREQUENCY		Mode/Band	Service	C_Power[dBm]		MPR [dB]	Side	Test Position	Number of RBs	RB Offset	SAR (1g)
MHz	Ch.			Start	End						(W/kg)
782.00	23230	LTE	QPSK	22.66	22.60	0.5	Right	Touch	25	13	0.214
782.00	23230	LTE	QPSK	23.12	23.16	0.0	Right	Touch	1	0	0.285
782.00	23230	LTE	QPSK	22.99	22.96	0.0	Right	Touch	1	49	0.150
782.00	23230	LTE	QPSK	22.66	22.63	0.5	Right	Tilt	25	13	0.144
782.00	23230	LTE	QPSK	23.12	23.19	0.0	Right	Tilt	1	0	0.186
782.00	23230	LTE	QPSK	22.99	23.09	0.0	Right	Tilt	1	49	0.131
782.00	23230	LTE	QPSK	22.66	22.73	0.5	Left	Touch	25	13	0.301
782.00	23230	LTE	QPSK	23.12	23.17	0.0	Left	Touch	1	0	0.350
782.00	23230	LTE	QPSK	22.99	22.99	0.0	Left	Touch	1	49	0.188
782.00	23230	LTE	QPSK	22.66	22.70	0.5	Left	Tilt	25	13	0.277
782.00	23230	LTE	QPSK	23.12	23.21	0.0	Left	Tilt	1	0	0.385
782.00	23230	LTE	QPSK	22.99	23.01	0.0	Left	Tilt	1	49	0.212
782.00	23230	LTE	QPSK	23.12	23.12	0.0	Left	Tilt	1	0	0.379*
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Brain 1.6 W/kg (mW/g) averaged over 1 gram				

Notes:

- 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].
- All modes of operation were investigated, and worst-case results are reported.
- Batteries are fully charged for all readings. Standard battery was used.
- Tissue parameters and temperatures are listed on the SAR plots.
- Liquid tissue depth was at least 15.0 cm.
- Inductive battery accessory was evaluated for SAR at the worst case SAR to take into consideration the additional optional manufacturer charging component accessory for RF exposure compliance (See Section 14.2). Asterisk (*) denotes that sample was tested with an inductive battery cover.
- Considerations: LTE test configurations are determined according to SAR Test Considerations for LTE Handsets and Data Modems KDB 941225 publication:
 - 1RB and 50% RB allocations were tested in both QPSK and 16 QAM for all configurations and 100% RB allocation testing was not required since SAR measured in other allocations was less than 1.45 W/kg.
 - There is only 10 MHz bandwidth available for this device in the LTE mode.
 - There is only one channel available for LTE Band 13.
 - A-MPR was disabled for all SAR testing.
 - There is a permanently applied MPR implemented by the manufacturer. MPR is enabled for this device according to 3GPP TS26.101 Section 6.2.3-6.2.5 under Table 6.2.3-1. The differences noted are not cases of implemented MPR but rather associated with measurement uncertainty and allowable tolerances per 3GPP standard and the manufacturer.
 - The measured SAR when extrapolated to the maximum tune-up power tolerance levels remain complaint for all operating configurations.

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Table 16-5
LTE 16-QAM Head SAR Results

MEASUREMENT RESULTS											
FREQUENCY		Mode/Band	Service	C_Power[dBm]		MPR [dB]	Side	Test Position	Number of RBs	RB Offset	SAR (1g)
MHz	Ch.			Start	End						(W/kg)
782.00	23230	LTE	16 QAM	22.15	22.23	1.0	Right	Touch	25	13	0.183
782.00	23230	LTE	16 QAM	22.52	22.44	0.5	Right	Touch	1	0	0.236
782.00	23230	LTE	16 QAM	22.36	22.46	0.5	Right	Touch	1	49	0.133
782.00	23230	LTE	16 QAM	22.15	22.23	1.0	Right	Tilt	25	13	0.155
782.00	23230	LTE	16 QAM	22.52	22.45	0.5	Right	Tilt	1	0	0.206
782.00	23230	LTE	16 QAM	22.36	22.37	0.5	Right	Tilt	1	49	0.116
782.00	23230	LTE	16 QAM	22.15	22.15	1.0	Left	Touch	25	13	0.232
782.00	23230	LTE	16 QAM	22.52	22.51	0.5	Left	Touch	1	0	0.312
782.00	23230	LTE	16 QAM	22.36	22.42	0.5	Left	Touch	1	49	0.174
782.00	23230	LTE	16 QAM	22.15	22.21	1.0	Left	Tilt	25	13	0.231
782.00	23230	LTE	16 QAM	22.52	22.51	0.5	Left	Tilt	1	0	0.322
782.00	23230	LTE	16 QAM	22.36	22.41	0.5	Left	Tilt	1	49	0.185
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Brain 1.6 W/kg (mW/g) averaged over 1 gram				

Notes:

- 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].
- All modes of operation were investigated, and worst-case results are reported.
- Batteries are fully charged for all readings. Standard battery was used.
- Tissue parameters and temperatures are listed on the SAR plots.
- Liquid tissue depth was at least 15.0 cm.
- LTE Considerations: LTE test configurations are determined according to SAR Test Considerations for LTE Handsets and Data Modems KDB 941225 publication:
 - 1RB and 50% RB allocations were tested in both QPSK and 16 QAM for all configurations and 100% RB allocation testing was not required since SAR measured in other allocations was less than 1.45 W/kg.
 - There is only 10 MHz bandwidth available for this device in the LTE mode.
 - There is only one channel available for LTE Band 13.
 - A-MPR was disabled for all SAR testing.
 - There is a permanently applied MPR implemented by the manufacturer. MPR is enabled for this device according to 3GPP TS26.101 Section 6.2.3-6.2.5 under Table 6.2.3-1. The differences noted are not cases of implemented MPR but rather associated with measurement uncertainty and allowable tolerances per 3GPP standard and the manufacturer.
 - The measured SAR when extrapolated to the maximum tune-up power tolerance levels remain complaint for all operating configurations.

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**Table 16-6
Body-Worn SAR Results**

MEASUREMENT RESULTS								
FREQUENCY		Mode	Service	C_Power[dBm]		Spacing	Side	SAR (1g)
MHz	Ch.			Start	End			(W/kg)
836.52	384	Cell. CDMA	TDSO32	24.81	24.75	1.5 cm	Back	0.484
1880.00	600	PCS CDMA	TDSO32	24.77	24.76	1.5 cm	Back	0.498
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram		

MEASUREMENT RESULTS									
FREQUENCY		Mode	C_Power[dBm]		Service	Spacing	Data Rate (Mbps)	Side	SAR
MHz	Ch.		Start	End					(W/kg)
2437	6	IEEE 802.11b	17.26	17.27	DSSS	1.0 cm	1	Back	0.072
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram			

MEASUREMENT RESULTS									
FREQUENCY		Mode	C_Power[dBm]		Service	Spacing	Data Rate (Mbps)	Side	SAR
MHz	Ch.		Start	End					(W/kg)
2480	78	Bluetooth	11.09	11.08	FHSS	1.5 cm	2	back	0.00055
2480	78	Bluetooth	11.09	11.18	FHSS	1.5 cm	2	back	0.00045
ANSI / IEEE C95.1 1992 - SAFETY LIMIT						Body			
Spatial Peak						1.6 W/kg (mW/g)			
Uncontrolled Exposure/General Population						averaged over 1 gram			

Notes:

- 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].
- All modes of operation were investigated, and worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plots.
- Batteries are fully charged for all readings. Standard battery was used.
- Liquid tissue depth was at least 15.0 cm.
- Device was tested using a fixed spacing.
- Body SAR for CDMA was tested under RC3/SO32 with FCH only since FCH+SCH modes are not greater than 0.25 dB of the FCH only.
- Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) 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).
- Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes: Highest average RF output power channel for the lowest data rate were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n) were not investigated since the average output powers were not greater than 0.25 dB than that of the corresponding channel in the lowest data rate IEEE 802.11b mode.
- WLAN and Bluetooth transmission was verified using a spectrum analyzer.
- Inductive battery accessory was evaluated for SAR at the worst case SAR to take into consideration the additional optional manufacturer charging component accessory for RF exposure compliance (See Section 14.2). Asterisk (*) denotes that sample was tested with an inductive battery cover.
- WLAN was tested at 1.0 cm because the SAR was more conservative.

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Table 16-7
EVDO SAR Results (Hotspot)

MEASUREMENT RESULTS								
FREQUENCY		Mode	Service	C_Power[dBm]		Spacing	Side	SAR (1g)
MHz	Ch.			Start	End			(W/kg)
824.70	1013	Cell. CDMA	EVDO	24.60	24.65	1.0 cm	Back	0.798
836.52	384	Cell. CDMA	EVDO	24.75	24.81	1.0 cm	Back	0.848
848.31	777	Cell. CDMA	EVDO	24.57	24.56	1.0 cm	Back	0.762
836.52	384	Cell. CDMA	EVDO	24.75	24.76	1.0 cm	Front	0.647
836.52	384	Cell. CDMA	EVDO	24.75	24.73	1.0 cm	Edge D	0.084
836.52	384	Cell. CDMA	EVDO	24.75	24.73	1.0 cm	Edge A	0.615
836.52	384	Cell. CDMA	EVDO	24.75	24.79	1.0 cm	Back	0.354*
1908.75	1175	PCS CDMA	EVDO	25.37	25.35	1.0 cm	Back	0.71*
1851.25	25	PCS CDMA	EVDO	25.06	25.00	1.0 cm	Back	0.752
1880.00	600	PCS CDMA	EVDO	24.69	24.59	1.0 cm	Back	0.872
1908.75	1175	PCS CDMA	EVDO	25.37	25.31	1.0 cm	Back	0.997
1880.00	600	PCS CDMA	EVDO	24.69	24.76	1.0 cm	Front	0.596
1880.00	600	PCS CDMA	EVDO	24.69	24.69	1.0 cm	Edge D	0.328
1880.00	600	PCS CDMA	EVDO	24.69	24.67	1.0 cm	Edge A	0.700
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram		

Notes:

- 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].
- All modes of operation were investigated, and worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plots.
- Batteries are fully charged for all readings. Standard battery was used.
- Liquid tissue depth was at least 15.0 cm.
- Device was tested using a fixed spacing.
- Body SAR was tested under EVDO Rev. 0 per FCC 3G Guidance (See Section 11).
- Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) 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).
- Inductive battery accessory was evaluated for SAR at the worst case SAR to take into consideration the additional optional manufacturer charging component accessory for RF exposure compliance (See Section 14.2). Asterisk (*) denotes that sample was tested with an inductive battery cover.
- Sides C and B were not required since the antenna distance from the edge was greater than 2.5 cm per Oct 2010 TCB Workshop guidance (see Section 14.1).
- It was confirmed that side D was low in SAR for Cell EVDO.

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Table 16-8
2.4 GHz WLAN Body SAR Results (Hotspot)

MEASUREMENT RESULTS									
FREQUENCY		Mode	C_Power[dBm]		Service	Spacing	Data Rate (Mbps)	Side	SAR
MHz	Ch.		Start	End					(W/kg)
2437	6	IEEE 802.11b	17.26	17.27	DSSS	1.0 cm	1	Back	0.072
2437	6	IEEE 802.11b	17.26	17.35	DSSS	1.0 cm	1	Back	0.0631*
2437	6	IEEE 802.11b	17.26	17.33	DSSS	1.0 cm	1	Front	0.006
2437	6	IEEE 802.11b	17.26	17.35	DSSS	1.0 cm	1	Edge B	0.037
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram			

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. All modes of operation were investigated, and worst-case results are reported.
3. Batteries are fully charged for all readings. Standard battery was used.
4. Tissue parameters and temperatures are listed on the SAR plots.
5. Liquid tissue depth is was at least 15.0 cm.
6. Device was tested using a fixed spacing.
7. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes: Highest average RF output power channel for the lowest data rate were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n) were not investigated since the average output powers were not greater than 0.25 dB than that of the corresponding channel in the lowest data rate IEEE 802.11b mode.
8. WLAN transmission was verified using a spectrum analyzer.
9. Inductive battery accessory was evaluated for SAR at the worst case SAR to take into consideration the additional optional manufacturer charging component accessory for RF exposure compliance (See Section 14.2). Asterisk (*) denotes that sample was tested with an inductive battery cover.
10. Edges A, C, and D were not required since the antenna distance from the edge was greater than 2.5 cm per Oct 2010 TCB Workshop guidance (see Section 14.1). Side D was additionally tested but not required.

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Table 16-9
LTE QPSK Body SAR Results (Hotspot)

MEASUREMENT RESULTS											
FREQUENCY		Mode	Service	C_Power[dBm]		MPR	Spacing	Number of RBs	RB Offset	Side	SAR (1g)
MHz	Ch.			Start	End						(W/kg)
782.00	23230	LTE	QPSK	22.66	22.65	0.5	1.0 cm	25	13	Back	0.177
782.00	23230	LTE	QPSK	23.12	23.12	0.0	1.0 cm	1	0	Back	0.229
783.00	23230	LTE	QPSK	23.12	23.15	0.0	1.0 cm	1	0	Back	0.195*
782.00	23230	LTE	QPSK	22.99	22.99	0.0	1.0 cm	1	49	Back	0.128
782.00	23230	LTE	QPSK	22.66	22.73	0.5	1.0 cm	25	13	Front	0.115
782.00	23230	LTE	QPSK	23.12	23.10	0.0	1.0 cm	1	0	Front	0.154
782.00	23230	LTE	QPSK	22.99	22.95	0.0	1.0 cm	1	49	Front	0.079
782.00	23230	LTE	QPSK	22.66	22.60	0.5	1.0 cm	25	13	Edge A	0.140
782.00	23230	LTE	QPSK	23.12	23.06	0.0	1.0 cm	1	0	Edge A	0.185
782.00	23230	LTE	QPSK	22.99	23.03	0.0	1.0 cm	1	49	Edge A	0.098
782.00	23230	LTE	QPSK	22.66	22.64	0.5	1.0 cm	25	13	Edge C	0.122
782.00	23230	LTE	QPSK	23.12	23.15	0.0	1.0 cm	1	0	Edge C	0.155
782.00	23230	LTE	QPSK	22.99	22.95	0.0	1.0 cm	1	49	Edge C	0.090
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram				

Notes:

- 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].
- All modes of operation were investigated, and worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plots.
- Batteries are fully charged for all readings. Standard battery was used.
- Liquid tissue depth was at least 15.0 cm.
- Device was tested using a fixed spacing.
- Inductive battery accessory was evaluated for SAR at the worst case SAR to take into consideration the additional optional manufacturer charging component accessory for RF exposure compliance (See Section 14.2). Asterisk (*) denotes that sample was tested with an inductive battery cover.
- LTE Considerations: LTE test configurations are determined according to SAR Test Considerations for LTE Handsets and Data Modems KDB 941225 publication:
 - 1RB and 50% RB allocations were tested in both QPSK and 16 QAM for all configurations and 100% RB allocation testing was not required since SAR measured in other allocations was less than 1.45 W/kg.
 - There is only 10 MHz bandwidth available for this device in the LTE mode.
 - There is only one channel available for LTE Band 13.
 - A-MPR was disabled for all SAR testing.
 - There is a permanently applied MPR implemented by the manufacturer. MPR is enabled for this device according to 3GPP TS26.101 Section 6.2.3-6.2.5 under Table 6.2.3-1. The differences noted are not cases of implemented MPR but rather associated with measurement uncertainty and allowable tolerances per 3GPP standard and the manufacturer.
 - The measured SAR when extrapolated to the maximum tune-up power tolerance levels remain compliant for all operating configurations.

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Table 16-10
LTE 16QAM Body SAR Results (Hotspot)

MEASUREMENT RESULTS											
FREQUENCY		Mode	Service	C_Power[dBm]		MPR	Spacing	Number of RBs	RB Offset	Side	SAR (1g)
MHz	Ch.			Start	End						(W/kg)
782.00	23230	LTE	16 QAM	22.15	22.17	1.0	1.0 cm	25	13	Back	0.144
782.00	23230	LTE	16 QAM	22.52	22.47	0.5	1.0 cm	1	0	Back	0.210
782.00	23230	LTE	16 QAM	22.36	22.37	0.5	1.0 cm	1	49	Back	0.110
782.00	23230	LTE	16 QAM	22.15	22.15	1.0	1.0 cm	25	13	Front	0.097
782.00	23230	LTE	16 QAM	22.52	22.55	0.5	1.0 cm	1	0	Front	0.131
782.00	23230	LTE	16 QAM	22.36	22.44	0.5	1.0 cm	1	49	Front	0.065
782.00	23230	LTE	16 QAM	22.15	22.09	1.0	1.0 cm	25	13	Edge A	0.135
782.00	23230	LTE	16 QAM	22.52	22.52	0.5	1.0 cm	1	0	Edge A	0.157
782.00	23230	LTE	16 QAM	22.36	22.37	0.5	1.0 cm	1	49	Edge A	0.085
782.00	23230	LTE	16 QAM	22.15	22.13	1.0	1.0 cm	25	13	Edge C	0.105
782.00	23230	LTE	16 QAM	22.52	22.55	0.5	1.0 cm	1	0	Edge C	0.127
782.00	23230	LTE	16 QAM	22.36	22.38	0.5	1.0 cm	1	49	Edge C	0.077
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram				

Notes:

- 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].
- All modes of operation were investigated, and worst-case results are reported.
- Tissue parameters and temperatures are listed on the SAR plots.
- Batteries are fully charged for all readings. Standard battery was used.
- Liquid tissue depth was at least 15.0 cm.
- Device was tested using a fixed spacing.
- LTE Considerations: LTE test configurations are determined according to SAR Test Considerations for LTE Handsets and Data Modems KDB 941225 publication:
 - 1RB and 50% RB allocations were tested in both QPSK and 16 QAM for all configurations and 100% RB allocation testing was not required since SAR measured in other allocations was less than 1.45 W/kg.
 - There is only 10 MHz bandwidth available for this device in the LTE mode.
 - There is only one channel available for LTE Band 13.
 - A-MPR was disabled for all SAR testing.
 - There is a permanently applied MPR implemented by the manufacturer. MPR is enabled for this device according to 3GPP TS26.101 Section 6.2.3-6.2.5 under Table 6.2.3-1. The differences noted are not cases of implemented MPR but rather associated with measurement uncertainty and allowable tolerances per 3GPP standard and the manufacturer.
 - The measured SAR when extrapolated to the maximum tune-up power tolerance levels remain complaint for all operating configurations.

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17 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

17.1 Introduction

The following procedures adopted from KDB Publication 648474 are applicable to handsets with built-in unlicensed transmitters such as 802.11a/b/g and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

17.2 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 17-1
Output Power Thresholds for Unlicensed Transmitters

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	<u>Routine evaluation required</u>	<u>SAR not required:</u> <u>Unlicensed only</u>
Unlicensed Transmitters	<u>When there is no simultaneous transmission –</u> - output ≤ 60/f: SAR not required - output > 60/f: stand-alone SAR required <u>When there is simultaneous transmission –</u> <u>Stand-alone SAR not required when</u> - output $\leq 2 \cdot P_{Ref}$ and antenna is ≥ 5.0 cm from other antennas - output $\leq P_{Ref}$ and antenna is ≥ 2.5 cm from other antennas - output $\leq P_{Ref}$ and antenna is < 2.5 cm from other antennas, each with either output power $\leq P_{Ref}$ or 1-g SAR < 1.2 W/kg <u>Otherwise stand-alone SAR is required</u> <u>When stand-alone SAR is required</u> - 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	- when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas <u>Licensed & Unlicensed</u> - 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 <u>SAR required:</u> <u>Licensed & Unlicensed</u> 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

Figure 17-2
SAR Evaluation Requirements for Multiple Transmitter Handsets

17.3 BT/WIFI Output Power Considerations for SCH-I510

RF Conducted Power of Bluetooth Tx is 12.853 mW. RF Conducted Power of WLAN is 53.21 mW.

Based on the output power, antenna separation distance and the Body SAR of the dominant transmitter, stand-alone Bluetooth and WLAN SAR tests are required.

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17.4 Simultaneous Transmission Analysis

This device supports hotspot capability.

The below figure represents the available transmission paths. See Table **Table 17-1** for supported simultaneous transmission combinations.

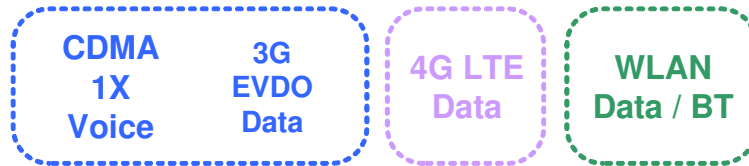


Figure 17-3
Simultaneous Transmission Paths

Table 17-1 Supported Transmission Combinations

Capable Tx Configurations	Transmission Scenarios Supported	Hotspot SAR
CDMA	✓	
EVDO	✓	
LTE	✓	
WIFI	✓	
CDMA+LTE	✓	
CDMA+WIFI	✓	
LTE+WIFI	✓	✓
EVDO+WIFI	✓	✓
CDMA+LTE+WIFI	✓	✓

Table 17-2
CDMA+LTE+WIFI Simultaneous Tx (Held to Ear)

Simult Tx	Configuration	Cell CDMA SAR (W/kg)	LTE SAR (W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS CDMA SAR (W/kg)	LTE SAR (W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.393	0.285	0.010	0.688	Head SAR	Right Cheek	1.010	0.285	0.010	1.305
	Right Tilt	0.271	0.206	0.007	0.484		Right Tilt	0.370	0.206	0.007	0.583
	Left Cheek	0.412	0.350	0.014	0.776		Left Cheek	0.521	0.350	0.014	0.885
	Left Tilt	0.283	0.385	0.002	0.670		Left Tilt	0.352	0.385	0.002	0.739

Table 17-2 represents CDMA+LTE+WIFI supported simultaneous transmission combination numerical summed SAR. Other combinations such as CDMA+WIFI and CDMA+LTE and LTE+WIFI simultaneous combinations are also addressed in **Table 17-2**.

Table 17-3
CDMA+BT+LTE+WIFI Simultaneous Tx (Body-Worn)

Simult Tx	Configuration	Cell CDMA SAR (W/kg)	Bluetooth SAR (W/kg)	LTE SAR (W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back Side	0.484	0.00055	0.229	0.072	0.786
Simult Tx	Configuration	PCS CDMA SAR (W/kg)	Bluetooth SAR (W/kg)	LTE SAR (W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back Side	0.498	0.00055	0.229	0.072	0.800

Table 17-3 represents CDMA+LTE+WIFI+BT supported simultaneous transmission combination numerical summed SAR. Other combinations such as CDMA+BT, CDMA+WIFI, CDMA+LTE, CDMA+LTE+BT, LTE+WIFI and LTE+BT simultaneous body-worn combinations are also addressed in **Table 17-3**.

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Table 17-4
EVDO+WIFI Simultaneous Tx (Hotspot)

Simult Tx	Configuration	Cell EVDO SAR (W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back Side	0.848	0.072	0.921
	Front Side	0.647	0.006	0.653
	Edge A	0.615	-	0.615
	Edge B	-	0.037	0.037
	Edge C	-	-	0.000
	Edge D	0.084	-	0.084

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back Side	0.997	0.072	1.069
	Front Side	0.596	0.006	0.602
	Edge A	0.700	-	0.700
	Edge B	-	0.037	0.037
	Edge C	-	-	0.000
	Edge D	0.328	-	0.328

Table 17-5
LTE+WIFI Simultaneous Tx (Hotspot)

Simult Tx	Configuration	4G SAR (W/kg)	WIFI SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back Side	0.229	0.072	0.302
	Front Side	0.154	0.006	0.160
	Edge A	0.185	-	0.185
	Edge B	-	0.037	0.037
	Edge C	0.155	-	0.155

Note: “-” SAR results shown in the tables are zero for summation purposes. SAR was not required to be measured due to exclusions mentioned in Section 14.1.

17.5 Simultaneous Transmission Conclusion

The above numerical summed SAR calculations were found to be below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. Therefore, no volumetric SAR summation is required since the numerical sums are below the limit.

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18 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	85070B	Dielectric Probe Kit	8/22/2010	Annual	8/22/2011	US33020316
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/11/2010	Annual	10/11/2011	3613A00315
Agilent	8753E	(30kHz-6GHz) Network Analyzer	3/31/2010	Annual	3/31/2011	JP38020182
Agilent	E5515C	Wireless Communications Test Set	10/11/2010	Annual	10/11/2011	GB46110872
Agilent	E5515C	Wireless Communications Test Set	10/11/2010	Annual	10/11/2011	GB46310798
Agilent	E5515C	Wireless Communications Test Set	8/12/2010	Annual	8/12/2011	GB41450275
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/30/2010	Annual	3/30/2011	MY45470194
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/11/2010	Annual	10/11/2011	1833460
Gigatronics	8651A	Universal Power Meter	10/11/2010	Annual	10/11/2011	8650319
Index SAR	IXTL-010	Dielectric Measurement Kit	N/A		N/A	N/A
Index SAR	IXTL-030	30MM TEM line for 6 GHz	N/A		N/A	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	6/21/2010	Annual	6/21/2011	833855/0010
SPEAG	D1450V2	1450 MHz SAR Dipole	5/20/2009	Biennial	5/20/2011	1025
SPEAG	D1765V2	1765 MHz SAR Dipole	5/19/2009	Biennial	5/19/2011	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	1/20/2009	Biennial	1/20/2011	502
SPEAG	D1900V2	1900 MHz SAR Dipole	8/18/2009	Biennial	8/18/2011	5d080
SPEAG	D2450V2	2450 MHz SAR Dipole	8/27/2009	Biennial	8/27/2011	719
SPEAG	D2450V2	2450 MHz SAR Dipole	1/8/2009	Biennial	1/8/2011	797
SPEAG	D2600V2	2600 MHz SAR Dipole	8/12/2009	Biennial	8/12/2011	1004
SPEAG	D5GHzV2	5 GHz SAR Dipole	8/19/2009	Biennial	8/19/2011	1007
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/15/2009	Biennial	1/15/2011	1057
SPEAG	D835V2	835 MHz SAR Dipole	1/19/2009	Biennial	1/19/2011	4d047
SPEAG	D835V2	835 MHz SAR Dipole	8/24/2009	Biennial	8/24/2011	4d026
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/22/2010	Annual	3/22/2011	704
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/21/2010	Annual	4/21/2011	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/22/2010	Annual	1/22/2011	649
SPEAG	ES3DV2	SAR Probe	9/21/2010	Annual	9/21/2011	3022
SPEAG	EX3DV4	SAR Probe	8/19/2010	Annual	8/19/2011	3561
SPEAG	EX3DV4	SAR Probe	1/26/2010	Annual	1/26/2011	3550
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/8/2010	Annual	7/8/2011	859
SPEAG	D750V3	750 MHz Dipole	8/19/2010	Biennial	8/19/2012	1003
SPEAG	ES3DV3	SAR Probe	3/16/2010	Annual	3/16/2011	3213
SPEAG	ES3DV3	SAR Probe	4/20/2010	Annual	4/20/2011	3209
Rohde & Schwarz	SMIQ03B	Signal Generator	4/1/2010	Annual	4/1/2011	DE27259
SPEAG	D1640V2	1640 MHz Dipole	8/17/2010	Biennial	8/17/2012	321
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	8/30/2010	Annual	8/30/2011	100976
Agilent	8648D	Signal Generator	4/1/2010	Annual	4/1/2011	3629U00687
Apriel	ALS-PR-DIEL	Dielectric Probe Kit	N/A		N/A	260-00959
Agilent	E5515C	Wireless Communications Tester	4/14/2010	Annual	4/14/2011	US41140256
SPEAG	ES3DV3	SAR Probe	2/10/2010	Annual	2/10/2011	3173
Amplifier Research	5S1G4	5W, 800MHz-4.2GHz	N/A			17042

Justification for 2-year calibration cycle for SAR dipoles is found in Section 15.3.

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19 MEASUREMENT UNCERTAINTIES

Applicable for 750 – 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	5.5	N	1	1.0	1.0	5.5	5.5	∞
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	11.8	11.5
Expanded Uncertainty (95% CONFIDENCE LEVEL)							k=2	23.7	23.0

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

FCC ID: A3LSCHI510		SAR COMPLIANCE REPORT		Reviewed by: Quality Manager
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20 CONCLUSION

20.1 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]

FCC ID: A3LSCHI510		SAR COMPLIANCE REPORT		Reviewed by: Quality Manager
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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN and LTE
Serial: FCC SAR #1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Brain Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.871 \text{ mho/m}$; $\epsilon_r = 40.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 11-18-2010; Ambient Temp: 24.1 °C; Tissue Temp: 22.5 °C

Probe: ES3DV3 - SN3213; ConvF(5.98, 5.98, 5.98); Calibrated: 3/16/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: Cellular CDMA, Right Head, Touch, Mid.ch

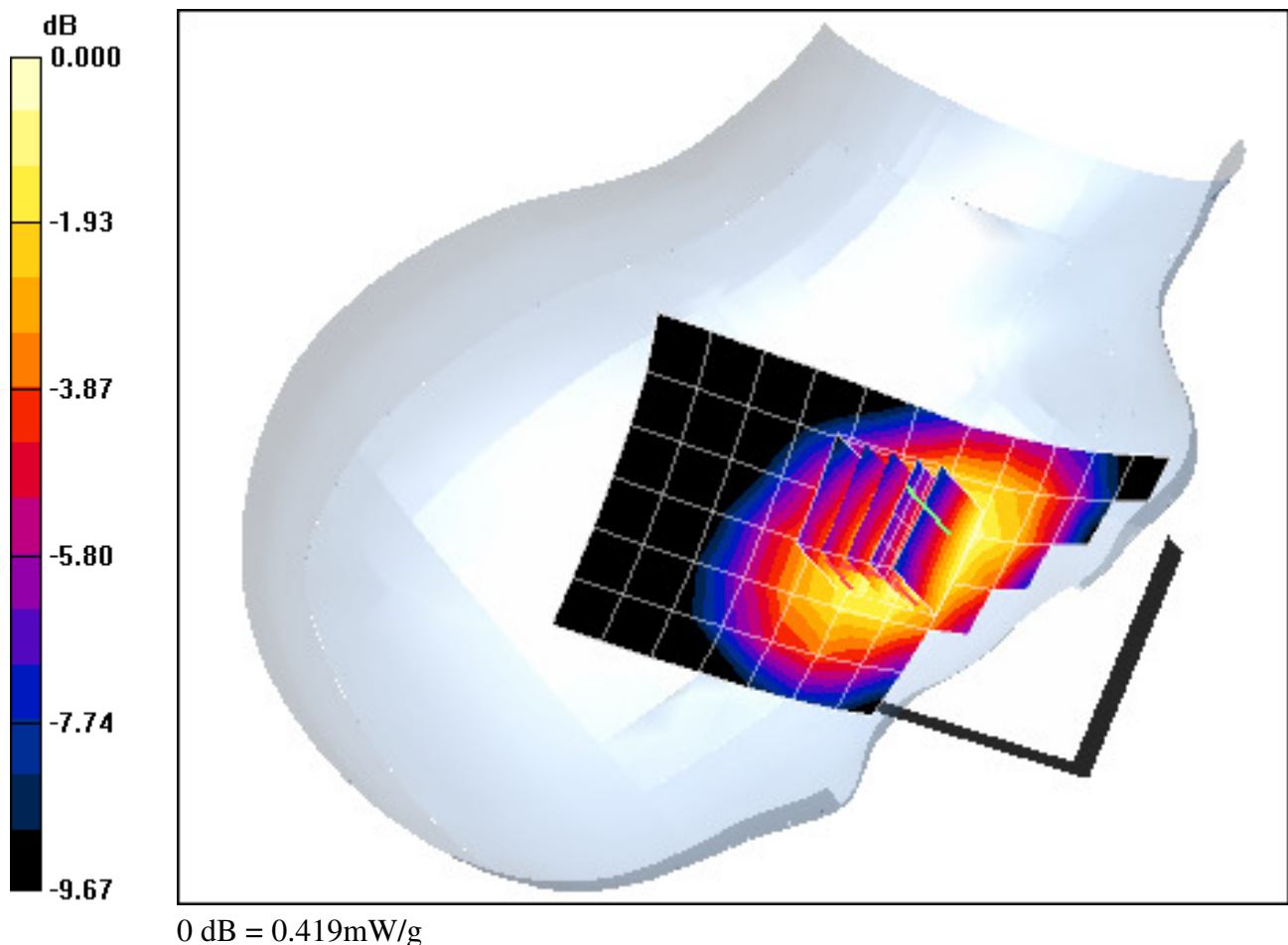
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 21.7 V/m

Peak SAR (extrapolated) = 0.558 W/kg

SAR(1 g) = 0.393 mW/g; SAR(10 g) = 0.297 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phonewith Bluetooth, WLAN, and LTE
Serial: FCC SAR #1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Brain Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.871 \text{ mho/m}$; $\epsilon_r = 40.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 11-18-2010; Ambient Temp: 24.1 °C; Tissue Temp: 22.5 °C

Probe: ES3DV3 - SN3213; ConvF(5.98, 5.98, 5.98); Calibrated: 3/16/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: Cellular CDMA, Right Head, Tilt, Mid.ch

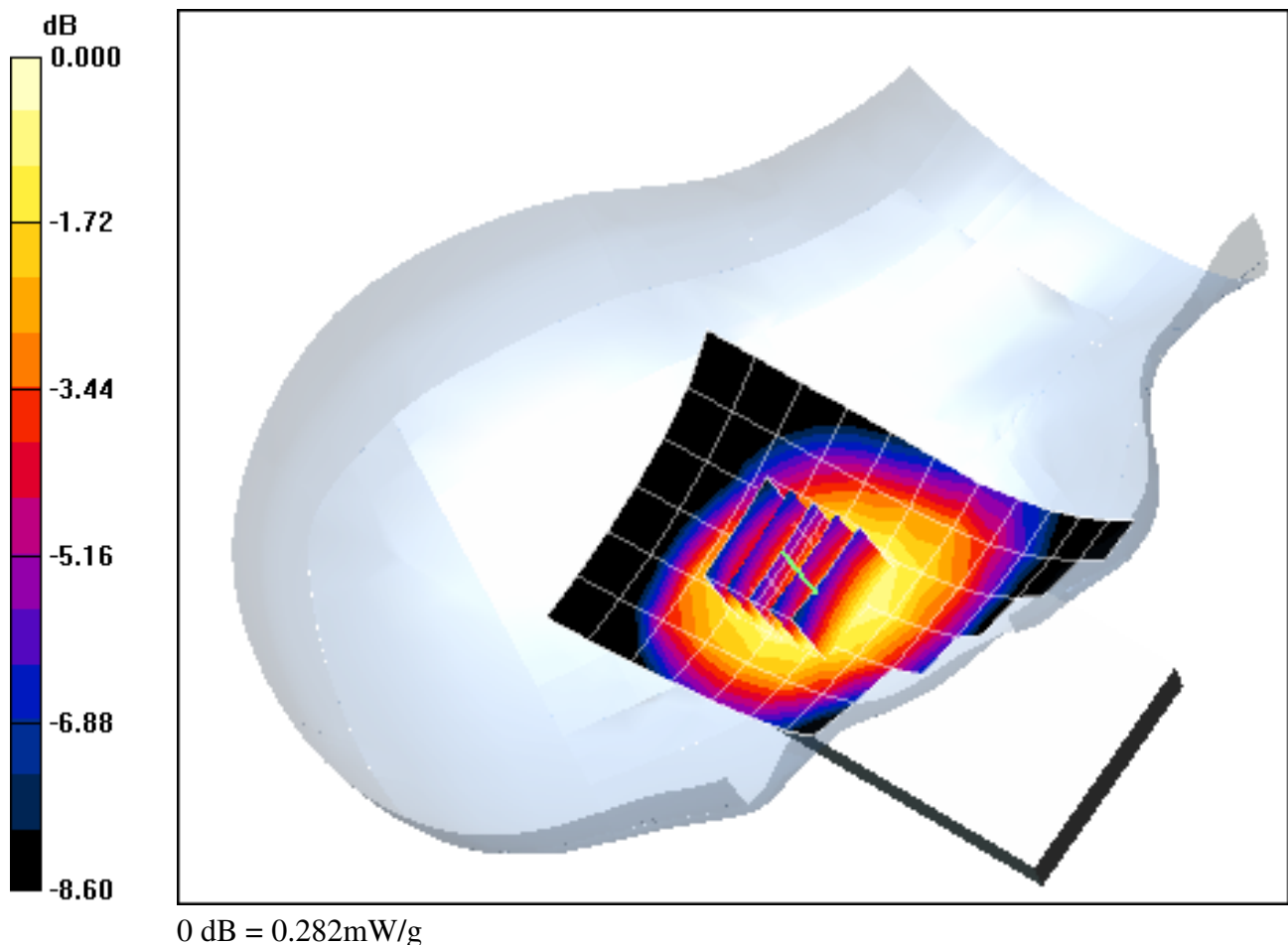
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 18.9 V/m

Peak SAR (extrapolated) = 0.325 W/kg

SAR(1 g) = 0.271 mW/g; SAR(10 g) = 0.207 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Brain Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.871 \text{ mho/m}$; $\epsilon_r = 40.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 11-18-2010; Ambient Temp: 24.1 °C; Tissue Temp: 22.5 °C

Probe: ES3DV3 - SN3213; ConvF(5.98, 5.98, 5.98); Calibrated: 3/16/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: Cellular CDMA, Left Head, Touch, Mid.ch

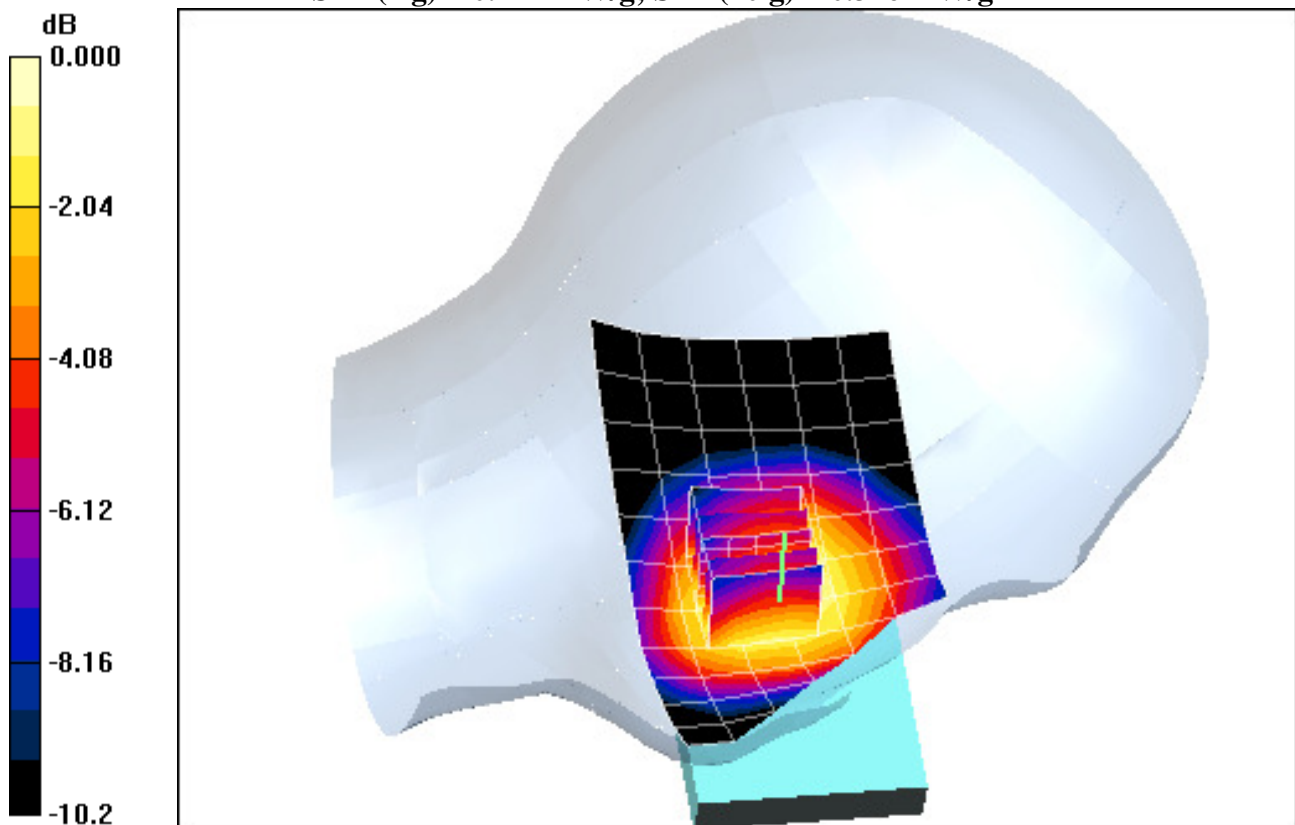
Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 6.41 V/m

Peak SAR (extrapolated) = 0.514 W/kg

SAR(1 g) = 0.412 mW/g; SAR(10 g) = 0.316 mW/g



0 dB = 0.430mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Brain Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.871 \text{ mho/m}$; $\epsilon_r = 40.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 11-18-2010; Ambient Temp: 24.1 °C; Tissue Temp: 22.5 °C

Probe: ES3DV3 - SN3213; ConvF(5.98, 5.98, 5.98); Calibrated: 3/16/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: Cellular CDMA, 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

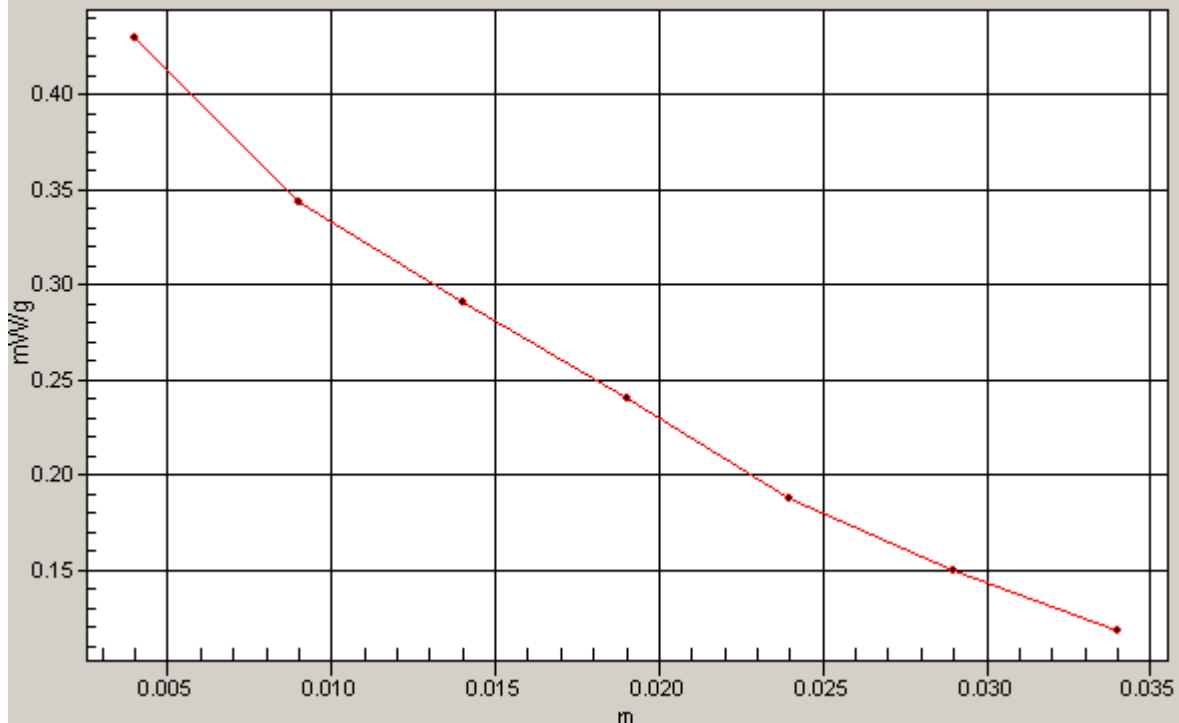
Reference Value = 6.41 V/m

Peak SAR (extrapolated) = 0.514 W/kg

SAR(1 g) = 0.412 mW/g; SAR(10 g) = 0.316 mW/g

1g/10g Averaged SAR

SAR; Zoom Scan: Value Along Z, X=1, Y=2



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Brain Medium parameters used (interpolated):
 $f = 836.52 \text{ MHz}$; $\sigma = 0.871 \text{ mho/m}$; $\epsilon_r = 40.1$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section

Test Date: 11-18-2010; Ambient Temp: 24.1 °C; Tissue Temp: 22.5 °C

Probe: ES3DV3 - SN3213; ConvF(5.98, 5.98, 5.98); Calibrated: 3/16/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: Cellular CDMA, Left Head, Tilt, Mid.ch

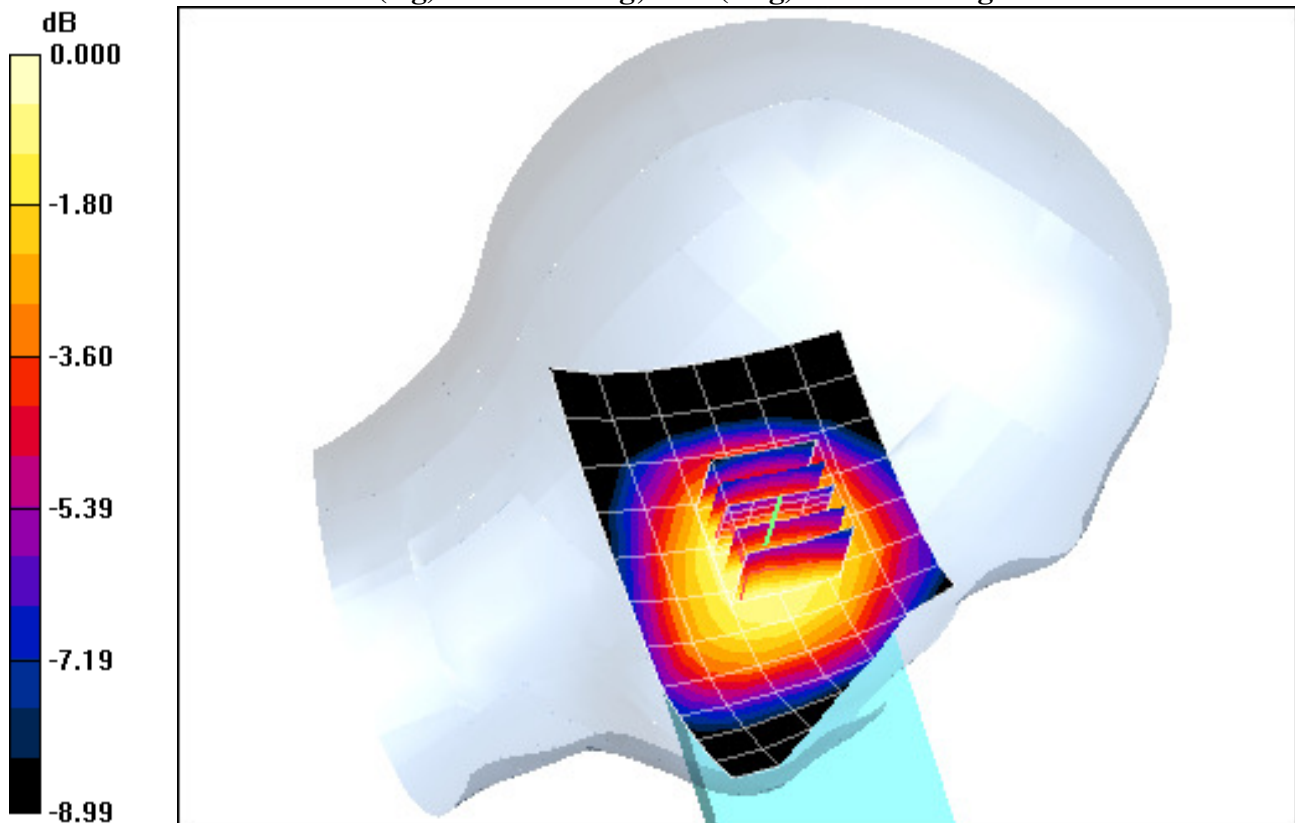
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 12.2 V/m

Peak SAR (extrapolated) = 0.366 W/kg

SAR(1 g) = 0.283 mW/g; SAR(10 g) = 0.218 mW/g



0 dB = 0.298mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #1

Communication System: PCS CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Brain Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 40.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 11-17-2010; Ambient Temp: 23.2°C; Tissue Temp: 22.1°C

Probe: ES3DV2 - SN3022; ConvF(4.83, 4.83, 4.83); Calibrated: 9/21/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/21/2010

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS CDMA, Right Head, Touch, Mid.ch

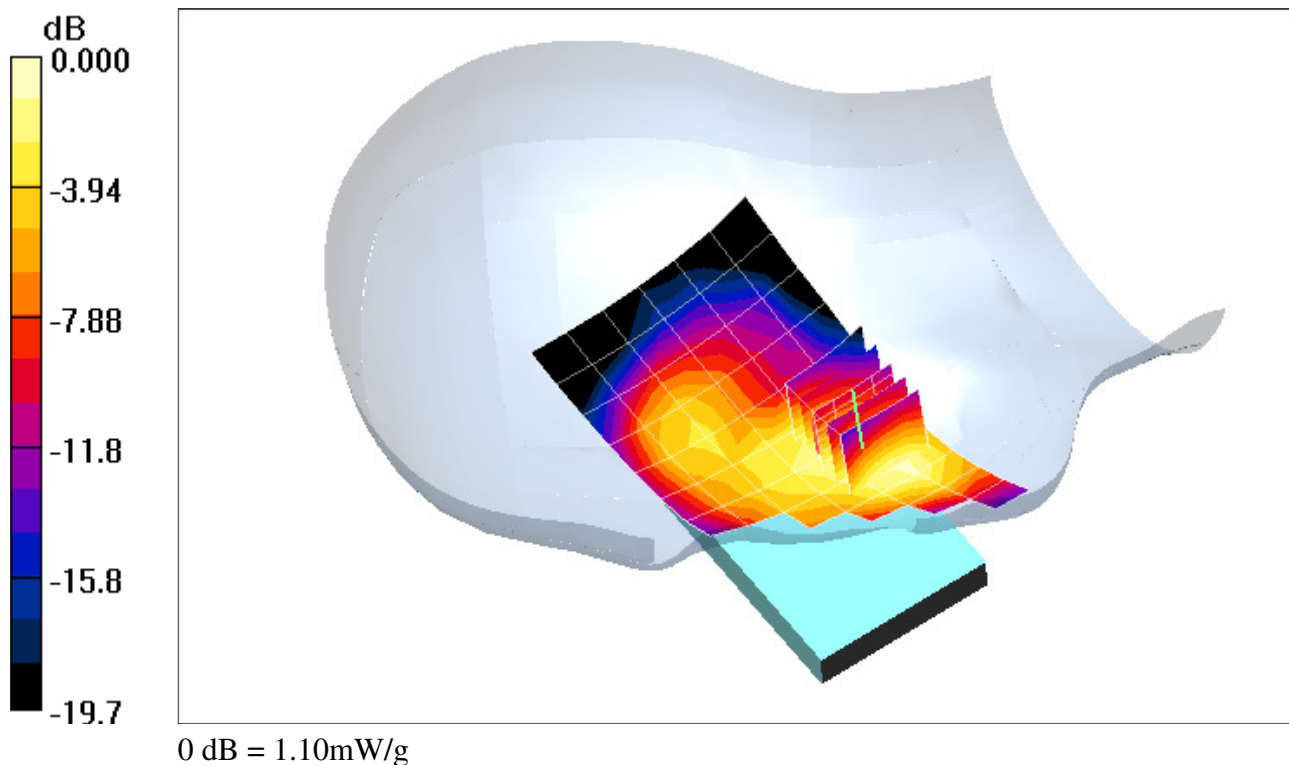
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 29.0 V/m

Peak SAR (extrapolated) = 1.52 W/kg

SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.640 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #1

Communication System: PCS CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Brain Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 40.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 11-17-2010; Ambient Temp: 23.2°C; Tissue Temp: 22.1°C

Probe: ES3DV2 - SN3022; ConvF(4.83, 4.83, 4.83); Calibrated: 9/21/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/21/2010

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS CDMA, Right Head, Touch, Mid.ch

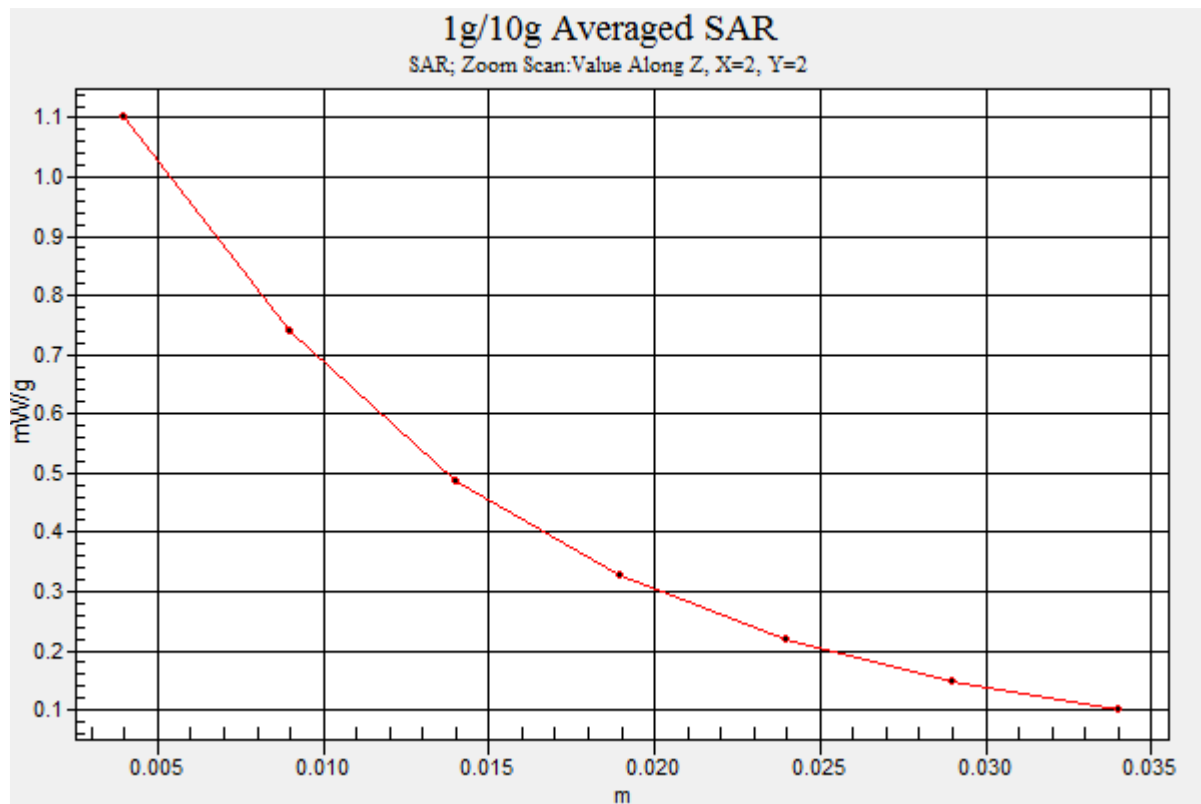
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 29.0 V/m

Peak SAR (extrapolated) = 1.52 W/kg

SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.640 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #1

Communication System: PCS CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Brain Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 40.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 11-17-2010; Ambient Temp: 23.2°C; Tissue Temp: 22.1°C

Probe: ES3DV2 - SN3022; ConvF(4.83, 4.83, 4.83); Calibrated: 9/21/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/21/2010

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS CDMA, Right Head, Tilt, Mid.ch

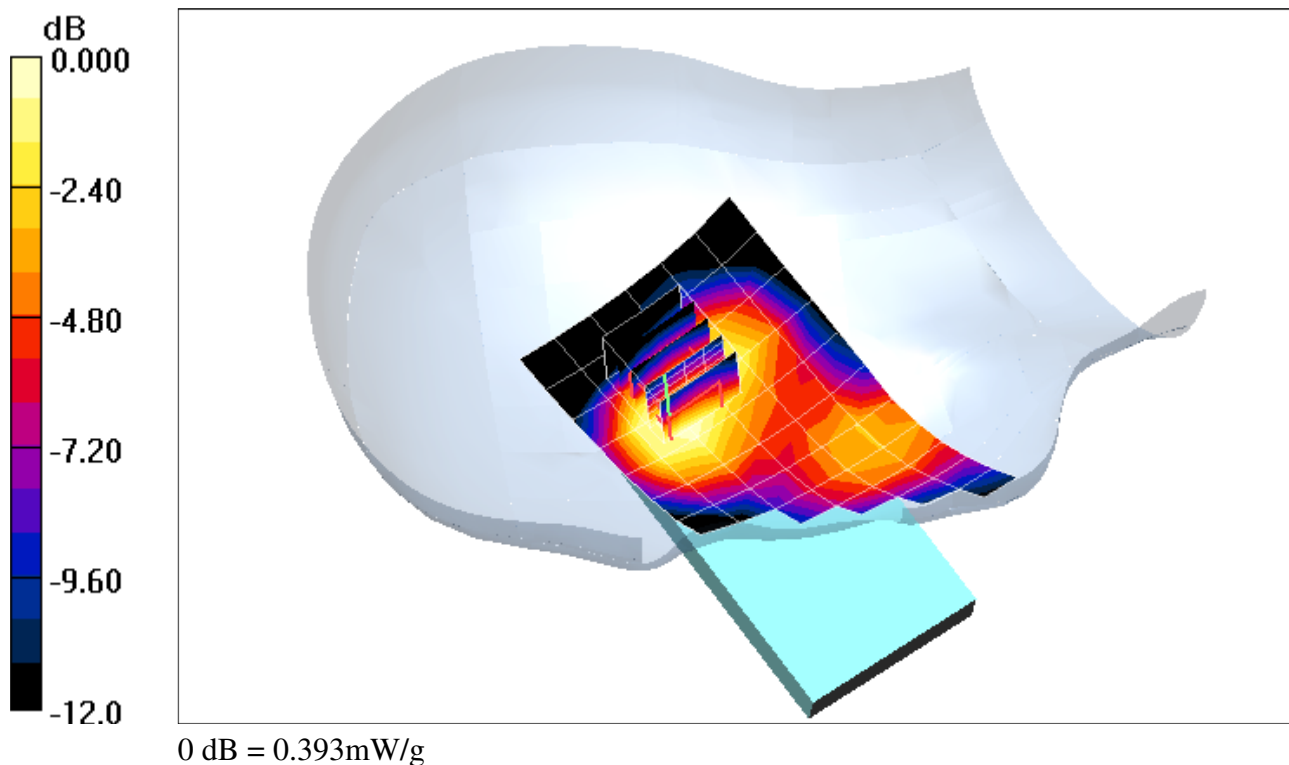
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 17.7 V/m

Peak SAR (extrapolated) = 0.543 W/kg

SAR(1 g) = 0.370 mW/g; SAR(10 g) = 0.238 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #1

Communication System: PCS CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Brain Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 40.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 11-17-2010; Ambient Temp: 23.2°C; Tissue Temp: 22.1°C

Probe: ES3DV2 - SN3022; ConvF(4.83, 4.83, 4.83); Calibrated: 9/21/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/21/2010

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS CDMA, Left Head, Touch, Mid.ch

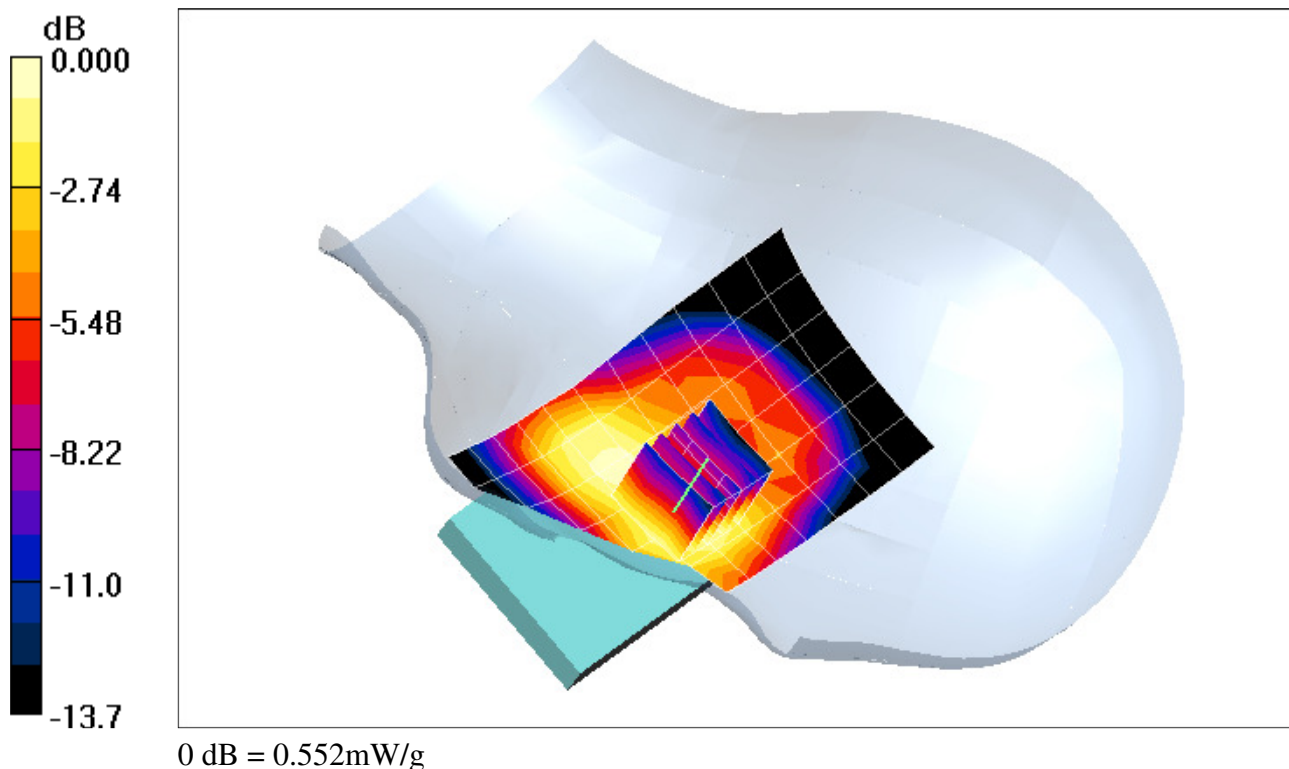
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 20.9 V/m

Peak SAR (extrapolated) = 0.743 W/kg

SAR(1 g) = 0.521 mW/g; SAR(10 g) = 0.353 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #1

Communication System: PCS CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Brain Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 40.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 11-17-2010; Ambient Temp: 23.2°C; Tissue Temp: 22.1°C

Probe: ES3DV2 - SN3022; ConvF(4.83, 4.83, 4.83); Calibrated: 9/21/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/21/2010

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS CDMA, Left Head, Tilt, Mid.ch

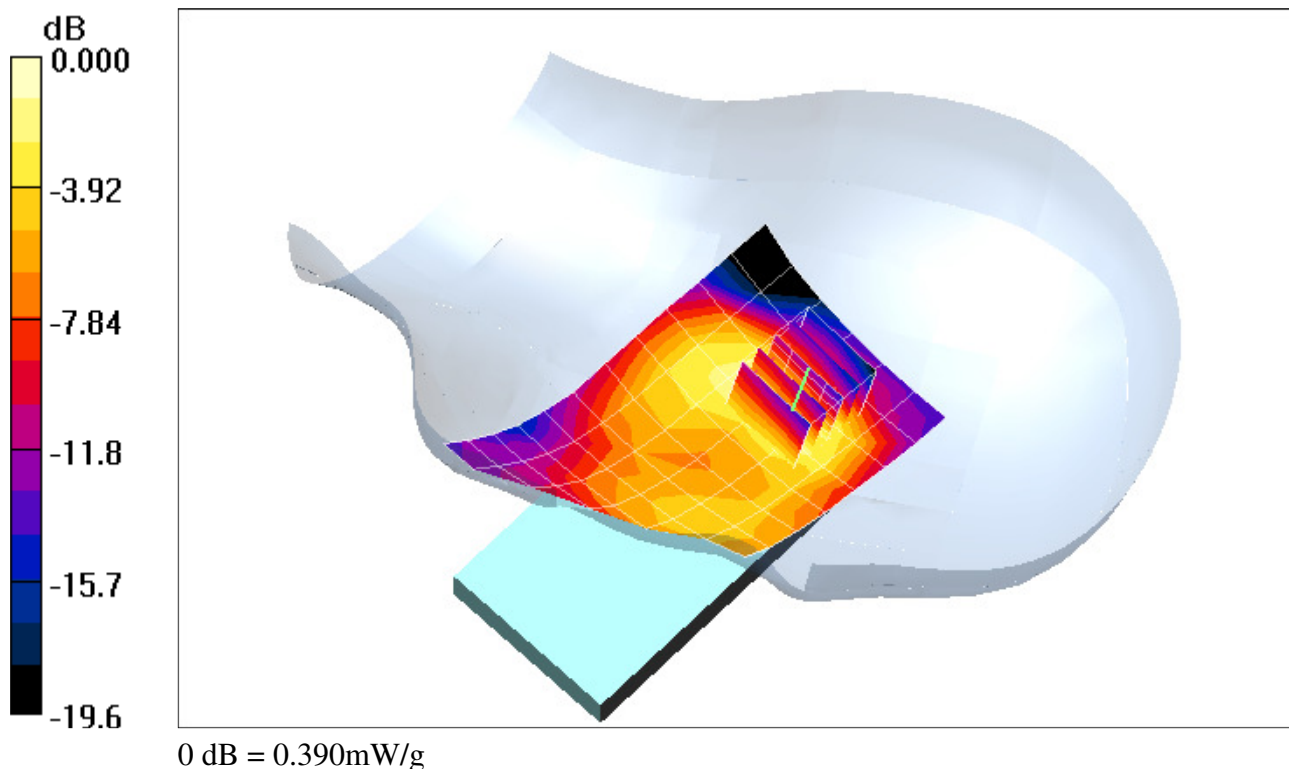
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 16.1 V/m

Peak SAR (extrapolated) = 0.557 W/kg

SAR(1 g) = 0.352 mW/g; SAR(10 g) = 0.206 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #3

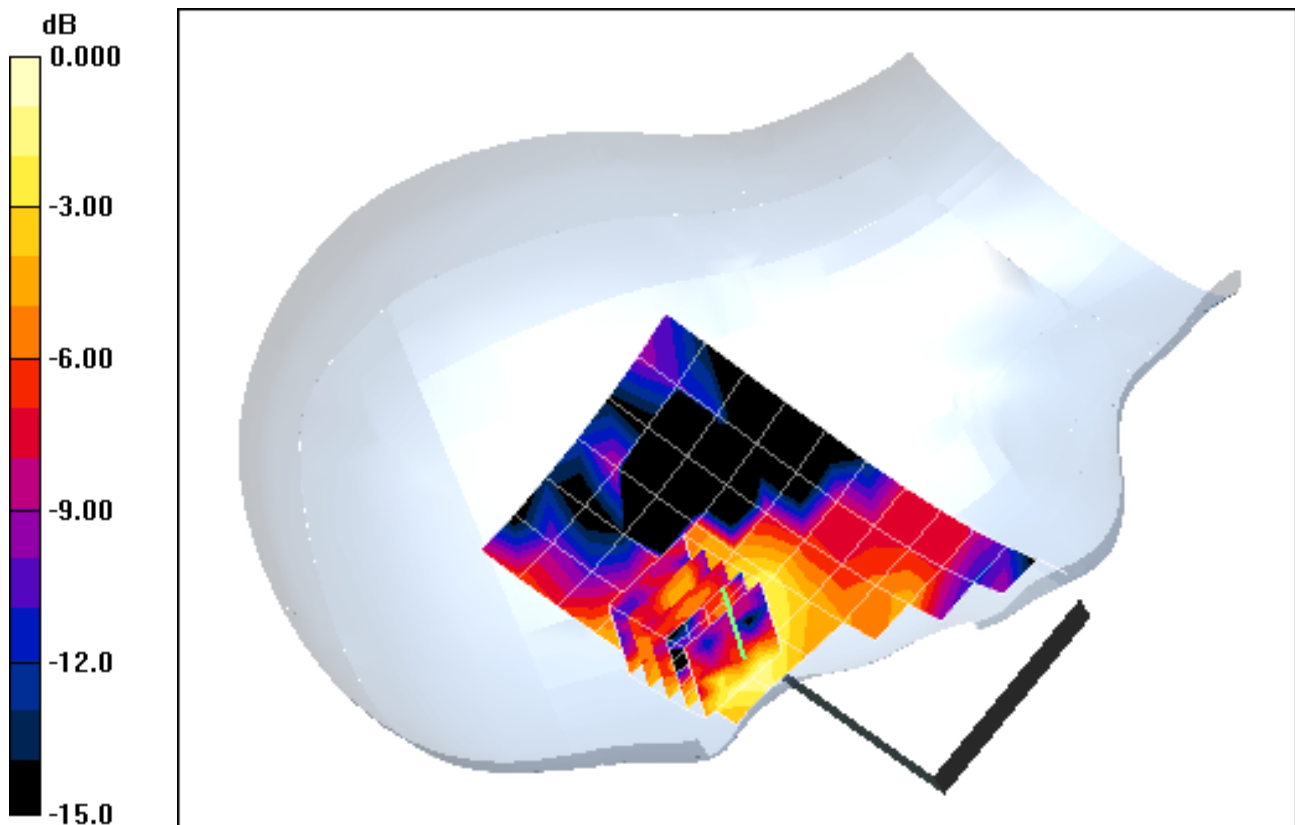
Communication System: IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Brain Medium parameters used (interpolated):
 $f = 2437 \text{ MHz}$; $\sigma = 1.83 \text{ mho/m}$; $\epsilon_r = 38.48$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

Test Date: 11-23-2010; Ambient Temp: 23.7 °C; Tissue Temp: 21.8 °C

Probe: EX3DV4 - SN3550; ConvF(6.21, 6.21, 6.21); Calibrated: 1/26/2010
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
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 802.11b, Right Head, Touch, Ch 06, 1 Mbps

Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 2.19 V/m
Peak SAR (extrapolated) = 0.022 W/kg
SAR(1 g) = 0.00963 mW/g; SAR(10 g) = 0.00422 mW/g



0 dB = 0.011mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #3

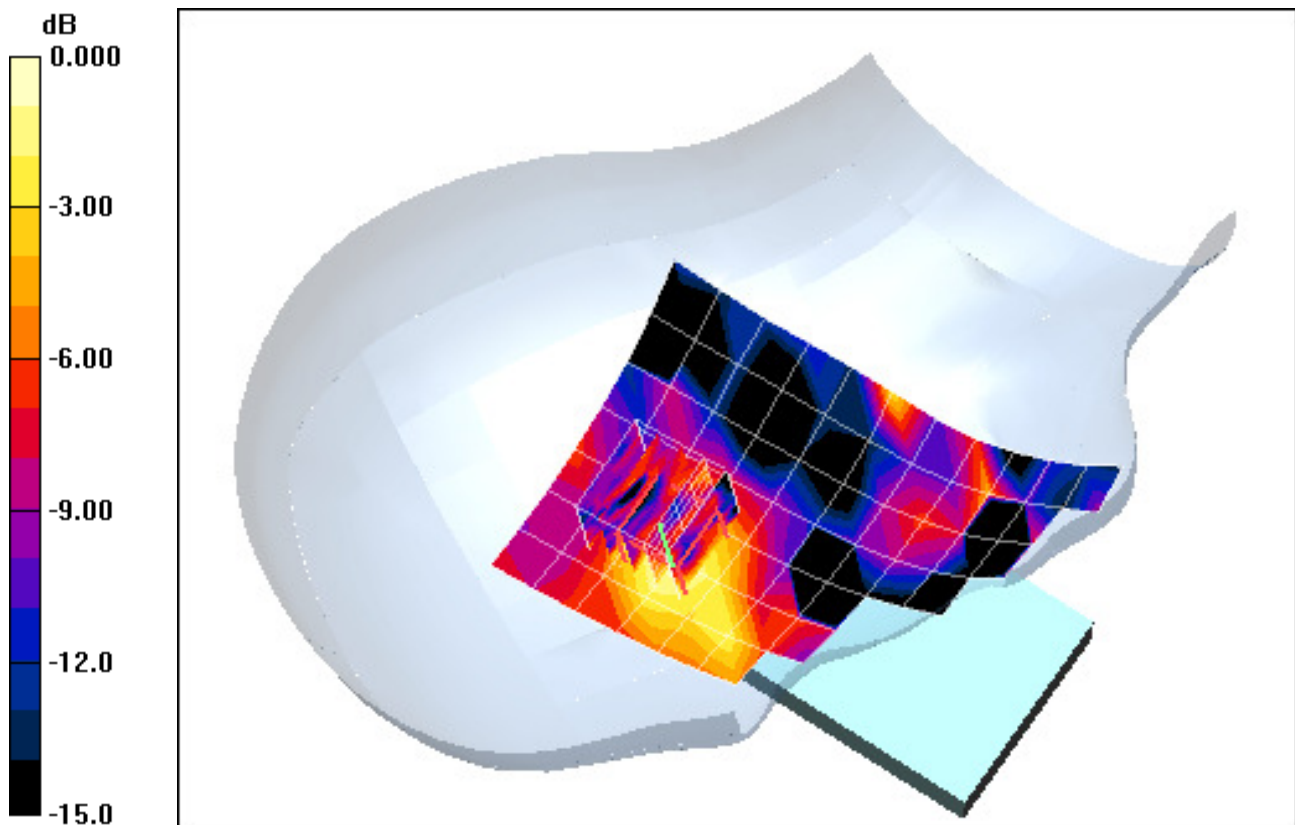
Communication System: IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Brain Medium parameters used (interpolated):
 $f = 2437 \text{ MHz}$; $\sigma = 1.83 \text{ mho/m}$; $\epsilon_r = 38.48$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

Test Date: 11-23-2010; Ambient Temp: 23.7 °C; Tissue Temp: 21.8 °C

Probe: EX3DV4 - SN3550; ConvF(6.21, 6.21, 6.21); Calibrated: 1/26/2010
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
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 802.11b, Right Head, Tilt, Ch 06, 1 Mbps

Area Scan (8x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 1.99 V/m
Peak SAR (extrapolated) = 0.028 W/kg
SAR(1 g) = 0.00701 mW/g; SAR(10 g) = 0.00238 mW/g



0 dB = 0.009mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #3

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

Medium: 2450 Brain Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 1.83 \text{ mho/m}$; $\epsilon_r = 38.48$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 11-23-2010; Ambient Temp: 23.7 °C; Tissue Temp: 21.8 °C

Probe: EX3DV4 - SN3550; ConvF(6.21, 6.21, 6.21); Calibrated: 1/26/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 1/22/2010

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 802.11b, Left Head, Touch, Ch 06, 1 Mbps

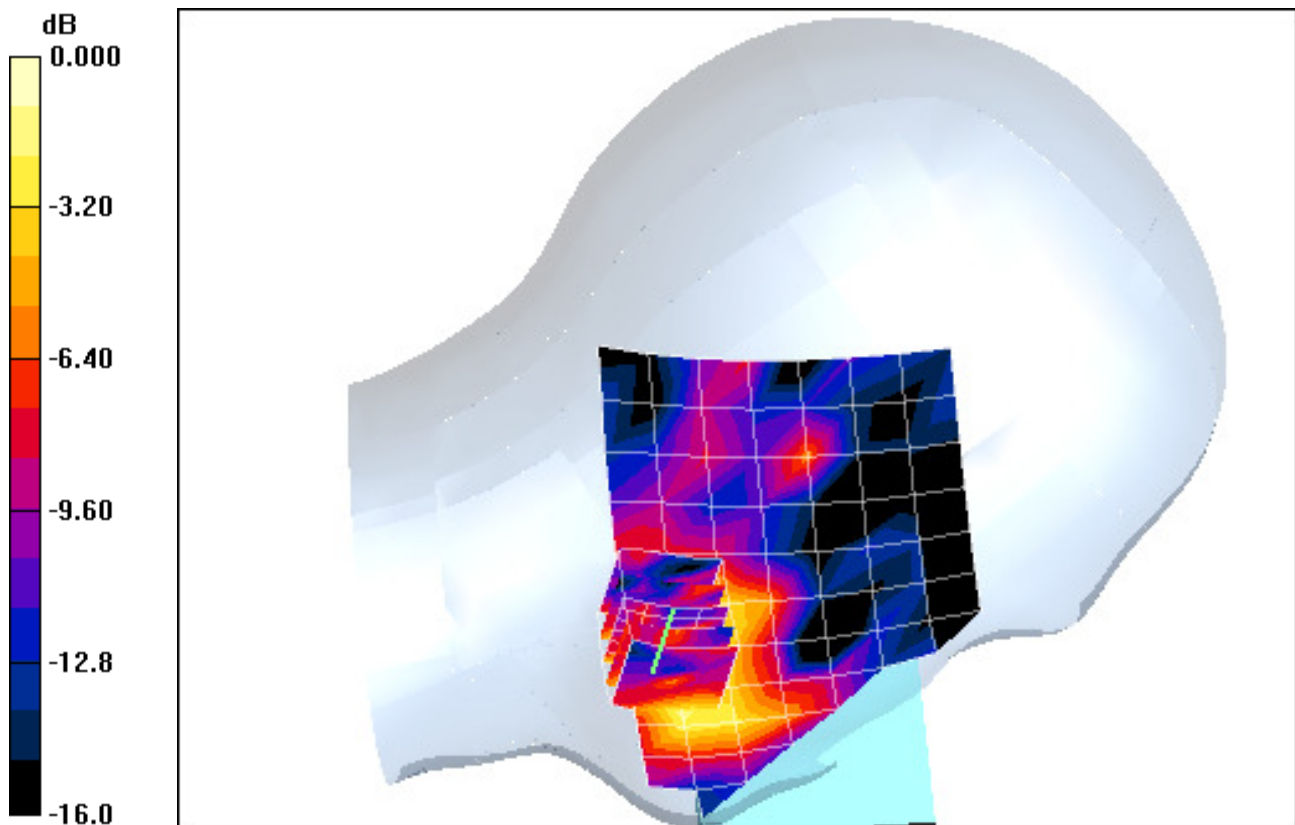
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 2.89 V/m

Peak SAR (extrapolated) = 0.064 W/kg

SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.00549 mW/g



0 dB = 0.019mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #3

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

Medium: 2450 Brain Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 1.83 \text{ mho/m}$; $\epsilon_r = 38.48$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 11-23-2010; Ambient Temp: 23.7 °C; Tissue Temp: 21.8 °C

Probe: EX3DV4 - SN3550; ConvF(6.21, 6.21, 6.21); Calibrated: 1/26/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 1/22/2010

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 802.11b, Left Head, Touch, Ch 06, 1 Mbps

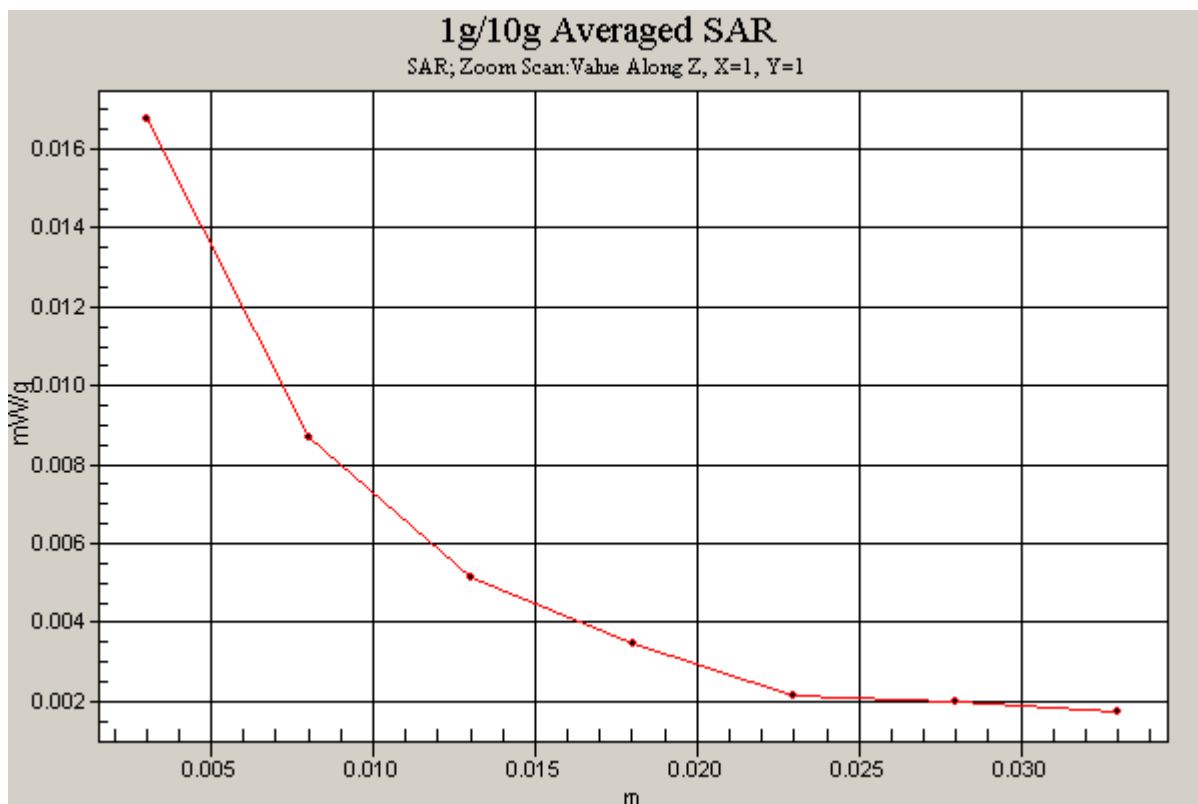
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 2.89 V/m

Peak SAR (extrapolated) = 0.064 W/kg

SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.00549 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #3

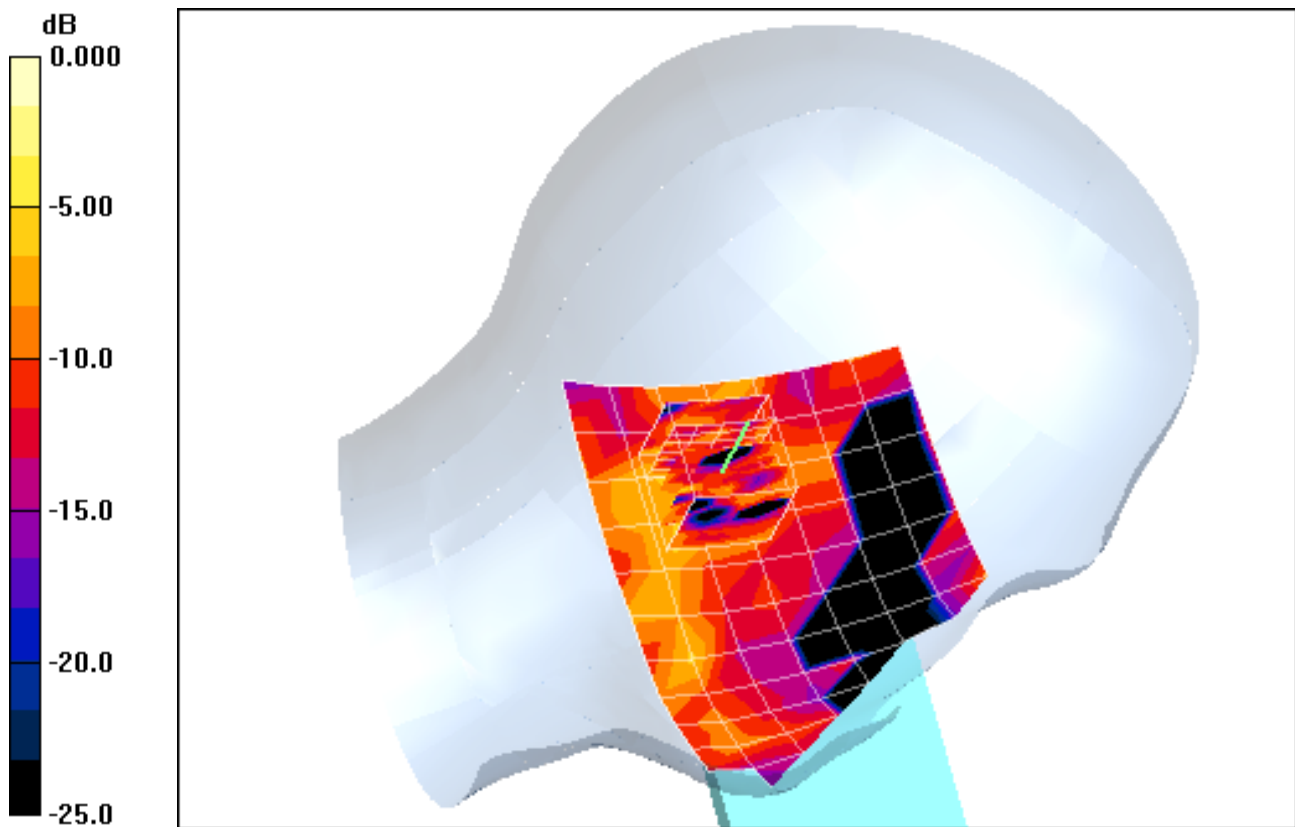
Communication System: IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Brain Medium parameters used (interpolated):
 $f = 2437 \text{ MHz}$; $\sigma = 1.83 \text{ mho/m}$; $\epsilon_r = 38.48$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section

Test Date: 11-23-2010; Ambient Temp: 23.7 °C; Tissue Temp: 21.8 °C

Probe: EX3DV4 - SN3550; ConvF(6.21, 6.21, 6.21); Calibrated: 1/26/2010
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
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 802.11b, Left Head, Tilt, Ch 06, 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 = 1.34 V/m
Peak SAR (extrapolated) = 0.008 W/kg
SAR(1 g) = 0.00191 mW/g; SAR(10 g) = 0.00047 mW/g



0 dB = 0.014mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #4

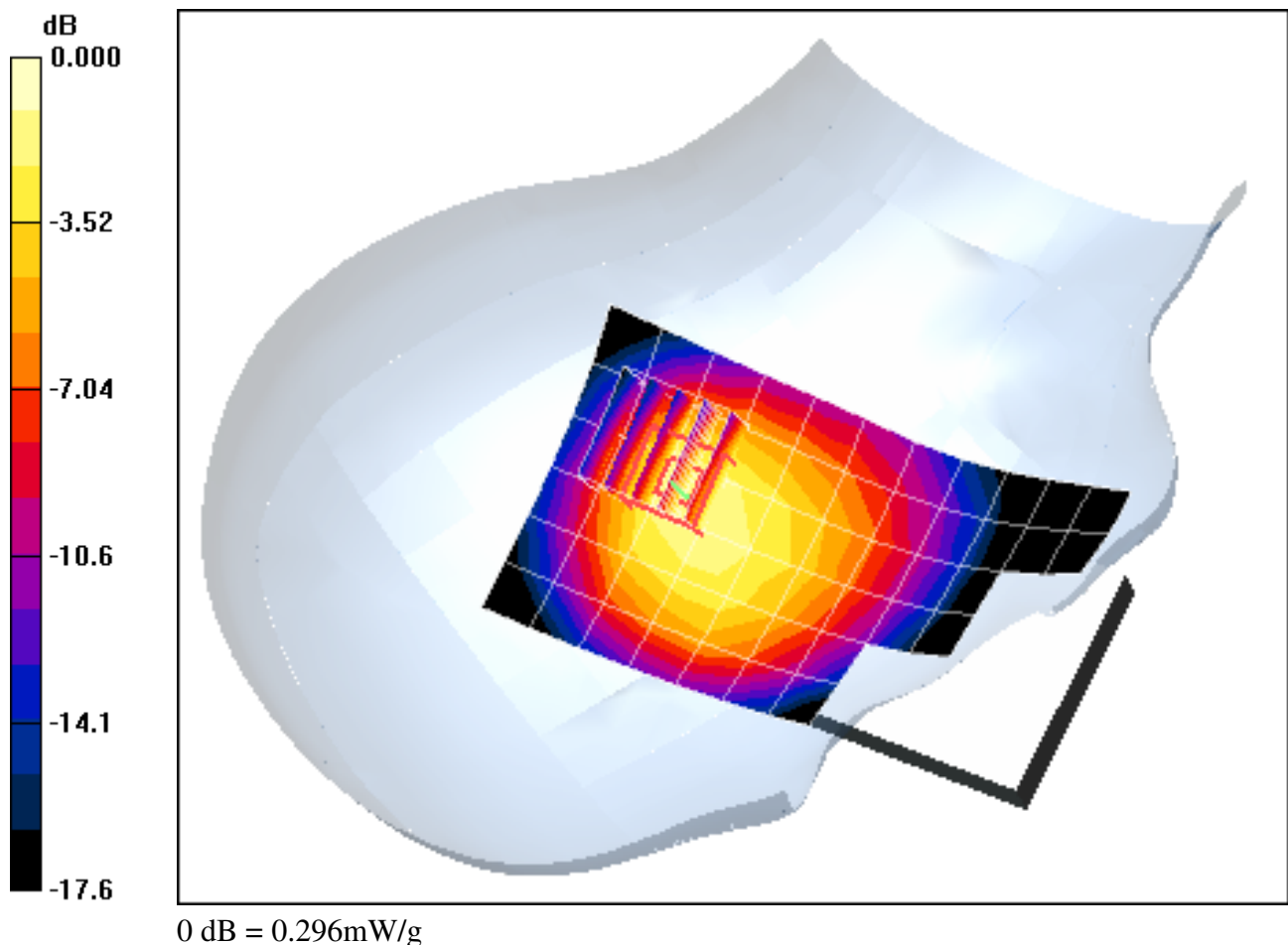
Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Brain Medium parameters used (interpolated):
 $f = 782 \text{ MHz}$; $\sigma = 0.905 \text{ mho/m}$; $\epsilon_r = 41.1$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

Test Date: 12-02-2010; Ambient Temp: 24.3 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3213; ConvF(6.3, 6.3, 6.3); Calibrated: 3/16/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: LTE, Right Head, Touch, Mid.ch, RB 1, Offset 0, QPSK

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 17.7 V/m
Peak SAR (extrapolated) = 0.488 W/kg
SAR(1 g) = 0.285 mW/g; SAR(10 g) = 0.176 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #4

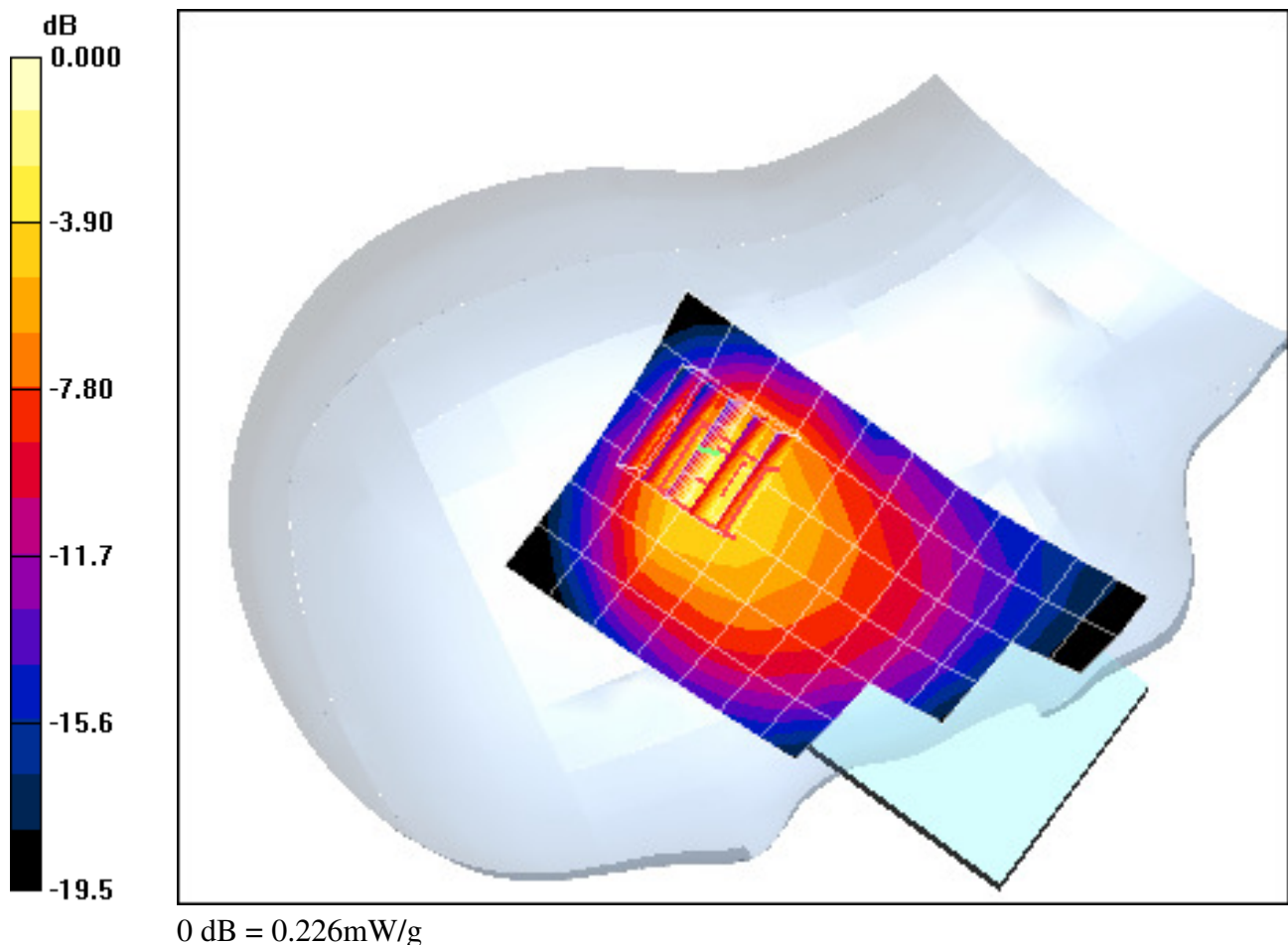
Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Brain Medium parameters used (interpolated):
 $f = 782 \text{ MHz}$; $\sigma = 0.905 \text{ mho/m}$; $\epsilon_r = 41.1$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

Test Date: 12-02-2010; Ambient Temp: 24.3 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3213; ConvF(6.3, 6.3, 6.3); Calibrated: 3/16/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: LTE, Right Head, Tilt, Mid.ch, RB 1, Offset 0, 16 QAM

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 16.2 V/m
Peak SAR (extrapolated) = 0.381 W/kg
SAR(1 g) = 0.206 mW/g; SAR(10 g) = 0.123 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #4

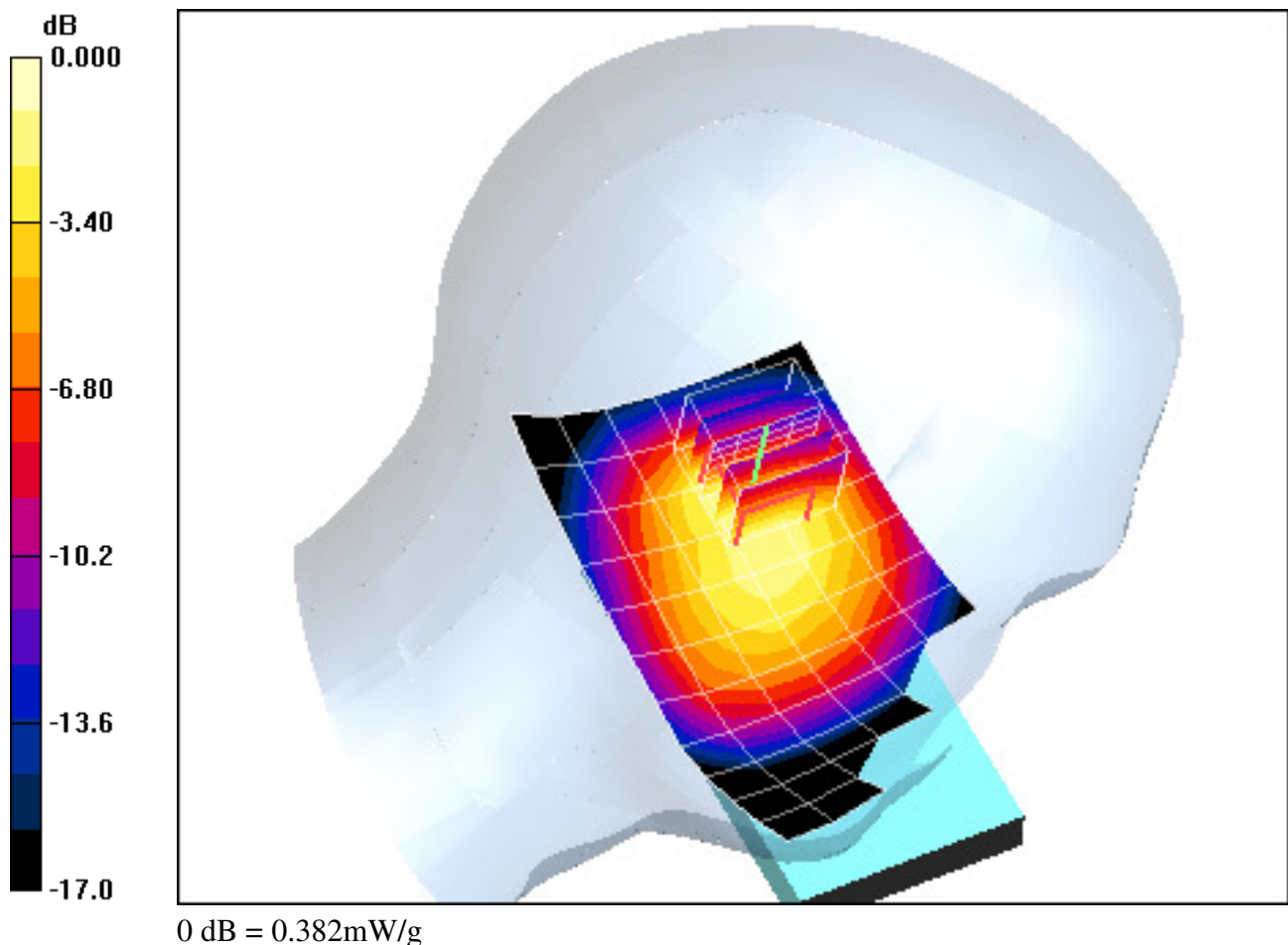
Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Brain Medium parameters used (interpolated):
 $f = 782 \text{ MHz}$; $\sigma = 0.905 \text{ mho/m}$; $\epsilon_r = 41.1$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section

Test Date: 12-02-2010; Ambient Temp: 24.3 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3213; ConvF(6.3, 6.3, 6.3); Calibrated: 3/16/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: LTE, Left Head, Touch, Mid.ch, RB 1, Offset 0, QPSK

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 16.3 V/m
Peak SAR (extrapolated) = 0.742 W/kg
SAR(1 g) = 0.350 mW/g; SAR(10 g) = 0.203 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #4

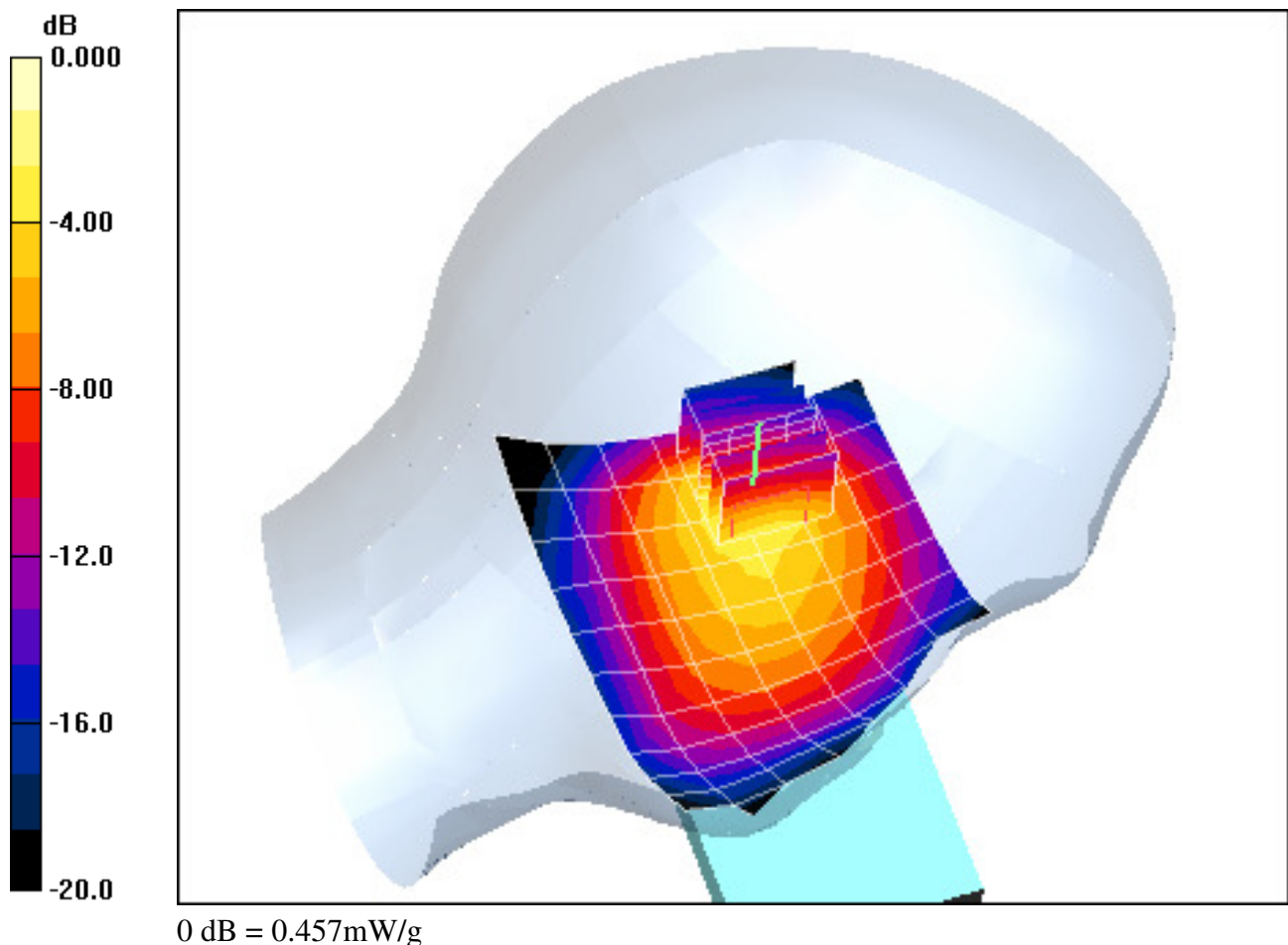
Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Brain Medium parameters used (interpolated):
 $f = 782 \text{ MHz}$; $\sigma = 0.905 \text{ mho/m}$; $\epsilon_r = 41.1$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section

Test Date: 12-02-2010; Ambient Temp: 24.3 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3213; ConvF(6.3, 6.3, 6.3); Calibrated: 3/16/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: LTE, Left Head, Tilt, Mid.ch, RB 1, Offset 0, QPSK

Area Scan (8x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 15.7 V/m
Peak SAR (extrapolated) = 0.941 W/kg
SAR(1 g) = 0.385 mW/g; SAR(10 g) = 0.192 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #4

Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Brain Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 0.905 \text{ mho/m}$; $\epsilon_r = 41.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 12-02-2010; Ambient Temp: 24.3 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3213; ConvF(6.3, 6.3, 6.3); Calibrated: 3/16/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: LTE, Left Head, Tilt, Mid.ch, RB 1, Offset 0, QPSK

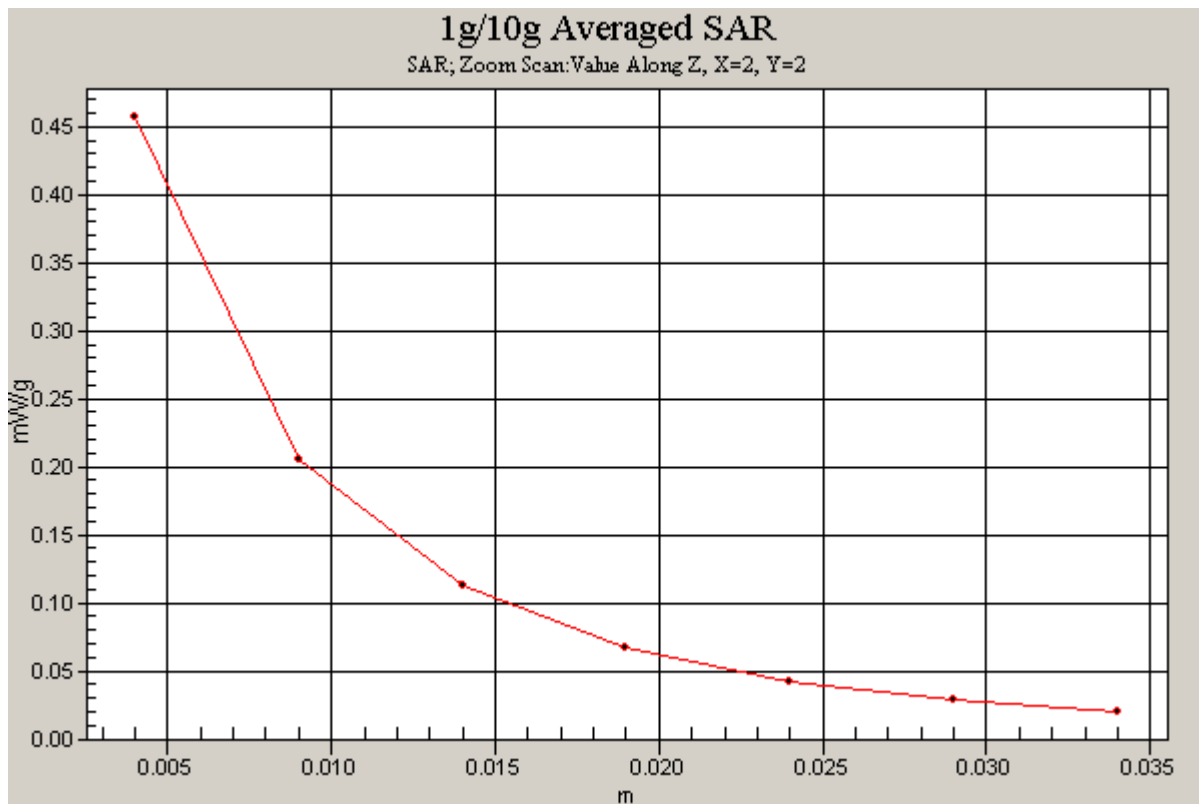
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 15.7 V/m

Peak SAR (extrapolated) = 0.941 W/kg

SAR(1 g) = 0.385 mW/g; SAR(10 g) = 0.192 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Muscle Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 56.21$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-01-2010; Ambient Temp: 23.9 °C; Tissue Temp: 22.4 °C

Probe: EX3DV4 - SN3550; ConvF(8.3, 8.3, 8.3); Calibrated: 1/26/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 1/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: Cellular EVDO, Body SAR, Back side, Mid.ch

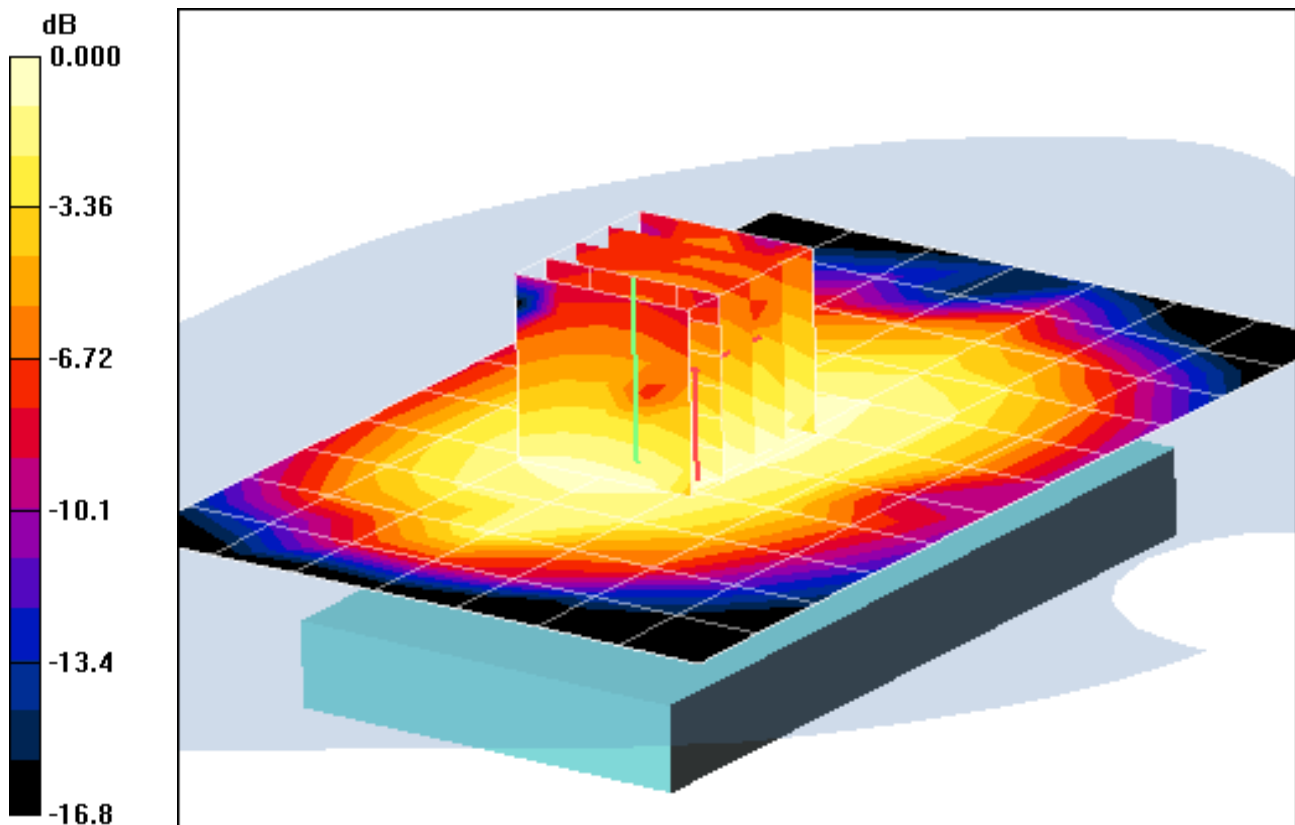
Area Scan (8x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 28.8 V/m

Peak SAR (extrapolated) = 3.89 W/kg

SAR(1 g) = 0.848 mW/g; SAR(10 g) = 0.583 mW/g



0 dB = 0.826mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC #1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Muscle Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 56.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-01-2010; Ambient Temp: 23.9 °C; Tissue Temp: 22.4 °C

Probe: EX3DV4 - SN3550; ConvF(8.3, 8.3, 8.3); Calibrated: 1/26/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 1/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: Cellular EVDO, Body SAR, Back side, Mid.ch

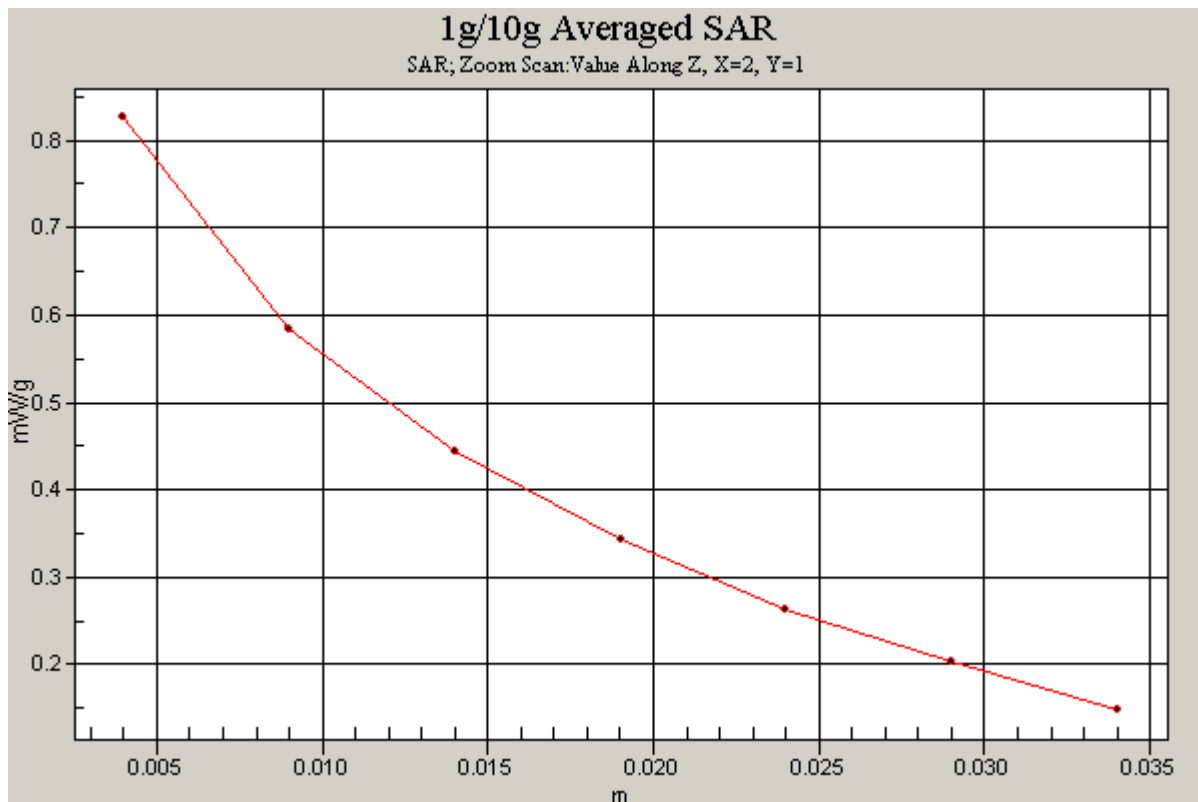
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 28.8 V/m

Peak SAR (extrapolated) = 3.89 W/kg

SAR(1 g) = 0.848 mW/g; SAR(10 g) = 0.583 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Muscle Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 56.21$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-01-2010; Ambient Temp: 23.9 °C; Tissue Temp: 22.4 °C

Probe: EX3DV4 - SN3550; ConvF(8.3, 8.3, 8.3); Calibrated: 1/26/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 1/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: Cellular EVDO, Body SAR, Front side, Mid.ch

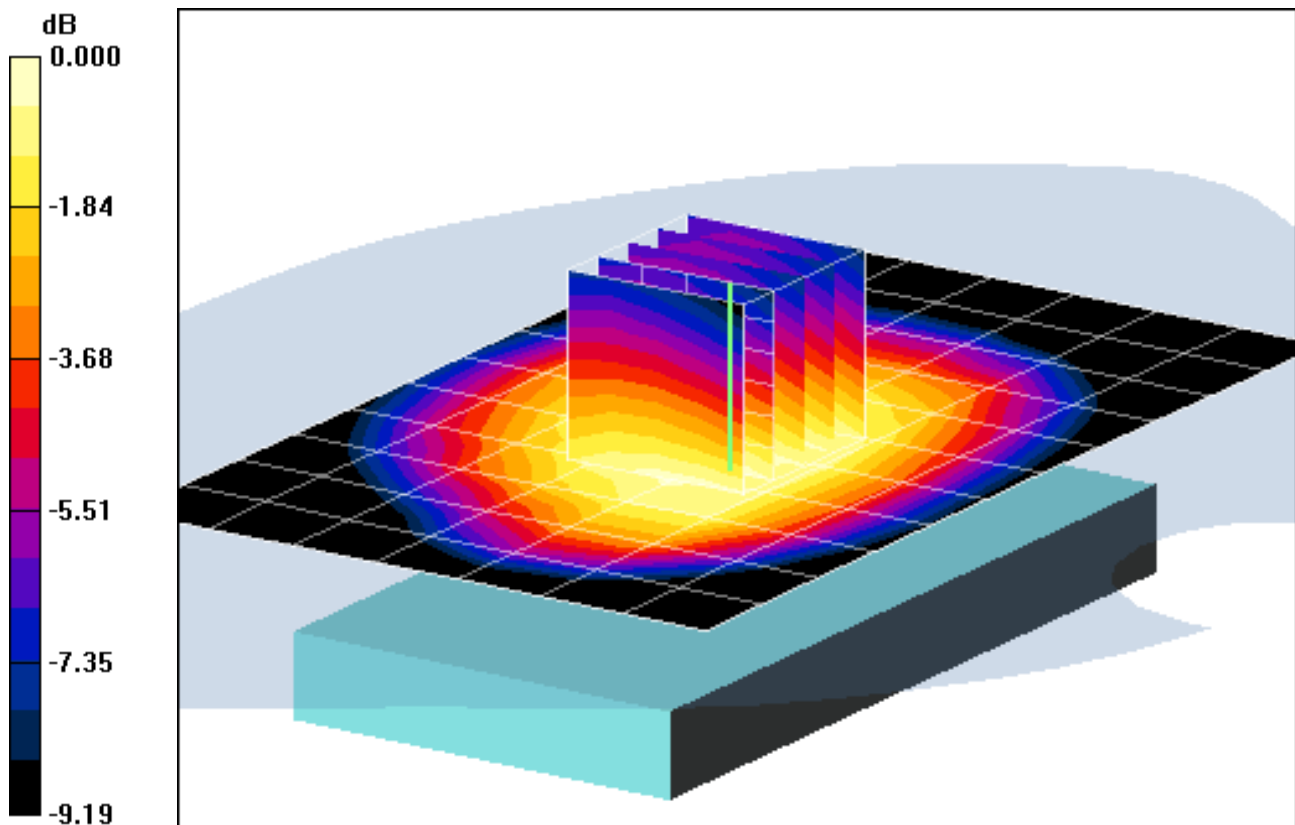
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 26.7 V/m

Peak SAR (extrapolated) = 0.840 W/kg

SAR(1 g) = 0.647 mW/g; SAR(10 g) = 0.494 mW/g



0 dB = 0.678mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Muscle Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 56.21$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-01-2010; Ambient Temp: 23.9 °C; Tissue Temp: 22.4 °C

Probe: EX3DV4 - SN3550; ConvF(8.3, 8.3, 8.3); Calibrated: 1/26/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 1/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: Cellular EVDO, Body SAR, Edge A, Mid.ch

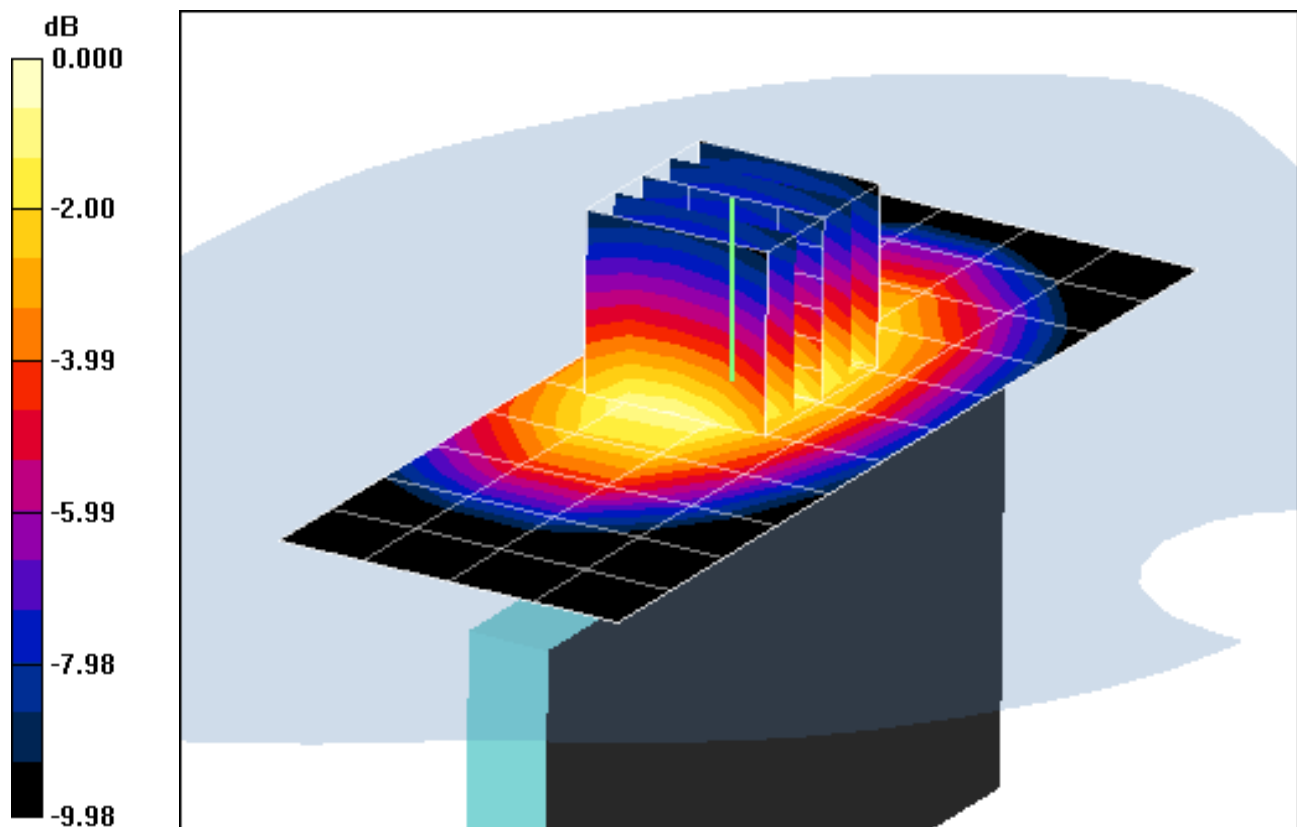
Area Scan (5x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 26.0 V/m

Peak SAR (extrapolated) = 0.865 W/kg

SAR(1 g) = 0.615 mW/g; SAR(10 g) = 0.419 mW/g



0 dB = 0.658mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Muscle Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 1.01 \text{ mho/m}$; $\epsilon_r = 56.21$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-01-2010; Ambient Temp: 23.9 °C; Tissue Temp: 22.4 °C

Probe: EX3DV4 - SN3550; ConvF(8.3, 8.3, 8.3); Calibrated: 1/26/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 1/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: Cellular EVDO, Body SAR, Edge D, Mid.ch

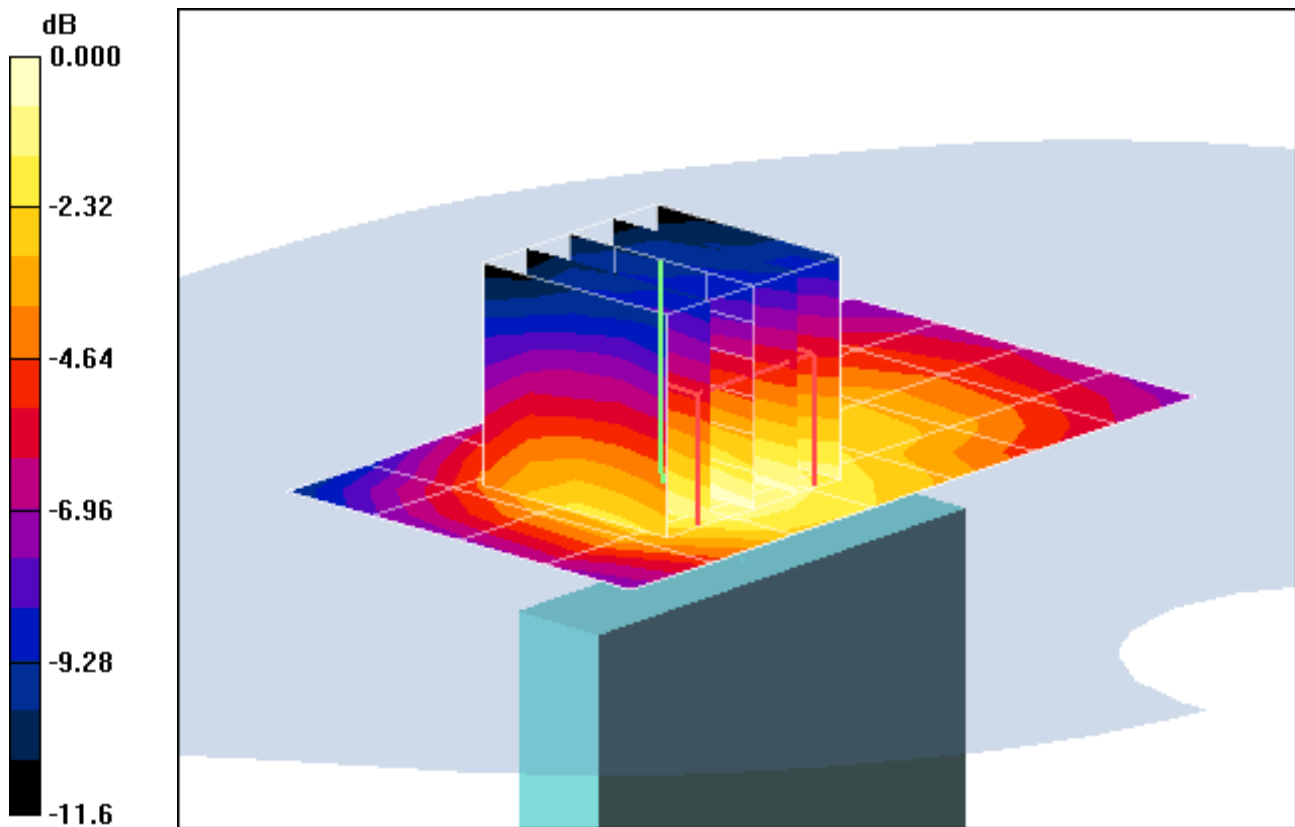
Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 8.13 V/m

Peak SAR (extrapolated) = 0.143 W/kg

SAR(1 g) = 0.084 mW/g; SAR(10 g) = 0.055 mW/g



0 dB = 0.087mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR # 1

Communication System: PCS CDMA; Frequency: 1908.75 MHz; Duty Cycle: 1:1

Medium: 1900 Muscle Medium parameters used:

$f = 1908.75 \text{ MHz}$; $\sigma = 1.57 \text{ mho/m}$; $\epsilon_r = 52.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 11-22-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.8 °C

Probe: ES3DV2 - SN3022; ConvF(4.34, 4.34, 4.34); Calibrated: 9/21/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/21/2010

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS EVDO, Body SAR, Back side, High.ch

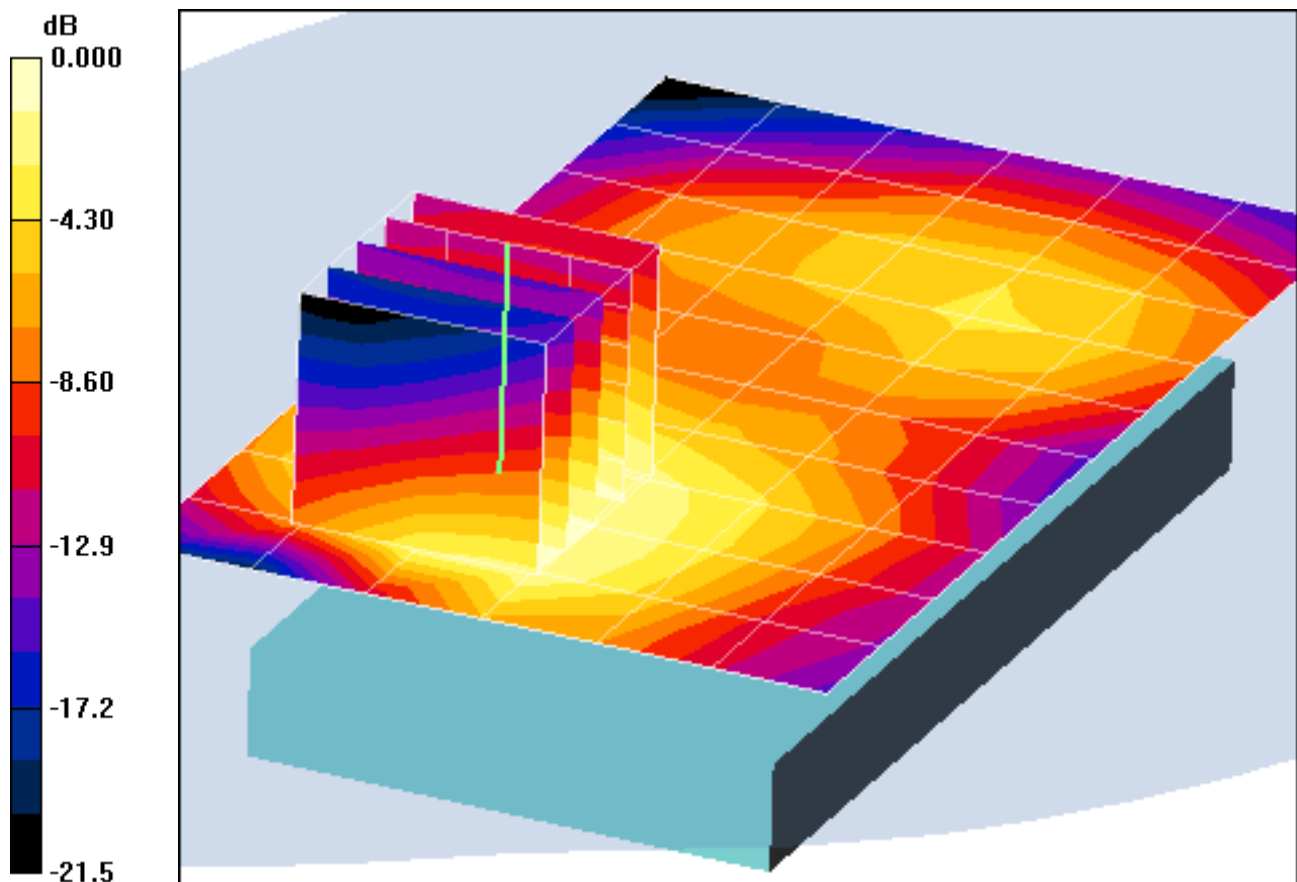
Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 27.2 V/m

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 0.997 mW/g; SAR(10 g) = 0.601 mW/g



0 dB = 1.09mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR # 1

Communication System: PCS CDMA; Frequency: 1908.75 MHz; Duty Cycle: 1:1

Medium: 1900 Muscle Medium parameters used:

$f = 1908.75 \text{ MHz}$; $\sigma = 1.57 \text{ mho/m}$; $\epsilon_r = 52.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 11-22-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.8 °C

Probe: ES3DV2 - SN3022; ConvF(4.34, 4.34, 4.34); Calibrated: 9/21/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/21/2010

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS EVDO, Body SAR, Back side, High.ch

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

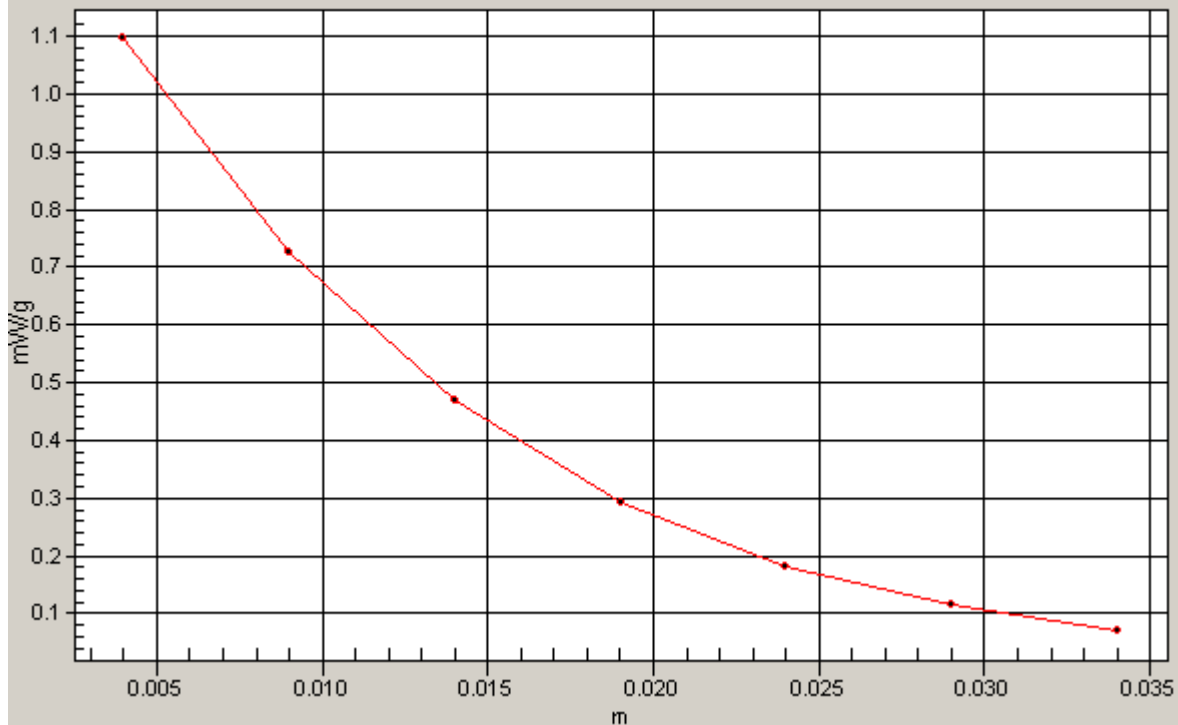
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 27.2 V/m

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 0.997 mW/g; SAR(10 g) = 0.601 mW/g
1g/10g Averaged SAR

SAR; Zoom Scan: Value Along Z, X=2, Y=3



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #1

Communication System: PCS CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Muscle Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.56 \text{ mho/m}$; $\epsilon_r = 53.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-03-2010; Ambient Temp: 23.8°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3213; ConvF(4.61, 4.61, 4.61); Calibrated: 3/16/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS EvDO, Body SAR, Front side, Mid.ch

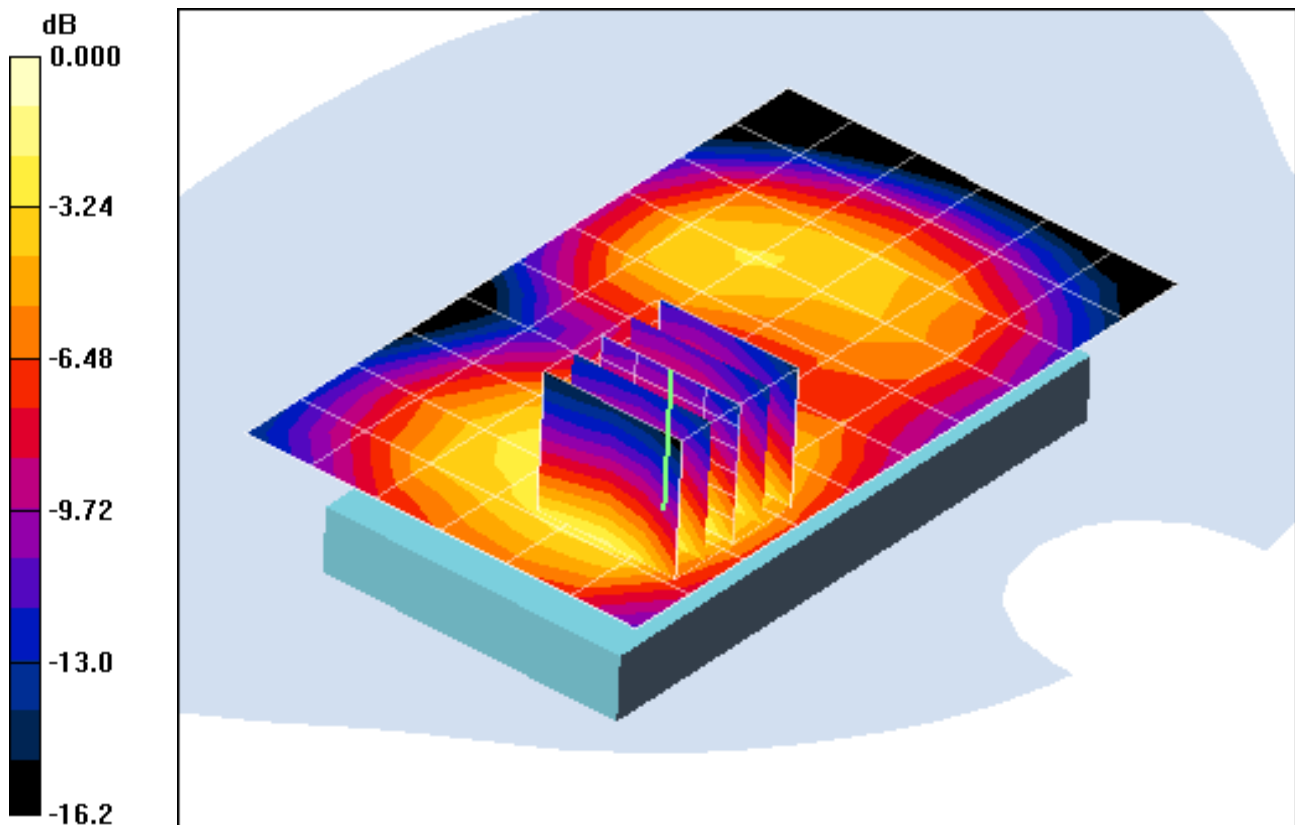
Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 21.0 V/m

Peak SAR (extrapolated) = 0.899 W/kg

SAR(1 g) = 0.596 mW/g; SAR(10 g) = 0.368 mW/g



0 dB = 0.640mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #1

Communication System: PCS CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Muscle Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.54 \text{ mho/m}$; $\epsilon_r = 52.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 11-22-2010; Ambient Temp: 23.6°C; Tissue Temp: 21.8°C

Probe: ES3DV2 - SN3022; ConvF(4.34, 4.34, 4.34); Calibrated: 9/21/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/21/2010

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS EvDO, Body SAR, Edge A, Mid.ch

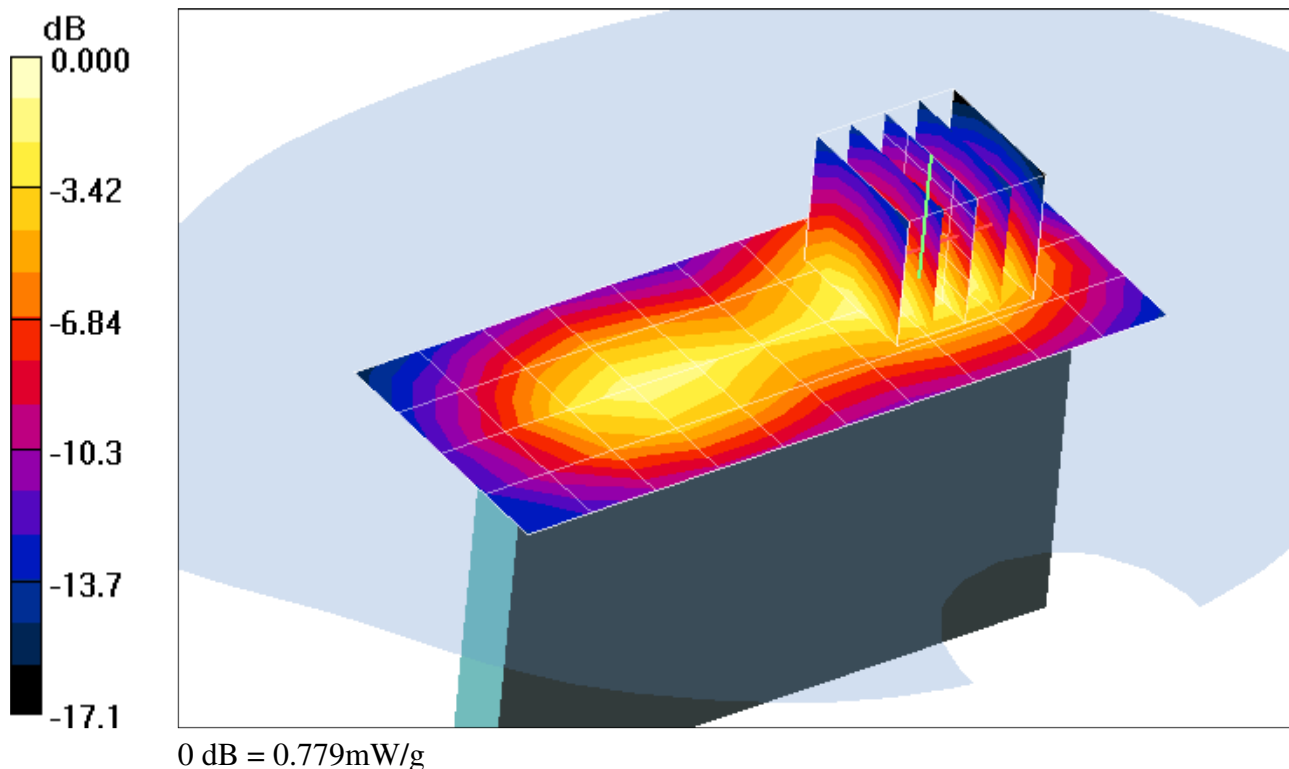
Area Scan (5x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 23.7 V/m

Peak SAR (extrapolated) = 1.08 W/kg

SAR(1 g) = 0.700 mW/g; SAR(10 g) = 0.407 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR # 1

Communication System: PCS CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Muscle Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.54 \text{ mho/m}$; $\epsilon_r = 52.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 11-22-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.8 °C

Probe: ES3DV2 - SN3022; ConvF(4.34, 4.34, 4.34); Calibrated: 9/21/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/21/2010

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS EVDO, Body SAR, Edge D, Mid.ch

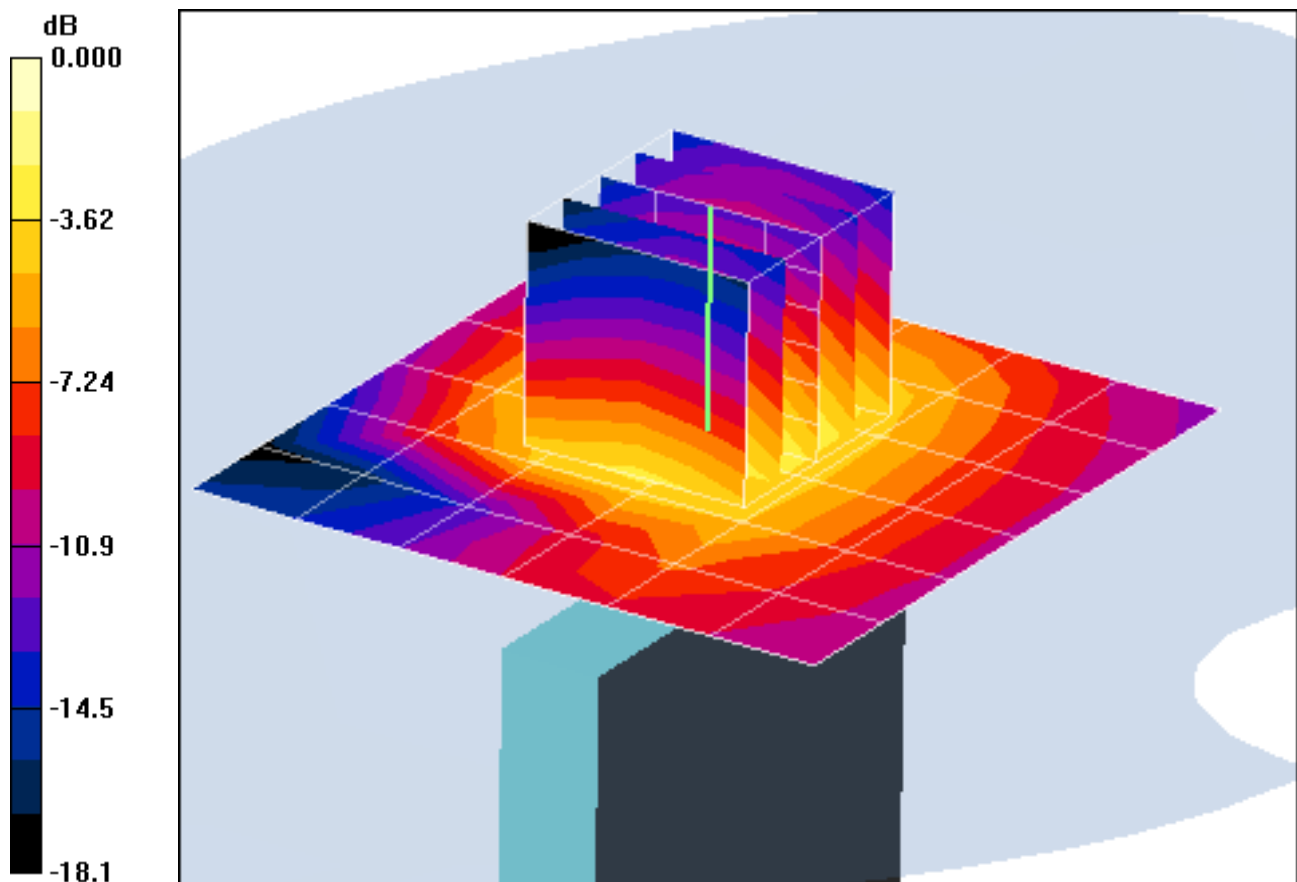
Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 16.0 V/m

Peak SAR (extrapolated) = 0.499 W/kg

SAR(1 g) = 0.328 mW/g; SAR(10 g) = 0.189 mW/g



0 dB = 0.370mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #3

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

Medium: 2450 Muscle Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 53.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-04-2010; Ambient Temp: 23.6 °C; Tissue Temp: 22.0 °C

Probe: ES3DV3 - SN3213; ConvF(4.27, 4.27, 4.27); Calibrated: 3/16/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

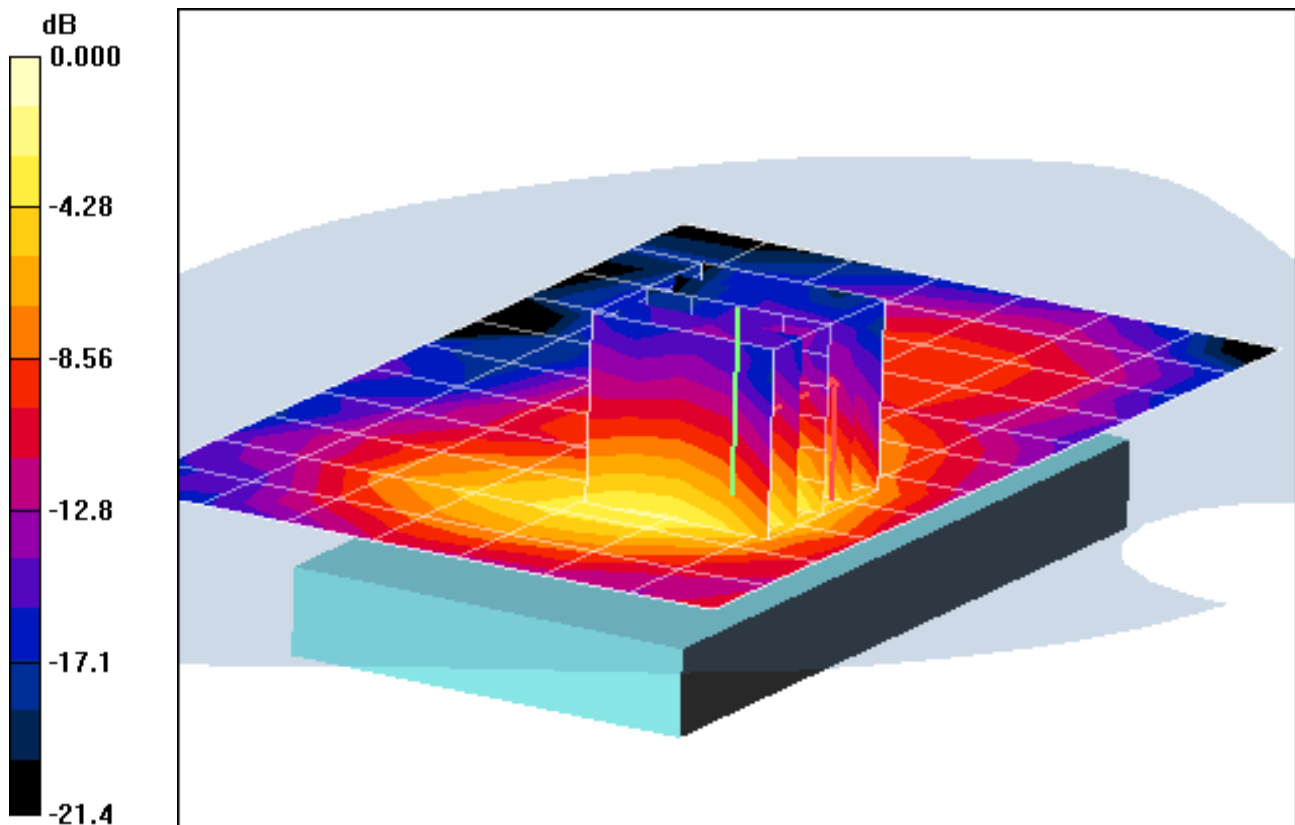
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 6.01 V/m

Peak SAR (extrapolated) = 0.150 W/kg

SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.034 mW/g



0 dB = 0.092mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #3

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

Medium: 2450 Muscle Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 53.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-04-2010; Ambient Temp: 23.6 °C; Tissue Temp: 22.0 °C

Probe: ES3DV3 - SN3213; ConvF(4.27, 4.27, 4.27); Calibrated: 3/16/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

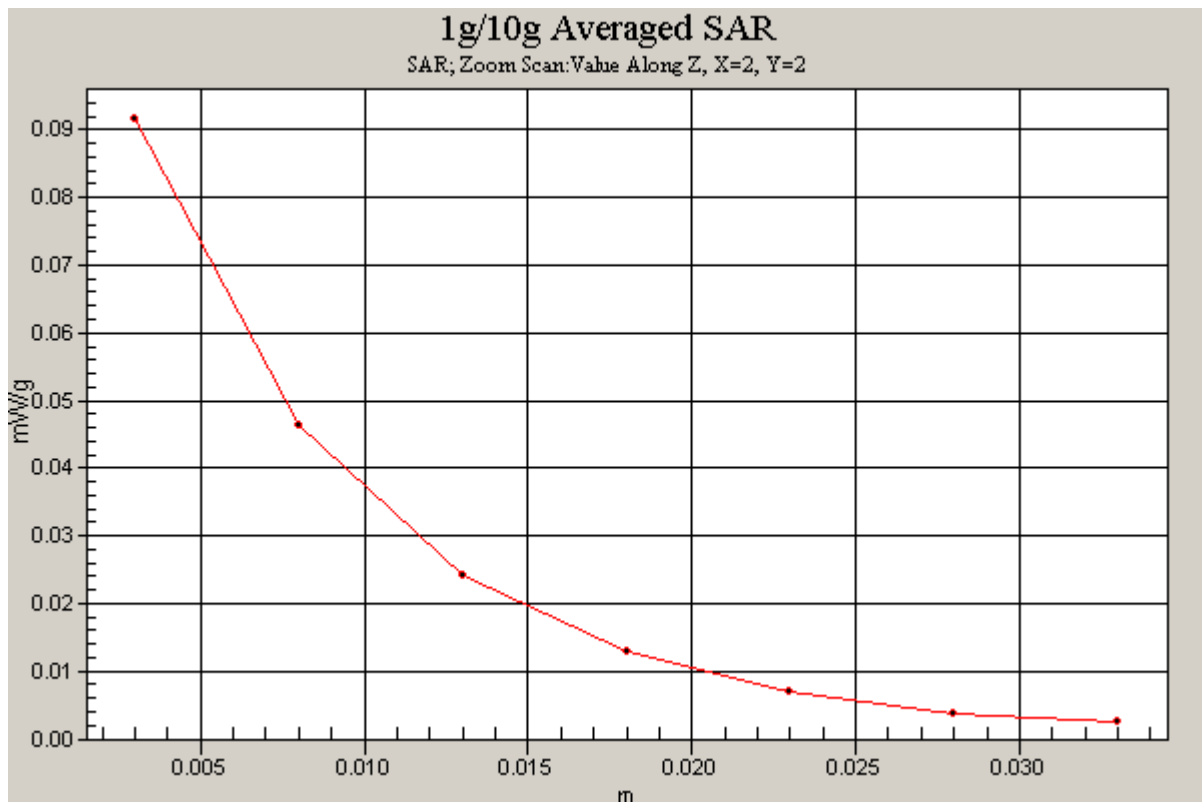
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 6.01 V/m

Peak SAR (extrapolated) = 0.150 W/kg

SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.034 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCCSAR #3

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

Medium: 2450 Muscle Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 53.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-04-2010; Ambient Temp: 23.6 °C; Tissue Temp: 22.0 °C

Probe: ES3DV3 - SN3213; ConvF(4.27, 4.27, 4.27); Calibrated: 3/16/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

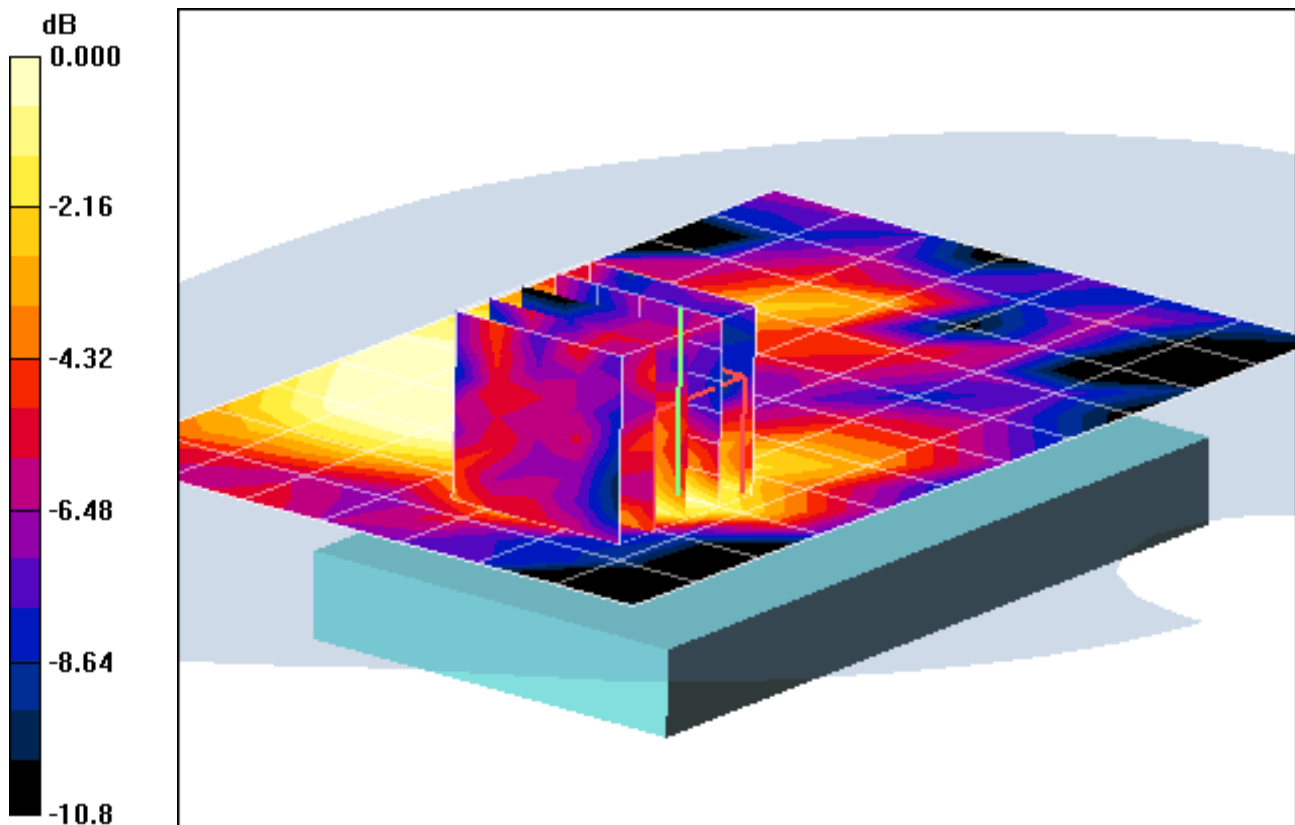
Area Scan (8x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 0.543 V/m

Peak SAR (extrapolated) = 0.010 W/kg

SAR(1 g) = 0.00567 mW/g; SAR(10 g) = 0.00338 mW/g



0 dB = 0.007mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCCSAR #3

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

Medium: 2450 Muscle Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 53.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-04-2010; Ambient Temp: 23.6 °C; Tissue Temp: 22.0 °C

Probe: ES3DV3 - SN3213; ConvF(4.27, 4.27, 4.27); Calibrated: 3/16/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11b, Body SAR, Edge B, Ch 06, 1 Mbps

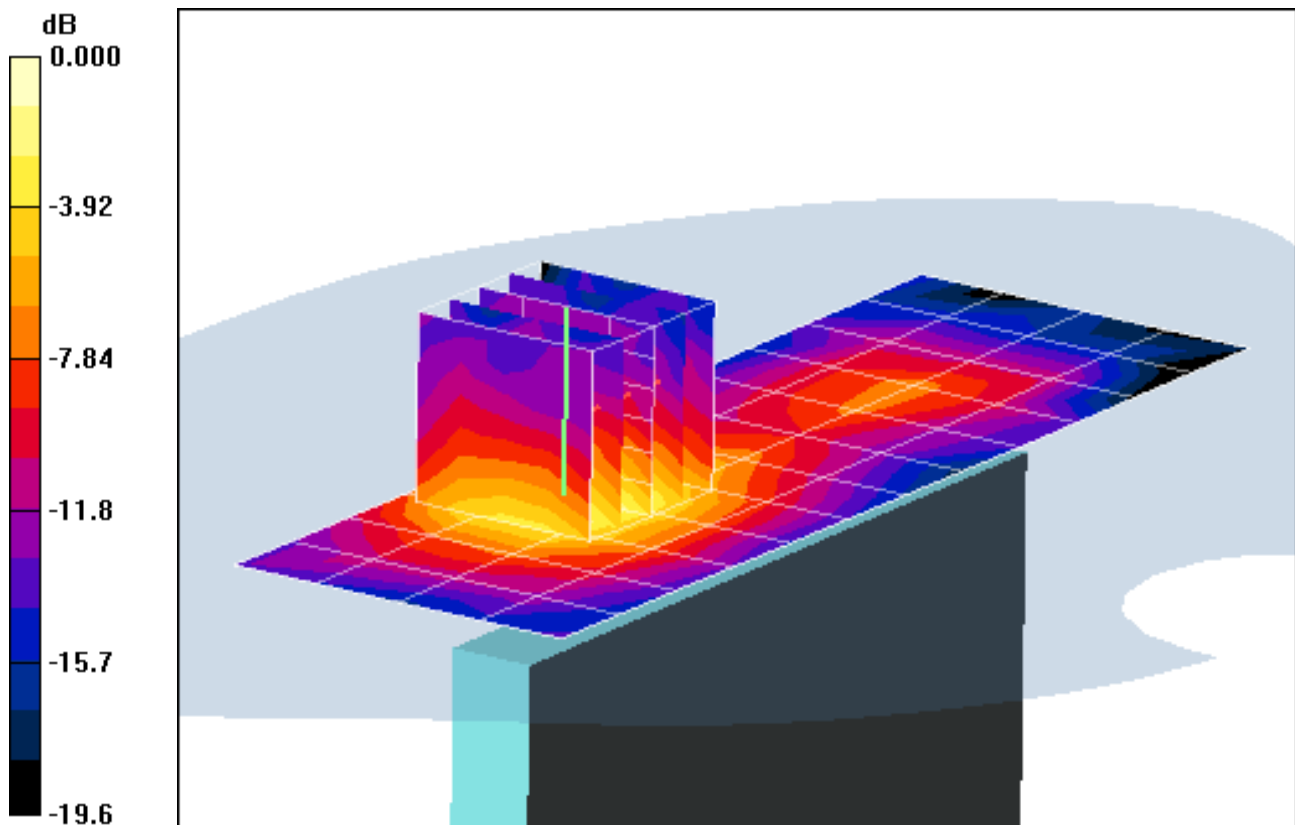
Area Scan (5x13x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 2.09 V/m

Peak SAR (extrapolated) = 0.073 W/kg

SAR(1 g) = 0.037 mW/g; SAR(10 g) = 0.018 mW/g



0 dB = 0.047mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #3

Communication System: IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Muscle Medium parameters used (interpolated):
 $f = 2437 \text{ MHz}$; $\sigma = 1.97 \text{ mho/m}$; $\epsilon_r = 53.2$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-04-2010; Ambient Temp: 23.6 °C; Tissue Temp: 22.0 °C

Probe: ES3DV3 - SN3213; ConvF(4.27, 4.27, 4.27); Calibrated: 3/16/2010
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11b, Body SAR, Edge D, Ch 06, 1 Mbps

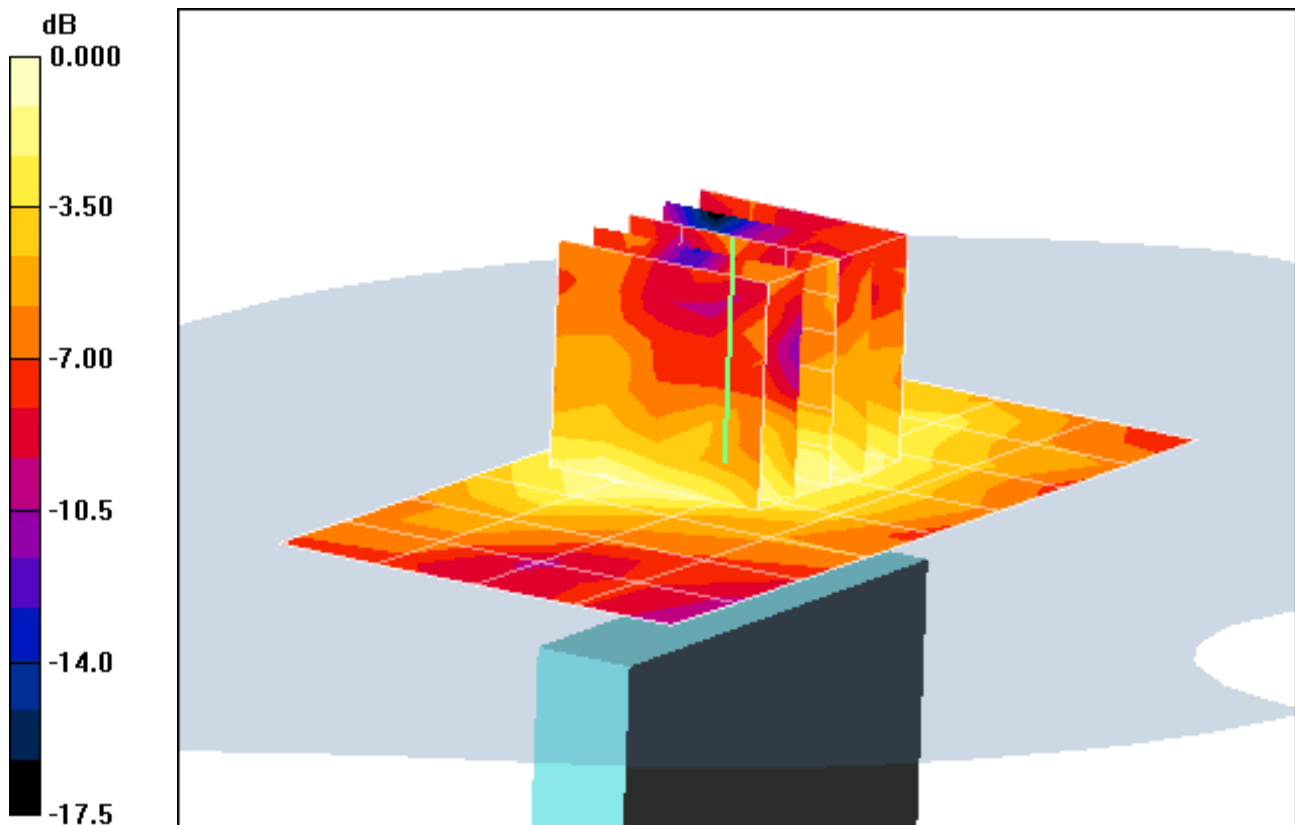
Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 1.70 V/m

Peak SAR (extrapolated) = 0.013 W/kg

SAR(1 g) = 0.00724 mW/g; SAR(10 g) = 0.00432 mW/g



0 dB = 0.009mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC #1

Communication System: Bluetooth; Frequency: 2480 MHz; Duty Cycle: 1:1

Medium: 2450 Muscle Medium parameters used (interpolated):

$f = 2480 \text{ MHz}$; $\sigma = 1.94 \text{ mho/m}$; $\epsilon_r = 50.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-14-2010; Ambient Temp: 22.7 °C; Tissue Temp: 21.4 °C

Probe: ES3DV3 - SN3213; ConvF(4.27, 4.27, 4.27); Calibrated: 3/16/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: Bluetooth, Body SAR, Ch. 78, 2 Mbps

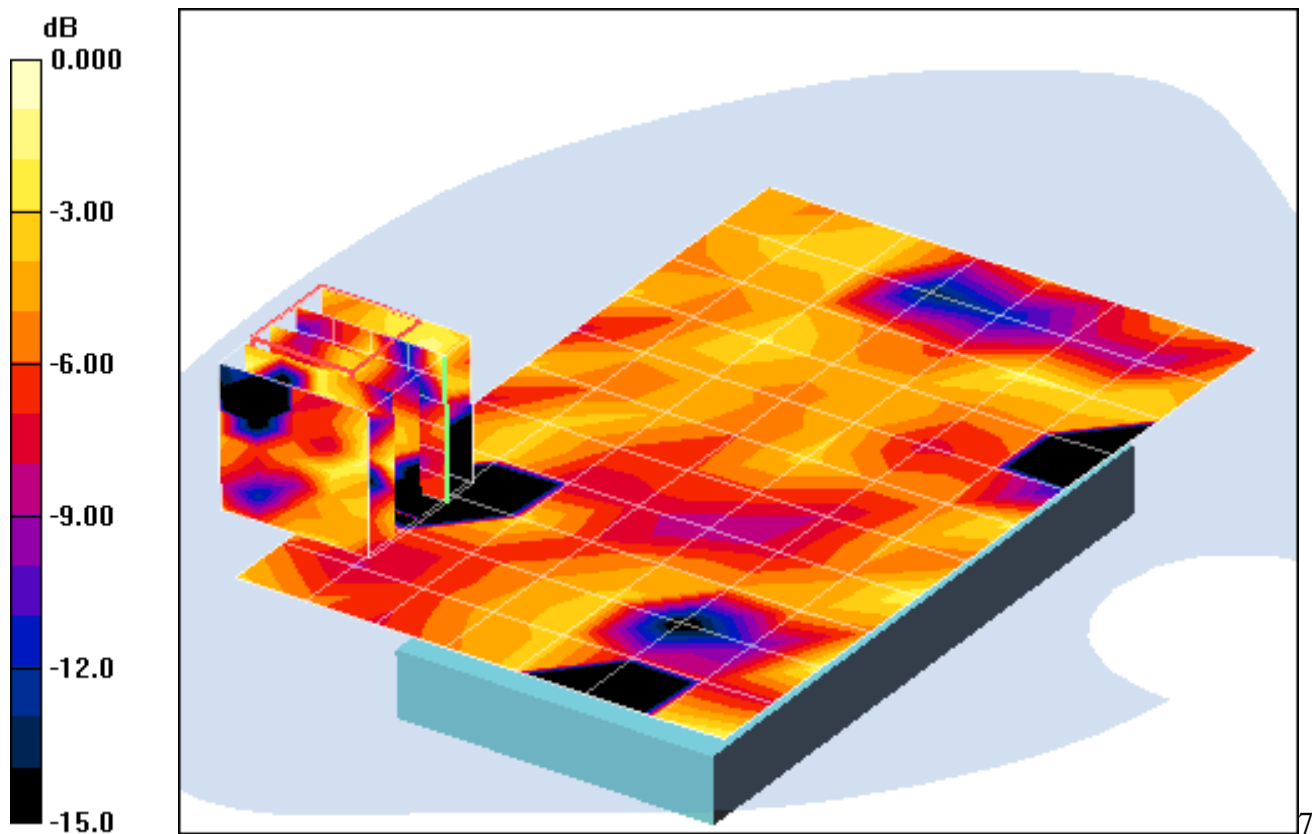
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 0.624 V/m

Peak SAR (extrapolated) = 0.002 W/kg

SAR(1 g) = 0.000545 mW/g; SAR(10 g) = 0.000309 mW/g



0 dB = 0.002mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #4

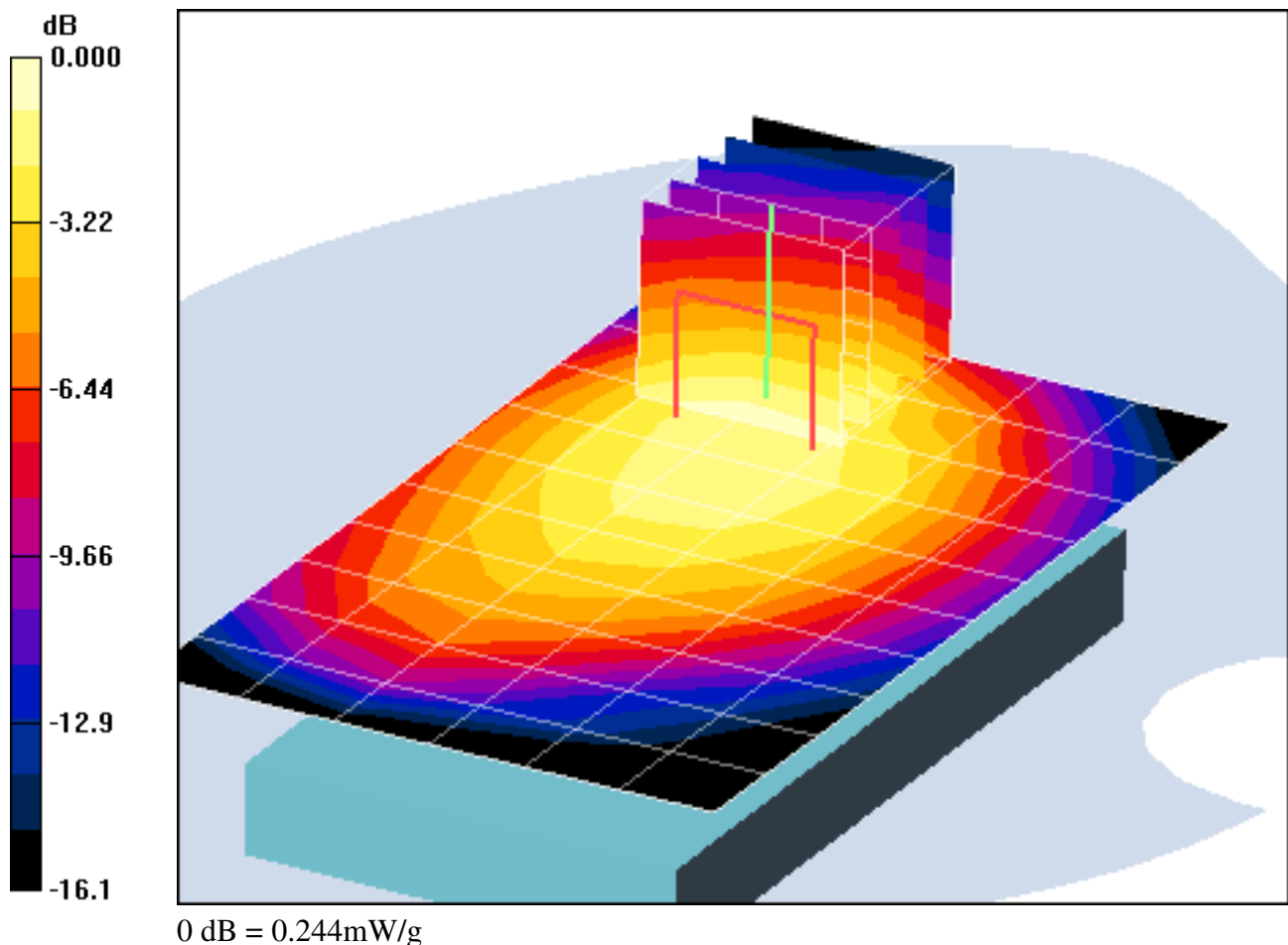
Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Muscle Medium parameters used (interpolated):
 $f = 782 \text{ MHz}$; $\sigma = 0.963 \text{ mho/m}$; $\epsilon_r = 54.2$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-02-2010; Ambient Temp: 24.5 °C; Tissue Temp: 22.7 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: LTE, Body SAR, Back Side, Mid Ch., RB 1, Offset 0, QPSK

Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
Reference Value = 15.3 V/m
Peak SAR (extrapolated) = 0.396 W/kg
SAR(1 g) = 0.229 mW/g; SAR(10 g) = 0.144 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE

Serial: FCC SAR #4

Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Muscle Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 0.963 \text{ mho/m}$; $\epsilon_r = 54.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-02-2010; Ambient Temp: 24.5 °C; Tissue Temp: 22.7 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010

Sensor-Surface: Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: LTE, Body SAR, Back Side, Mid Ch., RB1, Offset 0, QPSK

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

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

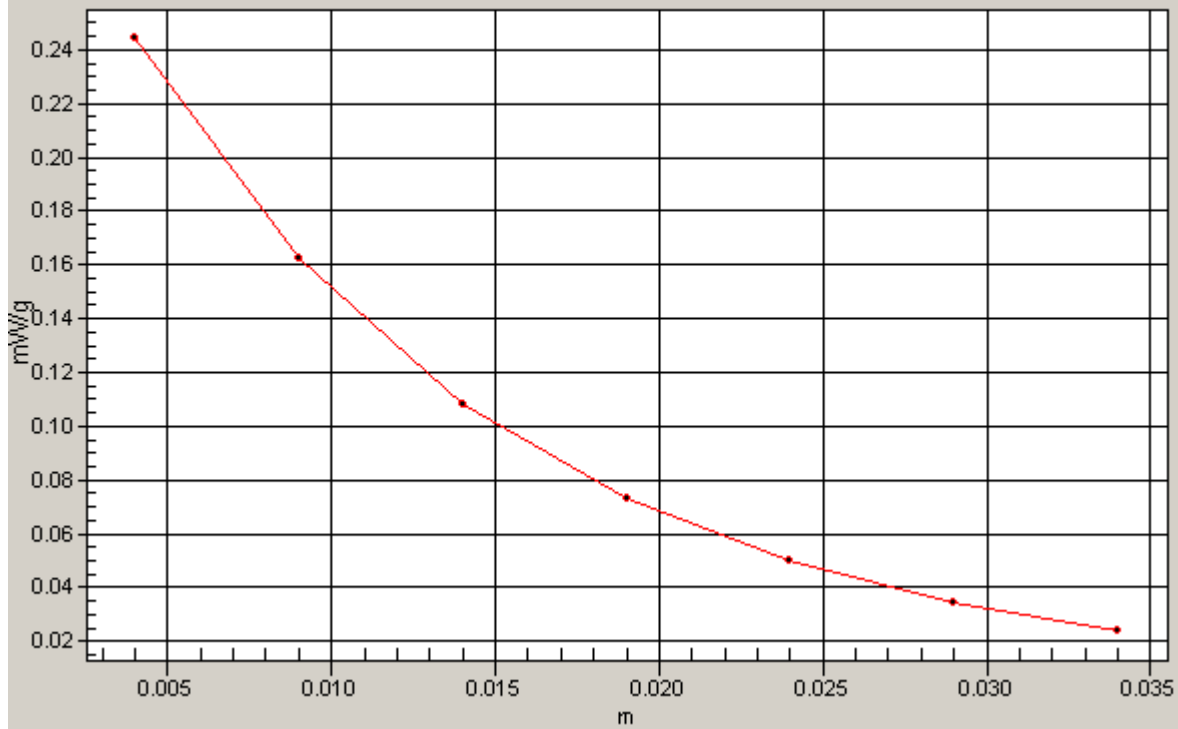
Reference Value = 15.3 V/m

Peak SAR (extrapolated) = 0.396 W/kg

SAR(1 g) = 0.229 mW/g; SAR(10 g) = 0.144 mW/g

1g/10g Averaged SAR

SAR; Zoom Scan: Value Along Z, X=2, Y=1



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #4

Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Muscle Medium parameters used (interpolated):
 $f = 782 \text{ MHz}$; $\sigma = 0.963 \text{ mho/m}$; $\epsilon_r = 54.2$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-02-2010; Ambient Temp: 24.5 °C; Tissue Temp: 22.7 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: LTE, Body SAR, Front Side, Mid Ch., RB1, Offset 0, QPSK

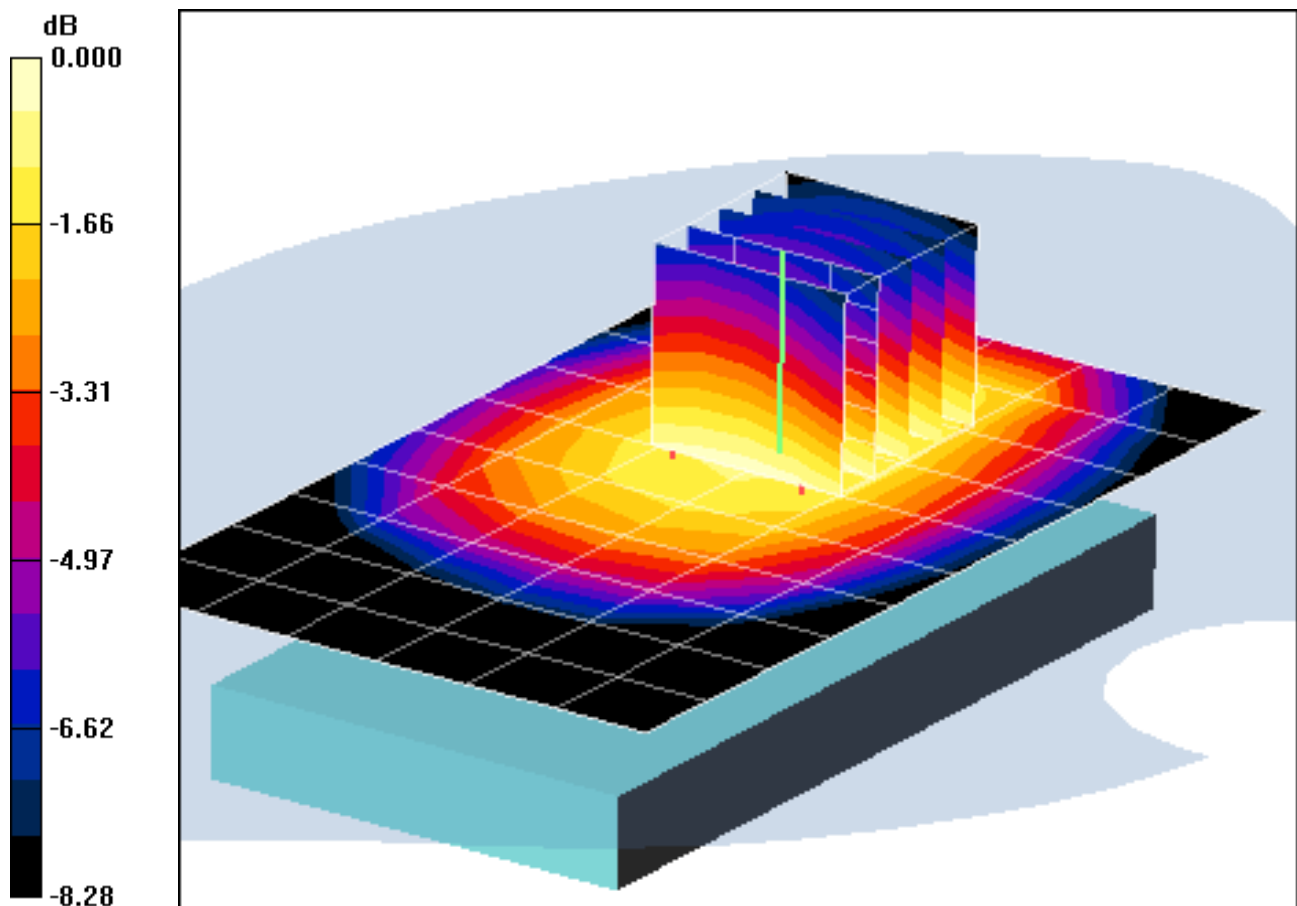
Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 12.2 V/m

Peak SAR (extrapolated) = 0.193 W/kg

SAR(1 g) = 0.154 mW/g; SAR(10 g) = 0.118 mW/g



0 dB = 0.160mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #4

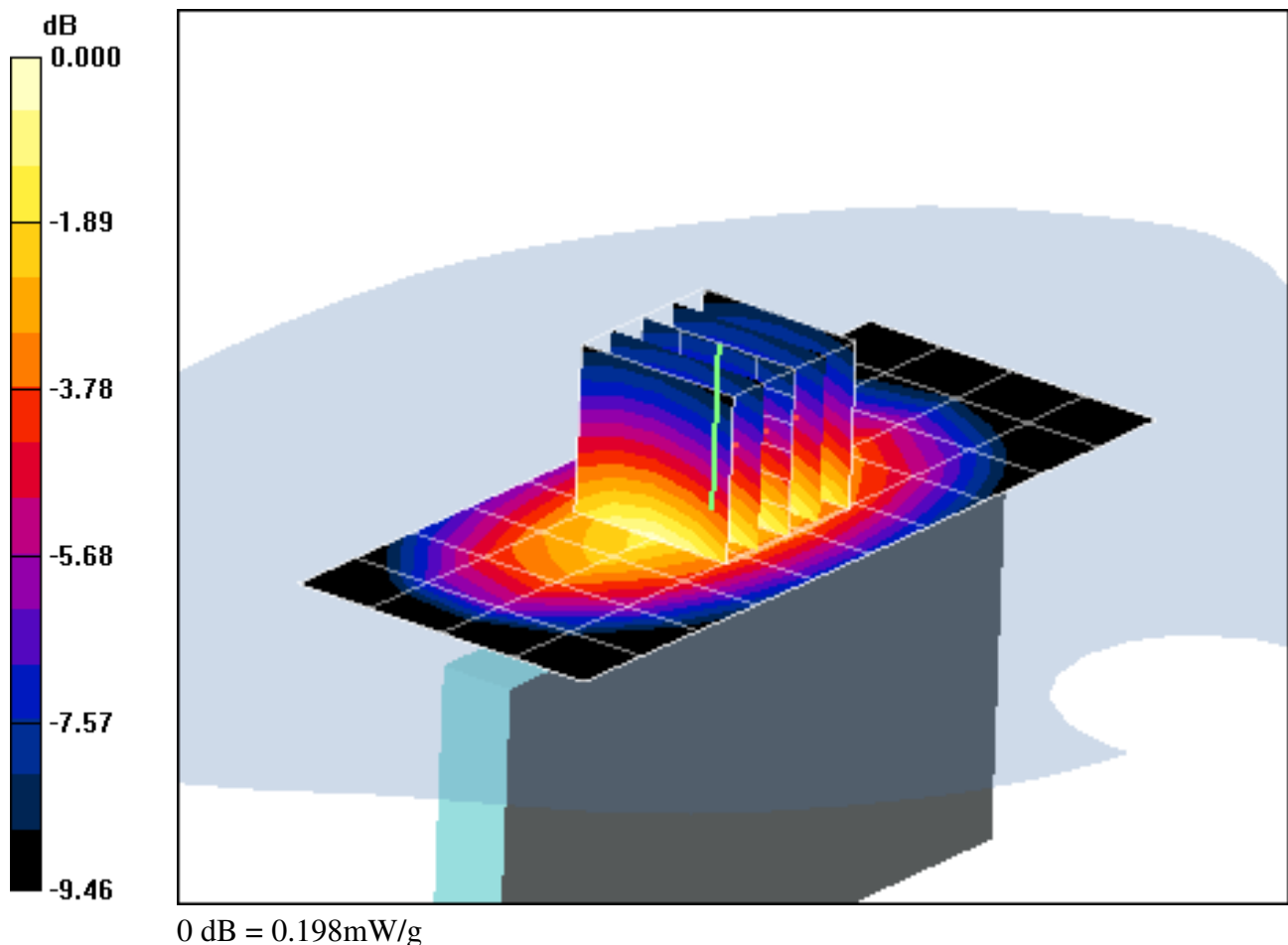
Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Muscle Medium parameters used (interpolated):
 $f = 782 \text{ MHz}$; $\sigma = 0.963 \text{ mho/m}$; $\epsilon_r = 54.2$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-02-2010; Ambient Temp: 24.5 °C; Tissue Temp: 22.7 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: LTE, Body SAR, Edge A, Mid Ch., RB 1, Offset 0, QPSK

Area Scan 2 (5x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.5 V/m
Peak SAR (extrapolated) = 0.262 W/kg
SAR(1 g) = 0.185 mW/g; SAR(10 g) = 0.128 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI510; Type: Cellular/PCS CDMA/EvDO Phone with Bluetooth, WLAN, and LTE
Serial: FCC SAR #4

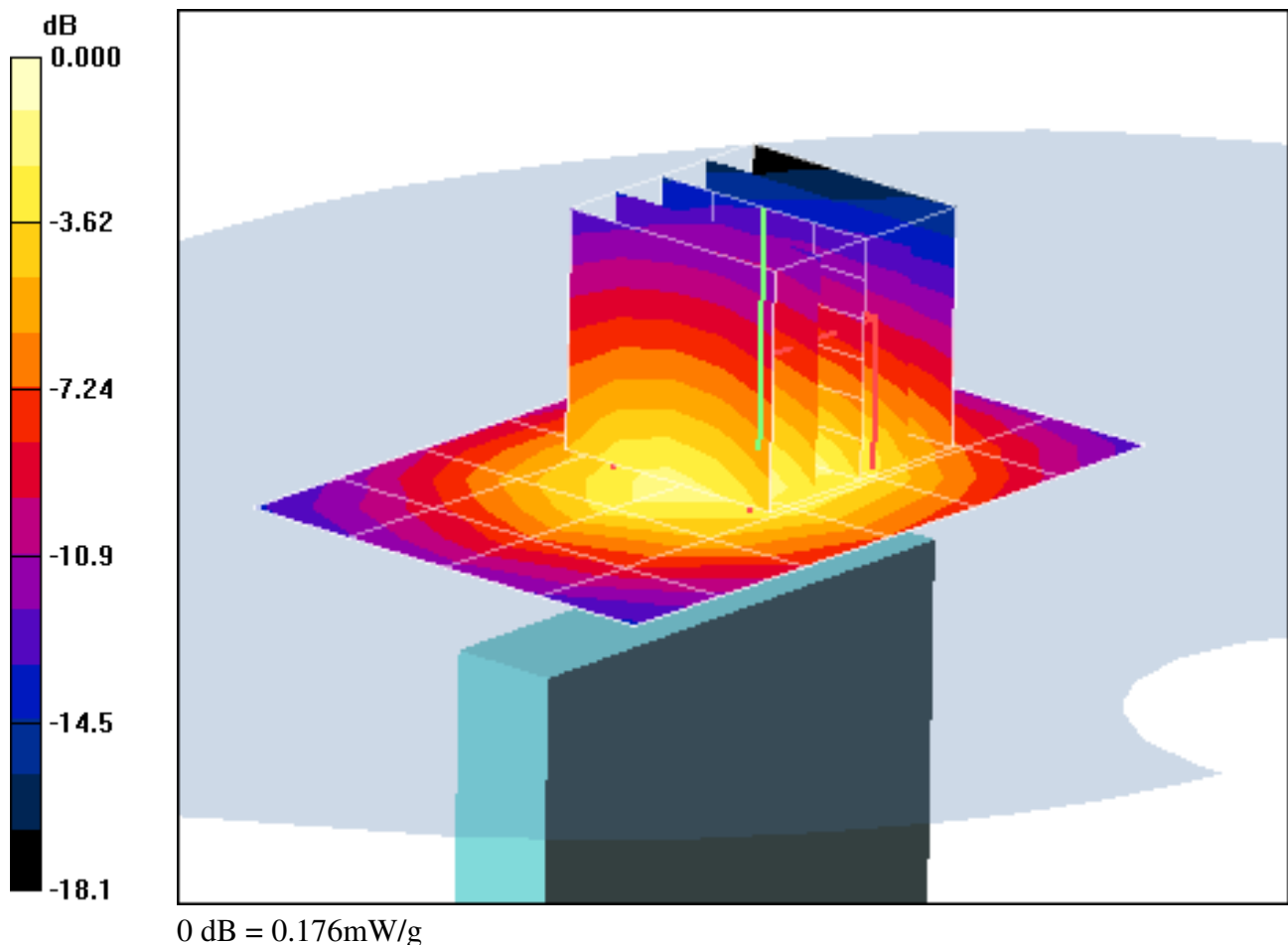
Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Muscle Medium parameters used (interpolated):
 $f = 782 \text{ MHz}$; $\sigma = 0.963 \text{ mho/m}$; $\epsilon_r = 54.2$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-02-2010; Ambient Temp: 24.5 °C; Tissue Temp: 22.7 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: LTE, Body SAR, Edge C, Mid Ch., RB 1, Offset 0, QPSK

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.9 V/m
Peak SAR (extrapolated) = 0.348 W/kg
SAR(1 g) = 0.155 mW/g; SAR(10 g) = 0.082 mW/g



APPENDIX B: DIPOLE VALIDATION

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Brain Medium parameters used (interpolated):

$f = 750 \text{ MHz}$; $\sigma = 0.875 \text{ mho/m}$; $\epsilon_r = 41.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-02-2010; Ambient Temp: 24.3 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3213; ConvF(6.3, 6.3, 6.3); Calibrated: 3/16/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

750MHz System Verification

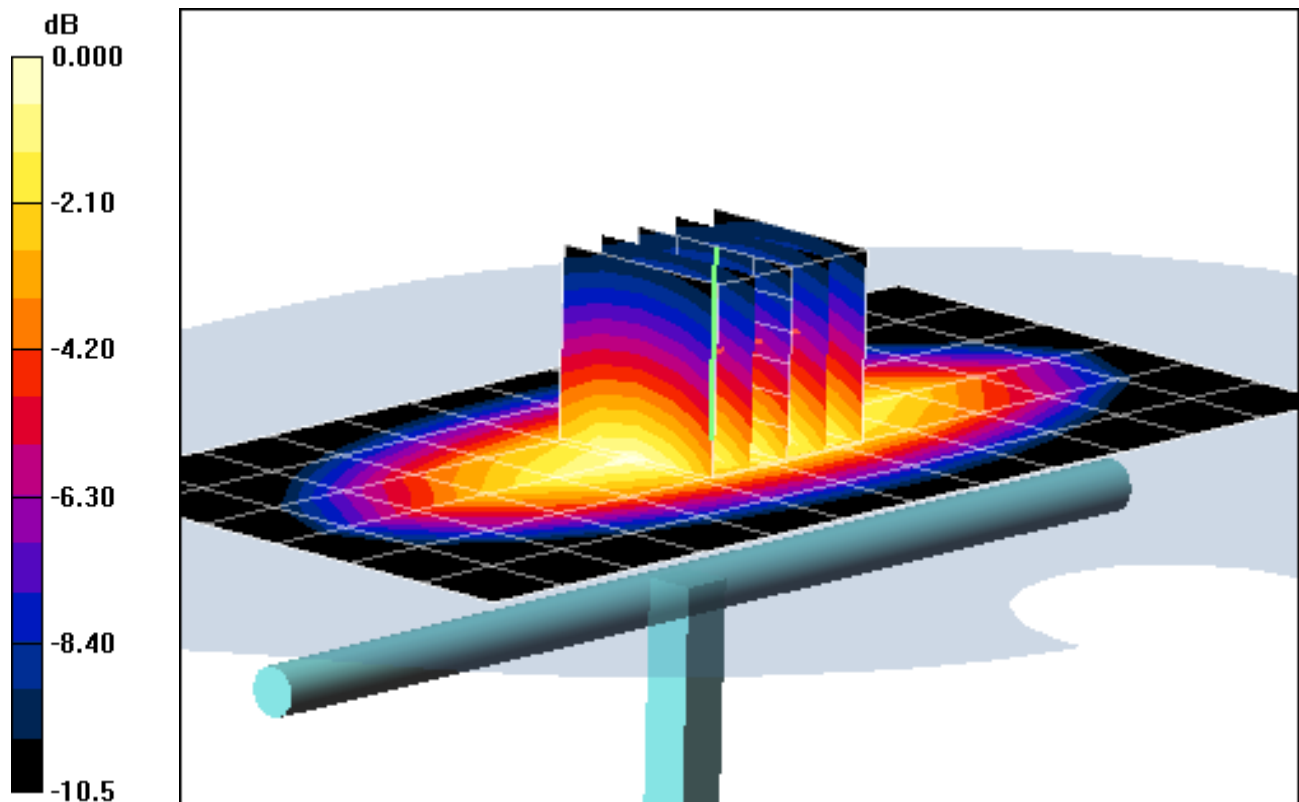
Area Scan (7x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Input Power = 18.0 dBm (63 mW)

SAR(1 g) = 0.510 mW/g; SAR(10 g) = 0.333 mW/g

Deviation = -4.99 %



0 dB = 0.550mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Brain Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.869 \text{ mho/m}$; $\epsilon_r = 40.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 11-18-2010; Ambient Temp: 24.1 °C; Tissue Temp: 22.5 °C

Probe: ES3DV3 - SN3213; ConvF(5.98, 5.98, 5.98); Calibrated: 3/16/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

835MHz System Verification

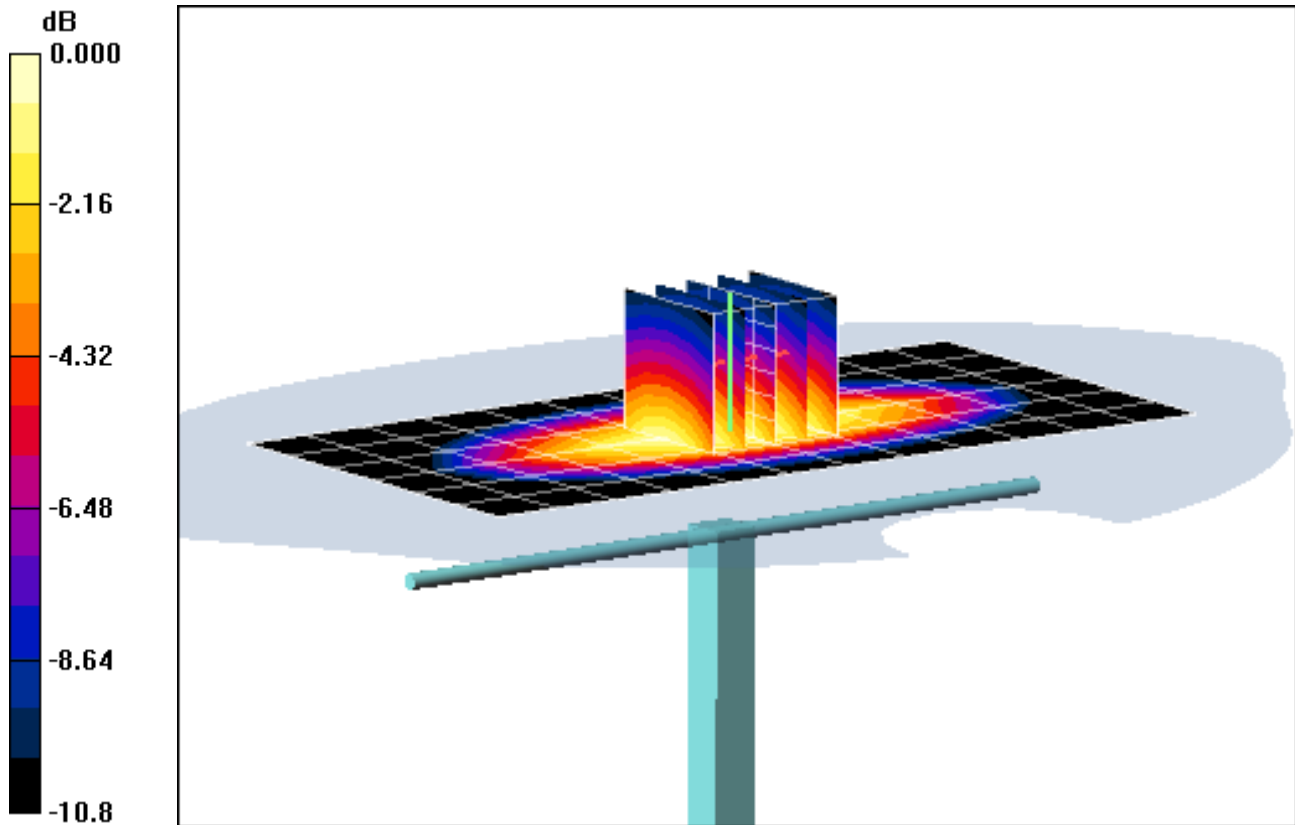
Area Scan (7x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 0.966 mW/g; SAR(10 g) = 0.624 mW/g

Deviation = -0.41 %



0 dB = 1.04mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d026

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Brain Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.884 \text{ mho/m}$; $\epsilon_r = 42.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-01-2010; Ambient Temp: 23.9 °C; Tissue Temp: 22.0 °C

Probe: EX3DV4 - SN3550; ConvF(8.28, 8.28, 8.28); Calibrated: 1/26/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 1/22/2010

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

835MHz Dipole Validation

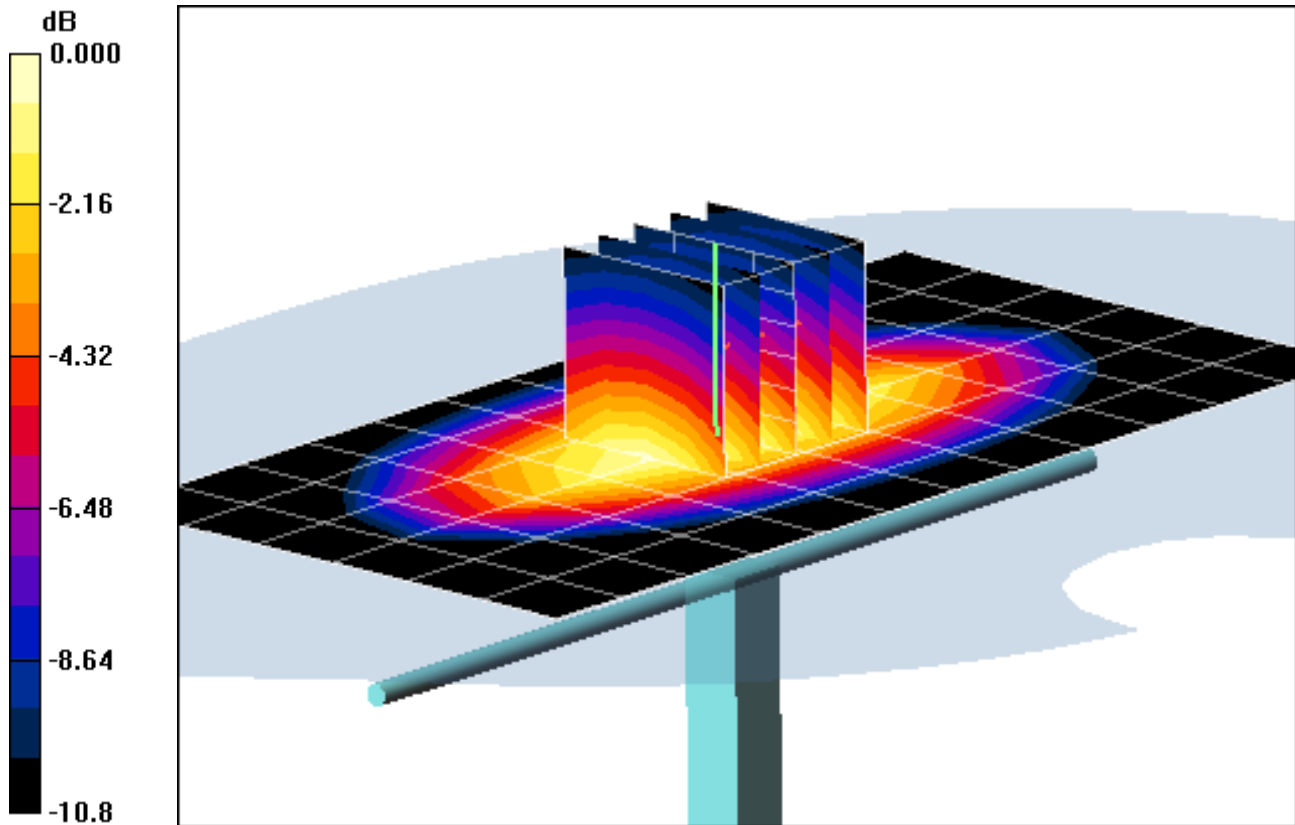
Area Scan (7x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 0.929 mW/g; SAR(10 g) = 0.601 mW/g

Deviation = -1.80 %



0 dB = 1.00mW/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 Brain Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.46 \text{ mho/m}$; $\epsilon_r = 40.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 11-17-2010; Ambient Temp: 23.2 °C; Tissue Temp: 22.1 °C

Probe: ES3DV2 - SN3022; ConvF(4.83, 4.83, 4.83); Calibrated: 9/21/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/21/2010

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

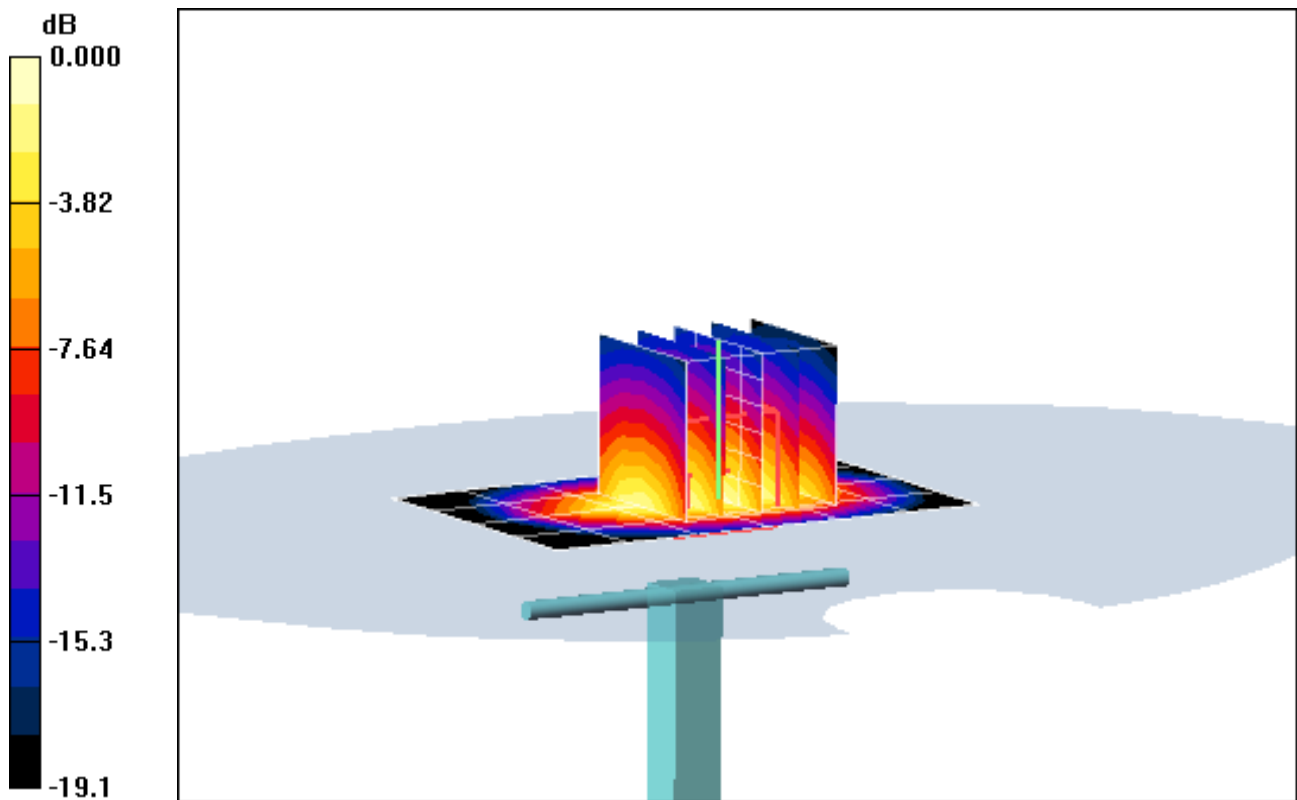
Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm

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

Input Power = 18.73 dBm (74.6 mW)

SAR(1 g) = 3 mW/g; SAR(10 g) = 1.53 mW/g

Deviation = 0.23 %



0 dB = 3.29mW/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 Muscle Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.56 \text{ mho/m}$; $\epsilon_r = 52.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 11-22-2010; Ambient Temp: 23.6°C; Tissue Temp: 21.8° C

Probe: ES3DV2 - SN3022; ConvF(4.34, 4.34, 4.34); Calibrated: 9/21/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/21/2010

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

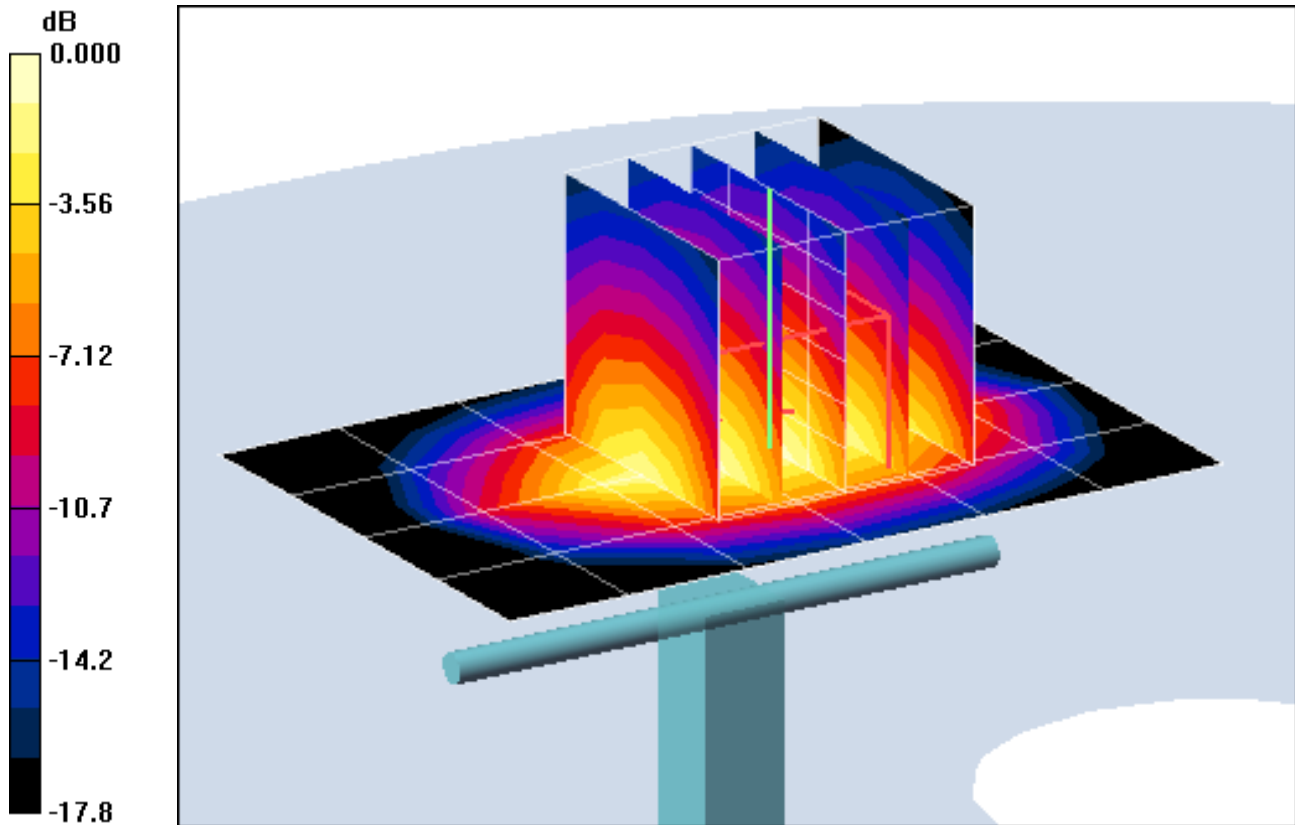
Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm

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

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 4.35 mW/g; SAR(10 g) = 2.3 mW/g

Deviation = 7.41 %



0 dB = 4.87mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Muscle Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.58 \text{ mho/m}$; $\epsilon_r = 53$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-03-2010; Ambient Temp: 23.8°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3213; ConvF(4.61, 4.61, 4.61); Calibrated: 3/16/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

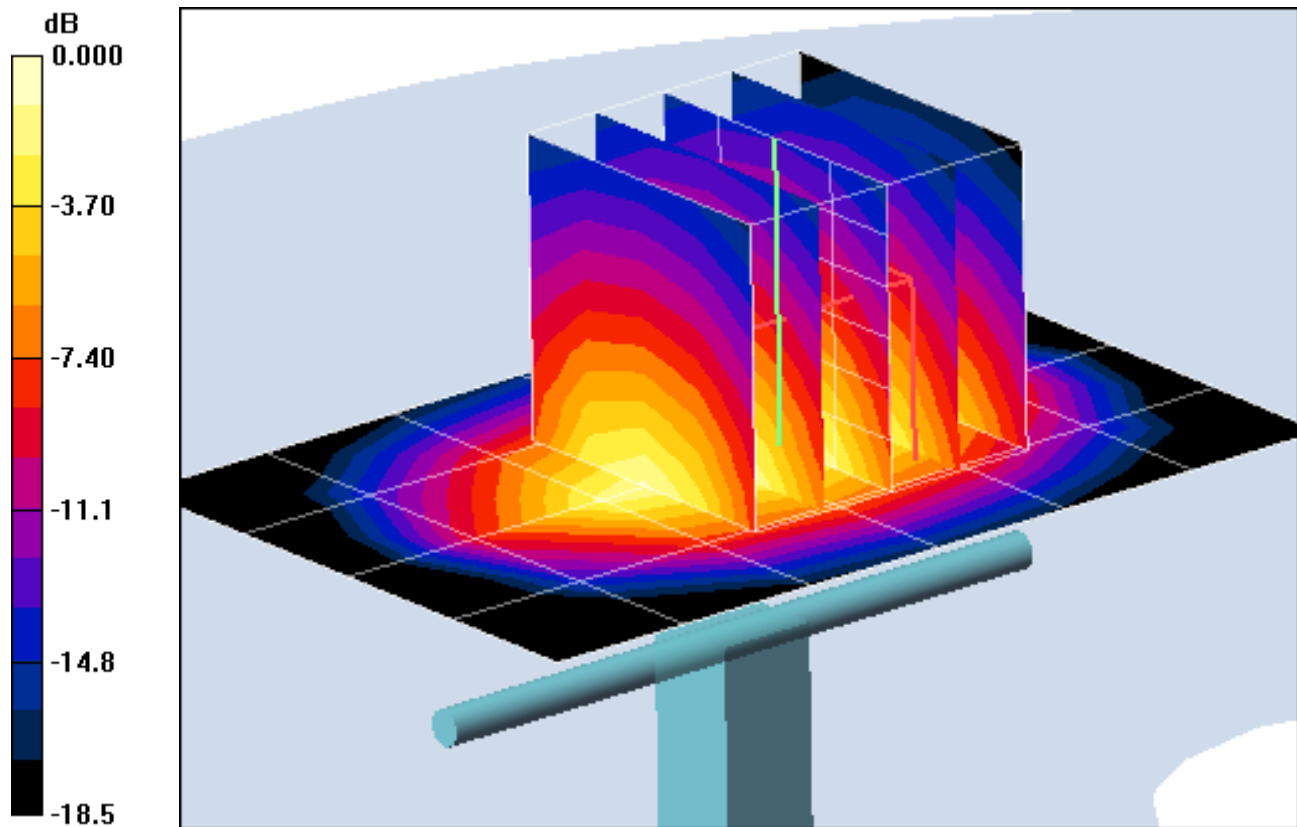
Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm

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

Input Power = 14.0 dBm (25 mW)

SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.538 mW/g

Deviation = 2.72%



0 dB = 1.16mW/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 Brain Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 1.84 \text{ mho/m}$; $\epsilon_r = 38.48$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 11-23-2010; Ambient Temp: 23.7 °C; Tissue Temp: 21.8 °C

Probe: EX3DV4 - SN3550; ConvF(6.21, 6.21, 6.21); Calibrated: 1/26/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 1/22/2010

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

2450MHz System Verification

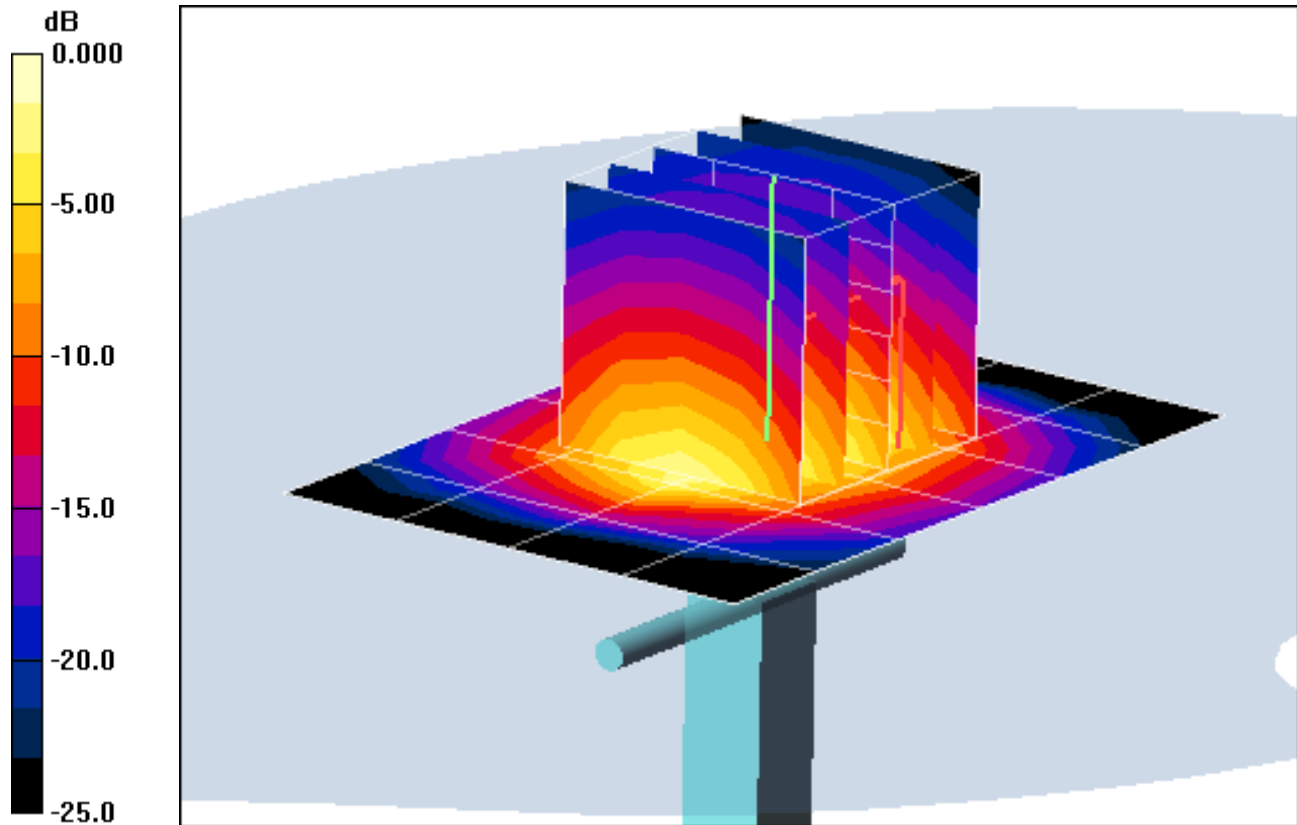
Area Scan (5x7x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Input Power = 16.0 dBm (40 mW)

SAR(1 g) = 2.17 mW/g; SAR(10 g) = 0.982 mW/g

Deviation = 1.40 %



0 dB = 2.80mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Muscle Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 1.99 \text{ mho/m}$; $\epsilon_r = 53.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-04-2010; Ambient Temp: 23.6 °C; Tissue Temp: 22.0 °C

Probe: ES3DV3 - SN3213; ConvF(4.27, 4.27, 4.27); Calibrated: 3/16/2010

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

2450MHz System Verification

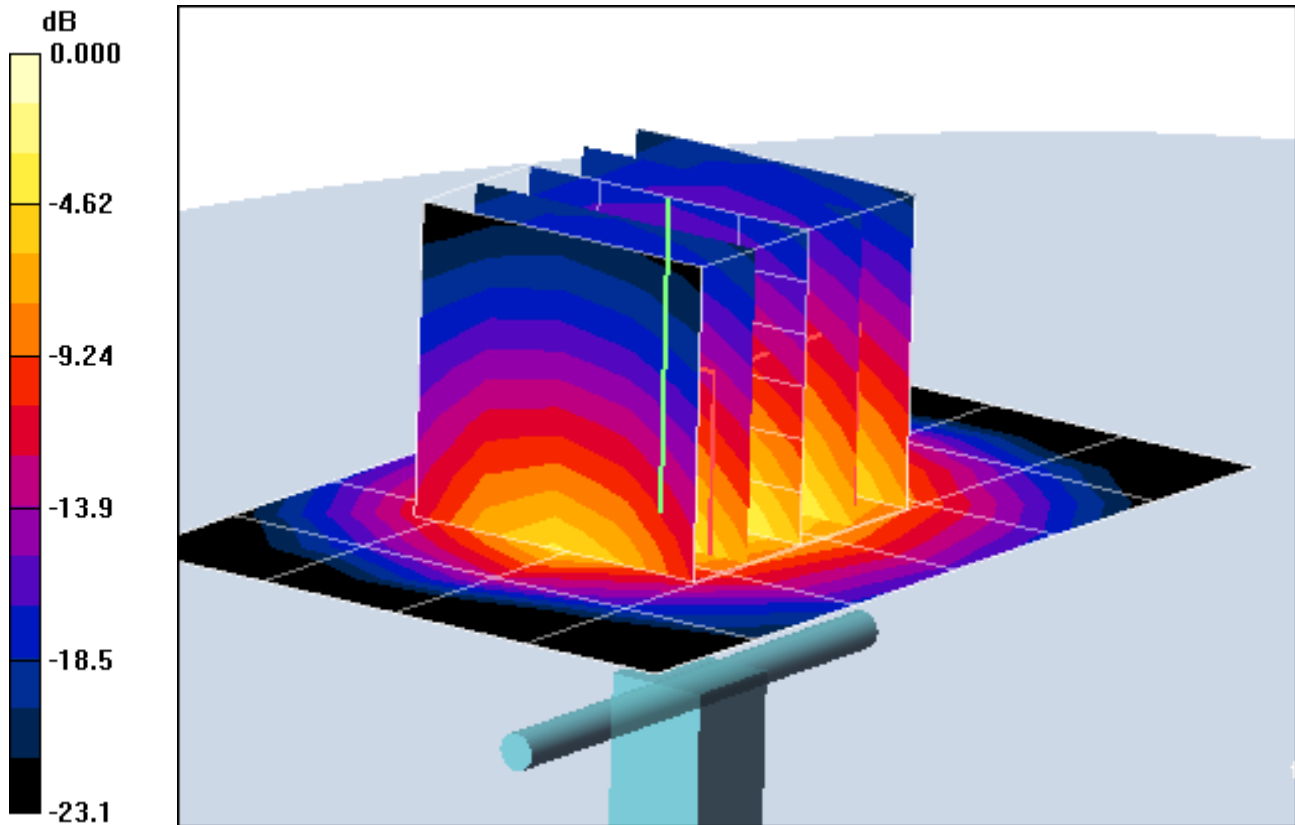
Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm

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

Input Power = 14.0 dBm (25 mW)

SAR(1 g) = 1.34 mW/g; SAR(10 g) = 0.618 mW/g

Deviation = 1.13 %



0 dB = 1.49mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Muscle Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 1.9 \text{ mho/m}$; $\epsilon_r = 50.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-14-2010; Ambient Temp: 22.7 °C; Tissue Temp: 21.4 °C

Probe: ES3DV3 - SN3213; ConvF(4.27, 4.27, 4.27); Calibrated: 3/16/2010

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn704; Calibrated: 3/22/2010

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

2450MHz System Verification

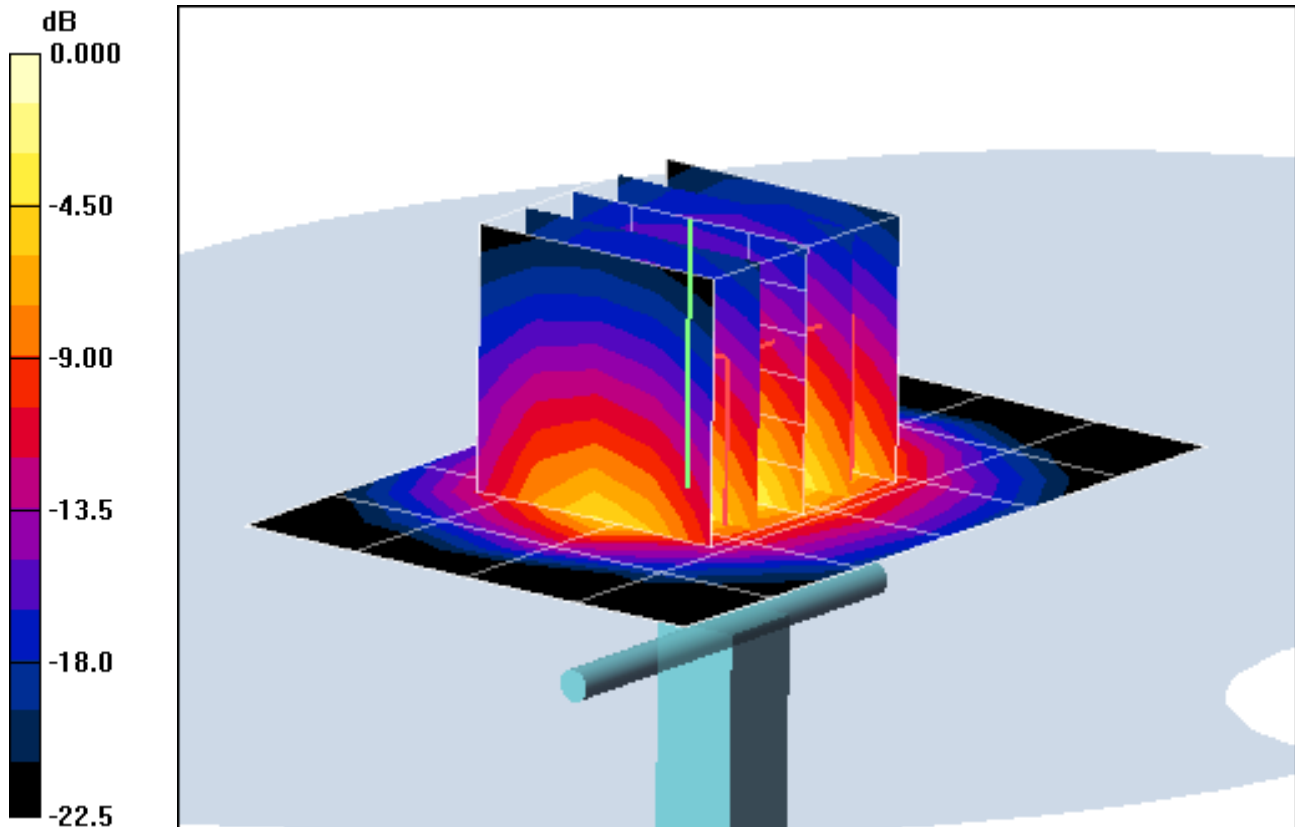
Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm

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

Input Power = 14.0 dBm (25 mW)

SAR(1 g) = 1.28 mW/g; SAR(10 g) = 0.592 mW/g

Deviation = -3.40 %



0 dB = 1.67mW/g

APPENDIX C: PROBE CALIBRATION



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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D750V3-1003_Feb09**

CALIBRATION CERTIFICATE

Object **D750V3 - SN: 1003**

Calibration procedure(s) **QA CAL-05.v7**
Calibration procedure for dipole validation kits

Calibration date: **February 19, 2009**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	01-Jul-08 (No. 217-00864)	Jul-09
Type-N mismatch combination	SN: 5047.2 / 06327	01-Jul-08 (No. 217-00867)	Jul-09
Reference Probe ES3DV2	SN: 3025	28-Apr-08 (No. ES3-3025_Apr08)	Apr-09
DAE4	SN: 601	14-Mar-08 (No. DAE4-601_Mar08)	Mar-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	

Approved by:	Katja Pokovic	Technical Manager
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Issued: February 20, 2009

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



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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.9 $\pm$ 6 %	0.90 mho/m $\pm$ 6 %
Head TSL temperature during test	(21.6 $\pm$ 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.15 mW / g
SAR normalized	normalized to 1W	8.60 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	8.52 mW /g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.41 mW / g
SAR normalized	normalized to 1W	5.64 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	5.60 mW /g $\pm$ 16.5 % (k=2)

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	56.0 ± 6 %	0.96 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.18 mW / g
SAR normalized	normalized to 1W	8.72 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	8.74 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.45 mW / g
SAR normalized	normalized to 1W	5.80 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	5.81 mW / g ± 16.5 % (k=2)

² Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.0 Ω - 2.6 j Ω
Return Loss	- 28.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.9 Ω - 4.9 j Ω
Return Loss	- 26.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.044 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 21, 2009

DASY5 Validation Report for Head TSL

Date/Time: 19.02.2009 09:26:26

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW-750; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: HSL 750 MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.9 \text{ mho/m}$; $\epsilon_r = 41.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(6.09, 6.09, 6.09); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin=250mW; dip=15mm; dist=3.4mm/Max Search (41x41x1): Measurement grid: dx=5mm, dy=5mm

Maximum value of SAR (interpolated) = 2.44 mW/g

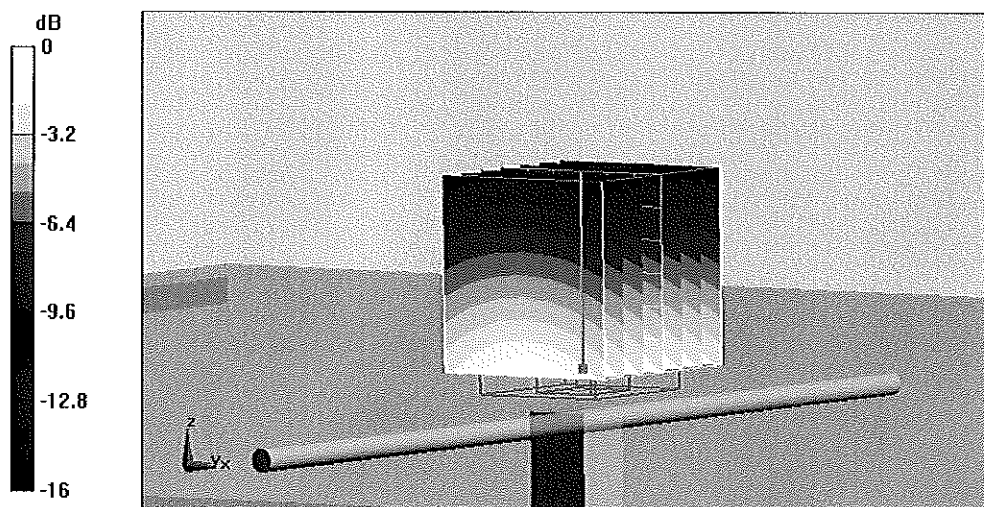
Pin=250mW; dip=15mm; dist=3.4mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.9 V/m; Power Drift = -0.00345 dB

Peak SAR (extrapolated) = 3.17 W/kg

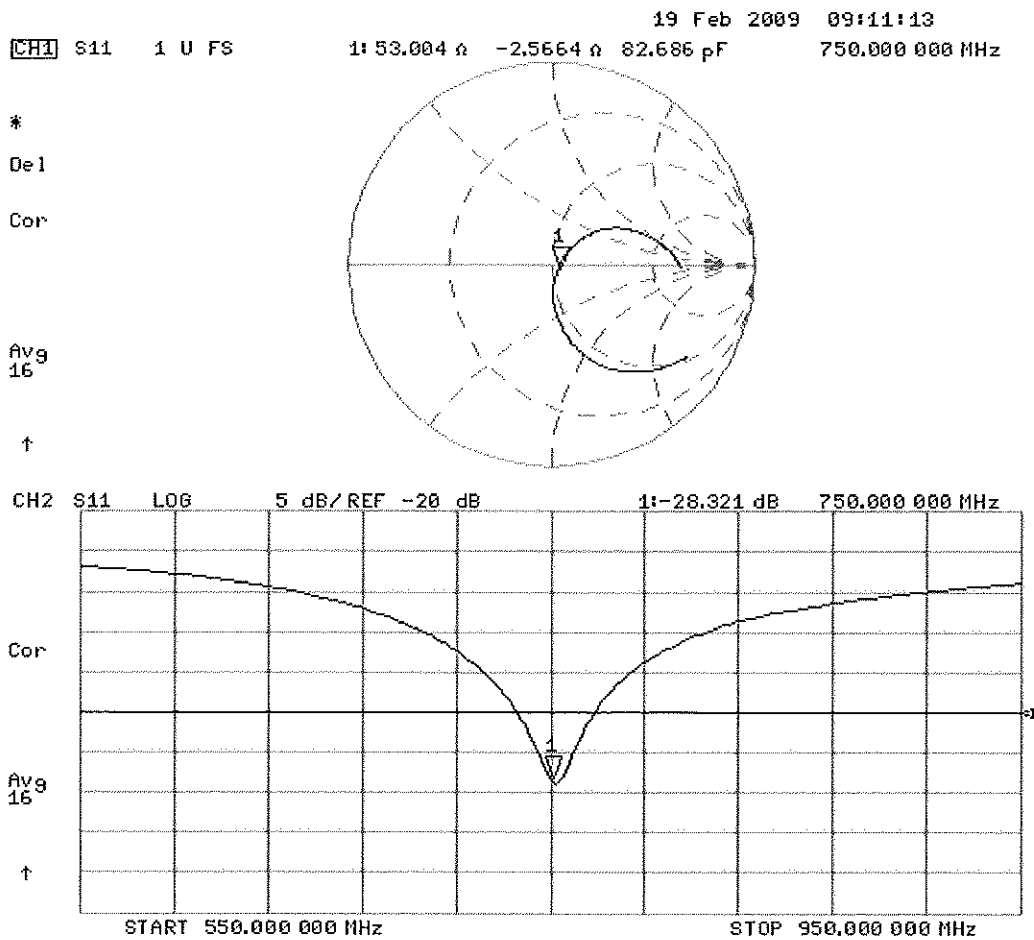
SAR(1 g) = 2.15 mW/g; SAR(10 g) = 1.41 mW/g

Maximum value of SAR (measured) = 2.44 mW/g



0 dB = 2.44mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 19.02.2009 10:32:36

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW-750; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: MSL750

Medium parameters used: $f = 750$ MHz; $\sigma = 0.96$ mho/m; $\epsilon_r = 56$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(5.9, 5.9, 5.9); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

Pin=250mW; dip=15mm; dist=3.4mm/Max Search (41x41x1): Measurement grid: dx=5mm, dy=5mm

Maximum value of SAR (interpolated) = 2.46 mW/g

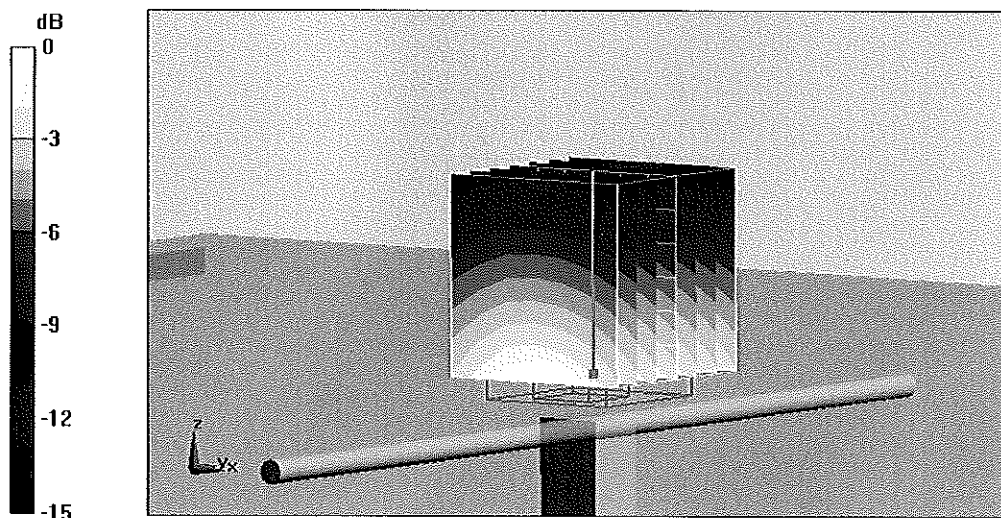
Pin=250mW; dip=15mm; dist=3.4mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 51.5 V/m; Power Drift = 0.040 dB

Peak SAR (extrapolated) = 3.13 W/kg

SAR(1 g) = 2.18 mW/g; SAR(10 g) = 1.45 mW/g

Maximum value of SAR (measured) = 2.46 mW/g

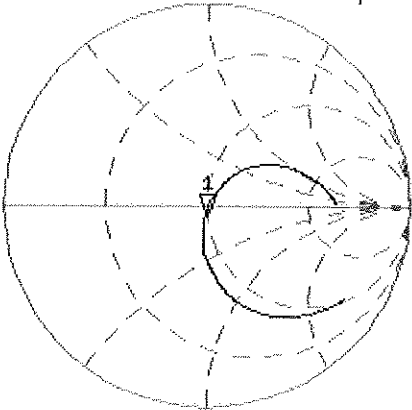


0 dB = 2.46mW/g

Impedance Measurement Plot for Body TSL

19 Feb 2009 10:57:49
[CH1] S11 1 U FS 1: 48.861 Ω -4.8555 Ω 43.705 pF 750.000 000 MHz

*
De1
Cor

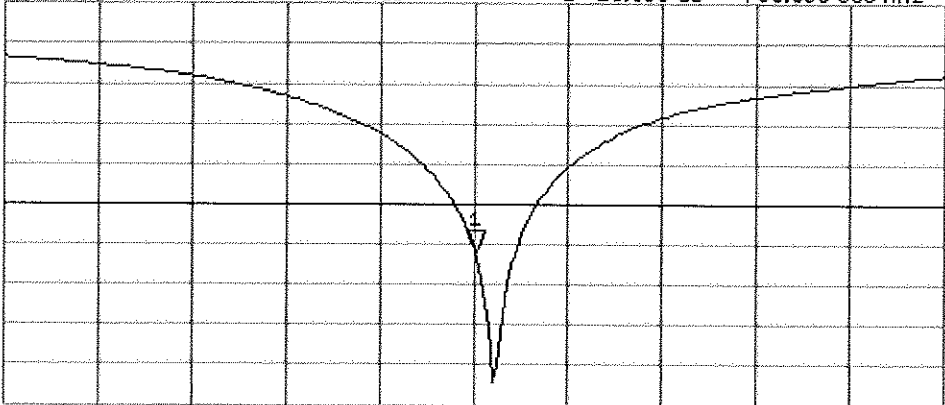


Avg
16

CH2 S11 LOG 5 dB/REF -20 dB 1:-25.955 dB 750.000 000 MHz

Cor

Avg
16



START 550.000 000 MHz

STOP 950.000 000 MHz



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Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **ES3-3022_Sep10**

CALIBRATION CERTIFICATE

Object **ES3DV2 - SN:3022**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2
 Calibration procedure for dosimetric E-field probes**

Calibration date: **September 21, 2010**

✓
 KOK
 9/29/10

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 22, 2010

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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

Probe ES3DV2

SN:3022

Manufactured:	April 15, 2003
Last calibrated:	September 18, 2009
Recalibrated:	September 21, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV2 SN:3022**Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.01	1.05	1.01	± 10.1%
DCP (mV) ^B	92.8	92.5	89.7	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

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

DASY/EASY - Parameters of Probe: ES3DV2 SN:3022

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	41.9 ± 5%	0.89 ± 5%	6.32	6.32	6.32	0.87	1.01 ± 11.0%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.02	6.02	6.02	0.62	1.20 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	5.01	5.01	5.01	0.27	2.23 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.83	4.83	4.83	0.25	2.29 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.21	4.21	4.21	0.25	2.62 ± 11.0%
2600	± 50 / ± 100	39.0 ± 5%	1.96 ± 5%	4.14	4.14	4.14	0.25	2.64 ± 11.0%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

DASY/EASY - Parameters of Probe: ES3DV2 SN:3022

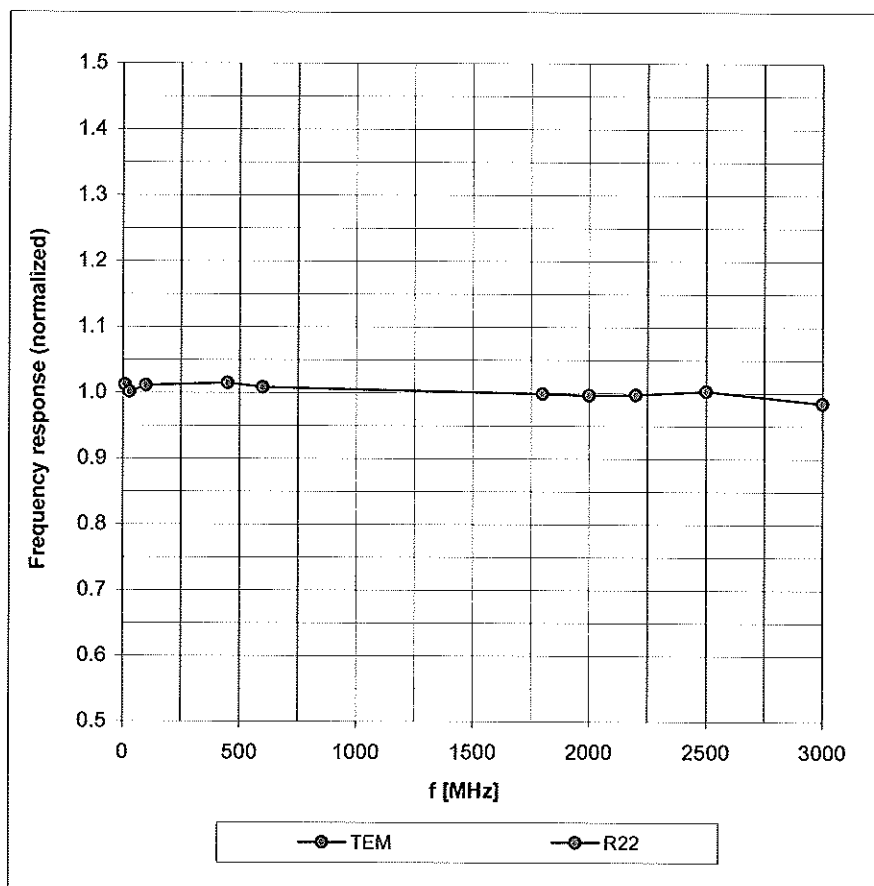
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	55.5 ± 5%	0.96 ± 5%	6.09	6.09	6.09	0.68	1.20 ± 11.0%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	5.89	5.89	5.89	0.65	1.20 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	4.59	4.59	4.59	0.23	2.83 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.34	4.34	4.34	0.22	3.71 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.06	4.06	4.06	0.41	1.42 ± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	4.06	4.06	4.06	0.53	1.23 ± 11.0%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

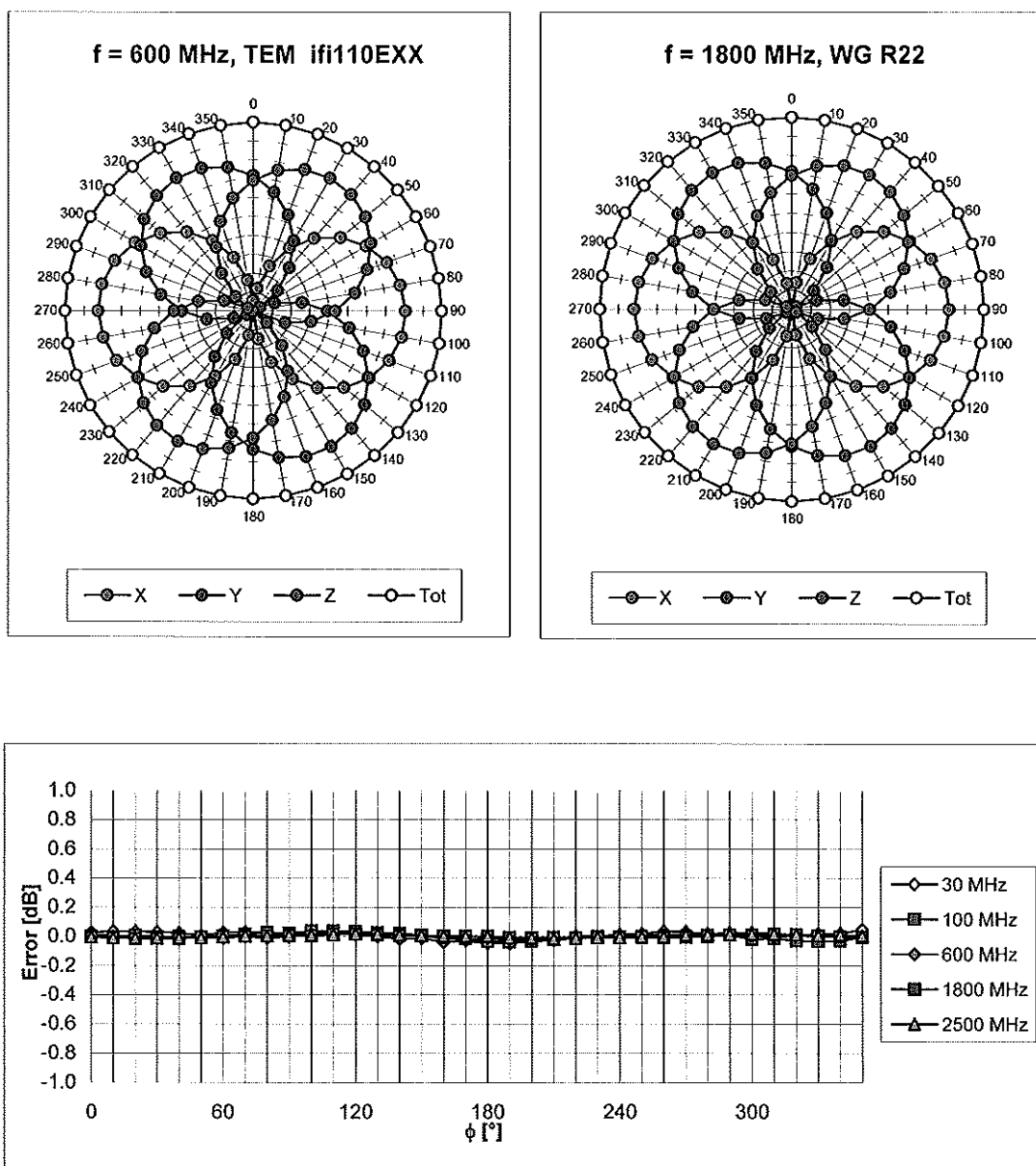
Frequency Response of E-Field

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



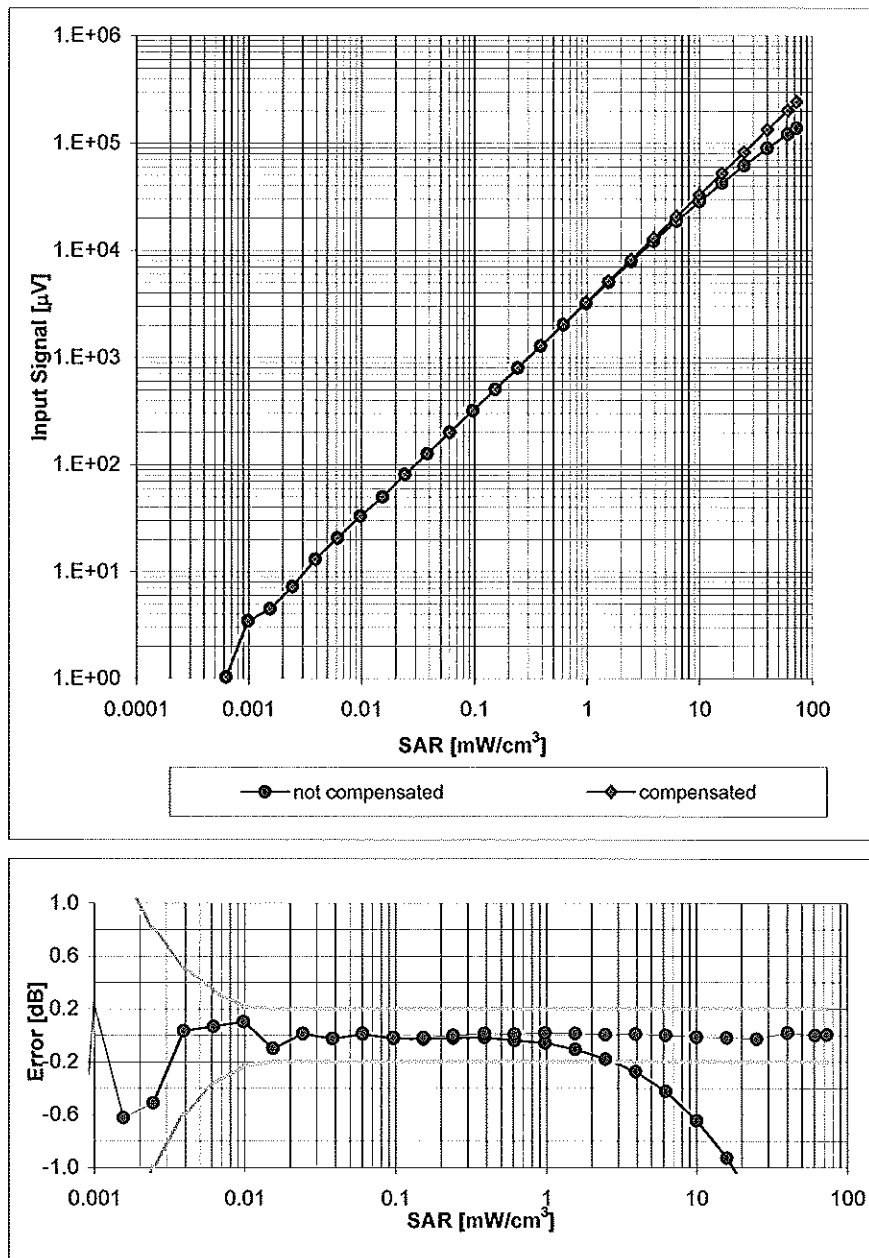
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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



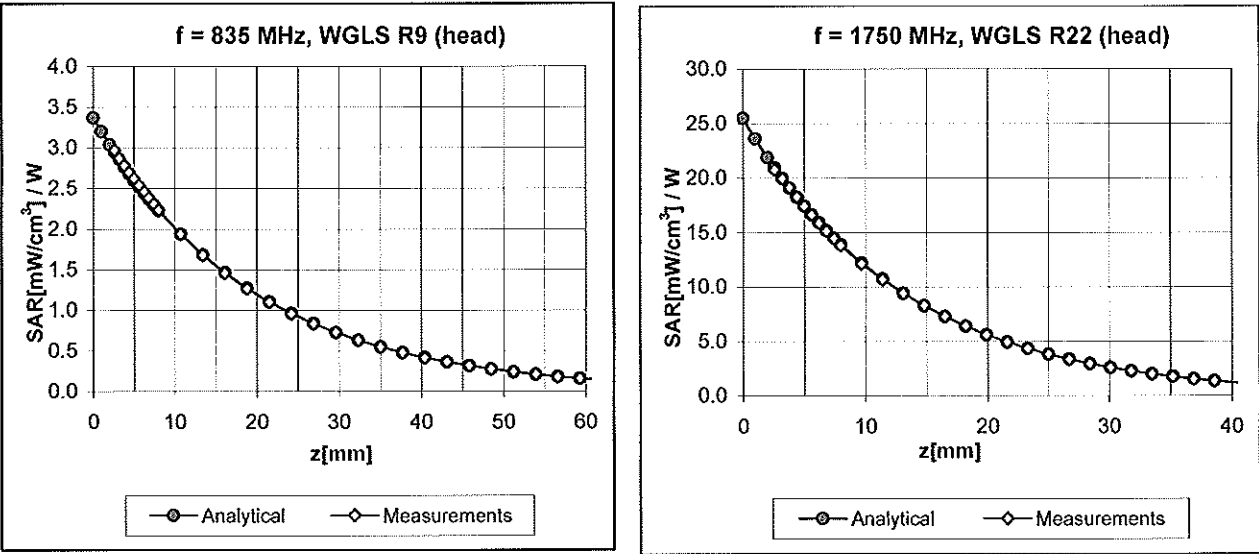
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$)



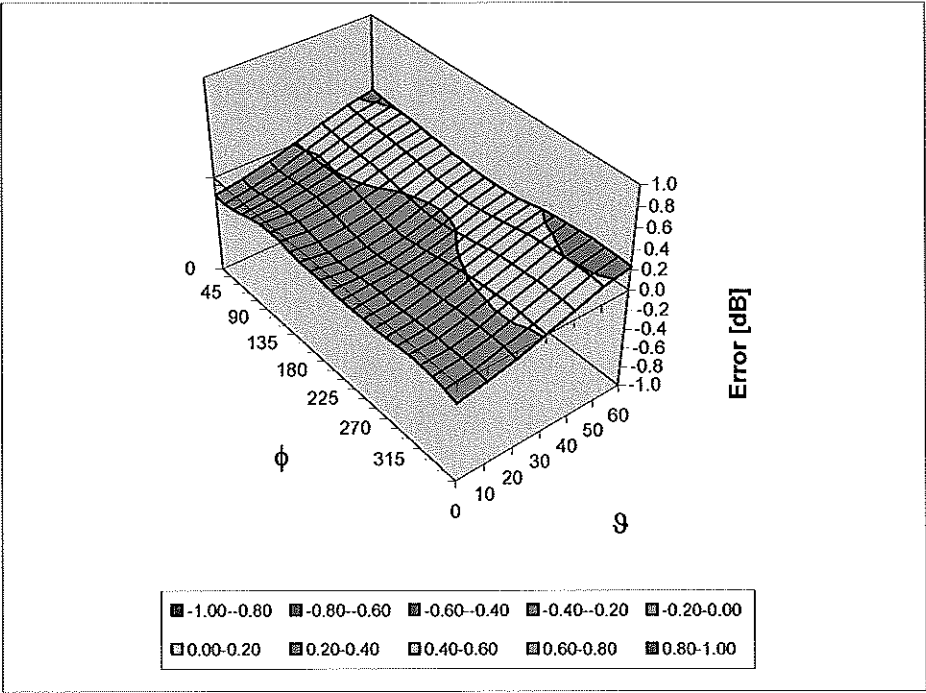
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in HSL

Error (ϕ , θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ (k=2)

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4.0 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm



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Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **ES3-3213_Mar10**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3213**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2
 Calibration procedure for dosimetric E-field probes**

Calibration date: **March 16, 2010**

*Volc
 3/29/10*

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013 Dec09)	Dec-10
DAE4	SN: 660	29-Sep-09 (No. DAE4-660_Sep09)	Sep-10
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature

Issued: March 19, 2010

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}:** Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}:** DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}:** A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters:** Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy):** in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset:** The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3213

Manufactured:	October 14, 2008
Last calibrated:	April 15, 2009
Recalibrated:	March 16, 2010

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3213**Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.24	1.40	1.36	± 10.1%
DCP (mV) ^B	93.8	93.1	91.6	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

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

DASY - Parameters of Probe: ES3DV3 SN:3213

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.30	6.30	6.30	0.99	1.04 ± 13.3%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	5.98	5.98	5.98	0.96	1.07 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	5.11	5.11	5.11	0.50	1.38 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.92	4.92	4.92	0.53	1.39 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.36	4.36	4.36	0.46	1.62 ± 11.0%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

DASY - Parameters of Probe: ES3DV3 SN:3213

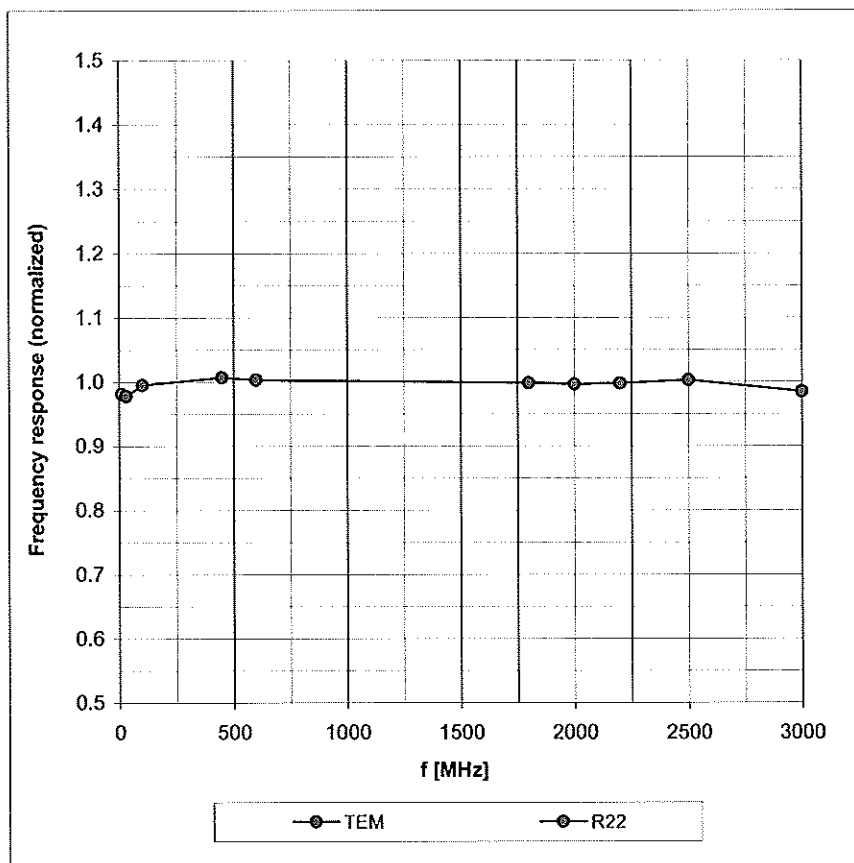
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	55.5 ± 5%	0.96 ± 5%	5.97	5.97	5.97	0.77	1.16 ± 13.3%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	5.91	5.91	5.91	0.85	1.17 ± 11.0%
1640	± 50 / ± 100	53.8 ± 5%	1.40 ± 5%	5.04	5.04	5.04	0.35	1.97 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	4.80	4.80	4.80	0.42	1.82 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.61	4.61	4.61	0.41	1.97 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.27	4.27	4.27	0.70	1.36 ± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	4.16	4.16	4.16	0.92	1.17 ± 11.0%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

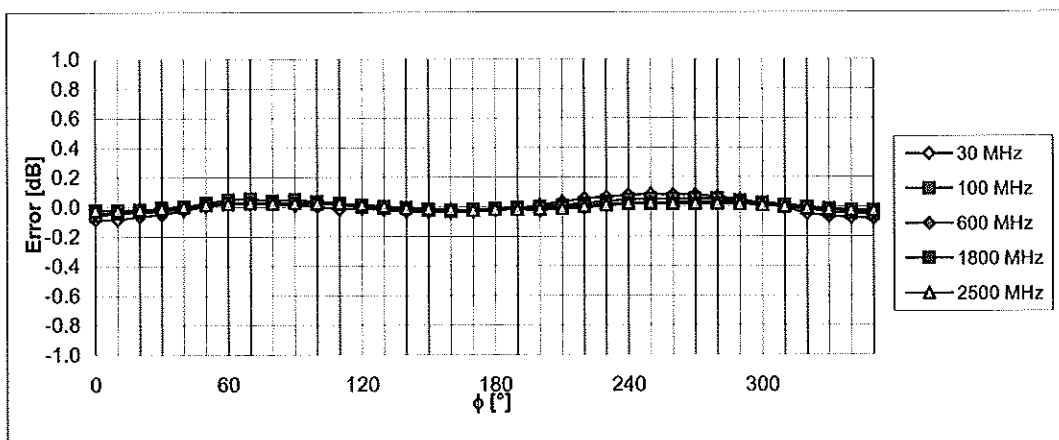
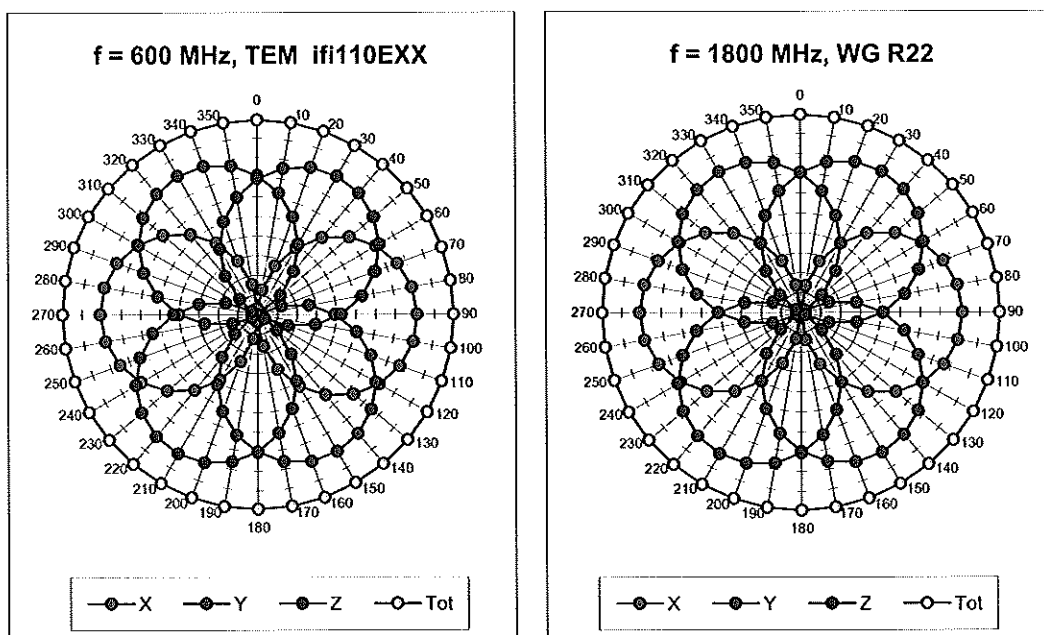
Frequency Response of E-Field

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



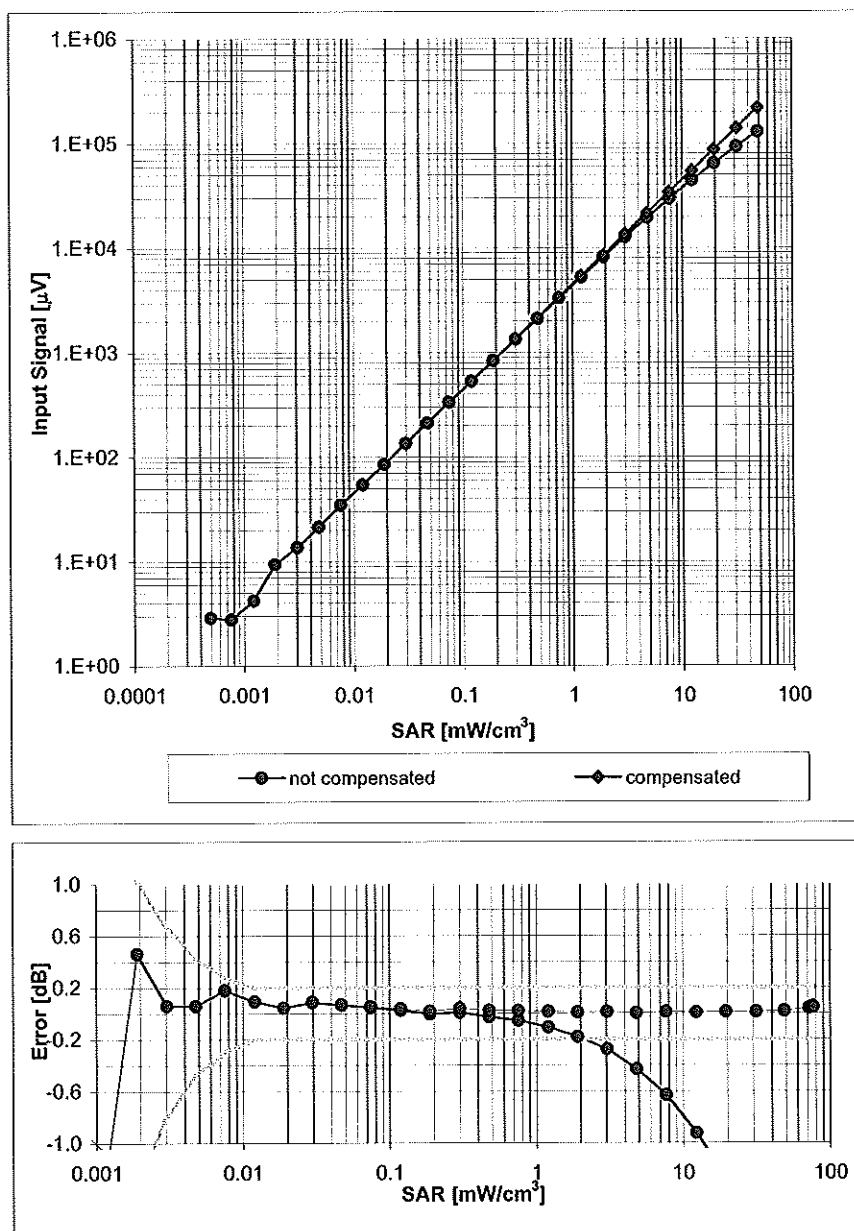
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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



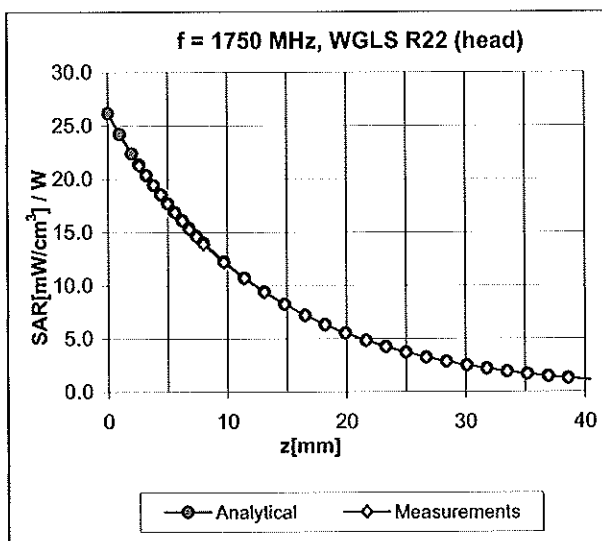
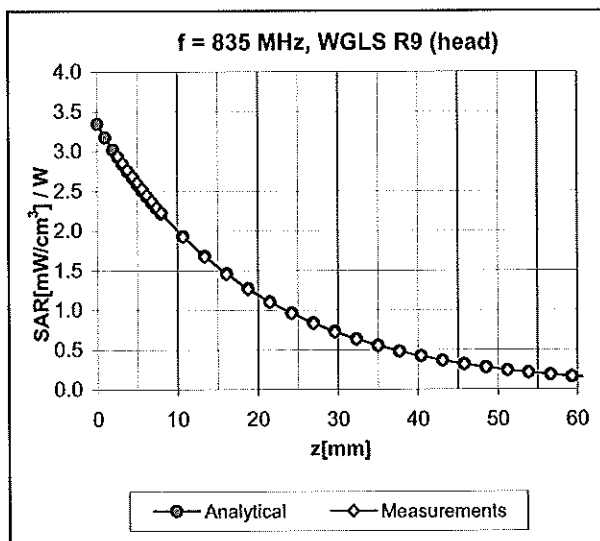
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$)



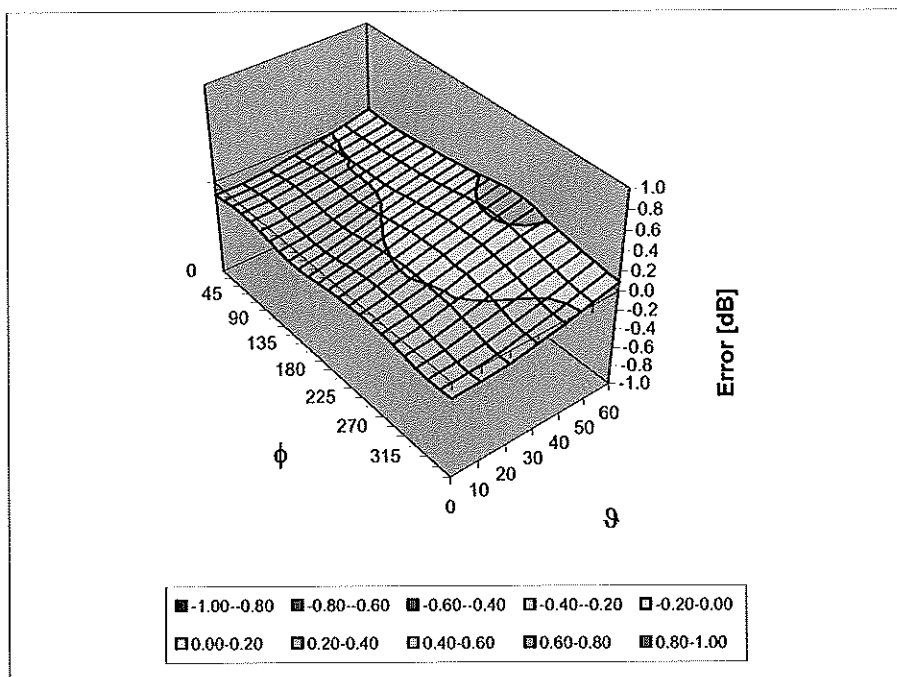
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in HSL

Error (ϕ , θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ (k=2)

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4.0 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:

ES3DV3

Serial Number:

3213

Place of Assessment:

Zurich

Date of Assessment:

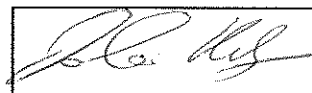
April 13, 2010

Probe Calibration Date:

March 16, 2010

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. The evaluation is coupled with measured conversion factors (probe calibration date indicated above). The uncertainty of the numerical assessment is based on the extrapolation from measured value at 835 MHz or at 1750 MHz.

Assessed by:



Dosimetric E-Field Probe ES3DV3 SN:3213

Conversion factor ($\pm$ standard deviation)

1640 $\pm$ 50 MHz

ConvF

5.27 $\pm$ 7%

$\epsilon_r = 40.2 \pm 5\%$
 $\sigma = 1.31 \pm 5\%$ mho/m
(head tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also DASY4 Manual.



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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **EX3-3550_Jan10**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3550**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-14.v3, QA CAL-23.v3 and QA CAL-25.v2
 Calibration procedure for dosimetric E-field probes**

Calibration date: **January 26, 2010**

✓
 1/26/10

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	29-Sep-09 (No. DAE4-660_Sep09)	Sep-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Fin Bornholt	R&D Director	

Issued: January 26, 2010

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



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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3550

Manufactured:	May 19, 2004
Last calibrated:	January 21, 2009
Recalibrated:	January 26, 2010

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3550**Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.48	0.47	0.48	± 10.1%
DCP (mV) ^B	92.9	88.4	91.4	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300	± 1.5%
			Y	0.00	0.00	1.00	300	
			Z	0.00	0.00	1.00	300	

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

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

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

DASY - Parameters of Probe: EX3DV4 SN:3550

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	8.28	8.28	8.28	0.45	0.70 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	7.03	7.03	7.03	0.39	0.75 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	6.81	6.81	6.81	0.32	0.81 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	6.21	6.21	6.21	0.22	1.07 ± 11.0%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

DASY - Parameters of Probe: EX3DV4 SN:3550

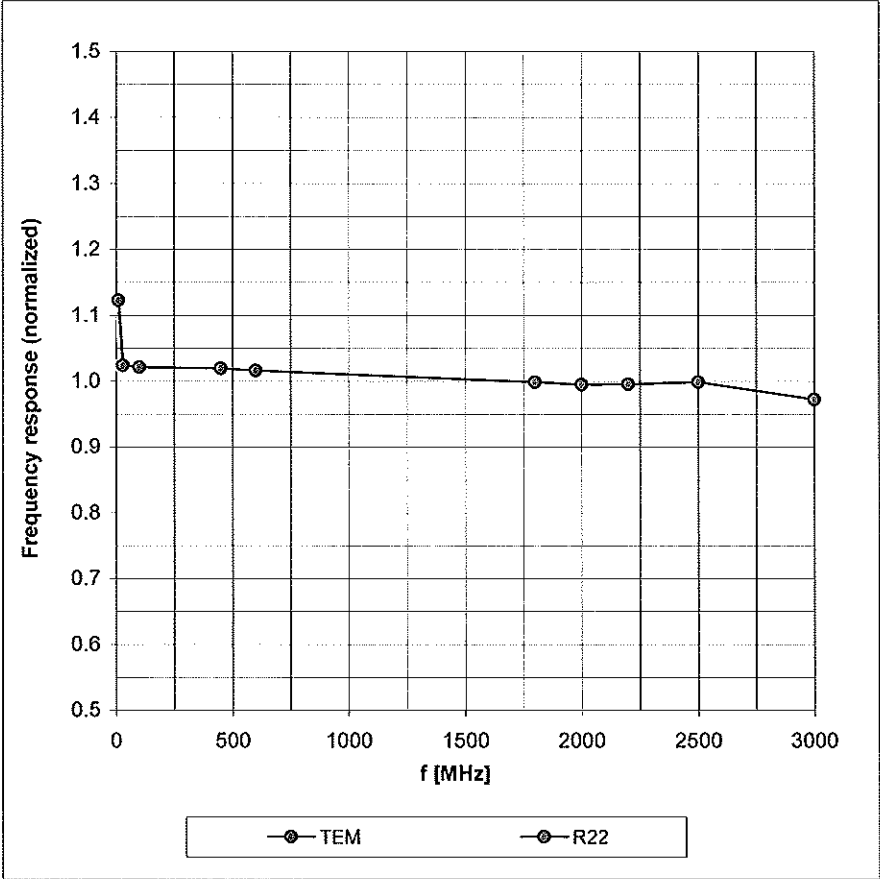
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	8.30	8.30	8.30	0.47	0.76 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	6.90	6.90	6.90	0.49	0.69 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	6.63	6.63	6.63	0.76	0.54 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	6.40	6.40	6.40	0.22	1.09 ± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	6.26	6.26	6.26	0.19	1.42 ± 11.0%
4950	± 50 / ± 100	49.4 ± 5%	5.01 ± 5%	3.64	3.64	3.64	0.50	1.75 ± 13.1%
5200	± 50 / ± 100	49.0 ± 5%	5.30 ± 5%	3.73	3.73	3.73	0.50	1.75 ± 13.1%
5300	± 50 / ± 100	48.5 ± 5%	5.42 ± 5%	3.52	3.52	3.52	0.52	1.75 ± 13.1%
5500	± 50 / ± 100	48.6 ± 5%	5.65 ± 5%	3.26	3.26	3.26	0.55	1.80 ± 13.1%
5600	± 50 / ± 100	48.5 ± 5%	5.77 ± 5%	3.16	3.16	3.16	0.65	1.80 ± 13.1%
5800	± 50 / ± 100	48.2 ± 5%	6.00 ± 5%	3.30	3.30	3.30	0.60	1.75 ± 13.1%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

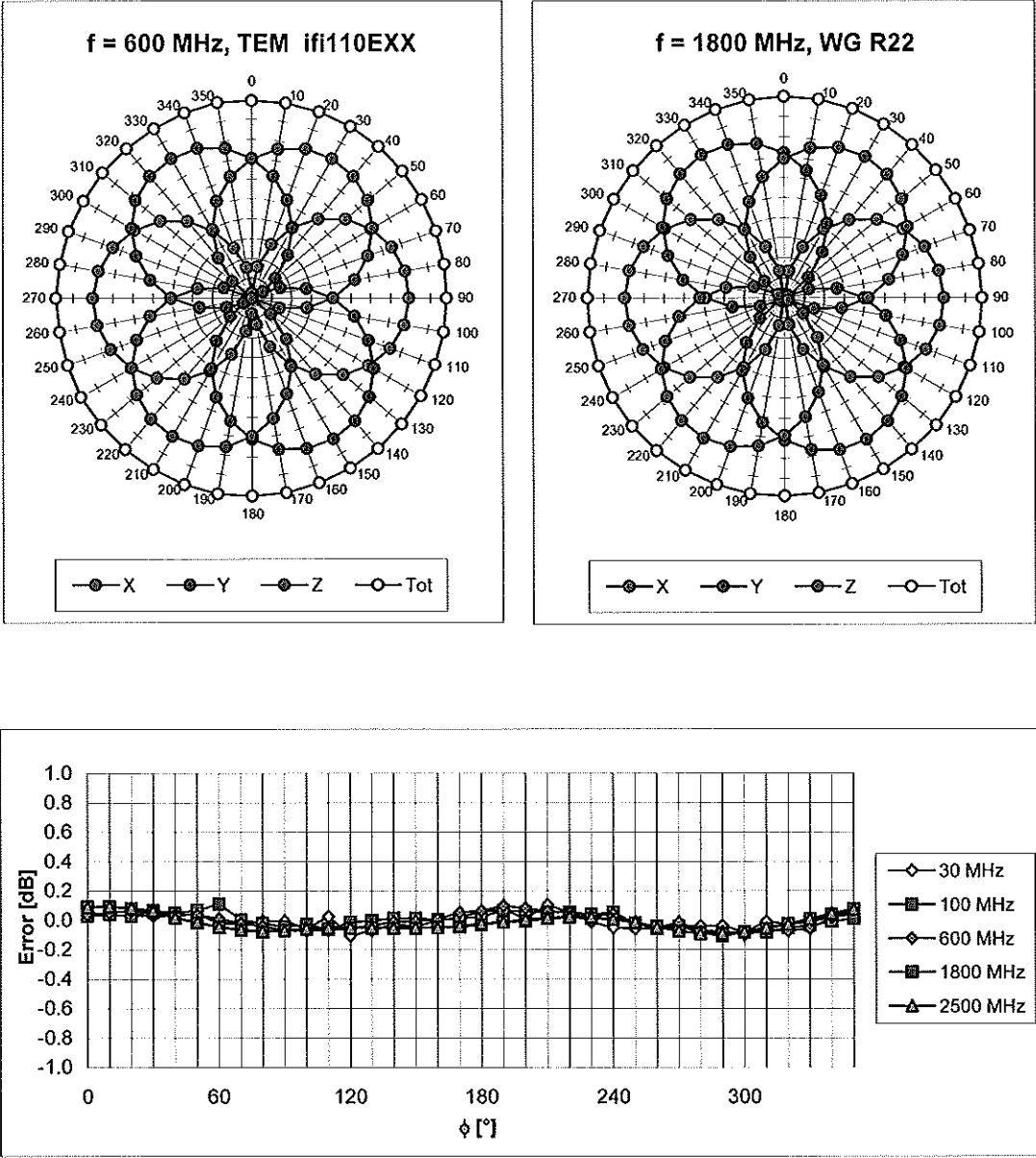
Frequency Response of E-Field

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



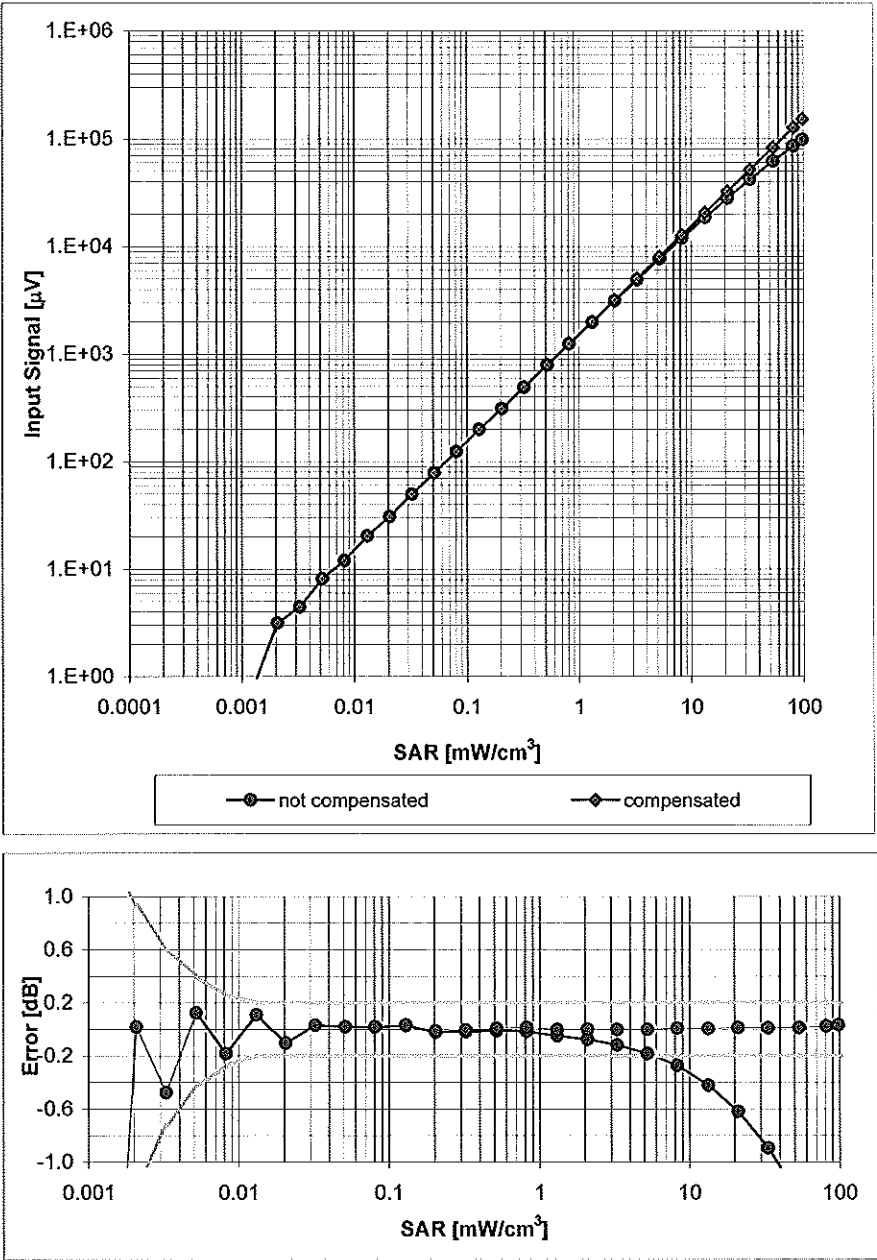
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

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



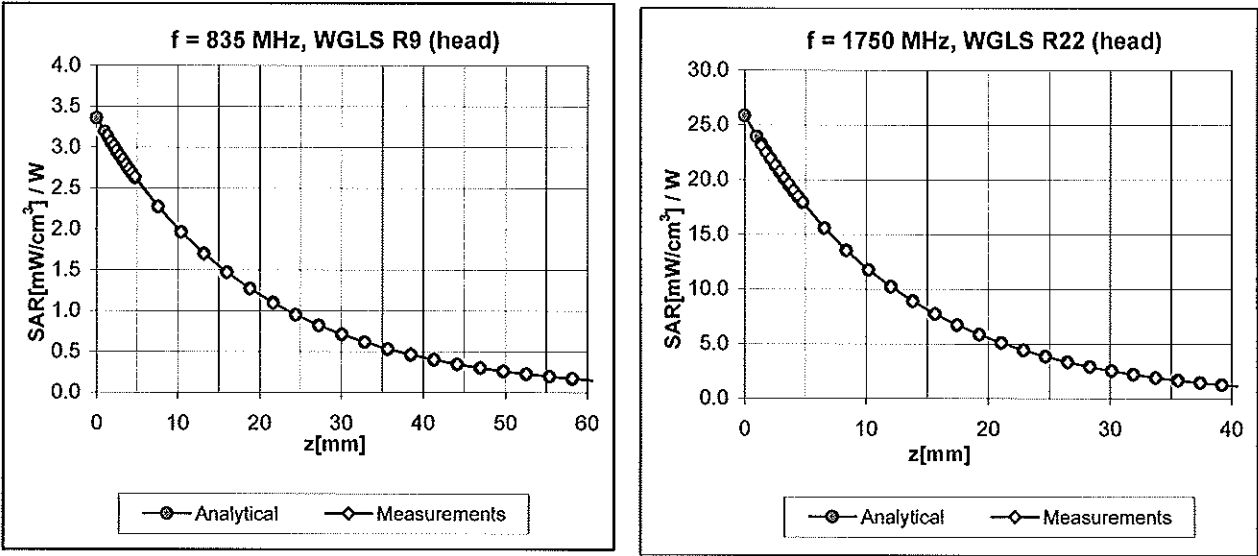
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range f(SAR_{head})
(Waveguide R22, f = 1800 MHz)



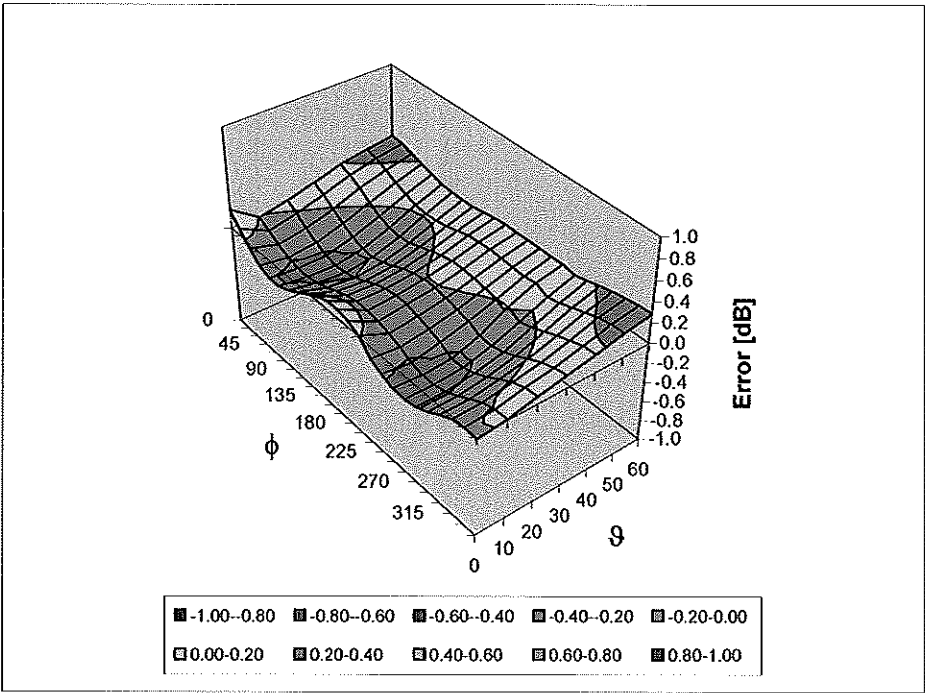
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in HSL

Error (ϕ, θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm