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

SAR COMPLIANCE EVALUATION REPORT

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

Date of Testing:
10/10/11 - 10/21/11
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1110171818.A3L

FCC ID:	**A3LSCHR920**
APPLICANT:	**SAMSUNG ELECTRONICS, CO. LTD.**

EUT Type:	Portable Handset
Application Type:	Certification
FCC Rule Part(s):	CFR §2.1093; FCC/OET Bulletin 65 Supplement C [June 2001]
Model(s):	SCH-R920
Test Device Serial No.:	Pre-Production [S/N: 99, 94, 93, 19]

Band & Mode	Tx Frequency	Conducted Power [dBm]	SAR		
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
Cell. CDMA/EVDO	824.70 - 848.31 MHz	24.38	0.30	0.91	N/A
AWS CDMA/EVDO	1711.25 - 1753.75 MHz	24.37	0.54	0.84	
AWS LTE	1710.7-1754.3 MHz	23.40	0.78	0.32	
PCS CDMA/EVDO	1851.25 - 1908.75 MHz	24.50	0.55	0.90	
PCS LTE	1850.7-1909.3 MHz	23.35	0.60	0.44	
2.4 GHz WLAN	2412 - 2462 MHz	15.96	0.02	0.01	
Bluetooth	2402 - 2480 MHz	11.83	N/A		
Simultaneous SAR per KDB 690783:			1.35 W/kg		

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

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001), IEEE 1528-2003 and in applicable Industry Canada Radio Standards Specifications (RSS); for North American frequency bands only.

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

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

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

TABLE OF CONTENTS

1 LTE INFORMATION PER KDB 941225 D05

KDB 941225 Pub LTE Information					
	FCC ID			**A3LSCHR920**	
	Form Factor			Handset	
1)	Frequency Range of each LTE transmission band			See 3)	
2)	Channel Bandwidths			1.4, 3, and 5 MHz BW	
3)	H, M, L channel numbers and frequencies				
	Low	Mid	High	Band 2	
	1850.7	1880	1909.3	1.4 MHz BW	
	1851.5	1880	1908.5	3 MHz BW	
	1852.5	1880	1907.5	5 MHz BW	
	Low	Mid	High	Band 4	
	1710.7	1732.5	1754.3	1.4 MHz BW	
	1711.5	1732.5	1753.5	3 MHz BW	
	1712.5	1732.5	1752.5	5 MHz BW	
4)(a)	UE Category			2	
(b)	Modulations Supported in UL			QPSK, 16QAM	
	LTE Transmitter and Antenna Implementation			More details in Technical Descriptions	
5)	Description of LTE Tx and Ant. Implementation			1 TX/RX Ant (Primary); 1 Rx Only Ant (Secondary)	
6)	LTE Voice available?			Yes	
	Hotspot with LTE+WIFI			No	
	Hotspot with LTE+WIFI active with 1XVoice sessions?			No	
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 (dBm)	RF Exposure Configurations
	835 MHz CDMA			See Section 15	See Section 18
	1750 MHz CDMA				
	1900 MHz CDMA				
	2.4 GHz Bluetooth				
	2.4 GHz WI-FI				
11)	Simultaneous Tx conditions			See Section 18	
12)	Power Reduction used for SAR Compliance?			No	
13-15)	N/A				

2 INTRODUCTION

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

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [24]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

2.1 SAR Definition

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

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

Figure 2-1
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/m^3)
E = Total RMS electric field strength (V/m)

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

3 TEST SITE LOCATION

3.1 INTRODUCTION

The map at the right shows the location of the PCTEST LABORATORY in Columbia, Maryland. It is in proximity to the FCC Laboratory, the Baltimore-Washington International (BWI) airport, the city of Baltimore and Washington, DC.

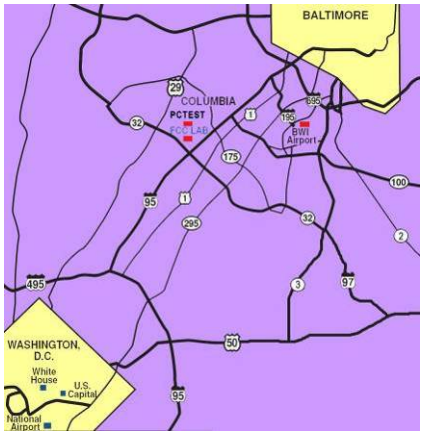


Figure 3-1
Map of the Greater Baltimore and Metropolitan Washington, D.C. area

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49' 38" W longitude. The facility is 1.5 miles north of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on January 27, 2006 and Industry Canada.

3.2 Test Facility / Accreditations:

Measurements were performed at an independent accredited PCTEST Engineering Lab located in Columbia, MD 21045, U.S.A.

- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing-Aid Compatibility (HAC), Battery Safety, CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (IC-2451).
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and all Industry Canada Standards (RSS).

- PCTEST facility is an IC registered (IC-2451) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS and CDMA, and EvDO mobile phones.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO Data, CDMA 1xRTT Data

4 SAR MEASUREMENT SETUP

4.1 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 4-1).

4.2 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.

4.3 System Electronics

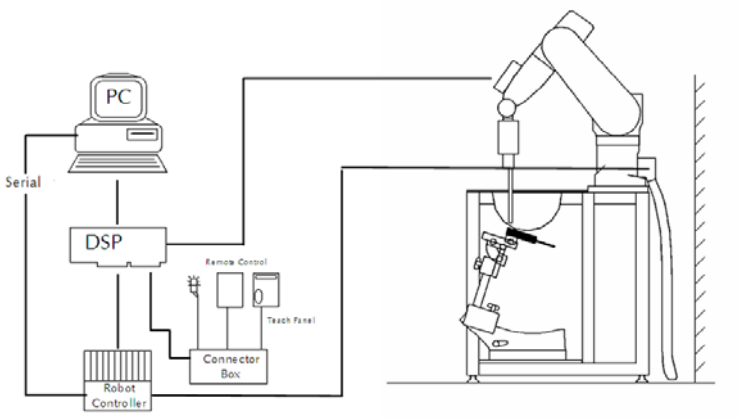


Figure 4-1
SAR Measurement System Setup

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.

4.4 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 4-2
SAR Measurement System

5 DASY E-FIELD PROBE SYSTEM

5.1 Probe Measurement System

Figure 5-1
SAR System

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration (see Figure 5-3) 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 6-1). The approach is stopped at reaching the maximum.

5.2 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 5-2
Near-Field Probe

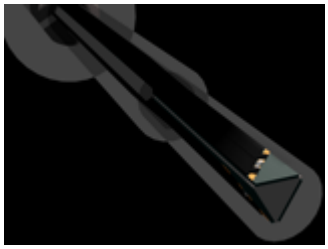


Figure 5-3
Triangular Probe Configuration

6 PROBE CALIBRATION PROCESS

6.1 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/cm^2) using an RF Signal generator, TEM cell, and RF Power Meter.

6.2 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/cm^2.

6.3 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/cm^3 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.

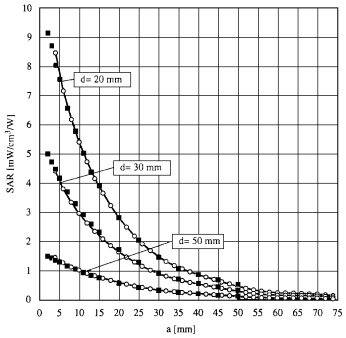


Figure 6-1 E-Field and Temperature measurements at 900MHz [9]

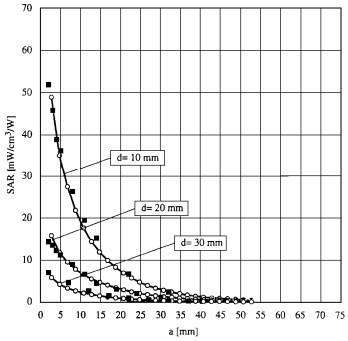


Figure 6-2 E-Field and temperature measurements at 1.9GHz [9]

7 PHANTOM AND EQUIVALENT TISSUES

7.1 SAM Phantoms

Figure 7-1
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).

7.2 Tissue Simulating Mixture Characterization

Figure 7-2
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 7-1
Composition of the Tissue Equivalent Matter

Frequency (MHz)	835	835	1750	1750	1900	1900	2450	2450
Tissue	Head	Body	Head	Body	Head	Body	Head	Body
Ingredients (% by weight)								
Bactericide	0.1	0.1						
DGBE			47	31	44.92	29.44	7.99	26.7
HEC	1	1						
NaCl	1.45	0.94	0.4	0.2	0.18	0.39	0.16	0.1
Sucrose	57	44.9						
Triton X-100							19.97	
Water	40.45	53.06	52.6	68.8	54.9	70.17	71.88	73.2

8 DOSIMETRIC ASSESSMENT & PHANTOM SPECS

8.1 Measurement Procedure

The evaluation was performed using the following procedure:

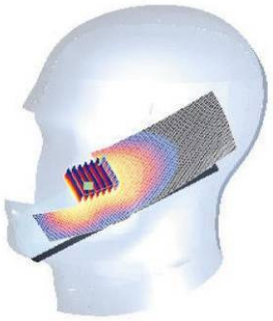


Figure 8-1
Sample SAR Area Scan

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 SAR test and drift measurements were repeated.

8.2 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 8-2). 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 8-2
SAM Twin Phantom Shell

9 DEFINITION OF REFERENCE POINTS

9.1 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 9-2). 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].

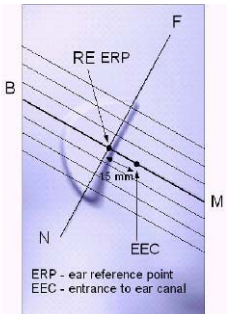


Figure 9-1
Close-Up Side view of ERP

9.2 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 9-3). The "test device reference point" was than located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at it's top and bottom edges, positioning the "ear reference point" on the outer surface of the both the left and right head phantoms on the ear reference point.

Figure 9-2
Front, back and side view of SAM Twin Phantom

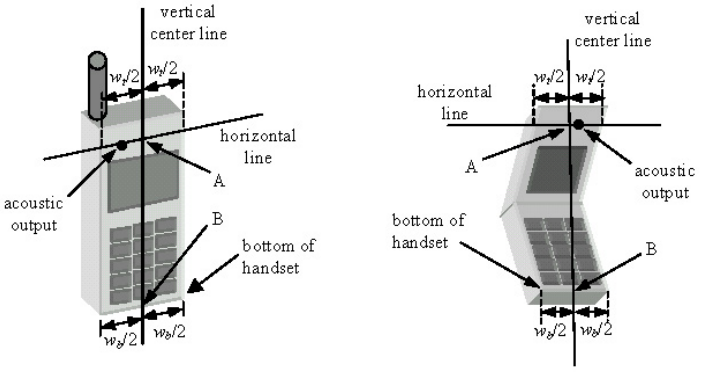


Figure 9-3
Handset Vertical Center & Horizontal Line Reference Points

10 TEST CONFIGURATION POSITIONS

10.1 Device Holder

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

10.2 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 10-1), 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.

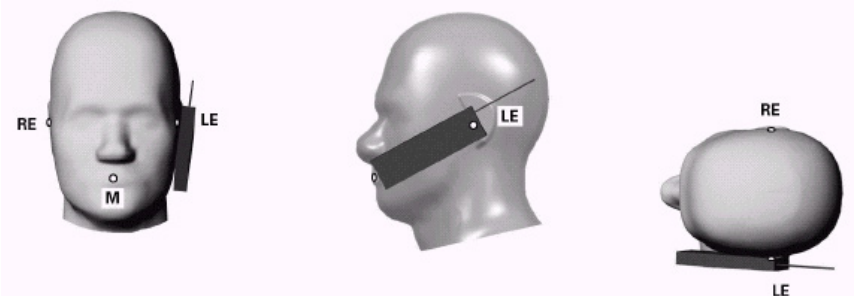


Figure 10-1 Front, Side and Top View of Cheek/Touch Position

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 hen rotated around the vertical centerline until the phone (horizontal line) was symmetrical was respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, the handset was rotated about the line NF until any point on the handset made contact with a phantom point below the ear (cheek) (See Figure 10-2).

10.3 Positioning for Ear / 15º Tilt

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

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15degree.
2. The phone was then rotated around the horizontal line by 15 degree.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the phone touches the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. The tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Figure 10-2).

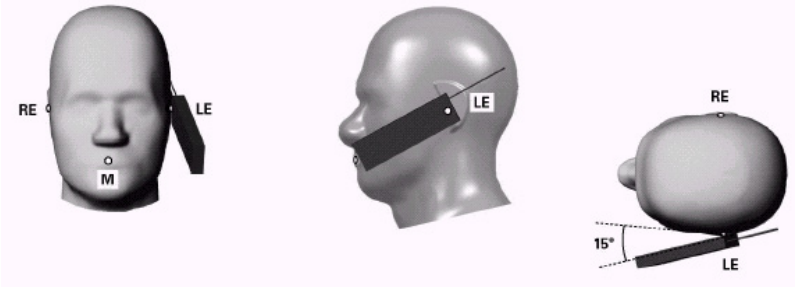


Figure 10-2 Front, Side and Top View of Ear/15º Tilt Position

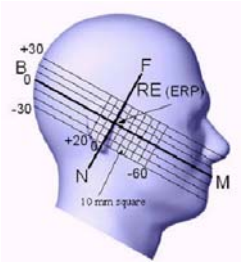


Figure 10-3
Side view w/ relevant markings

Figure 10-4 Body SAR Sample Photo
(Not Actual EUT)

10.4 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.

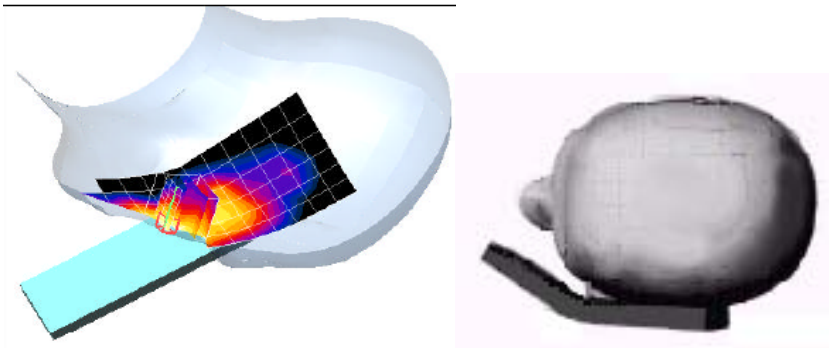


Figure 10-5
SAR Scans near the Jaw/Mouth

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,

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.

10.5 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 10-4). 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.

11 FCC RF EXPOSURE LIMITS

11.1 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.

11.2 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 11-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

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

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

12 FCC 3G MEASUREMENT PROCEDURES

12.1 Procedures Used to Establish RF Signal for SAR

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

12.2 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes following SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing.

12.2.1 MPR

MPR is permanently implemented for this device. The specific manufacturer target MPR is indicated alongside the SAR results. With the MPR permanently implemented, this device will never operate at higher power levels. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

12.2.2 A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests

12.2.3 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05:

1. Per KDB Publication 941225 D05 Page 4, 3) A), QPSK with 50% RB is required.
2. Per KDB Publication 941225 D05 Page 4, 3) B), QPSK with 1 RB for both channel edges are required.
3. Per KDB Publication 941225 D05 Page 4, 4) A), 16QAM with 50% RB is required.
4. Per KDB Publication 941225 D05 Page 4, 4) B), 16QAM with 1RB for both channel edges are required.
5. Per KDB Publication 941225 D05 Page 4, A) I), 100% RB Allocation is not required to be tested since SAR is not > 1.45 W/kg.

12.3 SAR Measurement Conditions for CDMA2000

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

12.3.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by "SAR Measurement Procedures for 3G Devices" v02, October 2007. Maximum output power is verified on the High, Middle and Low

channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in the "All Up" condition.

1. If the mobile station (MS) supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1, Table 12-1 parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH_0 and demodulation of RC 3,4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2, Table 13-2 was applied.
5. FCHs were configured at full rate for maximum SAR with "All Up" power control bits.

Table 12-1
Parameters for Max. Power for RC1

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

Table 12-2
Parameters for Max. Power for RC3

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

12.3.2 Head SAR Measurements

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

12.3.3 Body SAR Measurements

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

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

12.3.4 Handsets with EVDO

For handsets with Ev-Do capabilities, when the maximum average output of each channel in Rev. 0 is less than ¼ dB higher than that measured in RC3 (1x RTT), body SAR for EV-DO is not required. Otherwise, SAR for Rev. 0 is measured on the maximum output channel at 153.6 kbps using the body exposure configuration that results in the highest SAR for that channel in RC3.

12.4 SAR Measurements for 802.11 modes

The SAR test procedures for devices with 802.11 modes are adopted from FCC KDB 248227 publication.

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

12.5 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.

12.6 Frequency Channel Configurations [27]

802.11 b/g/n operating modes are tested independently according to the service requirements in each frequency band. 802.11 b/g/n modes are tested on channels 1, 6 and 11. These are referred to as the "default test channels". For 2.4 GHz, 802.11g/n modes were evaluated only if the output power was 0.25 dB higher than the 802.11b mode.

Table 12-3 IEEE 802.11 Default Test Channels

Mode	GHz	Channel	Turbo Channel	"Default Test Channels"			
				§15.247		UNII	
				802.11b	802.11g		
802.11 b/g/n	2.412	1		√	∇		
	2.437	6	6	√	∇		
	2.462	11		√	∇		

13 OUTPUT POWER MEASUREMENTS

13.1 LTE Conducted Powers

Table 13-1
AWS LTE Low Channel Conducted Powers

Frequency [MHz]	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Maximum Average Power [dBm]	Allowed MPR [dB]	Target MPR [dB]	Target Power [dBm]	Deviation [dB]
1710.7	19957	1.4	1	0	QPSK	22.90	0	0	23	-0.10
1710.7	19957	1.4	1	5	QPSK	22.85	0	0	23	-0.15
1710.7	19957	1.4	3	2	QPSK	23.00	0	0	23	0.00
1710.7	19957	1.4	6	0	QPSK	22.25	0-1	1	22	0.25
1710.7	19957	1.4	1	0	16-QAM	22.00	0-1	1	22	0.00
1710.7	19957	1.4	1	5	16-QAM	22.00	0-1	1	22	0.00
1710.7	19957	1.4	3	2	16-QAM	22.00	0-1	1	22	0.00
1710.7	19957	1.4	6	0	16-QAM	21.10	0-2	2	21	0.10
1711.5	19965	3	1	0	QPSK	23.10	0	0	23	0.10
1711.5	19965	3	1	14	QPSK	23.20	0	0	23	0.20
1711.5	19965	3	8	4	QPSK	22.35	0-1	1	22	0.35
1711.5	19965	3	15	0	QPSK	22.10	0-1	1	22	0.10
1711.5	19965	3	1	0	16-QAM	21.70	0-1	1	22	-0.30
1711.5	19965	3	1	14	16-QAM	21.80	0-1	1	22	-0.20
1711.5	19965	3	8	4	16-QAM	21.00	0-2	2	21	0.00
1711.5	19965	3	15	0	16-QAM	20.95	0-2	2	21	-0.05
1712.5	19975	5	1	0	QPSK	23.40	0	0	23	0.40
1712.5	19975	5	1	24	QPSK	23.30	0	0	23	0.30
1712.5	19975	5	12	6	QPSK	22.00	0-1	1	22	0.00
1712.5	19975	5	25	0	QPSK	22.25	0-1	1	22	0.25
1712.5	19975	5	1	0	16-QAM	22.50	0-1	1	22	0.50
1712.5	19975	5	1	24	16-QAM	22.00	0-1	1	22	0.00
1712.5	19975	5	12	6	16-QAM	21.20	0-2	2	21	0.20
1712.5	19975	5	25	0	16-QAM	21.20	0-2	2	21	0.20

Table 13-2
AWS LTE Mid Channel Conducted Powers

Frequency [MHz]	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Maximum Average Power [dBm]	Allowed MPR [dB]	Target MPR [dB]	Target Power [dBm]	Deviation [dB]
1732.5	20175	1.4	1	0	QPSK	22.75	0	0	23	-0.25
1732.5	20175	1.4	1	5	QPSK	22.75	0	0	23	-0.25
1732.5	20175	1.4	3	2	QPSK	23.00	0	0	23	0.00
1732.5	20175	1.4	6	0	QPSK	21.90	0-1	1	22	-0.10
1732.5	20175	1.4	1	0	16-QAM	21.80	0-1	1	22	-0.20
1732.5	20175	1.4	1	5	16-QAM	21.60	0-1	1	22	-0.40
1732.5	20175	1.4	3	2	16-QAM	21.75	0-1	1	22	-0.25
1732.5	20175	1.4	6	0	16-QAM	20.78	0-2	2	21	-0.22
1732.5	20175	3	1	0	QPSK	22.80	0	0	23	-0.20
1732.5	20175	3	1	14	QPSK	22.85	0	0	23	-0.15
1732.5	20175	3	8	4	QPSK	22.00	0-1	1	22	0.00
1732.5	20175	3	15	0	QPSK	21.85	0-1	1	22	-0.15
1732.5	20175	3	1	0	16-QAM	21.70	0-1	1	22	-0.30
1732.5	20175	3	1	14	16-QAM	21.75	0-1	1	22	-0.25
1732.5	20175	3	8	4	16-QAM	21.15	0-2	2	21	0.15
1732.5	20175	3	15	0	16-QAM	20.90	0-2	2	21	-0.10
1732.5	20175	5	1	0	QPSK	23.20	0	0	23	0.20
1732.5	20175	5	1	24	QPSK	23.15	0	0	23	0.15
1732.5	20175	5	12	6	QPSK	21.75	0-1	1	22	-0.25
1732.5	20175	5	25	0	QPSK	21.95	0-1	1	22	-0.05
1732.5	20175	5	1	0	16-QAM	22.30	0-1	1	22	0.30
1732.5	20175	5	1	24	16-QAM	22.20	0-1	1	22	0.20
1732.5	20175	5	12	6	16-QAM	21.30	0-2	2	21	0.30
1732.5	20175	5	25	0	16-QAM	21.00	0-2	2	21	0.00

Table 13-3
AWS LTE High Channel Conducted Powers

Frequency [MHz]	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Maximum Average Power [dBm]	Allowed MPR [dB]	Target MPR [dB]	Target Power [dBm]	Deviation [dB]
1754.3	20393	1.4	1	0	QPSK	22.75	0	0	23	0.25
1754.3	20393	1.4	1	5	QPSK	22.70	0	0	23	0.3
1754.3	20393	1.4	3	2	QPSK	22.90	0	0	23	0.1
1754.3	20393	1.4	6	0	QPSK	22.10	0-1	1	22	-0.1
1754.3	20393	1.4	1	0	16-QAM	21.70	0-1	1	22	0.3
1754.3	20393	1.4	1	5	16-QAM	21.60	0-1	1	22	0.4
1754.3	20393	1.4	3	2	16-QAM	22.05	0-1	1	22	-0.05
1754.3	20393	1.4	6	0	16-QAM	20.90	0-2	2	21	0.1
1753.5	20385	3	1	0	QPSK	22.60	0	0	23	0.4
1753.5	20385	3	1	14	QPSK	22.60	0	0	23	0.4
1753.5	20385	3	8	4	QPSK	22.25	0-1	1	22	-0.25
1753.5	20385	3	15	0	QPSK	22.00	0-1	1	22	0
1753.5	20385	3	1	0	16-QAM	21.40	0-1	1	22	0.6
1753.5	20385	3	1	14	16-QAM	21.35	0-1	1	22	0.65
1753.5	20385	3	8	4	16-QAM	20.90	0-2	2	21	0.1
1753.5	20385	3	15	0	16-QAM	20.60	0-2	2	21	0.4
1752.5	20325	5	1	0	QPSK	23.20	0	0	23	-0.2
1752.5	20325	5	1	24	QPSK	23.10	0	0	23	-0.1
1752.5	20325	5	12	6	QPSK	22.00	0-1	1	22	0
1752.5	20325	5	25	0	QPSK	22.00	0-1	1	22	0
1752.5	20325	5	1	0	16-QAM	22.10	0-1	1	22	-0.1
1752.5	20325	5	1	24	16-QAM	22.25	0-1	1	22	-0.25
1752.5	20325	5	12	6	16-QAM	20.85	0-2	2	21	0.15
1752.5	20325	5	25	0	16-QAM	20.95	0-2	2	21	0.05

Table 13-4
PCS LTE Low Channel Conducted Powers

Frequency [MHz]	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Maximum Average Power [dBm]	Allowed MPR [dB]	Target MPR [dB]	Target Power [dBm]	Deviation [dB]
1850.7	18607	1.4	1	0	QPSK	22.70	0	0	23	-0.30
1850.7	18607	1.4	1	5	QPSK	22.80	0	0	23	-0.20
1850.7	18607	1.4	3	2	QPSK	23.05	0	0	23	0.05
1850.7	18607	1.4	6	0	QPSK	22.00	0-1	1	22	0.00
1850.7	18607	1.4	1	0	16-QAM	22.00	0-1	1	22	0.00
1850.7	18607	1.4	1	5	16-QAM	22.10	0-1	1	22	0.10
1850.7	18607	1.4	3	2	16-QAM	22.25	0-1	1	22	0.25
1850.7	18607	1.4	6	0	16-QAM	21.20	0-2	2	21	0.20
1851.5	18615	3	1	0	QPSK	23.10	0	0	23	0.10
1851.5	18615	3	1	14	QPSK	23.20	0	0	23	0.20
1851.5	18615	3	8	4	QPSK	22.20	0-1	1	22	0.20
1851.5	18615	3	15	0	QPSK	21.95	0-1	1	22	-0.05
1851.5	18615	3	1	0	16-QAM	21.90	0-1	1	22	-0.10
1851.5	18615	3	1	14	16-QAM	21.45	0-1	1	22	-0.55
1851.5	18615	3	8	4	16-QAM	21.20	0-2	2	21	0.20
1851.5	18615	3	15	0	16-QAM	20.95	0-2	2	21	-0.05
1852.5	18625	5	1	0	QPSK	23.25	0	0	23	0.25
1852.5	18625	5	1	24	QPSK	23.35	0	0	23	0.35
1852.5	18625	5	12	6	QPSK	22.25	0-1	1	22	0.25
1852.5	18625	5	25	0	QPSK	22.35	0-1	1	22	0.35
1852.5	18625	5	1	0	16-QAM	22.35	0-1	1	22	0.35
1852.5	18625	5	1	24	16-QAM	22.30	0-1	1	22	0.30
1852.5	18625	5	12	6	16-QAM	21.50	0-2	2	21	0.50
1852.5	18625	5	25	0	16-QAM	21.40	0-2	2	21	0.40

Table 13-5
PCS LTE Mid. Channel Conducted Powers

Frequency [MHz]	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Maximum Average Power [dBm]	Allowed MPR [dB]	Target MPR [dB]	Target Power [dBm]	Deviation [dB]
1880	18900	1.4	1	0	QPSK	22.90	0	0	23	-0.10
1880	18900	1.4	1	5	QPSK	23.00	0	0	23	0.00
1880	18900	1.4	3	2	QPSK	22.90	0	0	23	-0.10
1880	18900	1.4	6	0	QPSK	21.95	0-1	1	22	-0.05
1880	18900	1.4	1	0	16-QAM	22.00	0-1	1	22	0.00
1880	18900	1.4	1	5	16-QAM	22.10	0-1	1	22	0.10
1880	18900	1.4	3	2	16-QAM	22.20	0-1	1	22	0.20
1880	18900	1.4	6	0	16-QAM	21.10	0-2	2	21	0.10
1880	18900	3	1	0	QPSK	22.90	0	0	23	-0.10
1880	18900	3	1	14	QPSK	23.00	0	0	23	0.00
1880	18900	3	8	4	QPSK	22.30	0-1	1	22	0.30
1880	18900	3	15	0	QPSK	22.05	0-1	1	22	0.05
1880	18900	3	1	0	16-QAM	21.95	0-1	1	22	-0.05
1880	18900	3	1	14	16-QAM	22.10	0-1	1	22	0.10
1880	18900	3	8	4	16-QAM	21.30	0-2	2	21	0.30
1880	18900	3	15	0	16-QAM	21.10	0-2	2	21	0.10
1880	18900	5	1	0	QPSK	23.25	0	0	23	0.25
1880	18900	5	1	24	QPSK	23.20	0	0	23	0.20
1880	18900	5	12	6	QPSK	22.05	0-1	1	22	0.05
1880	18900	5	25	0	QPSK	22.25	0-1	1	22	0.25
1880	18900	5	1	0	16-QAM	22.35	0-1	1	22	0.35
1880	18900	5	1	24	16-QAM	22.20	0-1	1	22	0.20
1880	18900	5	12	6	16-QAM	21.10	0-2	2	21	0.10
1880	18900	5	25	0	16-QAM	21.30	0-2	2	21	0.30

Table 13-6
PCS LTE High Channel Conducted Powers

Frequency [MHz]	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Maximum Average Power [dBm]	Allowed MPR [dB]	Target MPR [dB]	Target Power [dBm]	Deviation [dB]
1909.3	19193	1.4	1	0	QPSK	22.85	0	0	23	-0.15
1909.3	19193	1.4	1	5	QPSK	22.75	0	0	23	-0.25
1909.3	19193	1.4	3	2	QPSK	22.95	0	0	23	-0.05
1909.3	19193	1.4	6	0	QPSK	21.90	0-1	1	22	-0.10
1909.3	19193	1.4	1	0	16-QAM	21.85	0-1	1	22	-0.15
1909.3	19193	1.4	1	5	16-QAM	22.00	0-1	1	22	0.00
1909.3	19193	1.4	3	2	16-QAM	21.90	0-1	1	22	-0.10
1909.3	19193	1.4	6	0	16-QAM	21.15	0-2	2	21	0.15
1908.5	19185	3	1	0	QPSK	22.70	0	0	23	-0.30
1908.5	19185	3	1	14	QPSK	22.70	0	0	23	-0.30
1908.5	19185	3	8	4	QPSK	21.70	0-1	1	22	-0.30
1908.5	19185	3	15	0	QPSK	21.84	0-1	1	22	-0.16
1908.5	19185	3	1	0	16-QAM	21.80	0-1	1	22	-0.20
1908.5	19185	3	1	14	16-QAM	21.70	0-1	1	22	-0.30
1908.5	19185	3	8	4	16-QAM	20.95	0-2	2	21	-0.05
1908.5	19185	3	15	0	16-QAM	20.80	0-2	2	21	-0.20
1907.5	19175	5	1	0	QPSK	23.20	0	0	23	0.20
1907.5	19175	5	1	24	QPSK	23.00	0	0	23	0.00
1907.5	19175	5	12	6	QPSK	22.10	0-1	1	22	0.10
1907.5	19175	5	25	0	QPSK	21.85	0-1	1	22	-0.15
1907.5	19175	5	1	0	16-QAM	22.10	0-1	1	22	0.10
1907.5	19175	5	1	24	16-QAM	21.90	0-1	1	22	-0.10
1907.5	19175	5	12	6	16-QAM	21.00	0-2	2	21	0.00
1907.5	19175	5	25	0	16-QAM	21.00	0-2	2	21	0.00

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. Powers measured below the expected levels on the devices were extrapolated to ensure compliance for SAR.

LTE test configurations are determined according to SAR Test Considerations for LTE handsets and Data Modems KDB 941225 D05 Publication:

- Per KDB Publication 941225 D05 Page 4, 3) A), QPSK with 50% RB is required for the highest bandwidth (5 MHz).
- Per KDB Publication 941225 D05 Page 4, footnote 2, when the maximum output power across high, mid., and low channels is < 0.5 dB, mid channel is tested. Low and high channel SAR tests are not required because the SAR is < 0.8 W/kg.
- Per KDB Publication 941225 D05 Page 4, 3) B), QPSK with 1 RB for both channel edges are required for the highest bandwidth (5 MHz).
- Per KDB Publication 941225 D05 Page 5, footnote 5, 1 RB allocation SAR tests were performed on the highest output power channel for the RB allocation since the average output power of the 1 RB allocation was > 0.5 dB higher than the 50% RB allocation.
- Per KDB Publication 941225 D05 Page 4, 4) A), 16QAM with 50% RB is required for the highest bandwidth (5 MHz) on the channel with the highest measured SAR for QPSK with 50% RB allocation.
- Per KDB Publication 941225 D05 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth (5 MHz) on the highest output power channel for the 1 RB allocation since the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation.
- Per KDB Publication 941225 D05 Page 4, A) I), 100% RB Allocation is not required to be tested since SAR is not > 1.45 W/kg for the highest bandwidth (5 MHz).
- Per KDB Publication 941225 D05 Page 5, 5) B) I), smaller bandwidths are not required to be tested since SAR is not > 1.45 W/kg for the highest bandwidth (5 MHz).

Figure 13-7
Power Measurement Setup

13.2 CDMA Conducted Powers

Band	Channel	Frequency	SO2 [dBm]	SO2 [dBm]	SO2 [dBm]	SO55 [dBm]	SO55 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]
	F-RC	MHz	RC1	RC3	RC4	RC1	RC3	FCH+SCH	FCH	(RTAP)
Cellular	1013	824.7	24.38	24.42	24.37	24.34	24.39	24.37	24.38	24.40
	384	835.52	24.30	24.40	24.40	24.30	24.35	24.34	24.33	24.45
	777	848.31	24.91	23.97	23.94	23.82	23.95	23.96	23.99	24.03
AWS	25	1711.25	24.35	24.28	24.26	24.32	24.25	24.27	24.25	24.40
	450	1732.5	24.37	24.31	24.32	24.35	24.31	24.30	24.32	24.42
	875	1753.75	24.34	24.36	24.36	24.37	24.34	24.33	24.37	24.45
PCS	25	1851.25	24.51	24.54	24.53	24.50	24.48	24.47	24.50	24.63
	600	1880	24.46	24.42	24.40	24.40	24.38	24.38	24.38	24.50
	1175	1908.75	24.36	24.32	24.34	24.35	24.33	24.36	24.33	24.40

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

Per KDB Publication 941225 D01:

1. Head SAR was tested with SO55 RC3. SO55 RC1 was not required since the average output power was not more than 0.25 dB than the SO55 RC3 powers.
2. Body-Worn SAR was tested with TDSO32 FCH. EVDO and TDSO32 FCH+SCH SAR tests were not required since the average output power was not more than 0.25 dB higher than the TDSO32 FCH powers.

Figure 13-8
Power Measurement Setup

13.3 WLAN Conducted Powers

Table 13-1
IEEE 802.11b Average RF Power

Freq [MHz]	Channel	Data Rate [Mbps]	Average Power (dBm)
2412	1	1	15.10
		2	15.24
		5.5	15.35
		11	15.34
2437	6	1	**15.66**
		2	**15.96**
		5.5	15.71
		11	15.77
2462	11	1	14.31
		2	14.67
		5.5	14.56
		11	14.53

Table 13-2
IEEE 802.11g Average RF Power

Freq [MHz]	Channel	Data Rate [Mbps]	Average Power (dBm)
2412	1	6	13.18
		9	13.11
		12	13.09
		18	13.18
		24	13.16
		36	13.02
		48	13.12
		54	13.08
2437	6	6	13.71
		9	13.59
		12	13.57
		18	13.56
		24	13.55
		36	13.50
		48	13.47
		54	13.51
2462	11	6	12.74
		9	12.77
		12	12.75
		18	12.65
		24	12.71
		36	12.63
		48	12.65
		54	12.68

Table 13-3
IEEE 802.11n Average RF Power

Freq [MHz]	Channel	Data Rate [Mbps]	Average Power (dBm)
2412	1	6.5/7.2	12.16
		13/14.40	12.04
		19.5/21.70	11.98
		26/28.90	11.99
		29/43.3	11.99
		52/57.80	11.85
		58.50/65	11.94
		65/72.2	11.89
2437	6	6.5/7.2	12.58
		13/14.40	12.57
		19.5/21.70	12.47
		26/28.90	12.48
		29/43.3	12.46
		52/57.80	12.45
		58.50/65	12.47
		65/72.2	12.32
2462	11	6.5/7.2	11.71
		13/14.40	11.70
		19.5/21.70	11.63
		26/28.90	11.58
		29/43.3	11.56
		52/57.80	11.47
		58.50/65	11.51
		65/72.2	11.53

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes:

- For 2.4 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11b were selected for SAR evaluation. IEEE 802.11 g/n modes 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.
- 2 Mbps data rate was tested for mid channel since it was 0.25 dB higher than the lowest data rate.
- The bolded data rates and channel above were tested for SAR.

13.4 Peak Bluetooth Conducted Powers

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Peak Conducted Power	
			[dBm]	[mW]
2402	1.0	0	8.38	6.879
2441	1.0	39	9.34	8.582
2480	1.0	78	9.55	9.012
2402	2.0	0	10.82	12.064
2441	2.0	39	11.64	14.578
2480	2.0	78	11.83	15.248
2402	3.0	0	8.63	7.293
2441	3.0	39	9.64	9.196
2480	3.0	78	9.81	9.565

Based on the output power, antenna separation distance, and the Body SAR, per KDB 648474 publication, a stand-alone Bluetooth SAR test is not required:

1. 2.4 GHz WIFI and Bluetooth, share an antenna path
2. The maximum power in mW is less than 60/f where f is the frequency in GHz
3. The Bluetooth power is less than the WLAN power
4. The WLAN SAR is less than 0.4
5. All simultaneous sums for WLAN are less than 1.6 W/kg

Figure 13-9
Power Measurement Setup

14 SYSTEM VERIFICATION

14.1 Tissue Verification

Table 14-1
Measured Tissue Properties

Tissue Type	Calibrated for Tests Performed on:	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
835H	10/10/2011	22.9	820	0.884	43.47	0.898	41.571	-1.56%	4.57%
			835	0.902	43.31	0.900	41.500	0.22%	4.36%
			850	0.916	43.34	0.916	41.500	0.00%	4.43%
1750H	10/17/2011	23.2	1710	1.387	39.52	1.348	40.136	2.89%	-1.53%
			1750	1.424	39.30	1.370	40.100	3.94%	-2.00%
			1790	1.459	39.17	1.394	40.020	4.66%	-2.12%
1900H	10/12/2011	22.8	1850	1.369	39.15	1.400	40.000	-2.21%	-2.13%
			1880	1.398	39.01	1.400	40.000	-0.14%	-2.48%
			1910	1.434	38.91	1.400	40.000	2.43%	-2.73%
1900H	10/17/2011	23.8	1850	1.339	38.69	1.400	40.000	-4.36%	-3.28%
			1880	1.370	38.53	1.400	40.000	-2.14%	-3.68%
			1910	1.391	38.45	1.400	40.000	-0.64%	-3.87%
2450H	10/21/2011	23.0	2401	1.744	38.04	1.758	39.298	-0.80%	-3.20%
			2450	1.804	37.87	1.800	39.200	0.22%	-3.39%
			2499	1.856	37.61	1.852	39.135	0.22%	-3.90%
835B	10/10/2011	22.9	820	0.949	52.72	0.969	55.284	-2.06%	-4.64%
			835	0.963	52.68	0.970	55.200	-0.72%	-4.57%
			850	0.977	52.65	0.988	55.154	-1.11%	-4.54%
1750B	10/17/2011	23.2	1710	1.501	51.51	1.460	53.540	2.81%	-3.79%
			1750	1.538	51.45	1.490	53.430	3.22%	-3.71%
			1790	1.576	51.32	1.510	53.330	4.37%	-3.77%
1900B	10/13/2011	22.8	1850	1.451	51.01	1.520	53.300	-4.54%	-4.30%
			1880	1.469	50.97	1.520	53.300	-3.36%	-4.37%
			1910	1.490	50.94	1.520	53.300	-1.97%	-4.43%
1900B	10/15/2011	22.0	1850	1.511	52.27	1.520	53.300	-0.59%	-1.93%
			1880	1.538	52.14	1.520	53.300	1.18%	-2.18%
			1910	1.578	52.07	1.520	53.300	3.82%	-2.31%
2450B	10/19/2011	23.2	2401	1.828	52.04	1.903	52.765	-3.94%	-1.37%
			2450	1.898	51.83	1.950	52.700	-2.67%	-1.65%
			2499	1.955	51.61	2.019	52.638	-3.17%	-1.95%

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.

14.2 Measurement Procedure for Tissue verification

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

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

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

14.3 Test System Verification

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

Table 14-2
System Verification Results

System Verification TARGET & MEASURED											
Tissue Frequency (MHz)	**Tissue Type**	**Date:**	**Amb. Temp (°C)**	**Liquid Temp (°C)**	**Input Power (W)**	**Dipole SN**	**Probe SN**	**Measured SAR_{1g} (W/kg)**	**1 W Target SAR_{1g} (W/kg)**	**1 W Normalized SAR_{1g} (W/kg)**	**Deviation (%)**
835	Head	10/10/2011	24.2	22.4	0.100	4d047	3258	0.951	9.530	9.510	-0.21%
1750	Head	10/17/2011	22.3	21.2	0.100	1051	3561	3.69	37.000	36.900	-0.27%
1900	Head	10/12/2011	24.7	23.1	0.040	502	3550	1.72	40.200	43.000	6.97%
1900	Head	10/17/2011	23.6	21.9	0.100	502	3209	4.06	40.200	40.600	1.00%
2450	Head	10/21/2011	23.4	22.1	0.025	797	3561	1.38	53.300	55.200	3.56%
835	Body	10/10/2011	23.6	21.8	0.100	4d047	3258	0.986	9.850	9.860	0.10%
1750	Body	10/17/2011	22.8	21.6	0.040	1051	3561	1.5	37.000	37.500	1.35%
1900	Body	10/13/2011	23.1	21.5	0.100	502	3209	4.3	41.100	43.000	4.62%
1900	Body	10/15/2011	23.4	22.0	0.100	502	3209	4.2	41.100	42.000	2.19%
2450	Body	10/19/2011	23.0	22.0	0.016	797	3209	0.892	52.300	56.456	7.95%

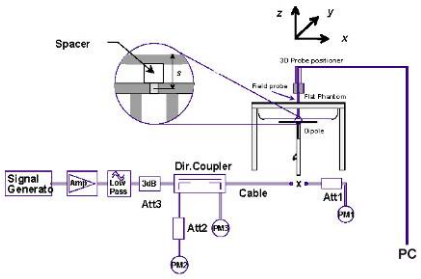


Figure 14-1
System Verification Setup Diagram

Figure 14-2
System Verification Setup Photo

15 SAR DATA SUMMARY

15.1 Head SAR Test Data

Table 15-1
CDMA Head SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Mode/Band	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Serial Number	SAR (1g)
MHz	Ch.								(W/kg)
836.52	384	Cell. CDMA	RC3 / SO55	24.35	-0.01	Right	Touch	99	0.299
836.52	384	Cell. CDMA	RC3 / SO55	24.35	-0.03	Right	Tilt	99	0.134
836.52	384	Cell. CDMA	RC3 / SO55	24.35	0.02	Left	Touch	99	0.300
836.52	384	Cell. CDMA	RC3 / SO55	24.35	0.05	Left	Tilt	99	0.108
1732.50	450	AWS CDMA	RC3 / SO55	24.31	0.00	Right	Touch	99	0.535
1732.50	450	AWS CDMA	RC3 / SO55	24.31	-0.05	Right	Tilt	99	0.146
1732.50	450	AWS CDMA	RC3 / SO55	24.31	0.09	Left	Touch	99	0.436
1732.50	450	AWS CDMA	RC3 / SO55	24.31	0.02	Left	Tilt	99	0.153
1880.00	600	PCS CDMA	RC3 / SO55	24.38	0.01	Right	Touch	99	0.552
1880.00	600	PCS CDMA	RC3 / SO55	24.38	0.03	Right	Tilt	99	0.232
1880.00	600	PCS CDMA	RC3 / SO55	24.38	0.01	Left	Touch	99	0.498
1880.00	600	PCS CDMA	RC3 / SO55	24.38	0.00	Left	Tilt	99	0.179
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**						**Head** **1.6 W/kg (mW/g)** averaged over 1 gram			

Table 15-2
AWS LTE Head SAR Results

MEASUREMENT RESULTS													
FREQUENCY		Mode	Bandwidth [MHz]	Modulation	Conducted Power [dBm]	Power Drift [dB]	Target MPR	Side	Test Position	Serial Number	# of Resource Blocks	Resource Block Offset	SAR (1g)
MHz	Ch.												(W/kg)
1732.50	20175	AWS LTE	5	QPSK	21.75	0.06	1	Right	Touch	94	12	6	0.331
1712.50	19975	AWS LTE	5	QPSK	23.40	0.06	0	Right	Touch	94	1	0	0.394
1712.50	19975	AWS LTE	5	QPSK	23.30	0.00	0	Right	Touch	94	1	24	0.528
1732.50	20175	AWS LTE	5	16QAM	21.30	-0.08	2	Right	Touch	94	12	6	0.258
1712.50	19975	AWS LTE	5	16QAM	22.50	0.08	1	Right	Touch	94	1	0	0.277
1752.50	20325	AWS LTE	5	16QAM	22.25	0.01	1	Right	Touch	94	1	24	0.403
1732.50	20175	AWS LTE	5	QPSK	21.75	-0.03	1	Right	Tilt	94	12	6	0.385
1712.50	19975	AWS LTE	5	QPSK	23.40	-0.06	0	Right	Tilt	94	1	0	0.463
1712.50	19975	AWS LTE	5	QPSK	23.30	-0.01	0	Right	Tilt	94	1	24	0.637
1732.50	20175	AWS LTE	5	16QAM	21.30	0.06	2	Right	Tilt	94	12	6	0.319
1712.50	19975	AWS LTE	5	16QAM	22.50	-0.02	1	Right	Tilt	94	1	0	0.339
1752.50	20325	AWS LTE	5	16QAM	22.25	0.05	1	Right	Tilt	94	1	24	0.444
1732.50	20175	AWS LTE	5	QPSK	21.75	0.09	1	Left	Touch	94	12	6	0.486
1712.50	19975	AWS LTE	5	QPSK	23.40	-0.02	0	Left	Touch	94	1	0	0.552
1712.50	19975	AWS LTE	5	QPSK	23.30	-0.01	0	Left	Touch	94	1	24	0.780
1732.50	20175	AWS LTE	5	16QAM	21.30	-0.08	2	Left	Touch	94	12	6	0.385
1712.50	19975	AWS LTE	5	16QAM	22.50	0.00	1	Left	Touch	94	1	0	0.416
1752.50	20325	AWS LTE	5	16QAM	22.25	0.02	1	Left	Touch	94	1	24	0.604
1732.50	20175	AWS LTE	5	QPSK	21.75	-0.03	1	Left	Tilt	94	12	6	0.466
1712.50	19975	AWS LTE	5	QPSK	23.40	0.06	0	Left	Tilt	94	1	0	0.565
1712.50	19975	AWS LTE	5	QPSK	23.30	0.01	0	Left	Tilt	94	1	24	0.780
1732.50	20175	AWS LTE	5	16QAM	21.30	0.07	2	Left	Tilt	94	12	6	0.384
1712.50	19975	AWS LTE	5	16QAM	22.50	-0.01	1	Left	Tilt	94	1	0	0.419
1752.50	20325	AWS LTE	5	16QAM	22.25	-0.01	1	Left	Tilt	94	1	24	0.585
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram					

Table 15-3
PCS LTE Head SAR Results

MEASUREMENT RESULTS													
FREQUENCY		Mode	Bandwidth [MHz]	Modulation	Conducted Power [dBm]	Power Drift [dB]	Target MPR	Side	Test Position	Serial Number	# of Resource Blocks	Resource Block Offset	SAR (1g)
MHz	Ch.												(W/kg)
1880.00	18900	PCS LTE	5	QPSK	22.05	-0.03	1	Right	Touch	93	12	6	0.255
1880.00	18900	PCS LTE	5	QPSK	23.25	-0.03	0	Right	Touch	93	1	0	0.309
1616.00	18625	PCS LTE	5	QPSK	23.35	-0.01	0	Right	Touch	93	1	24	0.394
1880.00	18900	PCS LTE	5	16QAM	21.10	0.02	2	Right	Touch	93	12	6	0.205
1880.00	18900	PCS LTE	5	16QAM	22.35	0.03	1	Right	Touch	93	1	0	0.230
1880.00	18900	PCS LTE	5	16QAM	22.20	0.00	1	Right	Touch	93	1	24	0.296
1880.00	18900	PCS LTE	5	QPSK	22.05	0.01	1	Right	Tilt	93	12	6	0.284
1880.00	18900	PCS LTE	5	QPSK	23.25	-0.02	0	Right	Tilt	93	1	0	0.360
1616.00	18625	PCS LTE	5	QPSK	23.35	0.06	0	Right	Tilt	93	1	24	0.469
1880.00	18900	PCS LTE	5	16QAM	21.10	0.03	2	Right	Tilt	93	12	6	0.240
1880.00	18900	PCS LTE	5	16QAM	22.35	0.09	1	Right	Tilt	93	1	0	0.258
1880.00	18900	PCS LTE	5	16QAM	22.20	-0.05	1	Right	Tilt	93	1	24	0.329
1880.00	18900	PCS LTE	5	QPSK	22.05	-0.03	1	Left	Touch	93	12	6	0.393
1880.00	18900	PCS LTE	5	QPSK	23.25	-0.01	0	Left	Touch	93	1	0	0.471
1616.00	18625	PCS LTE	5	QPSK	23.35	-0.02	0	Left	Touch	93	1	24	0.600
1880.00	18900	PCS LTE	5	16QAM	21.10	-0.07	2	Left	Touch	93	12	6	0.297
1880.00	18900	PCS LTE	5	16QAM	22.35	0.02	1	Left	Touch	93	1	0	0.330
1880.00	18900	PCS LTE	5	16QAM	22.20	0.00	1	Left	Touch	93	1	24	0.425
1880.00	18900	PCS LTE	5	QPSK	22.05	0.10	1	Left	Tilt	93	12	6	0.346
1880.00	18900	PCS LTE	5	QPSK	23.25	0.10	0	Left	Tilt	93	1	0	0.390
1616.00	18625	PCS LTE	5	QPSK	23.35	0.00	0	Left	Tilt	93	1	24	0.517
1880.00	18900	PCS LTE	5	16QAM	21.10	-0.04	2	Left	Tilt	93	12	6	0.267
1880.00	18900	PCS LTE	5	16QAM	22.35	0.03	1	Left	Tilt	93	1	0	0.288
1880.00	18900	PCS LTE	5	16QAM	22.20	0.10	1	Left	Tilt	93	1	24	0.355
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram					

Table 15-4
2.4 GHz WLAN Head SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Serial Number	Data Rate (Mbps)	SAR (1g)
MHz	Ch.									(W/kg)
2437	6	IEEE 802.11b	DSSS	15.66	-0.06	Right	Touch	19	1	0.023
2437	6	IEEE 802.11b	DSSS	15.96	-0.07	Right	Touch	19	2	0.023
2437	6	IEEE 802.11b	DSSS	15.66	-0.04	Right	Tilt	19	1	0.007
2437	6	IEEE 802.11b	DSSS	15.96	-0.07	Right	Tilt	19	2	0.006
2437	6	IEEE 802.11b	DSSS	15.66	0.07	Left	Touch	19	1	0.010
2437	6	IEEE 802.11b	DSSS	15.96	0.09	Left	Touch	19	2	0.009
2437	6	IEEE 802.11b	DSSS	15.66	-0.06	Left	Tilt	19	1	0.003
2437	6	IEEE 802.11b	DSSS	15.96	-0.06	Left	Tilt	19	2	0.004
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram			

15.2 Body-Worn SAR Test Data

Table 15-5
CDMA Body-Worn SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Serial Number	Side	SAR (1g)
MHz	Ch.								(W/kg)
824.70	1013	Cell. CDMA	TDSO32	24.38	-0.02	1.0 cm	99	back	0.909
836.52	384	Cell. CDMA	TDSO32	24.33	0.03	1.0 cm	99	back	0.895
848.31	777	Cell. CDMA	TDSO32	23.99	0.00	1.0 cm	99	back	0.839
1711.25	25	AWS CDMA	TDSO32	24.25	-0.05	1.0 cm	99	back	0.826
1732.50	450	AWS CDMA	TDSO32	24.32	-0.06	1.0 cm	99	back	0.844
1753.75	875	AWS CDMA	TDSO32	24.37	0.04	1.0 cm	99	back	0.768
1851.25	25	PCS CDMA	TDSO32	24.50	-0.04	1.0 cm	99	back	0.706
1880.00	600	PCS CDMA	TDSO32	24.38	-0.01	1.0 cm	99	back	0.903
1908.75	1175	PCS CDMA	TDSO32	24.33	-0.06	1.0 cm	99	back	0.866
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram			

Table 15-6
LTE Body-Worn SAR Results

MEASUREMENT RESULTS													
FREQUENCY		Mode	Bandwidth [MHz]	Modulation	Conducted Power [dBm]	Power Drift [dB]	Target MPR	Spacing	Serial Number	# of Resource Blocks	Resource Block Offset	Side	SAR (1g)
MHz	Ch.												(W/kg)
1732.50	20175	AWS LTE	5	QPSK	21.75	-0.01	1	1.0 cm	94	12	6	back	0.191
1732.50	20175	AWS LTE	5	QPSK	23.40	-0.02	0	1.0 cm	94	1	0	back	0.232
1732.50	20175	AWS LTE	5	QPSK	23.30	0.08	0	1.0 cm	94	1	24	back	0.317
1732.50	20175	AWS LTE	5	16QAM	21.30	0.04	2	1.0 cm	94	12	6	back	0.156
1732.50	20175	AWS LTE	5	16QAM	22.50	-0.05	1	1.0 cm	94	1	0	back	0.172
1732.50	20175	AWS LTE	5	16QAM	22.25	-0.02	1	1.0 cm	94	1	24	back	0.240
1880.00	18900	PCS LTE	5	QPSK	22.05	0.05	1	1.0 cm	93	12	6	back	0.286
1880.00	18900	PCS LTE	5	QPSK	23.25	0.08	0	1.0 cm	93	1	0	back	0.357
1852.50	18625	PCS LTE	5	QPSK	23.35	0.05	0	1.0 cm	93	1	24	back	0.442
1880.00	18900	PCS LTE	5	16QAM	21.10	0.01	2	1.0 cm	93	12	6	back	0.230
1880.00	18900	PCS LTE	5	16QAM	22.35	-0.04	1	1.0 cm	93	1	0	back	0.257
1880.00	18900	PCS LTE	5	16QAM	22.20	-0.01	1	1.0 cm	93	1	24	back	0.304
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram					

Table 15-7
2.4 GHz Body-Worn SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Serial Number	Data Rate (Mbps)	Side	SAR (1g)
MHz	Ch.									(W/kg)
2437	6	IEEE 802.11b	DSSS	15.66	0.09	1.0 cm	19	1	back	0.007
2437	6	IEEE 802.11b	DSSS	15.96	0.07	1.0 cm	19	2	back	0.006
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram				

15.3 SAR Testing Notes

General Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C.
2. Batteries are fully charged for all readings.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm.
5. Device was tested using a fixed spacing for body-worn testing. A separation distance of 10 mm was tested because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
6. Samples tested for CDMA, WIFI, and LTE were electrically identical per the applicant.
7. To confirm the proper SAR liquid depth, the z-axis plots from the system verifications were included since the system verifications were performed using the same probe, DAE, and liquid as the SAR tests.
8. SAR was measured with a probe calibrated at 1750 MHz and is valid for measuring SAR from ± 50 MHz. The 1750MHz specific head and body liquid was verified with specific probe calibration factors as required per FCC KDB Publication 450824 D01.
9. Wireless Router modes are not operational for this device according to the manufacturer. Therefore wireless router modes are not evaluated.

CDMA/EVDO Notes:

1. Per FCC/OET Bulletin 65 Supplement C and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
2. Head SAR was tested with SO55 RC3. SO55 RC1 was not required since the average output power was not more than 0.25 dB than the SO55 RC3 powers.
3. Body-Worn SAR was tested with TDSO32 FCH. TDSO32 FCH+SCH and EVDO SAR tests for body-worn were not required since the maximum average output powers were not more than 0.25 dB higher than the maximum average powers for TDSO32 FCH.

LTE Notes:

1. Considerations: LTE test configurations are determined according to SAR Test Considerations for LTE handsets and Data Modems KDB 941225 D05 Publication:
    a. Per KDB Publication 941225 D05 Page 4, 3) A), QPSK with 50% RB is required for the highest bandwidth (5 MHz).

b. Per KDB Publication 941225 D05 Page 4, footnote 2, when the maximum output power across high, mid., and low channels is < 0.5 dB, mid channel is tested. Low and high channel SAR tests are not required because the SAR is < 0.8 W/kg.
c. Per KDB Publication 941225 D05 Page 4, 3) B), QPSK with 1 RB for both channel edges are required for the highest bandwidth (5 MHz).
d. Per KDB Publication 941225 D05 Page 5, footnote 5, 1 RB allocation SAR tests were performed on the highest output power channel for the RB allocation since the average output power of the 1 RB allocation was > 0.5 dB higher than the 50% RB allocation.
e. Per KDB Publication 941225 D05 Page 4, 4) A), 16QAM with 50% RB is required for the highest bandwidth (5 MHz) on the channel with the highest measured SAR for QPSK with 50% RB allocation.
f. Per KDB Publication 941225 D05 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth (5 MHz) on the highest output power channel for the 1 RB allocation since the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation.
g. Per KDB Publication 941225 D05 Page 4, A) I), 100% RB Allocation is not required to be tested since SAR is not > 1.45 W/kg for the highest bandwidth (5 MHz).
h. Per KDB Publication 941225 D05 Page 5, 5) B) I), smaller bandwidths are not required to be tested since SAR is not > 1.45 W/kg for the highest bandwidth (5 MHz).

2. 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. The differences noted are not cases of implemented MPR but rather associated with measurement uncertainty and allowable tolerances per 3GPP standard and the manufacturer.
3. A-MPR was disabled for all SAR tests.
4. Only the primary Tx/Rx LTE antenna was transmitting during testing. The secondary LTE antenna is for receive-only and was not transmitting during testing.
5. SAR data provided accounts for standalone LTE data operations in simultaneous conditions with other voice modes, as well as VoLTE operations. FCC KDB 941225 D05 LTE SAR test procedures are applicable for either LTE SAR consideration.

Bluetooth/WLAN Notes

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes:
   a. Highest average RF output power channel for the lowest data rate were selected for SAR evaluation for each IEEE 802.11 mode. 2 Mbps was additionally tested because the average output power was greater than 0.25 dB than that of the tested channel in the lowest data rate IEEE 802.11b mode. IEEE 802.11g and IEEE 802.11n modes were not required to be tested since the average output powers were not more than 0.25 dB than that of the tested channel in the lowest data rate IEEE 802.11b mode.
2. WLAN transmission was verified using a spectrum analyzer.

16 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

16.1 Introduction

The following procedures adopted from "FCC SAR Considerations for Cell Phones with Multiple Transmitters" FCC KDB Publication 648474 are applicable to handsets with built-in unlicensed transmitters such as WIFI and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

16.2 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 16-1
Output Power Thresholds for Unlicensed Transmitters

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

Figure 16-2
SAR Evaluation Requirements for Multiple Transmitter Handsets

The maximum peak RF Conducted power of Bluetooth was measured to be 15.248 mW. Based on the output power, antenna separation distance, and the Body SAR, per KDB 648474 publication, a stand-alone Bluetooth SAR test is not required.

17 SIMULTANEOUS TRANSMISSION ANALYSIS

17.1 Simultaneous Transmission Scenarios

The following table shows exposure conditions for all transmitters operation in the DUT:

Table 17-1
Simultaneous Transmission Scenarios

No.	Capable Tx Configurations	Head SAR	Body SAR	Hotspot	Note
1	CDMA	√	√	-	CDMA Voice
2	LTE	√	√	-	VoLTE
3	WIFI	√	√	-	WIFI Data
4	CDMA+LTE	√	√	-	1X Voice + LTE Data
5	CDMA+WIFI	√	√	-	1X Voice + WIFI Data
6	LTE+WIFI	√	√	-	VoLTE + WIFI Data
7	CDMA+LTE+WIFI	-	-	-	Not supported

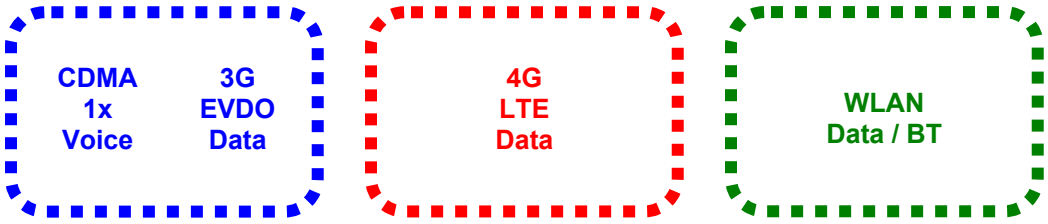


Figure 17-1
Simultaneous Transmission Paths

Notes:

1. 1x CDMA and EVDO share the same antenna path and cannot transmit simultaneously. Therefore, SVDO (CDMA Voice + EVDO Data) is not possible.
2. Bluetooth and 2.4 GHz WLAN share the same antenna path and cannot transmit simultaneously.
3. AWS and PCS LTE cannot transmit simultaneously.
4. VoLTE indicated in the above table is for VoLTE services which are Voice services provided through LTE network only.
5. 1x Voice + LTE Data is sometimes referred to as 'SVLTE' which are CDMA voice services provided through the CDMA network, with simultaneous LTE data services operating simultaneously
6. All other scenarios are not supported.
7. **Wireless router capability is disabled.**

17.2 Held to Ear Simultaneous Transmission Scenarios

Table 17-2
Held to Ear Simultaneous Transmission (CDMA, 2.4 GHz WIFI, LTE)

Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	AWS LTE SAR (W/kg)	2.4 GHz WIFI SAR (W/kg)	Σ SAR (W/kg)		
Transmitter		1	2	3	1 + 2	1 + 3	1 + 2 + 3
Head SAR	Right Cheek	0.299	0.528	0.023	**0.827**	**0.322**	**N/A**
	Right Tilt	0.134	0.637	0.007	**0.771**	**0.141**	**N/A**
	Left Cheek	0.300	0.780	0.010	**1.080**	**0.310**	**N/A**
	Left Tilt	0.108	0.780	0.004	**0.888**	**0.112**	**N/A**

Simult Tx	Configuration	AWS CDMA SAR (W/kg)	AWS LTE SAR (W/kg)	2.4 GHz WIFI SAR (W/kg)	Σ SAR (W/kg)		
Transmitter		1	2	3	1 + 2	1 + 3	1 + 2 + 3
Head SAR	Right Cheek	0.535	0.528	0.023	**1.063**	**0.558**	**N/A**
	Right Tilt	0.146	0.637	0.007	**0.783**	**0.153**	**N/A**
	Left Cheek	0.436	0.780	0.010	**1.216**	**0.446**	**N/A**
	Left Tilt	0.153	0.780	0.004	**0.933**	**0.157**	**N/A**

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	AWS LTE SAR (W/kg)	2.4 GHz WIFI SAR (W/kg)	Σ SAR (W/kg)		
Transmitter		1	2	3	1 + 2	1 + 3	1 + 2 + 3
Head SAR	Right Cheek	0.552	0.528	0.023	**1.080**	**0.575**	**N/A**
	Right Tilt	0.232	0.637	0.007	**0.869**	**0.239**	**N/A**
	Left Cheek	0.498	0.780	0.010	**1.278**	**0.508**	**N/A**
	Left Tilt	0.179	0.780	0.004	**0.959**	**0.183**	**N/A**

Simult Tx	Configuration	AWS CDMA SAR (W/kg)	PCS LTE SAR (W/kg)	2.4 GHz WIFI SAR (W/kg)	Σ SAR (W/kg)		
Transmitter		1	2	3	1 + 2	1 + 3	1 + 2 + 3
Head SAR	Right Cheek	0.535	0.394	0.023	**0.929**	**0.558**	**N/A**
	Right Tilt	0.146	0.469	0.007	**0.615**	**0.153**	**N/A**
	Left Cheek	0.436	0.600	0.010	**1.036**	**0.446**	**N/A**
	Left Tilt	0.153	0.517	0.004	**0.670**	**0.157**	**N/A**

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	PCS LTE SAR (W/kg)	2.4 GHz WIFI SAR (W/kg)	Σ SAR (W/kg)		
Transmitter		1	2	3	1 + 2	1 + 3	1 + 2 + 3
Head SAR	Right Cheek	0.552	0.394	0.023	**0.946**	**0.575**	**N/A**
	Right Tilt	0.232	0.469	0.007	**0.701**	**0.239**	**N/A**
	Left Cheek	0.498	0.600	0.010	**1.098**	**0.508**	**N/A**
	Left Tilt	0.179	0.517	0.004	**0.696**	**0.183**	**N/A**

17.3 Body-Worn Accessory Simultaneous Transmission Scenarios

Table 17-3
Body-Worn Simultaneous Transmission (CDMA, 2.4 GHz WIFI, LTE) at 1.0 cm

Body SAR	Configuration	1x CDMA SAR (W/kg)	AWS LTE SAR (W/kg)	2.4 GHz WIFI SAR (W/kg)	Σ SAR (W/kg)			
	Transmitter	1	2	3	1 + 2	1 + 3	2+3	1 + 2 + 3
	Cell Body Worn	0.909	0.317	0.007	**1.226**	**0.916**	**0.324**	**N/A**
	AWS Body Worn	0.844	0.317	0.007	**1.161**	**0.851**	**0.324**	**N/A**
	PCS Body Worn	0.903	0.317	0.007	**1.220**	**0.910**	**0.324**	**N/A**
Body SAR	Configuration	1x CDMA SAR (W/kg	PCS LTE SAR (W/kg)	2.4 GHz WIFI SAR (W/kg)	Σ SAR (W/kg)			
	Transmitter	1	2	3	1 +2	1 +3	2+3	1 + 2 + 3
	Cell Body Worn	0.909	0.442	0.007	**1.351**	**0.916**	**0.449**	**N/A**
	AWS Body Worn	0.844	0.442	0.007	**1.286**	**0.851**	**0.449**	**N/A**
	PCS Body Worn	0.903	0.442	0.007	**1.345**	**0.910**	**0.449**	**N/A**

17.4 Simultaneous Transmission Conclusion

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

18 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/10/2011	Annual	10/10/2012	3613A00315
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/21/2011	Annual	4/21/2012	JP38020182
Agilent	E5515C	Wireless Communications Test Set	10/10/2011	Annual	10/10/2012	GB46110872
Agilent	E5515C	Wireless Communications Test Set	7/6/2011	Annual	7/6/2012	GB41450275
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/8/2011	Annual	4/8/2012	MY45470194
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/12/2011	Annual	10/12/2012	1833460
Gigatronics	8651A	Universal Power Meter	10/12/2011	Annual	10/12/2012	8650319
Index SAR	IXTL-010	Dielectric Measurement Kit	N/A		N/A	N/A
Index SAR	IXTL-030	30MM TEM line for 6 GHz	N/A		N/A	N/A
Pasternack	PE2208-6	Bidirectional Coupler	N/A		N/A	N/A
Pasternack	PE2209-10	Bidirectional Coupler	N/A		N/A	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	6/1/2011	Annual	6/1/2012	833855/0010
Rohde & Schwarz	CMU200	Base Station Simulator	4/19/2011	Annual	4/19/2012	107826
Rohde & Schwarz	NRVD	Dual Channel Power Meter	4/8/2011	Biennial	4/8/2013	101695
SPEAG	D1900V2	1900 MHz SAR Dipole	2/17/2011	Annual	2/17/2012	502
SPEAG	D2450V2	2450 MHz SAR Dipole	2/8/2011	Annual	2/8/2012	797
SPEAG	D835V2	835 MHz SAR Dipole	2/9/2011	Annual	2/9/2012	4d047
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/20/2011	Annual	4/20/2012	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/21/2011	Annual	2/21/2012	649
SPEAG	EX3DV4	SAR Probe	7/27/2011	Annual	7/27/2012	3561
SPEAG	EX3DV4	SAR Probe	2/14/2011	Annual	2/14/2012	3550
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/19/2011	Annual	5/19/2012	859
SPEAG	ES3DV3	SAR Probe	4/18/2011	Annual	4/18/2012	3209
Rohde & Schwarz	SMIQ03B	Signal Generator	4/6/2011	Annual	4/6/2012	DE27259
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	8/25/2011	Annual	8/25/2012	100976
Anritsu	MA2481A	Power Sensor	2/7/2011	Annual	2/7/2012	5318
Anritsu	MA2481A	Power Sensor	2/7/2011	Annual	2/7/2012	5442
Anritsu	ML2438A	Power Meter	2/7/2011	Annual	2/7/2012	1190013
Anritsu	ML2438A	Power Meter	2/7/2011	Annual	2/7/2012	98150041
Agilent	8648D	Signal Generator	4/5/2011	Annual	4/5/2012	3629U00687
Anritsu	ML2438A	Power Meter	2/7/2011	Annual	2/7/2012	1070030
Anritsu	MA2481A	Power Sensor	2/7/2011	Annual	2/7/2012	5821
Anritsu	MA2481A	Power Sensor	2/7/2011	Annual	2/7/2012	8013
Anritsu	MA2481A	Power Sensor	2/7/2011	Annual	2/7/2012	5605
Anritsu	MA2481A	Power Sensor	2/7/2011	Annual	2/7/2012	2400
Agilent	E5515C	Wireless Communications Test Set	7/6/2011	Annual	7/6/2012	GB43304447
Agilent	E5515C	Wireless Communications Tester	4/21/2011	Annual	4/21/2012	US41140256
Agilent	E5515C	Wireless Communications Test Set	2/8/2011	Annual	2/8/2012	GB45360985
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	10/7/2011	Annual	10/7/2012	103962
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331322
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331323
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331330
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331332
Control Company	61220-416	Long-Stem Thermometer	3/16/2011	Biennial	3/16/2013	111391601
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286445
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286460
VWR	36934-158	Wall-Mounted Thermometer	5/26/2010	Biennial	5/26/2012	101718589
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286454
VWR	36934-158	Wall-Mounted Thermometer	2/26/2010	Biennial	2/26/2012	101536273
SPEAG	ES3DV3	SAR Probe	4/8/2011	Annual	4/8/2012	3258
SPEAG	D1750V2	1750 MHz SAR Dipole	5/24/2011	Annual	5/24/2012	1051
MiniCircuits	SLP-2400+	Low Pass Filter	N/A		N/A	R8979500903
Narda	4772-3	Attenuator (3dB)	N/A		N/A	9406
Narda	BW-S3W2	Attenuator (3dB)	N/A		N/A	120
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	8/5/2011	Annual	8/5/2012	112347
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	N/A		N/A	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	N/A		N/A	N/A

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

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

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]

21 REFERENCES

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

[2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300kHz to 100GHz, New York: IEEE, 2006.

[3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300kHz to 100GHz, New York: IEEE, Sept. 1992.

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

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

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

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

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

[9] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 120-124.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[26] FCC SAR Measurement Procedures for 3G Devices KDB Publication 941225

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

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

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

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

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

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

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

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

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

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

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

APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

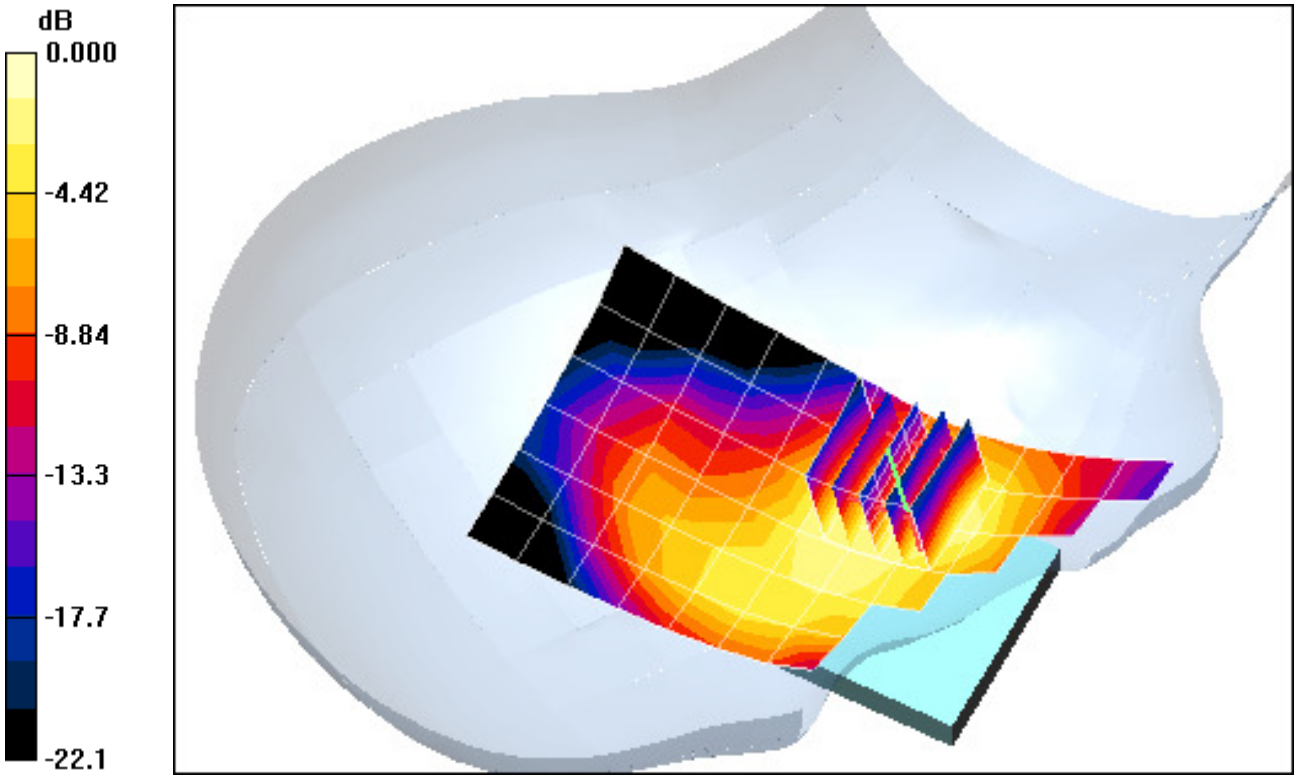
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.903 mho/m; ε_r = 43.31; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-10-2011; Ambient Temp: 24.2 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3258; ConvF(6.18, 6.18, 6.18); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.0 V/m
Peak SAR (extrapolated) = 0.576 W/kg
SAR(1 g) = 0.299 mW/g; SAR(10 g) = 0.160 mW/g



0 dB = 0.322mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

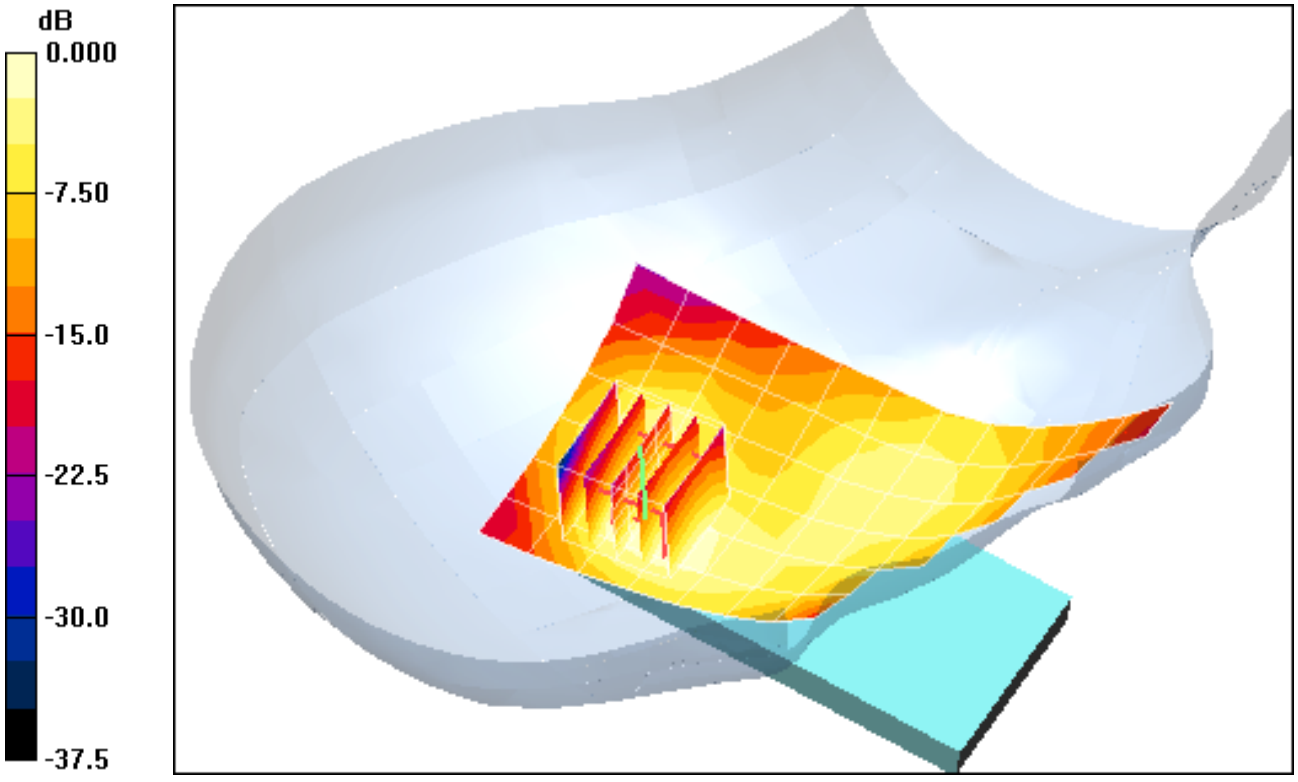
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.903 mho/m; ε_r = 43.31; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-10-2011; Ambient Temp: 24.2 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3258; ConvF(6.18, 6.18, 6.18); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.6 V/m
Peak SAR (extrapolated) = 0.274 W/kg
SAR(1 g) = 0.134 mW/g; SAR(10 g) = 0.070 mW/g



0 dB = 0.145mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

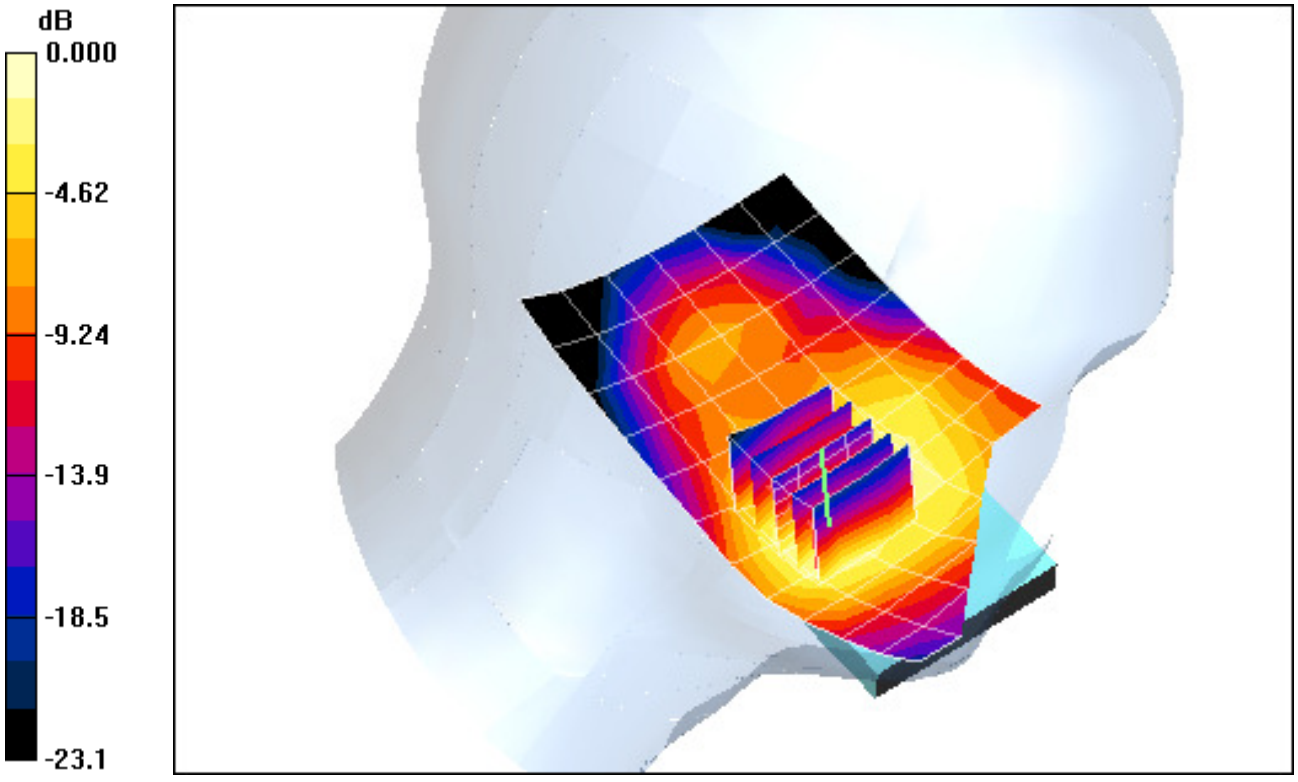
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.903 mho/m; ε_r = 43.31; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-10-2011; Ambient Temp: 24.2 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3258; ConvF(6.18, 6.18, 6.18); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.05 V/m
Peak SAR (extrapolated) = 0.552 W/kg
SAR(1 g) = 0.300 mW/g; SAR(10 g) = 0.159 mW/g



0 dB = 0.322mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

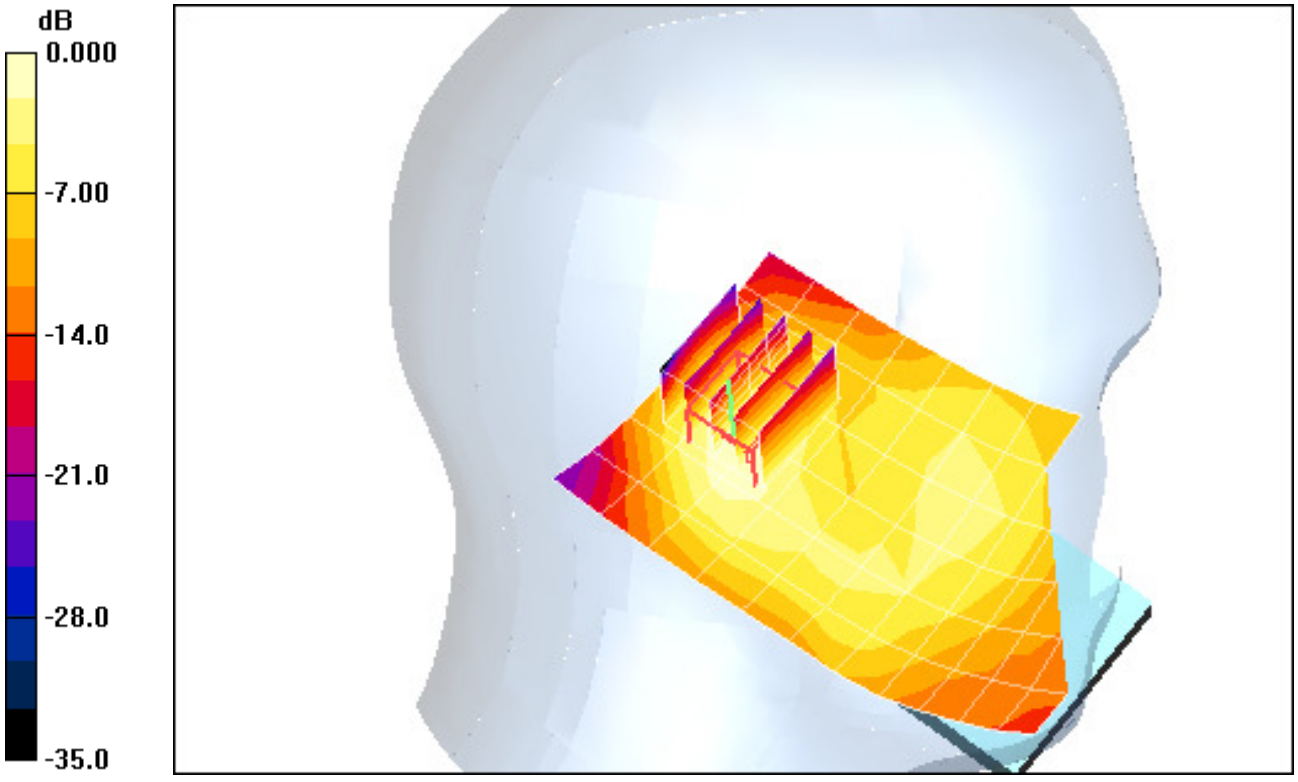
Communication System: Cellular CDMA; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.903 mho/m; ε_r = 43.31; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-10-2011; Ambient Temp: 24.2 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3258; ConvF(6.18, 6.18, 6.18); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.5 V/m
Peak SAR (extrapolated) = 0.212 W/kg
SAR(1 g) = 0.108 mW/g; SAR(10 g) = 0.056 mW/g



0 dB = 0.115mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

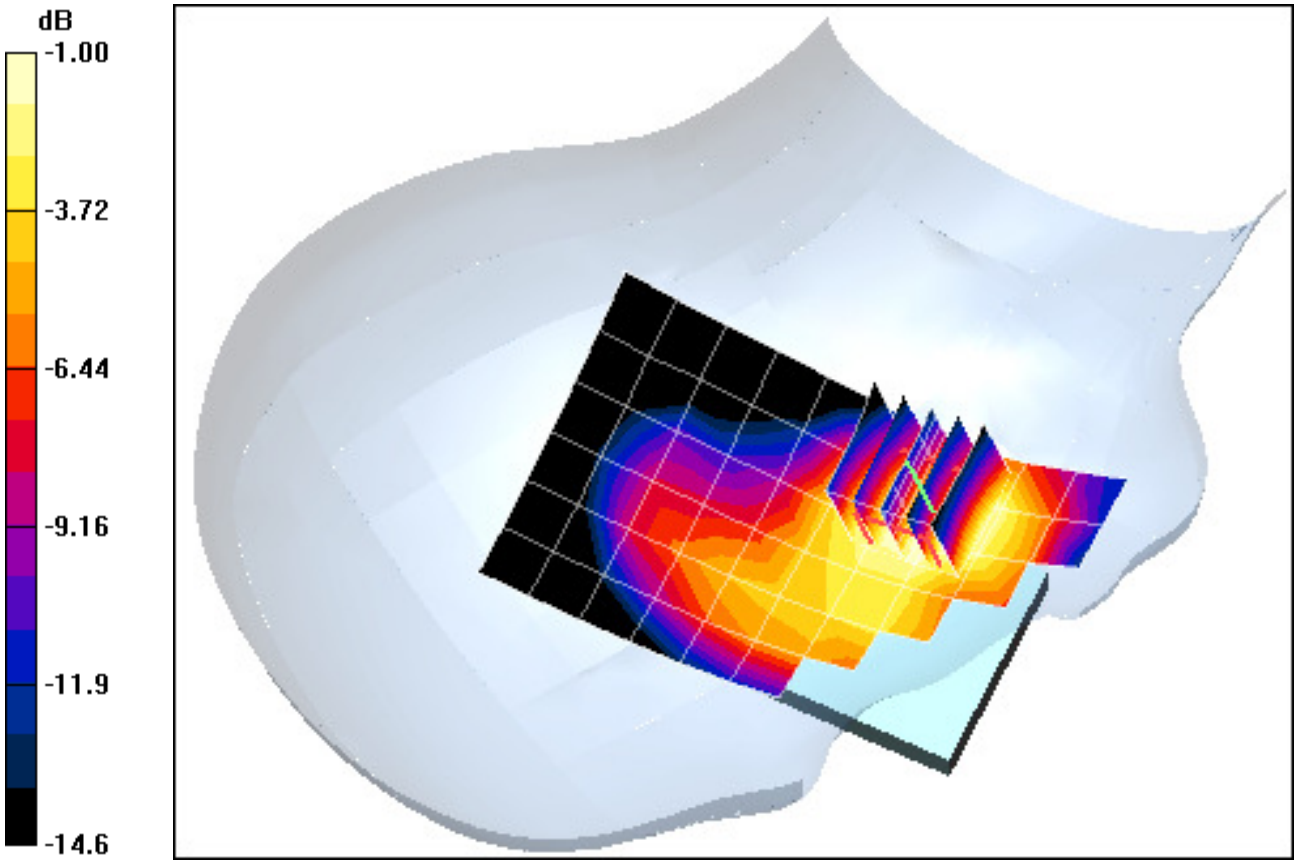
Communication System: AWS CDMA; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.41 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-17-2011; Ambient Temp: 22.3 °C; Tissue Temp: 21.2 °C

Probe: EX3DV4 - SN3561; ConvF(7.37, 7.37, 7.37); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: AWS CDMA, Right Head, Touch, 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 = 19.5 V/m
Peak SAR (extrapolated) = 0.845 W/kg
SAR(1 g) = 0.535 mW/g; SAR(10 g) = 0.320 mW/g



0 dB = 0.582mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

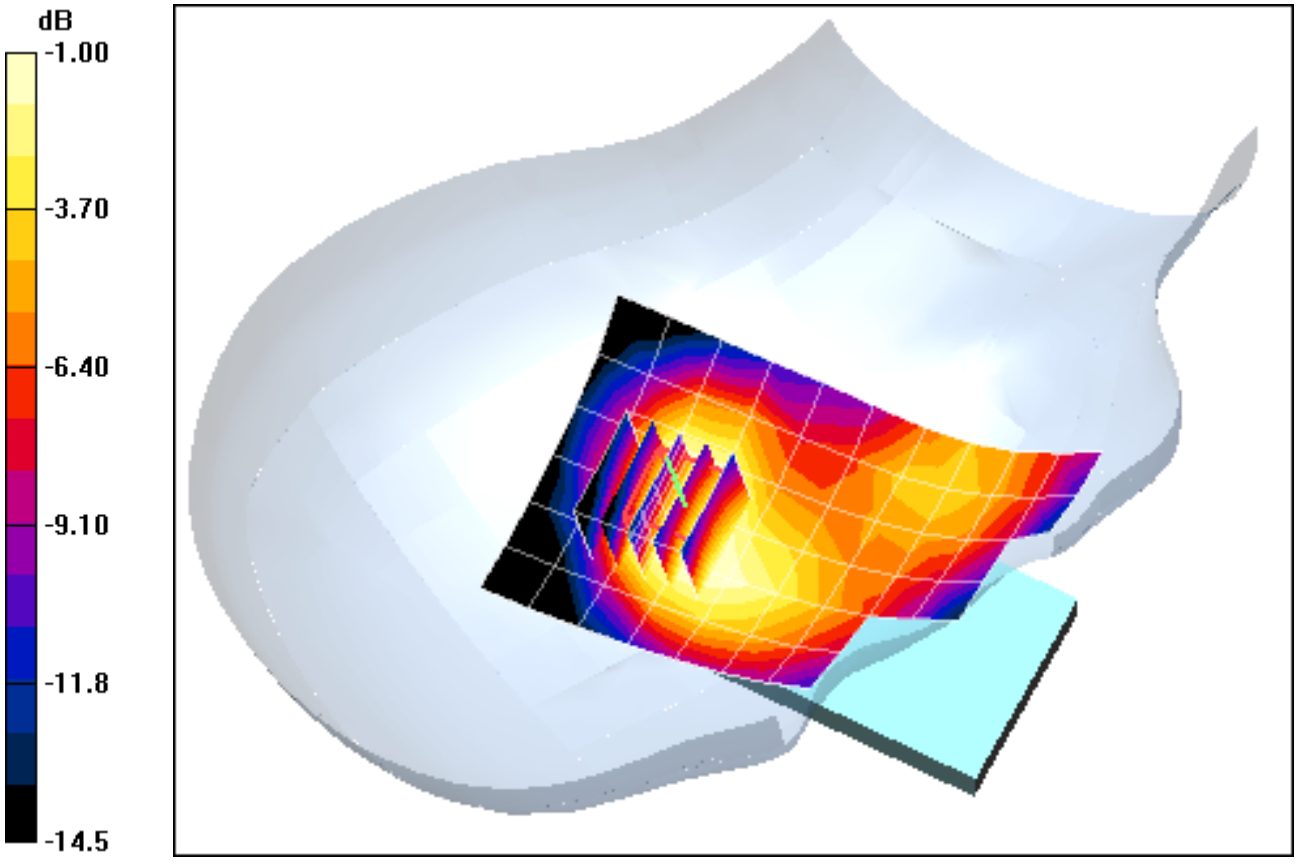
Communication System: AWS CDMA; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.41 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-17-2011; Ambient Temp: 22.3 °C; Tissue Temp: 21.2 °C

Probe: EX3DV4 - SN3561; ConvF(7.37, 7.37, 7.37); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: AWS CDMA, Right Head, Tilt, 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 = 10.3 V/m
Peak SAR (extrapolated) = 0.229 W/kg
SAR(1 g) = 0.146 mW/g; SAR(10 g) = 0.091 mW/g



0 dB = 0.158mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

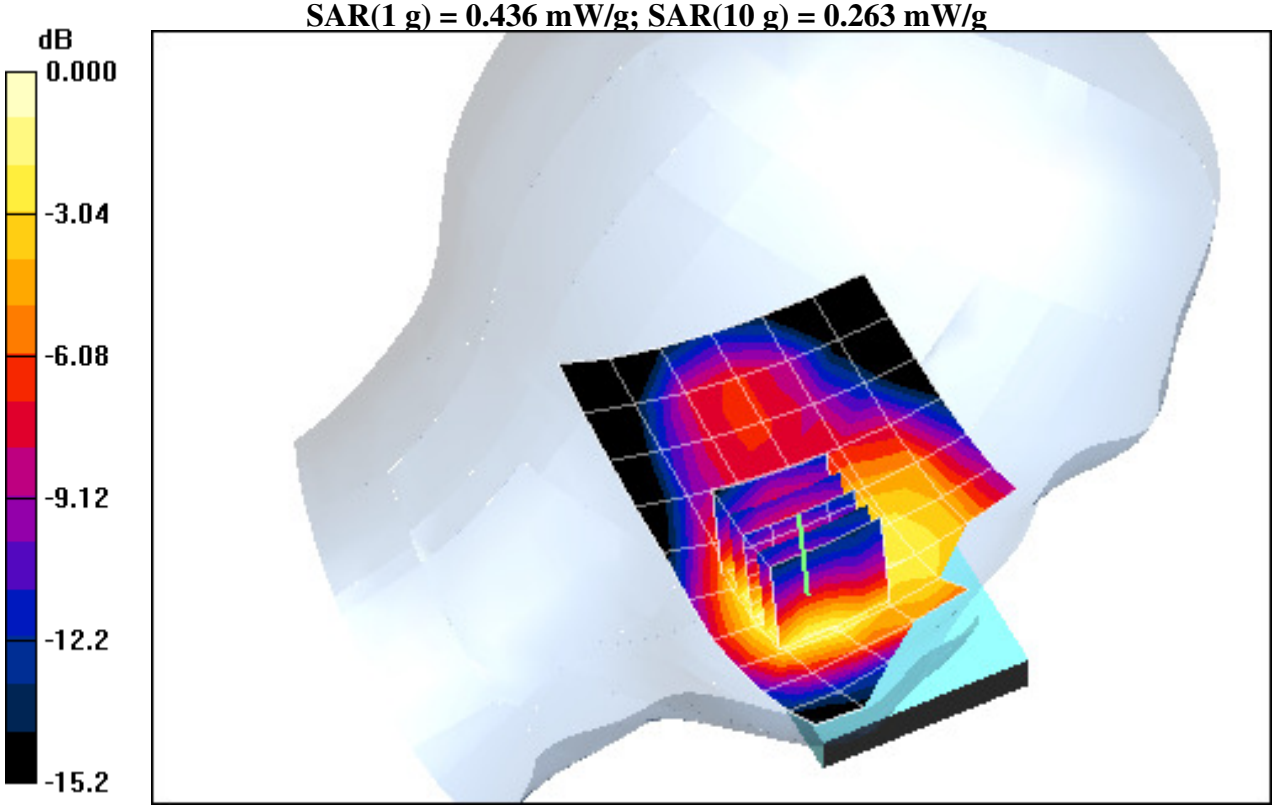
Communication System: AWS CDMA; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.41 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-17-2011; Ambient Temp: 22.3 °C; Tissue Temp: 21.2 °C

Probe: EX3DV4 - SN3561; ConvF(7.37, 7.37, 7.37); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: AWS CDMA, Left Head, Touch, 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 = 18.3 V/m
Peak SAR (extrapolated) = 0.659 W/kg
SAR(1 g) = 0.436 mW/g; SAR(10 g) = 0.263 mW/g



0 dB = 0.453mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

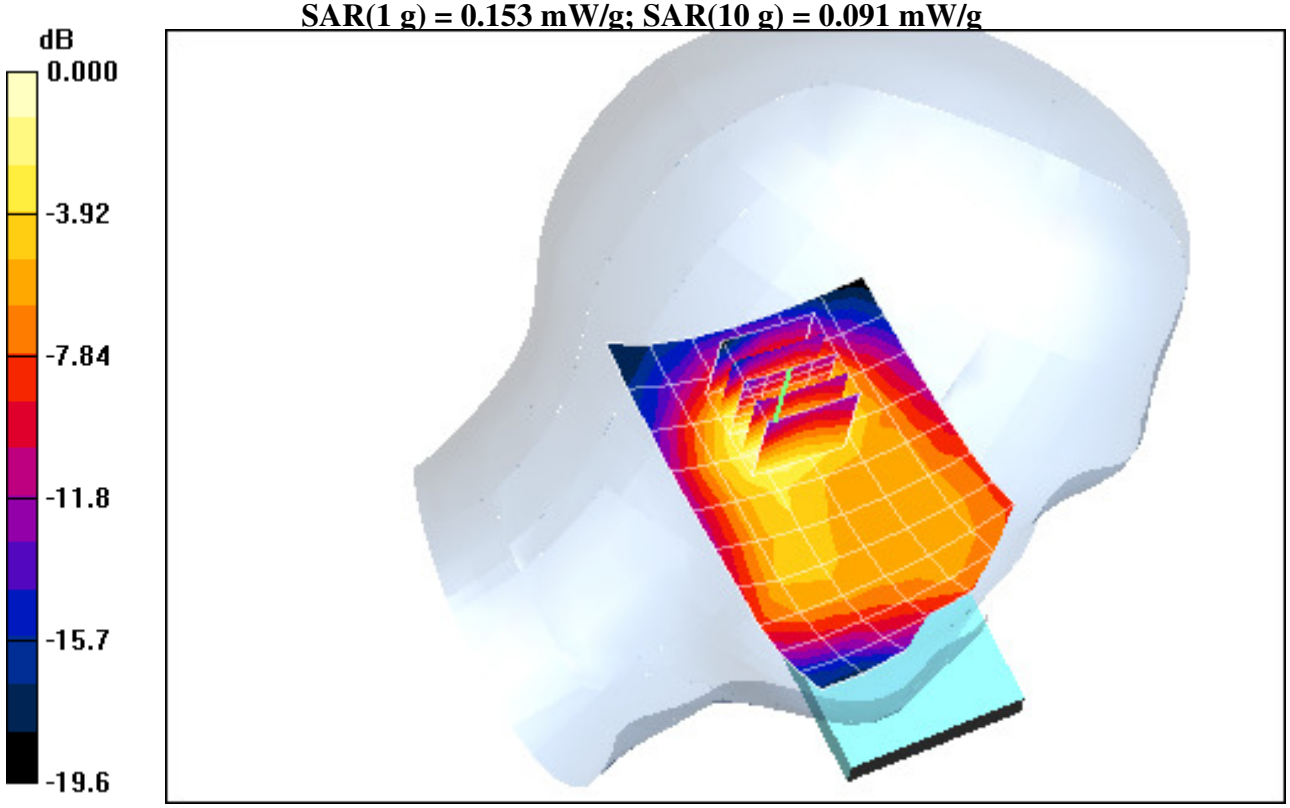
Communication System: AWS CDMA; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.41 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-17-2011; Ambient Temp: 22.3 °C; Tissue Temp: 21.2 °C

Probe: EX3DV4 - SN3561; ConvF(7.37, 7.37, 7.37); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: AWS CDMA, Left Head, Tilt, 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 = 10.5 V/m
Peak SAR (extrapolated) = 0.241 W/kg
SAR(1 g) = 0.153 mW/g; SAR(10 g) = 0.091 mW/g



0 dB = 0.168mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 94

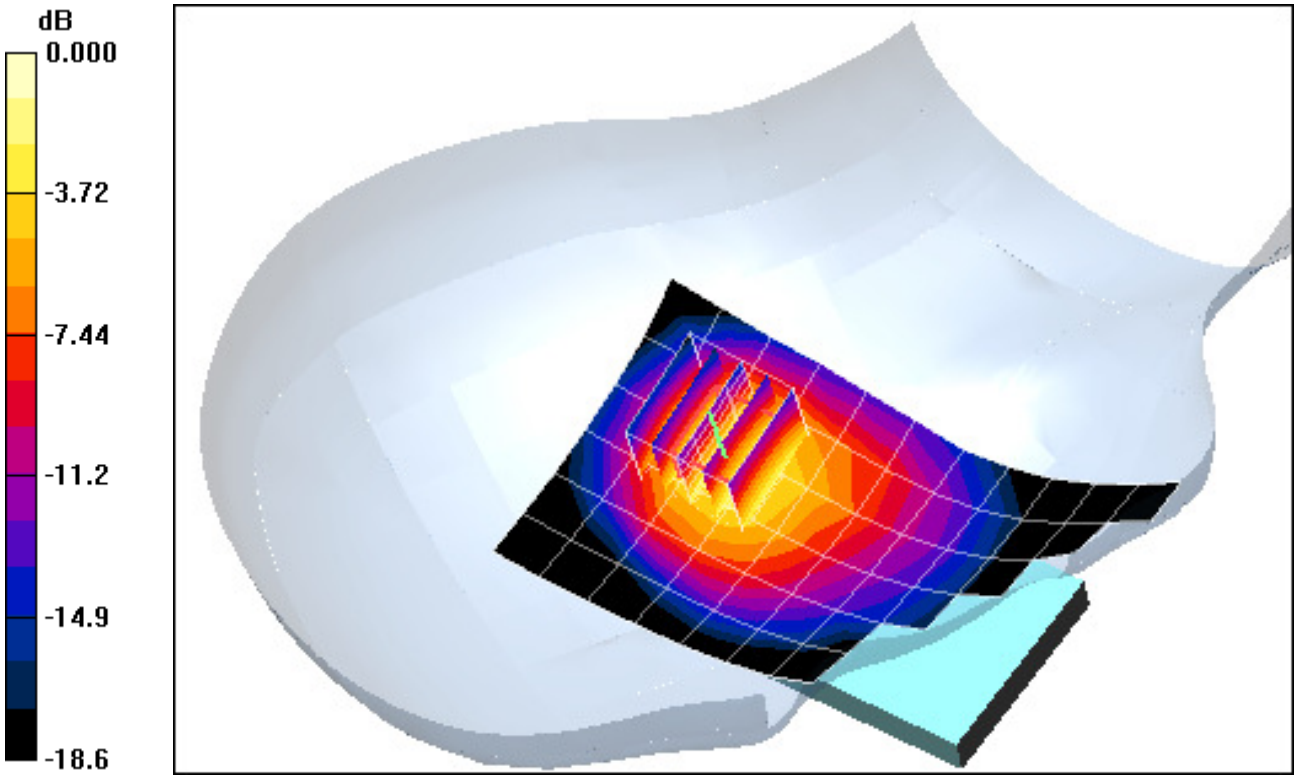
Communication System: LTE RF; Frequency: 1712.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1712.5 MHz; σ = 1.389 mho/m; ε_r = 39.51; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-17-2011; Ambient Temp: 22.3 °C; Tissue Temp: 21.2 °C

Probe: EX3DV4 - SN3561; ConvF(7.37, 7.37, 7.37); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: AWS LTE, Right Head, Touch, Low.ch, QPSK, 5 MHz BW, 1 RB, RB Offset 24

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.2 V/m
Peak SAR (extrapolated) = 0.847 W/kg
SAR(1 g) = 0.528 mW/g; SAR(10 g) = 0.317 mW/g



0 dB = 0.569mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 94

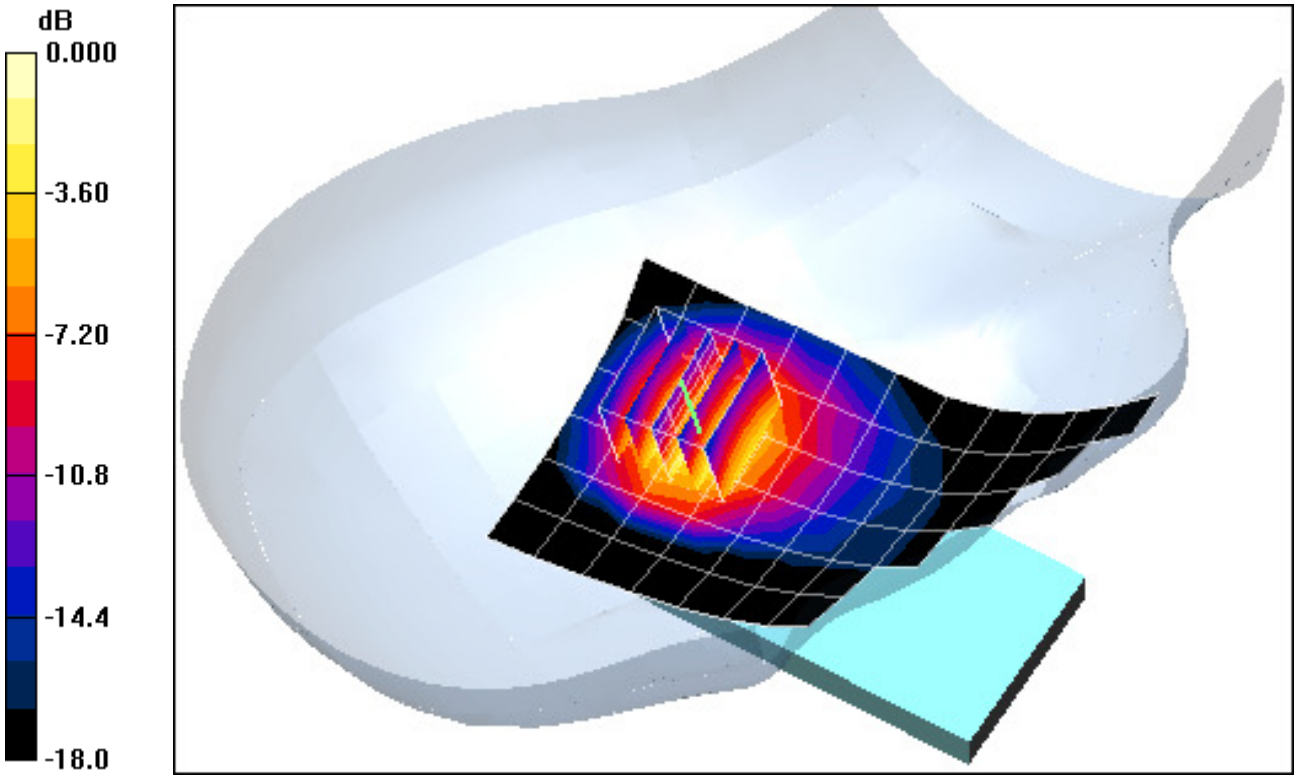
Communication System: LTE RF; Frequency: 1712.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1712.5 MHz; σ = 1.389 mho/m; ε_r = 39.51; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-17-2011; Ambient Temp: 22.3 ° C; Tissue Temp: 21.2 °C

Probe: EX3DV4 - SN3561; ConvF(7.37, 7.37, 7.37); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: AWS LTE, Right Head, Tilt, Low.ch, QPSK, 5 MHz BW, 1 RB, RB Offset 24

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.4 V/m
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.637 mW/g; SAR(10 g) = 0.370 mW/g



0 dB = 0.699mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 94

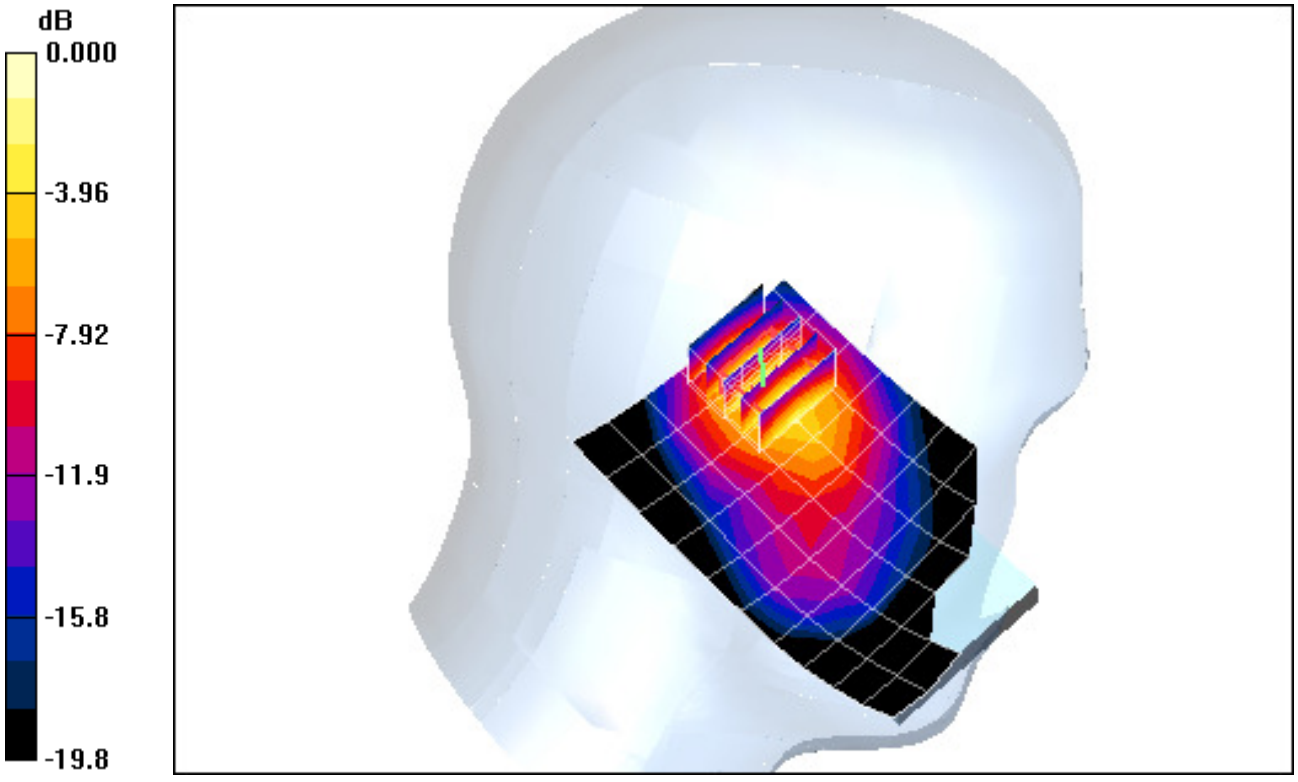
Communication System: LTE RF; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1712.5 MHz; σ = 1.389 mho/m; ε_r = 39.51; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-17-2011; Ambient Temp: 22.3 °C; Tissue Temp: 21.2 °C

Probe: EX3DV4 - SN3561; ConvF(7.37, 7.37, 7.37); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: AWS LTE, Left Head, Touch, Low. Ch, QPSK, 5 MHz BW, 1 RB, RB Offset 24

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.1 V/m
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.780 mW/g; SAR(10 g) = 0.431 mW/g



0 dB = 0.863mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 94

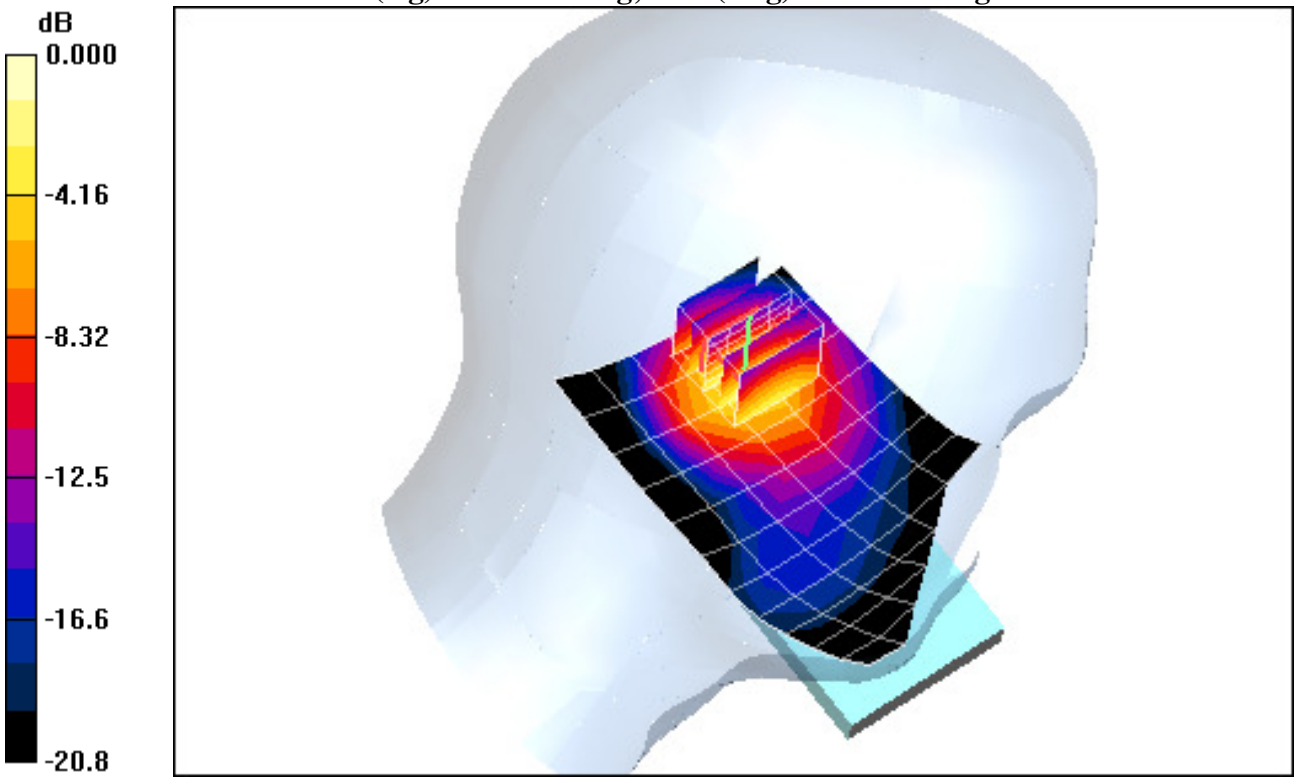
Communication System: LTE RF; Frequency: 1712.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1712.5 MHz; σ = 1.389 mho/m; ε_r = 39.51; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-17-2011; Ambient Temp: 22.3 °C; Tissue Temp: 21.2 °C

Probe: EX3DV4 - SN3561; ConvF(7.37, 7.37, 7.37); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: AWS LTE, Left Head, Tilt, Low.ch, QPSK, 5 MHz BW, 1 RB, RB Offset 24

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.8 V/m
Peak SAR (extrapolated) = 1.42 W/kg
SAR(1 g) = 0.780 mW/g; SAR(10 g) = 0.428 mW/g



0 dB = 0.850mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

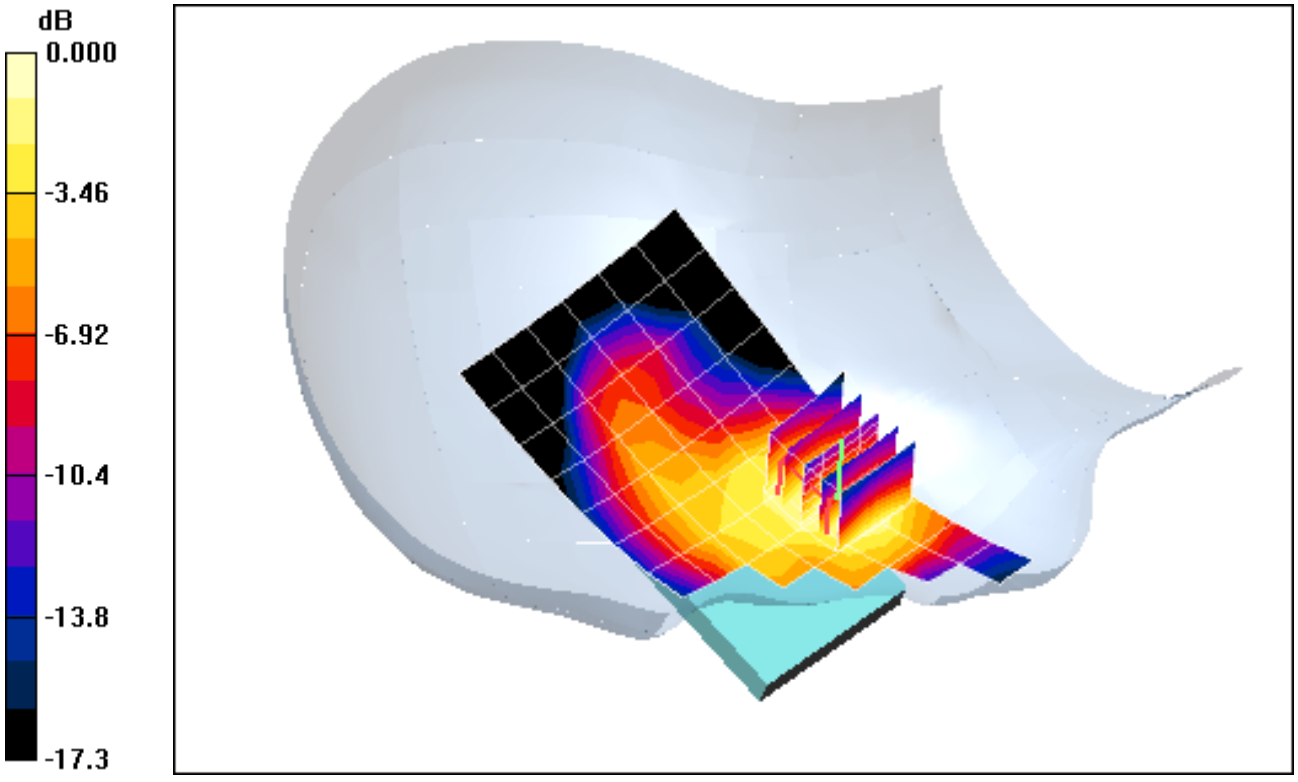
Communication System: PCS CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.4 mho/m; ε_r = 38.53; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-12-2011; Ambient Temp: 24.7 °C; Tissue Temp: 23.1 °C

Probe: EX3DV4 - SN3550; ConvF(7.01, 7.01, 7.01); Calibrated: 2/14/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.5 V/m
Peak SAR (extrapolated) = 0.855 W/kg
SAR(1 g) = 0.552 mW/g; SAR(10 g) = 0.341 mW/g



0 dB = 0.602mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

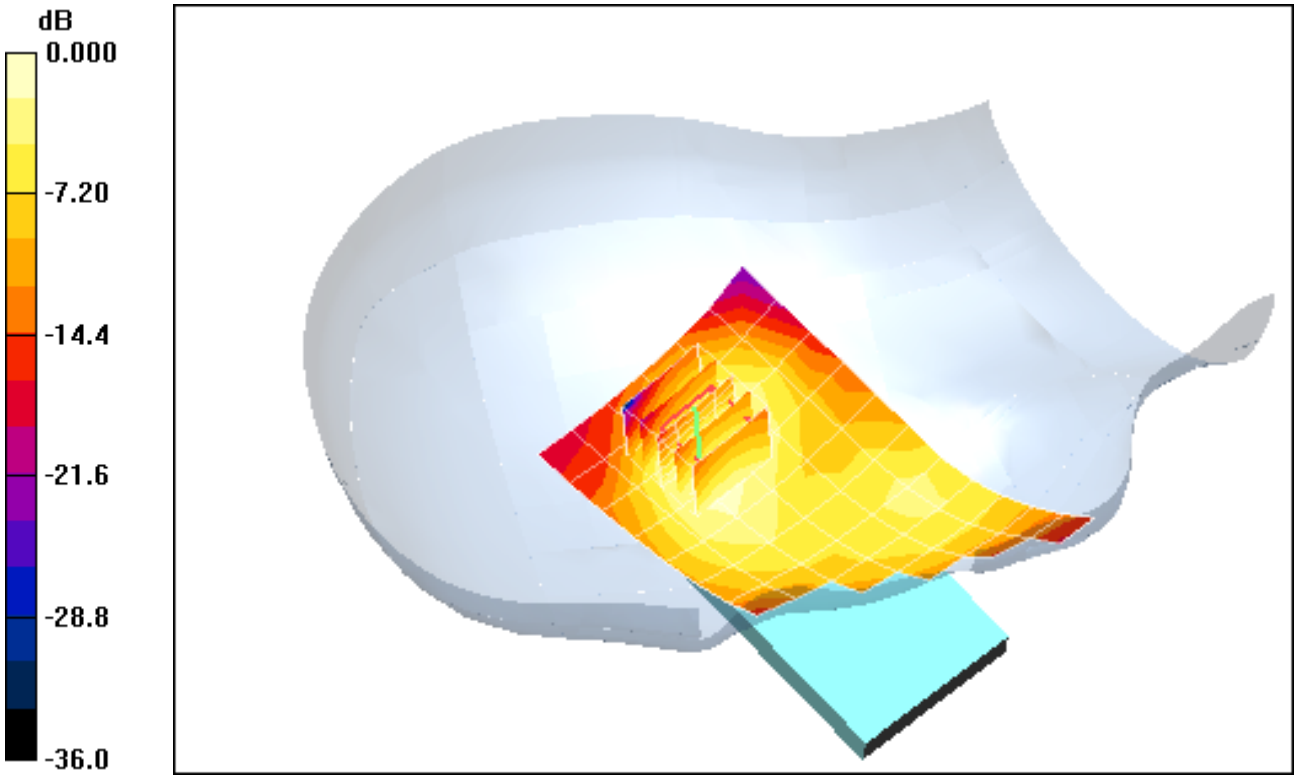
Communication System: PCS CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.4 mho/m; ε_r = 38.53; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-12-2011; Ambient Temp: 24.7 °C; Tissue Temp: 23.1 °C

Probe: EX3DV4 - SN3550; ConvF(7.01, 7.01, 7.01); Calibrated: 2/14/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.7 V/m
Peak SAR (extrapolated) = 0.369 W/kg
SAR(1 g) = 0.232 mW/g; SAR(10 g) = 0.138 mW/g



0 dB = 0.252mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

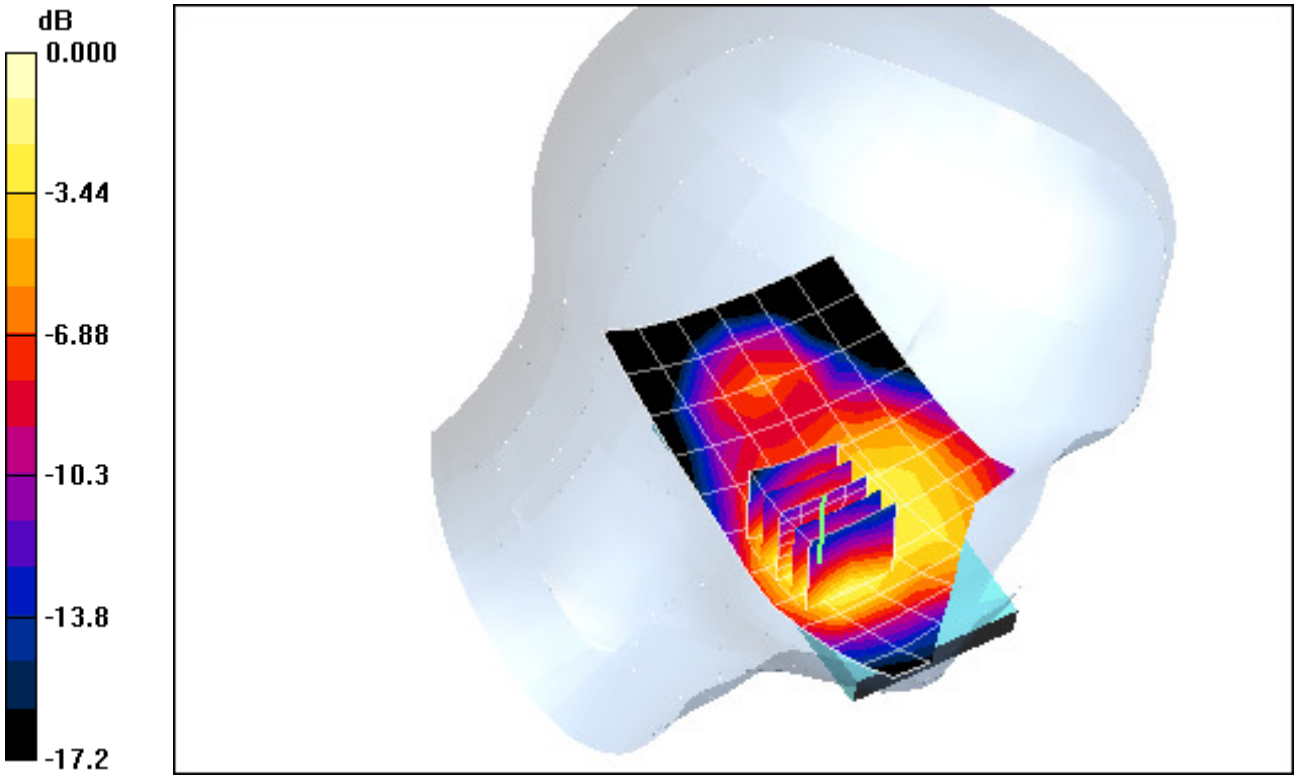
Communication System: PCS CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.4 mho/m; ε_r = 38.53; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-12-2011; Ambient Temp: 24.7 °C; Tissue Temp: 23.1 °C

Probe: EX3DV4 - SN3550; ConvF(7.01, 7.01, 7.01); Calibrated: 2/14/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.5 V/m
Peak SAR (extrapolated) = 0.763 W/kg
SAR(1 g) = 0.498 mW/g; SAR(10 g) = 0.303 mW/g



0 dB = 0.543mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

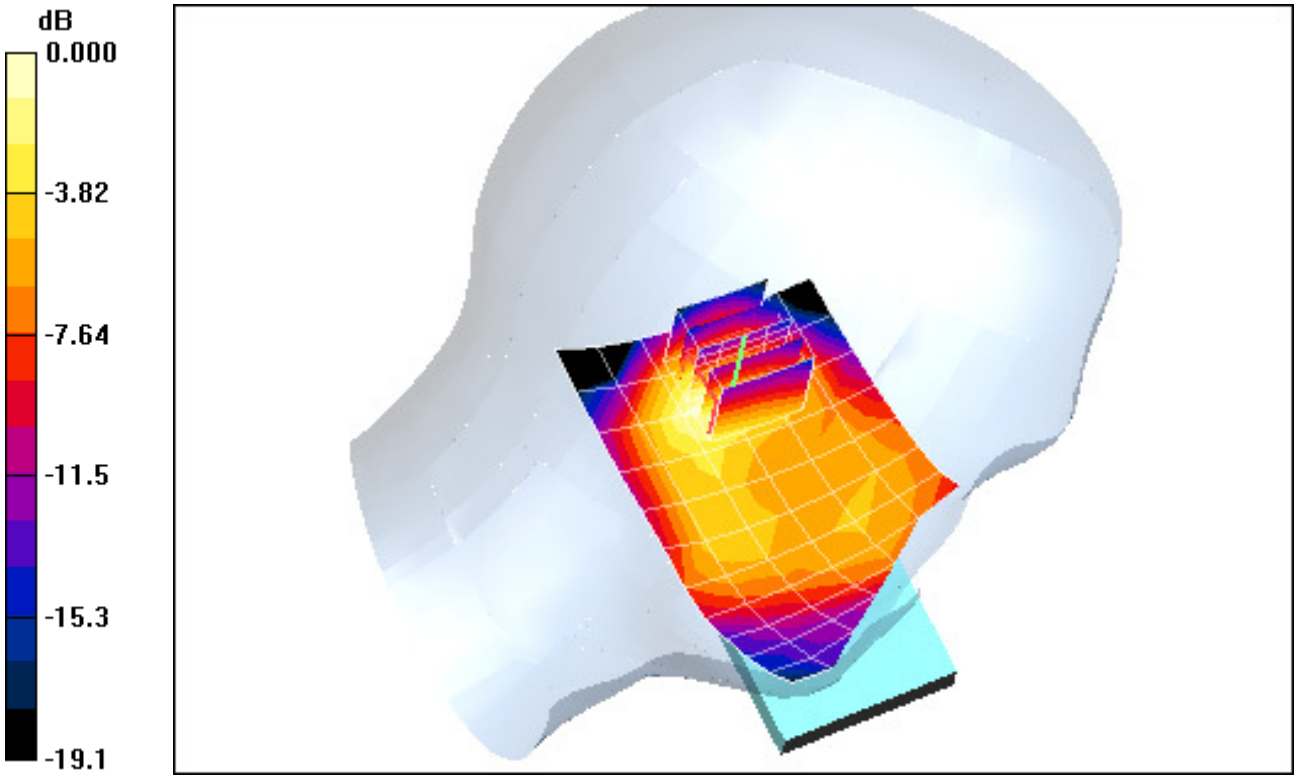
Communication System: PCS CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.4 mho/m; ε_r = 38.53; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-12-2011; Ambient Temp: 24.7°C; Tissue Temp: 23.1 °C

Probe: EX3DV4 - SN3550; ConvF(7.01, 7.01, 7.01); Calibrated: 2/14/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.2 V/m
Peak SAR (extrapolated) = 0.286 W/kg
SAR(1 g) = 0.179 mW/g; SAR(10 g) = 0.103 mW/g



0 dB = 0.194mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 93

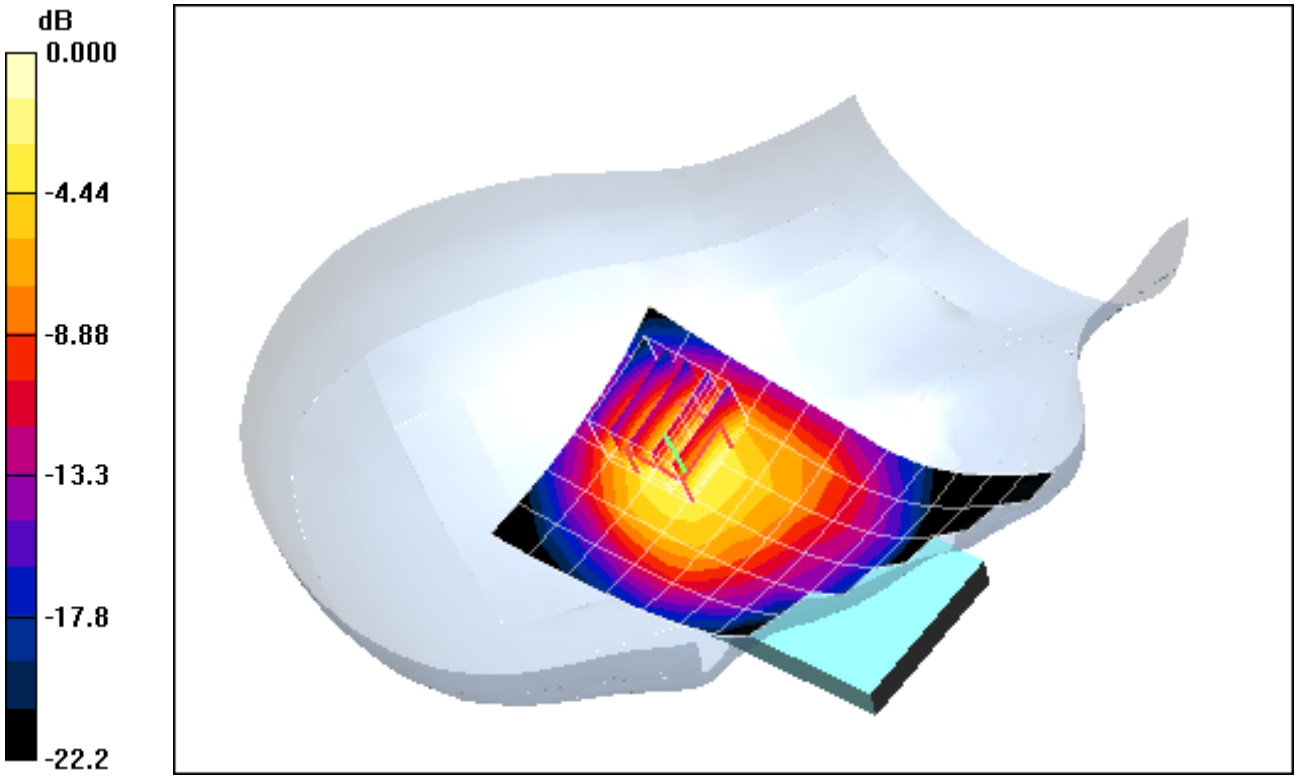
Communication System: LTE PCS 5 Mhz; Frequency: 1852.5 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1852.5 MHz; σ = 1.342 mho/m; ε_r = 38.68; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-17-2011; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3209; ConvF(5.11, 5.11, 5.11); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: PCS LTE, Right Head, Touch, Low.ch, QPSK, 5 MHz BW, 1 RB, RB Offset 24

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.5 V/m
Peak SAR (extrapolated) = 0.626 W/kg
SAR(1 g) = 0.394 mW/g; SAR(10 g) = 0.237 mW/g



0 dB = 0.419mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 93

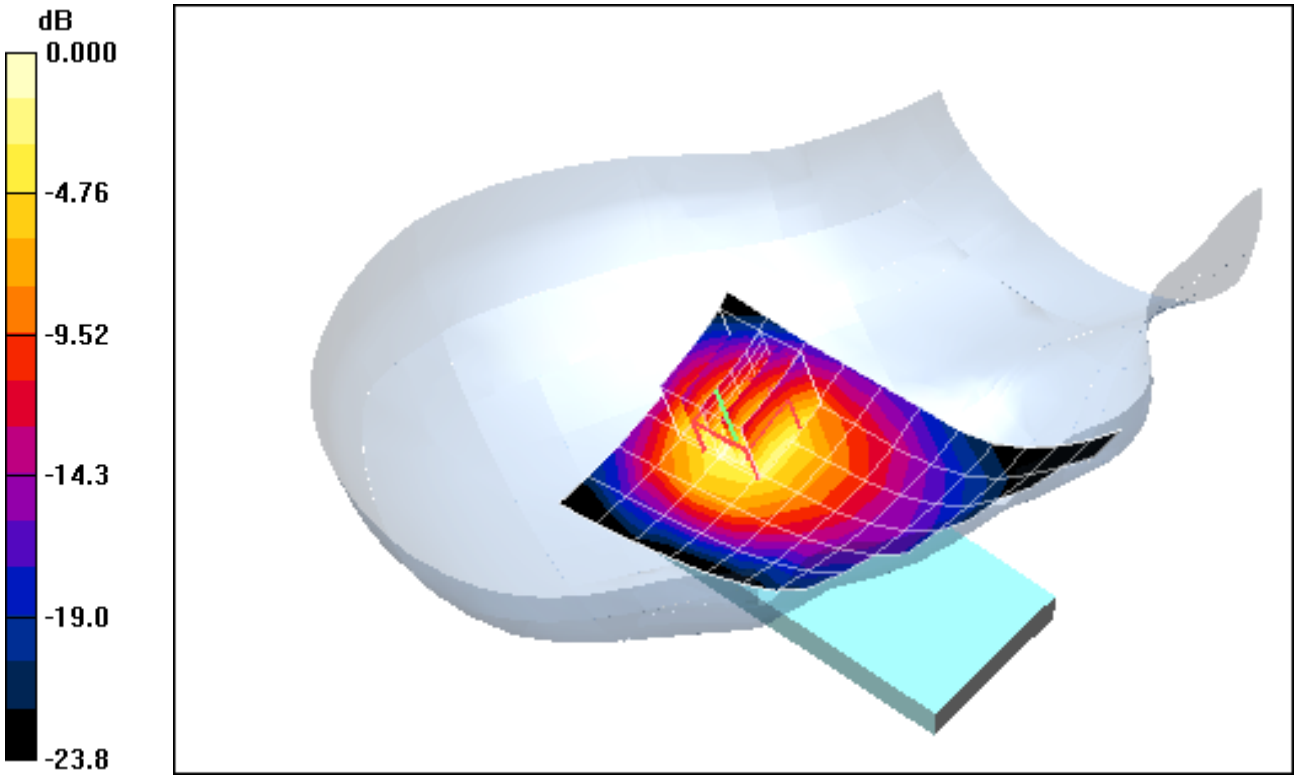
Communication System: LTE PCS 5 Mhz; Frequency: 1852.5 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1852.5 MHz; σ = 1.342 mho/m; ε_r = 38.68; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-17-2011; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3209; ConvF(5.11, 5.11, 5.11); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: PCS LTE, Right Head, Tilt, Low.ch, QPSK, 5 MHz BW, 1 RB, RB Offset 24

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.9 V/m
Peak SAR (extrapolated) = 0.771 W/kg
SAR(1 g) = 0.469 mW/g; SAR(10 g) = 0.272 mW/g



0 dB = 0.496mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 93

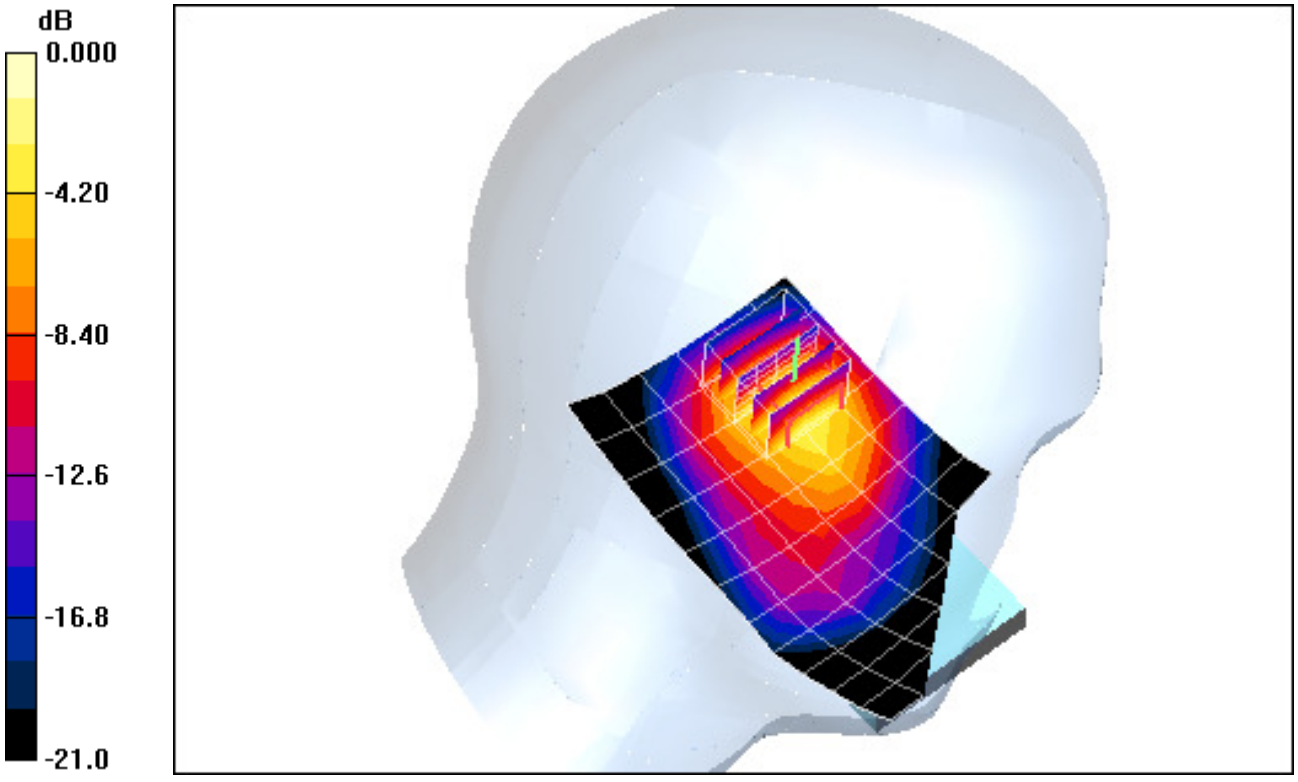
Communication System: LTE PCS 5 Mhz; Frequency: 1852.5 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1852.5 MHz; σ = 1.342 mho/m; ε_r = 38.68; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-17-2011; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3209; ConvF(5.11, 5.11, 5.11); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: PCS LTE, Left Head, Touch, Low. Ch, QPSK, 5 MHz BW, 1 RB, RB Offset 24

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.9 V/m
Peak SAR (extrapolated) = 1.12 W/kg
SAR(1 g) = 0.600 mW/g; SAR(10 g) = 0.330 mW/g



0 dB = 0.619mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 93

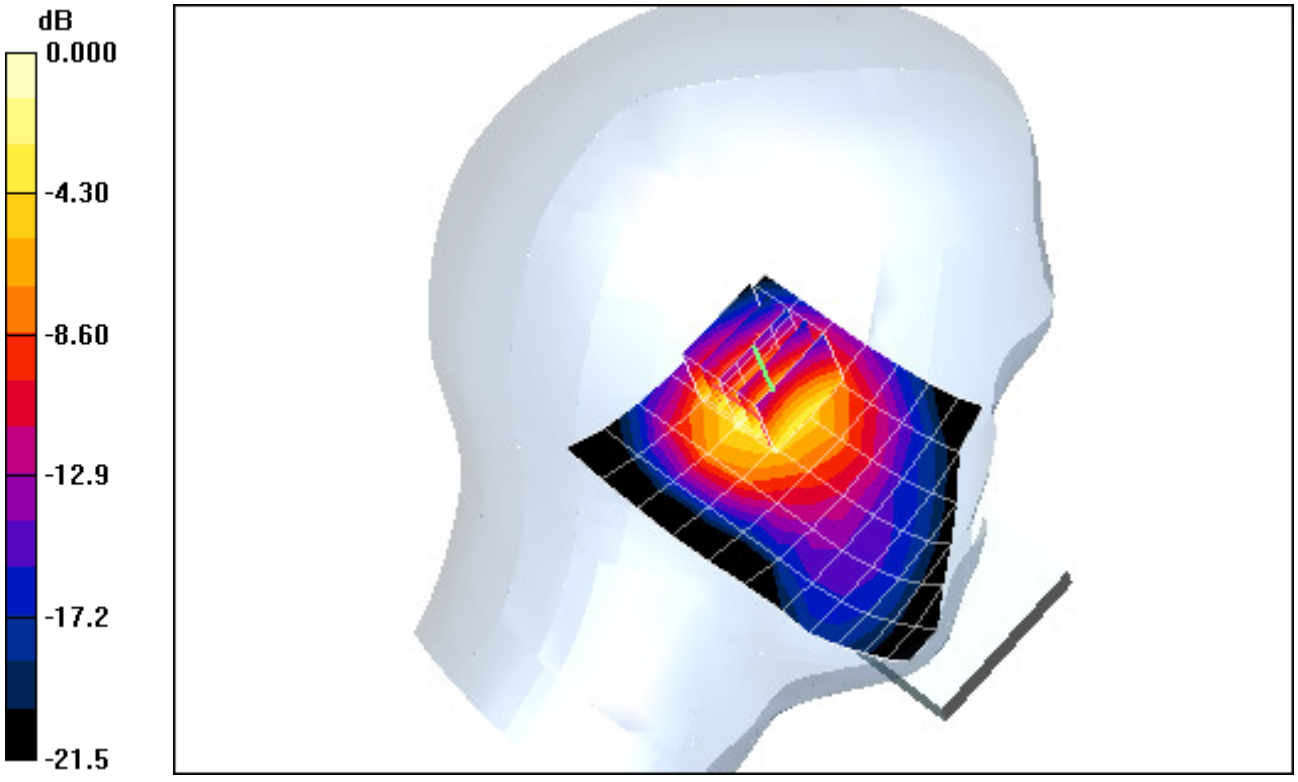
Communication System: LTE PCS 5 Mhz; Frequency: 1852.5 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1852.5 MHz; σ = 1.342 mho/m; ε_r = 38.68; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-17-2011; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3209; ConvF(5.11, 5.11, 5.11); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: PCS LTE, Left Head, Tilt, Low.ch, QPSK, 5 MHz BW, 1 RB, RB Offset 24

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.8 V/m
Peak SAR (extrapolated) = 0.974 W/kg
SAR(1 g) = 0.517 mW/g; SAR(10 g) = 0.292 mW/g



0 dB = 0.559mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 19

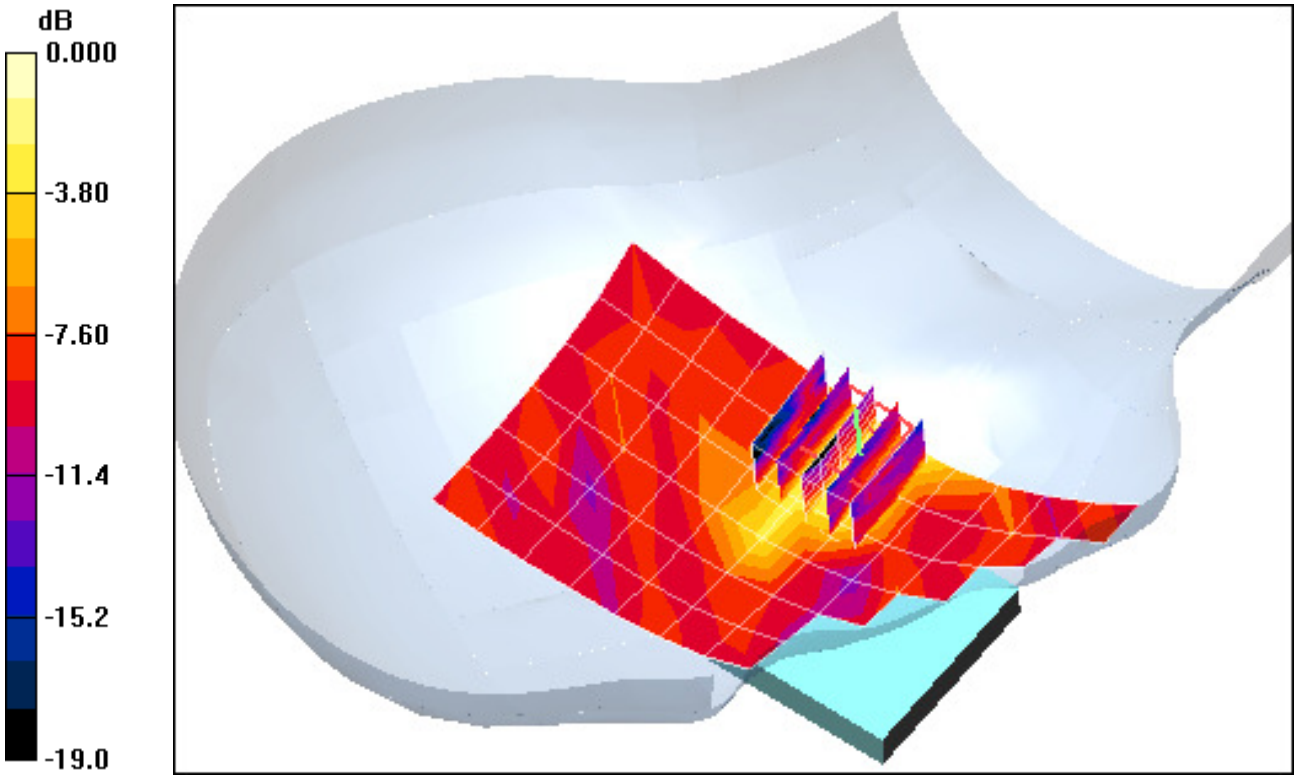
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.79 mho/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-21-2011; Ambient Temp: 23.4 °C; Tissue Temp: 22.1 °C

Probe: EX3DV4 - SN3561; ConvF(6.42, 6.42, 6.42); Calibrated: 7/27/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: IEEE 802.11b, Right Head, Touch, Ch 06, 2 Mbps

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.23 V/m
Peak SAR (extrapolated) = 0.052 W/kg
SAR(1 g) = 0.023 mW/g; SAR(10 g) = 0.011 mW/g



0 dB = 0.032mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 19

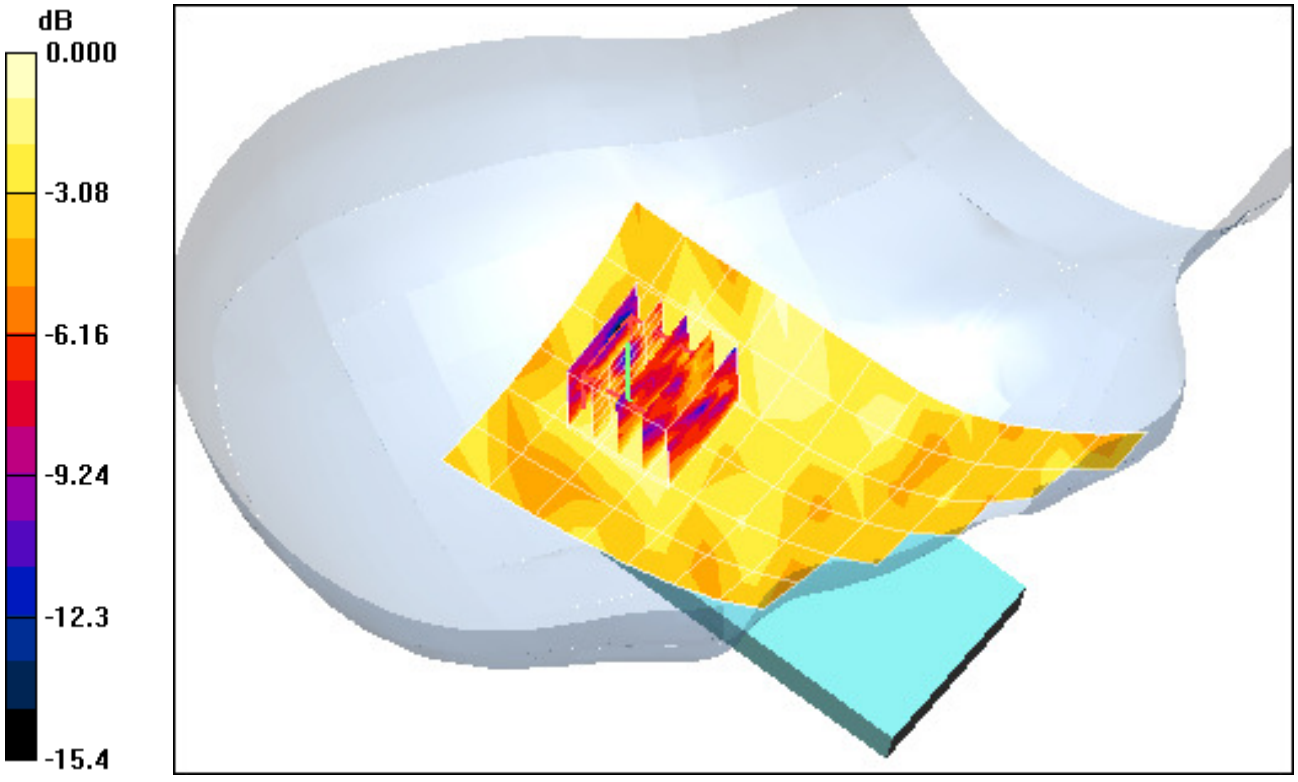
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.79 mho/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-21-2011; Ambient Temp: 23.4 °C; Tissue Temp: 22.1 °C

Probe: EX3DV4 - SN3561; ConvF(6.42, 6.42, 6.42); Calibrated: 7/27/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

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

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.76 V/m
Peak SAR (extrapolated) = 0.013 W/kg
SAR(1 g) = 0.00728 mW/g; SAR(10 g) = 0.00407 mW/g



0 dB = 0.009mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 19

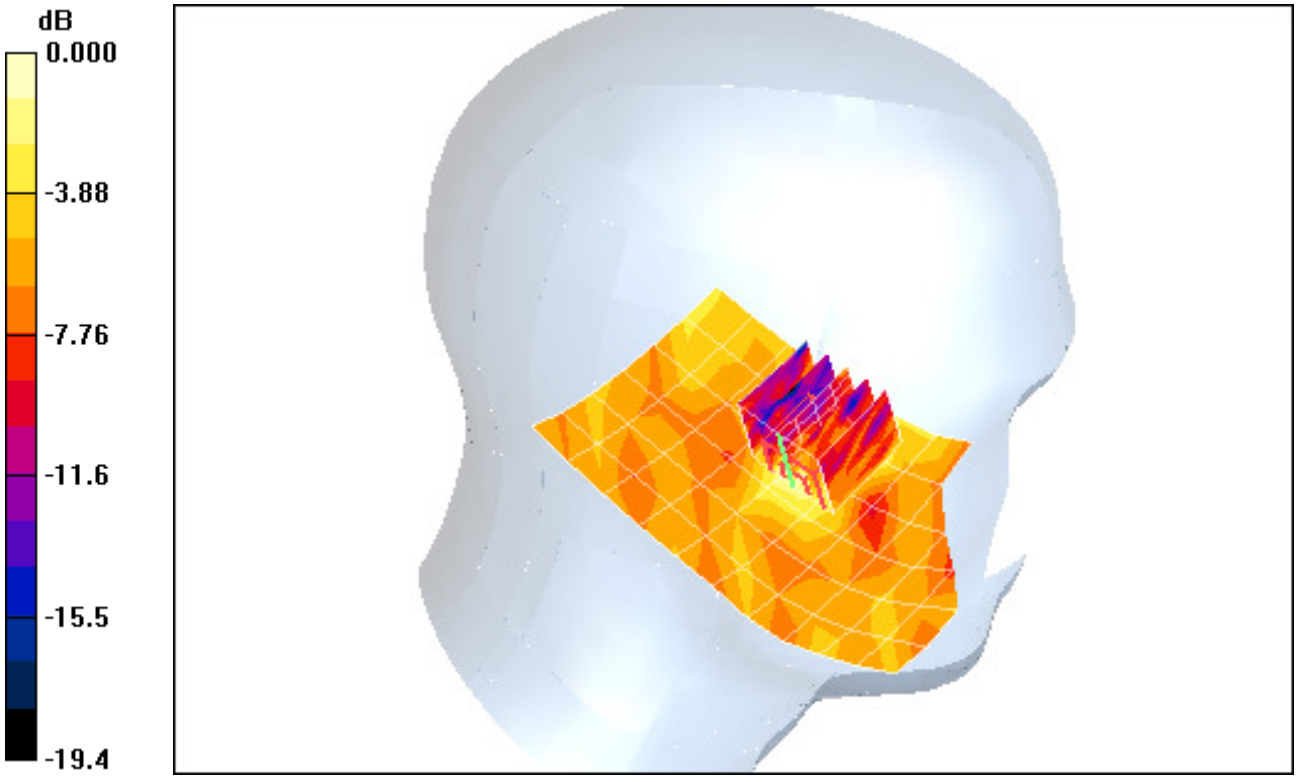
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.79 mho/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-21-2011; Ambient Temp: 23.4 °C; Tissue Temp: 22.1 °C

Probe: EX3DV4 - SN3561; ConvF(6.42, 6.42, 6.42); Calibrated: 7/27/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: IEEE 802.11b, Left Head, Touch, Ch 06, 1 Mbps

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.37 V/m
Peak SAR (extrapolated) = 0.021 W/kg
SAR(1 g) = 0.00983 mW/g; SAR(10 g) = 0.00517 mW/g



0 dB = 0.014mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 19

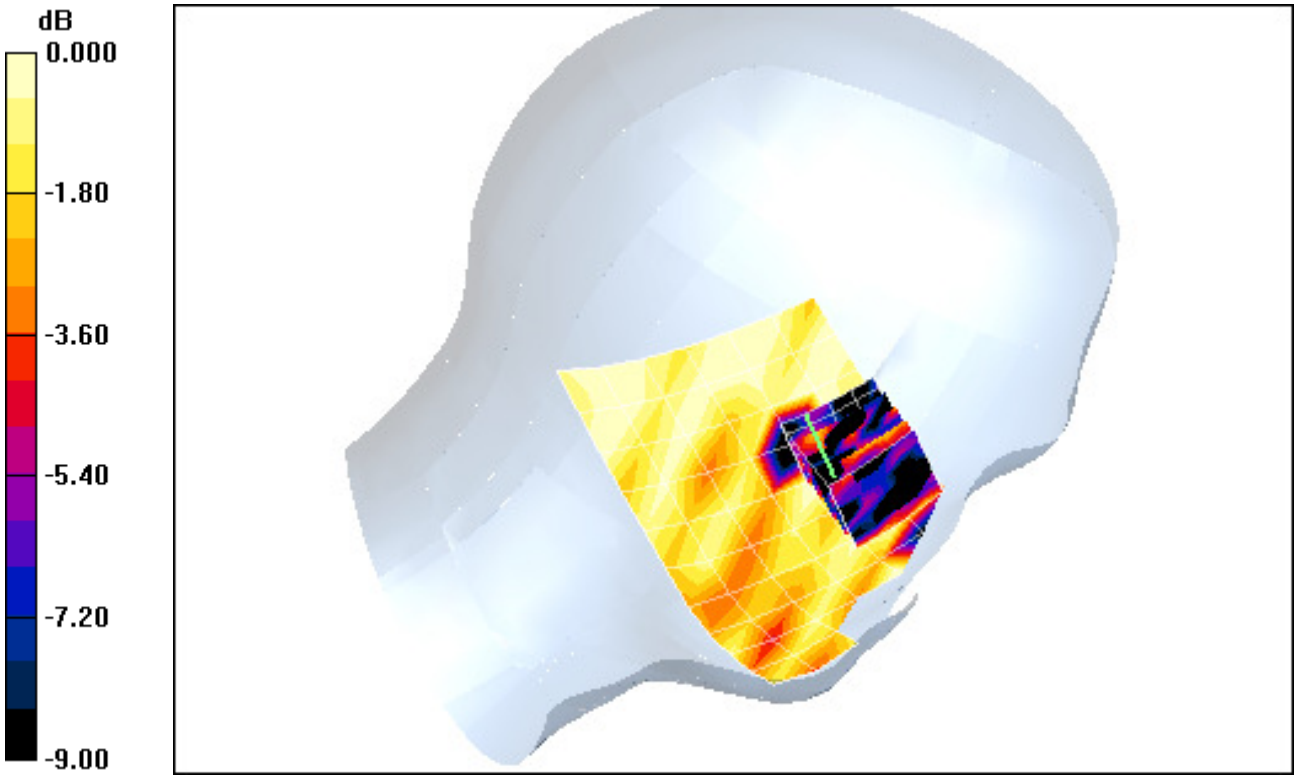
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.79 mho/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-21-2011; Ambient Temp: 23.4 °C; Tissue Temp: 22.1 °C

Probe: EX3DV4 - SN3561; ConvF(6.42, 6.42, 6.42); Calibrated: 7/27/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 172

Mode: IEEE 802.11b, Left Head, Tilt, Ch 06, 2 Mbps

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.21 V/m;
Peak SAR (extrapolated) = 0.015 W/kg
SAR(1 g) = 0.00355 mW/g; SAR(10 g) = 0.00118 mW/g



0 dB = 0.005mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

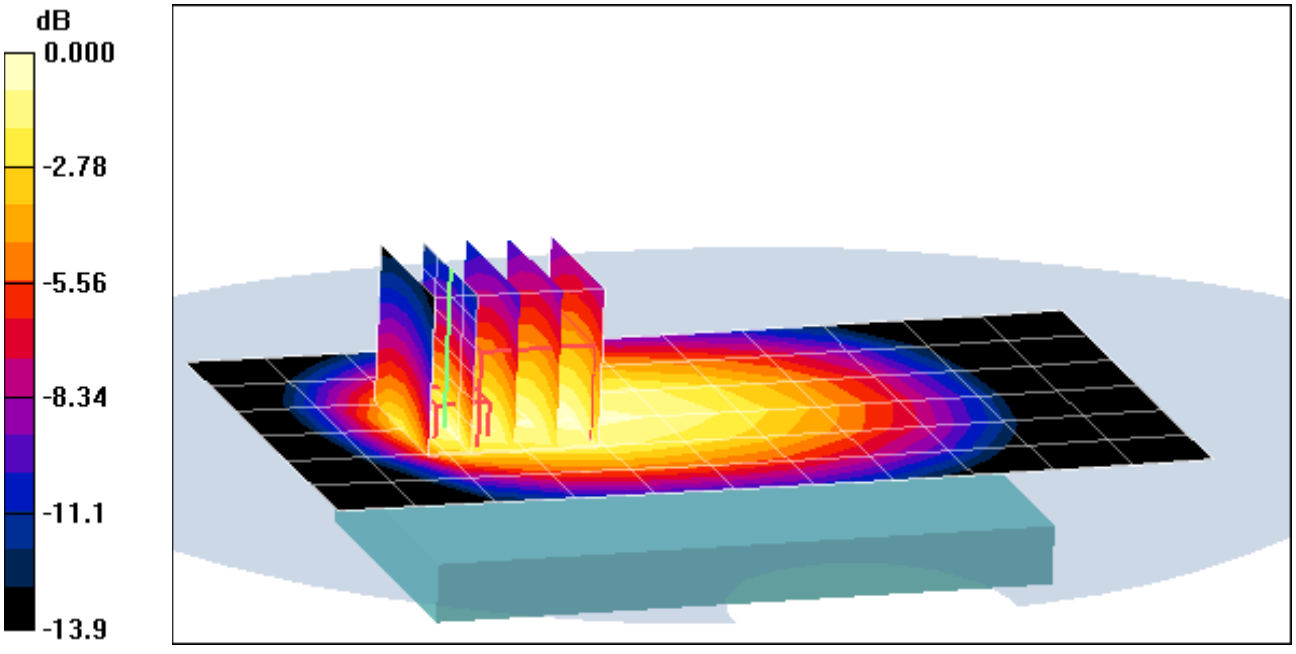
Communication System: Cellular CDMA; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 824.7 MHz; σ = 0.953 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-10-2011; Ambient Temp: 23.6 °C; Tissue Temp: 21.8 °C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
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: Cellular TDSO32, Body SAR, Back side, Low.ch

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 36.4 V/m
Peak SAR (extrapolated) = 1.57 W/kg
SAR(1 g) = 0.909 mW/g; SAR(10 g) = 0.599 mW/g



0 dB = 1.02mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

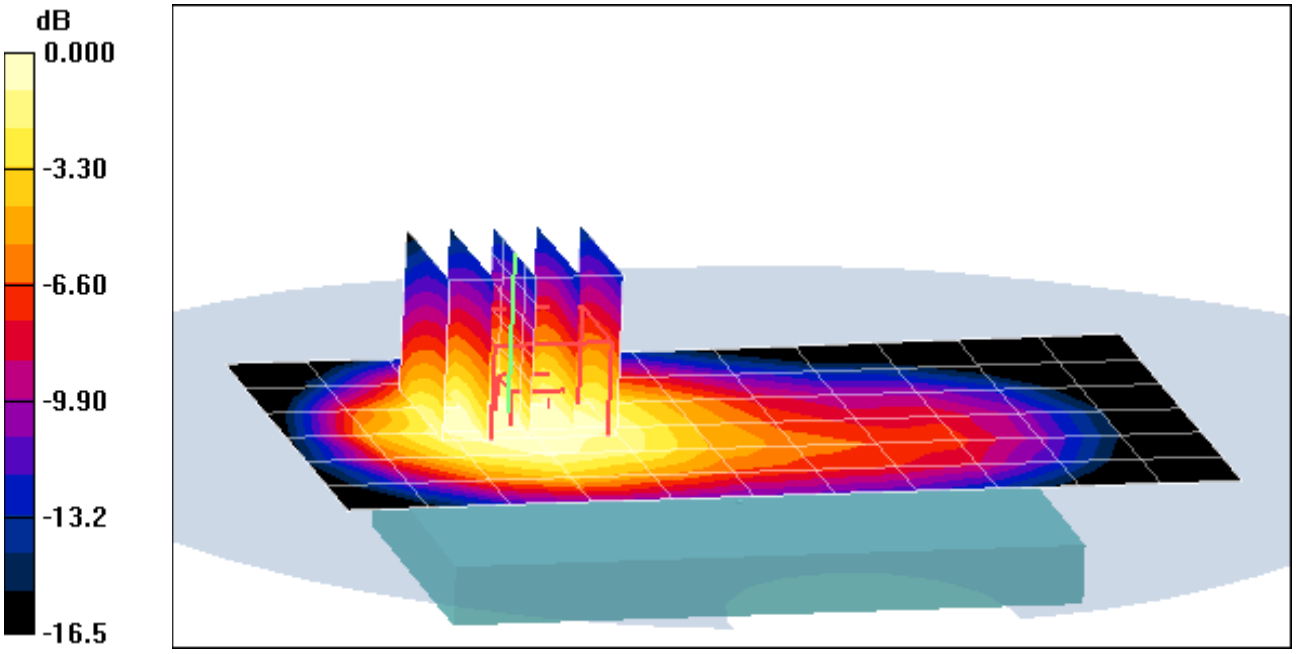
Communication System: AWS CDMA; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
$f = 1732.5$ MHz; $\sigma = 1.52$ mho/m; $\varepsilon_r = 51.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-17-2011; Ambient Temp: 22.8 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3561; ConvF(7.14, 7.14, 7.14); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: AWS TDSO32, Body SAR, Back side, Mid.ch

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.5 V/m
Peak SAR (extrapolated) = 1.43 W/kg
SAR(1 g) = 0.844 mW/g; SAR(10 g) = 0.507 mW/g



0 dB = 0.906mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 94

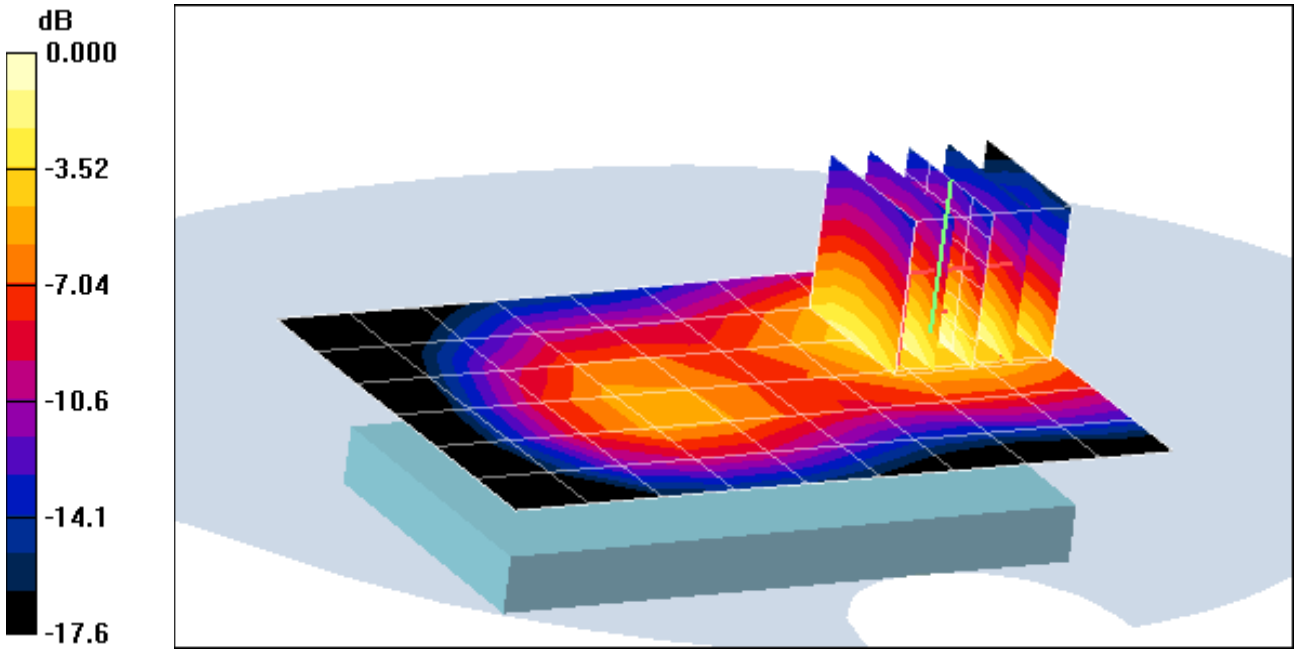
Communication System: LTE RF; Frequency: 1712.5 MHz;Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1712.5 MHz; σ = 1.503 mho/m; ε_r = 51.51; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-17-2011; Ambient Temp: 22.8 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3561; ConvF(7.14, 7.14, 7.14); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: AWS LTE, Body SAR, Back side, Low.ch, QPSK, 5 MHz BW, 1 RB, RB Offset 24

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.8 V/m
Peak SAR (extrapolated) = 0.531 W/kg
SAR(1 g) = 0.317 mW/g; SAR(10 g) = 0.185 mW/g



0 dB = 0.347mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 99

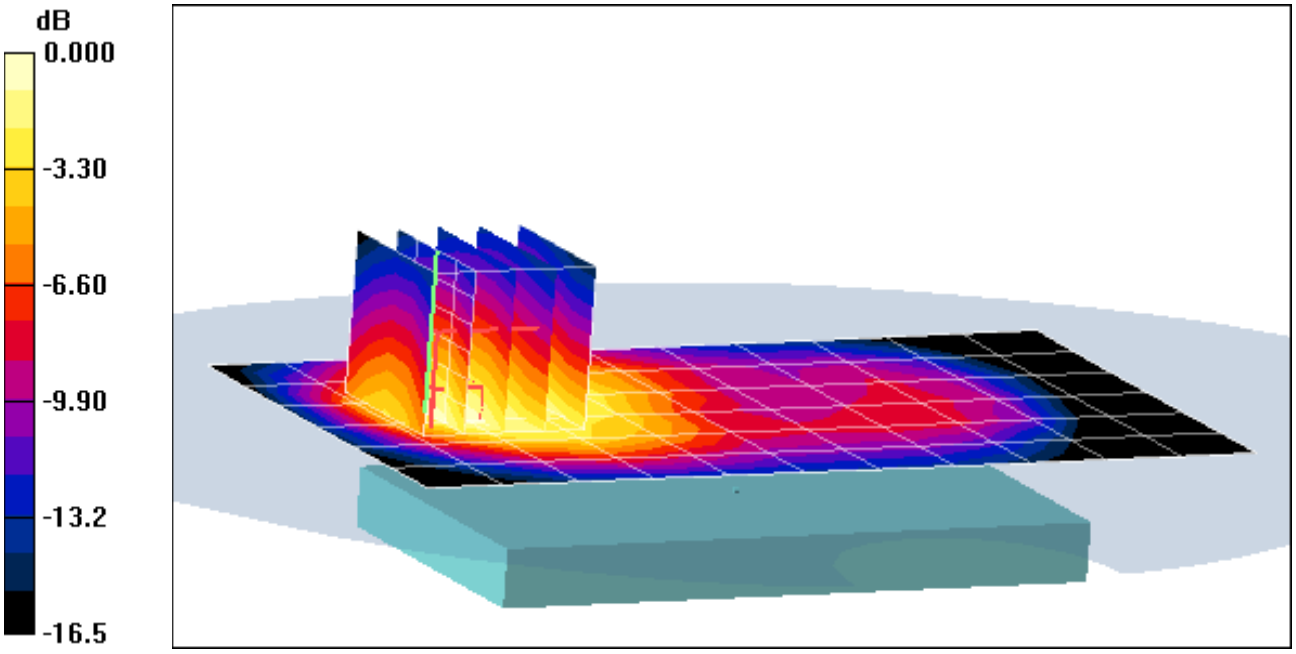
Communication System: PCS CDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.469 mho/m; ε_r = 50.97; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-13-2011; Ambient Temp: 23.1 °C; Tissue Temp: 21.5 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 4.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS TDSO32, Body SAR, Back side, Mid.ch

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.7 V/m
Peak SAR (extrapolated) = 1.52 W/kg
SAR(1 g) = 0.903 mW/g; SAR(10 g) = 0.517 mW/g



0 dB = 0.992mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 93

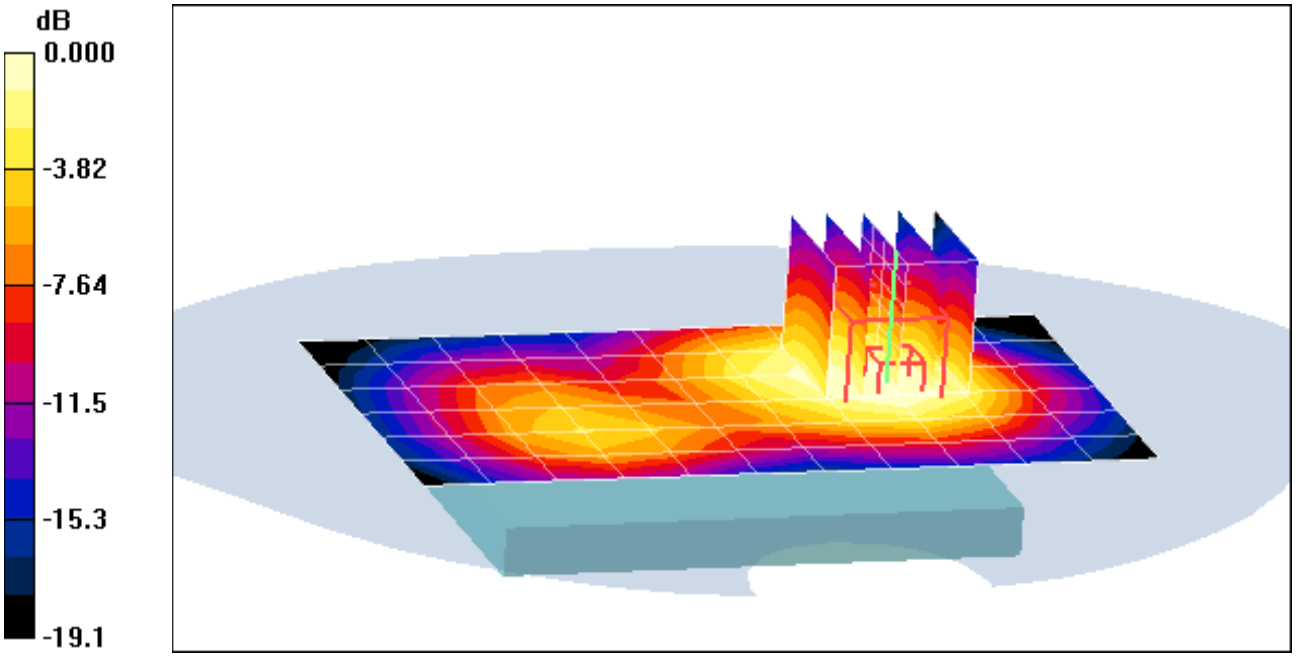
Communication System: LTE RF; Frequency: 1852.5 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1852.5 MHz; σ = 1.513 mho/m; ε_r = 52.26; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-15-2011; Ambient Temp: 23.4 °C; Tissue Temp: 22.0 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 4.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS LTE, Body SAR, Back side, Low.ch, QPSK, 5 MHz BW, 1 RB, RB Offset 24

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.58 V/m
Peak SAR (extrapolated) = 0.708 W/kg
SAR(1 g) = 0.442 mW/g; SAR(10 g) = 0.265 mW/g



0 dB = 0.479mW/g

DUT: A3LSCHR920; Type: Portable Handset; Serial: 19

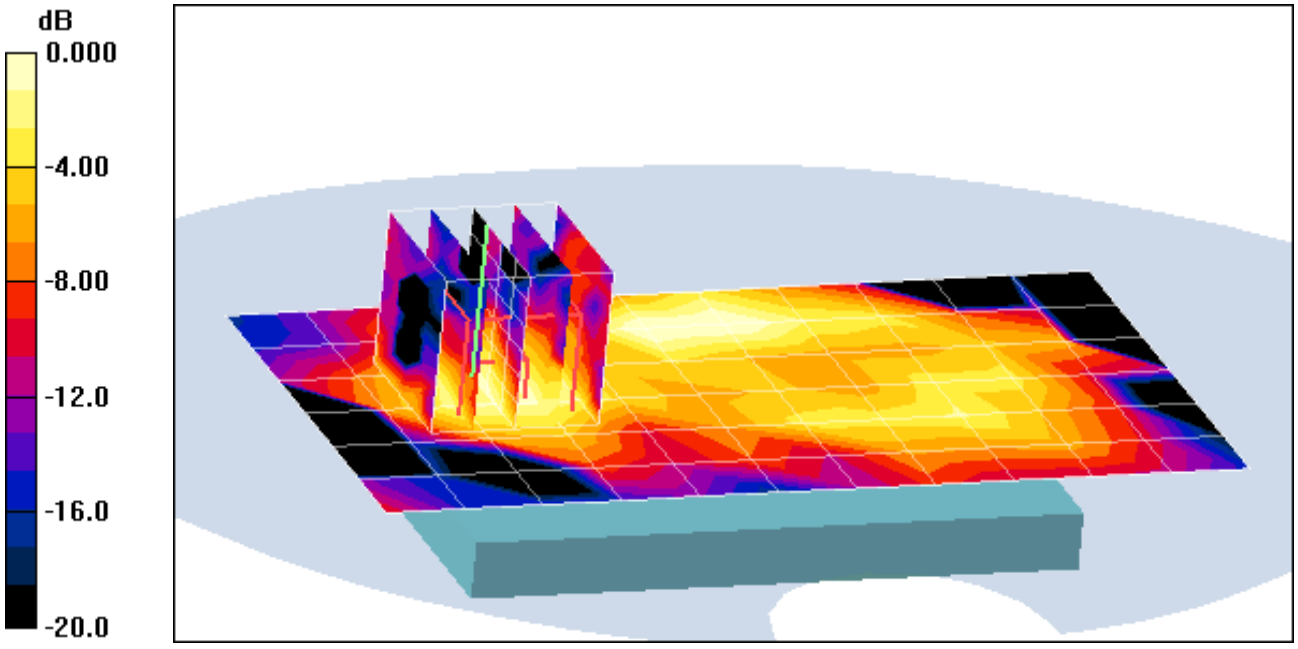
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.88 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-19-2011; Ambient Temp: 23.0 °C; Tissue Temp: 22.0 °C

Probe: ES3DV3 - SN3209; ConvF(4.15, 4.15, 4.15); Calibrated: 4/18/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.22 V/m
Peak SAR (extrapolated) = 0.020 W/kg
SAR(1 g) = 0.00748 mW/g; SAR(10 g) = 0.00291 mW/g



0 dB = 0.009mW/g

APPENDIX B: DIPOLE VALIDATION

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

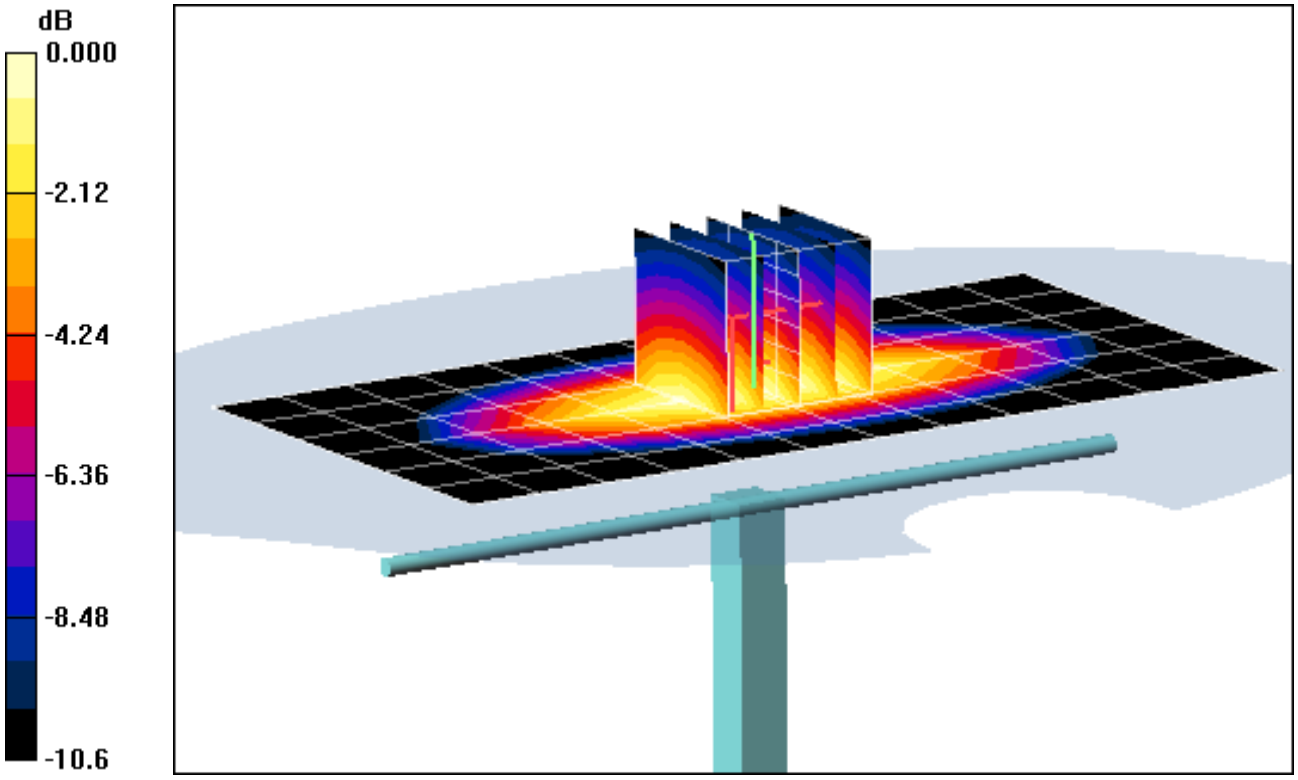
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.902 mho/m; ε_r = 43.31; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-10-2011; Ambient Temp: 24.2 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3258; ConvF(6.18, 6.18, 6.18); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
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=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) = 0.951 mW/g; SAR(10 g) = 0.620 mW/g
Deviation = -0.21 %



0 dB = 1.03mW/g

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

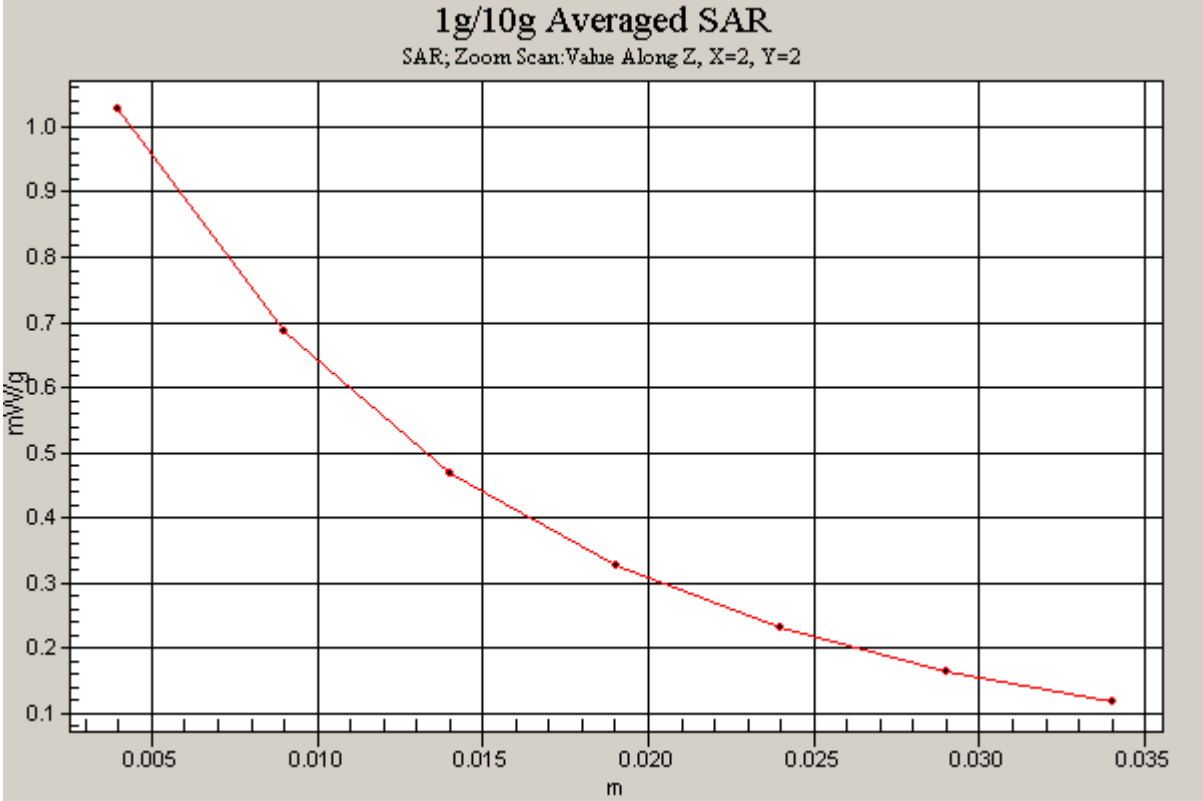
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.902 mho/m; ε_r = 43.31; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-10-2011; Ambient Temp: 24.2 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3258; ConvF(6.18, 6.18, 6.18); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
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=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) = 0.951 mW/g; SAR(10 g) = 0.620 mW/g
Deviation = -0.21 %



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

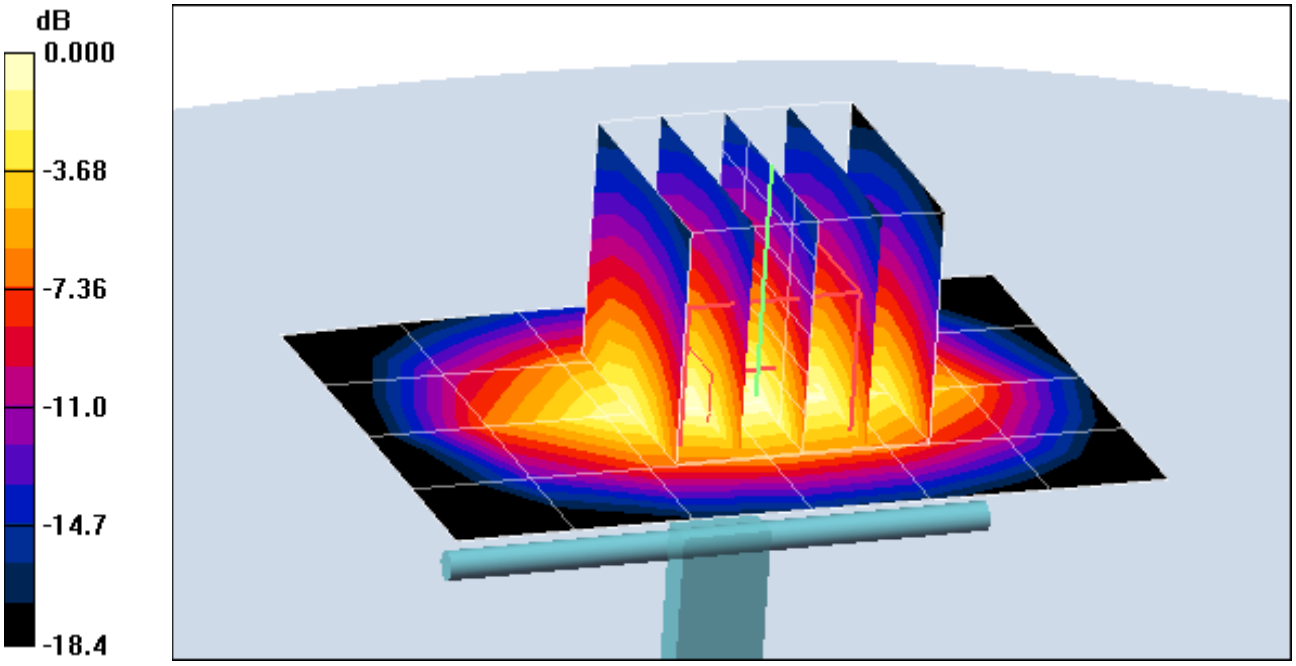
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.42 mho/m; ε_r = 39.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-17-2011; Ambient Temp: 22.3 °C; Tissue Temp: 21.2 °C

Probe: EX3DV4 - SN3561; ConvF(7.37, 7.37, 7.37); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1750 MHz 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) = 3.69 mW/g; SAR(10 g) = 1.9 mW/g
Deviation = -0.27 %



0 dB = 4.09mW/g

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

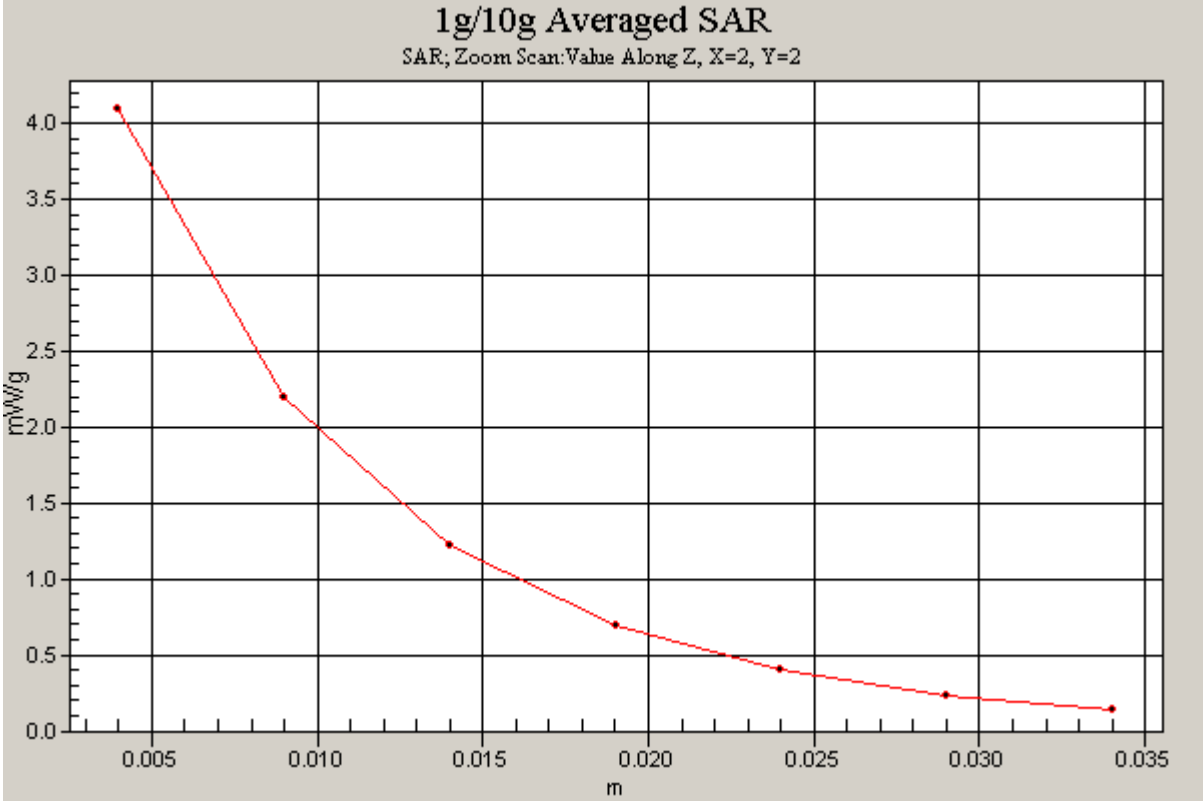
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.42 mho/m; ε_r = 39.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-17-2011; Ambient Temp: 22.3 °C; Tissue Temp: 21.2 °C

Probe: EX3DV4 - SN3561; ConvF(7.37, 7.37, 7.37); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1750 MHz 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) = 3.69 mW/g; SAR(10 g) = 1.9 mW/g
Deviation = -0.27 %



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

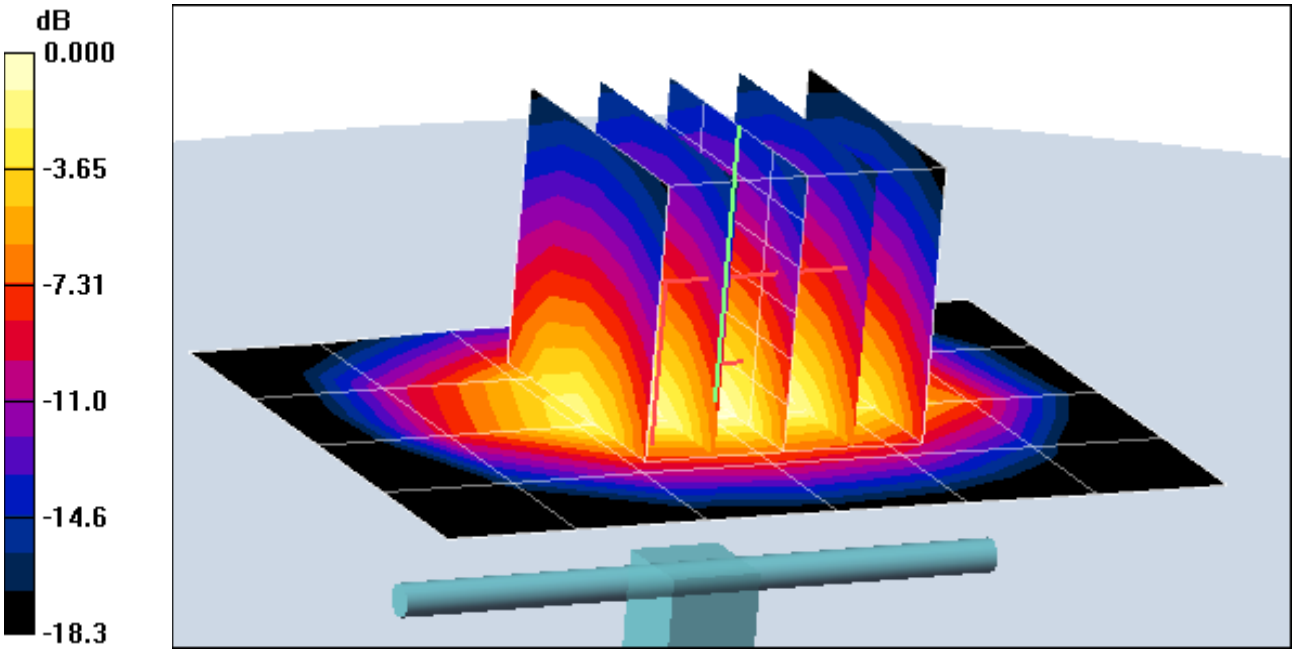
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.42 mho/m; ε_r = 38.92; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-12-2011; Ambient Temp: 24.7 °C; Tissue Temp: 23.1 °C

Probe: EX3DV4 - SN3550; ConvF(7.01, 7.01, 7.01); Calibrated: 2/14/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 16.0 dBm (40 mW)
SAR(1 g) = 1.72 mW/g; SAR(10 g) = 0.886 mW/g
Deviation = 6.97 %



0 dB = 1.95mW/g

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

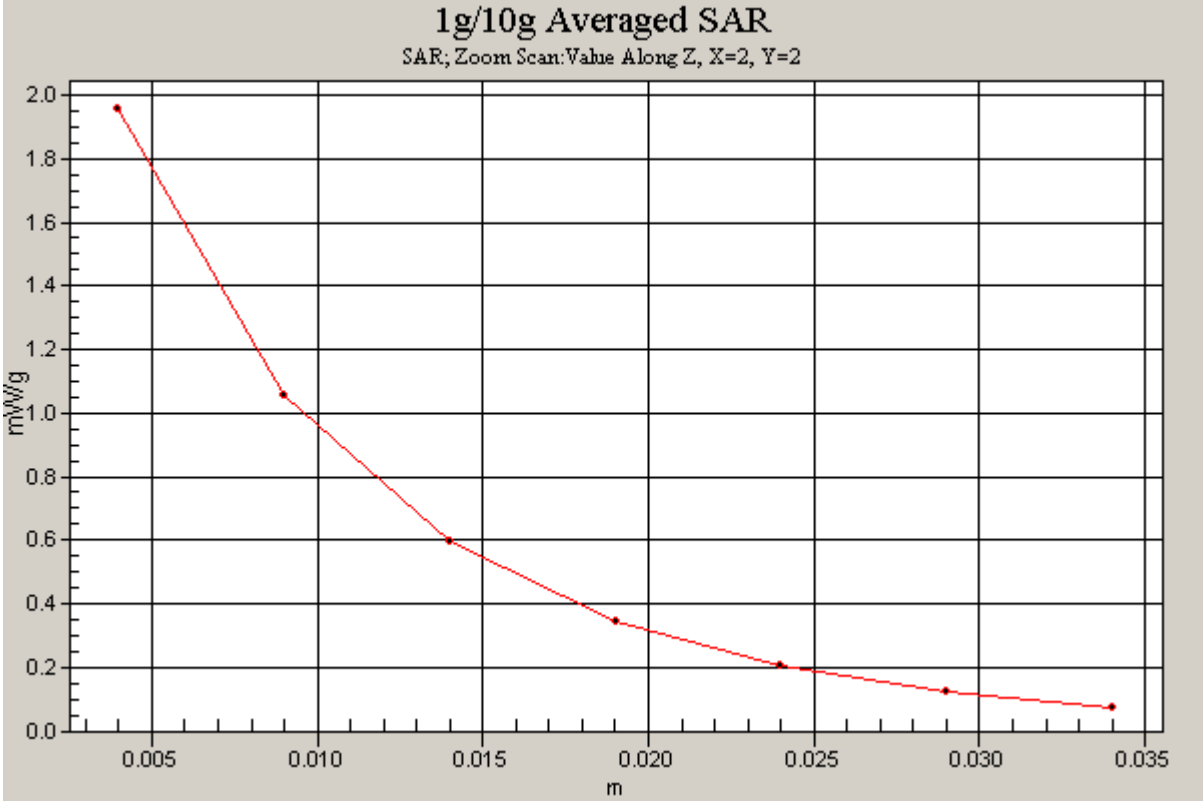
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.42 mho/m; ε_r = 38.92; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-12-2011; Ambient Temp: 24.7 °C; Tissue Temp: 23.1 °C

Probe: EX3DV4 - SN3550; ConvF(7.01, 7.01, 7.01); Calibrated: 2/14/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 16.0 dBm (40 mW)
SAR(1 g) = 1.72 mW/g; SAR(10 g) = 0.886 mW/g
Deviation = 6.97 %



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

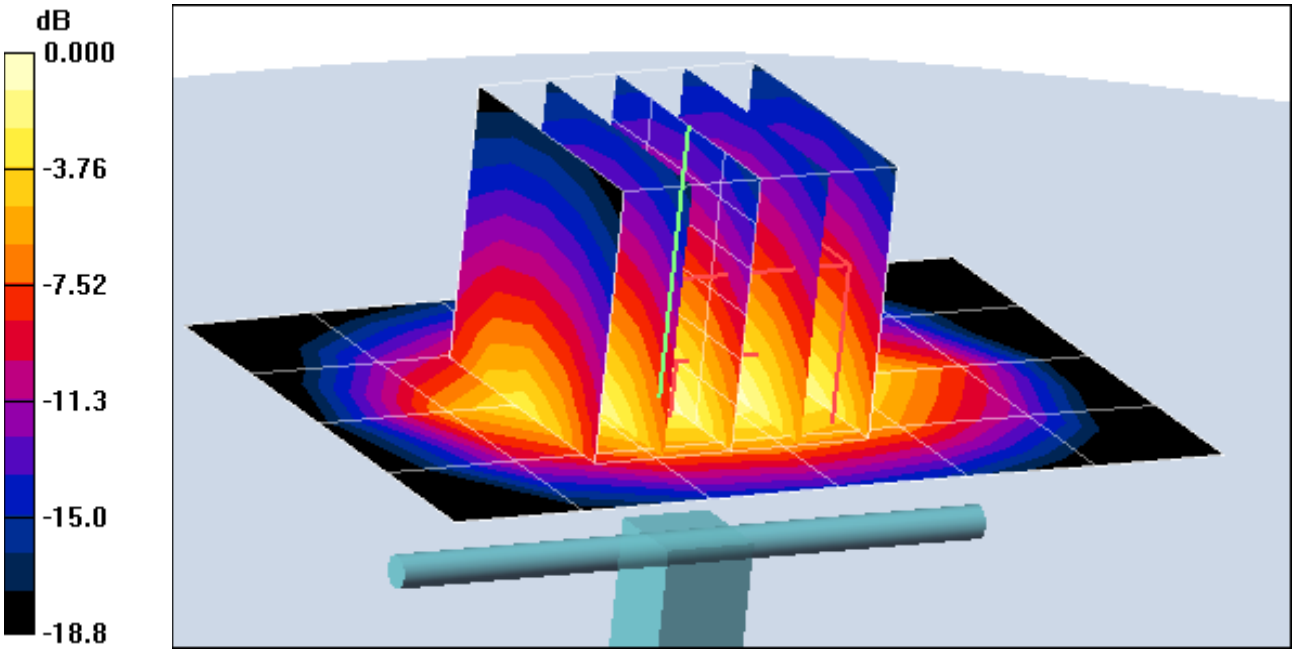
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.38 mho/m; ε_r = 38.54; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-17-2011; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3209; ConvF(5.11, 5.11, 5.11); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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) = 4.06 mW/g; SAR(10 g) = 2.09 mW/g
Deviation = 1.00 %



0 dB = 4.49mW/g

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

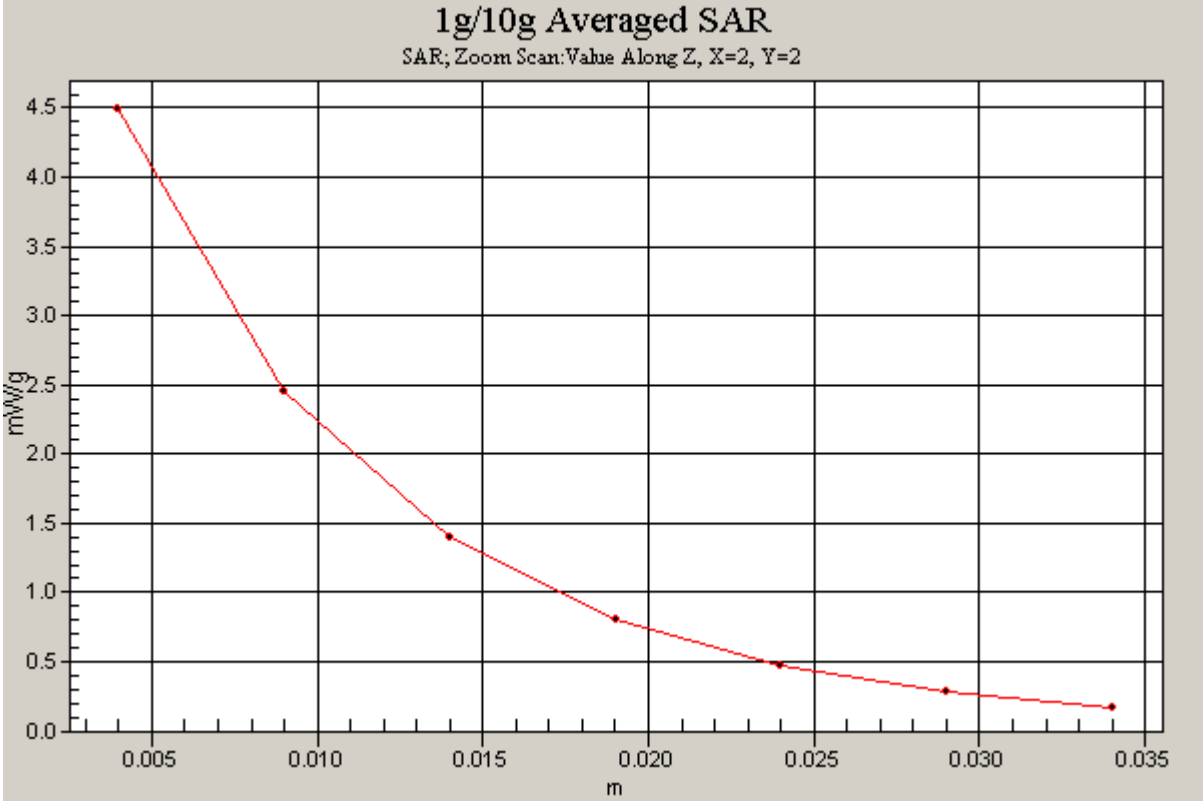
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.38 mho/m; ε_r = 38.54; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-17-2011; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3209; ConvF(5.11, 5.11, 5.11); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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) = 4.06 mW/g; SAR(10 g) = 2.09 mW/g
Deviation = 1.00 %



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

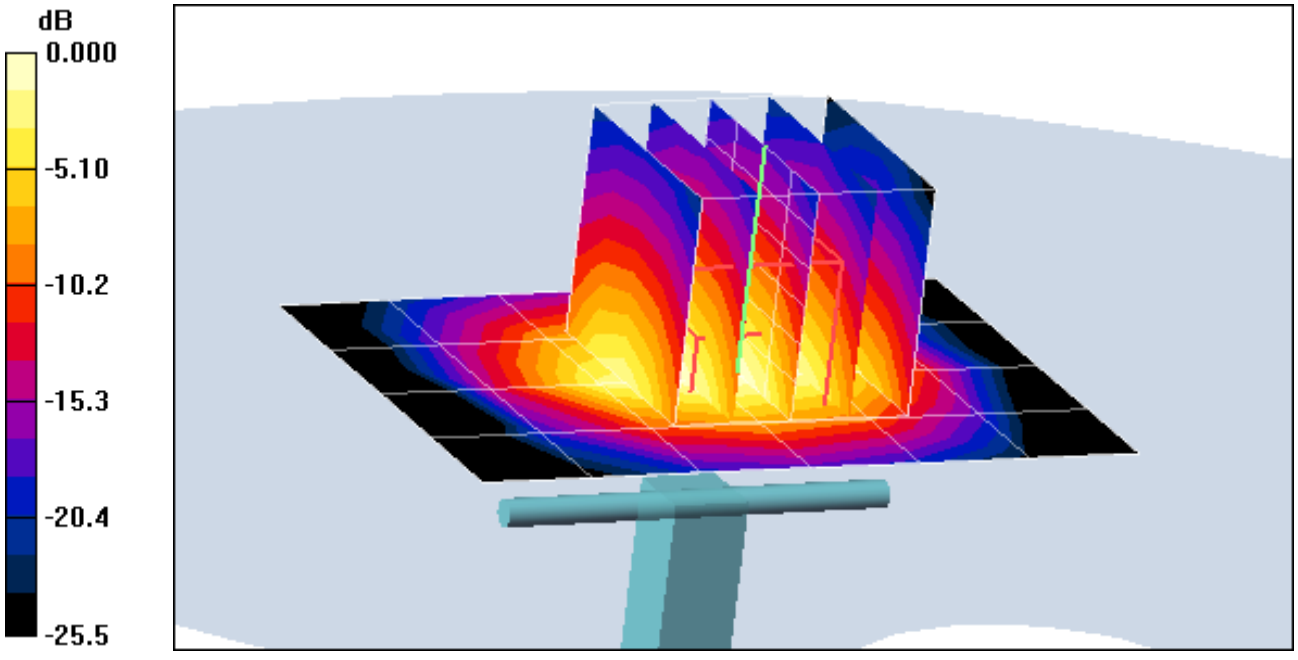
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.8 mho/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-21-2011; Ambient Temp: 23.4 °C; Tissue Temp: 22.1 °C

Probe: EX3DV4 - SN3561; ConvF(6.42, 6.42, 6.42); Calibrated: 7/27/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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) = 1.38 mW/g; SAR(10 g) = 0.629 mW/g
Deviation = 3.56 %



0 dB = 1.77mW/g

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

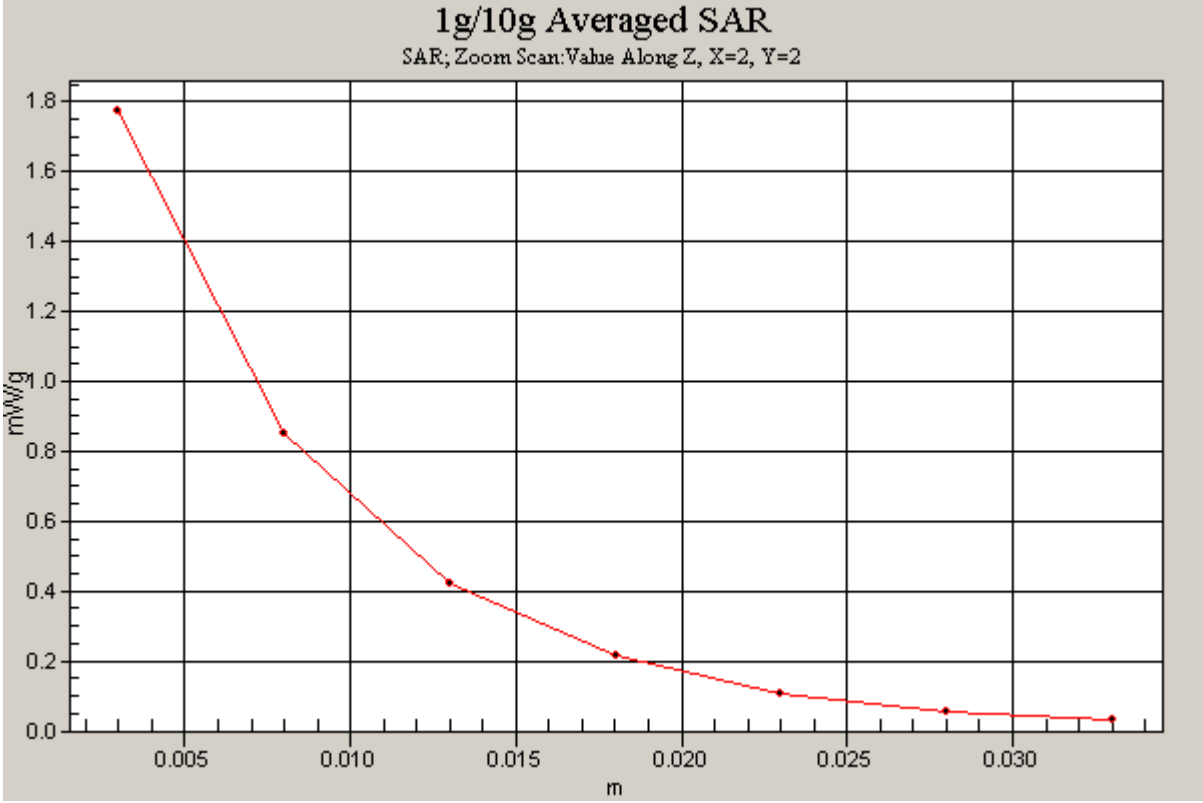
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.8 mho/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-21-2011; Ambient Temp: 23.4 °C; Tissue Temp: 22.1 °C

Probe: EX3DV4 - SN3561; ConvF(6.42, 6.42, 6.42); Calibrated: 7/27/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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) = 1.38 mW/g; SAR(10 g) = 0.629 mW/g
Deviation = 3.56 %



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

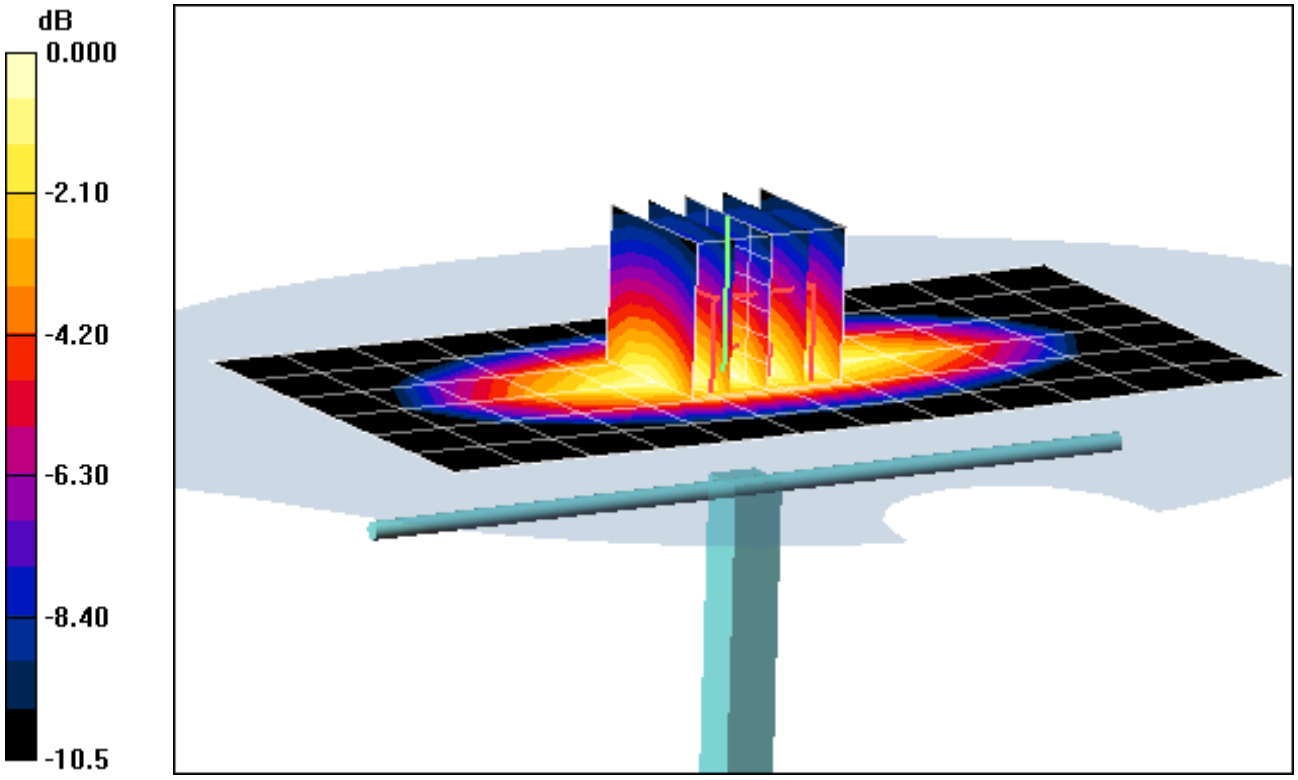
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.963 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-10-2011; Ambient Temp: 23.6 °C; Tissue Temp: 21.8 °C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

835MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 0.986 mW/g; SAR(10 g) = 0.643 mW/g
Deviation = 0.10 %



0 dB = 1.06mW/g

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

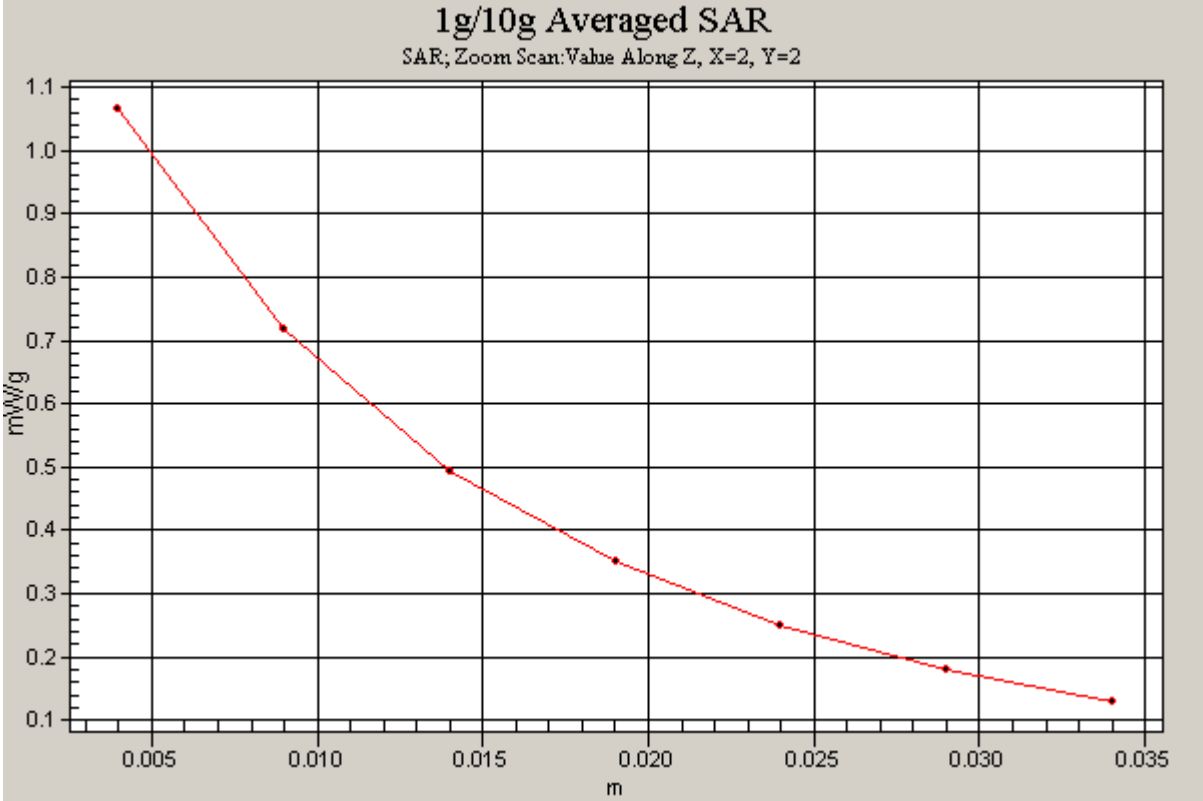
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.963 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-10-2011; Ambient Temp: 23.6 °C; Tissue Temp: 21.8 °C

Probe: ES3DV3 - SN3258; ConvF(6.12, 6.12, 6.12); Calibrated: 4/8/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/21/2011
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

835MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 0.986 mW/g; SAR(10 g) = 0.643 mW/g
Deviation = 0.10 %



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

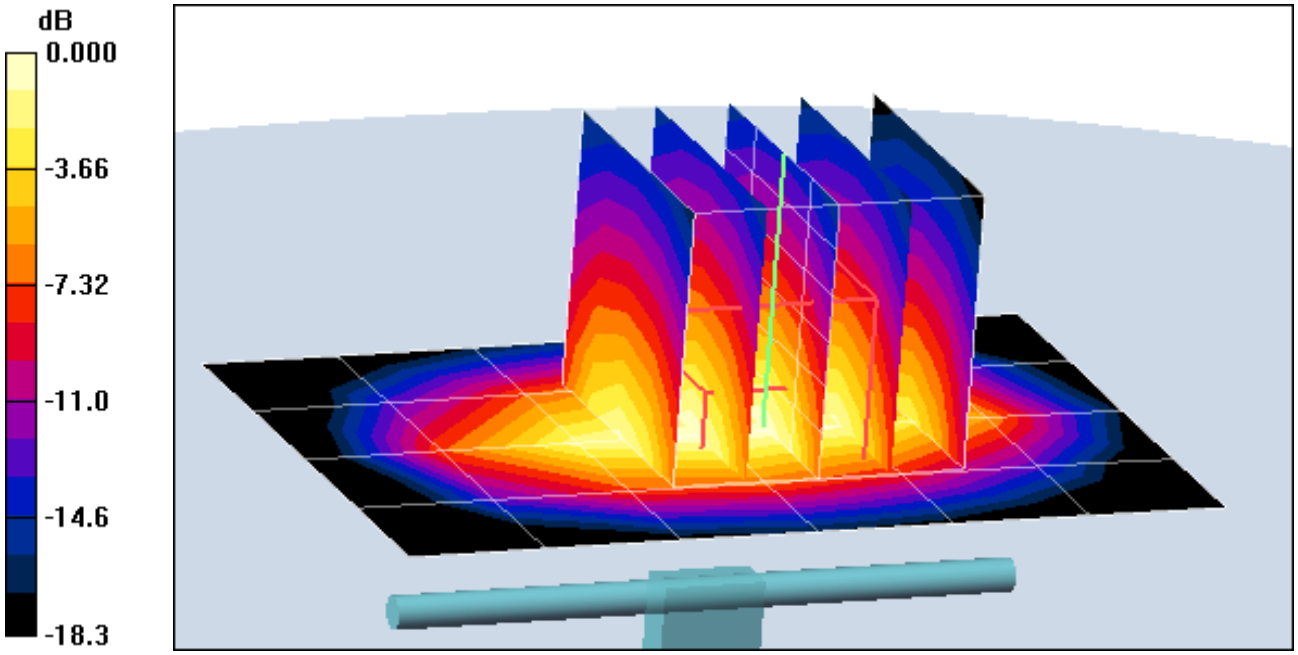
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.54 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-17-2011; Ambient Temp: 22.8 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3561; ConvF(7.14, 7.14, 7.14); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1750 MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 16.0 dBm (40 mW)
SAR(1 g) = 1.5 mW/g; SAR(10 g) = 0.772 mW/g
Deviation = 1.35 %



0 dB = 1.66mW/g

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

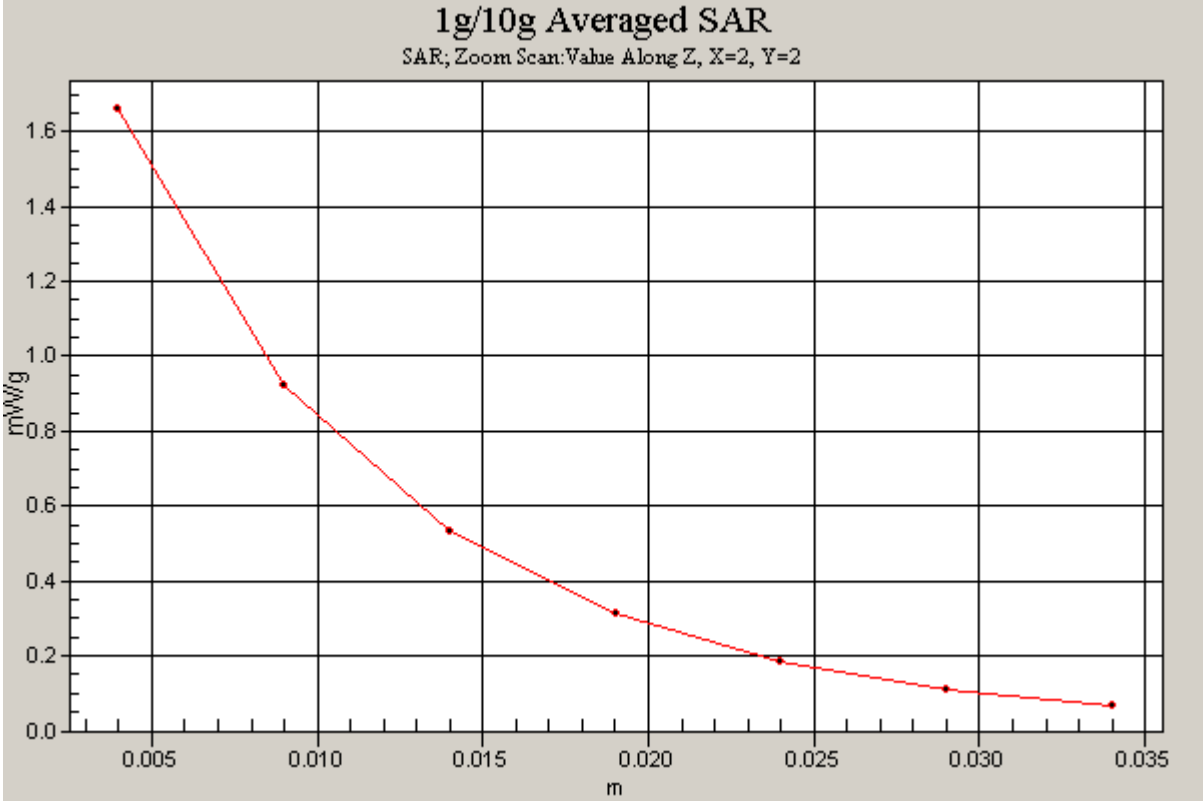
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.54 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-17-2011; Ambient Temp: 22.8 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3561; ConvF(7.14, 7.14, 7.14); Calibrated: 7/27/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/20/2011
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1750 MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 16.0 dBm (40 mW)
SAR(1 g) = 1.5 mW/g; SAR(10 g) = 0.772 mW/g
Deviation = 1.35 %



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

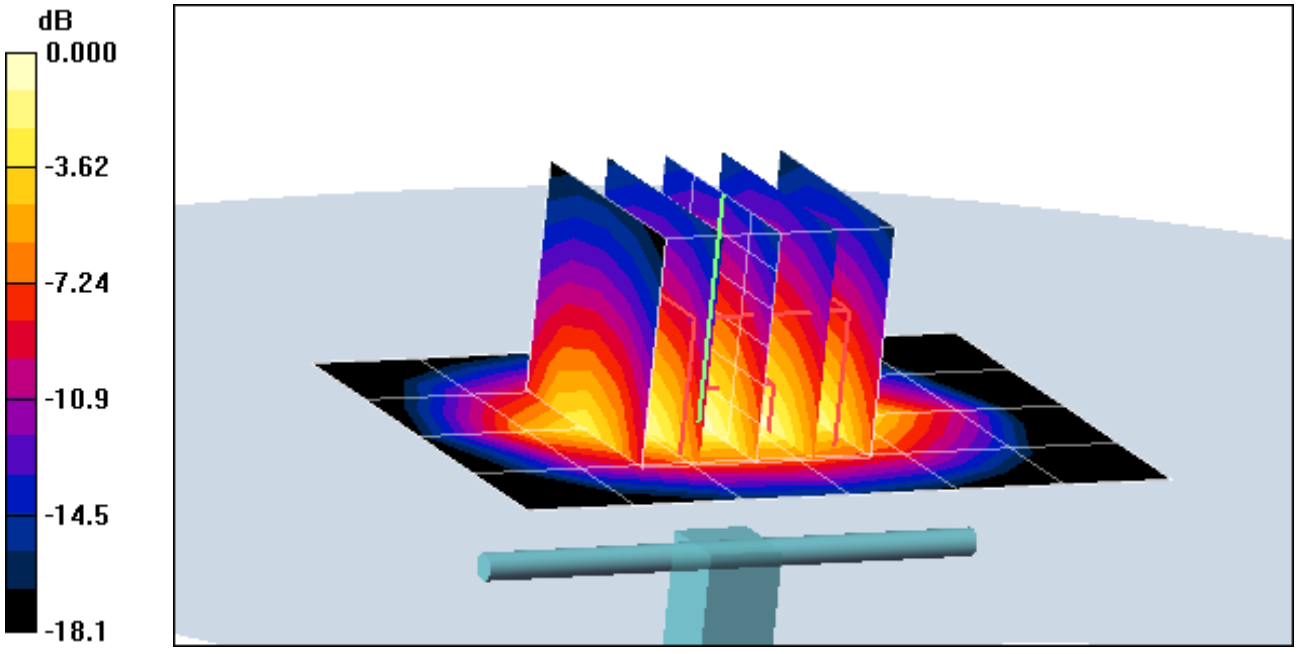
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.48 mho/m; ε_r = 51; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-13-2011; Ambient Temp: 23.1 °C; Tissue Temp: 21.5 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 4.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 4.3 mW/g; SAR(10 g) = 2.23 mW/g
Deviation = 4.62 %



0 dB = 4.79mW/g

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

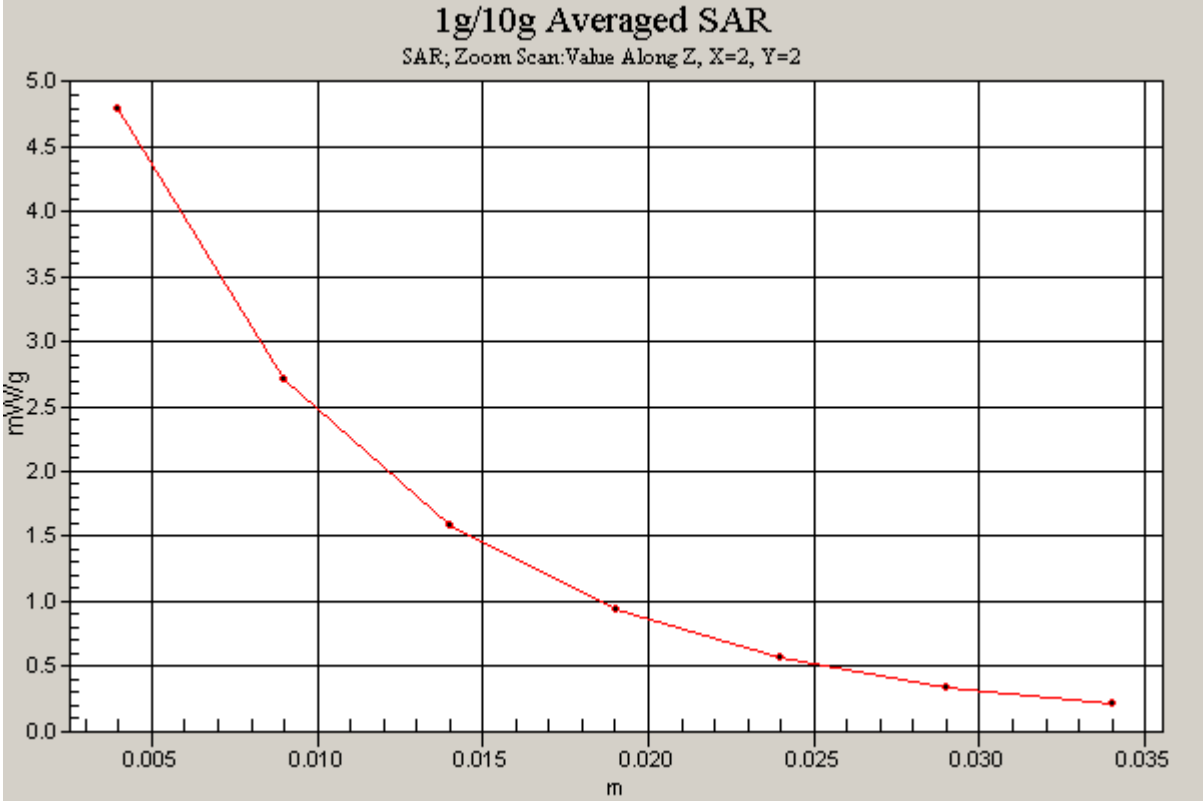
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.48 mho/m; ε_r = 51; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-13-2011; Ambient Temp: 23.1 °C; Tissue Temp: 21.5 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 4.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 4.3 mW/g; SAR(10 g) = 2.23 mW/g
Deviation = 4.62 %



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

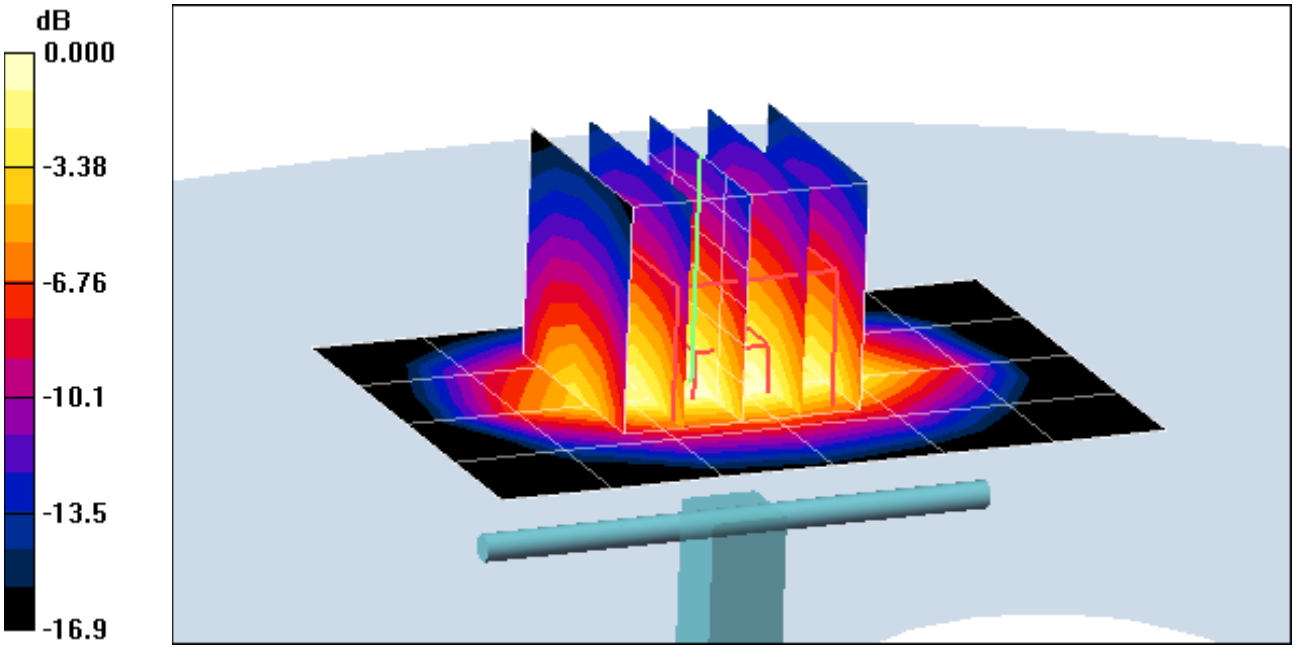
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-15-2011; Ambient Temp: 23.4 °C; Tissue Temp: 22.0 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 4.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 4.2 mW/g; SAR(10 g) = 2.28 mW/g
Deviation = 2.19 %



0 dB = 4.61mW/g

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

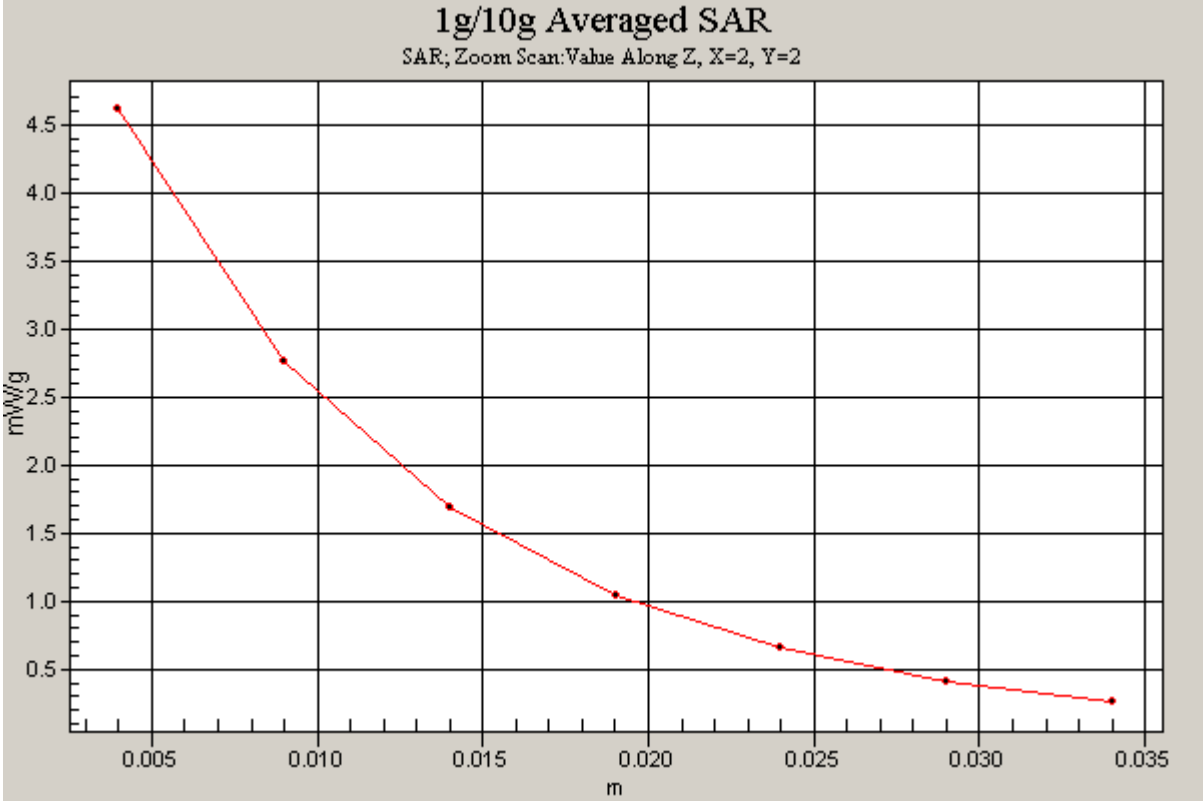
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.56 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-15-2011; Ambient Temp: 23.4 °C; Tissue Temp: 22.0 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 4.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 4.2 mW/g; SAR(10 g) = 2.28 mW/g
Deviation = 2.19 %



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

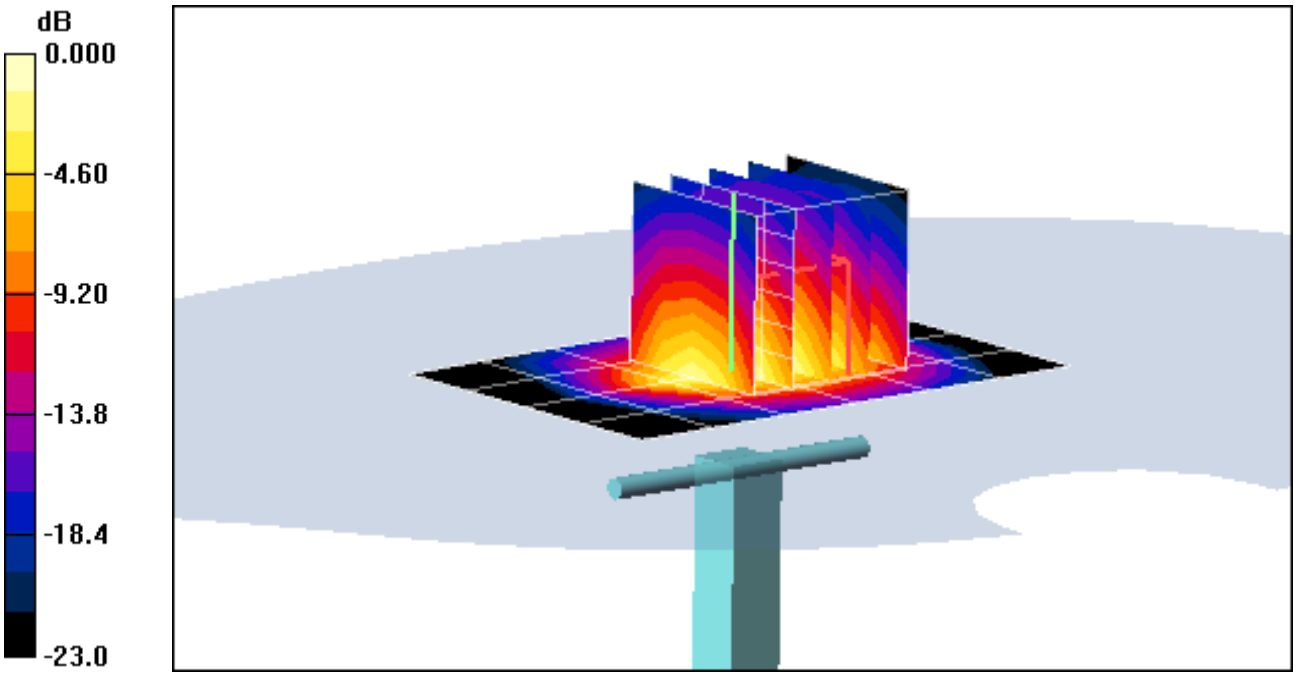
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 1.9 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-19-2011; Ambient Temp: 23.0 °C; Tissue Temp: 22.0 °C

Probe: ES3DV3 - SN3209; ConvF(4.15, 4.15, 4.15); Calibrated: 4/18/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

2450MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 12.0 dBm (15.8 mW)
SAR(1 g) = 0.892 mW/g; SAR(10 g) = 0.415 mW/g
Deviation = 7.95 %



0 dB = 1.14mW/g

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

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 1.9 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-19-2011; Ambient Temp: 23.0 °C; Tissue Temp: 22.0 °C

Probe: ES3DV3 - SN3209; ConvF(4.15, 4.15, 4.15); Calibrated: 4/18/2011
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

2450MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 12.0 dBm (15.8 mW)
SAR(1 g) = 0.892 mW/g; SAR(10 g) = 0.415 mW/g
Deviation = 7.95 %