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SAR COMPLIANCE EVALUATION REPORT

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

Date of Testing:
01/17/11 - 01/24/11
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1101100075-R1.A3L

FCC ID: A3LGTP7100

APPLICANT: SAMSUNG ELECTRONICS, CO. LTD.

EUT Type:	850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN
Application Type:	Certification
FCC Rule Part(s):	CFR §2.1093; FCC/OET Bulletin 65 Supplement C [June 2001]
FCC Classification:	PCS Licensed Transmitter (PCB) / Digital Transmission System (DTS) Unlicensed Transmitter National Infrastructure (UNII) FCC Part 15 Frequency Hopping Spread Spectrum Transceiver (DSS)
Model(s):	GT-P7100
Tx Frequency:	824.20 - 848.80 MHz (GSM 850) / 1850.20 - 1909.80 MHz (GSM 1900) 826.40 - 846.60 MHz (UMTS V) / 1852.4 - 1907.6 MHz (UMTS II) 2412 - 2462 MHz (WLAN 802.11b/g/n) 5180 - 5240 MHz (WLAN 802.11a/n) / 5260 - 5320 MHz (WLAN 802.11a/n) 5500 - 5700 MHz (WLAN 802.11 a/n) / 5745 - 5805 MHz (WLAN 802.11a/n)
Conducted Power:	32.41 dBm GSM 850 / 29.28 dBm GSM 1900 / 22.45 dBm UMTS V 22.30 dBm UMTS II / 16.03 dBm 2.4 GHz WLAN 802.11b 11.78 dBm 5.2 GHz WLAN 802.11a / 12.16 dBm 5.3 GHz WLAN 802.11a 12.18 dBm 5.5 GHz WLAN 802.11a / 12.16 dBm 5.8 GHz WLAN 802.11a
Max. SAR Measurement:	0.80 W/kg GSM 850 Body SAR / 0.90 W/kg GSM 1900 Body SAR 0.63 W/kg UMTS V Body SAR / 0.97 W/kg UMTS II Body SAR 0.73 W/kg 2.4 GHz WLAN 802.11b Body SAR 0.30 W/kg 5.2 GHz WLAN 802.11a / 0.31 W/kg 5.3 GHz WLAN 802.11a 0.23 W/kg 5.5 GHz WLAN 802.11a / 0.15 W/kg 5.8 GHz 802.11a WLAN 802.11a
Test Device S/N:	Pre-Production [S/N: IMEI 355691040001510]

Note: This revised Test Report (S/N: 0Y1101100075-R1.A3L) supersedes and replaces the previously issued test report on the same subject EUT for the same type of testing as indicated.

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

ilac-MRA ACCREDITED TESTING LABORATORY CERTIFICATE #2041.01

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1 INTRODUCTION

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

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

1.1 SAR Definition

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

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

Figure 1-1
SAR Mathematical Equation

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

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

where:

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

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

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2 TEST SITE LOCATION

2.1 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.

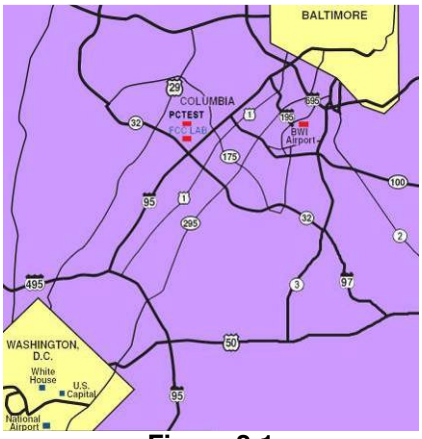

Figure 2-1
Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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.

2.2 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

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3 SAR MEASUREMENT SETUP

3.1 Robotic System

Measurements are performed using the DASY4 automated dosimetric assessment system. The DASY4 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the SAM phantom containing the head or body equivalent material. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Figure 3-1).

3.2 System Hardware

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

3.3 System Electronics

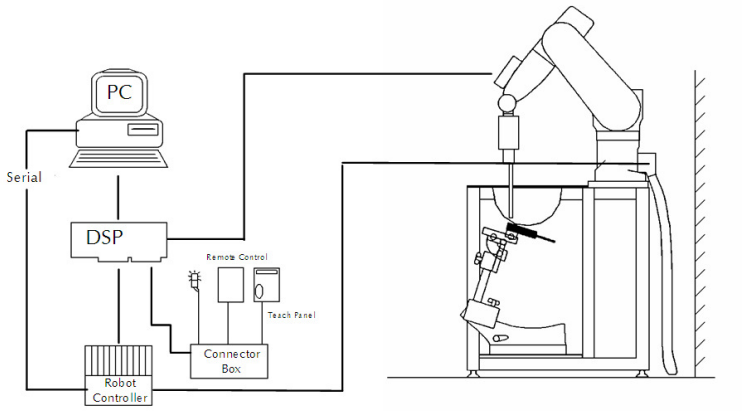

Figure 3-1
SAR Measurement System Setup

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

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3.4 Automated Test System Specifications

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

Data Acquisition Electronic System (DAE)

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

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

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

Figure 3-2
SAR Measurement System

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4 DASY E-FIELD PROBE SYSTEM

4.1 Probe Measurement System

Figure 4-1
SAR System

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

4.2 Probe Specifications

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

Figure 4-2
Near-Field Probe

Figure 4-3
Triangular Probe Configuration

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5 PROBE CALIBRATION PROCESS

5.1 Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm^2) using an RF Signal generator, TEM cell, and RF Power Meter.

5.2 Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm^2.

5.3 Temperature Assessment

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

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

where:

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

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

where:

σ = simulated tissue conductivity,
ρ = Tissue density (1.25 g/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.

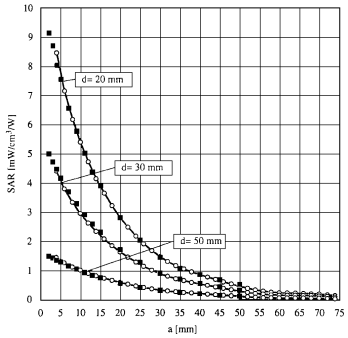

Figure 5-1 E-Field and Temperature measurements at 900MHz [9]

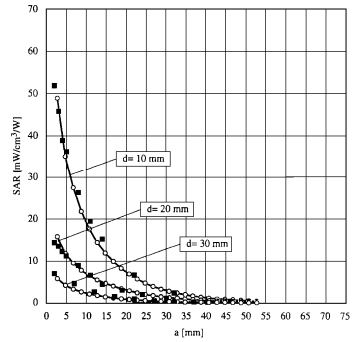

Figure 5-2 E-Field and temperature measurements at 1.9GHz [9]

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6 PHANTOM AND EQUIVALENT TISSUES

6.1 SAM Phantoms

Figure 6-1
SAM Phantoms

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

6.2 Tissue Simulating Mixture Characterization

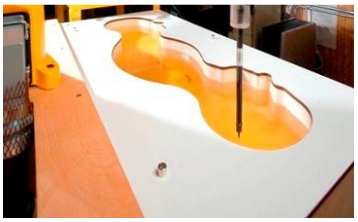

Figure 6-2
SAM Phantom with Simulating Tissue

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

Table 6-1
Composition of the Tissue Equivalent Matter

Frequency (MHz)	835	1900	2450	5200-5800
Tissue	Body	Body	Body	Body
Ingredients (% by weight)				
Bactericide	0.1			
Diacetin				
DGBE		29.44	26.7	
HEC	1			
NaCl	0.94	0.39	0.1	
Sucrose	44.9			
Triton X-100				10.67
Diethylenglycol monohexylether				10.67
Water	53.06	70.17	73.2	78.66

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7 DOSIMETRIC ASSESSMENT & PHANTOM SPECS

7.1 Measurement Procedure

The evaluation was performed using the following procedure:

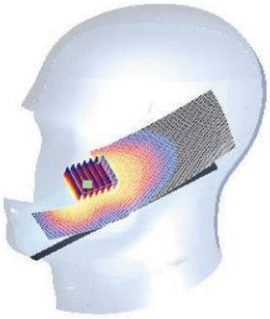

Figure 7-1
Sample SAR Area Scan

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 evaluation was repeated.
5. For 5 GHz testing finer resolution zoom scans were preformed as specified by FCC SAR Measurement Requirements for 3 – 6 GHz, KDB pub 865664. The 5 GHz zoom scan requires a minimum volume of 24mm x 24mm x 20mm and 7 x 7 x 11 points.

7.2 Specific Anthropomorphic Mannequin (SAM) Specifications

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

Figure 7-2
SAM Twin Phantom Shell

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8 FCC RF EXPOSURE LIMITS

8.1 Uncontrolled Environment

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

8.2 Controlled Environment

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

Table 8-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

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

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

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9 ANTENNA LOCATIONS AND KEY FEATURES

9.1 Antenna and Key Feature Information for GT-P7100

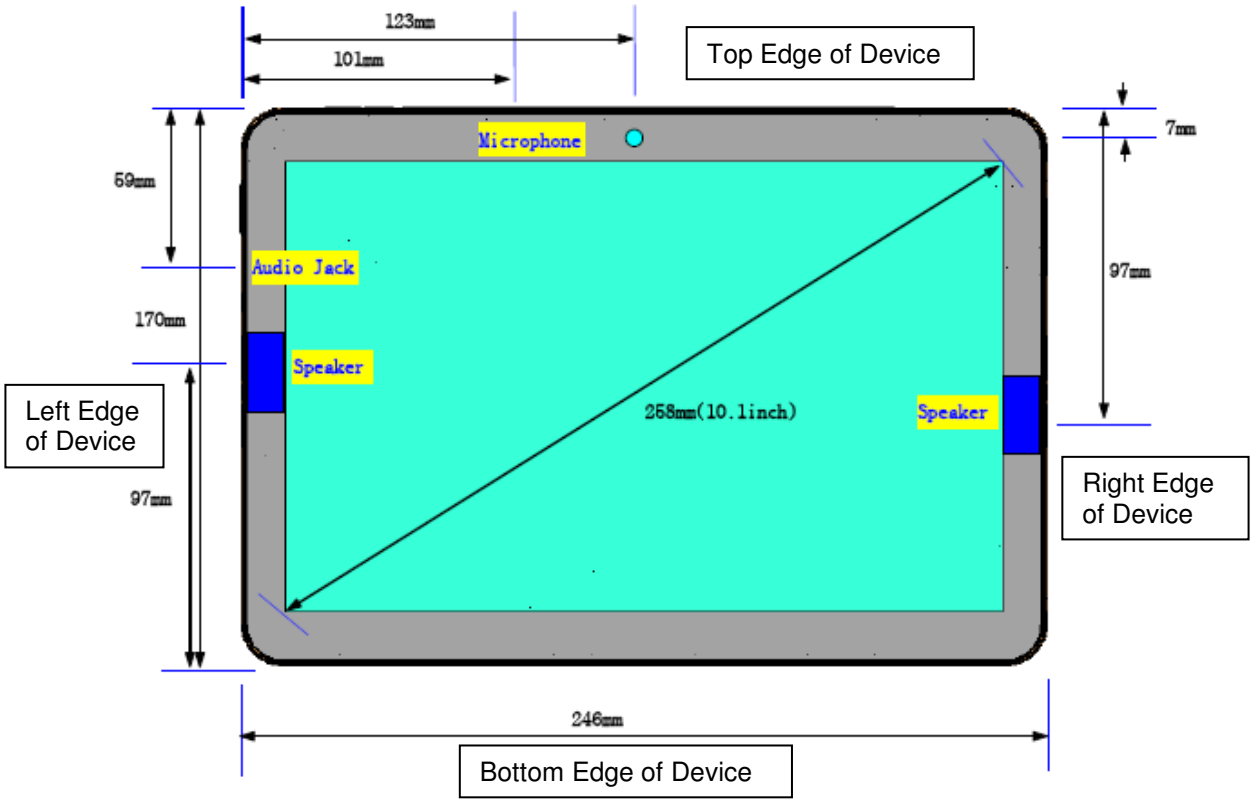

Figure 9-1 Front of Device View

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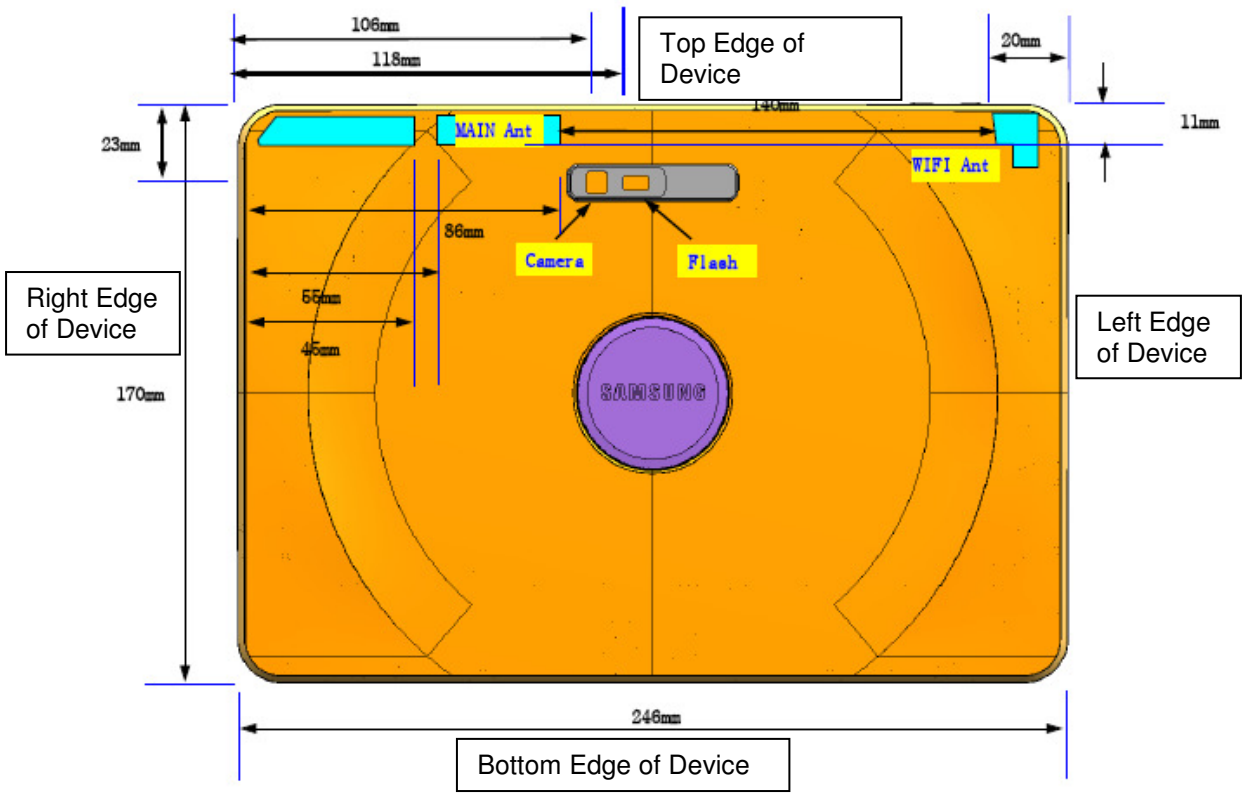

Figure 9-2 Rear of Device View

See back-off sensor operational description for sensor size and location.

Note: Rear camera is not for video calls but for standard digital camera functions

9.2 Proximity Sensor Information

The back sensor pad is located near the upper half of the device (below the main antenna). The top edge sensor pad is located along the top edge adjacent to the main antenna. Both pads are sufficient in size to cover exposure conditions to the main antenna. See technical description for sensor size and location. Back off sensor levels are provided in section 11.4

9.3 Display Orientations Capabilities

The device is capable of all display orientations for all transmit capabilities. Display auto-rotates.

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10 SAR TESTING CONSIDERATIONS & FCC KDB INQUIRIES

10.1 Tablet testing for SAR

Lap-touching devices that have transmitting antennas located less than 20 cm from the lap of the user require routine SAR evaluation. Such devices are considered portable and are capable of being held to the body. Devices are to be setup touching the phantom and are configured with maximum output power during SAR assessment for a worst-case SAR evaluation. Per FCC KDB Publication 447498, the tablet (notepad) computer was set up for testing for all sides with auto-rotation capability, including portrait and landscape positions touching the phantom.

10.2 HSPA Test Considerations for SAR Testing

Since the SAR test setup for HSPA is typically problematic due to static ETFCI and AG requirements for the duration of the SAR test, as long as the maximum average output power for WCDMA and HSPA are similar, testing in WCDMA mode is performed, which also facilitates the exclusion of HSPA testing. HSPA testing was excluded based on the conducted power measurement according to KDB Publication 941225.

10.3 Distance Thresholds for SAR Testing

Per KDB 447498 Publication 4. b) ii), SAR is required for each antenna located within 5 cm of the tablet edge closest to the user for the applicable display orientation, but for antenna(s) located ≥ 5 cm from this edge, the test reduction and exclusion procedures for laptop computers in KDB 616217 are applied.

Table 10-1 SAR Requirement Table per KDB pub 616217 D01

Antenna Output Power (mW)	$\leq 60/f_{(GHz)}$	$> 60/f_{(GHz)}$
Individual Transmitter or Antenna	SAR not required	Antenna-to-user distance – ≥ (5 + ½·n) cm: test SAR on highest output channel only < (5 + ½·n) cm: test SAR according to normal procedures
Simultaneous Transmitting Antennas	SAR not required: antenna-to-antenna or antenna-to-person distance ≥ 5 cm	SAR not required: antenna-to-antenna ≥ (5 + ½·n_x + ½·n_y) and antenna-to-person ≥ (5 + ½·n_x) cm
	SAR not required: when ∑ (SAR_{1g}) < SAR limit, antenna-to-antenna distances > 5 cm and antenna-to-user distance > 5 cm if output > 60/f	
	otherwise, test antenna(s) using highest SAR configuration for the individual transmitter/antenna	

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Table 10-2 Distance Thresholds per KDB 616217 Publication

Mode	Freq (GHz)	Power (mW)	60/f	n=P/(60/f)-1	distance thres in cm (5+1/2n)
GPRS850	0.835	1741	71.86	23.23	16.6
UMTS V	0.835	176	71.86	1.45	5.7
GPRS1900	1.88	847	31.91	25.54	17.8
UMTS II	1.88	170	31.91	4.33	7.2
WIFI b	2.437	40	24.62	0.62	5.3
WIFI b	2.437	15	24.62	-0.39	4.8
WIFI g	2.437	16	24.62	-0.35	4.8
WIFI a	5.8	16	10.34	0.55	5.3
WIFI a	5.2	16	11.54	0.39	5.2

Note: GSM Modes represent burst power

According to KDB 616217 publication and the antenna distances from the user to the edges of the device, the main WWAN antenna is required to be tested for SAR at the top edge and back of the device for all technologies, while the WLAN antenna is required to be tested for SAR at the back, top and left edges of the device. Even though WWAN antenna required only top and back edges to be tested, all other sides of the tablet were additionally evaluated.

10.4 Additional SAR Testing for the Back and Top of the Device

Based on the type and implementation of each of the sensors, testing lab KDB Inquiry 586872 requires sensor information regarding: (1) additional SAR evaluation at a conservative distance from the device where power back-off is de-activated, and (2) reliability sensor activation data. Reliability sensor activation data is provided for both the back and top edge of the tablet at 0° to cover direct usage and also at 45° to cover angled usage (See Table 10-3, 10.3, and Table 10-5). Since the back-off sensor activation distance at 45° was greater than 7 mm for the top edge, a conservative distance of 5 mm was tested. Details about sensing mechanism and sensor pad locations are included in the technical description.

There are two sensors on the device. One sensor is located on the back of the device and the other sensor is located on the top edge. Please see below for sensor activation/de-activation information:

Table 10-3
Body Sensor Distance from Back of Tablet

distance in mm	9	10	11	12	13	14
Condition of Sensor in the back of the device	on	on	on	on	off	off

Please see Figure **10-1** for power vs. back-off distance plots for each mode.

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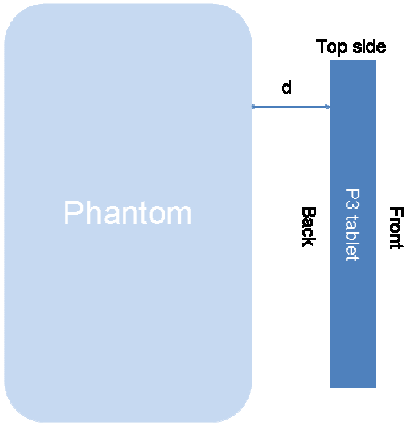
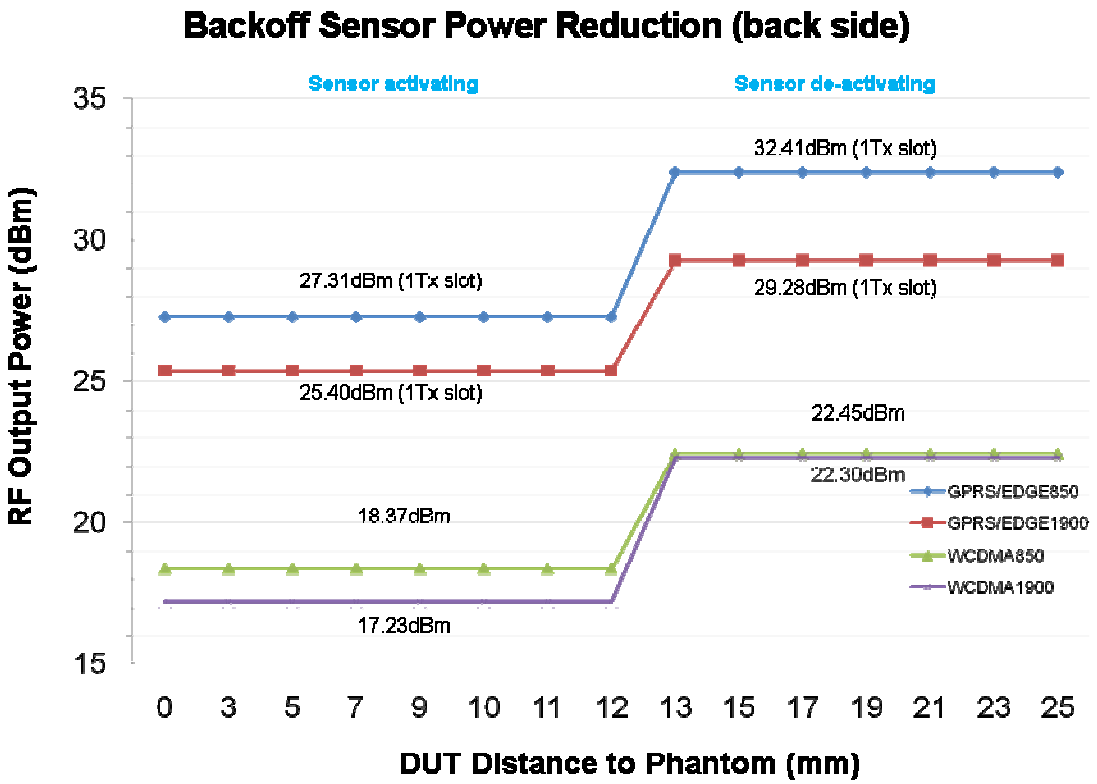
Backoff Sensor Power Reduction (back side)





GRPS/EDGE 2Tx, 3Tx and 4Tx slot have same sensor power reduction in 850 and 1900 band, respectively

Figure 10-1
Back off Power Reduction Graph – Back Sensor

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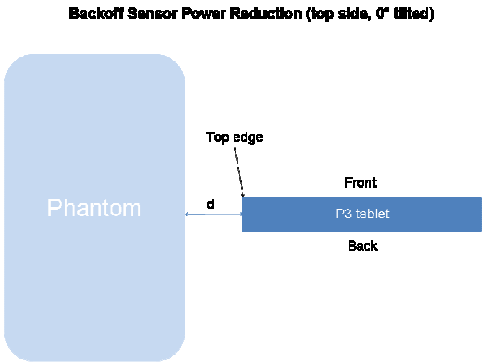
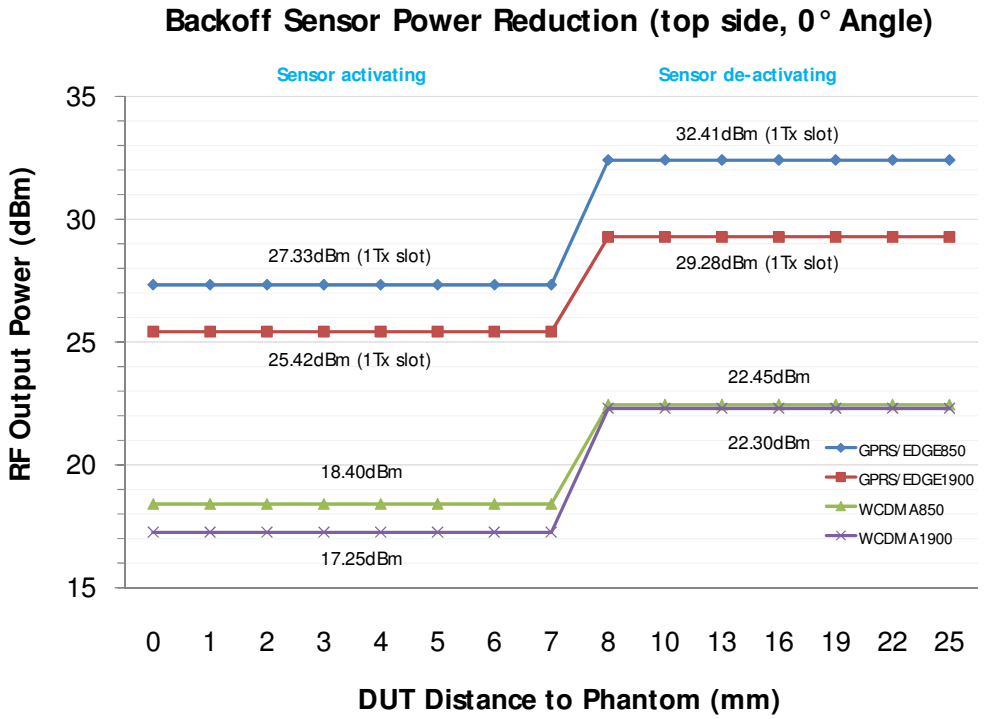
Table 10-4
Body Sensor Distance from Top of Tablet - 0° Angle

distance in mm	5	6	7	8	9	10
Condition of Sensor in the back of the device	on	on	on	off	off	off

Please see Figure 10-2 for power vs. back-off distance plots for each mode.



Note: Angle mentioned for top edge description is the perpendicular angle.
Above figure represents "0 degrees"



GRPS/EDGE 2Tx, 3Tx and 4Tx slot have same sensor power reduction in 850 and 1900 band, respectively

Figure 10-2
Back off Power Reduction Graph – Top Sensor at 0° Angle

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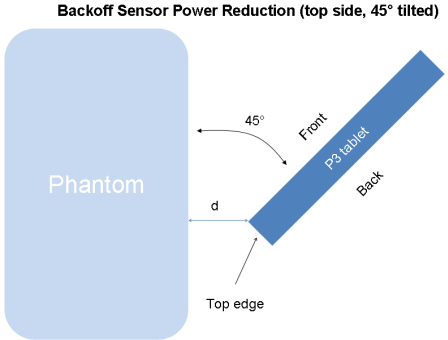
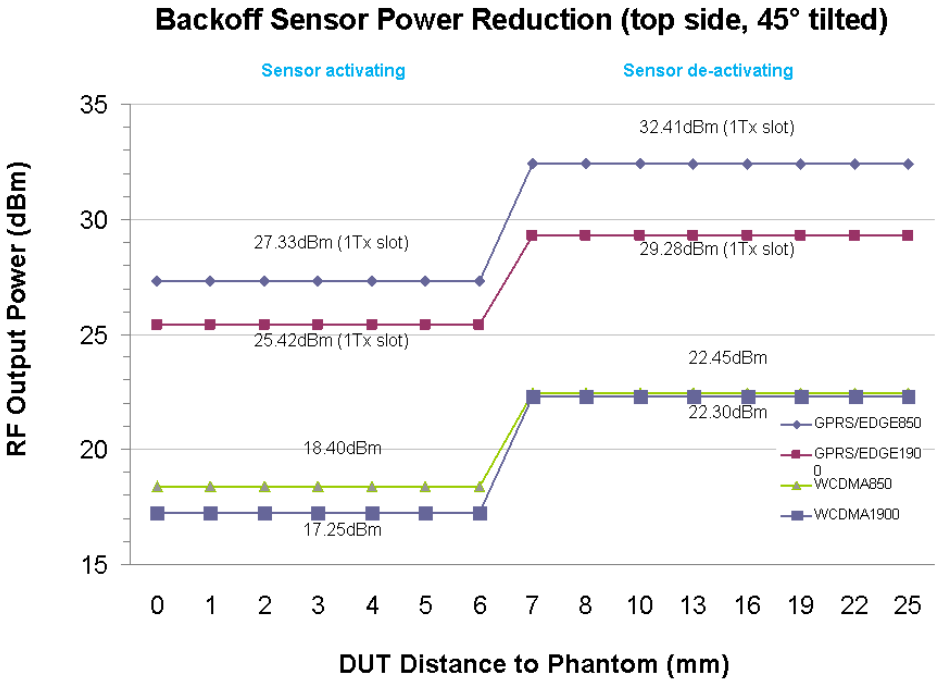
Table 10-5
Body Sensor Distance from Top of Tablet - 45° Angle

distance in mm	5	6	7	8	9	10
Condition of Sensor in the back of the device	on	on	off	off	off	off

Please see Figure 10-3 for power vs. back-off distance plots for each mode.



Note: Angle mentioned for top edge description is the perpendicular angle.
Above figure represents "45 degrees" between the screen face and phantom face.



GRPS/EDGE 2Tx, 3Tx and 4Tx slot have same sensor power reduction in 850 and 1900 band, respectively

Figure 10-3
Back off Power Reduction Graph – Back Sensor at 45° Angle

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10.5 Method of SAR Measurement with Power Reduction

Based on the power-reduction activation vs. distance results for the sensors, the device was tested touching the phantom with the sensors activated and additionally at a conservative 10 mm distance with the sensor de-activated (max power, no back-off) from the back side and 5 mm from the top edge.

To test SAR with power back-off sensor active while touching, the device was placed in maximum power transmit mode with a base station simulator. The device was then positioned to touching position under the tissue equivalent liquid-filled flat phantom, to activate the proximity sensors.

For the additional SAR measurements with the sensors de-activated when the device is positioned away from the user, SAR is needed to be evaluated with power back-off at 10 mm (from the back) and 5mm (from the edge), since the device sensor detection mechanism may be active at these distances, the sensors had to be disabled via manufacturer test software for SAR test purposes. The device was then placed in maximum power transmit mode with a base station simulator under the tissue equivalent liquid-filled flat phantom at a distance of 10 mm for the back and 5 mm for the top edge with the sensors deactivated (via manufacturer test software) and then tested at maximum power.

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11 FCC 3G MEASUREMENT PROCEDURES

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

11.1 Procedures Used to Establish RF Signal for SAR

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

11.2 SAR Measurement Conditions for HSPA Data Devices

11.2.1 Body SAR Measurements

SAR for body exposure configurations are measured according to the 'Body SAR Measurements' procedures in the 'WCDMA Handsets' section of the FCC 3G document. In addition, body SAR is also measured for HSPA when the maximum average output of each RF channel with HSPA active is at least ¼ dB higher than that measured without HSPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP is applicable for head exposure, SAR is not required when the maximum output of each RF channel with HSPA is less than ¼ dB higher than that measured using 12.2 kbps RMC; otherwise, the same HSPA configuration used for body measurements should be used to test for head exposure.

Due to inner loop power control requirements in HSPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and EDCH configurations for HSPA should be configured according to the β values indicated below as well as other applicable procedures described in the 'WCDMA Handset' and 'Release 5 HSDPA Data Devices' sections of the FCC 3G document.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}: 47/15 β_{ed2}: 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

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11.3 RF Conducted Powers

11.3.1 GSM Conducted Powers (Burst Power)

		RF Conducted Power Table - Without Power Back Off							
		GPRS Data				*EDGE Data*			
Band	**Channel**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
Cellular	128	32.41	29.35	27.34	27.35	26.52	26.53	26.56	23.40
	190	32.37	29.35	27.32	27.35	26.55	26.52	26.53	23.44
	251	32.28	29.36	27.37	27.39	26.53	26.52	26.56	23.52
PCS	512	29.26	26.41	24.45	24.45	25.50	25.50	24.18	22.49
	661	29.25	26.39	24.47	24.51	25.46	25.53	24.20	22.48
	810	29.28	26.39	24.54	24.53	25.55	25.59	24.26	22.55

Top Edge Sensor		RF Conducted Power Table - With Power Back Off							
		GPRS Data				*EDGE Data*			
Band	**Channel**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
Cellular	128	27.33	24.29	22.38	22.40	21.43	21.48	21.45	18.34
	190	27.36	24.33	22.35	22.38	21.46	21.49	21.49	18.47
	251	27.36	24.32	22.41	22.44	21.55	21.55	21.54	18.51
PCS	512	25.37	22.56	20.57	20.54	21.59	21.60	20.24	18.74
	661	25.37	22.52	20.54	20.57	21.53	21.55	20.26	18.71
	810	25.42	22.59	20.62	20.62	21.57	21.63	20.33	18.79

Back Sensor		RF Conducted Power Table back - With Power Back Off							
		GPRS Data				*EDGE Data*			
Band	**Channel**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
Cellular	128	27.31	24.30	22.37	22.41	21.45	21.49	21.49	18.36
	190	27.38	24.31	22.35	22.42	21.46	21.47	21.50	18.47
	251	27.38	24.29	22.45	22.45	21.53	21.60	21.57	18.52
PCS	512	25.37	22.56	20.54	20.57	21.58	21.57	20.25	18.74
	661	25.35	22.53	20.53	20.55	21.55	21.56	20.27	18.70
	810	25.40	22.57	20.65	20.66	21.59	21.61	20.35	18.76

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

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11.3.2 HSPA Conducted Powers

WCDMA Conducted Powers Without Power Backoff

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			βc	βd	ΔE-DPCCH	# of E-TFCI's	MPR
			4132	4183	4233	9262	9400	9538					
99	WCDMA	12.2 kbps RMC	**22.45**	22.28	22.33	**22.30**	22.19	22.27	-	-	-	-	-
6	HSDPA	Subtest 1	**22.44**	22.33	22.38	**22.46**	22.25	22.36	2	15			0
6		Subtest 2	22.25	22.14	22.18	22.21	22.10	22.24	11	15			0
6		Subtest 3	21.98	21.85	21.89	21.93	21.74	21.89	15	8	5	1	0.5
6		Subtest 4	21.77	21.63	21.60	21.62	21.47	21.71	15	4	5	1	0.5
6	HSUPA	Subtest 1	**22.50**	22.38	22.43	**22.38**	22.21	**22.38**	10	15	6	5	0
6		Subtest 2	20.29	20.19	20.19	20.39	20.21	20.35	6	15	8	5	2
6		Subtest 3	21.34	21.21	21.24	21.23	21.15	21.26	15	9	8	2	1
6		Subtest 4	20.54	20.45	20.43	20.63	20.53	20.58	2	15	5	5	2
6		Subtest 5	22.23	22.13	22.15	22.10	22.01	22.15	14	15	7	5	0

WCDMA Conducted Powers With Power Backoff - Top Edge Sensor

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			βc	βd	ΔE-DPCCH	# of E-TFCI's	MPR
			4132	4183	4233	9262	9400	9538					
99	WCDMA	12.2 kbps RMC	18.40	18.25	18.28	17.25	17.17	17.22	-	-	-	-	-
6	HSDPA	Subtest 1	18.42	18.32	18.30	17.40	17.24	17.38	2	15			0
6		Subtest 2	18.48	18.37	18.38	17.29	17.14	17.40	11	15			0
6		Subtest 3	18.46	18.34	18.34	17.37	17.16	17.36	15	8	5	1	0.5
6		Subtest 4	18.49	18.35	18.35	17.27	17.20	17.42	15	4	5	1	0.5
6	HSUPA	Subtest 1	18.45	18.37	18.35	17.30	17.12	17.35	10	15	6	5	0
6		Subtest 2	17.00	16.95	16.99	17.10	16.90	17.03	6	15	8	5	2
6		Subtest 3	17.88	17.78	17.74	14.49	14.15	14.28	15	9	8	2	1
6		Subtest 4	18.46	18.39	18.37	17.47	17.35	17.47	2	15	5	5	2
6		Subtest 5	18.45	18.36	18.36	17.23	17.22	17.37	14	15	7	5	0

WCDMA Conducted Powers With Power Backoff - Back Sensor

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			βc	βd	ΔE-DPCCH	# of E-TFCI's	MPR
			4132	4183	4233	9262	9400	9538					
99	WCDMA	12.2 kbps RMC	18.37	18.23	18.28	17.23	17.11	17.29	-	-	-	-	-
6	HSDPA	Subtest 1	18.41	18.32	18.30	17.39	17.25	17.36	2	15			0
6		Subtest 2	18.50	18.36	18.39	17.31	17.13	17.40	11	15			0
6		Subtest 3	18.47	18.34	18.35	17.37	17.15	17.36	15	8	5	1	0.5
6		Subtest 4	18.48	18.35	18.36	17.28	17.20	17.40	15	4	5	1	0.5
6	HSUPA	Subtest 1	18.49	18.37	18.36	17.29	17.13	17.37	10	15	6	5	0
6		Subtest 2	16.95	16.93	16.94	17.03	16.94	17.08	6	15	8	5	2
6		Subtest 3	17.89	17.77	17.72	14.52	14.16	14.27	15	9	8	2	1
6		Subtest 4	18.52	18.36	18.35	17.44	17.31	17.32	2	15	5	5	2
6		Subtest 5	18.46	18.36	18.37	17.24	17.19	17.37	14	15	7	5	0

Figure 11-1
Power Measurement Setup

MPR is not implemented when the sensor is active since the power is lower than the maximum output power. Behavior in HSUPA Subtest 2 and 3 are confirmed as acceptable by the applicant's operation with the chipset and sensor operation.

11.4 Summary of Power Reduction due to Proximity Sensor

Modes	Power Reduction Top Edge Sensor (dB)	Power Reduction Back Sensor (dB)
850 GPRS/EDGE	5	5
1900 GPRS/EDGE	4	4
850 WCDMA	4	4
1900 WCDMA	5	5

Note: There is no proximity sensor power reduction for WLAN modes.

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12 SAR TESTING WITH IEEE 802.11 TRANSMITTERS

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

12.1 General Device Setup

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

12.2 Frequency Channel Configurations [27]

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

Table 12-1
802.11 Test Channels per FCC Requirements

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

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Table 12-2
IEEE 802.11b Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 1	2	5.5	11
802.11b	2412	1	16.03	16.05	16.14	16.20
802.11b	2437	6	15.85	16.04	15.94	16.05
802.11b	2462	11	15.93	16.04	16.03	16.17

Table 12-3
IEEE 802.11g Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 6	9	12	18	24	36	48	54
802.11g	2412	1	14.09	14.24	13.94	14.09	13.84	13.93	13.72	13.66
802.11g	2437	6	14.16	14.10	14.11	14.18	13.83	13.89	13.86	13.87
802.11g	2462	11	14.12	14.04	13.85	14.10	13.91	14.19	13.92	13.91

Table 12-4
IEEE 802.11n Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 6.5	13	20	26	39	52	58	65
802.11n	2412	1	12.05	11.99	11.80	11.82	11.92	11.86	12.11	11.82
802.11n	2437	6	12.02	11.86	12.04	11.79	12.00	11.77	11.70	11.97
802.11n	2462	11	11.96	11.88	11.81	11.83	11.90	11.91	11.89	11.78

Table 12-5
IEEE 802.11a Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 6	9	12	18	24	36	48	54
802.11a	**5180**	**36**	11.42	11.65	11.65	11.48	11.50	11.52	11.50	11.58
802.11a	5200	40	11.55	11.64	11.59	11.71	11.76	11.58	11.58	11.64
802.11a	5220	44	11.40	11.46	11.61	11.70	11.69	11.53	11.65	11.55
802.11a	**5240**	**48**	11.78	11.86	11.98	11.84	11.81	11.89	11.98	12.02
802.11a	5260	52	11.98	11.96	11.93	12.09	12.00	12.06	12.01	11.99
802.11a	**5280**	**56**	11.96	11.92	12.03	11.95	11.96	12.03	12.16	12.07
802.11a	5300	60	11.71	11.86	11.65	11.78	11.73	11.79	11.99	11.96
802.11a	**5320**	**64**	**12.16**	12.01	12.22	12.07	12.19	12.18	12.18	12.09
802.11a	5500	100	12.37	12.46	12.53	12.52	12.47	12.50	12.51	12.52
802.11a	**5520**	**104**	12.36	12.35	12.45	12.58	12.43	12.50	12.40	12.36
802.11a	5540	108	12.34	12.48	12.49	12.32	12.39	12.37	12.34	12.34
802.11a	5560	112	12.21	12.04	12.20	12.17	12.19	12.14	12.15	12.34
802.11a	**5580**	**116**	**12.18**	11.95	12.16	12.12	12.01	12.07	12.11	11.96
802.11a	5600	120	11.90	11.77	11.93	11.94	11.99	12.06	11.88	11.95
802.11a	**5620**	**124**	11.61	11.71	11.69	11.73	11.89	11.75	11.63	11.79
802.11a	5640	128	11.62	11.54	11.66	11.47	11.48	11.68	11.44	11.42
802.11a	5660	132	11.54	11.43	11.08	11.14	11.37	11.00	11.46	11.35
802.11a	**5680**	**136**	11.13	11.24	11.21	11.45	11.39	11.27	11.10	11.13
802.11a	5700	140	11.43	11.42	11.47	11.55	11.61	11.54	11.58	11.48
802.11a	**5745**	**149**	12.16	12.08	12.17	12.23	12.19	12.11	12.18	12.13
802.11a	5765	153	12.12	12.03	12.09	12.20	12.23	12.14	12.21	12.08
802.11a	**5785**	**157**	**12.05**	12.15	12.08	12.08	12.04	12.05	11.95	12.11
802.11a	**5805**	**161**	12.08	12.09	12.08	12.22	12.16	12.06	12.05	12.09

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Table 12-6
IEEE 802.11n Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps]							
			6.5	13	20	26	39	52	58	65
802.11n	**5180**	**36**	9.99	9.69	10.10	9.79	10.12	10.21	10.02	9.86
802.11n	5200	40	9.99	10.16	9.97	10.08	9.98	9.90	10.14	10.03
802.11n	5220	44	10.09	10.09	10.14	10.37	10.31	10.07	10.15	10.41
802.11n	**5240**	**48**	10.05	10.22	10.34	10.11	10.38	10.38	10.32	10.16
802.11n	**5260**	**52**	10.31	10.46	10.45	10.32	10.31	10.56	10.28	10.59
802.11n	5280	56	10.42	10.37	10.34	10.54	10.52	10.48	10.44	10.44
802.11n	5300	60	10.35	10.58	10.44	10.58	10.57	10.41	10.59	10.59
802.11n	**5320**	**64**	10.52	10.48	10.61	10.52	10.43	10.38	10.50	10.54
802.11n	5500	100	10.36	10.36	10.52	10.45	10.53	10.52	10.55	10.50
802.11n	**5520**	**104**	10.42	10.33	10.37	10.42	10.54	10.48	10.38	10.49
802.11n	5540	108	10.45	10.46	10.45	10.30	10.26	10.35	10.46	10.56
802.11n	5560	112	10.05	10.12	10.23	10.41	10.20	10.36	10.34	10.34
802.11n	**5580**	**116**	10.27	10.15	10.00	10.24	10.03	10.03	10.30	10.27
802.11n	5600	120	9.96	10.05	9.86	10.19	10.09	10.34	10.09	10.12
802.11n	**5620**	**124**	9.71	9.67	9.91	9.95	9.93	9.84	9.72	9.73
802.11n	5640	128	9.46	9.54	9.48	9.53	9.68	9.67	9.75	9.55
802.11n	5660	132	9.30	9.33	9.61	9.39	9.53	9.46	9.60	9.46
802.11n	**5680**	**136**	9.00	9.21	9.23	9.34	9.27	9.39	9.40	9.30
802.11n	5700	140	9.28	9.28	9.40	9.41	9.44	9.57	9.50	9.40
802.11n	**5745**	**149**	9.90	9.79	9.95	10.05	9.94	10.15	10.09	10.21
802.11n	5765	153	10.05	9.94	10.01	10.03	10.05	10.10	9.80	9.75
802.11n	**5785**	**157**	9.80	9.85	9.84	9.76	10.04	9.89	10.02	10.08
802.11n	**5805**	**161**	9.70	9.73	9.86	9.89	10.12	9.97	9.97	9.98

Figure 12-1
Power Measurement Setup

Notes:

1. The maximum RF output power for all channels across all data rates was measured.
2. Per KDB 248227 Publication, since the SAR < 0.8 W/kg, the highest default channel per 5 GHz band across the lowest data rates were evaluated for SAR.
3. WIFI has no power back-off capability in this device.
4. 5825 MHz transmission is not supported in this device.

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13 SYSTEM VERIFICATION

13.1 Tissue Verification

Table 13-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
01/18/2011	835B	820	0.969	55.41	0.969	55.284	0.00%	0.23%
		835	0.986	55.25	0.970	55.200	1.65%	0.09%
		850	0.994	55.20	0.988	55.154	0.61%	0.08%
01/17/2011	1900B	1850	1.504	53.90	1.520	53.300	-1.05%	1.13%
		1880	1.535	53.76	1.520	53.300	0.99%	0.86%
		1910	1.569	53.64	1.520	53.300	3.22%	0.64%
01/19/2011	1900B	1850	1.462	52.89	1.520	53.300	-3.82%	-0.77%
		1880	1.506	52.79	1.520	53.300	-0.92%	-0.96%
		1910	1.545	52.77	1.520	53.300	1.64%	-0.99%
01/21/2011	835B	820	0.965	54.75	0.969	55.284	-0.41%	-0.97%
		835	0.984	54.58	0.970	55.200	1.44%	-1.12%
		850	0.996	54.30	0.988	55.154	0.81%	-1.55%
01/21/2011	2450B	2401	1.951	51.54	1.903	52.765	2.52%	-2.32%
		2450	2.013	51.35	1.950	52.700	3.23%	-2.56%
		2499	2.092	51.23	2.019	52.638	3.62%	-2.67%
01/23/2011	5200B-5800B	5170	5.375	47.51	5.264	49.055	2.11%	-3.15%
		5210	5.421	47.83	5.311	49.001	2.07%	-2.40%
		5250	5.526	47.80	5.358	48.946	3.14%	-2.34%
		5270	5.534	47.71	5.381	48.919	2.84%	-2.47%
		5310	5.589	47.43	5.428	48.865	2.97%	-2.94%
		5350	5.636	47.57	5.470	48.811	3.03%	-2.54%
		5470	5.813	46.87	5.615	48.648	3.53%	-3.65%
		5510	5.888	47.08	5.661	48.594	4.01%	-3.12%
		5550	5.950	47.00	5.708	48.539	4.24%	-3.16%
		5570	5.974	46.64	5.731	48.512	4.24%	-3.86%
		5610	6.019	46.89	5.778	48.458	4.17%	-3.24%
		5650	6.091	46.72	5.825	48.404	4.57%	-3.47%
		5670	6.120	46.62	5.848	48.376	4.65%	-3.62%
		5710	6.182	46.32	5.895	48.322	4.87%	-4.15%
		5750	6.226	46.63	5.942	48.268	4.78%	-3.39%
		5770	6.262	46.41	5.965	48.241	4.98%	-3.80%
		5810	6.305	46.42	6.012	48.186	4.87%	-3.66%

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

The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies (per IEEE 1528 6.6.1.2). The SAR test plots may slightly differ from the table above since the DASY software rounds to three significant digits.

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13.2 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):

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

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 $j = \sqrt{-1}$.

13.3 Justification for Extended SAR Dipole Calibrations

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

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

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

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

D5GHzV2 SN: 1007				
Date of Measurement	Return Loss (dB)	**Δ %**	Impedance (Ω)	**ΔΩ**
8/19/2009	-35.2		49.7	
8/19/2010	-31.5	**-10.5%**	48.4	**-1.3**

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13.4 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 13-2
System Verification Results

System Verification TARGET & MEASURED										
Date:	Amb. Temp (℃)	Liquid Temp (℃)	Input Power (W)	Tissue Frequency (MHz)	Dipole SN	Tissue Type	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	Deviation (%)
01/17/2011	23.7	22.3	0.040	1900	5d080	Body	1.61	40.500	40.25	-0.62%
01/18/2011	24.3	22.5	0.063	835	4d026	Body	0.627	9.78	9.952	1.76%
01/19/2011	23.9	22.3	0.040	1900	5d080	Body	1.52	40.500	38.00	-6.17%
01/21/2011	24.0	22.3	0.063	835	4d026	Body	0.634	9.780	10.0635	2.90%
01/21/2011	24.4	22.7	0.0158	2450	719	Body	0.846	51.400	53.544	4.17%
01/24/2011	23.5	21.9	0.025	5200	1007	Body	2.02	78.900	80.80	2.41%
01/24/2011	22.7	21.4	0.025	5500	1007	Body	1.99	84.100	79.60	-5.35%
01/24/2011	22.9	21.6	0.025	5800	1007	Body	1.85	72.300	74.00	2.35%

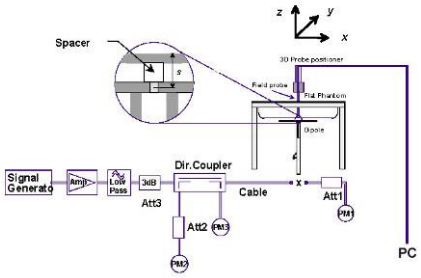

Figure 13-1
System Verification Setup Diagram

Figure 13-2
System Verification Setup Photo

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14 SAR DATA SUMMARY

Table 14-1
850 GSM Body SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Mode	Service	C_Power[dBm]		Spacing	# of GPRS Slots	Side	SAR (1g)
MHz	Ch.			Start	End				(W/kg)
836.60	190	GSM 850	GPRS	22.42	22.37	0 cm	4	back*	**0.679**
836.60	190	GSM 850	GPRS	27.35	27.40	1.0 cm	4	back	**0.191**
836.60	190	GSM 850	GPRS	22.38	22.34	0 cm	4	Top*	**0.796**
836.60	190	GSM 850	GPRS	27.35	27.35	0.5 cm	4	Top	**0.125**
836.60	190	GSM 850	GPRS	27.35	27.26	0 cm	4	Bottom	**0.007**
836.60	190	GSM 850	GPRS	27.35	27.39	0 cm	4	Right	**0.033**
836.60	190	GSM 850	GPRS	27.35	27.42	0 cm	4	Left	**0.047**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g)** averaged over 1 gram			

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Batteries are fully charged for all readings. Standard battery was used.
5. Liquid tissue depth was at least 15.0 cm.
6. Justification for reduced test configurations per KDB Publication 941225: The source-based time-averaged output power was evaluated for all multi-slot operations. In addition to the worst-case reported, all source-based time-averaged powers within 10% of the worst-case were additionally included in the evaluation.
7. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
8. Asterisk (*) denotes power back off activated.
9. Per lab KDB Inquiry 586872, a conservative additional test distance of 10 mm from the back was tested for SAR at the maximum power, with the back sensor de-activated. Also, a conservative additional test distance of 5 mm from the top edge was chosen to test SAR at maximum power with the top sensor de-activated. See Section 10.4 for more details.

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Table 14-2
1900 GSM Body SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Mode	Service	C_Power[dBm]		Spacing	# of GPRS Slots	Side	SAR (1g)
MHz	Ch.			Start	End				(W/kg)
1880.00	661	GSM 1900	GPRS	20.55	20.49	0 cm	4	back*	**0.676**
1880.00	661	GSM 1900	GPRS	24.51	24.60	1.0 cm	4	back	**0.390**
1850.20	512	GSM 1900	GPRS	20.54	20.49	0 cm	4	Top*	**0.749**
1880.00	661	GSM 1900	GPRS	20.57	20.57	0 cm	4	Top*	**0.814**
1909.80	810	GSM 1900	GPRS	20.62	20.52	0 cm	4	Top*	**0.902**
1880.00	661	GSM 1900	GPRS	24.51	24.43	0.5 cm	4	Top	**0.300**
1880.00	661	GSM 1900	GPRS	24.51	24.59	0 cm	4	Bottom	**0.003**
1880.00	661	GSM 1900	GPRS	24.51	24.60	0 cm	4	Right	**0.030**
1880.00	661	GSM 1900	GPRS	24.51	24.61	0.0 cm	4	Left	**0.001**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g)** averaged over 1 gram			

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Batteries are fully charged for all readings. Standard battery was used.
5. Liquid tissue depth was at least 15.0 cm.
6. Justification for reduced test configurations per KDB Publication 941225: The source-based time-averaged output power was evaluated for all multi-slot operations. In addition to the worst-case reported, all source-based time-averaged powers within 10% of the worst-case were additionally included in the evaluation.
7. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
8. Asterisk (*) denotes power back off activated.
9. Per lab KDB Inquiry 586872, a conservative additional test distance of 10 mm from the back was tested for SAR at the maximum power, with the back sensor de-activated. Also, a conservative additional test distance of 5 mm from the top edge was chosen to test SAR at maximum power with the top sensor de-activated. See Section 10.4 for more details.

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Table 14-3
850 WCDMA Body SAR Results

MEASUREMENT RESULTS								
FREQUENCY		Mode	Service	C_Power[dBm]		Spacing	Side	SAR (1g)
MHz	Ch.			Start	End			(W/kg)
836.60	4183	UMTS V	RMC	18.23	18.23	0 cm	back*	**0.443**
836.60	4183	UMTS V	RMC	22.28	22.30	1.0 cm	back	**0.070**
836.60	4183	UMTS V	RMC	18.25	18.18	0 cm	Top*	**0.625**
836.60	4183	UMTS V	RMC	22.28	22.25	0.5 cm	Top	**0.110**
836.60	4183	UMTS V	RMC	22.28	22.34	0 cm	Bottom	**0.012**
836.60	4183	UMTS V	RMC	22.28	22.31	0 cm	Right	**0.021**
836.60	4183	UMTS V	RMC	22.28	22.38	0 cm	Left	**0.013**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g)** averaged over 1 gram		

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Batteries are fully charged for all readings. Standard battery was used.
5. Liquid tissue depth was at least 15.0 cm.
6. WCDMA mode in Body SAR was tested under RMC 12.2 kbps with HSPA Inactive.
7. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
8. Asterisk (*) denotes power back off activated.
9. Per lab KDB Inquiry 586872, a conservative additional test distance of 10 mm from the back was tested for SAR at the maximum power, with the back sensor de-activated. Also, a conservative additional test distance of 5 mm from the top edge was chosen to test SAR at maximum power with the top sensor de-activated. See Section 10.4 for more details.

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Table 14-4
1900 WCDMA Body SAR Results

MEASUREMENT RESULTS								
FREQUENCY		Mode	Service	C_Power[dBm]		Spacing	Side	SAR (1g)
MHz	Ch.			Start	End			(W/kg)
1852.40	9262	UMTS II	RMC	17.23	17.17	0 cm	back*	**0.956**
1880.00	9400	UMTS II	RMC	17.11	17.09	0 cm	back*	**0.930**
1907.60	9538	UMTS II	RMC	17.29	17.22	0 cm	back*	**0.958**
1880.00	9400	UMTS II	RMC	22.19	22.25	1.0 cm	back	**0.160**
1852.40	9262	UMTS II	RMC	17.25	17.18	0 cm	Top*	**0.830**
1880.00	9400	UMTS II	RMC	17.17	17.10	0 cm	Top*	**0.813**
1907.60	9538	UMTS II	RMC	17.22	17.15	0 cm	Top*	**0.972**
1880.00	9400	UMTS II	RMC	22.19	22.13	0.5 cm	Top	**0.292**
1880.00	9400	UMTS II	RMC	22.19	22.19	0.0 cm	Bottom	**0.004**
1880.00	9400	UMTS II	RMC	22.19	22.16	0.0 cm	Right	**0.034**
1880.00	9400	UMTS II	RMC	22.19	22.10	0.0 cm	Left	**0.000**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g)** averaged over 1 gram		

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Batteries are fully charged for all readings. Standard battery was used.
5. Liquid tissue depth was at least 15.0 cm.
6. WCDMA mode in Body SAR was tested under RMC 12.2 kbps with HSPA Inactive.
7. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
8. Asterisk (*) denotes power back off activated.
9. Per lab KDB Inquiry 586872, a conservative additional test distance of 10 mm from the back was tested for SAR at the maximum power, with the back sensor de-activated. Also, a conservative additional test distance of 5 mm from the top edge was chosen to test SAR at maximum power with the top sensor de-activated. See Section 10.4 for more details.

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Table 14-5
2.4 GHz WLAN Body SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Mode	Service	C_Power[dBm]		Spacing	Data Rate (Mbps)	Side	SAR
MHz	Ch.			Start	End				(W/kg)
2412	1	IEEE 802.11b	DSSS	16.03	15.96	0 cm	1	back	0.726
2412	1	IEEE 802.11b	DSSS	16.03	16.04	0 cm	1	Top	0.180
2412	1	IEEE 802.11b	DSSS	16.03	15.96	0 cm	1	Left	0.212
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g)** averaged over 1 gram			

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Batteries are fully charged for all readings. Standard battery was used.
4. Tissue parameters and temperatures are listed on the SAR plots.
5. Liquid tissue depth was at least 15.0 cm.
6. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes: Highest average RF output power channel for the lowest data rate was selected for WLAN for SAR evaluation. Other IEEE 802.11 modes (including 802.11n), were not investigated since the average output powers were not greater than 0.25 dB than that of the corresponding highest output power channel in the lowest data rate IEEE 802.11b mode per channel.
7. WLAN transmission was verified using a spectrum analyzer.
8. There is no power back-off for WIFI.
9. Based on the output power and the distance of antennas to the edge of the device, only top and left edges were required for SAR testing. See section 10.3 for more details.

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Table 14-6
5 GHz WLAN Body SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Mode	Service	C_Power[dBm]		Spacing	Data Rate (Mbps)	Side	SAR
MHz	Ch.			Start	End				(W/kg)
5240	48	5.2 GHz WLAN	OFDM	11.78	11.71	0.0 cm	6	back	0.131
5240	48	5.2 GHz WLAN	OFDM	11.78	11.79	0.0 cm	6	Top	0.300
5240	48	5.2 GHz WLAN	OFDM	11.78	11.84	0.0 cm	6	Left	0.031
5320	64	5.3 GHz WLAN	OFDM	12.16	12.24	0.0 cm	6	back	0.128
5320	64	5.3 GHz WLAN	OFDM	12.16	12.22	0.0 cm	6	Top	0.307
5320	64	5.3 GHz WLAN	OFDM	12.16	12.11	0.0 cm	6	Left	0.018
5580	116	5.5 GHz WLAN	OFDM	12.18	12.18	0.0 cm	6	back	0.125
5580	116	5.5 GHz WLAN	OFDM	12.18	12.26	0.0 cm	6	Top	0.228
5580	116	5.5 GHz WLAN	OFDM	12.18	12.25	0.0 cm	6	Left	0.032
5745	149	5.8 GHz WLAN	OFDM	12.16	12.22	0.0 cm	6	back	0.071
5745	149	5.8 GHz WLAN	OFDM	12.16	12.24	0.0 cm	6	Top	0.153
5745	149	5.8 GHz WLAN	OFDM	12.16	12.07	0.0 cm	6	Left	0.023
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g)** averaged over 1 gram			

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C.
2. All modes of operation were investigated, and worst-case results are reported.
3. Batteries are fully charged for all readings. Standard battery was used.
4. Tissue parameters and temperatures are listed on the SAR plots.
5. Liquid tissue depth was at least 15.0 cm.
6. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes: Highest average RF output power channel for the lowest data rate was selected for WLAN for SAR evaluation. Other IEEE 802.11 modes (including 802.11n), were not investigated since the average output powers were not greater than 0.25 dB than that of the corresponding highest output power channel in the lowest data rate IEEE 802.11a mode per channel.
7. WLAN transmission was verified using a spectrum analyzer.
8. There is no power back-off for WIFI.
9. Based on the output power and the distance of antennas to the edge of the device, only top and left edges were required for SAR testing. See section 10.3 for more details.

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15 SIMULTANEOUS TRANSMISSION ANALYSIS

15.1 Simultaneous Transmission Information

This device contains multiple transmitters that may operate simultaneously and therefore, require a simultaneous transmission analysis (See Section 15.2)

Bluetooth and WIFI cannot transmit simultaneously since it shares the same circuit path and are switched by the radio.

5GHz WIFI cannot transmit simultaneously with the 2G/3G antenna.

15.2 Simultaneous Transmission Analysis

Simult Tx	Configuration	850 GSM SAR (W/kg)	2.4 GHz WIFI SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	1900 GSM SAR (W/kg)	2.4 GHz WIFI SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.679	0.726	**1.405**	Body SAR	Back	0.676	0.726	**1.402**
	Top	0.796	0.180	**0.976**		Top	0.902	0.180	**1.082**
	Bottom	0.007	-	**0.007**		Bottom	0.003	-	**0.003**
	Right	0.033	-	**0.033**		Right	0.030	-	**0.030**
	Left	0.047	0.212	**0.259**		Left	0.001	0.212	**0.213**
Simult Tx	Configuration	850 WCDMA SAR (W/kg)	2.4 GHz WIFI SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	1900 WCDMA GSM SAR	2.4 GHz WIFI SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.443	0.726	**1.169**	Body SAR	Back	0.958	0.726	**1.684**
	Top	0.625	0.180	**0.805**		Top	0.972	0.180	**1.152**
	Bottom	0.012	-	**0.012**		Bottom	0.004	-	**0.004**
	Right	0.021	-	**0.021**		Right	0.034	-	**0.034**
	Left	0.013	0.212	**0.225**		Left	0.003	0.212	**0.215**

Note: "-" SAR results shown in the table are zero for summation purposes. SAR was not required to be measured due to exclusions mentioned in Section 10.3.

The summation of the 1900 WCDMA and 2.4 GHz WLAN body SAR for the back side is 0.958 W/kg + 0.726 W/kg = 1.684 W/kg, which is greater than 1.6 W/kg.

However, the distance between the peak licensed transmitter head SAR and WLAN head SAR is 16.24 cm (See Figure 15-1). The ratio of the summed max SAR and the distance between the SAR peaks is 1.684 / 16.24 = 0.104, which is less than 0.3.

$$Ratio = \frac{\text{Sum}}{\text{Distance}} = \frac{1.684}{16.24} = 0.104 < 0.3$$

Therefore, a multi-band volumetric simultaneous SAR evaluation is not required for WCDMA 1900 and 2.4 GHz WLAN transmission in body tissue (See Figure 15-1).

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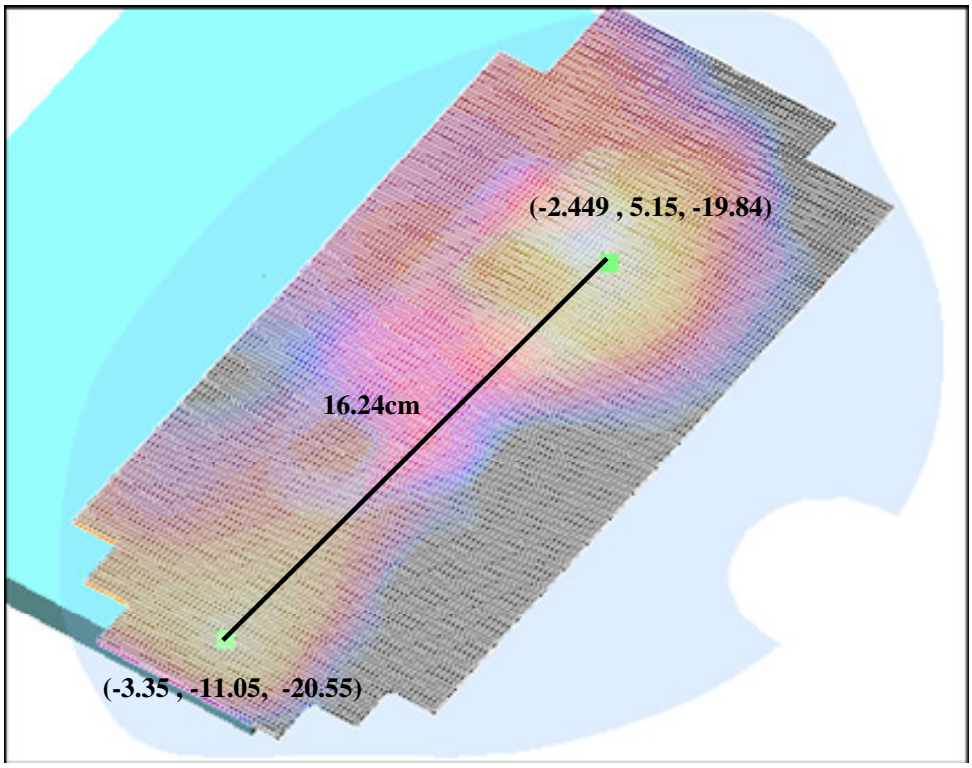

$$dist = \sqrt{(-2.449 + 3.35)^2 + (5.15 + 11.05)^2 + (-19.84 + 20.55)^2} = 16.24cm$$

$$Ratio = \frac{\text{Sum}}{\text{Distance}} = \frac{1.684}{16.24} = 0.104 < 0.3$$

Figure 15-1
Simultaneous Transmission Ratio Analysis for WCDMA 1900 and 2.4 GHz WLAN

15.3 Simultaneous Transmission Conclusion

The numerical summed SAR tables were either below the SAR limit or below the ratio analysis limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. Consequently, no volumetric SAR summation is required per FCC KDB Publication 648474 and FCC KDB Publication 44798 D01 v04 item 4)b)iii).

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16 EQUIPMENT LIST

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

Justification for 2-year calibration cycle for SAR dipoles is found in Section 13.3.

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17 MEASUREMENT UNCERTAINTIES

Applicable for 800 – 3000 MHz.

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	**IEEE 1528 Sec.**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i 1gm**	**c_i 10 gms**	**1gm u_i (± %)**	**10gms u_i (± %)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	5.5	N	1	1.0	1.0	5.5	5.5	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)			RSS				11.8	11.5	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				23.7	23.0	

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

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Applicable for 5200 – 5800 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	6.55	N	1	1.0	1.0	6.6	6.6	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)			RSS				12.4	12.0	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				24.7	24.0	

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

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18 CONCLUSION

18.1 Measurement Conclusion

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

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

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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

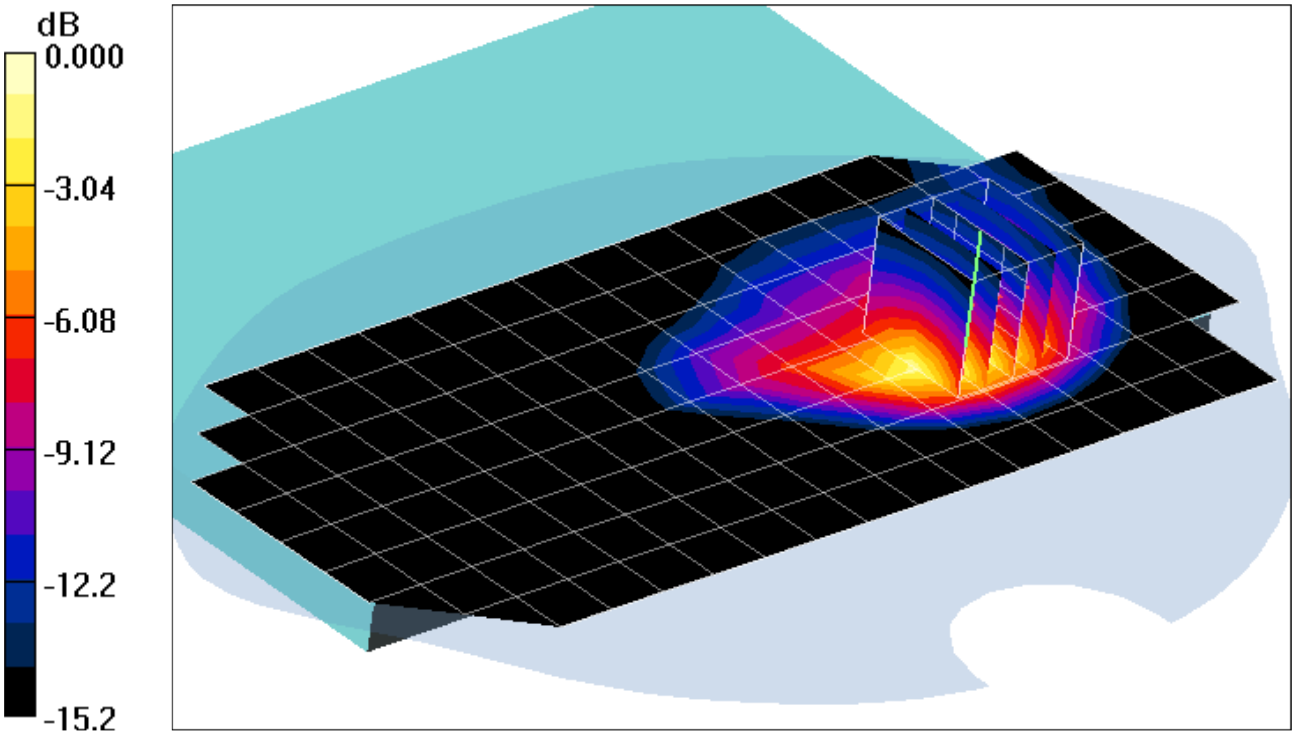
Communication System: GSM850 GPRS; 4 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:2.076
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.987 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-18-2011; Ambient Temp: 24.3 °C; Tissue Temp: 22.5 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 850, Body SAR, Back side, Mid.ch, 4 Tx Slots

Area Scan (9x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.1 V/m
Peak SAR (extrapolated) = 1.47 W/kg
SAR(1 g) = 0.679 mW/g; SAR(10 g) = 0.341 mW/g



0 dB = 0.762mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

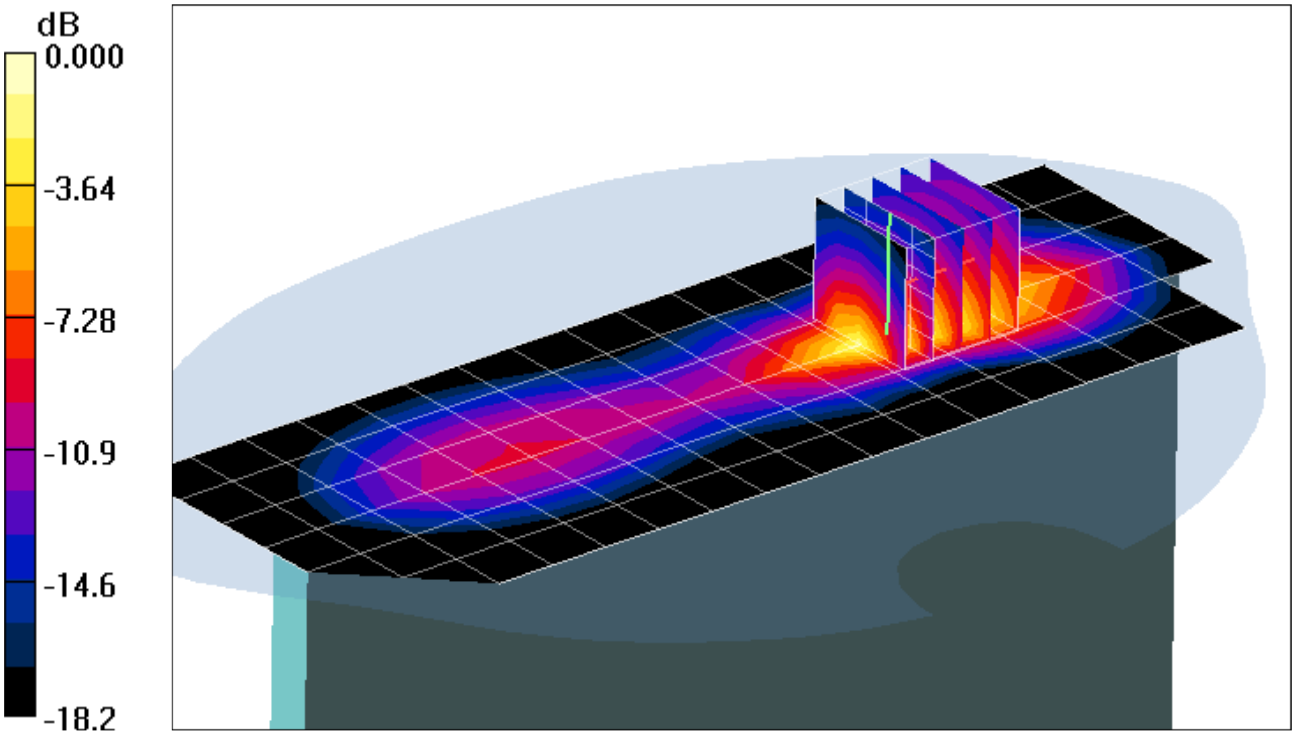
Communication System: GSM850 GPRS; 4 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:2.076
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.987 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-18-2011; Ambient Temp: 24.3 °C; Tissue Temp: 22.5 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 850, Body SAR, Top side, Mid.ch, 4 Tx Slots

Area Scan (7x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.9 V/m
Peak SAR (extrapolated) = 1.80 W/kg
SAR(1 g) = 0.796 mW/g; SAR(10 g) = 0.368 mW/g



0 dB = 0.963mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

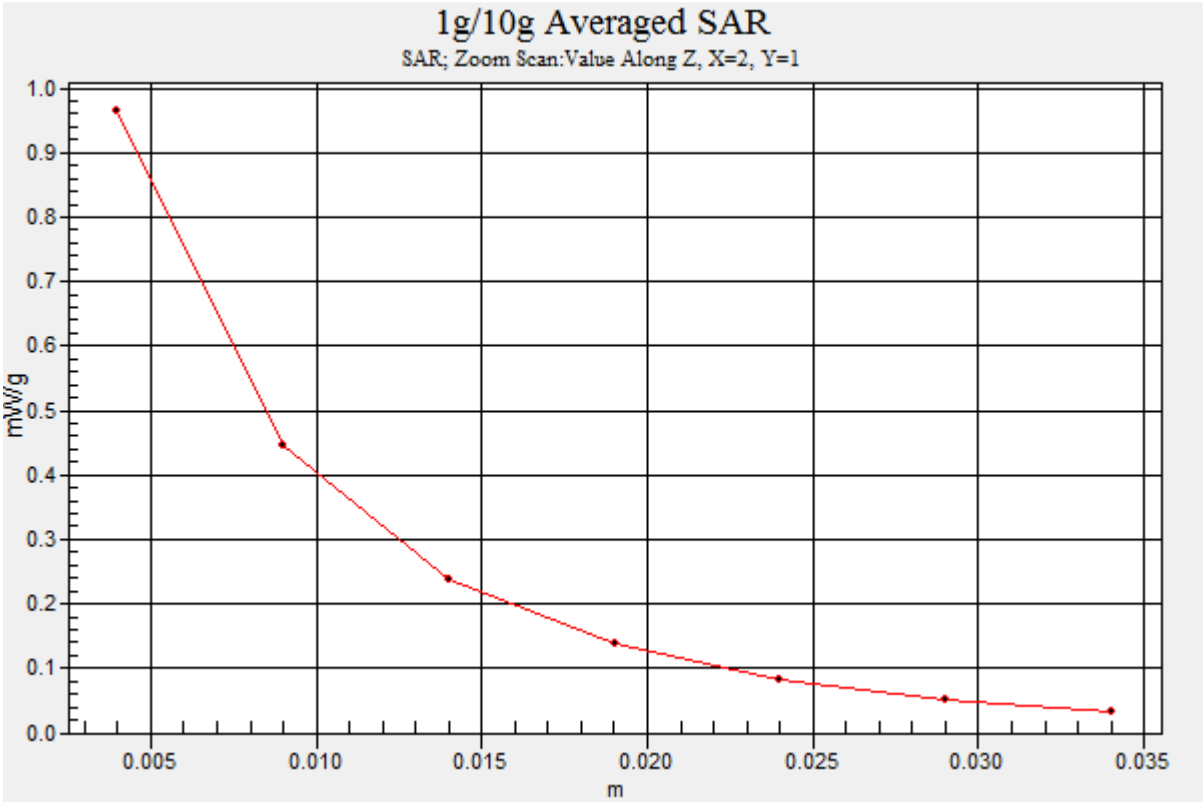
Communication System: GSM850 GPRS; 4 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:2.076
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.987 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-18-2011; Ambient Temp: 24.3 °C; Tissue Temp: 22.5 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 850, Body SAR, Top side, Mid.ch, 4 Tx Slots

Area Scan (7x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.9 V/m
Peak SAR (extrapolated) = 1.80 W/kg
SAR(1 g) = 0.796 mW/g; SAR(10 g) = 0.368 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

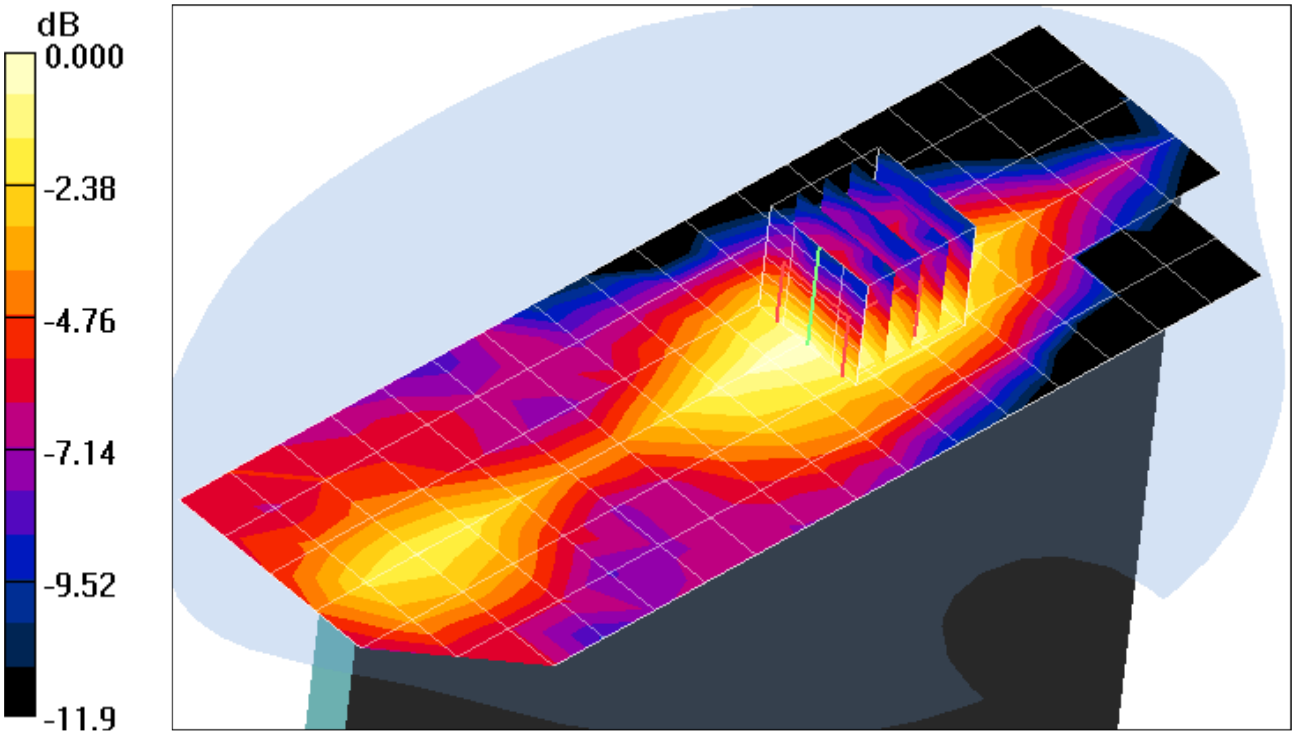
Communication System: GSM850 GPRS; 4 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:2.076
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.987 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-18-2011; Ambient Temp: 24.3 °C; Tissue Temp: 22.5 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 850, Body SAR, Bottom side, Mid.ch, 4 Tx Slots

Area Scan (7x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.83 V/m
Peak SAR (extrapolated) = 0.011 W/kg
SAR(1 g) = 0.00717 mW/g; SAR(10 g) = 0.00482 mW/g



0 dB = 0.008mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

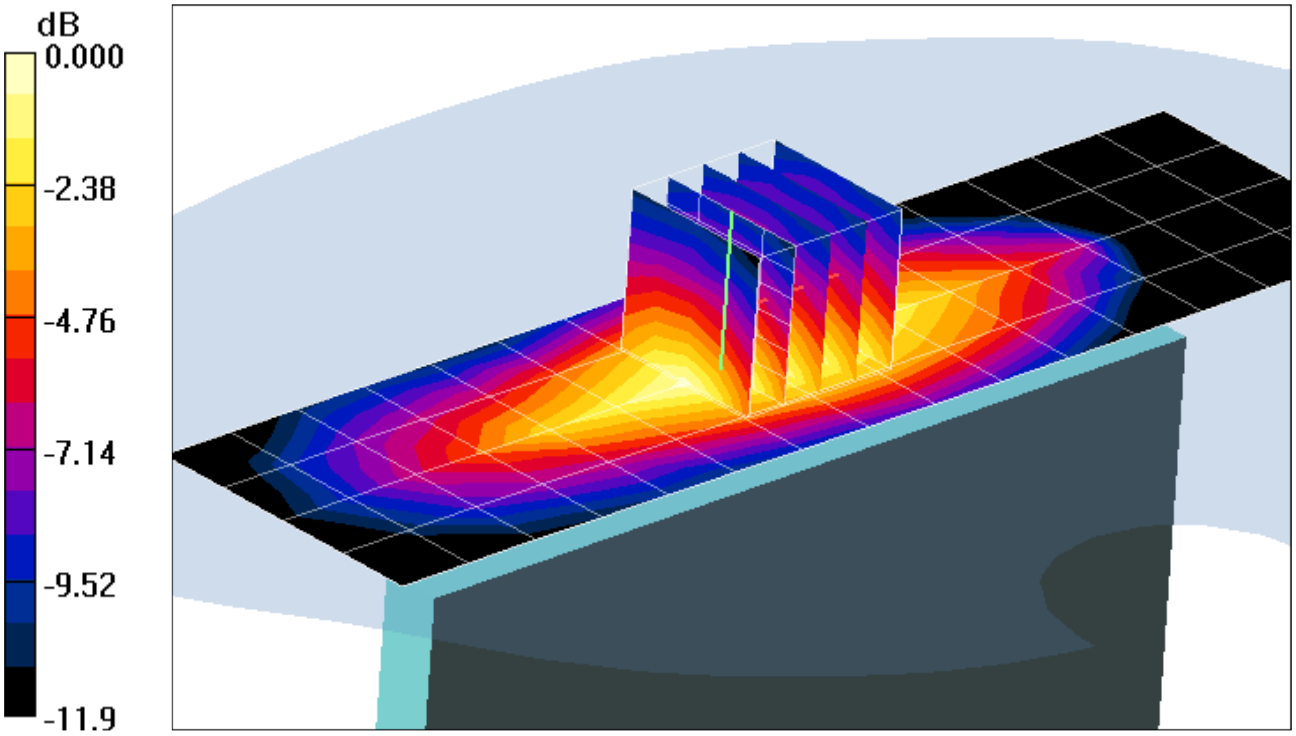
Communication System: GSM850 GPRS; 4 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:2.076
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.987 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-18-2011; Ambient Temp: 24.3 °C; Tissue Temp: 22.5 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 850, Body SAR, Right side, Mid.ch, 4 Tx Slots

Area Scan (5x16x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.08 V/m
Peak SAR (extrapolated) = 0.053 W/kg
SAR(1 g) = 0.033 mW/g; SAR(10 g) = 0.021 mW/g



0 dB = 0.036mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

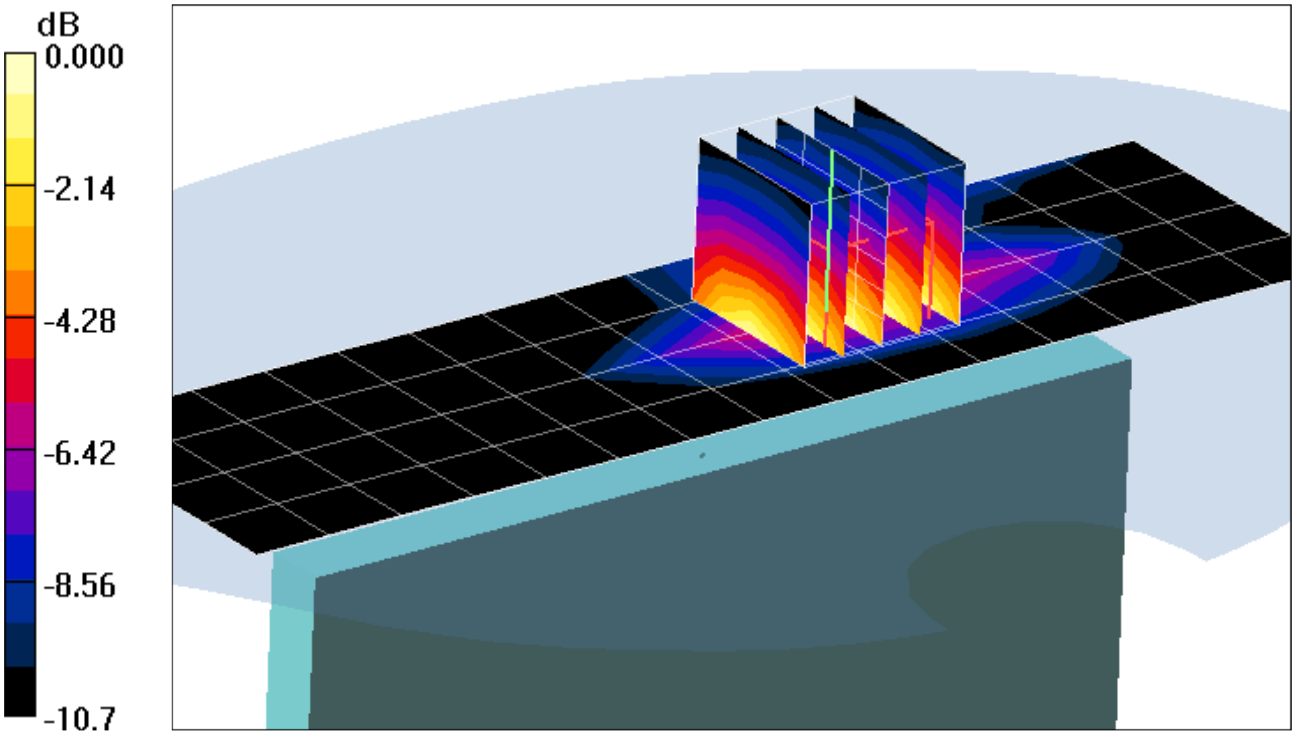
Communication System: GSM850 GPRS; 4 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:2.076
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.987 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-18-2011; Ambient Temp: 24.3 °C; Tissue Temp: 22.5 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 850, Body SAR, Left side, Mid.ch, 4 Tx Slots

Area Scan (5x16x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.09 V/m;
Peak SAR (extrapolated) = 0.075 W/kg
SAR(1 g) = 0.047 mW/g; SAR(10 g) = 0.029 mW/g



0 dB = 0.051mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

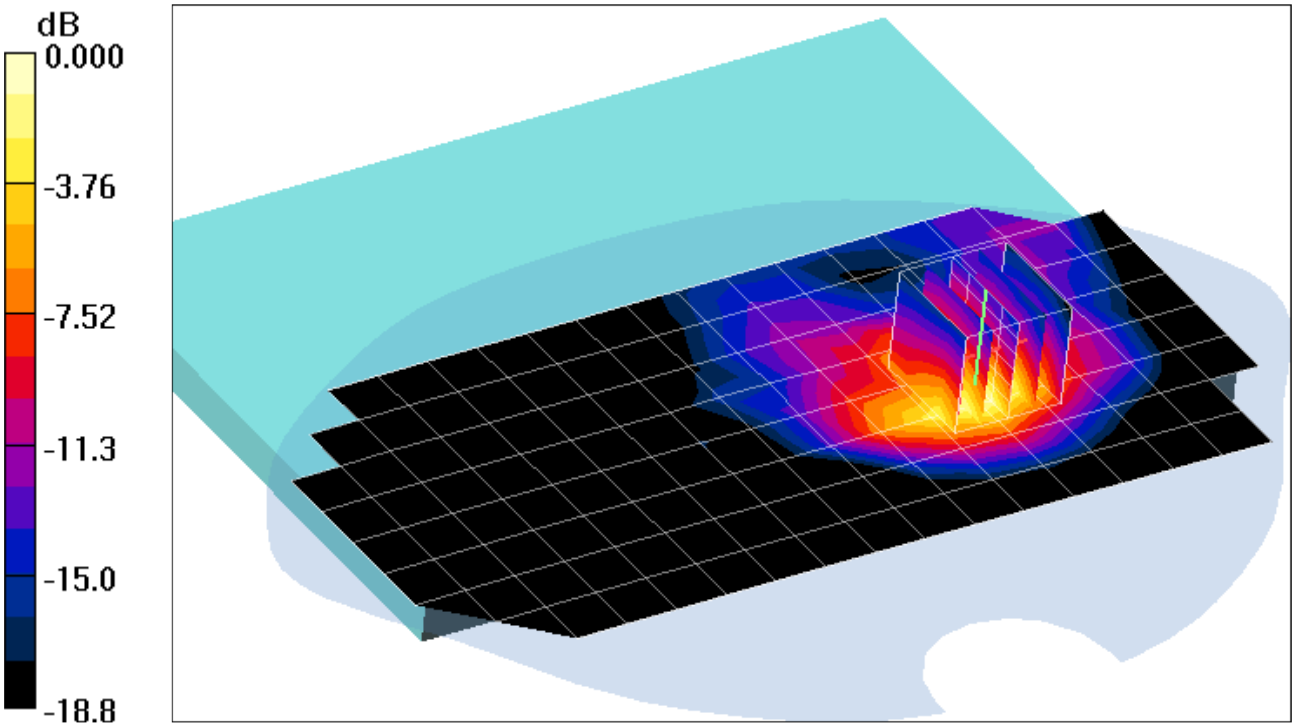
Communication System: GSM1900 GPRS; 4 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:2.076
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.53 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-17-2011; Ambient Temp: 23.7 °C ; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 1900, Body SAR, Back side, Mid.ch, 4 Tx Slots

Area Scan (9x18x1): 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) = 1.31 W/kg
SAR(1 g) = 0.676 mW/g; SAR(10 g) = 0.351 mW/g



0 dB = 0.742mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

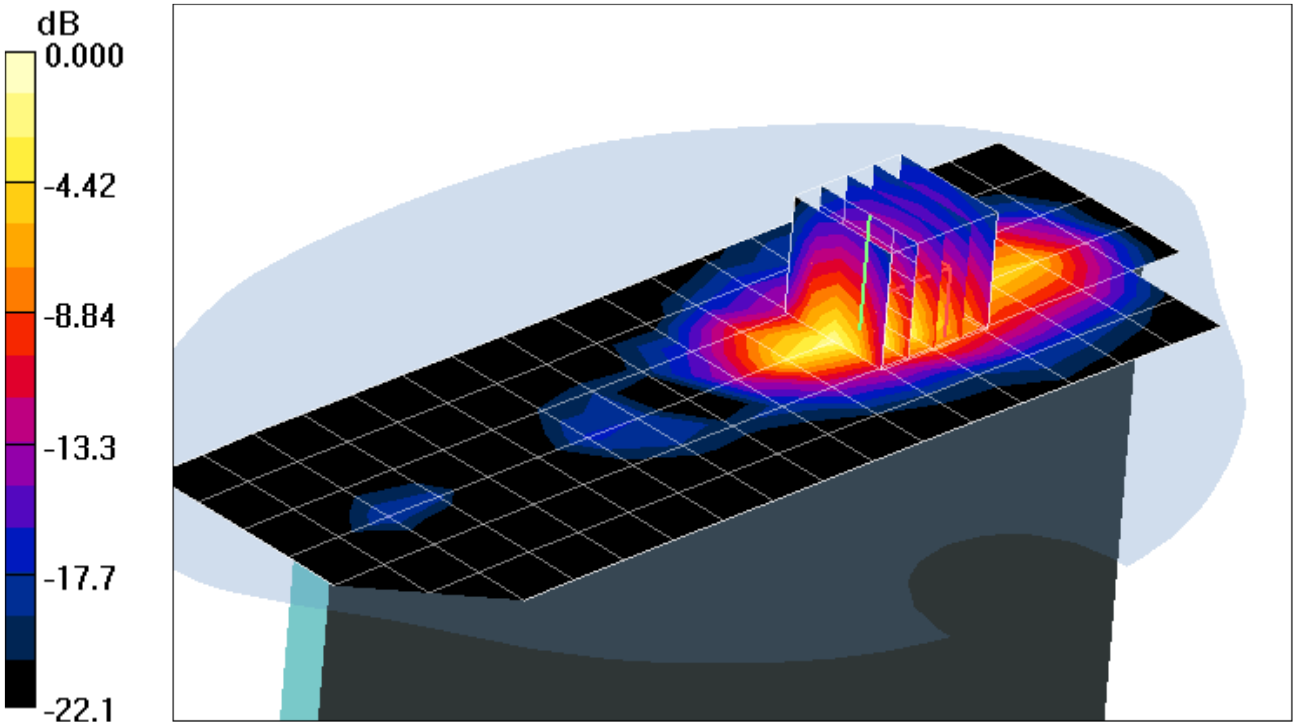
Communication System: GSM1900 GPRS; 4 Tx slots; Frequency: 1909.8 MHz;Duty Cycle: 1:2.076
Medium: 1900 Body Medium parameters used:
f = 1910 MHz; σ = 1.569 mho/m; ε_r = 53.64; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-17-2011; Ambient Temp: 23.7 °C ; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 1900, Body SAR, Top side, High.ch, 4 Tx Slots

Area Scan (7x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.0 V/m
Peak SAR (extrapolated) = 1.95 W/kg
SAR(1 g) = 0.902 mW/g; SAR(10 g) = 0.381 mW/g



0 dB = 1.06mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

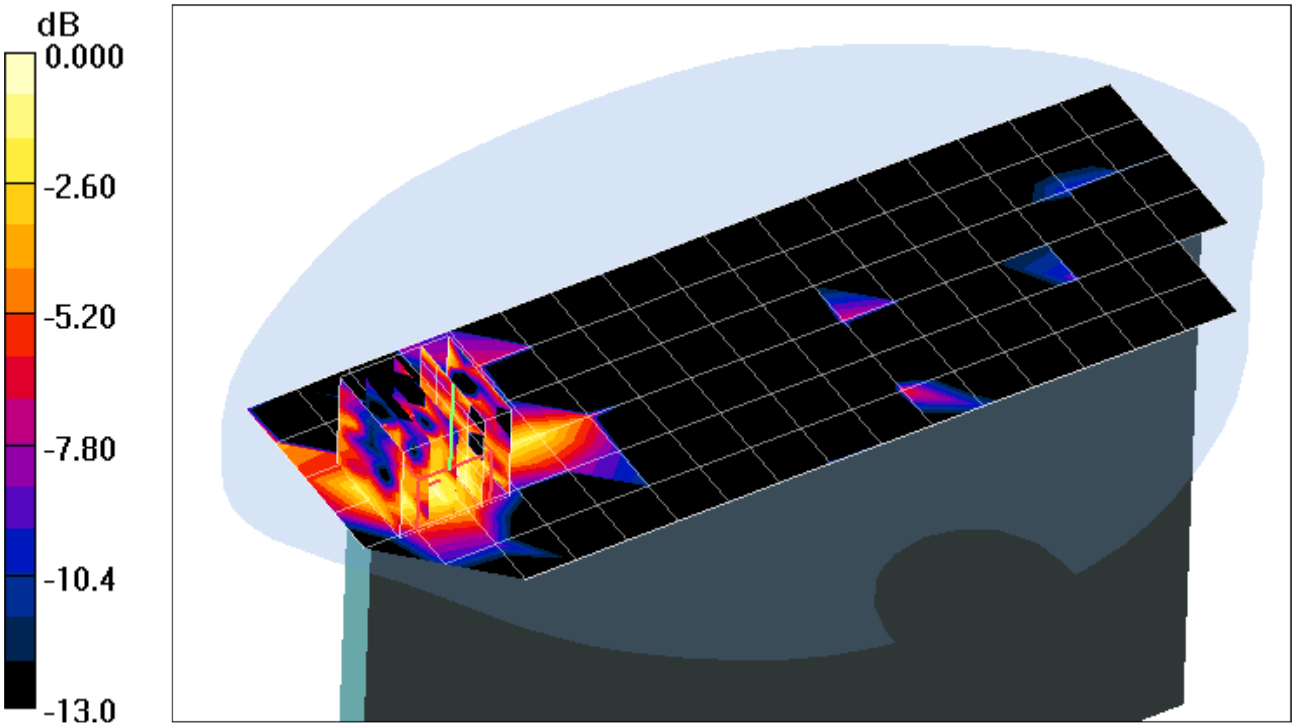
Communication System: GSM1900 GPRS; 4 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:2.076
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.53 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-17-2011; Ambient Temp: 23.7 °C ; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 1900, Body SAR, Bottom side, Mid.ch, 4 Tx Slots

Area Scan (7x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan 2 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.62 V/m
Peak SAR (extrapolated) = 0.017 W/kg
SAR(1 g) = 0.00349 mW/g; SAR(10 g) = 0.000744 mW/g



0 dB = 0.004mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

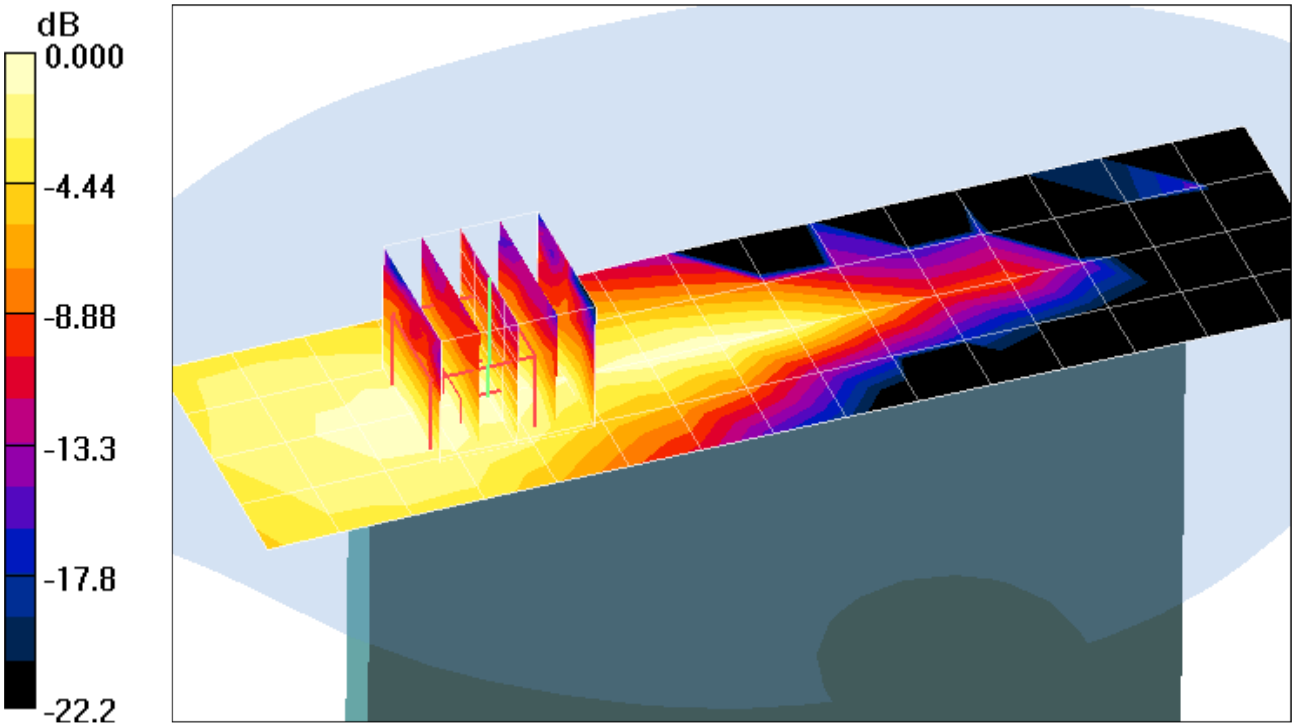
Communication System: GSM1900 GPRS; 4 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:2.076
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.53 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-17-2011; Ambient Temp: 23.7 °C ; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 1900, Body SAR, Right side, Mid.ch, 4 Tx Slots

Area Scan (5x16x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.58 V/m
Peak SAR (extrapolated) = 0.053 W/kg
SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.018 mW/g



0 dB = 0.034mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

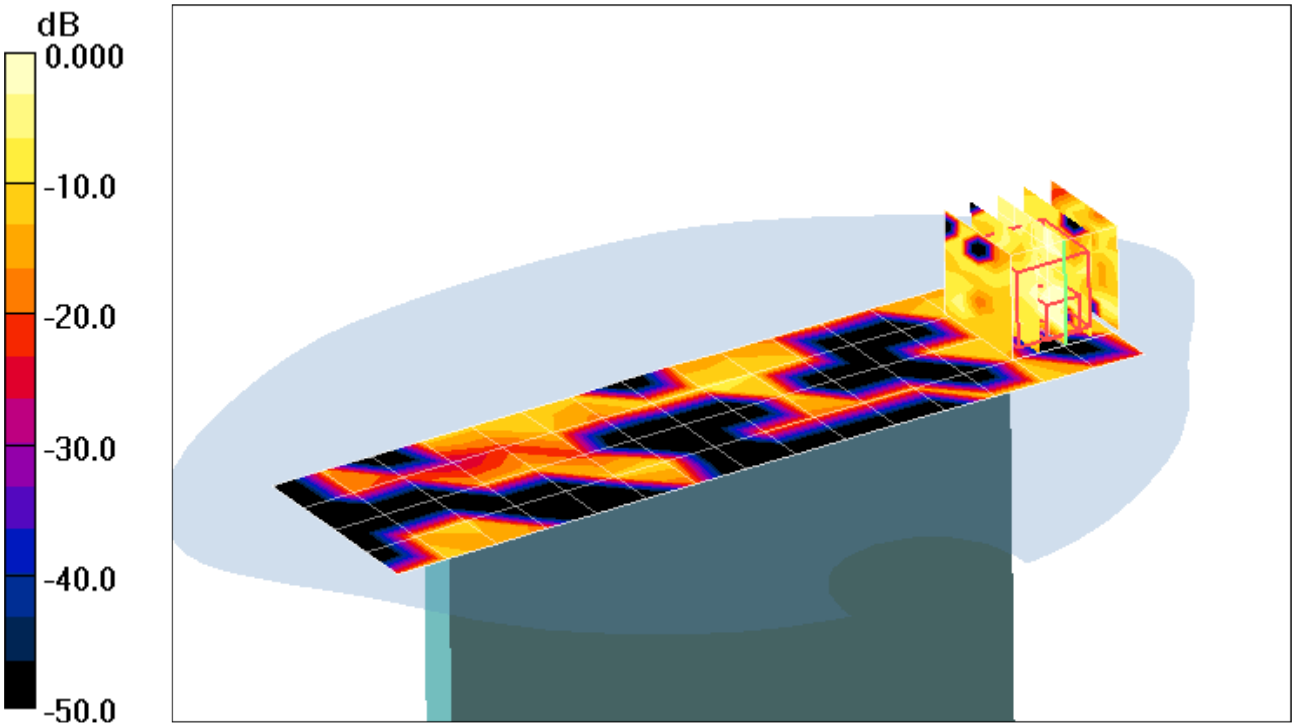
Communication System: GSM1900 GPRS; 4 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:2.076
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.53 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-17-2011; Ambient Temp: 23.7 °C ; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 1900, Body SAR, Left side, Mid.ch, 4 Tx Slots

Area Scan (5x16x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.000 V/m
Peak SAR (extrapolated) = 0.007 W/kg
SAR(1 g) = 0.000959 mW/g; SAR(10 g) = 0.000203 mW/g



0 dB = 0.007mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

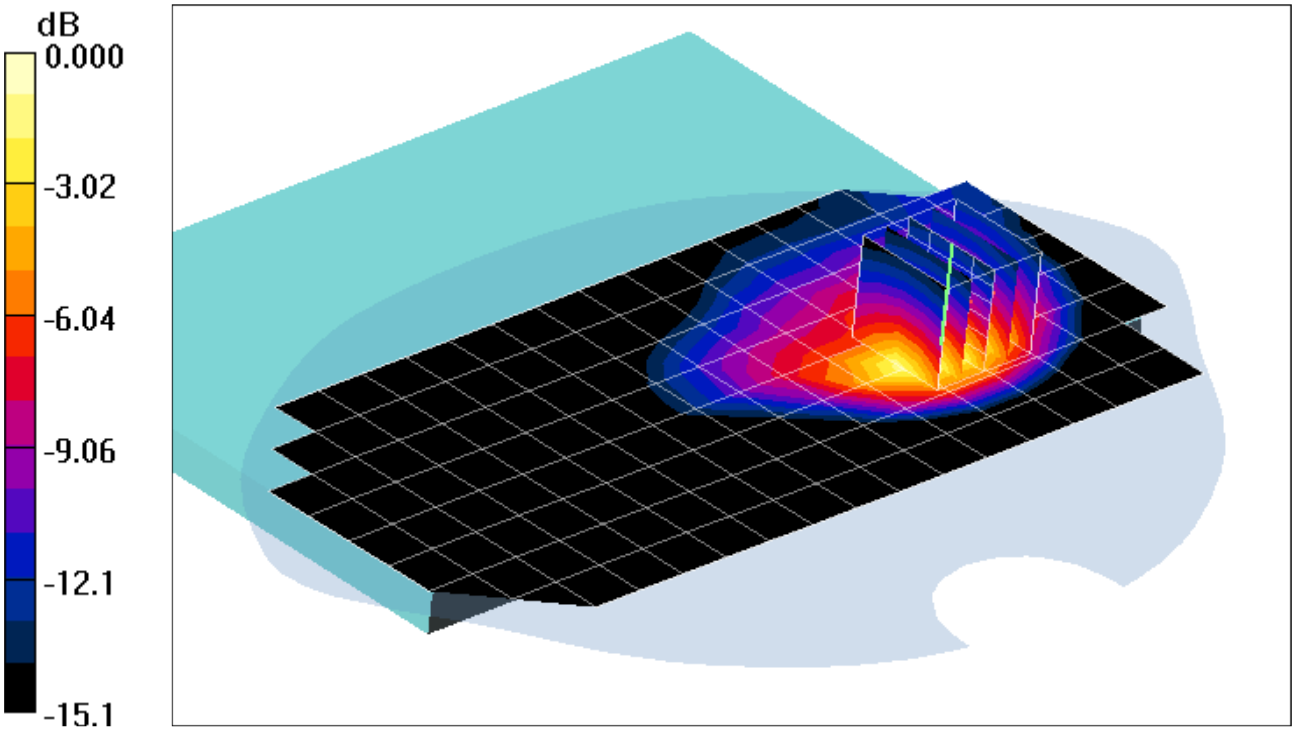
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.985 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-21-2011; Ambient Temp: 24.0 °C; Tissue Temp: 22.3 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA 850, Body SAR, Back side, Mid.ch

Area Scan (9x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.6 V/m
Peak SAR (extrapolated) = 0.918 W/kg
SAR(1 g) = 0.443 mW/g; SAR(10 g) = 0.228 mW/g



0 dB = 0.492mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial:IMEI 355691040001510

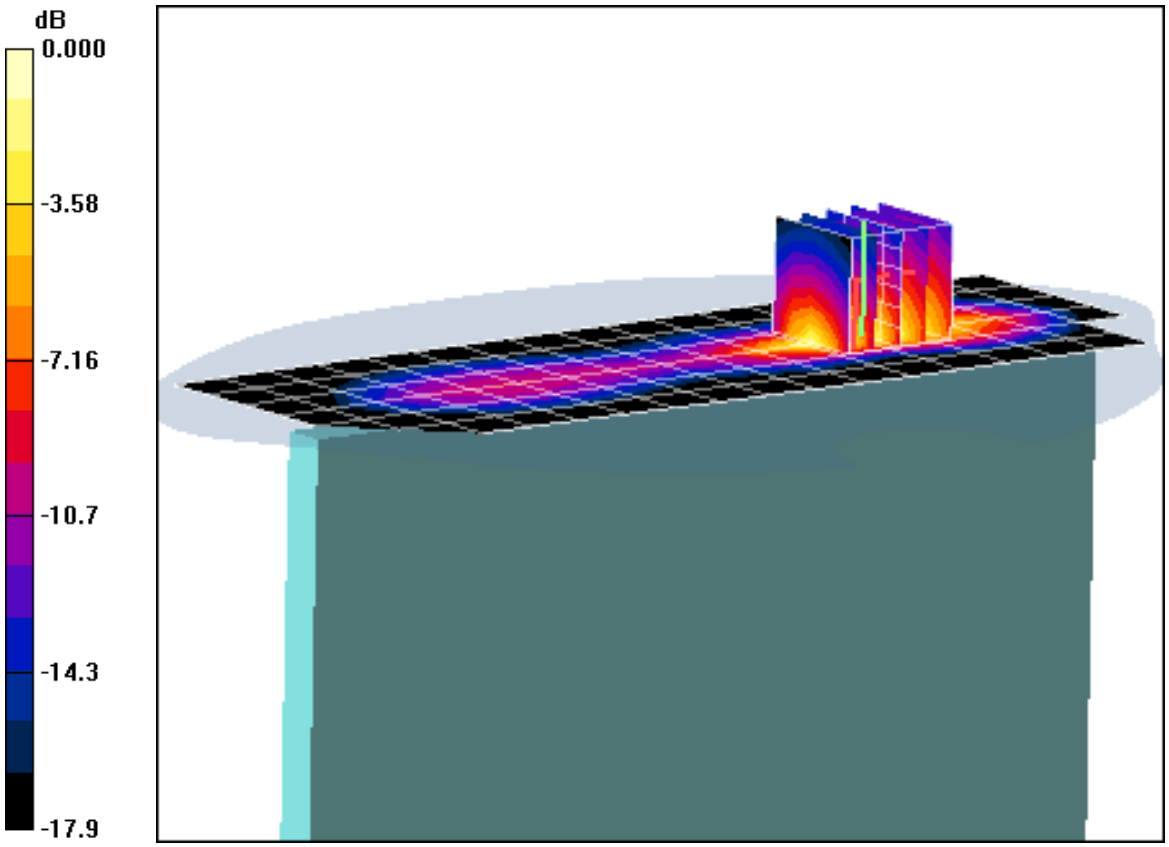
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.987 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-18-2011; Ambient Temp: 24.3 °C; Tissue Temp: 22.5 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA 850, Body SAR, Top side, Mid.ch

Area Scan (7x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.4 V/m
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.625 mW/g; SAR(10 g) = 0.297 mW/g



0 dB = 0.753mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

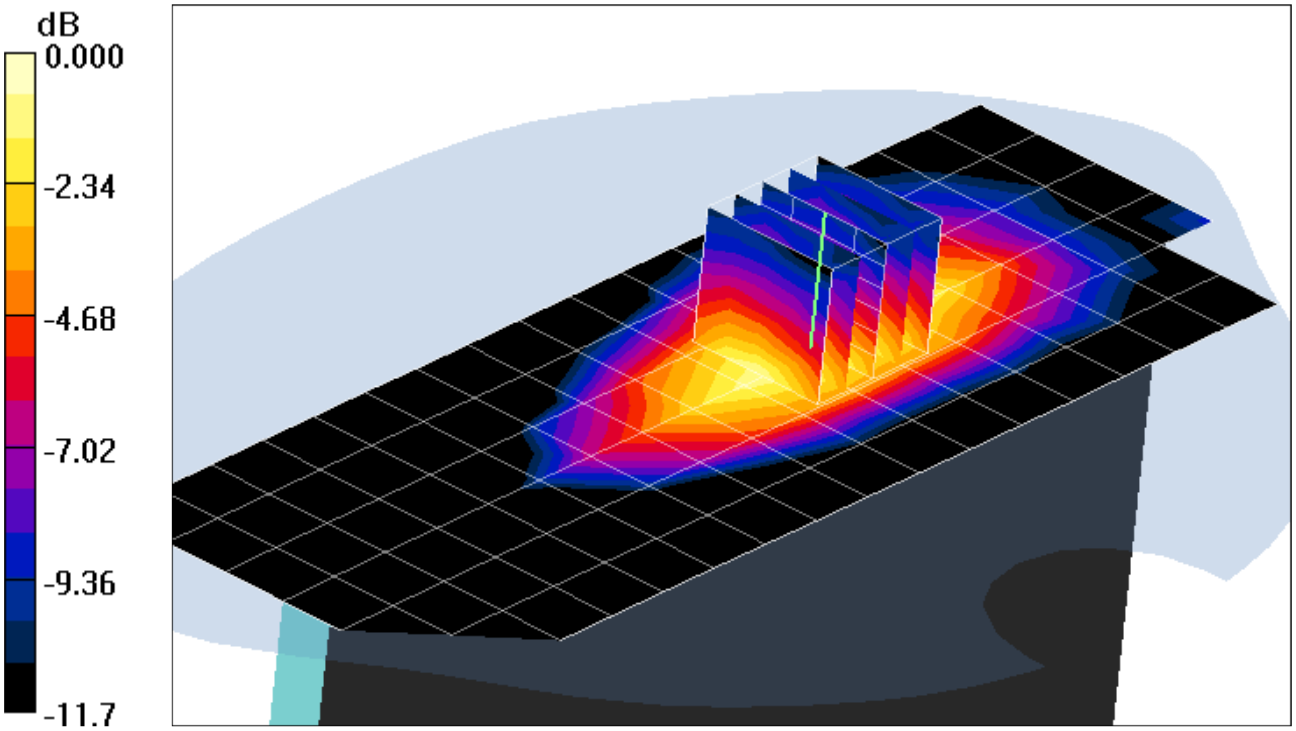
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.985 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-21-2011; Ambient Temp: 24.0 °C; Tissue Temp: 22.3 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA 850, Body SAR, Bottom side, Mid.ch

Area Scan (7x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.57 V/m
Peak SAR (extrapolated) = 0.021 W/kg
SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.00748 mW/g



0 dB = 0.013mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

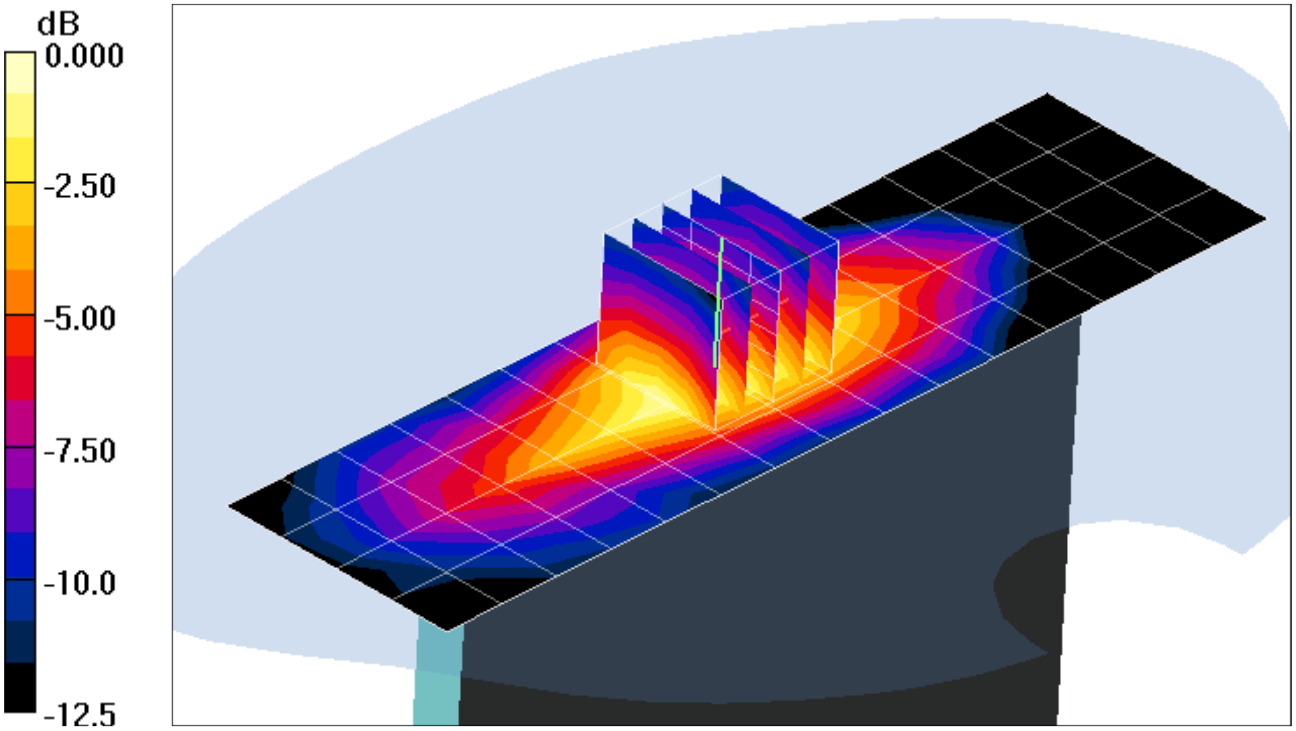
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.985 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-21-2011; Ambient Temp: 24.0 °C; Tissue Temp: 22.3 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA 850, Body SAR, Right side, Mid.ch

Area Scan (5x16x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.81 V/m
Peak SAR (extrapolated) = 0.033 W/kg
SAR(1 g) = 0.021 mW/g; SAR(10 g) = 0.013 mW/g



0 dB = 0.023mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

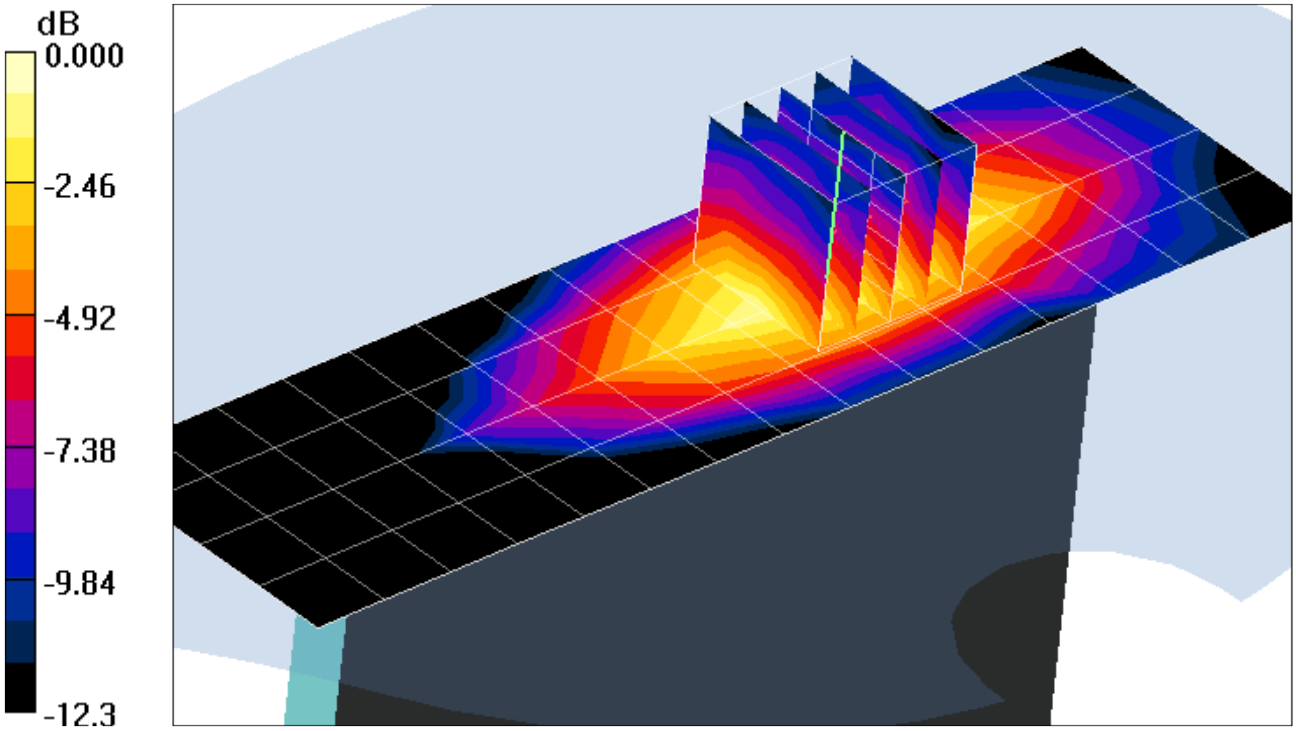
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.985 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-21-2011; Ambient Temp: 24.0 °C; Tissue Temp: 22.3 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA 850, Body SAR, Left side, Mid.ch

Area Scan (5x16x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.58 V/m
Peak SAR (extrapolated) = 0.021 W/kg
SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00762 mW/g



0 dB = 0.014mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

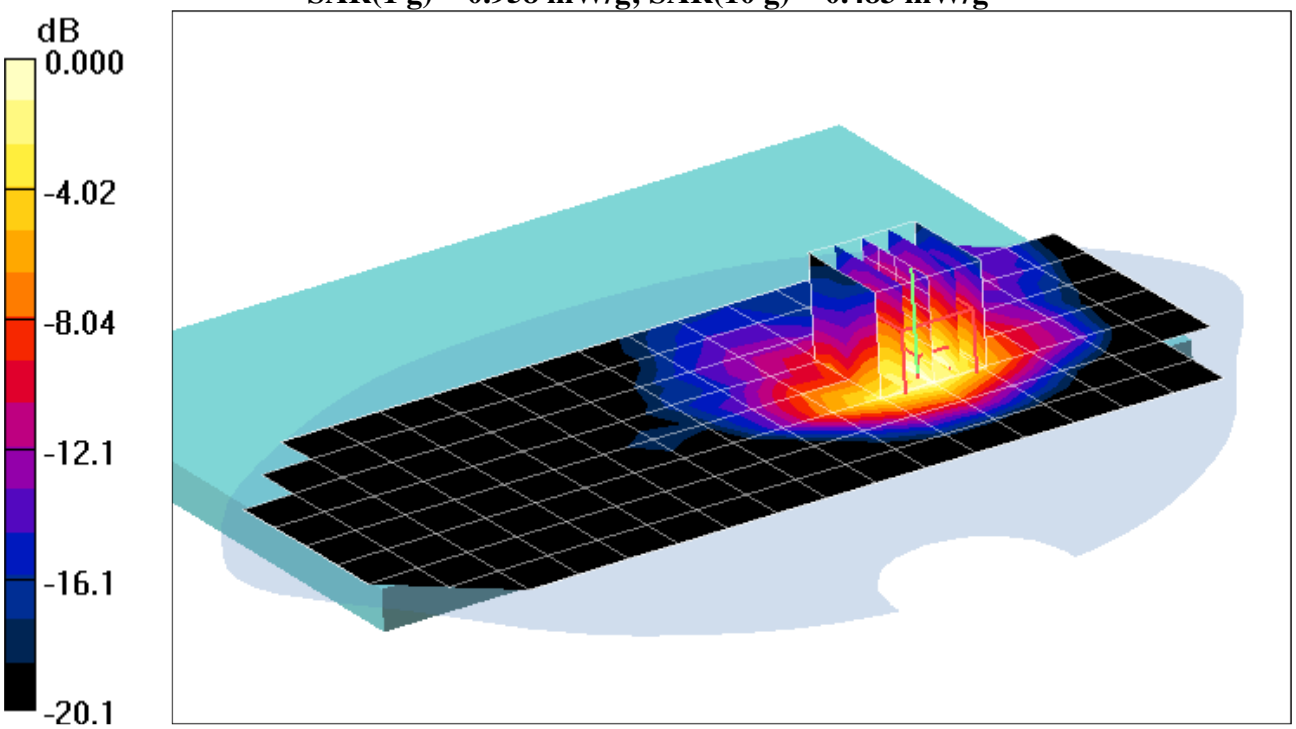
Communication System: WCDMA1900; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.54 mho/m; ε_r = 52.77; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2011; Ambient Temp: 23.9 °C; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA 1900, Body SAR, Back side, High.ch

Area Scan (9x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.0 V/m
Peak SAR (extrapolated) = 1.93 W/kg
SAR(1 g) = 0.958 mW/g; SAR(10 g) = 0.483 mW/g



0 dB = 1.00mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

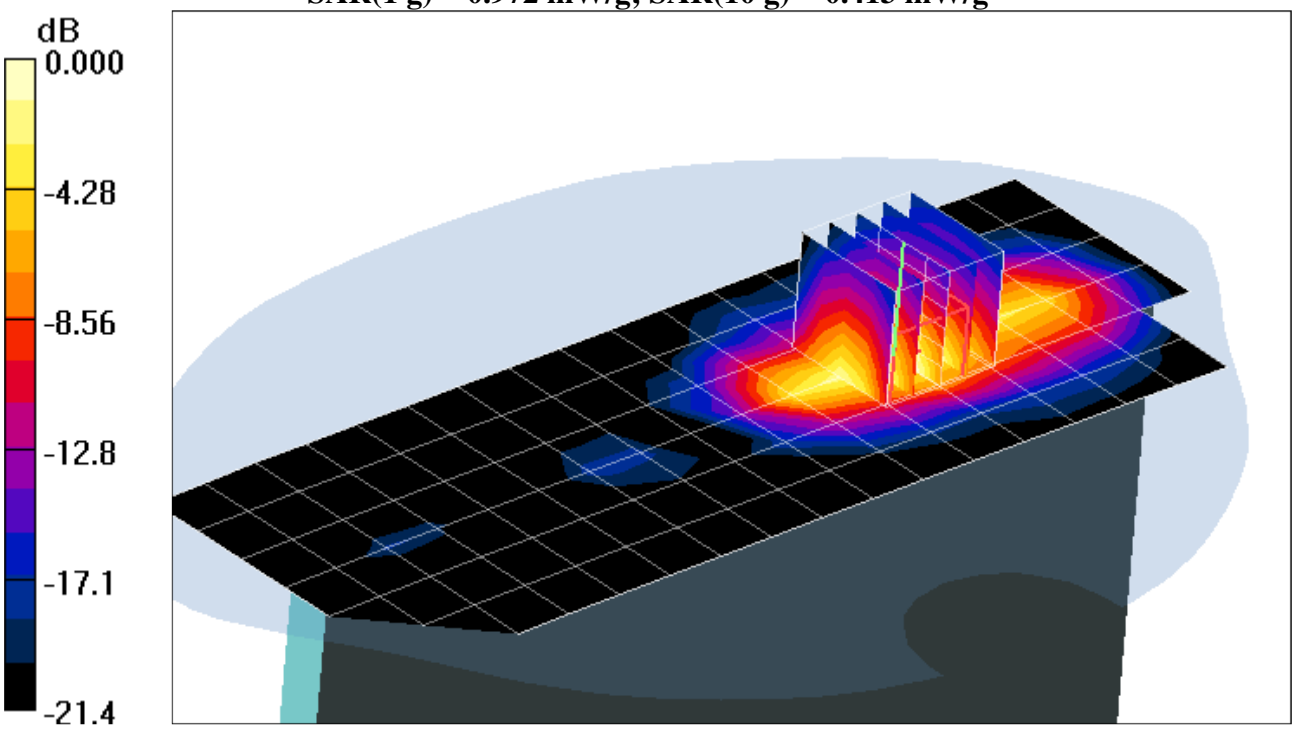
Communication System: WCDMA1900; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.54 mho/m; ε_r = 52.77; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2011; Ambient Temp: 23.9 °C; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA 1900, Body SAR, Top side, High.ch

Area Scan (7x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.9 V/m
Peak SAR (extrapolated) = 2.07 W/kg
SAR(1 g) = 0.972 mW/g; SAR(10 g) = 0.413 mW/g



0 dB = 1.04mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

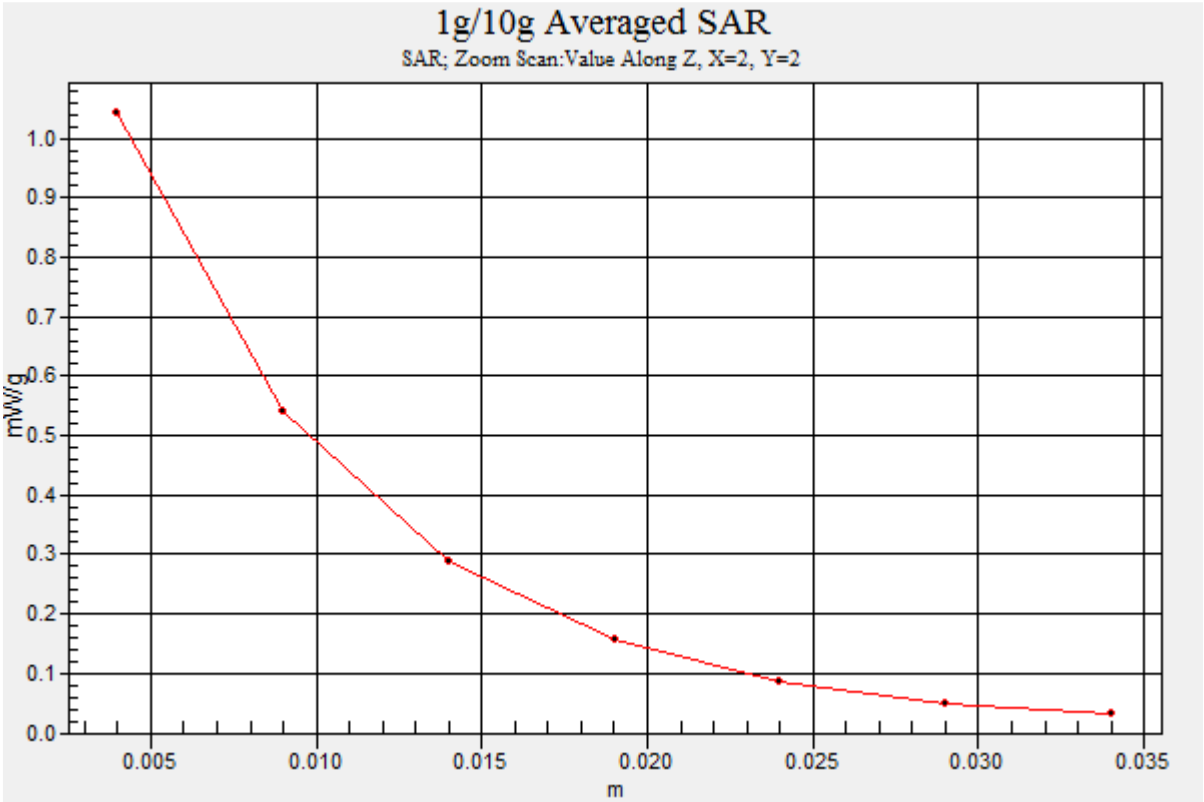
Communication System: WCDMA1900; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.54 mho/m; ε_r = 52.77; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2011; Ambient Temp: 23.9 °C; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA 1900, Body SAR, Top side, Mid.ch

Area Scan (7x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.9 V/m
Peak SAR (extrapolated) = 2.07 W/kg
SAR(1 g) = 0.972 mW/g; SAR(10 g) = 0.413 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

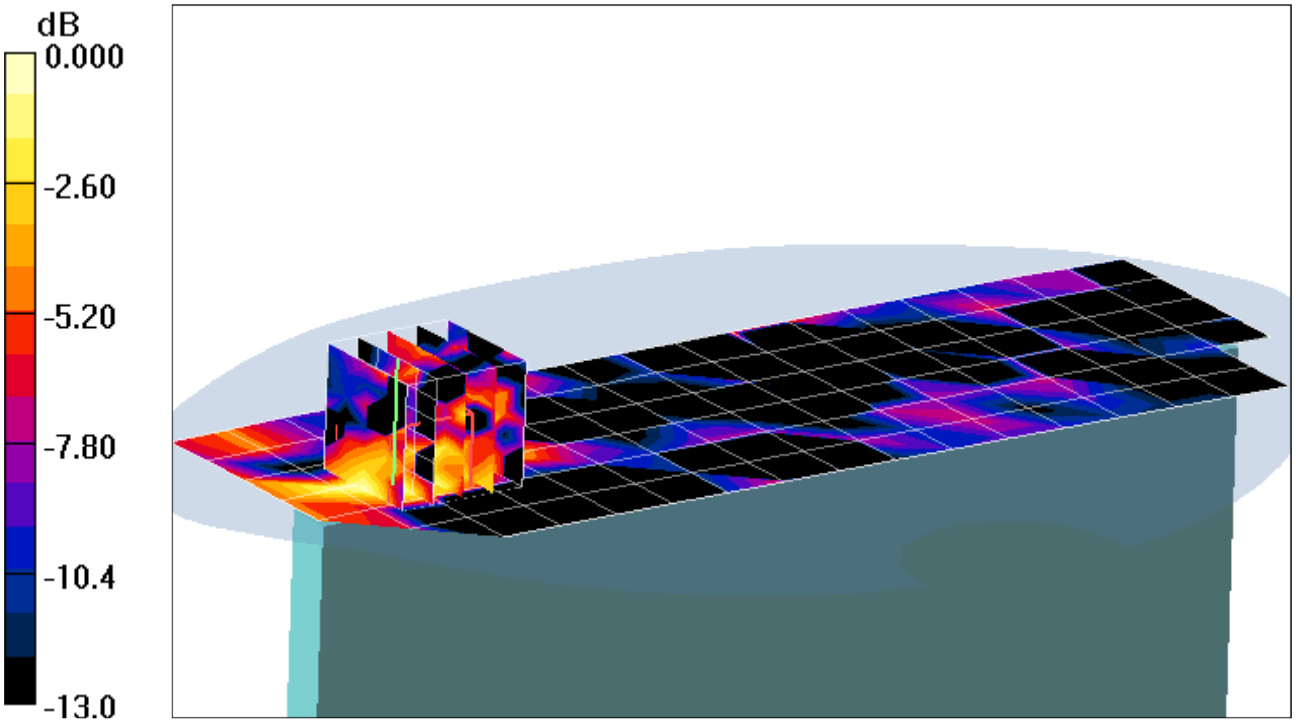
Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.51 mho/m; ε_r = 52.79; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2011; Ambient Temp: 23.9 °C; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA 1900, Body SAR, Bottom side, Mid.ch

Area Scan (7x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.75 V/m
Peak SAR (extrapolated) = 0.021 W/kg
SAR(1 g) = 0.00445 mW/g; SAR(10 g) = 0.0012 mW/g



0 dB = 0.004mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

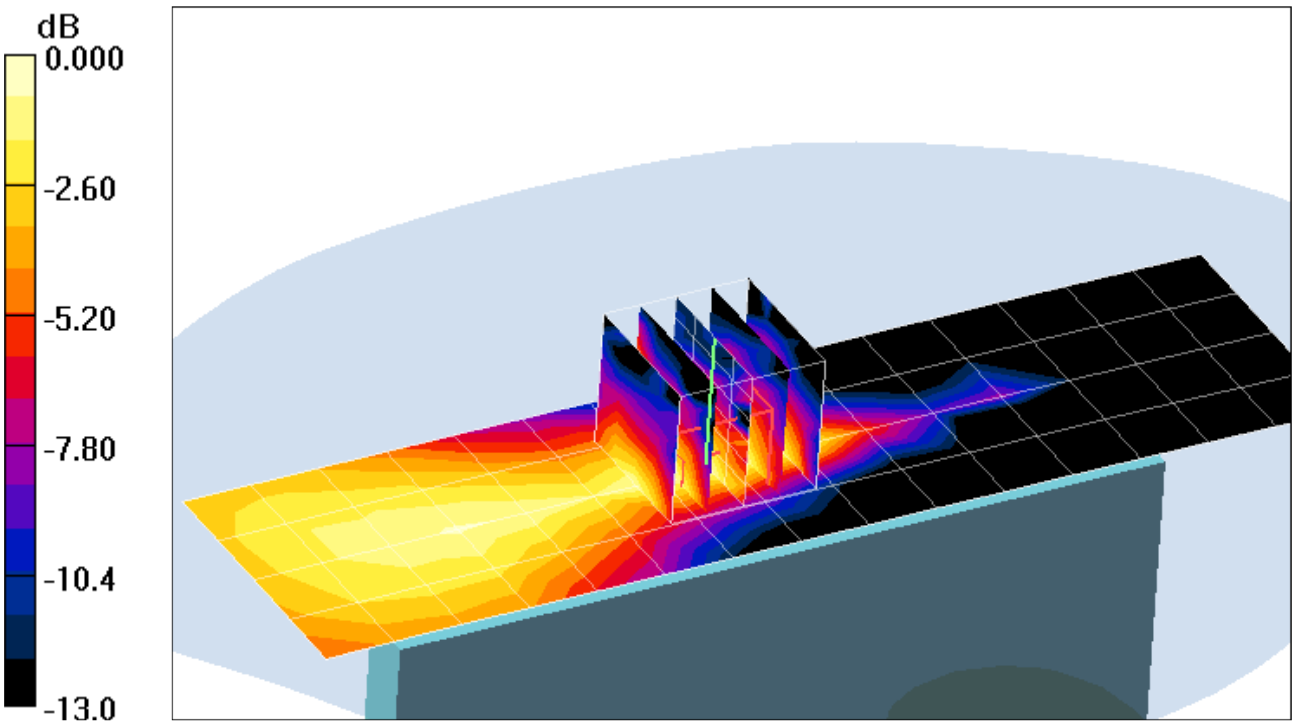
Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.51 mho/m; ε_r = 52.79; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2011; Ambient Temp: 23.9 °C; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA 1900, Body SAR, Right side, Mid.ch

Area Scan (5x16x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.05 V/m
Peak SAR (extrapolated) = 0.055 W/kg
SAR(1 g) = 0.034 mW/g; SAR(10 g) = 0.019 mW/g



0 dB = 0.039mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

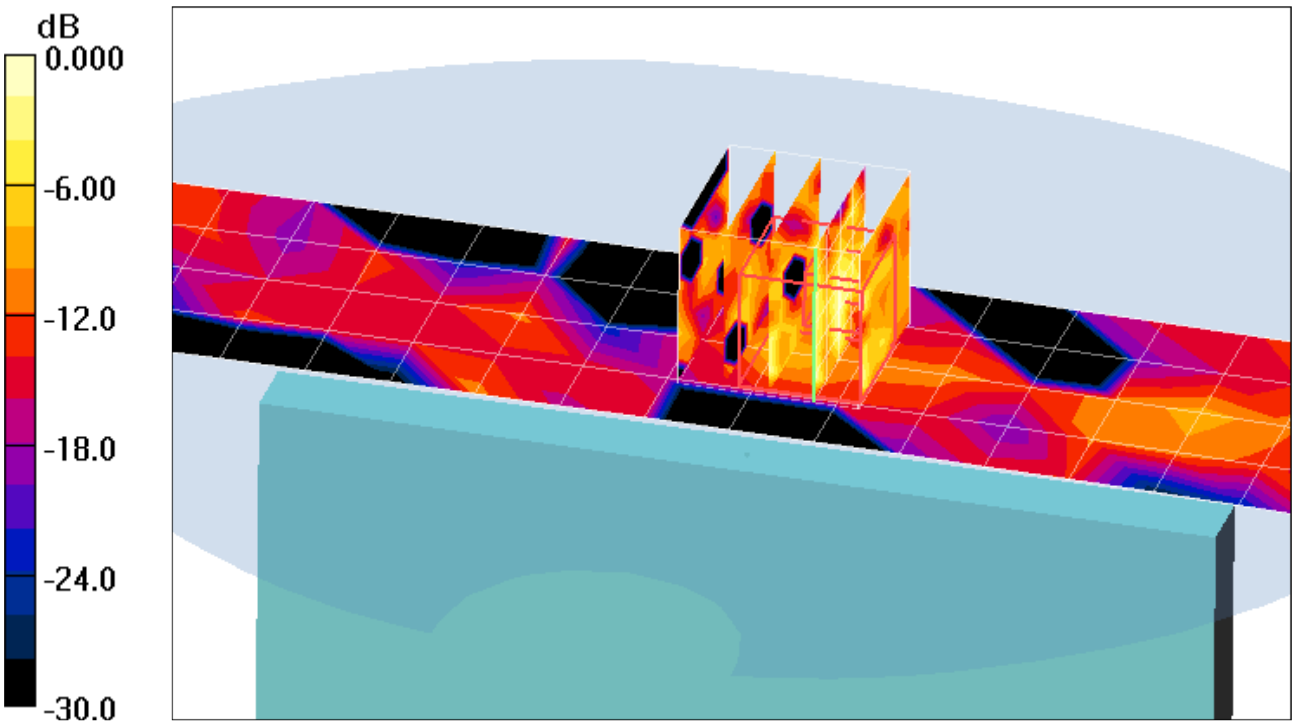
Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.51 mho/m; ε_r = 52.79; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2011; Ambient Temp: 23.9 °C; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA 1900, Body SAR, Left side, Mid.ch

Area Scan (5x16x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.06 V/m
Peak SAR (extrapolated) = 0.016 W/kg
SAR(1 g) = 0.000348 mW/g; SAR(10 g) = 0.000168 mW/g



0 dB = 0.014mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

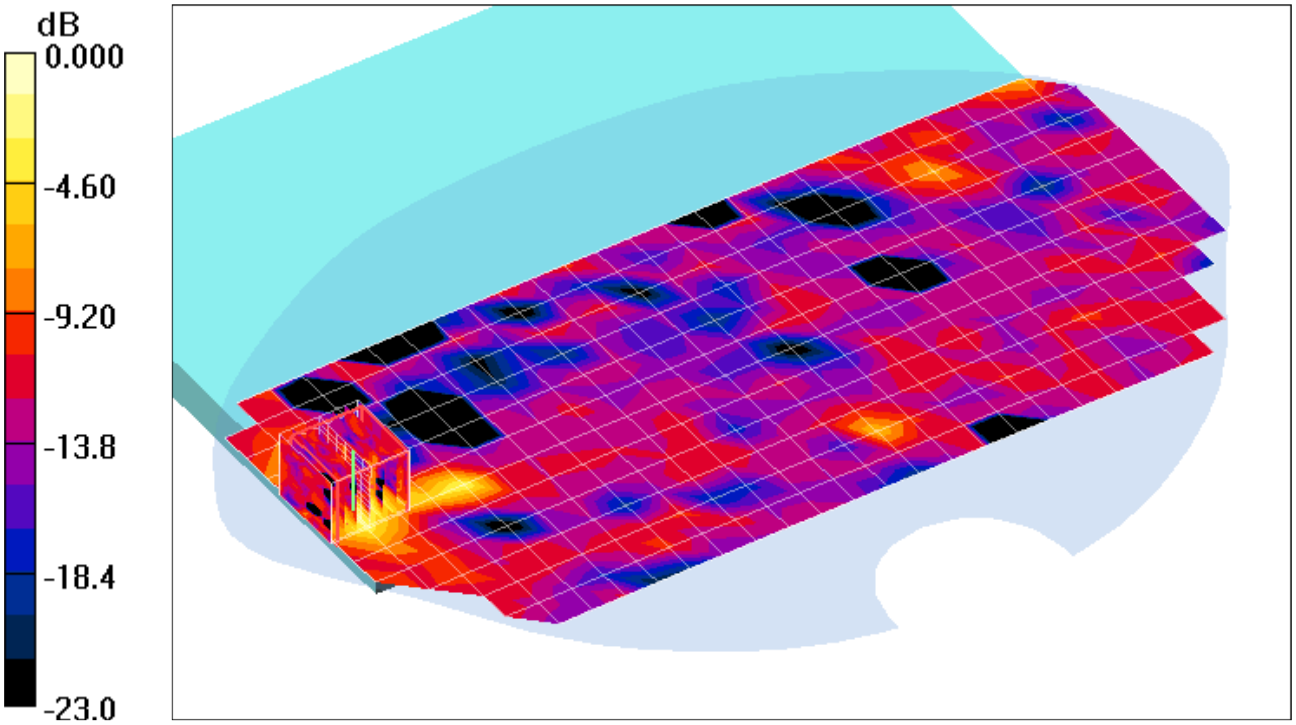
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5240 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5240 MHz; σ = 5.5 mho/m; ε_r = 47.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 23.5 °C; Tissue Temp: 21.9 °C

Probe: EX3DV4 - SN3561; ConvF(3.67, 3.67, 3.67); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11a 5.2 GHz, Body Back, Ch 48, 6 Mbps

Area Scan (13x27x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 6.32 V/m
Peak SAR (extrapolated) = 0.459 W/kg
SAR(1 g) = 0.131 mW/g; SAR(10 g) = 0.034 mW/g



0 dB = 0.279mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

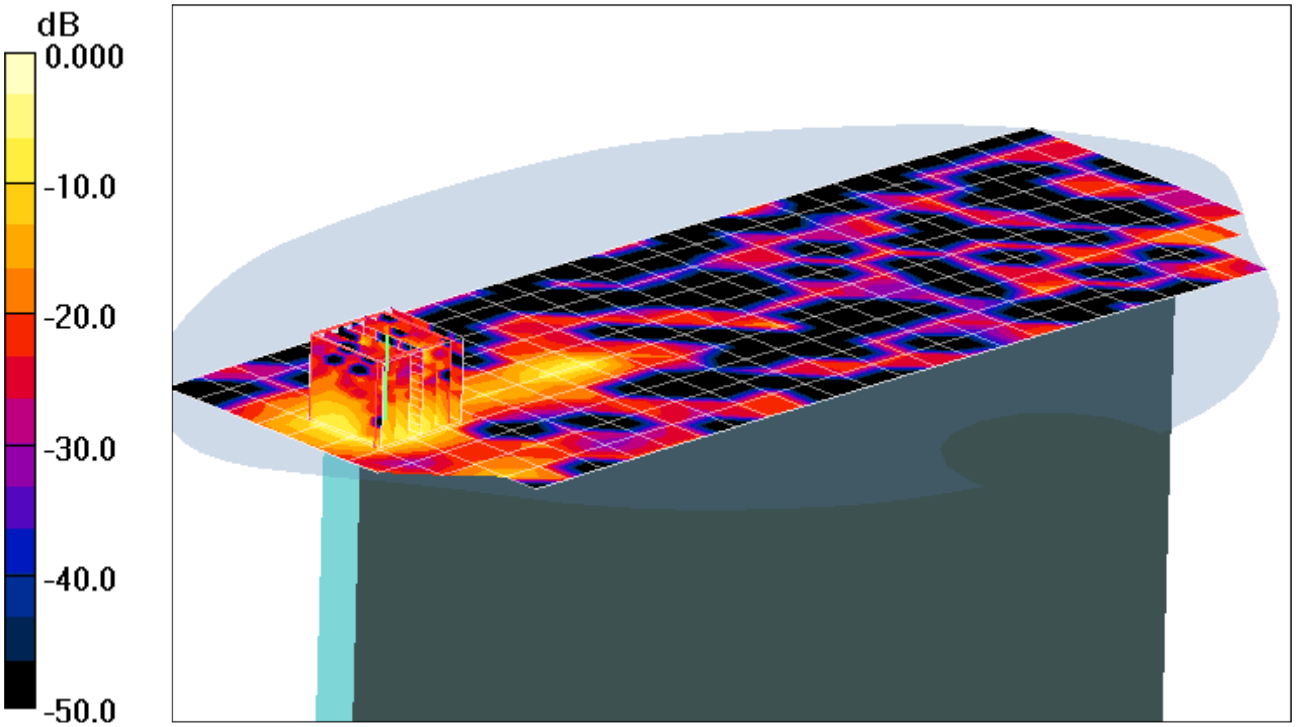
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5240 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5240 MHz; σ = 5.5 mho/m; ε_r = 47.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 23.5 °C; Tissue Temp: 21.9 °C

Probe: EX3DV4 - SN3561; ConvF(3.67, 3.67, 3.67); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11a 5.2 GHz, Edge Top, Ch 48, 6 Mbps

Area Scan (11x27x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 10.4 V/m
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.300 mW/g; SAR(10 g) = 0.068 mW/g



0 dB = 0.696mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

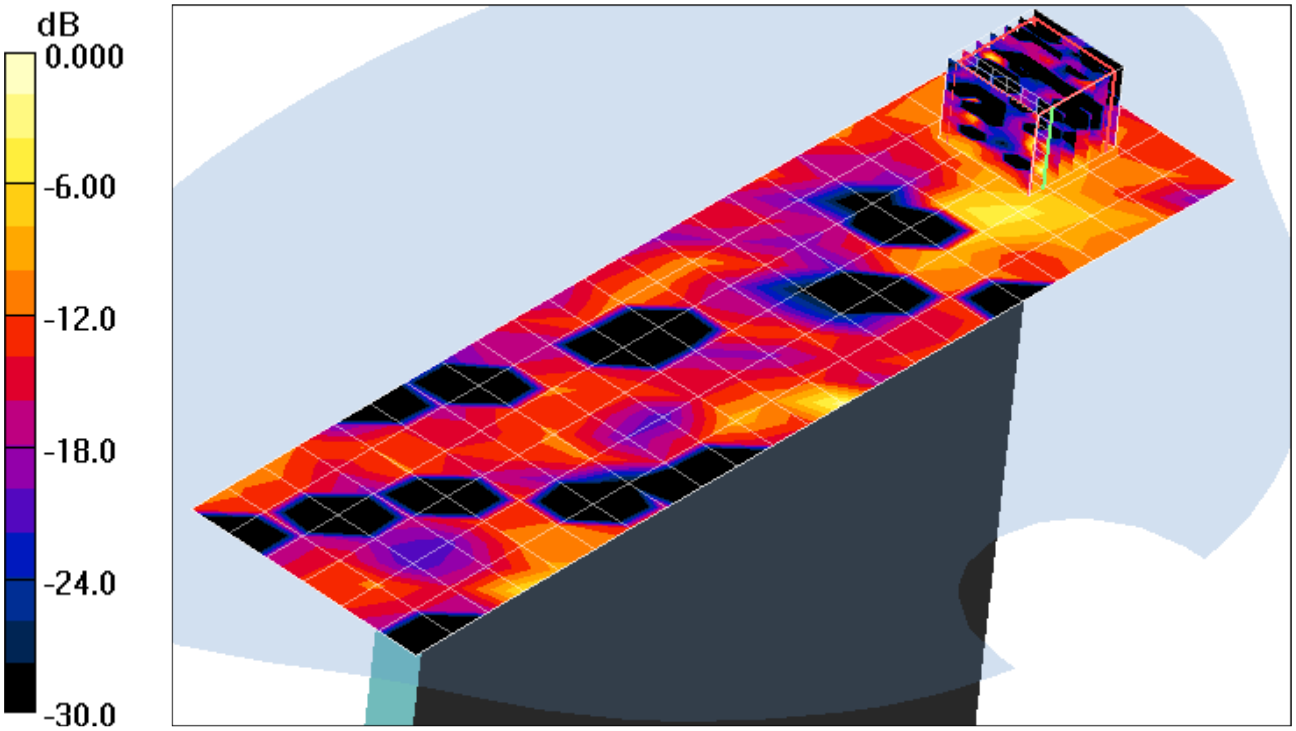
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5240 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5240 MHz; σ = 5.5 mho/m; ε_r = 47.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 23.5 °C; Tissue Temp: 21.9 °C

Probe: EX3DV4 - SN3561; ConvF(3.67, 3.67, 3.67); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11a 5.2 GHz, Left, Ch 48,6 Mbps

Area Scan (7x24x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.845 V/m
Peak SAR (extrapolated) = 0.544 W/kg
SAR(1 g) = 0.031 mW/g; SAR(10 g) = 0.0092 mW/g



0 dB = 0.320mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

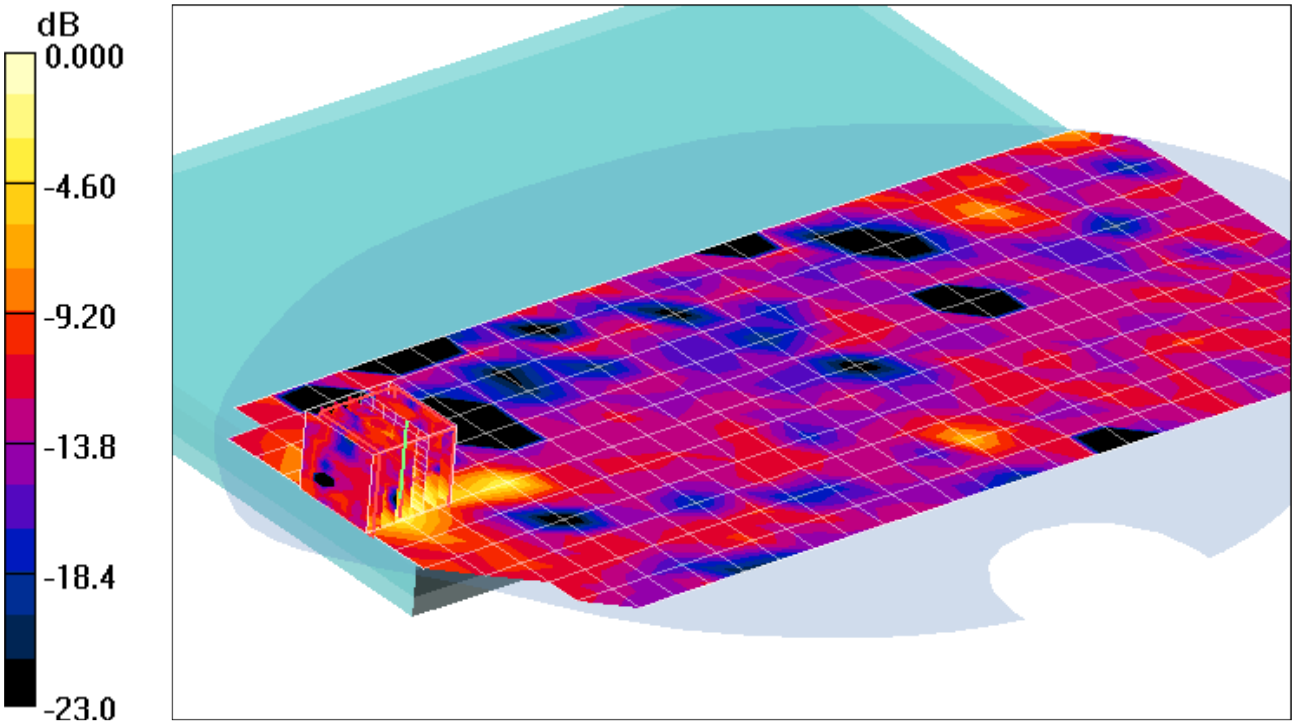
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5320 MHz;Duty Cycle: 1:1
Medium: 5 GHz Muscle Medium parameters used (interpolated):
f = 5320 MHz; σ = 5.6 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 23.5 °C; Tissue Temp: 21.9 °C

Probe: EX3DV4 - SN3561; ConvF(3.42, 3.42, 3.42); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Area Scan (13x27x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.56 V/m
Peak SAR (extrapolated) = 0.525 W/kg
SAR(1 g) = 0.128 mW/g; SAR(10 g) = 0.040 mW/g



0 dB = 0.283mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

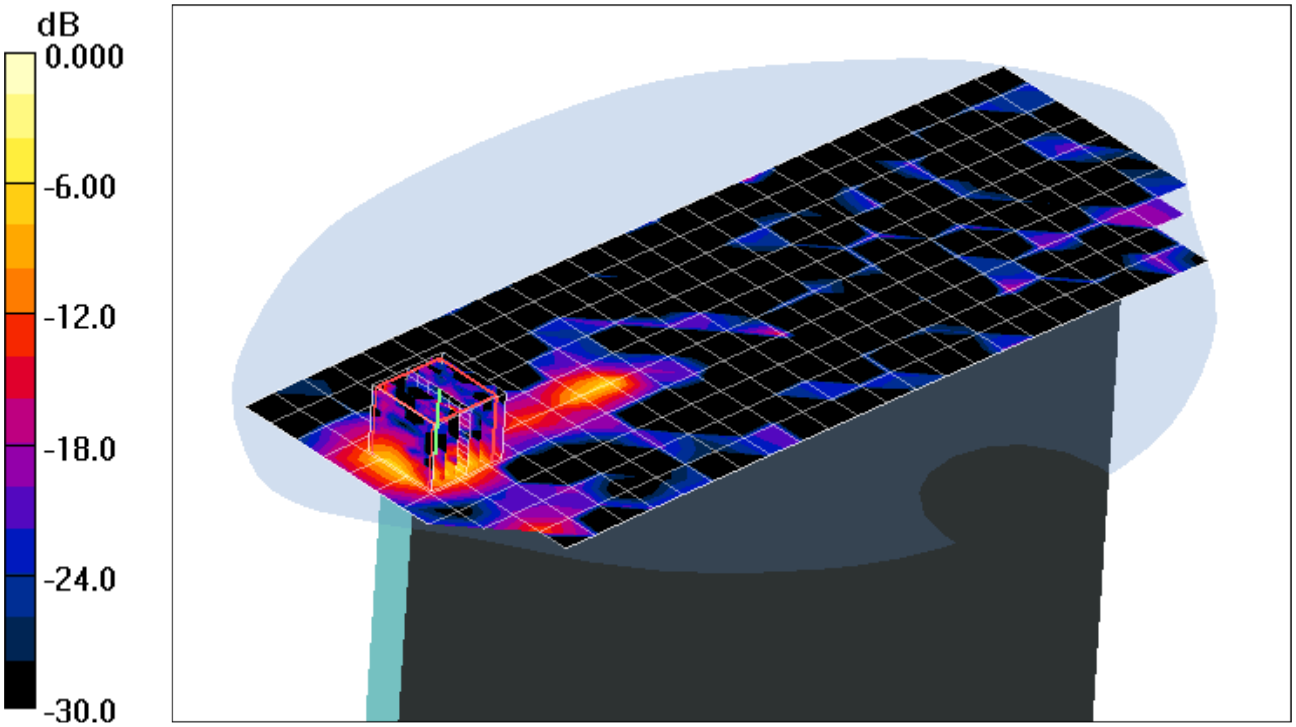
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5320 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5320 MHz; σ = 5.6 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 23.5 °C; Tissue Temp: 21.9 °C

Probe: EX3DV4 - SN3561; ConvF(3.42, 3.42, 3.42); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11a 5.3 GHz, Edge Top, Ch 64, 6 Mbps

Area Scan (11x27x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 10.7 V/m
Peak SAR (extrapolated) = 1.14 W/kg
SAR(1 g) = 0.307 mW/g; SAR(10 g) = 0.072 mW/g



0 dB = 0.709mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

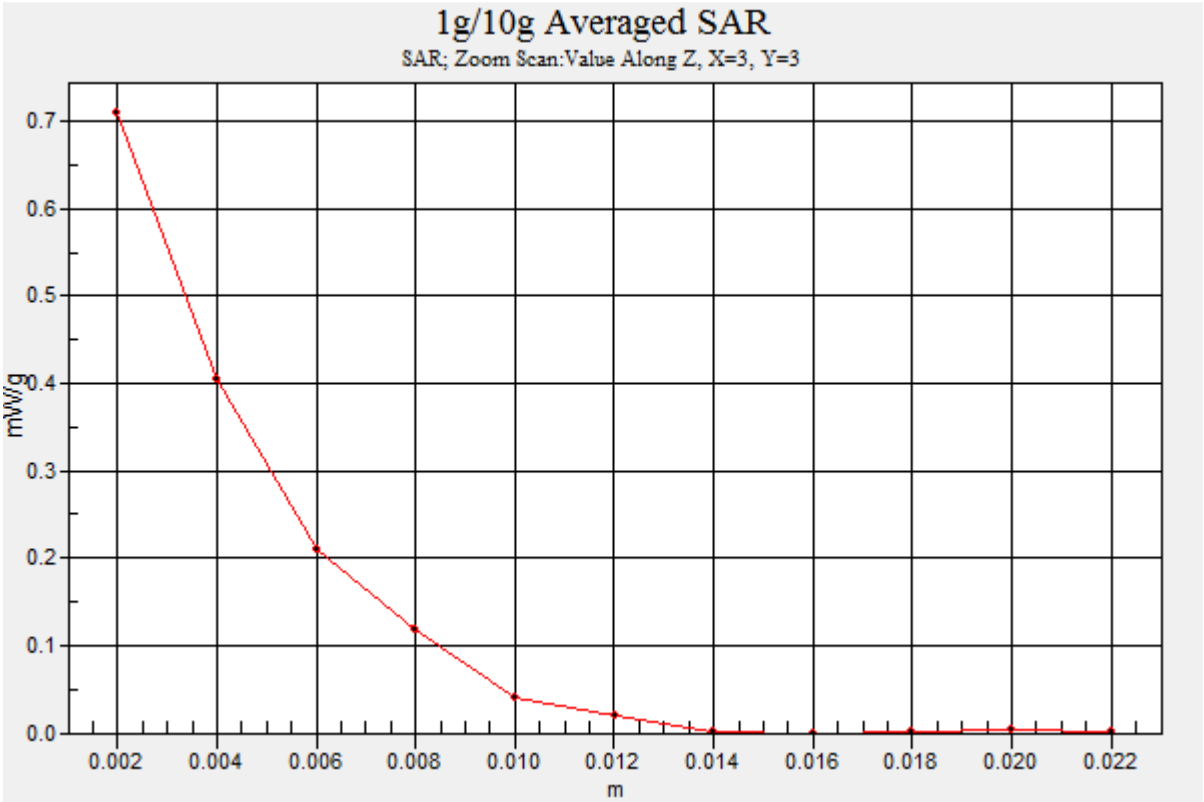
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5320 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5320 MHz; σ = 5.6 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 23.5 °C; Tissue Temp: 21.9 °C

Probe: EX3DV4 - SN3561; ConvF(3.42, 3.42, 3.42); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11a 5.3 GHz, Edge Top, Ch 64, 6 Mbps

Area Scan (11x27x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 10.7 V/m
Peak SAR (extrapolated) = 1.14 W/kg
SAR(1 g) = 0.307 mW/g; SAR(10 g) = 0.072 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

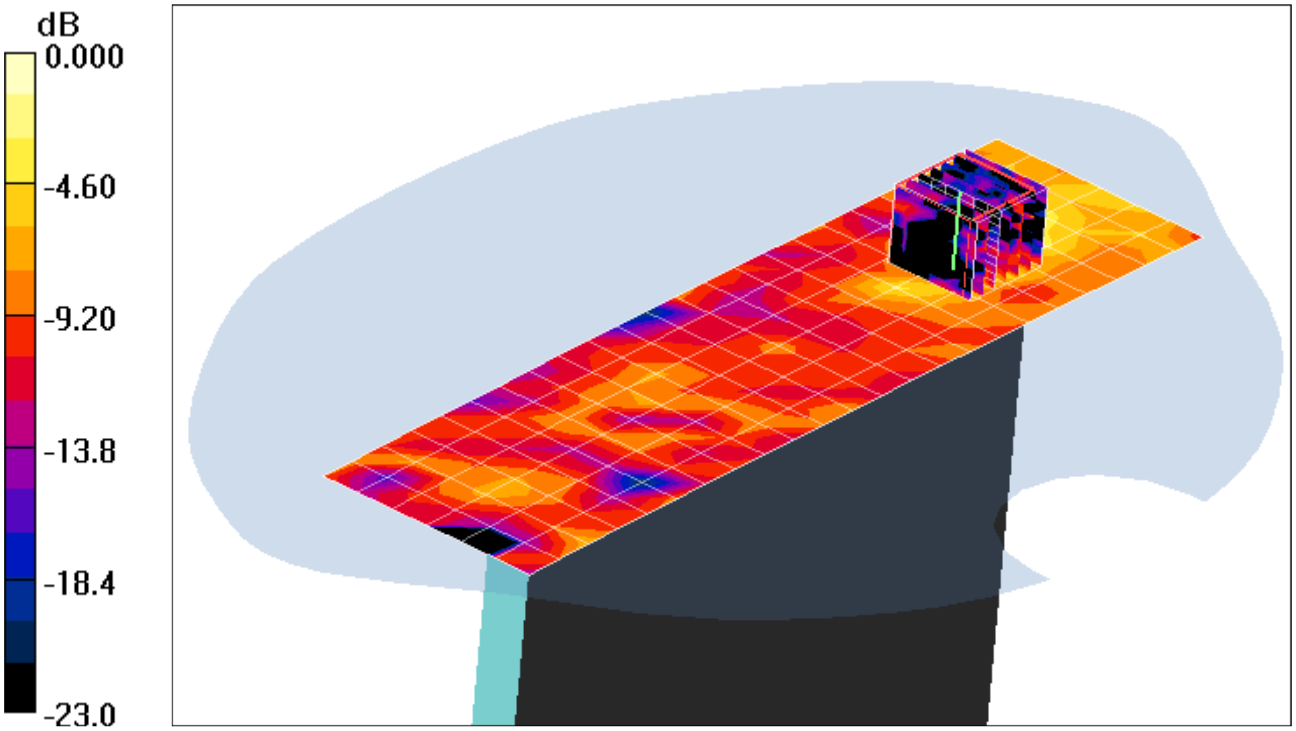
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5320 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5320 MHz; σ = 5.6 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 23.5 °C; Tissue Temp: 21.9 °C

Probe: EX3DV4 - SN3561; ConvF(3.42, 3.42, 3.42); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11a 5.3 GHz, Left, Ch 64, 6 Mbps

Area Scan (7x24x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.22 V/m
Peak SAR (extrapolated) = 0.490 W/kg
SAR(1 g) = 0.018 mW/g; SAR(10 g) = 0.00182 mW/g



0 dB = 0.116mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

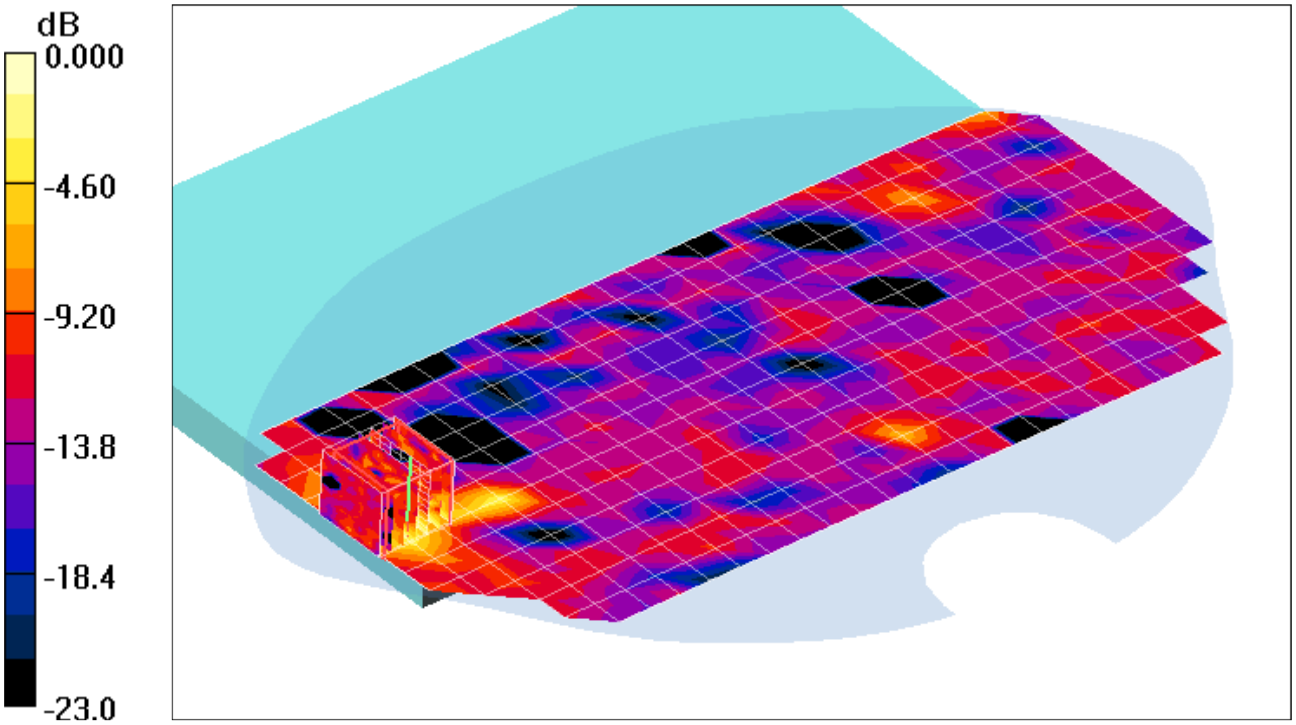
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5580 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5580 MHz; σ = 5.99 mho/m; ε_r = 46.7; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 22.7 °C; Tissue Temp: 21.4 °C

Probe: EX3DV4 - SN3561; ConvF(3.12, 3.12, 3.12); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11a 5.5 GHz, Body Back, Ch 116, 6 Mbps

Area Scan (13x27x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.95 V/m
Peak SAR (extrapolated) = 0.801 W/kg
SAR(1 g) = 0.125 mW/g; SAR(10 g) = 0.039 mW/g



0 dB = 0.292mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

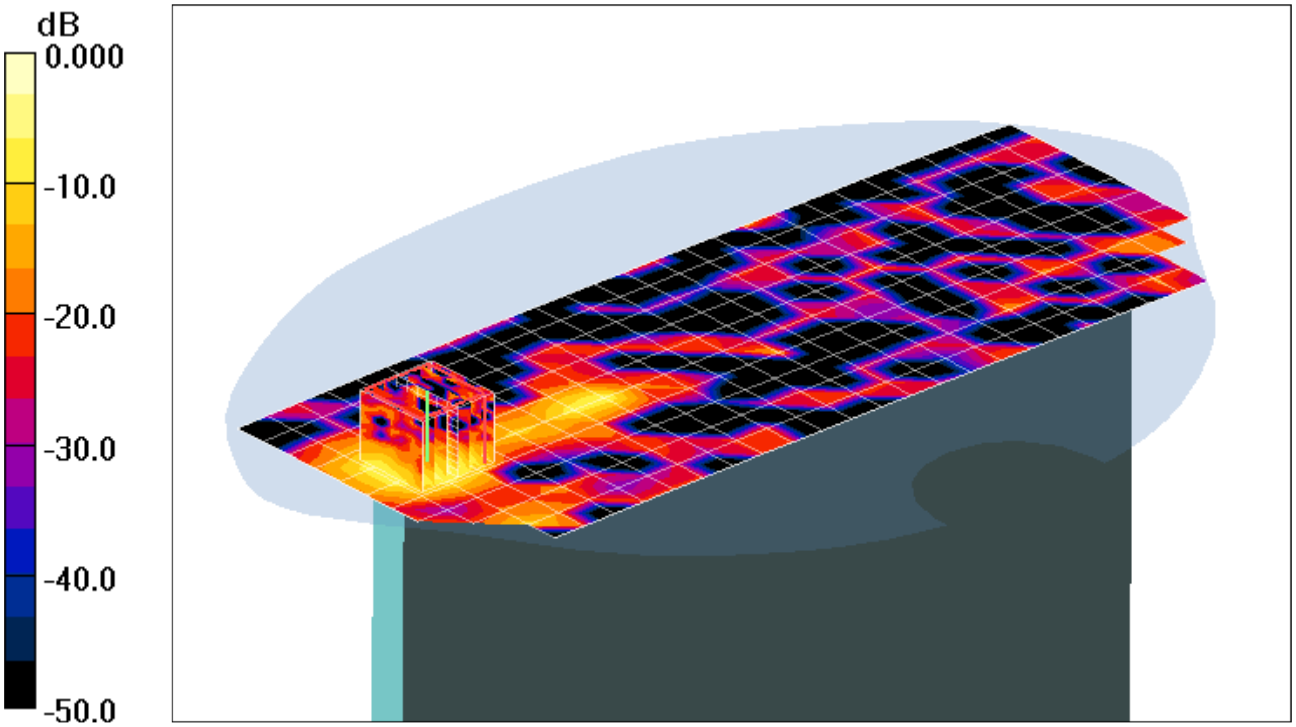
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5580 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5580 MHz; σ = 5.99 mho/m; ε_r = 46.7; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 22.7 °C; Tissue Temp: 21.4 °C

Probe: EX3DV4 - SN3561; ConvF(3.12, 3.12, 3.12); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11a 5.5 GHz, Edge Top, Ch 116, 6 Mbps

Area Scan (11x27x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 9.51 V/m
Peak SAR (extrapolated) = 1.47 W/kg
SAR(1 g) = 0.228 mW/g; SAR(10 g) = 0.044 mW/g



0 dB = 0.670mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

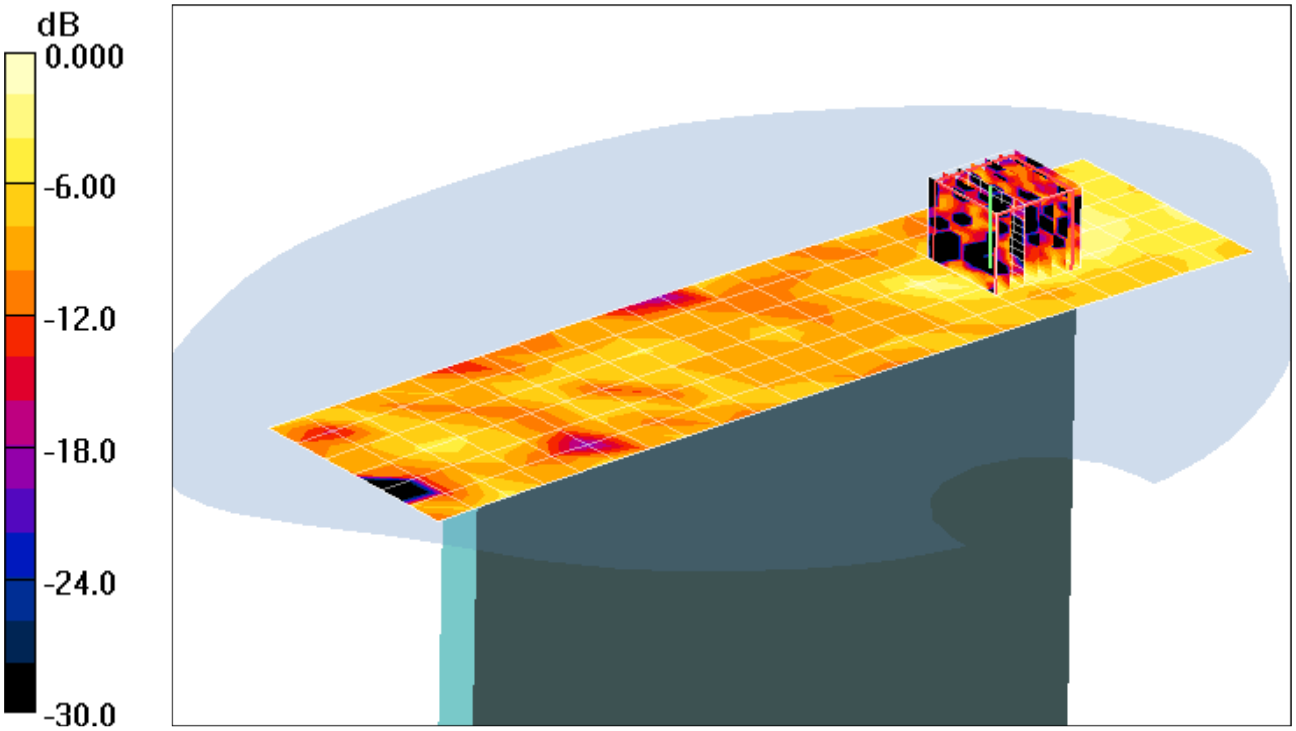
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5580 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5580 MHz; σ = 5.99 mho/m; ε_r = 46.7; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 22.7 °C; Tissue Temp: 21.4 °C

Probe: EX3DV4 - SN3561; ConvF(3.12, 3.12, 3.12); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11a 5.5 GHz, Left, Ch 116, 6 Mbps

Area Scan (7x24x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.43 V/m
Peak SAR (extrapolated) = 0.269 W/kg
SAR(1 g) = 0.032 mW/g; SAR(10 g) = 0.00701 mW/g



0 dB = 0.081mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

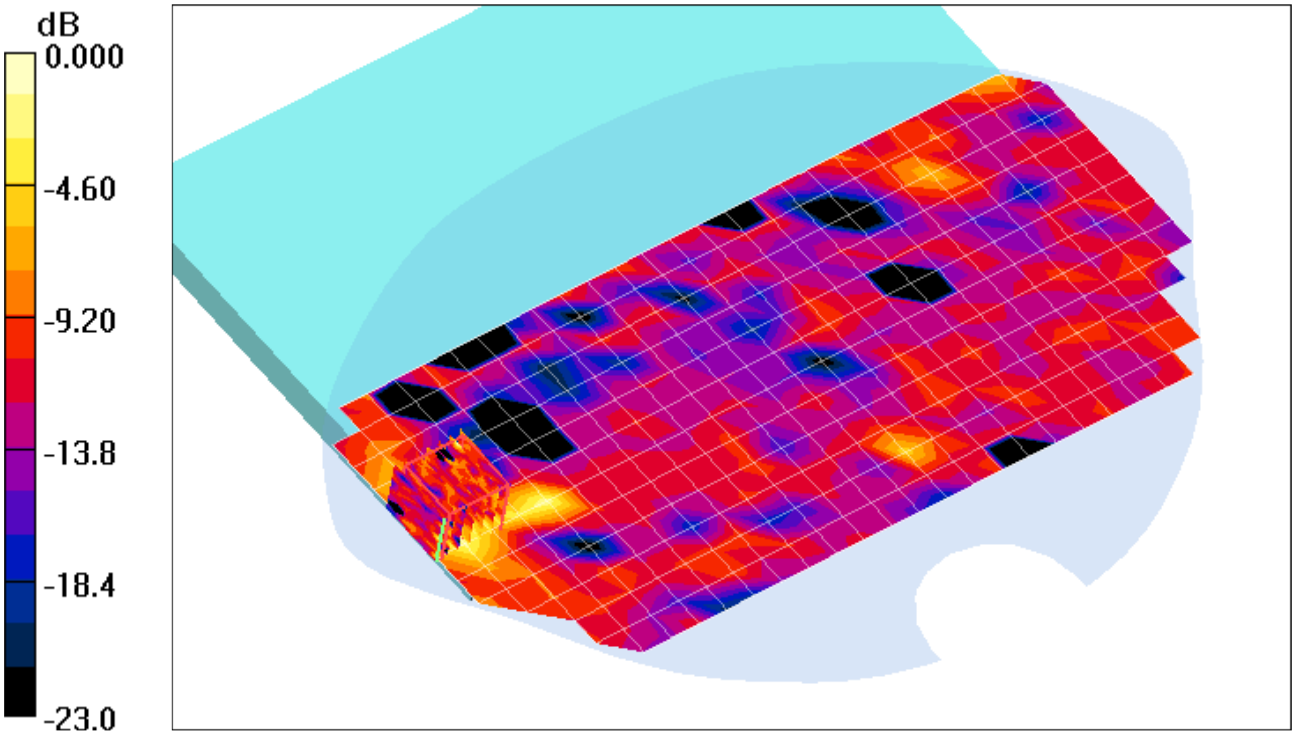
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5745 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5745 MHz; σ = 6.22 mho/m; ε_r = 46.6; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 22.9 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3561; ConvF(3.25, 3.25, 3.25); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Area Scan (13x27x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.59 V/m
Peak SAR (extrapolated) = 0.406 W/kg
SAR(1 g) = 0.071 mW/g; SAR(10 g) = 0.011 mW/g



0 dB = 0.227mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

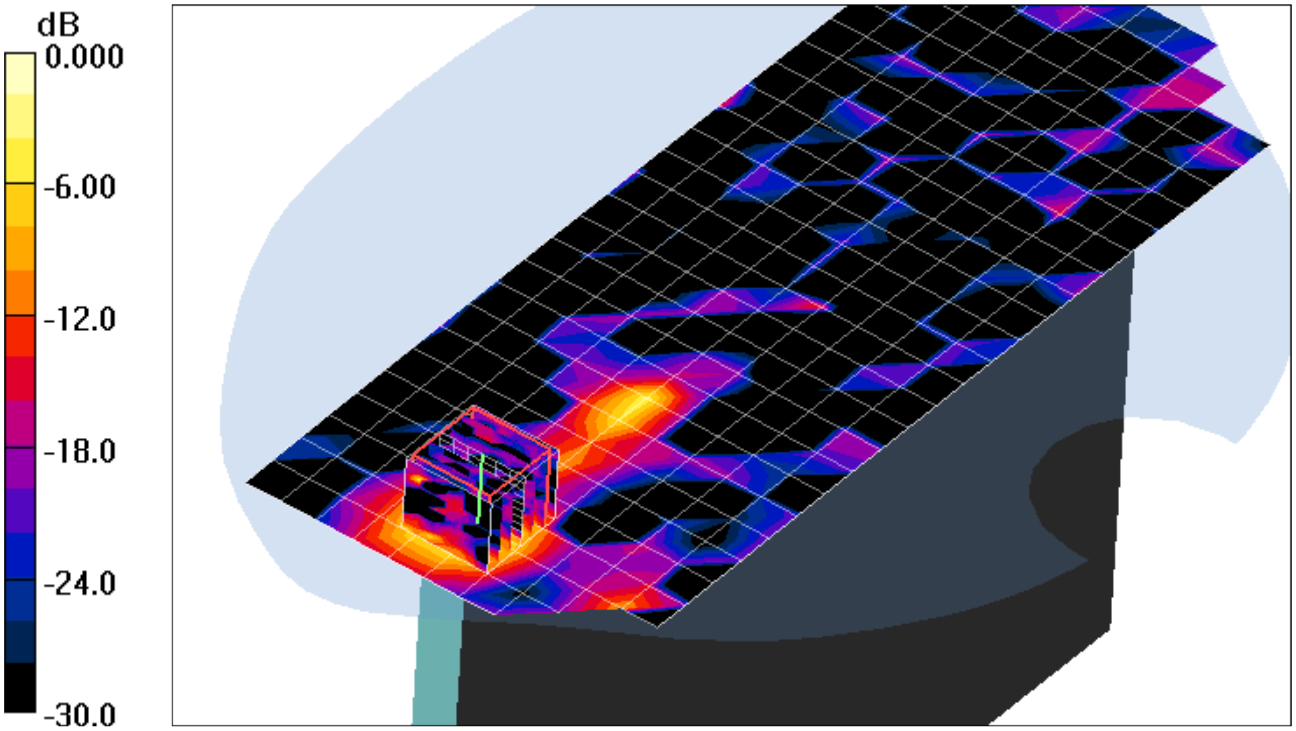
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5745 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5745 MHz; σ = 6.22 mho/m; ε_r = 46.6; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 22.9 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3561; ConvF(3.25, 3.25, 3.25); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11a 5.8 GHz, Edge Top, Ch 149, 6 Mbps

Area Scan (11x27x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 7.66 V/m
Peak SAR (extrapolated) = 0.994 W/kg
SAR(1 g) = 0.153 mW/g; SAR(10 g) = 0.034 mW/g



0 dB = 0.444mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

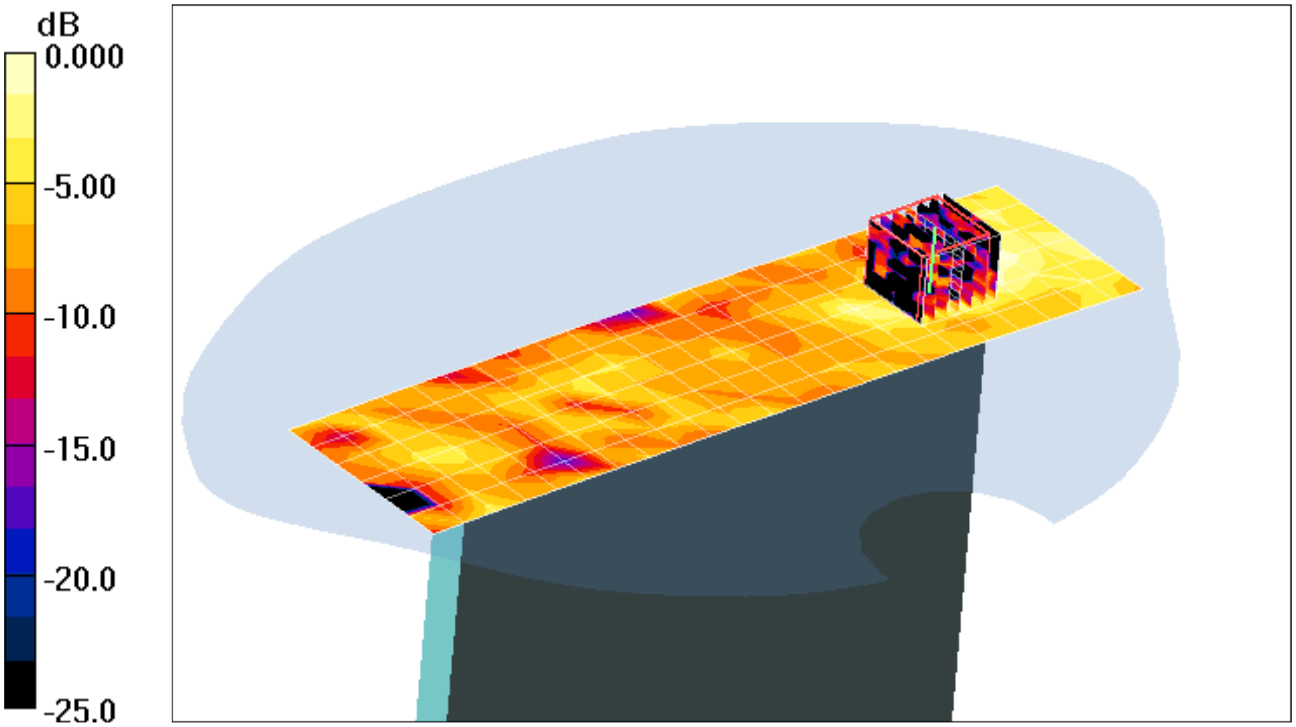
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5745 MHz;Duty Cycle: 1:1
Medium: 5 GHz Muscle Medium parameters used (interpolated):
f = 5745 MHz; σ = 6.22 mho/m; ε_r = 46.6; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2011; Ambient Temp: 22.9 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3561; ConvF(3.25, 3.25, 3.25); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Area Scan (7x24x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.58 V/m
Peak SAR (extrapolated) = 0.230 W/kg
SAR(1 g) = 0.023 mW/g; SAR(10 g) = 0.00335 mW/g



0 dB = 0.062mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

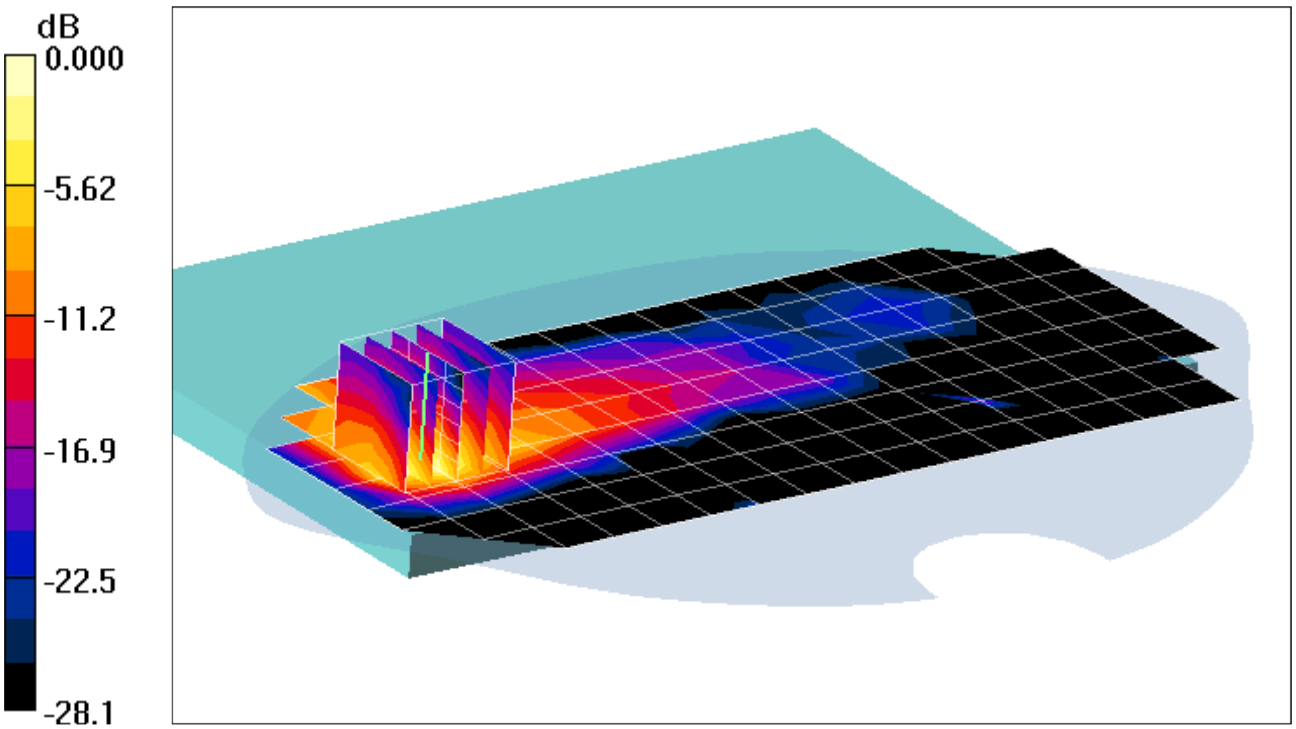
Communication System: IEEE 802.11b; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.96 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-21-2011; Ambient Temp: 24.4 °C; Tissue Temp: 22.7 °C

Probe: EX3DV4 - SN3561; ConvF(6.44, 6.44, 6.44); Calibrated: 8/19/2010
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11b, Body SAR, Back side, Ch 01, 1 Mbps

Area Scan (9x18x1): 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) = 1.67 W/kg
SAR(1 g) = 0.726 mW/g; SAR(10 g) = 0.296 mW/g



0 dB = 0.772mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

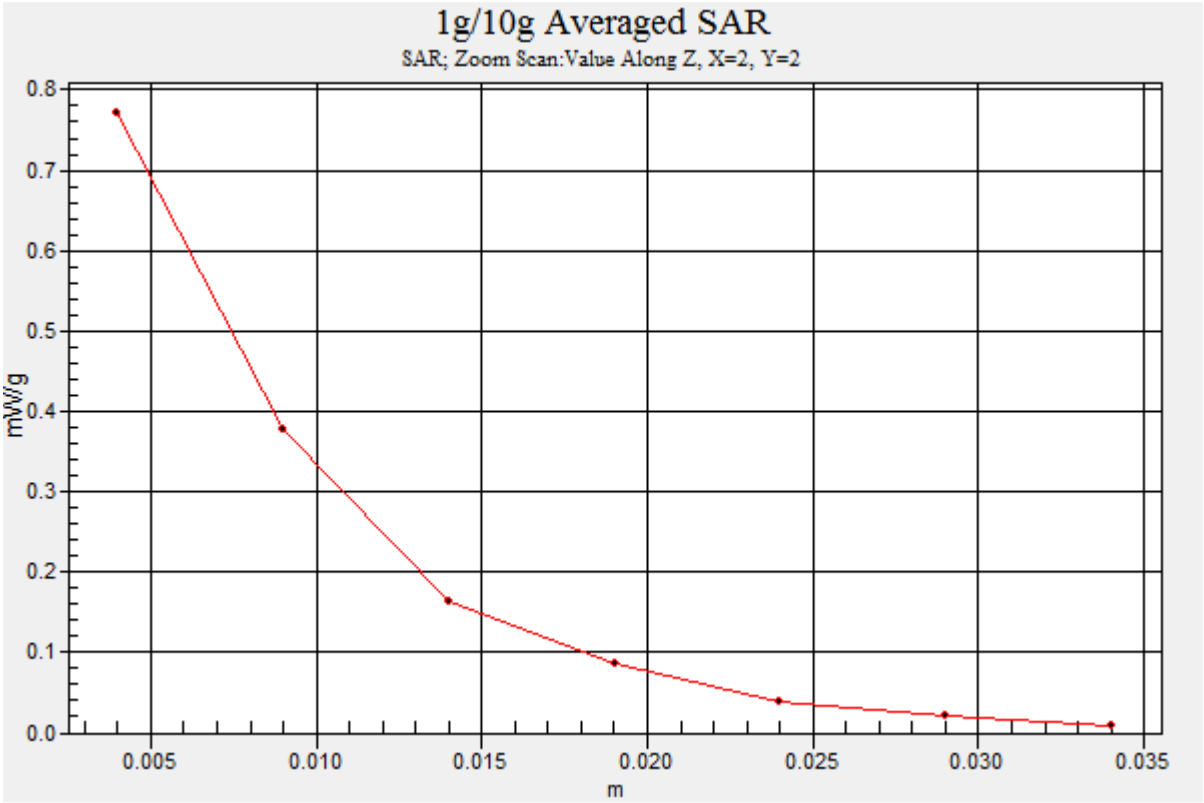
Communication System: IEEE 802.11b; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.96 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-21-2011; Ambient Temp: 24.4 °C; Tissue Temp: 22.7 °C

Probe: EX3DV4 - SN3561; ConvF(6.44, 6.44, 6.44); Calibrated: 8/19/2010
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11b, Body SAR, Back side, Ch 01, 1 Mbps

Area Scan (9x18x1): 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) = 1.67 W/kg
SAR(1 g) = 0.726 mW/g; SAR(10 g) = 0.296 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

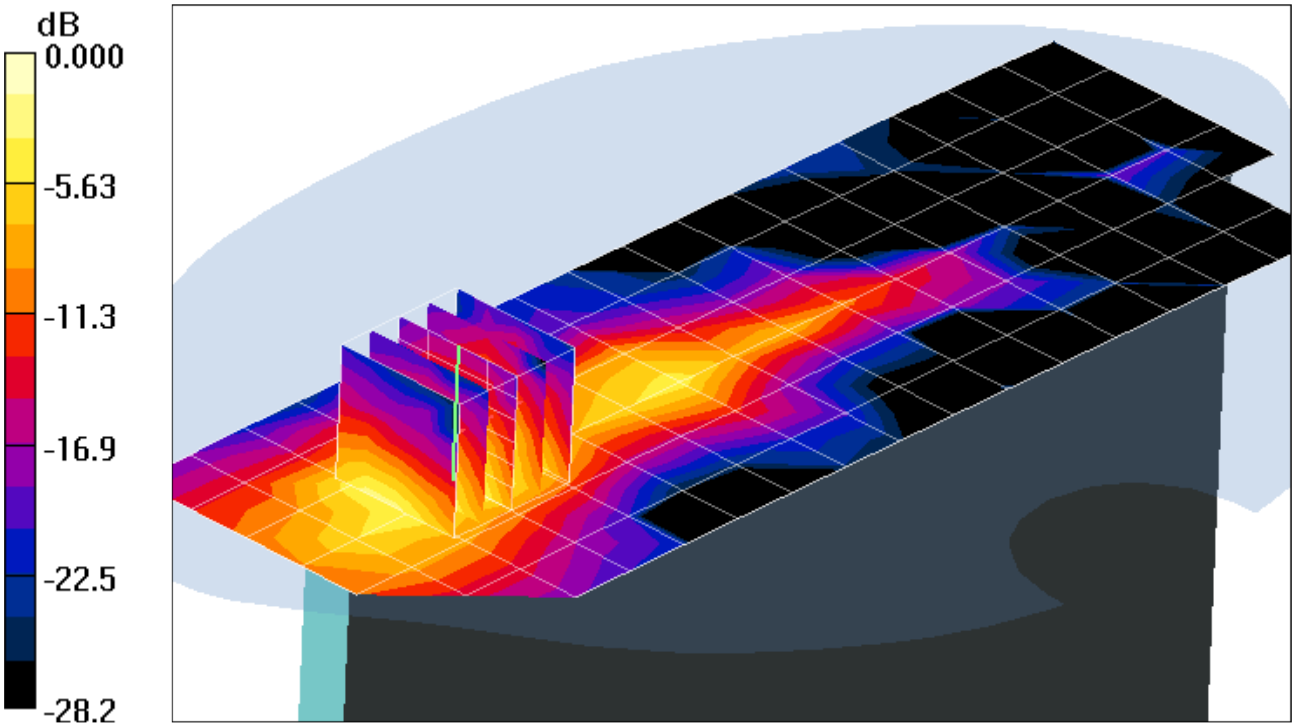
Communication System: IEEE 802.11b; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.96 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-21-2011; Ambient Temp: 24.4 °C; Tissue Temp: 22.7 °C

Probe: EX3DV4 - SN3561; ConvF(6.44, 6.44, 6.44); Calibrated: 8/19/2010
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11b, Body SAR, Top side, Ch 01, 1 Mbps

Area Scan (7x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.90 V/m
Peak SAR (extrapolated) = 0.352 W/kg
SAR(1 g) = 0.180 mW/g; SAR(10 g) = 0.083 mW/g



0 dB = 0.255mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTP7100; Type: 850/1900 GSM/GPRS/EDGE/WCDMA/HSPA Tablet with Bluetooth and WLAN; Serial: IMEI 355691040001510

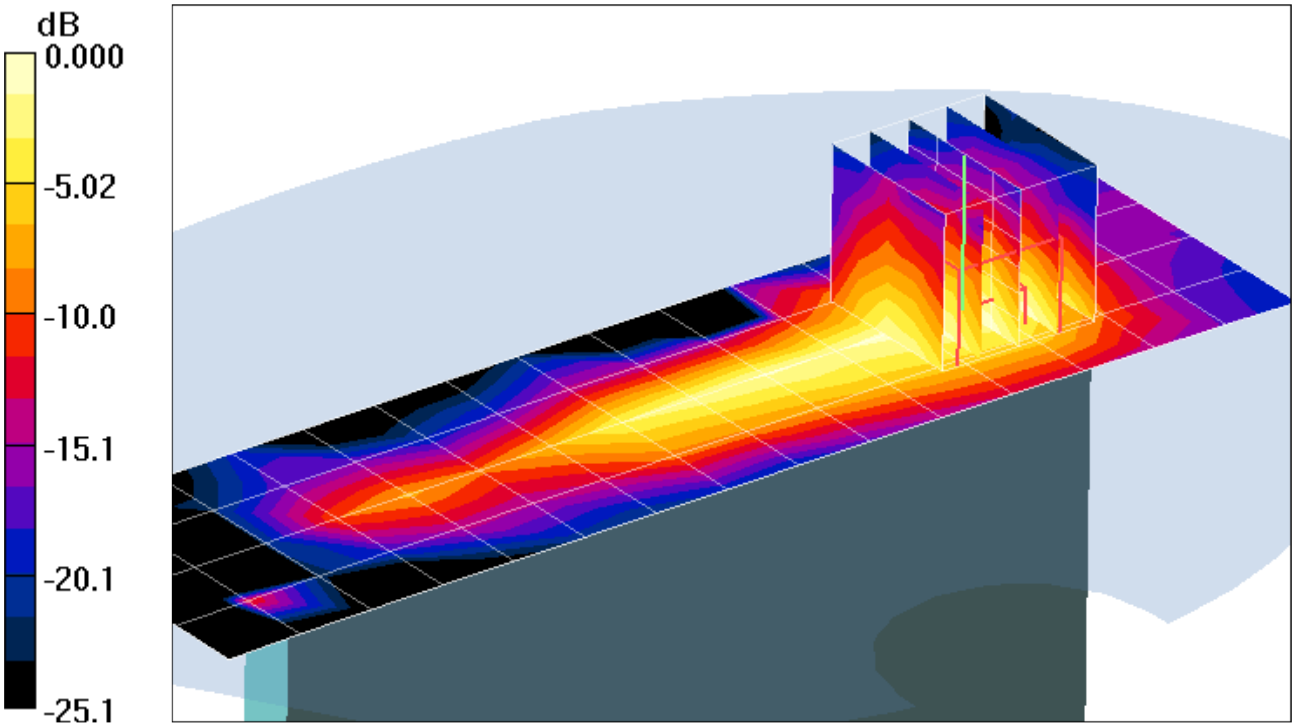
Communication System: IEEE 802.11b; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.96 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-21-2011; Ambient Temp: 24.4 °C; Tissue Temp: 22.7 °C

Probe: EX3DV4 - SN3561; ConvF(6.44, 6.44, 6.44); Calibrated: 8/19/2010
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: IEEE 802.11b, Body SAR, Left side, Ch 01, 1 Mbps

Area Scan (5x16x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.1 V/m
Peak SAR (extrapolated) = 0.422 W/kg
SAR(1 g) = 0.212 mW/g; SAR(10 g) = 0.102 mW/g



0 dB = 0.221mW/g

APPENDIX B: DIPOLE VALIDATION

PCTEST ENGINEERING LABORATORY, INC.

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

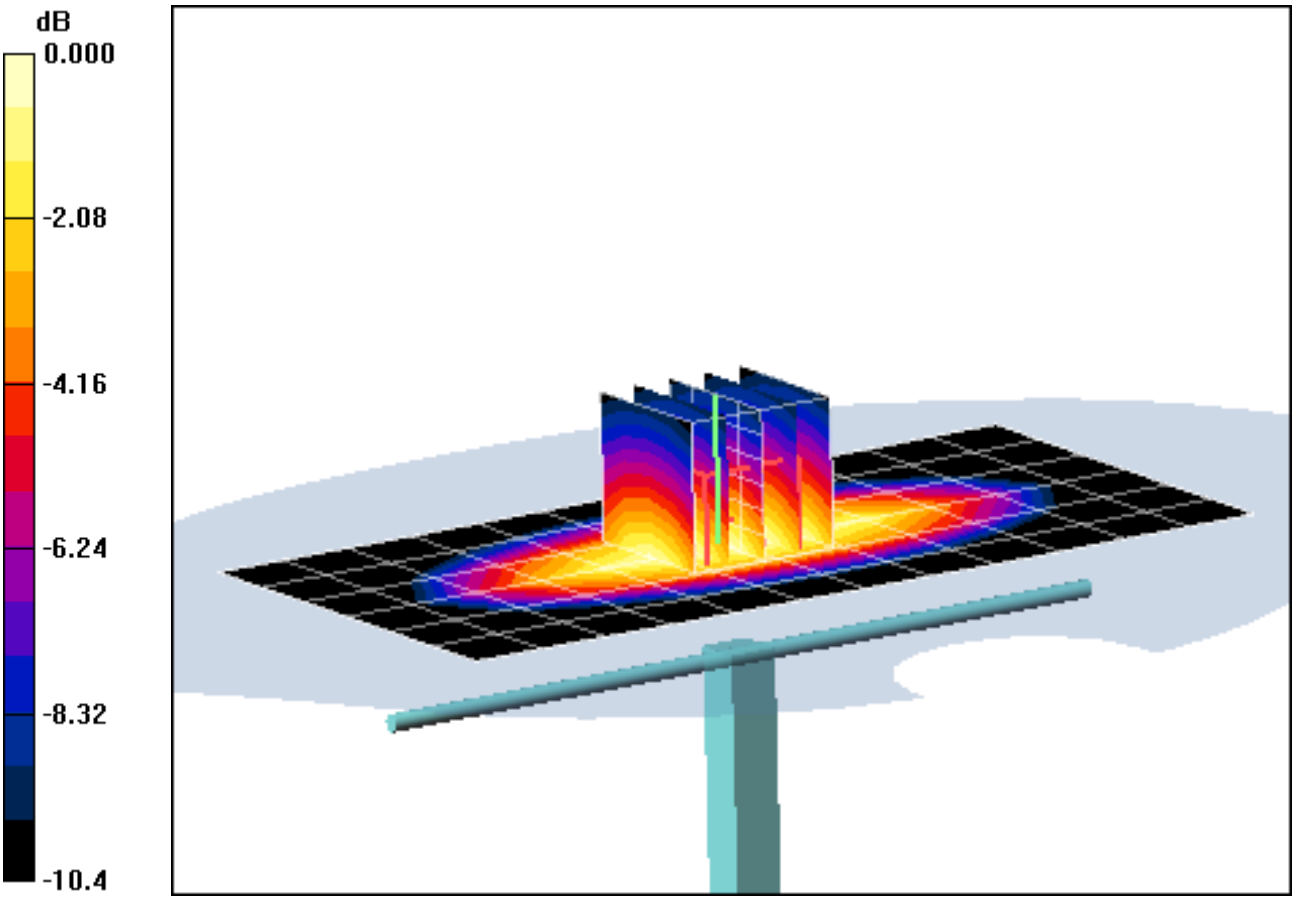
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.986 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-18-2011; Ambient Temp: 24.3 °C; Tissue Temp: 22.5 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 18.0 dBm (63 mW)
SAR(1 g) = 0.627 mW/g; SAR(10 g) = 0.413 mW/g
Deviation = 1.76 %



0 dB = 0.677mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.984 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3

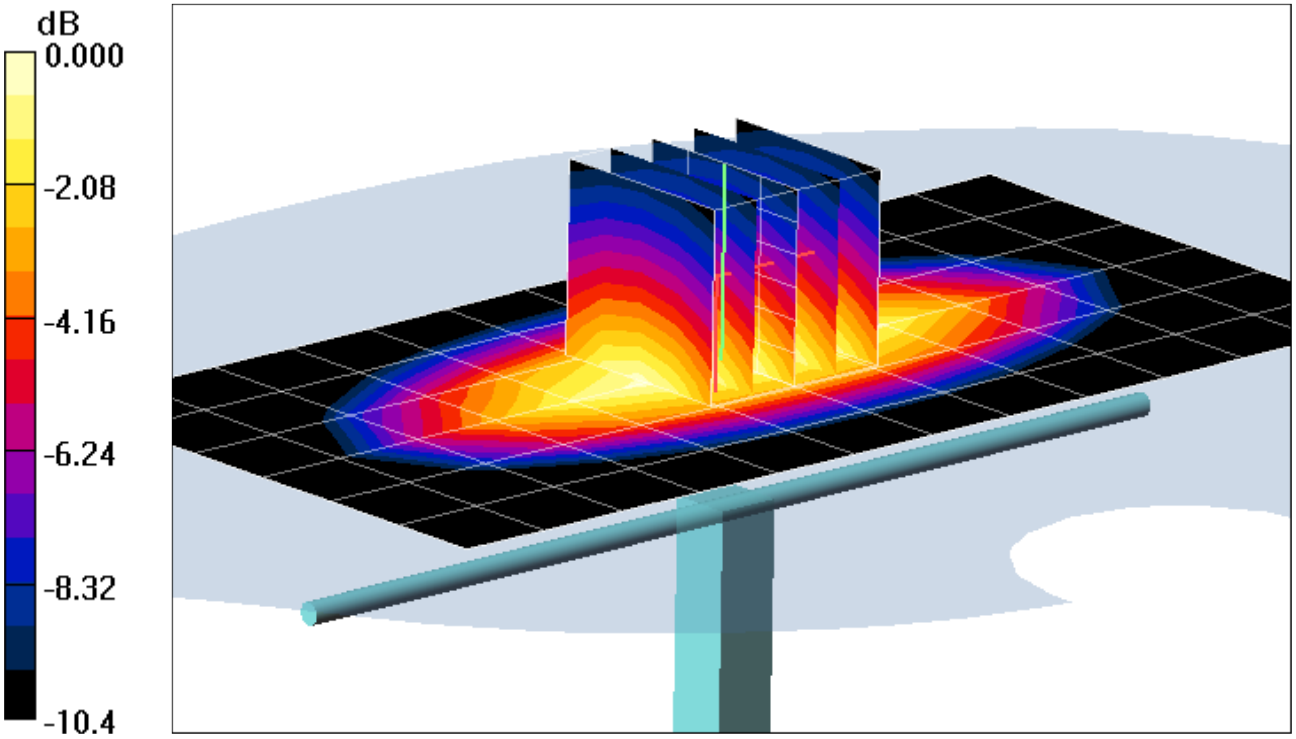
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-21-2011; Ambient Temp: 24.0 °C; Tissue Temp: 22.3 °C

Probe: ES3DV2 - SN3022; ConvF(5.89, 5.89, 5.89); Calibrated: 9/21/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE3 Sn455; Calibrated: 11/18/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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 = 18.0 dBm (63 mW)
SAR(1 g) = 0.634 mW/g; SAR(10 g) = 0.418 mW/g
Deviation = 2.90%



0 dB = 0.686mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

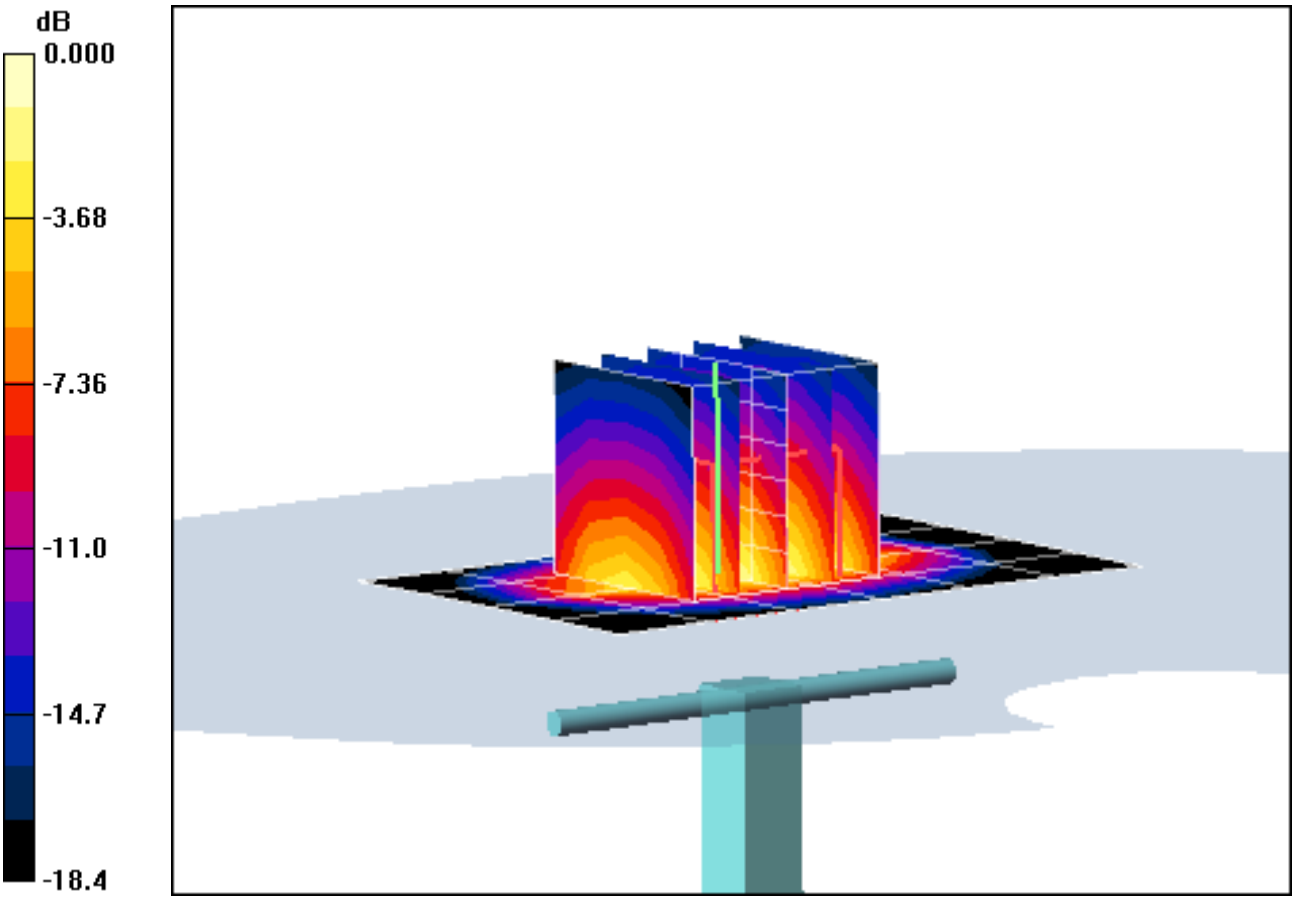
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.56 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-17-2011; Ambient Temp: 23.7 °C; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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) = 1.61 mW/g; SAR(10 g) = 0.822 mW/g
Deviation = -0.62 %



0 dB = 1.79mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.53 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3

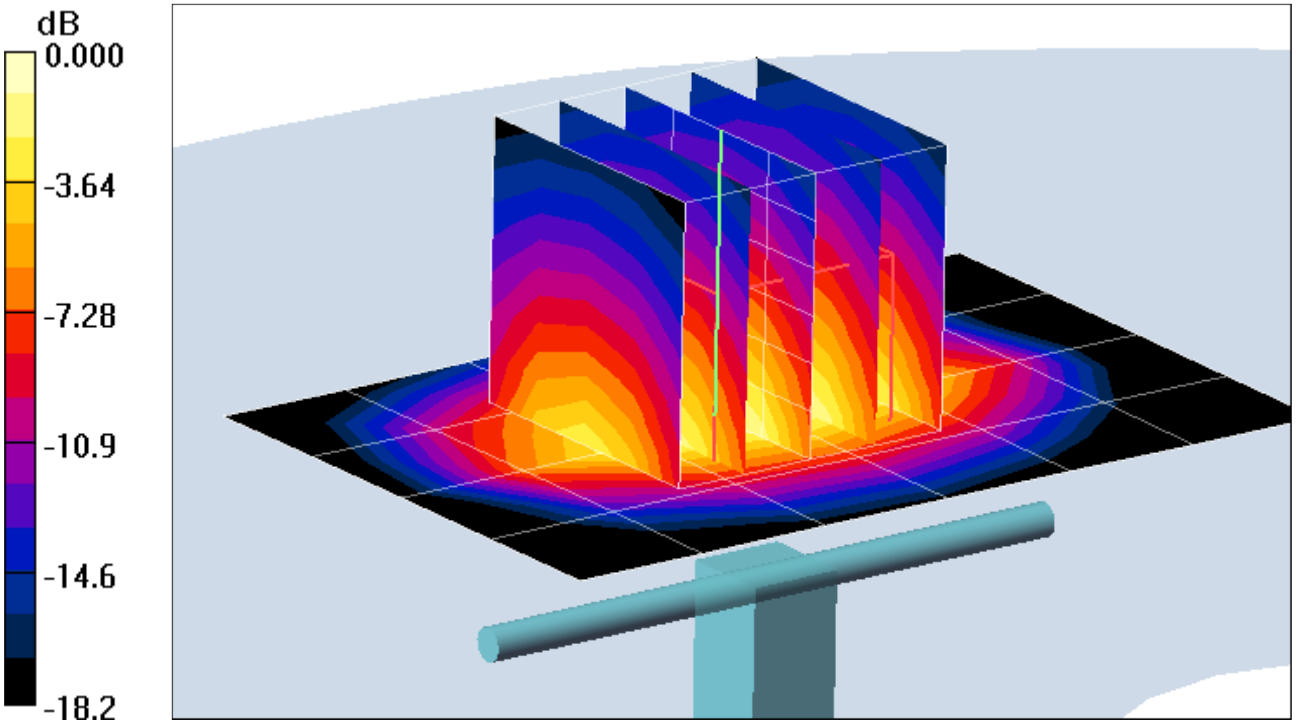
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-19-2011; Ambient Temp: 23.9 °C; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3550; ConvF(6.63, 6.63, 6.63); Calibrated: 1/26/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 1/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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) = 1.52 mW/g; SAR(10 g) = 0.775 mW/g
Deviation = -6.17%



0 dB = 1.70mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

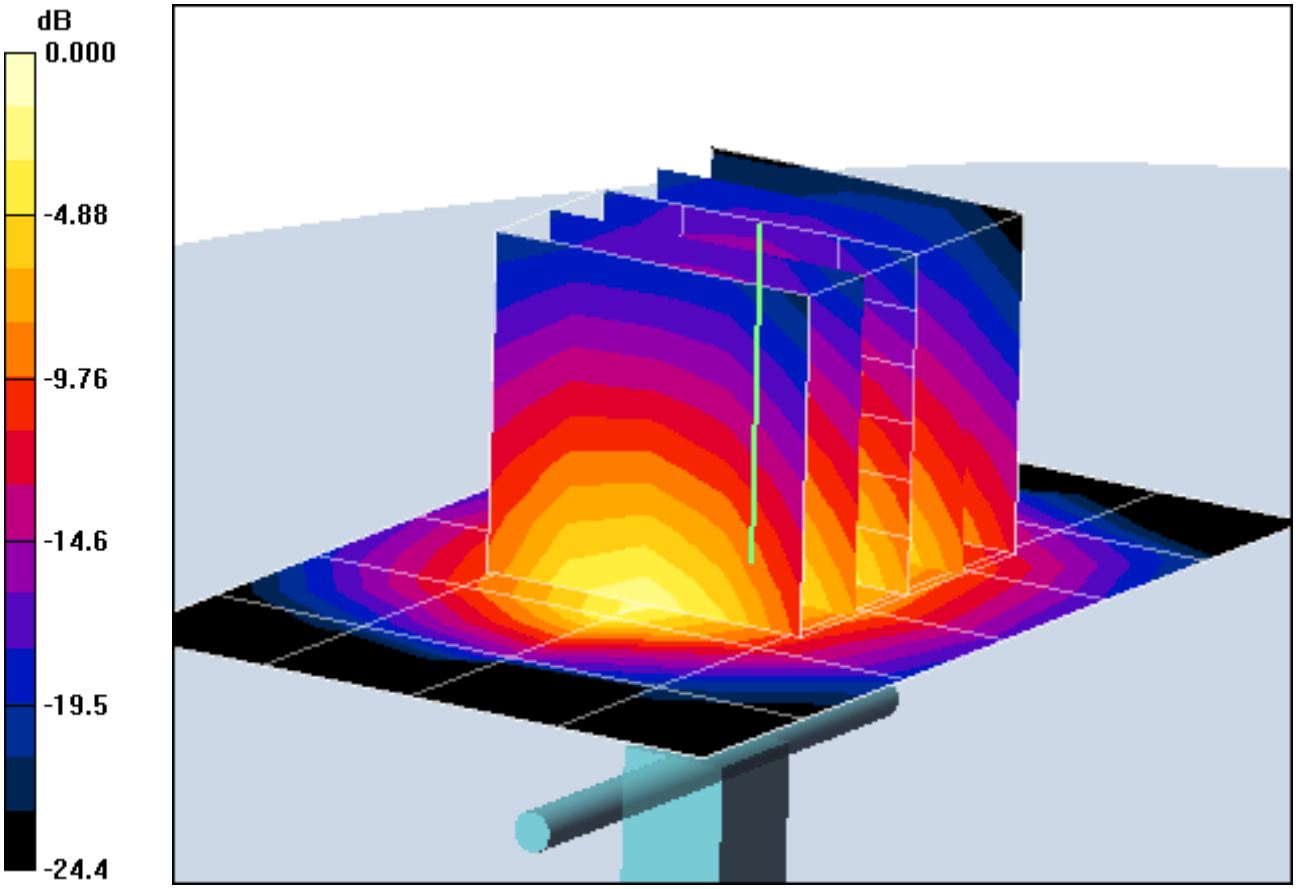
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.01 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-21-2011; Ambient Temp: 24.4 °C; Tissue Temp: 22.7 °C

Probe: EX3DV4 - SN3561; ConvF(6.44, 6.44, 6.44); Calibrated: 8/19/2010
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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) = 0.846 mW/g; SAR(10 g) = 0.383 mW/g
Deviation = 4.17 %



0 dB = 1.09mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

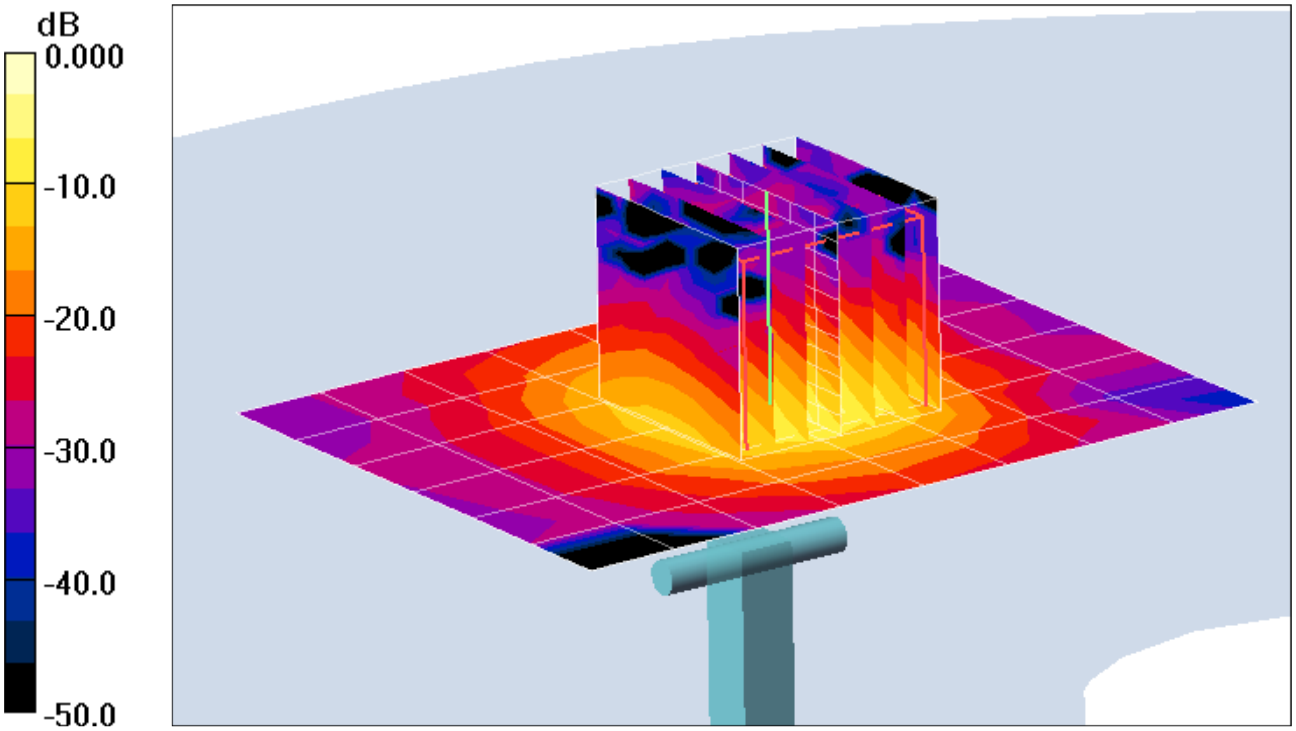
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5200 Muscle Medium parameters used (interpolated):
f = 5200 MHz; σ = 5.41 mho/m; ε_r = 47.7; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-24-2011; Ambient Temp: 23.5 °C; Tissue Temp: 21.9 °C

Probe: EX3DV4 - SN3561; ConvF(3.67, 3.67, 3.67); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5200MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power = 14.0 dBm (25 mW)
SAR(1 g) = 2.02 mW/g; SAR(10 g) = 0.564 mW/g
Deviation = 2.41%



0 dB = 7.66mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

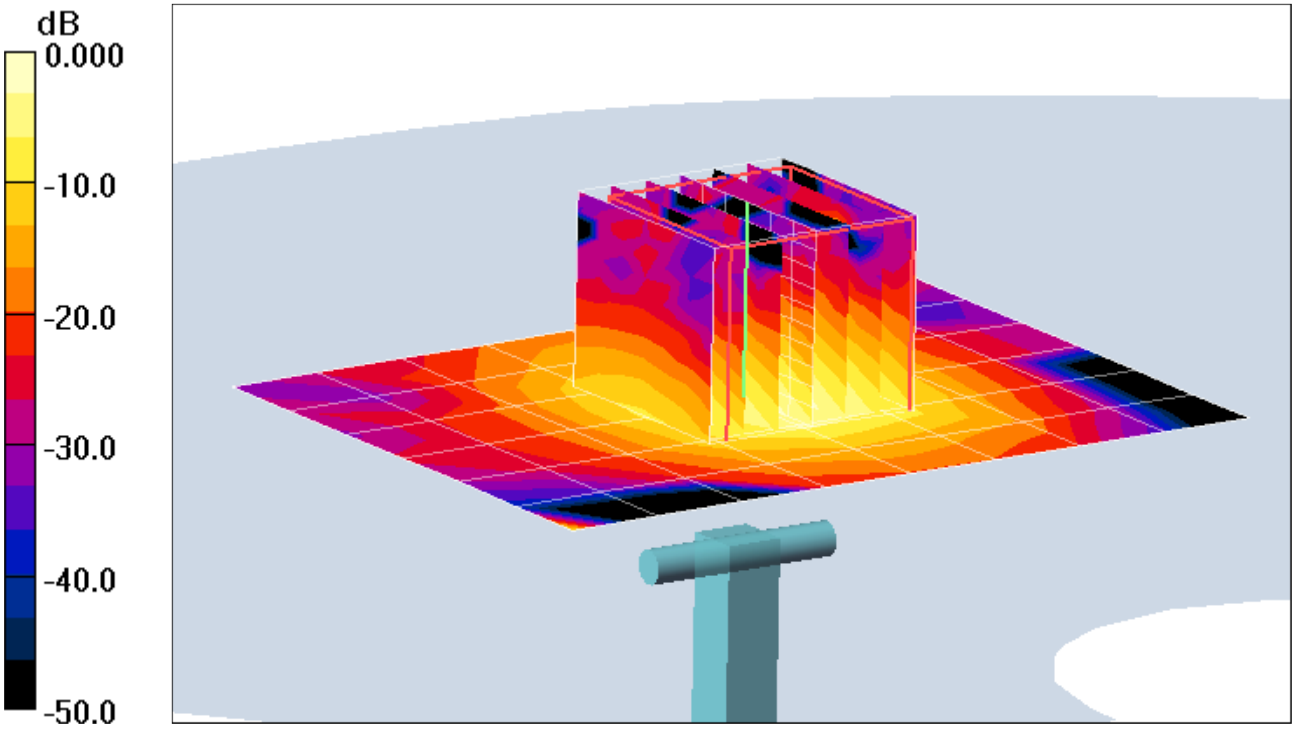
Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5500 MHz; σ = 5.87 mho/m; ε_r = 47; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-24-2011; Ambient Temp: 22.7 °C; Tissue Temp: 21.4 °C

Probe: EX3DV4 - SN3561; ConvF(3.31, 3.31, 3.31); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5500MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power = 14.0 dBm (25 mW)
SAR(1 g) = 1.99 mW/g; SAR(10 g) = 0.538 mW/g
Deviation = -5.35 %



0 dB = 4.17mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

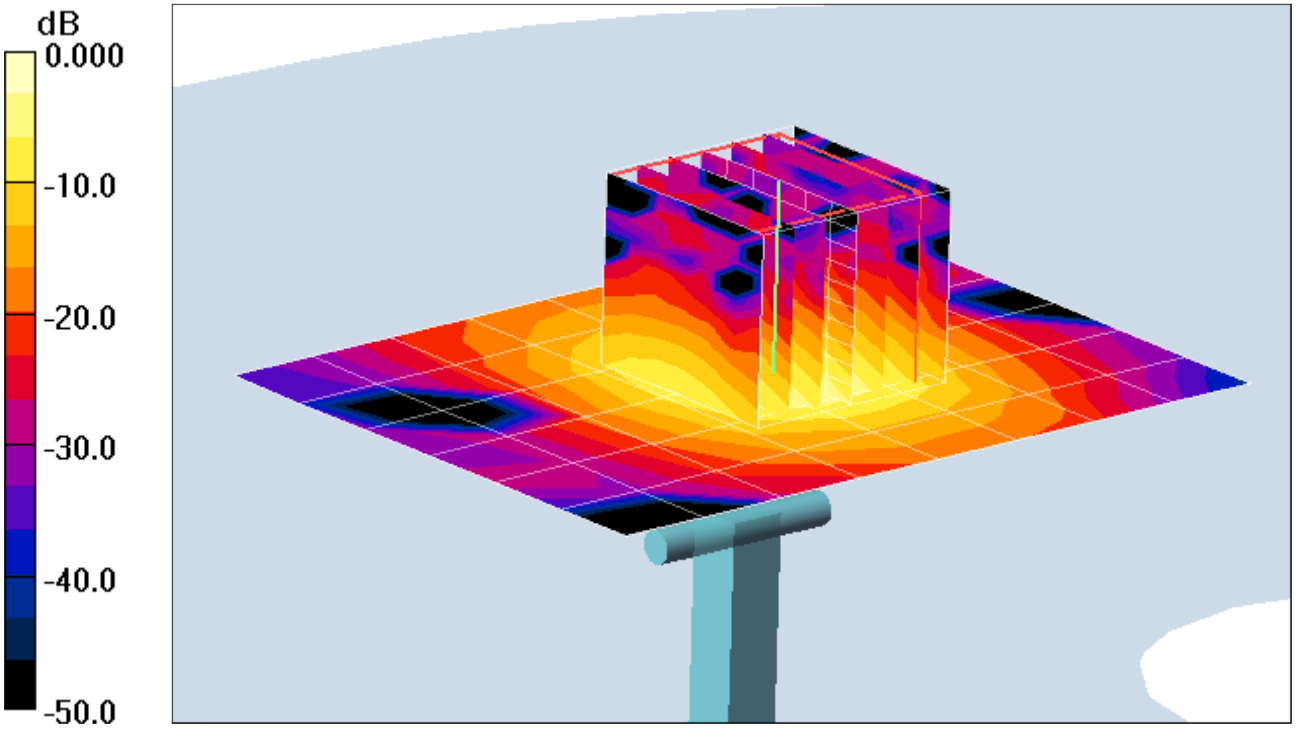
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5GHz Muscle Medium parameters used (interpolated):
f = 5800 MHz; σ = 6.29 mho/m; ε_r = 46.41; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-24-2011; Ambient Temp: 22.9 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3561; ConvF(3.25, 3.25, 3.25); Calibrated: 8/19/2010
Sensor-Surface: 2mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/21/2010
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5800MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Input Power = 14.0 dBm (25 mW)
SAR(1 g) = 1.85 mW/g; SAR(10 g) = 0.506 mW/g
Deviation = 2.35%



0 dB = 3.89mW/g

APPENDIX C: PROBE CALIBRATION

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

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

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

Accreditation No.: SCS 108

Client PC Test

Certificate No: ES3-3022_Sep10

CALIBRATION CERTIFICATE

Object	ES3DV2 - SN:3022
Calibration procedure(s)	QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	September 21, 2010

KOK 9/29/10

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

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

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

Issued: September 22, 2010

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ES3DV2

SN:3022

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

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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

Basic Calibration Parameters

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

Modulation Calibration Parameters

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

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

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

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

Calibration Parameter Determined in Head Tissue Simulating Media

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

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

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

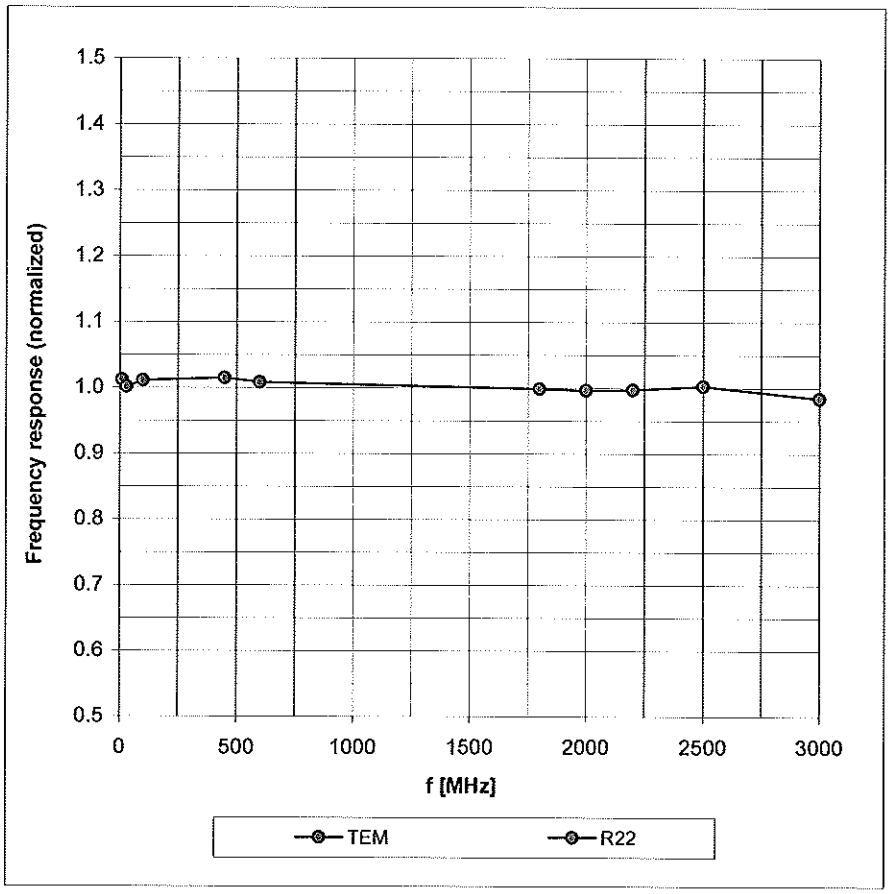
Calibration Parameter Determined in Body Tissue Simulating Media

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

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

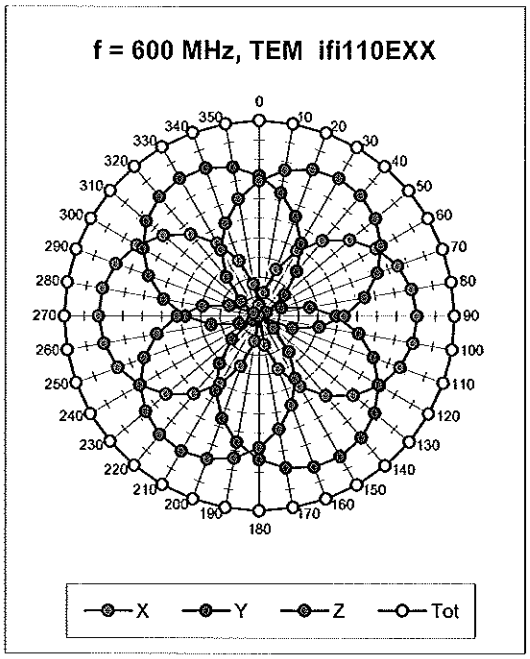
Frequency Response of E-Field

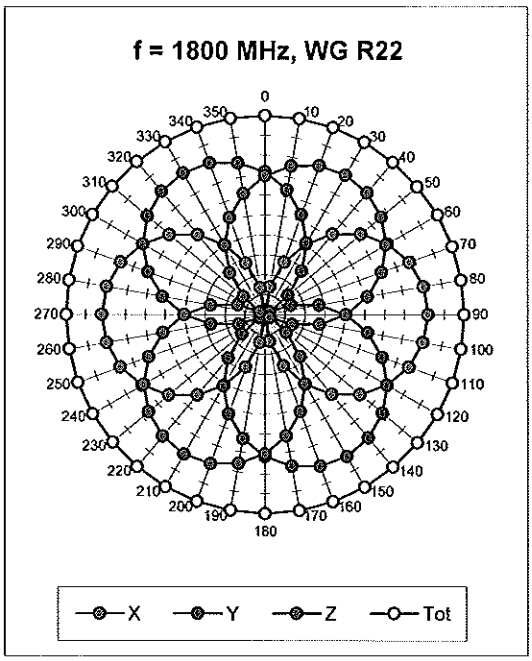
(TEM-Cell:ifi110 EXX, Waveguide: R22)

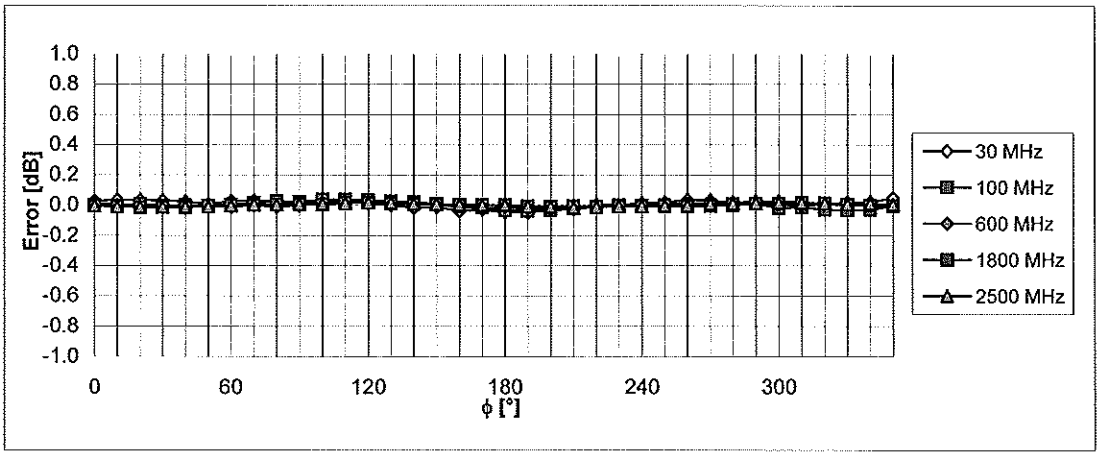


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



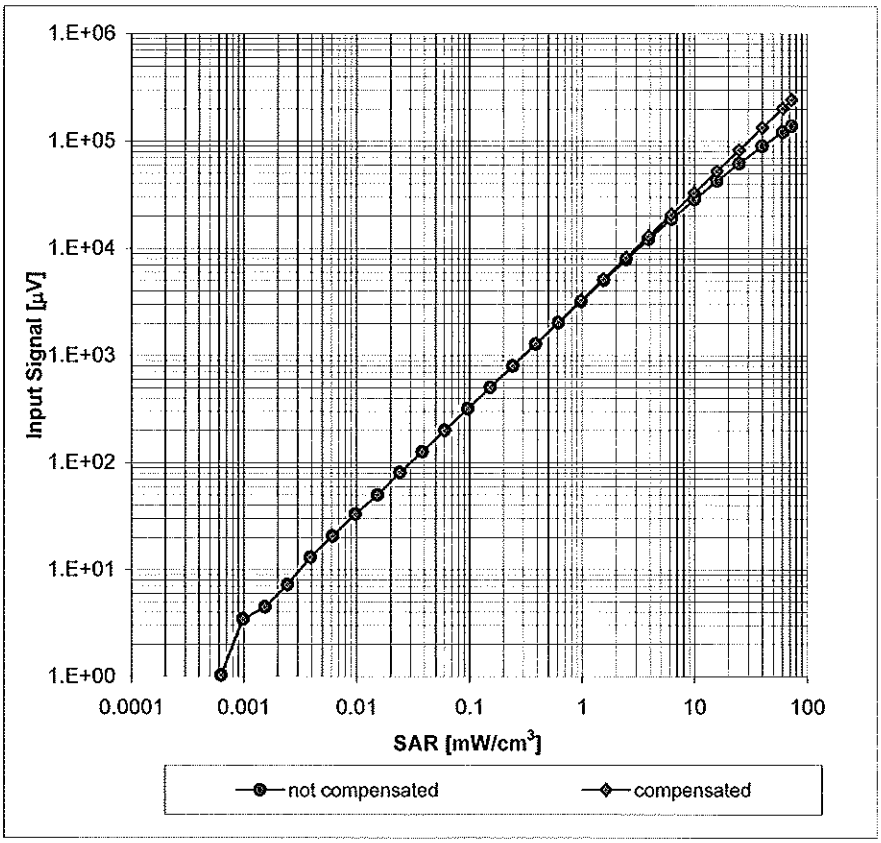


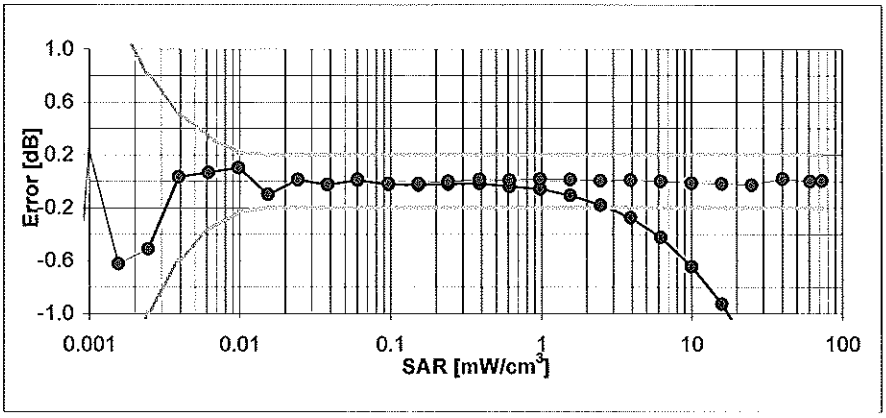


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

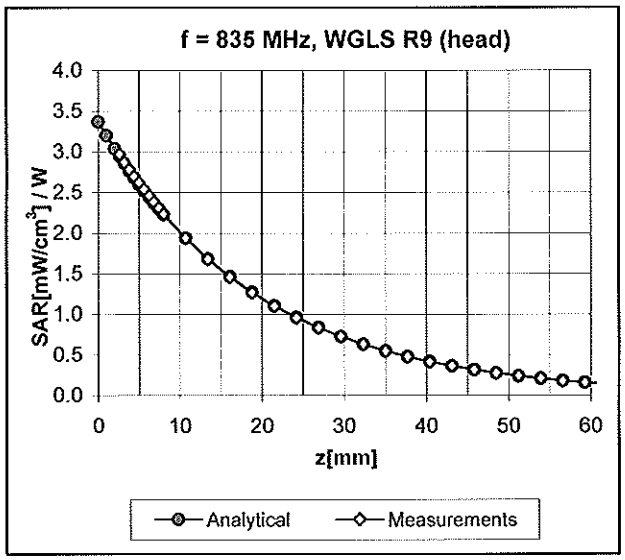
(Waveguide R22, f = 1800 MHz)

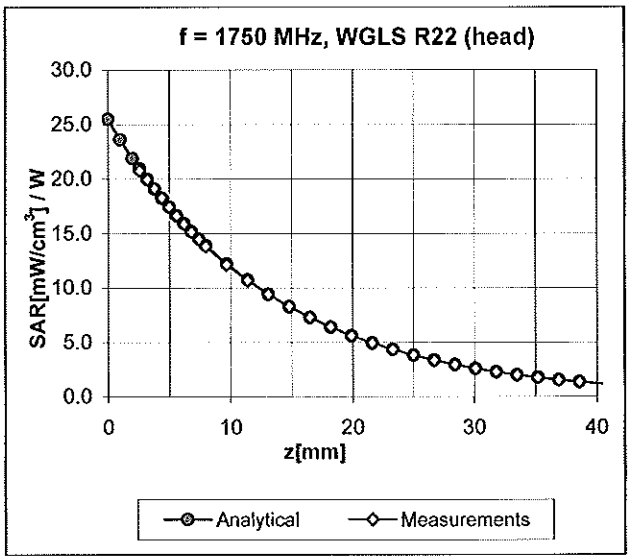




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

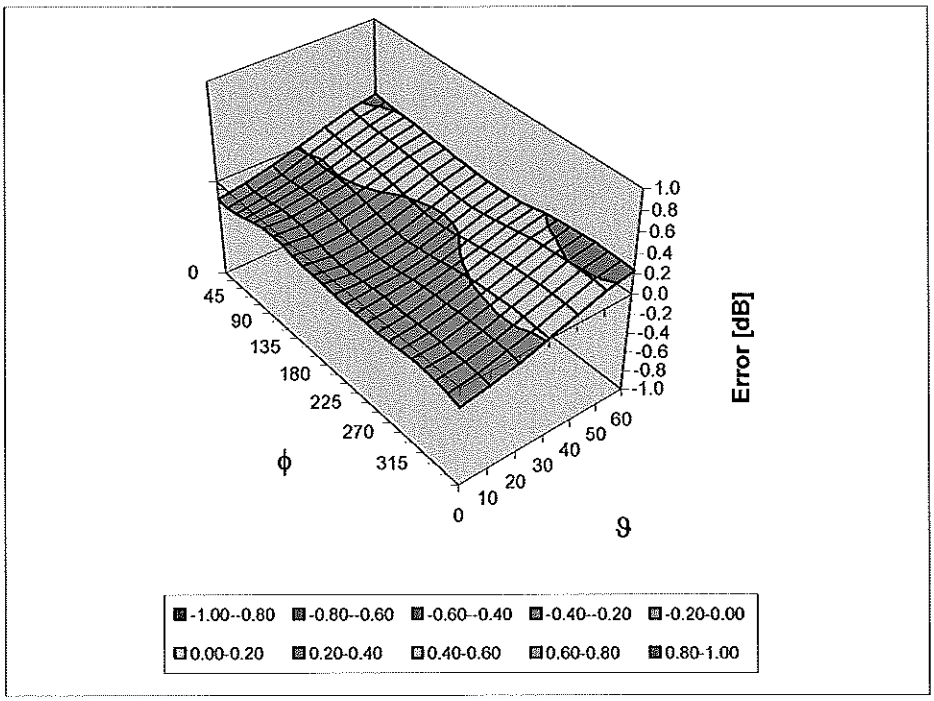
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Other Probe Parameters

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

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

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

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

Accreditation No.: SCS 108

Client PC Test

Certificate No: EX3-3550_Jan10

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3550
Calibration procedure(s)	QA CAL-01.v6, QA CAL-14.v3, QA CAL-23.v3 and QA CAL-25.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	January 26, 2010

1/20/10

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: January 26, 2010

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe EX3DV4

SN:3550

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

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3550

Basic Calibration Parameters

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

Modulation Calibration Parameters

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

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

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

DASY - Parameters of Probe: EX3DV4 SN:3550

Calibration Parameter Determined in Head Tissue Simulating Media

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

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

DASY - Parameters of Probe: EX3DV4 SN:3550

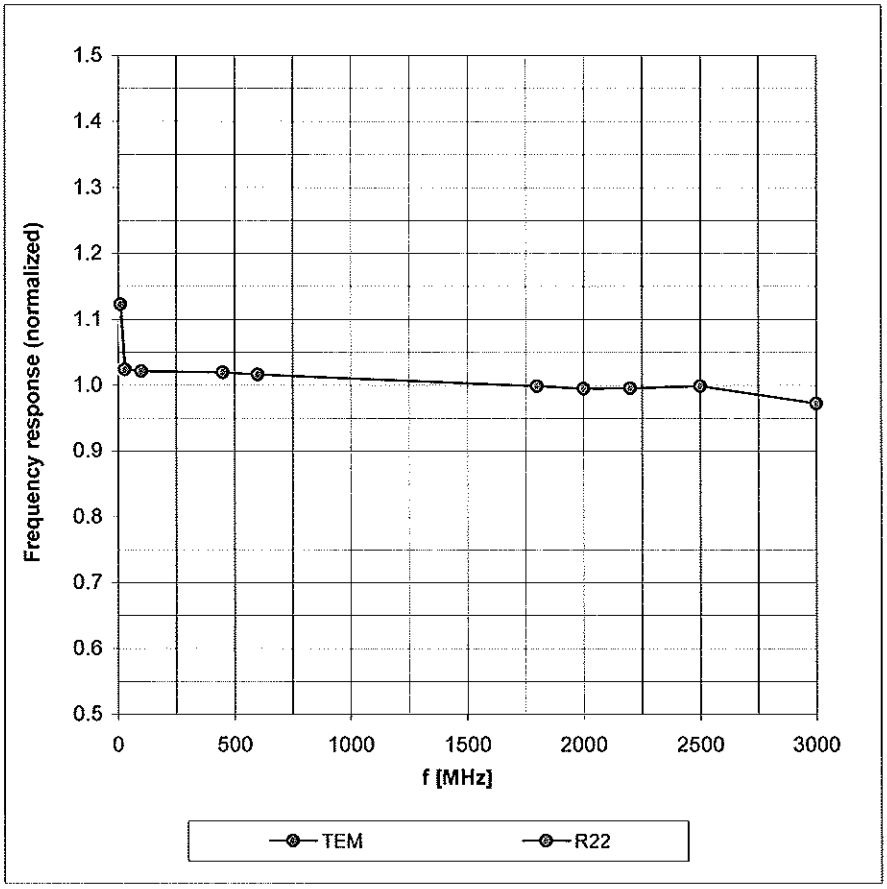
Calibration Parameter Determined in Body Tissue Simulating Media

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

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

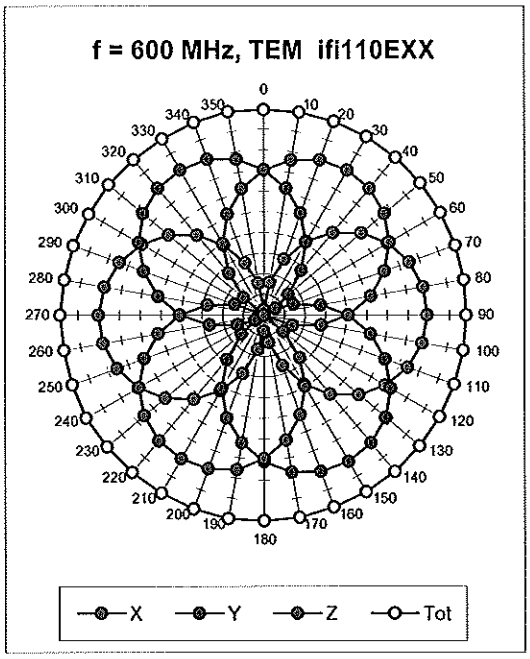
Frequency Response of E-Field

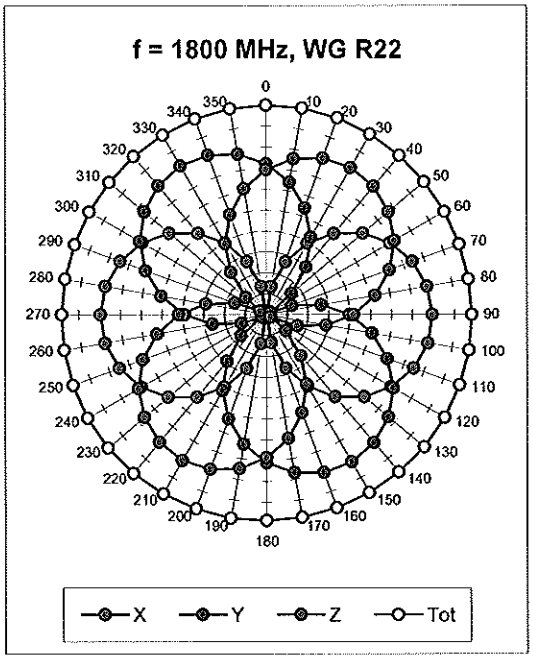
(TEM-Cell:ifi110 EXX, Waveguide: R22)

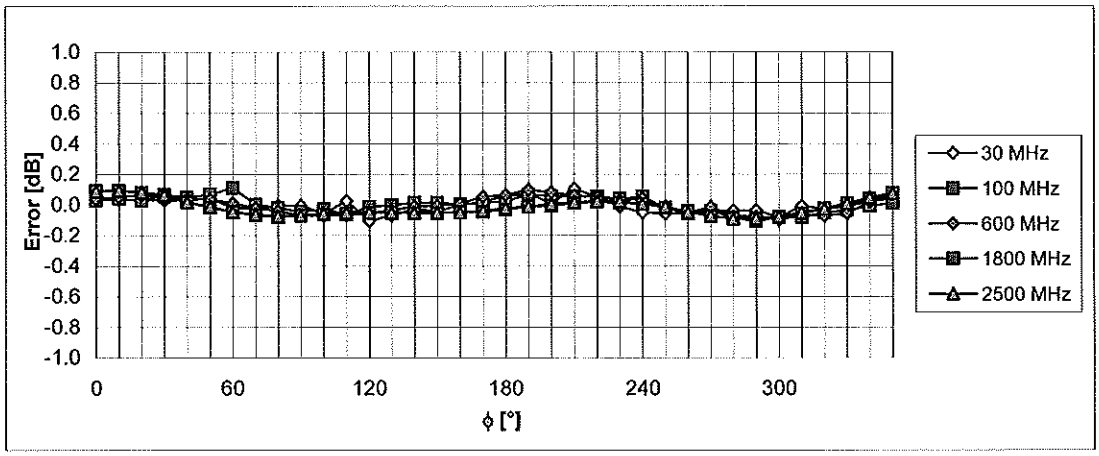


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



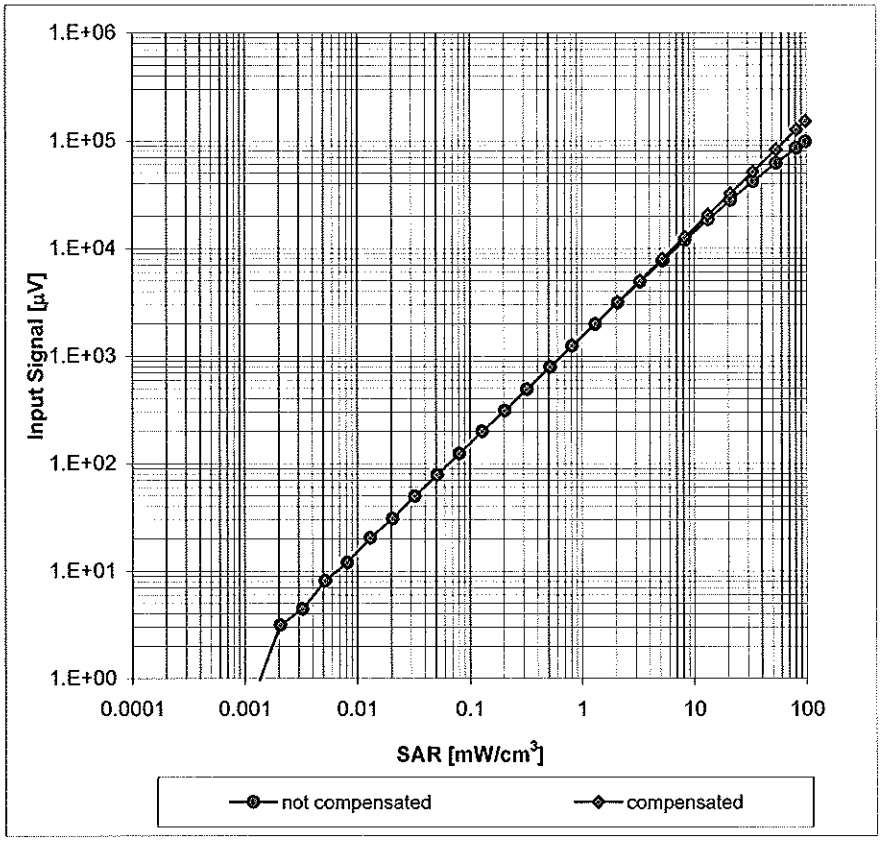


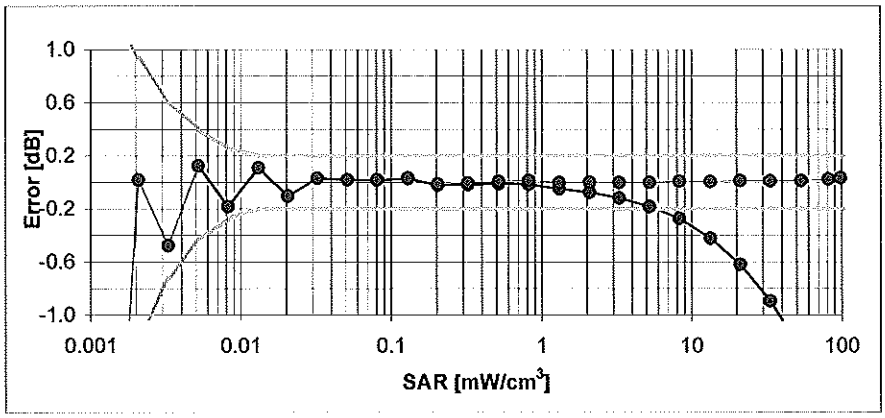


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

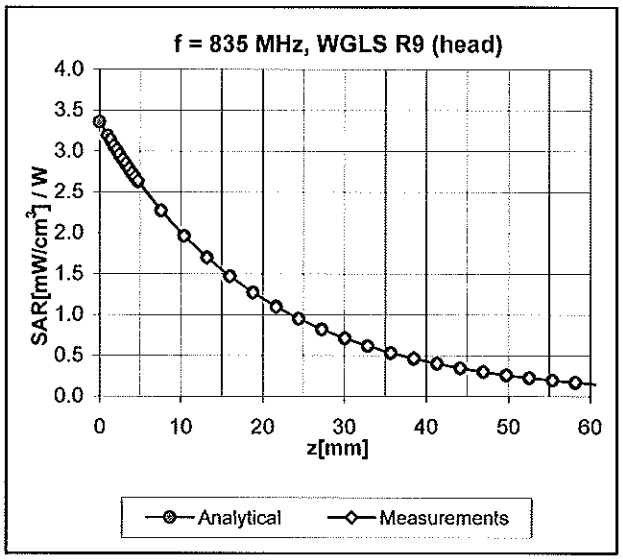
(Waveguide R22, f = 1800 MHz)

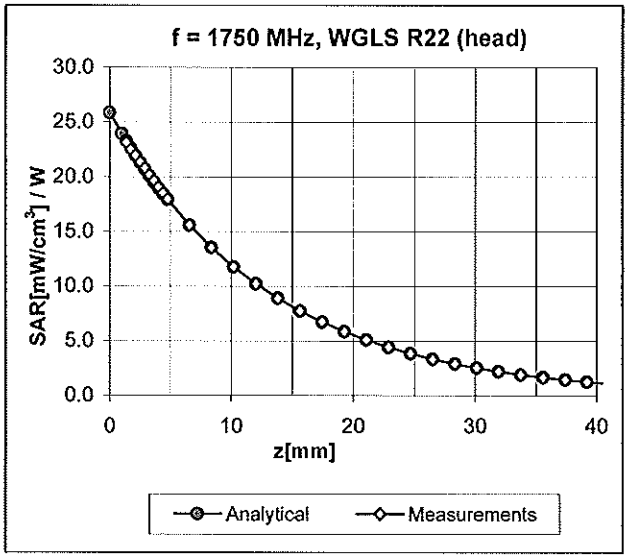




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

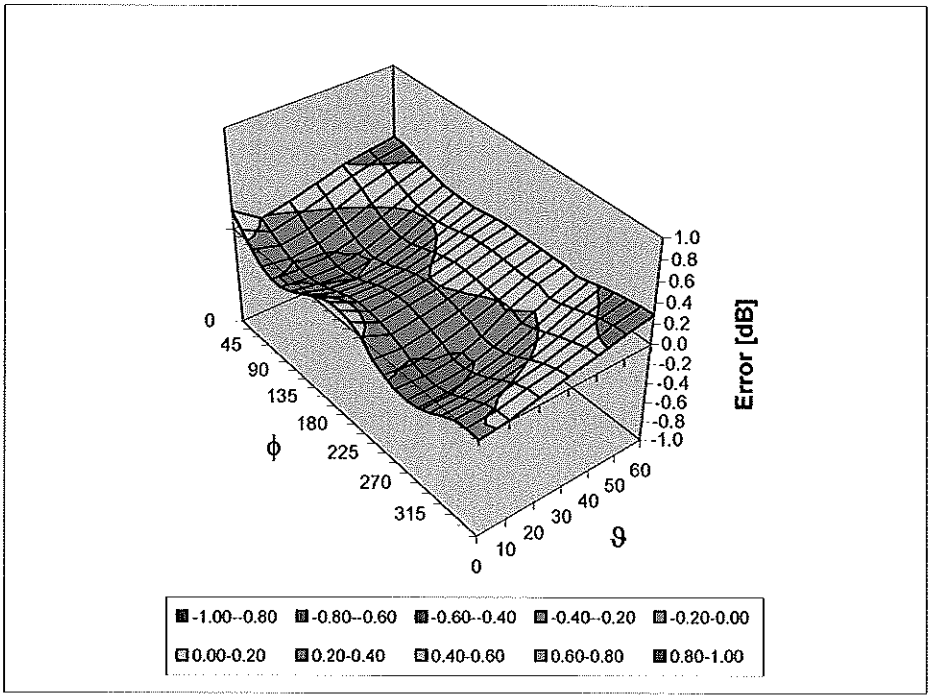
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm