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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:
12/15/11 - 1/19/12
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1203270335.A3L

FCC ID: **A3LGTN8000A**

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

EUT Type: Portable Tablet Device
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): GT-N8000

Band & Mode	Tx Frequency	Conducted Power [dBm]	SAR 1 gm Body (W/kg)
GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	32.49	0.59
WCDMA/HSPA 850	826.40 - 846.60 MHz	22.39	0.48
GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	29.48	1.10
WCDMA/HSPA 1900	1852.4 - 1907.6 MHz	20.41	1.04
2.4 GHz WLAN	2412 - 2462 MHz	12.91	N/A
5.8 GHz WLAN	5745 - 5825 MHz	9.67	N/A
5.2 GHz WLAN	5180 - 5240 MHz	9.86	N/A
5.3 GHz WLAN	5260 - 5320 MHz	9.92	N/A
5.5 GHz WLAN	5500 - 5700 MHz	9.65	N/A
Bluetooth	2402 - 2480 MHz	10.61	N/A

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

The wireless portable device has been shown to be electrically equivalent to the device FCC ID: A3LGTN8000 with respect to GSM/GPRS/EDGE/WCDMA/HSPA modes. Previous SAR test data for these modes have been incorporated in this report.

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 denied the 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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TABLE OF CONTENTS

1 EQUIPMENT UNDER TEST 3

2 INTRODUCTION 6

3 TEST SITE LOCATION 7

4 SAR MEASUREMENT SETUP 8

5 DASY E-FIELD PROBE SYSTEM 10

6 PHANTOM AND EQUIVALENT TISSUES 11

7 DOSIMETRIC ASSESSMENT & PHANTOM SPECS 12

8 FCC RF EXPOSURE LIMITS 13

9 SAR TABLET TESTING 14

10 FCC 3G MEASUREMENT PROCEDURES 25

11 SAR TESTING WITH IEEE 802.11 TRANSMITTERS 31

12 SYSTEM VERIFICATION 34

13 SAR DATA SUMMARY 36

14 EQUIPMENT LIST 40

15 MEASUREMENT UNCERTAINTIES 41

16 CONCLUSION 42

17 REFERENCES 43

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1 EQUIPMENT UNDER TEST

1.1 Device Overview

Technology	Band & Mode	Tx Frequency
GSM/GPRS	Cell GSM/GPRS/EDGE	824.20 - 848.80 MHz
	PCS GSM/GPRS/EDGE	1850.2 - 1909.8 MHz
WCDMA	WCDMA Band II	1852.4 - 1907.6 MHz
	WCDMA Band V	826.40 - 846.60 MHz
WIFI	2.4 GHz WLAN	2412 - 2462 MHz
	5.8 GHz WLAN	5745 - 5825 MHz
	5.2 GHz WLAN	5180 - 5240 MHz
	5.3 GHz WLAN	5260 - 5320 MHz
	5.5 GHz WLAN	5500 - 5700 MHz

1.2 Antenna Locations

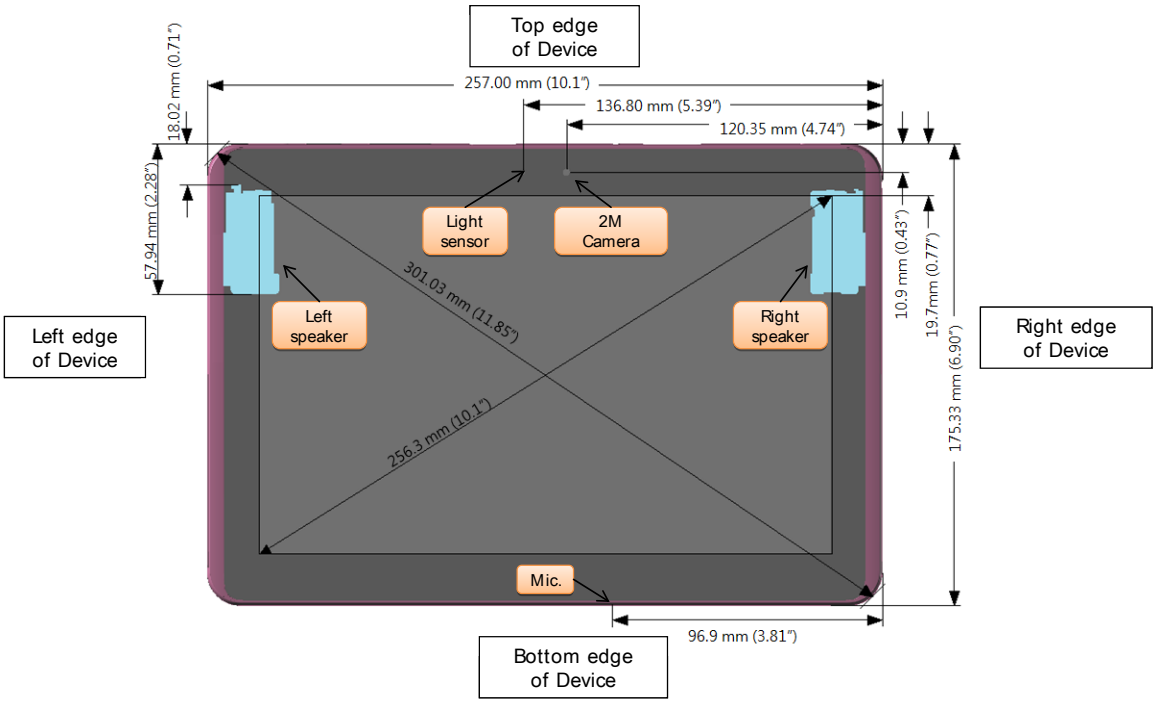

Figure 1-1
Front View of Device

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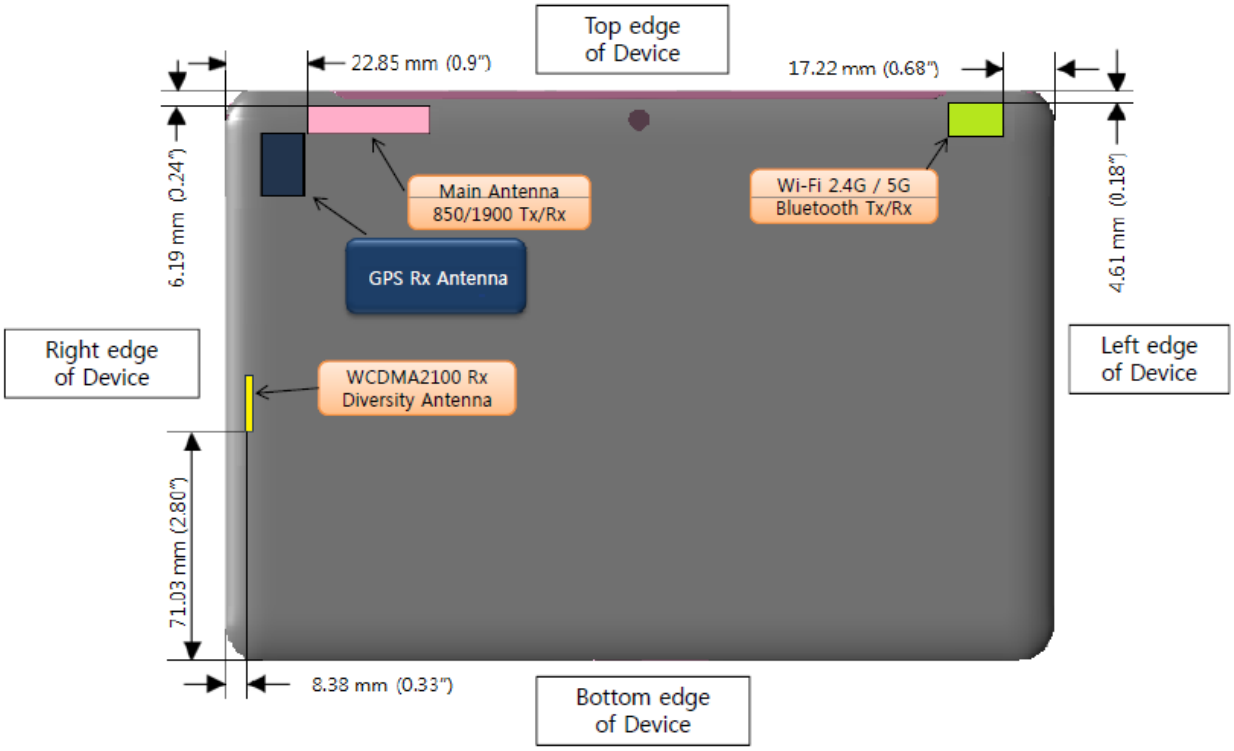

Figure 1-2
Back View of Device

1.3 Device Exclusions Applicable for SAR Testing

(A) WIFI/BT Testing

Per KDB Publication 447498 4) b), SAR is not required when the average output power is less than 60/f (GHz).

Therefore, Bluetooth SAR was not required since the maximum conducted power of Bluetooth Tx is 11.508 mW. 2.4 GHz WIFI SAR was not required since the maximum conducted power is 19.54 mW < 60/f. 5 GHz WIFI SAR was not required since the maximum conducted power is 10.23 mW < 60/f.

Please refer to the DSS EMC report filed for this EUT for a complete set of Bluetooth powers

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

(B) 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 and SAR results according to KDB 941225 Publication. HSPA+ operations are in the downlink only.

(C) Licensed Transmitter(s)

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

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1.4 Simultaneous Transmission Capabilities

This device contains multiple transmitters that may operate simultaneously and therefore, require a simultaneous transmission analysis according to KDB Publication 447498 4) b) iii) procedures. The tablet procedures required by KDB Publication 447498 generally do not require separate hotspot mode testing.

2.4 GHz and 5 GHz WIFI cannot transmit simultaneously since it shares the same circuit path and are switched by the radio. 2.4 GHz WIFI, 5 GHz WIFI, and Bluetooth share the same antenna path and cannot transmit simultaneously.

5 GHz WIFI cannot transmit simultaneously with the 2G/3G antennas. Therefore there is no simultaneous transmission with 5 GHz WIFI.

Since standalone Bluetooth SAR tests and 2.4 GHz WIFI SAR tests were not required, no further analysis was necessary to determine if simultaneous transmission cases would exceed the SAR limit.

1.5 Power Reduction for SAR

Proximity Sensors were utilized in the device for SAR purposes. April/October 2011 TCB Workshop Notes regarding Power reduction using proximity sensors were used for guidance for SAR Testing. See Section 9.3 for more information.

1.6 Samples Used for SAR Testing

Two samples with identical hardware were used to facilitate SAR testing only. For maximum power samples, power reduction was disabled via software (only available to the manufacturer - end user cannot disable power reduction) to ensure the device was always transmitting at maximum power when testing at a conservative distance. All reduced power samples were tuned to the reduced power levels. Power reduction was disabled via software (only available from the manufacturer) on this device to ensure the device was always transmitting at reduced power and to confirm reduced power levels.

Table 1-1
SAR Test Sample Serial Numbers

	GSM/GPRS and WCDMA
Maximum Power	#4
Reduced Power	#3

1.7 FCC Guidance Applied

- FCC KDB 941225 D01, D02, D03 (2G/3G SAR Procedures)
- FCC KDB 447498 Section 4 (Tablet SAR Considerations)
- April/Oct 2011 TCB Workshop Notes for RF Exposure and Sensors with Power Reduction

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2 INTRODUCTION

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

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

2.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. 2-1).

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

Figure 2-1
SAR Mathematical Equation

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

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

where:

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

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

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3 TEST SITE LOCATION

3.1 INTRODUCTION

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

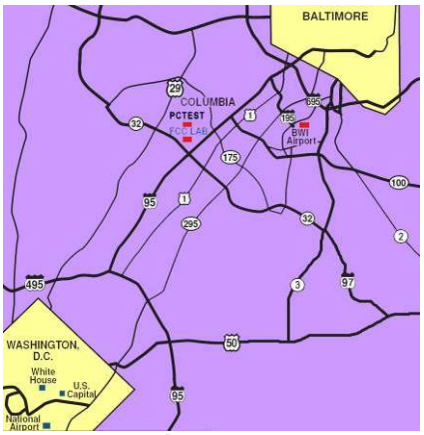

Figure 3-1
Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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

3.2 Test Facility / Accreditations:

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

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

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

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4 SAR MEASUREMENT SETUP

4.1 Robotic System

Measurements are performed using the DASY4 automated dosimetric assessment system. The DASY4 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the SAM phantom containing the head or body equivalent material. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Figure 4-1).

4.2 System Hardware

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

4.3 System Electronics

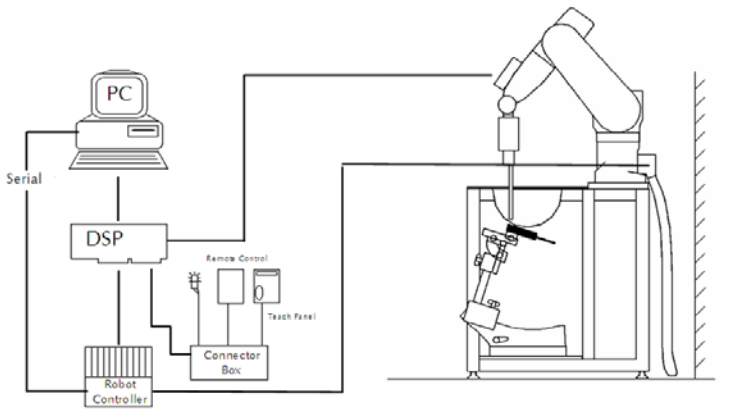

Figure 4-1
SAR Measurement System Setup

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

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4.4 Automated Test System Specifications

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

Data Acquisition Electronic System (DAE)

Data Converter

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

PC Interface Card

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

Phantom

Type:	SAM Twin Phantom (V4.0 and V5.0)
Shell Material:	Composite
Thickness:	2.0 ± 0.2 mm

Figure 4-2
SAR Measurement System

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5 DASY E-FIELD PROBE SYSTEM

5.1 Probe Measurement System

Figure 5-1
SAR System

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration (see Figure 5-3) and optimized for dosimetric evaluation [9]. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multi-fiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order curve fitting (see Figure 6-1). The approach is stopped at reaching the maximum.

5.2 Probe Specifications

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

Figure 5-2
Near-Field Probe

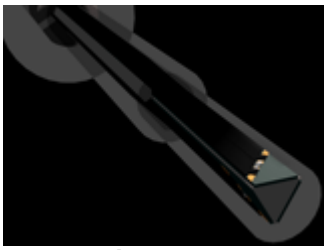

Figure 5-3
Triangular Probe Configuration

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6 PHANTOM AND EQUIVALENT TISSUES

6.1 SAM Phantoms

Figure 6-1
SAM Phantoms

The SAM Twin Phantoms V4.0 and V5.0 are 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
Tissue	Body	Body
Ingredients (% by weight)		
Bactericide	0.1	
DGBE		29.44
HEC	1	
NaCl	0.94	0.39
Sucrose	44.9	
Polysorbate (Tween) 80		
Water	53.06	70.17

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7 DOSIMETRIC ASSESSMENT & PHANTOM SPECS

7.1 Measurement Procedure

The evaluation was performed using the following procedure:

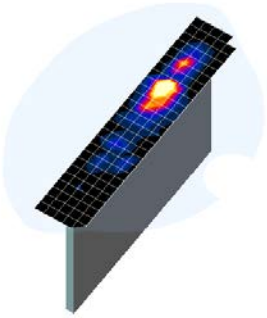

Figure 7-1
Sample SAR Area Scan

1. The SAR distribution area was ensured to cover the entire dimension of the body phantom area with the DUT positioned against the phantom. The horizontal grid resolution was 15mm x 15mm for up to 3 GHz frequencies. The horizontal grid resolution was 10mm x 10mm for 5-6 GHz frequencies per KDB 865664 pub.
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 fine resolution volume scan, "zoom scan," was assessed. 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 diodes from the tip of the probe housing plus the distance between the phantom outer 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 were obtained through interpolation, in order to calculate the averaged SAR.
   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the value deviated by more than 5%, the evaluation was repeated.

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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 SAR TABLET TESTING

9.1 SAR Testing for Tablet per KDB Publication 447498 Section 4

Lap-touching devices that have transmitting antennas located less than 20 cm from the body 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 according to KDB publication 447498 requirements and are configured with maximum output power during SAR assessment for a worst-case SAR evaluation.

Per KDB 447498 4) b) i), the bottom face (back of the device) is required to be tested touching the flat phantom.

Per KDB Publication 447498 4) b) ii) (2), SAR testing applies for the tablet edges with antennas located within 5 cm of each tablet edge closest to the user. According to KDB Publication 447498 4) b) ii) (2), for each antenna, SAR is only required for the edge with the most conservative exposure condition.

Since the diagonal dimension of the device is more than 20 cm (30.1 cm), this device is a tablet (not a mini-tablet).

9.2 Display Orientation Capabilities

This device is capable of multiple display orientations supporting both portrait and landscape positions. Therefore per KDB 447498 4) b) ii) (2), SAR testing applies for the tablet edges with antennas located within 5 cm of each tablet edge closest to the user. 4) b) ii) (2), for each antenna, SAR is only required for the edge with the most conservative exposure condition.

9.3 Proximity Sensor Information

The sensor pad is located near the top half of the device to cover exposure conditions to the main antenna. The technical description contains information about sensor size and location. Power reduction levels are provided in Table 10-3 and Table 10-6.

9.4 Additional SAR Testing Due to Proximity Sensors

Based on the type and implementation of the sensor, April 2011 FCC-TCB conference notes requires sensor information regarding: (1) additional SAR evaluation at a conservative distance from the device where power reduction is de-activated and (2) reliability sensor activation data. Reliability sensor activation data is provided for both the back side and top edge of the tablet at 0° to cover direct usage and also at 60° to cover angled usage (See Table 9-3.)

Since the back-off sensor activation distance for back is 11 mm, a conservative distance of 10 mm was tested for the back side at maximum power. Since the back-off sensor activation distance was 6 mm for the top edge, a conservative distance of 5 mm was tested at maximum power. Details about sensing mechanism and sensor pad location are included in the technical description.

The sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions.

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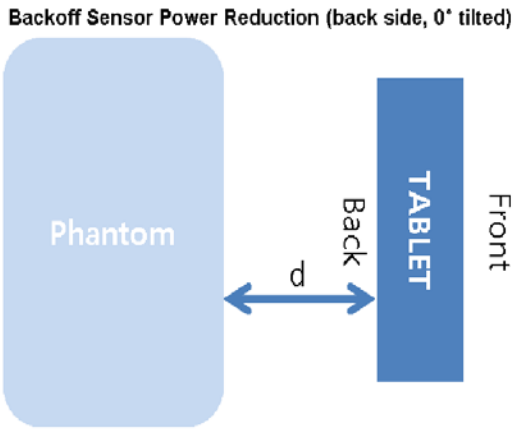
Table 9-1
Distance from Back of Tablet

Distance in mm	9	10	11	12	13	14
Condition of Sensor with respect to the back of the device	on	on	on	off	off	off

Please see Figure 9-1 through Figure 9-5 for measured max power and reduced power distance plots for each GSM/GPRS/EDGE multi-slot and WCDMA mode.



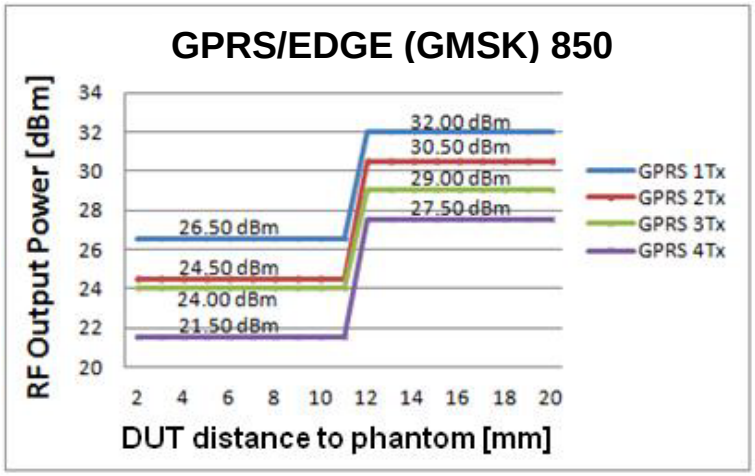


Figure 9-1
GPRS/EDGE (GMSK) 850 Back off Power Reduction Graph - Back side
Note: GSM voice applies the same target power levels as GPRS 1 Tx slot. GSM/GPRS/EDGE (GMSK) 1 Tx reduction levels are shown in Section 10.3.

Data in Figure 9-1 demonstrates reduced fixed GPRS/EDGE (GMSK) power levels at a distance of 11mm and less from the back, as shown in Table 9-1.

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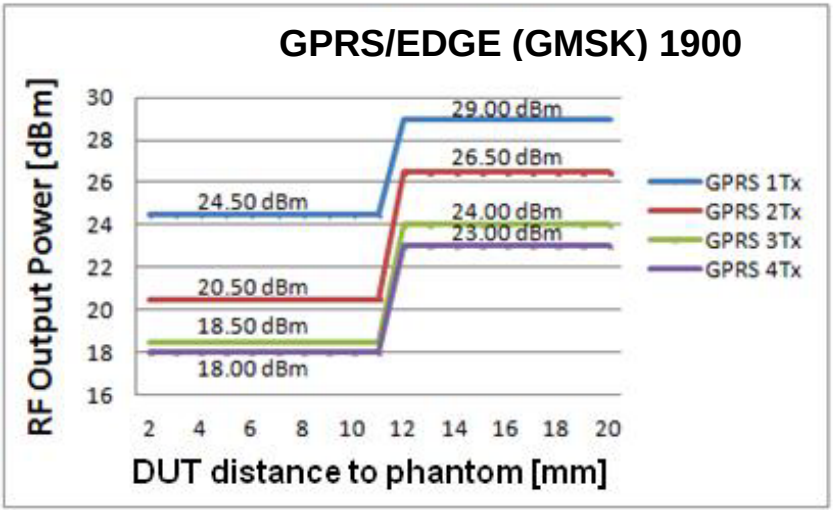

Figure 9-2
GPRS/EDGE (GMSK) 1900 Back off Power Reduction Graph - Back side
Note: GSM voice applies the same target power levels as GPRS 1 Tx slot. GSM/GPRS/EDGE (GMSK) 1 Tx reduction levels are shown in Section 10.3.

Data in Figure 9-2 demonstrates reduced fixed GPRS/EDGE (GMSK) power levels at a distance of 11mm and less from the back, as shown in Table 9-1.

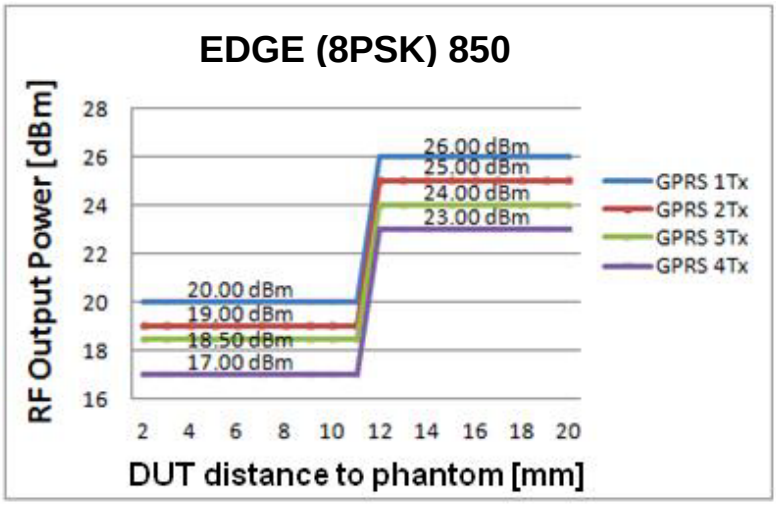

Figure 9-3
EDGE (8-PSK) 850 Back off Power Reduction Graph - Back side
Data in Figure 9-3 demonstrates reduced fixed EDGE (8-PSK) power levels at a distance of 11mm and less from the back, as shown in Table 9-1.

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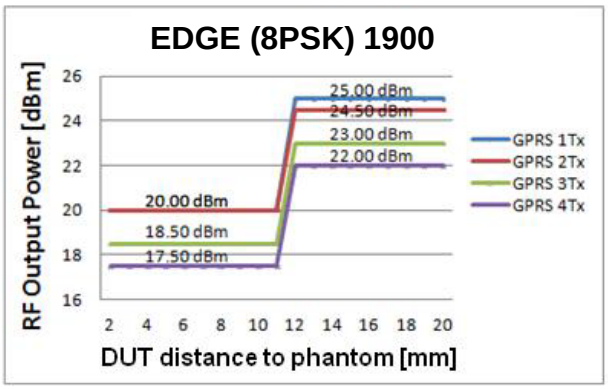
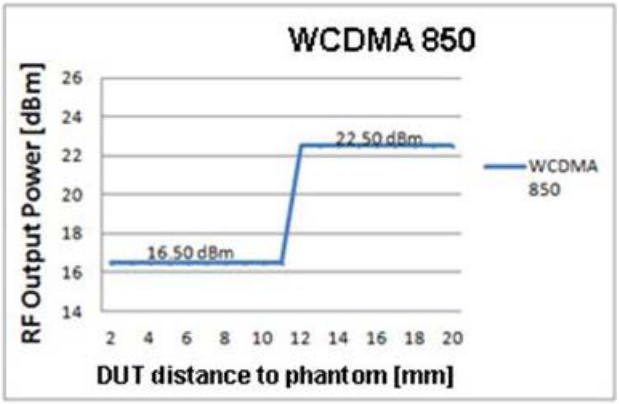


Figure 9-4
EDGE (8-PSK) 1900 Back off Power Reduction Graph - Back side
Data in Figure 9-4 demonstrates reduced fixed EDGE (8-PSK) power levels at a distance of 11mm and less from the back, as shown in Table 9-1.



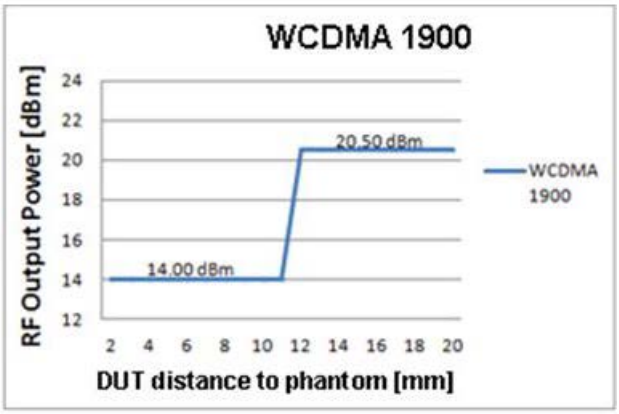


Figure 9-5
WCDMA 850/1900 Back off Power Reduction Graph - Back Side
Data in Figure 9-5 demonstrates reduced fixed WCDMA power levels at a distance of 11mm and less from the back, as shown in Table 9-1.

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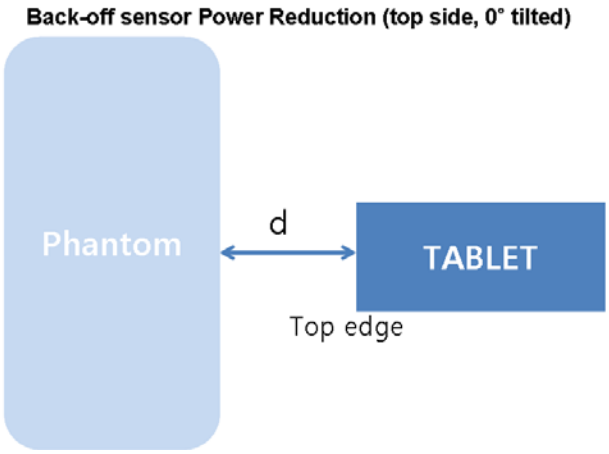
Table 9-2
Distance from Top Edge of Tablet - 0° Angle

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

Please see Figure 9-6 through Figure 9-10 for measured max power and reduced power distance plots for each GSM/GPRS/EDGE multi-slot and WCDMA mode.



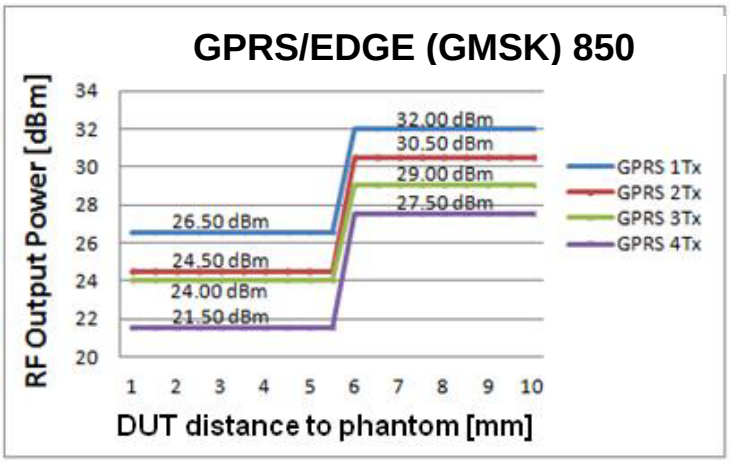


Figure 9-6
GPRS/EDGE (GMSK) 850 Back off Power Reduction Graph - Top Edge at 0° Angle
Note: GSM voice applies the same target power levels as GPRS 1 Tx slot. GSM/GPRS/EDGE (GMSK) 1 Tx reduction levels are shown in Section 10.3.

Data in Figure 9-6 demonstrates reduced fixed GPRS/EDGE (GMSK) power levels at a distance of 6mm and less from the top edge, as shown in Table 9-2.

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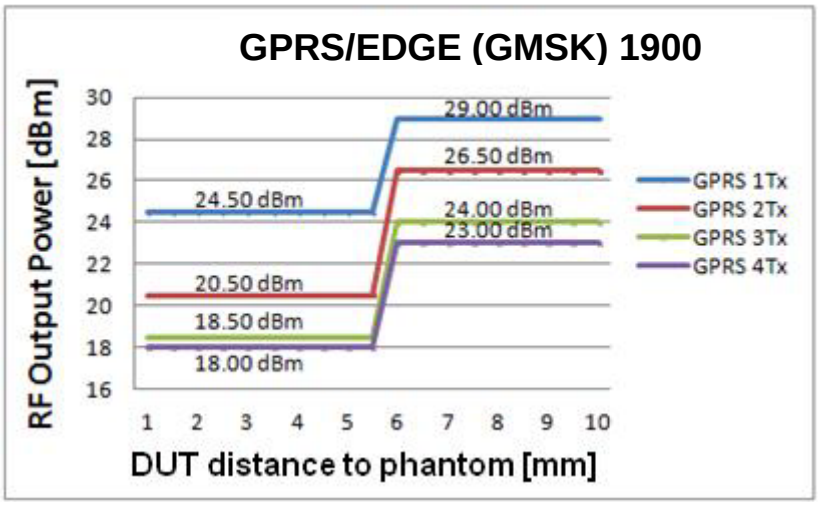

Figure 9-7
GPRS/EDGE (GMSK) 1900 Back off Power Reduction Graph - Top Edge at 0° Angle

Note: GSM voice applies the same target power levels as GPRS 1 Tx slot. GSM/GPRS/EDGE (GMSK) 1 Tx reduction levels are shown in Section 10.3.

Data in Figure 9-7 demonstrates reduced fixed GPRS/EDGE (GMSK) power levels at a distance of 6mm and less from the top edge, as shown in Table 9-2.

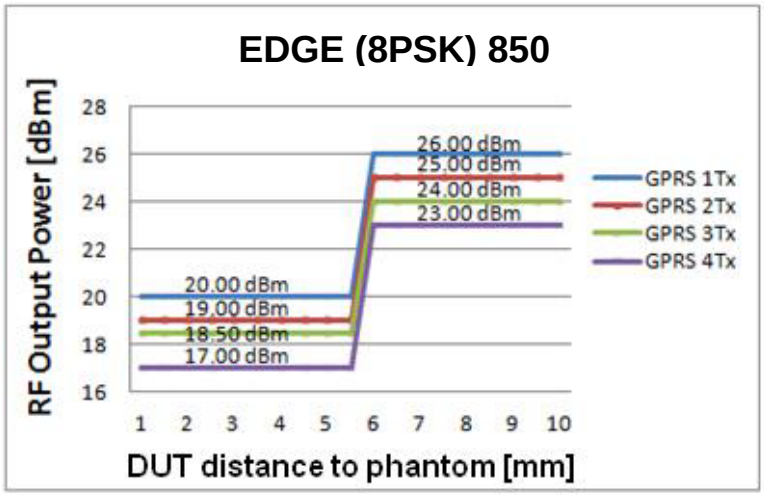

Figure 9-8
EDGE (8-PSK) 850 Back off Power Reduction Graph - Top Edge at 0° Angle

Data in Figure 9-8 demonstrates reduced fixed EDGE (8-PSK) power levels at a distance of 6mm and less from the top edge, as shown in Table 9-2.

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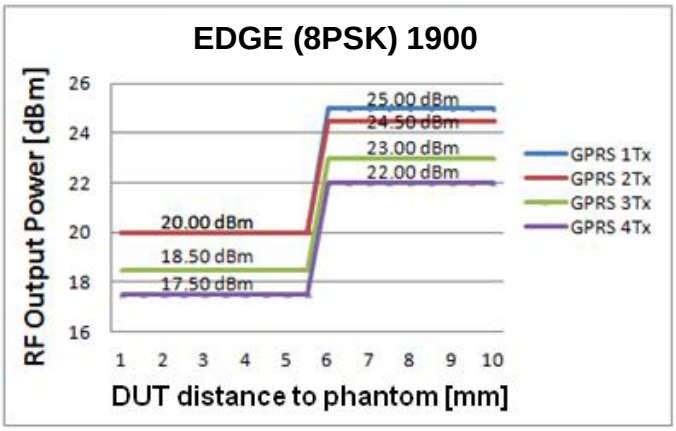
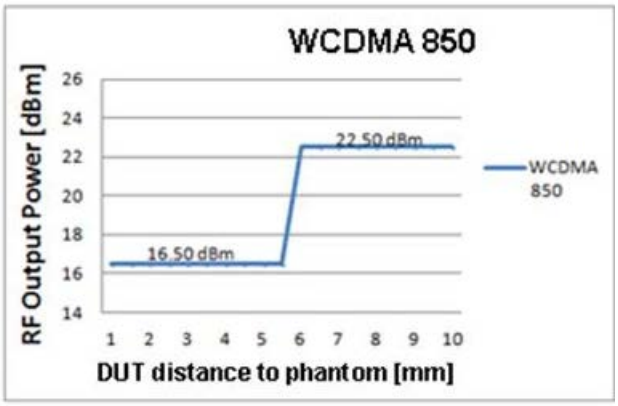


Figure 9-9
EDGE (8-PSK) 1900 Back off Power Reduction Graph - Top Edge at 0° Angle

Data in Figure 9-9 demonstrates reduced fixed EDGE (8-PSK) power levels at a distance of 6mm and less from the top edge, as shown in Table 9-2.



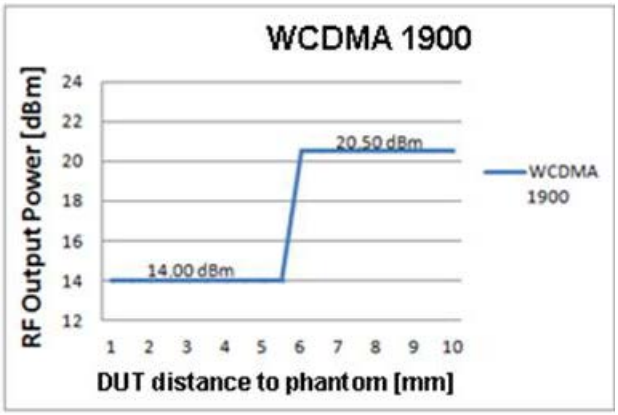


Figure 9-10
WCDMA 850/1900 Back off Power Reduction Graph - Top Edge at 0° Angle

Data in Figure 9-10 demonstrates reduced fixed WCDMA power levels at a distance of 6mm and less from the top edge, as shown in Table 9-2.

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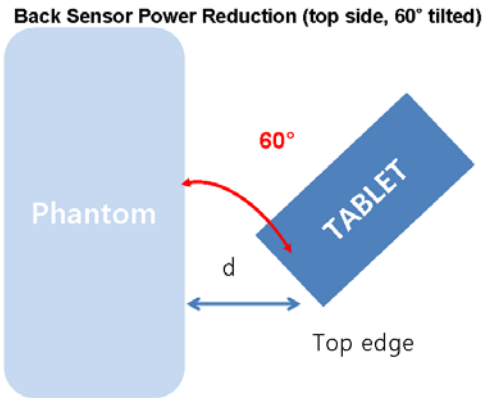
Table 9-3
Distance from Top Edge of Tablet - 60° Angle

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

Please see Figure 9-11 through Figure 9-15 for measured max power and reduced power distance plots for each GSM/GPRS/EDGE multi-slot and WCDMA mode.

Note: Angle mentioned for top edge description is the perpendicular angle.



Above figure represents "60 degrees" between the screen face and phantom face.
Please note that the 60 degree angle tilt has been used to identify proximity sensor coverage for the top edge, since this angle is consistent with device use conditions and sensor implementation according to the manufacturer. All relevant directions of coverage, as described in the April 2011 TCB workshop slides, have been considered in order to determine the worst case activation and deactivation test distances.

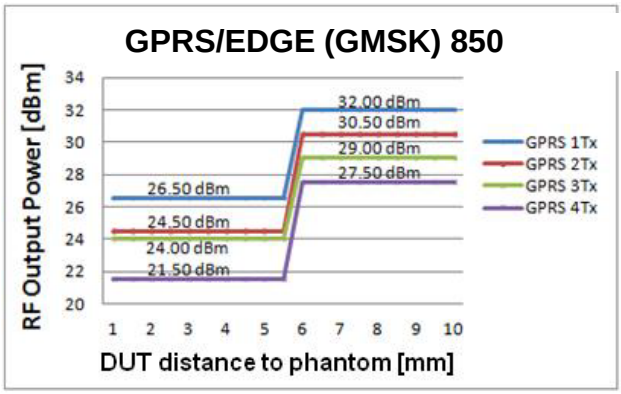


Figure 9-11
GPRS/EDGE (GMSK) 850 Back off Power Reduction Graph - Top Edge at 60° Angle
Note: GSM voice applies the same target power levels as GPRS 1 Tx slot. GSM/GPRS/EDGE (GMSK) 1 Tx reduction levels are shown in Section 10.3.

Data in Figure 9-11 demonstrates reduced fixed GPRS/EDGE (GMSK) power levels at a distance of 6mm and less from the top, as shown in Table 9-3.

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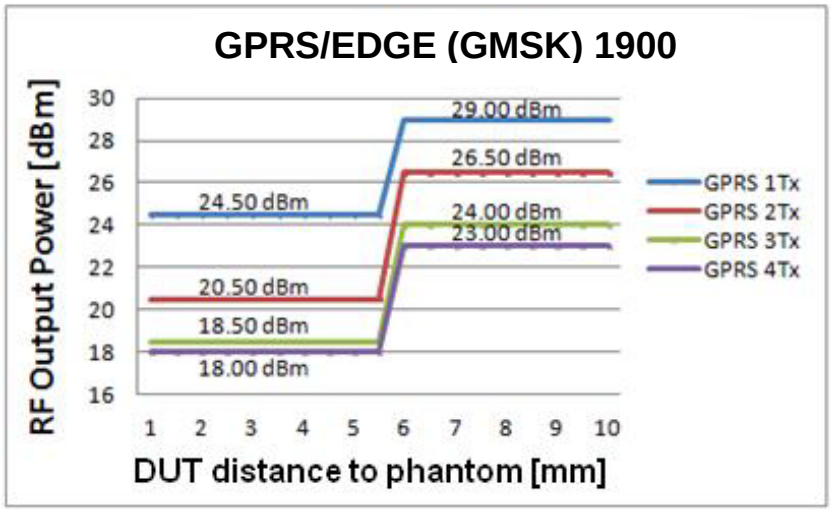

Figure 9-12
GPRS/EDGE (GMSK) 1900 Back off Power Reduction Graph - Top Edge at 60° Angle
Note: GSM voice applies the same target power levels as GPRS 1 Tx slot. GSM/GPRS/EDGE (GMSK) 1 Tx reduction levels are shown in Section 10.3.

Data in Figure 9-12 demonstrates a demonstrates reduced fixed GPRS/EDGE (GMSK) power levels at a distance of 6mm and less from the top, as shown in Table 9-3.

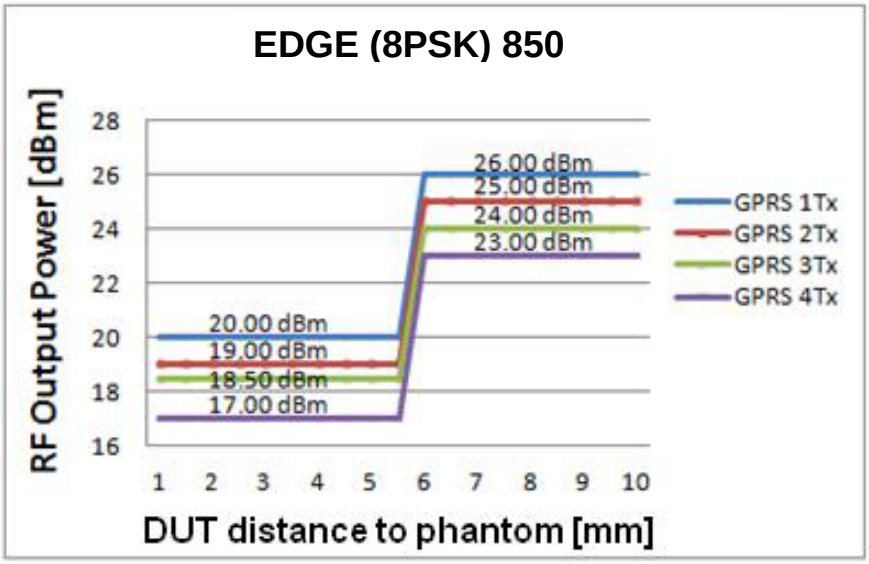

Figure 9-13
EDGE (8-PSK) 850 Back off Power Reduction Graph - Top Edge at 0° Angle
Data in Figure 9-13 demonstrates reduced fixed EDGE (8-PSK) power levels at a distance of 6mm and less from the top edge, as shown in Table 9-3.

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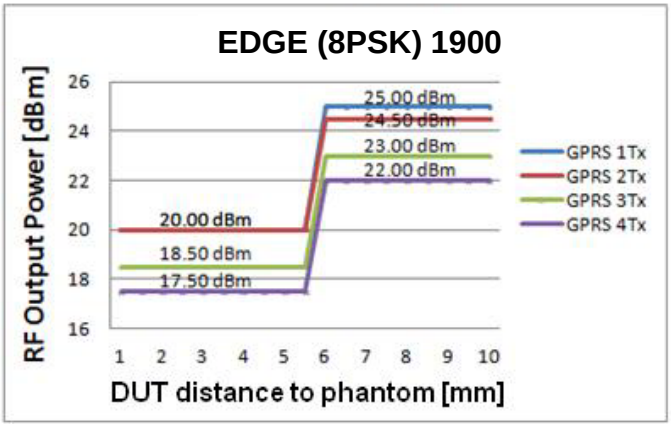
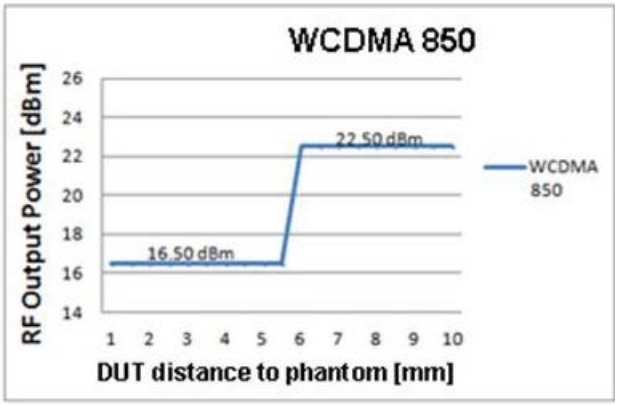


Figure 9-14
EDGE (8-PSK) 1900 Back off Power Reduction Graph - Top Edge at 0° Angle
Data in Figure 9-14 demonstrates reduced fixed EDGE (8-PSK) power levels at a distance of 6mm and less from the top edge, as shown in Table 9-3.



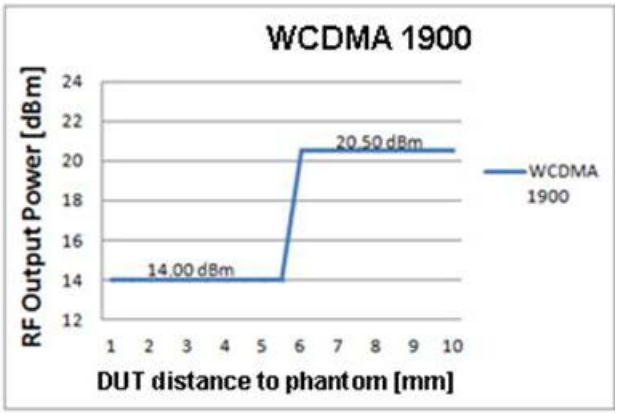


Figure 9-15
WCDMA 850/1900 Back off Power Reduction Graph - Top Edge at 60° Angle
Data in Figure 9-15 demonstrates reduced fixed WCDMA power levels at a distance of 6mm and less from the top, as shown in Table 9-3.

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9.5 Method of SAR measurement with Power Reduction

This tablet was tested in accordance with April 2011 TCB workshop notes for proximity sensor and power reduction.

Based on the power-reduction activation vs. distance results for the sensors, the samples representative of the device with the sensors activated (reduced power) was tested for SAR at 0 mm. For the additional SAR measurements with the sensors de-activated (max power, no power reduction) when the device is positioned away from the user, SAR evaluation is required at 10 mm (from the back) and 5mm (from the top edge) distances from the phantom. Since the device sensor detection mechanism is active at these distances, the power reduction was disabled via manufacturer test software, and the device was placed in maximum power transmit mode with a base station simulator under the tissue equivalent liquid- filled flat phantom at the required distances for testing.

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10 FCC 3G MEASUREMENT PROCEDURES

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

10.1 Procedures Used to Establish RF Signal for SAR

The device was placed into a simulated call using a base station simulator in a RF shielded chamber. Establishing connections in this manner ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. Devices under test were evaluated prior to testing, with a fully charged battery and were configured to operate at maximum output power. In order to verify that the device was tested throughout the SAR test at maximum output power, the SAR measurement system measures a "point SAR" at an arbitrary reference point at the start and end of the 1 gram SAR evaluation, to assess for any power drifts during the evaluation. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated

10.2 SAR Measurement Conditions for WCDMA per FCC KDB Pub. 941225

10.2.1 Output Power Verification

Maximum output power is measured on the High, Middle and Low channels for each applicable transmission band according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1s".

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in section 5.2 of 3GPP TS 34.121 (release 5), using the appropriate RMC with TPC (transmit power control) set to all "1s". Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HS-DPCCH) is tabulated in the test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations is identified.

10.2.2 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all "1s".

10.2.3 Procedures Used to Establish RF Signal for SAR HSDPA Data Devices

The following procedures are applicable to HSDPA data devices operating under 3GPP Release 5. Body exposure conditions are typically applicable to these devices, including handsets and data modems operating in various electronic devices. HSDPA operates in conjunction with WCDMA and requires an active DPCCH. The default test configuration is to measure SAR in WCDMA without HSDPA, with an established radio link between the DUT and a communication test set with 12.2 kbps RMC mode configured in Test Loop Mode 1; and tested with HSDPA with FRC and a 12.2 kbps RMC using the highest SAR configuration in WCDMA. SAR is selectively confirmed for other physical channel configurations according to output power, exposure conditions and device operating capabilities. Maximum output power is verified according to 3GPP TS 23.121 (Release 5) and SAR must be measured according to these maximum output conditions.

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10.2.4 SAR Measurement Conditions for HSUPA Data Devices

SAR for body exposure configurations are measured according to the 'Body SAR Measurements' procedures in the 'WCDMA Handsets' section of the KDB 941225 D01 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 of that measured without HSPA in 12.2 kbps RMC mode 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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10.3 RF Conducted Powers

10.3.1 GSM/GPRS/EDGE

Table 10-1
Maximum GSM/GPRS/EDGE Powers (Representing Proximity Sensor Inactive)

		Maximum Burst-Averaged Output Power								
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
Cellular	128	32.48	32.30	30.90	**29.40**	27.90	26.30	25.33	24.35	23.35
	190	32.49	32.35	30.95	**29.42**	27.89	26.35	25.36	24.40	23.40
	251	32.47	32.36	30.95	**29.43**	27.90	26.35	25.35	24.38	23.41
PCS	512	29.29	29.15	**26.78**	24.43	23.20	24.87	24.78	22.96	22.00
	661	29.48	29.20	**26.80**	24.40	23.17	24.90	24.80	22.95	21.96
	810	29.31	29.36	**26.87**	24.50	23.25	25.05	24.95	23.10	22.13

		Calculated Maximum Frame-Averaged Output Power								
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
Cellular	128	23.45	23.27	24.88	**25.14**	24.89	17.27	19.31	20.09	20.34
	190	23.46	23.32	24.93	**25.16**	24.88	17.32	19.34	20.14	20.39
	251	23.44	23.33	24.93	**25.17**	24.89	17.32	19.33	20.12	20.40
PCS	512	20.26	20.12	**20.76**	20.17	20.19	15.84	18.76	18.70	18.99
	661	20.45	20.17	**20.78**	20.14	20.16	15.87	18.78	18.69	18.95
	810	20.28	20.33	**20.85**	20.24	20.24	16.02	18.93	18.84	19.12

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Table 10-2
Reduced GSM/GPRS/EDGE Powers (Representing Proximity Sensor Active)

		Maximum Burst-Averaged Output Power								
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
Cellular	128	26.03	25.71	24.20	**23.47**	21.31	19.93	18.51	18.08	16.87
	190	26.57	26.25	24.74	**24.02**	21.85	20.47	19.05	18.62	17.42
	251	26.62	26.30	24.79	**24.07**	21.90	20.49	19.10	18.67	17.47
PCS	512	24.73	**24.77**	20.70	18.77	17.96	20.45	20.22	18.57	17.57
	661	24.81	**24.85**	20.78	18.85	18.04	20.49	20.30	18.65	17.65
	810	24.69	**24.73**	20.66	18.73	17.92	20.41	20.18	18.53	17.53

		Calculated Maximum Frame-Averaged Output Power								
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
Cellular	128	17.00	16.68	18.18	**19.21**	18.30	10.90	12.49	13.82	13.86
	190	17.54	17.22	18.72	**19.76**	18.84	11.44	13.03	14.36	14.41
	251	17.59	17.27	18.77	**19.81**	18.89	11.46	13.08	14.41	14.46
PCS	512	15.70	**15.74**	14.68	14.51	14.95	11.42	14.20	14.31	14.56
	661	15.78	**15.82**	14.76	14.59	15.02	11.46	14.28	14.39	14.64
	810	15.66	**15.70**	14.64	14.47	14.90	11.38	14.16	14.27	14.52

Notes:

- Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
- The bolded GPRS/EDGE modes were selected according to the highest frame-averaged output power table according to KDB 941225 D03.
- CS1 coding scheme was used in GPRS output power measurements and SAR Testing, as a condition where GMSK modulation was ensured. It was investigated that CS1 - CS4 settings do not have any impact on the output levels in the GPRS modes.
- MCS7 coding scheme was used to measure the output powers for EDGE since It has been shown that MCS levels that produce 8PSK modulation do not have an effect on output power.

GSM Class: B
GPRS Multislot class: 33 (max 4 Tx Uplink slots)
EDGE Multislot class: 33 (max 4 Tx Uplink slots)
DTM Multislot Class: N/A

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Table 10-3
GSM/GPRS/EDGE Power Reduction Summary due to the Proximity Sensor

		Maximum Burst-Averaged Output Power								
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Sensor State**	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
Cellular	Inactive	**32.0**	**32.0**	**30.5**	**29.0**	**27.5**	**26.0**	**25.0**	**24.0**	**23.0**
	Active	26.5	26.5	24.5	24.0	21.5	20.0	19.0	18.5	17.0
PCS	Inactive	**29.0**	**29.0**	**26.5**	**24.0**	**23.0**	**25.0**	**24.5**	**23.0**	**22.0**
	Active	24.5	24.5	20.5	18.5	18.0	20.0	20.0	18.5	17.5

10.3.2 HSPA Conducted Powers

Table 10-4
Maximum WCDMA Powers (Representing Proximity Sensor Inactive)

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			βc	βd	MPR [dB]
			4132	4183	4233	9262	9400	9538			
99	WCDMA	12.2 kbps RMC	**22.51**	22.39	22.31	**20.41**	20.35	20.32	-	-	-
99		12.2 kbps AMR	22.22	22.23	22.15	20.20	20.11	20.27	-	-	-
6	HSDPA	Subtest 1	**22.56**	22.32	22.26	**20.33**	20.24	20.23	2	15	0
6		Subtest 2	22.34	22.03	22.11	20.02	19.96	19.94	11	15	0
6		Subtest 3	22.11	21.85	21.78	19.70	19.61	19.64	15	8	0.5
6		Subtest 4	21.84	21.60	21.55	19.64	19.60	19.55	15	4	0.5
6	HSUPA	Subtest 1	**21.91**	21.65	21.63	19.78	**19.86**	19.78	10	15	0
6		Subtest 2	20.37	20.25	20.30	18.54	18.63	18.62	6	15	2
6		Subtest 3	21.54	21.28	21.23	19.33	19.41	19.35	15	9	1
6		Subtest 4	20.76	20.52	20.53	18.67	18.85	18.81	2	15	2
6		Subtest 5	21.64	21.44	21.35	19.53	19.60	19.54	14	15	0

Table 10-5
Reduced WCDMA Powers (Representing Proximity Sensor Active)

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			βc	βd	MPR [dB]
			4132	4183	4233	9262	9400	9538			
99	WCDMA	12.2 kbps RMC	16.64	16.21	16.81	**14.23**	14.05	14.06	-	-	-
99		12.2 kbps AMR	16.57	16.22	**16.82**	13.97	13.77	13.78	-	-	-
6	HSDPA	Subtest 1	16.75	16.30	**17.00**	**14.20**	13.96	14.09	2	15	0
6		Subtest 2	16.57	15.98	16.74	13.67	13.56	13.31	11	15	0
6		Subtest 3	16.31	15.80	16.53	13.30	13.37	13.06	15	8	0.5
6		Subtest 4	15.96	15.47	16.16	13.08	13.12	12.80	15	4	0.5
6	HSUPA	Subtest 1	16.52	16.04	16.76	**13.26**	13.09	13.06	10	15	0
6		Subtest 2	14.45	14.01	14.55	11.49	11.53	11.29	6	15	2
6		Subtest 3	15.43	15.01	15.62	12.57	12.67	12.34	15	9	1
6		Subtest 4	14.70	14.27	14.82	11.69	11.80	11.59	2	15	2
6		Subtest 5	16.83	16.29	**16.99**	13.11	12.91	12.93	14	15	0

This device is only capable of HSUPA in the uplink (QPSK in the uplink), but is capable of HSPA+ in the downlink. Information about the uplink and downlink capabilities is explained in further detail in the technical description for this model.

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WCDMA SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

It is expected by the manufacturer that MPR for some HSUPA subtests may be up to 1 dB more than specified by 3GPP, but also as low as 0 dB according to the chipset implementation in this model. Detailed information is included in the operational description explaining how the MPR is applied for this model.

Table 10-6
WCMDA Power Reduction Summary due to the Proximity Sensor

Mode / Band	Proximity Sensor State	Modulated Average (in dBm)		
		3GPP Rel 99	3GPP Rel 5	3GPP Rel 6
WCDMA Band 2 (1900 MHz)	Inactive	**20.5**		
	Active	14.0		
WCDMA Band 5 (850 MHz)	Inactive	**22.5**		
	Active	16.5		

Figure 10-1
Power Measurement Setup

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11 SAR TESTING WITH IEEE 802.11 TRANSMITTERS

Per FCC KDB 248227 Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g/n transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable.

11.1 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.

11.2 Frequency Channel Configurations [27]

802.11 a/b/g/n and 5GHz operating modes are tested independently according to the service requirements in each frequency band. 802.11 b/g/n modes are tested on channels 1, 6 and 11. 802.11a/n 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. These are referred to as the "default test channels". For 2.4 GHz, 802.11g/n modes were evaluated only if the output power was 0.25 dB higher than the 802.11b mode. For 5 GHz, 802.11n modes were evaluated only if the output power was 0.25 dB higher than the 802.11a mode.

Table 11-1
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 11-2
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	12.28	12.35	12.36	12.45
802.11b	2437	6	12.53	12.54	12.62	12.57
802.11b	2462	11	12.67	12.81	12.79	12.80

Table 11-3
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	12.52	12.54	12.56	12.51	12.54	12.44	12.47	12.48
802.11g	2437	6	12.73	12.74	12.74	12.69	12.81	12.76	12.72	12.77
802.11g	2462	11	12.91	12.87	12.89	12.91	12.87	12.86	12.90	12.86

Table 11-4
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	11.49	11.40	11.38	11.45	11.47	11.41	11.43	11.41
802.11n	2437	6	11.65	11.73	11.70	11.64	11.69	11.65	11.63	11.67
802.11n	2462	11	11.86	11.92	11.87	11.86	11.86	11.86	11.86	11.87

Table 11-5
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**	9.61	9.75	9.85	9.83	9.84	9.78	9.84	9.86
802.11a	5200	40	9.59	9.69	9.61	9.60	9.60	9.72	9.64	9.62
802.11a	5220	44	9.34	9.36	9.29	9.35	9.26	9.32	9.25	9.33
802.11a	**5240**	**48**	9.03	9.17	9.18	9.24	9.06	9.10	9.04	9.14
802.11a	**5260**	**52**	9.92	9.84	9.83	9.90	9.91	9.91	9.87	9.84
802.11a	5280	56	9.74	9.65	9.72	9.74	9.73	9.76	9.77	9.75
802.11a	5300	60	9.61	9.54	9.57	9.58	9.54	9.65	9.63	9.49
802.11a	**5320**	**64**	9.49	9.47	9.54	9.41	9.46	9.40	9.51	9.51
802.11a	5500	100	9.62	9.65	9.62	9.59	9.61	9.63	9.60	9.61
802.11a	**5520**	**104**	9.59	9.59	9.57	9.58	9.56	9.56	9.63	9.55
802.11a	5540	108	9.46	9.50	9.47	9.50	9.39	9.53	9.56	9.45
802.11a	5560	112	9.31	9.45	9.40	9.43	9.38	9.45	9.41	9.45
802.11a	**5580**	**116**	9.32	9.38	9.35	9.32	9.33	9.36	9.33	9.36
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	**5620**	**124**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	9.17	9.17	9.21	9.23	9.18	9.21	9.21	9.20
802.11a	**5680**	**136**	9.15	9.17	9.15	9.21	9.19	9.17	9.23	9.19
802.11a	5700	140	9.15	9.10	9.11	9.09	9.09	9.17	9.19	9.11
802.11a	**5745**	**149**	9.50	9.53	9.52	9.49	9.56	9.58	9.64	9.66
802.11a	5765	153	9.55	9.51	9.52	9.51	9.45	9.59	9.49	9.52
802.11a	**5785**	**157**	9.48	9.61	9.47	9.57	9.59	9.62	9.60	9.50
802.11a	**5805**	**161**	9.48	9.54	9.53	9.57	9.59	9.66	9.60	9.59
802.11a	5825	165	9.56	9.55	9.61	9.57	9.47	9.58	9.67	9.64

Notes: This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Bands. Per FCC KDB Publication 443999 and RSS-210 A9.2(3), 5600-5650 MHz operation is prohibited as a client and transmission on channels within this range is not allowed.

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Table 11-6
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**	8.75	8.80	8.80	8.68	8.82	8.77	8.78	8.86
802.11n	5200	40	8.70	8.71	8.78	8.85	8.81	8.83	8.86	8.81
802.11n	5220	44	8.64	8.72	8.56	8.67	8.76	8.70	8.68	8.71
802.11n	**5240**	**48**	8.65	8.61	8.63	8.68	8.60	8.69	8.62	8.61
802.11n	**5260**	**52**	9.21	9.12	9.20	9.15	9.07	9.06	9.16	9.20
802.11n	5280	56	9.02	9.12	9.20	9.09	9.18	9.25	9.19	9.13
802.11n	5300	60	9.62	9.60	9.68	9.69	9.70	9.69	9.77	9.71
802.11n	**5320**	**64**	9.65	9.69	9.63	9.65	9.53	9.63	9.70	9.65
802.11n	5500	100	8.98	8.94	8.99	8.93	9.00	8.99	9.03	9.12
802.11n	**5520**	**104**	9.30	9.26	9.18	9.11	9.24	9.21	9.25	9.25
802.11n	5540	108	9.28	9.31	9.26	9.18	9.30	9.40	9.33	9.25
802.11n	5560	112	9.48	9.38	9.42	9.38	9.35	9.35	9.38	9.26
802.11n	**5580**	**116**	9.46	9.64	9.51	9.42	9.52	9.59	9.54	9.57
802.11n	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	**5620**	**124**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	9.85	9.96	9.96	9.83	9.88	9.92	9.88	9.89
802.11n	**5680**	**136**	9.92	9.94	9.86	10.01	10.07	10.00	10.06	10.06
802.11n	5700	140	10.02	10.04	10.02	10.02	10.10	10.07	10.06	10.07
802.11n	**5745**	**149**	9.04	9.06	9.09	9.10	9.17	9.19	9.26	9.16
802.11n	5765	153	9.16	9.16	9.14	9.15	9.20	9.20	9.18	9.17
802.11n	**5785**	**157**	9.13	9.22	9.21	9.34	9.24	9.24	9.23	9.20
802.11n	**5805**	**161**	9.23	9.26	9.26	9.21	9.40	9.28	9.25	9.31
802.11n	5825	165	9.18	9.28	9.19	9.33	9.33	9.30	9.27	9.24

Note: This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Bands. Per FCC KDB Publication 443999 and RSS-210 A9.2(3), 5600-5650 MHz operation is prohibited as a client and transmission on channels within this range is not allowed.

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

- For 2.4 GHz modes, according to KDB 447498 1. b) SAR testing was not required because the maximum average output power was not greater than 60/f.
- For 5 GHz modes, according to KDB 447498 1. b) SAR testing was not required because the maximum average output power was not greater than 60/f.
- There is no power reduction for WIFI.

Figure 11-1
Power Measurement Setup

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12 SYSTEM VERIFICATION

12.1 Tissue Verification

Table 12-1
Measured Tissue Properties

Tissue Type	Calibrated for Tests Performed on:	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
835B	12/19/2011	22.2	820	0.965	54.89	0.969	55.284	-0.41%	-0.71%
			835	0.979	54.79	0.970	55.200	0.93%	-0.74%
			850	0.993	54.69	0.988	55.154	0.51%	-0.84%
835B	01/19/2012	21.9	820	0.963	54.41	0.969	55.284	-0.62%	-1.58%
			835	0.981	54.22	0.970	55.200	1.13%	-1.78%
			850	0.996	54.10	0.988	55.154	0.81%	-1.91%
1900B	12/15/2011	22.5	1850	1.505	51.40	1.520	53.300	-0.99%	-3.56%
			1880	1.541	51.30	1.520	53.300	1.38%	-3.75%
			1910	1.568	51.16	1.520	53.300	3.16%	-4.02%
1900B	01/19/2012	20.6	1850	1.501	53.19	1.520	53.300	-1.25%	-0.21%
			1880	1.542	53.04	1.520	53.300	1.45%	-0.49%
			1910	1.574	52.82	1.520	53.300	3.55%	-0.90%

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.

12.2 Measurement Procedure for Tissue verification

1) The network analyzer and probe system was configured and calibrated.
2) The probe was immersed in the sample which was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
3) The complex admittance with respect to the probe aperture was measured
4) The complex relative permittivity , 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 $j = \sqrt{-1}$.

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12.3 Test System Verification

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

Table 12-2
System Verification Results

System Verification TARGET & MEASURED											
Tissue Frequency (MHz)	**Tissue Type**	**Date:**	**Amb. Temp (°C)**	**Liquid Temp (°C)**	**Input Power (W)**	**Dipole SN**	**Probe SN**	**Measured SAR_{1g} (W/kg)**	**1 W Target SAR_{1g} (W/kg)**	**1 W Normalized SAR_{1g} (W/kg)**	**Deviation (%)**
835	Body	12/19/2011	21.6	20.5	0.100	4d047	3258	0.991	9.850	9.910	0.61%
835	Body	01/19/2012	21.6	19.9	0.100	4d119	3258	0.973	9.540	9.730	1.99%
1900	Body	12/15/2011	21.4	21.3	0.100	502	3209	4.38	41.100	43.800	6.57%
1900	Body	01/19/2012	21.9	20.3	0.100	502	3209	4.3	41.100	43.000	4.62%

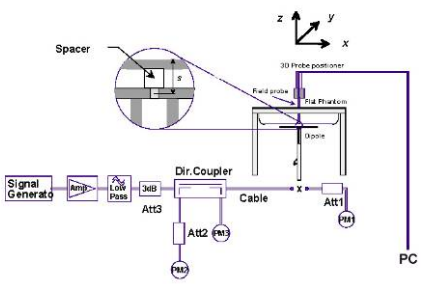

Figure 12-1
System Verification Setup Diagram

Figure 12-2
System Verification Setup Photo

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13 SAR DATA SUMMARY

13.1 Body SAR Data

Table 13-1
GSM Voice Body SAR Results

MEASUREMENT RESULTS											
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Target Power [dBm]	Spacing	Serial Number	# of GSM Slots	Side	SAR (1g)
MHz	Ch.										(W/kg)
836.60	190	GSM 850	GSM	26.57	0.13	26.5	0.0 cm	3	1	back*	0.424
836.60	190	GSM 850	GSM	32.49	-0.05	32.0	1.0 cm	4	1	back	0.189
836.60	190	GSM 850	GSM	26.57	0.09	26.5	0.0 cm	3	1	top*	0.163
836.60	190	GSM 850	GSM	32.49	0.02	32.0	0.5 cm	4	1	top	0.188
836.60	190	GSM 850	GSM	32.49	0.22	32.0	0.0 cm	4	1	right	0.112
1850.20	512	GSM 1900	GSM	24.73	0.00	24.5	0.0 cm	3	1	back*	1.040
1880.00	661	GSM 1900	GSM	24.81	-0.04	24.5	0.0 cm	3	1	back*	1.090
1909.80	810	GSM 1900	GSM	24.69	-0.03	24.5	0.0 cm	3	1	back*	1.050
1880.00	661	GSM 1900	GSM	29.48	0.02	29.0	1.0 cm	4	1	back	0.393
1880.00	661	GSM 1900	GSM	24.81	-0.01	24.5	0.0 cm	3	1	top*	0.609
1880.00	661	GSM 1900	GSM	29.48	0.05	29.0	0.5 cm	4	1	top	0.706
1880.00	661	GSM 1900	GSM	29.48	0.03	29.0	0.0 cm	4	1	right	0.067
ANSI / IEEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Body 1.6 W/kg (mW/g)** averaged over 1 gram				

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Table 13-2
GPRS Body SAR Results

MEASUREMENT RESULTS											
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Target Power [dBm]	Spacing	Serial Number	# of GPRS Slots	Side	SAR (1g)
MHz	Ch.										(W/kg)
836.60	190	GSM 850	GPRS	24.02	-0.08	24.0	0.0 cm	3	3	back*	0.588
836.60	190	GSM 850	GPRS	29.42	-0.06	29.0	1.0 cm	4	3	back	0.288
836.60	190	GSM 850	GPRS	24.02	0.01	24.0	0.0 cm	3	3	top*	0.238
836.60	190	GSM 850	GPRS	29.42	0.03	29.0	0.5 cm	4	3	top	0.305
836.60	190	GSM 850	GPRS	29.42	-0.10	29.0	0.0 cm	4	3	right	0.175
1850.20	512	GSM 1900	GPRS	24.77	0.04	24.5	0.0 cm	3	1	back*	1.100
1880.00	661	GSM 1900	GPRS	24.85	-0.02	25.5	0.0 cm	3	1	back*	1.070
1909.80	810	GSM 1900	GPRS	24.73	0.03	24.5	0.0 cm	3	1	back*	1.080
1880.00	661	GSM 1900	GPRS	26.80	-0.08	26.5	1.0 cm	4	2	back	0.485
1880.00	661	GSM 1900	GPRS	24.85	-0.05	24.5	0.0 cm	3	1	top*	0.605
1850.20	512	GSM 1900	GPRS	26.78	0.10	26.5	0.5 cm	4	2	top	0.847
1880.00	661	GSM 1900	GPRS	26.80	-0.01	26.5	0.5 cm	4	2	top	0.808
1909.80	810	GSM 1900	GPRS	26.87	0.01	26.5	0.5 cm	4	2	top	0.887
1880.00	661	GSM 1900	GPRS	26.80	0.05	26.5	0.0 cm	4	2	right	0.067
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram				

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Table 13-3
WCDMA Body SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Target Power [dBm]	Spacing	Serial Number	Side	SAR (1g)
MHz	Ch.									(W/kg)
846.60	4233	WCDMA 850	RMC	16.81	-0.03	16.5	0.0 cm	3	back*	0.418
836.60	4183	WCDMA 850	RMC	22.39	-0.06	22.5	1.0 cm	4	back	0.271
846.60	4233	WCDMA 850	RMC	16.81	0.03	16.5	0.0 cm	3	top*	0.476
836.60	4183	WCDMA 850	RMC	22.39	-0.11	22.5	0.5 cm	4	top	0.263
836.60	4183	WCDMA 850	RMC	22.39	0.19	22.5	0.0 cm	4	right	0.160
1852.40	9262	WCDMA 1900	RMC	14.23	0.20	14.0	0.0 cm	3	back*	1.040
1880.00	9400	WCDMA 1900	RMC	14.05	0.01	14.0	0.0 cm	3	back*	0.999
1907.60	9538	WCDMA 1900	RMC	14.06	0.03	14.0	0.0 cm	3	back*	1.000
1880.00	9400	WCDMA 1900	RMC	20.35	-0.16	20.5	1.0 cm	4	back	0.532
1880.00	9400	WCDMA 1900	RMC	14.05	0.05	14.0	0.0 cm	3	top*	0.492
1852.40	9262	WCDMA 1900	RMC	20.41	0.05	20.5	0.5 cm	4	top	0.998
1880.00	9400	WCDMA 1900	RMC	20.35	0.04	20.5	0.5 cm	4	top	0.926
1907.60	9538	WCDMA 1900	RMC	20.32	0.06	20.5	0.5 cm	4	top	0.924
1880.00	9400	WCDMA 1900	RMC	20.35	-0.03	20.5	0.0 cm	4	right	0.080
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Body 1.6 W/kg (mW/g) averaged over 1 gram**			

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13.2 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR value with the position of the device configured for SAR testing according to KDB 447498 Section 4.
2. Batteries are fully charged for all readings.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm.
5. To confirm the proper SAR liquid depth, the z-axis plots from the system verifications were included since the system verifications were performed using the same liquid, DAE and probe as the SAR tests in the same time period.
6. Asterisk (*) denotes power reduction activated.
7. Per KDB publication 447498 4) b) i) the back side is required to be tested touching the flat phantom.
8. This device is capable of multiple display orientations supporting both portrait and landscape positions. Therefore per KDB publication 447498 4) b) ii) (2), SAR testing applies for the tablet edges with antennas located within 5 cm of each tablet edge closest to the user. According to KDB publication 447498 4) b) ii) (2), for each antenna, SAR is only required for the edge with the most conservative exposure condition.

GSM Notes:

1. 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).
2. Justification for reduced test configurations per KDB Publication 941225 D03: The source-based time-averaged output power was evaluated for all multi-slot operations.
3. Per April 2011 TCB-FCC Workshop Notes, in addition to the 0 mm test distance required for tablet devices under KDB 447498, a conservative additional test distance of 10 mm from the back and 5 mm from the top edge were tested for SAR at maximum output power with the sensor deactivated. See Section 9.4 for more details.
4. This device does not use an antenna located on the corner of the device, therefore vertex SAR was not measured

WCDMA Notes:

1. WCDMA mode was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01. HSPA SAR for the body was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per October 2010 TCB Workshop, the mid. channel may be used as a default test channel when the output power deviation across the channels is <0.5 dB, otherwise the maximum output power must be used. If the SAR measured at for each test configuration for the default channel is at least 3.0 dB lower than the SAR limit, testing at the other channels is optional for such test configuration(s).
3. Per April 2011 TCB-FCC Workshop Notes, in addition to the 0 mm test distance required for tablet devices under KDB 447498, a conservative additional test distance of 10 mm from the back and 5 mm from the top edge were tested for SAR at maximum output power with the sensor deactivated. See Section 9.4 for more details.
4. This device does not use an antenna located on the corner of the device, therefore vertex SAR was not measured.

WLAN Notes:

1. For 2.4 GHz modes, according to KDB 447498 4) b), SAR testing was not required because the maximum average output power was not greater than 60/f.
2. For 5 GHz modes, according to KDB 447498 4) b), SAR testing was not required because the maximum average output power was not greater than 60/f.
3. There is no power reduction for WIFI.

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14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/10/2011	Annual	10/10/2012	3613A00315
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/21/2011	Annual	4/21/2012	JP38020182
Agilent	E5515C	Wireless Communications Test Set	10/10/2011	Annual	10/10/2012	GB46110872
Agilent	E5515C	Wireless Communications Test Set	7/6/2011	Annual	7/6/2012	GB41450275
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/8/2011	Annual	4/8/2012	MY45470194
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/12/2011	Annual	10/12/2012	1833460
Gigatronics	8651A	Universal Power Meter	10/12/2011	Annual	10/12/2012	8650319
Index SAR	IXTL-010	Dielectric Measurement Kit	N/A		N/A	N/A
Index SAR	IXTL-030	30MM TEM line for 6 GHz	N/A		N/A	N/A
Pasternack	PE2208-6	Bidirectional Coupler	CBT		N/A	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT		N/A	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	6/1/2011	Annual	6/1/2012	833855/0010
Rohde & Schwarz	CMU200	Base Station Simulator	4/19/2011	Annual	4/19/2012	107826
Rohde & Schwarz	NRVD	Dual Channel Power Meter	4/8/2011	Biennial	4/8/2013	101695
SPEAG	D1900V2	1900 MHz SAR Dipole	2/17/2011	Annual	2/17/2012	502
SPEAG	D835V2	835 MHz SAR Dipole	2/9/2011	Annual	2/9/2012	4d047
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/21/2011	Annual	2/21/2012	649
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/19/2011	Annual	5/19/2012	859
SPEAG	ES3DV3	SAR Probe	4/18/2011	Annual	4/18/2012	3209
Rohde & Schwarz	SMIQ03B	Signal Generator	4/6/2011	Annual	4/6/2012	DE27259
Anritsu	MA2481A	Power Sensor	2/7/2011	Annual	2/7/2012	5318
Anritsu	MA2481A	Power Sensor	2/7/2011	Annual	2/7/2012	5442
Anritsu	ML2438A	Power Meter	2/7/2011	Annual	2/7/2012	1190013
Anritsu	ML2438A	Power Meter	2/7/2011	Annual	2/7/2012	98150041
Agilent	8648D	Signal Generator	4/5/2011	Annual	4/5/2012	3629U00687
Anritsu	ML2438A	Power Meter	2/7/2011	Annual	2/7/2012	1070030
Anritsu	MA2481A	Power Sensor	2/7/2011	Annual	2/7/2012	5821
Anritsu	MA2481A	Power Sensor	2/7/2011	Annual	2/7/2012	8013
Anritsu	MA2481A	Power Sensor	2/7/2011	Annual	2/7/2012	5605
Anritsu	MA2481A	Power Sensor	2/7/2011	Annual	2/7/2012	2400
Agilent	E5515C	Wireless Communications Test Set	7/6/2011	Annual	7/6/2012	GB43304447
Agilent	E5515C	Wireless Communications Tester	4/21/2011	Annual	4/21/2012	US41140256
Anritsu	MA2411B	Pulse Sensor	10/13/2011	Annual	10/13/2012	1027293
Anritsu	ML2495A	Power Meter	10/13/2011	Annual	10/13/2012	1039008
Amplifier Research	5S1G4	5W, 800MHz-4.2GHz	N/A		N/A	21910
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT		N/A	N/A
Agilent	E5515C	Wireless Communications Test Set	2/8/2011	Annual	2/8/2012	GB45360985
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	10/7/2011	Annual	10/7/2012	103962
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331322
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331323
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331330
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331332
Control Company	61220-416	Long-Stem Thermometer	3/16/2011	Biennial	3/16/2013	111391601
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286445
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286460
VWR	36934-158	Wall-Mounted Thermometer	5/26/2010	Biennial	5/26/2012	101718589
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286454
VWR	36934-158	Wall-Mounted Thermometer	2/26/2010	Biennial	2/26/2012	101536273
SPEAG	ES3DV3	SAR Probe	4/8/2011	Annual	4/8/2012	3258
MiniCircuits	SLP-2400+	Low Pass Filter	CBT		N/A	R8979500903
Narda	4772-3	Attenuator (3dB)	CBT		N/A	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT		N/A	120
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT		N/A	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT		N/A	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/8/2011	Annual	7/8/2012	1272
SPEAG	D835V2	835 MHz SAR Dipole	12/21/2011	Annual	12/21/2012	4d119
MiniCircuits	VLF-6000+	Low Pass Filter	CBT		N/A	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT		N/A	N/A

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

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15 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3 GHz.

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

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

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16 CONCLUSION

16.1 Measurement Conclusion

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

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

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APPENDIX A: SAR TEST DATA

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PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 3

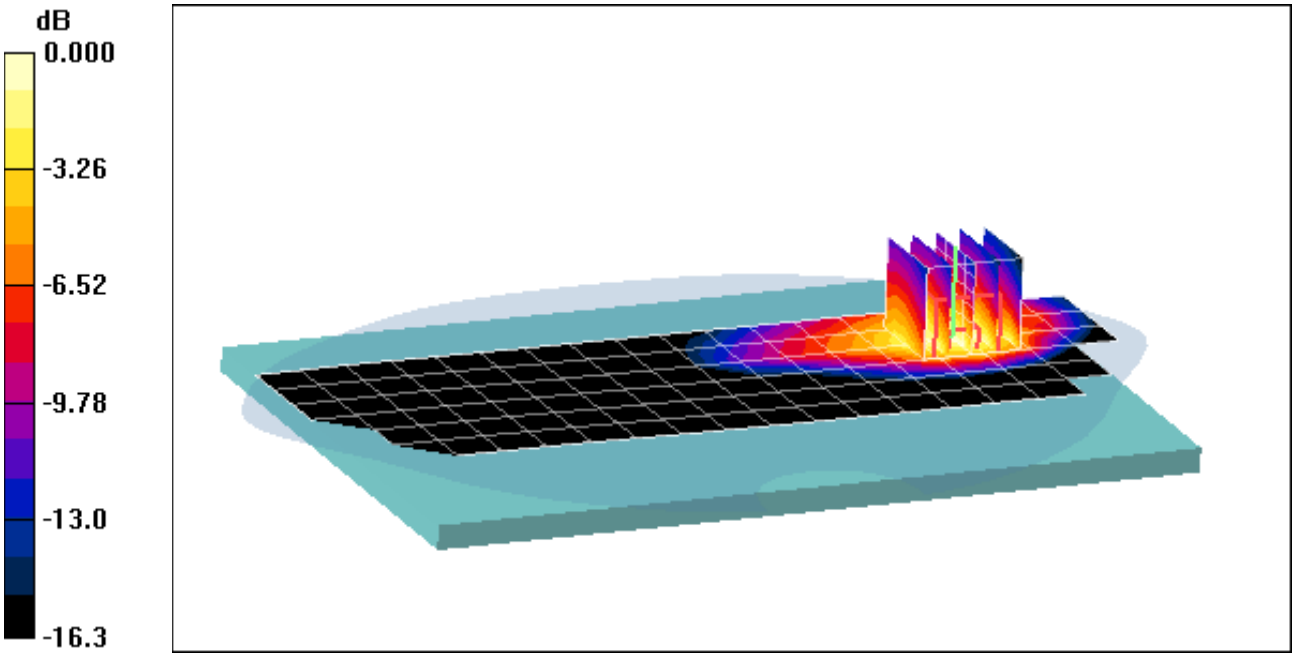
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.983 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.6°C; Tissue Temp: 19.9°C

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

Mode: GSM 850, Body SAR, Back Side, Mid.ch

Area Scan (7x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.7 V/m; Power Drift = 0.132 dB
Peak SAR (extrapolated) = 0.794 W/kg
SAR(1 g) = 0.424 mW/g; SAR(10 g) = 0.235 mW/g



0 dB = 0.448mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

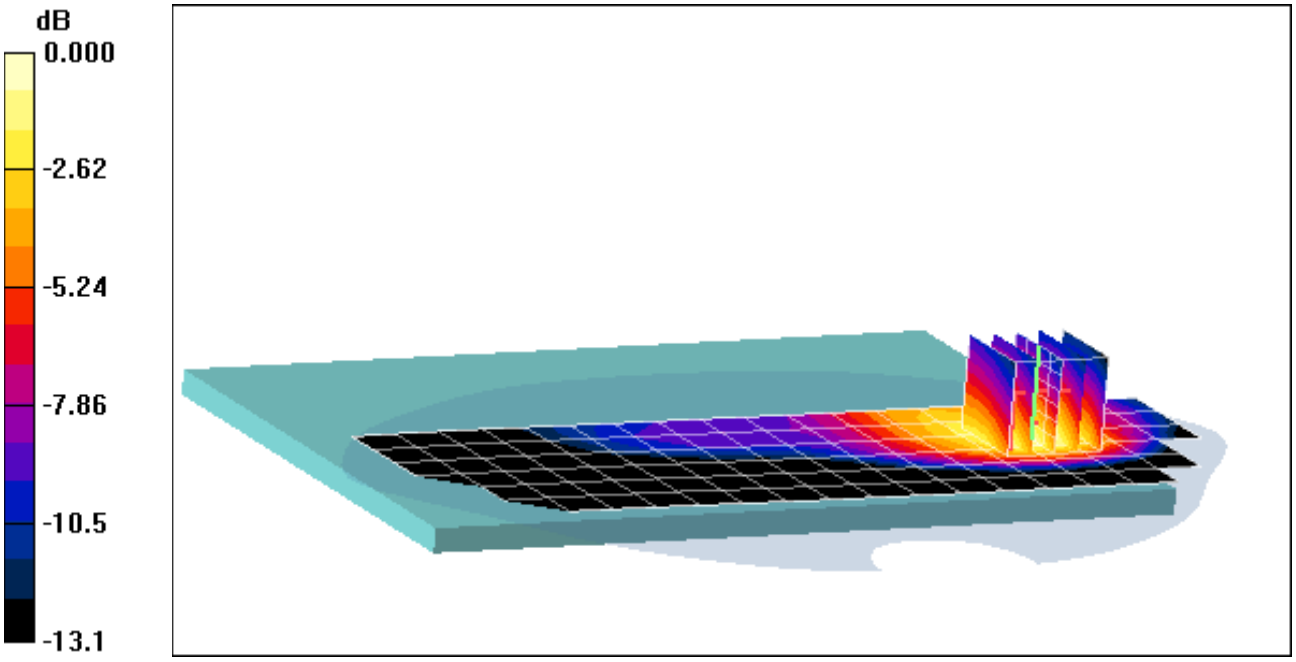
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section: Space: 1.0 cm

Test Date: 12-19-2011; Ambient Temp: 21.6°C; Tissue Temp: 20.5°C

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

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

Area Scan (7x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.4 V/m; Power Drift = -0.046 dB
Peak SAR (extrapolated) = 0.291 W/kg
SAR(1 g) = 0.189 mW/g; SAR(10 g) = 0.118 mW/g



0 dB = 0.206mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 3

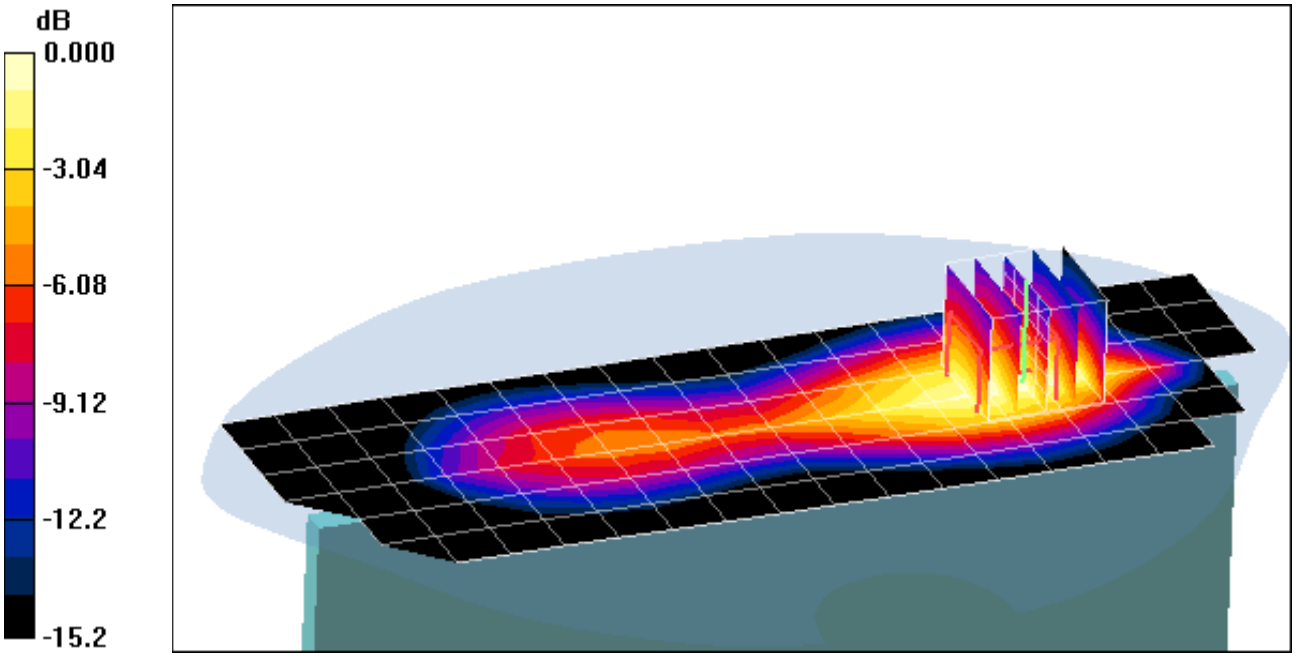
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.983 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.6°C; Tissue Temp: 19.9°C

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

Mode: GSM 850, Body SAR, Top Side, Mid.ch

Area Scan (7x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.5 V/m; Power Drift = 0.088 dB
Peak SAR (extrapolated) = 0.278 W/kg
SAR(1 g) = 0.163 mW/g; SAR(10 g) = 0.098 mW/g



0 dB = 0.183mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

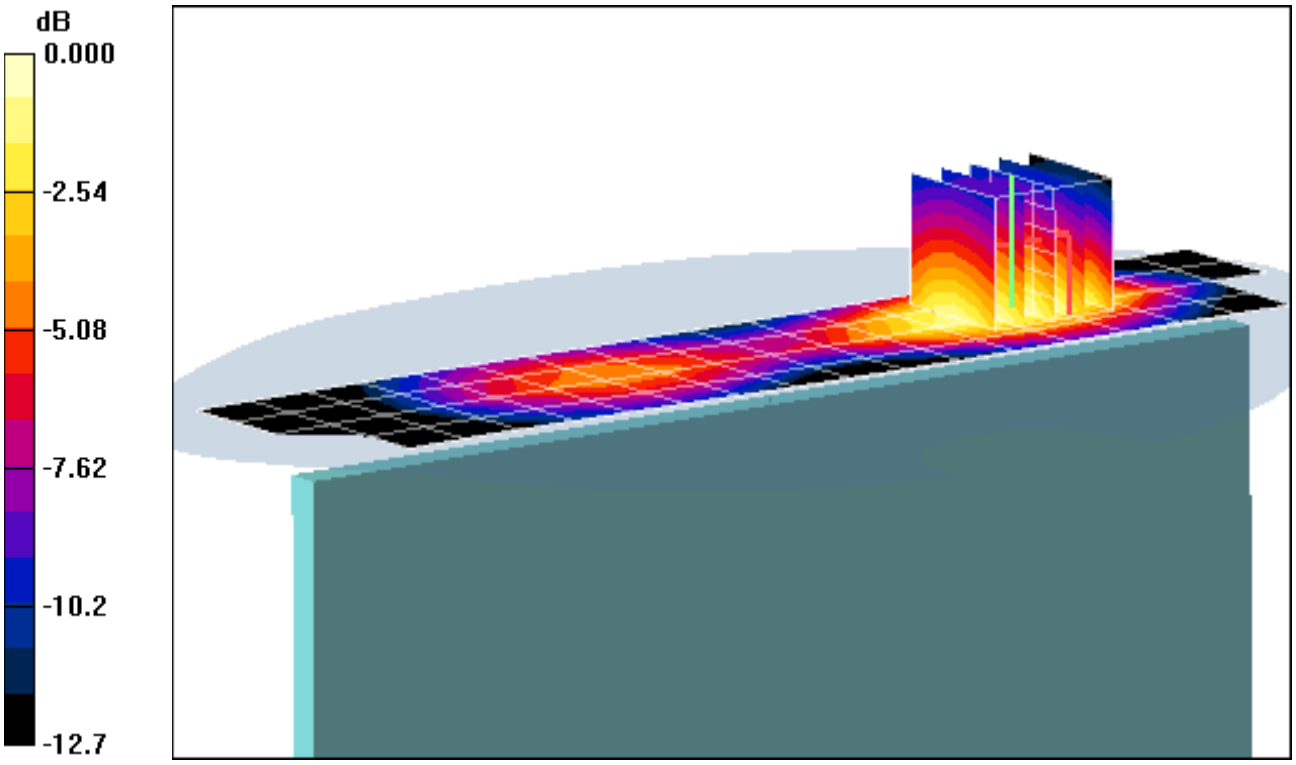
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 12-19-2011; Ambient Temp: 21.6 °C; Tissue Temp: 20.5 °C

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

Mode: GSM 850, Body SAR, Top Edge, Mid.ch

Area Scan (5x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.1 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 0.286 W/kg
SAR(1 g) = 0.188 mW/g; SAR(10 g) = 0.121 mW/g



0 dB = 0.202mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

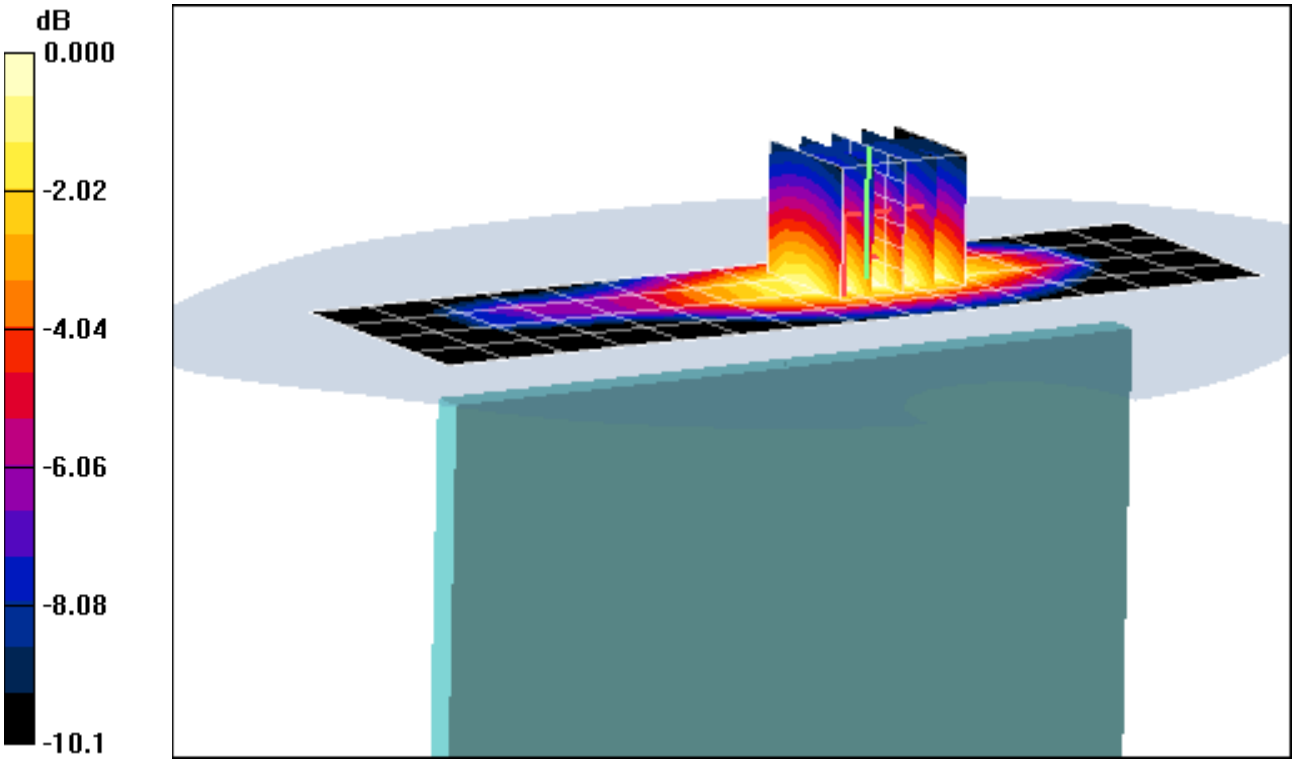
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-19-2011; Ambient Temp: 21.6 °C; Tissue Temp: 20.5 °C

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

Mode: GSM 850, Body SAR, Right Edge, Mid.ch

Area Scan (5x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.6 V/m; Power Drift = 0.216 dB
Peak SAR (extrapolated) = 0.163 W/kg
SAR(1 g) = 0.112 mW/g; SAR(10 g) = 0.076 mW/g



0 dB = 0.121mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 3

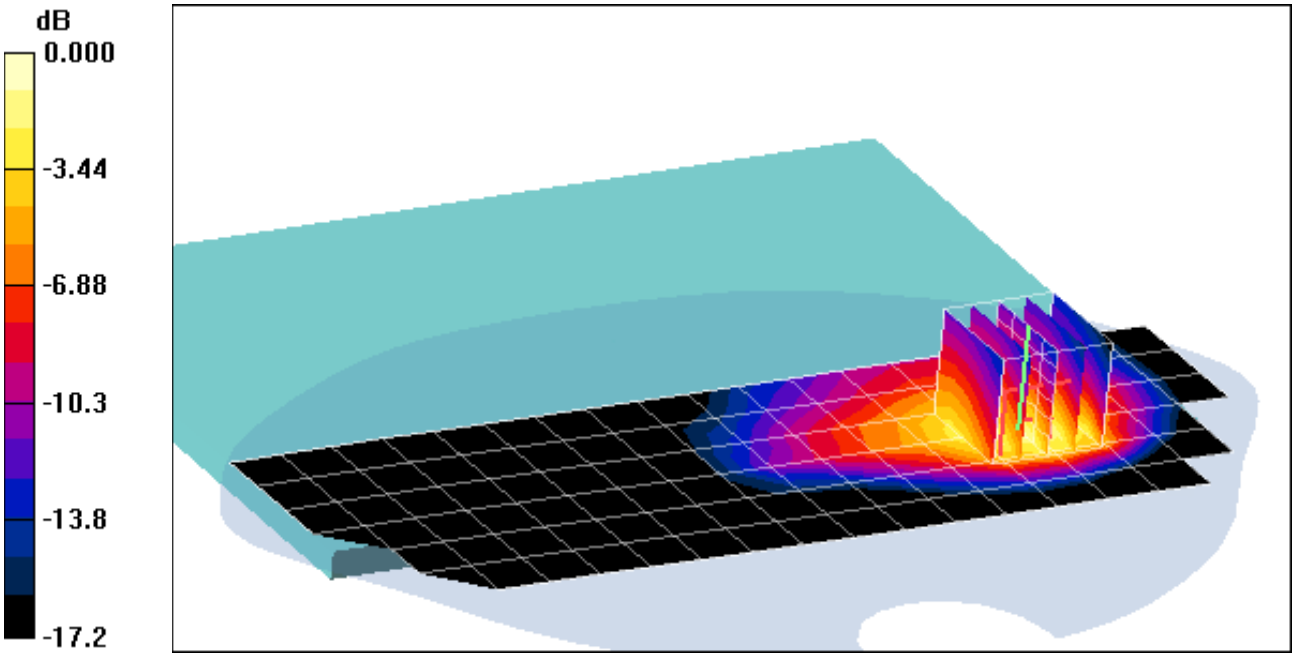
Communication System: GSM850 GPRS; 3 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:2.76
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.983 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.6°C; Tissue Temp: 19.9°C

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

Mode: GPRS 850, Body SAR, Back side, Mid.ch, 3 Tx Slots

Area Scan (7x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.1 V/m; Power Drift = -0.079 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.588 mW/g; SAR(10 g) = 0.325 mW/g



0 dB = 0.675mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

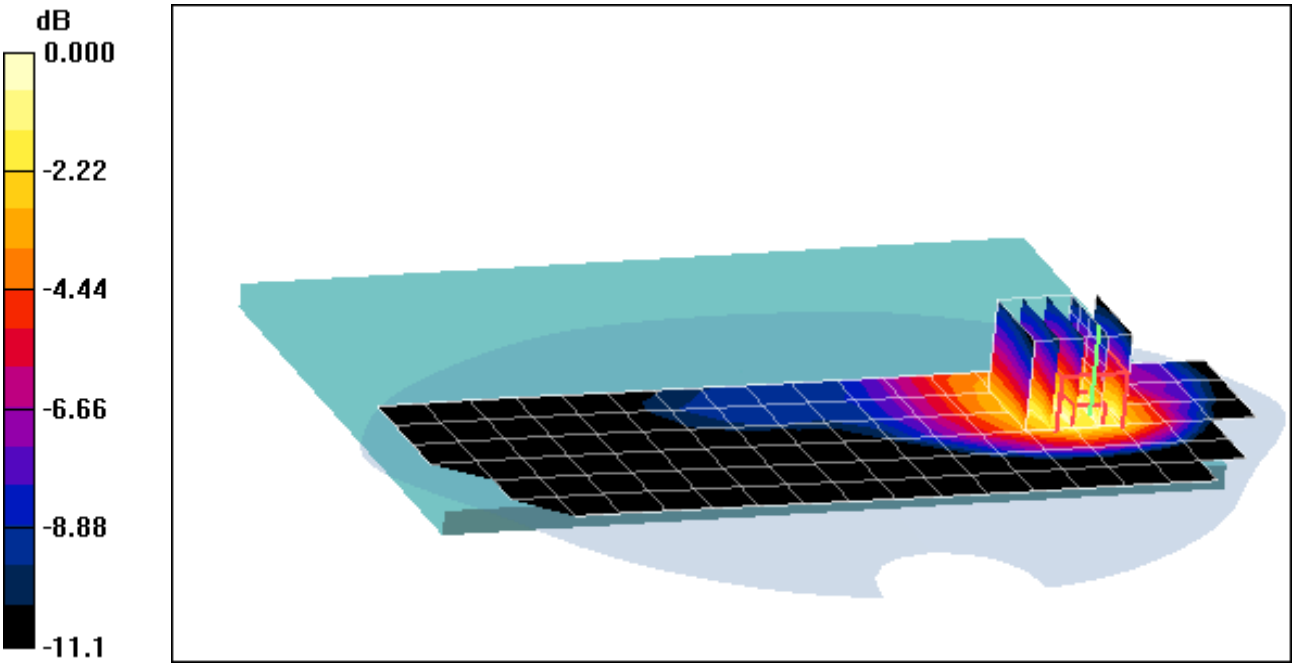
Communication System: GSM850 GPRS; 3 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.76
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-19-2011; Ambient Temp: 21.6°C; Tissue Temp: 20.5°C

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

Mode: GPRS 850, Body SAR, Back side, Mid.ch, 3 Tx Slots

Area Scan (7x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.7 V/m; Power Drift = -0.061 dB
Peak SAR (extrapolated) = 0.435 W/kg
SAR(1 g) = 0.288 mW/g; SAR(10 g) = 0.183 mW/g



0 dB = 0.314mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; 3

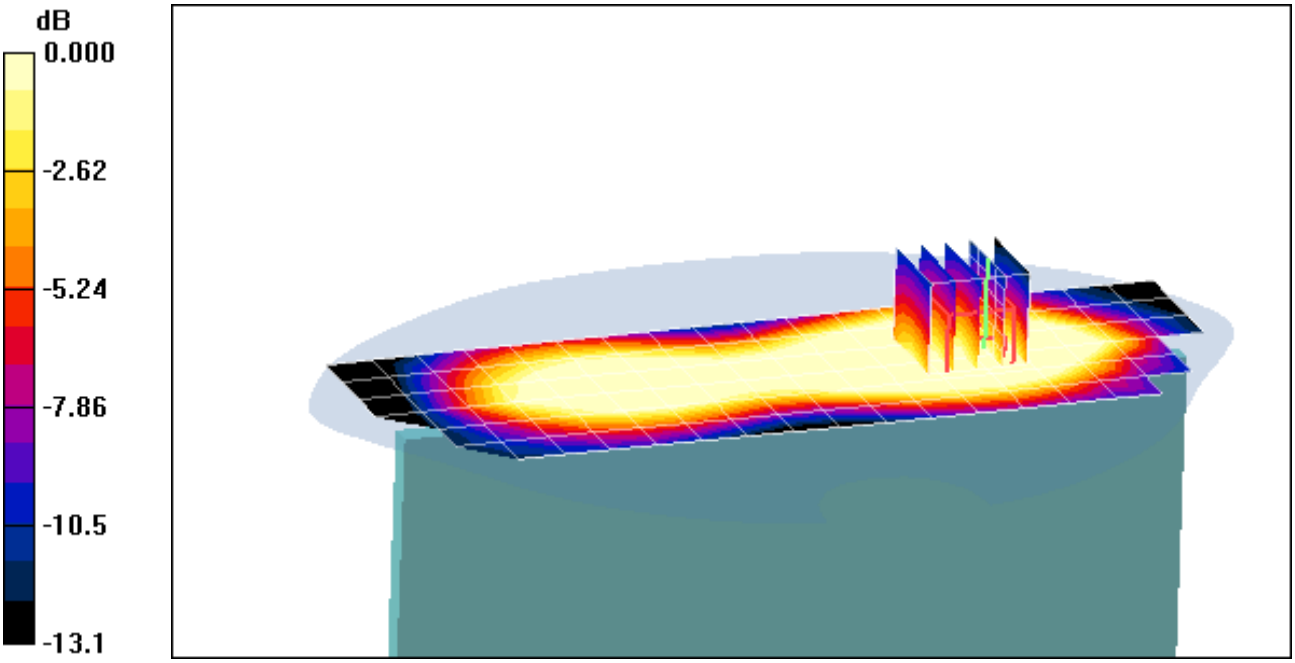
Communication System: GSM850 GPRS; 3 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:2.76
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.983 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2011; Ambient Temp: 21.6°C; Tissue Temp: 19.9°C

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

Mode: GPRS 850, Body SAR, Top side, Mid.ch, 3 Tx Slots

Area Scan (7x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.6 V/m; Power Drift = 0.005 dB
Peak SAR (extrapolated) = 0.404 W/kg
SAR(1 g) = 0.238 mW/g; SAR(10 g) = 0.146 mW/g



0 dB = 0.265mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

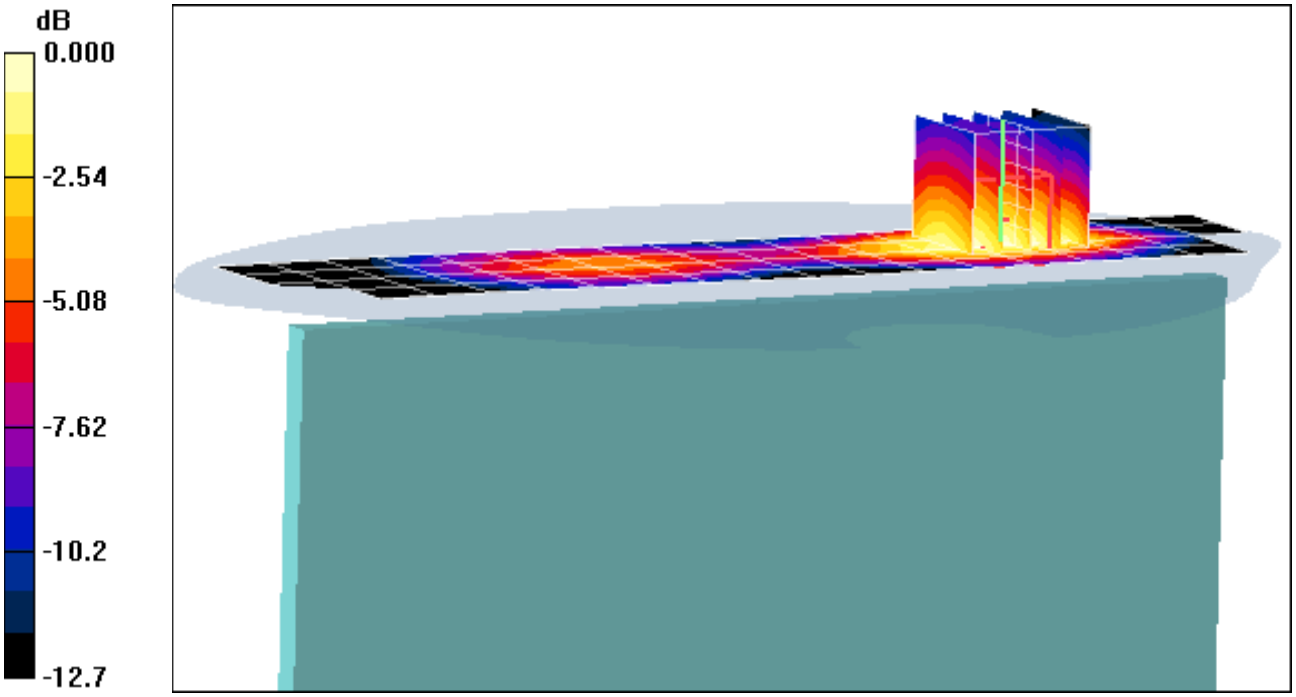
Communication System: GSM850 GPRS; 3 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:2.76
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 12-19-2011; Ambient Temp: 21.6 °C; Tissue Temp: 20.5 °C

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

Mode: GPRS 850, Body SAR, Top Edge, Mid.ch, 3 Tx Slots

Area Scan (5x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.9 V/m; Power Drift = 0.031 dB
Peak SAR (extrapolated) = 0.464 W/kg
SAR(1 g) = 0.305 mW/g; SAR(10 g) = 0.197 mW/g



0 dB = 0.328mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

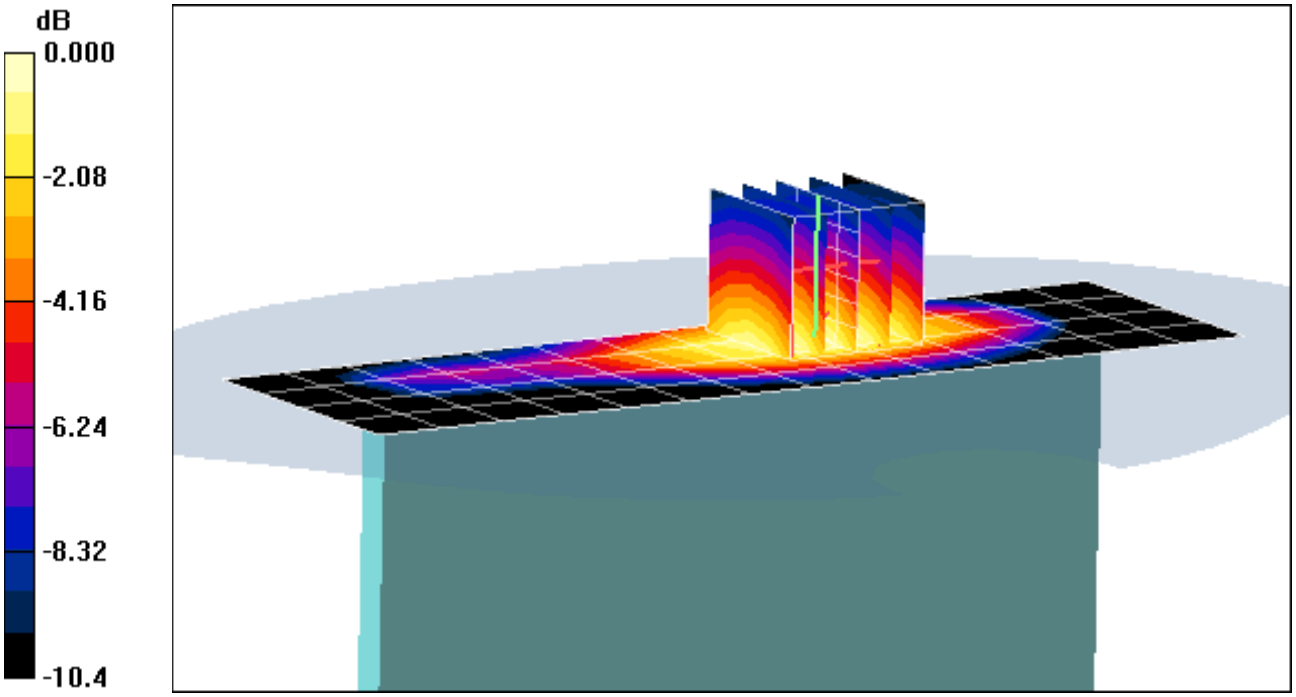
Communication System: GSM850 GPRS; 3 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:2.76
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-19-2011; Ambient Temp: 21.6 °C; Tissue Temp: 20.5 °C

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

Mode: GPRS 850, Body SAR, Right Edge, Mid.ch, 3 Tx Slots

Area Scan (5x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.1 V/m; Power Drift = -0.099 dB
Peak SAR (extrapolated) = 0.253 W/kg
SAR(1 g) = 0.175 mW/g; SAR(10 g) = 0.117 mW/g



0 dB = 0.188mW/g

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 3

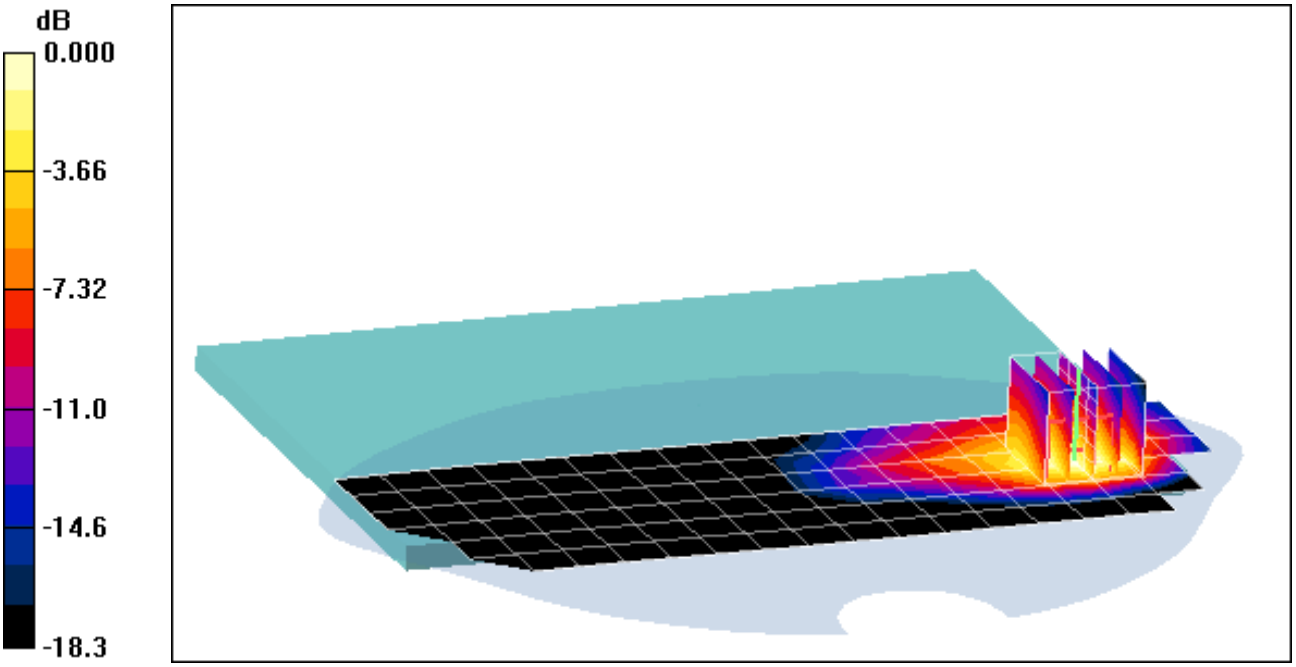
Communication System: WCDMA850; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium: 835 BodyMedium parameters used (interpolated):
f = 846.6 MHz; σ = 0.993 mho/m; ε_r = 54.1; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.6°C; Tissue Temp: 19.9°C

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

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

Area Scan (7x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.0 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 0.770 W/kg
SAR(1 g) = 0.418 mW/g; SAR(10 g) = 0.228 mW/g



0 dB = 0.474mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

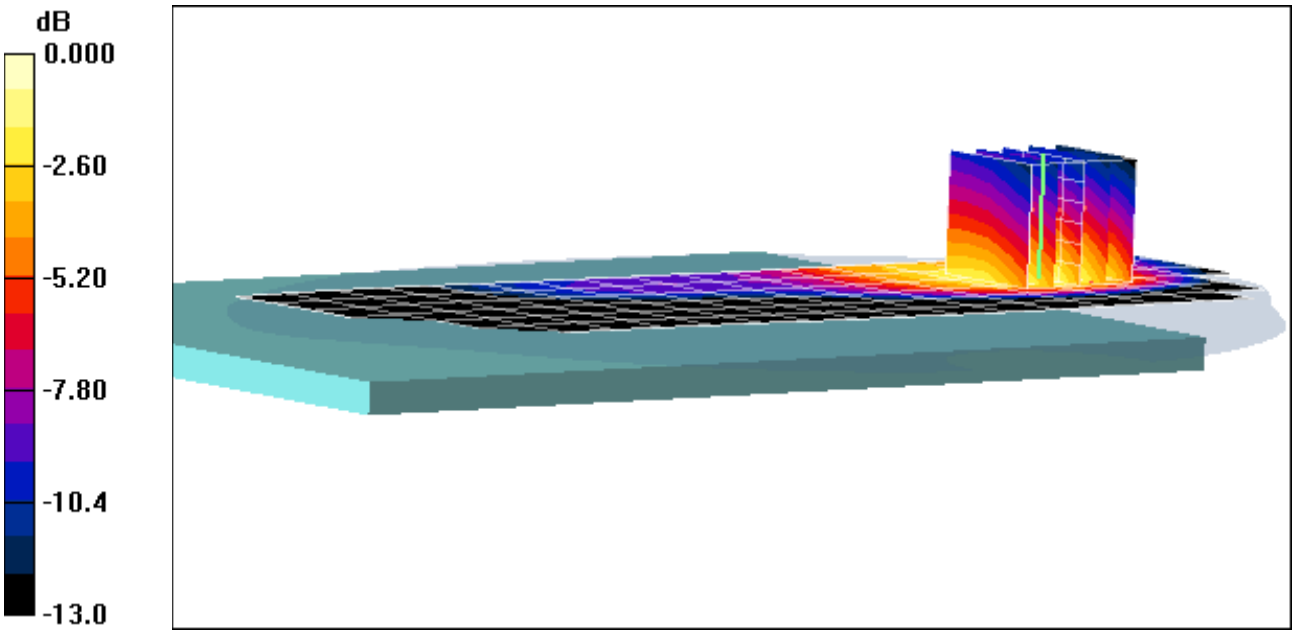
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-19-2011; Ambient Temp: 21.6 °C; Tissue Temp: 20.5 °C

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

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

Area Scan (7x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.0 V/m; Power Drift = -0.062 dB
Peak SAR (extrapolated) = 0.417 W/kg
SAR(1 g) = 0.271 mW/g; SAR(10 g) = 0.168 mW/g



0 dB = 0.295mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 3

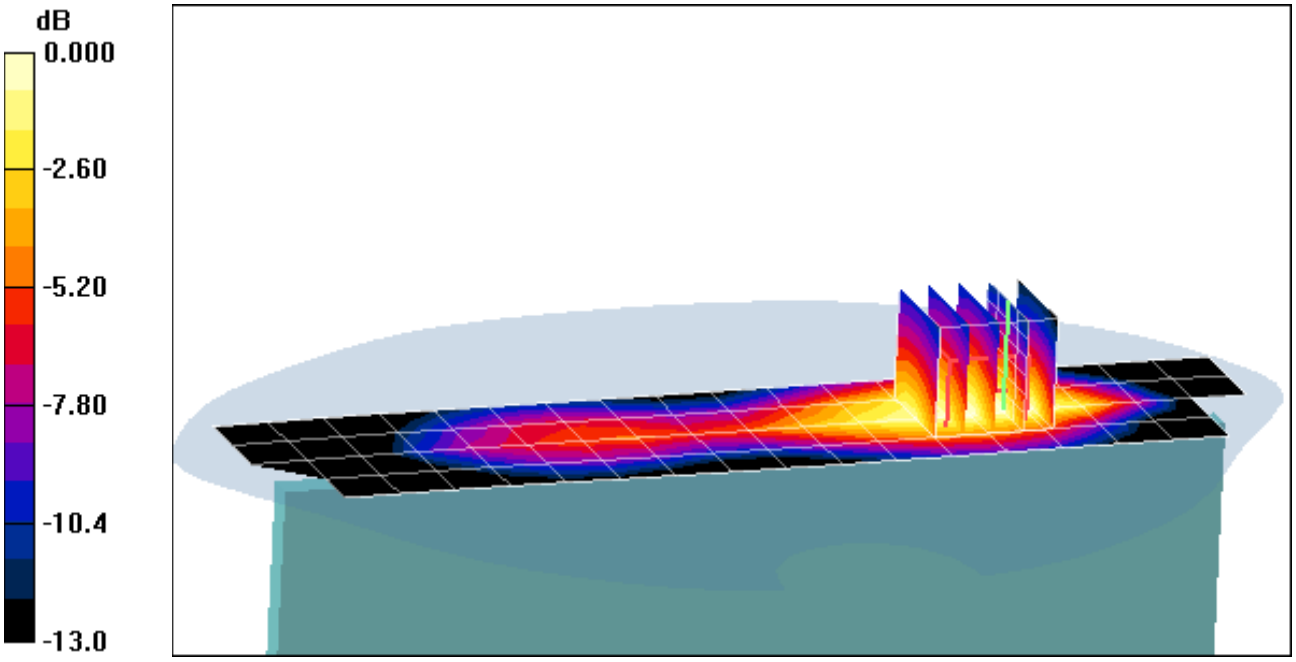
Communication System: WCDMA850; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 846.6 MHz; σ = 0.993 mho/m; ε_r = 54.1; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.6°C; Tissue Temp: 19.9°C

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

Mode: WCDMA 850, Body SAR, Top Edge, High.ch

Area Scan (5x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.3 V/m; Power Drift = 0.026 dB
Peak SAR (extrapolated) = 0.814 W/kg
SAR(1 g) = 0.476 mW/g; SAR(10 g) = 0.287 mW/g



0 dB = 0.501mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

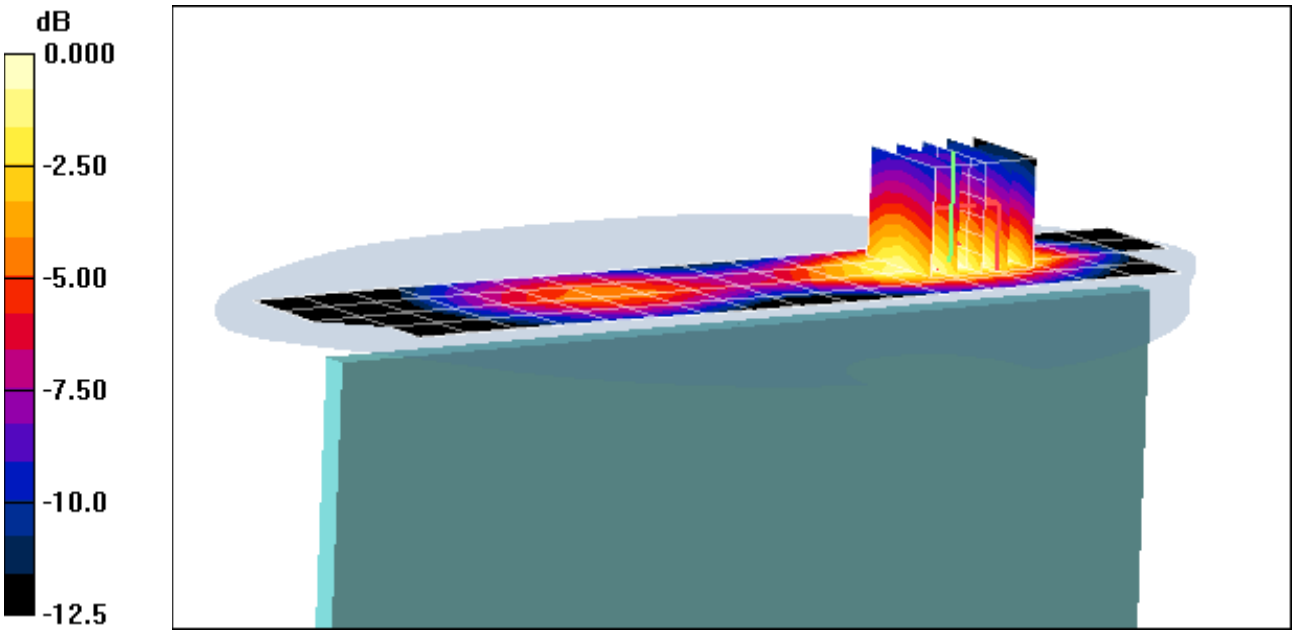
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 12-19-2011; Ambient Temp: 21.6 °C; Tissue Temp: 20.5 °C

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

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

Area Scan (5x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.6 V/m; Power Drift = -0.105 dB
Peak SAR (extrapolated) = 0.400 W/kg
SAR(1 g) = 0.263 mW/g; SAR(10 g) = 0.169 mW/g



0 dB = 0.284mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

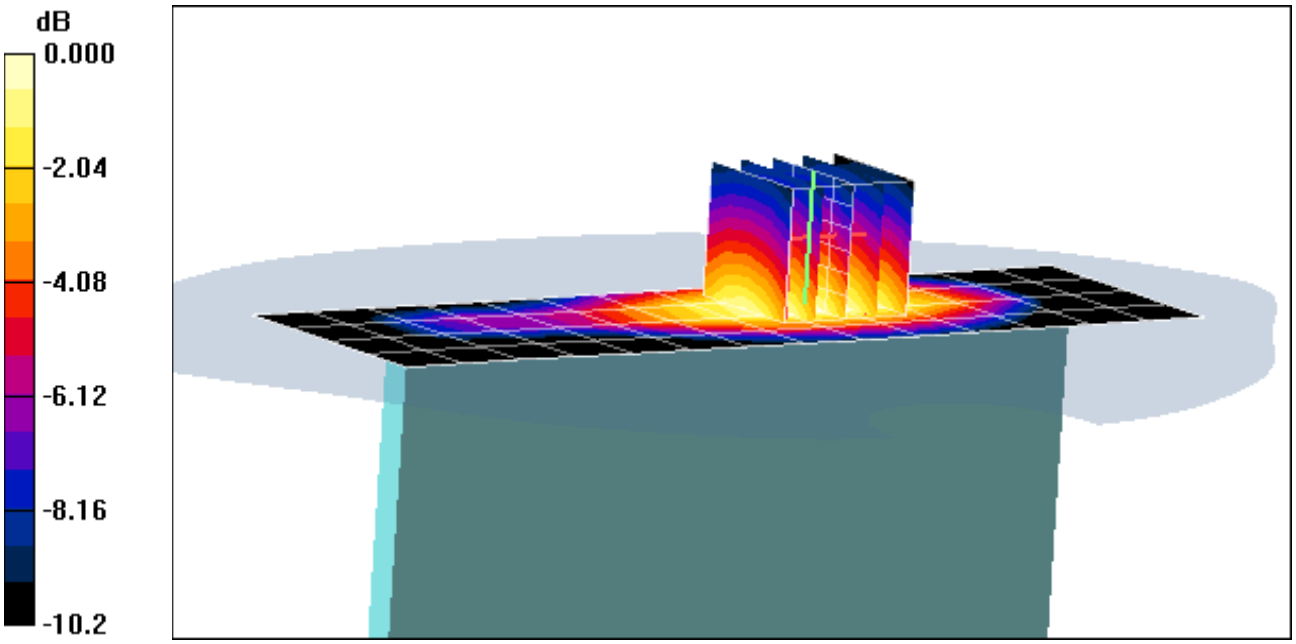
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.98 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-19-2011; Ambient Temp: 21.6 °C; Tissue Temp: 20.5 °C

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

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

Area Scan (5x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.6 V/m; Power Drift = 0.189 dB
Peak SAR (extrapolated) = 0.230 W/kg
SAR(1 g) = 0.160 mW/g; SAR(10 g) = 0.107 mW/g



0 dB = 0.171mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 3

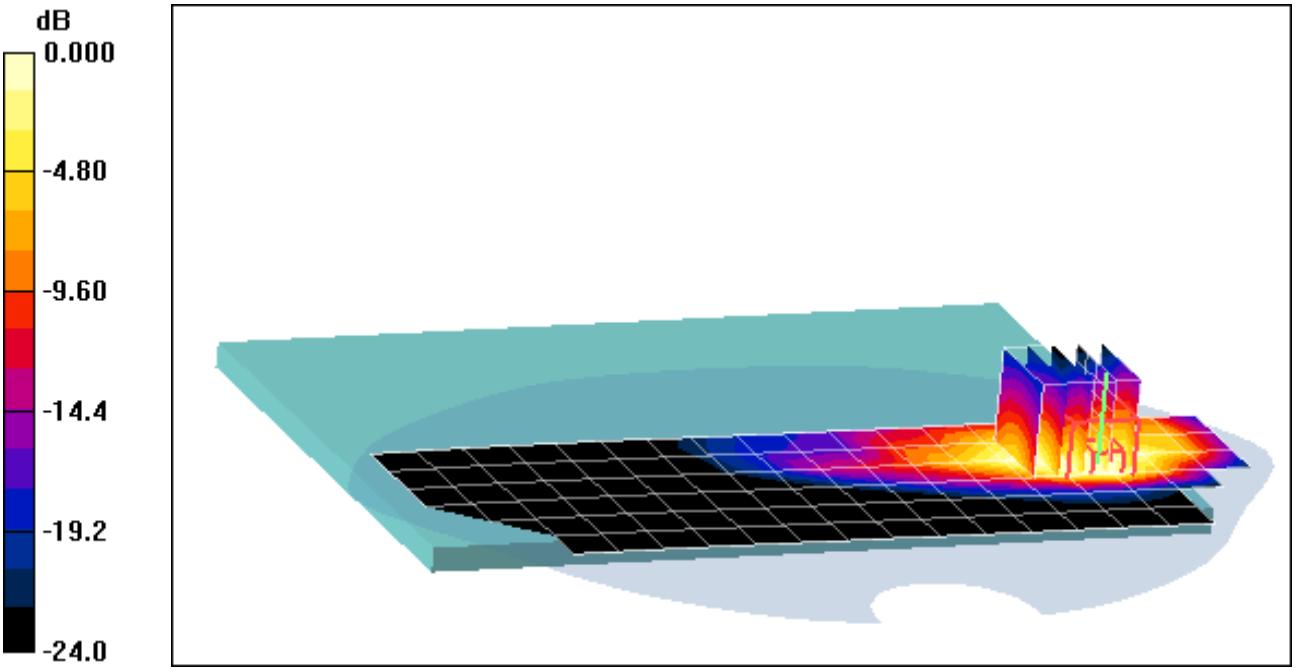
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.54 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.9°C; Tissue Temp: 20.3°C

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

Mode: GSM 1900, Body SAR, Back side, Mid.ch

Area Scan (7x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.0 V/m; Power Drift = -0.042 dB
Peak SAR (extrapolated) = 2.21 W/kg
SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.468 mW/g



0 dB = 1.42mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

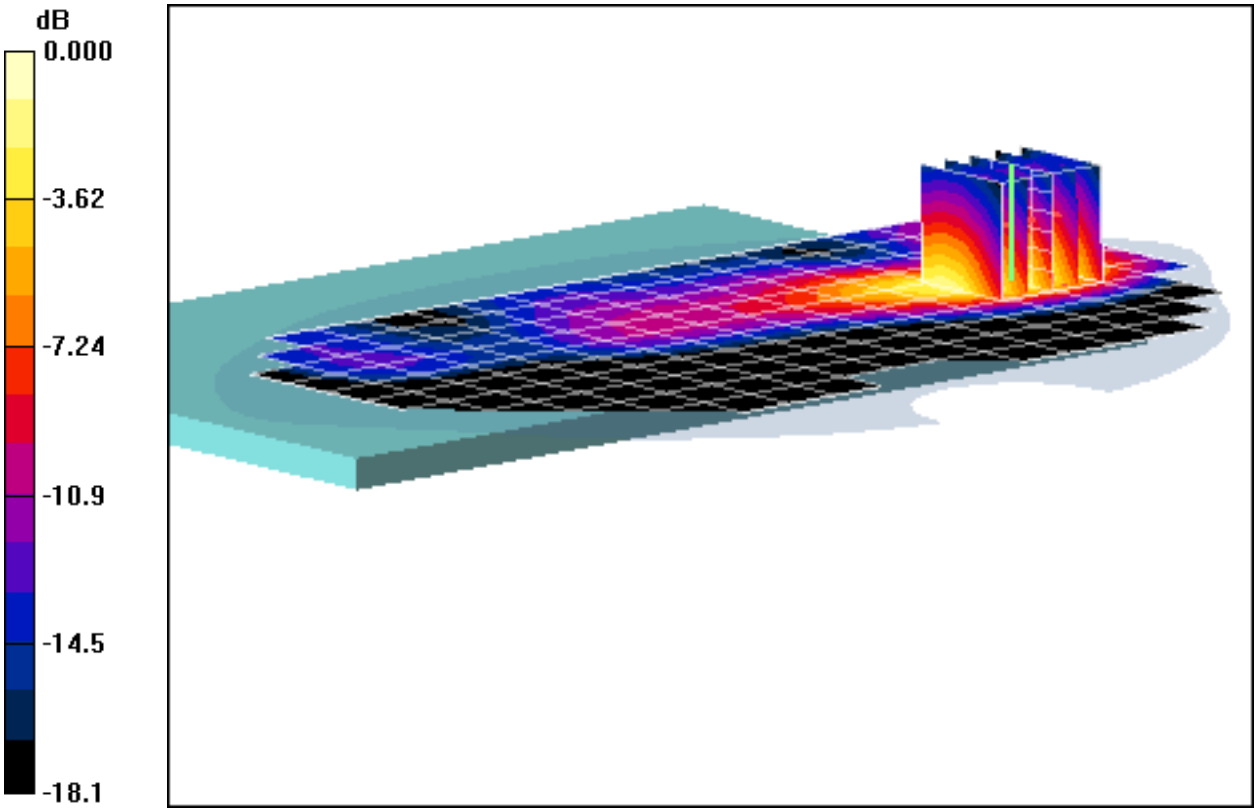
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.54 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-15-2011; Ambient Temp: 21.4 °C; Tissue Temp: 21.3 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GSM 1900, Body SAR, Back side, Mid.ch

Area Scan (11x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.8 V/m; Power Drift = 0.017 dB
Peak SAR (extrapolated) = 0.743 W/kg
SAR(1 g) = 0.393 mW/g; SAR(10 g) = 0.198 mW/g



0 dB = 0.419mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 3

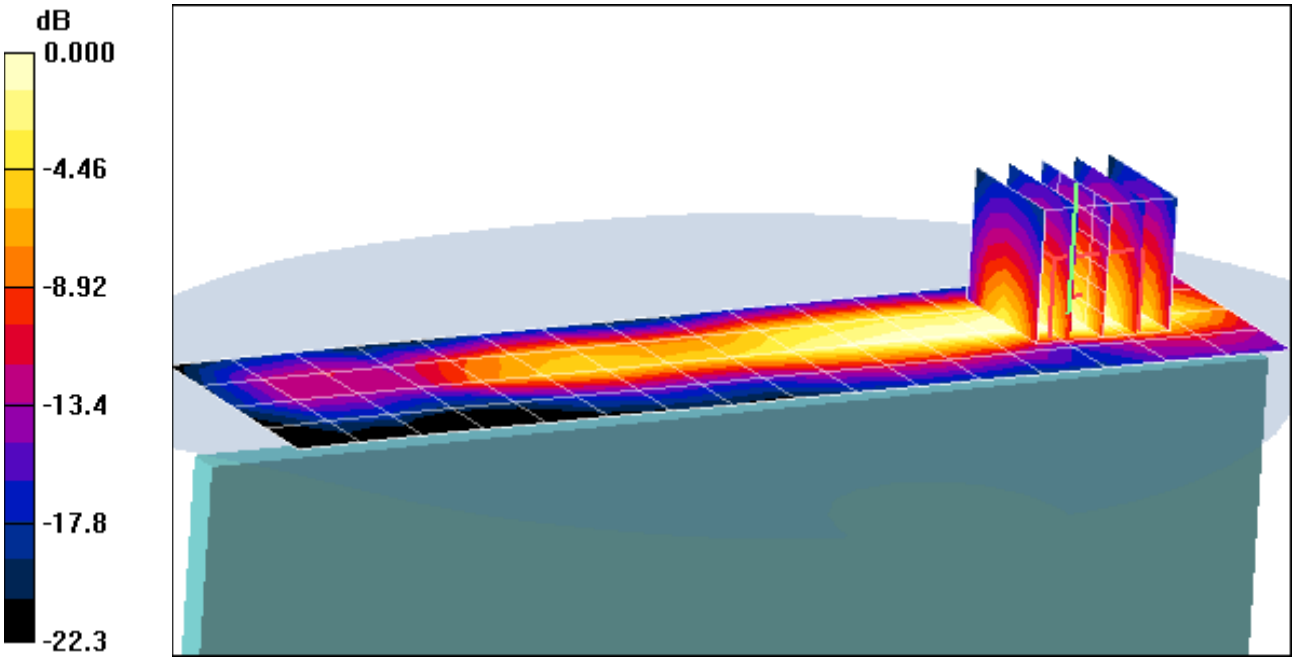
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.54 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.9°C; Tissue Temp: 20.3°C

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

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

Area Scan (5x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.0 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 1.28 W/kg
SAR(1 g) = 0.609 mW/g; SAR(10 g) = 0.264 mW/g



0 dB = 0.726mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

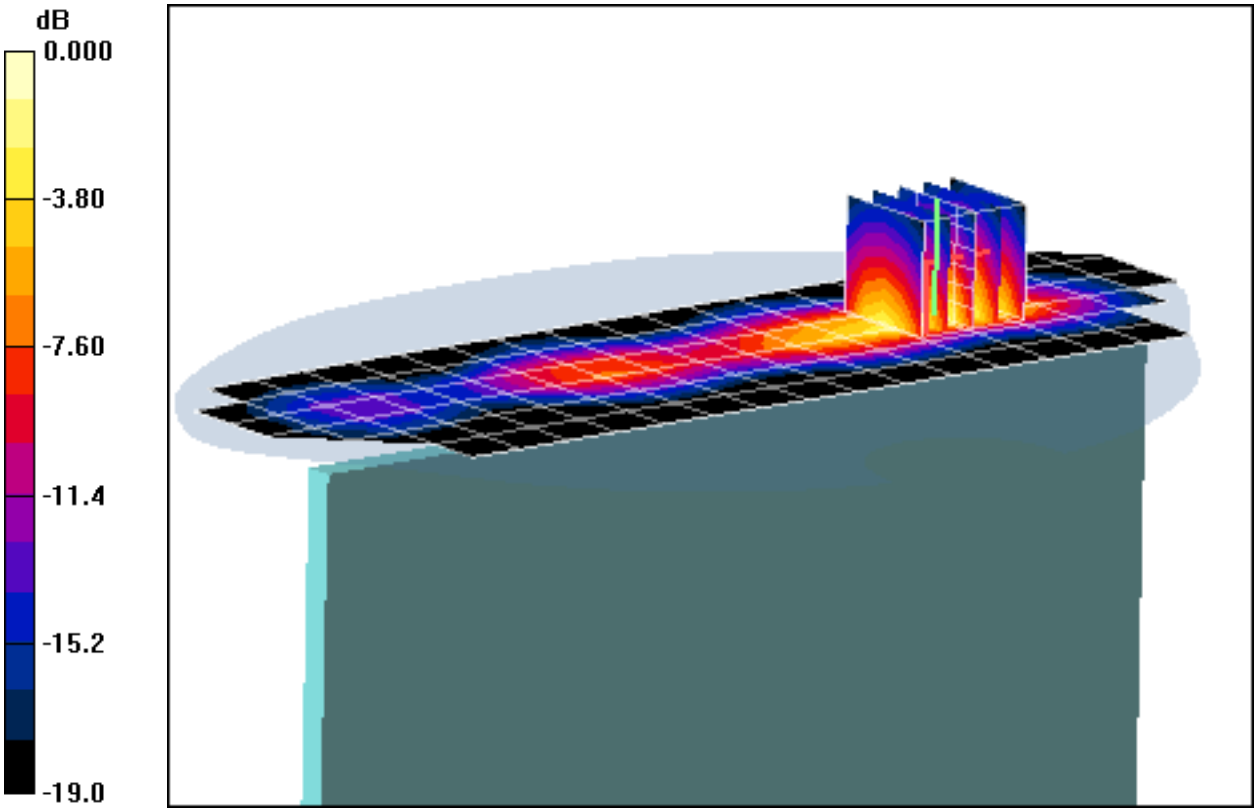
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.54 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 12-15-2011; Ambient Temp: 21.4 °C; Tissue Temp: 21.3 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GSM1900, Body SAR, Top side, Mid.ch

Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.0 V/m; Power Drift = 0.052 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.706 mW/g; SAR(10 g) = 0.335 mW/g



0 dB = 0.812mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

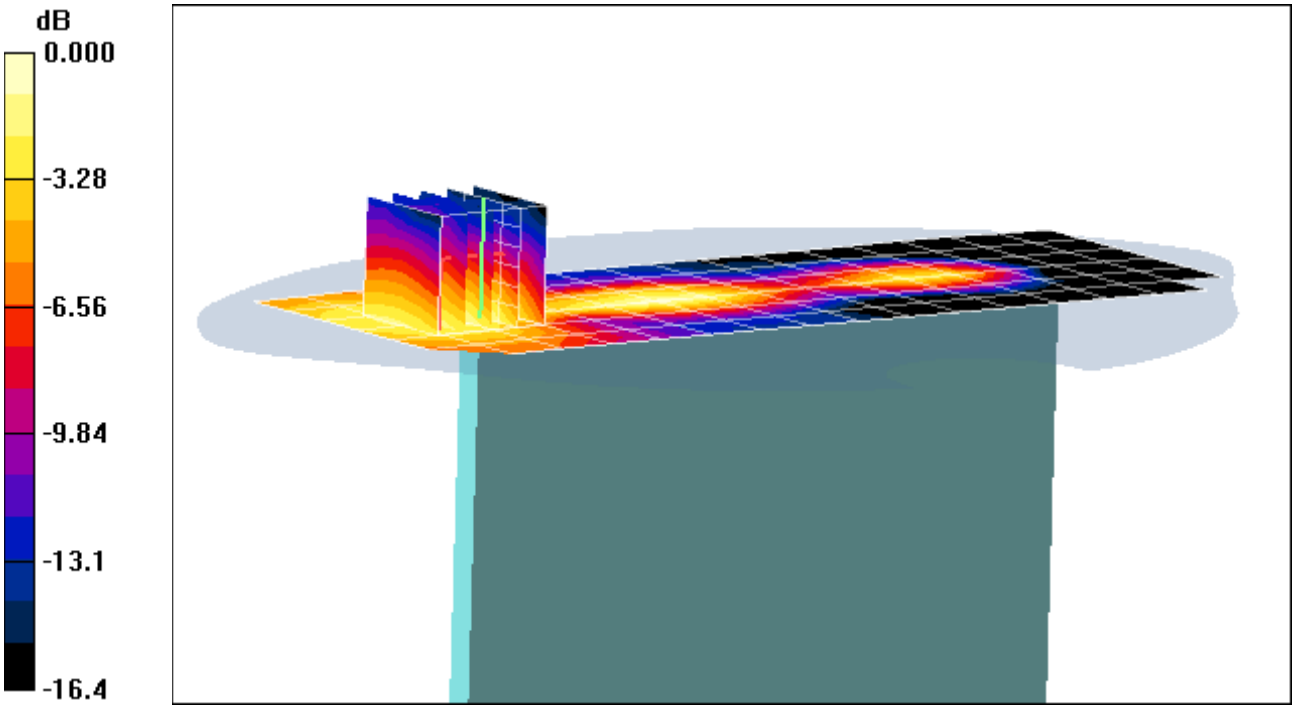
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.54 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-15-2011; Ambient Temp: 21.4 °C; Tissue Temp: 21.3 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GSM1900, Body SAR, Right side, Mid.ch

Area Scan (7x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.80 V/m; Power Drift = 0.029 dB
Peak SAR (extrapolated) = 0.116 W/kg
SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.038 mW/g



0 dB = 0.073mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 3

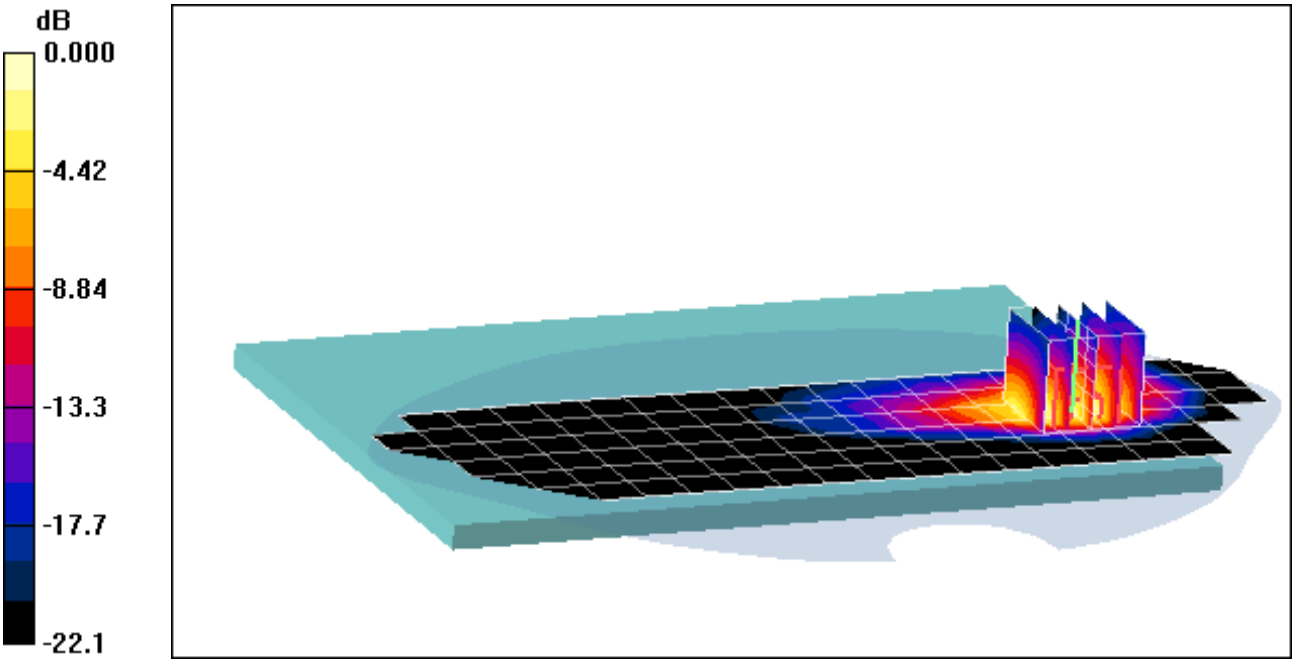
Communication System: GSM1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1850.2MHz; σ = 1.501 mho/m; ε_r = 53.19; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.9°C; Tissue Temp: 20.3°C

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

Mode: GPRS 1900, Body SAR, Back side, Low.ch, 1 Tx Slots

Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.8 V/m; Power Drift = 0.041 dB
Peak SAR (extrapolated) = 2.37 W/kg
SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.475 mW/g



0 dB = 1.44mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

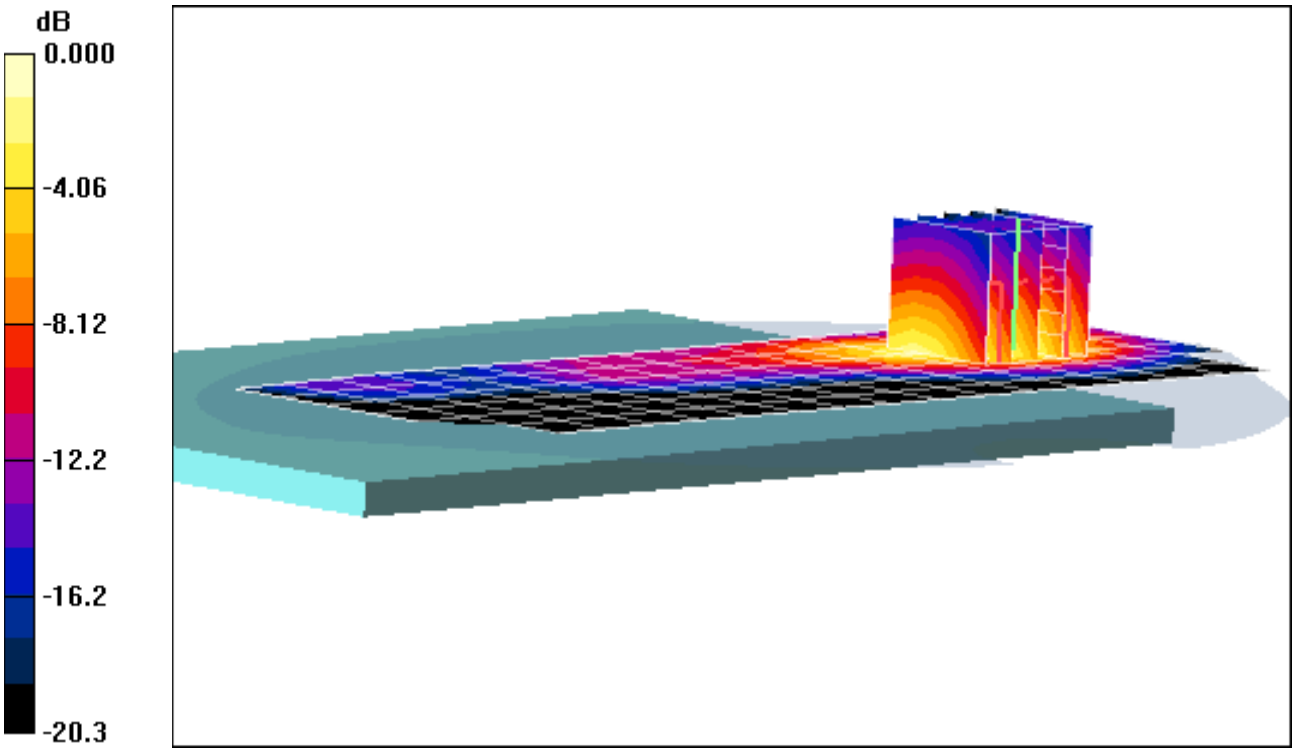
Communication System: GSM1900 GPRS; 2 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.54 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-15-2011; Ambient Temp: 21.4 °C; Tissue Temp: 21.3 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 1900, Body SAR, Back side, Mid.ch, 2 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 = 16.3 V/m; Power Drift = -0.079 dB
Peak SAR (extrapolated) = 0.917 W/kg
SAR(1 g) = 0.485 mW/g; SAR(10 g) = 0.248 mW/g



0 dB = 0.550mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 3

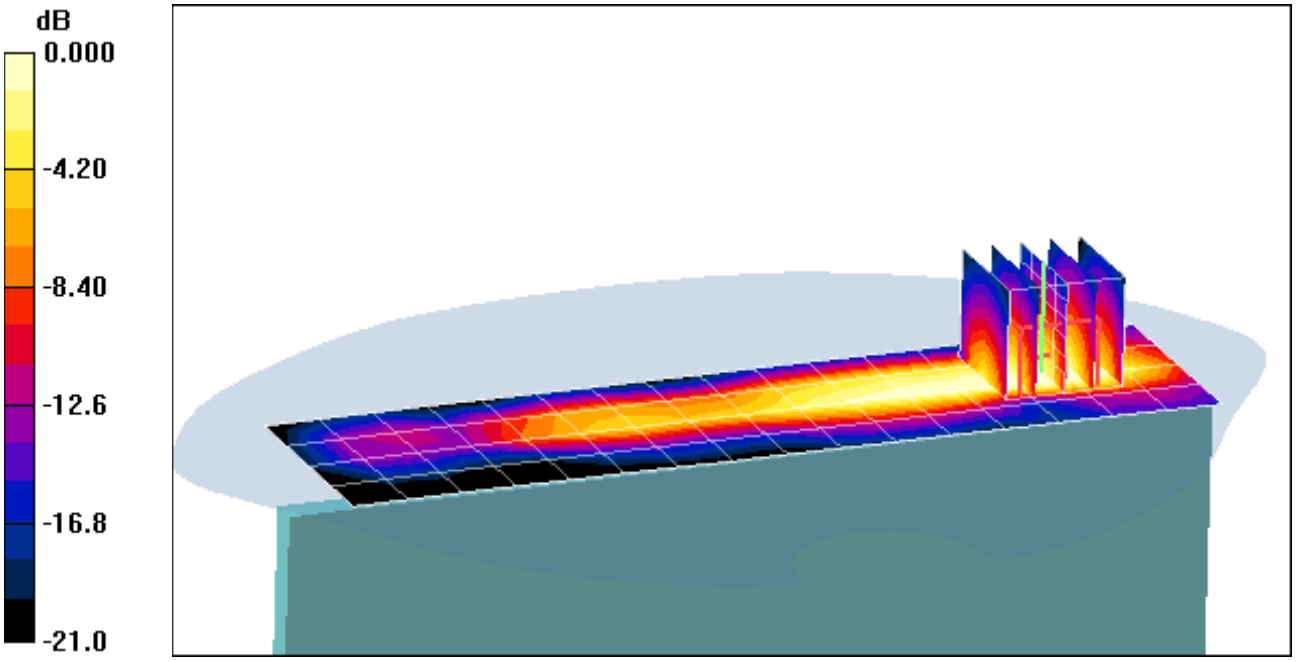
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.54 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.9°C; Tissue Temp: 20.3°C

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

Mode: GPRS 1900, Body SAR, Top side, Mid.ch, 1 Tx Slots

Area Scan (5x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.9 V/m; Power Drift = -0.051 dB
Peak SAR (extrapolated) = 1.31 W/kg
SAR(1 g) = 0.605 mW/g; SAR(10 g) = 0.256 mW/g



0 dB = 0.716mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

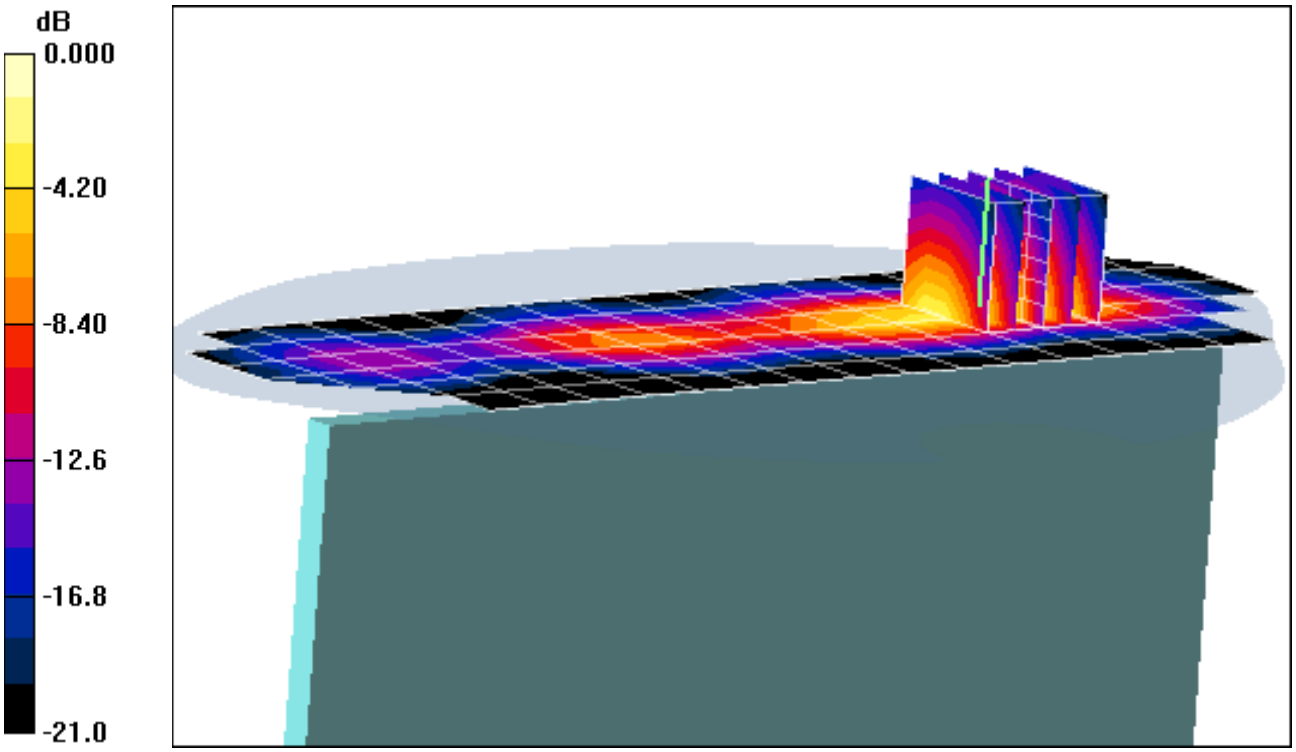
Communication System: GSM1900 GPRS; 2 Tx slots; Frequency: 1909.8 MHz;Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:
f = 1910 MHz; σ = 1.568 mho/m; ε_r = 51.16; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 12-15-2011; Ambient Temp: 21.4 °C; Tissue Temp: 21.3 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: GPRS 1900, Body SAR, Top side, High.ch, 2 Tx Slots

Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.9 V/m; Power Drift = 0.012 dB
Peak SAR (extrapolated) = 1.84 W/kg
SAR(1 g) = 0.887 mW/g; SAR(10 g) = 0.398 mW/g



0 dB = 0.866mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

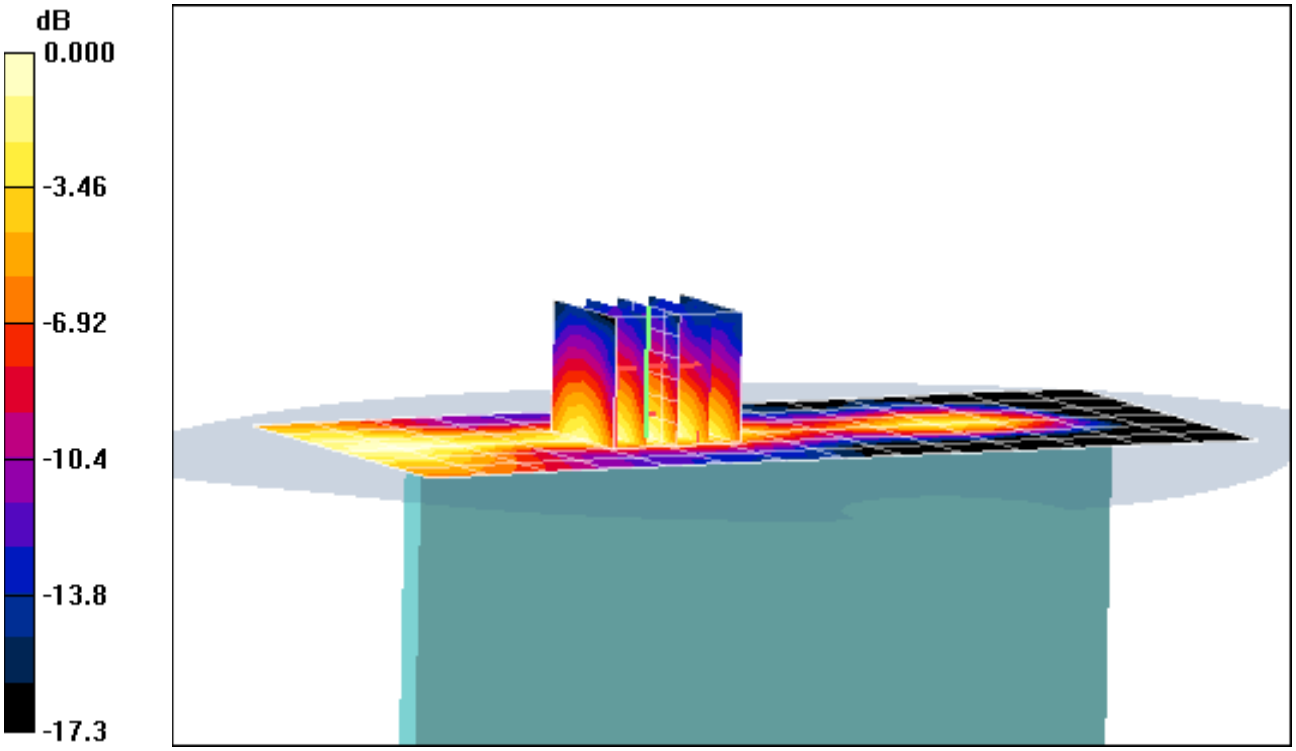
Communication System: GSM1900 GPRS; 2 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.54 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-15-2011; Ambient Temp: 21.4 °C; Tissue Temp: 21.3 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.08 V/m; Power Drift = 0.048 dB
Peak SAR (extrapolated) = 0.119 W/kg
SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.037 mW/g



0 dB = 0.075mW/g

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 3

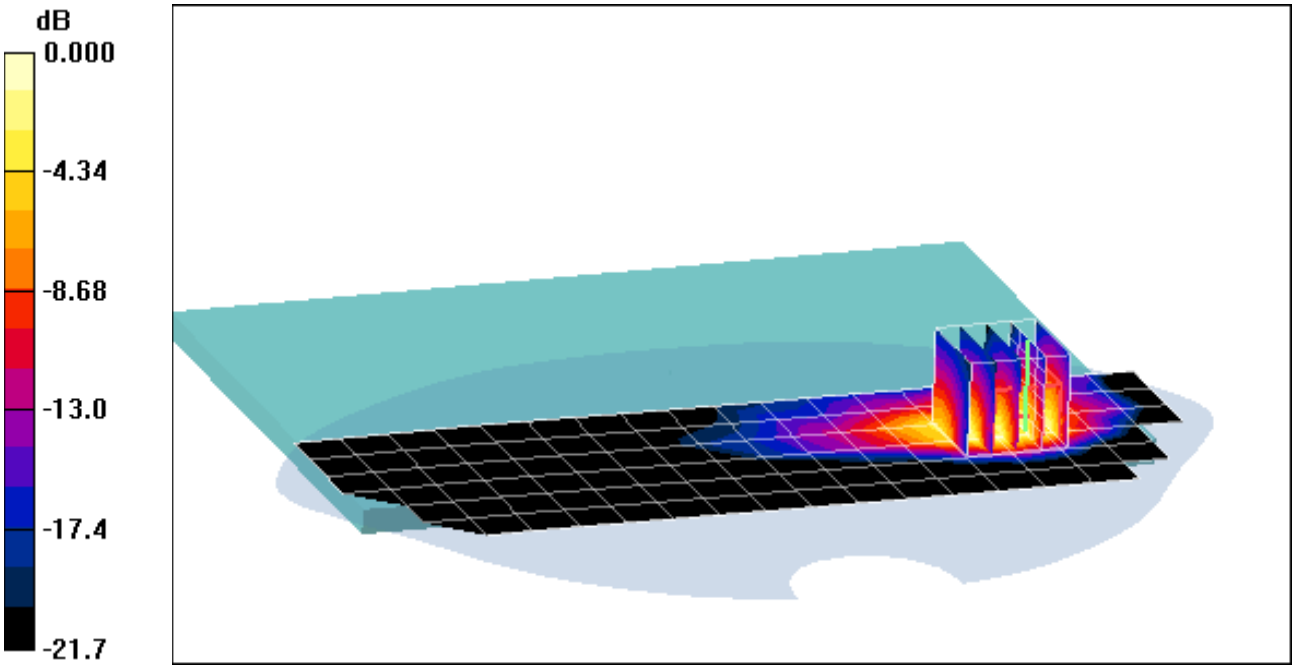
Communication System: WCDMA1900; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1852.4 MHz; σ = 1.501 mho/m; ε_r = 53.19; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.9°C; Tissue Temp: 20.3°C

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

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

Area Scan (7x19x1): 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; Power Drift = 0.203 dB
Peak SAR (extrapolated) = 2.33 W/kg
SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.445 mW/g



0 dB = 1.26mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

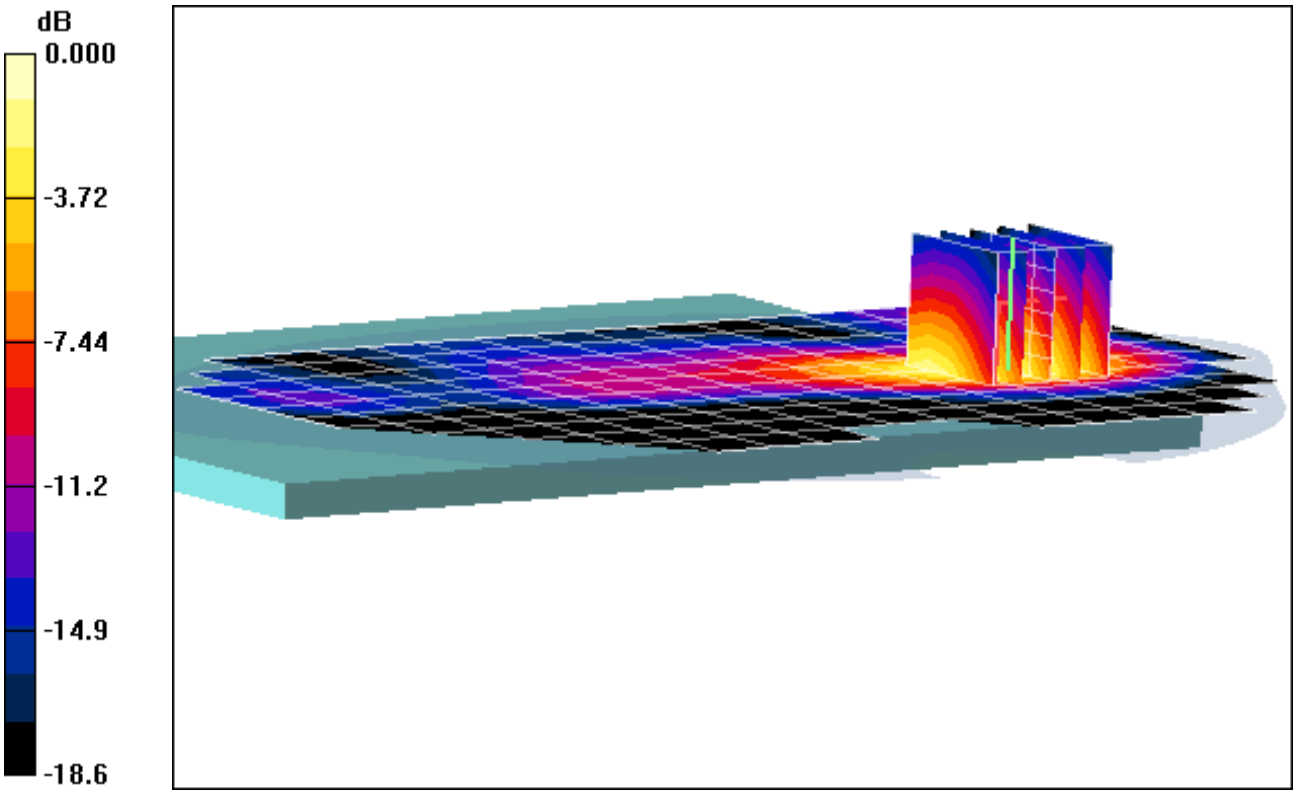
Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.54 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-15-2011; Ambient Temp: 21.4 °C; Tissue Temp: 21.3 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA1900, Body SAR, Back side, Mid.ch

Area Scan (11x18x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.34 V/m; Power Drift = -0.161 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.532 mW/g; SAR(10 g) = 0.267 mW/g



0 dB = 0.572mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 3

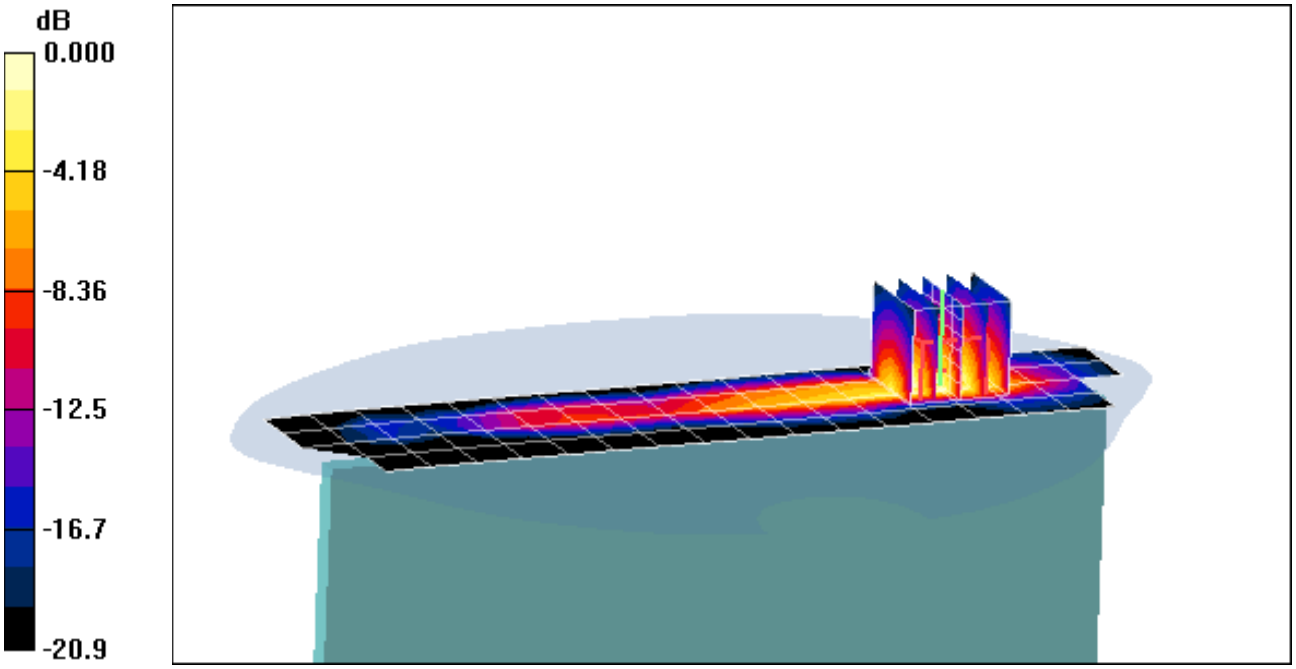
Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.54 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.9°C; Tissue Temp: 20.3°C

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

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

Area Scan (5x19x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.0 V/m; Power Drift = 0.046 dB
Peak SAR (extrapolated) = 1.07 W/kg
SAR(1 g) = 0.492 mW/g; SAR(10 g) = 0.207 mW/g



0 dB = 0.580mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

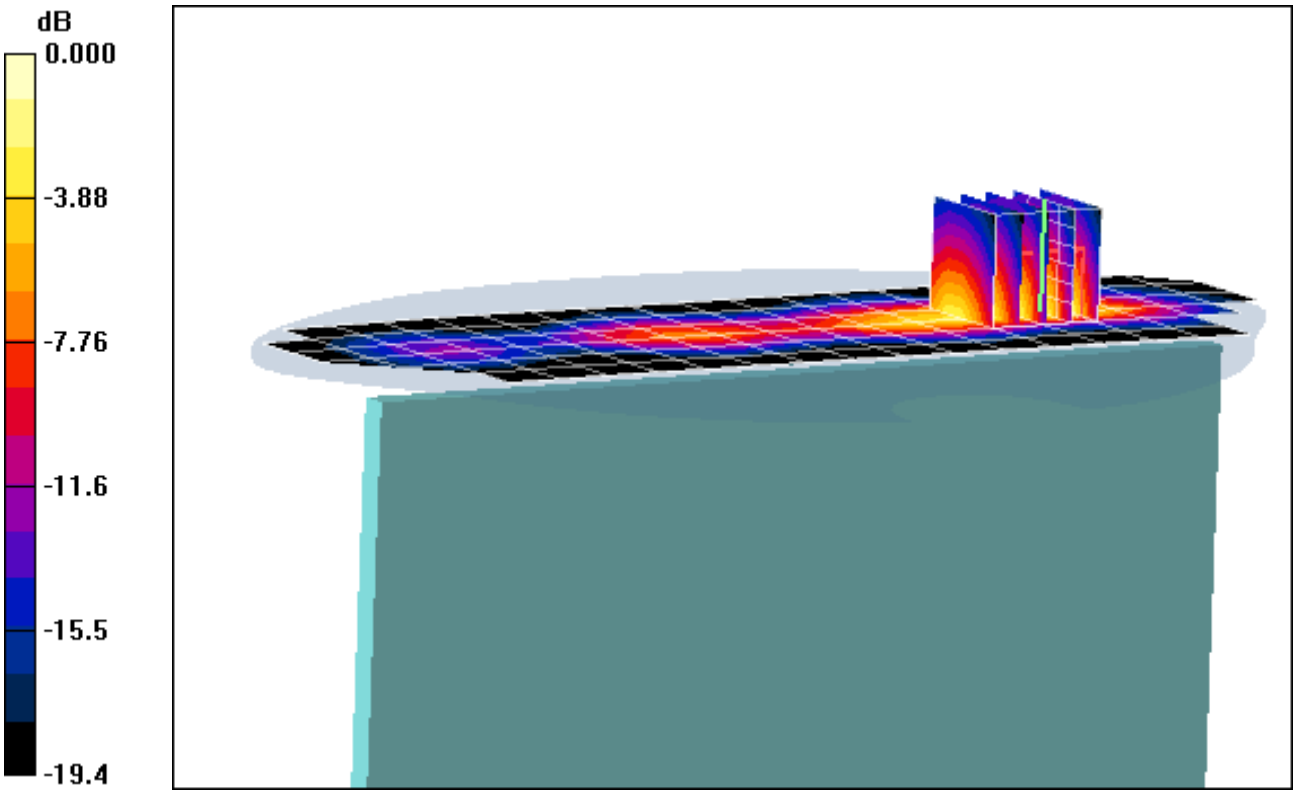
Communication System: WCDMA1900; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1852.4 MHz; σ = 1.51 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 12-15-2011; Ambient Temp: 21.4 °C; Tissue Temp: 21.3 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: WCDMA1900, Body SAR, Top side, Low.ch

Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.5 V/m; Power Drift = 0.049 dB
Peak SAR (extrapolated) = 2.02 W/kg
SAR(1 g) = 0.998 mW/g; SAR(10 g) = 0.457 mW/g



0 dB = 0.966mW/g

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DUT: A3LGTN8000A; Type: Portable Tablet Computer; Serial: 4

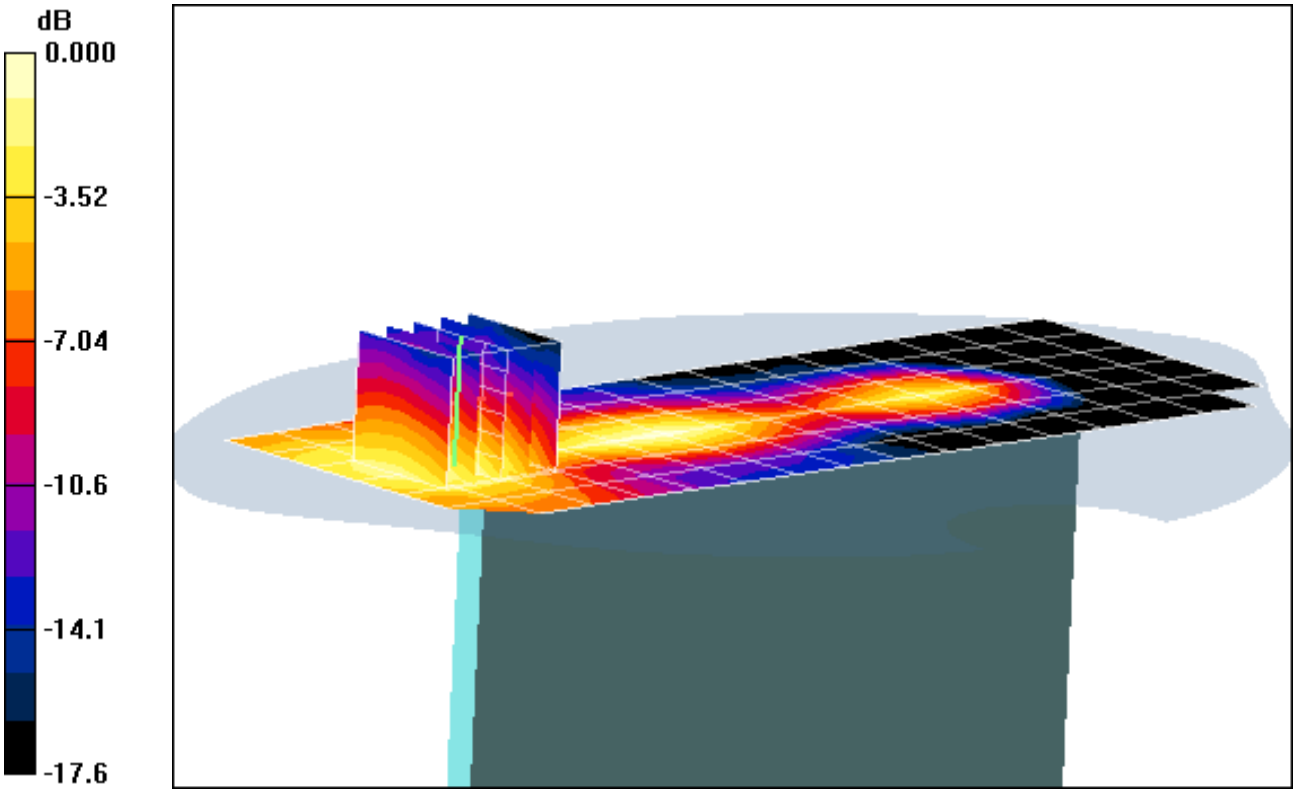
Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.54 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-15-2011; Ambient Temp: 21.4 °C; Tissue Temp: 21.3 °C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
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 (7x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.73 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 0.138 W/kg
SAR(1 g) = 0.080 mW/g; SAR(10 g) = 0.046 mW/g



0 dB = 0.089mW/g

APPENDIX B: SYSTEM VERIFICATION

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

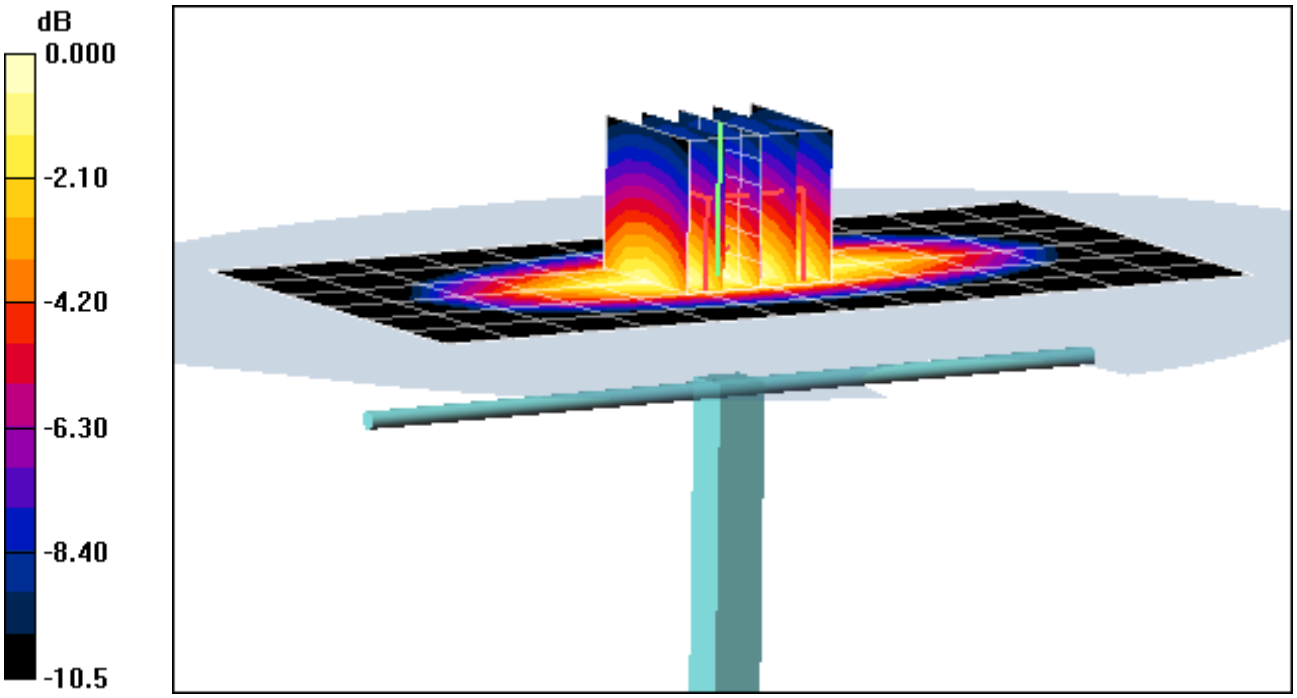
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.979 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-19-2011; Ambient Temp: 21.6 °C; Tissue Temp: 20.5 °C

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

835MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 0.991 mW/g; SAR(10 g) = 0.645 mW/g
Deviation = 0.61 %



0 dB = 1.07mW/g

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

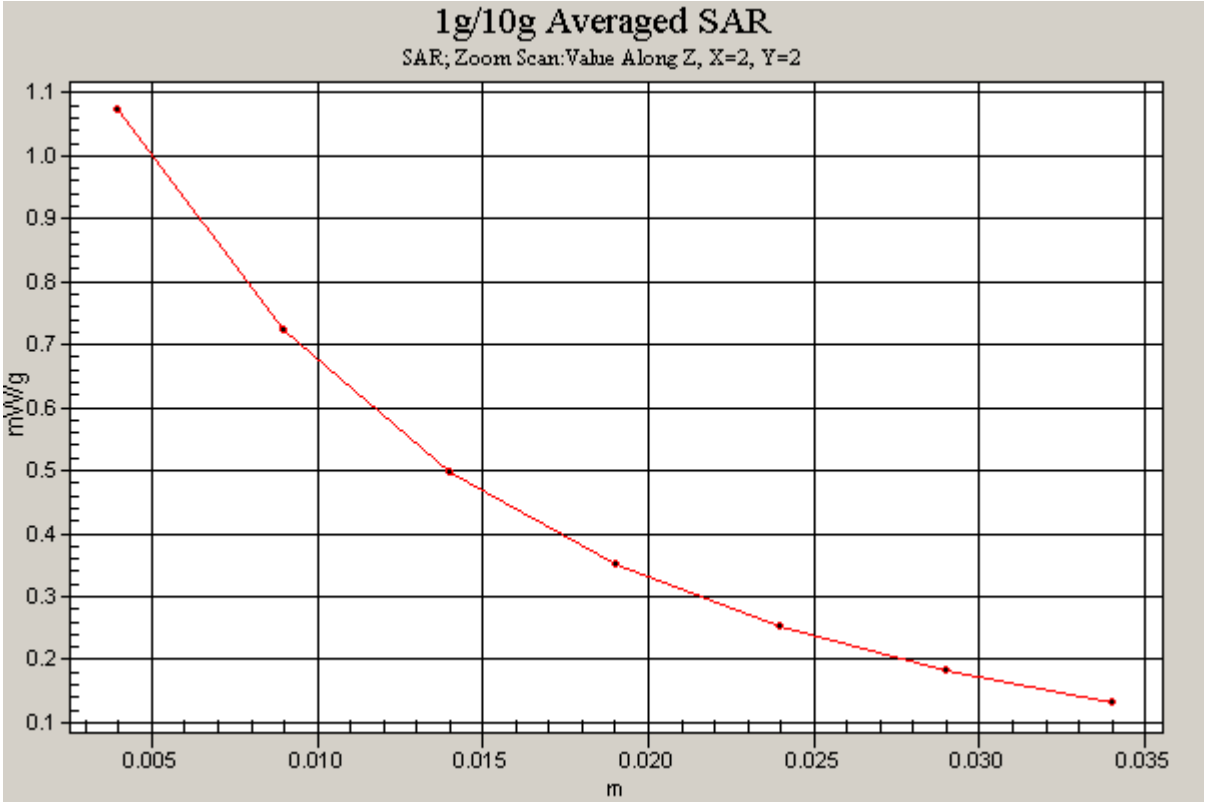
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.979 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 12-19-2011; Ambient Temp: 21.6 °C; Tissue Temp: 20.5 °C

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

835MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 0.991 mW/g; SAR(10 g) = 0.645 mW/g
Deviation = 0.61 %



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

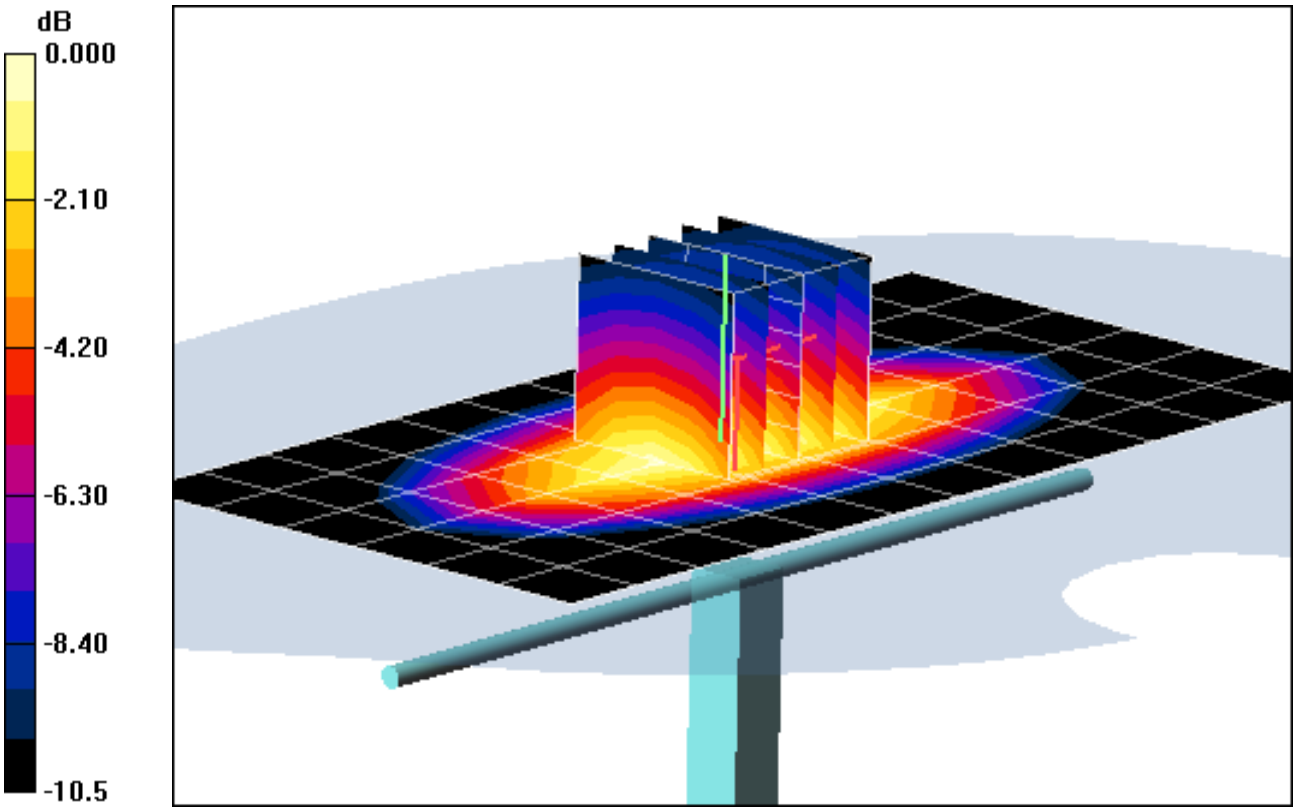
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.981 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-19-2012; Ambient Temp: 21.6°C; Tissue Temp: 19.9°C

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

835MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 0.973 mW/g; SAR(10 g) = 0.636 mW/g
Deviation = 1.99 %



0 dB = 1.05mW/g

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

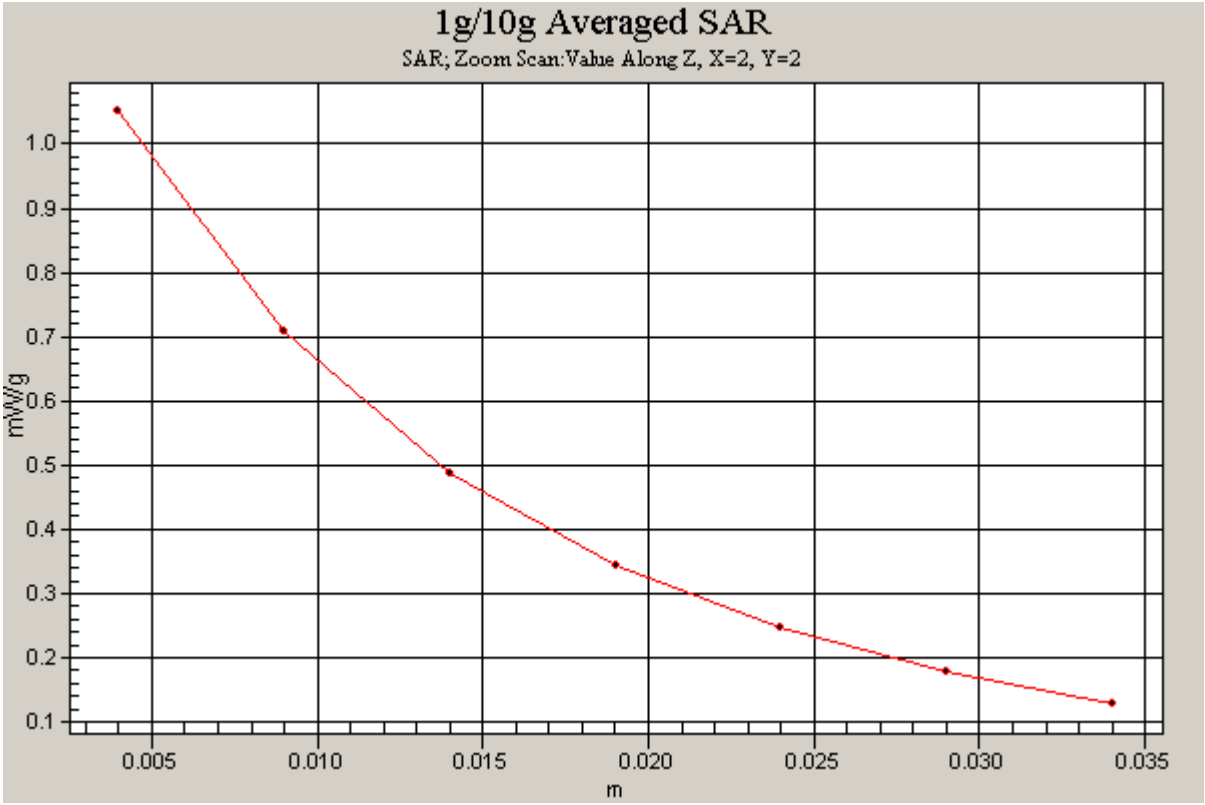
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.981 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-19-2012; Ambient Temp: 21.6°C; Tissue Temp: 19.9°C

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

835MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 0.973 mW/g; SAR(10 g) = 0.636 mW/g
Deviation = 1.99 %



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

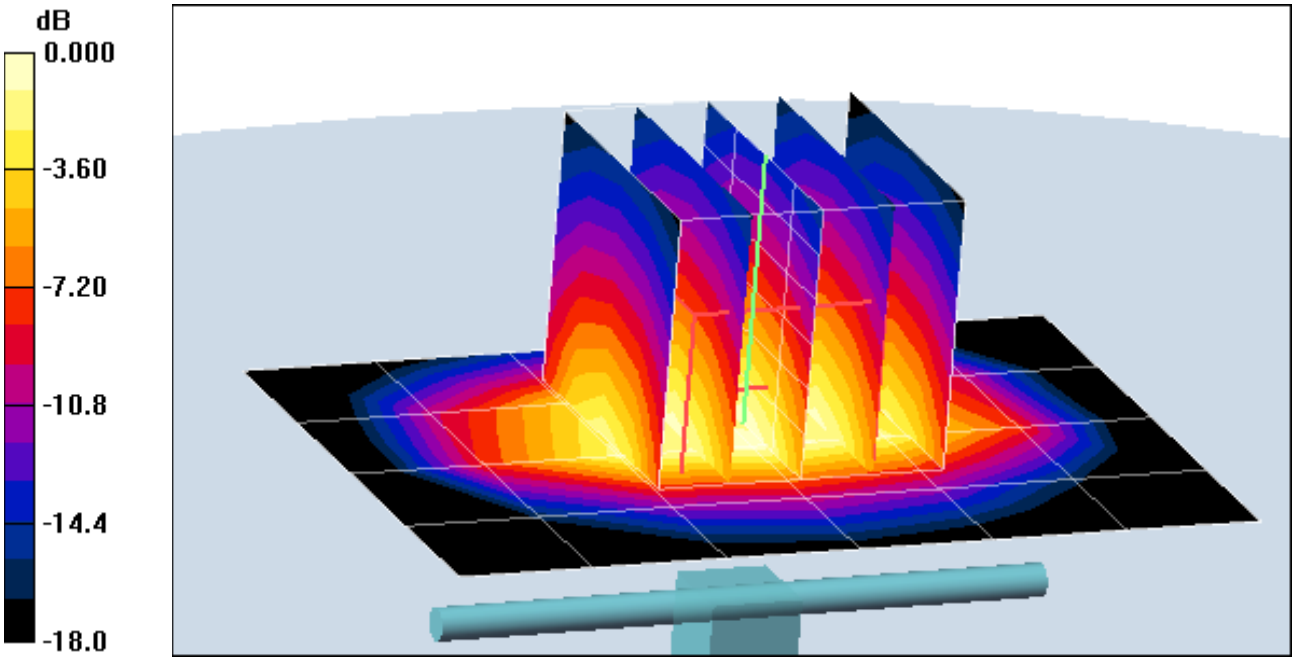
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.56 mho/m; ε_r = 51.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-15-2011; Ambient Temp: 21.4°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20 dBm (100 mW)
SAR(1 g) = 4.38 mW/g; SAR(10 g) = 2.29 mW/g
Deviation = 6.57 %



0 dB = 4.91mW/g

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

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.56 mho/m; ε_r = 51.2; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

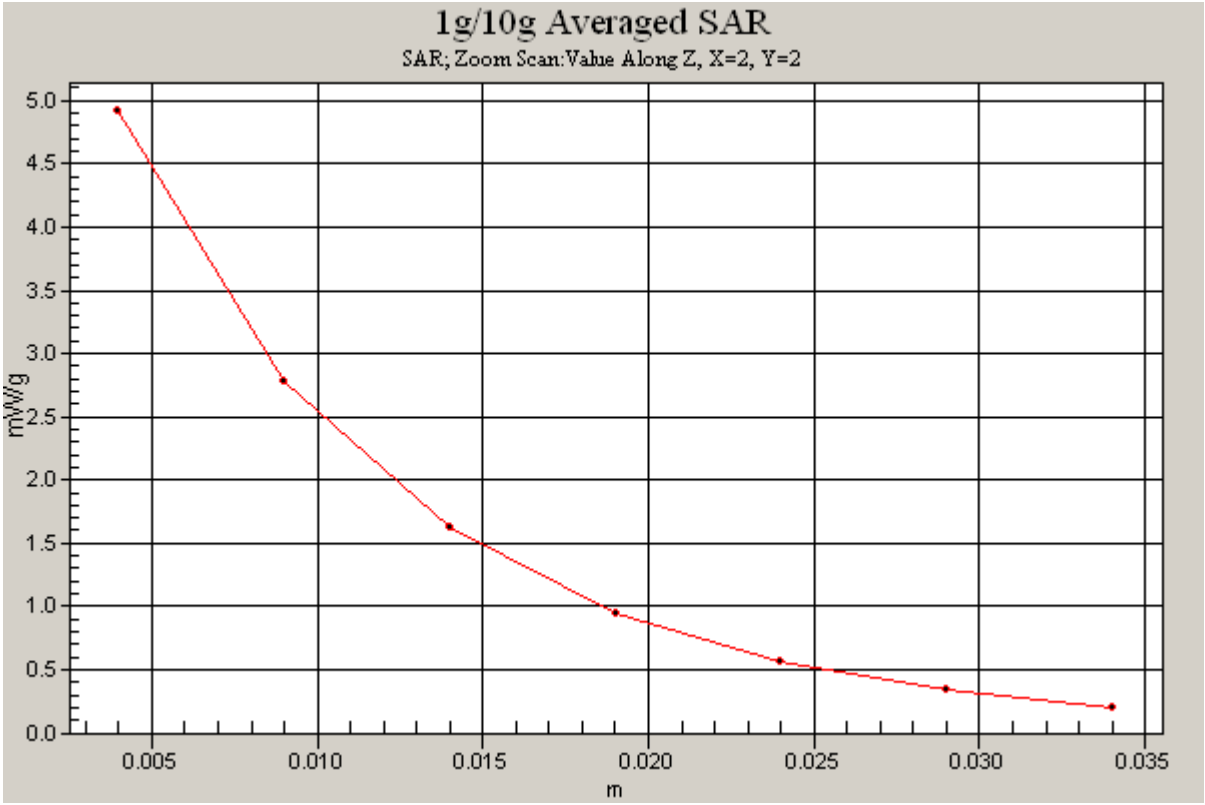
Test Date: 12-15-2011; Ambient Temp: 21.4°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

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

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20 dBm (100 mW)
SAR(1 g) = 4.38 mW/g; SAR(10 g) = 2.29 mW/g
Deviation = 6.57%



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

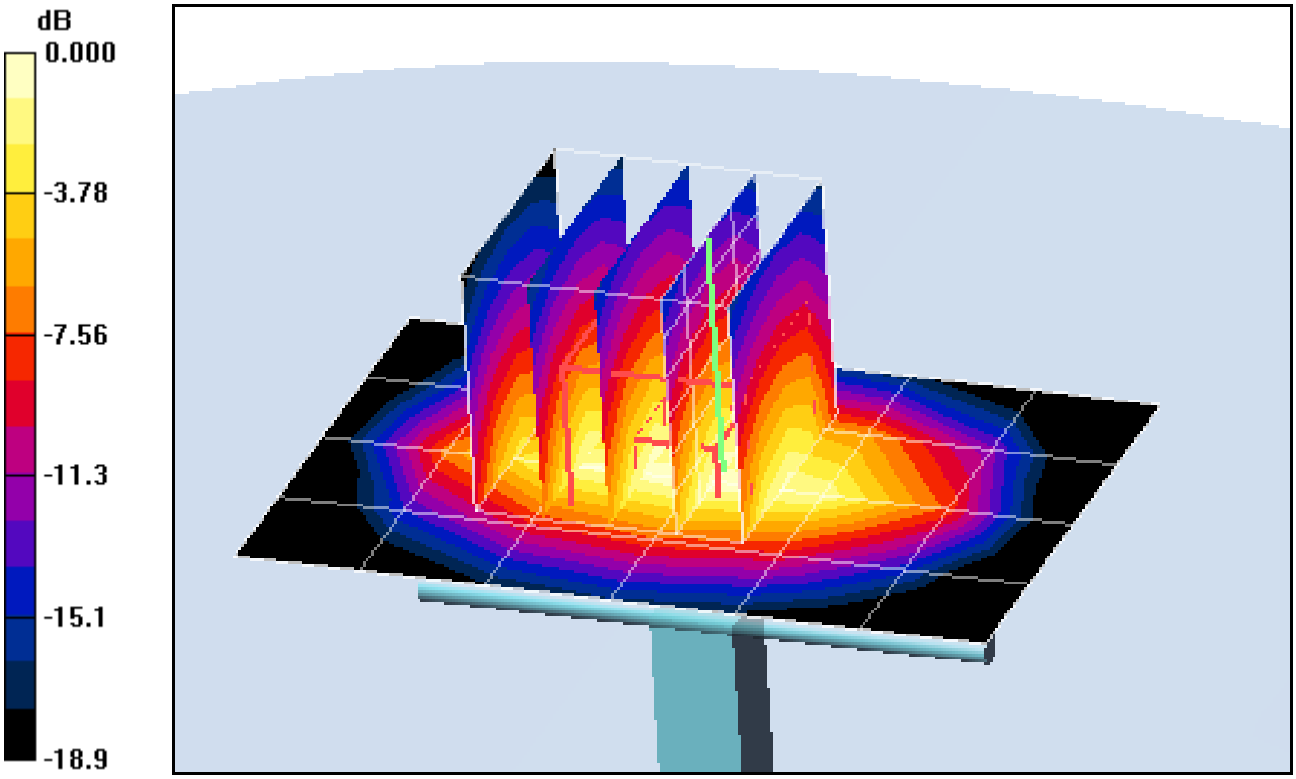
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.56 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.9°C; Tissue Temp: 20.3°C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
SAR(1 g) = 4.3 mW/g; SAR(10 g) = 2.25 mW/g
Deviation: 4.62%



0 dB = 4.77mW/g

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

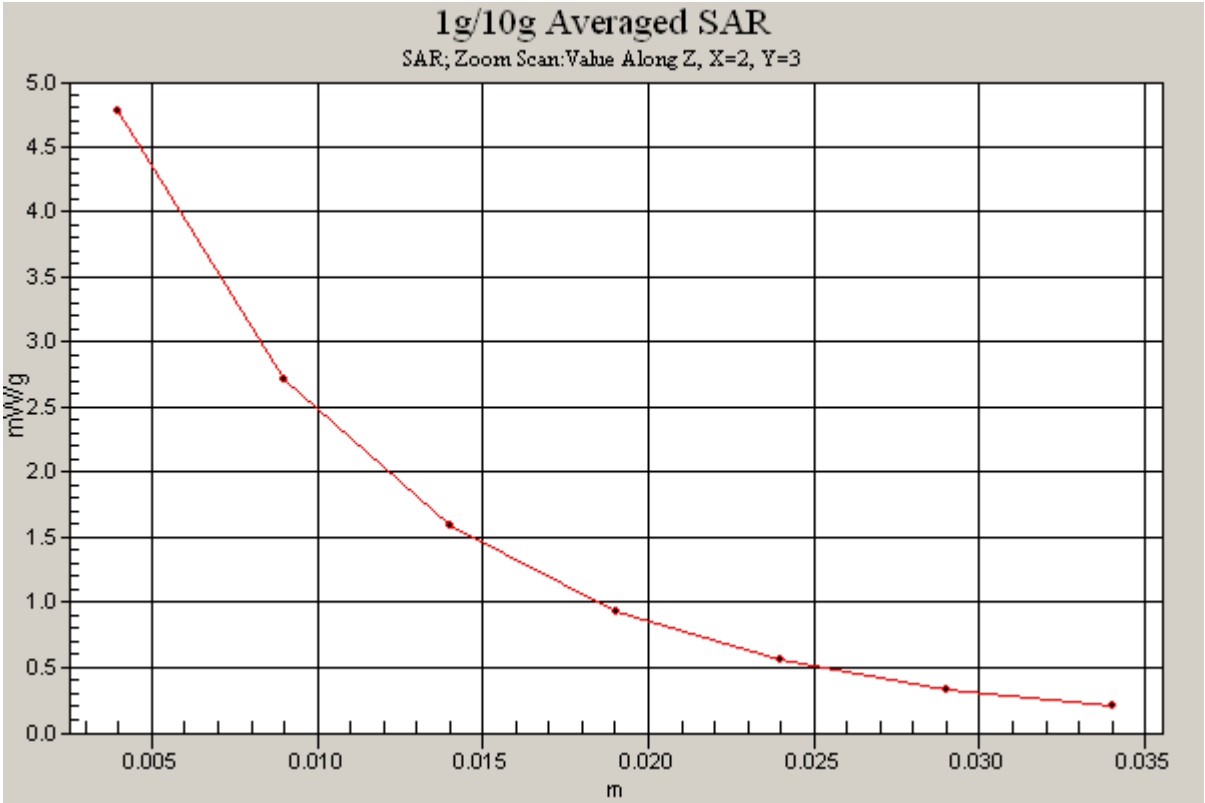
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.56 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-19-2012; Ambient Temp: 21.9°C; Tissue Temp: 20.3°C

Probe: ES3DV3 - SN3209; ConvF(4.48, 4.48, 4.48); Calibrated: 4/18/2011
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/19/2011
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
SAR(1 g) = 4.3 mW/g; SAR(10 g) = 2.25 mW/g
Deviation: 4.62%



APPENDIX C: PROBE CALIBRATION

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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: ES3-3258_Apr11

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3258
Calibration procedure(s)	QA CAL-01.v7, QA CAL-23.v4, QA CAL-25.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	April 8, 2011

OK 6/2/11

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	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41495277	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	23-Apr-10 (No. DAE4-654_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-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	D. Iliev
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 13, 2011

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 affect 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.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z* are numerical linearization parameters in dB assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media.
- *VR:* VR is the validity range of the calibration related to the average diode voltage or DAE voltage in mV.
- *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 ES3DV3

SN:3258

Manufactured: January 25, 2010
Calibrated: April 8, 2011

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3258

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.31	1.19	1.25	± 10.1 %
DCP (mV)[B]	98.3	103.8	99.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	115.1	±2.7 %
			Y	0.00	0.00	1.00	105.5	
			Z	0.00	0.00	1.00	113.5	

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 max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3258

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.41	6.41	6.41	1.00	1.00	± 12.0 %
835	41.5	0.90	6.18	6.18	6.18	1.00	1.00	± 12.0 %
1750	40.1	1.37	5.32	5.32	5.32	0.99	1.16	± 12.0 %
1900	40.0	1.40	5.15	5.15	5.15	1.00	1.15	± 12.0 %
2450	39.2	1.80	4.50	4.50	4.50	0.87	1.26	± 12.0 %
2600	39.0	1.96	4.33	4.33	4.33	0.87	1.24	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3- SN:3258

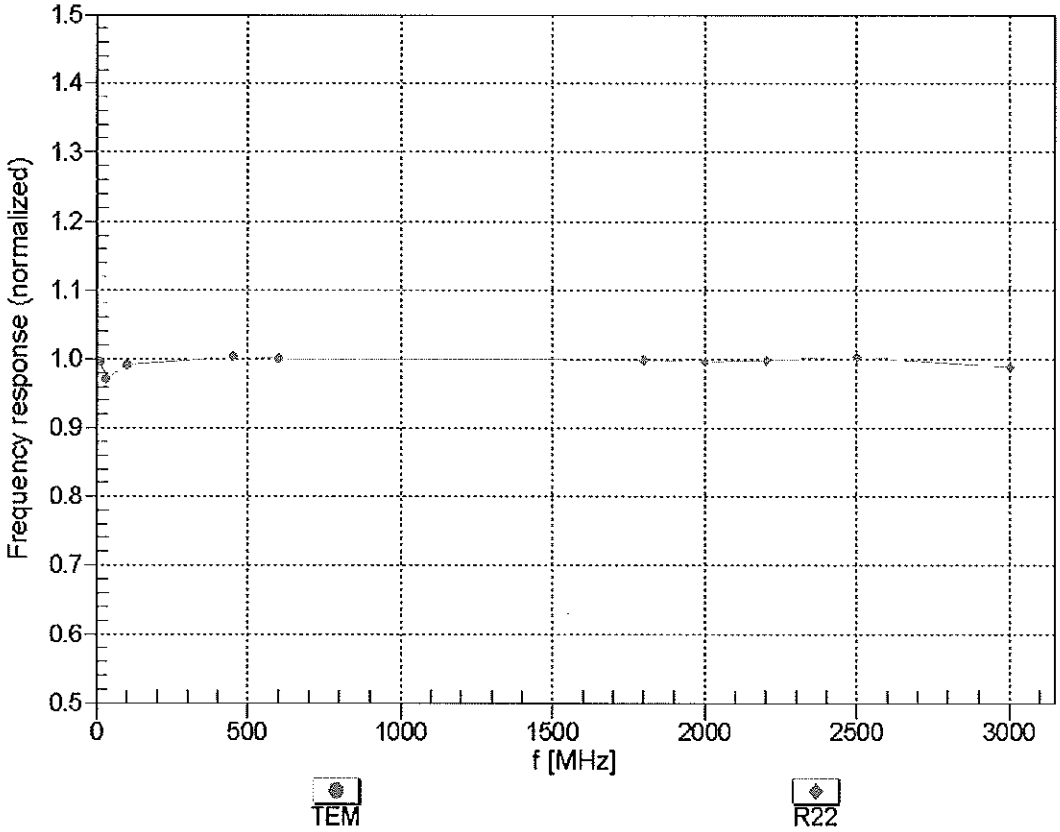
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.16	6.16	6.16	1.00	1.00	± 12.0 %
835	55.2	0.97	6.12	6.12	6.12	1.00	1.00	± 12.0 %
1750	53.4	1.49	5.00	5.00	5.00	0.91	1.28	± 12.0 %
1900	53.3	1.52	4.75	4.75	4.75	0.90	1.23	± 12.0 %
2450	52.7	1.95	4.34	4.34	4.34	1.00	1.00	± 12.0 %
2600	52.5	2.16	4.16	4.16	4.16	0.94	1.15	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

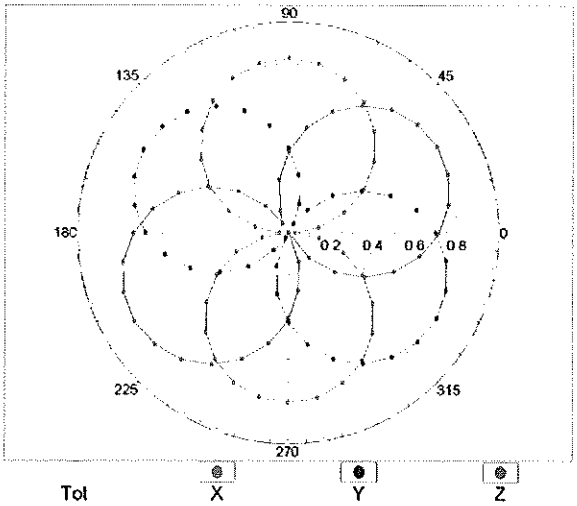
(TEM-Cell:ifi110 EXX, Waveguide: R22)



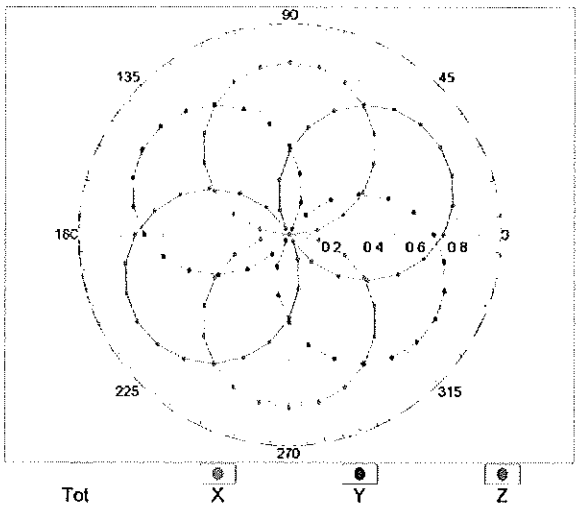
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

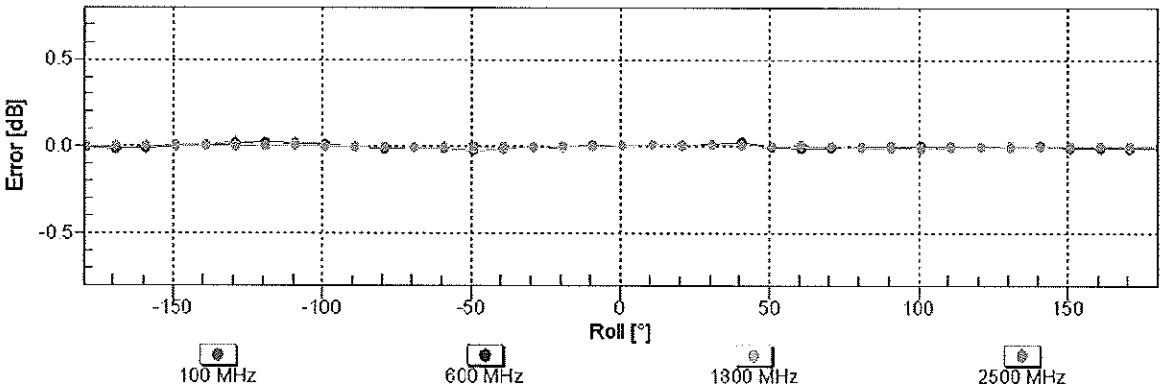
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



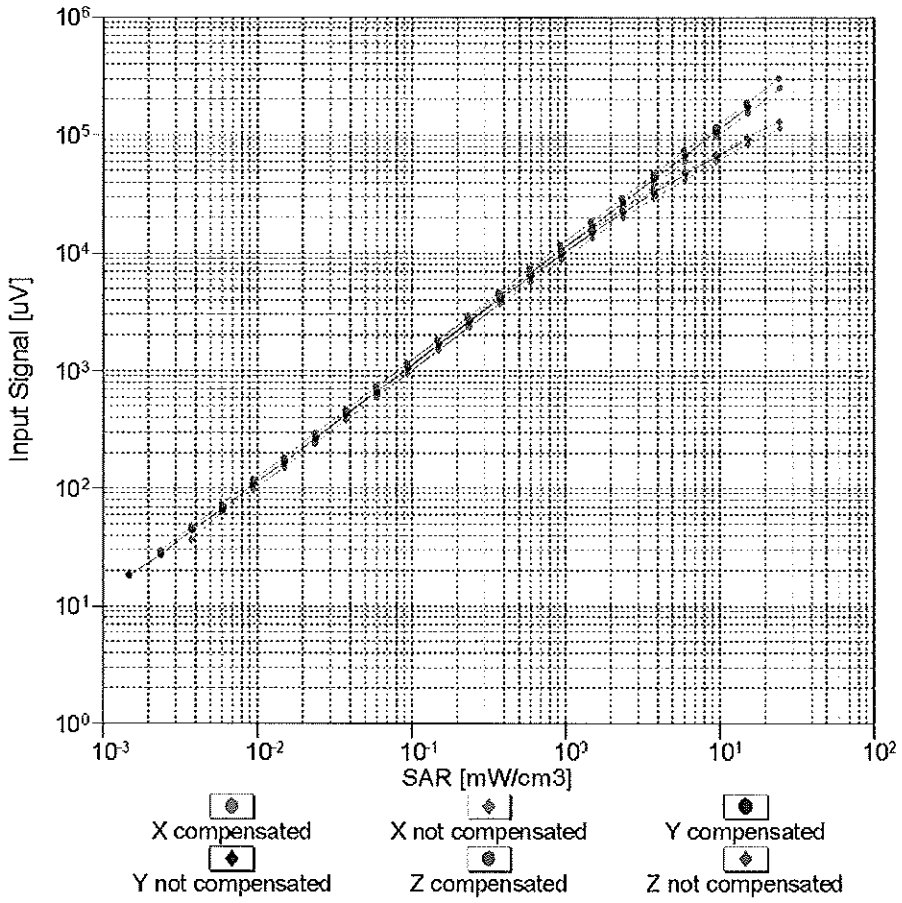
f=1800 MHz,R22

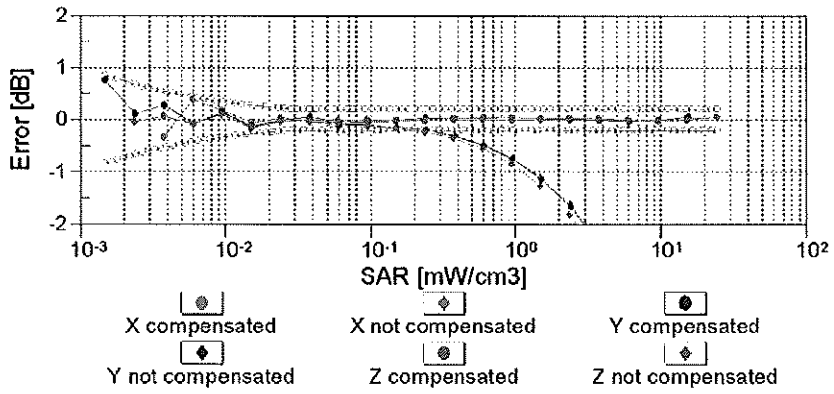




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

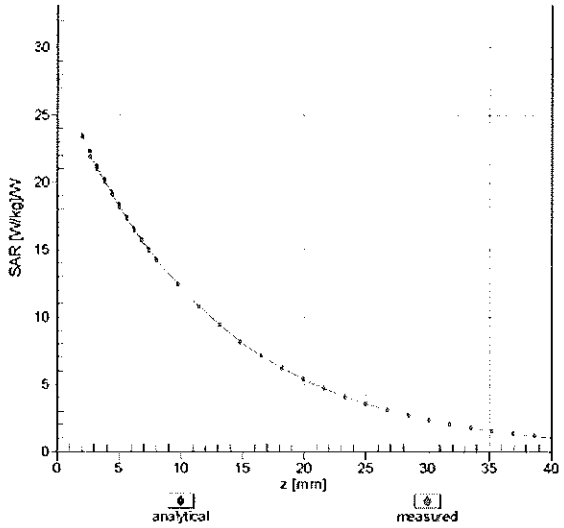




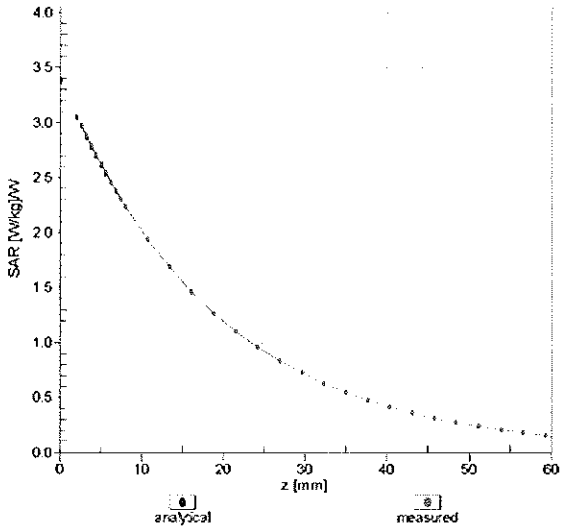
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 1900 MHz,WGLS R22 (H_convF)

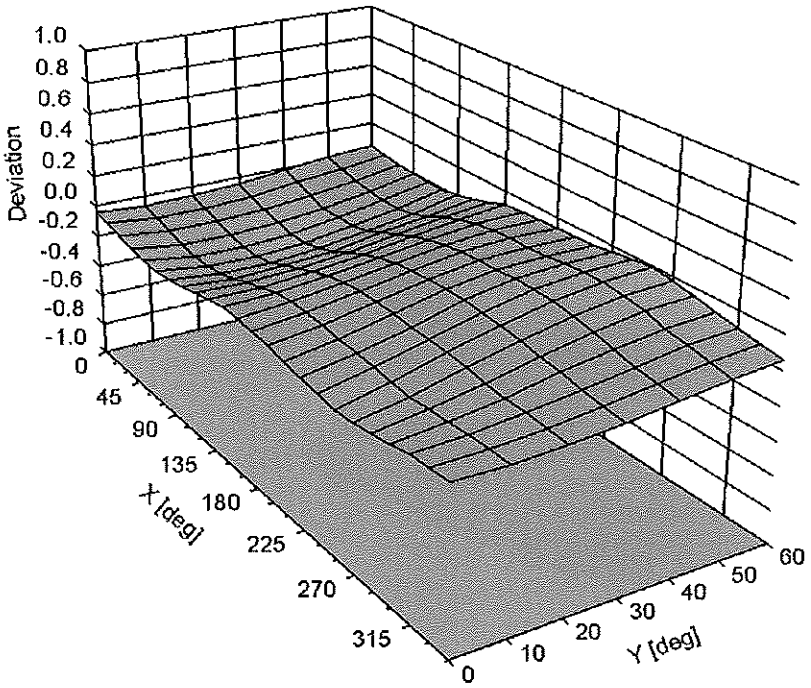


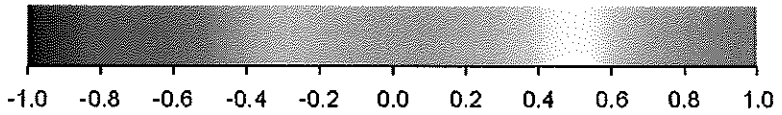
f = 835 MHz,WGLS R9 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3258

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 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: ES3-3209_Apr11

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3209
Calibration procedure(s)	QA CAL-01.v7, QA CAL-12.v6, QA CAL-23.v4, QA CAL-25.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	April 18, 2011

✓ K OK 4/26/11

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	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41495277	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	23-Apr-10 (No. DAE4-654_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-10)	In house check: Oct-11

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

Issued: April 18, 2011

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 affect 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.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z* are numerical linearization parameters in dB assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media.
- *VR:* VR is the validity range of the calibration related to the average diode voltage or DAE voltage in mV.
- *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 ES3DV3

SN:3209

Manufactured: October 14, 2008
Calibrated: April 18, 2011

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.37	1.34	1.15	± 10.1 %
DCP (mV)[B]	97.0	100.4	100.0	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	116.0	±3.0 %
			Y	0.00	0.00	1.00	118.9	
			Z	0.00	0.00	1.00	103.8	

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 max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.42	6.42	6.42	0.99	1.10	± 12.0 %
835	41.5	0.90	6.17	6.17	6.17	0.99	1.10	± 12.0 %
1750	40.1	1.37	5.33	5.33	5.33	0.99	1.12	± 12.0 %
1900	40.0	1.40	5.11	5.11	5.11	0.99	1.09	± 12.0 %
2450	39.2	1.80	4.52	4.52	4.52	0.84	1.21	± 12.0 %
2600	39.0	1.96	4.35	4.35	4.35	0.74	1.32	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3- SN:3209

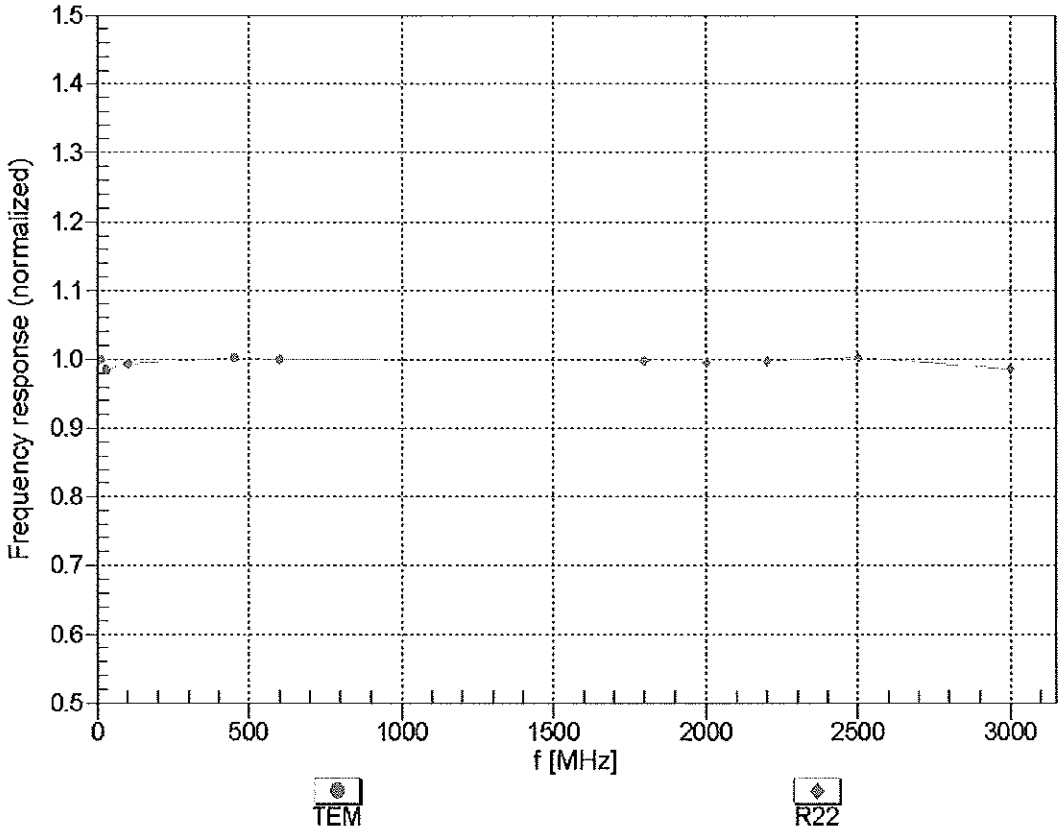
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.06	7.06	7.06	0.11	1.00	± 13.4 %
750	55.5	0.96	6.18	6.18	6.18	0.99	1.15	± 12.0 %
835	55.2	0.97	6.15	6.15	6.15	0.99	1.12	± 12.0 %
1640	53.8	1.40	5.18	5.18	5.18	0.89	1.25	± 12.0 %
1750	53.4	1.49	4.75	4.75	4.75	0.81	1.31	± 12.0 %
1900	53.3	1.52	4.48	4.48	4.48	0.95	1.19	± 12.0 %
2450	52.7	1.95	4.15	4.15	4.15	0.99	1.04	± 12.0 %
2600	52.5	2.16	4.00	4.00	4.00	0.88	1.15	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

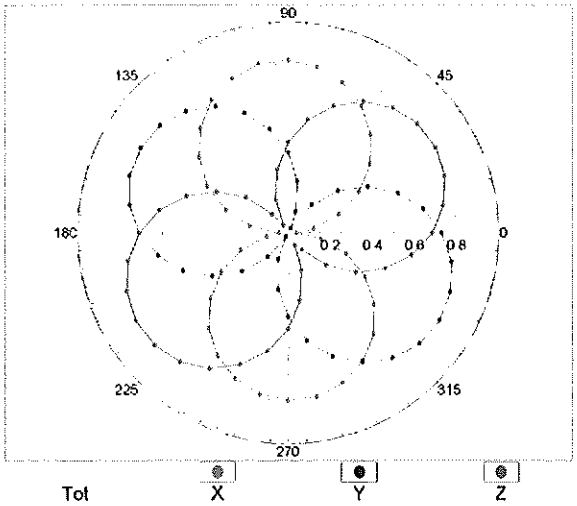
(TEM-Cell:ifi110 EXX, Waveguide: R22)



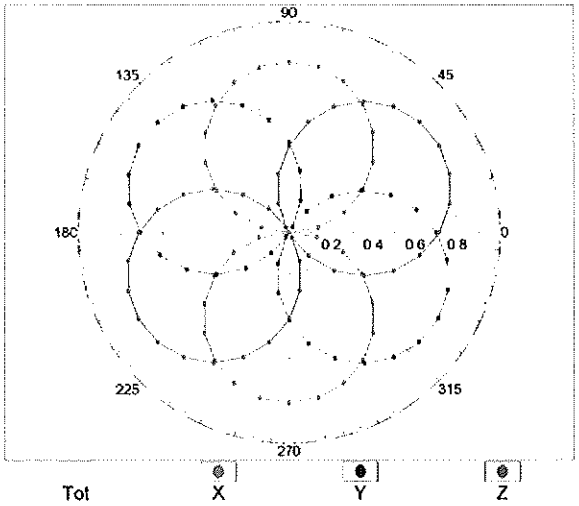
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

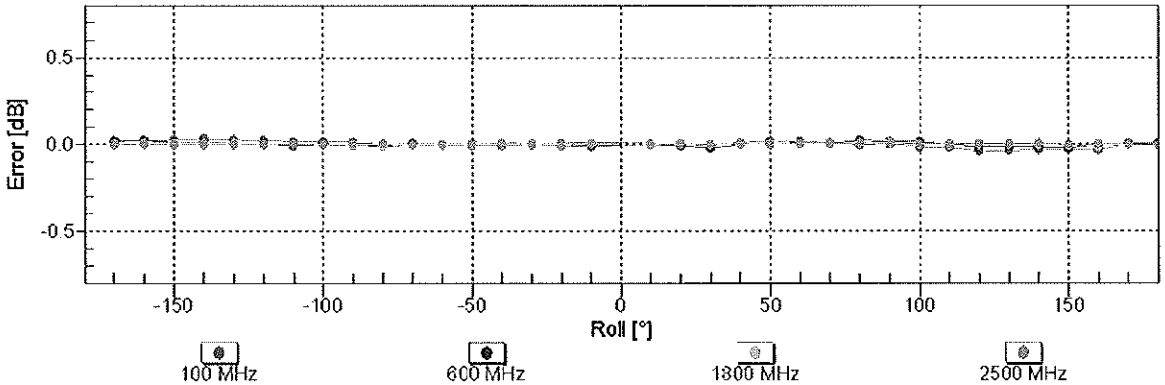
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



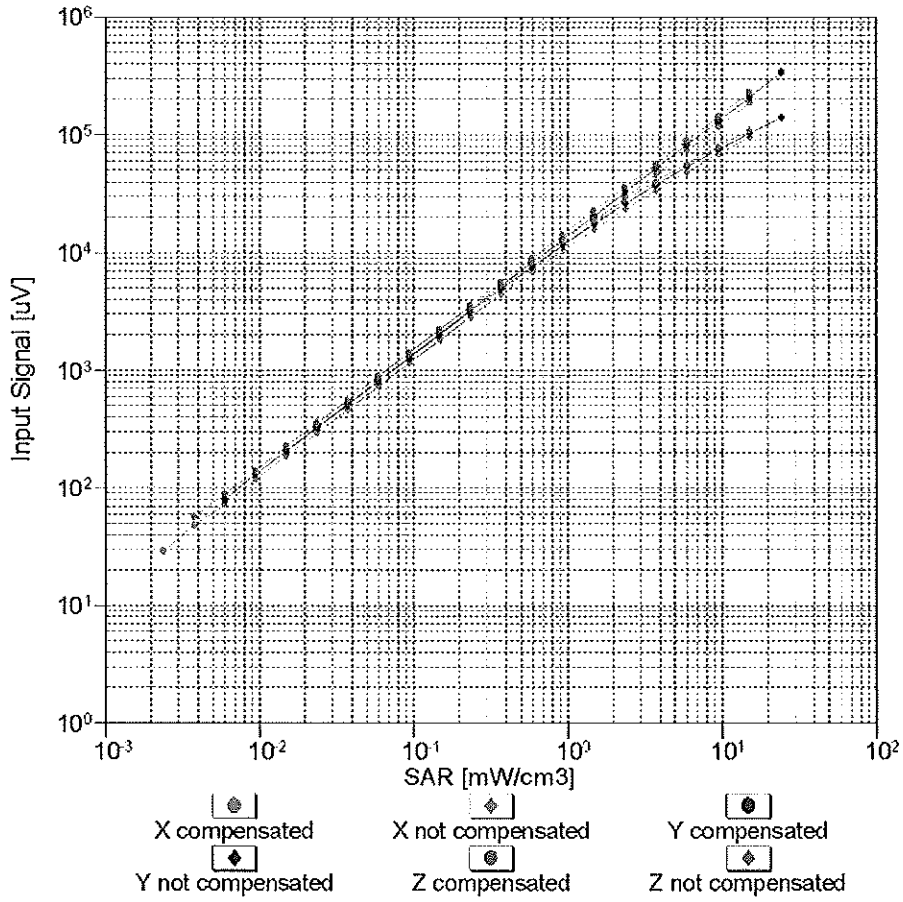
f=1800 MHz,R22

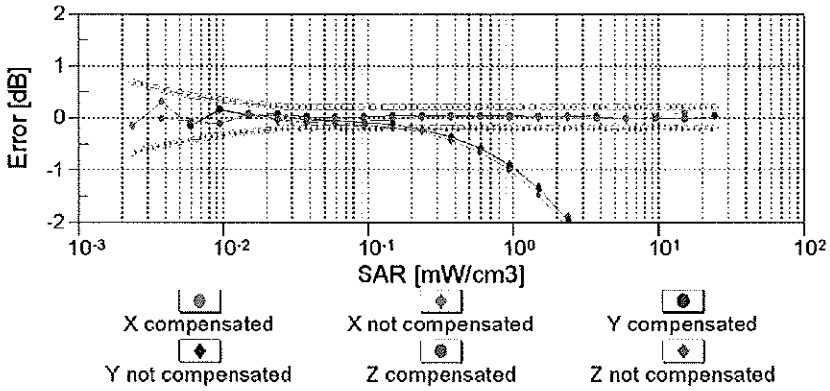




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

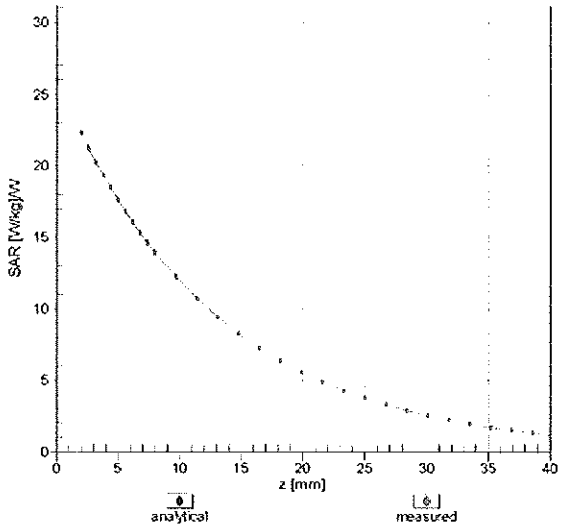




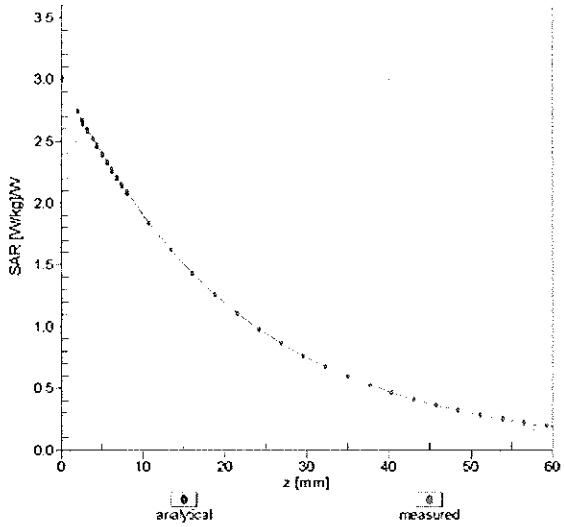
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 1750 MHz,WGLS R22 (H_convF)

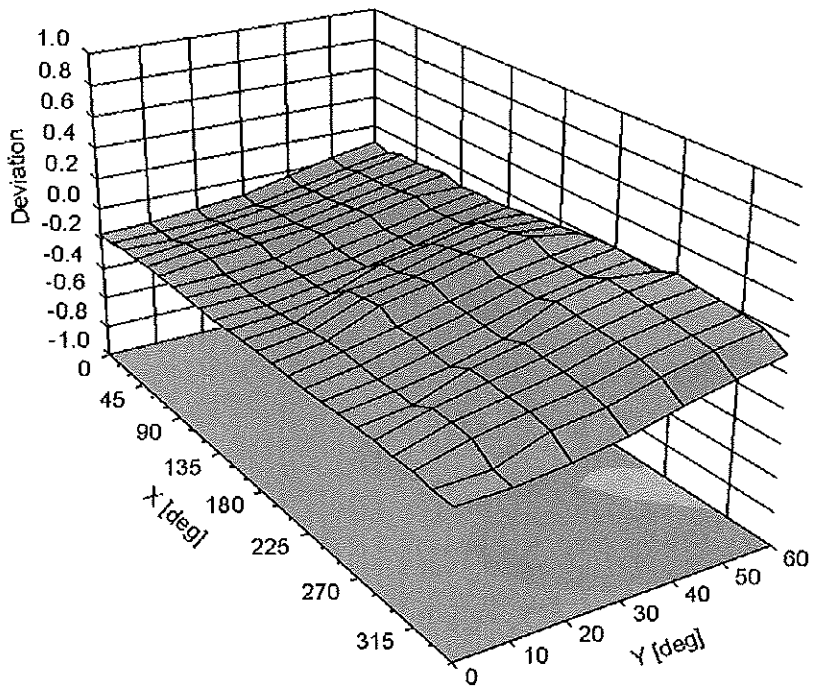


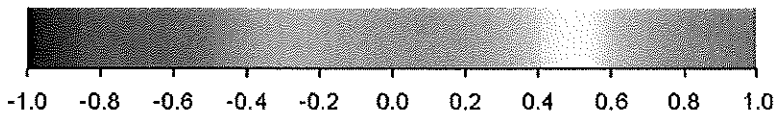
f = 750 MHz,WGLS R9 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

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 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

Schmid & Partner Engineering AG

s p e a g

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Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ES3DV3**
Serial Number:	**3209**
Place of Assessment:	**Zurich**
Date of Assessment:	**April 20, 2011**
Probe Calibration Date:	**April 18, 2011**

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

Assessed by:

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ES3DV3 SN:3209

Conversion factor (± standard deviation)

550 ± 50 MHz	*ConvF*	**6.7 ± 7%**	**ε_r = 56.3 ± 5%** **σ = 0.95 ± 5% mho/m** (body tissue)
650 ± 50 MHz	*ConvF*	**6.3 ± 7%**	**ε_r = 55.9 ± 5%** **σ = 0.95 ± 5% mho/m** (body tissue)

Important Note:

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

Please see also DASY Manual.

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

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S Swiss Calibration Service

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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: D835V2-4d047_Feb11

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d047
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits
Calibration date:	February 09, 2011

✓ 2/24/11 KOK

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	D. Iliev
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 9, 2011

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.1 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature during test	(21.8 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.37 mW / g
SAR normalized	normalized to 1W	9.48 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.53 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 mW / g
SAR normalized	normalized to 1W	6.16 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.19 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.51 mW / g
SAR normalized	normalized to 1W	10.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.85 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.64 mW / g
SAR normalized	normalized to 1W	6.56 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.47 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.1 Ω - 6.2 jΩ
Return Loss	- 24.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.9 Ω - 8.2 jΩ
Return Loss	- 20.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.387 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 16, 2006

DASY5 Validation Report for Head TSL

Date/Time: 09.02.2011 10:54:37

Test Laboratory: SPEAG, Zurich, Switzerland

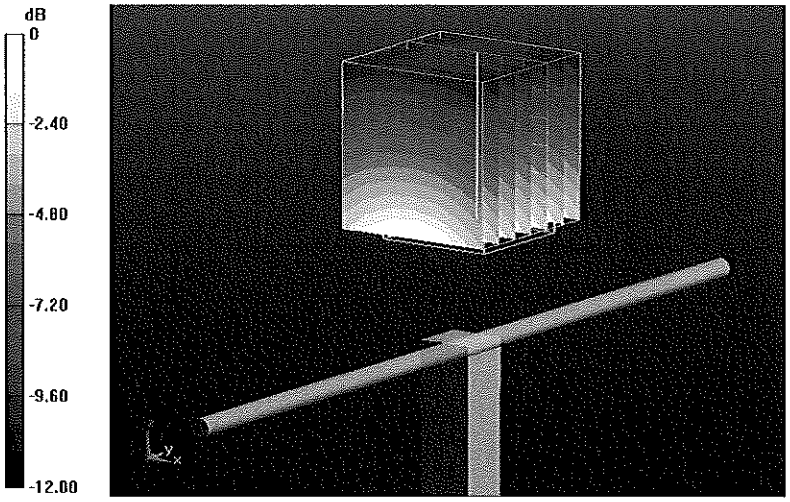
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d047

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL900
Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

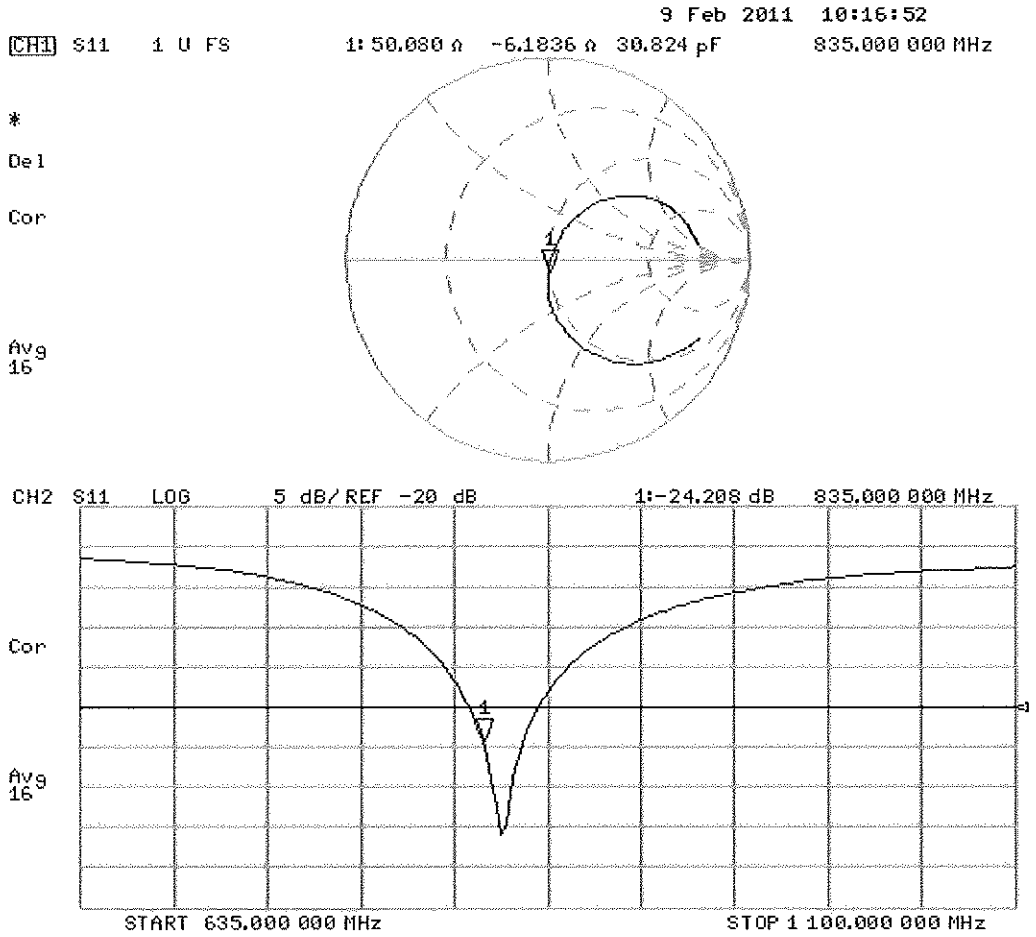
- Probe: ES3DV3 - SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.212 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.567 W/kg
SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.54 mW/g
Maximum value of SAR (measured) = 2.763 mW/g



0 dB = 2.760mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 09.02.2011 13:56:30

Test Laboratory: SPEAG, Zurich, Switzerland

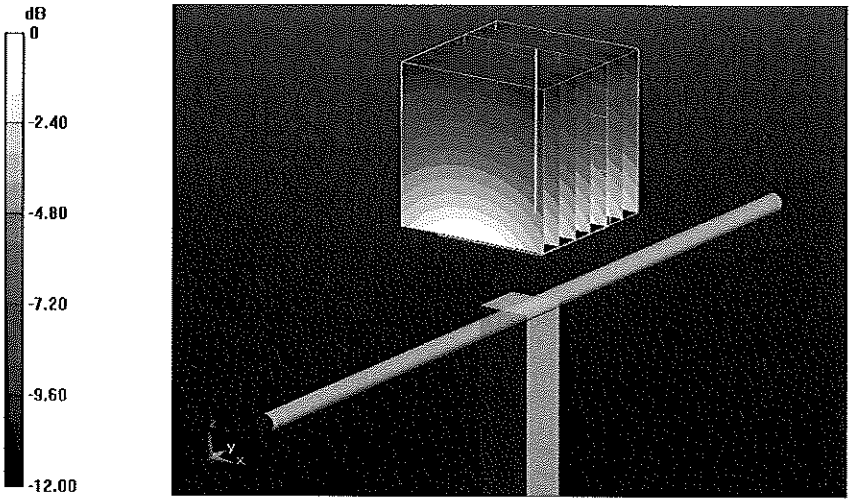
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d047

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900
Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

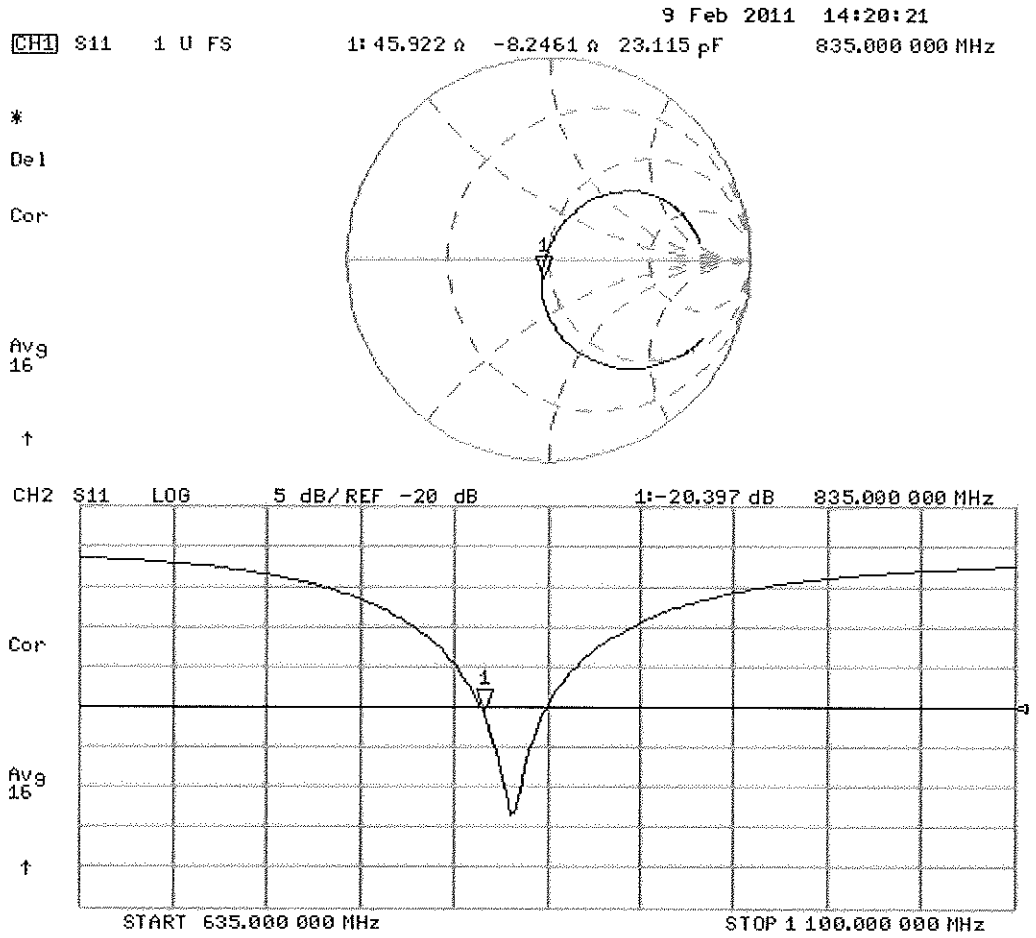
- Probe: ES3DV3 - SN3205; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.092 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.714 W/kg
SAR(1 g) = 2.51 mW/g; SAR(10 g) = 1.64 mW/g
Maximum value of SAR (measured) = 2.921 mW/g



0 dB = 2.920mW/g

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 108

Client **PC Test**

Certificate No: D1900V2-502_Feb11

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 502
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits
Calibration date:	February 17, 2011

✓ KOK 2/24/11

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	D. Iliev
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 17, 2011

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.8 ± 6 %	1.41 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**40.2 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**21.0 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.8 ± 6 %	1.55 mho/m ± 6 %
Body TSL temperature during test	(21.5 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.4 mW / g
SAR normalized	normalized to 1W	41.6 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**41.1 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.48 mW / g
SAR normalized	normalized to 1W	21.9 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.8 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.3 Ω + 6.4 jΩ
Return Loss	- 23.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.3 Ω + 6.7 jΩ
Return Loss	- 22.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.206 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 14, 1998

DASY5 Validation Report for Head TSL

Date/Time: 17.02.2011 10:13:23

Test Laboratory: SPEAG, Zurich, Switzerland

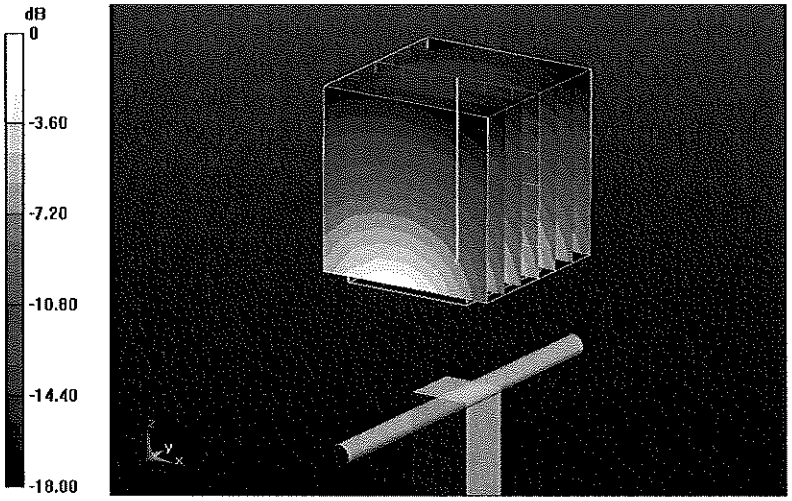
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:502

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 1900 MHz; σ = 1.41 mho/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

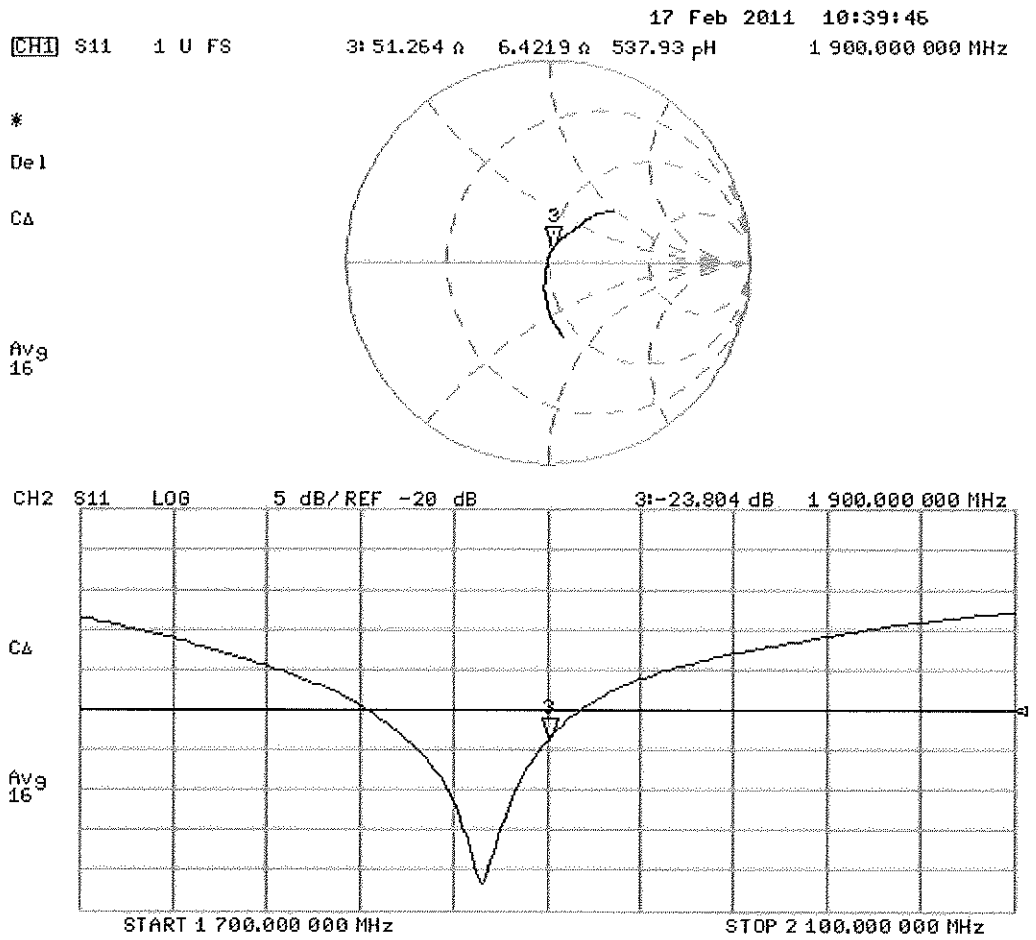
- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.159 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 18.519 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.26 mW/g
Maximum value of SAR (measured) = 12.407 mW/g



0 dB = 12.410mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 17.02.2011 10:55:26

Test Laboratory: SPEAG, Zurich, Switzerland

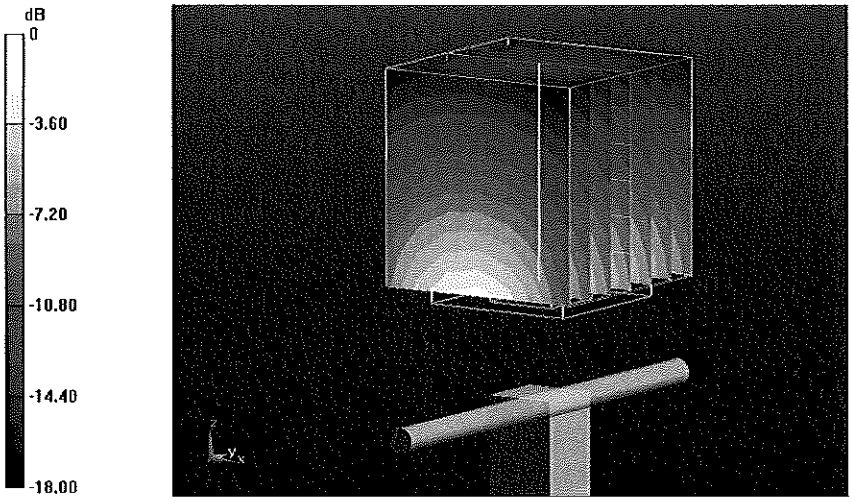
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:502

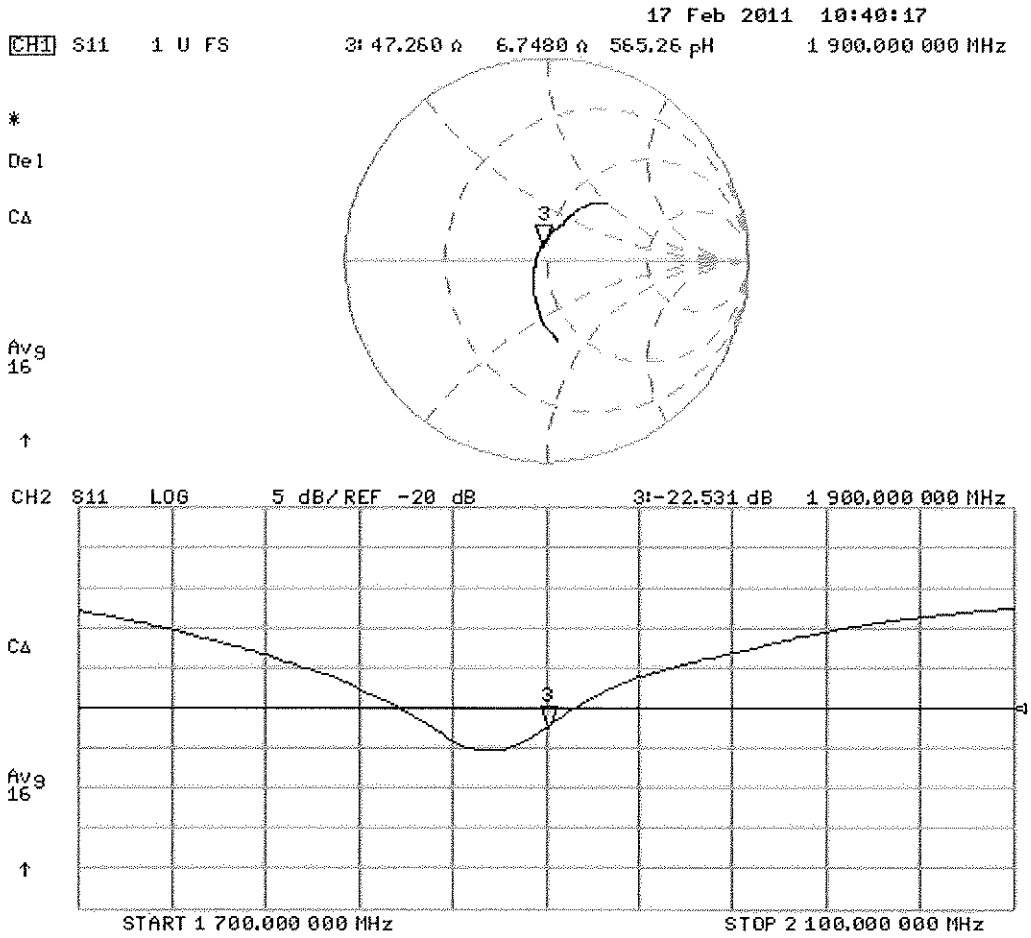
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 1900 MHz; σ = 1.55 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.636 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 17.829 W/kg
SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.48 mW/g
Maximum value of SAR (measured) = 13.070 mW/g



0 dB = 13.070mW/g

Impedance Measurement Plot for Body TSL