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SAR COMPLIANCE EVALUATION REPORT

Applicant Name:
IPWireless, Inc.
90 New Montgomery Street, Suite 315
San Francisco, CA 94105
USA

Date of Testing:
09/20/10 - 09/27/10
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1008301444-R2.PKT

FCC ID: **PKTUSBSTKAGJ**

APPLICANT: **IPWIRELESS, INC.**

EUT Type:	700 MHz TD-CDMA USB Modem
Application Type:	Certification
FCC Rule Part(s):	CFR §2.1093; FCC/OET Bulletin 65 Supplement C [June 2001]
FCC Classification:	Non-Broadcast Transmitter (TNB)
Model(s):	AGJ
Tx Frequency:	698-716 MHz (TD-CDMA Lower 700 Blocks A,B,C) 776-788 MHz (TD-CDMA Upper 700 Blocks C & A) 788-793 MHz (TD-CDMA Block D) 793-798 MHz (TD-CDMA Public Safety)
Conducted Power:	24.40 dBm TD-CDMA Lower 700 Blocks A,B,C 24.40 dBm TD-CDMA Upper 700 Blocks C & A 24.00 dBm TD-CDMA Block D / 24.00 dBm TD-CDMA Public Safety
Maximum SAR:	0.35 W/kg TD-CDMA Lower 700 Blocks A,B,C Body SAR 0.86 W/kg TD-CDMA Upper 700 Blocks C & A Body SAR 0.88 W/kg TD-CDMA Block D Body SAR 0.97 W/kg TD-CDMA Public Safety Body SAR
Test Device Serial No.:	Pre-Production [S/N: AGJAA3200131A]

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

Note: This revised Test Report (S/N: 0Y1008301444-R2.PKT) supersedes and replaces the previously issued test report on the same subject EUT for the same type of testing as indicated. Please discard or destroy the previously issued test report and dispose of it accordingly.

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

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

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

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1 INTRODUCTION

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

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

1.1 SAR Definition

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

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

Figure 1-1
SAR Mathematical Equation

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

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

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

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

2 TEST SITE LOCATION

2.1 INTRODUCTION

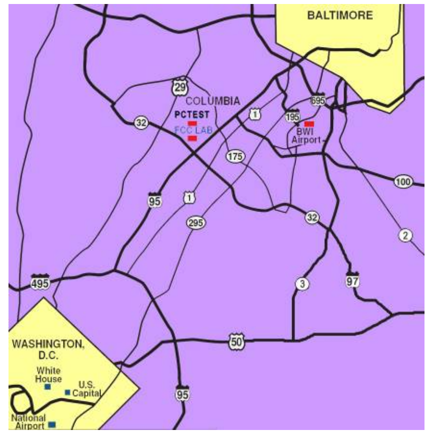


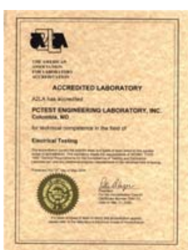
Figure 2-1
Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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.

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

2.2 Test Facility / Accreditations:

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



- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing-Aid Compatibility (HAC), 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

3 SAR MEASUREMENT SETUP

3.1 Robotic System

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

3.2 System Hardware

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

3.3 System Electronics

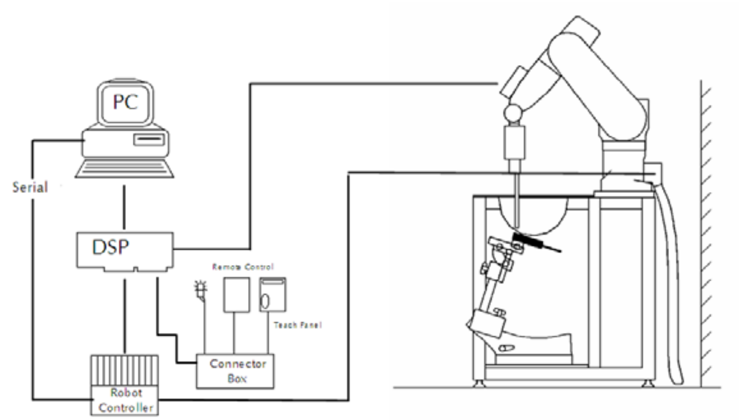


Figure 3-1
SAR Measurement System Setup

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

3.4 Automated Test System Specifications

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

Data Acquisition Electronic System (DAE)

Data Converter

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

PC Interface Card

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

Phantom

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

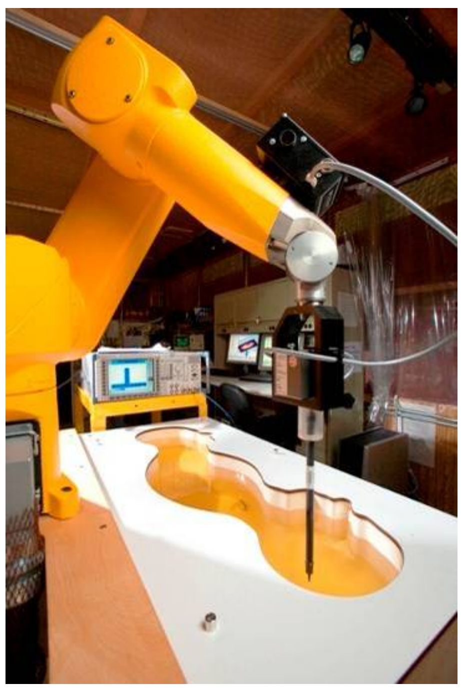


Figure 3-2
SAR Measurement System

4 DASY E-FIELD PROBE SYSTEM

4.1 Probe Measurement System

Figure 4-1
SAR System

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

4.2 Probe Specifications

Model:	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 835 up to 5800MHz
Linearity:	± 0.2 dB (30 MHz to 6 GHz) for EX3DV4 ± 0.2 dB (30 MHz to 4 GHz) for ES3DV3
Dynamic Range:	10 mW/kg – 100 W/kg
Probe Length:	330 mm
Probe Tip Length:	20 mm
Body Diameter:	12 mm
Tip Diameter:	2.5 mm (3.9mm for ES3DV3)
Tip-Center:	1 mm (2.0 mm for ES3DV3)
Application:	SAR Dosimetry Testing Compliance tests of mobile phones Dosimetry in strong gradient fields

Figure 4-2
Near-Field Probe

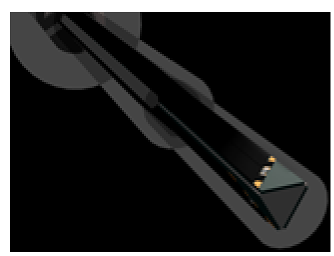


Figure 4-3
Triangular Probe Configuration

5 PROBE CALIBRATION PROCESS

5.1 Dosimetric Assessment Procedure

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

5.2 Free Space Assessment

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

5.3 Temperature Assessment

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

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

where:

Δt = exposure time (30 seconds),

C = heat capacity of tissue (brain or muscle),

ΔT = temperature increase due to RF exposure.

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

where:

σ = simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm^3 for brain tissue)

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

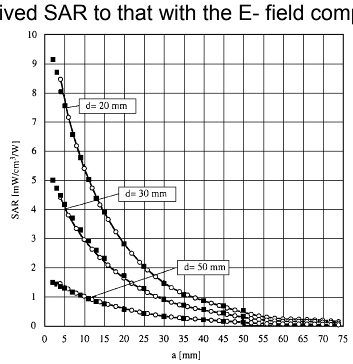


Figure 5-1 E-Field and Temperature measurements at 900MHz [9]

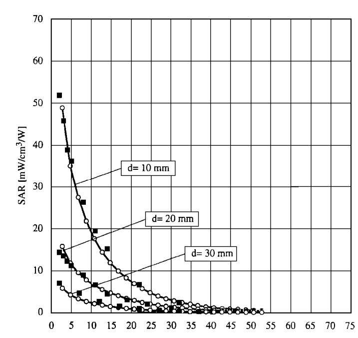


Figure 5-2 E-Field and temperature measurements at 1.9GHz [9]

6 PHANTOM AND EQUIVALENT TISSUES

6.1 SAM Phantoms

Figure 6-1
SAM Phantoms

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

6.2 Body Simulating Mixture Characterization

Table 6-1
Composition of the Brain & Muscle Tissue Equivalent Matter

2 Composition / Information on ingredients

The Item is composed of the following ingredients:

H_2O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40 – 60%
NaCl	Sodium Chloride, 0 – 6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyyl-3(2H)-isothiazolone, 0.1 – 0.7% Relevant for safety; Refer to the respective Safety Data Sheet*.

f [MHz]	HP-e'	HP-e"	sigma
300	61.02	35.43	0.59
350	60.21	32.13	0.63
400	59.50	29.71	0.66
450	58.79	28.00	0.70
500	58.16	26.60	0.74
550	57.57	25.54	0.78
600	56.99	24.68	0.82
650	56.43	23.97	0.87
700	55.88	23.46	0.91
750	55.35	22.91	0.96
800	55.02	22.56	1.00
850	54.50	22.31	1.06
900	54.02	22.08	1.11
950	53.55	21.89	1.16
1000	53.05	21.70	1.21

P/N:	SL AAM 075	TARGET PARAMETERS		
Charge:	090224-1	f [MHz]	eps	sigma
Mea Date:	05-Mrz-09	700	55.7	0.96
Temp [°C]	22	750	55.5	0.96
		800	55.3	0.97

Figure 6-1 Manufacturer Tissue Dielectric Sheet

Note: 750MHz Muscle liquid recipe is proprietary SPEAG. The composition is approximate to the actual liquids utilized.

7 DOSIMETRIC ASSESSMENT & PHANTOM SPECS

7.1 Measurement Procedure

The evaluation was performed using the following procedure:

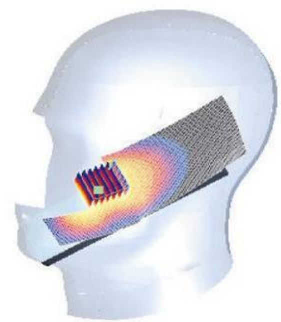


Figure 7-1
Sample SAR Area Scan

1. The SAR distribution at the exposed side of the head was measured at a distance of up to 5 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm x 15mm.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during testing the 1 gram cube. This fixed point was measured and used as a reference value.
3. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 30mm (fine resolution volume scan, zoom scan) was assessed by measuring 7 x 7 x 7 points (due to smaller form factor). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual for more details):
   a. The data was extrapolated to the surface of the outer-shell of the phantom. The combined distance extrapolated was the combined distance from the center of the dipoles 2.7mm away from the tip of the probe housing plus the 1.2 mm distance between the surface and the lowest measuring point. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
   b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete. If the value deviated by more than 5%, the evaluation was repeated.

7.2 Specific Anthropomorphic Mannequin (SAM) Specifications

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

Figure 7-2
SAM Twin Phantom Shell

8 USB DONGLES SAR CONFIGURATIONS

8.1 SAR test procedure for USB Dongles

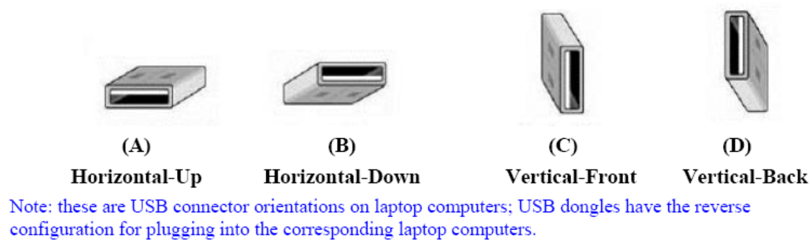


Figure 8-1
USB Dongle Test Configurations

Per KDB pub 447498: USB orientations (see Figure 8-1) with a device to phantom separation distance of 5 mm or less, were tested according to KDB pub 447498 requirements.

Current generation laptop computers should be used to ensure proper measurement distances. The same test separation distance should be used for all frequency bands and modes in each USB orientation. The typical Horizontal-Up USB connection (A), found in the majority of laptop computers, must be tested using an appropriate laptop computer. A laptop with either Vertical-Front (C) or Vertical-Back (D) USB connection should be used to test one of the vertical USB orientations. If laptop computers are not available for testing the Horizontal-Down (B) or the remaining Vertical USB orientation, a short and high quality USB cable (12 inches or less) may be used for testing these other orientations. It should be ensured that the USB cable does not affect device radiating characteristics and output power of the dongle.

This device was tested according to KDB pub 447498.

9 RF EXPOSURE LIMITS

9.1 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.

9.2 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 9-1
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.

10 MEASUREMENT UNCERTAINTIES

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

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

11 SYSTEM VERIFICATION

11.1 Tissue Verification

Table 11-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
09/20/2010 09/21/2010	750B	700	0.909	54.36	0.96	55.96	-4.99%	-2.85%
		713	0.919	54.23	0.96	55.88	-4.18%	-2.96%
		725	0.928	54.11	0.96	55.82	-3.33%	-3.06%
		738	0.938	53.98	0.96	55.74	-2.41%	-3.16%
		750	0.947	53.860	0.96	55.68	-1.56%	-3.26%
		763	0.957	53.735	0.96	55.60	-0.66%	-3.36%
		775	0.966	53.620	0.96	55.54	0.16%	-3.45%
		788	0.975	53.495	0.97	55.46	0.94%	-3.55%
		800	0.984	53.380	0.97	55.40	1.76%	-3.64%
09/27/2010	750B	700	0.912	53.69	0.96	55.96	-4.70%	-4.05%
		713	0.914	53.550	0.96	55.88	-4.66%	-4.18%
		725	0.916	53.420	0.96	55.82	-4.54%	-4.29%
		738	0.919	53.280	0.96	55.74	-4.40%	-4.42%
		750	0.921	53.15	0.96	55.68	-4.28%	-4.54%
		763	0.933	53.02	0.96	55.60	-3.11%	-4.65%
		775	0.944	52.90	0.96	55.54	-2.03%	-4.76%
		788	0.957	52.76	0.97	55.46	-0.96%	-4.87%
		800	0.968	52.64	0.97	55.40	0.10%	-4.98%

Note: KDB 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.

11.2 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 $j = \sqrt{-1}$.

11.3 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 11-2
System Verification Results

System Verification TARGET & MEASURED										
Date:	**Amb. Temp (°C)**	**Liquid Temp (°C)**	**Input Power (W)**	**Tissue Frequency (MHz)**	**Dipole SN**	**Tissue Type**	**Measured SAR_{1g} (W/kg)**	**1 W Target SAR_{1g} (W/kg)**	**1 W Normalized SAR_{1g} (W/kg)**	**Deviation (%)**
09/20/2010	23.8	22.1	0.076	750	1003	Body	0.692	8.740	9.11	4.18%
09/21/2010	23.6	21.9	0.076	750	1003	Body	0.696	8.740	9.16	4.78%
09/27/2010	23.5	22.3	0.076	750	1003	Body	0.678	8.740	8.92	2.07%

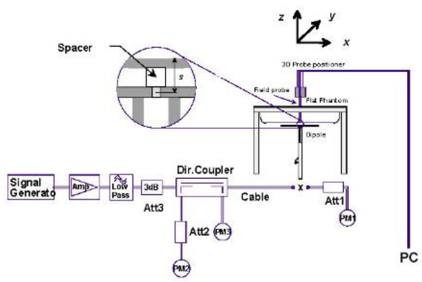


Figure 11-1
System Verification Setup Diagram

Figure 11-2
System Verification Setup Photo

12 TD-CDMA TEST CONFIGURATION

12.1 KDB Inquiry

KDB Lab Inquiry 577146 was submitted to clarify the TD-CDMA operations and to confirm the SAR Test configurations.

12.2 Band/Frequency of Operation

Table 12-1
700 MHz Blocks of Operation

FCC Part	Part 27							Part 90
	Lower 700 MHz Band			Upper 700 MHz Band				
700MHz Band Block	A	B	C	C & A			D	Public Safety
Frequency Band	698-716			776-788			788-793	793-798
Center Tx Frequency (MHz)	701	707	713	778.5	782	785.5	790.5	795.5
Rx Frequency (MHz)	731	737	743	748.5	752	755.5	760.5	765.5

SAR Tests were grouped into the four sections:

- Lower 700 MHz Band (A, B, C)
- Upper 700 MHz Band (C, A)
- Upper 700 MHz Band (D)
- Upper 700 MHz Band (Public Safety Band)

12.3 Slot Configurations for SAR Testing

There are 15 time slots that can be occupied at any time.

For the SAR Testing, the device was configured using proprietary test software Test Harness in order to transmit all 15 out of 15 timeslots, to prevent any PAR issues during the SAR assessment. This configuration is not available to the end-user but was only used for FCC SAR test purposes.

Although the SAR was evaluated at 100%, it was scaled to 80% operation by a factor of 0.8 since the device will be programmed for the end-user to a maximum duty factor of 80% (i.e. 12 transmitting time slots active) per manufacturer specification. The 100% duty factor SAR test results were scaled down to the maximum Duty Cycle allowed by the manufacturer (80%). This is seen in the tabulated SAR results in Section 15.

1-Code and 2-Code schemes are available, but only 1-Code was used for all SAR tests, since 2-Code powers are about 3 dB lower in average output power than the 1-Code scheme.

Table 12-2
Time-Slot maximum configuration during end-user operation

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
on	on	on	on	on	on	on	on	on	on	on	on	off	off	off

13 4G SAR PROBE LINEARITY ANALYSIS

13.1 Test Setup for Linearity

Probe linearity was analyzed after SAR test scans were completed. For each modulation, the EUT device was placed in the test configuration that resulted in the highest SAR value with the EUT touching the phantom in order to be able to achieve higher SAR values for the purpose of the span of power measurements for the linearity plots, per FCC guidance. The EUT RF output power was set to a minimum value and gradually increased up to the maximum output power.

13.1 Probe Linearity Data and Linearity Graphs

The resulting SAR vs. RF Output Power plot shows the probe linearity at maximum EUT output power.

Table 13-1
TD-CDMA QPSK Linearity Table for 5 MHz

SAR (W/kg)	Modulation	QPSK						
	Power (mW)	8.95	18.6	38.28	78.9	137	191	236
5 MHz	point SAR	0.1230	0.2610	0.5280	1.0180	1.78	2.500	3.090
	linear line	0.1230	0.2556	0.5261	1.0843	1.8828	2.625	3.243
	ε	0.0%	2.1%	0.4%	-6.5%	-6.1%	-5.0%	-5.0%

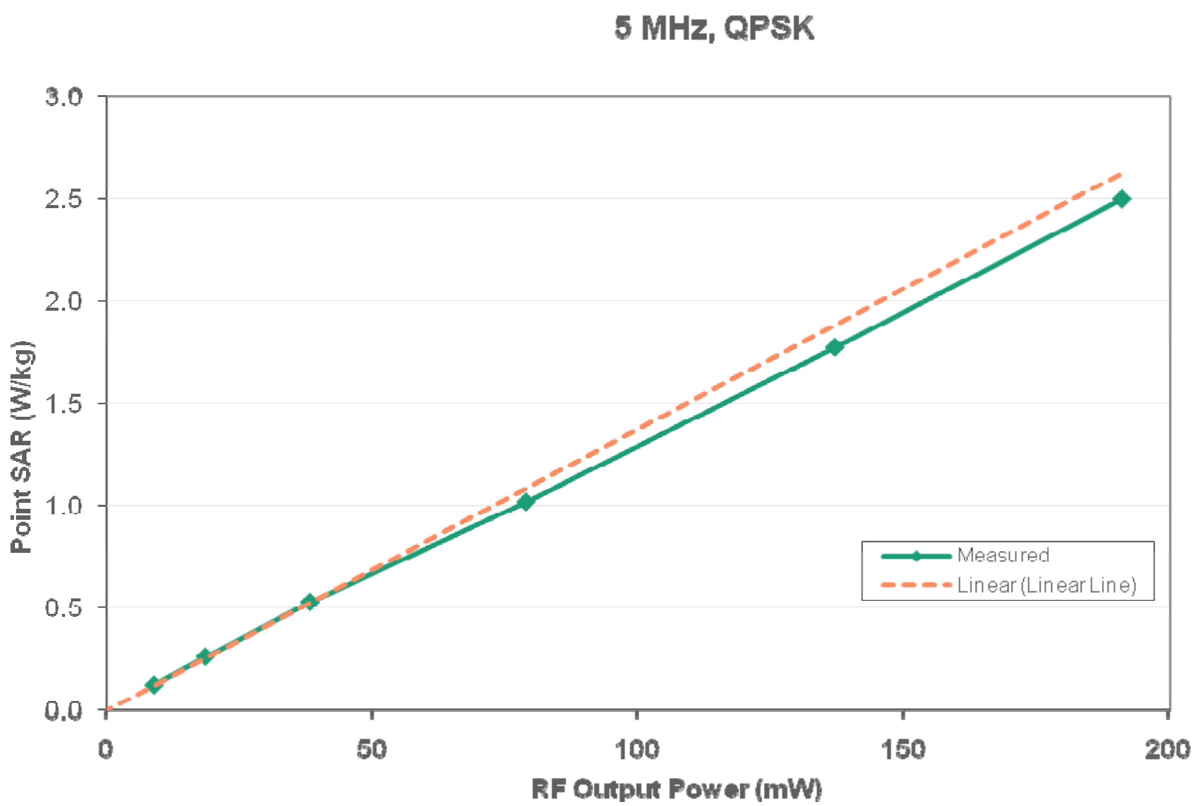


Table 13-2
TD-CDMA 16QAM Linearity Table for 5 MHz

SAR (W/kg)	Modulation	16 QAM						
	Power (mW)	8.892	18.493	37.068	79.433	135.52	183.65	221.31
5 MHz	point SAR	0.1230	0.2541	0.5160	1.0350	1.81	2.520	3.192
	linear line	0.1230	0.2558	0.5127	1.0988	1.8746	2.540	3.061
	ε	0.0%	-0.7%	0.6%	-6.2%	-3.5%	-0.8%	4.1%

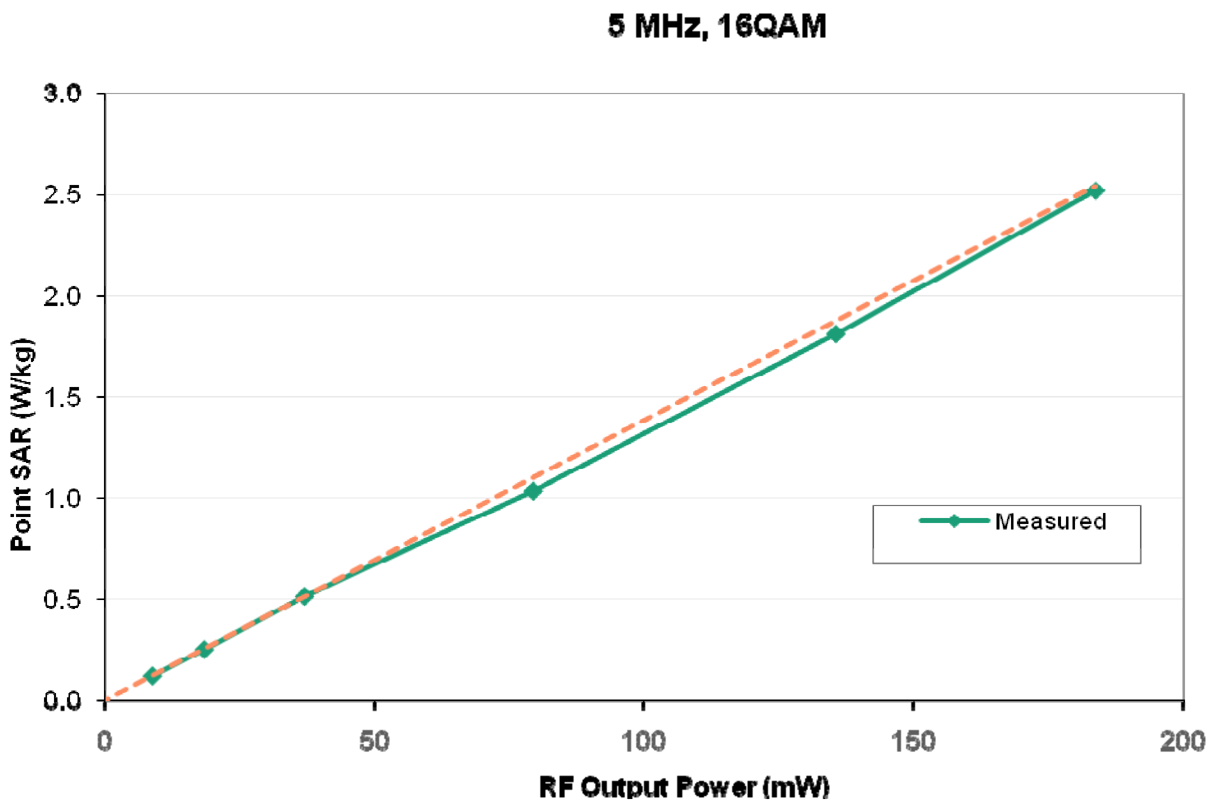
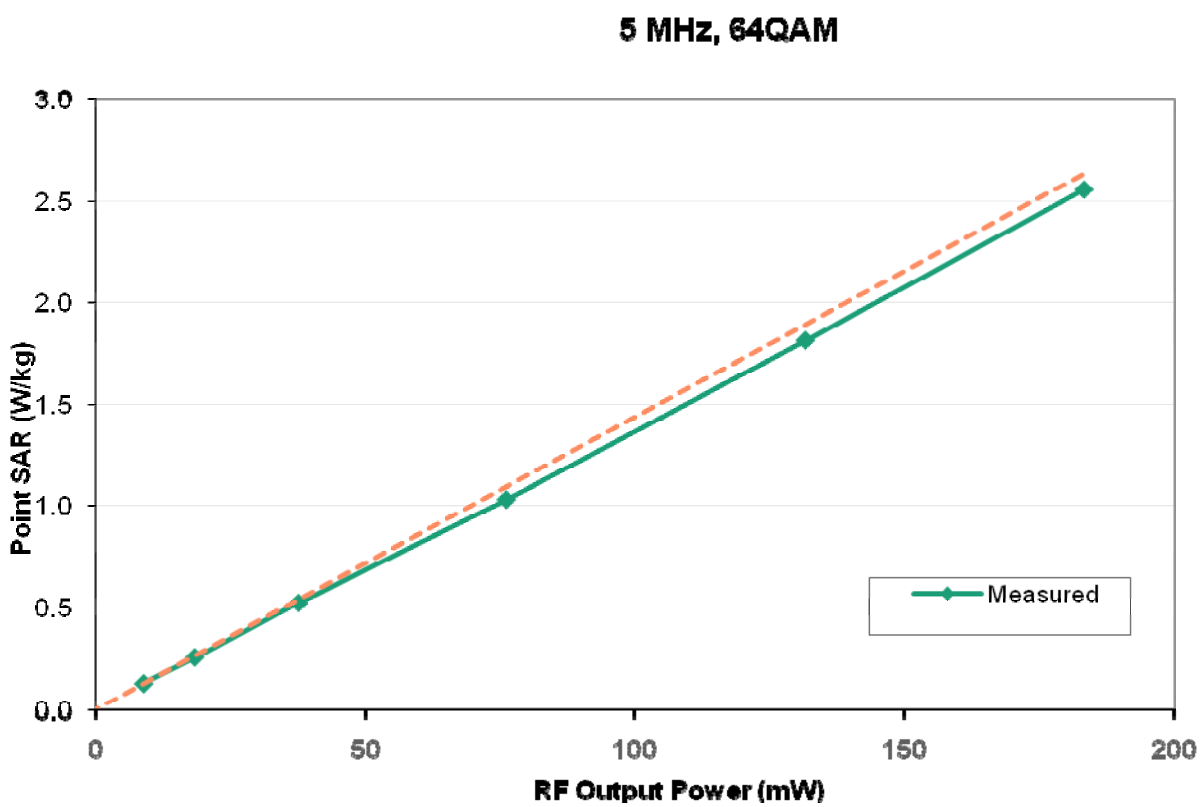


Table 13-3
TD-CDMA 64QAM Linearity Table for 5 MHz

SAR (W/kg)	Modulation	64QAM						
	Power (mW)	8.7902	18.239	37.497	76.033	131.52	183.23	222.33
5 MHz	point SAR	0.1264	0.255	0.522	1.030	1.815	2.5570	3.2140
	linear line	0.1264	0.2623	0.5392	1.0933	1.8912	2.6348	3.1970
	ε	0.0%	-2.9%	-3.2%	-6.1%	-4.2%	-3.0%	0.5%



14 RF CONDUCTED POWERS

FCC Part	Part 27							Part 90
	Lower 700 MHz Band			Upper 700 MHz Band				
700MHz Band Block	A	B	C	C & A			D	Public Safety
Frequency Band	698-716			776-788			788-793	793-798
Center Tx Frequency (MHz)	701	707	713	778.5	782	785.5	790.5	795.5
Rx Frequency (MHz)	731	737	743	748.5	752	755.5	760.5	765.5
Conducted Powers (dBm)								
QPSK	24.10	24.30	**24.40**	23.60	**24.40**	**24.40**	**24.00**	**24.00**
16QAM	24.10	24.20	**24.40**	23.40	24.10	24.20	23.90	23.90
64QAM	24.20	24.20	**24.40**	23.50	24.20	24.10	23.70	23.70

Setup Considerations from the manufacturer:

The EUT is rated at +24dBm output power (the maximum transmit power is set by the factory calibration), the setting of the transmit power to +24dBm in the test software achieves this power level. The EUT is capable of transmitting either a single code or 2 code signal depending upon data transmission requirements, the 2 code signal uses 2 codes transmitted at +21dBm per code to provide a +24dBm composite output power.

For test purposes the single code signal is the worst-case as this signal has a higher average power due to less zero crossings in the modulation.

1 Code	+24dBm	+1/-3dB
2 Code	+21dBm per code, +24dBm composite	+1/-3dB

3GPP 34.122 requires the sustained call to continuously send TPC (transmit power control) signals to the EUT to ensure the EUT is operating at maximum power during the test, the test script provided to configure the EUT enables the ALC function. The ALC function continually monitors the transmitter output power and ensures the power remains at the maximum transmitter setting of +24dBm for the complete duration of the test.

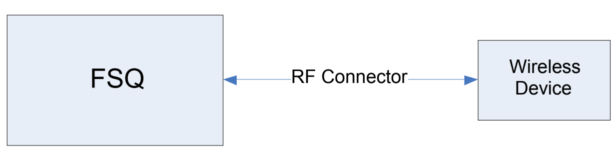


Figure 14-1
Power Measurement Setup

15 SAR DATA SUMMARY

Table 15-1
TD-CDMA Lower 700 Blocks A,B,C Body SAR Results

MEASUREMENT RESULTS									
FREQUENCY (MHz)	Mode/Band	C_Power[dBm]		Spacing	Side	Configuration	Modulation	Measured SAR (1g)	Calculated SAR (1g)
TX		Start	End					(W/kg)	(W/kg)
707	TD-CDMA Lower 700 Blocks A,B,C	24.30	24.33	0.5 cm	Horizontal-Down	USB CABLE	QPSK	**0.437**	**0.350**
707	TD-CDMA Lower 700 Blocks A,B,C	24.20	24.15	0.5 cm	Horizontal-Down	USB CABLE	16QAM	0.393	0.314
707	TD-CDMA Lower 700 Blocks A,B,C	24.20	24.16	0.5 cm	Horizontal-Down	USB CABLE	64QAM	0.371	0.297
707	TD-CDMA Lower 700 Blocks A,B,C	24.30	24.37	0.5 cm	Horizontal-Up	LAPTOP	QPSK	0.283	0.226
707	TD-CDMA Lower 700 Blocks A,B,C	24.30	24.38	0.5 cm	Vertical-Front	USB CABLE	QPSK	0.232	0.186
707	TD-CDMA Lower 700 Blocks A,B,C	24.30	24.37	0.5 cm	Vertical-Back	LAPTOP	QPSK	0.044	0.035
707	TD-CDMA Lower 700 Blocks A,B,C	24.30	24.24	0.5 cm	Tip	LAPTOP	QPSK	0.028	0.022
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population				**Brain 1.6 W/kg (mW/g)** averaged over 1 gram					

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm.
5. Per KDB pub 447498 for USB dongles, the device was tested using a fixed spacing of 5 mm for all sides, including the tip
6. Per KDB pub 447498 1) e) i) when SAR is less than 0.8 W/kg, only mid-channel is required for testing when the transmission band corresponding to all channels is ≤ 100 MHz.
7. Calculated SAR corresponds to the scaled down SAR to the maximum duty cycle of 0.8.
8. TD-CDMA mode was set to 1-Code per recommendation of the manufacturer. This mode generates the highest average power, and thus the highest SAR.

Table 15-2
TD-CDMA Upper 700 Blocks C & A Body SAR Results

MEASUREMENT RESULTS									
FREQUENCY (MHz)	Mode/Band	C_Power[dBm]		Spacing	Side	Configuration	Modulation	Measured SAR (1g)	Calculated SAR (1g)
TX		Start	End					(W/kg)	(W/kg)
782.0	TD-CDMA Upper 700 Blocks C & A	24.40	24.36	0.5 cm	Horizontal-Down	USB CABLE	QPSK	0.736	0.589
782.0	TD-CDMA Upper 700 Blocks C & A	24.10	24.09	0.5 cm	Horizontal-Down	USB CABLE	16QAM	0.690	0.552
782.0	TD-CDMA Upper 700 Blocks C & A	24.20	24.16	0.5 cm	Horizontal-Down	USB CABLE	64QAM	0.676	0.541
782.0	TD-CDMA Upper 700 Blocks C & A	24.40	24.40	0.5 cm	Horizontal-Up	LAPTOP	QPSK	0.669	0.535
778.5	TD-CDMA Upper 700 Blocks C & A	23.60	23.61	0.5 cm	Vertical-Front	USB CABLE	QPSK	0.780	0.624
782.0	TD-CDMA Upper 700 Blocks C & A	24.40	24.41	0.5 cm	Vertical-Front	USB CABLE	QPSK	0.982	0.786
785.5	TD-CDMA Upper 700 Blocks C & A	24.40	24.41	0.5 cm	Vertical-Front	USB CABLE	QPSK	**1.080**	**0.864**
782.0	TD-CDMA Upper 700 Blocks C & A	23.60	23.63	0.5 cm	Vertical-Back	LAPTOP	QPSK	0.141	0.113
782.0	TD-CDMA Upper 700 Blocks C & A	24.40	24.41	0.5 cm	Tip	LAPTOP	QPSK	0.203	0.162
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**				**Brain** **1.6 W/kg (mW/g)** averaged over 1 gram					

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm.
5. Per KDB pub 447498 for USB dongles, the device was tested using a fixed spacing of 5 mm for all sides, including the tip
6. Per KDB pub 447498 1) e) i) when SAR is less than 0.8 W/kg, only mid-channel is required for testing when the transmission band corresponding to all channels is ≤ 100 MHz.
7. Calculated SAR corresponds to the scaled down SAR to the maximum duty cycle of 0.8.
8. TD-CDMA mode was set to 1-Code per recommendation of the manufacturer. This mode generates the highest average power, and thus the highest SAR.

Table 15-3
TD-CDMA Block D Body SAR Results

MEASUREMENT RESULTS									
FREQUENCY (MHz)	Mode	C_Power[dBm]		Spacing	Side	Configuration	Modulation	Measured SAR (1g)	Calculated SAR (1g)
TX		Start	End					(W/kg)	(W/kg)
790.5	TD-CDMA Block D	24.00	24.01	0.5 cm	Horizontal-Down	USB CABLE	QPSK	0.844	0.675
790.5	TD-CDMA Block D	23.90	23.88	0.5 cm	Horizontal-Down	USB CABLE	16QAM	0.797	0.638
790.5	TD-CDMA Block D	23.70	23.70	0.5 cm	Horizontal-Down	USB CABLE	64QAM	0.766	0.613
790.5	TD-CDMA Block D	24.00	24.01	0.5 cm	Horizontal-Up	LAPTOP	QPSK	0.890	0.712
790.5	TD-CDMA Block D	24.00	24.02	0.5 cm	Vertical-Front	USB CABLE	QPSK	**1.100**	**0.880**
790.5	TD-CDMA Block D	24.00	24.01	0.5 cm	Vertical-Back	LAPTOP	QPSK	0.142	0.114
790.5	TD-CDMA Block D	24.00	24.02	0.5 cm	Tip	LAPTOP	QPSK	0.283	0.226
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population				**Brain 1.6 W/kg (mW/g)** averaged over 1 gram					

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm.
5. Per KDB pub 447498 for USB dongles, the device was tested using a fixed spacing of 5 mm for all sides, including the tip
6. Per KDB pub 447498 1) e) i) when SAR is less than 0.8 W/kg, only mid-channel is required for testing when the transmission band corresponding to all channels is ≤ 100 MHz.
7. Calculated SAR corresponds to the scaled down SAR to the maximum duty cycle of 0.8.
8. TD-CDMA mode was set to 1-Code per recommendation of the manufacturer. This mode generates the highest average power, and thus the highest SAR.

Table 15-4
TD-CDMA Public Safety Body SAR Results

MEASUREMENT RESULTS									
FREQUENCY (MHz)	Mode	C_Power[dBm]		Spacing	Side	Configuration	Modulation	Measured SAR (1g)	Calculated SAR (1g)
TX		Start	End					(W/kg)	(W/kg)
795.5	TD-CDMA Public Safety	24.00	24.00	0.5 cm	Horizontal-Down	USB CABLE	QPSK	1.050	0.840
795.5	TD-CDMA Public Safety	23.90	23.87	0.5 cm	Horizontal-Down	USB CABLE	16QAM	0.966	0.773
795.5	TD-CDMA Public Safety	23.70	23.66	0.5 cm	Horizontal-Down	USB CABLE	64QAM	0.946	0.757
795.5	TD-CDMA Public Safety	24.00	23.99	0.5 cm	Horizontal-Up	LAPTOP	QPSK	1.110	0.888
795.5	TD-CDMA Public Safety	24.00	24.02	0.5 cm	Vertical-Front	USB CABLE	QPSK	**1.210**	**0.968**
795.5	TD-CDMA Public Safety	24.00	23.97	0.5 cm	Vertical-Back	LAPTOP	QPSK	0.198	0.158
795.5	TD-CDMA Public Safety	24.00	23.99	0.5 cm	Tip	LAPTOP	QPSK	0.364	0.291
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population				**Brain 1.6 W/kg (mW/g)** averaged over 1 gram					

Notes:
1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm.
5. Per KDB pub 447498 for USB dongles, the device was tested using a fixed spacing of 5 mm for all sides, including the tip
6. Per KDB pub 447498 1) e) i) when SAR is less than 0.8 W/kg, only mid-channel is required for testing when the transmission band corresponding to all channels is ≤ 100 MHz.
7. Calculated SAR corresponds to the scaled down SAR to the maximum duty cycle of 0.8.
8. TD-CDMA mode was set to 1-Code per recommendation of the manufacturer. This mode generates the highest average power, and thus the highest SAR.

16 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	85070B	Dielectric Probe Kit	8/22/2010	Annual	8/22/2011	US33020316
Agilent	8648D	(9kHz-4GHz) Signal Generator	9/19/2009	Biennial	9/19/2011	3613A00315
Agilent	8753E	(30kHz-6GHz) Network Analyzer	3/31/2010	Annual	3/31/2011	JP38020182
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/30/2010	Annual	3/30/2011	MY45470194
Index SAR	IXTL-010	Dielectric Measurement Kit	N/A		N/A	N/A
Index SAR	IXTL-030	30MM TEM line for 6 GHz	N/A		N/A	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	11/11/2009	Annual	11/11/2010	836371/0079
Rohde & Schwarz	CMU200	Base Station Simulator	6/21/2010	Annual	6/21/2011	833855/0010
Rohde & Schwarz	CMU200	Base Station Simulator	11/4/2009	Annual	11/4/2010	109892
Rohde & Schwarz	NRV-Z32	Peak Power Sensor (100uW-2W)	12/5/2008	Biennial	12/5/2010	100155
Rohde & Schwarz	NRV-Z33	Peak Power Sensor (1mW-20W)	12/5/2008	Biennial	12/5/2010	100004
SPEAG	D1450V2	1450 MHz SAR Dipole	5/20/2009	Biennial	5/20/2011	1025
SPEAG	D1765V2	1765 MHz SAR Dipole	5/19/2009	Biennial	5/19/2011	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	1/20/2009	Biennial	1/20/2011	502
SPEAG	D1900V2	1900 MHz SAR Dipole	8/18/2009	Biennial	8/18/2011	5d080
SPEAG	D2450V2	2450 MHz SAR Dipole	8/27/2009	Biennial	8/27/2011	719
SPEAG	D2450V2	2450 MHz SAR Dipole	1/8/2009	Biennial	1/8/2011	797
SPEAG	D2600V2	2600 MHz SAR Dipole	8/12/2009	Biennial	8/12/2011	1004
SPEAG	D5GHzV2	5 GHz SAR Dipole	8/19/2009	Biennial	8/19/2011	1007
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/15/2009	Biennial	1/15/2011	1057
SPEAG	D835V2	835 MHz SAR Dipole	1/19/2009	Biennial	1/19/2011	4d047
SPEAG	D835V2	835 MHz SAR Dipole	8/24/2009	Biennial	8/24/2011	4d026
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/22/2010	Annual	3/22/2011	704
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/21/2010	Annual	4/21/2011	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/22/2010	Annual	1/22/2011	649
SPEAG	ES3DV2	SAR Probe	9/21/2010	Annual	9/21/2011	3022
SPEAG	EX3DV4	SAR Probe	8/19/2010	Annual	8/19/2011	3561
SPEAG	EX3DV4	SAR Probe	1/26/2010	Annual	1/26/2011	3550
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/8/2010	Annual	7/8/2011	859
SPEAG	D750V3	750 MHz Dipole	8/19/2010	Biennial	8/19/2012	1003
SPEAG	ES3DV3	SAR Probe	3/16/2010	Annual	3/16/2011	3213
SPEAG	ES3DV3	SAR Probe	4/20/2010	Annual	4/20/2011	3209
Rohde & Schwarz	SMIQ03B	Signal Generator	4/1/2010	Annual	4/1/2011	DE27259
SPEAG	D1640V2	1640 MHz Dipole	8/17/2010	Biennial	8/17/2012	321
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	8/30/2010	Annual	8/30/2011	100976
Anritsu	MA2481A	Power Sensor	12/2/2009	Annual	12/2/2010	5318
Anritsu	MA2481A	Power Sensor	12/3/2009	Annual	12/3/2010	5442
Anritsu	ML2438A	Power Meter	12/3/2009	Annual	12/3/2010	1190013
Anritsu	ML2438A	Power Meter	12/3/2009	Annual	12/3/2010	98150041
Agilent	8648D	Signal Generator	4/1/2010	Annual	4/1/2011	3629U00687
Anritsu	ML2438A	Power Meter	12/3/2009	Annual	12/3/2010	1070030
Anritsu	MA2481A	Power Sensor	12/2/2009	Annual	12/2/2010	5821
Anritsu	MA2481A	Power Sensor	12/3/2009	Annual	12/3/2010	8013
Anritsu	MA2481A	Power Sensor	12/3/2009	Annual	12/3/2010	2400
Aprel	ALS-PR-DIEL	Dielectric Probe Kit	N/A		N/A	260-00959
Agilent	E5515C	Wireless Communications Tester	4/14/2010	Annual	4/14/2011	US41140256
SPEAG	ES3DV3	SAR Probe	2/10/2010	Annual	2/10/2011	3173

17 CONCLUSION

17.1 Measurement Conclusion

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

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

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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

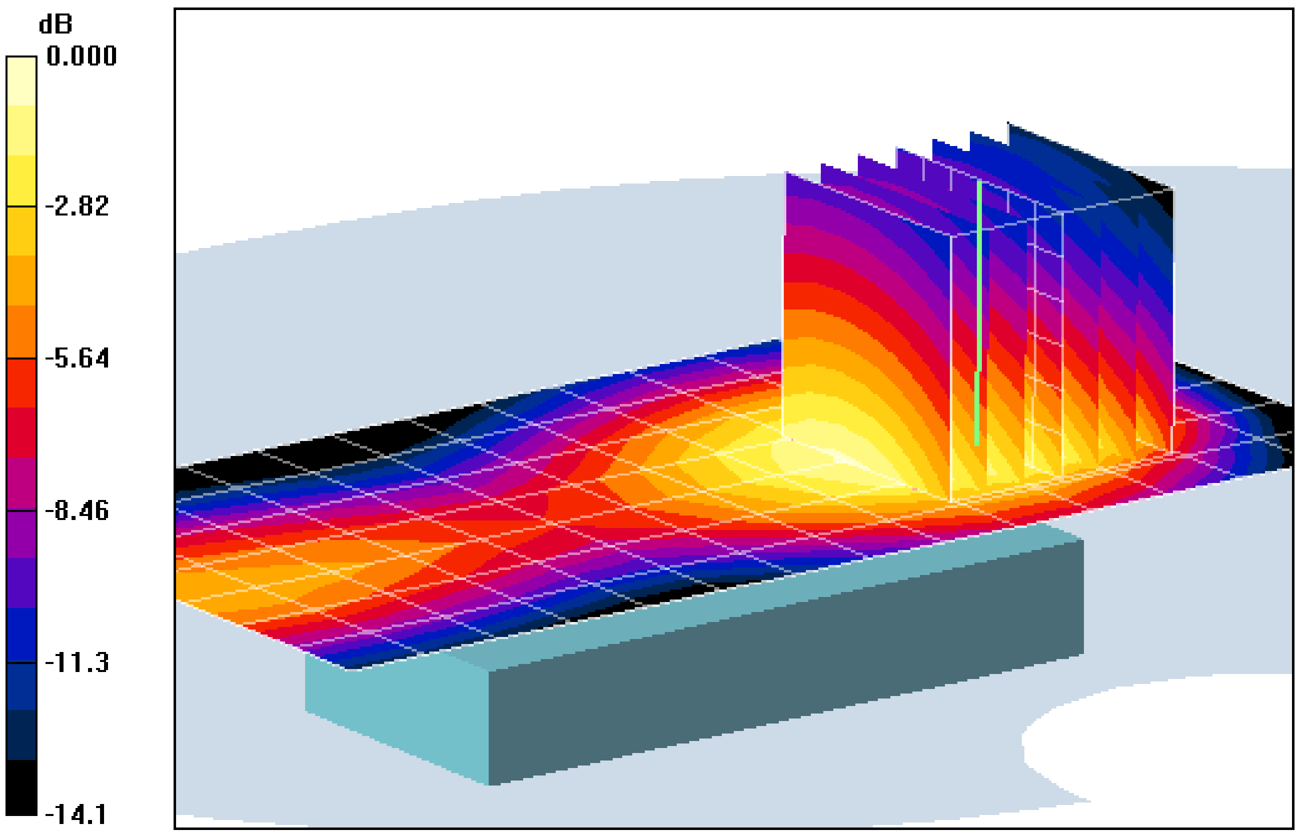
Communication System: 700MHz TD-CDMA; Frequency: 707 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 707 MHz; $\sigma = 0.914$ mho/m; $\varepsilon_r = 54.3$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-20-2010; Ambient Temp: 23.8 °C; Tissue Temp: 22.1 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 5mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHz TD-CDMA, Blocks A,B,C, Body SAR, Horizontal-Down, Mid.ch, QPSK

Area Scan (8x15x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.49 V/m
Peak SAR (extrapolated) = 0.792 W/kg
SAR(1 g) = 0.437 mW/g; SAR(10 g) = 0.275 mW/g



0 dB = 0.430mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

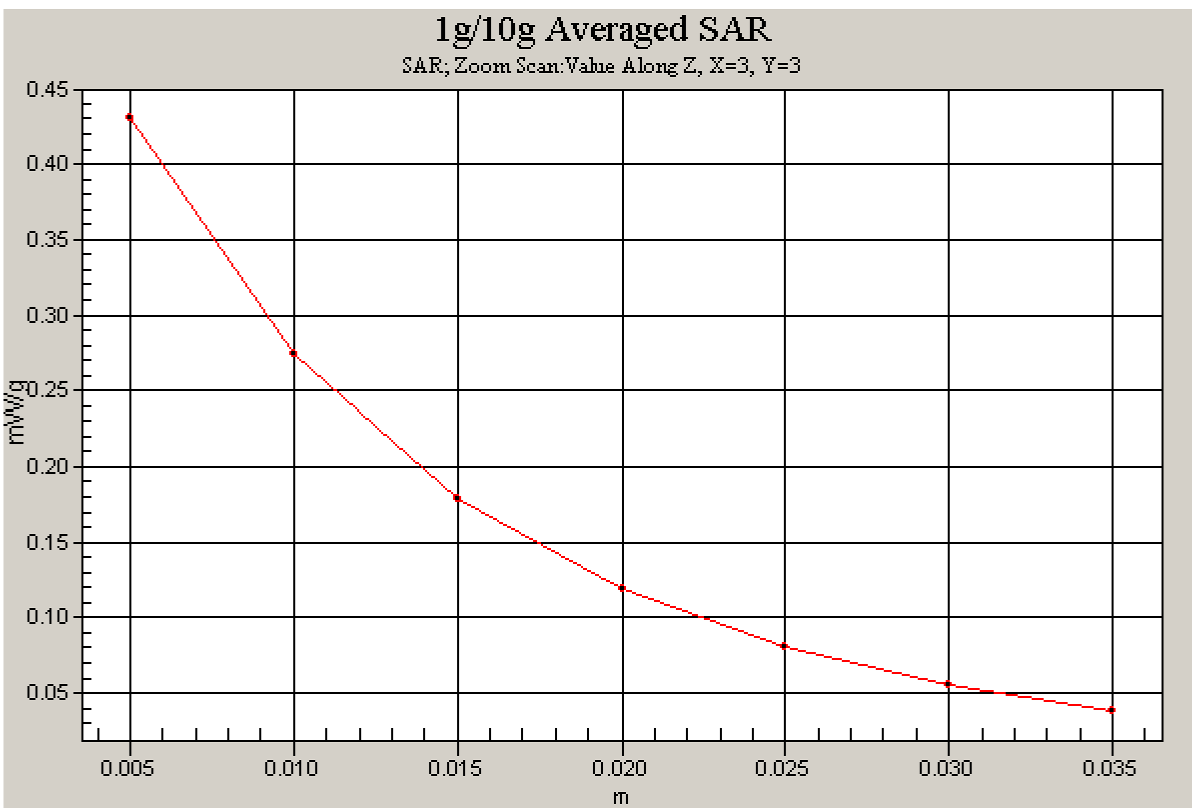
Communication System: 700MHz TD-CDMA; Frequency: 707 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
$f = 707$ MHz; $\sigma = 0.914$ mho/m; $\varepsilon_r = 54.3$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-20-2010; Ambient Temp: 23.8 °C; Tissue Temp: 22.1 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 5mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHz TD-CDMA, Blocks A,B,C, Body SAR, Horizontal-Down, Mid.ch, QPSK

Area Scan (8x15x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.49 V/m
Peak SAR (extrapolated) = 0.792 W/kg
SAR(1 g) = 0.437 mW/g; SAR(10 g) = 0.275 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

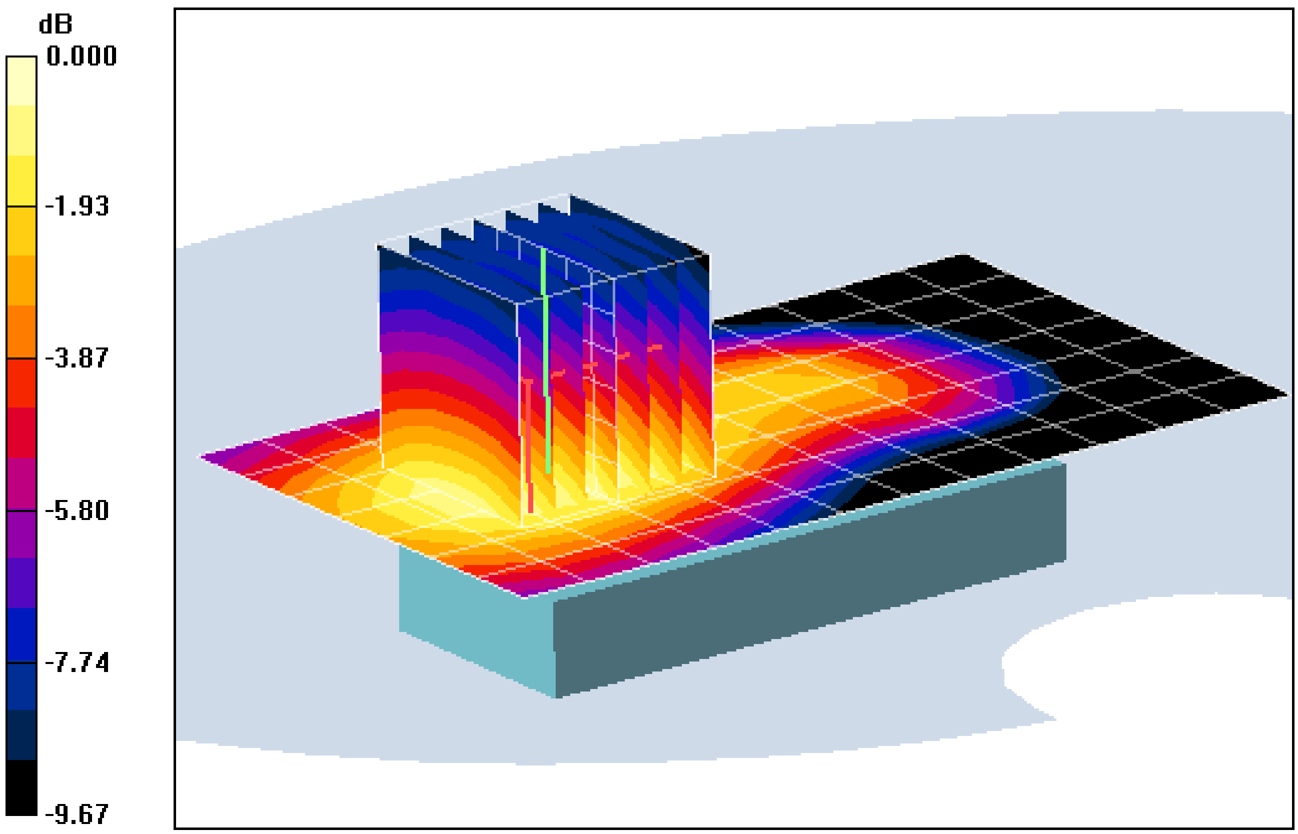
Communication System: 700MHz TD-CDMA; Frequency: 707 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 707 MHz; σ = 0.914 mho/m; ε_r = 54.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-20-2010; Ambient Temp: 23.8 °C; Tissue Temp: 22.1 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHz TD-CDMA, Blocks A,B,C, Body SAR, Horizontal-Up, Mid.ch, QPSK

Area Scan (8x13x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.97 V/m
Peak SAR (extrapolated) = 0.398 W/kg
SAR(1 g) = 0.283 mW/g; SAR(10 g) = 0.195 mW/g



0 dB = 0.305mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

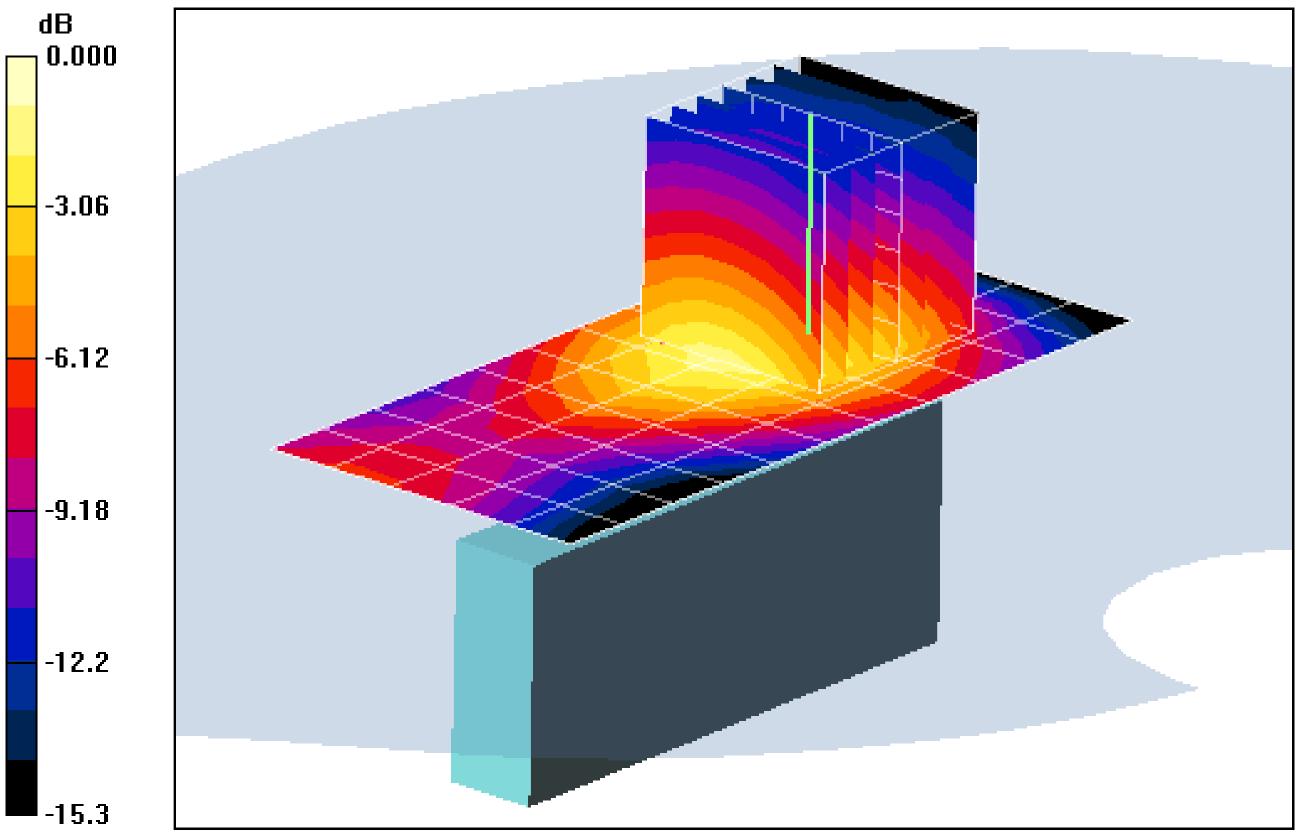
Communication System: 700MHz TD-CDMA; Frequency: 707 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
$f = 707$ MHz; $\sigma = 0.914$ mho/m; $\varepsilon_r = 54.3$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-20-2010; Ambient Temp: 23.8 °C; Tissue Temp: 22.1 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 5mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHz TD-CDMA, Blocks A,B,C, Body SAR, Vertical-Front, Mid.ch, QPSK

Area Scan (6x12x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.6 V/m
Peak SAR (extrapolated) = 0.514 W/kg
SAR(1 g) = 0.232 mW/g; SAR(10 g) = 0.122 mW/g



0 dB = 0.228mW/g

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

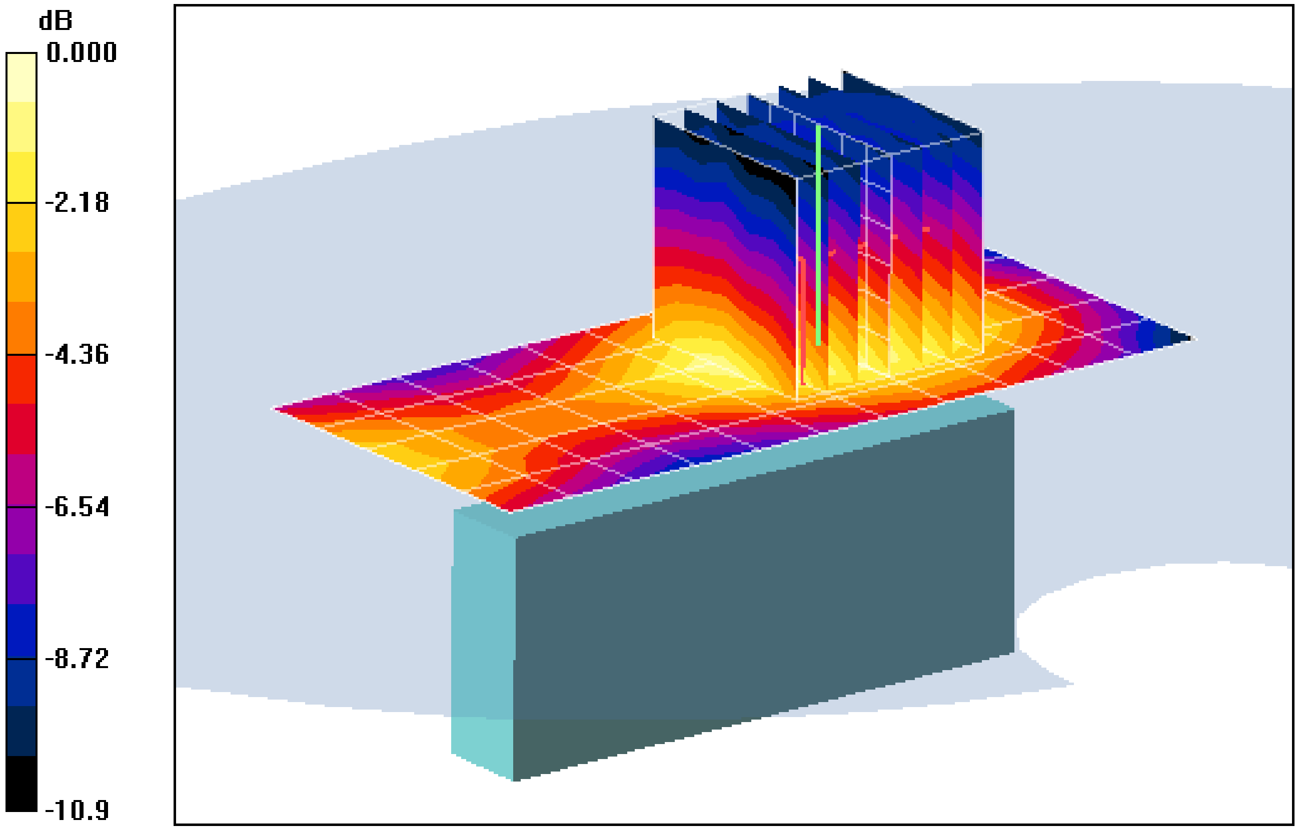
Communication System: 700MHz TD-CDMA; Frequency: 707 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 707 MHz; σ = 0.914 mho/m; ε_r = 54.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-20-2010; Ambient Temp: 23.8 °C; Tissue Temp: 22.1 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 5mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHz TD-CDMA, Blocks A,B,C, Body SAR, Vertical-Back, Mid.ch, QPSK

Area Scan (6x12x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.57 V/m
Peak SAR (extrapolated) = 0.067 W/kg
SAR(1 g) = 0.0435 mW/g; SAR(10 g) = 0.028 mW/g



0 dB = 0.044mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

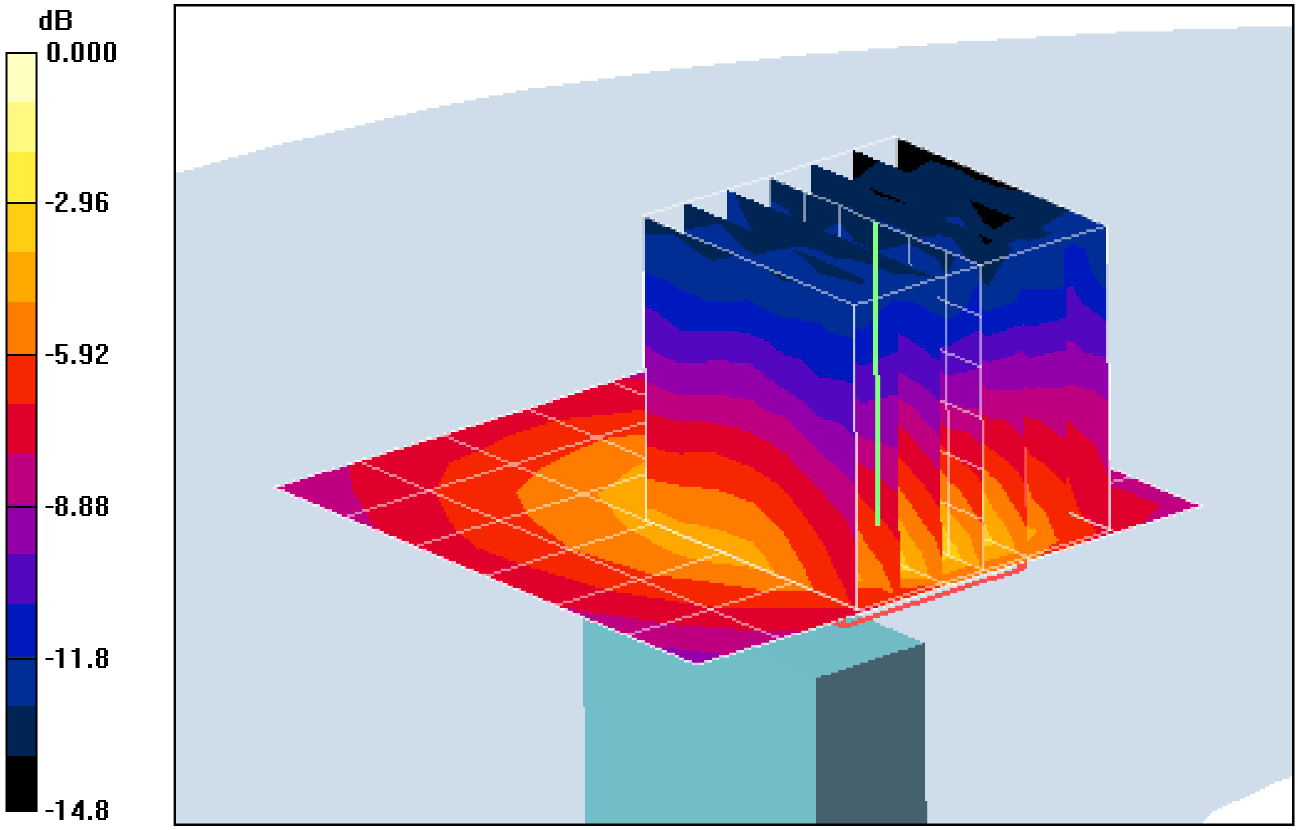
Communication System: 700MHz TD-CDMA; Frequency: 707 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 707 MHz; σ = 0.914 mho/m; ε_r = 54.3; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-20-2010; Ambient Temp: 23.8 °C; Tissue Temp: 22.1 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHzTD-CDMA, Blocks A,B,C, Body SAR, Tip, Mid.ch, QPSK

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.80 V/m
Peak SAR (extrapolated) = 0.075 W/kg
SAR(1 g) = 0.028 mW/g; SAR(10 g) = 0.013 mW/g



0 dB = 0.033mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

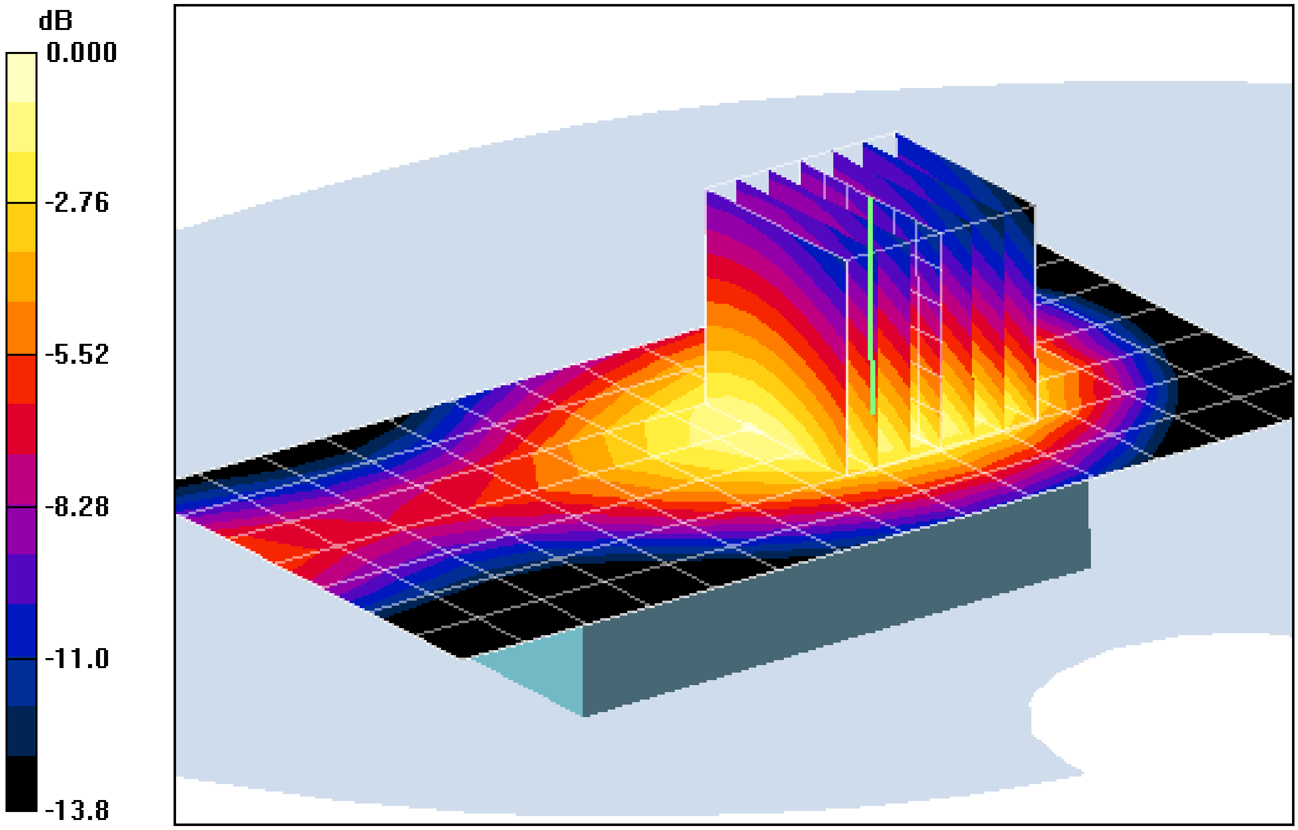
Communication System: 700MHz TD-CDMA Blocks C & A; Frequency: 782 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 782 MHz; σ = 0.951 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-27-2010; Ambient Temp: 23.5 °C; Tissue Temp: 22.3 °C

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

Mode: 700MHz TD-CDMA, Body SAR, Blocks C&A, Horizontal-Down, Mid.ch, QPSK

Area Scan (8x15x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.1 V/m
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.736 mW/g; SAR(10 g) = 0.477 mW/g



0 dB = 0.789mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

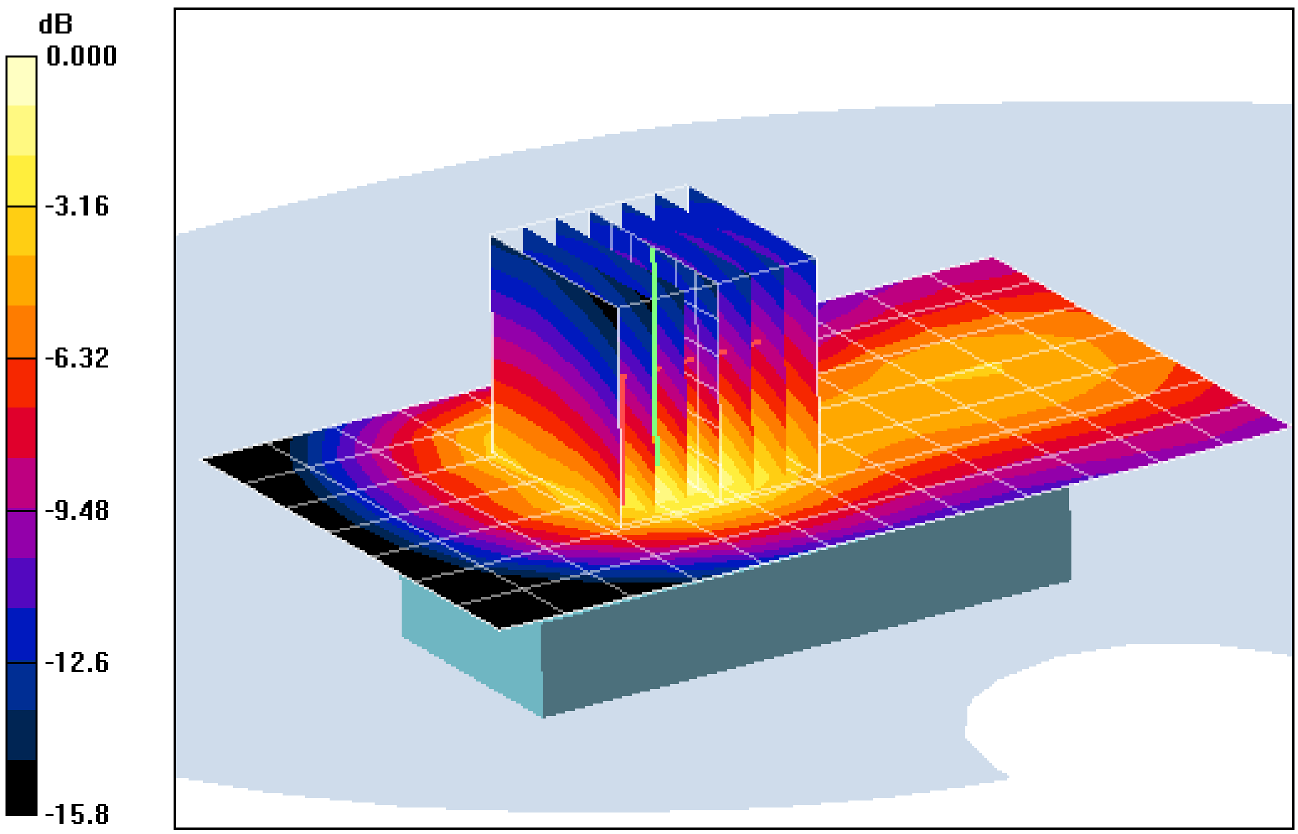
Communication System: 700MHz TD-CDMA Blocks C & A; Frequency: 782 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 782 MHz; $\sigma = 0.971$ mho/m; $\varepsilon_r = 53.6$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

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

Mode: 700MHz TD-CDMA, Body SAR, Blocks C&A, Horizontal Up, Mid.ch, QPSK

Area Scan (8x13x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.19 V/m
Peak SAR (extrapolated) = 1.39 W/kg
SAR(1 g) = 0.669 mW/g; SAR(10 g) = 0.354 mW/g



0 dB = 0.746mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

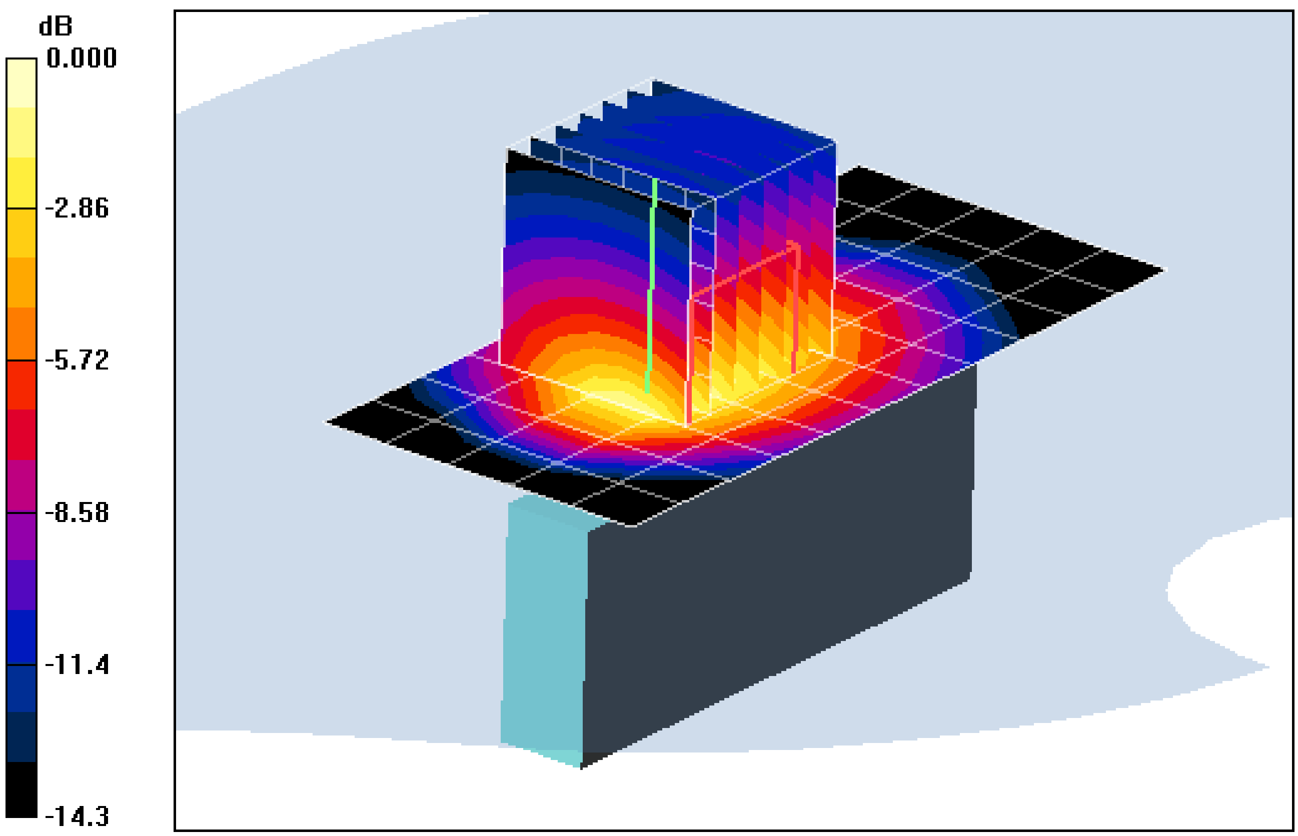
Communication System: 700MHz TD-CDMA Blocks C & A; Frequency: 785.5 MHz; Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
$f = 785.5$ MHz; $\sigma = 0.973$ mho/m; $\varepsilon_r = 53.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

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

Mode: 700MHz TD-CDMA, Body SAR, Blocks C&A, Vertical-Front, High.ch, QPSK

Area Scan (6x12x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.5 V/m
Peak SAR (extrapolated) = 2.27 W/kg
SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.591 mW/g



0 dB = 1.23mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

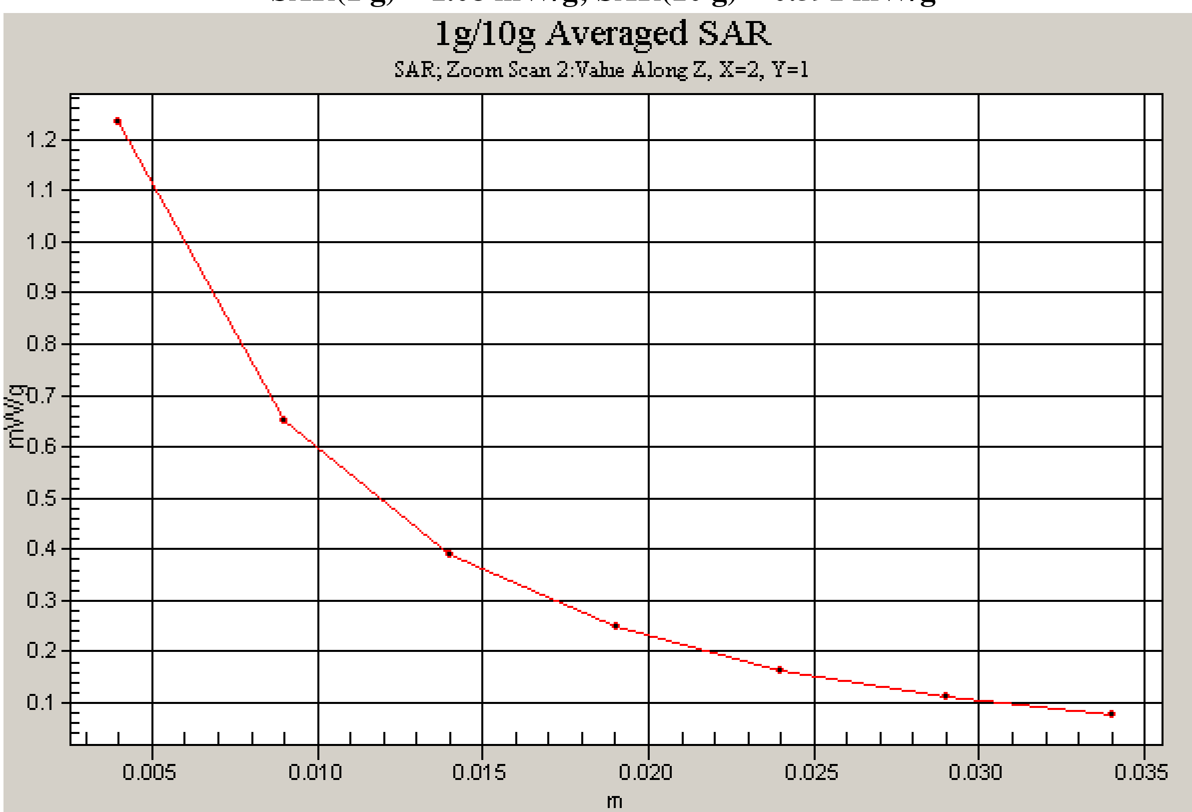
Communication System: 700MHz TD-CDMA Blocks C & A; Frequency: 785.5 MHz; Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 785.5 MHz; σ = 0.973 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

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

Mode: 700MHz TD-CDMA, Body SAR, Blocks C&A, Vertical-Front, High.ch, QPSK

Area Scan (6x12x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.5 V/m
Peak SAR (extrapolated) = 2.27 W/kg
SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.591 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

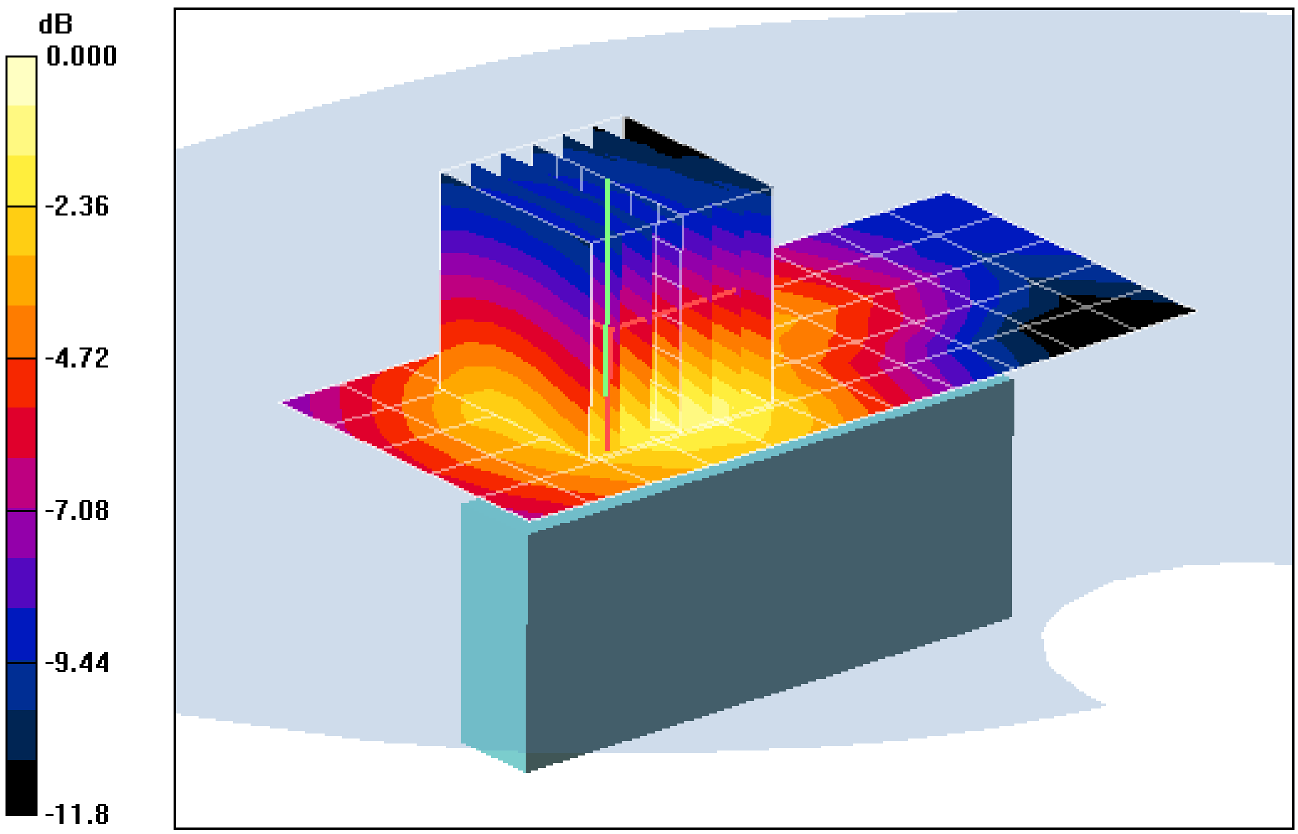
Communication System: 700MHz TD-CDMA Blocks C & A; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 782 MHz; σ = 0.971 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 5mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHz TD-CDMA, Body SAR, Blocks C&A, Vertical-Back, Mid.ch, QPSK

Area Scan (6x12x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.1 V/m
Peak SAR (extrapolated) = 0.255 W/kg
SAR(1 g) = 0.141 mW/g; SAR(10 g) = 0.083 mW/g



0 dB = 0.143mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

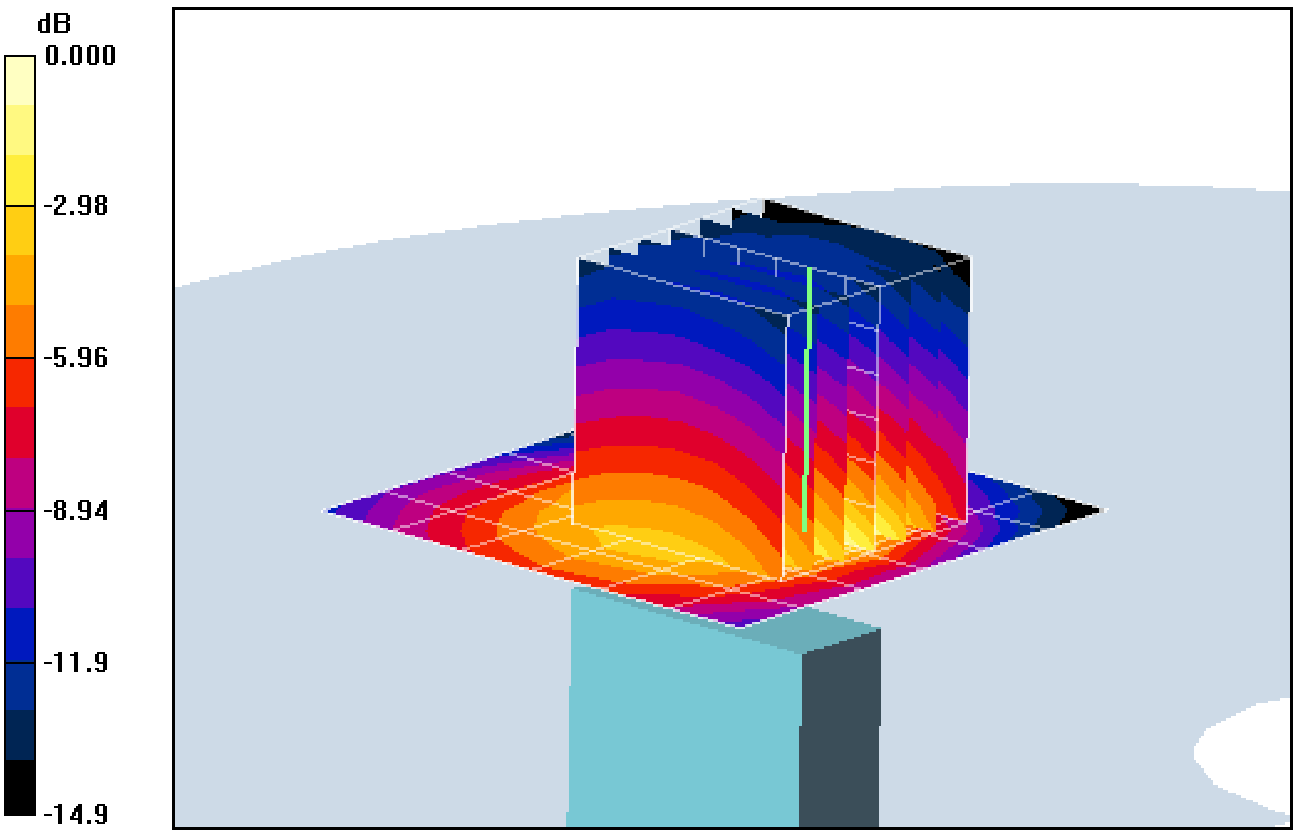
Communication System: 700MHz TD-CDMA Blocks C & A; Frequency: 782 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 782 MHz; σ = 0.971 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

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

Mode: 700MHzTD-CDMA, Body SAR, Blocks C&A, Tip, Mid.ch, QPSK

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.7 V/m
Peak SAR (extrapolated) = 0.499 W/kg
SAR(1 g) = 0.203 mW/g; SAR(10 g) = 0.107 mW/g



0 dB = 0.233mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

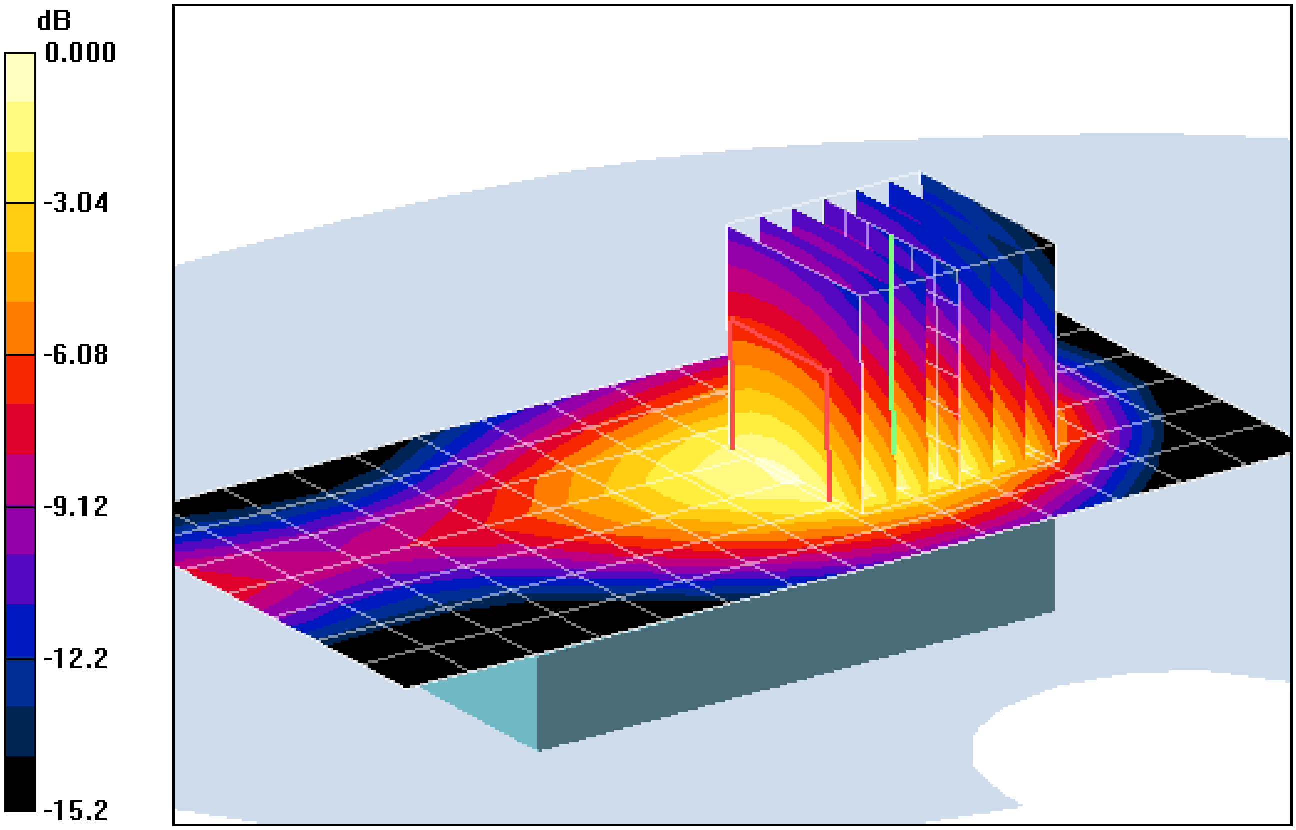
Communication System: 700MHz TD-CDMA Block D; Frequency: 790.5 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 790.5 MHz; σ = 0.959 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-27-2010; Ambient Temp: 23.5 °C; Tissue Temp: 22.3 °C

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

Mode: 700MHz TD-CDMA, Body SAR, Block D, Horizontal-Down, Mid.ch, QPSK

Area Scan (8x15x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.79 V/m
Peak SAR (extrapolated) = 1.52 W/kg
SAR(1 g) = 0.844 mW/g; SAR(10 g) = 0.511 mW/g



0 dB = 0.924mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

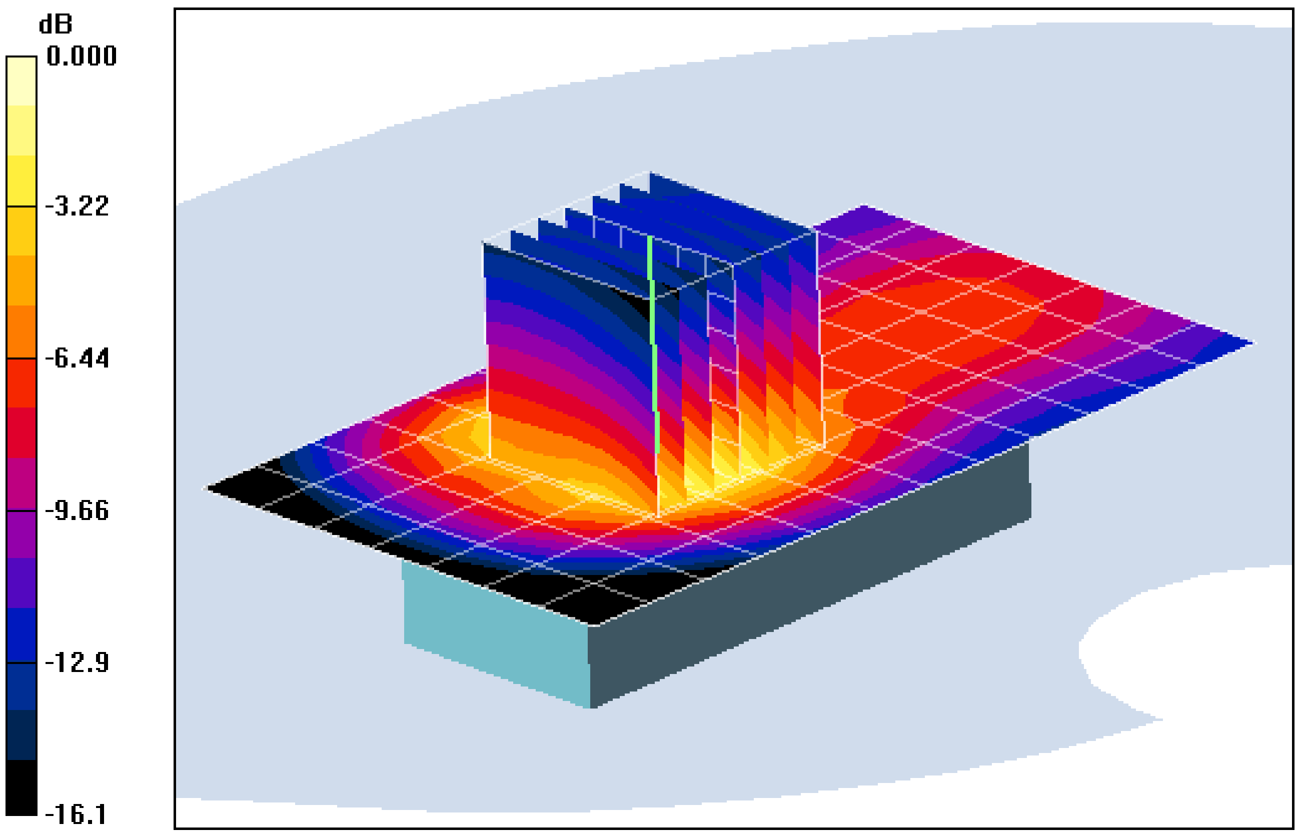
Communication System: 700MHz TD-CDMA Block D; Frequency: 790.5 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 790.5 MHz; σ = 0.977 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

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

Mode: 700MHz TD-CDMA, Body SAR, Block D, Horizontal-Up, Mid.ch, QPSK

Area Scan (8x13x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.74 V/m
Peak SAR (extrapolated) = 1.86 W/kg
SAR(1 g) = 0.890 mW/g; SAR(10 g) = 0.462 mW/g



0 dB = 0.996mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

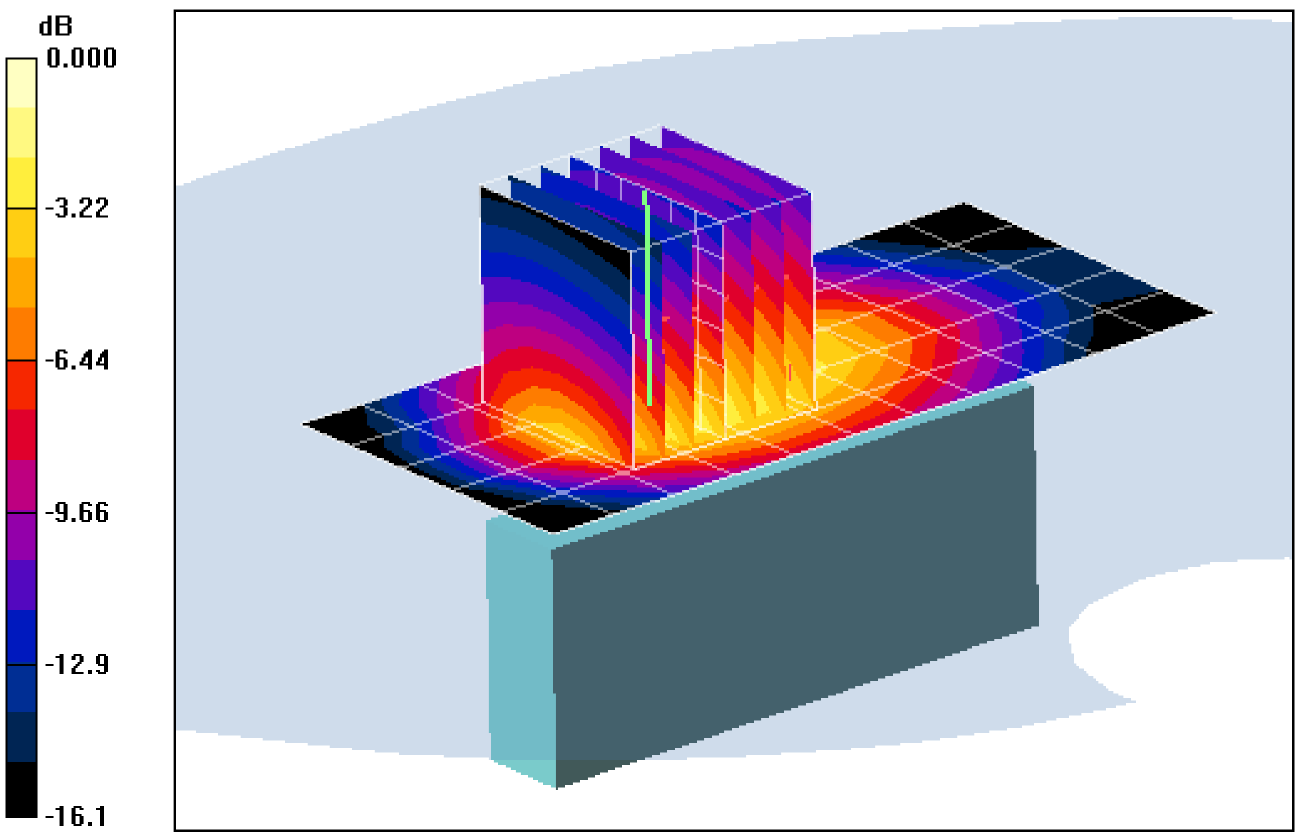
Communication System: 700MHz TD-CDMA Block D; Frequency: 790.5 MHz; Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 790.5 MHz; σ = 0.977 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 5mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHz TD-CDMA, Body SAR, Block D, Vertical-Front, Mid.ch, QPSK

Area Scan (6x12x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.8 V/m
Peak SAR (extrapolated) = 2.30 W/kg
SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.604 mW/g



0 dB = 1.09mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

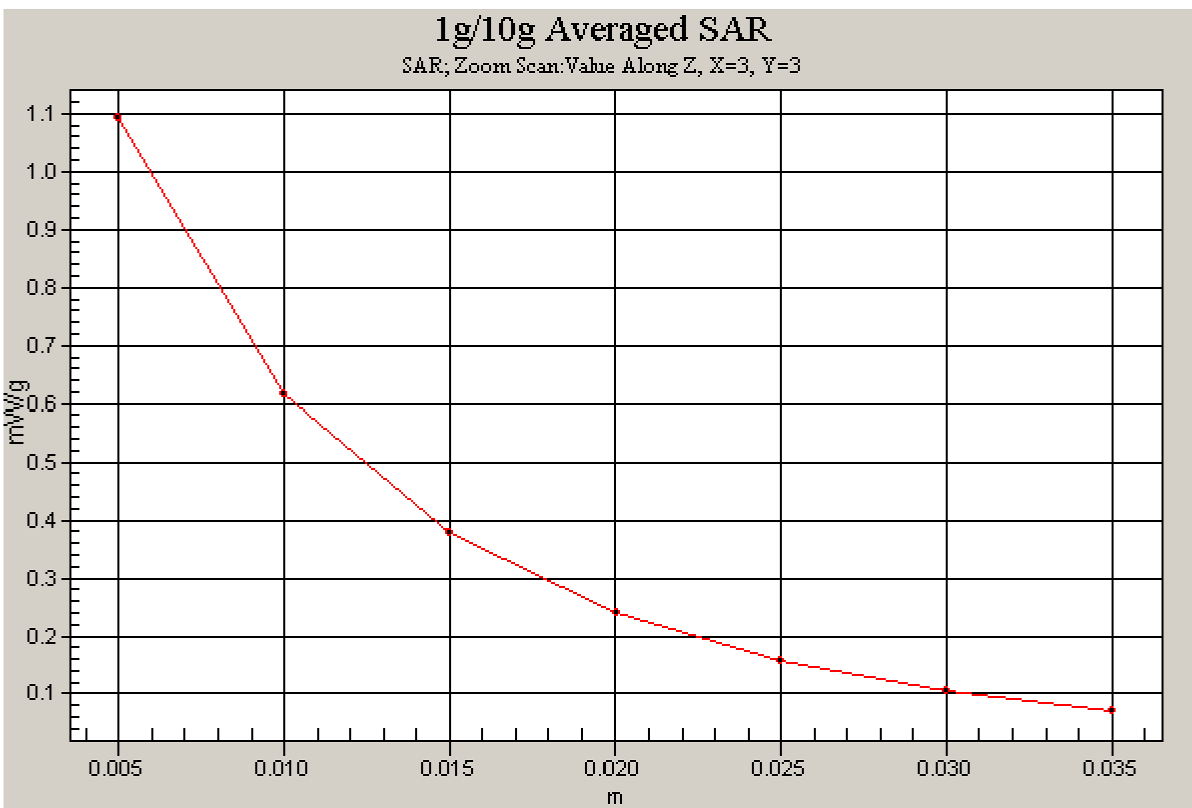
Communication System: 700MHz TD-CDMA Block D; Frequency: 790.5 MHz; Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
$f = 790.5$ MHz; $\sigma = 0.977$ mho/m; $\varepsilon_r = 53.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 5mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHz TD-CDMA, Body SAR, Block D, Vertical-Front, Mid.ch, QPSK

Area Scan (6x12x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.8 V/m
Peak SAR (extrapolated) = 2.30 W/kg
SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.604 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

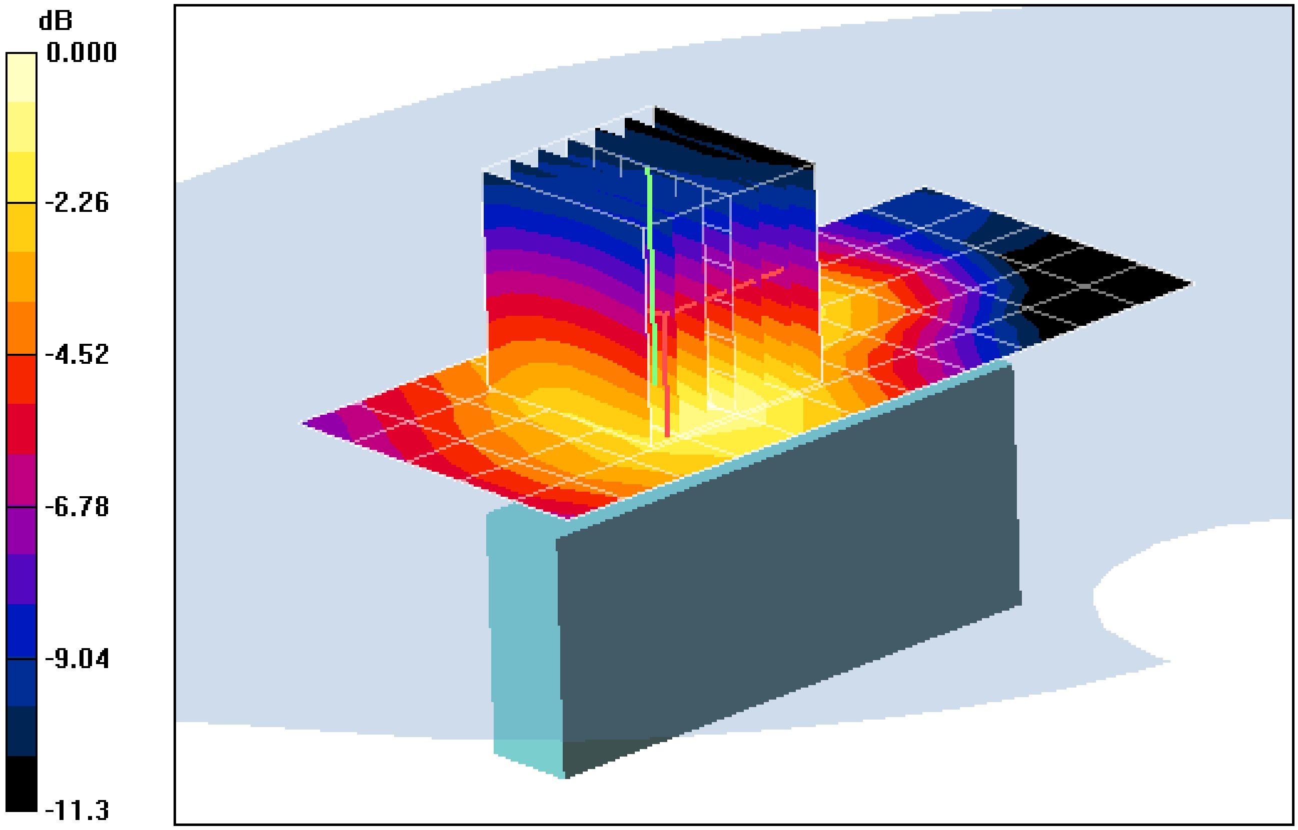
Communication System: 700MHz TD-CDMA Block D; Frequency: 790.5 MHz; Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 790.5 MHz; σ = 0.977 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 5mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHz TD-CDMA, Body SAR, Block D, Vertical-Back, Mid.ch, QPSK

Area Scan (6x12x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.3 V/m
Peak SAR (extrapolated) = 0.263 W/kg
SAR(1 g) = 0.142 mW/g; SAR(10 g) = 0.085 mW/g



0 dB = 0.141mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

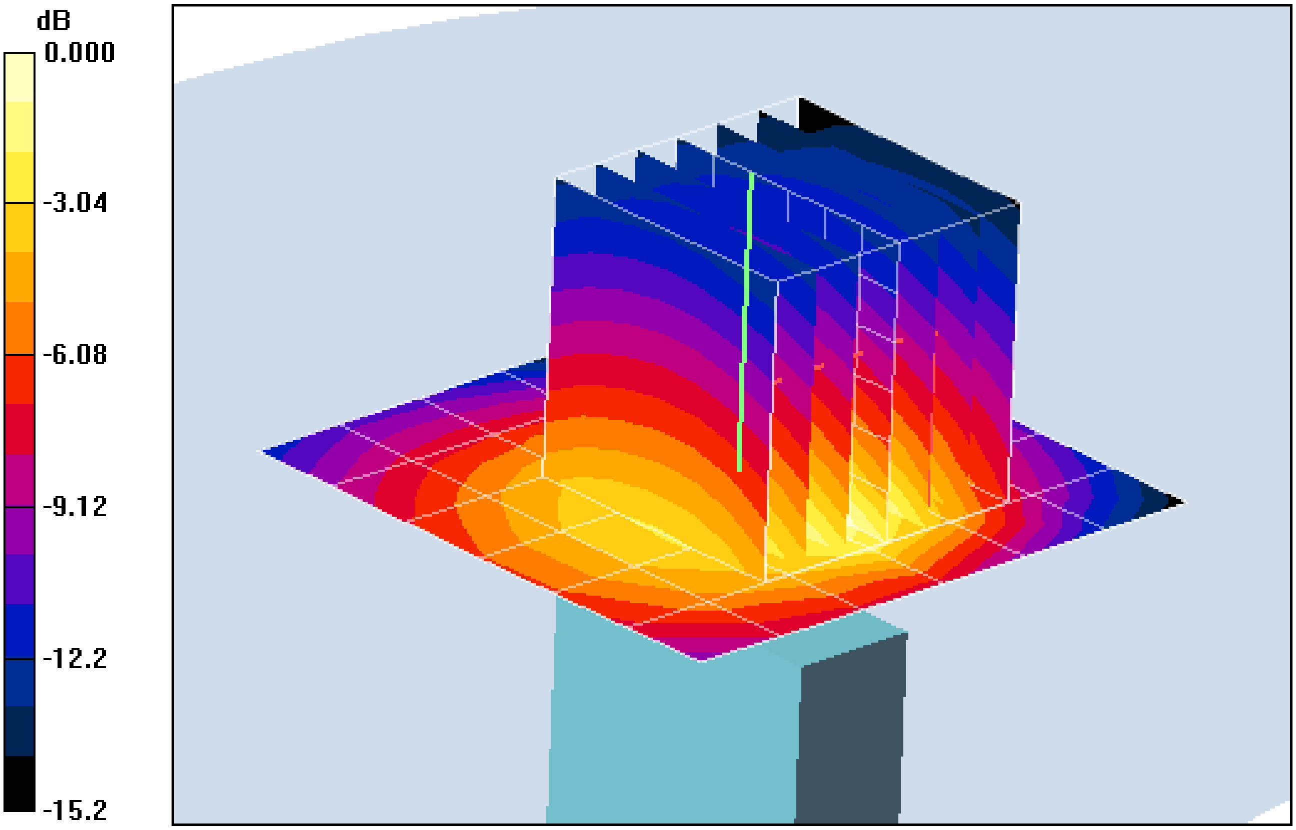
Communication System: 700MHz TD-CDMA Block D; Frequency: 790.5 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 790.5 MHz; σ = 0.977 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

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

Mode: 700MHzTD-CDMA, Body SAR, Block D, Tip, Mid.ch, QPSK

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.4 V/m
Peak SAR (extrapolated) = 0.733 W/kg
SAR(1 g) = 0.283 mW/g; SAR(10 g) = 0.152 mW/g



0 dB = 0.321mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

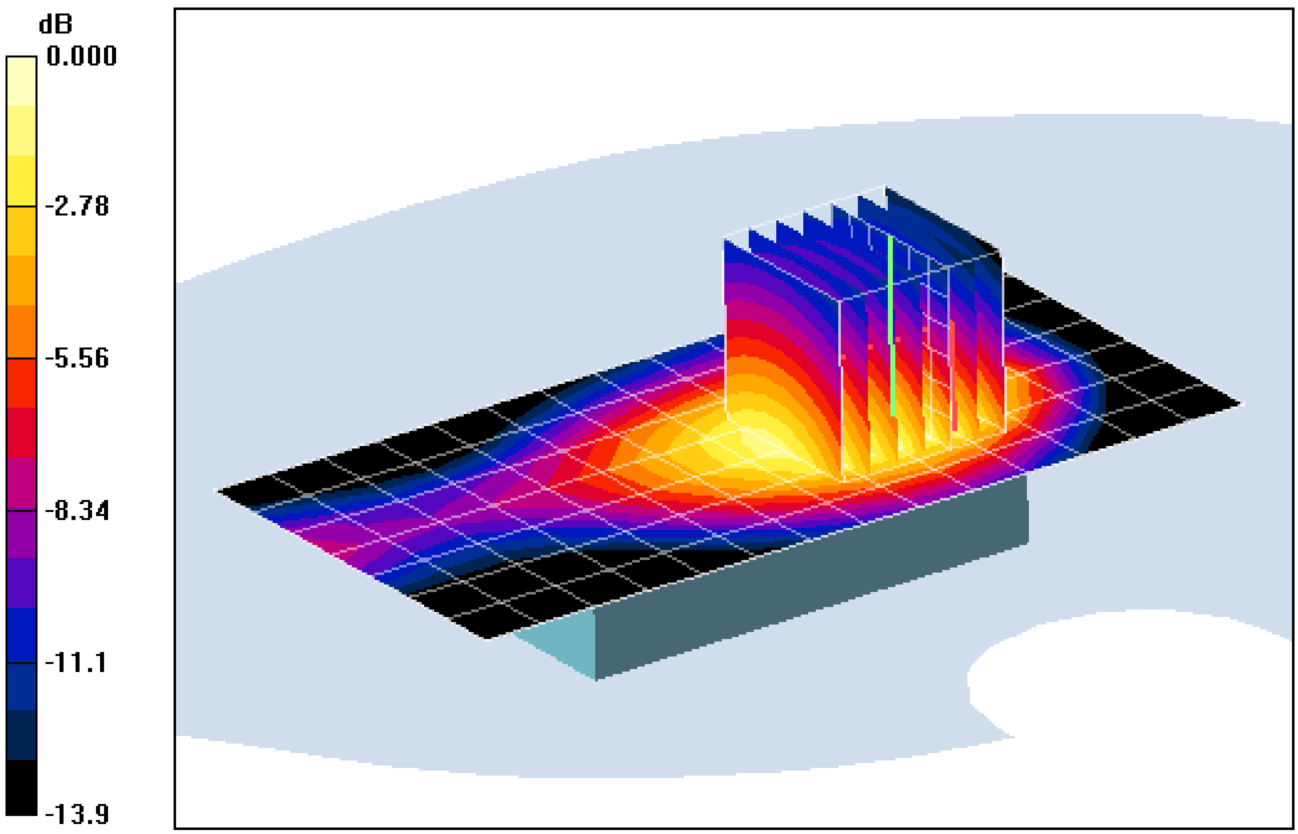
Communication System: 700MHz TD-CDMA Public safety; Frequency: 795.5 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
$f = 795.5$ MHz; $\sigma = 0.964$ mho/m; $\varepsilon_r = 52.7$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-27-2010; Ambient Temp: 23.5 °C; Tissue Temp: 22.3 °C

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

Mode: 700MHz TD-CDMA, Body SAR, Public Safety, Horizontal-Down, Mid.ch, QPSK

Area Scan (8x15x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.6 V/m
Peak SAR (extrapolated) = 1.83 W/kg
SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.628 mW/g



0 dB = 1.15mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

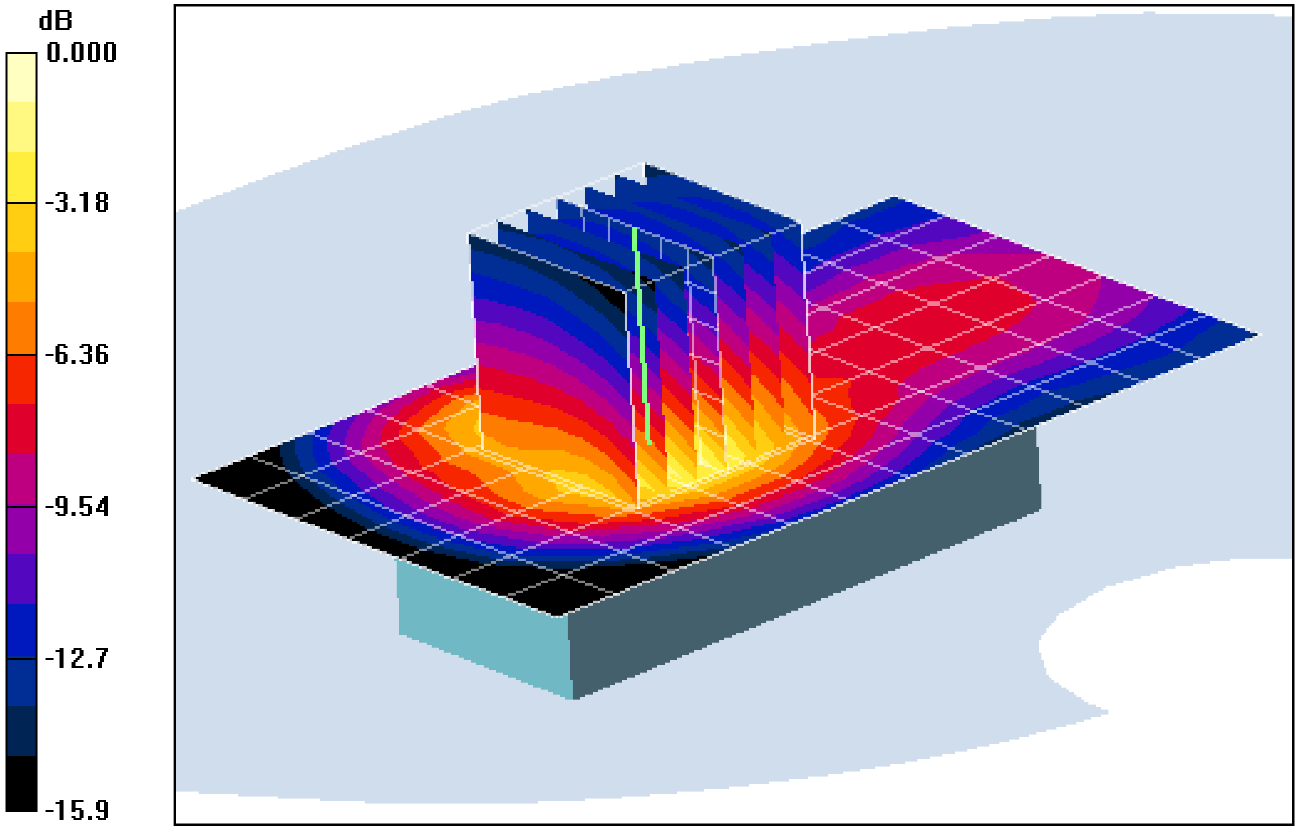
Communication System: 700MHz TD-CDMA Public safety; Frequency: 795.5 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
$f = 795.5$ MHz; $\sigma = 0.981$ mho/m; $\varepsilon_r = 53.4$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

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

Mode: 700MHz TD-CDMA, Body SAR, Public Safety, Horizontal-Up, Mid.ch, QPSK

Area Scan (8x13x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.38 V/m
Peak SAR (extrapolated) = 2.33 W/kg
SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.571 mW/g



0 dB = 1.25mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

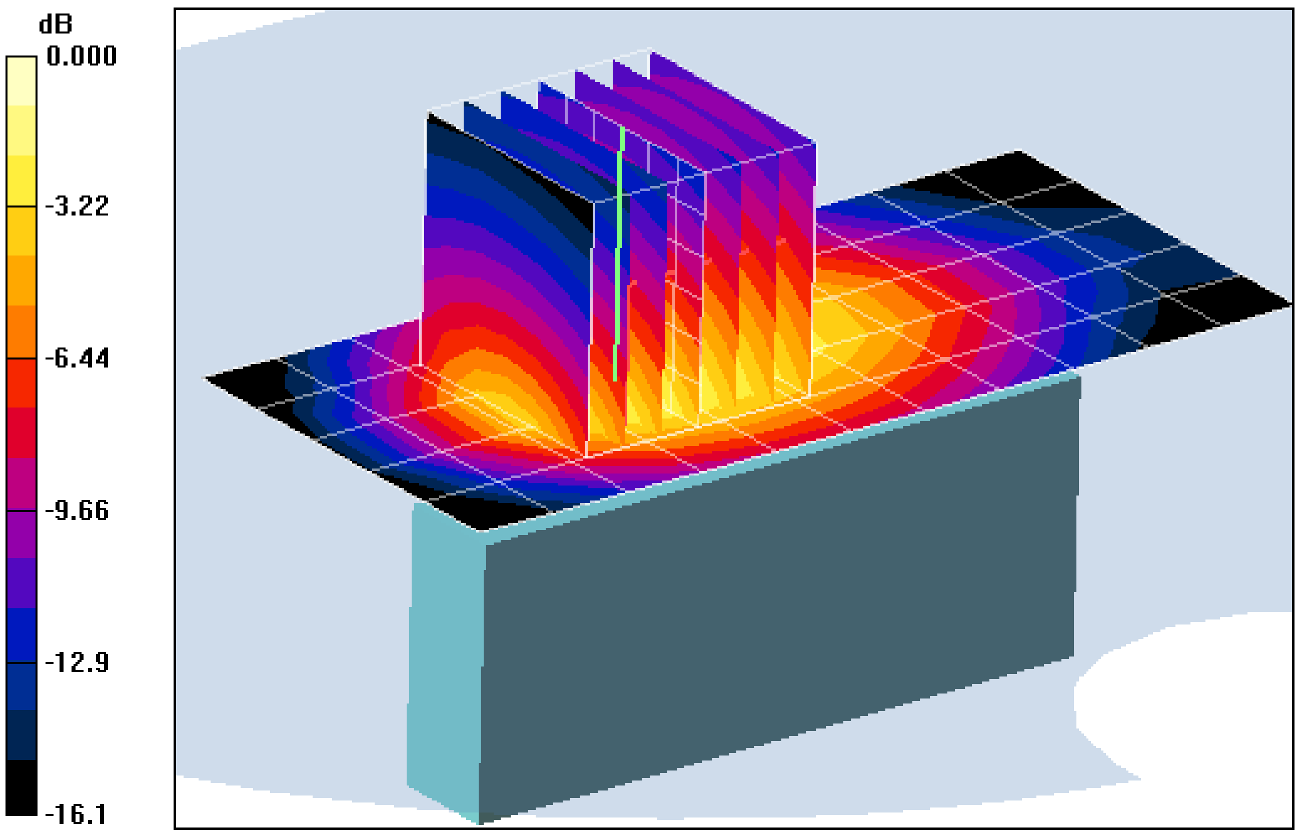
Communication System: 700MHz TD-CDMA Public Safety; Frequency: 795.5 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 795.5 MHz; σ = 0.981 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 5mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHz TD-CDMA, Body SAR, Public Safety, Vertical-Front, Mid.ch, QPSK

Area Scan (6x12x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 38.6 V/m
Peak SAR (extrapolated) = 2.48 W/kg
SAR(1 g) = 1.21 mW/g; SAR(10 g) = 0.667 mW/g



0 dB = 1.21mW/g

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

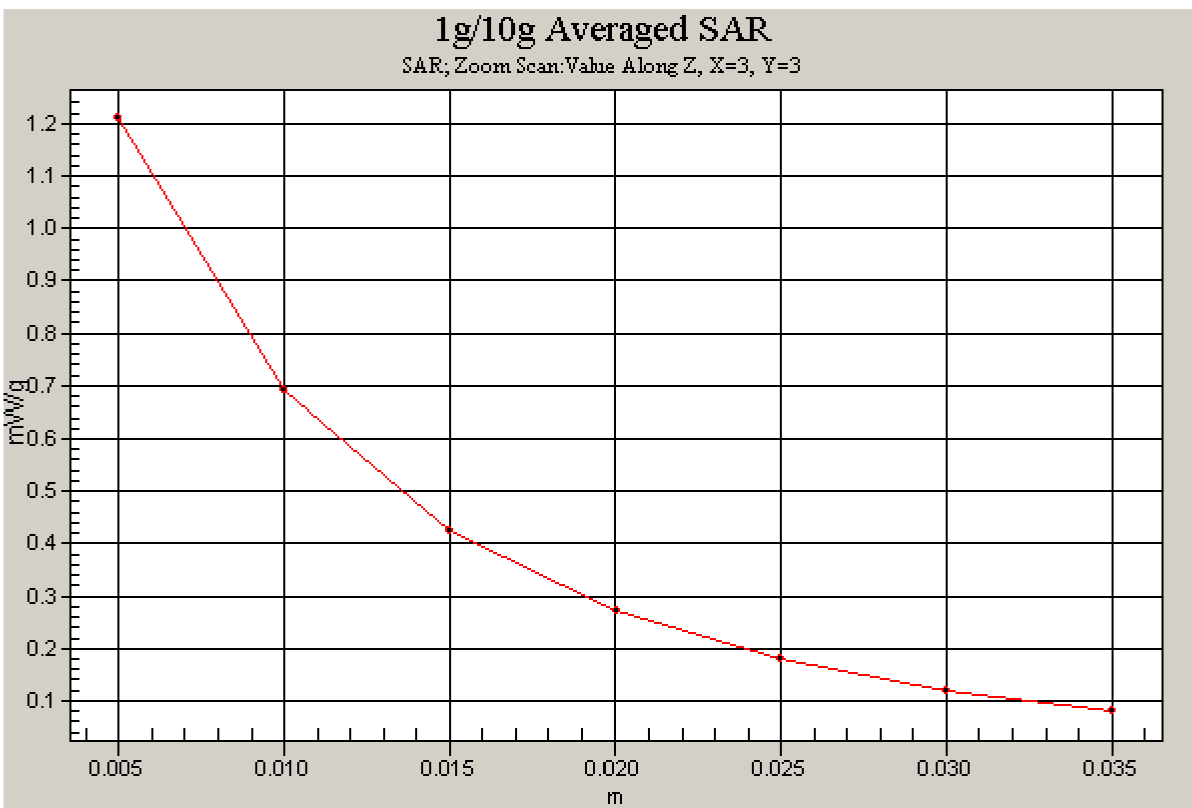
Communication System: 700MHz TD-CDMA Public safety; Frequency: 795.5 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 795.5 MHz; σ = 0.981 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 5mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHz TD-CDMA, Body SAR, Public Safety, Vertical-Front, Mid.ch, QPSK

Area Scan (6x12x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 38.6 V/m
Peak SAR (extrapolated) = 2.48 W/kg
SAR(1 g) = 1.21 mW/g; SAR(10 g) = 0.667 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

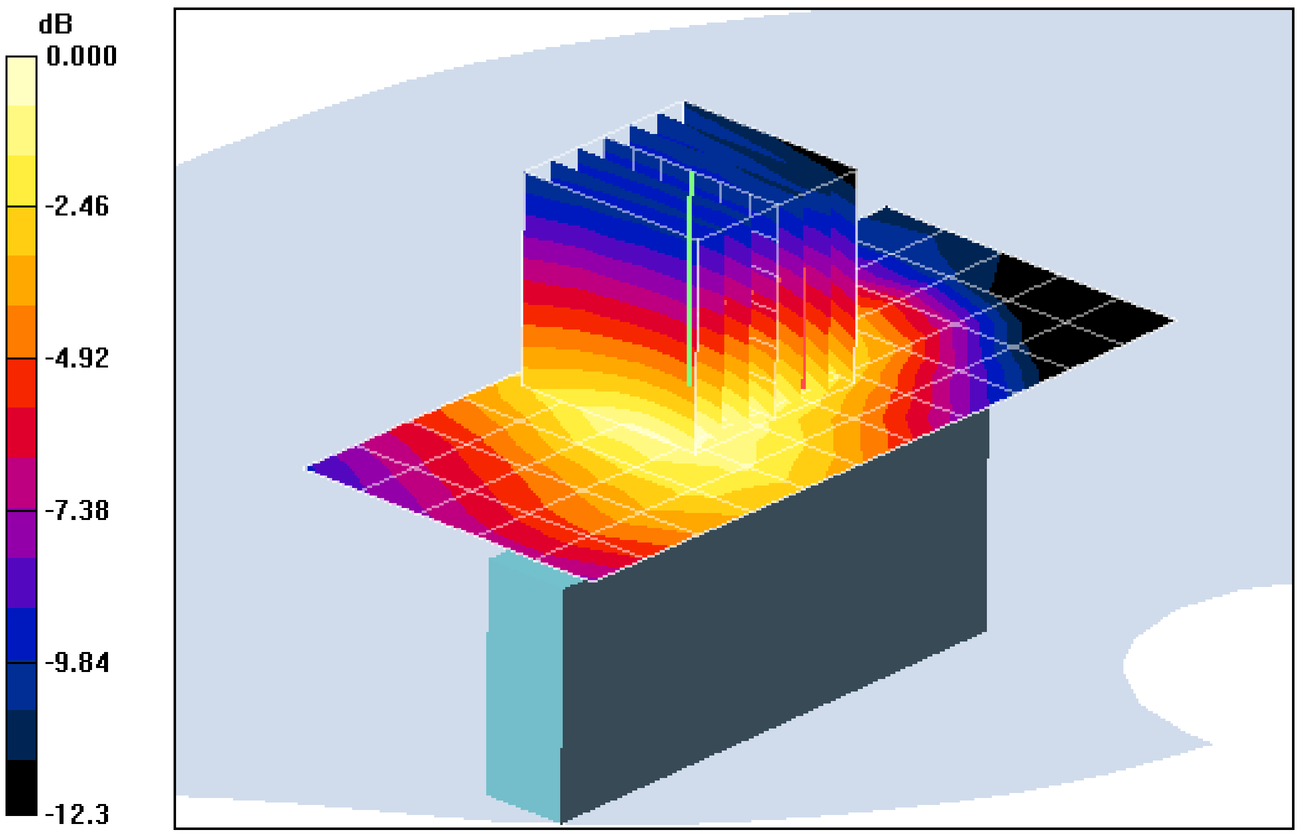
Communication System: 700MHz TD-CDMA Public safety; Frequency: 795.5 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 795.5 MHz; σ = 0.981 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

Probe: ES3DV3 - SN3213; ConvF(5.97, 5.97, 5.97); Calibrated: 3/16/2010
Sensor-Surface: 5mm (Mechanical Surface Detection)
Electronics: DAE4 Sn704; Calibrated: 3/22/2010
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: 700MHz TD-CDMA, Body SAR, Public Safety, Vertical-Back, Mid.ch, QPSK

Area Scan (6x12x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.2 V/m
Peak SAR (extrapolated) = 0.343 W/kg
SAR(1 g) = 0.198 mW/g; SAR(10 g) = 0.123 mW/g



0 dB = 0.192mW/g

DUT: PKTUSBSTKAGJ; Type: 700MHz TD-CDMA USB Modem
Serial: AGJAA3200131A

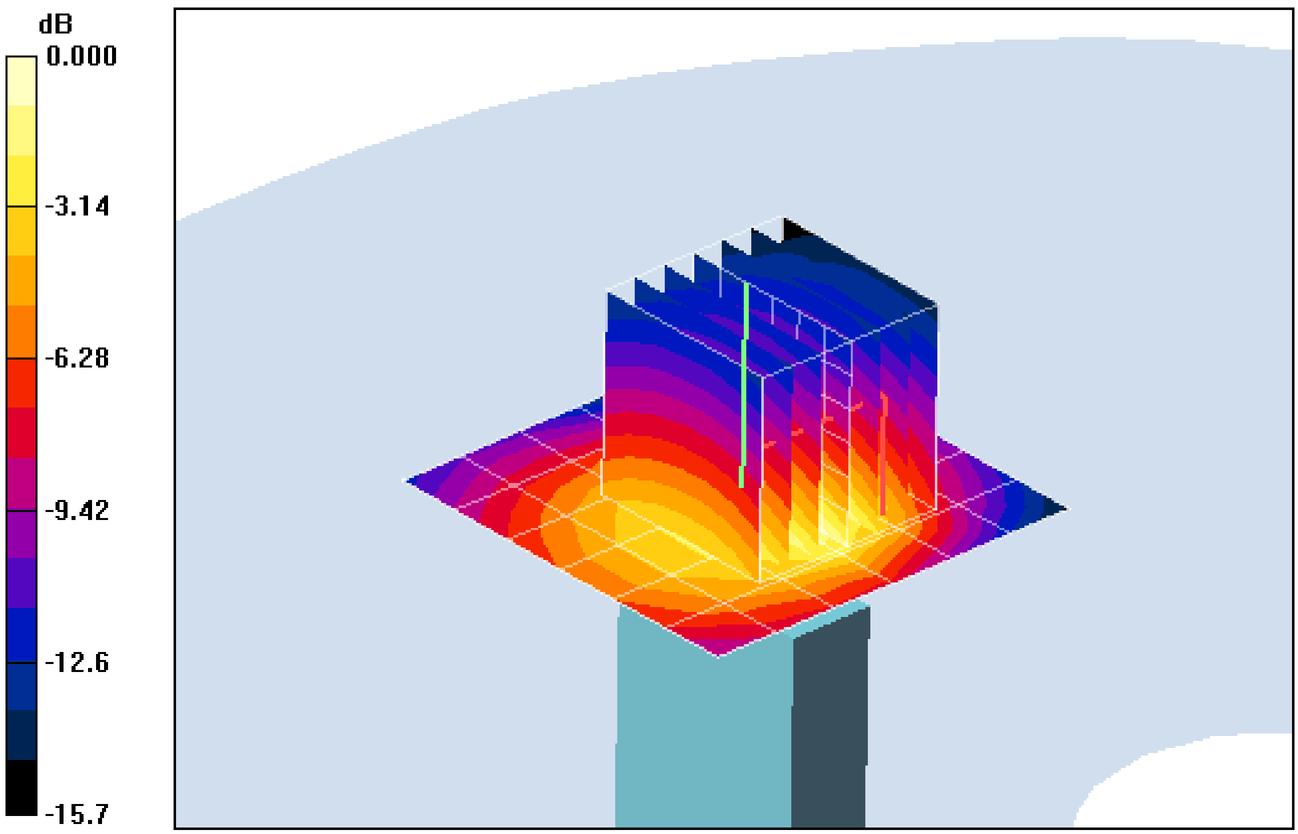
Communication System: 700MHz TD-CDMA Public safety; Frequency: 795.5 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used (interpolated):
f = 795.5 MHz; $\sigma = 0.981$ mho/m; $\varepsilon_r = 53.4$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 0.5 cm

gTest Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

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

Mode: 700MHz TD-CDMA, Body SAR, Public Safety, Tip, Mid.ch, QPSK

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.3 V/m
Peak SAR (extrapolated) = 0.947 W/kg
SAR(1 g) = 0.364 mW/g; SAR(10 g) = 0.194 mW/g



0 dB = 0.421mW/g

APPENDIX B: DIPOLE VALIDATION

PCTEST ENGINEERING LABORATORY, INC.

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

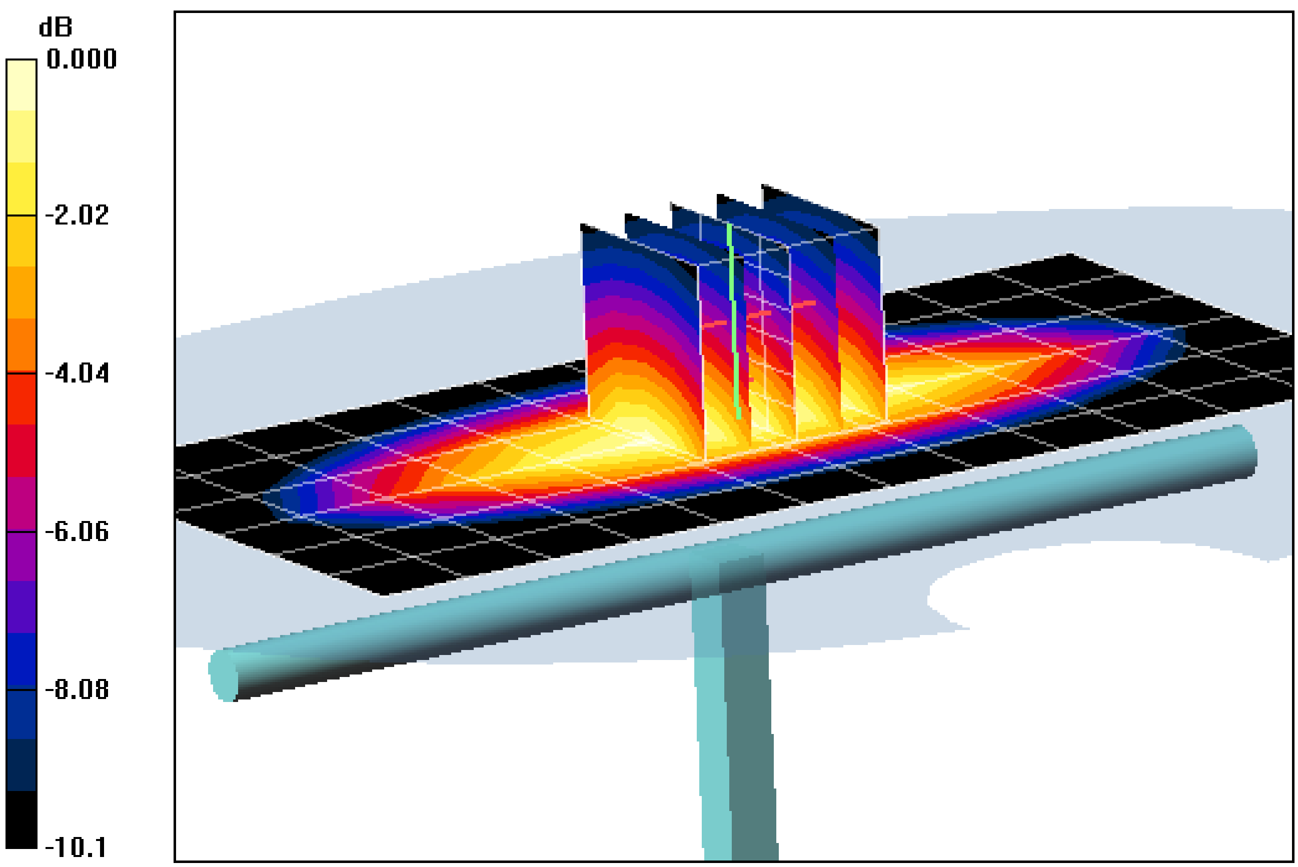
Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used:
f = 750 MHz; σ = 0.947 mho/m; ε_r = 53.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-20-2010; Ambient Temp: 23.8 °C; Tissue Temp: 22.1 °C

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

750MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 18.8 dBm (76.0 mW)
SAR(1 g) = 0.692 mW/g; SAR(10 g) = 0.458 mW/g
Deviation = 4.18 %



0 dB = 0.805mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

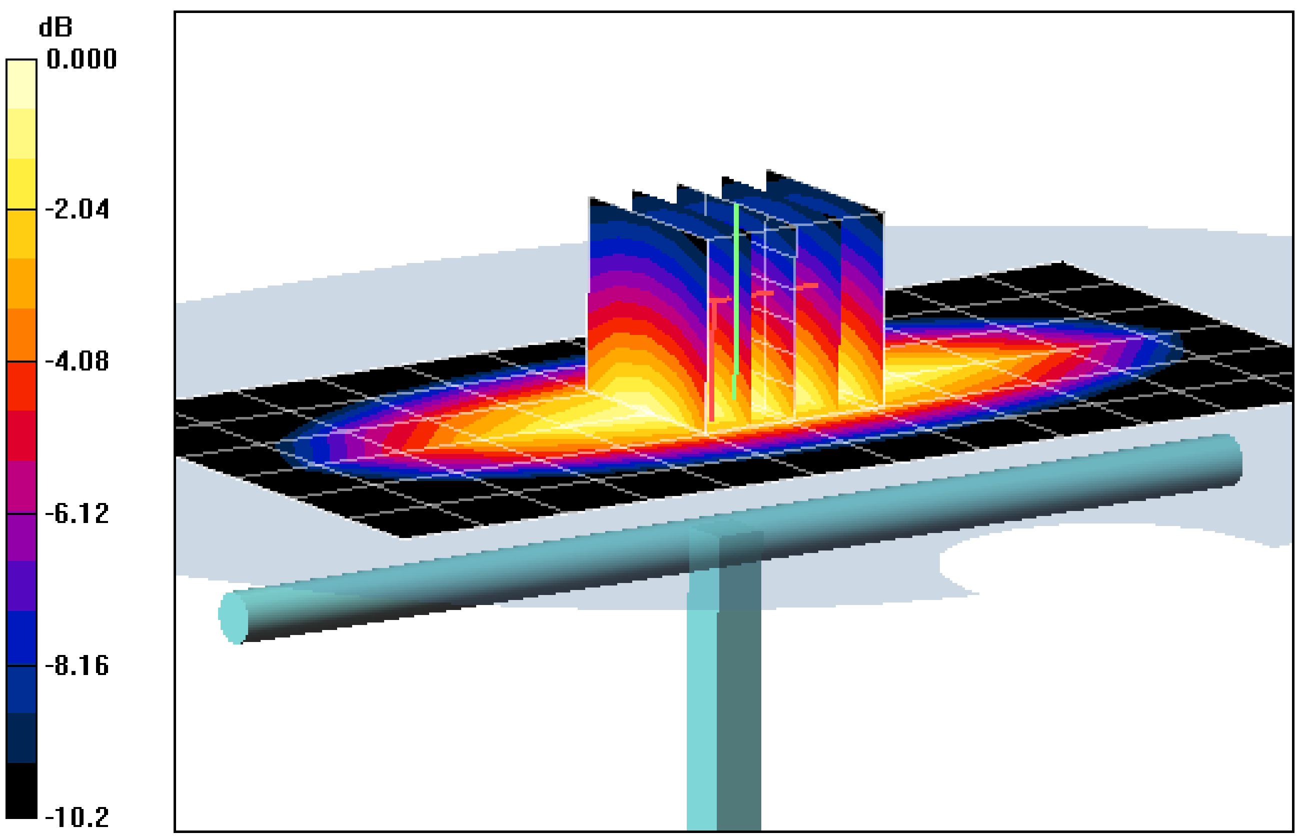
Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used:
f = 750 MHz; σ = 0.947 mho/m; ε_r = 53.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-21-2010; Ambient Temp: 23.6 °C; Tissue Temp: 21.9 °C

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

750MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 18.8 dBm (76 mW)
SAR(1 g) = 0.696 mW/g; SAR(10 g) = 0.459 mW/g
Deviation = 4.78 %



0 dB = 0.813mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

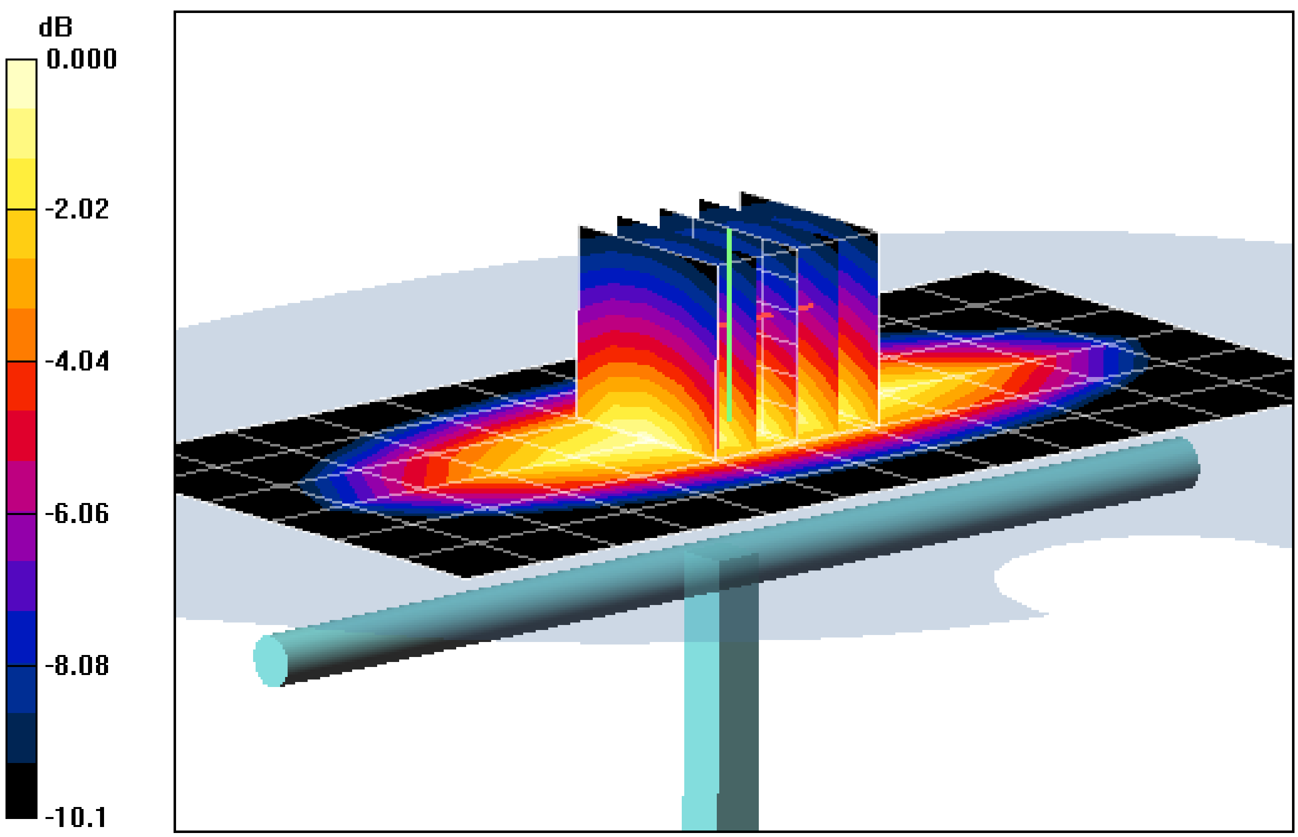
Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: 700 Muscle Medium parameters used:
f = 750 MHz; σ = 0.921 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-27-2010; Ambient Temp: 23.5 °C; Tissue Temp: 22.3 °C

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

750MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 18.8 dBm (76 mW)
SAR(1 g) = 0.678 mW/g; SAR(10 g) = 0.447 mW/g
Deviation = 2.07 %



0 dB = 0.792mW/g

APPENDIX C: PROBE CALIBRATION

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

S **Schweizerischer Kalibrierdienst**
C **Service suisse d'étalonnage**
S **Servizio svizzero di taratura**
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: ES3-3213_Mar10

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3213
Calibration procedure(s)	QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	March 16, 2010

✓ olc
3/29/10

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: March 19, 2010

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

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

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
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., $\vartheta = 0$ 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 $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z: A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *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:3213

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

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3213

Basic Calibration Parameters

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

Modulation Calibration Parameters

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

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

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

[B] Numerical linearization parameter: uncertainty not required.

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

DASY - Parameters of Probe: ES3DV3 SN:3213

Calibration Parameter Determined in Head Tissue Simulating Media

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

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

DASY - Parameters of Probe: ES3DV3 SN:3213

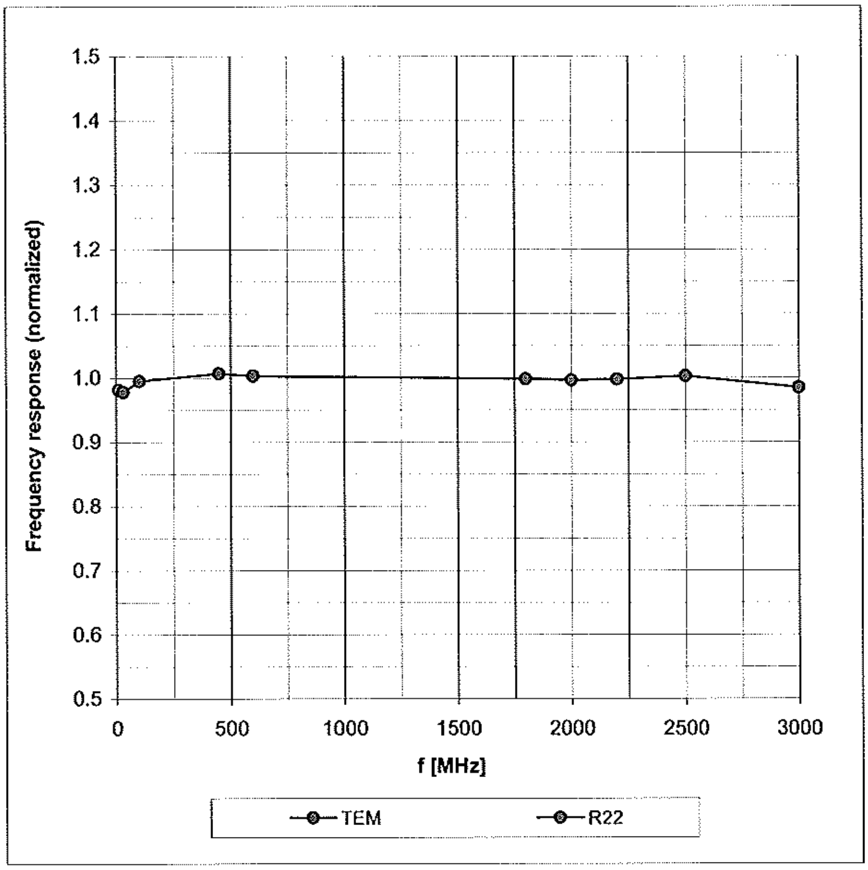
Calibration Parameter Determined in Body Tissue Simulating Media

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

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

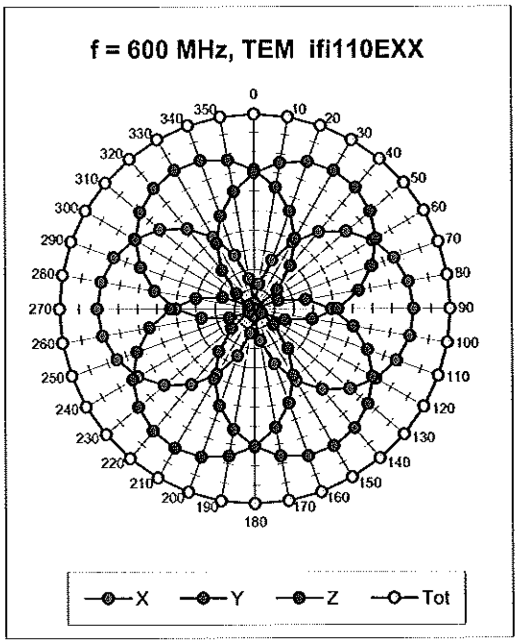
Frequency Response of E-Field

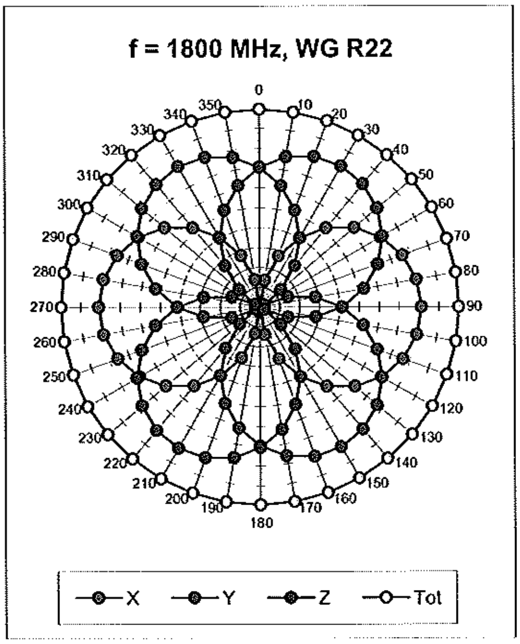
(TEM-Cell:ifi110 EXX, Waveguide: R22)

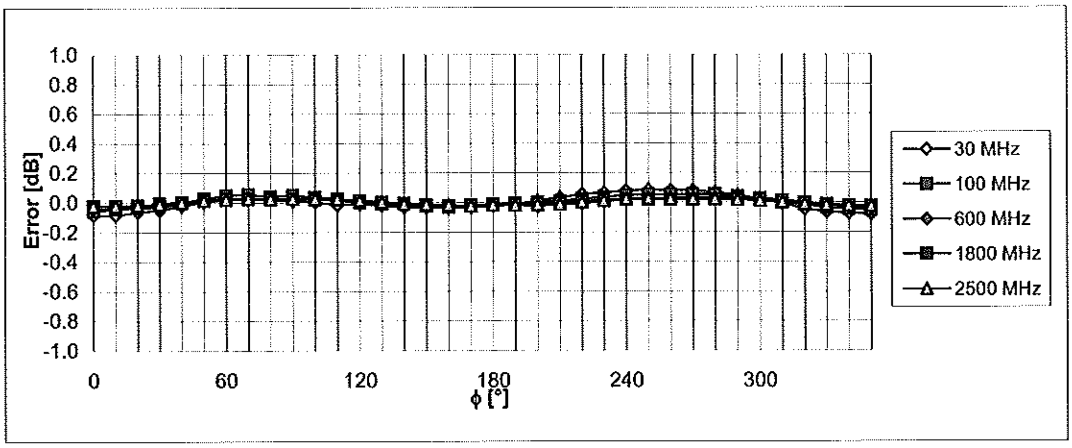


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



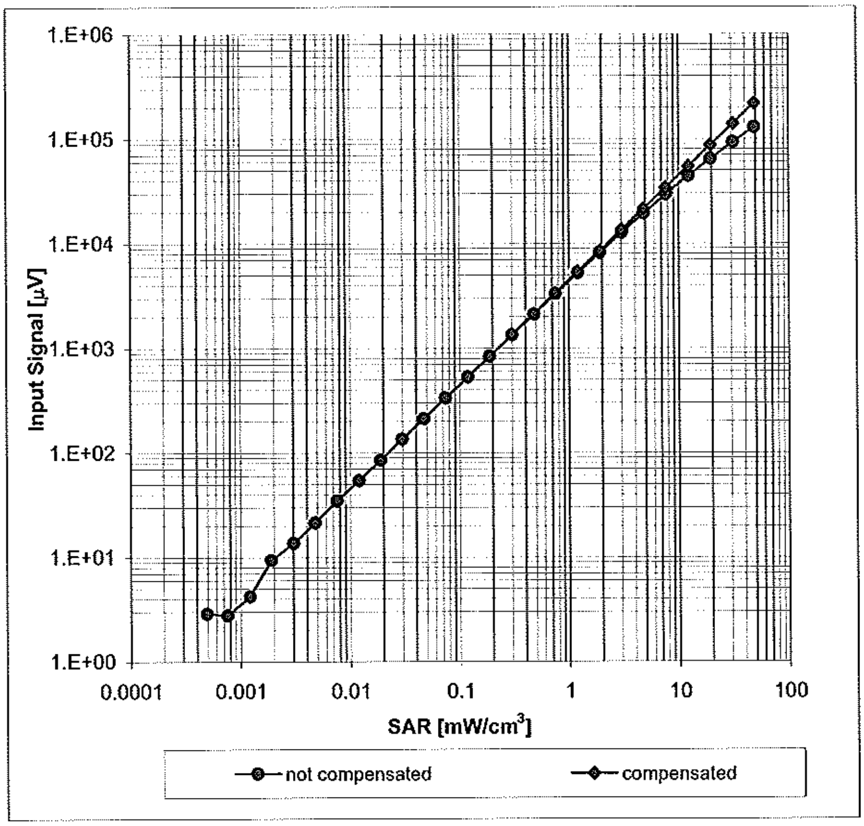


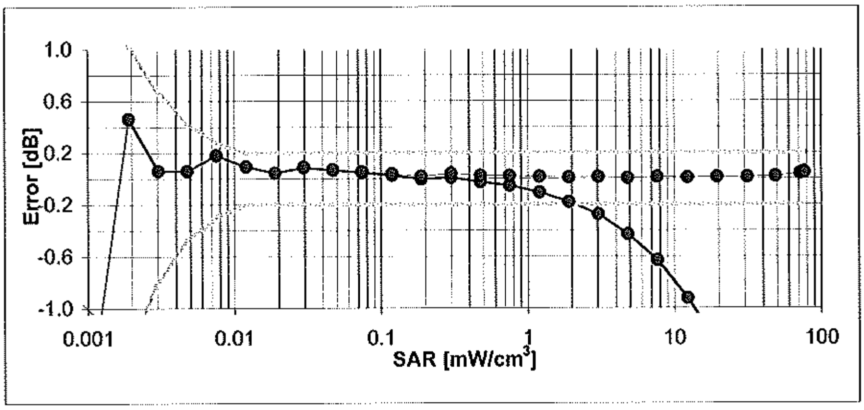


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

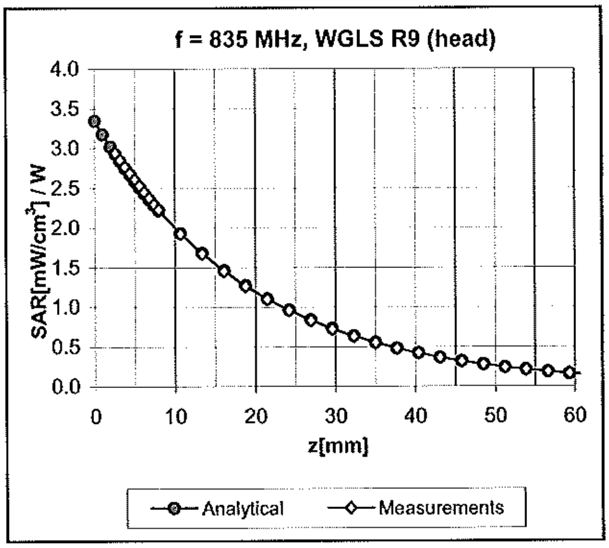
(Waveguide R22, f = 1800 MHz)

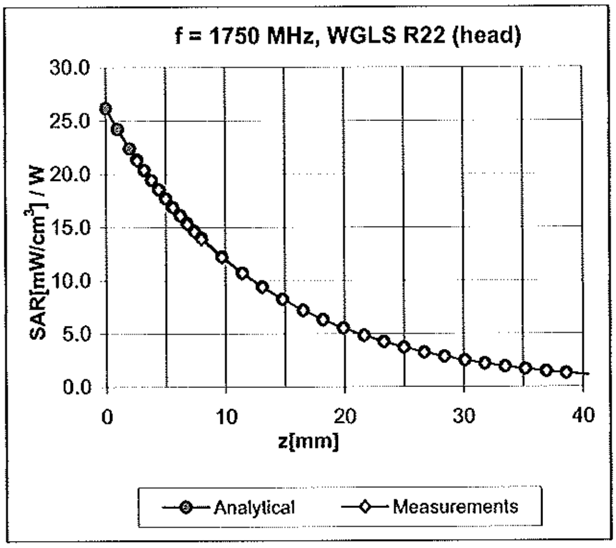




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

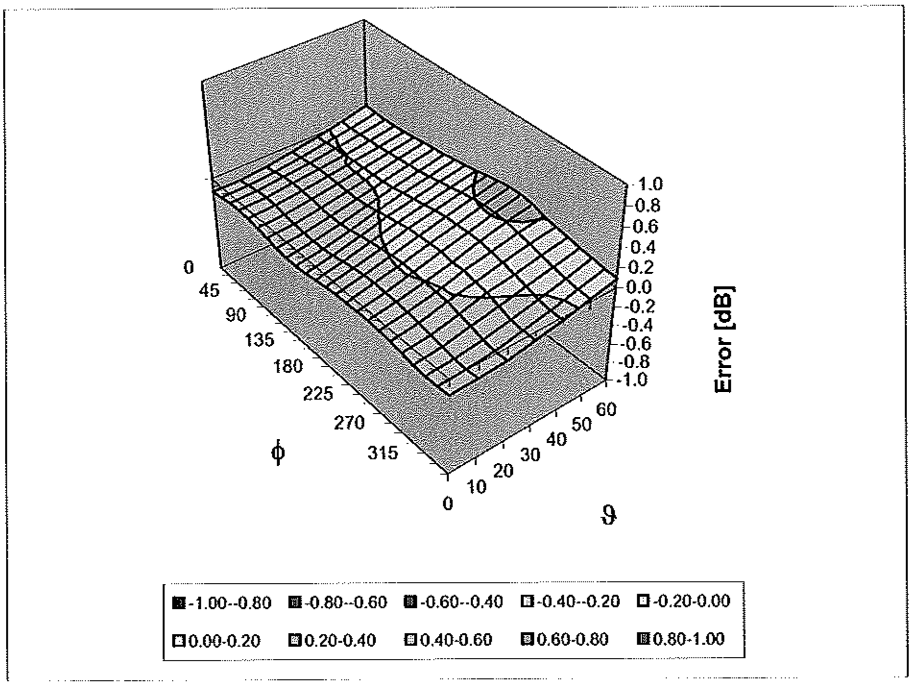
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Other Probe Parameters

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

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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: D750V3-1003_Aug10

CALIBRATION CERTIFICATE

Object	D750V3 - SN: 1003
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	August 19, 2010

KOK
8130110

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-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
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-09)	In house check: Oct-10

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

Issued: August 23, 2010

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

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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.2 ± 6 %	0.97 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	2.24 mW / g
SAR normalized	normalized to 1W	8.96 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**8.88 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.50 mW / g
SAR normalized	normalized to 1W	6.00 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**5.96 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.7 Ω - 3.3 jΩ
Return Loss	- 29.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.045 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 21, 2009

DASY5 Validation Report for Body TSL

Date/Time: 19.08.2010 14:22:09

Test Laboratory: SPEAG, Zurich, Switzerland

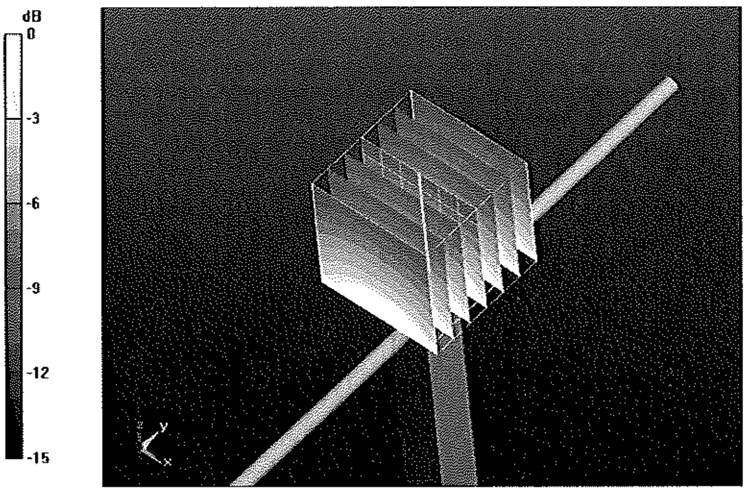
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1003

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: MSL U11 BB
Medium parameters used: f = 750 MHz; σ = 0.97 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.08, 6.08, 6.08); 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, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250mW; dip=15mm; dist=3.0mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.2 V/m; Power Drift = 0.013 dB
Peak SAR (extrapolated) = 3.23 W/kg
SAR(1 g) = 2.24 mW/g; SAR(10 g) = 1.5 mW/g
Maximum value of SAR (measured) = 2.59 mW/g



0 dB = 2.59mW/g

Impedance Measurement Plot for Body TSL