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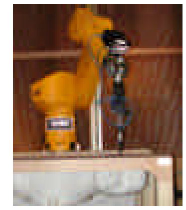

CERTIFICATE OF COMPLIANCE
(SAR EVALUATION)

APPLICANT NAME & ADDRESS:
MOTOROLA, INC.
8000 West Sunrise Blvd.
Ft. Lauderdale, FL 33322

DATE & LOCATION OF TESTING:
Dates of Tests: April 18-20, 2006
Additional Test Dates: May 4, 2006
Test Report S/N: 0604170281-R5
Test Site: PCTEST Lab, Columbia MD

FCC ID:	**IHDT56DB1**
APPLICANT:	**MOTOROLA, INC.**

EUT Type:	**Handheld Terminal with GSM, Bluetooth and WLAN Transceivers**
Tx Frequency:	**824.20 – 848.80MHz (GSM850) / 1850.20MHz – 1909.80MHz (GSM1900)** **2402 – 2480 MHz (Bluetooth)/ 2412 – 2462 MHz (WLAN)**
Rx Frequency:	**869.20 – 893.80MHz (GSM850) / 1930.20MHz – 1989.80MHz (GSM1900)** **2402 – 2480 MHz (Bluetooth)/ 2412 – 2462 MHz (WLAN)**
Max. RF Output Power:	**0.630 W GSM850 Conducted; 0.807 W PCS GSM Conducted;** **56 mW WLAN; 2.0 mW Bluetooth**
Max. SAR Measurement:	**GSM850: 0.1489 W Body SAR; GSM1900: 0.2161 W Body SAR;** **WLAN: 0.5821 W Body SAR**
Trade Name/Model(s):	**F4423A**
FCC Classification:	**Licensed Portable Transmitter worn on Body (PCT)** **Digital Transmission System (DTS)** **Spread Spectrum Transceiver (DSS)**
FCC Rule Part(s):	**§2.1093; FCC/OET Bulletin 65 Supplement C [July 2001]**
Application Type:	**Certification**
Test Device Serial No.:	**pilot vintage [S/N: #00039-082-693-121]**

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 Std. C95.1-1992 and had been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001) and IEEE Std. 1528 – 2003.

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.

***NOTE: This revised Test Report (S/N: 0604170281-R5) 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 report (S/N: 0604170281/-R1/-R2/-R3) and dispose of it accordingly.**

Grant Conditions: Power output listed is ERP for Part 22 and EIRP for Part 24. SAR compliance for body-worn operating configuration is based on the specific Belt clip tested in this filing. End-users must be informed of the body-worn operating requirements for satisfying RF exposure compliance.

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

Randy Ortanez
President

TABLE OF CONTENTS

1. INTRODUCTION / SAR DEFINITION

The FCC has adopted the guidelines for evaluating the environmental effects of radiofrequency 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*. (c) 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017.[2] The measurement procedure described in *IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave*[3] is used for guidance in measuring 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 National Council on Radiation Protection and Measurements (NCRP) in *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*," NCRP Report No. 86 (c) NCRP, 1986, Bethesda, MD 20814.[6] 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.

SAR Definition

Specific Absorption Rate (SAR) 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 (*r*). 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).

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

Figure 1.1
SAR Mathematical Equation

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

$$SAR = s\,\mathbf{E}^2 / r$$

where:

s	=	conductivity of the tissue-simulant material (S/m)
r	=	mass density of the tissue-simulant material (kg/m^3)
$\mathbf{E}$	=	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 relations 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. SAR MEASUREMENT SETUP

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 high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the 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 Fig. 2.1).

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 Gateway Pentium 4 2.53 GHz computer with Windows XP system and 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, AD-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 of the DAE and transfers data to the PC plug-in card.

System Electronics

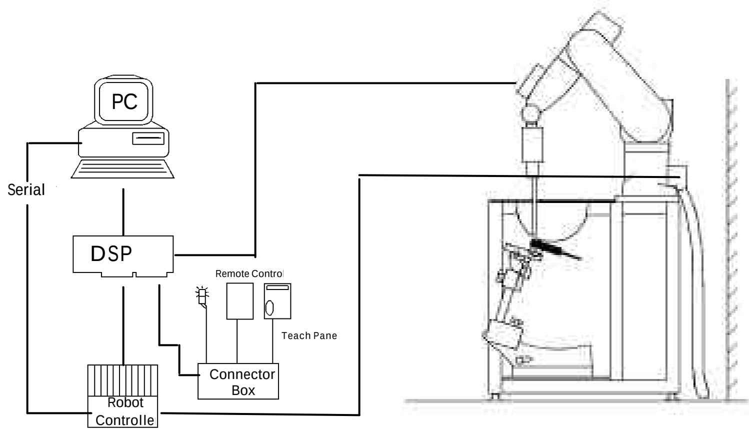

Figure 2.1 SAR Measurement System Setup

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, 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. The system is described in detail in [7].

3. DASY4 E-FIELD PROBE SYSTEM

Probe Measurement System

Figure 3.1 DAE System

The SAR measurements were conducted with the dosimetric probe EX3DV4, designed in the classical triangular configuration [7] (see Fig. 3.2) and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip (see Fig. 3.3). 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 fitting (see Fig.3.1). The approach is stopped at reaching the maximum.

Probe Specifications

Calibration:	In air from 10 MHz to 6 GHz
	In head and body simulating tissue at
	Frequencies of 150 MHz, 450 MHz, 835 MHz, 900 MHz, 1900MHz, 2450MHz, 5300MHz, & 5800MHz
Frequency:	10 MHz to > 6 GHz; Linearity: ± 0.2 dB
	(30 MHz to 6 GHz)
Directivity:	± 0.2 dB in HSL (rotation around probe axis)
	± 0.4 dB in HSL (rotation normal probe axis)
Dynamic:	5 mW/g to > 100 mW/g;
Range:	Linearity: ± 0.2 dB
Dimensions:	Overall length: 330 mm
	Tip length: 16 mm
	Body diameter: 12 mm
	Tip diameter: 3 mm
	Distance from probe tip to dipole centers: 2 mm
Application:	General dosimetry up to 6 GHz
	Compliance tests of mobile phones
	Fast automatic scanning in arbitrary phantoms

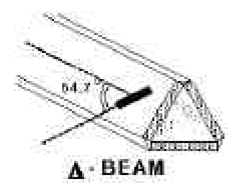

Figure 3.1 Triangular Probe Configuration

Figure 3.2 Probe Thick-Film Technique

4. Probe Calibration Process

Dosimetric Assessment Procedure

Each probe is calibrated according to a dosimetric assessment procedure described in [8] with accuracy better than +/- 10%. The spherical isotropy was evaluated with the procedure described in [9] and found to be better than +/-0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe is tested.

Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies below 1 GHz (see Fig. 4.1), and in a waveguide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity at the proper orientation with the field. The probe is then rotated 360 degrees.

Temperature Assessment *

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe (see Fig. 4.2).

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

where:

Δt = exposure time (30 seconds),

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

ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T / \Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E- field;

$$\text{SAR} = \frac{|E|^2 \cdot s}{r}$$

where:

σ = simulated tissue conductivity,

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

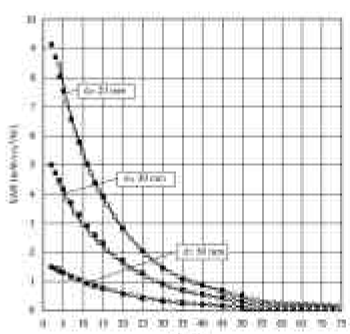

Figure 4.1 E-Field and Temperature measurements at 900MHz [7]

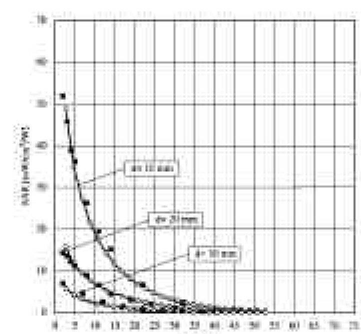

Figure 4.2 E-Field and temperature measurements at 1.9GHz [7]

**NOTE: The temperature calibration was not performed by PCTEST. For information use only.*

5. PHANTOM & EQUIVALENT TISSUES

SAM Phantom

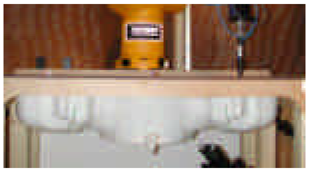

Figure 5.1 SAM Twin Phantom

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users [11][12]. It enables the dosimetric evaluation of left and right hand terminal usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. 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. (see Fig. 5.1)

Head & Body Simulating Mixture Characterization

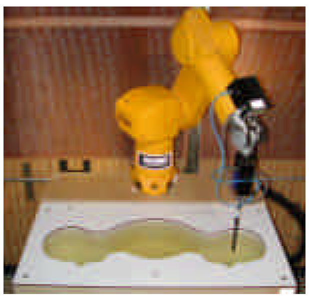

Figure 5.2 Simulated Tissue

The head and body mixtures consist of a viscous gel using hydroxethylcellullose (HEC) gelling agent and saline solution (see Table 6.1). Preservation with a bacteriacide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in the following table. Other head and body tissue parameters that have not bee specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations The mixture characterizations used for the head and body tissue simulating liquids are according to the data by C. Gabriel and G. Hartsgrove [13].(see Fig. 5.2)

Table 5.1 Composition of the Head & Body Tissue Equivalent Matter

INGREDIENTS		SIMULATING TISSUE					
		835MHz Head	835MHz Body	1900MHz Head	1900MHz Body	2450MHz Head	2450MHz Body
Mixture Percentage							
WATER		41.45	52.50	54.90	59.98	62.70	73.2
DGBE		0.000	0.000	44.92	38.41	0.000	26.7
SUGAR		56.00	45.00	0.000	58.00	0.000	0.000
SALT		1.450	1.400	0.180	0.100	0.5	0.04
BACTERIACIDE		0.100	0.100	0.000	0.100	0.000	0.000
HEC		1.000	1.000	0.000	1.410	0.000	0.000
Dielectric Constant	Target	41.50	55.20	40.00	53.30	39.20	52.70
Conductivity (S/m)	Target	0.900	0.970	1.40	1.52	1.80	1.95

Device Holder for Transmitters

Figure 5.2 Mounting Device

In combination with the SAM Twin Phantom V4.0, the Mounting Device (see Fig. 5.2) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation point is the ear opening. The devices can be easily, accurately, and repeatably be positioned according to the FCC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

* Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produce infinite number of configurations [12]. To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

6. TEST SYSTEM SPECIFICATIONS

Automated Test System Specifications

Positioner

Robot:	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability:	0.02 mm
No. of axis:	6

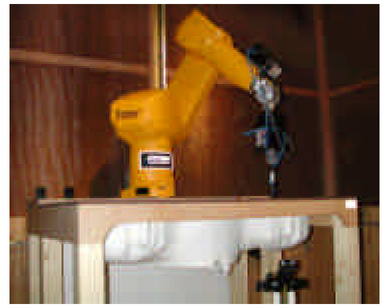

Figure 6.1 DASY4 Test System

Data Acquisition Electronic (DAE) System

Cell Controller

Processor:	Pentium 4
Clock Speed:	2.53 GHz
Operating System:	Windows XP Professional

Data Converter

Features:	Signal Amplifier, multiplexer, A/D converter, & control logic
Software:	DASY4 software
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock

PC Interface Card

Function:	24 bit (64 MHz) DSP for real time processing Link to DAE4 16 bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot

E-Field Probes

Model:	EX3DV4 S/N: 3561
Construction:	Triangular core
Frequency:	10 MHz to 6 GHz
Linearity:	± 0.2 dB (30 MHz to 6 GHz)

Phantom

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

7. TEST CONFIGURATION POSITIONS

Body Holster / Belt Clip Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 9.5). A device with a terminal output is tested with a terminal connected to the device. Body dielectric parameters are used.

In all cases SAR measurements are performed to investigate the worst-case positioning. Worst-case positioning is then documented and used to perform Body SAR testing.

In order for users to be aware of the body-worn operating requirements for meeting RF exposure compliance, operating instructions and cautions statements are included in the user's manual.

Figure 9.5 Typical Body Belt Clip & Holster Configurations Example Photo Only (Not Actual EUT)

8. ANSI/IEEE C95.1 - 1992 RF EXPOSURE LIMITS

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.

Controlled Environment

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

Table 10.1. Safety Limits for Partial Body Exposure [2]

	HUMAN EXPOSURE LIMITS	
	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/kg) or (mW/g)
SPATIAL PEAK SAR [1] Head	1.60	8.00
SPATIAL AVERAGE SAR [2] Whole Body	0.08	0.40
SPATIAL PEAK SAR [3] Hands, Feet, Ankles, Wrists	4.00	20.00

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.

9. MEASUREMENT UNCERTAINTIES

a	b	c	d	e= f(d,k)	f	g	h = cxf/e	i = cxg/e	k
Uncertainty Component	**Sec.**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i (1 - g)**	**c_i (10 - g)**	**1 - g u_i (± %)**	**10 - g u_i (± %)**	**v_i**
Measurement System									
Probe Calibration	E1.1	5.9	N	1	1	1	5.9	5.9	∞
Axial Isotropy	E1.2	4.7	R	√3	0.7	0.7	1.9	1.9	∞
Hemishperical Isotropy	E1.2	9.6	R	√3	0.7	0.7	3.9	3.9	∞
Boundary Effect	E1.3	1.0	R	√3	1	1	0.6	0.6	∞
Linearity	E1.4	4.7	R	√3	1	1	2.7	2.7	∞
System Detection Limits	E1.5	1.0	R	√3	1	1	0.6	0.6	∞
Readout Electronics	E1.6	1.0	N	1	1	1	1.0	1.0	∞
Response Time	E1.7	0.8	R	√3	1	1	0.5	0.5	∞
Integration Time	E1.8	2.6	R	√3	1	1	1.5	1.5	∞
RF Ambient Conditions	E5.1	3.0	R	√3	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E5.2	0.4	R	√3	1	1	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E5.3	2.9	R	√3	1	1	1.7	1.7	∞
Extrapolation, Interpolation & Integration Algorithms for Max. SAR Evaluation	E4.2	1.0	R	√3	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E3.2.1	2.9	N	1	1	1	2.9	2.9	145
Device Holder Uncertainty	E3.1.1	3.6	N	1	1	1	3.6	3.6	5
Output Power Variation - SAR drift measurement	5.6.2	5.0	R	√3	1	1	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E2.1	4.0	R	√3	1	1	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E2.2	5.0	R	√3	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E2.2	2.5	N	1	0.64	0.43	1.6	1.1	∞
Liquid Permittivity - deviation from target values	E2.2	5.0	R	√3	0.6	0.5	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E2.2	2.5	N	1	0.6	0.5	1.5	1.2	∞
Combined Standard Uncertainty (k=1)			RSS				10.8	10.6	
Expanded Uncertainty (k=2) (95% CONFIDENCE LEVEL)							21.7	21.2	

The above measurement uncertainties are according to IEEE Std. P1528 D1.2 (April 2003).

10. SYSTEM VERIFICATION

Tissue Verification

Table 12.1 Simulated Tissue Verification [5]

MEASURED TISSUE PARAMETERS									
Date(s)	04/18/2006 - 04/20/2006 & 05/04/2006	835MHz Head		835MHz Body		1900MHz Head		1900MHz Body	
Liquid Temperature (°C)		Target	Measured	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		41.50	42.55	55.20	56.24	40.00	40.98	53.30	52.53
Conductivity: σ		0.900	0.89	0.970	0.99	1.400	1.37	1.520	1.58

MEASURED TISSUE PARAMETERS					
Date(s)	04/18/2006 - 04/20/2006 & 05/04/2006	2450MHz Head		2450MHz Body	
Liquid Temperature (°C)		Target	Measured	Target	Measured
Dielectric Constant: ε		39.20	38.43	52.70	53.14
Conductivity: σ		1.80	1.82	1.95	1.93

MEASURED TISSUE PARAMETERS							
Date(s)	04/18/2006 - 04/20/2006 & 05/04/2006	835MHz Head		1900MHz Head		2450MHz Head	
Liquid Temperature (°C)		Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		41.50	42.18	40.00	41.13	39.20	38.62
Conductivity: σ		0.900	0.90	1.400	1.38	1.800	1.83

10. SYSTEM VERIFICATION (Continued)

Test System Validation

Prior to assessment, the system is verified to the ±10% of the specifications at 835MHz, 1900MHz and 2450 MHz by using the system validation kit(s). (Graphic Plots Attached)

Table 12.2 System Validation [5]

SYSTEM VALIDATION TARGET & MEASURED							
Date:	**Amb. Temp (°C)**	**Liquid Temp (°C)**	**Input Power (W)**	**Tissue**	**Targeted SAR1g (mW/g)**	**Measured SAR1g (mW/g)**	**Deviation (%)**
04/19/2006	23.5	21.6	0.250	835 MHz Head	2.38	2.440	2.73
05/04/2006	23.2	21.6				2.490	4.84
04/20/2006	23.4	21.5	0.100	1900 MHz Head	3.97	4.090	3.02
05/04/2006	23.2	21.4				4.130	4.03
04/18/2006	23.4	21.2	0.100	2450MHz Head	5.240	5.460	4.19
05/04/2006	23.2	21.4				5.420	3.43

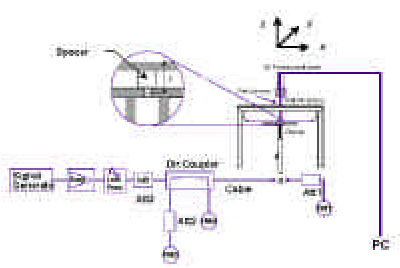

Figure 12.1 Dipole Validation Test Setup

11. SAR TEST DATA SUMMARY

See Measurement Result Data Pages

Procedures Used To Establish Test Signal

The terminal was placed into simulated call mode (Cellular GSM, PCS GSM, Bluetooth and WLAN modes) using manufacturers test codes. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR [4]. When test modes are not available or inappropriate for testing a handset, the actual transmission is activated through a base station simulator or similar equipment. See data pages for actual procedure used in measurement.

Device Test Conditions

The handset is battery operated. Each SAR measurement was taken with a fully charged battery. In order to verify that the device was tested at full power, conducted output power measurements were performed before and after each SAR measurement to confirm the output power. If a conducted power deviation of more than 5% occurred, the test was repeated.

SAR DATA SUMMARY (Continued)

Mixture Type: 850MHz Body

11.1 MEASUREMENT RESULTS (GSM850 Body SAR)

FREQUENCY		Modulation	Begin / End POWER‡			Carry Case	Device Test Position	SAR W/kg	Drift dB	Cal SAR W/kg
MHz	Ch.		(dBm)		Battery					
836.60	190	GSM	28.02	27.91	FTN6032B	FHN6498A	W/ Holster	**0.1450**	-0.114	**0.1489**
836.60	190	GSM	28.02	27.74	FTN6032B	None	Bystander	0.0536	-0.283	0.0572
836.60	190	GSM	28.02	28.08	FTN6032B	None	Touch-Bottom	0.0454	0.061	0.0448
836.60	190	GSM	28.02	28.22	FTN6032B	None	2.5 cm Front	0.0367	0.196	0.0351
836.60	190	GSM	28.02	28.19	FTN6032B	None	2.5 cm Back	0.0558	0.166	0.0537
*836.60	190	GSM	28.00	27.90	FTN6032B	FHN6498A	W/ Holster	**0.1440**	-0.100	**0.1474**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g)** averaged over 1 gram				

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-body position set in a typical configuration.
   Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated including all data bit rates, and worst-case results are reported.
3. Battery is fully charged for all readings. Standard batteries are the only option.
   ‡Power Measured ☒ Conducted ☐ ERP ☐ EIRP
4. SAR Measurement System ☒ DASY4 ☐ IDX
   Phantom Configuration ☐ Left Head ☒ Flat Phantom ☐ Right Head
5. SAR Configuration ☐ Head ☒ Body ☐ Hand
6. Test Signal Call Mode ☒ Manu. Test Codes ☐ Base Station Simulator
7. ‡‡Test Configuration ☒ With Beltclip ☐ Without Beltclip
8. Tissue parameters and temperatures are listed on the SAR plots.
9. Both sides of the terminal were tested and the worst-case side is reported.
10. Liquid tissue depth is 15.1 cm. ± 0.1

*11. EUT tested with Bluetooth ON.

Alfred Cirwithian
Vice President Engineering

Mixture Type: 1900MHz Body

11.2 MEASUREMENT RESULTS (GSM1900 Body SAR)

FREQUENCY		Modulation	Begin / End POWER‡			Carry Case	Device Test Position	SAR W/kg	Drift dB	Cal SAR W/kg
MHz	Ch.		(dBm)		Battery					
1880.00	661	GSM	29.08	29.28	FTN6032B	FHN6498A	W/ Holster	**0.2260**	0.195	**0.2161**
1880.00	661	GSM	29.08	29.13	FTN6032B	None	Bystander	0.0372	0.046	0.0368
1880.00	661	GSM	29.08	29.34	FTN6032B	None	Touch-Bottom	0.0321	0.264	0.0302
1880.00	661	GSM	29.08	28.92	FTN6032B	None	2.5 cm Front	0.0114	-0.159	0.0118
1880.00	661	GSM	29.08	29.35	FTN6032B	None	2.5 cm Back	0.1350	0.265	0.1270
*1880.00	661	GSM	29.08	29.28	FTN6032B	FHN6498A	W/ Holster	**0.2258**	0.193	**0.2160**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g)** averaged over 1 gram				

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-body position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated including all data bit rates, and worst-case results are reported.
3. Battery is fully charged for all readings. Standard batteries are the only option.
   ‡Power Measured ☒ Conducted ☐ ERP ☐ EIRP
4. SAR Measurement System ☒ DASY4 ☐ IDX
   Phantom Configuration ☐ Left Head ☒ Flat Phantom ☐ Right Head
5. SAR Configuration ☐ Head ☒ Body ☐ Hand
6. Test Signal Call Mode ☒ Manu. Test Codes ☐ Base Station Simulator
7. ‡‡Test Configuration ☒ With Beltclip ☐ Without Beltclip
8. Tissue parameters and temperatures are listed on the SAR plots.
9. Both sides of the terminal were tested and the worst-case side is reported.
10. Liquid tissue depth is 15.1 cm. ± 0.1

*11. EUT tested with Bluetooth ON.

Alfred Cirwithian
Vice President Engineering

Mixture Type: 2450MHz Body

11.3 MEASUREMENT RESULTS (2450 MHz Body SAR)

FREQUENCY		Modulation	Begin / End POWER‡			Device Test Position	Bluetooth MHz	Data Bit Rate	SAR W/kg	Drift dB	Cal SAR W/kg
MHz	Ch.		(dBm)		Battery						
2437	06	DSSS	17.02	17.29	FTN6032B	W/ Holster	Off	1	0.5620	0.272	0.5279
2437	06	DSSS	17.02	17.29	FTN6032B	W/ Holster	Off	2	0.5780	0.266	0.5437
2437	06	DSSS	17.02	17.10	FTN6032B	W/ Holster	Off	5.5	0.6040	0.077	0.5935
2437	06	DSSS	17.02	17.27	FTN6032B	W/ Holster	Off	11	0.5960	0.253	0.5623
2437	06	DSSS	17.02	17.25	FTN6032B	W/ Holster	2441	5.5	**0.6140**	0.232	**0.5821**
2437	06	DSSS	17.02	17.31	FTN6032B	Bystander	Off	5.5	0.0458	0.285	0.0429
2437	06	DSSS	17.02	16.82	FTN6032B	Touch-Bottom	Off	5.5	0.0251	-0.043	-0.0427
2437	06	DSSS	17.02	17.32	FTN6032B	2.5 cm Front	Off	5.5	0.0034	0.299	0.0031
2437	06	DSSS	17.02	17.26	FTN6032B	2.5 cm Back	Off	5.5	0.1760	0.242	0.1665
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram					

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-body position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supp.C [July 2001].
2. All modes of operation were investigated including all data bit rates, and worst-case results are reported.
3. Battery is fully charged for all readings. Standard batteries are the only option.

‡Power Measured	☒ Conducted	☐ ERP	☐ EIRP
4. SAR Measurement System	☒ DASY4	☐ IDX	
Phantom Configuration	☐ Left Head	☒ Flat Phantom	☐ Right Head
5. SAR Configuration	☐ Head	☒ Body	☐ Hand
6. Test Signal Call Mode	☒ Manu. Test Codes	☐ Base Station Simulator	
7. ‡‡Test Configuration	☒ With Beltclip	☐ Without Beltclip	

8. Tissue parameters and temperatures are listed on the SAR plots.
9. Both sides of the terminal were tested and the worst-case side is reported.
10. Liquid tissue depth is 15.1 cm. ± 0.1

Alfred Cirwithian
Vice President Engineering

12. SAR Test Equipment

Equipment Calibration

Type	Calibration Date	Serial Number
Stäubli Robot RX60L	Oct-05	599131-01
Stäubli Robot Controller	Oct-05	PCT592
Stäubli Teach Pendant (Joystick)	Oct-05	3323-00161
Micron Computer, 450 MHz Pentium III, Windows NT	Oct-05	PCT577
SPEAG EDC3	Oct-05	321
SPEAG DAE4	Sep-05	649
SPEAG E-Field Probe EX3DV4	Aug-05	3561
SPEAG SAM Twin Phantom V4.0 (Main)	Oct-05	TP:1197
SPEAG SAM Twin Phantom V4.0 (Sub)	Oct-05	TP:1357
SPEAG Light Alignment Sensor	Oct-05	205
SPEAG Validation Dipole D835V2	Feb-06	4d026
SPEAG Validation Dipole D1900V2	Feb-06	502
SPEAG Validation Dipole D2450V2	Feb-06	719
Brain Equivalent Matter (835MHz)	Dec-05	PCTBEM101
Brain Equivalent Matter (1900MHz)	Dec-05	PCTBEM301
Brain Equivalent Matter (2450MHz)	Dec-05	PCTBEM501
Muscle Equivalent Matter (835MHz)	Dec-05	PCTMEM201
Muscle Equivalent Matter (1900MHz)	Dec-05	PCTMEM401
Muscle Equivalent Matter (2450MHz)	Dec-05	PCTMEM601
Microwave Amp. Model: 5S1G4, (800MHz - 4.2GHz)	Jan-06	22332
Gigatronics 8651A Power Meter	Jan-06	1835299
HP-8648D (9kHz ~ 4GHz) Signal Generator	Jan-06	PCT530
Amplifier Research 5S1G4 Power Amp	Jan-06	PCT540
HP-8753E (30kHz ~ 3GHz) Network Analyzer	Jun-05	PCT552/ JP8020182
HP85070B Dielectric Probe Kit	Jan-06	PCT501
Ambient Noise/Reflection, etc. <12mW/kg/<3%of SAR	Jan-06	Anechoic Room PCT01

Table 15.1 Test Equipment Calibration

NOTE:

The E-field probe was calibrated by SPEAG, by waveguide technique procedure. Dipole Validation measurement is performed by PCTEST Lab. before each test. The head simulating material is calibrated by PCTEST using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the head-equivalent material.

13. CONCLUSION

Measurement Conclusion

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the FCC. These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The tested device complies with the requirements in respect to all parameters subject to the test. The test 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 innumerable factors may interact to determine the specific biological outcome of an exposure to electromagnetic fields, any protection guide shall consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.[3]

14. REFERENCES

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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: Motorola Model: F4423A; Type: GSM Dual Band+WLAN+Bluetooth; SN: 00039-082-693-121

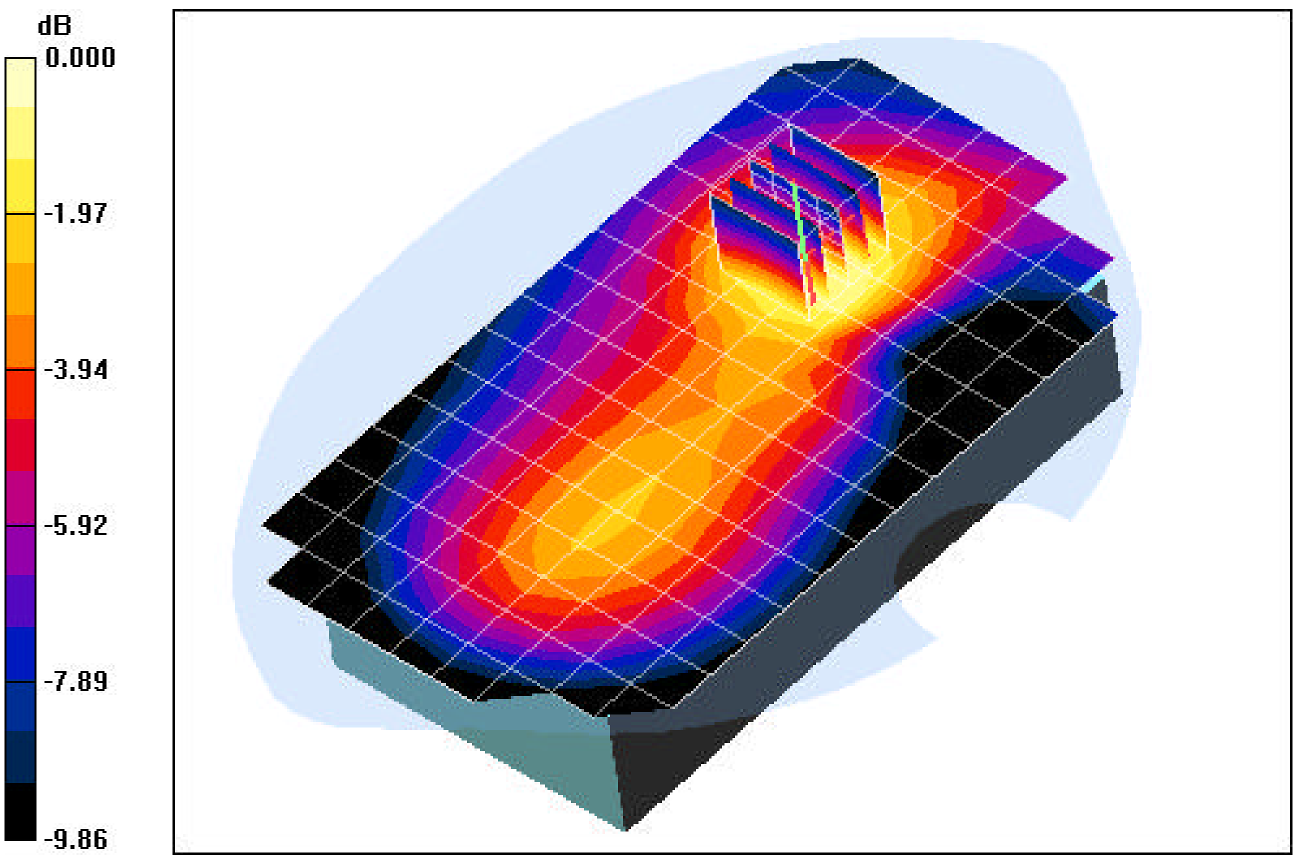
Communication System: GSM850 Motorola; Frequency: 836.6 MHz;Duty Cycle: 1:8
Medium: 835 Muscle (σ = 0.99 mho/m, ε_r = 56.24, ρ = 1000 kg/m^3)
Phantom section: Flat Section

Test Date: 04-19-2006; Ambient Temp: 23.5°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3561; ConvF(7.9, 7.9, 7.9); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body, w/ Holster, Ch.190, Li-Ion Battery FTN6032B, Antenna Internal

Area Scan (10x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.87 V/m; Power Drift = -0.114 dB
Peak SAR (extrapolated) = 0.202 W/kg
SAR(1 g) = 0.145 mW/g; SAR(10 g) = 0.100 mW/g



0 dB = 0.167mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Motorola Model: F4423A; Type: GSM Dual Band+WLAN+Bluetooth; SN: 00039-082-693-121

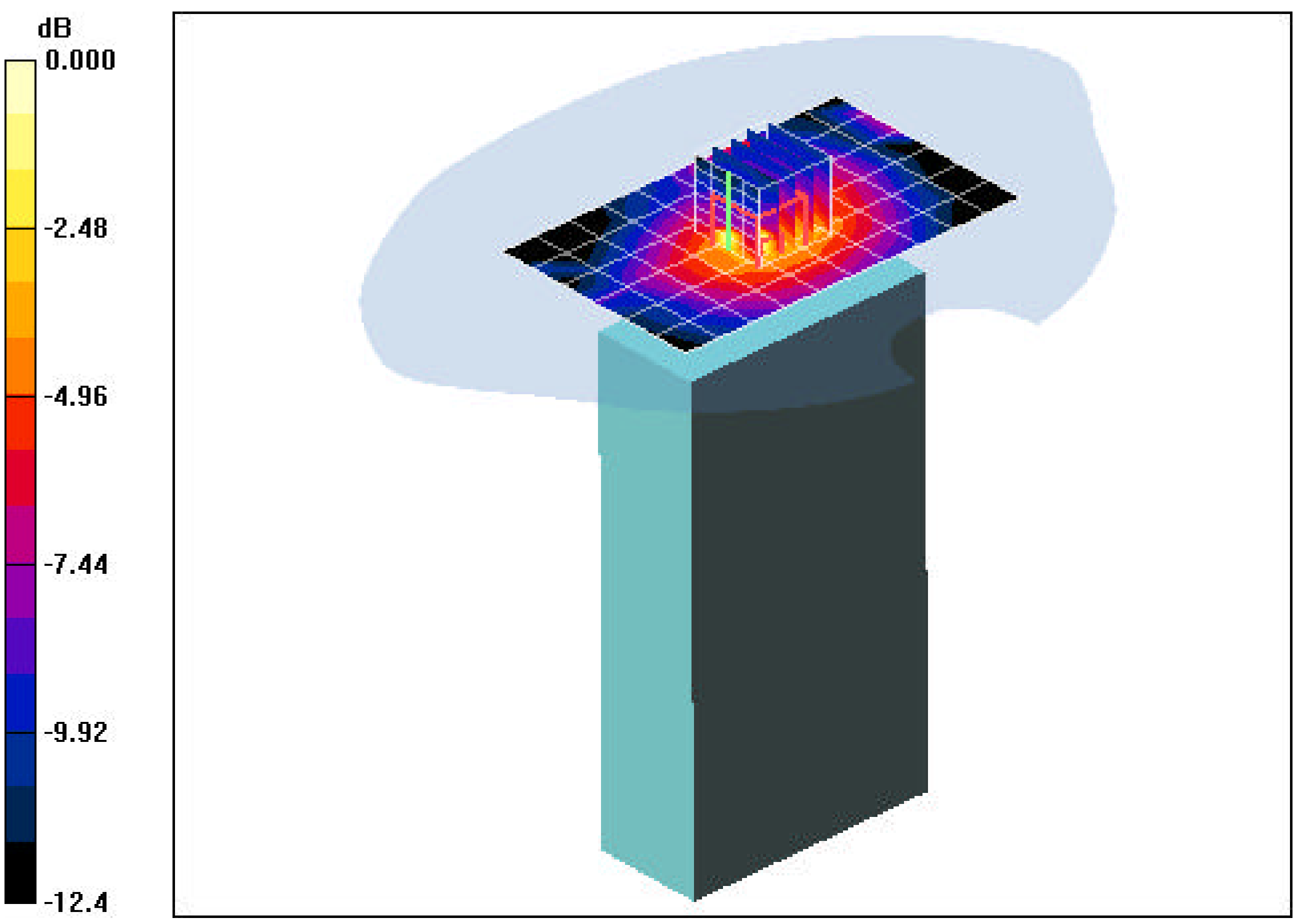
Communication System: GSM850 Motorola; Frequency: 836.6 MHz;Duty Cycle: 1:8
Medium: 835 Muscle (σ = 0.99 mho/m, ε_r = 56.21, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 2.5cm from DUT to Flat Phantom

Test Date: 04-19-2006; Ambient Temp: 23.5°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3561; ConvF(7.9, 7.9, 7.9); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body, Bystander Top side, Ch.190, Li-Ion Battery FTN6032B, Antenna Internal

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
(5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.55 V/m; Power Drift = -0.283 dB
Peak SAR (extrapolated) = 0.084 W/kg
SAR(1 g) = 0.054 mW/g; SAR(10 g) = 0.029 mW/g



0 dB = 0.084mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Motorola Model: F4423A; Type: GSM Dual Band+WLAN+Bluetooth; SN: 00039-082-693-121

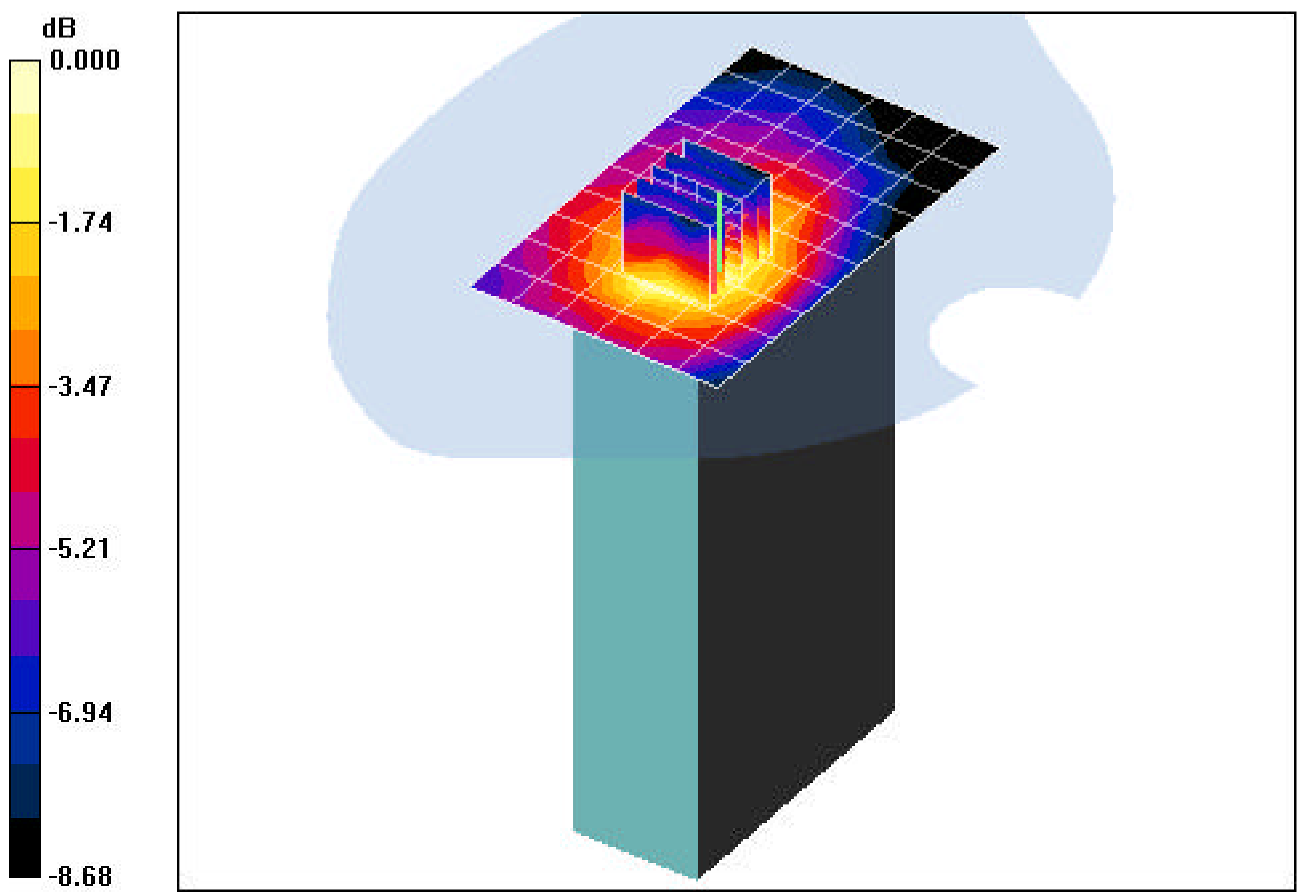
Communication System: GSM850 Motorola; Frequency: 836.6 MHz;Duty Cycle: 1:8
Medium: 835 Muscle (σ = 0.99 mho/m, ε_r = 56.21, ρ = 1000 kg/m^3)
Phantom section: Flat Section

Test Date: 04-19-2006; Ambient Temp: 23.5°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3561; ConvF(7.9, 7.9, 7.9); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body, Touch Bottom side, Ch.190, Li-Ion Battery FTN6032B, Antenna Internal

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.27 V/m; Power Drift = 0.061 dB
Peak SAR (extrapolated) = 0.065 W/kg
SAR(1 g) = 0.045 mW/g; SAR(10 g) = 0.032 mW/g



0 dB = 0.051mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Motorola Model: F4423A; Type: GSM Dual Band+WLAN+Bluetooth; SN: 00039-082-693-121

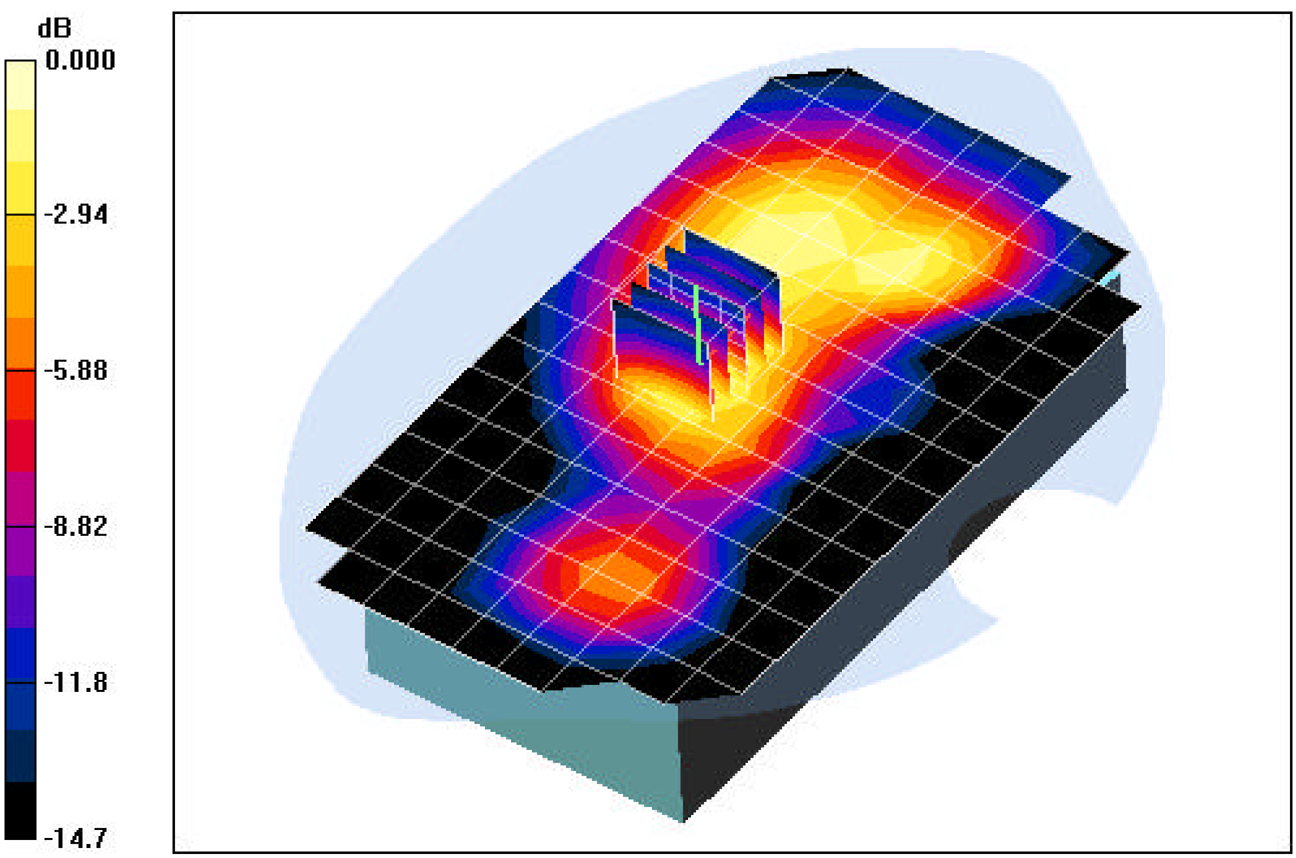
Communication System: GSM1900 Motorola; Frequency: 1880 MHz;Duty Cycle: 1:8
Medium: 1900 Muscle (σ = 1.58 mho/m, ε_r = 52.53, ρ = 1000 kg/m^3)
Phantom section: Flat Section

Test Date: 04-20-2006; Ambient Temp: 23.4°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3561; ConvF(6.48, 6.48, 6.48); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body, w/ Holster, Ch.661, Li-Ion Battery FTN6032B, Antenna Internal

Area Scan (10x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.81 V/m; Power Drift = 0.195 dB
Peak SAR (extrapolated) = 0.354 W/kg
SAR(1 g) = 0.226 mW/g; SAR(10 g) = 0.132 mW/g



0 dB = 0.272mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Motorola Model: F4423A; Type: GSM Dual Band+WLAN+Bluetooth; SN: 00039-082-693-121

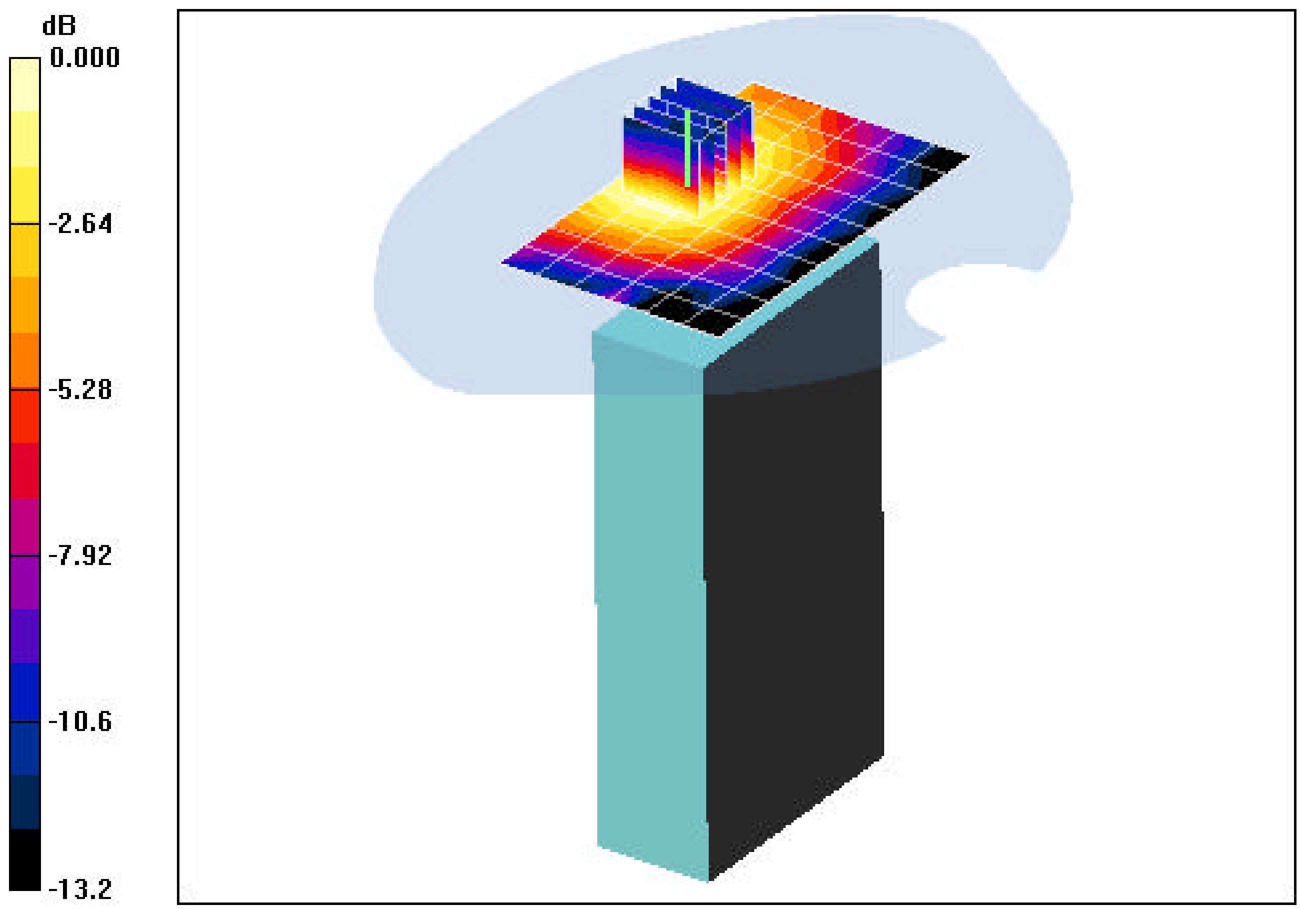
Communication System: GSM1900 Motorola; Frequency: 1880 MHz;Duty Cycle: 1:8
Medium: 1900 Muscle (σ = 1.58 mho/m, ε_r = 52.53, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 2.5cm from DUT to Flat Phantom

Test Date: 04-20-2006; Ambient Temp: 23.4°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3561; ConvF(6.48, 6.48, 6.48); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body, Bystander Top side, Ch.661, Li-Ion Battery FTN6032B, Antenna Internal

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.23 V/m; Power Drift = 0.046 dB
Peak SAR (extrapolated) = 0.057 W/kg
SAR(1 g) = 0.037 mW/g; SAR(10 g) = 0.025 mW/g



0 dB = 0.043mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Motorola Model: F4423A; Type: GSM Dual Band+WLAN+Bluetooth; SN: 00039-082-693-121

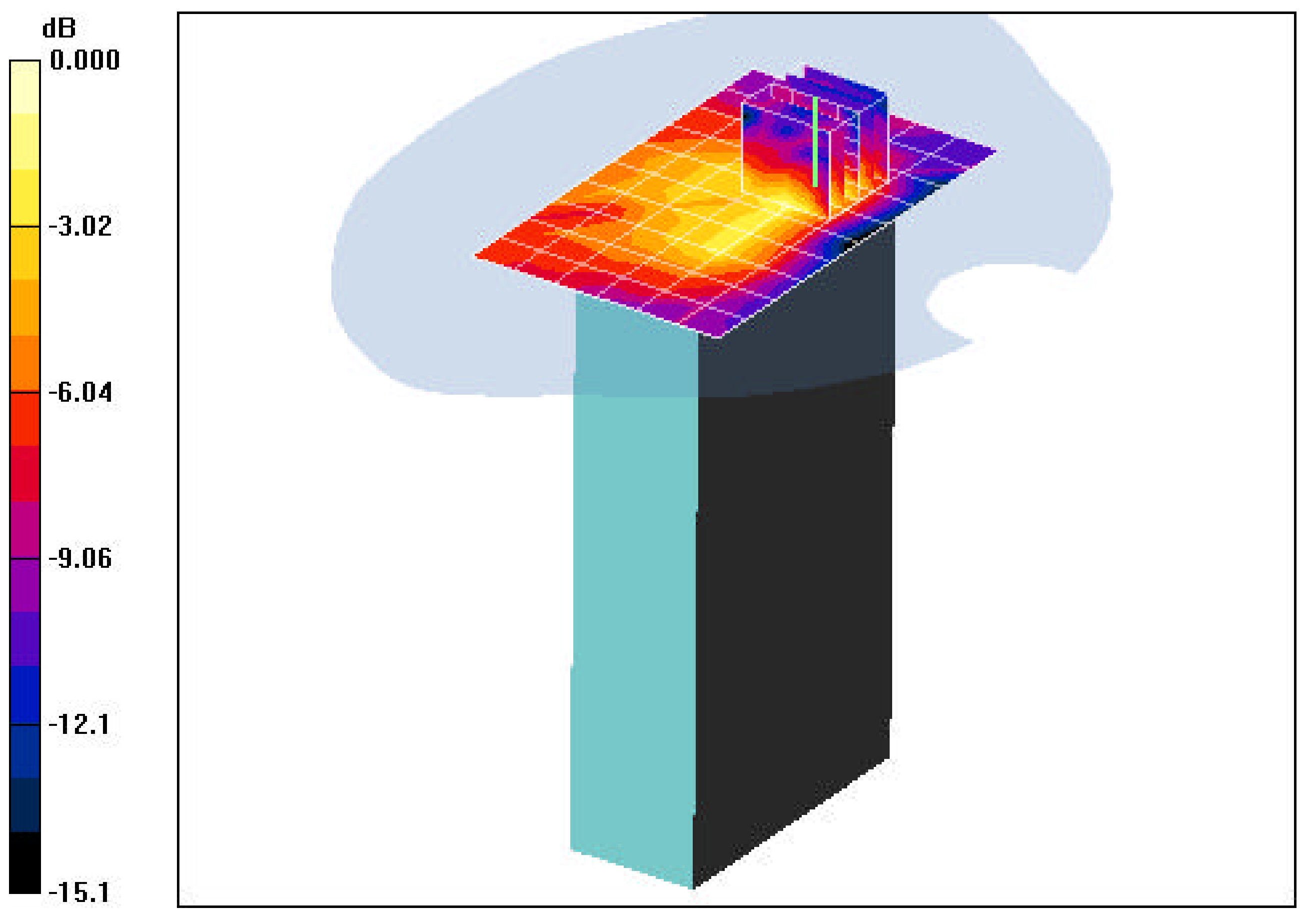
Communication System: GSM1900 Motorola; Frequency: 1880 MHz;Duty Cycle: 1:8
Medium: 1900 Muscle (σ = 1.58 mho/m, ε_r = 52.53, ρ = 1000 kg/m^3)
Phantom section: Flat Section

Test Date: 04-20-2006; Ambient Temp: 23.4°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3561; ConvF(6.48, 6.48, 6.48); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body, Touch Bottom side, Ch.661, Li-Ion Battery FTN6032B, Antenna Internal

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.97 V/m; Power Drift = 0.264 dB
Peak SAR (extrapolated) = 0.056 W/kg
SAR(1 g) = 0.032 mW/g; SAR(10 g) = 0.018 mW/g



0 dB = 0.039mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Motorola Model: F4423A; Type: GSM Dual Band+WLAN+Bluetooth; SN: 00039-082-693-121

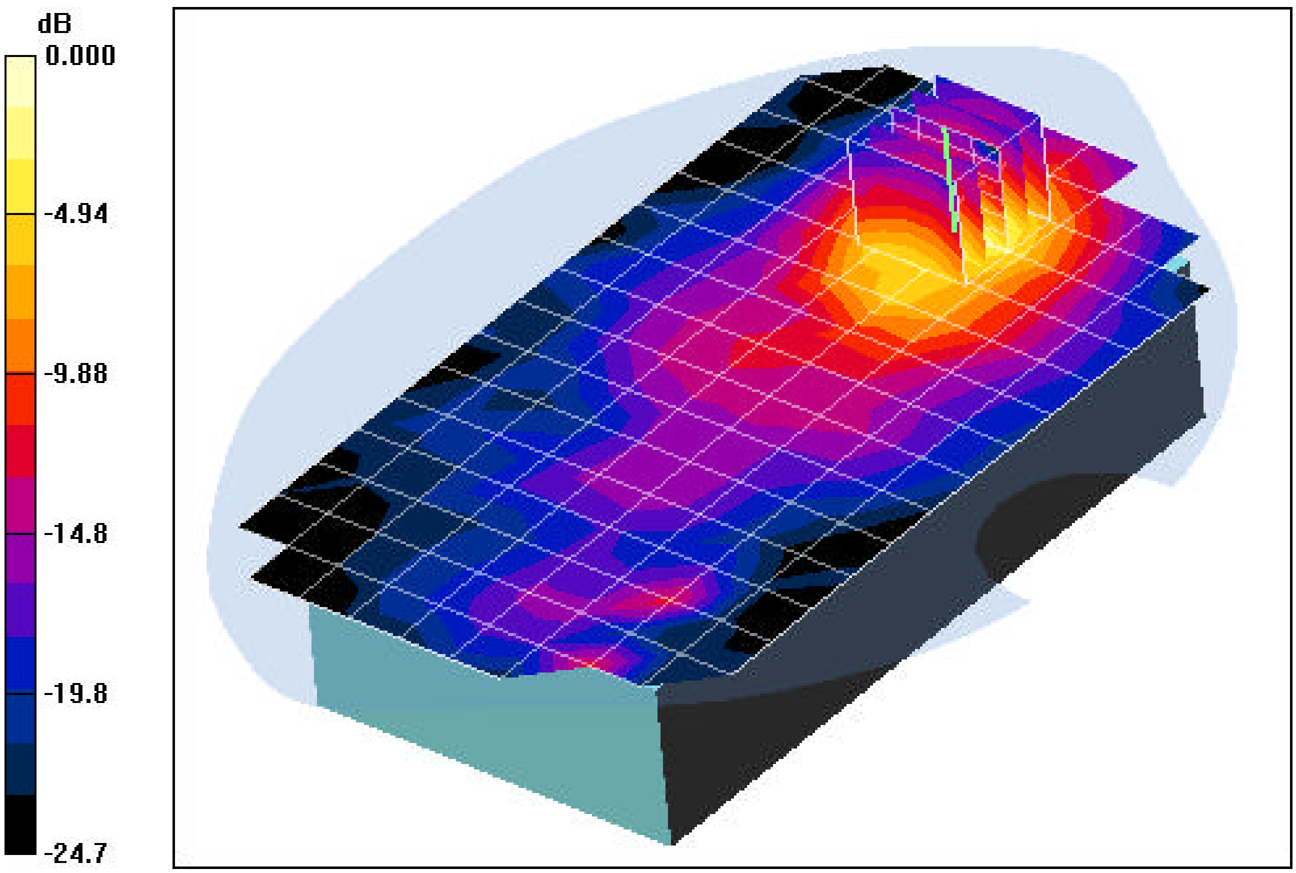
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Muscle (σ = 1.93 mho/m, ε_r = 53.14, ρ = 1000 kg/m^3)
Phantom section: Flat Section

Test Date: 04-18-2006; Ambient Temp: 23.4°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN3561; ConvF(6.3, 6.3, 6.3); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP:1357
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body, w/ Holster, Ch.06, 5.5 Mbps, Li-Ion Battery FTN6032B, Ant. Internal w/ BT 2441MHz

Area Scan (10x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.33 V/m; Power Drift = 0.232 dB
Peak SAR (extrapolated) = 1.23 W/kg
SAR(1 g) = 0.614 mW/g; SAR(10 g) = 0.294 mW/g



0 dB = 0.817mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Motorola Model: F4423A; Type: GSM Dual Band+WLAN+Bluetooth; SN: 00039-082-693-121

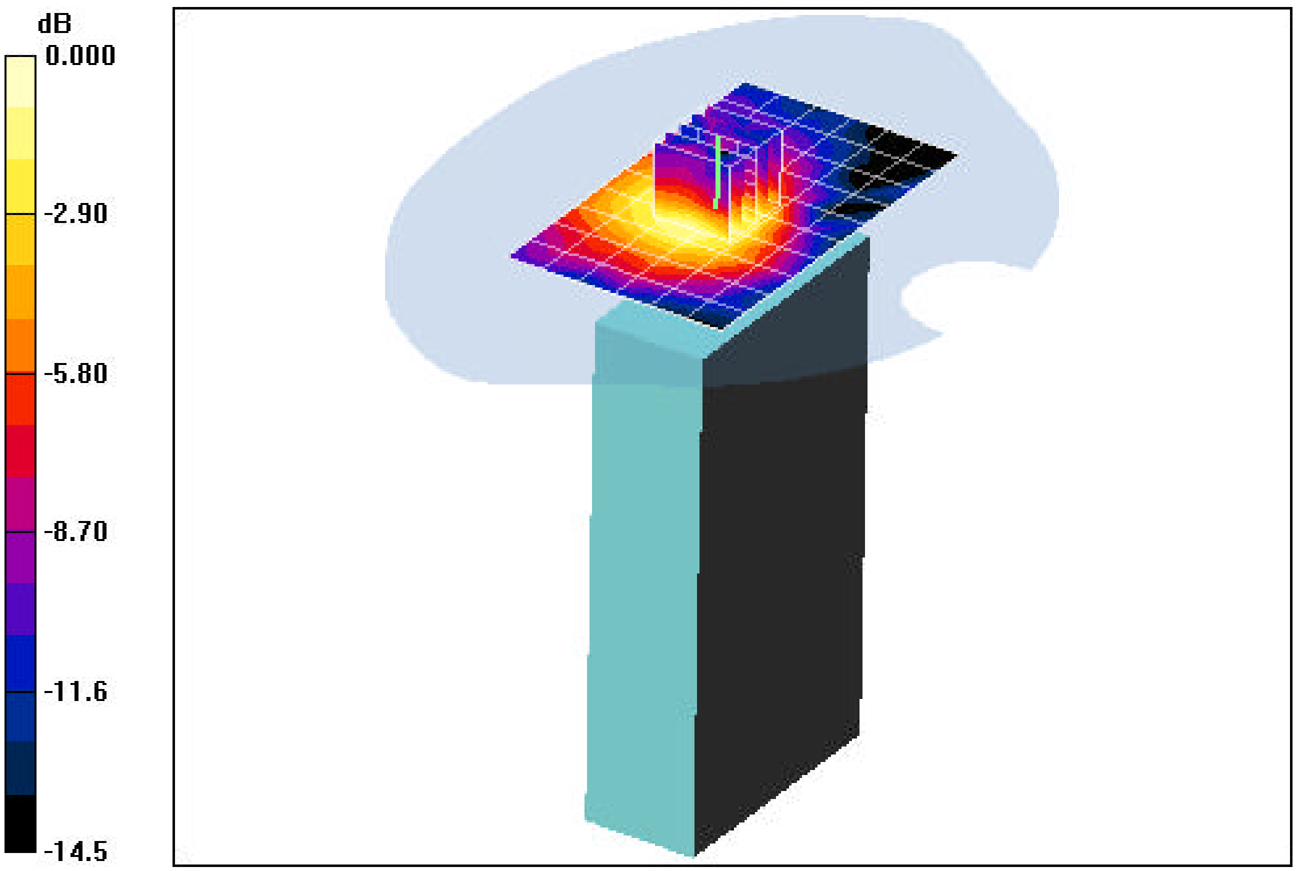
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Muscle (σ = 1.93 mho/m, ε_r = 53.14, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 2.5cm from DUT to Flat Phantom

Test Date: 04-18-2006; Ambient Temp: 23.4°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN3561; ConvF(6.3, 6.3, 6.3); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP:1357
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body, Bystander Top side Ch.06, 5.5 Mbps, Li-Ion Battery FTN6032B, Ant. Internal

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.71 V/m; Power Drift = 0.285 dB
Peak SAR (extrapolated) = 0.078 W/kg
SAR(1 g) = 0.046 mW/g; SAR(10 g) = 0.028 mW/g



0 dB = 0.054mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Motorola Model: F4423A; Type: GSM Dual Band+WLAN+Bluetooth; SN: 00039-082-693-121

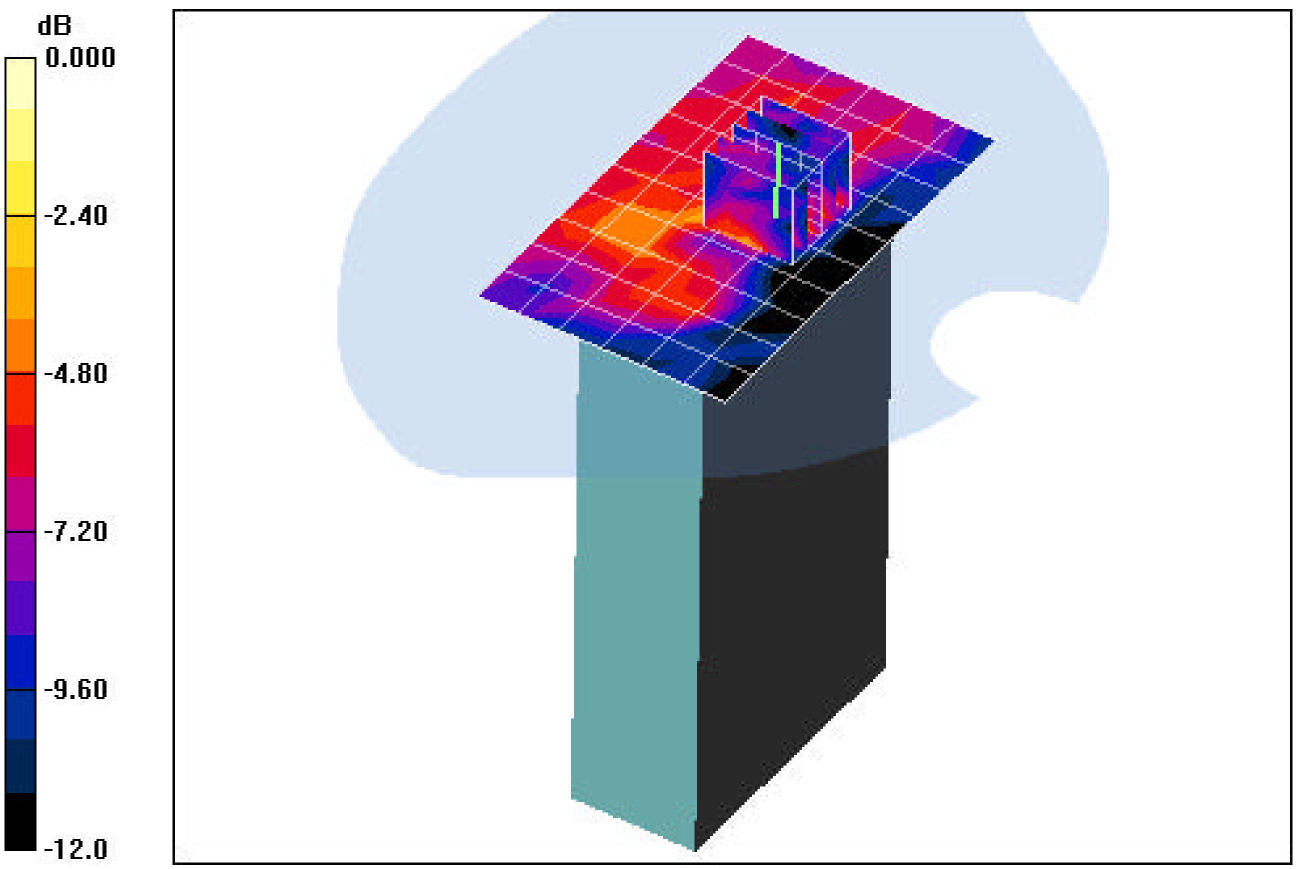
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Muscle (σ = 1.93 mho/m, ε_r = 53.14, ρ = 1000 kg/m^3)
Phantom section: Flat Section

Test Date: 04-18-2006; Ambient Temp: 23.4°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN3561; ConvF(6.3, 6.3, 6.3); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP:1357
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body, Touch Bottom side, Ch.06, 5.5Mbps, Li-Ion Battery FTN6032B, Ant. Internal

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.81 V/m; Power Drift = -0.043 dB
Peak SAR (extrapolated) = 0.049 W/kg
SAR(1 g) = 0.025 mW/g; SAR(10 g) = 0.013 mW/g



0 dB = 0.030mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Motorola Model: F4423A; Type: GSM Dual Band+WLAN+Bluetooth; SN: 00039-082-693-121

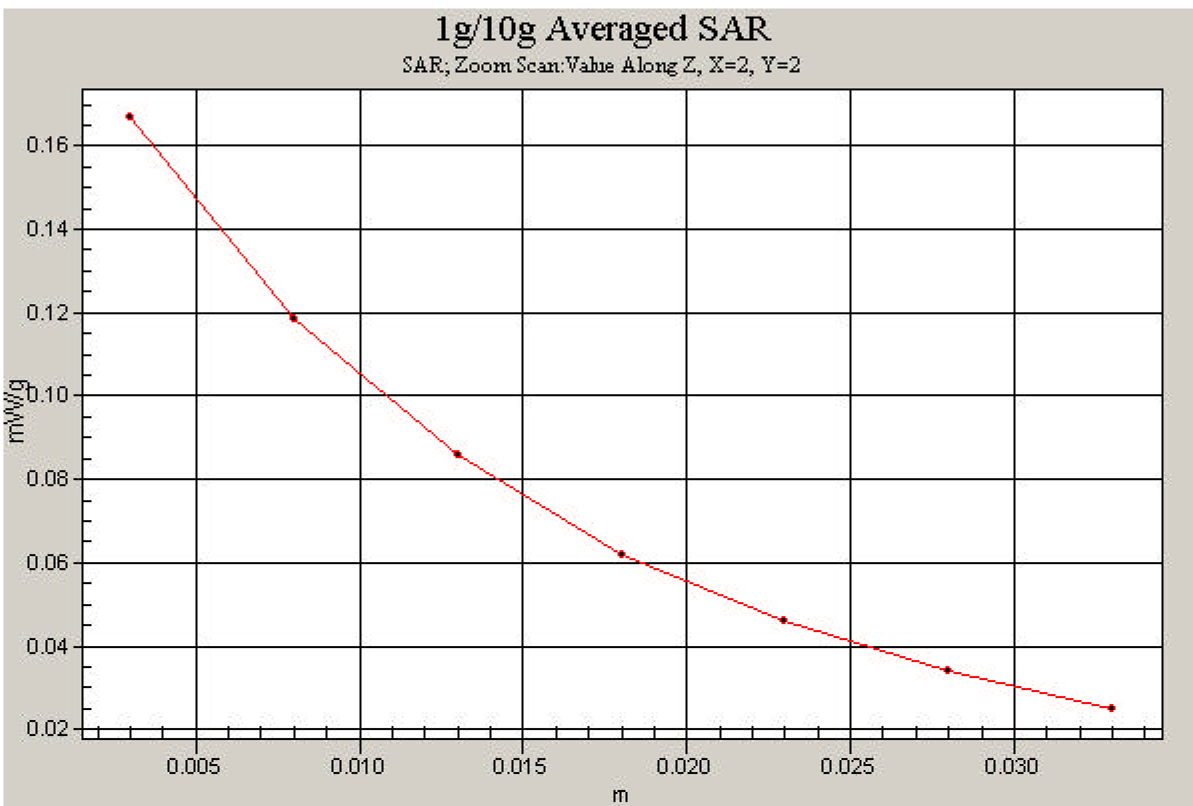
Communication System: GSM850 Motorola; Frequency: 836.6 MHz;Duty Cycle: 1:8
Medium: 835 Muscle (σ = 0.99 mho/m, ε_r = 56.24, ρ = 1000 kg/m^3)
Phantom section: Flat Section

Test Date: 04-19-2006; Ambient Temp: 23.5°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3561; ConvF(7.9, 7.9, 7.9); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body, w/ Holster, Ch.190, Li-Ion Battery FTN6032B, Antenna Internal

Area Scan (10x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.87 V/m; Power Drift = -0.114 dB
Peak SAR (extrapolated) = 0.202 W/kg
SAR(1 g) = 0.145 mW/g; SAR(10 g) = 0.100 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: Motorola Model: F4423A; Type: GSM Dual Band+WLAN+Bluetooth; SN: 00039-082-693-121

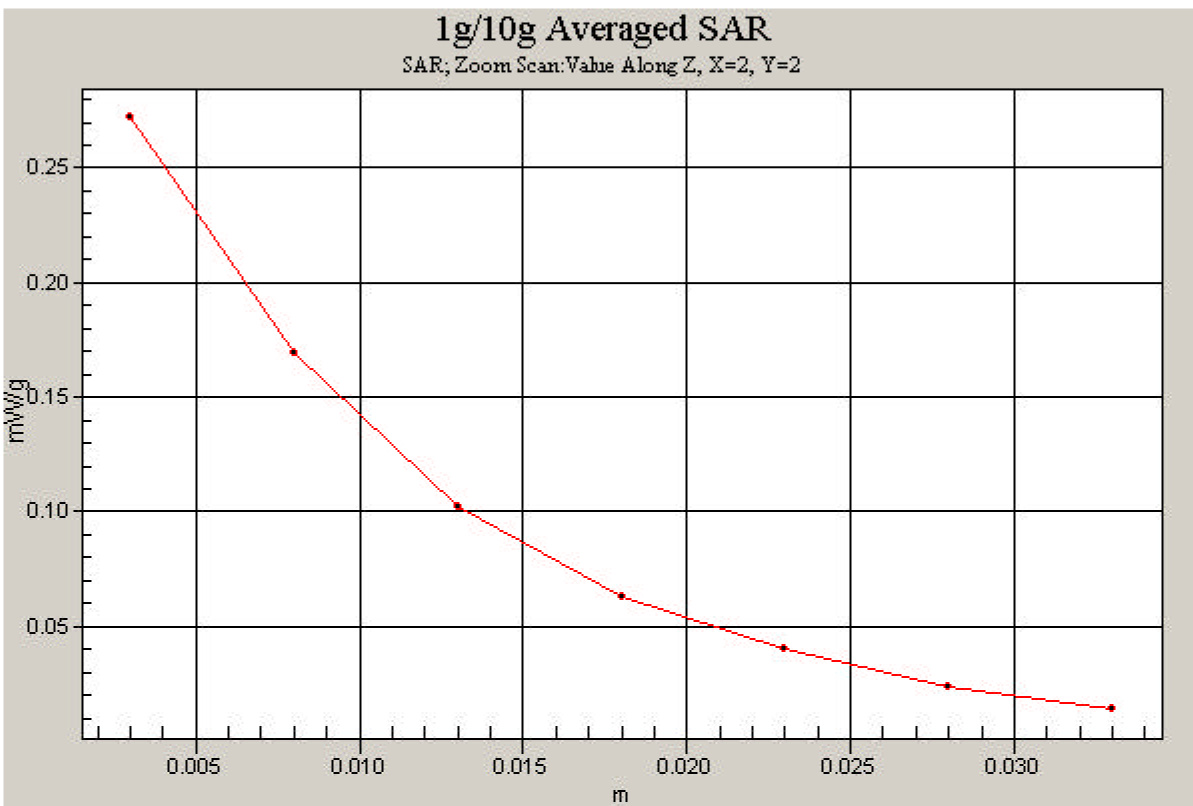
Communication System: GSM1900 Motorola; Frequency: 1880 MHz;Duty Cycle: 1:8
Medium: 1900 Muscle (σ = 1.58 mho/m, ε_r = 52.53, ρ = 1000 kg/m^3)
Phantom section: Flat Section

Test Date: 04-20-2006; Ambient Temp: 23.4°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3561; ConvF(6.48, 6.48, 6.48); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body, w/ Holster, Ch.661, Li-Ion Battery FTN6032B, Antenna Internal

Area Scan (10x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.81 V/m; Power Drift = 0.195 dB
Peak SAR (extrapolated) = 0.354 W/kg
SAR(1 g) = 0.226 mW/g; SAR(10 g) = 0.132 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: Motorola Model: F4423A; Type: GSM Dual Band+WLAN+Bluetooth; SN: 00039-082-693-121

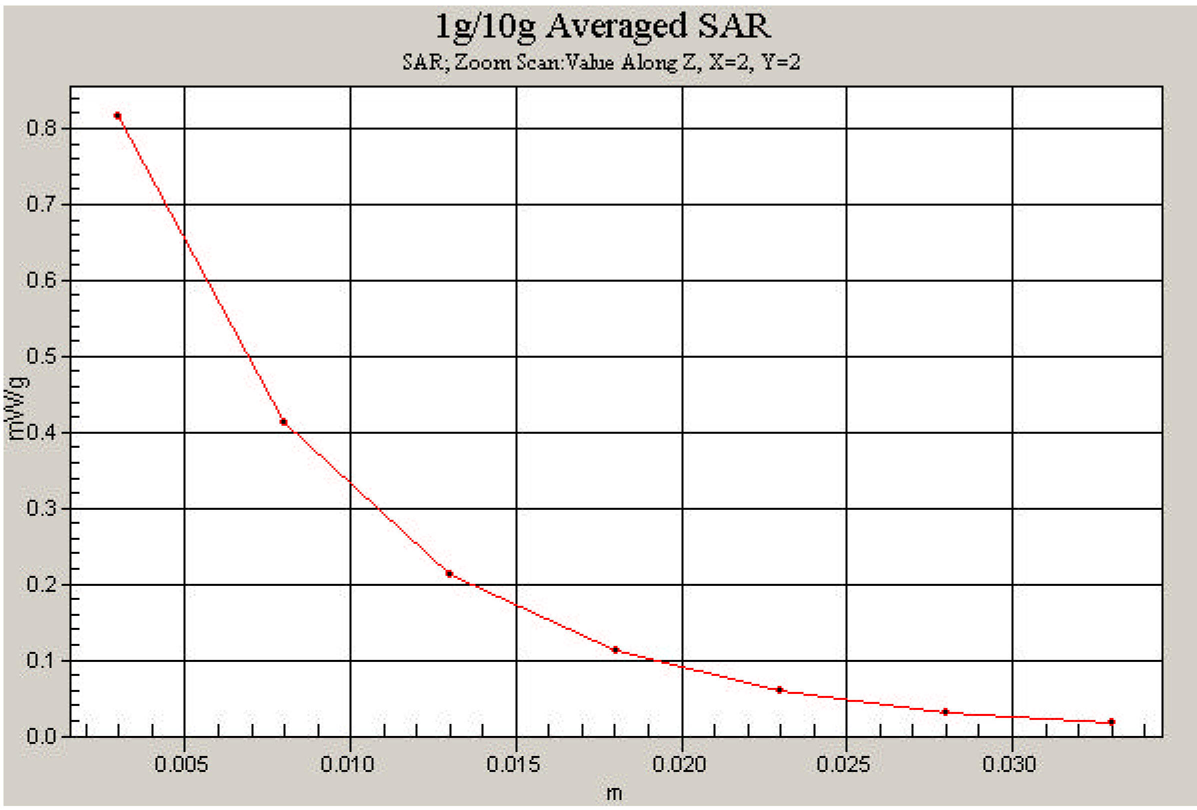
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Muscle (σ = 1.93 mho/m, ε_r = 53.14, ρ = 1000 kg/m^3)
Phantom section: Flat Section

Test Date: 04-18-2006; Ambient Temp: 23.4°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN3561; ConvF(6.3, 6.3, 6.3); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP:1357
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Body, w/ Holster, Ch.06, 5.5 Mbps, Li-Ion Battery FTN6032B, Ant. Internal w/ BT 2441

Area Scan (10x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.33 V/m; Power Drift = 0.232 dB
Peak SAR (extrapolated) = 1.23 W/kg
SAR(1 g) = 0.614 mW/g; SAR(10 g) = 0.294 mW/g



APPENDIX B: DIPOLE VALIDATION

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; SN:719

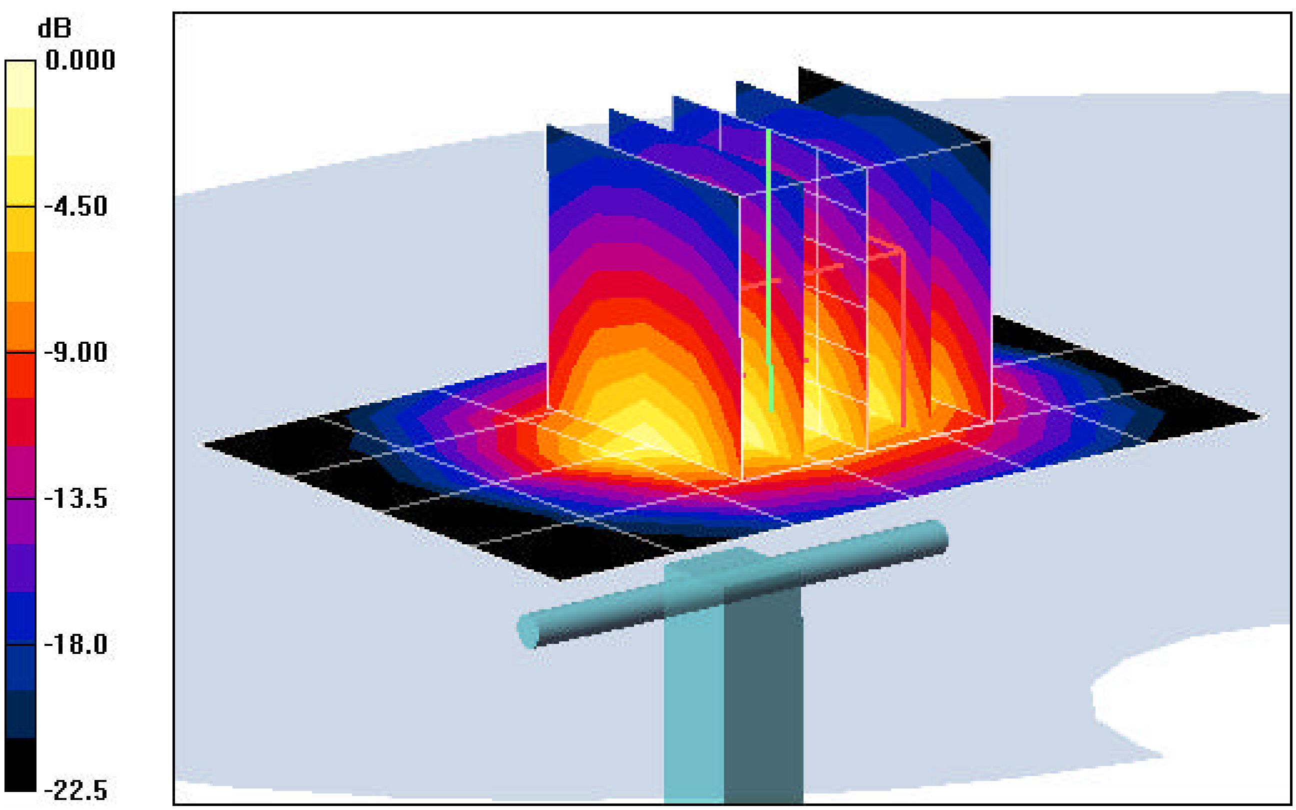
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Brain (σ = 1.82 mho/m, ε_r = 38.43, ρ = 1000 kg/m^3)
Phantom section: Flat Section

Test Date: 04-18-2006; Ambient Temp: 23.4°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN3561; ConvF(6.37, 6.37, 6.37); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

2450MHz Dipole Validation

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 5.46 mW/g; SAR(10 g) = 2.57 mW/g
Target SAR(1g) = 5.24 mW/g; Deviation = + 4.19 %



0 dB = 6.95mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

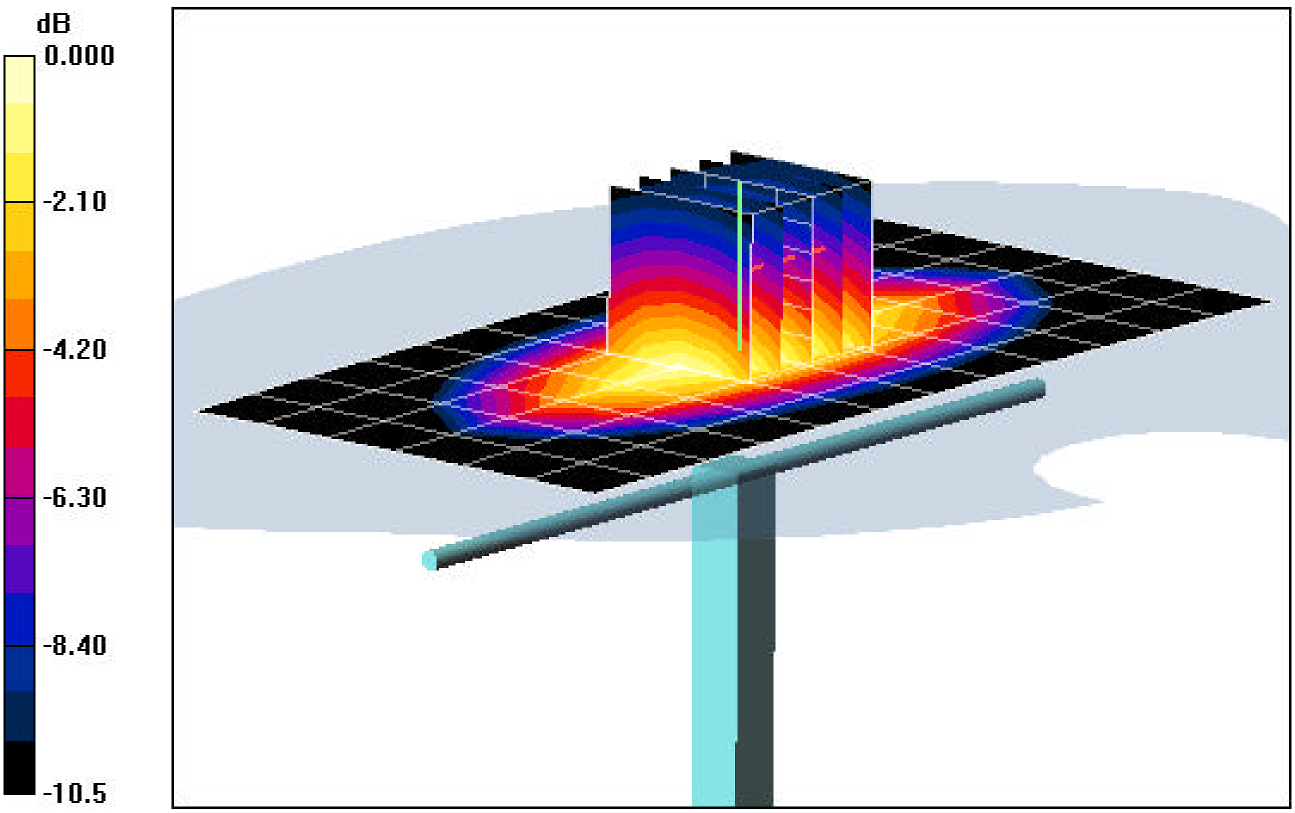
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Brain (σ = 0.89 mho/m, ε_r = 42.55, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-19-2006; Ambient Temp: 23.5°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3561; ConvF(7.91, 7.91, 7.91); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

835MHz Dipole Validation

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 24.0 dBm (250 mW)
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.58 mW/g
Target SAR(1g) = 2.375 mW/g; Deviation = + 2.73 %



0 dB = 2.83mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

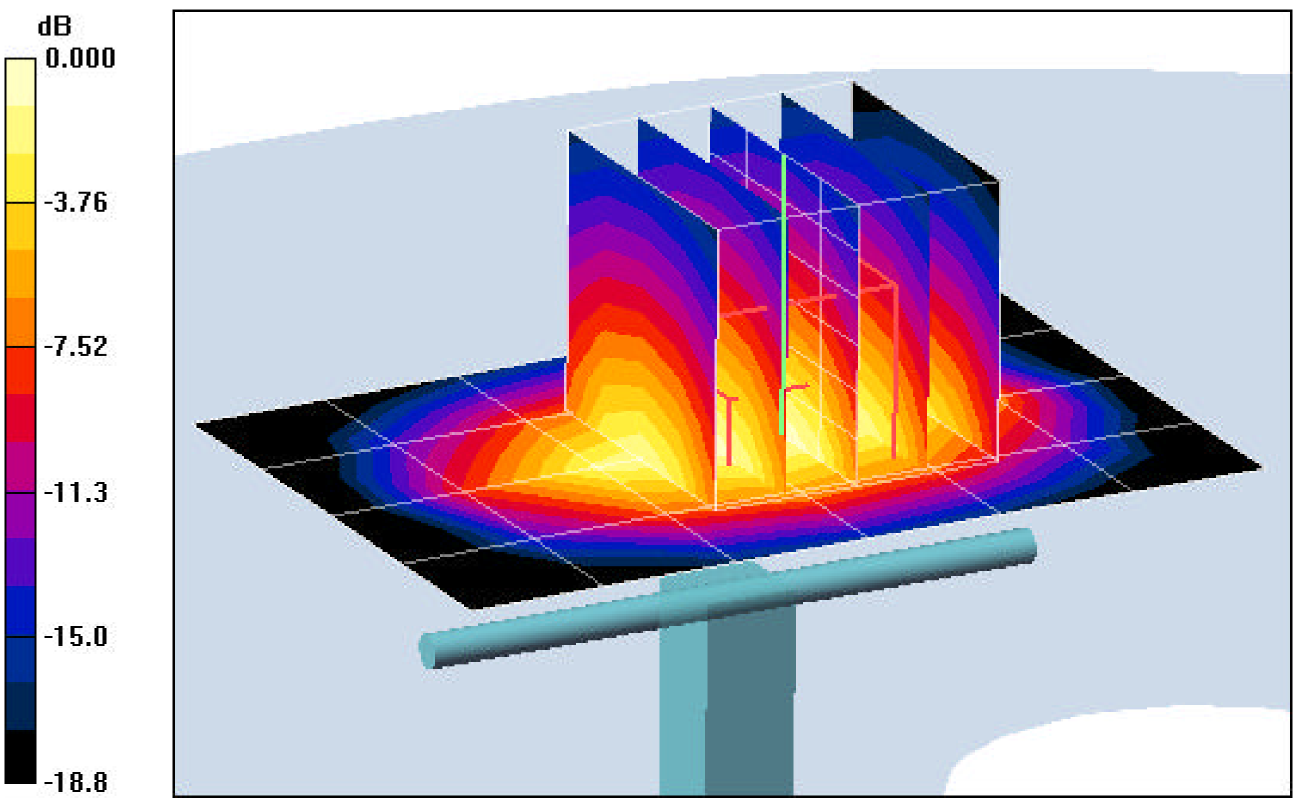
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Brain (σ = 1.37 mho/m, ε_r = 40.98, ρ = 1000 kg/m^3)
Phantom section: Flat Section

Test Date: 04-20-2006; Ambient Temp: 23.4°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3561; ConvF(7.04, 7.04, 7.04); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP:1357
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

1900MHz Dipole Validation

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 4.09 mW/g; SAR(10 g) = 1.98 mW/g
Target SAR(1g) = 3.97 mW/g; Deviation = + 3.02 %



0 dB = 4.92mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; SN: 719

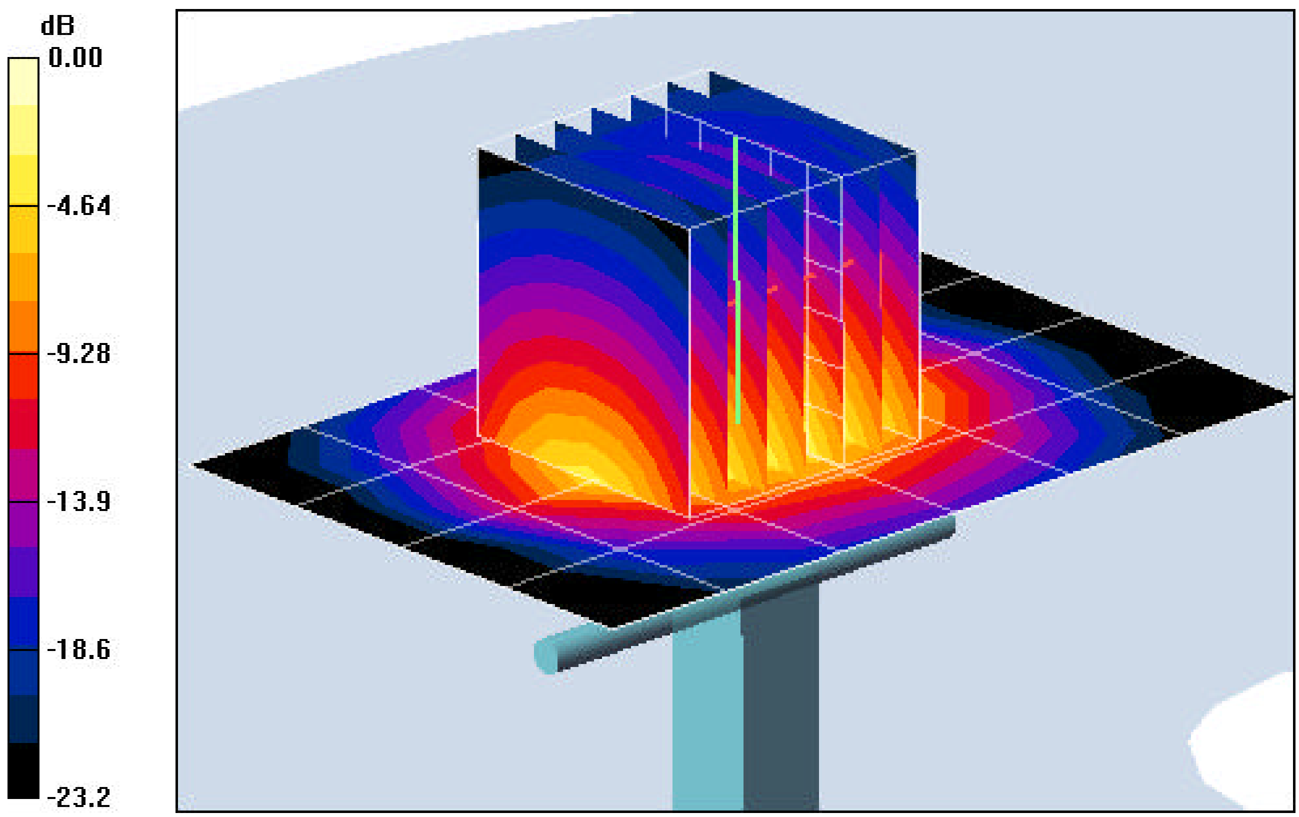
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Brain (σ = 1.83 mho/m, ε_r = 38.62, ρ = 1000 kg/m^3)
Phantom section: Flat Section

Test Date: 05-04-2006; Ambient Temp: 23.2°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3561; ConvF(6.37, 6.37, 6.37); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

2450MHz Dipole Validation

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100mW)
SAR(1 g) = 5.42 mW/g; SAR(10 g) = 2.51 mW/g
Target SAR(1 g) = 5.24 mW/g; Deviation = +3.43 %



0 dB = 7.58mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

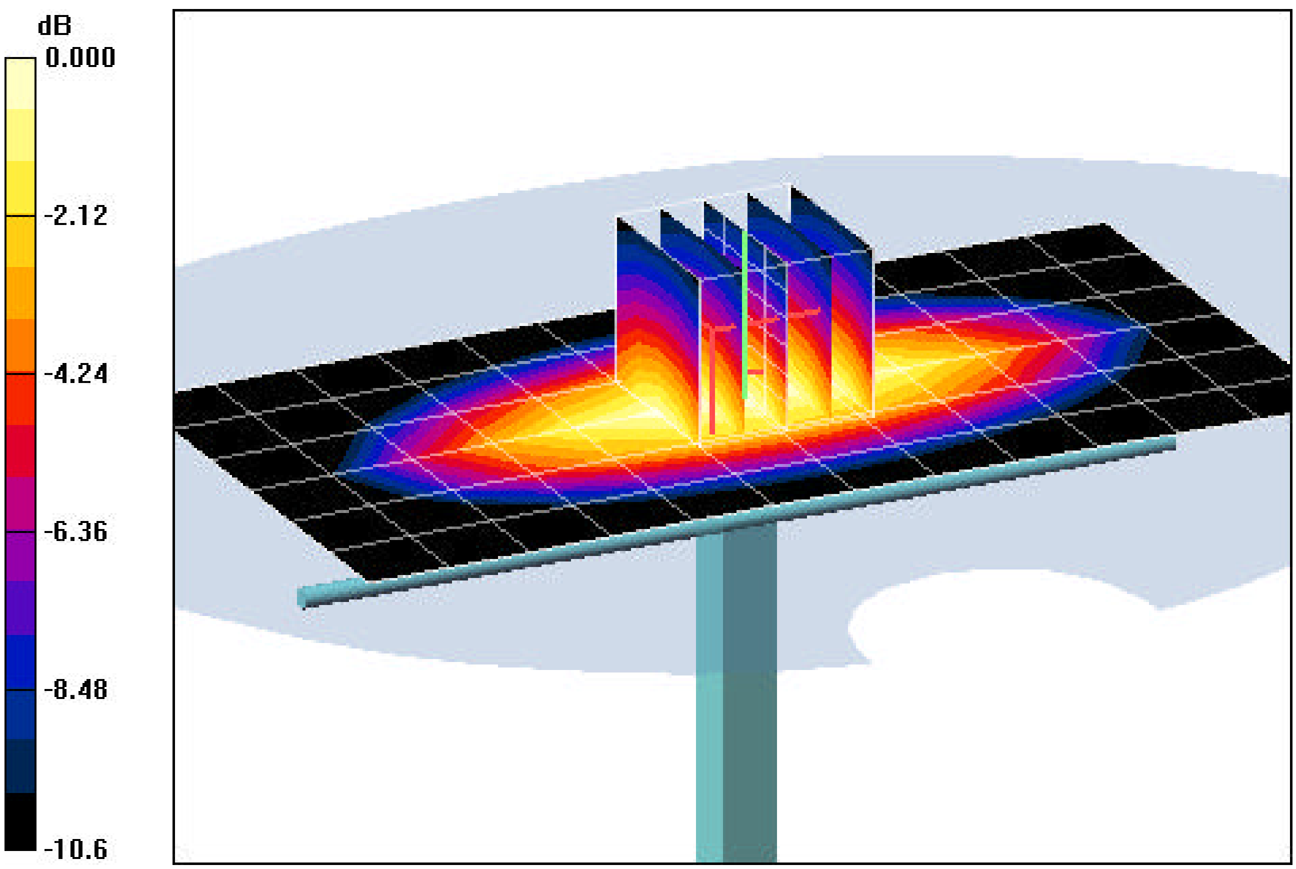
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Brain (σ = 0.90 mho/m, ε_r = 42.2, ρ = 1000 kg/m ^{3})
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 05-04-2006; Ambient Temp: 23.2°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3561; ConvF(7.91, 7.91, 7.91); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

835MHz Dipole Validation

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 24.0 dBm (250 mW)
SAR(1 g) = 2.49 mW/g; SAR(10 g) = 1.64 mW/g
Target SAR(1g) = 2.375 mW/g; Deviation = +4.84 %



0 dB = 2.91mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

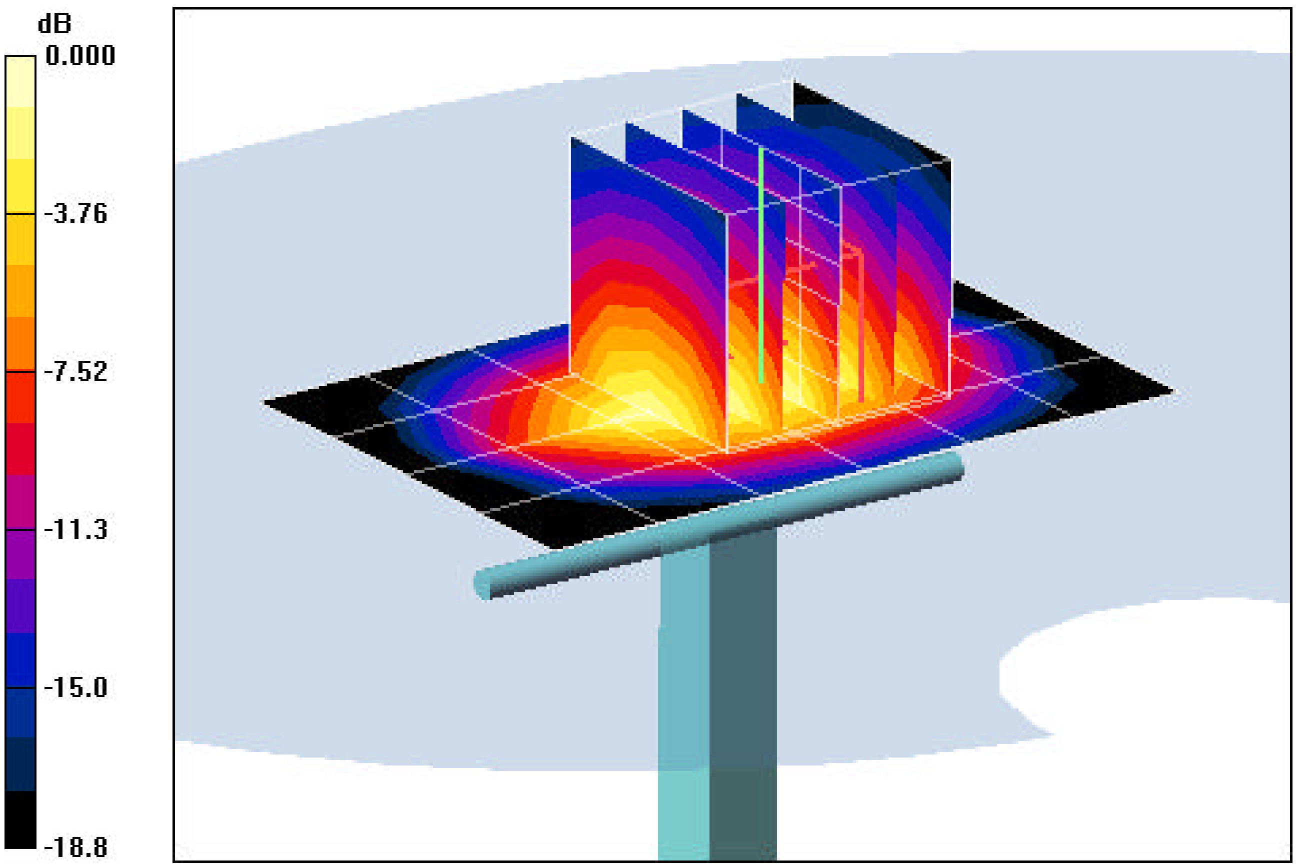
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Brain (σ = 1.38 mho/m, ε_r = 41.13, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-04-2006; Ambient Temp: 23.2°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3561; ConvF(7.04, 7.04, 7.04); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP:1357
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

1900MHz Dipole Validation

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 4.13 mW/g; SAR(10 g) = 2.16 mW/g
Target SAR(1g) = 3.97 mW/g; Deviation = +4.03 %



0 dB = 5.14mW/g

APPENDIX C: PROBE CALIBRATION

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

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

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client PC Test

Certificate No: EX3-3561_Aug05

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3561
Calibration procedure(s)	QA CAL-01.v5 and QA CAL-14.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	August 24, 2005
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	7-Jan-05 (SPEAG, No. ES3-3013_Jan05)	Jan-06
DAE4	SN: 654	29-Nov-04 (SPEAG, No. DAE4-654_Nov04)	Nov-05

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: August 24, 2005

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

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

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

Probe EX3DV4

SN:3561

Manufactured: February 14, 2005
Calibrated: August 24, 2005

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3561

Sensitivity in Free Space[A] / Diode Compression[B]

NormX	**0.430** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**90** mV
NormY	**0.470** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**90** mV
NormZ	**0.430** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**90** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	3.8	1.5
SAR_{be} [%]	With Correction Algorithm	0.0	0.0

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	4.7	2.8
SAR_{be} [%]	With Correction Algorithm	1.1	0.8

Sensor Offset

Probe Tip to Sensor Center **1.0** mm

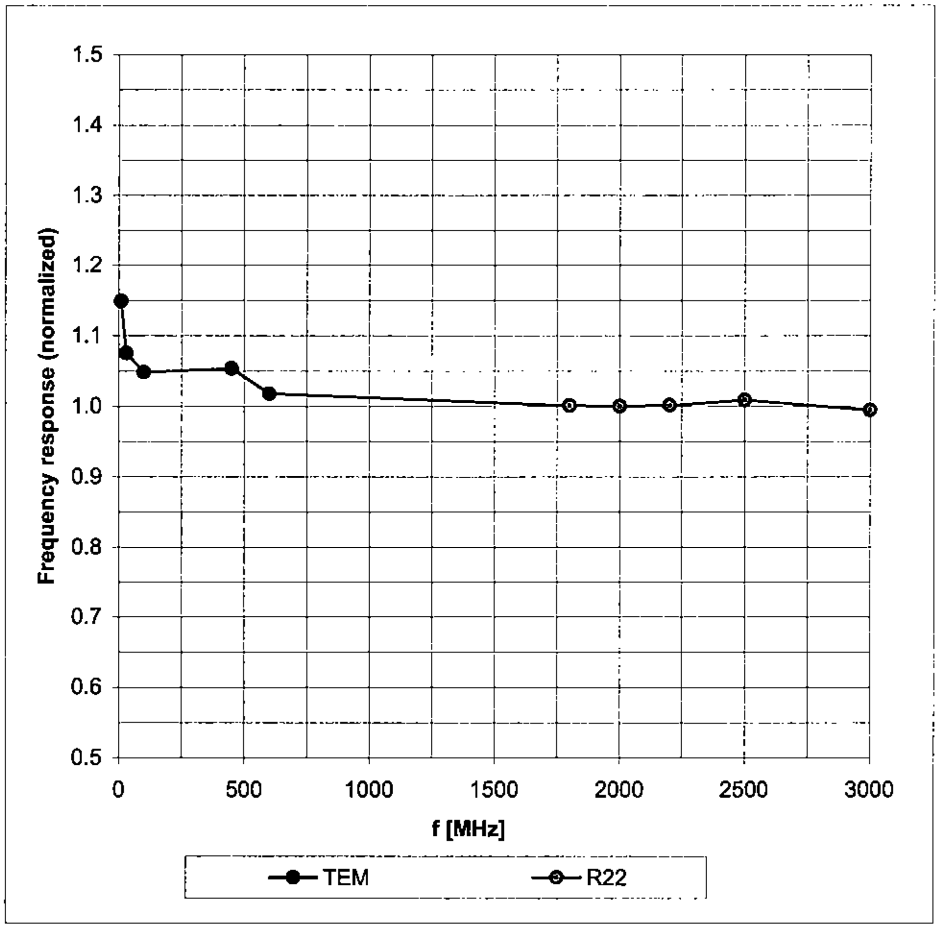
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

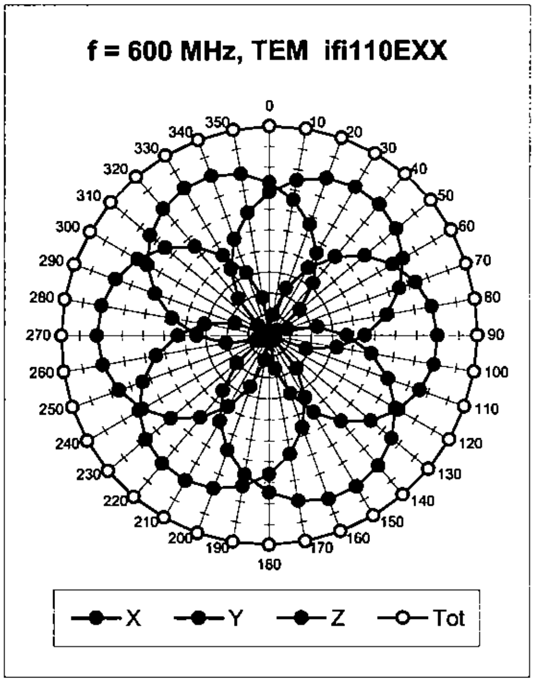
Frequency Response of E-Field

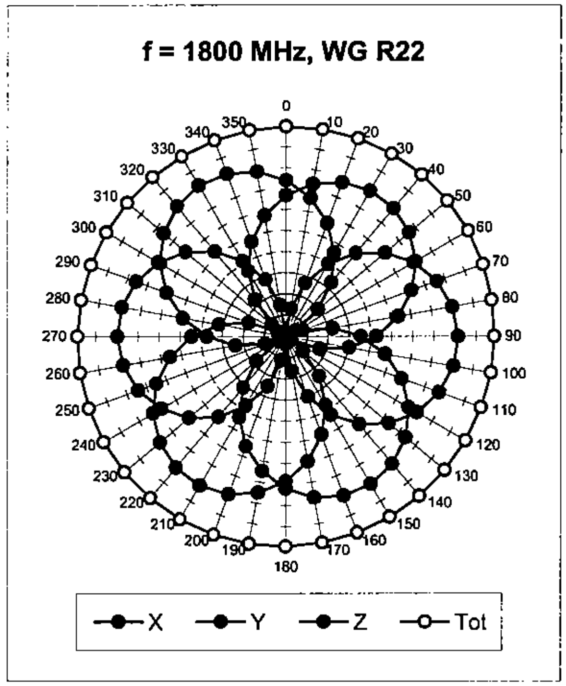
(TEM-Cell:ifi110 EXX, Waveguide: R22)

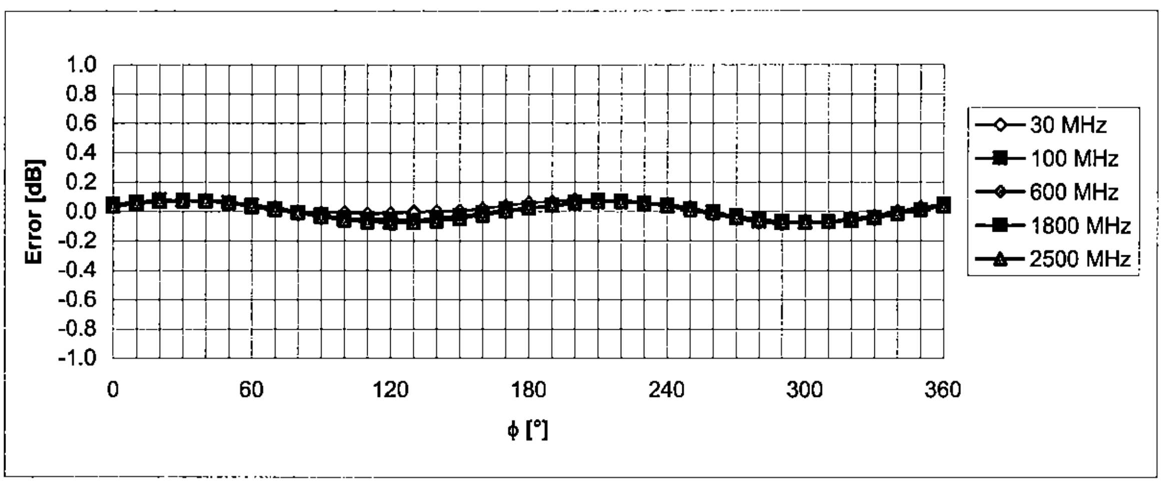


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



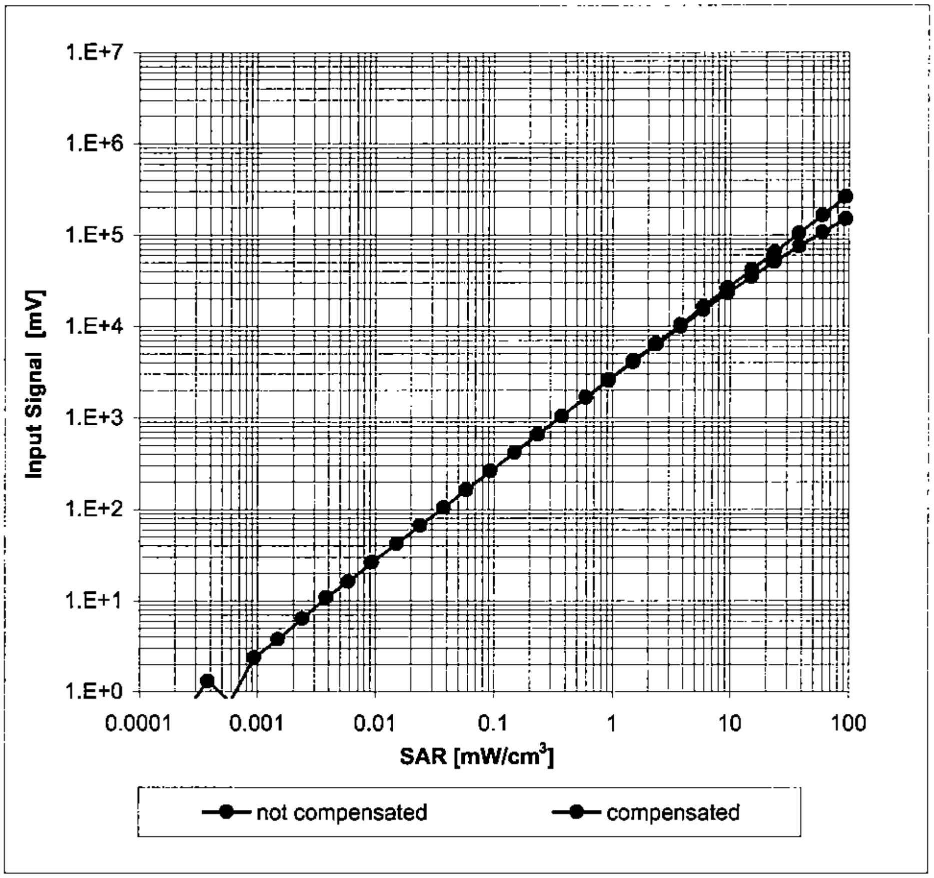


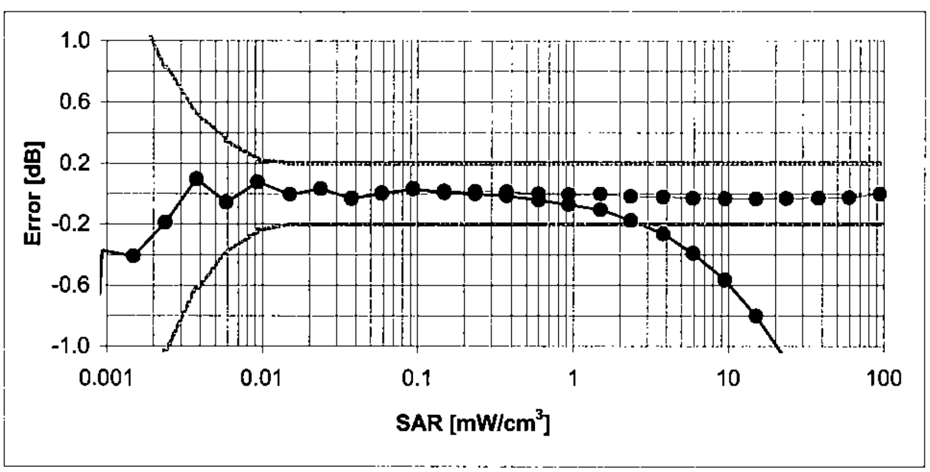


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

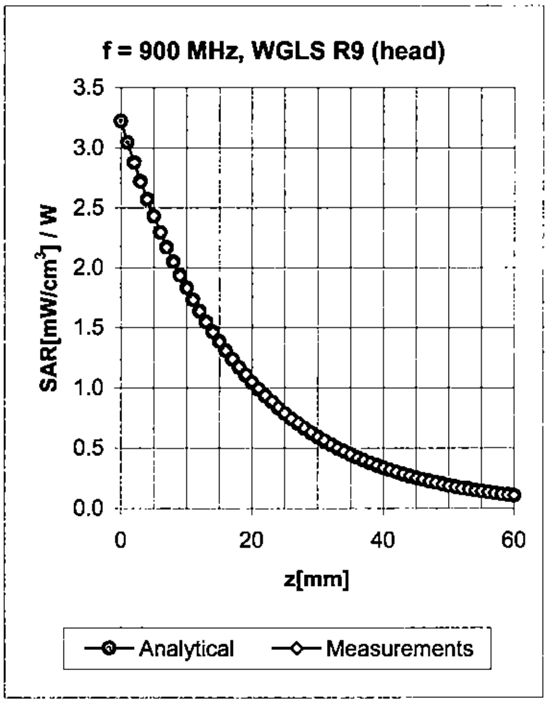
(Waveguide R22, f = 1800 MHz)

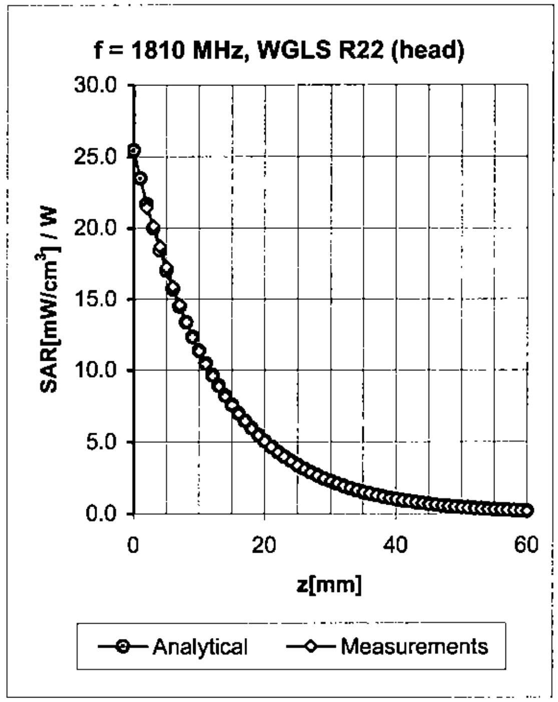




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



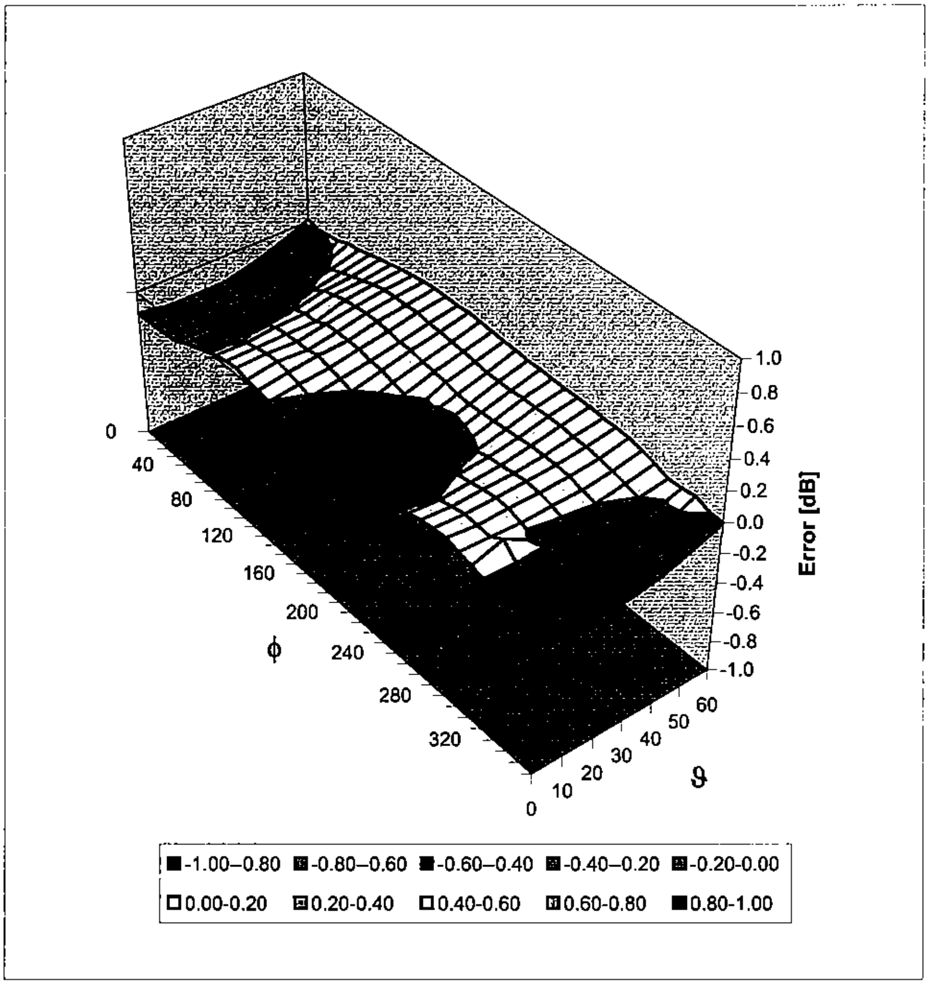


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.21	1.13	7.91	± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.47	0.94	7.04	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.61	0.71	6.37	± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.32	0.93	7.90	± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.34	1.60	6.48	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.75	0.62	6.30	± 11.8% (k=2)

[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.

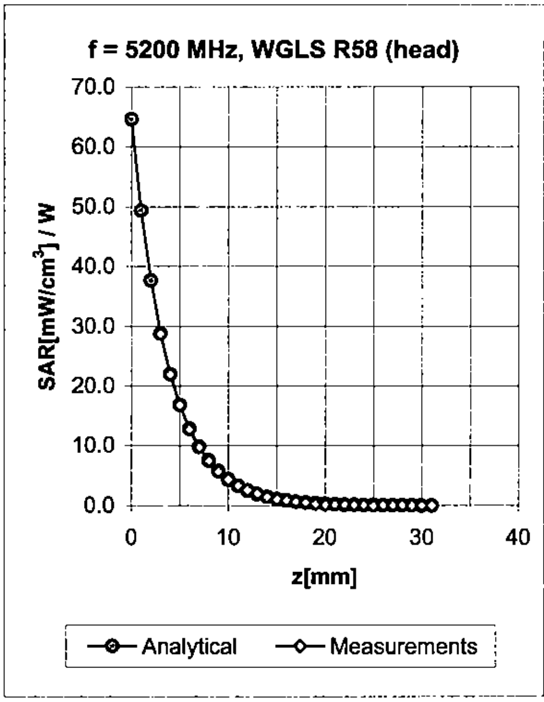
Deviation from Isotropy in HSL

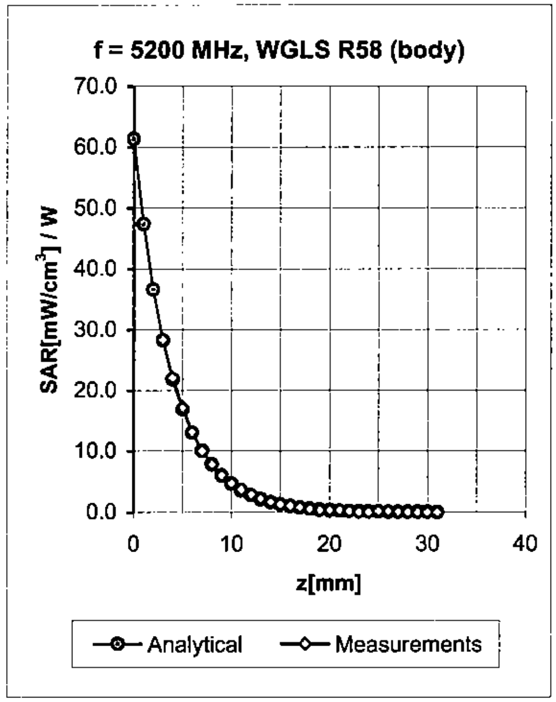
Error (ϕ, ϑ), f = 900 MHz



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

Appendix[D]





f [MHz][D]	Validity [MHz]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
5200	± 50	Head	36.0 ± 5%	4.76 ± 5%	0.49	1.36	4.26	± 13.6% (k=2)
5800	± 50	Head	35.3 ± 5%	5.27 ± 5%	0.52	1.42	3.75	± 13.6% (k=2)
5200	± 50	Body	49.0 ± 5%	5.30 ± 5%	0.50	1.63	4.10	± 13.6% (k=2)
5800	± 50	Body	48.2 ± 5%	6.00 ± 5%	0.49	1.70	3.63	± 13.6% (k=2)

[D] Accreditation for ConvF assessment above 3000 MHz is currently applied for.