DECLARATION OF COMPLIANCE
SAR RF EXPOSURE EVALUATION

Test Lab

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Applicant Information

NOVATEL WIRELESS INC.
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FCC IDENTIFIER:	**PKRNVWV620**
Model(s):	**V620**
Rule Part(s):	**FCC 47 CFR §2.1093; IC RSS-102 Issue 1 (Provisional)**
Test Procedure(s):	**FCC OET Bulletin 65, Supplement C (01-01)**
Device Classification:	**PCS Licensed Transmitter (PCB)**
Device Type:	**Dual-Band PCS/Cellular CDMA PCMCIA Modem (for Laptop PCs)**
Tx Frequency Range(s):	**1851.25 - 1908.75 MHz (PCS CDMA)** **824.70 - 848.31 MHz (Cellular CDMA)**
Max. RF Output Power Tested:	**24.0 dBm Conducted (PCS CDMA)** **24.5 dBm Conducted (Cellular CDMA)**
Power Source(s) Tested:	**Host Laptop AC Power Supply**
Antenna Type(s) Tested:	**Internal**
Host Laptop PCs Tested:	**Toshiba Tecra 8100 (11 mm Slot-to-Base Distance)** **Dell Latitude C800 (14 mm Slot-to-Base Distance)** **Dell Latitude D800 (14 mm Slot-to-Base Distance)**
Max. SAR Levels Measured:	**1.33 W/kg - PCS CDMA (Toshiba Tecra 8100 Laptop PC)** **1.21 W/kg - Cellular CDMA (Toshiba Tecra 8100 Laptop PC)**

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device was found to be in compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01) and Industry Canada RSS-102 Issue 1 (Provisional) for the General Population / Uncontrolled Exposure environment. All measurements were performed in accordance with the SAR system manufacturer recommendations.

I attest to the accuracy of data. All measurements 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.

Russell Pipe
Senior Compliance Technologist
Celltech Labs Inc.

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1.0 INTRODUCTION

This measurement report demonstrates that the Novatel Wireless Inc. Model: V620 Dual-Band PCS/Cellular CDMA PCMCIA Modem FCC ID: PKRNVWV620 (for Laptop PCs) complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the General Population / Uncontrolled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]), and IC RSS-102 Issue 1 (Provisional) (see reference [4]) were employed. A description of the product, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION of Device Under Test (DUT)

FCC Rule Part(s)	47 CFR §2.1093				
Test Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01)				
Device Classification	PCS Licensed Transmitter (PCB)				
Device Type	Dual-Band PCS/Cellular CDMA PCMCIA Modem (for Laptop PCs)				
FCC IDENTIFER	PKRNVWV620				
Model	V620				
Serial No.	S01272		Identical Prototype		
Modulation Scheme	QPSK				
Tx Frequency Range(s)	1851.25 - 1908.75 MHz		PCS CDMA		
	824.70 - 848.31 MHz		Cellular CDMA		
RF Output Power Tested	24.0 dBm	Conducted	1851.25 MHz	PCS CDMA	
	23.5 dBm	Conducted	1880.00 MHz		
	23.5 dBm	Conducted	1908.75 MHz		
	24.5 dBm	Conducted	824.70 MHz	Cellular CDMA	
	24.5 dBm	Conducted	836.52 MHz		
	24.5 dBm	Conducted	848.31 MHz		
Antenna Type(s) Tested	Internal				
Power Source(s) Tested	Host Laptop PC AC Power Supply				

Host Device(s) Tested	**Manufacturer / Model**	**Serial No.**	**Card Slots**	**Slot Location**	**Slot-to-Base (mm)**
Laptop PC Type (x3)	Toshiba Tecra 8100	X0031270U	2	Left Side Center	11 mm
	Dell Latitude C800	3G9G801	2	Right Side Rear	14 mm
	Dell Latitude D800	11272089781	1	Left Side Center	14 mm

3.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit 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 DASY4 measurement server. The DAE4 utilizes 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 DASY4 measurement server 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. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

DASY4 SAR Measurement System with SAM Phantom

DASY4 SAR Measurement System with Planar Phantom

4.0 MEASUREMENT SUMMARY

BODY SAR EVALUATION RESULTS - PCS CDMA

Test Date	Freq. (MHz)	Chan.	Test Mode	Power Source	Host Laptop PC	Host Laptop PCMCIA Card Slot	Host Laptop Position to Planar Phantom	Host Laptop Slot-to Base Distance (mm)	Spacing from DUT to Planar Phantom (mm)	Cond. Power Before Test (dBm)	Measured SAR 1g (W/kg)	SAR Drift During Test (dB)	Scaled SAR 1g (W/kg) with drift
Aug-5	1880.00	600	PCS CDMA	Laptop PC AC Supply	Toshiba Tecra	Bottom	Bottom 0.0 cm	11	13	23.5	1.33	0.183	1.33
Aug-5	1851.25	25	PCS CDMA	Laptop PC AC Supply	Toshiba Tecra	Bottom	Bottom 0.0 cm	11	13	24.0	1.14	-0.0309	1.15
Aug-5	1908.75	1175	PCS CDMA	Laptop PC AC Supply	Toshiba Tecra	Bottom	Bottom 0.0 cm	11	13	23.5	1.25	-0.0169	1.25
Aug-6	1880.00	600	PCS CDMA	Laptop PC AC Supply	Dell C800	Bottom	Bottom 0.0 cm	14	15	23.5	P 0.799 S 0.692	0.0709	P 0.799 S 0.692
Aug-6	1880.00	600	PCS CDMA	Laptop PC AC Supply	Dell D800	Single	Bottom 0.0 cm	14	17	23.5	0.614	-0.141	0.634

ANSI / IEEE C95.1 1999 - SAFETY LIMIT
BODY: 1.6 W/kg (averaged over 1 gram)
Spatial Peak - Uncontrolled Exposure / General Population

Test Date(s)	August 5, 2004			August 6, 2004			Test Date(s)	Aug-5	Aug-6	Unit
Dielectric Constant ε_r	1880 MHz Body			1880 MHz Body			Relative Humidity	45	39	%
	IEEE Target		Measured	IEEE Target		Measured	Atmospheric Pressure	102.1	102.2	kPa
	53.3	± 5%	51.9	53.3	± 5%	51.8	Ambient Temperature	24.6	24.9	°C
Conductivity σ (mho/m)	1880 MHz Body			1880 MHz Body			Fluid Temperature	22.4	23.6	°C
	IEEE Target		Measured	IEEE Target		Measured	Fluid Depth	≥ 15	≥ 15	cm
	1.52	± 5%	1.55	1.52	± 5%	1.52	ρ (Kg/m^3)	1000		

Note(s):

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. If the SAR levels measured at the mid channel were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]).
3. Secondary peak SAR levels within 2 dB of the primary were reported (P = Primary, S = Secondary).
4. The power drifts measured by the DASY4 system were added to the measured SAR levels to report scaled SAR results as shown in the above table.
5. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluation. The temperatures reported were consistent for all measurement periods.
6. The dielectric parameters of the simulated body tissue mixture were measured prior to the evaluation using an HP 85070C Dielectric Probe Kit and an HP 8753E Network Analyzer (see Appendix E for printout of measured fluid dielectric parameters).
7. The SAR evaluations were performed within 24 hours of the system performance check.

MEASUREMENT SUMMARY (Cont.)

BODY SAR EVALUATION RESULTS - CELLULAR CDMA

Test Date	Freq. (MHz)	Chan.	Test Mode	Power Source	Host Laptop PC	Host Laptop PCMCIA Card Slot	Host Laptop Position to Planar Phantom	Host Laptop Slot-to-Base Distance (mm)	Spacing from DUT to Planar Phantom (mm)	Cond. Power Before Test (dBm)	Measured SAR 1g (W/kg)	SAR Drift During Test (dB)	Scaled SAR 1g (W/kg) with drift
Aug-4	836.52	384	Cellular CDMA	Laptop PC AC Supply	Toshiba Tecra	Bottom	Bottom 0.0 cm	11	13	24.5	1.19	-0.0743	1.21
Aug-5	824.70	1013	Cellular CDMA	Laptop PC AC Supply	Toshiba Tecra	Bottom	Bottom 0.0 cm	11	13	24.5	0.958	-0.0904	0.978
Aug-5	848.31	777	Cellular CDMA	Laptop PC AC Supply	Toshiba Tecra	Bottom	Bottom 0.0 cm	11	13	24.5	P 0.787 S 0.763	-0.0867	P 0.803 S 0.778
Aug-4	836.52	384	Cellular CDMA	Laptop PC AC Supply	Dell C800	Bottom	Bottom 0.0 cm	14	15	24.5	0.277	-0.0255	0.279
Aug-4	836.52	384	Cellular CDMA	Laptop PC AC Supply	Dell D800	Single	Bottom 0.0 cm	14	17	24.5	0.635	-0.0456	0.642

ANSI / IEEE C95.1 1999 - SAFETY LIMIT
BODY: 1.6 W/kg (averaged over 1 gram)
Spatial Peak - Uncontrolled Exposure / General Population

Test Date(s)	August 4, 2004			August 5, 2004			Test Date(s)	Aug-4	Aug-5	Unit
Dielectric Constant ε_r	835 MHz Body			835 MHz Body			Relative Humidity	39	38	%
	IEEE Target		Measured	IEEE Target		Measured	Atmospheric Pressure	102.1	102.0	kPa
	55.2	± 5%	54.6	55.2	± 5%	53.8	Ambient Temperature	25.5	23.7	°C
Conductivity σ (mho/m)	835 MHz Body			835 MHz Body			Fluid Temperature	23.5	23.3	°C
	IEEE Target		Measured	IEEE Target		Measured	Fluid Depth	≥ 15	≥ 15	cm
	0.97	± 5%	1.00	0.97	± 5%	0.99	ρ (Kg/m^3)	1000		

Note(s):

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. If the SAR levels measured at the mid channel were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]).
3. Secondary peak SAR levels within 2 dB of the primary were reported (P = Primary, S = Secondary).
4. The power drifts measured by the DASY4 system were added to the measured SAR levels to report scaled SAR results as shown in the above table.
5. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluation. The temperatures reported were consistent for all measurement periods.
6. The dielectric parameters of the simulated body tissue mixture were measured prior to the evaluation using an HP 85070C Dielectric Probe Kit and an HP 8753E Network Analyzer (see Appendix E for printout of measured fluid dielectric parameters).
7. The SAR evaluations were performed within 24 hours of the system performance check.

5.0 DETAILS OF SAR EVALUATION

The Novatel Wireless Inc. Model: V620 Dual-Band PCS/Cellular CDMA PCMCIA Modem FCC ID: PKRNVWV620 (for Laptop PCs) was compliant for localized Specific Absorption Rate (SAR) based on the test provisions and conditions described below. The detailed test setup photographs are shown in Appendix H.

1. The DUT was evaluated for body SAR with the bottom side of the Toshiba Tecra 8100 host Laptop PC placed parallel to, and touching, the outer surface of the planar phantom. The DUT was tested in the bottom PCMCIA card slot of the Toshiba Tecra 8100 Laptop PC.
2. The DUT was evaluated for body SAR with the bottom side of the Dell Latitude C800 host Laptop PC placed parallel to, and touching, the outer surface of the planar phantom. The DUT was tested in the bottom PCMCIA card slot of the Dell Latitude C800 Laptop PC.
3. The DUT was evaluated for body SAR with the bottom side of the Dell Latitude D800 host Laptop PC placed parallel to, and touching, the outer surface of the planar phantom. The DUT was tested in the single PCMCIA card slot of the Dell Latitude D800 Laptop PC.
4. The conducted power levels were measured prior to the evaluations using a Gigatronics 8652A Universal Power Meter according to the procedures described in FCC 47 CFR §2.1046.
5. The power drifts measured by the DASY4 system were added to the measured SAR levels to report scaled SAR results as shown in the test data tables (Pages 5-6).
6. The DUT was tested with a modulated CDMA signal generated via internal software from the host Laptop PC in the “always up” power control mode.
7. The DUT was powered by the host Laptop PC’s AC power supply.
8. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluation. The temperatures reported were consistent for all measurement periods.
9. The dielectric parameters of the simulated tissue mixture were measured prior to the evaluation using an HP 85070C Dielectric Probe Kit and an HP 8753E Network Analyzer (see Appendix E for printout of measured fluid dielectric parameters.
10. The SAR evaluations were performed within 24 hours of the system performance check.

6.0 EVALUATION PROCEDURES

a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated using the SAM phantom.
(ii) For body-worn, lap-held, and face-held devices a planar phantom was used.

b. The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.

An area scan was determined as follows:

c. Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.

d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.

A 1g and 10g spatial peak SAR was determined as follows:

e. Extrapolation is used to find the points between the dipole center of the probe and the surface of the phantom. This data cannot be measured, since the center of the dipoles is 2.7 mm away form the tip of the probe and the distance between the surface and the lowest measuring point is 1.4 mm (see probe calibration document in Appendix D). The extrapolation was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.

f. Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).

g. A zoom scan volume of 32 mm x 32 mm x 30 mm (5 x 5 x 7 points) centered at the peak SAR location determined from the area scan is used for all zoom scans for devices with a transmit frequency < 800 MHz. Zoom scans for frequencies ≥ 800 MHz are determined with a scan volume of 30 mm x 30 mm x 30 mm (7 x 7 x 7) to ensure complete capture of the peak spatial-average SAR.

7.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluation a system check was performed at the planar section of the SAM phantom with a 1900MHz dipole and an 835MHz dipole (see Appendix C for system validation procedures). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using an HP 85070C Dielectric Probe Kit and an HP 8753E Network Analyzer (see Appendix E for printout of measured fluid dielectric parameters). A forward power of 250mW was applied to the dipole and the system was verified to a tolerance of ±10% (see Appendix B for system performance check test plots).

SYSTEM PERFORMANCE CHECK

Test Date	Freq. MHz (Brain)	SAR 1g (W/kg)		Dielectric Constant ε_r		Conductivity σ (mho/m)		ρ (Kg/m^3)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
		IEEE Target	Measured	IEEE Target	Measured	IEEE Target	Measured						
08/04/04	**835**	**2.38 ±10%**	2.46 (+3.4%)	**41.5 ±5%**	40.1	**0.90 ±5%**	0.90	1000	24.1	23.4	≥ 15	45	102.3
08/05/04	**835**	**2.38 ±10%**	2.48 (+4.2%)	**41.5 ±5%**	40.6	**0.90 ±5%**	0.91	1000	24.0	22.6	≥ 15	44	102.0
08/05/04	**1900**	**9.93 ±10%**	10.4 (+4.7%)	**40.0 ±5%**	38.3	**1.40 ±5%**	1.42	1000	25.7	22.0	≥ 15	42	102.0

Note(s):
1. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the system performance check. The temperatures listed in the table above were consistent for all measurement periods.

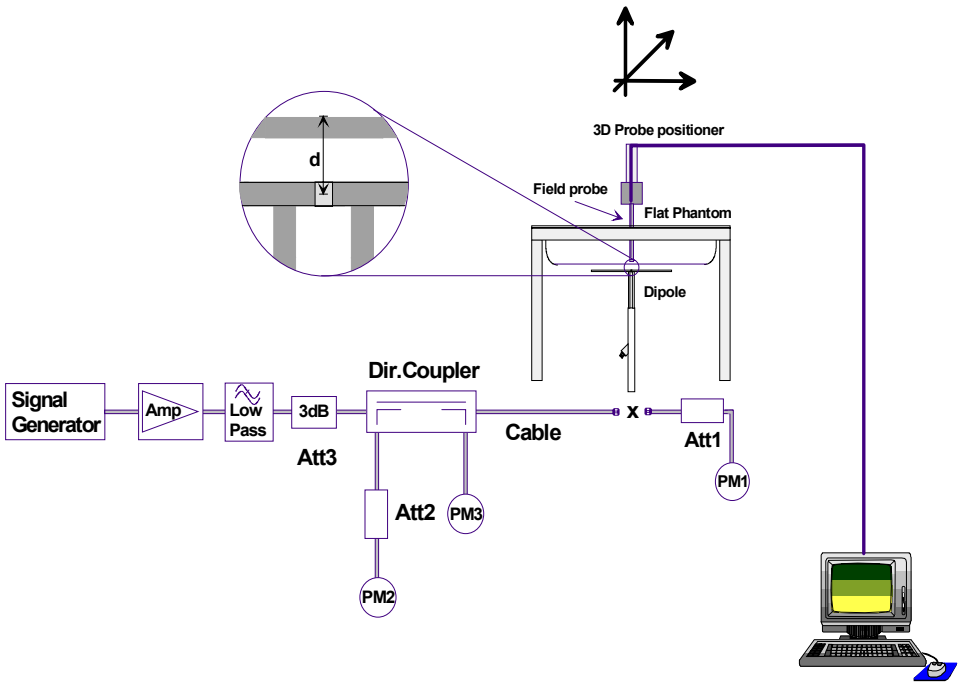


Figure 1. System Performance Check Setup Diagram

1900 MHz Dipole Setup

835 MHz Dipole Setup

8.0 SIMULATED EQUIVALENT TISSUES

The simulated tissue mixtures consist of Glycol-monobutyl, water, and salt. The 835MHz simulated tissue mixtures consist of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution. Preservation with a bactericide was added and visual inspection was made to ensure air bubbles were not trapped during the mixing process. The fluids were prepared according to standardized procedures and measured for dielectric parameters (permittivity and conductivity).

1880/1900MHz TISSUE SIMULANT		
INGREDIENT	1900MHz Brain	1880MHz Body
	System Performance Check	DUT Evaluation
Water	55.85 %	69.85 %
Glycol Monobutyl	44.00 %	29.89 %
Salt	0.15 %	0.26 %

835MHz TISSUE SIMULANT		
INGREDIENT	835MHz Brain	835MHz Body
	System Performance Check	DUT Evaluation
Water	40.71 %	53.79 %
Sugar	56.63 %	45.13 %
Salt	1.48 %	0.98 %
HEC	0.99 %	--
Bactericide	0.19 %	0.10 %

9.0 SAR SAFETY LIMITS

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

Notes:
1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

10.0 ROBOT SYSTEM SPECIFICATIONS

Specifications

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

Data Acquisition Electronic (DAE) System

Cell Controller

Processor: AMD Athlon XP 2400+
Clock Speed: 2.0 GHz
Operating System: Windows XP Professional

Data Converter

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

DASY4 Measurement Server

Function: Real-time data evaluation for field measurements and surface detection
Hardware: PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections: COM1, COM2, DAE, Robot, Ethernet, Service Interface

E-Field Probe

Model: ET3DV6
Serial No.: 1590
Construction: Triangular core fiber optic detection system
Frequency: 10 MHz to 6 GHz
Linearity: ±0.2 dB (30 MHz to 3 GHz)

Phantom(s)

Type 1: SAM V4.0C
Shell Material: Fiberglas
Thickness: 2.0 ±0.1 mm
Volume: Approx. 20 liters

Type 2: Planar Phantom
Shell Material: Fiberglas
Thickness: 2.0 ±0.1 mm
Volume: Approx. 72 liters

11.0 PROBE SPECIFICATION (ET3DV6)

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. glycol)
Calibration:	In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy ± 8%)
Frequency:	10 MHz to >6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity:	±0.2 dB in brain tissue (rotation around probe axis) ±0.4 dB in brain tissue (rotation normal to probe axis)
Dynamic Range:	5 μW/g to >100 mW/g; Linearity: ±0.2 dB
Surface Detection:	±0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions:	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application:	General dosimetry up to 3 GHz Compliance tests of mobile phone

ET3DV6 E-Field Probe

12.0 SAM PHANTOM V4.0C

The SAM phantom V4.0C is a Fiberglass shell phantom with a 2.0 mm (+/-0.2 mm) shell thickness for left and right head and flat planar area integrated in a wooden table. The shape of the Fiberglass shell corresponds to the phantom defined by SCC34-SC2. The device holder positions are adjusted to the standard measurement positions in the three sections (see Appendix F for specifications of the SAM phantom V4.0C).

SAM Phantom

13.0 PLANAR PHANTOM

The planar phantom is a Fiberglass shell phantom with a 2.0 mm (+/-0.2mm) thick device measurement area at the center of the phantom for SAR evaluations of devices with a larger surface area such as Laptop PCs. The planar phantom is integrated in a wooden table (see Appendix G for dimensions and specifications of the planar phantom).

Planar Phantom

14.0 DEVICE HOLDER

The DASY4 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. For evaluations of larger devices such as Laptop PCs, a Plexiglas platform is attached to the device holder.

Device Holder

15.0 TEST EQUIPMENT LIST

TEST EQUIPMENT	SERIAL NO.	CALIBRATION DATE
Schmid & Partner DASY4 System	-	-
-DASY4 Measurement Server	1078	N/A
-Robot	599396-01	N/A
-DAE3	353	Dec 2003
-DAE3	370	May 2004
-ET3DV6 E-Field Probe	1387	Mar 2004
-ET3DV6 E-Field Probe	1590	May 2004
-300MHz Validation Dipole	135	Oct 2003
-450MHz Validation Dipole	136	Nov 2003
-835MHz Validation Dipole	411	Mar 2004
-900MHz Validation Dipole	054	June 2004
-1800MHz Validation Dipole	247	June 2004
-1900MHz Validation Dipole	151	June 2004
-2450MHz Validation Dipole	150	Sept 2003
-SAM Phantom V4.0C	1033	N/A
-Barski Planar Phantom	03-01	N/A
-Plexiglas Planar Phantom	161	N/A
-Validation Planar Phantom	137	N/A
HP 85070C Dielectric Probe Kit	N/A	N/A
Gigatronics 8651A Power Meter	8650137	April 2004
Gigatronics 8652A Power Meter	1835267	April 2004
Gigatronics 80701A Power Sensor	1833535	April 2004
Gigatronics 80701A Power Sensor	1833542	April 2004
Gigatronics 80701A Power Sensor	1834350	April 2004
HP E4408B Spectrum Analyzer	US39240170	Dec 2003
HP 8594E Spectrum Analyzer	3543A02721	April 2004
HP 8753E Network Analyzer	US38433013	April 2004
HP 8648D Signal Generator	3847A00611	April 2004
Amplifier Research 5S1G4 Power Amplifier	26235	N/A

16.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**c_i 1g**	**Standard Uncertainty ±% (1g)**	**v_i or v_{eff}**
Measurement System						
Probe calibration (850 MHz)	± 5.95	Normal	1	1	± 5.95	∞
Probe calibration (1900 MHz)	± 4.85	Normal	1	1	± 4.85	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	$(1-c_p)$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	(c_p)	± 3.9	∞
Spatial resolution	± 0.0	Rectangular	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectangular	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 1.4	Rectangular	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectangular	√3	1	± 1.7	∞
Mech. constraints of robot	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
Extrapolation & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Test Sample Related						
Device positioning	± 6.0	Normal	√3	1	± 6.7	12
Device holder uncertainty	± 5.0	Normal	√3	1	± 5.9	8
Power drift	± 5.0	Rectangular	√3		± 2.9	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid conductivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Combined Standard Uncertainty						
850 MHz					**± 13.76**	
1900 MHz					**± 13.32**	
Expanded Uncertainty (k=2)						
850 MHz					**± 27.51**	
1900 MHz					**± 26.64**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])

MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**c_i 1g**	**Standard Uncertainty ±% (1g)**	**v_i or v_{eff}**
Measurement System						
Probe calibration (850 MHz)	± 5.95	Normal	1	1	± 5.95	∞
Probe calibration (1900 MHz)	± 4.85	Normal	1	1	± 4.85	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	$(1-c_p)$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	(c_p)	± 3.9	∞
Spatial resolution	± 0.0	Rectangular	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectangular	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 1.4	Rectangular	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectangular	√3	1	± 1.7	∞
Mech. constraints of robot	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
Extrapolation & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Dipole						
Dipole Axis to Liquid Distance	± 2.0	Rectangular	√3	1	± 1.2	∞
Input Power	± 4.7	Rectangular	√3	1	± 2.7	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid conductivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Combined Standard Uncertainty						
850 MHz					**± 10.54**	
1900 MHz					**± 9.97**	
Expanded Uncertainty (k=2)						
850 MHz					**± 21.09**	
1900 MHz					**± 19.93**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])

17.0 REFERENCES

[1] Federal Communications Commission, “Radiofrequency radiation exposure evaluation: portable devices”, Rule Part 47 CFR §2.1093: 1999.

[2] Health Canada, “Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz”, Safety Code 6.

[3] Federal Communications Commission, “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”, OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.

[4] Industry Canada, “Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada’s Safety Code 6 for Exposure of Humans to Radio Frequency Fields”, Radio Standards Specification RSS-102 Issue 1 (Provisional): September 1999.

[5] IEEE Std 1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”.

APPENDIX A - SAR MEASUREMENT DATA

Date Tested: 08/05/04

Body SAR - PCS CDMA - DUT with Toshiba Tecra 8100 Laptop PC - Bottom PCMCIA Slot

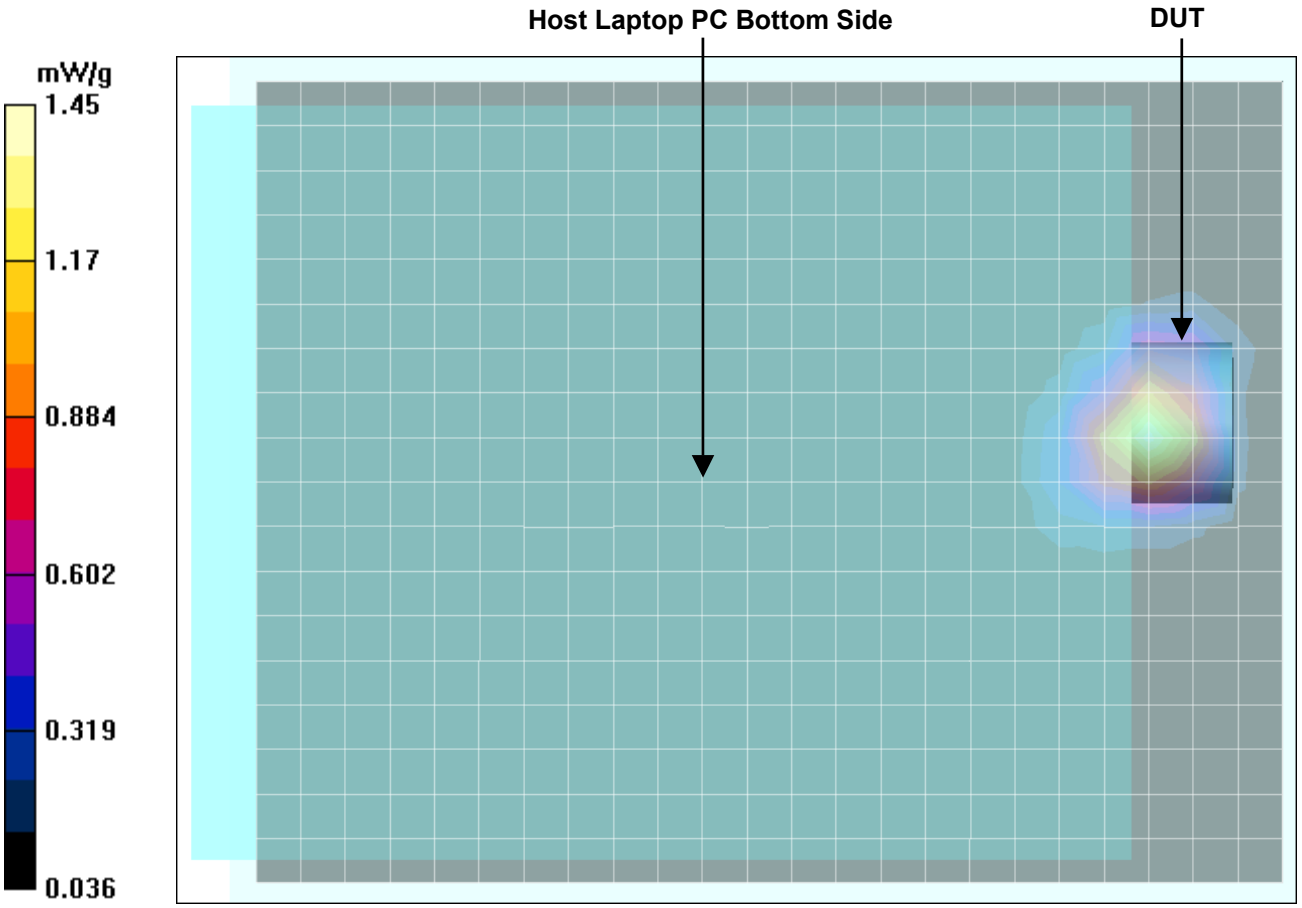
DUT: Novatel Wireless Model: V620; Type: Dual-Band CDMA PCMCIA Modem for Laptop PCs; Serial: S01272

Ambient Temp: 24.6 °C; Fluid Temp: 22.4 °C; Barometric Pressure: 102.1 kPa; Humidity: 45%

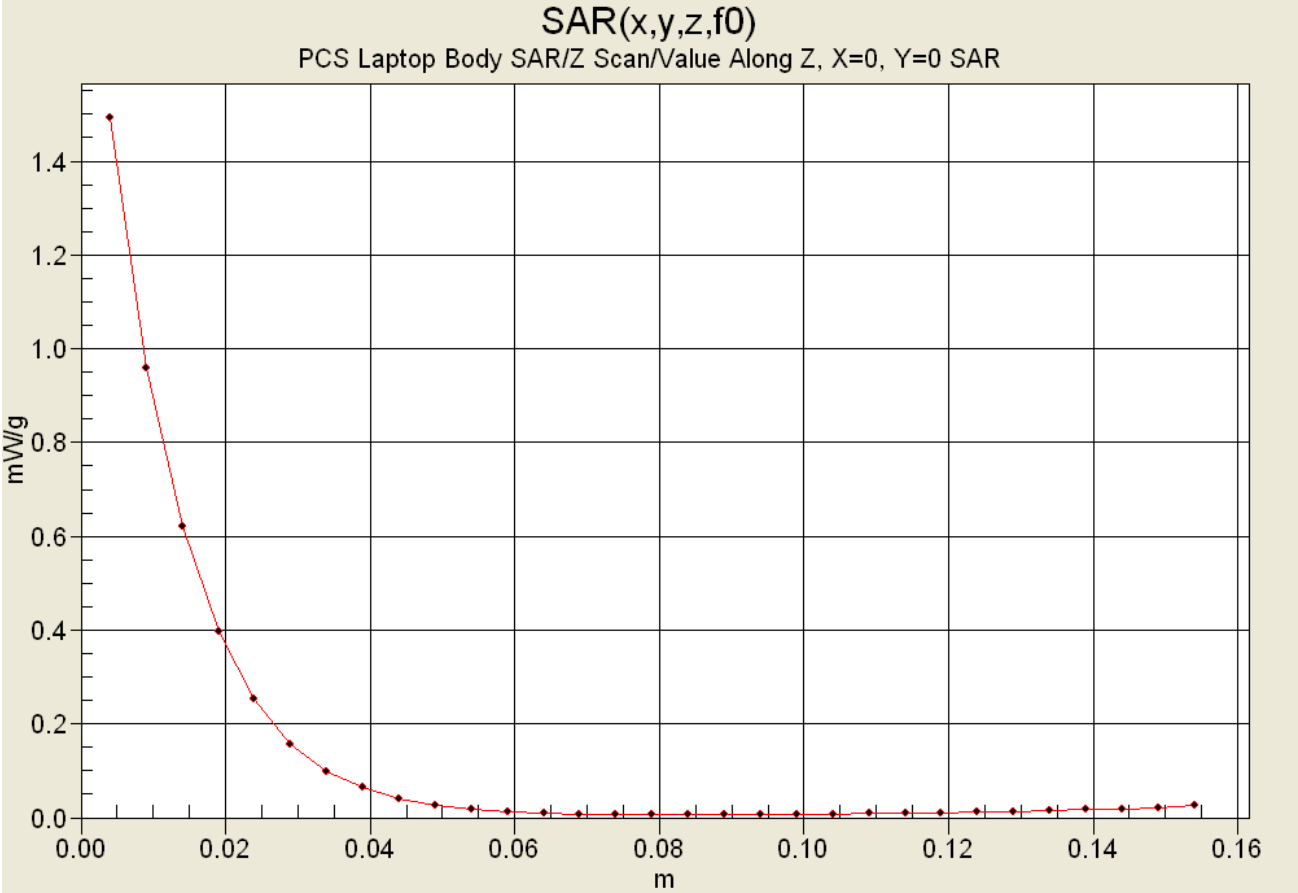
Power Source: Laptop AC Supply
Communication System: PCS CDMA
Frequency: 1880.00 MHz; Duty Cycle: 1:1
RF Output Power: 23.5 dBm (Conducted)
Medium: M1880 (σ = 1.55 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)
- Probe: ET3DV6 - SN1590; ConvF(4.58, 4.58, 4.58); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 600)
Area Scan (19x25x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 600)
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.8 V/m; Power Drift = 0.183 dB
Peak SAR (extrapolated) = 2.05 W/kg
SAR(1 g) = 1.33 mW/g; SAR(10 g) = 0.791 mW/g



Z-Axis Scan


SAR(x,y,z,f0)
PCS Laptop Body SAR/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date Tested: 08/05/04

Body SAR - PCS CDMA - DUT with Toshiba Tecra 8100 Laptop PC - Bottom PCMCIA Slot

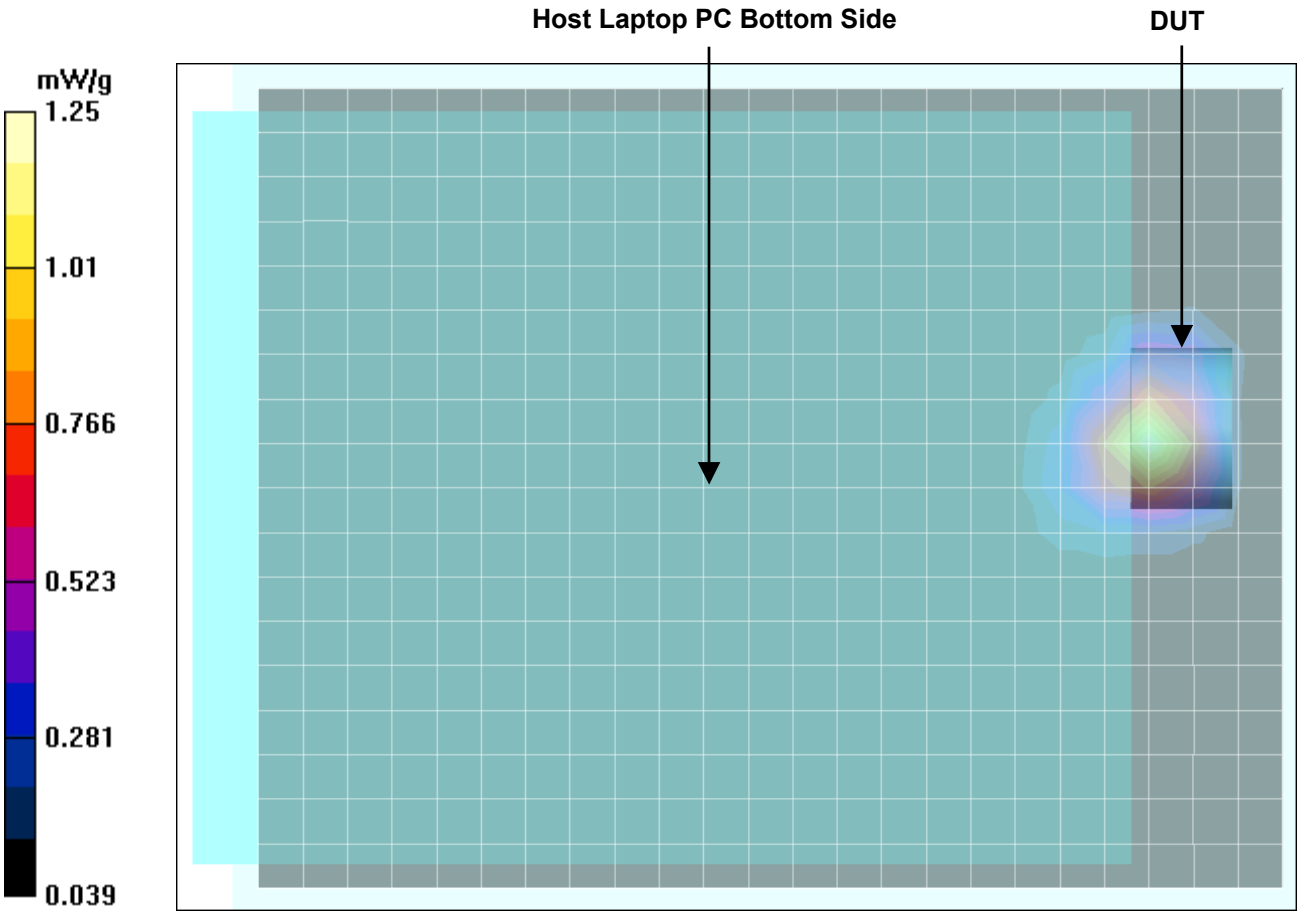
DUT: Novatel Wireless Model: V620; Type: Dual-Band CDMA PCMCIA Modem for Laptop PCs; Serial: S01272

Ambient Temp: 24.6 °C; Fluid Temp: 22.4 °C; Barometric Pressure: 102.1 kPa; Humidity: 45%

Power Source: Laptop AC Supply
Communication System: PCS CDMA
Frequency: 1851.25 MHz; Duty Cycle: 1:1
RF Output Power: 24.0 dBm (Conducted)
Medium: M1880 (σ = 1.55 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)
- Probe: ET3DV6 - SN1590; ConvF(4.58, 4.58, 4.58); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - Low Channel (Ch. 25)
Area Scan (19x25x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - Low Channel (Ch. 25)
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.3 V/m; Power Drift = -0.0309 dB
Peak SAR (extrapolated) = 1.78 W/kg
SAR(1 g) = 1.14 mW/g; SAR(10 g) = 0.675 mW/g



Date Tested: 08/05/04

Body SAR - PCS CDMA - DUT with Toshiba Tecra 8100 Laptop PC - Bottom PCMCIA Slot

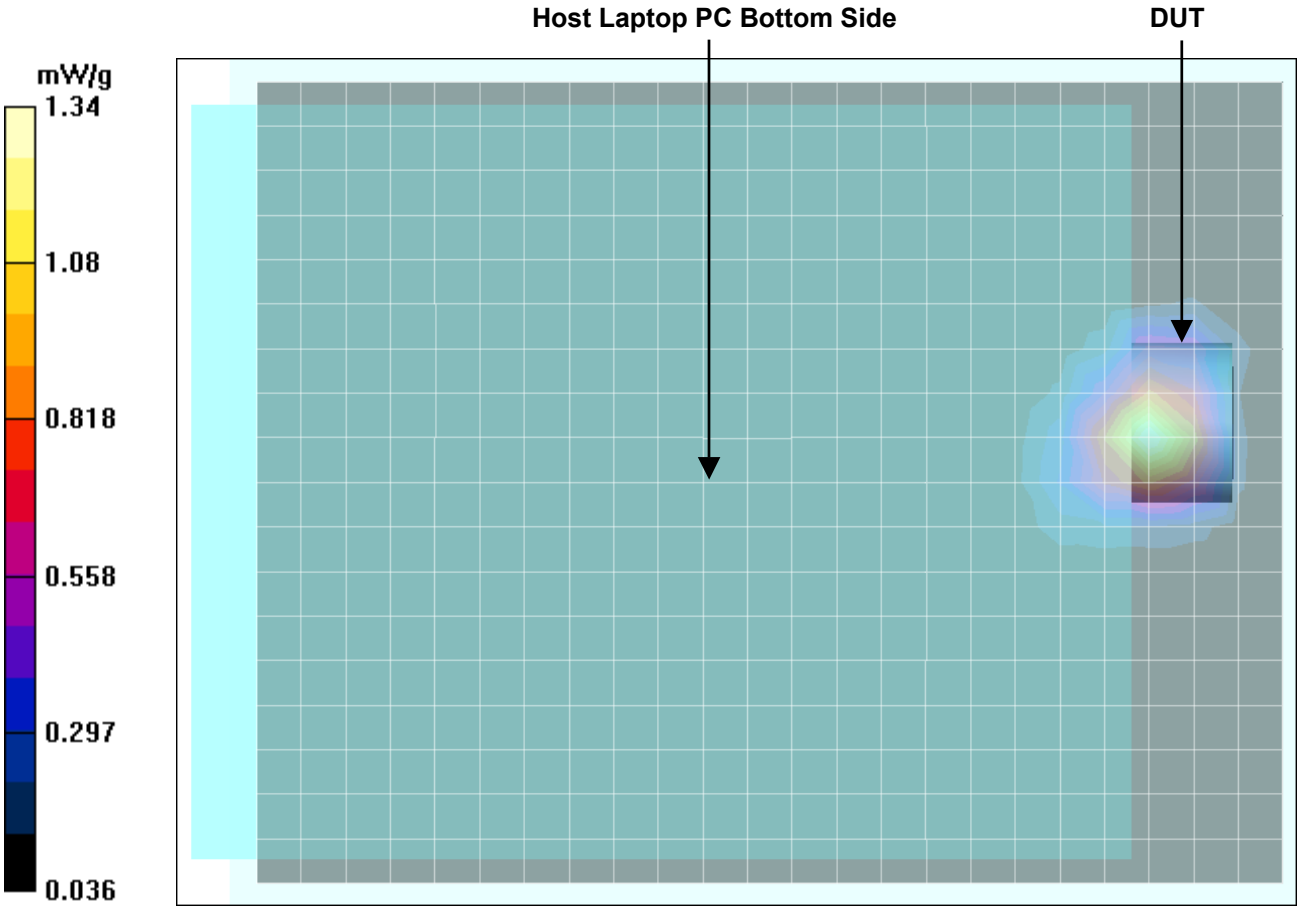
DUT: Novatel Wireless Model: V620; Type: Dual-Band CDMA PCMCIA Modem for Laptop PCs; Serial: S01272

Ambient Temp: 24.6 °C; Fluid Temp: 22.4 °C; Barometric Pressure: 102.1 kPa; Humidity: 45%

Power Source: Laptop AC Supply
Communication System: PCS CDMA
Frequency: 1908.75 MHz; Duty Cycle: 1:1
RF Output Power: 23.5 dBm (Conducted)
Medium: M1880 (σ = 1.55 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)
- Probe: ET3DV6 - SN1590; ConvF(4.58, 4.58, 4.58); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - High Channel (Ch. 1175)
Area Scan (19x25x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - High Channel (Ch. 1175)
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.4 V/m; Power Drift = -0.0169 dB
Peak SAR (extrapolated) = 1.9 W/kg
SAR(1 g) = 1.25 mW/g; SAR(10 g) = 0.734 mW/g

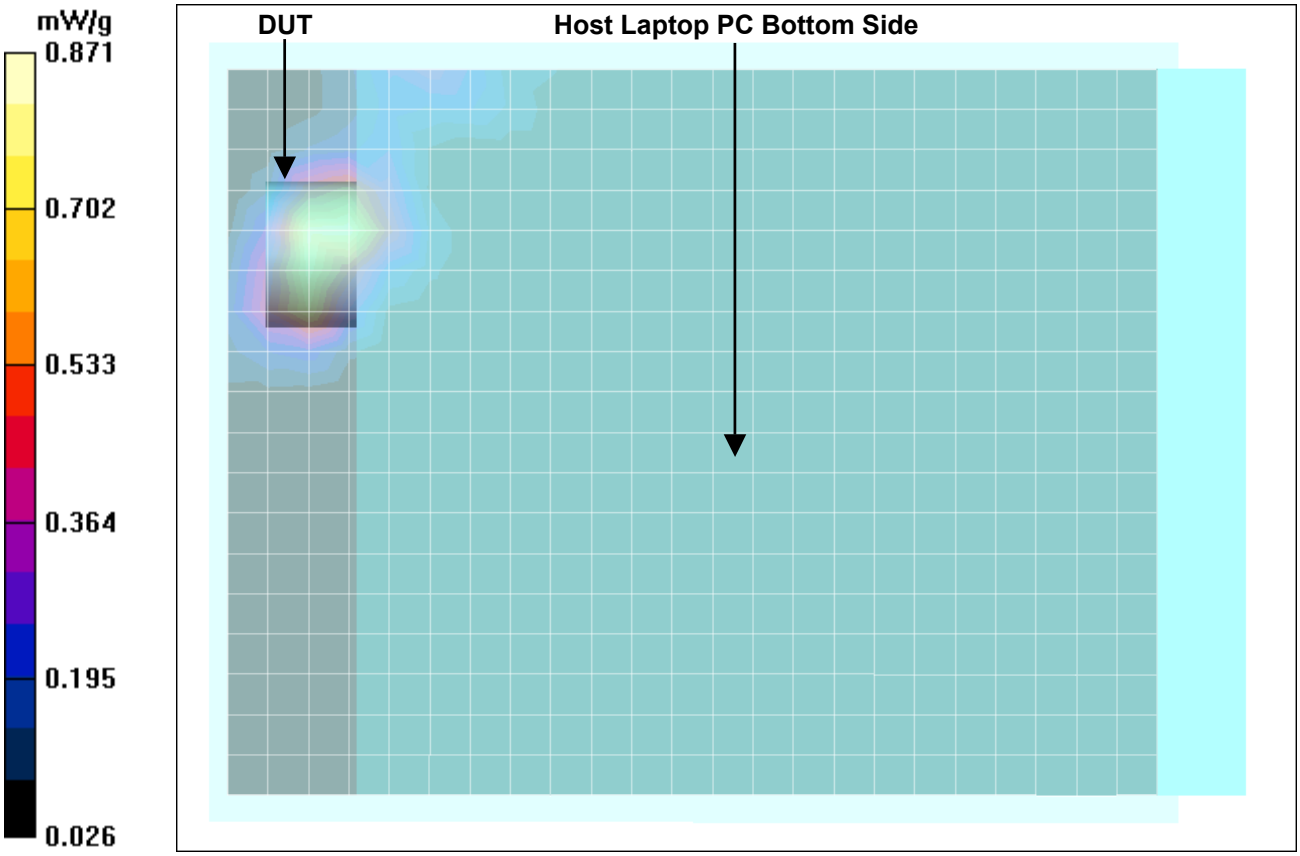


Date Tested: 08/06/04

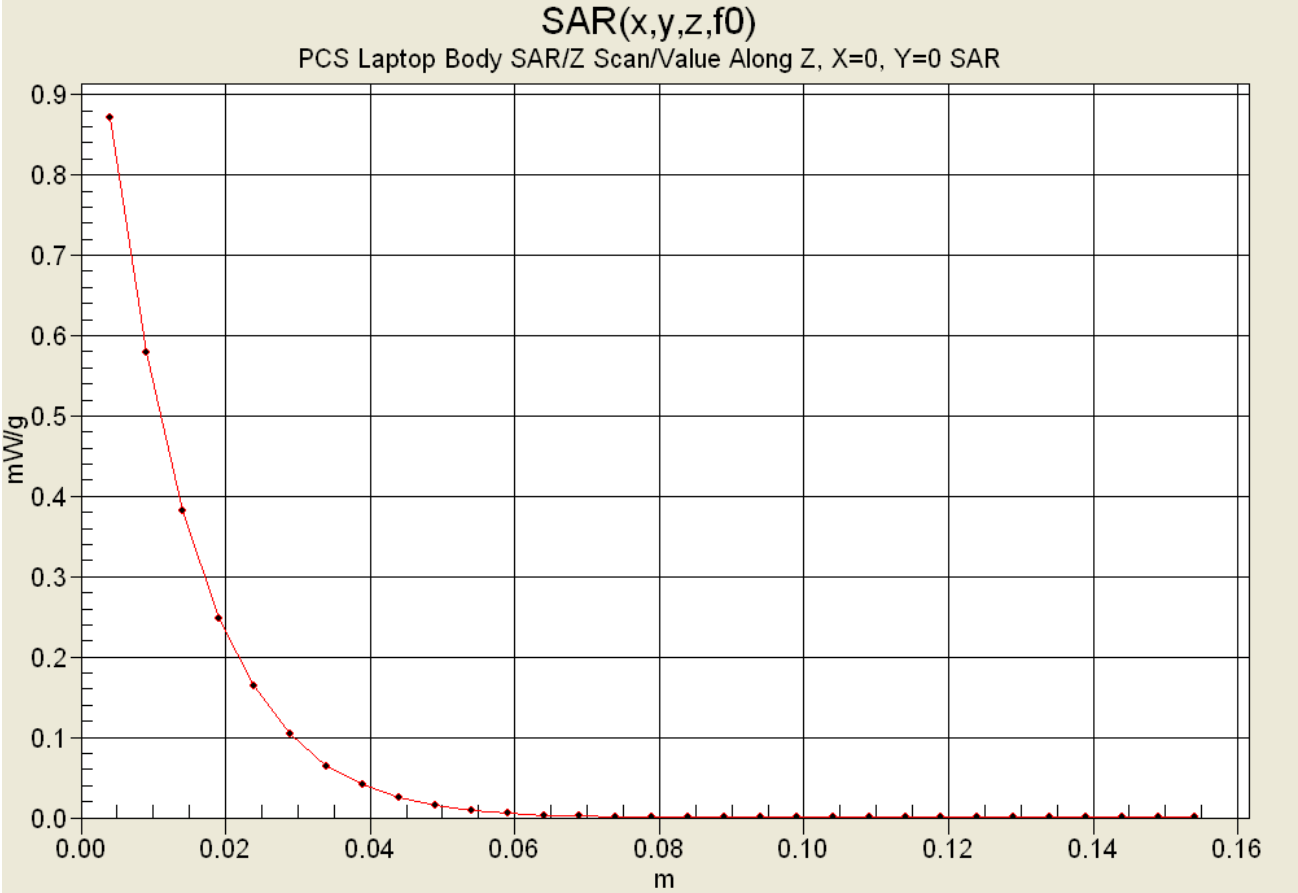
Body SAR - PCS CDMA - DUT with Dell Latitude C800 Laptop PC - Bottom PCMCIA Slot

DUT: Novatel Wireless Model: V620; Type: Dual-Band CDMA PCMCIA Modem for Laptop PCs; Serial: S01272
Ambient Temp: 24.9 °C; Fluid Temp: 23.6 °C; Barometric Pressure: 102.2 kPa; Humidity: 39%
Power Source: Laptop AC Supply
Communication System: PCS CDMA
Frequency: 1880.00 MHz; Duty Cycle: 1:1
RF Output Power: 23.5 dBm (Conducted)
Medium: M1880 (σ = 1.52 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3)
- Probe: ET3DV6 - SN1590; ConvF(4.58, 4.58, 4.58); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Body SAR - Bottom of Dell Latitude C800 Laptop PC Touching Planar Phantom (15 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 600)
Area Scan (19x25x1): Measurement grid: dx=15mm, dy=15mm
Body SAR - Bottom of Dell Latitude C800 Laptop PC Touching Planar Phantom (15 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 600)
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.5 V/m; Power Drift = 0.0709 dB
Peak SAR (extrapolated) = 1.22 W/kg
SAR(1 g) = 0.799 mW/g; SAR(10 g) = 0.500 mW/g
Body SAR - Bottom of Dell Latitude C800 Laptop PC Touching Planar Phantom (15 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 600)
Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.5 V/m; Power Drift = 0.0709 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.692 mW/g; SAR(10 g) = 0.429 mW/g



Z-Axis Scan


SAR(x,y,z,f0)
PCS Laptop Body SAR/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date Tested: 08/06/04

Body SAR - PCS CDMA - DUT with Dell Latitude D800 Laptop PC - Single PCMCIA Slot

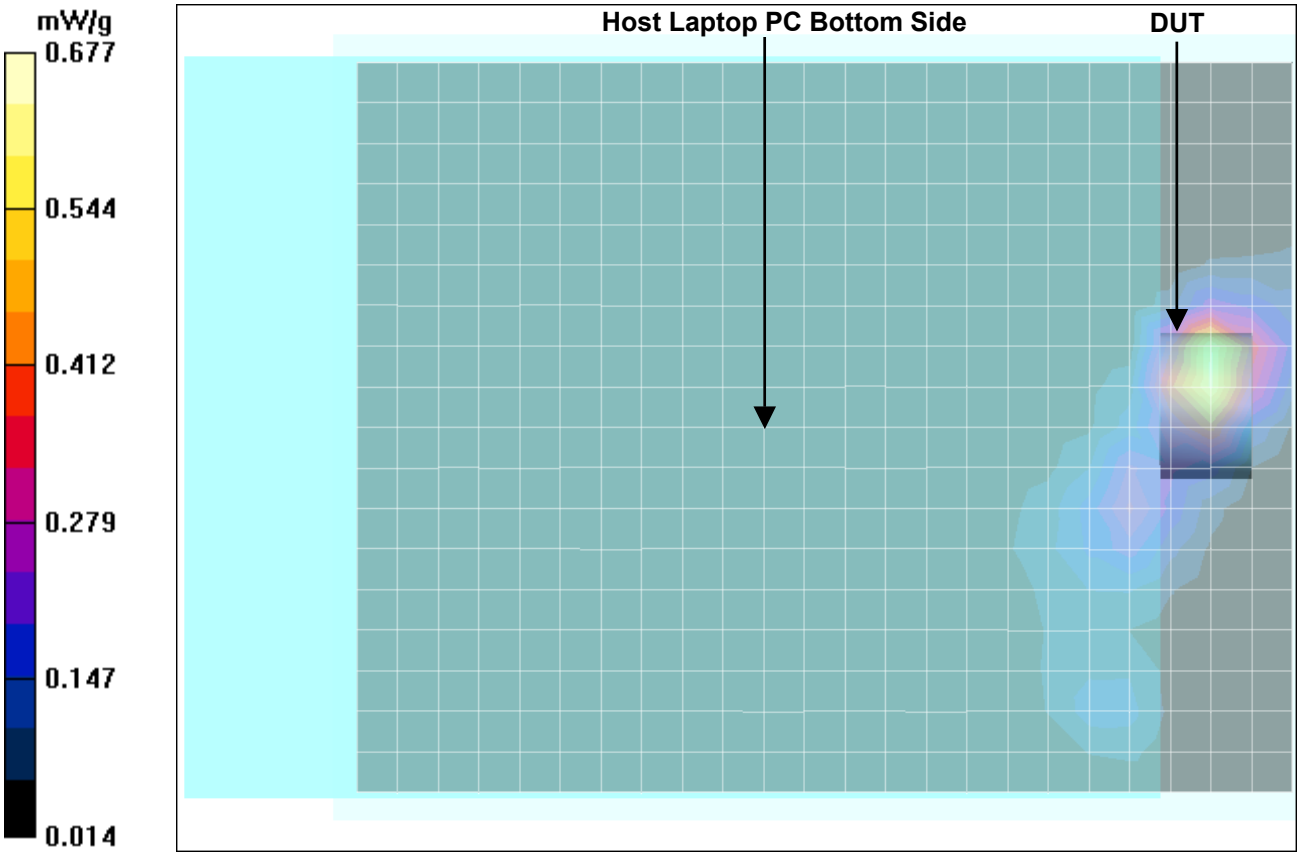
DUT: Novatel Wireless Model: V620; Type: Dual-Band CDMA PCMCIA Modem for Laptop PCs; Serial: S01272

Ambient Temp: 24.9 °C; Fluid Temp: 23.6 °C; Barometric Pressure: 102.2 kPa; Humidity: 39%

Power Source: Laptop AC Supply
Communication System: PCS CDMA
RF Output Power: 23.5 dBm (Conducted)
Frequency: 1880.00 MHz; Duty Cycle: 1:1
Medium: M1880 (σ = 1.52 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3)
- Probe: ET3DV6 - SN1590; ConvF(4.58, 4.58, 4.58); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Body SAR - Bottom of Dell Latitude D800 Laptop PC Touching Planar Phantom (17 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 600)
Area Scan (19x25x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - Bottom of Dell Latitude D800 Laptop PC Touching Planar Phantom (17 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 600)
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.7 V/m; Power Drift = -0.141 dB
Peak SAR (extrapolated) = 0.965 W/kg
SAR(1 g) = 0.614 mW/g; SAR(10 g) = 0.367 mW/g



Date Tested: 08/04/04

Body SAR - Cellular CDMA - DUT with Toshiba Tecra 8100 Laptop PC - Bottom PCMCIA Slot

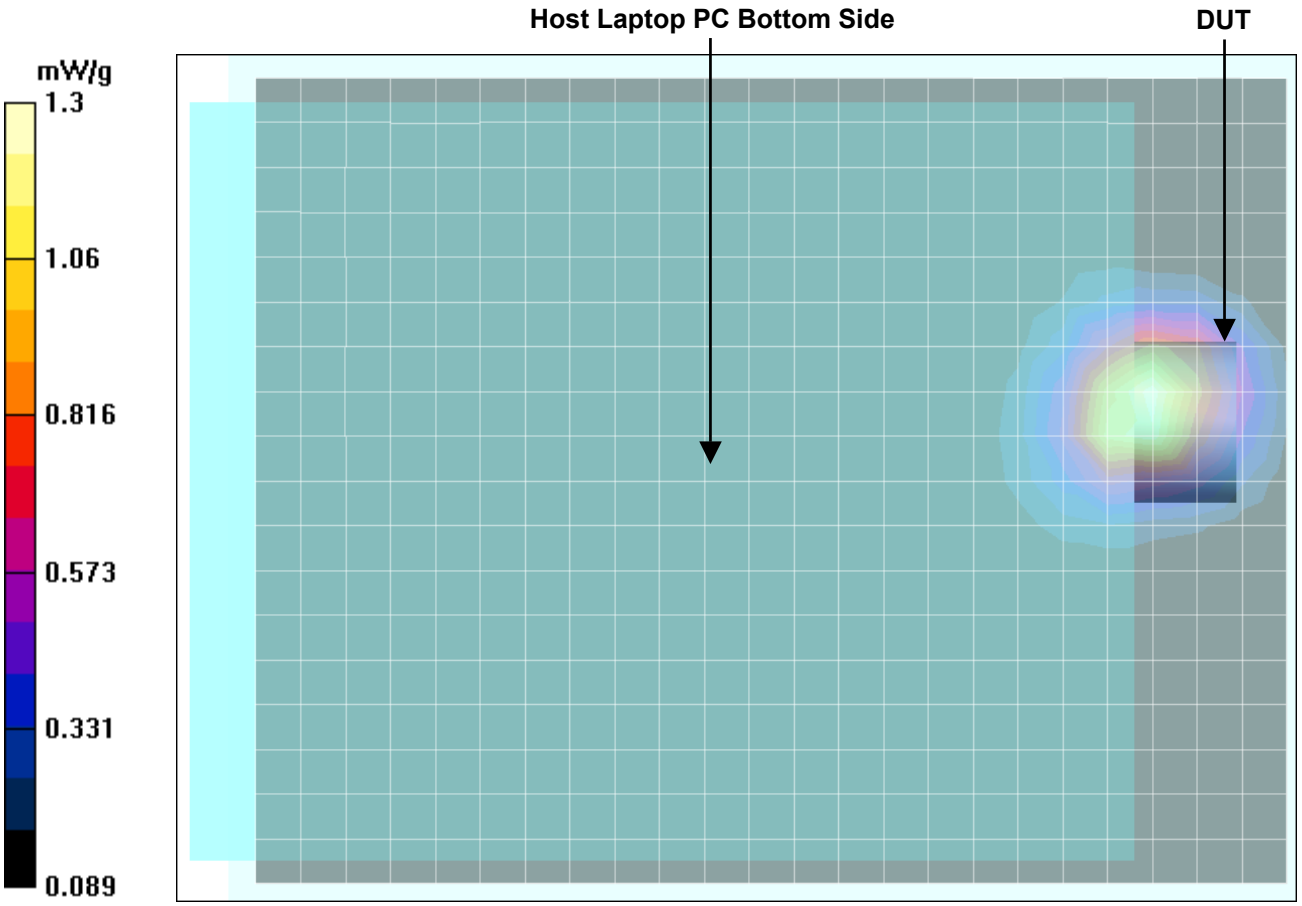
DUT: Novatel Wireless Model: V620; Type: Dual-Band CDMA PCMCIA Modem for Laptop PCs; Serial: S01272

Ambient Temp: 25.5 °C; Fluid Temp: 23.5 °C; Barometric Pressure: 102.1 kPa; Humidity: 39%

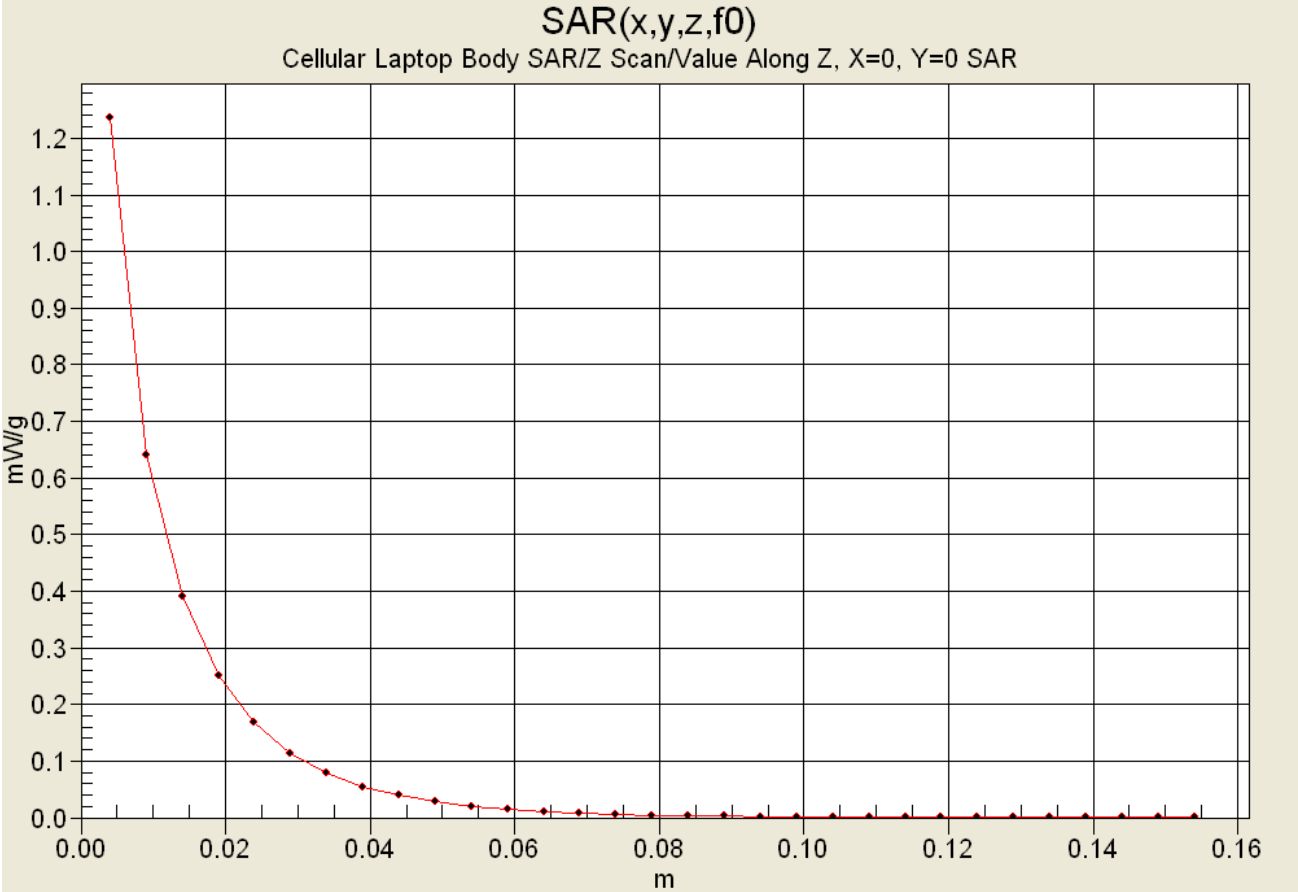
Power Source: Laptop AC Supply
Communication System: Cellular CDMA
Frequency: 836.52 MHz; Duty Cycle: 1:1
RF Output Power: 24.5 dBm (Conducted)
Medium: M835 (σ = 1.00 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3)
- Probe: ET3DV6 - SN1590; ConvF(6.54, 6.54, 6.54); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 384)
Area Scan (19x25x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 384)
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 29.6 V/m; Power Drift = -0.0743 dB
Peak SAR (extrapolated) = 1.82 W/kg
SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.776 mW/g



Z-Axis Scan


SAR(x,y,z,f0)
Cellular Laptop Body SAR/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date Tested: 08/05/04

Body SAR - Cellular CDMA - DUT with Toshiba Tecra 8100 Laptop PC - Bottom PCMCIA Slot

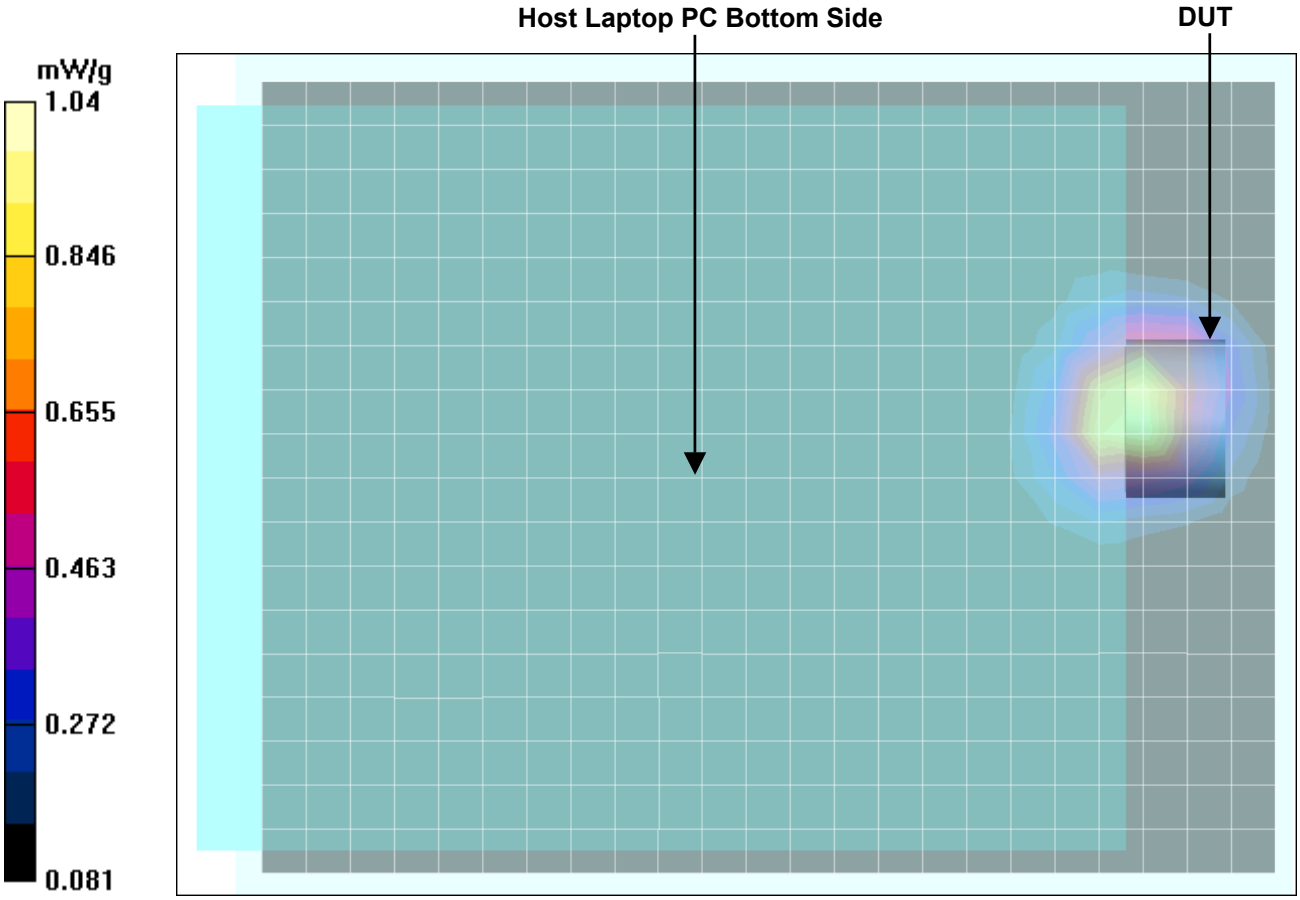
DUT: Novatel Wireless Model: V620; Type: Dual-Band CDMA PCMCIA Modem for Laptop PCs; Serial: S01272

Ambient Temp: 23.7 °C; Fluid Temp: 23.3 °C; Barometric Pressure: 102.0 kPa; Humidity: 38%

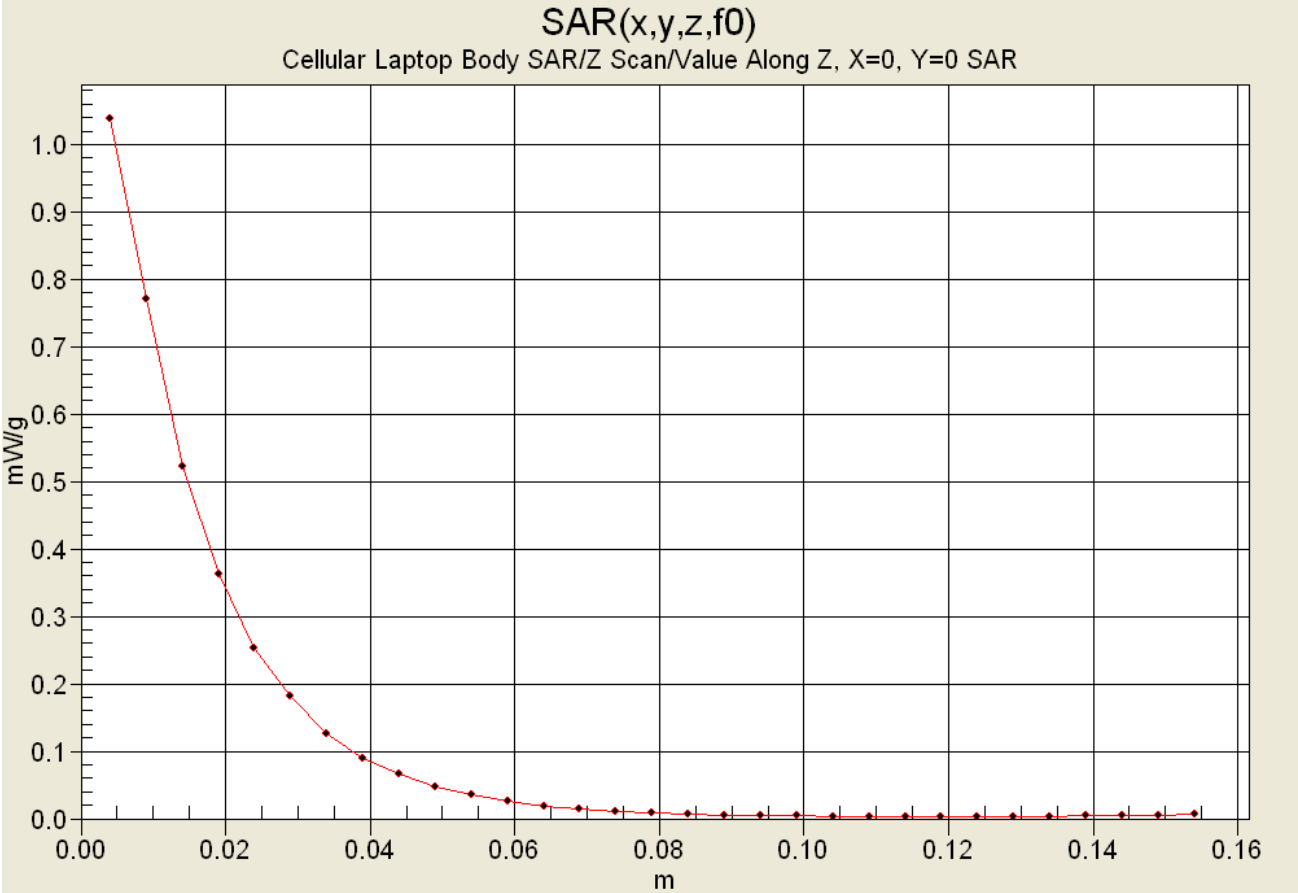
Power Source: Laptop AC Supply
Communication System: Cellular CDMA
Frequency: 824.7 MHz; Duty Cycle: 1:1
RF Output Power: 24.5 dBm (Conducted)
Medium: M835 (σ = 0.99 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3)
- Probe: ET3DV6 - SN1590; ConvF(6.54, 6.54, 6.54); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - Low Channel (Ch. 1013)
Area Scan (19x25x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - Low Channel (Ch. 1013)
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21 V/m; Power Drift = -0.0904 dB
Peak SAR (extrapolated) = 1.35 W/kg
SAR(1 g) = 0.958 mW/g; SAR(10 g) = 0.628 mW/g



Z-Axis Scan


SAR(x,y,z,f0)
Cellular Laptop Body SAR/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

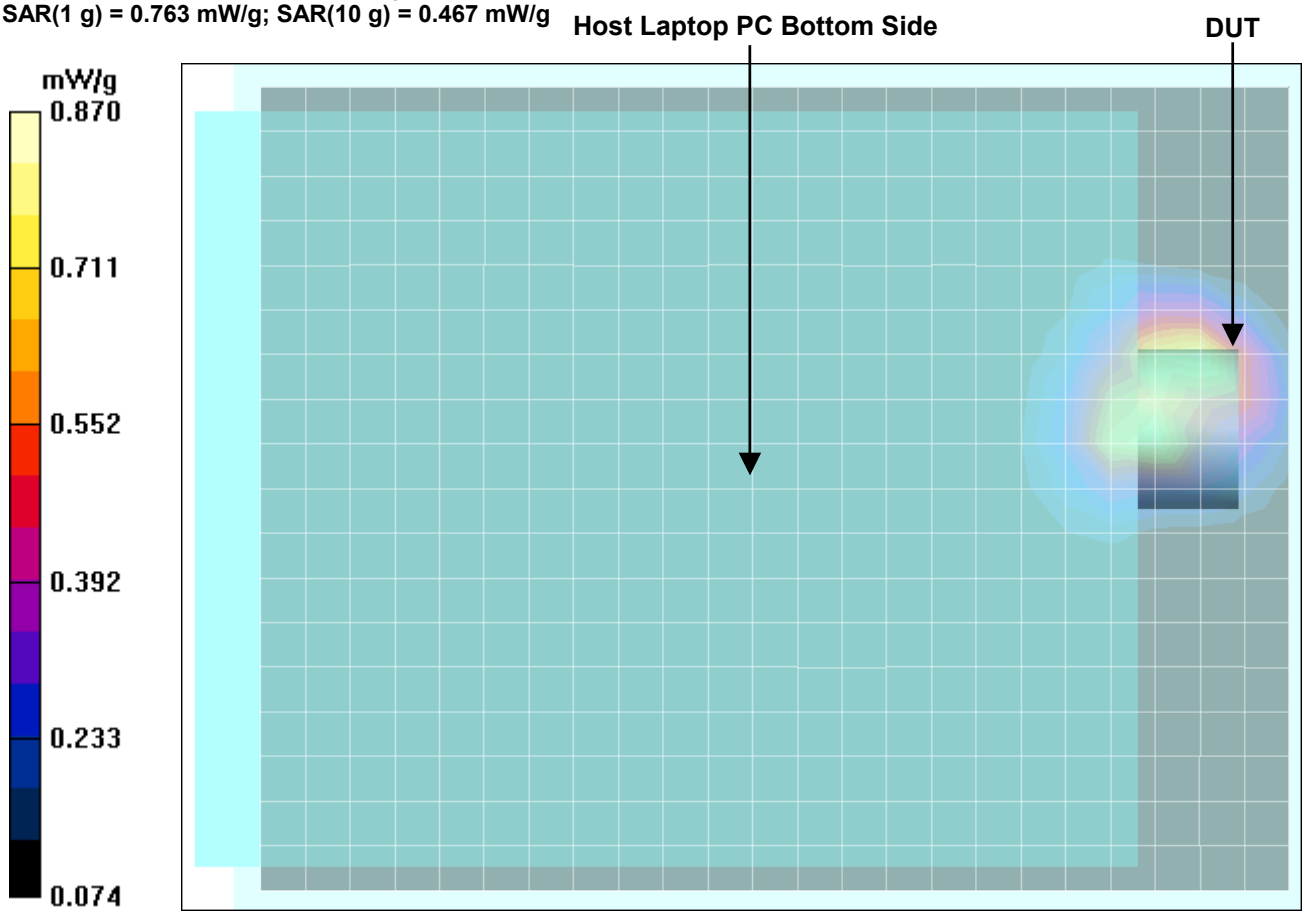
Date Tested: 08/05/04

Body SAR - Cellular CDMA - DUT with Toshiba Tecra 8100 Laptop PC - Bottom PCMCIA Slot

DUT: Novatel Wireless Model: V620; Type: Dual-Band CDMA PCMCIA Modem for Laptop PCs; Serial: S01272

Ambient Temp: 23.7 °C; Fluid Temp: 23.3 °C; Barometric Pressure: 102.0 kPa; Humidity: 38%
Power Source: Laptop AC Supply
Communication System: Cellular CDMA
Frequency: 848.31 MHz; Duty Cycle: 1:1
RF Output Power: 24.5 dBm (Conducted)
Medium: M835 (σ = 0.99 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3)
- Probe: ET3DV6 - SN1590; ConvF(6.54, 6.54, 6.54); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - High Channel (Ch. 777)
Area Scan (19x25x1): Measurement grid: dx=15mm, dy=15mm
Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - High Channel (Ch. 777)
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.9 V/m; Power Drift = -0.0867 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.787 mW/g; SAR(10 g) = 0.525 mW/g
Body SAR - Bottom of Toshiba Tecra 8100 Laptop PC Touching Planar Phantom (13 mm Spacing from Bottom of DUT to Planar Phantom) - High Channel (Ch. 777)
Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.9 V/m; Power Drift = -0.0867 dB
Peak SAR (extrapolated) = 1.31 W/kg
SAR(1 g) = 0.763 mW/g; SAR(10 g) = 0.467 mW/g



Date Tested: 08/04/04

Body SAR - Cellular CDMA - DUT with Dell Latitude C800 Laptop PC - Bottom PCMCIA Slot

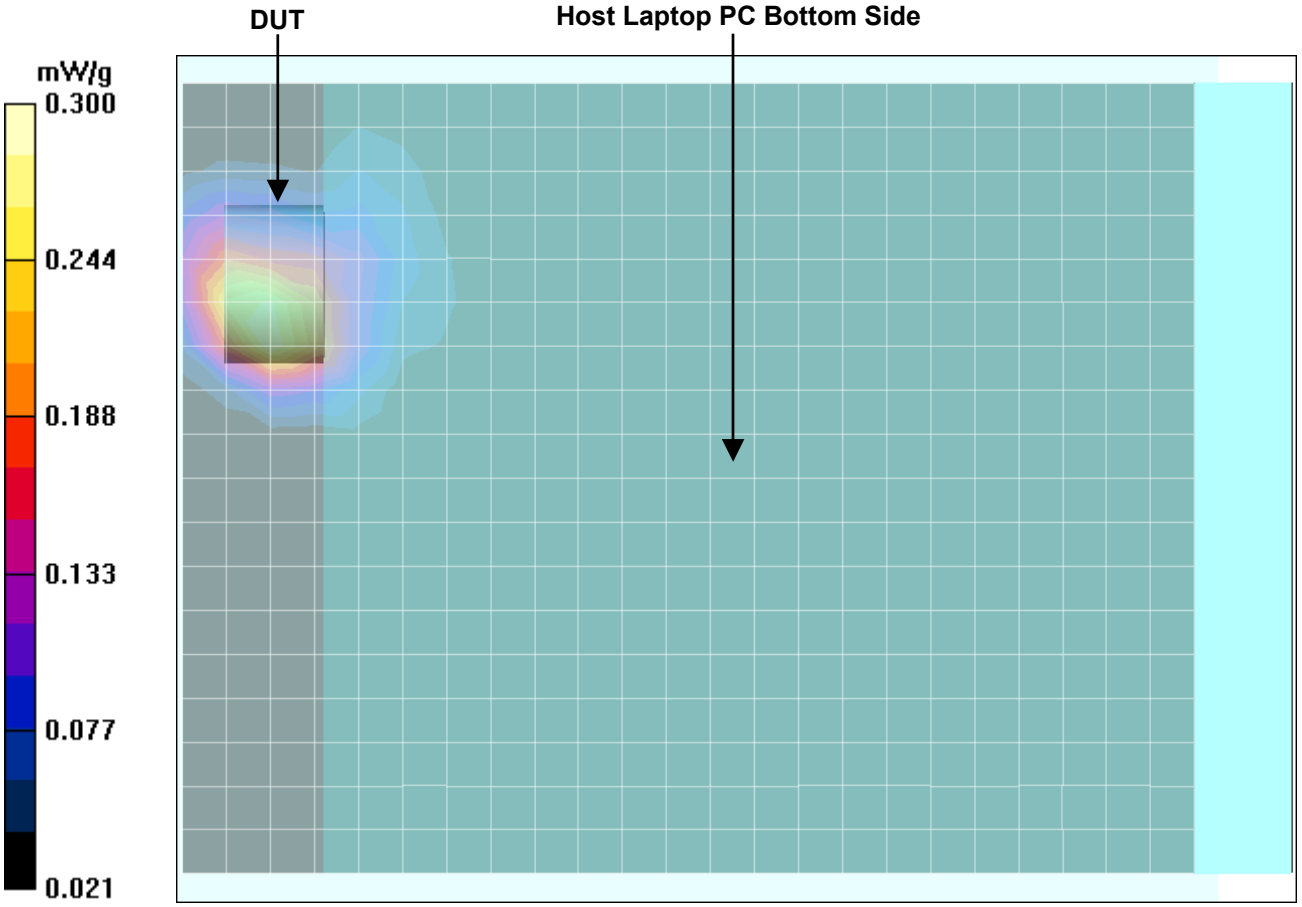
DUT: Novatel Wireless Model: V620; Type: Dual-Band CDMA PCMCIA Modem for Laptop PCs; Serial: S01272

Ambient Temp: 25.5 °C; Fluid Temp: 23.5 °C; Barometric Pressure: 102.1 kPa; Humidity: 39%

Power Source: Laptop AC Supply
Communication System: Cellular CDMA
Frequency: 836.52 MHz; Duty Cycle: 1:1
RF Output Power: 24.5 dBm (Conducted)
Medium: M835 (σ = 1.00 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3)
- Probe: ET3DV6 - SN1590; ConvF(6.54, 6.54, 6.54); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Body SAR - Bottom of Dell Latitude C800 Laptop PC Touching Planar Phantom (15 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 384)
Area Scan (19x25x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - Bottom of Dell Latitude C800 Laptop PC Touching Planar Phantom (15 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 384)
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.9 V/m; Power Drift = -0.0255 dB
Peak SAR (extrapolated) = 0.430 W/kg
SAR(1 g) = 0.277 mW/g; SAR(10 g) = 0.174 mW/g



Date Tested: 08/04/04

Body SAR - Cellular CDMA - DUT with Dell Latitude D800 Laptop PC - Single PCMCIA Slot

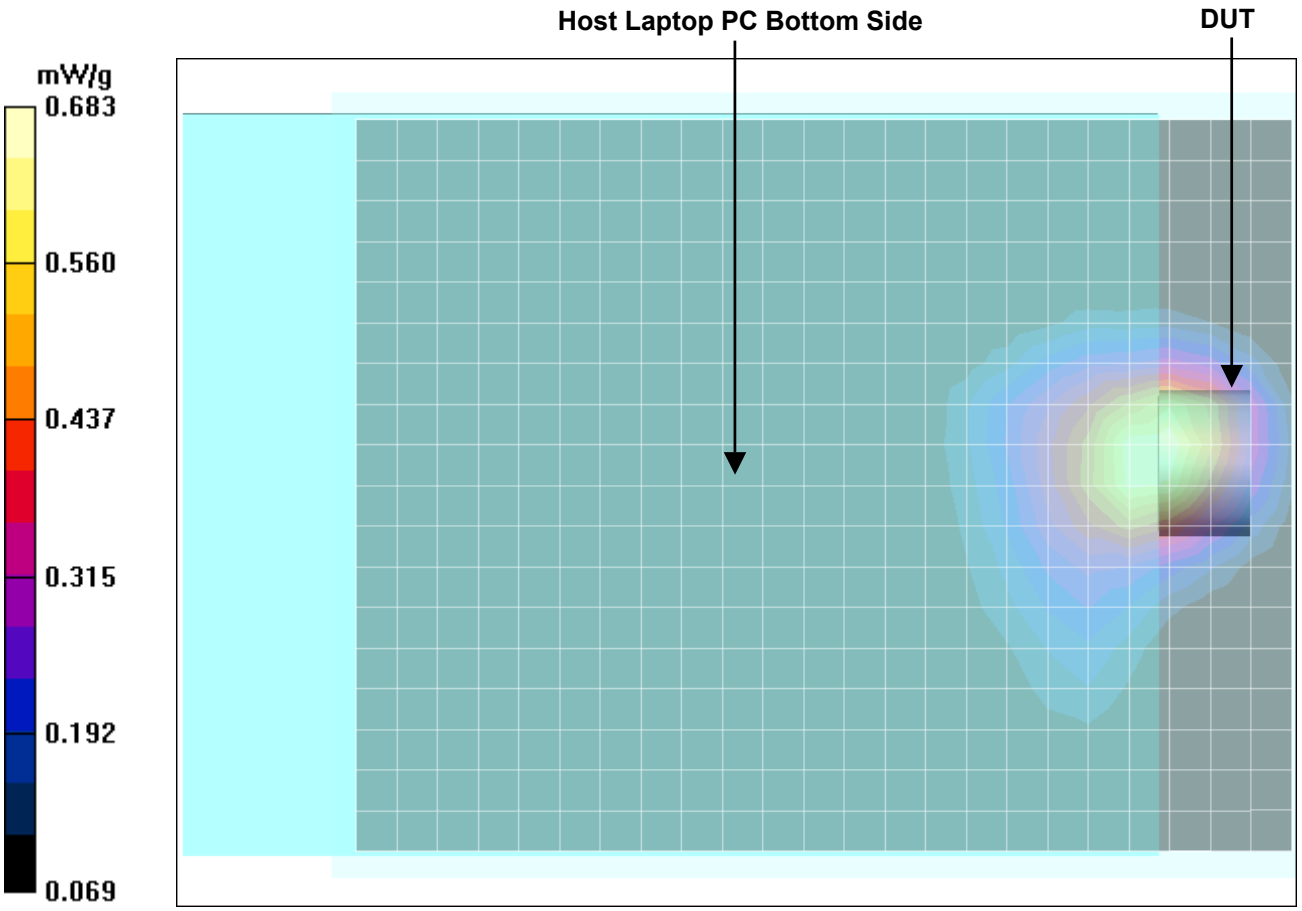
DUT: Novatel Wireless Model: V620; Type: Dual-Band CDMA PCMCIA Modem for Laptop PCs; Serial: S01272

Ambient Temp: 25.5 °C; Fluid Temp: 23.5 °C; Barometric Pressure: 102.1 kPa; Humidity: 39%

Power Source: Laptop AC Supply
Communication System: Cellular CDMA
Frequency: 836.52 MHz; Duty Cycle: 1:1
RF Output Power: 24.5 dBm (Conducted)
Medium: M835 (σ = 1.00 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3)
- Probe: ET3DV6 - SN1590; ConvF(6.54, 6.54, 6.54); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Body SAR - Bottom of Dell Latitude D800 Laptop PC Touching Planar Phantom (17 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 384)
Area Scan (19x25x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - Bottom of Dell Latitude D800 Laptop PC Touching Planar Phantom (17 mm Spacing from Bottom of DUT to Planar Phantom) - Mid Channel (Ch. 384)
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.4 V/m; Power Drift = -0.0456 dB
Peak SAR (extrapolated) = 0.868 W/kg
SAR(1 g) = 0.635 mW/g; SAR(10 g) = 0.449 mW/g



APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Date Tested: 08/04/04

System Performance Check - 835 MHz Dipole

DUT: Dipole 835 MHz; Model: D835V2; Type: System Performance Check; Serial: 411; Calibrated: 16/03/2004

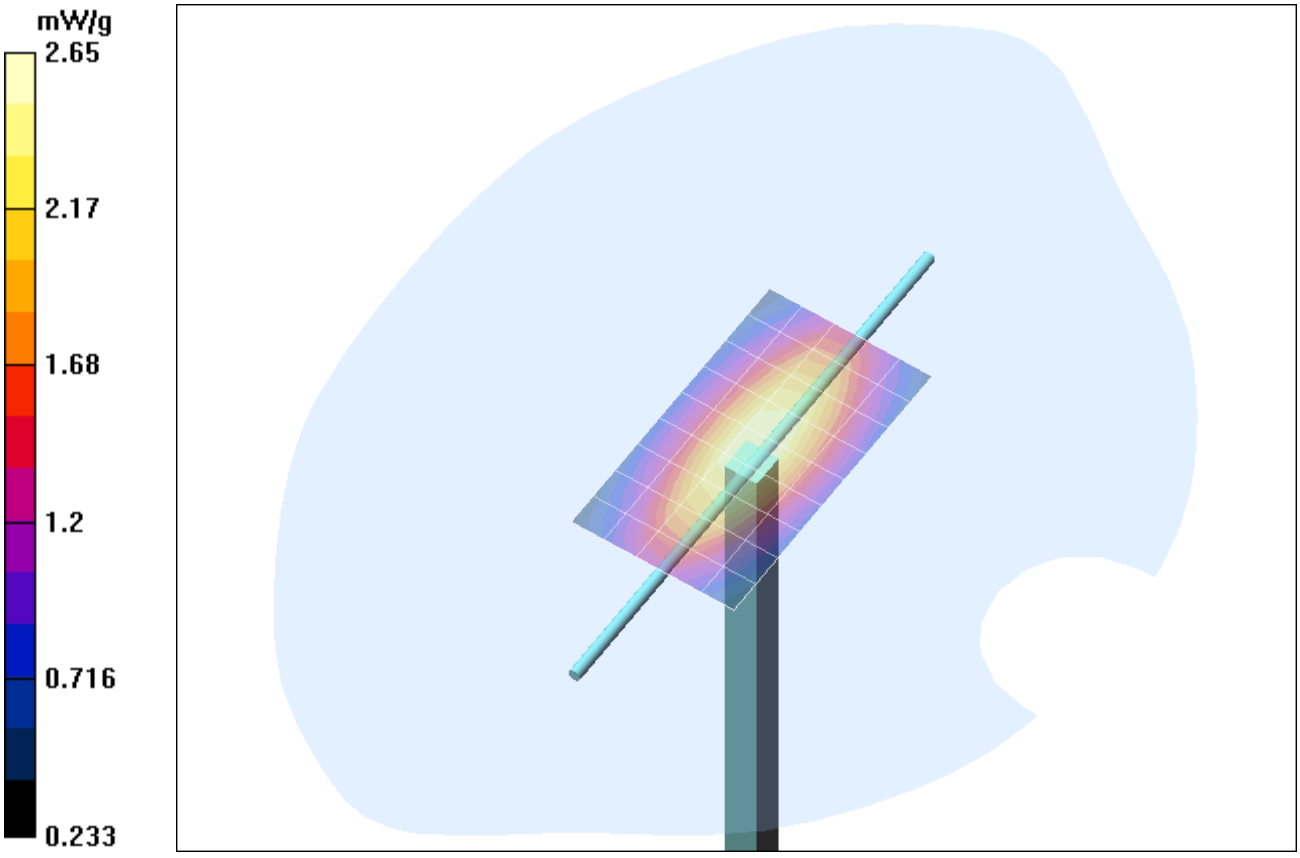
Ambient Temp: 24.1 °C; Fluid Temp: 23.4 °C; Barometric Pressure: 102.3 kPa; Humidity: 45%

Communication System: CW
Forward Conducted Power: 250mW
Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL835 (σ = 0.90 mho/m; ε_r = 40.1; ρ = 1000 kg/m^3)

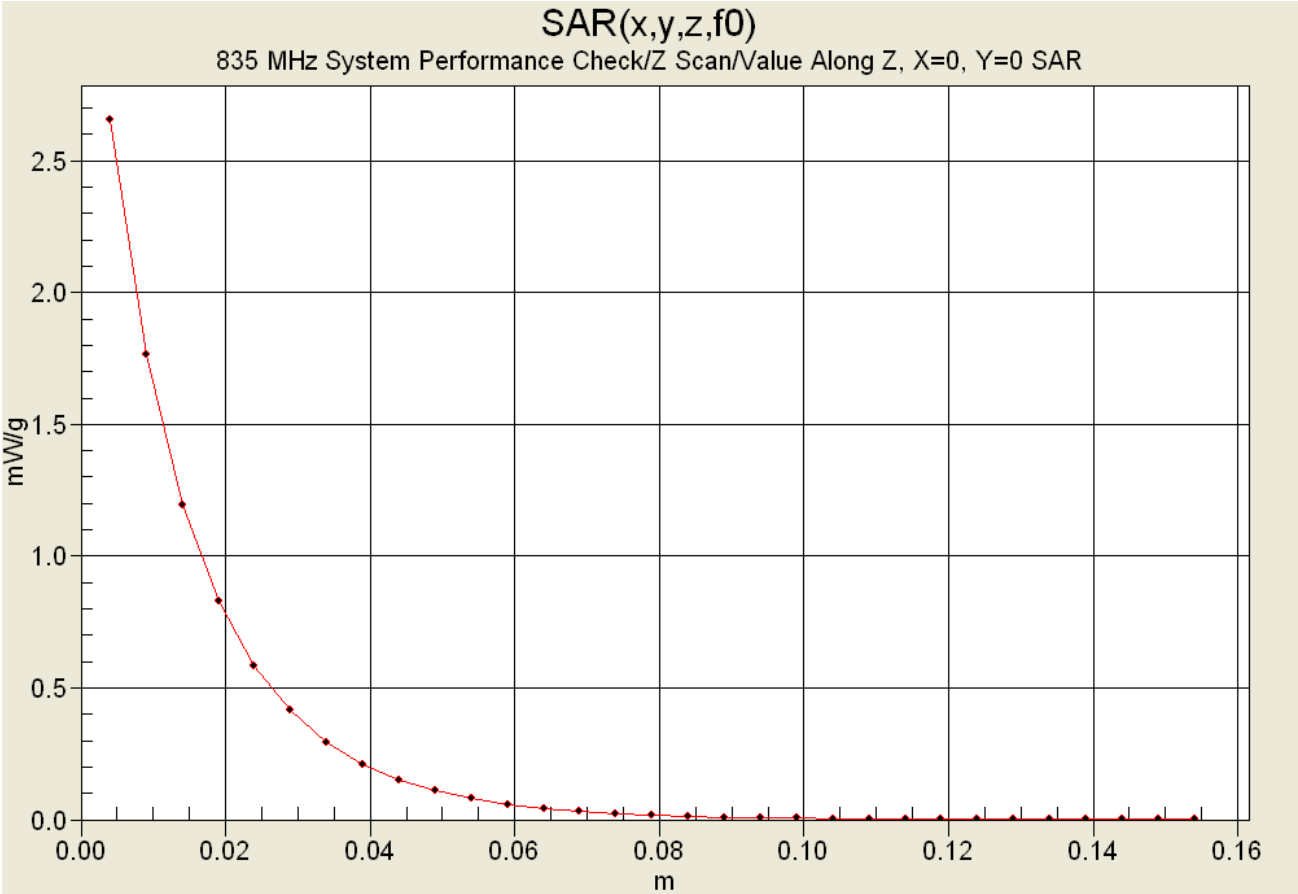
- Probe: ET3DV6 - SN1590; ConvF(6.71, 6.71, 6.71); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

835 MHz System Performance Check/Area Scan (6x10x1):
Measurement grid: dx=10mm, dy=10mm

835 MHz System Performance Check/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.7 V/m; Power Drift = 0.0 dB
Peak SAR (extrapolated) = 3.7 W/kg
SAR(1 g) = 2.46 mW/g; SAR(10 g) = 1.6 mW/g



Z-Axis Scan


SAR(x,y,z,f0)
835 MHz System Performance Check/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date Tested: 08/05/04

System Performance Check - 835 MHz Dipole

DUT: Dipole 835 MHz; Model: D835V2; Type: System Performance Check; Serial: 411; Calibrated: 16/03/2004

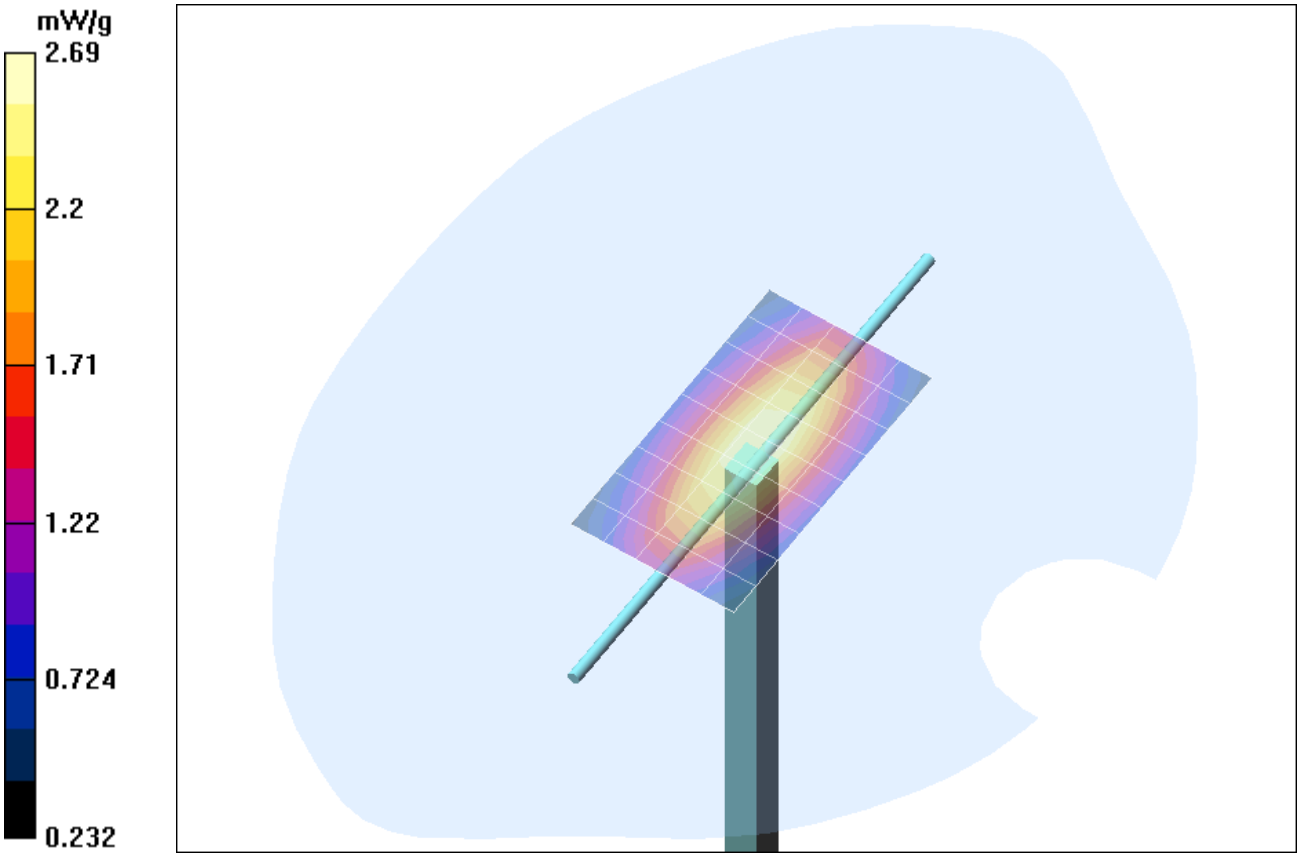
Ambient Temp: 24.0 °C; Fluid Temp: 22.6 °C; Barometric Pressure: 102.0 kPa; Humidity: 44%

Communication System: CW
Forward Conducted Power: 250mW
Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL835 (σ = 0.91 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3)

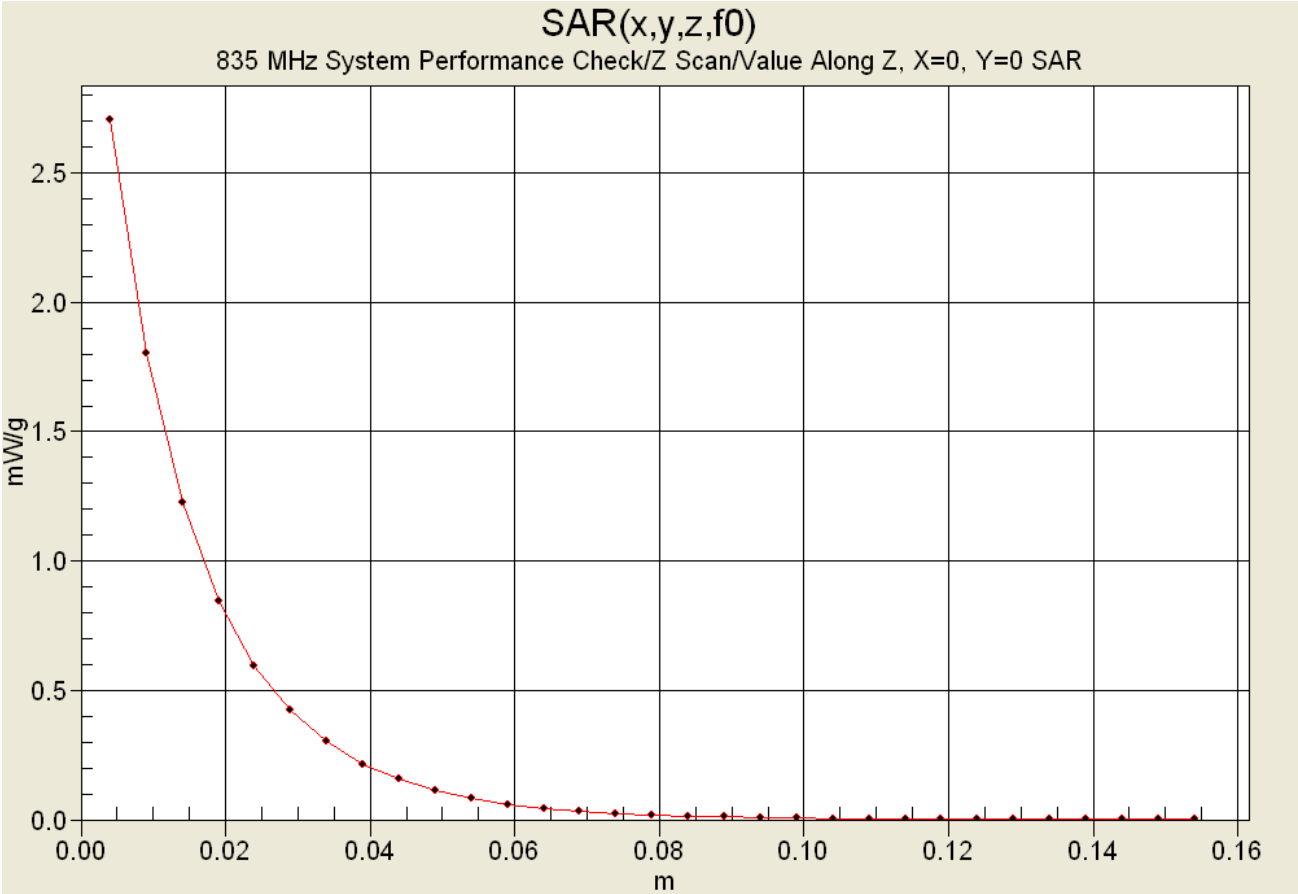
- Probe: ET3DV6 - SN1590; ConvF(6.71, 6.71, 6.71); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

835 MHz System Performance Check/Area Scan (6x10x1):
Measurement grid: dx=10mm, dy=10mm

835 MHz System Performance Check/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.6 V/m; Power Drift = 0.1 dB
Peak SAR (extrapolated) = 3.72 W/kg
SAR(1 g) = 2.48 mW/g; SAR(10 g) = 1.62 mW/g



Z-Axis Scan


SAR(x,y,z,f0)
835 MHz System Performance Check/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date Tested: 08/05/04

System Performance Check - 1900 MHz Dipole

DUT: Dipole 1900 MHz; Model: D1900V2; Type: System Performance Check; Serial: 151; Calibrated: 18/06/2004

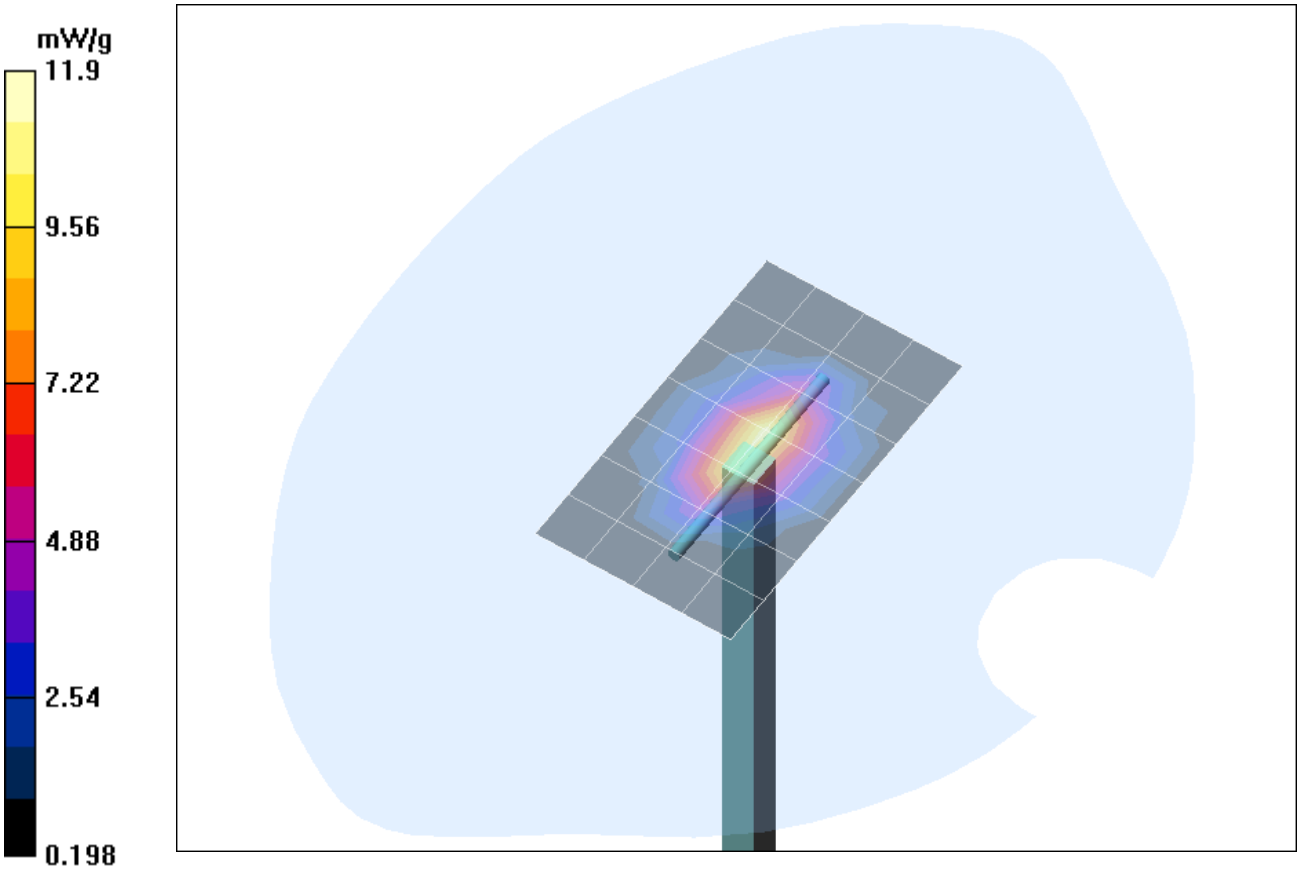
Ambient Temp: 25.7 °C; Fluid Temp: 22.0 °C; Barometric Pressure: 102.0 kPa; Humidity: 42%

Communication System: CW
Forward Conducted Power: 250mW
Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL1900 (σ = 1.42 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3)

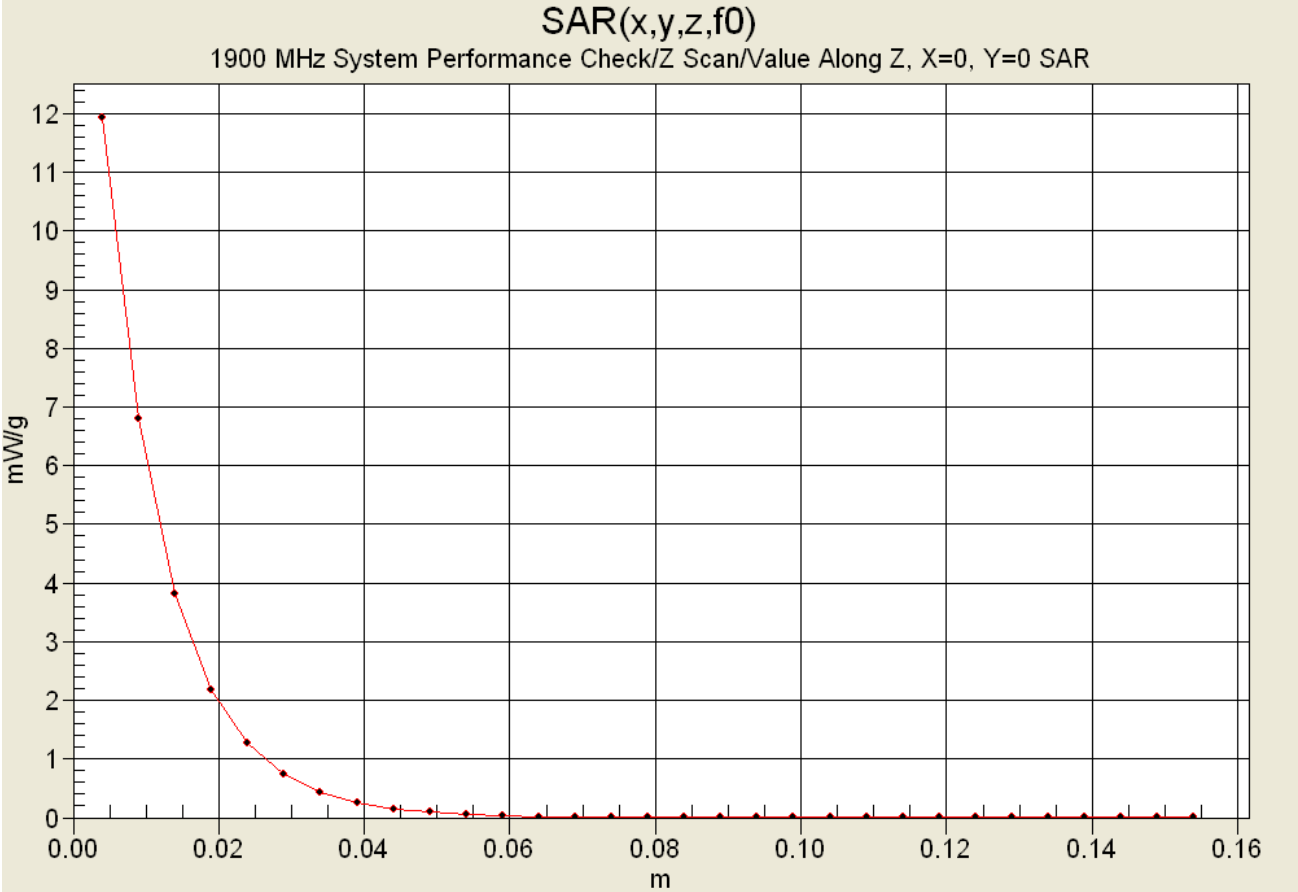
- Probe: ET3DV6 - SN1590; ConvF(5.03, 5.03, 5.03); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

1900 MHz System Performance Check/Area Scan (5x8x1):
Measurement grid: dx=15mm, dy=15mm

1900 MHz System Performance Check/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96 V/m; Power Drift = 0.0 dB
Peak SAR (extrapolated) = 18 W/kg
SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.46 mW/g



Z-Axis Scan


SAR(x,y,z,f0)
1900 MHz System Performance Check/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
m
0
1
2
3
4
5
6
7
8
9
10
11
12
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16

APPENDIX C - SYSTEM VALIDATION

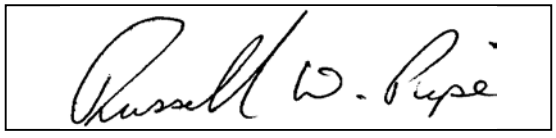
Celltech
Testing and Engineering Services Lab

835 MHz SYSTEM VALIDATION DIPOLE

Type:	**835 MHz Validation Dipole**
Serial Number:	**411**
Place of Calibration:	**Celltech Labs Inc.**
Date of Calibration:	**March 16, 2004**

Celltech Labs Inc. hereby certifies that this device has been calibrated on the date indicated above.

Calibrated by: 

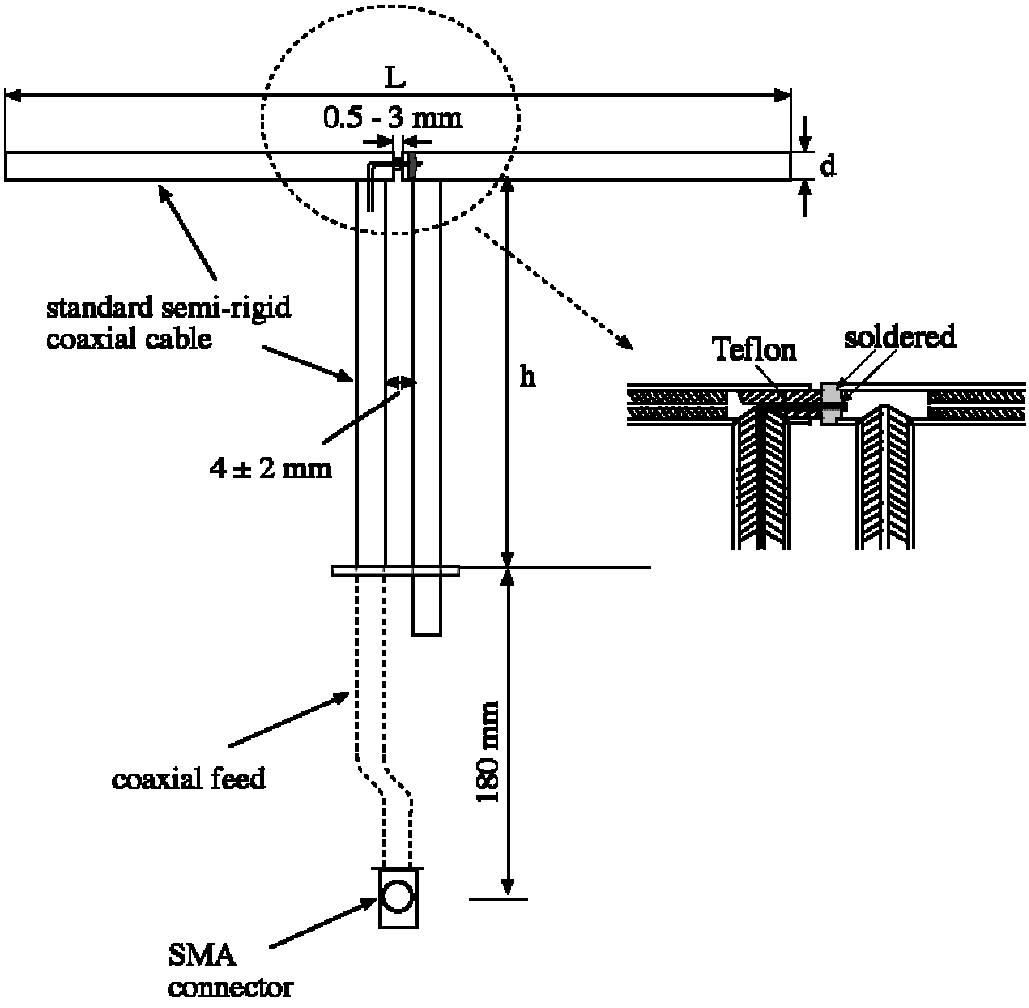
Approved by: 

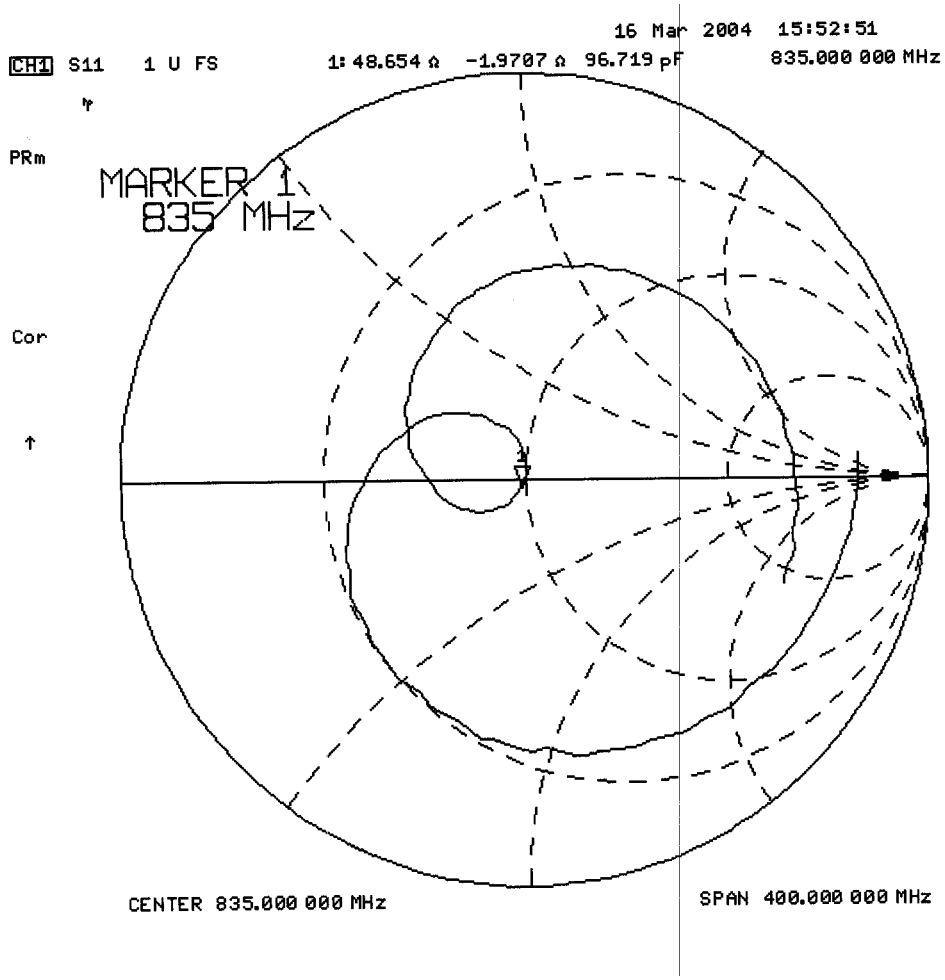
Celltech Labs Inc. 1955 Moss Court, Kelowna, B.C. Canada V1Y 9L3
Tel. 250-448-7047 • Fax. 250-448-7046 • e-mail: info@celltechlabs.com
www.celltechlabs.com

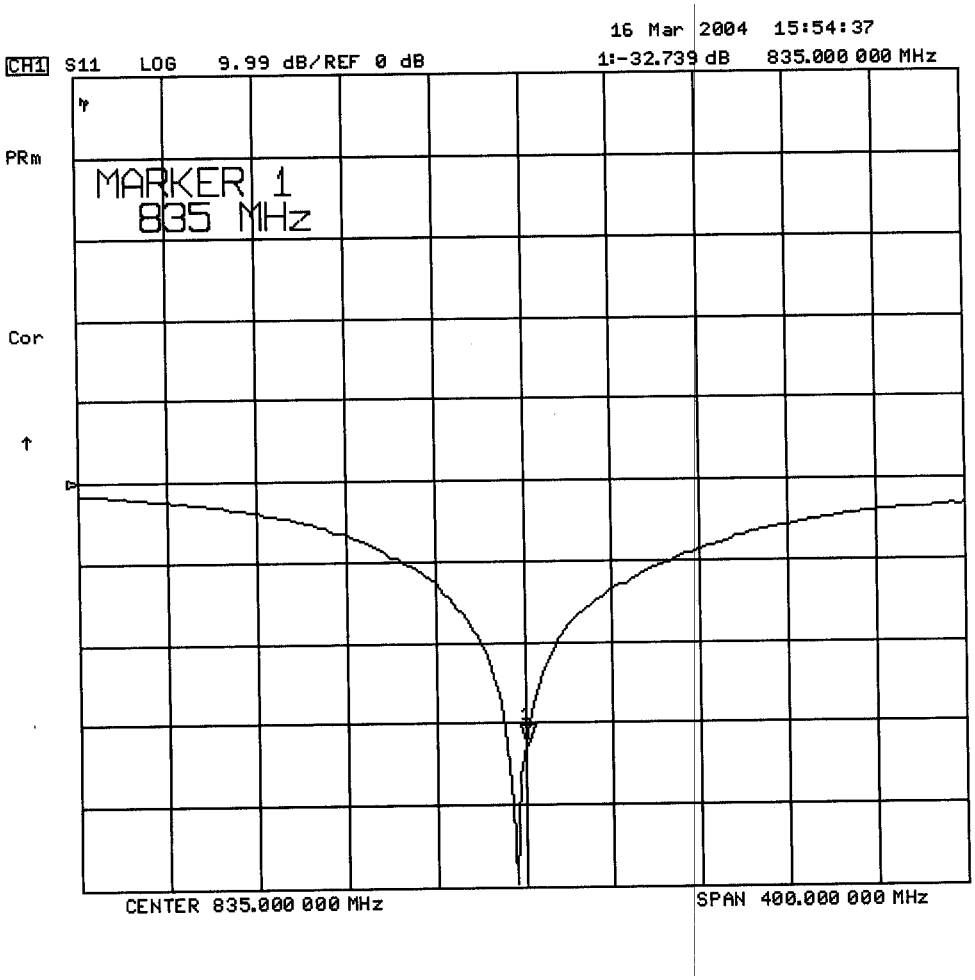
1. Dipole Construction & Electrical Characteristics

The validation dipole was constructed in accordance with the IEEE Standard "Annex G (informative) Reference dipoles for use in system validation". The electrical properties were measured using an HP 8753E Network Analyzer. The network analyzer was calibrated to the validation dipole N-type connector feed point using an HP85032E Type N calibration kit. The dipole was placed parallel to a planar phantom at a separation distance of 15.0mm from the simulating fluid using a loss-less dielectric spacer. The measured input impedance is:

Feed point impedance at 835MHz	Re{Z} = 48.654Ω
	Im{Z} = -1.9707Ω
Return Loss at 835MHz	-32.739dB




16 Mar 2004 15:52:51
CH1 S11 1 U FS
1: 48.654 Ω -1.9707 Ω 96.719 pF
835.000 000 MHz
PRm
MARKER 1
835 MHz
Cor
CENTER 835.000 000 MHz
SPAN 400.000 000 MHz


16 Mar 2004 15:54:37
CH1 S11 LOG 9.99 dB/REF 0 dB
1:-32.739 dB 835.000 000 MHz
PRm
MARKER 1
835 MHz
Cor
CENTER 835.000 000 MHz
SPAN 400.000 000 MHz

Validation Dipole Dimensions

Frequency (MHz)	L (mm)	h (mm)	d (mm)
300	420.0	250.0	6.2
450	288.0	167.0	6.2
835	161.0	89.8	3.6
900	149.0	83.3	3.6
1450	89.1	51.7	3.6
1800	72.0	41.7	3.6
1900	68.0	39.5	3.6
2000	64.5	37.5	3.6
2450	51.8	30.6	3.6
3000	41.5	25.0	3.6

2. Validation Phantom

The validation phantom is the SAM (Specific Anthropomorphic Mannequin) phantom manufactured by Schmid & Partner Engineering AG. The SAM phantom is a Fiberglass shell integrated in a wooden table. The shape of the shell corresponds to the phantom defined by SCC34-SC2. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents 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.

Shell Thickness: 2.0 ± 0.1 mm
Filling Volume: Approx. 20 liters
Dimensions: 50 cm (W) x 100 cm (L)

835 MHz System Validation Setup

835 MHz System Validation Setup

3. Measurement Conditions

The SAM phantom was filled with 835 MHz brain simulating tissue.

Relative Permittivity:	42.6
Conductivity:	0.94 mho/m
Ambient Temperature:	24.6 °C
Fluid Temperature:	21.9 °C
Fluid Depth:	≥ 15.0 cm
Barometric Pressure:	101.6 kPa
Humidity:	31%

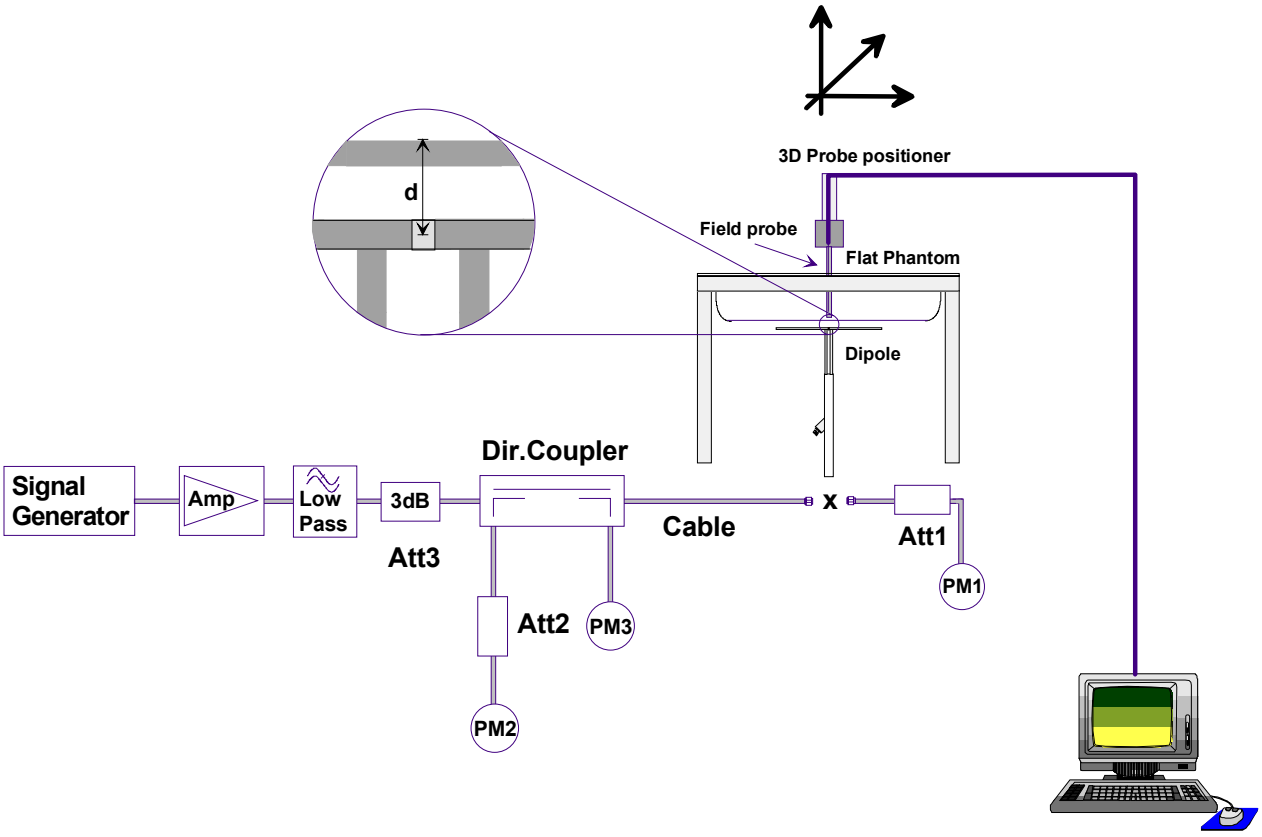
The 835 MHz simulating tissue consists of the following ingredients:

Ingredient	Percentage by weight
Water	40.71%
Sugar	56.63%
Salt	1.48%
HEC	0.99%
Dowicil 75	0.19%
Target Dielectric Parameters at 22 °C	ε_r = 41.5 σ = 0.90 S/m

Measurements were taken in the flat section of the SAM phantom using a dosimetric E-field probe ET3DV6 (s/n: 1590, conversion factor 7.0).

4. SAR Measurement

The SAR measurement was performed with the E-field probe in mechanical detection mode only. The setup and determination of the forward power into the dipole was performed using the following procedures.



First the power meter PM1 (including attenuator Att1) is connected to the cable to measure the forward power at the location of the dipole connector (X). The signal generator is adjusted for the desired forward power at the dipole connector (taking into account the attenuation of Att1) as read by power meter PM2. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2. If the signal generator does not allow adjustment in 0.01dB steps, the remaining difference at PM2 must be taken into consideration. PM3 records the reflected power from the dipole to ensure that the value is not changed from the previous value. The reflected power should be 20dB below the forward power.

Ten SAR measurements were performed in order to achieve repeatability and to establish an average target value.

Validation Dipole SAR Test Results

Validation Measurement	SAR @ 0.25W Input averaged over 1g	SAR @ 1W Input averaged over 1g	SAR @ 0.25W Input averaged over 10g	SAR @ 1W Input averaged over 10g	Peak SAR @ 0.25W Input
Test 1	2.46	9.84	1.61	6.44	3.56
Test 2	2.45	9.80	1.60	6.40	3.56
Test 3	2.45	9.80	1.61	6.44	3.56
Test 4	2.44	9.76	1.60	6.40	3.55
Test 5	2.43	9.72	1.60	6.40	3.53
Test 6	2.44	9.76	1.60	6.40	3.53
Test 7	2.44	9.76	1.60	6.40	3.55
Test 8	2.44	9.76	1.60	6.40	3.54
Test 9	2.47	9.88	1.62	6.48	3.58
Test10	2.47	9.88	1.62	6.48	3.62
Average Value	2.45	9.80	1.61	6.42	3.56

The results have been normalized to 1W (forward power) into the dipole.

Averaged over 1cm (1g) of tissue: 9.80 mW/g

Averaged over 10cm (10g) of tissue: 6.42 mW/g

835 MHz System Validation - March 16, 2004

DUT: Dipole 835 MHz; Type: D835V2; Serial: 411
Ambient Temp: 24.6°C; Fluid Temp: 21.9°C; Barometric Pressure: 101.6 kPa; Humidity: 31%

Communication System: CW
Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL835 (σ = 0.94 mho/m; ε_r = 42.6; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7, 7, 7); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

835 MHz System Validation/Area Scan (6x10x1): Measurement grid: dx=10mm, dy=10mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB

835 MHz System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.56 W/kg
SAR(1 g) = 2.46 mW/g; SAR(10 g) = 1.61 mW/g

835 MHz System Validation/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.56 W/kg
SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.6 mW/g

835 MHz System Validation/Zoom Scan 3 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.56 W/kg
SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.61 mW/g

835 MHz System Validation/Zoom Scan 5 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.55 W/kg
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g

835 MHz System Validation/Zoom Scan 6 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.6 mW/g

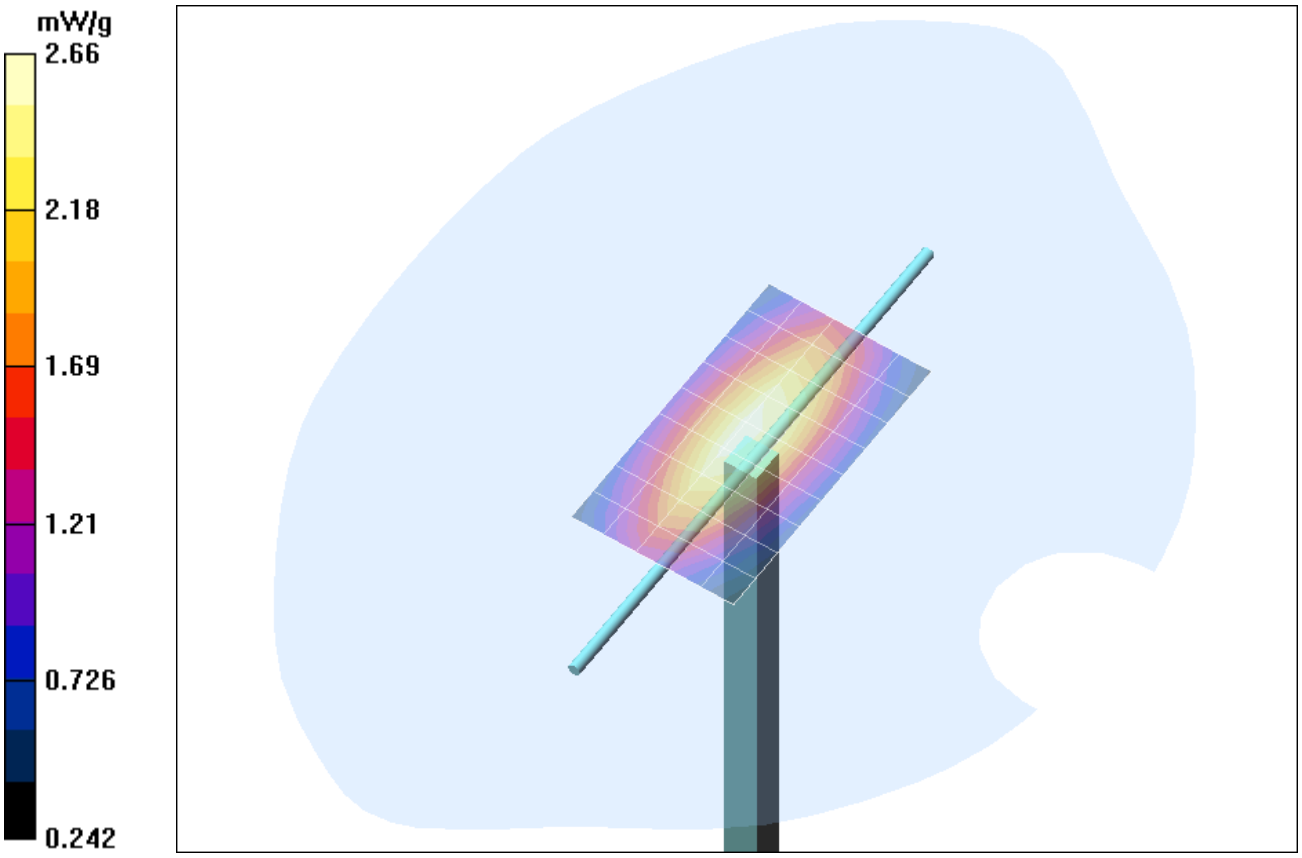
835 MHz System Validation/Zoom Scan 7 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g

835 MHz System Validation/Zoom Scan 8 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.55 W/kg
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g

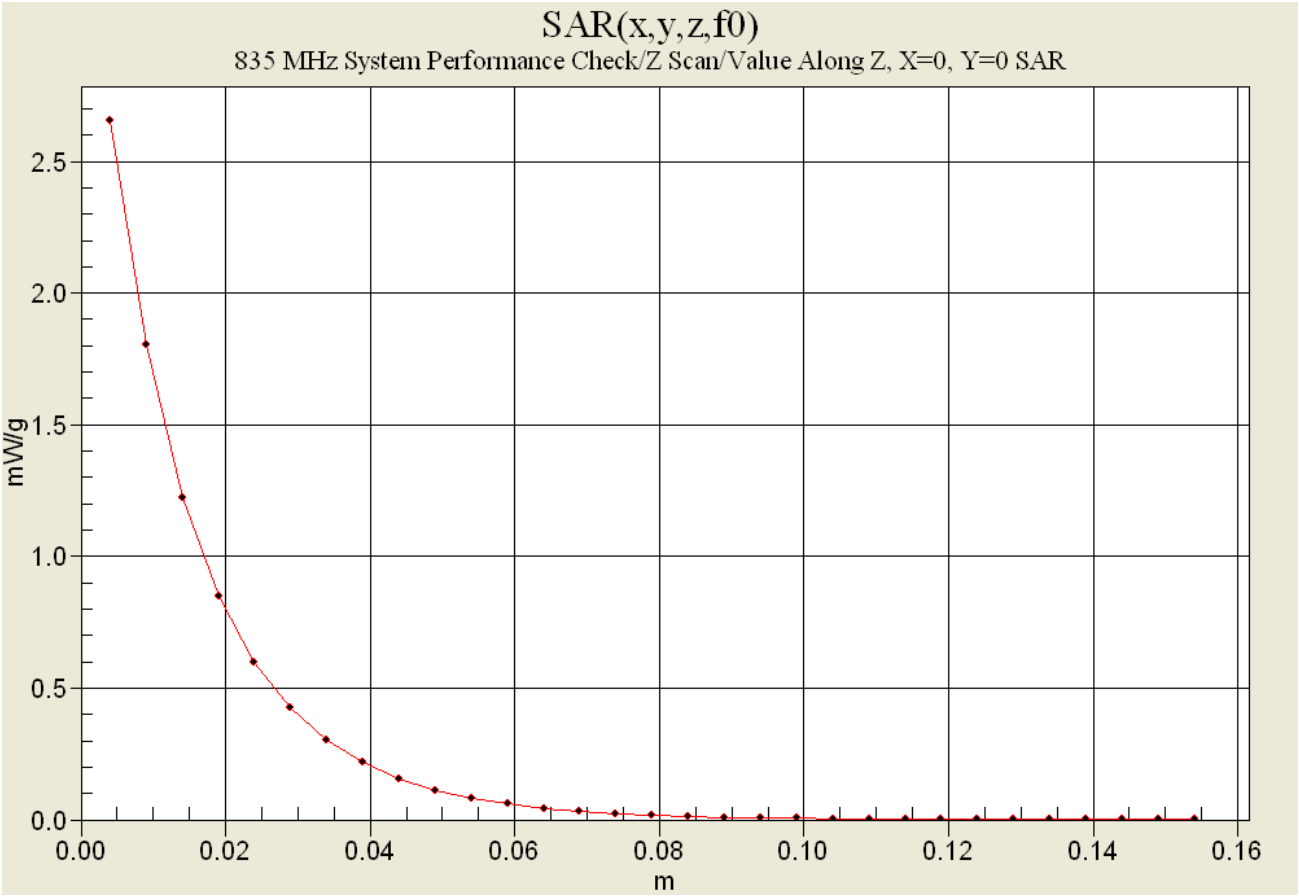
835 MHz System Validation/Zoom Scan 9 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.54 W/kg
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g

835 MHz System Validation/Zoom Scan 11 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.58 W/kg
SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.62 mW/g

835 MHz System Validation/Zoom Scan 12 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.62 mW/g



1 g average of 10 measurements: 2.449 mW/g
10 g average of 10 measurements: 1.606 mW/g



835 MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

March 16, 2004

Frequency	e'	e"
735.000000 MHz	43.8577	20.6938
745.000000 MHz	43.6899	20.6481
755.000000 MHz	43.5341	20.5840
765.000000 MHz	43.4161	20.5576
775.000000 MHz	43.3026	20.5312
785.000000 MHz	43.2065	20.5122
795.000000 MHz	43.1067	20.5061
805.000000 MHz	43.0154	20.4762
815.000000 MHz	42.8927	20.4182
825.000000 MHz	42.7420	20.3806
835.000000 MHz	42.6206	20.2993
845.000000 MHz	42.4357	20.2595
855.000000 MHz	42.2984	20.1872
865.000000 MHz	42.1422	20.1432
875.000000 MHz	42.0082	20.1253
885.000000 MHz	41.8996	20.1110
895.000000 MHz	41.8514	20.0192
905.000000 MHz	41.7550	20.0083
915.000000 MHz	41.6535	19.9701
925.000000 MHz	41.5521	19.9380
935.000000 MHz	41.4477	19.9175

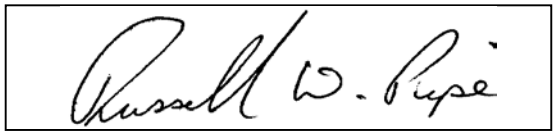
Celltech
Testing and Engineering Services Lab

1900 MHz SYSTEM VALIDATION DIPOLE

Type:	**1900 MHz Validation Dipole**
Serial Number:	**151**
Place of Calibration:	**Celltech Labs Inc.**
Date of Calibration:	**June 18, 2004**

Celltech Labs Inc. hereby certifies that this device has been calibrated on the date indicated above.

Calibrated by: 

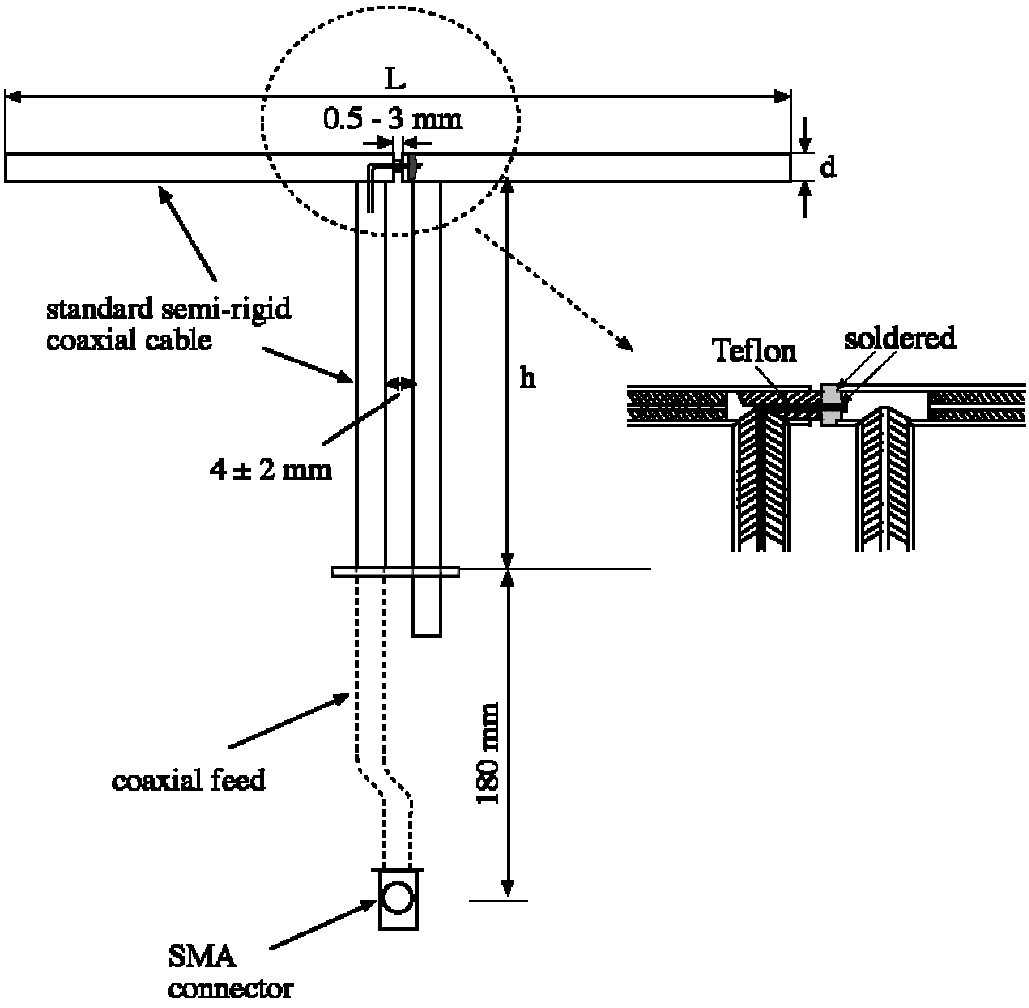
Approved by: 

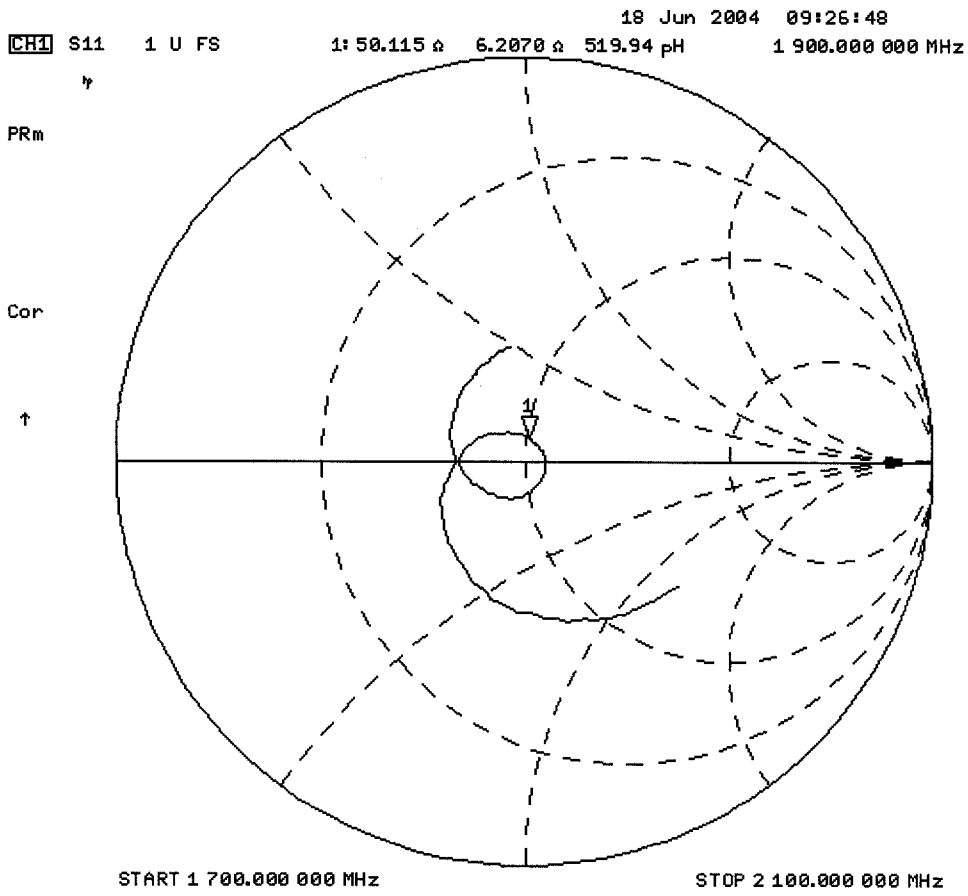
Celltech Labs Inc. 1955 Moss Court, Kelowna, B.C. Canada V1Y 9L3
Tel. 250-448-7047 • Fax. 250-448-7046 • e-mail: info@celltechlabs.com
www.celltechlabs.com

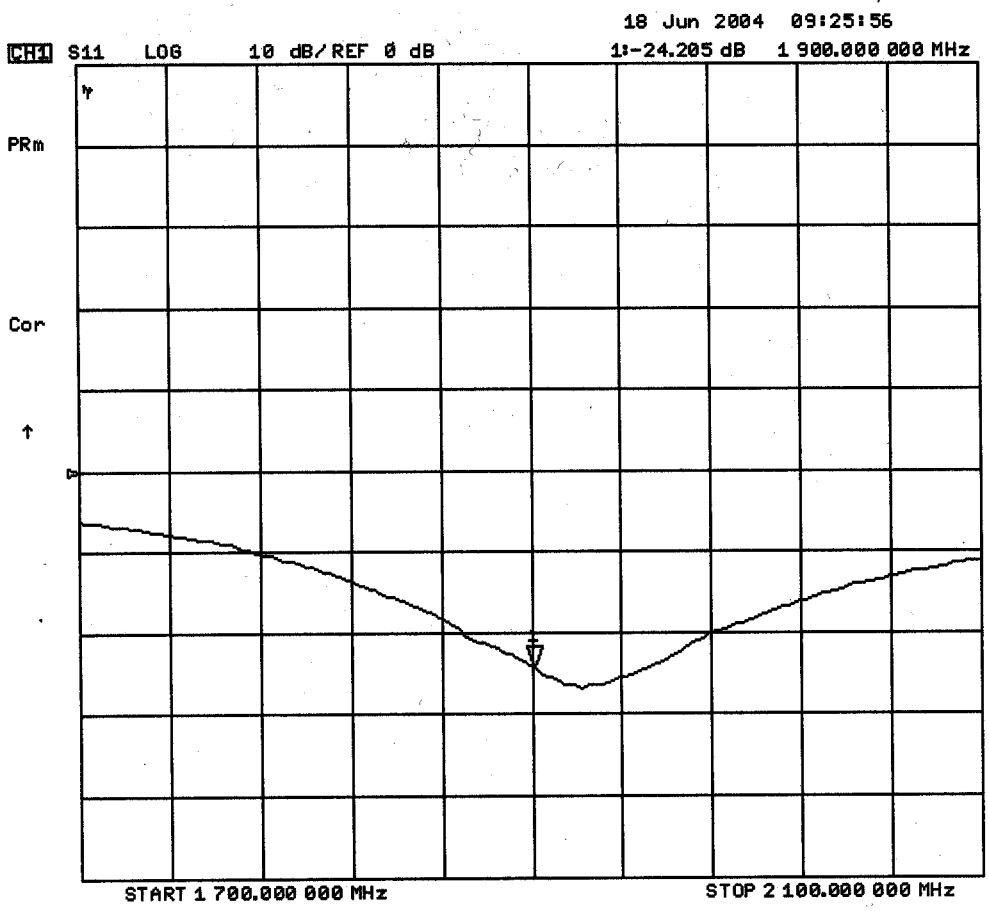
1. Dipole Construction & Electrical Characteristics

The validation dipole was constructed in accordance with the IEEE Standard "Annex G (informative) Reference dipoles for use in system validation". The electrical properties were measured using an HP 8753E Network Analyzer. The network analyzer was calibrated to the validation dipole N-type connector feed point using an HP85032E Type N calibration kit. The dipole was placed parallel to a planar phantom at a separation distance of 10.0mm from the simulating fluid using a loss-less dielectric spacer. The measured input impedance is:

Feed point impedance at 1900MHz	Re{Z} = 50.115Ω
	Im{Z} = 6.2070Ω
Return Loss at 1900MHz	-24.205dB




18 Jun 2004 09:26:48
CH1 S11 1 U FS
1: 50.115 Ω 6.2070 Ω 519.94 pH
1 900.000 000 MHz
PRm
Cor
1
START 1 700.000 000 MHz
STOP 2 100.000 000 MHz


18 Jun 2004 09:25:56
CH1 S11 LOG 10 dB/ REF 0 dB
1:-24.205 dB 1 900.000 000 MHz
PRm
Cor
START 1 700.000 000 MHz
STOP 2 100.000 000 MHz

Validation Dipole Dimensions

Frequency (MHz)	L (mm)	h (mm)	d (mm)
300	420.0	250.0	6.2
450	288.0	167.0	6.2
835	161.0	89.8	3.6
900	149.0	83.3	3.6
1450	89.1	51.7	3.6
1800	72.0	41.7	3.6
1900	68.0	39.5	3.6
2000	64.5	37.5	3.6
2450	51.8	30.6	3.6
3000	41.5	25.0	3.6

2. Validation Phantom

The validation phantom is the SAM (Specific Anthropomorphic Mannequin) phantom manufactured by Schmid & Partner Engineering AG. The SAM phantom is a Fiberglass shell integrated in a wooden table. The shape of the shell corresponds to the phantom defined by SCC34-SC2. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents 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.

Shell Thickness: 2.0 ± 0.1 mm
Filling Volume: Approx. 20 liters
Dimensions: 50 cm (W) x 100 cm (L)

1900 MHz System Validation Setup

1900 MHz System Validation Setup

3. Measurement Conditions

The SAM phantom was filled with 1900 MHz brain simulating tissue.

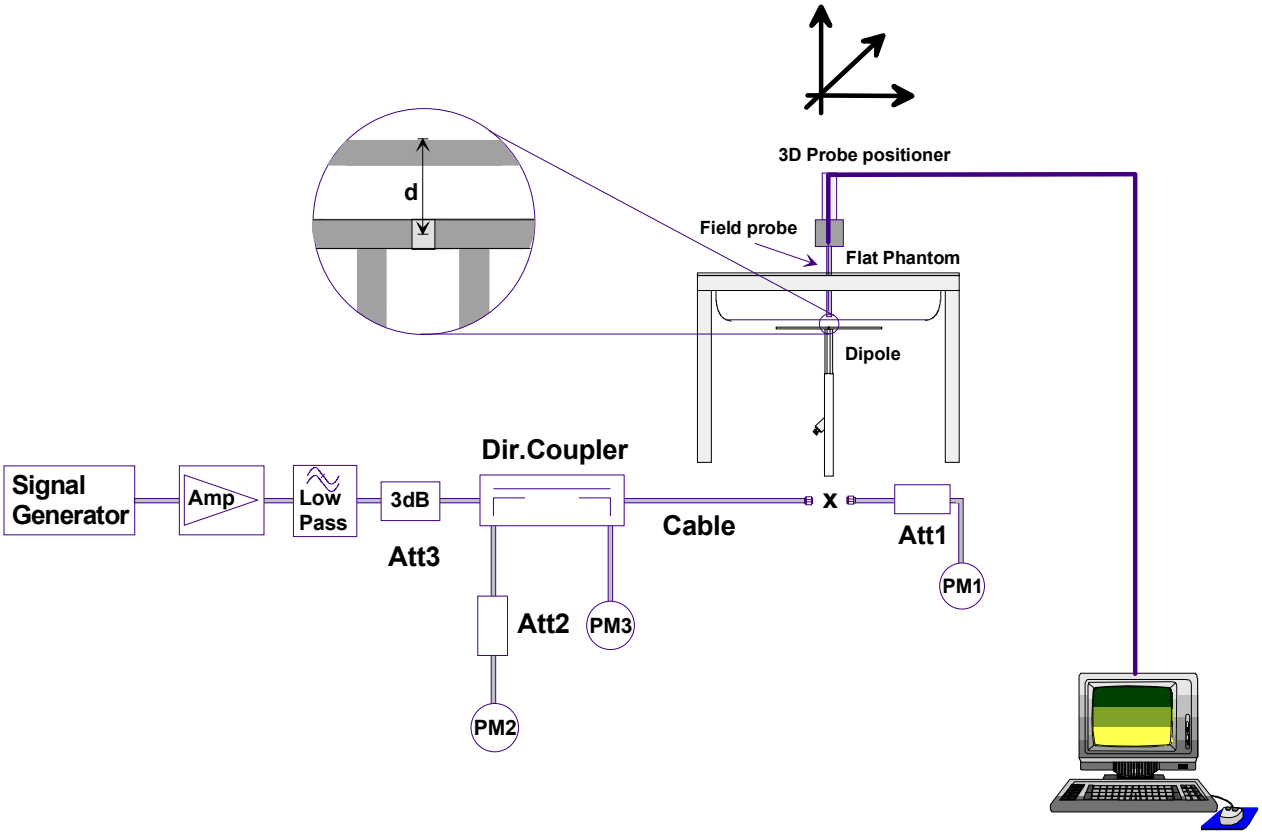
Relative Permittivity:	38.3
Conductivity:	1.43 mho/m
Ambient Temperature:	24.0 °C
Fluid Temperature:	22.6 °C
Fluid Depth:	≥ 15.0 cm
Barometric Pressure:	103.0 kPa
Humidity:	37%

The 1900 MHz tissue simulant consists of the following ingredients:

Ingredient	Percentage by weight
Water	55.85%
Glycol	44.00%
Salt	0.15%
Target Dielectric Parameters at 22 °C	ε_r = 40.0 σ = 1.40 S/m

4. SAR Measurement

The SAR measurement was performed with the E-field probe in mechanical detection mode only. The setup and determination of the forward power into the dipole was performed using the following procedures.



First the power meter PM1 (including attenuator Att1) is connected to the cable to measure the forward power at the location of the dipole connector (X). The signal generator is adjusted for the desired forward power at the dipole connector (taking into account the attenuation of Att1) as read by power meter PM2. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2. If the signal generator does not allow adjustment in 0.01dB steps, the remaining difference at PM2 must be taken into consideration. PM3 records the reflected power from the dipole to ensure that the value is not changed from the previous value. The reflected power should be 50dB below the forward power.

Ten SAR measurements were performed in order to achieve repeatability and to establish an average target value.

Validation Dipole SAR Test Results

Validation Measurement	SAR @ 0.25W Input averaged over 1g	SAR @ 1W Input averaged over 1g	SAR @ 0.25W Input averaged over 10g	SAR @ 1W Input averaged over 10g	Peak SAR @ 0.25W Input
Test 1	10.1	40.40	5.30	21.20	17.4
Test 2	9.93	39.72	5.21	20.84	17.2
Test 3	9.98	39.92	5.23	20.92	17.3
Test 4	9.99	39.96	5.21	20.84	17.4
Test 5	9.97	39.88	5.22	20.88	17.4
Test 6	9.90	39.60	5.20	20.80	17.1
Test 7	9.93	39.72	5.21	20.84	17.2
Test 8	9.96	39.84	5.20	20.80	17.3
Test 9	9.94	39.76	5.20	20.80	17.2
Test 10	9.96	39.84	5.21	20.84	17.2
Average	9.966	39.864	5.219	20.876	17.27

The results have been normalized to 1W (forward power) into the dipole.

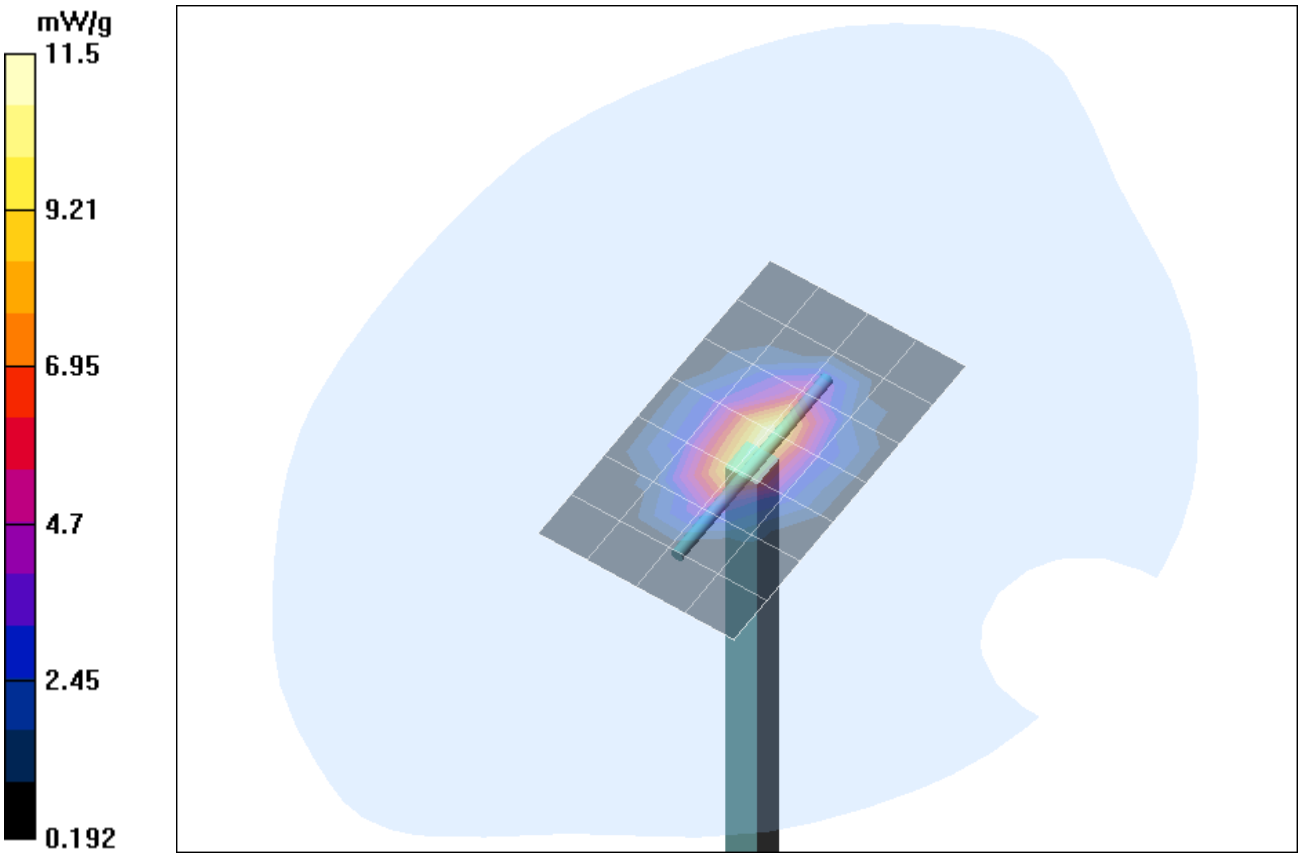
1g/10g Averaged	Average Measured SAR @ 1W Input	IEEE Target SAR @ 1W Input	Deviation (%)
1 gram	39.864	39.7	+ 0.413
10 gram	20.876	20.5	+ 1.835

1900 MHz System Validation - June 18, 2004

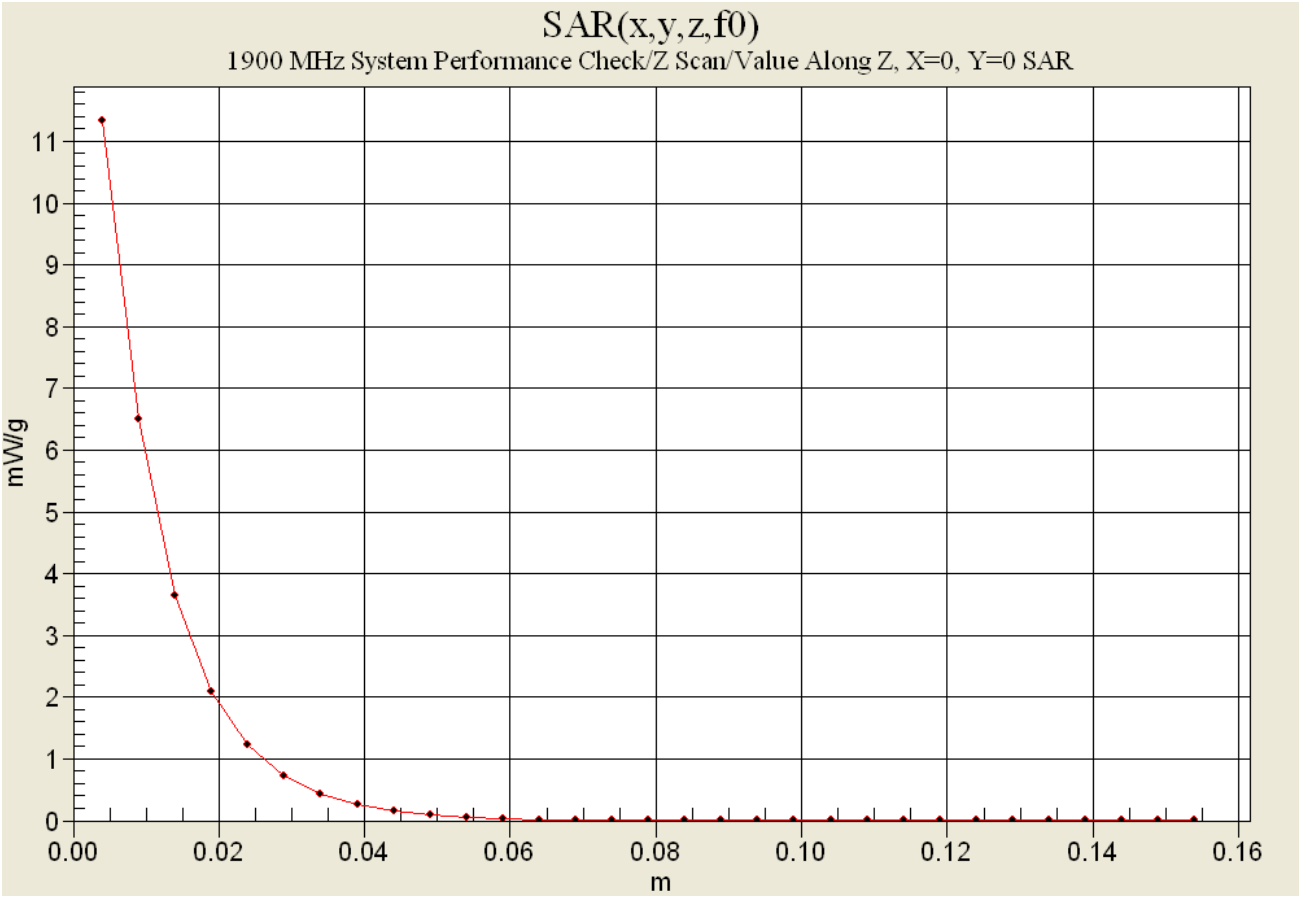
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 151
Ambient Temp: 24.0°C; Fluid Temp: 22.6°C; Barometric Pressure: 103.0 kPa; Humidity: 37%
Communication System: CW
Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL1900 (σ = 1.43 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1387; ConvF(5.25, 5.25, 5.25); Calibrated: 18/03/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 14/05/2004
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

1900 MHz System Validation/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 96.9 V/m; Power Drift = 0.1 dB
1900 MHz System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.9 V/m; Power Drift = 0.1 dB
Peak SAR (extrapolated) = 17.4 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.3 mW/g
1900 MHz System Validation/Zoom Scan 2 (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.8 V/m; Power Drift = 0.0 dB
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 9.93 mW/g; SAR(10 g) = 5.21 mW/g
1900 MHz System Validation/Zoom Scan 3 (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.2 V/m; Power Drift = 0.009 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 9.98 mW/g; SAR(10 g) = 5.23 mW/g
1900 MHz System Validation/Zoom Scan 4 (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.9 V/m; Power Drift = 0.001 dB
Peak SAR (extrapolated) = 17.4 W/kg
SAR(1 g) = 9.99 mW/g; SAR(10 g) = 5.21 mW/g
1900 MHz System Validation/Zoom Scan 5 (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.2 V/m; Power Drift = -0.003 dB
Peak SAR (extrapolated) = 17.4 W/kg
SAR(1 g) = 9.97 mW/g; SAR(10 g) = 5.22 mW/g
1900 MHz System Validation/Zoom Scan 6 (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.8 V/m; Power Drift = -0.0 dB
Peak SAR (extrapolated) = 17.1 W/kg
SAR(1 g) = 9.9 mW/g; SAR(10 g) = 5.2 mW/g
1900 MHz System Validation/Zoom Scan 7 (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.8 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 9.93 mW/g; SAR(10 g) = 5.21 mW/g
1900 MHz System Validation/Zoom Scan 8 (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.1 V/m; Power Drift = -0.007 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 9.96 mW/g; SAR(10 g) = 5.2 mW/g
1900 MHz System Validation/Zoom Scan 9 (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.7 V/m; Power Drift = -0.0 dB
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 9.94 mW/g; SAR(10 g) = 5.2 mW/g
1900 MHz System Validation/Zoom Scan 10 (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.1 V/m; Power Drift = -0.0 dB
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 9.96 mW/g; SAR(10 g) = 5.21 mW/g



1 g average of 10 measurements: 9.966 mW/g
10 g average of 10 measurements: 5.219 mW/g



1900 MHz System Validation

Measured Fluid Dielectric Parameters (Brain)

June 18, 2004

Frequency	e'	e"
1.800000000 GHz	38.7685	13.2945
1.810000000 GHz	38.7232	13.3253
1.820000000 GHz	38.6647	13.3519
1.830000000 GHz	38.6047	13.3737
1.840000000 GHz	38.5593	13.4078
1.850000000 GHz	38.5136	13.4244
1.860000000 GHz	38.4736	13.4289
1.870000000 GHz	38.4328	13.4399
1.880000000 GHz	38.3934	13.4856
1.890000000 GHz	38.3637	13.4872
1.900000000 GHz	38.3205	13.5178
1.910000000 GHz	38.2981	13.5327
1.920000000 GHz	38.2590	13.5755
1.930000000 GHz	38.2344	13.5976
1.940000000 GHz	38.2172	13.6297
1.950000000 GHz	38.1838	13.6574
1.960000000 GHz	38.1575	13.6807
1.970000000 GHz	38.1070	13.6962
1.980000000 GHz	38.0516	13.7296
1.990000000 GHz	38.0093	13.7634
2.000000000 GHz	37.9485	13.7978

APPENDIX D - PROBE CALIBRATION

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

Client **Celltech Labs**

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1590
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	May 24, 2004
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

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 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E4419B	GB41293874	5-May-04 (METAS, No 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No 251-00388)	May-05
Reference 20 dB Attenuator	SN: 5086 (20b)	3-May-04 (METAS, No 251-00389)	May-05
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-03)	In house check: Oct 05

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: May 24, 2004

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Probe ET3DV6

SN:1590

Manufactured:	March 19, 2001
Last calibrated:	May 15, 2003
Recalibrated:	May 24, 2004

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1590

Sensitivity in Free Space

Diode Compression[A]

NormX	**1.85** $\mu V/(V/m)^2$	DCP X	**91**	mV
NormY	**2.01** $\mu V/(V/m)^2$	DCP Y	**91**	mV
NormZ	**1.73** $\mu V/(V/m)^2$	DCP Z	**91**	mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Plese see Page 7.

Boundary Effect

Head **900 MHz** **Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	8.0	4.4
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	12.2	8.5
SAR_{be} [%]	With Correction Algorithm	0.2	0.1

Sensor Offset

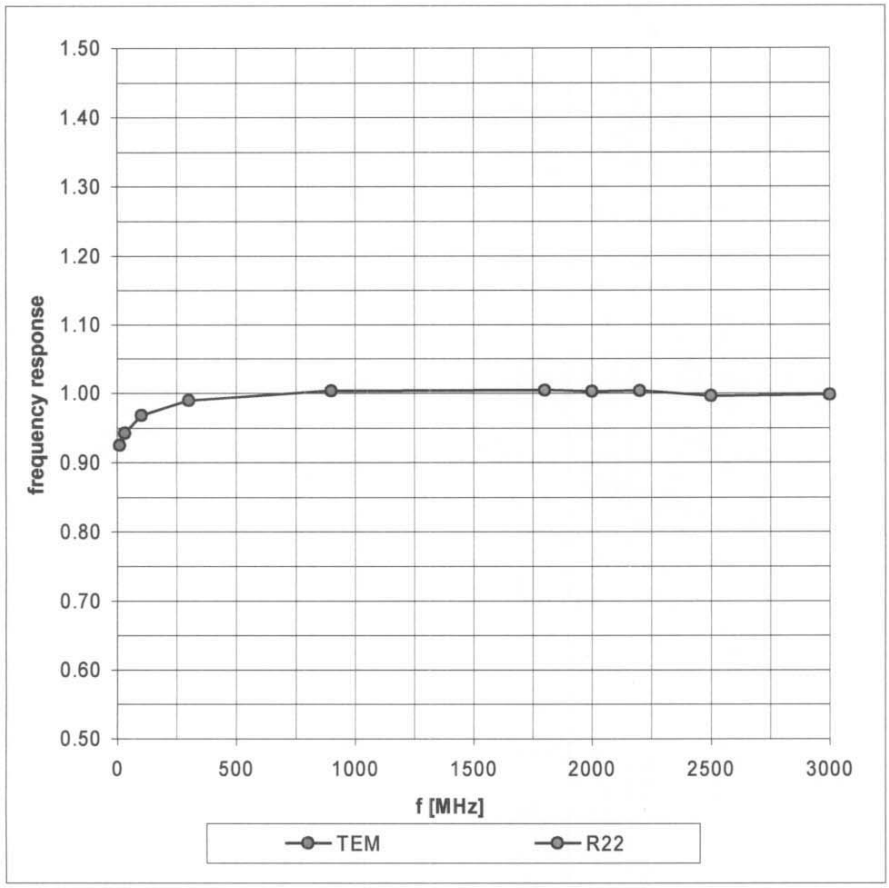
Probe Tip to Sensor Center	**2.7** mm
Optical Surface Detection	**in tolerance**

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%.

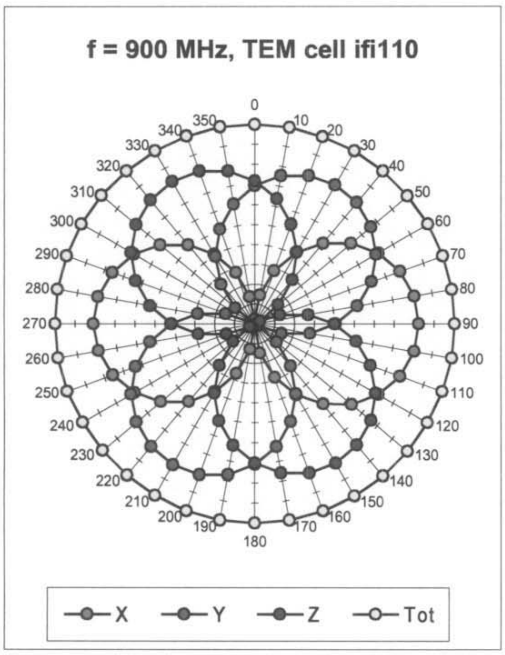
[A] numerical linearization parameter: uncertainty not required

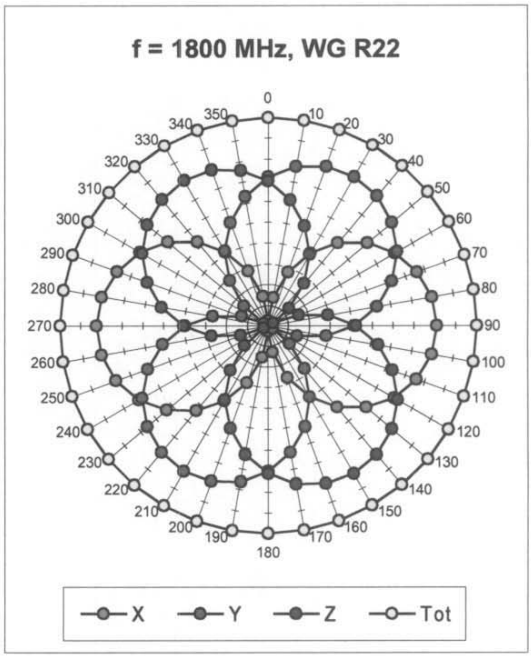
Frequency Response of E-Field

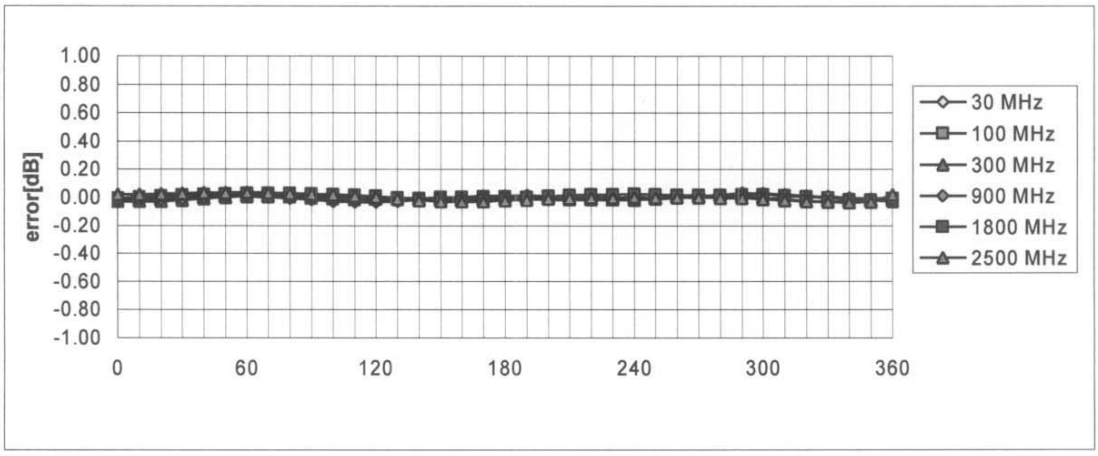
(TEM-Cell:ifi110, Waveguide R22)



Receiving Pattern (ϕ), θ = 0°



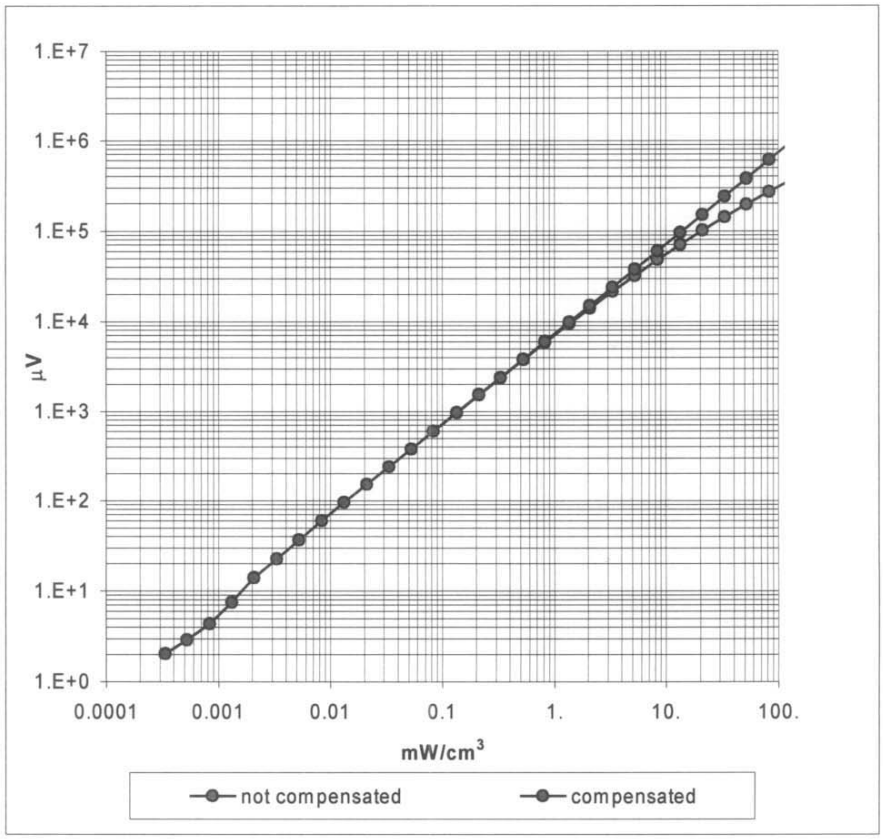


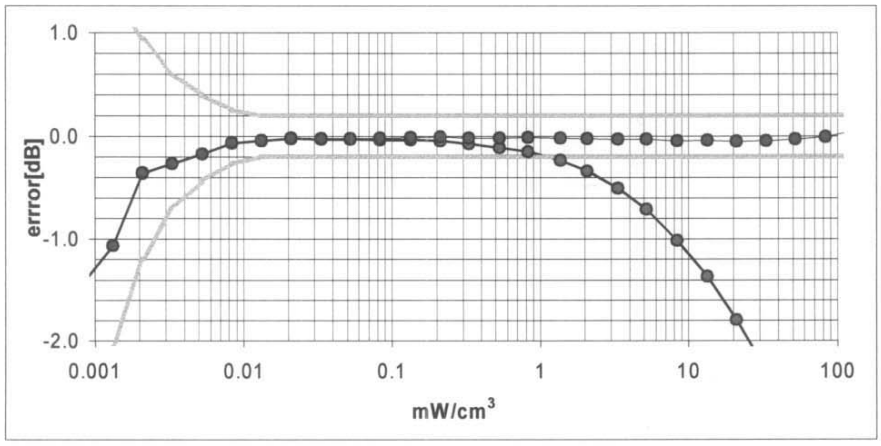


Axial Isotropy Error < ± 0.2 dB

Dynamic Range f(SAR_{head})

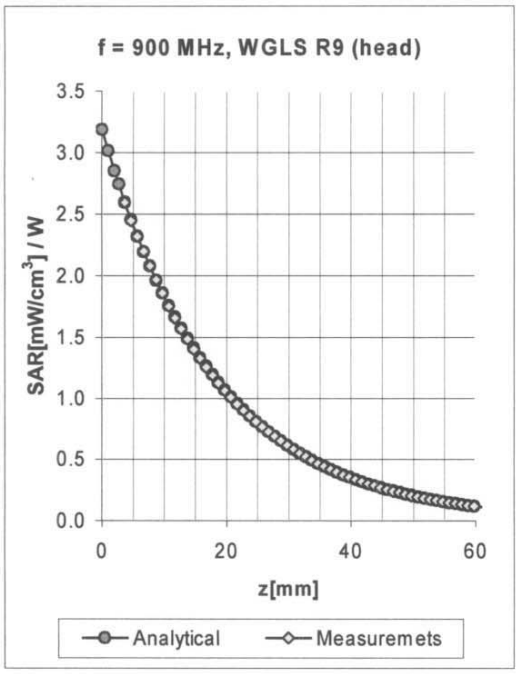
(Waveguide R22)

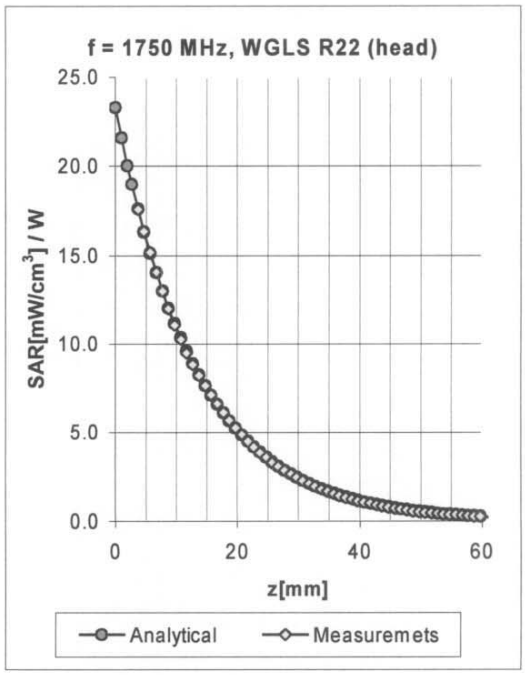




Probe Linearity Error < ± 0.2 dB

Conversion Factor Assessment



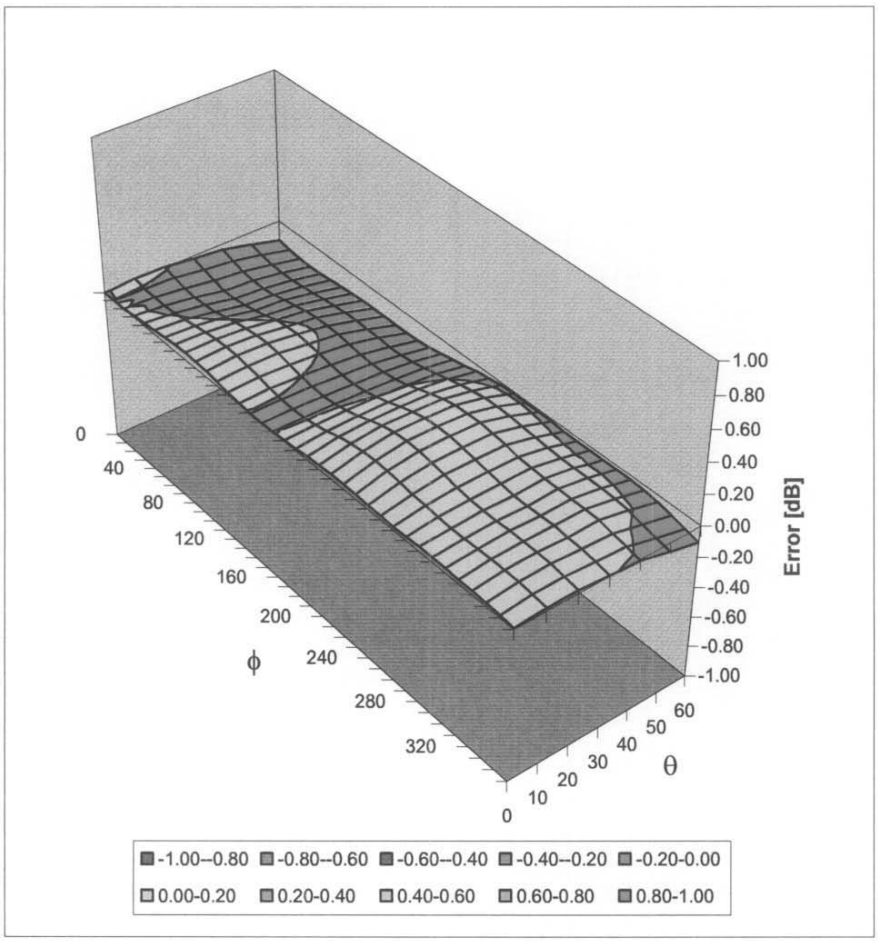


f [MHz]	Validity [MHz][B]	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	750-950	Head	41.5 ± 5%	0.90 ± 5%	0.68	1.64	6.71 ± 11.9% (k=2)
1750	1700-1800	Head	40.0 ± 5%	1.40 ± 5%	0.43	2.67	5.28 ± 9.7% (k=2)
1900	1850-1950	Head	40.0 ± 5%	1.40 ± 5%	0.46	2.81	5.03 ± 9.7% (k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	0.81	1.95	4.44 ± 9.7% (k=2)
835	750-950	Body	55.2 ± 5%	0.97 ± 5%	0.49	1.99	6.54 ± 11.9% (k=2)
1750	1700-1800	Body	53.3 ± 5%	1.52 ± 5%	0.50	2.87	4.68 ± 9.7% (k=2)
1900	1850-1950	Body	53.3 ± 5%	1.52 ± 5%	0.52	2.93	4.58 ± 9.7% (k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	0.91	1.78	4.22 ± 9.7% (k=2)

[B] The total standard uncertainty is calculated as root-sum-square of standard uncertainty of the Conversion Factor at calibration frequency and the standard uncertainty for the indicated frequency band.

Deviation from Isotropy in HSL

Error (θ, ϕ), f = 900 MHz



Spherical Isotropy Error < ± 0.4 dB

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info@speag.com, http://www.speag.com

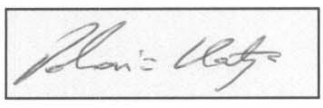
Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1590**
Place of Assessment:	**Zurich**
Date of Assessment:	**May 25, 2004**
Probe Calibration Date:	**May 24, 2004**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:



Schmid & Partner Engineering AG

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Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ET3DV6 SN:1590

Conversion factor (± standard deviation)

150 MHz	ConvF	**9.1 ± 8%**	ε_r = **52.3 ± 5%** σ = **0.76 ± 5% mho/m** (head tissue)
300 MHz	ConvF	**7.9 ± 8%**	ε_r = **45.3 ± 5%** σ = **0.87 ± 5% mho/m** (head tissue)
450 MHz	ConvF	**7.5 ± 8%**	ε_r = **43.5 ± 5%** σ = **0.87 ± 5% mho/m** (head tissue)
150 MHz	ConvF	**8.8 ± 8%**	ε_r = **61.9 ± 5%** σ = **0.80 ± 5% mho/m** (body tissue)
450 MHz	ConvF	**7.7 ± 8%**	ε_r = **56.7 ± 5%** σ = **0.94 ± 5% mho/m** (body tissue)

Important Note:

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

Please see also Section 4.7 of the DASY4 Manual.

APPENDIX E - MEASURED FLUID DIELECTRIC PARAMETERS

835 MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

August 04, 2004

Frequency	e'	e"
735.000000 MHz	41.2853	19.7190
745.000000 MHz	41.1336	19.6649
755.000000 MHz	40.9735	19.5808
765.000000 MHz	40.8478	19.5697
775.000000 MHz	40.7133	19.5505
785.000000 MHz	40.6071	19.5804
795.000000 MHz	40.5406	19.5780
805.000000 MHz	40.4697	19.5876
815.000000 MHz	40.3673	19.5467
825.000000 MHz	40.2326	19.5104
835.000000 MHz	40.1221	19.4323
845.000000 MHz	39.9307	19.3316
855.000000 MHz	39.7999	19.2484
865.000000 MHz	39.6403	19.1960
875.000000 MHz	39.5104	19.1272
885.000000 MHz	39.3853	19.0990
895.000000 MHz	39.3266	19.0831
905.000000 MHz	39.2477	19.0733
915.000000 MHz	39.1285	19.0998
925.000000 MHz	39.0694	19.0706
935.000000 MHz	38.9514	19.0450

835 MHz DUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

August 04, 2004

Frequency	e'	e"
735.000000 MHz	55.5974	22.1548
745.000000 MHz	55.4761	22.1059
755.000000 MHz	55.3671	22.0422
765.000000 MHz	55.2414	21.9502
775.000000 MHz	55.1417	21.8867
785.000000 MHz	55.0568	21.8193
795.000000 MHz	55.0071	21.7752
805.000000 MHz	54.9506	21.7339
815.000000 MHz	54.8417	21.6780
825.000000 MHz	54.7319	21.6686
835.000000 MHz	54.6160	21.5845
845.000000 MHz	54.5102	21.5754
855.000000 MHz	54.4062	21.5009
865.000000 MHz	54.2957	21.4846
875.000000 MHz	54.1744	21.4839
885.000000 MHz	54.0746	21.4437
895.000000 MHz	54.0255	21.3213
905.000000 MHz	53.9389	21.2575
915.000000 MHz	53.8601	21.2176
925.000000 MHz	53.7825	21.1472
935.000000 MHz	53.7154	21.1198

835 MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

August 05, 2004

Frequency	e'	e"
735.000000 MHz	41.8066	20.0109
745.000000 MHz	41.6629	19.9373
755.000000 MHz	41.4756	19.8541
765.000000 MHz	41.3580	19.8467
775.000000 MHz	41.2103	19.7918
785.000000 MHz	41.0858	19.7661
795.000000 MHz	40.9915	19.7555
805.000000 MHz	40.9338	19.7467
815.000000 MHz	40.8548	19.7276
825.000000 MHz	40.6936	19.7260
835.000000 MHz	40.5795	19.6863
845.000000 MHz	40.3943	19.6208
855.000000 MHz	40.2470	19.5267
865.000000 MHz	40.0670	19.4853
875.000000 MHz	39.9173	19.4273
885.000000 MHz	39.8047	19.3808
895.000000 MHz	39.7388	19.3126
905.000000 MHz	39.6402	19.2945
915.000000 MHz	39.5515	19.3329
925.000000 MHz	39.4361	19.3016
935.000000 MHz	39.3188	19.2528

835 MHz DUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

August 05, 2004

Frequency	e'	e"
735.000000 MHz	54.7589	21.9787
745.000000 MHz	54.6576	21.9311
755.000000 MHz	54.5359	21.8436
765.000000 MHz	54.4439	21.7955
775.000000 MHz	54.3039	21.7647
785.000000 MHz	54.2138	21.6949
795.000000 MHz	54.1451	21.6419
805.000000 MHz	54.1156	21.5929
815.000000 MHz	54.0435	21.5424
825.000000 MHz	53.9369	21.4939
835.000000 MHz	53.8096	21.4377
845.000000 MHz	53.6970	21.3941
855.000000 MHz	53.5946	21.3371
865.000000 MHz	53.4584	21.2943
875.000000 MHz	53.3630	21.2908
885.000000 MHz	53.2610	21.2586
895.000000 MHz	53.2117	21.1755
905.000000 MHz	53.1214	21.1147
915.000000 MHz	53.0397	21.0672
925.000000 MHz	52.9560	21.0062
935.000000 MHz	52.8325	20.9775

1900 MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

August 05, 2004

Frequency	e'	e"
1.800000000 GHz	38.7223	13.2826
1.810000000 GHz	38.6767	13.3227
1.820000000 GHz	38.6110	13.3269
1.830000000 GHz	38.5537	13.3682
1.840000000 GHz	38.5287	13.3964
1.850000000 GHz	38.4848	13.4061
1.860000000 GHz	38.4353	13.4194
1.870000000 GHz	38.3937	13.4341
1.880000000 GHz	38.3582	13.4423
1.890000000 GHz	38.3299	13.4609
1.900000000 GHz	38.2958	13.4919
1.910000000 GHz	38.2491	13.5103
1.920000000 GHz	38.2212	13.5523
1.930000000 GHz	38.1941	13.5703
1.940000000 GHz	38.1712	13.6120
1.950000000 GHz	38.1394	13.6331
1.960000000 GHz	38.1173	13.6539
1.970000000 GHz	38.0656	13.6676
1.980000000 GHz	38.0365	13.7103
1.990000000 GHz	37.9668	13.7330
2.000000000 GHz	37.9097	13.7911

1880 MHz DUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

August 05, 2004

Frequency	e'	e"
1.780000000 GHz	52.2714	14.6450
1.790000000 GHz	52.2508	14.6817
1.800000000 GHz	52.1931	14.7062
1.810000000 GHz	52.1756	14.7332
1.820000000 GHz	52.1104	14.7613
1.830000000 GHz	52.0823	14.7798
1.840000000 GHz	52.0317	14.8036
1.850000000 GHz	51.9870	14.8154
1.860000000 GHz	51.9383	14.8204
1.870000000 GHz	51.8915	14.8422
1.880000000 GHz	51.8549	14.8734
1.890000000 GHz	51.8270	14.9044
1.900000000 GHz	51.8102	14.9294
1.910000000 GHz	51.7922	14.9592
1.920000000 GHz	51.7962	14.9874
1.930000000 GHz	51.7711	15.0132
1.940000000 GHz	51.7637	15.0445
1.950000000 GHz	51.7411	15.0612
1.960000000 GHz	51.7161	15.0696
1.970000000 GHz	51.6649	15.1098
1.980000000 GHz	51.6336	15.1462

1880 MHz DUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

August 06, 2004

Frequency	e'	e"
1.780000000 GHz	52.2090	14.3389
1.790000000 GHz	52.1604	14.3743
1.800000000 GHz	52.1198	14.3996
1.810000000 GHz	52.0831	14.4400
1.820000000 GHz	52.0291	14.4702
1.830000000 GHz	51.9915	14.5047
1.840000000 GHz	51.9599	14.5272
1.850000000 GHz	51.9109	14.5398
1.860000000 GHz	51.8897	14.5575
1.870000000 GHz	51.8487	14.5712
1.880000000 GHz	51.8311	14.5932
1.890000000 GHz	51.8149	14.6106
1.900000000 GHz	51.7888	14.6191
1.910000000 GHz	51.7525	14.6583
1.920000000 GHz	51.7477	14.6945
1.930000000 GHz	51.7216	14.7287
1.940000000 GHz	51.6904	14.7749
1.950000000 GHz	51.6662	14.8149
1.960000000 GHz	51.6209	14.8531
1.970000000 GHz	51.5913	14.9024
1.980000000 GHz	51.5455	14.9206

APPENDIX F - SAM PHANTOM CERTIFICATE OF CONFORMITY

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 18.11.2001

Signature / Stamp Schmid & Partner Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

APPENDIX G - PLANAR PHANTOM CERTIFICATE OF CONFORMITY

2378 Westlake Road
Kelowna, B.C. Canada
V1Z-2V2

BARSKI INDUSTRIES (1985) LTD.

Ph. # 250-769-6848
Fax # 250-769-6334
E-mail: barskiind@shaw.ca
Web: www.bcfiberglass.com

FIBERGLASS FABRICATORS

Certificate of Conformity

Item : Flat Planar Phantom Unit # 03-01
Date: June 16, 2003
Manufacturer: Barski Industries (1985 Ltd)

Test	Requirement	Details
Shape	Compliance to geometry according to drawing	Supplied CAD drawing
Material Thickness	Compliant with the requirements	2mm +/- 0.2mm in measurement area
Material Parameters	Dielectric parameters for required frequencies Based on Dow Chemical technical data	100 MHz-5 GHz Relative permittivity<5 Loss Tangent<0.05

Conformity

Based on the above information, we certify this product to be compliant to the requirements specified.

Signature: 

Daniel Chailler

Fiberglass Planar Phantom - Top View

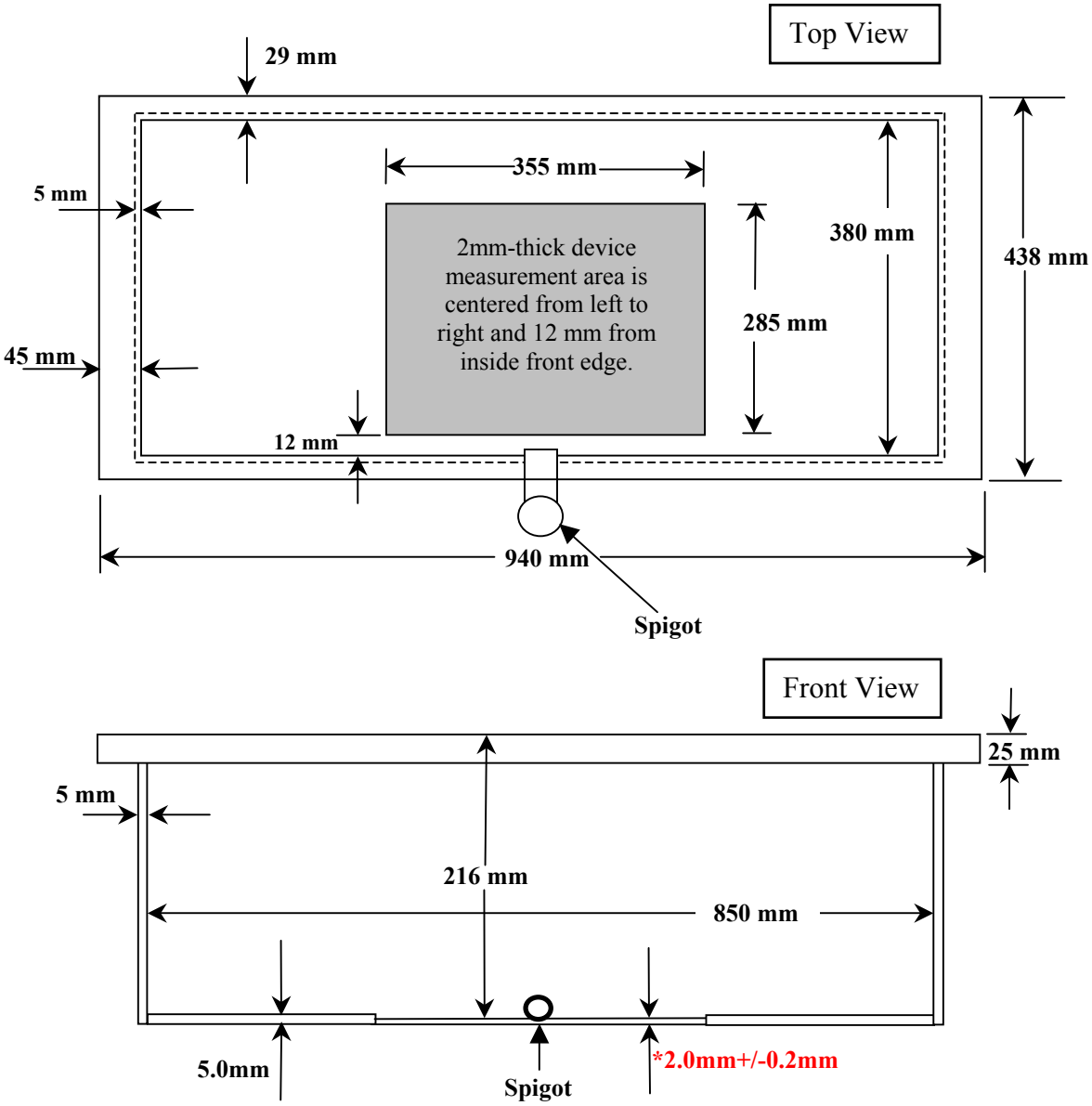
Fiberglass Planar Phantom - Front View

Fiberglass Planar Phantom - Back View

Fiberglass Planar Phantom - Bottom View

Dimensions of Fiberglass Planar Phantom

(Manufactured by Barski Industries Ltd. - Unit# 03-01)

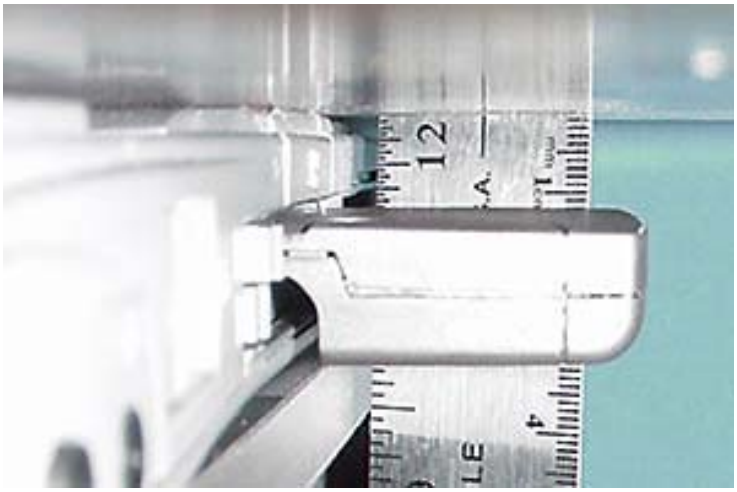


Note: Measurements that aren't repeated for the opposite sides are the same as the side measured. This drawing is not to scale.

APPENDIX H - SAR TEST SETUP & DUT PHOTOGRAPHS

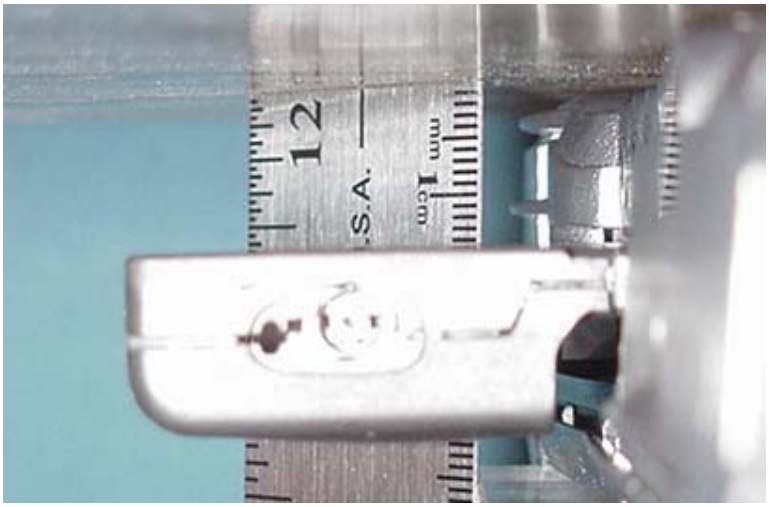
BODY SAR TEST SETUP PHOTOGRAPHS

DUT with Toshiba Tecra Laptop PC - Bottom PCMCIA Slot
Bottom Side of Host Laptop PC Touching Planar Phantom
13 mm Separation Distance from DUT to Planar Phantom



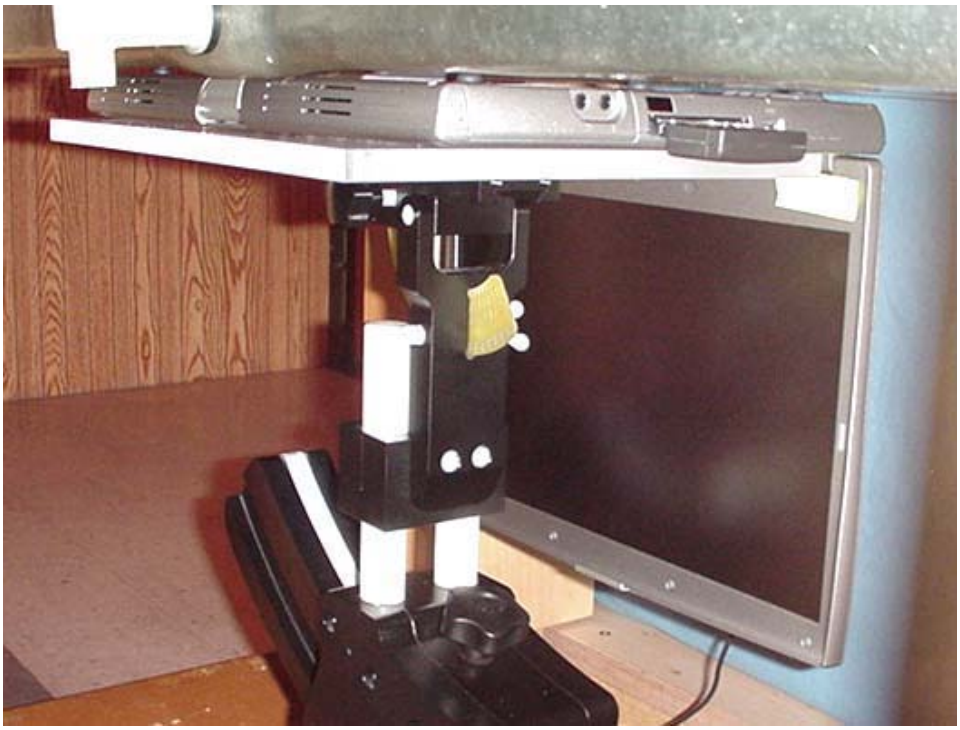
BODY SAR TEST SETUP PHOTOGRAPHS

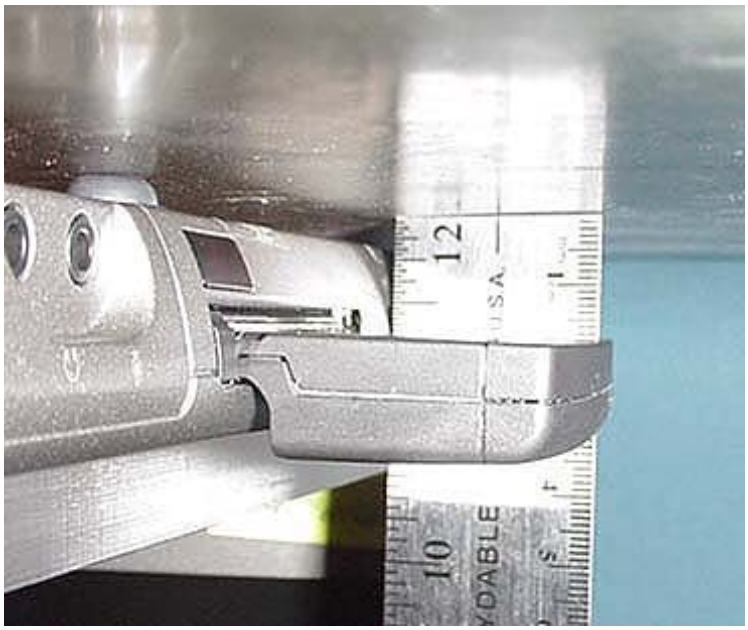
DUT with Dell Latitude C800 Laptop PC - Bottom PCMCIA Slot
Bottom Side of Host Laptop PC Touching Planar Phantom
15 mm Separation Distance from DUT to Planar Phantom



BODY SAR TEST SETUP PHOTOGRAPHS

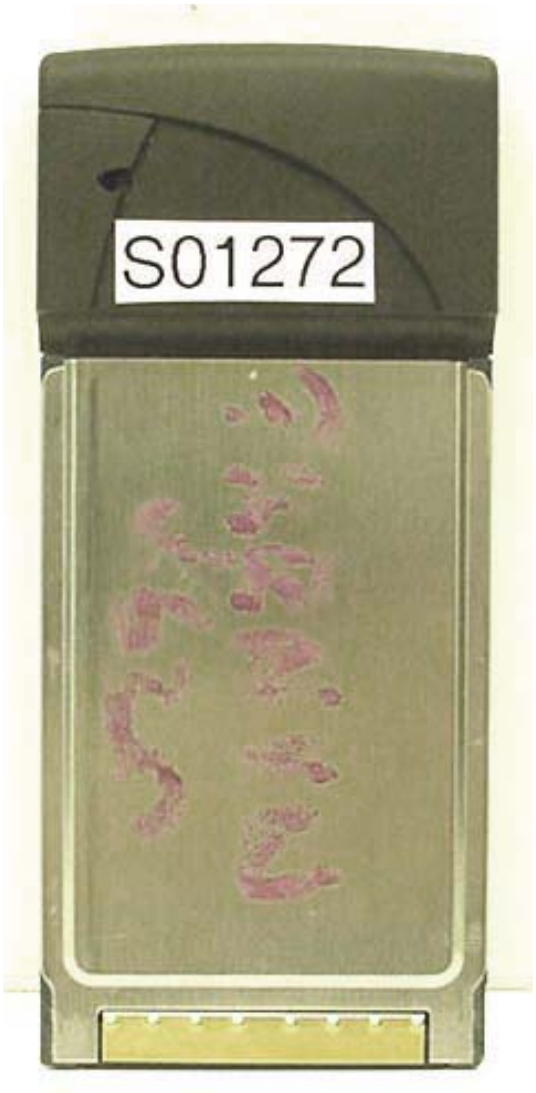
DUT with Dell Latitude D800 Laptop PC - Single PCMCIA Slot
Bottom Side of Host Laptop PC Touching Planar Phantom
17 mm Separation Distance from DUT to Planar Phantom





DUT PHOTOGRAPHS

Novatel V620 Dual-Band PCS/Cellular CDMA PCMCIA Modem



Front of DUT

Back of DUT

DUT PHOTOGRAPHS

Novatel V620 Dual-Band PCS/Cellular CDMA PCMCIA Modem

DUT PHOTOGRAPHS

DUT with Dell Latitude D800 Laptop PC - Single PCMCIA Slot

17 mm Card-to-Base Distance

14 mm Slot-to-Base Distance

DUT PHOTOGRAPHS

DUT with Dell Latitude C800 Laptop PC - Bottom PCMCIA Slot

15 mm Card-to-Base Distance

14 mm Slot-to-Base Distance

DUT PHOTOGRAPHS

DUT with Toshiba Tecra 8100 Laptop PC - Bottom PCMCIA Slot

13 mm Card-to-Base Distance

11 mm Slot-to-Base Distance