DECLARATION OF COMPLIANCE
SAR EVALUATION

Test Lab

CELLTECH RESEARCH INC.
Testing and Engineering Lab
1955 Moss Court
Kelowna, B.C.
Canada V1Y 9L3
Phone: 250-448-7047
Fax: 250-448-7046
e-mail: info@celltechlabs.com
web site: www.celltechlabs.com

Applicant Information

THE LINKSYS GROUP, INC.
17401 Armstrong Avenue
Irvine, CA 92614

FCC Rule Part(s):	**47 CFR §2.1093**
Test Procedure(s):	**FCC OET Bulletin 65, Supplement C (01-01)**
FCC Device Classification:	**Part 15 Spread Spectrum Transmitter (DSS)**
FCC ID:	**PKW-WUSB12**
Model:	**WUSB12**
Device Type:	**Wireless Compact USB LAN Adapter (for Laptop PC)**
Modulation:	**Direct Sequence Spread Spectrum (DSSS)**
Tx Frequency Range:	**2412 - 2462 MHz**
RF Output Power Tested:	**14.45 dBm Conducted (2412 MHz)** **14.25 dBm Conducted (2437 MHz)** **14.25 dBm Conducted (2462 MHz)**
Antenna Type:	**External**
Power Supply:	**from Host Laptop PC**
Host Laptop PC(s) Tested:	**1. Gateway Solo 1400 (Vertical USB Slot)** **2. SONY VAIO PCG-R505 Super Slim Pro (Horizontal USB Slot)**
Max. SAR Measured:	**0.407 W/kg (1g average)**

Celltech Research Inc. declares under its sole responsibility that this device was found to be in compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C, Edition 01-01 (General Population / Uncontrolled Exposure).

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 Research Inc.

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1.0 INTRODUCTION

This measurement report demonstrates that THE LINKSYS GROUP, INC. Model: WUSB12 Wireless Compact USB LAN Adapter FCC ID: PKW-WUSB12 (for Laptop PC) complies with the RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) for the General Population environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [2]) 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 Equipment Under Test (EUT)

FCC Rule Part(s)	47 CFR §2.1093
Test Procedure	FCC OET Bulletin 65, Supplement C (01-01)
FCC Device Classification	Part 15 Spread Spectrum Transmitter (DSS)
Device Type	Wireless Compact USB LAN Adapter (for Laptop PC)
FCC ID	PKW-WUSB12
Model	WUSB12
Serial No.	Pre-Production
Modulation	Direct Sequence Spread Spectrum (DSSS)
Tx Frequency Range	2412 - 2462 MHz
RF Output Power Tested	14.45 dBm Conducted (2412 MHz) 14.25 dBm Conducted (2437 MHz) 14.25 dBm Conducted (2462 MHz)
Antenna Type	External
Power Supply	From Host Laptop PC
Host Laptop PC(s) Tested	1. Gateway Solo 1400 (Vertical USB Slot) (S/N: BT002062449) 2. SONY VAIO PCG-R505 Super Slim Pro (Horizontal USB Slot) (S/N: 28321630 3205677)

3.0 SAR MEASUREMENT SYSTEM

Celltech Research SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY 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 PC plug-in card. The DAE3 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 PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

DASY3 SAR Measurement System with SAM phantom

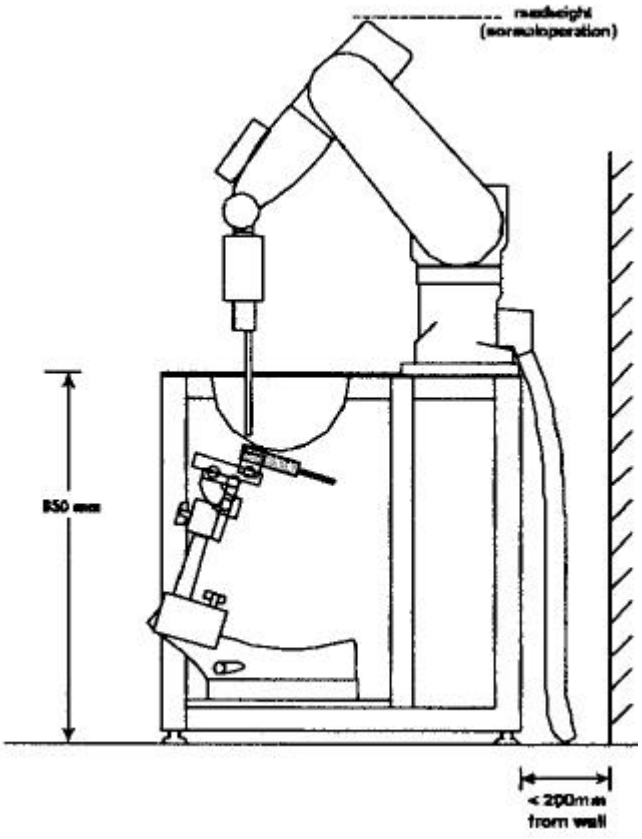


Figure 1. DASY3 Compact Version - Side View

4.0 MEASUREMENT SUMMARY

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the EUT are reported in Appendix A.

BODY SAR MEASUREMENT RESULTS

Freq. (MHz)	Chan.	Mode	Conducted Power (dBm)		Host Laptop PC Position to Planar Phantom	Host Laptop PC	USB Slot Position	Antenna Position	Separation Distance (cm)	Measured SAR 1g (W/kg)
			Before	After						
2437	Mid	CW	14.25	14.15	Bottom Side	Gateway	Vertical	Closed	0.0	0.0872
2437	Mid	CW	14.25	14.16	Bottom Side	Gateway	Vertical	Open	0.0	0.0560
2412	Low	CW	14.45	14.36	Bottom Side	Gateway	Vertical	Closed	0.0	0.134
2462	High	CW	14.25	14.10	Bottom Side	Gateway	Vertical	Closed	0.0	0.407
2437	Mid	CW	14.25	14.13	Bottom Side	SONY	Horizontal	Closed	0.0	0.0376
2437	Mid	CW	14.25	14.17	Bottom Side	SONY	Horizontal	Open	0.0	0.0344
2412	Low	CW	14.45	14.44	Bottom Side	SONY	Horizontal	Closed	0.0	0.0957
2462	High	CW	14.25	14.17	Bottom Side	SONY	Horizontal	Closed	0.0	0.0889
2437	Mid	CW	14.25	14.25	Back Side	Gateway	Vertical	Closed	1.5	0.0091
2437	Mid	CW	14.25	14.08	Back Side	Gateway	Vertical	Open	1.5	0.156
2412	Low	CW	14.45	14.31	Back Side	Gateway	Vertical	Open	1.5	0.0958
2462	High	CW	14.25	14.18	Back Side	Gateway	Vertical	Open	1.5	0.116
2437	Mid	CW	14.25	14.14	Back Side	SONY	Horizontal	Closed	1.5	0.0058
2437	Mid	CW	14.25	14.12	Back Side	SONY	Horizontal	Open	1.5	0.0503
2412	Low	CW	14.45	14.43	Back Side	SONY	Horizontal	Open	1.5	0.0897
2462	High	CW	14.25	14.15	Back Side	SONY	Horizontal	Open	1.5	0.122

ANSI / IEEE C95.1 1992 - SAFETY LIMIT
BODY: 1.6 W/kg (averaged over 1 gram)
Spatial Peak - Uncontrolled Exposure / General Population

Test Date(s)	12/17/02		**Relative Humidity**	59 %	
Measured Mixture Type	2450MHz Muscle		**Atmospheric Pressure**	101.6 kPa	
Dielectric Constant ε_r	**Target**	**Measured**	**Ambient Temperature**	**Fluid Parameter Check**	**SAR Evaluation**
	52.7 (±10%)	47.5		23.3 °C	23.3 °C
Conductivity σ (mho/m)	**Target**	**Measured**	**Fluid Temperature**	**Fluid Parameter Check**	**SAR Evaluation**
	1.95 (±5%)	1.98		23.4 °C	23.4 °C
ρ (Kg/m^3)	1000		**Fluid Depth**	≥ 15 cm	

Notes:
1. The EUT was initially tested at the middle channel with the antenna in the open and closed positions. The low and high channels were subsequently tested for the worst-case antenna position in each Laptop PC configuration.
2. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluation. The temperatures listed in the table above were consistent for all measurement periods.

5.0 DETAILS OF SAR EVALUATION

The LINKSYS GROUP, INC. Model: WUSB12 Wireless Compact USB LAN Adapter FCC ID: PKW-WUSB12 (for Laptop PC) was found to be compliant for localized Specific Absorption Rate based on the following test provisions and conditions described below. The detailed test setup photographs are shown in Appendix G.

1. The EUT was tested for body SAR with the bottom side of the Gateway Solo 1400 host Laptop PC facing parallel to, and touching, the outer surface of the planar phantom. The Gateway Solo 1400 host Laptop PC provided a vertically positioned USB slot. The EUT was tested with the antenna in both the open and closed positions.
2. The EUT was tested for body SAR with the bottom side of the SONY VAIO PCG-R505 Super Slim Pro host Laptop PC facing parallel to, and touching, the outer surface of the planar phantom. The SONY VAIO PCG-R505 Super Slim Pro host Laptop PC provided a horizontally positioned USB slot. The EUT was tested with the antenna in both the open and closed positions.
3. The EUT was tested for body SAR with the back side of the Gateway Solo 1400 host Laptop PC facing parallel to the outer surface of the planar phantom. A 1.5 cm separation distance was maintained between the EUT and the outer surface of the planar phantom. The EUT was tested with the antenna in both the open and closed positions.
4. The EUT was tested for body SAR with the back side of the SONY VAIO PCG-R505 Super Slim Pro host Laptop PC facing parallel to the outer surface of the planar phantom. A 1.5 cm separation distance was maintained between the EUT and the outer surface of the planar phantom. The EUT was tested with the antenna in both the open and closed positions.
5. The EUT was operated for an appropriate period prior to the evaluation to minimize power drift.
6. The conducted power levels were measured before and after each test using a Gigatronics 8652A Universal Power Meter according to the procedures described in FCC 47 CFR §2.1046. During the entire test the conducted power level was maintained to within 5% of the initial conducted power measured. Any unusual anomalies over the course of the test warranted a re-evaluation.
7. The EUT was controlled via software from the host Laptop PC and tested in unmodulated continuous transmit operation (CW mode at 100% duty cycle).
8. The location of the maximum spatial SAR distribution (Hot Spot) was determined relative to the device and its antenna(s).
9. The EUT was tested with a fully charged battery in the host Laptop PC.
10. Due to the dimensions of the host device, a stack of low-density, low-loss dielectric foamed polystyrene was used in place of the device holder.

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 in accordance with FCC OET Bulletin 65, Supplement C (Edition 01-01) using the SAM phantom.
(ii) For body-worn and face-held devices a planar phantom was used.
b. The SAR was determined by a pre-defined procedure within the DASY3 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 20mm x 20mm.
c. Based on the area scan data, the area of maximum absorption was determined by spline interpolation. Around this point, a volume of 40 x 40 x 35 mm (fine resolution volume scan, zoom scan) was assessed by measuring 5 x 5 x 7 points.
d. The 1g and 10g spatial peak SAR was determined as follows:
1. The first step was an extrapolation 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 1.3 mm (see probe calibration document in Appendix D). The extrapolation was based on a least square algorithm [W. Gander, Computermathematik, p.168-180] (see reference [4]). Through the points in the first 3 cm in all z-axis, polynomials of the fourth order were calculated. This polynomial was then used to evaluate the points between the surface and the probe tip.
2. The next step used 3D-spline interpolation to get all points within the measured volume in a 1mm grid (35000 points). The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition [W. Gander, Computermathematik, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff] (see reference [4]).
3. The maximal interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-spline interpolation algorithm. 8000 points (20x20x20) were interpolated to calculate the average.

EVALUATION PROCEDURES (Cont.)

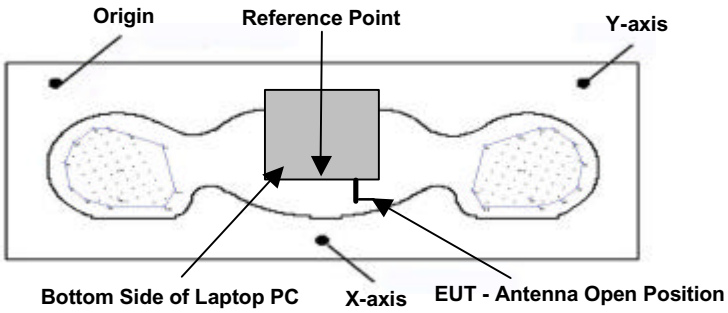


Figure 2. Phantom Reference Point & EUT Positioning
Bottom Side of Gateway Laptop PC - Vertical USB Slot

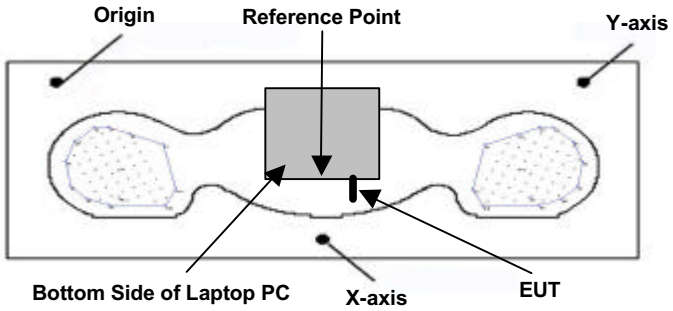


Figure 3. Phantom Reference Point & EUT Positioning
Bottom Side of SONY Laptop PC - Horizontal USB Slot

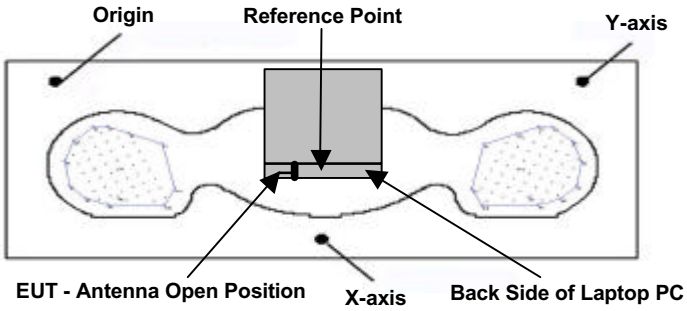


Figure 4. Phantom Reference Point & EUT Positioning
Back Side of Gateway Laptop PC - Vertical USB Slot

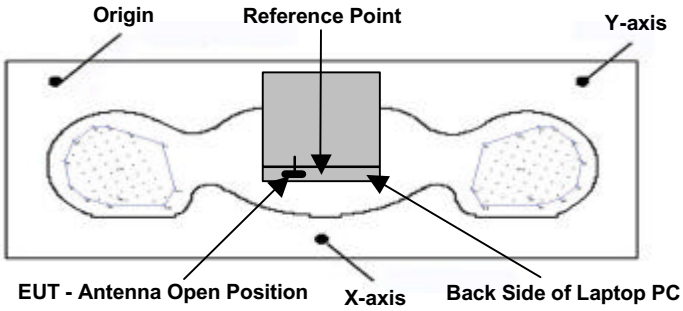


Figure 5. Phantom Reference Point & EUT Positioning
Back Side of SONY Laptop PC - Horizontal USB Slot

7.0 SYSTEM PERFORMANCE CHECK

Prior to the assessment a system performance check was performed in the planar section of the SAM phantom with a 2450MHz dipole (see Appendix C for detailed system validation procedures). The fluids were verified using an 85070C Dielectric Probe Kit and an 8753E Network Analyzer (see Appendix E for printout of measured fluid dielectric parameters). A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of ±10% (see Appendix B for system check test plot).

SYSTEM PERFORMANCE CHECK											
Test Date	Equiv. Tissue	SAR 1g (W/kg)		Dielectric Constant ε_r		Conductivity σ (mho/m)		ρ (Kg/m^3)	Ambient Temp.	Fluid Temp.	Fluid Depth
		Target	Measured	Target	Measured	Target	Measured				
12/17/02	2450MHz (Brain)	13.1 ±10%	14.2	39.2 ±10%	37.1	1.80 ±5%	1.85	1000	23.3 °C*	24.0 °C*	≥ 15 cm
									23.3 °C**	23.8 °C**	

* Fluid Parameter Check
** System Performance Check

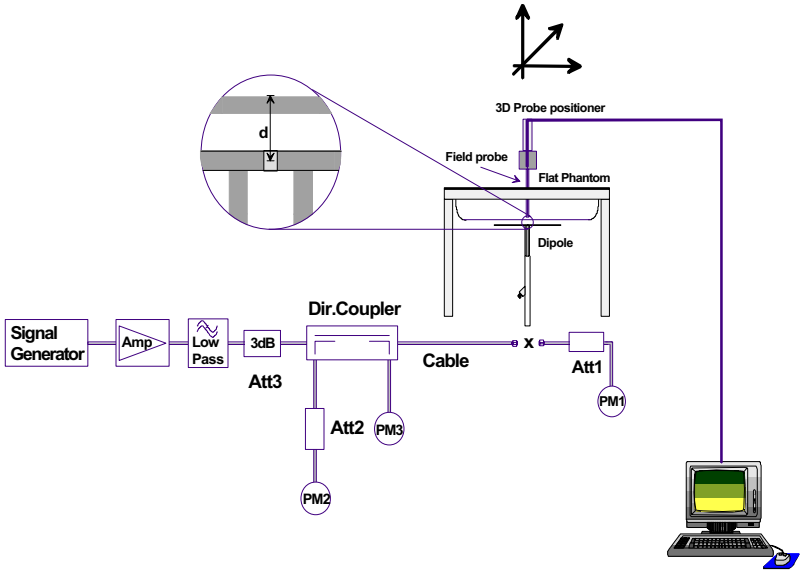


Figure 6. 2450MHz System Check Setup Diagram

2450MHz System Check Setup Photograph

8.0 EQUIVALENT TISSUES

The 2450MHz brain and body mixtures consist of Glycol-monobutyl, water, and salt (body mixture only). The fluid was prepared according to standardized procedures and measured for dielectric parameters (permittivity and conductivity).

TISSUE MIXTURES		
INGREDIENT	**2450MHz Brain (System Performance Check)**	**2450MHz Body (EUT Evaluation)**
Water	55.20 %	69.95 %
Glycol Monobutyl	44.80 %	30.00 %
Salt	-	0.05 %

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:	Pentium III
Clock Speed:	450 MHz
Operating System:	Windows NT
Data Card:	DASY3 PC-Board

Data Converter

Features:	Signal Amplifier, multiplexer, A/D converter, and control logic
Software:	DASY3 software
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock

PC Interface Card

Function:	24 bit (64 MHz) DSP for real time processing Link to DAE3 16-bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot

E-Field Probe

Model:	ET3DV6
Serial No.:	1387
Construction:	Triangular core fiber optic detection system
Frequency:	10 MHz to 6 GHz
Linearity:	±0.2 dB (30 MHz to 3 GHz)

Phantom

Type:	SAM V4.0C
Shell Material:	Fiberglass
Thickness:	2.0 ±0.1 mm
Volume:	Approx. 20 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)
Dynam. Rnge:	5 µW/g to >100 mW/g; Linearity: ±0.2 dB
Srfce. Detect.	±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 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.

SAM Phantom

13.0 DEVICE HOLDER

The DASY3 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.

Device Holder

14.0 TEST EQUIPMENT LIST

SAR MEASUREMENT SYSTEM		
EQUIPMENT	**SERIAL NO.**	**CALIBRATION DATE**
DASY3 System -Robot -ET3DV6 E-Field Probe -300MHz Validation Dipole -450MHz Validation Dipole -900MHz Validation Dipole -1800MHz Validation Dipole -2450MHz Validation Dipole -SAM Phantom V4.0C -Small Planar Phantom -Medium Planar Phantom -Large Planar Phantom	 599396-01 1387 135 136 054 247 150 N/A N/A N/A N/A	 N/A Feb 2002 Oct 2002 Oct 2002 June 2001 June 2001 Oct 2002 N/A N/A N/A N/A
85070C Dielectric Probe Kit	N/A	N/A
Gigatronics 8652A Power Meter -Power Sensor 80701A -Power Sensor 80701A	1835272 1833535 1833542	Feb 2002 Feb 2002 Mar 2002
Pasternack Attenuator (30dB, 2W)	PE7014-30	N/A
E4408B Spectrum Analyzer	US39240170	Nov 2002
8594E Spectrum Analyzer	3543A02721	Feb 2002
8753E Network Analyzer	US38433013	Feb 2002
8648D Signal Generator	3847A00611	Feb 2002
5S1G4 Amplifier Research Power Amplifier	26235	N/A

15.0 MEASUREMENT UNCERTAINTIES

Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	c_i 1g	Standard Uncertainty ±% (1g)	v_i or v_{eff}
Measurement System						
Probe calibration	± 4.8	Normal	1	1	± 4.8	∞
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)	± 10.0	Rectangular	√3	0.6	± 3.5	∞
Liquid permittivity (measured)	± 10.0	Rectangular	√3	0.6	± 3.5	∞
Combined Standard Uncertainty					**± 13.7**	
Expanded Uncertainty (k=2)					**± 27.5**	

Measurement Uncertainty Table in accordance with IEEE Std 1528 (Draft - see Reference [3])

16.0 REFERENCES

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

[2] 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.

[3] IEEE Standards Coordinating Committee 34, Std 1528-200X, “DRAFT Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques”.

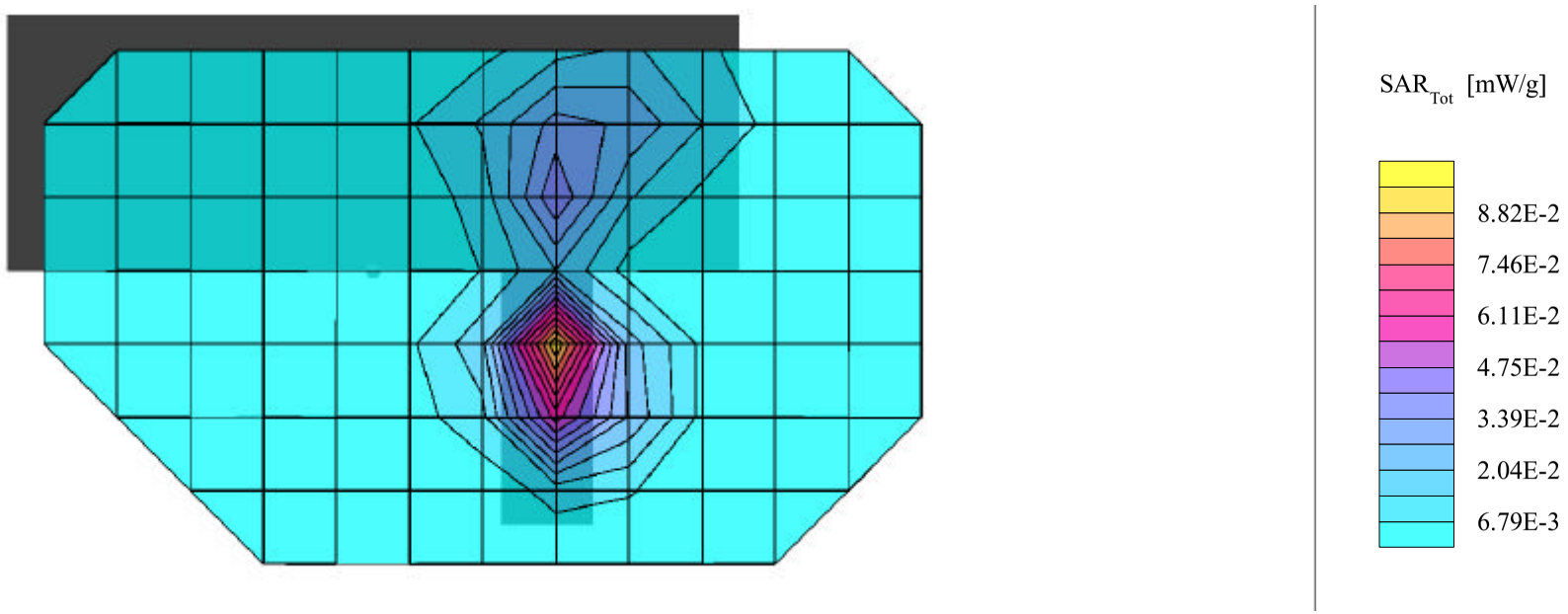
[4] W. Gander, *Computermathematick*, Birkhaeuser, Basel: 1992.

APPENDIX A - SAR MEASUREMENT DATA

The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: $\sigma = 1.98$ mho/m $\varepsilon_r = 47.5$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.13 dB
SAR (1g): 0.0872 mW/g, SAR (10g): 0.0436 mW/g

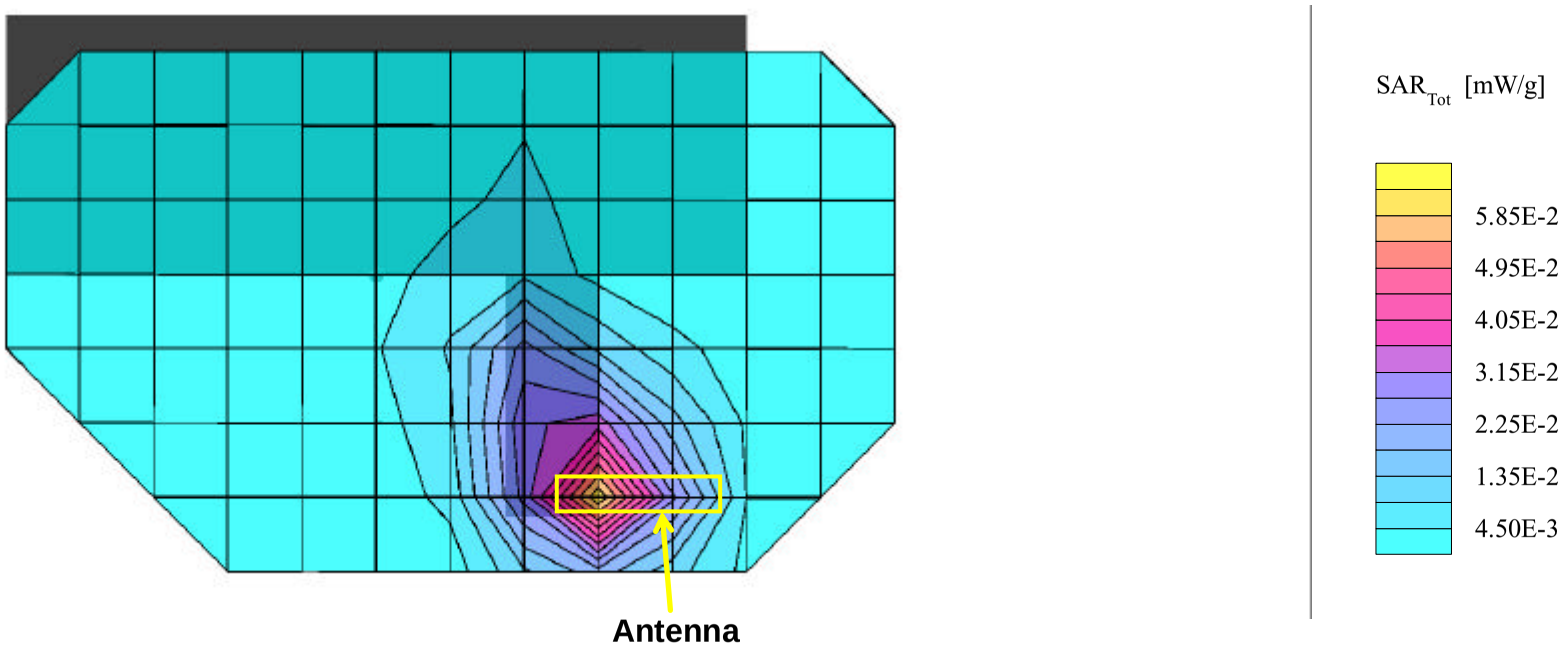
Body SAR - Bottom Side of Laptop PC - 0.0cm Separation Distance
Antenna Closed Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with Gateway Solo 1400 Laptop PC (Vertical USB Slot)
CW Mode
Mid Channel [2437.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002



The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.12 dB
SAR (1g): 0.0560 mW/g, SAR (10g): 0.0300 mW/g

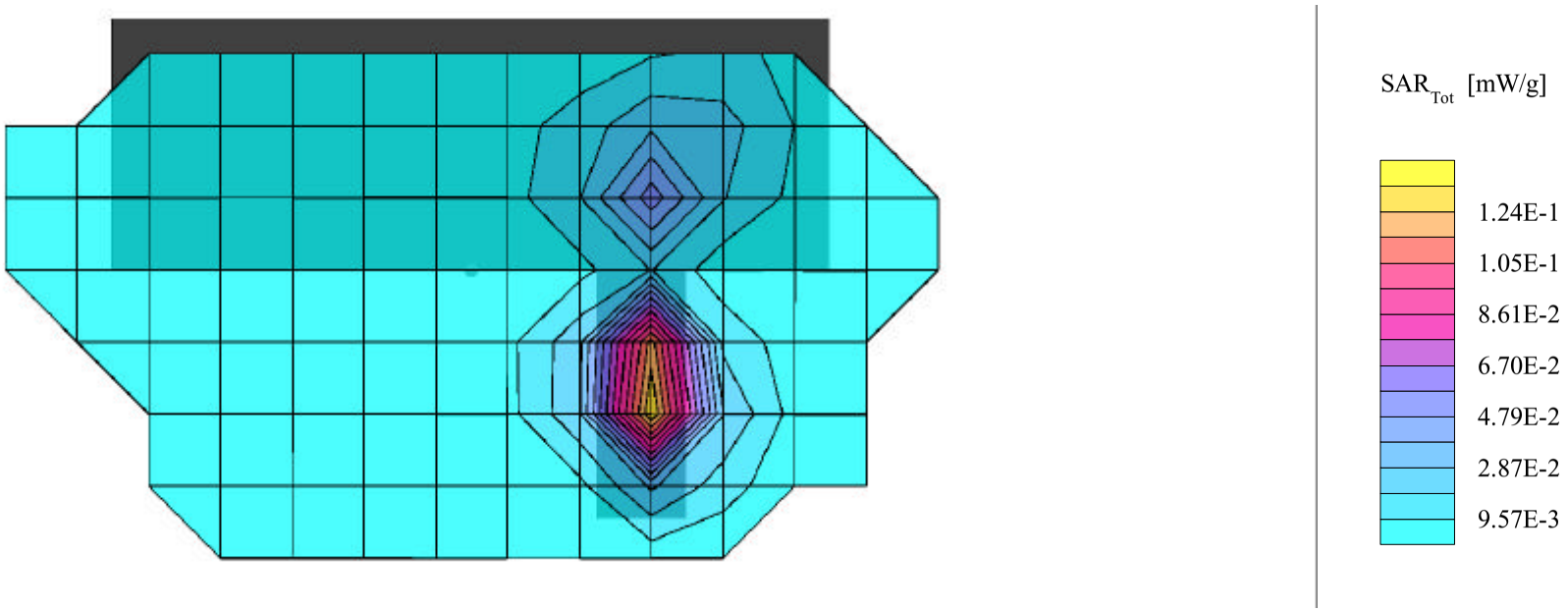
Body SAR - Bottom Side of Laptop PC - 0.0cm Separation Distance
Antenna Open Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with Gateway Solo 1400 Laptop PC (Vertical USB Slot)
CW Mode
Mid Channel [2437.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002



The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.13 dB
SAR (1g): 0.134 mW/g, SAR (10g): 0.0654 mW/g

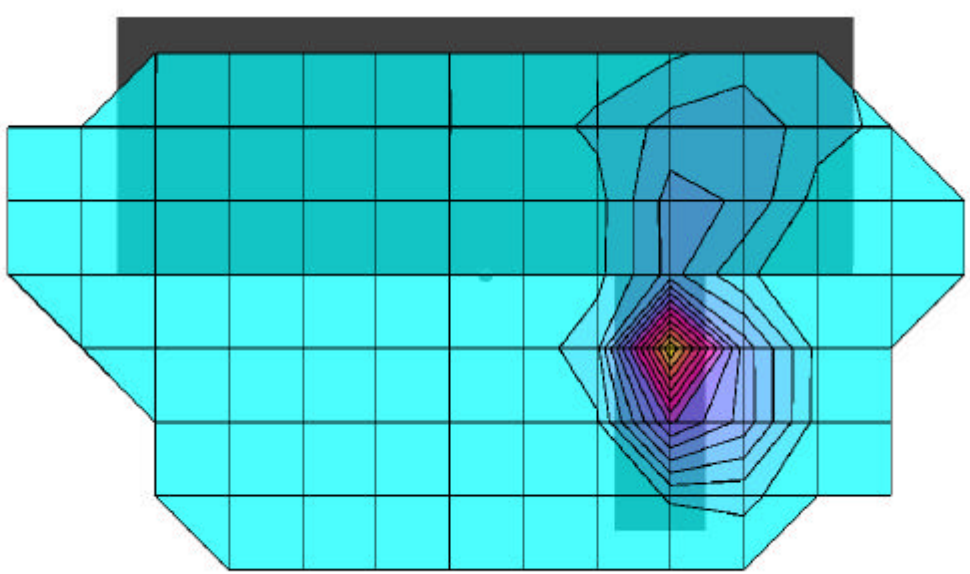
Body SAR - Bottom Side of Laptop PC - 0.0cm Separation Distance
Antenna Closed Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with Gateway Solo 1400 Laptop PC (Vertical USB Slot)
CW Mode
Low Channel [2412.00 MHz]
Conducted Power: 14.45 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002

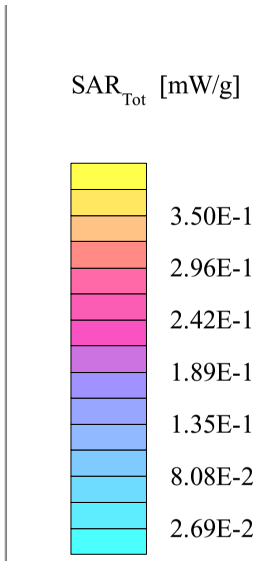


The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.19 dB
SAR (1g): 0.407 mW/g, SAR (10g): 0.195 mW/g

Body SAR - Bottom Side of Laptop PC - 0.0cm Separation Distance
Antenna Closed Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with Gateway Solo 1400 Laptop PC (Vertical USB Slot)
CW Mode
High Channel [2462.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002



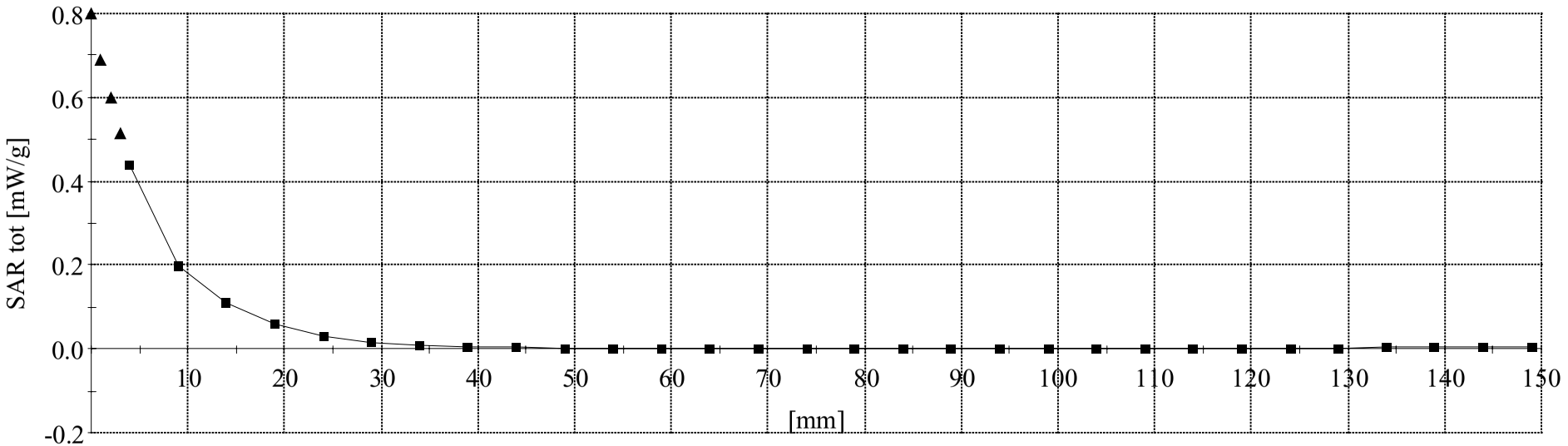


The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3

Z-Axis Extrapolation at Peak SAR Location

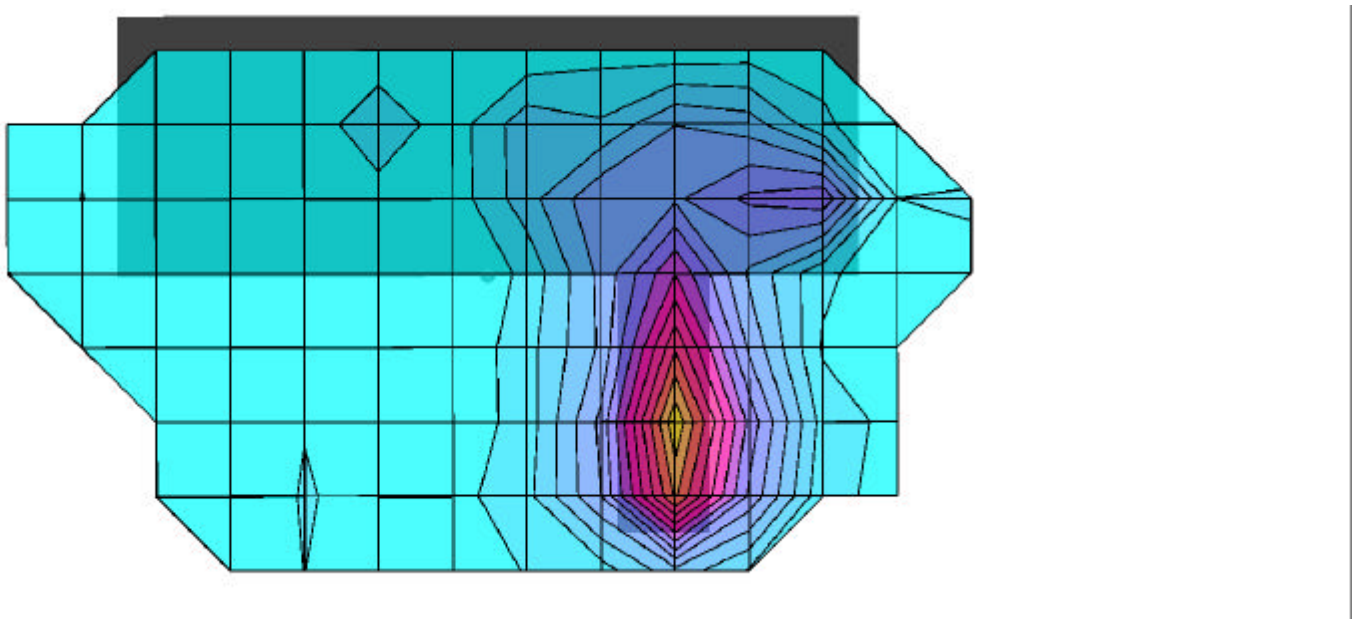
Body SAR - Bottom Side of Laptop PC - 0.0cm Separation Distance
Antenna Closed Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with Gateway Solo 1400 Laptop PC (Vertical USB Slot)
CW Mode
High Channel [2462.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002



The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.15 dB
SAR (1g): 0.0376 mW/g, SAR (10g): 0.0214 mW/g

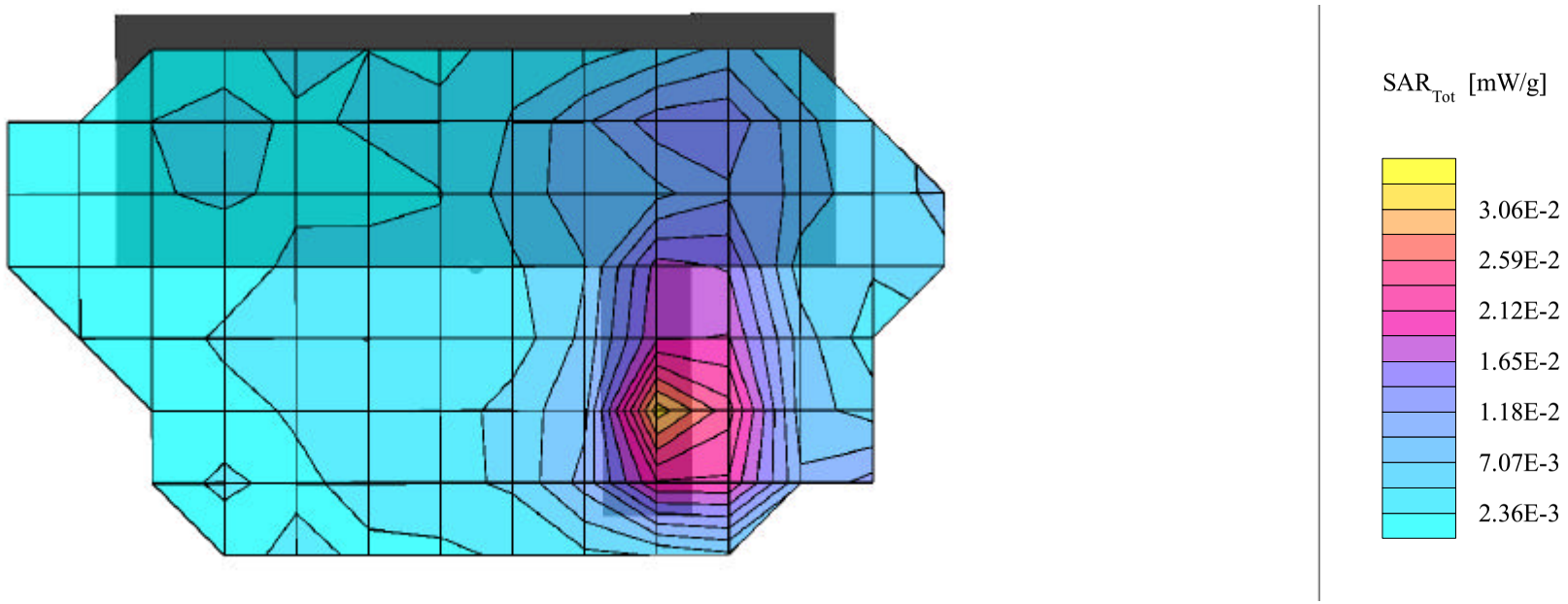
Body SAR - Bottom Side of Laptop PC - 0.0cm Separation Distance
Antenna Closed Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with SONY VAIO PCG-R505 Laptop PC (Horizontal USB Slot)
CW Mode
Mid Channel [2437.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002



The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.12 dB
SAR (1g): 0.0344 mW/g, SAR (10g): 0.0190 mW/g

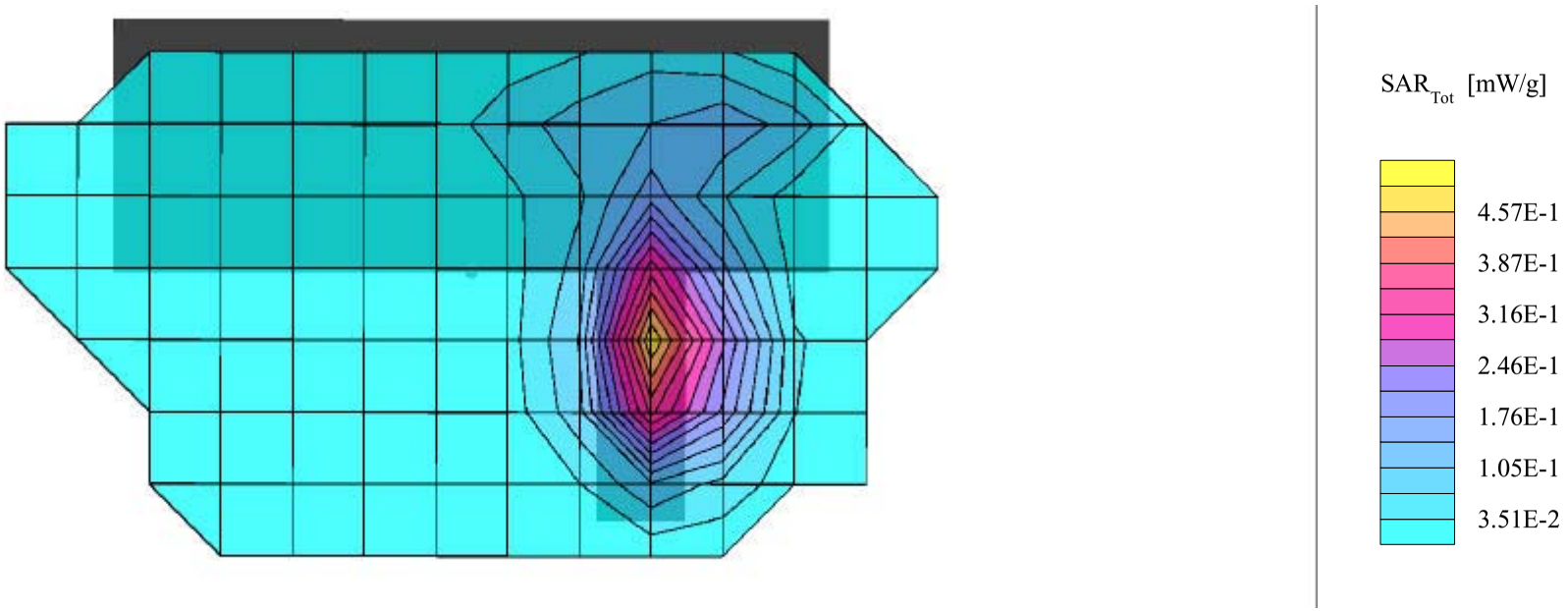
Body SAR - Bottom Side of Laptop PC - 0.0cm Separation Distance
Antenna Open Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with SONY VAIO PCG-R505 Laptop PC (Horizontal USB Slot)
CW Mode
Mid Channel [2437.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002



The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.03 dB
SAR (1g): 0.0957 mW/g, SAR (10g): 0.0521 mW/g

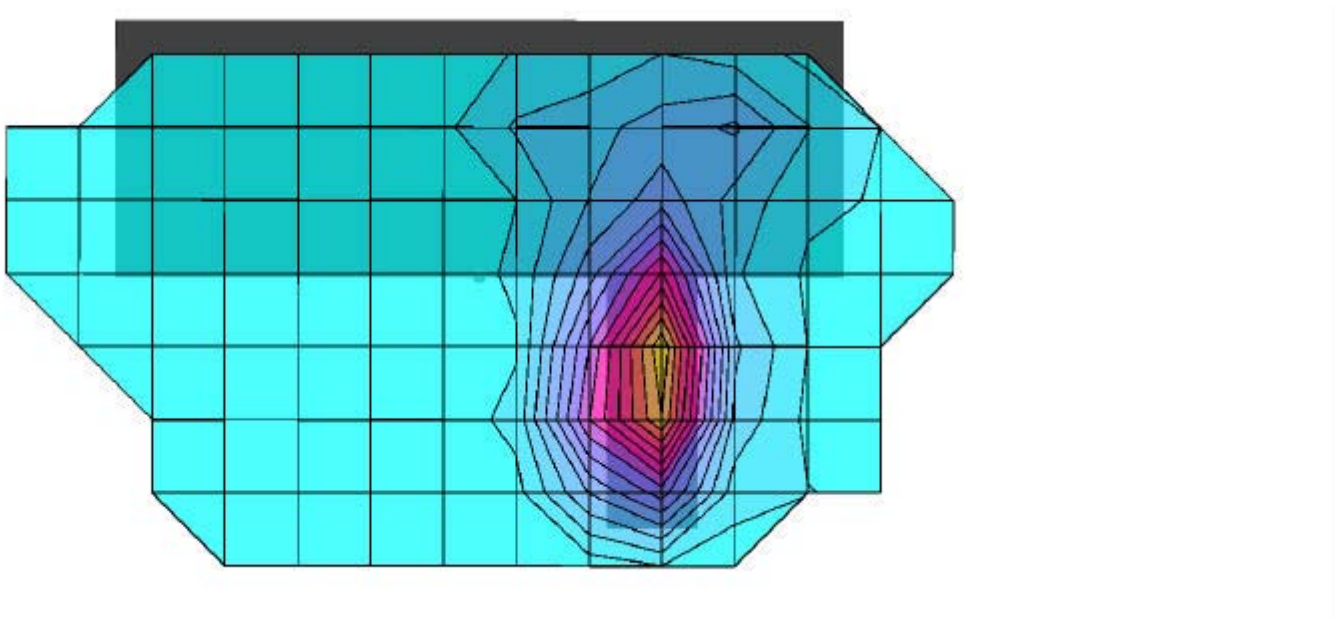
Body SAR - Bottom Side of Laptop PC - 0.0cm Separation Distance
Antenna Closed Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with SONY VAIO PCG-R505 Laptop PC (Horizontal USB Slot)
CW Mode
Low Channel [2412.00 MHz]
Conducted Power: 14.45 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002



The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.11 dB
SAR (1g): 0.0889 mW/g, SAR (10g): 0.0486 mW/g

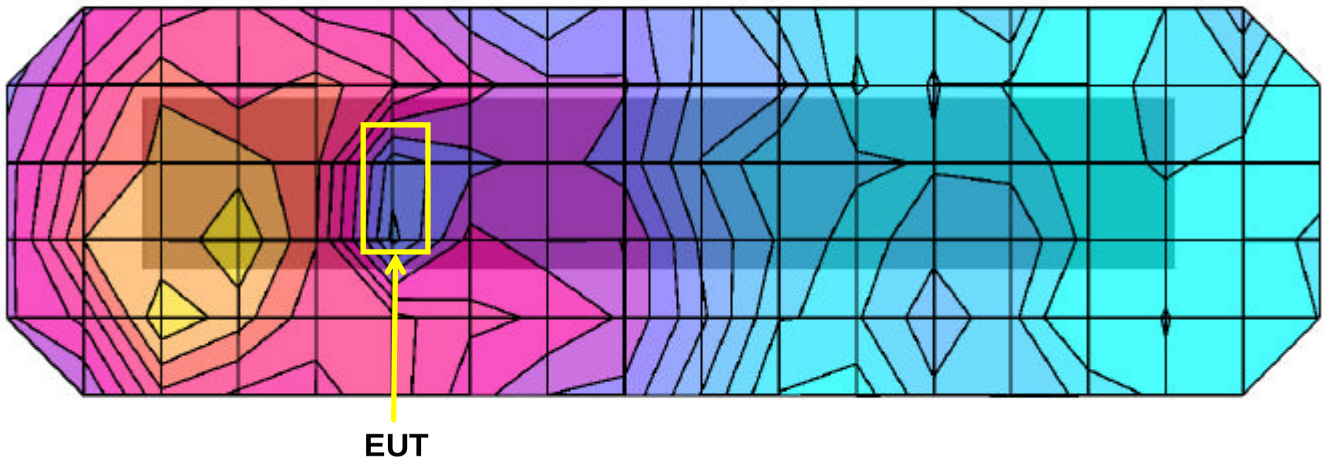
Body SAR - Bottom Side of Laptop PC - 0.0cm Separation Distance
Antenna Closed Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with SONY VAIO PCG-R505 Laptop PC (Horizontal USB Slot)
CW Mode
High Channel [2462.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002

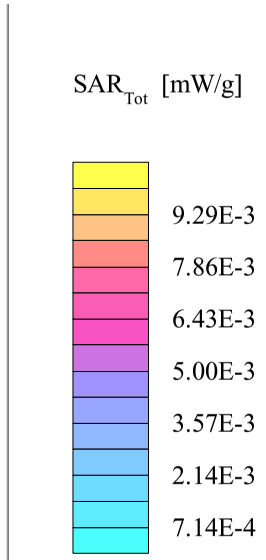


The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (180°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.03 dB
SAR (1g): 0.0091 mW/g, SAR (10g): 0.0056 mW/g

Body SAR - Back Side of Laptop PC - 1.5cm Separation Distance
Antenna Closed Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with Gateway Solo 1400 Laptop PC (Vertical USB Slot)
CW Mode
Mid Channel [2437.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002

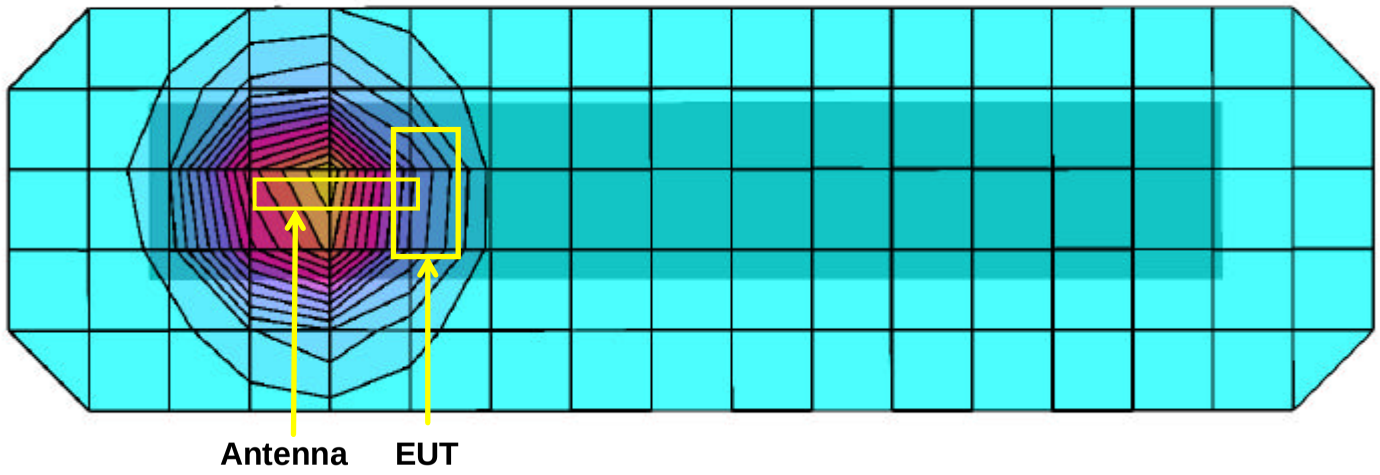


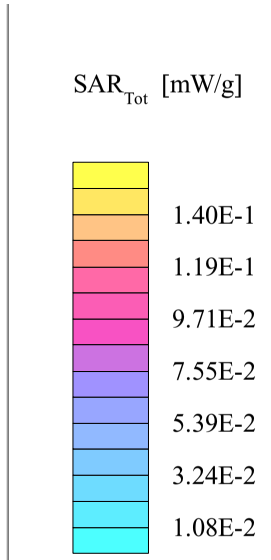


The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (180°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.20 dB
SAR (1g): 0.156 mW/g, SAR (10g): 0.0775 mW/g

Body SAR - Back Side of Laptop PC - 1.5cm Separation Distance
Antenna Open Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with Gateway Solo 1400 Laptop PC (Vertical USB Slot)
CW Mode
Mid Channel [2437.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002

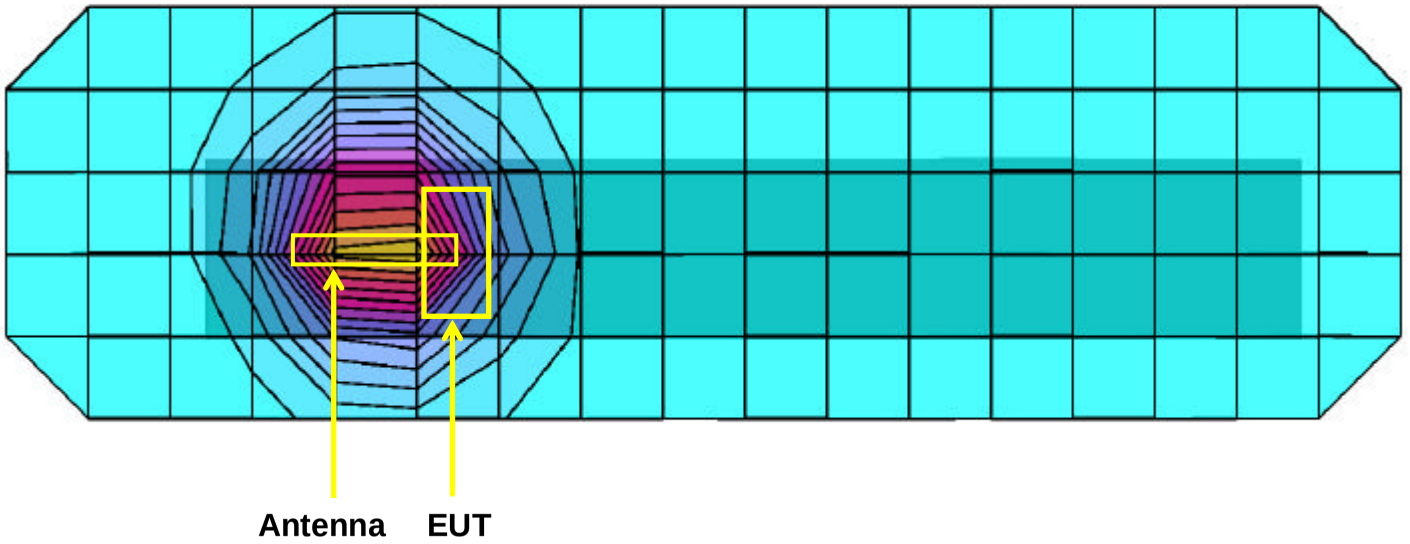


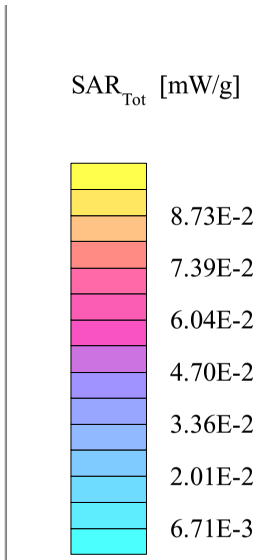


The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (180°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.17 dB
SAR (1g): 0.0958 mW/g, SAR (10g): 0.0487 mW/g

Body SAR - Back Side of Laptop PC - 1.5cm Separation Distance
Antenna Open Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with Gateway Solo 1400 Laptop PC (Vertical USB Slot)
CW Mode
Low Channel [2412.00 MHz]
Conducted Power: 14.45 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002

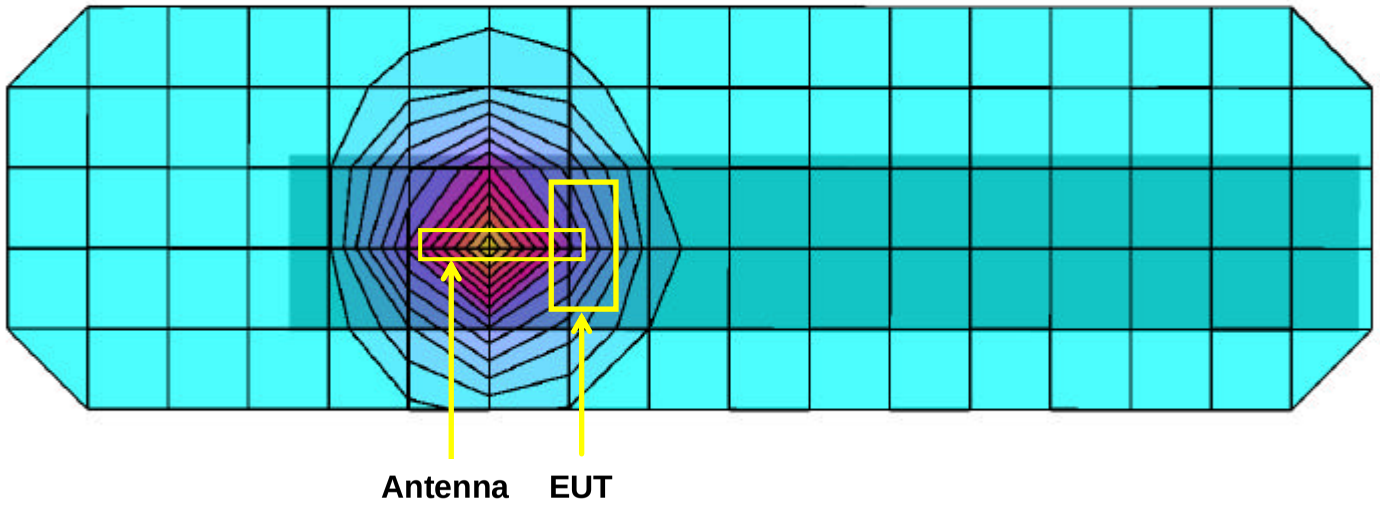


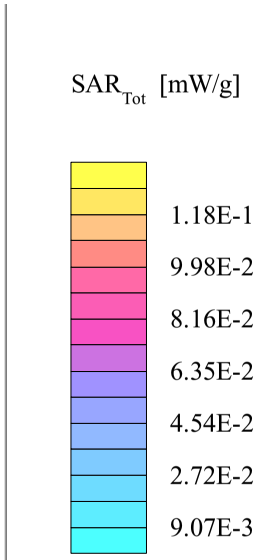


The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (180°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.11 dB
SAR (1g): 0.116 mW/g, SAR (10g): 0.0579 mW/g

Body SAR - Back Side of Laptop PC - 1.5cm Separation Distance
Antenna Open Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with Gateway Solo 1400 Laptop PC (Vertical USB Slot)
CW Mode
High Channel [2462.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002

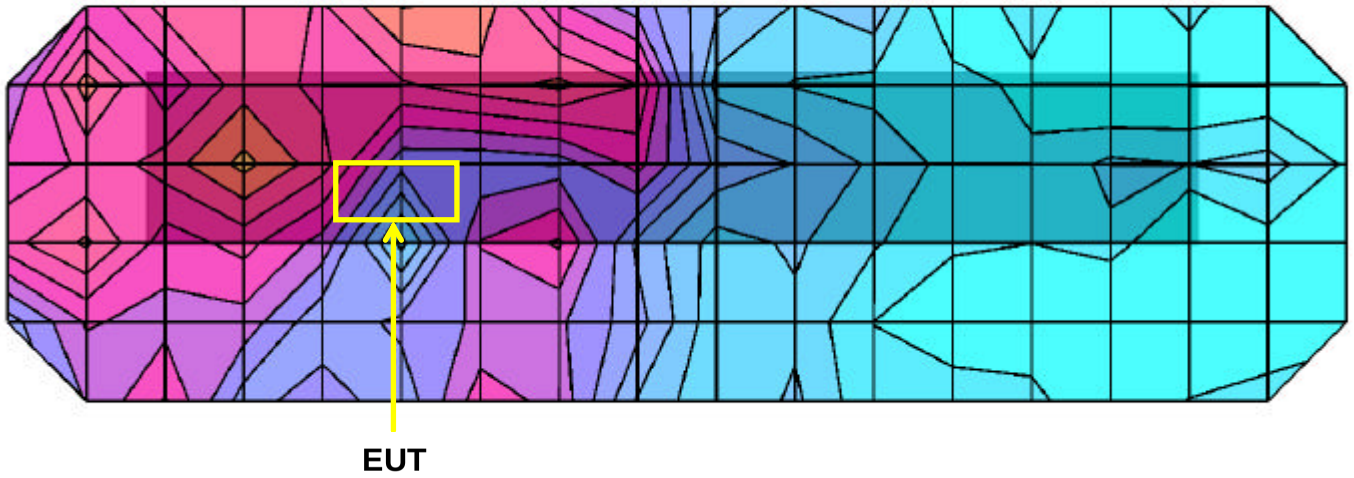


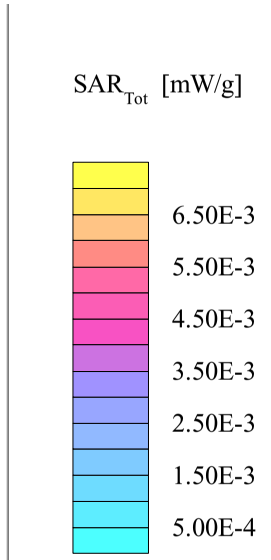


The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (180°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.14 dB
SAR (1g): 0.0058 mW/g, SAR (10g): 0.0038 mW/g

Body SAR - Back Side of Laptop PC - 1.5cm Separation Distance
Antenna Closed Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with SONY VAIO PCG-R505 Laptop PC (Horizontal USB Slot)
CW Mode
Mid Channel [2437.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002

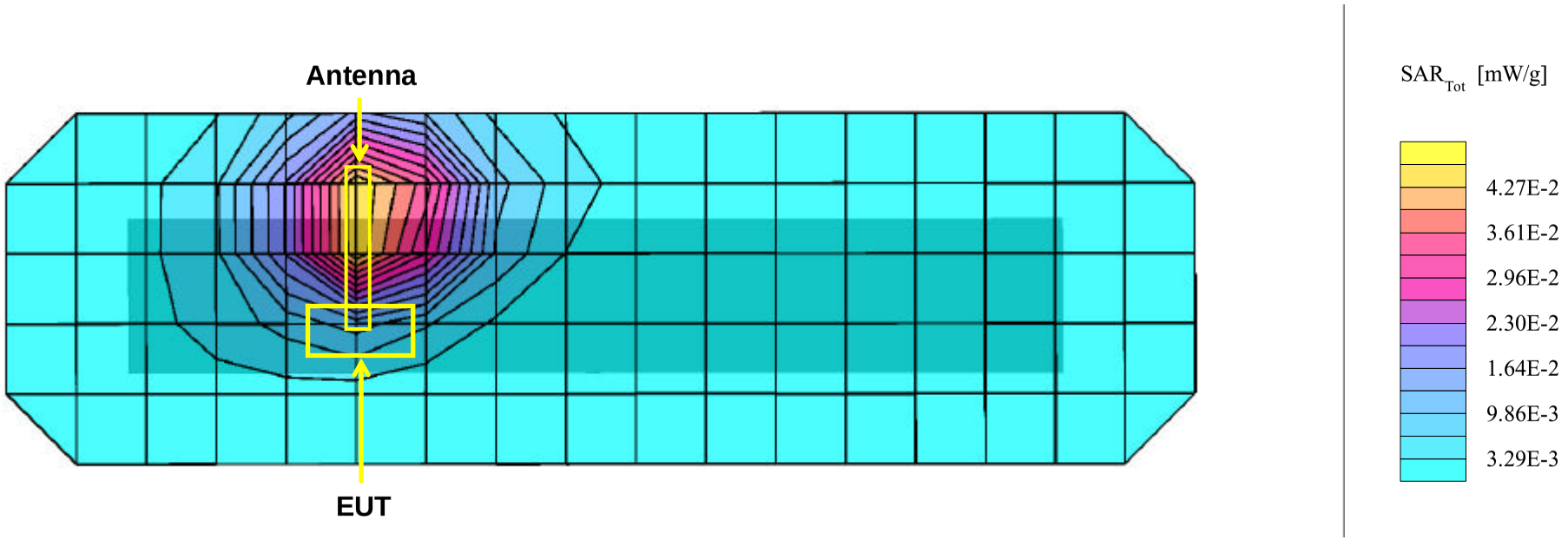




The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (180°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.16 dB
SAR (1g): 0.0503 mW/g, SAR (10g): 0.0259 mW/g

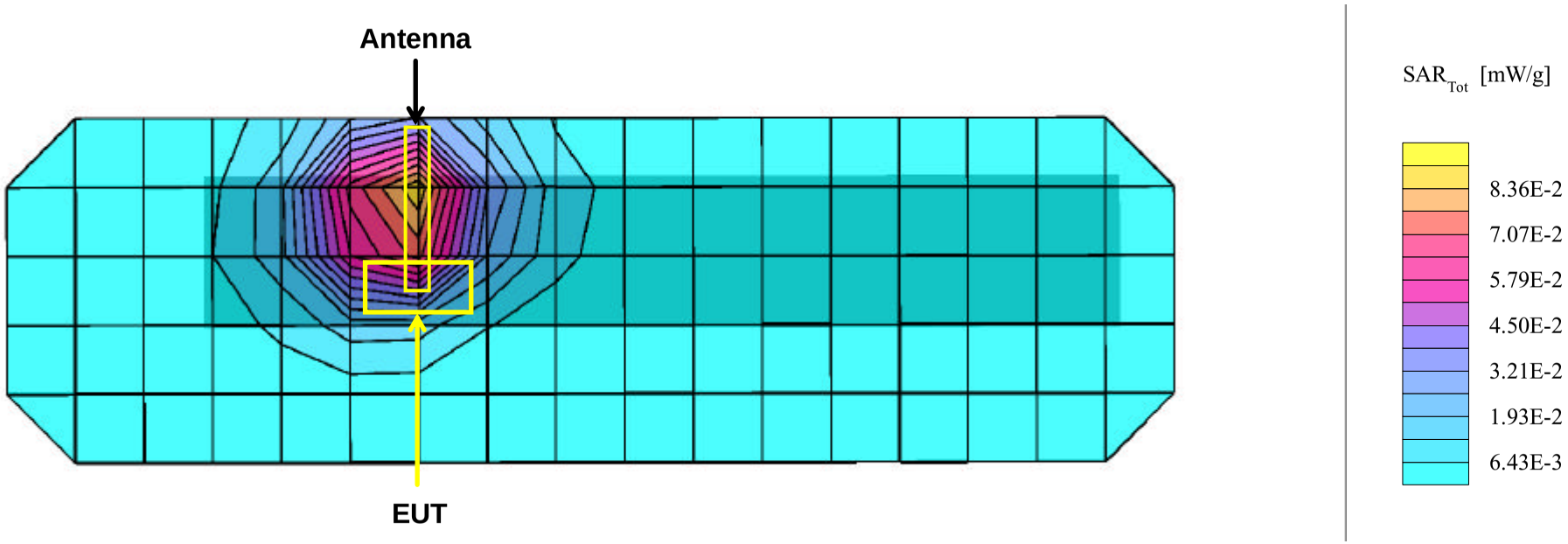
Body SAR - Back Side of Laptop PC - 1.5cm Separation Distance
Antenna Open Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with SONY VAIO PCG-R505 Laptop PC (Horizontal USB Slot)
CW Mode
Mid Channel [2437.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002



The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (180°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.00 dB
SAR (1g): 0.0897 mW/g, SAR (10g): 0.0452 mW/g

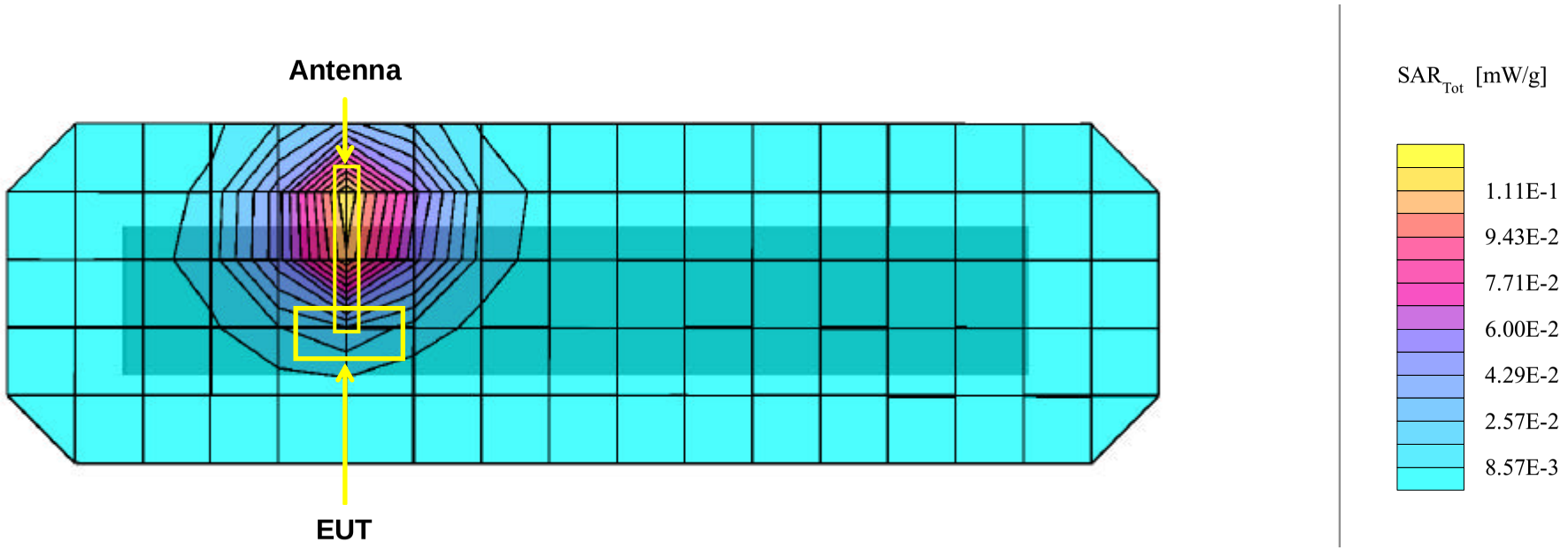
Body SAR - Back Side of Laptop PC - 1.5cm Separation Distance
Antenna Open Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with SONY VAIO PCG-R505 Laptop PC (Horizontal USB Slot)
CW Mode
Low Channel [2412.00 MHz]
Conducted Power: 14.45 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002



The Linksys Group, Inc. FCC ID: PKW-WUSB12

SAM Phantom; Flat Section; Position: (180°,180°)
Probe: ET3DV6 - SN1387; ConvF(4.30,4.30,4.30); Crest factor: 1.0
2450 MHz Muscle: σ = 1.98 mho/m ε_r = 47.5 ρ = 1.00 g/cm^3
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.13 dB
SAR (1g): 0.122 mW/g, SAR (10g): 0.0600 mW/g

Body SAR - Back Side of Laptop PC - 1.5cm Separation Distance
Antenna Open Position
Model: WUSB12 Wireless Compact USB LAN Adapter
with SONY VAIO PCG-R505 Laptop PC (Horizontal USB Slot)
CW Mode
High Channel [2462.00 MHz]
Conducted Power: 14.25 dBm
Ambient Temp. 23.3°C; Fluid Temp. 23.4°C
Date Tested: December 17, 2002



APPENDIX B - SYSTEM CHECK DATA

System Performance Check - 2450MHz Dipole

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1387; ConvF(4.70,4.70,4.70); Crest factor: 1.0; 2450MHz Brain: σ = 1.85 mho/m ε_r = 37.1 ρ = 1.00 g/cm^3

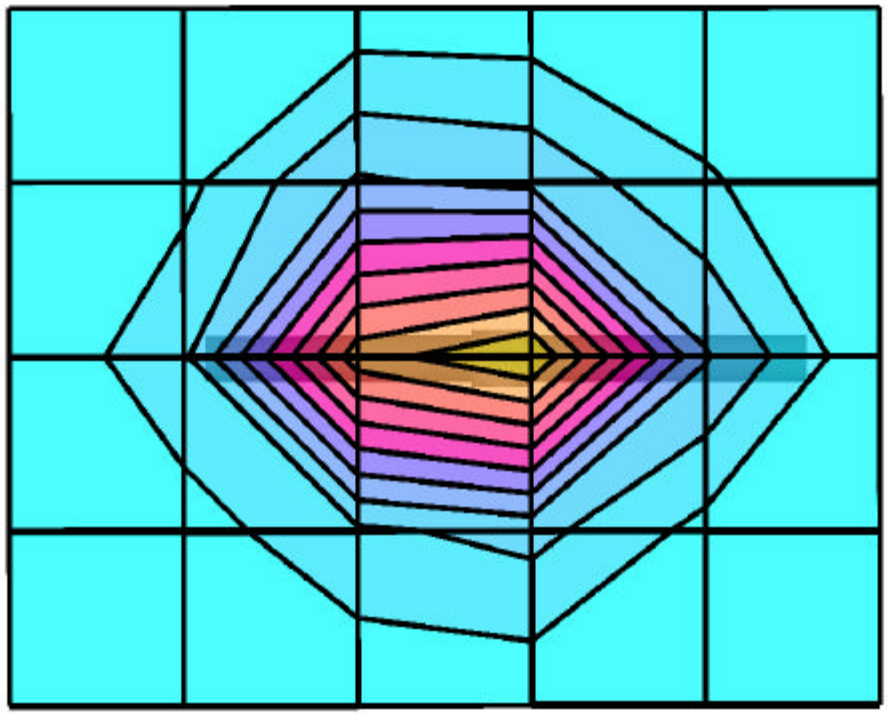
Cube 5x5x7: Peak: 30.2 mW/g, SAR (1g): 14.2 mW/g, SAR (10g): 6.44 mW/g, (Worst-case extrapolation)

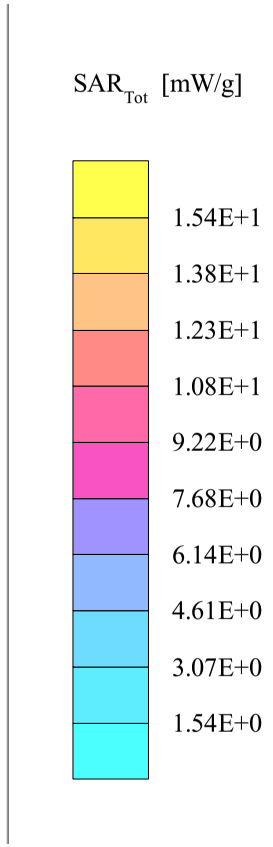
Penetration depth: 6.3 (6.1, 7.2) [mm]; Powerdrift: -0.01 dB

Ambient Temp: 23.3°C; Fluid Temp: 23.8°C

Forward Conducted Power: 250 mW

Date Tested: December 17, 2002



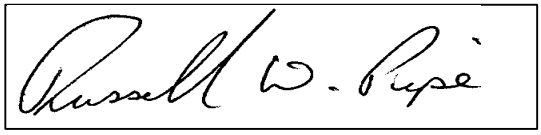


APPENDIX C - SYSTEM VALIDATION

2450MHz SYSTEM VALIDATION DIPOLE

Type:	**2450MHz Validation Dipole**
Serial Number:	**150**
Place of Calibration:	**Celltech Research Inc.**
Date of Calibration:	**October 24, 2002**

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

Calibrated by: 

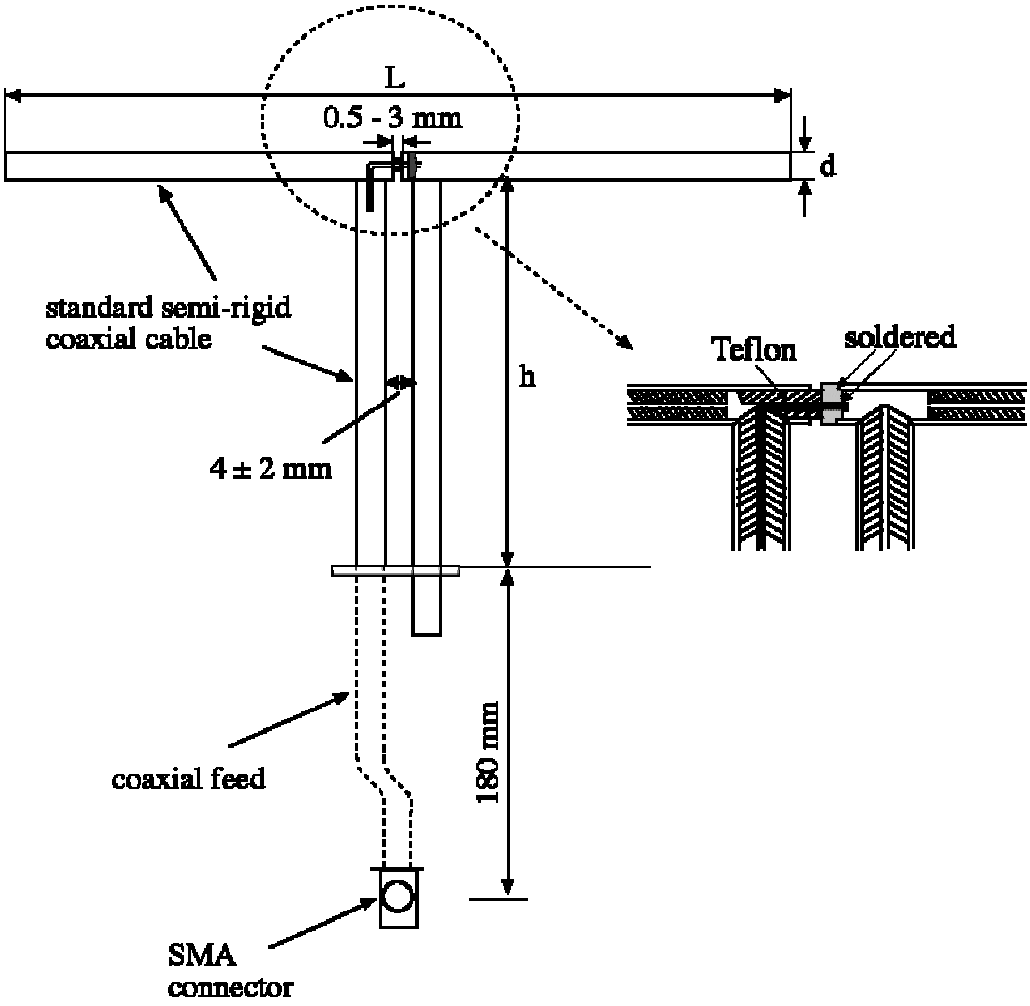
Approved by: 

Celltech Research 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 Std "Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques". 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 2450MHz	Re{Z} = 49.838Ω
	Im{Z} = 0.2207Ω
Return Loss at 2450MHz	-49.398 dB



Validation Dipole Dimensions

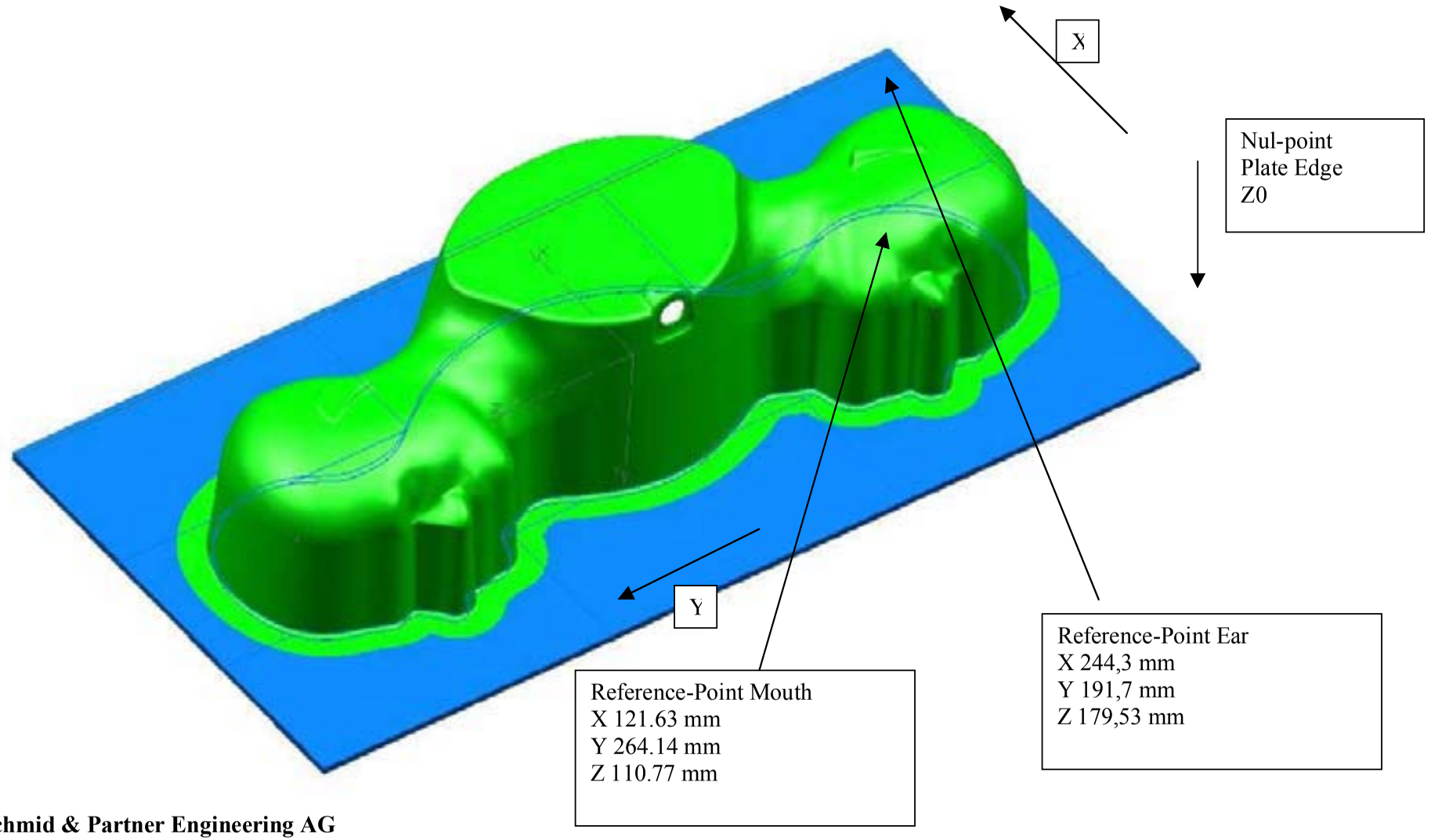
Frequency (MHz)	L (mm)	h (mm)	d (mm)
300	420.0	250.0	6.2
450	288.0	167.0	6.2
835	161.0	89.8	3.6
900	149.0	83.3	3.6
1450	89.1	51.7	3.6
1800	72.0	41.7	3.6
1900	68.0	39.5	3.6
2000	64.5	37.5	3.6
2450	51.8	30.6	3.6
3000	41.5	25.0	3.6

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)

SAM Twin-Phantom



Schmid & Partner Engineering AG

2450MHz Dipole Calibration

2450MHz Dipole Calibration

3. Measurement Conditions

The planar phantom was filled with brain simulating tissue having the following electrical parameters at 2450MHz:

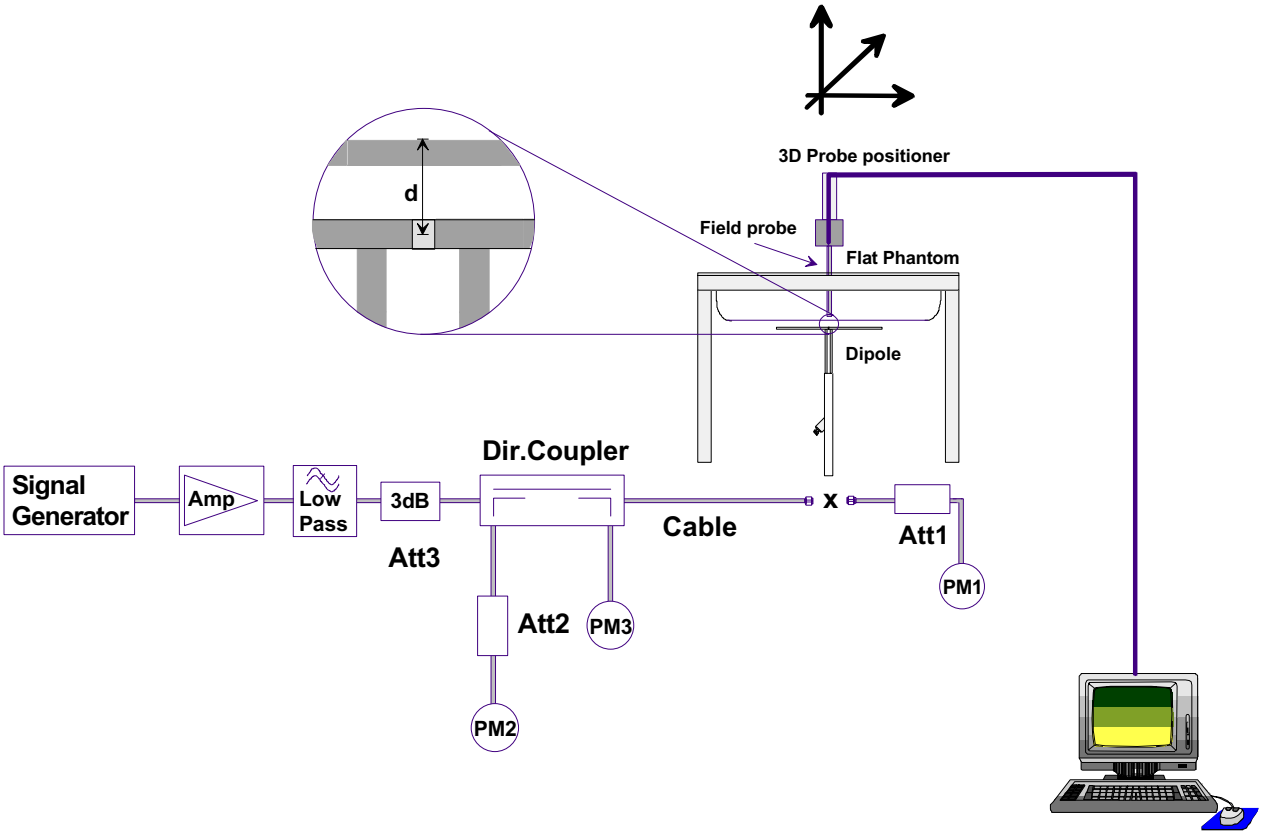
Relative Permittivity:	36.8
Conductivity:	1.79 mho/m
Ambient Temperature:	23.6°C
Fluid Temperature:	23.8°C
Fluid Depth:	≥ 15cm

The 2450MHz simulating tissue consists of the following ingredients:

Ingredient	Percentage by weight
Water	55.20%
Glycol Monobutyl	44.80%
Target Dielectric Parameters at 22°C	ε_r = 39.2 (+/-10%) σ = 1.80 S/m (+/-5%)

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.

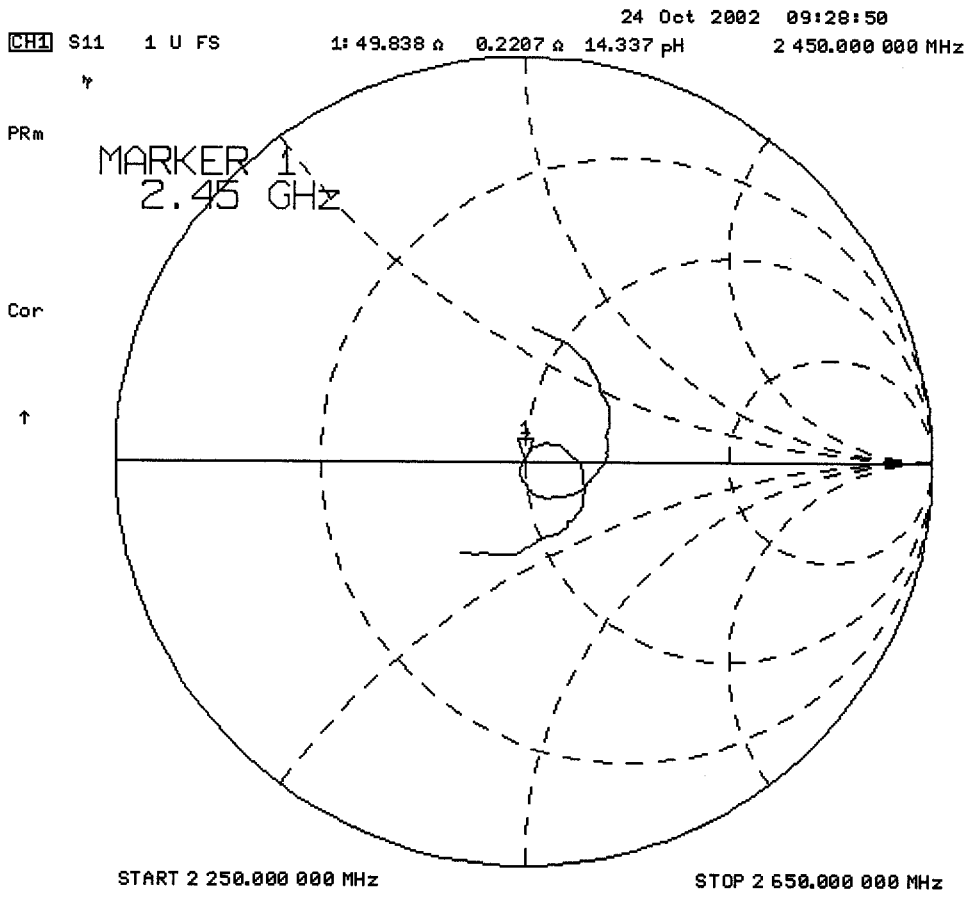
Validation Dipole SAR Test Results

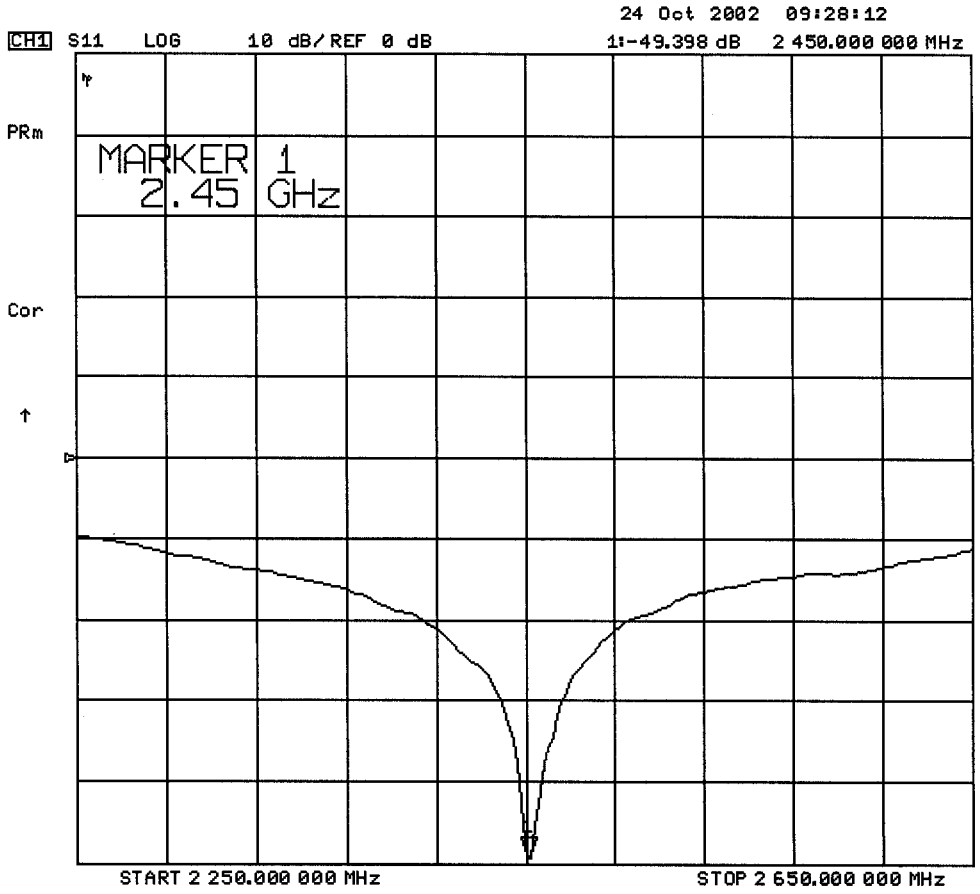
Validation Measurement	SAR @ 0.25W Input averaged over 1g	SAR @ 1W Input averaged over 1g	SAR @ 0.25W Input averaged over 10g	SAR @ 1W Input averaged over 10g	Peak SAR @ 0.25W Input
Test 1	14.4	57.6	6.55	26.20	30.5
Test 2	14.2	56.8	6.44	25.76	30.0
Test 3	14.0	56.0	6.35	25.40	29.7
Test 4	13.9	55.6	6.32	25.28	29.5
Test 5	14.0	56.0	6.33	25.32	29.7
Test 6	14.0	56.0	6.33	25.32	29.7
Test 7	13.9	55.6	6.31	25.24	29.5
Test 8	13.8	55.2	6.28	25.12	29.3
Test 9	13.8	55.2	6.28	25.12	29.4
Test10	14.0	56.0	6.33	25.32	29.7
Average Value	14.0	56.0	6.35	25.41	29.7

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

Averaged over 1cm (1g) of tissue: 56.00 mW/g

Averaged over 10cm (10g) of tissue: 25.41 mW/g


24 Oct 2002 09:28:50
CH1 S11 1 U FS
1: 49.838 Ω 0.2207 Ω 14.337 pH
2 450.000 000 MHz
PRm
MARKER 1
2.45 GHz
Cor
START 2 250.000 000 MHz
STOP 2 650.000 000 MHz


24 Oct 2002 09:28:12
CH1 S11 LOG 10 dB/ REF 0 dB
1:-49.398 dB 2 450.000 000 MHz
PRm
MARKER 1
2.45 GHz
Cor
START 2 250.000 000 MHz
STOP 2 650.000 000 MHz

Dipole 2450MHz

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1387; ConvF(4.70,4.70,4.70); Crest factor: 1.0; 2450 MHz Brain: $\sigma = 1.79$ mho/m $\varepsilon_r = 36.8$ $\rho = 1.00$ g/cm^3

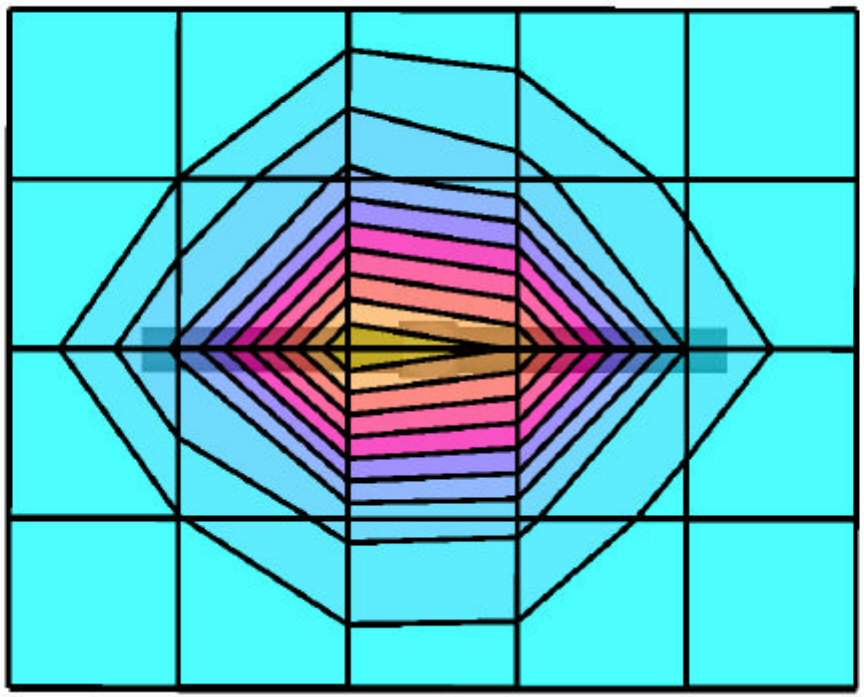
Cubes (4): Peak: 29.7 mW/g ± 0.04 dB, SAR (1g): 14.0 mW/g ± 0.04 dB, SAR (10g): 6.35 mW/g ± 0.04 dB, (Worst-case extrapolation)

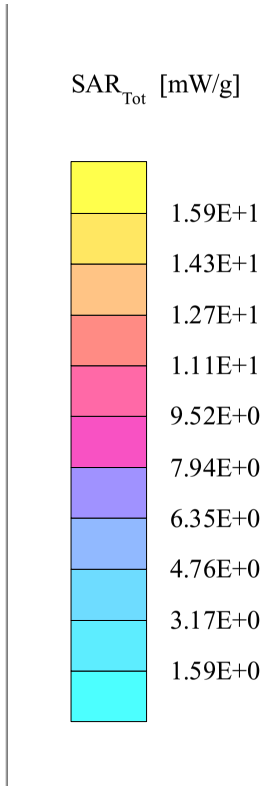
Penetration depth: 6.4 (6.1, 7.2) [mm]; Powerdrift: -0.04 dB

Ambient Temp.: 23.6°C; Fluid Temp.: 23.8°C

Forward Conducted Power: 250 mW

Calibration Date: October 24, 2002





2450MHz System Validation

Measured Fluid Dielectric Parameters (Brain)

October 24, 2002

Frequency	e'	e''
2.350000000 GHz	37.2108	12.9039
2.360000000 GHz	37.1695	12.9350
2.370000000 GHz	37.1398	12.9630
2.380000000 GHz	37.1057	12.9945
2.390000000 GHz	37.0746	13.0290
2.400000000 GHz	37.0424	13.0464
2.410000000 GHz	36.9746	13.0743
2.420000000 GHz	36.9322	13.1074
2.430000000 GHz	36.8908	13.1372
2.440000000 GHz	36.8449	13.1527
2.450000000 GHz	36.7983	13.1767
2.460000000 GHz	36.7651	13.2038
2.470000000 GHz	36.7300	13.2377
2.480000000 GHz	36.7004	13.2677
2.490000000 GHz	36.6658	13.2862
2.500000000 GHz	36.6120	13.2988
2.510000000 GHz	36.5655	13.3268
2.520000000 GHz	36.5147	13.3582
2.530000000 GHz	36.4743	13.3922
2.540000000 GHz	36.4044	13.4131
2.550000000 GHz	36.3807	13.4402

APPENDIX D - PROBE CALIBRATION

Schmid & Partner
Engineering AG

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

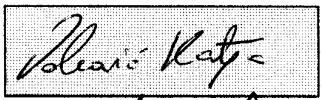
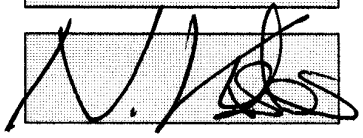
Calibration Certificate

Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1387**
Place of Calibration:	**Zurich**
Date of Calibration:	**February 22, 2002**
Calibration Interval:	**12 months**

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	
Approved by:	

Probe ET3DV6

SN:1387

Manufactured:	September 21, 1999
Last calibration:	September 22, 1999
Recalibrated:	February 22, 2002

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1387

Sensitivity in Free Space

Diode Compression

NormX	**1.58**	$\mu V/(V/m)^2$	DCP X	**97**	mV
NormY	**1.67**	$\mu V/(V/m)^2$	DCP Y	**97**	mV
NormZ	**1.67**	$\mu V/(V/m)^2$	DCP Z	**97**	mV

Sensitivity in Tissue Simulating Liquid

Head **900 MHz** **ε_r = 41.5 ± 5%** **σ = 0.97 ± 5% mho/m**
Head **835 MHz** **ε_r = 41.5 ± 5%** **σ = 0.90 ± 5% mho/m**

ConvF X	**6.6**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.6**	± 9.5% (k=2)	Alpha	**0.40**
ConvF Z	**6.6**	± 9.5% (k=2)	Depth	**2.38**

Head **1800 MHz** **ε_r = 40.0 ± 5%** **σ = 1.40 ± 5% mho/m**
Head **1900 MHz** **ε_r = 40.0 ± 5%** **σ = 1.40 ± 5% mho/m**

ConvF X	**5.4**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.4**	± 9.5% (k=2)	Alpha	**0.57**
ConvF Z	**5.4**	± 9.5% (k=2)	Depth	**2.18**

Boundary Effect

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

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	9.7	5.4
SAR_{be} [%]	With Correction Algorithm	0.3	0.6

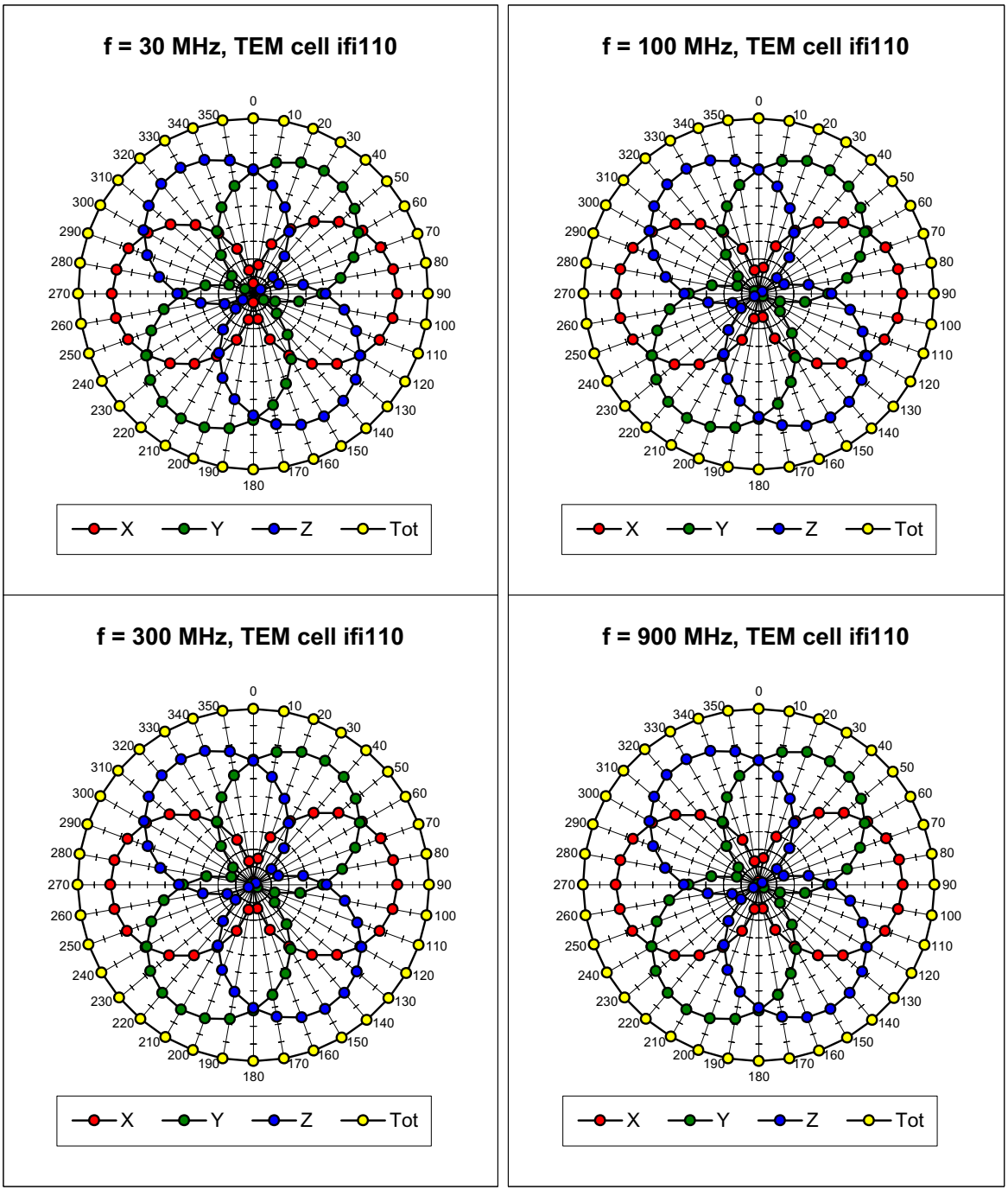
Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

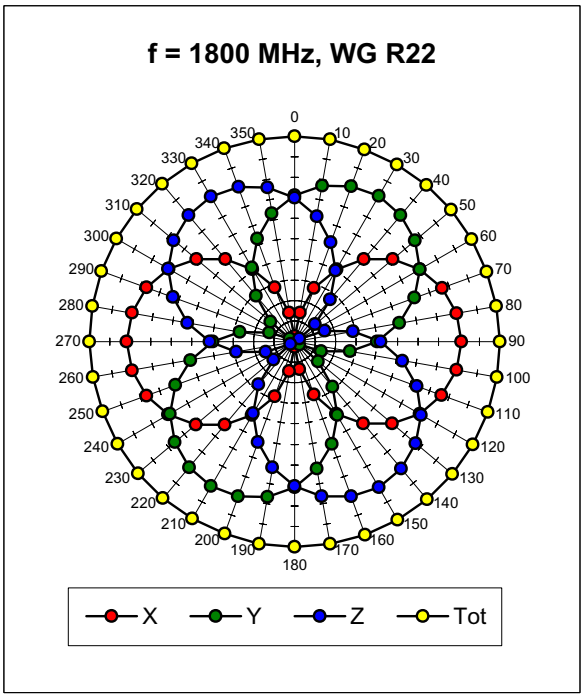
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	11.5	7.3
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

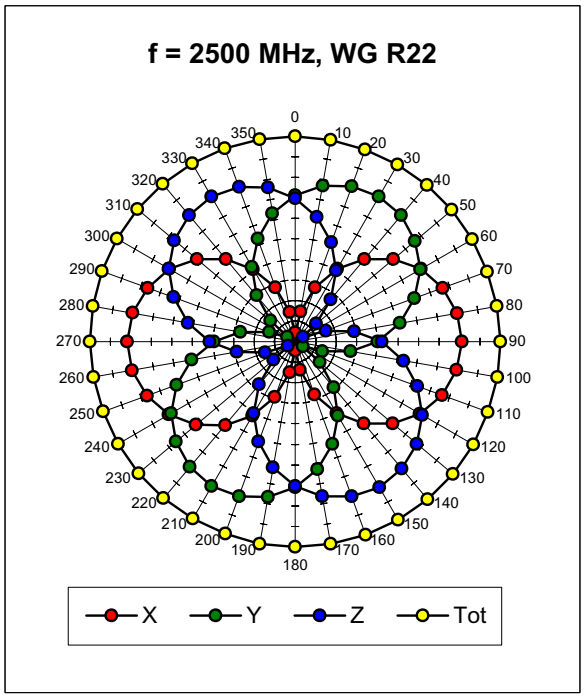
Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.3 ± 0.2**	mm

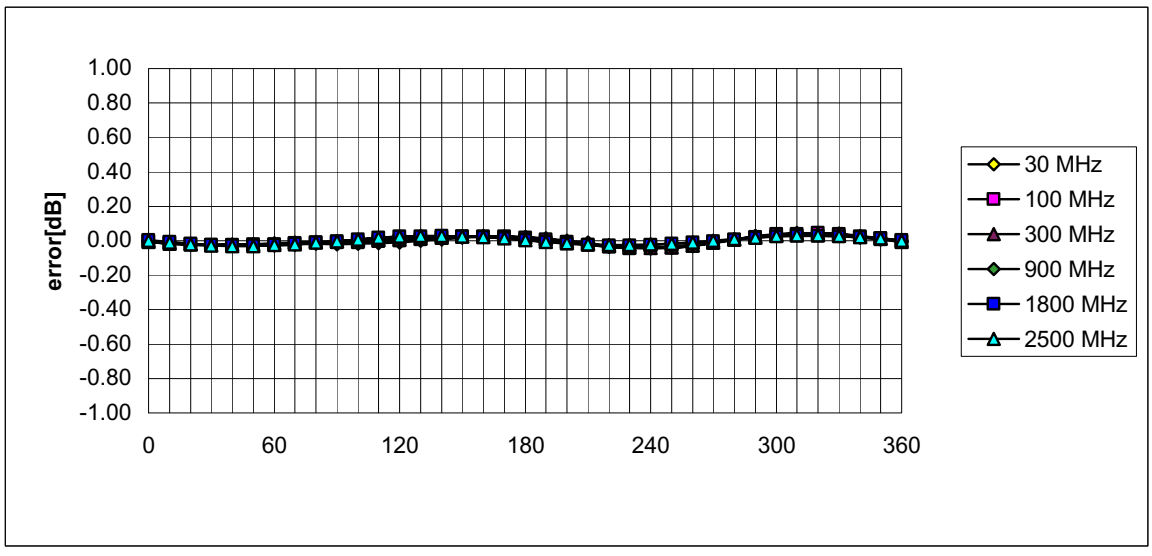
Receiving Pattern (ϕ , θ = 0°





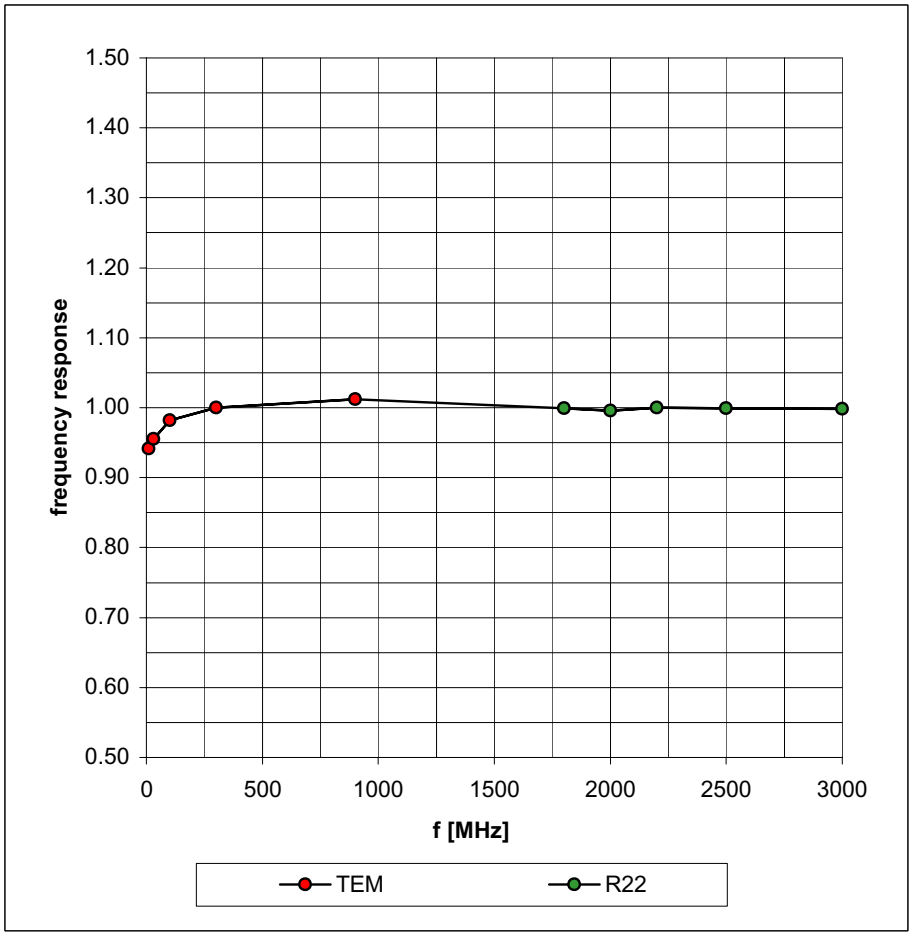


Isotropy Error (ϕ), θ = 0°



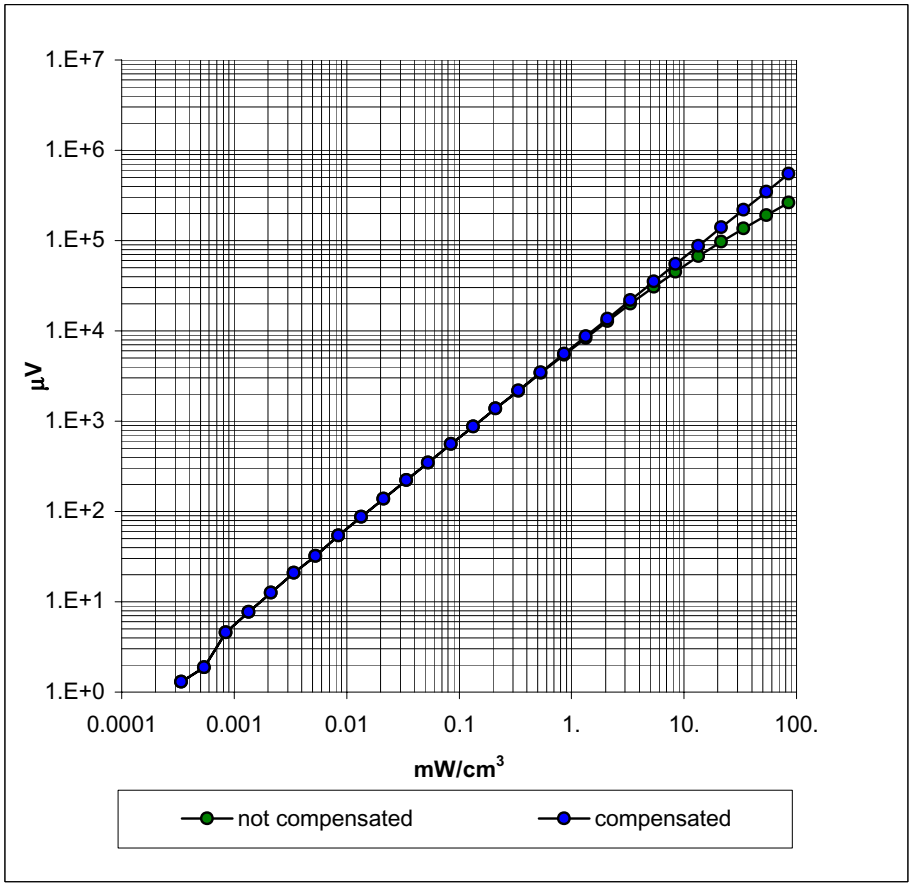
Frequency Response of E-Field

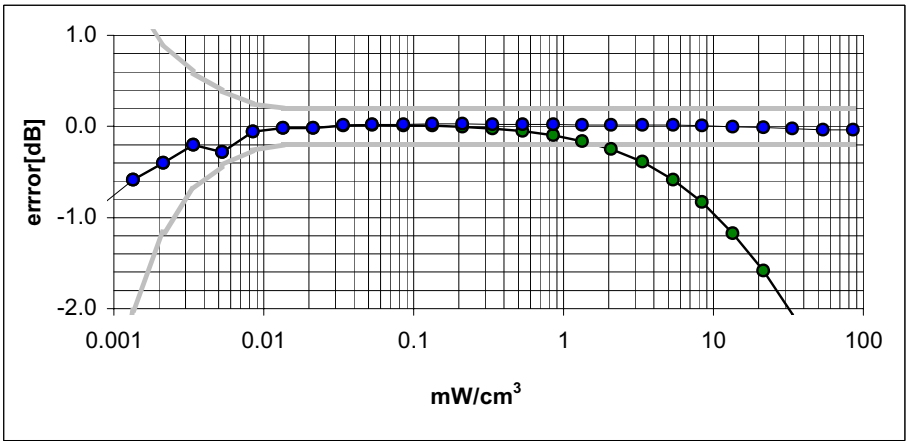
(TEM-Cell:ifi110, Waveguide R22)



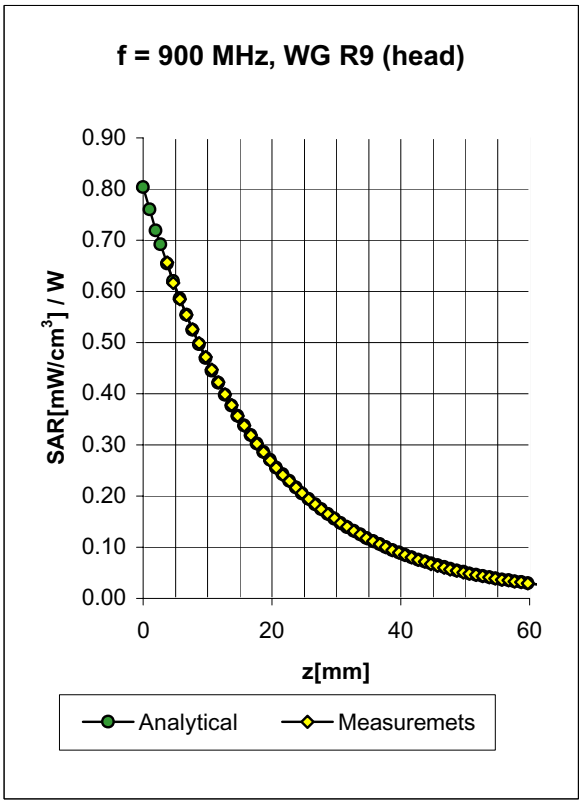
Dynamic Range f(SAR_{brain})

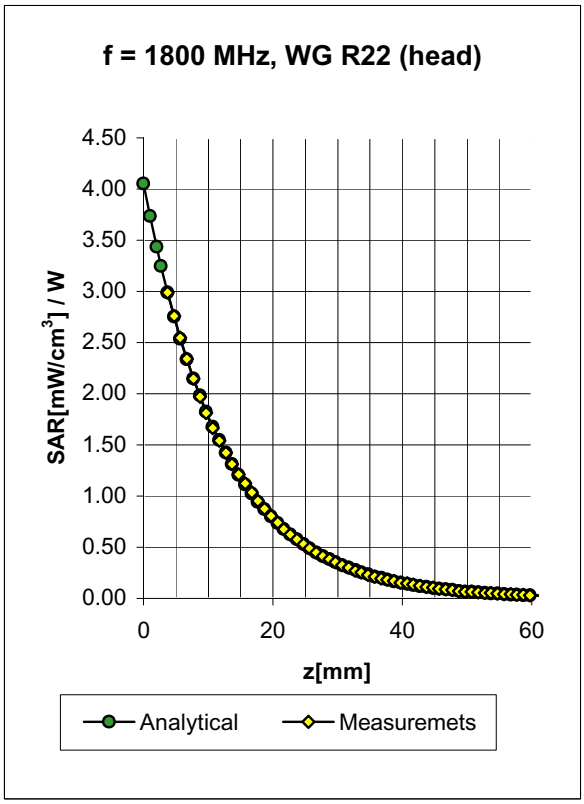
(Waveguide R22)





Conversion Factor Assessment



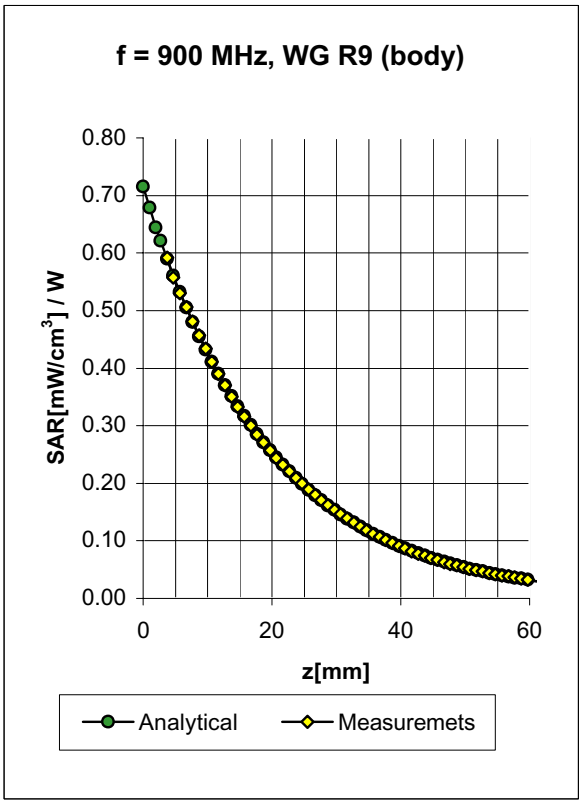


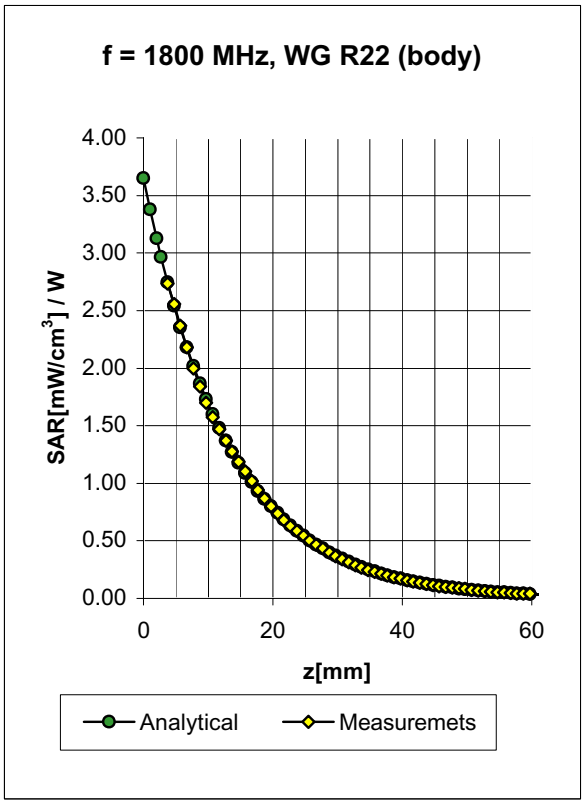
Head	**900 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.97 ± 5% mho/m**
Head	**835 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.90 ± 5% mho/m**
	ConvF X	**6.6** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**6.6** ± 9.5% (k=2)		Alpha **0.40**
	ConvF Z	**6.6** ± 9.5% (k=2)		Depth **2.38**

Head	**1800 MHz**		**ε_r = 40.0 ± 5%**	**σ = 1.40 ± 5% mho/m**
Head	**1900 MHz**		**ε_r = 40.0 ± 5%**	**σ = 1.40 ± 5% mho/m**
	ConvF X	**5.4** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**5.4** ± 9.5% (k=2)		Alpha **0.57**
	ConvF Z	**5.4** ± 9.5% (k=2)		Depth **2.18**

ET3DV6 SN:1387 **February 22, 2002**

Conversion Factor Assessment





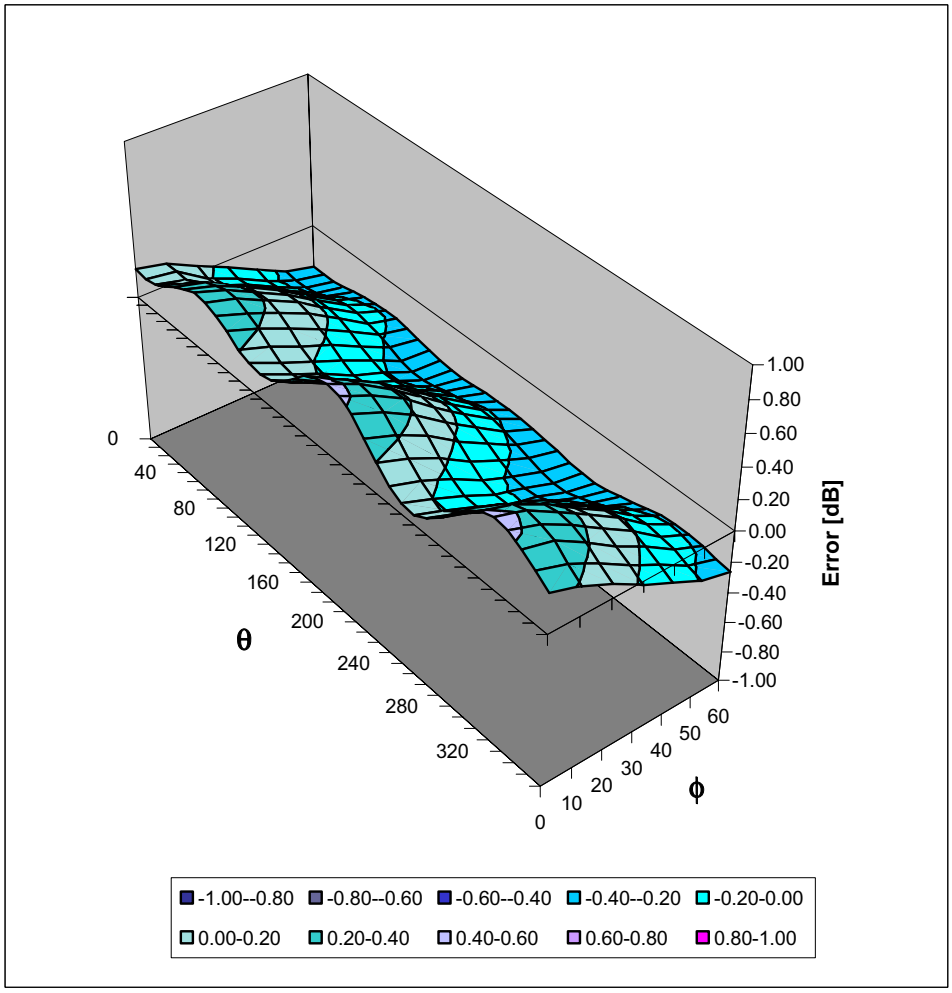
Body	**900 MHz**	ε_r **= 55.0 ± 5%**	**σ = 1.05 ± 5% mho/m**	
Body	**835 MHz**	ε_r **= 55.2 ± 5%**	**σ = 0.97 ± 5% mho/m**	
	ConvF X	**6.3** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.3** ± 9.5% (k=2)	Alpha	**0.42**
	ConvF Z	**6.3** ± 9.5% (k=2)	Depth	**2.44**

Body	**1800 MHz**	ε_r **= 53.3 ± 5%**	**σ = 1.52 ± 5% mho/m**	
Body	**1900 MHz**	ε_r **= 53.3 ± 5%**	**σ = 1.52 ± 5% mho/m**	
	ConvF X	**5.0** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.0** ± 9.5% (k=2)	Alpha	**0.76**
	ConvF Z	**5.0** ± 9.5% (k=2)	Depth	**2.01**

ET3DV6 SN:1387 **February 22, 2002**

Deviation from Isotropy in HSL

Error ($\theta\phi$), f = 900 MHz



Schmid & Partner
Engineering AG

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

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1387**
Place of Assessment:	**Zurich**
Date of Assessment:	**February 25, 2002**
Probe Calibration Date:	**February 22, 2002**

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:

Dosimetric E-Field Probe ET3DV6 SN:1387

Conversion Factor (± standard deviation)

150 MHz	ConvF	**9.2 ± 8%**	**ε_r = 52.3** **σ = 0.76 mho/m** (head tissue)
300 MHz	ConvF	**8.0 ± 8%**	**ε_r = 45.3** **σ = 0.87 mho/m** (head tissue)
450 MHz	ConvF	**7.3 ± 8%**	**ε_r = 43.5** **σ = 0.87 mho/m** (head tissue)
2450 MHz	ConvF	**4.7 ± 8%**	**ε_r = 39.2** **σ = 1.80 mho/m** (head tissue)
150 MHz	ConvF	**8.8 ± 8%**	**ε_r = 61.9** **σ = 0.80 mho/m** (body tissue)
450 MHz	ConvF	**7.7 ± 8%**	**ε_r = 56.7** **σ = 0.94 mho/m** (body tissue)
2450 MHz	ConvF	**4.3 ± 8%**	**ε_r = 52.7** **σ = 1.95 mho/m** (body tissue)

APPENDIX E - MEASURED FLUID DIELECTRIC PARAMETERS

2450MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

December 17, 2002

Frequency	e'	e''
2.400000000 GHz	37.3074	13.4727
2.405000000 GHz	37.2755	13.4781
2.410000000 GHz	37.2551	13.4930
2.415000000 GHz	37.2263	13.4988
2.420000000 GHz	37.2058	13.5119
2.425000000 GHz	37.1680	13.5285
2.430000000 GHz	37.1409	13.5570
2.435000000 GHz	37.1329	13.5764
2.440000000 GHz	37.1217	13.5877
2.445000000 GHz	37.0915	13.5975
2.450000000 GHz	37.0673	13.6185
2.455000000 GHz	37.0443	13.6383
2.460000000 GHz	37.0272	13.6573
2.465000000 GHz	37.0036	13.6706
2.470000000 GHz	36.9934	13.6890
2.475000000 GHz	36.9628	13.7072
2.480000000 GHz	36.9572	13.7172
2.485000000 GHz	36.9284	13.7190
2.490000000 GHz	36.9131	13.7363
2.495000000 GHz	36.8947	13.7381
2.500000000 GHz	36.8683	13.7461

2450MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

December 17, 2002

Frequency	e'	e''
2.350000000 GHz	47.9432	14.1750
2.360000000 GHz	47.9044	14.2055
2.370000000 GHz	47.8821	14.2626
2.380000000 GHz	47.8498	14.2903
2.390000000 GHz	47.8186	14.3207
2.400000000 GHz	47.7668	14.3435
2.410000000 GHz	47.7281	14.3832
2.420000000 GHz	47.6640	14.4139
2.430000000 GHz	47.6087	14.4730
2.440000000 GHz	47.5850	14.5012
2.450000000 GHz	47.5206	14.5616
2.460000000 GHz	47.5005	14.6240
2.470000000 GHz	47.4607	14.6583
2.480000000 GHz	47.4349	14.6978
2.490000000 GHz	47.4084	14.7114
2.500000000 GHz	47.3468	14.7380
2.510000000 GHz	47.3293	14.7663
2.520000000 GHz	47.2633	14.7959
2.530000000 GHz	47.2172	14.8476
2.540000000 GHz	47.1673	14.8772
2.550000000 GHz	47.1255	14.9185

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 - SAR TEST SETUP & EUT PHOTOGRAPHS

BODY SAR TEST SETUP PHOTOGRAPHS

Bottom Side of Gateway Solo 1400 Laptop PC (Vertical USB Slot)
0.0cm Separation Distance (Laptop PC to Planar Phantom)
Antenna Closed Position

BODY SAR TEST SETUP PHOTOGRAPHS

Bottom Side of Gateway Solo 1400 Laptop PC (Vertical USB Slot)
0.0cm Separation Distance (Laptop PC to Planar Phantom)
Antenna Open Position

BODY SAR TEST SETUP PHOTOGRAPHS

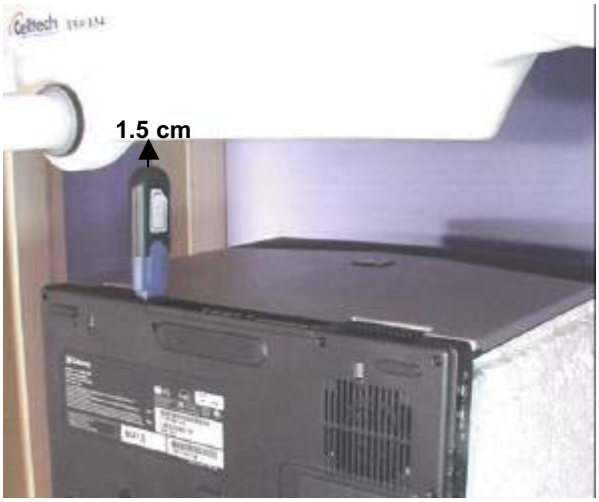
Bottom Side of SONY VAIO PCG-R505 Laptop PC (Horizontal USB Slot)
0.0cm Separation Distance (Laptop PC to Planar Phantom)
Antenna Closed Position

BODY SAR TEST SETUP PHOTOGRAPHS

Bottom Side of SONY VAIO PCG-R505 Laptop PC (Horizontal USB Slot)
0.0cm Separation Distance (Laptop PC to Planar Phantom)
Antenna Open Position

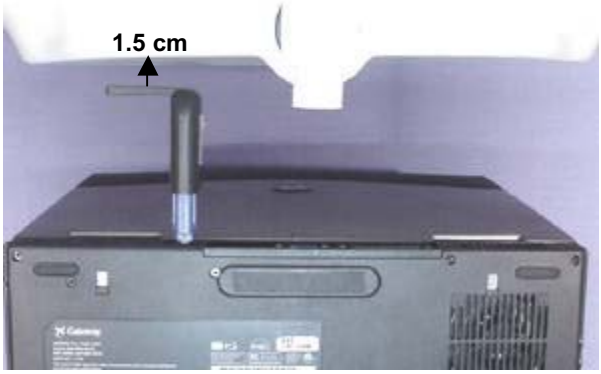
BODY SAR TEST SETUP PHOTOGRAPHS

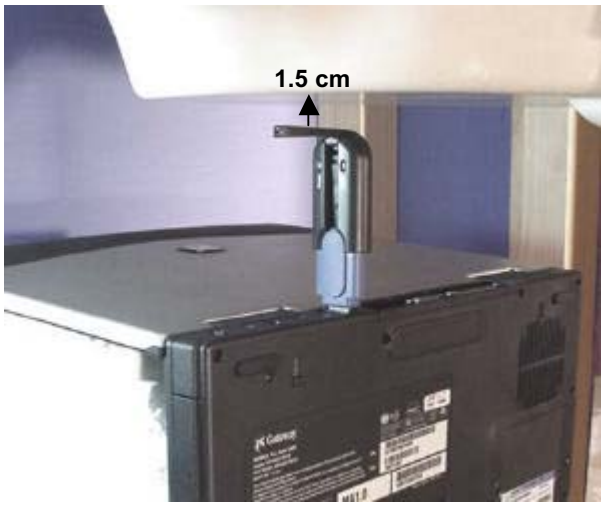
Back Side of Gateway Solo 1400 Laptop PC (Vertical USB Slot)
1.5cm Separation Distance (EUT to Planar Phantom)
Antenna Closed Position



BODY SAR TEST SETUP PHOTOGRAPHS

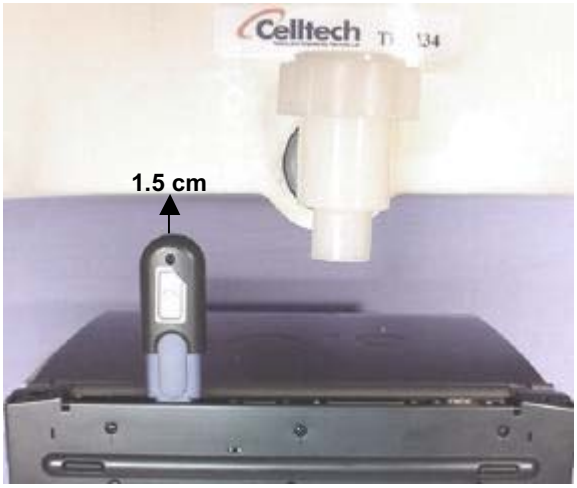
Back Side of Gateway Solo 1400 Laptop PC (Vertical USB Slot)
1.5cm Separation Distance (Antenna to Planar Phantom)
Antenna Open Position

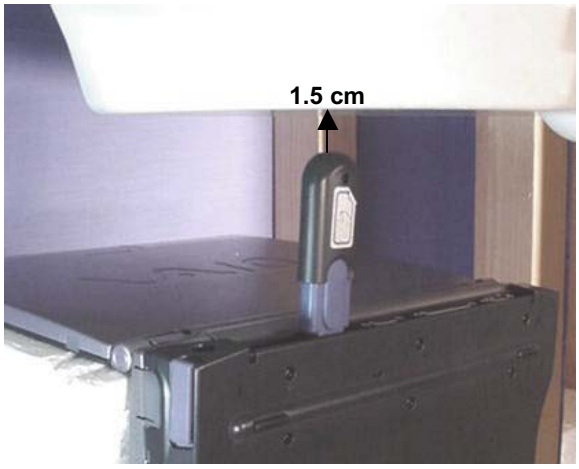




BODY SAR TEST SETUP PHOTOGRAPHS

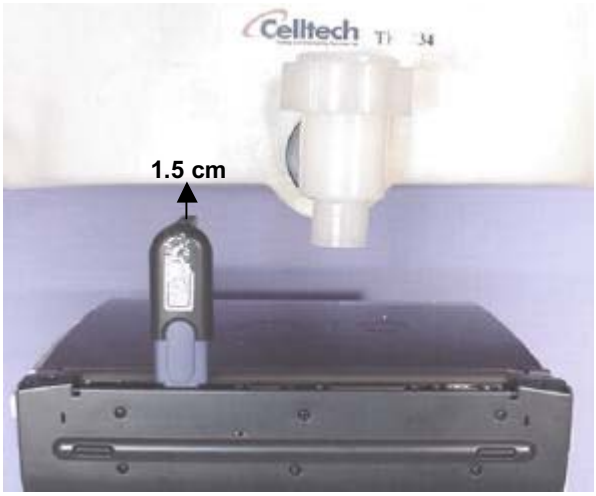
Back Side of SONY VAIO PCG-R505 Laptop PC (Horizontal USB Slot)
1.5cm Separation Distance (EUT to Planar Phantom)
Antenna Closed Position

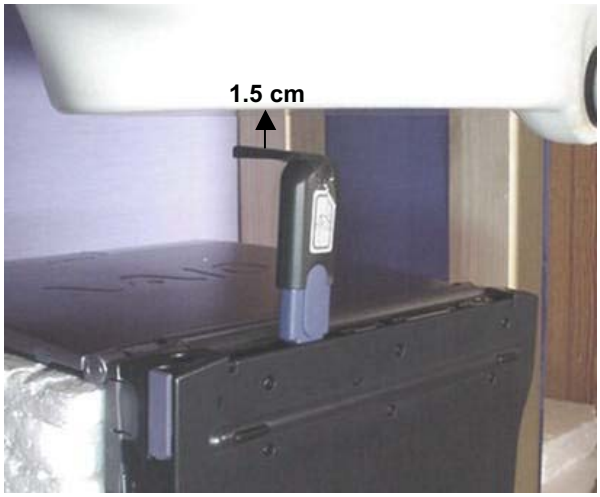


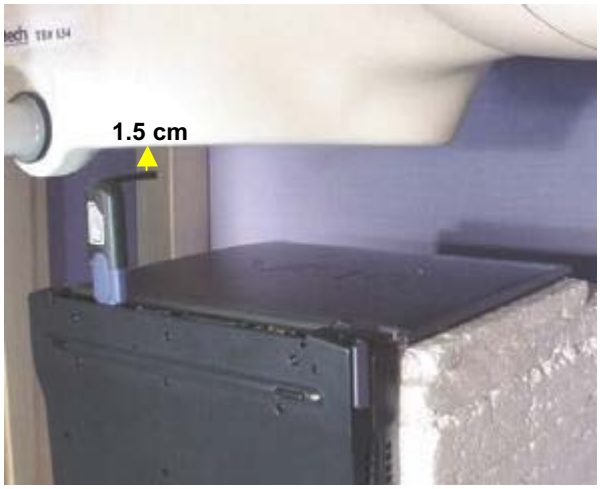


BODY SAR TEST SETUP PHOTOGRAPHS

Back Side of SONY VAIO PCG-R505 Laptop PC (Horizontal USB Slot)
1.5cm Separation Distance (Antenna to Planar Phantom)
Antenna Open Position







EUT PHOTOGRAPHS

Wireless Compact USB LAN Adapter

EUT PHOTOGRAPHS

with Gateway Solo 1400 Host Laptop PC
Vertical USB Slot






EUT PHOTOGRAPHS

with SONY VAIO PCG-R505 Host Laptop PC
Horizontal USB Slot