RF EXPOSURE EVALUATION

SPECIFIC ABSORPTION RATE

2.4 GHz

SAR TEST REPORT

FOR

ITRONIX CORPORATION

IX325 SERIES RUGGED TABLET PC

WITH

CISCO AIR-CB21AG-A-K9 802.11abg WLAN

AND

CO-LOCATED BLUETOOTH

MODEL: IX325-CWLBT

FCC ID: KBCIX325-CWLBT

IC: 1943A-IX325ab

Test Report Serial Number

040505KBC-F631-S15Wbg

Test Report Issue Number

S631Wbg-042106-R0

Test Lab

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DECLARATION OF COMPLIANCE
SAR RF EXPOSURE EVALUATION

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FCC IDENTIFIER:	**KBCIX325-CWLBT**
IC IDENTIFER:	**1943A-IX325ab**
Model(s):	**IX325-CWLBT**
Rule Part(s):	**FCC 47 CFR §2.1093; Health Canada Safety Code 6**
Test Procedure(s):	**FCC OET Bulletin 65, Supplement C (Edition 01-01)** **Industry Canada RSS-102 Issue 2**
FCC Device Classification(s):	**Digital Transmission System (DTS) - §15C** **Unlicensed National Information Infrastructure TX (NII) - §15E**
IC Device Classification:	**Low Power License-Exempt Radiocommunication Device (RSS-210 Issue 6)**
Device Description:	**Rugged Tablet PC**
LCD Display Orientation(s):	**0 Degrees Landscape, -90 Degrees Portrait**
Internal Transmitter Type:	**Cisco AIR-CB21AG-A-K9 802.11abg WLAN (PCMCIA)**
Co-located Transmitter(s):	**MSI MS-6837 Bluetooth (simultaneous transmission)**
Mode(s) of Operation:	**802.11b: DSSS (Direct Sequence Spread Spectrum)** **802.11a/g: OFDM (Orthogonal Frequency Division Multiplexing)** **Bluetooth: FHSS (Frequency Hopping Spread Spectrum)**
Transmit Frequency Range(s):	**2412 - 2462 MHz 802.11b/g (ISM Band)** **5180 - 5250 MHz 802.11a (UNII-1 Band)** **5250 - 5320 MHz 802.11a (UNII-2 Band)** **5745 - 5825 MHz 802.11a (UNII-3 Band)** **2402 - 2480 MHz (Bluetooth)**
Max. RF Output Power Tested:	**20.1 dBm (0.102 Watts) - Peak Conducted (802.11b Mode - 1 Mbps - 2442 MHz)** **3.78 dBm (0.0024 Watts) - Peak Conducted (Bluetooth - 2441 MHz)**
Date Rate(s):	**802.11b: 1 / 2 / 5.5 / 11 Mbps** **802.11g: 6 / 9 / 12 / 18 / 24 / 36 / 48 / 54 Mbps** **802.11a: 6 / 9 / 12 / 18 / 24 / 36 / 48 / 54 Mbps**
Power Source(s) Tested:	**Internal Lithium-ion Battery - 11.1 V, 3600 mAh (Model: T8M-E)** **External Second Lithium-ion Battery - 11.1 V, 3600 mAh (Model: T8S-E)**
Antenna Type(s) Tested:	**Internal Embedded Dual-Band Monopole (integrated on PCMCIA Card)** **Internal PIFA (Bluetooth)**
Max. SAR Level(s) Measured:	**Body: 0.172 W/kg (1g) - 802.11b & Bluetooth (Bottom Side of Tablet PC)**

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device was compliant 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 2 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.

Tested By:	Reviewed By:
Sean Johnston Compliance Technologist Celltech Labs Inc.	Spencer Watson Senior Compliance Technologist Celltech Labs Inc.

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1.0 INTRODUCTION

This measurement report demonstrates that ITRONIX CORPORATION Model: IX325-CWLBT Rugged Tablet PC FCC ID: KBCIX325-CWLBT incorporating the Cisco AIR-CB21AG-A-K9 802.11abg WLAN PCMCIA Card and co-located MSI MS-6837 Bluetooth 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 2 (see reference [4]) were employed. A description of the product and 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)

Rule Part(s)	FCC 47 CFR §2.1093			Health Canada Safety Code 6	
Test Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01)			Industry Canada RSS-102 Issue 2	
FCC Device Classification(s)	Digital Transmission System (DTS)		§15C	2412 - 2462 MHz	5745 - 5825 MHz
	Unlicensed National Information Infrastructure (NII)		§15E	5180 - 5320 MHz	
IC Device Classification	Low Power License-Exempt Radiocommunication Device: Category I Equipment				RSS-210 Issue 6
RF Exposure Category	Uncontrolled Environment / General Population				
Device Description	Rugged Tablet PC		**Model(s)**	IX325-CWLBT	
Internal Transmitter Type	Cisco AIR-CB21AG-A-K9 802.11abg WLAN Card (PCMCIA)				
Co-located Transmitter(s)	MSI MS-6837 Bluetooth				
LCD Display Orientation(s)	0 Degrees Landscape, -90 Degrees Portrait				
IDENTIFIER(s)	FCC ID: KBCIX325-CWLBT			IC: 1943A-IX325ab	
Test Device Serial No.(s)	ZZGEG5073ZZ9781		IX325 Rugged Tablet PC		Identical Prototype
	F0C0853N07U		Cisco AIR-CB21AG-A-K9 WLAN		Production Unit
	BH5070000096		MSI MS-6837 Bluetooth		Production Unit
Mode(s) of Operation	802.11b	DSSS	Direct Sequence Spread Spectrum		
	802.11g	OFDM	Orthogonal Frequency Division Multiplexing		
	802.11a	OFDM	Orthogonal Frequency Division Multiplexing		
	Bluetooth	FHSS	Frequency Hopping Spread Spectrum		
Data Rates	802.11b		1 / 2 / 5.5 / 11 Mbps		
	802.11a/g		6 / 9 / 12 / 18 / 24 / 36 / 48 / 54 Mbps		
Transmit Frequency Range(s)	2412 - 2462 MHz		802.11b/g		ISM Band
	5180 - 5250 MHz		802.11a		UNII-1 Band
	5250 - 5320 MHz		802.11a		UNII-2 Band
	5745 - 5825 MHz		802.11a		UNII-3 Band
	2402 - 2480 MHz		Bluetooth		

Maximum Peak Conducted RF Output Power Levels Measured (ISM Band)

Freq. (MHz)	Chan.	Default Test Channels*		802.11b								802.11g	
				1 Mbps		2 Mbps		5.5 Mbps		11 Mbps		6 Mbps	
		802.11b	802.11g	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts
2412	1	✓	∇	19.8	0.0955	19.7	0.0933	19.8	0.0955	19.7	0.0933	18.0	0.0631
2442	**7**	✓	∇	**20.1**	**0.102**	20.1	0.102	20.2	0.105	20.2	0.105	17.7	0.0589
2462	11	✓	∇	20.0	0.100	20.1	0.102	20.1	0.102	20.1	0.102	17.6	0.0575

* 2.4 GHz: when ∇ channel is 0.25 dB > ✓ channel, select both ✓ and ∇ channels (per October 2005 FCC TCB Council Workshop - see reference [7])

Note: Turbo Mode for the Cisco AIR-CB21AG-A-K9 802.11abg WLAN is not supported by Itronix Corporation for use with the IX325 Tablet PC

Bluetooth RF Output Power	3.78 dBm	0.0024 Watts	Peak Conducted (Measured)	2441 MHz
Antenna Type(s) Tested	Internal	Monopole	Embedded on PCMCIA Card	WLAN
	Internal	PIFA	Left Side Edge of Tablet PC	Bluetooth
Power Source(s) Tested	Internal Lithium-ion Battery		11.1 V, 3600 mAh	Model: T8M-E
	External Second Lithium-ion Battery		11.1 V, 3600 mAh	Model: T8S-E
DUT Configuration(s) Tested	Bottom Side of Tablet PC (Touch Position)			

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 measurement server, 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 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 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 planar phantom

DASY4 SAR Measurement System with planar phantom

4.0 MEASUREMENT SUMMARY

BODY SAR MEASUREMENT RESULTS (802.11b)

Transmit Mode	Test Mode	Freq. (MHz)	Chan.	Data Rate (Mbps)	Battery Type	Antenna Position	DUT Position to Planar Phantom	Separation Distance to Planar Phantom (cm)	Cond. Power Before Test (dBm)	SAR Drift During Test (dB)	Measured SAR 1g (W/kg)
802.11b	DSSS	2442	7	1	Internal Li-ion	Internal	Bottom Side	0.0 (Touch)	20.1	-0.106	0.166
802.11b	DSSS	2442	7	1	External Li-ion	Internal	Bottom Side	0.0 (Touch)	20.1	0.0950	0.106
802.11b	DSSS	2442	7	1	Internal Li-ion	Internal	Bottom Side	0.0 (Touch)	20.1	0.168	**0.172**
Bluetooth	Modulated Fixed Freq.	2441	39	-		Internal			3.78		

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)	April 26, 2005				**Relative Humidity**	30	%
Measured Fluid Type	**2450 MHz Body**				**Atmospheric Pressure**	102.1	kPa
Dielectric Constant ε_r	**IEEE Target**		**Measured**	**Deviation**	**Ambient Temperature**	25.5	°C
	52.7	**±5%**	50.2	-4.7%	**Fluid Temperature**	23.9	°C
Conductivity σ (mho/m)	**IEEE Target**		**Measured**	**Deviation**	**Fluid Depth**	≥ 15	cm
	1.95	**±5%**	1.98	+1.5%	**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.	The SAR levels measured at the highest output channel of the frequency band were ≥ 3 dB below the SAR limit, therefore SAR evaluation for the remaining selected channels was not required (per October 2005 FCC TCB Council Workshop - see reference [7]).
	3.	Higher data rates and the 802.11g mode were not evaluated based on the average output power levels were not > 0.25 dB than the output power level measured at the lowest data rate in the 802.11b mode (per October 2005 FCC TCB Council Workshop - see reference [7]).
	4.	The DUT was initially evaluated for SAR with the Bluetooth transmitter disabled. Co-located simultaneous transmit SAR evaluation with both the 802.11b WLAN and Bluetooth transmitters enabled was performed in the worst-case configuration from the 802.11b WLAN single-transmit evaluations.
	5.	The power drifts measured by the DASY4 system for the duration of the SAR evaluations were <5% from the start power.
	6.	The DUT battery was fully charged prior to the SAR evaluations.
	7.	The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
	8.	The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an HP 85070C Dielectric Probe Kit and an HP 8753E Network Analyzer (see Appendix C).
	9.	The SAR evaluations were performed within 24 hours of the system performance check.

5.0 DETAILS OF SAR EVALUATION

The ITRONIX CORPORATION Model: IX325-CWLBT Rugged Tablet PC FCC ID: KBCIX325-CWLBT, with Cisco AIR-CB21AG-A-K9 802.11(b/g) WLAN PCMCIA Card and co-located MSI MS-6837 Bluetooth, was compliant for localized Specific Absorption Rate (Uncontrolled Exposure) based on the test provisions and conditions described below. The SAR test setup photographs are shown in Appendix D.

Test Configurations

1. The DUT was evaluated for body SAR with the bottom side of the Tablet PC placed parallel to, and touching, the outer surface of the planar phantom. The DUT was tested with and without the Bluetooth transmitter enabled. The DUT was tested consecutively with the internal lithium-ion battery and with the external second lithium-ion battery.

Test Modes & Power Settings

2. The peak conducted output power levels were measured prior to the SAR evaluations using a spectrum analyzer according to the procedures described in FCC 47 CFR §2.1046. A PC controller was used to record the spectrum analyzer display. Software was used to integrate the values recorded within the EBW. The resulting channel power was recorded and reported herein.
3. The power drifts measured by the DASY4 system for the duration of the SAR evaluations were <5% from the start power.
4. The DUT was controlled in test mode via internal software. SAR measurements were performed with the DUT transmitting continuously at maximum power with a modulated DSSS signal. For co-located simultaneous transmit evaluation, the Bluetooth transmitter was tested in continuous transmit operation at maximum power with a modulated signal on a fixed frequency (frequency hopping disabled).
5. The DUT battery was fully charged prior to the SAR evaluations.

Test Conditions

6. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
7. The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an HP 85070C Dielectric Probe Kit and an HP 8753E Network Analyzer (see Appendix C).
8. 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 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 from 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 F). 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 evaluations a system check was performed using a planar phantom with a 2450MHz dipole (see Appendix E 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 C). 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 performance check test plot). See Table 1 below for the SAR system manufacturer's reference body SAR values from the DASY4 Operation Manual, March 2005 (see reference [6]).

SYSTEM PERFORMANCE CHECK EVALUATION

Test Date	Equiv. Tissue	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)
	MHz	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.						
4/25/05	Body 2450	12.8 ±10%	12.8	0.0%	52.7 ±5%	50.6	-4.0%	1.95 ±5%	2.01	+3.1%	1000	24.8	23.9	≥ 15	30	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.															

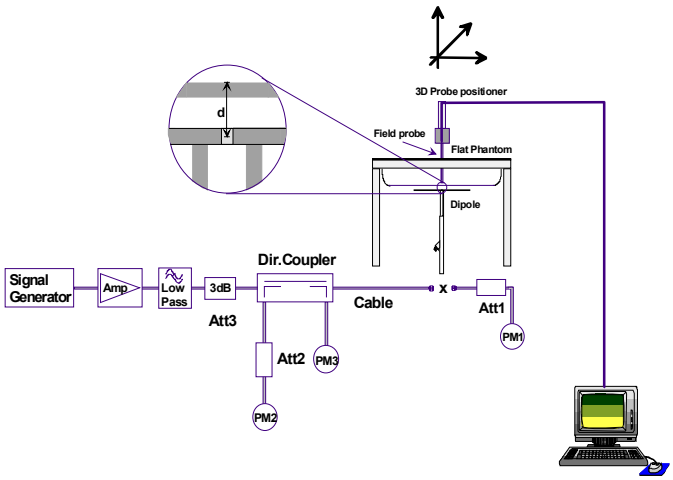
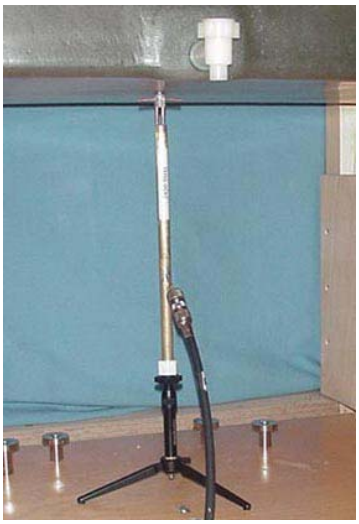


Figure 1. System Performance Check Setup Diagram



2450MHz Dipole Setup

Dipole Type	Distance [mm]	Frequency [MHz]	SAR (1g) [W/kg]	SAR (10g) [W/kg]	SAR (peak) [W/kg]
D300V2	15	300	3.02	2.06	4.36
D450V2	15	450	5.01	3.36	7.22
D835V2	15	835	9.71	6.38	14.1
D900V2	15	900	11.1	7.17	16.3
D1450V2	10	1450	29.6	16.6	49.8
D1500V2	10	1500	30.8	17.1	52.1
D1640V2	10	1640	34.4	18.7	59.4
D1800V2	10	1800	38.5	20.3	67.5
D1900V2	10	1900	39.8	20.8	69.6
D2000V2	10	2000	40.9	21.2	71.5
D2450V2	10	2450	51.2	23.7	97.6
D3000V2	10	3000	61.9	24.8	136.7

Table 32.1: Numerical reference SAR values for SPEAG dipoles and flat phantom filled with body-tissue simulating liquid. Note: All SAR values normalized to 1 W forward power.

Table 1. SAR system manufacturer's reference body SAR values

8.0 SIMULATED EQUIVALENT TISSUES

The 2450MHz simulated body tissue mixture consists of Glycol-monobutyl, water, and salt. The fluids were prepared according to standardized procedures and measured for dielectric parameters (permittivity and conductivity).

SIMULATED TISSUE MIXTURES		
INGREDIENT	**2450 MHz Body**	**2450 MHz Body**
	System Performance Check	DUT Evaluation
Water	69.98 %	69.98 %
Glycol Monobutyl	30.00 %	30.00 %
Salt	0.02 %	0.02 %

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
Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.		
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: Planar Phantom
Shell Material: Fiberglass
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 portable devices

ET3DV6 E-Field Probe

12.0 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 than the planar section of the SAM phantom. The planar phantom is integrated in a wooden table (see Appendix G for dimensions and specifications of the planar phantom).

Planar Phantom

13.0 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 and Tablet PCs, a Plexiglas platform is attached to the device holder.

Device Holder

14.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED		CALIBRATION DUE DATE
USED	DESCRIPTION					
x	Schmid & Partner DASY4 System	-	-	-		-
x	-DASY4 Measurement Server	00158	1078	N/A		N/A
x	-Robot	00046	599396-01	N/A		N/A
x	-DAE3	00019	353	06Jul04		06Jul05
	-DAE3	00018	370	25Jan05		25Jan06
	-ET3DV6 E-Field Probe	00016	1387	18Mar05		18Mar06
x	-ET3DV6 E-Field Probe	00017	1590	24May04		24May05
	-EX3DV4 E-Field Probe	00125	3547	21Jan05		21Jan06
	-300MHz Validation Dipole	00023	135	26Oct04		26Oct05
	-450MHz Validation Dipole	00024	136	04Nov04		04Nov05
	-835MHz Validation Dipole	00022	411	**Brain**	30Mar05	30Mar06
				Body	12Apr05	12Apr06
	-900MHz Validation Dipole	00020	054	10Jun04		10Jun05
	-1800MHz Validation Dipole	00021	247	08Jun04		08Jun05
	-1900MHz Validation Dipole	00032	151	**Brain**	18Jun04	18Jun05
				Body	22Apr05	22Apr06
	-2450MHz Validation Dipole	00025	150	**Brain**	30Sep04	30Sep05
x				**Body**	22Apr05	22Apr06
	-5000MHz Validation Dipole	00126	1031	**Brain**	11Jan05	11Jan06
				Body	11Jan05	11Jan06
	-SAM Phantom V4.0C	00154	1033	N/A		N/A
x	-Barski Planar Phantom	00155	03-01	N/A		N/A
	-Plexiglas Side Planar Phantom	00156	161	N/A		N/A
	-Plexiglas Validation Planar Phantom	00157	137	N/A		N/A
x	HP 85070C Dielectric Probe Kit	00033	N/A	N/A		N/A
	ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A		N/A
	Gigatronics 8652A Power Meter	00110	1835801	16Apr05		16Apr06
x	Gigatronics 8652A Power Meter	00008	1835267	30Apr04		30Apr05
	Gigatronics 8652A Power Meter	00007	1835272	18Oct04		18Oct05
x	Gigatronics 80701A Power Sensor	00013	1833713	11Oct04		11Oct05
	Gigatronics 80701A Power Sensor	00011	1833542	08Oct04		08Oct05
x	Gigatronics 80701A Power Sensor	00109	1834366	16Apr05		16Apr06
x	HP 8753E Network Analyzer	80006	US38433271	04Jan05		04Jan06
	HP 8648D Signal Generator	00005	3847A00611	30Apr04		30Apr05
x	Rohde & Schwarz SMR40 Signal Generator	00006	100104	12Apr05		12Apr06
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	N/A		N/A

15.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**ci 1g**	**Uncertainty Value ±% (1g)**	**V_i or V_{eff}**
Measurement System						
Probe calibration	4.85	Normal	1	1	4.85	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	0.7	1.9	∞
Spherical isotropy of the probe	9.6	Rectangular	1.732050808	0.7	3.9	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	1	Rectangular	1.732050808	1	0.6	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1	Rectangular	1.732050808	1	0.6	∞
Readout electronics	0.3	Normal	1	1	0.3	∞
Response time	0.8	Rectangular	1.732050808	1	0.5	∞
Integration time	2.6	Rectangular	1.732050808	1	1.5	∞
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	∞
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	∞
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	∞
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	∞
Test Sample Related						
Device positioning	2.9	Normal	1	1	2.9	12
Device holder uncertainty	3.6	Normal	1	1	3.6	8
Power drift	5	Rectangular	1.732050808	1	2.9	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	2.5	Normal	1	0.64	1.6	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.5	Normal	1	0.6	1.5	∞
Combined Standard Uncertainty					**10.26**	
Expanded Uncertainty (k=2)					**20.52**	

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	ci 1g	Uncertainty Value ±% (1g)	V_i or V_{eff}
Measurement System						
Probe calibration	4.85	Normal	1	1	4.85	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	1	2.7	∞
Spherical isotropy of the probe	0	Rectangular	1.732050808	1	0.0	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	1	Rectangular	1.732050808	1	0.6	∞
Probe linearity	4.7	Rectangular	1.732050808	1	2.7	∞
Detection limit	1	Rectangular	1.732050808	1	0.6	∞
Readout electronics	0.3	Normal	1	1	0.3	∞
Response time	0	Rectangular	1.732050808	1	0.0	∞
Integration time	0	Rectangular	1.732050808	1	0.0	∞
RF ambient conditions	3	Rectangular	1.732050808	1	1.7	∞
Mech. constraints of robot	0.4	Rectangular	1.732050808	1	0.2	∞
Probe positioning	2.9	Rectangular	1.732050808	1	1.7	∞
Extrapolation & integration	1	Rectangular	1.732050808	1	0.6	∞
Test Sample Related						
Dipole Positioning	2	Normal	1.732050808	1	1.2	∞
Power & Power Drift	4.7	Normal	1.732050808	1	2.7	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	2.5	Normal	1	0.64	1.6	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.5	Normal	1	0.6	1.5	∞
Combined Standard Uncertainty					**8.39**	
Expanded Uncertainty (k=2)					**16.79**	

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

16.0 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: 1999.

[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, “Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)”, Radio Standards Specification RSS-102 Issue 2: November 2005.

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

[6] Schmid & Partner Engineering AG, “DASY4 Manual”, V4.5: March 2005.

[7] FCC TCB Council Workshop, “RF Exposure (RFx) Mobile and Portable Device Review and Approval Procedures, 802.11abg SAR Procedures (Proposed Testing Guidance)”: October 2005.

APPENDIX A - SAR MEASUREMENT DATA

Date Tested: 04/26/2005

Body SAR - 802.11b - 1 Mbps - Bottom Side of DUT - 0.0 cm Spacing - Internal Battery Power

DUT: Itronix Model: IX325-CWLBT; Type: Tablet PC with Cisco AIR-CB21AG-1-K9 802.11a/b/g WLAN; Serial: ZZGEG5073ZZ9781

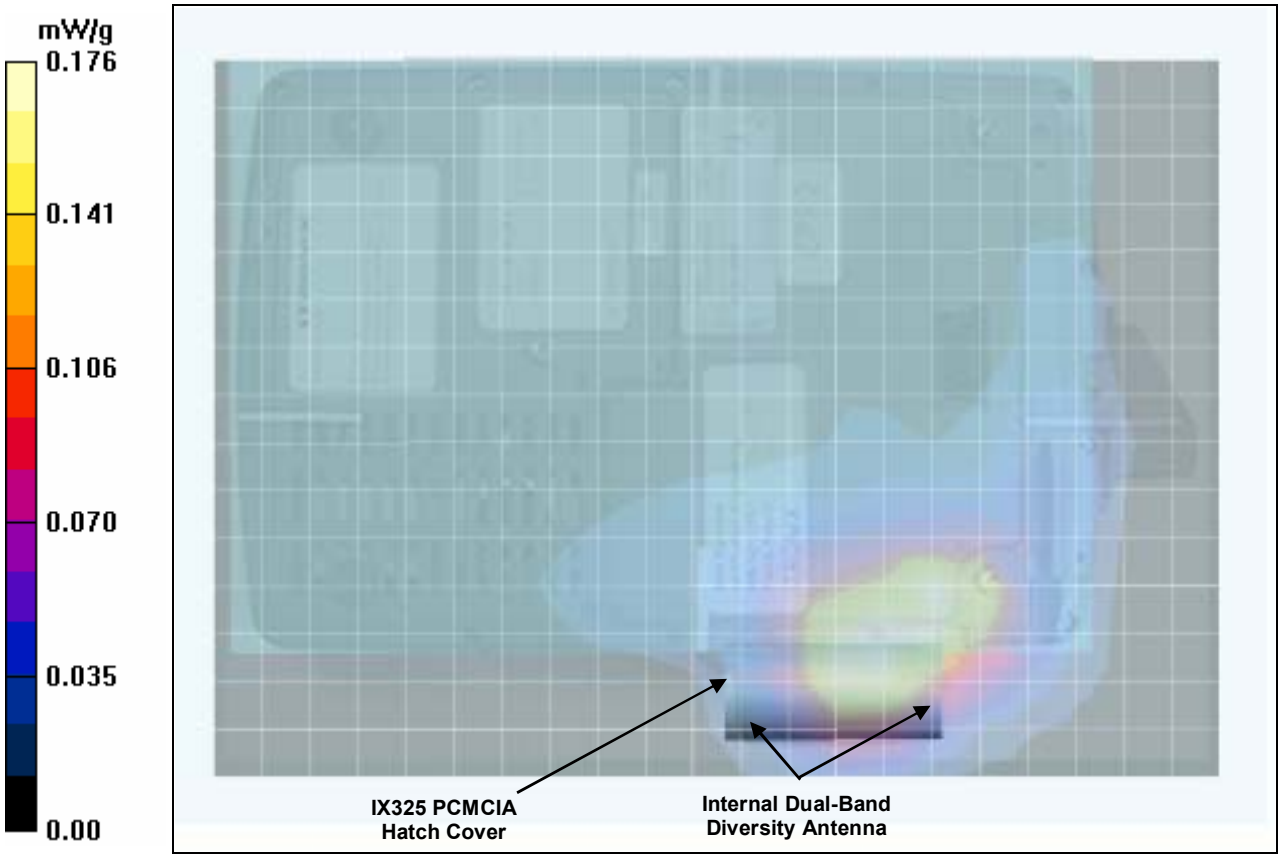
Ambient Temp: 25.5 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 102.1 kPa; Humidity: 30%

11.1V, 3600mAh Internal Lithium-ion Battery (Model: T8M-E)
Communication System: DSSS WLAN
RF Output Power: 20.1 dBm (Conducted)
Frequency: 2442 MHz; Channel 7; Duty Cycle: 1:1
Medium: M2450 (σ = 1.98 mho/m; ε_r = 50.2; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 06/07/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Body SAR - 802.11b - Bottom Side of DUT Touching Planar Phantom - Mid Channel
Area Scan (16x22x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - 802.11b - Bottom Side of DUT Touching Planar Phantom - Mid Channel
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.71 V/m; Power Drift = -0.106 dB
Peak SAR (extrapolated) = 0.314 W/kg
SAR(1 g) = 0.166 mW/g; SAR(10 g) = 0.0953 mW/g



Date Tested: 04/26/2005

Body SAR - 802.11b - 1 Mbps - Bottom Side of DUT - 0.0 cm Spacing - With External 2nd Battery

DUT: Itronix Model: IX325-CWLBT; Type: Tablet PC with Cisco AIR-CB21AG-1-K9 802.11a/b/g WLAN; Serial: ZZGEG5073ZZ9781

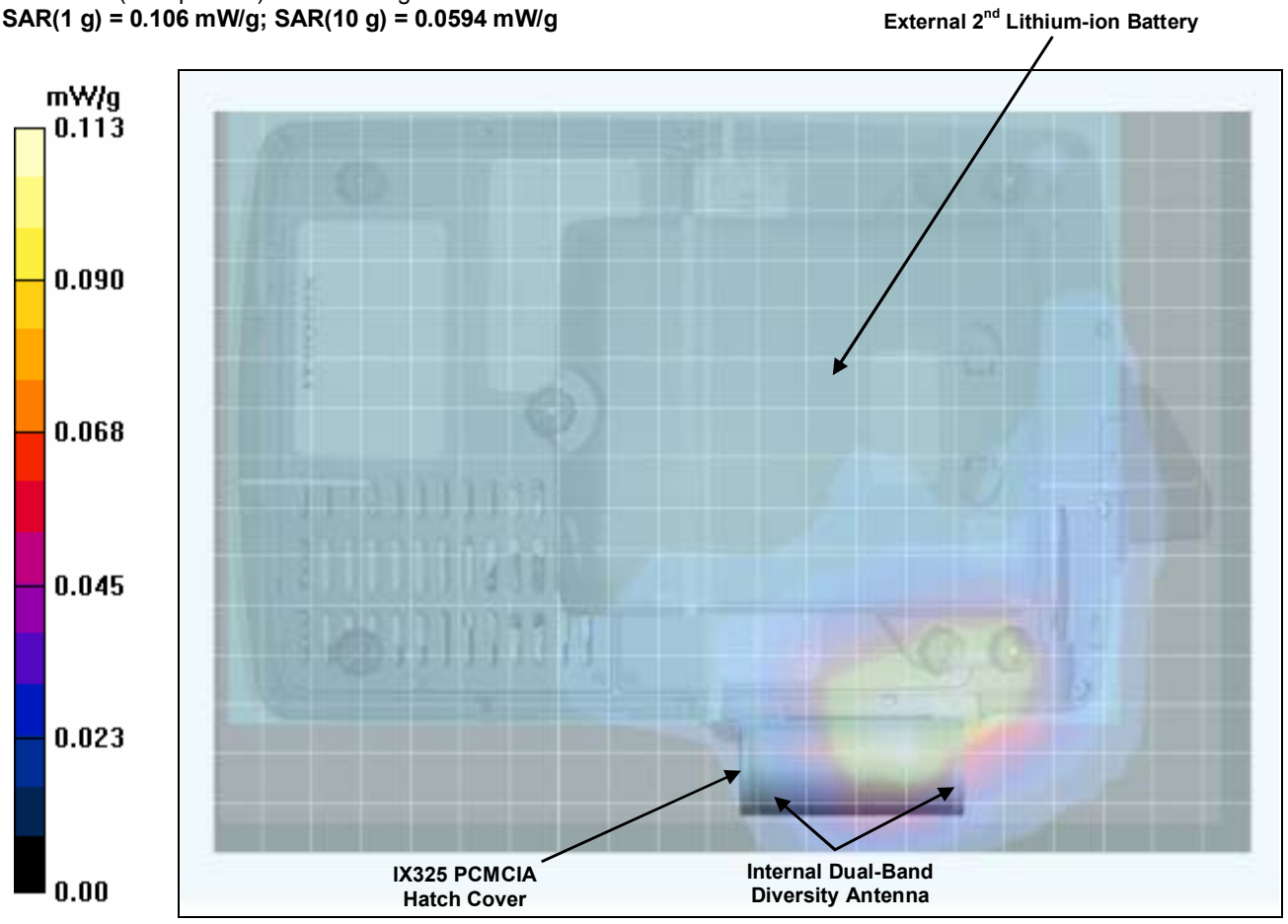
Ambient Temp: 25.5 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 102.1 kPa; Humidity: 30%

11.1V, 3600mAh External Second Lithium-ion Battery (Model: T8S-E)
Communication System: DSSS WLAN
RF Output Power: 20.1 dBm (Conducted)
Frequency: 2442 MHz; Channel 7; Duty Cycle: 1:1
Medium: M2450 (σ = 1.98 mho/m; ε_r = 50.2; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 06/07/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Body SAR - 802.11b - Bottom Side of DUT (External 2nd Battery) Touching Planar Phantom - Mid Channel (15 mm External Battery Thickness) / Area Scan (16x22x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - 802.11b - Bottom Side of DUT (External 2nd Battery) Touching Planar Phantom - Mid Channel (15 mm External Battery Thickness) / Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.40 V/m; Power Drift = 0.0950 dB
Peak SAR (extrapolated) = 0.202 W/kg
SAR(1 g) = 0.106 mW/g; SAR(10 g) = 0.0594 mW/g



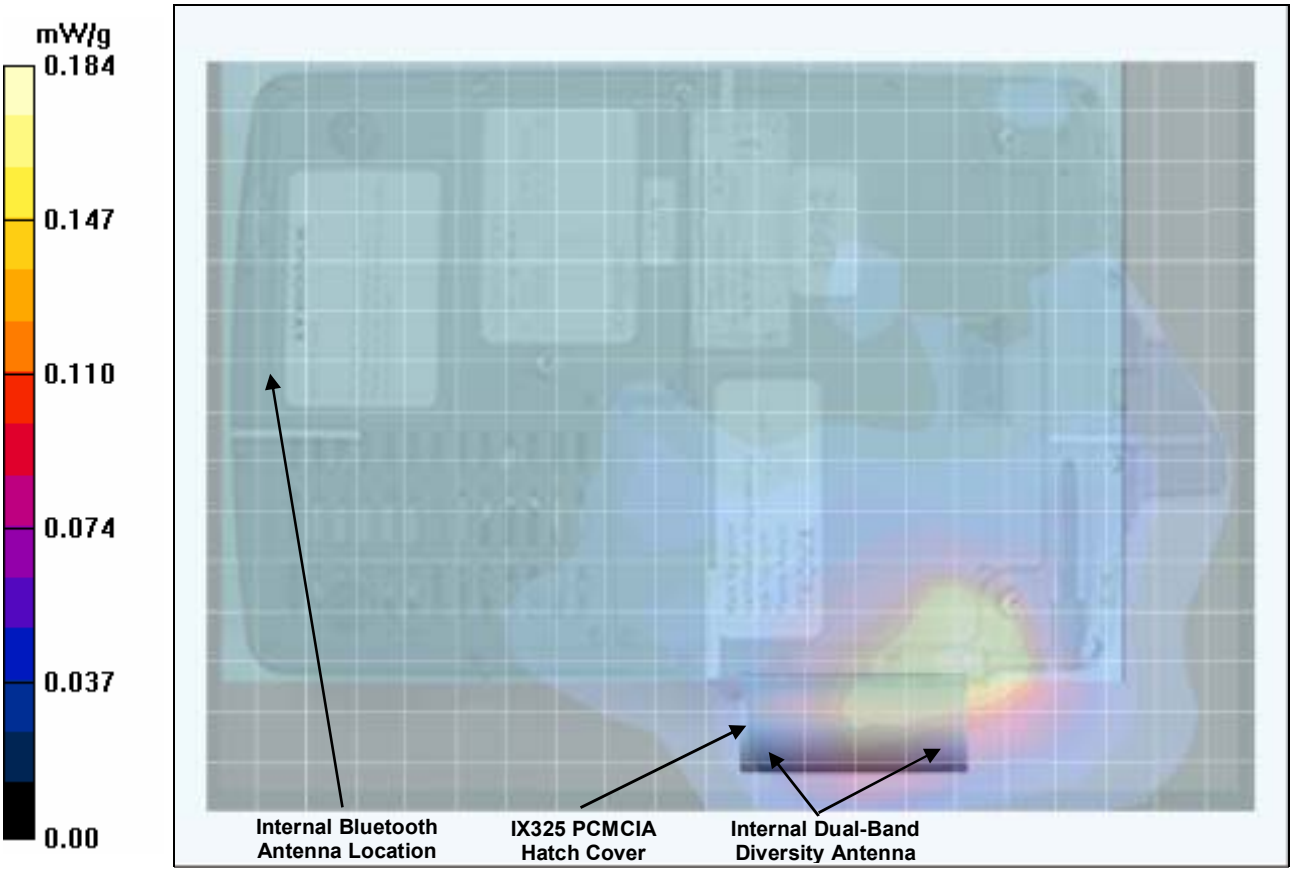
Date Tested: 04/26/2005

Body SAR - 802.11b - 1 Mbps - Bottom Side of DUT - 0.0 cm Spacing - Internal Battery Power Simultaneous Transmit with Co-located Bluetooth

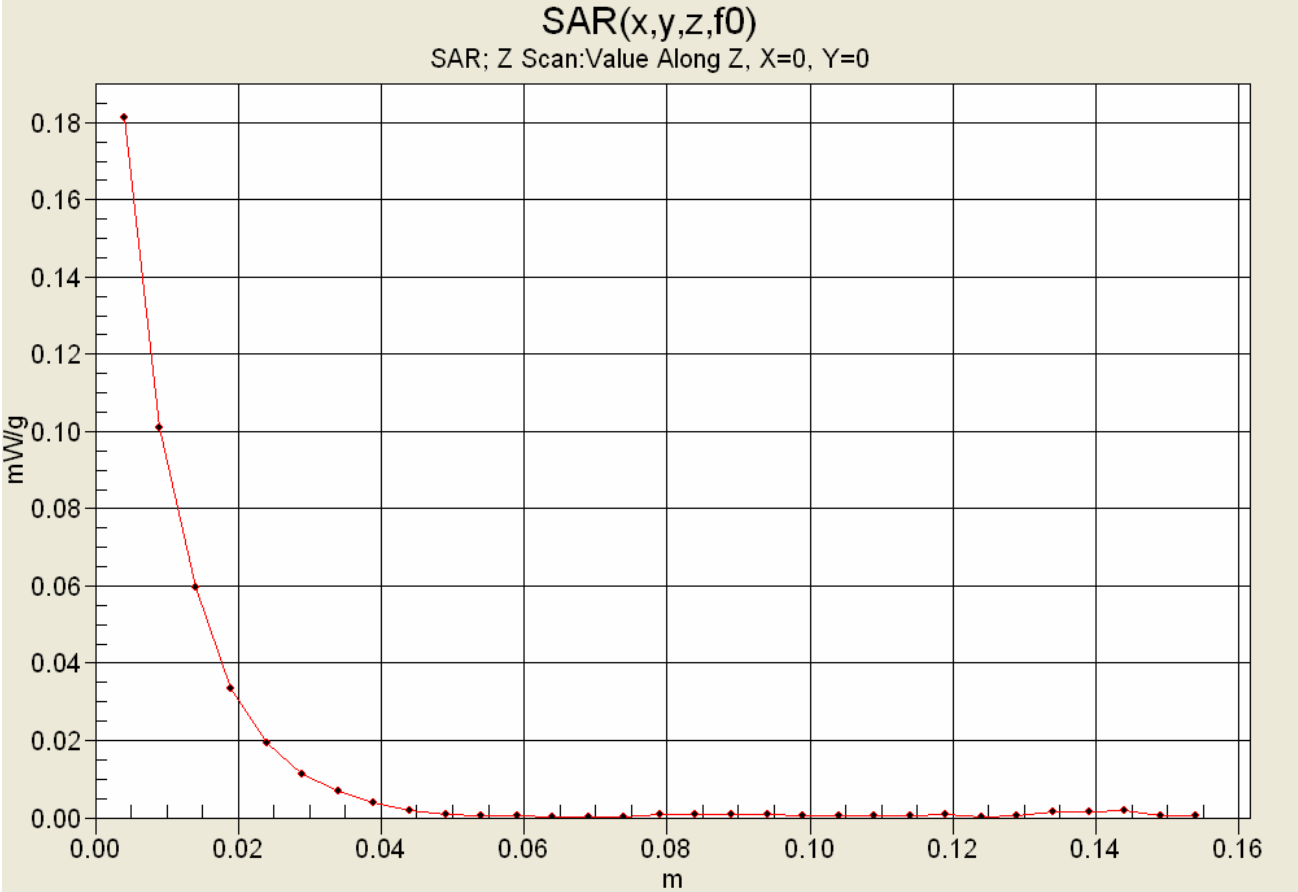
DUT: Itronix Model: IX325-CWLBT; Type: Tablet PC with Cisco AIR-CB21AG-1-K9 802.11a/b/g WLAN; Serial: ZZGEG5073ZZ9781
Ambient Temp: 25.5 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 102.1 kPa; Humidity: 30%

11.1V, 3600mAh Internal Lithium-ion Battery (Model: T8M-E)
Communication System: DSSS WLAN
Frequency: 2442 MHz; Duty Cycle: 1:1
RF Output Power: 20.1dBm (Conducted)
Communication System: Modulated Fixed Frequency (Bluetooth)
Frequency: 2441 MHz; Duty Cycle: 1:1 (Bluetooth)
RF Output Power: 3.78 dBm (Conducted) Bluetooth
Medium: M2450 (σ = 1.98 mho/m; ε_r = 50.2; ρ = 1000 kg/m^3)
- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 06/07/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Body SAR - 802.11b & Bluetooth - Bottom Side of DUT Touching Planar Phantom - Mid Channel
Area Scan (16x22x1): Measurement grid: dx=15mm, dy=15mm
Body SAR - 802.11b & Bluetooth - Bottom Side of DUT Touching Planar Phantom - Mid Channel
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.32 V/m; Power Drift = 0.168 dB
Peak SAR (extrapolated) = 0.325 W/kg
SAR(1 g) = 0.172 mW/g; SAR(10 g) = 0.0987 mW/g



Z-Axis Scan



APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Date Tested: 04/25/2005

System Performance Check (Body) - 2450 MHz Dipole

DUT: Dipole 2450 MHz; Model: D2450V2; Type: System Performance Check; Serial: 150; Calibrated: 22/04/2005

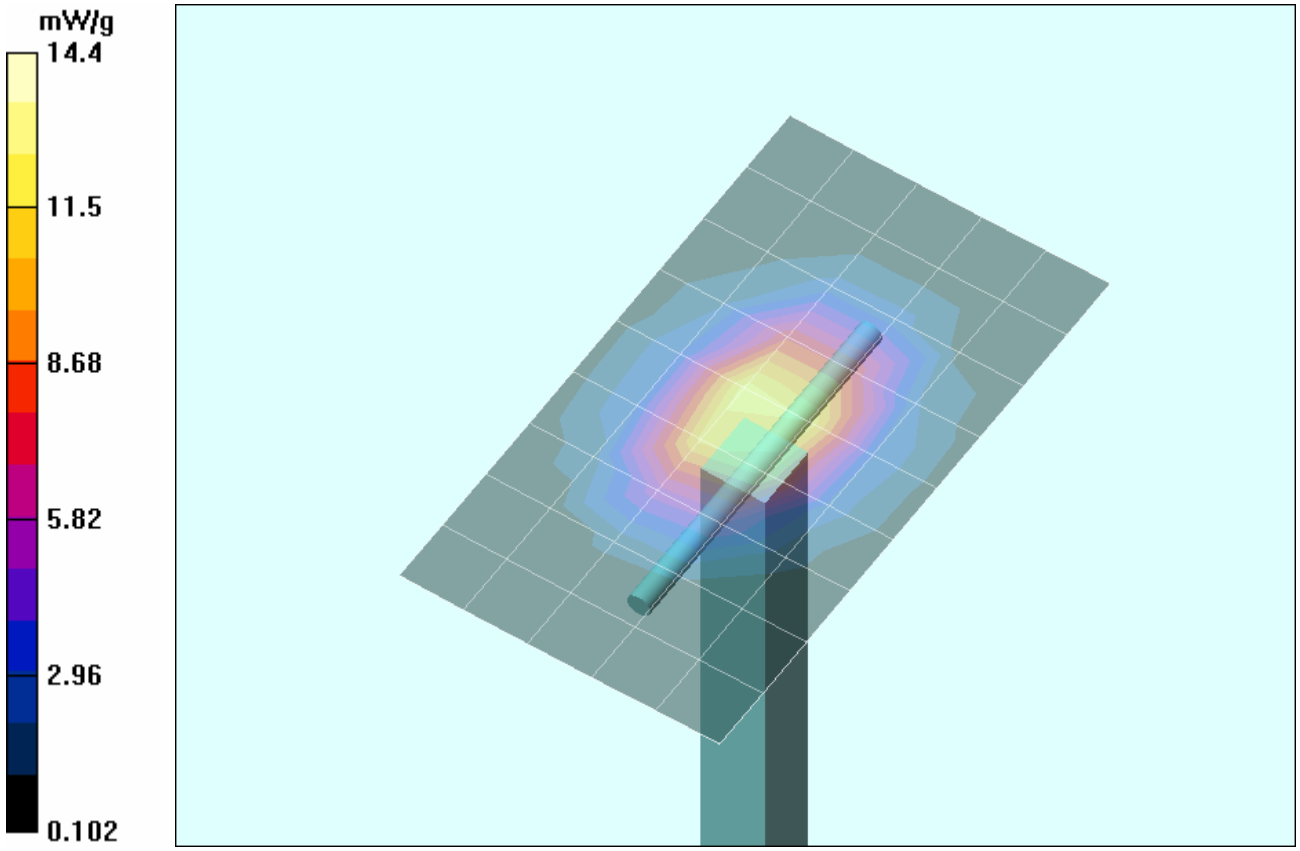
Ambient Temp: 24.8 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 102.0 kPa; Humidity: 30%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: M2450 (σ = 2.01 mho/m; ε_r = 50.6; ρ = 1000 kg/m^3)

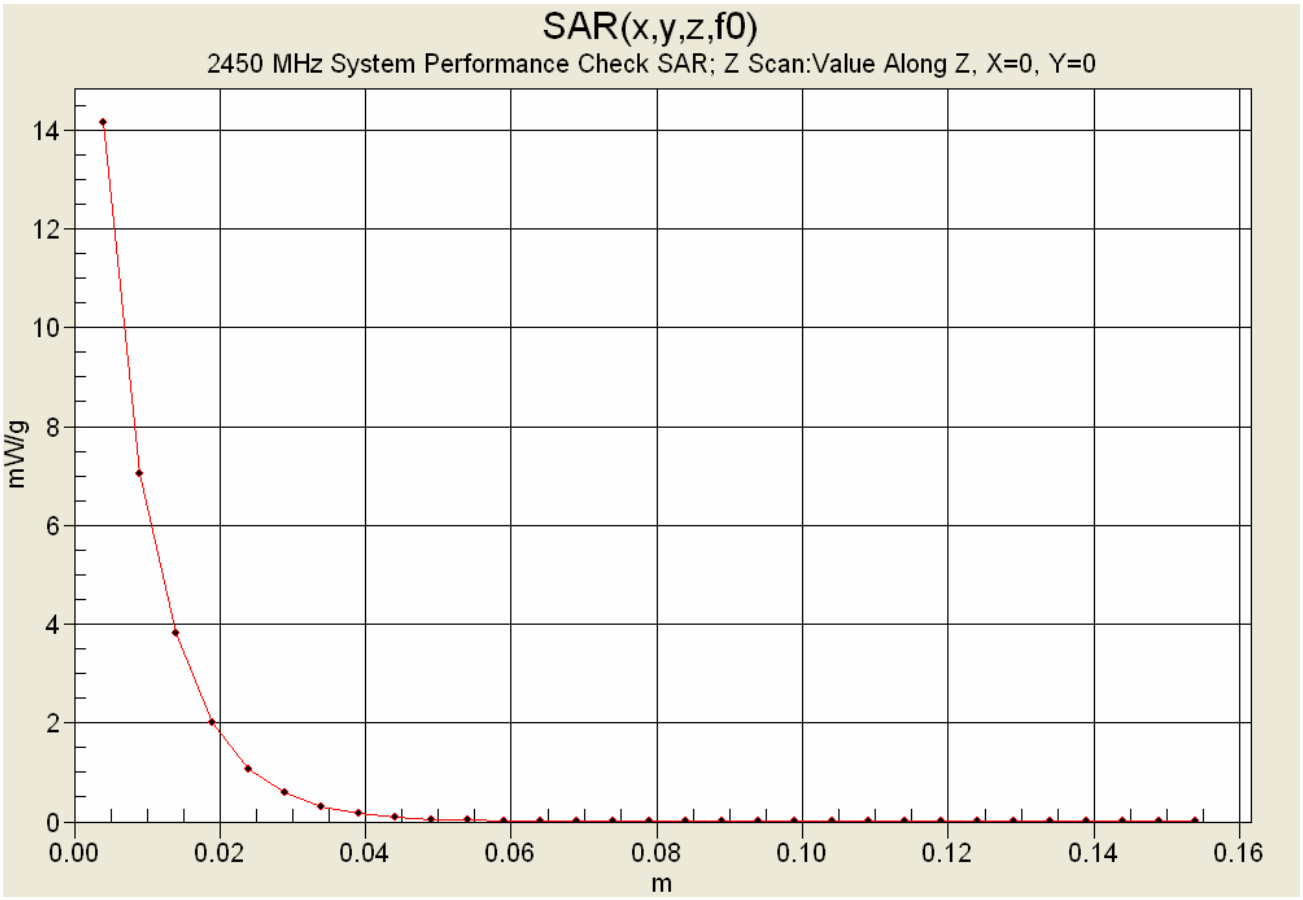
- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 06/07/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

2450 MHz Dipole - System Performance Check/Area Scan (6x10x1):
Measurement grid: dx=10mm, dy=10mm

2450 MHz Dipole - System Performance Check/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.7 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 28.1 W/kg
SAR(1 g) = 12.8 mW/g; SAR(10 g) = 5.92 mW/g



Z-Axis Scan



APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

2450 DUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

April 26, 2005

Frequency	e'	e"
2.350000000 GHz	50.5671	14.1826
2.360000000 GHz	50.5355	14.2181
2.370000000 GHz	50.4988	14.2600
2.380000000 GHz	50.4599	14.3051
2.390000000 GHz	50.4180	14.3400
2.400000000 GHz	50.3935	14.3730
2.410000000 GHz	50.3681	14.4041
2.420000000 GHz	50.3310	14.4605
2.430000000 GHz	50.3109	14.5116
2.440000000 GHz	50.2779	14.5354
2.450000000 GHz	50.2464	14.5834
2.460000000 GHz	50.2134	14.6049
2.470000000 GHz	50.1750	14.6625
2.480000000 GHz	50.1405	14.7161
2.490000000 GHz	50.0882	14.7450
2.500000000 GHz	50.0419	14.7746
2.510000000 GHz	50.0035	14.8243
2.520000000 GHz	49.9764	14.8789
2.530000000 GHz	49.9371	14.9166
2.540000000 GHz	49.9105	14.9575
2.550000000 GHz	49.8748	14.9957

2450 MHz System Performance Check

Measured Fluid Dielectric Parameters (Muscle)

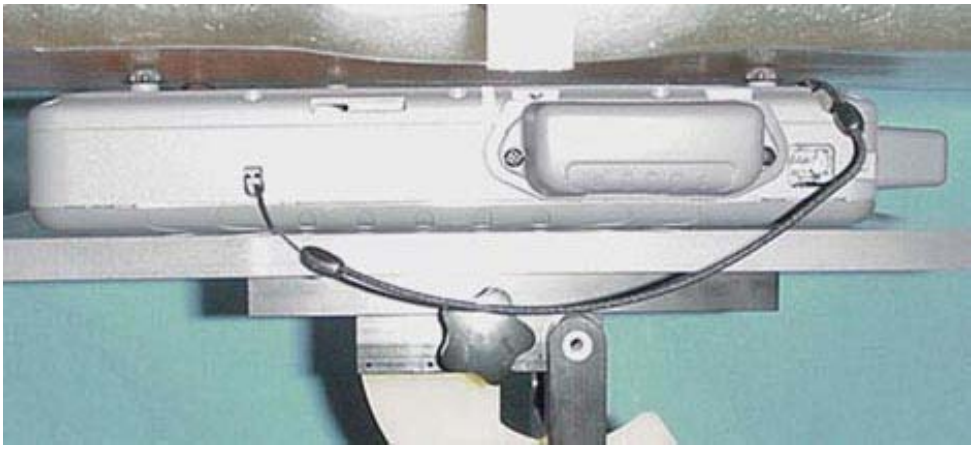
April 25, 2005

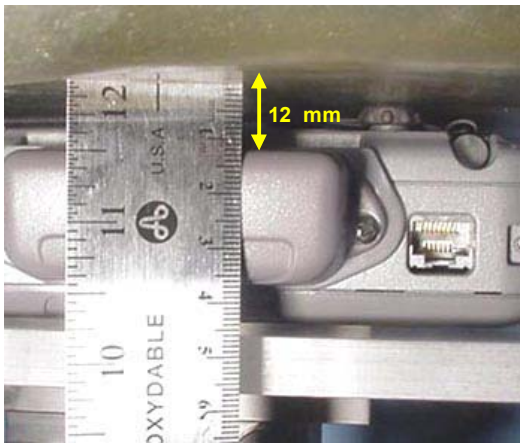
Frequency	e'	e"
2.350000000 GHz	50.9638	14.4079
2.360000000 GHz	50.9285	14.4390
2.370000000 GHz	50.8874	14.4700
2.380000000 GHz	50.8322	14.5185
2.390000000 GHz	50.7870	14.5558
2.400000000 GHz	50.7597	14.5945
2.410000000 GHz	50.7066	14.6317
2.420000000 GHz	50.6657	14.6808
2.430000000 GHz	50.6382	14.7216
2.440000000 GHz	50.5941	14.7503
2.450000000 GHz	50.5696	14.7669
2.460000000 GHz	50.5361	14.8170
2.470000000 GHz	50.4944	14.8412
2.480000000 GHz	50.4528	14.8880
2.490000000 GHz	50.4003	14.9160
2.500000000 GHz	50.3635	14.9437
2.510000000 GHz	50.3257	14.9990
2.520000000 GHz	50.2983	15.0348
2.530000000 GHz	50.2682	15.0820
2.540000000 GHz	50.2263	15.1041
2.550000000 GHz	50.1854	15.1258

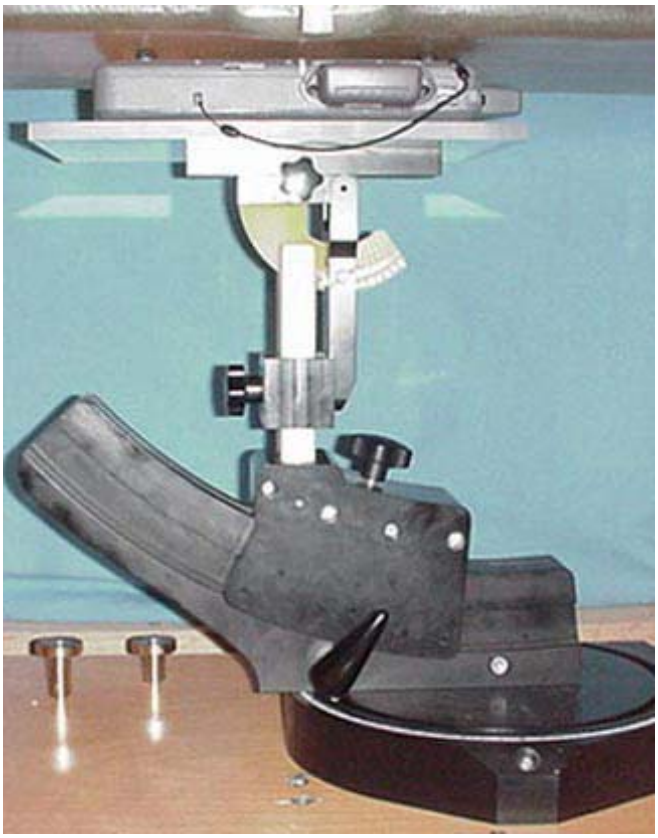
APPENDIX D - SAR TEST SETUP PHOTOGRAPHS

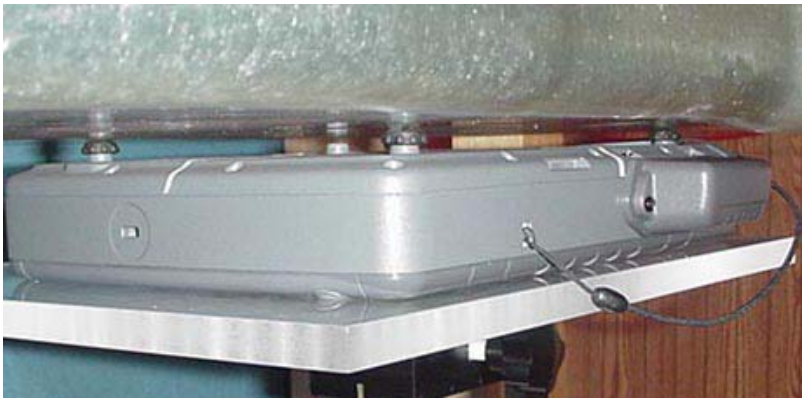
BODY SAR TEST SETUP PHOTOGRAPHS

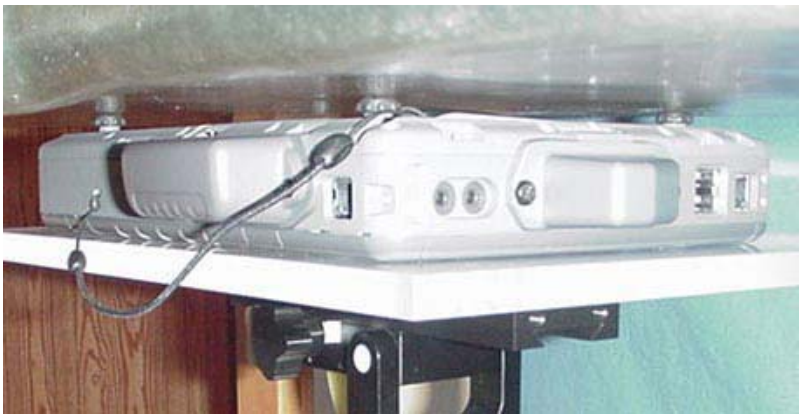
Bottom Side of DUT Touching Planar Phantom
Internal Lithium-ion Battery (Model: T8M-E)





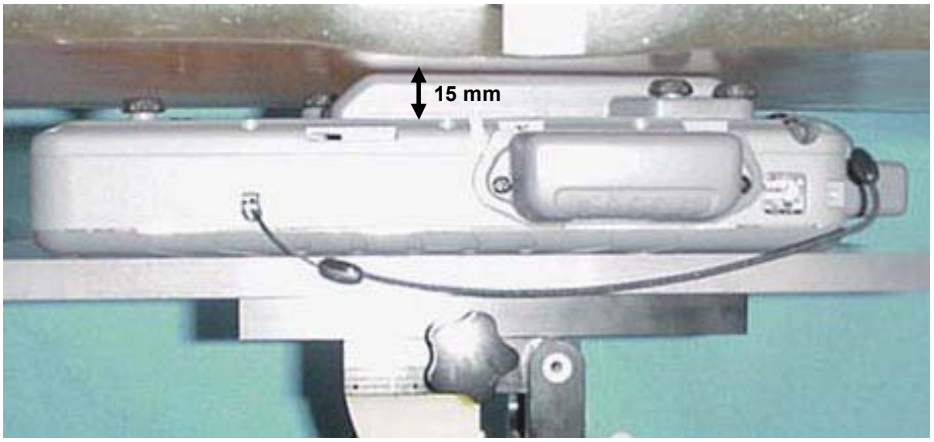


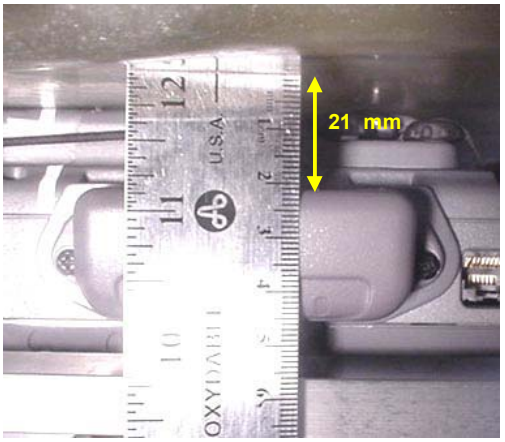


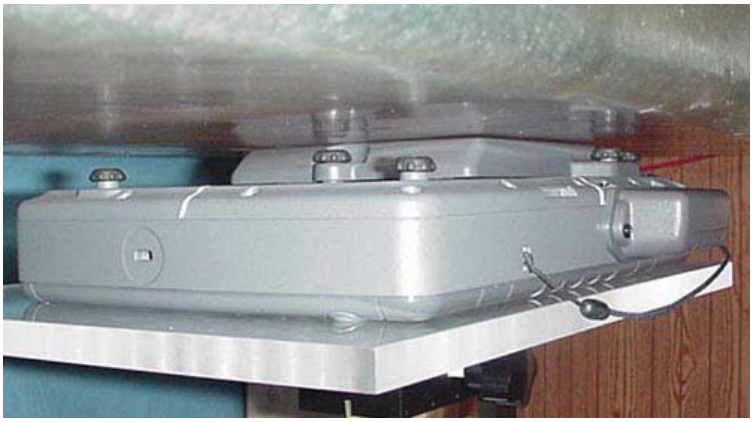


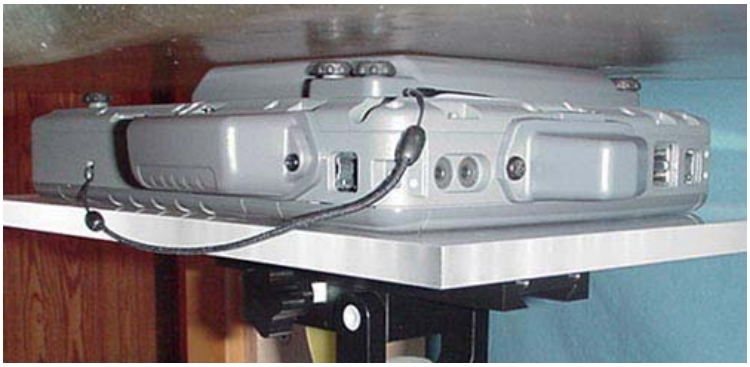
BODY SAR TEST SETUP PHOTOGRAPHS

Bottom Side of DUT (External Second Battery) Touching Planar Phantom
External Second Lithium-ion Battery (15 mm External Battery Thickness)







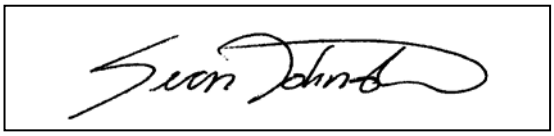


APPENDIX E - SYSTEM VALIDATION

2450 MHz SYSTEM VALIDATION DIPOLE

Type:	**2450 MHz Validation Dipole**
Serial Number:	**150**
Place of Calibration:	**Celltech Labs Inc.**
Date of Calibration:	**April 22, 2005**

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

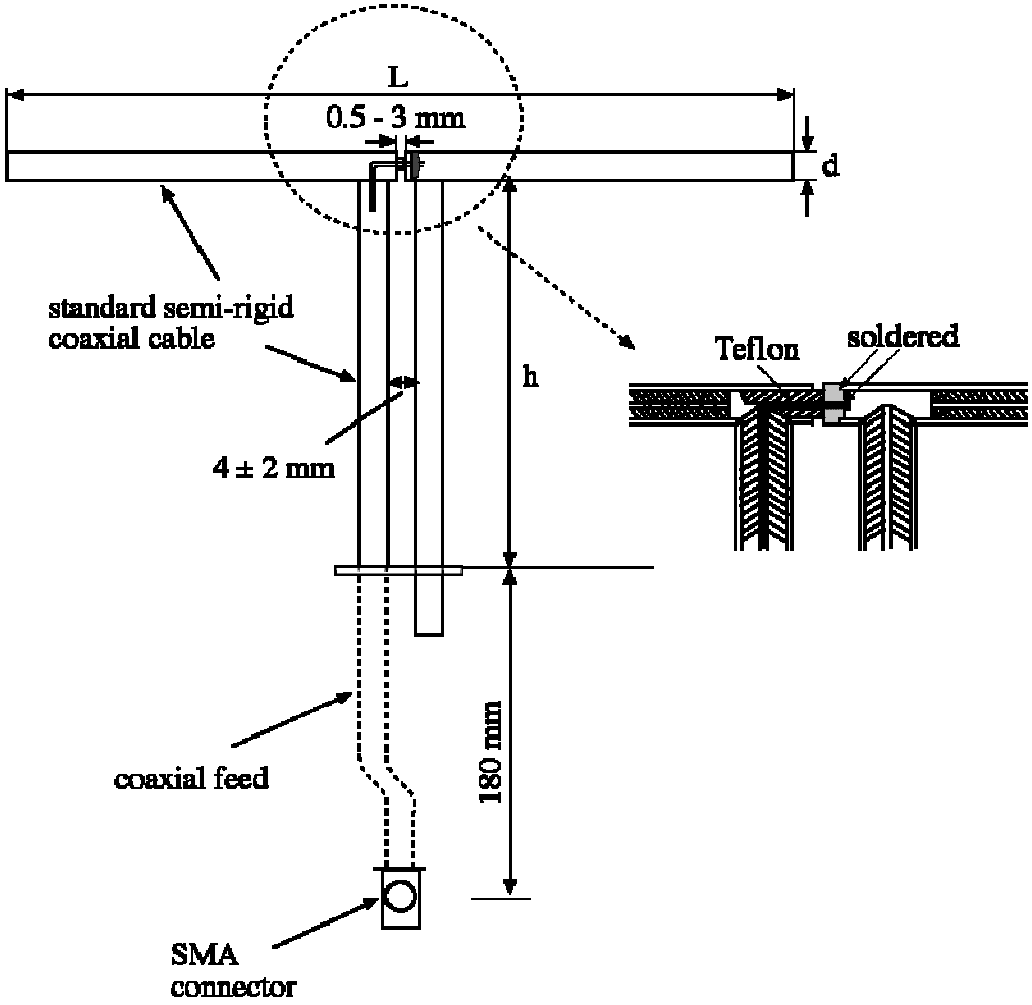
Calibrated by: 

Approved by: 

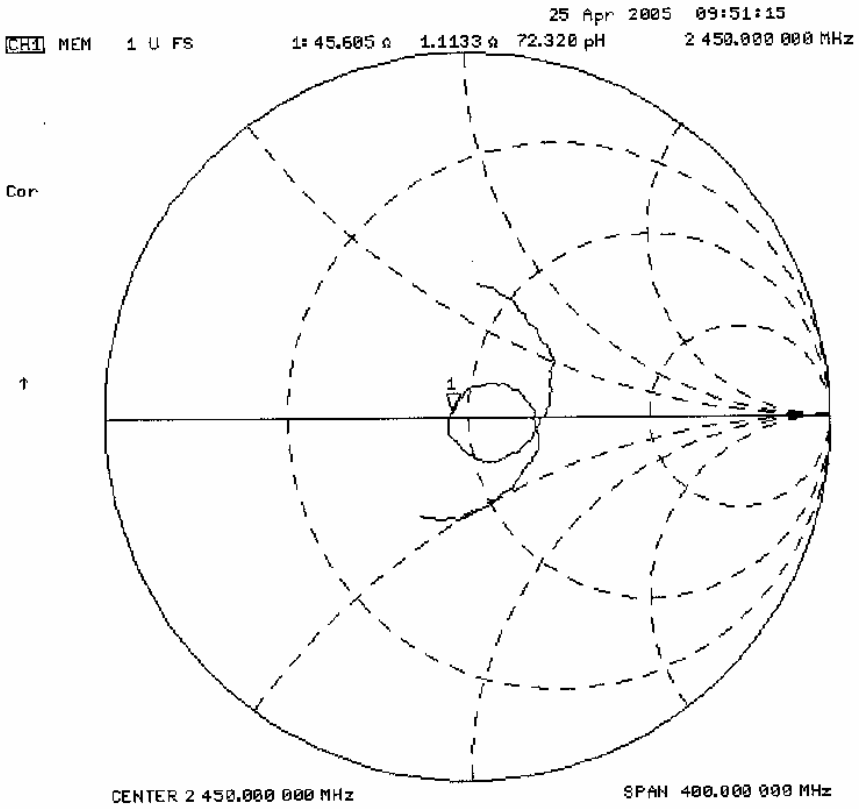
1. Dipole Construction & Electrical Characteristics

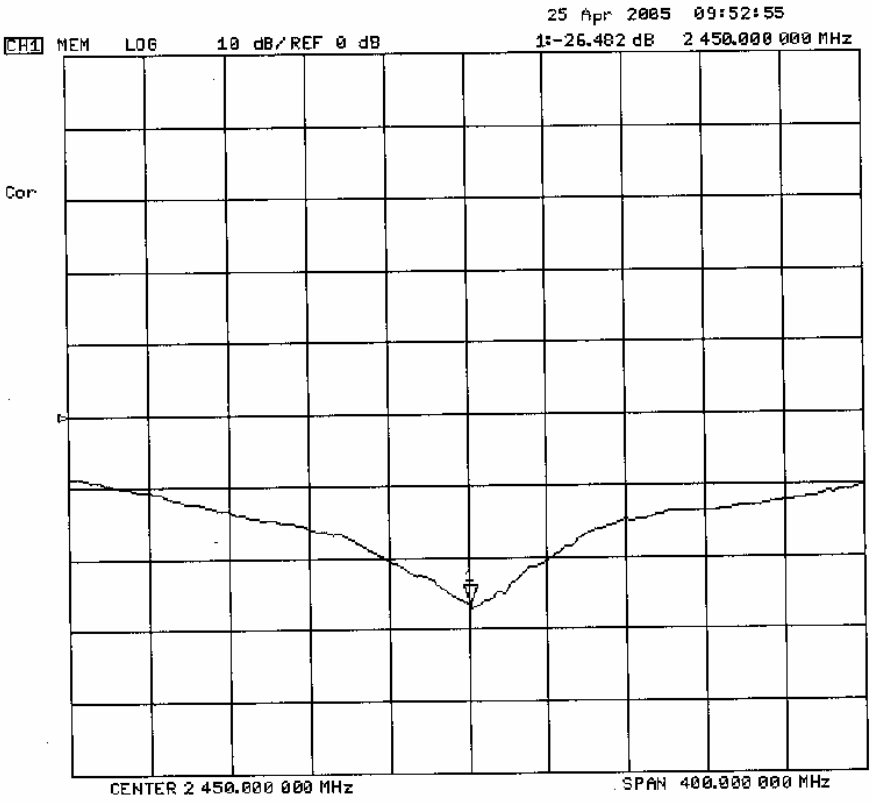
The validation dipole was constructed in accordance with the IEEE Std "Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques". The electrical properties were measured using an HP 8753E Network 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 2450 MHz	Re{Z} = 45.605Ω
	Im{Z} = 1.1133Ω
Return Loss at 2450 MHz	-26.482 dB



2. Validation Dipole VSWR Data





3. 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

4. Validation Phantom

The validation phantom is a Fiberglass shell planar phantom manufactured by Barski Industries Ltd. The phantom is in conformance with the requirements defined by IEEE SCC34-SC2 for the dosimetric evaluations of body-worn and lap-held operating configurations. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids.

Shell Thickness: 2.0 ± 0.2 mm
Filling Volume: Approx. 55 liters
Dimensions: 44 cm (W) x 94 cm (L)

5. 2450 MHz System Validation Setup

6. 2450 MHz Dipole Setup

7. Measurement Conditions

The phantom was filled with 2450 MHz Body simulating tissue:

Relative Permittivity:	50.2
Conductivity:	1.97 mho/m
Fluid Temperature:	23.9 °C
Fluid Depth:	≥ 15.0 cm

Environmental Conditions:

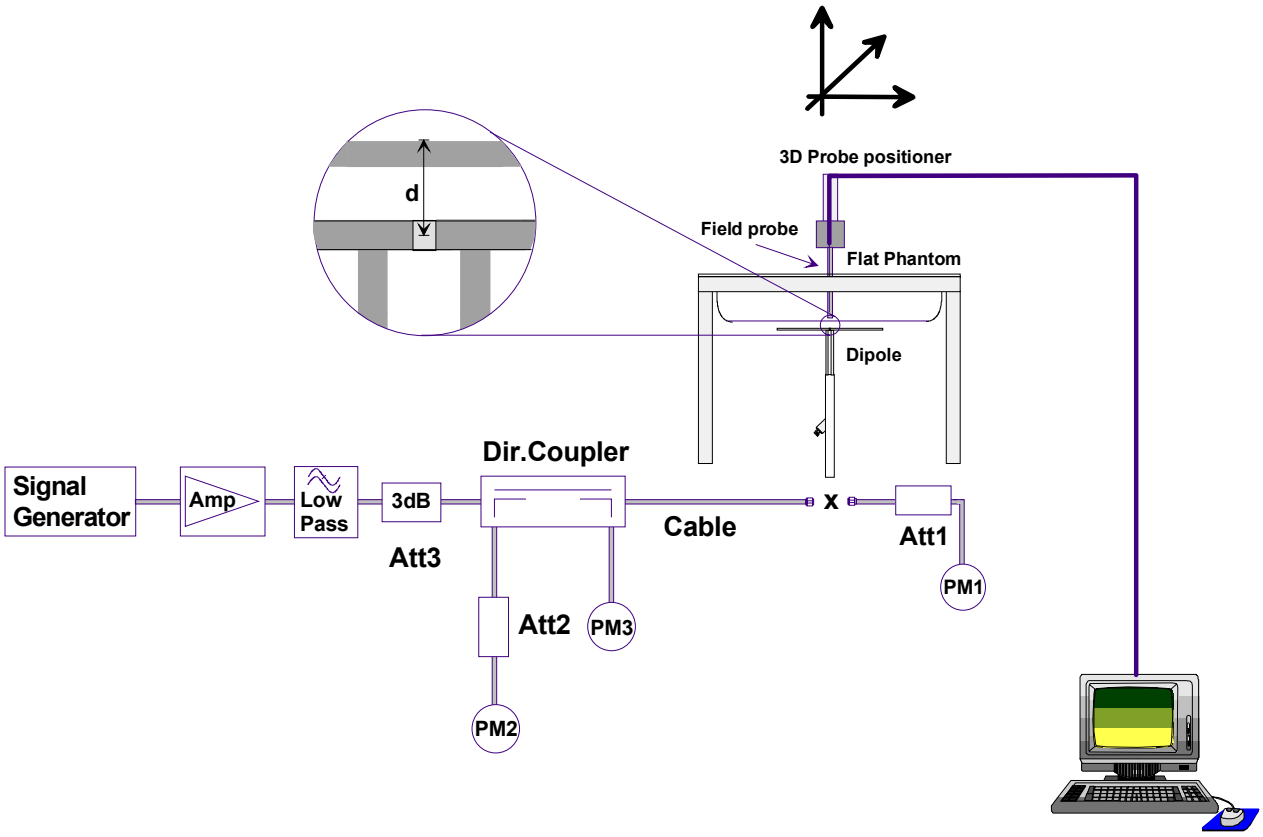
Ambient Temperature:	25.7 °C
Humidity:	30 %
Barometric Pressure:	102.6 kPa

The 2450 MHz simulated Body tissue mixture consists of the following ingredients:

Ingredient	Percentage by weight
Water	69.98%
Glycol Monobutyl	30.00%
Salt	0.02%
Target Dielectric Parameters at 22°C	ε_r = 52.7 (+/-5%) σ = 1.95 S/m (+/-5%)

8. 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.

9. Validation Dipole SAR Test Results

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

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	12.6	50.4	5.86	23.44	27.7
Test 2	12.6	50.4	5.86	23.44	27.4
Test 3	12.6	50.4	5.87	23.48	27.4
Test 4	12.6	50.4	5.86	23.44	27.3
Test 5	12.6	50.4	5.86	23.44	27.4
Test 6	12.6	50.4	5.87	23.48	27.8
Test 7	12.7	50.8	5.88	23.52	27.7
Test 8	12.7	50.8	5.88	23.52	27.8
Test 9	12.6	50.4	5.87	23.48	27.6
Test10	12.7	50.8	5.88	23.52	27.7
Average Value	12.63	50.52	5.869	23.48	27.58

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

Target SAR @ 1 Watt Input averaged over 1 gram (W/kg)		Measured SAR @ 1 Watt Input averaged over 1 gram (W/kg)	Deviation from Target (%)	Target SAR @ 1 Watt Input averaged over 10 grams (W/kg)		Measured SAR @ 1 Watt Input averaged over 10 grams (W/kg)	Deviation from Target (%)
51.2	+/- 10%	50.52	- 1.3	23.7	+/- 10%	23.48	- 0.93

Dipole Type	Distance [mm]	Frequency [MHz]	SAR (1g) [W/kg]	SAR (10g) [W/kg]	SAR (peak) [W/kg]
D300V2	15	300	3.02	2.06	4.36
D450V2	15	450	5.01	3.36	7.22
D835V2	15	835	9.71	6.38	14.1
D900V2	15	900	11.1	7.17	16.3
D1450V2	10	1450	29.6	16.6	49.8
D1500V2	10	1500	30.8	17.1	52.1
D1640V2	10	1640	34.4	18.7	59.4
D1800V2	10	1800	38.5	20.3	67.5
D1900V2	10	1900	39.8	20.8	69.6
D2000V2	10	2000	40.9	21.2	71.5
D2450V2	10	2450	51.2	23.7	97.6
D3000V2	10	3000	61.9	24.8	136.7

Table 32.1: Numerical reference SAR values for SPEAG dipoles and flat phantom filled with body-tissue simulating liquid. Note: All SAR values normalized to 1 W forward power.

2450 MHz System Validation - April 22, 2005

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 150; Calibrated: 04/22/2005
Ambient Temp: 25.7 ºC; Fluid Temp: 23.9 ºC; Barometric Pressure: 102.6 kPa; Humidity: 30%
Communication System: CW
Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 50.2; ρ = 1000 kg/m^3
- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 24/05/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 06/07/2004
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

2450 MHz System Validation/Area Scan (6x10x1): Measurement grid: dx=10mm, dy=10mm

2450 MHz System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.7 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 27.7 W/kg
SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.86 mW/g

2450 MHz System Validation/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.1 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.86 mW/g

2450 MHz System Validation/Zoom Scan 3 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.0 V/m; Power Drift = 0.015 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.87 mW/g

2450 MHz System Validation/Zoom Scan 4 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.9 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 27.3 W/kg
SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.86 mW/g

2450 MHz System Validation/Zoom Scan 5 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.5 V/m; Power Drift = 0.010 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.86 mW/g

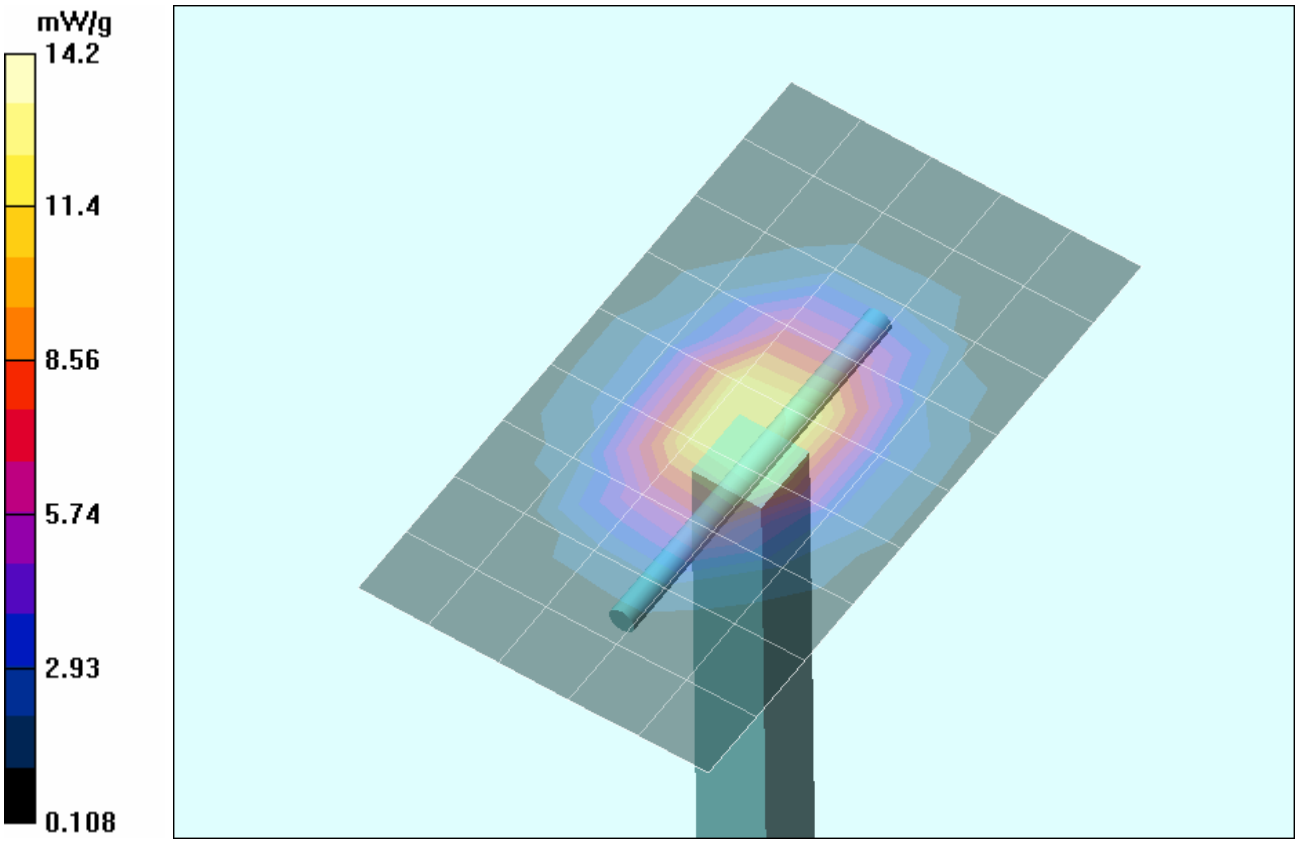
2450 MHz System Validation/Zoom Scan 6 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.0 V/m; Power Drift = -0.042 dB
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.87 mW/g

2450 MHz System Validation/Zoom Scan 7 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.7 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 27.7 W/kg
SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.88 mW/g

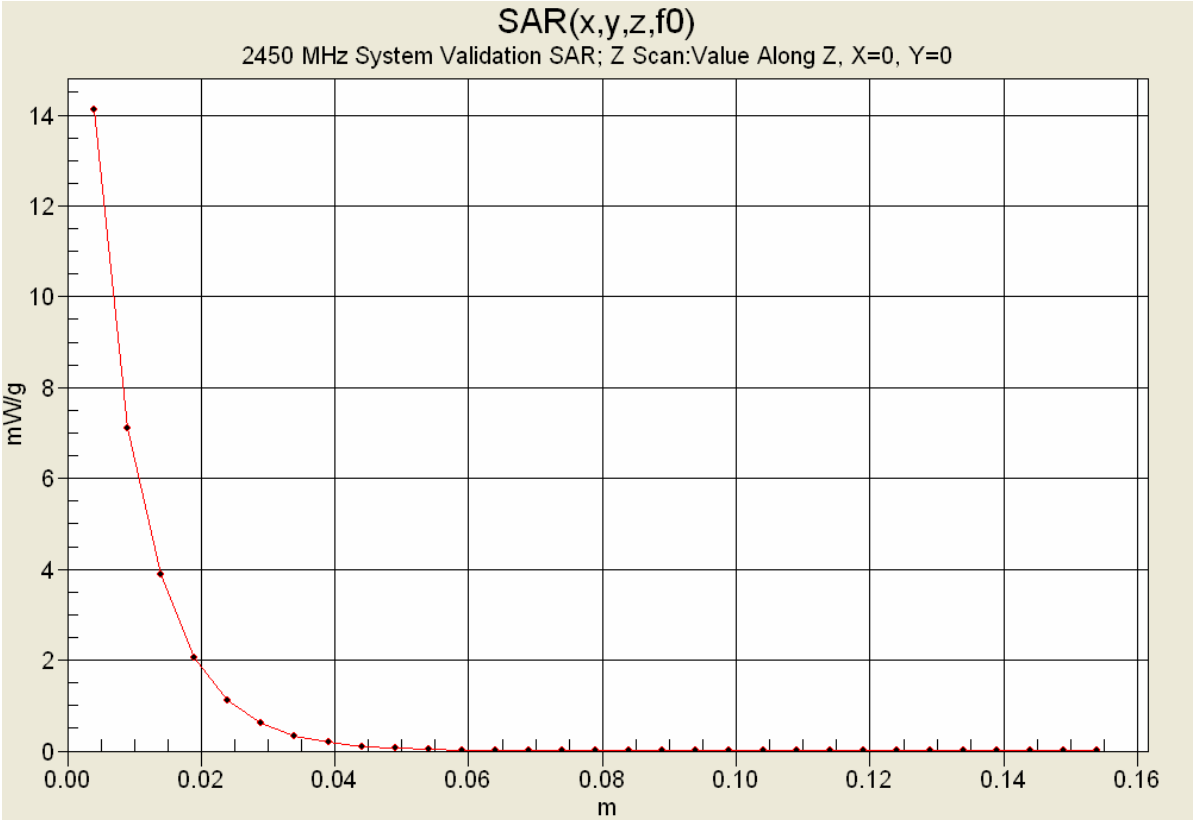
2450 MHz System Validation/Zoom Scan 8 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.4 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.88 mW/g

2450 MHz System Validation/Zoom Scan 9 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.3 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 27.6 W/kg
SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.87 mW/g

2450 MHz System Validation/Zoom Scan 10 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.6 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 27.7 W/kg
SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.88 mW/g



1 g average of 10 measurements: 12.63 mW/g
10 g average of 10 measurements: 5.869 mW/g



10. Measured Fluid Dielectric Parameters

System Validation - 2450 MHz Dipole

Measured Fluid Dielectric Parameters (Muscle)

April 22, 2005

Frequency	e'	e"
2.350000000 GHz	50.4884	14.1016
2.360000000 GHz	50.4542	14.1475
2.370000000 GHz	50.4295	14.1756
2.380000000 GHz	50.4094	14.2063
2.390000000 GHz	50.3750	14.2541
2.400000000 GHz	50.3395	14.2965
2.410000000 GHz	50.2961	14.3310
2.420000000 GHz	50.2408	14.3481
2.430000000 GHz	50.2047	14.3861
2.440000000 GHz	50.1822	14.4193
2.450000000 GHz	50.1500	14.4611
2.460000000 GHz	50.1035	14.5137
2.470000000 GHz	50.0825	14.5504
2.480000000 GHz	50.0515	14.6073
2.490000000 GHz	50.0191	14.6410
2.500000000 GHz	49.9867	14.6647
2.510000000 GHz	49.9442	14.7231
2.520000000 GHz	49.9042	14.7502
2.530000000 GHz	49.8769	14.7804
2.540000000 GHz	49.8259	14.8081
2.550000000 GHz	49.7900	14.8467

APPENDIX F - 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: environ ment 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

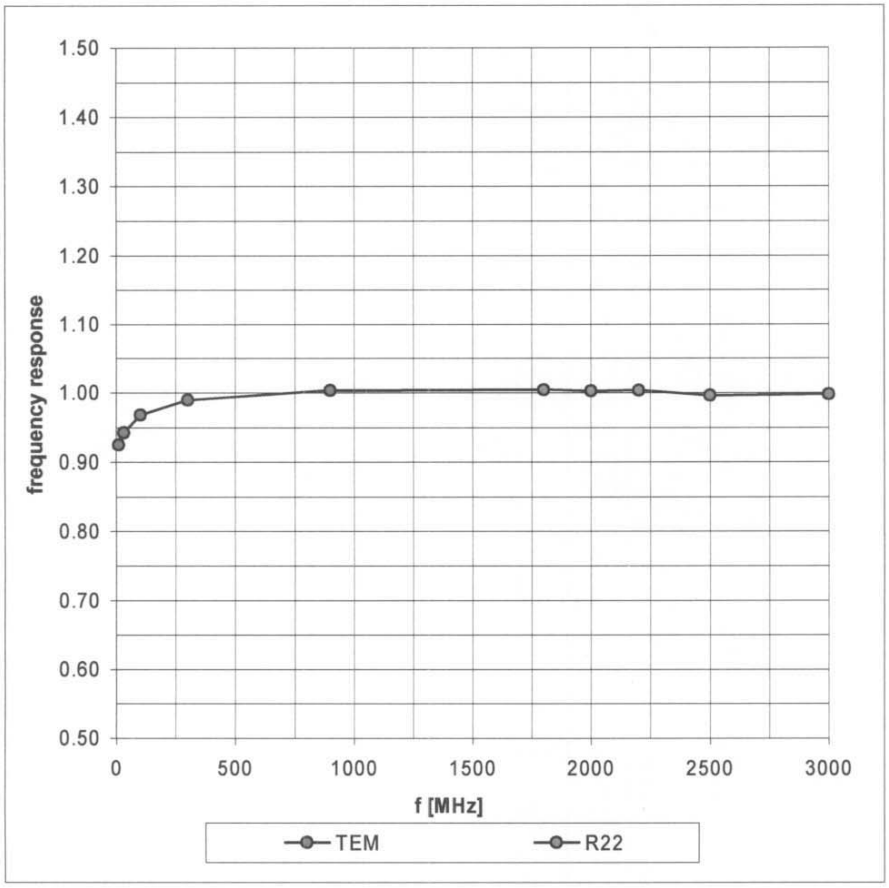
Probe Tip to Sensor Center	**2.7** mm
Optical Surface Detection	**in tolerance**

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%.

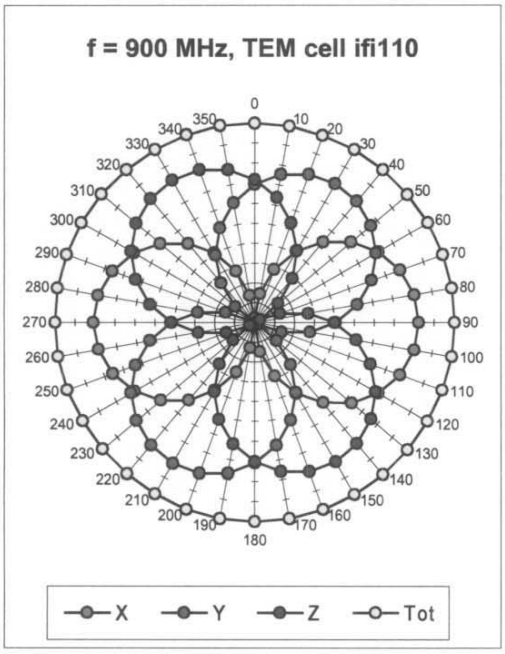
[A] numerical linearization parameter: uncertainty not required

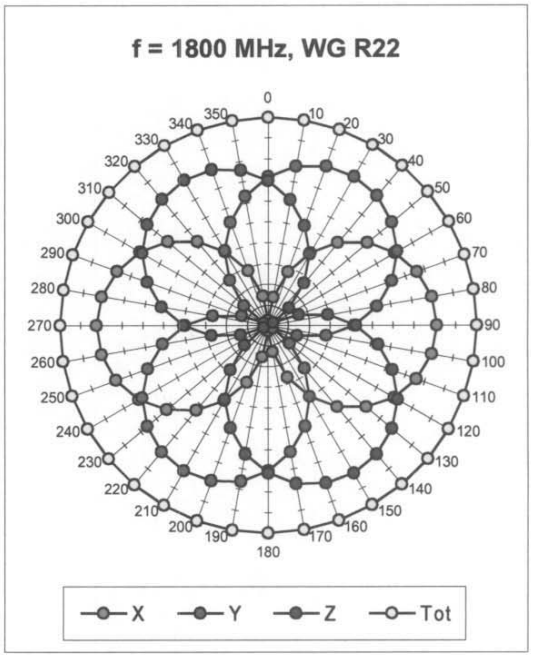
Frequency Response of E-Field

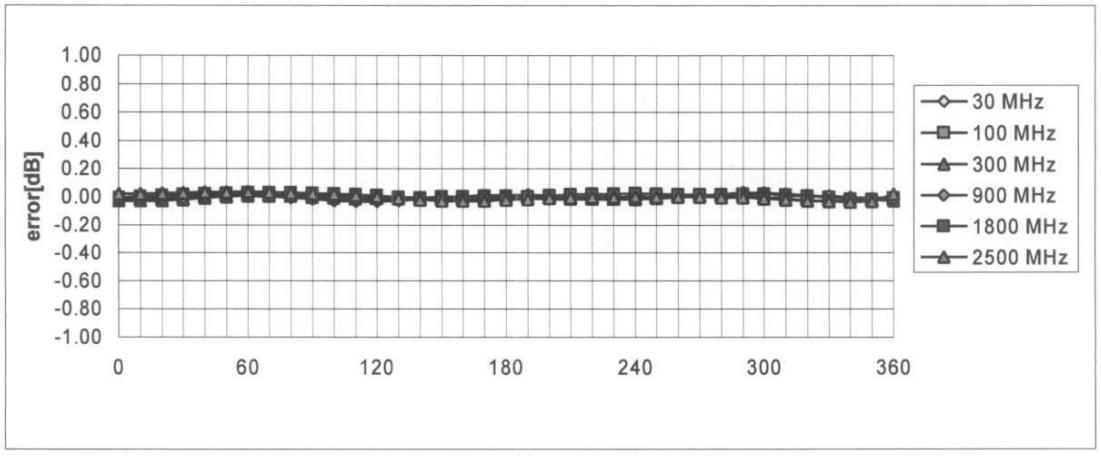
(TEM-Cell:ifi110, Waveguide R22)



Receiving Pattern (ϕ), θ = 0°



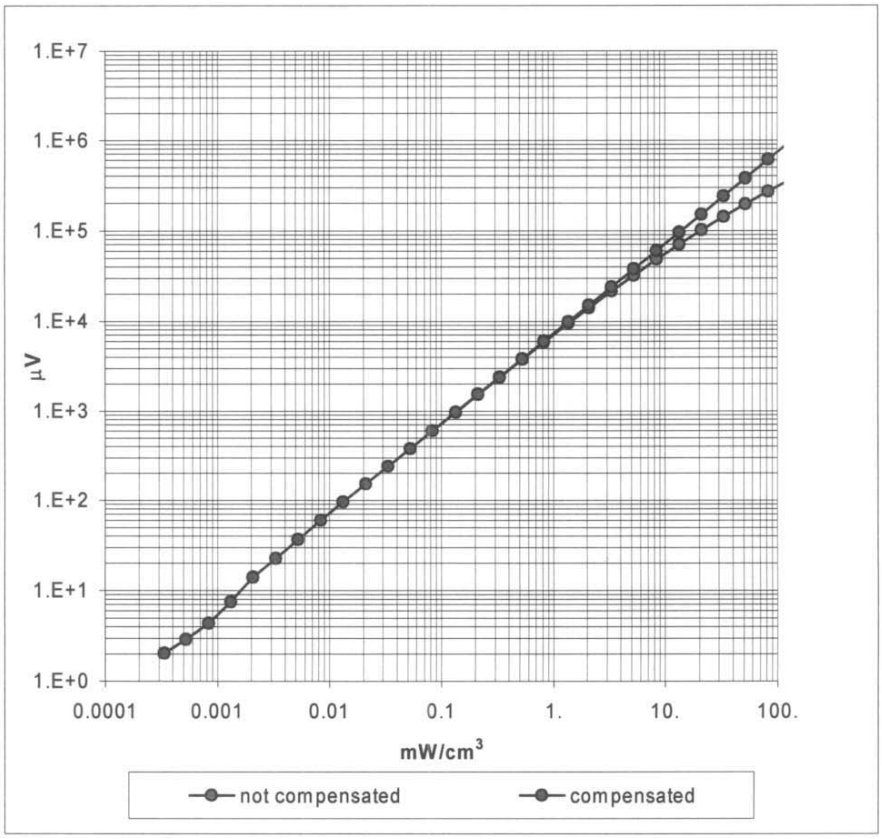


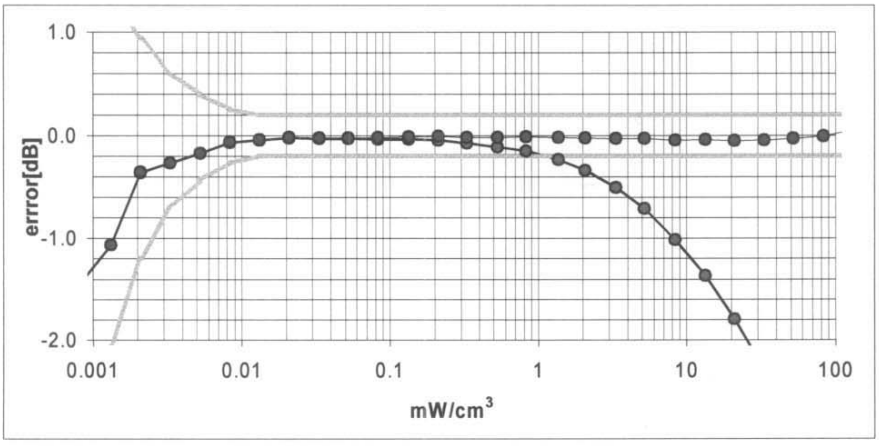


Axial Isotropy Error < ± 0.2 dB

Dynamic Range f(SAR_{head})

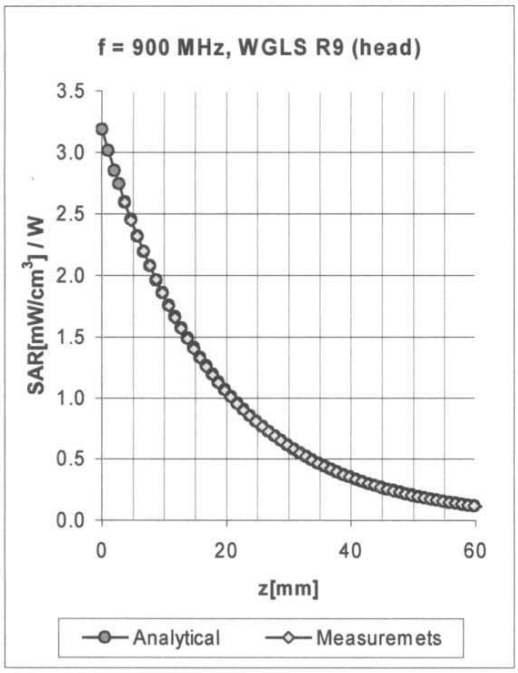
(Waveguide R22)

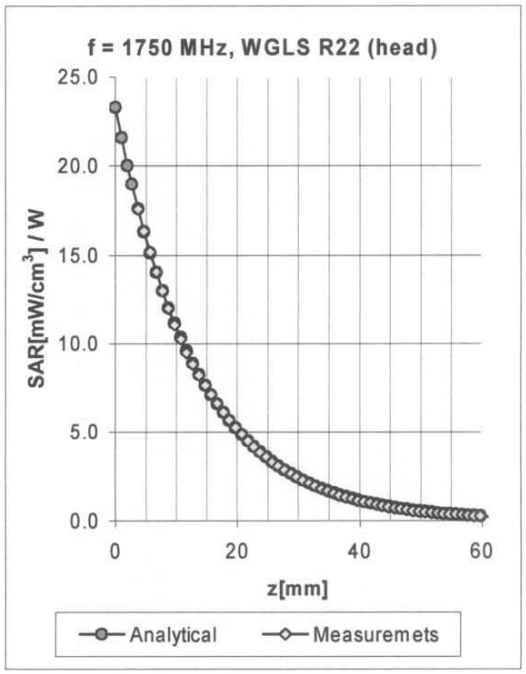




Probe Linearity Error < ± 0.2 dB

Conversion Factor Assessment



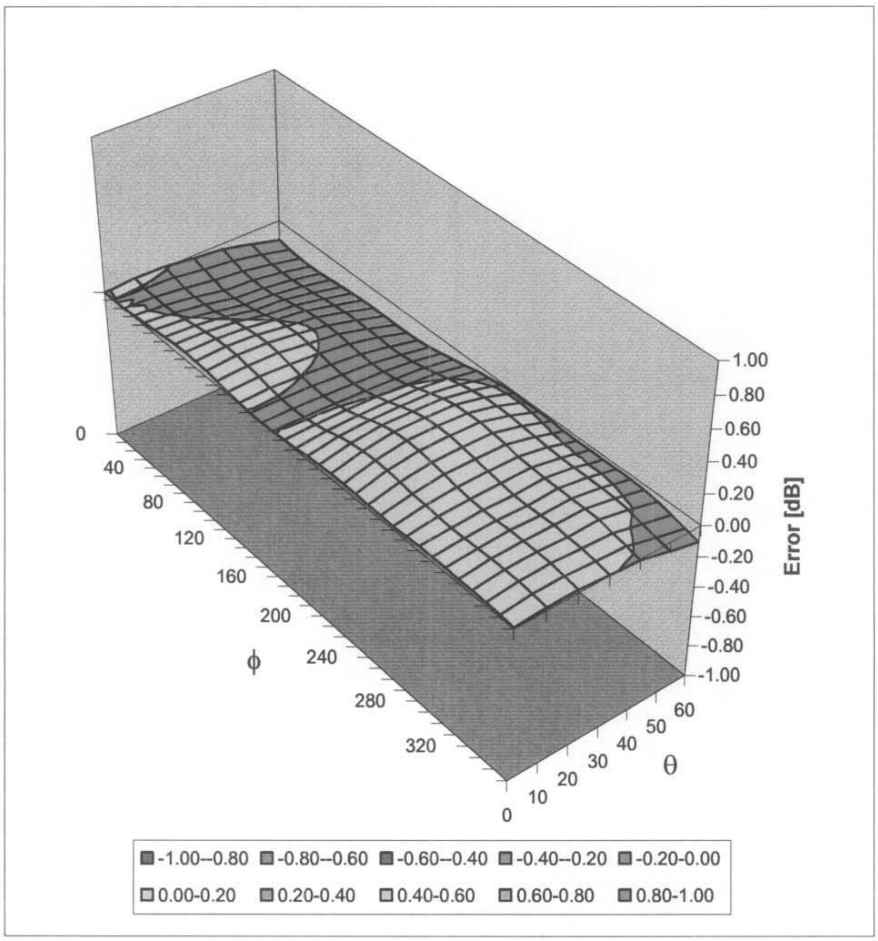


f [MHz]	Validity [MHz][B]	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	750-950	Head	41.5 ± 5%	0.90 ± 5%	0.68	1.64	6.71 ± 11.9% (k=2)
1750	1700-1800	Head	40.0 ± 5%	1.40 ± 5%	0.43	2.67	5.28 ± 9.7% (k=2)
1900	1850-1950	Head	40.0 ± 5%	1.40 ± 5%	0.46	2.81	5.03 ± 9.7% (k=2)
2450	2400-2500	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

Schmid & Partner Engineering AG

s p e a g

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

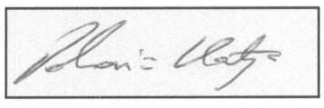
Additional Conversion Factors

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

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
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 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

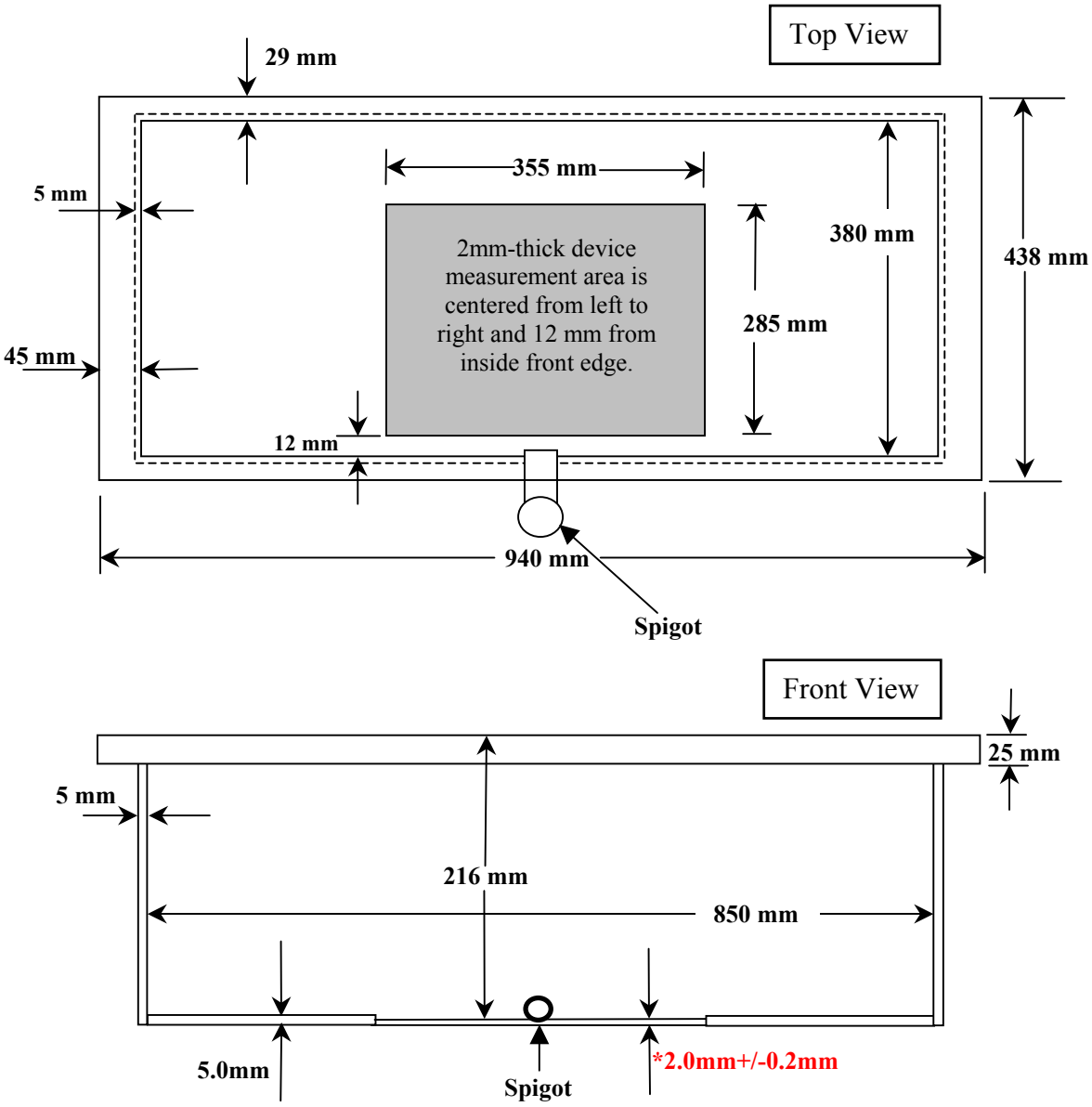
Fiberglass Planar Phantom - Front View

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.