RF EXPOSURE EVALUATION

SPECIFIC ABSORPTION RATE

SAR TEST REPORT

FOR

802.11bg WLAN / BLUETOOTH COMBO MODULE

INSTALLED IN

ITRONIX CORPORATION

IX100X SERIES RUGGED HANDHELD PC

MODEL: IX100XUSI-WLBT

FCC ID: KBCIX100XUSI-WLBT

(FCC OET BULLETIN 65 SUPPLEMENT C)

IC: 1943A-IX100Xg

(IC RSS-102 ISSUE 2)

Test Report Serial No.

042406KBC-T750-S15W

Test Report Revision No.

Revision 1.0 (Initial Release)

Test Location

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DECLARATION OF COMPLIANCE
SAR RF EXPOSURE EVALUATION

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FCC IDENTIFIER:	**KBCIX100XUSI-WLBT**
IC IDENTIFER:	**1943A-IX100Xg**
Model(s):	**IX100XUSI-WLBT**
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):	**WLAN: Digital Transmission System (DTS) - §15C** **Bluetooth: Part 15 Spread Spectrum Transmitter (DSS) - §15C**
IC Device Classification:	**Low Power License-Exempt Radiocommunication Device (RSS-210 Issue 6)**
Internal Transmitter Type:	**802.11bg WLAN / Bluetooth Combo Module (Model: WM-BG-MR-01)**
Host PC Type:	**Itronix IX100X Series Rugged Handheld PC**
Mode(s) of Operation:	**DSSS (Direct Sequence Spread Spectrum) - 802.11b** **OFDM (Orthogonal Frequency Division Multiplexing) - 802.11g** **FHSS (Frequency Hopping Spread Spectrum) - Bluetooth**
Transmit Frequency Range(s):	**2412 - 2462 MHz (WLAN)** **2402 - 2480 MHz (Bluetooth)**
Max. RF Output Power Tested:	**15.93 dBm (39.17 mW) - Peak Conducted (802.11b)** **14.98 dBm (31.48 mW) - Peak Conducted (802.11g)** **3.59 dBm (2.29 mW) - Peak Conducted (Bluetooth)**
Date Rate(s):	**802.11b: 1 / 2 / 5.5 / 11 Mbps** **802.11g: 6 / 9 / 12 / 18 / 24 / 36 / 48 / 54 Mbps**
Battery Type(s) Tested:	**Lithium-ion 7.4 V, 3.0 Ah (P/N: 46-0155-001)**
Antenna Type(s) Tested:	**WLAN - Internal Dipole (Front Side above LCD Display)** **Bluetooth - Internal Printed Circuit (Right Side of LCD Display)**
Body-Worn Accessories Tested:	**Nylon Carry Case with Shoulder Strap (P/N: 77041A)**
Audio Accessories Tested:	**Ear-Microphone (Model: JABRA)**
Max. SAR Level(s) Evaluated:	**Body - 802.11b/g: 0.003 W/kg (Peak SAR measured from Area Scan)**

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.

Test Report Approved By:
Sean Johnston
SAR Lab Manager
Celltech Labs Inc.

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1.0 INTRODUCTION

This measurement report demonstrates that the 802.11bg WLAN / Bluetooth Combo Module FCC ID: KBCIX100XUSI-WLBT installed in the ITRONIX CORPORATION IX100X Series Rugged Handheld PC 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) Applied	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)	WLAN	Digital Transmission System (DTS)		§15C	
	Bluetooth	Part 15 Spread Spectrum Transmitter (DSS)		§15C	
IC Device Classification	Low Power License-Exempt Radiocommunication Device: Category I Equipment			RSS-210 Issue 6	
RF Exposure Category	Uncontrolled Environment / General Population				
Internal Transmitter Type	802.11bg WLAN / Bluetooth Combo Module		Manufacturer: USI		Model: WM-BG-MR-01
Co-Transmit Operation	802.11bg WLAN and Bluetooth simultaneous transmit				
Host PC Type	Rugged Handheld PC		Itronix IX100X Series		
Model(s)	IX100XUSI-WLBT (IX100X with 802.11bg / Bluetooth Combo Module)				
IDENTIFIER(s)	FCC ID: KBCIX100XUSI-WLBT		IC: 1943A-IX100Xg		
Test Device Serial No.(s)	8601-600160-30	WLAN/Bluetooth Combo Module	Production Sample		
	DZGEG5326ZZ5091	IX100X Handheld PC	Production Sample		
Mode(s) of Operation	802.11b	DSSS	Direct Sequence Spread Spectrum		
	802.11g	OFDM	Orthogonal Frequency Division Multiplexing		
	Bluetooth	FHSS	Frequency Hopping Spread Spectrum		
Data Rates	802.11b	1 / 2 / 5.5 / 11 Mbps	802.11g	6 / 9 / 12 / 18 / 24 / 36 / 48 / 54 Mbps	
Transmit Frequency Range(s)	802.11b/g	2412 - 2462 MHz	Bluetooth	2402 - 2480 MHz	

Maximum Peak Conducted RF Output Power Levels Measured (WLAN)

Default Test Channels*		Freq.	Chan.	802.11b		802.11b			802.11g					
				1 Mbps		2462 MHz - Channel 11			2462 MHz - Channel 11					
802.11b	802.11g			dBm	mW	Data Rate	dBm	mW	Data Rate	dBm	mW	Data Rate	dBm	mW
✓	∇	2412	1	13.37	21.73	2	14.05	25.41	6	14.10	25.70	24	14.85	30.55
✓	∇	2437	6	13.69	23.39	5.5	15.85	38.46	9	14.30	26.92	36	14.69	29.44
✓	∇	**2462**	**11**	**13.76**	**23.77**	11	15.93	39.17	12	13.20	20.89	48	14.98	31.48
									18	14.15	26.00	54	14.91	30.97

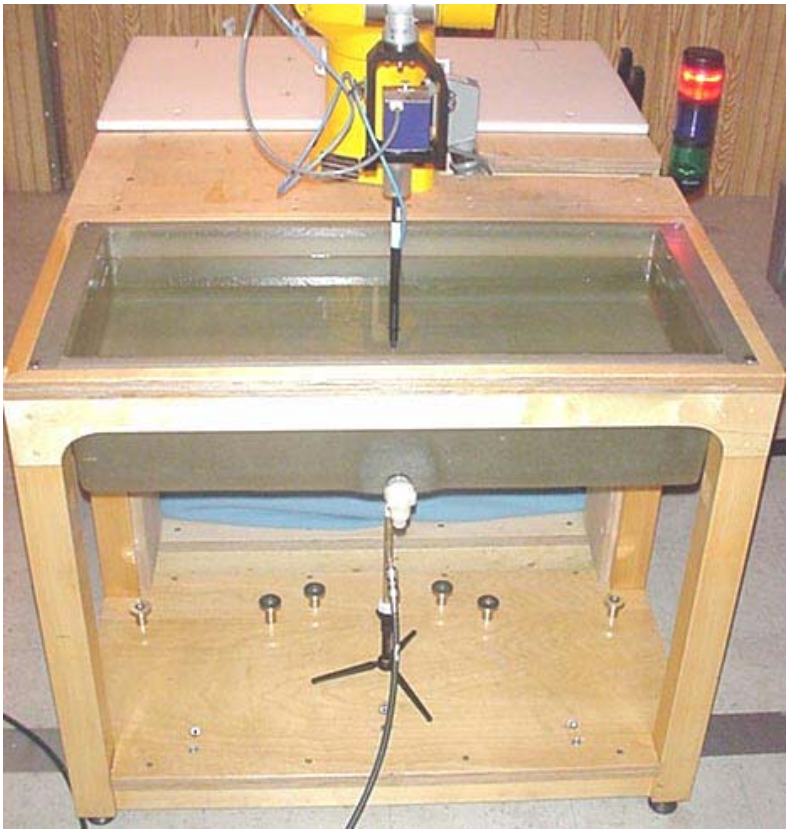
*2.4 GHz: when ∇ channel is 0.25 dB > ✓ channel, select both ✓ and ∇ channels (draft procedures per October 2005 FCC TCB Council Workshop - see reference [7]). Test higher data rates if output power levels measured are 0.25 dB > output power levels measured at the lowest data rate.

Max. RF Output Power Tested	Bluetooth	3.59 dBm	2.29 mW	Peak Conducted
Antenna Type(s) Tested	Internal Dipole	Front Side above LCD Display		WLAN
	Internal Printed Circuit	Right Side of LCD Display		Bluetooth
Power Source(s) Tested	Lithium-ion Battery	7.4V	3.0 Ah	P/N: 46-0155-001
Body-Worn Accessories Tested	Nylon Carry Case with Shoulder Strap (contains metal components)			P/N: 77041A
Audio Accessories Tested	Ear-Microphone (for non-voice-transmit audio applications only)			Model: JABRA

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 DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the DASY4 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

DASY4 SAR Measurement System with planar phantom



DASY4 SAR Measurement System with planar phantom and validation dipole

4.0 MEASUREMENT SUMMARY

BODY SAR EVALUATION RESULTS

Freq.	Chan.	Test Mode [3]		Data Rate [4]	Antenna Type	Battery Type	DUT Position to Planar Phantom	Accessories	Device Separation Distance to Planar Phantom	Cond. Power Before Test	SAR Drift During Test [6]	Peak SAR Measured from the Area Scan [5]
								Body-worn				
MHz				Mbps				Audio	cm	dBm	dB	W/kg
2462	11	802.11b	DSSS	1	Internal	Li-ion	Back Side	None	0.0 (Touch)	13.76	-- [6]	0.003
2462	11	802.11b	DSSS	2	Internal	Li-ion	Back Side	None	0.0 (Touch)	14.05	-- [6]	0.003
2462	11	802.11b	DSSS	5.5	Internal	Li-ion	Back Side	None	0.0 (Touch)	15.85	-- [6]	0.003
2462	11	802.11b	DSSS	11	Internal	Li-ion	Back Side	None	0.0 (Touch)	15.93	-- [6]	0.002
2462	11	802.11g	OFDM	6	Internal	Li-ion	Back Side	None	0.0 (Touch)	14.10	-- [6]	0.002
2462	11	802.11g	OFDM	24	Internal	Li-ion	Back Side	None	0.0 (Touch)	14.85	-- [6]	0.002
2462	11	802.11g	OFDM	36	Internal	Li-ion	Back Side	None	0.0 (Touch)	14.69	-- [6]	0.003
2462	11	802.11g	OFDM	48	Internal	Li-ion	Back Side	None	0.0 (Touch)	14.98	-- [6]	0.003
2462	11	802.11g	OFDM	54	Internal	Li-ion	Back Side	None	0.0 (Touch)	14.91	-- [6]	0.003
2462	11	802.11g	OFDM	54	Internal	Li-ion	Back Side	Carry Case Ear-Mic	1.0	14.91	-- [6]	0.002
2462	11	802.11g	OFDM	54	Internal	Li-ion	Back Side	None	0.0 (Touch)	14.91	-- [6]	0.003
2441	39	Bluetooth - Modulated Fixed Frequency		-	Internal					3.59		

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)	May 01, 2006				Relative Humidity	30	%
Measured Fluid Type	2450 MHz Body				Atmospheric Pressure	101.8	kPa
Dielectric Constant ε_r	IEEE Target		Measured	Deviation	Ambient Temperature	25.2	°C
	52.7	± 5%	51.9	-1.5%	Fluid Temperature	23.9	°C
Conductivity σ (mho/m)	IEEE Target		Measured	Deviation	Fluid Depth	≥ 15	cm
	1.95	± 5%	2.04	+4.6%	ρ (Kg/m^3)	1000	

Note(s)		
	1.	The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
	2.	If the SAR levels measured at the highest output channel were ≥ 3 dB below the SAR limit, SAR evaluation for all other selected channels was optional (per October 2005 TCB Council Workshop proposed guidance - see reference [7]).
	3.	802.11g mode was evaluated based on output power level 0.25 dB > output power level measured at the lowest data rate in 802.11b mode (per October 2005 TCB Council Workshop proposed guidance - see reference [7]).
	4.	Higher data rates were evaluated if the measured conducted output power levels were 0.25 dB > output power levels measured at the lowest data rate (per October 2005 TCB Council Workshop proposed guidance - see reference [7]).
	5.	The 1g-averaged SAR was not measured because the peak SAR value from the area scan evaluations for each test configuration was less than 1% of the 1g average limit. The peak SAR values measured during the area scan evaluations for each test configuration are reported. The mathematical formula used to extrapolate the SAR value at the surface from the zoom scan SAR values measured at 5 mm steps leading away from the surface assumes a curving slope (i.e. the SAR values gradually decrease as the probe moves away from the surface). When the peak SAR of a device is so low that the RF noise level is competing with the level of the SAR, the Zoom Scan measurements leading away from the surface are no longer a curving slope and the extrapolation formula cannot accurately estimate the 1g average SAR. In this manner, we have reported the peak values from the area scan in place of the 1g averaged SAR values whenever the peak values are less than 1% of the average limit. This avoids gross uncertainties in the 1g average SAR calculation while maintaining a conservative estimation of the SAR level.
	6.	The power drifts were measured at the reference point of the phantom with low SAR. The drift values were inaccurate due to the SAR value at the reference point was close to the measurement noise floor; therefore the drift values were not reported.

5.0 DETAILS OF SAR EVALUATION

The 802.11bg WLAN / Bluetooth Combo Module FCC ID: KBCIX100XUSI-WLBT installed in the ITRONIX CORPORATION IX100X Series Rugged Handheld PC 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.

Body SAR Test Configuration(s)

1. The IX100X Handheld PC was tested for body SAR (lap-held) with the back side (battery side) facing parallel to, and touching, the outer surface of the planar phantom.
2. The IX100X Handheld PC was tested for body-worn SAR placed inside the nylon carry case with shoulder strap accessory (contains metal components) and the back of the IX100X Handheld PC was facing parallel to the outer surface of the planar phantom. The back side of the carry case accessory was touching the other surface of the planar phantom and provided a separation distance of 1.0 cm between the back of the IX100X Handheld PC and the outer surface of the planar phantom. The IX100X Handheld PC was evaluated for body-worn SAR with the ear-microphone accessory connected to the audio port (IX100X Handheld PC supports data transmission only - the ear-microphone accessory is intended for standard PC operating system program purposes only, and is not intended for voice transmit operations).
3. The external antenna was connected to the IX100X Handheld PC for the duration of the tests. The external antenna is for operation with the optional co-located AirCard 860 GSM/GPRS.EDGE/UMTS PCMCIA Card only. The AirCard 860 was not installed for the duration of the SAR evaluations described in this report and therefore the external antenna was not activated or transmitting.

Test Modes & Power Settings

4. The WLAN was placed in test mode via internal test software provided by the manufacturer. The SAR evaluations were performed with the WLAN transmitting continuously at maximum power with a modulated DSSS signal for 802.11b mode and a modulated OFDM signal for 802.11g mode. The peak conducted output power levels of the WLAN 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 (Spectrum Analyzer settings: RBW - 3 MHz, VBW - 3 MHz, Detector - Peak, Trace - Max Hold, Span -25 MHz).
5. For the co-transmit SAR evaluations the Bluetooth was evaluated at maximum power using a modulated signal on a fixed frequency with the frequency hopping disabled. The conducted power was measured at the Bluetooth antenna connector prior to the SAR evaluations using a Spectrum Analyzer according to the procedures described in FCC 47 CFR §2.1046 (Spectrum Analyzer settings: RBW - 1 MHz, VBW - 1 MHz, Detector - Peak, Trace - Max Hold, Span - 12 MHz).
6. The power drift of the DUT during the SAR evaluations was measured by the DASY4 system.
7. The IX100X Handheld PC battery was fully charged prior to the SAR evaluations.

Test Conditions

8. 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.
9. The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
10. The SAR evaluations were performed within 24 hours of the system performance check.

6.0 EVALUATION PROCEDURES

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

(ii) For body-worn 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 ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET 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 (see reference [6]).

SYSTEM PERFORMANCE CHECK EVALUATION

Test Date	2450MHz 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)
		IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.						
5/1/06	Body	12.8 ±10%	13.5	+5.5%	52.7 ±5%	51.9	-1.5%	1.95 ±5%	2.04	+4.6%	1000	25.2	23.9	≥ 15	30	101.8
Note(s)		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.														

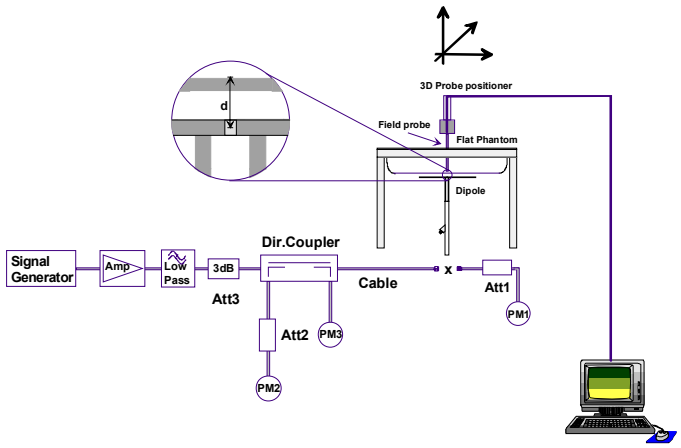


Figure 1. System Performance Check Measurement Setup

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

2450MHz Dipole Setup

8.0 SIMULATED EQUIVALENT TISSUES

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

SIMULATED TISSUE MIXTURE		
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	Measurement Software: DASY4, V4.6 Build 23
	Postprocessing Software: SEMCAD, V1.8 Build 161
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. 70 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, 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 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 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	-DAE4	00019	353	15Jun05		15Jun06
	-DAE3	00018	370	08Feb06		08Feb07
	-ET3DV6 E-Field Probe	00016	1387	16Mar06		16Mar07
x	-ET3DV6 E-Field Probe	00017	1590	20May05		20May06
	-EX3DV4 E-Field Probe	00125	3547	14Feb06		14Feb07
	-300MHz Validation Dipole	00023	135	25Oct05		25Oct06
	-450MHz Validation Dipole	00024	136	25Oct05		25Oct06
	-835MHz Validation Dipole	00022	411	**Brain**	28Mar06	28Mar07
				Body	27Mar06	27Mar07
	-900MHz Validation Dipole	00020	054	**Brain**	10Jun05	10Jun06
				Body	10Jun05	10Jun06
	-1800MHz Validation Dipole	00021	247	**Brain**	14Jun05	14Jun06
				Body	14Jun05	14Jun06
	-1900MHz Validation Dipole	00032	151	**Brain**	17Jun05	17Jun06
				Body	25Apr06	25Apr07
	-2450MHz Validation Dipole	00025	150	**Brain**	20Sep05	20Sep06
x				**Body**	24Apr06	24Apr07
	-5800MHz Validation Dipole	00126	1031	**Brain**	15Mar06	15Mar07
	-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	ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A		N/A
x	Gigatronics 8652A Power Meter	00110	1835801	12Apr06		12Apr07
	Gigatronics 8652A Power Meter	00007	1835272	03Feb06		03Feb07
	Gigatronics 80701A Power Sensor	00011	1833542	03Feb06		03Feb07
x	Gigatronics 80701A Power Sensor	00012	1834350	12Sep05		12Sep06
	Gigatronics 80701A Power Sensor	00013	1833713	03Feb06		03Feb07
x	Gigatronics 80701A Power Sensor	00014	1833699	07Sep05		07Sep06
x	HP 8753ET Network Analyzer	00134	US39170292	18Apr06		18Apr07
x	HP 8648D Signal Generator	00005	3847A00611	N/A		N/A
	Rohde & Schwarz SMR40 Signal Generator	00006	100104	06Apr06		06Apr07
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	N/A		N/A
x	HP E4408B Spectrum Analyzer	00015	US39240170	02Feb06		02Feb07

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	5.9	Normal	1	1	5.9	∞
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					**10.79**	
Expanded Uncertainty (k=2)					**21.59**	

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	5.9	Normal	1	1	5.9	∞
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	∞
Dipole						
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					**9.04**	
Expanded Uncertainty (k=2)					**18.08**	

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: 05/01/2006

Body SAR - 802.11b - 1 Mbps - 2462 MHz - Back Side of DUT Touching Phantom (0.0 cm Spacing)

DUT: Itronix Model: IX100XUSI-WLBT; Type: WLAN/Bluetooth Combo Module installed in IX100X PC; Serial: 8601-600160-30

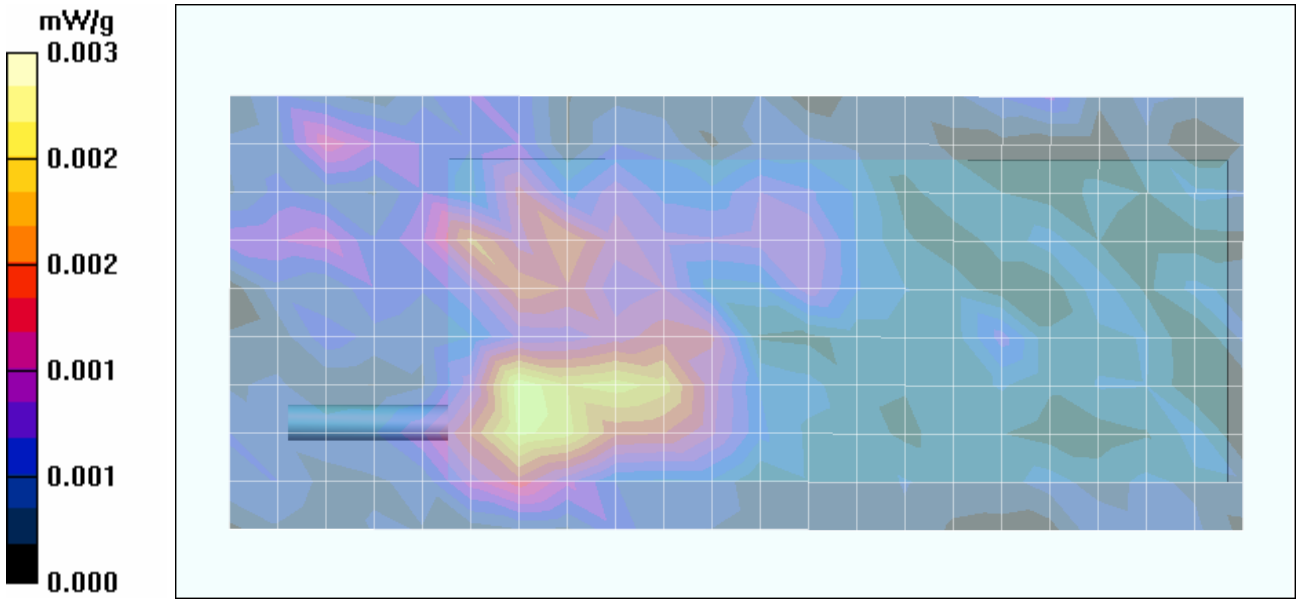
Body-Worn Accessory: None; Audio Accessory: None

Ambient Temp: 25.2 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

7.4V, 3.0Ah Li-ion Battery Pack
Communication System: DSSS WLAN
RF Output Power: 13.76 dBm (Peak Conducted)
Frequency: 2462 MHz; Channel 11; Duty Cycle: 1:1
Medium: M2450 (σ = 2.04 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Body SAR - 802.11b - 1 Mbps - Back Side of DUT Touching Planar Phantom - High Channel
Area Scan (10x22x1): Measurement grid: dx=15mm, dy=15mm
Maximum Peak Value of SAR (measured) = 0.003 mW/g



Date Tested: 05/01/2006

Body SAR - 802.11b - 2 Mbps - 2462 MHz - Back Side of DUT Touching Phantom (0.0 cm Spacing)

DUT: Itronix Model: IX100XUSI-WLBT; Type: WLAN/Bluetooth Combo Module installed in IX100X PC; Serial: 8601-600160-30

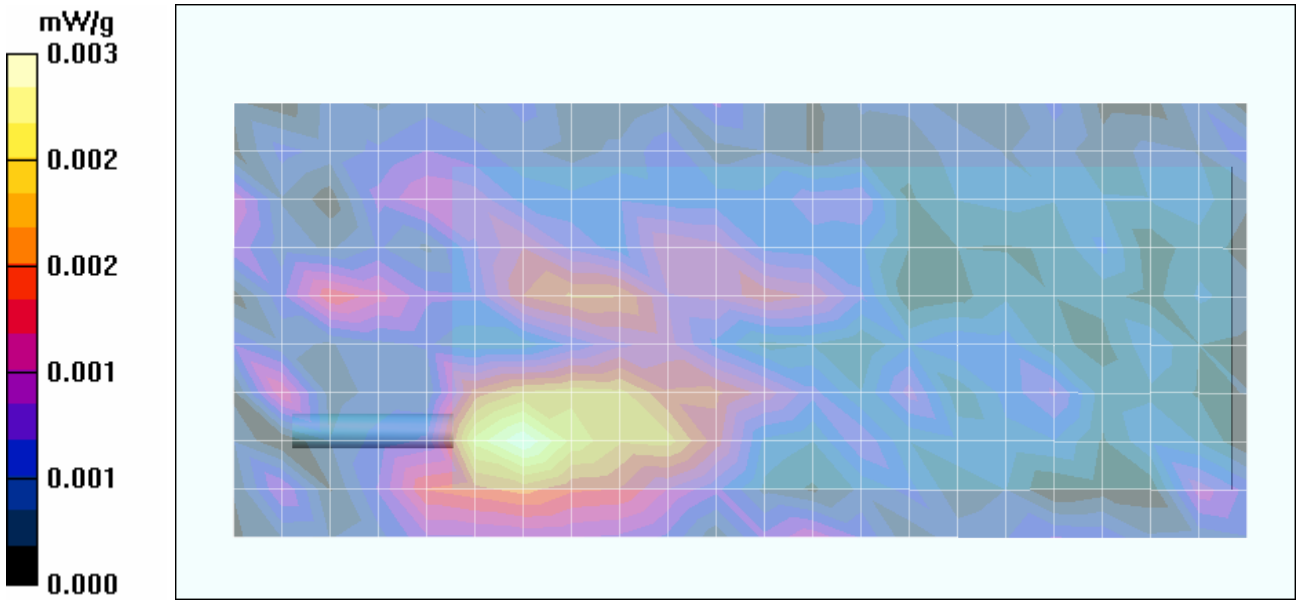
Body-Worn Accessory: None; Audio Accessory: None

Ambient Temp: 25.2 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

7.4V, 3.0Ah Li-ion Battery Pack
Communication System: DSSS WLAN
RF Output Power: 14.05 dBm (Peak Conducted)
Frequency: 2462 MHz; Channel 11; Duty Cycle: 1:1
Medium: M2450 (σ = 2.04 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Body SAR - 802.11b - 2 Mbps - Back Side of DUT Touching Planar Phantom - High Channel
Area Scan (10x22x1): Measurement grid: dx=15mm, dy=15mm
Maximum Peak Value of SAR (measured) = 0.003 mW/g



Date Tested: 05/01/2006

Body SAR - 802.11b - 5.5 Mbps - 2462 MHz - Back Side of DUT Touching Phantom (0.0 cm Spacing)

DUT: Itronix Model: IX100XUSI-WLBT; Type: WLAN/Bluetooth Combo Module installed in IX100X PC; Serial: 8601-600160-30

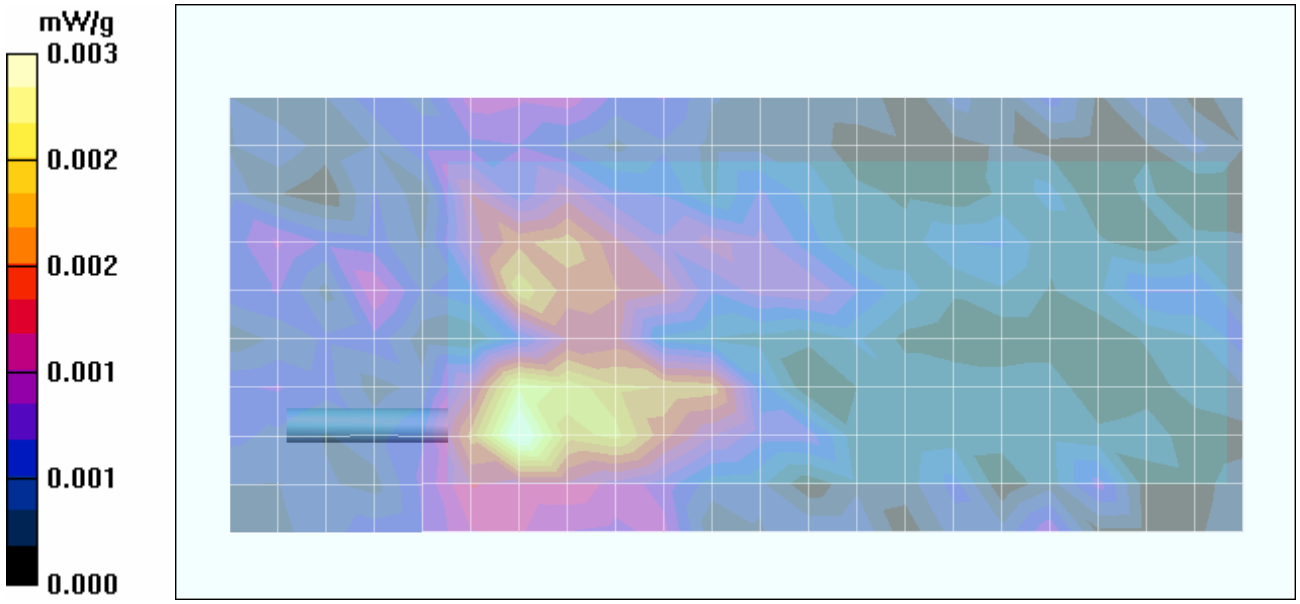
Body-Worn Accessory: None; Audio Accessory: None

Ambient Temp: 25.2 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

7.4V, 3.0Ah Li-ion Battery Pack
Communication System: DSSS WLAN
RF Output Power: 15.85 dBm (Peak Conducted)
Frequency: 2462 MHz; Channel 11; Duty Cycle: 1:1
Medium: M2450 (σ = 2.04 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Body SAR - 802.11b - 5.5 Mbps - Back Side of DUT Touching Planar Phantom - High Channel
Area Scan (10x22x1): Measurement grid: dx=15mm, dy=15mm
Maximum Peak Value of SAR (measured) = 0.003 mW/g



Date Tested: 05/01/2006

Body SAR - 802.11b - 11 Mbps - 2462 MHz - Back Side of DUT Touching Phantom (0.0 cm Spacing)

DUT: Itronix Model: IX100XUSI-WLBT; Type: WLAN/Bluetooth Combo Module installed in IX100X PC; Serial: 8601-600160-30

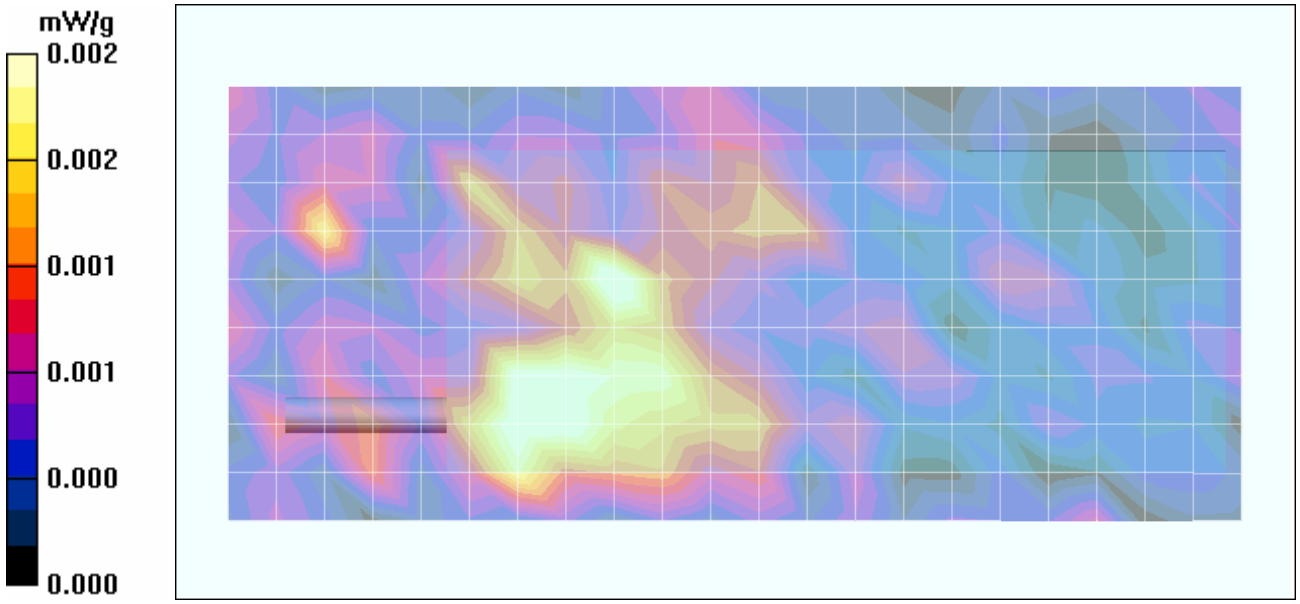
Body-Worn Accessory: None; Audio Accessory: None

Ambient Temp: 25.2 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

7.4V, 3.0Ah Li-ion Battery Pack
Communication System: DSSS WLAN
RF Output Power: 15.93 dBm (Peak Conducted)
Frequency: 2462 MHz; Channel 11; Duty Cycle: 1:1
Medium: M2450 (σ = 2.04 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Body SAR - 802.11b - 11 Mbps - Back Side of DUT Touching Planar Phantom - High Channel
Area Scan (10x22x1): Measurement grid: dx=15mm, dy=15mm
Maximum Peak Value of SAR (measured) = 0.002 mW/g



Date Tested: 05/01/2006

Body SAR - 802.11g - 6 Mbps - 2462 MHz - Back Side of DUT Touching Phantom (0.0 cm Spacing)

DUT: Itronix Model: IX100XUSI-WLBT; Type: WLAN/Bluetooth Combo Module installed in IX100X PC; Serial: 8601-600160-30

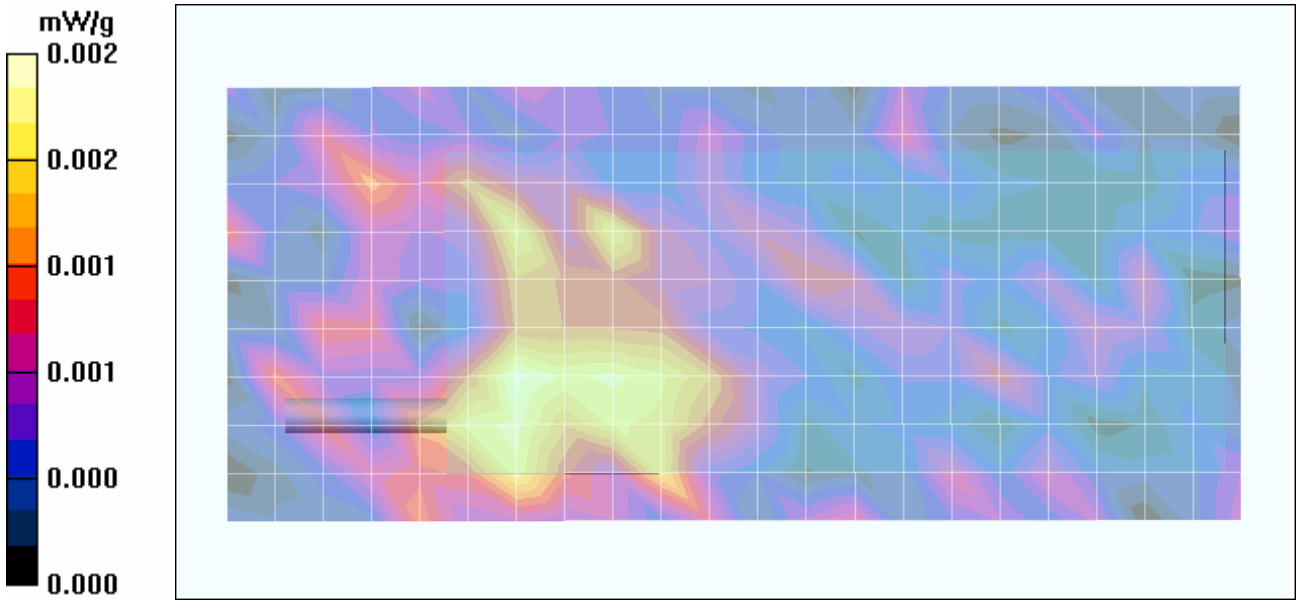
Body-Worn Accessory: None; Audio Accessory: None

Ambient Temp: 25.2 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

7.4V, 3.0Ah Li-ion Battery Pack
Communication System: OFDM WLAN
RF Output Power: 14.10 dBm (Peak Conducted)
Frequency: 2462 MHz; Channel 11; Duty Cycle: 1:1
Medium: M2450 (σ = 2.04 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Body SAR - 802.11g - 6 Mbps - Back Side of DUT Touching Planar Phantom - High Channel
Area Scan (10x22x1): Measurement grid: dx=15mm, dy=15mm
Maximum Peak Value of SAR (measured) = 0.002 mW/g



Date Tested: 05/01/2006

Body SAR - 802.11g - 24 Mbps - 2462 MHz - Back Side of DUT Touching Phantom (0.0 cm Spacing)

DUT: Itronix Model: IX100XUSI-WLBT; Type: WLAN/Bluetooth Combo Module installed in IX100X PC; Serial: 8601-600160-30

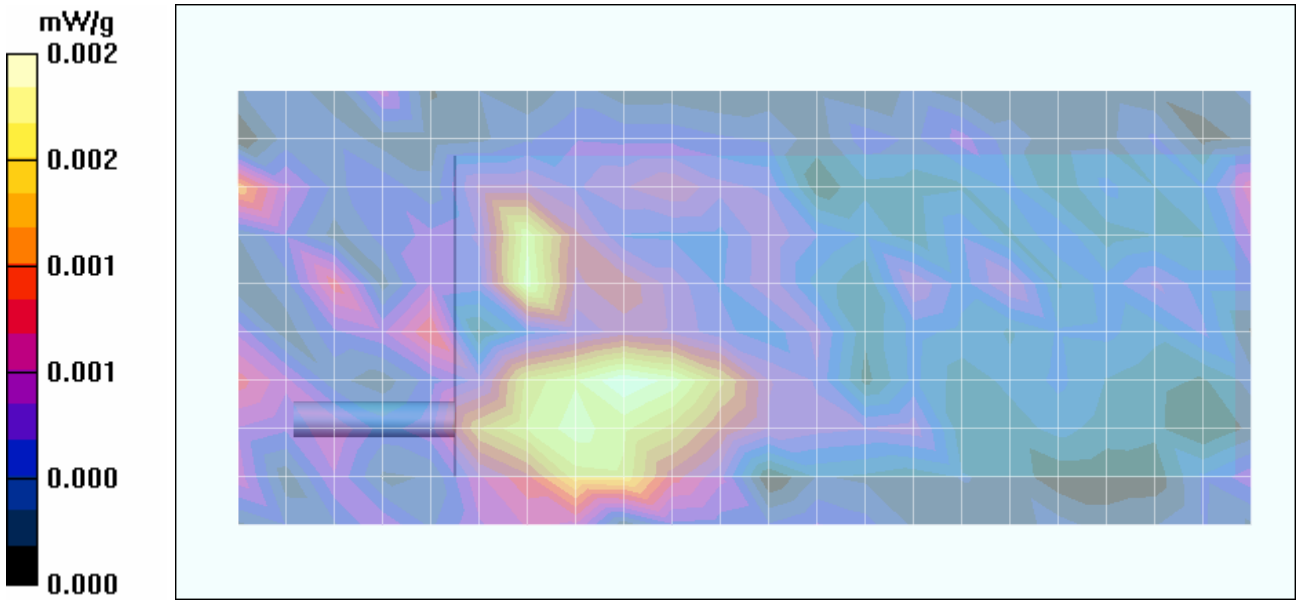
Body-Worn Accessory: None; Audio Accessory: None

Ambient Temp: 25.2 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

7.4V, 3.0Ah Li-ion Battery Pack
Communication System: OFDM WLAN
RF Output Power: 14.85 dBm (Peak Conducted)
Frequency: 2462 MHz; Channel 11; Duty Cycle: 1:1
Medium: M2450 (σ = 2.04 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Body SAR - 802.11g - 24 Mbps - Back Side of DUT Touching Planar Phantom - High Channel
Area Scan (10x22x1): Measurement grid: dx=15mm, dy=15mm
Maximum Peak Value of SAR (measured) = 0.002 mW/g



Date Tested: 05/01/2006

Body SAR - 802.11g - 36 Mbps - 2462 MHz - Back Side of DUT Touching Phantom (0.0 cm Spacing)

DUT: Itronix Model: IX100XUSI-WLBT; Type: WLAN/Bluetooth Combo Module installed in IX100X PC; Serial: 8601-600160-30

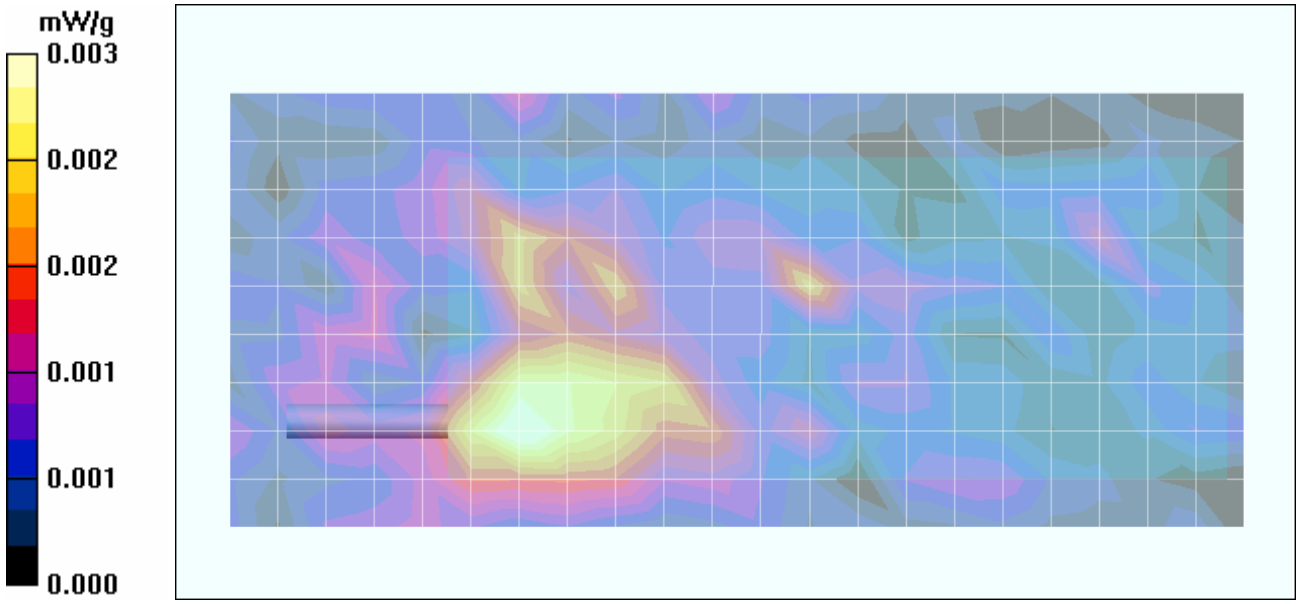
Body-Worn Accessory: None; Audio Accessory: None

Ambient Temp: 25.2 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

7.4V, 3.0Ah Li-ion Battery Pack
Communication System: OFDM WLAN
RF Output Power: 14.69 dBm (Peak Conducted)
Frequency: 2462 MHz; Channel 11; Duty Cycle: 1:1
Medium: M2450 (σ = 2.04 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Body SAR - 802.11g - 36 Mbps - Back Side of DUT Touching Planar Phantom - High Channel
Area Scan (10x22x1): Measurement grid: dx=15mm, dy=15mm
Maximum Peak Value of SAR (measured) = 0.003 mW/g



Date Tested: 05/01/2006

Body SAR - 802.11g - 48 Mbps - 2462 MHz - Back Side of DUT Touching Phantom (0.0 cm Spacing)

DUT: Itronix Model: IX100XUSI-WLBT; Type: WLAN/Bluetooth Combo Module installed in IX100X PC; Serial: 8601-600160-30

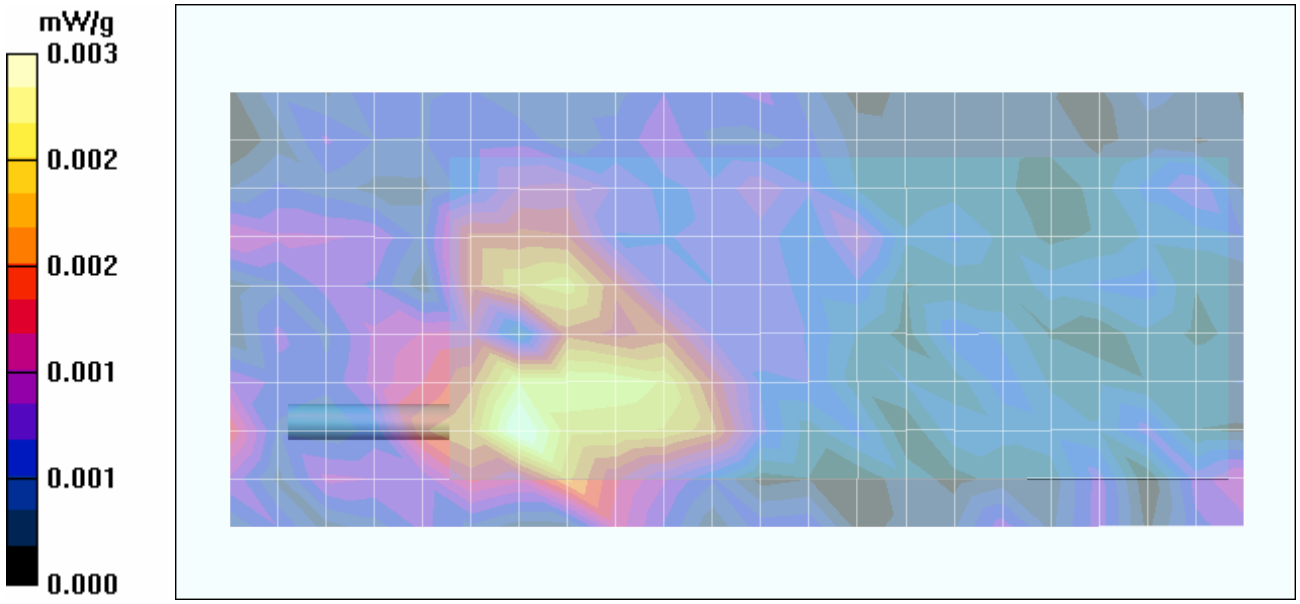
Body-Worn Accessory: None; Audio Accessory: None

Ambient Temp: 25.2 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

7.4V, 3.0Ah Li-ion Battery Pack
Communication System: OFDM WLAN
RF Output Power: 14.98 dBm (Peak Conducted)
Frequency: 2462 MHz; Channel 11; Duty Cycle: 1:1
Medium: M2450 (σ = 2.04 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Body SAR - 802.11g - 48 Mbps - Back Side of DUT Touching Planar Phantom - High Channel
Area Scan (10x22x1): Measurement grid: dx=15mm, dy=15mm
Maximum Peak Value of SAR (measured) = 0.003 mW/g



Date Tested: 05/01/2006

Body SAR - 802.11g - 54 Mbps - 2462 MHz - Back Side of DUT Touching Phantom (0.0 cm Spacing)

DUT: Itronix Model: IX100XUSI-WLBT; Type: WLAN/Bluetooth Combo Module installed in IX100X PC; Serial: 8601-600160-30

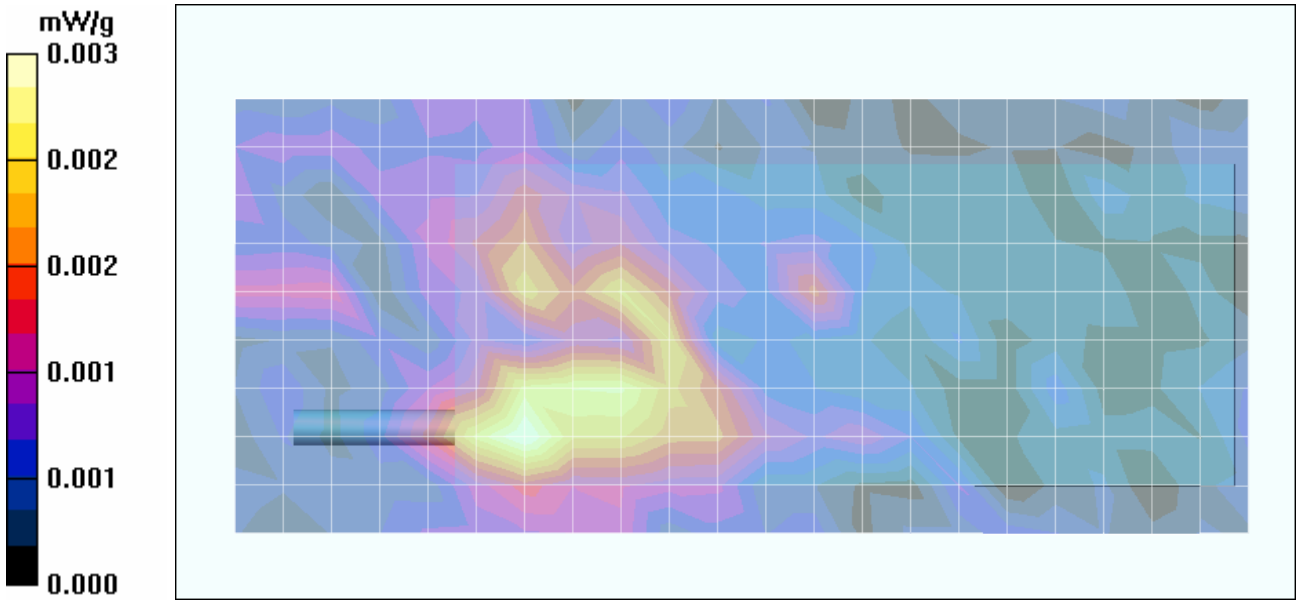
Body-Worn Accessory: None; Audio Accessory: None

Ambient Temp: 25.2 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

7.4V, 3.0Ah Li-ion Battery Pack
Communication System: OFDM WLAN
RF Output Power: 14.91 dBm (Peak Conducted)
Frequency: 2462 MHz; Channel 11; Duty Cycle: 1:1
Medium: M2450 (σ = 2.04 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Body SAR - 802.11g - 54 Mbps - Back Side of DUT Touching Planar Phantom - High Channel
Area Scan (10x22x1): Measurement grid: dx=15mm, dy=15mm
Maximum Peak Value of SAR (measured) = 0.003 mW/g



Date Tested: 05/01/2006

Body-Worn SAR - 802.11g - 54 Mbps - 2462 MHz - Back Side of DUT with Carry Case and Ear-Mic

DUT: Itronix Model: IX100XUSI-WLBT; Type: WLAN/Bluetooth Combo Module installed in IX100X PC; Serial: 8601-600160-30

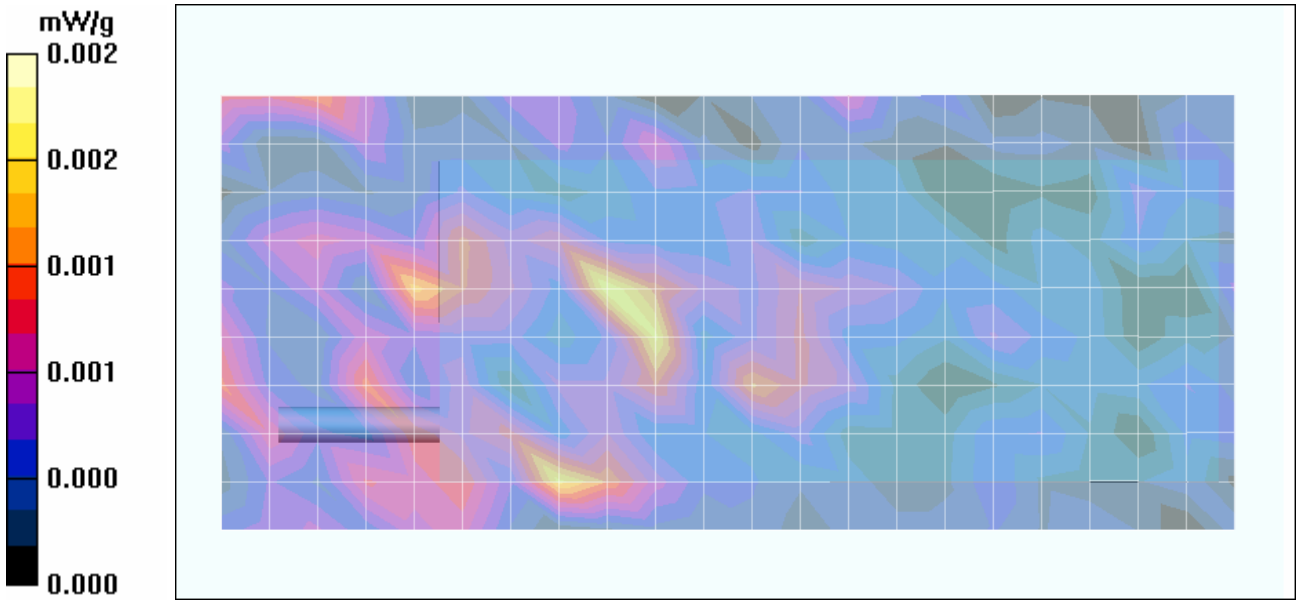
Body-Worn Accessory: Nylon Carry Case (P/N: 77041A); Audio Accessory: Ear-Microphone (Model: JABRA)

Ambient Temp: 25.2 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

7.4V, 3.0Ah Li-ion Battery Pack
Communication System: OFDM WLAN
RF Output Power: 14.91 dBm (Peak Conducted)
Frequency: 2462 MHz; Channel 11; Duty Cycle: 1:1
Medium: M2450 (σ = 2.04 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Body-worn SAR - 802.11g - 54 Mbps - 1.0 cm Carry Case Separation Distance to Planar Phantom - High Channel
Area Scan (10x22x1): Measurement grid: dx=15mm, dy=15mm
Maximum Peak Value of SAR (measured) = 0.002 mW/g



Date Tested: 05/01/2006

Body SAR - 802.11g - 54 Mbps - 2462 MHz - Back Side of DUT Touching Phantom (0.0 cm Spacing) Simultaneous Transmit with Bluetooth

DUT: Itronix Model: IX100XUSI-WLBT; Type: WLAN/Bluetooth Combo Module installed in IX100X PC; Serial: 8601-600160-30

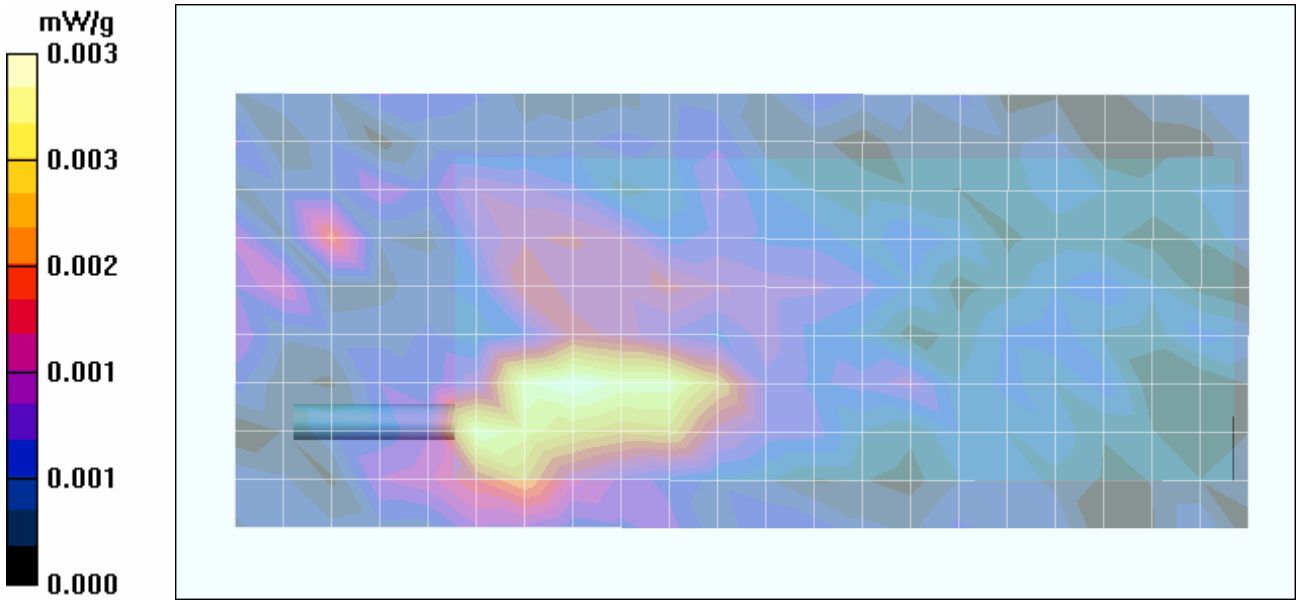
Body-Worn Accessory: None; Audio Accessory: None

Ambient Temp: 25.2 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

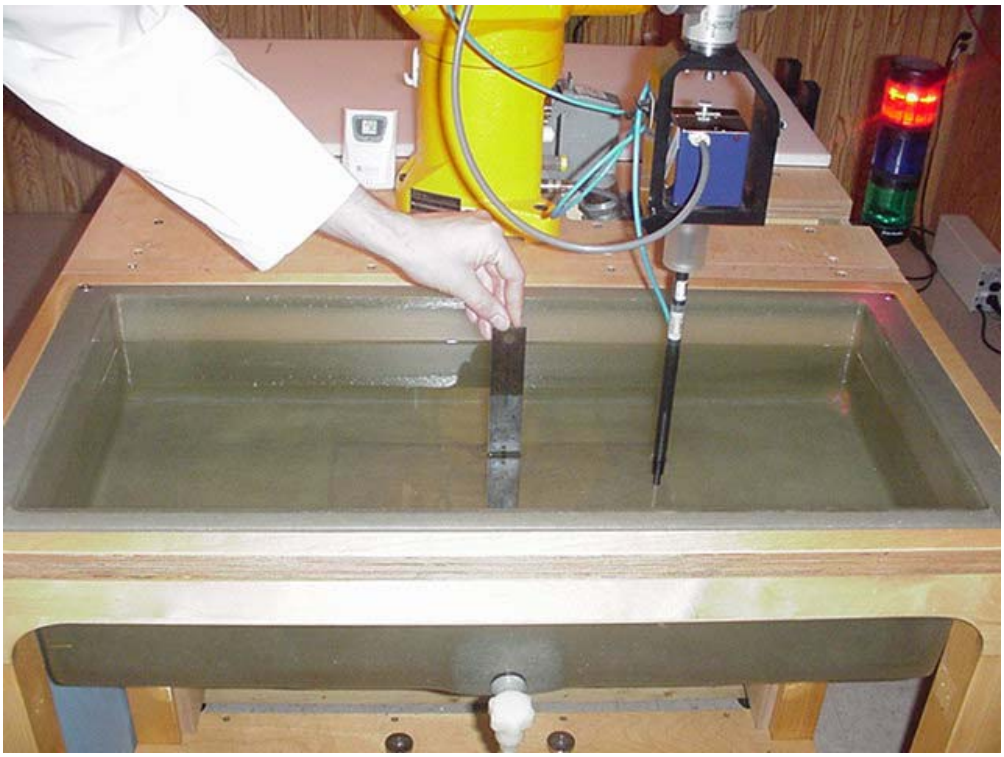
7.4V, 3.0Ah Li-ion Battery Pack
Communication System: OFDM WLAN
RF Output Power: 14.91 dBm (Peak Conducted)
Frequency: 2462 MHz; Channel 11; Duty Cycle: 1:1
RF Output Power: 3.59 dBm (Peak Conducted) Bluetooth
Communication System: Modulated Fixed Frequency (Bluetooth)
Frequency: 2441 MHz; Duty Cycle: 1:1 (Bluetooth)
Medium: M2450 (σ = 2.04 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

Body SAR - 802.11g & Bluetooth - 54 Mbps - Back Side of DUT Touching Planar Phantom - High Channel
Area Scan (10x22x1): Measurement grid: dx=15mm, dy=15mm
Maximum Peak Value of SAR (measured) = 0.003 mW/g



Fluid Depth (≥ 15 cm)



APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Date Tested: 05/01/2006

System Performance Check (Body) - 2450 MHz Dipole

DUT: Dipole 2450 MHz; Model: D2450V2; Type: System Performance Check; Serial: 150; Validation: 04/24/2006

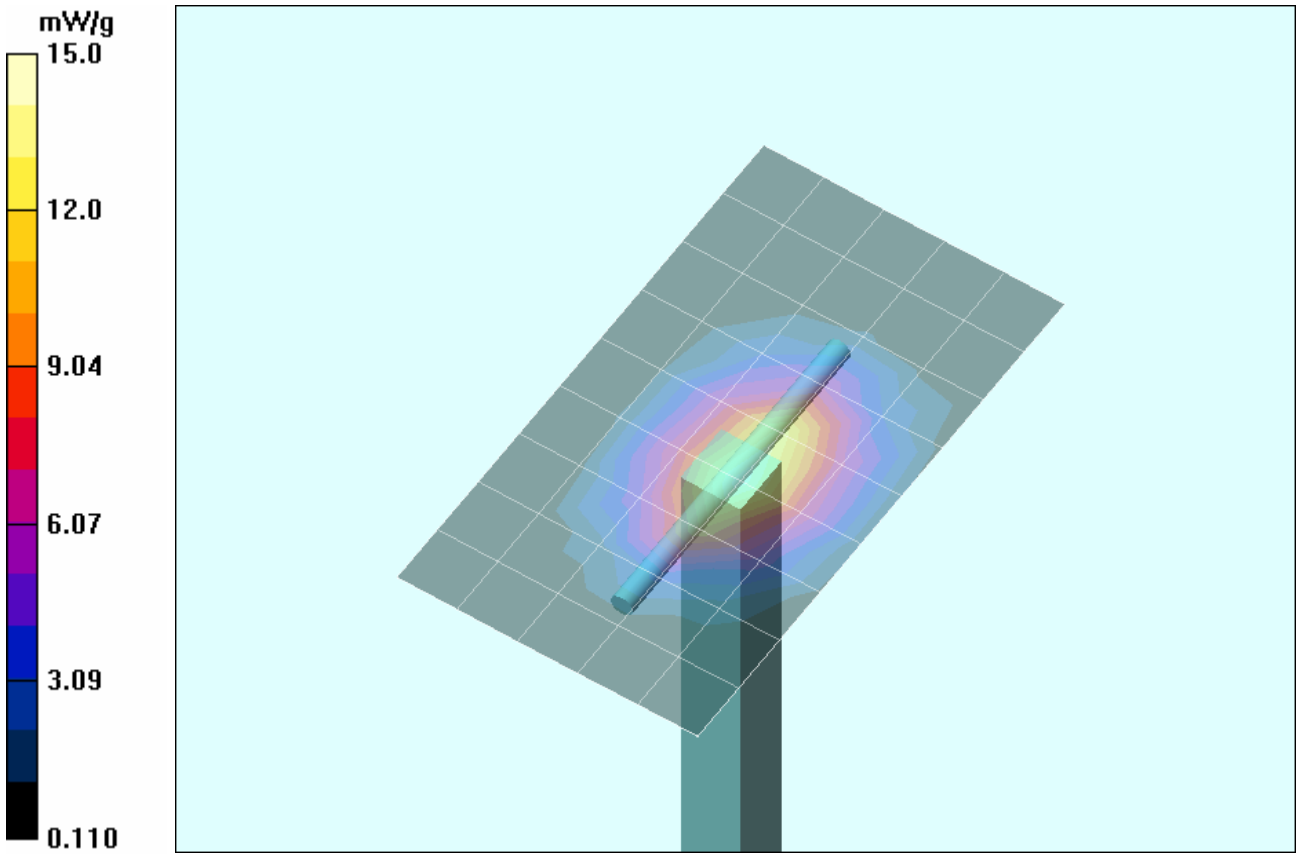
Ambient Temp: 25.2 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.8 kPa; Humidity: 30%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: M2450 (σ = 2.04 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3)

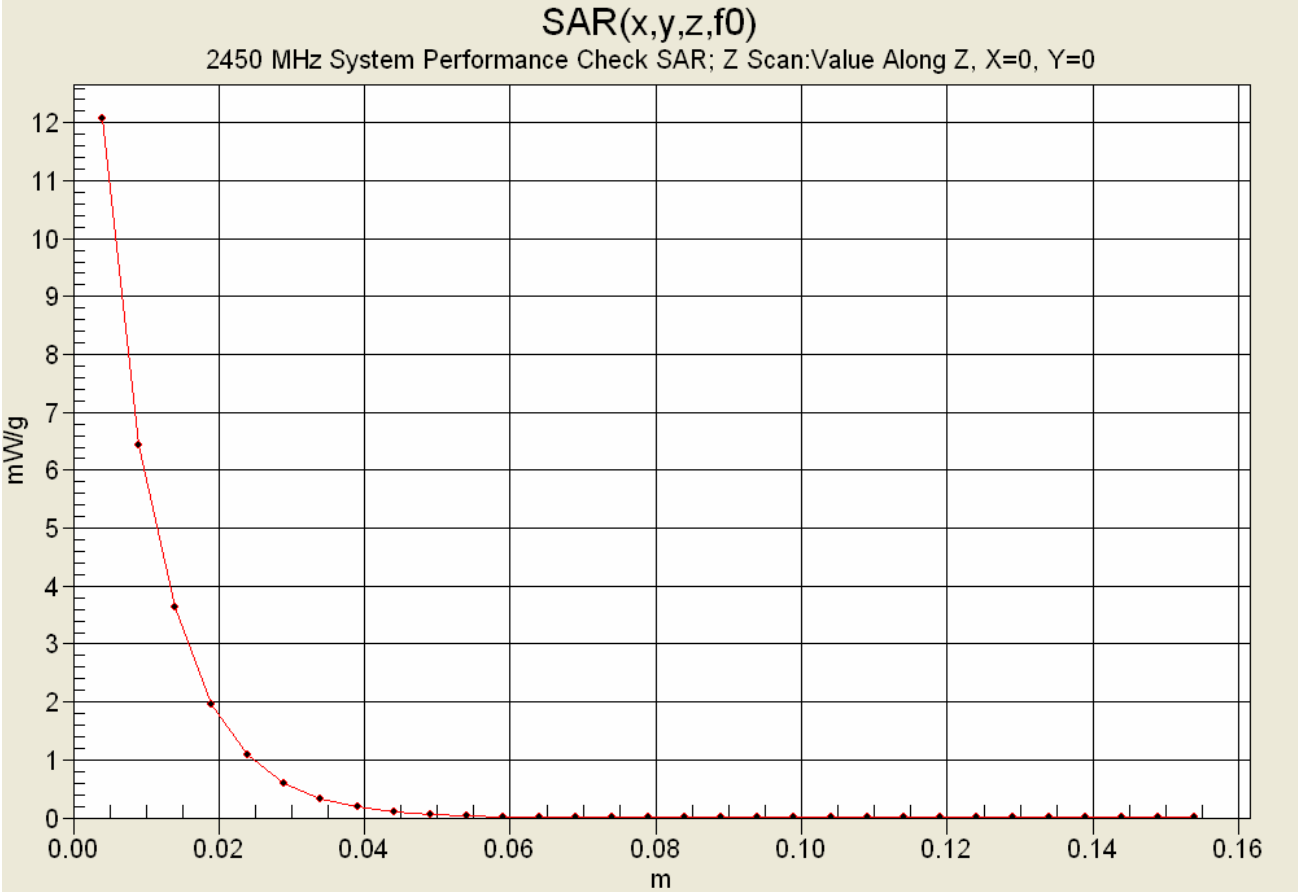
- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

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 = 80.8 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 30.0 W/kg
SAR(1 g) = 13.5 mW/g; SAR(10 g) = 6.24 mW/g



Z-Axis Scan



APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

2450 MHz System Performance Check & DUT Evaluation (Body)

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Mon 01/May/2006
Frequency (GHz)
FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

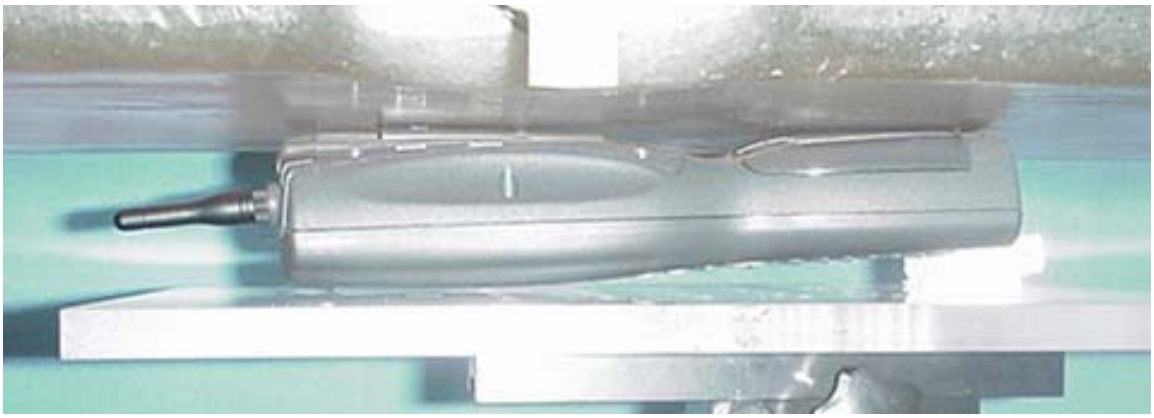
****

Freq	FCC_eB	FCC_sB	Test_e	Test_s
2.3500	52.83	1.85	52.26	1.92
2.3600	52.82	1.86	52.21	1.93
2.3700	52.81	1.87	52.20	1.92
2.3800	52.79	1.88	52.04	1.96
2.3900	52.78	1.89	52.15	1.96
2.4000	52.77	1.90	51.96	1.97
2.4100	52.75	1.91	51.96	1.99
2.4200	52.74	1.92	51.95	2.01
2.4300	52.73	1.93	51.78	2.02
2.4400	52.71	1.94	51.71	2.02
2.4500	52.70	1.95	51.92	2.04
2.4600	52.69	1.96	51.72	2.06
2.4700	52.67	1.98	51.85	2.08
2.4800	52.66	1.99	51.86	2.08
2.4900	52.65	2.01	51.65	2.10
2.5000	52.64	2.02	51.64	2.10
2.5100	52.62	2.04	51.66	2.12
2.5200	52.61	2.05	51.55	2.12
2.5300	52.60	2.06	51.50	2.15
2.5400	52.59	2.08	51.43	2.16
2.5500	52.57	2.09	51.32	2.16

APPENDIX D - SAR TEST SETUP PHOTOGRAPHS

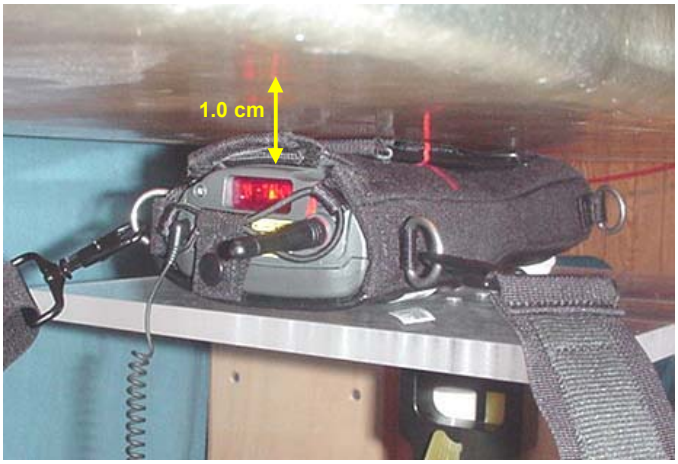
BODY SAR TEST SETUP PHOTOGRAPHS

Back Side of IX100X Handheld PC Touching Planar Phantom



BODY-WORN SAR TEST SETUP PHOTOGRAPHS

IX100X with Carry Case, Shoulder Strap and Ear-Microphone Accessories
(1.0 cm Carry Case Thickness between Back Side of IX100X and Planar Phantom)



APPENDIX E - SYSTEM VALIDATION

2450 MHz SYSTEM VALIDATION DIPOLE

Type:	**2450 MHz Validation Dipole**
Asset Number:	**00025**
Serial Number:	**150**
Place of Validation:	**Celltech Labs Inc.**
Date of Validation:	**April 24, 2006**

Celltech Labs Inc. hereby certifies that the 2450 MHz System Validation (Body) was performed on the date indicated above.

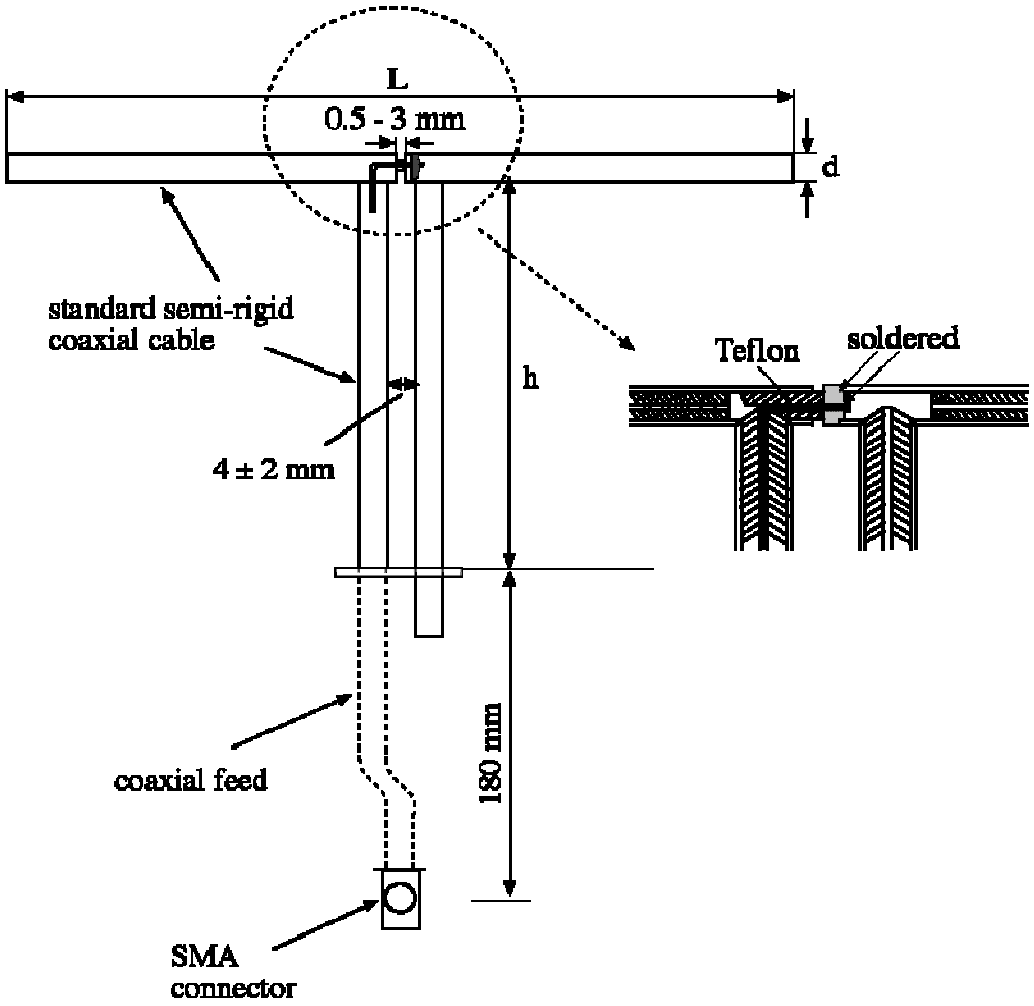
Performed by:	**Sean Johnston**
Approved by:	**Spencer Watson**

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

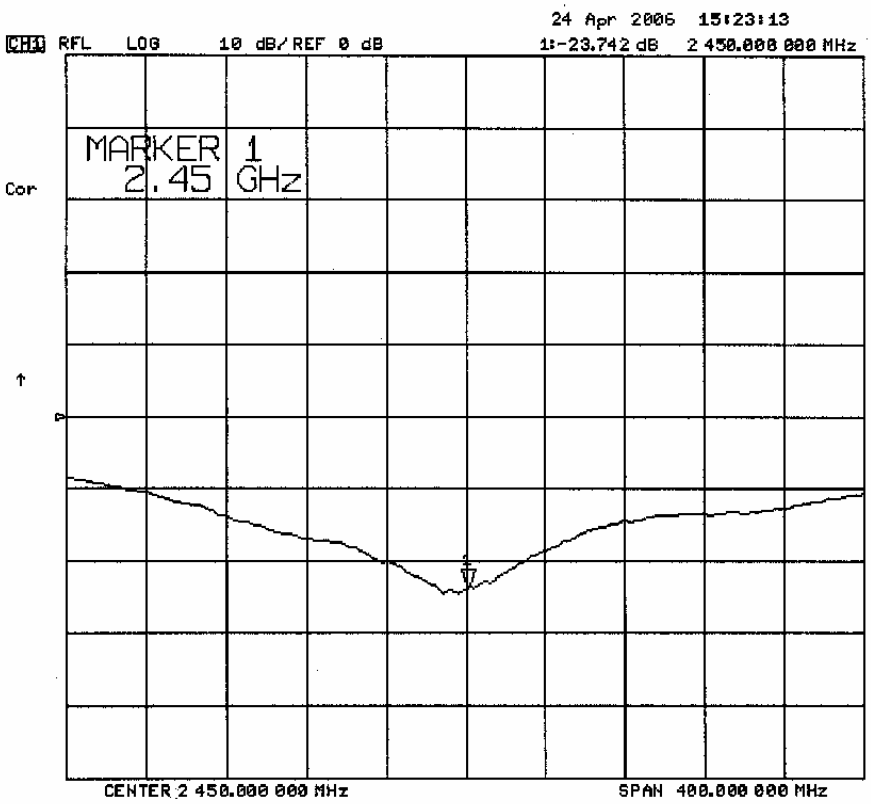
1. Dipole Construction & Electrical Characteristics

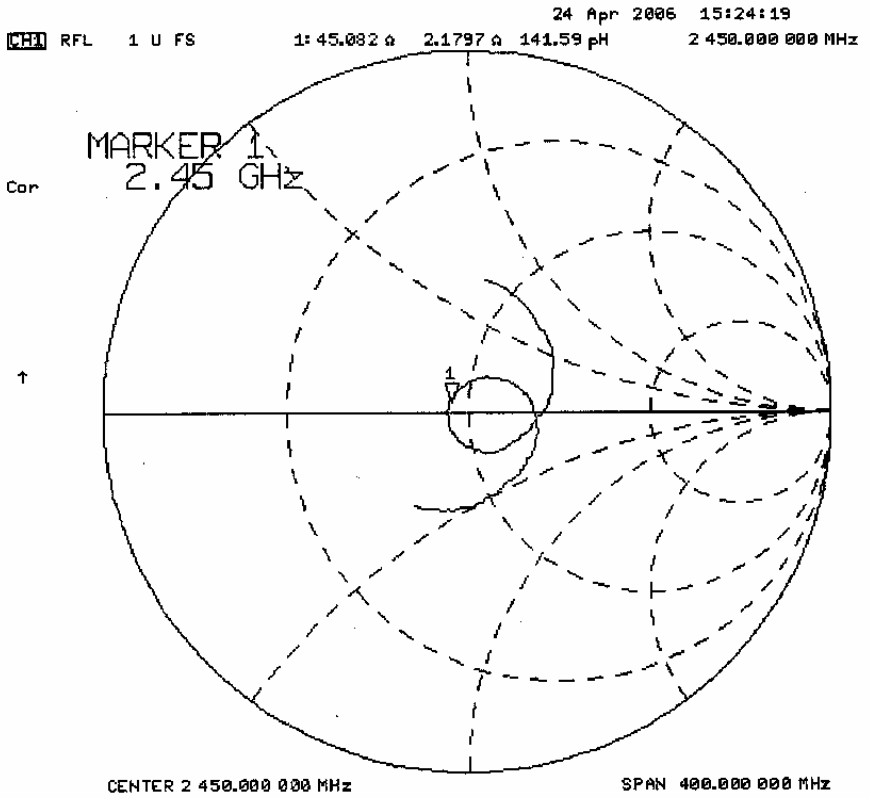
The validation dipole was constructed in accordance with the IEEE Std "Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques". The electrical properties were measured using an HP 8753E Network 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} = 45.082Ω
	Im{Z} = 2.1797Ω
Return Loss at 2450 MHz	-23.742dB



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. 72 liters
Dimensions: L) 94 cm x (W) 44 cm x (H) 22 cm

5. 2450 MHz System Validation Setup

6. 2450 MHz Dipole Setup

7. Measurement Conditions

The planar phantom was filled with 2450 MHz Body tissue simulant:

Relative Permittivity: 51.2 (-2.8% deviation from target)
Conductivity: 1.89 mho/m (-3% deviation from target)
Fluid Temperature: 23.9 °C
Fluid Depth: ≥ 15.0 cm

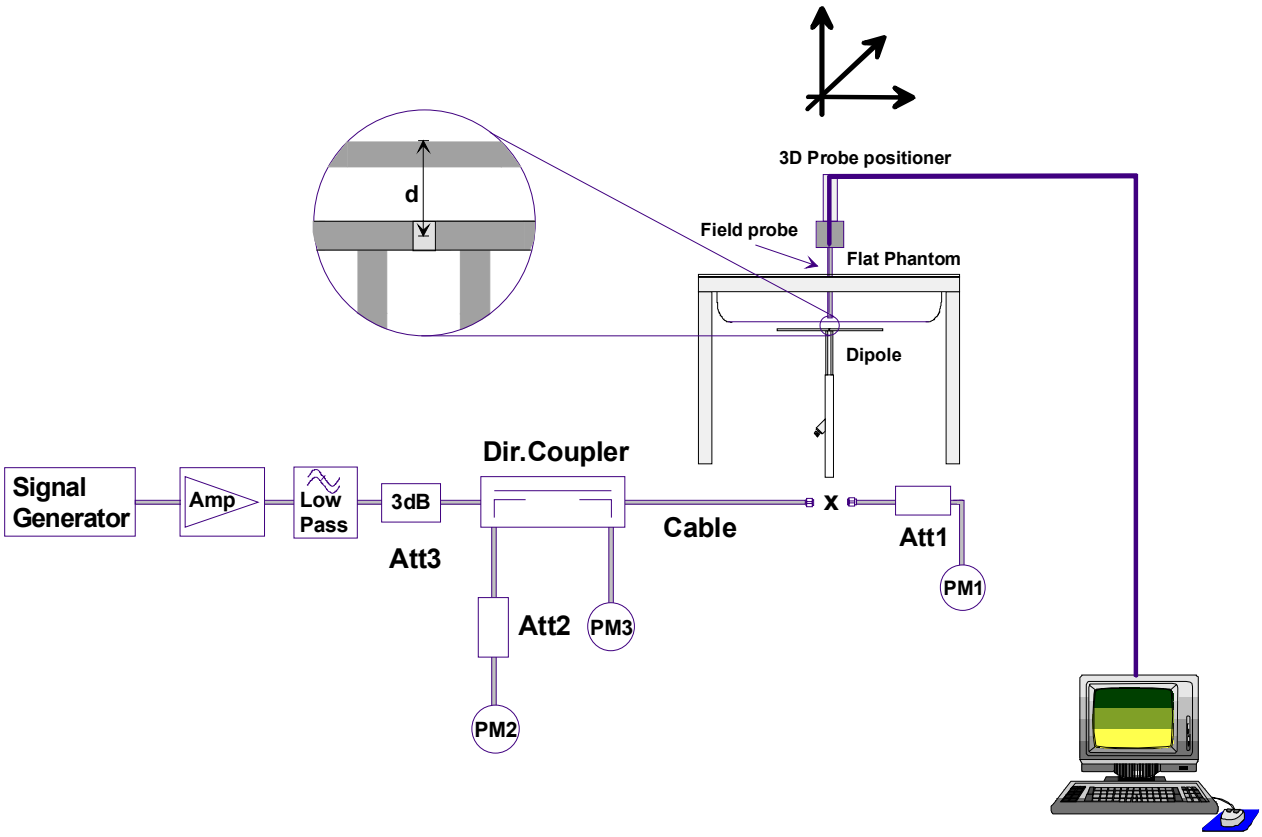
Environmental Conditions:
Ambient Temperature: 24.9 °C
Humidity: 30 %
Barometric Pressure: 101.1 kPa

The 2450 MHz Body tissue simulant consisted 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

Measurements were made at the planar section of the SAM phantom using a dosimetric E-field probe ET3DV6 (S/N: 1590, conversion factor 4.22). 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	12.7	50.80	5.87	23.48	14.40
Test 2	12.8	51.20	5.88	23.52	14.40
Test 3	12.6	50.40	5.81	23.24	14.10
Test 4	13.1	52.40	6.05	24.20	14.70
Test 5	12.7	50.80	5.84	23.36	14.20
Test 6	12.6	50.40	5.79	23.16	14.10
Test 7	12.9	51.60	6.00	24.00	14.50
Test 8	12.9	51.60	5.99	23.96	14.50
Test 9	13.1	52.40	6.09	24.36	14.80
Test10	13.2	52.80	6.09	24.36	14.90
Average Value	**12.86**	**51.44**	**5.94**	**23.76**	**14.46**

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%	51.44	+0.47%	23.7	+/- 10%	23.76	+0.27%

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 Dipole - System Validation (Body) - April 24, 2006

DUT: Dipole 2450 MHz; Model: D2450V2; Serial: 150; Validated: 04/24/2006
Ambient Temp: 24.9 ºC; Fluid Temp: 23.9 ºC; Barometric Pressure: 101.1 kPa; Humidity: 30%
Communication System: CW
Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: M2450 (σ = 1.89 mho/m; ε_r = 51.2; ρ = 1000 kg/m^3)
- Probe: ET3DV6 - SN1590; ConvF(4.22, 4.22, 4.22); Calibrated: 20/05/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 161

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

2450 MHz System Validation/Zoom Scan 1 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.0 V/m; Power Drift = -0.104 dB
SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.87 mW/g
Maximum value of SAR (measured) = 14.4 mW/g

2450 MHz System Validation/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 83.9 V/m; Power Drift = -0.070 dB
SAR(1 g) = 12.8 mW/g; SAR(10 g) = 5.88 mW/g
Maximum value of SAR (measured) = 14.4 mW/g

2450 MHz System Validation/Zoom Scan 3 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.1 V/m; Power Drift = -0.039 dB
SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.81 mW/g
Maximum value of SAR (measured) = 14.1 mW/g

2450 MHz System Validation/Zoom Scan 4 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.2 V/m; Power Drift = -0.026 dB
SAR(1 g) = 13.1 mW/g; SAR(10 g) = 6.05 mW/g
Maximum value of SAR (measured) = 14.7 mW/g

2450 MHz System Validation/Zoom Scan 5 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 83.3 V/m; Power Drift = 0.014 dB
SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.84 mW/g
Maximum value of SAR (measured) = 14.2 mW/g

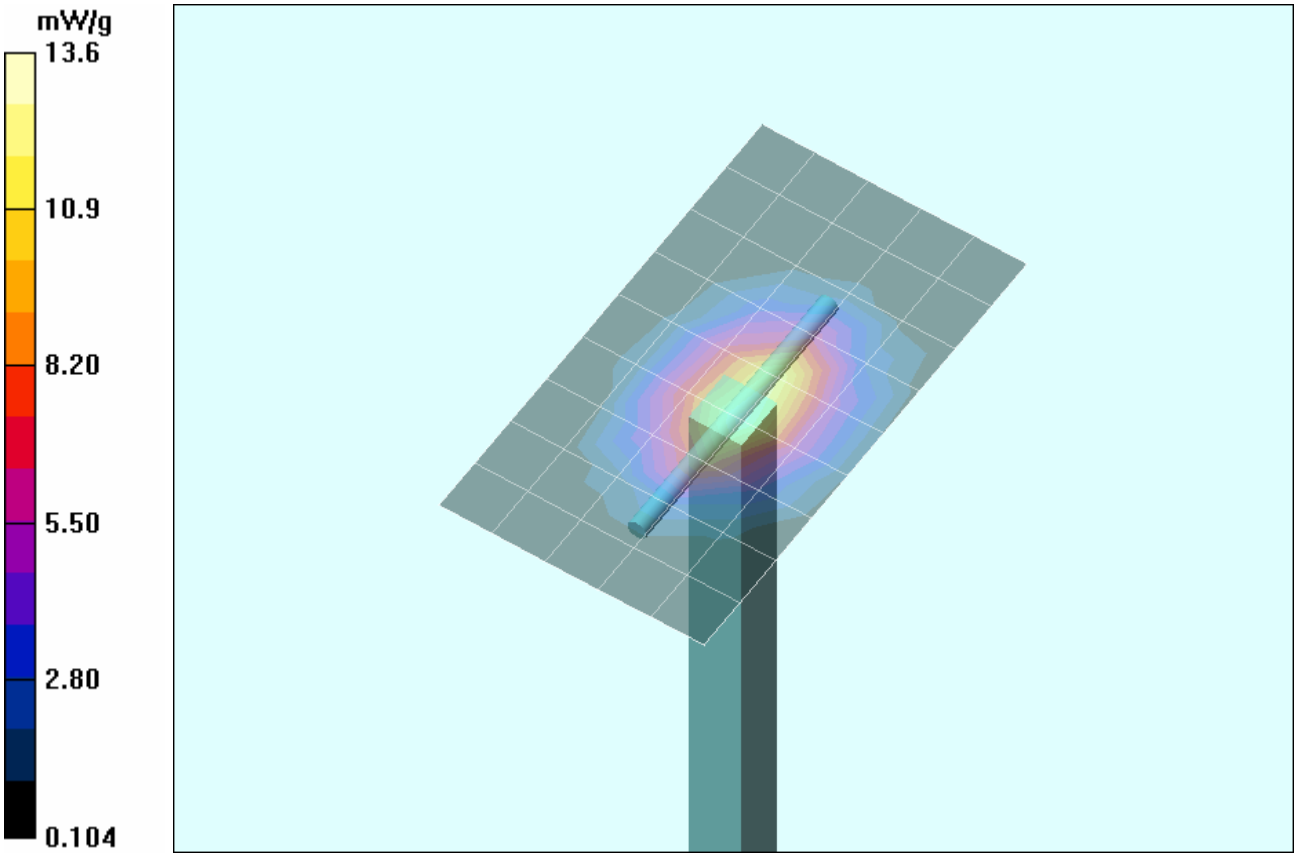
2450 MHz System Validation/Zoom Scan 6 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.5 V/m; Power Drift = -0.037 dB
SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.79 mW/g
Maximum value of SAR (measured) = 14.1 mW/g

2450 MHz System Validation/Zoom Scan 7 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.0 V/m; Power Drift = -0.078 dB
SAR(1 g) = 12.9 mW/g; SAR(10 g) = 6 mW/g
Maximum value of SAR (measured) = 14.5 mW/g

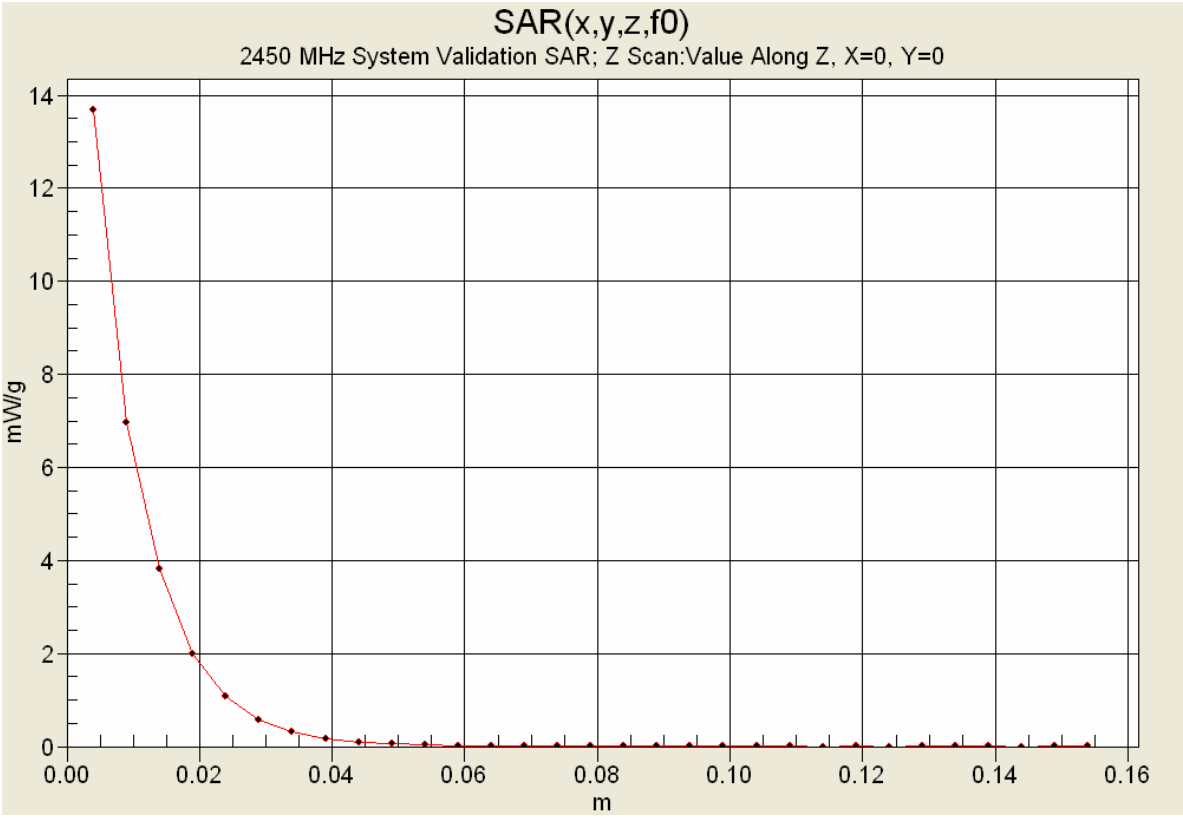
2450 MHz System Validation/Zoom Scan 8 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.1 V/m; Power Drift = -0.069 dB
SAR(1 g) = 12.9 mW/g; SAR(10 g) = 5.99 mW/g
Maximum value of SAR (measured) = 14.5 mW/g

2450 MHz System Validation/Zoom Scan 9 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.8 V/m; Power Drift = -0.076 dB
SAR(1 g) = 13.1 mW/g; SAR(10 g) = 6.09 mW/g
Maximum value of SAR (measured) = 14.8 mW/g

2450 MHz System Validation/Zoom Scan 10 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.8 V/m; Power Drift = -0.013 dB
SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.09 mW/g
Maximum value of SAR (measured) = 14.9 mW/g



1 g average of 10 measurements: 12.86 mW/g
10 g average of 10 measurements: 5.94 mW/g



10. Measured Fluid Dielectric Parameters

2450 MHz System Validation (Body)

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Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Mon 24/Apr/2006
Frequency(GHz)
FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eB	FCC_sB	Test_e	Test_s
2.3500	52.83	1.85	51.24	1.76
2.3600	52.82	1.86	51.30	1.78
2.3700	52.81	1.87	51.30	1.79
2.3800	52.79	1.88	51.28	1.81
2.3900	52.78	1.89	51.28	1.82
2.4000	52.77	1.90	51.22	1.81
2.4100	52.75	1.91	51.26	1.85
2.4200	52.74	1.92	51.13	1.85
2.4300	52.73	1.93	51.03	1.86
2.4400	52.71	1.94	51.10	1.86
2.4500	52.70	1.95	51.17	1.89
2.4600	52.69	1.96	51.07	1.92
2.4700	52.67	1.98	51.03	1.92
2.4800	52.66	1.99	51.04	1.92
2.4900	52.65	2.01	51.04	1.93
2.5000	52.64	2.02	51.04	1.93
2.5100	52.62	2.04	50.96	1.95
2.5200	52.61	2.05	50.94	1.97
2.5300	52.60	2.06	51.02	1.97
2.5400	52.59	2.08	50.97	1.99
2.5500	52.57	2.09	50.85	1.98

APPENDIX F - PROBE CALIBRATION

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

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

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

Accreditation No.: SCS 108

Client Celltech

Certificate No: ET3-1590_May05

CALIBRATION CERTIFICATE

Object: ET3DV6 - SN:1590

Calibration procedure(s): QA CAL-01.v5
Calibration procedure for dosimetric E-field probes

Calibration date: May 20, 2005

Condition of the calibrated item: In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-04 (METAS, No. 251-00403)	Aug-05
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-04 (METAS, No. 251-00404)	Aug-05
Reference Probe ES3DV2	SN: 3013	7-Jan-05 (SPEAG, No. ES3-3013_Jan05)	Jan-06
DAE4	SN: 617	19-Jan-05 (SPEAG, No. DAE4-617_Jan05)	Jan-06

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

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

Issued: May 21, 2005

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

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

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

Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ET3DV6

SN:1590

Manufactured:	March 19, 2001
Last calibrated:	May 24, 2004
Recalibrated:	May 20, 2005

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1590

Sensitivity in Free Space[A]

NormX	**1.82** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**87** mV
NormY	**1.97** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**87** mV
NormZ	**1.70** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**87** mV

Diode Compression[B]

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	7.6	3.9
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

TSL **1810 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	11.8	8.3
SAR_{be} [%]	With Correction Algorithm	0.6	0.1

Sensor Offset

Probe Tip to Sensor Center	**2.7** mm

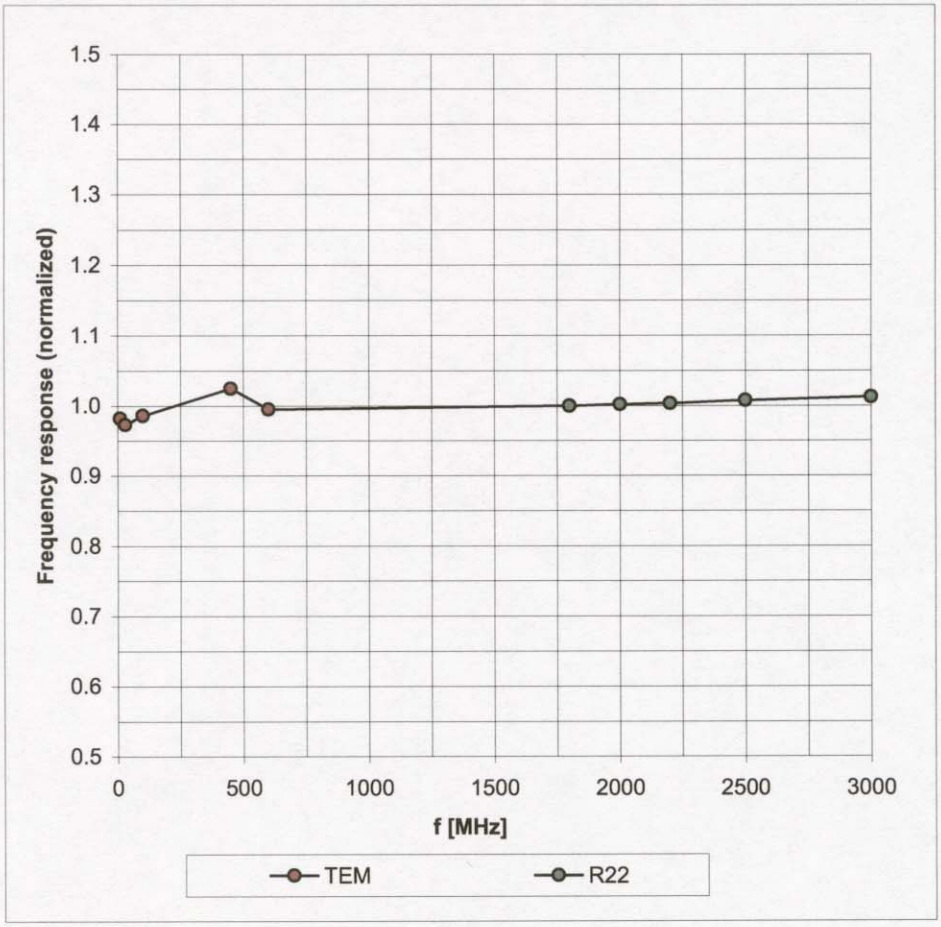
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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

[B] Numerical linearization parameter: uncertainty not required.

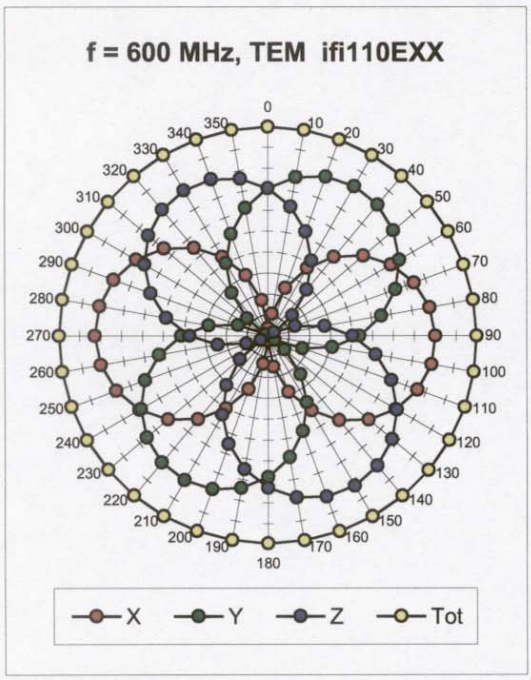
Frequency Response of E-Field

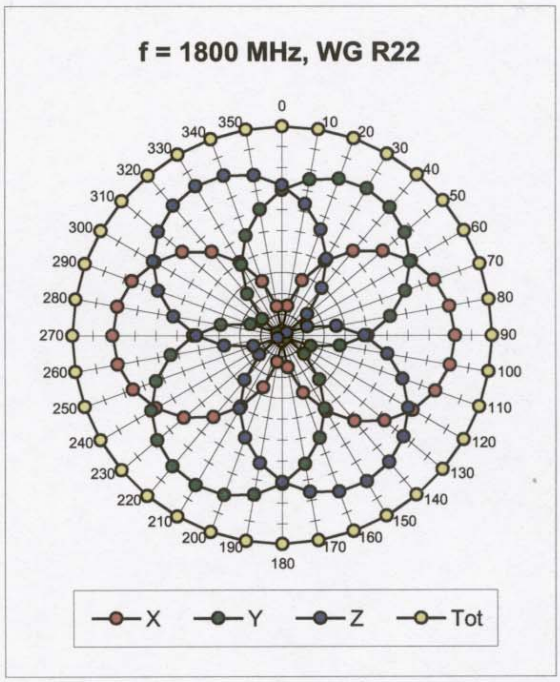
(TEM-Cell:ifi110 EXX, Waveguide: R22)

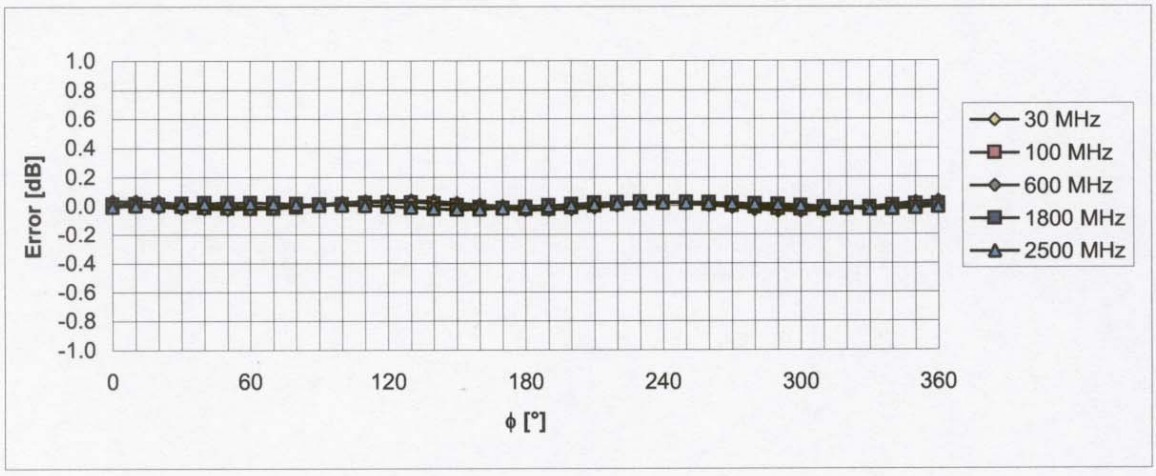


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



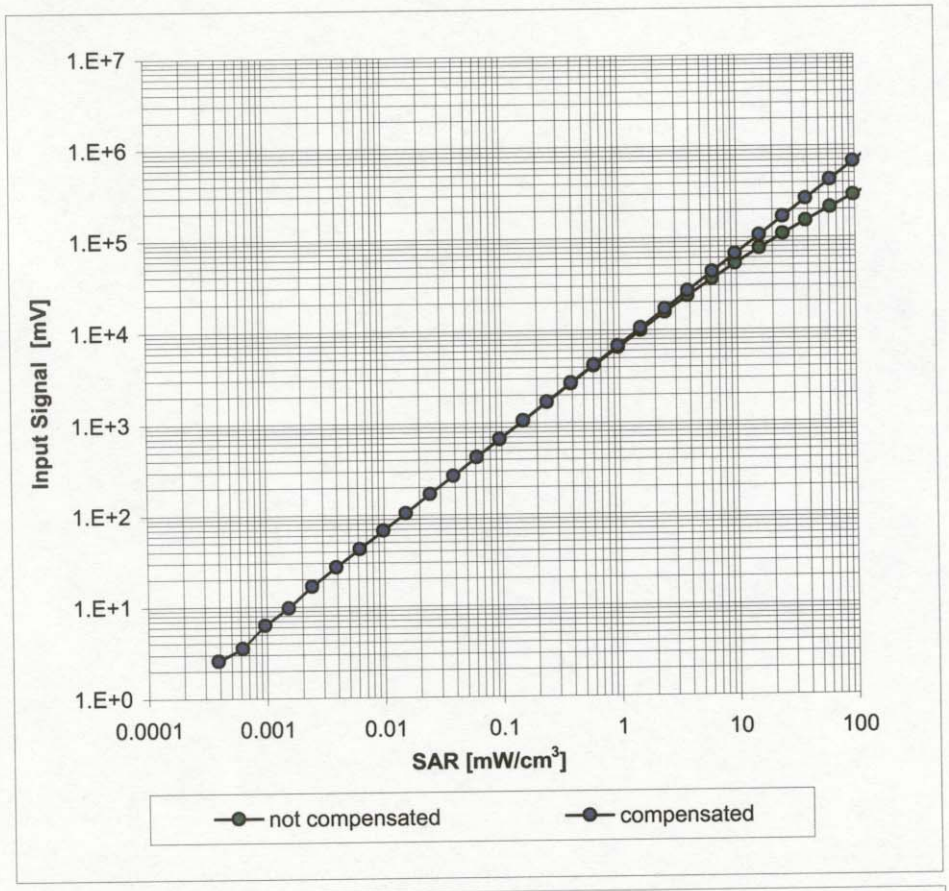


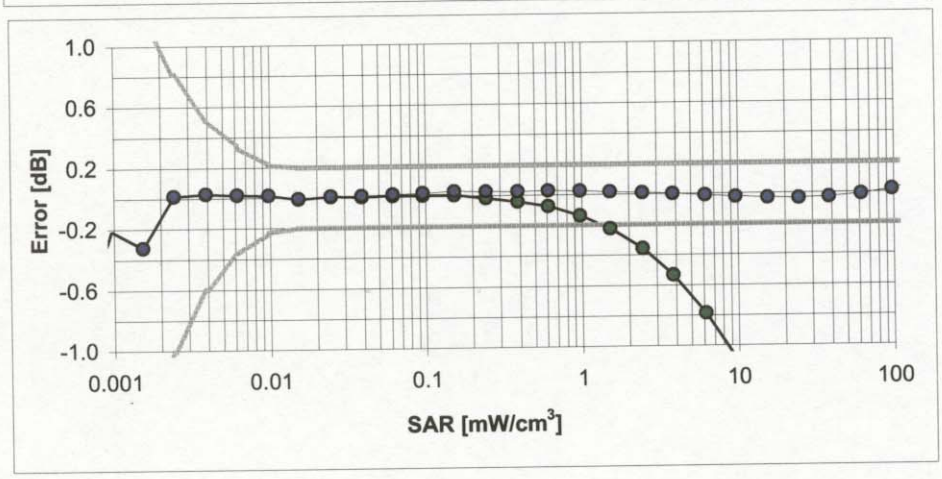


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

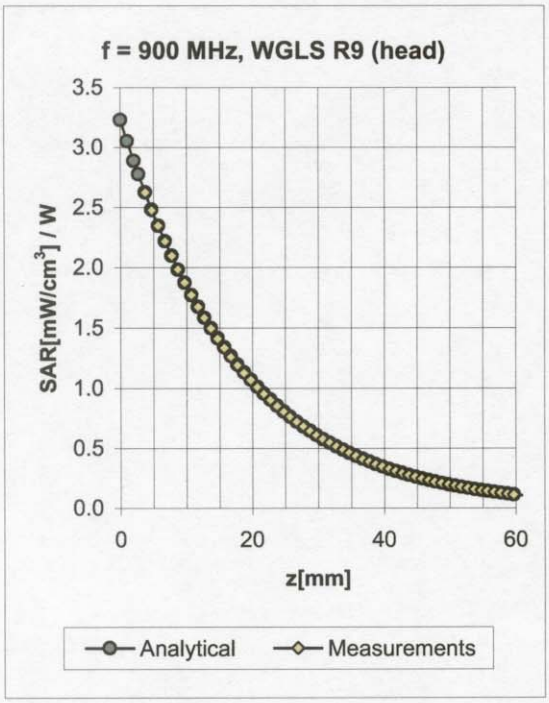
(Waveguide R22, f = 1800 MHz)

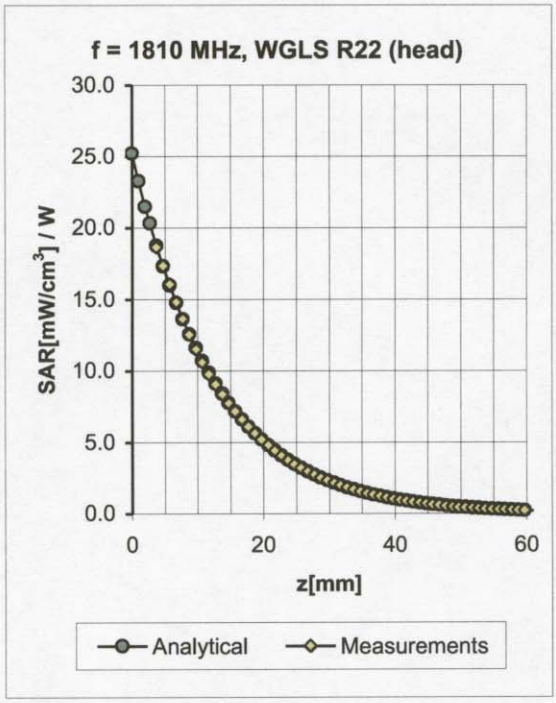




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



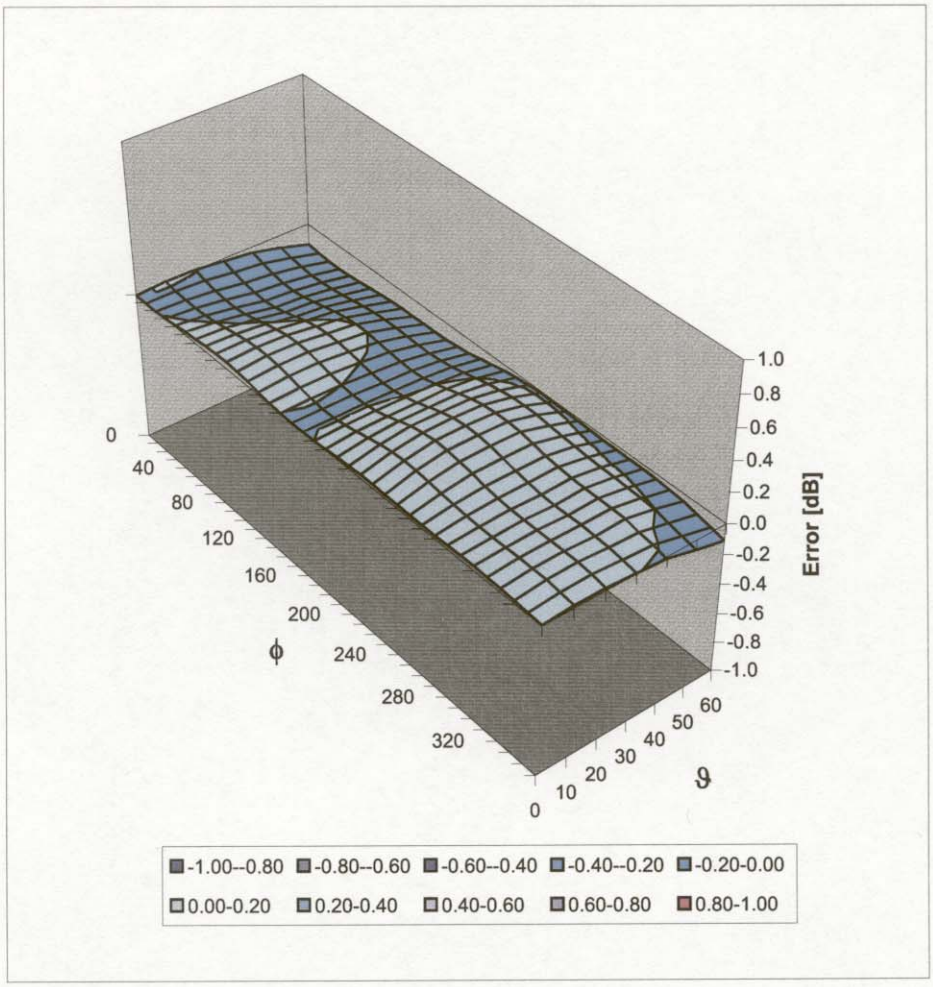


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.54	1.81	6.67 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.46	2.62	5.44 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.50	2.53	4.56 ± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.46	2.09	6.47 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.44	3.00	4.85 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.50	2.42	4.22 ± 11.8% (k=2)

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

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

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s p e a g

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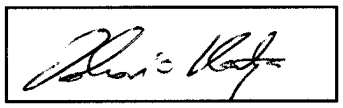
Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1590**
Place of Assessment:	**Zurich**
Date of Assessment:	**May 23, 2005**
Probe Calibration Date:	**May 20, 2005**

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:



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Dosimetric E-Field Probe ET3DV6 SN:1590

Conversion factor (± standard deviation)

f = 150 MHz	ConvF	**9.1 ± 10%**	**ε_r = 52.3 ± 5%** **σ = 0.76 ± 5% mho/m** (head tissue)
f = 300 MHz	ConvF	**8.1 ± 9%**	**ε_r = 45.3 ± 5%** **σ = 0.87 ± 5% mho/m** (head tissue)
f = 450 MHz	ConvF	**7.8 ± 8%**	**ε_r = 43.5 ± 5%** **σ = 0.87 ± 5% mho/m** (head tissue)
f = 150 MHz	ConvF	**8.6 ± 10%**	**ε_r = 61.9 ± 5%** **σ = 0.80 ± 5% mho/m** (body tissue)
f = 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

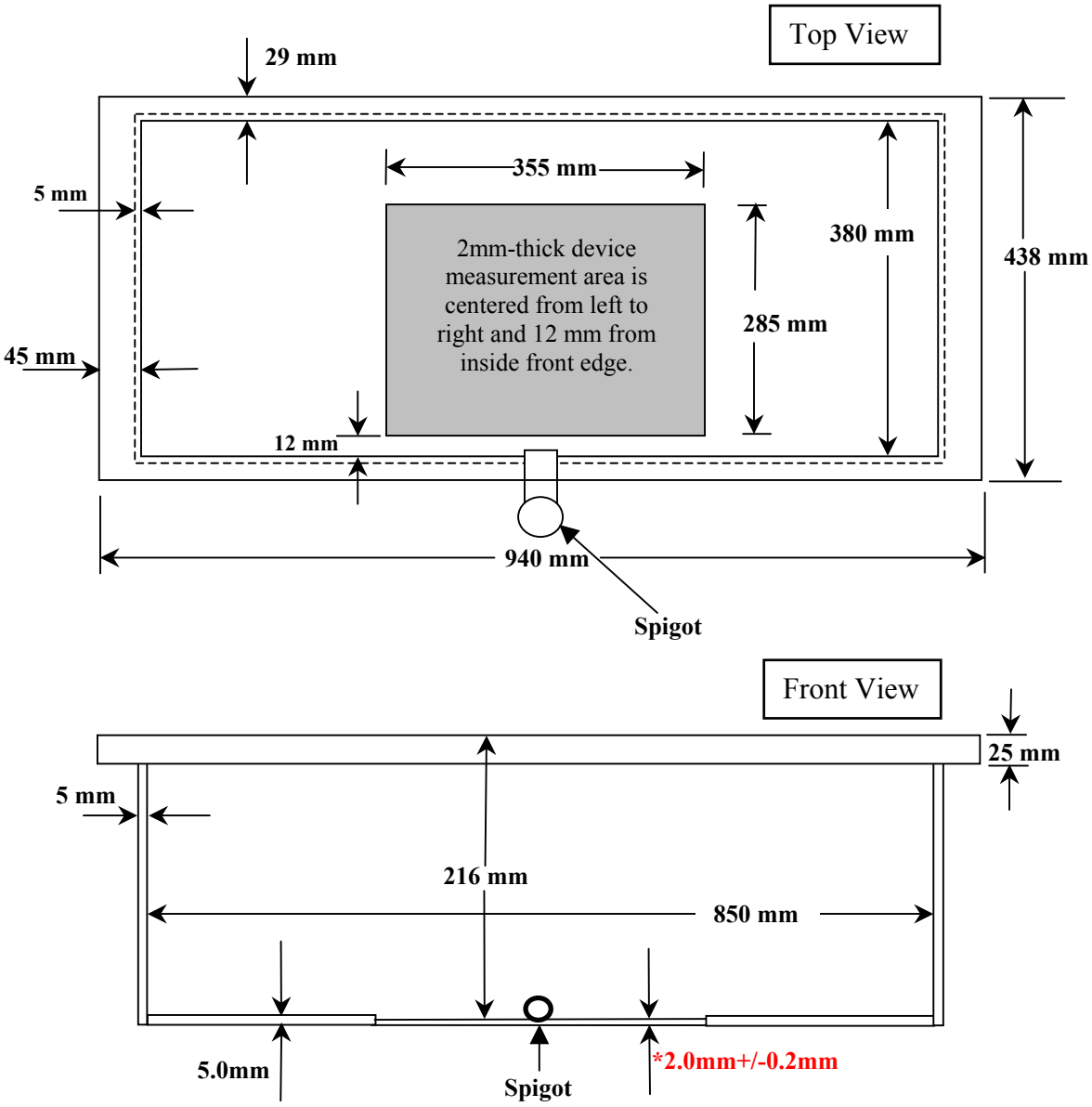
Fiberglass Planar Phantom - Front View

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.