

	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

## 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


**Celltech Compliance Testing & Engineering Lab  
(Celltech Labs Inc.)  
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Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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## DECLARATION OF COMPLIANCE SAR RF EXPOSURE EVALUATION

<b>Test Lab and Location</b>  <b>CELLTECH LABS INC.</b> Testing and Engineering Services 1955 Moss Court Kelowna, B.C. Canada V1Y 9L3 Phone: 250-448-7047 Fax: 250-448-7046 e-mail: info@celltechlabs.com web site: www.celltechlabs.com		<b>Company Information</b>  <b>ITRONIX CORPORATION</b> 12825 E. Mirabeau Parkway Spokane Valley, WA 99216 United States	
<b>FCC IDENTIFIER:</b> <b>IC IDENTIFIER:</b> <b>Model(s):</b>		<b>KBCIX100XUSI-WLBT</b> <b>1943A-IX100Xg</b> <b>IX100XUSI-WLBT</b>	
<b>Rule Part(s):</b> <b>Test Procedure(s):</b>  <b>FCC Device Classification(s):</b> <b>IC Device Classification:</b>		<b>FCC 47 CFR §2.1093; Health Canada Safety Code 6</b> <b>FCC OET Bulletin 65, Supplement C (Edition 01-01)</b> <b>Industry Canada RSS-102 Issue 2</b> <b>WLAN: Digital Transmission System (DTS) - §15C</b> <b>Bluetooth: Part 15 Spread Spectrum Transmitter (DSS) - §15C</b> <b>Low Power License-Exempt Radiocommunication Device (RSS-210 Issue 6)</b>	
<b>Internal Transmitter Type:</b> <b>Host PC Type:</b> <b>Mode(s) of Operation:</b>  <b>Transmit Frequency Range(s):</b>  <b>Max. RF Output Power Tested:</b>  <b>Date Rate(s):</b>  <b>Battery Type(s) Tested:</b> <b>Antenna Type(s) Tested:</b>		<b>802.11bg WLAN / Bluetooth Combo Module (Model: WM-BG-MR-01)</b> <b>Itronix IX100X Series Rugged Handheld PC</b> <b>DSSS (Direct Sequence Spread Spectrum) - 802.11b</b> <b>OFDM (Orthogonal Frequency Division Multiplexing) - 802.11g</b> <b>FHSS (Frequency Hopping Spread Spectrum) - Bluetooth</b> <b>2412 - 2462 MHz (WLAN)</b> <b>2402 - 2480 MHz (Bluetooth)</b> <b>15.93 dBm (39.17 mW) - Peak Conducted (802.11b)</b> <b>14.98 dBm (31.48 mW) - Peak Conducted (802.11g)</b> <b>3.59 dBm (2.29 mW) - Peak Conducted (Bluetooth)</b> <b>802.11b: 1 / 2 / 5.5 / 11 Mbps</b> <b>802.11g: 6 / 9 / 12 / 18 / 24 / 36 / 48 / 54 Mbps</b> <b>Lithium-ion 7.4 V, 3.0 Ah (P/N: 46-0155-001)</b> <b>WLAN - Internal Dipole (Front Side above LCD Display)</b> <b>Bluetooth - Internal Printed Circuit (Right Side of LCD Display)</b>	
<b>Body-Worn Accessories Tested:</b> <b>Audio Accessories Tested:</b>		<b>Nylon Carry Case with Shoulder Strap (P/N: 77041A)</b> <b>Ear-Microphone (Model: JABRA)</b>	
<b>Max. SAR Level(s) Evaluated:</b>		<b>Body - 802.11b/g: 0.003 W/kg (Peak SAR measured from Area Scan)</b>	

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.


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### Test Report Approved By:

**Sean Johnston**  
**SAR Lab Manager**  
**Celltech Labs Inc.**




Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
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### 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

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## 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.

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## 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.

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## 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  $\pm 10\%$  (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 $\epsilon_r$			Conductivity $\sigma$ (mho/m)			$\rho$ (Kg/m <sup>3</sup> )	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 $\pm 10\%$	13.5	+5.5%	52.7 $\pm 5\%$	51.9	-1.5%	1.95 $\pm 5\%$	2.04	+4.6%	1000	25.2	23.9	$\geq 15$	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.														

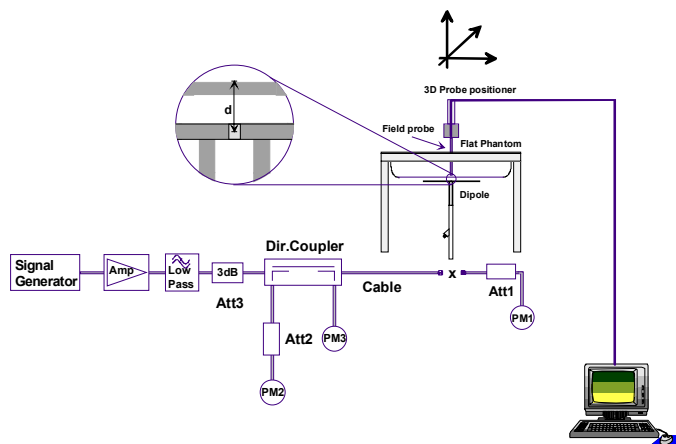
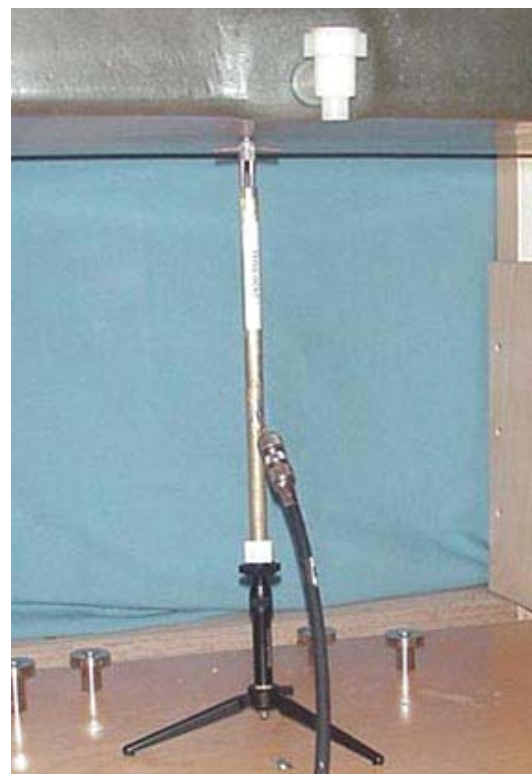


Figure 1. System Performance Check Measurement Setup


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

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## 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

<u>Specifications</u>	
<b>POSITIONER</b>	Stäubli Unimation Corp. Robot Model: RX60L
<b>Repeatability</b>	0.02 mm
<b>No. of axis</b>	6
<u>Data Acquisition Electronic (DAE) System</u>	
<u>Cell Controller</u>	
<b>Processor</b>	AMD Athlon XP 2400+
<b>Clock Speed</b>	2.0 GHz
<b>Operating System</b>	Windows XP Professional
<u>Data Converter</u>	
<b>Features</b>	Signal Amplifier, multiplexer, A/D converter, and control logic
<b>Software</b>	Measurement Software: DASY4, V4.6 Build 23
	Postprocessing Software: SEMCAD, V1.8 Build 161
<b>Connecting Lines</b>	Optical downlink for data and status info.; Optical uplink for commands and clock
<u>DASY4 Measurement Server</u>	
<b>Function</b>	Real-time data evaluation for field measurements and surface detection
<b>Hardware</b>	PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
<b>Connections</b>	COM1, COM2, DAE, Robot, Ethernet, Service Interface
<u>E-Field Probe</u>	
<b>Model</b>	ET3DV6
<b>Serial No.</b>	1590
<b>Construction</b>	Triangular core fiber optic detection system
<b>Frequency</b>	10 MHz to 6 GHz
<b>Linearity</b>	±0.2 dB (30 MHz to 3 GHz)
<u>Phantom(s)</u>	
<b>Type</b>	Planar Phantom
<b>Shell Material</b>	Fiberglass
<b>Thickness</b>	2.0 ±0.1 mm
<b>Volume</b>	Approx. 70 liters


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## 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 $\pm 8\%$ )	
Frequency:	10 MHz to $> 6$ GHz; Linearity: $\pm 0.2$ dB (30 MHz to 3 GHz)	
Directivity:	$\pm 0.2$ dB in brain tissue (rotation around probe axis) $\pm 0.4$ dB in brain tissue (rotation normal to probe axis)	
Dynamic Range:	5 $\mu$ W/g to $> 100$ mW/g; Linearity: $\pm 0.2$ dB	
Surface Detect:	$\pm 0.2$ 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


<p>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).</p>	


Planar Phantom

## 13.0 DEVICE HOLDER

<p>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.</p>	


Device Holder

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## 14.0 TEST EQUIPMENT LIST

USED	TEST EQUIPMENT DESCRIPTION	ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION DUE DATE
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
				Body	27Mar06
	-900MHz Validation Dipole	00020	054	Brain	10Jun05
				Body	10Jun05
	-1800MHz Validation Dipole	00021	247	Brain	14Jun05
				Body	14Jun05
	-1900MHz Validation Dipole	00032	151	Brain	17Jun05
				Body	25Apr06
	-2450MHz Validation Dipole	00025	150	Brain	20Sep05
x				Body	24Apr06
	-5800MHz Validation Dipole	00126	1031	Brain	15Mar06
	-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

Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure      SAR	FCC 47 CFR 2.1093	IC RSS-102 Issue 2

## 15.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	Uncertainty Value ±% (1g)	V <sub>i</sub> or V <sub>eff</sub>
<b>Measurement System</b>						
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	∞
<b>Test Sample Related</b>						
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	∞
<b>Phantom and Setup</b>						
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	∞
<b>Combined Standard Uncertainty</b>					<b>10.79</b>	
<b>Expanded Uncertainty (k=2)</b>					<b>21.59</b>	

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


Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure      SAR	FCC 47 CFR 2.1093	IC RSS-102 Issue 2

## MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	Uncertainty Value ±% (1g)	V <sub>i</sub> or V <sub>eff</sub>
<b>Measurement System</b>						
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	∞
<b>Dipole</b>						
Dipole Positioning	2	Normal	1.732050808	1	1.2	∞
Power & Power Drift	4.7	Normal	1.732050808	1	2.7	∞
<b>Phantom and Setup</b>						
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	∞
<b>Combined Standard Uncertainty</b>					<b>9.04</b>	
<b>Expanded Uncertainty (k=2)</b>					<b>18.08</b>	


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


Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2


## 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.

Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

## APPENDIX A - SAR MEASUREMENT DATA

Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

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

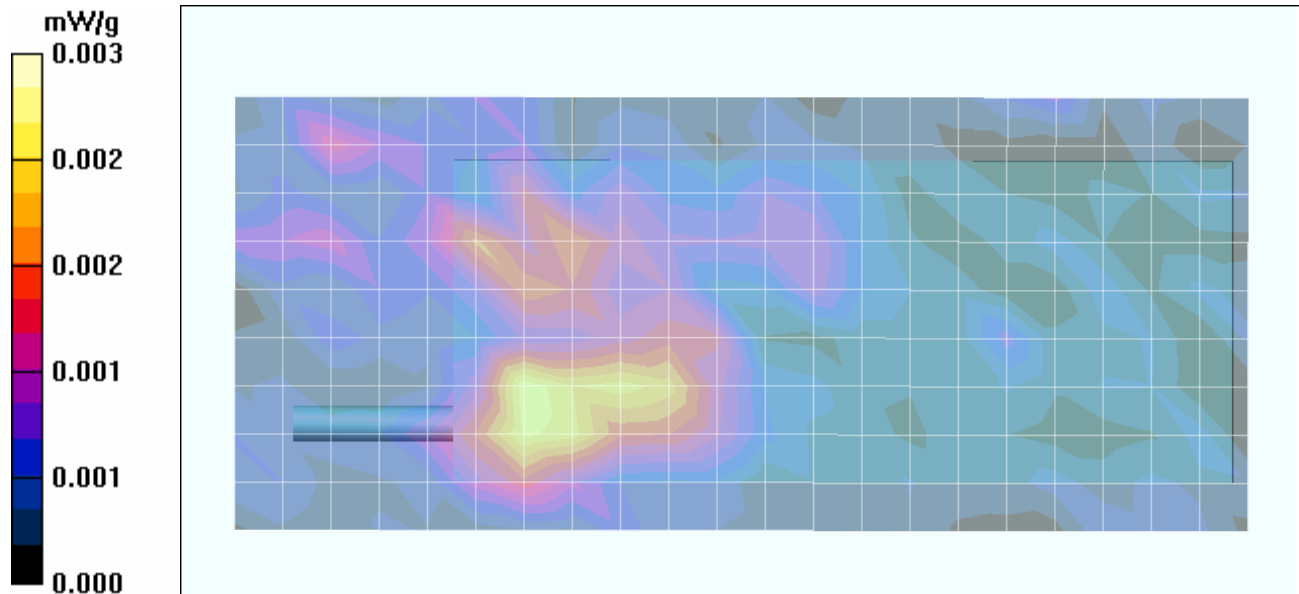
Medium: M2450 ( $\sigma = 2.04$  mho/m;  $\epsilon_r = 51.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>)


- 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: Fiberglass 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



Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

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

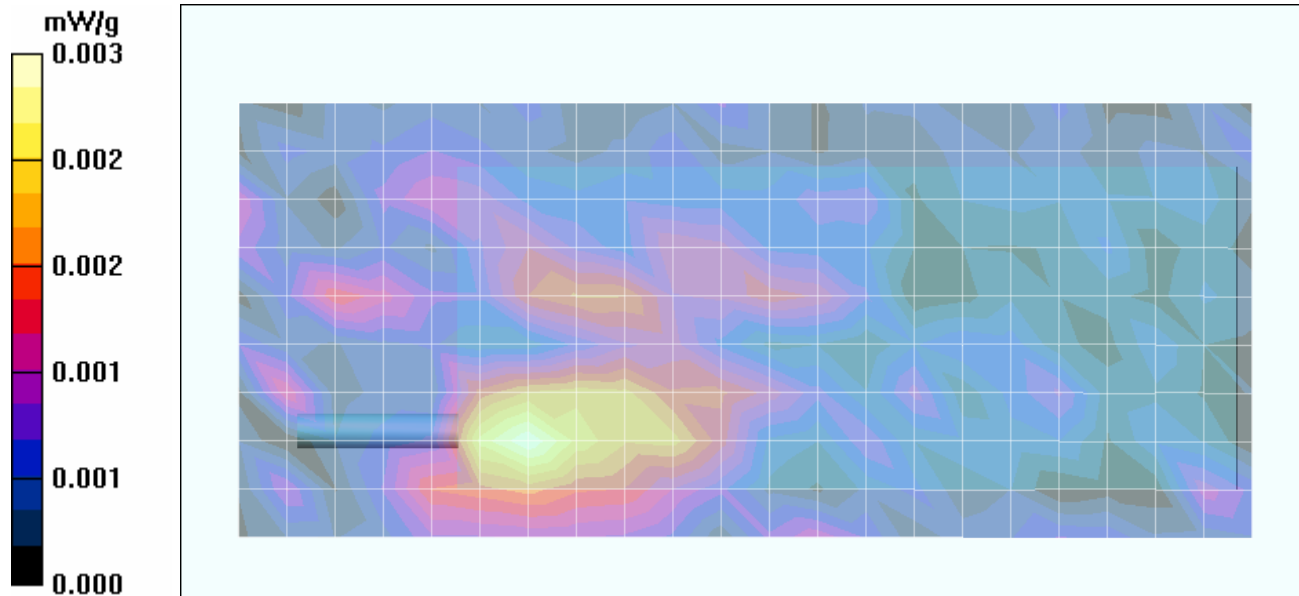
Medium: M2450 ( $\sigma = 2.04 \text{ mho/m}$ ;  $\epsilon_r = 51.9$ ;  $\rho = 1000 \text{ kg/m}^3$ )


- 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: Fiberglass 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**



Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

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

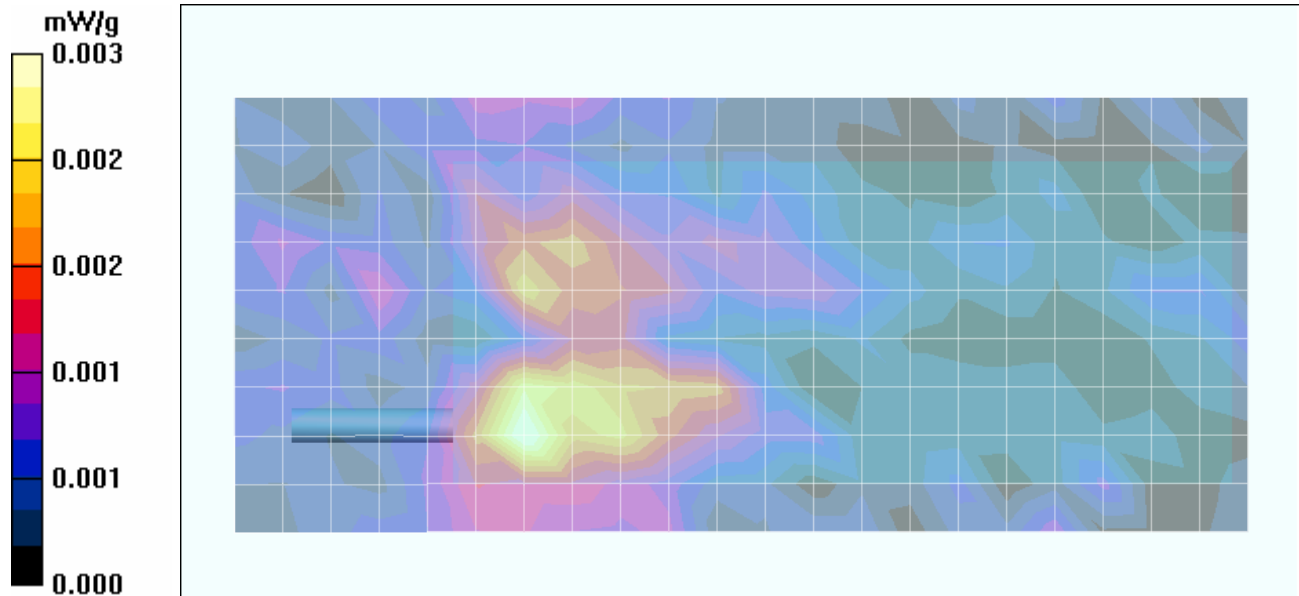
Medium: M2450 ( $\sigma = 2.04 \text{ mho/m}$ ;  $\epsilon_r = 51.9$ ;  $\rho = 1000 \text{ kg/m}^3$ )


- 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: Fiberglass 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**



Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

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

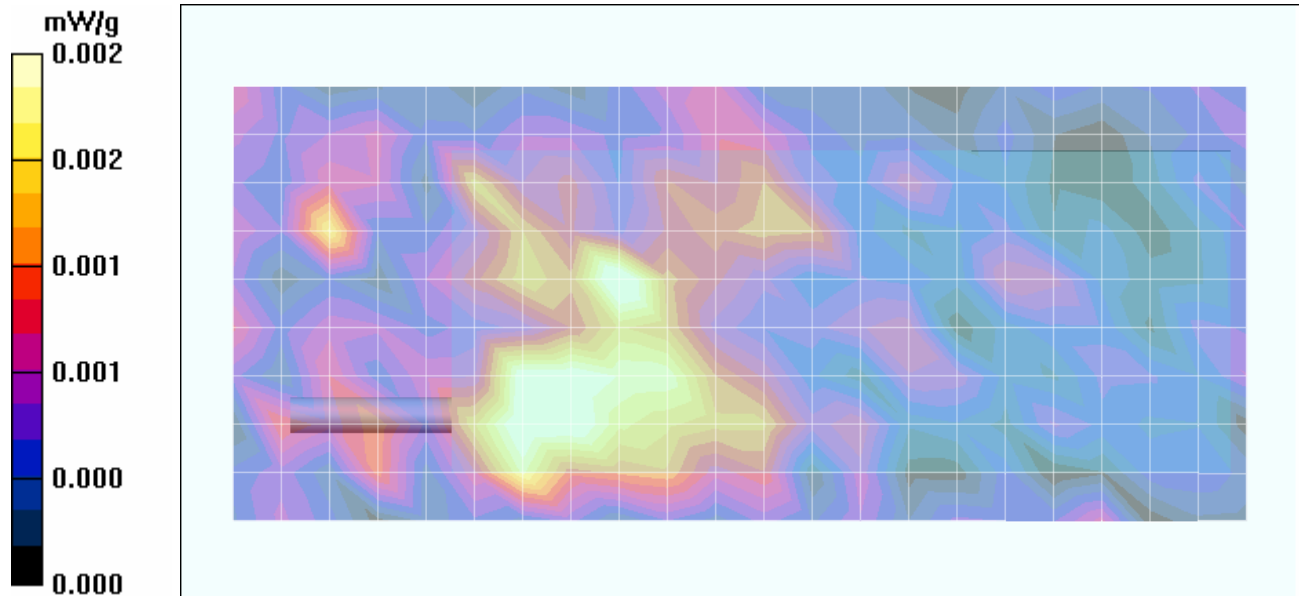
Medium: M2450 ( $\sigma = 2.04 \text{ mho/m}$ ;  $\epsilon_r = 51.9$ ;  $\rho = 1000 \text{ kg/m}^3$ )


- 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: Fiberglass 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**



Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

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

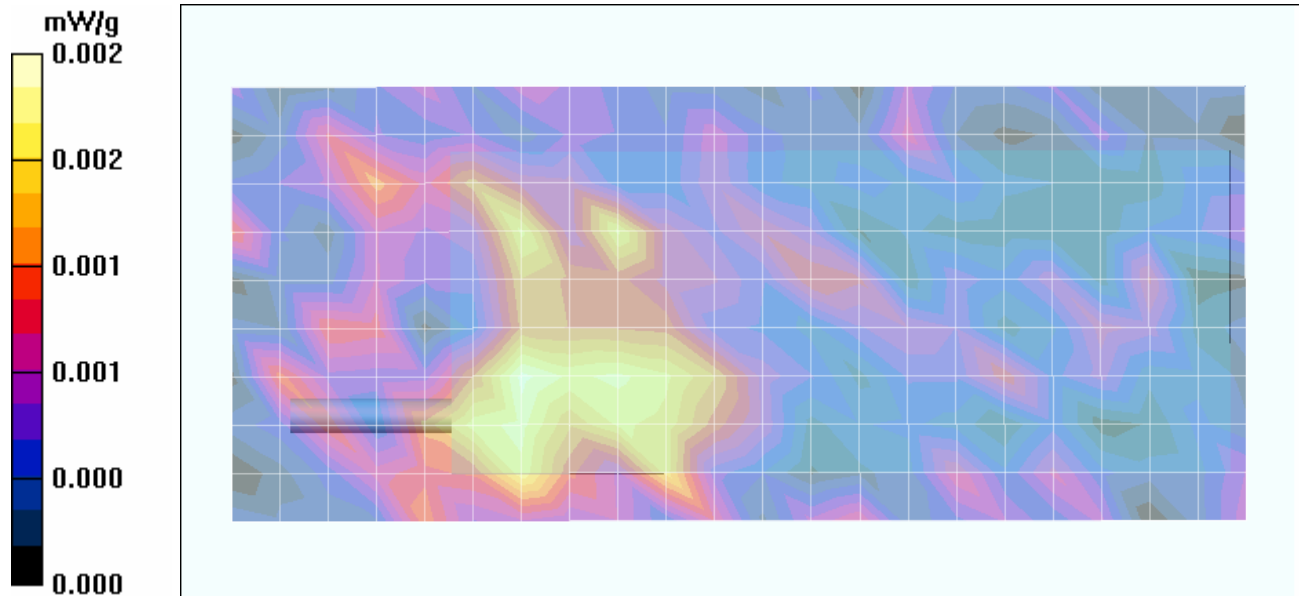
Medium: M2450 ( $\sigma = 2.04 \text{ mho/m}$ ;  $\epsilon_r = 51.9$ ;  $\rho = 1000 \text{ kg/m}^3$ )


- 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: Fiberglass 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**



Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

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

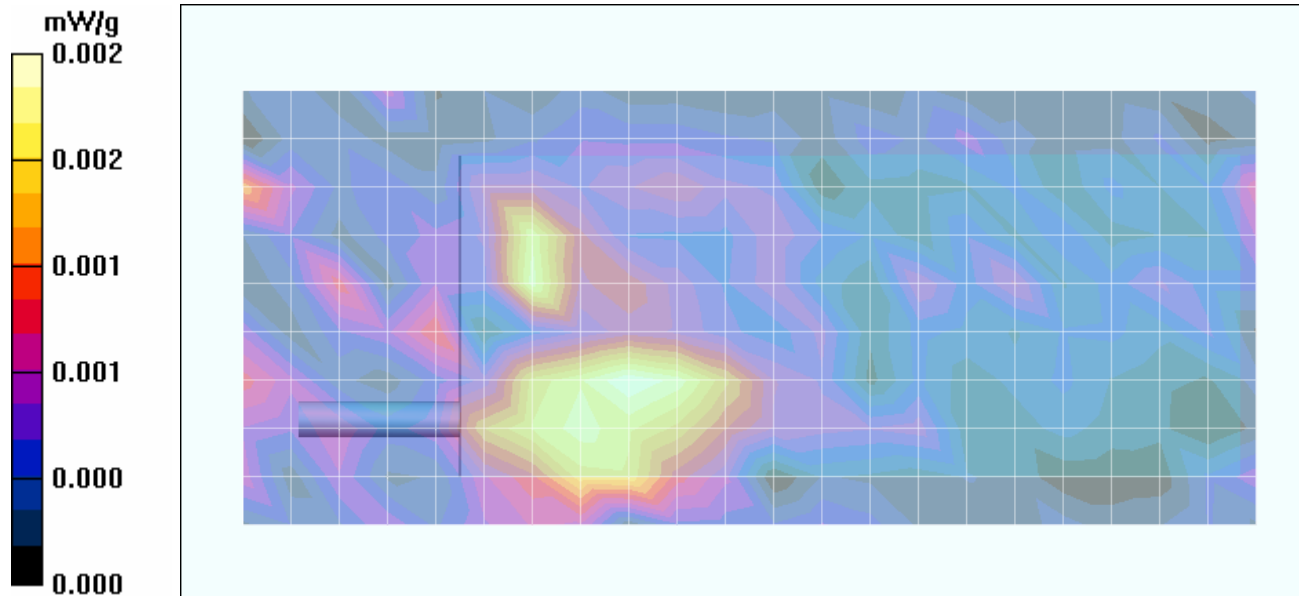
Medium: M2450 ( $\sigma = 2.04 \text{ mho/m}$ ;  $\epsilon_r = 51.9$ ;  $\rho = 1000 \text{ kg/m}^3$ )


- 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: Fiberglass 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**



Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

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

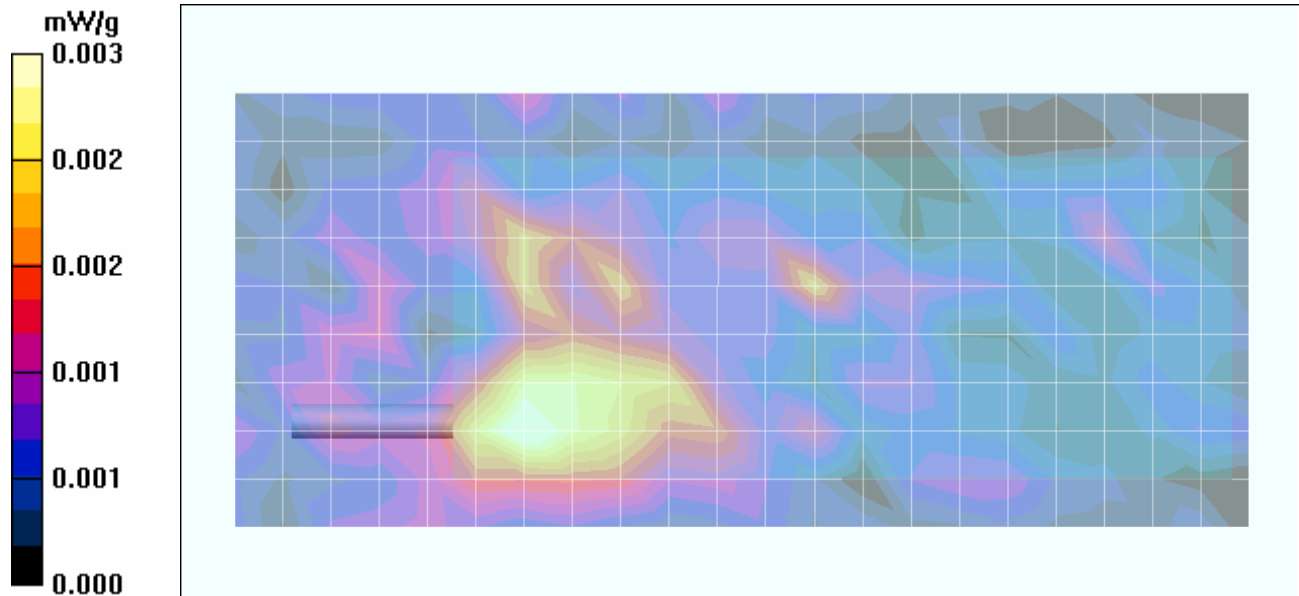
Medium: M2450 ( $\sigma = 2.04 \text{ mho/m}$ ;  $\epsilon_r = 51.9$ ;  $\rho = 1000 \text{ kg/m}^3$ )


- 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: Fiberglass 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**



Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

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

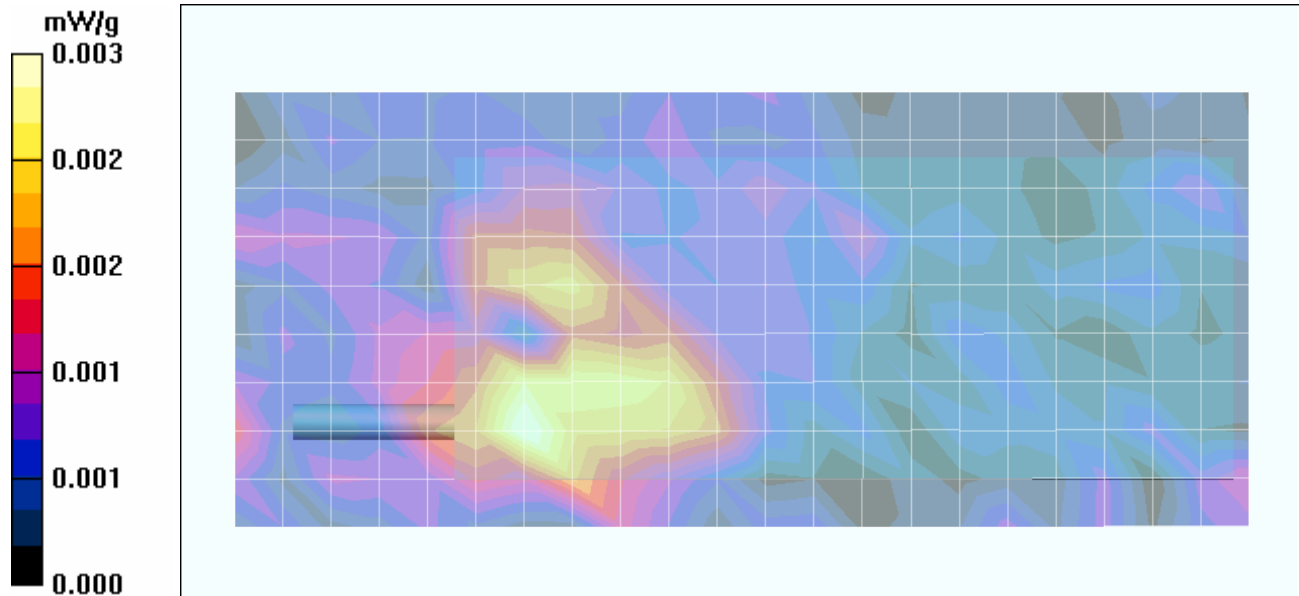
Medium: M2450 ( $\sigma = 2.04 \text{ mho/m}$ ;  $\epsilon_r = 51.9$ ;  $\rho = 1000 \text{ kg/m}^3$ )


- 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: Fiberglass 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**



Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

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

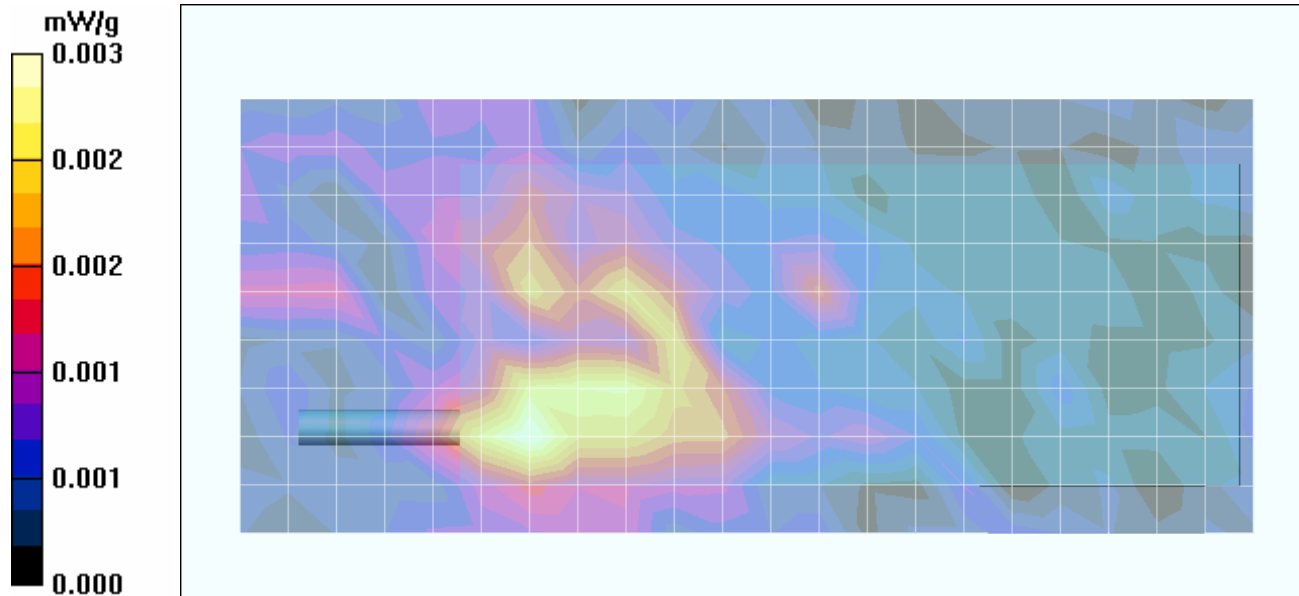
Medium: M2450 ( $\sigma = 2.04 \text{ mho/m}$ ;  $\epsilon_r = 51.9$ ;  $\rho = 1000 \text{ kg/m}^3$ )


- 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: Fiberglass 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**



Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

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

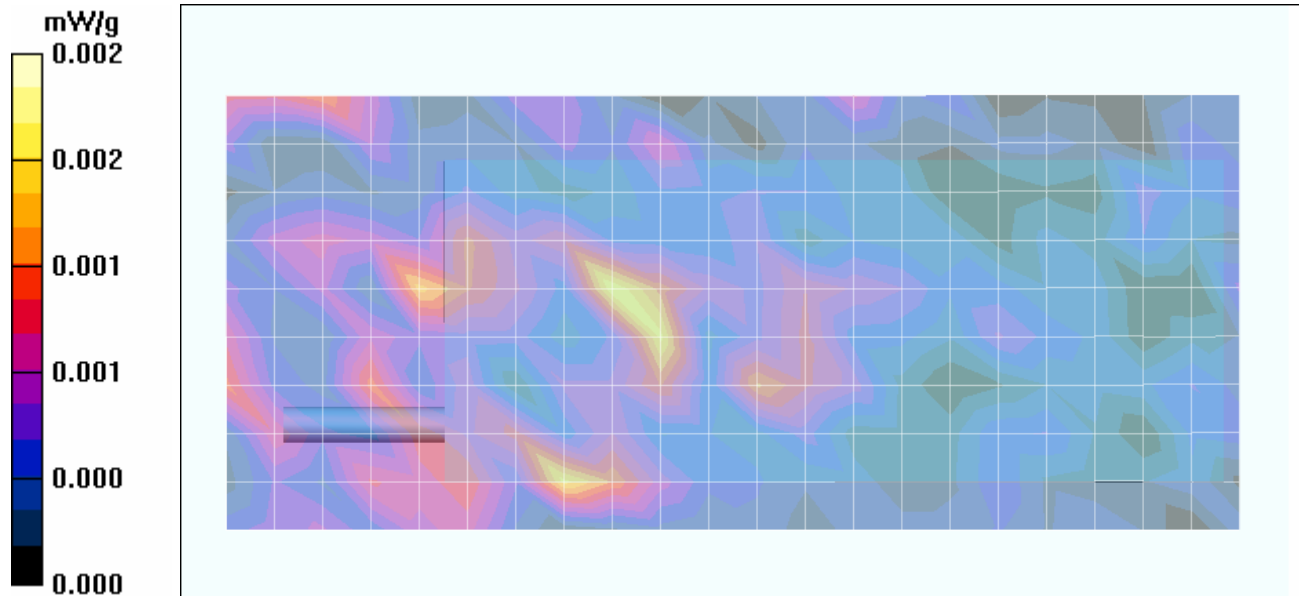
Medium: M2450 ( $\sigma = 2.04 \text{ mho/m}$ ;  $\epsilon_r = 51.9$ ;  $\rho = 1000 \text{ kg/m}^3$ )


- 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: Fiberglass 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**



Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

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

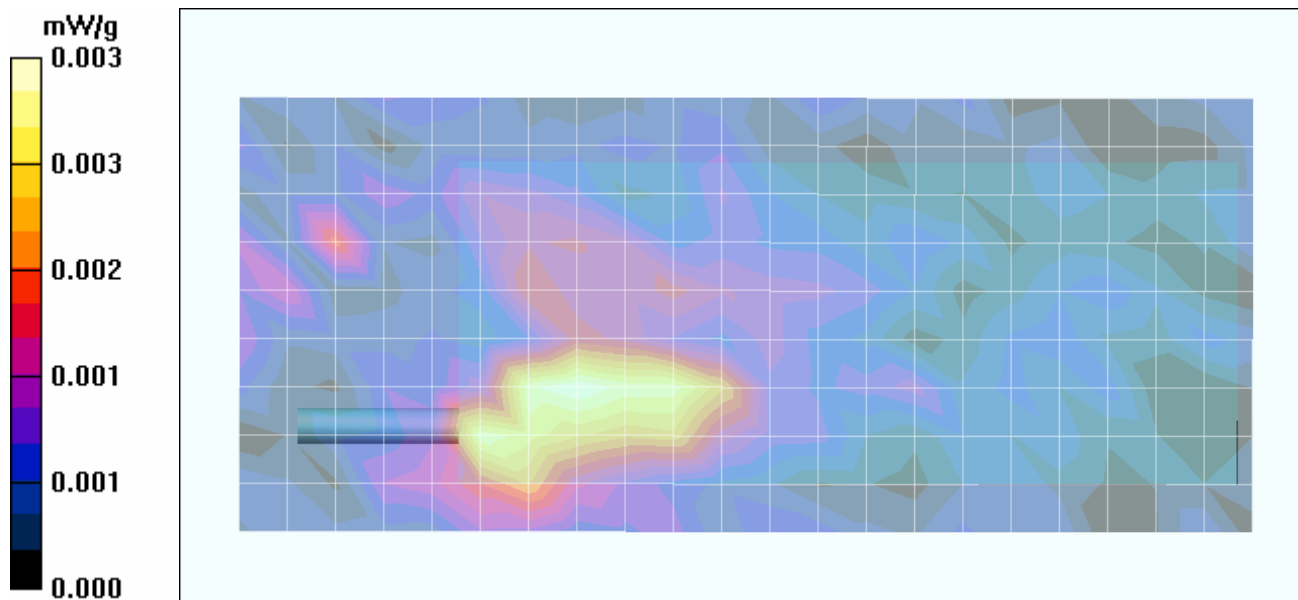
Body-Worn Accessory: None; Audio Accessory: None


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 ( $\sigma = 2.04$  mho/m;  $\epsilon_r = 51.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>)

- 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**

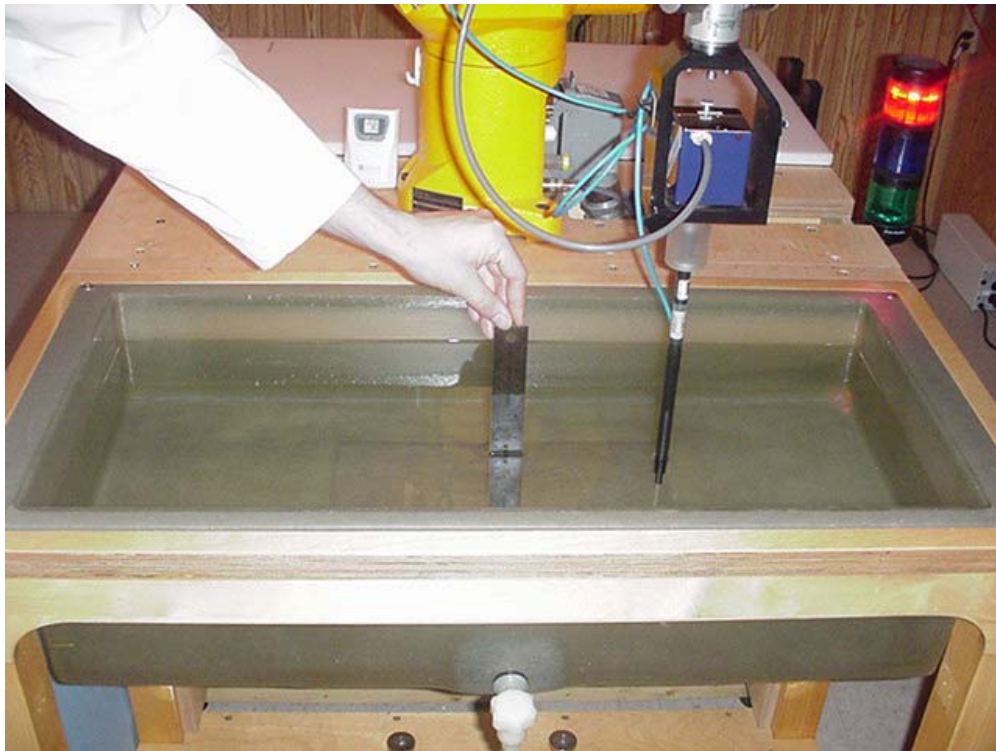



Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2


## Fluid Depth ( $\geq 15$ cm)



Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W		Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006		Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093	IC RSS-102 Issue 2

## APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093 IC RSS-102 Issue 2

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 ( $\sigma = 2.04$  mho/m;  $\epsilon_r = 51.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>)

- 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: Fiberglass 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

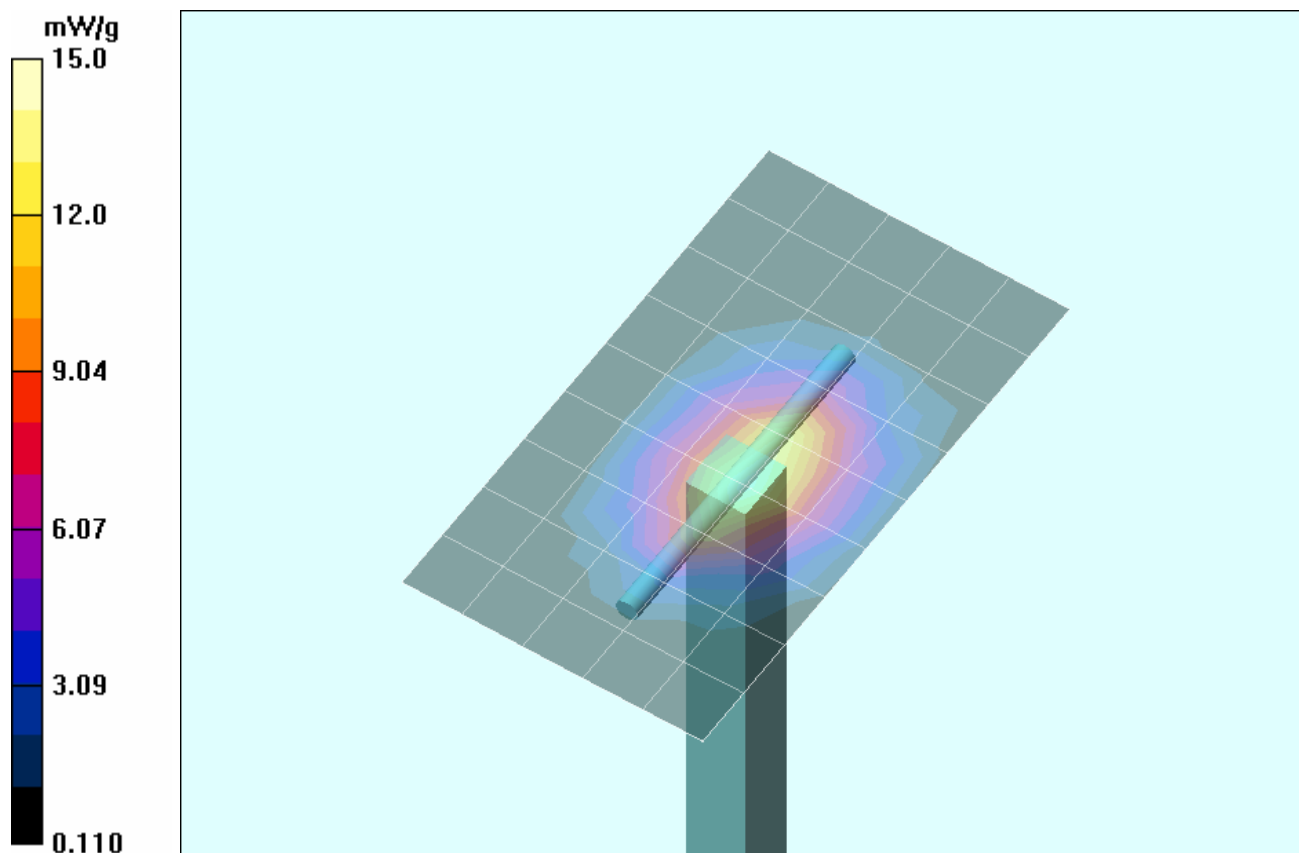
### 2450 MHz Dipole - System Performance Check/Zoom Scan (7x7x7)/Cube 0:


Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 80.8 V/m; Power Drift = -0.038 dB

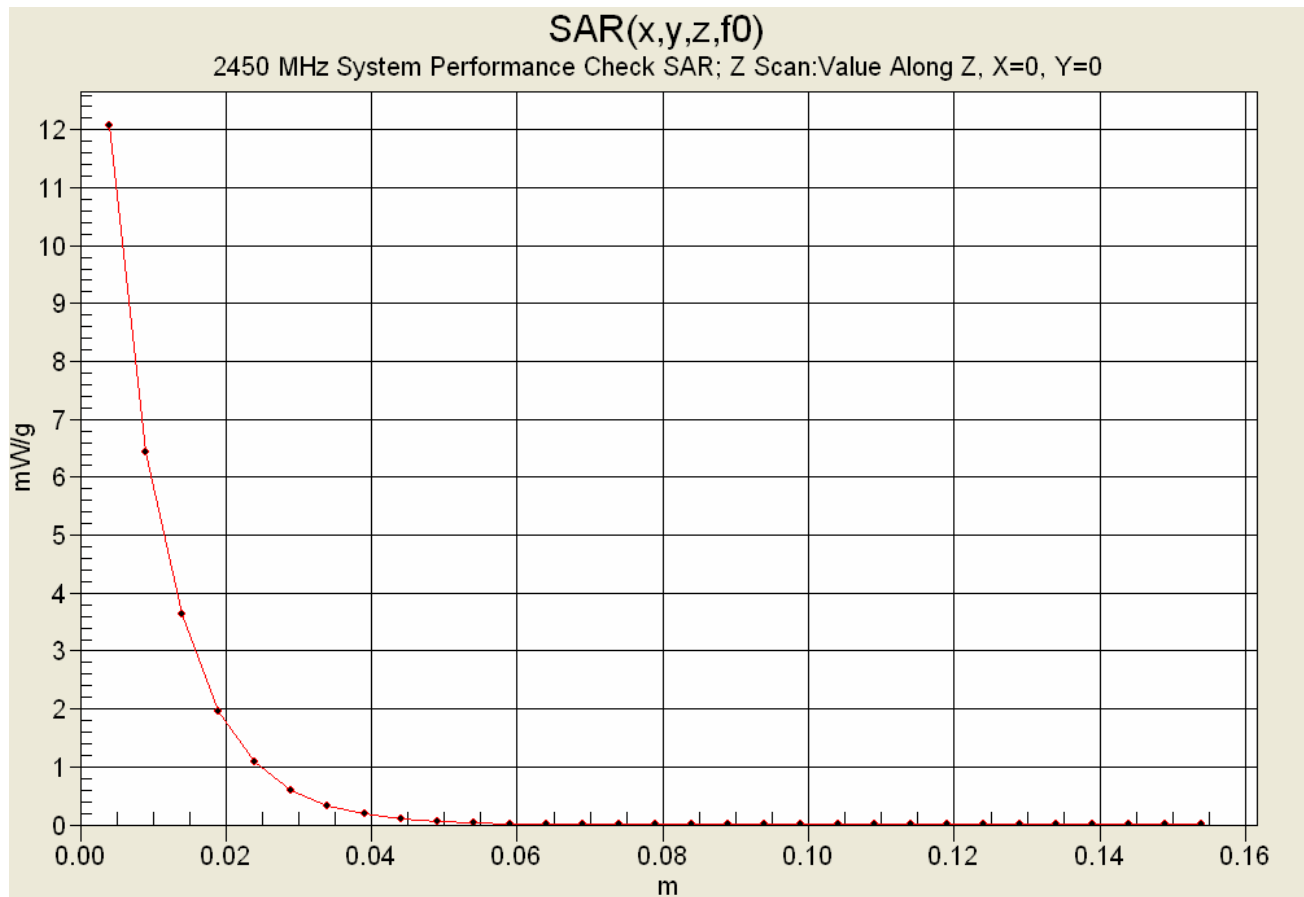
Peak SAR (extrapolated) = 30.0 W/kg


**SAR(1 g) = 13.5 mW/g; SAR(10 g) = 6.24 mW/g**




Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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## Z-Axis Scan



	Test Report Serial No.:	042406KBC-T750-S15W		Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006		Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093	IC RSS-102 Issue 2

## APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2


## 2450 MHz System Performance Check & DUT Evaluation (Body)

\*\*\*\*\*

Celltech Labs Inc.  
Test Result for UIM Dielectric Parameter  
Mon 01/May/2006  
Frequency (GHz)  
FCC\_eHFCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon  
FCC\_sHFCC 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

Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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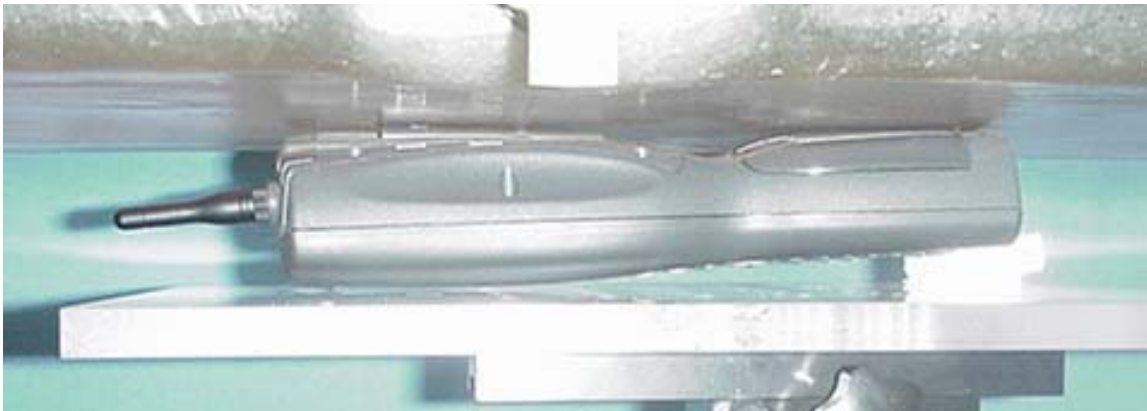
	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2


## APPENDIX D - SAR TEST SETUP PHOTOGRAPHS

Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

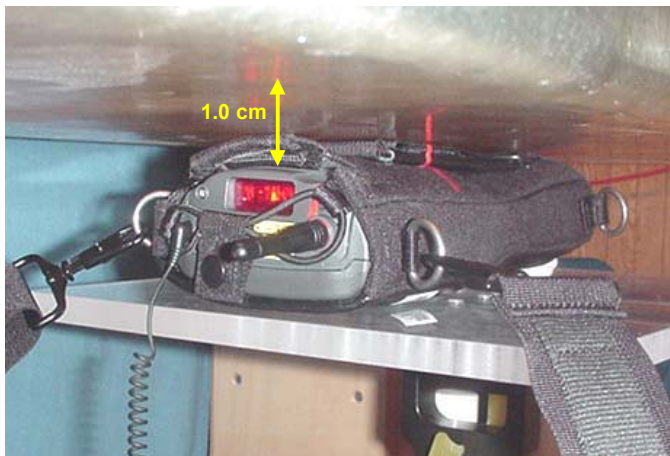
**BODY SAR TEST SETUP PHOTOGRAPHS**  
**Back Side of IX100X Handheld PC Touching Planar Phantom**





Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure      SAR	FCC 47 CFR 2.1093	IC RSS-102 Issue 2


**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)**




Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Test Report Serial No.:	042406KBC-T750-S15W	Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006	Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093
				IC RSS-102 Issue 2

## APPENDIX E - SYSTEM VALIDATION

Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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	Date of Evaluation:	April 24, 2006	Document Serial No.:	SV2450B-042406-R1	
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz	Body

## **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:

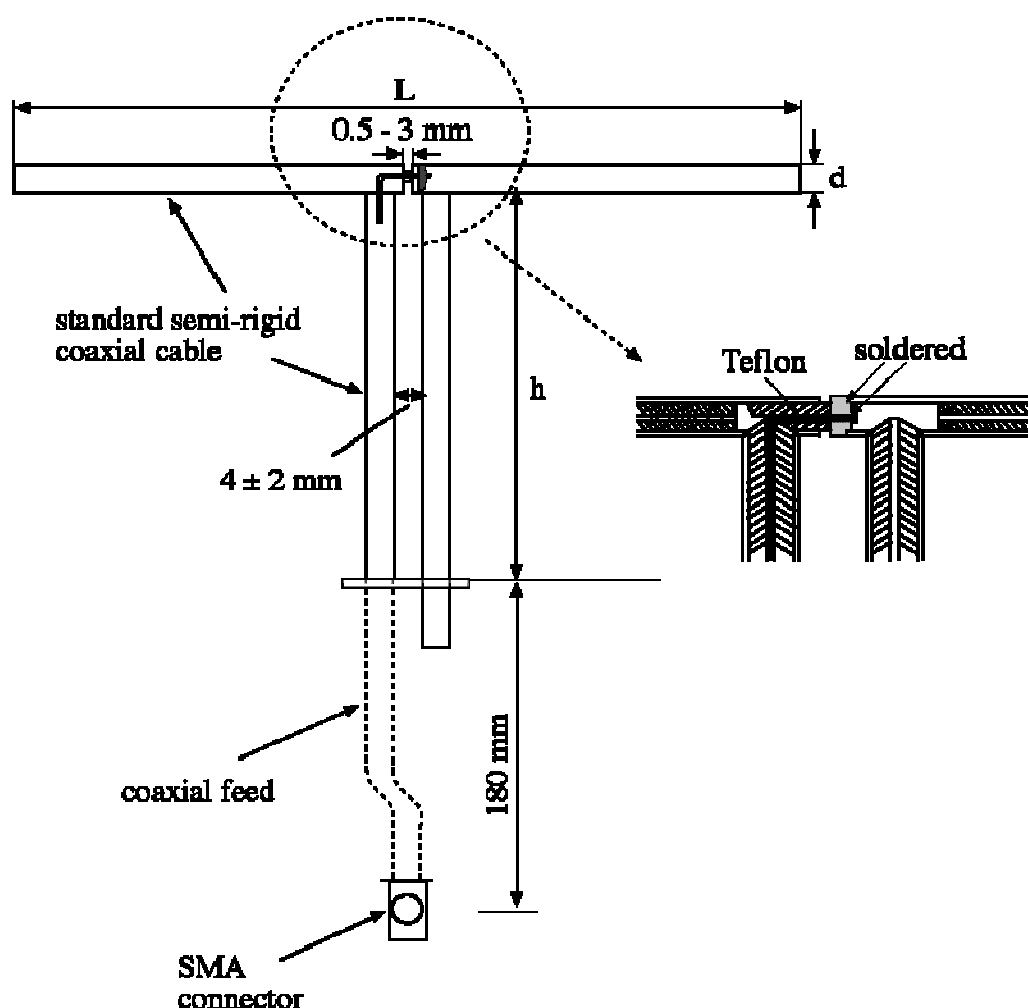
**Spencer Watson**



## 1. Dipole Construction & Electrical Characteristics

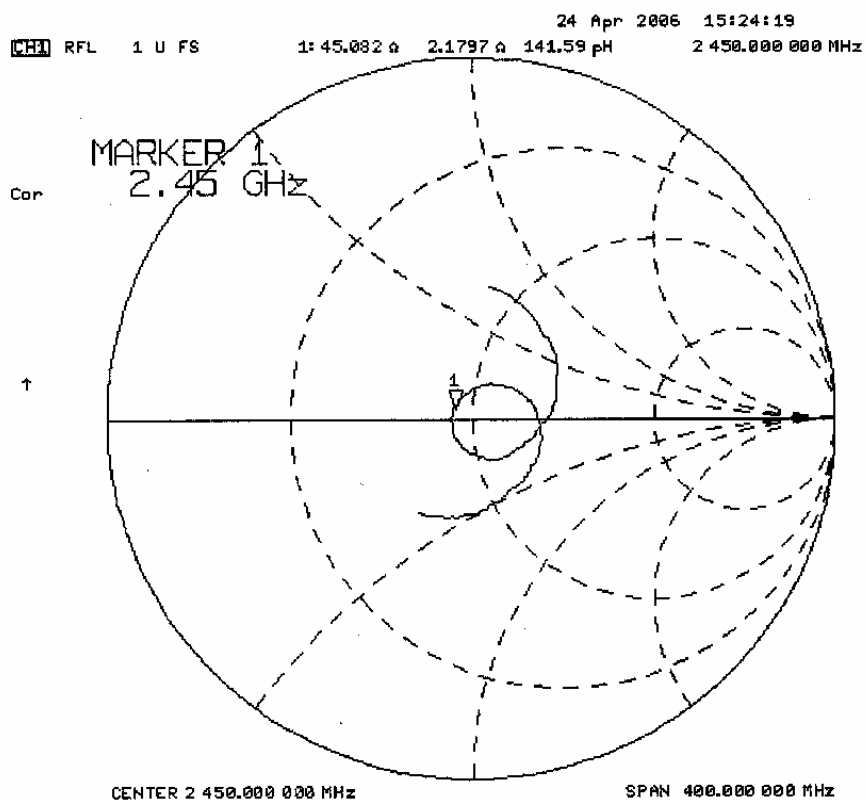
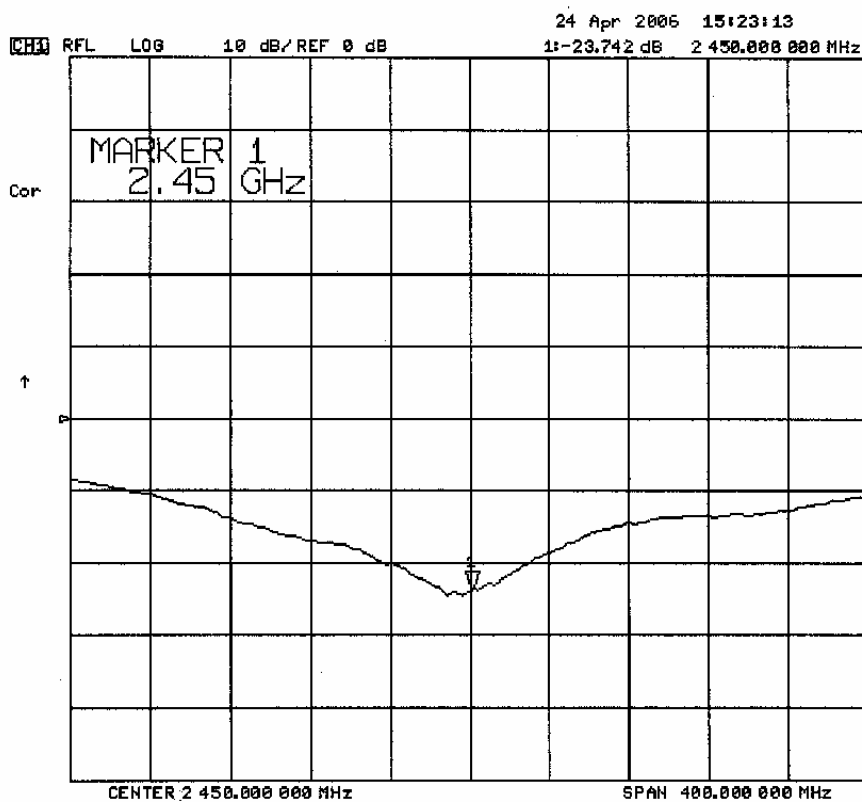
The validation dipole was constructed in accordance with the IEEE Std “Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques”. The electrical properties were measured using an HP 8753E Network 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	$\text{Re}\{Z\} = 45.082\Omega$
	$\text{Im}\{Z\} = 2.1797\Omega$
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

	Date of Evaluation:	April 24, 2006	Document Serial No.:	SV2450B-042406-R1	
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz	Body


## 5. 2450 MHz System Validation Setup



	Date of Evaluation:	April 24, 2006	Document Serial No.:	SV2450B-042406-R1	
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz	Body

## 6. 2450 MHz Dipole Setup



	Date of Evaluation:	April 24, 2006	Document Serial No.:	SV2450B-042406-R1	
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz	Body

## 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:  $\geq 15.0$  cm

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

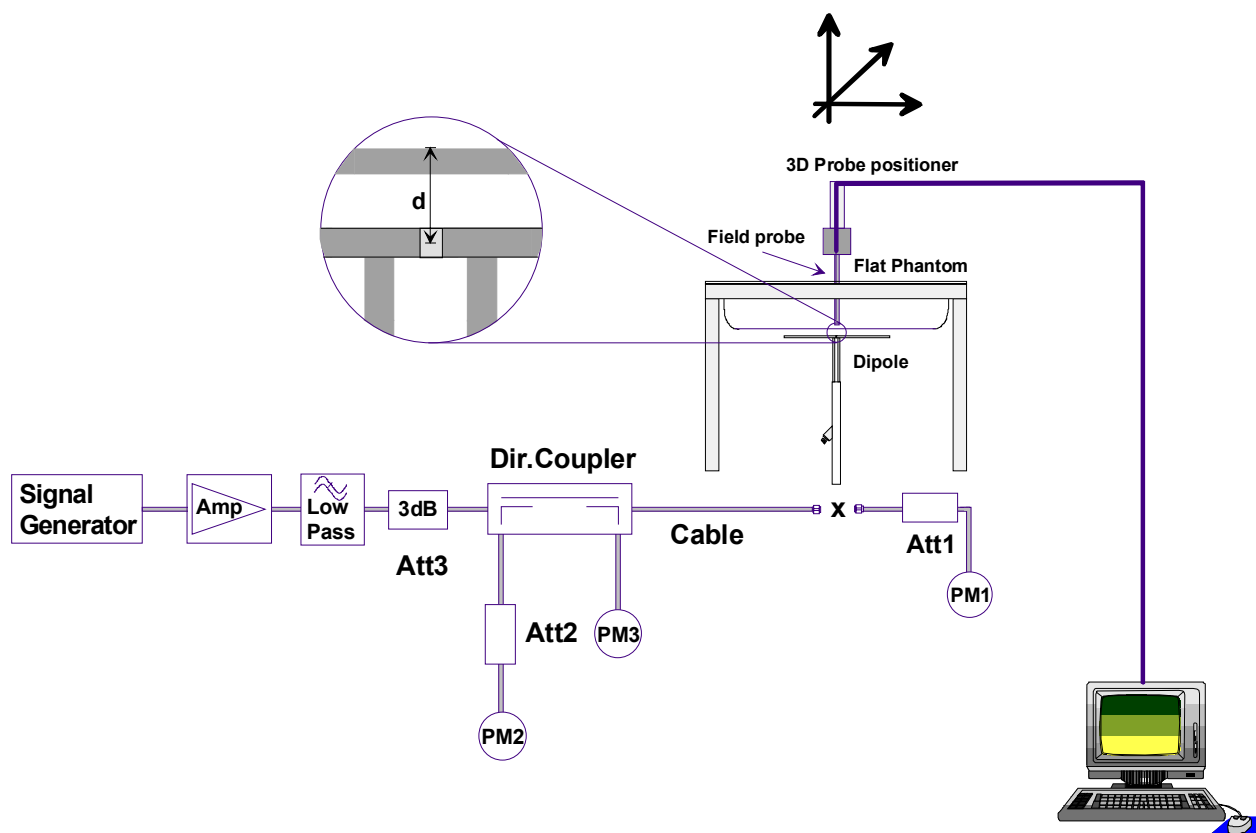
The 2450 MHz Body tissue simulant consisted of the following ingredients:

Ingredient	Percentage by weight
Water	69.98%
Glycol Monobutyl	30.00%
Salt	0.02%
Target Dielectric Parameters at 22°C	$\epsilon_r = 52.7 (+/-5\%)$ $\sigma = 1.95 \text{ S/m } (+/-5\%)$

	Date of Evaluation:	April 24, 2006	Document Serial No.:	SV2450B-042406-R1	
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz	Body

## 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
<b>Average Value</b>	<b>12.86</b>	<b>51.44</b>	<b>5.94</b>	<b>23.76</b>	<b>14.46</b>

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.

	Date of Evaluation:	April 24, 2006	Document Serial No.:	SV2450B-042406-R1	
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz	Body

## 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 °C; Fluid Temp: 23.9 °C; Barometric Pressure: 101.1 kPa; Humidity: 30%  
Communication System: CW  
Frequency: 2450 MHz; Duty Cycle: 1:1  
Medium: M2450 ( $\sigma = 1.89$  mho/m;  $\epsilon_r = 51.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>)  
- 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: Fiberglass 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

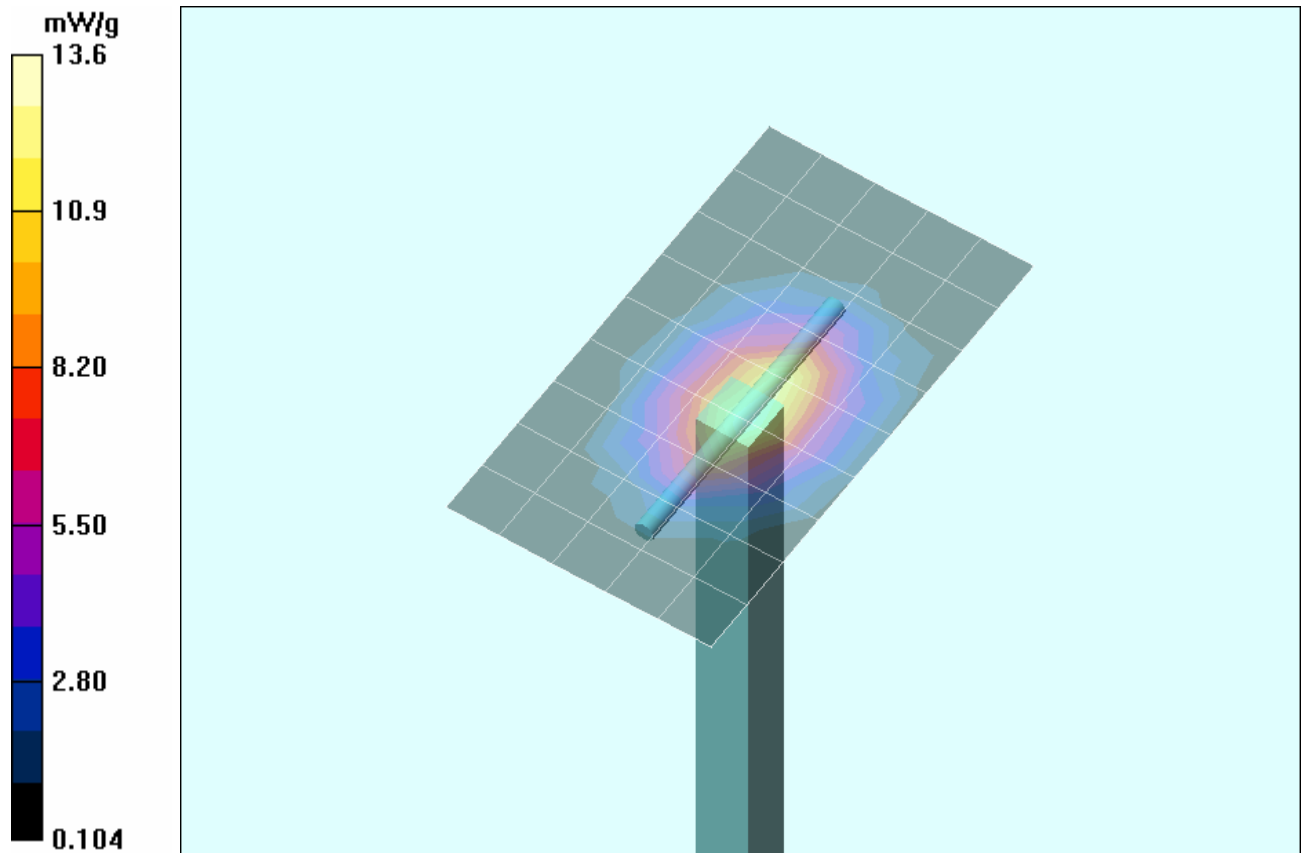
**2450 MHz System Validation/Zoom Scan 6 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 84.5 V/m; Power Drift = -0.037 dB  
**SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.79 mW/g**  
Maximum value of SAR (measured) = 14.1 mW/g

**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

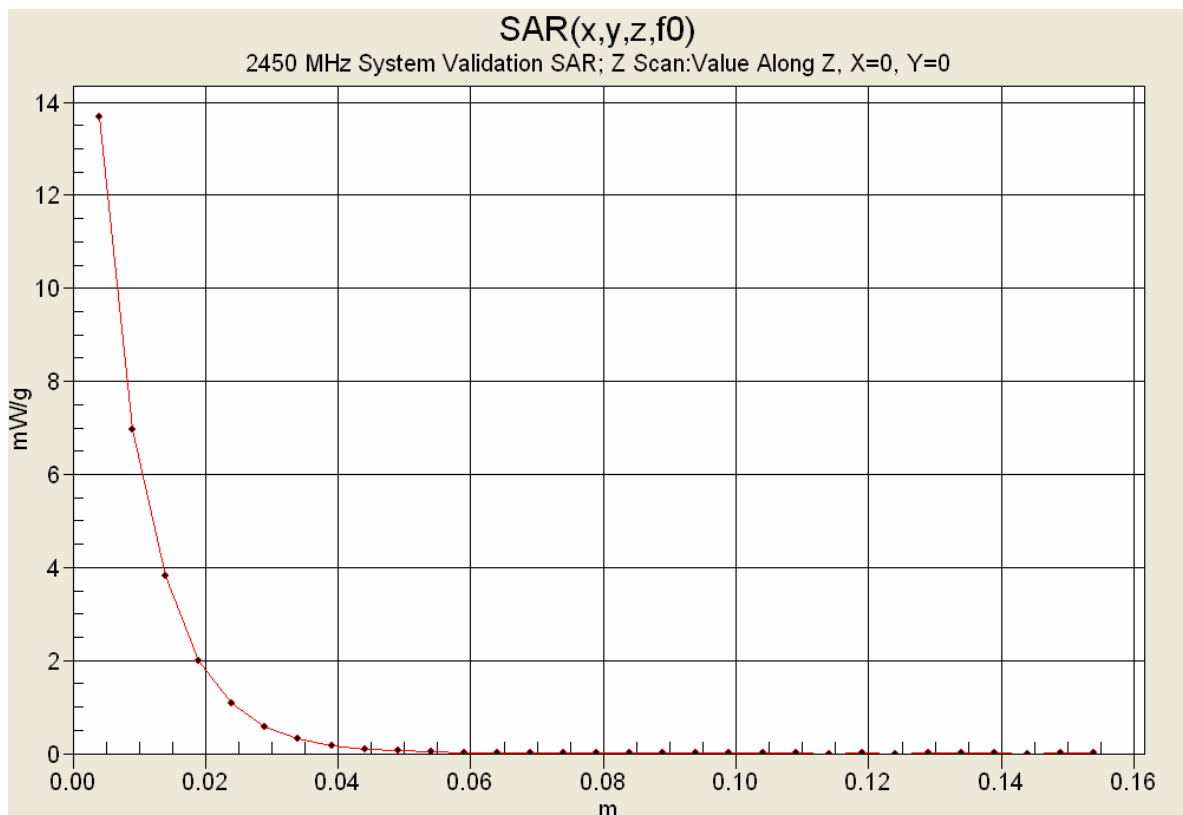
**2450 MHz System Validation/Zoom Scan 8 (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 89.1 V/m; Power Drift = -0.069 dB  
**SAR(1 g) = 12.9 mW/g; SAR(10 g) = 5.99 mW/g**  
Maximum value of SAR (measured) = 14.5 mW/g


**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



	Date of Evaluation:	April 24, 2006	Document Serial No.:	SV2450B-042406-R1	
	Evaluation Type:	System Validation	Validation Dipole:	2450 MHz	Body

## 10. Measured Fluid Dielectric Parameters

### 2450 MHz System Validation (Body)

\*\*\*\*\*

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

	Test Report Serial No.:	042406KBC-T750-S15W		Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006		Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093	IC RSS-102 Issue 2

## APPENDIX F - PROBE CALIBRATION

Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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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  $(22 \pm 3)^{\circ}\text{C}$  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

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.





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 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
NORM <sub>x,y,z</sub>	sensitivity in free space
ConF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
Polarization $\phi$	$\phi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ 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:

- 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
- 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:

- NORM<sub>x,y,z</sub>:** Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not effect the  $E^2$ -field uncertainty inside TSL (see below *ConvF*).
- NORM( $f$ )<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* 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*.
- DCP<sub>x,y,z</sub>:** 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 NORM<sub>x,y,z</sub> \* *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  $\pm 50$  MHz to  $\pm 100$  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<sup>A</sup>

### Diode Compression<sup>B</sup>

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

### Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

### Boundary Effect

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

Sensor Center to Phantom Surface Distance		<b>3.7 mm</b>	<b>4.7 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	7.6	3.9
SAR <sub>be</sub> [%]	With Correction Algorithm	0.1	0.2

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

Sensor Center to Phantom Surface Distance		<b>3.7 mm</b>	<b>4.7 mm</b>
SAR <sub>be</sub> [%]	Without Correction Algorithm	11.8	8.3
SAR <sub>be</sub> [%]	With Correction Algorithm	0.6	0.1

### Sensor Offset

Probe Tip to Sensor Center                      **2.7 mm**

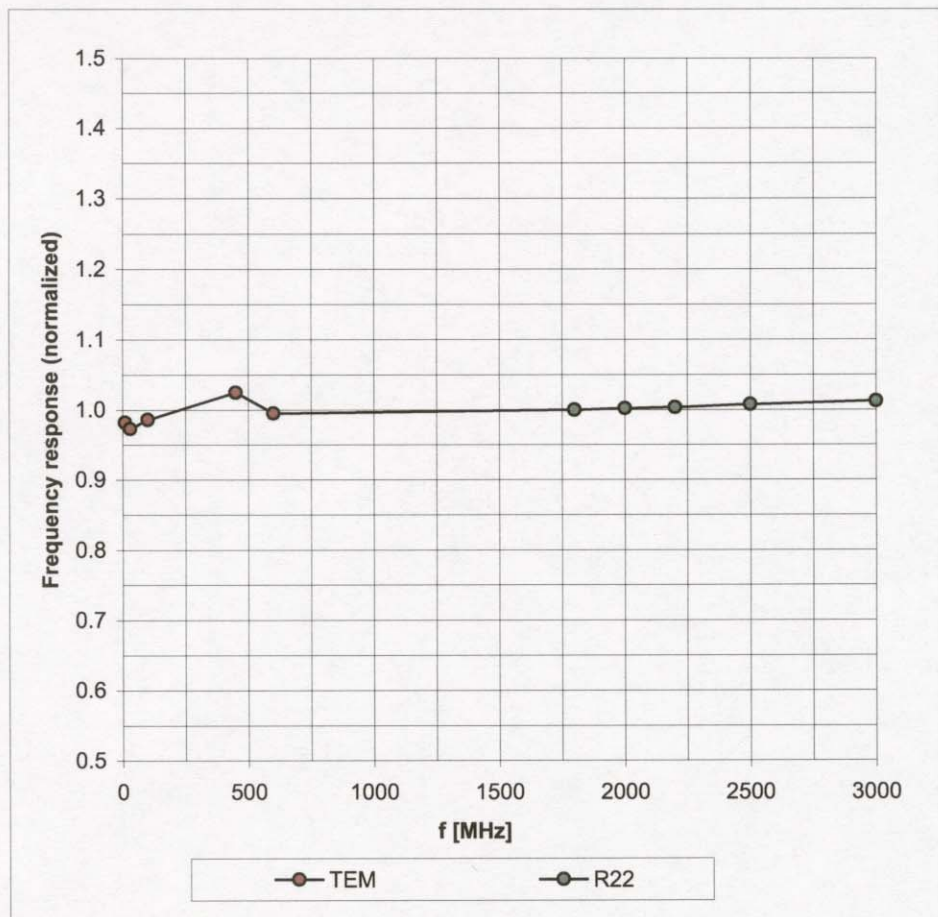
**The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.**

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Page 8).

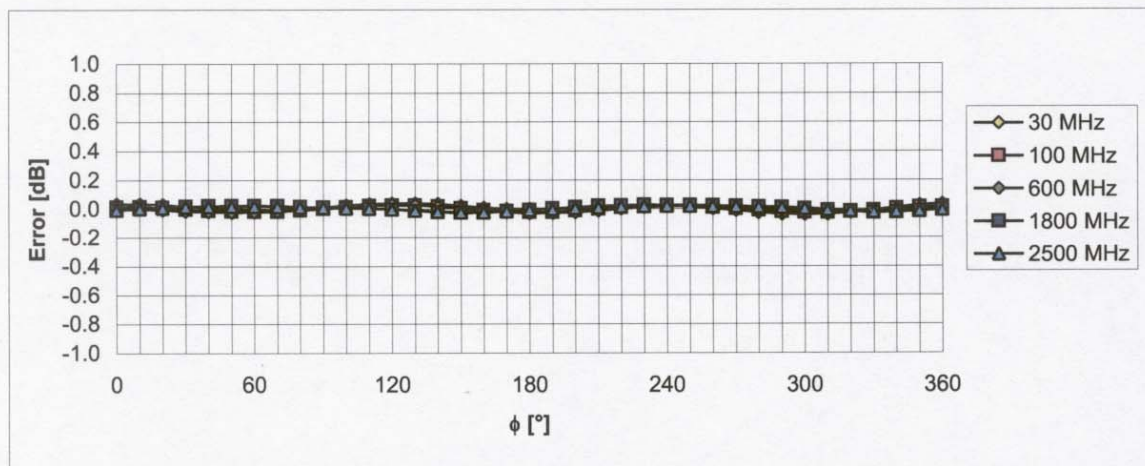
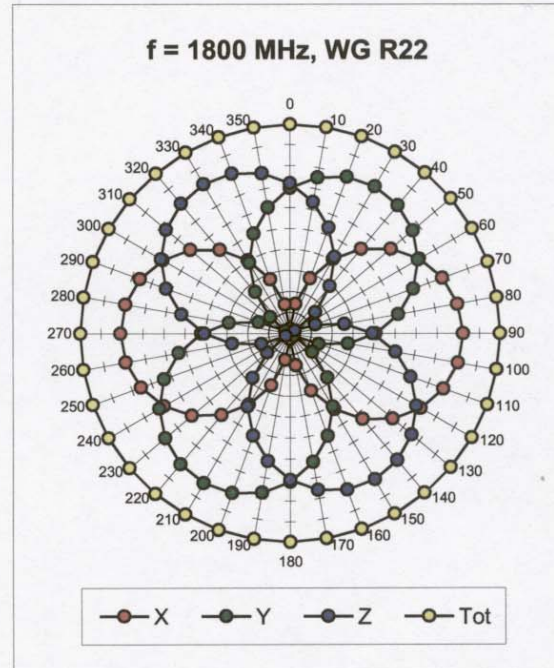
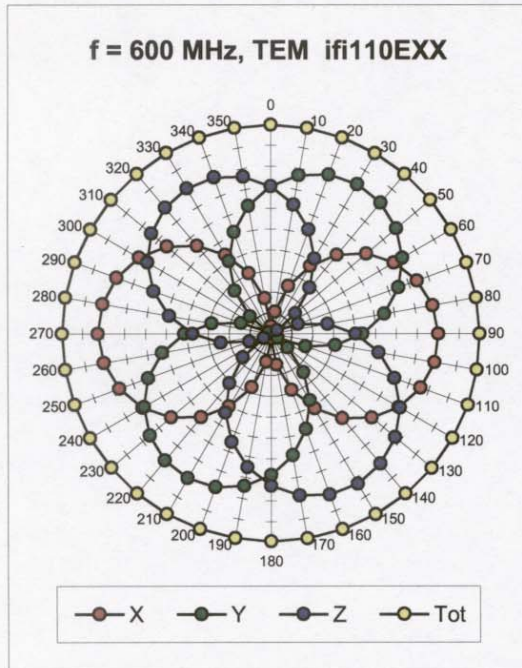
<sup>B</sup> Numerical linearization parameter: uncertainty not required.

## Frequency Response of E-Field

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

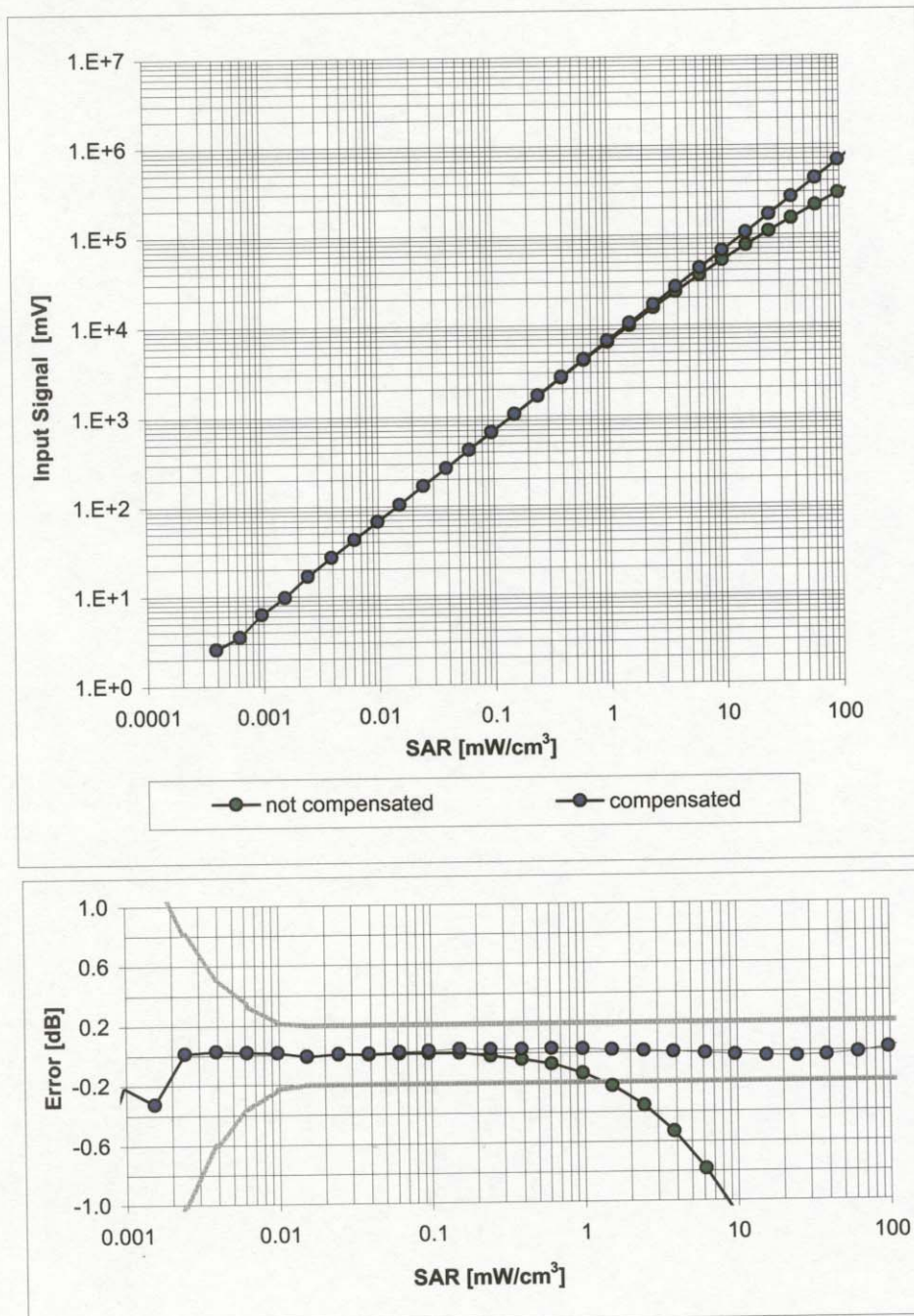


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

Receiving Pattern ( $\phi$ ),  $\vartheta = 0^\circ$ Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

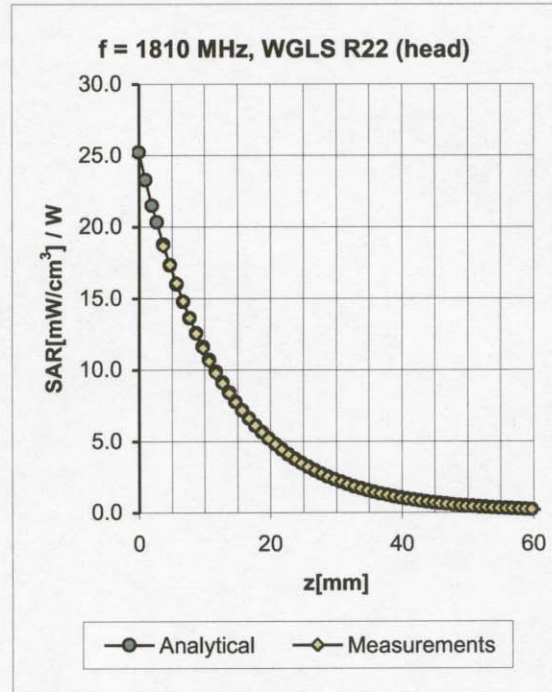
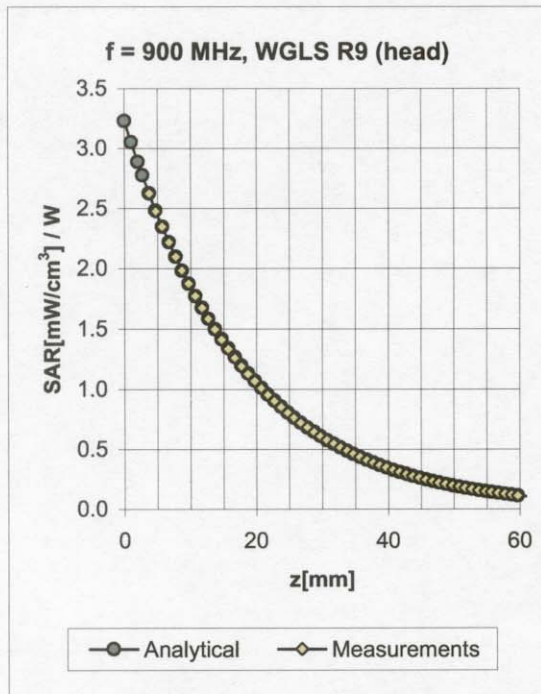


# Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$ )



Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )

## Conversion Factor Assessment



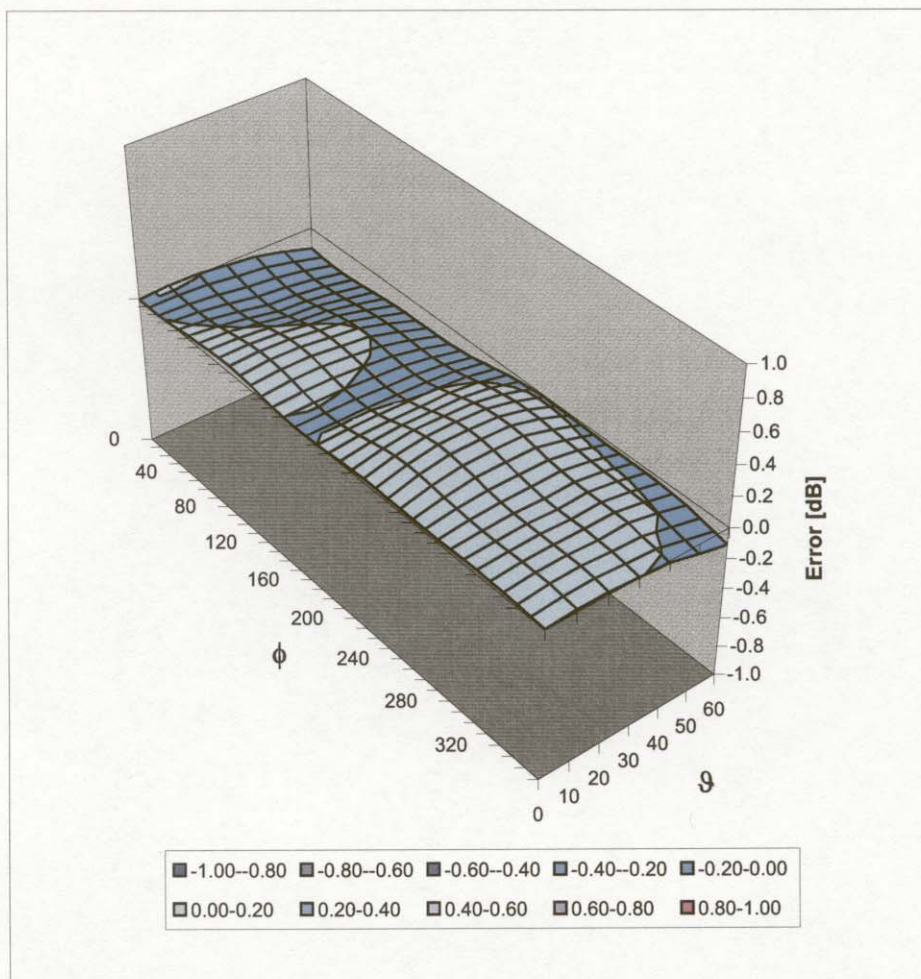
f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.54	1.81	6.67 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.46	2.62	5.44 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.50	2.53	4.56 ± 11.8% (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)

<sup>c</sup> 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 ( $\phi$ ,  $\vartheta$ ),  $f = 900$  MHz



Uncertainty of Spherical Isotropy Assessment:  $\pm 2.6\%$  ( $k=2$ )

## **Additional Conversion Factors**

**for Dosimetric E-Field Probe**

Type:

**ET3DV6**

Serial Number:

**1590**

Place of Assessment:

**Zurich**

Date of Assessment:

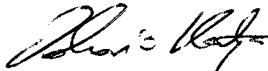
**May 23, 2005**

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:



## Dosimetric E-Field Probe ET3DV6 SN:1590


Conversion factor ( $\pm$  standard deviation)

<b>f = 150 MHz</b>	ConvF	<b>9.1 <math>\pm</math> 10 %</b>	$\epsilon_r = 52.3 \pm 5\%$ $\sigma = 0.76 \pm 5\%$ mho/m (head tissue)
<b>f = 300 MHz</b>	ConvF	<b>8.1 <math>\pm</math> 9 %</b>	$\epsilon_r = 45.3 \pm 5\%$ $\sigma = 0.87 \pm 5\%$ mho/m (head tissue)
<b>f = 450 MHz</b>	ConvF	<b>7.8 <math>\pm</math> 8 %</b>	$\epsilon_r = 43.5 \pm 5\%$ $\sigma = 0.87 \pm 5\%$ mho/m (head tissue)
<b>f = 150 MHz</b>	ConvF	<b>8.6 <math>\pm</math> 10 %</b>	$\epsilon_r = 61.9 \pm 5\%$ $\sigma = 0.80 \pm 5\%$ mho/m (body tissue)
<b>f = 450 MHz</b>	ConvF	<b>7.7 <math>\pm</math> 8 %</b>	$\epsilon_r = 56.7 \pm 5\%$ $\sigma = 0.94 \pm 5\%$ 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.

	Test Report Serial No.:	042406KBC-T750-S15W		Report Issue Date:	September 25, 2006
	Date(s) of Evaluation:	May 01, 2006		Report Revision No.:	Revision 1.0
	Evaluation Type:	RF Exposure	SAR	FCC 47 CFR 2.1093	IC RSS-102 Issue 2

## APPENDIX G - PLANAR PHANTOM CERTIFICATE OF CONFORMITY

Company:	Itronix Corporation	FCC ID:	KBCIX100XUSI-WLBT	IC ID:	1943A-IX100Xg	 A GENERAL DYNAMICS COMPANY
Model(s):	IX100XUSI-WLBT	802.11bg/Bluetooth Combo Module installed in IX100X Handheld PC				
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Web: [www.bcfiberglass.com](http://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: \_\_\_\_\_

A handwritten signature in black ink, appearing to read 'Daniel Chailier', is written over a horizontal line.

Daniel Chailier



**Fiberglass Planar Phantom - Top View**



**Fiberglass Planar Phantom - Front View**



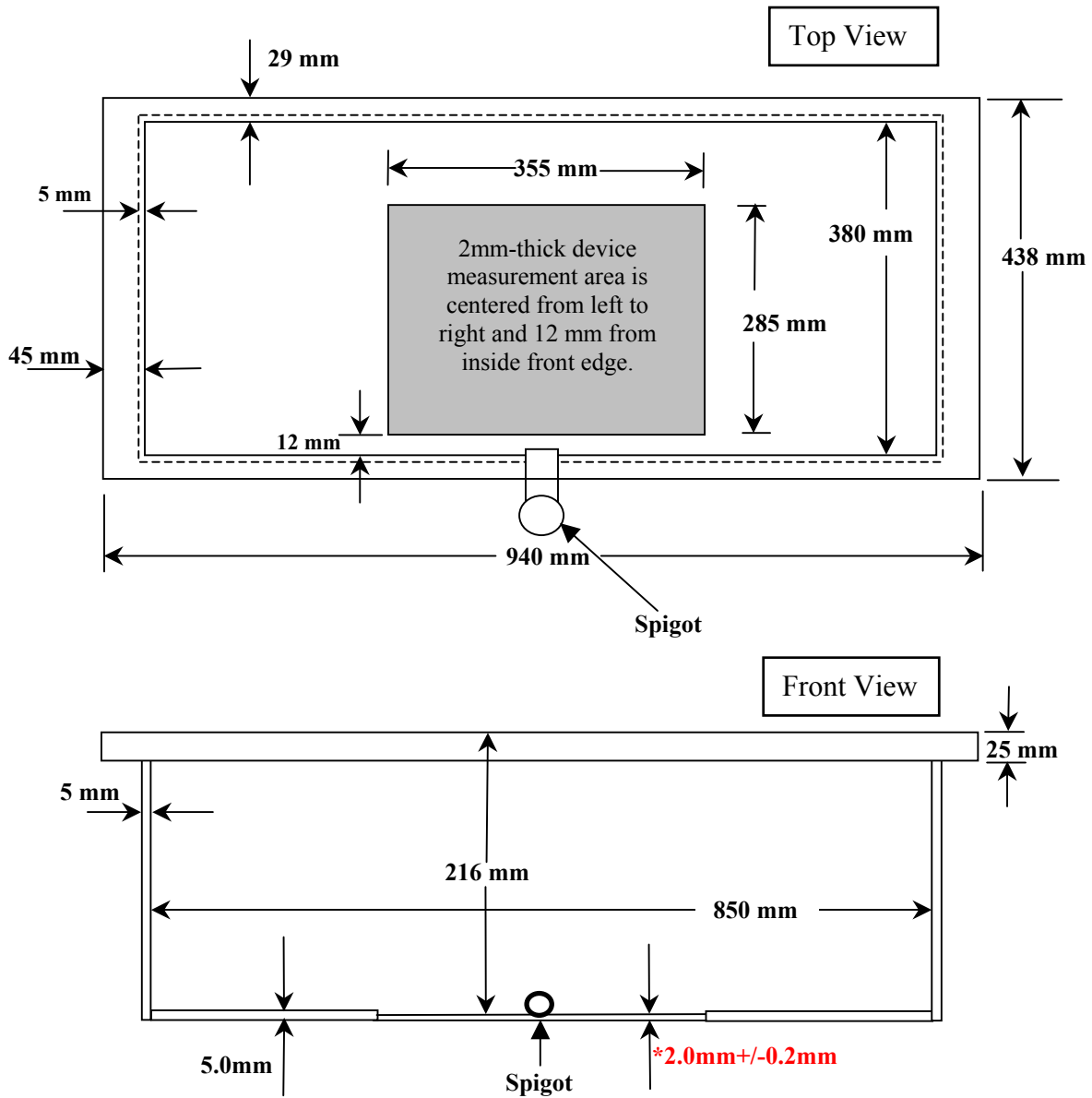
**Fiberglass Planar Phantom - Back View**



**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.**