DECLARATION OF COMPLIANCE
SAR RF EXPOSURE EVALUATION

Test Lab

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Applicant Information

ITRONIX CORPORATION
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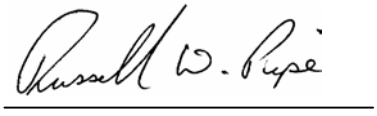
Rule Part(s):	**FCC 47 CFR §2.1093; IC RSS-102 Issue 1 (Provisional)**
Test Procedure(s):	**FCC OET Bulletin 65, Supplement C (Edition 01-01)**
FCC Device Classification:	**PCS Licensed Transmitter (PCB)**
IC Device Classification:	**2 GHz Personal Communication Services (RSS-133 Issue 2)** **800MHz CDMA Cellular Transmitter (RSS-132 Issue 1)**
FCC IDENTIFIER:	**KBCIX100XA555WLBT**
IC Certification No.:	**1943A-IX100Xb**
Model(s):	**IX100XA555WLBT**
Device Type:	**Rugged Handheld PC with Sierra Wireless AirCard 555/550 Dual-Band PCS/Cellular CDMA Modem co-located with USI WM-BB-AG-01 802.11b & Bluetooth Transmitters**
Mode(s) of Operation:	**PCS CDMA, Cellular CDMA, DSSS, FHSS**
Tx Frequency Range(s):	**1851.25 - 1908.75 MHz (PCS CDMA)** **824.70 - 848.31 MHz (Cellular CDMA)** **2412 - 2462 MHz (802.11b)** **2402 - 2480 MHz (Bluetooth)**
Max. RF Output Power Tested:	**23.0 dBm Conducted (PCS CDMA)** **23.0 dBm Conducted (Cellular CDMA)** **14.0 dBm Peak Conducted (802.11b)** **3.5 dBm Peak Conducted (Bluetooth)**
Battery Type(s) Tested:	**Lithium-ion 7.4 V, 3.0 Ah (P/N: 46-0136-001)**
Antenna Type(s) Tested:	**External - ¼ Wave Helix (Dual-Band CDMA)** **Internal - Front Center above LCD Display (802.11b)** **Internal - Front Right Side (Bluetooth)**
Body-Worn Accessories Tested:	**Nylon Carry Case (P/N: 54-0644-001)** **Ear-Microphone (Model: JABRA)**
Maximum SAR Level(s):	**PCS CDMA: 1.01 W/kg (1g average)** **Cellular CDMA: 1.00 W/kg (1g average)**

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 1 (Provisional) for the General Population / Uncontrolled Exposure environment. All measurements were performed in accordance with the SAR system manufacturer recommendations.

I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



Russell Pipe
Senior Compliance Technologist
Celltech Labs Inc.

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1.0 INTRODUCTION

This measurement report demonstrates that ITRONIX CORPORATION Model: IX100XA555WLBT Rugged Handheld PC FCC ID: KBCIX100XA555WLBT with Sierra Wireless AirCard 555/550 Dual-Band PCS/Cellular CDMA PCMCIA Modem Card co-located with USI WM-BB-AG-01 802.11b & Bluetooth Transmitters 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 environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]), and IC RSS-102 Issue 1 (Provisional) (see reference [4]), were employed. A description of the product 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)

FCC Rule Part(s)	47 CFR §2.1093			
IC Rule Part(s)	RSS-102 Issue 1 (Provisional)			
Test Procedure(s)	FCC OET Bulletin 65, Supplement C (01-01)			
FCC Device Classification	PCS Licensed Transmitter (PCB)			
IC Device Classification	2 GHz Personal Communication Services (RSS 133 Issue 2)			
	800MHz CDMA Cellular Transmitter (RSS-132 Issue 1)			
Device Type	Rugged Handheld PC with Sierra Wireless AirCard 555/550 Dual-Band CDMA Modem co-located with USI WM-BB-AG-01 802.11b / Bluetooth			
FCC IDENTIFIER	KBCIX100XA555WLBT			
IC Certification No.	1943A-IX100Xb			
Model(s)	IX100A555WLBT			
Serial No.	510495001-U5103-0025		Identical Prototype	
Mode(s) of Operation	CDMA	PCS		
		Cellular		
	802.11b	DSSS	Direct Sequence Spread Spectrum	
	Bluetooth	FHSS	Frequency Hopping Spread Spectrum	
Tx Frequency Range(s)	1851.25 - 1908.75 MHz		PCS CDMA	
	824.70 - 848.31 MHz		Cellular CDMA	
	2412 - 2462 MHz		802.11b	
	2402 - 2480 MHz		Bluetooth	
Max. RF Output Power(s) Tested	23.0 dBm	PCS CDMA	Conducted	
	23.0 dBm	Cellular CDMA	Conducted	
	14.0 dBm	802.11b	Peak Conducted	
	3.5 dBm	Bluetooth	Peak Conducted	
Antenna Type(s)	External	¼ Wave Helix	Dual-Band CDMA	
	Internal	Front Center above LCD Display	802.11b	
	Internal	Front Right Side	Bluetooth	
Battery Type	Lithium-ion	7.4V, 3.0 Ah	P/N: 46-0136-001	
Body-worn Accessories Tested	Nylon Carry Case		P/N: 54-0644-001	
	Ear-Microphone		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 SAM phantom

4.0 MEASUREMENT SUMMARY

BODY-WORN SAR MEASUREMENT RESULTS - PCS CDMA

Tx	Test Mode	Freq. (MHz	Chan.	Cond. Power Before Test (dBm)	Antenna Location	Body-Worn Accessories	DUT Position Relative to Front of Carry Case	DUT Position Relative to Planar Phantom	Separ. Distance to Planar Phantom (cm)	Measured SAR 1g (W/kg)	Power Drift During Test (dB)	Scaled SAR 1g (W/kg)
CDMA	PCS CDMA	1880.00	600	23.0	External	--	--	Back Side facing Phantom	0.0	F 0.223 S 0.223	-0.126	F 0.230 S 0.230
CDMA	PCS CDMA	1800.00	600	23.0	External	--	--	Right Side facing Phantom	0.0	0.904	-0.0100	0.906
CDMA	PCS CDMA	1851.25	25	23.0	External	--	--	Right Side facing Phantom	0.0	1.01	-0.0193	1.01
CDMA	PCS CDMA	1908.75	1175	23.0	External	--	--	Right Side facing Phantom	0.0	0.767	-0.0113	0.769
CDMA	PCS CDMA	1880.00	600	23.0	External	Carry Case Ear-Mic	Front Side facing Front of Case	Right Side facing Phantom	0.0	0.521	-0.207	0.546
CDMA	PCS CDMA	1880.00	600	23.0	External	Carry Case Ear-Mic	Back Side facing Front of Case	Right Side facing Phantom	0.0	0.451	-0.0780	0.459
CDMA	PCS CDMA	1880.00	600	23.0	External	Carry Case Ear-Mic	Front Side facing Front of Case	Front Side facing Phantom	0.0	0.109	-0.0384	0.110
CDMA	PCS CDMA	1880.00	600	23.0	External	Carry Case Ear-Mic	Back Side facing Front of Case	Back Side facing Phantom	0.0	F 0.112 S 0.113	-0.149	F 0.116 S 0.117
CDMA	PCS CDMA	1851.25	25	23.0	External	--	--	Right Side facing Phantom	0.0	0.987	-0.00869	0.989
802.11b	DSSS	2437	Mid	14.0	Internal							
CDMA	PCS CDMA	1851.25	25	23.0	External	--	--	Right Side facing Phantom	0.0	0.931	0.122	0.931
802.11b	DSSS	2437	Mid	14.0	Internal							
BT	Modulated	2441	Mid	3.5	Internal							

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)	March 5, 2004			Relative Humidity	30	%
Measured Fluid Type	1880 MHz Body			Atmospheric Pressure	101.5	kPa
Dielectric Constant ε_r	IEEE Target		Measured	Ambient Temperature	24.8	°C
	53.3	±5%	52.2	Fluid Temperature	21.7	°C
Conductivity σ (mho/m)	IEEE Target		Measured	Fluid Depth	≥ 15	cm
	1.52	±5%	1.59	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 measurements performed at the mid channel were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]).
3. Secondary peak SAR locations were evaluated to report SAR levels within 2 dB of the primary (P = Primary, S = Secondary).
4. The power drifts measured by the DASY system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.
5. The SAR evaluations were performed within 24 hours of the system performance check.

MEASUREMENT SUMMARY (Cont.)

BODY-WORN SAR MEASUREMENT RESULTS - CELLULAR CDMA

Tx	Test Mode	Freq. (MHz	Chan.	Cond. Power Before Test (dBm)	Antenna Location	Body-Worn Accessories	DUT Position Relative to Front of Carry Case	DUT Position Relative to Planar Phantom	Separ. Distance to Planar Phantom (cm)	Measured SAR 1g (W/kg)	SAR Drift During Test (dB)	Scaled SAR 1g (W/kg)
CDMA	Cellular CDMA	835.89	363	23.0	External	--	--	Back Side facing Phantom	0.0	0.415	0.00	0.415
CDMA	Cellular CDMA	835.89	363	23.0	External	--		Right Side Facing Phantom	0.0	0.992	-0.0500	1.00
CDMA	Cellular CDMA	824.70	1013	23.0	External	--	--	Right Side facing Phantom	0.0	0.788	-0.0100	0.790
CDMA	Cellular CDMA	848.31	777	23.0	External	--	--	Right Side facing Phantom	0.0	0.913	-0.0300	0.919
CDMA	Cellular CDMA	835.89	363	23.0	External	Carry Case Ear-Mic	Front Side facing Front of Case	Right Side facing Phantom	0.0	0.634	-0.100	0.649
CDMA	Cellular CDMA	835.89	363	23.0	External	Carry Case Ear-Mic	Back Side facing Front of Case	Right Side facing Phantom	0.0	0.532	-0.0869	0.543
CDMA	Cellular CDMA	835.89	363	23.0	External	Carry Case Ear-Mic	Front Side facing Front of Case	Front Side facing Phantom	0.0	0.265	-0.0300	0.267
CDMA	Cellular CDMA	835.89	363	23.0	External	Carry Case Ear-Mic	Back Side facing Front of Case	Back Side facing Phantom	0.0	0.349	-0.0400	0.352
CDMA	Cellular CDMA	835.89	363	23.0	External	--	--	Right Side facing Phantom	0.0	0.840	-0.0100	0.842
802.11b	DSSS	2437	Mid	14.0	Internal							
CDMA	Cellular CDMA	835.89	363	23.0	External	--	--	Right Side facing Phantom	0.0	P 0.832	0.0200	P 0.832
802.11b	DSSS	2437	Mid	14.0	Internal				0.0	S 0.699		S 0.699
BT	Modulated	2441	Mid	3.5	Internal							

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)	March 8, 2004			Relative Humidity	39	%
Measured Fluid Type	835 MHz Body			Atmospheric Pressure	103.4	kPa
Dielectric Constant ε_r	IEEE Target		Measured	Ambient Temperature	23.9	°C
	55.2	±5%	53.7	Fluid Temperature	22.4	°C
Conductivity σ (mho/m)	IEEE Target		Measured	Fluid Depth	≥ 15	cm
	0.97	±5%	0.98	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 measurements performed at the mid channel were ≥ 3 dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 - see reference [3]).
3. Secondary peak SAR locations were evaluated to report SAR levels within 2 dB of the primary (P = Primary, S = Secondary).
4. The power drifts measured by the DASY system for the duration of the SAR evaluations were added to the measured SAR levels to report scaled SAR results as shown in the above test data table.
5. The SAR evaluations were performed within 24 hours of the system performance check.

5.0 DETAILS OF SAR EVALUATION

The ITRONIX CORPORATION Model: IX100XA555WLBT Rugged Handheld PC FCC ID: KBCIX100XA555WLBT with Sierra Wireless AirCard 555/550 Dual-Band PCS/Cellular CDMA PCMCIA Modem Card co-located with USI WM-BB-AG-01 802.11b & Bluetooth Transmitters was compliant for localized Specific Absorption Rate (Uncontrolled Exposure) based on the test provisions and conditions described below. The detailed test setup photographs are shown in Appendix H.

Body SAR Configuration

1. The DUT 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 DUT was tested for body SAR (lap-held) with the right side (antenna side) facing parallel to, and touching, the outer surface of the planar phantom.
3. The DUT was tested for body SAR with the shoulder-worn nylon carry case and ear-microphone accessories. The front side of the DUT (keypad/LCD side) was placed parallel to the outer surface of the planar phantom with the front side of the DUT facing the front of the carry case. The front of the carry case was touching the outer surface of the planar phantom.
4. The DUT was tested for body SAR with the shoulder-worn nylon carry case and ear-microphone accessories. The back side of the DUT (battery side) was placed parallel to the outer surface of the planar phantom with the back side of the DUT facing the front of the carry case. The front of the carry case was touching the outer surface of the planar phantom.
5. The DUT was tested for body SAR with the shoulder-worn nylon carry case and ear-microphone accessories. The right side of the DUT (antenna side) was placed parallel to the outer surface of the planar phantom with the front side of the DUT facing the front of the carry case. The right side of the carry case was touching the outer surface of the planar phantom.
6. The DUT was tested for body SAR with the shoulder-worn nylon carry case and ear-microphone accessories. The right side of the DUT (antenna side) was placed parallel to the outer surface of the planar phantom with the back side of the DUT facing the front of the carry case. The left side of the carry case was touching the outer surface of the planar phantom.
7. With the DUT placed in the nylon carry case the thickness of the carry case provided a 0.5 cm separation distance from the DUT to the outer surface of the planar phantom.
8. Co-located simultaneous transmit tests were performed with both CDMA and 802.11b transmitters for the worst-case single transmit CDMA configuration in both the PCS and Cellular bands.
9. Tri-located simultaneous transmit tests were performed with CDMA, 802.11b, and Bluetooth transmitters for the worst-case single transmit CDMA configuration in both the PCS and Cellular bands.
10. Due to the dimensions of the DUT, a stack of low-density, low-loss dielectric foamed polystyrene was used in place of the device holder.
11. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluation. The temperatures listed in the table above were consistent for all measurement periods.
12. The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluation using an HP 85070C Dielectric Probe Kit and an HP 8753E Network Analyzer (see Appendix E for printout of measured fluid dielectric parameters).

DUT Test Modes & Power Settings

13. The conducted power levels of the DUT were measured prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter according to the procedures described in FCC 47 CFR §2.1046. The power drift measured by the DASY4 system for the duration of the SAR evaluations was added to the measured SAR levels to report scaled SAR results as shown in the test data tables (page 5-6).
14. The DUT was controlled in test mode via internal software. The SAR evaluations were performed with the DUT transmitting in the “always up” power control mode with a modulated CDMA signal. For the co-located simultaneous transmit tests the 802.11b was placed in continuous transmit operation at maximum power with a modulated DSSS signal. The Bluetooth transmitter was placed in continuous transmit operation at maximum power with the frequency hopping disabled and a modulated signal.
15. The DUT was tested with a fully charged battery for each test.

DETAILS OF SAR EVALUATION (Cont.)

Back Side of DUT facing body - worst-case antenna configuration relative to left arm

Front Side of DUT facing body - worst-case antenna configuration relative to right arm

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 form the tip of the probe and the distance between the surface and the lowest measuring point is 1.4 mm (see probe calibration document in Appendix D). The extrapolation was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.
f. Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).
g. A zoom scan volume of 32 mm x 32 mm x 30 mm (5 x 5 x 7 points) centered at the peak SAR location determined from the area scan is used for all zoom scans for devices with a transmit frequency < 800 MHz. Zoom scans for frequencies ≥ 800 MHz are determined with a scan volume of 30 mm x 30 mm x 30 mm (7 x 7 x 7) to ensure complete capture of the peak spatial-average SAR.

7.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluation a system check was performed at the planar section of the SAM phantom with an 1800MHz dipole and a 900MHz dipole (see Appendix C for system validation procedures). The fluid dielectric parameters were measured prior to the system performance check using an HP 85070C Dielectric Probe Kit and an HP 8753E Network Analyzer (see Appendix E for printout of measured fluid dielectric parameters). A forward power of 250mW was applied to the dipole and the system was verified to a tolerance of ±10% (see Appendix B for system performance check test plots).

SYSTEM PERFORMANCE CHECK

Test Date	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	Measured	IEEE Target	Measured	IEEE Target	Measured						
03/05/04	**1800MHz Brain**	**9.53 (±10%)**	9.40 (-1.4%)	**40.0 ±5%**	40.0	**1.40±5%**	1.38	1000	23.2	21.6	≥ 15	35	101.9
03/08/04	**900MHz Brain**	**2.70 (±10%)**	2.64 (-2.2%)	**41.5 ±5%**	41.2	**0.97±5%**	0.99	1000	23.9	20.7	≥ 15	39	103.4

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

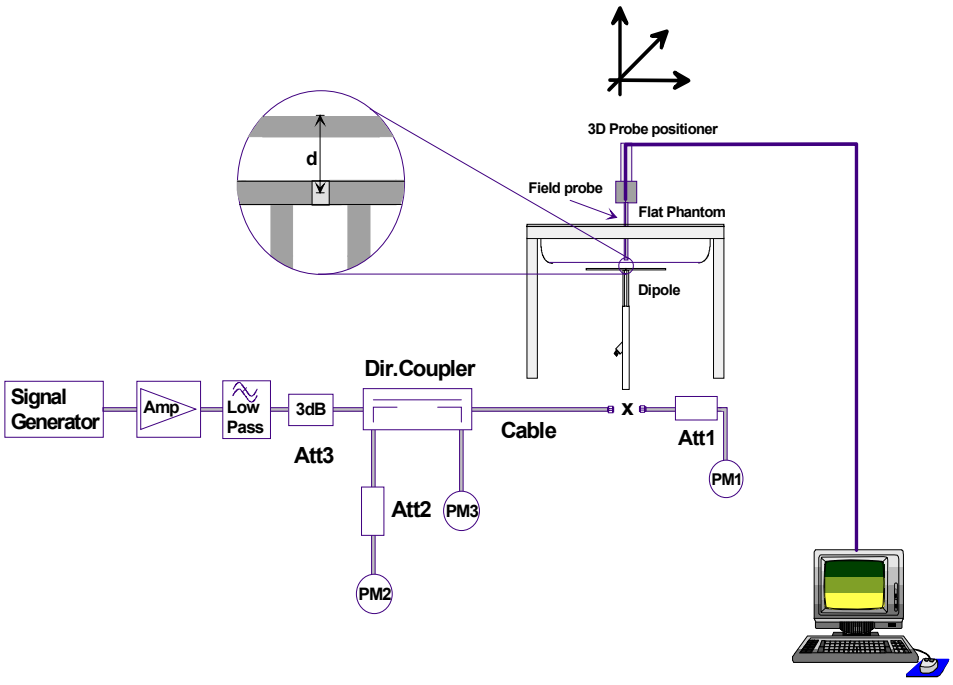


Figure 1. System Performance Check Setup Diagram

1800MHz Dipole Setup

900MHz Dipole Setup

8.0 SIMULATED EQUIVALENT TISSUES

The 1800MHz and 1880MHz simulated equivalent tissue mixtures consist of Glycol-monobutyl, water, and salt. The 835MHz and 900MHz simulated equivalent tissue mixtures consist of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution. Preservation with a bactericide was added and visual inspection was made to ensure air bubbles were not trapped during the mixing process. The fluids were prepared according to standardized procedures and measured for dielectric parameters (permittivity and conductivity).

1800MHz & 1880MHz TISSUE MIXTURES		
INGREDIENT	**1800 MHz Brain**	**1880 MHz Body**
	System Performance Check	DUT Evaluation
Water	54.83 %	69.85 %
Glycol Monobutyl	44.86 %	29.89 %
Salt	0.31 %	0.26 %

835MHz & 900MHz TISSUE MIXTURES		
INGREDIENT	**900 MHz Brain**	**835 MHz Body**
	System Performance Check	DUT Evaluation
Water	40.71 %	53.79 %
Sugar	56.63 %	45.13 %
Salt	1.48 %	0.98 %
HEC	0.99 %	--
Bactericide	0.19 %	0.10 %

9.0 SAR SAFETY LIMITS

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

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

10.0 ROBOT SYSTEM SPECIFICATIONS

Specifications

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

Data Acquisition Electronic (DAE) System

Cell Controller

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

Data Converter

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

DASY4 Measurement Server

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

E-Field Probe

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

Phantom(s)

Evaluation Phantom

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

Validation Phantom

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

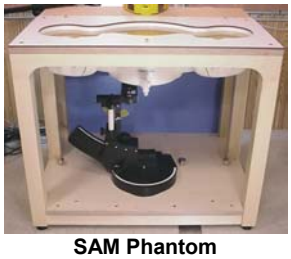
11.0 PROBE SPECIFICATION (ET3DV6)

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

ET3DV6 E-Field Probe

12.0 SAM PHANTOM V4.0C

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



SAM Phantom

13.0 PLANAR PHANTOM

The planar phantom is a fiberglass shell phantom with a 2.0 mm (+/-0.2mm) thick device measurement area at the center of the phantom for SAR evaluations of devices with a larger surface area 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

14.0 DEVICE HOLDER

The DASY4 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.

Device Holder

15.0 TEST EQUIPMENT LIST

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

16.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**c_i 1g**	**Standard Uncertainty ±% (1g)**	**v_i or v_{eff}**
Measurement System						
Probe calibration	± 4.8	Normal	1	1	± 4.8	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	$(1-c_p)$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	(c_p)	± 3.9	∞
Spatial resolution	± 0.0	Rectangular	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectangular	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 1.4	Rectangular	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectangular	√3	1	± 1.7	∞
Mech. constraints of robot	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
Extrapolation & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Test Sample Related						
Device positioning	± 6.0	Normal	√3	1	± 6.7	12
Device holder uncertainty	± 5.0	Normal	√3	1	± 5.9	8
Power drift	± 5.0	Rectangular	√3		± 2.9	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid conductivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Combined Standard Uncertainty					**± 13.3**	
Expanded Uncertainty (k=2)					**± 26.6**	

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

MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**c_i 1g**	**Standard Uncertainty ±% (1g)**	**v_i or v_{eff}**
Measurement System						
Probe calibration	± 4.8	Normal	1	1	± 4.8	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	$(1-c_p)$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	(c_p)	± 3.9	∞
Spatial resolution	± 0.0	Rectangular	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectangular	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 1.4	Rectangular	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectangular	√3	1	± 1.7	∞
Mech. constraints of robot	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
Extrapolation & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Dipole						
Dipole Axis to Liquid Distance	± 2.0	Rectangular	√3	1	± 1.2	∞
Input Power	± 4.7	Rectangular	√3	1	± 2.7	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid conductivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Combined Standard Uncertainty					**± 9.9**	
Expanded Uncertainty (k=2)					**± 19.8**	

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

17.0 REFERENCES

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

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

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

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

[5] IEEE 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”.

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

System Performance Check - 1800 MHz Dipole

Date Tested: 03/05/04

DUT: Dipole 1800 MHz; Model: D1800V2; Type: System Performance Check; Serial: 247

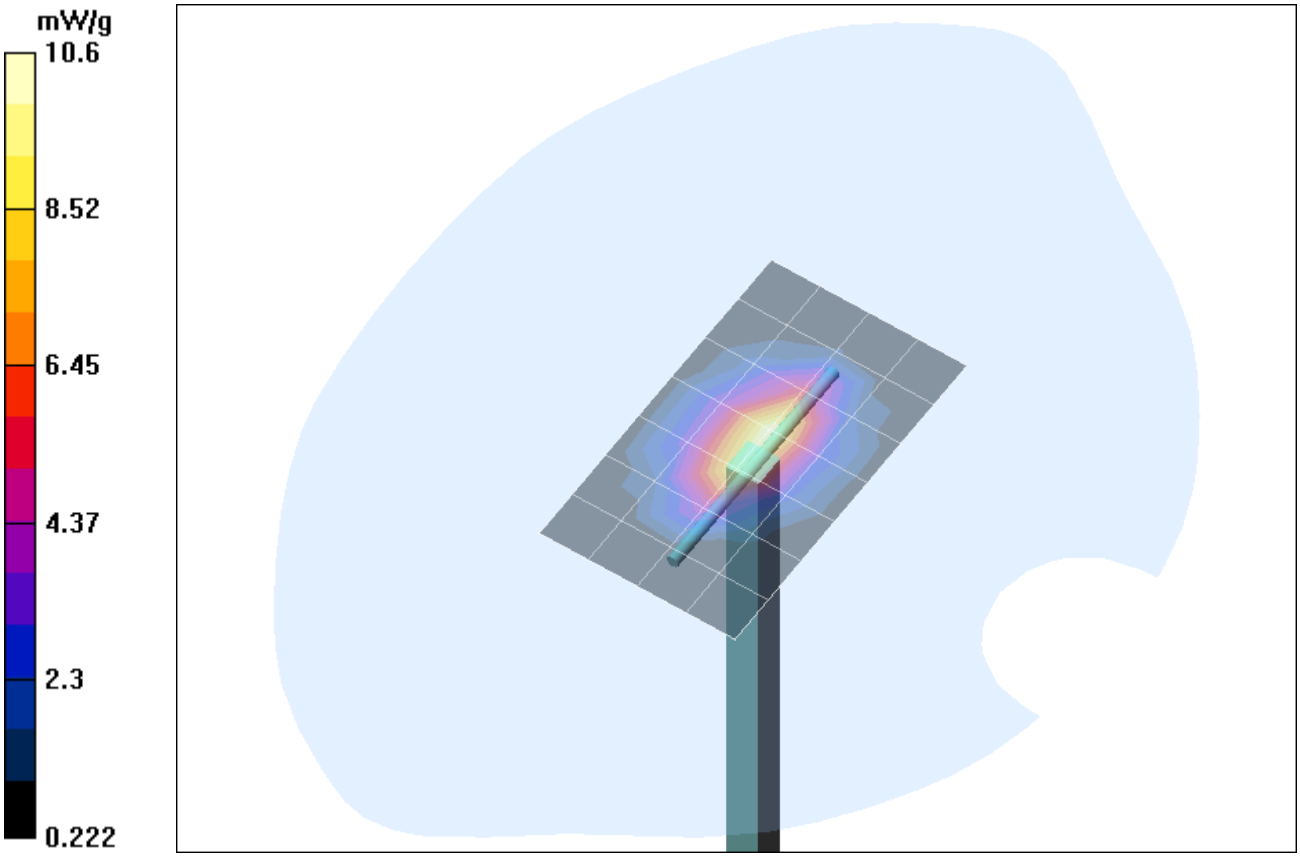
Ambient Temp: 23.2 °C; Fluid Temp: 21.6 °C; Barometric Pressure: 101.9 kPa; Humidity: 35%

Communication System: CW
Forward Conducted Power: 250mW
Frequency: 1800 MHz; Duty Cycle: 1:1
Medium: HSL1800 (σ = 1.38 mho/m; ε_r = 40.0; ρ = 1000 kg/m^3)

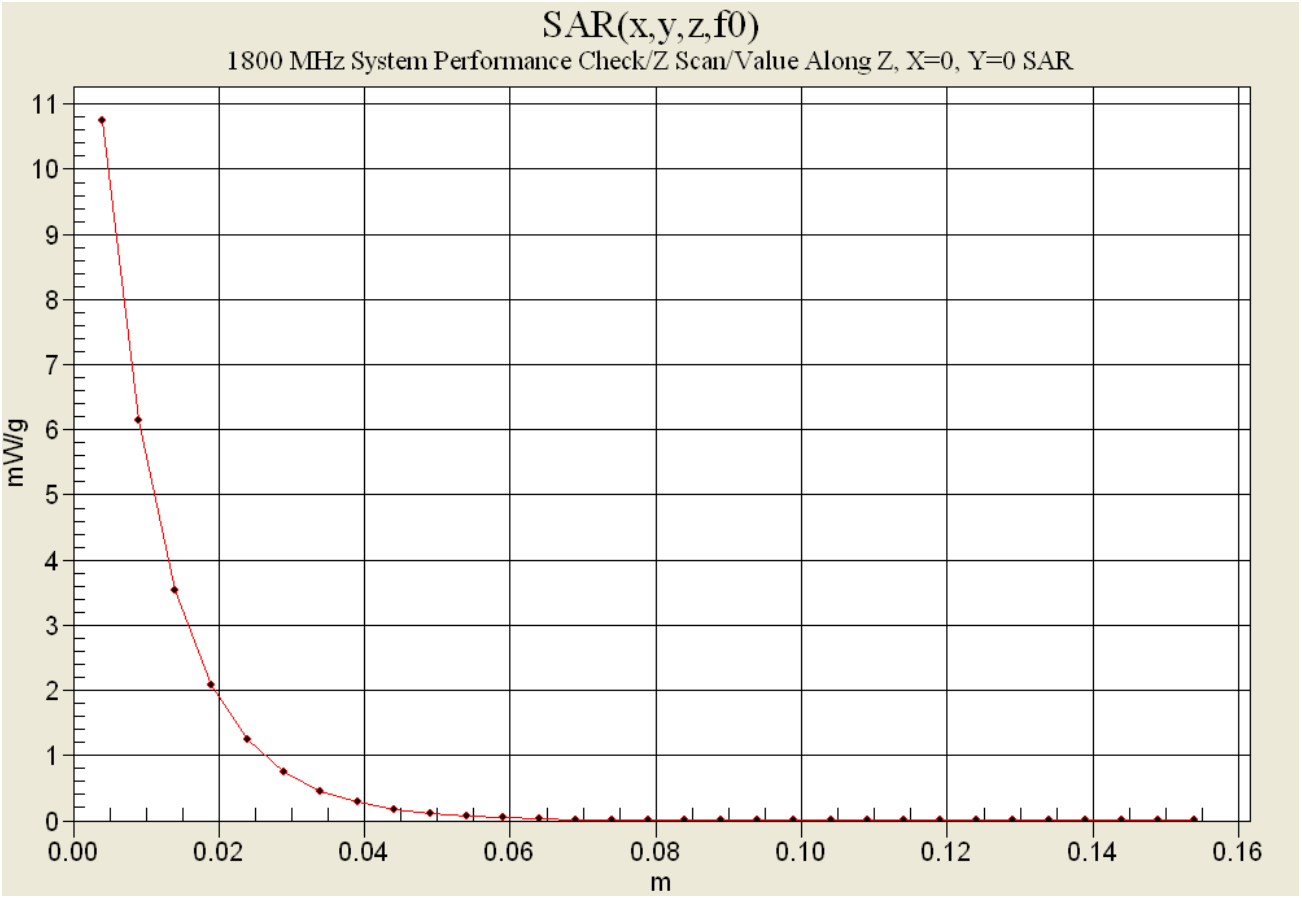
- Probe: ET3DV6 - SN1590; ConvF(5.5, 5.5, 5.5); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 94

1800 MHz System Performance Check/Area Scan (5x8x1):
Measurement grid: dx=15mm, dy=15mm

1800 MHz System Performance Check/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 9.40 mW/g; SAR(10 g) = 5.03 mW/g
Reference Value = 92 V/m
Power Drift = -0.0 dB



Z-Axis Scan


SAR(x,y,z,f0)
1800 MHz System Performance Check/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
m
0
1
2
3
4
5
6
7
8
9
10
11
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16

System Performance Check - 900 MHz Dipole

Date Tested: 03/08/04

DUT: Dipole 900 MHz; Model: D900V2; Type: System Performance Check; Serial: 054

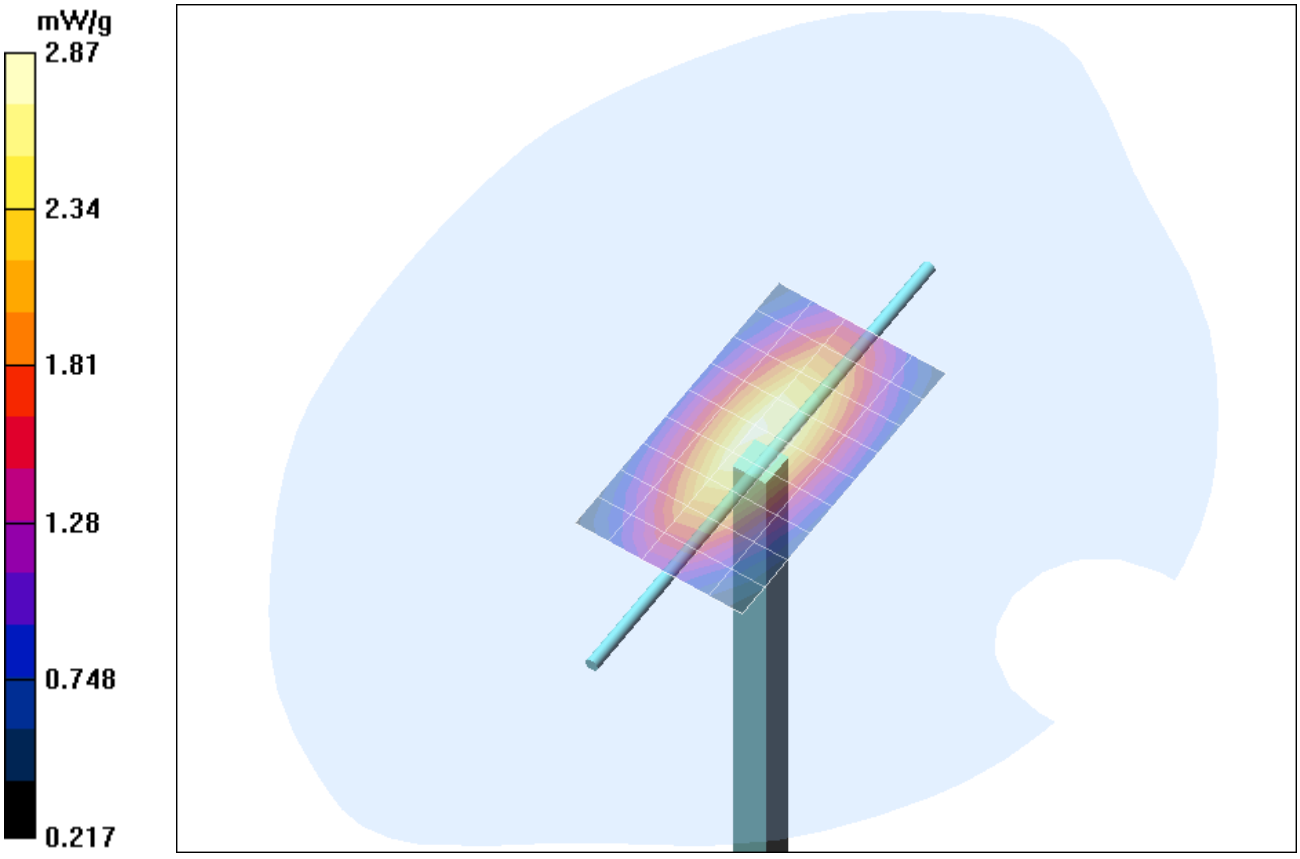
Ambient Temp: 23.9 °C; Fluid Temp: 20.7 °C; Barometric Pressure: 103.4 kPa; Humidity: 39%

Communication System: CW
Forward Conducted Power: 250mW
Frequency: 900 MHz; Duty Cycle: 1:1
Medium: HSL900 (σ = 0.99 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3)

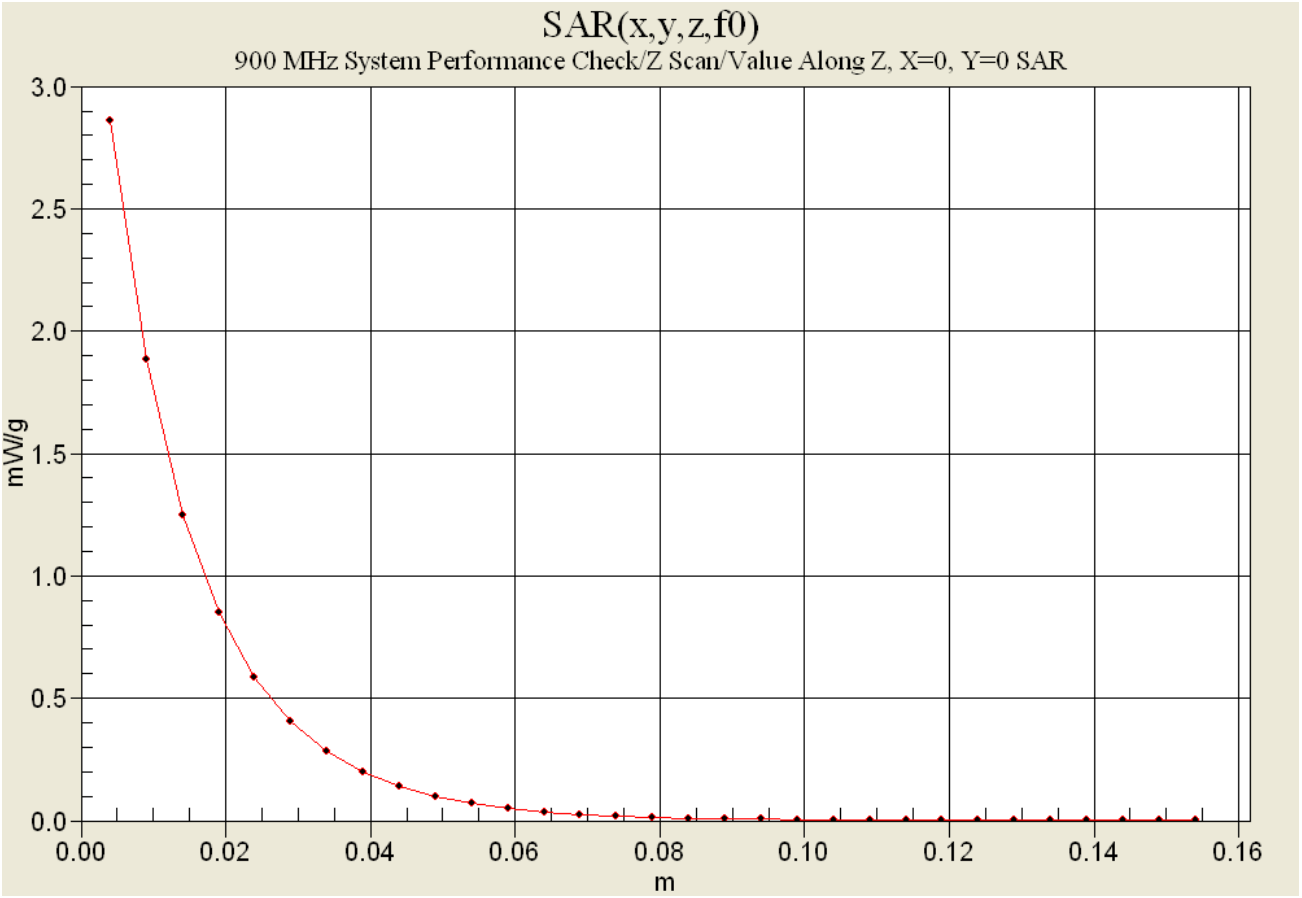
- Probe: ET3DV6 - SN1590; ConvF(7, 7, 7); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 94

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

900 MHz System Performance Check/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 3.96 W/kg
SAR(1 g) = 2.64 mW/g; SAR(10 g) = 1.69 mW/g
Reference Value = 55.8 V/m
Power Drift = -0.0 dB



Z-Axis Scan


SAR(x,y,z,f0)
900 MHz System Performance Check/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

APPENDIX E - MEASURED FLUID DIELECTRIC PARAMETERS

1800 MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

March 05, 2004

Frequency	e'	e"
1.700000000 GHz	40.5168	13.5794
1.710000000 GHz	40.4880	13.6050
1.720000000 GHz	40.4225	13.6300
1.730000000 GHz	40.3724	13.6681
1.740000000 GHz	40.3039	13.6830
1.750000000 GHz	40.2425	13.7126
1.760000000 GHz	40.2051	13.7280
1.770000000 GHz	40.1596	13.7485
1.780000000 GHz	40.1142	13.7567
1.790000000 GHz	40.0752	13.7735
1.800000000 GHz	40.0238	13.7981
1.810000000 GHz	39.9838	13.8342
1.820000000 GHz	39.9251	13.8575
1.830000000 GHz	39.8839	13.8823
1.840000000 GHz	39.8542	13.8941
1.850000000 GHz	39.8046	13.9063
1.860000000 GHz	39.7820	13.9260
1.870000000 GHz	39.7369	13.9177
1.880000000 GHz	39.7039	13.9411
1.890000000 GHz	39.6830	13.9629
1.900000000 GHz	39.6735	13.9774

1880 MHz DUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

March 05, 2004

Frequency	e'	e"
1.850000000 GHz	52.2555	15.1175
1.855000000 GHz	52.2565	15.1278
1.860000000 GHz	52.2418	15.1445
1.865000000 GHz	52.2371	15.1597
1.870000000 GHz	52.2061	15.1691
1.875000000 GHz	52.1946	15.1795
1.880000000 GHz	52.1773	15.1951
1.885000000 GHz	52.1628	15.2011
1.890000000 GHz	52.1405	15.2142
1.895000000 GHz	52.1279	15.2295
1.900000000 GHz	52.1026	15.2381
1.905000000 GHz	52.0728	15.2654
1.910000000 GHz	52.0328	15.2767
1.915000000 GHz	51.9985	15.2938
1.920000000 GHz	51.9674	15.3299
1.925000000 GHz	51.9382	15.3356
1.930000000 GHz	51.9237	15.3570
1.935000000 GHz	51.8872	15.3696
1.940000000 GHz	51.8826	15.3929
1.945000000 GHz	51.8596	15.4152
1.950000000 GHz	51.8483	15.4341

900 MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

March 08, 2004

Frequency	e'	e"
850.000000 MHz	41.8313	19.9596
855.000000 MHz	41.7561	19.9283
860.000000 MHz	41.6751	19.9095
865.000000 MHz	41.5981	19.9003
870.000000 MHz	41.5532	19.8924
875.000000 MHz	41.4622	19.8980
880.000000 MHz	41.4016	19.8647
885.000000 MHz	41.3594	19.8566
890.000000 MHz	41.2875	19.8475
895.000000 MHz	41.2884	19.7771
900.000000 MHz	41.2273	19.7655
905.000000 MHz	41.1926	19.7561
910.000000 MHz	41.1200	19.7337
915.000000 MHz	41.0741	19.6987
920.000000 MHz	41.0223	19.6904
925.000000 MHz	40.9805	19.6646
930.000000 MHz	40.9040	19.6498
935.000000 MHz	40.8373	19.6323
940.000000 MHz	40.8153	19.6014
945.000000 MHz	40.7584	19.6104
950.000000 MHz	40.7169	19.6050

835 MHz DUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

March 08, 2004

Frequency	e'	e"
785.000000 MHz	54.0280	21.4235
790.000000 MHz	54.0158	21.3798
795.000000 MHz	53.9736	21.3467
800.000000 MHz	53.9359	21.3237
805.000000 MHz	53.8820	21.2839
810.000000 MHz	53.8580	21.2622
815.000000 MHz	53.8248	21.2438
820.000000 MHz	53.7953	21.2019
825.000000 MHz	53.7409	21.1970
830.000000 MHz	53.6601	21.2074
835.000000 MHz	53.6617	21.1824
840.000000 MHz	53.5660	21.1601
845.000000 MHz	53.4753	21.1474
850.000000 MHz	53.4505	21.1326
855.000000 MHz	53.3909	21.1091
860.000000 MHz	53.3228	21.0891
865.000000 MHz	53.2595	21.0785
870.000000 MHz	53.2195	21.0701
875.000000 MHz	53.1676	21.0556
880.000000 MHz	53.1109	21.0537
885.000000 MHz	53.0957	21.0468

APPENDIX F - SAM PHANTOM CERTIFICATE OF CONFORMITY

Schmid & Partner Engineering AG

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

Certificate of conformity / First Article Inspection

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

Tests

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

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

Standards

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

Conformity

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

Date 18.11.2001

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

APPENDIX G - PLANAR PHANTOM CERTIFICATE OF CONFORMITY

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

BARSKI INDUSTRIES (1985) LTD.

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

FIBERGLASS FABRICATORS

Certificate of Conformity

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

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

Conformity

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

Signature: 

Daniel Chailler

Fiberglass Planar Phantom - Top View

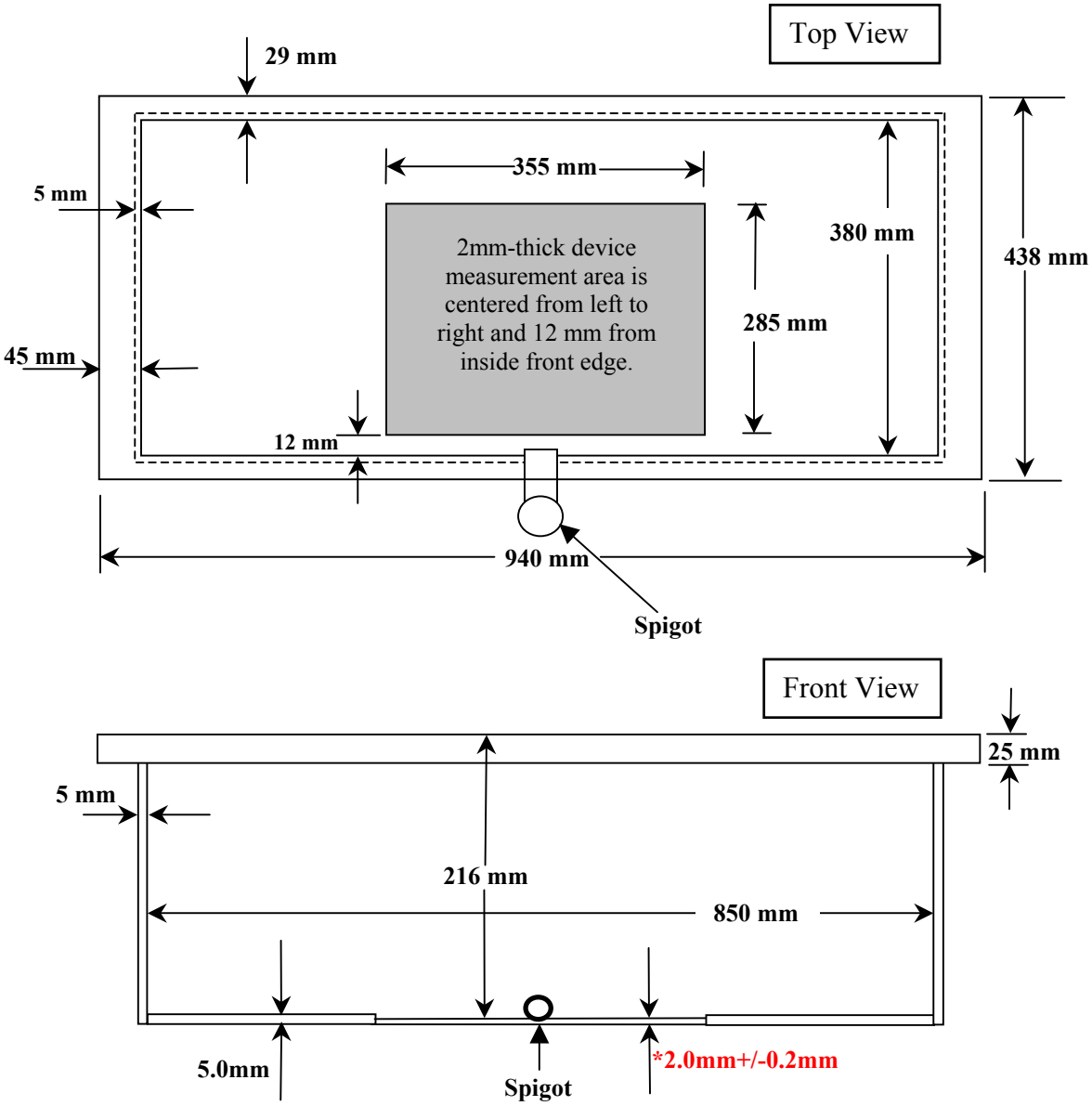
Fiberglass Planar Phantom - Front View

Fiberglass Planar Phantom - Back View

Fiberglass Planar Phantom - Bottom View

Dimensions of Fiberglass Planar Phantom

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



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