RF EXPOSURE EVALUATION

SPECIFIC ABSORPTION RATE

5 GHz

SAR TEST REPORT

FOR

ITRONIX CORPORATION

IX325 SERIES RUGGED TABLET PC

WITH

CISCO AIR-CB21AG-A-K9 802.11abg WLAN

AND

CO-LOCATED BLUETOOTH

MODEL: IX325-CWLBT

FCC ID: KBCIX325-CWLBT

IC: 1943A-IX325ab

Test Report Serial Number

040505KBC-F631-S15Wa

Test Report Issue Number

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Test Lab

Celltech Compliance Testing & Engineering Lab
(Celltech Labs Inc.)
1955 Moss Court
Kelowna, BC
Canada
V1Y 9L3

Test Report Prepared By:	Test Report Approved By:
Cheri Frangiadakis	
Cheri Frangiadakis Test Report Writer Celltech Labs Inc.	Jonathan Hughes General Manager Celltech Labs Inc.

DECLARATION OF COMPLIANCE
SAR RF EXPOSURE EVALUATION

Test Lab

CELLTECH LABS INC.
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

Company Information

ITRONIX CORPORATION
12825 E. Mirabeau Parkway
Spokane Valley, WA 99216
United States

FCC IDENTIFIER:	**KBCIX325-CWLBT**
IC IDENTIFER:	**1943A-IX325ab**
Model(s):	**IX325-CWLBT**
Rule Part(s):	**FCC 47 CFR §2.1093; Health Canada Safety Code 6**
Test Procedure(s):	**FCC OET Bulletin 65, Supplement C (Edition 01-01)** **Industry Canada RSS-102 Issue 2**
FCC Device Classification(s):	**Digital Transmission System (DTS) - §15C** **Unlicensed National Information Infrastructure TX (NII) - §15E**
IC Device Classification:	**Low Power License-Exempt Radiocommunication Device (RSS-210 Issue 6)**
Device Description:	**Rugged Tablet PC**
LCD Display Orientation(s):	**0 Degrees Landscape, -90 Degrees Portrait**
Internal Transmitter Type:	**Cisco AIR-CB21AG-A-K9 802.11abg WLAN (PCMCIA)**
Co-located Transmitter(s):	**MSI MS-6837 Bluetooth (simultaneous transmission)**
Mode(s) of Operation:	**802.11a: OFDM (Orthogonal Frequency Division Multiplexing)** **Bluetooth: FHSS (Frequency Hopping Spread Spectrum)**
Transmit Frequency Range(s):	**5180 - 5250 MHz 802.11a (UNII-1 Band); 5250 - 5320 MHz 802.11a (UNII-2 Band)** **5745 - 5825 MHz 802.11a (UNII-3 Band); 2412 - 2462 MHz 802.11b/g (ISM Band)** **2402 - 2480 MHz (Bluetooth)**
Max. RF Output Power Tested:	**15.9 dBm (0.0389 Watts) Peak Conducted (UNII-1 - 5240 MHz - 6 Mbps)** **15.7 dBm (0.0372 Watts) Peak Conducted (UNII-2 - 5260 MHz - 6 Mbps)** **15.8 dBm (0.0380 Watts) Peak Conducted (UNII-3 - 5785 MHz - 6 Mbps)** **3.78 dBm (0.0024 Watts) - Peak Conducted (Bluetooth)**
Date Rate(s):	**802.11a: 6 / 9 / 12 / 18 / 24 / 36 / 48 / 54 Mbps**
Power Source(s) Tested:	**Internal Lithium-ion Battery - 11.1 V, 3600 mAh (Model: T8M-E)** **External Second Lithium-ion Battery - 11.1 V, 3600 mAh (Model: T8S-E)**
Antenna Type(s) Tested:	**Internal Embedded Dual-Band Monopole (integrated on PCMCIA Card)** **Internal PIFA (Bluetooth)**
Max. SAR Level(s) Measured:	**Body: 0.258 W/kg (1g average) UNII-3 (Bottom Side of Tablet PC)** **Body: 0.173 W/kg (1g average) UNII-2 (Bottom Side of Tablet PC)** **Body: 0.149 W/kg (1g average) UNII-1 (Bottom Side of Tablet PC)**

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device was compliant with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01) and Industry Canada RSS-102 Issue 2 for the General Population / Uncontrolled Exposure environment. All measurements were performed in accordance with the SAR system manufacturer recommendations.

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

Tested By:

Sean Johnston
Compliance Technologist
Celltech Labs Inc.

Reviewed By:

Spencer Watson
Senior Compliance Technologist
Celltech Labs Inc.

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1.0 INTRODUCTION

This measurement report demonstrates that ITRONIX CORPORATION Model: IX325-CWLBT Rugged Tablet PC FCC ID: KBCIX325-CWLBT, incorporating the Cisco AIR-CB21AG-A-K9 802.11abg WLAN PCMCIA Card with co-located MSI MS-6837 Bluetooth, complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the General Population / Uncontrolled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]) and IC RSS-102 Issue 2 (see reference [4]) were employed. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION of DEVICE UNDER TEST (DUT)

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

Max. RF Output Power Levels (Measured)	Data Rate	GHz	Chan.	Peak Conducted dBm	Peak Conducted Watts	Default Test Chan.*	GHz	Chan.	Peak Conducted dBm	Peak Conducted Watts	Default Test Chan.*
	6 Mbps	5.18	36	15.8	0.0380	✓	**5.26**	**52**	**15.7**	**0.0372**	✓
	6 Mbps	5.20	40	16.0	0.0398	✸	5.28	56	15.0	0.0316	✸
	6 Mbps	5.22	44	16.1	0.0407	✸	5.30	60	15.1	0.0324	✸
	6 Mbps	**5.24**	**48**	**15.9**	**0.0389**	✓	5.32	64	15.4	0.0347	✓
	6 Mbps	5.745	149	15.7	0.0372	✓	* 5 GHz: when highest output ✸ is 0.25 dB > nearest ✓ channels, select ✸ instead of ✓ channel (per October 2005 FCC TCB Council Workshop - see reference [7])				
	6 Mbps	5.765	153	16.0	0.0398	✸					
	6 Mbps	**5.785**	**157**	**15.8**	**0.0380**	✓					
	6 Mbps	5.805	161	15.6	0.0363	✸	Turbo Mode for the Cisco AIR-CB21AG-A-K9 802.11abg WLAN is not supported by Itronix Corp. for use with the IX325 Tablet PC				
	6 Mbps	5.825	165	15.6	0.0363	✓					
	Note:	Higher data rates were also measured and the power levels were not > 0.25 dB than the power levels at 6 Mbps									
	-	3.78 dBm	0.0024 Watts	2441 MHz			Bluetooth				

Antenna Type(s) Tested	Internal	Monopole	Embedded on PCMCIA card	WLAN
	Internal	PIFA	Left Side Edge of Tablet PC	Bluetooth
Power Source(s) Tested	Internal Lithium-ion Battery		11.1 V, 3600 mAh	Model: T8M-E
	External Second Lithium-ion Battery		11.1 V, 3600 mAh	Model: T8S-E
DUT Configuration(s) Tested	Bottom Side of Tablet PC (Touch Position)			

3.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the DASY4 measurement server. The 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

4.0 MEASUREMENT SUMMARY

BODY SAR MEASUREMENT RESULTS (802.11a - 5.2 GHz)

Transmit Mode	Test Mode	Freq. (MHz)	Chan.	Data Rate	Battery Type	Antenna Position	DUT Position to Planar Phantom	Separation Distance to Planar Phantom (cm)	Cond. Power Before Test (dBm)	SAR Drift During Test (dB)	Measured SAR 1g (W/kg)
802.11a	OFDM	5240	48	6 Mbps	Internal Li-ion	Internal	Bottom Side	0.0 (Touch)	15.9	0.0813	0.149
802.11a	OFDM	5260	52	6 Mbps	Internal Li-ion	Internal	Bottom Side	0.0 (Touch)	15.7	0.0811	**0.173**
802.11a	OFDM	5260	52	6 Mbps	Internal Li-ion	Internal	Bottom Side	0.0 (Touch)	15.7	0.0726	0.166
Bluetooth Modulated Fixed Frequency		2441	39	--		Internal			3.78		

ANSI / IEEE C95.1 1999 - SAFETY LIMIT	BODY: 1.6 W/kg (averaged over 1 gram)	Spatial Peak Uncontrolled Exposure / General Population

Test Date(s)	October 17, 2005				**Relative Humidity**	38	%
Measured Fluid Type	**5200 MHz Body**				**Atmospheric Pressure**	101.8	kPa
Dielectric Constant ε_r	**IEEE Target**		**Measured**	**Deviation**	**Ambient Temperature**	23.5	°C
	49.0	**±5%**	47.5	-3.1%	**Fluid Temperature**	23.2	°C
Conductivity σ (mho/m)	**IEEE Target**		**Measured**	**Deviation**	**Fluid Depth**	≥ 15	cm
	5.30	**±5%**	5.12	-3.4%	**ρ (Kg/m^3)**	1000	

Note(s)		
	1.	The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
	2.	The SAR levels measured at the highest output channel in each frequency band were ≥ 3 dB below the SAR limit, therefore SAR evaluation for the remaining selected channels was not required (per October 2005 FCC TCB Council Workshop - see reference [7]).
	3.	Only the lowest data rate was evaluated based on the output power levels measured at the higher data rates were not > +0.25 dB than the output power level measured at the lowest data rate (per October 2005 FCC TCB Council Workshop - see reference [7]).
	4.	The DUT was initially evaluated for SAR with the Bluetooth transmitter disabled. Co-located simultaneous transmit SAR evaluation with both the 802.11a WLAN and Bluetooth transmitters enabled was performed in the worst-case configuration from the 802.11a WLAN single-transmit evaluations.
	5.	The power drifts measured by the DASY4 system for the duration of the SAR evaluations were <5% from the start power.
	6.	The DUT battery was fully charged prior to the SAR evaluations.
	7.	The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
	8.	The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
	9.	The SAR evaluations were performed within 24 hours of the system performance check.

MEASUREMENT SUMMARY (Cont.)

BODY SAR MEASUREMENT RESULTS (802.11a - 5.8 GHz)

Transmit Mode	Test Mode	Freq. (MHz)	Chan.	Data Rate	Battery Type	Antenna Position	DUT Position to Planar Phantom	Separation Distance to Planar Phantom (cm)	Cond. Power Before Test (dBm)	SAR Drift During Test (dB)	Measured SAR 1g (W/kg)
802.11a	OFDM	5785	157	6 Mbps	Internal Li-ion	Internal	Bottom Side	0.0 (Touch)	15.8	0.0189	**0.258**
802.11a	OFDM	5785	157	6 Mbps	External Li-ion	Internal	Bottom Side	0.0 (Touch)	15.8	0.119	0.150
802.11a	OFDM	5785	157	6 Mbps	Internal Li-ion	Internal	Bottom Side	0.0 (Touch)	15.8	0.120	0.241
Bluetooth Modulated Fixed Frequency		2441	39	--		Internal			3.78		

ANSI / IEEE C95.1 1999 - SAFETY LIMIT	BODY: 1.6 W/kg (averaged over 1 gram)	Spatial Peak Uncontrolled Exposure / General Population

Test Date(s)	October 17, 2005				**Relative Humidity**	35	%
Measured Fluid Type	**5800 MHz Body**				**Atmospheric Pressure**	101.9	kPa
Dielectric Constant ε_r	**IEEE Target**		**Measured**	**Deviation**	**Ambient Temperature**	23.7	°C
	48.2	**±5%**	46.1	-4.4%	**Fluid Temperature**	23.0	°C
Conductivity σ (mho/m)	**IEEE Target**		**Measured**	**Deviation**	**Fluid Depth**	≥ 15	cm
	6.00	**±5%**	6.19	+3.2%	**ρ (Kg/m^3)**	1000	

Note(s)

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. The SAR levels measured at the highest output channel in each frequency band were ≥ 3 dB below the SAR limit, therefore SAR evaluation for the remaining selected channels was not required (per October 2005 FCC TCB Council Workshop - see reference [7]).
3. Only the lowest data rate was evaluated based on the output power levels measured at the higher data rates were not > +0.25 dB than the output power level measured at the lowest data rate (per October 2005 FCC TCB Council Workshop - see reference [7]).
4. The DUT was initially evaluated for SAR with the Bluetooth transmitter disabled. Co-located simultaneous transmit SAR evaluation with both the 802.11a WLAN and Bluetooth transmitters enabled was performed in the worst-case configuration from the 802.11a WLAN single-transmit evaluations.
5. The power drifts measured by the DASY4 system for the duration of the SAR evaluations were <5% from the start power.
6. The DUT battery was fully charged prior to the SAR evaluations.
7. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
8. The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
9. The SAR evaluations were performed within 24 hours of the system performance check.

5.0 DETAILS OF SAR EVALUATION

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

Test Configurations

1. The DUT was evaluated for body SAR with the bottom side of the Tablet PC placed parallel to, and touching, the outer surface of the planar phantom. The DUT was tested with and without the Bluetooth transmitter enabled. The DUT was evaluated for body SAR with the internal lithium-ion battery and also with the external second lithium-ion battery (5.8 GHz - worst-case).

Test Modes & Power Settings

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

Test Conditions

6. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluations. The temperatures reported were consistent for all measurement periods.
7. The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluations using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C).
8. The SAR evaluations were performed within 24 hours of the system performance check.

6.0 EVALUATION PROCEDURES

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

b. The SAR was determined by a pre-defined procedure within the DASY4 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 15mm x 15mm.
An area scan was determined as follows:

c. Based on the defined area scan grid, a more detailed grid is created to increase the points by a factor of 10. The interpolation function then evaluates all field values between corresponding measurement points.

d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.
A 1g and 10g spatial peak SAR was determined as follows:

e. Extrapolation is used to determine the values between the dipole center of the probe and the surface of the phantom. This data cannot be measured because the center of the dipole sensors is 1.0 mm away from the probe tip and the distance between the probe and the boundary must be larger than 25% of the probe diameter. The probe diameter is 2.4 mm. In the DASY4 software, the distance between the sensor center and phantom surface is set to 2.0 mm. This provides a distance of 1.0 mm between the probe tip and the surface. The extrapolation of the values between the dipole center and the surface of the phantom 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 (5x5x7 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 (7x7x7 points) to ensure complete capture of the peak spatial-average SAR.

7.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations a system check was performed using a planar phantom and a SPEAG D5GHzV2 validation dipole (see Appendix F for system validation procedures). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using an ALS-PR-DIEL Dielectric Probe Kit and an HP 8753ET Network Analyzer (see Appendix C). A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of ±10% (see Appendix B for system performance check test plots). See table at bottom of this page for system manufacturer's reference SAR values from the DASY 4 Manual, March '05 (see reference [6]).

SYSTEM PERFORMANCE CHECK EVALUATION

Test Date	Equiv. Tissue	SAR 1g (W/kg)			Dielectric Constant ε_r			Conductivity σ (mho/m)			ρ (Kg/m^3)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
	MHz	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.	IEEE Target	Meas.	Dev.						
10/17/05	Body 5200	18.0 ±10%	17.6	-2.2%	49.0 ±5%	47.5	-3.1%	5.30 ±5%	5.12	-3.4%	1000	23.1	23.2	≥ 15	40	101.6
10/17/05	Body 5800	18.5 ±10%	17.3	-6.5%	48.2 ±5%	46.1	-4.4%	6.00 ±5%	6.19	+3.2%	1000	23.7	23.0	≥ 15	35	101.9
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.															

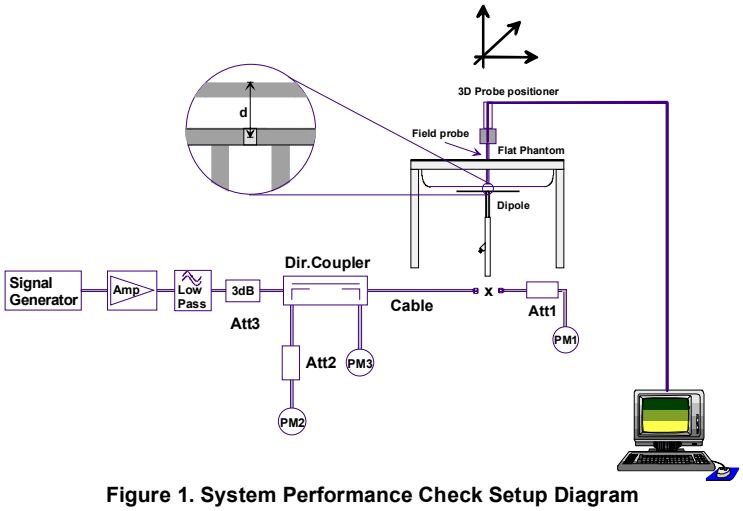


Figure 1. System Performance Check Setup Diagram

5 GHz Dipole Setup

Reference SAR values

The reference SAR values were calculated using finite-difference time-domain FDTD method (feed-point impedance set to 50 Ω) and the mechanical dimensions of the D5GHzV2 dipole (manufactured by SPEAG).

f (GHz)	Head Tissue			Body Tissue		
	SAR_{1g}	SAR_{10g}	SAR_{peak}	SAR_{1g}	SAR_{10g}	SAR_{peak}
5.0	72.9	20.7	285.6	68.1	19.2	260.3
5.1	74.6	21.1	297.5	78.8	19.6	272.3
5.2	76.5	21.6	310.3	71.8	20.1	284.7
5.5	83.3	23.4	349.4	79.1	22.0	326.3
5.8	78.0	21.9	340.9	74.1	20.5	324.7

Table 27.2: Numerical reference SAR values for D5GHzV2 dipole and flat phantom.

5 GHz Dipole

8.0 SIMULATED EQUIVALENT TISSUES

The 5.2GHz and 5.8GHz simulated tissue mixtures provided by SPEAG are listed below. The dielectric parameters of the fluid (permittivity and conductivity) were measured prior to the SAR evaluations. See Appendix D for manufacturer's fluid data sheet.

SIMULATED TISSUE MIXTURE		
INGREDIENT	System Performance Check & DUT Evaluation	
	5.2 GHz & 5.8 GHz Body	**5 GHz Fluid**
Water	64-78%	
Mineral Oil	11-18%	
Emulsifiers	9-15%	
Additives and Salt	2-3%	

9.0 SAR SAFETY LIMITS

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	**(Occupational / Controlled Exposure Environment)**
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0
Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.		
Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.		

10.0 ROBOT SYSTEM SPECIFICATIONS

Specifications

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

Data Acquisition Electronic (DAE) System

Cell Controller

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

Data Converter

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

DASY4 Measurement Server

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

E-Field Probe

Model: EX3DV4
Serial No.: 3547
Construction: Symmetrical design with triangular core
Frequency: 10 MHz to 6 GHz
Linearity: ±0.2 dB (30 MHz to 3 GHz)

Phantom(s)

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

11.0 PROBE SPECIFICATION (EX3DV4)

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. DGBE)
Calibration:	Basic Broadband Calibration in air: 10-3000 MHz Conversion Factors (CF) for HSL 900 and HSL 1750
Frequency:	10 MHz to >6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity:	±0.3 dB in HSL (rotation around probe axis) ±0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range:	10 μW/g to >100 mW/g; Linearity: ±0.2 dB (noise: typically < 1 μW/g)
Dimensions:	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1.0 mm
Application:	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better than 30%.

EX3DV4 E-Field Probe

12.0 PLANAR PHANTOM

The planar phantom is a fiberglass shell phantom with a 2.0 mm (+/-0.2mm) thick device measurement area at the center of the phantom for SAR evaluations of devices with a larger surface area than the planar section of the SAM phantom. The planar phantom is integrated in a wooden table (see Appendix H for dimensions and specifications of the planar phantom).

Planar Phantom

13.0 DEVICE HOLDER

The DASY4 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. For evaluations of larger devices such as Laptop and Tablet PCs, a Plexiglas platform is attached to the device holder.

Device Holder

14.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED		CALIBRATION DUE DATE
USED	DESCRIPTION					
x	Schmid & Partner DASY4 System	-	-	-		-
x	-DASY4 Measurement Server	00158	1078	N/A		N/A
x	-Robot	00046	599396-01	N/A		N/A
x	-DAE4	00019	353	15Jun05		15Jun06
	-DAE3	00018	370	25Jan05		25Jan06
	-ET3DV6 E-Field Probe	00016	1387	18Mar05		18Mar06
	-ET3DV6 E-Field Probe	00017	1590	20May05		20May06
x	-EX3DV4 E-Field Probe	00125	3547	21Jan05		21Jan06
	-300MHz Validation Dipole	00023	135	26Oct04		26Oct05
	-450MHz Validation Dipole	00024	136	04Nov04		04Nov05
	-835MHz Validation Dipole	00022	411	**Brain**	30Mar05	30Mar06
				Body	12Apr05	12Apr06
	-900MHz Validation Dipole	00020	054	**Brain**	10Jun05	10Jun06
				Body	10Jun05	10Jun06
	-1800MHz Validation Dipole	00021	247	**Brain**	14Jun05	14Jun06
				Body	14Jun05	14Jun06
	-1900MHz Validation Dipole	00032	151	**Brain**	17Jun05	17Jun06
				Body	22Apr05	22Apr06
	-2450MHz Validation Dipole	00025	150	**Brain**	20Sep05	20Sep06
				Body	22Apr05	22Apr06
	-5000MHz Validation Dipole	00126	1031	**Brain**	11Jan05	11Jan06
x				**Body**	11Jan05	11Jan06
	-SAM Phantom V4.0C	00154	1033	N/A		N/A
x	-Barski Planar Phantom	00155	03-01	N/A		N/A
	-Plexiglas Side Planar Phantom	00156	161	N/A		N/A
	-Plexiglas Validation Planar Phantom	00157	137	N/A		N/A
	HP 85070C Dielectric Probe Kit	00033	N/A	N/A		N/A
x	ALS-PR-DIEL Dielectric Probe Kit	00160	260-00953	N/A		N/A
	HP/Agilent E4408B Spectrum Analyzer	00015	US39240170	24Jan05		24Jan06
	Pasternack PE7014-30 30 dB Attenuator	00076	none	01Nov04		01Nov05
	Gigatronics 8652A Power Meter	00110	1835801	16Apr05		16Apr06
x	Gigatronics 8652A Power Meter	00008	1835267	29Apr05		29Apr06
	Gigatronics 80701A Power Sensor	00012	1834350	12Sep05		12Sep06
x	Gigatronics 80701A Power Sensor	00014	1833699	07Sep05		07Sep06
x	Gigatronics 80701A Power Sensor	00109	1834366	16Apr05		16Apr06
x	HP 8753ET Network Analyzer	00134	US39170292	04May05		04May06
x	HP 8648D Signal Generator	00005	3847A00611	29Apr05		29Apr06
	Rohde & Schwarz SMR40 Signal Generator	00006	100104	12Apr05		12Apr06
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	N/A		N/A

15.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**ci 1g**	**Uncertainty Value ±% (1g)**	**V_i or V_{eff}**
Measurement System						
Probe calibration	6.8	Normal	1	1	6.8	∞
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	2	Rectangular	1.732050808	1	1.2	∞
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	0.8	Rectangular	1.732050808	1	0.5	∞
Probe positioning	5.7	Rectangular	1.732050808	1	3.3	∞
Extrapolation & integration	4	Rectangular	1.732050808	1	2.3	∞
Test Sample Related						
Device positioning	2.9	Normal	1	1	2.9	12
Device holder uncertainty	3.6	Normal	1	1	3.6	8
Power drift	5	Rectangular	1.732050808	1	2.9	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	2.5	Normal	1	0.64	1.6	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.5	Normal	1	0.6	1.5	∞
Combined Standard Uncertainty					**11.92**	
Expanded Uncertainty (k=2)					**23.84**	

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

MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**ci 1g**	**Uncertainty Value ±% (1g)**	**V_i or V_{eff}**
Measurement System						
Probe calibration	6.8	Normal	1	1	6.8	∞
Axial isotropy of the probe	4.7	Rectangular	1.732050808	1	2.7	∞
Spherical isotropy of the probe	9.6	Rectangular	1.732050808	1	5.5	∞
Spatial resolution	0	Rectangular	1.732050808	1	0.0	∞
Boundary effects	2	Rectangular	1.732050808	1	1.2	∞
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	0.8	Rectangular	1.732050808	1	0.5	∞
Probe positioning	5.7	Rectangular	1.732050808	1	3.3	∞
Extrapolation & integration	4	Rectangular	1.732050808	1	2.3	∞
Dipole						
Dipole positioning	2	Rectangular	1.732050808	1	1.2	∞
Power & Power Drift	4.7	Rectangular	1.732050808	1	2.7	∞
Phantom and Setup						
Phantom uncertainty	4	Rectangular	1.732050808	1	2.3	∞
Liquid conductivity (target)	5	Rectangular	1.732050808	0.64	1.8	∞
Liquid conductivity (measured)	2.5	Normal	1	0.64	1.6	∞
Liquid permittivity (target)	5	Rectangular	1.732050808	0.6	1.7	∞
Liquid permittivity (measured)	2.5	Normal	1	0.6	1.5	∞
Combined Standard Uncertainty					**11.75**	
Expanded Uncertainty (k=2)					**23.50**	

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

16.0 REFERENCES

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

[2] Health Canada, “Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz”, Safety Code 6: 1999.

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

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

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

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

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

APPENDIX A - SAR MEASUREMENT DATA

Date Tested: 10/17/2005

Body SAR - 802.11a - 6 Mbps - 5240 MHz - Bottom Side of DUT - 0.0 cm Spacing - Internal Battery Power

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

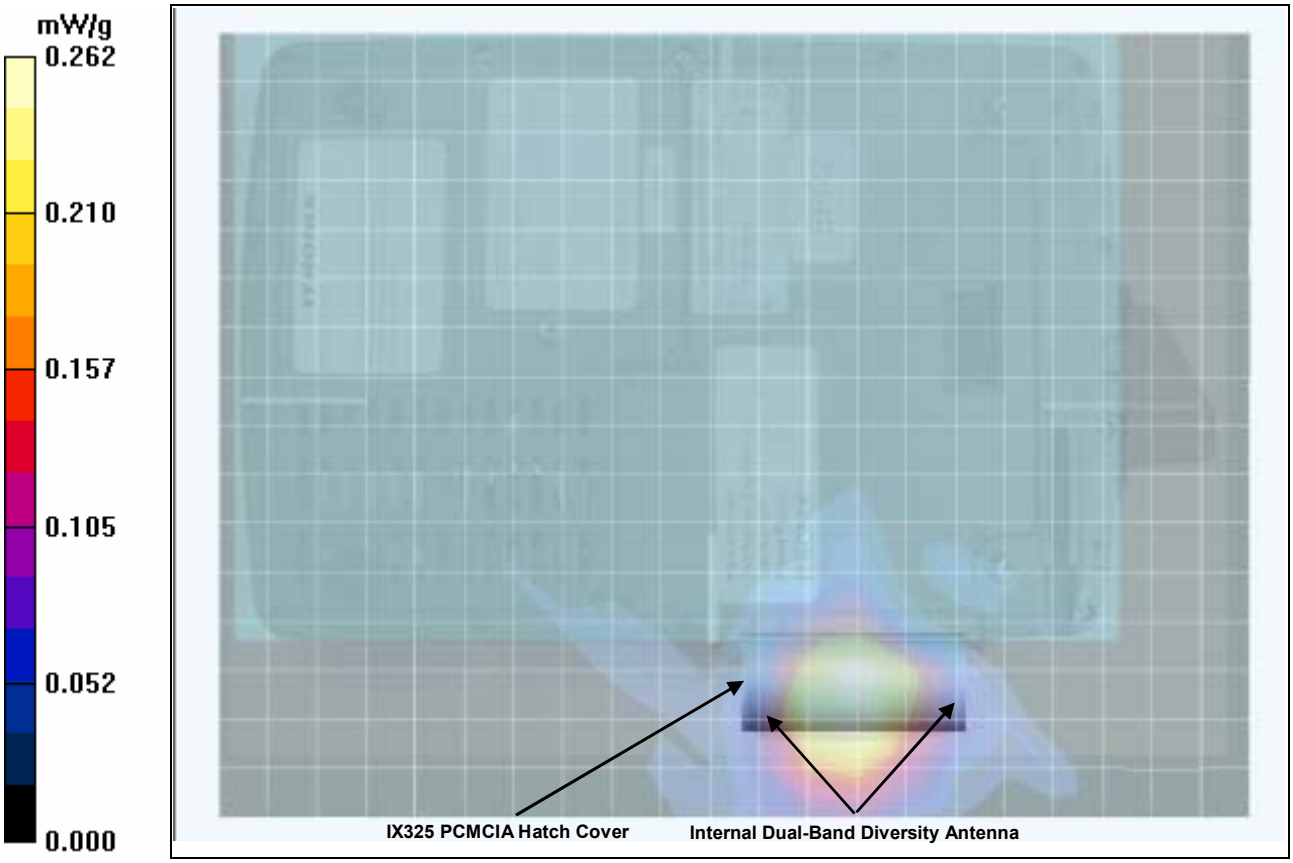
Ambient Temp: 23.5 °C; Fluid Temp: 23.2 °C; Barometric Pressure: 101.8 kPa; Humidity: 38%

11.1V, 3600mAh Internal Lithium-ion Battery (Model: T8M-E)
Communication System: OFDM WLAN
RF Output Power: 15.9 dBm (Conducted)
Frequency: 5240 MHz; Channel 48; Duty Cycle: 1:1
Medium: M5200-5800 (σ = 5.12 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3)

- Probe: EX3DV4 - SN3547; ConvF(4.82, 4.82, 4.82); Calibrated: 21/01/2005
- Sensor-Surface: 2mm (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 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Body SAR - 802.11a - Bottom Side of DUT Touching Planar Phantom - 5240 MHz
Area Scan (17x23x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - 802.11a - Bottom Side of DUT Touching Planar Phantom - 5240 MHz
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.38 V/m; Power Drift = 0.0813 dB
Peak SAR (extrapolated) = 0.459 W/kg
SAR(1 g) = 0.149 mW/g; SAR(10 g) = 0.060 mW/g



Date Tested: 10/17/2005

Body SAR - 802.11a - 6 Mbps - 5260 MHz - Bottom Side of DUT - 0.0 cm Spacing - Internal Battery Power

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

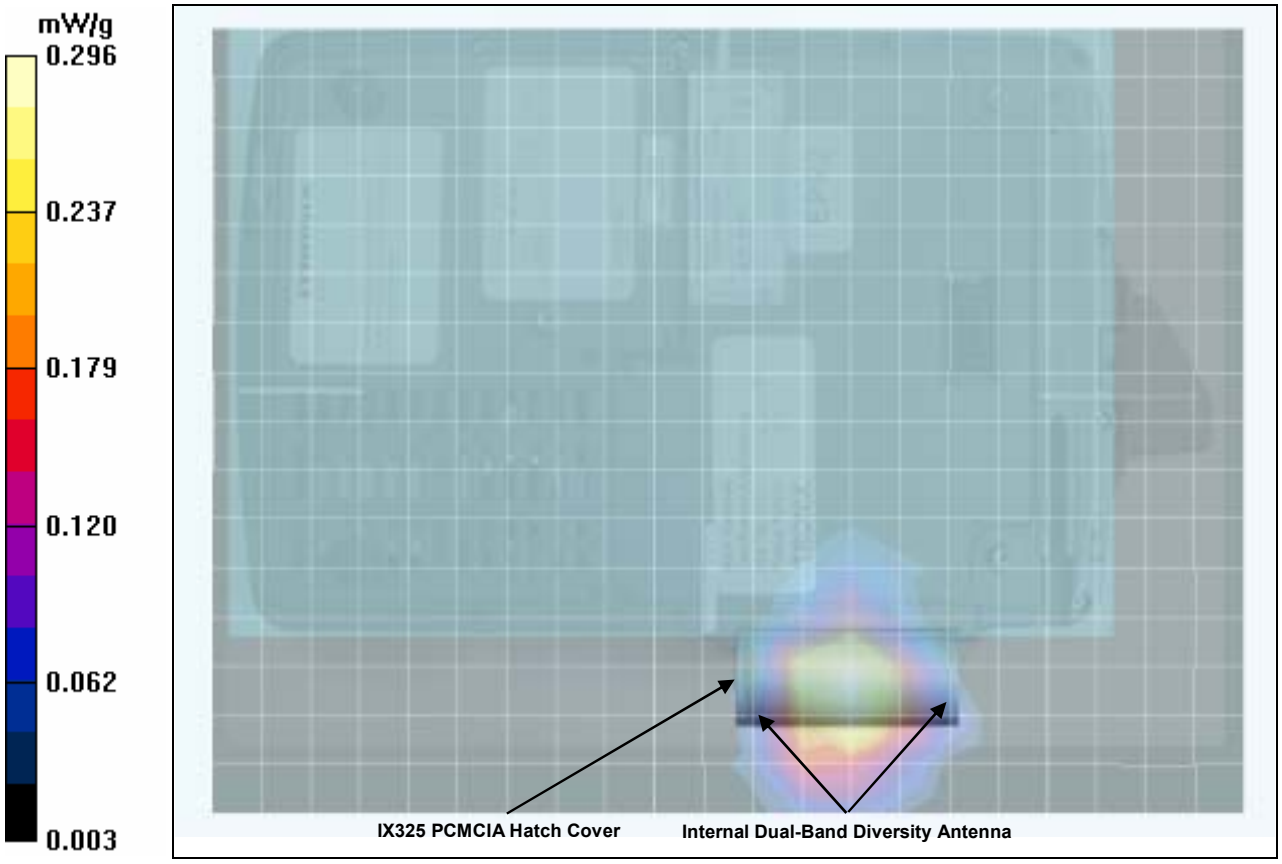
Ambient Temp: 23.5 °C; Fluid Temp: 23.2 °C; Barometric Pressure: 101.8 kPa; Humidity: 38%

11.1V, 3600mAh Internal Lithium-ion Battery (Model: T8M-E)
Communication System: OFDM WLAN
RF Output Power: 15.7 dBm (Conducted)
Frequency: 5260 MHz; Channel 52; Duty Cycle: 1:1
Medium: M5200-5800 (σ = 5.12 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3)

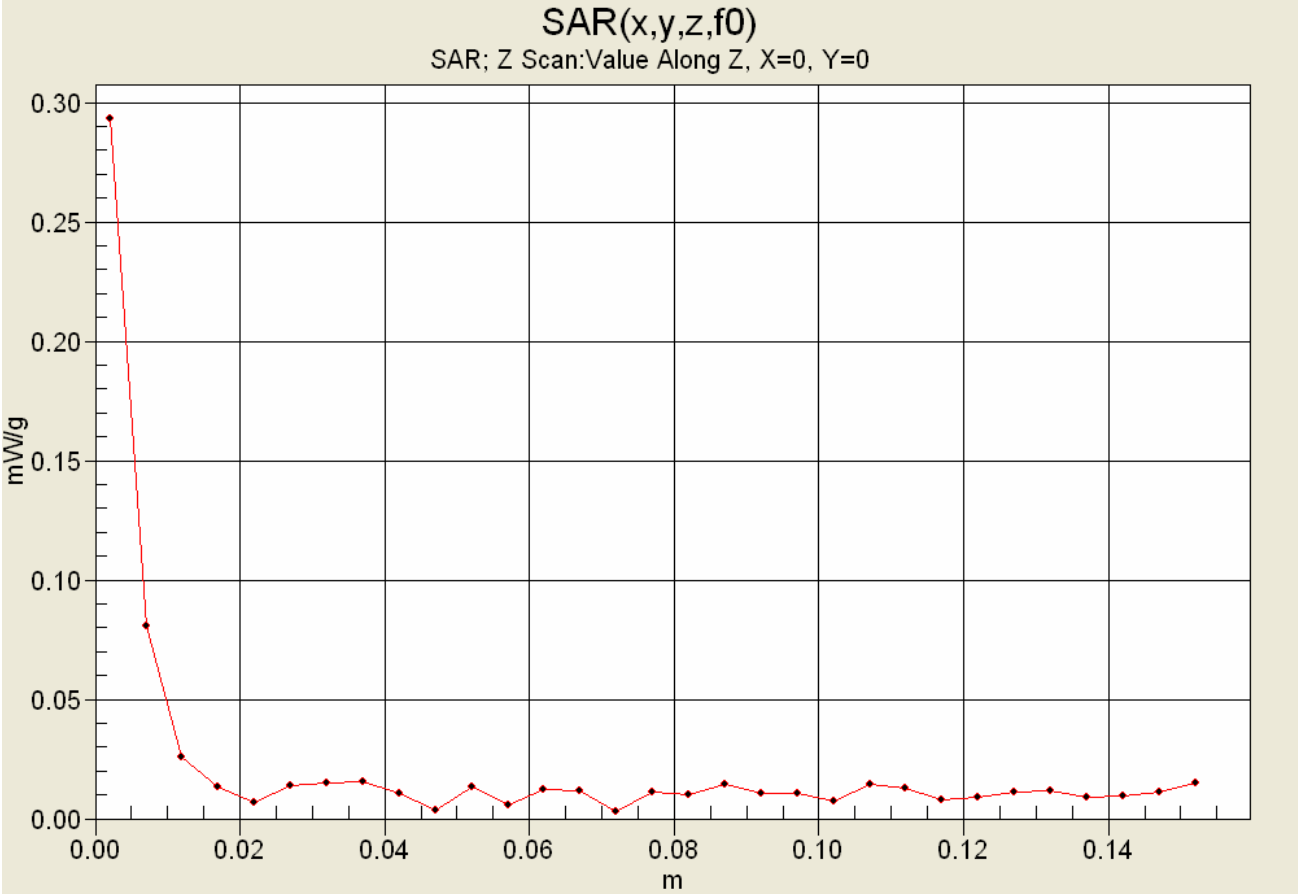
- Probe: EX3DV4 - SN3547; ConvF(4.82, 4.82, 4.82); Calibrated: 21/01/2005
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Body SAR - 802.11a - Bottom Side of DUT Touching Planar Phantom - 5260 MHz
Area Scan (17x23x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - 802.11a - Bottom Side of DUT Touching Planar Phantom - 5260 MHz
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.70 V/m; Power Drift = 0.0811 dB
Peak SAR (extrapolated) = 0.570 W/kg
SAR(1 g) = 0.173 mW/g; SAR(10 g) = 0.081 mW/g



Z-Axis Scan



Date Tested: 10/17/2005

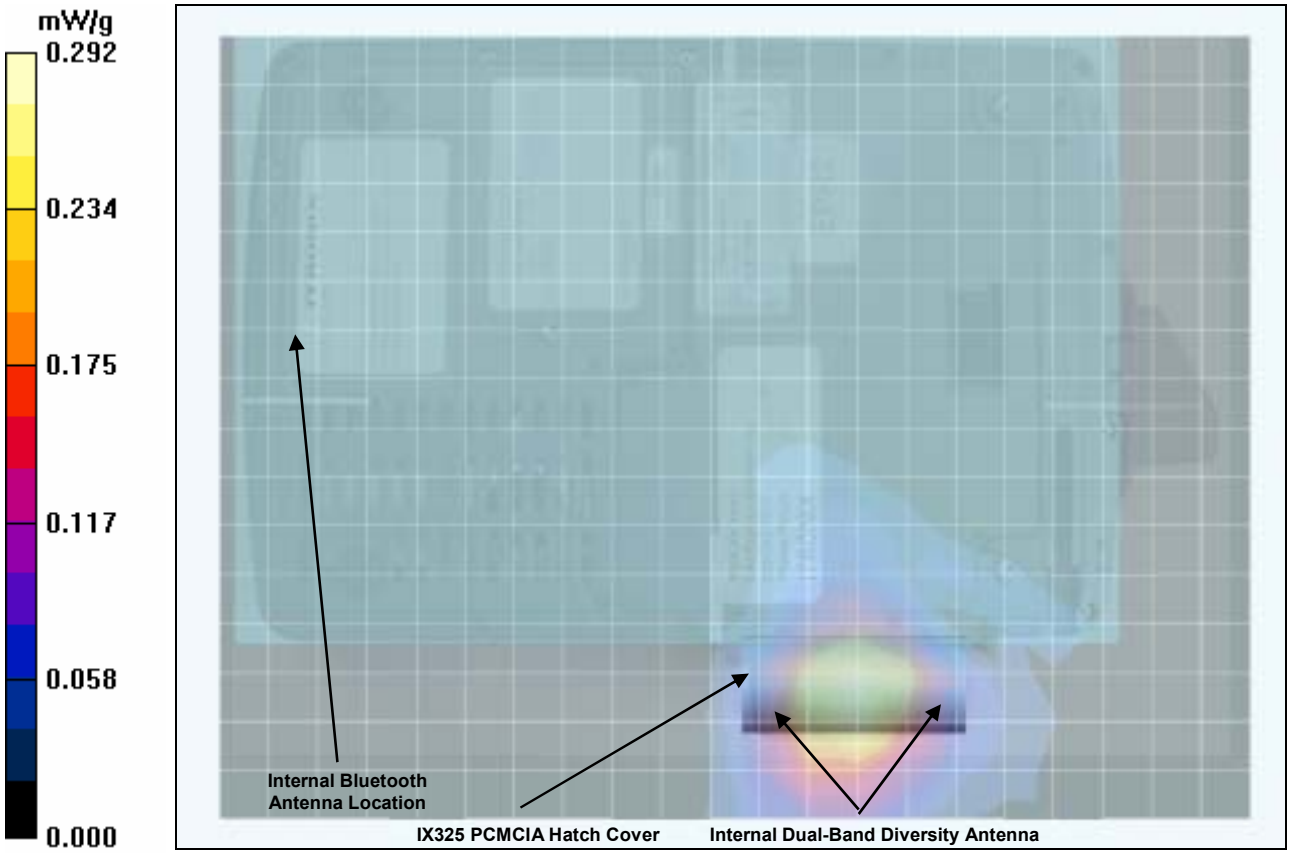
Body SAR - 802.11a - 6 Mbps - 5260 MHz - Bottom Side of DUT - 0.0 cm Spacing - Internal Battery Power

Simultaneous Transmit with Co-located Bluetooth

DUT: Itronix Model: IX325-CWLBT; Type: Tablet PC with Cisco AIR-CB21AG-1-K9 802.11abg WLAN; Serial: ZZGEG5073ZZ9781
Ambient Temp: 23.5 °C; Fluid Temp: 23.2 °C; Barometric Pressure: 101.8 kPa; Humidity: 38%
11.1V, 3600mAh Internal Lithium-ion Battery (Model: T8M-E)
Communication System: OFDM WLAN
RF Output Power: 15.7 dBm (Conducted)
Frequency: 5260 MHz; Channel 52; Duty Cycle: 1:1
Communication System: Modulated Fixed Frequency (Bluetooth)
Frequency: 2441 MHz; Channel: 39; Duty Cycle: 1:1 (Bluetooth)
RF Output Power: 3.78 dBm (Conducted) Bluetooth
Medium: M5200-5800 (σ = 5.15 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3)
- Probe: EX3DV4 - SN3547; ConvF(4.82, 4.82, 4.82); Calibrated: 21/01/2005
- Sensor-Surface: 2mm (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 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Body SAR - 802.11a with Bluetooth - Bottom Side of DUT Touching Planar Phantom - 5260 MHz
Area Scan (17x23x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - 802.11a with Bluetooth - Bottom Side of DUT Touching Planar Phantom - 5260 MHz
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.69 V/m; Power Drift = 0.0726 dB
Peak SAR (extrapolated) = 0.563 W/kg
SAR(1 g) = 0.166 mW/g; SAR(10 g) = 0.073 mW/g



Date Tested: 10/17/2005

Body SAR - 802.11a - 6 Mbps - 5785 MHz - Bottom Side of DUT - 0.0 cm Spacing - Internal Battery Power

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

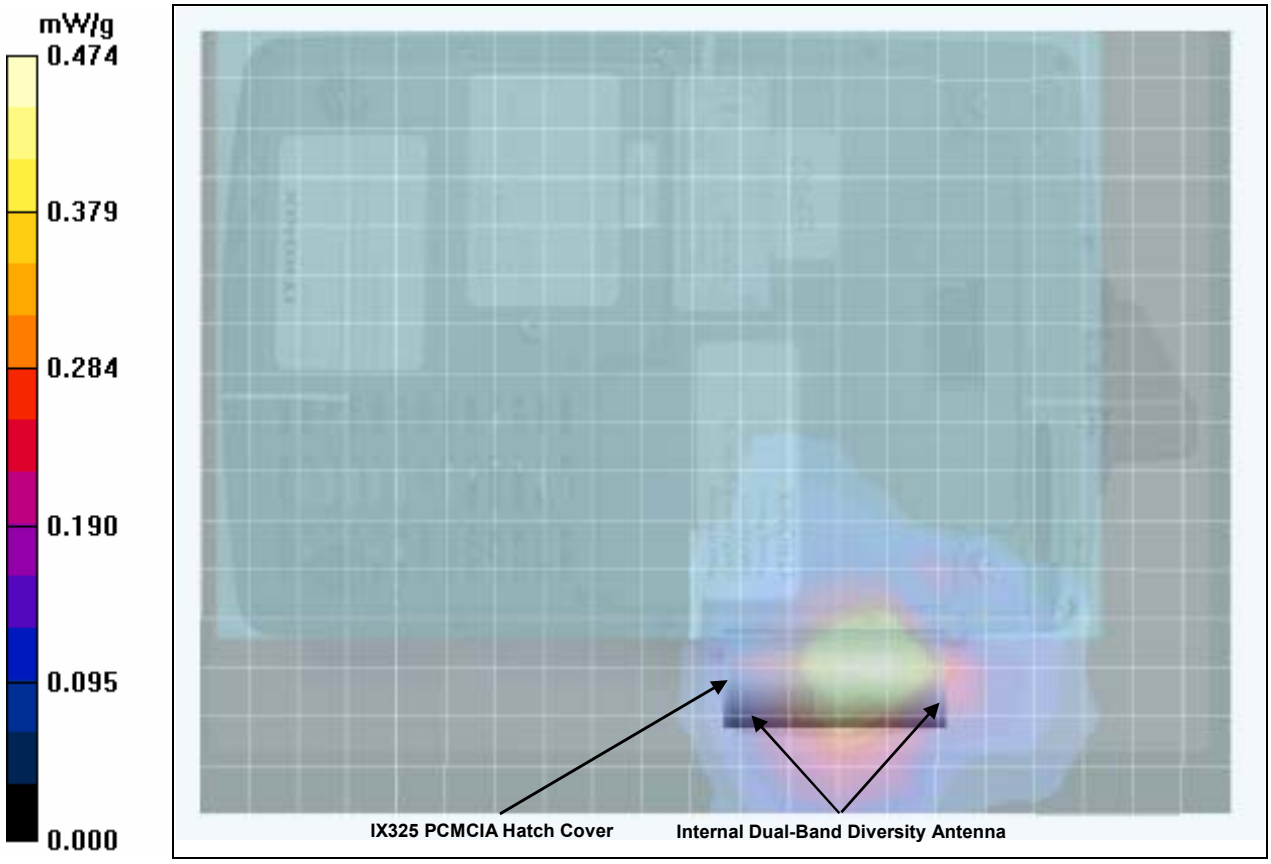
Ambient Temp: 23.7 °C; Fluid Temp: 23.0 °C; Barometric Pressure: 101.9 kPa; Humidity: 35%

11.1V, 3600mAh Internal Lithium-ion Battery (Model: T8M-E)
Communication System: OFDM WLAN
RF Output Power: 15.8 dBm (Conducted)
Frequency: 5785 MHz; Channel 157; Duty Cycle: 1:1
Medium: M5200-5800 (σ = 6.19 mho/m; ε_r = 46.1; ρ = 1000 kg/m^3)

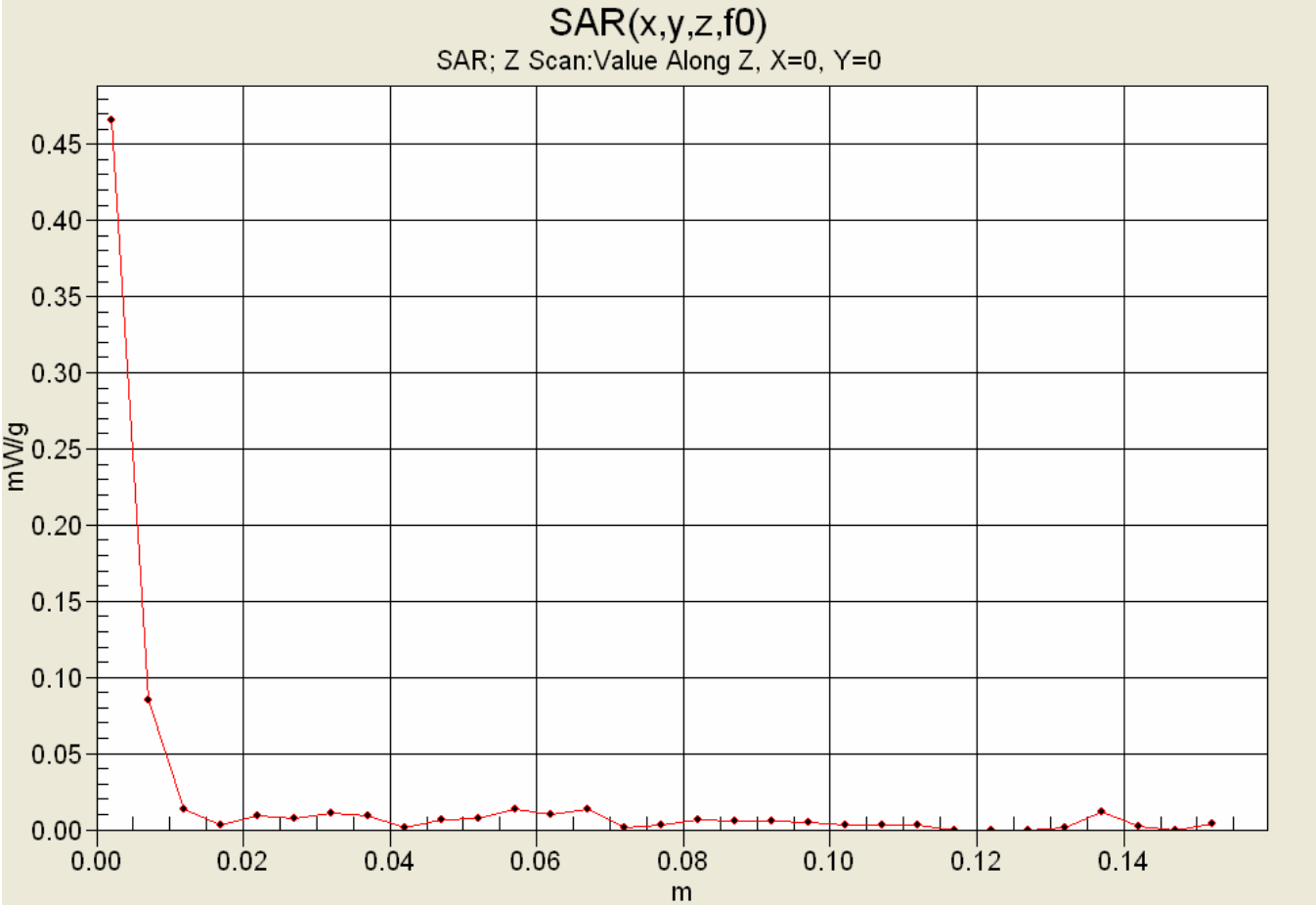
- Probe: EX3DV4 - SN3547; ConvF(4.59, 4.59, 4.59); Calibrated: 21/01/2005
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Body SAR - 802.11a - Bottom Side of DUT Touching Planar Phantom - 5785 MHz
Area Scan (17x23x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - 802.11a - Bottom Side of DUT Touching Planar Phantom - 5785 MHz
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.39 V/m; Power Drift = 0.0189 dB
Peak SAR (extrapolated) = 0.951 W/kg
SAR(1 g) = 0.258 mW/g; SAR(10 g) = 0.107 mW/g



Z-Axis Scan



Date Tested: 10/17/2005

Body SAR - 802.11a - 6 Mbps - 5785 MHz - Bottom Side of DUT - 0.0 cm Spacing - With External 2nd Battery

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

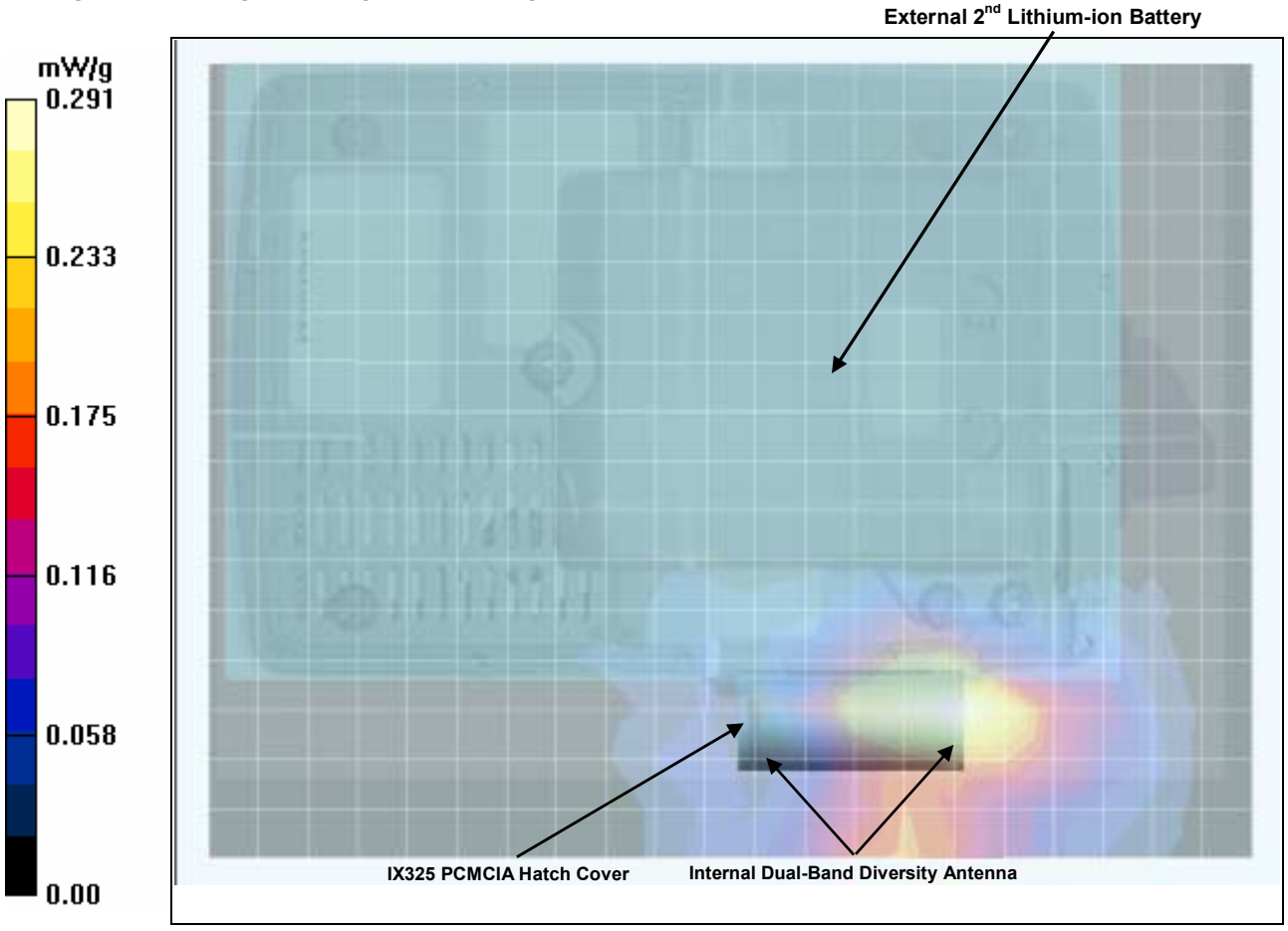
Ambient Temp: 23.7 ºC; Fluid Temp: 23.0 ºC; Barometric Pressure: 101.9 kPa; Humidity: 35%

11.1V, 3600mAh External Second Lithium-ion Battery (Model: T8S-E)
Communication System: OFDM WLAN
RF Output Power: 15.8 dBm (Conducted)
Frequency: 5785 MHz; Channel 157; Duty Cycle: 1:1
Medium: M5200-5800 (σ = 6.19 mho/m; ε_r = 46.1; ρ = 1000 kg/m^3)

- Probe: EX3DV4 - SN3547; ConvF(4.59, 4.59, 4.59); Calibrated: 21/01/2005
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 25/01/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Body SAR - 802.11a - Bottom Side of DUT (External 2nd Battery) Touching Planar Phantom - 5785 MHz (15 mm External Battery Thickness) / Area Scan (17x22x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - 802.11a - Bottom Side of DUT (External 2nd Battery) Touching Planar Phantom - 5785 MHz (15 mm External Battery Thickness) / Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.53 V/m; Power Drift = 0.119 dB
Peak SAR (extrapolated) = 0.605 W/kg
SAR(1 g) = 0.150 mW/g; SAR(10 g) = 0.066 mW/g



Date Tested: 10/17/2005

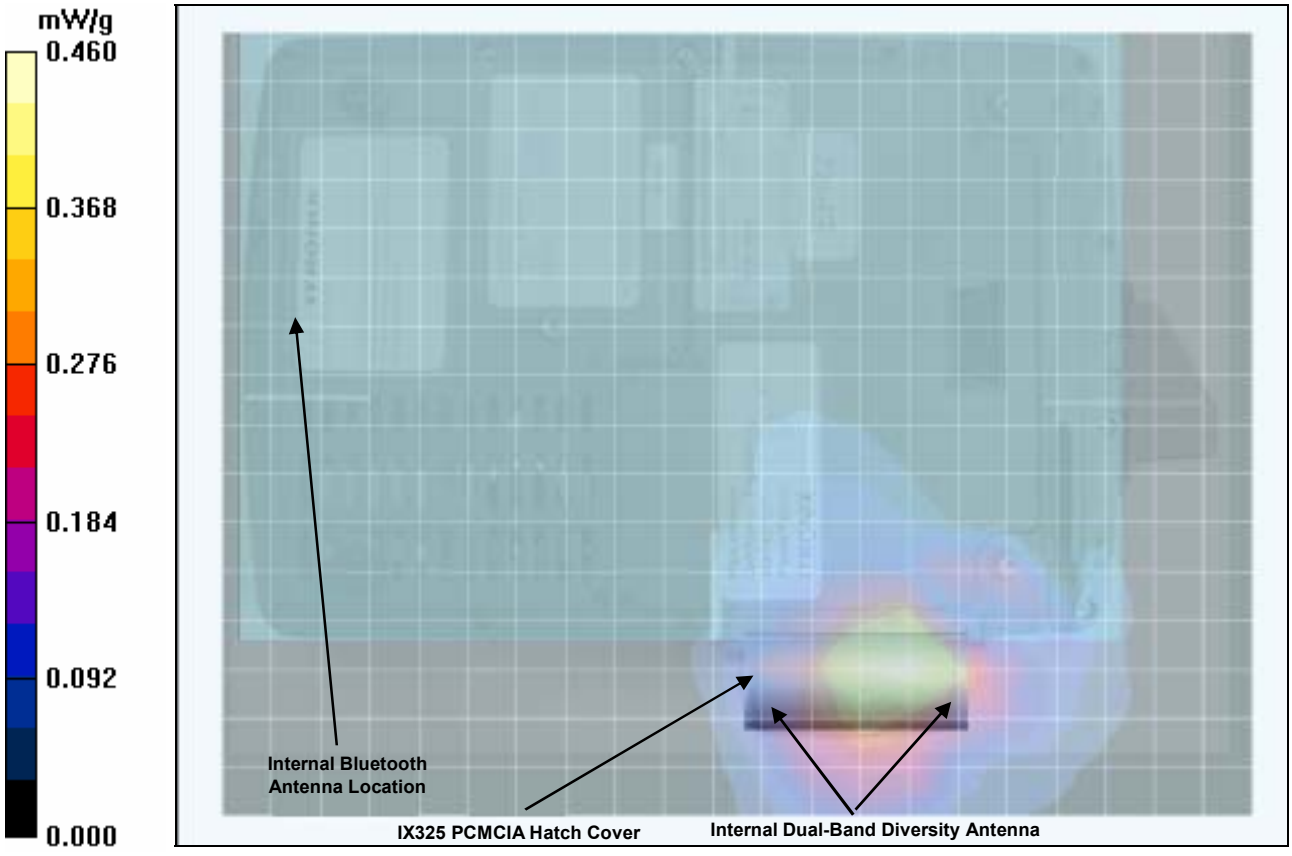
Body SAR - 802.11a - 6 Mbps - 5785 MHz - Bottom Side of DUT - 0.0 cm Spacing - Internal Battery Power
Simultaneous Transmit with Co-Located Bluetooth

DUT: Itronix Model: IX325-CWLBT; Type: Tablet PC with Cisco AIR-CB21AG-1-K9 802.11abg WLAN; Serial: ZZGEG5073ZZ9781
Ambient Temp: 23.7 °C; Fluid Temp: 23.0 °C; Barometric Pressure: 101.9 kPa; Humidity: 35%

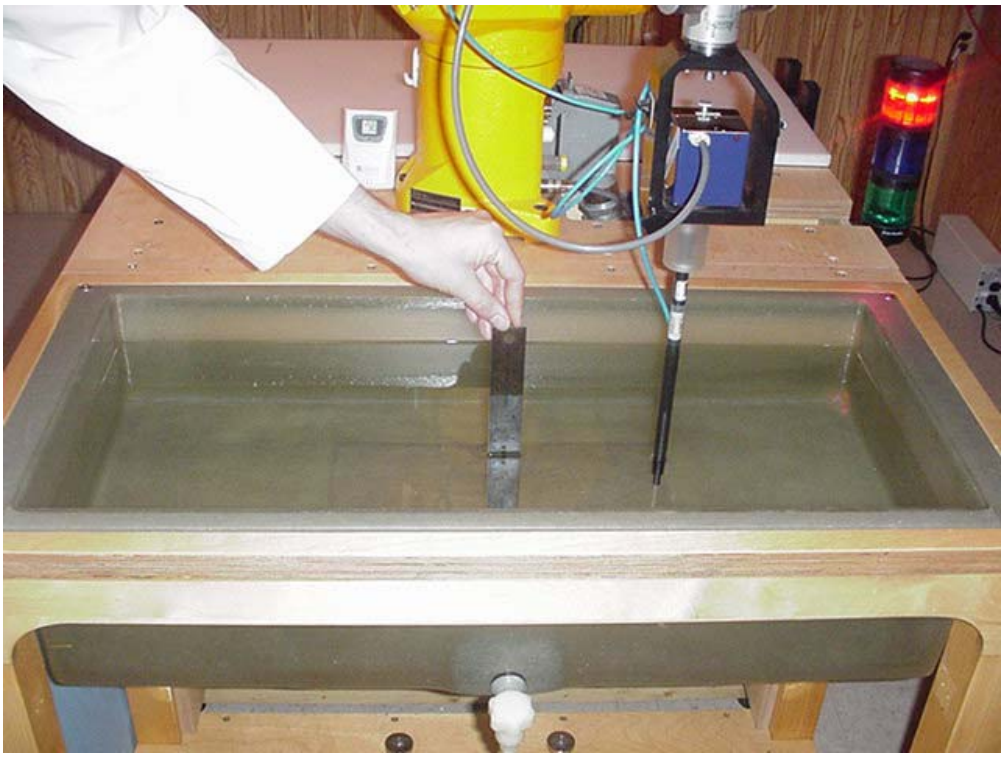
11.1V, 3600mAh Internal Lithium-ion Battery (Model: T8M-E)
Communication System: OFDM WLAN
RF Output Power: 15.8 dBm (Conducted)
Frequency: 5785 MHz; Channel 157; Duty Cycle: 1:1
Communication System: Modulated Fixed Frequency (Bluetooth)
Frequency: 2441 MHz; Channel: 39; Duty Cycle: 1:1 (Bluetooth)
RF Output Power: 3.78 dBm (Conducted) Bluetooth
Medium: M5200-5800 (σ = 6.19 mho/m; ε_r = 46.1; ρ = 1000 kg/m^3)
- Probe: EX3DV4 - SN3547; ConvF(4.59, 4.59, 4.59); Calibrated: 21/01/2005
- Sensor-Surface: 2mm (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 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Body SAR - 802.11a with Bluetooth - Bottom Side of DUT Touching Planar Phantom - 5785 MHz
Area Scan (17x23x1): Measurement grid: dx=15mm, dy=15mm

Body SAR - 802.11a with Bluetooth - Bottom Side of DUT Touching Planar Phantom - 5785 MHz
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.41 V/m; Power Drift = 0.120 dB
Peak SAR (extrapolated) = 1.31 W/kg
SAR(1 g) = 0.241 mW/g; SAR(10 g) = 0.102 mW/g



Fluid Depth (≥ 15cm)



APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Date Tested: 10/17//2005

System Performance Check (Body) - 5200 MHz Dipole

DUT: Dipole 5GHz; Model: D5GHzV2; Type: System Performance Check; Serial: 1031; Calibrated: 01/11/2005

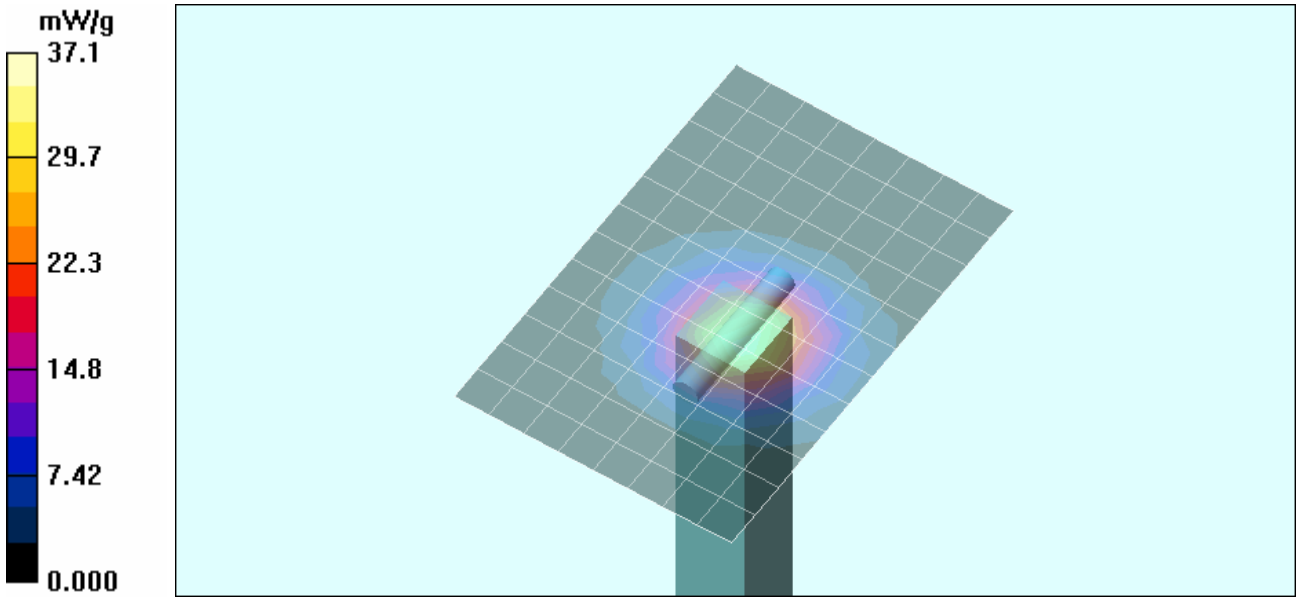
Ambient Temp: 23.1 °C; Fluid Temp: 23.2 °C; Barometric Pressure: 101.6 kPa; Humidity: 40%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 5200 MHz; Duty Cycle: 1:1
Medium: M5200-5800 (σ = 5.12 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3)

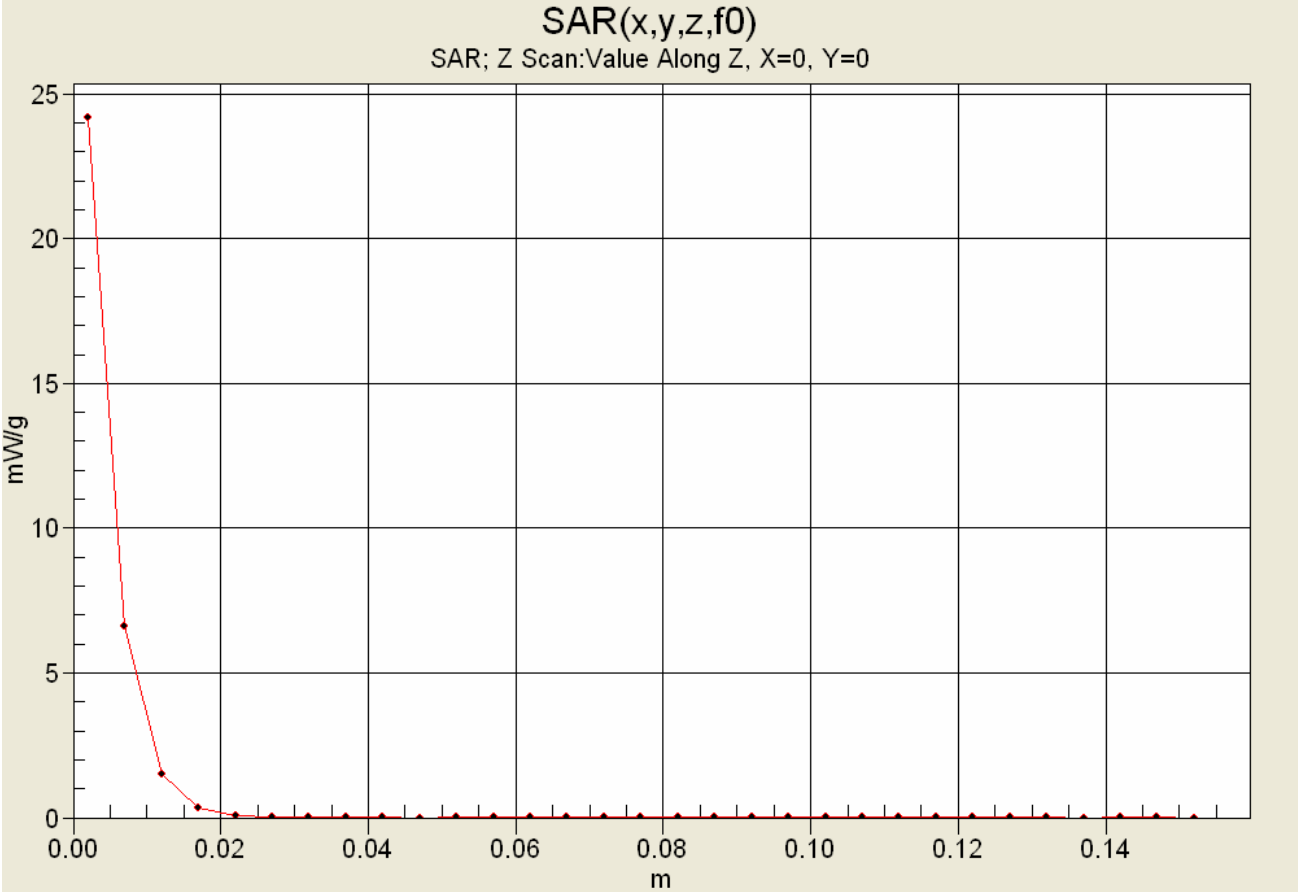
- Probe: EX3DV4 - SN3547; ConvF(4.82, 4.82, 4.82); Calibrated: 21/01/2005
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

5200 MHz Dipole - System Performance Check/Area Scan (9x13x1):
Measurement grid: dx=5mm, dy=5mm

5200 MHz Dipole - System Performance Check/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 75.4 V/m; Power Drift = 0.017 dB
Peak SAR (extrapolated) = 69.9 W/kg
SAR(1 g) = 17.6 mW/g; SAR(10 g) = 4.93 mW/g



Z-Axis Scan



Date Tested: 10/17/2005

System Performance Check (Body) - 5800 MHz Dipole

DUT: Dipole 5GHz; Model: D5GHzV2; Type: System Performance Check; Serial: 1031; Calibrated: 01/11/2005

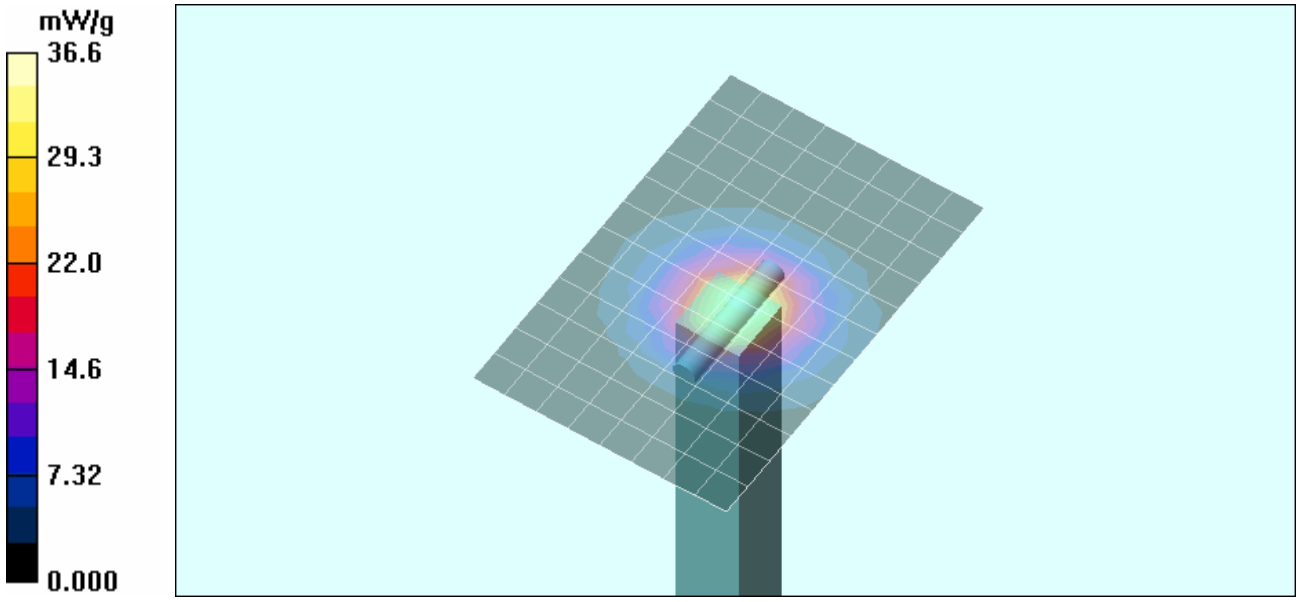
Ambient Temp: 23.7 °C; Fluid Temp: 23.0 °C; Barometric Pressure: 101.9 kPa; Humidity: 35%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 5800 MHz; Duty Cycle: 1:1
Medium: M5200-5800 (σ = 6.19 mho/m; ε_r = 46.1; ρ = 1000 kg/m^3)

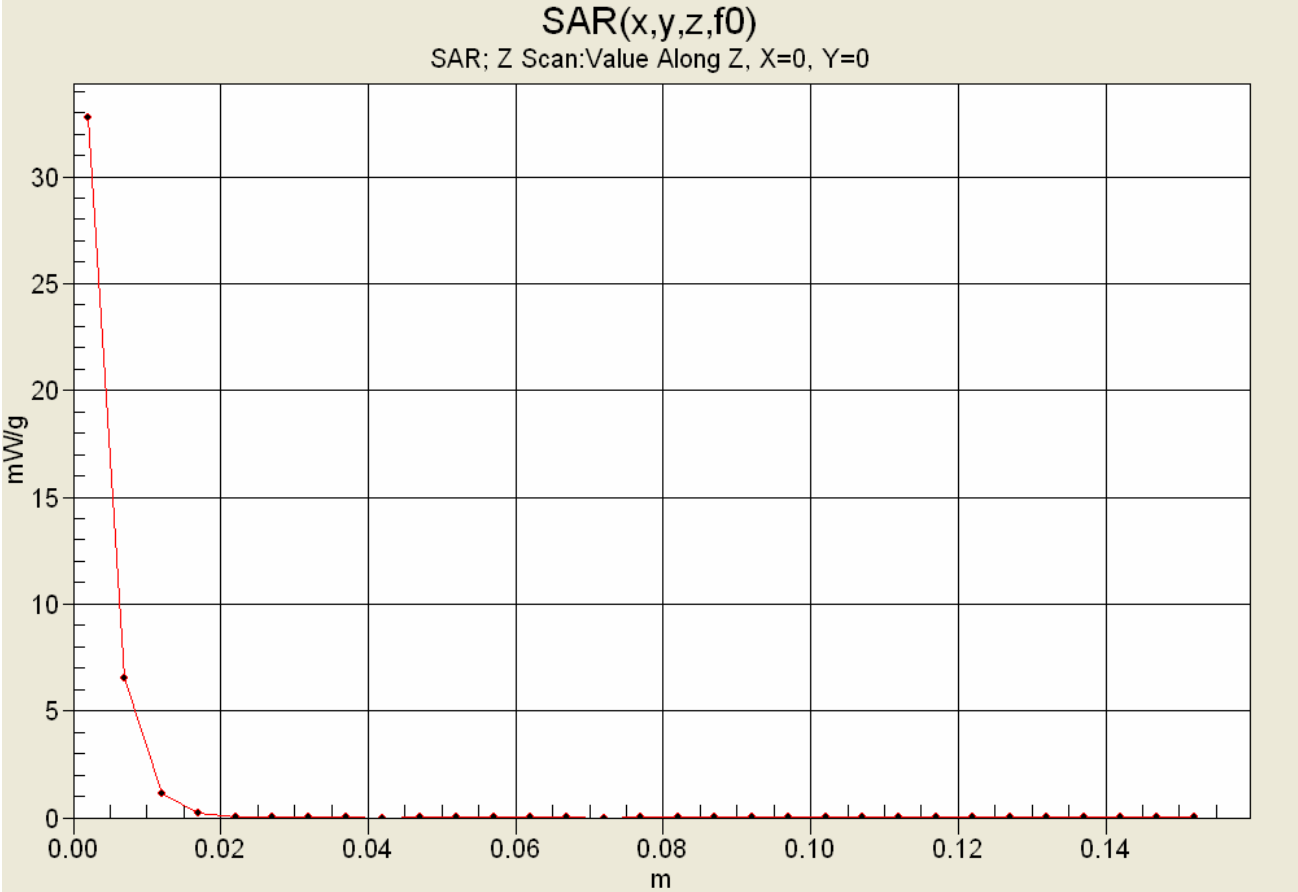
- Probe: EX3DV4 - SN3547; ConvF(4.59, 4.59, 4.59); Calibrated: 21/01/2005
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 15/06/2005
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

5800 MHz Dipole - System Performance Check/Area Scan (9x13x1):
Measurement grid: dx=5mm, dy=5mm

5800 MHz Dipole - System Performance Check/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 78.8 V/m; Power Drift = -0.033 dB
Peak SAR (extrapolated) = 83.2 W/kg
SAR(1 g) = 17.3 mW/g; SAR(10 g) = 4.72 mW/g



Z-Axis Scan



APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

5200 MHz System Performance Check & DUT Evaluation (Body)

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Mon 17/Oct/2005
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
5.1000	49.15	5.18	47.76	5.005
5.1100	49.14	5.19	47.74	5.031
5.1200	49.12	5.21	47.73	5.050
5.1300	49.11	5.22	47.84	5.068
5.1400	49.10	5.23	47.80	5.133
5.1500	49.08	5.24	47.90	5.143
5.1600	49.07	5.25	47.91	5.133
5.1700	49.06	5.26	47.51	5.157
5.1800	49.04	5.28	47.64	5.150
5.1900	49.03	5.29	47.51	5.154
5.2000	49.01	5.30	47.47	5.115
5.2100	49.00	5.31	47.47	5.198
5.2200	48.99	5.32	47.41	5.274
5.2300	48.97	5.33	47.42	5.256
5.2400	48.96	5.35	47.72	5.238
5.2500	48.95	5.36	47.74	5.280
5.2600	48.93	5.37	47.67	5.362
5.2700	48.92	5.38	47.81	5.313
5.2800	48.91	5.39	47.81	5.337
5.2900	48.89	5.40	47.48	5.322
5.3000	48.88	5.42	47.38	5.327

5800 MHz System Performance Check & DUT Evaluation (Body)

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
Mon 17/Oct/2005
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
5.7000	48.34	5.88	47.12	6.078
5.7100	48.32	5.89	47.36	5.976
5.7200	48.31	5.91	47.69	5.705
5.7300	48.30	5.92	47.22	5.320
5.7400	48.28	5.93	46.77	5.046
5.7500	48.27	5.94	45.64	4.926
5.7600	48.25	5.95	45.08	5.044
5.7700	48.24	5.96	44.47	5.237
5.7800	48.23	5.98	44.65	5.556
5.7900	48.21	5.99	44.94	5.889
5.8000	48.20	6.00	46.10	6.185
5.8100	48.19	6.01	46.63	6.360
5.8200	48.17	6.02	47.52	6.047
5.8300	48.16	6.04	47.40	5.807
5.8400	48.15	6.05	47.26	5.531
5.8500	48.13	6.06	46.52	5.091
5.8600	48.12	6.07	45.51	5.026
5.8700	48.10	6.08	44.68	5.063
5.8800	48.09	6.09	44.05	5.178
5.8900	48.08	6.11	44.15	5.608
5.9000	48.06	6.12	44.49	6.103

APPENDIX D - MANUFACTURER'S TISSUE SIMULANT DATA SHEET

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Material Safety Data Sheet

1 Identification of the substance and of the manufacturer / origin

Item	Head Tissue Simulation Liquid HSL5800 Muscle Tissue Simulation Liquid MSL 5800
Type No	SL AAH 580, SL AAM 580
Series No	N/A
Manufacturer / Origin	Schmid & Partner Engineering AG Zeughausstrasse 43 8004 Zürich Switzerland Phone +41 1 245 9700, Fax +41 1 245 9779, support@speag.com

Use of the substance:
Liquid simulating physical parameters of Head or Muscle Tissue in the RF range to 6GHz.

2 Composition / Information on ingredients

The Item is composed of the following ingredients:

Water	64 - 78%
Mineral Oil	11 - 18%
Emulsifiers	9 - 15%
Additives and Salt	2 - 3%

Safety relevant ingredients according to EU directives:

CAS-No 107-41-5	< 4%	2-Methyl-2,4-pentandiol (Hexylene Glycol): Xi irritant, R36/38 irritant for eyes and skin
CAS-No 770-35-4	< 2%	1-Phenoxy-2-propanol (Propylene Glycol Phenyl Ether): Xi irritant, R36 irritant for eyes
CAS-No 93-83-4	< 2%	N,N-bis(2-Hydroxyethyl)oleamide: Xi irritant, R36/38 irritant for eyes and skin
CAS-No 9004-95-9	< 0.5%	Polyethylene glycol cetyl ether: Xi irritant, R22 harmful if swallowed, R36/38 irritant for eyes and skin R50 Very toxic to aquatic organisms

According to EU guidelines and Swiss rules, the product is not a dangerous mixture and therefore not required to be marked by symbols.

3 Hazards identification

Identification not required.

4 First aid measures

The product reacts slightly alkaline.

After skin contact:	Wash with fresh water and mild sope
After eye contact:	Rinse out with plenty of water for several minutes with the eyelid held open. Consult an ophthalmologist if necessary.
After ingestion:	Do not induce vomiting. Get medical attention.

5 Fire-fighting measures

Firefighting media	CO2, foam, dry chemical
Combustion products	Carbon oxides, nitrogen and traces of oxides of chlorine and sulfur, HCl

Due to the high water content, the liquid is self-extinguishing.

6 Accidental release measures

Person-related precaution measures: wash with water and mild soap.
Environmental-protection measures: do not allow to enter sewerage system.
Procedures for cleaning / absorption: Use oil-binding agents., forward for disposal. Spills may cause slippery conditions.

7 Handling and storage

Handling: Keep in open container only for minimum required time in order to avoid water evaporation.
Storage: tightly closed, between >0 to 40°C. Avoid direct solar irradiation of the storage containers.

8 Exposure controls / personal protection

Protection measures are not generally required. For eye protection, industrial safety glasses are recommended.
Personal hygiene and clean working practices are sufficient.

9 Physical and chemical properties

Form:	liquid
Colour:	medium to dark brown, transparent to opaque
Odour:	almost odourless / slightly oily
pH-Value:	slightly alcalic
Boiling point:	100°C
Density:	1g/cm^3

10 Stability and reactivity

Conditions to be avoided: heating above 40°C
The product contains water and is not compatible with strong oxidizers or magnesium.

11 Toxicological information

LD50 > 40 g/kg
Further data: the product should be handled with the care usual when dealing with chemicals

12 Ecological information

Contains mineral oil. Do not allow to enter waters, waste water, or soil!

13 Disposal considerations

Disposal is possible by splitting the mineral oil from the emulsion with absorbing agents, with salt or ultra-filtration. Dispose as other mineral oil containing products according to local regulations.
Product packing must be disposed of in compliance with respect national regulations.

14 Transport information

Not subject to transport regulations.

15 Regulatory information

No special labelling required.

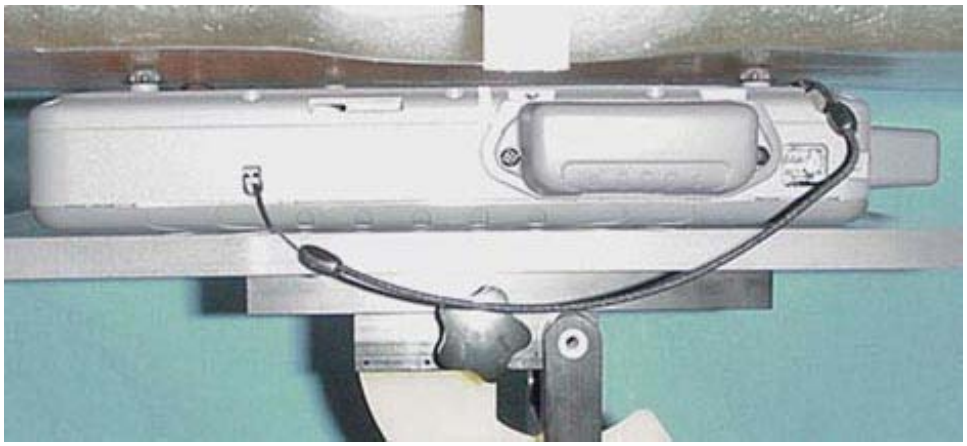
16 Other information

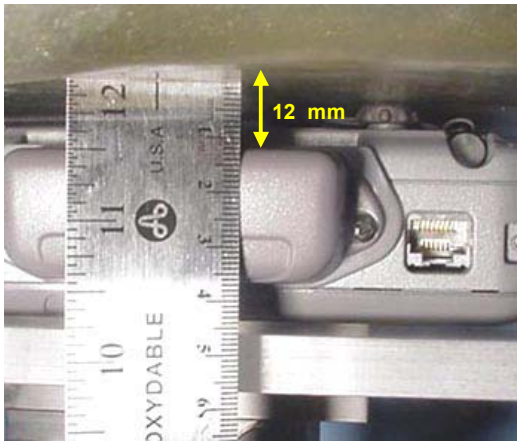
Release date:	6.1.2005
Responsible:	FB

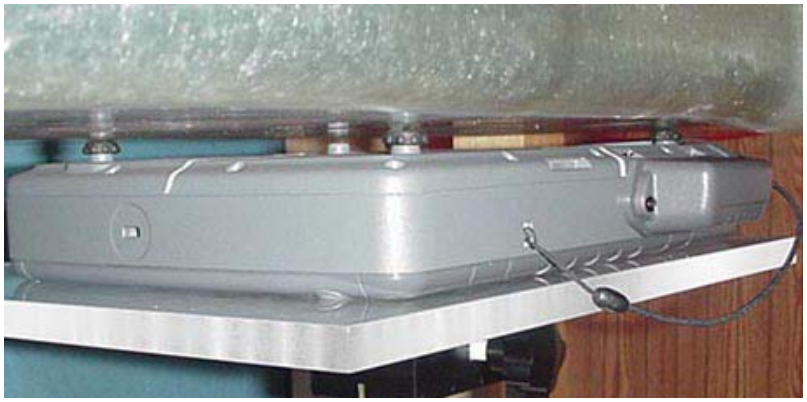
APPENDIX E - SAR TEST SETUP PHOTOGRAPHS

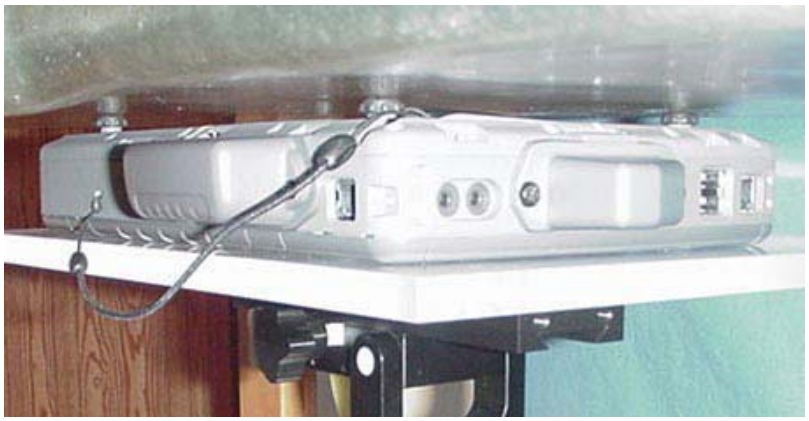
BODY SAR TEST SETUP PHOTOGRAPHS

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



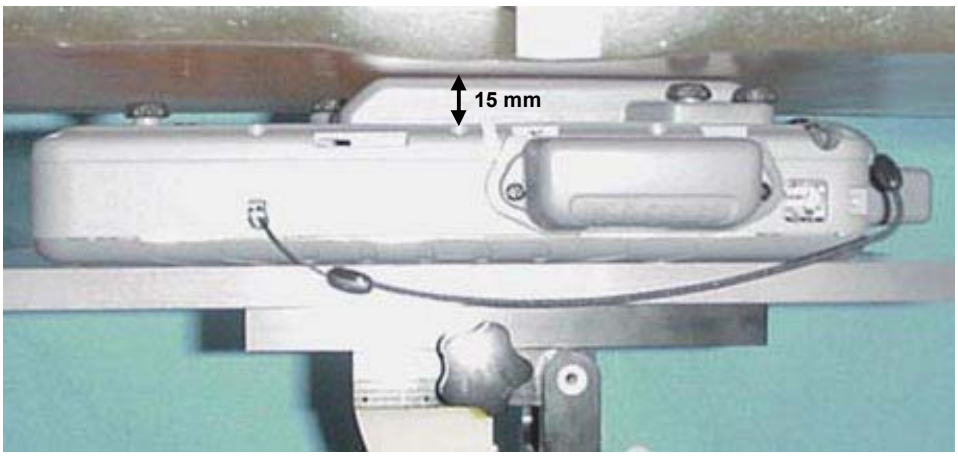


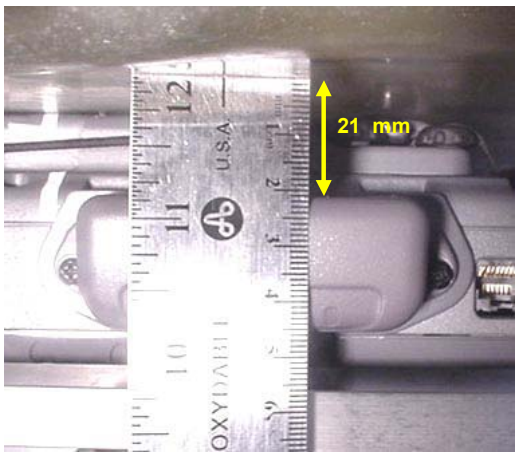


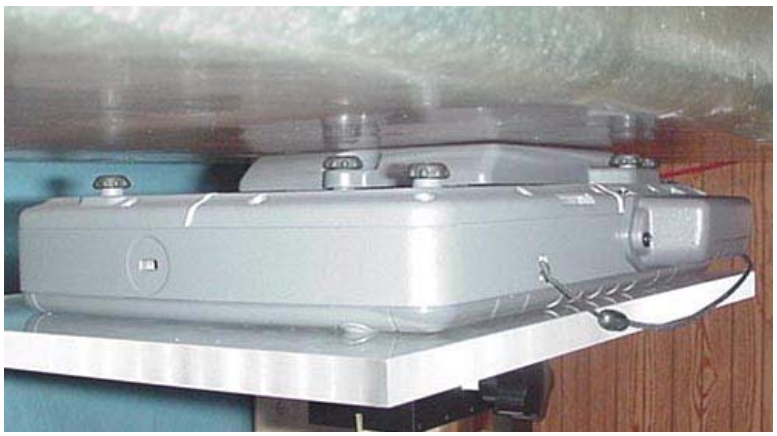


BODY SAR TEST SETUP PHOTOGRAPHS

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







APPENDIX F - SYSTEM VALIDATION

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

Client **Celltech**

CALIBRATION CERTIFICATE

Object(s)	D5GHzV2 - SN:1031
Calibration procedure(s)	QA CAL-05.v2 Calibration procedure for dipole validation kits
Calibration date:	January 11, 2005
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

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

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

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E4419B	GB41293874	5-May-04 (METAS, No 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No 251-00388)	May-05
Reference 20 dB Attenuator	SN: 5086 (20b)	3-May-04 (METAS, No 251-00389)	May-05
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator R&S SMT06	100058	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Laboratory Director	
Approved by:	Fin Bomholt	R&D Director	

Issued: January 14, 2005

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

DASY

Dipole Validation Kit

Type: D5GHzV2

Serial: 1031

Manufactured: July 9, 2004
Calibrated: January 11, 2005

1. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with **head simulating solution** of the following electrical parameters:

Frequency:	**5200 MHz**	
Relative Dielectricity	**36.5**	± 5%
Conductivity	**4.64 mho/m**	± 5%
Frequency:	**5500 MHz**	
Relative Dielectricity	**35.9**	± 5%
Conductivity	**4.97 mho/m**	± 5%
Frequency:	**5800 MHz**	
Relative Dielectricity	**35.4**	± 5%
Conductivity	**5.28 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe EX3DV3 - SN:3503 was used for the measurements. The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm from dipole center to the solution surface. Lossless spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 10mm was aligned with the dipole. Special 8x8x8 fine cube was chosen for cube integration (dx=dy=4.3mm, dz=3mm). Distance between probe sensors and phantom surface was set to 2.0 mm. The dipole input power (forward power) was 250 mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement with DASY System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figures supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured at **5200 MHz (Head Tissue)** with the dosimetric probe EX3DV3 SN:3503 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue: **81.2 mW/g** ± 20.3 % (k=2)[1]

averaged over 10 cm^3 (10 g) of tissue: **22.8 mW/g** ± 19.8 % (k=2)[1]

[1] Target dipole values determined by FDTD (feedpoint impedance set to 50 Ohm). The values are SAR_1g=76.5 mW/g, SAR_10g=21.6 mW/g and SAR_peak=310.3 mW/g.

The resulting averaged SAR-values measured **at 5500 MHz (Head Tissue)** with the dosimetric probe EX3DV3 SN:3503 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue: **84.8 mW/g** ± 20.3 % $(k=2)^2$

averaged over 10 cm^3 (10 g) of tissue: **23.6 mW/g** ± 19.8 % $(k=2)^2$

The resulting averaged SAR-values measured **at 5800 MHz (Head Tissue)** with the dosimetric probe EX3DV3 SN:3503 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue: **79.2 mW/g** ± 20.3 % $(k=2)^3$

averaged over 10 cm^3 (10 g) of tissue: **22.3 mW/g** ± 19.8 % $(k=2)^3$

3. Dipole Transformation Parameters

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint (please refer to the graphics attached to this document). The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.196 ns**	(one direction)
Transmission factor:	**0.955**	(voltage transmission, one direction)

4. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with **body simulating solution** of the following electrical parameters:

Frequency:	**5200 MHz**	
Relative Dielectricity	**48.6**	± 5%
Conductivity	**5.17 mho/m**	± 5%

Frequency:	**5500 MHz**	
Relative Dielectricity	**48.0**	± 5%
Conductivity	**5.55 mho/m**	± 5%

Frequency:	**5800 MHz**	
Relative Dielectricity	**47.4**	± 5%
Conductivity	**5.95 mho/m**	± 5%

[2] Target dipole values determined by FDTD (feedpoint impedance set to 50 Ohm). The values are SAR_1g=83.3 mW/g, SAR_10g=23.4 mW/g and SAR_peak=349.4 mW/g.

[3] Target dipole values determined by FDTD (feedpoint impedance set to 50 Ohm). The values are SAR_1g=78.0 mW/g, SAR_10g=21.9 mW/g and SAR_peak=340.9 mW/g.

The DASY4 System with a dosimetric E-field probe EX3DV3 - SN:3503 was used for the measurements. The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm from dipole center to the solution surface. Lossless spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 10mm was aligned with the dipole. The 8x8x8 fine cube was chosen for cube integration (dx=dy=4.3mm, dz=3mm). Distance between probe sensors and phantom surface was set to 2.0 mm. The dipole input power (forward power) was 250 mW ± 3 %. The results are normalized to 1W input power.

5. SAR Measurement with DASY System

Standard SAR-measurements were performed according to the measurement conditions described in section 4. The results (see figures supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured at **5200 MHz (Body Tissue)** with the dosimetric probe EX3DV3 SN:3503 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue: **80.0 mW/g** ± 20.3 % (k=2)[4]

averaged over 10 cm^3 (10 g) of tissue: **22.4 mW/g** ± 19.8 % (k=2)[4]

The resulting averaged SAR-values measured **at 5500 MHz (Body Tissue)** with the dosimetric probe EX3DV3 SN:3503 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue: **78.8 mW/g** ± 20.3 % (k=2)[5]

averaged over 10 cm^3 (10 g) of tissue: **21.8 mW/g** ± 19.8 % (k=2)[5]

The resulting averaged SAR-values measured **at 5800 MHz (Body Tissue)** with the dosimetric probe EX3DV3 SN:3503 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue: **73.6 mW/g** ± 20.3 % (k=2)[6]

averaged over 10 cm^3 (10 g) of tissue: **20.5 mW/g** ± 19.8 % (k=2)[6]

[4] Target dipole values determined by FDTD (feedpoint impedance set to 50 Ohm). The values are SAR_1g=71.8 mW/g, SAR_10g=20.1 mW/g and SAR_peak=284.7 mW/g.
[5] Target dipole values determined by FDTD (feedpoint impedance set to 50 Ohm). The values are SAR_1g=79.1 mW/g, SAR_10g=22.0 mW/g and SAR_peak=326.3 mW/g.
[6] Target dipole values determined by FDTD (feedpoint impedance set to 50 Ohm). The values are SAR_1g=74.1 mW/g, SAR_10g=20.5 mW/g and SAR_peak=324.7 mW/g.

6. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

7. Design

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

Small end caps have been added to the dipole arms in order to increase frequency bandwidth at the position as explained in Sections 1 and 4.

8. Power Test

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Date/Time: 01/11/05 11:57:53

SPEAG Calibration Laboratory

DUT: Dipole 5GHz; Serial: D5GHzV2 - SN:1031

DASY4 Configuration:

- Communication System: CW-5GHz; Frequency: 5200 MHzFrequency: 5800 MHzFrequency: 5500 MHz; Duty Cycle: 1:1
- Probe: EX3DV3 - SN3503; ConvF(5.7, 5.7, 5.7)ConvF(5, 5, 5); Calibrated: 1/8/2005
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Medium: HSL5800; Medium parameters used: f = 5200 MHz; σ = 4.64 mho/m; ε_r = 36.5; ρ = 1000 kg/m^3 Medium parameters used: f = 5800 MHz; σ = 5.28 mho/m; ε_r = 35.4; ρ = 1000 kg/m^3 Medium parameters used: f = 5500 MHz; σ = 4.97 mho/m; ε_r = 35.9; ρ = 1000 kg/m^3

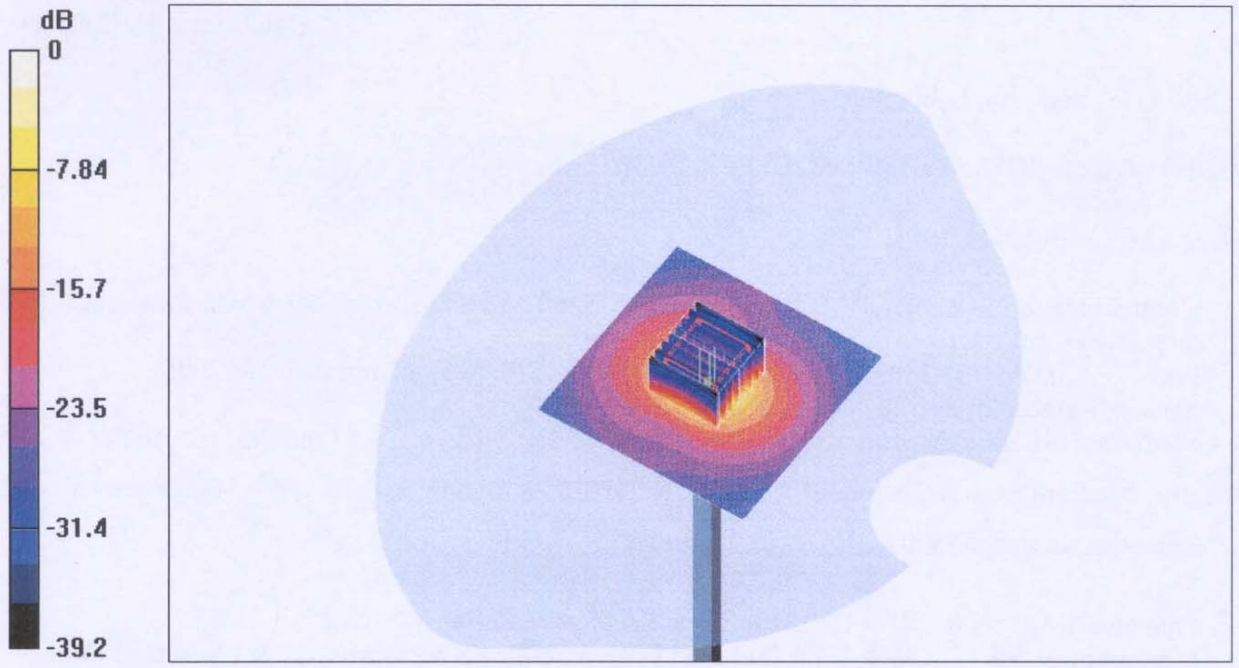
- Phantom: SAM with CRP - TP:1312; Type: SAM v4.0; Serial: TP:1312
- Measurement SW: DASY4, V4.4 Build 10; Postprocessing SW: SEMCAD, V1.8 Build 133

d=10mm, Pin=250mW, f=5200 MHz 2/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 43.3 mW/g

d=10mm, Pin=250mW, f=5800 MHz/Zoom Scan (8x8x8), dist=2mm (8x8x8)/Cube 0:
Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 78.3 V/m; Power Drift = 0.0 dB
Peak SAR (extrapolated) = 85.1 W/kg
SAR(1 g) = 19.8 mW/g; SAR(10 g) = 5.57 mW/g
Maximum value of SAR (measured) = 39.8 mW/g

d=10mm, Pin=250mW, f=5500 MHz/Zoom Scan (8x8x8), dist=2mm (8x8x8)/Cube 0:
Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 84.1 V/m; Power Drift = -0.0 dB
Peak SAR (extrapolated) = 86.2 W/kg
SAR(1 g) = 21.2 mW/g; SAR(10 g) = 5.91 mW/g
Maximum value of SAR (measured) = 41 mW/g

d=10mm, Pin=250mW, f=5200 MHz 2/Zoom Scan (8x8x8), dist=2mm (8x8x8)/Cube 0:
Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 85.4 V/m; Power Drift = 0.0 dB
Peak SAR (extrapolated) = 79.4 W/kg
SAR(1 g) = 20.3 mW/g; SAR(10 g) = 5.7 mW/g
Maximum value of SAR (measured) = 39.4 mW/g



0 dB = 39.4mW/g

Date/Time: 01/11/05 18:28:50

SPEAG Calibration Laboratory

DUT: Dipole 5GHz; Serial: D5GHzV2 - SN:1031

DASY4 Configuration:

- Communication System: CW-5GHz; Frequency: 5200 MHzFrequency: 5800 MHzFrequency: 5500 MHz; Duty Cycle: 1:1
- Probe: EX3DV3 - SN3503; ConvF(5, 5, 5)ConvF(4.6, 4.6, 4.6); Calibrated: 1/8/2005
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Medium: MSL5800; Medium parameters used: f = 5200 MHz; σ = 5.17 mho/m; ε_r = 48.6; ρ = 1000 kg/m^3 Medium parameters used: f = 5800 MHz; σ = 5.95 mho/m; ε_r = 47.4; ρ = 1000 kg/m^3 Medium parameters used: f = 5500 MHz; σ = 5.55 mho/m; ε_r = 48; ρ = 1000 kg/m^3

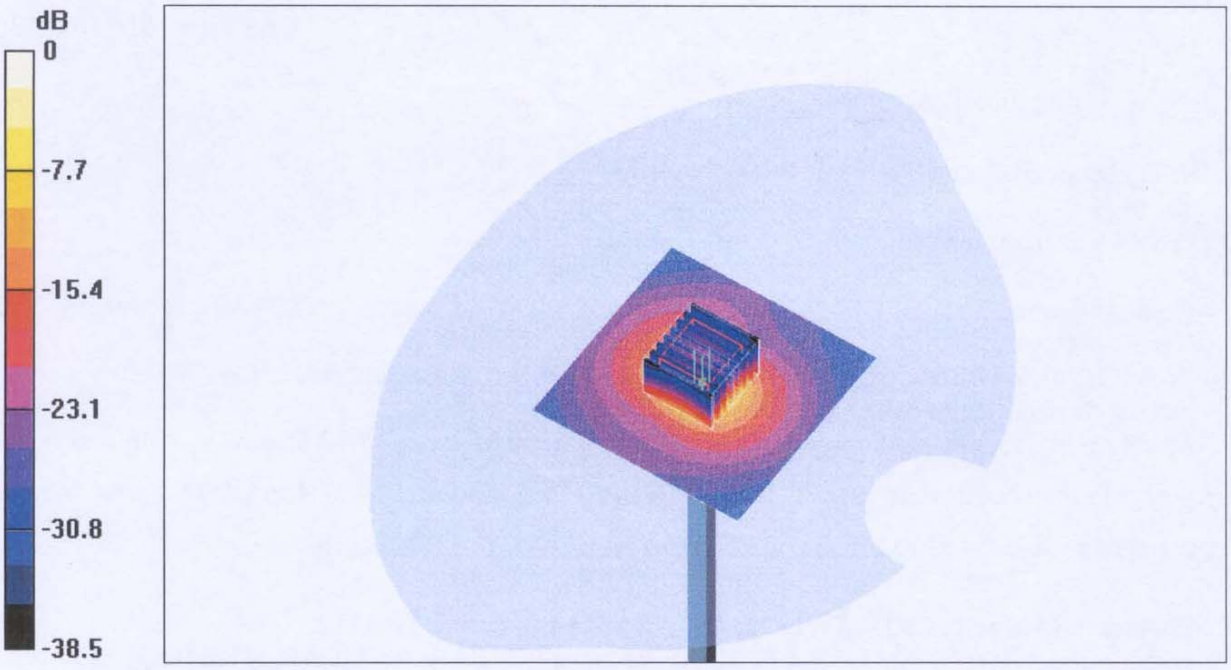
- Phantom: SAM with CRP - TP:1312; Type: SAM v4.0; Serial: TP:1312
- Measurement SW: DASY4, V4.4 Build 10; Postprocessing SW: SEMCAD, V1.8 Build 133

d=10mm, Pin=250mW, f=5200 MHz 2/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 41 mW/g

d=10mm, Pin=250mW, f=5800 MHz/Zoom Scan (8x8x8), dist=2mm (8x8x8)/Cube 0:
Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 71.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 77 W/kg
SAR(1 g) = 18.4 mW/g; SAR(10 g) = 5.13 mW/g
Maximum value of SAR (measured) = 35.6 mW/g

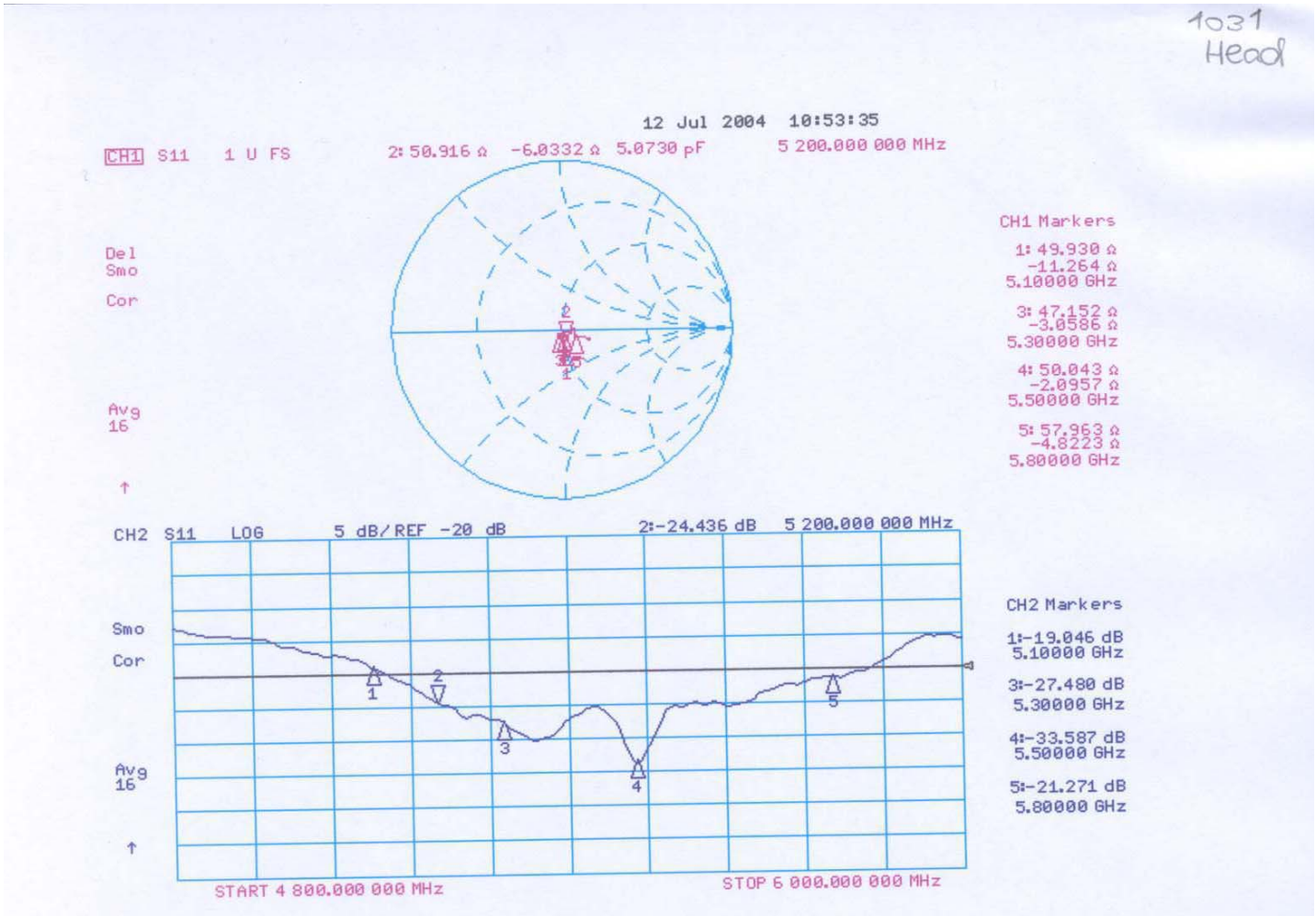
d=10mm, Pin=250mW, f=5500 MHz/Zoom Scan (8x8x8), dist=2mm (8x8x8)/Cube 0:
Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 76 V/m; Power Drift = 0.1 dB
Peak SAR (extrapolated) = 77.9 W/kg
SAR(1 g) = 19.7 mW/g; SAR(10 g) = 5.44 mW/g
Maximum value of SAR (measured) = 37.9 mW/g

d=10mm, Pin=250mW, f=5200 MHz 2/Zoom Scan (8x8x8), dist=2mm (8x8x8)/Cube 0:
Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 79.9 V/m; Power Drift = 0.1 dB
Peak SAR (extrapolated) = 73.5 W/kg
SAR(1 g) = 20 mW/g; SAR(10 g) = 5.6 mW/g
Maximum value of SAR (measured) = 38.4 mW/g



0 dB = 38.4mW/g

1031
Head


12 Jul 2004 10:53:35
CH1 S11 1 U FS
2: 50.916 Ω -6.0332 Ω 5.0730 pF
5 200.000 000 MHz
Del
Smo
Cor
Avg
16
CH1 Markers
1: 49.930 Ω
-11.264 Ω
5.10000 GHz
3: 47.152 Ω
-3.0586 Ω
5.30000 GHz
4: 50.043 Ω
-2.0957 Ω
5.50000 GHz
5: 57.963 Ω
-4.8223 Ω
5.80000 GHz
CH2 S11 LOG
5 dB/ REF -20 dB
2:-24.436 dB
5 200.000 000 MHz
Smo
Cor
Avg
16
CH2 Markers
1:-19.046 dB
5.10000 GHz
3:-27.480 dB
5.30000 GHz
4:-33.587 dB
5.50000 GHz
5:-21.271 dB
5.80000 GHz
START 4 800.000 000 MHz
STOP 6 000.000 000 MHz

1031
Body

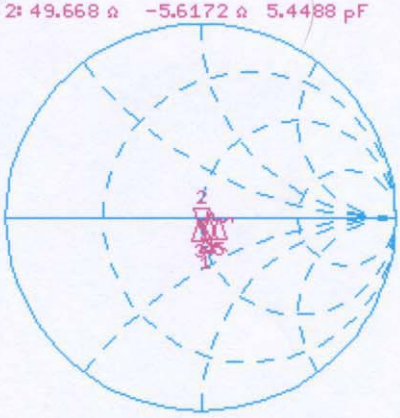
21 Oct 2004 15:50:50

CH1 S11 1 U FS 2: 49.668 Ω -5.6172 Ω 5.4488 pF 5 200.000 000 MHz

Del
Smo
Cor

Avg
16

↑



CH1 Markers

1: 51.498 Ω
-8.3184 Ω
5.10000 GHz

3: 48.629 Ω
-1.7617 Ω
5.30000 GHz

4: 53.945 Ω
-1.4863 Ω
5.50000 GHz

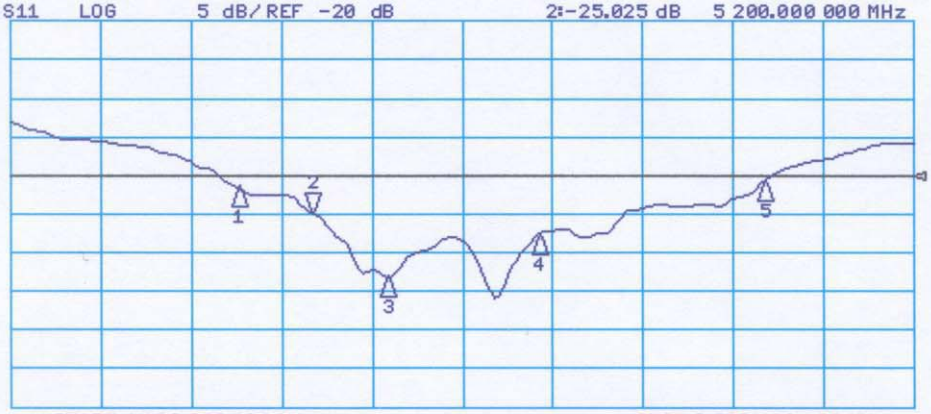
5: 59.777 Ω
-2.0469 Ω
5.80000 GHz

CH2 S11 LOG 5 dB/ REF -20 dB 2:-25.025 dB 5 200.000 000 MHz

Smo
Cor

Avg
16

↑



START 4 800.000 000 MHz STOP 6 000.000 000 MHz

CH2 Markers

1:-21.639 dB
5.10000 GHz

3:-33.132 dB
5.30000 GHz

4:-27.753 dB
5.50000 GHz

5:-20.781 dB
5.80000 GHz

APPENDIX G - PROBE CALIBRATION

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

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

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

Accreditation No.: SCS 108

Client Celltech

Certificate No: EX3-3547_Jan05

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3547
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	January 21, 2005
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-May-04 (METAS, No. 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No. 251-00388)	May-05
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-04 (METAS, No. 251-00389)	May-05
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	29-Sep-04 (SPEAG, No. DAE4-617_Sep04)	Sep-05

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
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:	Katja Pokovic	Technical Manager	
Approved by:	Fin Bomholt	R&D Director	

Issued: January 21, 2005

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

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

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

Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY 4.3 B17 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3547

Manufactured: July 5, 2004
Calibrated: January 21, 2005

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3547

Sensitivity in Free Space[A] Diode Compression[B]

NormX	**0.39** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**92** mV
NormY	**0.42** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**92** mV
NormZ	**0.48** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**92** 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		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	4.0	1.3
SAR_{be} [%]	With Correction Algorithm	0.2	0.4

TSL **1750 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	4.7	2.3
SAR_{be} [%]	With Correction Algorithm	0.7	0.8

Sensor Offset

Probe Tip to Sensor Center	**1.0** mm

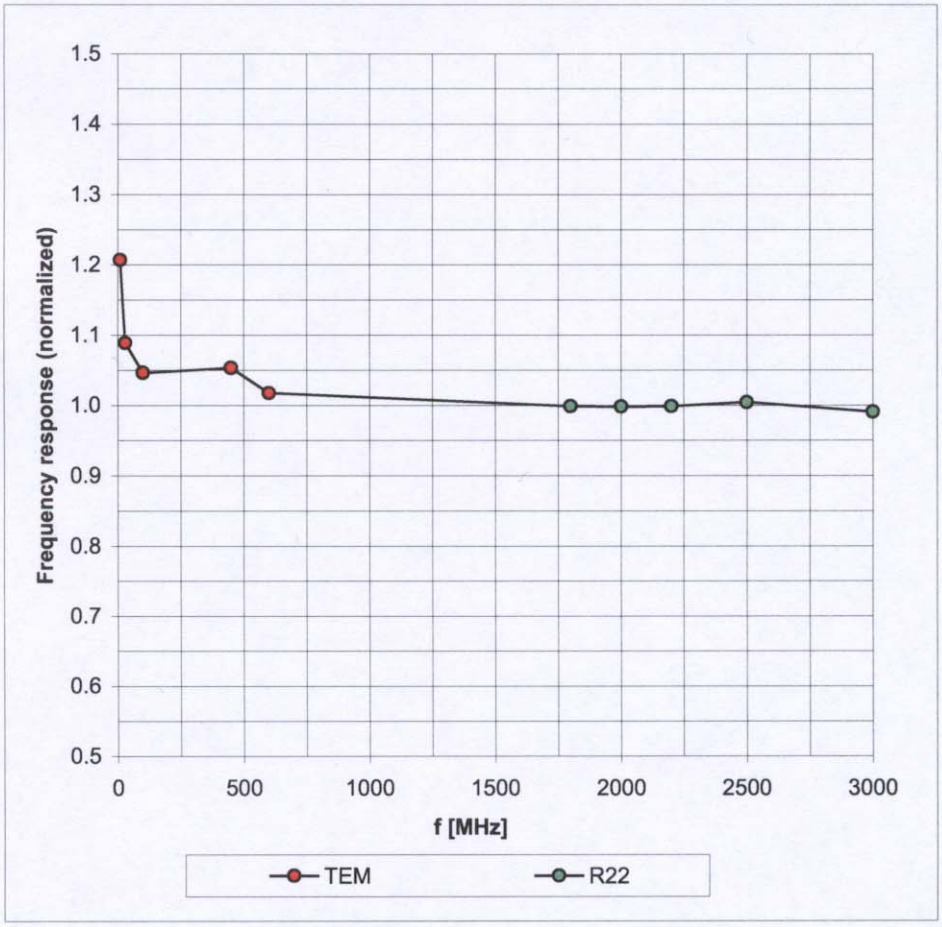
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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

[B] Numerical linearization parameter: uncertainty not required.

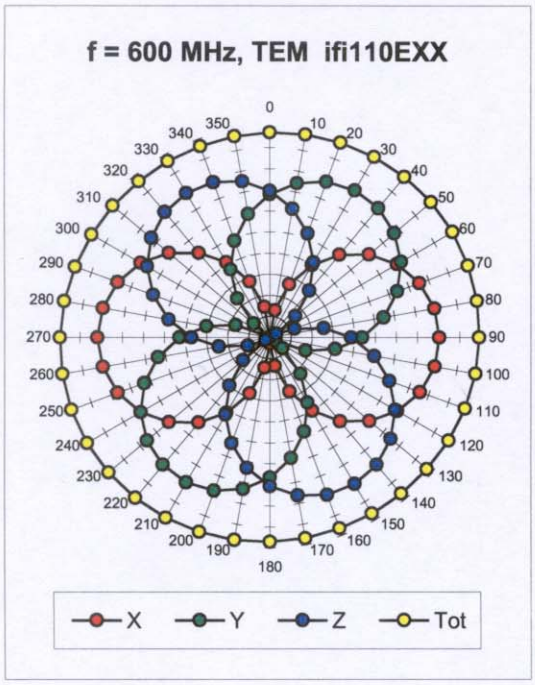
Frequency Response of E-Field

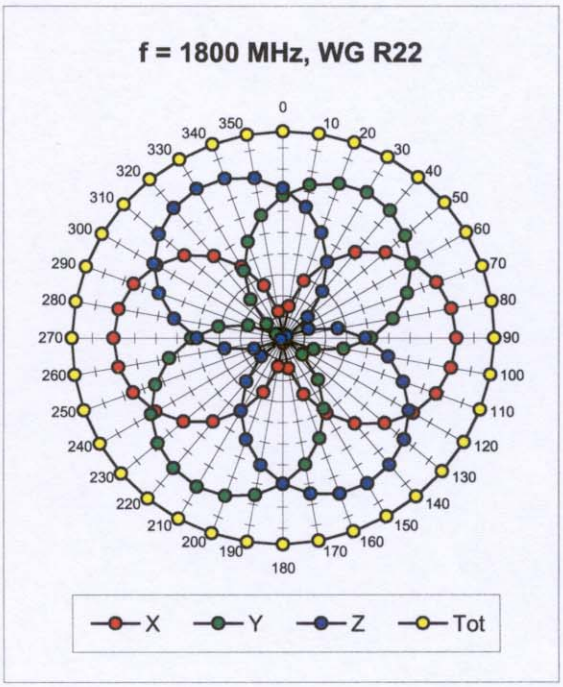
(TEM-Cell:ifi110 EXX, Waveguide: R22)

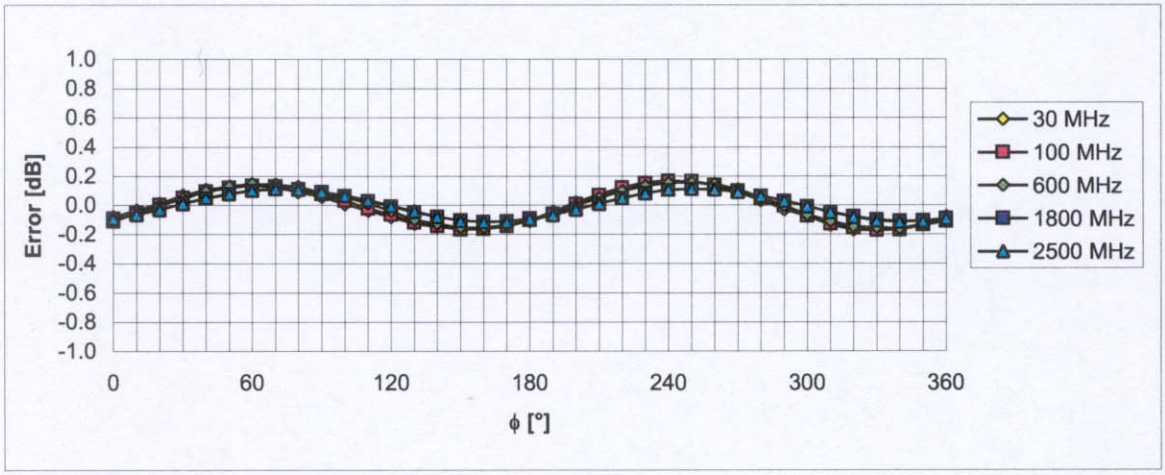


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



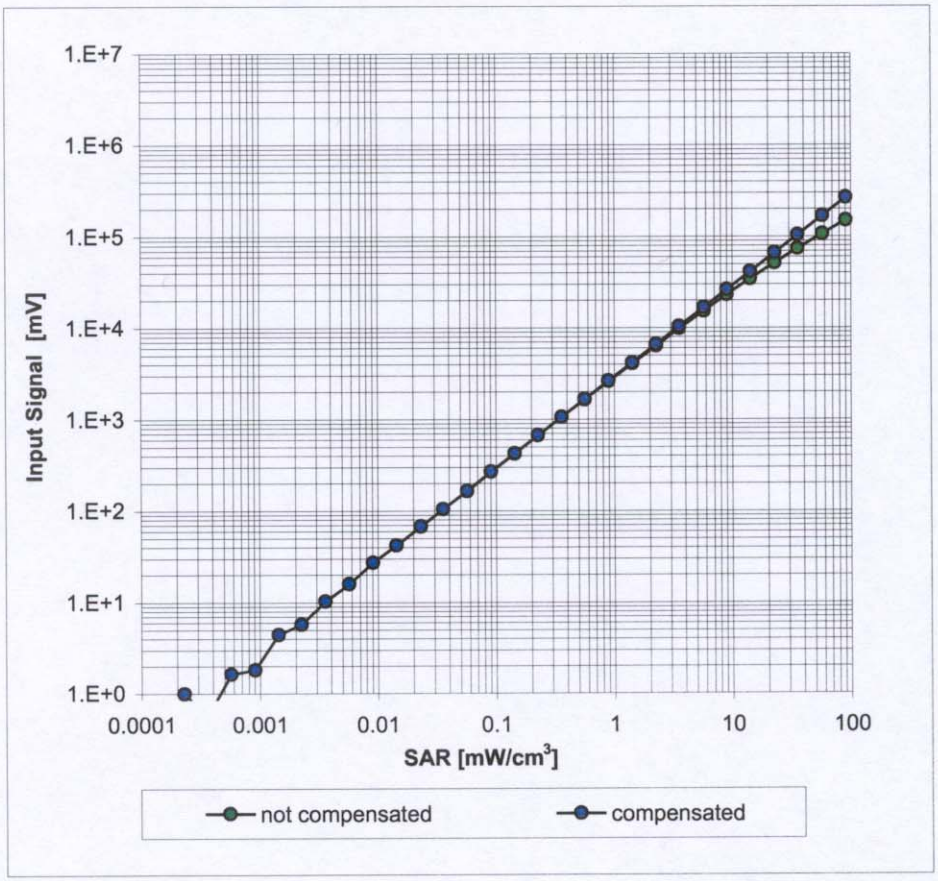


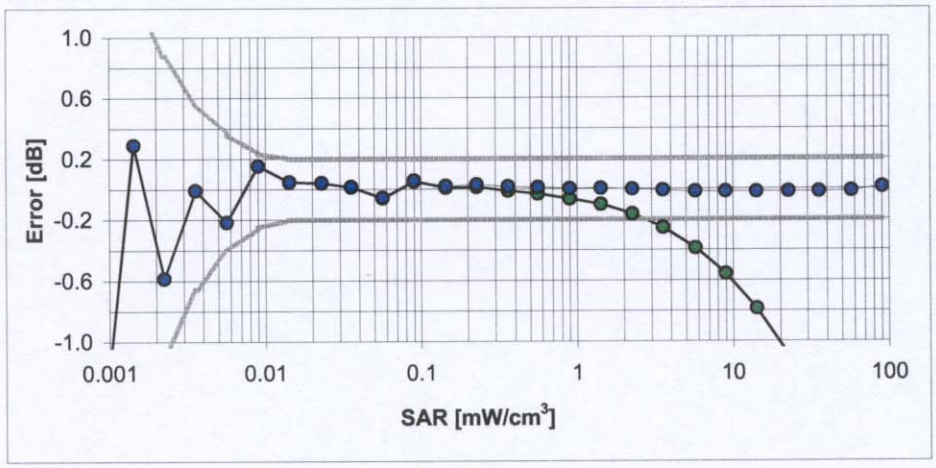


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

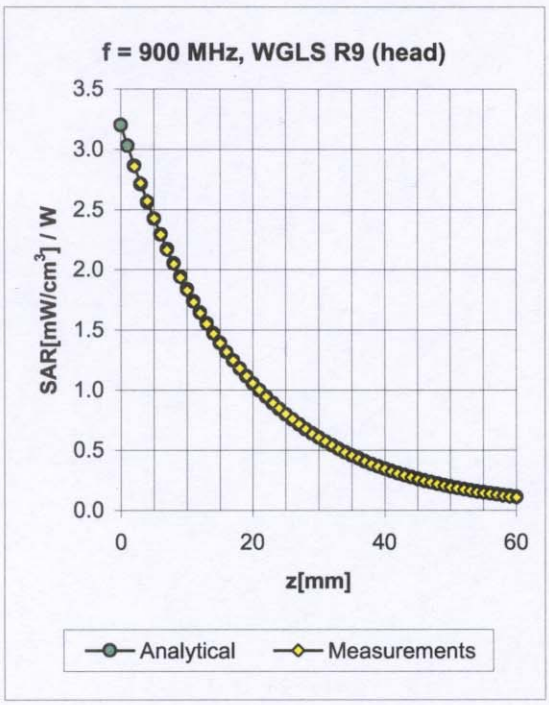
(Waveguide R22, f = 1800 MHz)

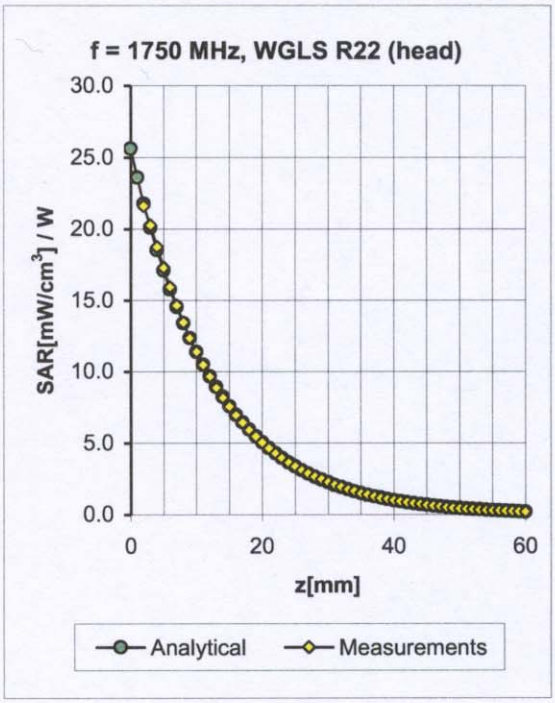




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



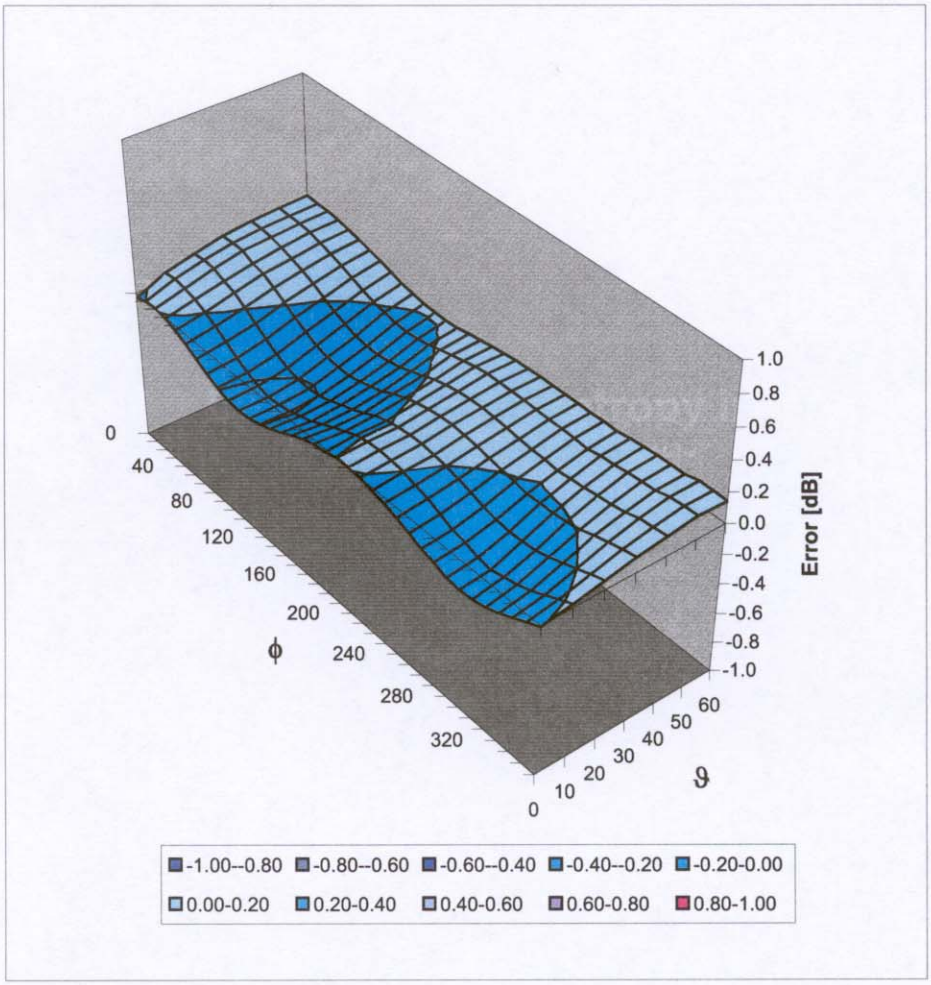


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.96	0.63	9.08 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.67	0.81	8.24 ± 11.0% (k=2)

[C] The validity of ± 100 MHz only applies for DASY 4.3 B17 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

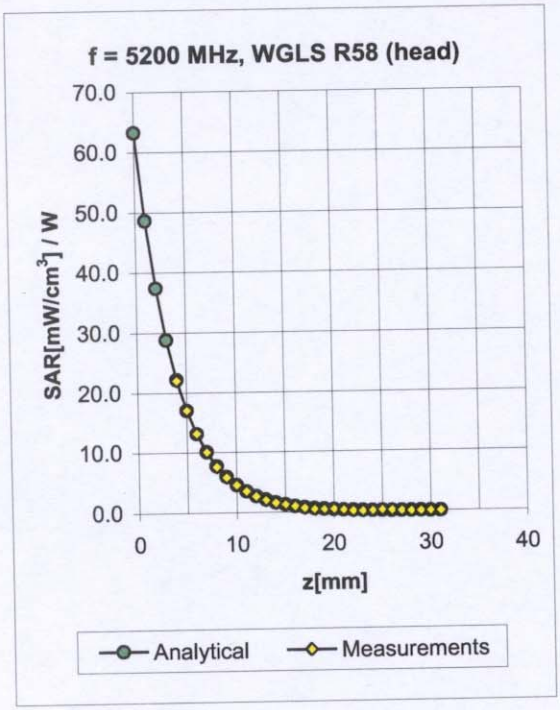
Deviation from Isotropy in HSL

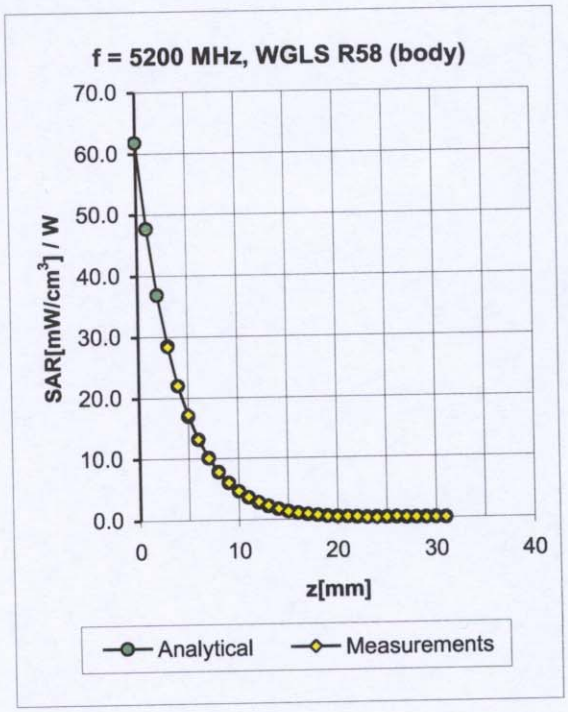
Error (ϕ, ϑ), f = 900 MHz



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

Appendix[D]





f [MHz][D]	Validity [MHz]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
5200	± 50	Head	36.0 ± 5%	4.76 ± 5%	0.47	1.80	5.14 ± 13.6% (k=2)
5500	± 50	Head	35.6 ± 5%	4.96 ± 5%	0.47	1.80	4.71 ± 13.6% (k=2)
5800	± 50	Head	35.3 ± 5%	5.27 ± 5%	0.47	1.80	4.71 ± 13.6% (k=2)
5200	± 50	Body	49.0 ± 5%	5.30 ± 5%	0.49	1.90	4.82 ± 13.6% (k=2)
5500	± 50	Body	48.6 ± 5%	5.65 ± 5%	0.47	1.90	4.54 ± 13.6% (k=2)
5800	± 50	Body	48.2 ± 5%	6.00 ± 5%	0.47	1.90	4.59 ± 13.6% (k=2)

[D] Accreditation for ConvF assessment above 3000 MHz is currently applied for. Accreditation is expected at the beginning of 2005.

APPENDIX H - 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

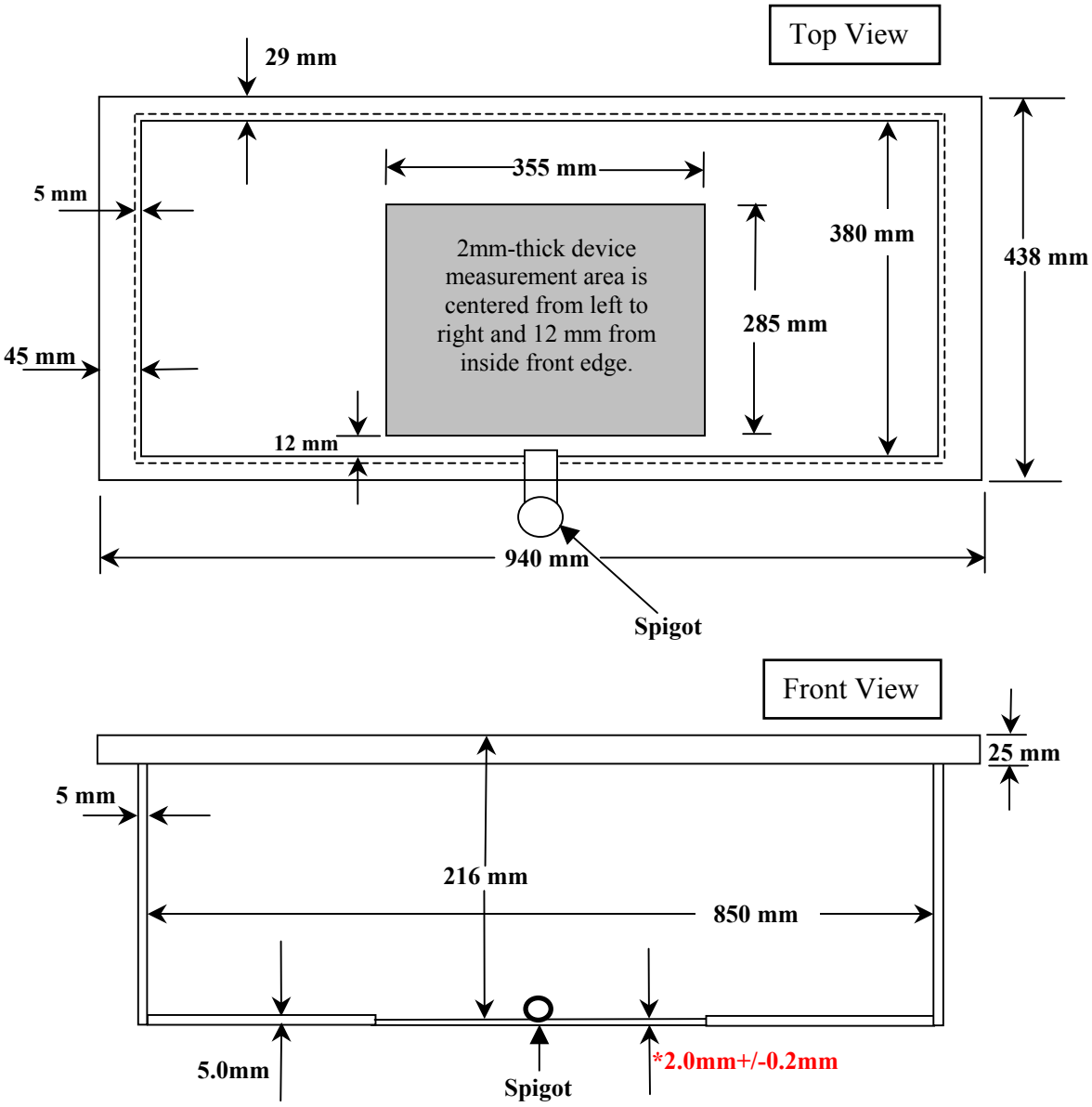
Fiberglass Planar Phantom - Front View

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.