DECLARATION OF COMPLIANCE - SAR RF EXPOSURE EVALUATION (FCC/IC) - INTERMEC CN70

Test Lab Information	**Name**	**CELLTECH LABS INC.**						
	Address	21-364 Lougheed Road, Kelowna B.C. V1X 7R8 Canada						
Test Lab Accreditation	**A2LA**	ISO/IEC 17025:2005 (A2LA Test Lab Certificate No. 2470.01)						
Manufacturer / Applicant	**Name**	**INTERMEC TECHNOLOGIES CORPORATION**						
	Address	6001 36th Avenue West, Everett, WA 98203-1264 USA						
Standards Applied	**FCC**	47 CFR §2.1093		**IC**	Health Canada Safety Code 6			
Procedures Applied	**FCC**	KDB 447498 D01v04	KDB 248227 D01v01r02	KDB 178919 D01v04r04	KDB 865664			
	FCC	OET Bulletin 65, Supplement C (01-01)		**IEEE**	1528-2003			
	IEC	International Standard 62209-1:2005		International Standard 62209-2 Edition 1.0 2010-03				
Device Classification(s)	**FCC**	Digital Transmission System (DTS) - §15 Subpart C (2412-2462, 5725-5850 MHz)						
		Unlicensed National Information Infrastructure TX (NII) - §15 Subpart E (5180-5320, 5470-5725 MHz)						
	IC	Low Power License-Exempt Radiocommunication Device (RSS-210 Issue 7)						
Application Type(s)	**FCC/IC**	Original Certification						
Device-Under-Test Sample	**Rcpt Date**	November 24, 2010		**Test Date(s)**	November 25, 29-30, December 2, 7, 2010			
Device Identifier(s)	**FCC ID:**	EHA-1000CP01X2		**IC:**	1223A-1000CP01X2			
Device Under Test (DUT)	**Type(s)**	Rugged Portable PC/Handset		**Model(s)**	**Name**	CN70	**No.**	1000CP01
Test Sample S/N & P/N	**Serial No.**	28311047086 (Identical Prototype)		**Part No.**	Coz-P4-A2-001			
Test Sample Revision No.(s)	**Hardware**	P4		**Firmware**	6.1.0.0.337			
Internal Transmitter(s)	**WLAN**	802.11a/b/g/n		**Bluetooth**	Class 1.5			
Antenna Type(s)	**WLAN-BT**	Internal		**Co-Transmit**	WLAN and Bluetooth do not co-transmit			
Transmit Frequency Ranges	**WLAN**	2412 - 2462 MHz	5180 - 5240 MHz	5260 - 5320 MHz	5500 - 5700 MHz	5745 - 5825 MHz		
Manuf. Rated Output Power	**802.11a**	13.0 dBm (+/- 1dB) - 5150-5350 MHz	12.0 dBm (+/- 1dB) - 5470-5725 MHz	11.0 dBm (+/- 1dB) - 5725-5850 MHz				
	802.11b	17.0 dBm (+/- 1dB)	**802.11g**	13.0 dBm (+/- 1dB)	**802.11n**	13.0 dBm (+/- 1dB)		
	Bluetooth	GFSK = 5.5 dBm (+/- 1dB)	π/4-DQPSK = 5.5 dBm (+/- 1dB)	8DPSK = 5.5 dBm (+/- 1dB)	P(mW)<60/f			
Power Source(s) Tested	**Battery**	Lithium-ion Rechargeable - Model: 1000AB01 (3.7V, 4.0Ah)			P/N: 318-043-002			
Configuration(s) Tested	**Head SAR**	Left Head (Cheek-Touch Position, Ear-Tilt Position)		Right Head (Cheek-Touch Position, Ear-Tilt Position)				
	Body SAR	Holster with Y-Belt (contains metal)	Position 1 - Front Keypad Side of DUT Facing Body		P/N: X11183-V1-R1 (Holster) P/N: X11148-V2 (Y-Belt)			
			Position 2 - Left Side Edge of DUT Facing Body					
Snap-On Accessory Tested	**Audio**	Audio Standard Adapter with VR10 Headset audio accessory			P/N: 225-771-001			
Max. SAR Level(s) Evaluated	**HEAD**	**1.43 W/kg**	**1g average**	**802.11a**	**0.528 W/kg**	**1g average**	**802.11b**	
	BODY	**0.518 W/kg**	**1g average**	**802.11a**	**0.147 W/kg**	**1g average**	**802.11b**	
Spatial Peak SAR Limit(s)	**Head/Body**	**1.6 W/kg**	**1g average**	**FCC/IC**	**General Population / Uncontrolled Exposure**			

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device is compliant with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6 for the General Population / Uncontrolled Exposure environment. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 4, IEEE 1528-2003, International Standard IEC 62209-1 (2005) and International Standard IEC 62209-2 (Edition 1.0 2010-03). 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.

The results and statements contained in this report pertain only to the device(s) evaluated.

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

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REVISION HISTORY			
REVISION NO.	**DESCRIPTION**	**IMPLEMENTED BY**	**RELEASE DATE**
1.0	Initial Release	Jon Hughes	December 21, 2010

TEST REPORT SIGN-OFF			
DEVICE TESTED BY	**REPORT PREPARED BY**	**QA REVIEW BY**	**REPORT APPROVED BY**
Scott Kulifaj	Scott Kulifaj	Jon Hughes	Sean Johnston

1.0 INTRODUCTION

This measurement report demonstrates that the Intermec Technologies Corporation Model: CN70 Rugged Portable PC/Handset with 802.11a/b/g/n WLAN and Bluetooth complies with the SAR (Specific Absorption Rate) RF exposure requirements and measurement procedures 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]), Industry Canada RSS-102 Issue 4 (see reference [4]), IEEE 1528-2003 (see reference [5]), IEC 62209-1 (see reference [6]) and IEC 62209-2 (see reference [7]) were employed. A description of the product, 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 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 head 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 utilizes a controller with built in VME-bus computer.

3.0 SAR PROBE CALIBRATION & MEASUREMENT FREQ. (150MHz - 3GHz)

The following procedures are recommended for measurements at 150 MHz - 3 GHz to minimize probe calibration and tissue dielectric parameter discrepancies. In general, SAR measurements below 300 MHz should be within $\pm$50 MHz of the probe calibration frequency. At 300 MHz to 3 GHz, measurements should be within $\pm$100 MHz of the probe calibration frequency. Measurements exceeding 50% of these intervals, $\pm$25 MHz < 300 MHz and $\pm$50 MHz $\geq$300 MHz, require additional steps (per FCC KDB 450824 D01 v01r01, SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz - see reference [10]).

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	±50 MHz ≥ 300 MHz
2450 MHz	2462 MHz	12 MHz	< 50 MHz
1. The probe calibration and measurement frequency interval is < 50 MHz; therefore the additional steps were not required.			

4.0 CONDUCTED OUTPUT POWER MEASUREMENTS

802.11b – 2.4 GHz

Duty Cycle 100%

Channel	Frequency	Data Rate	Conducted Average Power	
	MHz	Mbps	dBm	Watts
1	2412	1	16.6	0.046
7	2442	1	16.8	0.048
11	2462	1	17.0	0.050

802.11g – 2.4 GHz

Duty Cycle 99%

Channel	Frequency	Data Rate	Conducted Average Power	
	MHz	Mbps	dBm	Watts
1	2412	6	13.1	0.020
7	2442	6	13.3	0.021
11	2462	6	13.4	0.022

802.11n

Duty Cycle 99%

Channel	Frequency	Data Rate	Conducted Average Power	
	MHz	Mbps	dBm	Watts
1	2412	7.2	13.1	0.020
7	2442	7.2	13.4	0.022
11	2462	7.2	13.6	0.023

CONDUCTED OUTPUT POWER MEASUREMENTS (CONT.)

802.11a – 5.2 GHz

Duty Cycle 99%

Channel	Frequency	Data Rate	Conducted Average Power	
	MHz	Mbps	dBm	Watts
36	5180	6	13.8	0.024
40	5200	6	13.8	0.024
44	5220	6	13.6	0.023
48	5240	6	13.6	0.023

802.11n (20 MHz)

Duty Cycle 99%

Channel	Frequency	Data Rate	Conducted Average Power	
	MHz	Mbps	dBm	Watts
36	5180	7.2	13.7	0.023
40	5200	7.2	13.7	0.023
44	5220	7.2	13.7	0.023
48	5240	7.2	13.5	0.022

802.11a – 5.3 GHz

Duty Cycle 99%

Channel	Frequency	Data Rate	Average Power	
	MHz	Mbps	dBm	Watts
52	5260	6	13.5	0.022
56	5280	6	13.5	0.022
60	5300	6	13.6	0.023
64	5320	6	13.3	0.021

802.11n (20 MHz)

Duty Cycle 99%

Channel	Frequency	Data Rate	Conducted Average Power	
	MHz	Mbps	dBm	Watts
52	5260	7.2	13.6	0.023
56	5280	7.2	13.5	0.022
60	5300	7.2	13.4	0.022
64	5320	7.2	13.3	0.021

CONDUCTED OUTPUT POWER MEASUREMENTS (CONT.)

802.11a - 5.5-5.7 GHz

Duty Cycle 99%

Channel	Frequency	Data Rate	Conducted Average Power	
	MHz	Mbps	dBm	Watts
100	5500	6	13.4	0.022
104	5520	6	13.4	0.022
108	5540	6	13.5	0.022
112	5560	6	13.5	0.022
116	5580	6	13.5	0.022
120	5600	6	13.6	0.023
124	5620	6	13.6	0.023
128	5640	6	13.6	0.023
132	5660	6	13.4	0.022
136	5680	6	13.3	0.021
140	5700	6	13.3	0.021

802.11n (20 MHz)

Duty Cycle 99%

Channel	Frequency	Data Rate	Conducted Average Power	
	MHz	Mbps	dBm	Watts
100	5500	7.2	13.4	0.022
104	5520	7.2	13.4	0.022
108	5540	7.2	13.5	0.022
112	5560	7.2	13.5	0.022
116	5580	7.2	13.4	0.022
120	5600	7.2	13.6	0.023
124	5620	7.2	13.5	0.022
128	5640	7.2	13.4	0.022
132	5660	7.2	13.2	0.021
136	5680	7.2	13.0	0.020
140	5700	7.2	13.0	0.020

CONDUCTED OUTPUT POWER MEASUREMENTS (CONT.)

802.11a – 5.7-5.8 GHz

Duty Cycle 99%

Channel	Frequency	Data Rate	Conducted Average Power	
	MHz	Mbps	dBm	Watts
149	5745	6	12.9	0.019
153	5765	6	12.4	0.017
157	5785	6	12.4	0.017
161	5805	6	12.3	0.017
165	5825	6	12.2	0.017

802.11n (20 MHz)

Duty Cycle 99%

Channel	Frequency	Data Rate	Conducted Average Power	
	MHz	Mbps	dBm	Watts
149	5745	7.2	12.4	0.017
153	5765	7.2	12.3	0.017
157	5785	7.2	12.2	0.017
161	5805	7.2	12.2	0.017
165	5825	7.2	12.1	0.016

Notes

1. The RF conducted average output power levels of the DUT were measured by Celltech prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter at the internal antenna connector in accordance with FCC 47 CFR §2.1046 (see reference [15]) and IC RSS-Gen (see reference [16]).

2. The RF conducted output power levels measured in 802.11g mode were < 0.25 dB > 802.11b mode; therefore SAR evaluations were not required for 802.11g mode (per FCC KDB 248227 D01v01r02 - see reference [9]).

3. The RF conducted output power levels were measured for the higher data rates and were not 0.25 dB > the conducted output power levels measured for the lowest data rates listed in the above tables; therefore SAR evaluations were not required for the higher data rates (per FCC KDB 248227 D01v01r02 - see reference [9]).

5.0 SAR MEASUREMENT SUMMARY

HEAD SAR MEASUREMENT SUMMARY (1g) - INTERMEC CN70

Test Config.	Test Date	Freq. Band	Test Freq.	Test Chan.	Test Mode	Data Rate	DUT Test Position		Start Power (Conducted)	SAR Drift During Test	Measured SAR Level
		GHz	MHz			Mbps			dBm	dB	W/kg (1g)
HEAD	Nov 25	2.4	2462	11	802.11b	1	Left Head	Cheek	17.0	-0.187	0.308
	Nov 25							Tilt	17.0	0.148	0.358
	Nov 25						Right Head	Cheek	17.0	-0.163	0.259
	Nov 25							Tilt	17.0	-0.146	**0.528**
	Dec 7	5.2	5180	36	802.11a	6	Left Head	Cheek	13.8	0.204	1.25
	Dec 7							Tilt	13.8	0.063	1.43
	Dec 2						Right Head	Cheek	13.8	-0.109	1.28
	Dec 2							Tilt	13.8	0.060	1.34
	Dec 7		5240	48			Left Head	Cheek	13.6	0.091	1.28
	Dec 7							Tilt	13.6	-0.066	1.38
	Dec 2						Right Head	Cheek	13.6	-0.175	1.24
	Dec 2							Tilt	13.6	-0.053	1.14
	Dec 7	5.3	5260	52	802.11a	6	Left Head	Cheek	13.5	0.093	1.28
	Dec 7							Tilt	13.5	0.140	1.40
	Dec 7						Right Head	Cheek	13.5	-0.173	1.24
	Dec 7							Tilt	13.5	-0.168	1.40
	Dec 7		5300	60			Left Head	Cheek	13.6	-0.070	1.29
	Dec 7							Tilt	13.6	-0.021	1.39
	Dec 7						Right Head	Cheek	13.6	-0.052	1.28
	Dec 7							Tilt	13.6	-0.029	**1.43**
	Dec 7	5.5	5540	108	802.11a	6	Left Head	Cheek	13.5	0.172	1.01
	Dec 7							Tilt	13.5	-0.040	1.12
	Dec 7						Right Head	Cheek	13.5	-0.079	1.06
	Dec 7							Tilt	13.5	-0.105	1.18
	Dec 7		5580	116			Left Head	Cheek	13.5	0.053	0.823
	Dec 7							Tilt	13.5	0.190	0.910
	Dec 7						Right Head	Cheek	13.5	-0.151	0.880
	Dec 7							Tilt	13.5	-0.157	0.926
	Dec 7		5600	120			Left Head	Cheek	13.6	0.020	0.935
	Dec 7							Tilt	13.6	0.032	0.979
	Dec 7						Right Head	Cheek	13.6	-0.151	0.857
	Dec 7							Tilt	13.6	-0.035	0.954
	Dec 7		5700	140			Left Head	Cheek	13.3	-0.166	0.659
	Dec 7							Tilt	13.3	-0.171	0.629
	Dec 7						Right Head	Cheek	13.3	-0.120	0.520
	Dec 7							Tilt	13.3	-0.215	0.728
	Dec 7	5.8	5745	149	802.11a	6	Left Head	Cheek	12.9	-0.009	0.466
	Dec 7							Tilt	12.9	-0.095	0.537
	Dec 7						Right Head	Cheek	12.9	0.008	0.573
	Dec 7							Tilt	12.9	-0.022	0.658
	Dec 7	5.3	5260	52	802.11n	7.2	Right Head	Cheek	13.6	-0.188	1.43

SAR MEASUREMENT SUMMARY (Cont.)

BODY SAR MEASUREMENT SUMMARY (1g) - INTERMEC CN70

Test Config.	Test Date	Freq. Band	Test Freq.	Test Chan.	Test Mode	Data Rate	DUT Test Position	Body-worn Accessory	Audio Accessory	Start Power (Conducted)	SAR Drift During Test	Measured SAR Level
		GHz	MHz			Mbps				dBm	dB	W/kg (1g)
BODY	Nov 29	2.4	2462	11	802.11b	1	Front Side	Holster	none	17.0	Note*	0.059
	Nov 29						Left Side	Holster	none	17.0	Note*	0.056
	Nov 29						Front Side	Holster	VR10 Headset	17.0	0.164	**0.147**
	Nov 29						Left Side	Holster	VR10 Headset	17.0	Note*	0.065
	Nov 30	5.2	5180	36	802.11a	6	Front Side	Holster	none	13.8	-0.012	0.510
	Nov 30						Left Side	Holster	none	13.8	Note*	0.064
	Nov 30	5.3	5300	60	802.11a	6	Front Side	Holster	none	13.6	0.095	**0.518**
	Nov 30						Left Side	Holster	none	13.6	Note*	0.049
	Nov 30	5.5	5540	108	802.11a	6	Front Side	Holster	none	13.5	0.187	0.383
	Nov 30						Left Side	Holster	none	13.5	Note*	0.049
	Nov 30		5580	116			Front Side	Holster	none	13.5	0.187	0.369
	Nov 30		5600	120			Front Side	Holster	none	13.6	0.062	0.338
	Nov 30		5700	140			Front Side	Holster	none	13.3	-0.204	0.257
	Nov 30	5.8	5745	149	802.11a	6	Front Side	Holster	none	12.9	0.144	0.227
	Nov 30						Left Side	Holster	none	12.9	Note*	0.022
	Nov 30	5.3	5260	52	802.11n	7.2	Front Side	Holster	none	13.6	-0.147	0.472

Note:
* The SAR drift of the DUT was measured at the reference point of the phantom with low SAR. The resulting drift values were inaccurate due to the SAR value at the reference point was close to the measurement noise floor and are therefore not reported.

Test Date	Tissue Medium	Ambient Temp.	Fluid Temp.	Fluid Depth	Relative Humidity	ρ (Kg/m^3)	Atmospheric Pressure
Nov. 25, 2010	2450 Head	23.0°C	21.5°C	≥ 15 cm	40%	1000	101.1 kPa
Nov. 29, 2010	2450 Body	23.5°C	21.8°C	≥ 15 cm	40%	1000	101.1 kPa
Nov. 30, 2010	5 GHz Body	23.0°C	21.2°C	≥ 15 cm	40%	1000	101.1 kPa
Dec. 2, 2010	5 GHz Head	23.0°C	21.7°C	≥ 15 cm	40%	1000	101.1 kPa
Dec. 7, 2010	5 GHz Head	23.5°C	22.0°C	≥ 15 cm	35%	1000	101.1 kPa

6.0 DETAILS OF SAR EVALUATION

Head SAR

1. The DUT was tested in a held-to-ear configuration at the left and right head sections of the SAM phantom as follows:

   a) The handset was placed in the device holder in a normal operating position with the test device reference point located along the vertical centerline on the front of the device aligned to the ear reference point, with the center of the earpiece touching the center of the ear spacer of the SAM phantom.

   b) With the handset positioned parallel to the cheek, the test device reference point was aligned to the ear reference point on the head phantom, and the vertical centerline was aligned to the phantom reference plane (initial ear position).

   c) While maintaining the three alignments, the body of the handset was gradually adjusted to each of the following test positions:

- Cheek/Touch Position: the handset was brought toward the mouth of the head phantom by pivoting against the ear reference point until any point of the mouthpiece or keypad touched the phantom.

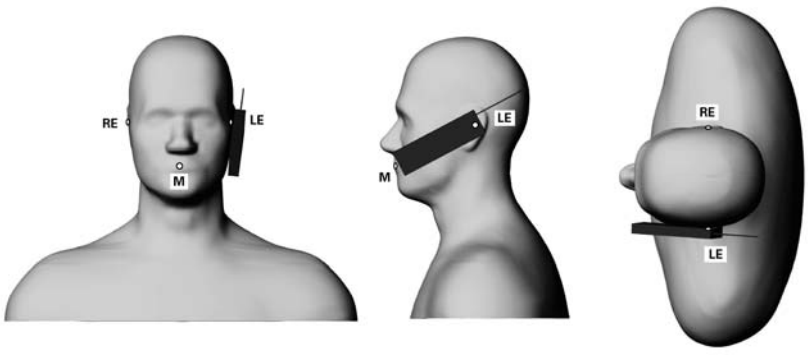


Figure 1. Position 1, "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for device positioning, are indicated (Shoulders are shown for illustration only).

- Ear/Tilt Position: With the phone aligned in the Cheek/Touch position, the handset was tilted away from the mouth with respect to the test device reference point by 15 degrees.

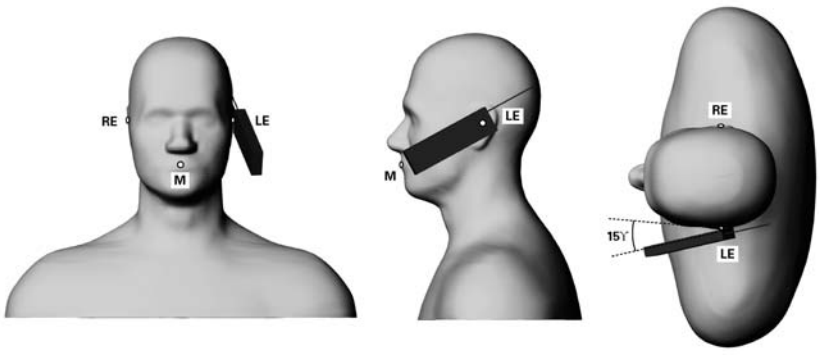


Figure 2. Phone position 2, "tilted position." The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning, are indicated (Shoulders are shown for illustration only).

DETAILS OF SAR EVALUATION (CONT.)

Body SAR

2. The body-worn SAR evaluations were performed with the front side (keypad side) of the DUT facing the outer surface of the planar phantom and the DUT placed inside the holster accessory (top end down) with the holster accessory touching the planar phantom. The holster accessory provided a 1.5 cm spacing from the front keypad side of the DUT to the planar phantom.
3. The body-worn SAR evaluations were performed with the left side (closest antenna side to user's body) of the DUT facing the outer surface of the planar phantom and the DUT placed inside the holster accessory (top end down) with the holster accessory touching the planar phantom. The holster accessory provided a 1.2 cm spacing from the left side (closest antenna side to user's body) of the DUT to the planar phantom.
4. The body-worn SAR evaluations were performed with and without the audio snap-on adapter and headset accessory.

Notes

1. The start channel selected for the SAR evaluations per frequency band was the highest output channel in accordance with the procedures specified in FCC KDB 447498 Section 1) e). The procedure for evaluating multiple channels was also applied in accordance with FCC KDB 447498 Section 1) e).
2. The SAR evaluations performed in the 5.5-5.7 GHz band deviated from the test channel selection procedures specified in FCC KDB 248227 based on probe conversion factor limitations for 5.2 GHz (+/- 100 MHz), 5.5 GHz (+/- 100 MHz) and 5.8 GHz (+/- 100 MHz). The default test channels between 5.6 GHz and 5.7 GHz are outside of the probe calibration frequency range and therefore the channels selected for the SAR evaluations were 5.6 GHz and 5.7 GHz. The measured conducted output power levels are not less than the conducted output power levels measured for the default test channels specified in FCC KDB 248227.
3. The DUT battery was fully charged prior to the SAR evaluations.
4. The SAR drift of the DUT was measured by the DASY4 system for the duration of the SAR evaluations.
5. The WLAN was tested using proprietary test software provided by Intermec Technologies Corporation enabling continuous transmission, modulation and selection of frequency band, mode, test channel/frequency, transmit antenna, output power and duty cycle.
6. The fluid temperature was measured prior to and after the SAR evaluations. The fluid temperature remained within +/-2°C during the SAR evaluations.
7. The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).

7.0 SAR 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. For frequencies < 3 GHz a zoom scan volume of 24 mm x 24 mm x 24 mm (7x7x7 points) centered at the peak SAR location determined from the area scan was used and a zoom scan resolution of 5 mm x 5 mm x 5 mm was used.

h. For frequencies > 3 GHz a zoom scan volume of 24 mm x 24 mm x 20 mm (7x7x9 points) centered at the peak SAR location determined from the area scan was used and a zoom scan resolution of 4 mm x 4 mm x 2.5 mm was used.

8.0 FLUID DIELECTRIC PARAMETERS

FLUID DIELECTRIC PARAMETERS						
Date: 11/25/2010		Frequency: 2450 MHz			Tissue: Head	
Freq (GHz)	Test_e	Test_s	2.45 GHz Target_e	2.45 GHz Target_s	Deviation Permittivity	Deviation Conductivity
2.35	38.23	1.73	39.20	1.80	-2.47%	-3.89%
2.36	38.15	1.74	39.20	1.80	-2.68%	-3.33%
2.37	38.06	1.74	39.20	1.80	-2.91%	-3.33%
2.38	38.25	1.78	39.20	1.80	-2.42%	-1.11%
2.39	38.12	1.77	39.20	1.80	-2.76%	-1.67%
2.40	38.05	1.78	39.20	1.80	-2.93%	-1.11%
2.41	37.98	1.79	39.20	1.80	-3.11%	-0.56%
2.42	37.94	1.79	39.20	1.80	-3.21%	-0.56%
2.43	37.92	1.80	39.20	1.80	-3.27%	0.00%
2.44	37.93	1.82	39.20	1.80	-3.24%	1.11%
2.45	37.93	1.83	39.20	1.80	-3.24%	1.67%
2.46	37.89	1.83	39.20	1.80	-3.34%	1.67%
2.462*	37.90	1.83	39.20	1.80	-3.32%	1.67%
2.47	37.83	1.85	39.20	1.80	-3.49%	2.78%
2.48	37.74	1.88	39.20	1.80	-3.72%	4.44%
2.49	37.73	1.88	39.20	1.80	-3.75%	4.44%
2.50	37.65	1.90	39.20	1.80	-3.95%	5.56%
2.51	37.62	1.90	39.20	1.80	-4.03%	5.56%
2.52	37.67	1.91	39.20	1.80	-3.90%	6.11%
2.53	37.61	1.95	39.20	1.80	-4.06%	8.33%
2.54	37.49	1.94	39.20	1.80	-4.36%	7.78%
2.55	37.64	1.93	39.20	1.80	-3.98%	7.22%

*Interpolated using DASY4 Software

FLUID DIELECTRIC PARAMETERS (Cont.)

FLUID DIELECTRIC PARAMETERS						
Date: 11/29/2010		Frequency: 2450 MHz			Tissue: Body	
Freq (GHz)	Test_e	Test_s	2.45 GHz Target_e	2.45 GHz Target_s	Deviation Permittivity	Deviation Conductivity
2.35	50.78	1.80	52.70	1.95	-3.64%	-7.69%
2.36	50.83	1.84	52.70	1.95	-3.55%	-5.64%
2.37	50.93	1.84	52.70	1.95	-3.36%	-5.64%
2.38	50.74	1.88	52.70	1.95	-3.72%	-3.59%
2.39	50.78	1.89	52.70	1.95	-3.64%	-3.08%
2.40	50.58	1.89	52.70	1.95	-4.02%	-3.08%
2.41	50.78	1.93	52.70	1.95	-3.64%	-1.03%
2.42	50.56	1.93	52.70	1.95	-4.06%	-1.03%
2.43	50.65	1.93	52.70	1.95	-3.89%	-1.03%
2.44	50.62	1.96	52.70	1.95	-3.95%	0.51%
2.45	50.60	1.96	52.70	1.95	-3.98%	0.51%
2.46	50.50	1.98	52.70	1.95	-4.17%	1.54%
2.462*	50.50	1.98	52.70	1.95	-4.17%	1.54%
2.47	50.45	1.99	52.70	1.95	-4.27%	2.05%
2.48	50.36	2.03	52.70	1.95	-4.44%	4.10%
2.49	50.52	2.05	52.70	1.95	-4.14%	5.13%
2.50	50.28	2.04	52.70	1.95	-4.59%	4.62%
2.51	50.52	2.02	52.70	1.95	-4.14%	3.59%
2.52	50.24	2.05	52.70	1.95	-4.67%	5.13%
2.53	50.35	2.07	52.70	1.95	-4.46%	6.15%
2.54	50.46	2.06	52.70	1.95	-4.25%	5.64%
2.55	50.20	2.10	52.70	1.95	-4.74%	7.69%

*Interpolated using DASY4 Software

FLUID DIELECTRIC PARAMETERS (Cont.)

FLUID DIELECTRIC PARAMETERS

Date: 11/30/2010		Frequency: 5180-5820 MHz			Tissue: Body	
Freq (GHz)	Test_e	Test_s	5 GHz Target_e	5 GHz Target_s	Deviation Permittivity	Deviation Conductivity
5.18	50.65	5.09	49.00	5.30	3.37%	-3.96%
5.20	50.61	5.05	49.00	5.30	3.29%	-4.72%
5.22	50.04	5.08	49.00	5.30	2.12%	-4.15%
5.24	50.11	5.10	49.00	5.30	2.27%	-3.77%
5.26	50.39	5.11	49.00	5.30	2.84%	-3.58%
5.28	50.14	5.10	49.00	5.30	2.33%	-3.77%
5.30	50.20	5.15	49.00	5.30	2.45%	-2.83%
5.32	49.87	5.20	49.00	5.30	1.78%	-1.89%
5.34	50.09	5.30	49.00	5.30	2.22%	0.00%
5.36	50.04	5.37	48.60	5.65	2.96%	-4.96%
5.38	49.98	5.38	48.60	5.65	2.84%	-4.78%
5.40	50.13	5.40	48.60	5.65	3.15%	-4.42%
5.42	50.07	5.42	48.60	5.65	3.02%	-4.07%
5.44	49.75	5.44	48.60	5.65	2.37%	-3.72%
5.46	49.92	5.41	48.60	5.65	2.72%	-4.25%
5.48	49.67	5.46	48.60	5.65	2.20%	-3.36%
5.50	49.92	5.39	48.60	5.65	2.72%	-4.60%
5.52	49.54	5.58	48.60	5.65	1.93%	-1.24%
5.54	49.65	5.58	48.60	5.65	2.16%	-1.24%
5.56	49.52	5.63	48.60	5.65	1.89%	-0.35%
5.58	49.90	5.66	48.60	5.65	2.67%	0.18%
5.60	49.55	5.77	48.60	5.65	1.95%	2.12%
5.62	49.72	5.70	48.60	5.65	2.30%	0.88%
5.64	49.42	5.85	48.60	5.65	1.69%	3.54%
5.66	49.34	5.79	48.20	6.00	2.37%	-3.50%
5.68	49.67	5.86	48.20	6.00	3.05%	-2.33%
5.70	49.76	5.94	48.20	6.00	3.24%	-1.00%
5.72	49.87	5.99	48.20	6.00	3.46%	-0.17%
5.74	49.85	5.92	48.20	6.00	3.42%	-1.33%
5.745*	49.80	5.96	48.20	6.00	3.32%	-0.67%
5.76	49.77	6.09	48.20	6.00	3.26%	1.50%
5.78	49.77	6.02	48.20	6.00	3.26%	0.33%
5.80	49.64	6.15	48.20	6.00	2.99%	2.50%
5.82	49.60	6.17	48.20	6.00	2.90%	2.83%

*Interpolated using DASY4 Software

FLUID DIELECTRIC PARAMETERS (Cont.)

FLUID DIELECTRIC PARAMETERS						
Date: 12/02/2010		Frequency: 5200-5800 MHz			Tissue: Head	
Freq (GHz)	Test_e	Test_s	5 GHz Target_e	5 GHz Target_s	Deviation Permittivity	Deviation Conductivity
5.18	37.30	4.61	36.00	4.66	3.61%	-1.07%
5.20	37.77	4.57	36.00	4.66	4.92%	-1.93%
5.22	37.34	4.55	36.00	4.66	3.72%	-2.36%
5.24	37.39	4.56	36.00	4.66	3.86%	-2.15%
5.26	37.06	4.62	36.00	4.66	2.94%	-0.86%
5.28	37.18	4.78	36.00	4.66	3.28%	2.58%
5.30	37.46	4.83	36.00	4.66	4.06%	3.65%
5.32	37.69	4.71	36.00	4.66	4.69%	1.07%
5.34	37.22	4.64	36.00	4.66	3.39%	-0.43%
5.36	36.81	4.73	35.60	4.96	3.40%	-4.64%
5.38	36.78	4.88	35.60	4.96	3.31%	-1.61%
5.40	37.30	4.95	35.60	4.96	4.78%	-0.20%
5.42	37.28	4.87	35.60	4.96	4.72%	-1.81%
5.44	37.15	4.76	35.60	4.96	4.35%	-4.03%
5.46	36.61	4.80	35.60	4.96	2.84%	-3.23%
5.48	36.60	4.91	35.60	4.96	2.81%	-1.01%
5.50	37.08	5.02	35.60	4.96	4.16%	1.21%
5.52	37.35	5.05	35.60	4.96	4.92%	1.81%
5.54	37.10	4.93	35.60	4.96	4.21%	-0.60%
5.56	37.03	4.91	35.60	4.96	4.02%	-1.01%
5.58	36.32	4.96	35.60	4.96	2.02%	0.00%
5.60	36.37	5.18	35.60	4.96	2.16%	4.44%
5.62	36.82	5.19	35.60	4.96	3.43%	4.64%
5.64	37.33	5.16	35.60	4.96	4.86%	4.03%
5.66	36.65	5.04	35.30	5.27	3.82%	-4.36%
5.68	36.00	5.13	35.30	5.27	1.98%	-2.66%
5.70	36.20	5.30	35.30	5.27	2.55%	0.57%
5.72	36.52	5.24	35.30	5.27	3.46%	-0.57%
5.74	37.05	5.22	35.30	5.27	4.96%	-0.95%
5.745*	37.00	5.21	35.30	5.27	4.82%	-1.14%
5.76	36.91	5.19	35.30	5.27	4.56%	-1.52%
5.78	36.24	5.20	35.30	5.27	2.66%	-1.33%
5.80	35.77	5.34	35.30	5.27	1.33%	1.33%
5.82	36.22	5.46	35.30	5.27	2.61%	3.61%

*Interpolated using DASY4 Software

FLUID DIELECTRIC PARAMETERS (Cont.)

FLUID DIELECTRIC PARAMETERS						
Date: 12/07/2010		Frequency: 5200-5800 MHz			Tissue: Head	
Freq (GHz)	Test_e	Test_s	5 GHz Target_e	5 GHz Target_s	Deviation Permittivity	Deviation Conductivity
5.18	37.60	4.56	36.00	4.66	4.44%	-2.15%
5.20	37.57	4.51	36.00	4.66	4.36%	-3.22%
5.22	37.76	4.57	36.00	4.66	4.89%	-1.93%
5.24	37.61	4.61	36.00	4.66	4.47%	-1.07%
5.26	37.78	4.53	36.00	4.66	4.94%	-2.79%
5.28	37.60	4.55	36.00	4.66	4.44%	-2.36%
5.30	37.58	4.52	36.00	4.66	4.39%	-3.00%
5.32	37.24	4.55	36.00	4.66	3.44%	-2.36%
5.34	37.57	4.65	36.00	4.66	4.36%	-0.21%
5.36	37.37	4.72	35.60	4.96	4.97%	-4.84%
5.38	37.36	4.74	35.60	4.96	4.94%	-4.44%
5.40	37.32	4.73	35.60	4.96	4.83%	-4.64%
5.42	37.30	4.75	35.60	4.96	4.78%	-4.23%
5.44	37.31	4.73	35.60	4.96	4.80%	-4.64%
5.46	37.33	4.78	35.60	4.96	4.86%	-3.63%
5.48	37.36	4.78	35.60	4.96	4.94%	-3.63%
5.50	37.27	4.76	35.60	4.96	4.69%	-4.03%
5.52	37.24	4.82	35.60	4.96	4.61%	-2.82%
5.54	37.22	4.79	35.60	4.96	4.55%	-3.43%
5.56	37.30	4.89	35.60	4.96	4.78%	-1.41%
5.58	37.35	4.89	35.60	4.96	4.92%	-1.41%
5.60	37.32	4.88	35.60	4.96	4.83%	-1.61%
5.62	37.08	4.88	35.60	4.96	4.16%	-1.61%
5.64	37.17	5.02	35.60	4.96	4.41%	1.21%
5.66	37.05	5.05	35.30	5.27	4.96%	-4.17%
5.68	36.93	5.06	35.30	5.27	4.62%	-3.98%
5.70	36.90	5.05	35.30	5.27	4.53%	-4.17%
5.72	36.89	5.12	35.30	5.27	4.50%	-2.85%
5.74	36.80	5.15	35.30	5.27	4.25%	-2.28%
5.745*	36.80	5.15	35.30	5.27	4.25%	-2.28%
5.76	36.75	5.14	35.30	5.27	4.11%	-2.47%
5.78	36.65	5.21	35.30	5.27	3.82%	-1.14%
5.785*	36.40	5.10	35.30	5.27	3.12%	-3.23%
5.80	36.40	5.09	35.30	5.27	3.12%	-3.42%
5.82	36.45	5.12	35.30	5.27	3.26%	-2.85%

*Interpolated using DASY4 Software

9.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations, daily system checks were performed with a planar phantom and SPEAG 2450 MHz validation dipole and 5 GHz validation dipole (see Appendix B for system performance check evaluation plots) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [5]) and IEC International Standard 62209-1:2005 (see reference [6]). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C). The SAR measurement system was verified to a tolerance of ±10% from the system manufacturer's dipole calibration target SAR value (see Appendix G for system manufacturer's dipole calibration procedures).

SYSTEM PERFORMANCE CHECK EVALUATION RESULTS

Test Date	Freq. (MHz) / Fluid Type	SAR 1g (W/kg) SPEAG Target	SAR 1g (W/kg) 1W	SAR 1g (W/kg) Meas.	SAR 1g (W/kg) Dev.	Dielectric Constant ε_r SPEAG Target	Dielectric Constant ε_r Meas.	Dielectric Constant ε_r Dev.	Conductivity σ (mho/m) SPEAG Target	Conductivity σ (mho/m) Meas.	Conductivity σ (mho/m) Dev.	Amb. Temp. (°C)	Fluid Temp. (°C)	Humid. (%)	Barom. Press. (kPa)
Nov 25	2450 Head	54.4 ± 10% (Norm. 1W)	51.2	12.8	-5.9%	39.2 ± 5%	37.9	-3.3%	1.80 ± 5%	1.83	+1.7%	23.0	21.5	40	101.1
Nov 29	2450 Body	51.6 ± 10% (Norm. 1W)	56.0	14.0	+8.5%	52.7 ± 5%	50.6	-4.0%	1.95 ± 5%	1.96	+0.5%	23.5	21.8	40	101.1
Nov 30	5200 Body	76.3 ± 10% (Norm. 1W)	69.0	3.45	-9.6%	49.0 ± 5%	50.6	+3.3%	5.30 ± 5%	5.05	-4.7%	23.0	21.2	40	101.1
Nov 30	5500 Body	80.1 ± 10% (Norm. 1W)	79.0	7.9	-1.4%	48.6 ± 5%	49.9	+2.7%	5.65 ± 5%	5.39	-4.6%	23.0	21.2	40	101.1
Nov 30	5800 Body	68.2 ± 10% (Norm. 1W)	61.8	3.09	-9.4%	48.2 ± 5%	49.6	+2.9%	6.00 ± 5%	6.15	+2.5%	23.0	21.2	40	101.1
Dec 2	5200 Head	82.0 ± 10% (Norm. 1W)	88.2	4.41	+7.6%	36.0 ± 5%	37.8	+5.0%	4.66 ± 5%	4.57	-1.9%	23.0	21.7	40	101.1
Dec 7	5200 Head	82.0 ± 10% (Norm. 1W)	87.0	4.35	+6.1%	36.0 ± 5%	37.6	+4.4%	4.66 ± 5%	4.51	-3.2%	23.5	22.0	35	101.1
Dec 7	5500 Head	86.7 ± 10% (Norm. 1W)	81.8	4.09	-5.7%	35.6 ± 5%	37.3	+4.8%	4.96 ± 5%	4.76	-4.0%	23.5	22.0	35	101.1
Dec 7	5800 Head	79.0 ± 10% (Norm. 1W)	79.2	3.96	+0.3%	35.3 ± 5%	36.4	+3.1%	5.27 ± 5%	5.09	-3.4%	23.5	22.0	35	101.1

Notes

- The target SAR values are the measured values from the SAR system manufacturer's dipole calibration (see Appendix G).
- The target dielectric parameters are the nominal values from the SAR system manufacturer's dipole calibration (see Appendix G).
- The fluid temperature was measured prior to and after the system performance check evaluations. The fluid temperature remained within +/-2°C during the system performance check evaluations.

2450 MHz SPC Input Power = 250 mW (Head/Body)	5200/5800 MHz SPC Input Power = 50 mW (Head/Body)
5500 MHz SPC Input Power = 50 mW (Head)	5500 MHz SPC Input Power = 100 mW (Body)
Fluid Depth = ≥ 15 cm	ρ (Kg/m^3) = 1000

2 GHz Validation Dipole with SAM

5 GHz Validation Dipole with SAM

2 GHz Validation Dipole with Barski

5 GHz Validation Dipole with Barski

10.0 SIMULATED EQUIVALENT TISSUES

The 2450 MHz simulated equivalent tissue recipe in the table below is derived from the SAR system manufacturer's suggested recipe in the DASY4 manual (see references [12] and [13]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2003 (see reference [5]) and IEC Standard 62209-1:2005 (see reference [6]). The ingredient percentage may have been adjusted marginally in order to achieve the appropriate target dielectric parameters within the specified tolerance. The 5 GHz simulated tissue mixture was provided by SPEAG and is listed below. The dielectric parameters of the fluid (permittivity and conductivity) were measured prior to the SAR evaluations. See Appendix D for the system manufacturer's 5 GHz fluid data sheet.

2450 MHz TISSUE MIXTURE		
INGREDIENT	**2450 MHz Head**	**2450 MHz Body**
Water	52.00 %	69.98 %
Glycol Monobutyl	48.00 %	30.00 %
Salt	-	0.02 %

5 GHz TISSUE MIXTURE		
INGREDIENT	**5 GHz Head**	**5 GHz Body**
Water	64-78%	64-78%
Mineral Oil	11-18%	11-18%
Emulsifiers	9-15%	9-15%
Additives and Salt	2-3%	2-3%

11.0 SAR LIMITS

SAR RF EXPOSURE LIMITS			
FCC 47 CFR 2.1093	**Health Canada Safety Code 6**	**(General Population / Uncontrolled Exposure)**	**(Occupational / Controlled Exposure)**
Spatial Average (averaged over the whole body)		0.08 W/kg	0.4 W/kg
Spatial Peak (averaged over any 1 g of tissue)		**1.6 W/kg**	8.0 W/kg
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)		4.0 W/kg	20.0 W/kg
The Spatial Average value of the SAR averaged over the whole body.			
The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.			
The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.			
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.			

12.0 ROBOT SYSTEM SPECIFICATIONS

Specifications	
Positioner	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability	0.02 mm
No. of axis	6
Data Acquisition Electronic (DAE) System	
Cell Controller	
Processor	AMD Athlon XP 2400+
Clock Speed	2.0 GHz
Operating System	Windows XP Professional
Data Converter	
Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY4, V4.7 Build 44
	Postprocessing Software: SEMCAD, V1.8 Build 171
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.	3600, 3746
Construction	Symmetrical design with triangular core
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
Phantom(s)	
Type	SAM V4.0C
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 25 liters
Type	Barski Planar Phantom
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 70 liters

13.0 PROBE SPECIFICATIONS

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

14.0 SAM TWIN PHANTOM V4.0C

The SAM Twin 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 I for specifications of the SAM phantom V4.0C).

SAM Twin Phantom V4.0C

15.0 BARSKI PLANAR PHANTOM

The Barski 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. The Barski planar phantom is used for DUT SAR evaluations and system performance check evaluations. See Appendix J for dimensions and specifications of the Barski planar phantom.

Barski Planar Phantom

16.0 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 evaluation of devices with a larger footprint (e.g. Laptop PC, Tablet PC), or to avoid perturbation due to device holder clamps for devices with a smaller footprint, a Plexiglas platform is attached to the device holder.

Device Holder

17.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
USED	DESCRIPTION				
x	Schmid & Partner DASY4 System	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	CNR	CNR
x	-Robot	00046	599396-01	CNR	CNR
x	-DAE4	00019	353	27Apr10	Annual
x	-EX3DV4 E-Field Probe (Body SAR evaluations)	00213	3600	29Apr10	Annual
x	-EX3DV4 E-Field Probe (Head SAR evaluations)	N/A	3746	11Nov10	Annual
x	-D2450V2 Validation Dipole	00219	825	17Apr09	Biennial
x	-D5GHzV2 Validation Dipole (Body)	00126	1031	29Apr09	Biennial
x	-D5GHzV2 Validation Dipole (Head)	N/A	1062	12May10	Biennial
x	-SAM Phantom V4.0C	00154	1033	CNR	CNR
x	-Barski Planar Phantom	00155	03-01	CNR	CNR
x	HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
x	Gigatronics 8652A Power Meter	00007	1835272	04May10	Biennial
x	Gigatronics 80701A Power Sensor	00014	1833699	04May10	Biennial
x	HP 8753ET Network Analyzer	00134	US39170292	04May10	Biennial
x	Rohde & Schwarz SMR20 Signal Generator	00006	100104	CNR	CNR
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
Abbr.	CNR = Calibration Not Required; N/A = Not Applicable				

18.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION

Uncertainty Component	IEEE 1528 Section	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value ±% (1g)	Uncertainty Value ±% (10g)	V_i or V_{eff}
Measurement System									
Probe Calibration (2450 MHz)	E.2.1	5.5	Normal	1	1	1	5.5	5.5	∞
Axial Isotropy	E.2.2	4.7	Rectangular	1.732050808	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	Rectangular	1.732050808	0.7	0.7	3.9	3.9	∞
Boundary Effect	E.2.3	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell	E.6.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Extrapolation, interpolation & integration algorithms for max. SAR evaluation	E.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.9	Normal	1	1	1	2.9	2.9	12
Device Holder Uncertainty	E.4.1	3.6	Normal	1	1	1	3.6	3.6	8
SAR Drift Measurement	6.6.2	5	Rectangular	1.732050808	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5	Rectangular	1.732050808	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measured)	E.3.3	1.67	Normal	1	0.64	0.43	1.1	0.7	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	4.17	Normal	1	0.6	0.49	2.5	2.0	∞
Combined Standard Uncertainty			**RSS**				**10.70**	**10.44**	
Expanded Uncertainty (95% Confidence Interval)			**k=2**				**21.40**	**20.88**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR DEVICE EVALUATION

Error Description	IEC 62209 Section	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value ±% (1g)	Uncertainty Value ±% (10g)	V_i or V_{eff}
Measurement System									
Probe Calibration (5 GHz)	7.2.1	6.55	Normal	1	1	1	6.55	6.55	∞
Axial Isotropy	7.2.1.2	4.7	Rectangular	1.732050808	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	7.2.1.2	9.6	Rectangular	1.732050808	0.7	0.7	3.9	3.9	∞
Boundary Effect	7.2.1.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Linearity	7.2.1.3	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits	7.2.1.4	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	7.2.1.6	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	7.2.1.7	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	7.2.1.8	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	7.2.3.6	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Restrictions	7.2.2.1	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Probe Positioning wrt Phantom Shell	7.2.2.3	5.7	Rectangular	1.732050808	1	1	3.3	3.3	∞
Post-processing	7.2.4	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Test Sample Related									
Device positioning	7.2.2.4	2.9	Normal	1	1	1	2.9	2.9	12
Device holder uncertainty	7.2.2.4.2	3.6	Normal	1	1	1	3.6	3.6	8
Power drift	7.2.3.5	5	Rectangular	1.732050808	1	1	2.9	2.9	∞
Phantom and Setup									
Phantom uncertainty	7.2.2.2	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Liquid conductivity (target)	7.2.3.3	5	Rectangular	1.732050808	0.64	0.43	1.8	1.2	∞
Liquid conductivity (measured)	7.2.3.3	4.72	Normal	1	0.64	0.43	3.0	2.0	∞
Liquid permittivity (target)	7.2.3.4	10	Rectangular	1.732050808	0.6	0.49	3.5	2.8	∞
Liquid permittivity (measured)	7.2.3.4	4.94	Normal	1	0.6	0.49	3.0	2.4	∞
Combined Standard Uncertainty			**RSS**				**12.64**	**12.09**	
Expanded Uncertainty (95% Confidence Interval)			**k=2**				**25.29**	**24.17**	
Measurement Uncertainty Table in accordance with IEC International Standard 62209-1:2005									

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

19.0 REFERENCES

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

[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 (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)”, Radio Standards Specification RSS-102 Issue 4: March 2010.

[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] International Standard IEC 62209-1:2005 - “Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for handheld devices used in close proximity to the ear (300 MHz to 3 GHz)”.

[7] International Standard IEC 62209-2 Edition 1.0 2010-03 - “Human exposure to radio frequency fields from hand-held & body-mounted wireless communication devices - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)”.

[8] Federal Communications Commission, Office of Engineering and Technology - “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”; KDB 447498 D01v04: November 2009.

[9] Federal Communications Commission, Office of Engineering and Technology - “SAR Measurement Procedures for 802.11a/b/g Transmitters”; KDB 248227 D01v01r02: May 2007.

[10] Federal Communications Commission, Office of Engineering and Technology - “Application Note: SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz”; KDB 450824 D01 v01r01: January 2007.

[11] Federal Communications Commission, Office of Engineering and Technology - “SAR Measurement Requirements for 3 - 6 GHz”; KDB 865664 Rev. 1.1: April 2007.

[12] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 16 Application Note, Head Tissue Recipe: Sept. 2005.

[13] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 17 Application Note, Body Tissue Recipe: Sept. 2005.

[14] ISO/IEC 17025 - “General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005).”

[15] Federal Communications Commission - “Measurements Required: RF Power Output”; Rule Part 47 CFR §2.1046.

[16] Industry Canada - “General Requirements and Information for the Certification of Radiocommunication Equipment”, Radio Standards Specification RSS-Gen Issue 2: June 2007.

APPENDIX B - SYSTEM PERFORMANCE CHECK PLOTS

Date Tested: 11/25/2010

System Performance Check - 2450 MHz Dipole - Head

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 825; Calibration: 04/17/2009

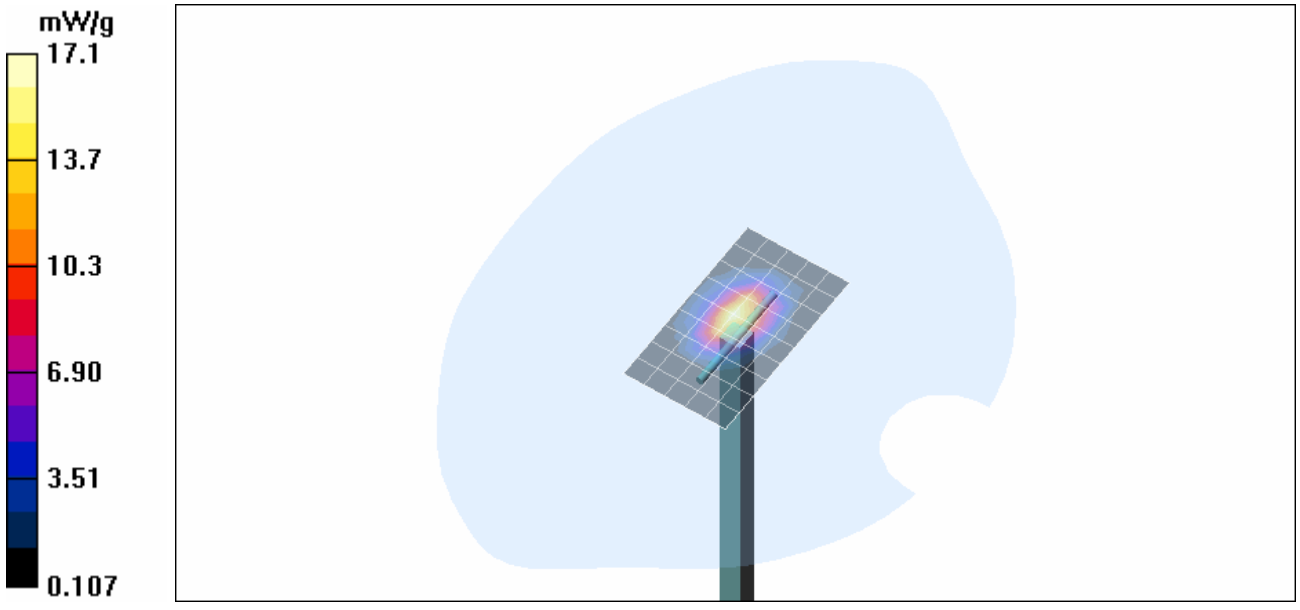
Ambient Temp: 23.0°C; Fluid Temp: 21.5°C; Barometric Pressure: 101.1 kPa; Humidity: 40%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL2450 Medium parameters used: f = 2450 MHz; σ = 1.83 mho/m; ε_r = 37.9; ρ = 1000 kg/m^3

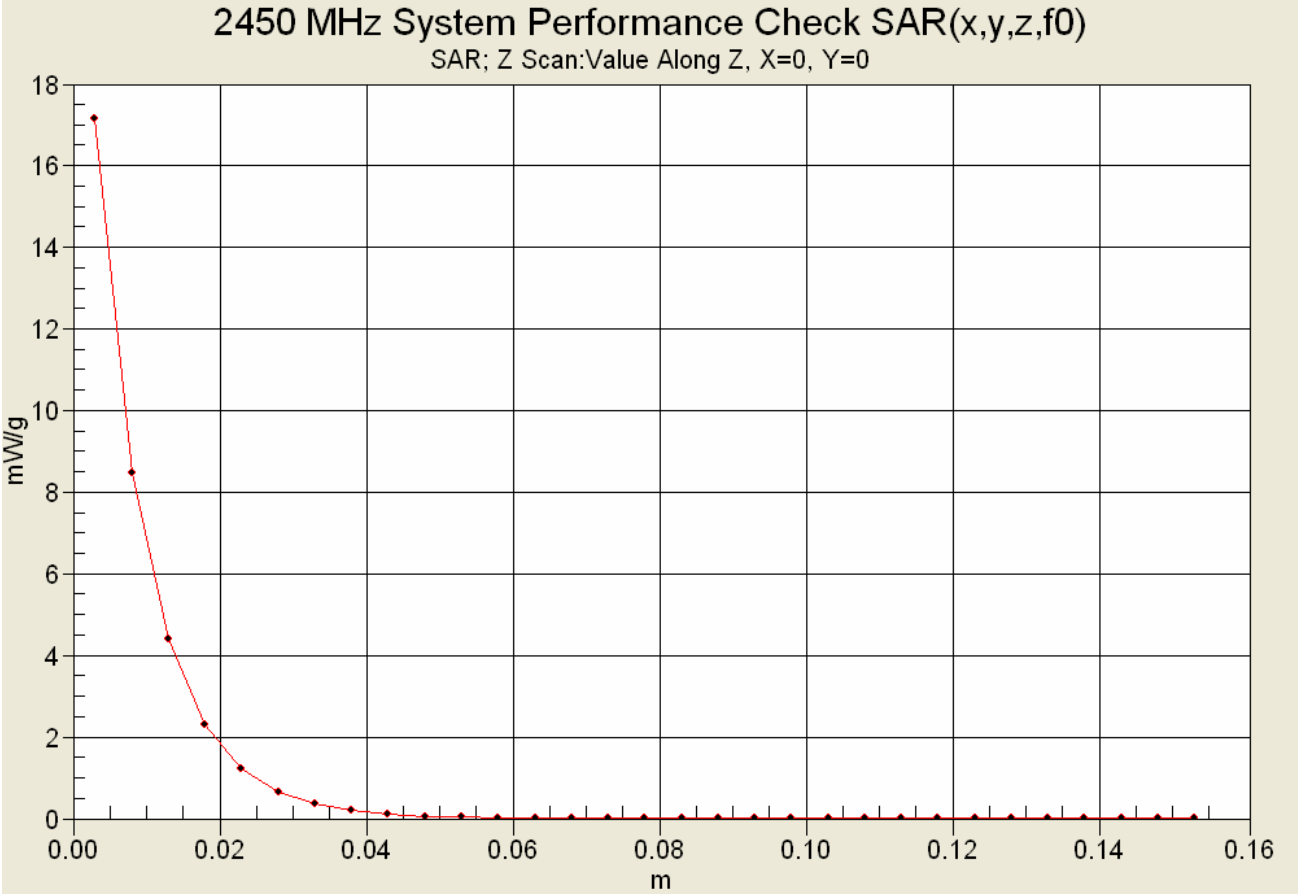
- Probe: EX3DV4 - SN3600; ConvF(6.15, 6.15, 6.15); Calibrated: 29/04/2010
- Sensor-Surface: 3 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

2450 MHz Dipole - System Performance Check/Area Scan (6x10x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 16.6 mW/g

2450 MHz Dipole - System Performance Check/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.9 V/m; Power Drift = -0.046 dB
Peak SAR (extrapolated) = 26.6 W/kg
SAR(1 g) = 12.8 mW/g; SAR(10 g) = 5.94 mW/g
Maximum value of SAR (measured) = 17.1 mW/g



Z-Axis Scan



Date Tested: 11/29/2010

System Performance Check - 2450 MHz Dipole - Body

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 825; Calibration: 04/17/2009

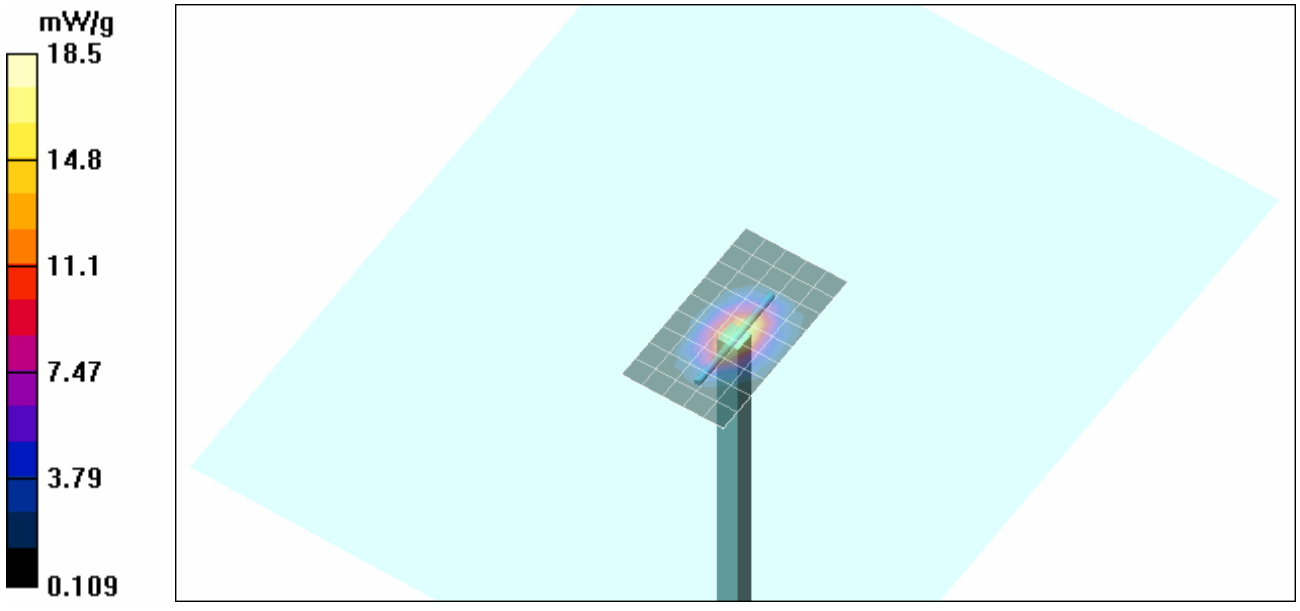
Ambient Temp: 23.5°C; Fluid Temp: 21.8°C; Barometric Pressure: 101.1 kPa; Humidity: 40%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2450 MHz; σ = 1.96 mho/m; ε_r = 50.6; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600; ConvF(6.24, 6.24, 6.24); Calibrated: 29/04/2010
- Sensor-Surface: 3 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

2450 MHz Dipole - System Performance Check/Area Scan (6x10x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 18.1 mW/g

2450 MHz Dipole - System Performance Check/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.8 V/m; Power Drift = 0.074 dB
Peak SAR (extrapolated) = 29.7 W/kg
SAR(1 g) = 14 mW/g; SAR(10 g) = 6.41 mW/g
Maximum value of SAR (measured) = 18.5 mW/g



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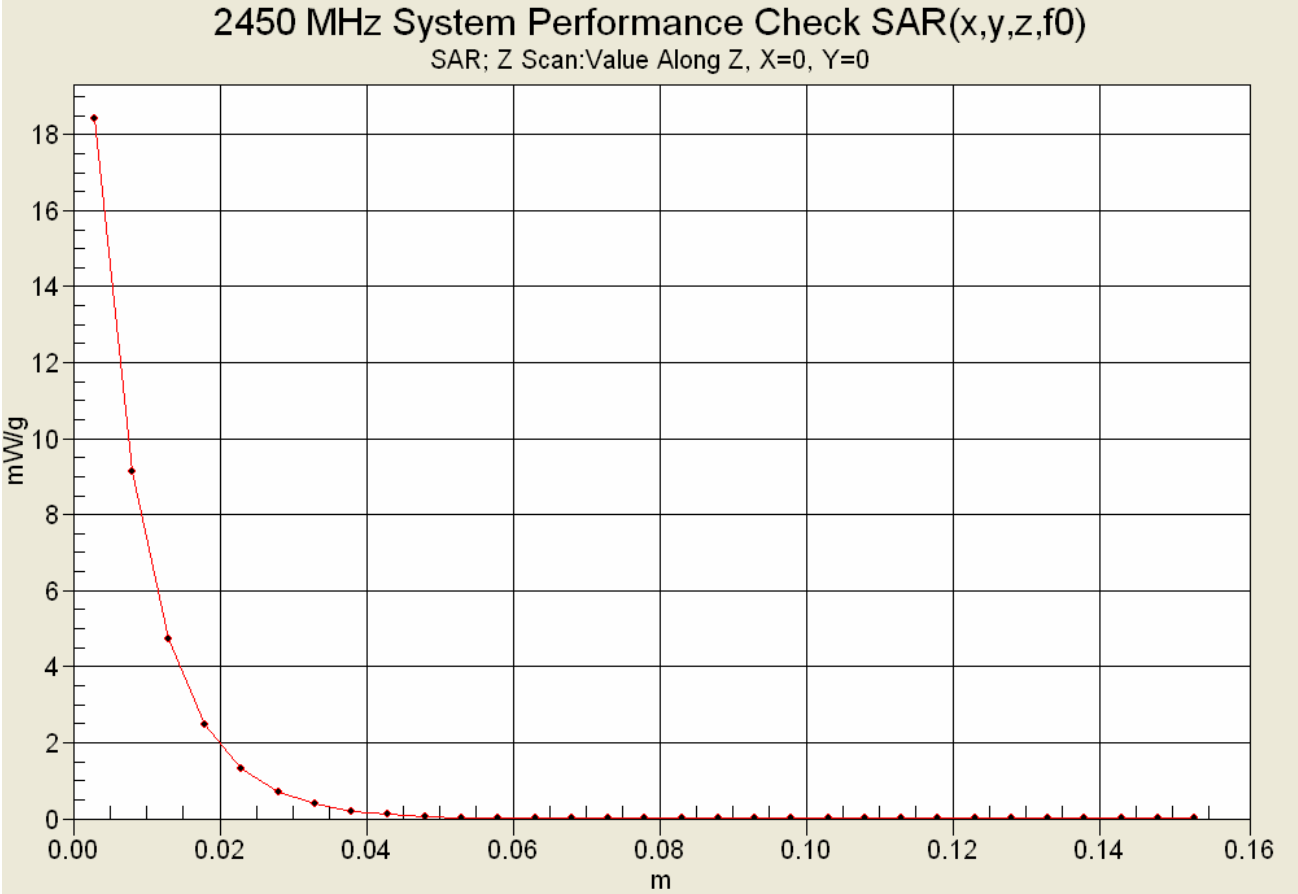


Date Tested: 11/30/2010

System Performance Check - 5200 MHz Dipole - Body

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: 1031; Calibration: 04/29/2009

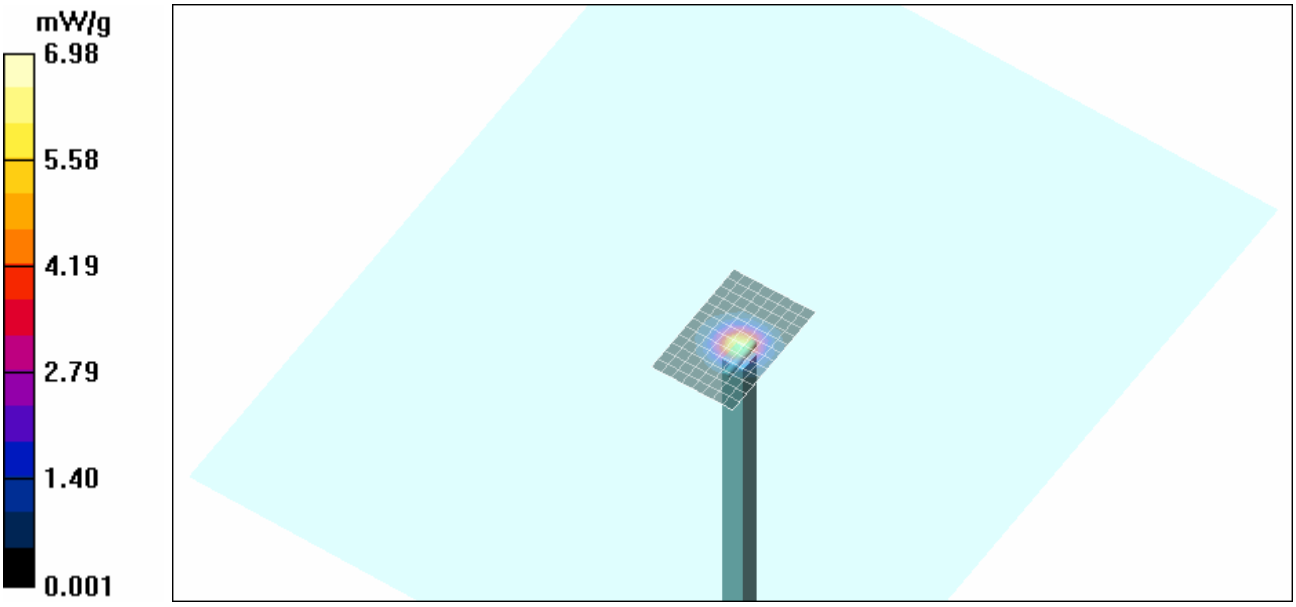
Ambient Temp: 23.0°C; Fluid Temp: 21.2°C; Barometric Pressure: 101.1 kPa; Humidity: 40%

Communication System: CW
Forward Conducted Power: 50 mW
Frequency: 5200 MHz; Duty Cycle: 1:1
Medium: M5200-5800 Medium parameters used: f = 5200 MHz; σ = 5.05 mho/m; ε_r = 50.6; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600; ConvF(3.73, 3.73, 3.73); Calibrated: 29/04/2010
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

5200 MHz System Performance Check/Area Scan (9x13x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 6.57 mW/g

5200 MHz System Performance Check/Zoom Scan (7x7x9)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 39.3 V/m; Power Drift = 0.037 dB
Peak SAR (extrapolated) = 12.4 W/kg
SAR(1 g) = 3.45 mW/g; SAR(10 g) = 0.967 mW/g
Maximum value of SAR (measured) = 6.98 mW/g



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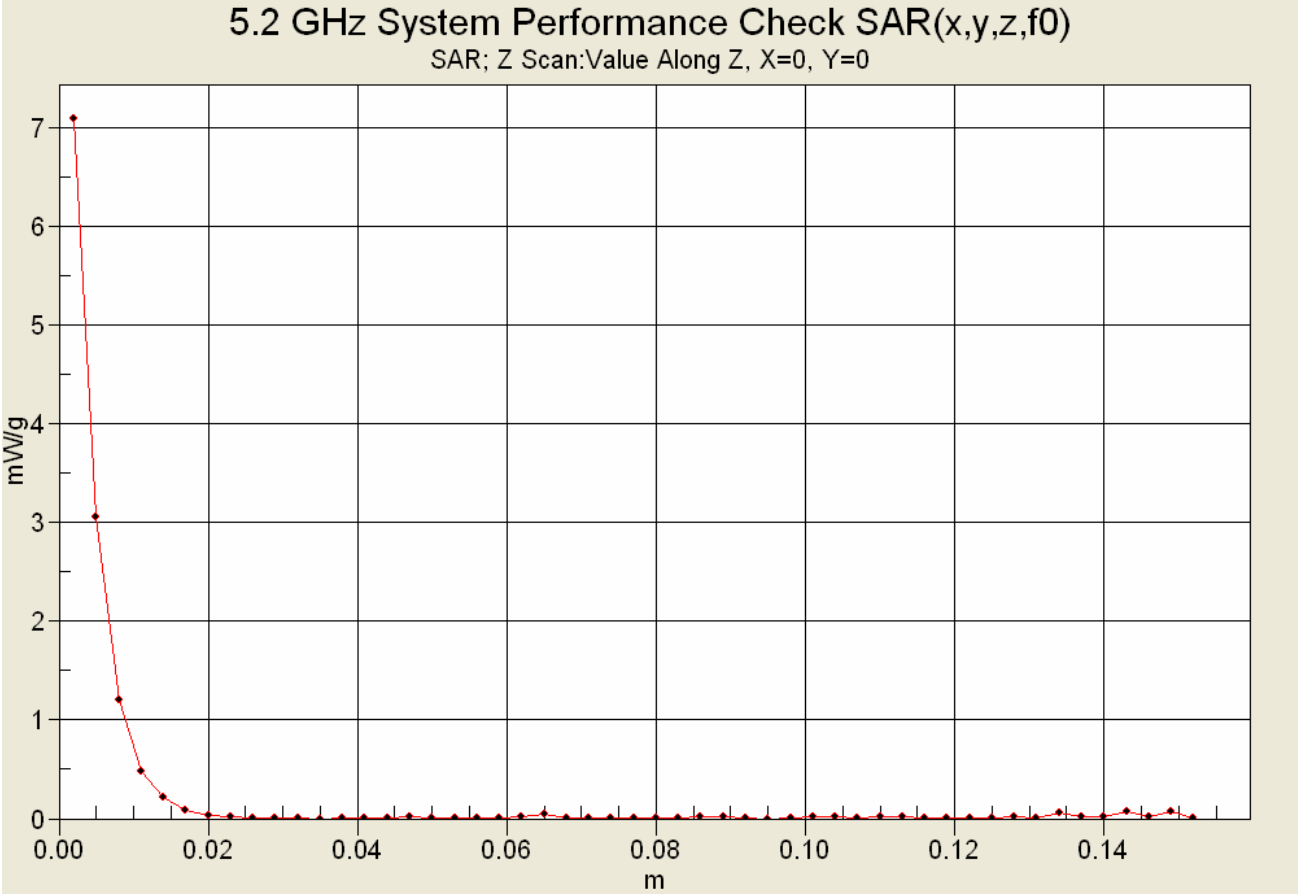


Date Tested: 11/30/2010

System Performance Check - 5500 MHz Dipole - Body

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: 1031; Calibration: 04/29/2009

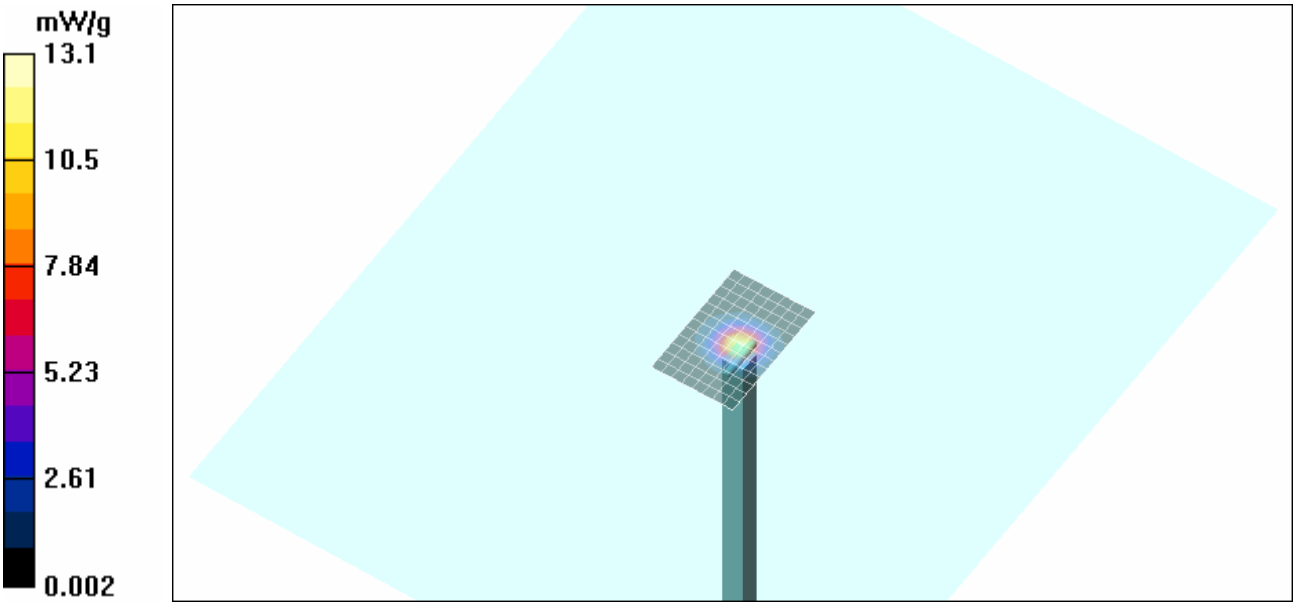
Ambient Temp: 23.0°C; Fluid Temp: 21.2°C; Barometric Pressure: 101.1 kPa; Humidity: 40%

Communication System: CW
Forward Conducted Power: 100 mW
Frequency: 5500 MHz; Duty Cycle: 1:1
Medium: M5200-5800 Medium parameters used: f = 5500 MHz; σ = 5.39 mho/m; ε_r = 49.9; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600; ConvF(3.3, 3.3, 3.3); Calibrated: 29/04/2010
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

5500 MHz System Performance Check/Area Scan (9x13x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 11.8 mW/g

5500 MHz System Performance Check/Zoom Scan (7x7x9)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 50.1 V/m; Power Drift = -0.151 dB
Peak SAR (extrapolated) = 24.7 W/kg
SAR(1 g) = 7.9 mW/g; SAR(10 g) = 2.29 mW/g
Maximum value of SAR (measured) = 13.1 mW/g



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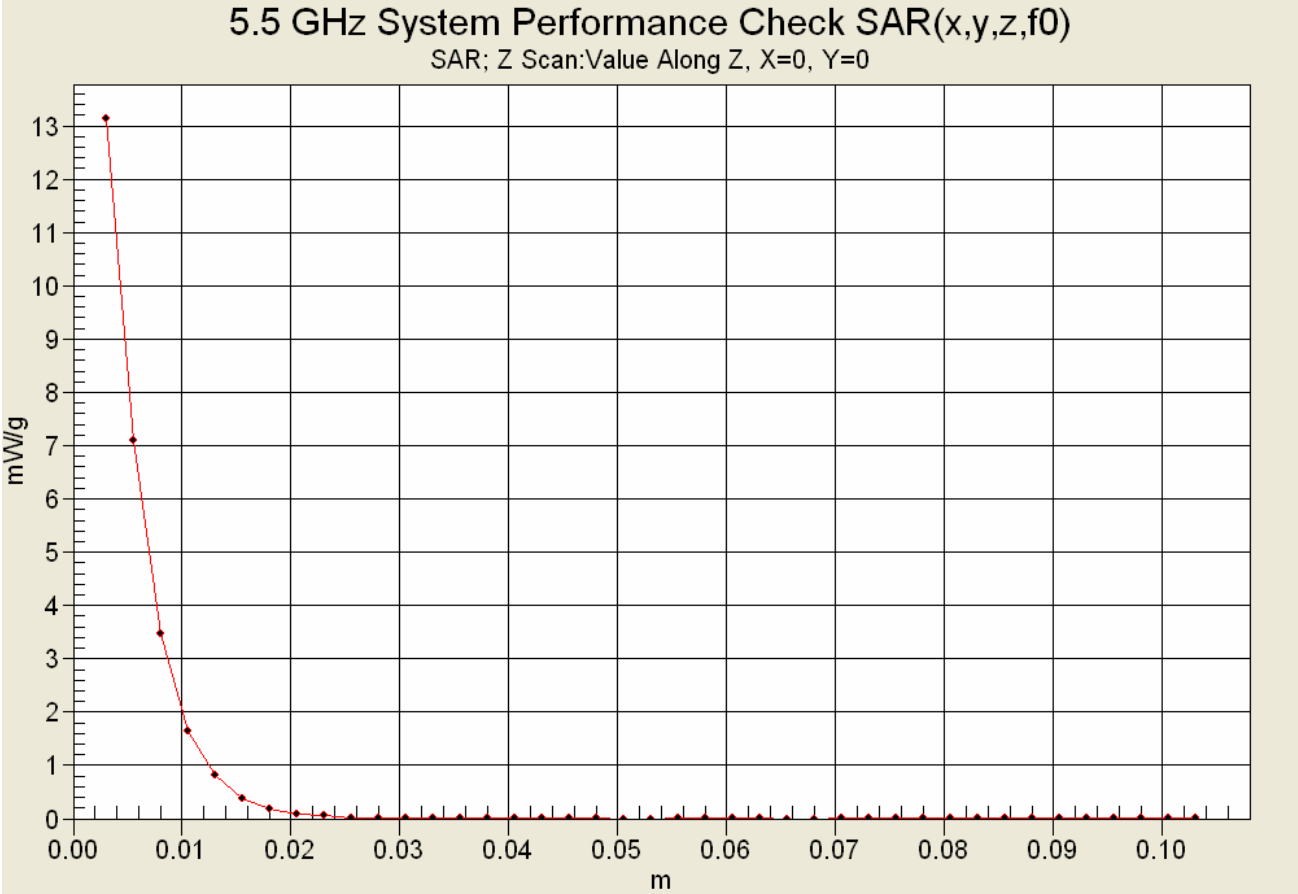


Date Tested: 11/30/2010

System Performance Check - 5800 MHz Dipole - Body

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: 1031; Calibration: 04/29/2009

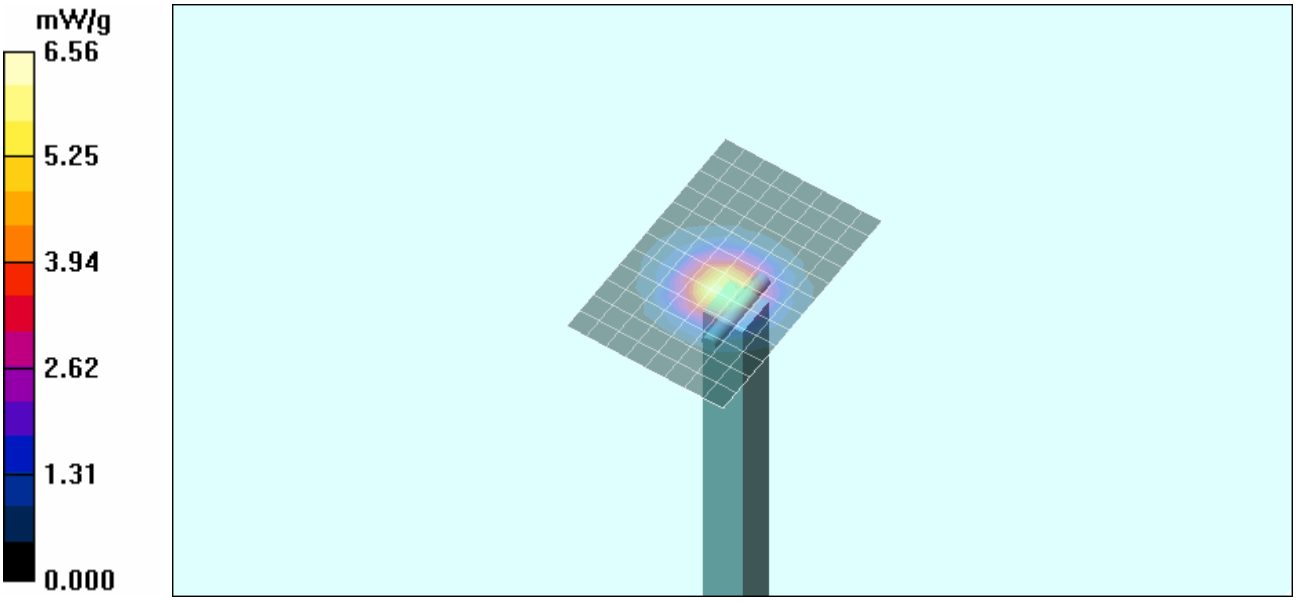
Ambient Temp: 23.0°C; Fluid Temp: 21.2°C; Barometric Pressure: 101.1 kPa; Humidity: 40%

Communication System: CW
Forward Conducted Power: 50 mW
Frequency: 5800 MHz; Duty Cycle: 1:1
Medium: M5200-5800 Medium parameters used: f = 5800 MHz; σ = 6.15 mho/m; ε_r = 49.6; ρ = 1000 kg/m^3

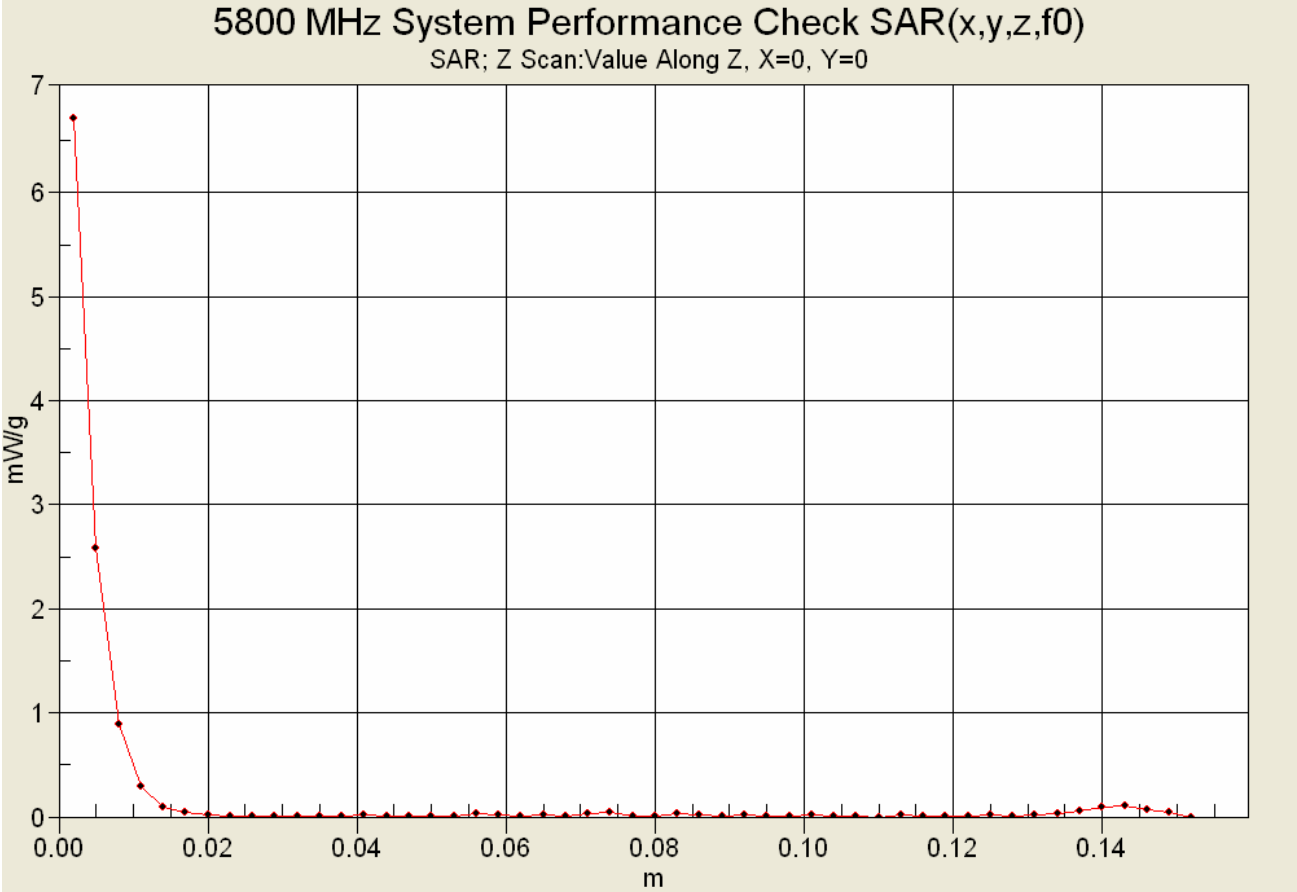
- Probe: EX3DV4 - SN3600; ConvF(3.44, 3.44, 3.44); Calibrated: 29/04/2010
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

5800 MHz System Performance Check/Area Scan (9x13x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 6.57 mW/g

5800 MHz System Performance Check/Zoom Scan (7x7x9)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 34.7 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 12.5 W/kg
SAR(1 g) = 3.09 mW/g; SAR(10 g) = 0.865 mW/g
Maximum value of SAR (measured) = 6.56 mW/g



Z-Axis Scan



Date Tested: 12/02/2010

System Performance Check - 5200 MHz Dipole - Head

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: 1062; Calibration: 05/12/2010

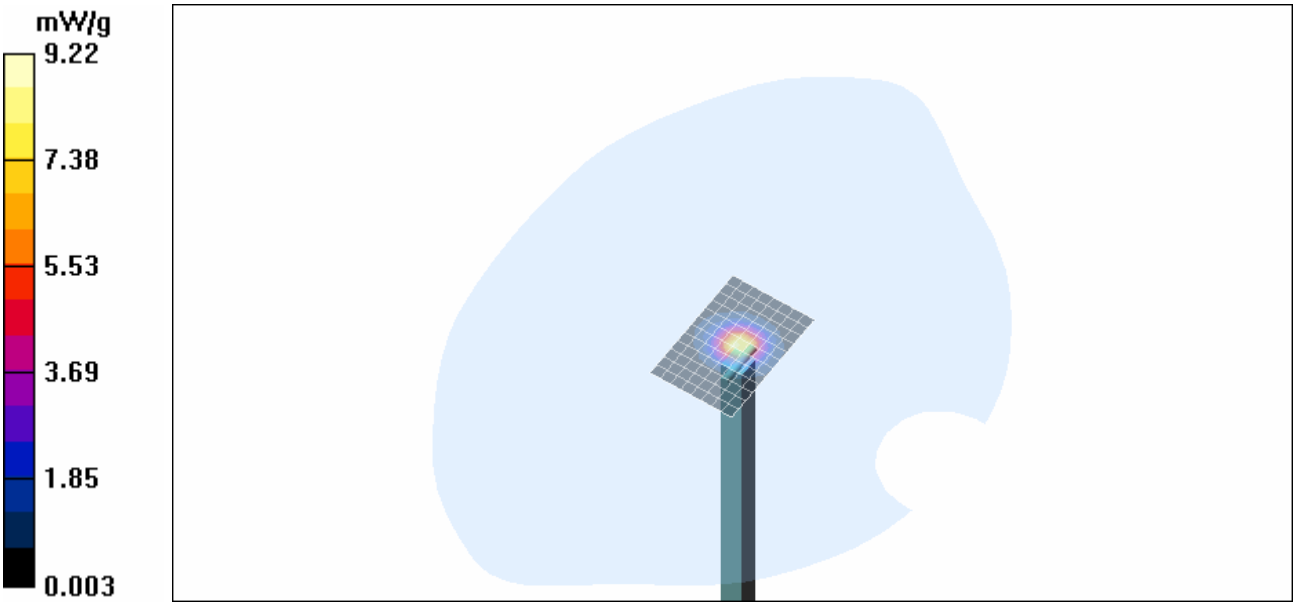
Ambient Temp: 23.0°C; Fluid Temp: 21.7°C; Barometric Pressure: 101.1 kPa; Humidity: 40%

Communication System: CW
Forward Conducted Power: 50 mW
Frequency: 5200 MHz; Duty Cycle: 1:1
Medium: HSL5200-5800 Medium parameters used: f = 5200 MHz; σ = 4.57 mho/m; ε_r = 37.8; ρ = 1000 kg/m^3

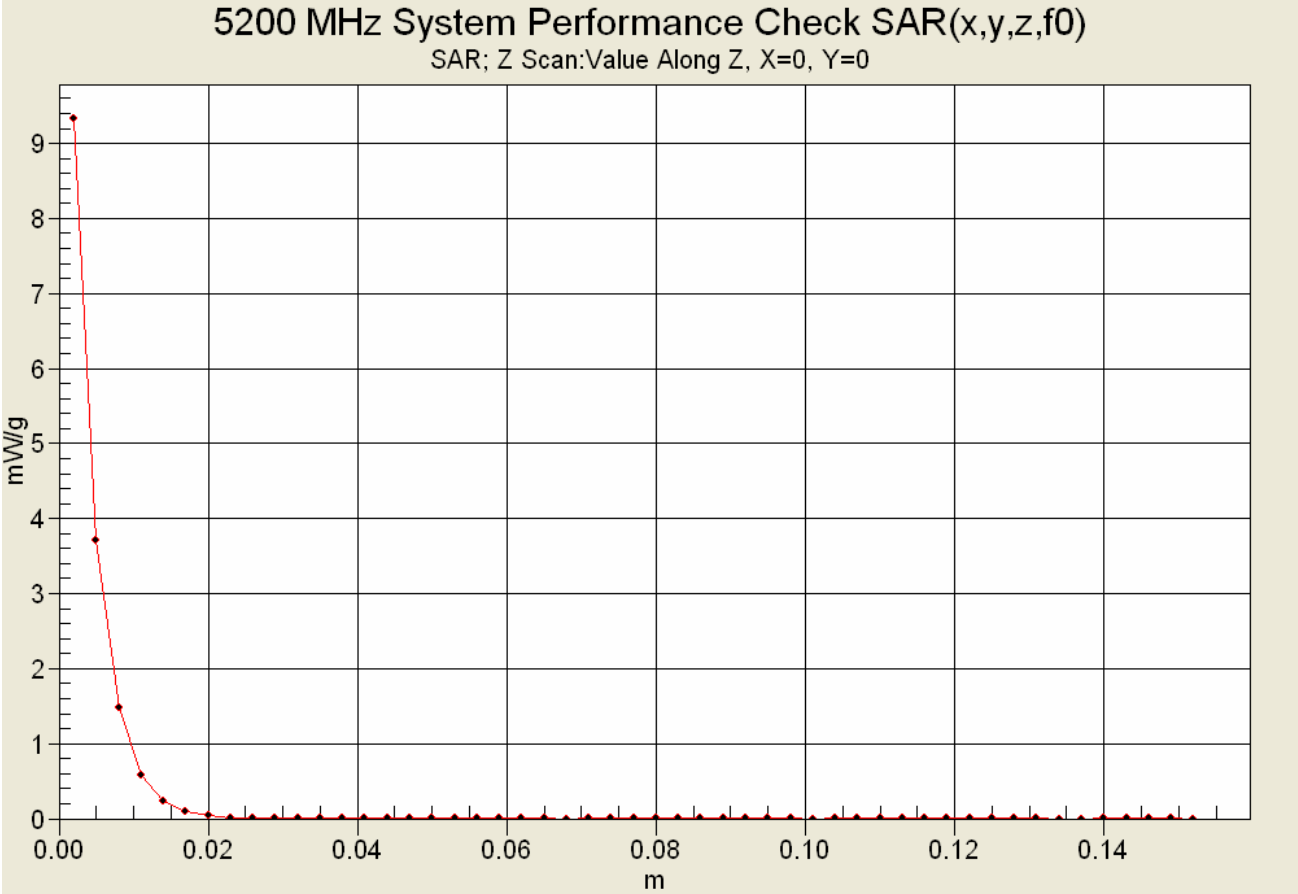
- Probe: EX3DV4 - SN3746; ConvF(5.08, 5.08, 5.08); Calibrated: 11/11/2010
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

5200 MHz System Performance Check/Area Scan (9x13x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 8.41 mW/g

5200 MHz System Performance Check/Zoom Scan (7x7x9)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 43.8 V/m; Power Drift = -0.059 dB
Peak SAR (extrapolated) = 18.6 W/kg
SAR(1 g) = 4.41 mW/g; SAR(10 g) = 1.25 mW/g
Maximum value of SAR (measured) = 9.22 mW/g



Z-Axis Scan



Date Tested: 12/07/2010

System Performance Check - 5200 MHz Dipole - Head

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: 1062; Calibration: 05/12/2010

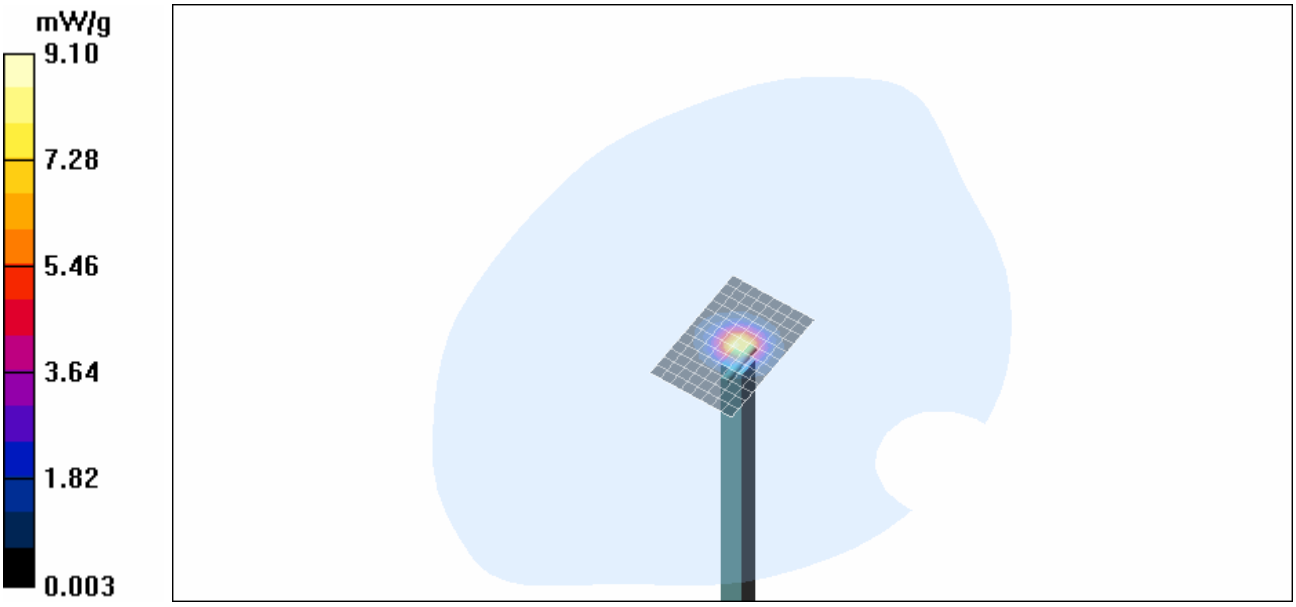
Ambient Temp: 23.5°C; Fluid Temp: 22.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Forward Conducted Power: 50 mW
Frequency: 5200 MHz; Duty Cycle: 1:1
Medium: HSL5200-5800 Medium parameters used: f = 5200 MHz; σ = 4.51 mho/m; ε_r = 37.6; ρ = 1000 kg/m^3

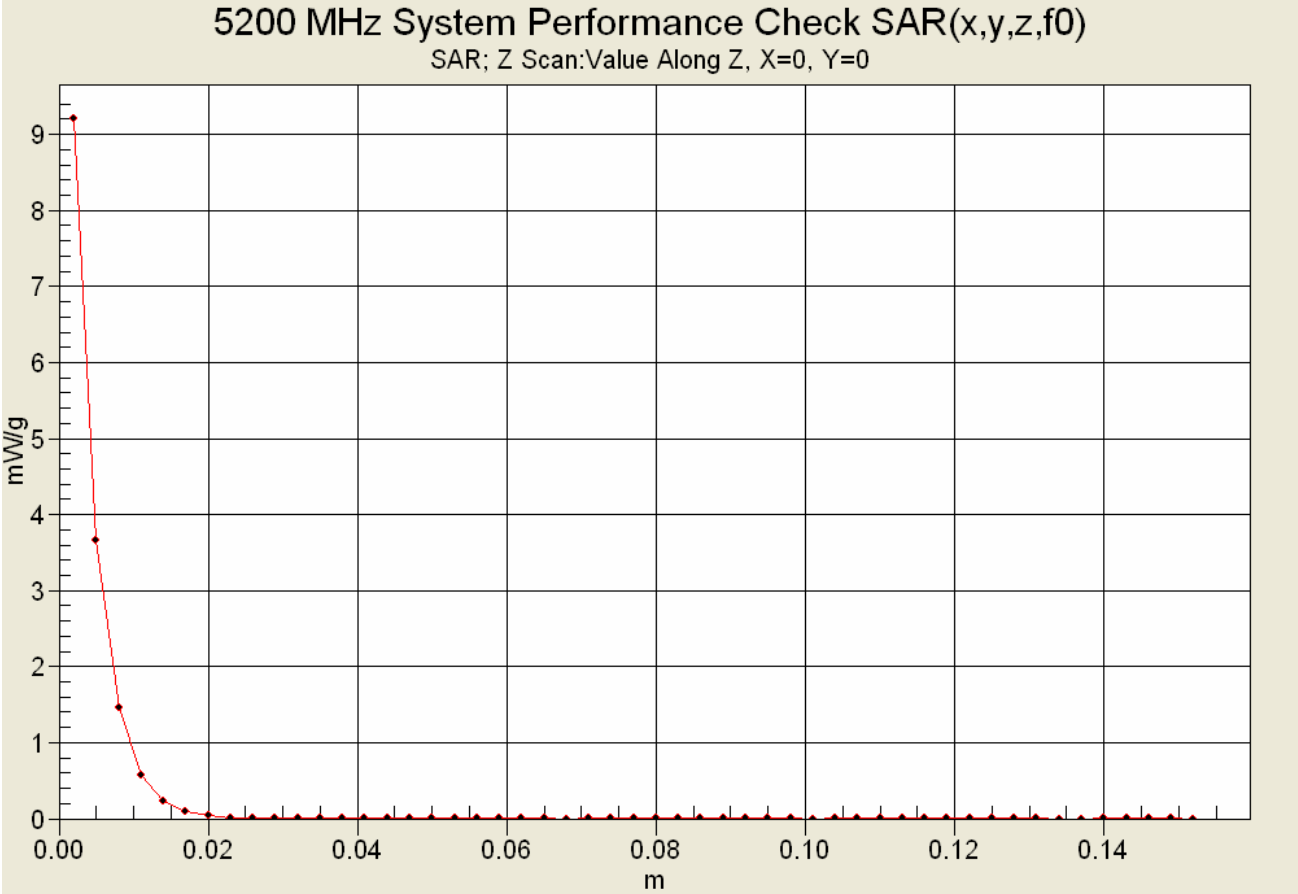
- Probe: EX3DV4 - SN3746; ConvF(5.08, 5.08, 5.08); Calibrated: 11/11/2010
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

5200 MHz System Performance Check/Area Scan (9x13x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 8.30 mW/g

5200 MHz System Performance Check/Zoom Scan (7x7x9)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 43.8 V/m; Power Drift = -0.059 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 4.35 mW/g; SAR(10 g) = 1.23 mW/g
Maximum value of SAR (measured) = 9.10 mW/g



Z-Axis Scan



Date Tested: 12/07/2010

System Performance Check - 5500 MHz Dipole - Head

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: 1062; Calibration: 05/12/2010

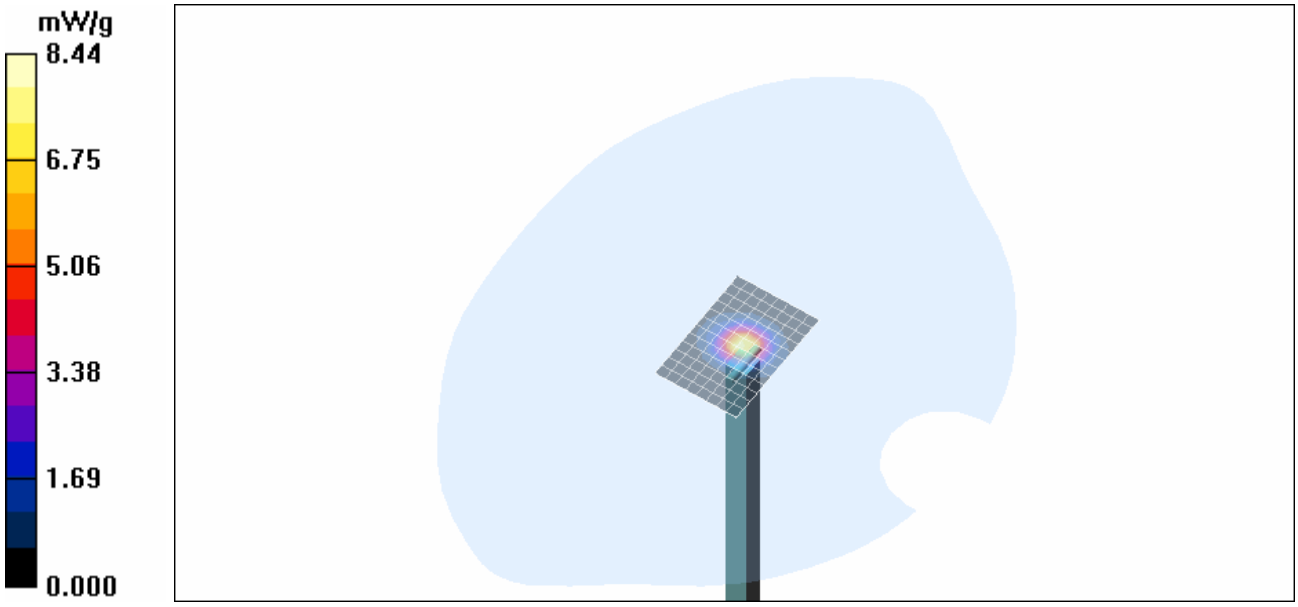
Ambient Temp: 23.5°C; Fluid Temp: 22.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Forward Conducted Power: 50 mW
Frequency: 5500 MHz; Duty Cycle: 1:1
Medium: HSL5200-5800 Medium parameters used: f = 5500 MHz; σ = 4.76 mho/m; ε_r = 37.3; ρ = 1000 kg/m^3

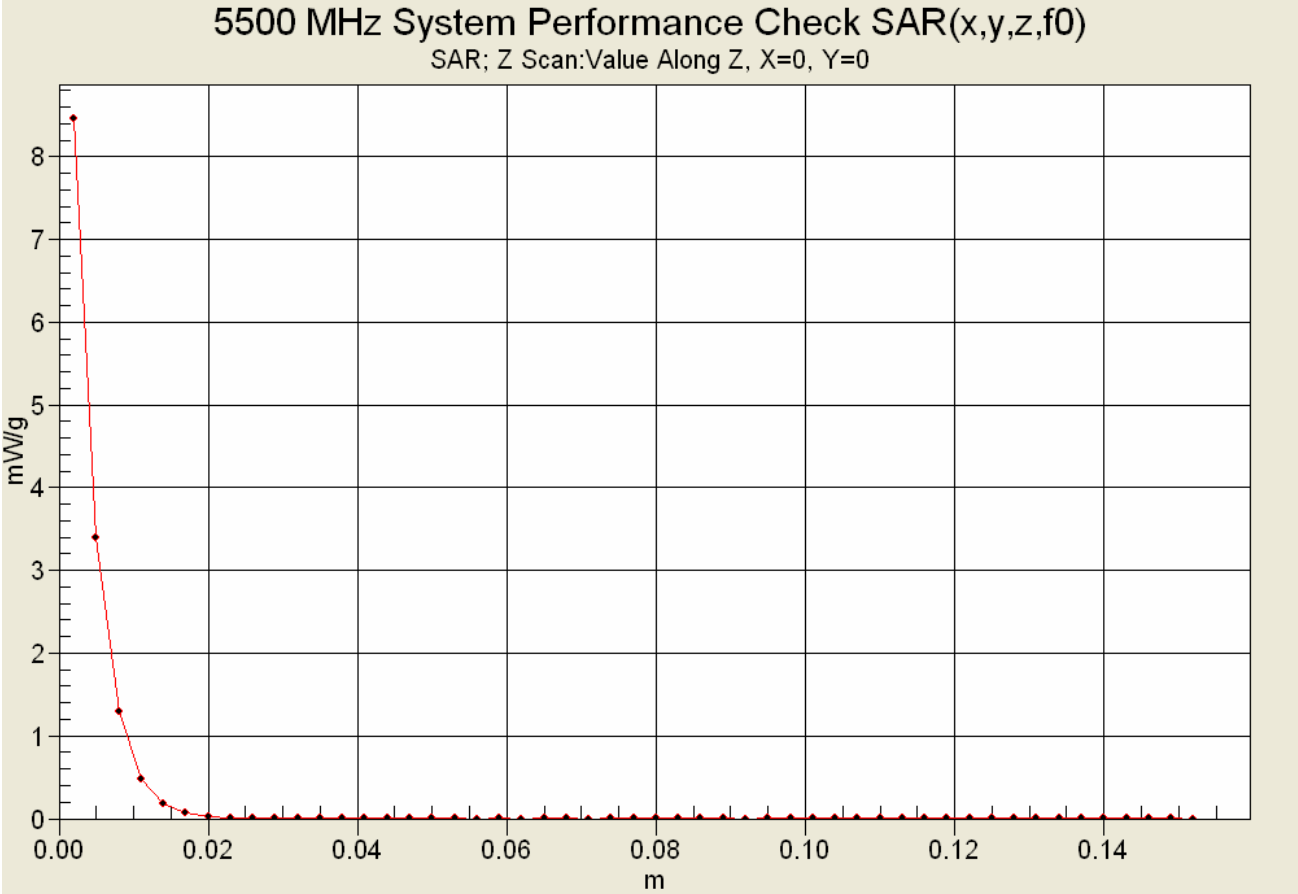
- Probe: EX3DV4 - SN3746; ConvF(4.37, 4.37, 4.37); Calibrated: 11/11/2010
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

5500 MHz System Performance Check/Area Scan (9x13x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 7.93 mW/g

5500 MHz System Performance Check/Zoom Scan (7x7x9)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 44.5 V/m; Power Drift = -0.142 dB
Peak SAR (extrapolated) = 17.0 W/kg
SAR(1 g) = 4.09 mW/g; SAR(10 g) = 1.14 mW/g
Maximum value of SAR (measured) = 8.44 mW/g



Z-Axis Scan


5500 MHz System Performance Check SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
0
1
2
3
4
5
6
7
8
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

Date Tested: 12/07/2010

System Performance Check - 5800 MHz Dipole - Head

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: 1062; Calibration: 05/12/2010

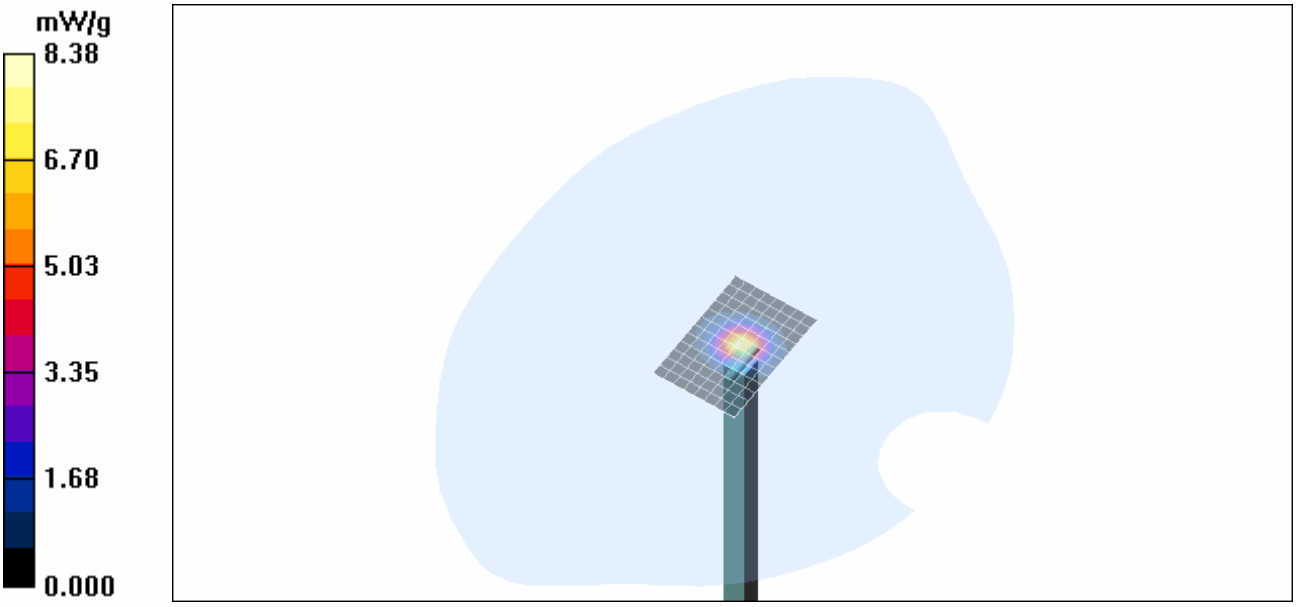
Ambient Temp: 23.5°C; Fluid Temp: 22.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Forward Conducted Power: 50 mW
Frequency: 5800 MHz; Duty Cycle: 1:1
Medium: HSL5200-5800 Medium parameters used: f = 5800 MHz; σ = 5.09 mho/m; ε_r = 36.4; ρ = 1000 kg/m^3

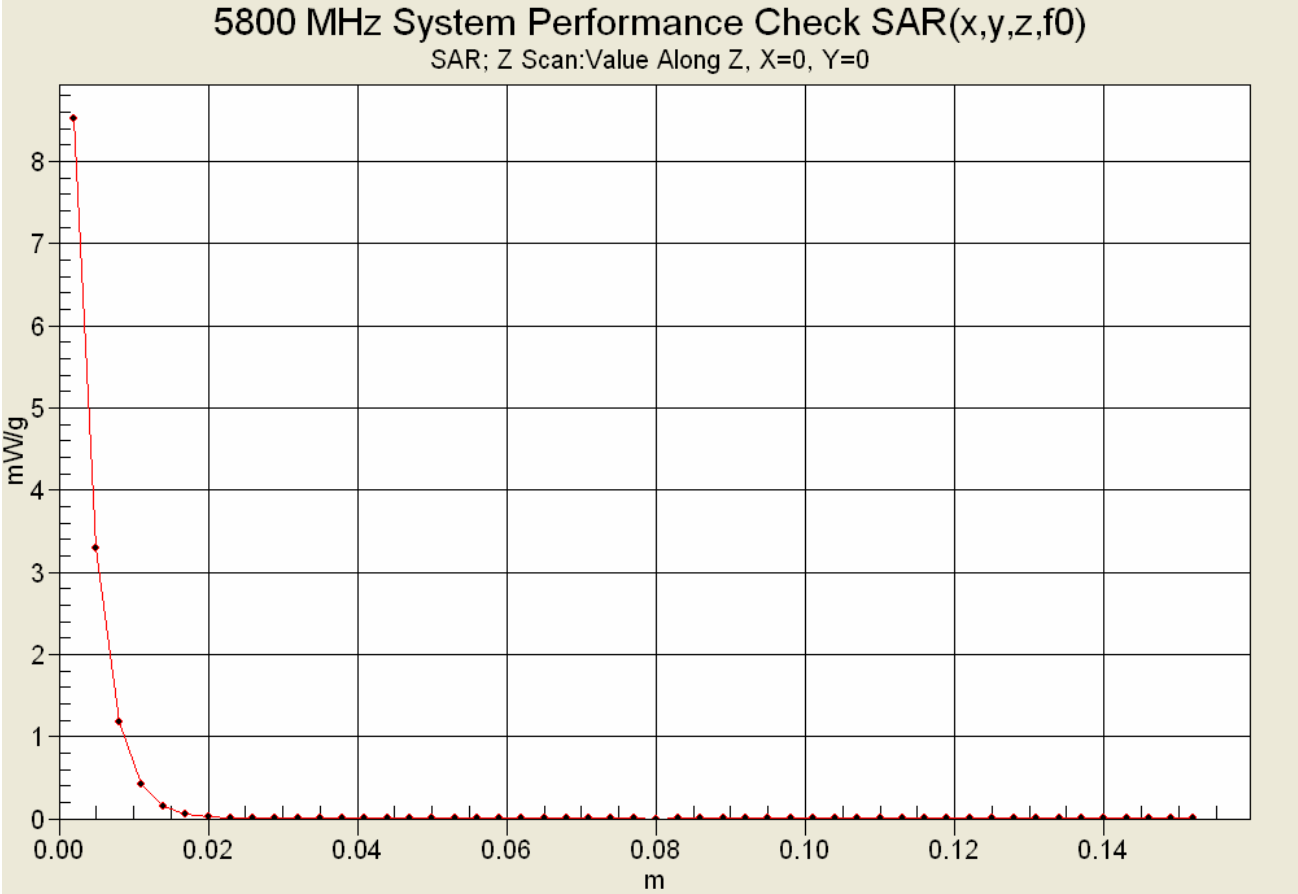
- Probe: EX3DV4 - SN3746; ConvF(4.14, 4.14, 4.14); Calibrated: 11/11/2010
- Sensor-Surface: 2 mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

5800 MHz System Performance Check/Area Scan (9x13x1):
Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 7.80 mW/g

5800 MHz System Performance Check/Zoom Scan (7x7x9)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 42.9 V/m; Power Drift = -0.106 dB
Peak SAR (extrapolated) = 17.1 W/kg
SAR(1 g) = 3.96 mW/g; SAR(10 g) = 1.11 mW/g
Maximum value of SAR (measured) = 8.38 mW/g



Z-Axis Scan


5800 MHz System Performance Check SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
0
1
2
3
4
5
6
7
8
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

2450 MHz Head

****

Test Result for UIM Dielectric Parameter
25/Nov/2010
Frequency (GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
2.3500	39.38	1.71	38.23	1.73
2.3600	39.36	1.72	38.15	1.74
2.3700	39.34	1.73	38.06	1.74
2.3800	39.32	1.74	38.25	1.78
2.3900	39.31	1.75	38.12	1.77
2.4000	39.29	1.76	38.05	1.78
2.4100	39.27	1.76	37.98	1.79
2.4200	39.25	1.77	37.94	1.79
2.4300	39.24	1.78	37.92	1.80
2.4400	39.22	1.79	37.93	1.82
2.4500	39.20	1.80	37.93	1.83
2.4600	39.19	1.81	37.89	1.83
2.4700	39.17	1.82	37.83	1.85
2.4800	39.16	1.83	37.74	1.88
2.4900	39.15	1.84	37.73	1.88
2.5000	39.14	1.85	37.65	1.90
2.5100	39.12	1.87	37.62	1.90
2.5200	39.11	1.88	37.67	1.91
2.5300	39.10	1.89	37.61	1.95
2.5400	39.09	1.90	37.49	1.94
2.5500	39.07	1.91	37.64	1.93

2450 MHz Body

****

Test Result for UIM Dielectric Parameter
29/Nov/2010
Frequency (GHz)
FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eB	FCC_sB	Test_e	Test_s
2.3500	52.83	1.85	50.78	1.80
2.3600	52.82	1.86	50.83	1.84
2.3700	52.81	1.87	50.93	1.84
2.3800	52.79	1.88	50.74	1.88
2.3900	52.78	1.89	50.78	1.89
2.4000	52.77	1.90	50.58	1.89
2.4100	52.75	1.91	50.78	1.93
2.4200	52.74	1.92	50.56	1.93
2.4300	52.73	1.93	50.65	1.93
2.4400	52.71	1.94	50.62	1.96
2.4500	52.70	1.95	50.60	1.96
2.4600	52.69	1.96	50.50	1.98
2.4700	52.67	1.98	50.45	1.99
2.4800	52.66	1.99	50.36	2.03
2.4900	52.65	2.01	50.52	2.05
2.5000	52.64	2.02	50.28	2.04
2.5100	52.62	2.04	50.52	2.02
2.5200	52.61	2.05	50.24	2.05
2.5300	52.60	2.06	50.35	2.07
2.5400	52.59	2.08	50.46	2.06
2.5500	52.57	2.09	50.20	2.10

5 GHz Head

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
02/Dec/2010
Frequency (GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
5.1800	36.01	4.63	37.30	4.61
5.2000	35.99	4.65	37.77	4.57
5.2200	35.96	4.68	37.34	4.55
5.2400	35.94	4.70	37.39	4.56
5.2600	35.92	4.72	37.06	4.62
5.2800	35.89	4.74	37.18	4.78
5.3000	35.87	4.76	37.46	4.83
5.3200	35.85	4.78	37.69	4.71
5.3400	35.83	4.80	37.22	4.64
5.3600	35.80	4.82	36.81	4.73
5.3800	35.78	4.84	36.78	4.88
5.4000	35.76	4.86	37.30	4.95
5.4200	35.73	4.88	37.28	4.87
5.4400	35.71	4.90	37.15	4.76
5.4600	35.69	4.92	36.61	4.80
5.4800	35.67	4.94	36.60	4.91
5.5000	35.64	4.96	37.08	5.02
5.5200	35.62	4.98	37.35	5.05
5.5400	35.60	5.00	37.10	4.93
5.5600	35.57	5.02	37.03	4.91
5.5800	35.55	5.04	36.32	4.96
5.6000	35.53	5.07	36.37	5.18
5.6200	35.51	5.09	36.82	5.19
5.6400	35.48	5.11	37.33	5.16
5.6600	35.46	5.13	36.65	5.04
5.6800	35.44	5.15	36.00	5.13
5.7000	35.41	5.17	36.20	5.30
5.7200	35.39	5.19	36.52	5.24
5.7400	35.37	5.21	37.05	5.22
5.7600	35.35	5.23	36.91	5.19
5.7800	35.32	5.25	36.24	5.20
5.8000	35.30	5.27	35.77	5.34
5.8200	35.28	5.29	36.22	5.46

5 GHz Head

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
07/Dec/2010
Frequency (GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
5.1800	36.01	4.63	37.60	4.56
5.2000	35.99	4.65	37.57	4.51
5.2200	35.96	4.68	37.76	4.57
5.2400	35.94	4.70	37.61	4.61
5.2600	35.92	4.72	37.78	4.53
5.2800	35.89	4.74	37.60	4.55
5.3000	35.87	4.76	37.58	4.52
5.3200	35.85	4.78	37.24	4.55
5.3400	35.83	4.80	37.57	4.65
5.3600	35.80	4.82	37.37	4.72
5.3800	35.78	4.84	37.36	4.74
5.4000	35.76	4.86	37.32	4.73
5.4200	35.73	4.88	37.30	4.75
5.4400	35.71	4.90	37.31	4.73
5.4600	35.69	4.92	37.33	4.78
5.4800	35.67	4.94	37.36	4.78
5.5000	35.64	4.96	37.27	4.76
5.5200	35.62	4.98	37.24	4.82
5.5400	35.60	5.00	37.22	4.79
5.5600	35.57	5.02	37.30	4.89
5.5800	35.55	5.04	37.35	4.89
5.6000	35.53	5.07	37.32	4.88
5.6200	35.51	5.09	37.08	4.88
5.6400	35.48	5.11	37.17	5.02
5.6600	35.46	5.13	37.05	5.05
5.6800	35.44	5.15	36.93	5.06
5.7000	35.41	5.17	36.90	5.05
5.7200	35.39	5.19	36.89	5.12
5.7400	35.37	5.21	36.80	5.15
5.7600	35.35	5.23	36.75	5.14
5.7800	35.32	5.25	36.65	5.21
5.8000	35.30	5.27	36.40	5.09
5.8200	35.28	5.29	36.45	5.12

5 GHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
30/Nov/2010
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
5.1800	49.04	5.33	50.65	5.09
5.2000	49.01	5.30	50.61	5.05
5.2200	48.99	5.32	50.04	5.08
5.2400	48.96	5.35	50.11	5.10
5.2600	48.93	5.37	50.39	5.11
5.2800	48.91	5.39	50.14	5.10
5.3000	48.88	5.42	50.20	5.15
5.3200	48.85	5.44	49.87	5.20
5.3400	48.82	5.46	50.09	5.30
5.3600	48.80	5.49	50.04	5.37
5.3800	48.77	5.51	49.98	5.38
5.4000	48.74	5.53	50.13	5.40
5.4200	48.72	5.56	50.07	5.42
5.4400	48.69	5.58	49.75	5.44
5.4600	48.66	5.60	49.92	5.41
5.4800	48.63	5.63	49.67	5.46
5.5000	48.61	5.65	49.92	5.39
5.5200	48.58	5.67	49.54	5.58
5.5400	48.55	5.70	49.65	5.58
5.5600	48.53	5.72	49.52	5.63
5.5800	48.50	5.74	49.90	5.66
5.6000	48.47	5.77	49.55	5.77
5.6200	48.44	5.79	49.72	5.70
5.6400	48.42	5.81	49.42	5.85
5.6600	48.39	5.84	49.34	5.79
5.6800	48.36	5.86	49.67	5.86
5.7000	48.34	5.88	49.76	5.94
5.7200	48.31	5.91	49.87	5.99
5.7400	48.28	5.93	49.85	5.92
5.7600	48.25	5.95	49.77	6.09
5.7800	48.23	5.98	49.77	6.02
5.8000	48.20	6.00	49.64	6.15
5.8200	48.17	6.02	49.60	6.17

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	CO_2, 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.

APPENDIX E - SAR TEST SETUP PHOTOGRAPHS

HEAD SAR TEST SETUP PHOTOGRAPHS

Left Head Section / Cheek Position

HEAD SAR TEST SETUP PHOTOGRAPHS

Left Head Section / Tilt Position (15°)

HEAD SAR TEST SETUP PHOTOGRAPHS

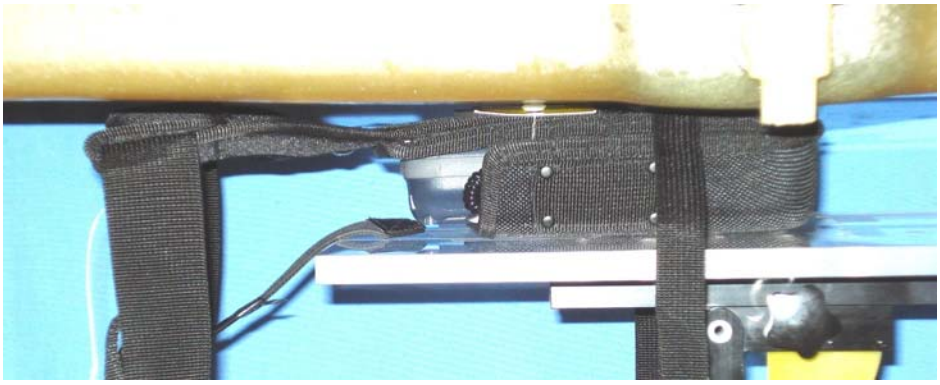
Right Head Section / Cheek Position

HEAD SAR TEST SETUP PHOTOGRAPHS

Right Head Section / Tilt Position (15°)

BODY SAR TEST SETUP PHOTOGRAPHS

DUT inside Holster accessory with Y-Belt attached
Front Keypad Side of DUT Facing Planar Phantom

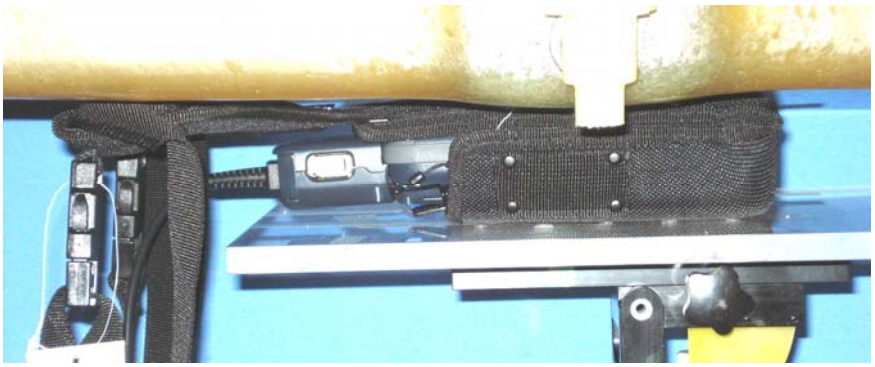


BODY SAR TEST SETUP PHOTOGRAPHS

DUT inside Holster accessory with Y-Belt attached
Left (Antenna) Side of DUT Facing Planar Phantom

BODY SAR TEST SETUP PHOTOGRAPHS

DUT inside Holster accessory with Y-Belt attached
Front Keypad Side of DUT Facing Planar Phantom
DUT with Audio Snap-On Adapter & VR10 Headset



BODY SAR TEST SETUP PHOTOGRAPHS

DUT inside Holster accessory with Y-Belt attached
Left (Antenna) Side of DUT Facing Planar Phantom
DUT with Audio Snap-On Adapter & VR10 Headset

APPENDIX F - SAR DUT PHOTOGRAPHS

Front Side of DUT

Back Side of DUT

Left and Right Side of DUT

Top end of DUT

Bottom end of DUT

DUT Battery Housing

DUT Lithium-ion Battery (Model: 1000AB01)

Front of DUT with Audio Snap-on Adapter & VR10 Headset

Back of DUT with Audio Snap-on Adapter & VR10 Headset

Audio Snap-on Standard Adapter Accessory (P/N: 225-771-001)

DUT with Holster & Y-Belt Body-worn accessory – Front Keypad Side of DUT facing user's body

DUT with Holster & Y-Belt Body-worn accessory – Left Side of DUT facing user's body (antenna side closest to user)

Holster (P/N: X11183-V1-R1) & Y-Belt (P/N: X11148-V2) Body-worn accessory

APPENDIX I - 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 J - BARSKI 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

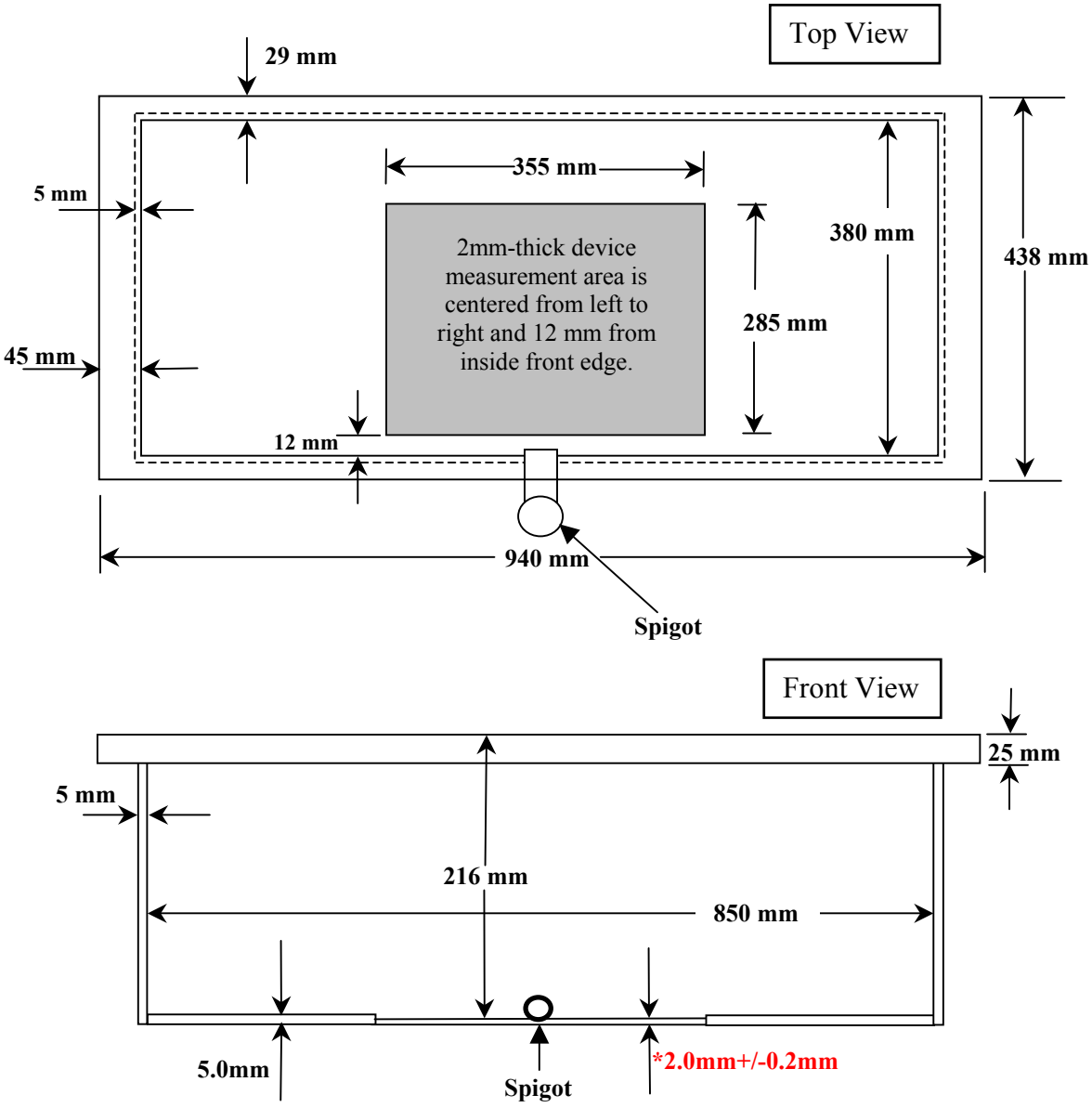
Fiberglass Planar Phantom - Front View

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.