DECLARATION OF COMPLIANCE - SAR RF EXPOSURE EVALUATION (FCC)

Test Lab Information	**CELLTECH LABS INC.**	21-364 Lougheed Road, Kelowna, B.C. V1X 7R8 Canada				
Test Lab Accreditation(s)	**ISO 17025 (A2LA Test Lab Certificate No. 2470.01)**					
Applicant Information	**KENWOOD USA CORPORATION**	3970 Johns Creek Court, Suite 100, Suwanee, GA 30024 USA				
Application Type(s)	**FCC**	TCB Certification				
Standard(s) Applied	**FCC**	47 CFR §2.1093				
Procedure(s) Applied	**FCC**	OET Bulletin 65, Supplement C	KDB 447498 D01v04	KDB Inquiry Track No. 218833		
	FCC	Occupational PTT Test Reduction *Draft* Considerations (v 07 15 10 Jul 29 2010)				
	IEEE	1528-2003	**IEC**	62209-1:2005		
Device Classification(s)	**FCC**	Licensed Non-Broadcast Transmitter Held to Face (TNF) - FCC Part 90				
Device Identifier(s)	**FCC ID:**	ALH413801				
Device Model(s)	TK-3312-1 (tested)	TK-3317-1	Note: Models are electrically and mechanically identical			
Test Sample Serial No.	1SU12 (Identical Prototype)	**Hardware Rev. No.**	0	**Firmware Rev. No.**	0	
Date of Sample Receipt	August 03, 2010	**Date(s) of Evaluations**	Aug. 05-06, 09-13, 16-17, 31, Sept. 01-03, 07, 2010			
Device Description	Portable FM UHF Push-To-Talk (PTT) Radio Transceiver					
Device Frequency Range(s)	450.0 - 512.0 MHz					
Manufacturer's Rated Output Power	5 Watts (Conducted)	**Manuf. Tolerance Spec.**	+/- 0 dB			
RF Output Power Level(s) Tested	36.90 dBm	4.90 Watts	450.0 MHz	Average Conducted		
	36.90 dBm	4.90 Watts	463.3 MHz	Average Conducted		
	36.90 dBm	4.90 Watts	470.0 MHz	Average Conducted		
	36.99 dBm	5.00 Watts	476.7 MHz	Average Conducted		
	36.99 dBm	5.00 Watts	484.0 MHz	Average Conducted		
	37.08 dBm	5.10 Watts	490.0 MHz	Average Conducted		
	37.08 dBm	5.10 Watts	498.0 MHz	Average Conducted		
	37.16 dBm	5.20 Watts	512.0 MHz	Average Conducted		
Antenna Type(s) Tested	Detachable Stub	P/N: KRA-17M	Antenna A	450-490 MHz	Nc = 4	Length: 79 mm
	Detachable Stub	P/N: KRA-17M2	Antenna B	470-512 MHz	Nc = 4	Length: 74 mm
	Detachable Stub	P/N: KRA-23M	Antenna C	450-490 MHz	Nc = 4	Length: 80 mm
	Detachable Stub	P/N: KRA-23M2	Antenna D	470-512 MHz	Nc = 4	Length: 80 mm
	Detachable Whip	P/N: KRA-27M	Antenna E	450-490 MHz	Nc = 4	Length: 149 mm
	Detachable Whip	P/N: KRA-27M2	Antenna F	470-512 MHz	Nc = 4	Length: 140 mm
Battery Type(s) Tested	Ni-MH	7.2 V	1500 mAh	P/N: KNB-29N	Battery a	
	Li-ion	7.4 V	2000 mAh	P/N: KNB-45L	Battery b	
Body-worn Accessories Tested	Metal Belt-Clip	P/N: KBH-10				

Audio Accessories Tested	**Category 1: Headset**	**Category 2: Earpiece**	**Category 3: Wire Kit**	**Category 4: Speaker-Mic**
	PN: KHS-10-OH (Default)	PN: KHS-23 (Default)	PN: KHS-8BL (Default)	PN: KMC-48GPS (Default)
	PN: KHS-10-BH	PN: KHS-25	PN: KHS-9BL	PN: KMC-45
	PN: KHS-21	PN: KHS-26	-	PN: KMC-21
	PN: KHS-22	PN: KHS-27	-	-
	PN: KHS-7	-	-	-
	PN: KHS-7A	-	-	-

Max. SAR Level(s) Evaluated	Face-held	**4.68 W/kg**	1g	50% PTT duty cycle	Occupational / Controlled Exposure
	Body-worn	**7.62 W/kg**	1g	50% PTT duty cycle	Occupational / Controlled Exposure
FCC Spatial Peak SAR Limit	Head/Body	8.0 W/kg	1g	50% PTT duty cycle	Occupational / Controlled Exposure

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 for the Occupational / Controlled Exposure environment. The device was tested in accordance with the measurement procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), IEEE Standard 1528-2003 and IEC International Standard 62209-1:2005. 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.

This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc.

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	October 26, 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 Kenwood USA Corporation Models: TK-3312-1, TK-3317-1 Portable FM UHF PTT Radio Transceiver complies with the SAR (Specific Absorption Rate) RF exposure requirements FCC 47 CFR §2.1093 (see reference [1]) for the Occupational / Controlled Exposure environment. The measurement procedures described in FCC OET Bulletin 65, Supplement C 01-01 (see reference [2]), IEEE Standard 1528-2003 (see reference [3]) and IEC Standard 62209-1:2005 (see reference [4]) were employed. A description of the device, 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 uses a controller with a built in VME-bus computer.

3.0 RF CONDUCTED OUTPUT POWER MEASUREMENTS

MEASURED RF CONDUCTED OUTPUT POWER LEVELS

Test Frequency	Mode	dBm	Watts	Method
450.0 MHz	CW	36.90	4.9	Average Conducted
463.3 MHz	CW	36.90	4.9	Average Conducted
470.0 MHz	CW	36.90	4.9	Average Conducted
476.7 MHz	CW	36.99	5.0	Average Conducted
484.0 MHz	CW	36.99	5.0	Average Conducted
490.0 MHz	CW	37.08	5.1	Average Conducted
498.0 MHz	CW	37.08	5.1	Average Conducted
512.0 MHz	CW	37.16	5.2	Average Conducted

Notes

1. The test channels were selected in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (see reference [5]).

2. The RF conducted output power levels of the DUT were measured by Celltech prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter at the external antenna connector of the radio in accordance with FCC 47 CFR §2.1046 (see reference [12]).

4.0 FCC POWER THRESHOLDS FOR PTT DEVICES ($f \leq 0.5$ GHz)

FCC SAR Evaluation Power Thresholds for PTT Devices, $f \leq 0.5$ GHz*			Manufacturer's Rated RF Output Power	
Exposure Conditions	***P* mW (General Population)**	***P* mW (Occupational)**	**100% PTT Duty Cycle**	**50% PTT Duty Cycle**
Held to face, $d \geq 2.5$ cm	250	**1250**	5 Watts	**2.5 Watts**
Body-worn, $d \geq 1.5$ cm	200	1000		
Body-worn, $d \geq 1.0$ cm	150	**750**	5 Watts	**2.5 Watts**
1. The time-averaged output power, corresponding to the required PTT duty factor, is compared with these thresholds. 2. The closest distance between the user and the device or its antenna is used to determine the power thresholds. * Per FCC KDB 447498 D01v04 Section 5)b)i) (see reference [5]).			1. The conducted output power level of the DUT exceeds the FCC threshold for SAR evaluation requirement.	

5.0 SAR PROBE CALIBRATION & MEASUREMENT FREQUENCIES

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 ±50 MHz of the probe calibration frequency. At 300 MHz to 3 GHz, measurements should be within ±100 MHz of the probe calibration frequency. Measurements exceeding 50% of these intervals, ±25 MHz < 300 MHz and ±50 MHz ≥300 MHz, require additional steps (per FCC KDB 450824 D01v01r01, SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz - see reference [7]).

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	±50 MHz (≥ 300 MHz)
450 MHz	450.0 MHz	0 MHz	< 50 MHz[1]
	463.3 MHz	13.3 MHz	< 50 MHz[1]
	470.0 MHz	20 MHz	< 50 MHz[1]
	476.7 MHz	26.7 MHz	< 50 MHz[1]
	484.0 MHz	34 MHz	< 50 MHz[1]
	490.0 MHz	40 MHz	< 50 MHz[1]
	498.0 MHz	48 MHz	< 50 MHz[1]
	512.0 MHz	**62 MHz**	**> 50 MHz[2]**

1. The probe calibration and measurement frequency interval is < 50 MHz; therefore the additional steps were not required.

2. The probe calibration and measurement frequency interval is > 50 MHz; therefore the following additional steps were implemented (per FCC KDB 450824 D01v01r01 - see reference [7]): *The measured 1-g SAR may be compensated with respect to +5% tolerances in ε_r and -5% tolerances in σ, computed according to valid SAR sensitivity data, to reduce SAR underestimation and maintain conservativeness.* SAR sensitivity data is per SPEAG DASY4 Manual (see reference [8]).

Probe Calibration Frequency = 450 MHz					Target Parameters:			Head 43.5 ε_r / 0.87 σ	Body = 56.7 ε_r / 0.94 σ		
Test Freq.	**Tissue**	**σ**	**Coeff.**	**Sens.**	**ε_r**	**Coeff.**	**Sens.**	**% Change**	**Compensated SAR at 512 MHz**		
512 MHz	Body	2.1%	0.67	n/a	-0.9%	-0.56	-0.504%	0.504%	**7.66 W/kg**	1g	50% ptt d/c

Parameter	ϵ	σ	ρ
f=450 MHz, d=15 mm (ϵ_r=43.5, σ=0.87 S/m)			
SAR Peak	- 0.56	+ 0.67	-
SAR 1 g	- 0.46	+ 0.43	0.09
SAR 10 g	- 0.37	+ 0.22	0.17

Note: Per the SAR system manufacturer SPEAG, the above sensitivity data (Head) from the DASY4 manual (see reference [8]) can be applied to Body tissue parameters provided the approximation is for <5% deviation of liquid parameters.

6.0 NO. OF TEST CHANNELS (N_c)

Antenna Type	Antenna Part No.	Antenna Freq. Range	Test Freq. Range	N_c	Test Frequencies
Stub	KRA-17M	450 - 490 MHz	450.0 - 490.0 MHz	4	450.0, 463.3, 476.7, 490.0 MHz
Stub	KRA-17M2	470 - 512 MHz	470.0 - 512.0 MHz	4	470.0, 484.0, 498.0, 512.0 MHz
Stub	KRA-23M	440 - 490 MHz	450.0 - 490.0 MHz	4	450.0, 463.3, 476.7, 490.0 MHz
Stub	KRA-23M2	470 - 520 MHz	470.0 - 512.0 MHz	4	470.0, 484.0, 498.0, 512.0 MHz
Whip	KRA-27M	440 - 490 MHz	450.0 - 490.0 MHz	4	450.0, 463.3, 476.7, 490.0 MHz
Whip	KRA-27M2	470 - 520 MHz	470.0 - 512.0 MHz	4	470.0, 484.0, 498.0, 512.0 MHz

Note: The number of test channels per antenna frequency range was calculated in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (see reference [5]).

7.0 MANUFACTURER'S DISCLOSED ACCESSORY LISTING

Part No.	Description	Accessory Type
KRA-27M	Whip Antenna (440-490)	Antenna
KRA-27M2	Whip Antenna (470-520)	
KRA-23M	Stub Antenna (440-490)	
KRA-23M2	Stub Antenna (470-520)	
KRA-17M	Stub Antenna (450-490)	
KRA-17M2	Stub Antenna (470-512)	
KNB-45L	Battery Pack 2000mAh (Li-ion)	Battery
KNB-29N	Battery Pack 1500mAh (Ni-MH)	
KBH-10	Belt-Clip	Body-worn
	Audio Accessory Category	Audio
KHS-21	Single muff Headset w/boom mic	**Category 1 - Headset**
KHS-10-OH	Over-the-Head Headset Vox Ready	
KHS-10-BH	Behind-the-Head Headset Vox Ready	
KHS-22	Behind-the-Head Headset w/boom mic	
KHS-7	Single-speaker Lightweight Headset Vox Ready	
KHS-7A	Single-speaker Lightweight Headset with PTT Vox Ready	
KHS-23	2Wire Ear-Bud w/mic/PTT Vox Ready	**Category 2 - Earpiece**
KHS-25	D Earpiece w/boom mic & PTT	
KHS-26	PTT & Mic in line 2P	
KHS-27	D Earpiece, PTT W/Mic	
KHS-8BL	2Wire Palm Mic Kit Vox Ready	**Category 3 - Wire Kit**
KHS-9BL	3Wire Lapel Mic Kit Black Vox Ready	
KMC-45	Speaker-Microphone	**Category 4 - Speaker-Mic**
KMC-21	Speaker-Microphone	
KMC-48GPS	Speaker-Microphone	

8.0 SAR MEASUREMENT SUMMARY

FACE-HELD SAR EVALUATION RESULTS

C	Test Date(s): August 17, 2010			1		2	3		4
R	Antenna P/N (Freq. Range)	Test Frequency (MHz)	Conducted Power (W)	1g SAR (W/kg)		1g SAR (W/kg)	1g SAR (W/kg)		1g SAR (W/kg)
				Ni-MH Battery 1500 mAh KNB-29N (a)			Li-ion Battery 2000 mAh KNB-45L (b)		
				Plot #	100% ptt d/f	50% ptt d/f	Plot #	100% ptt d/f	50% ptt d/f
					SAR Drift dB	50% + droop		SAR Drift dB	50% + droop
1	KRA-17M (450-490 MHz) Antenna A	450.0	4.9	N/A			N/A		
2		463.3	4.9	N/A			N/A		
3		476.7	5.0	N/A			N/A		
4		490.0	5.1	N/A			F1	5.12	2.56
5								-0.551	2.91
6	KRA-17M2 (470-512 MHz) Antenna B	470.0	4.9	N/A			N/A		
7		484.0	5.0	N/A			F2	6.98	3.49
8								-0.224	3.67
9		498.0	5.1	N/A			F3	7.88	3.94
10								-0.336	4.26
11		512.0	5.2	F5	8.24	4.12	F4	8.15	4.08
12					-0.554	**4.68**		-0.401	4.47
13	KRA-23M (450-490 MHz) Antenna C	450.0	4.9	N/A			N/A		
14		463.3	4.9	N/A			N/A		
15		476.7	5.0	N/A			N/A		
16		490.0	5.1	N/A			F6	4.39	2.20
17								-0.443	2.43
18	KRA-23M2 (470-512 MHz) Antenna D	470.0	4.9	N/A			N/A		
19		484.0	5.0	N/A			N/A		
20		498.0	5.1	N/A			N/A		
21		512.0	5.2	N/A			F7	6.10	3.05
22								-0.644	3.54
23	KRA-27M (450-490 MHz) Antenna E	450.0	4.9	N/A			N/A		
24		463.3	4.9	N/A			N/A		
25		476.7	5.0	N/A			N/A		
26		490.0	5.1	N/A			F8	6.27	3.14
27								-0.466	3.49
28	KRA-27M2 (470-512 MHz) Antenna F	470.0	4.9	N/A			N/A		
29		484.0	5.0	N/A			F9	6.82	3.41
30								-0.378	3.72
31		498.0	5.1	N/A			F10	8.43	4.22
32								-0.245	4.46
33		512.0	5.2	F12	8.01	4.01	F11	8.22	4.11
34					-0.615	4.61		-0.394	4.50

SAR LIMITS		HEAD	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1g average	Occupational / Controlled

Notes

Test Mode = CW (Unmodulated Continuous Wave)	Phantom = Barski Planar Phantom
DUT Spacing to Phantom = 2.5 cm	Antenna Distance to Phantom = 3.3 cm
C = Column	R = Row

Test Date	Fluid Type	Ambient Temp.	Fluid Temp.	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Aug 17	450 Head	23.0°C	23.5 °C	≥ 15 cm	101.1 kPa	35%	1000

SAR MEASUREMENT SUMMARY (CONT.)

FACE-HELD SAR EVALUATION PROCEDURES
Test Procedures applied per "FCC Occupational PTT Test Reduction *Draft* Considerations" (see ref. [6] & App. H)
1. For face-held configuration, the battery with the highest capacity was selected as the default battery (battery "b").
2. The SAR configurations highlighted in yellow denote the starting points of the evaluation (highest output power channel).
3. When the head SAR of an antenna tested on the highest output power channel using the default battery is ≤ 4.0 W/kg (C4R22), testing of the required immediately adjacent channel(s) is not necessary. When the head SAR of an antenna tested on the highest output power channel using the default battery is ≤ 3.5 W/kg (C4R5, C4R17, C4R27), testing of all other required channels is not necessary.
4. When the head SAR of an antenna tested on the highest output power channel using the default battery is ≥ 4.0 W/kg (C4R12, C4R34), head SAR should be measured for that antenna on the required immediately adjacent channel(s) (C4R10, C4R32) (this procedure is applied recursively for each adjacent channel). SAR evaluations for the remaining channels are not required if the highest SAR channel or adjacent channel is < 6.0 W/kg.
5. When the highest SAR of an antenna tested using the default battery is ≥ 4.0 W/kg (C4R12, C4R34), test additional batteries on the channel that resulted in the highest SAR for that antenna when tested with the standard default battery (C2R12, C2R34).
6. When test reduction applies, the slots for such configurations are denoted with N/A (Not Applicable).

SAR MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION RESULTS - WITHOUT AUDIO ACCESSORIES

C	Test Date(s): August 5-6, 9-10, 2010			1			2			3			4
R	Antenna P/N (Freq. Range)	Test Frequency (MHz)	Conducted Power (W)	1g SAR (W/kg)			1g SAR (W/kg)			1g SAR (W/kg)			1g SAR (W/kg)
				DEFAULT BODY-WORN ACCESSORY: BELT-CLIP (P/N: KBH-10)									
				Ni-MH Battery 1500 mAh KNB-29N (a)						Li-ion Battery 2000 mAh KNB-45L (b)			
				Plot #	100% ptt d/f	SAR Drift dB	50% ptt d/f	50% + droop		Plot #	100% ptt d/f	SAR Drift dB	50% ptt d/f	50% + droop
1	KRA-17M (450-490 MHz) Antenna A	450.0	4.9	B5	9.49		4.75			B1	9.55		4.78	
2					0.330		-				0.053		-	
3		463.3	4.9	B6	13.0		6.50			B2	11.9		5.95	
4					-0.649		7.55				-0.276		6.34	
5		476.7	5.0	B7	10.2		5.10			B3	9.11		4.56	
6					-0.661		5.94				-0.235		4.81	
7		490.0	5.1	B8	8.46		4.23			B4	7.60		3.80	
8					-0.570		4.82				-0.373		4.41	
9	KRA-17M2 (470-512 MHz) Antenna B	470.0	4.9	N/A						B9	11.4		5.70	
10											-0.548		6.47	
11		484.0	5.0	N/A						B10	11.1		5.55	
12											-0.277		5.92	
13		498.0	5.1	B13	11.8		5.90			B11	12.4		6.20	
14					-0.657		6.86				-0.504		6.96	
15		512.0	5.2	B14	11.9		5.95			B12	13.0		6.50	
16					-0.344		6.45				-0.470		7.24	
17	KRA-23M (450-490 MHz) Antenna C	450.0	4.9	N/A						B15	7.90		3.95	
18											0.090		-	
19		463.3	4.9	B19	8.28		4.14			B16	8.87		4.44	
20					-0.550		4.70				-0.600		5.09	
21		476.7	5.0	N/A						B17	7.22		3.61	
22											-0.406		3.96	
23		490.0	5.1	N/A						B18	6.75		3.38	
24											-0.832		4.09	
25	KRA-23M2 (470-512 MHz) Antenna D	470.0	4.9	B24	11.2		5.60			B20	10.9		5.45	
26					-0.900		6.89				-0.441		6.03	
27		484.0	5.0	B25	9.64		4.82			B21	9.93		4.97	
28					-1.03		6.11				-0.656		5.77	
29		498.0	5.1	N/A						B22	9.39		4.70	
30											-0.549		5.33	
31		512.0	5.2	N/A						B23	9.04		4.52	
32											-0.578		5.16	

SAR LIMITS		BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1g average	Occupational / Controlled

Notes

Test Mode = CW (Unmodulated Continuous Wave)		Phantom = Barski Planar Phantom
C = Column	R = Row	DUT Spacing to Phantom = 1.3 cm Belt-Clip Spacing
Antenna Distance to Phantom:	KRA-17M/M2 (Antenna A/B) = 3.2 cm	KRA-23M/M2 (Antenna C/D) = 3.1 cm

Test Date	Fluid Type	Ambient Temp.	Fluid Temp.	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Aug 5	450 Body	22.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Aug 6	450 Body	22.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Aug 9	450 Body	21.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Aug 10	450 Body	21.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000

SAR MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION RESULTS - WITHOUT AUDIO ACCESSORIES (CONT.)

C	Test Date(s): August 5-6, 9-10, 2010			1			2		3		4
R	Antenna P/N (Freq. Range)	Test Frequency (MHz)	Conducted Power (W)	1g SAR (W/kg)			1g SAR (W/kg)		1g SAR (W/kg)		1g SAR (W/kg)
				DEFAULT BODY-WORN ACCESSORY: BELT-CLIP (P/N: KBH-10)							
				Ni-MH Battery 1500 mAh KNB-29N (a)					Li-ion Battery 2000 mAh KNB-45L (b)		
				Plot #	100% ptt d/f	50% ptt d/f			Plot #	100% ptt d/f	50% ptt d/f
					SAR Drift dB	50% + droop				SAR Drift dB	50% + droop
33	KRA-27M (450-490 MHz) Antenna E	450.0	4.9	N/A					B26	8.27	4.14
34										-0.093	4.22
35		463.3	4.9	B30	10.0	5.00			B27	9.80	4.90
36					-0.430	5.52				-0.224	5.16
37		476.7	5.0	N/A					B28	9.26	4.63
38										-0.346	5.01
39		490.0	5.1	N/A					B29	9.49	4.75
40										-0.301	5.09
41	KRA-27M2 (470-512 MHz) Antenna F	470.0	4.9	B35	10.5	5.25			B31	10.4	5.20
42					-0.337	5.67				-0.237	5.49
43		484.0	5.0	B36	9.86	4.93			B32	10.2	5.10
44					-0.811	5.94				-0.313	5.48
45		498.0	5.1	B37	12.7	6.35			B33	12.7	6.35
46					-0.556	7.22				-0.346	6.88
47		512.0	5.2	B38	12.6	6.30			B34	11.5	5.75
48					-0.633	7.29				-0.316	6.18

SAR LIMITS		BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1g average	Occupational / Controlled

Notes

Test Mode = CW (Unmodulated Continuous Wave)	Phantom = Barski Planar Phantom
C = Column / R = Row	DUT Spacing to Phantom = 1.3 cm Belt-Clip Spacing
Antenna Distance to Phantom: KRA-27M/M2 (Antenna E/F) = 3.0 cm	

Test Date	Fluid Type	Ambient Temp.	Fluid Temp.	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Aug 5	450 Body	22.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Aug 6	450 Body	22.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Aug 9	450 Body	21.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Aug 10	450 Body	21.0°C	21.0°C	≥ 15 cm	101.1 kPa	35%	1000

SAR MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION PROCEDURES - WITHOUT AUDIO ACCESSORIES
Test Procedures applied per "FCC Occupational PTT Test Reduction *Draft* Considerations" (see ref. [6] & App. H)
1. For body-worn configuration, select the thinnest standard battery with the highest capacity as the default battery. Please note Battery "a" & Battery "b" are identical dimensions; therefore Battery "b" was selected based on the higher capacity.
2. The belt-clip accessory is the manufacturer's only disclosed body-worn accessory and is therefore the default accessory.
3. The SAR configurations highlighted in yellow denote the starting points of the evaluation (highest output power channel).
4. When the body SAR of an antenna tested on the highest output power channel using the default battery is $\geq$ 4.0 W/kg (C4R8, C4R24, C4R32, C4R40), body SAR should be measured for that antenna on the required immediately adjacent channel(s) (C4R6, C4R22, C4R30, C4R38). This procedure is applied recursively to each adjacent channel.
5. When the body SAR of an antenna tested on the highest output power channel using the default battery is > 6.0 W/kg (C4R16, C4R48), all required channels should be measured for that antenna (C4R14, C4R12, C4R10, C4R46, C4R34, C4R32).
6. When the highest SAR of an antenna tested using the default battery is $\geq$ 4.0 W/kg (C4R4, C4R16, C4R20, C4R26, C4R36, C4R48), test additional batteries on the channel that resulted in the highest SAR for that antenna when tested with the standard default battery (C2R4, C2R16, C2R20, C2R26, C2R36, C2R48).
7. When the body SAR of an antenna tested using an additional battery is $\geq$ 6.0 W/kg (C2R16, C2R26), test additional batteries on the immediately adjacent channel(s) for that antenna (C2R14, C2R28). This procedure is not applied recursively to each adjacent channel.
8. When the body SAR of an antenna tested using an additional battery is $\geq$ 7.0 W/kg (C2R4, C2R48), test additional batteries on all other required channels for that antenna (C2R1, C2R6, C2R8 & C2R46, C2R44, C2R42).
9. When test reduction applies, the slots for such configurations are denoted with N/A (Not Applicable).

SAR MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION RESULTS - WITH DEFAULT AUDIO ACCESSORIES

C	Test Dates: Aug. 11-13, 16, 2010			1		2	3		4	5		6	7		8
R	Antenna P/N (Freq. Range)	Test Freq. (MHz)	Cond. Power (W)	1g SAR (W/kg)			1g SAR (W/kg)			1g SAR (W/kg)			1g SAR (W/kg)		
				Audio Acc. Category 1			Audio Acc. Category 2			Audio Acc. Category 3			Audio Acc. Category 4		
				Headset P/N: KHS-10-OH			Earpiece P/N: KHS-23			Wire Kit P/N: KHS-8BL			Spkr-Mic P/N: KMC-48GPS		
				Battery a (P/N: KNB-29N)			Battery a (P/N: KNB-29N)			Battery a (P/N: KNB-29N)			Battery a (P/N: KNB-29N)		
				Plot #	100% ptt d/f SAR Drift dB	50% ptt d/f 50% d/f +droop	Plot #	100% ptt d/f SAR Drift dB	50% ptt d/f 50% d/f +droop	Plot #	100% ptt d/f SAR Drift dB	50% ptt d/f 50% d/f +droop	Plot #	100% ptt d/f SAR Drift dB	50% ptt d/f 50% d/f +droop
1	KRA-17M (450-490) Antenna A	450.0	4.9	A1	9.74	4.87	A4	9.72	4.86	A20	10.2	5.1	A28	9.84	4.92
2					0.150	-		0.273	-		0.188	-		0.247	-
3		463.3	4.9	A2	11.4	5.70	A5	12.5	6.25	A21	12.0	6.00	A29	11.8	5.90
4					-0.807	6.86		-0.859	**7.62**		-0.669	7.00		-0.694	6.92
5		476.7	5.0	A3	8.55	4.28	A6	10.0	5.00	A22	9.59	4.80	A30	9.36	4.68
6					-0.639	4.95		-0.817	6.03		-0.791	5.75		0.247	-
7		490.0	5.1	N/A			A7	7.47	3.74	A23	7.41	3.71	N/A		
8								-0.540	4.23		-0.545	4.20			
9	KRA-23M2 (470-512) Antenna D	470.0	4.9	A43	10.3	5.15	A45	11.3	5.65	A61	10.2	5.10	A62	10.8	5.40
10					-0.955	6.42		-1.08	7.25		-0.643	5.91		-0.948	6.72
11		484.0	5.0	A44	8.09	4.05	A46	8.46	4.23	N/A			A63	8.38	4.19
12					-0.817	4.88		-0.841	5.13					-0.972	5.24
13		498.0	5.1	N/A			A47	8.04	4.02	N/A			N/A		
14								-0.597	4.61						
15		512.0	5.2	N/A			A48	8.64	4.32	N/A			N/A		
16								-1.08	5.54						
17	KRA-27M (450-490) Antenna E	450.0	4.9	N/A			N/A			N/A			N/A		
18		463.3	4.9	A64	9.29	4.65	A65	10.1	5.05	A66	9.99	5.00	A67	9.63	4.82
19					-0.610	5.35		-0.577	5.77		-0.550	5.67		-0.510	5.41
20		476.7	5.0	N/A			N/A			N/A			N/A		
21		490.0	5.1	N/A			N/A			N/A			N/A		
22	KRA-27M2 (470-512) Antenna F	470.0	4.9	A68	11.3	5.65	A92	10.8	5.40	A108	10.7	5.35	A116	10.7	5.35
23					-0.467	6.29		-0.444	5.98		-0.415	5.89		-0.461	5.95
24		484.0	5.0	A69	10.2	5.10	A93	10.4	5.20	A109	9.89	4.95	A117	10.2	5.10
25					-0.771	6.09		-0.723	6.14		-0.644	5.74		-0.796	6.13
26		498.0	5.1	A70	12.4	6.20	A94	12.2	6.10	A110	12.4	6.20	A118	12.1	6.05
27					-0.609	7.13		-0.623	7.04		-0.597	7.11		-0.501	6.79
28		512.0	5.2	A71	12.4	6.20	A95	12.0	6.0	A111	12.8	6.40	A119	12.4	6.20
29					-0.608	7.13		-0.757	7.14		-0.636	7.41		-0.681	7.25

SAR LIMITS		BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1g average	Occupational / Controlled

Notes

	Antenna Distance to Phantom		DUT Distance to Phantom
Test Mode = CW (Unmodulated Continuous Wave)			
Phantom = Barski Planar Phantom	KRA-17M (Antenna A)	3.2 cm	1.3 cm with Belt-Clip accessory
C = Column	KRA-23M2 (Antenna D)	3.1 cm	
R = Row	KRA-27M/M2 (Antenna E/F)	3.0 cm	
Audio accessories do not contain a built-in radiating element	Body-worn Accessory = Belt-Clip (P/N: KBH-10)		

Test Date	Fluid Type	Ambient Temp.	Fluid Temp.	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Aug 11	450 Body	20.0°C	22.5°C	≥ 15 cm	101.1 kPa	35%	1000
Aug 12	450 Body	22.0°C	22.5°C	≥ 15 cm	101.1 kPa	35%	1000
Aug 13	450 Body	22.0°C	23.5°C	≥ 15 cm	101.1 kPa	35%	1000
Aug 16	450 Body	22.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000

SAR MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION RESULTS - WITH DEFAULT AUDIO ACCESSORIES

C	Test Dates: Aug. 11-13, 16, 2010			1		2	3		4	5		6	7		8
R	Antenna P/N (Freq. Range)	Test Freq. (MHz)	Cond. Power (W)	1g SAR (W/kg)			1g SAR (W/kg)			1g SAR (W/kg)			1g SAR (W/kg)		
				Audio Acc. Category 1			Audio Acc. Category 2			Audio Acc. Category 3			Audio Acc. Category 4		
				Headset P/N: KHS-10-OH			Earpiece P/N: KHS-23			Wire Kit P/N: KHS-8BL			Spkr-Mic P/N: KMC-48GPS		
				Battery b (P/N: KNB-45L)			Battery b (P/N: KNB-45L)			Battery b (P/N: KNB-45L)			Battery b (P/N: KNB-45L)		
				Plot #	100% ptt d/f SAR Drift dB	50% ptt d/f 50% d/f +droop	Plot #	100% ptt d/f SAR Drift dB	50% ptt d/f 50% d/f +droop	Plot #	100% ptt d/f SAR Drift dB	50% ptt d/f 50% d/f +droop	Plot #	100% ptt d/f SAR Drift dB	50% ptt d/f 50% d/f +droop
30	KRA-17M2 (470-512) Antenna B	470.0	4.9	N/A			N/A			N/A			N/A		
31		484.0	5.0	N/A			N/A			N/A			N/A		
32		498.0	5.1	A31	10.5	5.25	A33	10.5	5.25	A35	11.3	5.65	A37	10.8	5.40
33					-0.209	5.51		-0.195	5.49		-0.447	6.26		-0.389	5.91
34		512.0	5.2	A32	11.9	5.95	A34	12.3	6.15	A36	12.1	6.05	A38	12.0	6.00
35					-0.389	6.51		-0.339	6.65		-0.458	6.72		-0.317	6.45
36	KRA-23M (450-490) Antenna C	450.0	4.9	N/A			N/A			N/A			N/A		
37		463.3	4.9	A39	8.00	4.00	A40	8.21	4.11	A41	8.99	4.50	A42	8.12	4.06
38					-0.713	4.71		-0.560	4.67		-0.729	5.32		-0.688	4.76
39		476.7	5.0	N/A			N/A			N/A			N/A		
40		490.0	5.1	N/A			N/A			N/A			N/A		

SAR LIMITS		BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1g average	Occupational / Controlled

Notes

Test Mode = CW (Unmodulated Continuous Wave)		Antenna Distance to Phantom		DUT Distance to Phantom
Phantom = Barski Planar Phantom		KRA-17M2 (Antenna B)	3.2 cm	1.3 cm with Belt-Clip accessory
C = Column	R = Row	KRA-23M (Antenna C)	3.1 cm	
Audio accessories do not contain a built-in radiating element		Body-worn Accessory = Belt-Clip (P/N: KBH-10)		

Test Date	Fluid Type	Ambient Temp.	Fluid Temp.	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Aug 11	450 Body	20.0°C	22.5°C	≥ 15 cm	101.1 kPa	35%	1000
Aug 12	450 Body	22.0°C	22.5°C	≥ 15 cm	101.1 kPa	35%	1000
Aug 13	450 Body	22.0°C	23.5°C	≥ 15 cm	101.1 kPa	35%	1000
Aug 16	450 Body	22.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000

SAR MEASUREMENT SUMMARY (CONT.)

SAR EVALUATION PROCEDURES - DEFAULT AUDIO ACCESSORIES

Test Procedures applied per "FCC Occupational PTT Test Reduction *Draft* Considerations" (see ref. [6] & App. H)

1. The SAR configurations highlighted in yellow denote the starting points of the evaluation per procedures described below.

2. Preliminary evaluations were performed in order to select the default accessory, per audio accessory category (see manufacturer's disclosed accessory listing, Section 7.0), expected to result in the highest SAR, with respect to changes in RF characteristics and exposure conditions, based on similar construction and operating requirements (see Appendix D for photographs of the manufacturer's disclosed accessory options).

3. Based on the SAR measured in the body-worn test sequence (without audio accessory), if the SAR for the antenna, body-worn accessory and battery combination(s) applicable to an audio accessory is/are > 4.0 W/kg, test that audio accessory using the highest body-worn SAR combination and channel configuration applicable to the audio accessory (C2R4, C4R4, C6R4, C8R4, C2R10, C4R10, C6R10, C8R10, C2R19, C4R19, C6R19, C8R19, C2R29, C4R29, C6R29, C8R29, C2R35, C4R35, C6R35, C8R35, C2R38, C4R38, C6R38, C8R38).

4. If the SAR measured for an audio accessory combination is > 6.0 W/kg (C2R4, C8R4, C2R10, C8R10, C2R35, C4R25, C6R25, C8R25), test that audio accessory on the required immediately adjacent channels (C2R1, C2R6, C8R1, C8R5, C2R12, C8R12, C2R33, C4R33, C6R33, C8R33).

5. If the SAR measured for an audio accessory combination is > 7.0 W/kg (C4R4, C6R4, C4R10, C2R29, C4R29, C6R29, C8R29), test that audio accessory on all required channels (C4R1, C4R6, C4R8, C6R1, C6R6, C6R8, C4R12, C4R14, C4R16, C2R27, C2R25, C2R23, C4R27, C4R25, C4R23, C6R27, C6R25, C6R23, C8R27, C8R25, C8R23).

6. Additional audio accessories per category were not tested if the highest SAR channel(s) and/or adjacent channel(s) were < 7.0 W/kg.

7. When test reduction applies, the slots for such configurations are denoted with N/A (Not Applicable).

SAR MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION RESULTS - ADDITIONAL AUDIO ACCESSORIES

C	Test Date(s): August 31, September 1-3, 7, 2010					1	2
R	Antenna P/N (Freq. Range)	Audio Accessory & Category	Audio Accessory P/N	Test Frequency (MHz)	Conducted Power (W)	1g SAR (W/kg) Ni-MH Battery 1500 mAh KNB-29N (a) Plot #	100% ptt d/f SAR Drift dB	50% ptt d/f 50% + droop
1	KRA-17M (450-490 MHz) Antenna A	Earpiece (c/2)	KHS-25	450.0	4.9	A8	9.45	4.73
2							-0.454	5.25
3				463.3	4.9	A9	11.6	5.80
4							-0.910	7.15
5				476.7	5.0	A10	9.55	4.78
6							-0.922	5.90
7				490.0	5.1	A11	7.21	3.61
8							-0.667	4.20
9			KHS-26	450.0	4.9	A12	8.88	4.44
10							0.456	-
11				463.3	4.9	A13	10.6	5.30
12							-0.702	6.23
13				476.7	5.0	A14	9.06	4.53
14							-0.494	5.08
15				490.0	5.1	A15	6.79	3.40
16							-0.548	3.85
17			KHS-27	450.0	4.9	A16	10.1	5.05
18							0.034	-
19				463.3	4.9	A17	11.5	5.75
20							-0.728	6.80
21				476.7	5.0	A18	9.24	4.62
22							-0.920	5.71
23				490.0	5.1	A19	6.86	3.43
24							-0.566	3.91
25		Wire Kit (c/3)	KHS-9BL	450.0	4.9	A24	10.4	5.20
26							0.268	-
27				463.3	4.9	A25	11.9	5.95
28							-0.795	7.15
29				476.7	5.0	A26	9.57	4.85
30							-0.960	5.97
31				490.0	5.1	A27	6.96	3.48
32							-0.442	3.85

SAR LIMITS		BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1g average	Occupational / Controlled

Notes

		Antenna Distance to Phantom		DUT Distance to Phantom	
Test Mode = CW (Unmodulated Continuous Wave)		KRA-17M (Antenna A)	3.2 cm	KRA-17M (Antenna A)	1.3 cm Belt-Clip
Phantom = Barski Planar Phantom					
C = Column	R = Row				
Audio accessories do not contain a built-in radiating element		Body-worn Accessory = Belt-Clip (P/N: KBH-10)			

Test Date	Fluid Type	Ambient Temp.	Fluid Temp.	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Aug 31	450 Body	20.0°C	22.5°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 1	450 Body	21.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 2	450 Body	22.0°C	22.0°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 3	450 Body	23.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 7	450 Body	21.5°C	22.0°C	≥ 15 cm	101.1 kPa	35%	1000

SAR MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION RESULTS - ADDITIONAL AUDIO ACCESSORIES

C	Test Date(s): August 31, September 1-3, 7, 2010					1	2
R	Antenna P/N (Freq. Range)	Audio Accessory & Category	Audio Accessory P/N	Test Frequency (MHz)	Conducted Power (W)	1g SAR (W/kg) Ni-MH Battery 1500 mAh KNB-29N (a) Plot #	100% ptt d/f / SAR Drift dB	50% ptt d/f / 50% + droop
33	KRA-23M2 (470-512 MHz) Antenna D	Earpiece (c/2)	KHS-25	470.0	4.9	A49	10.6	5.30
34							-0.871	6.48
35				484.0	5.0	A50	9.76	4.88
36							-1.09	6.27
37				498.0	5.1	A51	7.95	3.98
38							-0.613	4.58
39				512.0	5.2	A52	9.24	4.62
40							-1.54	6.59
41			KHS-26	470.0	4.9	A53	9.94	4.97
42							-1.03	6.30
43				484.0	5.0	A54	8.30	4.15
44							-0.638	4.81
45				498.0	5.1	A55	7.89	3.95
46							-0.533	4.46
47				512.0	5.2	A56	9.52	4.76
48							-1.62	6.91
49			KHS-27	470.0	4.9	A57	9.81	4.91
50							-0.699	5.76
51				484.0	5.0	A58	9.20	4.60
52							-0.937	5.71
53				498.0	5.1	A59	7.49	3.75
54							-0.479	4.18
55				512.0	5.2	A60	9.04	4.52
56							-1.57	6.49

SAR LIMITS		BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1g average	Occupational / Controlled

Notes

		DUT Distance to Phantom		Antenna Distance to Phantom	
Test Mode = CW (Unmodulated Continuous Wave)		KRA-23M2 (Antenna D)	1.3 cm Belt-Clip	KRA-23M2 (Antenna D)	3.1 cm
Phantom = Barski Planar Phantom					
C = Column	R = Row				
Body-worn Accessory = Belt-Clip (P/N: KBH-10)					
Audio accessories do not contain a built-in radiating element					

Test Date	Fluid Type	Ambient Temp.	Fluid Temp.	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Aug 31	450 Body	20.0°C	22.5°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 1	450 Body	21.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 2	450 Body	22.0°C	22.0°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 3	450 Body	23.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 7	450 Body	21.5°C	22.0°C	≥ 15 cm	101.1 kPa	35%	1000

SAR MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION RESULTS - ADDITIONAL AUDIO ACCESSORIES

C: Test Date(s): August 31, September 1-3, 7, 2010

R	Antenna P/N (Freq. Range)	Audio Accessory & Category	Audio Accessory P/N	Test Frequency (MHz)	Conducted Power (W)	1	1g SAR (W/kg) Ni-MH Battery 1500 mAh KNB-29N (a)	2
						Plot #	100% ptt d/f SAR Drift dB	50% ptt d/f 50% + droop
57	KRA-27M2 (470-512 MHz) Antenna F	Headset (c/1)	KHS-21	470.0	4.9	A72	12.4	6.20
58							-0.383	5.57
59				484.0	5.0	A73	10.6	5.30
60							-0.654	6.16
61				498.0	5.1	A74	12.3	6.15
62							-0.660	7.16
63				512.0	5.2	A75	12.7	6.35
64							-0.664	7.40
65			KHS-10-BH	470.0	4.9	A76	9.95	4.98
66							-0.425	5.49
67				484.0	5.0	A77	10.7	5.35
68							-0.655	6.22
69				498.0	5.1	A78	11.5	5.75
70							-0.632	6.65
71				512.0	5.2	A79	12.0	6.00
72							-0.633	6.94
73			KHS-22	470.0	4.9	A80	9.84	4.92
74							-0.435	5.44
75				484.0	5.0	A81	11.8	5.90
76							-0.414	6.49
77				498.0	5.1	A82	11.9	5.95
78							-0.653	6.92
79				512.0	5.2	A83	11.9	5.95
80							-0.667	6.94
81			KHS-7	470.0	4.9	A84	10.3	5.15
82							-0.467	5.73
83				484.0	5.0	A85	10.7	5.35
84							-0.620	6.17
85				498.0	5.1	A86	11.8	5.90
86							-0.529	6.66
87				512.0	5.2	A87	13.0	6.50
88							-0.661	7.57
89			KHS- 7A	470.0	4.9	A88	10.9	5.45
90							-0.467	6.07
91				484.0	5.0	A89	10.1	5.05
92							-0.717	5.96
93				498.0	5.1	A90	11.8	5.90
94							-0.753	7.02
95				512.0	5.2	A91	12.3	6.15
96							-0.754	7.32

SAR LIMITS		BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1g average	Occupational / Controlled

Notes

		DUT Distance to Phantom		Antenna Distance to Phantom	
Test Mode = CW (Unmodulated Continuous Wave)		KRA-27M2 (Antenna F)	1.3 cm Belt-Clip	KRA-27M2 (Antenna F)	3.0 cm
Phantom = Barski Planar Phantom					
C = Column	R = Row				
Audio accessories do not contain a built-in radiating element		Body-worn Accessory = Belt-Clip (P/N: KBH-10)			

SAR MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION RESULTS - ADDITIONAL AUDIO ACCESSORIES

C	Test Date(s): August 31, September 1-3, 7, 2010					1		2
R	Antenna P/N (Freq. Range)	Audio Accessory & Category	Audio Accessory P/N	Test Frequency (MHz)	Conducted Power (W)	1g SAR (W/kg) Ni-MH Battery 1500 mAh KNB-29N (a) Plot #	100% ptt d/f SAR Drift dB	50% ptt d/f 50% + droop
97	KRA-27M2 (470-512 MHz) Antenna F	Earpiece (c/2)	KHS-25	470.0	4.9	A96	10.9	5.45
98							-0.521	6.14
99				484.0	5.0	A97	9.54	4.77
100							-0.772	5.70
101				498.0	5.1	A98	12.0	6.00
102							-0.542	6.80
103				512.0	5.2	A99	11.5	5.75
104							-0.796	6.91
105			KHS-26	470.0	4.9	A100	10.8	5.40
106							-0.350	5.85
107				484.0	5.0	A101	10.3	5.15
108							-0.820	6.22
109				498.0	5.1	A102	12.4	6.20
110							-0.550	7.04
111				512.0	5.2	A103	11.9	5.95
112							-0.697	6.99
113			KHS-27	470.0	4.9	A104	10.4	5.20
114							-0.440	5.75
115				484.0	5.0	A105	9.46	4.73
116							-0.549	5.37
117				498.0	5.1	A106	11.4	5.70
118							-0.620	6.57
119				512.0	5.2	A107	12.1	6.05
120							-0.779	7.24

SAR LIMITS		BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1g average	Occupational / Controlled

Notes

Test Mode = CW (Unmodulated Continuous Wave)		DUT Distance to Phantom		Antenna Distance to Phantom	
Phantom = Barski Planar Phantom		KRA-27M2 (Antenna F)	1.3 cm Belt-Clip	KRA-27M2 (Antenna F)	3.0 cm
C = Column	R = Row				
Audio accessories do not contain a built-in radiating element		Body-worn Accessory = Belt-Clip (P/N: KBH-10)			

Test Date	Fluid Type	Ambient Temp.	Fluid Temp.	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Aug 31	450 Body	20.0°C	22.5°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 1	450 Body	21.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 2	450 Body	22.0°C	22.0°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 3	450 Body	23.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 7	450 Body	21.5°C	22.0°C	≥ 15 cm	101.1 kPa	35%	1000

SAR MEASUREMENT SUMMARY (CONT.)

BODY-WORN SAR EVALUATION RESULTS - ADDITIONAL AUDIO ACCESSORIES

C	Test Date(s): August 31, September 1-3, 7, 2010	1	2

R	Antenna P/N (Freq. Range)	Audio Accessory & Category	Audio Accessory P/N	Test Frequency (MHz)	Conducted Power (W)	1g SAR (W/kg) Ni-MH Battery 1500 mAh KNB-29N (a) Plot #	100% ptt d/f / SAR Drift dB	50% ptt d/f / 50% + droop
121	KRA-27M2 (470-512 MHz) Antenna F	Wire Kit (c/3)	KHS-9BL	470.0	4.9	A112	10.0	5.00
122							-0.367	5.44
123				484.0	5.0	A113	9.92	4.96
124							-0.883	6.08
125				498.0	5.1	A114	11.4	5.70
126							-0.587	6.52
127				512.0	5.2	A115	11.5	5.75
128							-0.822	6.95
129		Speaker-Mic (c/4)	KMC-45	470.0	4.9	A120	10.0	5.00
130							-0.353	5.42
131				484.0	5.0	A121	9.70	4.85
132							-0.799	5.83
133				498.0	5.1	A122	10.6	5.30
134							-0.386	5.79
135				512.0	5.2	A123	12.4	6.20
136							-0.771	7.40
137			KMC-21	470.0	4.9	A124	9.71	4.86
138							-0.355	5.27
139				484.0	5.0	A125	9.83	4.92
140							-0.745	5.83
141				498.0	5.1	A126	11.3	5.65
142							-0.616	6.51
143				512.0	5.2	A127	11.6	5.80
144							-0.746	6.89

SAR LIMITS		BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1g average	Occupational / Controlled

Notes

		DUT Distance to Phantom		Antenna Distance to Phantom	
Test Mode = CW (Unmodulated Continuous Wave)		KRA-27M2 (Antenna F)	1.3 cm Belt-Clip	KRA-27M2 (Antenna F)	3.0 cm
Phantom = Barski Planar Phantom					
C = Column	R = Row				
Audio accessories do not contain a built-in radiating element		Body-worn Accessory = Belt-Clip (P/N: KBH-10)			

Test Date	Fluid Type	Ambient Temp.	Fluid Temp.	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Aug 31	450 Body	20.0°C	22.5°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 1	450 Body	21.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 2	450 Body	22.0°C	22.0°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 3	450 Body	23.0°C	23.0°C	≥ 15 cm	101.1 kPa	35%	1000
Sept 7	450 Body	21.5°C	22.0°C	≥ 15 cm	101.1 kPa	35%	1000

SAR MEASUREMENT SUMMARY (CONT.)

SAR EVALUATION PROCEDURES - ADDITIONAL AUDIO ACCESSORIES

Test Procedures applied per "FCC Occupational PTT Test Reduction *Draft* Considerations" (see ref. [6] & App. H)

1. Based on the SAR measurement results with the default audio accessories, if the SAR measured for a default audio accessory combination was > 7.0 W/kg, all additional accessory options within each accessory category were evaluated.

9.0 SAR SCALING

SAR LEVELS SCALED TO KENWOOD MAXIMUM OUTPUT POWER SPEC. (5 WATTS)

Plot #	Test Config.	Freq. (MHz)	Antenna	Battery	Meas. Cond. Pwr. (Watts)	SAR Level 1g (W/kg)	Scaling to 5 Watts (dB)	Scaled SAR 1g (W/kg)
B5	Body-worn	450.0	A	a	4.9	4.75	+0.0877	4.85
B1	Body-worn	450.0	A	b	4.9	4.78	+0.0877	4.88
B6	Body-worn	463.3	A	a	4.9	7.55	+0.0877	7.70
B2	Body-worn	463.3	A	b	4.9	6.34	+0.0877	6.47
B9	Body-worn	470.0	B	b	4.9	6.47	+0.0877	6.60
B15	Body-worn	450.0	C	b	4.9	3.95	+0.0877	4.03
B19	Body-worn	463.3	C	a	4.9	4.70	+0.0877	4.80
B16	Body-worn	463.3	C	b	4.9	5.09	+0.0877	5.19
B24	Body-worn	470.0	D	a	4.9	6.89	+0.0877	7.03
B20	Body-worn	470.0	D	b	4.9	6.03	+0.0877	6.15
B26	Body-worn	450.0	E	b	4.9	4.22	+0.0877	4.31
B30	Body-worn	463.3	E	a	4.9	5.52	+0.0877	5.63
B27	Body-worn	463.3	E	b	4.9	5.16	+0.0877	5.27
B35	Body-worn	470.0	F	a	4.9	5.67	+0.0877	5.79
B31	Body-worn	470.0	F	b	4.9	5.49	+0.0877	5.60
A1	Body-worn	450.0	A	a	4.9	4.87	+0.0877	4.97
A4	Body-worn	450.0	A	a	4.9	4.86	+0.0877	4.96
A20	Body-worn	450.0	A	a	4.9	5.10	+0.0877	5.20
A28	Body-worn	450.0	A	a	4.9	4.92	+0.0877	5.02
A2	Body-worn	463.3	A	a	4.9	6.86	+0.0877	7.00
A5	Body-worn	463.3	A	a	4.9	7.62	+0.0877	7.78
A21	Body-worn	463.3	A	a	4.9	7.00	+0.0877	7.14
A29	Body-worn	463.3	A	a	4.9	6.92	+0.0877	7.06
A43	Body-worn	470.0	D	a	4.9	6.42	+0.0877	6.55
A45	Body-worn	470.0	D	a	4.9	7.25	+0.0877	7.40
A61	Body-worn	470.0	D	a	4.9	5.91	+0.0877	6.03
A62	Body-worn	470.0	D	a	4.9	6.72	+0.0877	6.86
A64	Body-worn	463.3	E	a	4.9	5.35	+0.0877	5.46
A65	Body-worn	463.3	E	a	4.9	5.77	+0.0877	5.89
A66	Body-worn	463.3	E	a	4.9	5.67	+0.0877	5.79
A67	Body-worn	463.3	E	a	4.9	5.41	+0.0877	5.52
A68	Body-worn	470.0	F	a	4.9	6.29	+0.0877	6.42
A92	Body-worn	470.0	F	a	4.9	5.98	+0.0877	6.10
A108	Body-worn	470.0	F	a	4.9	5.89	+0.0877	6.01
A116	Body-worn	470.0	F	a	4.9	5.95	+0.0877	6.07

SAR SCALING (CONT.)

SAR LEVELS SCALED TO KENWOOD MAXIMUM OUTPUT POWER SPEC. (5 WATTS)

Plot #	Test Config.	Freq. (MHz)	Antenna	Battery	Meas. Cond. Pwr. (Watts)	SAR Level 1g (W/kg)	Scaling to 5 Watts (dB)	Scaled SAR 1g (W/kg)
A39	Body-worn	463.3	C	b	4.9	4.71	+0.0877	4.81
A40	Body-worn	463.3	C	b	4.9	4.67	+0.0877	4.77
A41	Body-worn	463.3	C	b	4.9	5.32	+0.0877	5.43
A42	Body-worn	463.3	C	b	4.9	4.76	+0.0877	4.86
A8	Body-worn	450.0	A	a	4.9	5.25	+0.0877	5.36
A9	Body-worn	463.3	A	a	4.9	7.15	+0.0877	7.30
A12	Body-worn	450.0	A	a	4.9	4.44	+0.0877	4.53
A13	Body-worn	463.3	A	a	4.9	6.23	+0.0877	6.36
A16	Body-worn	450.0	A	a	4.9	5.05	+0.0877	5.15
A17	Body-worn	463.3	A	a	4.9	6.80	+0.0877	6.94
A24	Body-worn	450.0	A	a	4.9	5.20	+0.0877	5.31
A25	Body-worn	463.3	A	a	4.9	7.15	+0.0877	7.30
A49	Body-worn	470.0	D	a	4.9	6.48	+0.0877	6.61
A53	Body-worn	470.0	D	a	4.9	6.30	+0.0877	6.43
A57	Body-worn	470.0	D	a	4.9	5.76	+0.0877	5.88
A72	Body-worn	470.0	F	a	4.9	5.57	+0.0877	5.68
A76	Body-worn	470.0	F	a	4.9	5.49	+0.0877	5.60
A80	Body-worn	470.0	F	a	4.9	5.44	+0.0877	5.55
A84	Body-worn	470.0	F	a	4.9	5.73	+0.0877	5.85
A88	Body-worn	470.0	F	a	4.9	6.07	+0.0877	6.19
A96	Body-worn	470.0	F	a	4.9	6.14	+0.0877	6.27
A100	Body-worn	470.0	F	a	4.9	5.85	+0.0877	5.97
A104	Body-worn	470.0	F	a	4.9	5.75	+0.0877	5.87
A112	Body-worn	470.0	F	a	4.9	5.44	+0.0877	5.55
A120	Body-worn	470.0	F	a	4.9	5.42	+0.0877	5.53
A124	Body-worn	470.0	F	a	4.9	5.27	+0.0877	5.38

Notes:

1. The SAR levels reported are based on 50% PTT duty factor including SAR droop.
2. The scaled SAR levels are below the FCC/IC Occupational SAR Limit of 8.0 W/kg.

10.0 FLUID DIELECTRIC PARAMETERS

450 MHz Body – August 5				490 MHz Body – August 5				512 MHz Body – August 5				450 MHz Body – August 6			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.
56.7	± 5%	56.3	-0.7%	56.7	± 5%	55.8	-1.6%	56.7	± 5%	55.6	-1.9%	56.7	± 5%	57.7	+1.8%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.
0.94	± 5%	0.92	-2.1%	0.94	± 5%	0.95	+1.1%	0.94	± 5%	0.96	+2.1%	0.94	± 5%	0.91	-3.2%
463.3 MHz Body – August 6				**470 MHz Body – August 6**				**476.7 MHz Body – August 6**				**484 MHz Body – August 6**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.
56.7	± 5%	57.2	+1%	56.7	± 5%	57.0	+0.5%	56.7	± 5%	57.4	+1.2%	56.7	± 5%	57.4	+1.2%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.
0.94	± 5%	0.93	-1.1%	0.94	± 5%	0.94	0.0%	0.94	± 5%	0.95	+1.1%	0.94	± 5%	0.95	+1.1%
490 MHz Body – August 6				**498 MHz Body –August 6**				**512 MHz Body – August 6**				**450 MHz Body – August 9**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.
56.7	± 5%	57.1	0.7%	56.7	± 5%	56.9	+0.4%	56.7	± 5%	56.8	+0.2%	56.7	± 5%	55.5	-2.1%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.
0.94	± 5%	0.95	+1.1%	0.94	± 5%	0.96	+2.1%	0.94	± 5%	0.97	+3.2%	0.94	± 5%	0.94	0.0%
463.3 MHz Body – August 9				**470 MHz Body – August 9**				**476.7 MHz Body – August 9**				**480 MHz Body – August 9**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.
56.7	± 5%	56.2	-1.0%	56.7	± 5%	56.1	-1.1%	56.7	± 5%	55.8	-1.6%	56.7	± 5%	55.7	-1.8%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.
0.94	± 5%	0.94	0.0%	0.94	± 5%	0.95	+1.1%	0.94	± 5%	0.95	+1.1%	0.94	± 5%	0.95	+1.1%
484 MHz Body – August 9				**490 MHz Body – August 9**				**498 MHz Body – August 9**				**512 MHz Body – August 9**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.
56.7	± 5%	55.8	-1.6%	56.7	± 5%	56.1	-1.1%	56.7	± 5%	56.4	-0.5%	56.7	± 5%	55.5	-2.1%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.
0.94	± 5%	0.96	+2.1%	0.94	± 5%	0.98	+4.3%	0.94	± 5%	0.97	+3.2%	0.94	± 5%	0.98	+4.3%
450 MHz Body – August 10				**463.3 MHz Body – August 10**				**470 MHz Body – August 10**				**484 MHz Body – August 10**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.
56.7	± 5%	57.3	+1.1%	56.7	± 5%	56.4	-0.5%	56.7	± 5%	56.6	-0.2%	56.7	± 5%	56.3	-0.7%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.
0.94	± 5%	0.92	-2.1%	0.94	± 5%	0.93	-1.1%	0.94	± 5%	0.92	-2.1%	0.94	± 5%	0.93	-1.1%

FLUID DIELECTRIC PARAMETERS (CONT.)

498 MHz Body – August 10				512 MHz Body – August 10				450 MHz Body – August 11				463.3 MHz Body – August 11			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.
56.7	± 5%	56.4	-0.5%	56.7	± 5%	55.9	-1.4%	56.7	± 5%	55.7	-1.8%	56.7	± 5%	55.7	-1.8%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.
0.94	± 5%	0.95	+1.1%	0.94	± 5%	0.96	+2.1%	0.94	± 5%	0.92	-2.1%	0.94	± 5%	0.94	0.0%
470 MHz Body – August 11				**512 MHz Body – August 11**				**450 MHz Body – August 12**				**463.3 MHz Body – August 12**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.
56.7	± 5%	56.3	-0.7%	56.7	± 5%	55.2	-2.6%	56.7	± 5%	58.0	+2.3%	56.7	± 5%	58.0	+2.3%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.
0.94	± 5%	0.94	0.0%	0.94	± 5%	0.98	+4.3%	0.94	± 5%	0.90	-4.3%	0.94	± 5%	0.91	-3.2%
470 MHz Body – August 12				**484 MHz Body –August 12**				**498 MHz Body – August 12**				**512 MHz Body – August 12**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.
56.7	± 5%	57.3	+1.1%	56.7	± 5%	57.7	+1.8%	56.7	± 5%	57.6	+1.6%	56.7	± 5%	57.2	+0.9%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.
0.94	± 5%	0.93	-1.1%	0.94	± 5%	0.93	-1.1%	0.94	± 5%	0.95	+1.1%	0.94	± 5%	0.96	+2.1%
450 MHz Body – August 13				**470 MHz Body – August 13**				**484 MHz Body – August 13**				**498 MHz Body – August 13**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.
56.7	± 5%	55.1	+2.8%	56.7	± 5%	55.2	-2.6%	56.7	± 5%	55.1	-2.8%	56.7	± 5%	54.3	-4.2%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.
0.94	± 5%	0.9	-4.3%	0.94	± 5%	0.92	-2.1%	0.94	± 5%	0.93	-1.1%	0.94	± 5%	0.95	+1.1%
450 MHz Body – August 16				**476.7 MHz Body – August 16**				**484 MHz Body – August 16**				**490 MHz Body – August 16**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.
56.7	± 5%	56.0	-1.2%	56.7	± 5%	54.0	-4.8%	56.7	± 5%	55.0	-3.0%	56.7	± 5%	54.9	-3.2%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.
0.94	± 5%	0.93	-1.1%	0.94	± 5%	0.94	0.0%	0.94	± 5%	0.94	0.0%	0.94	± 5%	0.95	+1.1%
498 MHz Body – August 16				**450 MHz Head – August 17**				**484 MHz Head – August 17**				**490 MHz Head – August 17**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.
56.7	± 5%	54.9	-3.2%	43.5	± 5%	43.0	-1.1%	43.5	± 5%	42.5	-2.3%	43.5	± 5%	42.4	-2.5%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.
0.94	± 5%	0.97	+3.2%	0.87	± 5%	0.83	-4.6%	0.87	± 5%	0.87	0.0%	0.87	± 5%	0.87	0.0%

FLUID DIELECTRIC PARAMETERS (CONT.)

498 MHz Head – August 17				512 MHz Head – August 17				450 MHz Body – August 31				463.3 MHz Body – August 31			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.
43.5	± 5%	42.5	-2.3%	43.5	± 5%	42.5	-2.3%	56.7	± 5%	56.8	+0.2%	56.7	± 5%	55.8	-1.6%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.
0.87	± 5%	0.88	+1.1%	0.87	± 5%	0.89	+2.3%	0.94	± 5%	0.9	-4.3%	0.94	± 5%	0.92	-2.1%
476.7 MHz Body – August 31				**490 MHz Body – August 31**				**450 MHz Body – Sept. 1**				**463.3 MHz Body – Sept. 1**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.
56.7	± 5%	55.6	-1.9%	56.7	± 5%	55.5	-2.1%	56.7	± 5%	56.9	+0.4%	56.7	± 5%	56.5	-0.4%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Inter.	Dev.
0.94	± 5%	0.93	-1.1%	0.94	± 5%	0.94	0.0%	0.94	± 5%	0.91	-3.2%	0.94	± 5%	0.91	-3.2%
470 MHz Body – Sept. 1				**476.7 MHz Body – Sept. 1**				**484 MHz Body – Sept. 1**				**490 MHz Body – Sept. 1**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.
56.7	± 5%	56.1	-1.1%	56.7	± 5%	56.3	-0.7%	56.7	± 5%	56.3	-0.7%	56.7	± 5%	56.2	-0.9%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Meas.	Dev.	450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.
0.94	± 5%	0.92	-2.1%	0.94	± 5%	0.93	-1.1%	0.94	± 5%	0.93	-1.1%	0.94	± 5%	0.93	-1.1%
498 MHz Body – Sept. 1				**512 MHz Body – Sept. 1**				**450 MHz Body – Sept. 2**				**470 MHz Body – Sept. 2**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Meas.	Dev.
56.7	± 5%	55.7	-1.8%	56.7	± 5%	56.0	-1.2%	56.7	± 5%	57.4	+1.2%	56.7	± 5%	56.9	+0.4%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Inter.	Dev.	450 Target		Inter.	Dev.	450 Target		Meas.	Dev.	450 Target		Meas.	Dev.
0.94	± 5%	0.95	+1.1%	0.94	± 5%	0.94	0.0%	0.94	± 5%	0.91	-3.2%	0.94	± 5%	0.92	-2.1%
484 MHz Body – Sept. 2				**498 MHz Body – Sept. 2**				**512 MHz Body – Sept. 2**				**450 MHz Body – Sept. 3**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Meas.	Dev.
56.7	± 5%	57.0	+0.5%	56.7	± 5%	57.0	+0.5%	56.7	± 5%	56.4	-0.5%	56.7	± 5%	56.3	-0.7%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Meas.	Dev.
0.94	± 5%	0.95	+1.1%	0.94	± 5%	0.93	-1.1%	0.94	± 5%	0.94	0.0%	0.94	± 5%	0.92	-2.1%
470 MHz Body – Sept. 3				**484 MHz Body – Sept. 3**				**498 MHz Body – Sept. 3**				**512 MHz Body – Sept. 3**			
Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r				Dielectric Constant ε_r			
450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Meas.	Dev.
56.7	± 5%	56.0	-1.2%	56.7	± 5%	56.3	-0.7%	56.7	± 5%	56.7	0.0%	56.7	± 5%	56.0	-1.2%
Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)				Conductivity σ (mho/m)			
450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Meas.	Dev.	450 Target		Meas.	Dev.
0.94	± 5%	0.95	+1.1%	0.94	± 5%	0.94	0.0%	0.94	± 5%	0.97	+3.2%	0.94	± 5%	0.97	+3.2%

FLUID DIELECTRIC PARAMETERS (CONT.)

450 MHz Body – Sept. 7			
Dielectric Constant ε_r			
450 Target		Meas.	Dev.
56.7	± 5%	57.0	+0.5%
Conductivity σ (mho/m)			
450 Target		Meas.	Dev.
0.94	± 5%	0.90	-4.3%

470 MHz Body – Sept. 7			
Dielectric Constant ε_r			
450 Target		Meas.	Dev.
56.7	± 5%	57.3	+1.0%
Conductivity σ (mho/m)			
450 Target		Meas.	Dev.
0.94	± 5%	0.92	-2.1%

484 MHz Body – Sept. 7			
Dielectric Constant ε_r			
450 Target		Meas.	Dev.
56.7	± 5%	56.8	+0.2%
Conductivity σ (mho/m)			
450 Target		Meas.	Dev.
0.94	± 5%	0.92	-2.1%

498 MHz Body – Sept. 7			
Dielectric Constant ε_r			
450 Target		Meas.	Dev.
56.7	± 5%	56.5	-0.4%
Conductivity σ (mho/m)			
450 Target		Meas.	Dev.
0.94	± 5%	0.94	0.0%

512 MHz Body – Sept. 7			
Dielectric Constant ε_r			
450 Target		Meas.	Dev.
56.7	± 5%	56.6	-0.2%
Conductivity σ (mho/m)			
450 Target		Meas.	Dev.
0.94	± 5%	0.94	0.0%

11.0 DETAILS OF SAR EVALUATION

1. The number of test frequencies and the test channels evaluated for SAR were selected in accordance with the procedures described in FCC KDB 447498 Section 6) c) (see reference [5]).
2. The DUT was evaluated for SAR in accordance with the procedures described in FCC Occupational PTT Test Reduction *Draft* Considerations (see reference [6] and Appendix H).
3. The area scan evaluation was performed with a fully charged battery. After the area scan was completed the radio was cooled down and the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
4. The SAR droop of the DUT was measured by the DASY4 system for the duration of the SAR evaluations. The measured SAR droop was added to the measured SAR levels to report scaled SAR levels as shown in the SAR test data tables. A SAR-versus-Time power droop evaluation was performed in the test configuration that reported the maximum measured SAR droop. Please refer to Appendix A for the SAR-versus-Time power droop evaluation plot.
5. The fluid temperature was measured prior to and after the SAR evaluations. The fluid temperature after the SAR evaluations remained within +/-2°C of the fluid temperature measured prior to the SAR evaluations.
6. 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. The DUT was tested at the maximum conducted output power level preset by the manufacturer in unmodulated continuous transmit operation (Continuous Wave mode at 100% duty cycle) with the transmit key constantly depressed. For a push-to-talk device the 50% duty cycle compensation reported assumes a transmit/receive cycle of equal time base.

12.0 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 find the points between the dipole center of the probe and the surface of the phantom. This data cannot be measured, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.4 mm (see probe calibration document in Appendix F). The extrapolation was based on trivariate quadratics computed from the previously calculated 3D interpolated points nearest the phantom surface.

f. Interpolated data is used to calculate the average SAR over 1g and 10g cubes by spatially discretizing the entire measured cube. The volume used to determine the averaged SAR is a 1mm grid (42875 interpolated points).

g. A zoom scan volume of 32 mm x 32 mm x 30 mm (5 x 5 x 7 points) centered at the peak SAR location determined from the area scan is used for all zoom scans for devices with a transmit frequency < 800 MHz. Zoom scans for frequencies ≥ 800 MHz are determined with a scan volume of 30 mm x 30 mm x 30 mm (7 x 7 x 7) to ensure complete capture of the peak spatial-average SAR.

13.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations, daily system checks were performed with a planar phantom and SPEAG 450 MHz dipole (see Appendix B) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [3]). 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 for measured fluid dielectric parameters). A forward power of 398 mW was applied to the dipole and the system was verified to a tolerance of ±10% from the SAR system manufacturer's dipole calibration target SAR value (see Appendix E for system manufacturer's dipole calibration procedures).

SYSTEM PERFORMANCE CHECK EVALUATIONS

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)
	Freq. (MHz)	SPEAG Target	Meas.	Dev.	SPEAG Target	Meas.	Dev.	SPEAG Target	Meas.	Dev.						
Aug 05	Body 450	1.78 ±10%	1.84	+3.4%	56.7 ±5%	56.3	-0.7%	0.94 ±5%	0.92	-2.1%	1000	22.0	23.0	≥ 15	35	101.1
Aug 06	Body 450	1.78 ±10%	1.78	0.0%	56.7 ±5%	57.7	+1.8%	0.94 ±5%	0.91	-3.2%	1000	22.0	23.0	≥ 15	35	101.1
Aug 09	Body 450	1.78 ±10%	1.9	+6.7%	56.7 ±5%	55.5	-2.1%	0.94 ±5%	0.94	0.0%	1000	21.0	23.0	≥ 15	35	101.1
Aug 10	Body 450	1.78 ±10%	1.88	+5.6%	56.7 ±5%	57.27	+1.0%	0.94 ±5%	0.92	-2.1%	1000	21.0	23.0	≥ 15	35	101.1
Aug 11	Body 450	1.78 ±10%	1.9	+6.7%	56.7 ±5%	55.7	-1.8%	0.94 ±5%	0.92	-2.1%	1000	20.0	22.5	≥ 15	35	101.1
Aug 12	Body 450	1.78 ±10%	1.82	+2.2%	56.7 ±5%	58.0	+2.3%	0.94 ±5%	0.90	-4.3%	1000	22.0	23.0	≥ 15	35	101.1
Aug 13	Body 450	1.78 ±10%	1.77	-0.6%	56.7 ±5%	55.1	-2.8%	0.94 ±5%	0.90	-4.3%	1000	22.0	23.5	≥ 15	35	101.1
Aug 16	Body 450	1.78 ±10%	1.88	+5.6%	56.7 ±5%	56.0	-1.2%	0.94 ±5%	0.93	-1.1%	1000	22.0	23.0	≥ 15	35	101.1
Aug 17	Head 450	1.87 ±10%	1.86	-0.5%	43.5 ±5%	43.0	-1.1%	0.87 ±5%	0.83	-4.6%	1000	23.0	23.5	≥ 15	35	101.1
Aug 31	Body 450	1.78 ±10%	1.85	+3.9%	56.7 ±5%	56.8	+0.2%	0.94 ±5%	0.90	-4.3%	1000	20.0	22.5	≥ 15	35	101.1
Sep 01	Body 450	1.78 ±10%	1.82	+2.2%	56.7 ±5%	56.9	+0.4%	0.94 ±5%	0.91	-3.2%	1000	21.0	23.0	≥ 15	35	101.1
Sep 02	Body 450	1.78 ±10%	1.87	+5.1%	56.7 ±5%	57.4	+1.2%	0.94 ±5%	0.91	-3.2%	1000	22.0	22.0	≥ 15	35	101.1
Sep 03	Body 450	1.78 ±10%	1.86	+4.5%	56.7 ±5%	56.3	-0.7%	0.94 ±5%	0.92	-2.1%	1000	23.0	23.0	≥ 15	35	101.1
Sep 07	Body 450	1.78 ±10%	1.85	+3.9%	56.7 ±5%	57.0	+0.5%	0.94 ±5%	0.90	-4.3%	1000	21.5	22.0	≥ 15	35	101.1

Notes		
	1.	The target SAR values are the measured values from the SAR system manufacturer's dipole calibration (see Appendix E).
	2.	The target dielectric parameters are the nominal values from the SAR system manufacturer's dipole calibration (see Appendix E).
	3.	The fluid temperature was measured prior to and after the system performance check to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.
	4.	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).

14.0 SIMULATED EQUIVALENT TISSUES

The simulated equivalent tissue recipes in the table below are derived from the SAR system manufacturer's suggested recipes in the DASY4 manual (see references [9] and [10]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2003 (see reference [3]). The ingredient percentage may have been adjusted minimally in order to achieve the appropriate target dielectric parameters within the specified tolerance.

SIMULATED TISSUE MIXTURES		
INGREDIENT	**450 MHz HEAD**	**450 MHz BODY**
Water	38.56 %	52.00 %
Sugar	56.32 %	45.65 %
Salt	3.95 %	1.75 %
HEC	0.98 %	0.50 %
Bactericide	0.19 %	0.10 %

15.0 SAR LIMITS

SAR RF EXPOSURE LIMITS		
FCC 47 CFR 2.1093	**General Population**	**Occupational**
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.		

16.0 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	ET3DV6
Serial No.	1590
Construction	Triangular core fiber optic detection system
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
Evaluation Phantom	
Type	Barski Planar Phantom
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 70 liters
Validation Phantom	
Type	Barski Planar Phantom
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 70 liters

17.0 PROBE SPECIFICATION (ET3DV6)

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

ET3DV6 E-Field Probe

18.0 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 planar phantom was used for the DUT SAR evaluations and the system performance check evaluations. See Appendix G for dimensions and specifications of the Barski Planar Phantom.

Barski Planar Phantom

19.0 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 a Plexiglas platform is attached to the device holder.

Device Holder

20.0 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	-ET3DV6 E-Field Probe	00017	1590	15Jul10	Annual
x	-SPEAG D450V3 Validation Dipole	00217	1068	18Jan10	Biennial
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				

21.0 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 (450 MHz)	E.2.1	6.65	Normal	1	1	1	6.65	6.65	∞
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	4.6	Normal	1	0.64	0.43	2.9	2.0	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	4.8	Normal	1	0.6	0.49	2.9	2.4	∞
Combined Standard Uncertainty			**RSS**				**11.75**	**11.30**	
Expanded Uncertainty (95% Confidence Interval)			**k=2**				**23.50**	**22.60**	

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

22.0 REFERENCES

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

[2] 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.

[3] 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.

[4] IEC International Standard 62209-1:2005 - "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures."

[5] Federal Communications Commission, Office of Engineering and Technology - "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies"; KDB 447498 D01 v04: November 2009.

[6] Federal Communications Commission - "Occupational PTT Test Reduction *Draft* Considerations": Version 07 15 10.

[7] 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.

[8] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 21 Application Note, SAR Sensitivities: Sept. 2005.

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

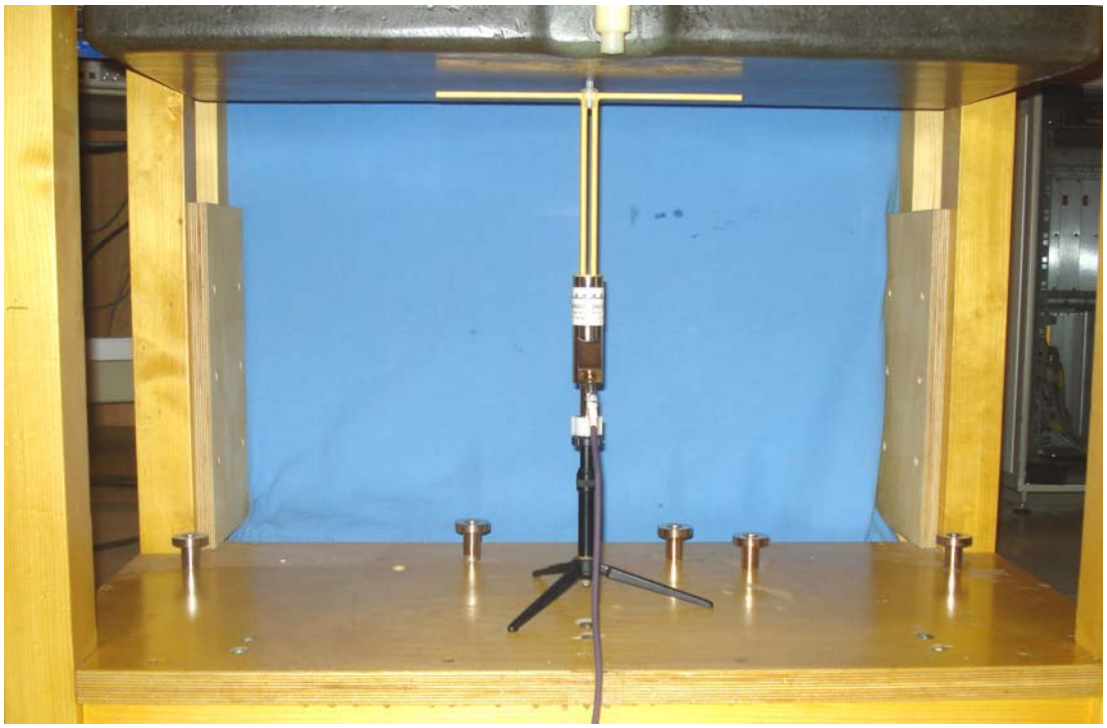
[10] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 17 Application Note, Body Tissue Recipe: Sept. 2005.

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

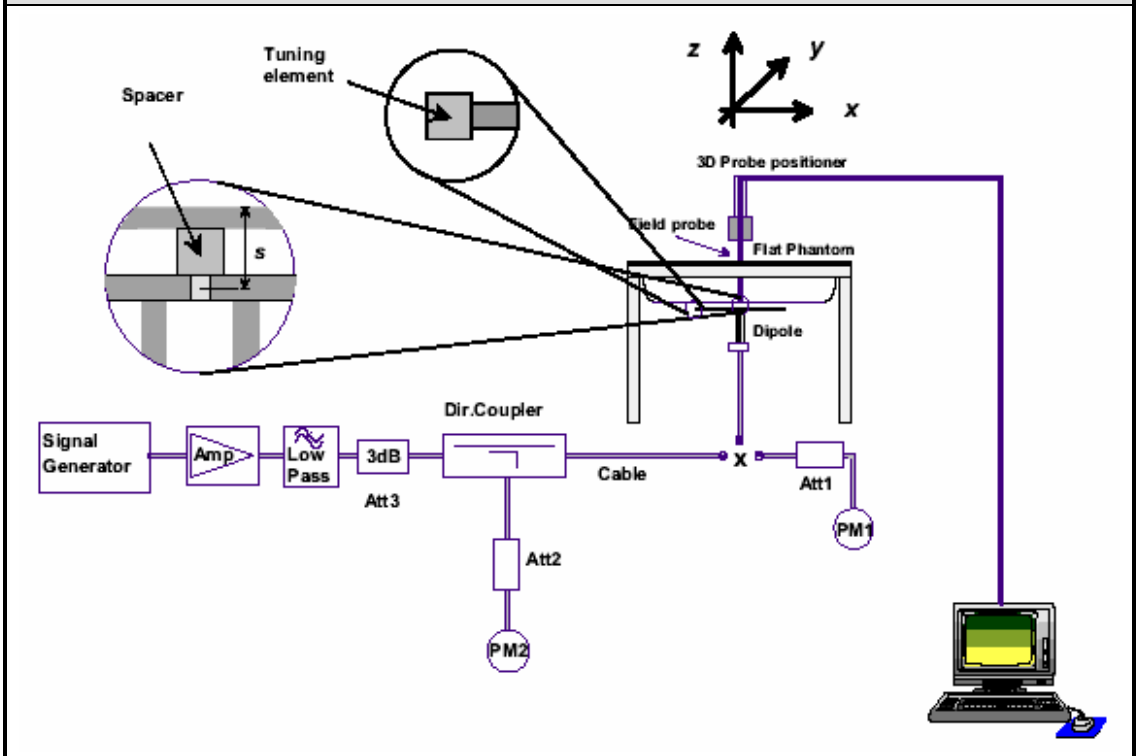
[12] Federal Communications Commission - "Measurements Required: RF Power Output"; Rule Part 47 CFR §2.1046.

APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

SYSTEM PERFORMANCE CHECK MEASUREMENT SETUP



SPEAG 450 MHz Validation Dipole with Fiberglas Validation Phantom



System Performance Check Measurement Setup (IEEE Standard 1528-2003)

Date Tested: 08/05/2010

System Performance Check - 450 MHz Dipole - Body

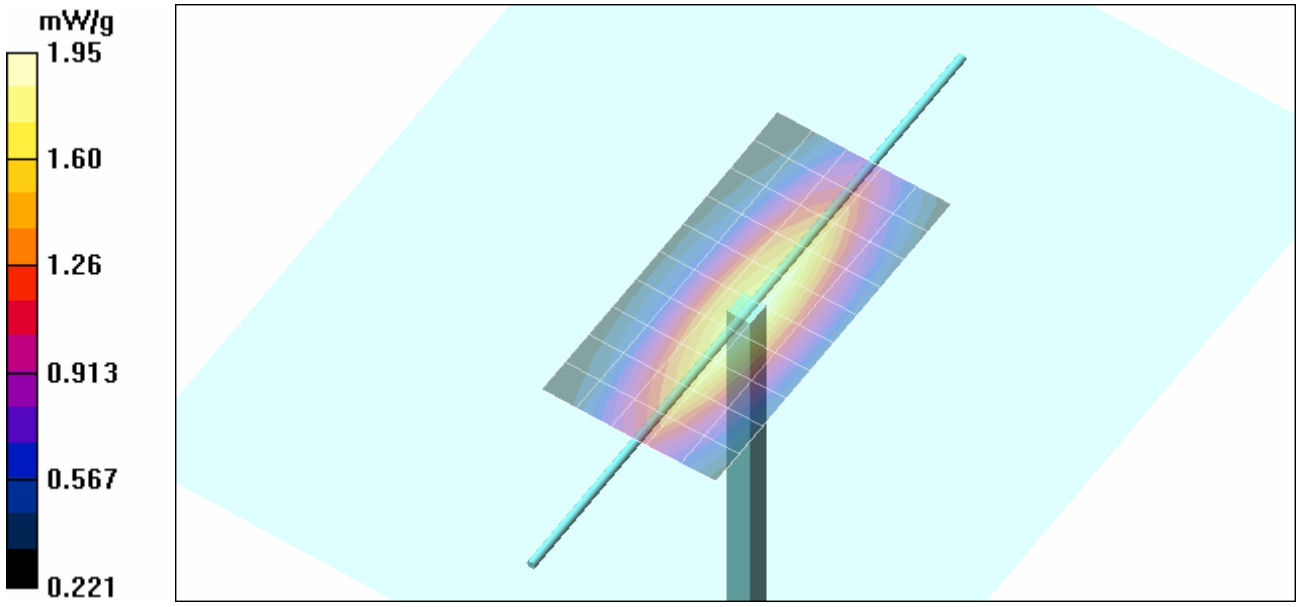
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

Ambient Temp: 22.0°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

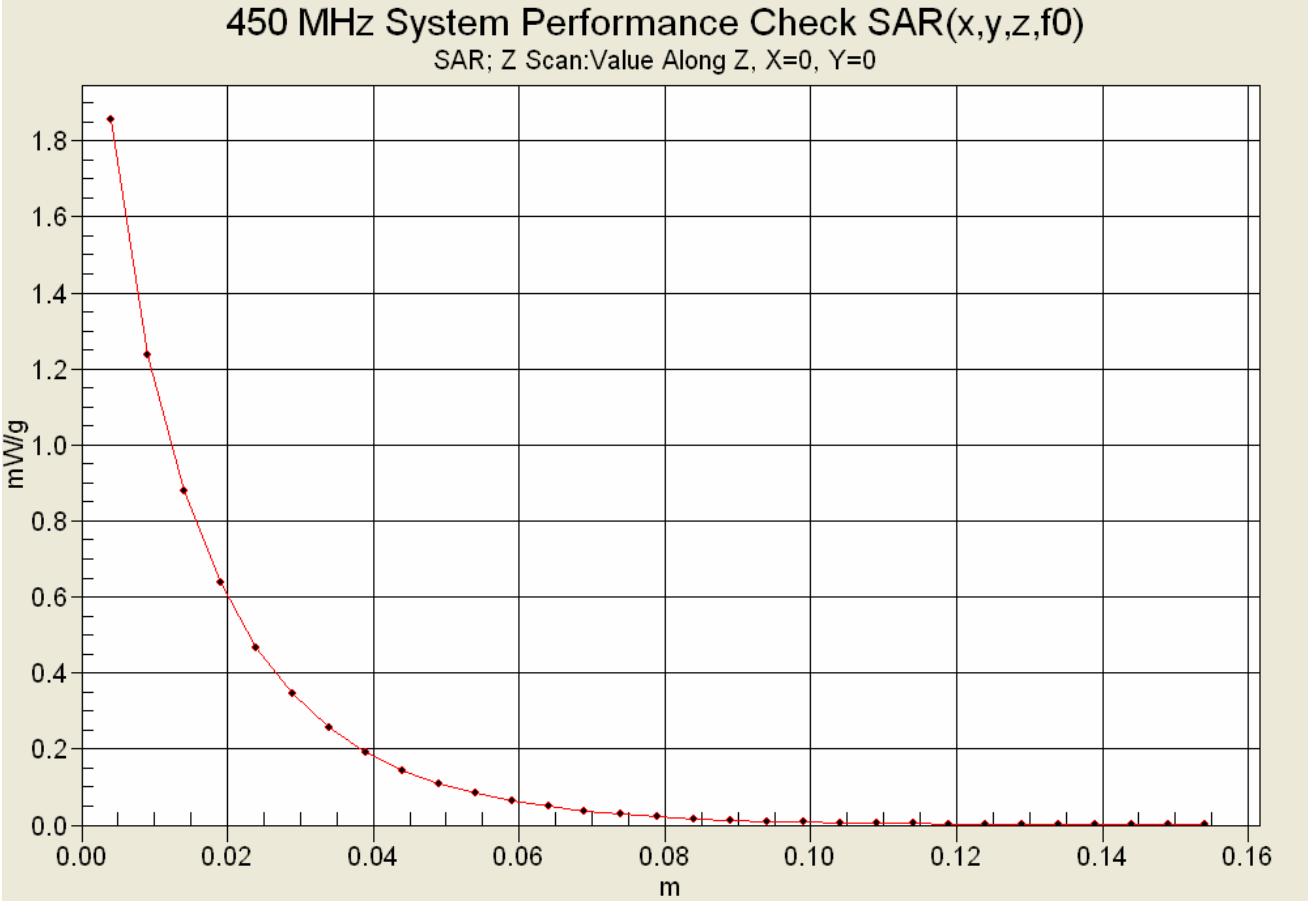
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.92 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.91 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 44.9 V/m; Power Drift = 0.087dB
Peak SAR (extrapolated) = 2.95 W/kg
SAR(1 g) = 1.84 mW/g; SAR(10 g) = 1.22 mW/g
Maximum value of SAR (measured) = 1.95 mW/g



Z-Axis Scan



Date Tested: 08/06/2010

System Performance Check - 450 MHz Dipole - Body

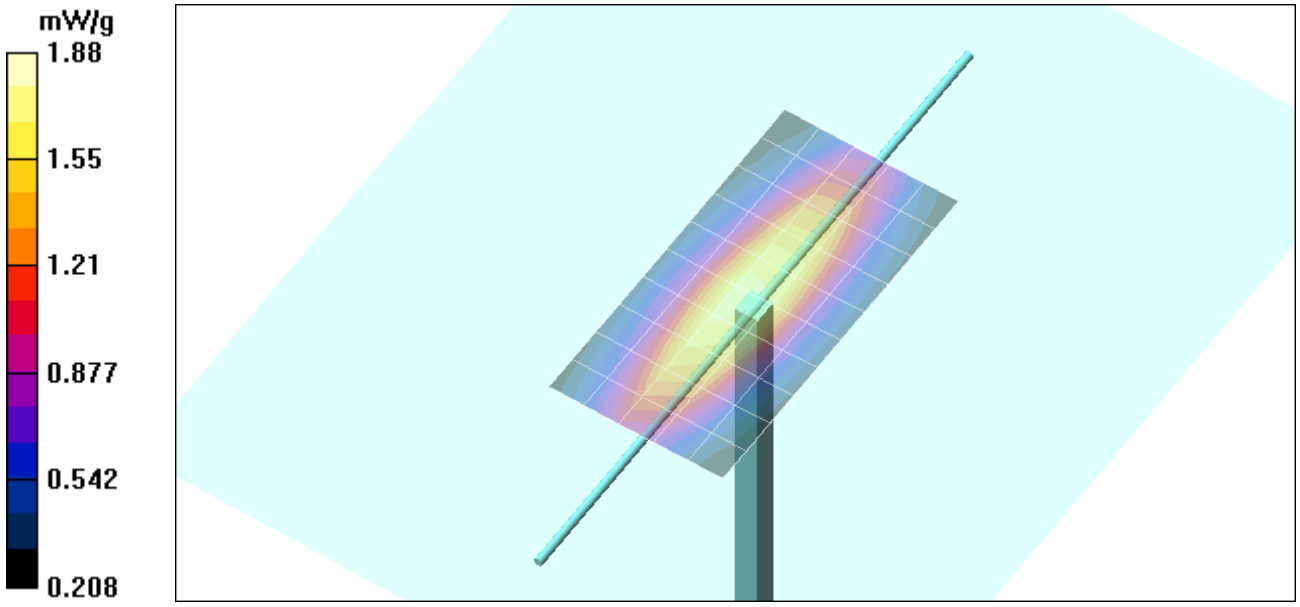
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

Ambient Temp: 22.0°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

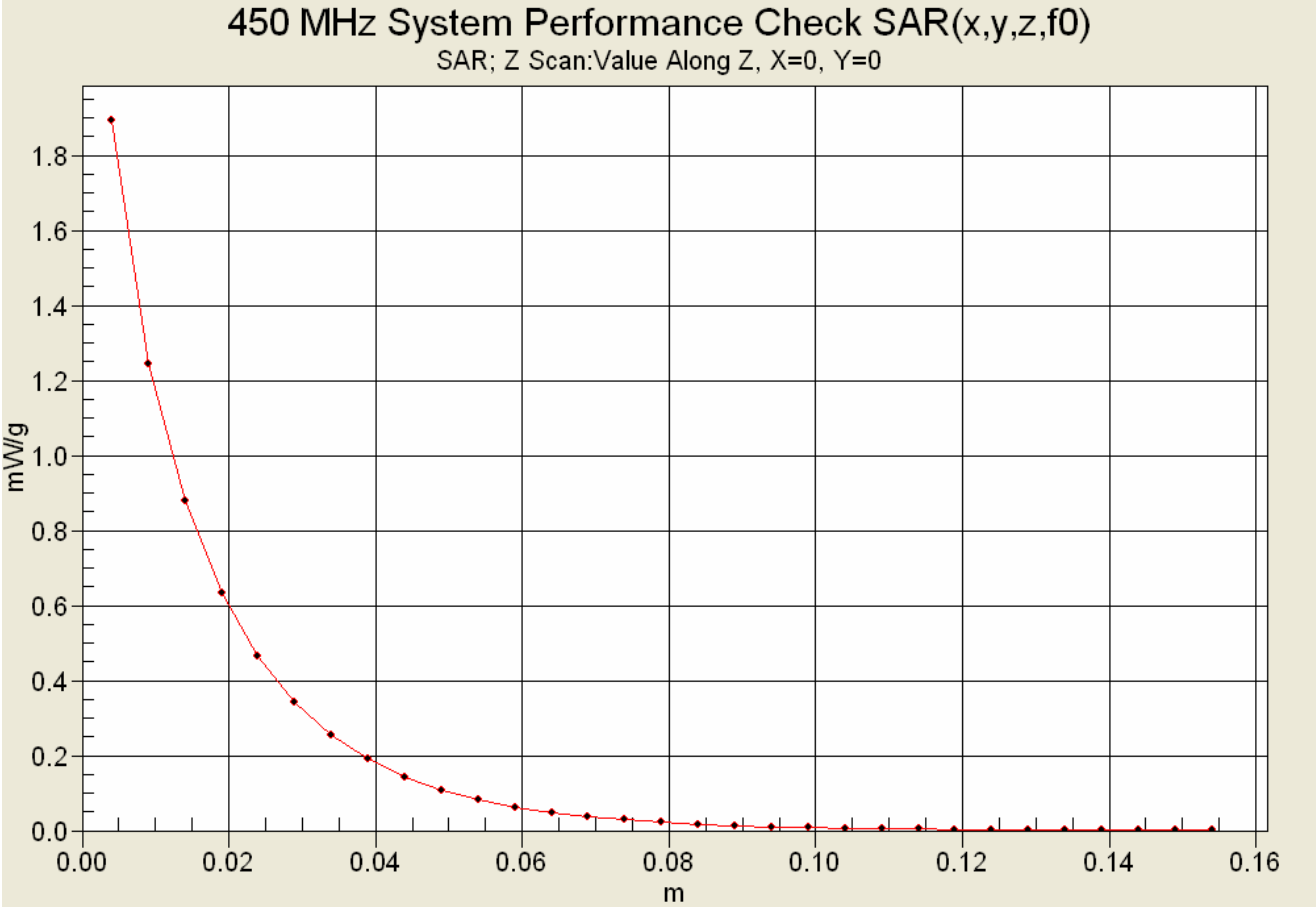
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.91 mho/m; ε_r = 57.7; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.71 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 45.7 V/m; Power Drift = 0.069 dB
Peak SAR (extrapolated) = 2.84 W/kg
SAR(1 g) = 1.78 mW/g; SAR(10 g) = 1.18 mW/g
Maximum value of SAR (measured) = 1.88 mW/g



Z-Axis Scan



Date Tested: 08/09/2010

System Performance Check - 450 MHz Dipole - Body

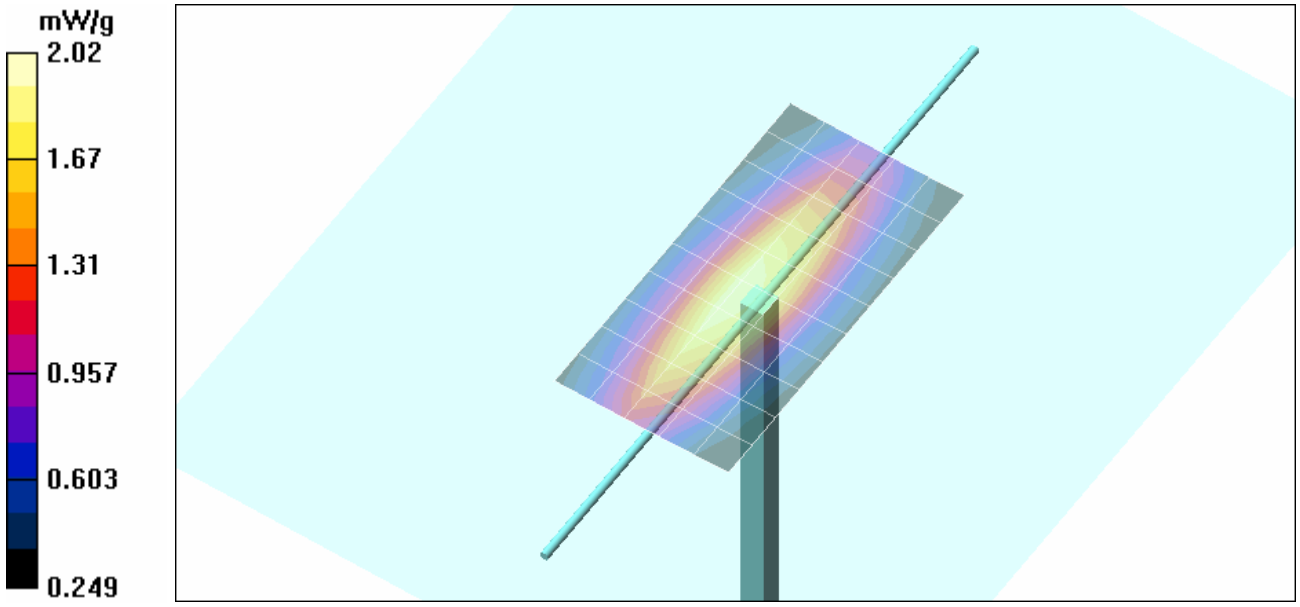
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

Ambient Temp: 21.0°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

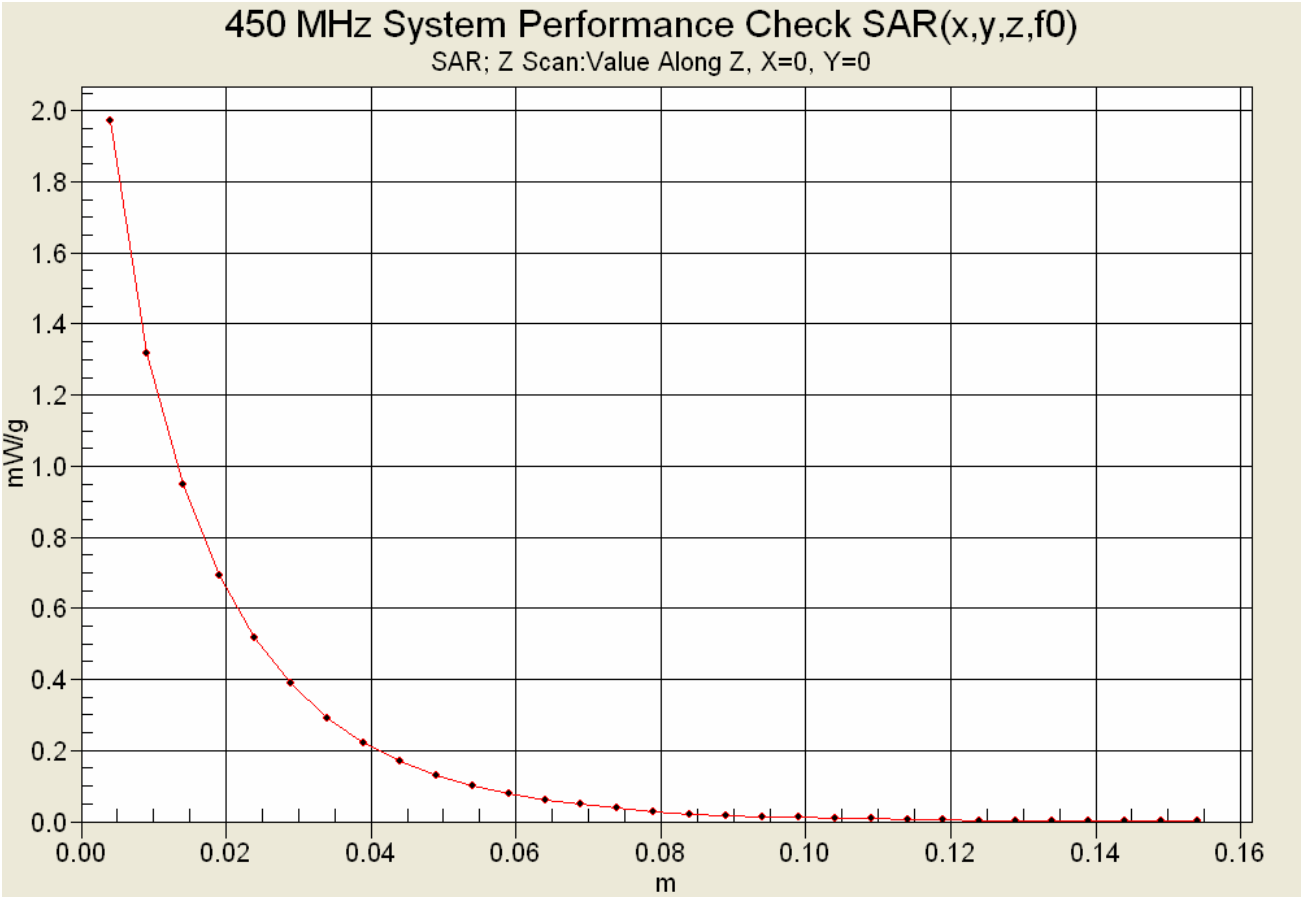
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.94 mho/m; ε_r = 55.5; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.91 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 46.4 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 3.03 W/kg
SAR(1 g) = 1.9 mW/g; SAR(10 g) = 1.28 mW/g
Maximum value of SAR (measured) = 2.02 mW/g



Z-Axis Scan



Date Tested: 08/10/2010

System Performance Check - 450 MHz Dipole - Body

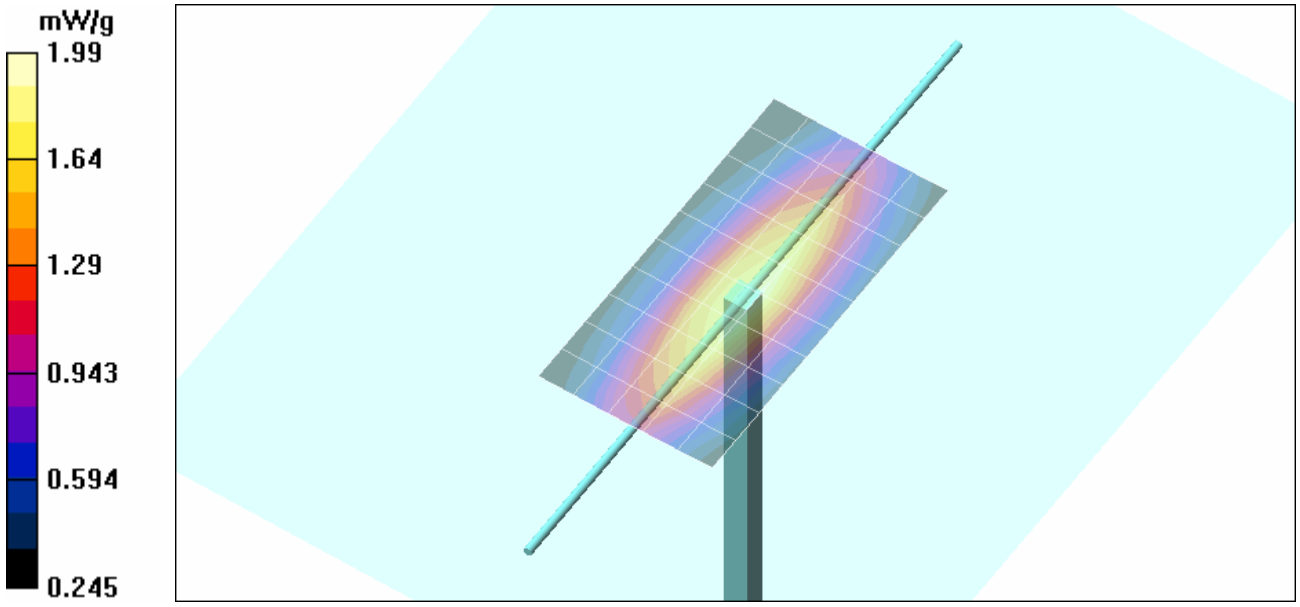
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

Ambient Temp: 21.0°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

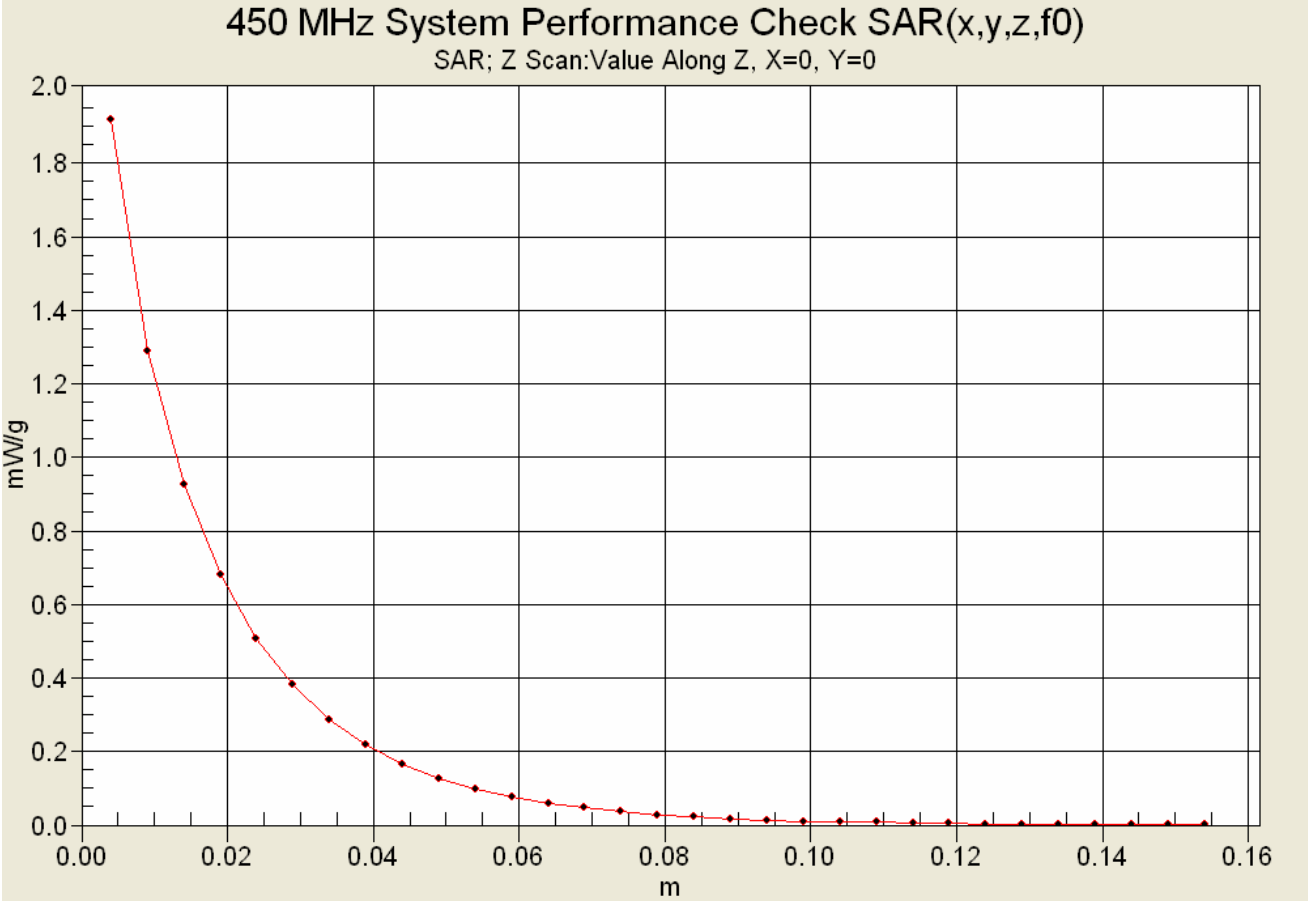
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.92 mho/m; ε_r = 57.3; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.92 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 45.7 V/m; Power Drift = 0.070 dB
Peak SAR (extrapolated) = 3.01 W/kg
SAR(1 g) = 1.88 mW/g; SAR(10 g) = 1.26 mW/g
Maximum value of SAR (measured) = 1.99 mW/g



Z-Axis Scan



Date Tested: 08/11/2010

System Performance Check - 450 MHz Dipole - Body

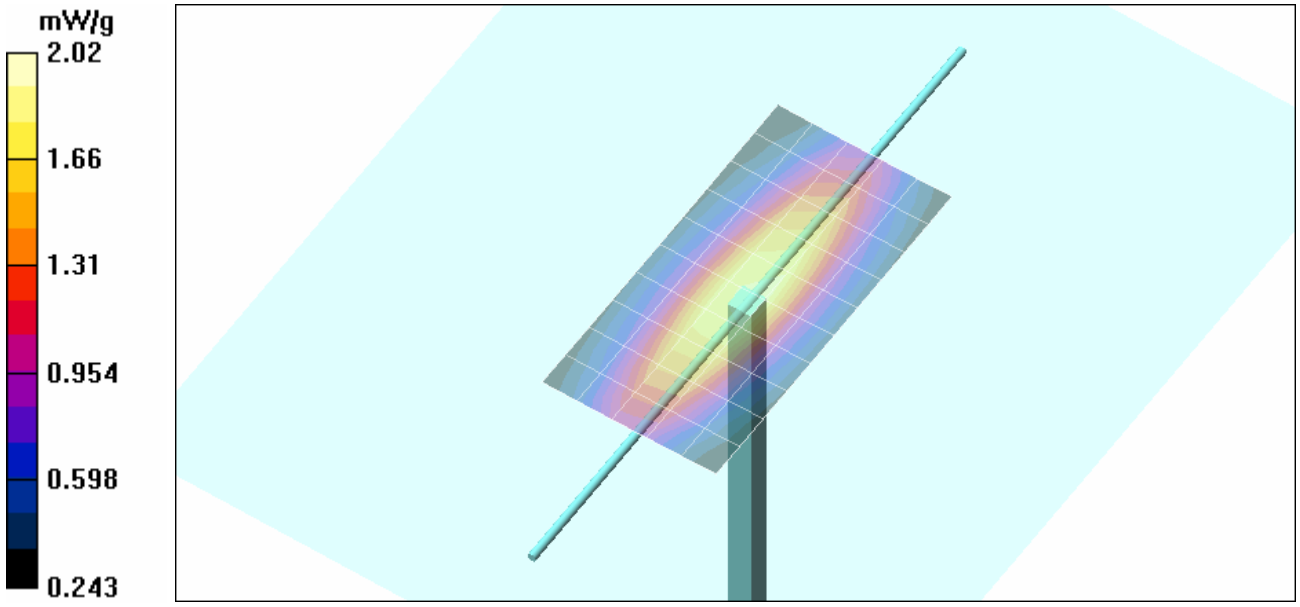
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

Ambient Temp: 20.0°C; Fluid Temp: 22.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

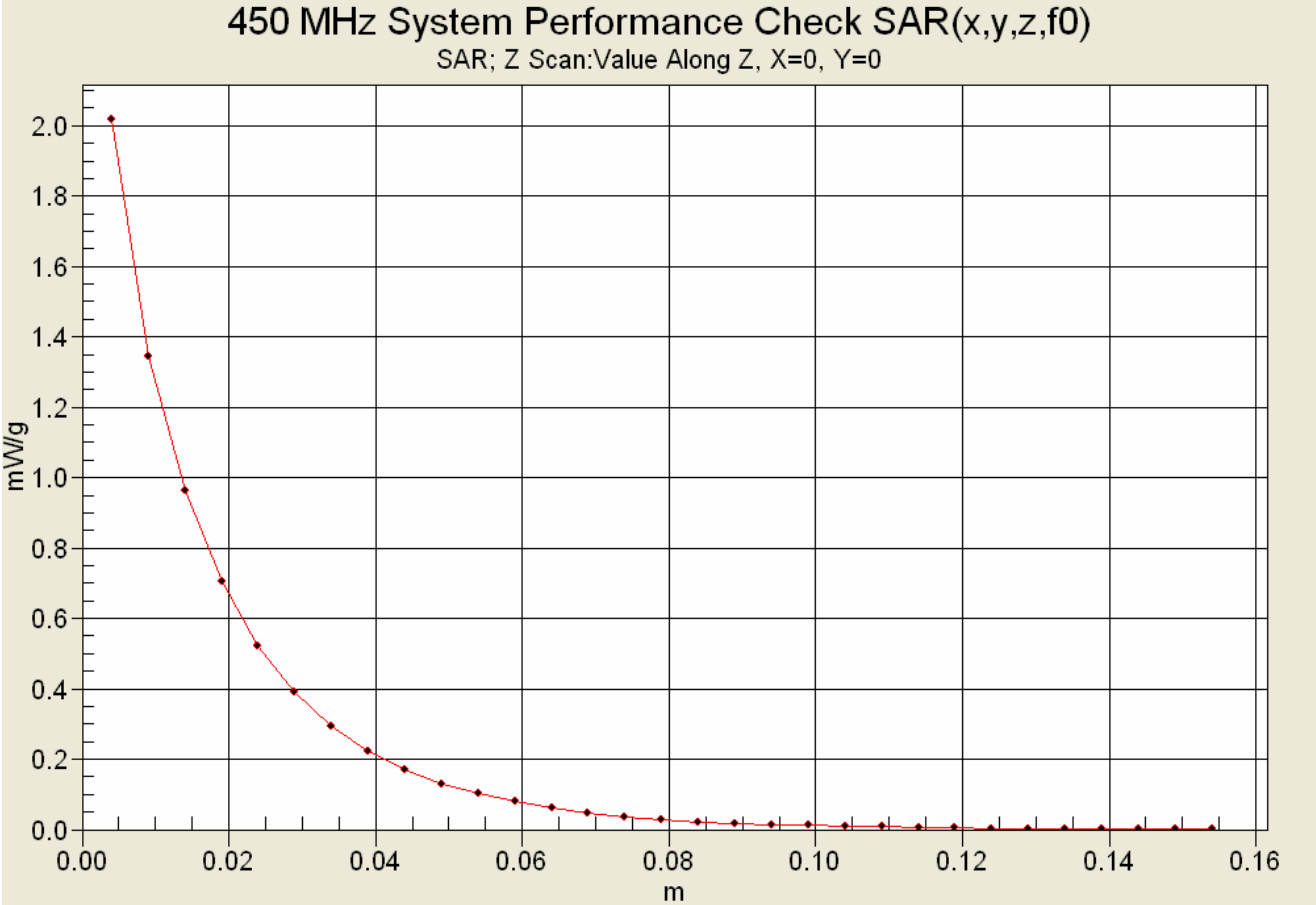
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.92 mho/m; ε_r = 55.7; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.85 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 47.1 V/m; Power Drift = 0.020 dB
Peak SAR (extrapolated) = 3.01 W/kg
SAR(1 g) = 1.9 mW/g; SAR(10 g) = 1.28 mW/g
Maximum value of SAR (measured) = 2.02 mW/g



Z-Axis Scan


450 MHz System Performance Check SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date Tested: 08/12/2010

System Performance Check - 450 MHz Dipole - Body

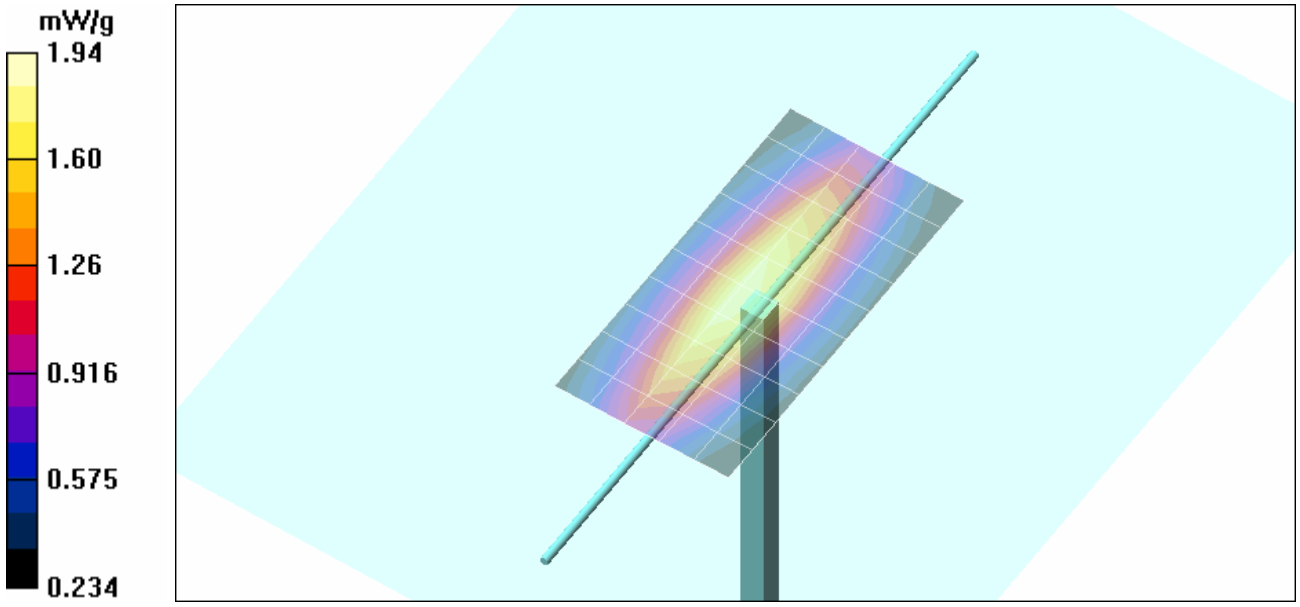
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

Ambient Temp: 20.0°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

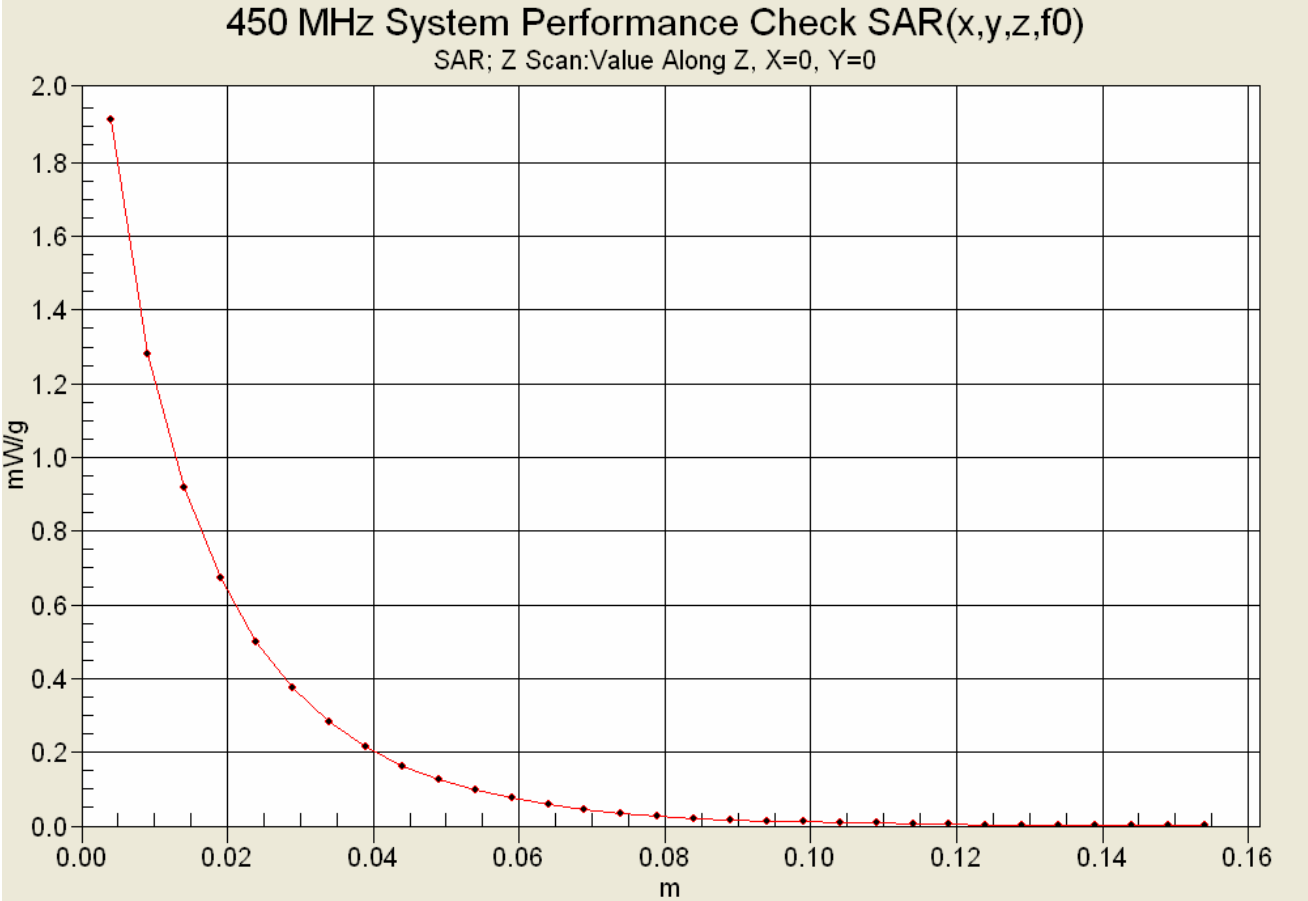
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.90 mho/m; ε_r = 58; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.82 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 46.5 V/m; Power Drift = 0.002 dB
Peak SAR (extrapolated) = 2.90 W/kg
SAR(1 g) = 1.82 mW/g; SAR(10 g) = 1.23 mW/g
Maximum value of SAR (measured) = 1.94 mW/g



Z-Axis Scan



Date Tested: 08/13/2010

System Performance Check - 450 MHz Dipole - Body

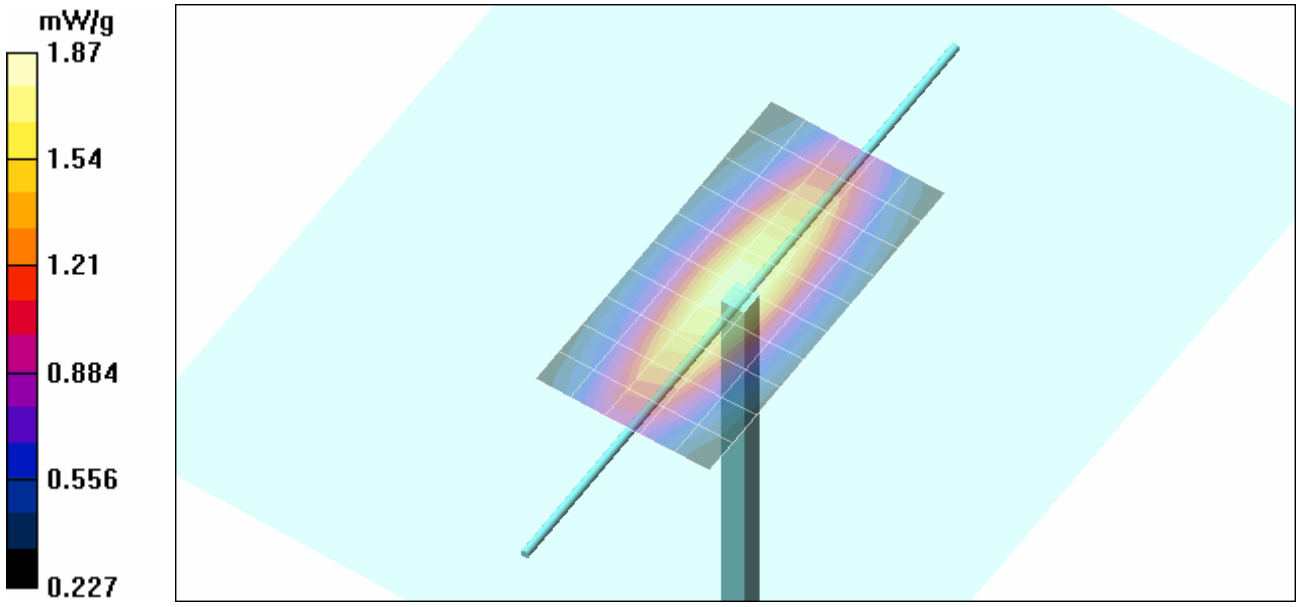
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

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

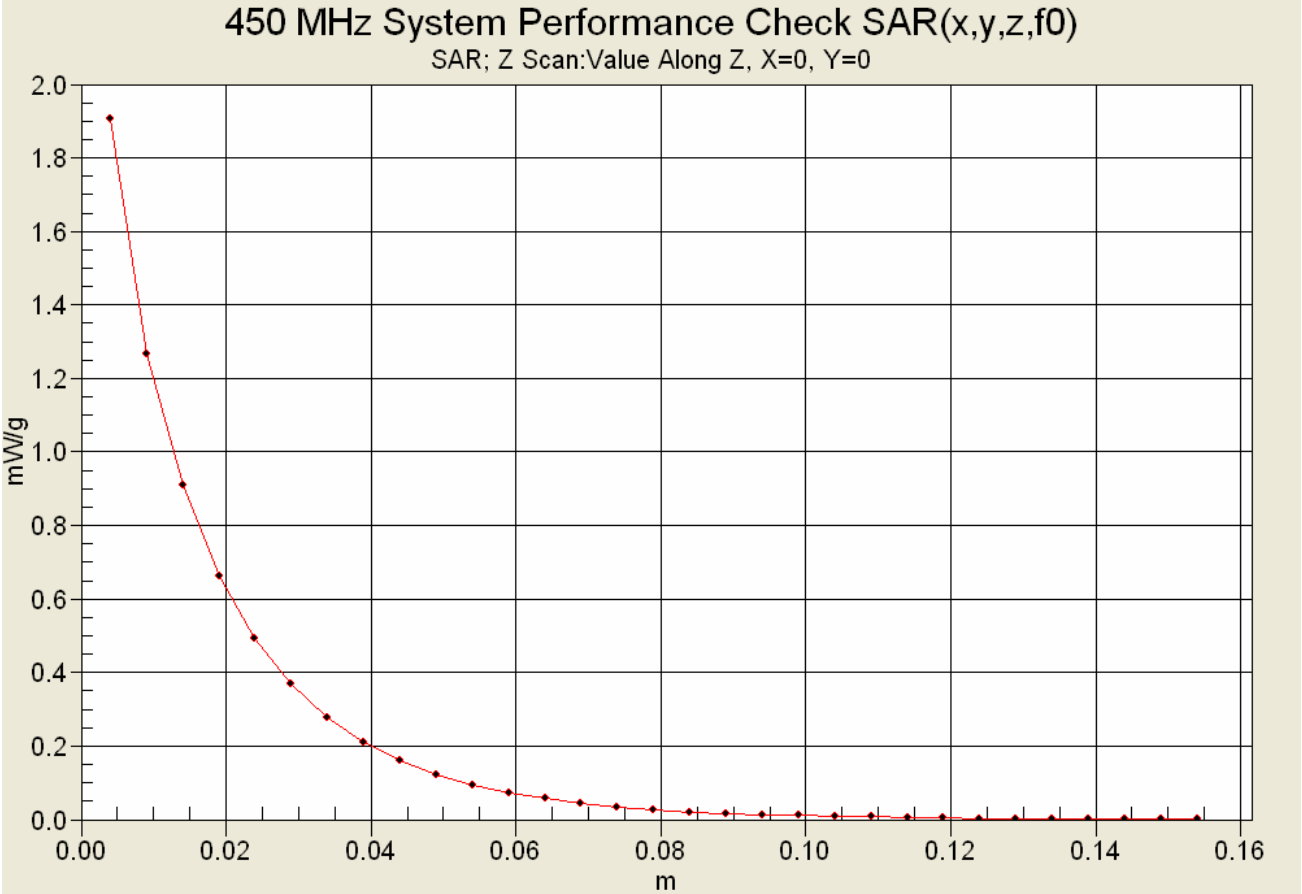
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.90 mho/m; ε_r = 55.1; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.71 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 45.8 V/m; Power Drift = 0.105 dB
Peak SAR (extrapolated) = 2.83 W/kg
SAR(1 g) = 1.77 mW/g; SAR(10 g) = 1.2 mW/g
Maximum value of SAR (measured) = 1.87 mW/g



Z-Axis Scan



Date Tested: 08/16/2010

System Performance Check - 450 MHz Dipole - Body

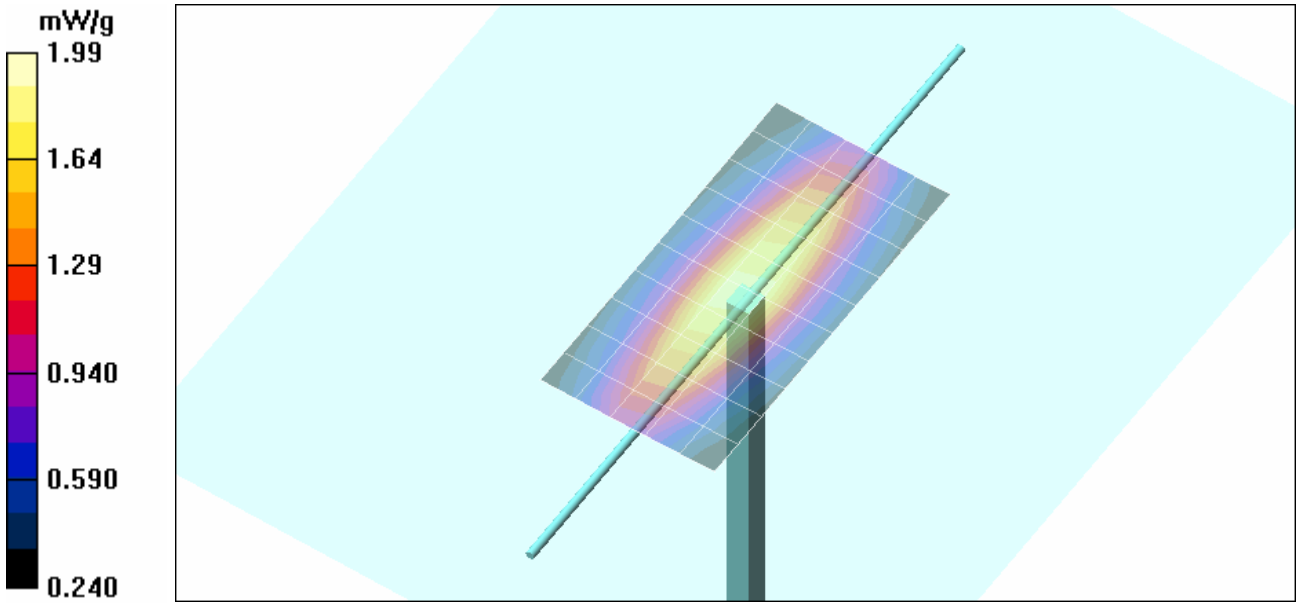
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

Ambient Temp: 22.0°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

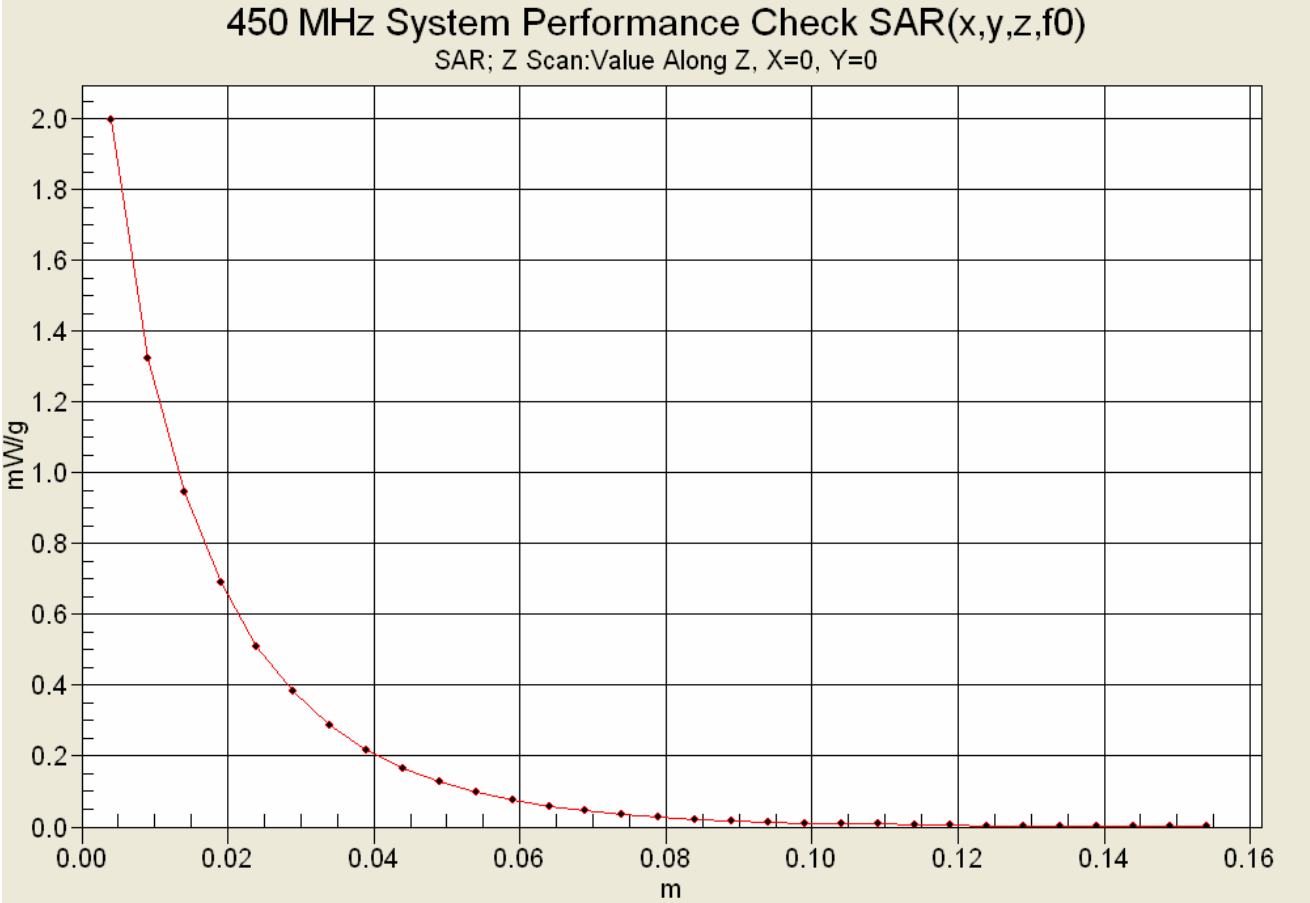
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.93 mho/m; ε_r = 56; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.81 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 46.6 V/m; Power Drift = 0.012 dB
Peak SAR (extrapolated) = 2.83 W/kg
SAR(1 g) = 1.88 mW/g; SAR(10 g) = 1.26 mW/g
Maximum value of SAR (measured) = 1.99 mW/g



Z-Axis Scan



Date Tested: 08/17/2010

System Performance Check - 450 MHz Dipole - Head

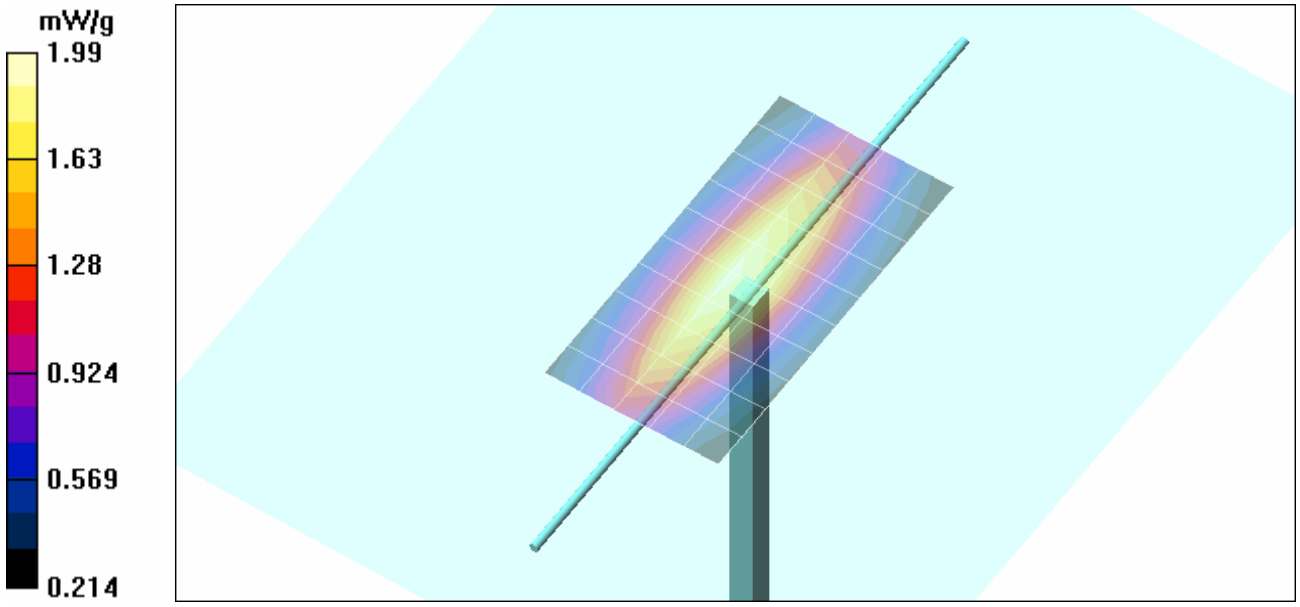
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

Ambient Temp: 23.0°C; Fluid Temp: 23.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

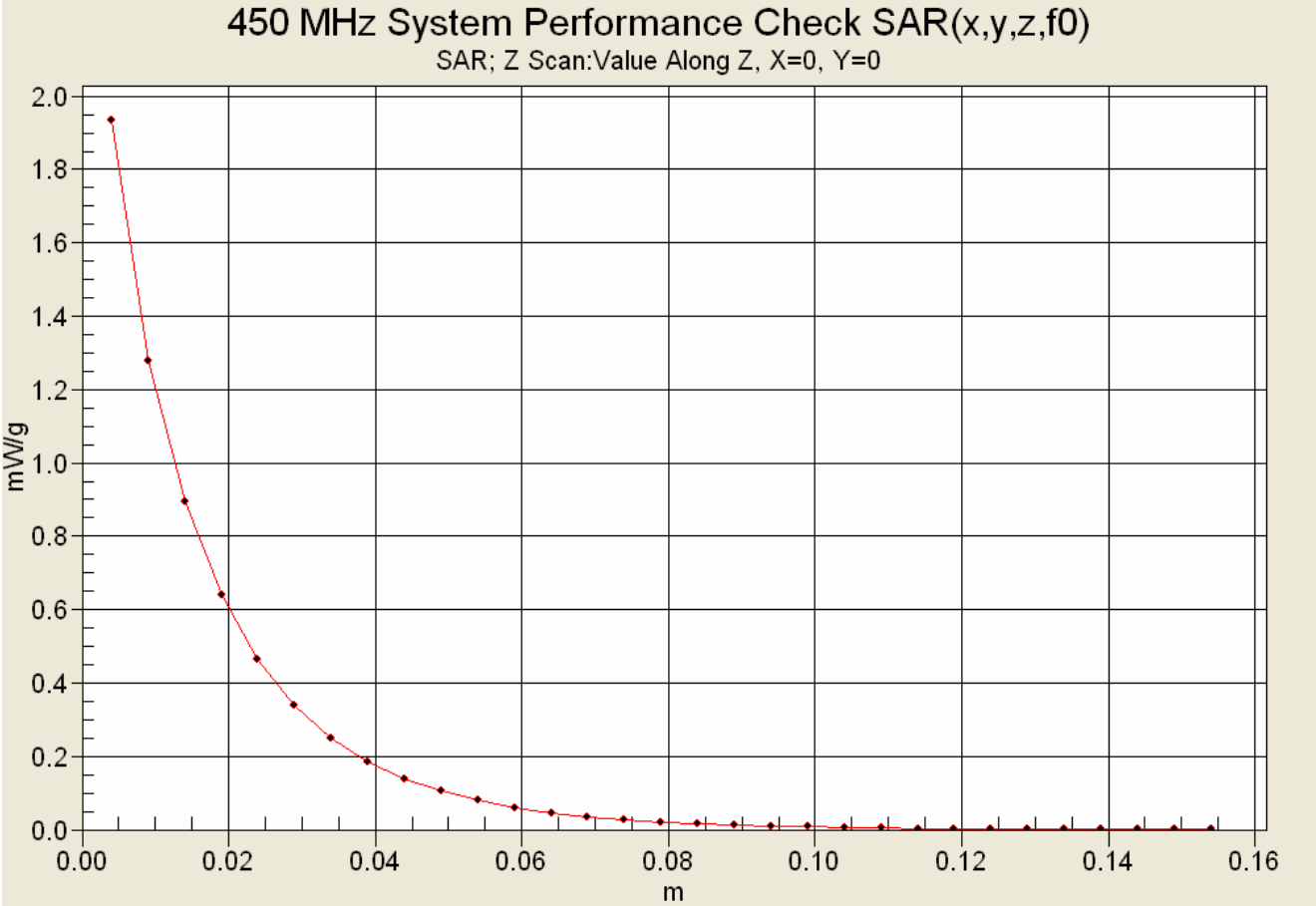
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: HSL450 Medium parameters used: f = 450 MHz; σ = 0.83 mho/m; ε_r = 43; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.25, 7.25, 7.25); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.93 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 49.2 V/m; Power Drift = -0.022 dB
Peak SAR (extrapolated) = 2.95 W/kg
SAR(1 g) = 1.86 mW/g; SAR(10 g) = 1.23 mW/g
Maximum value of SAR (measured) = 1.99 mW/g



Z-Axis Scan


450 MHz System Performance Check SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date Tested: 08/31/2010

System Performance Check - 450 MHz Dipole - Body

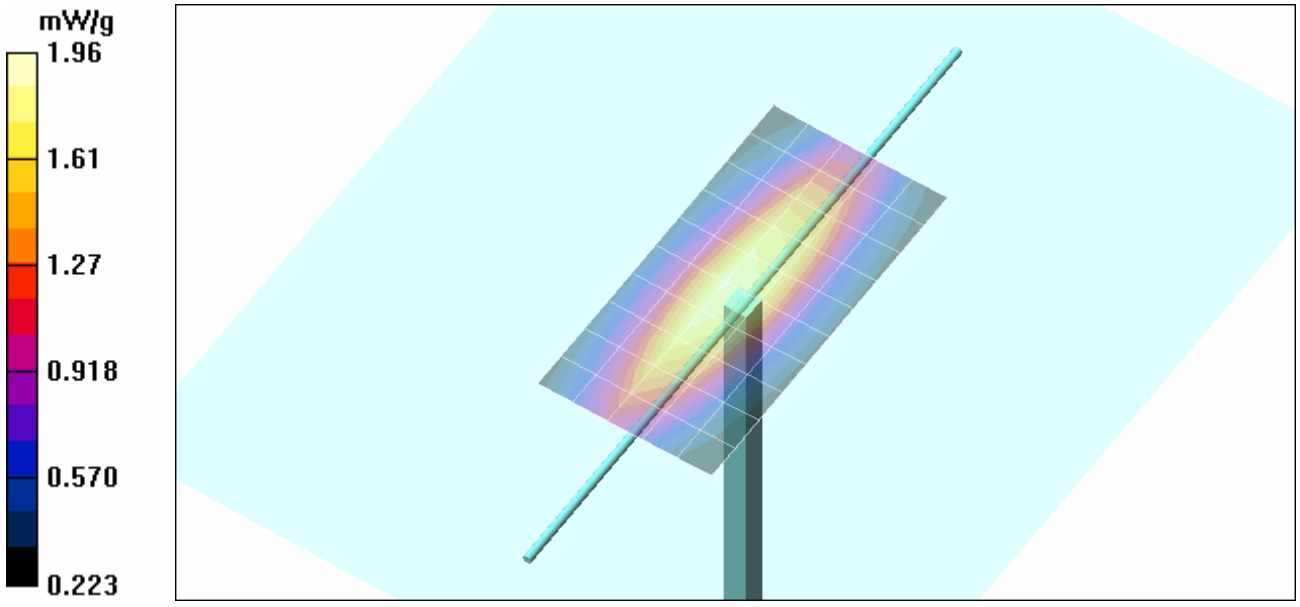
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

Ambient Temp: 20.0°C; Fluid Temp: 22.5°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

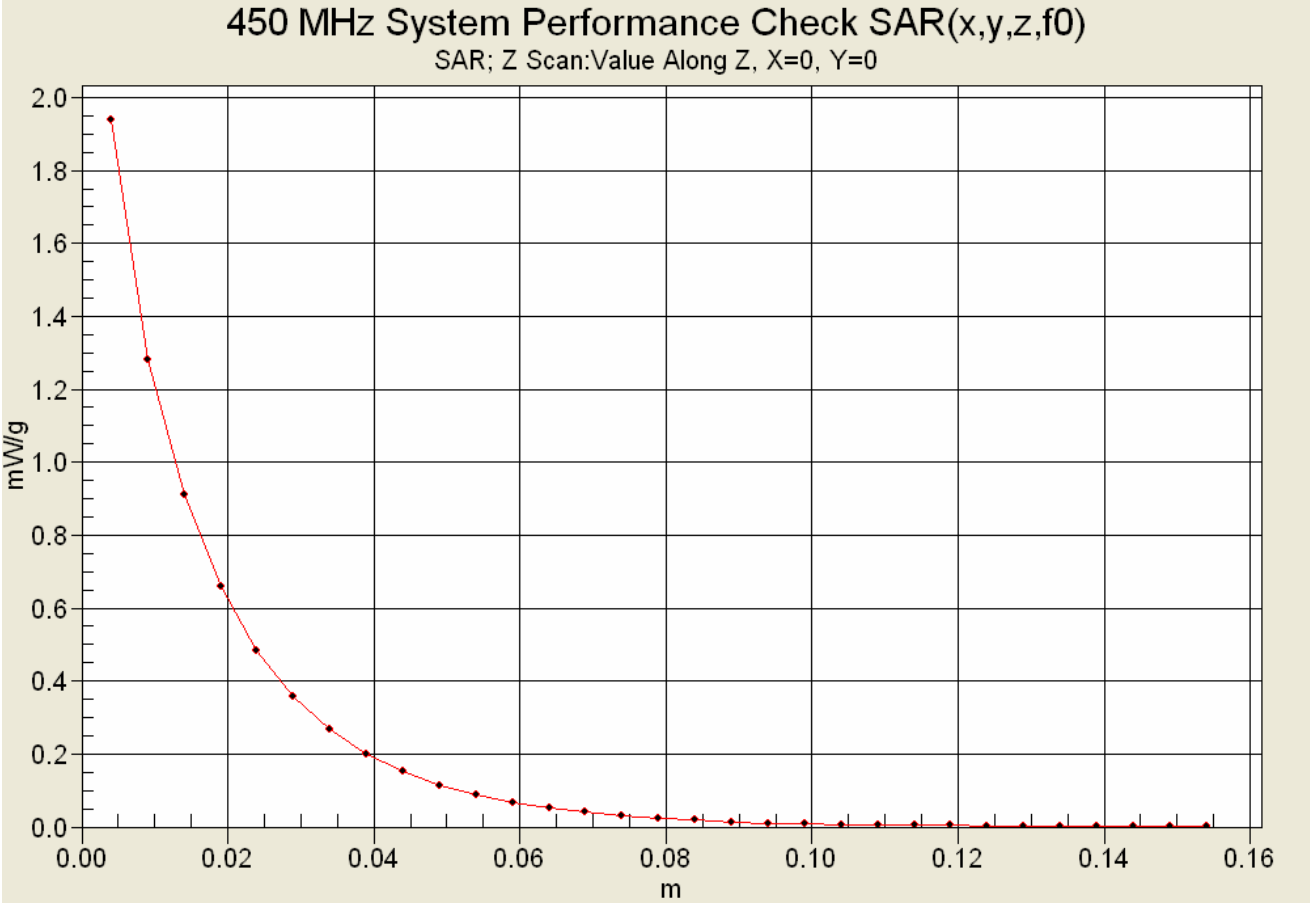
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.9 mho/m; ε_r = 56.8; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.87 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 47.0 V/m; Power Drift = -0.023 dB
Peak SAR (extrapolated) = 2.94 W/kg
SAR(1 g) = 1.85 mW/g; SAR(10 g) = 1.23 mW/g
Maximum value of SAR (measured) = 1.96 mW/g



Z-Axis Scan



Date Tested: 09/01/2010

System Performance Check - 450 MHz Dipole - Body

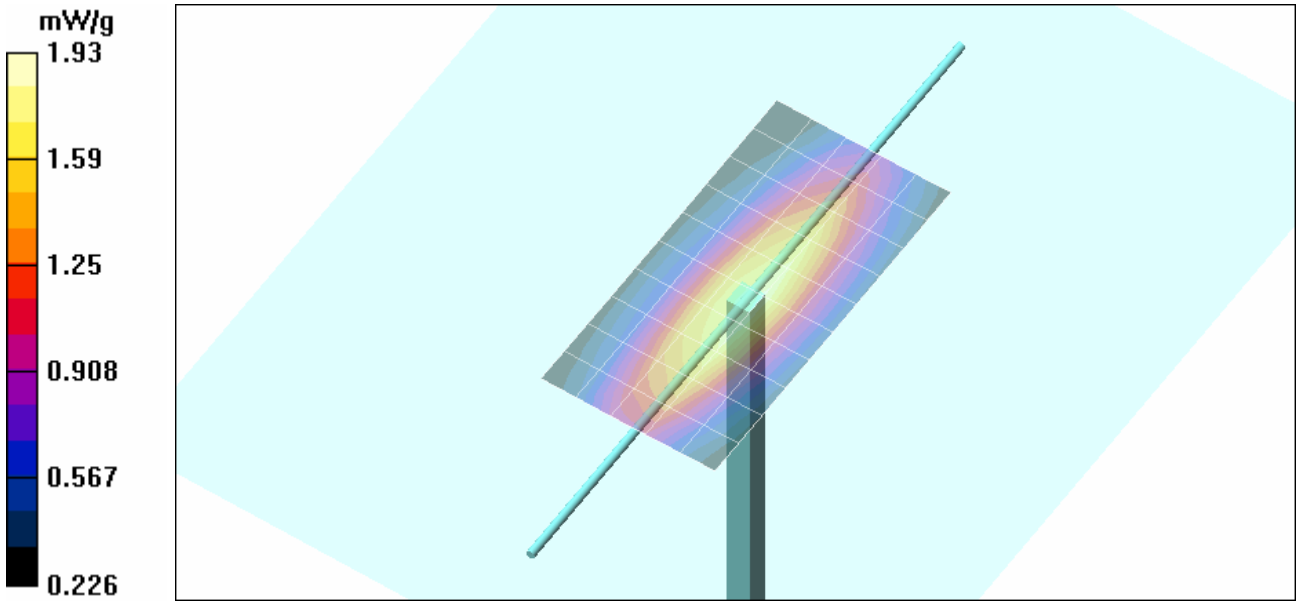
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

Ambient Temp: 21.0°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

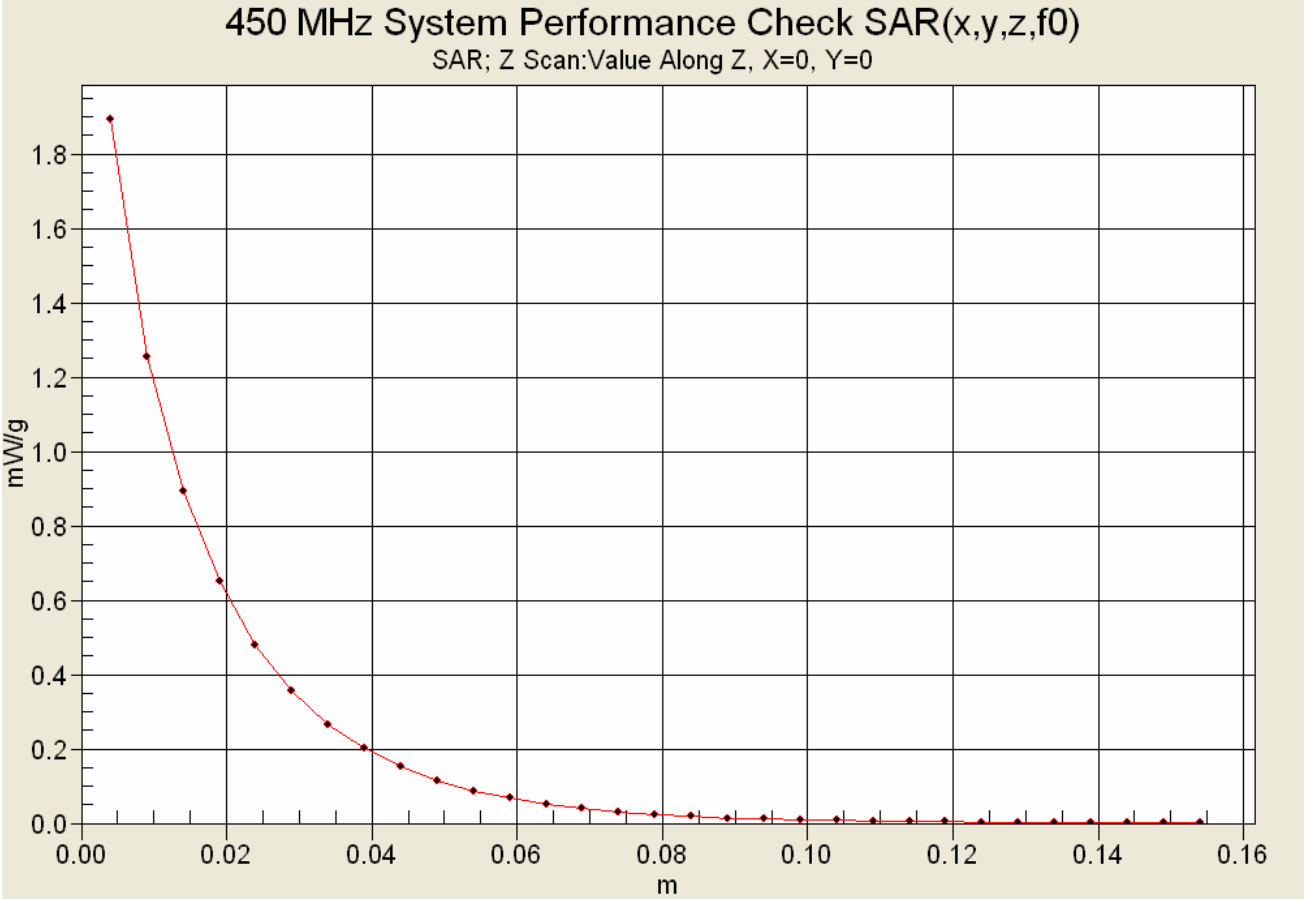
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.91 mho/m; ε_r = 56.9; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.85 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 45.6 V/m; Power Drift = 0.064 dB
Peak SAR (extrapolated) = 2.94 W/kg
SAR(1 g) = 1.82 mW/g; SAR(10 g) = 1.21 mW/g
Maximum value of SAR (measured) = 1.93 mW/g



Z-Axis Scan



Date Tested: 09/02/2010

System Performance Check - 450 MHz Dipole - Body

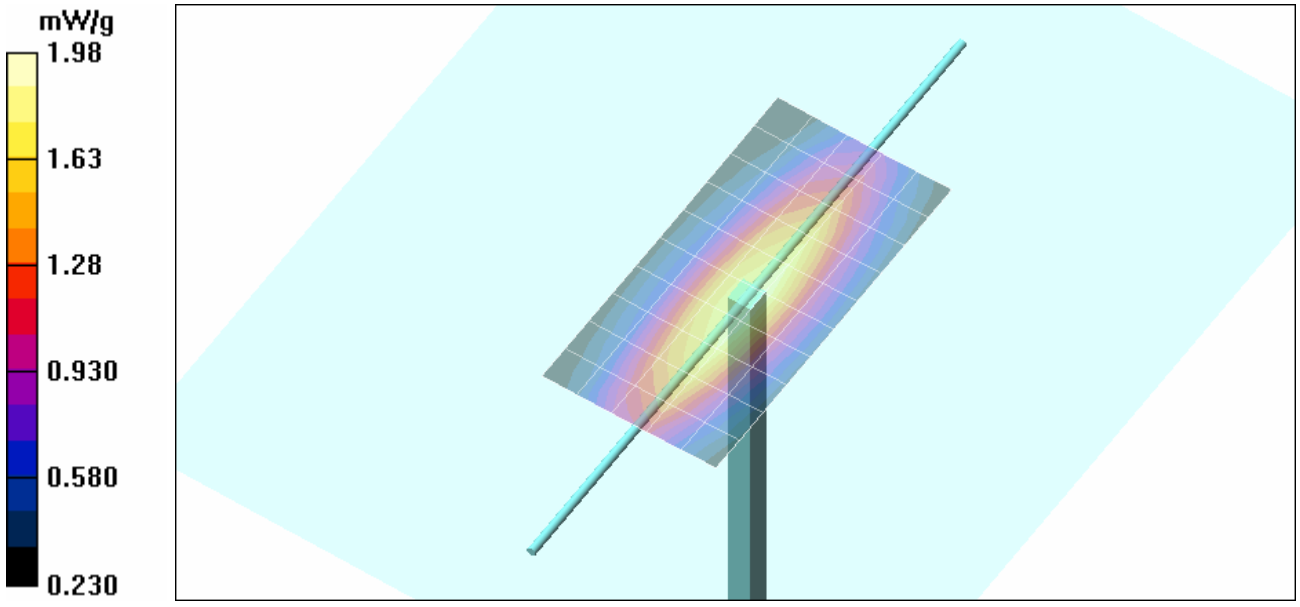
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

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

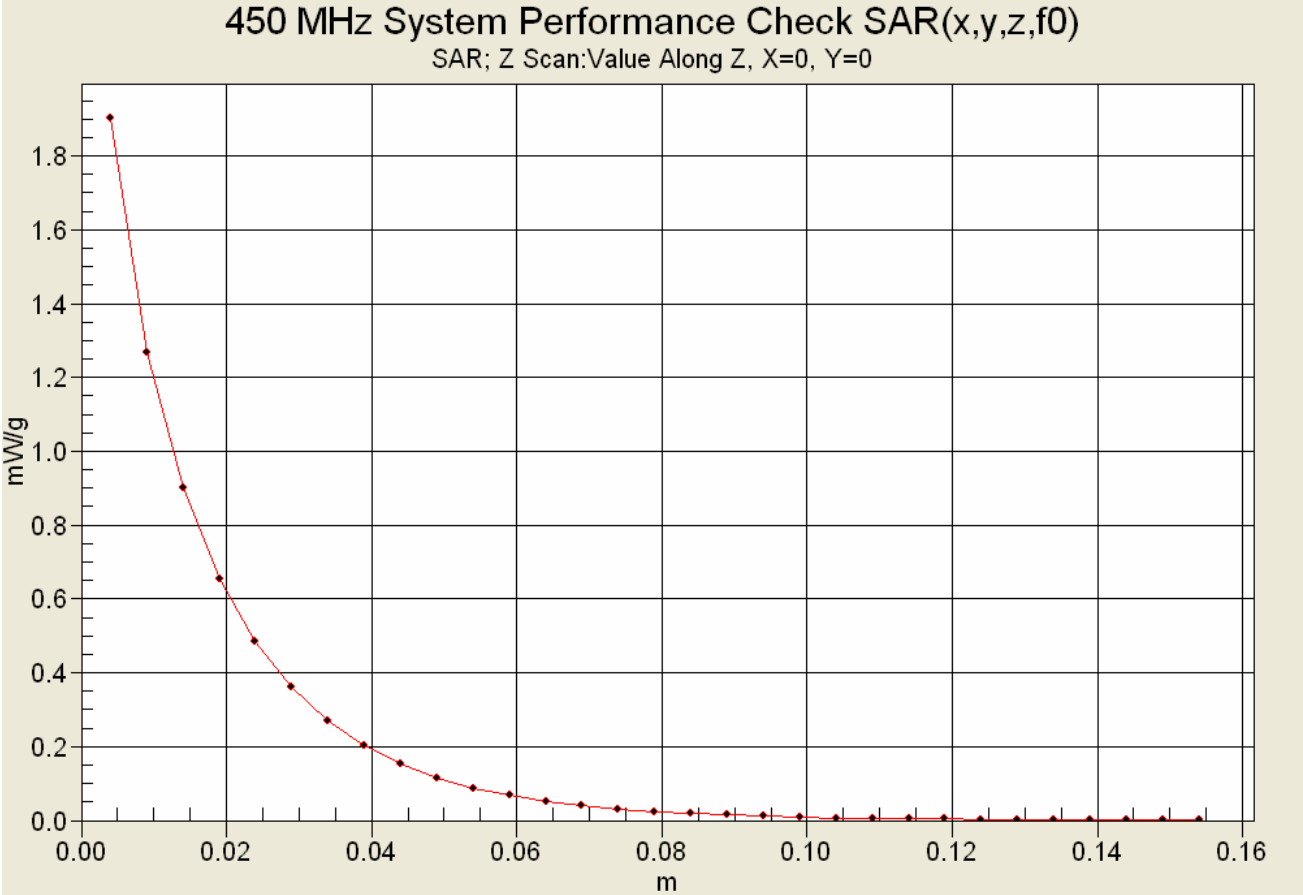
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.91 mho/m; ε_r = 57.4; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.89 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 45.7 V/m; Power Drift = 0.103 dB
Peak SAR (extrapolated) = 3.01 W/kg
SAR(1 g) = 1.87 mW/g; SAR(10 g) = 1.24 mW/g
Maximum value of SAR (measured) = 1.98 mW/g



Z-Axis Scan



Date Tested: 09/03/2010

System Performance Check - 450 MHz Dipole - Body

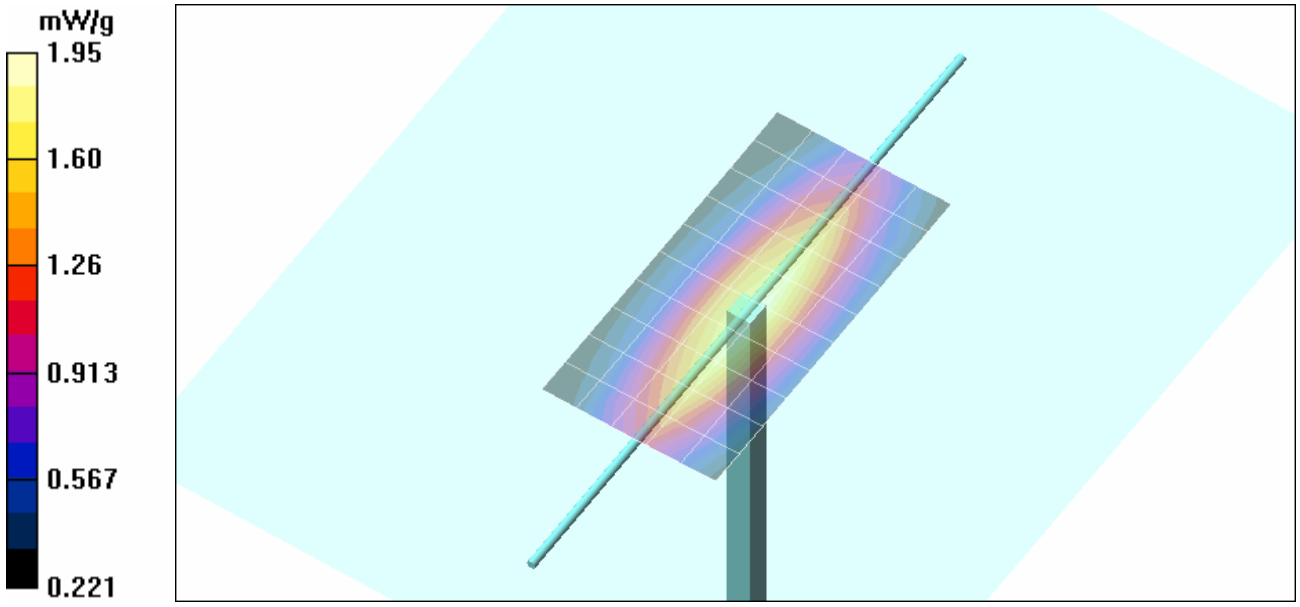
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

Ambient Temp: 23.0°C; Fluid Temp: 23.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

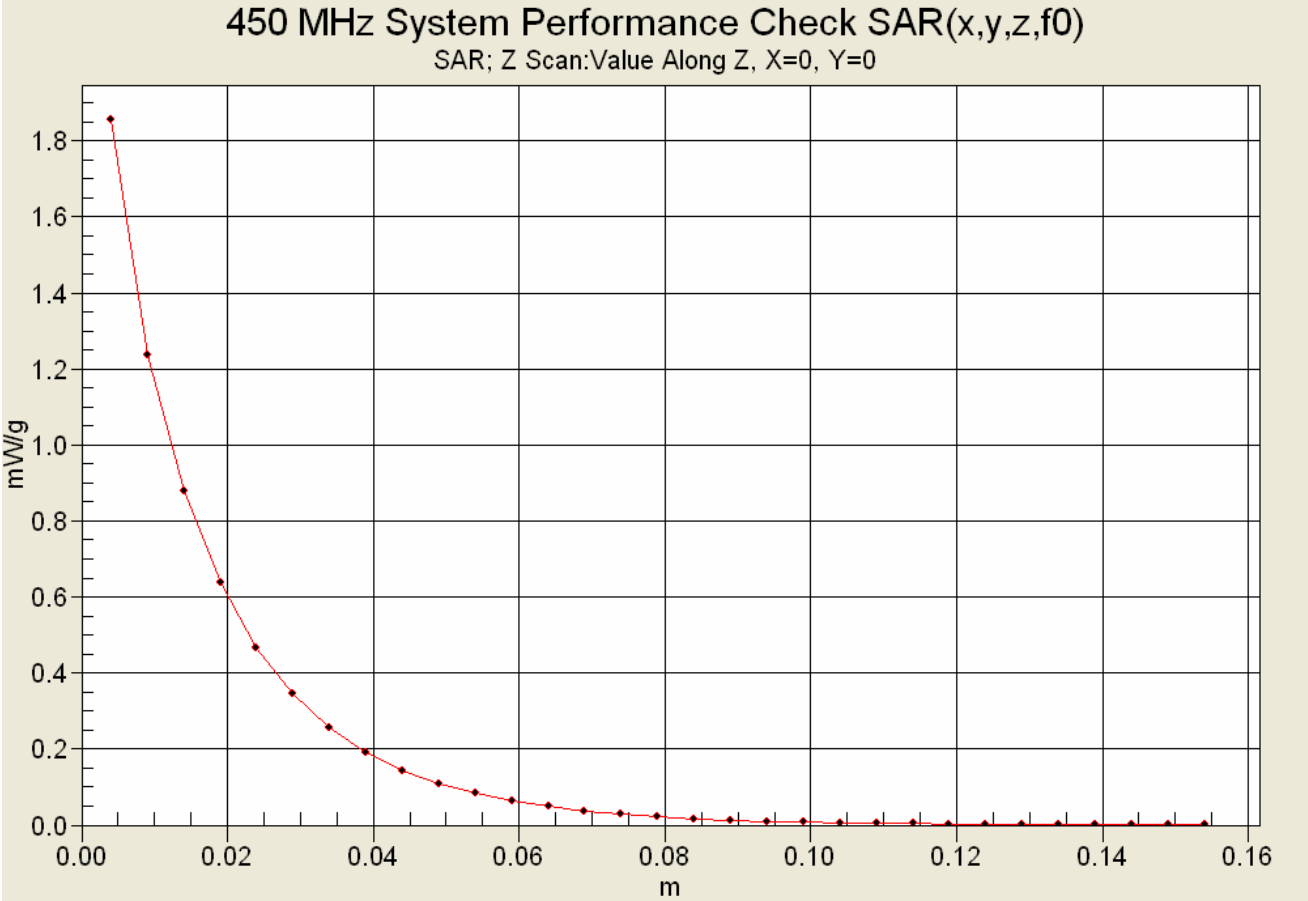
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.92 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.91 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 44.9 V/m; Power Drift = 0.087 dB
Peak SAR (extrapolated) = 2.95 W/kg
SAR(1 g) = 1.86 mW/g; SAR(10 g) = 1.23 mW/g
Maximum value of SAR (measured) = 1.95 mW/g



Z-Axis Scan



Date Tested: 09/07/2010

System Performance Check - 450 MHz Dipole - Body

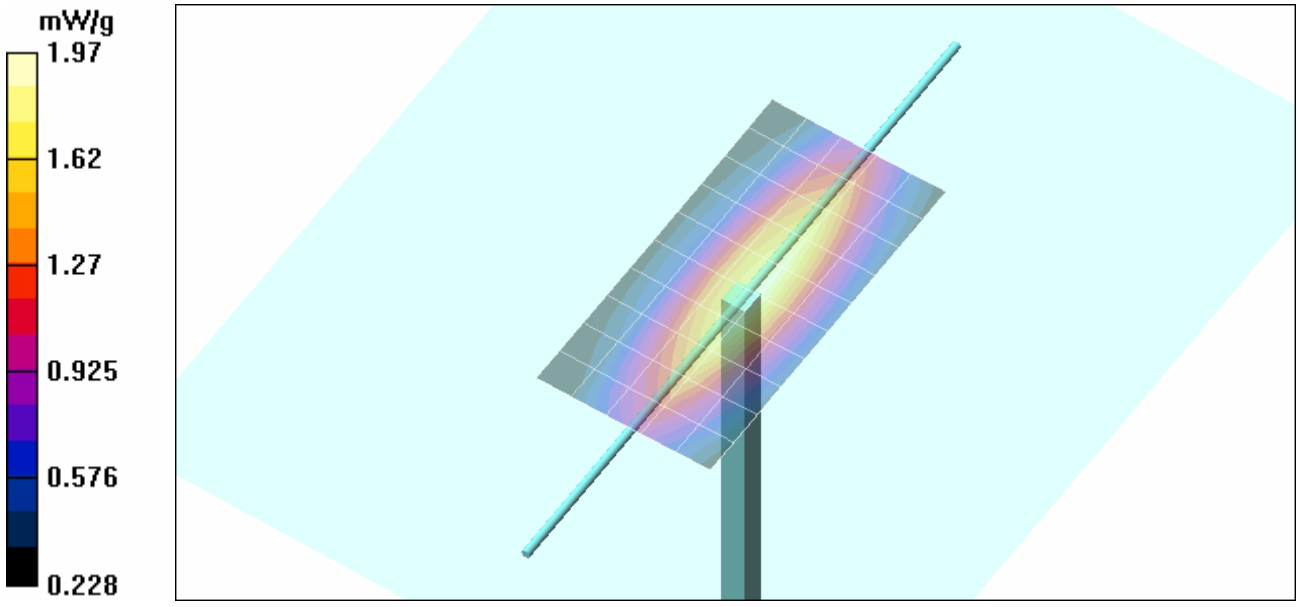
DUT: Dipole D450V3; Asset: 00217; Serial: 1068; Calibration: 01/18/2010

Ambient Temp: 21.5°C; Fluid Temp: 22.0°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

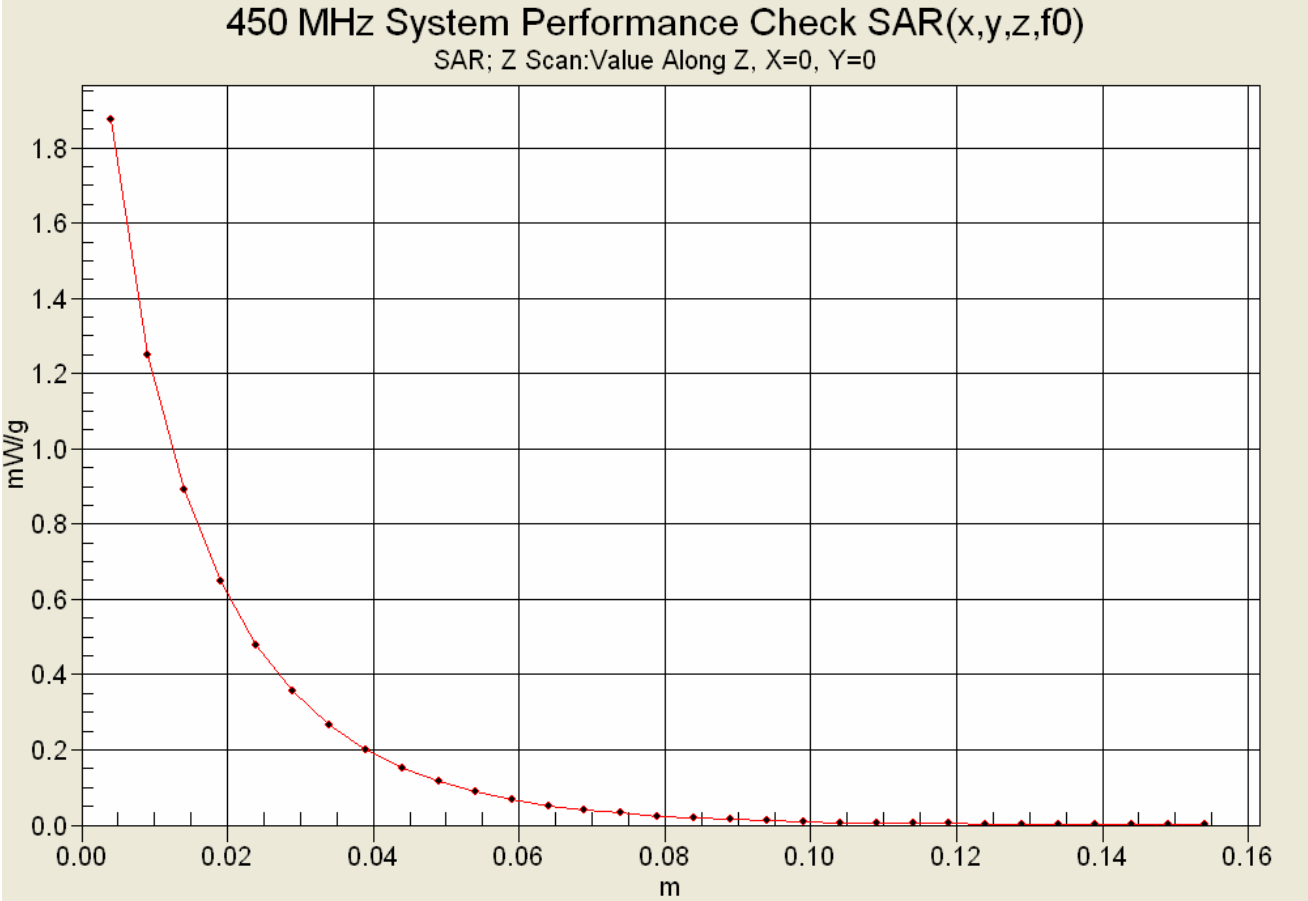
Communication System: CW
Forward Conducted Power: 398 mW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; σ = 0.9 mho/m; ε_r = 57; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (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

System Performance Check - 450 MHz Dipole
Head d=15mm Pin=398mW 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.93 mW/g
Head d=15mm Pin=398mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 45.7 V/m; Power Drift = 0.077 dB
Peak SAR (extrapolated) = 2.98 W/kg
SAR(1 g) = 1.85 mW/g; SAR(10 g) = 1.23 mW/g
Maximum value of SAR (measured) = 1.97 mW/g



Z-Axis Scan



APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

450 MHz Body

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Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
05/Aug/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
0.3500	57.70	0.93	57.37	0.83
0.3600	57.60	0.93	57.12	0.84
0.3700	57.50	0.93	57.09	0.85
0.3800	57.40	0.93	57.14	0.86
0.3900	57.30	0.93	56.98	0.86
0.4000	57.20	0.93	57.05	0.88
0.4100	57.10	0.93	57.14	0.88
0.4200	57.00	0.94	56.38	0.89
0.4300	56.90	0.94	56.17	0.91
0.4400	56.80	0.94	56.34	0.90
0.4500	56.70	0.94	56.31	0.92
0.4600	56.66	0.94	55.66	0.92
0.4700	56.62	0.94	55.59	0.92
0.4800	56.58	0.94	56.44	0.94
0.4900	56.54	0.94	55.79	0.95
0.5000	56.51	0.94	55.81	0.97
0.5100	56.47	0.94	55.73	0.96
0.5200	56.43	0.95	55.31	0.97
0.5300	56.39	0.95	54.94	0.97
0.5400	56.35	0.95	55.28	1.00
0.5500	56.31	0.95	54.82	1.00

450 MHz Body

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Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
06/Aug/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
0.3500	57.70	0.93	59.18	0.82
0.3600	57.60	0.93	59.70	0.84
0.3700	57.50	0.93	58.46	0.85
0.3800	57.40	0.93	58.29	0.85
0.3900	57.30	0.93	59.05	0.86
0.4000	57.20	0.93	58.67	0.87
0.4100	57.10	0.93	58.33	0.87
0.4200	57.00	0.94	57.77	0.88
0.4300	56.90	0.94	57.80	0.91
0.4400	56.80	0.94	58.11	0.90
0.4500	56.70	0.94	57.73	0.91
0.4600	56.66	0.94	57.33	0.92
0.4700	56.62	0.94	57.02	0.94
0.4800	56.58	0.94	57.56	0.95
0.4900	56.54	0.94	57.07	0.95
0.5000	56.51	0.94	56.88	0.96
0.5100	56.47	0.94	56.73	0.97
0.5200	56.43	0.95	56.87	0.97
0.5300	56.39	0.95	56.95	0.98
0.5400	56.35	0.95	56.79	1.01
0.5500	56.31	0.95	56.44	1.02

450 MHz Body

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Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
09/Aug/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
0.3500	57.70	0.93	58.04	0.86
0.3600	57.60	0.93	56.88	0.85
0.3700	57.50	0.93	57.50	0.85
0.3800	57.40	0.93	57.31	0.87
0.3900	57.30	0.93	57.16	0.88
0.4000	57.20	0.93	57.39	0.90
0.4100	57.10	0.93	56.62	0.91
0.4200	57.00	0.94	56.93	0.92
0.4300	56.90	0.94	56.39	0.91
0.4400	56.80	0.94	55.92	0.92
0.4500	56.70	0.94	55.54	0.94
0.4600	56.66	0.94	56.30	0.93
0.4700	56.62	0.94	56.12	0.95
0.4800	56.58	0.94	55.67	0.95
0.4900	56.54	0.94	56.05	0.98
0.5000	56.51	0.94	56.50	0.97
0.5100	56.47	0.94	55.49	0.98
0.5200	56.43	0.95	55.29	0.97
0.5300	56.39	0.95	55.02	1.00
0.5400	56.35	0.95	54.92	1.01
0.5500	56.31	0.95	55.46	1.01

450 MHz Body

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Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
10/Aug/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
0.3500	57.70	0.93	58.03	0.83
0.3600	57.60	0.93	58.46	0.83
0.3700	57.50	0.93	57.76	0.83
0.3800	57.40	0.93	58.08	0.86
0.3900	57.30	0.93	57.83	0.87
0.4000	57.20	0.93	57.48	0.86
0.4100	57.10	0.93	57.48	0.88
0.4200	57.00	0.94	57.26	0.89
0.4300	56.90	0.94	57.36	0.89
0.4400	56.80	0.94	57.31	0.90
0.4500	56.70	0.94	57.27	0.92
0.4600	56.66	0.94	56.37	0.93
0.4700	56.62	0.94	56.57	0.92
0.4800	56.58	0.94	56.33	0.93
0.4900	56.54	0.94	56.23	0.94
0.5000	56.51	0.94	56.40	0.95
0.5100	56.47	0.94	55.95	0.96
0.5200	56.43	0.95	55.89	0.97
0.5300	56.39	0.95	55.52	0.98
0.5400	56.35	0.95	55.41	0.99
0.5500	56.31	0.95	55.80	1.00

450 MHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
11/Aug/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
0.3500	57.70	0.93	57.33	0.83
0.3600	57.60	0.93	57.30	0.85
0.3700	57.50	0.93	57.27	0.86
0.3800	57.40	0.93	57.40	0.88
0.3900	57.30	0.93	56.97	0.86
0.4000	57.20	0.93	56.90	0.86
0.4100	57.10	0.93	56.09	0.89
0.4200	57.00	0.94	56.51	0.89
0.4300	56.90	0.94	55.80	0.91
0.4400	56.80	0.94	55.88	0.91
0.4500	56.70	0.94	55.74	0.92
0.4600	56.66	0.94	55.41	0.94
0.4700	56.62	0.94	56.34	0.94
0.4800	56.58	0.94	55.24	0.93
0.4900	56.54	0.94	55.12	0.95
0.5000	56.51	0.94	55.88	0.97
0.5100	56.47	0.94	55.30	0.98
0.5200	56.43	0.95	54.77	0.98
0.5300	56.39	0.95	54.72	0.99
0.5400	56.35	0.95	55.59	1.00
0.5500	56.31	0.95	54.93	1.01

450 MHz Body

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Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
12/Aug/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
0.3500	57.70	0.93	59.99	0.80
0.3600	57.60	0.93	60.10	0.81
0.3700	57.50	0.93	59.57	0.81
0.3800	57.40	0.93	58.67	0.82
0.3900	57.30	0.93	60.20	0.86
0.4000	57.20	0.93	58.41	0.84
0.4100	57.10	0.93	58.55	0.86
0.4200	57.00	0.94	59.06	0.87
0.4300	56.90	0.94	58.04	0.86
0.4400	56.80	0.94	58.56	0.88
0.4500	56.70	0.94	57.99	0.90
0.4600	56.66	0.94	58.29	0.90
0.4700	56.62	0.94	57.34	0.93
0.4800	56.58	0.94	57.46	0.93
0.4900	56.54	0.94	58.17	0.94
0.5000	56.51	0.94	57.46	0.95
0.5100	56.47	0.94	57.28	0.96
0.5200	56.43	0.95	56.96	0.96
0.5300	56.39	0.95	56.85	0.98
0.5400	56.35	0.95	57.12	0.98
0.5500	56.31	0.95	56.48	1.00

450 MHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
13/Aug/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
0.3500	57.70	0.93	56.76	0.81
0.3600	57.60	0.93	56.27	0.83
0.3700	57.50	0.93	55.94	0.84
0.3800	57.40	0.93	55.70	0.83
0.3900	57.30	0.93	55.74	0.86
0.4000	57.20	0.93	55.57	0.86
0.4100	57.10	0.93	55.88	0.87
0.4200	57.00	0.94	55.16	0.88
0.4300	56.90	0.94	55.42	0.89
0.4400	56.80	0.94	54.96	0.90
0.4500	56.70	0.94	55.12	0.90
0.4600	56.66	0.94	55.36	0.90
0.4700	56.62	0.94	55.23	0.92
0.4800	56.58	0.94	55.27	0.93
0.4900	56.54	0.94	54.75	0.94
0.5000	56.51	0.94	54.68	0.94
0.5100	56.47	0.94	54.20	0.97
0.5200	56.43	0.95	54.40	0.96
0.5300	56.39	0.95	54.45	0.99
0.5400	56.35	0.95	54.09	0.99
0.5500	56.31	0.95	53.75	1.00

450 MHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
16/Aug/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
0.3500	57.70	0.93	57.41	0.85
0.3600	57.60	0.93	57.00	0.85
0.3700	57.50	0.93	56.78	0.85
0.3800	57.40	0.93	56.51	0.86
0.3900	57.30	0.93	57.43	0.86
0.4000	57.20	0.93	56.06	0.88
0.4100	57.10	0.93	56.90	0.90
0.4200	57.00	0.94	55.77	0.88
0.4300	56.90	0.94	55.86	0.90
0.4400	56.80	0.94	55.85	0.91
0.4500	56.70	0.94	56.03	0.93
0.4600	56.66	0.94	55.84	0.92
0.4700	56.62	0.94	56.11	0.93
0.4800	56.58	0.94	55.08	0.94
0.4900	56.54	0.94	54.93	0.95
0.5000	56.51	0.94	55.39	0.96
0.5100	56.47	0.94	54.90	0.97
0.5200	56.43	0.95	55.00	0.98
0.5300	56.39	0.95	54.27	0.99
0.5400	56.35	0.95	54.67	0.98
0.5500	56.31	0.95	54.48	1.01

450 MHz Head

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
17/Aug/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
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
0.3500	44.70	0.87	45.07	0.75
0.3600	44.58	0.87	45.08	0.75
0.3700	44.46	0.87	44.94	0.76
0.3800	44.34	0.87	44.41	0.78
0.3900	44.22	0.87	43.98	0.78
0.4000	44.10	0.87	44.28	0.80
0.4100	43.98	0.87	43.53	0.80
0.4200	43.86	0.87	43.96	0.82
0.4300	43.74	0.87	43.53	0.82
0.4400	43.62	0.87	43.90	0.83
0.4500	43.50	0.87	43.03	0.83
0.4600	43.45	0.87	43.01	0.84
0.4700	43.40	0.87	43.15	0.86
0.4800	43.34	0.87	42.62	0.87
0.4900	43.29	0.87	42.36	0.87
0.5000	43.24	0.87	42.51	0.88
0.5100	43.19	0.87	42.70	0.89
0.5200	43.14	0.88	41.81	0.90
0.5300	43.08	0.88	42.29	0.91
0.5400	43.03	0.88	41.81	0.92
0.5500	42.98	0.88	41.86	0.93

450 MHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
31/Aug/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_eH	FCC_sH	Test_e	Test_s
0.3500	57.70	0.93	57.38	0.83
0.3600	57.60	0.93	56.96	0.82
0.3700	57.50	0.93	58.33	0.85
0.3800	57.40	0.93	56.33	0.84
0.3900	57.30	0.93	56.70	0.87
0.4000	57.20	0.93	56.97	0.86
0.4100	57.10	0.93	56.29	0.86
0.4200	57.00	0.94	55.79	0.87
0.4300	56.90	0.94	56.04	0.90
0.4400	56.80	0.94	56.38	0.90
0.4500	56.70	0.94	56.80	0.90
0.4600	56.66	0.94	55.74	0.92
0.4700	56.62	0.94	55.91	0.92
0.4800	56.58	0.94	55.42	0.94
0.4900	56.54	0.94	55.51	0.94
0.5000	56.51	0.94	55.63	0.95
0.5100	56.47	0.94	55.79	0.94
0.5200	56.43	0.95	55.16	0.98
0.5300	56.39	0.95	54.83	0.99
0.5400	56.35	0.95	54.75	0.98
0.5500	56.31	0.95	54.64	0.99

450 MHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
1/Sept/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_eH	FCC_sH	Test_e	Test_s
0.3500	57.70	0.93	57.53	0.82
0.3600	57.60	0.93	57.57	0.83
0.3700	57.50	0.93	57.88	0.85
0.3800	57.40	0.93	56.99	0.85
0.3900	57.30	0.93	56.75	0.86
0.4000	57.20	0.93	57.25	0.87
0.4100	57.10	0.93	56.71	0.86
0.4200	57.00	0.94	56.88	0.88
0.4300	56.90	0.94	56.49	0.90
0.4400	56.80	0.94	56.34	0.89
0.4500	56.70	0.94	56.87	0.91
0.4600	56.66	0.94	56.72	0.91
0.4700	56.62	0.94	56.11	0.92
0.4800	56.58	0.94	56.40	0.93
0.4900	56.54	0.94	56.18	0.93
0.5000	56.51	0.94	55.54	0.95
0.5100	56.47	0.94	56.04	0.94
0.5200	56.43	0.95	55.71	0.96
0.5300	56.39	0.95	55.43	0.97
0.5400	56.35	0.95	55.43	0.97
0.5500	56.31	0.95	55.47	0.98

450 MHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
2/Sept/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_eH	FCC_sH	Test_e	Test_s
0.3500	57.70	0.93	59.64	0.83
0.3600	57.60	0.93	58.57	0.84
0.3700	57.50	0.93	58.50	0.84
0.3800	57.40	0.93	58.53	0.83
0.3900	57.30	0.93	58.11	0.85
0.4000	57.20	0.93	57.39	0.86
0.4100	57.10	0.93	57.85	0.85
0.4200	57.00	0.94	57.59	0.87
0.4300	56.90	0.94	57.73	0.88
0.4400	56.80	0.94	57.60	0.88
0.4500	56.70	0.94	57.42	0.91
0.4600	56.66	0.94	57.03	0.90
0.4700	56.62	0.94	56.91	0.92
0.4800	56.58	0.94	56.95	0.95
0.4900	56.54	0.94	56.96	0.95
0.5000	56.51	0.94	57.04	0.93
0.5100	56.47	0.94	56.50	0.93
0.5200	56.43	0.95	55.95	0.97
0.5300	56.39	0.95	56.28	0.96
0.5400	56.35	0.95	56.11	0.97
0.5500	56.31	0.95	56.30	0.97

450 MHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
3/Sept/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_eH	FCC_sH	Test_e	Test_s
0.3500	57.70	0.93	58.16	0.86
0.3600	57.60	0.93	57.96	0.85
0.3700	57.50	0.93	57.37	0.85
0.3800	57.40	0.93	57.71	0.87
0.3900	57.30	0.93	57.91	0.87
0.4000	57.20	0.93	57.40	0.88
0.4100	57.10	0.93	57.45	0.88
0.4200	57.00	0.94	57.00	0.89
0.4300	56.90	0.94	56.28	0.90
0.4400	56.80	0.94	57.01	0.91
0.4500	56.70	0.94	56.78	0.93
0.4600	56.66	0.94	56.68	0.93
0.4700	56.62	0.94	56.23	0.95
0.4800	56.58	0.94	56.17	0.93
0.4900	56.54	0.94	56.59	0.95
0.5000	56.51	0.94	56.75	0.97
0.5100	56.47	0.94	55.96	0.97
0.5200	56.43	0.95	56.02	0.98
0.5300	56.39	0.95	55.75	0.99
0.5400	56.35	0.95	55.07	0.98
0.5500	56.31	0.95	55.62	0.99

450 MHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
7/Sept/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_eH	FCC_sH	Test_e	Test_s
0.3500	57.70	0.93	59.01	0.83
0.3600	57.60	0.93	58.57	0.83
0.3700	57.50	0.93	58.48	0.84
0.3800	57.40	0.93	58.14	0.83
0.3900	57.30	0.93	58.17	0.85
0.4000	57.20	0.93	57.98	0.86
0.4100	57.10	0.93	57.66	0.85
0.4200	57.00	0.94	57.87	0.86
0.4300	56.90	0.94	56.93	0.88
0.4400	56.80	0.94	57.67	0.89
0.4500	56.70	0.94	57.02	0.90
0.4600	56.66	0.94	57.15	0.91
0.4700	56.62	0.94	57.26	0.92
0.4800	56.58	0.94	56.81	0.91
0.4900	56.54	0.94	56.80	0.93
0.5000	56.51	0.94	56.37	0.94
0.5100	56.47	0.94	56.71	0.94
0.5200	56.43	0.95	56.17	0.96
0.5300	56.39	0.95	56.12	0.95
0.5400	56.35	0.95	55.67	0.98
0.5500	56.31	0.95	55.76	0.98

APPENDIX E - DIPOLE 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 Accreditation Service (SAS)
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: D450V3-1068_Jan10

CALIBRATION CERTIFICATE

Object: D450V3 - SN: 1068

Calibration procedure(s): QA CAL-15.v5
Calibration Procedure for dipole validation kits below 800 MHz

Calibration date: January 18, 2010

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	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ET3DV6 (LF)	SN: 1507	03-Jul-09 (No. ET3-1507_Jul09)	Jul-10
DAE4	SN: 654	04-May-09 (No. DAE4-654_May09)	May-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	i.V.
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 20, 2010

Glossary:

TSL	tissue simulating liquid
ConF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V5.2
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Area Scan Resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	43.5	0.87 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	44.2 ± 6 %	0.86 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	condition	
SAR measured	398 mW input power	1.87 mW / g
SAR normalized	normalized to 1W	4.70 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**4.76 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	398 mW input power	1.25 mW / g
SAR normalized	normalized to 1W	3.14 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**3.17 mW / g ± 17.6 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	56.7	0.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.1 ± 6 %	0.90 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	condition	
SAR measured	398 mW input power	1.78 mW / g
SAR normalized	normalized to 1W	4.47 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**4.58 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	398 mW input power	1.19 mW / g
SAR normalized	normalized to 1W	2.99 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**3.06 mW / g ± 17.6 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	57.5 Ω - 5.9 jΩ
Return Loss	- 21.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	54.8 Ω - 9.3 jΩ
Return Loss	- 20.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.350 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 16, 2009

Date/Time: 1/18/2010 10:59:37 AM

DUT: Dipole 450 MHz; Type: D450V3; Serial: D450V3 - SN:1068

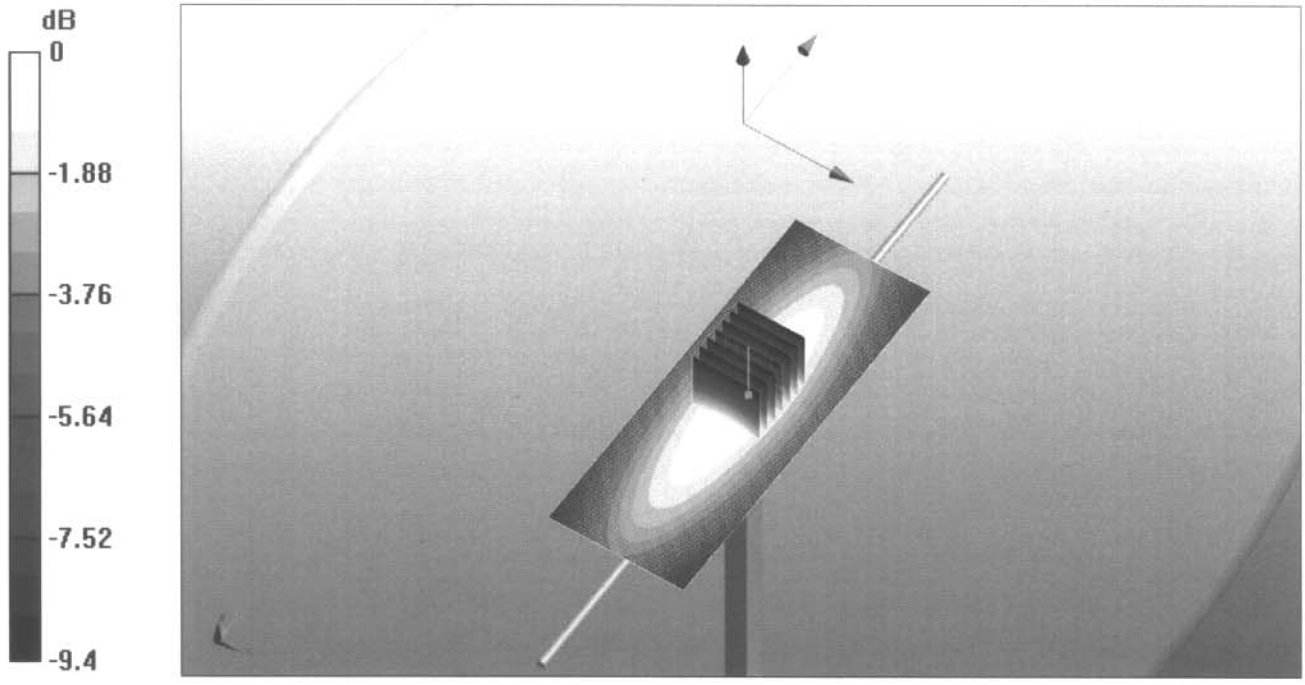
Communication System: CW; Frequency: 450 MHz; Duty Cycle: 1:1
Medium: HSL450
Medium parameters used: f = 450 MHz; σ = 0.86 mho/m; ε_r = 44.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ET3DV6 - SN1507 (LF); ConvF(6.66, 6.66, 6.66); Calibrated: 7/3/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 5/4/2009
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 57

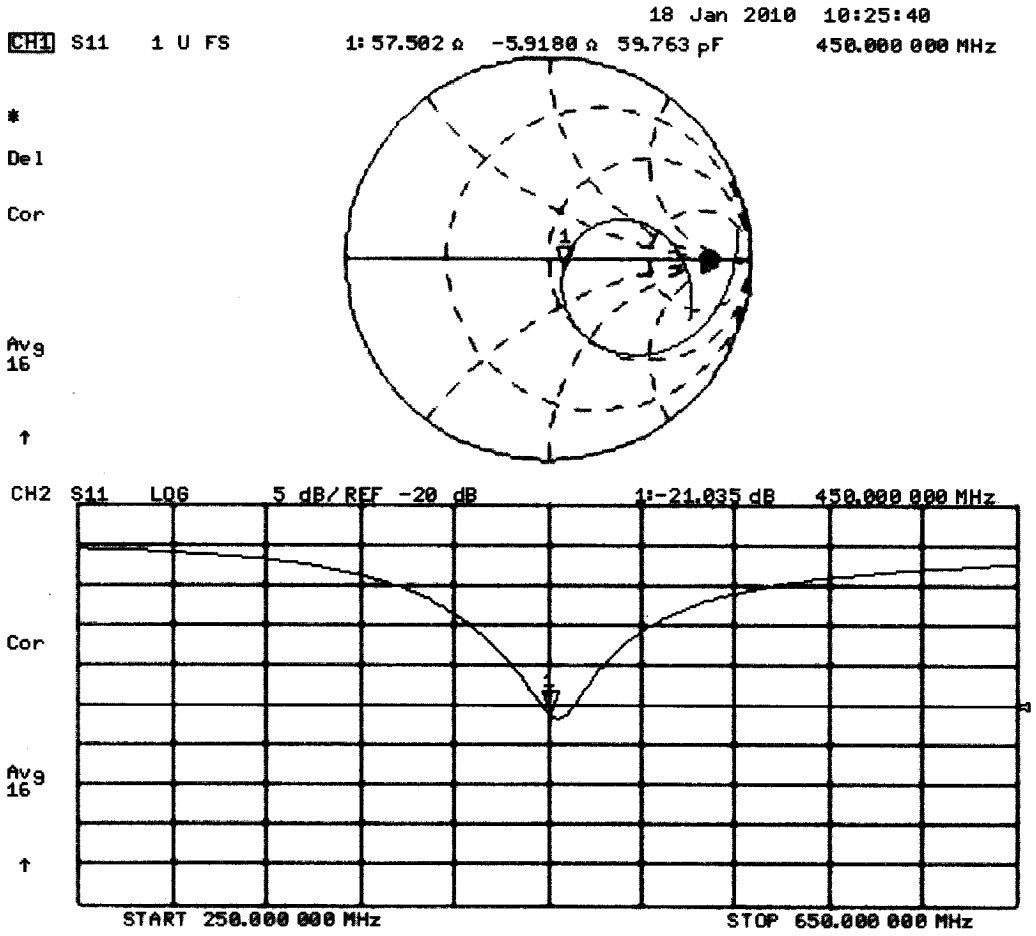
Head/d=15mm, Pin=398mW/Area Scan (41x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.99 mW/g

Head/d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.2 V/m; Power Drift = -0.020 dB
Peak SAR (extrapolated) = 2.78 W/kg
SAR(1 g) = 1.87 mW/g; SAR(10 g) = 1.25 mW/g
Maximum value of SAR (measured) = 2 mW/g



0 dB = 2mW/g

Impedance Measurement Plot for Head TSL



Date/Time: 1/18/2010 1:24:11 PM

DUT: Dipole 450 MHz; Type: D450V3; Serial: D450V3 - SN:1068

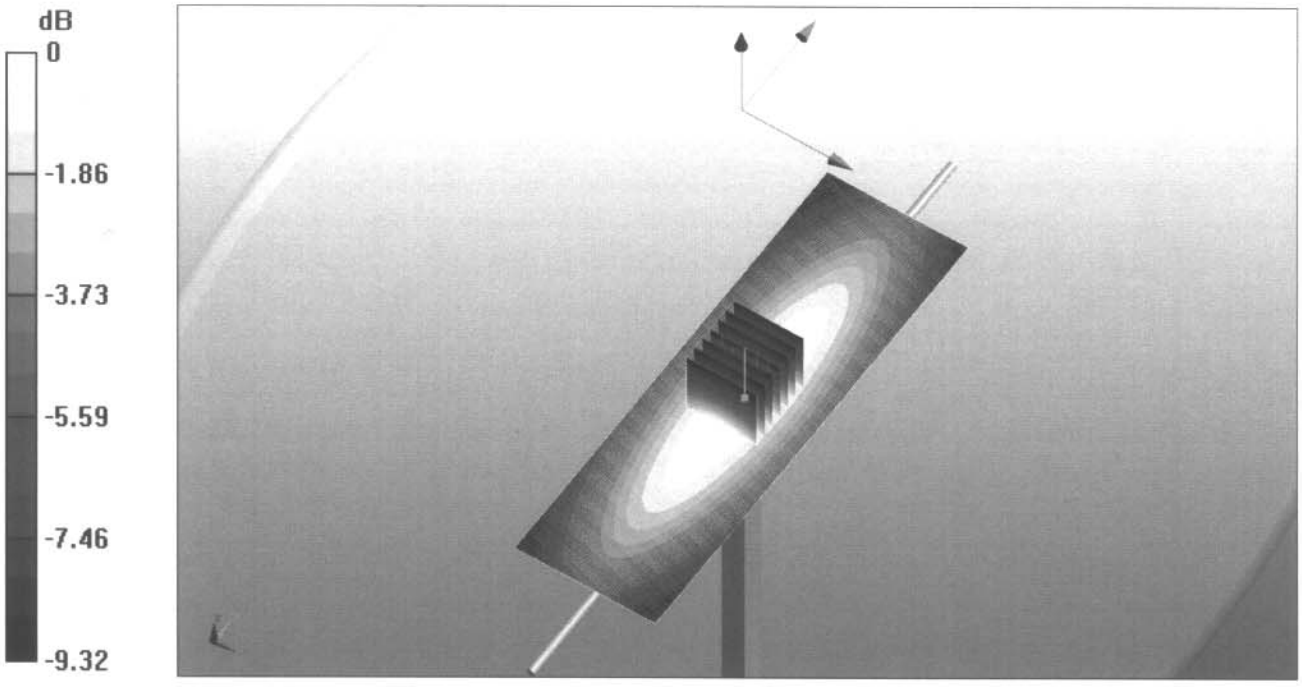
Communication System: CW; Frequency: 450 MHz; Duty Cycle: 1:1
Medium: MSL450
Medium parameters used: f = 450 MHz; σ = 0.9 mho/m; ε_r = 54.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ET3DV6 - SN1507 (LF); ConvF(7.11, 7.11, 7.11); Calibrated: 7/3/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 5/4/2009
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- Measurement SW: DASY5, V5.2 Build 162; SEMCAD X Version 14.0 Build 57

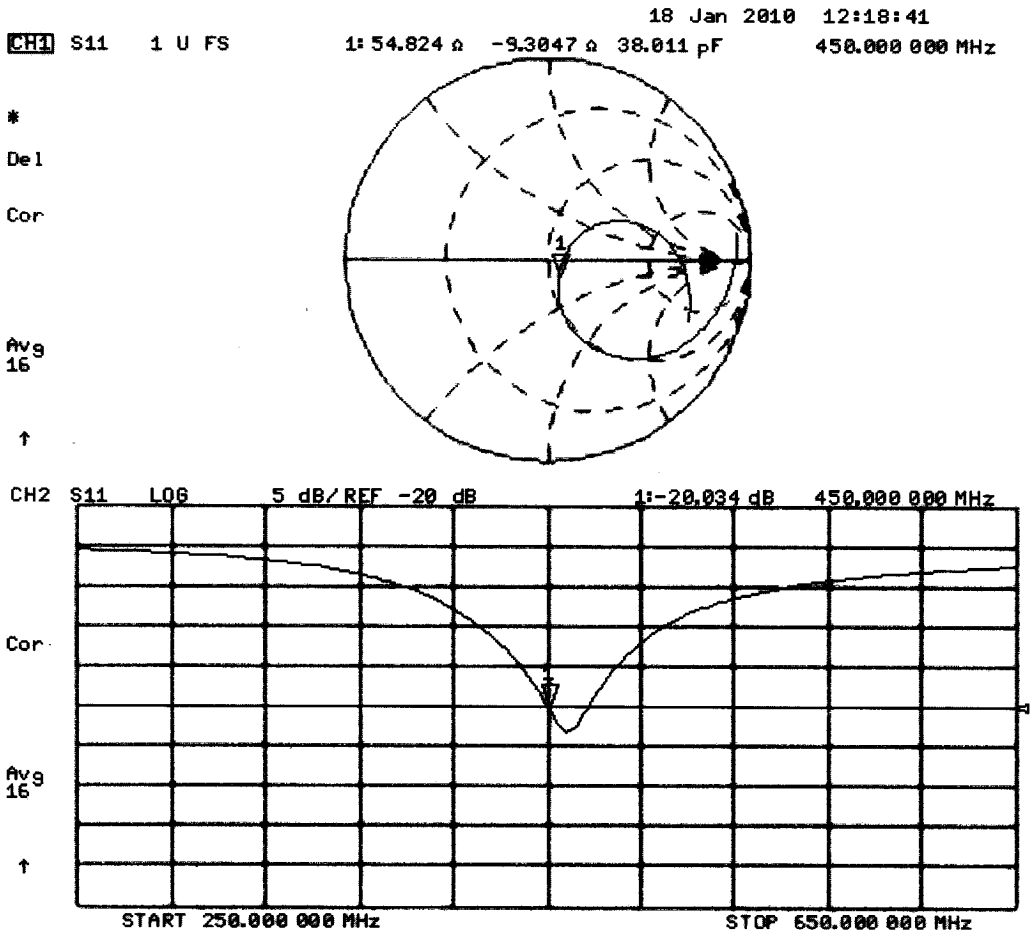
Body/d=15mm, Pin=398mW/Area Scan (61x201x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.9 mW/g

Body/d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 47.4 V/m; Power Drift = -0.034 dB
Peak SAR (extrapolated) = 2.71 W/kg
SAR(1 g) = 1.78 mW/g; SAR(10 g) = 1.19 mW/g
Maximum value of SAR (measured) = 1.9 mW/g



0 dB = 1.9mW/g

Impedance Measurement Plot for Body TSL



APPENDIX F - PROBE CALIBRATION

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

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

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **Celltech**

Certificate No: ET3-1590_Jul10

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1590**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-12.v6, QA CAL-23.v3 and QA CAL-25.v2**
Calibration procedure for dosimetric E-field probes

Calibration date: **July 15, 2010**

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 (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

	Name	Function	Signature
Calibrated by	**Jeton Kastrati**	**Laboratory Technician**	
Approved by:	**Katja Pokovic**	**Technical Manager**	

Issued: July 15, 2010

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
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
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \le 900$ 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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z: A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \le 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1590

Manufactured:	March 19, 2001
Last calibrated:	July 16, 2009
Recalibrated:	July 15, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ET3DV6 SN:1590

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.86	2.06	1.77	± 10.1%
DCP (mV)[B]	91.4	92.4	83.5	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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 Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

[E] Uncertainty is determined using the maximum deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ET3DV6 SN:1590

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
450	± 50 / ± 100	43.5 ± 5%	0.87 ± 5%	7.25	7.25	7.25	0.20	2.19 ± 13.3%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.27	6.27	6.27	0.32	2.49 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	6.12	6.12	6.12	0.27	2.86 ± 11.0%

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

DASY/EASY - Parameters of Probe: ET3DV6 SN:1590

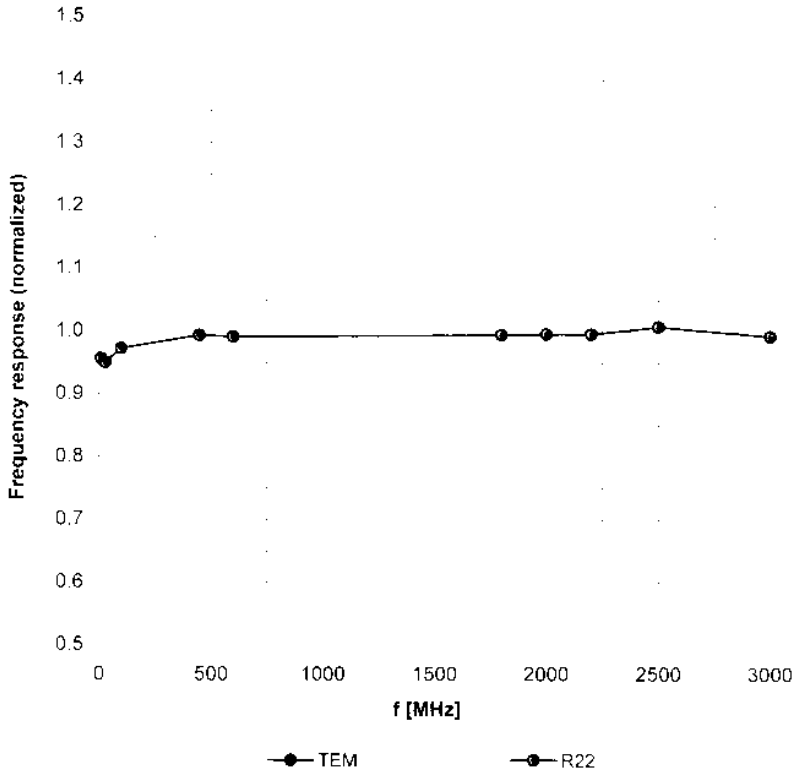
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
450	± 50 / ± 100	56.7 ± 5%	0.94 ± 5%	7.73	7.73	7.73	0.13	2.06 ± 13.3%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	6.33	6.33	6.33	0.22	3.60 ± 11.0%
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	6.15	6.15	6.15	0.28	2.94 ± 11.0%

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

Frequency Response of E-Field

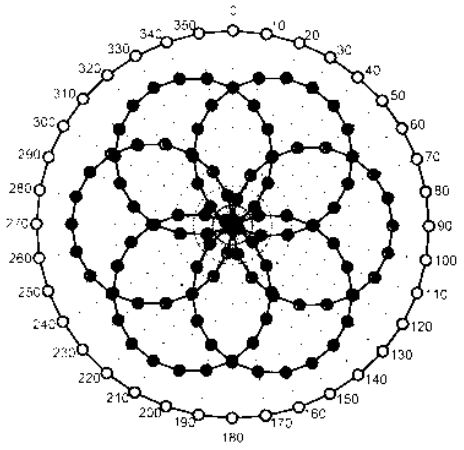
(TEM-Cell:ifi110 EXX, Waveguide: R22)



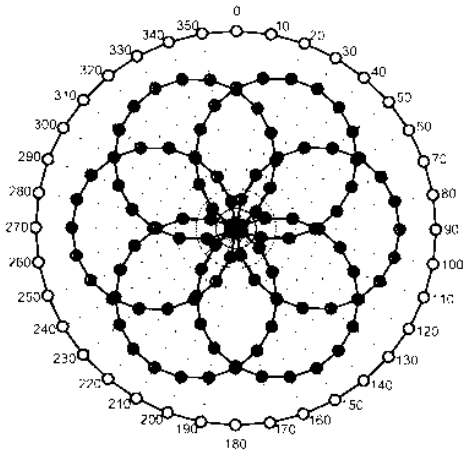
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

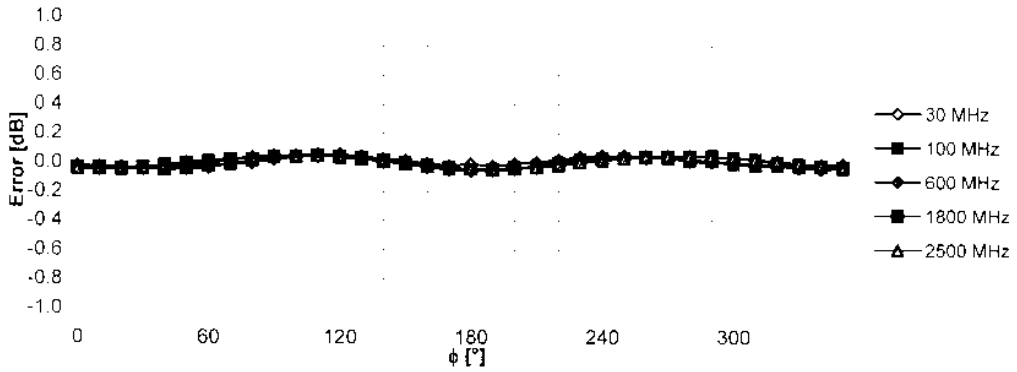
Receiving Pattern (ϕ), ϑ = 0°

f = 600 MHz, TEM ifi110EXX



f = 1800 MHz, WG R22

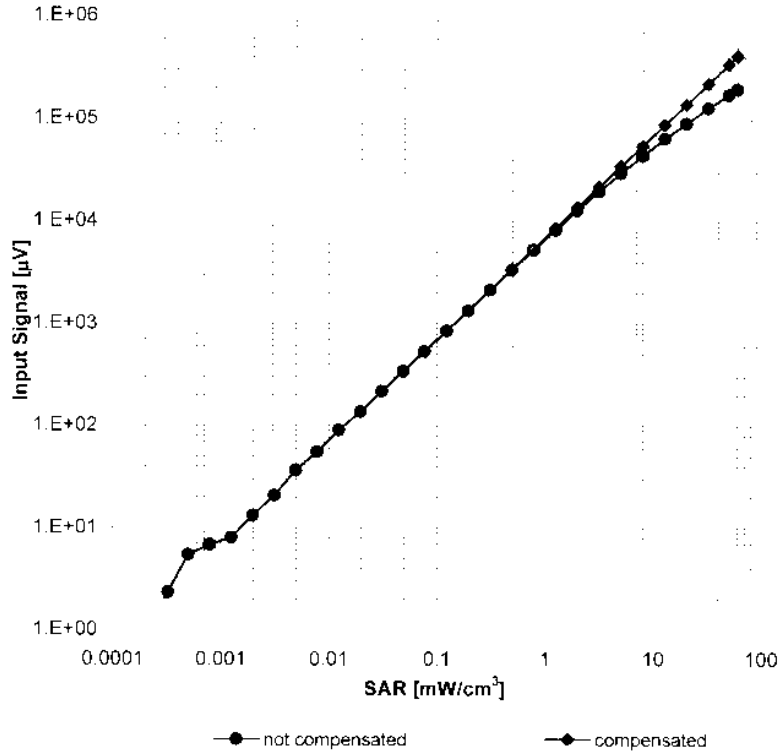


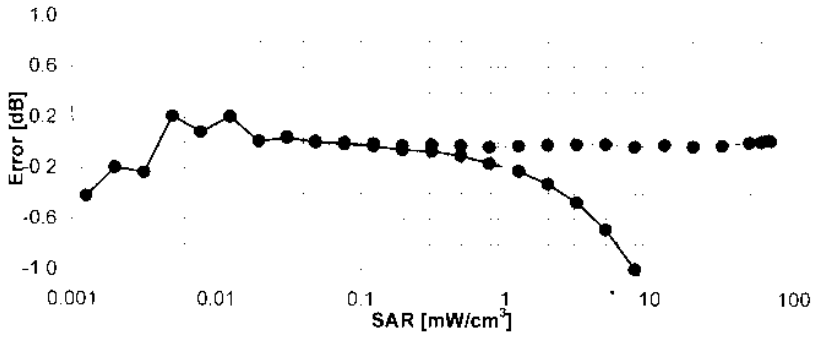


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

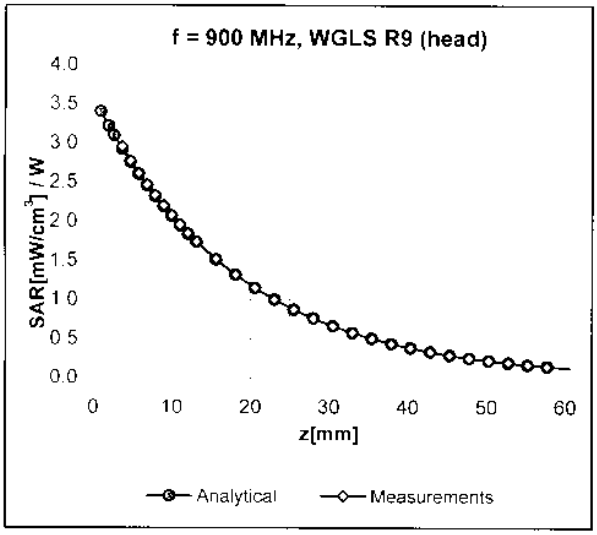
(Waveguide R22, f = 1800 MHz)

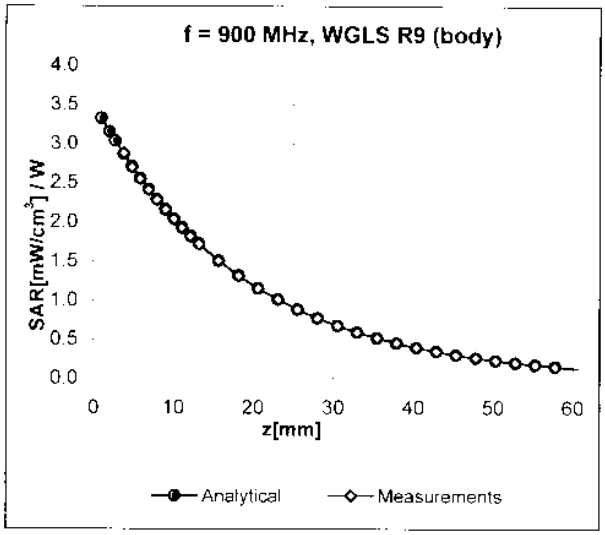




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

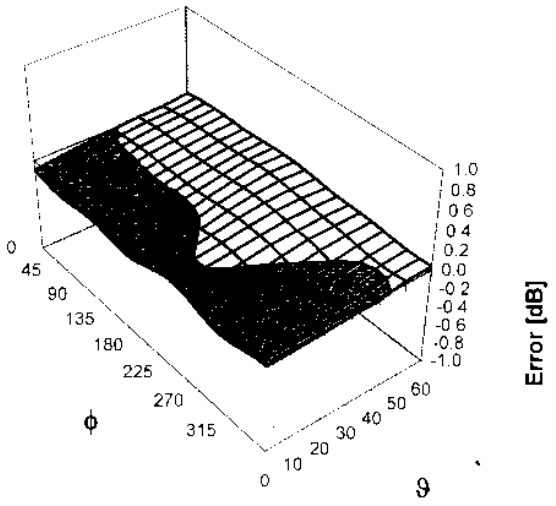
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

APPENDIX G - BARSKI 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

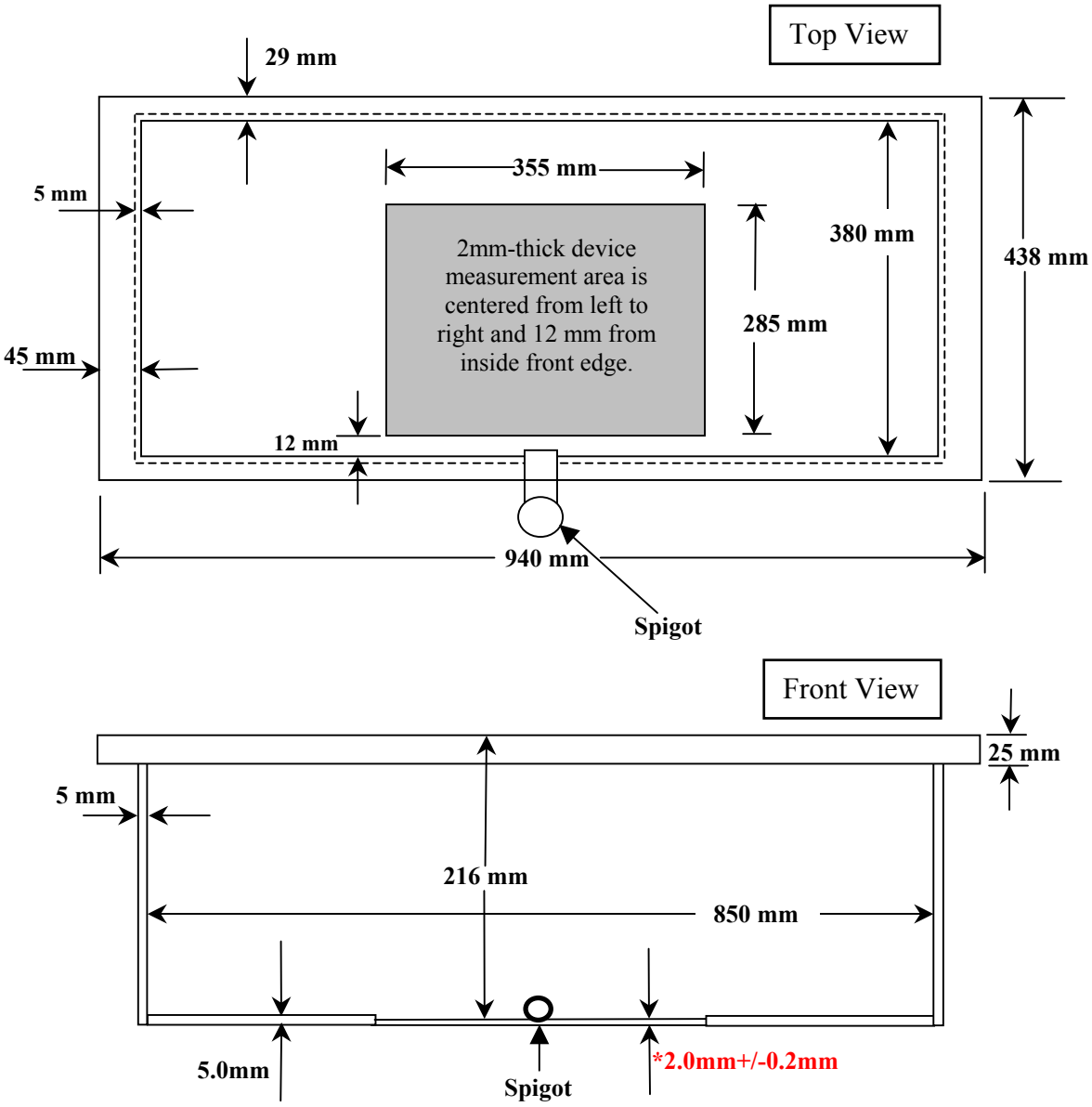
Fiberglass Planar Phantom - Front View

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.

APPENDIX H - OCCUPATIONAL PTT TEST REDUCTION *DRAFT* CONSIDERATIONS

Occupational PTT Test Reduction *Draft* Considerations

Head SAR Test Considerations

Passive body-worn and audio accessories generally do not apply to the head SAR of PTT devices. Head SAR is measured with the front of the device at 2.5 cm parallel to a flat phantom. When the front of the device has a contour or non-uniform surface with > 1.0 cm variation, the average distance of such variations is used to establish the 2.5 cm test separation from the phantom.

A) Start with a standard battery supplied with the device by default to measure the head SAR of each antenna on the highest output power channel, according to the test channels required by KDB 447498 (6)(c) and in the frequency range covered by the antenna within each device operating frequency band.[1]
   1) When multiple standard batteries are supplied with a device, the battery with the highest capacity is considered the default battery for making head SAR measurements.

B) When the head SAR of an antenna tested on the highest output power channel using the default battery is ≤ 4.0 W/kg, testing of the required immediately adjacent channel(s) is not necessary. When the head SAR of an antenna tested on the highest output power channel using the default battery is ≤ 3.5 W/kg, testing of all other required channels is not necessary. For the remaining channels that require testing, the exclusion of 4.0 W/kg for the required immediately adjacent channels and 3.5 W/kg for subsequent remaining channels may be applied recursively with respect to the highest output power channel among the remaining channels. When the head SAR of an antenna tested on the highest output power channel using the default battery is > 4.0 W/kg, head SAR should be measured for that antenna on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 6.0 W/kg.

C) For antennas of the same type and construction, with similar SAR distributions, operating within the same device operating frequency band, if the frequency range of an antenna (A) is fully within the frequency range of another antenna (B) and the highest SAR for antenna (A) is ≤ 4.0 W/kg or ≤ 6.0 W/kg and at least 25% lower than the highest SAR measured for antenna (B) within the device operating frequency band, further head SAR tests are not necessary for antenna (A).[2]

D) When the highest SAR for <u>all antennas</u> tested using the default battery is ≤ 4.0 W/kg, according to the above test sequences, test additional batteries using the antenna and channel configuration that resulted in the highest SAR among all antennas tested with the default battery. Testing of additional batteries for other antennas is unnecessary.
   1) When the SAR tested with an additional battery using the antenna and channel configuration that resulted in the highest SAR from the default battery is > 6.0 W/kg, test that battery on the highest SAR channel of each antenna.
      a) If the SAR measured on the highest SAR channel of an antenna using an additional battery is > 6.0 W/kg, test that additional battery and antenna combination on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 7.0 W/kg.

E) When the highest SAR of an antenna tested using the default battery is > 4.0 W/kg,[3] test additional batteries on the channel that resulted in the highest SAR for that antenna when tested with the standard default battery.
   1) If the SAR of an antenna tested with the default battery or an additional battery using the highest SAR channel is > 6.0 W/kg, test that battery and antenna combination on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 7.0 W/kg.
   2) An antenna tested using the default battery with highest SAR ≤ 4.0 W/kg[4] does not need to be tested using additional batteries.

F) Report the measured head SAR in formats similar to the following:

[1] The test channel selection criteria in IEEE 1528-2003 may be considered when the number of channels required is greater than or equal to that required by KDB 447498 and the measured maximum output power for the closest channels between the channel selection schemes are within ½ dB.

[2] The highest SAR is determined according to the SAR measured on the highest output power channel and all required adjacent and remaining channels. Also note that the procedures must be applied in sequence, from A) – F).

[3] D) and E) are mutually exclusive. For item D), all SAR must be ≤ 4.0 W/kg. For Item E), the SAR for some antennas could be ≤ 4.0 W/kg when others are > 4.0 W/kg.

[4] See footnote 3.

Example for Illustration Only					
Head SAR – in front of the face					
Antenna (MHz)	Measured	Ch. Freq. (MHz)	Battery		
			Default	I: *Model #*	II: *Model #*
A (470 – 490)	Power (W)	470.5			
		480.0			
		489.5			
	SAR (W/kg)	470.5			
		480.0			
		489.5			
B (420 – 450)	Power (W)	420.5			
		430.0			
		440.0			
		449.5			
	SAR (W/kg)	420.5			
		430.0			
		440.0			
		449.5			
C (450 – 465)	Power (W)	450.5			
		464.5			
	SAR (W/kg)	450.5			
		464.5			
D (465 – 470)	Power (W)	467.5			
	SAR (W/kg)	467.5			
Reported SAR values have already been scaled by the applicable duty factor Antenna, battery and accessory specifications are explained in the product descriptions section When test reduction applies, the slots for such configurations are left blank *(Need to confirm this table layout works)*					

Body SAR Test Considerations for Body-worn Accessories

Body SAR is measured with the device placed in a body-worn accessory, positioned against a flat phantom, representative of the normal operating conditions expected by users, without any audio accessory. Since audio accessories, including any default audio accessories supplied with the device, may be designed to operate with a subset of the combination of antennas, batteries and body-worn accessories, to simplify the test selection sequences for audio accessories, body-worn accessories are tested without audio accessory. All sides of the device that may be positioned using a body-worn accessory facing the user must be considered for SAR compliance.

A) Start with a standard battery supplied with the device by default and a standard body-worn accessory, also supplied with the device by default, to measure the body SAR of each antenna on the highest output power channel, according to the test channels required by KDB 447498 (6)(c) and in the frequency range covered within each device operating frequency band.[5]
   1) When multiple default batteries and/or default body-worn accessories are supplied with a device, for testing purposes, the thinnest standard battery with the highest capacity and the standard body-worn accessory expected to result in the highest SAR based on its construction and exposure conditions are considered the default battery and default body-worn accessory for body SAR measurements.

B) When the body SAR of an antenna tested on the highest output power channel using the default battery and default body-worn accessory is ≤ 4.0 W/kg, testing of the required immediately adjacent channel(s) is not necessary. When the body SAR of an antenna tested on the highest output power channel using the default battery and default body-worn accessory is ≤ 3.5 W/kg, testing of all other required channels is not necessary. For the remaining channels that require testing, the exclusion of 4.0 W/kg for the required immediately adjacent channels and 3.5 W/kg for subsequent remaining channels may be applied recursively with respect to the highest output power channel among the remaining channels. When the body SAR of an antenna tested on the highest output power channel using the default battery and default body-worn accessory is > 4.0 W/kg, body SAR should be measured for that antenna on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 6.0 W/kg using the default battery and default body-worn accessory.

C) For antennas of the same type and construction, with similar SAR distributions, operating within the same device operating frequency band, if the frequency range of an antenna (A) is fully within the frequency range of another antenna (B) and the highest SAR for antenna (A) is ≤ 4.0 W/kg or ≤ 6.0 W/kg and at least 25% lower than the highest SAR measured for antenna (B) within the device operating frequency band, further body SAR tests are not necessary for antenna (A).[6]

D) When the highest SAR for <u>all antennas</u> tested using the default battery and default body-worn accessory is ≤ 4.0 W/kg, according to the above test sequences, test additional batteries using the antenna and channel configuration that resulted in the highest SAR among all antennas tested with the default battery and default body-worn accessory. Testing of additional batteries with the default body-worn accessory for other antennas is unnecessary.
   1) For batteries with similar construction, test only the battery that is expected to result in the highest SAR. This is generally determined by the smallest antenna separation distance provided by the body-worn accessory, between the device and the user, with the applicable side(s) of the device facing the user.
   2) When the SAR tested with an additional battery using the antenna, default body-worn accessory and channel configuration that resulted in the highest SAR is > 6.0 W/kg, test that battery with the default body-worn accessory on the highest SAR channel of each applicable antenna.
      a) If the SAR measured on the highest SAR channel of an antenna tested using an additional battery and the default body-worn accessory is > 6.0 W/kg, test that additional battery, antenna and default body-worn accessory combination on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 7.0 W/kg.

E) When the highest SAR of an antenna tested using the default battery and default body-worn accessory is > 4.0 W/kg,[7] test additional batteries on the channel that resulted in the highest SAR for that antenna when tested using the default battery and default body-worn accessory.
   1) For batteries with similar construction, test only the battery that is expected to result in the highest SAR. This is generally determined by the smallest antenna separation distance provided by the body-worn accessory, between the device and the user, with the applicable side(s) of the device facing the user.

[5] See footnote 1.
[6] See footnote 2.
[7] See footnote 3.

2) If the SAR of an antenna tested with the default battery or an additional battery and the default body-worn accessory using the highest SAR channel is > 6.0 W/kg, test that battery, antenna and default body-worn accessory on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 7.0 W/kg.
3) An antenna tested using the default battery and default body-worn accessory with highest SAR ≤ 4.0 W/kg[8] does not need to be tested using additional batteries when such batteries provide a minimum separation distance, between the device and the user, greater than or equal to that established by the default battery.

F) Report the measured body SAR in formats similar to the following for the default body-worn accessory:

Example for Illustration Only					
Body-worn Accessory 1: *Model Number* Default Audio Accessory I: *Model Number*					
Antenna (MHz)	Measured	Ch. Freq. (MHz)	Battery		
			Standard	I	II
A (470 – 490)	Power (W)	470.5			
		480.0			
		489.5			
	SAR (W/kg)	470.5			
		480.0			
		489.5			
B (420 – 450)	Power (W)	420.5			
		430.0			
		440.0			
		449.5			
	SAR (W/kg)	420.5			
		430.0			
		440.0			
		449.5			
C (450 – 465)	Power (W)	450.5			
		464.5			
	SAR (W/kg)	450.5			
		464.5			
D (465 – 470)	Power (W)	467.5			
	SAR (W/kg)	467.5			
Reported SAR values have already been scaled by the applicable duty factor Antenna, battery and accessory specifications are explained in the product descriptions section When test reduction applies, the slots for such configurations are left blank *(Need to confirm this table layout works)*					

G) Repeat the above test sequence for the additional body-worn accessories by replacing the "default body-worn" accessory with each "additional body-worn accessory".
1) For body-worn accessories with similar construction and operating configurations, test only the body-worn accessory within the group that is expected to result in the highest SAR. This is typically determined by the smallest antenna separation distance provided by the body-worn accessory, between the device and the user, with the applicable side(s) of the device facing the user. Similarities in construction and operating configurations for batteries and body-worn accessories must be clearly explained in the SAR report.

[8] See footnote 3.

Body SAR Test Considerations for Audio Accessories with Integral Antenna

Audio accessories with an integral radiating element (antenna) must be tested separately from those without any primary radiating element. An audio accessory with a built-in antenna that enables the (main) antenna on the (PTT) device to be disconnected from its output while the audio accessory is in use should be tested using the highest capacity default battery. When transmission from the (main) antenna on the (PTT) device is disabled while the audio accessory is transmitting using its integral antenna, body-worn accessories for the device are not expected to influence the SAR of the audio accessory. In addition, different body-worn accessories or attachments are generally used for audio accessories with an integral antenna, which must be tested according to the way these are attached to the user during normal operation. Body SAR is measured with the audio accessory positioned against a flat phantom representative of the normal operating and exposure conditions expected by users. All sides of the device that may be positioned against the user must be considered for SAR compliance.

A) The audio accessory is tested on the highest output power channel, according to the test channels required by KDB 447498 (6)(c) and in the frequency range covered by the antenna on the audio accessory within each device operating frequency band to measure body SAR.[9]
B) When the body SAR of an audio accessory tested on the highest output power channel is ≤ 4.0 W/kg, testing of the required immediately adjacent channel(s) is not necessary. When the body SAR of an audio accessory tested on the highest output power channel using the default battery is ≤ 3.5 W/kg, testing of all other required channels is not necessary. For the remaining channels that require testing, the exclusion of 4.0 W/kg for the required immediately adjacent channels and 3.5 W/kg for subsequent remaining channels may be applied recursively with respect to the highest output power channel among the remaining channels. When the body SAR of an audio accessory tested on the highest output power channel is > 4.0 W/kg, body SAR should be measured on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 7.0 W/kg.
C) For audio accessories of the same type and construction, including the antenna, with similar SAR distributions, operating within the same device operating frequency band, if the (antenna) frequency range of an audio accessory (A) is fully within the (antenna) frequency range of another audio accessory (B) and the highest SAR for accessory (A) is ≤ 4.0 W/kg or ≤ 6.0 W/kg and at least 25% lower than the highest SAR measured for accessory (B) within the device operating frequency band, further body SAR tests are not necessary for audio accessory (A)
D) Report the measured body SAR in formats similar to the following for the audio accessory:

Example for Illustration Only			
Body SAR – audio accessories with integral antenna			
Audio Accessory (MHz)	Measured	Ch. Freq. (MHz)	SAR (W/kg)
A: *Model #* (470 – 490)	Power (W)	470.5	
		480.0	
		489.5	
	SAR (W/kg)	470.5	
		480.0	
		489.5	
B: *Model #* (450 – 465)	Power (W)	450.5	
		464.5	
	SAR (W/kg)	450.5	
		464.5	
Reported SAR values have already been scaled by the applicable duty factor Antenna, battery and accessory specifications are explained in the product descriptions section When test reduction applies, the slots for such configurations are left blank *(Need to confirm this table layout works)*			

[9] See footnote 1.

Body SAR Test Considerations for Audio Accessories without Built-in Antenna

For audio accessories that do not have any built-in radiating element, the antenna, battery and body-worn accessory combinations that are applicable to each audio accessory must be clearly identified in a format similar to the following, with the applicable combinations requiring testing highlighted to facilitate reviewing the results.

Example for Illustration Only												
Antenna (1 – 5)	Battery											
	a				b				c			
	Body-worn				Body-worn				Body-worn			
Audio Accessory	A	B	C	D	A	B	C	D	A	B	C	D
I	1, 2, 3, 4, 5	N/A	1, 3, 4, 5	N/A	3, 4, 5	1, 2, 3, 4, 5	2, 3	N/A	N/A	2, 4	1, 2, 3, 4, 5	1, 4
II	1, 2, 3, 4	1, 2, 3, 4, 5	N/A	1, 2, 3, 4, 5	N/A	N/A	1, 2, 3, 4, 5	2, 5	3, 5	1, 2, 3, 4, 5	N/A	N/A
III	2, 3, 4, 5	N/A	2, 3, 4, 5	2, 5	1, 3, 4, 5	1, 3, 5	N/A	1, 2, 3, 4, 5	1, 2, 3, 4, 5	N/A	2, 3, 4	1, 2, 3, 4, 5

In this example, audio accessories only work with the subset of antenna, battery and body-worn accessory combinations identified in the table, where N/A indicates the audio accessory (I, II or III) and/or the battery (a, b, or c) is not supported or applicable for the body-worn accessory. The antenna numbers listed for each body-worn accessory and battery combination identify the antennas supported or applicable for that body-worn accessory.

The possible combinations are highly dependent on the design and implementation of an individual device and the applicable antenna and accessory combinations. The above table must be adapted accordingly for the specific product and accessory combinations in use. The combinations require testing should be highlighted.

(Need to confirm this table layout works)

A) For audio accessories with similar construction and operating requirements, test only the audio accessory within the group that is expected to result in the highest SAR, with respect to changes in RF characteristics and exposure conditions for the combination. If it is unclear which audio accessory within a group of similar accessories is expected to result in the highest SAR, good engineering judgment or preliminary testing should be applied to select the accessory that is expected to result in the highest SAR. Similarities in construction and operating configurations must be clearly explained in the SAR report.

B) Based on the SAR measured in the body-worn test sequence, without audio accessory, if the SAR for the antenna, body-worn accessory and battery combination(s) applicable to an audio accessory are all ≤ 4.0 W/kg, SAR tests for that audio accessory is not necessary.

C) Based on the SAR measured in the body-worn test sequence, without audio accessory, if the SAR for the antenna, body-worn accessory and battery combination(s) applicable to an audio accessory is/are > 4.0 W/kg, test that audio accessory using the highest body-worn SAR combination and channel configuration applicable to the audio accessory.

D) If the SAR measured for an audio accessory combination is > 6.0 W/kg, test that audio accessory on the required immediately adjacent channels and on all required channels if the highest SAR channel or an adjacent channel is > 7.0 W/kg, using the highest body-worn SAR combination applicable to that audio accessory.

E) If the SAR measured for an audio accessory is > 7.0 W/kg and it is one of the accessories within a group of similar audio accessories, test all other audio accessories within that group of similar audio accessories using the 7.0 W/kg audio accessory test combination.

   1) If the highest SAR for a similar audio accessory is > 7.0 W/kg, test that audio accessory on all required channels using that combination of antenna, battery and body-worn accessory.

F) Report the measured body SAR for audio accessories in formats similar to the following

Example for Illustration Only							
Audio Accessory I: *Model Number*							
Antenna (MHz)	Measured	Ch. Freq. (MHz)	Battery (a – c) & Body-Worn (1 – 5) Combinations				
			c/1	c/2	c/3	b/4	b/5
A (470 – 490)	Power (W)	470.5					
		480.0					
		489.5					
	SAR (W/kg)	470.5					
		480.0					
		489.5					
B (420 – 450)	Power (W)	420.5					
		430.0					
		440.0					
		449.5					
	SAR (W/kg)	420.5					
		430.0					
		440.0					
		449.5					
C (450 – 465)	Power (W)	450.5					
		464.5					
	SAR (W/kg)	450.5					
		464.5					
D (465 – 470)	Power (W)	467.5					
	SAR (W/kg)	467.5					
Reported SAR values have already been scaled by the applicable duty factor Antenna, battery and accessory specifications are explained in the product descriptions section When test reduction applies, the slots for such configurations are left blank *(Need to confirm this table layout works)*							

General Reporting Procedures

All SAR values should be reported as measured, with the applicable duty factor taken into consideration. Adjustments made to account for tune-up tolerances should be considered separately, apart from the reported SAR summary results. SAR adjustments for tune-up tolerances are only needed for the highest reported SAR and SAR results that are within the tune-up tolerance range from the SAR limit, with respect to the power applied during testing for the individual channels, to determine compliance.