DECLARATION OF COMPLIANCE — SAR RF EXPOSURE EVALUATION — FCC & IC

Test Lab Information	**Name**	**CELLTECH LABS INC.**		
	Address	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	**Name**	**SIMOCO AUSTRALAISIA PTY LTD.**		
	Address	1270 Ferntree Gully, Scoresby, VIC 3179, Australia		
Application Type(s)	**FCC**	TCB Certification	**IC**	CB Certification
Standard(s) Applied	**FCC**	47 CFR §2.1093	**IC**	Health Canada Safety Code 6
Procedure(s) Applied	**FCC**	KDB 447498 D01v05r01	**FCC**	KDB 643646 D01v01r01
	FCC	KDB 865664 D01v01r02	**IEEE**	Standard 1528-2013
	FCC	KDB 865664 D02v01r01		
	IC	RSS-102 Issue 4	**IEC**	62209-2:2010
Device Classification(s)	**FCC**	Licensed Non-Broadcast Transmitter Held to Face (TNF)		
	IC	Land Mobile Radio Transmitter/Receiver (27.41-960 MHz) – RSS-119.		
Device RF Exposure Category	**FCC/IC**	Occupational / Controlled Exposure		
Device Identifier(s)	**FCC ID:**	STZSDP600AC		
	IC:	7068A-SDP600AC		
Device Model(s)	**Model(s)**	Simoco Xd DMR Portable SDP650AC, SDP660AC		

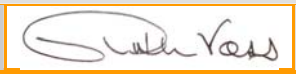
Co-located Transmitters	n/a			
Test Sample Serial No.	56NAC133101K0 (Identical Prototype)			
Date of Sample Receipt	Nov. 7th, 2013	**Date(s) of Evaluations**	Nov. 22-27, 2013	
Test Sample Hardware Rev. No.	n/a	**Test Sample Software Rev. No.**	n/a	
Device-Under-Test Description (DUT)	VHF Digital Mobile Push-To-Talk (PTT) Land Mobile Transceiver			
VHF Transmit Frequency Range(s)	136.0 – 174.0 MHz			
Manuf. Rated Output Power	5.0 W			
Measured RF Output Power	5.7 W	37.6 dBm	Conducted	173.9250MHz (Ch. A0DH)
Battery Type Tested	Li-ion	7.4 V	16.6Wh	PAR-600-BATL2I
Antenna Type Tested	1: A0AH	2: A03H	3: A03H	4: A0DH
Body-worn Accessory Tested	Belt-Clip (contains metal)			P/N: n/a
Audio Accessory Tested	Speaker-Microphone			P/N: n/a

Max. SAR Level(s) Evaluated	Face-held	**FCC: 0.955 W/kg**	**IC: 1.03 W/kg**	1g	**50% PTT duty factor**
	Body-worn	**FCC: 1.49 W/kg**	**IC: 1.80 W/kg**	1g	**50% PTT duty factor**
	Note: IC SAR level is also scaled for droop (see section 9.0)				
FCC/IC Spatial Peak SAR Limit	Head/Body	8.0 W/kg	Occupational / Controlled Exposure	1g	50% PTT duty factor

Celltech Labs Inc. declares under its sole responsibility that this device has demonstrated compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada Safety Code 6 for the Occupational / controlled exposure environment. The device was tested in accordance with the measurement procedures specified in FCC KDB 447498, KDB 865664 D01, KDB 865664 D02, KDB 643646 D01, Industry Canada RSS-102 Issue 4, IEEE Standard 1528-2013 and IEC International Standard 62209-2:2010. All measurements were performed in accordance with the SAR system manufacturer recommendations.

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

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

Test Report Approved By		**Art Voss**	**Sr. Engineer**	**Celltech Labs Inc.**

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REVISION HISTORY			
REVISION NO.	**DESCRIPTION**	**IMPLEMENTED BY**	**RELEASE DATE**
1.2	3rd Release – Changed Applicant Information	Art Voss	Jan 20, 2014

TEST REPORT SIGN-OFF			
DEVICE TESTED BY	**REPORT PREPARED BY**	**QA REVIEW BY**	**REPORT APPROVED BY**
Art Voss	Cheri Frangiadakis	Art Voss	Art Voss

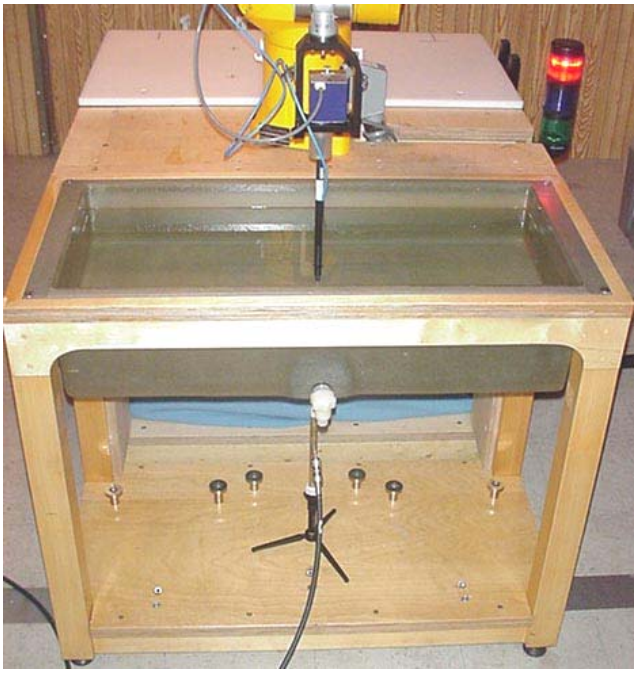
1.0 INTRODUCTION

This measurement report demonstrates that the SDP650AC & SDP660AC VHF PTT Digital Mobile Radio comply with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the Occupational / Controlled Exposure environment. The measurement procedures described in FCC KDB 447498 (see reference [8]), IC RSS-102 Issue 4 (see reference [4]), IEEE Standard 1528-2013 (see reference [5]) and IEC Standard 62209-2:2010 (see reference [6]) 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 utilizes a controller with built in VME-bus computer.

DASY4 SAR System with Plexiglas side planar phantom



DASY4 SAR System with Barski Fiberglas Planar Phantom

3.0 RF CONDUCTED OUTPUT POWER MEASUREMENT

Band	Frequency MHz	Channel	Mode	Measured Power Level		Method
				dBm	Watts	
VHF	136.125	A0AH	CW	37.2	5.3	Average Conducted
VHF	143.9875	A02H	CW	37.2	5.3	Average Conducted
VHF	148.0125	A03H	CW	37.0	5	Average Conducted
VHF	149.8875	A04H	CW	37.0	5	Average Conducted
VHF	150.0625	A05H	CW	37.0	5	Average Conducted
VHF	162.000	A0CH	CW	37.2	5.2	Average Conducted
VHF	173.9250	A0DH	CW	37.6	5.7	Average Conducted

Notes

1. The test channels were selected in accordance with the procedures specified in FCC KDB 447498 (see reference [8]).

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 [15]) and IC RSS-Gen (see reference [16]).

4.0 NO. OF TEST CHANNELS (N_c)

Device Frequency Range	Band	N_c	Test Frequencies (MHz)
136-174 MHz	VHF	7	136.125, 143.9875, 148.0125, 149.8875, 150.0625, 162.000, 173.925

Note: The number of test channels (*Nc*) were calculated in accordance with the procedures specified in FCC KDB 447498 (see reference [8]).

5.0 SAR PROBE CALIBRATION & MEASUREMENT FREQUENCIES

The following procedures are recommended for 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 6 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 865664 D01v01 - see reference [6]).

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	±25 MHz ≤ 300 MHz
150 MHz	136.125 MHz	13.875 MHz	< 25 MHz
	143.9875 MHz	6.0125 MHz	< 25 MHz
	148.0125 MHz	1.9875 MHz	< 25 MHz
	149.8875 MHz	0.1125 MHz	< 25 MHz
	150.0625 MHz	0.0625 MHz	< 25 MHz
	162.000 MHz	2.0 MHz	< 25 MHz
	173.9250 MHz	23.925 MHz	< 25 MHz

Note: The probe calibration and measurement frequency interval is < 25 MHz; therefore additional steps were not required.

6.0 ACCESSORY LISTING

Accessory ID # for Test Report	ACCESSORY CATEGORY: ANTENNA		
	Part Number	**Description**	**SAR Evaluation**
1	A0AH	Detachable whip Antenna	Yes
2	A03H	Detachable whip Antenna	Yes
3	A0CH	Detachable whip Antenna	Yes
4	A0DH	Detachable whip Antenna	Yes
Accessory ID # for Test Report	**ACCESSORY CATEGORY: BATTERY**		
	Part Number	**Description**	**SAR Evaluation**
a		Li-ion Battery 7.4V, 16.6 Wh	Yes
Accessory ID # for Test Report	**ACCESSORY CATEGORY: BODY-WORN**		
	Part Number	**Description**	**SAR Evaluation**
1	N/A	Belt-clip (contains metal)	Yes

Manufacturer's disclosed accessory listing provided by SIMOCO.

Notes:
1. The manufacturer does not supply an audio accessory, however, the device does have an audio jack and supports customer supplied audio accessories.

7.0 FLUID DIELECTRIC PARAMETERS

FLUID DIELECTRIC PARAMETERS

Date: 11/22/2013		Frequency: 150 MHz			Tissue: Body	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	64.27	0.77	61.9	0.8	3.83%	-3.75%
0.060	73.04	0.75	61.9	0.8	18.00%	-6.25%
0.070	65.42	0.78	61.9	0.8	5.69%	-2.50%
0.080	69.61	0.75	61.9	0.8	12.46%	-6.25%
0.090	68.72	0.76	61.9	0.8	11.02%	-5.00%
0.100	65.33	0.79	61.9	0.8	5.54%	-1.25%
0.110	64.26	0.78	61.9	0.8	3.81%	-2.50%
0.120	58.97	0.8	61.9	0.8	-4.73%	0.00%
0.130	63.33	0.81	61.9	0.8	2.31%	1.25%
0.140	63.11	0.82	61.9	0.8	1.95%	2.50%
0.150	63.23	0.81	61.9	0.8	2.15%	1.25%
0.160	61.32	0.82	61.9	0.8	-0.94%	2.50%
0.170	60.58	0.82	61.9	0.8	-2.13%	2.50%
0.173925*	61.3	0.828	61.9	0.8	-0.97%	3.50%
0.180	62.42	0.84	61.9	0.8	0.84%	5.00%
0.190	62.04	0.83	61.9	0.8	0.23%	3.75%
0.200	62	0.85	61.9	0.8	0.16%	6.25%
0.210	60.69	0.86	61.9	0.8	-1.95%	7.50%
0.220	60.47	0.87	61.9	0.8	-2.31%	8.75%
0.230	61.01	0.88	61.9	0.8	-1.44%	10.00%
0.240	60.09	0.89	61.9	0.8	-2.92%	11.25%
0.250	59.47	0.9	61.9	0.8	-3.93%	12.50%

**interpolated using DASY4 software*

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Nov 22	150 Body	26°C	23.1°C	≥ 15 cm	104.6 kPa	15%	1000

FLUID DIELECTRIC PARAMETERS

Date: 11/26&27/2013		Frequency: 150 MHz			Tissue: Body	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	58.07	0.72	61.9	0.8	-6.19%	-10.00%
0.060	62.95	0.75	61.9	0.8	1.70%	-6.25%
0.070	65.02	0.72	61.9	0.8	5.04%	-10.00%
0.080	66.99	0.76	61.9	0.8	8.22%	-5.00%
0.090	66.2	0.76	61.9	0.8	6.95%	-5.00%
0.100	67.32	0.79	61.9	0.8	8.76%	-1.25%
0.110	63	0.8	61.9	0.8	1.78%	0.00%
0.120	60.67	0.78	61.9	0.8	-1.99%	-2.50%
0.130	61.65	0.8	61.9	0.8	-0.40%	0.00%
0.136125*	61.2	0.812	61.9	0.8	-1.13%	1.50%
0.140	60.95	0.82	61.9	0.8	-1.53%	2.50%
0.143988*	61.4	0.816	61.9	0.8	-0.81%	2.00%
0.148012*	61.8	0.812	61.9	0.8	-0.16%	1.50%
0.149.887*	62.1	0.81	61.9	0.8	0.32%	1.25%
0.150	62.07	0.81	61.9	0.8	0.27%	1.25%
0.150063*	62.1	0.81	61.9	0.8	0.32%	1.25%
0.160	63.56	0.81	61.9	0.8	2.68%	1.25%
0.162*	63.1	0.818	61.9	0.8	1.94%	2.25%
0.170	61.06	0.81	61.9	0.8	-1.36%	1.25%
0.180	61.28	0.82	61.9	0.8	-1.00%	2.50%
0.190	61.73	0.84	61.9	0.8	-0.27%	5.00%
0.200	61.06	0.84	61.9	0.8	-1.36%	5.00%
0.210	59.19	0.86	61.9	0.8	-4.38%	7.50%
0.220	60.25	0.85	61.9	0.8	-2.67%	6.25%
0.230	59.03	0.86	61.9	0.8	-4.64%	7.50%
0.240	59.55	0.86	61.9	0.8	-3.80%	7.50%
0.250	59.2	0.87	61.9	0.8	-4.36%	8.75%

**interpolated using DASY4 software*

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Nov 26	150 Body	26°C	22.8°C	≥ 15 cm	102.8 kPa	17%	1000
Nov 27	150 Body	26°C	23.0°C	≥ 15 cm	102.6 kPa	15%	1000

FLUID DIELECTRIC PARAMETERS

Date: 11/27&28/2013		Frequency: 150 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	67.16	0.72	52.3	0.76	28.41%	-5.26%
0.060	70.76	0.7	52.3	0.76	35.30%	-7.89%
0.070	49.05	0.71	52.3	0.76	-6.21%	-6.58%
0.080	55.26	0.71	52.3	0.76	5.66%	-6.58%
0.090	64.07	0.74	52.3	0.76	22.50%	-2.63%
0.100	53.8	0.72	52.3	0.76	2.87%	-5.26%
0.110	52.79	0.73	52.3	0.76	0.94%	-3.95%
0.120	56.35	0.74	52.3	0.76	7.74%	-2.63%
0.130	50.68	0.75	52.3	0.76	-3.10%	-1.32%
0.136125*	50.9	0.756	52.3	0.76	-2.68%	-0.53%
0.140	51.12	0.76	52.3	0.76	-2.26%	0.00%
0.143988*	51.3	0.764	52.3	0.76	-1.91%	0.53%
0.148012*	51.4	0.768	52.3	0.76	-1.72%	1.05%
0.149887*	51.5	0.77	52.3	0.76	-1.53%	1.32%
0.150	51.45	0.77	52.3	0.76	-1.63%	1.32%
0.150063*	51.4	0.77	52.3	0.76	-1.72%	1.32%
0.160	49.99	0.79	52.3	0.76	-4.42%	3.95%
162*	50.3	0.792	52.3	0.76	-3.82%	4.21%
0.170	51.48	0.8	52.3	0.76	-1.57%	5.26%
0.173925*	50.9	0.8	52.3	0.76	-2.68%	5.26%
0.180	50.03	0.81	52.3	0.76	-4.34%	6.58%
0.190	48.23	0.82	52.3	0.76	-7.78%	7.89%
0.200	47.14	0.82	52.3	0.76	-9.87%	7.89%
0.210	47.94	0.83	52.3	0.76	-8.34%	9.21%
0.220	46.44	0.85	52.3	0.76	-11.20%	11.84%
0.230	47.07	0.85	52.3	0.76	-10.00%	11.84%
0.240	46.52	0.86	52.3	0.76	-11.05%	13.16%
0.250	46.88	0.88	52.3	0.76	-10.36%	15.79%

**interpolated using DASY4 software*

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Nov 27	150 Head	22°C	21.2°C	≥ 15 cm	102.9 kPa	31%	1000
Nov 28	150 Head	26°C	22.8°C	≥ 15 cm	102.8 kPa	14%	1000

8.0 SAR MEASUREMENT SUMMARY

Table 1 — FACE-HELD SAR EVALUATION RESULTS

Test Date(s): November 28, 2013

Plot #	DUT Model	Freq.	Ch.	Antenna Accessory ID	Cond. Power Before Test	Device Distance to Planar Phantom		Measured SAR (before droop) 1g (W/kg) PTT Duty Factor		SAR Drift During Test	Scaled SAR (with droop) 1g (W/kg) PTT Duty Factor	
		MHz			Watts	DUT	Antenna	100%	50%	dB	100%	50%
F1	SDP650	136.125	A0AH	1	5.3	2.5 cm	3.4 cm	1.25	**0.625**	-1.23	1.66	**0.830**
F2	SDP650	143.9875	A02H	1	5.3	2.5 cm	3.4 cm	0.977	**0.489**	-0.800	1.18	**0.587**
F3	SDP650	148.0125	A03H	2	5	2.5 cm	3.4 cm	1.58	**0.790**	-0.235	1.67	**0.834**
F4	SDP650	149.8875	A04H	2	5	2.5 cm	3.4 cm	1.23	**0.615**	-0.484	1.38	**0.688**
F5	SDP650	150.0625	A05H	2	5	2.5 cm	3.4 cm	1.25	**0.625**	-0.323	1.35	**0.673**
F6	SDP650	162.000	A0CH	3	5.2	2.5 cm	3.4 cm	1.81	**0.905**	-0.554	2.06	**1.03**
F7	SDP650	173.9250	A0DH	4	5.7	2.5 cm	3.4 cm	1.91	**0.955**	-0.171	1.99	**0.993**
F8	SDP660	173.9250	A0DH	4	5.7	2.5 cm	3.4 cm	1.79	**0.895**	-0.070	1.82	**0.909**

SAR LIMIT(S)		HEAD	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	averaged over 1 gram	Occupational / Controlled

Notes

1. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. The SAR droop measured by the DASY4 system for the duration of the SAR evaluation was added to the measured SAR level to report the scaled SAR result as shown in the above test data table.
3. The device was tested with a Li-ion battery.

Table 2 — BODY-WORN SAR EVALUATION RESULTS

Test Date(s): November 22, 26, & 27, 2013

Plot #	DUT Model	Freq.	Ch.	Antenna Access. ID	Cond. Power Before Test	Accessories		Device Distance to Planar Phantom		Measured SAR (before droop) 1g (W/kg) PTT Duty Factor		SAR Drift During Test	Scaled SAR (with droop) 1g (W/kg) PTT Duty Factor	
		MHz			Watts	Body-worn	Audio	DUT	Antenna	100%	50%	dB	100%	50%
B1	SP650	136.125	A0AH	1	5.3	Belt-Clip	Spkr-Mic	1.8 cm	3.2 cm	0.965	**0.483**	-0.867	1.18	**0.589**
B2	SP650	143.9875	A02H	1	5.3	Belt-Clip	Spkr-Mic	1.8 cm	3.2 cm	0.411	**0.206**	-0.977	0.515	**0.257**
B3	SP650	148.0125	A03H	2	5	Belt-Clip	Spkr-Mic	1.8 cm	3.2 cm	0.670	**0.335**	-1.04	0.851	**0.426**
B4	SP650	149.8875	A04H	2	5	Belt-Clip	Spkr-Mic	1.8 cm	3.2 cm	1.03	**0.515**	-1.41	1.43	**0.713**
B5	SP650	150.0625	A05H	2	5	Belt-Clip	Spkr-Mic	1.8 cm	3.2 cm	2.97	**1.49**	-0.831	3.60	**1.80**
B6	SP650	162.000	A0CH	3	5.2	Belt-Clip	Spkr-Mic	1.8 cm	3.2 cm	2.48	**1.24**	-1.23	3.29	**1.65**
B7	SP650	173.9250	A0DH	4	5.7	Belt-Clip	Spkr-Mic	1.8 cm	3.2 cm	2.08	**1.04**	-0.574	2.37	**1.19**
B8	SP660	150.0625	A05H	2	5	Belt-Clip	Spkr-Mic	1.8 cm	3.2 cm	2.45	**1.23**	-0.373	2.67	**1.34**

SAR LIMIT(S)		BODY	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	averaged over 1 gram	Occupational / Controlled

Notes

1. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. The SAR droop measured by the DASY4 system for the duration of the SAR evaluation was added to the measured SAR level to report the scaled SAR result as shown in the above test data table.
3. The device was tested with a Li-ion Battery.

9.0 SAR SCALING (MANUFACTURER TOLERANCE)

The device was tested at the maximum output power

10.0 DETAILS OF SAR EVALUATION

The DUT was compliant for localized Specific Absorption Rate (General Population / Uncontrolled Exposure) based on the test provisions and conditions described below. The detailed test setup photographs are shown in Appendix D.

1. The face-held SAR evaluation was performed with the front of the DUT placed parallel to the outer surface of the planar phantom. A 2.5 cm spacing was maintained between the front side of the DUT and the outer surface of the planar phantom.
2. The Body-worn SAR evaluation was performed with the belt-clip body-worn accessory attached to the back of the DUT in a parallel-touch position to the outer surface of the planar phantom.
3. Each evaluation was performed with a fully charged battery. The battery was also recharged between the area and zoom scan measurements.
4. The DUT was evaluated for SAR in an 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.
5. The SAR drift of the DUT was measured by the DASY4 system for the duration of the SAR evaluation and a SAR-versus-Time power droop evaluation was performed (see Appendix A).
6. The fluid temperature remained within +/-2°C from the fluid dielectric parameter measurement to the completion of the SAR evaluation.
7. The dielectric parameters of the simulated tissue mixture were measured prior to the SAR evaluation using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).

11.0 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 30 mm x 30 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.

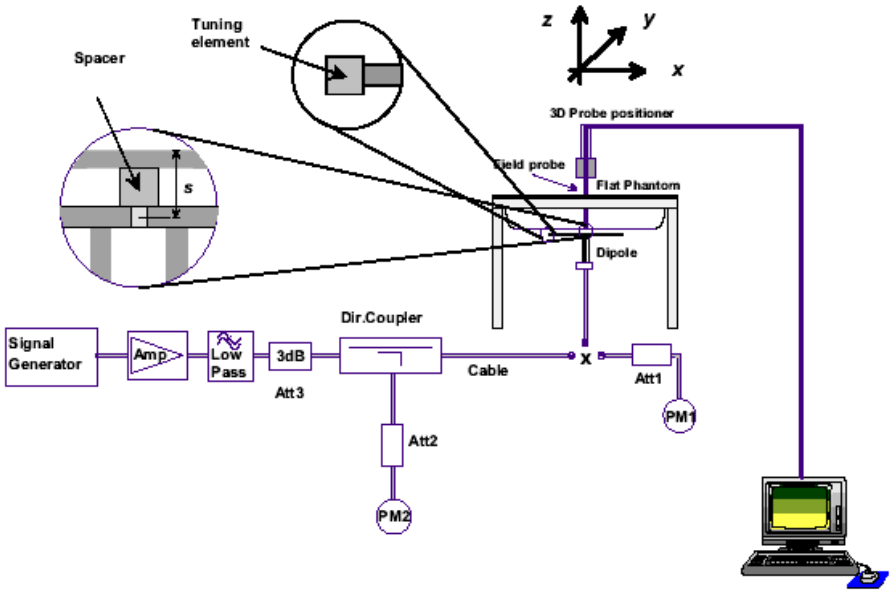
12.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations, system verifications were performed with a planar phantom and SPEAG 300 MHz dipole (see Appendix B) in accordance with the procedures described in FCC KDB 865664 (see reference [9]). The system was verified to meet the internally generated SAR target using 150MHz tissue-equivalent medium with a 300 MHz validation dipole transmitting at 300 MHz (see Appendix E). 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 for 150 Head and 250 mW was applied for 150 Body.

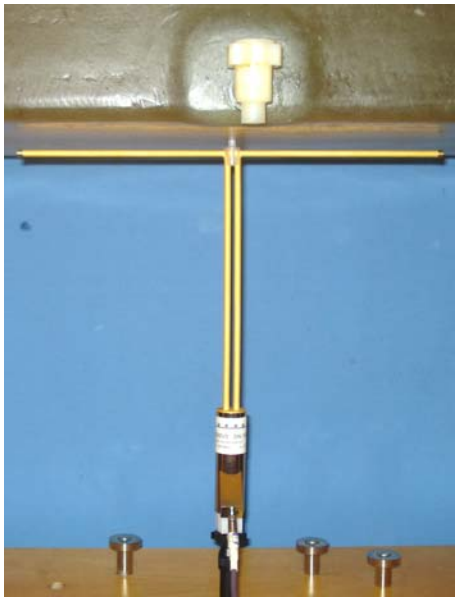
SYSTEM PERFORMANCE CHECK EVALUATION

Test Date	Equiv. Tissue	SAR 1g (W/kg)			Dielectric Constant ε_r			Conductivity σ (mho/m)			ρ (Kg/m^3)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
	Freq. (MHz)	Target	Meas.	Dev.	Target	Meas.	Dev.	Target	Meas.	Dev.						
Nov 22	Body 150	0.653 ±10%	0.647	-0.9%	61.9 ±5%	63.2	+2.1%	0.80 ±5%	0.81	+1.3%	1000	26	23.1	≥ 15	15	104.6
Nov 22	Body 150	0.653 ±10%	0.650	-0.5%	61.9 ±5%	62.1	+0.3%	0.80 ±5%	0.81	+1.3%	1000	26	22.8	≥ 15	17	102.8
Nov 27	Head 150	0.953 ±10%	0.989	+3.8%	52.3 ±5%	51.5	-1.5%	0.76 ±5%	0.77	+1.3%	1000	22	21.2	≥ 15	31	102.9

Notes		
	1.	The 150MHz SAR values have a coefficient of variation < 3%.
	2.	The target fluid dielectric parameters are the nominal values from the SAR system manufacturer's probe calibration (see Appendix F)
	3.	The fluid temperature remained within +/-2°C from the fluid dielectric parameter measurement to the completion of the system performance check.
	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).



System Performance Check Measurement Setup (IEEE Standard 1528-2013)



SPEAG 300 MHz Validation Dipole Setup

13.0 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 [13] and [14]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2013 (see reference [5]). 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	**150 MHz HEAD**	**150 MHz BODY**
Water	38.35 %	46.6 %
Sugar	55.5%	49.7 %
Salt	5.15%	2.6 %
HEC	0.9%	1.0 %
Bactericide	0.1%	0.1 %

14.0 SAR LIMITS

SAR RF EXPOSURE LIMITS			
FCC 47 CFR 2.1093	**Health Canada Safety Code 6**	**(General Population / Uncontrolled Exposure)**	**(Occupational / Controlled Exposure)**
Spatial Average (averaged over the whole body)		0.08 W/kg	0.4 W/kg
Spatial Peak (averaged over any 1 g of tissue)		**1.6 W/kg**	8.0 W/kg
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)		4.0 W/kg	20.0 W/kg
The Spatial Average value of the SAR averaged over the whole body.			
The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.			
The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.			
Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.			
Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.			

15.0 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 80
	Postprocessing Software: SEMCAD, V1.8 Build 186
Connecting Lines	Optical downlink for data and status info., Optical uplink for commands and clock
DASY4 Measurement Server	
Function	Real-time data evaluation for field measurements and surface detection
Hardware	PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections	COM1, COM2, DAE, Robot, Ethernet, Service Interface
E-Field Probe	
Model	ET3DV6
Serial No.	1590
Construction	Triangular core fiber optic detection system
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
Phantom	
Type	Barski Planar Phantom
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 70 liters

16.0 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 Body 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 Body tissue (rotation around probe axis) ± 0.4 dB in Body 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

17.0 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

18.0 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. Face-held SAR evaluations (PTT radios) are performed with the device holder in the body axis.

Device Holder

19.0 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	19-Apr-12	Biennial
x	-ET3DV6 E-Field Probe	00017	1590	24-Apr-13	Annual
x	-D300V3 Validation Dipole	00216	1009	17-Apr-12 / 8-Jan-13	Triennial
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	03-May-12	Biennial
x	Gigatronics 80701A Power Sensor	00014	1833542	03-May-12	Biennial
x	Gigatronics 80334A Power Sensor	-	1837001	03-May-12	Biennial
x	HP 8753ET Network Analyzer	00134	US39170292	26-Apr-12	Biennial
x	Rohde & Schwarz SMR20 Signal Generator	00006	100104	02-May-12	Biennial
x	Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
Abbr.	CNR = Calibration Not Required				

20.0 MEASUREMENT UNCERTAINTIES (IC ONLY)

UNCERTAINTY BUDGET FOR DEVICE EVALUATION (IEC 62209-2:2010)

Source of Uncertainty	IEC 62209-2 Section	Tolerance / Uncertainty ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Standard Uncertainty ±% (1g)	Standard Uncertainty ±% (10g)	V_i or V_{eff}
Measurement System									
Probe Calibration (150 MHz)	7.2.2.1	10.0	Normal	1	1	1	10.0	10.0	∞
Isotropy	7.2.2.2	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
Boundary Effect	7.2.2.6	2.5	Rectangular	1.732050808	1	1	1.4	1.4	∞
Linearity	7.2.2.3	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
Detection Limits	7.2.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	7.2.2.7	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	7.2.2.8	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	7.2.2.9	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	7.2.4.5	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Restrictions	7.2.3.1	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell	7.2.3.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Post-processing	7.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	7.2.3.4.3	2.9	Normal	1	1	1	2.9	2.9	12
Device Holder Uncertainty	7.2.3.4.2	3.6	Normal	1	1	1	3.6	3.6	8
Drift of Output Power (meas. SAR drift)	7.2.2.10	0	Rectangular	1.732050808	1	1	0.0	0.0	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	7.2.3.2	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
SAR Correction Algorithm for deviations in permittivity and conductivity	7.2.4.3	1.2	Normal	1	1	0.81	1.2	0.97	∞
Liquid Conductivity (measured)	7.2.4.3	5.26	Normal	1	0.78	0.71	4.1	3.7	∞
Liquid Permittivity (measured)	7.2.4.3	3.82	Normal	1	0.23	0.26	0.9	1.0	∞
Liquid Permittivity - temp. uncertainty	7.2.4.4	1.04	Rectangular	1.732050808	0.78	0.71	0.5	0.4	∞
Liquid Conductivity - temp. uncertainty	7.2.4.4	1.97	Rectangular	1.732050808	0.23	0.26	0.3	0.3	∞
Combined Standard Uncertainty	**7.3.1**		**RSS**				**13.11**	**12.99**	
Expanded Uncertainty (95% Confidence Interval)	**7.3.2**		**k=2**				**26.22**	**25.98**	

Measurement Uncertainty Table in accordance with International Standard IEC 62209-2:2010

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

21.0 REFERENCES

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

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

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

[5] IEEE Standard 1528-2013 - “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”: June 2013.

[6] 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.”

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

[8] Federal Communications Commission, Office of Engineering and Technology - “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”; KDB 447498 D01 v05: October 2012.

[9] Federal Communications Commission, Office of Engineering and Technology - “SAR Measurement Requirements for 100 MHz to 6 GHz”; KDB 865664 D01v01: October 2012.

[10] Federal Communications Commission, Office of Engineering and Technology - “SAR Test Reduction Considerations for Occupational PTT Radios”, KDB 643646 D01v01: December 2010.

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

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

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

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

[16] Industry Canada - “General Requirements and Information for the Certification of Radiocommunication Equipment”, Radio Standards Specification RSS-Gen Issue 3: December 2010.

APPENDIX A - SAR MEASUREMENT PLOTS

Face-held SAR – F1

Date Tested: 11/28/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

Procedure Notes:

Communication System: VHF
Frequency: 136.125 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 136.125 MHz; σ = 0.756 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3

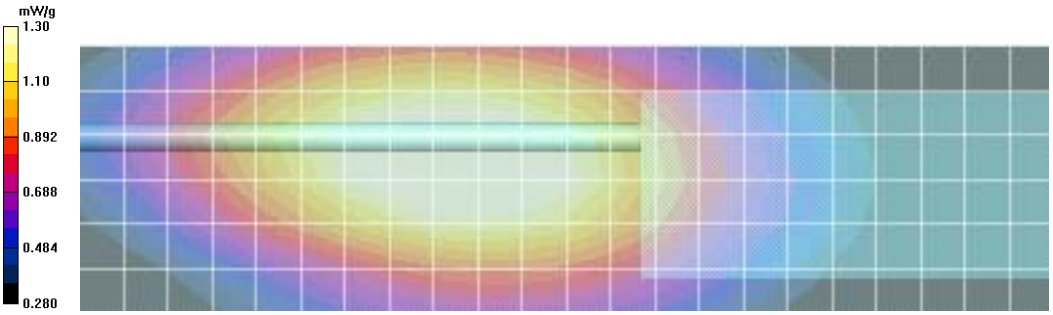
- Probe: ET3DV6 - SN1590; ConvF(9.31, 9.31, 9.31); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Head SDP650 A0AH, Belt Cip, Spk Mic, Ant A0AH/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.38 mW/g

Head SDP650 A0AH, Belt Cip, Spk Mic, Ant A0AH/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 42.4 V/m; Power Drift = -1.23 dB
Peak SAR (extrapolated) = 1.85 W/kg
SAR(1 g) = 1.25 mW/g; SAR(10 g) = 0.944 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.30 mW/g



Face-held SAR – F2

Date Tested: 11/28/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

Procedure Notes:

Communication System: VHF
Frequency: 143.988 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 143.988 MHz; σ = 0.764 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3

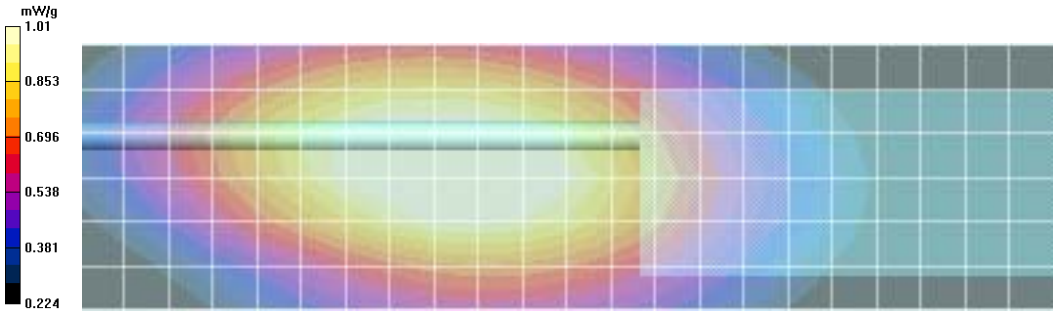
- Probe: ET3DV6 - SN1590; ConvF(9.31, 9.31, 9.31); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Head SDP650 A02H, Belt Cip, Spk Mic, Ant A0AH/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.08 mW/g

Head SDP650 A02H, Belt Cip, Spk Mic, Ant A0AH/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 36.5 V/m; Power Drift = -0.800 dB
Peak SAR (extrapolated) = 1.42 W/kg
SAR(1 g) = 0.977 mW/g; SAR(10 g) = 0.735 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.01 mW/g



Face-held SAR – F3

Date Tested: 11/28/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

Procedure Notes:

Communication System: VHF
Frequency: 148.012 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 148.012 MHz; σ = 0.768 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(9.31, 9.31, 9.31); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

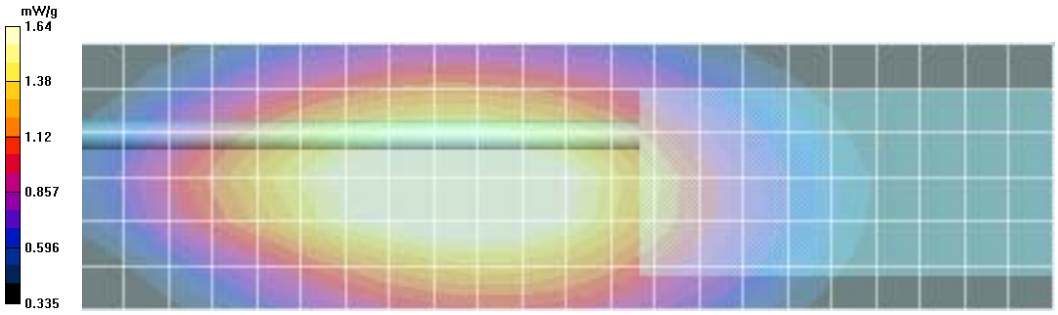
Head SDP650 A03H, Belt Cip, Spk Mic, Ant A03H/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.79 mW/g

Head SDP650 A03H, Belt Cip, Spk Mic, Ant A03H/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 43.9 V/m; Power Drift = -0.235 dB
Peak SAR (extrapolated) = 2.33 W/kg
SAR(1 g) = 1.58 mW/g; SAR(10 g) = 1.18 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.64 mW/g



Face-held SAR – F4

Date Tested: 11/28/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

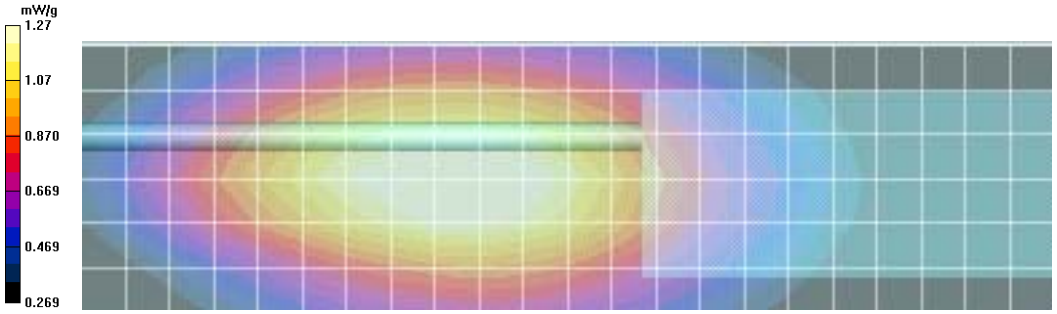
Procedure Notes:

Communication System: VHF
Frequency: 149.887 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 150 MHz; σ = 0.77 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(9.31, 9.31, 9.31); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Head SDP650 A04H, Belt Cip, Spk Mic, Ant A03H/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.33 mW/g

Head SDP650 A04H, Belt Cip, Spk Mic, Ant A03H/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.6 V/m; Power Drift = -0.484 dB
Peak SAR (extrapolated) = 1.81 W/kg
SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.916 mW/g
Maximum value of SAR (measured) = 1.27 mW/g



Face-held SAR – F5

Date Tested: 11/28/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

Procedure Notes:

Communication System: VHF
Frequency: 150.063 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 150.063 MHz; σ = 0.77 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3

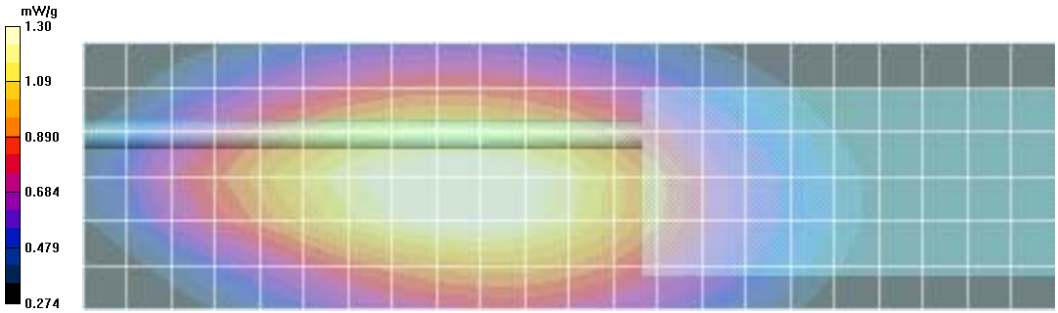
- Probe: ET3DV6 - SN1590; ConvF(9.31, 9.31, 9.31); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Head SDP650 A05H, Belt Cip, Spk Mic, Ant A03H/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.33 mW/g

Head SDP650 A05H, Belt Cip, Spk Mic, Ant A03H/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.4 V/m; Power Drift = -0.323 dB
Peak SAR (extrapolated) = 1.86 W/kg
SAR(1 g) = 1.25 mW/g; SAR(10 g) = 0.932 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.30 mW/g



Face-held SAR – F6

Date Tested: 11/28/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

Procedure Notes:

Communication System: VHF
Frequency: 162 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 162 MHz; σ = 0.792 mho/m; ε_r = 50.3; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(9.31, 9.31, 9.31); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

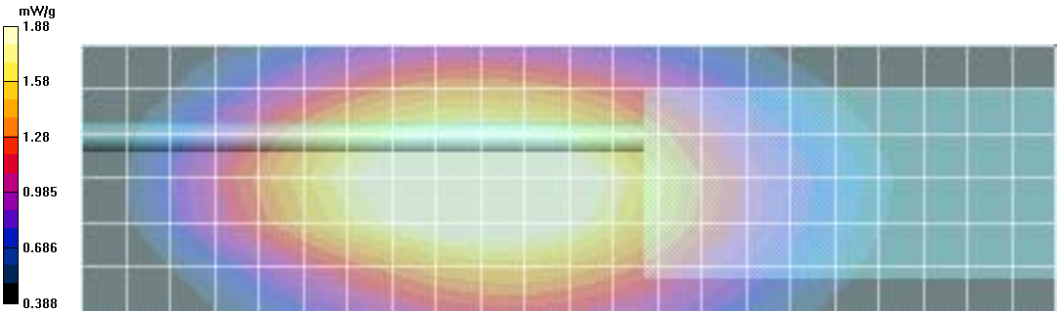
Head SDP650 A0CH, Belt Cip, Spk Mic, Ant A0CH/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.10 mW/g

Head SDP650 A0CH, Belt Cip, Spk Mic, Ant A0CH/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 49.0 V/m; Power Drift = -0.554 dB
Peak SAR (extrapolated) = 2.68 W/kg
SAR(1 g) = 1.81 mW/g; SAR(10 g) = 1.35 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.88 mW/g



Face-held SAR – F7

Date Tested: 11/28/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

Procedure Notes:

Communication System: VHF
Frequency: 173.925 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 173.925 MHz; σ = 0.8 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3

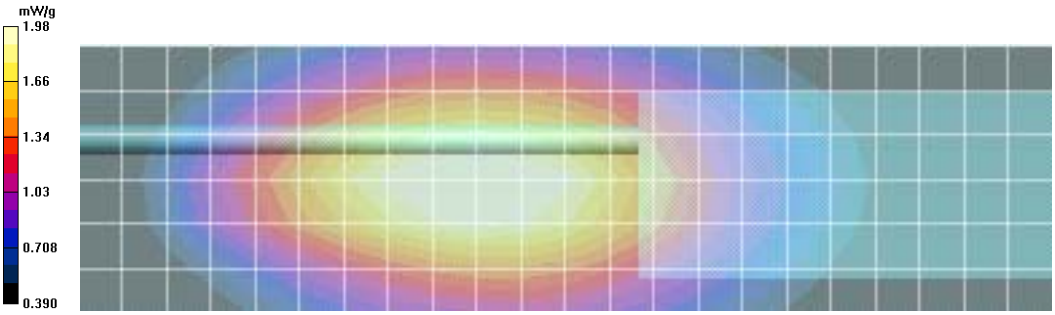
- Probe: ET3DV6 - SN1590; ConvF(9.31, 9.31, 9.31); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Head SDP650 A0DH, Belt Cip, Spk Mic, Ant A0DH/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.07 mW/g

Head SDP650 A0DH, Belt Cip, Spk Mic, Ant A0DH/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 47.5 V/m; Power Drift = -0.171 dB
Peak SAR (extrapolated) = 2.85 W/kg
SAR(1 g) = 1.91 mW/g; SAR(10 g) = 1.41 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.98 mW/g



Face-held SAR – F8

Date Tested: 11/28/2013

DUT: Simoco 660; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

Procedure Notes:

Communication System: VHF
Frequency: 173.925 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 173.925 MHz; σ = 0.8 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(9.31, 9.31, 9.31); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

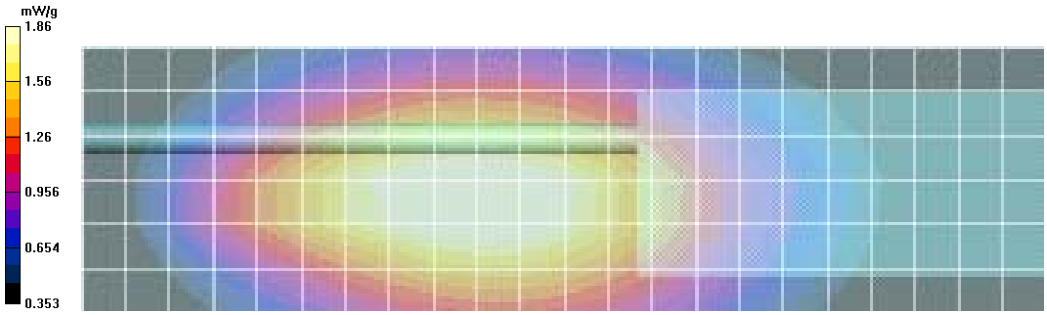
Head SDP660 w/c, Belt Cip, Spk Mic, Ant w/c/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.94 mW/g

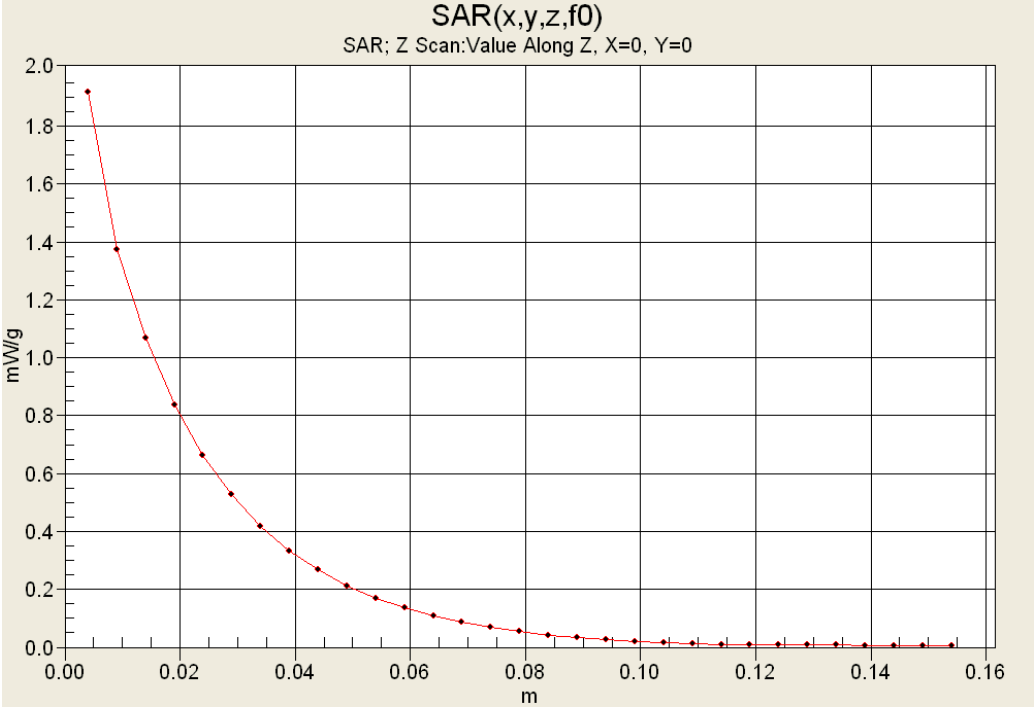
Head SDP660 w/c, Belt Cip, Spk Mic, Ant w/c/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 45.7 V/m; Power Drift = -0.070 dB
Peak SAR (extrapolated) = 2.66 W/kg
SAR(1 g) = 1.79 mW/g; SAR(10 g) = 1.32 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

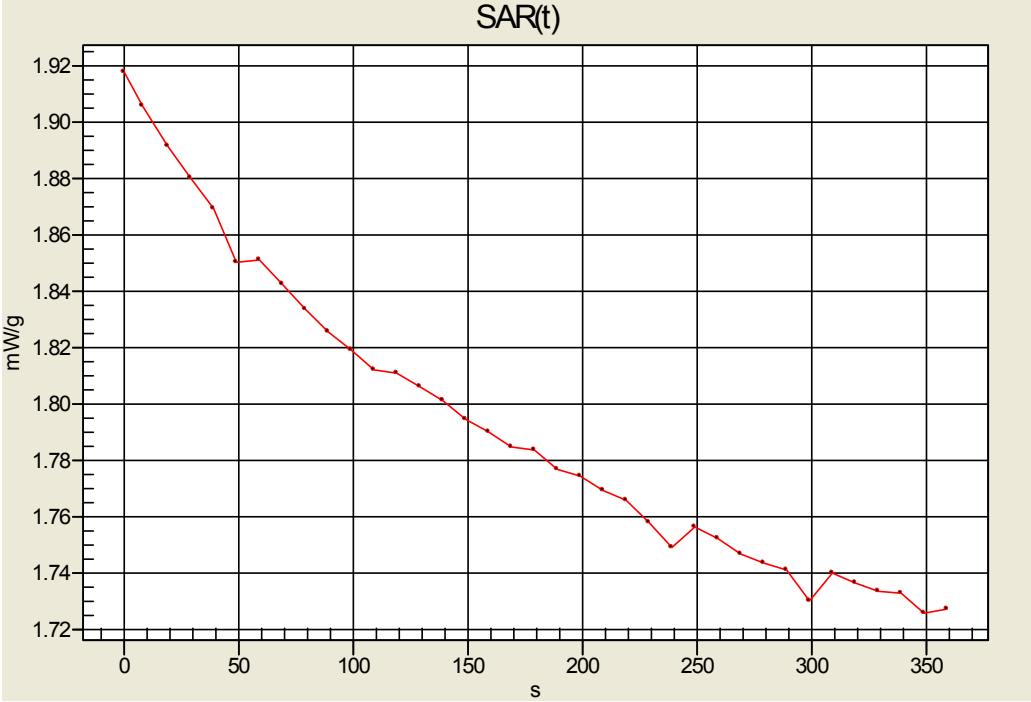
Maximum value of SAR (measured) = 1.86 mW/g



Z-Axis Scan



SAR-Vs-Time



Body-worn SAR - B1

Date Tested: 11/26/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

Procedure Notes:

Communication System: VHF
Frequency: 136.125 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 136.125 MHz; σ = 0.812 mho/m; ε_r = 61.2; ρ = 1000 kg/m^3

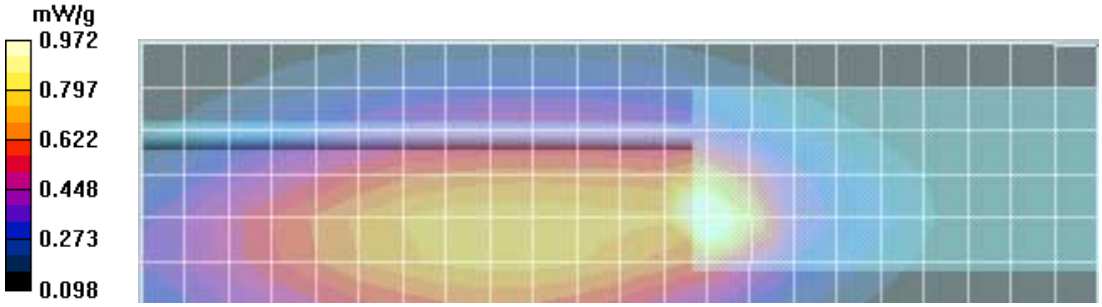
- Probe: ET3DV6 - SN1590; ConvF(8.65, 8.65, 8.65); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body SDP650 A0AH, Belt Cip, Spk Mic, Ant A0AH/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.15 mW/g

Body SDP650 A0AH, Belt Cip, Spk Mic, Ant A0AH/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 29.4 V/m; Power Drift = -0.867 dB
Peak SAR (extrapolated) = 2.66 W/kg
SAR(1 g) = 0.965 mW/g; SAR(10 g) = 0.541 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.972 mW/g



Body-worn SAR – B2

Date Tested: 11/26/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

Procedure Notes:

Communication System: VHF
Frequency: 143.988 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 143.988 MHz; σ = 0.816 mho/m; ε_r = 61.4; ρ = 1000 kg/m^3

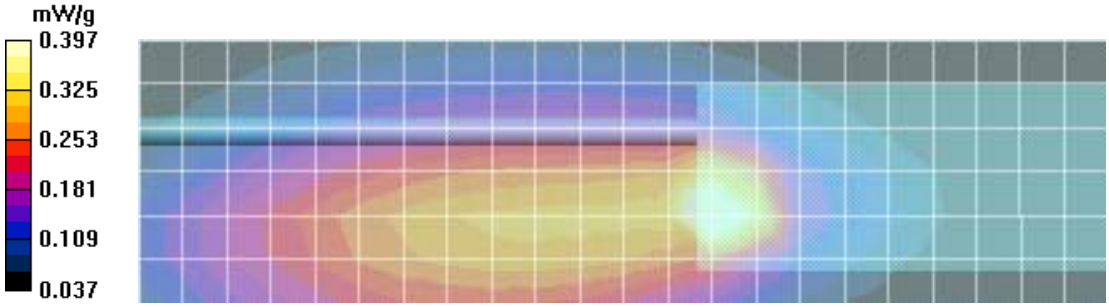
- Probe: ET3DV6 - SN1590; ConvF(8.65, 8.65, 8.65); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body SDP650 A02H, Belt Cip, Spk Mic, Ant A0AH/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.475 mW/g

Body SDP650 A02H, Belt Cip, Spk Mic, Ant A0AH/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 19.2 V/m; Power Drift = -0.977 dB
Peak SAR (extrapolated) = 1.20 W/kg
SAR(1 g) = 0.411 mW/g; SAR(10 g) = 0.222 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.397 mW/g



Body-worn SAR – B3

Date Tested: 11/26/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

Procedure Notes:

Communication System: VHF
Frequency: 148.012 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 148.012 MHz; σ = 0.812 mho/m; ε_r = 61.8; ρ = 1000 kg/m^3

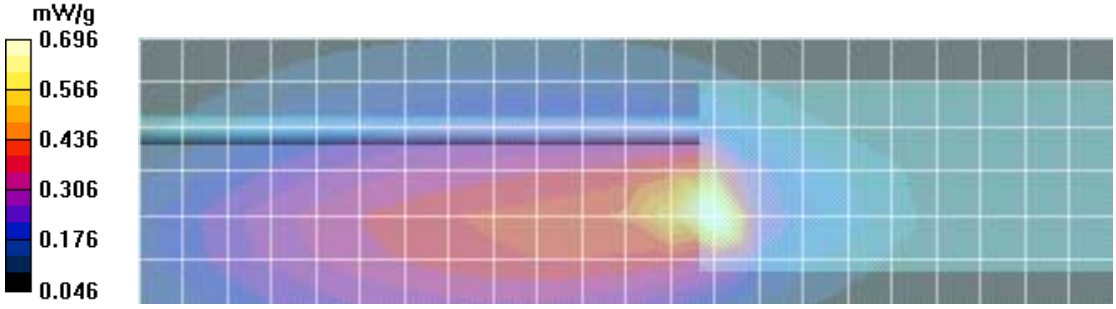
- Probe: ET3DV6 - SN1590; ConvF(8.65, 8.65, 8.65); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body SDP650 A03H, Belt Cip, Spk Mic, Ant A03H 2/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.782 mW/g

Body SDP650 A03H, Belt Cip, Spk Mic, Ant A03H 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 22.9 V/m; Power Drift = -1.04 dB
Peak SAR (extrapolated) = 2.11 W/kg
SAR(1 g) = 0.670 mW/g; SAR(10 g) = 0.345 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.696 mW/g



Body-worn SAR – B4

Date Tested: 11/26/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

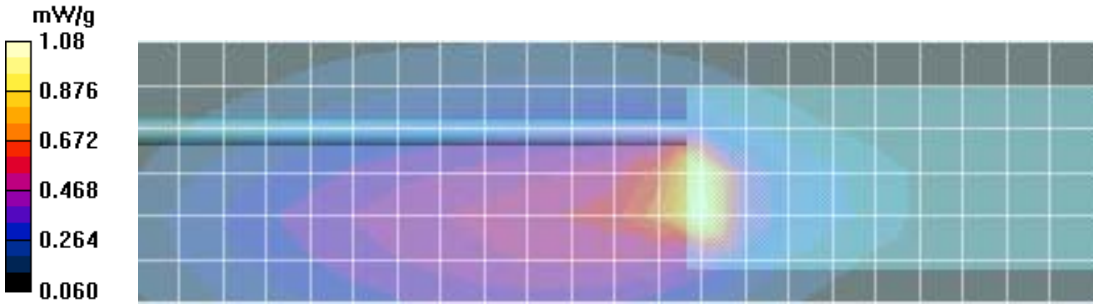
Procedure Notes:

Communication System: VHF
Frequency: 149.887 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 150 MHz; σ = 0.81 mho/m; ε_r = 62.1; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1590; ConvF(8.65, 8.65, 8.65); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body SDP650 A04H, Belt Cip, Spk Mic, Ant A03H/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.02 mW/g

Body SDP650 A04H, Belt Cip, Spk Mic, Ant A03H/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 27.4 V/m; Power Drift = -1.41 dB
Peak SAR (extrapolated) = 3.73 W/kg
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.495 mW/g
Maximum value of SAR (measured) = 1.08 mW/g



Body-worn SAR – B5

Date Tested: 11/26/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

Procedure Notes:

Communication System: VHF
Frequency: 150.063 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 150.063 MHz; σ = 0.81 mho/m; ε_r = 62.1; ρ = 1000 kg/m^3

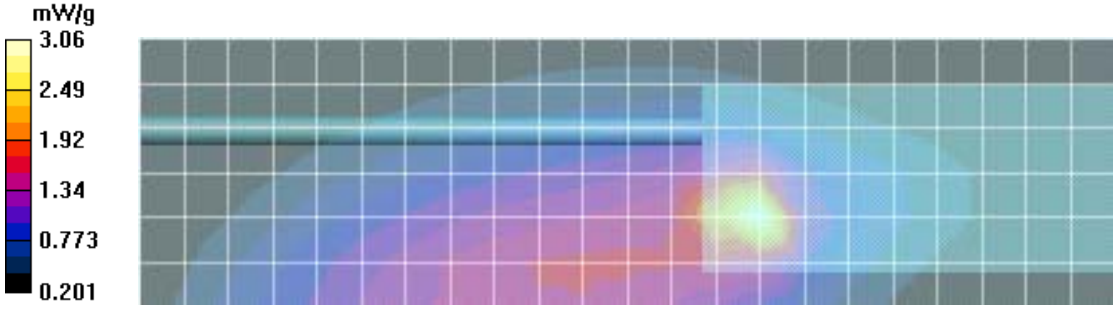
- Probe: ET3DV6 - SN1590; ConvF(8.65, 8.65, 8.65); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body SDP650 A05H, Belt Cip, Spk Mic, Ant A03H/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 3.21 mW/g

Body SDP650 A05H, Belt Cip, Spk Mic, Ant A03H/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.9 V/m; Power Drift = -0.831 dB
Peak SAR (extrapolated) = 10.6 W/kg
SAR(1 g) = 2.97 mW/g; SAR(10 g) = 1.45 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 3.06 mW/g



Body-worn SAR – B6

Date Tested: 11/26/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 14%

Procedure Notes:

Communication System: VHF
Frequency: 162 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 162 MHz; σ = 0.818 mho/m; ε_r = 63.1; ρ = 1000 kg/m^3

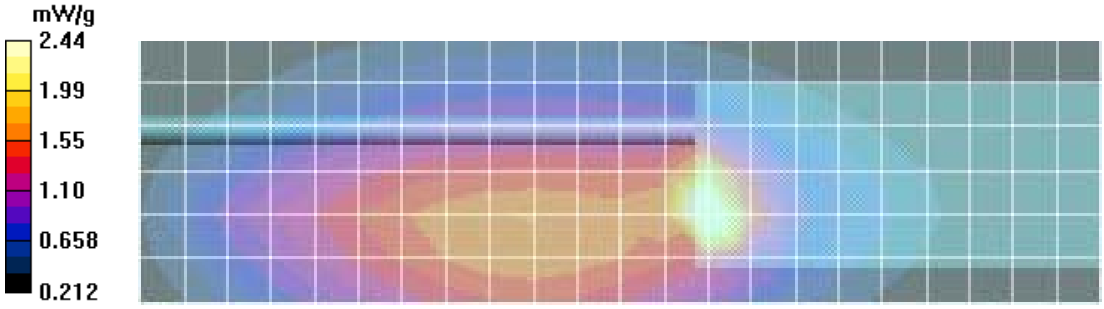
- Probe: ET3DV6 - SN1590; ConvF(8.65, 8.65, 8.65); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body SDP650 A0CH, Belt Cip, Spk Mic, Ant A0CH/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

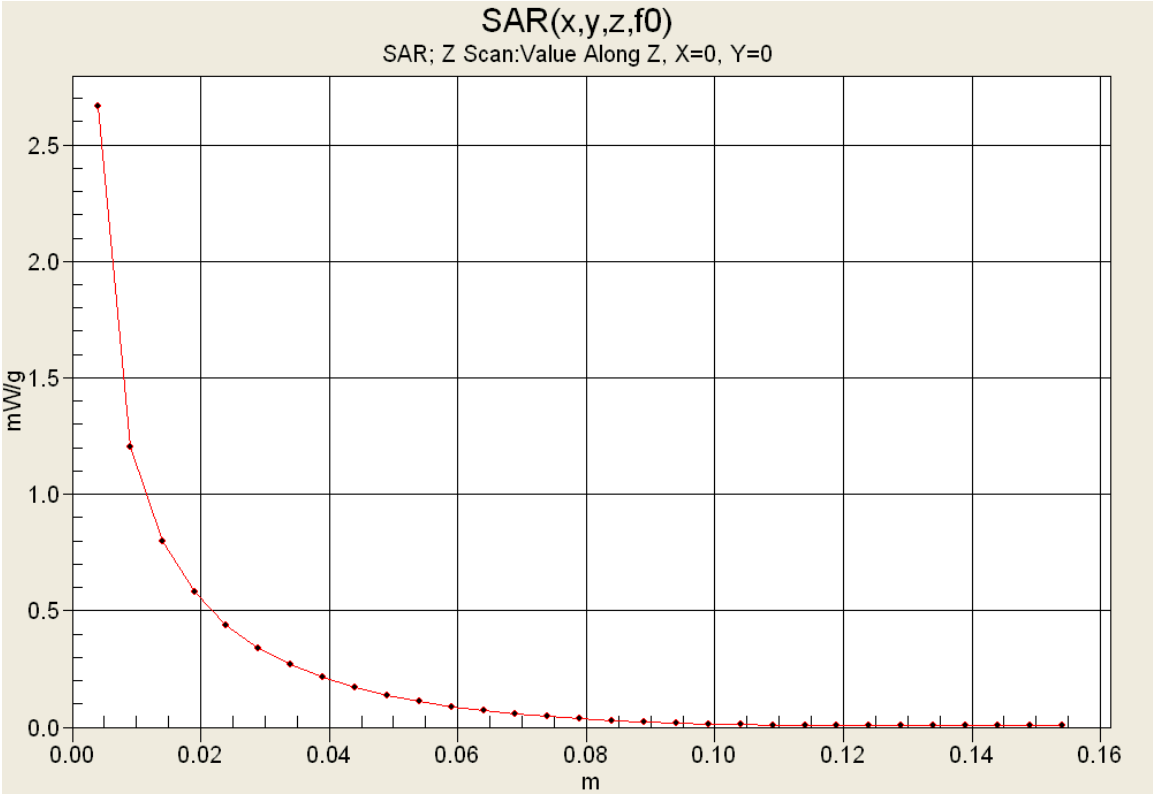
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.93 mW/g

Body SDP650 A0CH, Belt Cip, Spk Mic, Ant A0CH/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 44.8 V/m; Power Drift = -1.23 dB
Peak SAR (extrapolated) = 8.07 W/kg
SAR(1 g) = 2.48 mW/g; SAR(10 g) = 1.28 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.44 mW/g



Z-Axis Scan



Body-worn SAR – B7

Date Tested: 11/22/2013

DUT: Simoco 650; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 23C; Fluid Temp: 20.5C; Barometric Pressure: 101.9 kPa; Humidity: 24%

Procedure Notes:

Communication System: VHF
Frequency: 173.925 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 173.925 MHz; σ = 0.828 mho/m; ε_r = 61.3; ρ = 1000 kg/m^3

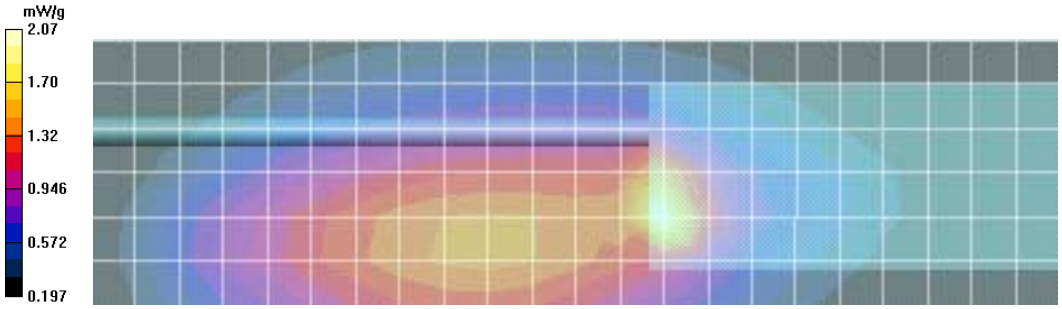
- Probe: ET3DV6 - SN1590; ConvF(8.65, 8.65, 8.65); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body SDP650 A0DH, Belt Cip, Spk Mic, Ant A0DH/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

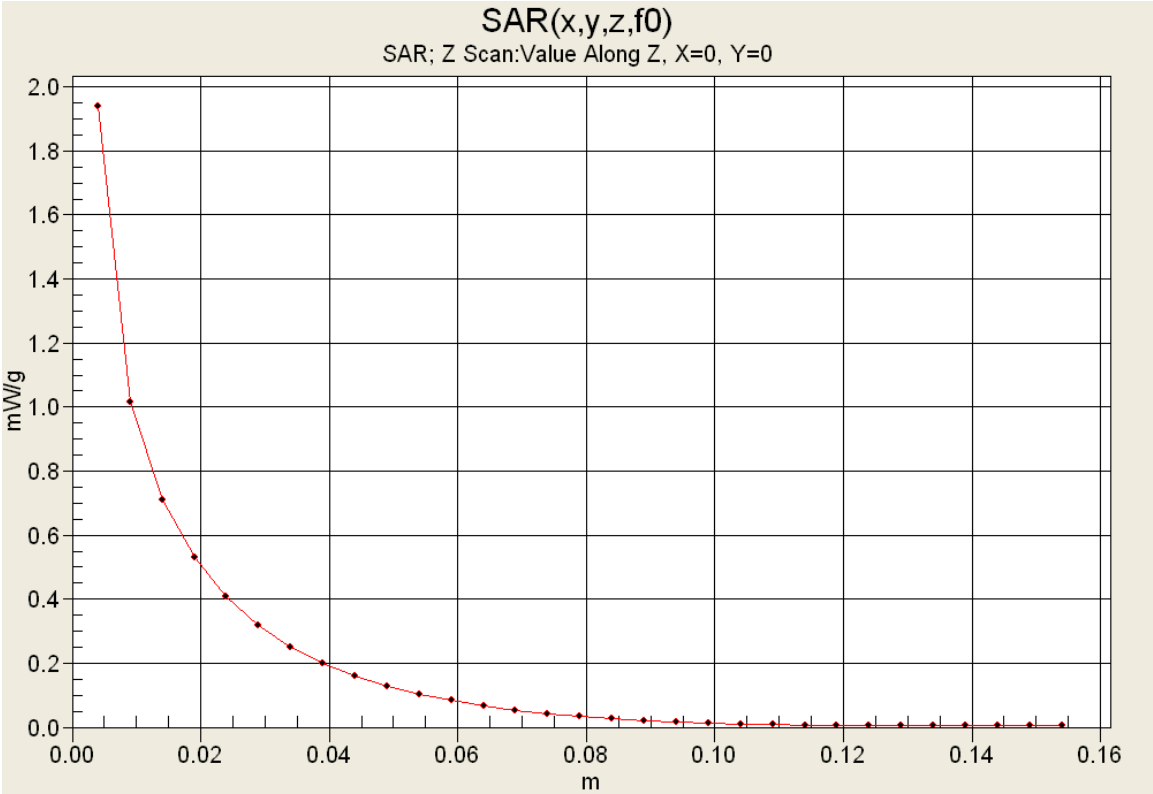
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.09 mW/g

Body SDP650 A0DH, Belt Cip, Spk Mic, Ant A0DH/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.5 V/m; Power Drift = -0.574 dB
Peak SAR (extrapolated) = 6.06 W/kg
SAR(1 g) = 2.08 mW/g; SAR(10 g) = 1.13 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.07 mW/g



Z-Axis Scan



Body-worn SAR – B8

Date Tested: 11/ 27/2013

DUT: Simoco 660; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 26C; Fluid Temp: 23.5C; Barometric Pressure: 102.6 kPa; Humidity: 15%

Procedure Notes:

Communication System: VHF
Frequency: 150.063 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 150.063 MHz; σ = 0.81 mho/m; ε_r = 62.1; ρ = 1000 kg/m^3

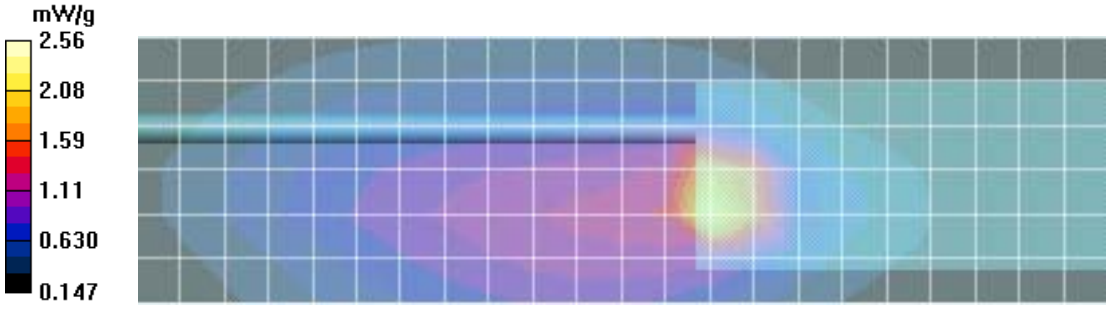
- Probe: ET3DV6 - SN1590; ConvF(8.65, 8.65, 8.65); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body SDP660 A05H, Belt Cip, Spk Mic, Ant A03H/Area Scan 2 (7x23x1): Measurement grid: dx=15mm, dy=15mm

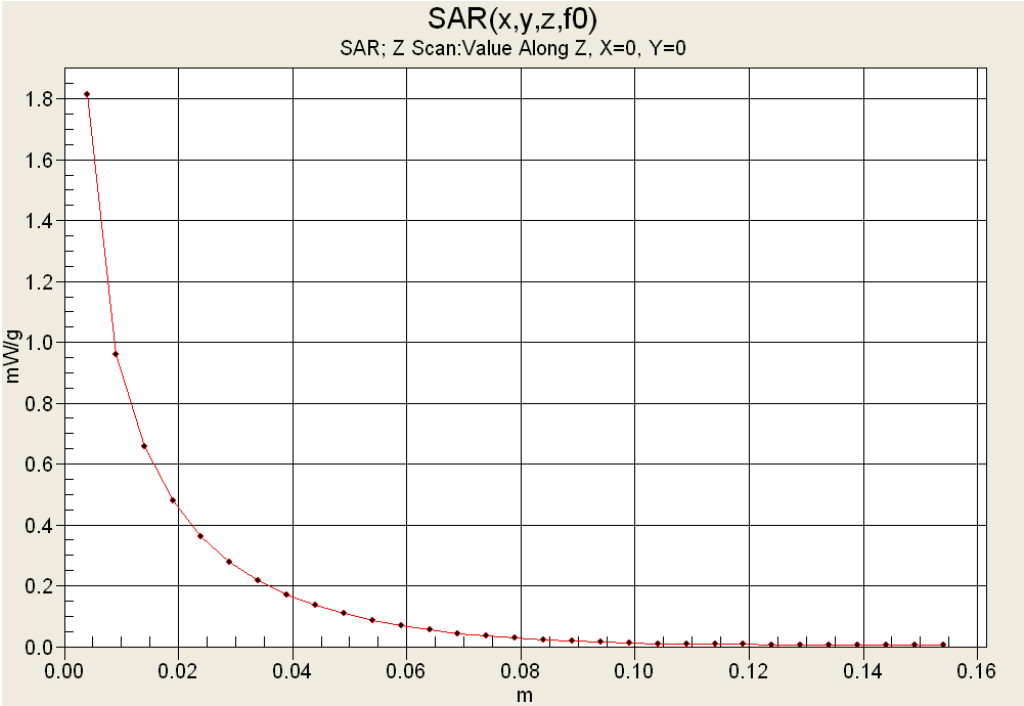
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.31 mW/g

Body SDP660 A05H, Belt Cip, Spk Mic, Ant A03H/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 36.4 V/m; Power Drift = -0.373 dB
Peak SAR (extrapolated) = 9.00 W/kg
SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.17 mW/g

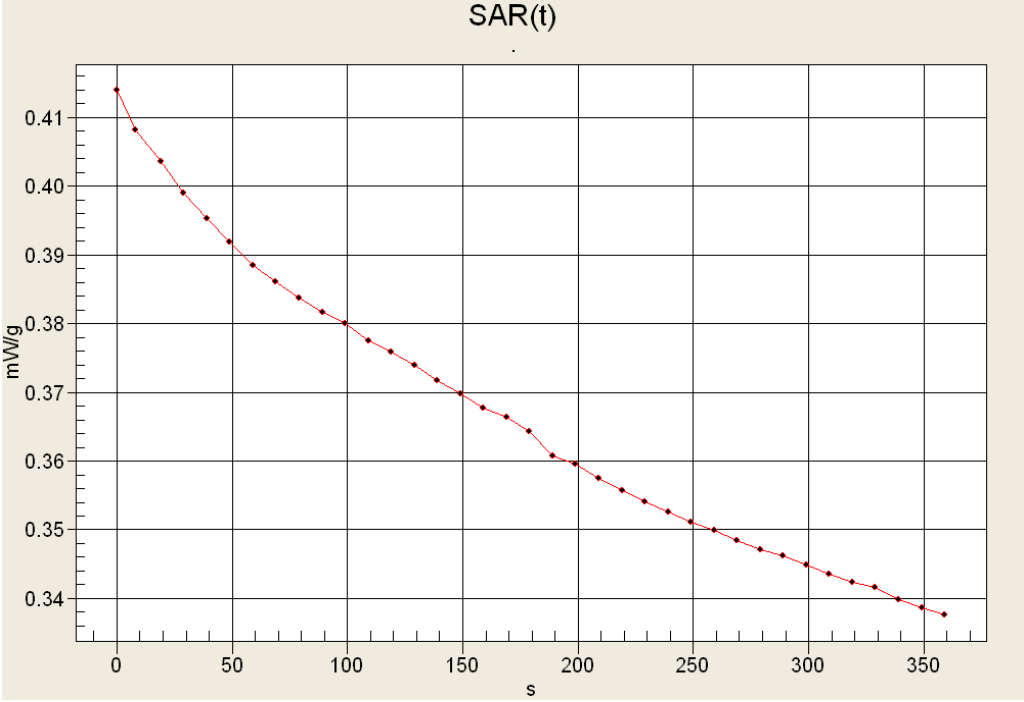
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.56 mW/g



Z-Axis Scan



SAR-Versus-Time



APPENDIX B - SYSTEM PERFORMANCE CHECK PLOTS

Date Tested: 11/22/2013

System Performance Check - 300 MHz Dipole - 150 MHz Body Fluid

DUT: Dipole 300 MHz Body; Type: D300V3; Serial: 1009; Calibrated: 01/08/2013

Program Notes: Ambient Temp: 26C; Fluid Temp: 23.1C; Barometric Pressure: 104.6 kPa; Humidity: 15%

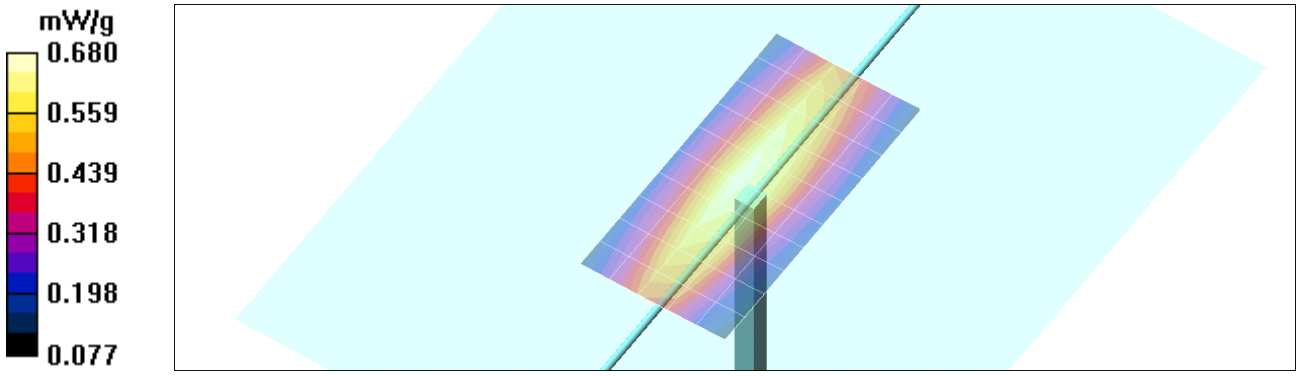
Procedure Notes: 300 MHz Dipole transmitting at 300 MHz using 150 MHz SAR probe calibration and 150 MHz tissue dielectric parameters

Communication System: CW
Frequency: 150 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 150 MHz; σ = 0.81 mho/m; ε_r = 63.2; ρ = 1000 kg/m^3

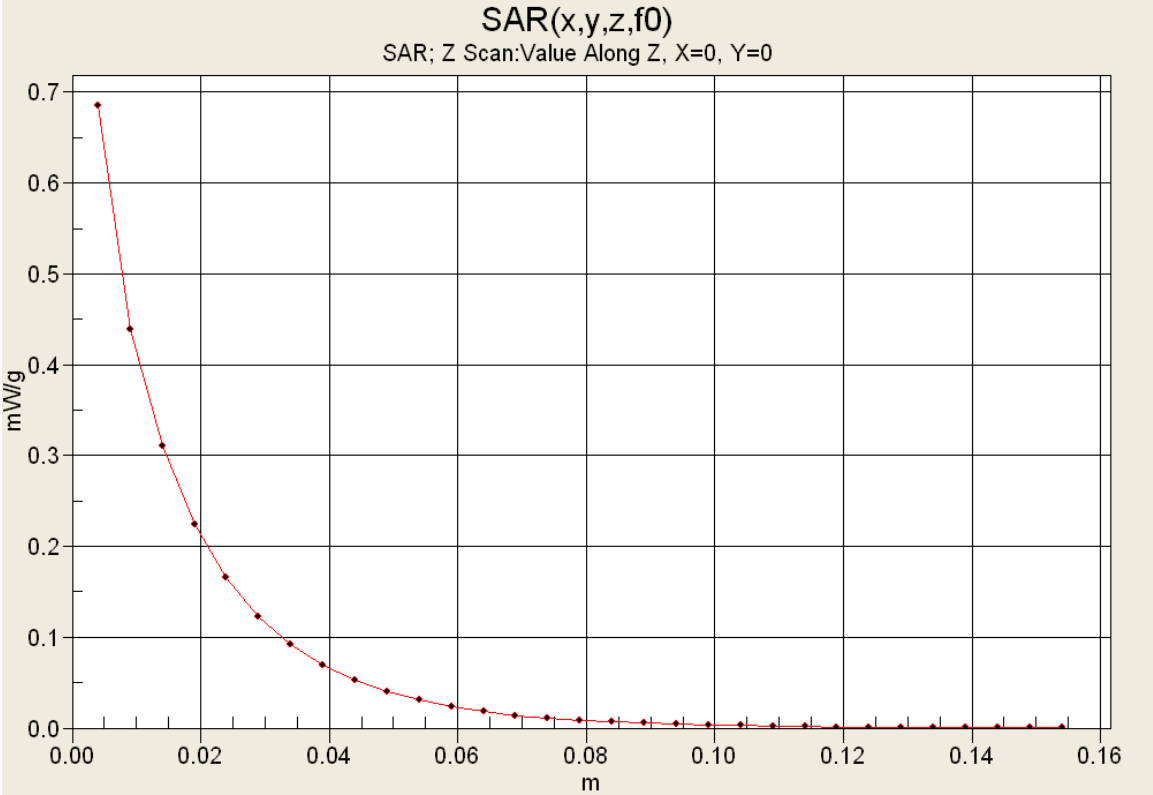
- Probe: ET3DV6 - SN1590; ConvF(8.65, 8.65, 8.65); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body d=15mm, Pin = 250mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.672 mW/g

Body d=15mm, Pin = 250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 29.3 V/m; Power Drift = -0.445 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.647 mW/g; SAR(10 g) = 0.432 mW/g
Maximum value of SAR (measured) = 0.680 mW/g



Z-Axis Scan



Date Tested: 11/26/2013

System Performance Check - 300 MHz Dipole - 150 MHz Body Fluid

DUT: Dipole 300 MHz Body; Type: D300V3; Serial: 1009; Calibrated: 01/08/2013

Program Notes: Ambient Temp: 26C; Fluid Temp: 22.8C; Barometric Pressure: 102.8 kPa; Humidity: 17%

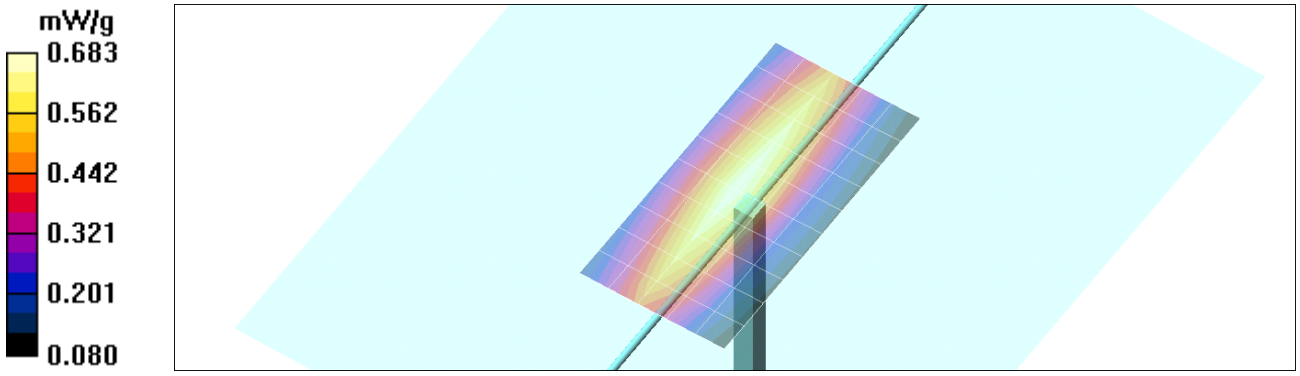
Procedure Notes: 300 MHz Dipole transmitting at 300 MHz using 150 MHz SAR probe calibration and 150 MHz tissue dielectric parameters

Communication System: CW
Frequency: 150 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 150 MHz; σ = 0.81 mho/m; ε_r = 62.1; ρ = 1000 kg/m^3

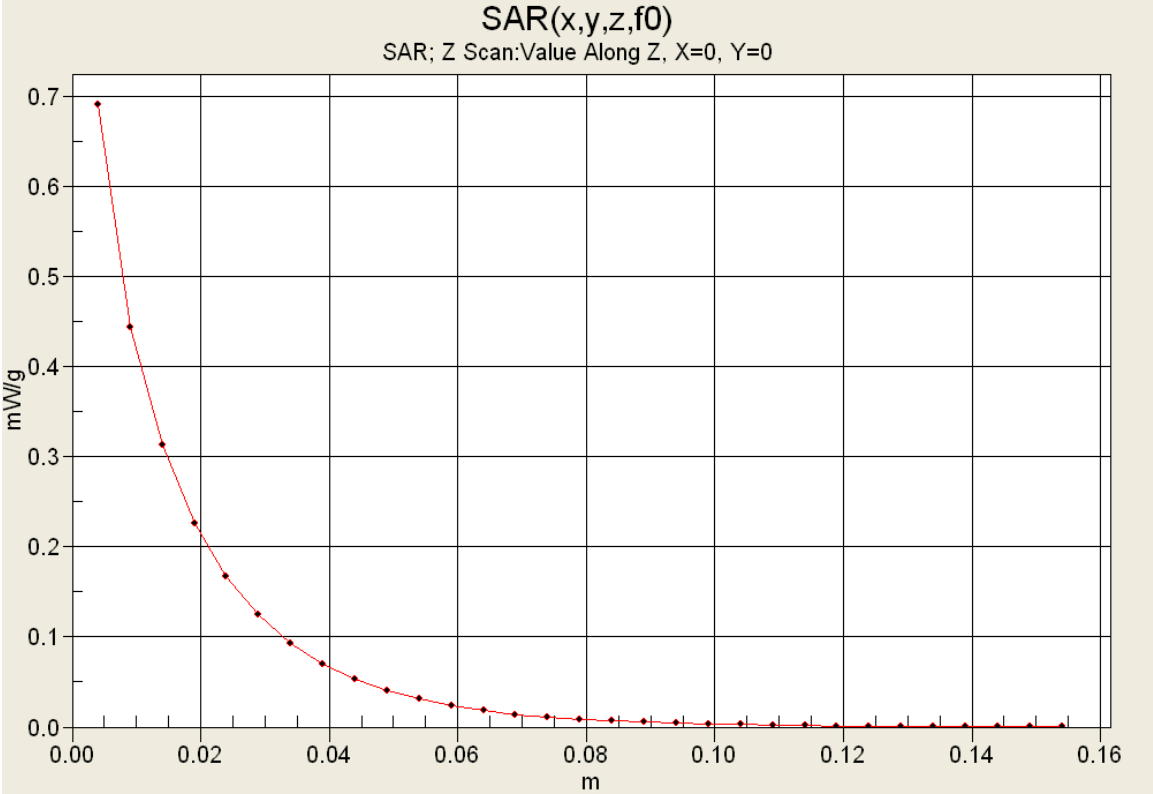
- Probe: ET3DV6 - SN1590; ConvF(8.65, 8.65, 8.65); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body d=15mm, Pin = 250mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.691 mW/g

Body d=15mm, Pin = 250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.9 V/m; Power Drift = -0.012 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.650 mW/g; SAR(10 g) = 0.432 mW/g
Maximum value of SAR (measured) = 0.683 mW/g



Z-Axis Scan



Date Tested: 11/27/2013

System Performance Check - 300 MHz Dipole - 150 MHz Head Fluid

DUT: Dipole 300 MHz; Type: D300V3; Serial: 1009; Calibrated: 17/04/2012

Program Notes: Ambient Temp: 26C; Fluid Temp: 23.5C; Barometric Pressure: 102.6 kPa; Humidity: 15%

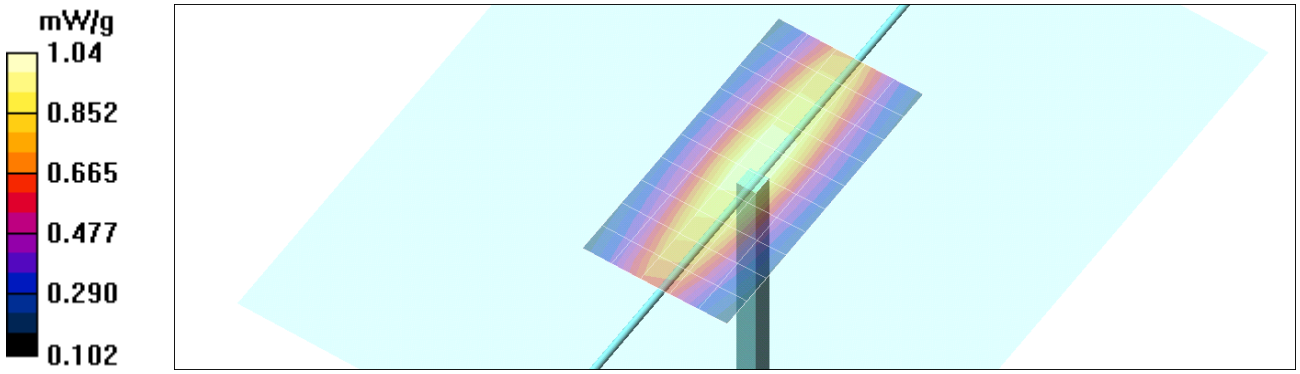
Procedure Notes: 300 MHz Dipole transmitting at 300 MHz using 150 MHz SAR probe calibration and 150 MHz tissue dielectric parameters

Communication System: CW
Frequency: 150 MHz; Duty Cycle: 1:1
Medium: HSL150 Medium parameters used: f = 150 MHz; σ = 0.77 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3

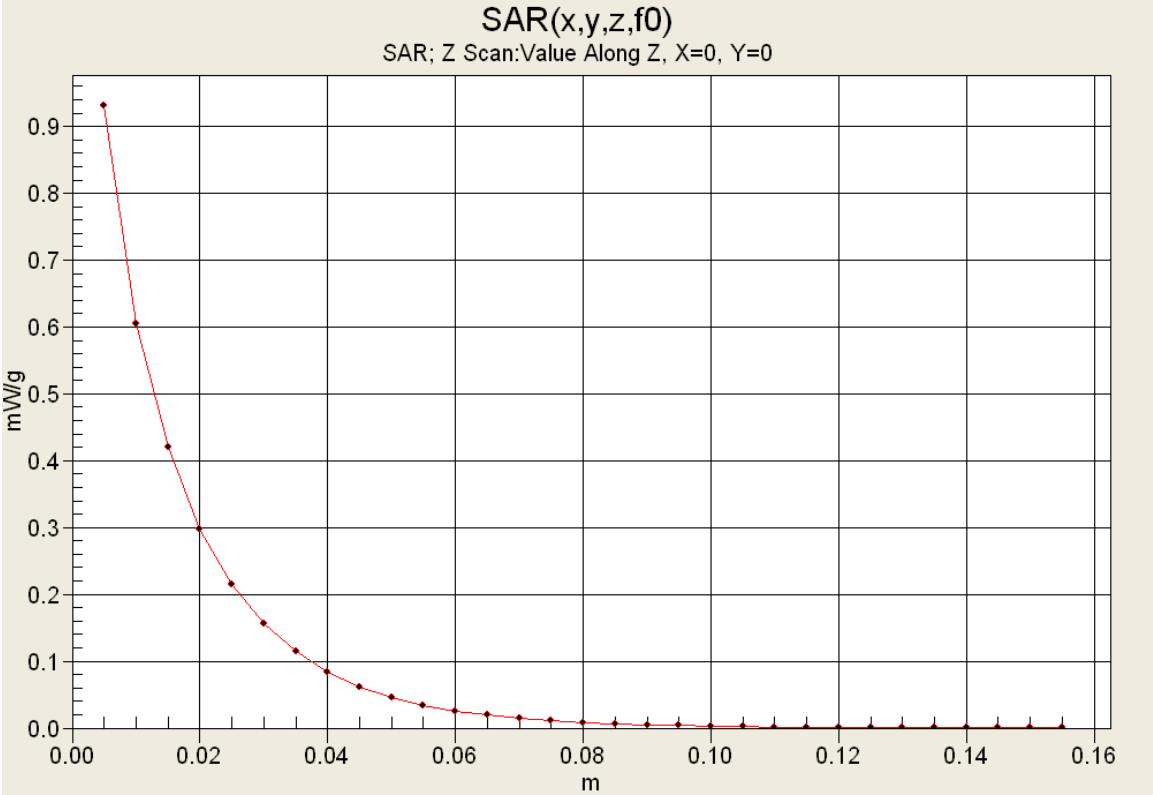
- Probe: ET3DV6 - SN1590; ConvF(9.31, 9.31, 9.31); Calibrated: 24/04/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Head d=15mm, Pin = 398mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.963 mW/g

Head d=15mm, Pin = 398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 37.1 V/m; Power Drift = -0.104 dB
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 0.989 mW/g; SAR(10 g) = 0.644 mW/g
Maximum value of SAR (measured) = 1.04 mW/g



Z-Axis Scan



APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

150 MHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
22/Nov/2013
Frequency(GHz)
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
0.0500	64.37	0.72	64.27	0.77
0.0600	64.12	0.73	73.04	0.75
0.0700	63.87	0.74	65.42	0.78
0.0800	63.63	0.74	69.61	0.75
0.0900	63.38	0.75	68.72	0.76
0.1000	63.13	0.76	65.33	0.79
0.1100	62.89	0.77	64.26	0.78
0.1200	62.64	0.78	58.97	0.80
0.1300	62.39	0.78	63.33	0.81
0.1400	62.15	0.79	63.11	0.82
0.1500	61.90	0.80	63.23	0.81
0.1600	61.65	0.81	61.32	0.82
0.1700	61.41	0.82	60.58	0.82
0.1800	61.16	0.82	62.42	0.84
0.1900	60.91	0.83	62.04	0.83
0.2000	60.67	0.84	62.00	0.85
0.2100	60.42	0.85	60.69	0.86
0.2200	60.17	0.86	60.47	0.87
0.2300	59.93	0.86	61.01	0.88
0.2400	59.68	0.87	60.09	0.89
0.2500	59.43	0.88	59.47	0.90

150 MHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
26&27/Nov/2013
Frequency(GHz)
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
0.0500	64.37	0.72	58.07	0.72
0.0600	64.12	0.73	62.95	0.75
0.0700	63.87	0.74	65.02	0.72
0.0800	63.63	0.74	66.99	0.76
0.0900	63.38	0.75	66.20	0.76
0.1000	63.13	0.76	67.32	0.79
0.1100	62.89	0.77	63.00	0.80
0.1200	62.64	0.78	60.67	0.78
0.1300	62.39	0.78	61.65	0.80
0.1400	62.15	0.79	60.95	0.82
0.1500	61.90	0.80	62.07	0.81
0.1600	61.65	0.81	63.56	0.81
0.1700	61.41	0.82	61.06	0.81
0.1800	61.16	0.82	61.28	0.82
0.1900	60.91	0.83	61.73	0.84
0.2000	60.67	0.84	61.06	0.84
0.2100	60.42	0.85	59.19	0.86
0.2200	60.17	0.86	60.25	0.85
0.2300	59.93	0.86	59.03	0.86
0.2400	59.68	0.87	59.55	0.86
0.2500	59.43	0.88	59.20	0.87

150 MHz Head

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
27&28/Nov/2013
Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

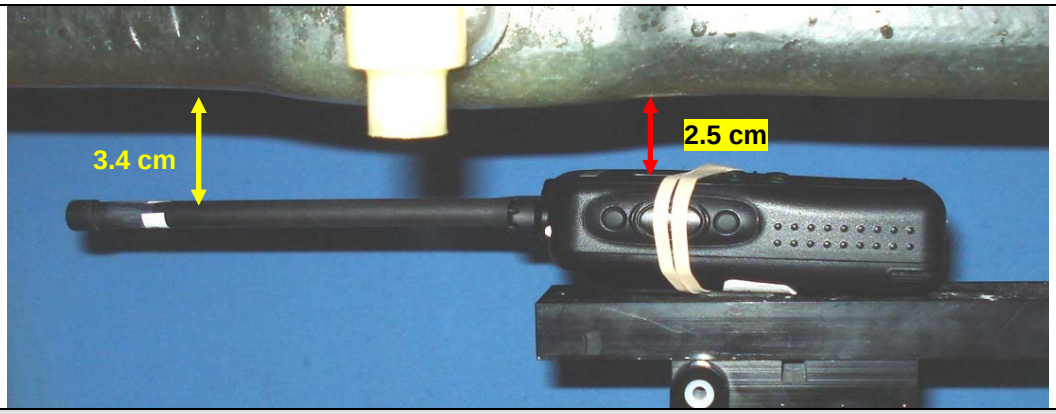
Freq	FCC_eH	FCC_sH	Test_e	Test_s
0.0500	56.97	0.69	67.16	0.72
0.0600	56.50	0.69	70.76	0.70
0.0700	56.03	0.70	49.05	0.71
0.0800	55.57	0.71	55.26	0.71
0.0900	55.10	0.72	64.07	0.74
0.1000	54.63	0.72	53.80	0.72
0.1100	54.17	0.73	52.79	0.73
0.1200	53.70	0.74	56.35	0.74
0.1300	53.23	0.75	50.68	0.75
0.1400	52.77	0.75	51.12	0.76
0.1500	52.30	0.76	51.45	0.77
0.1600	51.83	0.77	49.99	0.79
0.1700	51.37	0.77	51.48	0.80
0.1800	50.90	0.78	50.03	0.81
0.1900	50.43	0.79	48.23	0.82
0.2000	49.97	0.80	47.14	0.82
0.2100	49.50	0.80	47.94	0.83
0.2200	49.03	0.81	46.44	0.85
0.2300	48.57	0.82	47.07	0.85
0.2400	48.10	0.83	46.52	0.86
0.2500	47.63	0.83	46.88	0.88

APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

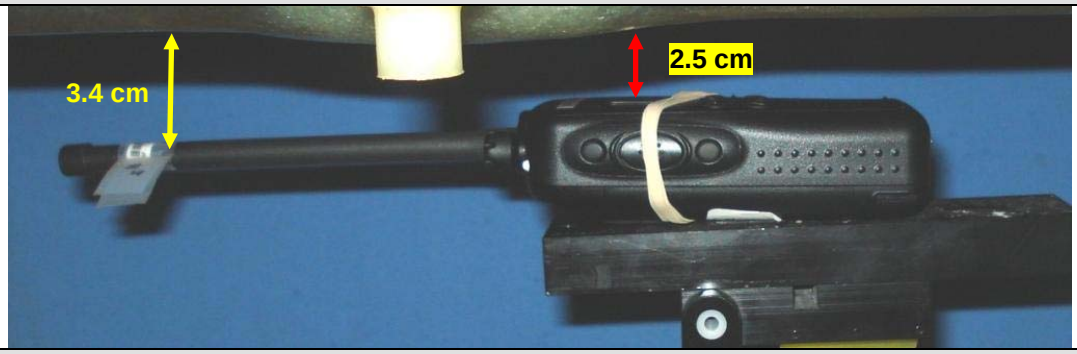
FACE-HELD SAR TEST SETUP PHOTOGRAPHS

Face-held Test Setup

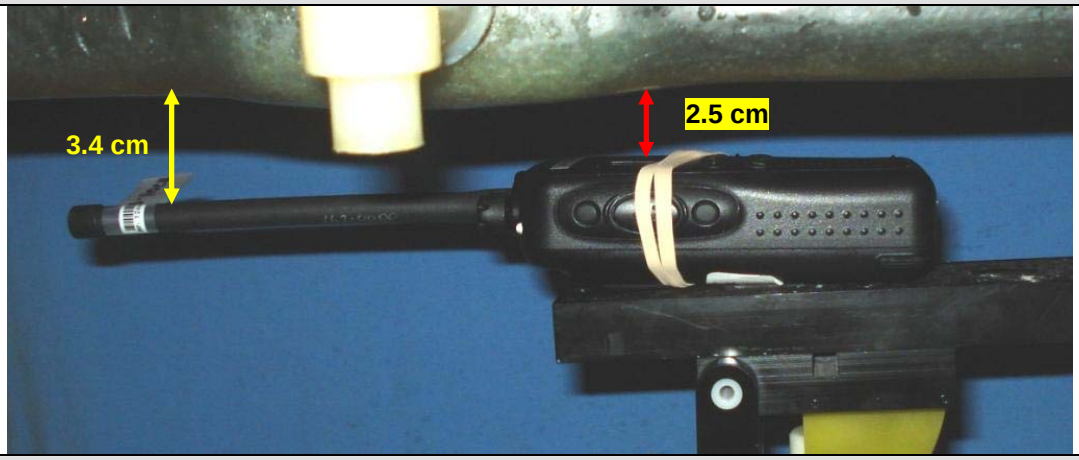
FACE-HELD SAR TEST SETUP PHOTOGRAPHS



Radio SDP650 With Antenna 1

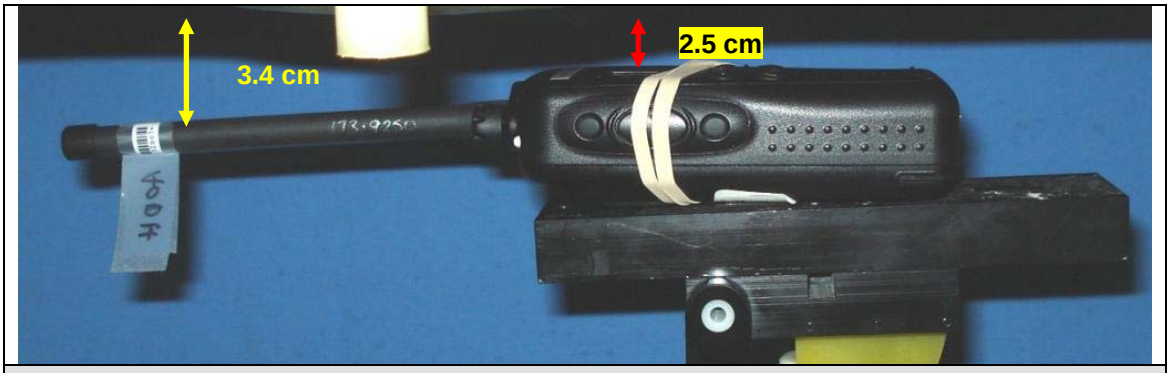


Radio SDP650 With Antenna 2

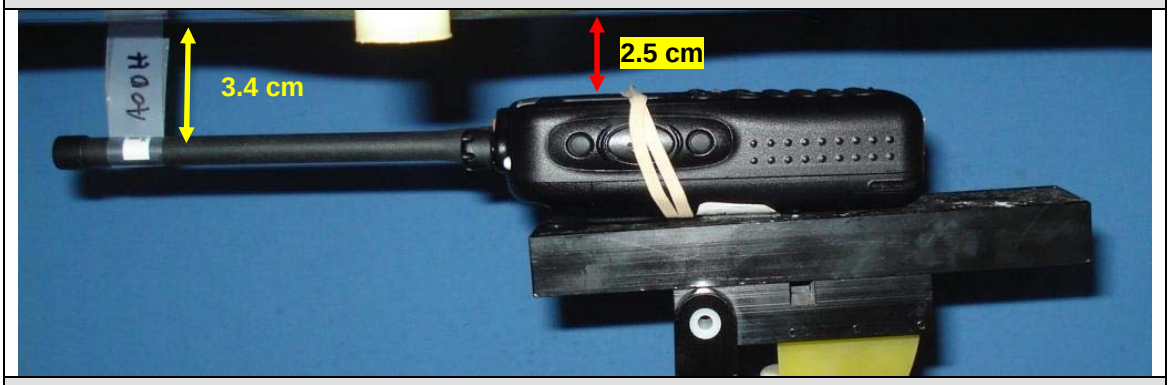


Radio SDP650 With Antenna 3

FACE-HELD SAR TEST SETUP PHOTOGRAPHS



Radio SDP650 With Antenna 4

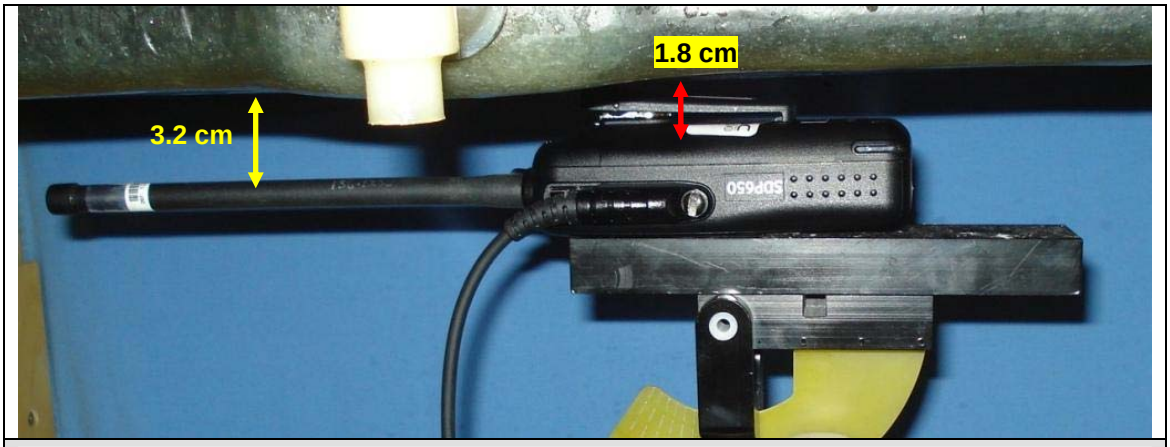


Radio SDP660 With Antenna 4

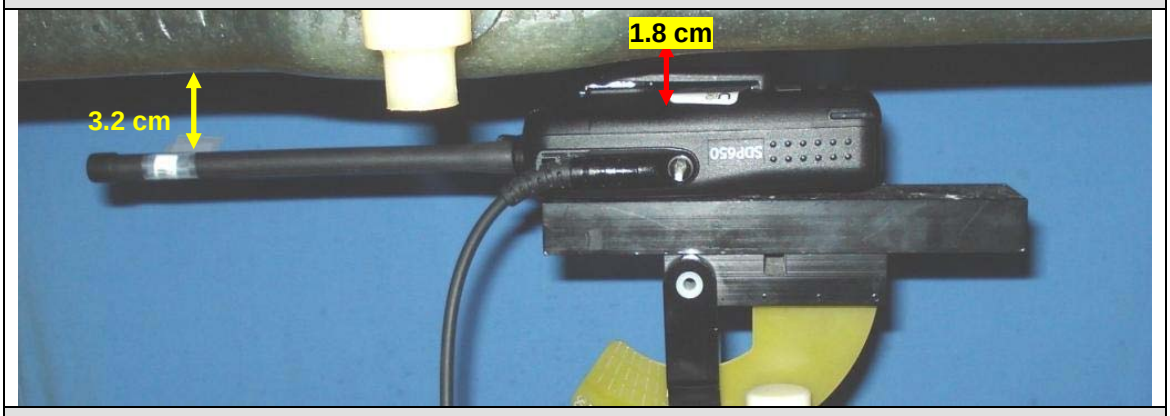
BODY-WORN SAR TEST SETUP PHOTOGRAPHS

Body-worn Test Setup

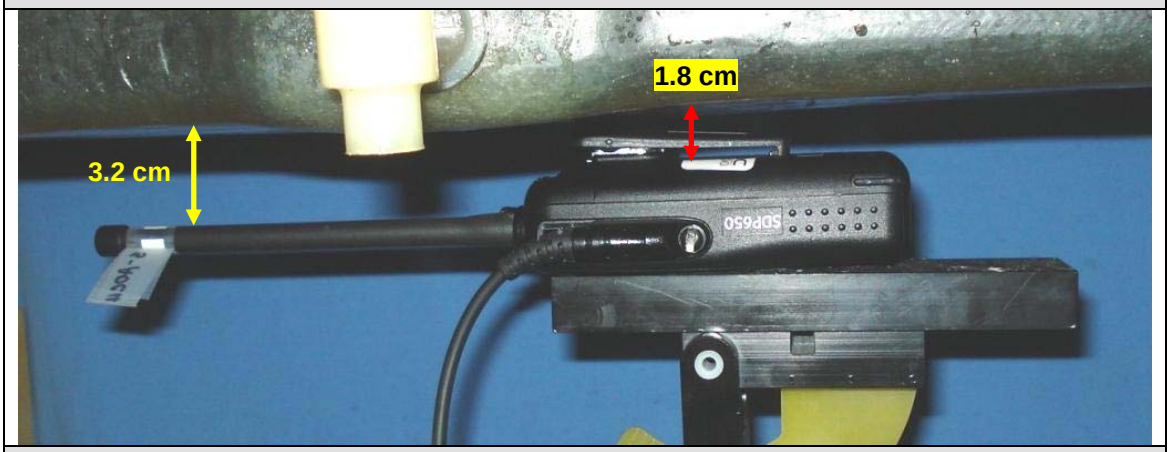
BODY-WORN SAR TEST SETUP PHOTOGRAPHS



Radio SDP650 With Antenna 1

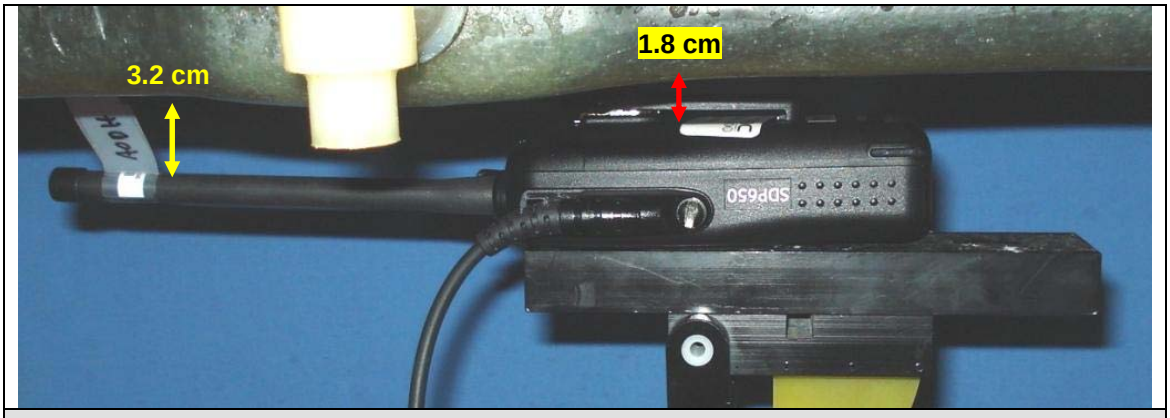


Radio SDP650 With Antenna 2

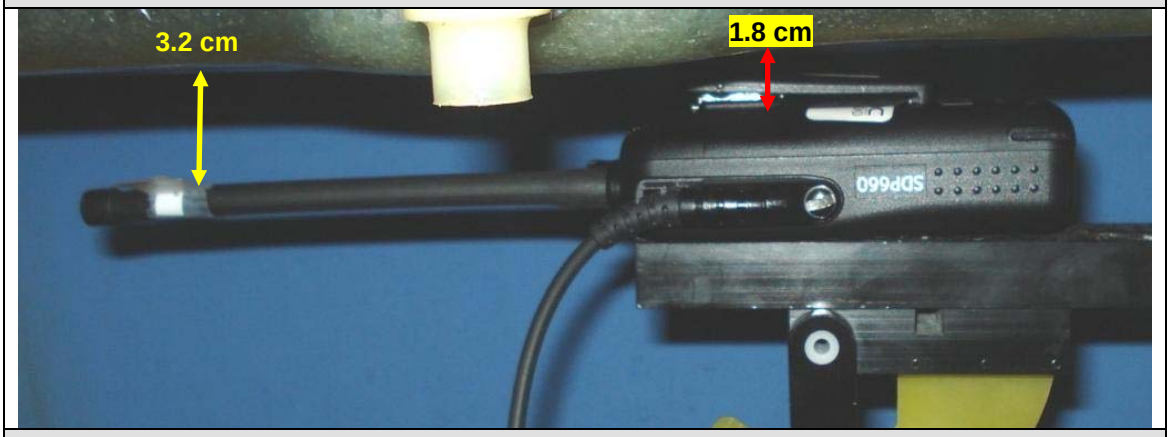


Radio SDP650 With Antenna 3

BODY-WORN SAR TEST SETUP PHOTOGRAPHS



Radio SDP650 With Antenna 4



Radio SDP660 With Antenna 2

DUT PHOTOGRAPHS

Radio Model: SDP650

DUT Front side

DUT Left side

DUT Back side

DUT Right side

DUT Top end (antenna removed)

DUT Bottom end

DUT PHOTOGRAPHS

Radio Model: SDP660

DUT Front side

DUT Left side

DUT Back side

DUT Right side

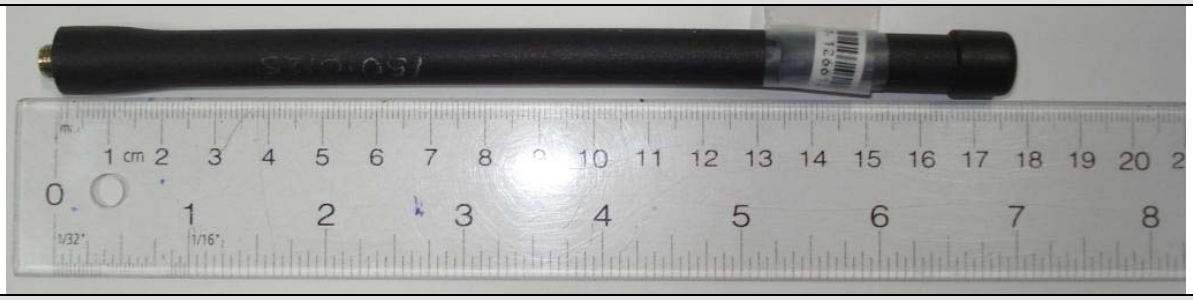
DUT Top end (antenna removed)

DUT Bottom end

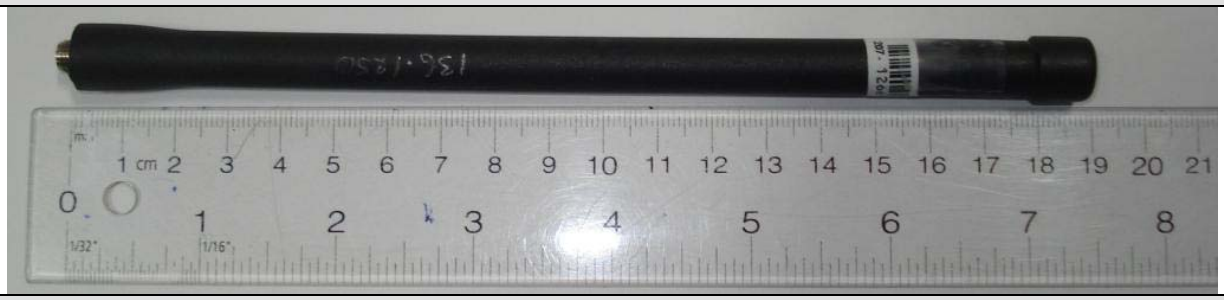
DUT PHOTOGRAPHS

Antenna 1

Antenna 2



Antenna 3



Antenna 4

DUT PHOTOGRAPHS

Audio Accessory

Belt-clip accessory

DUT PHOTOGRAPHS

Front of Li-ion Battery

Back of Li-ion Battery

Back of DUT with Battery removed

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: D300V3-1009_Apr12

CALIBRATION CERTIFICATE

Object: D300V3 - SN: 1009

Calibration procedure(s): QA CAL-15.v6
Calibration procedure for dipole validation kits below 700 MHz

Calibration date: April 17, 2012

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ET3DV6	SN: 1507	30-Dec-11 (No. ET3-1507_Dec11)	Dec-12
DAE4	SN: 900	11-Apr-12 (No. DAE4-900_Apr12)	Apr-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: April 27, 2012

Glossary:

TSL	tissue simulating liquid
ConvF	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) DASY4/5 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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	300 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	45.3	0.87 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	44.9 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	398 mW input power	1.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**2.88 mW /g ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	398 mW input power	0.770 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**1.90 mW /g ± 17.6 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	57.8 Ω - 2.9 jΩ
Return Loss	- 22.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.748 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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	February 26, 2009

DASY5 Validation Report for Head TSL

Date: 17.04.2012

Test Laboratory: SPEAG

DUT: Dipole 300 MHz; Type: D300V3; Serial: D300V3 - SN: 1009

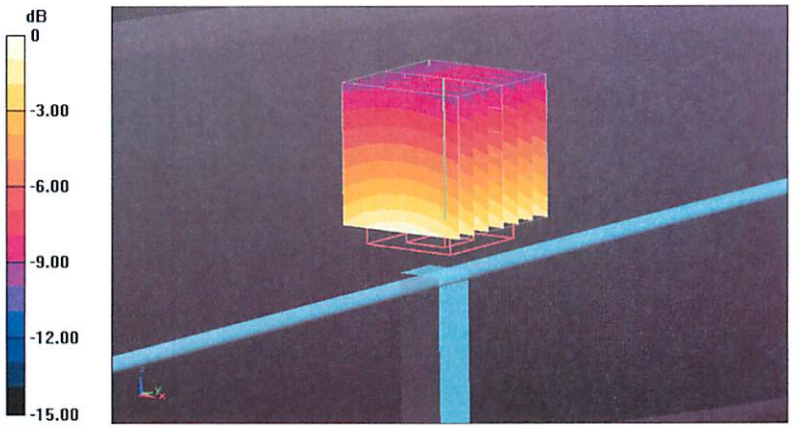
Communication System: CW; Frequency: 300 MHz
Medium parameters used: f = 300 MHz; σ = 0.89 mho/m; ε_r = 44.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.59, 6.59, 6.59); Calibrated: 30.12.2011;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn900; Calibrated: 11.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

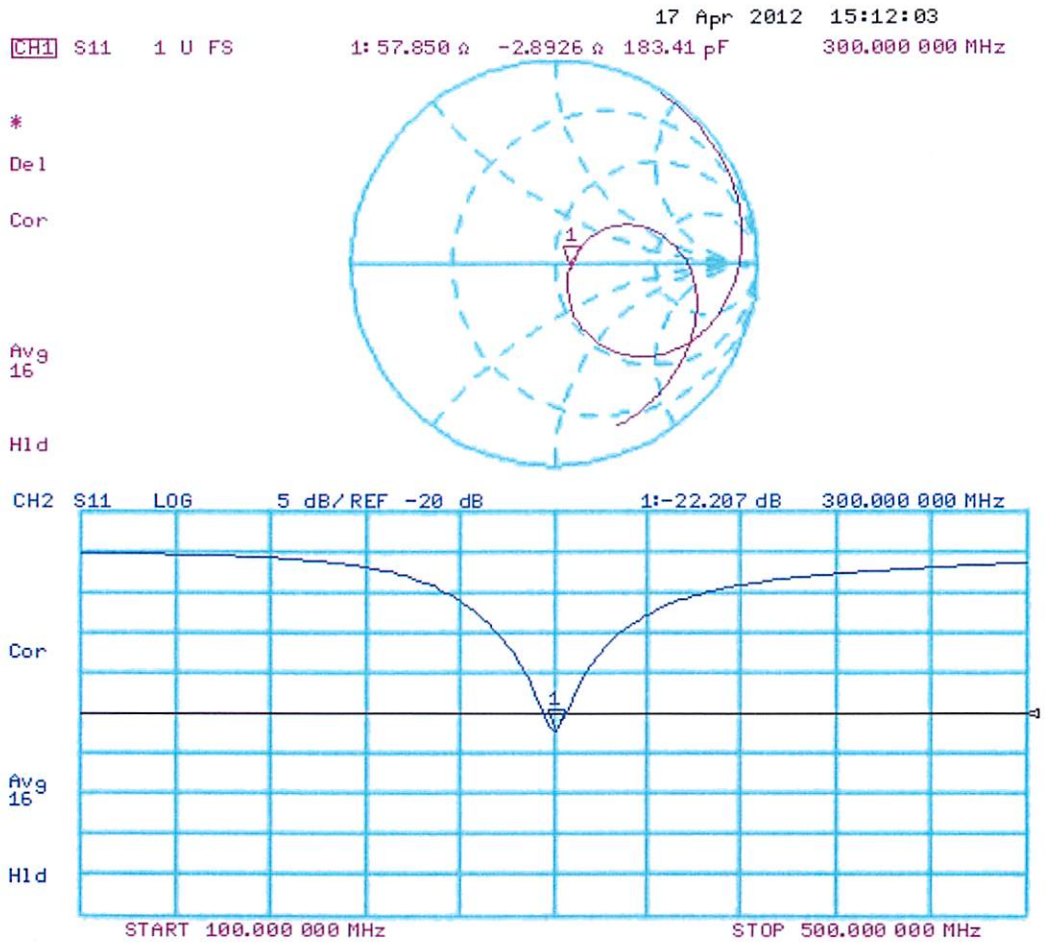
Dipole Calibration for Head Tissue/d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 37.838 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.974 mW/g
SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.770 mW/g
Maximum value of SAR (measured) = 1.24 mW/g



0 dB = 1.24 mW/g = 1.87 dB mW/g

Impedance Measurement Plot for Head TSL



Dipole: D300V3
Serial Number: 1009
Last Calibrated: Apr. 27, 2012 (Head)
Jan. 8, 2013 (Body)

Antenna Parameters with Head TSL						
	Impedance Real (ohms)	Deviation from cal	Impedance Imaginary (ohms)	Deviation from cal	Return Loss (dB)	Deviation from Cal
Last Calibration	57.8	-	-2.9	-	-22.2	-
Extended Cal May 16, 2013	54.0	3.8	-7.5	4.6	-21.8	1.8%

Antenna Parameters with Body TSL						
	Impedance Real (ohms)	Deviation from cal (ohms)	Impedance Imaginary (ohms)	Deviation from cal (ohms)	Return Loss (dB)	Deviation from Cal (%)
Last Calibration	57.1	-	-5.9	-	-21.3	-

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Accreditation No.: SCS 108

Client Celltech

Certificate No: D300V3-1009_Jan13

CALIBRATION CERTIFICATE

Object: D300V3 - SN: 1009

Calibration procedure(s): QA CAL-15.v7
Calibration procedure for dipole validation kits below 700 MHz

Calibration date: January 08, 2013

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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ET3DV6	SN: 1507	28-Dec-12 (No. ET3-1507_Dec12)	Dec-13
DAE4	SN: 654	18-Apr-12 (No. DAE4-654_Apr12)	Apr-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: January 8, 2013

Glossary:

TSL	tissue simulating liquid
ConvF	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) DASY4/5 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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.4
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	300 MHz ± 1 MHz	

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	58.2	0.92 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	57.6 ± 6 %	0.91 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	0.717 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**2.89 W/kg ± 18.1 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	0.483 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**1.94 W/kg ± 17.6 % (k=2)**

Appendix

Antenna Parameters with Body TSL

Impedance, transformed to feed point	57.1 Ω - 5.9 jΩ
Return Loss	- 21.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.748 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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	February 26, 2009

DASY5 Validation Report for Body TSL

Date: 08.01.2013

Test Laboratory: SPEAG, Zürich, Switzerland

DUT: Dipole 300 MHz; Type: D300V3; Serial: D300V3 - SN: 1009

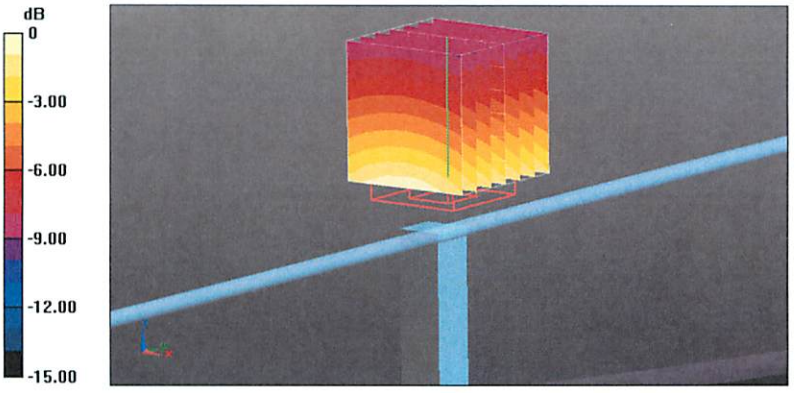
Communication System: CW; Frequency: 300 MHz
Medium parameters used: f = 300 MHz; σ = 0.91 S/m; ε_r = 57.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(7.08, 7.08, 7.08); Calibrated: 28.12.2012;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 18.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

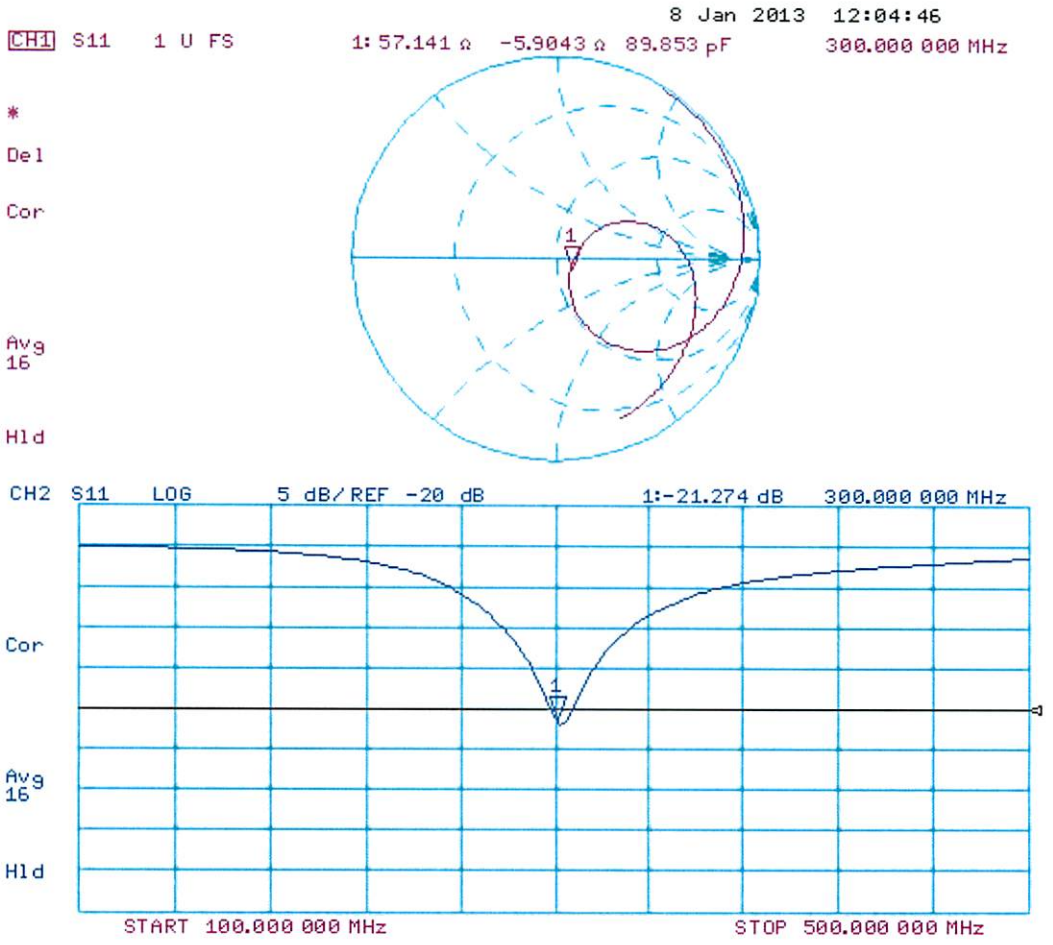
Dipole Calibration for Body Tissue/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 29.820 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.717 W/kg; SAR(10 g) = 0.483 W/kg
Maximum value of SAR (measured) = 0.763 W/kg



0 dB = 0.763 W/kg = -1.17 dBW/kg

Impedance Measurement Plot for Body TSL



APPENDIX F - PROBE CALIBRATION

Calibration Laboratory of
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Accreditation No.: SCS 108

Client **Celltech**

Certificate No: ET3-1590_Apr13

CALIBRATION CERTIFICATE

Object: ET3DV6 - SN:1590

Calibration procedure(s): QA CAL-01.v8, QA CAL-12.v7, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: April 24, 2013

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	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-15
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 27, 2013

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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, D	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., ϑ = 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 ϑ = 0 (f ≤ 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 affect 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.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* 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 ≤ 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
Calibrated: April 24, 2013

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]	1.73	1.85	1.61	± 10.1 %
DCP (mV)[B]	94.7	99.4	88.0	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	186.7	±2.7 %
		Y	0.0	0.0	1.0		151.0	
		Z	0.0	0.0	1.0		171.2	

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 max. 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) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	7.53	7.53	7.53	0.21	2.23	± 13.4 %
750	41.9	0.89	7.24	7.24	7.24	0.25	3.00	± 12.0 %
835	41.5	0.90	6.84	6.84	6.84	0.26	3.00	± 12.0 %
900	41.5	0.97	6.68	6.68	6.68	0.28	3.00	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

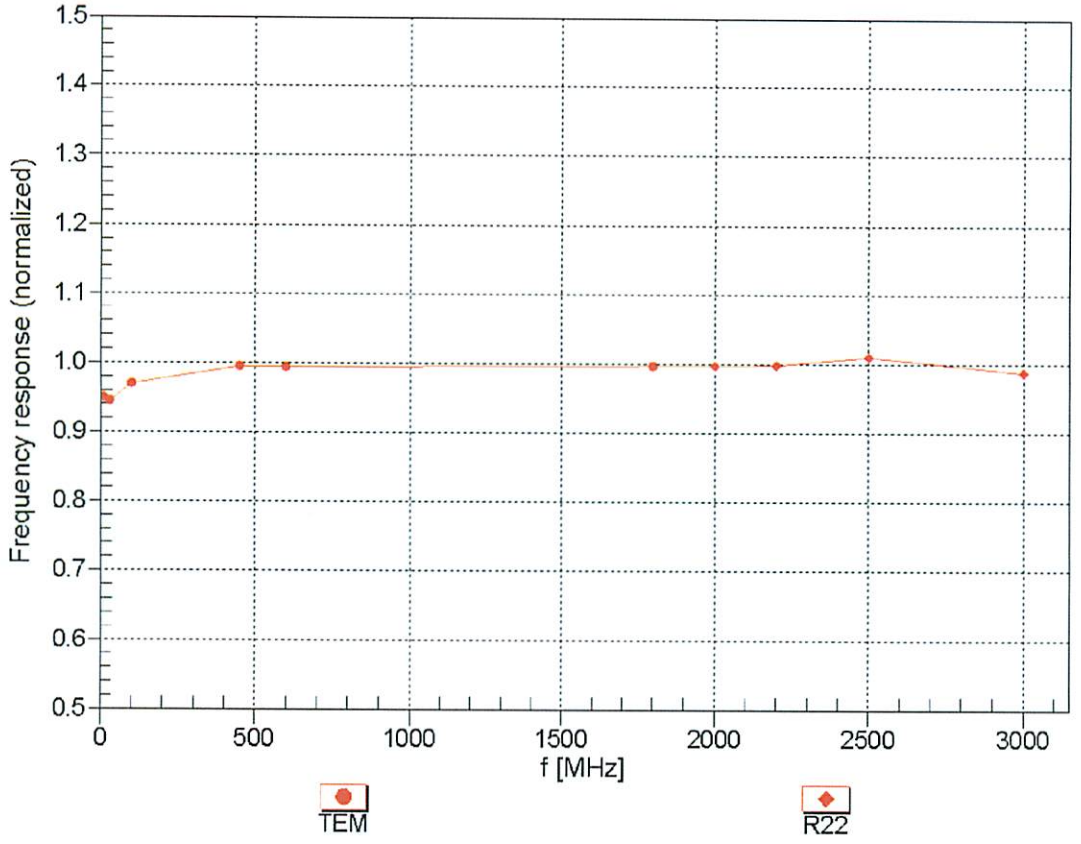
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.98	7.98	7.98	0.13	2.14	± 13.4 %
750	55.5	0.96	6.84	6.84	6.84	0.31	2.49	± 12.0 %
835	55.2	0.97	6.67	6.67	6.67	0.29	2.67	± 12.0 %
900	55.0	1.05	6.63	6.63	6.63	0.26	3.00	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

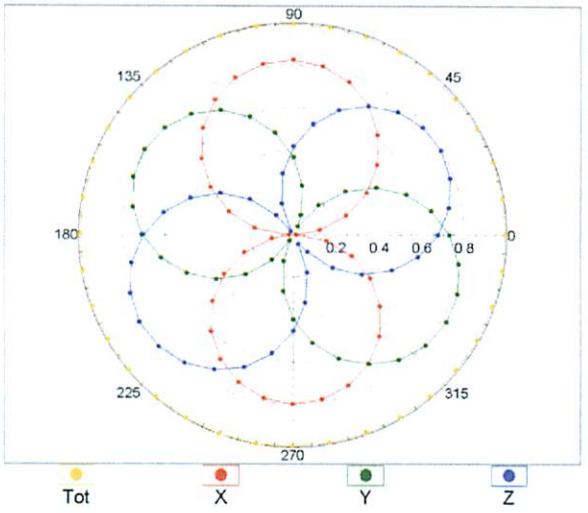
(TEM-Cell:ifi110 EXX, Waveguide: R22)



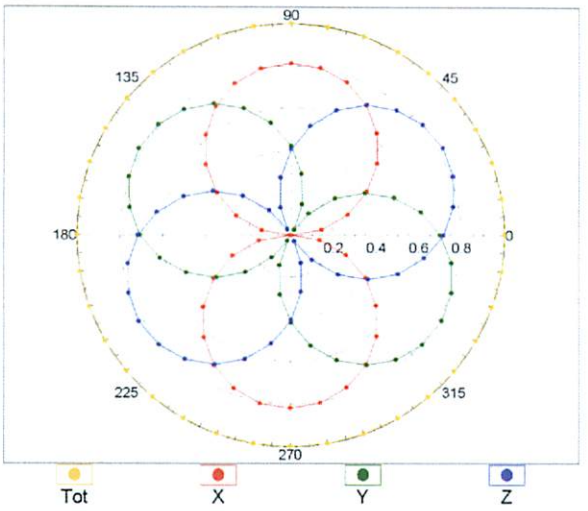
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

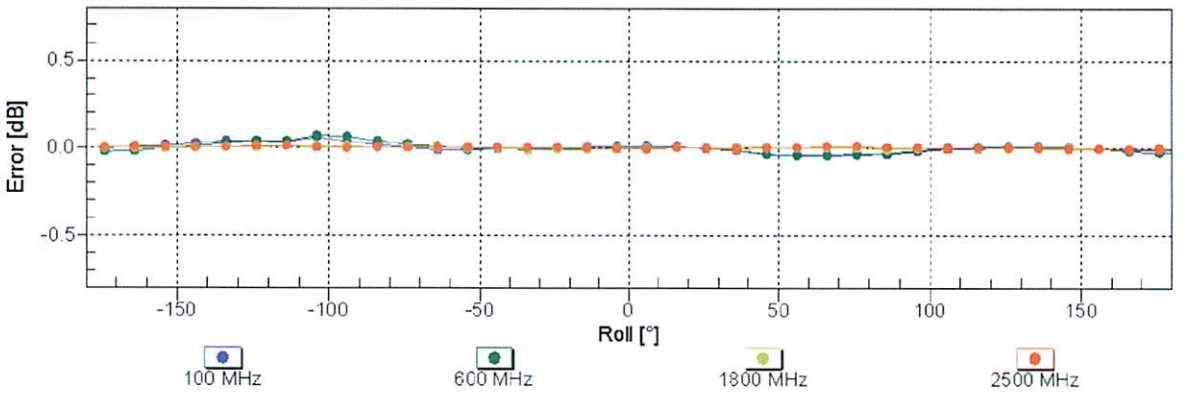
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



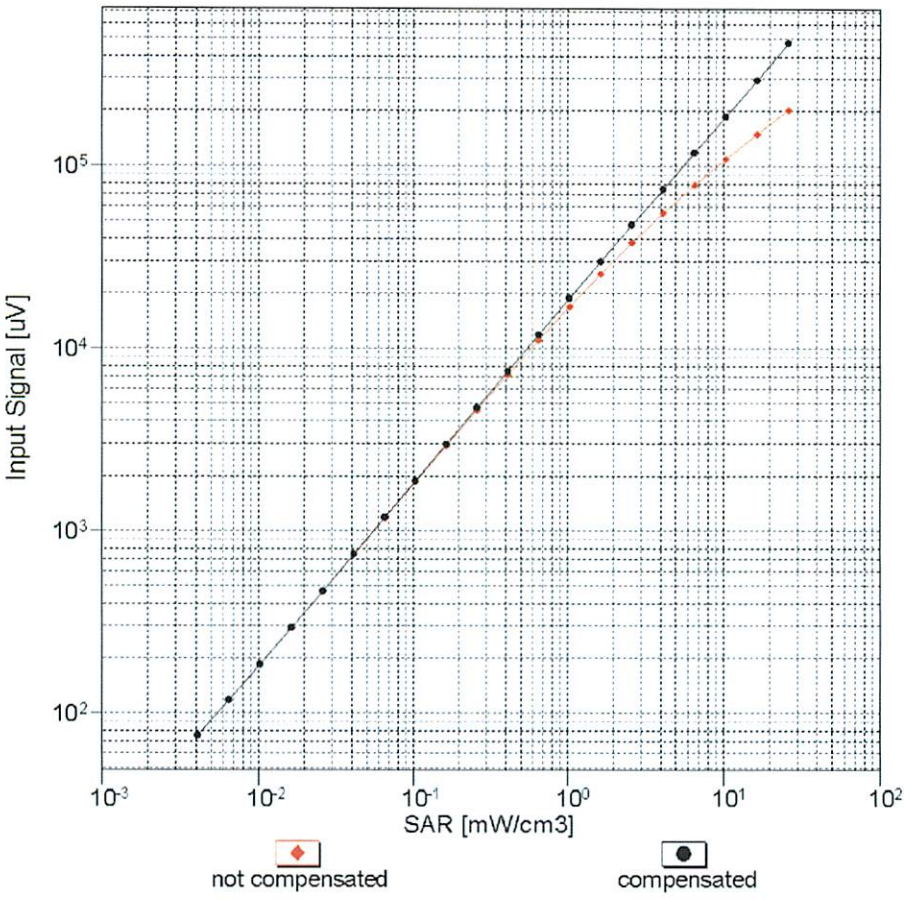
f=1800 MHz,R22

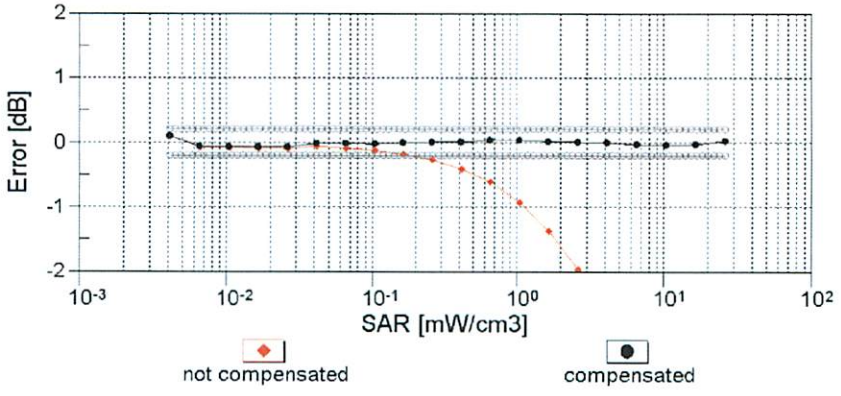




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

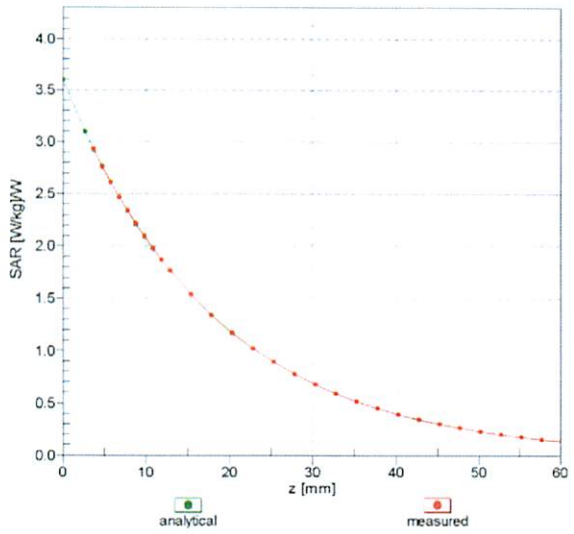




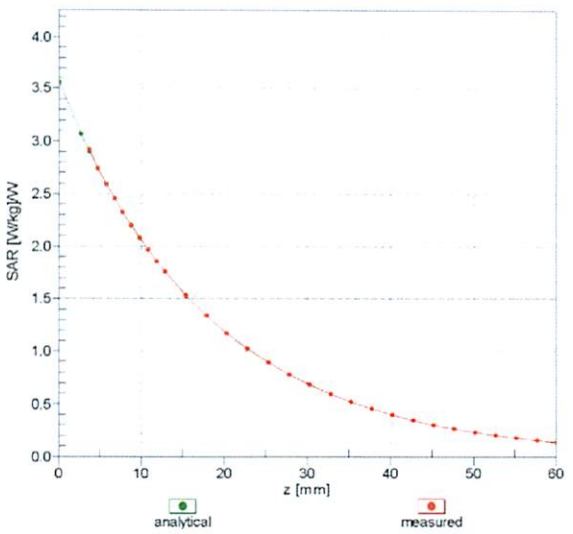
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

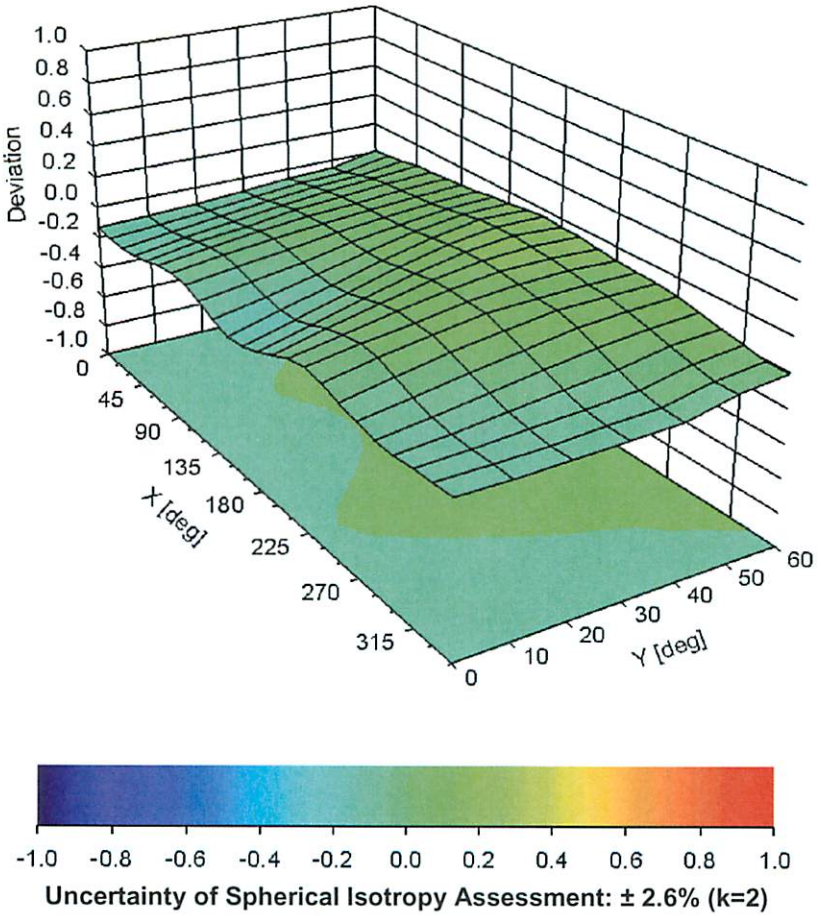


f = 900 MHz,WGLS R9 (M_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
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

Schmid & Partner Engineering AG

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info@speag.com, http://www.speag.com

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1590**
Place of Assessment:	**Zurich**
Date of Assessment:	**April 29, 2013**
Probe Calibration Date:	**April 24, 2013**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 450, 835 and 900 MHz.

Assessed by:

Schmid & Partner Engineering AG

s p e a g

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Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ET3DV6 SN:1590

Conversion factor (± standard deviation)

150 ± 50 MHz	*ConvF*	**9.31 ± 10%**	ε_r = **52.3 ± 5%** σ = **0.76 ± 5% mho/m** (head tissue)
300 ± 50 MHz	*ConvF*	**8.36 ± 9%**	ε_r = **45.3 ± 5%** σ = **0.87 ± 5% mho/m** (head tissue)
150 ± 50 MHz	*ConvF*	**8.65 ± 10%**	ε_r = **61.9 ± 5%** σ = **0.80 ± 5% mho/m** (body tissue)
300 ± 50 MHz	*ConvF*	**8.41 ± 9%**	ε_r = **58.2 ± 5%** σ = **0.92 ± 5% mho/m** (body tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also DASY Manual.

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

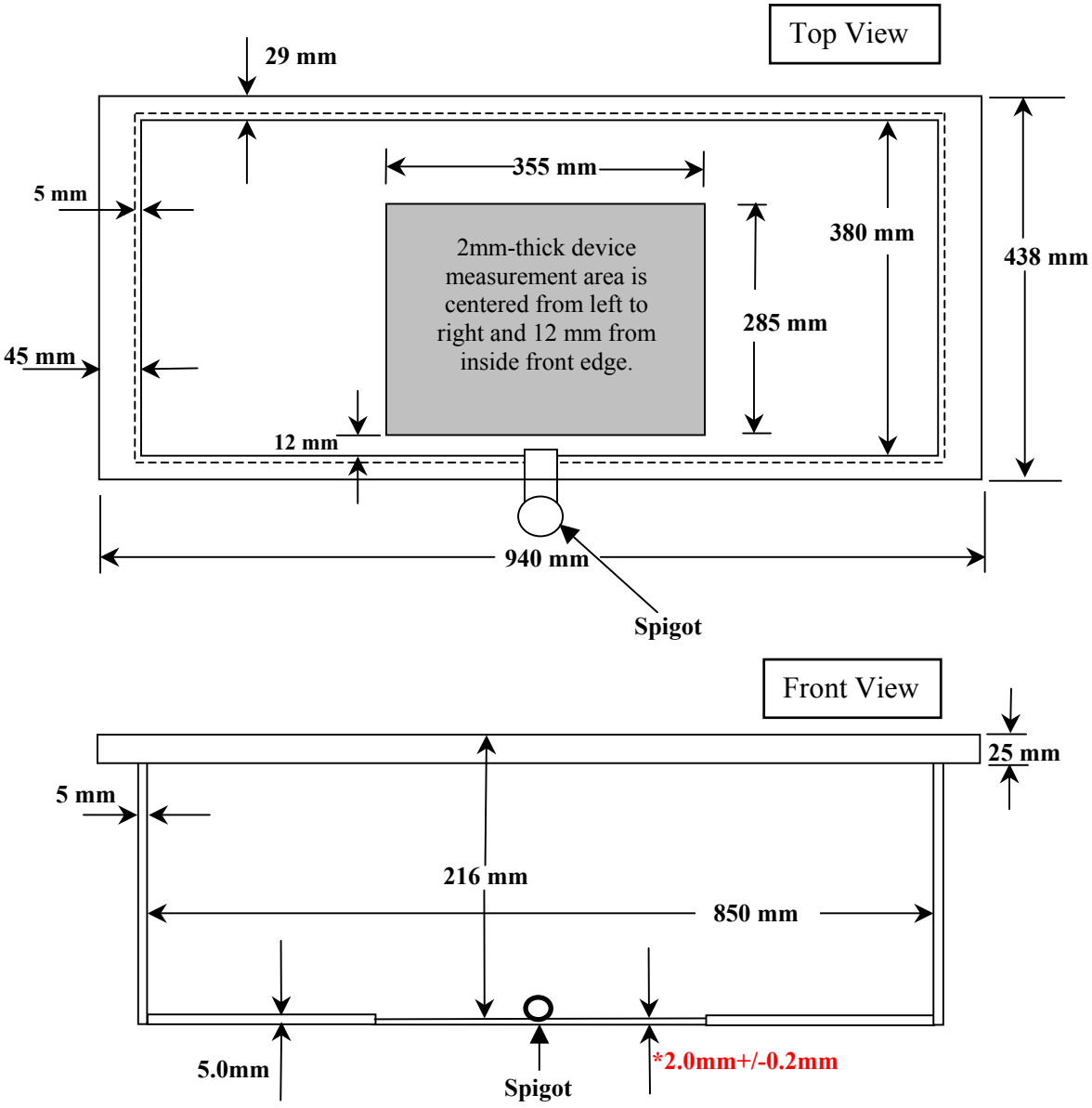
Fiberglass Planar Phantom - Front View

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.