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**	**NAVICO AUCKLAND LTD.**				
	Address	3-5 OMEGA STREET, ALBANY, 0632, AUCKLAND, NZ				
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**	OET 65, Supplement C		**FCC**	KDB 447498 D01v05	
	IC	RSS-102 Issue 4		**IEEE**	Standard 1528-2003	
Device Classification(s)	**FCC**	Licensed Non-Broadcast Transmitter Held to Face (TNF)				
	IC	Maritime Radio Transmitter and Receiver (RSS-182)				
Device RF Exposure Category	**FCC/IC**	General Population / Uncontrolled Environment				
Device Identifier(s)	**FCC ID:**	RAYVHFLINK2				
	IC:	4697A-LINK2				
Device Model(s)	**Model(s)**	Link 2, HH36 (models are identical)				
Co-located Transmitters	n/a					
Test Sample Serial No.	20130125002 (Identical Prototype)					
Date of Sample Receipt	Mar. 27, 2013		**Date(s) of Evaluations**		Apr. 4, 2013	
Test Sample Hardware Rev. No.	n/a		**Test Sample Software Rev. No.**		V1.007T	
Device-Under-Test Description (DUT)	Portable FM VHF Push-To-Talk (PTT) Marine Radio Transceiver					
VHF Transmit Frequency Range(s)	156.025 - 157.425 MHz (VHF Marine Band)					
Manuf. Rated Output Power	5.0 W +/- 0.5 W (average conducted) (Hi power setting)					
Measured RF Output Power	5.2 W	37.2 dBm	Conducted		156.7 MHz (Ch. 14)	
Battery Type Tested	Lithium-Polymer	7.4 V	1400 mAh		P/N: BP-10	
Antenna Type Tested	Detachable Whip				P/N: n/a	
Body-worn Accessory Tested	Belt-Clip (contains metal)				P/N: n/a	
Audio Accessory Tested	n/a				P/N: n/a	
Max. SAR Level(s) Evaluated	Face-held	**FCC: 0.754 W/kg**	**IC: 1.01 W/kg**	1g	**50% PTT duty factor**	
	Body-worn	**FCC: 0.932 W/kg**	**IC: 1.15 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	1.6 W/kg		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 General Population / Uncontrolled Exposure environment. The device was tested in accordance with the measurement procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 4, IEEE Standard 1528-2003 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		Mike Meaker	Engineering Technologist	Celltech Labs Inc.

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REVISION HISTORY			
REVISION NO.	**DESCRIPTION**	**IMPLEMENTED BY**	**RELEASE DATE**
1.0	1st Release	Mike Meaker	Apr. 8, 2013

TEST REPORT SIGN-OFF			
DEVICE TESTED BY	**REPORT PREPARED BY**	**QA REVIEW BY**	**REPORT APPROVED BY**
Mike Meaker	Mike Meaker	Glen Westwell	Mike Meaker

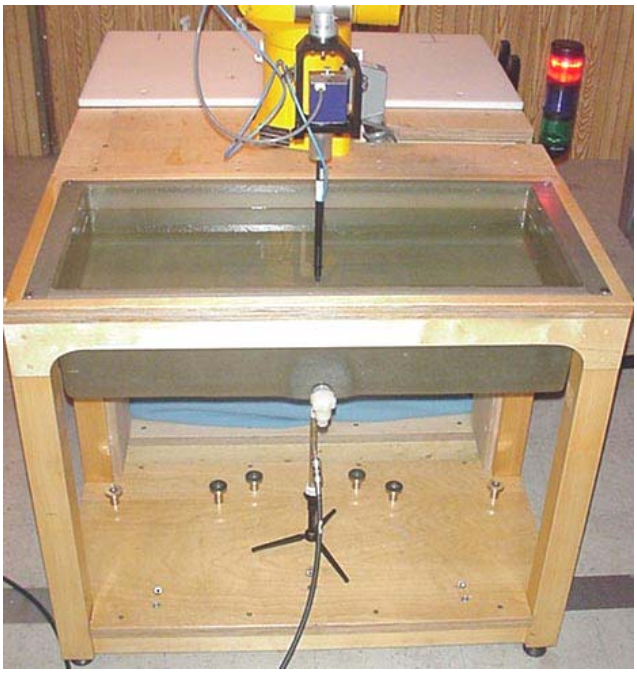
1.0 INTRODUCTION

This measurement report demonstrates that the Navico Models: Link 2 and HH36 Portable VHF PTT Marine Radio Transceivers 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 General Population / Uncontrolled Exposure environment. The measurement procedures described in FCC OET Bulletin 65, Supplement C 01-01 (see reference [3]), IC RSS-102 Issue 4 (see reference [4]), IEEE Standard 1528-2003 (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	Channel	Mode	Power Setting	Measured Power Level		Method
					dBm	Watts	
VHF	156.7 MHz	14	CW	Hi	37.2	5.2	Average Conducted
Notes							
1. The test channel was selected in accordance with the procedures specified in FCC KDB 447498 (see reference [7]).							
2. The RF conducted output power level of the DUT was measured by Celltech prior to the SAR evaluations using a Gigatronics 8652A Universal Power Meter at the antenna of the DUT in accordance with FCC 47 CFR §2.1046 (see reference [13]) and IC RSS-Gen (see reference [14]).							

4.0 NO. OF TEST CHANNELS (N_c)

Device Frequency Range	Band	N_c	Test Frequencies (MHz)
156.025 - 157.425 MHz	VHF Marine	1	156.7 MHz
Note: The number of test channels (*Nc*) was calculated in accordance with the procedures specified in FCC KDB 447498 (see reference [7]).			

5.0 SAR PROBE CALIBRATION & MEASUREMENT FREQUENCIES

The following procedures are recommended for measurements at 150 MHz - 3 GHz to minimize probe calibration and tissue dielectric parameter discrepancies. In general, SAR measurements below 300 MHz should be within ±50 MHz of the probe calibration frequency. At 300 MHz to 3 GHz, measurements should be within ±100 MHz of the probe calibration frequency. Measurements exceeding 50% of these intervals, ±25 MHz < 300 MHz and ±50 MHz ≥300 MHz, require additional steps (per FCC KDB 450824 D01 v01r01, SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz - see reference [9]).

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	±25 MHz ≤ 300 MHz
150 MHz	156.7 MHz	6.7 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	N/A	Detachable whip Antenna	Yes
Accessory ID # for Test Report	**ACCESSORY CATEGORY: BATTERY**		
	Part Number	**Description**	**SAR Evaluation**
a	BP-10	Li-poly Battery 7.4V, 1400mAh	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 Navico.

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: 04/04/2013		Frequency: 150 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	74.7	0.7	52.3	0.76	42.83%	-7.89%
0.060	77.69	0.67	52.3	0.76	48.55%	-11.84%
0.070	65.78	0.75	52.3	0.76	25.77%	-1.32%
0.080	63.63	0.71	52.3	0.76	21.66%	-6.58%
0.090	62.35	0.74	52.3	0.76	19.22%	-2.63%
0.100	58.11	0.75	52.3	0.76	11.11%	-1.32%
0.110	56.99	0.76	52.3	0.76	8.97%	0.00%
0.120	55.89	0.78	52.3	0.76	6.86%	2.63%
0.130	52.04	0.75	52.3	0.76	-0.50%	-1.32%
0.140	52.21	0.76	52.3	0.76	-0.17%	0.00%
0.150	53.39	0.75	52.3	0.76	2.08%	-1.32%
0.1567*	52.8	0.79	52.3	0.76	0.96%	3.95%
0.160	52.47	0.81	52.3	0.76	0.33%	6.58%
0.170	53.37	0.8	52.3	0.76	2.05%	5.26%
0.180	52.19	0.79	52.3	0.76	-0.21%	3.95%
0.190	51.94	0.81	52.3	0.76	-0.69%	6.58%
0.200	50.41	0.84	52.3	0.76	-3.61%	10.53%
0.210	49.17	0.84	52.3	0.76	-5.98%	10.53%
0.220	49.99	0.83	52.3	0.76	-4.42%	9.21%
0.230	48.47	0.85	52.3	0.76	-7.32%	11.84%
0.240	47.18	0.85	52.3	0.76	-9.79%	11.84%
0.250	47.52	0.86	52.3	0.76	-9.14%	13.16%

**interpolated using DASY4 software*

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Apr 4	150 Head	23.0 °C	20.8 °C	≥ 15 cm	101.3 kPa	30%	1000

FLUID DIELECTRIC PARAMETERS

Date: 04/04/2013		Frequency: 150 MHz			Tissue: Body	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	77.07	0.74	61.9	0.8	24.51%	-7.50%
0.060	84.92	0.71	61.9	0.8	37.19%	-11.25%
0.070	72.27	0.78	61.9	0.8	16.75%	-2.50%
0.080	72.69	0.76	61.9	0.8	17.43%	-5.00%
0.090	70.07	0.76	61.9	0.8	13.20%	-5.00%
0.100	68.19	0.78	61.9	0.8	10.16%	-2.50%
0.110	64.87	0.79	61.9	0.8	4.80%	-1.25%
0.120	64.47	0.82	61.9	0.8	4.15%	2.50%
0.130	61.6	0.78	61.9	0.8	-0.48%	-2.50%
0.140	61.7	0.79	61.9	0.8	-0.32%	-1.25%
0.150	63.39	0.77	61.9	0.8	2.41%	-3.75%
0.1567*	63	0.81	61.9	0.8	1.78%	1.25%
0.160	62.77	0.83	61.9	0.8	1.41%	3.75%
0.170	62.87	0.82	61.9	0.8	1.57%	2.50%
0.180	62.85	0.81	61.9	0.8	1.53%	1.25%
0.190	61.7	0.83	61.9	0.8	-0.32%	3.75%
0.200	61.43	0.84	61.9	0.8	-0.76%	5.00%
0.210	60.1	0.85	61.9	0.8	-2.91%	6.25%
0.220	59.48	0.83	61.9	0.8	-3.91%	3.75%
0.230	58.77	0.85	61.9	0.8	-5.06%	6.25%
0.240	59.14	0.86	61.9	0.8	-4.46%	7.50%
0.250	59.19	0.86	61.9	0.8	-4.38%	7.50%

**interpolated using DASY4 software*

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Apr 4	150 Body	23.0 °C	21.5 °C	≥ 15 cm	101.3 kPa	30%	1000

8.0 SAR MEASUREMENT SUMMARY

SAR EVALUATION RESULTS

Test Config.	Test Date	Freq.	Ch.	Battery Type	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%
FACE	Apr 4	156.7	14	Li-poly	5.2	-	-	2.5 cm	4.7 cm	1.44	**0.720**	-1.26	1.93	**0.962**
BODY	Apr 4	156.7	14	Li-poly	5.2	Belt-clip	-	2.5 cm	3.2 cm	1.74	**0.870**	-0.976	2.18	**1.089**
Repeat BODY	Apr 4	156.7	14	Li-poly	5.2	Belt-clip	-	2.5 cm	3.2 cm	1.78	**0.890**	-0.926	2.20	**1.10**

SAR LIMIT(S)		HEAD	SPATIAL PEAK	RF EXPOSURE CATEGORY
FCC 47 CFR 2.1093	Health Canada Safety Code 6	1.6 W/kg	averaged over 1 gram	General Population / Uncontrolled

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 highest measured SAR test was > 0.8 W/kg. Therefore repeatability measurements were required according to the procedures of FCC KDB 865664 (see reference [8]).

9.0 SAR SCALING (MANUFACTURER TOLERANCE)

SAR SCALING TO MANUFACTURER'S MAX. UPPER TOLERANCE SPEC.

Test Config.	Test Freq. (MHz)	Measured Conducted Power (Watts)	Measured SAR Level 1g (W/kg)*	Scaling to Max. Conducted Power Level (5.5 Watts)	Scaled SAR Level* 1g (W/kg)	Scaled SAR Level** (with droop) 1g (W/kg)
Face	156.7	5.2	1.44	+ 0.2 dB	**0.754**	**1.01**
Body	156.7	5.2	1.78	+ 0.2 dB	**0.932**	**1.15**

*50% PTT duty-cycle SAR level (before droop) - FCC
**50% PTT duty-cycle SAR level (with droop) - IC

10.0 CO-LOCATED TRANSMITTERS

The Link 2, HH36 does not contain co-located transmitters.

11.0 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. The body-worn SAR evaluation was performed without an audio accessory connected to the DUT because one is not provided by the manufacturer. The connection of an audio accessory (ie. headset) to the external audio connector would not affect body-worn SAR.
4. The worst case SAR evaluation was repeated according to FCC KDB 447498 (see reference [8])
5. Each evaluation was performed with a fully charged battery. The battery was also recharged between the area and zoom scan measurements.
6. 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.
7. 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).
8. The fluid temperature remained within +/-2°C from the fluid dielectric parameter measurement to the completion of the SAR evaluation.
9. 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).

12.0 SAR EVALUATION PROCEDURES

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

(ii) For body-worn and face-held devices a planar phantom was used.

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

An area scan was determined as follows:

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

d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.

A 1g and 10g spatial peak SAR was determined as follows:

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

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

g. A zoom scan volume of 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.

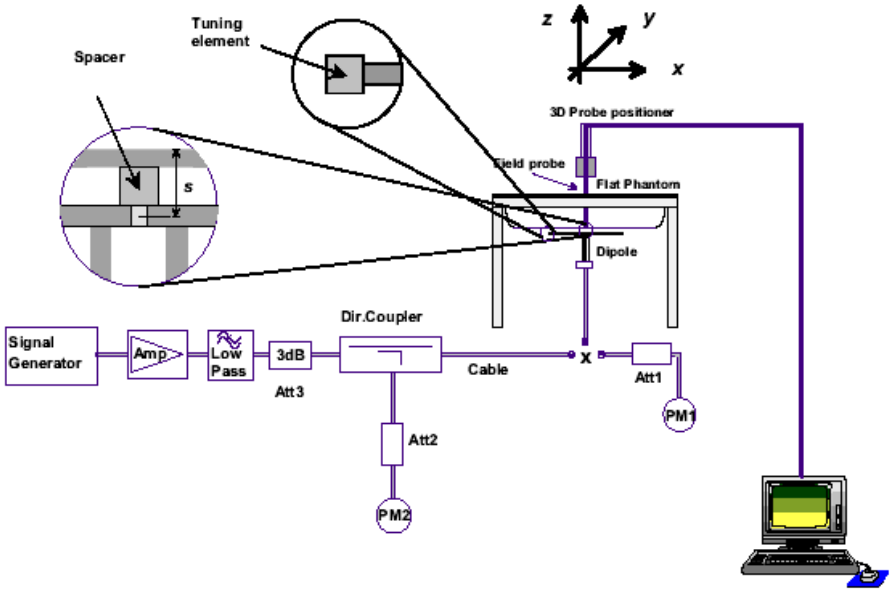
13.0 SYSTEM PERFORMANCE CHECK

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 [8]). 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.

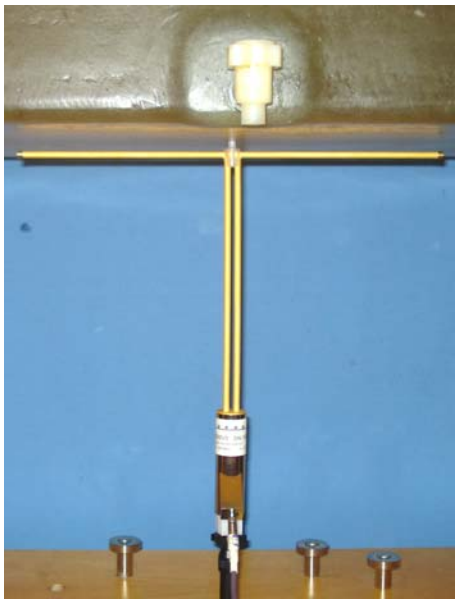
SYSTEM PERFORMANCE CHECK EVALUATION

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.						
Apr 4	Head 150	0.910 ±10%	0.896	-1.5%	52.3 ±5%	53.4	+2.1%	0.76 ±5%	0.75	-1.3%	1000	23.0	20.8	≥ 15	30	101.3
Apr 4	Body 150	0.940 ±10%	0.964	+2.6%	61.9 ±5%	63.4	+2.4%	0.80 ±5%	0.77	-3.8%	1000	23.0	21.5	≥ 15	30	101.3

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 1528-2003)



SPEAG 300 MHz Validation Dipole Setup

14.0 SIMULATED EQUIVALENT TISSUES

The simulated equivalent tissue recipes in the table below are derived from the SAR system manufacturer's suggested recipes in the DASY4 manual (see references [10] and [11]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2003 (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 %

15.0 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.			

16.0 ROBOT SYSTEM SPECIFICATIONS

Specifications	
Positioner	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability	0.02 mm
No. of axis	6
Data Acquisition Electronic (DAE) System	
Cell Controller	
Processor	AMD Athlon XP 2400+
Clock Speed	2.0 GHz
Operating System	Windows XP Professional
Data Converter	
Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY4, V4.7 Build 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

17.0 PROBE SPECIFICATION (ET3DV6)

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, glycol)
Calibration:	In air from 10 MHz to 2.5 GHz In 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

18.0 BARSKI PLANAR PHANTOM

The Barski planar phantom is a fiberglass shell phantom with a 2.0 mm (+/-0.2mm) thick device measurement area at the center of the phantom for SAR evaluations of devices with a larger surface area than the planar section of the SAM phantom. The planar phantom is integrated in a wooden table. The planar phantom was used for the DUT SAR evaluations and the system performance check evaluations. See Appendix G for dimensions and specifications of the Barski planar phantom.

Barski Planar Phantom

19.0 DEVICE HOLDER

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

Device Holder

20.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
USED	DESCRIPTION				
x	Schmid & Partner DASY4 System	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	CNR	CNR
x	-Robot	00046	599396-01	CNR	CNR
x	-DAE4	00019	353	19-Apr-12	Biennial
x	-ET3DV6 E-Field Probe	00017	1590	24-Apr-12	Annual
x	-SPEAG D300V3 Validation Dipole	000216	1009	17-Apr-12	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	1833699	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				

21.0 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	1.9	Normal	1	1	0.81	1.9	1.54	∞
Liquid Conductivity (measured)	7.2.4.3	3.95	Normal	1	0.78	0.71	3.1	2.8	∞
Liquid Permittivity (measured)	7.2.4.3	2.41	Normal	1	0.23	0.26	0.6	0.6	∞
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**				**12.90**	**12.79**	
Expanded Uncertainty (95% Confidence Interval)	**7.3.2**		**k=2**				**25.79**	**25.57**	

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

22.0 REFERENCES

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

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

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

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

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

[6] International Standard IEC 62209-2 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)”.

[7] Federal Communications Commission, Office of Engineering and Technology - “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”; KDB 447498 D01v05: October 2012.

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

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

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

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

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

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

[14] 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

Date Tested: 4/4/2013

Face-held SAR - Channel 14 - 156.7 MHz

DUT: Navico Link 2; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 23C; Fluid Temp: 20.8C; Barometric Pressure: 101.3 kPa; Humidity: 30%

Procedure Notes:

Communication System: VHF Marine
Frequency: 156.7 MHz; Duty Cycle: 1:1
Medium: HSL150 Medium parameters used (interpolated): f = 156.7 MHz; σ = 0.79 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3

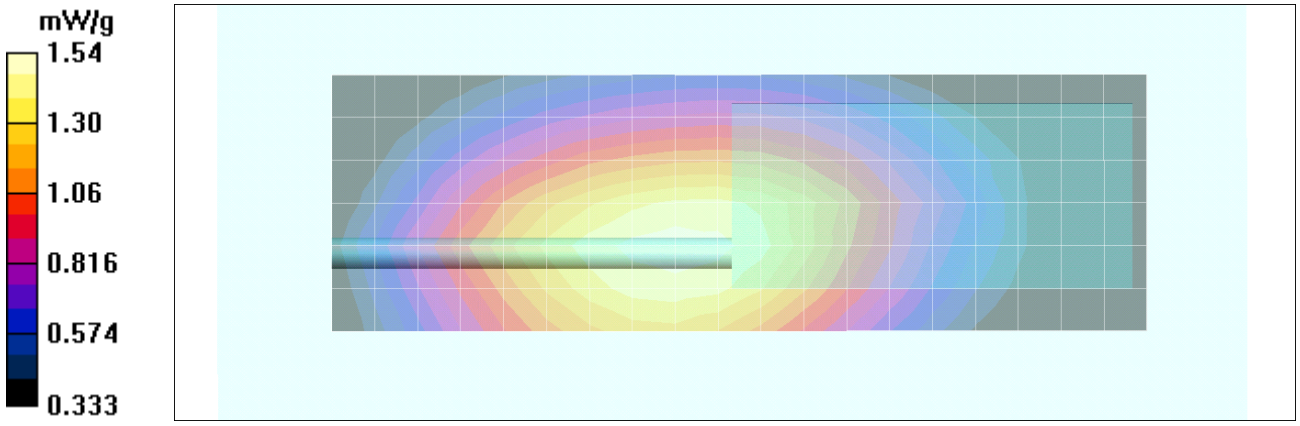
- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch.14 - Face/Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm

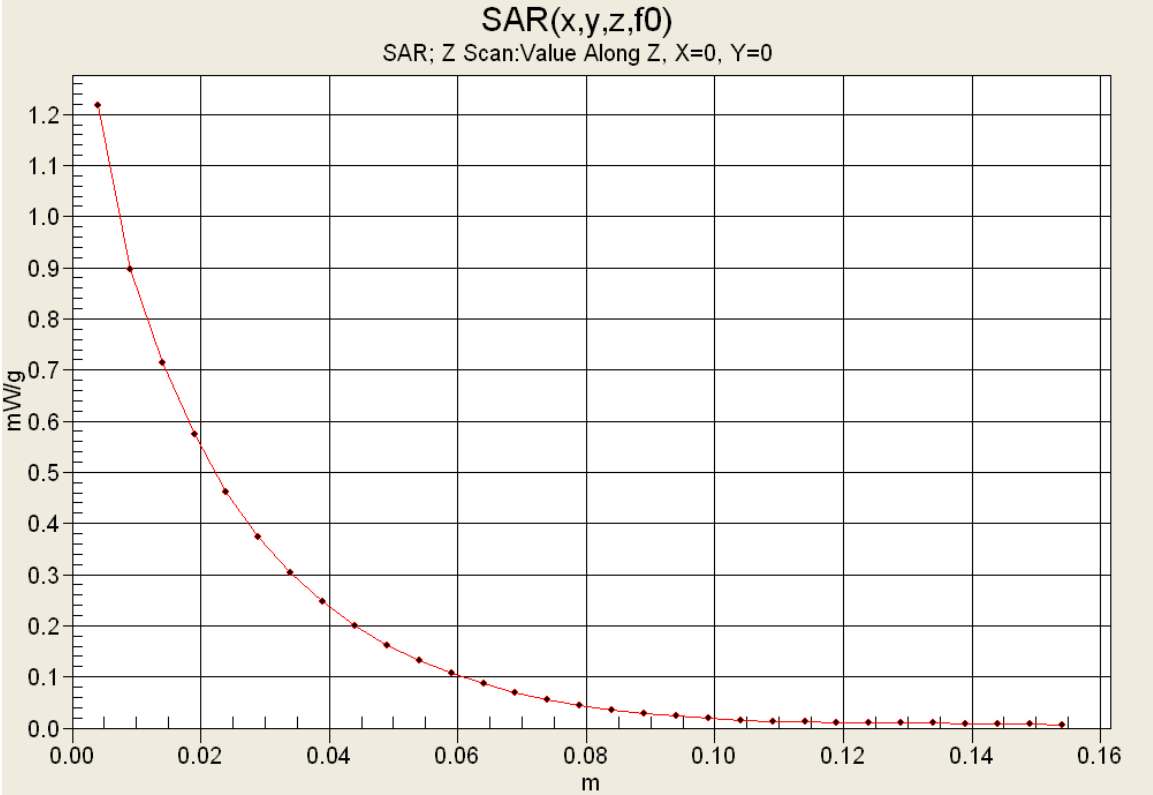
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.51 mW/g

Ch.14 - Face/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 46.1 V/m; Power Drift = -1.26 dB
Peak SAR (extrapolated) = 2.13 W/kg
SAR(1 g) = 1.44 mW/g; SAR(10 g) = 1.09 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.54 mW/g



Z-Axis Scan


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date Tested: 4/4/2013

Body-worn SAR - Channel 14 - 156.7 MHz

DUT: Navico Link 2; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 23C; Fluid Temp: 21.5C; Barometric Pressure: 101.3 kPa; Humidity: 30%

Procedure Notes:

Communication System: VHF Marine
Frequency: 156.7 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 156.7 MHz; σ = 0.81 mho/m; ε_r = 63; ρ = 1000 kg/m^3

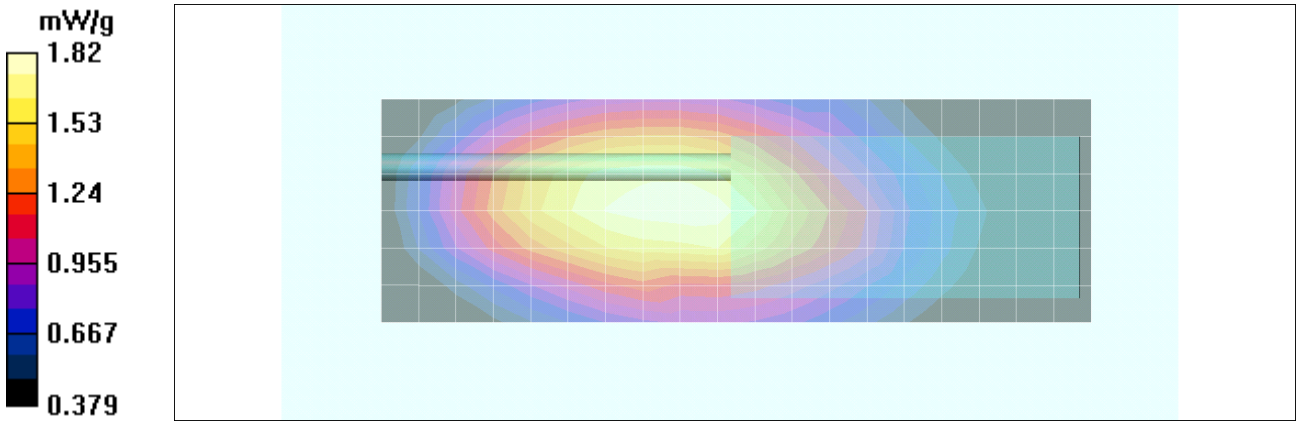
- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch.14 - Body/Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm

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

Ch.14 - Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 50.1 V/m; Power Drift = -0.976 dB
Peak SAR (extrapolated) = 2.57 W/kg
SAR(1 g) = 1.74 mW/g; SAR(10 g) = 1.3 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.82 mW/g



Date Tested: 4/4/2013

Body-worn SAR - Channel 14 - 156.7 MHz - Repeatability Test

DUT: Navico Link 2; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 23C; Fluid Temp: 21.5C; Barometric Pressure: 101.3 kPa; Humidity: 30%

Procedure Notes:

Communication System: VHF Marine
Frequency: 156.7 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 156.7 MHz; σ = 0.81 mho/m; ε_r = 63; ρ = 1000 kg/m^3

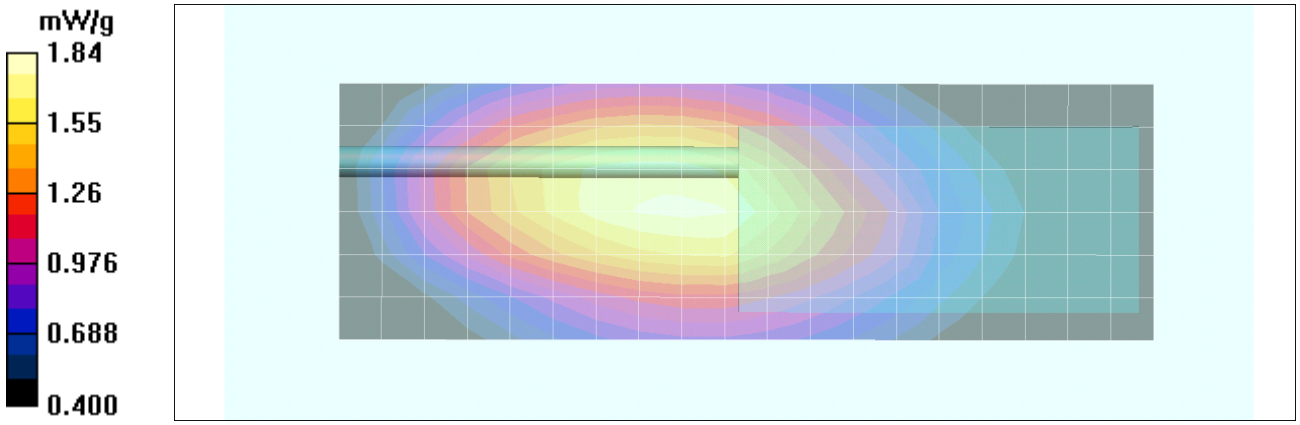
- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ch.14 - Body/Area Scan (7x20x1): Measurement grid: dx=15mm, dy=15mm

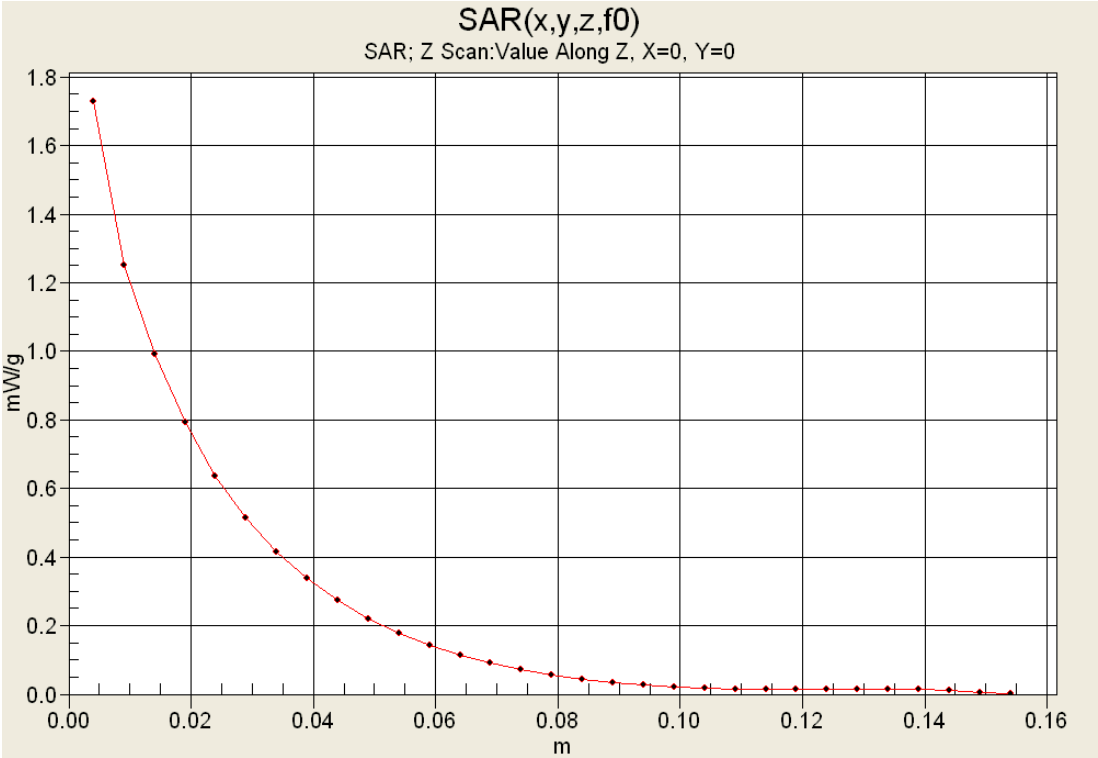
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.77 mW/g

Ch.14 - Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 49.6 V/m; Power Drift = -0.926 dB
Peak SAR (extrapolated) = 2.63 W/kg
SAR(1 g) = 1.78 mW/g; SAR(10 g) = 1.34 mW/g

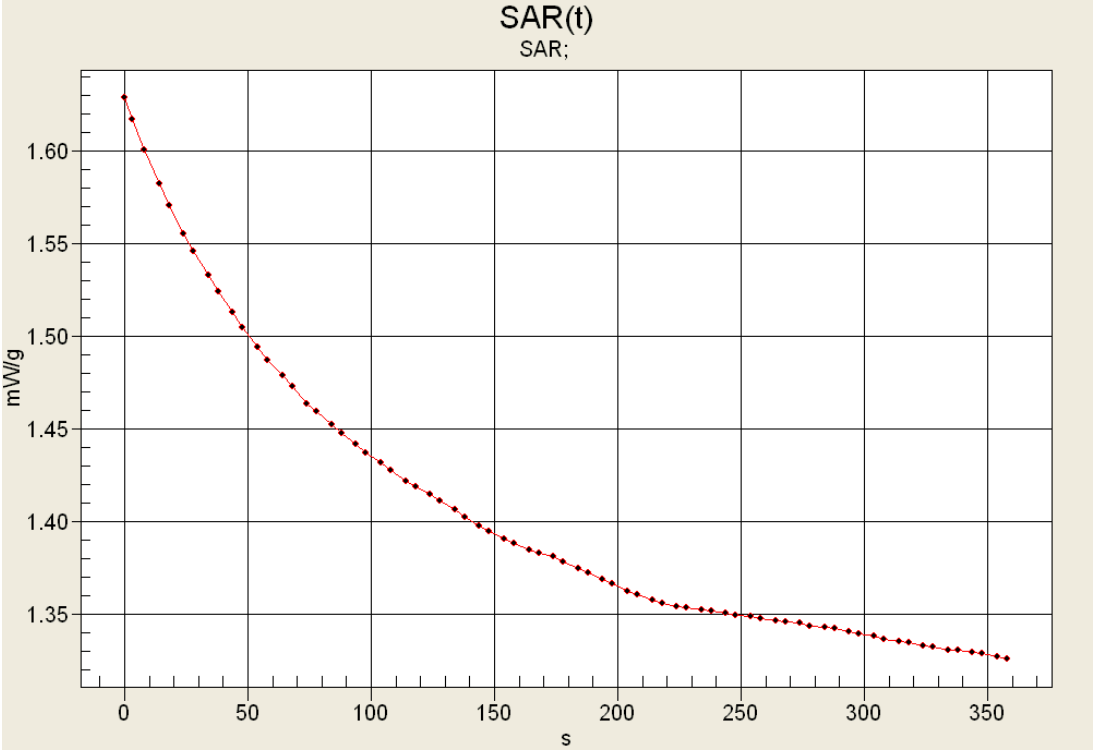
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.84 mW/g



Z-Axis Scan



SAR vs. Time



APPENDIX B - SYSTEM PERFORMANCE CHECK PLOTS

Date Tested: 4/4/2013

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: 23C; Fluid Temp: 20.8C; Barometric Pressure: 101.3 kPa; Humidity: 30%

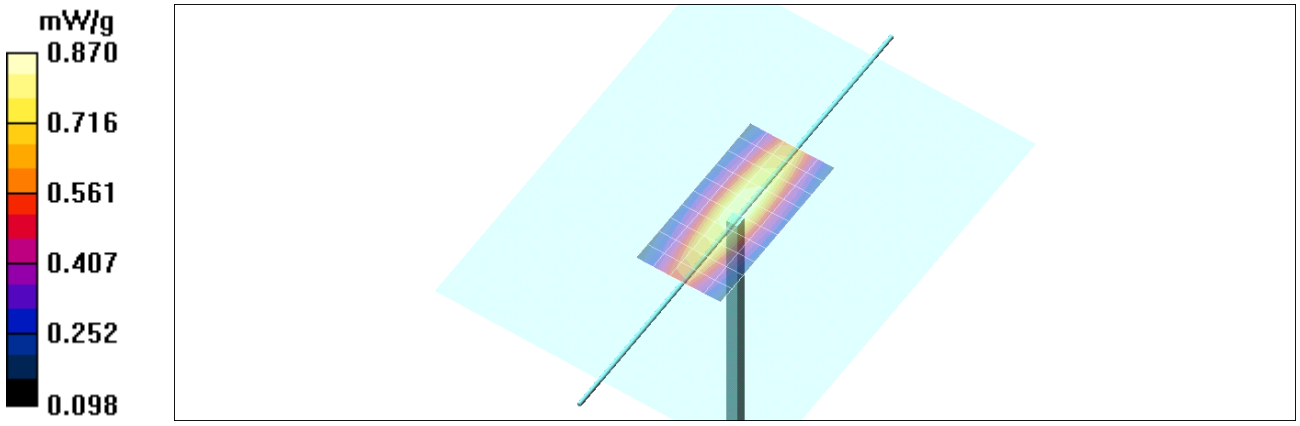
Procedure Notes: 300 MHz Dipole transmitting at 300 MHz using 150 MHz SAR probe calibration and 150 MHz tissue dielectric parameters

Communication System: CW
Frequency: 150 MHz; Duty Cycle: 1:1
Medium: HSL150 Medium parameters used: f = 150 MHz; σ = 0.75 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3

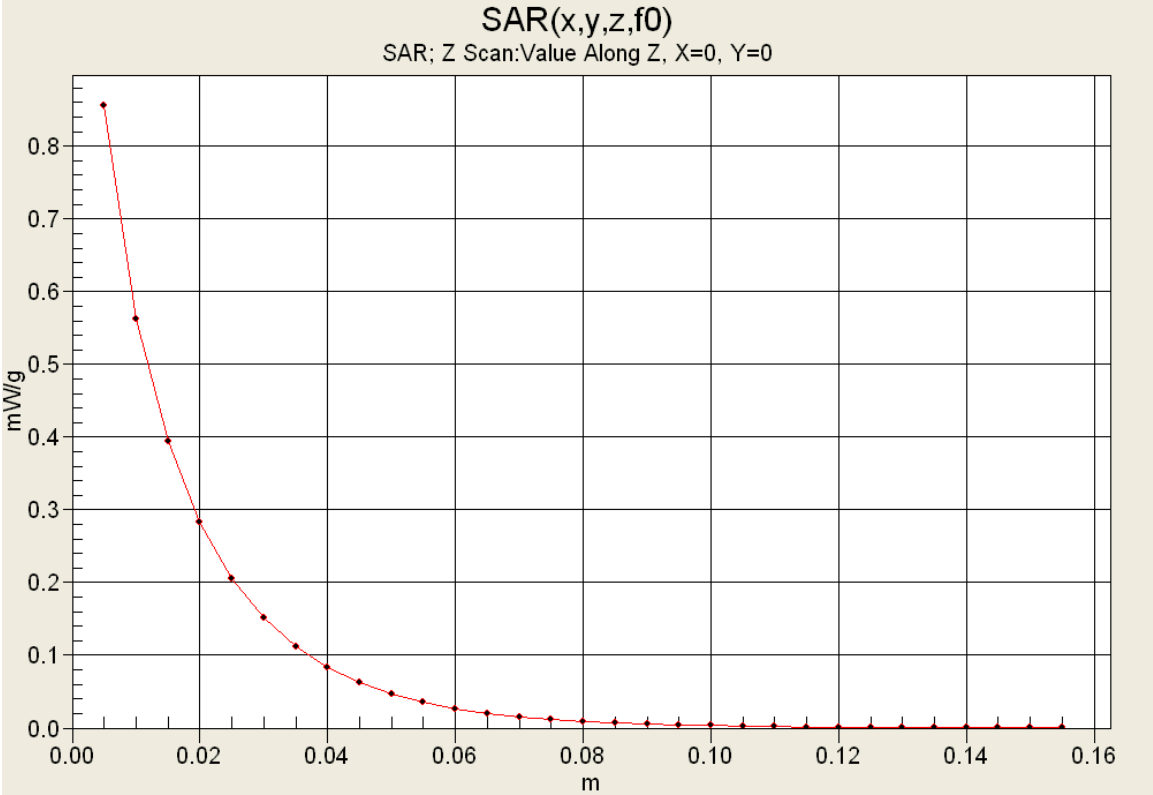
- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Head d=15mm, Pin = 398mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.832 mW/g

Head d=15mm, Pin = 398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.2 V/m; Power Drift = -0.143 dB
Peak SAR (extrapolated) = 1.45 W/kg
SAR(1 g) = 0.896 mW/g; SAR(10 g) = 0.593 mW/g
Maximum value of SAR (measured) = 0.870 mW/g



Z-axis Scan


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date Tested: 4/4/2013

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: 23C; Fluid Temp: 21.5C; Barometric Pressure: 101.3 kPa; Humidity: 30%

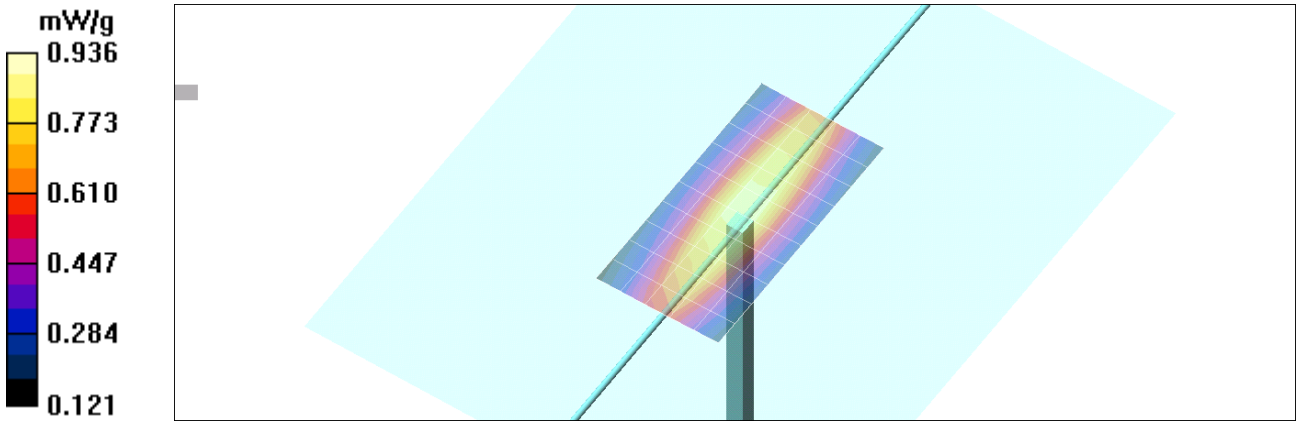
Procedure Notes: 300 MHz Dipole transmitting at 300 MHz using 150 MHz SAR probe calibration and 150 MHz tissue dielectric parameters

Communication System: CW
Frequency: 150 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 150 MHz; σ = 0.77 mho/m; ε_r = 63.4; ρ = 1000 kg/m^3

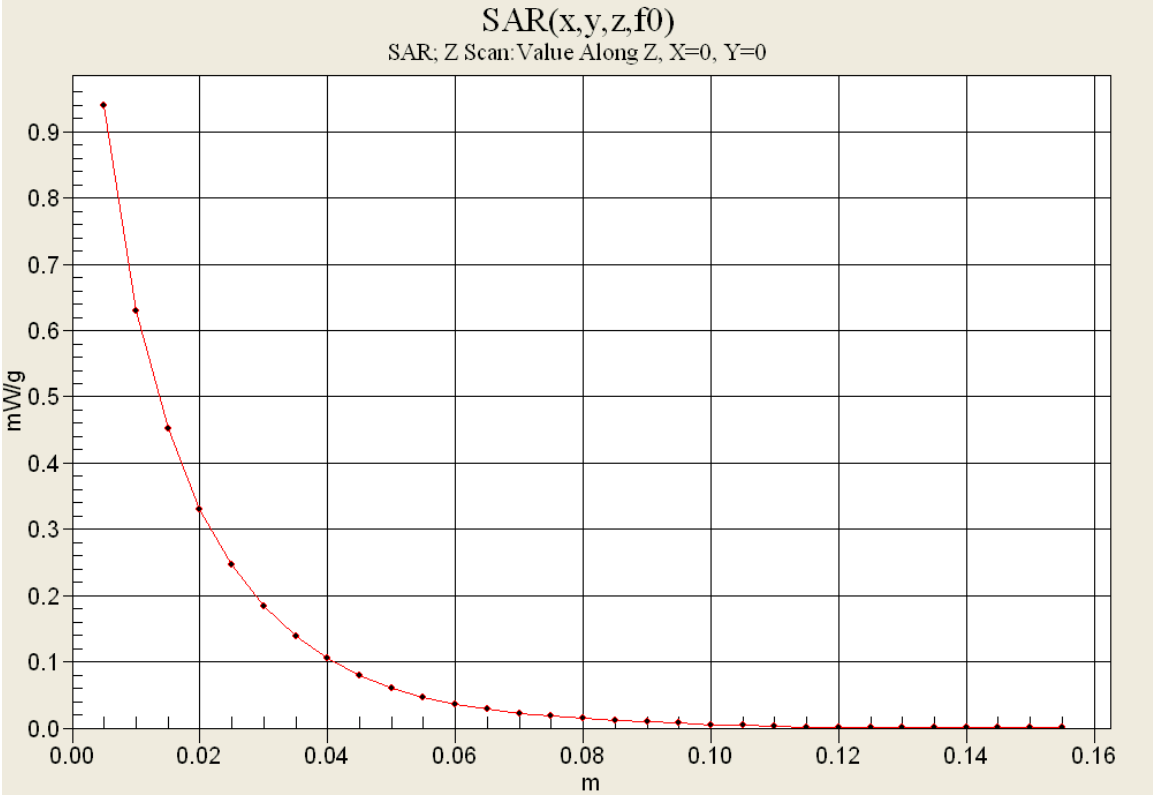
- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body d=15mm, Pin = 398mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.870 mW/g

Body d=15mm, Pin = 398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.8 V/m; Power Drift = 0.004 dB
Peak SAR (extrapolated) = 1.52 W/kg
SAR(1 g) = 0.964 mW/g; SAR(10 g) = 0.649 mW/g
Maximum value of SAR (measured) = 0.936 mW/g



Z-axis Scan


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

150 MHz Head

****

Celltech Labs
Test Result for UIM Dielectric Parameter
04/Apr/2013
Freq 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	74.70	0.70
0.0600	56.50	0.69	77.69	0.67
0.0700	56.03	0.70	65.78	0.75
0.0800	55.57	0.71	63.63	0.71
0.0900	55.10	0.72	62.35	0.74
0.1000	54.63	0.72	58.11	0.75
0.1100	54.17	0.73	56.99	0.76
0.1200	53.70	0.74	55.89	0.78
0.1300	53.23	0.75	52.04	0.75
0.1400	52.77	0.75	52.21	0.76
0.1500	52.30	0.76	53.39	0.75
0.1600	51.83	0.77	52.47	0.81
0.1700	51.37	0.77	53.37	0.80
0.1800	50.90	0.78	52.19	0.79
0.1900	50.43	0.79	51.94	0.81
0.2000	49.97	0.80	50.41	0.84
0.2100	49.50	0.80	49.17	0.84
0.2200	49.03	0.81	49.99	0.83
0.2300	48.57	0.82	48.47	0.85
0.2400	48.10	0.83	47.18	0.85
0.2500	47.63	0.83	47.52	0.86

150 MHz Body

****

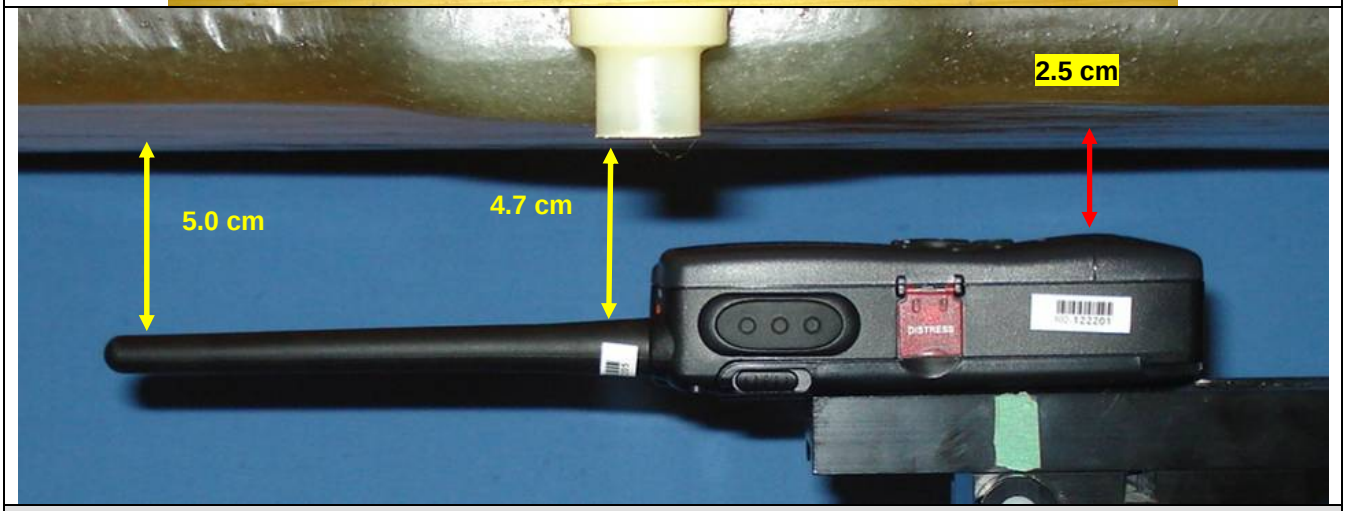
Celltech Labs
Test Result for UIM Dielectric Parameter
04/Apr/2013
Freq Frequency(GHz)
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eB	FCC_sB	Test_e	Test_s
0.0500	64.37	0.72	77.07	0.74
0.0600	64.12	0.73	84.92	0.71
0.0700	63.87	0.74	72.27	0.78
0.0800	63.63	0.74	72.69	0.76
0.0900	63.38	0.75	70.07	0.76
0.1000	63.13	0.76	68.19	0.78
0.1100	62.89	0.77	64.87	0.79
0.1200	62.64	0.78	64.47	0.82
0.1300	62.39	0.78	61.60	0.78
0.1400	62.15	0.79	61.70	0.79
0.1500	61.90	0.80	63.39	0.77
0.1600	61.65	0.81	62.77	0.83
0.1700	61.41	0.82	62.87	0.82
0.1800	61.16	0.82	62.85	0.81
0.1900	60.91	0.83	61.70	0.83
0.2000	60.67	0.84	61.43	0.84
0.2100	60.42	0.85	60.10	0.85
0.2200	60.17	0.86	59.48	0.83
0.2300	59.93	0.86	58.77	0.85
0.2400	59.68	0.87	59.14	0.86
0.2500	59.43	0.88	59.19	0.86

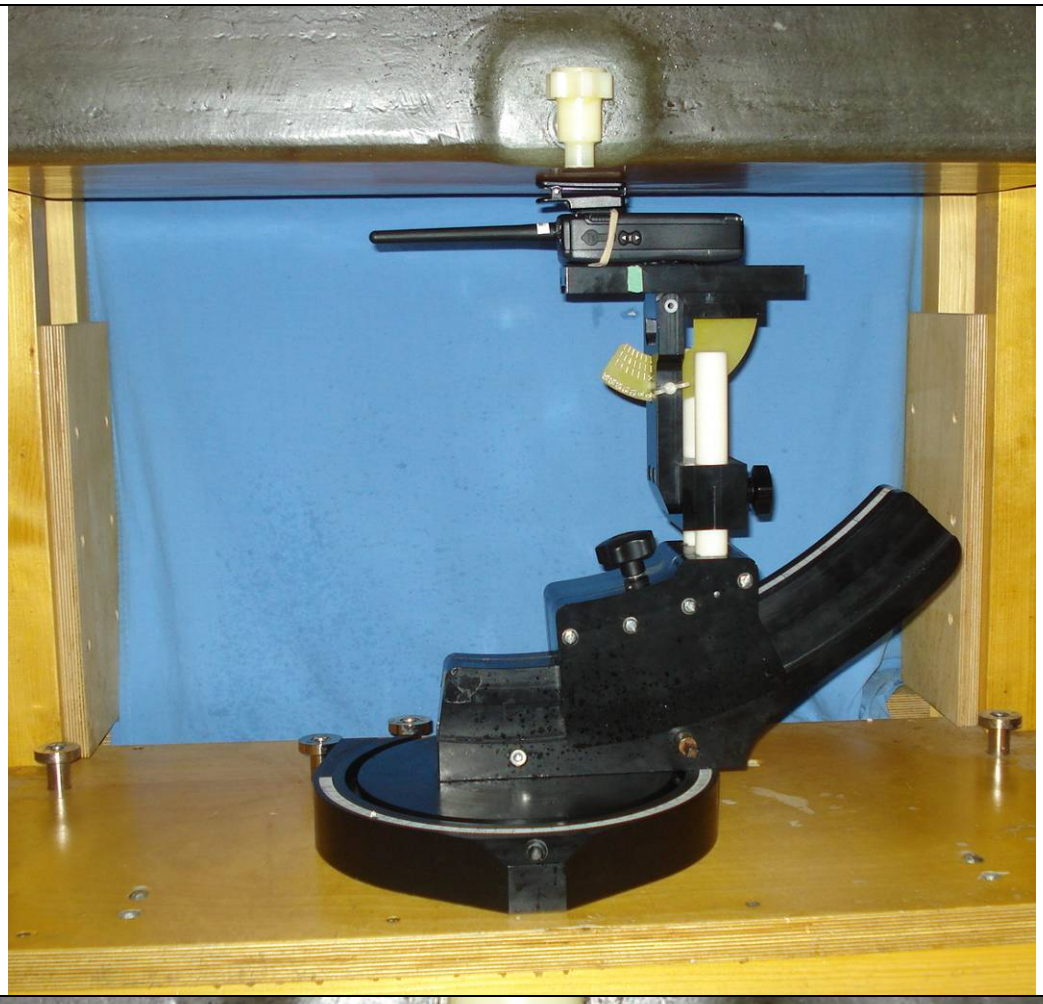
APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

FACE-HELD SAR TEST SETUP PHOTOGRAPHS



Face-held Test Setup

BODY-WORN SAR TEST SETUP PHOTOGRAPHS

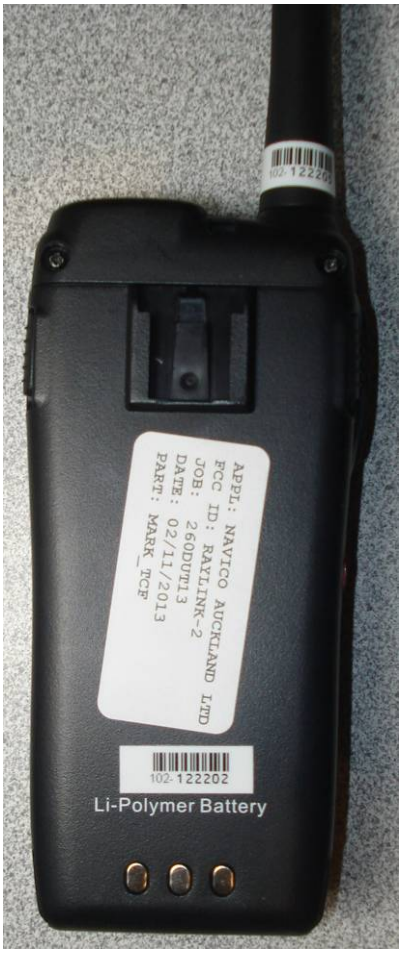


Body-worn Test Setup

DUT PHOTOGRAPHS

DUT Front side

DUT Left side



DUT Back side

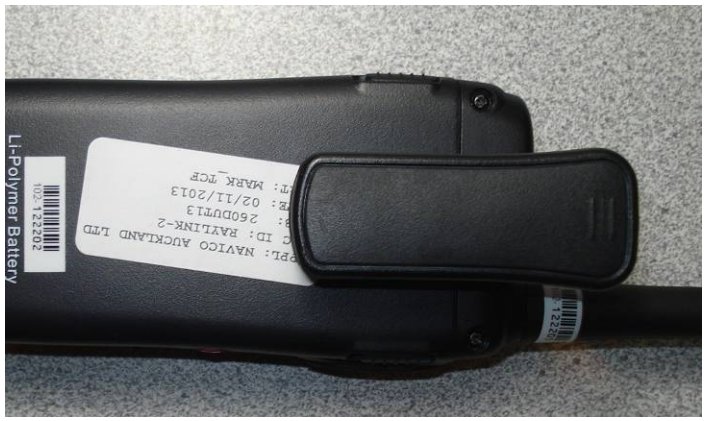
DUT Right side

DUT Top end (antenna removed)

DUT Bottom end

DUT PHOTOGRAPHS

Antenna



Belt-clip accessory

DUT PHOTOGRAPHS

Front of Li-ion Battery

Back of Li-ion Battery

Back of DUT with Battery removed