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)	**A2LA**	ISO/IEC 17025:2005 (A2LA Test Lab Certificate No. 2470.01)				
Applicant Information	**Name**	**VERTEX STANDARD USA INC.**				
	Address	8000 West Sunrise Blvd. Ft. Lauderdale, FL 33322, USA				
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 Bulletin 65, Supplement C	**FCC**	KDB 447498 D01v05		
	FCC	KDB 643646 D01v01	**IC**	RSS-102 Issue 4		
	IEEE	1528-2003	**IEC**	62209-1:2005, 62209-2:2010		
Device Classification(s)	**FCC**	Licensed Non-Broadcast Transmitter Held to Face (TNF) - FCC Part 90				
	IC	Land Mobile Radio Transmitter/Receiver (27.41-960 MHz) - RSS-119 Issue 11				
Device Identifier(s)	**FCC ID:**	AXI11133020	**IC**	10239A-11133020		
Device Model(s) Tested	EVX-531-D0-5 (S/N: 202L230028, 202L230022)					
Test Sample Revision No.s	**Hardware**	PCB: FR024520E	**Firmware**	CPU: 2.05 / DSP: 2.06		
Date of Sample Receipt	Jan. 10, 2013	**Date(s) of SAR Evaluations**	Jan. 17-18, 2013			
Device Description	Portable FM VHF Push-To-Talk (PTT) Radio Transceiver					
Transmit Frequency Range	**FCC**	150.8 - 173.4 MHz				
	IC	138.0 - 144.0, 148.0 - 174.0 MHz				
Manuf. Rated Output Power	5 Watts (Conducted)	**Manuf. Tolerance Specification**	+/- 10%			
Antenna Type(s) Tested	See manufacturer's accessory listing (Section 7.0)					
Battery Type(s) Tested	Li-ion	7.4 V	1350mAh	P/N: FNB-V133LI	a	
	Li-ion	7.4 V	2250 mAh	P/N: FNB-V134LI	b	
Body-worn Accessories Tested	Belt-Clip (contains metal)			P/N: CLIP-20	1	
Audio Accessories Tested	See manufacturer's accessory listing (Section 7.0)					
Max. SAR Level(s) Evaluated	Face-held	**1.14 W/kg**	1g	50% PTT duty cycle	Occupational / Controlled Exposure	
	Body-worn	**2.29 W/kg**	1g	50% PTT duty cycle	Occupational / Controlled Exposure	
FCC Spatial Peak SAR Limit	Head/Body	8.0 W/kg	1g	50% PTT duty cycle	Occupational / Controlled Exposure	

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 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 OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 4, IEEE Standard 1528-2003 and IEC International Standard 62209-1:2005. All measurements were performed in accordance with the SAR system manufacturer recommendations.

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

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

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

Test Report Approved By		**Mike Meaker**	**Engineering Technologist**	**Celltech Labs Inc.**

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REVISION HISTORY			
REVISION NO.	**DESCRIPTION**	**IMPLEMENTED BY**	**RELEASE DATE**
1.0	Initial Release	Mike Meaker	Jan. 24, 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 Vertex Standard USA Inc. Model: EVX-531-D0-5 Portable VHF PTT Radio Transceiver FCC ID: AXI11133020 complies with the SAR (Specific Absorption Rate) RF exposure requirements of 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 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 62209-1:2005 (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 uses a controller with a built in VME-bus computer.

3.0 RF CONDUCTED OUTPUT POWER MEASUREMENTS

MEASURED RF CONDUCTED OUTPUT POWER LEVELS

Radio Model	Test Frequency	Mode	dBm	Watts	Method
EVX-531-D0-5	138.0 MHz	CW	37.2	5.3	Average Conducted
	144.0 MHz	CW	37.2	5.3	Average Conducted
	150.8 MHz	CW	37.3	5.4	Average Conducted
	158.3 MHz	CW	37.3	5.4	Average Conducted
	165.9 MHz	CW	37.3	5.4	Average Conducted
	173.4 MHz	CW	37.2	5.3	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 SAR PROBE CALIBRATION & MEASUREMENT FREQUENCIES

The following procedures are recommended for measurements at 150 MHz - 3 GHz to minimize probe calibration and tissue dielectric parameter discrepancies. In general, SAR measurements below 300 MHz should be within ±50 MHz of the probe calibration frequency. At 300 MHz to 3 GHz, measurements should be within ±100 MHz of the probe calibration frequency. Measurements exceeding 50% of these intervals, ±25 MHz < 300 MHz and ±50 MHz ≥300 MHz, require additional steps (per FCC KDB 450824 D01v01r01, SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz - see reference [11]).

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	±50 MHz (≥ 300 MHz)
150 MHz	138.0 MHz	12.0 MHz	< 50 MHz[1]
	158.3 MHz	8.3 MHz	< 50 MHz[1]
	165.9 MHz	15.9 MHz	< 50 MHz[1]
1. The probe calibration and measurement frequency interval is < 50 MHz; therefore the additional steps were not required.			

5.0 NO. OF TEST CHANNELS (N_c)

Antenna Part No.	Antenna Freq. Range	Test Freq. Range	Band	N_c	Test Frequencies (MHz)
ATV-16XL	136 - 174 MHz	138.0 - 144.0 MHz	IC	2	138.0, 144.0
		150.8 - 173.4 MHz	FCC/IC	4	150.8, 158.3, 165.9, 173.4
Note: The number of test channels (*Nc*) were calculated in accordance with the procedures specified in FCC KDB 447498 (see reference [8]).					

6.0 MANUFACTURER'S DISCLOSED ACCESSORY LISTING

Accessory ID # for Test Report	ACCESSORY CATEGORY: ANTENNA			
	Part Number	**Description**		**SAR Evaluation**
1	ATV-16XL	Detachable Whip - Untuned (136-174 MHz)		Yes[2]
Accessory ID # for Test Report	**ACCESSORY CATEGORY: BATTERY**			
	Part Number	**Description**		**SAR Evaluation**
a	FNB-V133LI / FNB-V133LI-UNI	Li-ion (7.4V, 1350mAh)		Yes
b	FNB-V134LI / FNB-V134LI-UNI	Li-ion (7.4V, 2250mAh)		Yes
Accessory ID # for Test Report	**ACCESSORY CATEGORY: BODY-WORN**			
	Part Number	**Description**		**SAR Evaluation**
1	CLIP-20	Belt-clip (contains metal)		Yes
Accessory ID # for Test Report	**ACCESSORY CATEGORY: AUDIO**			
	Part Number	**Description**	**Audio Accessory Grouping**	**SAR Evaluation**
G1a	MH-360S	Compact Speaker-Mic	Group 1	No[1]
G1b	MH-450S	Standard Speaker-Mic		Yes
G2a	MH-81A4B	Light duty VOX headset	Group 2	No[1]
G3a	MH-37A4B	Earpiece mic	Group 3	No[1]

Manufacturer's disclosed accessory listing information provided by Vertex Standard USA Inc.

Notes:
1. Audio accessories not evaluated for SAR in accordance with the procedures and provisions of FCC KDB 643646 D01v01r01.
2. Antenna ATV-16XL is not tuned. Antenna is intended to be cut to length in order to tune to desired frequency within the operating range. Manufacturer supplied 3 pretuned samples for low, mid, and high frequencies. These samples were used for SAR testing.

7.0 FLUID DIELECTRIC PARAMETERS

FLUID DIELECTRIC PARAMETERS

Date: 01/21&22/2013		Frequency: 150 MHz			Tissue: Body	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.100	68.53	0.74	61.9	0.8	10.71%	-7.50%
0.110	62.28	0.72	61.9	0.8	0.61%	-10.00%
0.120	62.34	0.76	61.9	0.8	0.71%	-5.00%
0.130	61.43	0.75	61.9	0.8	-0.76%	-6.25%
0.138*	63	0.75	61.9	0.8	1.78%	-6.25%
0.140	63.37	0.75	61.9	0.8	2.37%	-6.25%
0.150	62.13	0.77	61.9	0.8	0.37%	-3.75%
0.1583*	62	0.778	61.9	0.8	0.16%	-2.75%
0.160	61.94	0.78	61.9	0.8	0.06%	-2.50%
0.1659*	61.5	0.786	61.9	0.8	-0.65%	-1.75%
0.170	61.23	0.79	61.9	0.8	-1.08%	-1.25%
0.180	59.85	0.79	61.9	0.8	-3.31%	-1.25%
0.190	60.84	0.8	61.9	0.8	-1.71%	0.00%
0.200	59.47	0.8	61.9	0.8	-3.93%	0.00%
0.210	59.54	0.83	61.9	0.8	-3.81%	3.75%
0.220	58.31	0.83	61.9	0.8	-5.80%	3.75%
0.230	57.88	0.83	61.9	0.8	-6.49%	3.75%
0.240	57.61	0.83	61.9	0.8	-6.93%	3.75%
0.250	56.87	0.82	61.9	0.8	-8.13%	2.50%

**interpolated using DASY4 software*

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Jan 21	150 Body	21.0°C	22.0°C	≥ 15 cm	103.1 kPa	34%	1000
Jan 22	150 Body	22.0°C	21.7°C	≥ 15 cm	102.8 kPa	34%	1000

FLUID DIELECTRIC PARAMETERS

Date: 01/23/2013		Frequency: 150 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	79.09	0.68	52.3	0.76	51.22%	-10.53%
0.060	69.06	0.71	52.3	0.76	32.05%	-6.58%
0.070	64.67	0.68	52.3	0.76	23.65%	-10.53%
0.080	58.42	0.72	52.3	0.76	11.70%	-5.26%
0.090	60.4	0.74	52.3	0.76	15.49%	-2.63%
0.100	61.07	0.73	52.3	0.76	16.77%	-3.95%
0.110	56.89	0.76	52.3	0.76	8.78%	0.00%
0.120	53.83	0.75	52.3	0.76	2.93%	-1.32%
0.130	51.67	0.75	52.3	0.76	-1.20%	-1.32%
0.138*	51.6	0.766	52.3	0.76	-1.34%	0.79%
0.140	51.63	0.77	52.3	0.76	-1.28%	1.32%
0.150	51.03	0.75	52.3	0.76	-2.43%	-1.32%
0.1583*	50.6	0.775	52.3	0.76	-3.25%	1.97%
0.160	50.54	0.78	52.3	0.76	-3.37%	2.63%
0.1659*	50.7	0.786	52.3	0.76	-3.06%	3.42%
0.170	50.77	0.79	52.3	0.76	-2.93%	3.95%
0.180	51.36	0.78	52.3	0.76	-1.80%	2.63%
0.190	50.16	0.79	52.3	0.76	-4.09%	3.95%
0.200	48.65	0.82	52.3	0.76	-6.98%	7.89%
0.210	48.31	0.8	52.3	0.76	-7.63%	5.26%
0.220	46.89	0.83	52.3	0.76	-10.34%	9.21%
0.230	47.34	0.85	52.3	0.76	-9.48%	11.84%
0.240	47.65	0.84	52.3	0.76	-8.89%	10.53%
0.250	46.36	0.86	52.3	0.76	-11.36%	13.16%

**interpolated using DASY4 software*

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m^3)
Jan 23	150 Head	22.0°C	22.3°C	≥ 15 cm	102.0 kPa	32%	1000

8.0 SAR MEASUREMENT SUMMARY

Table 1 — FACE-HELD SAR EVALUATION RESULTS

C	Test Date(s): Jan. 23, 2013			1		2	3	4	5		6	7	8
R	Antenna Tested	Test Freq. (MHz)	Cond. Pwr (W)	SAR W/kg 1g Battery (a) 100% ptt d/f		50% ptt d/f	Drift (dB)	50%+droop	SAR W/kg 1g Default Battery (b) 100% ptt d/f		50% ptt d/f	Drift dB	50%+droop
1	ATV-16XL (LOW)	138.0	5.3	F4	1.87	0.935	-0.103	0.957	F1	1.86	0.930	-0.228	0.980
2		144.0	5.3	N/A					N/A				
3	ATV-16XL (MID)	150.8	5.4	N/A					N/A				
4		158.3	5.4	F5	2.22	**1.11**	-0.379	1.21	F2	1.85	0.925	-0.360	1.01
5	ATV-16XL (HIGH)	165.9	5.4	N/A					F3	1.32	0.660	-0.294	0.706
6		173.4	5.3	N/A					N/A				

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

Notes

Test Mode = CW (Unmodulated Continuous Wave)	Phantom = Barski Planar Phantom

Battery	Front of DUT Distance to Planar Phantom (see Appendix D)	Antenna Distance to Planar Phantom (see Appendix D)
a	2.5 cm	3.9 cm
b	2.5 cm	3.9 cm

C = Column; R = Row	F1-Fx (F = Face) denotes the corresponding Face SAR Plot # as shown in Appendix A

Test Procedures applied in accordance with FCC KDB 643646 D01v01 (see reference [10])

1. For face-held configuration, the highest capacity battery was selected as the default battery (battery "b").
2. The SAR evaluations commenced at the highest output power channel per antenna and frequency range.
3. There were 3 different samples of the ATV-16XL antenna tuned to low (136-150 MHz), mid (150-162 MHz), and high (162-174 MHz).
4. When the head SAR of an antenna tested on the highest output power channel using the default battery is ≤ 3.5 W/kg (50% PTT duty factor), testing of all other required channels is not necessary.
5. When the SAR for all antennas tested using the default battery is ≤ 4.0 W/kg, test additional batteries using the antenna and channel configuration that resulted in the highest SAR.
6. When test reduction applies, the slots for such configurations are denoted with N/A (Not Applicable).

Table 2 — BODY-WORN SAR EVALUATION RESULTS

C	Test Date(s): Jan. 22, 2013	1	2	3	4	5	6	7	8

R	Antenna Tested	Test Freq. (MHz)	Cond. Pwr (W)	SAR W/kg 1g Default Battery (a) Default Body-worn Acc. (1) Default Audio Acc. (G1b)					SAR W/kg 1g Battery (b) Default Body-worn Acc. (1) Default Audio Acc. (G1b)				
					100% ptt d/f	50% ptt d/f	Drift (dB)	50%+droop		100% ptt d/f	50% ptt d/f	Drift dB	50%+droop
1	ATV-16XL (LOW)	138.0	5.3	B1	0.350	0.175	-0.838	0.212			N/A		
2		144.0	5.3			N/A					N/A		
4	ATV-16XL (MID)	150.8	5.4			N/A					N/A		
6		158.3	5.4	B2	4.47	**2.24**	-0.311	2.40	B4	2.57	1.29	-0.190	1.34
8	ATV-16XL (HIGH)	165.9	5.4	B3	1.7	0.850	-0.279	0.906			N/A		
9		173.4	5.3			N/A					N/A		

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

Notes

Test Mode = CW (Unmodulated Continuous Wave) | Phantom = Barski Planar Phantom

Battery	Back of DUT Distance to Planar Phantom (see Appendix D)	Antenna Distance to Planar Phantom (see Appendix D)
a	1.7 cm	2.7 cm
b	1.2 cm	2.9 cm

C = Column; R = Row | F1-Fx (F = Face) denotes the corresponding Face SAR Plot # as shown in Appendix A

Test Procedures applied in accordance with FCC KDB 643646 D01v01 (see reference [10])

1. For body-worn configuration, the thinnest standard battery was selected as the default battery (battery "a").
2. The SAR evaluations commenced at the highest output power channel per antenna and frequency range.
3. There were 3 different samples of the ATV-16XL antenna tuned to low (136-150 MHz), mid (150-162 MHz), and high (162-174 MHz).
4. When the SAR of an antenna tested on the highest output power channel using the default battery is ≤ 3.5 W/kg (50% PTT duty factor), testing of all other required channels is not necessary.
5. When the SAR for all antennas tested using the default battery is ≤ 4.0 W/kg, test additional batteries using the antenna and channel configuration that resulted in the highest SAR.
6. Audio accessory (G1b) was selected as the default audio accessory based on preliminary evaluations with the most conservative SAR.
7. Testing of additional audio accessories was not required because the highest measured SAR with the default audio accessory was ≤ 4.0 W/kg.
8. When test reduction applies, the slots for such configurations are denoted with N/A (Not Applicable).

NOTE: Repeatability tests were not required because the highest measured SAR was < 4.0 W/kg - per KDB 865664 (see reference [9]).

9.0 SAR SCALING (TUNE-UP TOLERANCE)

SAR LEVELS SCALED TO MANUFACTURER'S TUNE-UP TOLERANCE

Test Config.	Freq. (MHz)	Plot	Antenna	Battery	Conducted Power (W)	SAR Level 1g (W/kg)	Scale to 5.5 W (5 W + 10%)	Scaled SAR 1g (W/kg)
Face-held	158.3	F5	1	a	5.4	1.11	+0.1 dB	**1.14**
Body-worn	158.3	B2	1	a	5.4	2.24	+0.1 dB	**2.29**

Notes:

1. Only the highest SAR values for head and body per frequency band are scaled.
2. The resulting value is the reported SAR.
3. The scaled SAR levels are below the FCC/IC Occupational SAR Limit of 8.0 W/kg.

10.0 SAR TEST REDUCTION PROCEDURES APPLIED (FCC KDB 643646)

a. Face-held Configuration - Default Battery Selection per FCC KDB 643646, Page 2, Section 1) A): *"When multiple standard batteries are supplied with a radio, the battery with the highest capacity is considered the default battery for making head SAR measurements."*

b. Body-worn Configuration - Default Battery and Body-worn Accessory Selection per FCC KDB 643646, Page 5, Section 1) A):*"Start by testing a PTT radio with the thinnest battery and a standard (default) body-worn accessory that are both supplied with the radio and, if applicable, a default audio accessory……..."*

c. Body-worn Configuration - Default Audio Accessory Selection - According to the manufacturer, the radio is not supplied to the end user with a standard default audio accessory (as referenced in FCC KDB 643646, Page 4, Section "Body SAR Test Considerations for Body-worn Accessories"); therefore the procedures described in note (f) below were applied in order to establish the default audio accessory.

d. Body-worn Configuration - Selection of Remaining Default Audio Accessories by Category - the Remaining Default Audio Accessories by Category were selected based on the guidance provided in FCC KDB 643646, Section "Body SAR Test Considerations for Audio Accessories without Built-in Antenna", Page 10: *"For audio accessories with similar construction and operating requirements, test only the audio accessory within the group that is expected to result in the highest SAR, with respect to changes in RF characteristics and exposure conditions for the combination. If it is unclear which audio accessory within a group of similar accessories is expected to result in the highest SAR, good engineering judgment and preliminary testing should be applied to select the accessory that is expected to result in the highest SAR."* Please refer to note (f) below for the procedure implemented to establish the Default Audio Accessory by Category (Grouping).

e. Body-worn Configuration - Selection of Additional Audio Accessories by Category - the Additional Audio Accessories by Category were selected based on the guidance provided in FCC KDB 643646, Section "Body SAR Test Considerations for Audio Accessories without Built-in Antenna", Page 10.

f. According to the manufacturer, all the optional audio accessories can be used with any accessory combination (antenna, battery & body-worn accessory). Therefore, in order to determine the default audio accessory (in accordance with FCC KDB 643646, Page 4, footnote 8), preliminary SAR evaluations (area scans with belt-clip and thinnest battery) were performed by Celltech with all of the optional audio accessories connected to the radio consecutively in order to select the audio accessory expected to result in the highest SAR level for the final compliance evaluations.

11.0 DETAILS OF SAR EVALUATION

1. The number of test frequencies and the test channels evaluated for SAR were selected in accordance with the procedures described in FCC KDB 447498 (see reference [8]).
2. The manufacturer provided 3 tuned test samples of the ATV-16XL antenna. For testing purposes each tuned sample was treated as a separate antenna. The 3 samples cover the entire operating range of the radio. The samples are tuned for low, mid and high frequencies and cover 136-150MHz, 150-162MHz, and 162-174MHz respectively.
3. The DUT was evaluated for SAR in accordance with the procedures described in FCC KDB 643646 D01v01 (see reference [10]).
4. Each SAR evaluation was performed with a fully charged battery. The radio was allowed a cooldown period and the battery was swapped between the area and zoom scan evaluations.
5. The SAR droop of the DUT was measured by the DASY4 system for the duration of the SAR evaluations. The measured SAR droop was added to the measured SAR levels to report scaled SAR levels as shown in the SAR test data tables. A SAR-versus-Time power droop evaluation was performed (see Appendix A).
6. The fluid temperature was measured prior to and after the SAR evaluations. The fluid temperature remained within +/-2°C during the SAR evaluations.
7. The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).
8. The DUT was tested at the maximum conducted output power level preset by the manufacturer in unmodulated continuous transmit operation (Continuous Wave mode at 100% duty cycle) with the transmit key constantly depressed. For a push-to-talk device the 50% duty cycle compensation reported assumes a transmit/receive cycle of equal time base.

12.0 SAR EVALUATION PROCEDURES

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

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

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

An area scan was determined as follows:

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

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

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

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

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

g. A zoom scan volume of 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.

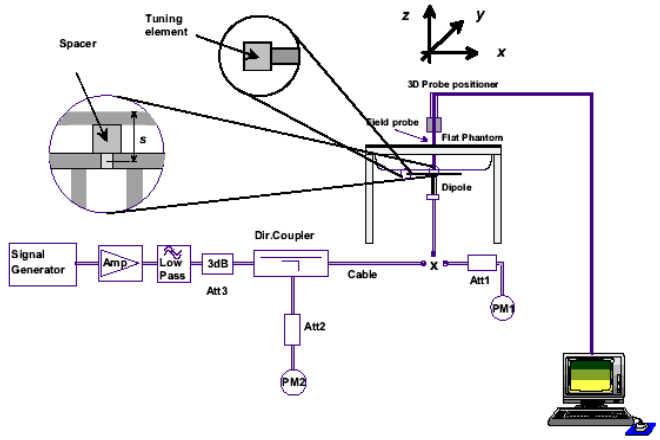
13.0 SYSTEM PERFORMANCE CHECK

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 [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.

SYSTEM PERFORMANCE CHECK EVALUATIONS

Test Date	Equiv. Tissue	SAR 1g (W/kg)			Dielectric Constant ε_r			Conductivity σ (mho/m)			ρ (Kg/m^3)	Amb. Temp. (°C)	Fluid Temp. (°C)	Fluid Depth (cm)	Humid. (%)	Barom. Press. (kPa)
	Freq. (MHz)	SPEAG Target	Meas.	Dev.	SPEAG Target	Meas.	Dev.	SPEAG Target	Meas.	Dev.						
Jan 21	Body 150	**0.940**	0.946	+0.6%	**61.9 ±5%**	62.1	+0.3%	**0.80 ±5%**	0.77	-3.8%	1000	21.0	22.0	≥ 15	34	103.1
Jan 23	Head 150	**0.910 ±10%**	0.882	-3.1%	**52.3 ±5%**	51.0	-2.5%	**0.76 ±5%**	0.75	-1.3%	1000	22.0	22.3	≥ 15	32	102.0

Notes		
	1.	The 150MHz SAR values have a coefficient of variation < 3%.
	2.	The target dielectric parameters are the nominal values from the SAR system manufacturer's dipole calibration (see Appendix E).
	3.	The fluid temperature was measured prior to and after the system performance check evaluations. The fluid temperature remained within +/-2°C during the system performance check evaluations.
	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 450 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 [12] and [13]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2003 (see reference [5]) and IEC Standard 62209-1:2005 (see reference [6]). The ingredient percentage may have been adjusted 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 171
Connecting Lines	Optical downlink for data and status info., Optical uplink for commands and clock
DASY4 Measurement Server	
Function	Real-time data evaluation for field measurements and surface detection
Hardware	PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM
Connections	COM1, COM2, DAE, Robot, Ethernet, Service Interface
E-Field Probe	
Model	ET3DV6
Serial No.	1590
Construction	Triangular core fiber optic detection system
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
Phantom	
Type	Barski Planar Phantom
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 70 liters

17.0 PROBE SPECIFICATION (ET3DV6)

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

ET3DV6 E-Field Probe

18.0 BARSKI PLANAR PHANTOM

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

Barski Planar Phantom

19.0 DEVICE HOLDER

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

Device Holder

20.0 TEST EQUIPMENT LIST

TEST EQUIPMENT		ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
USED	DESCRIPTION				
x	Schmid & Partner DASY4 System	-	-	-	-
x	-DASY4 Measurement Server	00158	1078	CNR	CNR
x	-Robot	00046	599396-01	CNR	CNR
x	-DAE4	00019	353	19-Apr-12	Biennial
x	-ET3DV6 E-Field Probe	00017	1590	24-Apr-12	Annual
x	-D300V3 Validation Dipole	00216	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	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				

21.0 MEASUREMENT UNCERTAINTIES

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	6.25	Normal	1	0.78	0.71	4.9	4.4	∞
Liquid Permittivity (measured)	7.2.4.3	3.25	Normal	1	0.23	0.26	0.7	0.8	∞
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**				**13.45**	**13.25**	
Expanded Uncertainty (95% Confidence Interval)	**7.3.2**		**k=2**				**26.89**	**26.51**	

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] 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.

[11] 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.

[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

Plot F1

Date Tested: 01/23/2013

DUT: EVX-531-D0-5; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 22.0C; Fluid Temp: 22.3C; Barometric Pressure: 102.0 kPa; Humidity: 32%

Procedure Notes:

Communication System: VHF 136-174
Frequency: 138 MHz; Duty Cycle: 1:1
Medium: HSL150 Medium parameters used (interpolated): f = 138 MHz; σ = 0.766 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3

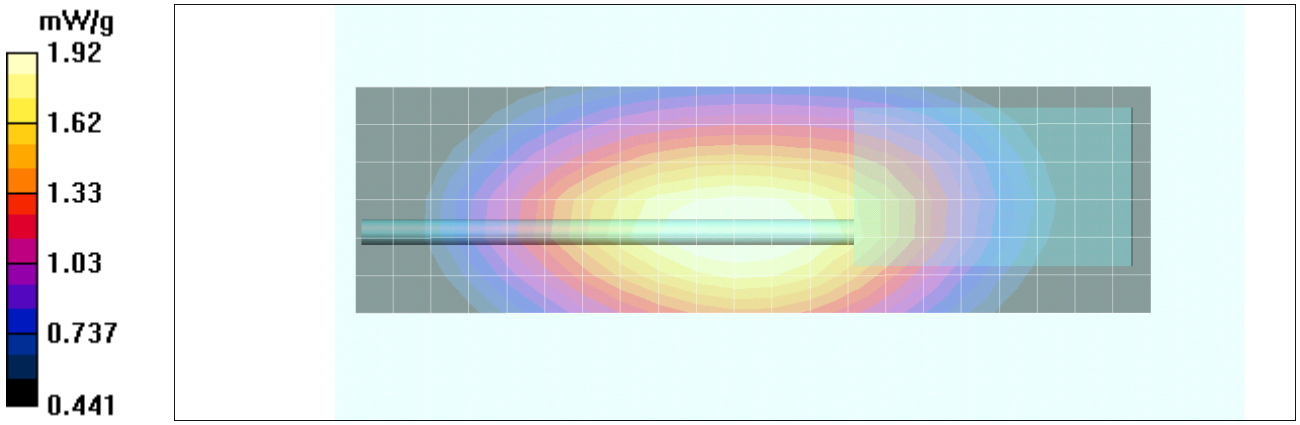
- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass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

136 - 134LI - 138.0MHz/Area Scan (7x22x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.96 mW/g

136 - 134LI - 138.0MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 47.4 V/m; Power Drift = -0.228 dB
Peak SAR (extrapolated) = 2.69 W/kg
SAR(1 g) = 1.86 mW/g; SAR(10 g) = 1.4 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.92 mW/g



Plot F2

Date Tested: 01/23/2013

DUT: EVX-531-D0-5; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 22.0C; Fluid Temp: 22.3C; Barometric Pressure: 102.0 kPa; Humidity: 32%

Procedure Notes:

Communication System: VHF 136-174
Frequency: 158.3 MHz; Duty Cycle: 1:1
Medium: HSL150 Medium parameters used (interpolated): f = 158.3 MHz; σ = 0.775 mho/m; ε_r = 50.6; ρ = 1000 kg/m^3

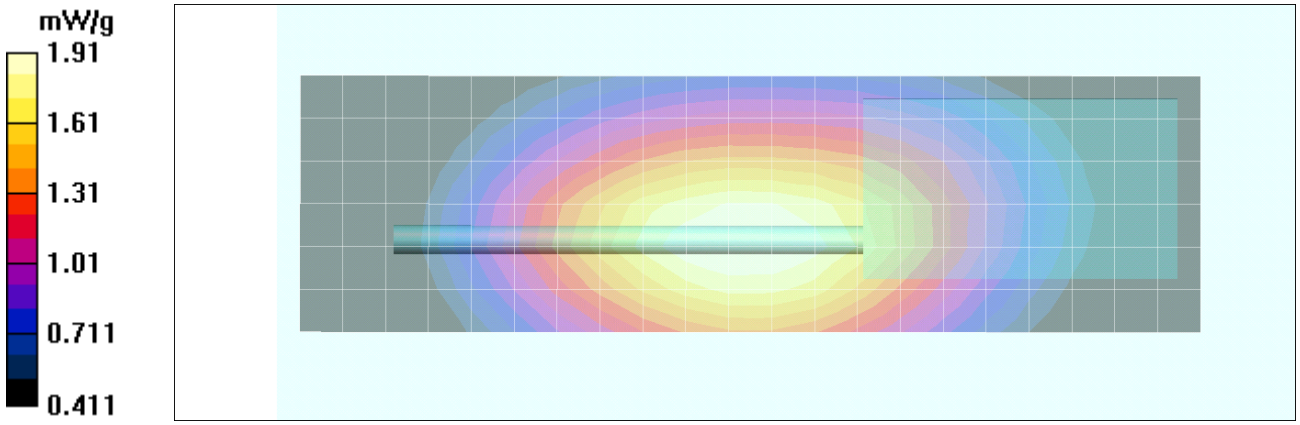
- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass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

155 - 134LI - 158.3MHz/Area Scan (7x22x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.95 mW/g

155 - 134LI - 158.3MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 47.2 V/m; Power Drift = -0.360 dB
Peak SAR (extrapolated) = 2.69 W/kg
SAR(1 g) = 1.85 mW/g; SAR(10 g) = 1.39 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.91 mW/g



Plot F3

Date Tested: 01/23/2013

DUT: EVX-531-D0-5; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 22.0C; Fluid Temp: 22.3C; Barometric Pressure: 102.0 kPa; Humidity: 32%

Procedure Notes:

Communication System: VHF 136-174
Frequency: 165.9 MHz; Duty Cycle: 1:1
Medium: HSL150 Medium parameters used (interpolated): f = 165.9 MHz; σ = 0.786 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3

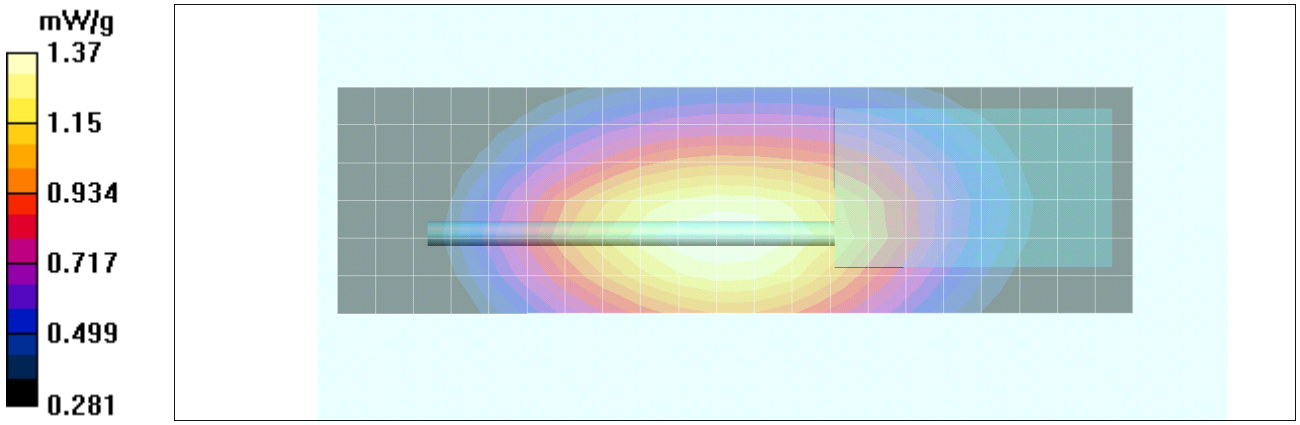
- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass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

174 - 134LI - 165.9MHz/Area Scan (7x22x1): Measurement grid: dx=15mm, dy=15mm

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

174 - 134LI - 165.9MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.1 V/m; Power Drift = -0.294 dB
Peak SAR (extrapolated) = 1.93 W/kg
SAR(1 g) = 1.32 mW/g; SAR(10 g) = 0.984 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.37 mW/g



Plot F4

Date Tested: 01/23/2013

DUT: EVX-531-D0-5; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 22.0C; Fluid Temp: 22.3C; Barometric Pressure: 102.0 kPa; Humidity: 32%

Procedure Notes:

Communication System: VHF 136-174
Frequency: 138 MHz; Duty Cycle: 1:1
Medium: HSL150 Medium parameters used (interpolated): f = 138 MHz; σ = 0.766 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3

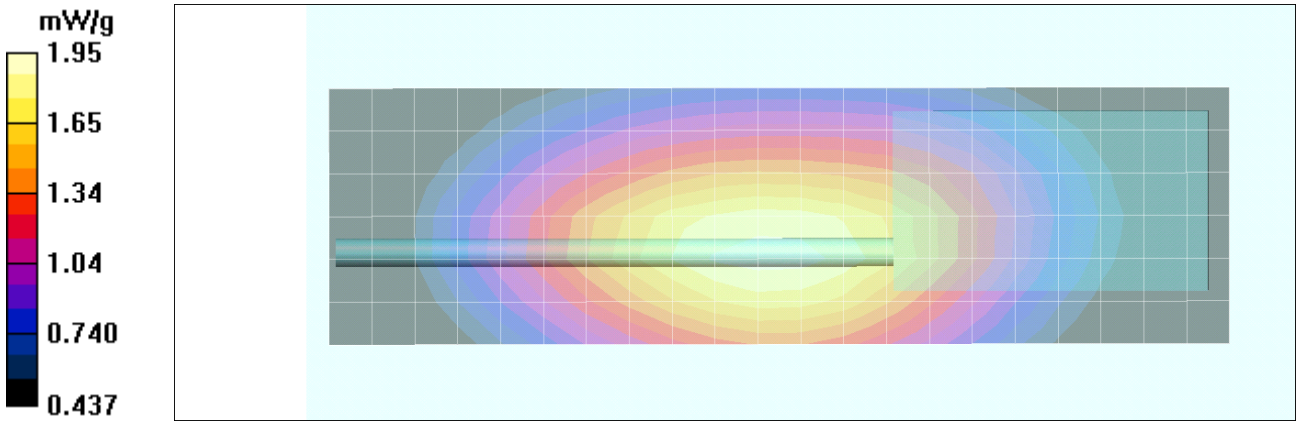
- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass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

136 - 133LI - 138.0MHz/Area Scan (7x22x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.90 mW/g

136 - 133LI - 138.0MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 47.2 V/m; Power Drift = -0.103 dB
Peak SAR (extrapolated) = 2.72 W/kg
SAR(1 g) = 1.87 mW/g; SAR(10 g) = 1.41 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.95 mW/g



Plot F5

Date Tested: 01/23/2013

DUT: EVX-531-D0-5; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 22.0C; Fluid Temp: 22.3C; Barometric Pressure: 102.0 kPa; Humidity: 32%

Procedure Notes:

Communication System: VHF 136-174
Frequency: 158.3 MHz; Duty Cycle: 1:1
Medium: HSL150 Medium parameters used (interpolated): f = 158.3 MHz; σ = 0.775 mho/m; ε_r = 50.6; ρ = 1000 kg/m^3

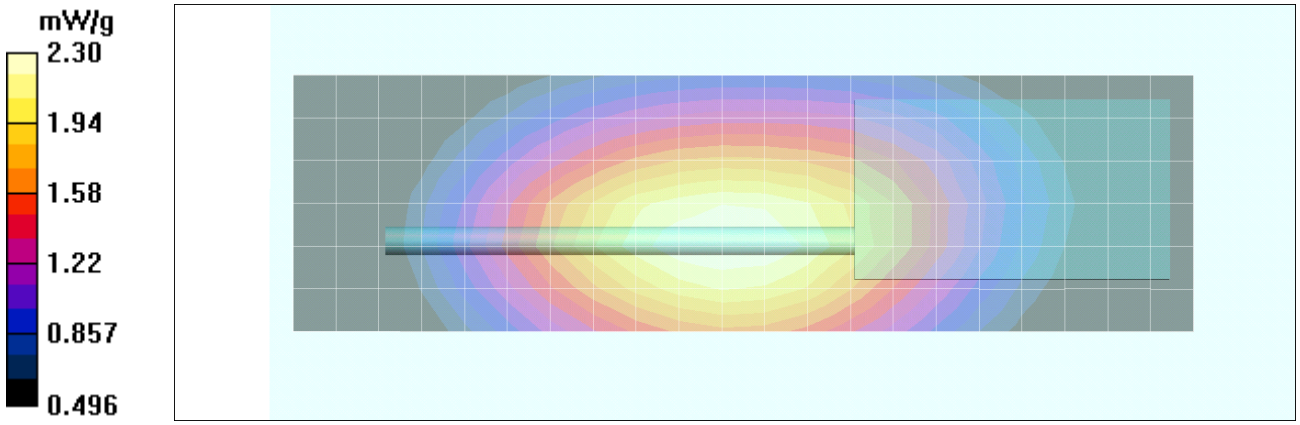
- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass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

155 - 133LI - 158.3MHz/Area Scan (7x22x1): Measurement grid: dx=15mm, dy=15mm

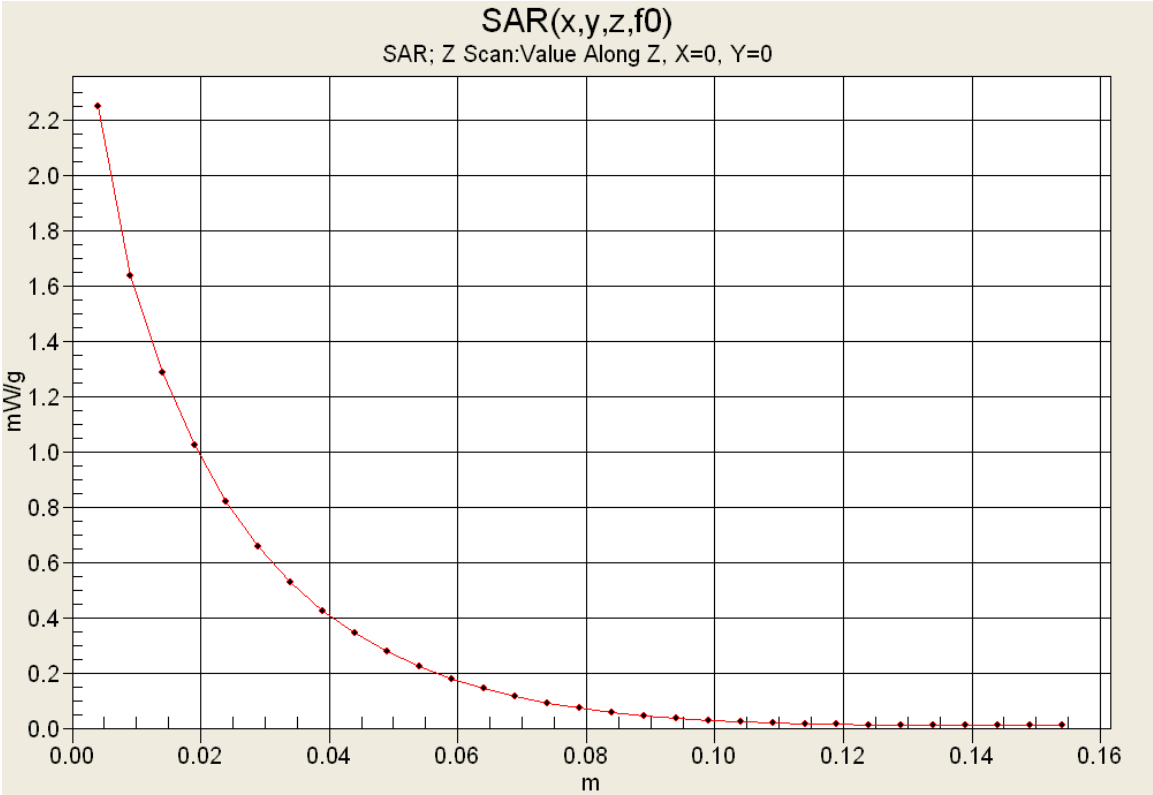
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.32 mW/g

155 - 133LI - 158.3MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 52.4 V/m; Power Drift = -0.379 dB
Peak SAR (extrapolated) = 3.23 W/kg
SAR(1 g) = 2.22 mW/g; SAR(10 g) = 1.66 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.30 mW/g



Z-axis Scan


SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Plot B1

Date Tested: 01/22/2013

DUT: EVX-531-D0-5; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 22.0C; Fluid Temp: 21.7C; Barometric Pressure: 102.8 kPa; Humidity: 34%

Procedure Notes:

Communication System: VHF 136-174
Frequency: 138 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 138 MHz; σ = 0.75 mho/m; ε_r = 63; ρ = 1000 kg/m^3

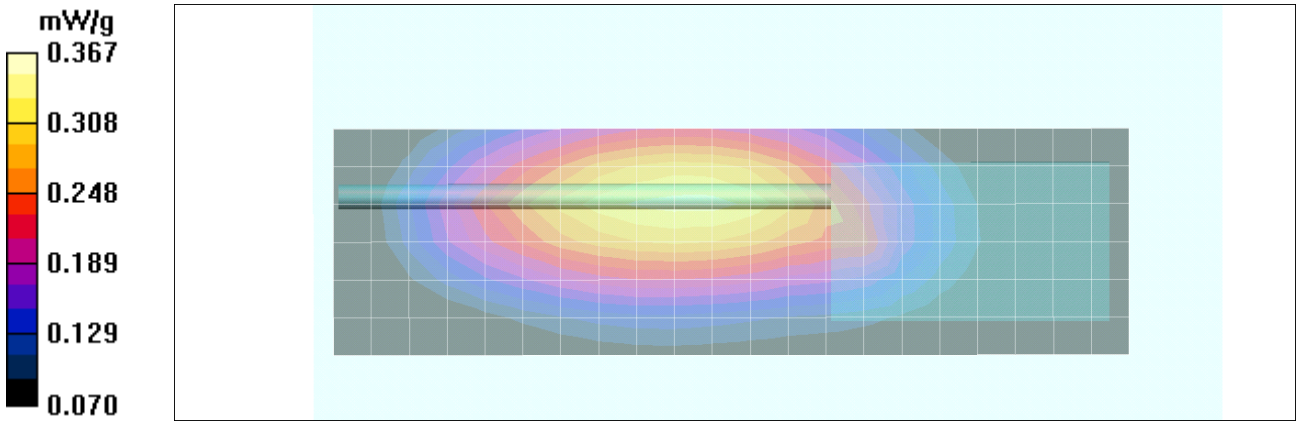
- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass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

MH-450S - 136 - 133LI - 138.0MHz/Area Scan (7x22x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.337 mW/g

MH-450S - 136 - 133LI - 138.0MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 20.3 V/m; Power Drift = -0.838 dB
Peak SAR (extrapolated) = 0.528 W/kg
SAR(1 g) = 0.350 mW/g; SAR(10 g) = 0.256 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.367 mW/g



Plot B2

Date Tested: 01/22/2013

DUT: EVX-531-D0-5; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 22.0C; Fluid Temp: 21.7C; Barometric Pressure: 102.8 kPa; Humidity: 34%

Procedure Notes:

Communication System: VHF 136-174
Frequency: 158.3 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 158.3 MHz; σ = 0.778 mho/m; ε_r = 62; ρ = 1000 kg/m^3

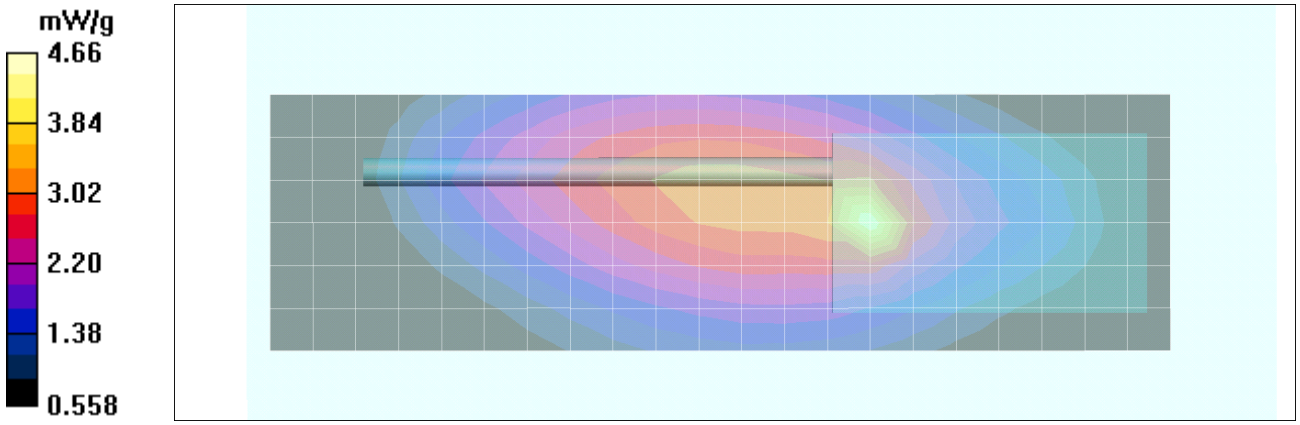
- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass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

MH-450S - 155 - 133LI - 158.3MHz/Area Scan (7x22x1): Measurement grid: dx=15mm, dy=15mm

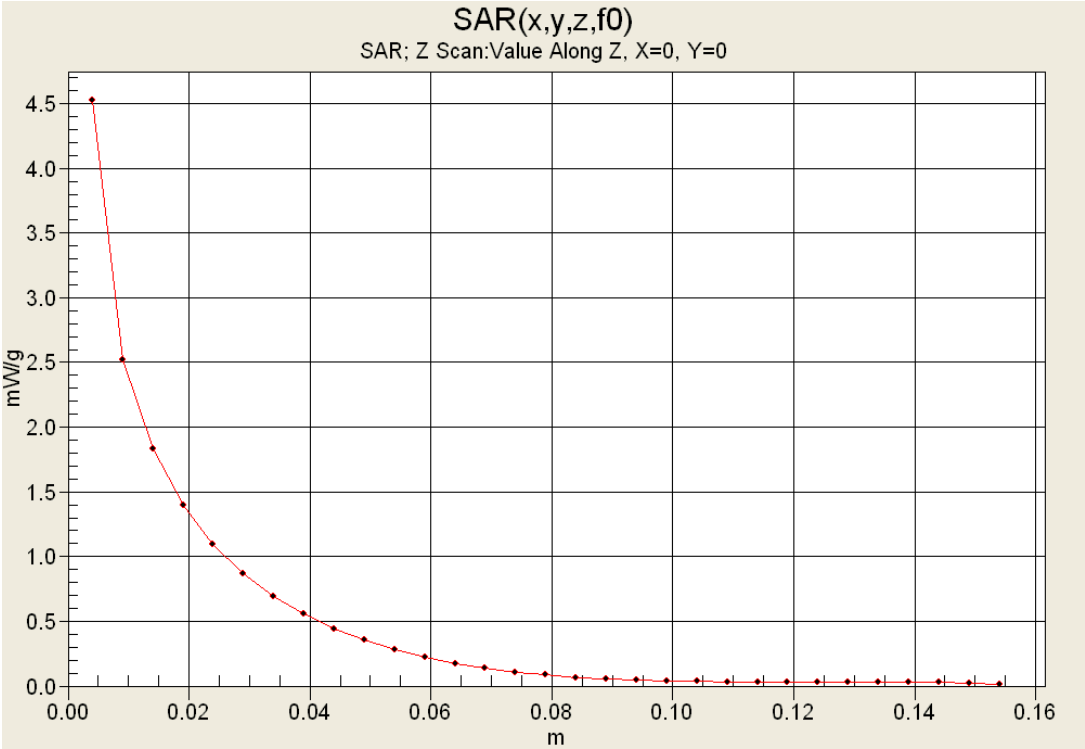
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 4.44 mW/g

MH-450S - 155 - 133LI - 158.3MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 67.7 V/m; Power Drift = -0.311 dB
Peak SAR (extrapolated) = 10.5 W/kg
SAR(1 g) = 4.47 mW/g; SAR(10 g) = 2.77 mW/g

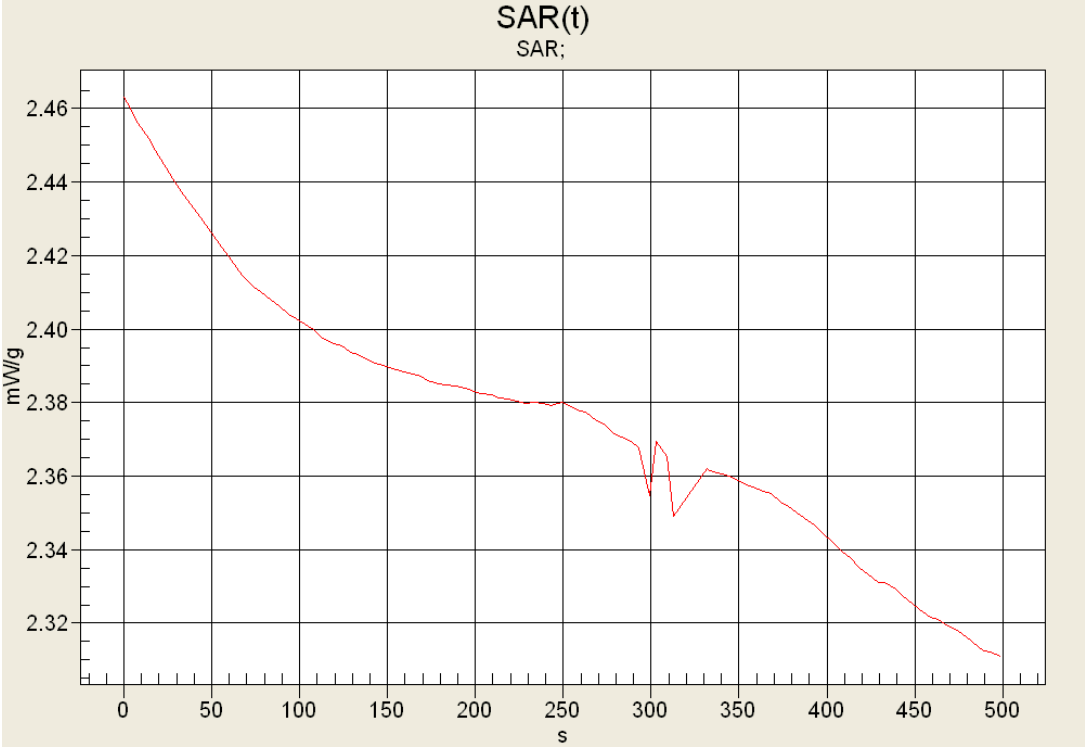
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 4.66 mW/g



Z-axis Scan



SAR vs. Time



Plot B3

Date Tested: 01/22/2013

DUT: EVX-531-D0-5; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 22.0C; Fluid Temp: 21.7C; Barometric Pressure: 102.8 kPa; Humidity: 34%

Procedure Notes:

Communication System: VHF 136-174
Frequency: 165.9 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 165.9 MHz; σ = 0.786 mho/m; ε_r = 61.5; ρ = 1000 kg/m^3

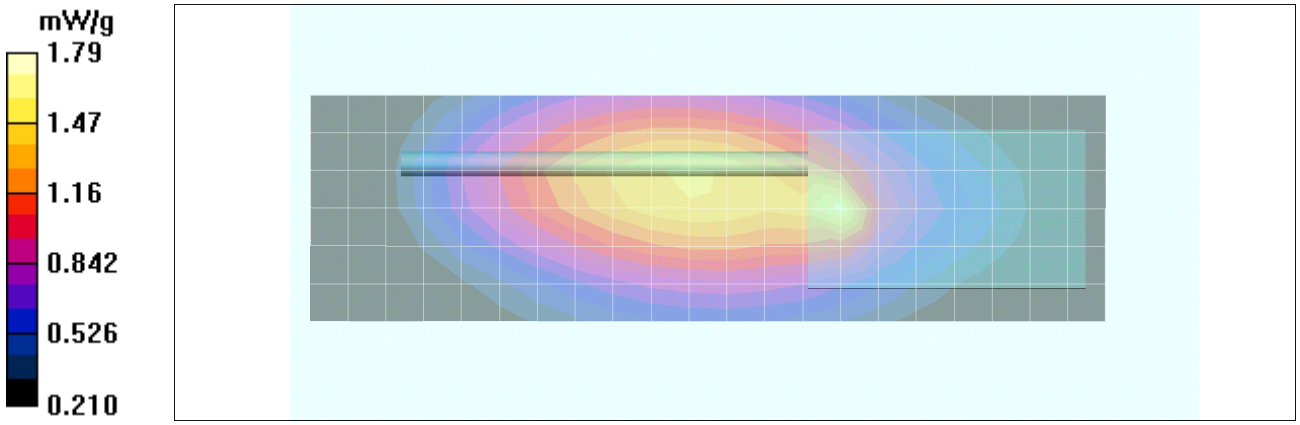
- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass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

MH-450S - 174 - 133LI - 165.9MHz/Area Scan (7x22x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.62 mW/g

MH-450S - 174 - 133LI - 165.9MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 44.8 V/m; Power Drift = -0.279 dB
Peak SAR (extrapolated) = 3.66 W/kg
SAR(1 g) = 1.7 mW/g; SAR(10 g) = 1.09 mW/g

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



Plot B4

Date Tested: 01/22/2013

DUT: EVX-531-D0-5; Type: VHF PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 22.0C; Fluid Temp: 21.7C; Barometric Pressure: 102.8 kPa; Humidity: 34%

Procedure Notes:

Communication System: VHF 136-174
Frequency: 158.3 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used (interpolated): f = 158.3 MHz; σ = 0.778 mho/m; ε_r = 62; ρ = 1000 kg/m^3

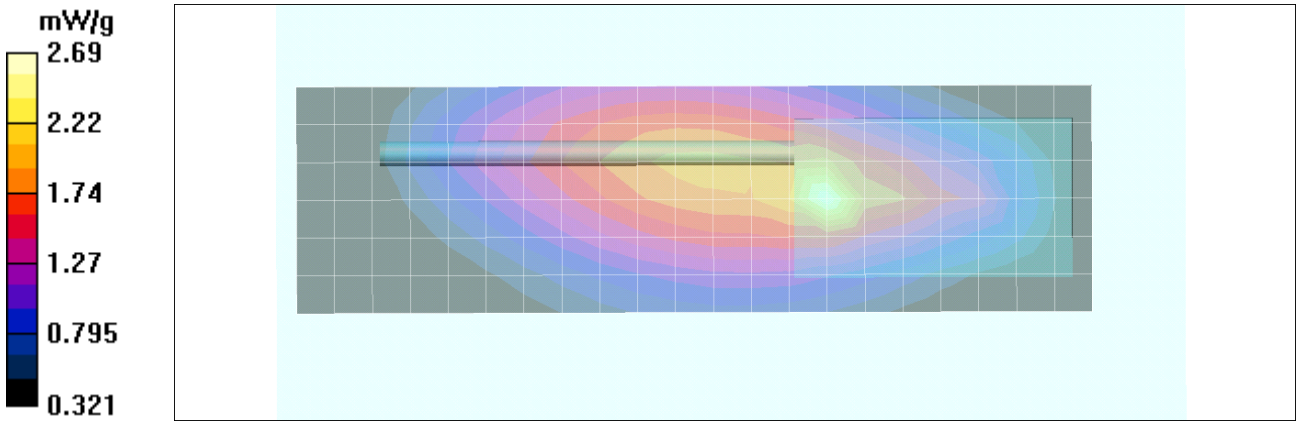
- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass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

MH-450S - 155 - 134LI - 158.3MHz/Area Scan (7x22x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.70 mW/g

MH-450S - 155 - 134LI - 158.3MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 49.5 V/m; Power Drift = -0.190 dB
Peak SAR (extrapolated) = 5.78 W/kg
SAR(1 g) = 2.57 mW/g; SAR(10 g) = 1.59 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.69 mW/g



APPENDIX B - SYSTEM PERFORMANCE CHECK PLOTS

System Performance Check - 150 MHz Body

Date Tested: 01/21/2013

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

Program Notes: Ambient Temp: 21C; Fluid Temp: 22.0C; Barometric Pressure: 103.1 kPa; Humidity: 34%

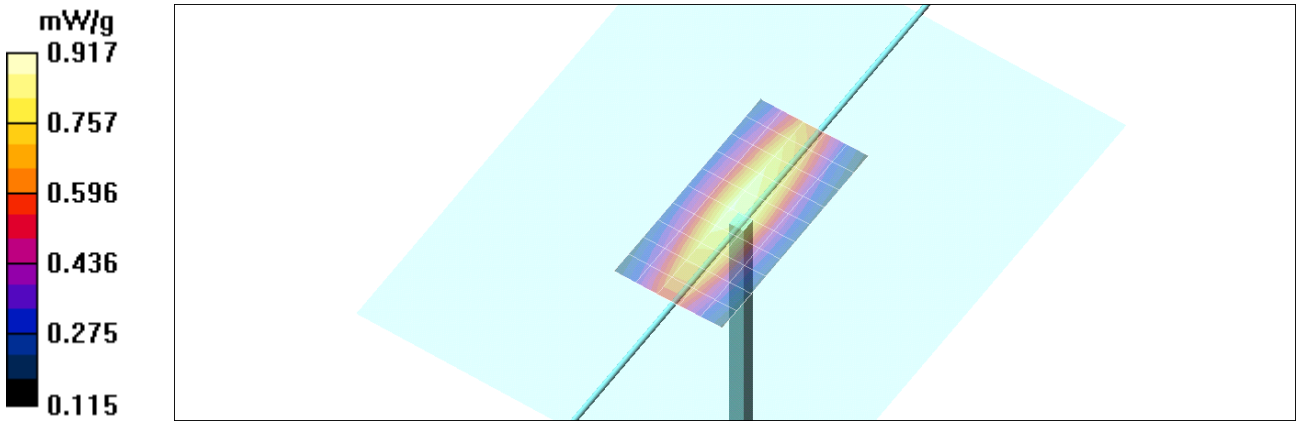
Procedure Notes: 300 MHz Dipole transmitting at 300 MHz using 150 MHz SAR probe calibration and 150 MHz tissue dielectric parameters

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 = 62.1; ρ = 1000 kg/m^3

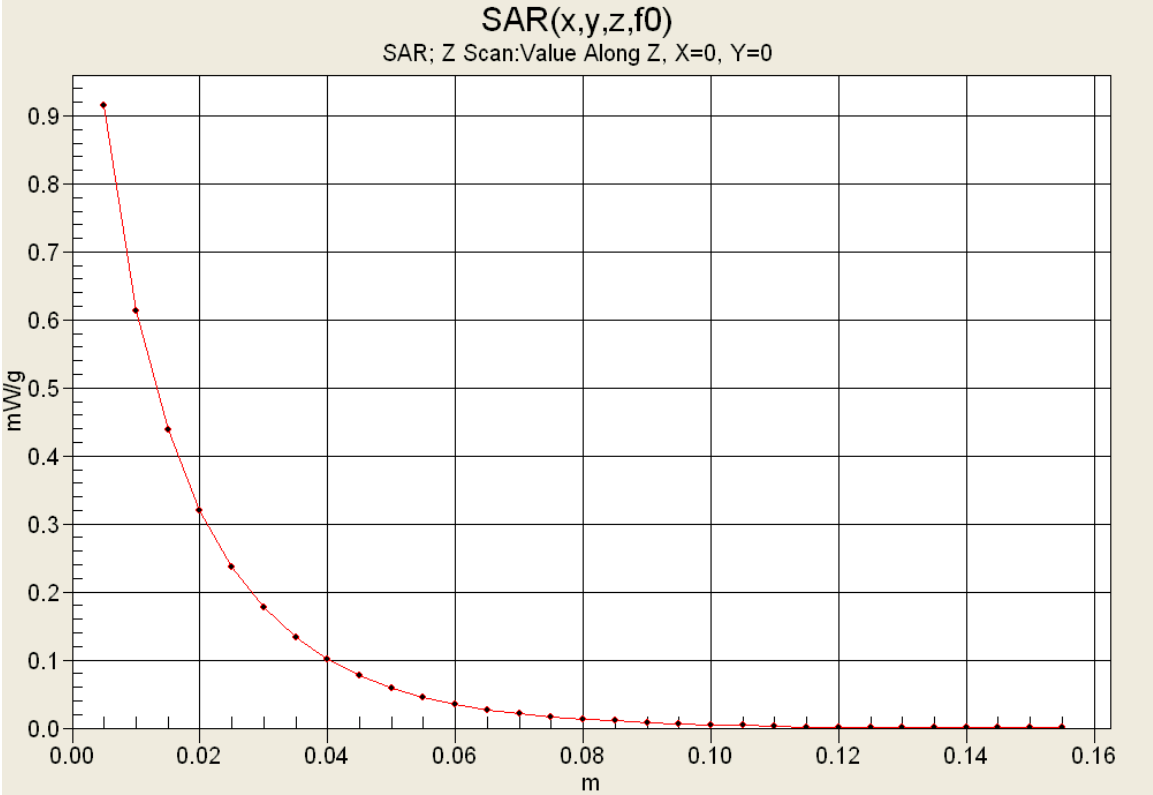
- Probe: ET3DV6 - SN1590; ConvF(8.6, 8.6, 8.6); Calibrated: 24/04/2012
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: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

Body d=15mm, Pin = 398mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.875 mW/g

Body d=15mm, Pin = 398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.4 V/m; Power Drift = 0.003 dB
Peak SAR (extrapolated) = 1.49 W/kg
SAR(1 g) = 0.946 mW/g; SAR(10 g) = 0.636 mW/g
Maximum value of SAR (measured) = 0.917 mW/g



Z-Axis Scan



System Performance Check - 150 MHz Head

Date Tested: 01/23/2013

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

Program Notes: Ambient Temp: 22C; Fluid Temp: 22.3C; Barometric Pressure: 102.0 kPa; Humidity: 32%

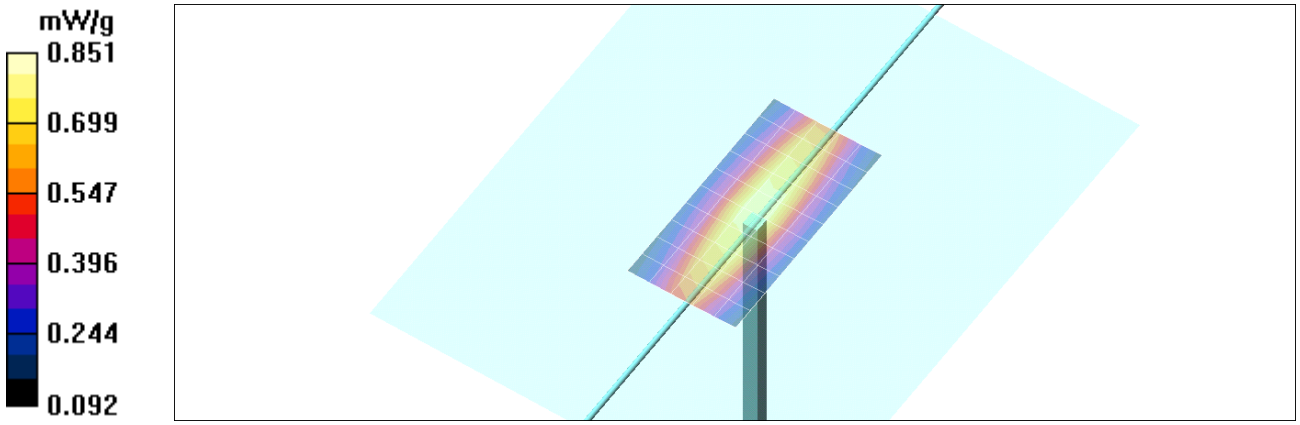
Procedure Notes: 300 MHz Dipole transmitting at 300 MHz using 150 MHz SAR probe calibration and 150 MHz tissue dielectric parameters

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 = 51; ρ = 1000 kg/m^3

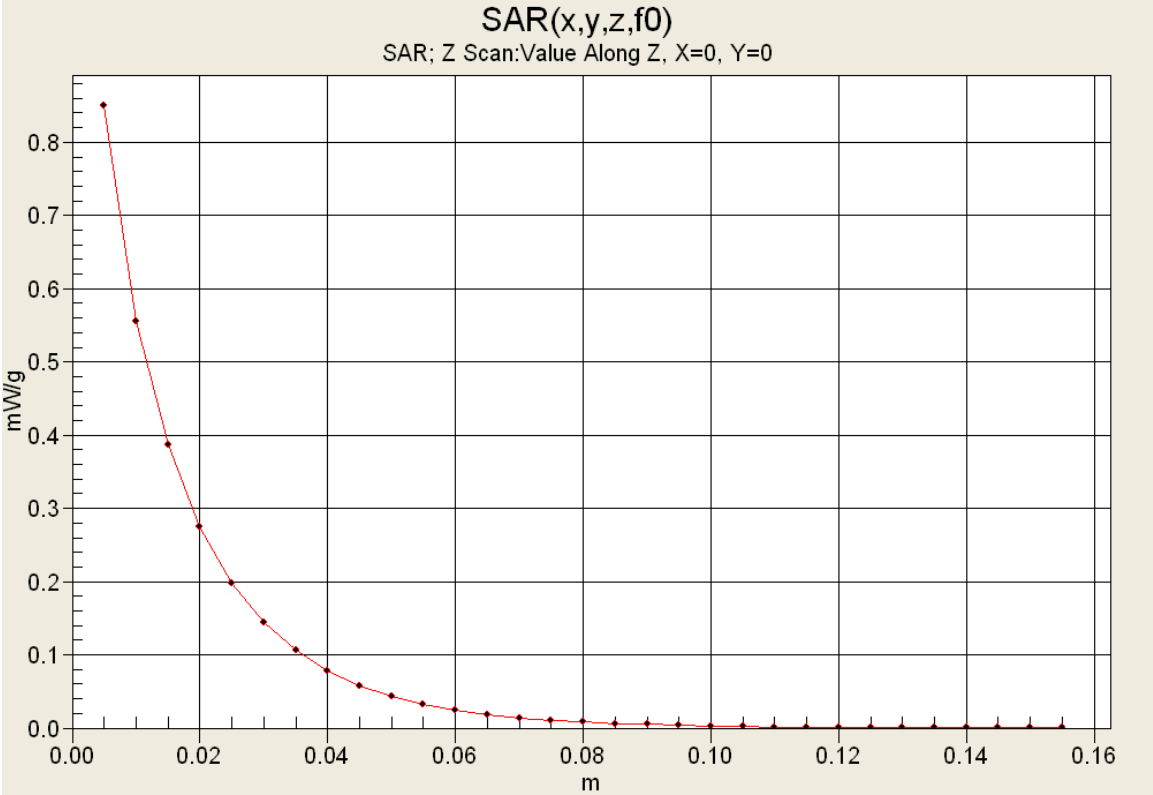
- Probe: ET3DV6 - SN1590; ConvF(9.3, 9.3, 9.3); Calibrated: 24/04/2012
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: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

Head d=15mm, Pin = 398mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.792 mW/g

Head d=15mm, Pin = 398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.1 V/m; Power Drift = -0.117 dB
Peak SAR (extrapolated) = 1.43 W/kg
SAR(1 g) = 0.882 mW/g; SAR(10 g) = 0.582 mW/g
Maximum value of SAR (measured) = 0.851 mW/g



Z-Axis Scan



APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

150 MHz Body

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
21/Jan/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
0.1000	63.13	0.76	68.53	0.74
0.1100	62.89	0.77	62.28	0.72
0.1200	62.64	0.78	62.34	0.76
0.1300	62.39	0.78	61.43	0.75
0.1400	62.15	0.79	63.37	0.75
0.1500	61.90	0.80	62.13	0.77
0.1600	61.65	0.81	61.94	0.78
0.1700	61.41	0.82	61.23	0.79
0.1800	61.16	0.82	59.85	0.79
0.1900	60.91	0.83	60.84	0.80
0.2000	60.67	0.84	59.47	0.80
0.2100	60.42	0.85	59.54	0.83
0.2200	60.17	0.86	58.31	0.83
0.2300	59.93	0.86	57.88	0.83
0.2400	59.68	0.87	57.61	0.83
0.2500	59.43	0.88	56.87	0.82

150 MHz Head

****

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
23/Jan/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

****

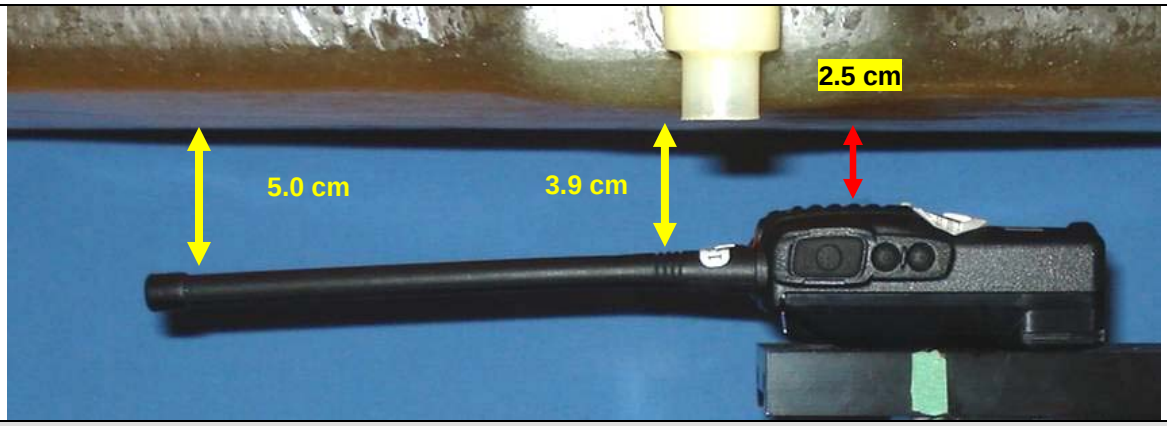
Freq	FCC_eH	FCC_sH	Test_e	Test_s
0.0500	56.97	0.69	79.09	0.68
0.0600	56.50	0.69	69.06	0.71
0.0700	56.03	0.70	64.67	0.68
0.0800	55.57	0.71	58.42	0.72
0.0900	55.10	0.72	60.40	0.74
0.1000	54.63	0.72	61.07	0.73
0.1100	54.17	0.73	56.89	0.76
0.1200	53.70	0.74	53.83	0.75
0.1300	53.23	0.75	51.67	0.75
0.1400	52.77	0.75	51.63	0.77
0.1500	52.30	0.76	51.03	0.75
0.1600	51.83	0.77	50.54	0.78
0.1700	51.37	0.77	50.77	0.79
0.1800	50.90	0.78	51.36	0.78
0.1900	50.43	0.79	50.16	0.79
0.2000	49.97	0.80	48.65	0.82
0.2100	49.50	0.80	48.31	0.80
0.2200	49.03	0.81	46.89	0.83
0.2300	48.57	0.82	47.34	0.85
0.2400	48.10	0.83	47.65	0.84
0.2500	47.63	0.83	46.36	0.86

APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

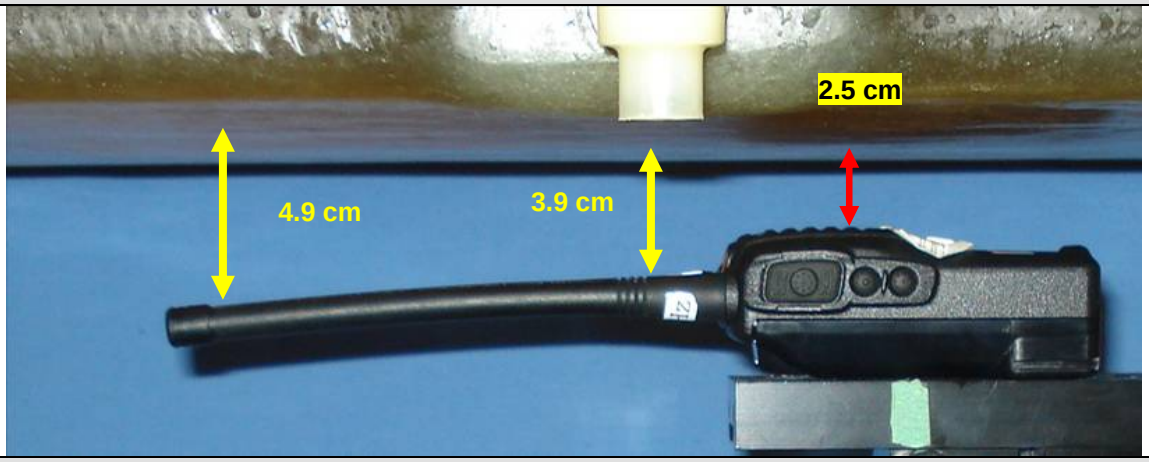
FACE-HELD SAR TEST SETUP PHOTOGRAPHS

Face-held SAR Configuration Test Setup

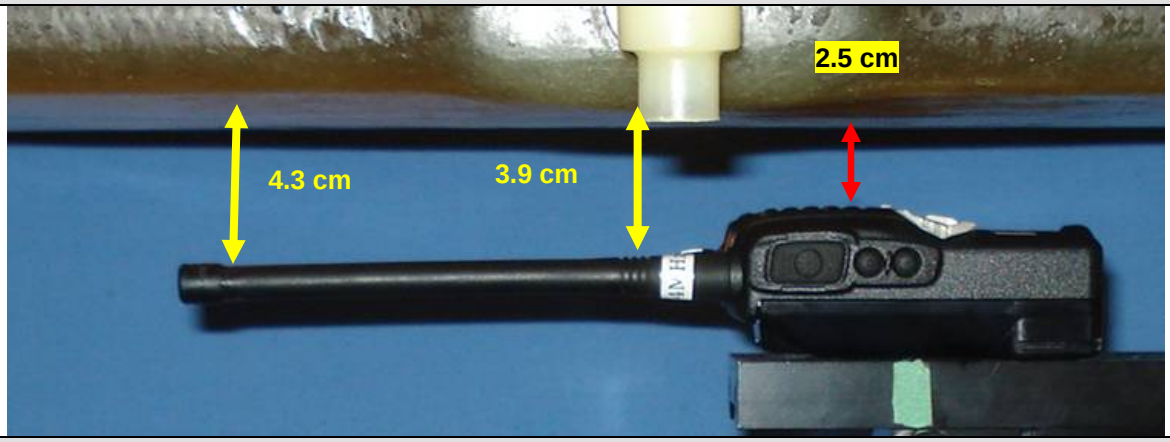
FACE-HELD SAR TEST SETUP PHOTOGRAPHS



Face-held SAR Configuration - Antenna Low, Battery b

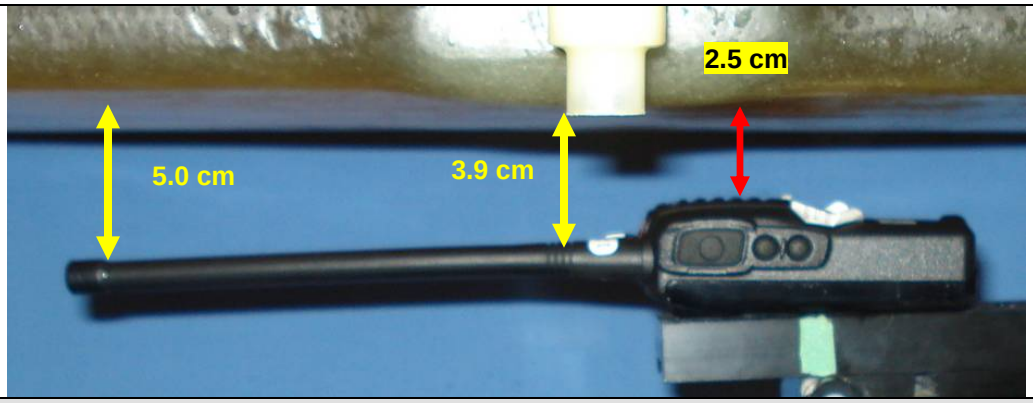


Face-held SAR Configuration - Antenna Mid, Battery b

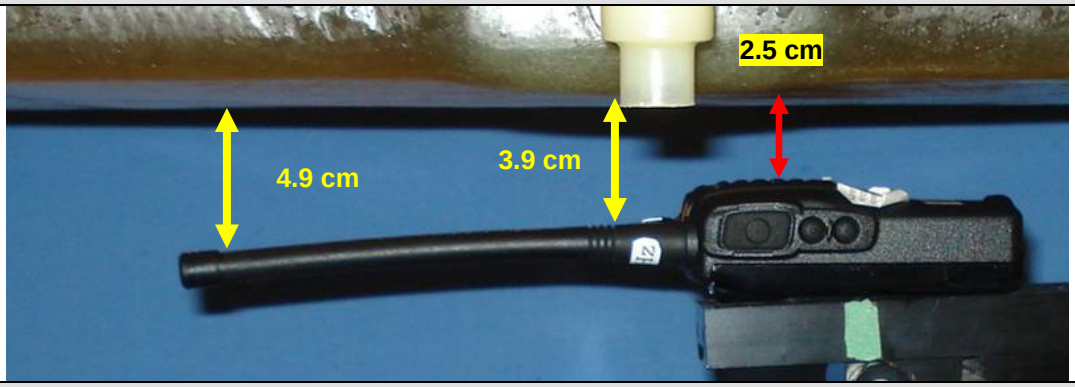


Face-held SAR Configuration - Antenna High, Battery b

FACE-HELD SAR TEST SETUP PHOTOGRAPHS



Face-held SAR Configuration - Antenna Low, Battery b

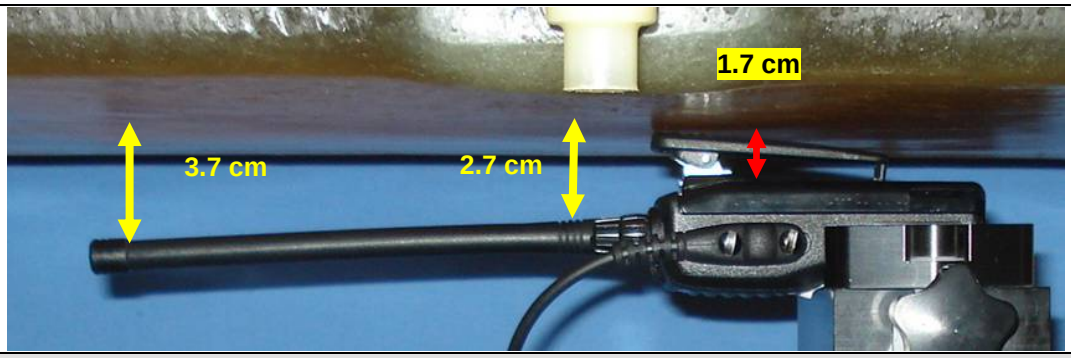


Face-held SAR Configuration - Antenna Mid, Battery b

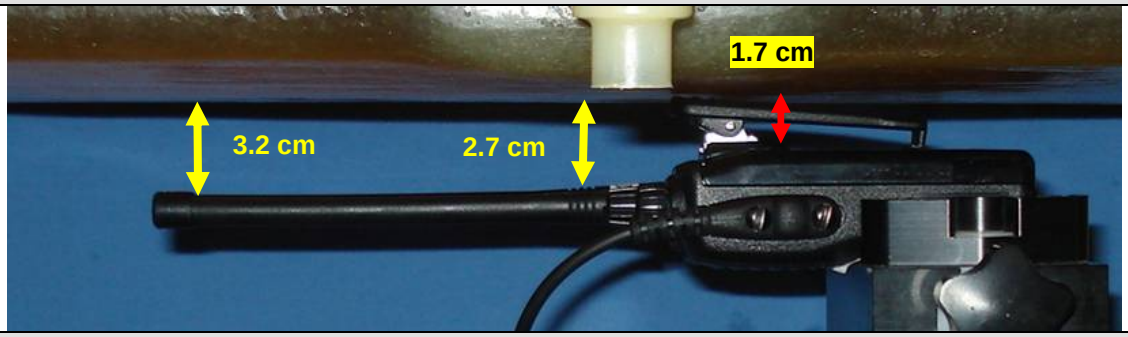
BODY-WORN SAR TEST SETUP PHOTOGRAPHS (WITH DEFAULT AUDIO ACC.)

Body-worn SAR Configuration Test Setup

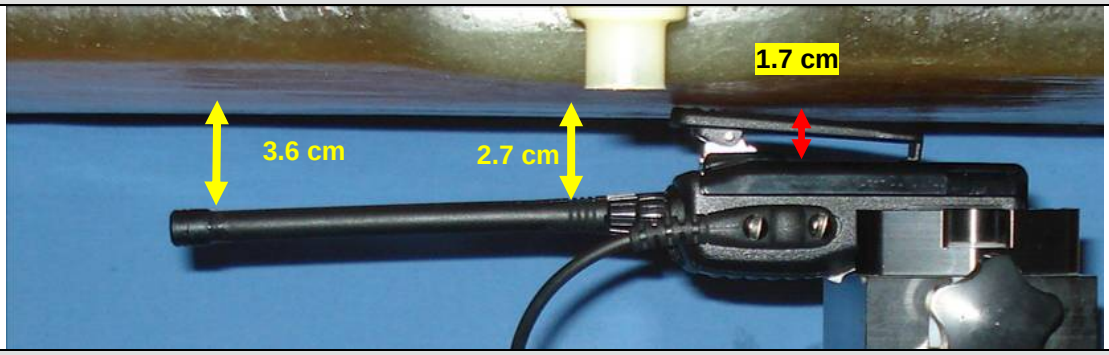
BODY-WORN SAR TEST SETUP PHOTOGRAPHS (WITH DEFAULT AUDIO ACC.)



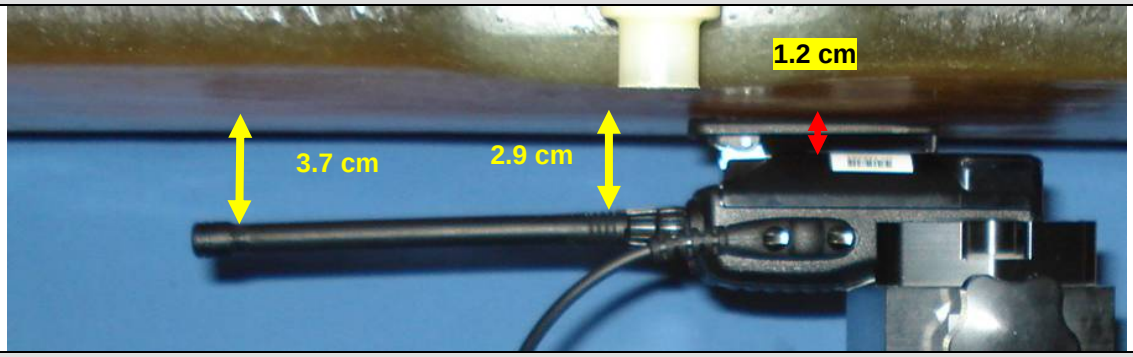
Body-worn SAR Configuration - Antenna Low, Battery a, Audio G1b



Body-worn SAR Configuration - Antenna Mid, Battery a, Audio G1b



Body-worn SAR Configuration - Antenna High, Battery a, Audio G1B



Body-worn SAR Configuration - Antenna Mid, Battery a, Audio G1b

DUT PHOTOGRAPHS

Radio Front

Radio Left Side

Radio Back

Radio Right Side

Radio Top

Radio Bottom

DUT PHOTOGRAPHS

Back of Radio without battery

Side of Radio with Battery a and Belt-clip accessory

Side of Radio with Battery b and Belt-clip accessory

Belt-clip accessory

DUT PHOTOGRAPHS

Antenna 1 (Low 136-150 MHz)

Antenna 1 (Mid 150-162 MHz)

Antenna 1 (High 162-174 MHz)

DUT PHOTOGRAPHS

Battery a - Front

Battery a - Side

Battery a - Back

Battery a - Side

Battery a - Top

Battery a - Bottom

DUT PHOTOGRAPHS

Battery b - Front

Battery b - Side

Battery b - Back

Battery b - Side

Battery b - Top

Battery b - Bottom

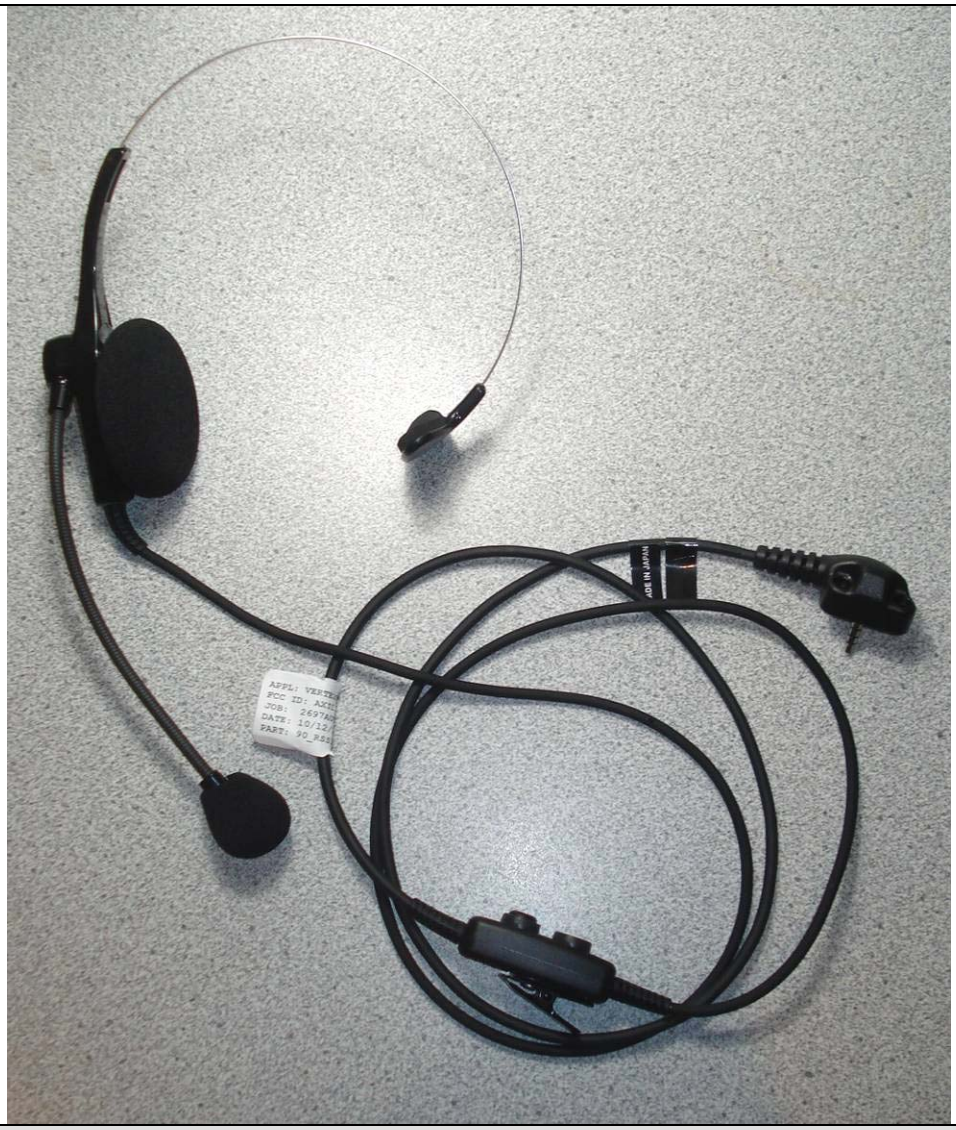
DUT PHOTOGRAPHS

Audio Accessory G1a

DUT PHOTOGRAPHS

Audio Accessory G1b

DUT PHOTOGRAPHS



Audio Accessory G2a

DUT PHOTOGRAPHS

Audio Accessory G3a