


	<u>Date(s) of Evaluation</u> Jan. 29-31, 2013	<u>Test Report Serial No.</u> 012513BBO-T1216-S95	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DECLARATION OF COMPLIANCE		SAR RF EXPOSURE EVALUATION			FCC & IC	
Test Lab Information	Name	CELLTECH LABS INC.				
	Address	21-364 Lougheed Road, Kelowna, British Columbia V1X 7R8 Canada				
Test Lab Accreditation	ISO 17025	A2LA Test Lab Certificate No. 2470.01				
Applicant Information	Name	COBRA ELECTRONICS CORPORATION				
	Address	6500 West Cortland Street, Chicago, IL 60707 United States				
Standard(s) Applied	FCC	47 CFR §2.1093	IC	Health Canada Safety Code 6		
Procedure(s) Applied	FCC	OET Bulletin 65, Supp. C (01-01)	KDB Publication 447498 D01v05			
	IC	RSS-102 Issue 4	IEEE	1528-2003	IEC	62209-2:2010
Device Classification(s)	FCC	Part 95 Family Radio Face Held Transmitter (FRF)				
	IC	Licence-exempt Radio Apparatus: Category I Equipment (RSS-210 Issue 8)				
Application Type(s)	FCC/IC	New Certification				
Device Identifier(s)	FCC ID:	BBO1133A	IC:	906A-1133A		
Device Model(s)	CX312, CX312C, CXT345, CXT345C, CXT345PC, CXT390, CXT390C, CXT395C, CXT395 (All models are electrically and mechanically identical)					
Device Model(s) Tested	CXT345 (S/N: None (Identical Prototype))					
Hardware Revision No.	1.4	Firmware Revision No.	1.0			
Date of Sample Receipt	Jan. 25, 2013	Date(s) of Evaluation	Jan. 29-31, 2013			
Device Description	Portable FM UHF GMRS/FRS Push-To-Talk (PTT) Radio Transceiver					
Transmit Frequency Range(s)	462.5500 - 462.7250 MHz (GMRS Channels 15-22)					
	462.5625 - 462.7125 MHz (GMRS/FRS Channels 1-7)					
	467.5625 - 467.7125 MHz (FRS Channels 8-14)					
Conducted Output Power	Rated (Alkaline):	1.0W	Tolerance:	0.7 - 1.05W		
Battery Type(s) Tested	Ni-MH Battery	3x AAA	1.2 V	300 mAh		
	Alkaline Battery	3x AAA	1.5 V	Energizer Industrial		
Antenna Type(s) Tested	External (Non-detachable)					
Body-worn Accessories Tested	Plastic Belt-Clip (supplied with DUT)					
Audio Accessories Tested	Ear-bud with Lapel-Microphone & PTT (P/N: GA-EBM2)					
Max. Measured SAR Level(s)	Face-held	0.501 W/kg	1g	50% ptt duty cycle	General Population / Uncontrolled	
	Body-worn	0.450 W/kg	1g	50% ptt duty cycle	General Population / Uncontrolled	
FCC/IC Spatial Peak SAR Limit	Head/Body	1.6 W/kg	1g	50% ptt duty cycle	General Population / Uncontrolled	
<p>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's 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 International Standard IEC 62209-2:2010. All measurements were performed in accordance with the SAR system manufacturer recommendations.</p> <p>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.</p> <p>The results and statements contained in this report pertain only to the device(s) evaluated.</p> <p>This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc.</p>						
Test Report Approved By		Mike Meaker	Engineering Technologist	Celltech Labs Inc.		

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver		Model(s):	CXT345		
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REVISION HISTORY			
REVISION NO.	DESCRIPTION	IMPLEMENTED BY	RELEASE DATE
1.0	1st Release	Mike Meaker	Feb. 4, 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

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
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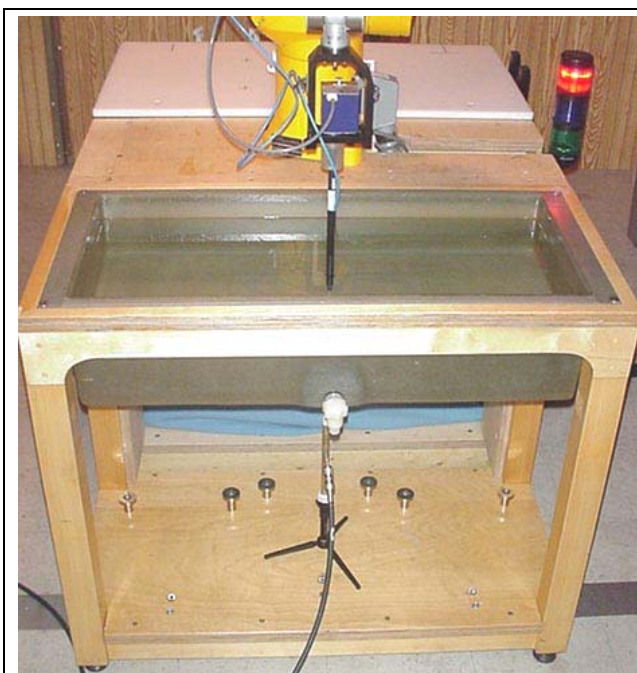
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1.0 INTRODUCTION

This measurement report demonstrates that the Cobra Electronics Corporation Models: CXT345 / CXT390 / CXT395 / CX312 Portable FM UHF GMRS/FRS PTT Radio Transceiver complies 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 test procedures described in FCC OET Bulletin 65, Supplement C Edition 01-01 (see reference [3]), IC RSS-102 Issue 4 (see reference [4]), IEEE Standard 1528-2003 (see reference [5]) and International Standard IEC 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 Barski Fibreglas Planar Phantom



DASY4 Measurement Server

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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3.0 RF OUTPUT POWER MEASUREMENTS

Band	Frequency	Channel	Mode	Battery Type	Measured Power Level		Method
					dBm	Watts	
GMRS	462.5625 MHz	1	CW	Alkaline	28.9	0.77	Average Conducted
GMRS	462.5625 MHz	1	CW	NiMH	27.8	0.60	Average Conducted

Notes

- The test channel was selected in accordance with the procedures specified in FCC KDB 447498 (see reference [7]).
- 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 NUMBER OF TEST CHANNELS

Device Frequency Range	Band	N_c	Test Frequencies (MHz)
462.550 – 467.7125 MHz	GMRS / FRS	1	462.5625 MHz


Note: The number of test channels (N_c) 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 \geq 300 MHz, require additional steps (per FCC KDB 450824 D01 v01r01, SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz - see reference [8]).

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	± 50 MHz \geq 300 MHz
450 MHz	462.5625 MHz	12.5625 MHz	$<$ 50 MHz

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

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver		Model(s):	CXT345		
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6.0 FLUID DIELECTRIC PARAMETERS

FLUID DIELECTRIC PARAMETERS						
Date: 01/28&29/2013		Frequency: 450 MHz			Tissue: Body	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.350	59.55	0.83	56.7	0.94	5.03%	-11.70%
0.360	58.81	0.83	56.7	0.94	3.72%	-11.70%
0.370	58.45	0.85	56.7	0.94	3.09%	-9.57%
0.380	58.47	0.84	56.7	0.94	3.12%	-10.64%
0.390	58.32	0.86	56.7	0.94	2.86%	-8.51%
0.400	57.98	0.86	56.7	0.94	2.26%	-8.51%
0.410	57.6	0.87	56.7	0.94	1.59%	-7.45%
0.420	58.4	0.89	56.7	0.94	3.00%	-5.32%
0.430	57.84	0.9	56.7	0.94	2.01%	-4.26%
0.440	57.55	0.9	56.7	0.94	1.50%	-4.26%
0.450	57.93	0.92	56.7	0.94	2.17%	-2.13%
0.460	57.39	0.93	56.7	0.94	1.22%	-1.06%
0.462563*	57.3	0.927	56.7	0.94	1.06%	-1.38%
0.470	56.95	0.92	56.7	0.94	0.44%	-2.13%
0.480	56.49	0.93	56.7	0.94	-0.37%	-1.06%
0.490	56.81	0.95	56.7	0.94	0.19%	1.06%
0.500	56.33	0.96	56.7	0.94	-0.65%	2.13%
0.510	56.27	0.96	56.7	0.94	-0.76%	2.13%
0.520	56.64	0.96	56.7	0.94	-0.11%	2.13%
0.530	56.61	1	56.7	0.94	-0.16%	6.38%
0.540	56.05	1.01	56.7	0.94	-1.15%	7.45%
0.550	56.01	1.01	56.7	0.94	-1.22%	7.45%

*interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Jan 28	450 Body	21.0 °C	20.2 °C	≥ 15 cm	101.3 kPa	33%	1000
Jan 29	450 Body	21.0 °C	20.7 °C	≥ 15 cm	102.3 kPa	34%	1000


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DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver		Model(s):	CXT345		
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FLUID DIELECTRIC PARAMETERS						
Date: 01/30&31/2013		Frequency: 450 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.350	46.88	0.78	43.5	0.87	7.77%	-10.34%
0.360	46.04	0.78	43.5	0.87	5.84%	-10.34%
0.370	45.23	0.8	43.5	0.87	3.98%	-8.05%
0.380	45.12	0.81	43.5	0.87	3.72%	-6.90%
0.390	44.76	0.81	43.5	0.87	2.90%	-6.90%
0.400	45.43	0.83	43.5	0.87	4.44%	-4.60%
0.410	45	0.84	43.5	0.87	3.45%	-3.45%
0.420	44.46	0.84	43.5	0.87	2.21%	-3.45%
0.430	44.72	0.85	43.5	0.87	2.80%	-2.30%
0.440	44.47	0.86	43.5	0.87	2.23%	-1.15%
0.450	44.46	0.88	43.5	0.87	2.21%	1.15%
0.460	43.78	0.88	43.5	0.87	0.64%	1.15%
0.4625625*	43.7	0.88	43.5	0.87	0.46%	1.15%
0.470	43.54	0.88	43.5	0.87	0.09%	1.15%
0.480	42.97	0.89	43.5	0.87	-1.22%	2.30%
0.490	43.23	0.9	43.5	0.87	-0.62%	3.45%
0.500	42.89	0.91	43.5	0.87	-1.40%	4.60%
0.510	42.95	0.91	43.5	0.87	-1.26%	4.60%
0.520	42.64	0.93	43.5	0.87	-1.98%	6.90%
0.530	42.45	0.95	43.5	0.87	-2.41%	9.20%
0.540	42.45	0.94	43.5	0.87	-2.41%	8.05%
0.550	41.67	0.95	43.5	0.87	-4.21%	9.20%

*interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
Jan 30	450 Head	22.0 °C	21.3 °C	≥ 15 cm	102.4 kPa	33%	1000
Jan 31	450 Head	21.0 °C	21.4 °C	≥ 15 cm	102.5 kPa	33%	1000

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7.0 SAR MEASUREMENT SUMMARY

SAR EVALUATION RESULTS

Test Config.	Test Freq. MHz	Chan. / Mode		Battery Type	Accessories		DUT Spacing to Planar Phantom		DUT Power Before Test (ERP) dBm	Measured SAR 1g (W/kg) PTT Duty Cycle		SAR Drift During Test dB	Scaled SAR with droop 1g (W/kg) PTT Duty Cycle	
					Body	Audio	DUT	Antenna		100%	50%		100%	50%
	FACE	462.5625	1	GMRS	Alkaline	n/a	n/a	2.5 cm	3.4 cm	28.9	0.743	0.372	-0.558	0.845
462.5625		1	GMRS	NiMH	n/a	n/a	2.5 cm	3.4 cm	27.8	0.678	0.339	-0.038	0.684	0.342
BODY	462.5625	1	GMRS	Alkaline	Belt-Clip	Ear-bud	0.7 cm	1.7 cm	28.9	0.667	0.334	-0.417	0.734	0.367
	462.5625	1	GMRS	NiMH	Belt-Clip	Ear-bud	0.7 cm	1.7 cm	27.8	0.482	0.241	-0.142	0.498	0.249
SAR LIMIT(S)					HEAD / BODY		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


- Detailed measurement plots showing the maximum SAR location of the DUT are reported in Appendix A.
- The SAR droop measured by the DASY4 system for the duration of the SAR zoom scan evaluation was added to the measured SAR level to report the scaled SAR result as shown in the above test data table.
- The DUT was tested in unmodulated continuous transmit operation (Continuous Wave mode at 100% PTT duty cycle) with the PTT constantly depressed.
- The fluid temperature remained within +/-2°C from the dielectric parameter measurement to the completion of the SAR evaluations.
- 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 Section 6 and Appendix C).
- Repeatability tests were not required because the SAR was <0.8W/kg (KDB 447498 reference [5]).



8.0 SCALING FOR MANUFACTURER'S TUNE-UP 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 (1.05 Watts)	Scaled SAR Level 1g (W/kg)*
Face	462.5625	0.77	0.372	+ 1.3 dB	0.501
Body	462.5625	0.77	0.334	+ 1.3 dB	0.450

*50% Duty Cycle

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DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver		Model(s):	CXT345		
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9.0 DETAILS OF SAR EVALUATION



The Cobra Electronics Corporation Model: CXT345 Portable FM UHF GMRS/FRS PTT Radio Transceiver 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 DUT was evaluated for SAR in a face-held configuration with the front of the radio placed parallel to the outer surface of the planar phantom. A 2.5 cm spacing was maintained between the front of the DUT and the outer surface of the planar phantom.
2. The DUT was evaluated for SAR in a body-worn configuration with the back of the radio facing the outer surface of the planar phantom. The DUT antenna was placed parallel to the planar phantom. The attached plastic belt-clip accessory was touching the planar phantom and provided 0.7 cm spacing from the back of the DUT to the outer surface of the planar phantom. The DUT was evaluated for body-worn SAR with the Cobra supplied ear-bud lapel-microphone audio accessory connected to the external audio port.
3. The SAR drift of the DUT was measured by the DASY4 system for the duration of each evaluation. A SAR-versus-Time power droop evaluation was performed and is shown in Appendix A.
4. New or fully charged batteries were used for each SAR evaluation.
5. The DUT was tested in unmodulated continuous transmit operation (Continuous Wave mode at 100% PTT duty cycle) with the PTT 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.

10.0 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.

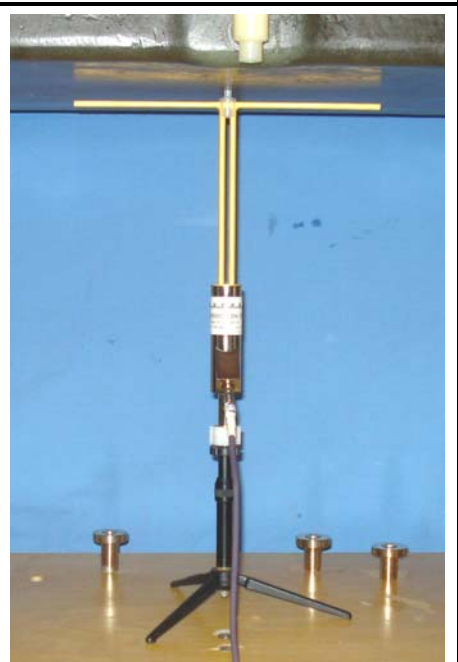
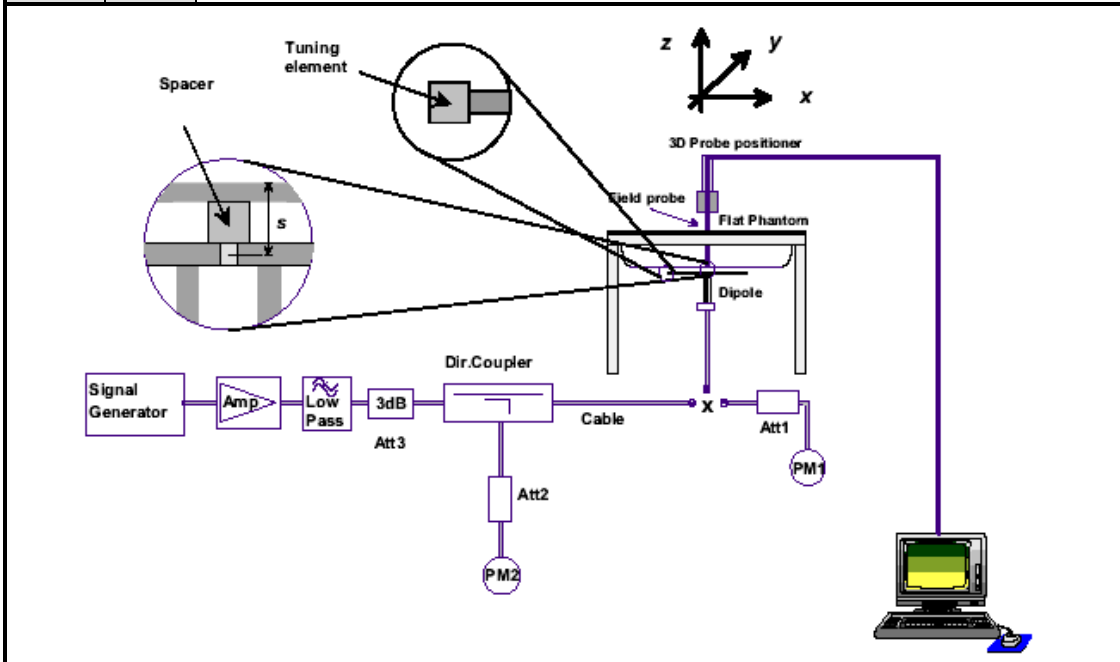
Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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11.0 SYSTEM PERFORMANCE CHECK


Prior to the SAR evaluations, daily system checks were performed with the Barski planar phantom and 450 MHz SPEAG validation dipole (see Appendix B for system performance check test plots) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [5]) and IEC Standard 62209-2 (see reference [6]). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C for measured fluid dielectric parameters). A forward power of 398 mW was applied to the dipole and the system was verified to a tolerance of $\pm 10\%$ from the SAR system manufacturer's dipole calibration target SAR value (see Appendix E for system manufacturer's dipole calibration procedures).



SYSTEM PERFORMANCE CHECK 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.						
Jan 30	Head 450	1.87 $\pm 10\%$	1.92	+2.7%	43.5 $\pm 5\%$	44.5	+2.3%	0.87 $\pm 5\%$	0.88	+1.1%	1000	22.0	21.3	≥ 15	33	102.4
Jan 28	Body 450	1.81 $\pm 10\%$	1.91	+5.5%	56.7 $\pm 5\%$	57.9	+2.1%	0.94 $\pm 5\%$	0.92	-2.1%	1000	21.0	20.2	≥ 15	33	101.3
Notes	1.	The target SAR value is the measured value specified by the SAR system manufacturer in the dipole calibration (see Appendix E).														
	2.	The target dielectric parameters are the nominal values specified by the SAR system manufacturer in the dipole calibration (see Appendix E).														
	3.	The fluid temperature remained within $\pm 2^\circ\text{C}$ from the 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 Diagram (IEEE Standard 1528-2003)

SPEAG 450 MHz Validation Dipole Setup

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12.0 SIMULATED EQUIVALENT TISSUES



The simulated equivalent tissue recipes in the table below are derived from the SAR system manufacturer's suggested recipes in the DASY4 manual (see references [9] and [10]) in accordance with the procedures 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	450 MHz HEAD	450 MHz BODY
Water	38.56 %	52.00 %
Sugar	56.32 %	45.65 %
Salt	3.95 %	1.75 %
HEC	0.98 %	0.50 %
Bactericide	0.19 %	0.10 %

13.0 SAR LIMITS


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



Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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14.0 ROBOT SYSTEM SPECIFICATIONS

<u>Specifications</u>	
Positioner	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability	0.02 mm
No. of axis	6
<u>Data Acquisition Electronic (DAE) System</u>	
<u>Cell Controller</u>	
Processor	AMD Athlon XP 2400+
Clock Speed	2.0 GHz
Operating System	Windows XP Professional
<u>Data Converter</u>	
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
<u>DASY4 Measurement Server</u>	
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
<u>E-Field Probe</u>	
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)
<u>Phantom</u>	
Type	Barski Planar Phantom
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 70 liters

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver		Model(s):	CXT345		
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15.0 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 $\pm 8\%$)
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 μ W/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

16.0 BARKSI 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



17.0 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.




Device Holder



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18.0 TEST EQUIPMENT LIST

TEST EQUIPMENT DESCRIPTION	ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
Schmid & Partner DASY4 System	-	-	-	-
-DASY4 Measurement Server	00158	1078	CNR	CNR
-Robot	00046	599396-01	CNR	CNR
-DAE4	00019	353	19-Apr-12	Biennial
-ET3DV6 E-Field Probe	00017	1590	24-Apr-12	Annual
-D450V3 Validation Dipole	00221	1068	27-Apr-12	Triennial
Barski Planar Phantom	00155	03-01	CNR	CNR
HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
Gigatronics 8652A Power Meter	00007	1835272	03-May-12	Biennial
Gigatronics 80701A Power Sensor	00014	1833542	03-May-12	Biennial
Gigatronics 80334A Power Sensor	-	1837001	03-May-12	Biennial
HP 8753ET Network Analyzer	00134	US39170292	26-Apr-12	Biennial
Rohde & Schwarz SMR20 Signal Generator	00006	100104	02-May-12	Biennial
Amplifier Research 10W10000 Power Amplifier	00041	27887	CNR	CNR
CNR = Calibration Not Required				

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19.0 MEASUREMENT UNCERTAINTY (IC RSS-102 / IEC 62209-2)

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 (450 MHz)	7.2.2.1	6.7	Normal	1	1	1	6.7	6.7	∞
Isotropy	7.2.2.2	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
Boundary Effect	7.2.2.6	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
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	1.38	Normal	1	0.78	0.71	1.1	1.0	∞
Liquid Permittivity (measured)	7.2.4.3	1.06	Normal	1	0.23	0.26	0.2	0.3	∞
Liquid Permittivity - temp. uncertainty	7.2.4.4	0.27	Rectangular	1.732050808	0.78	0.71	0.1	0.1	∞
Liquid Conductivity - temp. uncertainty	7.2.4.4	0.84	Rectangular	1.732050808	0.23	0.26	0.1	0.1	∞
Combined Standard Uncertainty	7.3.1		RSS				10.03	9.96	
Expanded Uncertainty (95% Confidence Interval)	7.3.2		k=2				20.06	19.92	

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



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20.0 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 - "Application Note: SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz"; KDB 450824 D01 v01r01: January 2007.
- [9] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 16 Application Note, Head Tissue Recipe: Sept. 2005.
- [10] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 17 Application Note, Body Tissue Recipe: Sept. 2005.
- [11] ISO/IEC 17025 - "General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)."
- [12] ANSI/TIA-603-C - "Land Mobile FM or PM Communications Equipment - Measurement and Performance Standards": December 2004.
- [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.

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APPENDIX A - SAR MEASUREMENT PLOTS

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Date Tested: 01/31/2013

Face-held SAR - GMRS - Ch. 1 - 462.5625 MHz - Alkaline AA Batteries

DUT: Cobra CXT345; Type: Portable FM PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 21C; Fluid Temp: 21.4 C; Barometric Pressure: 102.5 kPa; Humidity: 33%

Procedure Notes:

Communication System: FRS/GMRS

Frequency: 462.563 MHz; Duty Cycle: 1:1

Medium: HSL450 Medium parameters used (interpolated): $f = 462.563 \text{ MHz}$; $\sigma = 0.88 \text{ mho/m}$; $\epsilon_r = 43.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(7.54, 7.54, 7.54); 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

Alkaline/Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.827 mW/g

Alkaline/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

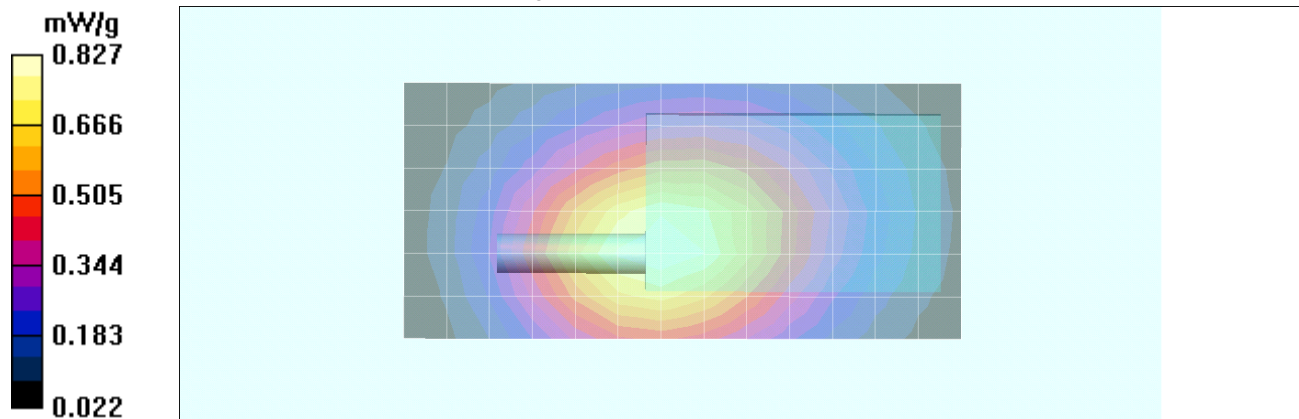
Reference Value = 30.1 V/m; Power Drift = -0.558 dB


Peak SAR (extrapolated) = 1.05 W/kg



SAR(1 g) = 0.743 mW/g; SAR(10 g) = 0.535 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

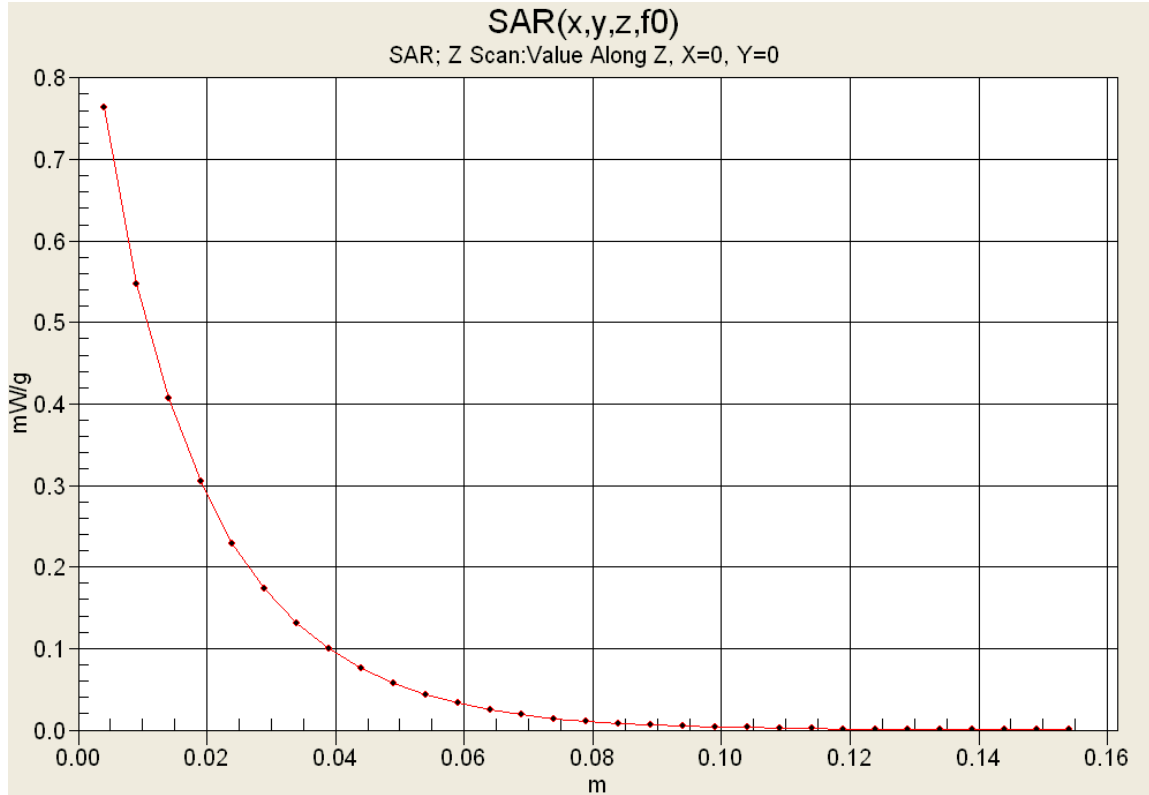
Maximum value of SAR (measured) = 0.782 mW/g






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Z-Axis Scan



Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
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Date Tested: 01/31/2013

Face-held SAR - GMRS - Ch. 1 - 462.5625 MHz - NiMH AA Batteries

DUT: Cobra CXT345; Type: Portable FM PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 21C; Fluid Temp: 21.4 C; Barometric Pressure: 102.5 kPa; Humidity: 33%

Procedure Notes:

Communication System: FRS/GMRS

Frequency: 462.563 MHz; Duty Cycle: 1:1

Medium: HSL450 Medium parameters used (interpolated): $f = 462.563 \text{ MHz}$; $\sigma = 0.88 \text{ mho/m}$; $\epsilon_r = 43.7$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(7.54, 7.54, 7.54); 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

NiMH/Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.712 mW/g

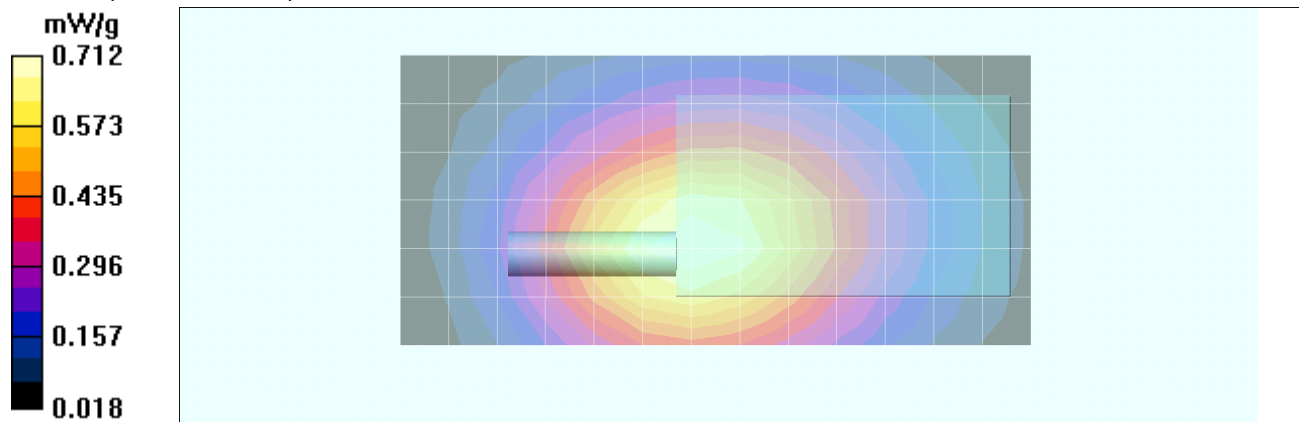
NiMH/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm


Reference Value = 26.9 V/m; Power Drift = -0.038 dB



Peak SAR (extrapolated) = 0.951 W/kg

SAR(1 g) = 0.678 mW/g; SAR(10 g) = 0.490 mW/g

Info: Interpolated medium parameters used for SAR evaluation.



Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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	<u>Date(s) of Evaluation</u> Jan. 29-31, 2013	<u>Test Report Serial No.</u> 012513BBO-T1216-S95	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 01/29/2013

**Body-worn SAR - GMRS - Ch. 1 - 462.5625 MHz - Alkaline AA Batteries
Plastic Belt-clip - Earbud**

DUT: Cobra CXT345; Type: Portable FM PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 21C; Fluid Temp: 20.7C; Barometric Pressure: 102.3 kPa; Humidity: 34%

Procedure Notes:

Communication System: FRS/GMRS

Frequency: 462.563 MHz; Duty Cycle: 1:1

Medium: M450 Medium parameters used (interpolated): $f = 462.563 \text{ MHz}$; $\sigma = 0.927 \text{ mho/m}$; $\epsilon_r = 57.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(7.93, 7.93, 7.93); 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

Alkaline/Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.526 mW/g

Alkaline/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

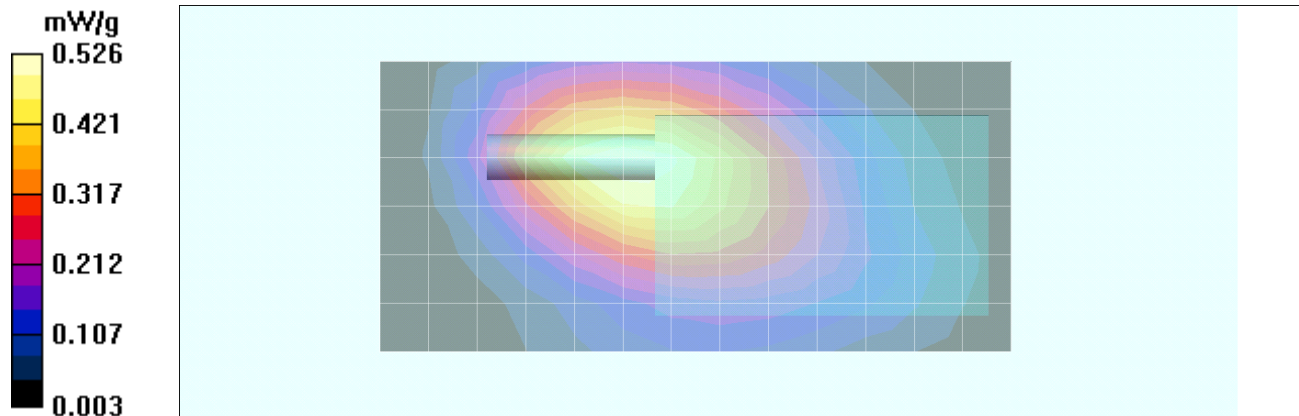
Reference Value = 25.9 V/m; Power Drift = -0.417 dB


Peak SAR (extrapolated) = 0.994 W/kg

SAR(1 g) = 0.667 mW/g; SAR(10 g) = 0.468 mW/g

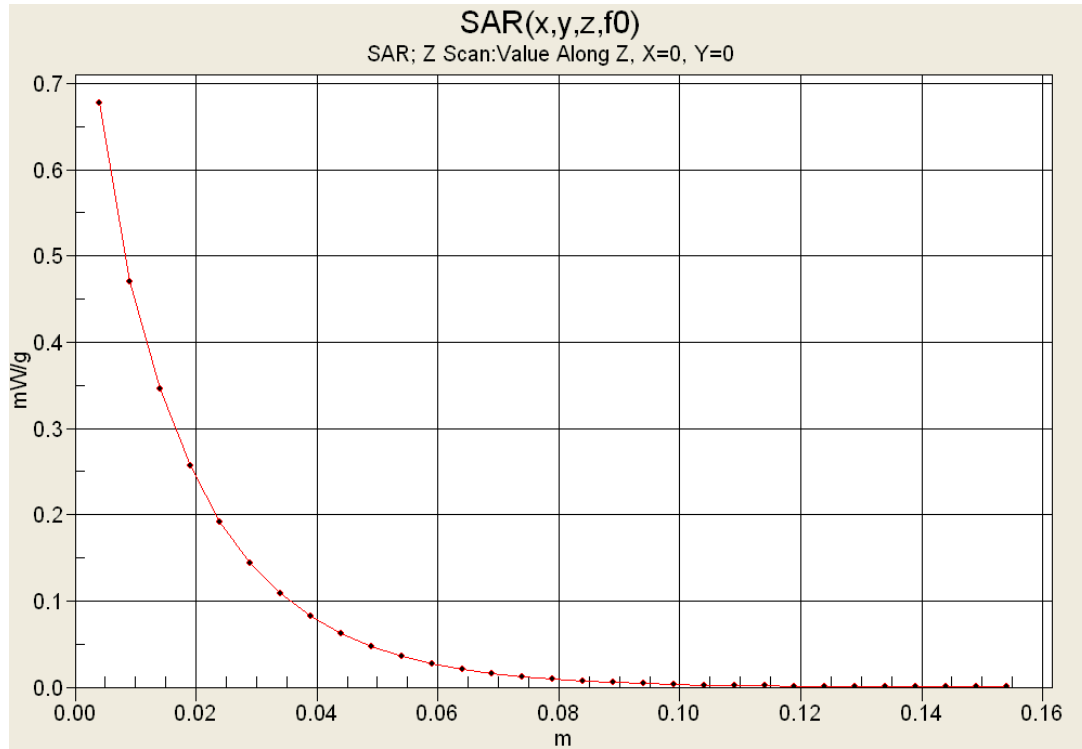
Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.703 mW/g

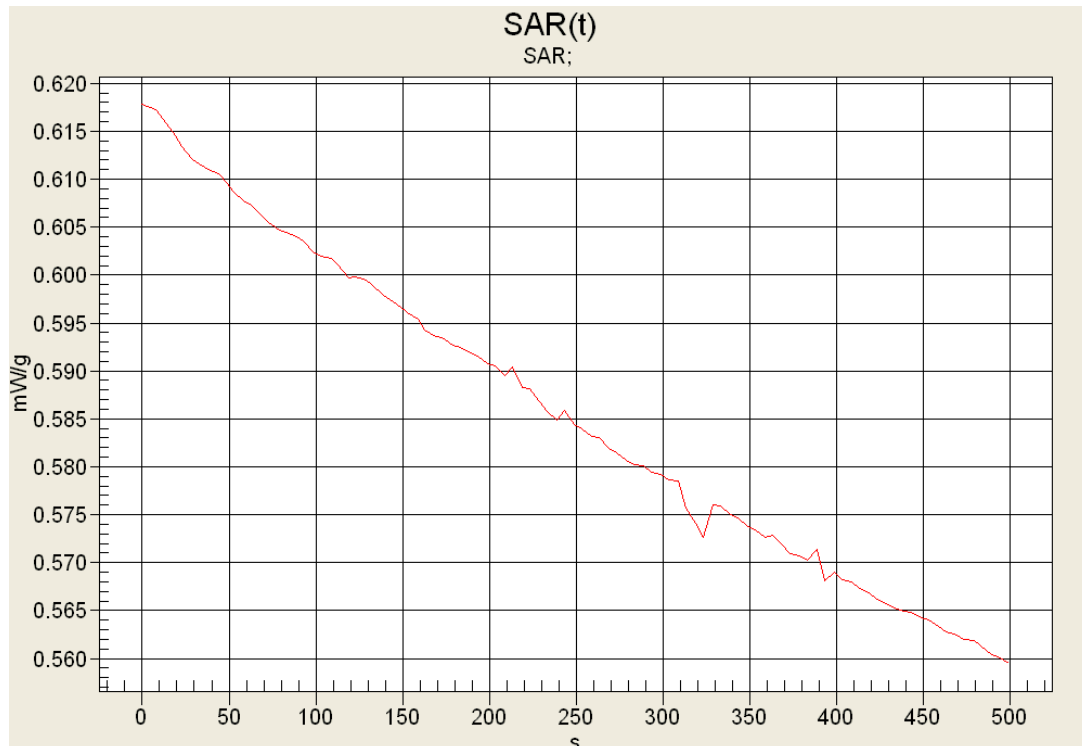




Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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Z-Axis Scan



SAR vs TIME



	<u>Date(s) of Evaluation</u> Jan. 29-31, 2013	<u>Test Report Serial No.</u> 012513BBO-T1216-S95	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 01/29/2013

**Body-worn SAR - GMRS - Ch. 1 - 462.5625 MHz - NiMH AA Batteries
Plastic Belt-clip - Earbud**

DUT: Cobra CXT345; Type: Portable FM PTT Radio Transceiver; Serial: Not Specified

Program Notes: Ambient Temp: 21C; Fluid Temp: 20.7C; Barometric Pressure: 102.3 kPa; Humidity: 34%

Procedure Notes:

Communication System: FRS/GMRS

Frequency: 462.563 MHz; Duty Cycle: 1:1

Medium: M450 Medium parameters used (interpolated): $f = 462.563 \text{ MHz}$; $\sigma = 0.927 \text{ mho/m}$; $\epsilon_r = 57.3$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(7.93, 7.93, 7.93); 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

NiMH/Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.493 mW/g

NiMH/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

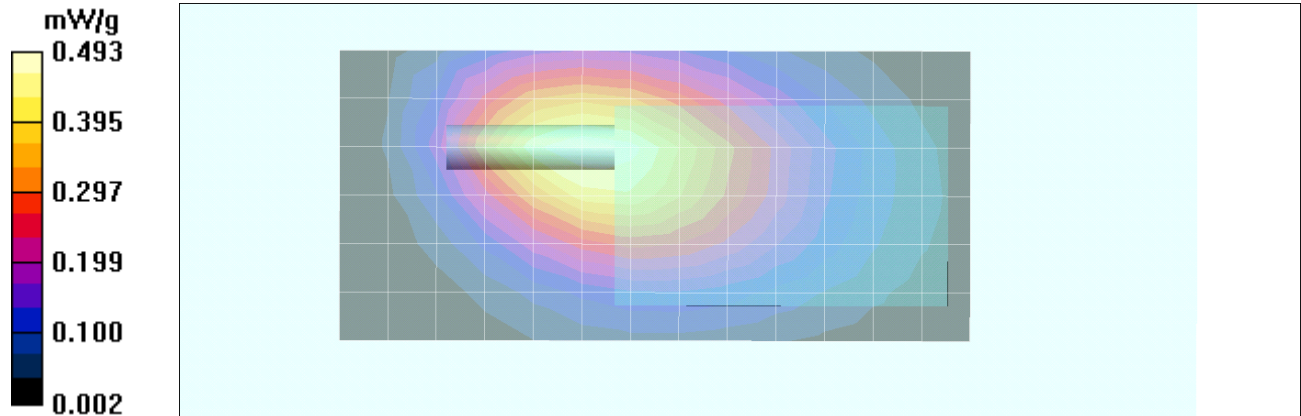
Reference Value = 21.5 V/m; Power Drift = -0.142 dB


Peak SAR (extrapolated) = 0.723 W/kg



SAR(1 g) = 0.482 mW/g; SAR(10 g) = 0.334 mW/g

Info: Interpolated medium parameters used for SAR evaluation.


Maximum value of SAR (measured) = 0.512 mW/g





Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX B - SYSTEM PERFORMANCE CHECK PLOTS

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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	<u>Date(s) of Evaluation</u> Jan. 29-31, 2013	<u>Test Report Serial No.</u> 012513BBO-T1216-S95	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 01/30/2013

System Performance Check - 450 MHz Dipole - Head

DUT: Dipole 450 MHz; Type: D450V3; Serial: 1068; Calibrated: 04/27/2012

Program Notes: Ambient Temp: 22.0C; Fluid Temp: 21.3C; Barometric Pressure: 102.4 kPa; Humidity: 33%

Procedure Notes:

Communication System: CW

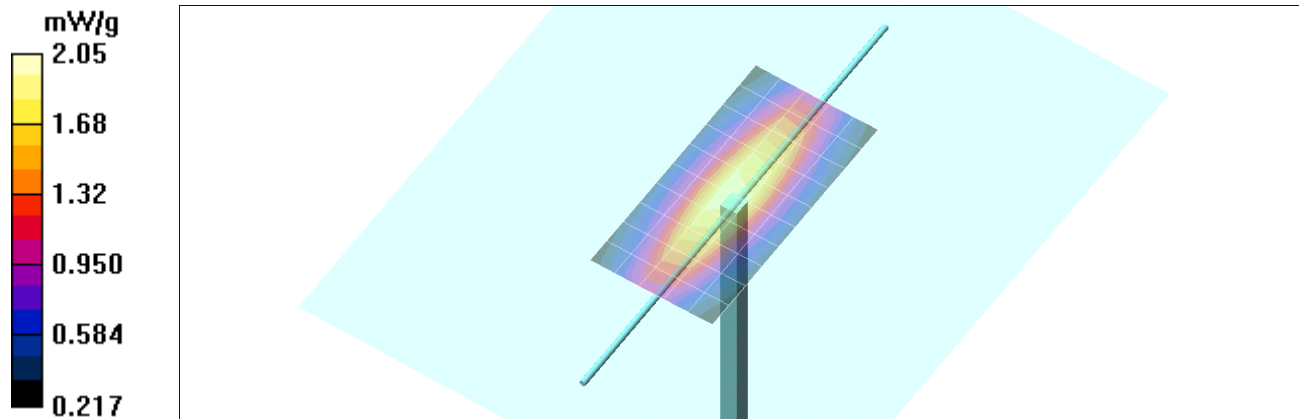
Frequency: 450 MHz; Duty Cycle: 1:1


Medium: HSL450 Medium parameters used: $f = 450 \text{ MHz}$; $\sigma = 0.88 \text{ mho/m}$; $\epsilon_r = 44.5$; $\rho = 1000 \text{ kg/m}^3$



- Probe: ET3DV6 - SN1590; ConvF(7.54, 7.54, 7.54); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASy4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Head d=15mm Pin=398mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.88 mW/g

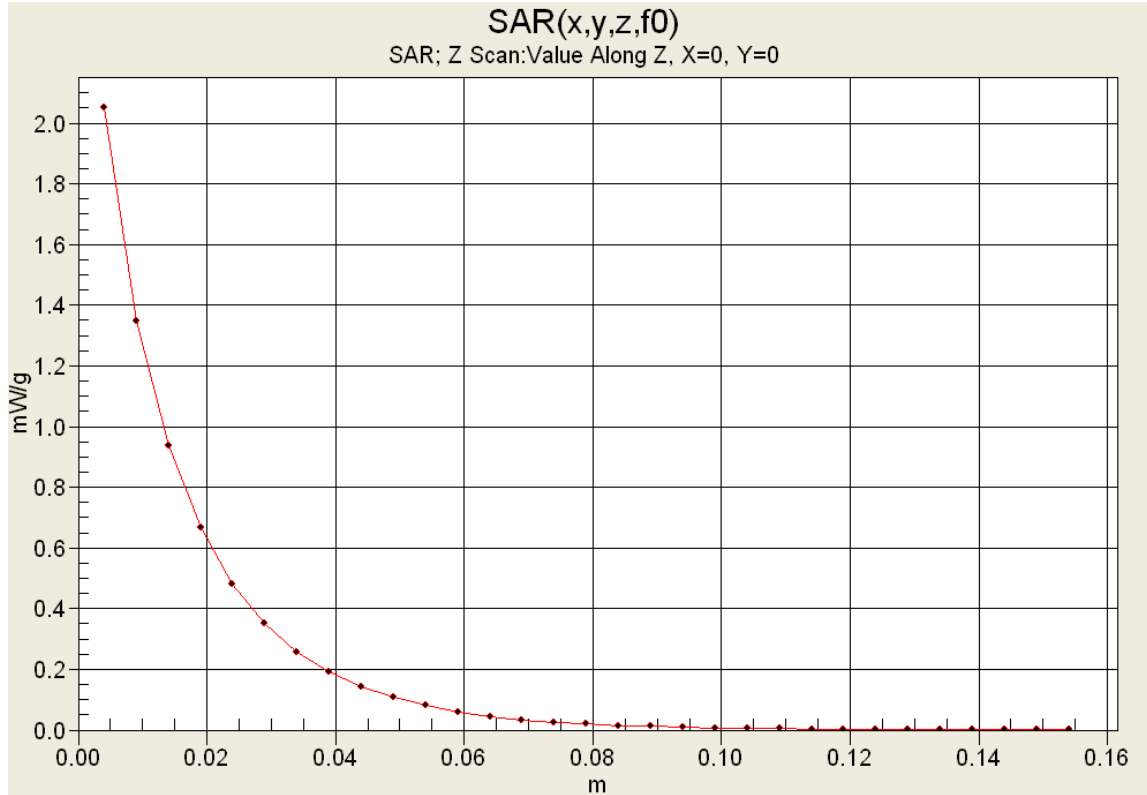
Head d=15mm Pin=398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 49.1 V/m; Power Drift = -0.005 dB
Peak SAR (extrapolated) = 3.02 W/kg
SAR(1 g) = 1.92 mW/g; SAR(10 g) = 1.27 mW/g
Maximum value of SAR (measured) = 2.05 mW/g






Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver		Model(s):	CXT345		
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	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Z-Axis Scan



Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Date Tested: 01/28/2013

System Performance Check - 450 MHz Dipole - Body

DUT: Dipole 450 MHz; Type: D450V3; Serial: 1068; Calibrated: 04/27/2012

Program Notes: Ambient Temp: 21.0C; Fluid Temp: 20.2C; Barometric Pressure: 101.3 kPa; Humidity: 33%

Procedure Notes:

Communication System: CW

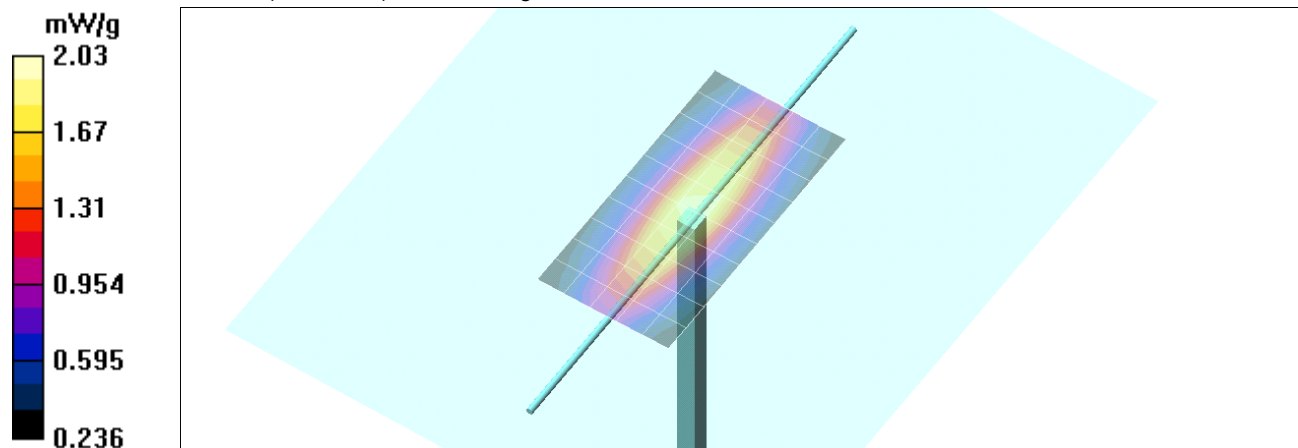
Frequency: 450 MHz; Duty Cycle: 1:1


Medium: M450 Medium parameters used: $f = 450 \text{ MHz}$; $\sigma = 0.92 \text{ mho/m}$; $\epsilon_r = 57.9$; $\rho = 1000 \text{ kg/m}^3$



- Probe: ET3DV6 - SN1590; ConvF(7.93, 7.93, 7.93); Calibrated: 24/04/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 19/04/2012
- Phantom: Barski Industries; Type: Fiberglass Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body d=15mm Pin=398mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (measured) = 1.88 mW/g

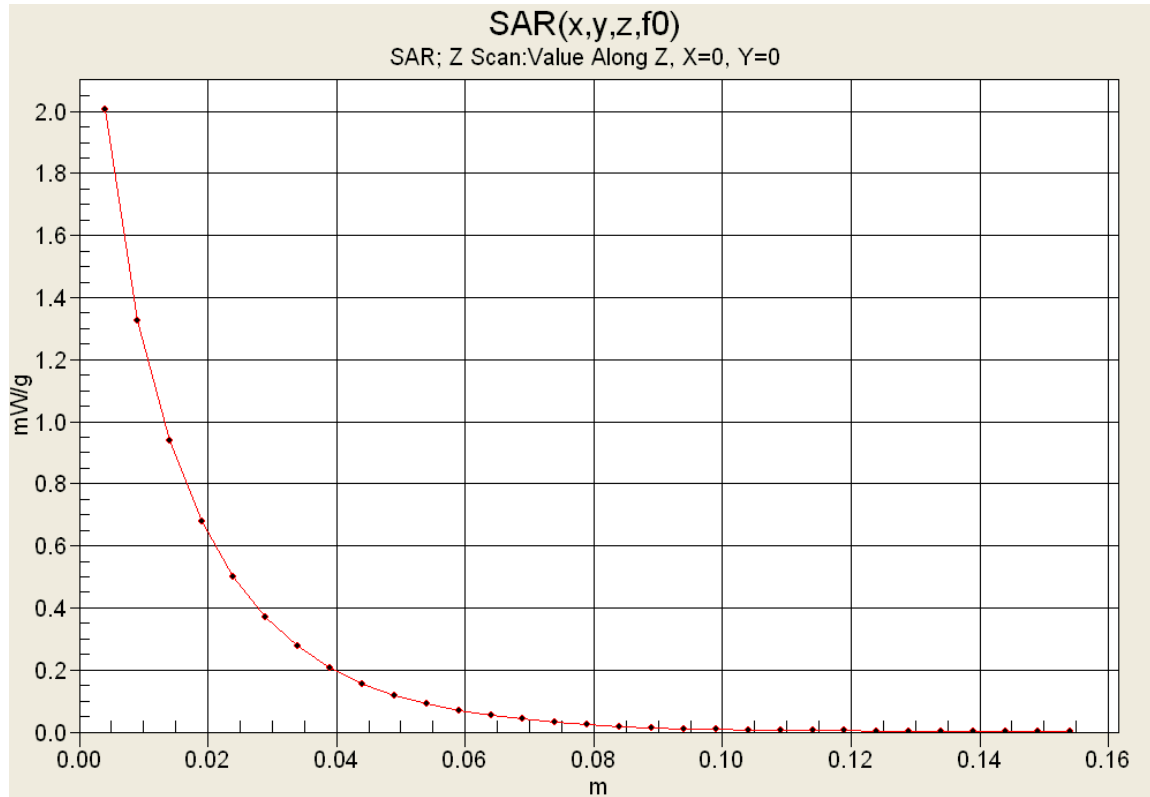
Body d=15mm Pin=398mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 47.3 V/m; Power Drift = -0.040 dB
 Peak SAR (extrapolated) = 3.06 W/kg
SAR(1 g) = 1.91 mW/g; SAR(10 g) = 1.27 mW/g
 Maximum value of SAR (measured) = 2.03 mW/g






Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver		Model(s):	CXT345		
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	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	


Z-Axis Scan





Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS


Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

450 MHz Body

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
28/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
0.3500	57.70	0.93	59.55	0.83
0.3600	57.60	0.93	58.81	0.83
0.3700	57.50	0.93	58.45	0.85
0.3800	57.40	0.93	58.47	0.84
0.3900	57.30	0.93	58.32	0.86
0.4000	57.20	0.93	57.98	0.86
0.4100	57.10	0.93	57.60	0.87
0.4200	57.00	0.94	58.40	0.89
0.4300	56.90	0.94	57.84	0.90
0.4400	56.80	0.94	57.55	0.90
0.4500	56.70	0.94	57.93	0.92
0.4600	56.66	0.94	57.39	0.93
0.4700	56.62	0.94	56.95	0.92
0.4800	56.58	0.94	56.49	0.93
0.4900	56.54	0.94	56.81	0.95
0.5000	56.51	0.94	56.33	0.96
0.5100	56.47	0.94	56.27	0.96
0.5200	56.43	0.95	56.64	0.96
0.5300	56.39	0.95	56.61	1.00
0.5400	56.35	0.95	56.05	1.01
0.5500	56.31	0.95	56.01	1.01

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver		Model(s):	CXT345		
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	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

450 MHz Head

Celltech Labs Inc.

Test Result for UIM Dielectric Parameter

30/Jan/2013

Freq Frequency(GHz)


FCC_eHFCC OET 65 Supplement C (June 2001) Limits for Head Epsilon



FCC_sHFCC OET 65 Supplement C (June 2001) Limits for Head Sigma

Test_e Epsilon of UIM


Test_s Sigma of UIM



Freq	FCC_eHFCC_sH	Test_e	Test_s
0.3500	44.70 0.87	46.88	0.78
0.3600	44.58 0.87	46.04	0.78
0.3700	44.46 0.87	45.23	0.80
0.3800	44.34 0.87	45.12	0.81
0.3900	44.22 0.87	44.76	0.81
0.4000	44.10 0.87	45.43	0.83
0.4100	43.98 0.87	45.00	0.84
0.4200	43.86 0.87	44.46	0.84
0.4300	43.74 0.87	44.72	0.85
0.4400	43.62 0.87	44.47	0.86
0.4500	43.50 0.87	44.46	0.88
0.4600	43.45 0.87	43.78	0.88
0.4700	43.40 0.87	43.54	0.88
0.4800	43.34 0.87	42.97	0.89
0.4900	43.29 0.87	43.23	0.90
0.5000	43.24 0.87	42.89	0.91
0.5100	43.19 0.87	42.95	0.91
0.5200	43.14 0.88	42.64	0.93
0.5300	43.08 0.88	42.45	0.95
0.5400	43.03 0.88	42.45	0.94
0.5500	42.98 0.88	41.67	0.95

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver		Model(s):	CXT345		
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	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	


APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS



Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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	<u>Date(s) of Evaluation</u> Jan. 29-31, 2013	<u>Test Report Serial No.</u> 012513BBO-T1216-S95	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

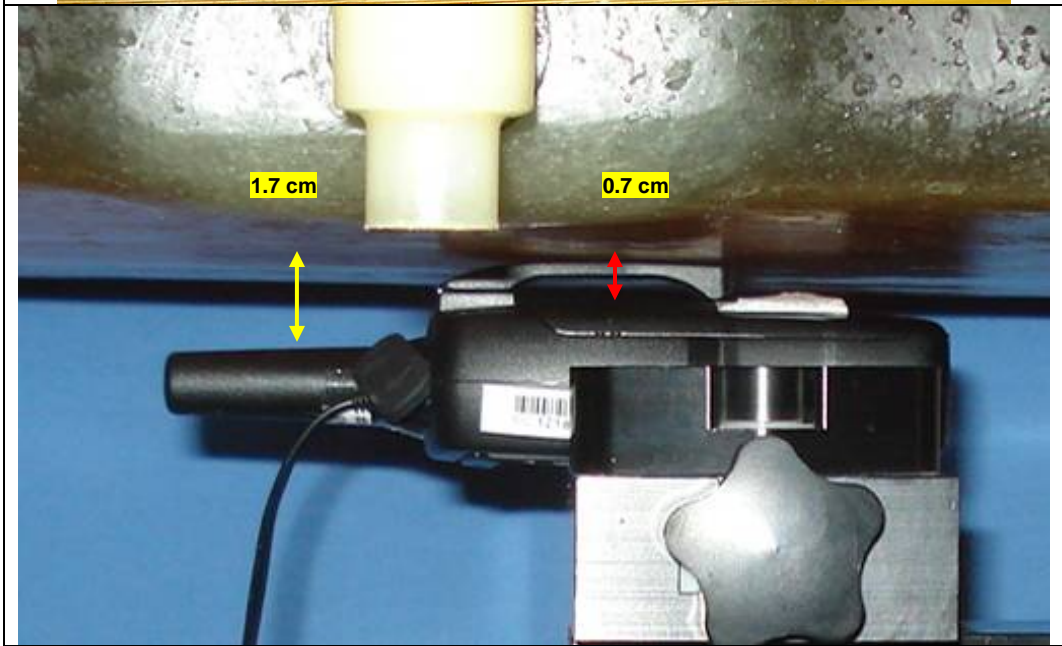
FACE-HELD SAR TEST SETUP PHOTOGRAPHS




Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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	<u>Date(s) of Evaluation</u> Jan. 29-31, 2013	<u>Test Report Serial No.</u> 012513BBO-T1216-S95	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

BODY-WORN SAR TEST SETUP PHOTOGRAPHS




Body-worn test setup



Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver			Model(s):	CXT345	
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	<u>Date(s) of Evaluation</u> Jan. 29-31, 2013	<u>Test Report Serial No.</u> 012513BBO-T1216-S95	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS






Applicant: Cobra Electronics Corporation	FCC ID: BBO1133A	IC: 906A-1133A	
DUT Type: Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s): CXT345		
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	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DUT PHOTOGRAPHS






Applicant: Cobra Electronics Corporation	FCC ID: BBO1133A	IC: 906A-1133A	
DUT Type: Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s): CXT345		
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	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

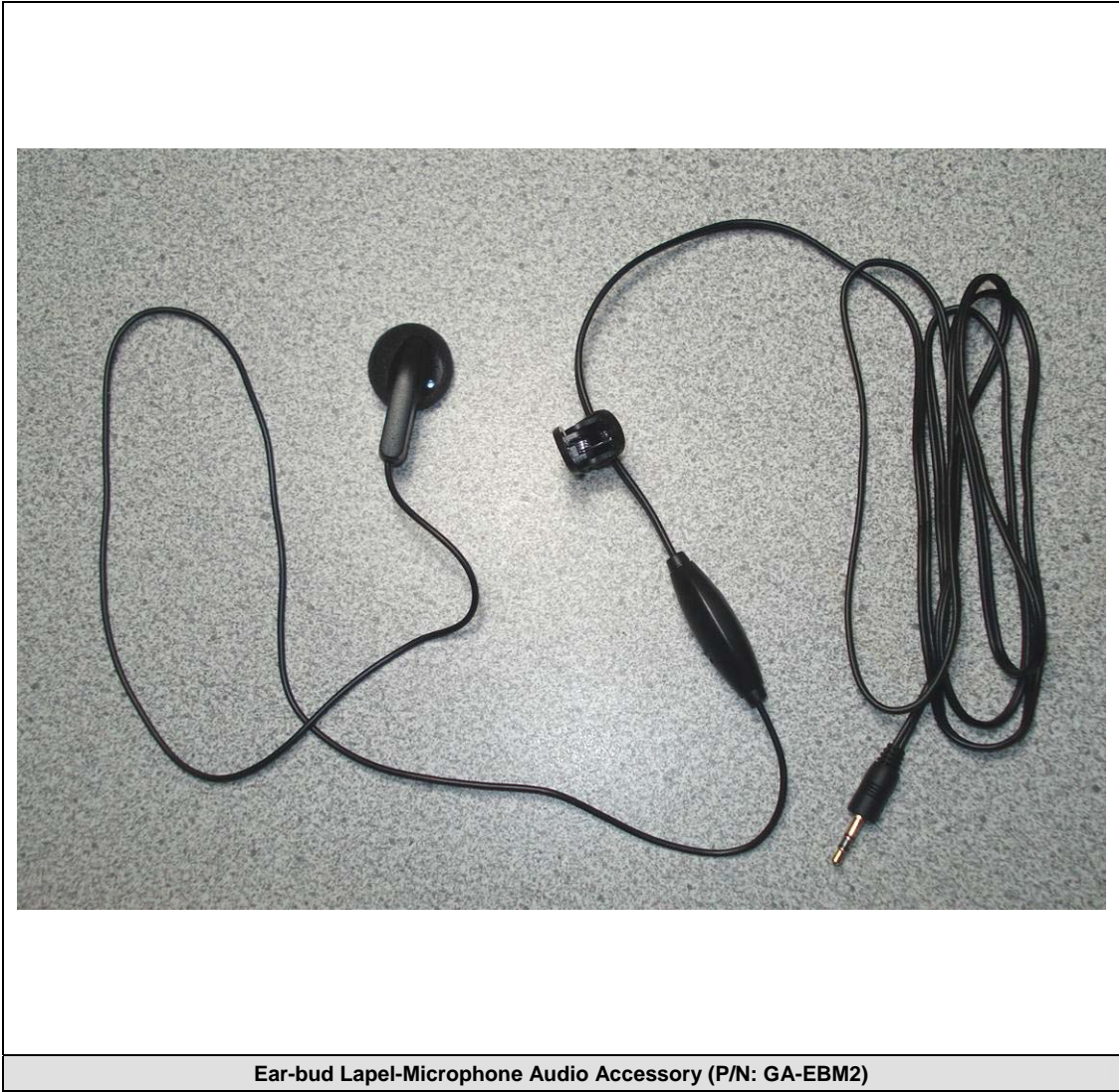
DUT PHOTOGRAPHS






Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver		Model(s):	CXT345		
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	<u>Date(s) of Evaluation</u> Jan. 29-31, 2013	<u>Test Report Serial No.</u> 012513BBO-T1216-S95	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	


DUT PHOTOGRAPHS



Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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	<u>Date(s) of Evaluation</u> Jan. 29-31, 2013	<u>Test Report Serial No.</u> 012513BBO-T1216-S95	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX E - DIPOLE CALIBRATION

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **D450V3-1068_Apr12**

CALIBRATION CERTIFICATE

Object **D450V3 - SN: 1068**

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

Calibration date: **April 27, 2012**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ET3DV6	SN: 1507	30-Dec-11 (No. ET3-1507_Dec11)	Dec-12
DAE4	SN: 654	03-May-11 (No. DAE4-654_May11)	May-12

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

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

Approved by: **Katja Pokovic** Technical Manager

Issued: April 27, 2012

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Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	450 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	43.5	0.87 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	44.1 \pm 6 %	0.87 mho/m \pm 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	398 mW input power	1.87 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	4.71 mW / g \pm 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	398 mW input power	1.25 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	3.15 mW / g \pm 17.6 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	56.7	0.94 mho/m
Measured Body TSL parameters	(22.0 \pm 0.2) °C	54.9 \pm 6 %	0.94 mho/m \pm 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	398 mW input power	1.81 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	4.52 mW / g \pm 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	398 mW input power	1.21 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	3.02 mW / g \pm 17.6 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	57.7 Ω - 4.7 j Ω
Return Loss	- 21.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	54.6 Ω - 8.1 j Ω
Return Loss	- 21.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.755 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 16, 2009

DASY5 Validation Report for Head TSL

Date: 27.04.2012

Test Laboratory: SPEAG

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

Communication System: CW; Frequency: 450 MHz

Medium parameters used: $f = 450$ MHz; $\sigma = 0.87$ mho/m; $\epsilon_r = 44.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.59, 6.59, 6.59); Calibrated: 30.12.2011;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 18.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

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

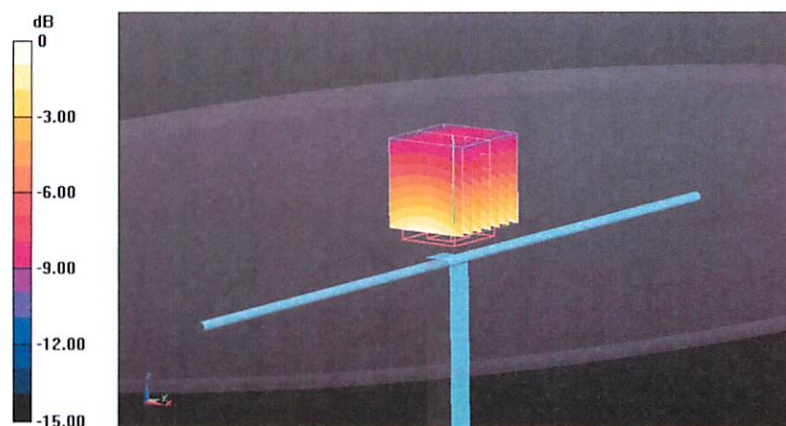
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 49.745 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 2.835 mW/g

SAR(1 g) = 1.87 mW/g; SAR(10 g) = 1.25 mW/g

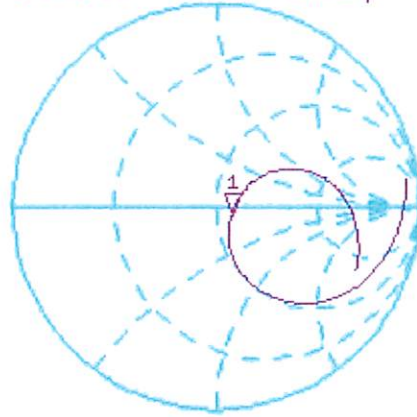
Maximum value of SAR (measured) = 2.00 mW/g



Impedance Measurement Plot for Head TSL

27 Apr 2012 11:05:00
[CH1] S11 1 U FS 1: 57.676 Ω -4.7266 Ω 74.828 pF 450.000 000 MHz

*
De l
Cor



Avg
16

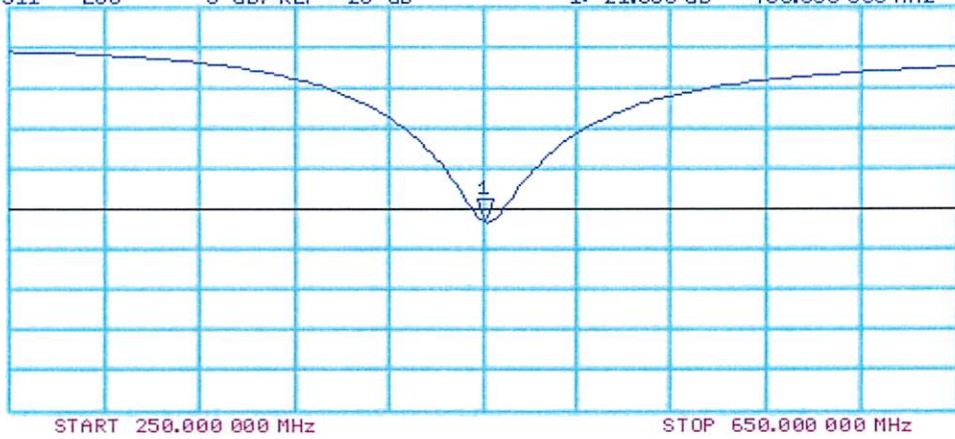
H1 d

CH2 S11 LOG 5 dB/REF -20 dB 1:-21.550 dB 450.000 000 MHz

Cor

Avg
16

H1 d



DASY5 Validation Report for Body TSL

Date: 27.04.2012

Test Laboratory: SPEAG

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

Communication System: CW; Frequency: 450 MHz

Medium parameters used: $f = 450$ MHz; $\sigma = 0.94$ mho/m; $\epsilon_r = 54.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(7.05, 7.05, 7.05); Calibrated: 30.12.2011;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 18.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

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

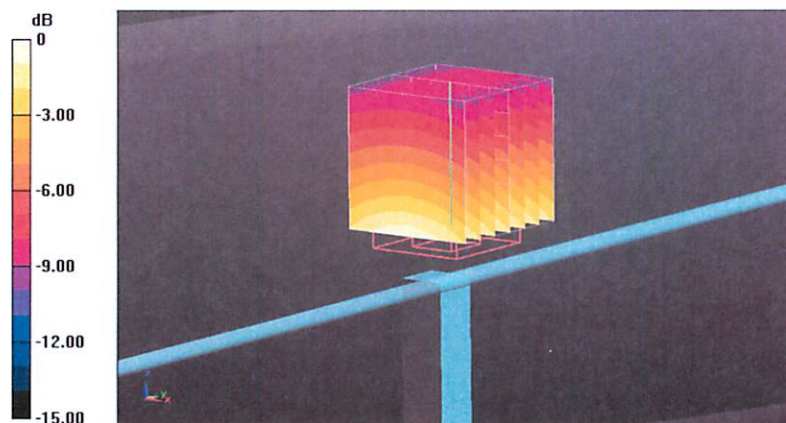
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 46.572 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 2.834 mW/g

SAR(1 g) = 1.81 mW/g; SAR(10 g) = 1.21 mW/g

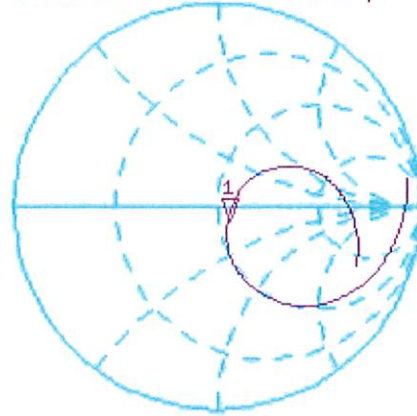
Maximum value of SAR (measured) = 1.94 mW/g



Impedance Measurement Plot for Body TSL

27 Apr 2012 10:46:42
[CH1] S11 1 U FS 1: 54.635 Ω -8.0625 Ω 43.867 pF 450.000 000 MHz

*
De1
Cor



Avg
16

H1 d



CH2 S11 LOG 5 dB/REF -20 dB 1:-21.047 dB 450.000 000 MHz

Cor


Avg
16

H1 d



	<u>Date(s) of Evaluation</u> Jan. 29-31, 2013	<u>Test Report Serial No.</u> 012513BBO-T1216-S95	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX F - PROBE CALIBRATION

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **ET3-1590_Apr12**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1590**

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

Calibration date: **April 24, 2012**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	10-Jan-12 (No. DAE4-660_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
			Issued: April 26, 2012
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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}:** Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}:** DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR:** PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}:** A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters:** Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy):** in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset:** The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1590

Manufactured: March 19, 2001
Calibrated: April 24, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.79	1.92	1.60	$\pm 10.1 \%$
DCP (mV) ^B	94.8	98.4	88.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
0	CW	0.00	X	0.00	0.00	1.00	143.4	$\pm 4.6 \%$
			Y	0.00	0.00	1.00	150.1	
			Z	0.00	0.00	1.00	179.4	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

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

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	7.54	7.54	7.54	0.20	2.16	± 13.4 %
750	41.9	0.89	7.11	7.11	7.11	0.29	3.00	± 12.0 %
835	41.5	0.90	6.77	6.77	6.77	0.27	3.00	± 12.0 %
900	41.5	0.97	6.67	6.67	6.67	0.29	3.00	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

Calibration Parameter Determined in Body Tissue Simulating Media

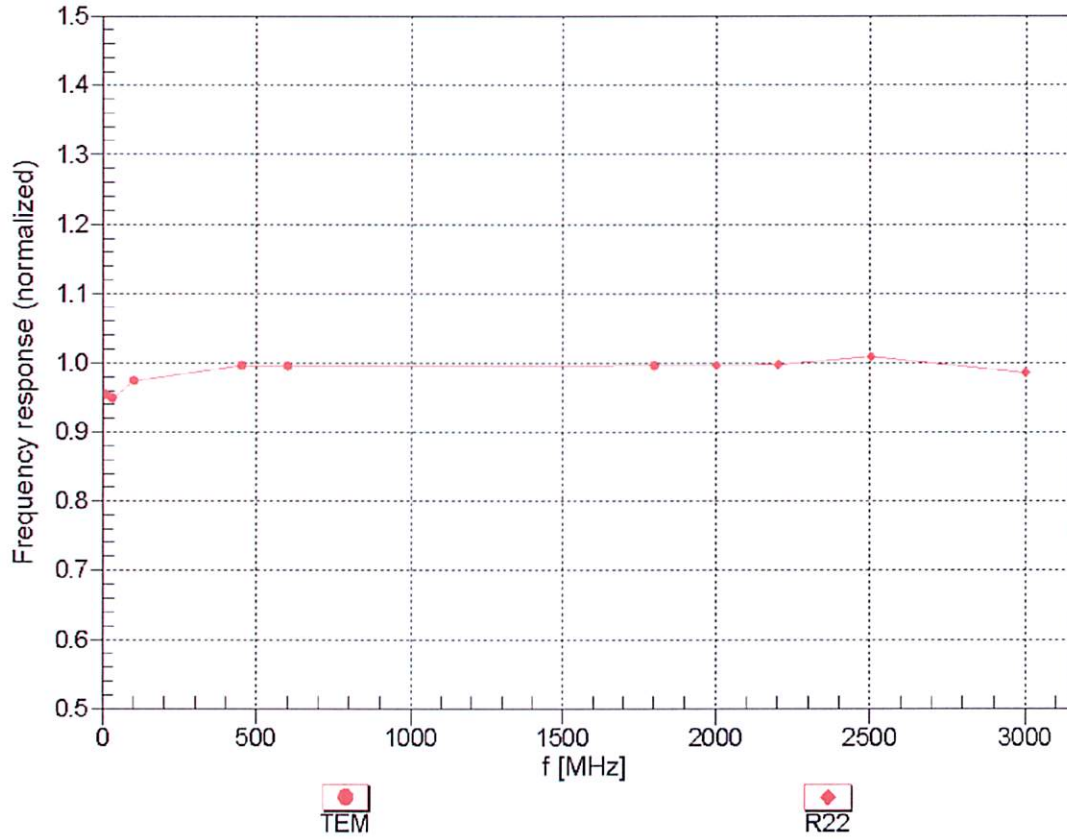
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.93	7.93	7.93	0.12	2.07	± 13.4 %
750	55.5	0.96	6.71	6.71	6.71	0.22	3.00	± 12.0 %
835	55.2	0.97	6.54	6.54	6.54	0.27	3.00	± 12.0 %
900	55.0	1.05	6.51	6.51	6.51	0.29	2.92	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

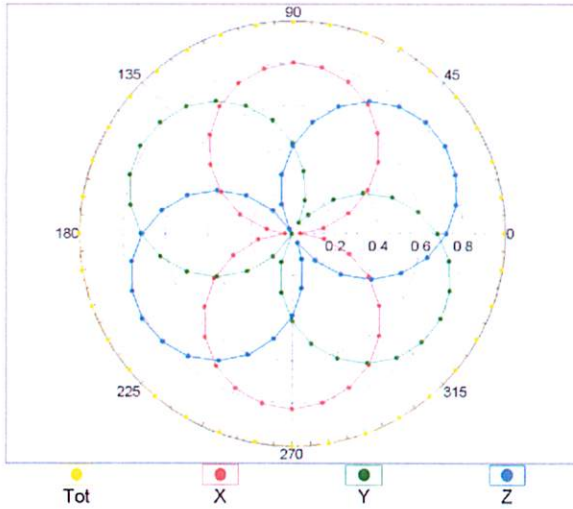
(TEM-Cell:ifi110 EXX, Waveguide: R22)



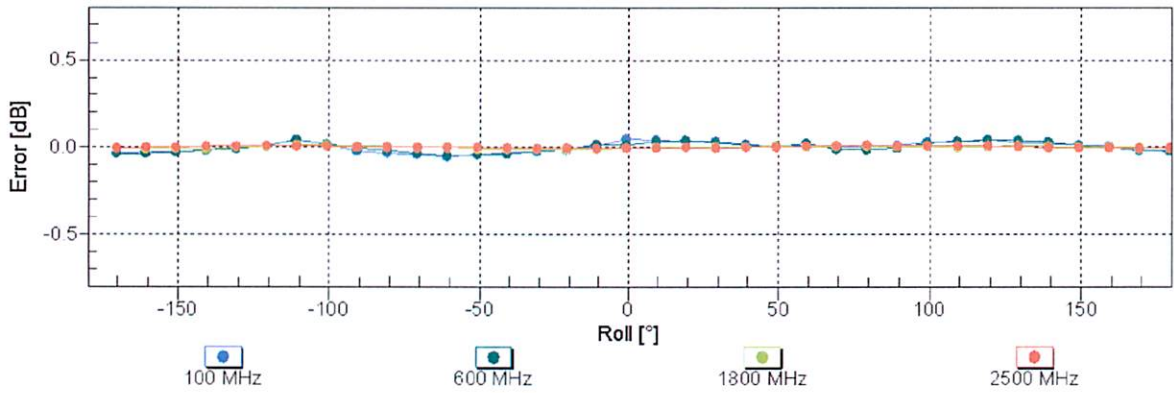
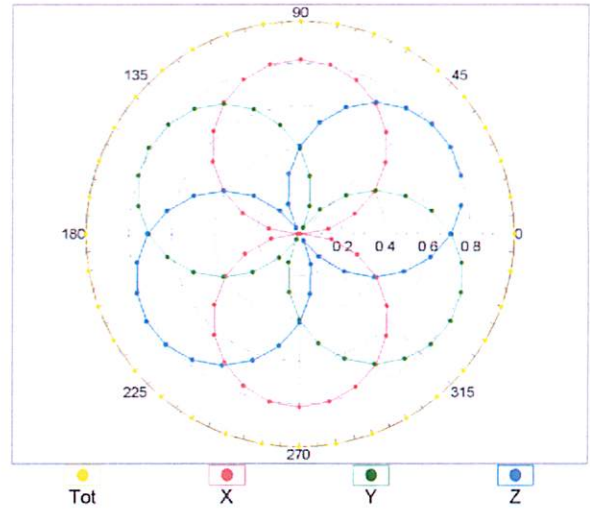
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz,TEM

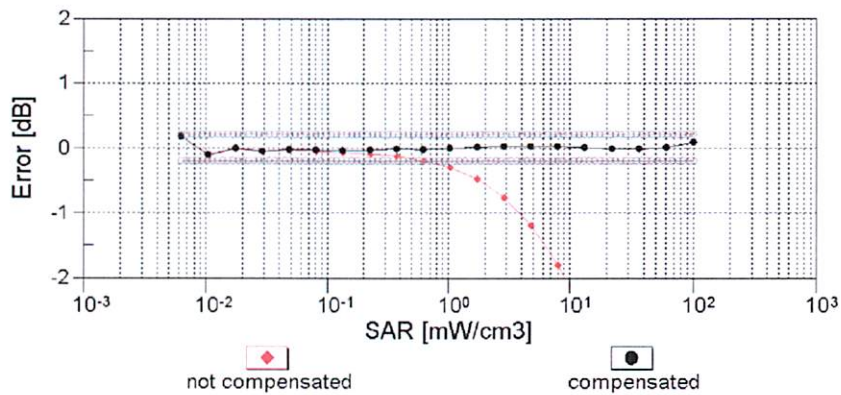
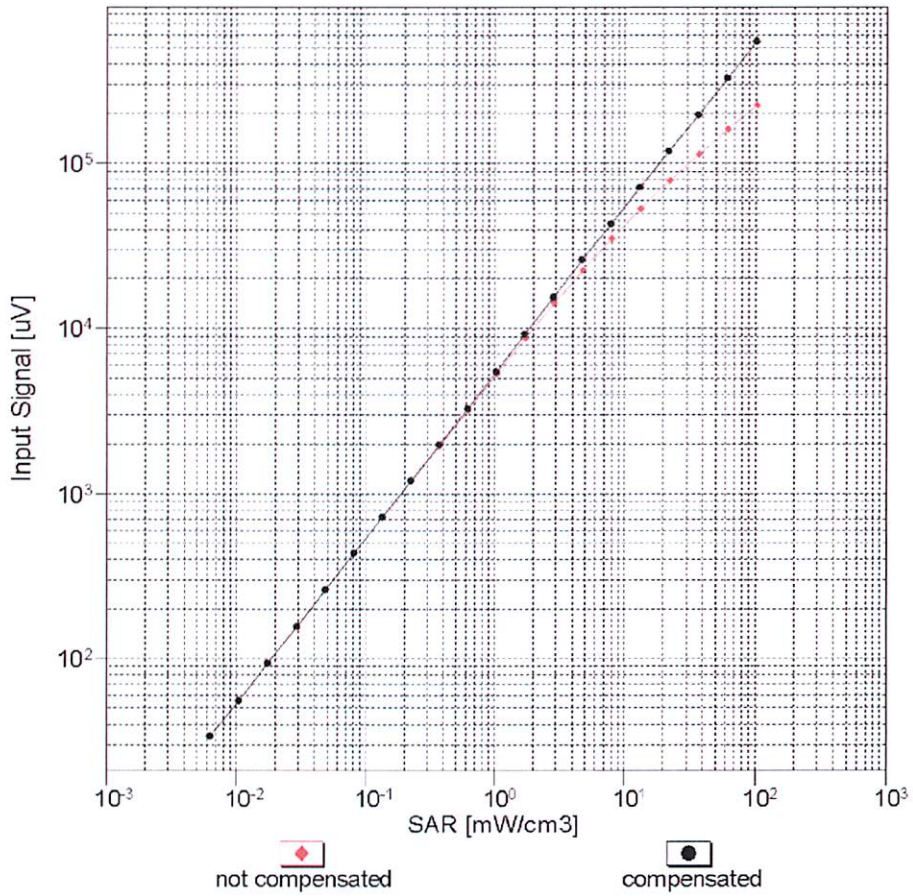


f=1800 MHz,R22



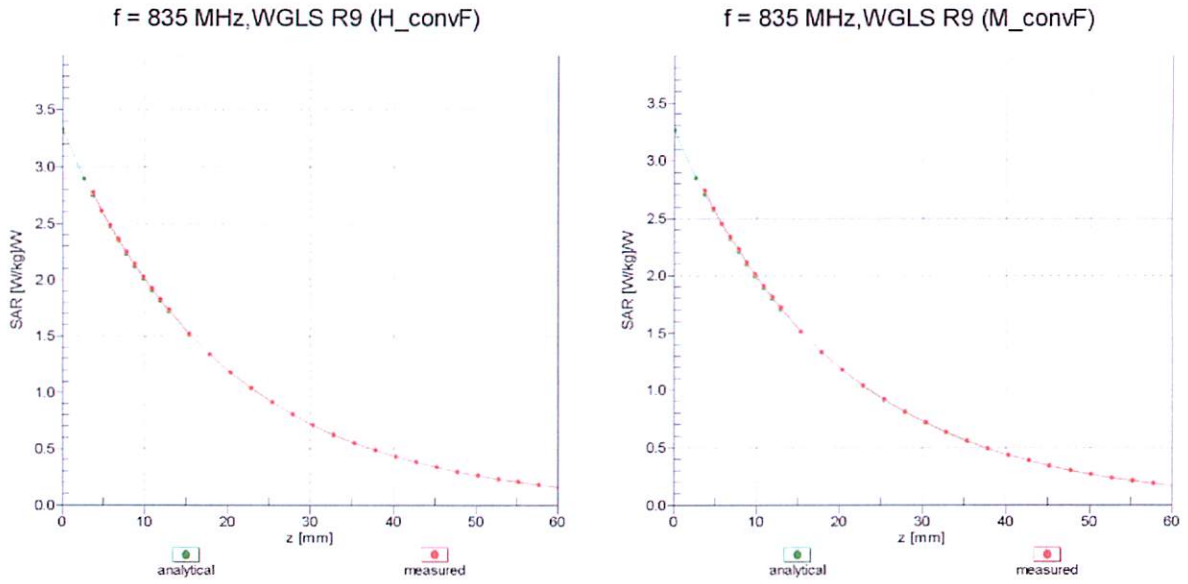
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

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

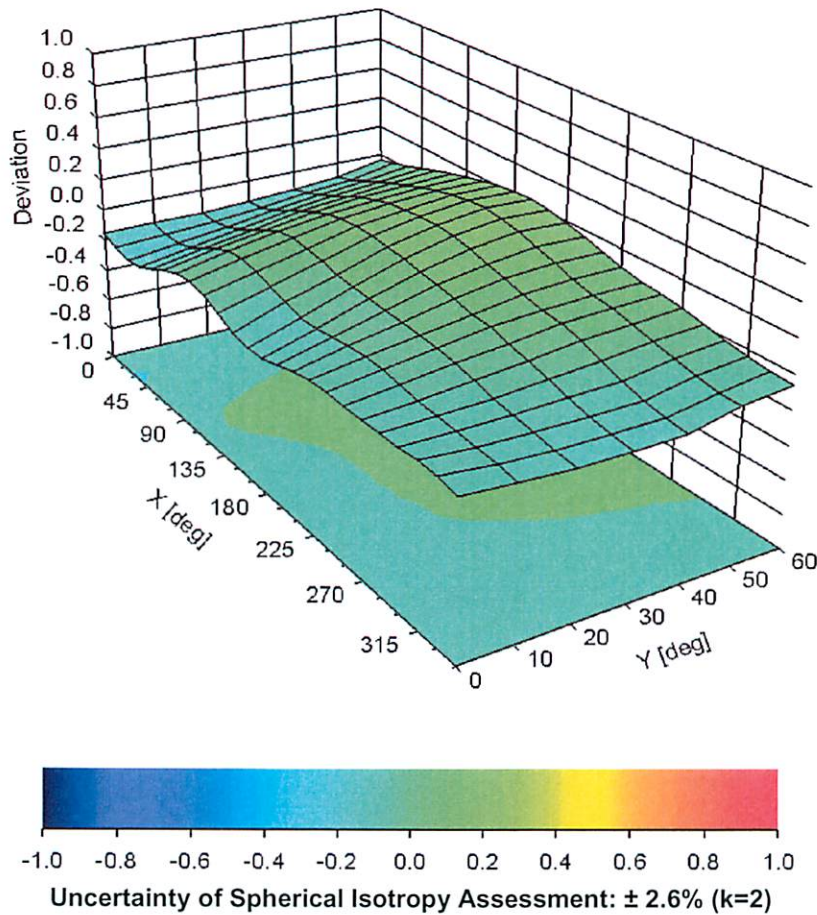


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment





Deviation from Isotropy in Liquid Error (ϕ, ϑ), f = 900 MHz




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

Sensor Arrangement	Triangular
Connector Angle (°)	-170.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

	<u>Date(s) of Evaluation</u> Jan. 29-31, 2013	<u>Test Report Serial No.</u> 012513BBO-T1216-S95	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> Feb. 4, 2013	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX G - BARSKI PLANAR PHANTOM CERTIFICATE OF CONFORMITY

Applicant:	Cobra Electronics Corporation	FCC ID:	BBO1133A	IC:	906A-1133A	
DUT Type:	Portable UHF GMRS/FRS PTT Radio Transceiver	Model(s):	CXT345			
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FIBERGLASS FABRICATORS

Certificate of Conformity

Item : Flat Planar Phantom Unit # 03-01
Date: June 16, 2003
Manufacturer: Barski Industries (1985 Ltd)

Test	Requirement	Details
Shape	Compliance to geometry according to drawing	Supplied CAD drawing
Material Thickness	Compliant with the requirements	2mm +/- 0.2mm in measurement area
Material Parameters	Dielectric parameters for required frequencies Based on Dow Chemical technical data	100 MHz-5 GHz Relative permittivity<5 Loss Tangent<0.05

Conformity

Based on the above information, we certify this product to be compliant to the requirements specified.

Signature: _____

A handwritten signature in black ink, appearing to read 'Daniel Chailier', is written over a horizontal line.

Daniel Chailier



Fiberglass Planar Phantom - Top View



Fiberglass Planar Phantom - Front View



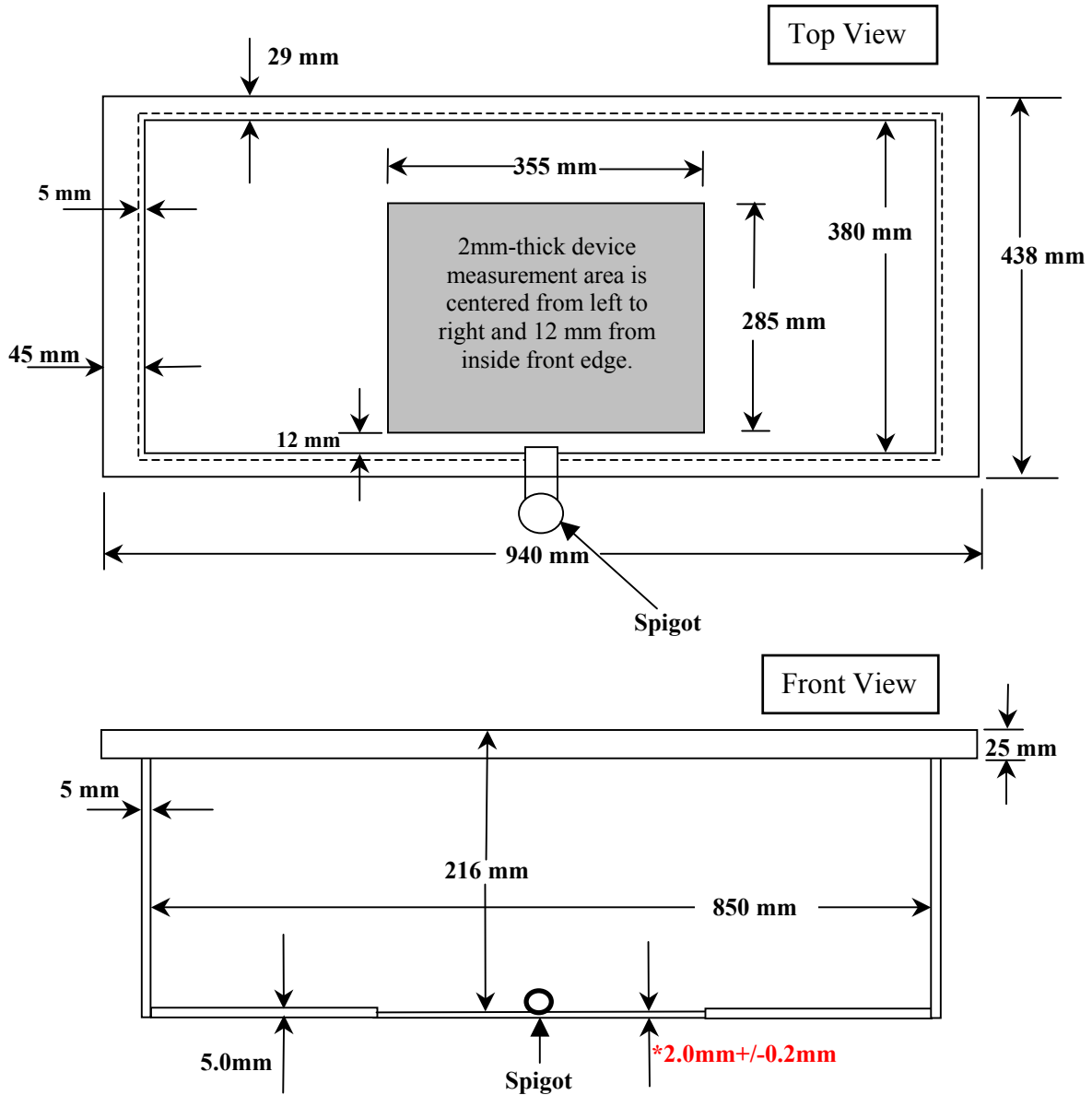
Fiberglass Planar Phantom - Back View



Fiberglass Planar Phantom - Bottom View

Dimensions of Fiberglass Planar Phantom

(Manufactured by Barski Industries Ltd. - Unit# 03-01)



**Note: Measurements that aren't repeated for the opposite sides are the same as the side measured.
This drawing is not to scale.**