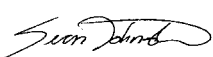


	<u>Date(s) of Evaluation</u> May 30, 2012	<u>Test Report Serial No.</u> 052912AIE-T1177-S95V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

DECLARATION OF COMPLIANCE		SAR RF EXPOSURE EVALUATION			FCC
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	RITRON INC.			
	Address	505 West Carmel Drive, Carmel, IN 46032 USA			
Standard(s) Applied	FCC	47 CFR §2.1093			
Procedure(s) Applied	FCC	KDB 447498 D01v04			
		OET Bulletin 65, Supplement C			
	IEEE	1528-2003			
Device Identifier(s)	FCC ID:	AIERIT29-150M			
Application Type	FCC Part 95(J) Certification				
Date of Sample Receipt	May 29, 2012				
Date(s) of Evaluation	May 30, 2012				
Device Description	Portable VHF MURS PTT Radio Transceiver				
Mode(s) of Operation	FM Analog				
Device Model No.	PT-150M				
Test Sample Serial No.	None (Identical Prototype)				
Transmit Frequency Range(s)	150.0 - 155.0 MHz				
Manufacturer's Rated Output Power	2 Watts (Conducted)				
Manuf. Power Tolerance Spec.	+/- 5%				
Antenna Type(s) Tested	Helical	P/N: AF-X155-PT	Length: 5.0"	150-160 MHz	
Battery Type(s) Tested	Li-Ion	7.4 VDC	1800 mAh	P/N: BP-PT18-L	
Body-worn Accessories Tested	Metal Belt-Clip			P/N: CB-PT	
Audio Accessories Tested	Speaker-Microphone			P/N: RSM-6X	
	Earbud speaker/ lapel mic/ptt			P/N: RHD-15X	
Max. SAR Level(s) Evaluated	Face-held	0.580 W/kg	1g	50% PTT duty factor	General Population / Uncontrolled
	Body-worn	0.735 W/kg	1g	50% PTT duty factor	General Population / Uncontrolled
FCC/IC Spatial Peak SAR Limit	Head & Body	1.6 W/kg	1g	50% PTT duty factor	General Population / Uncontrolled
Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 for the 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) and IEEE Standard 1528-2003. All measurements were performed in accordance with the SAR system manufacturer recommendations. I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc. The results and statements contained in this report pertain only to the device(s) evaluated.					
Test Report Approved By			Sean Johnston	Lab Manager	Celltech Labs Inc.

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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Test Lab Certificate No. 2470.01				

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Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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Test Lab Certificate No. 2470.01				

REVISION HISTORY

REVISION NO.	DESCRIPTION	IMPLEMENTED BY	RELEASE DATE
1.0	1st Release	Jon Hughes	June 01, 2012

TEST REPORT SIGN-OFF

DEVICE TESTED BY	REPORT PREPARED BY	QA REVIEW BY	REPORT APPROVED BY
Mike Meaker	Mike Meaker	Jon Hughes	Sean Johnston

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

1.0 INTRODUCTION

This measurement report demonstrates that the Ritron Inc. Model: PT-150M Portable VHF 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 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]), IEC 62209-1:2005 (see reference [6]) and IEC 62209-2:2010 (see reference [7]) 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

Band	Test Freq.	Mode	dBm	Watts	Method
VHF	151.94 MHz	CW	33.0	2.0	Average Conducted
VHF	154.57 MHz	CW	32.8	1.9	Average Conducted

Notes

1. The test channels were selected in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (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 [13]) and IC RSS-Gen (see reference [14]).

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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4.0 FCC POWER THRESHOLDS FOR PTT DEVICES ($f \leq 0.5$ GHz)

FCC SAR Evaluation Power Thresholds for PTT Devices, $f \leq 0.5$ GHz*		
Exposure Conditions	P mW (General Population)	P mW (Occupational)
Held to face, $d \geq 2.5$ cm	250	1250
Body-worn, $d \geq 1.5$ cm	200	1000
Body-worn, $d \geq 1.0$ cm	150	750
1. The time-averaged output power, corresponding to the required PTT duty factor, is compared with these thresholds. 2. The closest distance between the user and the device or its antenna is used to determine the power thresholds. * Per FCC KDB 447498 D01v04 Section 5)b)i) (see reference [8]).		

5.0 SAR PROBE CALIBRATION & MEASUREMENT FREQUENCIES

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

Probe Calibration Freq.	Device Measurement Freq.	Frequency Interval	± 25 MHz ≤ 300 MHz
150 MHz	151.94 MHz	1.94 MHz	< 25 MHz
Note: The probe calibration and measurement frequency interval is < 25 MHz; therefore additional steps were not required.			

6.0 NO. OF TEST CHANNELS (N_c)

Antenna Part No.	Antenna Test Frequency Range	Band	N_c	Test Frequencies
AF-X155-PT	150 - 155 MHz	FCC	1	151.94 MHz
Note: The number of test channels (N_c) were calculated in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (see reference [8]).				

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver	Transmitter Freq. Range:		150.0 - 155.0 MHz		
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7.0 FLUID DIELECTRIC PARAMETERS

FLUID DIELECTRIC PARAMETERS						
Date: 05/29/2012		Frequency: 300 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.200	52.43	0.77	45.3	0.87	15.74%	-11.49%
0.210	51.23	0.77	45.3	0.87	13.09%	-11.49%
0.220	50.43	0.79	45.3	0.87	11.32%	-9.20%
0.230	49.95	0.8	45.3	0.87	10.26%	-8.05%
0.240	49.5	0.8	45.3	0.87	9.27%	-8.05%
0.250	46.95	0.8	45.3	0.87	3.64%	-8.05%
0.260	48.71	0.82	45.3	0.87	7.53%	-5.75%
0.270	47.07	0.82	45.3	0.87	3.91%	-5.75%
0.280	46.41	0.84	45.3	0.87	2.45%	-3.45%
0.290	45.94	0.84	45.3	0.87	1.41%	-3.45%
0.300	46.24	0.85	45.3	0.87	2.08%	-2.30%
0.310	45.89	0.85	45.3	0.87	1.30%	-2.30%
0.320	45.49	0.87	45.3	0.87	0.42%	0.00%
0.330	45.44	0.88	45.3	0.87	0.31%	1.15%
0.340	45.23	0.88	45.3	0.87	-0.15%	1.15%
0.350	44.62	0.89	45.3	0.87	-1.50%	2.30%
0.360	44.18	0.9	45.3	0.87	-2.47%	3.45%
0.370	43.46	0.9	45.3	0.87	-4.06%	3.45%
0.380	43.69	0.91	45.3	0.87	-3.55%	4.60%
0.390	43.92	0.93	45.3	0.87	-3.05%	6.90%
0.400	43.65	0.94	45.3	0.87	-3.64%	8.05%

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
May 29	300 Head	23.0°C	22.4°C	≥ 15 cm	101.1 kPa	30%	1000

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	
Test Lab Certificate No. 2470.01				

FLUID DIELECTRIC PARAMETERS						
Date: 05/30/2012		Frequency: 150 MHz			Tissue: Body	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	141.57	0.61	61.9	0.8	128.71%	-23.75%
0.060	105.31	0.64	61.9	0.8	70.13%	-20.00%
0.070	87.19	0.67	61.9	0.8	40.86%	-16.25%
0.080	77.96	0.67	61.9	0.8	25.95%	-16.25%
0.090	73.13	0.71	61.9	0.8	18.14%	-11.25%
0.100	74.74	0.72	61.9	0.8	20.74%	-10.00%
0.110	72.93	0.74	61.9	0.8	17.82%	-7.50%
0.120	70.95	0.75	61.9	0.8	14.62%	-6.25%
0.130	68.06	0.75	61.9	0.8	9.95%	-6.25%
0.140	66.48	0.76	61.9	0.8	7.40%	-5.00%
0.150	63.68	0.76	61.9	0.8	2.88%	-5.00%
0.15194*	63.8	0.76	61.9	0.8	3.07%	-5.00%
0.160	64.21	0.76	61.9	0.8	3.73%	-5.00%
0.170	64.86	0.77	61.9	0.8	4.78%	-3.75%
0.180	63.98	0.76	61.9	0.8	3.36%	-5.00%
0.190	63.86	0.78	61.9	0.8	3.17%	-2.50%
0.200	62.23	0.78	61.9	0.8	0.53%	-2.50%
0.210	61.65	0.8	61.9	0.8	-0.40%	0.00%
0.220	60.9	0.79	61.9	0.8	-1.62%	-1.25%
0.230	59.16	0.8	61.9	0.8	-4.43%	0.00%
0.240	60.89	0.8	61.9	0.8	-1.63%	0.00%
0.250	59.79	0.82	61.9	0.8	-3.41%	2.50%

* Interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
May 30	150 Body	23.0°C	22.2°C	≥ 15 cm	101.1 kPa	30%	1000

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver	Transmitter Freq. Range:		150.0 - 155.0 MHz		
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FLUID DIELECTRIC PARAMETERS						
Date: 05/30/2012		Frequency: 150 MHz			Tissue: Head	
Freq	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
0.050	134.18	0.59	52.3	0.76	156.56%	-22.37%
0.060	98.1	0.62	52.3	0.76	87.57%	-18.42%
0.070	78.93	0.64	52.3	0.76	50.92%	-15.79%
0.080	71.14	0.65	52.3	0.76	36.02%	-14.47%
0.090	64.61	0.69	52.3	0.76	23.54%	-9.21%
0.100	67.96	0.7	52.3	0.76	29.94%	-7.89%
0.110	64.84	0.73	52.3	0.76	23.98%	-3.95%
0.120	62.13	0.73	52.3	0.76	18.80%	-3.95%
0.130	58.18	0.74	52.3	0.76	11.24%	-2.63%
0.140	57.97	0.75	52.3	0.76	10.84%	-1.32%
0.150	54.72	0.75	52.3	0.76	4.63%	-1.32%
0.15194*	54.9	0.752	52.3	0.76	4.97%	-1.05%
0.160	55.42	0.76	52.3	0.76	5.97%	0.00%
0.170	54.46	0.76	52.3	0.76	4.13%	0.00%
0.180	55.53	0.77	52.3	0.76	6.18%	1.32%
0.190	53.65	0.79	52.3	0.76	2.58%	3.95%
0.200	52.3	0.79	52.3	0.76	0.00%	3.95%
0.210	52.35	0.81	52.3	0.76	0.10%	6.58%
0.220	50.99	0.81	52.3	0.76	-2.50%	6.58%
0.230	50.04	0.82	52.3	0.76	-4.32%	7.89%
0.240	50.67	0.82	52.3	0.76	-3.12%	7.89%
0.250	49.08	0.83	52.3	0.76	-6.16%	9.21%

*Interpolated using DASY4 software

Test Date	Fluid Type	Ambient Temperature	Fluid Temperature	Fluid Depth	Atmospheric Pressure	Relative Humidity	ρ (Kg/m ³)
May 30	150 Head	23.0°C	22.3°C	≥ 15 cm	101.1 kPa	30%	1000

	<u>Date(s) of Evaluation</u> May 30, 2012	<u>Test Report Serial No.</u> 052912AIE-T1177-S95V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
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Test Lab Certificate No. 2470.01				

8.0 SAR MEASUREMENT SUMMARY

SAR EVALUATION RESULTS

Test Config.	Test Mode	Test Freq.	Cond. Power Before Test	Accessories		DUT Distance to Planar Phantom		Measured SAR (before droop) 1g (W/kg)		SAR Drift During Test	Scaled SAR (with droop) 1g (W/kg)	
		PTT Duty Factor						PTT Duty Factor				
		MHz	Watts	Body-worn	Audio	DUT	Antenna	100%	50%		dB	100%
FACE	CW	151.94	2.0	n/a	n/a	2.5 cm	3.7 cm	1.16	0.580	-0.227	1.22	0.611
BODY	CW	151.94	2.0	Belt-Clip	Spkr-Mic	1.5 cm	2.0 cm	1.47	0.735	0.269	n/a	n/a
	CW	151.94	2.0	Belt-Clip	Earbud	1.5 cm	2.0 cm	1.19	0.595	-0.151	1.23	0.616
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 was added to the measured SAR level to report the scaled SAR result as shown in the above test data table.
- The DUT was evaluated for SAR in an unmodulated continuous transmit operation (Continuous Wave mode at 100% duty cycle) with the transmit key constantly depressed. For a push-to-talk device the 50% duty cycle compensation reported assumes a transmit/receive cycle of equal time base.

9.0 SAR SCALING (MANUFACTURER'S TUNE-UP TOLERANCE)

MAX. SAR LEVELS SCALED TO MANUF. MAXIMUM TOLERANCE SPECIFICATION

Test Config.	Test Freq. (MHz)	Test Config.	Measured Conducted Power (dBm)	Max. Rated Conducted Power inc. Upper Tol. (dBm)	Measured SAR Level 1g (W/kg) (50% PTT d/f)	Scaling up to Max. Power inc. Tolerance (2.1 Watts)	Scaled SAR 1g (W/kg) (50% PTT d/f)
Face-held	151.94	Face	33.0	33.2	0.580	+0.2 dB	0.607
Body-worn	151.94	Body	33.0	33.2	0.735	+0.2 dB	0.770

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	
Test Lab Certificate No. 2470.01				

10.0 DETAILS OF SAR EVALUATION

- The number of test channels evaluated for SAR were selected in accordance with the procedures described in FCC KDB 447498 Section 6) c) (see reference [8]).
- The DUT was evaluated in face-held configuration with the front of the device placed parallel to the outer surface of the planar phantom. A 2.5 cm spacing was maintained between the front side of the DUT and the outer surface of the planar phantom.
- The DUT was evaluated in body-worn configuration with the metal belt-clip accessory installed on the radio with the audio accessory connected to the audio input connector. The back of the DUT was placed parallel to the outer surface of the planar phantom and the belt-clip accessory was touching the outer surface of the planar phantom.
- The SAR evaluations were performed with a fully charged battery.
- The SAR drift 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).
- The fluid temperature remained within $\pm 2^{\circ}\text{C}$ from the fluid dielectric parameter measurement to the completion of the SAR evaluation.
- 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).
- 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.

11.0 SAR EVALUATION PROCEDURES

- 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.
 - For body-worn and face-held devices a planar phantom was used.
- 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:
 - 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.
 - 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:
 - 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.
 - 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).
 - 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:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver	Transmitter Freq. Range:		150.0 - 155.0 MHz		
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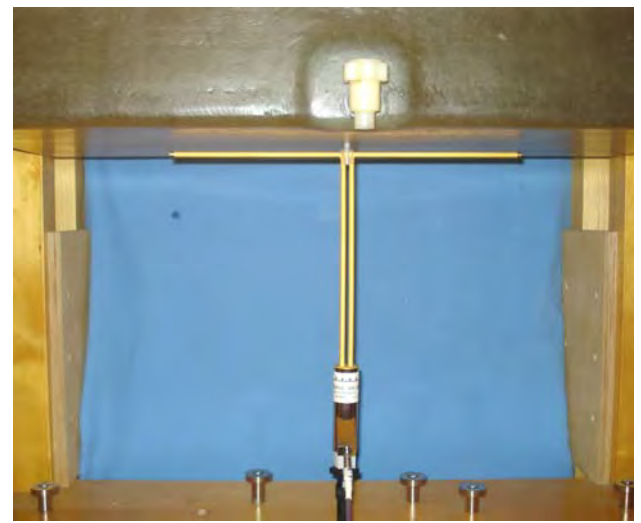
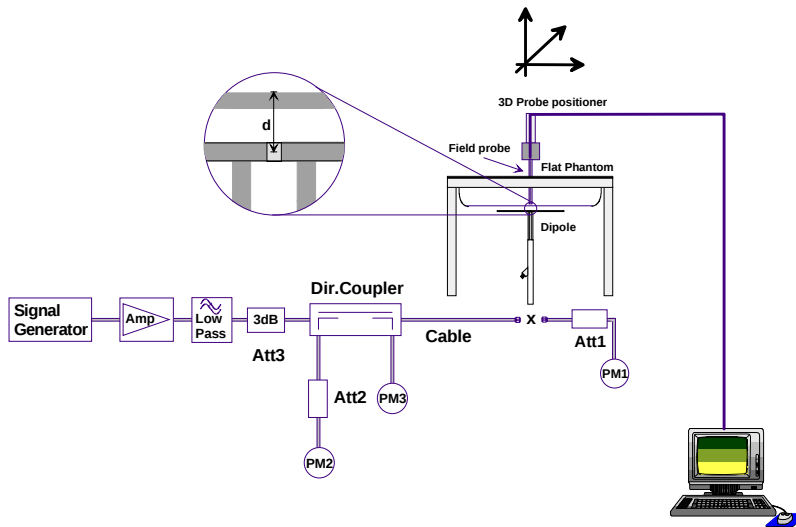
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12.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations, a system check was performed with a planar phantom and 300 MHz SPEAG dipole (see Appendix B for system performance check test plots) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [5]). 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 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 Freq. (MHz)	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)
		Target	Meas.	Dev.	Target	Meas.	Dev.	Target	Meas.	Dev.						
May 29	Head 300	1.17 $\pm 10\%$	1.22	+4.3%	45.3 $\pm 5\%$	46.2	+2.1%	0.87 $\pm 5\%$	0.85	-2.3%	1000	23.0	22.4	≥ 15	30	101.1
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 fluid dielectric parameters are the nominal values specified by the SAR system manufacturer in the dipole calibration (see Appendix E) and IEEE Standard 1528-2003.														
	3.	The fluid temperature remained within $\pm 2^\circ\text{C}$ from the fluid dielectric parameter measurement to the completion of the system performance check.														
	4.	The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C).														
	5.	The DUT SAR evaluations were performed within 24 hours of the system performance check.														



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

300 MHz SPEAG Validation Dipole Setup

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DUT Type:	Portable VHF MURS PTT Radio Transceiver	Transmitter Freq. Range:	150.0 - 155.0 MHz			
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13.0 SIMULATED EQUIVALENT TISSUES

The simulated equivalent tissue recipes in the table below are derived from the SAR system manufacturer's suggested recipes in the DASY4 manual (see references [10] and [11]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2003 (see reference [5]). The ingredient percentage may have been adjusted minimally in order to achieve the appropriate target dielectric parameters within the specified tolerance.

SIMULATED TISSUE MIXTURES							
INGREDIENT	Water	300 MHz HEAD Tissue Mixture	37.56 %	150 MHz HEAD Tissue Mixture	38.35 %	150 MHz BODY Tissue Mixture	46.6 %
	Sugar		55.32 %		55.5%		49.7 %
	Salt		5.95 %		5.15%		2.6 %
	HEC		0.98 %		0.9%		1.0 %
	Bactericide		0.19 %		0.1%		0.1 %

14.0 SAR LIMITS

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

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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15.0 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 44
	Postprocessing Software: SEMCAD, V1.8 Build 171
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 1</u>	
Type	Side Planar Phantom
Shell Material	Plexiglass
Bottom Thickness	2.0 mm ± 0.1 mm
Inner Dimensions	72.6 cm (L) x 20.3 cm (W) x 20.3 cm (H)
<u>Phantom 2</u>	
Type	Barski Planar Phantom
Shell Material	Fiberglass
Thickness	2.0 ±0.1 mm
Volume	Approx. 70 liters

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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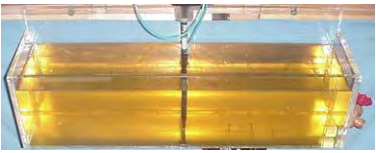
	<u>Date(s) of Evaluation</u> May 30, 2012	<u>Test Report Serial No.</u> 052912AIE-T1177-S95V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
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16.0 PROBE SPECIFICATION

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

17.0 PHANTOM(S)

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

The side planar phantom is constructed of Plexiglas material with a 2.0 mm shell thickness for face-held and body-worn SAR evaluations of portable radio transceivers. The side planar phantom is mounted on the side of the DASY4 compact system table.	
	Plexiglas Side Planar Phantom

18.0 DEVICE HOLDER

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

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver	Transmitter Freq. Range:	150.0 - 155.0 MHz			
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19.0 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
-D300V3 Validation Dipole	00220	1009	17-Apr-12	Triennial
Side Planar Phantom	00156	161	CNR	CNR
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 5S1G4 Power Amplifier	00106	26235	CNR	CNR
CNR = Calibration Not Required				

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20.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION									
Uncertainty Component	IEEE 1528 Section	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value ±% (1g)	Uncertainty Value ±% (10g)	V _i or V _{eff}
Measurement System									
Probe Calibration (150 MHz)	E.2.1	10.0	Normal	1	1	1	10.0	10.0	∞
Axial Isotropy	E.2.2	4.7	Rectangular	1.732050808	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	Rectangular	1.732050808	0.7	0.7	3.9	3.9	∞
Boundary Effect	E.2.3	2.5	Rectangular	1.732050808	1	1	1.4	1.4	∞
Linearity	E.2.4	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	Normal	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	Rectangular	1.732050808	1	1	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3	Rectangular	1.732050808	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell	E.6.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Extrapolation, interpolation & integration algorithms for max. SAR evaluation	E.5	1	Rectangular	1.732050808	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.9	Normal	1	1	1	2.9	2.9	12
Device Holder Uncertainty	E.4.1	3.6	Normal	1	1	1	3.6	3.6	8
SAR Drift Measurement	6.6.2	5	Rectangular	1.732050808	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4	Rectangular	1.732050808	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5	Rectangular	1.732050808	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measured)	E.3.3	5	Normal	1	0.64	0.43	3.2	2.2	∞
Liquid Permittivity (target)	E.3.2	5	Rectangular	1.732050808	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measured)	E.3.3	4.97	Normal	1	0.6	0.49	3.0	2.4	∞
Combined Standard Uncertainty			RSS				14.06	13.65	
Expanded Uncertainty (95% Confidence Interval)			k=2				28.13	27.30	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003									

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

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21.0 REFERENCES

- [1] Federal Communications Commission - "Radiofrequency radiation exposure evaluation: portable devices", Rule Part 47 CFR §2.1093.
- [2] Health Canada - "Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz", Safety Code 6: 1999.
- [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 D01v04: November 2009.
- [9] Federal Communications Commission, Office of Engineering and Technology - "Application Note: SAR Probe Calibration and System Verification Considerations for Measurements at 150 MHz - 3 GHz"; KDB 450824 D01 v01r01: January 2007.
- [10] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 16 Application Note, Head Tissue Recipe: Sept. 2005.
- [11] Schmid & Partner Engineering AG - DASY4 Manual V4.6, Chapter 17 Application Note, Body Tissue Recipe: Sept. 2005.
- [12] ISO/IEC 17025 - "General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005).
- [13] Federal Communications Commission - "Measurements Required: RF Power Output"; Rule Part 47 CFR §2.1046.
- [14] Industry Canada - "General Requirements and Information for the Certification of Radiocommunication Equipment", Radio Standards Specification RSS-Gen Issue 3: December 2010.

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APPENDIX A - SAR MEASUREMENT PLOTS

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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Test Lab Certificate No. 2470.01				

Face-held SAR

Date Tested: 05/30/2012

DUT: Ritron PT-150M; Type: VHF MURS PTT Radio Transceiver; Serial: None (pre-production)

Program Notes: Ambient Temp: 23C; Fluid Temp: 22.3C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 151.94 MHz; Duty Cycle: 1:1

Medium: HSL150 Medium parameters used (interpolated): $f = 151.94 \text{ MHz}$; $\sigma = 0.752 \text{ mho/m}$; $\epsilon_r = 54.9$; $\rho = 1000 \text{ kg/m}^3$

- 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: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Face - 151.94 MHz/Area Scan (7x19x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.19 mW/g

Face - 151.94 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

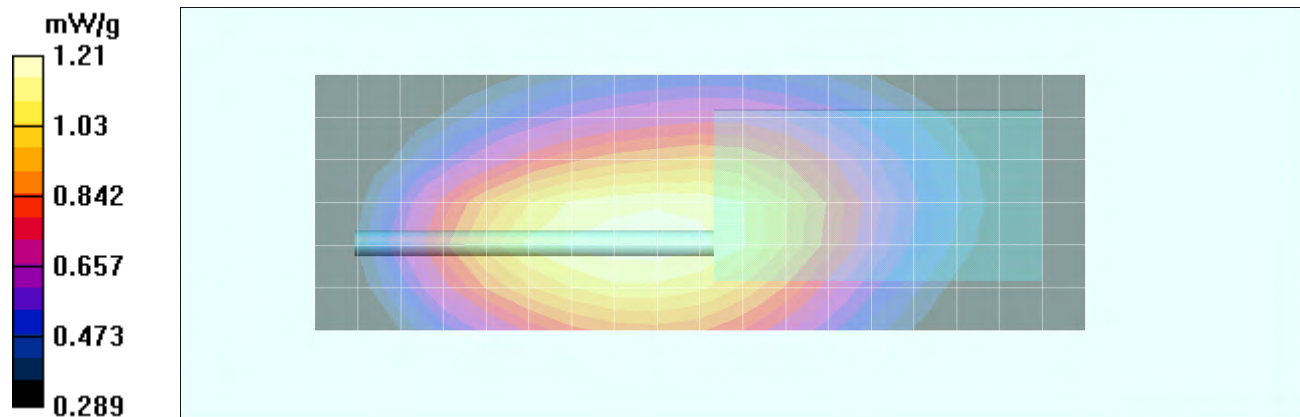
Reference Value = 39.2 V/m; Power Drift = -0.227 dB

Peak SAR (extrapolated) = 1.73 W/kg

SAR(1 g) = 1.16 mW/g; SAR(10 g) = 0.886 mW/g

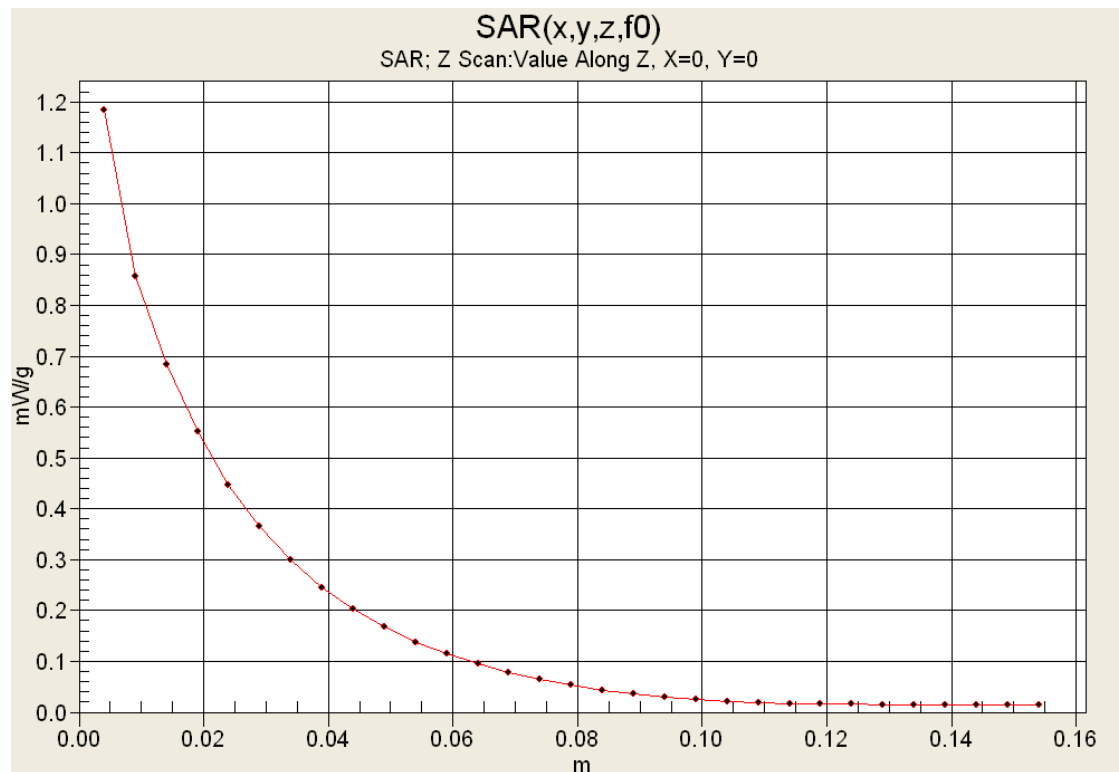
Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.21 mW/g



Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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Z-axis Scan



	<u>Date(s) of Evaluation</u> May 30, 2012	<u>Test Report Serial No.</u> 052912AIE-T1177-S95V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	
Test Lab Certificate No. 2470.01				

Body SAR - Belt-Clip - Speaker-Mic

Date Tested: 05/30/2012

DUT: Ritron PT-150M; Type: VHF MURS PTT Radio Transceiver; Serial: None (pre-production)

Program Notes: Ambient Temp: 23C; Fluid Temp: 22.2C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 151.94 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 151.94 \text{ MHz}$; $\sigma = 0.76 \text{ mho/m}$; $\epsilon_r = 63.8$; $\rho = 1000 \text{ kg/m}^3$

- 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: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Body - Belt-clip - Speaker-mic/Area Scan (7x19x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.24 mW/g

Body - Belt-clip - Speaker-mic/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

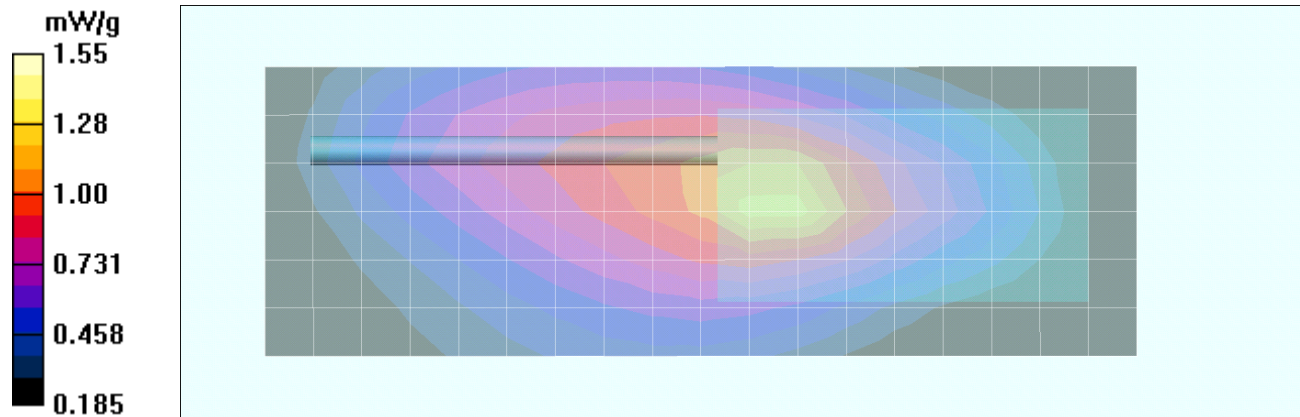
Reference Value = 37.2 V/m; Power Drift = 0.269 dB

Peak SAR (extrapolated) = 3.47 W/kg

SAR(1 g) = 1.47 mW/g; SAR(10 g) = 0.898 mW/g

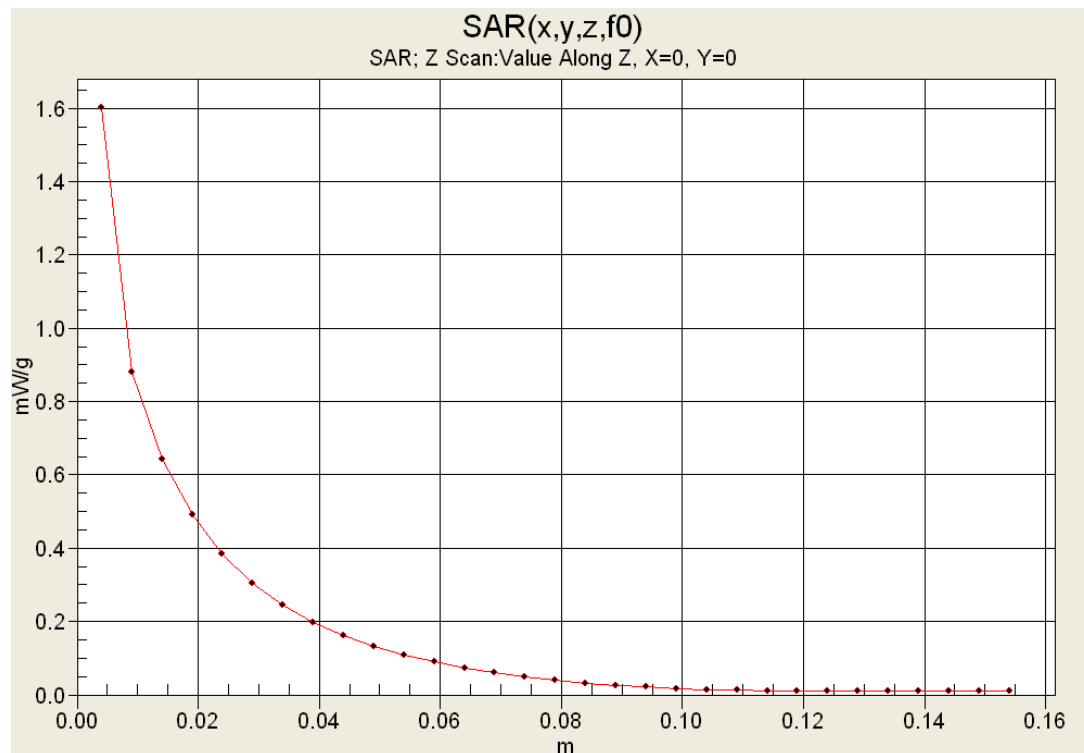
Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.55 mW/g

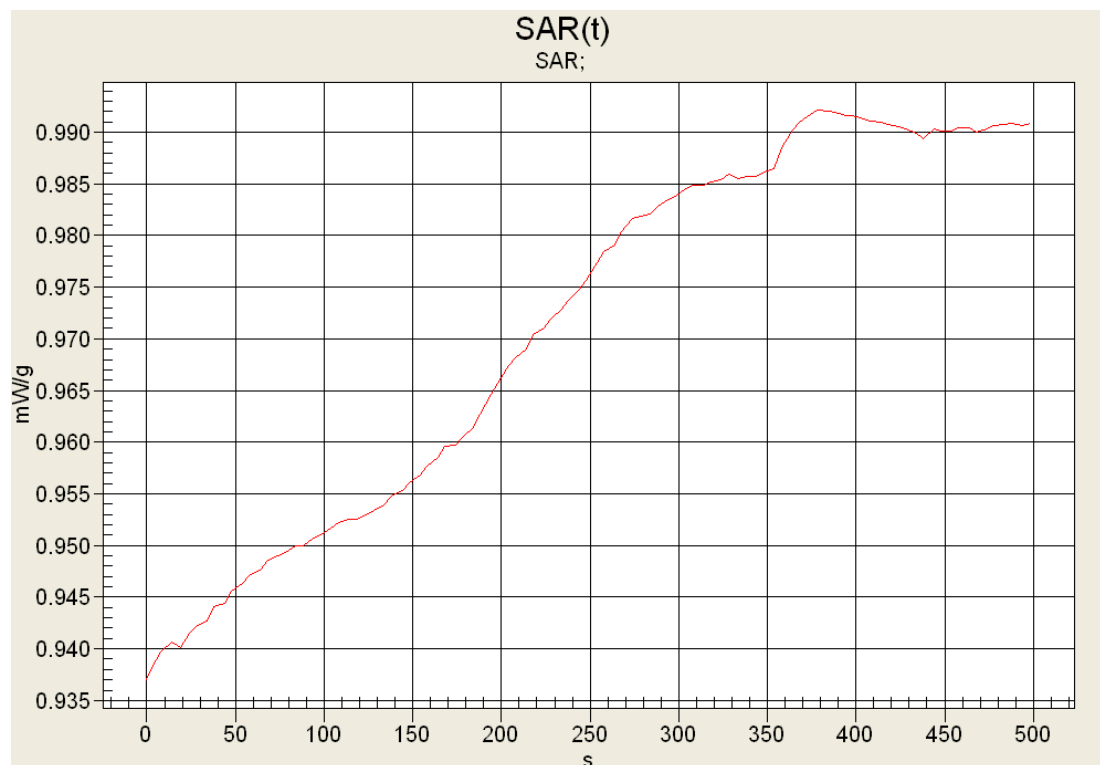


Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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Z-axis Scan



SAR vs Time



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	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	
Test Lab Certificate No. 2470.01				

Body SAR - Belt-Clip - Earbud

Date Tested: 05/30/2012

DUT: Ritron PT-150M; Type: VHF MURS PTT Radio Transceiver; Serial: None (pre-production)

Program Notes: Ambient Temp: 23C; Fluid Temp: 22.2C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 151.94 MHz; Duty Cycle: 1:1

Medium: M150 Medium parameters used (interpolated): $f = 151.94 \text{ MHz}$; $\sigma = 0.76 \text{ mho/m}$; $\epsilon_r = 63.8$; $\rho = 1000 \text{ kg/m}^3$

- 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: Side Planar; Type: Plexiglass; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

151.94 MHz - Belt-clip - Earbud/Area Scan (7x19x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.15 mW/g

151.94 MHz - Belt-clip - Earbud/Zoom Scan 2 (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

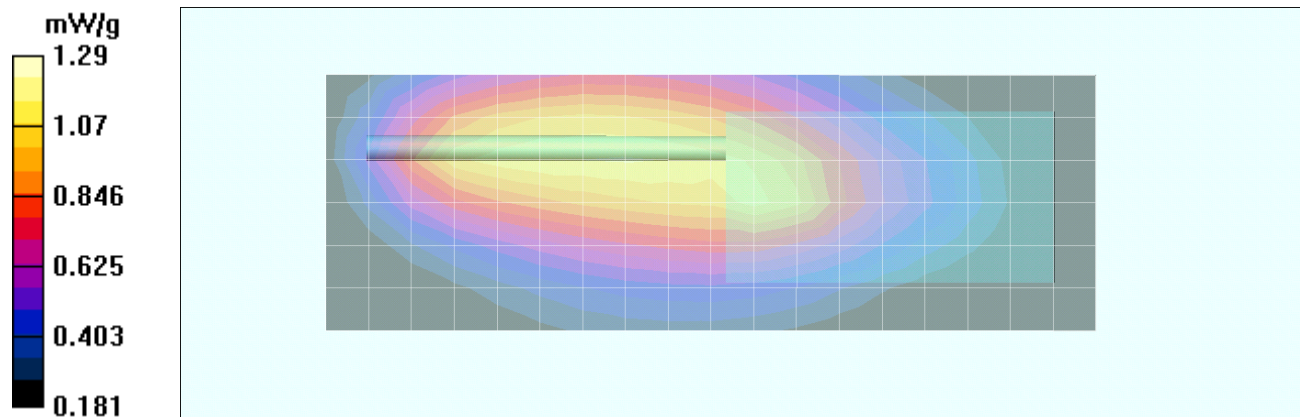
Reference Value = 37.5 V/m; Power Drift = -0.151 dB

Peak SAR (extrapolated) = 2.45 W/kg

SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.780 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.29 mW/g



Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver	Transmitter Freq. Range:		150.0 - 155.0 MHz		
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	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX B - SYSTEM PERFORMANCE CHECK PLOT

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	
Test Lab Certificate No. 2470.01				

Date Tested: 05/29/2012

System Performance Check - 300 MHz Dipole - Head

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

Program Notes: Ambient Temp: 23C; Fluid Temp: 22.4C; Barometric Pressure: 101.1 kPa; Humidity: 30%

Communication System: CW

Frequency: 300 MHz; Duty Cycle: 1:1

Medium: 300 HSL Medium parameters used: $f = 300 \text{ MHz}$; $\sigma = 0.85 \text{ mho/m}$; $\epsilon_r = 46.2$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1590; ConvF(8.3, 8.3, 8.3); 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 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Area Scan (6x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.22 mW/g

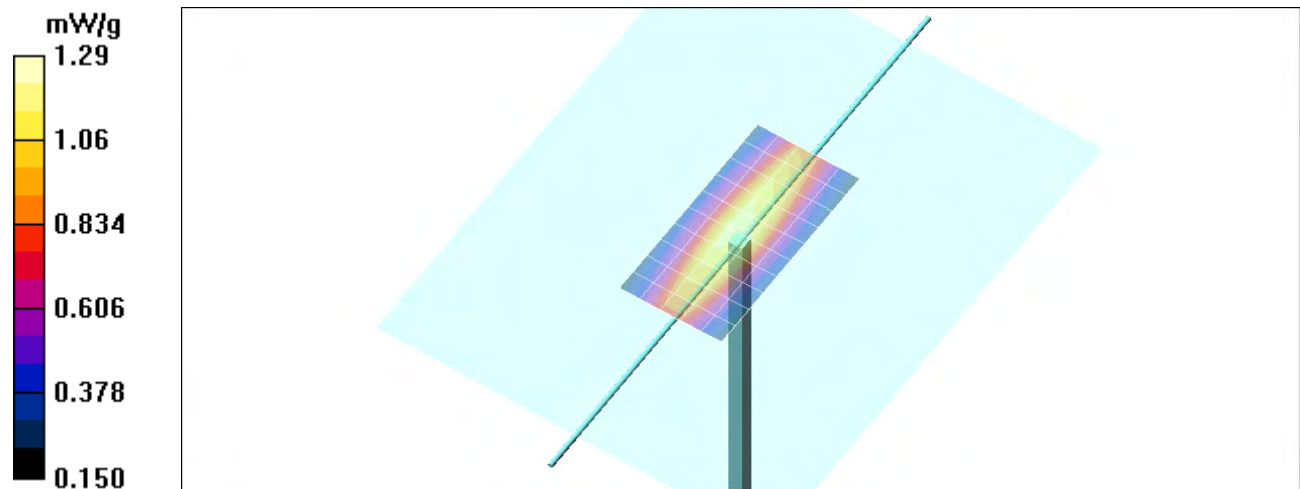
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 39.0 V/m; Power Drift = -0.019 dB

Peak SAR (extrapolated) = 2.05 W/kg

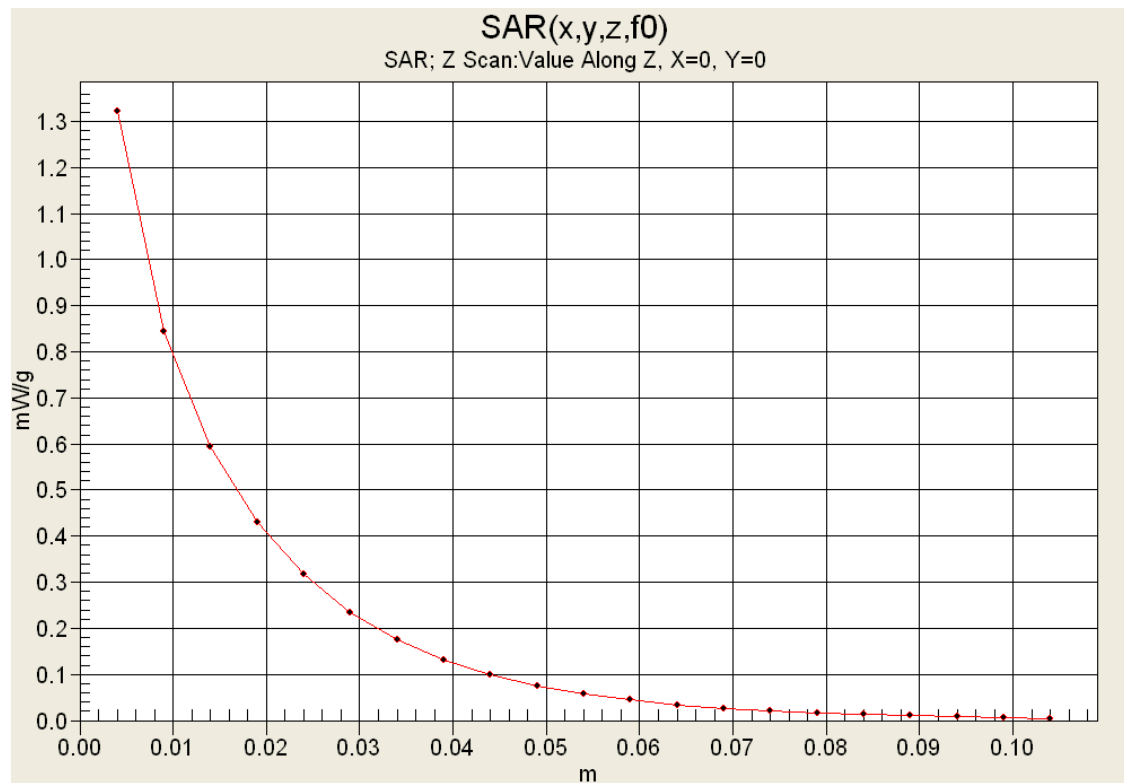
SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.812 mW/g

Maximum value of SAR (measured) = 1.29 mW/g



Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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Z-Axis Scan



	<u>Date(s) of Evaluation</u> May 30, 2012	<u>Test Report Serial No.</u> 052912AIE-T1177-S95V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	
Test Lab Certificate No. 2470.01				

APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	
Test Lab Certificate No. 2470.01				

300 MHz Head

Celltech Labs
Test Result for UIM Dielectric Parameter
29/May/2012

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	sHFCC	Test_e	Test_s
0.2000	49.97	0.80	52.43	0.77
0.2100	49.50	0.80	51.23	0.77
0.2200	49.03	0.81	50.43	0.79
0.2300	48.57	0.82	49.95	0.80
0.2400	48.10	0.83	49.50	0.80
0.2500	47.63	0.83	46.95	0.80
0.2600	47.17	0.84	48.71	0.82
0.2700	46.70	0.85	47.07	0.82
0.2800	46.23	0.86	46.41	0.84
0.2900	45.77	0.86	45.94	0.84
0.3000	45.30	0.87	46.24	0.85
0.3100	45.18	0.87	45.89	0.85
0.3200	45.06	0.87	45.49	0.87
0.3300	44.94	0.87	45.44	0.88
0.3400	44.82	0.87	45.23	0.88
0.3500	44.70	0.87	44.62	0.89
0.3600	44.58	0.87	44.18	0.90
0.3700	44.46	0.87	43.46	0.90
0.3800	44.34	0.87	43.69	0.91
0.3900	44.22	0.87	43.92	0.93
0.4000	44.10	0.87	43.65	0.94

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

150 MHz Body

Celltech Labs
Test Result for UIM Dielectric Parameter
30/May/2012
Frequency (GHz)
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
0.0500	64.37	0.72	141.57	0.61
0.0600	64.12	0.73	105.31	0.64
0.0700	63.87	0.74	87.19	0.67
0.0800	63.63	0.74	77.96	0.67
0.0900	63.38	0.75	73.13	0.71
0.1000	63.13	0.76	74.74	0.72
0.1100	62.89	0.77	72.93	0.74
0.1200	62.64	0.78	70.95	0.75
0.1300	62.39	0.78	68.06	0.75
0.1400	62.15	0.79	66.48	0.76
0.1500	61.90	0.80	63.68	0.76
0.1600	61.65	0.81	64.21	0.76
0.1700	61.41	0.82	64.86	0.77
0.1800	61.16	0.82	63.98	0.76
0.1900	60.91	0.83	63.86	0.78
0.2000	60.67	0.84	62.23	0.78
0.2100	60.42	0.85	61.65	0.80
0.2200	60.17	0.86	60.90	0.79
0.2300	59.93	0.86	59.16	0.80
0.2400	59.68	0.87	60.89	0.80
0.2500	59.43	0.88	59.79	0.82

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

150 MHz Head

Celltech Labs
Test Result for UIM Dielectric Parameter
30/May/2012

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	sHFCC	Test_e	Test_s
0.0500	56.97	0.69	134.18	0.59
0.0600	56.50	0.69	98.10	0.62
0.0700	56.03	0.70	78.93	0.64
0.0800	55.57	0.71	71.14	0.65
0.0900	55.10	0.72	64.61	0.69
0.1000	54.63	0.72	67.96	0.70
0.1100	54.17	0.73	64.84	0.73
0.1200	53.70	0.74	62.13	0.73
0.1300	53.23	0.75	58.18	0.74
0.1400	52.77	0.75	57.97	0.75
0.1500	52.30	0.76	54.72	0.75
0.1600	51.83	0.77	55.42	0.76
0.1700	51.37	0.77	54.46	0.76
0.1800	50.90	0.78	55.53	0.77
0.1900	50.43	0.79	53.65	0.79
0.2000	49.97	0.80	52.30	0.79
0.2100	49.50	0.80	52.35	0.81
0.2200	49.03	0.81	50.99	0.81
0.2300	48.57	0.82	50.04	0.82
0.2400	48.10	0.83	50.67	0.82
0.2500	47.63	0.83	49.08	0.83

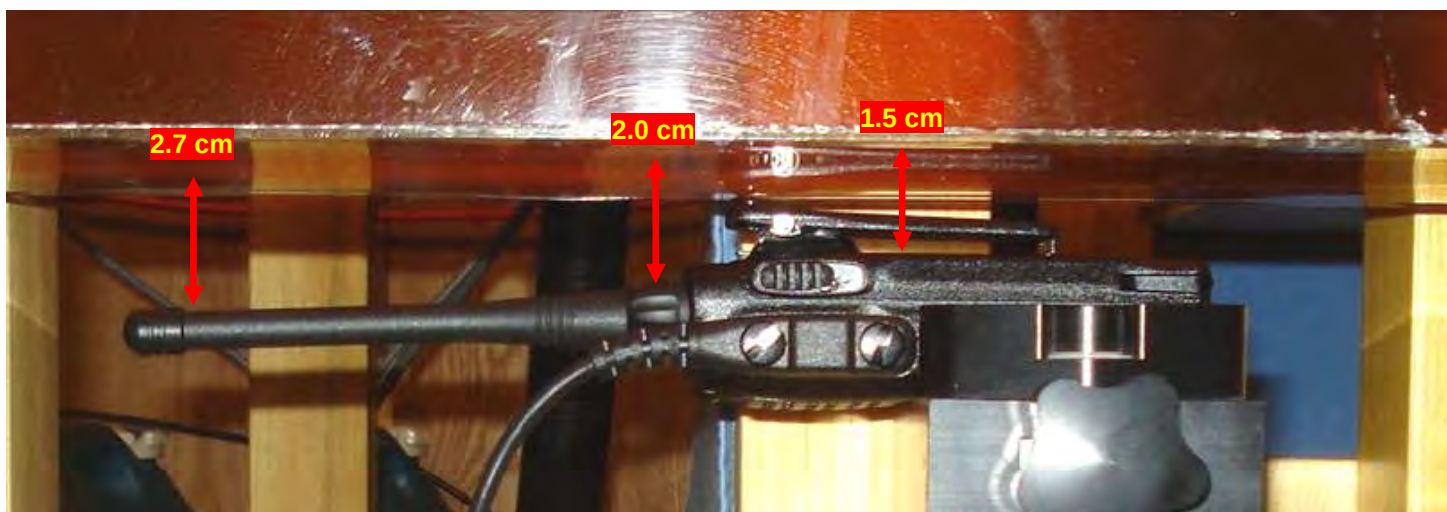
Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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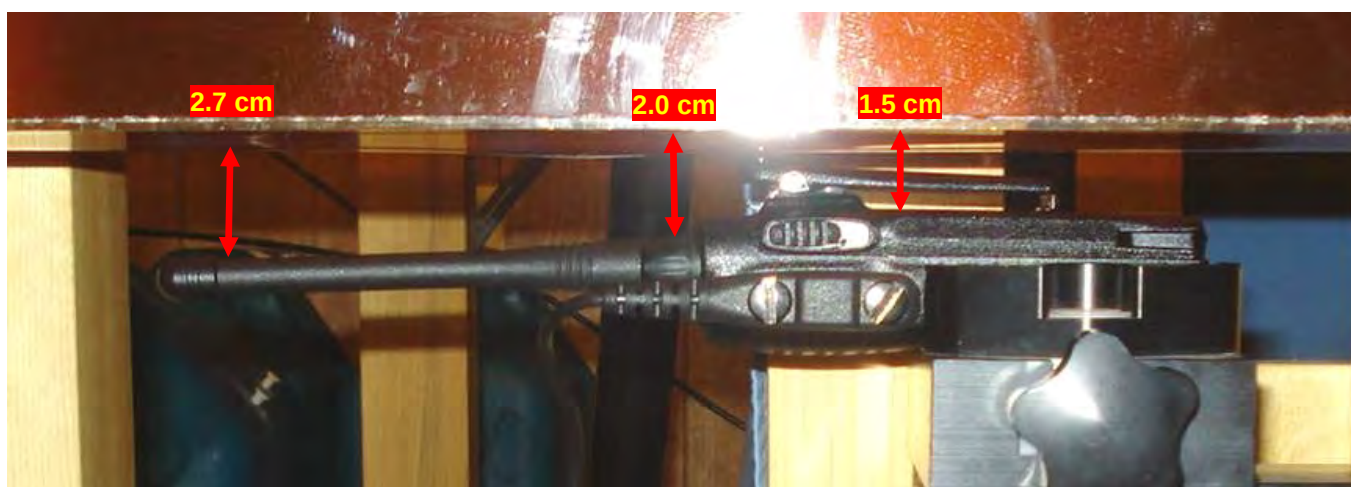
BODY-WORN SAR TEST SETUP PHOTOGRAPHS



Body-worn Test Setup - Belt-Clip and Speaker-Mic

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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BODY-WORN SAR TEST SETUP PHOTOGRAPHS



Body-worn Test Setup – Belt-Clip and Earbud

FACE-HELD SAR TEST SETUP PHOTOGRAPHS



Face-held test setup

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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DUT PHOTOGRAPHS



DUT Front



DUT Left Side



DUT Back



DUT Right Side



DUT Top end



DUT Bottom end

	<u>Date(s) of Evaluation</u> May 30, 2012	<u>Test Report Serial No.</u> 052912AIE-T1177-S95V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	



Back of DUT with battery removed



Back of DUT with Battery and Belt-clip



Side of DUT with Battery and Belt-Clip

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

Test Lab Certificate No. 2470.01



DUT with Antenna

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver	Transmitter Freq. Range:		150.0 - 155.0 MHz		
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	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	
Test Lab Certificate No. 2470.01				



Battery – Front (P/N: BP-PT18-L)



Battery - Side



Battery - Back



Battery – Top end



Battery – Bottom end

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Date(s) of Evaluation</u> May 30, 2012	<u>Test Report Serial No.</u> 052912AIE-T1177-S95V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	
Test Lab Certificate No. 2470.01				



Body-worn Accessory - Metal Belt-Clip (P/N: CB-PT)

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Date(s) of Evaluation</u> May 30, 2012	<u>Test Report Serial No.</u> 052912AIE-T1177-S95V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	
Test Lab Certificate No. 2470.01				



Audio Accessory - Speaker-Microphone (P/N: RSM-6X)

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Date(s) of Evaluation</u> May 30, 2012	<u>Test Report Serial No.</u> 052912AIE-T1177-S95V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	



Audio Accessory - Earbud (P/N: RHD-15X)

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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	<u>Date(s) of Evaluation</u> May 30, 2012	<u>Test Report Serial No.</u> 052912AIE-T1177-S95V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX E - DIPOLE CALIBRATION

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **D300V3-1009_Apr12**

CALIBRATION CERTIFICATE

Object **D300V3 - SN: 1009**

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

Calibration date: **April 17, 2012**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ET3DV6	SN: 1507	30-Dec-11 (No. ET3-1507_Dec11)	Dec-12
DAE4	SN: 900	11-Apr-12 (No. DAE4-900_Apr12)	Apr-13

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

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

Issued: April 27, 2012

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Accreditation No.: **SCS 108**

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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	300 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	45.3	0.87 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	44.9 $\pm$ 6 %	0.89 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	1.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	2.88 mW /g $\pm$ 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	398 mW input power	0.770 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	1.90 mW /g $\pm$ 17.6 % (k=2)

Appendix

Antenna Parameters with Head TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.748 ns
----------------------------------	----------

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	February 26, 2009

DASY5 Validation Report for Head TSL

Date: 17.04.2012

Test Laboratory: SPEAG

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

Communication System: CW; Frequency: 300 MHz

Medium parameters used: $f = 300$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 44.9$; $\rho = 1000$ 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 Sn900; Calibrated: 11.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

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

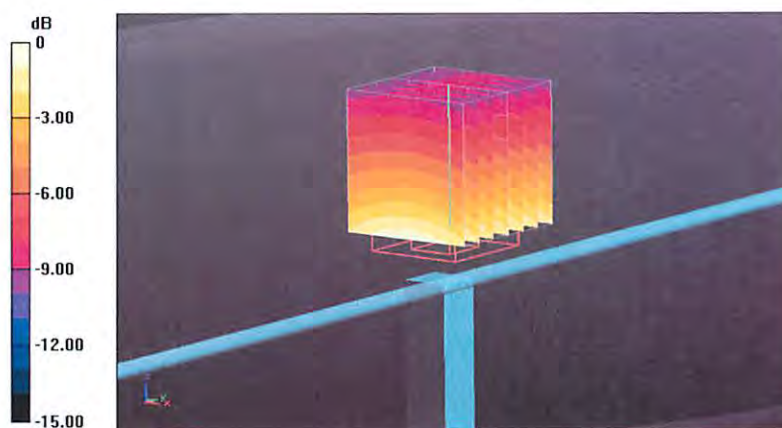
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 37.838 V/m; Power Drift = -0.01 dB

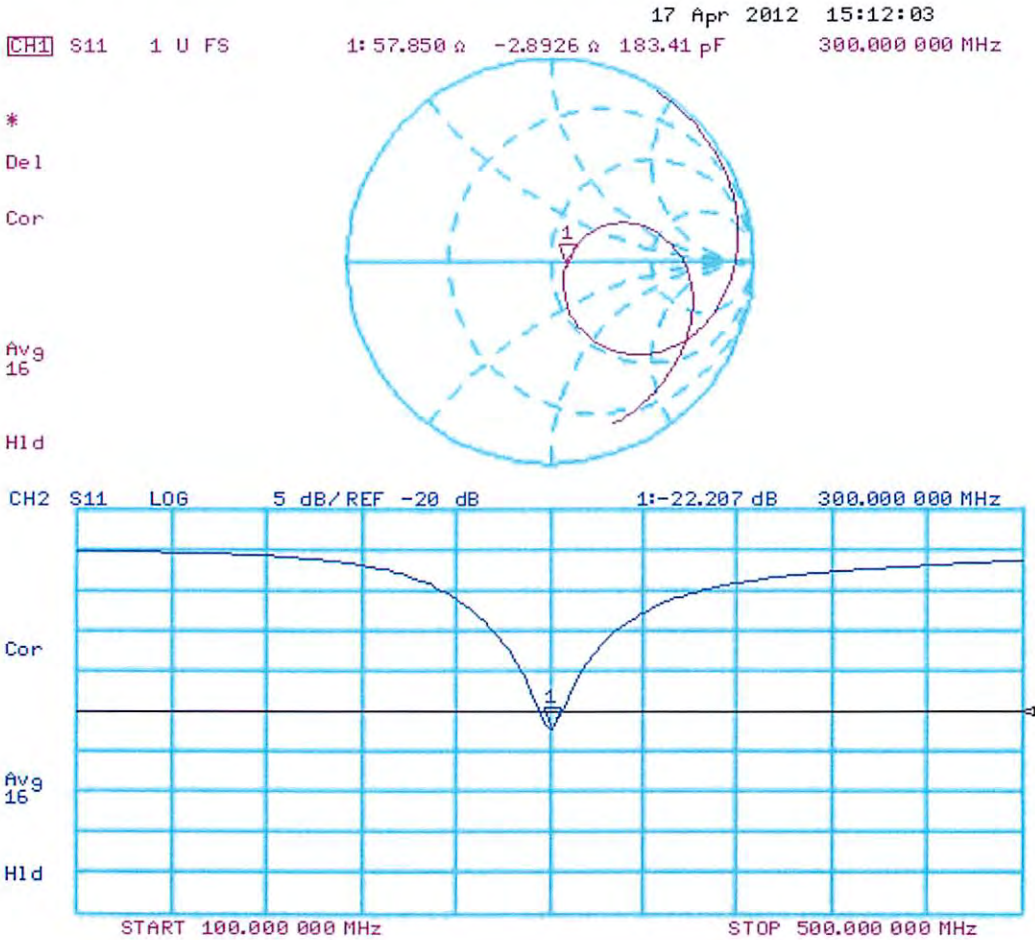
Peak SAR (extrapolated) = 1.974 mW/g

SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.770 mW/g

Maximum value of SAR (measured) = 1.24 mW/g



Impedance Measurement Plot for Head TSL



	<u>Date(s) of Evaluation</u> May 30, 2012	<u>Test Report Serial No.</u> 052912AIE-T1177-S95V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 Test Lab Certificate No. 2470.01
	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	

APPENDIX F - PROBE CALIBRATION

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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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 E^2 -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	± 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	±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

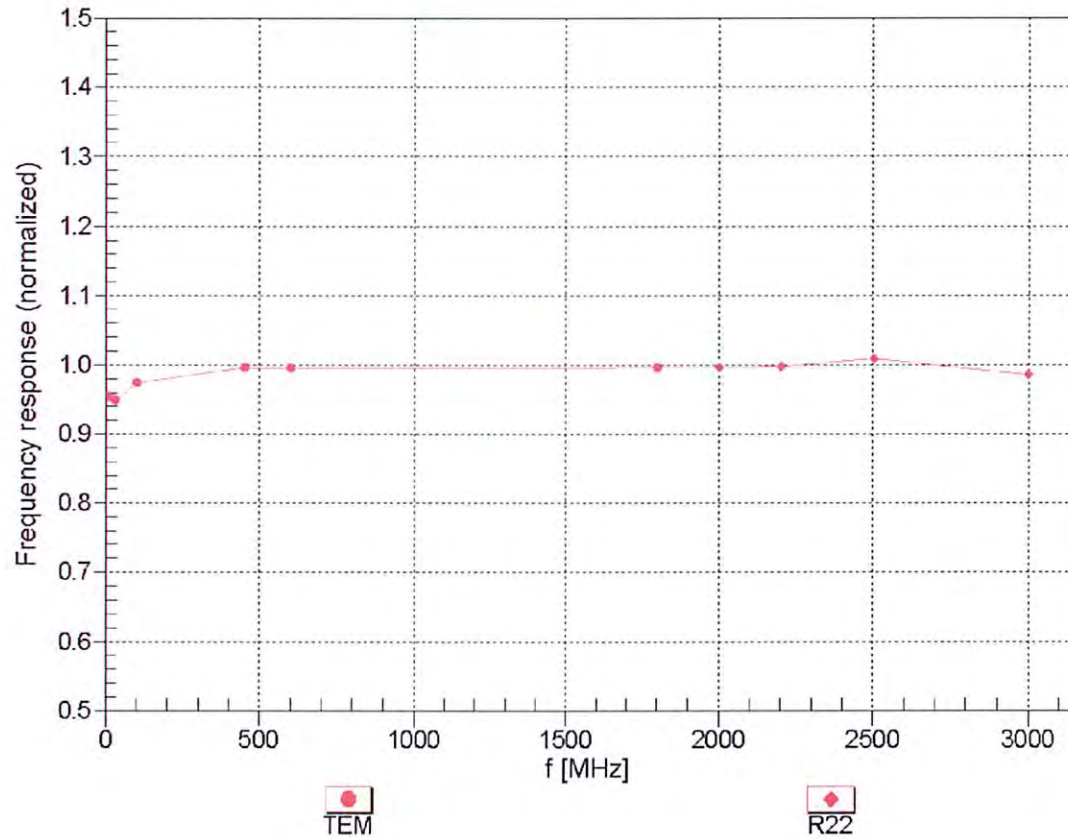
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.93	7.93	7.93	0.12	2.07	± 13.4 %
750	55.5	0.96	6.71	6.71	6.71	0.22	3.00	± 12.0 %
835	55.2	0.97	6.54	6.54	6.54	0.27	3.00	± 12.0 %
900	55.0	1.05	6.51	6.51	6.51	0.29	2.92	± 12.0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

^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

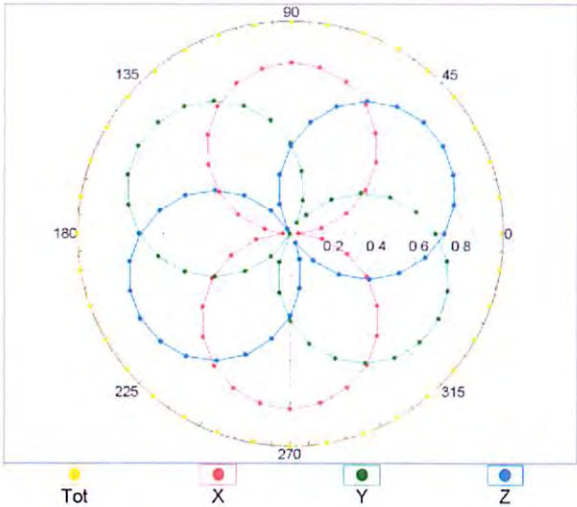
(TEM-Cell: ifi110 EXX, Waveguide: R22)



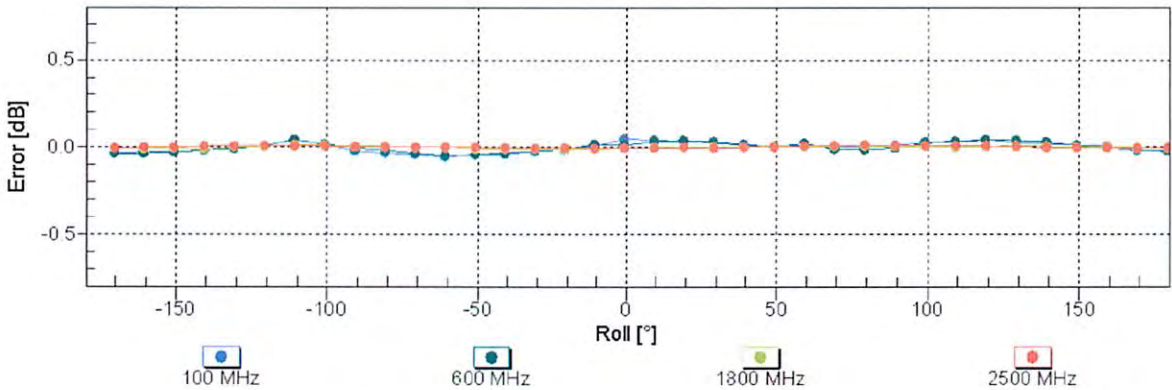
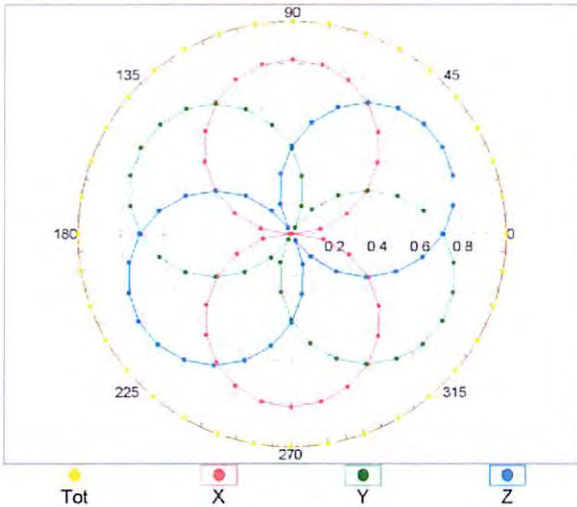
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

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

f=600 MHz,TEM

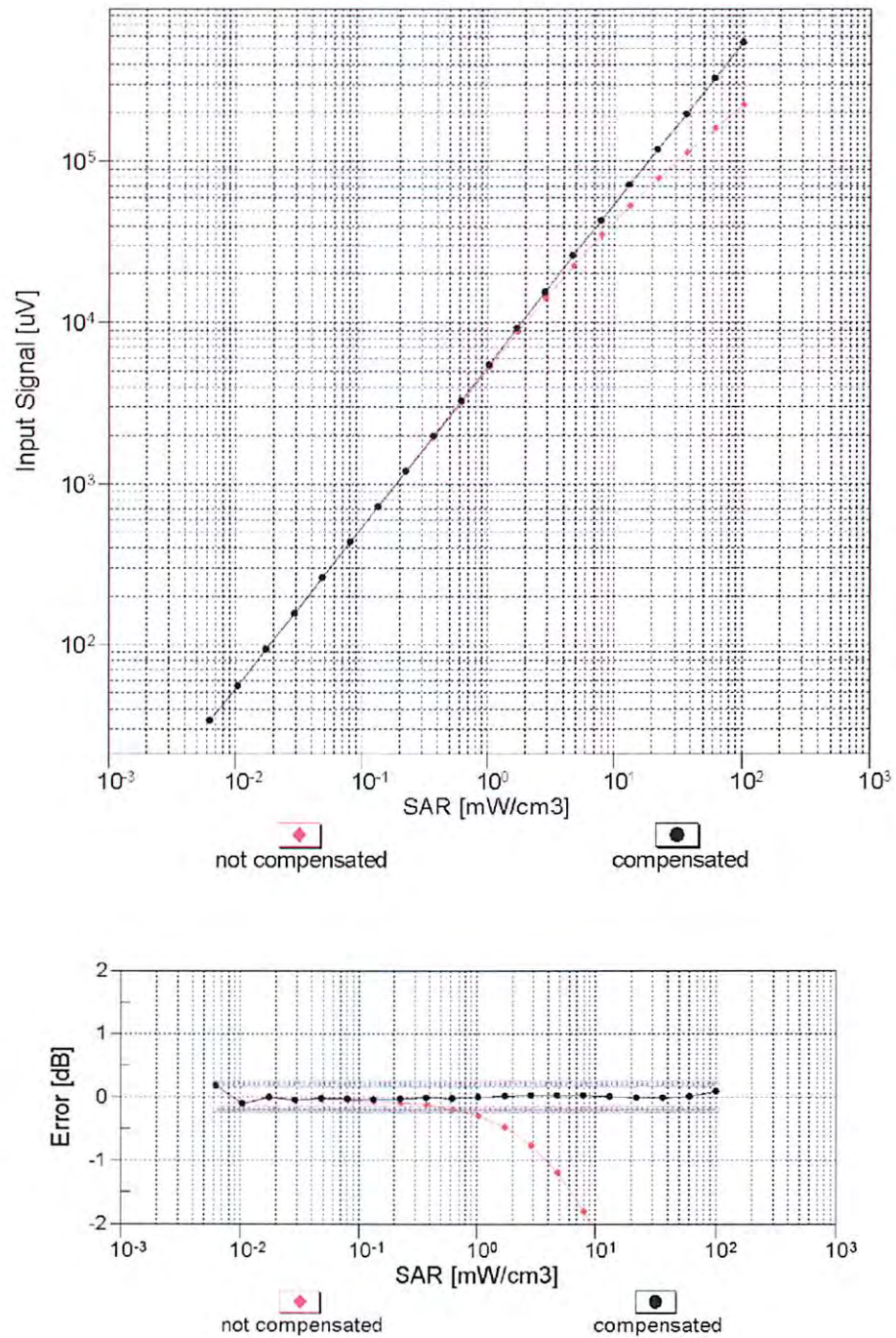


f=1800 MHz,R22



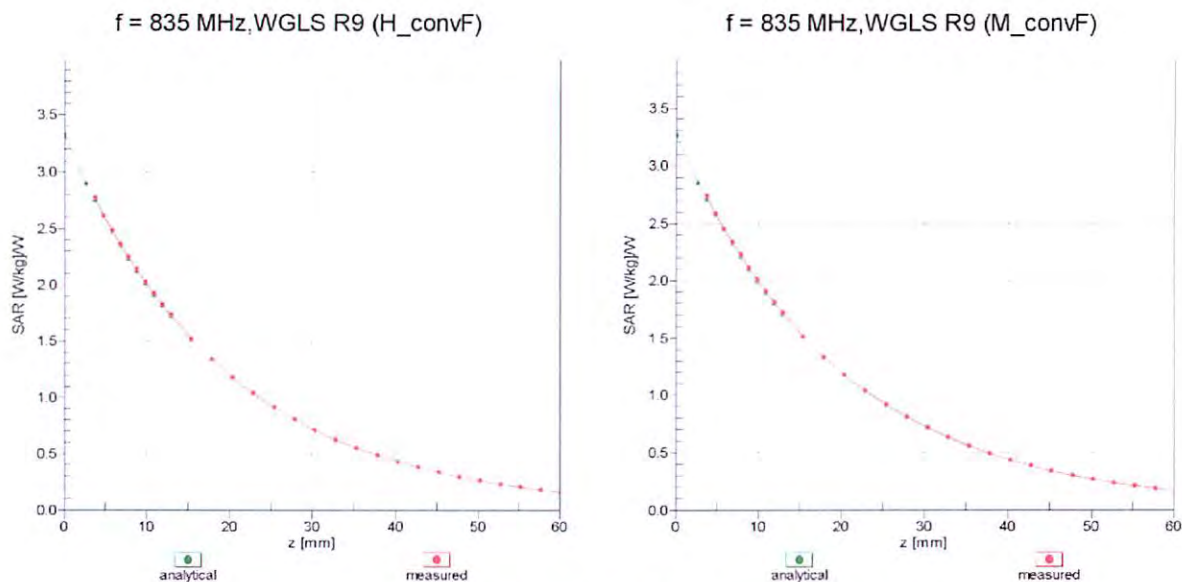
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$)



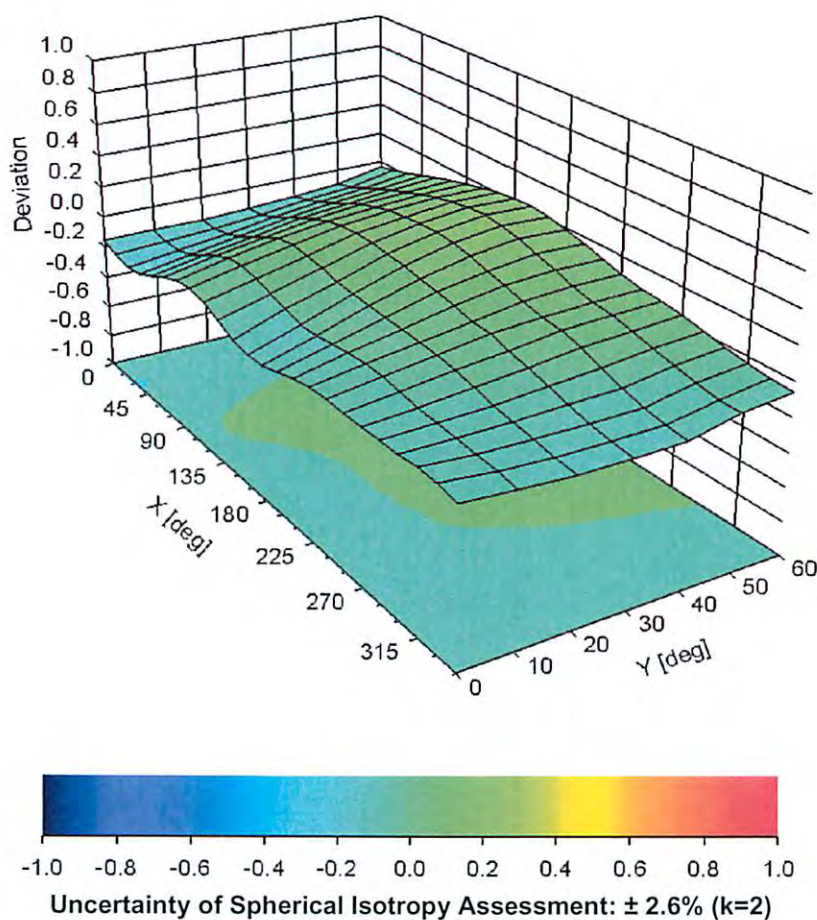
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), $f = 900 \text{ MHz}$



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

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1590

Place of Assessment:

Zurich

Date of Assessment:

April 27, 2012

Probe Calibration Date:

April 24, 2012

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

Assessed by:



Dosimetric E-Field Probe ET3DV6 SN:1590

Conversion factor ($\pm$ standard deviation)

150 $\pm$ 50 MHz *ConvF* 9.3 $\pm$ 10%

$\epsilon_r = 52.3 \pm 5\%$
 $\sigma = 0.76 \pm 5\%$ mho/m
(head tissue)

150 $\pm$ 50 MHz *ConvF* 8.6 $\pm$ 10%

$\epsilon_r = 61.9 \pm 5\%$
 $\sigma = 0.80 \pm 5\%$ mho/m
(body tissue)

Important Note:

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

Please see also DASY Manual.

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1590

Place of Assessment:

Zurich

Date of Assessment:

May 21, 2012

Probe Calibration Date:

April 24, 2012

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

Assessed by:



Dosimetric E-Field Probe ET3DV6 SN:1590

Conversion factor ($\pm$ standard deviation)

300 ± 50 MHz $ConvF$ $8.3 \pm 9\%$

$\epsilon_r = 45.3 \pm 5\%$
 $\sigma = 0.87 \pm 5\%$ mho/m
(head tissue)

Important Note:

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

Please see also DASY Manual.

	<u>Date(s) of Evaluation</u> May 30, 2012	<u>Test Report Serial No.</u> 052912AIE-T1177-S95V	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	
	<u>Test Report Issue Date</u> June 01, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Gen. Pop. / Uncontrolled	
Test Lab Certificate No. 2470.01				

APPENDIX G - BARSKI PLANAR PHANTOM CERTIFICATE OF CONFORMITY

Applicant:	Ritron Inc.	FCC ID:	AIERIT29-150M	DUT Model:	PT-150M	
DUT Type:	Portable VHF MURS PTT Radio Transceiver		Transmitter Freq. Range:		150.0 - 155.0 MHz	
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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 Chailler', is written over a horizontal line.

Daniel Chailler



Fiberglass Planar Phantom - Top View



Fiberglass Planar Phantom - Front View



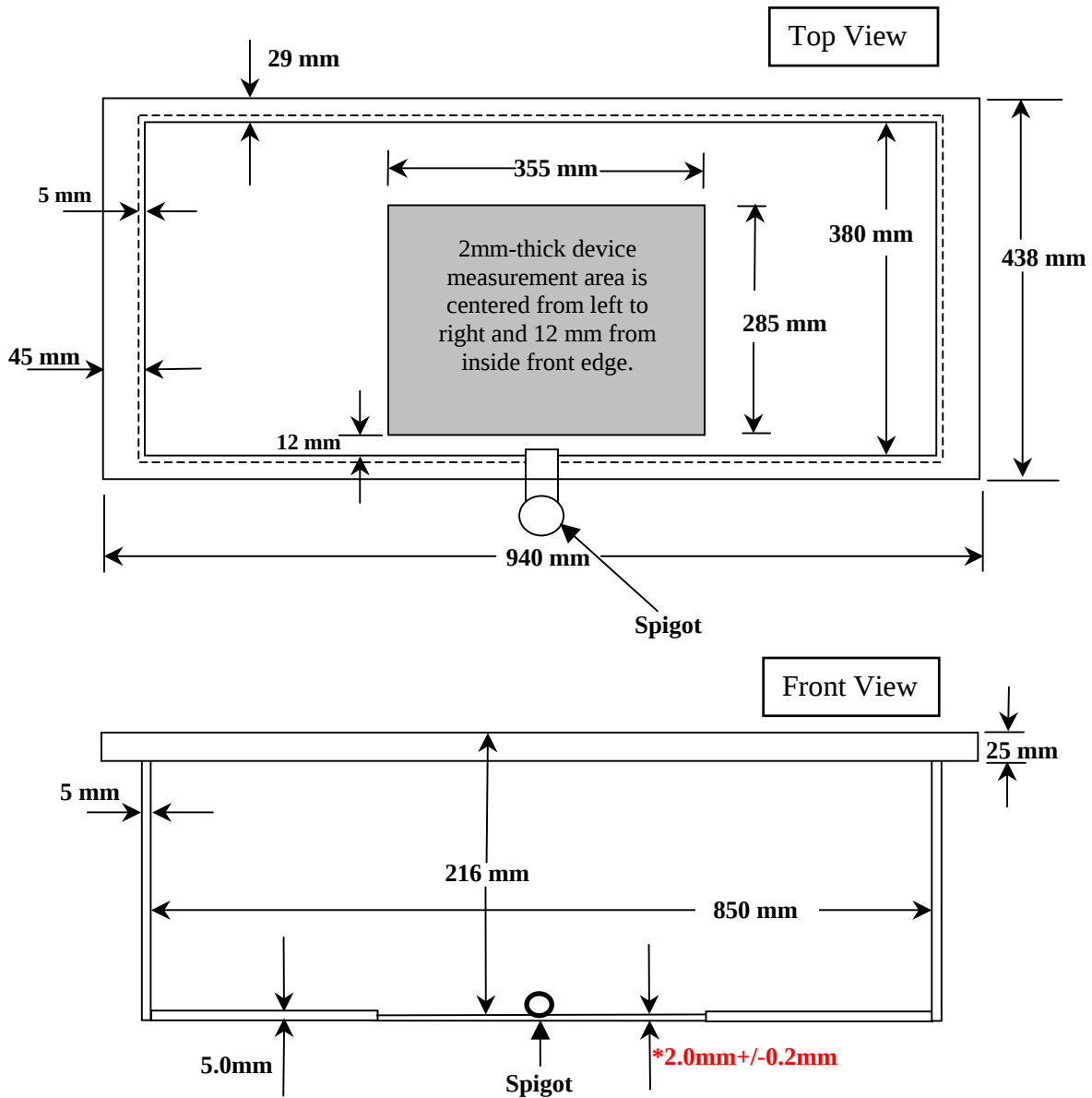
Fiberglass Planar Phantom - Back View



Fiberglass Planar Phantom - Bottom View

Dimensions of Fiberglass Planar Phantom

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



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