# DECLARATION OF COMPLIANCE - SAR RF EXPOSURE EVALUATION - FCC

| | | | | | | |
|---|---|---|---|---|---|---|
| **Test Lab Information** | **Name** | **CELLTECH LABS INC.** | | | | |
| | **Address** | 21-364 Lougheed Road, Kelowna, British Columbia V1X 7R8 Canada | | | | |
| **Test Lab Accreditation(s)** | **A2LA** | ISO/IEC 17025:2005 (A2LA Test Lab Certificate No. 2470.01) | | | | |
| **Applicant Information** | **Name** | **GARMIN INTERNATIONAL INC.** | | | | |
| | **Address** | 1200, East 151st Street, O;athe, KS, 66062 USA | | | | |
| **Application Type(s)** | **FCC** | TCB Certification | | | | |
| **Standard(s) Applied** | **FCC** | 47 CFR §2.1093 | | | | |
| **Procedure(s) Applied** | **FCC** | OET Bulletin 65, Supp. C; KDB 447498 | **IEEE** | 1528-2003 | | |
| **Device Classification(s)** | **FCC** | Part 95 Family Radio Face Held Transmitter (FRF) | | | | |
| **Device Identifier(s)** | **FCC ID:** | IPH-01767 | | | | |
| **Date of Sample Receipt** | April 15, 2011 | **Date(s) of Evaluation** | May 16-18, 24-25 & June 10, 13-14, 2011 | | | |
| **Device Model(s) Tested** | Rino650 US | Rino655t US (with camera on rear of radio) | | | | |
| **Test Sample Serial No.(s)** | 1766382196551000 Identical Prototype (Rino 650) | | | | | |
| | 1766382247997103 Identical Prototype (Rino 655t) | | | | | |
| **Device-Under-Test Description (DUT)** | Portable GMRS/FRS Push-To-Talk (PTT) Radio Transceiver | | | | | |
| **Device Mode(s) of Operation** | Analog FM | | | | | |
| **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) | | | | | |
| **Manuf. Max. Rated Output Power** | 5 Watts Conducted (+0/-0.46 dB) | | | | | |
| **Max. RF Output Power Measured** | 4.85 W | 36.9 dBm | Conducted Average | 462.5625 MHz | GMRS Ch. 1 | Li-ion |
| | 1.9 W | 32.8 dBm | Conducted Average | 462.5625 MHz | GMRS Ch. 1 | Alkaline |
| | Note: DUT is limited to 2W maximum conducted power when operated with alkaline batteries | | | | | |
| **Battery Type(s) Tested** | Li-ion Battery Pack | 8.2 V | 2300 mAh | P/N: 011-02526-30 | | |
| | Alkaline Battery Pack | 1.5 V (x4) | Energizer Industrial | P/N: 011-02526-40 | | |
| **Antenna Type Tested** | Helix (Non-detachable) | Length: 62.3 mm | P/N: 700-00040-00 | | | |
| **Body-worn Accessories Tested** | Swivel Belt-Clip (contains metal) | P/N: 013-00063-00 | | | | |
| | Carabiner Clip (contains metal) | P/N: 011-01750-20 | | | | |
| **Audio Accessories Tested** | Earbud w/ PTT Mic | P/N: 013-00072-00 | | | | |
| | Flexible Ear Receiver | P/N 013-00071-00 | | | | |
| | Headset w/ Mic, no PTT | P/N: 013-00392-00 | | | | |
| **Max. SAR Level(s) Evaluated** | Face-held | **1.51 W/kg** | 1g | 50% PTT duty cycle | General Population / Uncontrolled | |
| | Body-worn | **1.43 W/kg** | 1g | 50% PTT duty cycle | | |
| **FCC/IC Spatial Peak SAR Limit** | Head/Body | 1.6 W/kg | 1g | 50% PTT duty cycle | | |

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.

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

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| **Test Report Approved By** |  | **Sean Johnston** | **Lab Manager** | **Celltech Labs Inc** |
|---|---|---|---|---|

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| REVISION HISTORY | | | |
|---|---|---|---|
| **REVISION NO.** | **DESCRIPTION** | **IMPLEMENTED BY** | **RELEASE DATE** |
| 1.0 | Initial Release | Jon Hughes | July 15, 2011 |

| TEST REPORT SIGN-OFF | | | |
|---|---|---|---|
| **DEVICE TESTED BY** | **REPORT PREPARED BY** | **QA REVIEW BY** | **REPORT APPROVED BY** |
| Mike Meaker | Mike Meaker | Jon Hughes | Sean Johnston |


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## 1.0 INTRODUCTION

This measurement report demonstrates that the Garmin International Inc. Models: Rino650 US and Rino655t (with camera) US Portable GMRS/FRS Push-To-Talk Radio Transceiver (FCC ID: IPH-01767) complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) for the General Population / Uncontrolled Exposure environment. The test procedures described in FCC OET Bulletin 65, Supplement C Edition 01-01 (see reference [2]), and IEEE Standard 1528-2003 (see reference [3]) were employed. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the 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/face 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.

## 3.0 RF CONDUCTED OUTPUT POWER MEASUREMENT

**MEASURED RF CONDUCTED OUTPUT POWER**

| DUT Model | Battery | Test Frequency | Band | Mode | dBm | Watts | Method |
|---|---|---|---|---|---|---|---|
| Rino650 | Li-ion | 462.5625 MHz | GMRS | CW | 36.9 | 4.85 | Conducted Average |
| Rino650 | Alkaline | 462.5625 MHz | GMRS | CW | 32.8 | 1.90 | Conducted Average |
| Rino655t | Li-ion | 462.5625 MHz | GMRS | CW | 36.9 | 4.85 | Conducted Average |
| Rino655t | Alkaline | 462.5625 MHz | GMRS | CW | 32.8 | 1.90 | Conducted Average |

**Notes**

1. The test channels were selected in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (see reference [4]).

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 antenna connector of the radio in accordance with FCC 47 CFR §2.1046 (see reference [9]).


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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* | | | Manufacturer's Rated RF Output Power | |
|---|---|---|---|---|
| **Exposure Conditions** | ***P* mW (General Population)** | ***P* mW (Occupational)** | **100% PTT Duty Cycle** | **50% PTT Duty Cycle** |
| Held to face, $d \geq 2.5$ cm | 250 | 1250 | 5.0 Watts | 2.5 Watts |
| 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.<br>2. The closest distance between the user and the device or its antenna is used to determine the power thresholds.<br>* Per FCC KDB 447498 D01v04 Section 5)b)i) (see reference [4]). | | | The conducted output power level of the DUT exceeds the FCC power threshold and therefore SAR evaluation is required. | |

## 5.0 NO. OF TEST CHANNELS ($N_c$)

| Device Frequency Range | Band | $N_c$ | Test Frequencies (MHz) |
|---|---|---|---|
| 462.5500 - 462.7250 MHz | UHF GMRS | 1 | 462.5625 MHz |
| Note: The number of test channels per antenna frequency range was calculated in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (see reference [4]). | | | |

## 6.0 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 [5]).

| Probe Calibration Freq. | Device Measurement Freq. | Frequency Interval | ±50 MHz ≥ 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. | | | |

## 7.0 MANUFACTURER'S DISCLOSED ACCESSORY LISTING

| Part No. | Description | Accessory Category |
|---|---|---|
| 011-02526-30 | Lithium-ion Battery | Battery |
| 011-02526-40 | Battery Case (with AA Alkaline) | |
| 013-00063-00 | Swivel Belt-Clip (Contains Metal) | Body-worn |
| 011-01750-20 | Carabiner Clip (Contains Metal) | |
| 013-00072-00 | Earbud w/ PTT Mic | Audio |
| 013-00071-00 | Flexible Ear Receiver | |
| 013-00392-00 | Headset w/ mic, no PTT | |

Note:
1. Manufacturer's disclosed accessory listing information provided by Garmin International Inc.


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# 8.0 FLUID DIELECTRIC PARAMETERS

## FLUID DIELECTRIC PARAMETERS

| Date: 05/16/2011** | | Frequency: 450 MHz | | | Tissue: Body | |
|---|---|---|---|---|---|---|
| Freq | Test_e | Test_s | Target_e | Target_s | Deviation Permittivity | Deviation Conductivity |
| 0.350 | 59.4 | 0.82 | 56.7 | 0.94 | 4.76% | -12.77% |
| 0.360 | 59.14 | 0.82 | 56.7 | 0.94 | 4.30% | -12.77% |
| 0.370 | 58.86 | 0.83 | 56.7 | 0.94 | 3.81% | -11.70% |
| 0.380 | 59.31 | 0.84 | 56.7 | 0.94 | 4.60% | -10.64% |
| 0.390 | 58.01 | 0.84 | 56.7 | 0.94 | 2.31% | -10.64% |
| 0.400 | 58.82 | 0.86 | 56.7 | 0.94 | 3.74% | -8.51% |
| 0.410 | 58.84 | 0.87 | 56.7 | 0.94 | 3.77% | -7.45% |
| 0.420 | 58.28 | 0.88 | 56.7 | 0.94 | 2.79% | -6.38% |
| 0.430 | 58.46 | 0.89 | 56.7 | 0.94 | 3.10% | -5.32% |
| 0.440 | 58.19 | 0.89 | 56.7 | 0.94 | 2.63% | -5.32% |
| 0.450 | 58.38 | 0.9 | 56.7 | 0.94 | 2.96% | -4.26% |
| 0.460 | 57.74 | 0.9 | 56.7 | 0.94 | 1.83% | -4.26% |
| 0.4625625* | 57.7 | 0.903 | 56.7 | 0.94 | 1.76% | -3.94% |
| 0.470 | 57.71 | 0.91 | 56.7 | 0.94 | 1.78% | -3.19% |
| 0.480 | 57.34 | 0.92 | 56.7 | 0.94 | 1.13% | -2.13% |
| 0.490 | 57.02 | 0.93 | 56.7 | 0.94 | 0.56% | -1.06% |
| 0.500 | 57.14 | 0.93 | 56.7 | 0.94 | 0.78% | -1.06% |
| 0.510 | 57.12 | 0.96 | 56.7 | 0.94 | 0.74% | 2.13% |
| 0.520 | 56.94 | 0.96 | 56.7 | 0.94 | 0.42% | 2.13% |
| 0.530 | 56.89 | 0.98 | 56.7 | 0.94 | 0.34% | 4.26% |
| 0.540 | 56.85 | 0.99 | 56.7 | 0.94 | 0.26% | 5.32% |
| 0.550 | 56.45 | 0.98 | 56.7 | 0.94 | -0.44% | 4.26% |

*interpolated using DASY4 software
** The SAR evaluations on May 17 were performed within 24 hours of the May 16 fluid parameter measurement

| Test Date | Fluid Type | Ambient Temperature | Fluid Temperature | Fluid Depth | Atmospheric Pressure | Relative Humidity | ρ (Kg/m$^3$) |
|---|---|---|---|---|---|---|---|
| May 16 | 450 Body | 23.0 °C | 20.5 °C | ≥ 15 cm | 101.1 kPa | 32% | 1000 |
| May 17 | 450 Body | 21.0 °C | 20.6 °C | ≥ 15 cm | 101.1 kPa | 33% | 1000 |


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## FLUID DIELECTRIC PARAMETERS

| Date: 05/18/2011 | | Frequency: 450 MHz | | | Tissue: Head | |
|---|---|---|---|---|---|---|
| Freq | Test_e | Test_s | Target_e | Target_s | Deviation Permittivity | Deviation Conductivity |
| 0.350 | 47.64 | 0.78 | 43.5 | 0.87 | 9.52% | -10.34% |
| 0.360 | 46.78 | 0.78 | 43.5 | 0.87 | 7.54% | -10.34% |
| 0.370 | 46.28 | 0.78 | 43.5 | 0.87 | 6.39% | -10.34% |
| 0.380 | 46.09 | 0.79 | 43.5 | 0.87 | 5.95% | -9.20% |
| 0.390 | 46.08 | 0.79 | 43.5 | 0.87 | 5.93% | -9.20% |
| 0.400 | 45.33 | 0.8 | 43.5 | 0.87 | 4.21% | -8.05% |
| 0.410 | 45.12 | 0.82 | 43.5 | 0.87 | 3.72% | -5.75% |
| 0.420 | 45.47 | 0.84 | 43.5 | 0.87 | 4.53% | -3.45% |
| 0.430 | 45.2 | 0.86 | 43.5 | 0.87 | 3.91% | -1.15% |
| 0.440 | 45.05 | 0.87 | 43.5 | 0.87 | 3.56% | 0.00% |
| 0.450 | 44.83 | 0.87 | 43.5 | 0.87 | 3.06% | 0.00% |
| 0.460 | 44.87 | 0.88 | 43.5 | 0.87 | 3.15% | 1.15% |
| 0.4625625* | 44.9 | 0.88 | 43.5 | 0.87 | 3.22% | 1.15% |
| 0.470 | 44.89 | 0.88 | 43.5 | 0.87 | 3.20% | 1.15% |
| 0.480 | 44.08 | 0.89 | 43.5 | 0.87 | 1.33% | 2.30% |
| 0.490 | 43.76 | 0.89 | 43.5 | 0.87 | 0.60% | 2.30% |
| 0.500 | 43.83 | 0.91 | 43.5 | 0.87 | 0.76% | 4.60% |
| 0.510 | 43.22 | 0.91 | 43.5 | 0.87 | -0.64% | 4.60% |
| 0.520 | 43.23 | 0.91 | 43.5 | 0.87 | -0.62% | 4.60% |
| 0.530 | 42.94 | 0.94 | 43.5 | 0.87 | -1.29% | 8.05% |
| 0.540 | 42.88 | 0.95 | 43.5 | 0.87 | -1.43% | 9.20% |
| 0.550 | 42.72 | 0.97 | 43.5 | 0.87 | -1.79% | 11.49% |

*interpolated using DASY4 software

| Test Date | Fluid Type | Ambient Temperature | Fluid Temperature | Fluid Depth | Atmospheric Pressure | Relative Humidity | ρ (Kg/m$^3$) |
|---|---|---|---|---|---|---|---|
| May 18 | 450 Head | 23.0 °C | 20.9 °C | ≥ 15 cm | 101.1 kPa | 31% | 1000 |


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## FLUID DIELECTRIC PARAMETERS

| Date: 05/24/2011 | | Frequency: 450 MHz | | | Tissue: Body | |
|---|---|---|---|---|---|---|
| Freq | Test_e | Test_s | Target_e | Target_s | Deviation Permittivity | Deviation Conductivity |
| 0.350 | 58.56 | 0.84 | 56.7 | 0.94 | 3.28% | -10.64% |
| 0.360 | 58.99 | 0.87 | 56.7 | 0.94 | 4.04% | -7.45% |
| 0.370 | 57.9 | 0.87 | 56.7 | 0.94 | 2.12% | -7.45% |
| 0.380 | 58.02 | 0.88 | 56.7 | 0.94 | 2.33% | -6.38% |
| 0.390 | 58.13 | 0.89 | 56.7 | 0.94 | 2.52% | -5.32% |
| 0.400 | 57.72 | 0.9 | 56.7 | 0.94 | 1.80% | -4.26% |
| 0.410 | 57.53 | 0.9 | 56.7 | 0.94 | 1.46% | -4.26% |
| 0.420 | 57.84 | 0.9 | 56.7 | 0.94 | 2.01% | -4.26% |
| 0.430 | 57.35 | 0.91 | 56.7 | 0.94 | 1.15% | -3.19% |
| 0.440 | 56.98 | 0.92 | 56.7 | 0.94 | 0.49% | -2.13% |
| 0.450 | 57.52 | 0.94 | 56.7 | 0.94 | 1.45% | 0.00% |
| 0.460 | 57.8 | 0.94 | 56.7 | 0.94 | 1.94% | 0.00% |
| 0.4625625* | 57.8 | 0.94 | 56.7 | 0.94 | 1.94% | 0.00% |
| 0.470 | 57.71 | 0.94 | 56.7 | 0.94 | 1.78% | 0.00% |
| 0.480 | 56.63 | 0.95 | 56.7 | 0.94 | -0.12% | 1.06% |
| 0.490 | 56.42 | 0.96 | 56.7 | 0.94 | -0.49% | 2.13% |
| 0.500 | 56.22 | 0.97 | 56.7 | 0.94 | -0.85% | 3.19% |
| 0.510 | 56.22 | 0.98 | 56.7 | 0.94 | -0.85% | 4.26% |
| 0.520 | 55.95 | 0.98 | 56.7 | 0.94 | -1.32% | 4.26% |
| 0.530 | 56.5 | 1 | 56.7 | 0.94 | -0.35% | 6.38% |
| 0.540 | 56.23 | 1.01 | 56.7 | 0.94 | -0.83% | 7.45% |
| 0.550 | 55.91 | 1.01 | 56.7 | 0.94 | -1.39% | 7.45% |

*interpolated using DASY4 software

| Test Date | Fluid Type | Ambient Temperature | Fluid Temperature | Fluid Depth | Atmospheric Pressure | Relative Humidity | ρ (Kg/m$^3$) |
|---|---|---|---|---|---|---|---|
| May 24 | 450 Body | 23.0 °C | 21.1 °C | ≥ 15 cm | 101.1 kPa | 34% | 1000 |


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## FLUID DIELECTRIC PARAMETERS

| Date: 05/25/2011 | | Frequency: 450 MHz | | | Tissue: Body | |
|---|---|---|---|---|---|---|
| Freq | Test_e | Test_s | Target_e | Target_s | Deviation Permittivity | Deviation Conductivity |
| 0.350 | 59.89 | 0.86 | 56.7 | 0.94 | 5.63% | -8.51% |
| 0.360 | 58.9 | 0.86 | 56.7 | 0.94 | 3.88% | -8.51% |
| 0.370 | 58.7 | 0.88 | 56.7 | 0.94 | 3.53% | -6.38% |
| 0.380 | 58.7 | 0.88 | 56.7 | 0.94 | 3.53% | -6.38% |
| 0.390 | 58.85 | 0.91 | 56.7 | 0.94 | 3.79% | -3.19% |
| 0.400 | 59.01 | 0.9 | 56.7 | 0.94 | 4.07% | -4.26% |
| 0.410 | 59.2 | 0.91 | 56.7 | 0.94 | 4.41% | -3.19% |
| 0.420 | 58.15 | 0.92 | 56.7 | 0.94 | 2.56% | -2.13% |
| 0.430 | 58.25 | 0.92 | 56.7 | 0.94 | 2.73% | -2.13% |
| 0.440 | 58.09 | 0.94 | 56.7 | 0.94 | 2.45% | 0.00% |
| 0.450 | 58.1 | 0.94 | 56.7 | 0.94 | 2.47% | 0.00% |
| 0.460 | 57.54 | 0.93 | 56.7 | 0.94 | 1.48% | -1.06% |
| 0.4625625* | 57.5 | 0.933 | 56.7 | 0.94 | 1.41% | -0.74% |
| 0.470 | 57.63 | 0.94 | 56.7 | 0.94 | 1.64% | 0.00% |
| 0.480 | 57.79 | 0.96 | 56.7 | 0.94 | 1.92% | 2.13% |
| 0.490 | 56.88 | 0.96 | 56.7 | 0.94 | 0.32% | 2.13% |
| 0.500 | 57 | 0.97 | 56.7 | 0.94 | 0.53% | 3.19% |
| 0.510 | 57.03 | 1 | 56.7 | 0.94 | 0.58% | 6.38% |
| 0.520 | 57.24 | 0.99 | 56.7 | 0.94 | 0.95% | 5.32% |
| 0.530 | 57.01 | 1 | 56.7 | 0.94 | 0.55% | 6.38% |
| 0.540 | 56.85 | 1.03 | 56.7 | 0.94 | 0.26% | 9.57% |
| 0.550 | 56.69 | 1.03 | 56.7 | 0.94 | -0.02% | 9.57% |

*interpolated using DASY4 software

| Test Date | Fluid Type | Ambient Temperature | Fluid Temperature | Fluid Depth | Atmospheric Pressure | Relative Humidity | ρ (Kg/m$^3$) |
|---|---|---|---|---|---|---|---|
| May 25 | 450 Body | 22.0 °C | 22.1 °C | ≥ 15 cm | 101.1 kPa | 35% | 1000 |


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## FLUID DIELECTRIC PARAMETERS

| Date: 06/10/2011 | | Frequency: 450 MHz | | | Tissue: Body | |
|---|---|---|---|---|---|---|
| Freq | Test_e | Test_s | Target_e | Target_s | Deviation Permittivity | Deviation Conductivity |
| 0.350 | 59.04 | 0.89 | 56.7 | 0.94 | 4.13% | -5.32% |
| 0.360 | 58.91 | 0.9 | 56.7 | 0.94 | 3.90% | -4.26% |
| 0.370 | 58.74 | 0.92 | 56.7 | 0.94 | 3.60% | -2.13% |
| 0.380 | 58.62 | 0.91 | 56.7 | 0.94 | 3.39% | -3.19% |
| 0.390 | 59.05 | 0.9 | 56.7 | 0.94 | 4.14% | -4.26% |
| 0.400 | 58.46 | 0.92 | 56.7 | 0.94 | 3.10% | -2.13% |
| 0.410 | 58.22 | 0.94 | 56.7 | 0.94 | 2.68% | 0.00% |
| 0.420 | 58.54 | 0.95 | 56.7 | 0.94 | 3.25% | 1.06% |
| 0.430 | 57.74 | 0.96 | 56.7 | 0.94 | 1.83% | 2.13% |
| 0.440 | 57.84 | 0.96 | 56.7 | 0.94 | 2.01% | 2.13% |
| 0.450 | 57.9 | 0.97 | 56.7 | 0.94 | 2.12% | 3.19% |
| 0.460 | 57.75 | 0.98 | 56.7 | 0.94 | 1.85% | 4.26% |
| 0.4625625* | 57.7 | 0.98 | 56.7 | 0.94 | 1.76% | 4.26% |
| 0.470 | 57.71 | 0.98 | 56.7 | 0.94 | 1.78% | 4.26% |
| 0.480 | 57.07 | 1 | 56.7 | 0.94 | 0.65% | 6.38% |
| 0.490 | 57.22 | 1.01 | 56.7 | 0.94 | 0.92% | 7.45% |
| 0.500 | 57.05 | 1.02 | 56.7 | 0.94 | 0.62% | 8.51% |
| 0.510 | 56.94 | 1.02 | 56.7 | 0.94 | 0.42% | 8.51% |
| 0.520 | 56.83 | 1.03 | 56.7 | 0.94 | 0.23% | 9.57% |
| 0.530 | 56.56 | 1.03 | 56.7 | 0.94 | -0.25% | 9.57% |
| 0.540 | 57.04 | 1.03 | 56.7 | 0.94 | 0.60% | 9.57% |
| 0.550 | 56.49 | 1.04 | 56.7 | 0.94 | -0.37% | 10.64% |

*interpolated using DASY4 software

| Test Date | Fluid Type | Ambient Temperature | Fluid Temperature | Fluid Depth | Atmospheric Pressure | Relative Humidity | ρ (Kg/m$^3$) |
|---|---|---|---|---|---|---|---|
| Jun 10 | 450 Body | 22.0 °C | 22.9 °C | ≥ 15 cm | 101.1 kPa | 34% | 1000 |


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## FLUID DIELECTRIC PARAMETERS

| Date: 06/13/2011 | | Frequency: 450 MHz | | | Tissue: Body | |
|---|---|---|---|---|---|---|
| Freq | Test_e | Test_s | Target_e | Target_s | Deviation Permittivity | Deviation Conductivity |
| 0.350 | 58.49 | 0.85 | 56.7 | 0.94 | 3.16% | -9.57% |
| 0.360 | 57.86 | 0.86 | 56.7 | 0.94 | 2.05% | -8.51% |
| 0.370 | 58.2 | 0.85 | 56.7 | 0.94 | 2.65% | -9.57% |
| 0.380 | 57.84 | 0.87 | 56.7 | 0.94 | 2.01% | -7.45% |
| 0.390 | 57.79 | 0.87 | 56.7 | 0.94 | 1.92% | -7.45% |
| 0.400 | 57.42 | 0.89 | 56.7 | 0.94 | 1.27% | -5.32% |
| 0.410 | 56.79 | 0.89 | 56.7 | 0.94 | 0.16% | -5.32% |
| 0.420 | 57.24 | 0.89 | 56.7 | 0.94 | 0.95% | -5.32% |
| 0.430 | 57.07 | 0.9 | 56.7 | 0.94 | 0.65% | -4.26% |
| 0.440 | 56.85 | 0.91 | 56.7 | 0.94 | 0.26% | -3.19% |
| 0.450 | 57.18 | 0.93 | 56.7 | 0.94 | 0.85% | -1.06% |
| 0.460 | 57.12 | 0.94 | 56.7 | 0.94 | 0.74% | 0.00% |
| 0.4625625* | 57 | 0.94 | 56.7 | 0.94 | 0.53% | 0.00% |
| 0.470 | 56.83 | 0.94 | 56.7 | 0.94 | 0.23% | 0.00% |
| 0.480 | 56.42 | 0.95 | 56.7 | 0.94 | -0.49% | 1.06% |
| 0.490 | 56.12 | 0.97 | 56.7 | 0.94 | -1.02% | 3.19% |
| 0.500 | 56.04 | 0.97 | 56.7 | 0.94 | -1.16% | 3.19% |
| 0.510 | 55.75 | 0.97 | 56.7 | 0.94 | -1.68% | 3.19% |
| 0.520 | 55.98 | 0.98 | 56.7 | 0.94 | -1.27% | 4.26% |
| 0.530 | 55.9 | 0.99 | 56.7 | 0.94 | -1.41% | 5.32% |
| 0.540 | 55.63 | 0.99 | 56.7 | 0.94 | -1.89% | 5.32% |
| 0.550 | 55.38 | 1 | 56.7 | 0.94 | -2.33% | 6.38% |

*interpolated using DASY4 software

| Test Date | Fluid Type | Ambient Temperature | Fluid Temperature | Fluid Depth | Atmospheric Pressure | Relative Humidity | ρ (Kg/m$^3$) |
|---|---|---|---|---|---|---|---|
| Jun 13 | 450 Body | 23.0 °C | 22.8 °C | ≥ 15 cm | 101.1 kPa | 40% | 1000 |


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## FLUID DIELECTRIC PARAMETERS

| Date: 06/14/2011 | | Frequency: 450 MHz | | | Tissue: Body | |
|---|---|---|---|---|---|---|
| Freq | Test_e | Test_s | Target_e | Target_s | Deviation Permittivity | Deviation Conductivity |
| 0.350 | 59.34 | 0.85 | 56.7 | 0.94 | 4.66% | -9.57% |
| 0.360 | 59.56 | 0.86 | 56.7 | 0.94 | 5.04% | -8.51% |
| 0.370 | 58.61 | 0.87 | 56.7 | 0.94 | 3.37% | -7.45% |
| 0.380 | 58.45 | 0.87 | 56.7 | 0.94 | 3.09% | -7.45% |
| 0.390 | 58.15 | 0.88 | 56.7 | 0.94 | 2.56% | -6.38% |
| 0.400 | 58.57 | 0.89 | 56.7 | 0.94 | 3.30% | -5.32% |
| 0.410 | 57.87 | 0.9 | 56.7 | 0.94 | 2.06% | -4.26% |
| 0.420 | 57.43 | 0.9 | 56.7 | 0.94 | 1.29% | -4.26% |
| 0.430 | 58.37 | 0.91 | 56.7 | 0.94 | 2.95% | -3.19% |
| 0.440 | 57.89 | 0.94 | 56.7 | 0.94 | 2.10% | 0.00% |
| 0.450 | 57.85 | 0.93 | 56.7 | 0.94 | 2.03% | -1.06% |
| 0.460 | 57.2 | 0.94 | 56.7 | 0.94 | 0.88% | 0.00% |
| 0.4625625* | 57.1 | 0.945 | 56.7 | 0.94 | 0.71% | 0.53% |
| 0.470 | 56.99 | 0.96 | 56.7 | 0.94 | 0.51% | 2.13% |
| 0.480 | 57.31 | 0.95 | 56.7 | 0.94 | 1.08% | 1.06% |
| 0.490 | 56.79 | 0.96 | 56.7 | 0.94 | 0.16% | 2.13% |
| 0.500 | 56.96 | 0.98 | 56.7 | 0.94 | 0.46% | 4.26% |
| 0.510 | 56.92 | 0.97 | 56.7 | 0.94 | 0.39% | 3.19% |
| 0.520 | 56.79 | 0.98 | 56.7 | 0.94 | 0.16% | 4.26% |
| 0.530 | 56.05 | 1 | 56.7 | 0.94 | -1.15% | 6.38% |
| 0.540 | 56.64 | 0.99 | 56.7 | 0.94 | -0.11% | 5.32% |
| 0.550 | 56.33 | 1.01 | 56.7 | 0.94 | -0.65% | 7.45% |

*interpolated using DASY4 software

| Test Date | Fluid Type | Ambient Temperature | Fluid Temperature | Fluid Depth | Atmospheric Pressure | Relative Humidity | ρ (Kg/m$^3$) |
|---|---|---|---|---|---|---|---|
| Jun 14 | 450 Body | 23.0 °C | 22.8 °C | ≥ 15 cm | 101.1 kPa | 32% | 1000 |


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# 9.0 SAR MEASUREMENT SUMMARY

## SAR EVALUATION RESULTS (GMRS Mode)

| Test Date | DUT Model | Battery Type | Rated Cond. Output Power | Accessories | | DUT Spacing to Planar Phantom | | Cond. Power Before Test | Measured SAR 1g (W/kg) | | SAR Drift During Test | SAR Scaling (with Droop) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | PTT Duty Cycle | | | PTT Duty Cycle | |
| | | | | Body-worn | Audio | DUT | Antenna | Watts | 100% | 50% | dB | 100% | 50% |
| **Face-held** | | | | | | | | | | | | | |
| May 18 | Rino650 | Alkaline | 2W | n/a | n/a | 2.5 cm | 3.5 cm | 1.9 | 1.10 | 0.550 | -0.810 | 1.33 | 0.663 |
| May 18 | Rino650 | Li-ion | 5W | n/a | n/a | 2.5 cm | 3.5 cm | 4.85 | 2.90 | 1.45 | -0.156 | 3.01 | **1.51** |
| May 18 | Rino655t | Alkaline | 2W | n/a | n/a | 2.5 cm | 3.5 cm | 1.9 | 1.21 | 0.605 | -0.890 | 1.52 | 0.760 |
| May 18 | Rino655t | Li-ion | 5W | n/a | n/a | 2.5 cm | 3.5 cm | 4.85 | 2.91 | 1.46 | -0.032 | 2.93 | **1.47** |
| **Body-worn** | | | | | | | | | | | | | |
| May 25 | Rino650 | Alkaline | 2W | Belt-Clip | Earbud Mic | 2.9 cm | 5.3 cm | 1.9 | 0.436 | 0.218 | -0.861 | 0.532 | 0.266 |
| May 25 | Rino650 | Li-ion | 5W | Belt-Clip | Earbud Mic | 2.9 cm | 4.2 cm | 4.85 | 1.73 | 0.865 | -0.241 | 1.83 | 0.914 |
| May 25 | Rino650 | Alkaline | 2W | Belt-Clip | Ear Receiver | 2.9 cm | 5.3 cm | 1.9 | 0.355 | 0.178 | -0.709 | 0.418 | 0.209 |
| May 25 | Rino650 | Li-ion | 5W | Belt-Clip | Ear Receiver | 2.9 cm | 4.2 cm | 4.85 | 1.68 | 0.840 | -0.135 | 1.73 | 0.867 |
| Jun 10 | Rino650 | Alkaline | 2W | Belt-Clip | Headset Mic | 2.9 cm | 5.3 cm | 1.9 | 0.412 | 0.206 | -0.862 | 0.503 | 0.251 |
| Jun 10 | Rino650 | Li-ion | 5W | Belt-Clip | Headset Mic | 2.9 cm | 4.2 cm | 4.85 | 1.67 | 0.835 | -0.224 | 1.76 | 0.880 |
| May 24 | Rino655t | Alkaline | 2W | Belt-Clip | Earbud Mic | 2.9 cm | 5.3 cm | 1.9 | 0.345 | 0.173 | -0.849 | 0.420 | 0.210 |
| May 24 | Rino655t | Li-ion | 5W | Belt-Clip | Earbud Mic | 2.9 cm | 4.2 cm | 4.85 | 1.61 | 0.805 | -0.137 | 1.66 | 0.831 |
| May 24 | Rino655t | Alkaline | 2W | Belt-Clip | Ear Receiver | 2.9 cm | 5.3 cm | 1.9 | 0.302 | 0.151 | -0.741 | 0.358 | 0.179 |
| May 24 | Rino655t | Li-ion | 5W | Belt-Clip | Ear Receiver | 2.9 cm | 4.2 cm | 4.85 | 1.67 | 0.835 | -0.101 | 1.71 | 0.855 |
| Jun 14 | Rino655t | Alkaline | 2W | Belt-Clip | Headset Mic | 2.9 cm | 5.3 cm | 1.9 | 0.492 | 0.246 | -0.691 | 0.577 | 0.288 |
| Jun 10 | Rino655t | Li-ion | 5W | Belt-Clip | Headset Mic | 2.9 cm | 4.2 cm | 4.85 | 1.79 | 0.895 | -0.214 | 1.88 | 0.940 |
| May 17 | Rino650 | Alkaline | 2W | Carabiner Clip | Earbud Mic | 1.3 cm | 4.5 cm | 1.9 | 0.338 | 0.169 | -0.849 | 0.411 | 0.206 |
| May 16 | Rino650 | Li-ion | 5W | Carabiner Clip | Earbud Mic | 1.3 cm | 3.5 cm | 4.85 | 2.51 | 1.26 | -0.307 | 2.69 | **1.35** |
| May 17 | Rino650 | Alkaline | 2W | Carabiner Clip | Ear Receiver | 1.3 cm | 4.5 cm | 1.9 | 0.397 | 0.199 | -0.776 | 0.475 | 0.237 |
| May 16 | Rino650 | Li-ion | 5W | Carabiner Clip | Ear Receiver | 1.3 cm | 3.5 cm | 4.85 | 2.43 | 1.22 | -0.218 | 2.56 | 1.28 |
| Jun 13 | Rino650 | Alkaline | 2W | Carabiner Clip | Headset Mic | 1.3 cm | 4.5 cm | 1.9 | 0.694 | 0.347 | -0.927 | 0.859 | 0.430 |
| Jun 13 | Rino650 | Li-ion | 5W | Carabiner Clip | Headset Mic | 1.3 cm | 3.5 cm | 4.85 | 2.50 | 1.25 | -0.220 | 2.63 | 1.32 |
| May 17 | Rino655t | Alkaline | 2W | Carabiner Clip | Earbud Mic | 1.3 cm | 4.5 cm | 1.9 | 0.715 | 0.358 | -1.18 | 0.938 | 0.469 |
| May 17 | Rino655t | Li-ion | 5W | Carabiner Clip | Earbud Mic | 1.3 cm | 3.5 cm | 4.85 | 2.27 | 1.14 | -0.264 | 2.41 | 1.21 |
| May 17 | Rino655t | Alkaline | 2W | Carabiner Clip | Ear Receiver | 1.3 cm | 4.5 cm | 1.9 | 0.446 | 0.223 | -0.854 | 0.543 | 0.272 |
| May 17 | Rino655t | Li-ion | 5W | Carabiner Clip | Ear Receiver | 1.3 cm | 3.5 cm | 4.85 | 2.37 | 1.19 | -0.364 | 2.58 | 1.29 |
| Jun 14 | Rino655t | Alkaline | 2W | Carabiner Clip | Headset Mic | 1.3 cm | 4.5 cm | 1.9 | 0.837 | 0.419 | -0.881 | 1.03 | 0.513 |
| Jun 14 | Rino655t | Li-ion | 5W | Carabiner Clip | Headset Mic | 1.3 cm | 3.5 cm | 4.85 | 2.72 | 1.36 | -0.216 | 2.86 | **1.43** |

| SAR LIMIT(S) | HEAD / BODY | SPATIAL PEAK | RF EXPOSURE CATEGORY |
|---|---|---|---|
| FCC 47 CFR 2.1093 | 1.6 W/kg | averaged over 1 gram | General Population / Uncontrolled |


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| Notes | |
|---|---|
| 1. | Detailed measurement plots showing the maximum SAR location of the DUT are reported in Appendix A. |
| 2. | Test Mode: CW (Unmodulated Continuous Wave) |
| 3. | The number of test channels was selected in accordance with the procedures specified in FCC KDB 447498 Section 6) c) (see reference [4]). |
| 4. | The SAR droop measured by the DASY4 system for the duration of the SAR evaluation was added to the measured SAR level to report the scaled SAR result as shown in the above test data table. |
| 5. | The DUT was tested 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. |
| 6. | The fluid temperature was measured prior to and after the SAR evaluations. The measured fluid remained within +/-2°C. |
| 7. | The dielectric parameters of the simulated tissue mixtures were measured prior to the SAR evaluations using a Dielectric Probe Kit and a Network Analyzer (see Appendix C). |

## 10.0 SAR SCALING (MANUFACTURER'S RATED OUTPUT POWER LEVEL)

**MAX. SAR LEVELS SCALED TO MANUFACTURER'S RATED OUTPUT POWER**

| Test Config. | DUT | Freq. (MHz) | Battery | Measured Conducted Power (W) | SAR Level (50% PTT d/f) W/kg (1g) | Scaling up Rated Cond. Power | Scaled SAR 1g (W/kg) |
|---|---|---|---|---|---|---|---|
| Face-held | Rino650 | 462.5625 MHz | Li-ion | 4.85 | 1.51 | + 0.13 dB | 1.56 |
| Face-held | Rino650 | 462.5625 MHz | Alkaline | 1.9 | 0.663 | + 0.22 dB | 0.698 |
| Face-held | Rino655t | 462.5625 MHz | Li-ion | 4.85 | 1.47 | + 0.13 dB | 1.52 |
| Face-held | Rino655t | 462.5625 MHz | Alkaline | 1.9 | 0.760 | + 0.22 dB | 0.800 |
| Body-worn | Rino650 | 462.5625 MHz | Li-ion | 4.85 | 1.35 | + 0.13 dB | 1.39 |
| Body-worn | Rino650 | 462.5625 MHz | Alkaline | 1.9 | 0.430 | + 0.22 dB | 0.452 |
| Body-worn | Rino655t | 462.5625 MHz | Li-ion | 4.85 | 1.43 | + 0.13 dB | 1.47 |
| Body-worn | Rino655t | 462.5625 MHz | Alkaline | 1.9 | 0.513 | + 0.22 dB | 0.540 |

| SAR LIMIT | HEAD / BODY | SPATIAL PEAK | RF EXPOSURE CATEGORY |
|---|---|---|---|
| FCC 47 CFR 2.1093 | 1.6 W/kg | 1 gram average | General Population / Uncontrolled |


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## 11.0 DETAILS OF SAR EVALUATION

The Garmin International Inc. Models: Rino650 US and Rino655t US (with camera) Portable GMRS/FRS PTT Radio Transceiver (FCC ID: IPH-01767) was compliant for localized Specific Absorption Rate (General Population / Uncontrolled Exposure) based on the test provisions and conditions described below. The detailed test setup photographs are shown in Appendix D.

1. The face-held SAR evaluations were performed 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 side of the DUT and the outer surface of the planar phantom. The face-held SAR evaluations were performed consecutively with each battery option.
2. The body-worn SAR evaluations were performed with the swivel belt-clip and carabiner clip body-worn accessories consecutively with each audio accessory and battery option.
3. The area scan evaluation was performed with a fully charged battery pack. After the area scan was completed the battery was replaced with a fully charged battery pack prior to the zoom scan evaluation.

## 12.0 SAR EVALUATION PROCEDURES

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

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

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

d. A linear search is applied to find all the candidate maxima. Subsequently, all maxima are removed that are >2 dB from the global maximum. The remaining maxima are then used to position the cube scans.
A 1g and 10g spatial peak SAR was determined as follows:

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

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

g. A zoom scan volume of 32 mm x 32 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.


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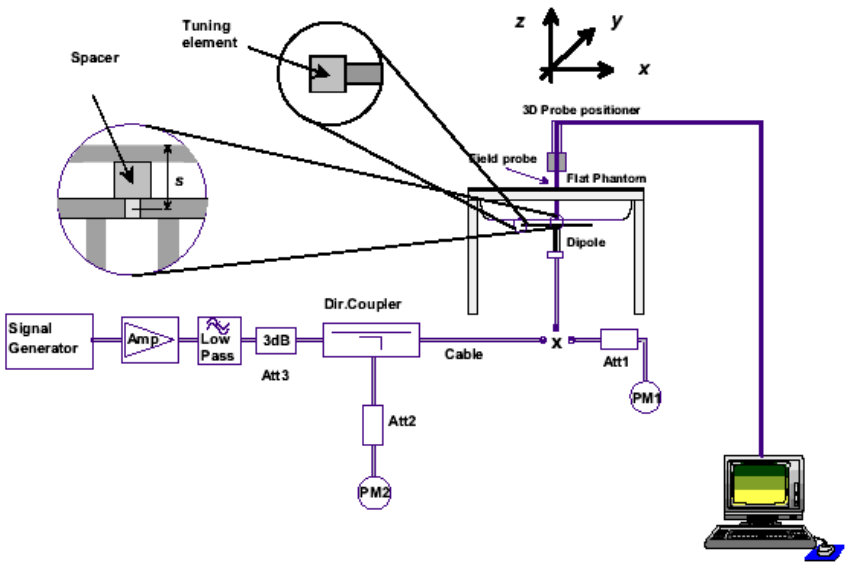
## 13.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations, a system check was performed with a planar phantom and 450 MHz dipole (see Appendix B for system performance check test plot) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [3]). 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 ±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 EVALUATIONS

| Test Date | Equiv. Tissue | SAR 1g normalized to 1W (W/kg) | | | Dielectric Constant $\varepsilon_r$ | | | Conductivity $\sigma$ (mho/m) | | | $\rho$ (Kg/m$^3$) | Amb. Temp. (°C) | Fluid Temp. (°C) | Fluid Depth (cm) | Humid. (%) | Barom. Press. (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. (MHz) | Target | Meas. | Dev. | Target | Meas. | Dev. | Target | Meas. | Dev. | | | | | | |
| May 16 | Body 450 | 4.58 ±10% | 4.60 | +0.4% | 56.7 ±5% | 58.4 | +3.0% | 0.94 ±5% | 0.90 | -4.2% | 1000 | 24 | 20.7 | ≥ 15 | 31 | 101.1 |
| May 18 | Head 450 | 4.76 ±10% | 5.15 | +8.2% | 43.5 ±5% | 44.8 | +3.0% | 0.87 ±5% | 0.87 | 0% | 1000 | 22 | 20.9 | ≥ 15 | 31 | 101.1 |
| May 24 | Body 450 | 4.58 ±10% | 4.97 | +8.5% | 56.7 ±5% | 57.5 | +1.4% | 0.94 ±5% | 0.94 | 0% | 1000 | 23 | 21.1 | ≥ 15 | 34 | 101.1 |
| Jun 10 | Body 450 | 4.58 ±10% | 4.92 | +7.4% | 56.7 ±5% | 57.9 | +2.1% | 0.94 ±5% | 0.97 | +3.2% | 1000 | 22 | 22.7 | ≥ 15 | 34 | 101.1 |
| Jun 13 | Body 450 | 4.58 ±10% | 4.85 | +5.9% | 56.7 ±5% | 57.2 | +0.9% | 0.94 ±5% | 0.93 | -1.1% | 1000 | 23 | 22.8 | ≥ 15 | 40 | 101.1 |

| Notes | | |
|---|---|---|
| | 1 | The SAR evaluations performed on May 17, May 25 and June 14 were performed within 24 hours of the SPC from previous day. |
| | 2. | The target SAR value is the measured values from the SAR system manufacturer's dipole calibration (see Appendix E). |
| | 3. | The target dielectric parameters are the normalized values for nominal fluid parameters from the SAR system manufacturer's dipole calibration (see Appendix E). |
| | 4. | The fluid temperature was measured prior to and after the system performance check. The measured fluid remained within +/-2°C. |
| | 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). |




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

SPEAG 450 MHz Validation Dipole Setup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## 14.0 SIMULATED EQUIVALENT TISSUES

The simulated equivalent tissue recipe in the table below is derived from the SAR system manufacturer's suggested recipe in the DASY4 manual (see references [6] and [7]) in accordance with the procedures and requirements specified in IEEE Standard 1528-2003 (see reference [3]). 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 % |

## 15.0 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. | | | |


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# 16.0 ROBOT SYSTEM SPECIFICATIONS

| Specifications | |
|---|---|
| **Positioner** | Stäubli Unimation Corp. Robot Model: RX60L |
| **Repeatability** | 0.02 mm |
| **No. of axis** | 6 |
| **Data Acquisition Electronic (DAE) System** | |
| **Cell Controller** | |
| **Processor** | AMD Athlon XP 2400+ |
| **Clock Speed** | 2.0 GHz |
| **Operating System** | Windows XP Professional |
| **Data Converter** | |
| **Features** | Signal Amplifier, multiplexer, A/D converter, and control logic |
| **Software** | Measurement Software: DASY4, V4.7 Build 44 |
| | Postprocessing Software: SEMCAD, V1.8 Build 171 |
| **Connecting Lines** | Optical downlink for data and status info., Optical uplink for commands and clock |
| **DASY4 Measurement Server** | |
| **Function** | Real-time data evaluation for field measurements and surface detection |
| **Hardware** | PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 MB RAM |
| **Connections** | COM1, COM2, DAE, Robot, Ethernet, Service Interface |
| **E-Field Probe** | |
| **Model** | ET3DV6 |
| **Serial No.** | 1590 |
| **Construction** | Triangular core fiber optic detection system |
| **Frequency** | 10 MHz to 6 GHz |
| **Linearity** | ±0.2 dB (30 MHz to 3 GHz) |
| **Phantom** | |
| **Type** | Barski Planar Phantom |
| **Shell Material** | Fiberglass |
| **Thickness** | 2.0 ±0.1 mm |
| **Volume** | Approx. 70 liters |


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## 17.0 PROBE SPECIFICATION (ET3DV6)

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

**ET3DV6 E-Field Probe**

## 18.0 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**

## 19.0 DEVICE HOLDER

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

**Device Holder**


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## 20.0 TEST EQUIPMENT LIST

| TEST EQUIPMENT | | ASSET NO. | SERIAL NO. | DATE CALIBRATED | CALIBRATION INTERVAL |
|---|---|---|---|---|---|
| USED | DESCRIPTION | | | | |
| x | Schmid & Partner DASY4 System | - | - | - | - |
| x | -DASY4 Measurement Server | 00158 | 1078 | CNR | CNR |
| x | -Robot | 00046 | 599396-01 | CNR | CNR |
| x | -DAE4 | 00019 | 353 | 27Apr10 | Biennial |
| x | -ET3DV6 E-Field Probe | 00017 | 1590 | 15Jul10 | Annual |
| x | -SPEAG D450V3 Validation Dipole | 000217 | 1068 | 18Jan10 | Triennial |
| x | -Barski Planar Phantom | 00155 | 03-01 | CNR | CNR |
| x | HP 85070C Dielectric Probe Kit | 00033 | none | CNR | CNR |
| x | Gigatronics 8652A Power Meter | 00007 | 1835272 | 04May10 | Biennial |
| x | Gigatronics 80701A Power Sensor | 00014 | 1833699 | 04May10 | Biennial |
| x | HP 8753ET Network Analyzer | 00134 | US39170292 | 04May10 | Biennial |
| x | Rohde & Schwarz SMR20 Signal Generator | 00006 | 100104 | CNR | CNR |
| x | Amplifier Research 5S1G4 Power Amplifier | 00106 | 26235 | CNR | CNR |
| Abbr. | CNR = Calibration Not Required | | | | |

## 21.0 JUSTIFICATION FOR EXTENDED SAR DIPOLE CALIBRATION

SAR dipoles calibrated less than two years ago but more than one year ago were confirmed by maintaining return loss (< -20dB, within 20% of prior calibration) and impedance (within 5Ω from prior calibration) requirements per extended calibrations in FCC KDB 450824 (see reference [5]).

| SPEAG VALIDATION DIPOLE D450V3 - SN: 1068 | | | | | | |
|---|---|---|---|---|---|---|
| Measurement Date | Freq. | TSL | Return Loss (dB) | Δ % | Impedance (Ω) | Δ Ω |
| January 18, 2010 | 450 MHz | Body | - 20.0 | | 54.8 | |
| February 7, 2011 | | | -20.5 | 2.5% | 50.4 | 4.4 |


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# 22.0 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 (450 MHz) | E.2.1 | 6.65 | Normal | 1 | 1 | 1 | 6.65 | 6.65 | ∞ |
| 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 | 1 | Rectangular | 1.732050808 | 1 | 1 | 0.6 | 0.6 | ∞ |
| 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 | 4.26 | Normal | 1 | 0.64 | 0.43 | 2.7 | 1.8 | ∞ |
| Liquid Permittivity (target) | E.3.2 | 5 | Rectangular | 1.732050808 | 0.6 | 0.49 | 1.7 | 1.4 | ∞ |
| Liquid Permittivity (measured) | E.3.3 | 3.22 | Normal | 1 | 0.6 | 0.49 | 1.9 | 1.6 | ∞ |
| **Combined Standard Uncertainty** | | | **RSS** | | | | **11.50** | **11.14** | |
| **Expanded Uncertainty (95% Confidence Interval)** | | | **k=2** | | | | **23.00** | **22.28** | |
| **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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## 23.0 REFERENCES

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

[2] 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.

[3] 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.

[4] Federal Communications Commission, Office of Engineering and Technology - "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies"; KDB 447498 D01v04: November 2009.

[5] 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.

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

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

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

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


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# APPENDIX A - SAR MEASUREMENT DATA


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Date Tested: 05/18/2011

## Face SAR - 1.9W - GMRS ch.1 - 462.5625 MHz – Alkaline – Rino 650

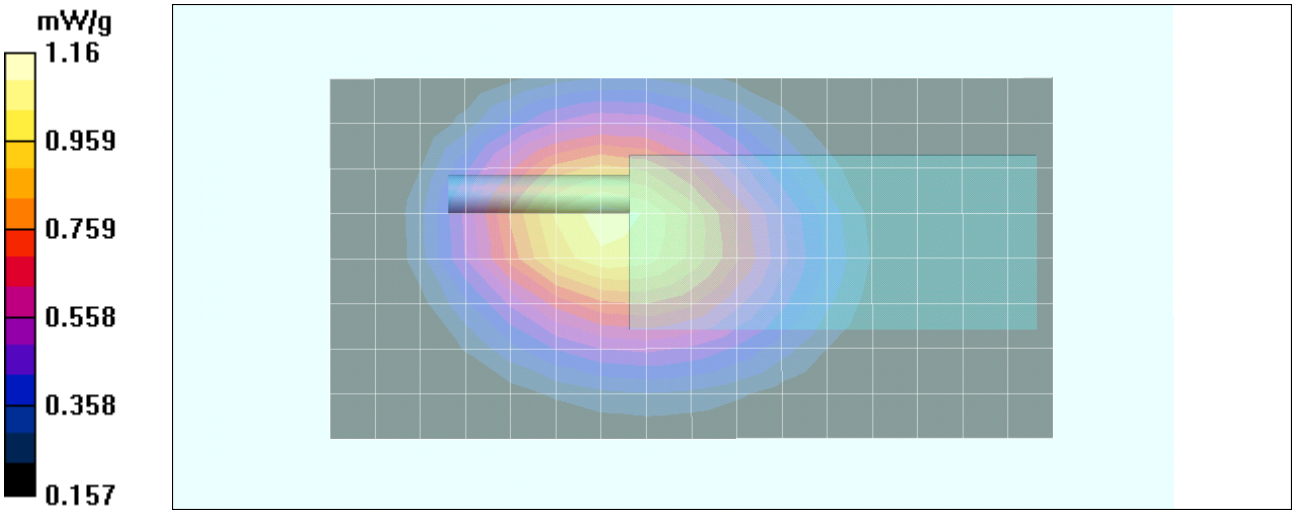
**DUT: Garmin Rino 650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 23°C; Fluid Temp: 20.9°C; Barometric Pressure: 101.1 kPa; Humidity: 31%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: HSL450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.88 mho/m; $\varepsilon_r$ = 44.9; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.25, 7.25, 7.25); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.07 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 38.3 V/m; Power Drift = -0.810 dB
Peak SAR (extrapolated) = 1.56 W/kg
**SAR(1 g) = 1.1 mW/g; SAR(10 g) = 0.800 mW/g**
Maximum value of SAR (measured) = 1.16 mW/g





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Date Tested: 05/18/2011

## Face SAR - 4.85W - GMRS ch.1 - 462.5625 MHz – Li-ion – Rino 650

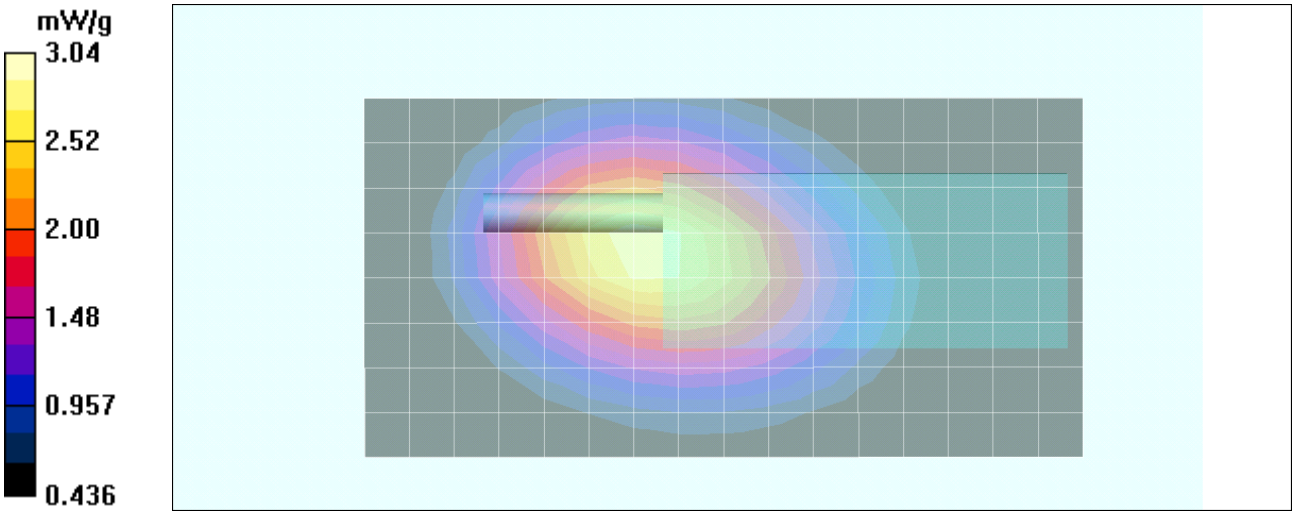
**DUT: Garmin Rino650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 23°C; Fluid Temp: 20.9°C; Barometric Pressure: 101.1 kPa; Humidity: 31%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: HSL450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.88 mho/m; $\varepsilon_r$ = 44.9; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.25, 7.25, 7.25); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.82 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 60.2 V/m; Power Drift = -0.156 dB
Peak SAR (extrapolated) = 4.07 W/kg
**SAR(1 g) = 2.9 mW/g; SAR(10 g) = 2.11 mW/g**
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 3.04 mW/g





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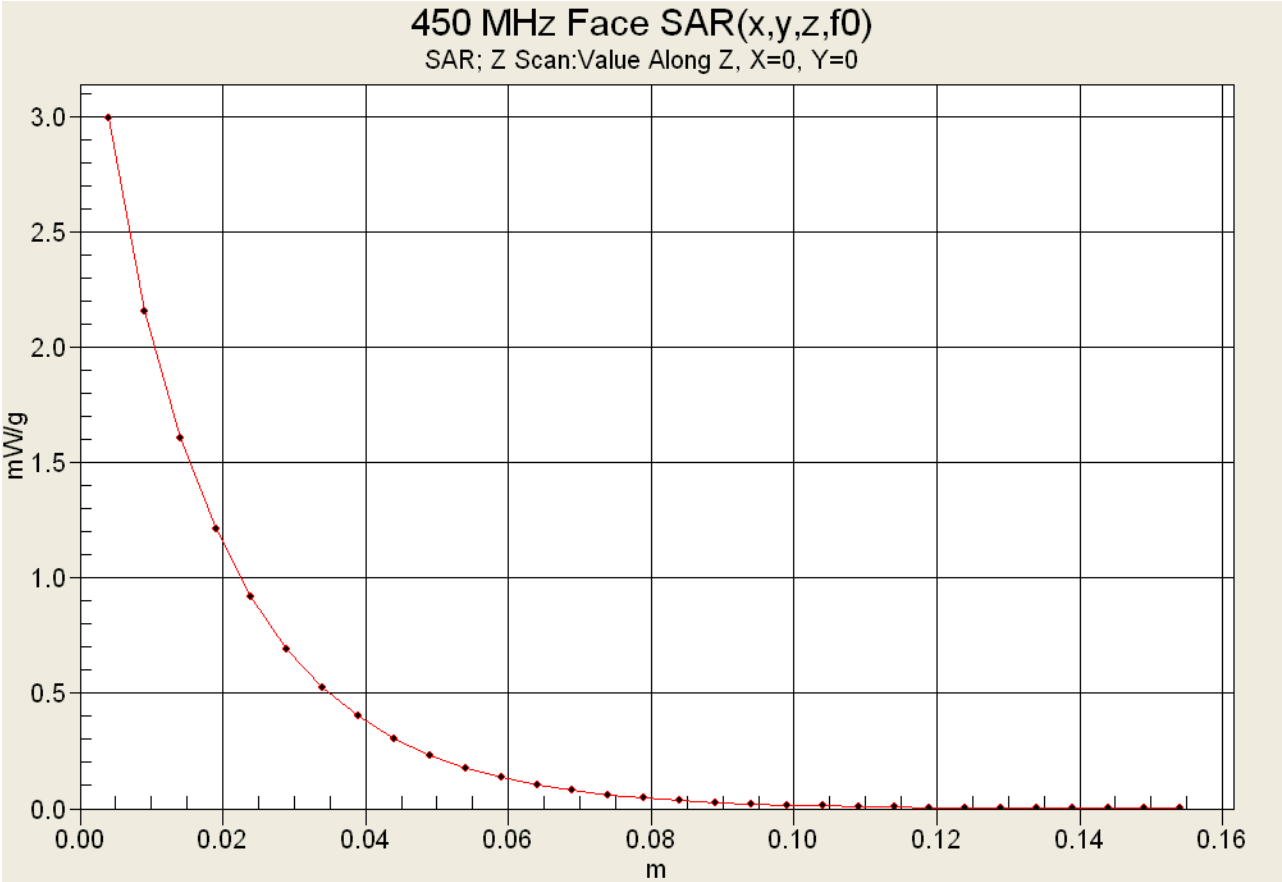
## Z-axis Scan





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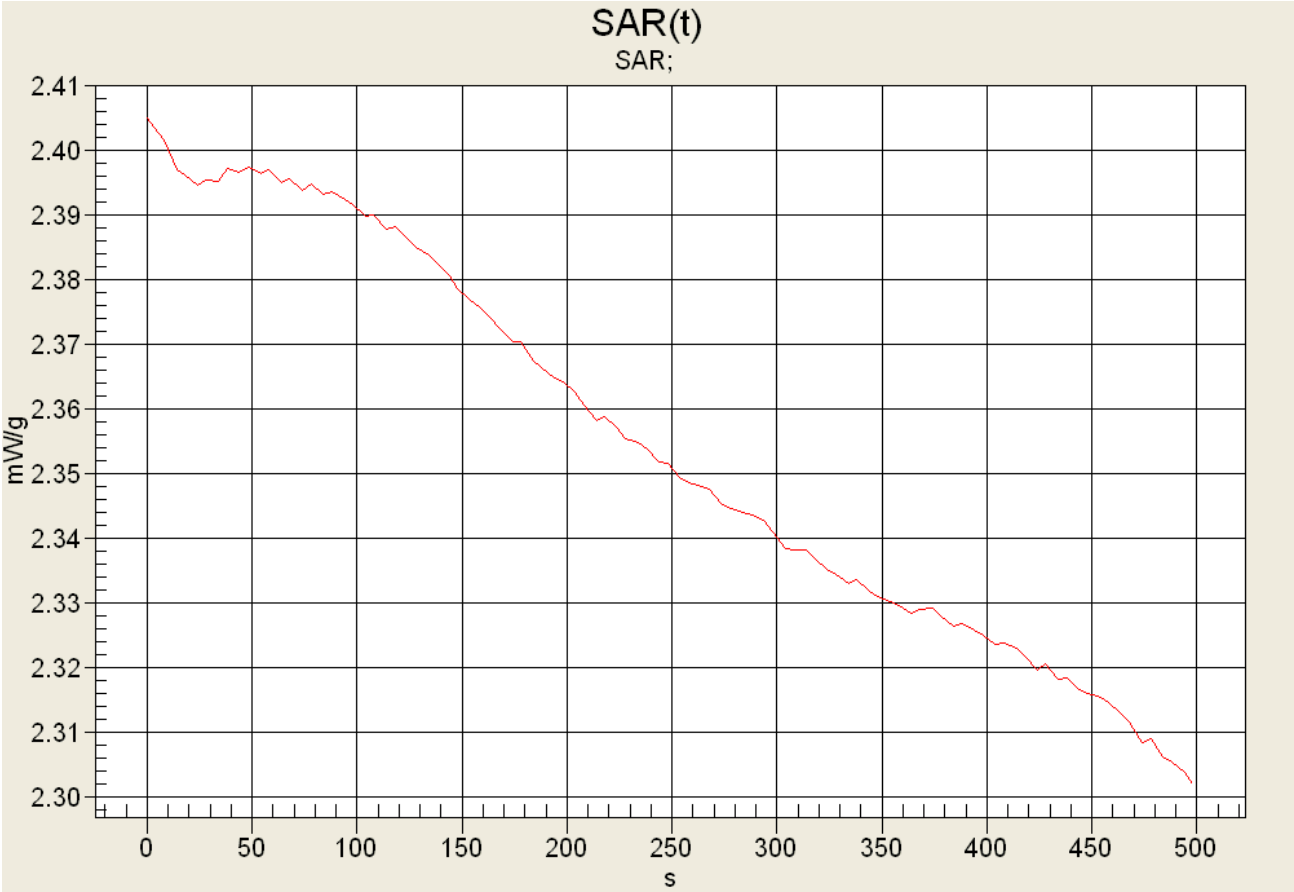
## SAR versus Time




Start SAR: 2.405 mW/g
Zoom Scan (after 250s): 2.352 mW/g (-0.100 dB)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Date Tested: 05/18/2011

## Face SAR – 1.9W - GMRS ch.1 - 462.5625 MHz – Alkaline – Rino 655t

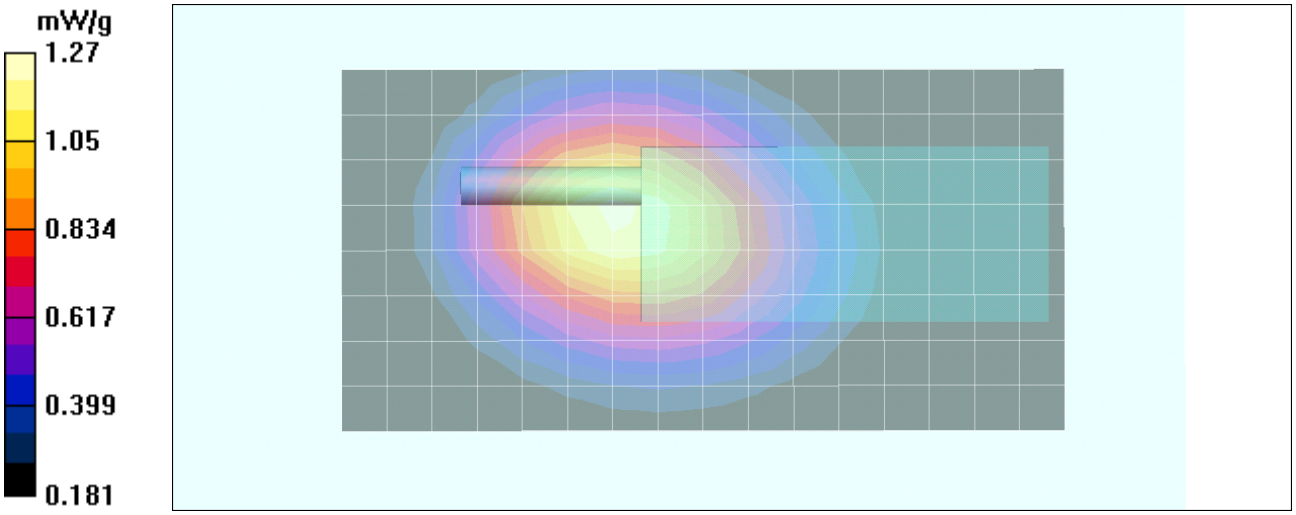
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 23°C; Fluid Temp: 20.9°C; Barometric Pressure: 101.1 kPa; Humidity: 31%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: HSL450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.88 mho/m; $\varepsilon_r$ = 44.9; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.25, 7.25, 7.25); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.23 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 40.1 V/m; Power Drift = -0.890 dB
Peak SAR (extrapolated) = 1.72 W/kg
**SAR(1 g) = 1.21 mW/g; SAR(10 g) = 0.876 mW/g**
Maximum value of SAR (measured) = 1.27 mW/g





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Date Tested: 05/18/2011

## Face SAR – 4.85W - GMRS ch.1 - 462.5625 MHz – Li-ion – Rino 655t

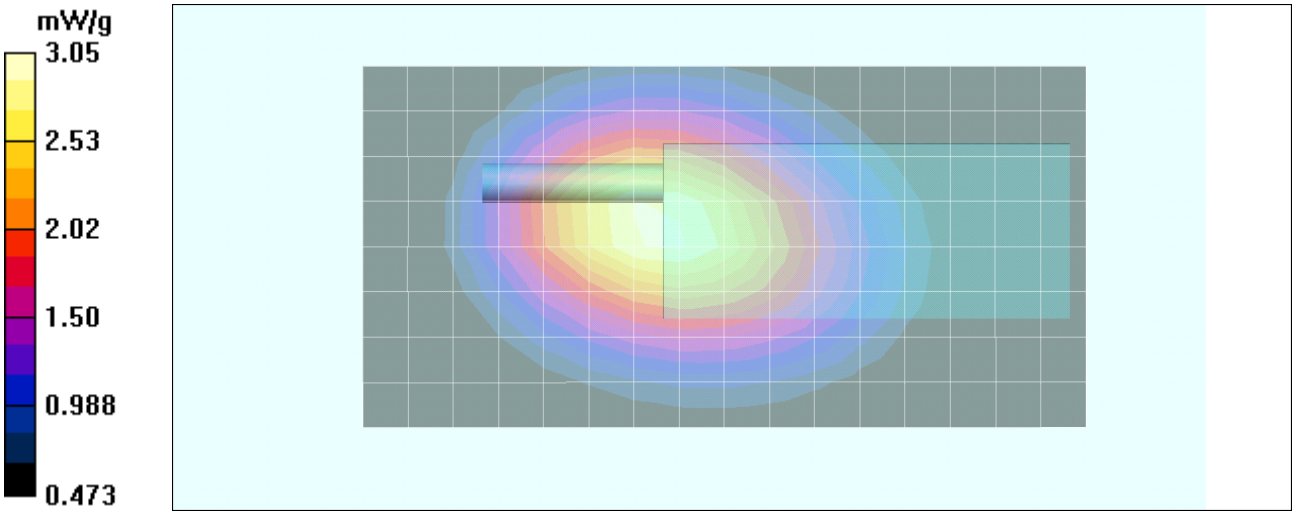
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 23°C; Fluid Temp: 20.9°C; Barometric Pressure: 101.1 kPa; Humidity: 31%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: HSL450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.88 mho/m; $\varepsilon_r$ = 44.9; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.25, 7.25, 7.25); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.91 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 59.3 V/m; Power Drift = -0.032 dB
Peak SAR (extrapolated) = 4.10 W/kg
**SAR(1 g) = 2.91 mW/g; SAR(10 g) = 2.11 mW/g**
Maximum value of SAR (measured) = 3.05 mW/g





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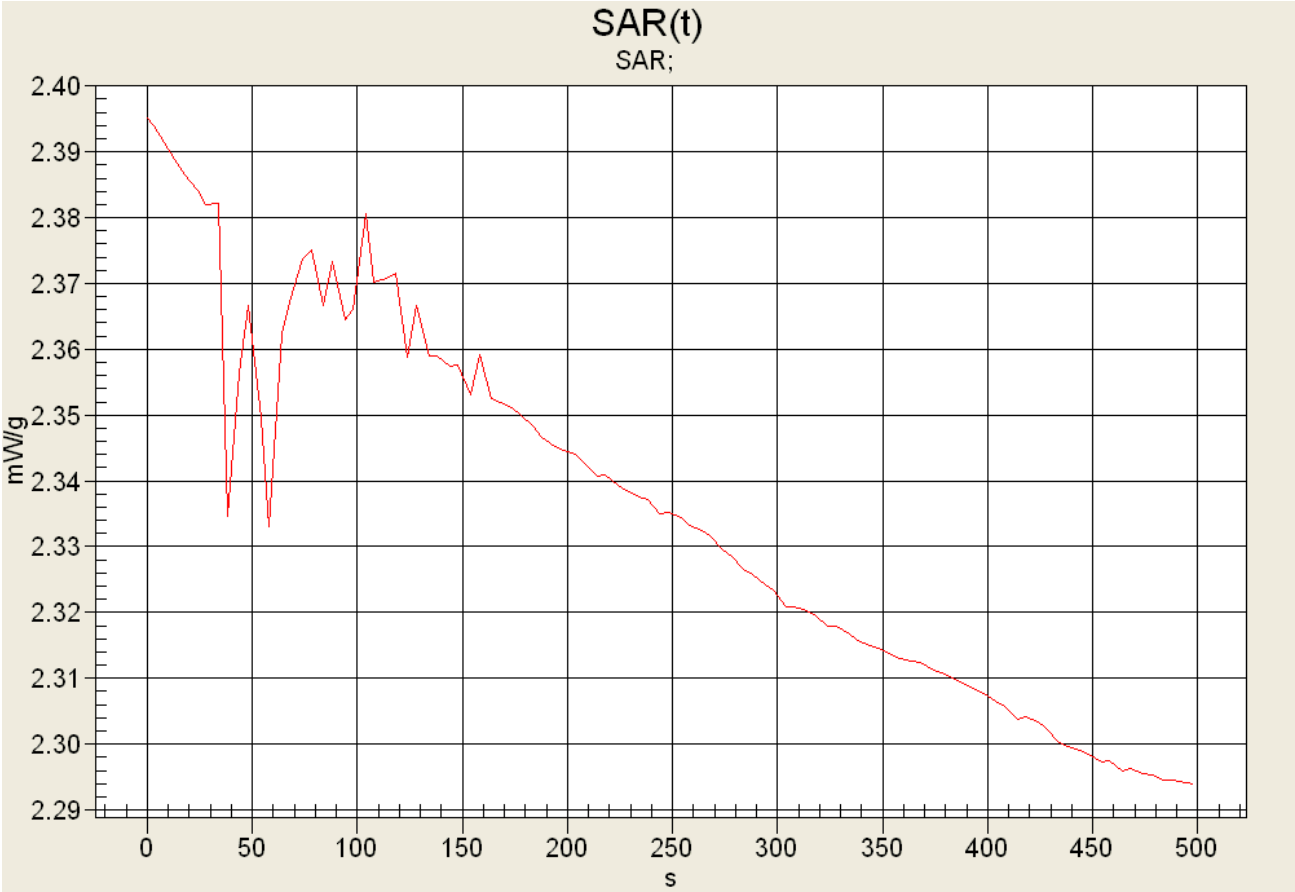
## SAR versus Time




Start SAR: 2.395 mW/g
Zoom Scan (after 250s): 2.335 mW/g (-0.110 dB)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Date Tested: 05/25/2011

## Body-worn SAR – 1.9W - GMRS ch.1 - 462.5625 MHz - Alkaline - Belt-Clip – Earbud – Rino 650

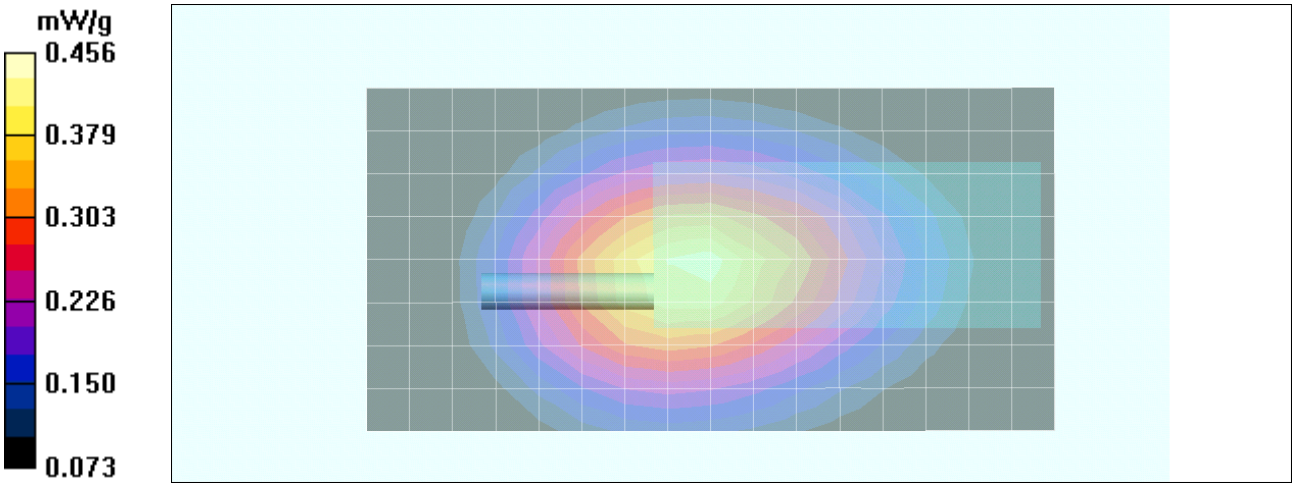
**DUT: Garmin Rino 650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 22°C; Fluid Temp: 22.1°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.933 mho/m; $\varepsilon_r$ = 57.5; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.421 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 22.5 V/m; Power Drift = -0.861 dB
Peak SAR (extrapolated) = 0.622 W/kg
**SAR(1 g) = 0.436 mW/g; SAR(10 g) = 0.319 mW/g**
Maximum value of SAR (measured) = 0.456 mW/g





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Date Tested: 05/25/2011

## Body-Worn SAR – 4.85W - GMRS ch.1 - 462.5625 MHz - Li-ion - Belt-Clip – Earbud – Rino 650

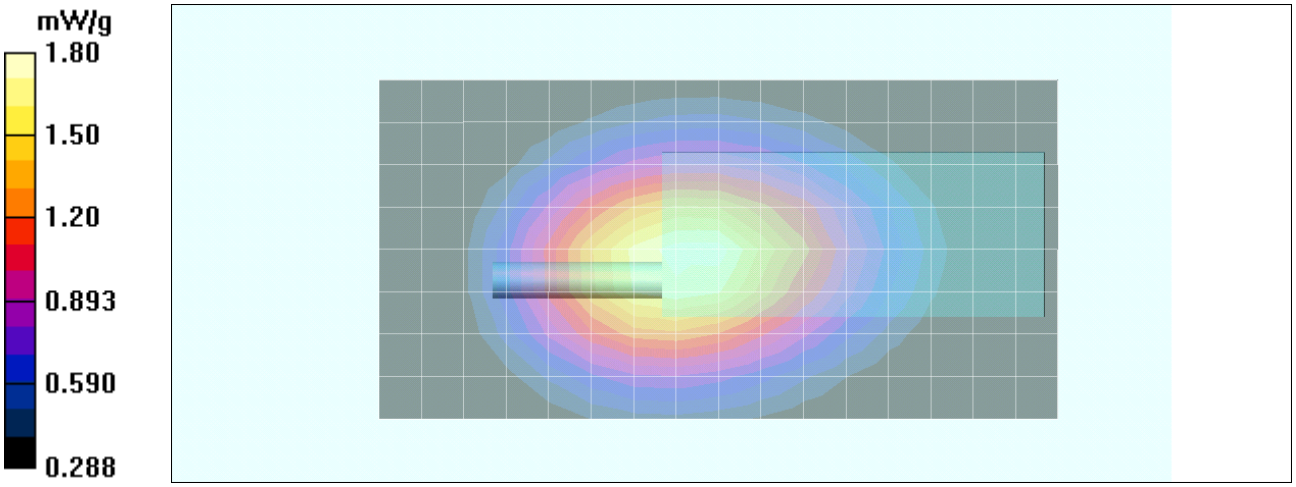
**DUT: Garmin Rino650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 22°C; Fluid Temp: 22.1°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.933 mho/m; $\varepsilon_r$ = 57.5; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.76 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 43.4 V/m; Power Drift = -0.241 dB
Peak SAR (extrapolated) = 2.47 W/kg
**SAR(1 g) = 1.73 mW/g; SAR(10 g) = 1.26 mW/g**
Maximum value of SAR (measured) = 1.80 mW/g





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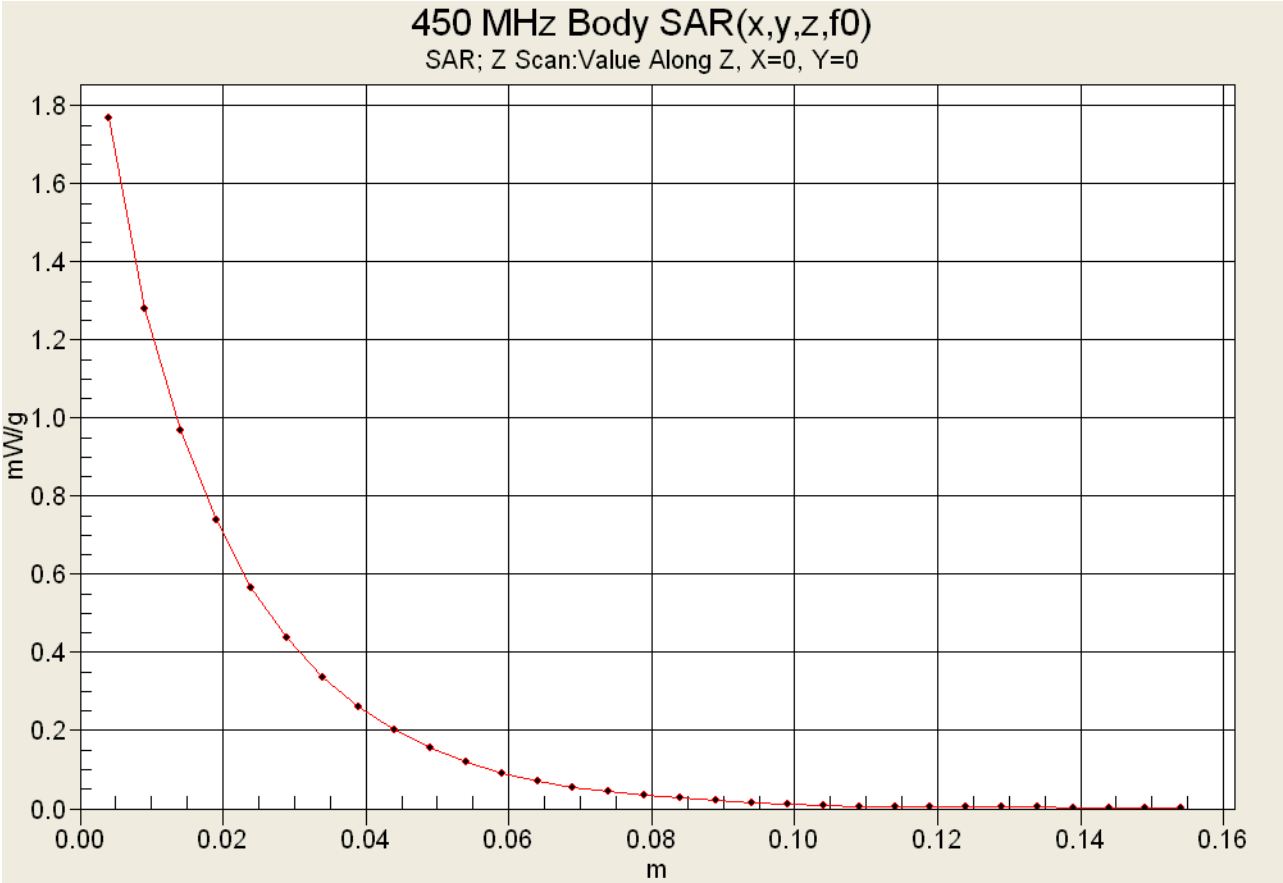
## Z-axis Scan





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Date Tested: 05/25/2011

## Body-worn SAR - 1.9W - GMRS ch.1 - 462.5625 MHz - Alkaline - Belt-Clip - Ear Receiver - Rino 650

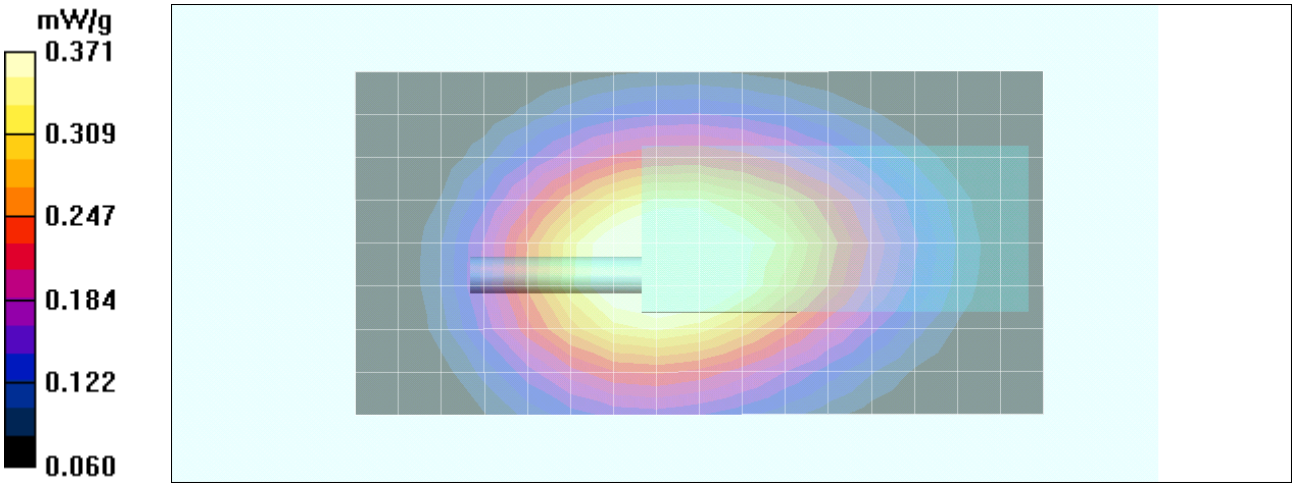
**DUT: Garmin Rino 650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 22°C; Fluid Temp: 22.1°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.933 mho/m; $\varepsilon_r$ = 57.5; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.422 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 20.2 V/m; Power Drift = -0.709 dB
Peak SAR (extrapolated) = 0.512 W/kg
**SAR(1 g) = 0.355 mW/g; SAR(10 g) = 0.260 mW/g**
Maximum value of SAR (measured) = 0.371 mW/g





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Date Tested: 05/25/2011

## Body-Worn SAR - 4.85W - GMRS ch.1 - 462.5625 MHz - Li-ion - Belt-Clip - Ear Receiver - Rino 650

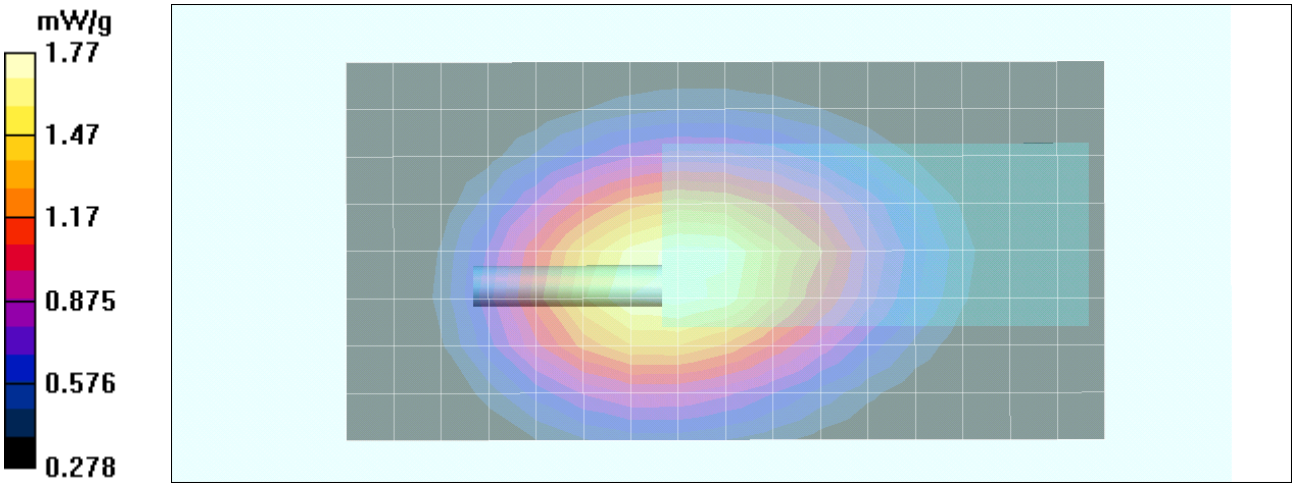
**DUT: Garmin Rino650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 22°C; Fluid Temp: 22.1°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.933 mho/m; $\varepsilon_r$ = 57.5; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.72 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 42.4 V/m; Power Drift = -0.135 dB
Peak SAR (extrapolated) = 2.43 W/kg
**SAR(1 g) = 1.68 mW/g; SAR(10 g) = 1.23 mW/g**
Maximum value of SAR (measured) = 1.77 mW/g





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Date Tested: 06/10/2011

## Body-worn SAR - 1.9W - GMRS ch.1 - 462.5625 MHz – Alkaline - Belt-Clip - Headset - Rino 650

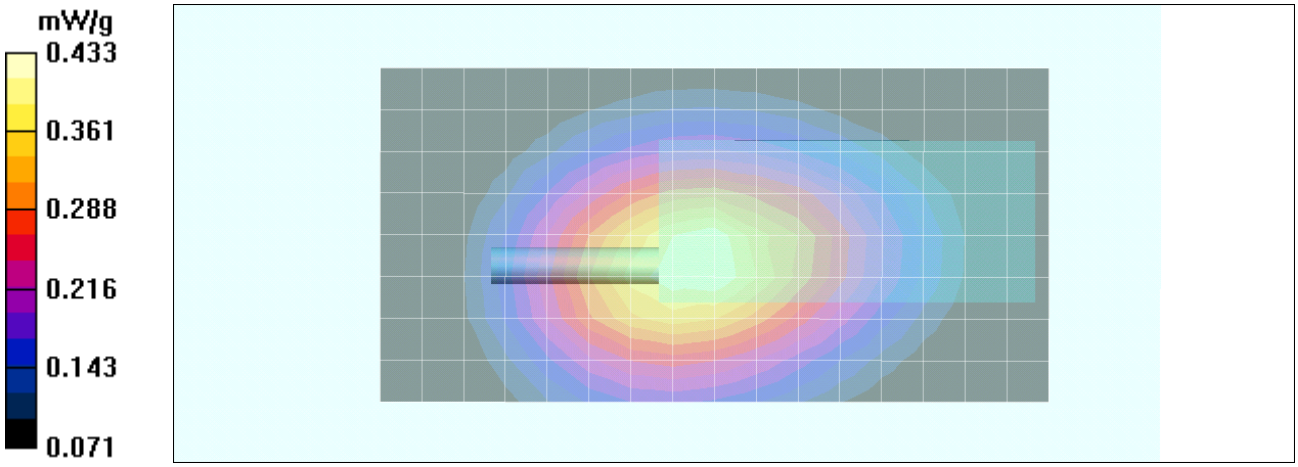
**DUT: Garmin Rino 650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 22°C; Fluid Temp: 22.9°C; Barometric Pressure: 101.1 kPa; Humidity: 34%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.98 mho/m; $\varepsilon_r$ = 57.7; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.410 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 20.9 V/m; Power Drift = -0.862 dB
Peak SAR (extrapolated) = 0.602 W/kg
**SAR(1 g) = 0.412 mW/g; SAR(10 g) = 0.301 mW/g**
Maximum value of SAR (measured) = 0.433 mW/g





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Date Tested: 06/10/2011

## Body-Worn SAR – 4.85W - GMRS ch.1 - 462.5625 MHz – Li-ion- Belt-Clip – Headset – Rino 650

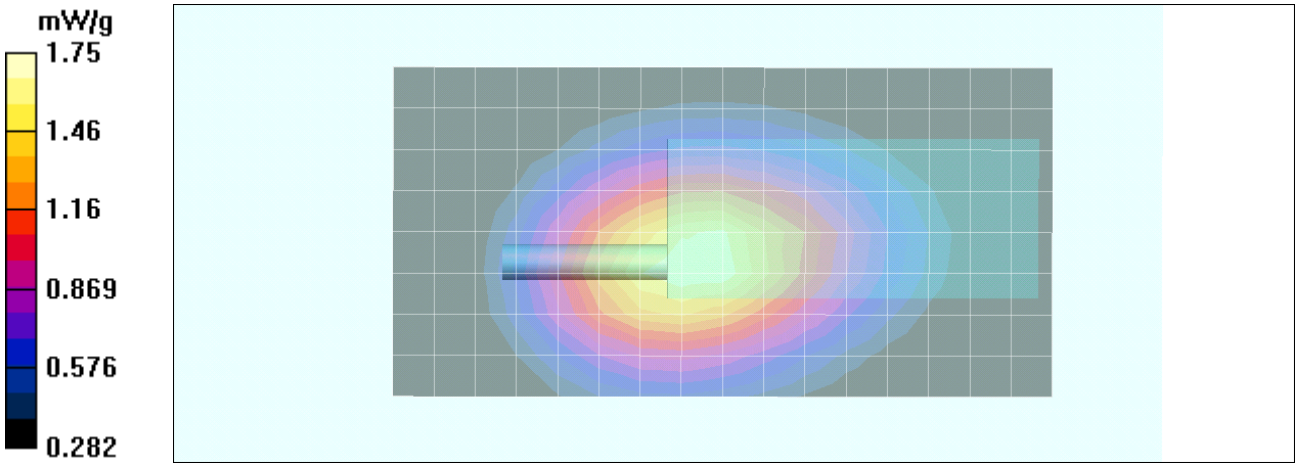
**DUT: Garmin Rino650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 22°C; Fluid Temp: 22.9°C; Barometric Pressure: 101.1 kPa; Humidity: 34%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.98 mho/m; $\varepsilon_r$ = 57.7; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm.
Maximum value of SAR (measured) = 1.65 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 40.3 V/m; Power Drift = -0.224 dB
Peak SAR (extrapolated) = 2.41 W/kg
**SAR(1 g) = 1.67 mW/g; SAR(10 g) = 1.22 mW/g**
Maximum value of SAR (measured) = 1.75 mW/g





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Date Tested: 05/24/2011

## Body-Worn SAR – 1.9W - GMRS ch.1 - 462.5625 MHz – Alkaline - Belt-Clip – Earbud – Rino 655t

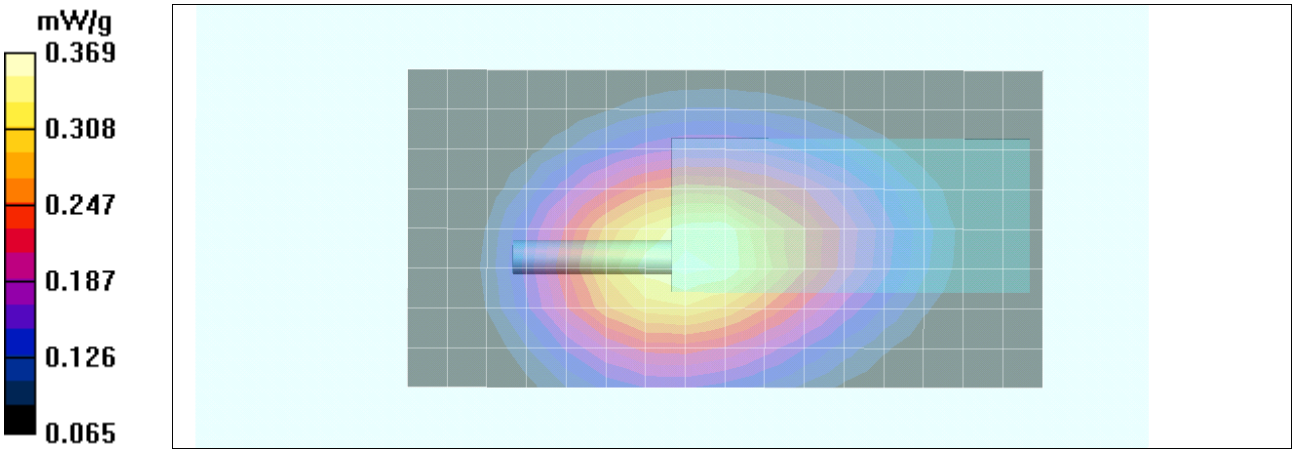
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 23°C; Fluid Temp: 21.1°C; Barometric Pressure: 101.1 kPa; Humidity: 34%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.94 mho/m; $\varepsilon_r$ = 57.8; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.357 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 20.7 V/m; Power Drift = -0.849 dB
Peak SAR (extrapolated) = 0.494 W/kg
**SAR(1 g) = 0.345 mW/g; SAR(10 g) = 0.254 mW/g**
Maximum value of SAR (measured) = 0.369 mW/g





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Date Tested: 05/24/2011

## Body-Worn SAR – 4.85W - GMRS ch.1 - 462.5625 MHz – Li-ion – Belt-Clip – Earbud – Rino 655t

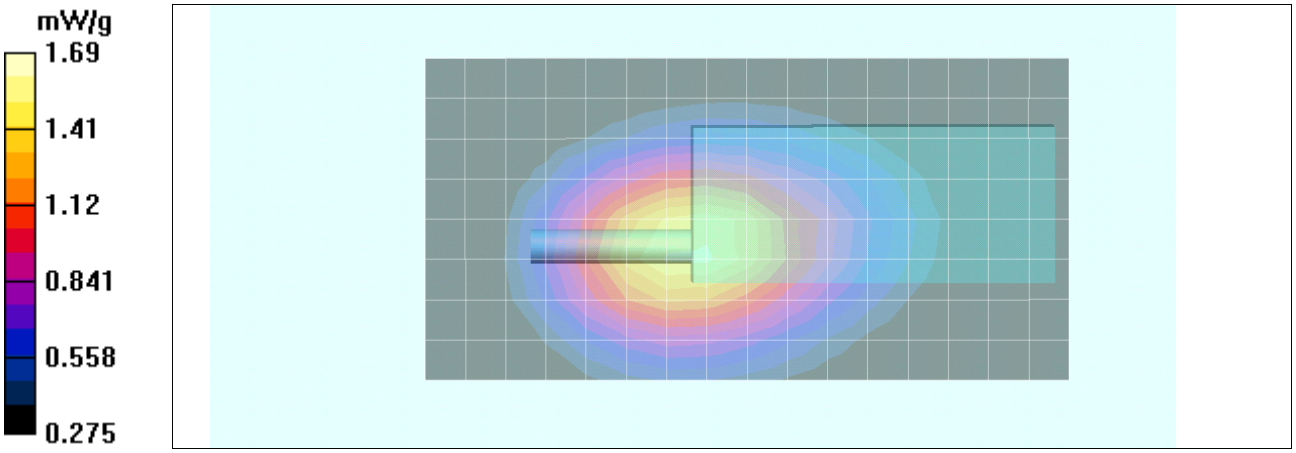
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 23°C; Fluid Temp: 21.1°C; Barometric Pressure: 101.1 kPa; Humidity: 34%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.94 mho/m; $\varepsilon_r$ = 57.8; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.53 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 40.4 V/m; Power Drift = -0.137 dB
Peak SAR (extrapolated) = 2.30 W/kg
**SAR(1 g) = 1.61 mW/g; SAR(10 g) = 1.17 mW/g**
Maximum value of SAR (measured) = 1.69 mW/g





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Date Tested: 05/24/2011

## Body-Worn SAR – 1.9W - GMRS ch.1 - 462.5625 MHz – Alkaline - Belt-Clip – Ear Receiver – Rino 655t

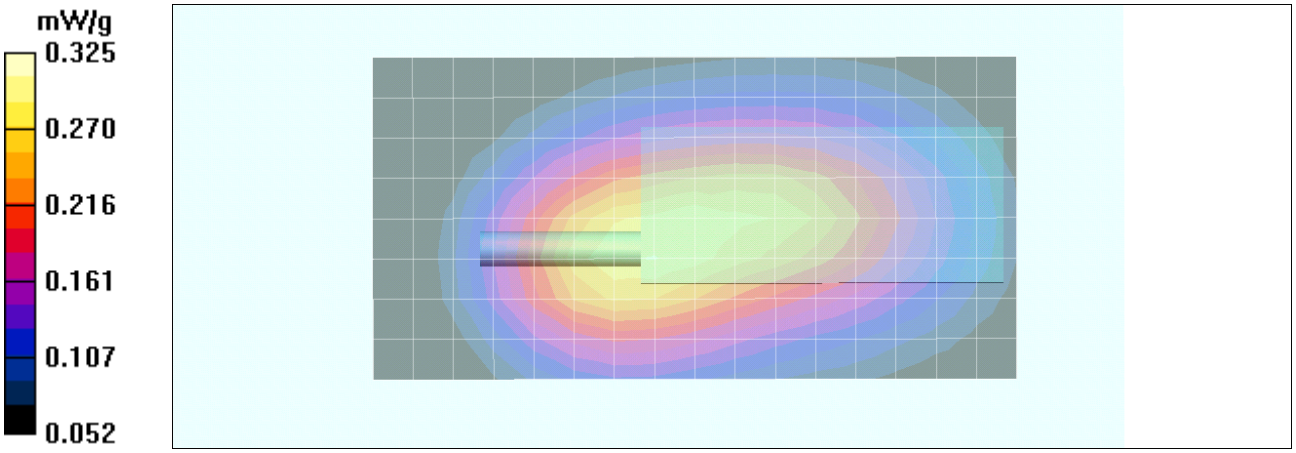
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 23°C; Fluid Temp: 21.1°C; Barometric Pressure: 101.1 kPa; Humidity: 34%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.94 mho/m; $\varepsilon_r$ = 57.8; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.290 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 18.8 V/m; Power Drift = -0.741 dB
Peak SAR (extrapolated) = 0.436 W/kg
**SAR(1 g) = 0.302 mW/g; SAR(10 g) = 0.220 mW/g**
Maximum value of SAR (measured) = 0.325 mW/g





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Date Tested: 05/24/2011

## Body-Worn SAR - 4.85W - GMRS ch.1 - 462.5625 MHz - Li-ion - Belt-Clip - Ear Receiver - Rino 655t

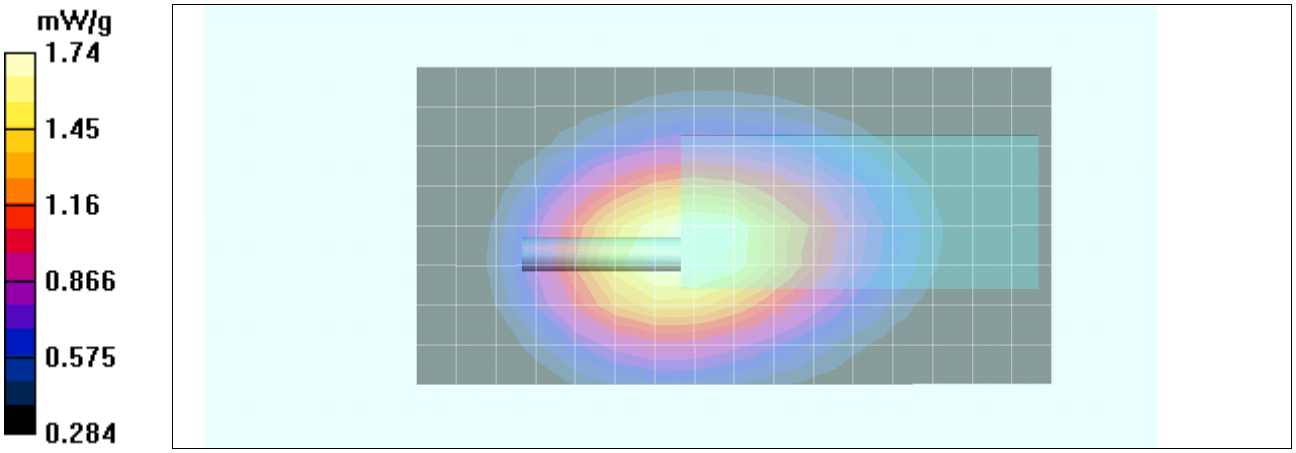
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 23°C; Fluid Temp: 21.1°C; Barometric Pressure: 101.1 kPa; Humidity: 34%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.94 mho/m; $\varepsilon_r$ = 57.8; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.74 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 41.6 V/m; Power Drift = -0.101 dB
Peak SAR (extrapolated) = 2.40 W/kg
**SAR(1 g) = 1.67 mW/g; SAR(10 g) = 1.21 mW/g**





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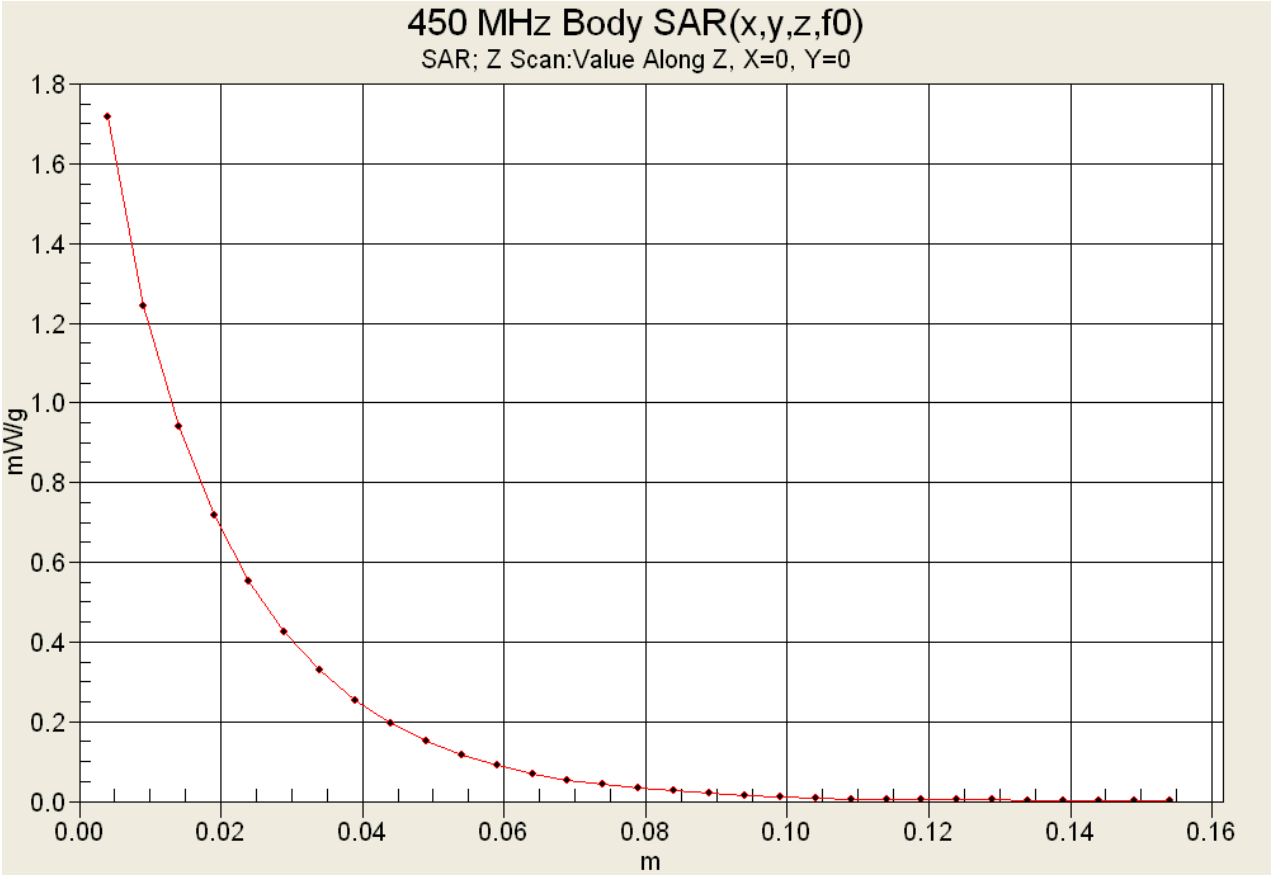
## Z-axis Scan





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Date Tested: 06/14/2011

## Body-Worn SAR – 1.9W - GMRS ch.1 - 462.5625 MHz - Alkaline - Belt-clip – Headset – Rino 655t

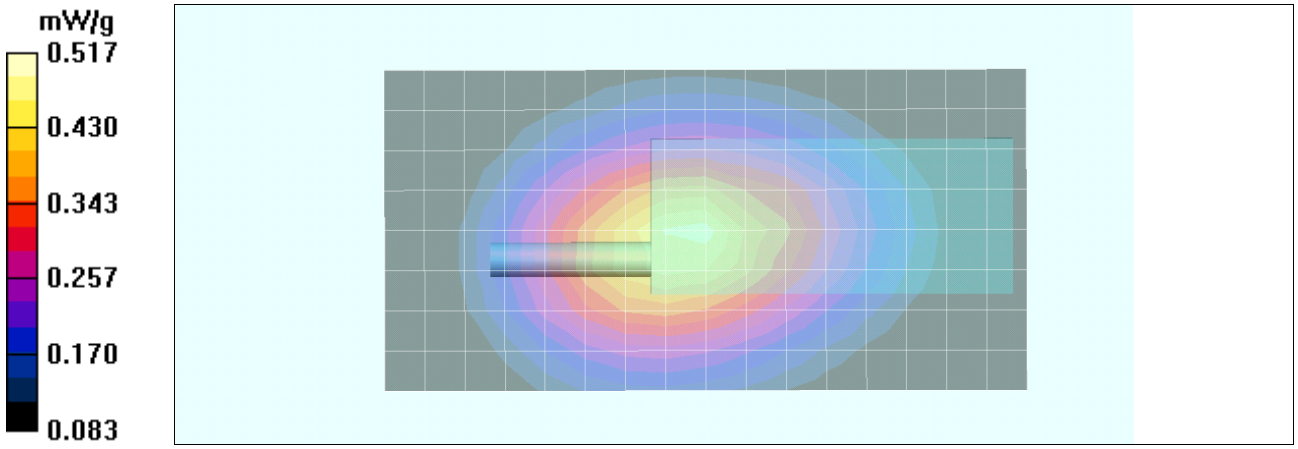
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 23°C; Fluid Temp: 22.8°C; Barometric Pressure: 101.1 kPa; Humidity: 32%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.945 mho/m; $\varepsilon_r$ = 57.1; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm.
Maximum value of SAR (measured) = 0.475 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 23.7 V/m; Power Drift = -0.691 dB
Peak SAR (extrapolated) = 0.717 W/kg
**SAR(1 g) = 0.492 mW/g; SAR(10 g) = 0.358 mW/g**
Maximum value of SAR (measured) = 0.517 mW/g





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Date Tested: 06/10/2011

## Body-Worn SAR – 4.85W - GMRS ch.1 - 462.5625 MHz – Li-ion - Belt-Clip – Headset – Rino 655t

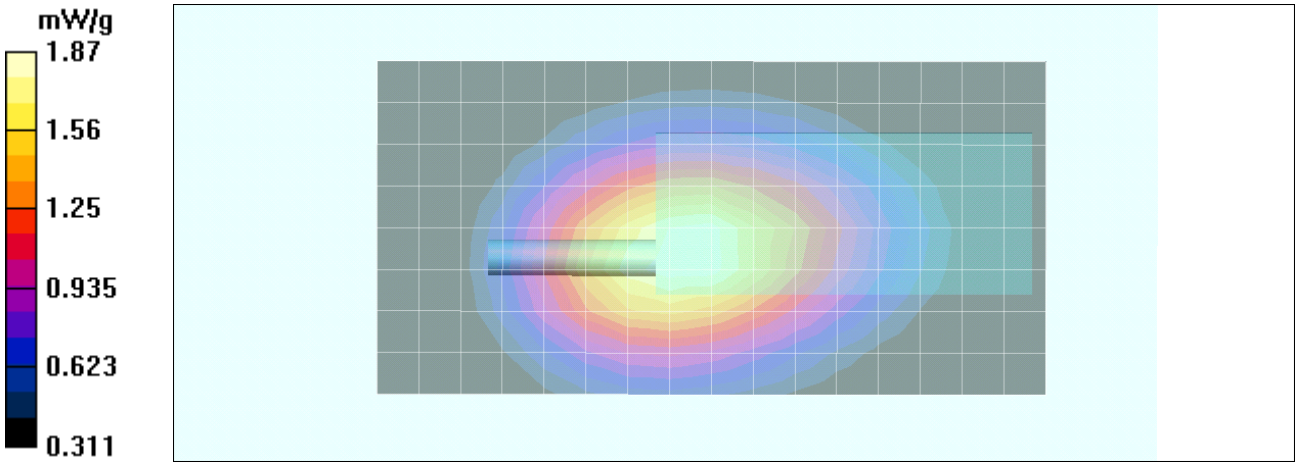
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 22°C; Fluid Temp: 22.9°C; Barometric Pressure: 101.1 kPa; Humidity: 34%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.98 mho/m; $\varepsilon_r$ = 57.7; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.83 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 41.5 V/m; Power Drift = -0.214 dB
Peak SAR (extrapolated) = 2.60 W/kg
**SAR(1 g) = 1.79 mW/g; SAR(10 g) = 1.3 mW/g**
Maximum value of SAR (measured) = 1.87 mW/g





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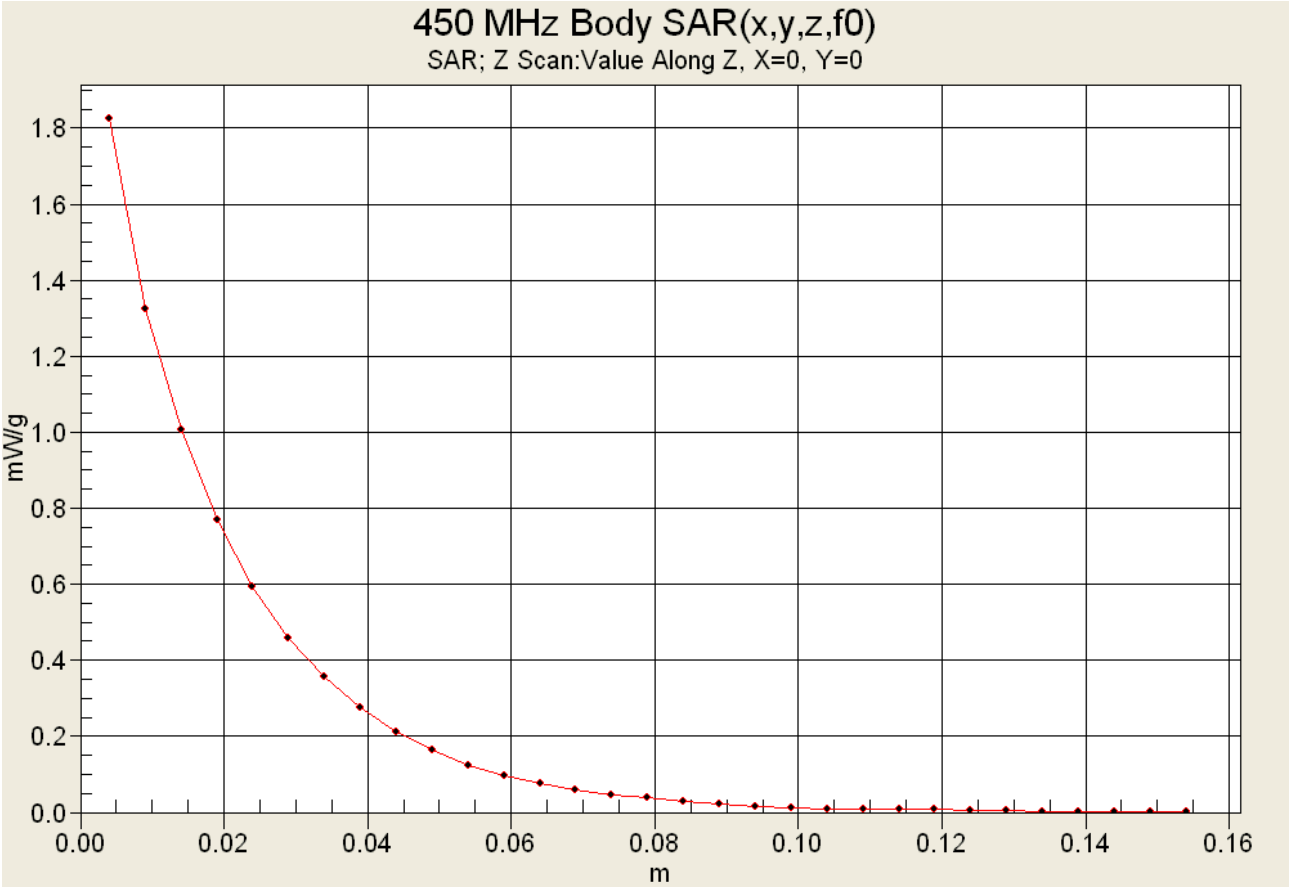
## Z-axis Scan





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Date Tested: 05/17/2011

## Body-worn SAR – 1.9W - GMRS ch.1 - 462.5625 MHz - Alkaline - Carabiner – Earbud – Rino 650

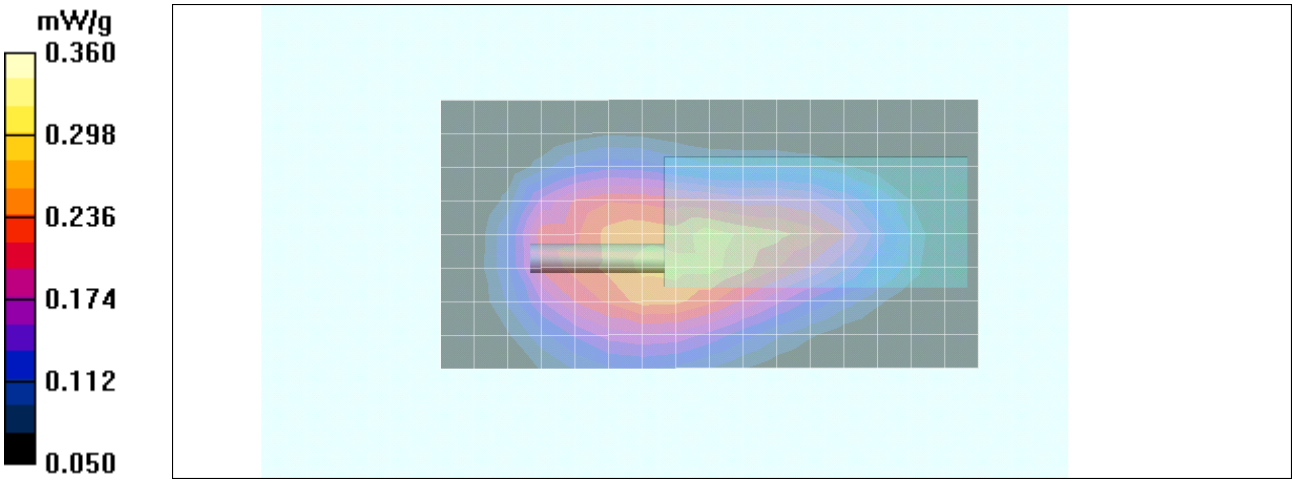
**DUT: Garmin Rino 650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 21°C; Fluid Temp: 20.6°C; Barometric Pressure: 101.1 kPa; Humidity: 33%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.903 mho/m; $\varepsilon_r$ = 57.7; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.269 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 20.4 V/m; Power Drift = -0.849 dB
Peak SAR (extrapolated) = 0.476 W/kg
**SAR(1 g) = 0.338 mW/g; SAR(10 g) = 0.250 mW/g**
Maximum value of SAR (measured) = 0.360 mW/g



Date Tested: 05/16/2011

## Body-Worn SAR – 4.85W - GMRS ch.1 - 462.5625 MHz – Li-ion - Carabiner – Earbud – Rino 650

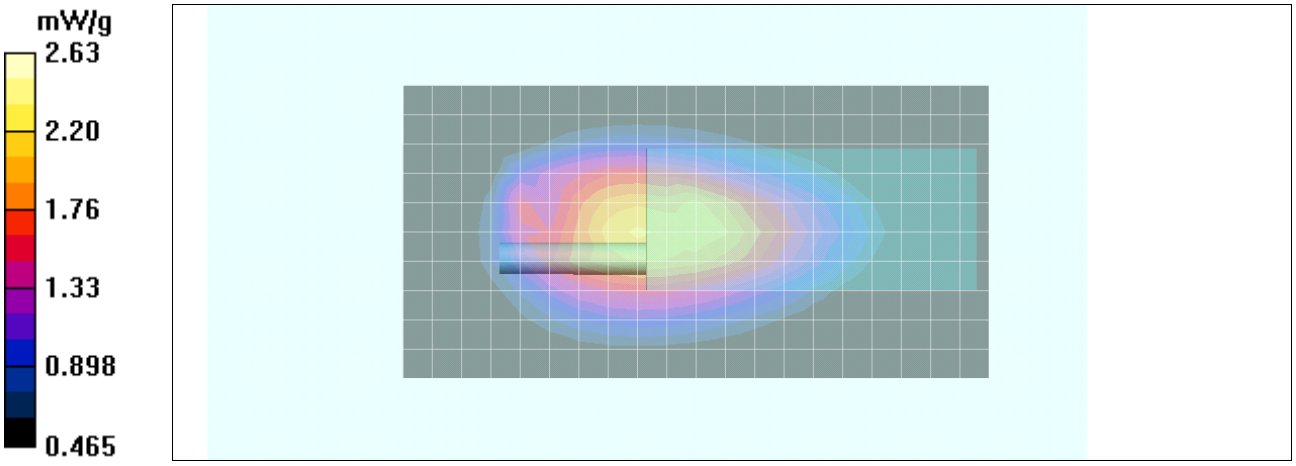
**DUT: Garmin Rino650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 23°C; Fluid Temp: 20.5°C; Barometric Pressure: 101.1 kPa; Humidity: 32%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.903 mho/m; $\varepsilon_r$ = 57.7; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (11x21x1):** Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 2.23 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 54.5 V/m; Power Drift = -0.307 dB
Peak SAR (extrapolated) = 3.41 W/kg
**SAR(1 g) = 2.51 mW/g; SAR(10 g) = 1.87 mW/g**
Maximum value of SAR (measured) = 2.63 mW/g





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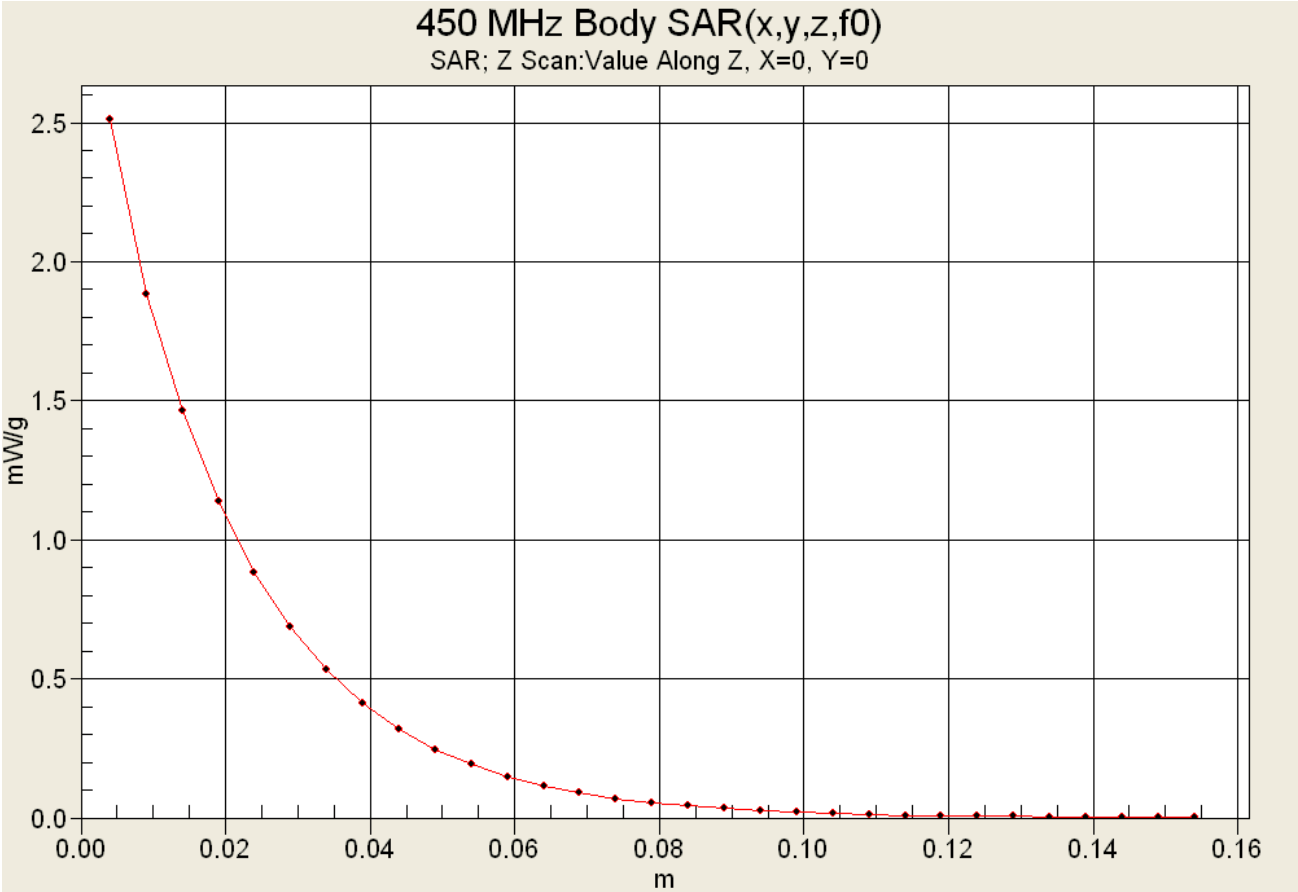
## Z-axis Scan





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Date Tested: 05/17/2011

## Body-Worn SAR - 1.9W - GMRS ch.1 - 462.5625 MHz - Alkaline - Carabiner - Ear Receiver - Rino 650

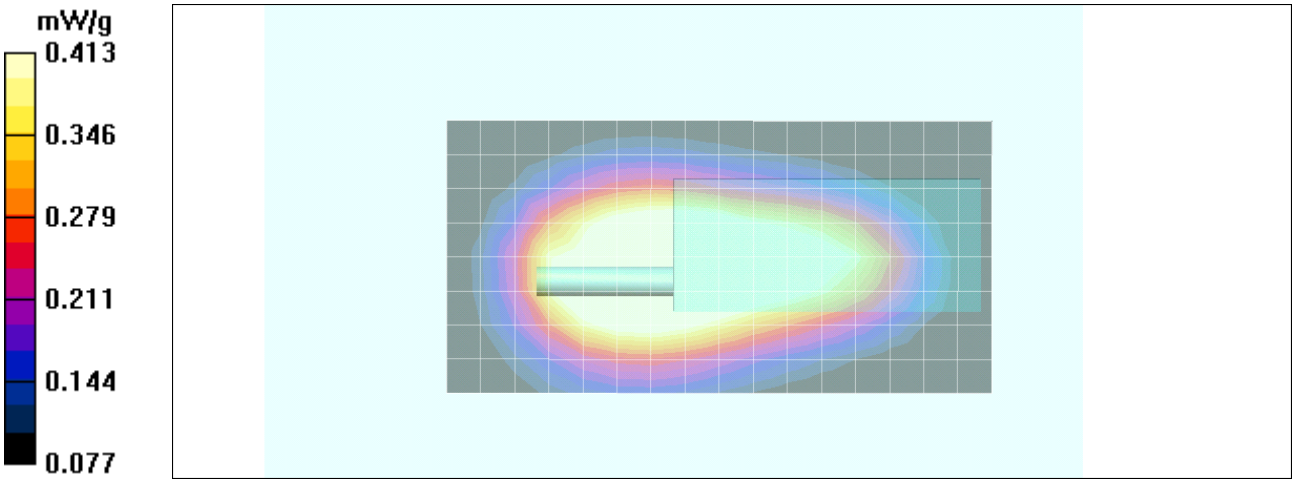
**DUT: Garmin Rino650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 21°C; Fluid Temp: 20.6°C; Barometric Pressure: 101.1 kPa; Humidity: 33%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.903 mho/m; $\varepsilon_r$ = 57.7; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.593 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 21.1 V/m; Power Drift = -0.776 dB
Peak SAR (extrapolated) = 0.541 W/kg
**SAR(1 g) = 0.397 mW/g; SAR(10 g) = 0.300 mW/g**
Maximum value of SAR (measured) = 0.413 mW/g



Date Tested: 05/16/2011

## Body-Worn SAR - 4.85W - GMRS ch.1 - 462.5625 MHz - Li-ion - Carabiner - Ear Receiver - Rino 650

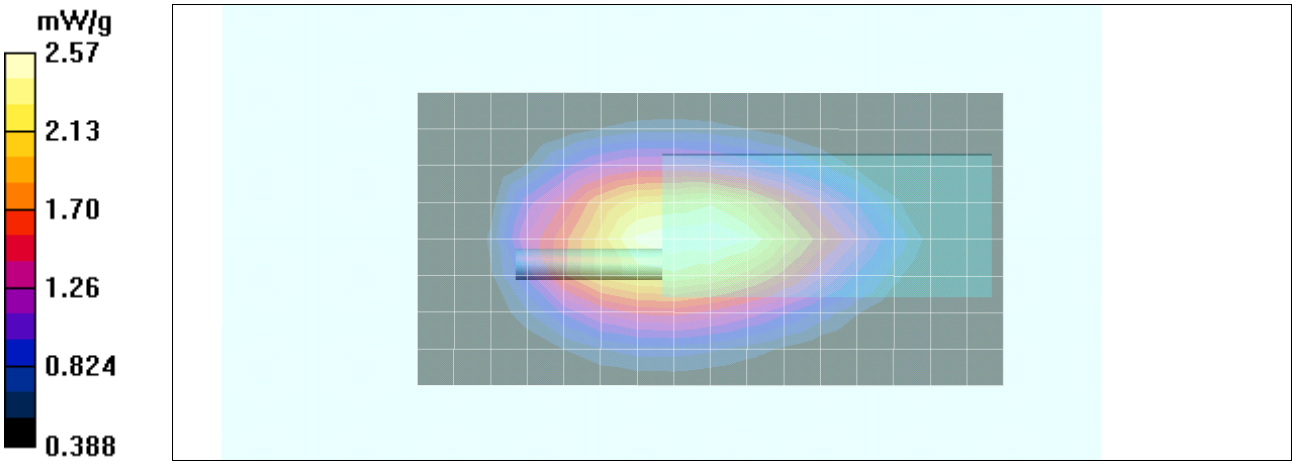
**DUT: Garmin Rino650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 23°C; Fluid Temp: 20.5°C; Barometric Pressure: 101.1 kPa; Humidity: 32%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.903 mho/m; $\varepsilon_r$ = 57.7; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.58 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 53.5 V/m; Power Drift = -0.218 dB
Peak SAR (extrapolated) = 3.56 W/kg
**SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.8 mW/g**
Maximum value of SAR (measured) = 2.57 mW/g





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Date Tested: 06/13/2011

## Body-worn SAR – 1.9W - GMRS ch.1 - 462.5625 MHz – Alkaline – Carabiner – Headset – Rino 650

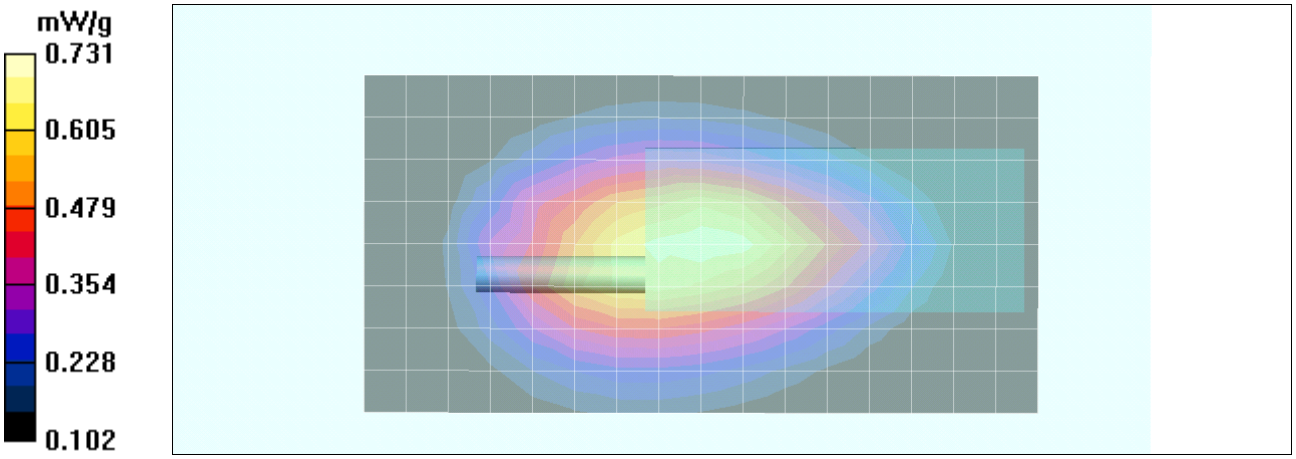
**DUT: Garmin Rino 650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 23°C; Fluid Temp: 22.8°C; Barometric Pressure: 101.1 kPa; Humidity: 40%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.94 mho/m; $\varepsilon_r$ = 57; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.686 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 28.0 V/m; Power Drift = -0.927 dB
Peak SAR (extrapolated) = 1.03 W/kg
**SAR(1 g) = 0.694 mW/g; SAR(10 g) = 0.506 mW/g**
Maximum value of SAR (measured) = 0.731 mW/g





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Date Tested: 06/13/2011

## Body-Worn SAR – 4.85W - GMRS ch.1 - 462.5625 MHz - Li-ion- Carabiner – Headset – Rino 650

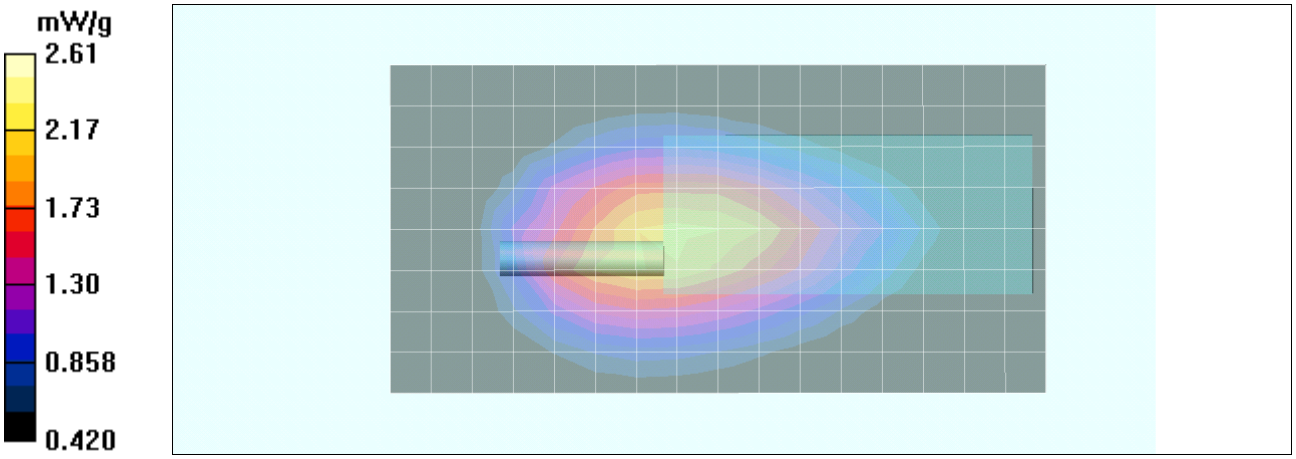
**DUT: Garmin Rino650; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382248001401**

Ambient Temp: 23°C; Fluid Temp: 22.8°C; Barometric Pressure: 101.1 kPa; Humidity: 40%

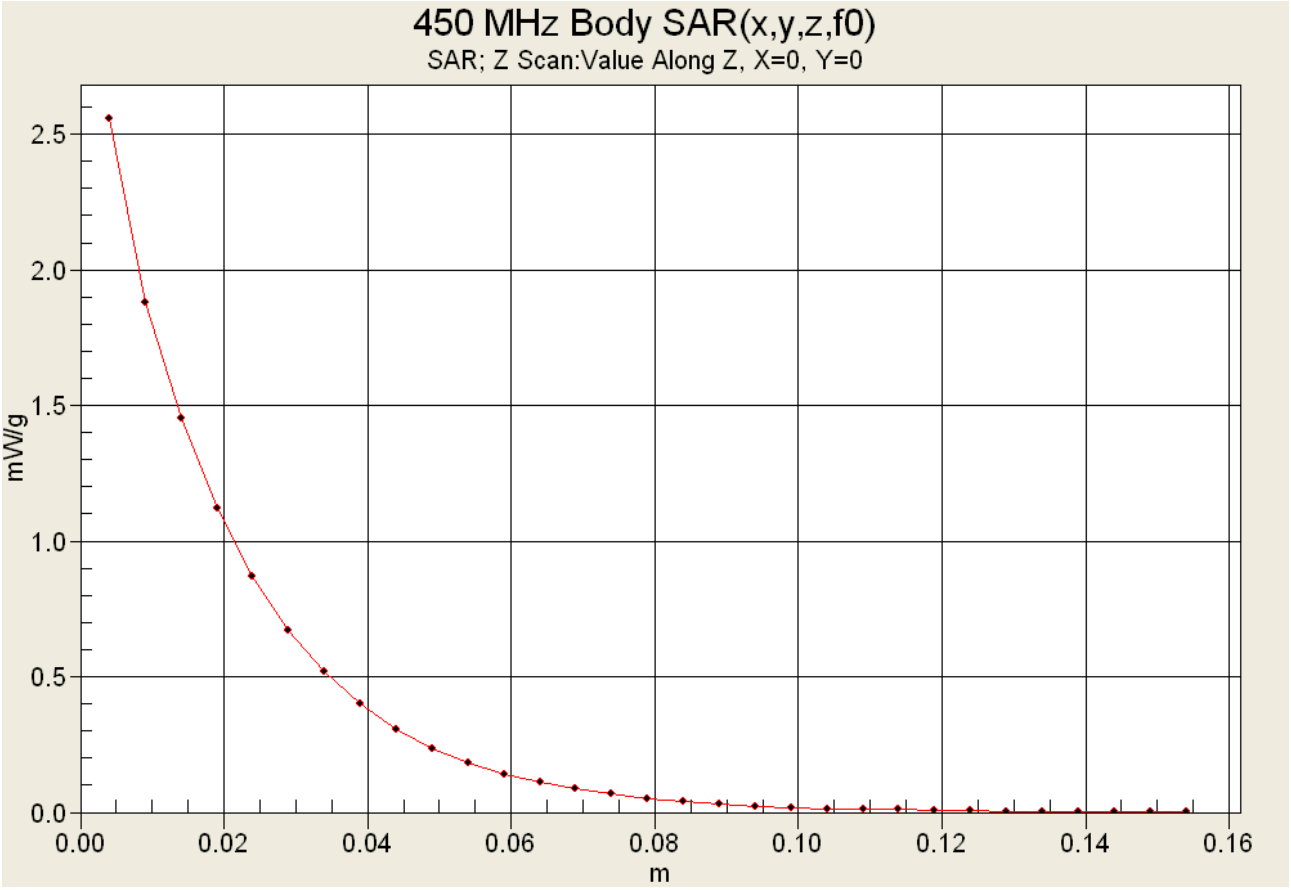
Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.94 mho/m; $\varepsilon_r$ = 57; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.09 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 52.1 V/m; Power Drift = -0.220 dB
Peak SAR (extrapolated) = 3.45 W/kg
**SAR(1 g) = 2.5 mW/g; SAR(10 g) = 1.84 mW/g**
Maximum value of SAR (measured) = 2.61 mW/g



## Z-axis Scan





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Date Tested: 05/17/2011

## Body-Worn SAR – 1.9W - GMRS ch.1 - 462.5625 MHz - Alkaline - Carabiner – Earbud – Rino 655t

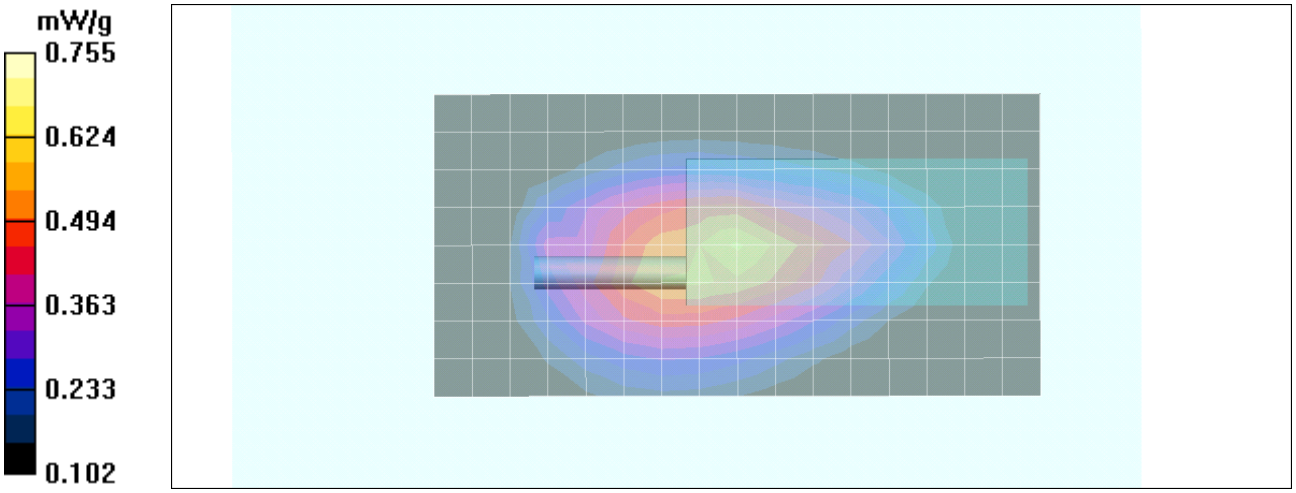
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 21°C; Fluid Temp: 20.6°C; Barometric Pressure: 101.1 kPa; Humidity: 33%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.903 mho/m; $\varepsilon_r$ = 57.7; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.591 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 29.0 V/m; Power Drift = -1.18 dB
Peak SAR (extrapolated) = 1.07 W/kg
**SAR(1 g) = 0.715 mW/g; SAR(10 g) = 0.516 mW/g**
Maximum value of SAR (measured) = 0.755 mW/g





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Date Tested: 05/17/2011

## Body-Worn SAR – 4.85W - GMRS ch.1 - 462.5625 MHz - Li-ion - Carabiner – Earbud – Rino 655t

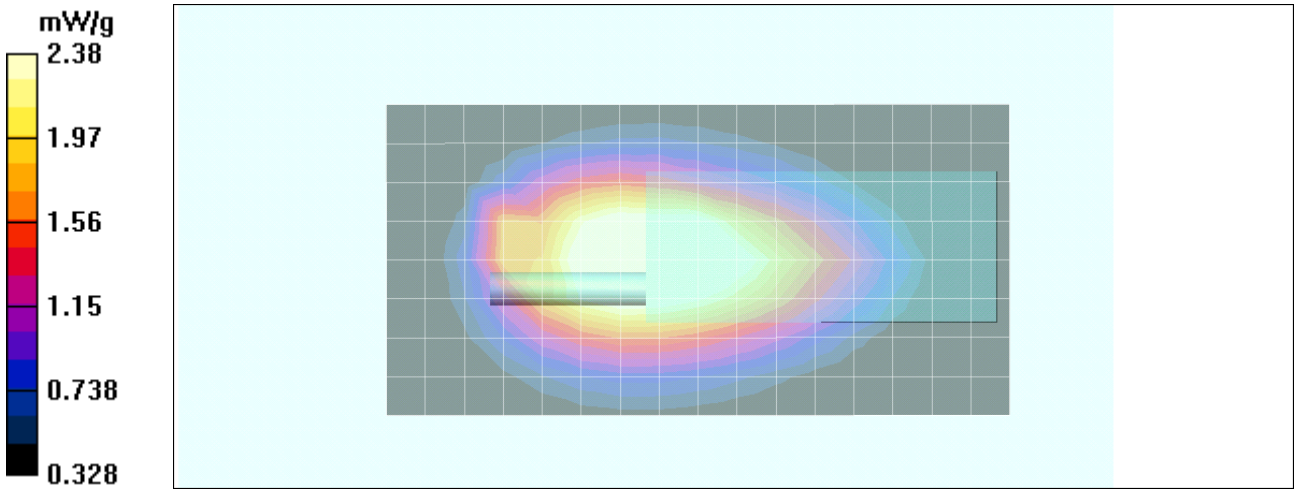
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 21°C; Fluid Temp: 20.6°C; Barometric Pressure: 101.1 kPa; Humidity: 33%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.903 mho/m; $\varepsilon_r$ = 57.7; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.83 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 51.0 V/m; Power Drift = -0.264 dB
Peak SAR (extrapolated) = 3.34 W/kg
**SAR(1 g) = 2.27 mW/g; SAR(10 g) = 1.67 mW/g**
Maximum value of SAR (measured) = 2.38 mW/g





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Date Tested: 05/17/2011

## Body-Worn SAR - 1.9W - GMRS ch.1 - 462.5625 MHz - Alkaline - Carabiner - Ear Receiver - Rino 655t

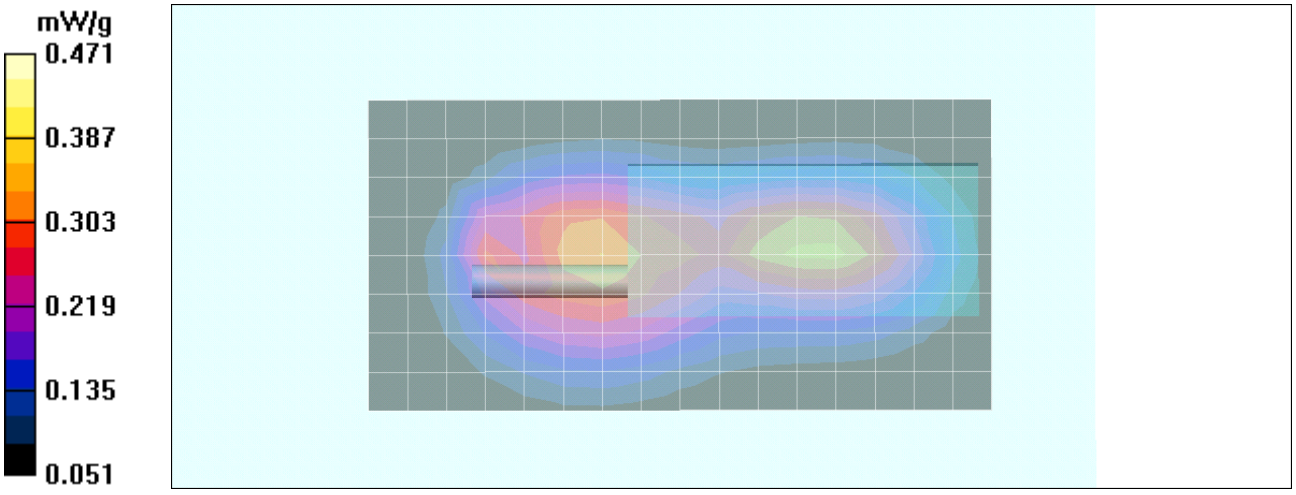
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 21°C; Fluid Temp: 20.6°C; Barometric Pressure: 101.1 kPa; Humidity: 33%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.903 mho/m; $\varepsilon_r$ = 57.7; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.344 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 22.6 V/m; Power Drift = -0.854 dB
Peak SAR (extrapolated) = 0.681 W/kg
**SAR(1 g) = 0.446 mW/g; SAR(10 g) = 0.311 mW/g**
Maximum value of SAR (measured) = 0.471 mW/g





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Date Tested: 05/17/2011

## Body-Worn SAR - 4.85W - GMRS ch.1 - 462.5625 MHz - Li-ion - Carabiner - Ear Receiver - Rino 655t

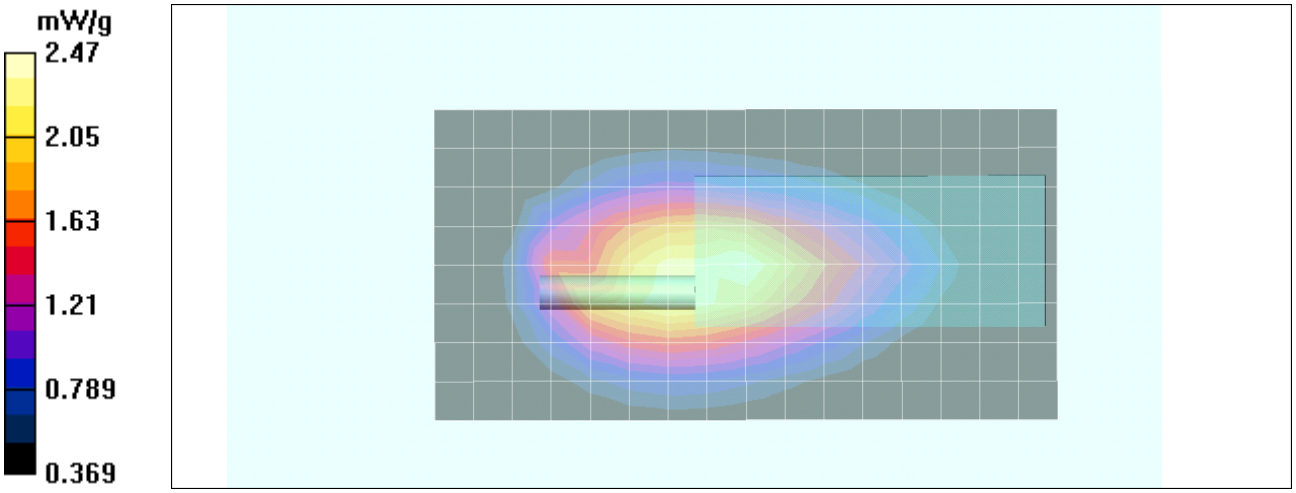
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 21°C; Fluid Temp: 20.6°C; Barometric Pressure: 101.1 kPa; Humidity: 33%

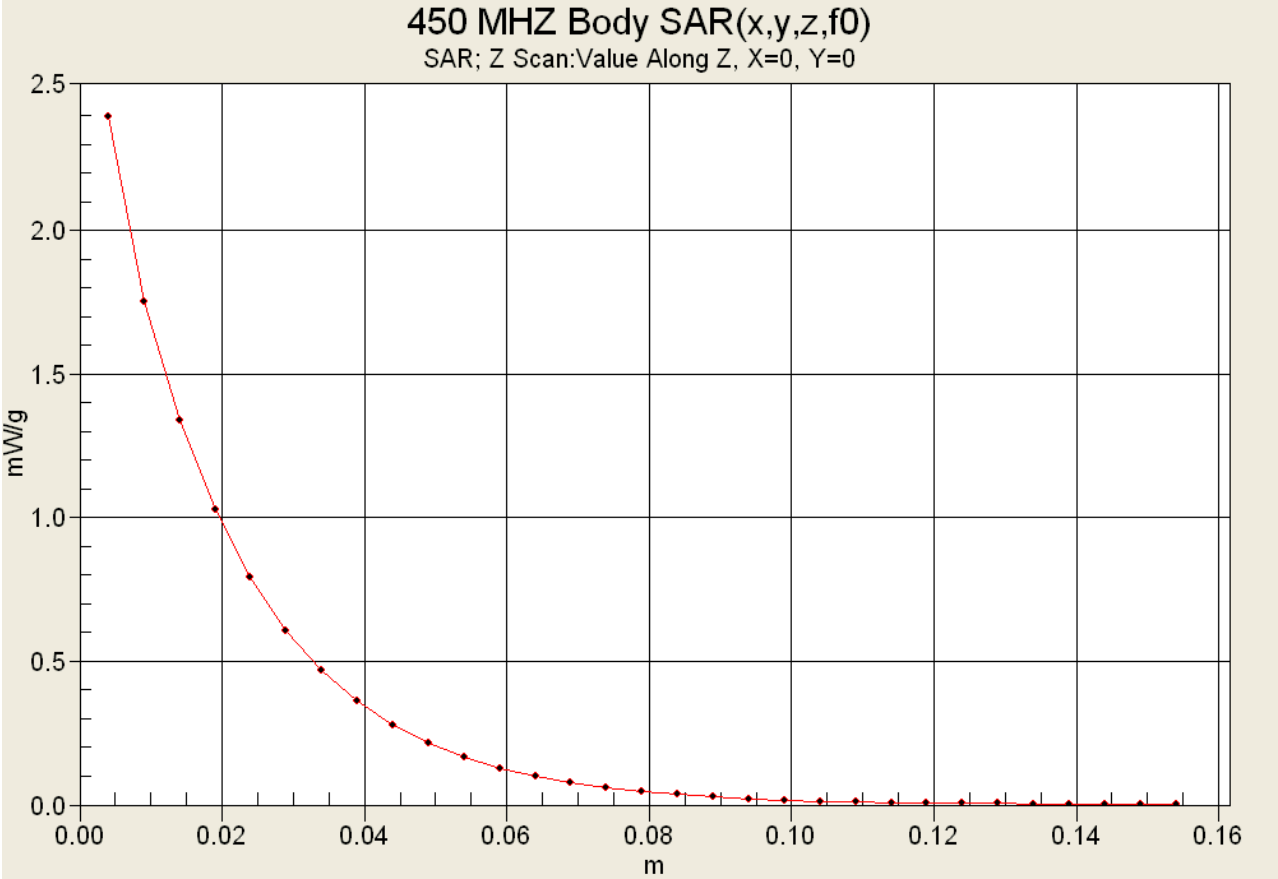
Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.903 mho/m; $\varepsilon_r$ = 57.7; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.37 mW/g
**Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 51.3 V/m; Power Drift = -0.364 dB
Peak SAR (extrapolated) = 3.32 W/kg
**SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.73 mW/g**
Maximum value of SAR (measured) = 2.47 mW/g



## Z-axis Scan





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Date Tested: 06/14/2011

## Body-Worn SAR - 1.9W - GMRS ch.1 - 462.5625 MHz - Alkaline - Carabiner - Headset - Rino 655t

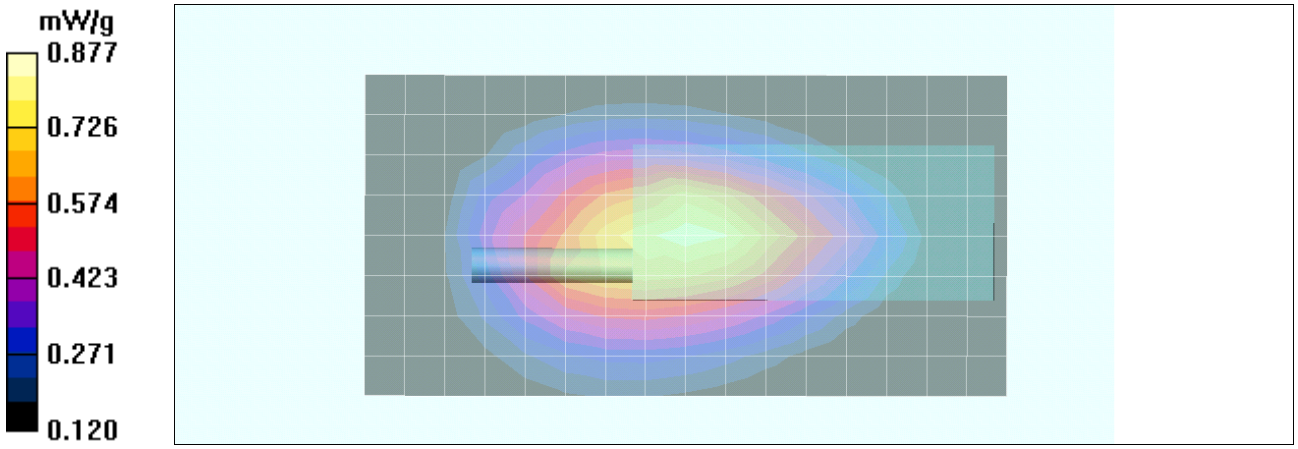
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 23°C; Fluid Temp: 22.8°C; Barometric Pressure: 101.1 kPa; Humidity: 32%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.945 mho/m; $\varepsilon_r$ = 57.1; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.812 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 30.9 V/m; Power Drift = -0.881 dB
Peak SAR (extrapolated) = 1.26 W/kg
**SAR(1 g) = 0.837 mW/g; SAR(10 g) = 0.609 mW/g**
Maximum value of SAR (measured) = 0.877 mW/g



Date Tested: 06/14/2011

## Body-Worn SAR - 4.85W - GMRS ch.1 - 462.5625 MHz - Li-ion - Carabiner - Headset - Rino 655t

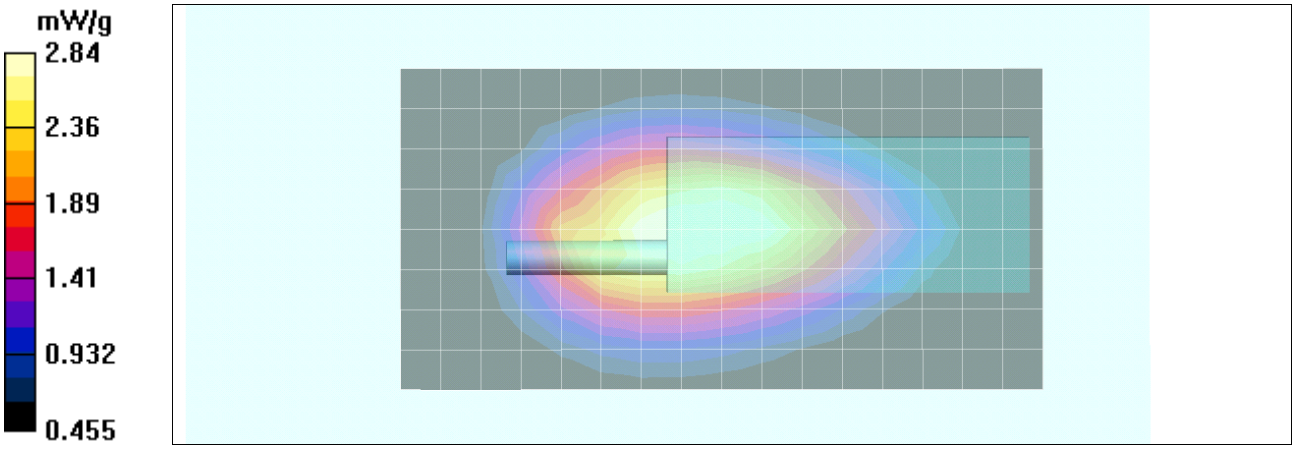
**DUT: Garmin Rino655t; Type: Portable UHF FRS/GMRS PTT Radio Transceiver; Serial: 1766382247997103**

Ambient Temp: 23°C; Fluid Temp: 22.8°C; Barometric Pressure: 101.1 kPa; Humidity: 32%

Communication System: UHF GMRS
Frequency: 462.563 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used (interpolated): f = 462.563 MHz; $\sigma$ = 0.945 mho/m; $\varepsilon_r$ = 57.1; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (9x17x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.99 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 54.9 V/m; Power Drift = -0.216 dB
Peak SAR (extrapolated) = 3.88 W/kg
**SAR(1 g) = 2.72 mW/g; SAR(10 g) = 2.01 mW/g**
Maximum value of SAR (measured) = 2.84 mW/g





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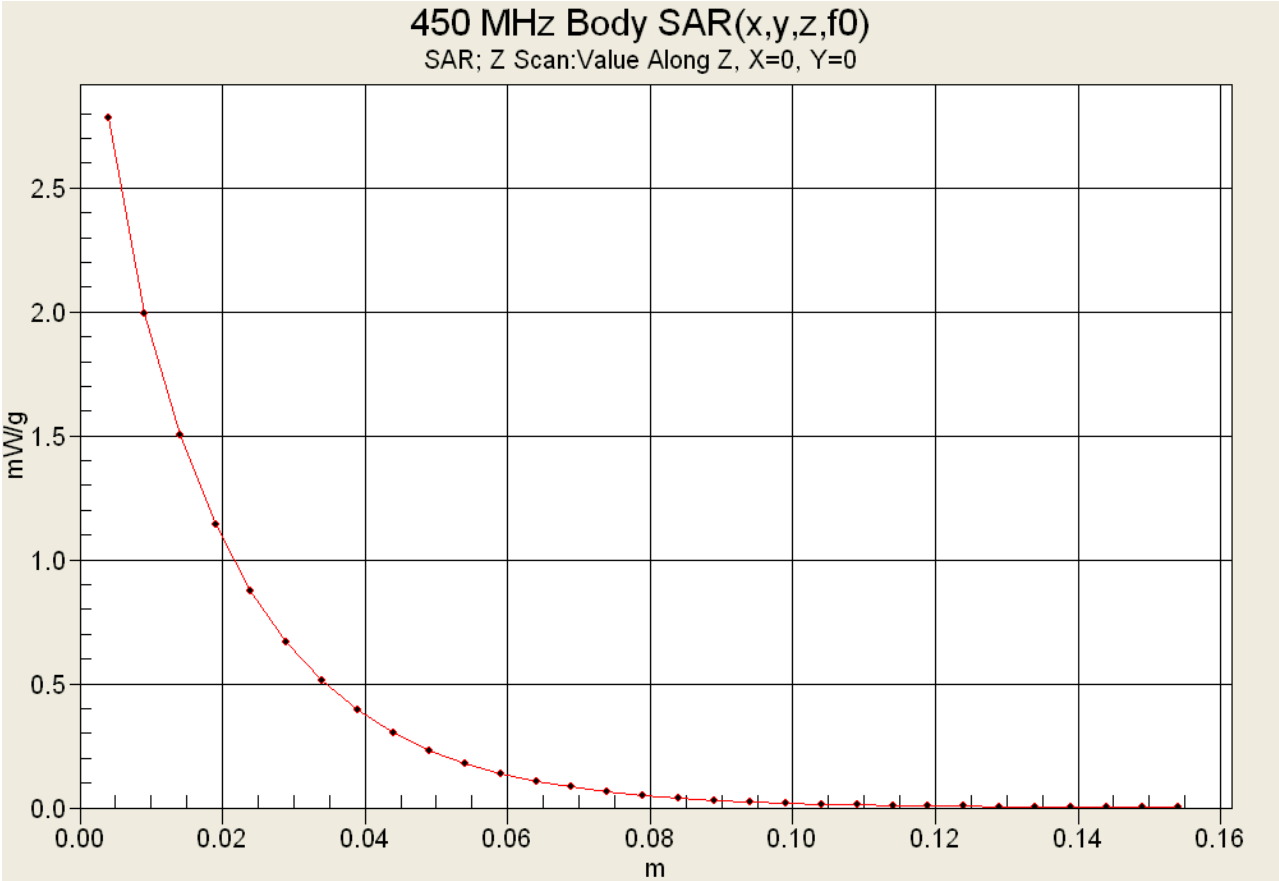
## Z-axis Scan





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# APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Date Tested: 05/16/2011

## System Performance Check - 450 MHz Dipole - Body

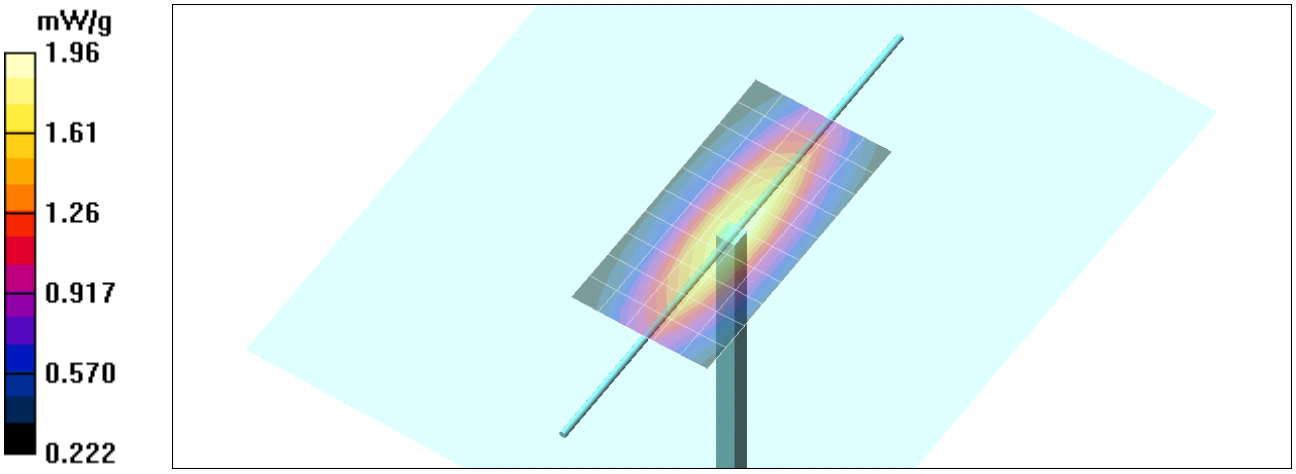
**DUT: Dipole 450 MHz; Type: D450V3; Serial: 1068; Calibrated: 01/18/2010**

Ambient Temp: 24°C; Fluid Temp: 20.7°C; Barometric Pressure: 101.1 kPa; Humidity: 31%

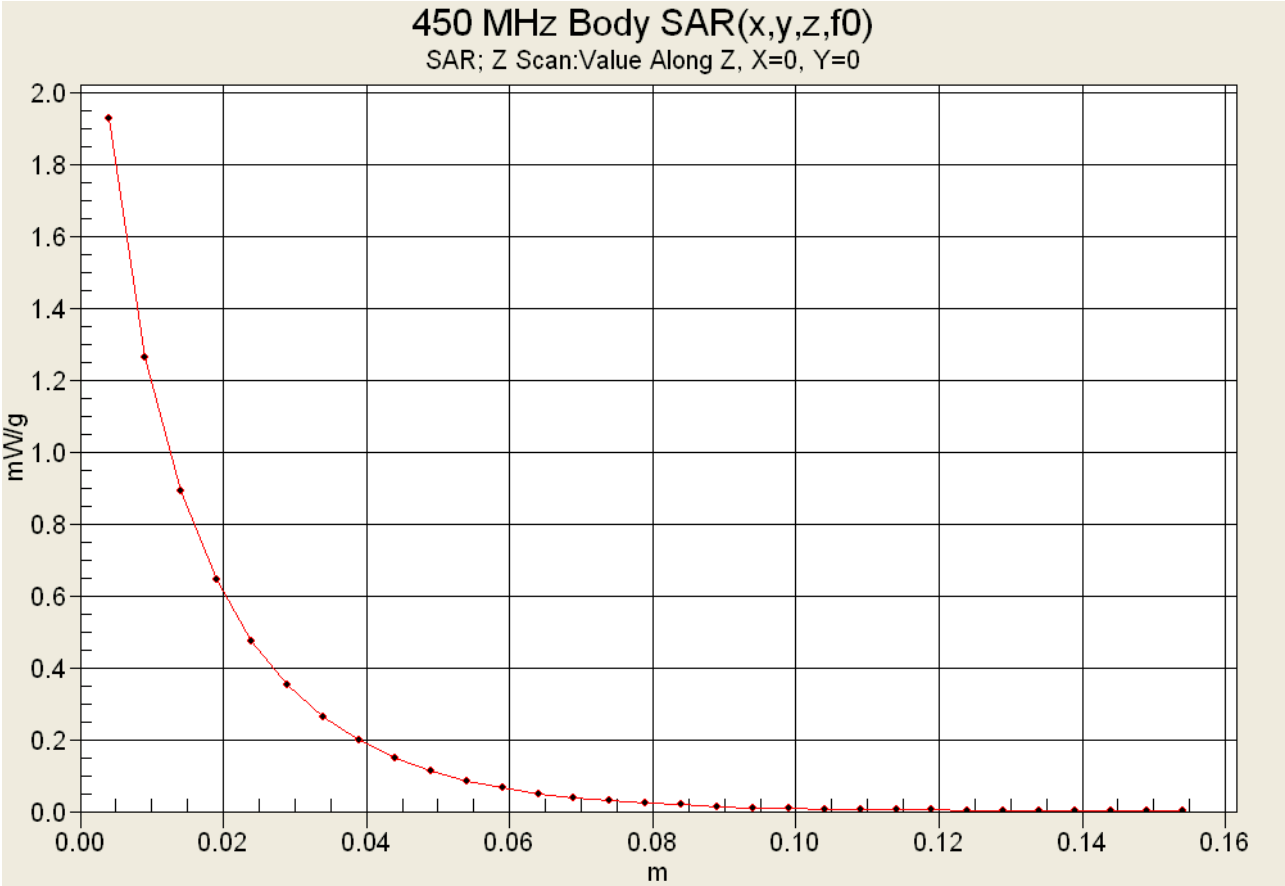
Communication System: CW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; $\sigma$ = 0.9 mho/m; $\varepsilon_r$ = 58.4; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (6x11x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.89 mW/g
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 46.2 V/m; Power Drift = -0.046 dB
Peak SAR (extrapolated) = 2.95 W/kg
**SAR(1 g) = 1.83 mW/g; SAR(10 g) = 1.21 mW/g**
Maximum value of SAR (measured) = 1.96 mW/g



## Z-axis Scan





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Date Tested: 05/18/2011

## System Performance Check - 450 MHz Dipole - Head

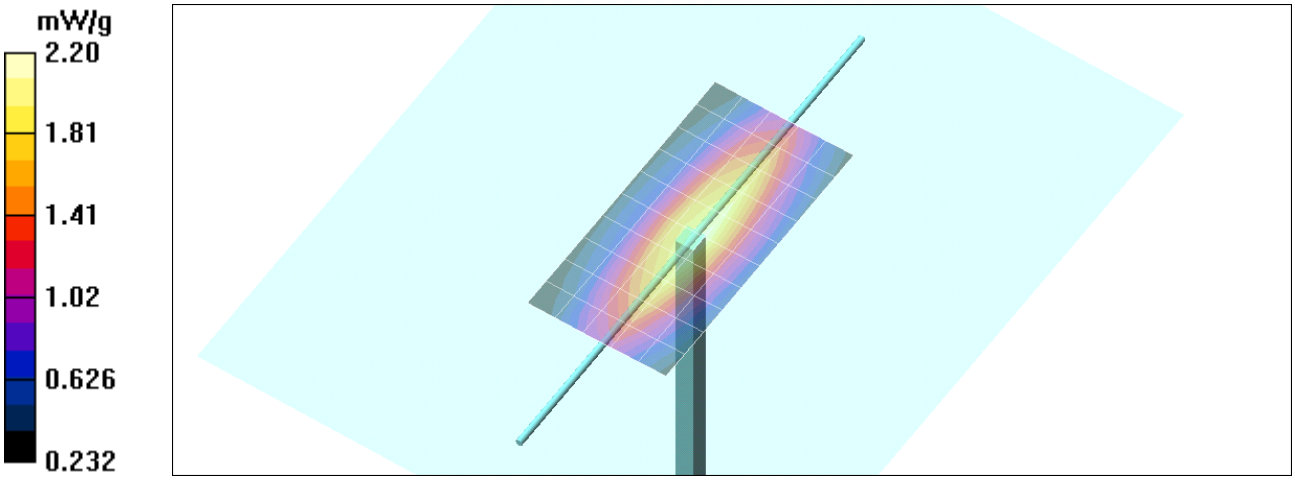
**DUT: Dipole 450 MHz; Type: D450V3; Serial: 1068; Calibrated: 01/18/2010**

Ambient Temp: 22.0°C; Fluid Temp: 20.9°C; Barometric Pressure: 101.1 kPa; Humidity: 31%

Communication System: CW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: HSL450 Medium parameters used: f = 450 MHz; $\sigma$ = 0.87 mho/m; $\varepsilon_r$ = 44.8; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.25, 7.25, 7.25); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (6x11x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.13 mW/g
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 49.6 V/m; Power Drift = 0.086 dB
Peak SAR (extrapolated) = 3.24 W/kg
**SAR(1 g) = 2.05 mW/g; SAR(10 g) = 1.36 mW/g**
Maximum value of SAR (measured) = 2.20 mW/g





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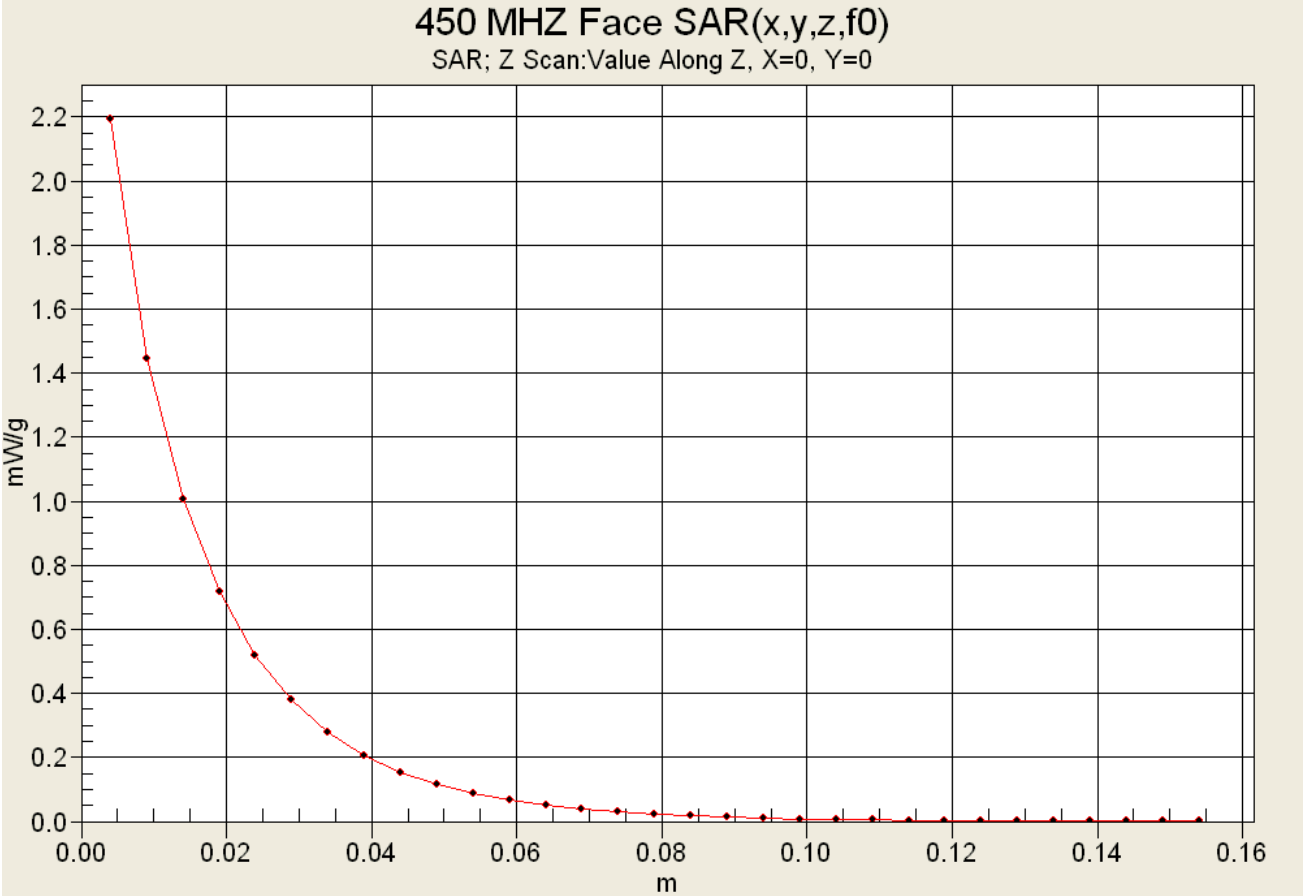
## Z-axis Scan





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Date Tested: 05/24/2011

## System Performance Check - 450 MHz Dipole - Body

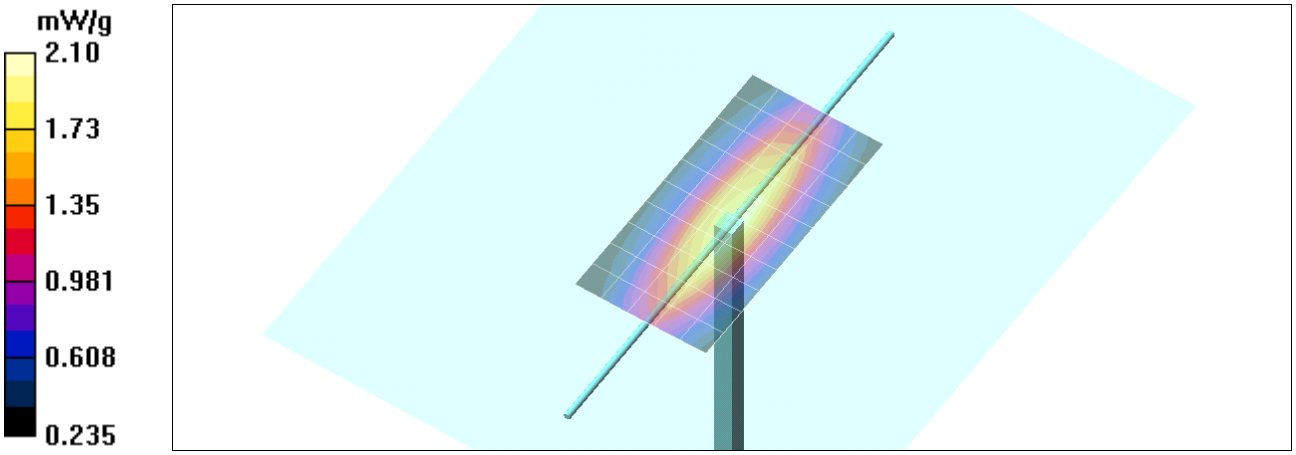
**DUT: Dipole 450 MHz; Type: D450V3; Serial: 1068; Calibrated: 01/18/2010**

Ambient Temp: 23.0°C; Fluid Temp: 21.1°C; Barometric Pressure: 101.1 kPa; Humidity: 34%

Communication System: CW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; $\sigma$ = 0.94 mho/m; $\varepsilon_r$ = 57.5; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Area Scan (6x11x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.03 mW/g
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 47.0 V/m; Power Drift = 0.015 dB
Peak SAR (extrapolated) = 3.21 W/kg
**SAR(1 g) = 1.98 mW/g; SAR(10 g) = 1.31 mW/g**
Maximum value of SAR (measured) = 2.10 mW/g





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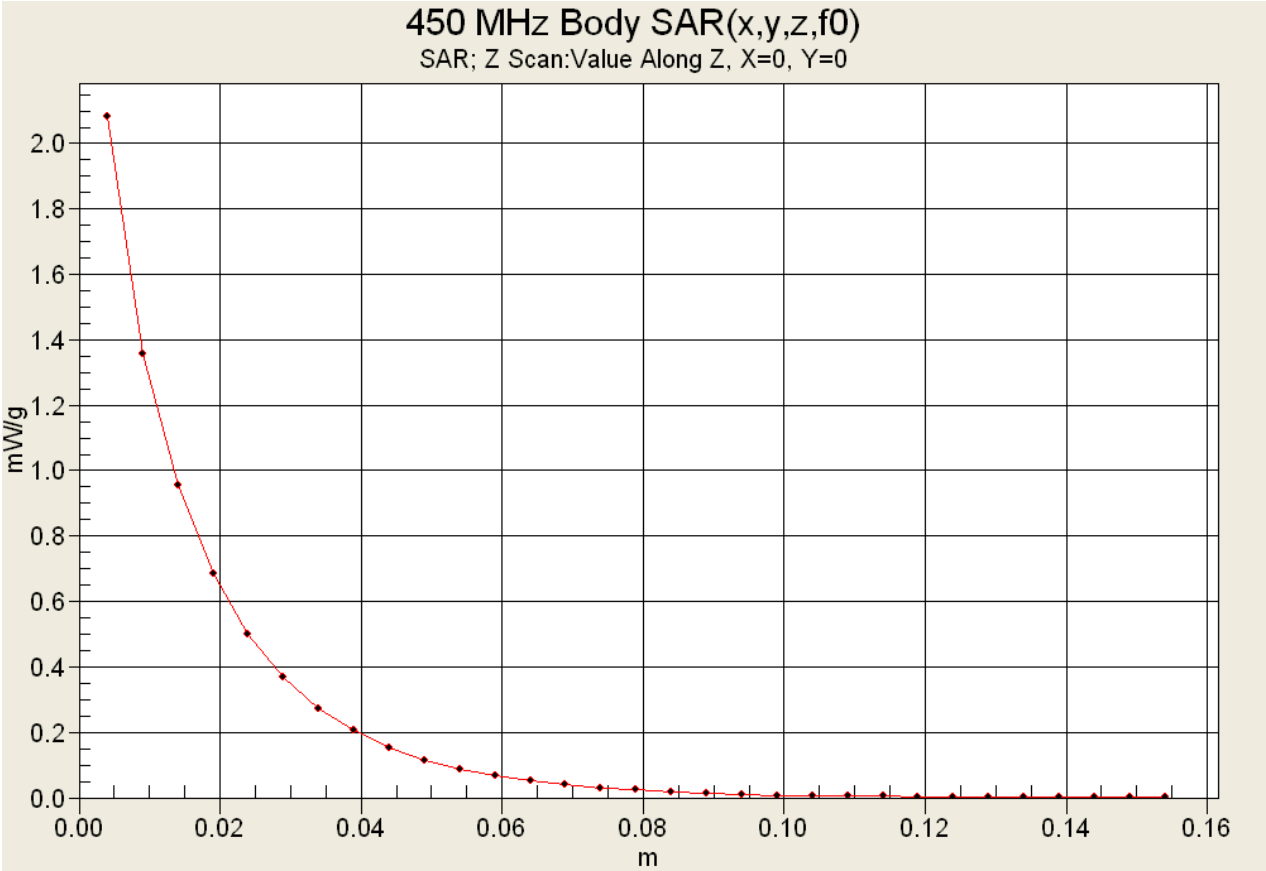
## Z-axis Scan





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Date Tested: 06/10/2011

## System Performance Check - 450 MHz Dipole - Body

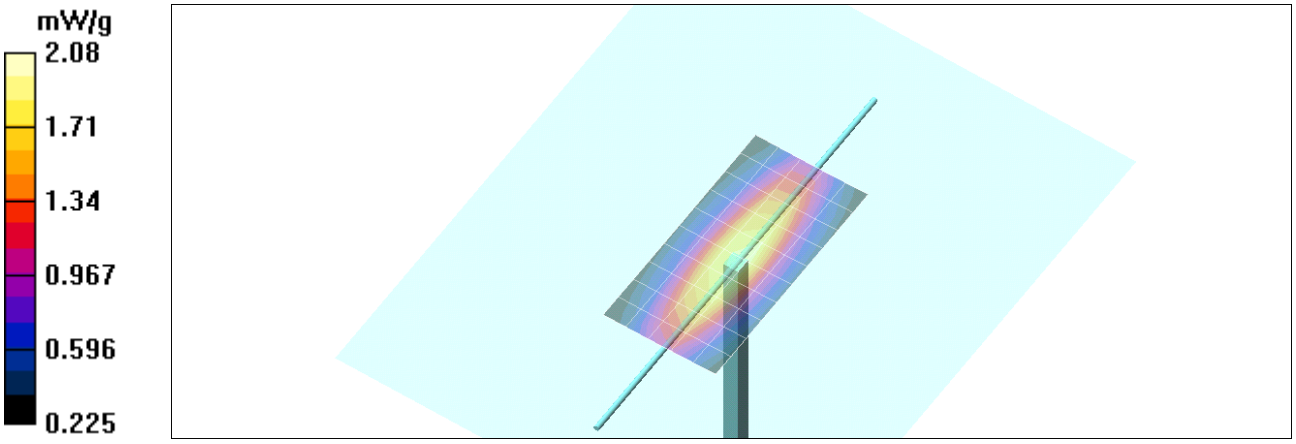
**DUT: Dipole 450 MHz; Type: D450V3; Serial: 1068; Calibrated: 01/18/2010**

Ambient Temp: 22°C; Fluid Temp: 22.7°C; Barometric Pressure: 101.1 kPa; Humidity: 34%

Communication System: CW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; $\sigma$ = 0.97 mho/m; $\varepsilon_r$ = 57.9; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Body d=15mm Pin=398mW/Area Scan (6x11x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.98 mW/g
**Body d=15mm Pin=398mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 46.4 V/m; Power Drift = 0.008 dB
Peak SAR (extrapolated) = 3.17 W/kg
**SAR(1 g) = 1.96 mW/g; SAR(10 g) = 1.3 mW/g**
Maximum value of SAR (measured) = 2.08 mW/g





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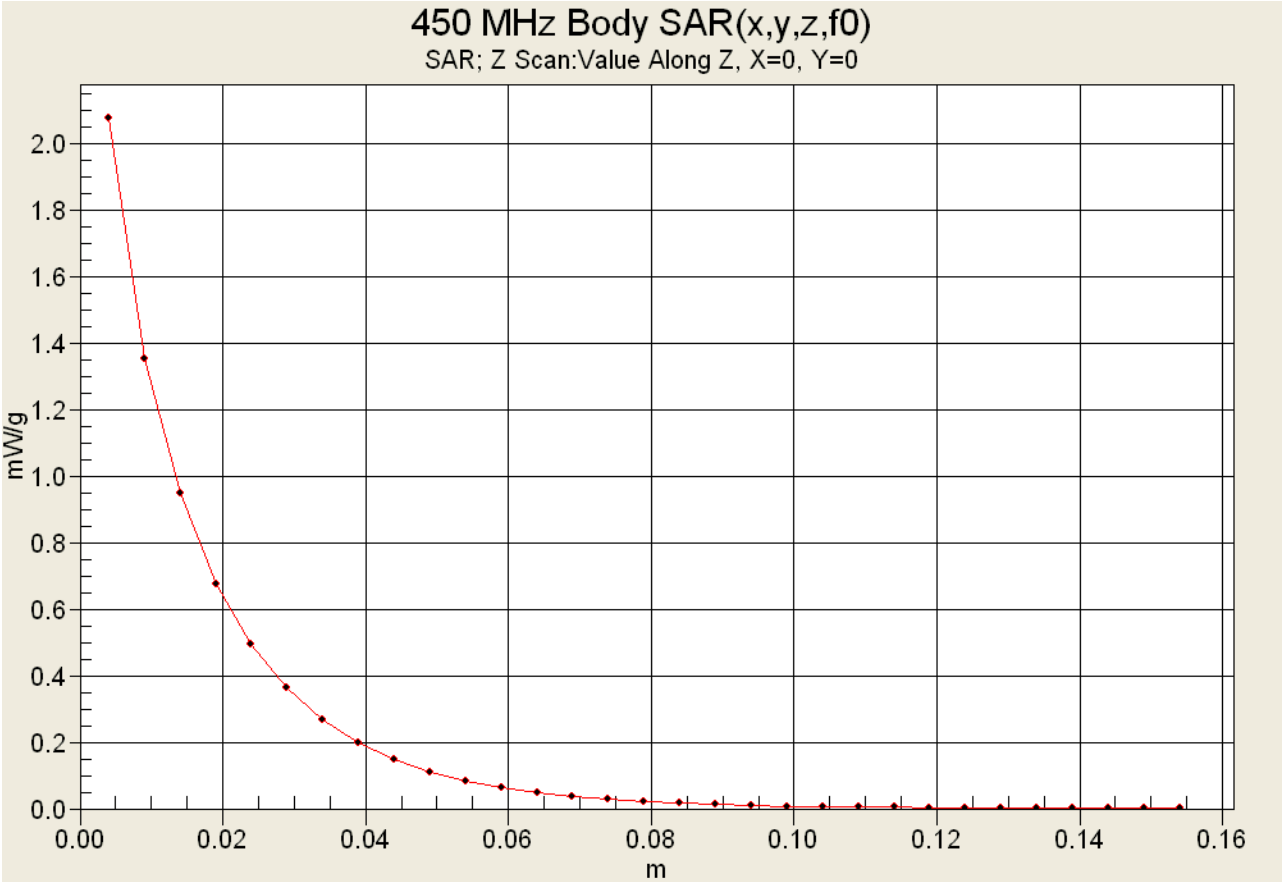
## Z-axis Scan





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Date Tested: 06/13/2011

## System Performance Check - 450 MHz Dipole - Body

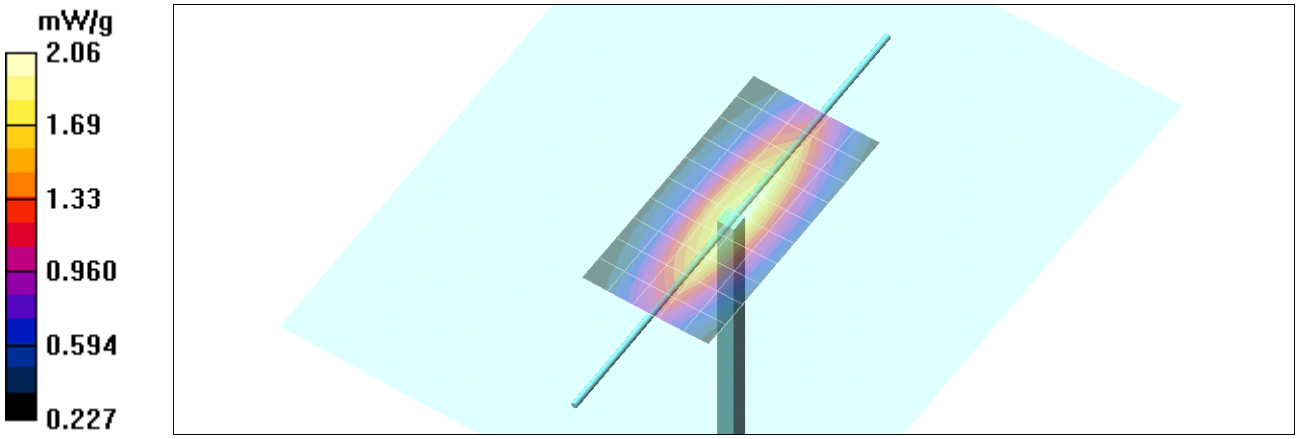
**DUT: Dipole 450 MHz; Type: D450V3; Serial: 1068; Calibrated: 01/18/2010**

Ambient Temp: 23°C; Fluid Temp: 22.8°C; Barometric Pressure: 101.1 kPa; Humidity: 40%

Communication System: CW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: M450 Medium parameters used: f = 450 MHz; $\sigma$ = 0.93 mho/m; $\varepsilon_r$ = 57.2; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(7.73, 7.73, 7.73); Calibrated: 15/07/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 27/04/2010
- Phantom: Barski Industries; Type: Fiberglas Planar; Serial: 03-01
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Body d=15mm Pin=398mW/Area Scan (6x11x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.00 mW/g
**Body d=15mm Pin=398mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 46.2 V/m; Power Drift = 0.020 dB
Peak SAR (extrapolated) = 3.15 W/kg
**SAR(1 g) = 1.93 mW/g; SAR(10 g) = 1.27 mW/g**
Maximum value of SAR (measured) = 2.06 mW/g





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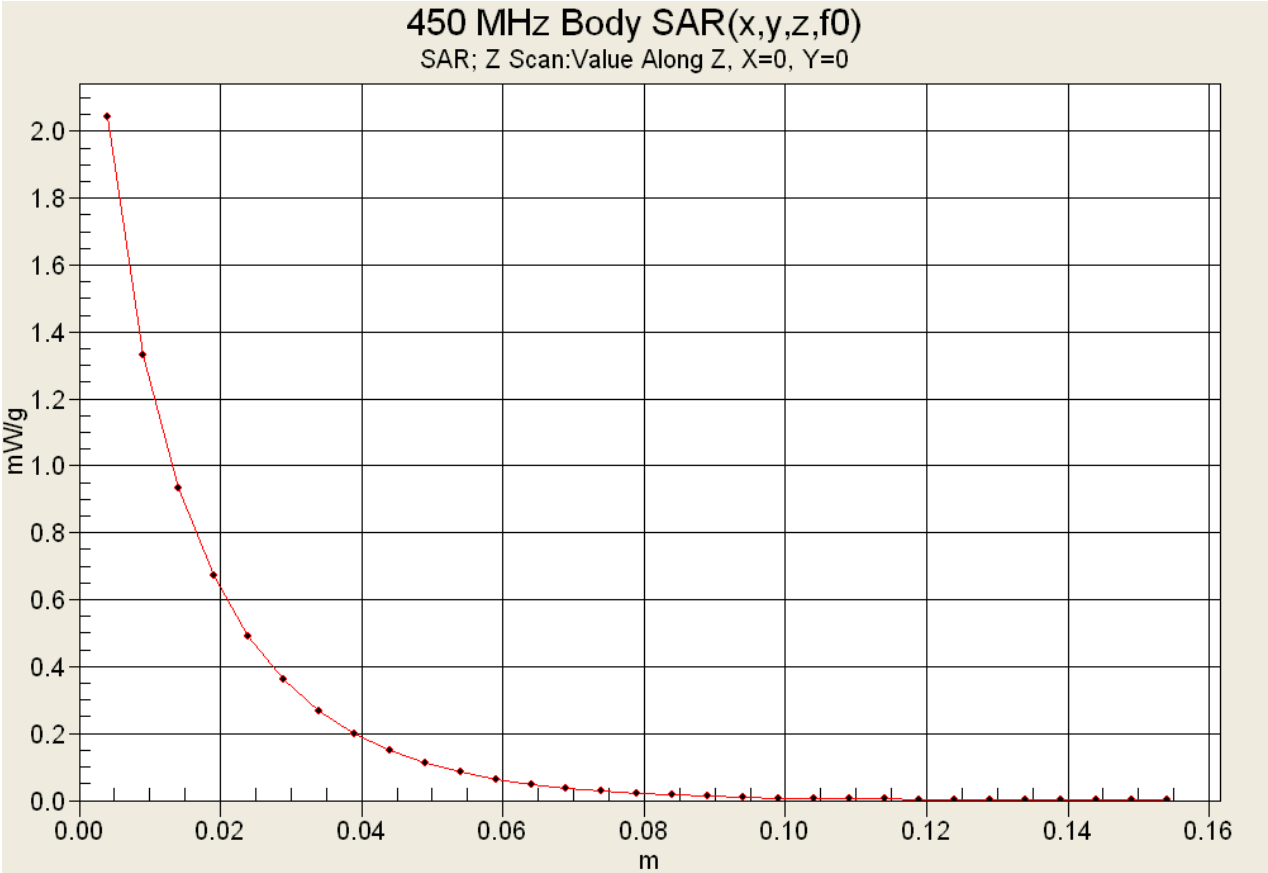
## Z-axis Scan





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# APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS


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## 450 MHz Body

**********

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
16/May/2011
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 | 59.40 | 0.82 |
| 0.3600 | 57.60 | 0.93 | 59.14 | 0.82 |
| 0.3700 | 57.50 | 0.93 | 58.86 | 0.83 |
| 0.3800 | 57.40 | 0.93 | 59.31 | 0.84 |
| 0.3900 | 57.30 | 0.93 | 58.01 | 0.84 |
| 0.4000 | 57.20 | 0.93 | 58.82 | 0.86 |
| 0.4100 | 57.10 | 0.93 | 58.84 | 0.87 |
| 0.4200 | 57.00 | 0.94 | 58.28 | 0.88 |
| 0.4300 | 56.90 | 0.94 | 58.46 | 0.89 |
| 0.4400 | 56.80 | 0.94 | 58.19 | 0.89 |
| 0.4500 | 56.70 | 0.94 | 58.38 | 0.90 |
| 0.4600 | 56.66 | 0.94 | 57.74 | 0.90 |
| 0.4700 | 56.62 | 0.94 | 57.71 | 0.91 |
| 0.4800 | 56.58 | 0.94 | 57.34 | 0.92 |
| 0.4900 | 56.54 | 0.94 | 57.02 | 0.93 |
| 0.5000 | 56.51 | 0.94 | 57.14 | 0.93 |
| 0.5100 | 56.47 | 0.94 | 57.12 | 0.96 |
| 0.5200 | 56.43 | 0.95 | 56.94 | 0.96 |
| 0.5300 | 56.39 | 0.95 | 56.89 | 0.98 |
| 0.5400 | 56.35 | 0.95 | 56.85 | 0.99 |
| 0.5500 | 56.31 | 0.95 | 56.45 | 0.98 |

Note: The SAR evaluations on May 17 were performed within 24 hours of the May 16 fluid parameter measurement


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## 450 MHz Head

**********

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
18/May/2011
Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

**********

| Freq | FCC_eH | FCC_sH | Test_e | Test_s |
|---|---|---|---|---|
| 0.3500 | 44.70 | 0.87 | 47.64 | 0.78 |
| 0.3600 | 44.58 | 0.87 | 46.78 | 0.78 |
| 0.3700 | 44.46 | 0.87 | 46.28 | 0.78 |
| 0.3800 | 44.34 | 0.87 | 46.09 | 0.79 |
| 0.3900 | 44.22 | 0.87 | 46.08 | 0.79 |
| 0.4000 | 44.10 | 0.87 | 45.33 | 0.80 |
| 0.4100 | 43.98 | 0.87 | 45.12 | 0.82 |
| 0.4200 | 43.86 | 0.87 | 45.47 | 0.84 |
| 0.4300 | 43.74 | 0.87 | 45.20 | 0.86 |
| 0.4400 | 43.62 | 0.87 | 45.05 | 0.87 |
| 0.4500 | 43.50 | 0.87 | 44.83 | 0.87 |
| 0.4600 | 43.45 | 0.87 | 44.87 | 0.88 |
| 0.4700 | 43.40 | 0.87 | 44.89 | 0.88 |
| 0.4800 | 43.34 | 0.87 | 44.08 | 0.89 |
| 0.4900 | 43.29 | 0.87 | 43.76 | 0.89 |
| 0.5000 | 43.24 | 0.87 | 43.83 | 0.91 |
| 0.5100 | 43.19 | 0.87 | 43.22 | 0.91 |
| 0.5200 | 43.14 | 0.88 | 43.23 | 0.91 |
| 0.5300 | 43.08 | 0.88 | 42.94 | 0.94 |
| 0.5400 | 43.03 | 0.88 | 42.88 | 0.95 |
| 0.5500 | 42.98 | 0.88 | 42.72 | 0.97 |


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## 450 MHz Body

**********

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
24/May/2011
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 | 58.56 | 0.84 |
| 0.3600 | 57.60 | 0.93 | 58.99 | 0.87 |
| 0.3700 | 57.50 | 0.93 | 57.90 | 0.87 |
| 0.3800 | 57.40 | 0.93 | 58.02 | 0.88 |
| 0.3900 | 57.30 | 0.93 | 58.13 | 0.89 |
| 0.4000 | 57.20 | 0.93 | 57.72 | 0.90 |
| 0.4100 | 57.10 | 0.93 | 57.53 | 0.90 |
| 0.4200 | 57.00 | 0.94 | 57.84 | 0.90 |
| 0.4300 | 56.90 | 0.94 | 57.35 | 0.91 |
| 0.4400 | 56.80 | 0.94 | 56.98 | 0.92 |
| 0.4500 | 56.70 | 0.94 | 57.52 | 0.94 |
| 0.4600 | 56.66 | 0.94 | 57.80 | 0.94 |
| 0.4700 | 56.62 | 0.94 | 57.71 | 0.94 |
| 0.4800 | 56.58 | 0.94 | 56.63 | 0.95 |
| 0.4900 | 56.54 | 0.94 | 56.42 | 0.96 |
| 0.5000 | 56.51 | 0.94 | 56.22 | 0.97 |
| 0.5100 | 56.47 | 0.94 | 56.22 | 0.98 |
| 0.5200 | 56.43 | 0.95 | 55.95 | 0.98 |
| 0.5300 | 56.39 | 0.95 | 56.50 | 1.00 |
| 0.5400 | 56.35 | 0.95 | 56.23 | 1.01 |
| 0.5500 | 56.31 | 0.95 | 55.91 | 1.01 |


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## 450 MHz Body

**********

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
25/May/2011
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 | 59.89 | 0.86 |
| 0.3600 | 57.60 | 0.93 | 58.90 | 0.86 |
| 0.3700 | 57.50 | 0.93 | 58.70 | 0.88 |
| 0.3800 | 57.40 | 0.93 | 58.70 | 0.88 |
| 0.3900 | 57.30 | 0.93 | 58.85 | 0.91 |
| 0.4000 | 57.20 | 0.93 | 59.01 | 0.90 |
| 0.4100 | 57.10 | 0.93 | 59.20 | 0.91 |
| 0.4200 | 57.00 | 0.94 | 58.15 | 0.92 |
| 0.4300 | 56.90 | 0.94 | 58.25 | 0.92 |
| 0.4400 | 56.80 | 0.94 | 58.09 | 0.94 |
| 0.4500 | 56.70 | 0.94 | 58.10 | 0.94 |
| 0.4600 | 56.66 | 0.94 | 57.54 | 0.93 |
| 0.4700 | 56.62 | 0.94 | 57.63 | 0.94 |
| 0.4800 | 56.58 | 0.94 | 57.79 | 0.96 |
| 0.4900 | 56.54 | 0.94 | 56.88 | 0.96 |
| 0.5000 | 56.51 | 0.94 | 57.00 | 0.97 |
| 0.5100 | 56.47 | 0.94 | 57.03 | 1.00 |
| 0.5200 | 56.43 | 0.95 | 57.24 | 0.99 |
| 0.5300 | 56.39 | 0.95 | 57.01 | 1.00 |
| 0.5400 | 56.35 | 0.95 | 56.85 | 1.03 |
| 0.5500 | 56.31 | 0.95 | 56.69 | 1.03 |


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## 450 MHz Body

**********

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
10/Jun/2011
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 | 59.04 | 0.89 |
| 0.3600 | 57.60 | 0.93 | 58.91 | 0.90 |
| 0.3700 | 57.50 | 0.93 | 58.74 | 0.92 |
| 0.3800 | 57.40 | 0.93 | 58.62 | 0.91 |
| 0.3900 | 57.30 | 0.93 | 59.05 | 0.90 |
| 0.4000 | 57.20 | 0.93 | 58.46 | 0.92 |
| 0.4100 | 57.10 | 0.93 | 58.22 | 0.94 |
| 0.4200 | 57.00 | 0.94 | 58.54 | 0.95 |
| 0.4300 | 56.90 | 0.94 | 57.74 | 0.96 |
| 0.4400 | 56.80 | 0.94 | 57.84 | 0.96 |
| 0.4500 | 56.70 | 0.94 | 57.90 | 0.97 |
| 0.4600 | 56.66 | 0.94 | 57.75 | 0.98 |
| 0.4700 | 56.62 | 0.94 | 57.71 | 0.98 |
| 0.4800 | 56.58 | 0.94 | 57.07 | 1.00 |
| 0.4900 | 56.54 | 0.94 | 57.22 | 1.01 |
| 0.5000 | 56.51 | 0.94 | 57.05 | 1.02 |
| 0.5100 | 56.47 | 0.94 | 56.94 | 1.02 |
| 0.5200 | 56.43 | 0.95 | 56.83 | 1.03 |
| 0.5300 | 56.39 | 0.95 | 56.56 | 1.03 |
| 0.5400 | 56.35 | 0.95 | 57.04 | 1.03 |
| 0.5500 | 56.31 | 0.95 | 56.49 | 1.04 |


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## 450 MHz Body

**********

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
13/Jun/2011
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 | 58.49 | 0.85 |
| 0.3600 | 57.60 | 0.93 | 57.86 | 0.86 |
| 0.3700 | 57.50 | 0.93 | 58.20 | 0.85 |
| 0.3800 | 57.40 | 0.93 | 57.84 | 0.87 |
| 0.3900 | 57.30 | 0.93 | 57.79 | 0.87 |
| 0.4000 | 57.20 | 0.93 | 57.42 | 0.89 |
| 0.4100 | 57.10 | 0.93 | 56.79 | 0.89 |
| 0.4200 | 57.00 | 0.94 | 57.24 | 0.89 |
| 0.4300 | 56.90 | 0.94 | 57.07 | 0.90 |
| 0.4400 | 56.80 | 0.94 | 56.85 | 0.91 |
| 0.4500 | 56.70 | 0.94 | 57.18 | 0.93 |
| 0.4600 | 56.66 | 0.94 | 57.12 | 0.94 |
| 0.4700 | 56.62 | 0.94 | 56.83 | 0.94 |
| 0.4800 | 56.58 | 0.94 | 56.42 | 0.95 |
| 0.4900 | 56.54 | 0.94 | 56.12 | 0.97 |
| 0.5000 | 56.51 | 0.94 | 56.04 | 0.97 |
| 0.5100 | 56.47 | 0.94 | 55.75 | 0.97 |
| 0.5200 | 56.43 | 0.95 | 55.98 | 0.98 |
| 0.5300 | 56.39 | 0.95 | 55.90 | 0.99 |
| 0.5400 | 56.35 | 0.95 | 55.63 | 0.99 |
| 0.5500 | 56.31 | 0.95 | 55.38 | 1.00 |


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## 450 MHz Body

**********

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
14/Jun/2011
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 | 59.34 | 0.85 |
| 0.3600 | 57.60 | 0.93 | 59.56 | 0.86 |
| 0.3700 | 57.50 | 0.93 | 58.61 | 0.87 |
| 0.3800 | 57.40 | 0.93 | 58.45 | 0.87 |
| 0.3900 | 57.30 | 0.93 | 58.15 | 0.88 |
| 0.4000 | 57.20 | 0.93 | 58.57 | 0.89 |
| 0.4100 | 57.10 | 0.93 | 57.87 | 0.90 |
| 0.4200 | 57.00 | 0.94 | 57.43 | 0.90 |
| 0.4300 | 56.90 | 0.94 | 58.37 | 0.91 |
| 0.4400 | 56.80 | 0.94 | 57.89 | 0.94 |
| 0.4500 | 56.70 | 0.94 | 57.85 | 0.93 |
| 0.4600 | 56.66 | 0.94 | 57.20 | 0.94 |
| 0.4700 | 56.62 | 0.94 | 56.99 | 0.96 |
| 0.4800 | 56.58 | 0.94 | 57.31 | 0.95 |
| 0.4900 | 56.54 | 0.94 | 56.79 | 0.96 |
| 0.5000 | 56.51 | 0.94 | 56.96 | 0.98 |
| 0.5100 | 56.47 | 0.94 | 56.92 | 0.97 |
| 0.5200 | 56.43 | 0.95 | 56.79 | 0.98 |
| 0.5300 | 56.39 | 0.95 | 56.05 | 1.00 |
| 0.5400 | 56.35 | 0.95 | 56.64 | 0.99 |
| 0.5500 | 56.31 | 0.95 | 56.33 | 1.01 |


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# APPENDIX G - BARSKI PLANAR PHANTOM CERTIFICATE OF CONFORMITY


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2378 Westlake Road
Kelowna, B.C. Canada
V1Z-2V2

BARSKI INDUSTRIES (1985) LTD.

Ph. # 250-769-6848
Fax # 250-769-6334
E-mail: barskiind@shaw.ca
Web: www.bcfiberglass.com

**FIBERGLASS FABRICATORS**

# Certificate of Conformity

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

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

Conformity

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

Signature: 

Daniel Chailler

**Fiberglass Planar Phantom - Top View**

**Fiberglass Planar Phantom - Front View**

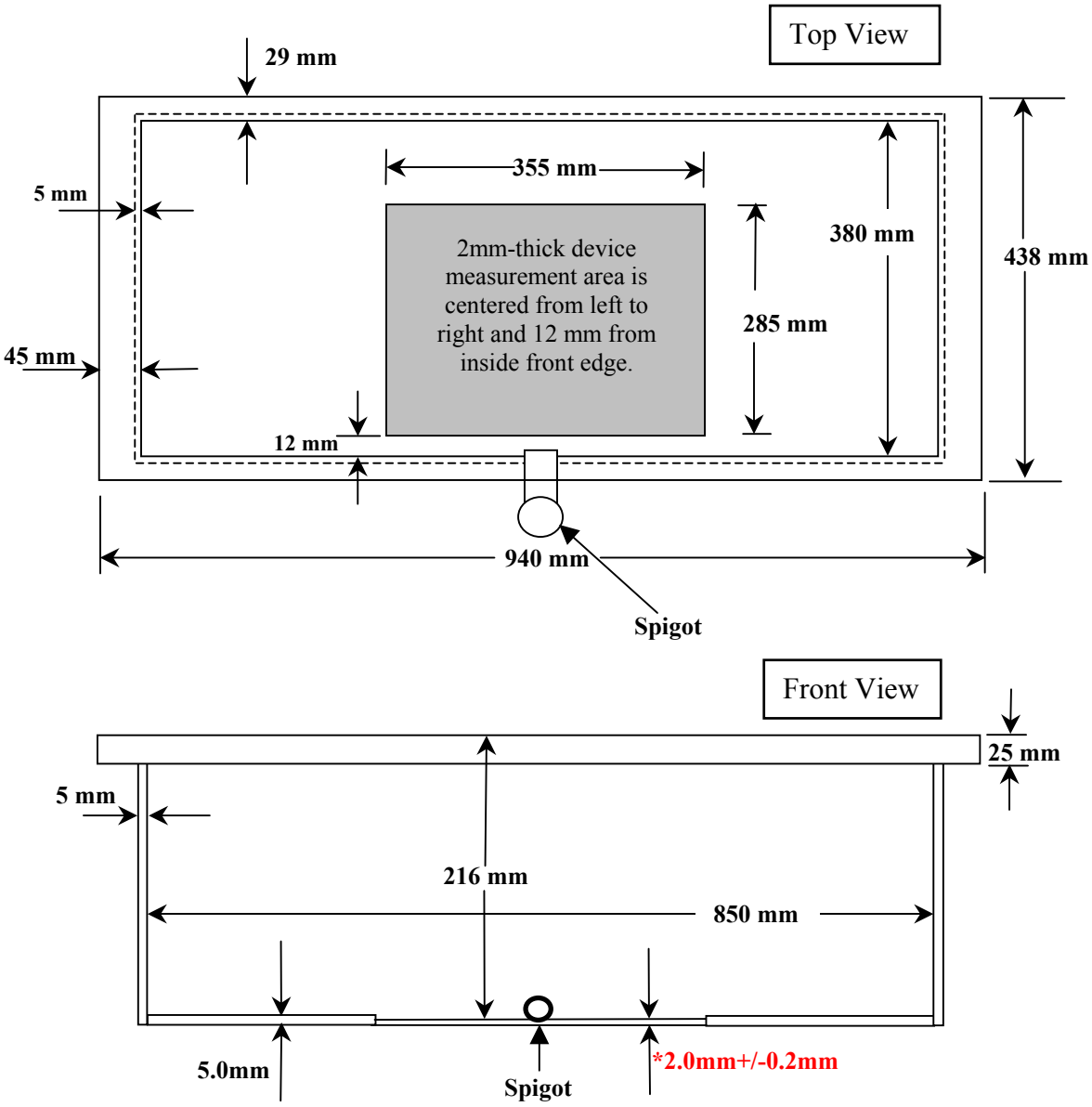
**Fiberglass Planar Phantom - Back View**

**Fiberglass Planar Phantom - Bottom View**

2003 Celltech Labs Inc.

## 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.**

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