# SAR TEST REPORT (FCC/IC)

## RF EXPOSURE EVALUATION | SPECIFIC ABSORPTION RATE

| | | | |
|---|---|---|---|
| APPLICANT / MANUFACTURER | KENWOOD USA CORPORATION | | |
| DEVICE UNDER TEST (DUT) | PORTABLE FM VHF PUSH-TO-TALK RADIO TRANSCEIVER | | |
| DEVICE MODEL(S) | TK-2300-1 (4 Channels) | TK-2300-2 (16 Channels) | |
| RATED MAX. OUTPUT POWER | 2 Watts (Conducted) | | |
| FREQUENCY RANGE(S) TESTED | FCC | 150.8 - 173.4 MHz | |
| DEVICE IDENTIFIER(S) | FCC ID: | ALH413501 | |
| APPLICATION TYPE | Certification | | |
| STANDARD(S) APPLIED | FCC 47 CFR §2.1093 | | |
| | Health Canada Safety Code 6 | | |
| PROCEDURE(S) APPLIED | FCC OET Bulletin 65, Supplement C (01-01) | | |
| | FCC Mobile & Portable RF Exp. Proc. (KDB 447498 D01 v03r03) | | |
| | Industry Canada RSS-102 Issue 2 | | |
| | IEEE 1528-2003 | | |
| | IEC 62209-1:2005 | | |
| FCC DEVICE CLASSIFICATION | Licensed Non-Broadcast Transmitter Held to Face (TNF) | | |
| IC DEVICE CLASSIFICATION | Land Mobile Radio Transmitter/Receiver (27.41-960 MHz) | | |
| RF EXPOSURE CATEGORY | Occupational / Controlled | | |
| RF EXPOSURE EVALUATION(S) | Face-held & Body-worn | | |
| DATE(S) OF EVALUATION | May 12 & 15, 2009 | | |
| TEST REPORT SERIAL NO. | 051109ALH-T966-S90V | | |
| TEST REPORT REVISION NO. | Revision 1.0 | Initial Release | May 20, 2009 |
| TEST REPORT SIGNATORIES | Testing Performed By | Test Report Prepared By | |
| | Sean Johnston<br>Celltech Labs Inc. | Jonathan Hughes<br>Celltech Labs Inc. | |
| TEST LAB AND LOCATION | Celltech Compliance Testing and Engineering Lab | | |
| | 21-364 Lougheed Road, Kelowna, B.C. V1X 7R8 Canada | | |
| TEST LAB CONTACT INFO. | Tel.: 250-765-7650 | Fax: 250-765-7645 | |
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| TEST LAB ACCREDITATION(S) | ilac-MRA ACCREDITED<br>Test Lab Certificate No. 2470.01 | | |

# DECLARATION OF COMPLIANCE
# SAR RF EXPOSURE EVALUATION

| | | | | | | |
|---|---|---|---|---|---|---|
| **Test Lab Information** | **Name** | **CELLTECH LABS INC.** | | | | |
| | **Address** | 21-364 Lougheed Road, Kelowna, B.C. V1X 7R8 Canada | | | | |
| **Applicant Information** | **Name** | **KENWOOD USA CORPORATION** | | | | |
| | **Address** | 3970 Johns Creek Court, Suite 100, Suwanee, GA 30024 United States | | | | |
| **Standard(s) Applied** | **FCC** | 47 CFR §2.1093 | | | | |
| | **IC** | Health Canada Safety Code 6 | | | | |
| **Procedure(s) Applied** | **FCC** | OET Bulletin 65, Supplement C (Edition 01-01) | | | | |
| | **FCC** | Mobile & Portable RF Exposure Procedures (KDB 447498 D01 v03r03) | | | | |
| | **IC** | RSS-102 Issue 2 | **IEEE** | 1528-2003 | **IEC** | 62209-1:2005 |
| **Application Type** | **FCC** | Certification | | | | |
| **Device Classification(s)** | **FCC** | Licensed Non-Broadcast Transmitter Held to Face (TNF) | | | | |
| | **IC** | Land Mobile Radio Transmitter/Receiver (27.41-960 MHz) | | | | |
| **Device RF Exposure Category** | **Portable** | Occupational / Controlled Environment | | | | |
| **Device Identifier(s)** | **FCC ID:** | ALH413501 | | | | |
| **Device Model(s)** | TK-2300-1 (4 channels), TK-2300-2 (16 channels) | | | | | |
| **Device Model(s) Tested** | TK-2300-2 (16 channels) | | | | | |
| **Test Sample Serial No.** | 00000000 (Identical Prototype) | | | | | |
| **Device Description** | Portable FM VHF Push-To-Talk (PTT) Radio Transceiver | | | | | |
| **Frequency Range(s) Tested** | 150.8 - 173.4 MHz | | | | | |
| **Manufacturer Rated Output Power** | 2 Watts (Conducted) | | | | | |
| **RF Output Power Levels Tested** | 2 Watts | 33.0 dBm | Conducted | 150.8 MHz | Low Channel | |
| | 2 Watts | 33.0 dBm | Conducted | 162.1 MHz | Mid Channel | |
| | 2 Watts | 33.0 dBm | Conducted | 173.4 MHz | High Channel | |
| **Antenna Type(s) Tested** | Detachable | P/N: KRA-22M | 146 - 162 MHz | Length: 110 mm | | |
| | Detachable | P/N: KRA-22M2 | 162 - 174 MHz | Length: 110 mm | | |
| **Battery Type(s) Tested** | Ni-Cd | 7.2 V | 1100 mAh | P/N: KNB-30A | | |
| | Ni-MH | 7.2 V | 1500 mAh | P/N: KNB-29N | | |
| **Body-worn Accessories Tested** | Metal Belt-Clip | Contains Metal Components | P/N: KBH-10 | | | |
| **Audio Accessories Tested** | Speaker-Microphone (P/N: KMC-45) | Headset with Boom-Microphone (P/N: KHS-22) | | | | |
| **Max. SAR Level(s) Evaluated** | Face-held | **0.246 W/kg** | 1g | 50% PTT duty cycle | Occupational / Controlled Exp. | |
| | Body-worn | **0.695 W/kg** | 1g | 50% PTT duty cycle | Occupational / Controlled Exp. | |
| **FCC/IC Spatial Peak SAR Limit** | Head/Body | 8.0 W/kg | 1g | 50% PTT duty cycle | Occupational / Controlled Exp. | |

Celltech Labs Inc. declares under its sole responsibility that this wireless portable device has demonstrated compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC 47 CFR §2.1093 and Health Canada's Safety Code 6 for the Occupational / Controlled Exposure environment. The device was tested in accordance with the measurement procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01), Industry Canada RSS-102 Issue 2, IEEE Standard 1528-2003 and IEC International Standard 62209-1:2005. All measurements were performed in accordance with the SAR system manufacturer recommendations.

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

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

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

| **Test Report Approved By** | | **Sean Johnston** | **Celltech Labs Inc.** |
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## 1.0 INTRODUCTION

This measurement report demonstrates that the Kenwood USA Corporation Models: TK-2300-1, TK-2300-2 Portable FM VHF PTT Radio Transceiver complies with the SAR (Specific Absorption Rate) RF exposure requirements specified in FCC 47 CFR §2.1093 (see reference [1]) and Health Canada's Safety Code 6 (see reference [2]) for the Occupational / Controlled Exposure environment. The measurement procedures described in FCC OET Bulletin 65, Supplement C (Edition 01-01) (see reference [3]), IC RSS-102 Issue 2 (see reference [4]), IEEE Standard 1528-2003 (see reference [5]) and IEC International Standard 62209-1:2005 (see reference [6]) were employed. A description of the device, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used and the various provisions of the rules are included within this test report.

## 2.0 SAR MEASUREMENT SYSTEM

Celltech Labs Inc. SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 measurement system is comprised of the measurement server, robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for head and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the DASY4 measurement server. The DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the DASY4 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot uses a controller with a built in VME-bus computer.

**DASY4 SAR System with Plexiglas validation phantom**

**DASY4 SAR System with Plexiglas side planar phantom**

# 3.0 MEASUREMENT SUMMARY

## SAR EVALUATION RESULTS

| Test Type | Test Date | Freq. | Batt. Type | Antenna Part No. | Accessory Type(s) | | Device Distance to Planar Phantom | | Cond. Power Before Test | Measured SAR 1g (W/kg) PTT Duty Cycle | | SAR Drift During Test | Scaled SAR with droop 1g (W/kg) PTT Duty Cycle | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | | | Body-worn | Audio | DUT | Antenna | Watts | 100% | 50% | dB | 100% | 50% |
| Face | May 15 | 162.1 | NiCd | KRA-22M | n/a | n/a | 2.5 cm | 3.5 cm | 2.0 | 0.321 | 0.161 | 0.087 | 0.321 | 0.161 |
| Face | May 15 | 162.1 | NiCd | KRA-22M2 | n/a | n/a | 2.5 cm | 3.5 cm | 2.0 | 0.444 | 0.222 | -0.451 | 0.493 | **0.246** |
| Body | May 12 | 162.1 | NiMH | KRA-22M | Belt-Clip | Spkr-Mic | 1.2 cm | 3.2 cm | 2.0 | 0.334 | 0.167 | -0.395 | 0.366 | 0.183 |
| Body | May 12 | 162.1 | NiMH | KRA-22M | Belt-Clip | Headset | 1.2 cm | 3.2 cm | 2.0 | 0.375 | 0.188 | -0.924 | 0.464 | 0.232 |
| Body | May 12 | 162.1 | NiCd | KRA-22M | Belt-Clip | Spkr-Mic | 1.2 cm | 3.2 cm | 2.0 | 0.409 | 0.205 | -0.803 | 0.492 | 0.246 |
| Body | May 12 | 162.1 | NiCd | KRA-22M | Belt-Clip | Headset | 1.2 cm | 3.2 cm | 2.0 | 0.354 | 0.177 | -0.720 | 0.418 | 0.209 |
| Body | May 12 | 150.8 | NiCd | KRA-22M | Belt-Clip | Spkr-Mic | 1.2 cm | 3.2 cm | 2.0 | 1.18 | 0.590 | -0.708 | 1.39 | **0.695** |
| Body | May 15 | 162.1 | NiMH | KRA-22M2 | Belt-Clip | Spkr-Mic | 1.2 cm | 3.2 cm | 2.0 | 1.09 | 0.545 | -0.251 | 1.15 | 0.577 |
| Body | May 15 | 162.1 | NiMH | KRA-22M2 | Belt-Clip | Headset | 1.2 cm | 3.2 cm | 2.0 | 1.11 | 0.555 | -0.229 | 1.17 | 0.585 |
| Body | May 15 | 162.1 | NiCd | KRA-22M2 | Belt-Clip | Spkr-Mic | 1.2 cm | 3.2 cm | 2.0 | 1.16 | 0.580 | -0.639 | 1.34 | 0.672 |
| Body | May 15 | 162.1 | NiCd | KRA-22M2 | Belt-Clip | Headset | 1.2 cm | 3.2 cm | 2.0 | 1.20 | 0.600 | -0.287 | 1.28 | 0.641 |
| Body | May 15 | 173.4 | NiCd | KRA-22M2 | Belt-Clip | Spkr-Mic | 1.2 cm | 3.2 cm | 2.0 | 0.388 | 0.194 | -0.435 | 0.429 | 0.214 |

| SAR LIMIT(S) | | HEAD & BODY | SPATIAL PEAK | RF EXPOSURE CATEGORY |
|---|---|---|---|---|
| FCC 47 CFR 2.1093 | Health Canada Safety Code 6 | 8.0 W/kg | averaged over 1 gram | Occupational / Controlled |

| May 12, 2009 | | | May 12, 2009 | | | May 12, 2009 | | | May 15, 2009 | | | May 15, 2009 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **160 MHz Head** | | | **150 MHz Body** | | | **160 MHz Body** | | | **160 MHz Body** | | | **170 MHz Body** | | |
| **Dielectric Constant $\varepsilon_r$** | | | **Dielectric Constant $\varepsilon_r$** | | | **Dielectric Constant $\varepsilon_r$** | | | **Dielectric Constant $\varepsilon_r$** | | | **Dielectric Constant $\varepsilon_r$** | | |
| **150 Target** | Meas. | Dev. | **150 Target** | Meas. | Dev. | **150 Target** | Meas. | Dev. | **150 Target** | Meas. | Dev. | **150 Target** | Meas. | Dev. |
| **52.3 ±5%** | 54.8 | +4.8% | **61.9 ±5%** | 62.1 | +0.3% | **61.9 ±5%** | 64.1 | +3.6% | **61.9 ±5%** | 64.0 | +3.4% | **61.9 ±5%** | 64.0 | +3.4% |
| **Conductivity σ (mho/m)** | | | **Conductivity σ (mho/m)** | | | **Conductivity σ (mho/m)** | | | **Conductivity σ (mho/m)** | | | **Conductivity σ (mho/m)** | | |
| **150 Target** | Meas. | Dev. | **150 Target** | Meas. | Dev. | **150 Target** | Meas. | Dev. | **150 Target** | Meas. | Dev. | **150 Target** | Meas. | Dev. |
| **0.76 ±5%** | 0.78 | +2.6% | **0.80 ±5%** | 0.83 | +3.8% | **0.80 ±5%** | 0.84 | +5.0% | **0.80 ±5%** | 0.83 | +3.8% | **0.80 ±5%** | 0.84 | +5.0% |

| Test Date | Fluid Type | Ambient Temp. | Fluid Temp. | Fluid Depth | Atmospheric Pressure | Relative Humidity | ρ (Kg/m$^3$) |
|---|---|---|---|---|---|---|---|
| May 12 | Head | 24.5 °C | 22.3 °C | ≥ 15 cm | 101.1 kPa | 35% | 1000 |
| May 12 | Body | 25.0 °C | 22.6 °C | ≥ 15 cm | 101.1 kPa | 35% | 1000 |
| May 15 | Body | 24.6 °C | 22.3 °C | ≥ 15 cm | 101.1 kPa | 35% | 1000 |

**Notes**

1. The face-held SAR evaluations were selected based on the worst-case battery configuration measured during the body-worn evaluations.
2. The SAR droop of the DUT measured by the DASY4 system for the duration of the SAR evaluations was added to the measured SAR level.
3. The Ni-MH and Ni-Cd batteries are identical in dimension and provide the same belt-clip spacing from the back of the DUT to the planar phantom.
4. **SAR Evaluation Power Thresholds for PTT Devices, $f \leq 0.5$ GHz (FCC KDB 447498 D01 v03r03 Section 5)b)i) - Mobile & Portable RF Exposure Procedures)**

| Exposure Conditions | *P* mW (General Population) | *P* mW (Occupational) | Measured RF Conducted Output Power: 100% PTT Duty Cycle | 50% PTT Duty Cycle |
|---|---|---|---|---|
| Held to face, $d \geq 2.5$ cm | 250 | 1250 | 2 Watts | 1 Watt |
| Body-worn, $d \geq 1.5$ cm | 200 | 1000 | n/a | n/a |
| Body-worn, $d \geq 1.0$ cm | 150 | 750 | 2 Watts | 1 Watt |

1. The time-averaged output power, corresponding to the required PTT duty factor, is compared with these thresholds.
2. The closest distance between the user and the device or its antenna is used to determine the power thresholds.

## 4.0 DETAILS OF SAR EVALUATION

The Kenwood USA Corporation Models: TK-2300-1, TK-2300-2 Portable FM VHF PTT Radio Transceiver described in this report was compliant for localized Specific Absorption Rate (Occupational / Controlled Exposure) based on the test provisions and conditions described below. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A. Detailed photographs of the test setup are shown in Appendix D.

1. The DUT was evaluated in a face-held configuration with the front of the radio placed parallel to the outer surface of the planar phantom. A 2.5 cm spacing was maintained between the front side of the DUT and the outer surface of the planar phantom.
2. The DUT was evaluated in a body-worn configuration with the back of the radio facing the outer surface of the planar phantom and the attached belt-clip accessory placed parallel to and touching the planar phantom. The attached belt-clip accessory provided a 1.2 cm spacing from the back of the DUT to the planar phantom. The DUT was evaluated for body-worn SAR with the customer-supplied speaker-microphone and headset-microphone audio accessories connected to the audio port consecutively.
3. The maximum SAR configuration measured at the mid channel was further evaluated at the low and high channels.
4. The DUT was tested at maximum power 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.
5. The average conducted output power levels referenced in this report were measured by Celltech Labs Inc. prior to the SAR evaluations at the antenna connector of the DUT using a Gigatronics 8652A Universal Power Meter in accordance with FCC 47 CFR §2.1046 and IC RSS-Gen.
6. The area scan evaluation was performed with a fully charged battery. After the area scan was completed the radio was cooled down and the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
7. A SAR-versus-Time power droop evaluation was performed in the test configuration that reported the maximum scaled SAR level. See Appendix A (SAR Test Plots) for SAR-versus-Time power droop evaluation plot.
8. The fluid temperature was measured prior to and after the SAR evaluations to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements.
9. 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).

## 5.0 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 E). 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.

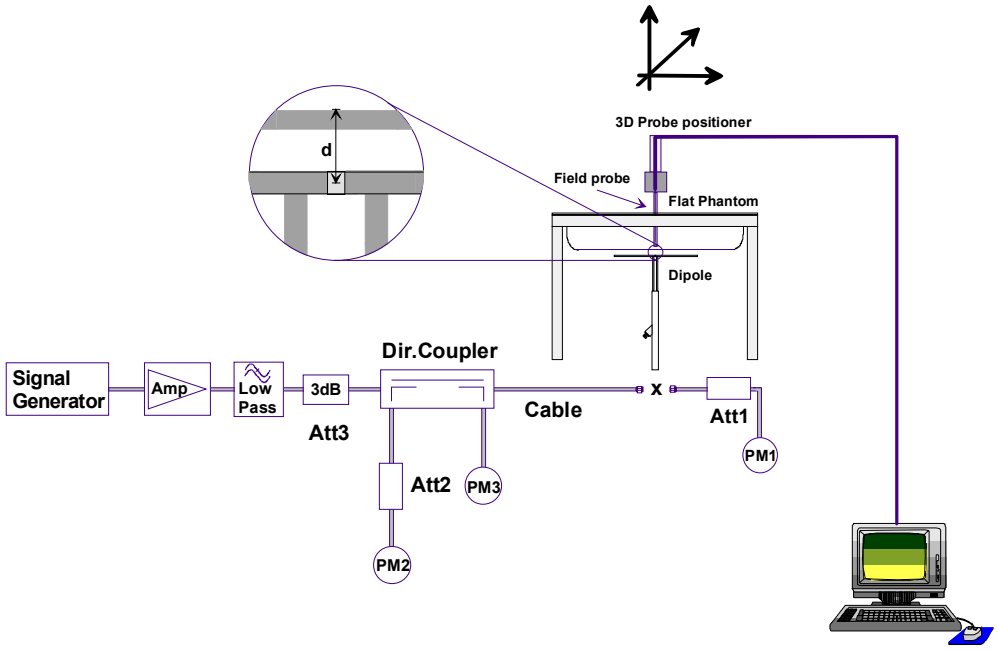
## 6.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluations a daily system check was performed using a Plexiglas planar phantom and 300 MHz dipole (see Appendix B for system performance check test plot) in accordance with the procedures described in IEEE Standard 1528-2003 (see reference [5]) and IEC International Standard 62209-1:2005 (see reference [6]). The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C for measured fluid dielectric parameters). A forward power of 250 mW was applied to the dipole and the system was verified to a tolerance of ±10% from the system validation target SAR value (see Appendix E for system validation target SAR value listed on page 10 of the dipole calibration report).

### SYSTEM PERFORMANCE CHECK EVALUATION

| Test Date | Equiv. Tissue | SAR 1g (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) | Sys. Val. Target | Meas. | Dev. | Sys. Val. Target | Meas. | Dev. | Sys. Val. Target | Meas. | Dev. | | | | | | |
| May 12 | Head 300 | 0.760 ±10% | 0.809 | +6.5% | 44.9 ±5% | 46.0 | +2.5% | 0.85 ±5% | 0.88 | +3.5% | 1000 | 25.0 | 22.7 | ≥ 15 | 35 | 101.1 |
| May 15 | Head 300 | 0.760 ±10% | 0.799 | +5.1% | 44.9 ±5% | 45.7 | +1.8% | 0.85 ±5% | 0.88 | +3.5% | 1000 | 24.0 | 22.3 | ≥ 15 | 35 | 101.1 |

| Notes | | |
|---|---|---|
| | 1. | The target SAR value is referenced from the System Validation performed by Celltech Labs Inc. (see Appendix E). |
| | 2. | The target dielectric parameters are referenced from the System Validation performed by Celltech Labs Inc. (see Appendix E). |
| | 3. | The fluid temperature was measured prior to and after the system performance check to ensure the temperature remained within +/-2°C of the fluid temperature reported during the dielectric parameter measurements. |
| | 4. | The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer (see Appendix C). |




System Performance Check Measurement Setup Diagram

300 MHz Validation Dipole Setup

## 7.0 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 [8]).

| Probe Calibration Freq. | Device Measurement Freq. | Frequency Interval | ±25 MHz < 300 MHz |
|---|---|---|---|
| **150 MHz** | 150.8 MHz | 0.8 MHz | < 25 MHz |
| | 162.1 MHz | 12.1 MHz | < 25 MHz |
| | 173.4 MHz | 23.4 MHz | < 25 MHz |
| The probe calibration and measurement frequency interval is < 25 MHz; therefore the additional steps are not required. | | | |

## 8.0 SIMULATED EQUIVALENT TISSUES

The simulated tissue mixtures consisted of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution. Preservation with a bactericide was added and visual inspection made to ensure air bubbles were not trapped during the mixing process. The fluid was prepared according to standardized procedures and measured for dielectric parameters (permittivity and conductivity).

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

## 9.0 SAR LIMITS

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

# 10.0 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) |
| **Evaluation Phantom** | |
| **Type** | Side Planar Phantom |
| **Shell Material** | Plexiglas |
| **Bottom Thickness** | 2.0 mm ± 0.1 mm |
| **Inner Dimensions** | 72.6 cm (L) x 20.3 cm (W) x 20.3 cm (H) |
| **Validation Phantom (≤ 450MHz)** | |
| **Type** | Planar Phantom |
| **Shell Material** | Plexiglas |
| **Bottom Thickness** | 6 mm ± 0.1 mm |
| **Inner Dimensions** | 83.5 cm (L) x 36.9 cm (W) x 21.8 cm (H) |

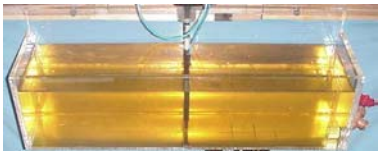
## 11.0 PROBE SPECIFICATION (ET3DV6)

| | |
|---|---|
| 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**

## 12.0 SIDE PLANAR PHANTOM

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



**Plexiglas Side Planar Phantom**

## 13.0 VALIDATION PLANAR PHANTOM

The validation planar phantom is constructed of Plexiglas material with a 6.0 mm shell thickness for system validations at 450MHz and below. The validation planar phantom is mounted to the table of the DASY4 compact system.

**Plexiglas Validation Planar Phantom**

## 14.0 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**

## 15.0 TEST EQUIPMENT LIST

| TEST EQUIPMENT | | ASSET NO. | SERIAL NO. | DATE CALIBRATED | CALIBRATION DUE DATE |
|---|---|---|---|---|---|
| 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 | 28Apr09 | 28Apr10 |
| x | -ET3DV6 E-Field Probe | 00017 | 1590 | 21Jul08 | 21Jul09 |
| x | -Celltech 300 MHz Validation Dipole | 00023 | 135 | 26Jan09 | 26Jan10 |
| x | -Plexiglas Side Planar Phantom | 00156 | 161 | CNR | CNR |
| x | -Plexiglas Validation Planar Phantom | 00157 | 137 | CNR | CNR |
| x | HP 85070C Dielectric Probe Kit | 00033 | US39240170 | CNR | CNR |
| x | Gigatronics 8652A Power Meter | 00007 | 1835272 | 23Apr08 | 21Jul09 |
| x | Gigatronics 80701A Power Sensor | 00014 | 1833699 | 23Apr08 | 21Jul09 |
| x | HP 8753ET Network Analyzer | 00134 | US39170292 | 28Apr08 | 28Apr10 |
| x | HP 8648D Signal Generator | 00005 | 3847A00611 | CNR | CNR |
| x | Amplifier Research 10W1000C Power Amplifier | 00041 | 27887 | CNR | CNR |
| Abbr. | CNR = Calibration Not Required | | | | |

# 16.0 MEASUREMENT UNCERTAINTIES

**UNCERTAINTY BUDGET FOR DEVICE EVALUATION**

| Uncertainty Component | IEEE 1528 Section | Uncertainty Value ±% | Probability Distribution | Divisor | ci 1g | ci 10g | Uncertainty Value ±% (1g) | Uncertainty Value ±% (10g) | $V_i$ or $V_{eff}$ |
|---|---|---|---|---|---|---|---|---|---|
| **Measurement System** | | | | | | | | | |
| Probe Calibration (150 MHz) | E.2.1 | 10 | Normal | 1 | 1 | 1 | 10.0 | 10 | ∞ |
| Axial Isotropy | E.2.2 | 4.7 | Rectangular | 1.732050808 | 0.7 | 0.7 | 1.9 | 1.9 | ∞ |
| Hemispherical Isotropy | E.2.2 | 9.6 | Rectangular | 1.732050808 | 0.7 | 0.7 | 3.9 | 3.9 | ∞ |
| Boundary Effect | E.2.3 | 2.5 | Rectangular | 1.732050808 | 1 | 1 | 1.4 | 1.4 | ∞ |
| Linearity | E.2.4 | 4.7 | Rectangular | 1.732050808 | 1 | 1 | 2.7 | 2.7 | ∞ |
| System Detection Limits | E.2.5 | 1 | Rectangular | 1.732050808 | 1 | 1 | 0.6 | 0.6 | ∞ |
| Readout Electronics | E.2.6 | 0.3 | Normal | 1 | 1 | 1 | 0.3 | 0.3 | ∞ |
| Response Time | E.2.7 | 0.8 | Rectangular | 1.732050808 | 1 | 1 | 0.5 | 0.5 | ∞ |
| Integration Time | E.2.8 | 2.6 | Rectangular | 1.732050808 | 1 | 1 | 1.5 | 1.5 | ∞ |
| RF Ambient Conditions | E.6.1 | 3 | Rectangular | 1.732050808 | 1 | 1 | 1.7 | 1.7 | ∞ |
| Probe Positioner Mechanical Tolerance | E.6.2 | 0.4 | Rectangular | 1.732050808 | 1 | 1 | 0.2 | 0.2 | ∞ |
| Probe Positioning wrt Phantom Shell | E.6.3 | 2.9 | Rectangular | 1.732050808 | 1 | 1 | 1.7 | 1.7 | ∞ |
| Extrapolation, interpolation & integration algorithms for max. SAR evaluation | E.5 | 1 | Rectangular | 1.732050808 | 1 | 1 | 0.6 | 0.6 | ∞ |
| **Test Sample Related** | | | | | | | | | |
| Test Sample Positioning | E.4.2 | 2.9 | Normal | 1 | 1 | 1 | 2.9 | 2.9 | 12 |
| Device Holder Uncertainty | E.4.1 | 3.6 | Normal | 1 | 1 | 1 | 3.6 | 3.6 | 8 |
| SAR Drift Measurement | 6.6.2 | 5 | Rectangular | 1.732050808 | 1 | 1 | 2.9 | 2.9 | ∞ |
| **Phantom and Tissue Parameters** | | | | | | | | | |
| Phantom Uncertainty | E.3.1 | 4 | Rectangular | 1.732050808 | 1 | 1 | 2.3 | 2.3 | ∞ |
| Liquid Conductivity (target) | E.3.2 | 5 | Rectangular | 1.732050808 | 0.64 | 0.43 | 1.8 | 1.2 | ∞ |
| Liquid Conductivity (measured) | E.3.3 | 5 | Normal | 1 | 0.64 | 0.43 | 3.2 | 2.2 | ∞ |
| Liquid Permittivity (target) | E.3.2 | 5 | Rectangular | 1.732050808 | 0.6 | 0.49 | 1.7 | 1.4 | ∞ |
| Liquid Permittivity (measured) | E.3.3 | 4.8 | Normal | 1 | 0.6 | 0.49 | 2.9 | 2.4 | ∞ |
| **Combined Standard Uncertainty** | | | **RSS** | | | | **14.04** | **13.64** | |
| **Expanded Uncertainty (95% Confidence Interval)** | | | **k=2** | | | | **28.08** | **27.27** | |

**Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 and IEC International Standard 62209-1:2005**

## 17.0 REFERENCES


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

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

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

[4] Industry Canada - "Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)", Radio Standards Specification RSS-102 Issue 2: November 2005.

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

[6] IEC International Standard 62209-1:2005 - "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures."

[7] Federal Communications Commission, Office of Engineering and Technology - "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies"; KDB 447498 D01 v03r03: January 2009.

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

# APPENDIX A - SAR MEASUREMENT DATA

Date Tested: 05/15/2009

## Face-held SAR - KRA-22M Antenna - Ni-Cd Battery - Mid Channel - 162.1 MHz

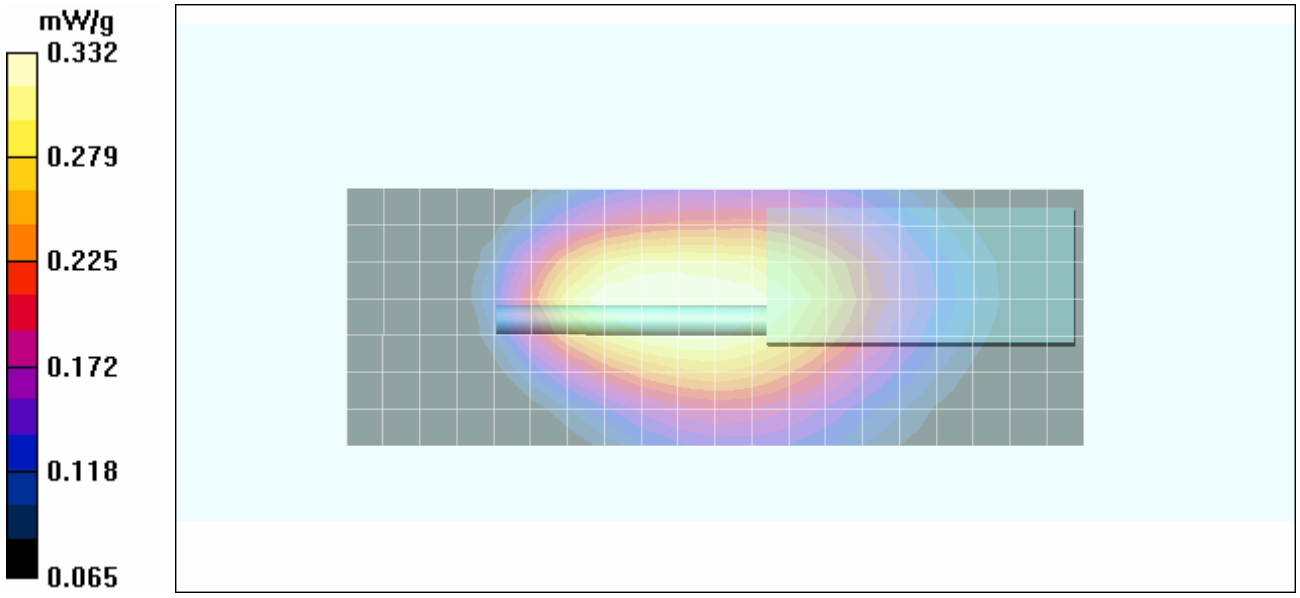
**DUT: Kenwood TK-2300-2; Type: Portable FM VHF PTT Radio Transceiver; Serial: 00000000 (Pre-production)**

Ambient Temp: 24.5°C; Fluid Temp: 22.3°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: FM VHF (CW)
Frequency: 162.1 MHz; Duty Cycle: 1:1
Medium: HSL150 Medium parameters used: f = 162.1 MHz; $\sigma$ = 0.78 mho/m; $\varepsilon_r$ = 54.8; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(8.9, 8.9, 8.9); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Face-held SAR - 2.5 cm Spacing from Front Side of DUT to Planar Phantom**
**Area Scan (8x21x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.345 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 19.2 V/m; Power Drift = 0.087 dB
Peak SAR (extrapolated) = 0.516 W/kg
**SAR(1 g) = 0.321 mW/g; SAR(10 g) = 0.239 mW/g**
Maximum value of SAR (measured) = 0.332 mW/g



Date Tested: 05/15/2009

## Face-held SAR - KRA-22M2 Antenna - Ni-Cd Battery - Mid Channel - 162.1 MHz

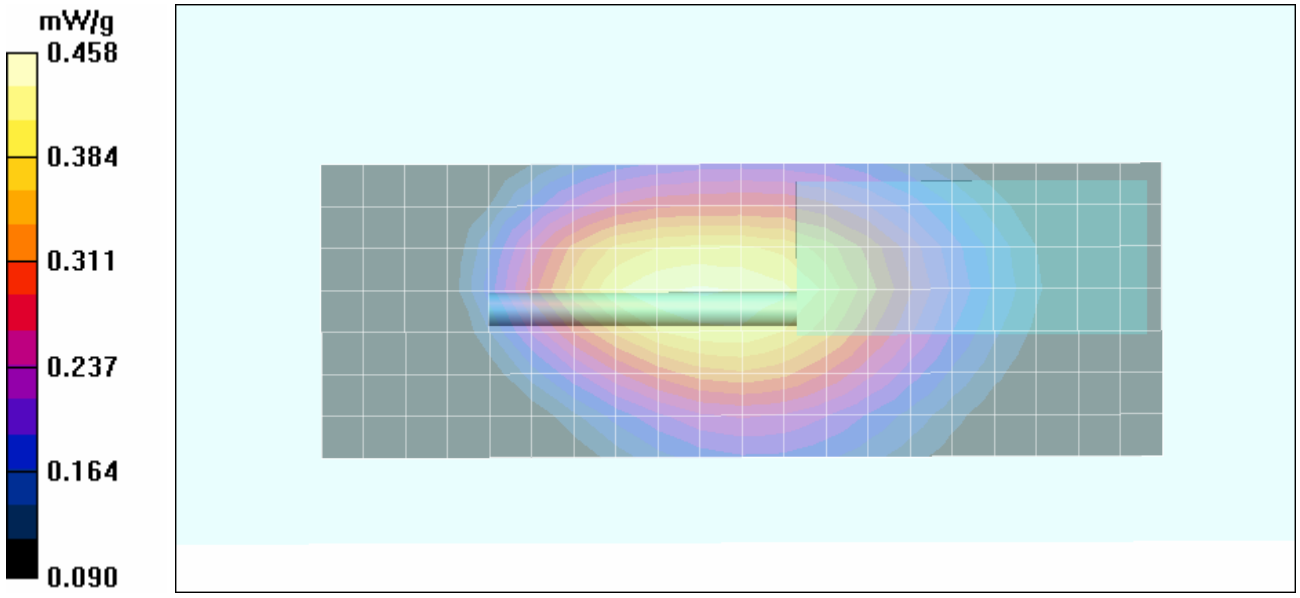
**DUT: Kenwood TK-2300-2; Type: Portable FM VHF PTT Radio Transceiver; Serial: 00000000 (Pre-production)**

Ambient Temp: 24.5°C; Fluid Temp: 22.3°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

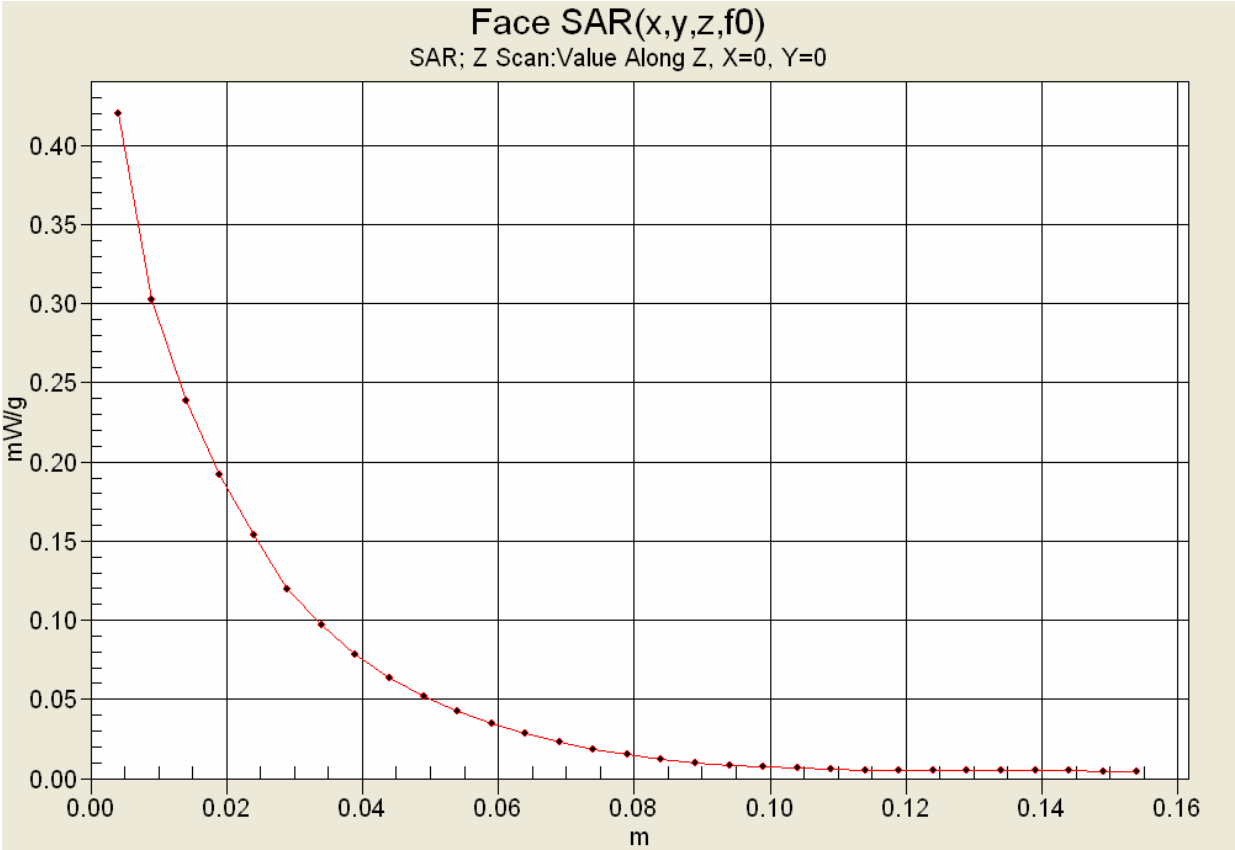
Communication System: FM VHF (CW)
Frequency: 162.1 MHz; Duty Cycle: 1:1
Medium: HSL150 Medium parameters used: f = 162.1 MHz; $\sigma$ = 0.78 mho/m; $\varepsilon_r$ = 54.8; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(8.9, 8.9, 8.9); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Face-held SAR - 2.5 cm Spacing from Front Side of DUT to Planar Phantom**
**Area Scan (8x21x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.438 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 23.0 V/m; Power Drift = -0.451 dB
Peak SAR (extrapolated) = 0.681 W/kg
**SAR(1 g) = 0.444 mW/g; SAR(10 g) = 0.332 mW/g**
Maximum value of SAR (measured) = 0.458 mW/g



## Z-Axis Scan



Date Tested: 05/12/2009

## Body-worn SAR - KRA-22M Antenna - Ni-MH Battery - Mid Channel - 162.1 MHz

**DUT: Kenwood TK-2300-2; Type: Portable FM VHF PTT Radio Transceiver; Serial: 00000000 (Pre-production)**

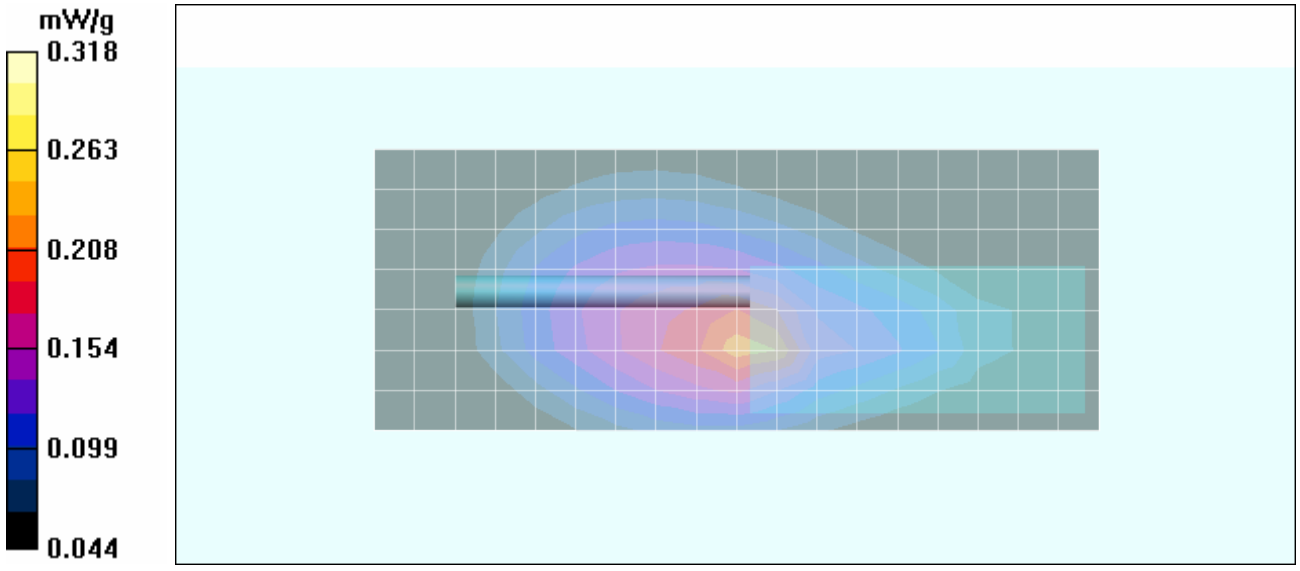
**Body-worn Accessory: Belt-Clip (P/N: KBH-10); Audio Accessory: Speaker-Microphone (P/N: KMC-45)**

Ambient Temp: 25.0°C; Fluid Temp: 22.6°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: FM VHF (CW)
Frequency: 162.1 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 162.1 MHz; $\sigma$ = 0.84 mho/m; $\varepsilon_r$ = 64.1; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(8.5, 8.5, 8.5); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Body-worn SAR - 1.2 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom**
**Area Scan (8x19x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.220 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 = -0.395 dB
Peak SAR (extrapolated) = 0.606 W/kg
**SAR(1 g) = 0.334 mW/g; SAR(10 g) = 0.223 mW/g**
Maximum value of SAR (measured) = 0.318 mW/g



Date Tested: 05/12/2009

## Body-worn SAR - KRA-22M Antenna - Ni-MH Battery - Mid Channel - 162.1 MHz

**DUT: Kenwood TK-2300-2; Type: Portable FM VHF PTT Radio Transceiver; Serial: 00000000 (Pre-production)**

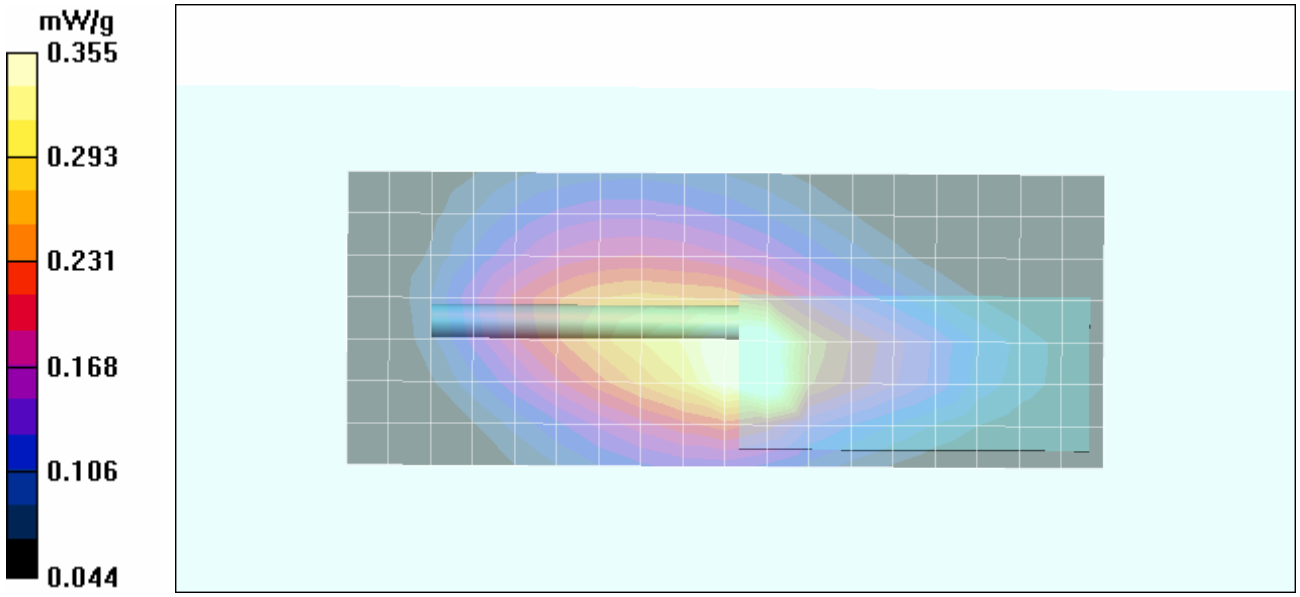
**Body-worn Accessory: Belt-Clip (P/N: KBH-10); Audio Accessory: Headset-Microphone (P/N: KHS-22)**

Ambient Temp: 25.0°C; Fluid Temp: 22.6°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: FM VHF (CW)
Frequency: 162.1 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 162.1 MHz; $\sigma$ = 0.84 mho/m; $\varepsilon_r$ = 64.1; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(8.5, 8.5, 8.5); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Body-worn SAR - 1.2 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom**
**Area Scan (8x19x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.402 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 21.4 V/m; Power Drift = -0.924 dB
Peak SAR (extrapolated) = 0.700 W/kg
**SAR(1 g) = 0.375 mW/g; SAR(10 g) = 0.238 mW/g**
Maximum value of SAR (measured) = 0.355 mW/g



Date Tested: 05/12/2009

## Body-worn SAR - KRA-22M Antenna - Ni-Cd Battery - Mid Channel - 162.1 MHz

**DUT: Kenwood TK-2300-2; Type: Portable FM VHF PTT Radio Transceiver; Serial: 00000000 (Pre-production)**

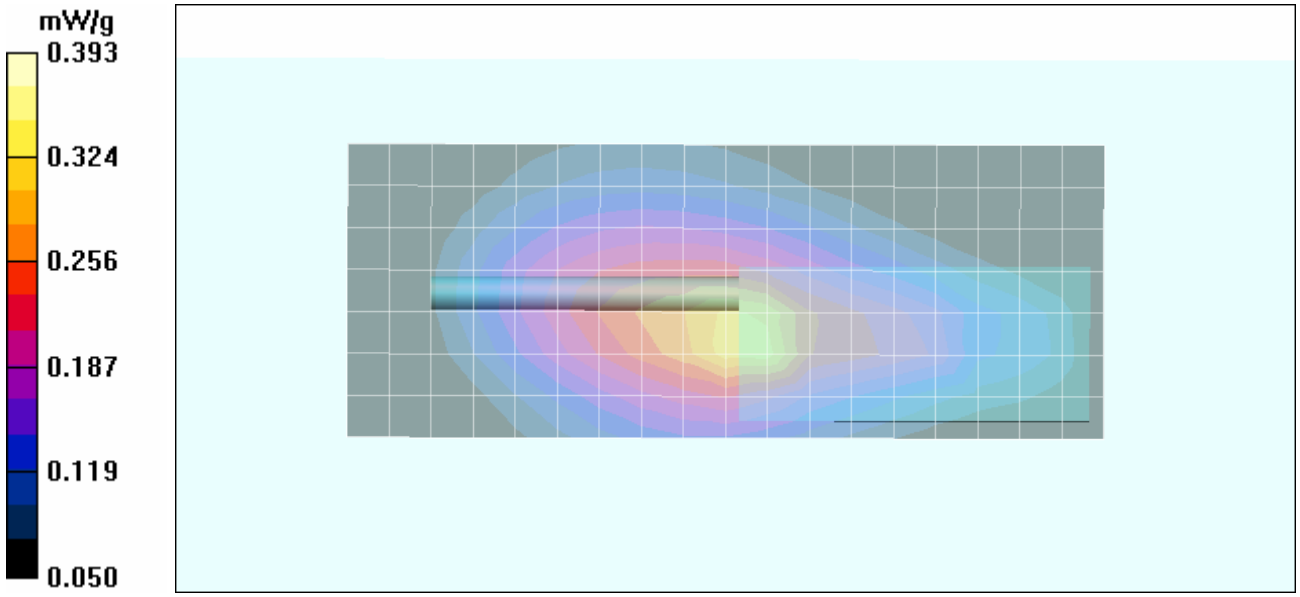
**Body-worn Accessory: Belt-Clip (P/N: KBH-10); Audio Accessory: Speaker-Microphone (P/N: KMC-45)**

Ambient Temp: 25.0°C; Fluid Temp: 22.6°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: FM VHF (CW)
Frequency: 162.1 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 162.1 MHz; $\sigma$ = 0.84 mho/m; $\varepsilon_r$ = 64.1; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(8.5, 8.5, 8.5); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Body-worn SAR - 1.2 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom**
**Area Scan (8x19x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.313 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 23.0 V/m; Power Drift = -0.803 dB
Peak SAR (extrapolated) = 0.772 W/kg
**SAR(1 g) = 0.409 mW/g; SAR(10 g) = 0.264 mW/g**
Maximum value of SAR (measured) = 0.393 mW/g



Date Tested: 05/12/2009

## Body-worn SAR - KRA-22M Antenna - Ni-Cd Battery - Mid Channel - 162.1 MHz

**DUT: Kenwood TK-2300-2; Type: Portable FM VHF PTT Radio Transceiver; Serial: 00000000 (Pre-production)**

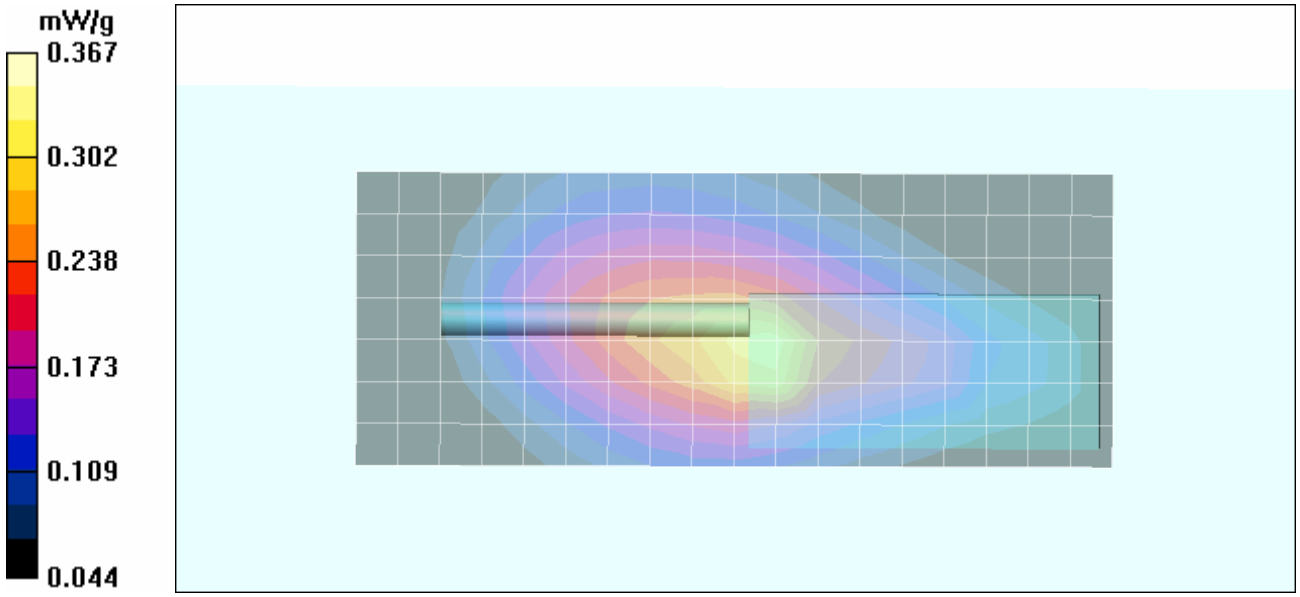
**Body-worn Accessory: Belt-Clip (P/N: KBH-10); Audio Accessory: Headset-Microphone (P/N: KHS-22)**

Ambient Temp: 25.0°C; Fluid Temp: 22.6°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: FM VHF (CW)
Frequency: 162.1 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 162.1 MHz; $\sigma$ = 0.84 mho/m; $\varepsilon_r$ = 64.1; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(8.5, 8.5, 8.5); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Body-worn SAR - 1.2 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom**
**Area Scan (8x19x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.316 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 = -0.720 dB
Peak SAR (extrapolated) = 0.761 W/kg
**SAR(1 g) = 0.354 mW/g; SAR(10 g) = 0.223 mW/g**
Maximum value of SAR (measured) = 0.367 mW/g



Date Tested: 05/12/2009

## Body-worn SAR - KRA-22M Antenna - Ni-Cd Battery - Low Channel - 150.8 MHz

**DUT: Kenwood TK-2300-2; Type: Portable FM VHF PTT Radio Transceiver; Serial: 00000000 (Pre-production)**

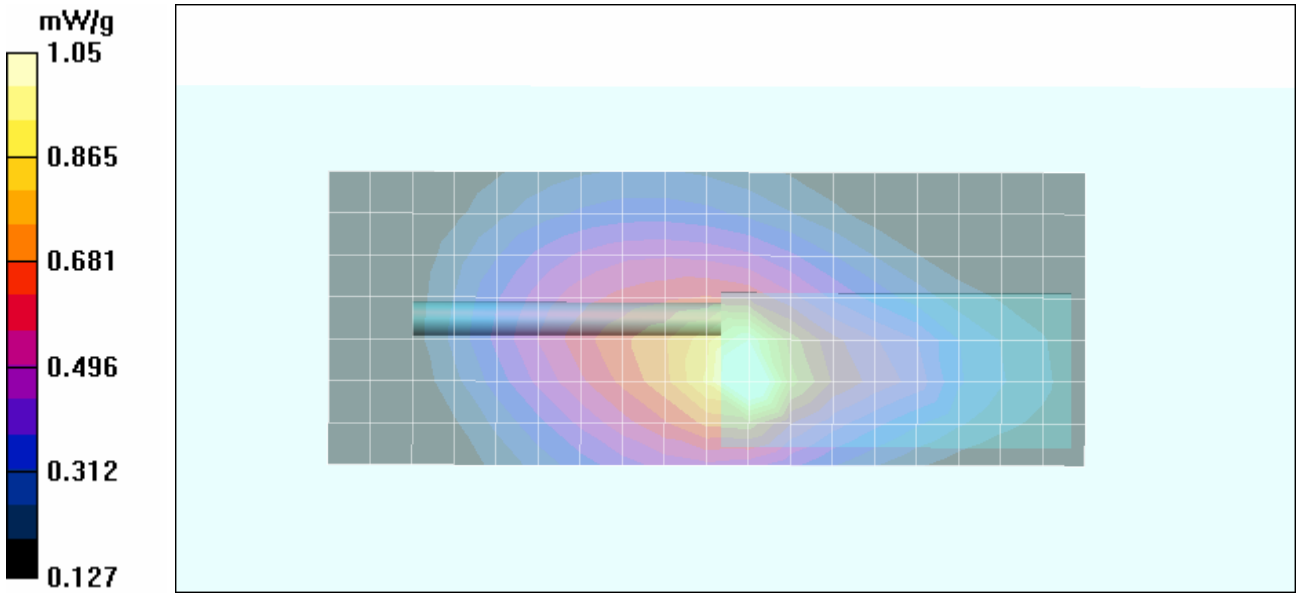
**Body-worn Accessory: Belt-Clip (P/N: KBH-10); Audio Accessory: Speaker-Microphone (P/N: KMC-45)**

Ambient Temp: 25.0°C; Fluid Temp: 22.6°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

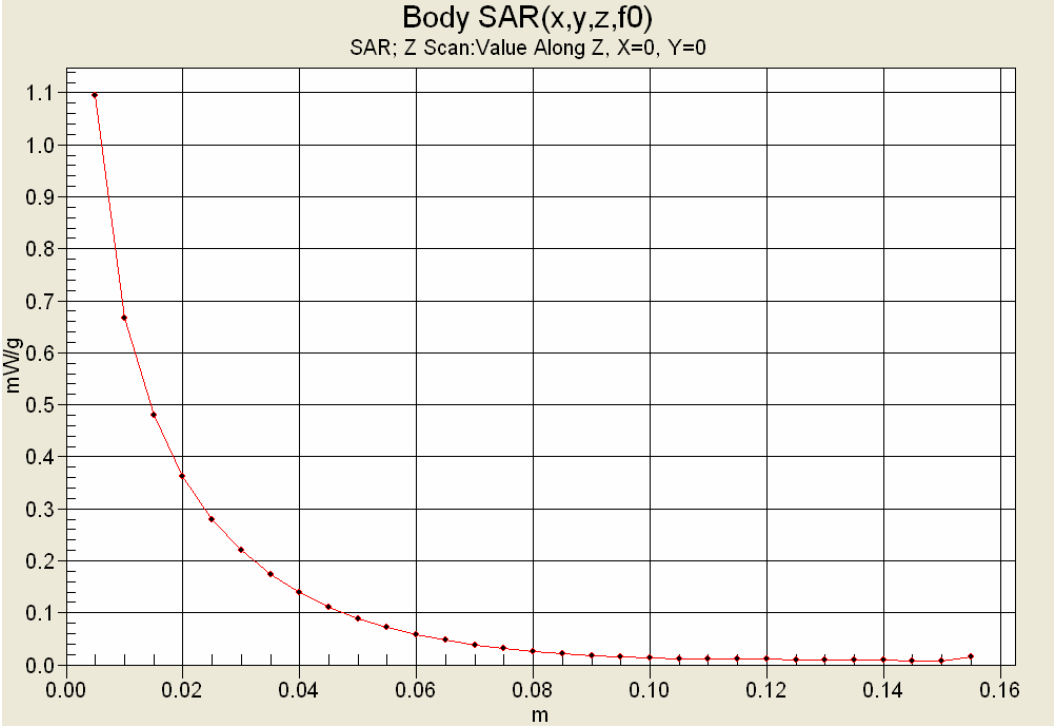
Communication System: FM VHF (CW)
Frequency: 150.8 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 150.8 MHz; $\sigma$ = 0.83 mho/m; $\varepsilon_r$ = 62.1; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(8.5, 8.5, 8.5); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

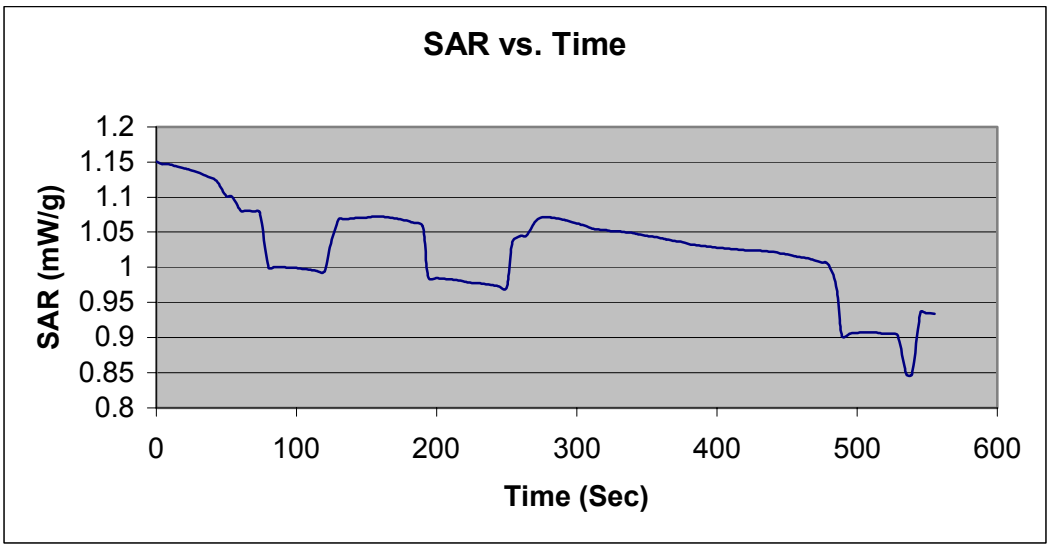
**Body-worn SAR - 1.2 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom**
**Area Scan (8x19x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.21 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 37.2 V/m; Power Drift = -0.708 dB
Peak SAR (extrapolated) = 2.53 W/kg
**SAR(1 g) = 1.18 mW/g; SAR(10 g) = 0.713 mW/g**
Maximum value of SAR (measured) = 1.05 mW/g



**Z-Axis Scan**




**SAR-versus-Time Droop Evaluation**
Body-worn Configuration
Low Channel 150.8 MHz
22M Ant. / Ni-Cd Battery




| | | | |
|---|---|---|---|
| 0s | 1.15078 | Start | |
| 250s | 0.970491 | -0.739 dB | |
| 340s | 1.04896 | -0.437 dB | zoom scan |
| 555s | 0.933867 | -0.922 dB | area scan |

Date Tested: 05/15/2009

## Body-worn SAR - KRA-22M2 Antenna - Ni-MH Battery - Mid Channel - 162.1 MHz

**DUT: Kenwood TK-2300-2; Type: Portable FM VHF PTT Radio Transceiver; Serial: 00000000 (Pre-production)**

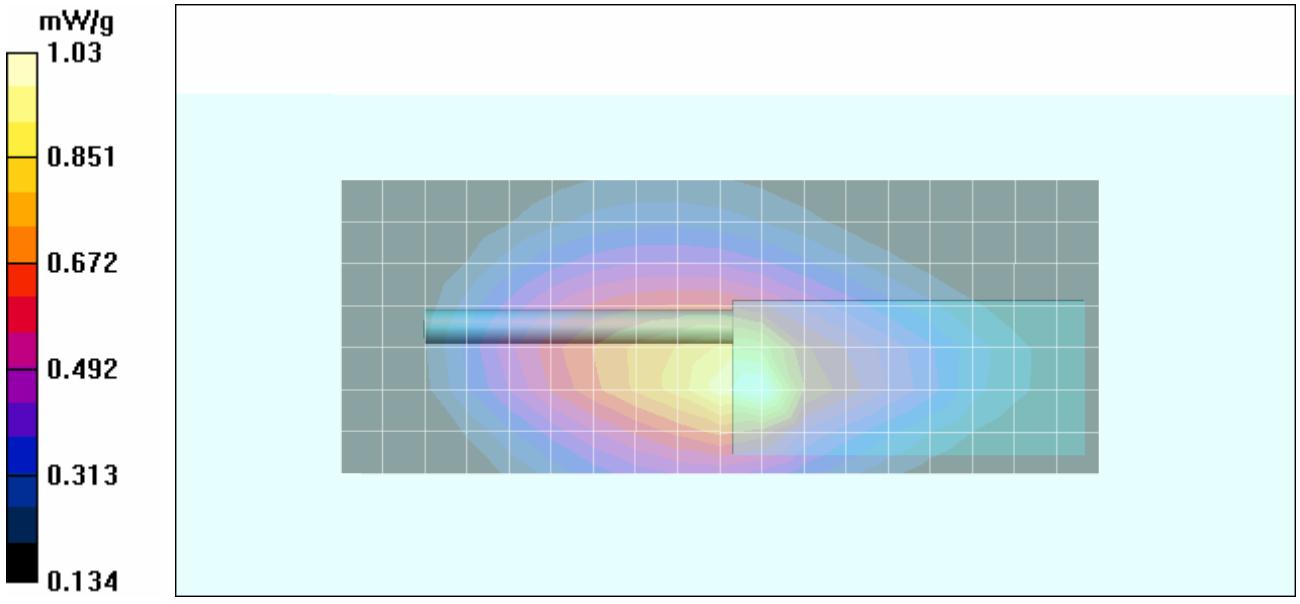
**Body-worn Accessory: Belt-Clip (P/N: KBH-10); Audio Accessory: Speaker-Microphone (P/N: KMC-45)**

Ambient Temp: 24.6°C; Fluid Temp: 22.3°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: FM VHF (CW)
Frequency: 162.1 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 162.1 MHz; $\sigma$ = 0.83 mho/m; $\varepsilon_r$ = 64; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(8.5, 8.5, 8.5); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Body-worn SAR - 1.2 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom**
**Area Scan (8x19x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.05 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 35.0 V/m; Power Drift = -0.251 dB
Peak SAR (extrapolated) = 2.02 W/kg
**SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.705 mW/g**
Maximum value of SAR (measured) = 1.03 mW/g



Date Tested: 05/15/2009

## Body-worn SAR - KRA-22M2 Antenna - Ni-MH Battery - Mid Channel - 162.1 MHz

**DUT: Kenwood TK-2300-2; Type: Portable FM VHF PTT Radio Transceiver; Serial: 00000000 (Pre-production)**

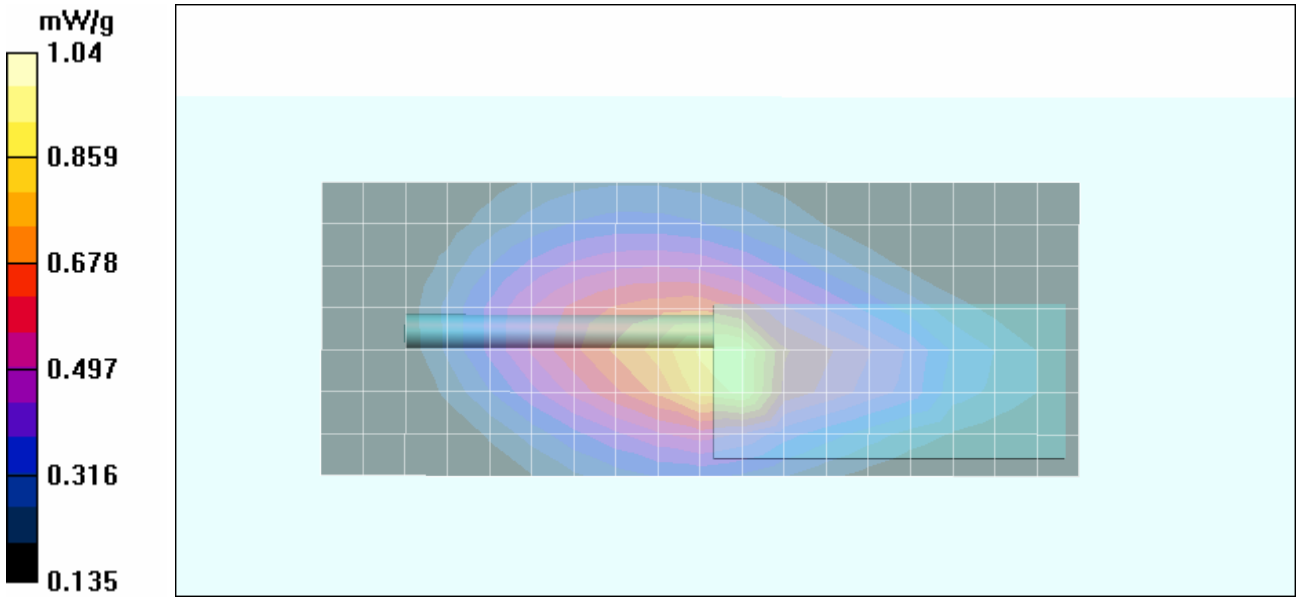
**Body-worn Accessory: Belt-Clip (P/N: KBH-10); Audio Accessory: Headset-Microphone (P/N: KHS-22)**

Ambient Temp: 24.6°C; Fluid Temp: 22.3°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: FM VHF (CW)
Frequency: 162.1 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 162.1 MHz; $\sigma$ = 0.83 mho/m; $\varepsilon_r$ = 64; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(8.5, 8.5, 8.5); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Body-worn SAR - 1.2 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom**
**Area Scan (8x19x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.879 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 35.2 V/m; Power Drift = -0.229 dB
Peak SAR (extrapolated) = 2.07 W/kg
**SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.716 mW/g**
Maximum value of SAR (measured) = 1.04 mW/g



Date Tested: 05/15/2009

## Body-worn SAR - KRA-22M2 Antenna - Ni-Cd Battery - Mid Channel - 162.1 MHz

**DUT: Kenwood TK-2300-2; Type: Portable FM VHF PTT Radio Transceiver; Serial: 00000000 (Pre-production)**

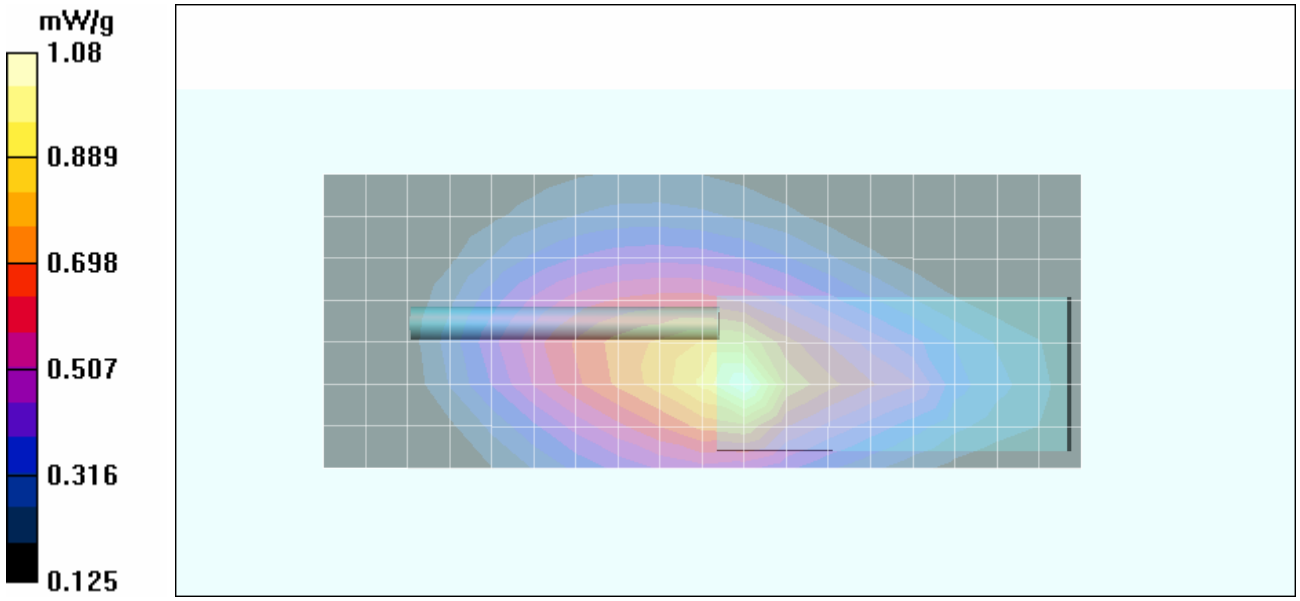
**Body-worn Accessory: Belt-Clip (P/N: KBH-10); Audio Accessory: Speaker-Microphone (P/N: KMC-45)**

Ambient Temp: 24.6°C; Fluid Temp: 22.3°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: FM VHF (CW)
Frequency: 162.1 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 162.1 MHz; $\sigma$ = 0.83 mho/m; $\varepsilon_r$ = 64; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(8.5, 8.5, 8.5); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Body-worn SAR - 1.2 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom**
**Area Scan (8x19x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.09 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 37.8 V/m; Power Drift = -0.639 dB
Peak SAR (extrapolated) = 2.15 W/kg
**SAR(1 g) = 1.16 mW/g; SAR(10 g) = 0.693 mW/g**
Maximum value of SAR (measured) = 1.08 mW/g



Date Tested: 05/15/2009

## Body-worn SAR - KRA-22M2 Antenna - Ni-Cd Battery - Mid Channel - 162.1 MHz

**DUT: Kenwood TK-2300-2; Type: Portable FM VHF PTT Radio Transceiver; Serial: 00000000 (Pre-production)**

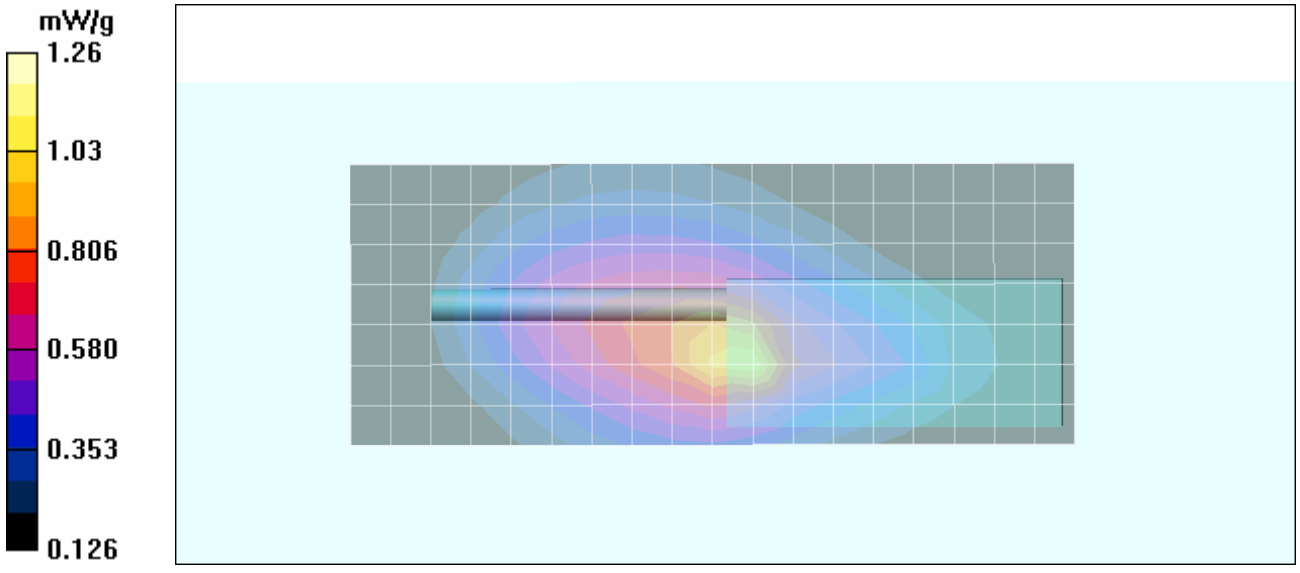
**Body-worn Accessory: Belt-Clip (P/N: KBH-10); Audio Accessory: Headset-Microphone (P/N: KHS-22)**

Ambient Temp: 24.6°C; Fluid Temp: 22.3°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

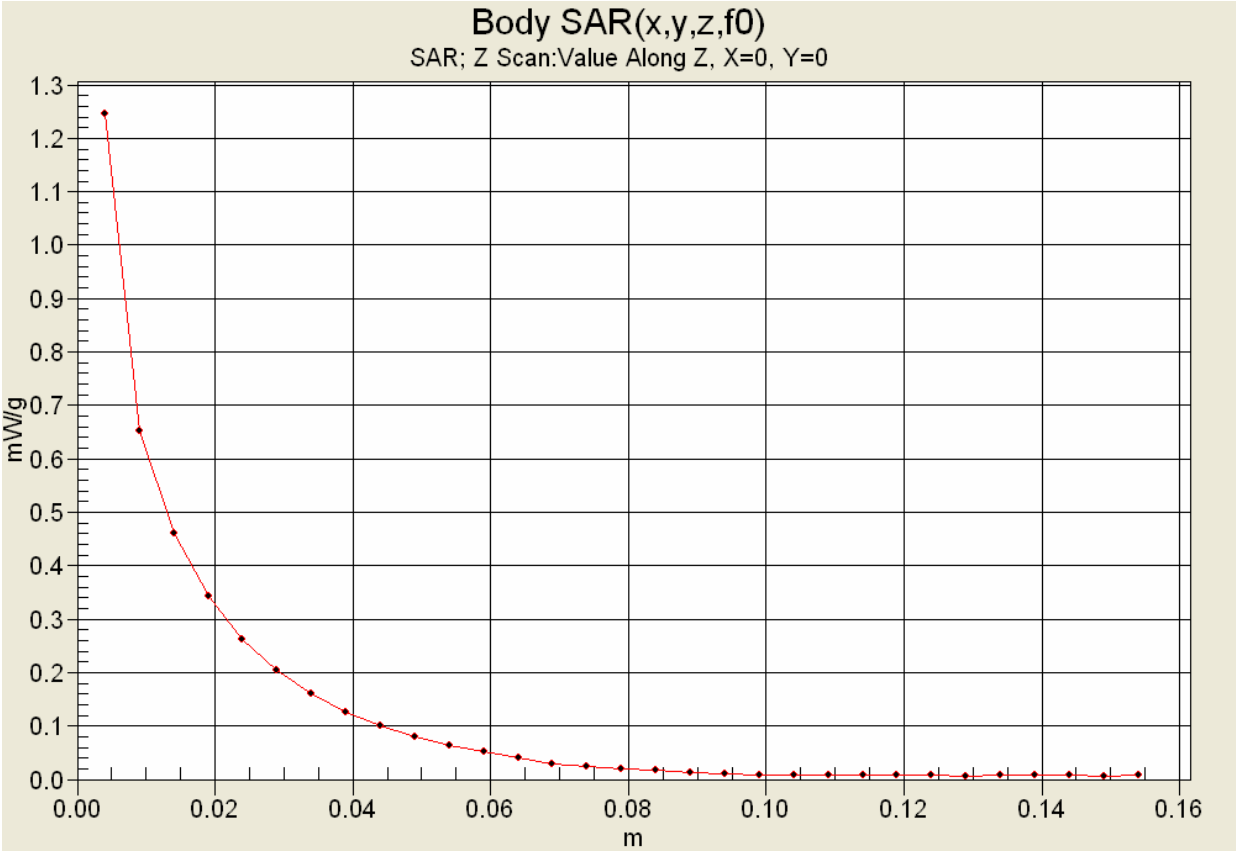
Communication System: FM VHF (CW)
Frequency: 162.1 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 162.1 MHz; $\sigma$ = 0.83 mho/m; $\varepsilon_r$ = 64; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(8.5, 8.5, 8.5); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Body-worn SAR - 1.2 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom**
**Area Scan (8x19x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.03 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.2 V/m; Power Drift = -0.287 dB
Peak SAR (extrapolated) = 2.89 W/kg
**SAR(1 g) = 1.2 mW/g; SAR(10 g) = 0.721 mW/g**
Maximum value of SAR (measured) = 1.26 mW/g



## Z-Axis Scan



Date Tested: 05/15/2009

## Body-worn SAR - KRA-22M2 Antenna - Ni-Cd Battery - High Channel - 173.4 MHz

**DUT: Kenwood TK-2300-2; Type: Portable FM VHF PTT Radio Transceiver; Serial: 00000000 (Pre-production)**

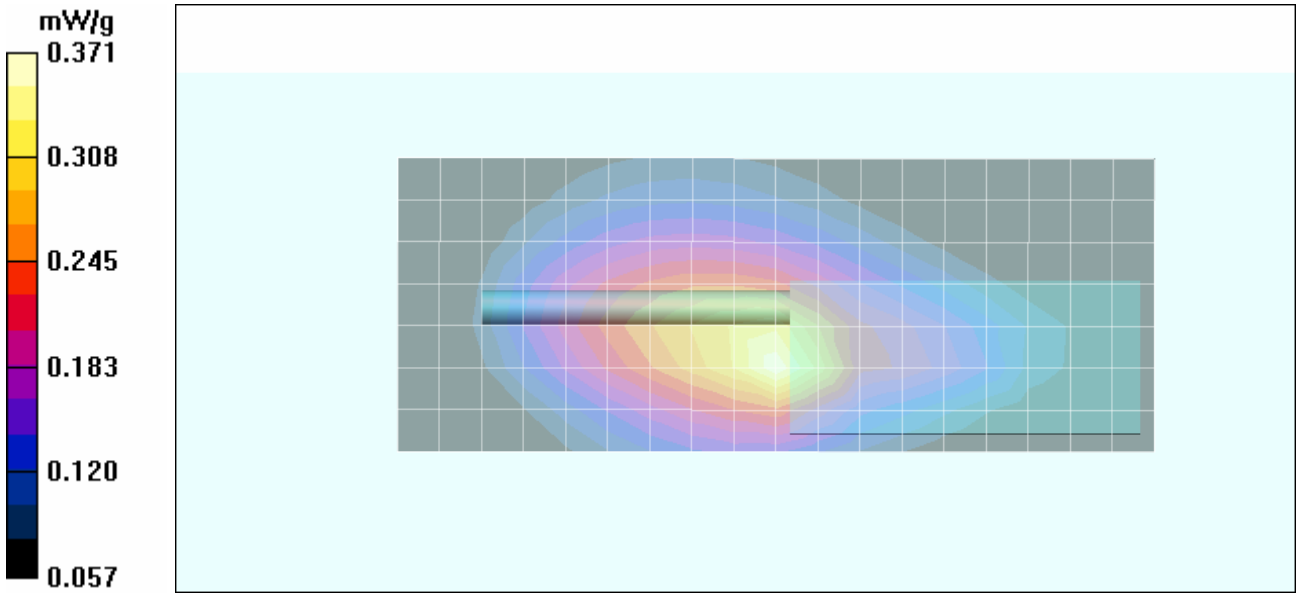
**Body-worn Accessory: Belt-Clip (P/N: KBH-10); Audio Accessory: Speaker-Microphone (P/N: KMC-45)**

Ambient Temp: 24.6°C; Fluid Temp: 22.3°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: FM VHF (CW)
Frequency: 173.4 MHz; Duty Cycle: 1:1
Medium: M150 Medium parameters used: f = 173.4 MHz; $\sigma$ = 0.84 mho/m; $\varepsilon_r$ = 64; $\rho$ = 1000 kg/m$^3$

- Probe: ET3DV6 - SN1590; ConvF(8.5, 8.5, 8.5); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Side Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**Body-worn SAR - 1.2 cm Belt-Clip Spacing from Back Side of DUT to Planar Phantom**
**Area Scan (8x19x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.367 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 21.3 V/m; Power Drift = -0.435 dB
Peak SAR (extrapolated) = 0.706 W/kg
**SAR(1 g) = 0.388 mW/g; SAR(10 g) = 0.261 mW/g**
Maximum value of SAR (measured) = 0.371 mW/g



# APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

Date Tested: 05/12/2009

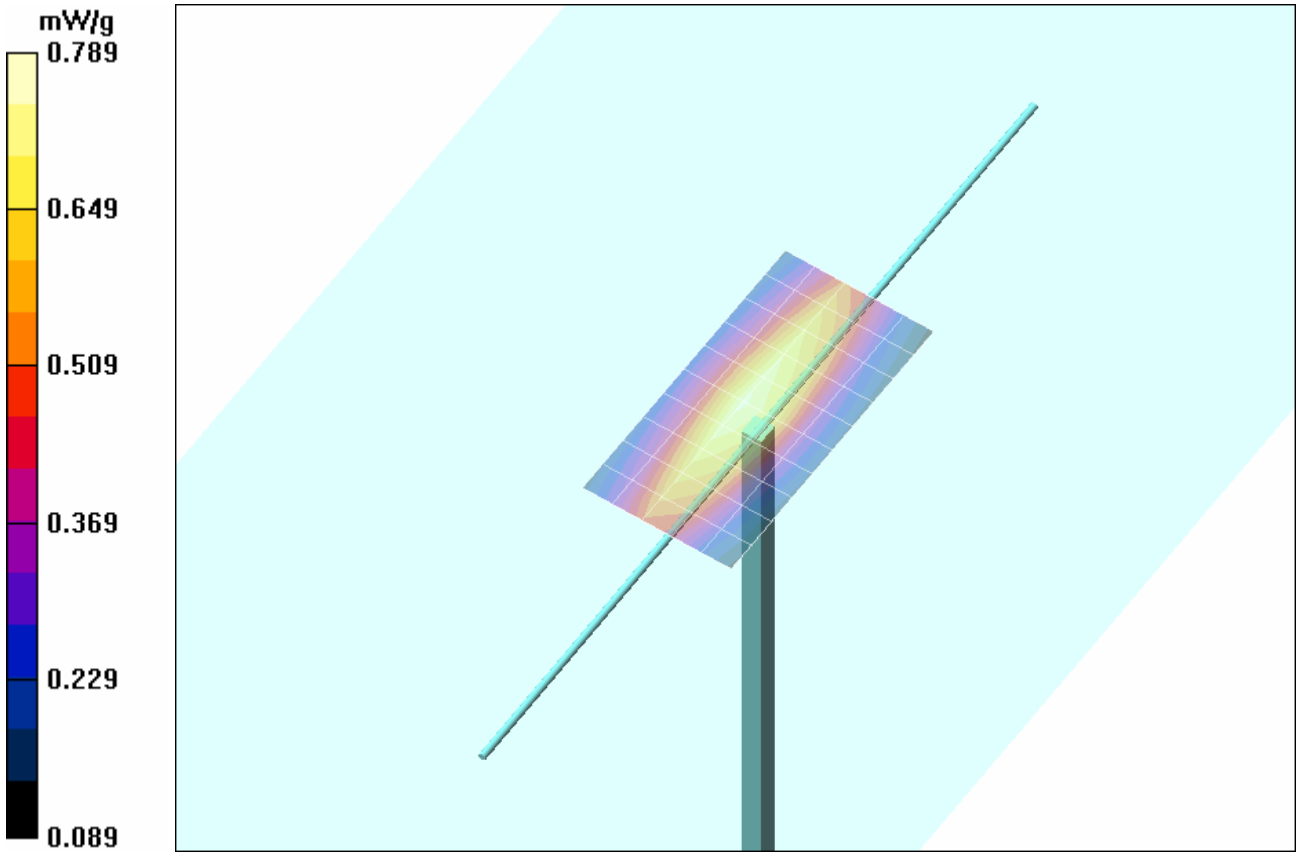
## System Performance Check - 300 MHz Dipole - HSL

**DUT: Dipole 300 MHz; Asset: 00023; Serial: 135; Calibrated: 26/01/2009**

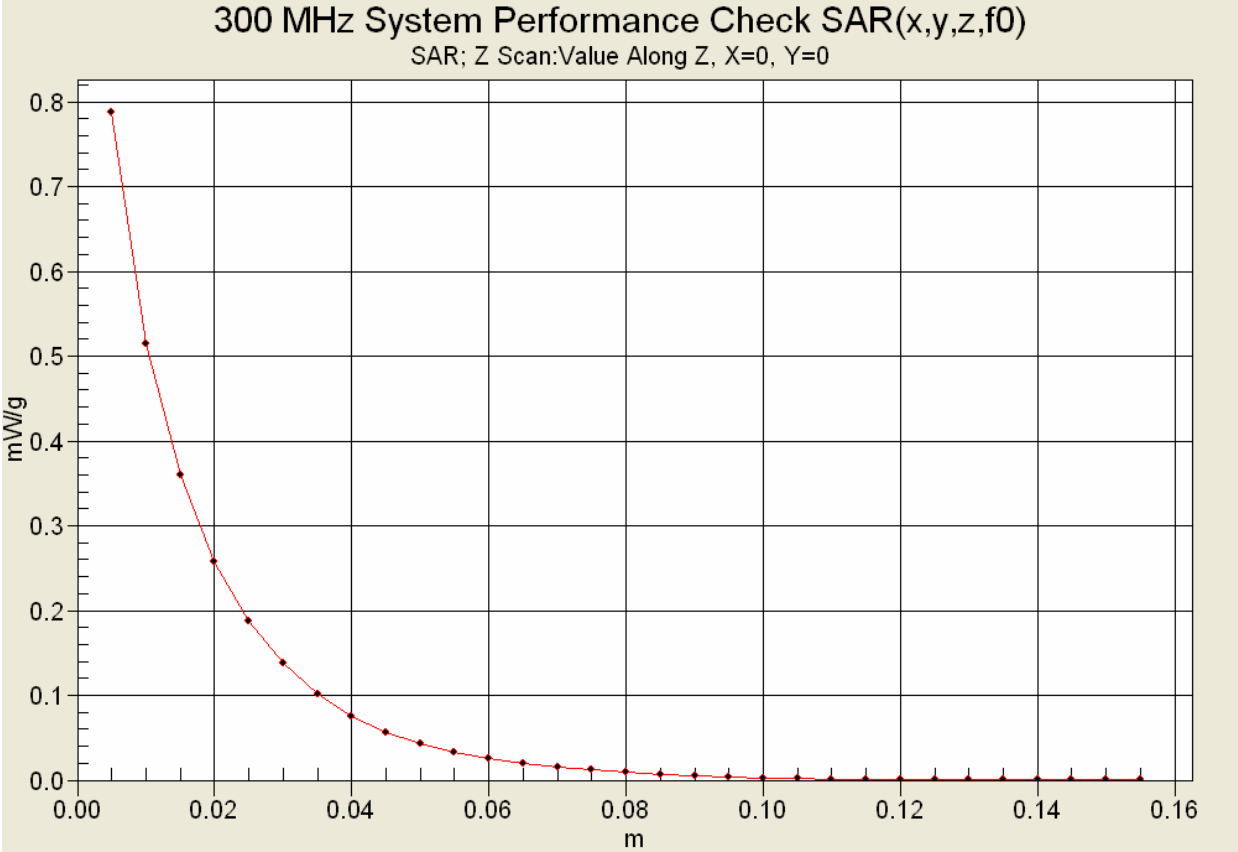
Ambient Temp: 25.0°C; Fluid Temp: 22.7°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 300 MHz; Duty Cycle: 1:1
Medium: 300 HSL Medium parameters used: f = 300 MHz; $\sigma$ = 0.88 mho/m; $\varepsilon_r$ = 46; $\rho$ = 1000 kg/m$^3$
- Probe: ET3DV6 - SN1590; ConvF(8, 8, 8); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Validation Planar; Type: Plexiglas; Serial: TE#137
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**300 MHz System Performance Check**
**Area Scan (6x11x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.759 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 29.8 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 1.30 W/kg
**SAR(1 g) = 0.809 mW/g; SAR(10 g) = 0.534 mW/g**
Maximum value of SAR (measured) = 0.789 mW/g



## Z-Axis Scan



Date/Time: 05/15/2009

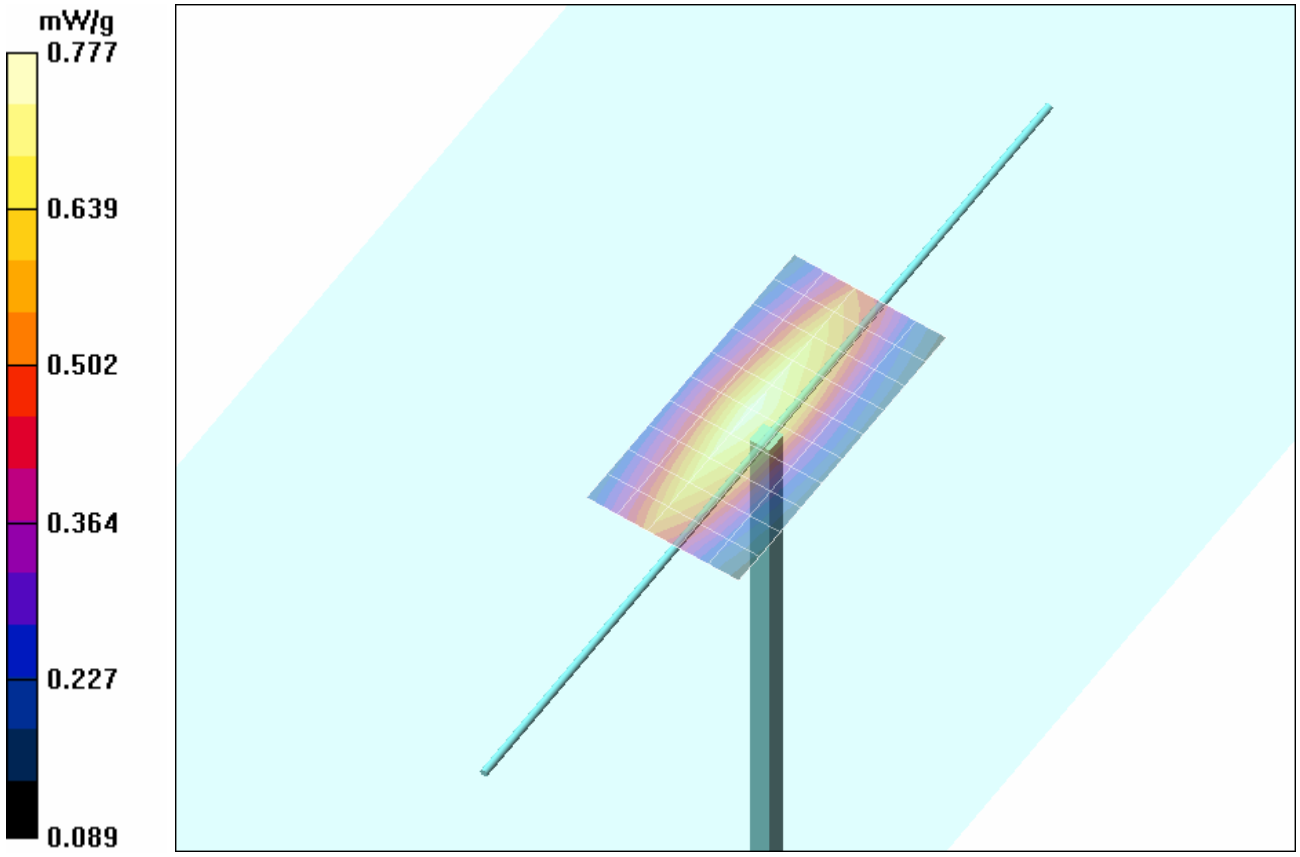
## System Performance Check - 300 MHz Dipole - HSL

### DUT: Dipole 300 MHz; Asset: 00023; Serial: 135; Calibrated: 26/01/2009

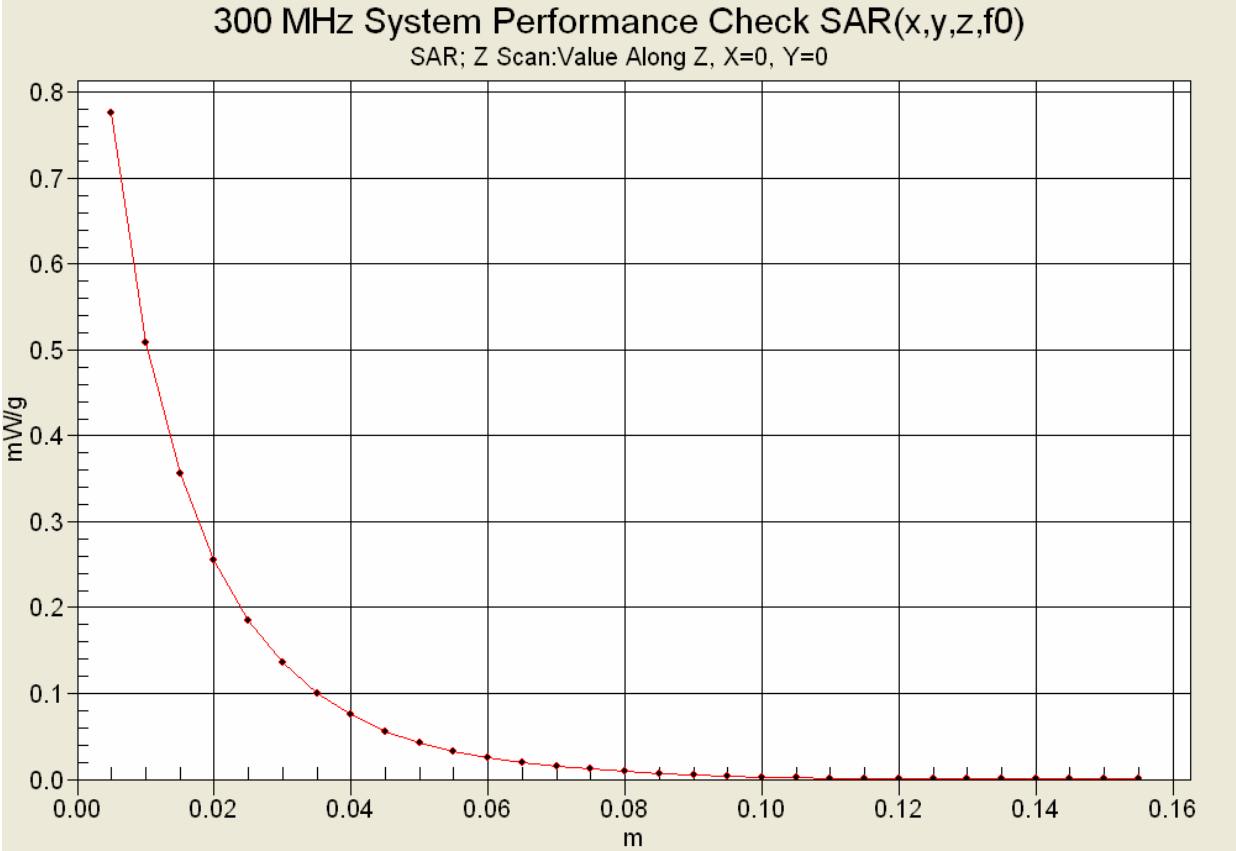
Ambient Temp: 24.0°C; Fluid Temp: 22.3°C; Barometric Pressure: 101.1 kPa; Humidity: 35%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 300 MHz; Duty Cycle: 1:1
Medium: 300 HSL Medium parameters used: f = 300 MHz; $\sigma$ = 0.88 mho/m; $\varepsilon_r$ = 45.7; $\rho$ = 1000 kg/m$^3$
- Probe: ET3DV6 - SN1590; ConvF(8, 8, 8); Calibrated: 21/07/2008
- Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 28/04/2009
- Phantom: Validation Planar; Type: Plexiglas; Serial: TE#137
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

**300 MHz System Performance Check**
**Area Scan (6x11x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.763 mW/g
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 29.3 V/m; Power Drift = 0.028 dB
Peak SAR (extrapolated) = 1.28 W/kg
**SAR(1 g) = 0.799 mW/g; SAR(10 g) = 0.528 mW/g**
Maximum value of SAR (measured) = 0.777 mW/g



## Z-Axis Scan



# APPENDIX C - MEASURED FLUID DIELECTRIC PARAMETERS

## 300 MHz System Performance Check (Head)

**********

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
12/May/2009
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 |
|---|---|---|---|---|
| 0.2000 | 49.97 | 0.80 | 48.41 | 0.79 |
| 0.2100 | 49.50 | 0.80 | 48.99 | 0.80 |
| 0.2200 | 49.03 | 0.81 | 47.95 | 0.81 |
| 0.2300 | 48.57 | 0.82 | 48.89 | 0.82 |
| 0.2400 | 48.10 | 0.83 | 48.05 | 0.82 |
| 0.2500 | 47.63 | 0.83 | 46.97 | 0.84 |
| 0.2600 | 47.17 | 0.84 | 46.76 | 0.83 |
| 0.2700 | 46.70 | 0.85 | 46.99 | 0.86 |
| 0.2800 | 46.23 | 0.86 | 46.62 | 0.85 |
| 0.2900 | 45.77 | 0.86 | 46.02 | 0.87 |
| 0.3000 | 45.30 | 0.87 | 46.03 | 0.88 |
| 0.3100 | 45.18 | 0.87 | 45.18 | 0.88 |
| 0.3200 | 45.06 | 0.87 | 44.61 | 0.90 |
| 0.3300 | 44.94 | 0.87 | 45.15 | 0.90 |
| 0.3400 | 44.82 | 0.87 | 44.74 | 0.91 |
| 0.3500 | 44.70 | 0.87 | 43.78 | 0.91 |
| 0.3600 | 44.58 | 0.87 | 43.48 | 0.93 |
| 0.3700 | 44.46 | 0.87 | 43.09 | 0.93 |
| 0.3800 | 44.34 | 0.87 | 42.60 | 0.96 |
| 0.3900 | 44.22 | 0.87 | 42.96 | 0.95 |
| 0.4000 | 44.10 | 0.87 | 42.61 | 0.96 |

## 300 MHz System Performance Check (Head)

**********

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
15/May/2009
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 |
|---|---|---|---|---|
| 0.2000 | 49.97 | 0.80 | 49.10 | 0.80 |
| 0.2100 | 49.50 | 0.80 | 48.71 | 0.80 |
| 0.2200 | 49.03 | 0.81 | 48.36 | 0.82 |
| 0.2300 | 48.57 | 0.82 | 47.90 | 0.82 |
| 0.2400 | 48.10 | 0.83 | 47.76 | 0.82 |
| 0.2500 | 47.63 | 0.83 | 46.90 | 0.84 |
| 0.2600 | 47.17 | 0.84 | 46.76 | 0.84 |
| 0.2700 | 46.70 | 0.85 | 46.14 | 0.85 |
| 0.2800 | 46.23 | 0.86 | 45.92 | 0.86 |
| 0.2900 | 45.77 | 0.86 | 45.74 | 0.86 |
| 0.3000 | 45.30 | 0.87 | 45.68 | 0.88 |
| 0.3100 | 45.18 | 0.87 | 45.36 | 0.88 |
| 0.3200 | 45.06 | 0.87 | 44.66 | 0.90 |
| 0.3300 | 44.94 | 0.87 | 44.46 | 0.90 |
| 0.3400 | 44.82 | 0.87 | 43.93 | 0.91 |
| 0.3500 | 44.70 | 0.87 | 43.54 | 0.92 |
| 0.3600 | 44.58 | 0.87 | 43.53 | 0.92 |
| 0.3700 | 44.46 | 0.87 | 43.12 | 0.94 |
| 0.3800 | 44.34 | 0.87 | 42.72 | 0.94 |
| 0.3900 | 44.22 | 0.87 | 42.41 | 0.95 |
| 0.4000 | 44.10 | 0.87 | 42.48 | 0.95 |

## 160 MHz DUT Evaluation (Head)

**********

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
12/May/2009
Frequency (GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

**********

| Freq | FCC_eH | FCC_sH | Test_e | Test_s |
|---|---|---|---|---|
| 0.0500 | 56.97 | 0.69 | 63.42 | 0.70 |
| 0.0600 | 56.50 | 0.69 | 60.59 | 0.67 |
| 0.0700 | 56.03 | 0.70 | 70.33 | 0.69 |
| 0.0800 | 55.57 | 0.71 | 63.21 | 0.70 |
| 0.0900 | 55.10 | 0.72 | 56.64 | 0.71 |
| 0.1000 | 54.63 | 0.72 | 58.90 | 0.72 |
| 0.1100 | 54.17 | 0.73 | 58.15 | 0.72 |
| 0.1200 | 53.70 | 0.74 | 55.55 | 0.75 |
| 0.1300 | 53.23 | 0.75 | 57.41 | 0.77 |
| 0.1400 | 52.77 | 0.75 | 53.84 | 0.76 |
| 0.1500 | 52.30 | 0.76 | 54.12 | 0.75 |
| 0.1600 | 51.83 | 0.77 | 54.76 | 0.78 |
| 0.1700 | 51.37 | 0.77 | 53.64 | 0.79 |
| 0.1800 | 50.90 | 0.78 | 51.53 | 0.79 |
| 0.1900 | 50.43 | 0.79 | 52.57 | 0.81 |
| 0.2000 | 49.97 | 0.80 | 51.92 | 0.80 |
| 0.2100 | 49.50 | 0.80 | 51.11 | 0.82 |
| 0.2200 | 49.03 | 0.81 | 50.64 | 0.82 |
| 0.2300 | 48.57 | 0.82 | 50.89 | 0.85 |
| 0.2400 | 48.10 | 0.83 | 49.95 | 0.84 |
| 0.2500 | 47.63 | 0.83 | 49.90 | 0.87 |

## 150 & 160 MHz DUT Evaluation (Body)

**********

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
12/May/2009
Frequency (GHz)
FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

**********

| Freq | FCC_eB | FCC_sB | Test_e | Test_s |
|---|---|---|---|---|
| 0.0500 | 64.37 | 0.72 | 70.30 | 0.80 |
| 0.0600 | 64.12 | 0.73 | 65.71 | 0.77 |
| 0.0700 | 63.87 | 0.74 | 74.81 | 0.80 |
| 0.0800 | 63.63 | 0.74 | 70.71 | 0.82 |
| 0.0900 | 63.38 | 0.75 | 61.99 | 0.82 |
| 0.1000 | 63.13 | 0.76 | 67.89 | 0.81 |
| 0.1100 | 62.89 | 0.77 | 68.38 | 0.81 |
| 0.1200 | 62.64 | 0.78 | 63.03 | 0.82 |
| 0.1300 | 62.39 | 0.78 | 62.14 | 0.83 |
| 0.1400 | 62.15 | 0.79 | 63.15 | 0.82 |
| 0.1500 | 61.90 | 0.80 | 62.10 | 0.83 |
| 0.1600 | 61.65 | 0.81 | 64.06 | 0.84 |
| 0.1700 | 61.41 | 0.82 | 62.16 | 0.84 |
| 0.1800 | 61.16 | 0.82 | 60.76 | 0.86 |
| 0.1900 | 60.91 | 0.83 | 62.99 | 0.87 |
| 0.2000 | 60.67 | 0.84 | 62.17 | 0.86 |
| 0.2100 | 60.42 | 0.85 | 61.30 | 0.87 |
| 0.2200 | 60.17 | 0.86 | 61.19 | 0.86 |
| 0.2300 | 59.93 | 0.86 | 61.18 | 0.89 |
| 0.2400 | 59.68 | 0.87 | 61.26 | 0.88 |
| 0.2500 | 59.43 | 0.88 | 60.89 | 0.91 |

## 160 & 170 MHz DUT Evaluation (Body)

**********

Celltech Labs Inc.
Test Result for UIM Dielectric Parameter
15/May/2009
Frequency (GHz)
FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

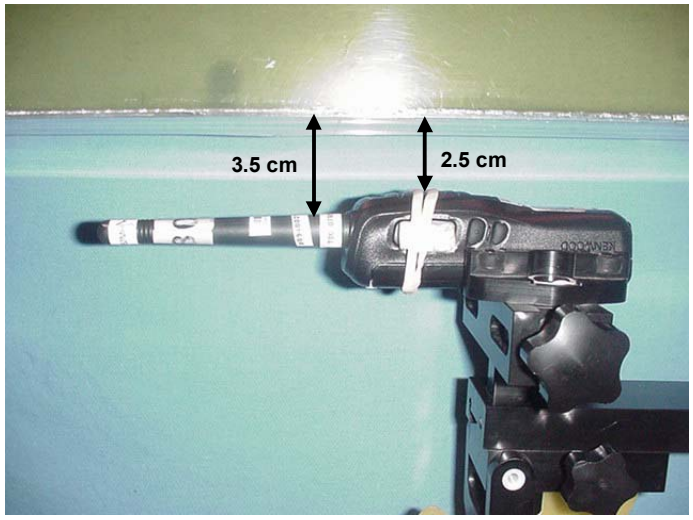
**********

| Freq | FCC_eB | FCC_sB | Test_e | Test_s |
|---|---|---|---|---|
| 0.0500 | 64.37 | 0.72 | 69.87 | 0.80 |
| 0.0600 | 64.12 | 0.73 | 66.53 | 0.76 |
| 0.0700 | 63.87 | 0.74 | 67.69 | 0.79 |
| 0.0800 | 63.63 | 0.74 | 71.10 | 0.80 |
| 0.0900 | 63.38 | 0.75 | 71.22 | 0.81 |
| 0.1000 | 63.13 | 0.76 | 64.81 | 0.81 |
| 0.1100 | 62.89 | 0.77 | 66.06 | 0.82 |
| 0.1200 | 62.64 | 0.78 | 67.28 | 0.83 |
| 0.1300 | 62.39 | 0.78 | 64.12 | 0.80 |
| 0.1400 | 62.15 | 0.79 | 62.85 | 0.83 |
| 0.1500 | 61.90 | 0.80 | 63.88 | 0.82 |
| 0.1600 | 61.65 | 0.81 | 64.04 | 0.83 |
| 0.1700 | 61.41 | 0.82 | 64.03 | 0.84 |
| 0.1800 | 61.16 | 0.82 | 64.01 | 0.85 |
| 0.1900 | 60.91 | 0.83 | 62.68 | 0.84 |
| 0.2000 | 60.67 | 0.84 | 62.58 | 0.87 |
| 0.2100 | 60.42 | 0.85 | 62.33 | 0.86 |
| 0.2200 | 60.17 | 0.86 | 61.30 | 0.88 |
| 0.2300 | 59.93 | 0.86 | 60.57 | 0.87 |
| 0.2400 | 59.68 | 0.87 | 60.49 | 0.88 |
| 0.2500 | 59.43 | 0.88 | 60.60 | 0.89 |

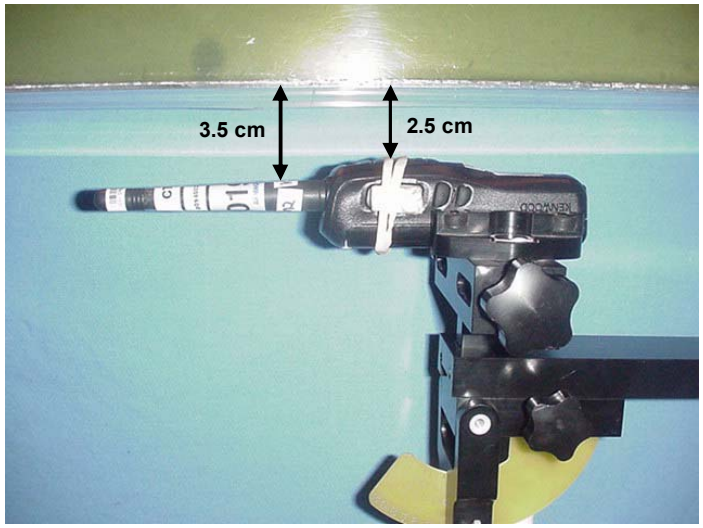
# APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

# FACE-HELD SAR TEST SETUP PHOTOGRAPHS

**2.5 cm Spacing from Front of DUT to Planar Phantom**




**DUT with Antenna P/N: KRA-22M**

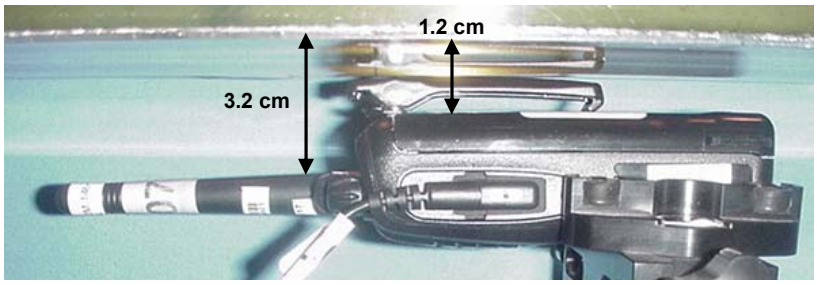



**DUT with Antenna P/N: KRA-22M2**

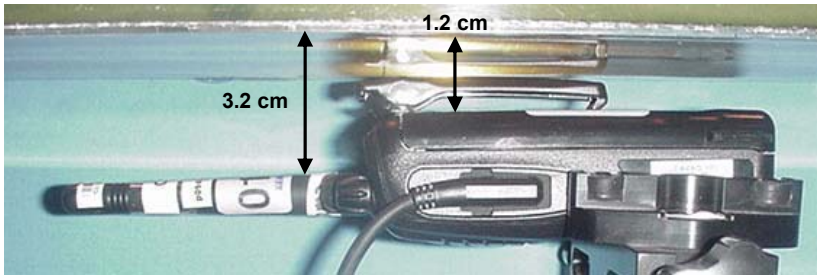
# BODY-WORN SAR TEST SETUP PHOTOGRAPHS

**1.2 cm Belt-Clip Spacing from Back of DUT to Planar Phantom**

DUT with Speaker-Microphone Audio Accessory

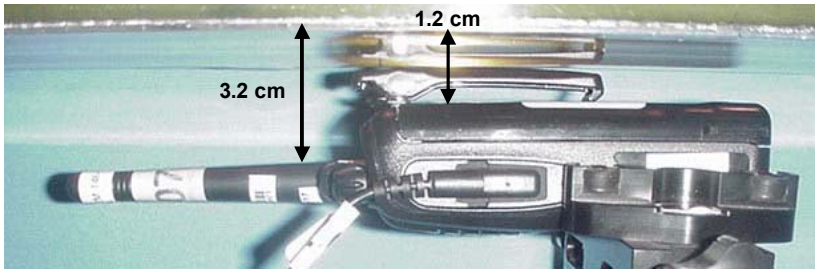



DUT with KRA-22M Antenna

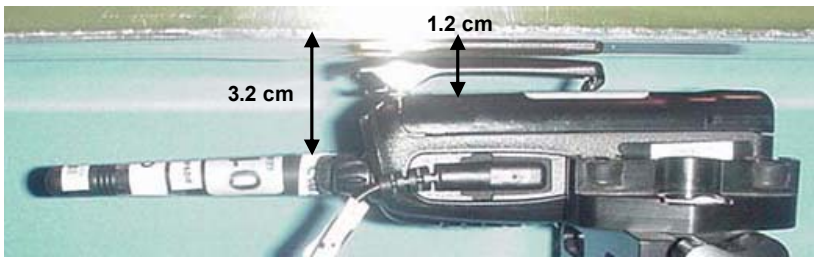



DUT with KRA-22M2 Antenna

DUT with Headset-Microphone Audio Accessory




DUT with KRA-22M Antenna



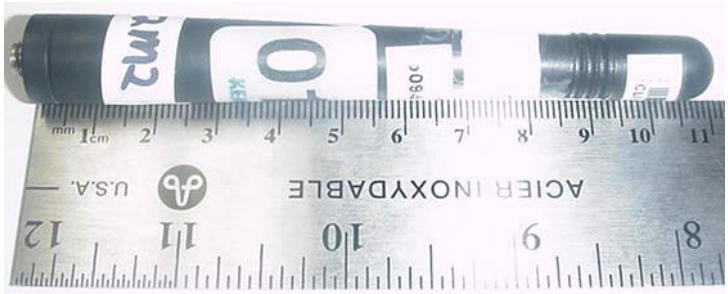

DUT with KRA-22M2 Antenna

# DUT PHOTOGRAPHS


Front & Back of DUT with KRA-22M Antenna


Front & Back of DUT with KRA-22M2 Antenna

Antenna P/N: KRA-22M



Antenna P/N: KRA-22M2

# DUT PHOTOGRAPHS

Left & Right Sides of DUT with Belt-Clip accessory

Back of DUT with Belt-Clip accessory


Back of DUT with Battery removed


Bottom end of DUT with Belt-Clip accessory


Top end of DUT with Belt-Clip accessory

# DUT PHOTOGRAPHS


Ni-MH Battery P/N: KNB-29N


Ni-Cd Battery P/N: KNB-30A


Belt-Clip P/N: KBH-10

Ni-MH Battery P/N: KNB-29N

Ni-Cd Battery P/N: KNB-30A

Belt-Clip P/N: KBH-10

# DUT PHOTOGRAPHS


DUT with Speaker-Microphone Audio Accessory (P/N: KMC-45)


DUT with Headset-Microphone Audio Accessory (P/N: KHS-22)