DECLARATION OF COMPLIANCE
SAR RF EXPOSURE EVALUATION

Test Lab

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Applicant Information

M/A-COM, INC.
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Rule Part(s):	**FCC 47 CFR §2.1093; IC RSS-102, Issue 1 (Provisional)**
Test Procedure(s):	**FCC OET Bulletin 65, Supplement C (Edition 01-01)**
FCC Device Classification:	**Licensed Non-Broadcast Transmitter Held to Face (TNF)**
Device Type:	**Portable FM PTT Radio Transceiver**
FCC IDENTIFIER:	**BV8P800**
Model(s):	**P800**
Modulation Tested:	**FM (Analog Voice)**
Tx Frequency Range(s) Tested:	**851.0125 - 868.9875 MHz (Talkaround)**
Max. RF Output Power Tested:	**2.82 Watts Conducted (861.3625MHz)**
Antenna Type(s) Tested:	**½ Wave Helical Whip (P/N: MAHROS0006)**
Battery Type(s) Tested:	**NiCd 7.2V, 1500mAh (Kenwood P/N: KNB-17A)** **NiMH 7.2V, 2100mAh (Kenwood P/N: KNB-22N)**
Body-Worn Accessories Tested:	**Metal Belt-Clip (Kenwood P/N: J29-0652-35)** **Leather Holster (P/N: MAHROS0013)** **Swivel Belt-Loop (P/N: MAHROS0041)** **T-Strap hold down (P/N: MAHROS0042)** **Earphone (P/N: OT-V1-10291)** **Audio Adapter (P/N: OT-V1-10430)** **Evolution Speaker-Microphone (P/N: MC102823V1)** **Over-the-Head Headset (P/N: OT-V4-10080)**
Max. SAR Levels Measured:	**0.710 W/kg Face-held (50% Duty Cycle)** **3.36 W/kg Body-worn (50% 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 and Health Canada's Safety Code 6. The device was tested in accordance with the measurement standards and procedures specified in FCC OET Bulletin 65, Supplement C (Edition 01-01) and Industry Canada RSS-102, Issue 1 (Provisional) for the Occupational / Controlled Exposure environment. 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.

Russell W. Pipe
Senior Compliance Technologist
Celltech Labs Inc.

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1.0 INTRODUCTION

This measurement report demonstrates that the M/A-COM, Inc. Model: P800 Portable FM PTT Radio Transceiver FCC ID: BV8P800 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 test procedures described in FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]) and IC RSS-102, Issue 1 (Provisional) (see reference [4]), 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 DESCRIPTION OF DEVICE UNDER TEST (DUT)

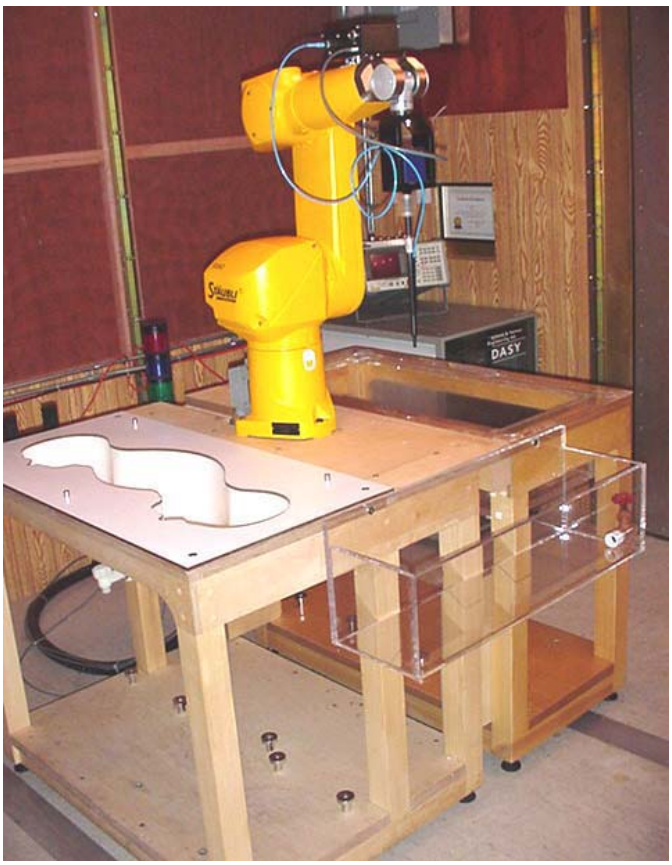
Rule Part(s)	FCC 47 CFR §2.1093; IC RSS-102 Issue 1 (Provisional)		
Test Procedure(s)	FCC OET Bulletin 65, Supplement C (Edition 01-01)		
Device Classification	Licensed Non-Broadcast Transmitter Held to Face (TNF)		
Device Type	Portable FM PTT Radio Transceiver		
FCC IDENTIFIER	BV8P800		
Model(s)	P800		
Serial No.(s)	A40007100071 (Production Unit)		
Modulation	FM (Analog Voice)		
Tx Frequency Range(s) Tested	851.0125 - 868.9875 MHz (Talkaround)		
Max. RF Output Power Measured	2.82 Watts	Conducted	861.3625 MHz
Antenna Type(s) Tested	½ Wave Helical Whip	Length: 178 mm	P/N: MAHROS0006
Battery Type(s) Tested	NiCd	7.2V 1500mAh	Kenwood P/N: KNB-17A
	NiMH	7.2V, 2100mAh	Kenwood P/N: KNB-22N

	Type	**Part No.**	
Body-worn Accessories Tested	Metal Belt-Clip	Kenwood	J29-0652-35
	Leather Holster	M/A-COM	MAHROS0013
	Swivel Belt-Loop	M/A-COM	MAHROS0041
	T-Strap hold down	M/A-COM	MAHROS0042
	Earphone	M/A-COM	OT-V1-10291
	Audio Adapter	M/A-COM	OT-V1-10430
	Over-the-Head Headset	M/A-COM	OT-V4-10080
	Evolution Speaker-Microphone	M/A-COM	MC102823V1
Additional Body-Worn Accessories **Testing Not Required**	Genesis Speaker-Microphone	M/A-COM	MC102823V10
	OpenSky Speaker-Microphone	M/A-COM	MAHROS0002
	Earphone kit for Evolution	M/A-COM	RLD10547/11
	Skull Mic (for Genesis only)	M/A-COM	OT-V4-10428
	Throat Mic (for Genesis only)	M/A-COM	OT-V4-10656
	Ranger Headset (for Genesis only)	M/A-COM	OT-V4-10421
	2.5mm Earphone Cable Assembly	M/A-COM	OT-V1-10234
	3 Wire Mini Lapel Mic (Beige)	M/A-COM	OT-V1-10356
	3 Wire Mini Lapel Mic (Black)	M/A-COM	OT-V1-10357
	2 Wire Palm Mic w/ Tube	M/A-COM	OT-V1-10695
	2 Wire Palm Mic w/ Tube	M/A-COM	OT-V1-10354
	Explorer Headset w/ Std. PTT	M/A-COM	OT-V4-EX2KB1
	Breeze Headset w/ Std. PTT	M/A-COM	OT-V4-BA2KB3B
	Ranger Headset w/ Std. PTT	M/A-COM	OT-V4-NR2KB1
	Hurricane Headset w/ Std. PTT	M/A-COM	OT-V4-HC2KB3B
	Behind-the-Head Headset w/ Std. PTT	M/A-COM	OT-V4-10081
	Ring PTT w/ 5" cable	M/A-COM	OT-V1-10513
	Body PTT w/ Coil Cord	M/A-COM	OT-V1-10519
	Earphone Coil Cord	Kenwood	KEP-1

3.0 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 brain 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 its own controller with a built in VME-bus computer.

DASY4 SAR Measurement System with validation phantom



DASY4 SAR Measurement System with Plexiglas planar phantom

4.0 SAR MEASUREMENT SUMMARY

SAR MEASUREMENT RESULTS

Test Date	Test Type	Freq. (MHz)	Chan.	Test Mode	Battery Type	Body-Worn Accessories	Separation Distance to Planar Phantom (cm)	Conducted Power Before Test (Watts)	SAR Drift During Test (dB)	Measured SAR 1g (W/kg)	
										Duty Cycle	
										100%	50%
03/24/04	Face	861.3625	Mid	CW	NiCd	--	2.5	2.80	0.120	1.42	0.710
03/24/04	Face	861.3625	Mid	CW	NiMH	--	2.5	2.78	0.170	1.38	0.690
03/23/04	Body	861.3625	Mid	CW	NiCd	Metal Belt-Clip Speaker-Microphone	1.2	2.82	0.686	6.69	3.35
03/23/04	Body	861.3625	Mid	CW	NiCd	Metal Belt-Clip Earphone & Adapter	1.2	2.80	0.647	6.71	3.36
03/23/04	Body	861.3625	Mid	CW	NiCd	Metal Belt-Clip Headset	1.2	2.64	0.670	6.70	3.35
03/23/04	Body	861.3625	Mid	CW	NiMH	Metal Belt-Clip Speaker-Microphone	1.2	2.74	0.689	6.72	3.36
03/23/04	Body	861.3625	Mid	CW	NiMH	Metal Belt-Clip Earphone & Adapter	1.2	2.70	0.597	6.48	3.24
03/23/04	Body	861.3625	Mid	CW	NiMH	Metal Belt-Clip Headset	1.2	2.75	0.577	6.61	3.31
03/23/04	Body	861.3625	Mid	CW	NiMH	Holster, Belt-Loop, T-Strap, Speaker-Mic	4.0	2.68	0.412	1.36	0.680

ANSI / IEEE C95.1 1992 - SAFETY LIMIT
FACE / BODY: 8.0 W/kg (averaged over 1 gram)
Spatial Peak - Controlled Exposure / Occupational

Dielectric Constant ε_r	**861 MHz Brain**		**861 MHz Body**		**Ambient Temperature**	Brain	22.9 °C	Body	25.1 °C
	IEEE Target	**Measured**	**IEEE Target**	**Measured**	**Fluid Temperature**	Brain	21.8 °C	Body	20.5 °C
	41.5 (± 5%)	40.2	**55.1 (± 5%)**	53.5	**Relative Humidity**	Brain	54 %	Body	31 %
Conductivity σ (mho/m)	**861 MHz Brain**		**861 MHz Body**		**Atmospheric Pressure**	Brain	100.8 kPa	Body	100.8 kPa
	IEEE Target	**Measured**	**IEEE Target**	**Measured**	**Fluid Depth**	Brain	≥ 15 cm	Body	≥ 15 cm
	0.91 (± 5%)	0.92	**0.98 (± 5%)**	1.02	**ρ (Kg/m^3)**	Brain	1000	Body	1000

Note(s):

1. The measurement results were obtained with the DUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the DUT are reported in Appendix A.
2. If the SAR measurements performed at the mid channel were ≥ 3dB below the SAR limit, SAR evaluation for the low and high channels was optional (per FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [3]).
3. The DUT was evaluated for body-worn SAR with 1.2 cm Metal Belt-Clip accessory. An additional body-worn SAR evaluation was performed for the worst-case configuration (Metal Belt-Clip & Speaker-Microphone accessories, NiMH battery) with the 4.0 cm Leather Holster, Swivel Belt-Loop, & T-Strap Hold Down accessories.
4. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the SAR evaluation. The temperatures listed in the table above were consistent for all measurement periods.
5. The dielectric parameters of the simulated tissue fluids were measured prior to the evaluation using an 85070C Dielectric Probe Kit and an 8753E Network Analyzer (see Appendix E for printout of measured fluid dielectric parameters).
6. The target dielectric parameters of the simulated tissue fluids for 861MHz were interpolated from the IEEE target dielectric parameters at 835MHz to 900MHz.
7. SAR measurements were performed within 24 hours of the system peformance check.

5.0 DETAILS OF SAR EVALUATION

The M/A-COM, Inc. Model: P800 Portable FM PTT Radio Transceiver FCC ID: BV8P800 was found to be compliant for localized Specific Absorption Rate (Occupational / Controlled Exposure) based on the test provisions and conditions described below. Detailed photographs of the test setup are shown in Appendix G.

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 separation distance was maintained between the front side of the DUT and the outer surface of the planar phantom for the duration of the tests.
2. The DUT was tested in a body-worn configuration with the back of the radio placed parallel to the outer surface of the planar phantom. The attached Metal Belt-Clip (P/N: J29-0652-35) was touching the planar phantom and provided a 1.2 cm separation distance between the back of the DUT and the outer surface of the planar phantom. The DUT was evaluated for body-worn SAR with Evolution Speaker-Microphone (P/N: MC102823V1), Earphone (P/N: OT-V1-10291), and Over-the-Head Headset (P/N: OT-V4-10080) accessories. The Evolution Speaker-Microphone and Over-the-Head Headset accessories were connected to the DUT via the audio accessory connector. The Earphone accessory was connected to the DUT via Audio Adapter accessory (P/N: OT-V1-10430) connected to the audio accessory connector.
3. The worst-case Metal Belt-Clip configuration (with Evolution Speaker-Microphone accessory and NiMH battery) was further evaluated with the Leather Holster (P/N: MAHROS0013), Swivel Belt-Loop (P/N: MAHROS0041), and T-Strap Hold Down (P/N: MAHROS0042) accessories. The DUT was evaluated in a body-worn configuration with the radio placed inside the Leather Holster accessory with the back of the Holster and Belt-Loop placed parallel to the outer surface of the planar phantom. The back of the Belt-Loop accessory was touching the planar phantom and both the Holster and Belt-Loop accessories provided a total separation distance of 4.0 cm between the back of the DUT and the outer surface of the planar phantom.
4. The conducted power levels were measured before each test using a Gigatronics 8652A Universal Power Meter according to the procedures described in FCC 47 CFR §2.1046.
5. The area scan evaluation was performed with a fully charged battery. After the area scan evaluation was completed the battery was replaced with a fully charged battery prior to the zoom scan evaluation.
6. The DUT was tested in unmodulated continuous transmit operation (Continuous Wave mode at 100% duty cycle) with no turn-on delay and 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.
7. Due to the dimensions of the DUT a Plexiglas planar phantom was used in place of the SAM phantom.
8. A stack of low-density, low-loss dielectric foamed polystyrene was used in place of the device holder.

6.0 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 form 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 D). 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.

7.0 SYSTEM PERFORMANCE CHECK

Prior to the SAR evaluation a system check was performed at the planar section of the SAM phantom with an 835MHz dipole (see Appendix C for system validation procedures). Prior to the system performance check the dielectric parameters of the simulated brain tissue mixture were measured using an 85070C Dielectric Probe Kit and an 8753E Network Analyzer (see Appendix E for printout of 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% (see Appendix B for system performance check test plot).

SYSTEM PERFORMANCE CHECK

Test Date	835MHz Equiv. Tissue	SAR 1g (W/kg)		Dielectric Constant ε_r		Conductivity σ (mho/m)		ρ (Kg/m^3)	Amb. Temp. °C	Fluid Temp. °C	Fluid Depth (cm)	Humid. %	Barom. Press. (kPa)
		IEEE Target	Measured	IEEE Target	Measured	IEEE Target	Measured						
03/23/04	Brain	2.38 ±10%	2.28 (-4.2%)	41.5 ±5%	41.4	0.90 ±5%	0.92	1000	23.6	21.5	≥ 15	50	99.6
03/24/04	Brain	2.38 ±10%	2.22 (-6.7%)	41.5 ±5%	40.6	0.90 ±5%	0.90	1000	22.9	22.7	≥ 15	54	100.8

Note(s):
1. The ambient and fluid temperatures were measured prior to, and during, the fluid dielectric parameter check and the system performance check. The temperatures listed in the table above were consistent for all measurement periods.

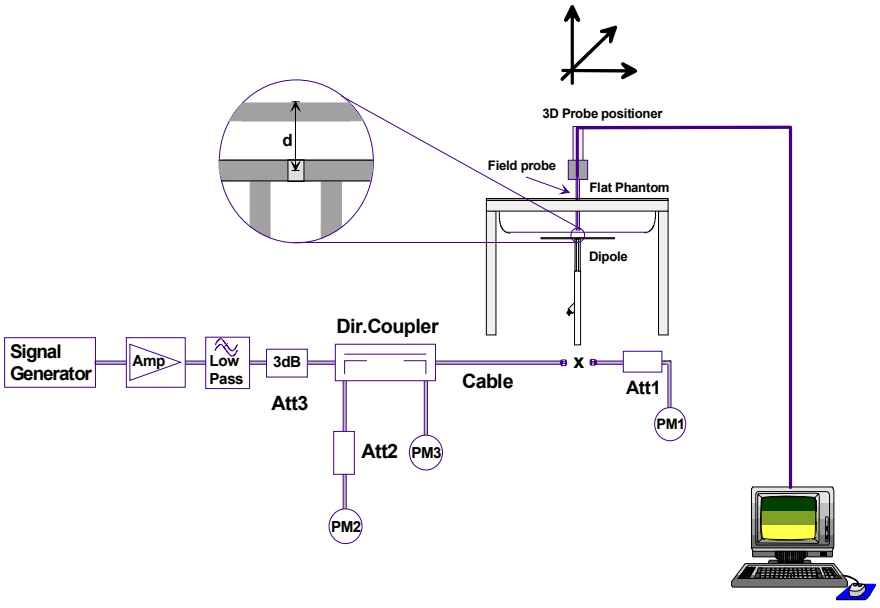


Figure 1. System Performance Check Setup Diagram

835MHz Dipole Setup

8.0 SIMULATED EQUIVALENT TISSUES

The 835MHz and 861MHz simulated tissue mixtures consist of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution. Preservation with a bactericide is added and visual inspection is made to ensure air bubbles are 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	**835MHz Brain (System Check)**	**861MHz Brain (DUT Evaluation)**	**861MHz Body (DUT Evaluation)**
Water	40.71 %	40.71 %	53.79 %
Sugar	56.63 %	56.63 %	45.13 %
Salt	1.48 %	1.48 %	0.98 %
HEC	0.99 %	0.99 %	--
Bactericide	0.19 %	0.19 %	0.10 %

9.0 SAR SAFETY LIMITS

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	**(Occupational / Controlled Exposure Environment)**
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	1.60	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

Notes:
1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. 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: DASY4 software
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(s)

Evaluation Phantom

Type: Planar Phantom
Shell Material: Plexiglas
Bottom Thickness: 2.0 mm ± 0.1 mm
Outer Dimensions: 75.0 cm (L) x 22.5 cm (W) x 20.5 cm (H); Back Plane: 25.7 cm (H)

Validation Phantom

Type: SAM V4.0C
Shell Material: Fiberglass
Thickness: 2.0 ±0.1 mm
Volume: Approx. 20 liters

11.0 PROBE SPECIFICATION (ET3DV6)

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

ET3DV6 E-Field Probe

12.0 SAM PHANTOM V4.0C

The SAM phantom V4.0C is a fiberglass shell phantom with a 2.0 mm (+/-0.2 mm) shell thickness for left and right head and flat planar area integrated in a wooden table. The shape of the fiberglass shell corresponds to the phantom defined by SCC34-SC2. The device holder positions are adjusted to the standard measurement positions in the three sections (see Appendix F for specifications of the SAM phantom V4.0C).

SAM Phantom

13.0 PLANAR PHANTOM

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

Plexiglas 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	SERIAL NO.	CALIBRATION DATE
Schmid & Partner DASY4 System	-	-
DASY4 Measurement Server	1078	N/A
-Robot	599396-01	N/A
-ET3DV6 E-Field Probe	1590	May 2003
-300MHz Validation Dipole	135	Oct 2003
-450MHz Validation Dipole	136	Nov 2003
-835MHz Validation Dipole	411	Mar 2004
-900MHz Validation Dipole	054	June 2003
-1800MHz Validation Dipole	247	June 2003
-2450MHz Validation Dipole	150	Sept 2003
-SAM Phantom V4.0C	1033	N/A
-Plexiglas Planar Phantom	161	N/A
HP 85070C Dielectric Probe Kit	N/A	N/A
Gigatronics 8651A Power Meter	8650137	April 2003
Gigatronics 8652A Power Meter	1835267	April 2003
Power Sensor 80701A	1833542	April 2003
Power Sensor 80701A	1834350	April 2003
HP E4408B Spectrum Analyzer	US39240170	Dec 2003
HP 8594E Spectrum Analyzer	3543A02721	April 2003
HP 8753E Network Analyzer	US38433013	May 2003
HP 8648D Signal Generator	3847A00611	May 2003
Amplifier Research 5S1G4 Power Amplifier	26235	N/A

16.0 MEASUREMENT UNCERTAINTIES

UNCERTAINTY BUDGET FOR DEVICE EVALUATION						
Error Description	**Uncertainty Value ±%**	**Probability Distribution**	**Divisor**	**c_i 1g**	**Standard Uncertainty ±% (1g)**	**v_i or v_{eff}**
Measurement System						
Probe calibration	± 4.8	Normal	1	1	± 4.8	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	$(1-c_p)$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	(c_p)	± 3.9	∞
Spatial resolution	± 0.0	Rectangular	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectangular	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 1.4	Rectangular	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectangular	√3	1	± 1.7	∞
Mech. constraints of robot	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
Extrapolation & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Test Sample Related						
Device positioning	± 6.0	Normal	√3	1	± 6.7	12
Device holder uncertainty	± 5.0	Normal	√3	1	± 5.9	8
Power drift	± 5.0	Rectangular	√3		± 2.9	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid conductivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Combined Standard Uncertainty					**± 13.3**	
Expanded Uncertainty (k=2)					**± 26.6**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])

MEASUREMENT UNCERTAINTIES (Cont.)

UNCERTAINTY BUDGET FOR SYSTEM VALIDATION

Error Description	Uncertainty Value ±%	Probability Distribution	Divisor	c_i 1g	Standard Uncertainty ±% (1g)	v_i or v_{eff}
Measurement System						
Probe calibration	± 4.8	Normal	1	1	± 4.8	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	$(1-c_p)$	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	(c_p)	± 3.9	∞
Spatial resolution	± 0.0	Rectangular	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectangular	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 1.4	Rectangular	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectangular	√3	1	± 1.7	∞
Mech. constraints of robot	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
Extrapolation & integration	± 3.9	Rectangular	√3	1	± 2.3	∞
Dipole						
Dipole Axis to Liquid Distance	± 2.0	Rectangular	√3	1	± 1.2	∞
Input Power	± 4.7	Rectangular	√3	1	± 2.7	∞
Phantom and Setup						
Phantom uncertainty	± 4.0	Rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid conductivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (target)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (measured)	± 5.0	Rectangular	√3	0.6	± 1.7	∞
Combined Standard Uncertainty					**± 9.9**	
Expanded Uncertainty (k=2)					**± 19.8**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003 (see reference [5])

17.0 REFERENCES

[1] Federal Communications Commission, “Radiofrequency radiation exposure evaluation: portable devices”, Rule Part 47 CFR §2.1093: 1999.

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

[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, “Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada’s Safety Code 6 for Exposure of Humans to Radio Frequency Fields”, Radio Standards Specification RSS-102 Issue 1 (Provisional): September 1999.

[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”.

APPENDIX A - SAR MEASUREMENT DATA

Face-Held SAR - NiCd Battery Pack

Date Tested: 03/24/04

DUT: M/A-COM Model: P800; Type: Portable FM PTT Radio Transceiver; Serial: A40007100071

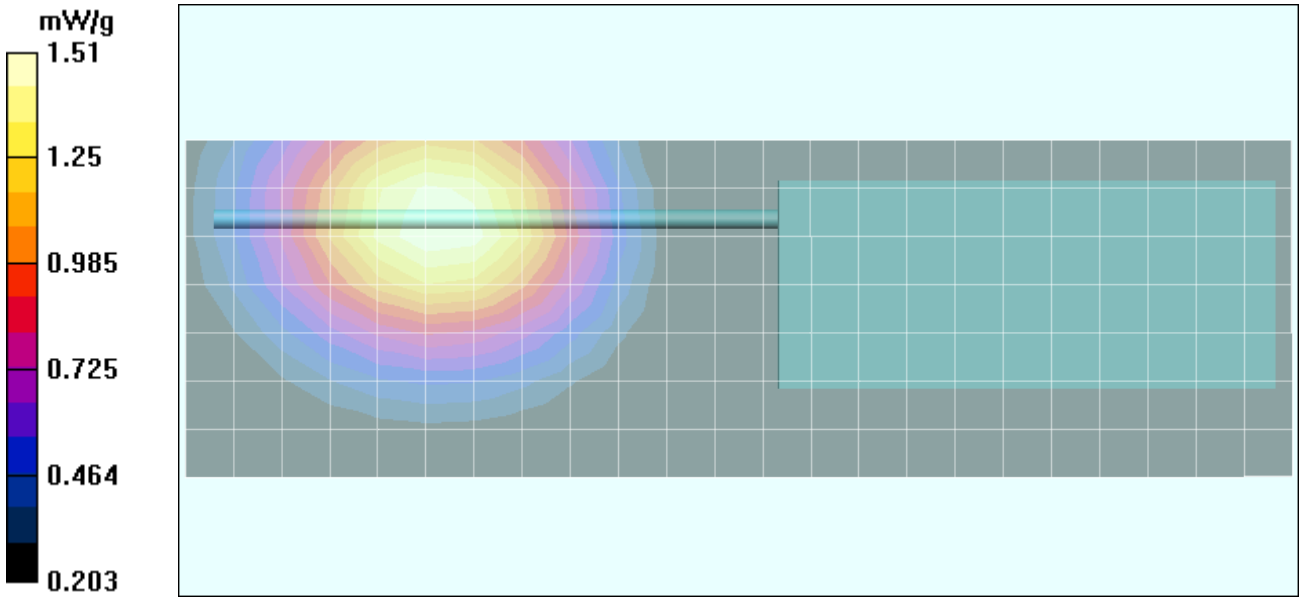
Ambient Temp: 22.9 °C; Fluid Temp: 21.8 °C; Barometric Pressure: 100.8 kPa; Humidity: 54%

Communication System: FM Talk-Around
RF Output Power: 2.80 Watts (Conducted)
Frequency: 861.3625 MHz; Duty Cycle: 1:1
7.2V, 1500mAh NiCd Battery Pack (P/N: KNB-17A)
Medium: HSL861 (σ = 0.92 mho/m; ε_r = 40.2; ρ = 1000 kg/m^3)

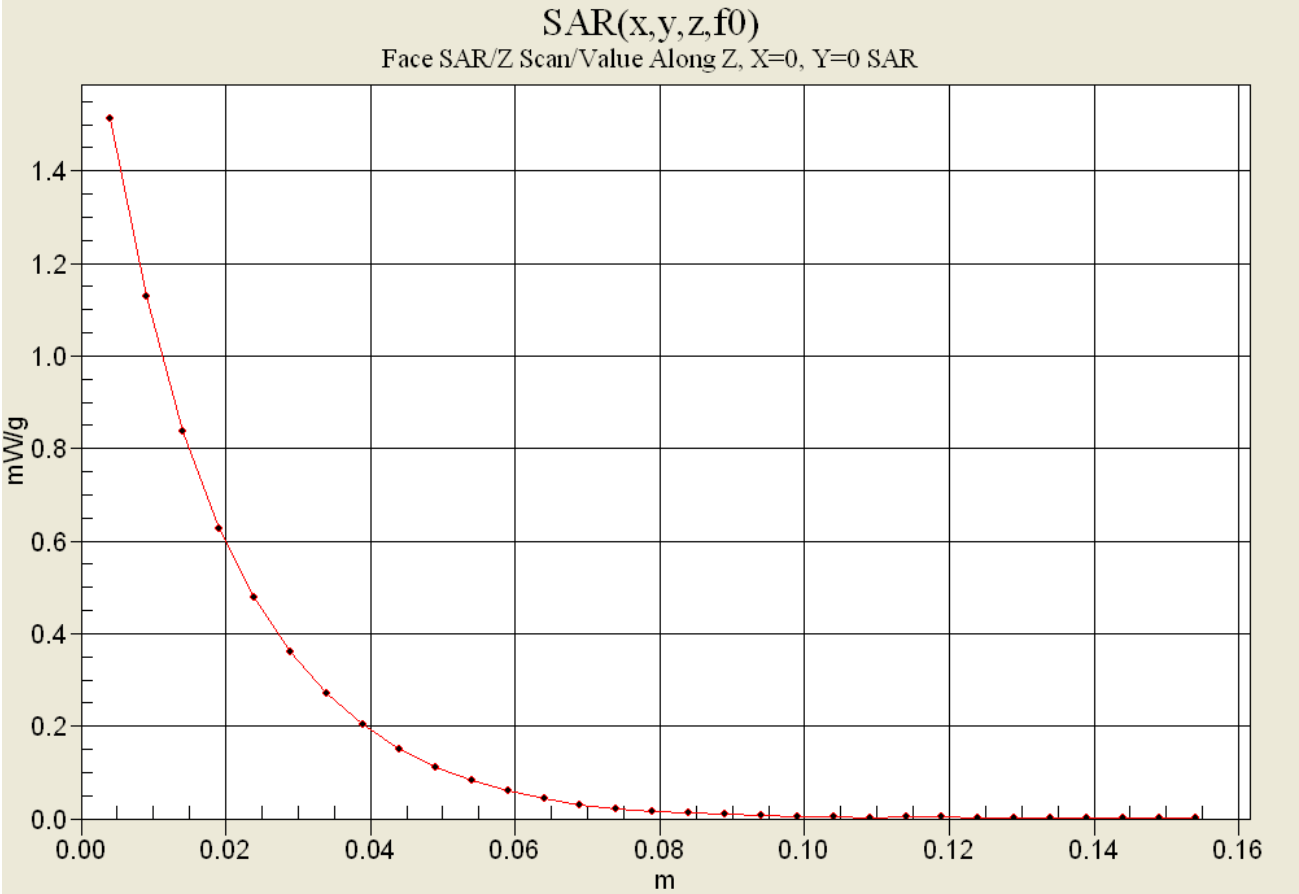
- Probe: ET3DV6 - SN1590; ConvF(7, 7, 7); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

Face-Held - 2.5 cm Separation Distance - Mid Channel/Area Scan (8x24x1):
Measurement grid: dx=15mm, dy=15mm

Face-Held - 2.5 cm Separation Distance - Mid Channel/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.9 W/kg
SAR(1 g) = 1.42 mW/g; SAR(10 g) = 1.05 mW/g
Reference Value = 6.26 V/m;
Power Drift = 0.120 dB



Z-Axis Scan



Face-Held SAR - NiMH Battery Pack

Date Tested: 03/24/04

DUT: M/A-COM Model: P800; Type: Portable FM PTT Radio Transceiver; Serial: A40007100071

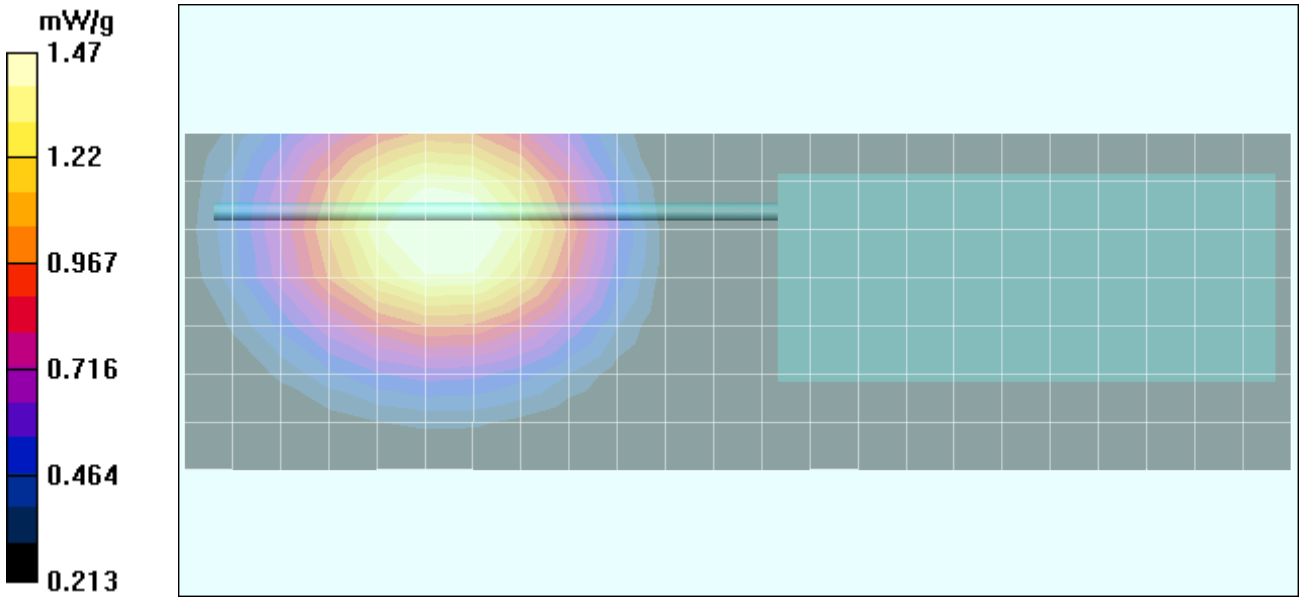
Ambient Temp: 22.9 °C; Fluid Temp: 21.8 °C; Barometric Pressure: 100.8 kPa; Humidity: 54%

Communication System: FM Talk-Around
RF Output Power: 2.78 Watts (Conducted)
Frequency: 861.3625 MHz; Duty Cycle: 1:1
7.2V, 2100mAh NiMH Battery Pack (P/N: KNB-22N)
Medium: HSL861 (σ = 0.92 mho/m; ε_r = 40.2; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7, 7, 7); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

Face-Held - 2.5 cm Separation Distance - Mid Channel/Area Scan (8x24x1):
Measurement grid: dx=15mm, dy=15mm

Face-Held - 2.5 cm Separation Distance - Mid Channel/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.83 W/kg
SAR(1 g) = 1.38 mW/g; SAR(10 g) = 1.02 mW/g
Reference Value = 6.51 V/m;
Power Drift = 0.170 dB



Body-Worn SAR - NiCd Battery Pack

Date Tested: 03/23/04

DUT: M/A-COM Model: P800; Type: Portable FM PTT Radio Transceiver; Serial: A40007100071

Ambient Temp: 25.1 °C; Fluid Temp: 20.5 °C; Barometric Pressure: 100.8 kPa; Humidity: 31%

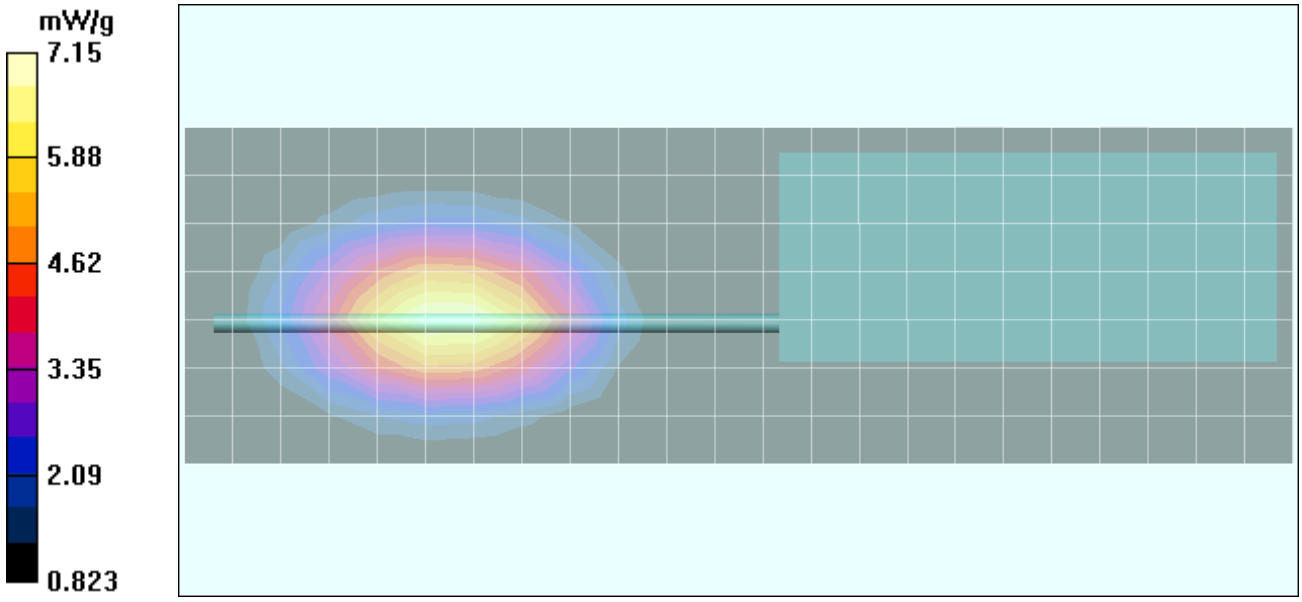
Body-Worn Accessories: Metal Belt-Clip (P/N: J29-0652-35) & Evolution Speaker-Microphone (P/N: MC102823V1)

Communication System: FM Talk-Around
RF Output Power: 2.82 Watts (Conducted)
Frequency: 861.3625 MHz; Duty Cycle: 1:1
7.2V, 1500mAh NiCd Battery Pack (P/N: KNB-17A)
Medium: M861 (σ = 1.02 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(6.8, 6.8, 6.8); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

Body-Worn - 1.2 cm Metal Belt-Clip Separation Distance - Mid Channel/Area Scan (8x24x1):
Measurement grid: dx=15mm, dy=15mm

Body-Worn - 1.2 cm Metal Belt-Clip Separation Distance - Mid Channel/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 8.95 W/kg
SAR(1 g) = 6.69 mW/g; SAR(10 g) = 4.69 mW/g
Reference Value = 16.3 V/m;
Power Drift = 0.686 dB



Body-Worn SAR - NiCd Battery Pack

Date Tested: 03/23/04

DUT: M/A-COM Model: P800; Type: Portable FM PTT Radio Transceiver; Serial: A40007100071

Ambient Temp: 25.1 °C; Fluid Temp: 20.5 °C; Barometric Pressure: 100.8 kPa; Humidity: 31%

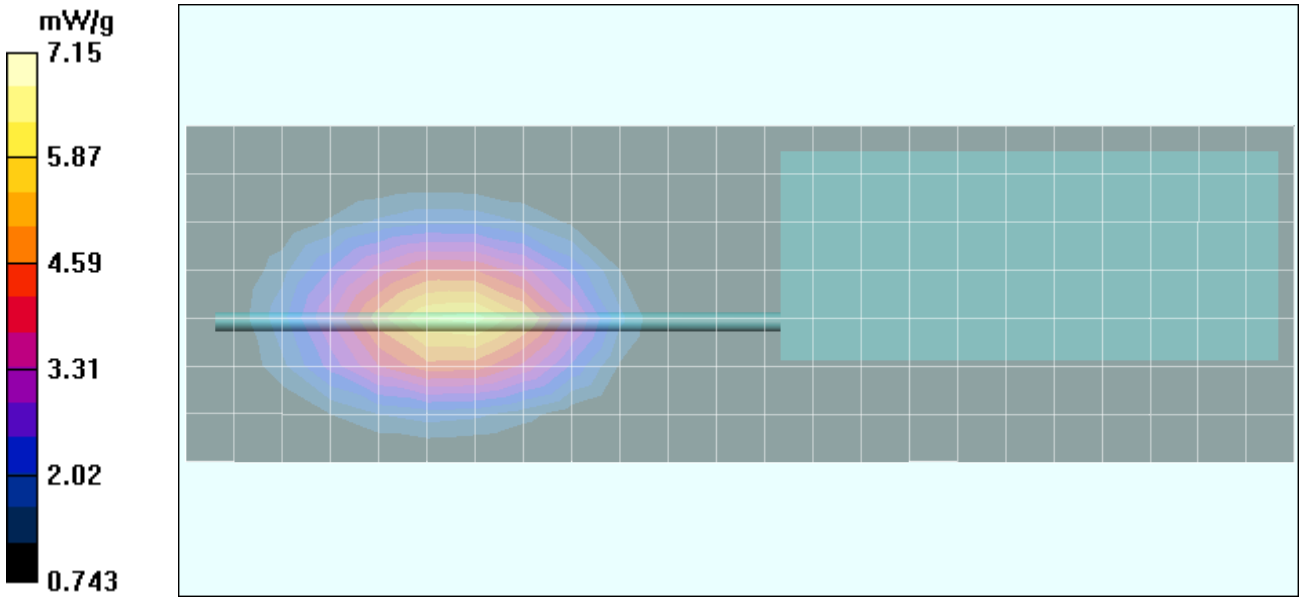
Body-Worn Accessories: Metal Belt-Clip (P/N: J29-0652-35), Earphone (P/N: OT-V1-10291), Audio Adapter (P/N: OT-V1-10430)

Communication System: FM Talk-Around
RF Output Power: 2.80 Watts (Conducted)
Frequency: 861.3625 MHz; Duty Cycle: 1:1
7.2V, 1500mAh NiCd Battery Pack (P/N: KNB-17A)
Medium: M861 (σ = 1.02 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(6.8, 6.8, 6.8); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

Body-Worn - 1.2 cm Metal Belt-Clip Separation Distance - Mid Channel/Area Scan (8x24x1):
Measurement grid: dx=15mm, dy=15mm

Body-Worn - 1.2 cm Metal Belt-Clip Separation Distance - Mid Channel/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 8.98 W/kg
SAR(1 g) = 6.71 mW/g; SAR(10 g) = 4.69 mW/g
Reference Value = 16.3 V/m;
Power Drift = 0.647 dB



Body-Worn SAR - NiCd Battery Pack

Date Tested: 03/23/04

DUT: M/A-COM Model: P800; Type: Portable FM PTT Radio Transceiver; Serial: A40007100071

Ambient Temp: 25.1 °C; Fluid Temp: 20.5 °C; Barometric Pressure: 100.8 kPa; Humidity: 31%

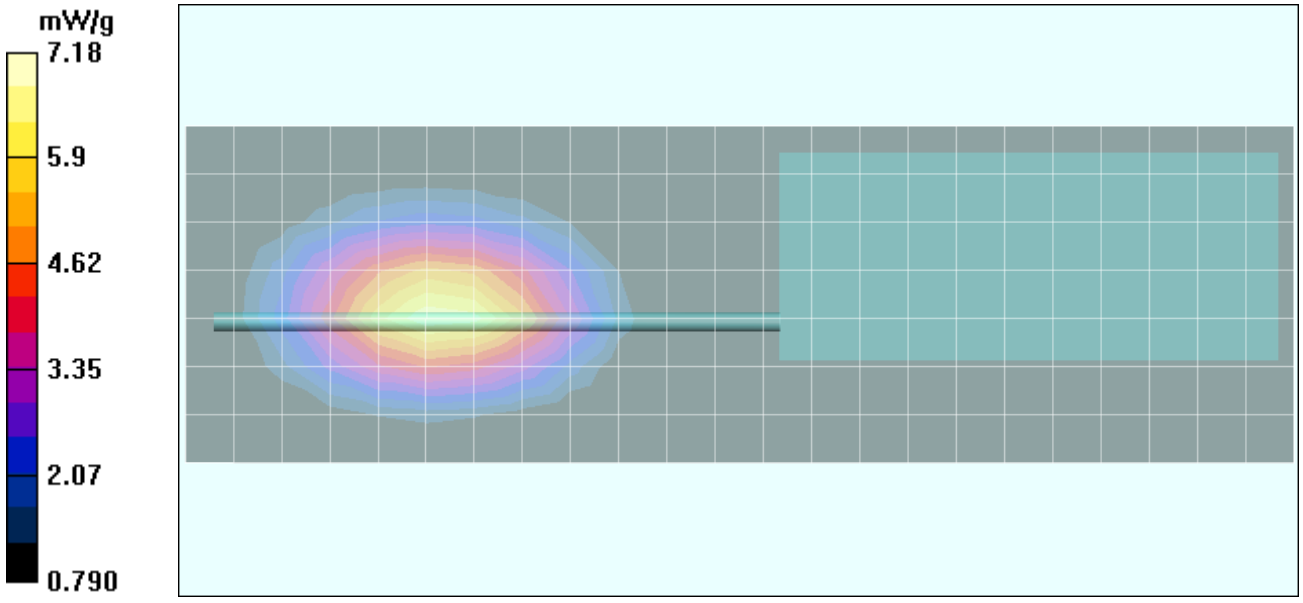
Body-Worn Accessories: Metal Belt-Clip (P/N: J29-0652-35) & Over-the-Head Headset (P/N: OT-V4-10080)

Communication System: FM Talk-Around
RF Output Power: 2.64 Watts (Conducted)
Frequency: 861.3625 MHz; Duty Cycle: 1:1
7.2V, 1500mAh NiCd Battery Pack (P/N: KNB-17A)
Medium: M861 (σ = 1.02 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(6.8, 6.8, 6.8); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

Body-Worn - 1.2 cm Metal Belt-Clip Separation Distance - Mid Channel/Area Scan (8x24x1):
Measurement grid: dx=15mm, dy=15mm

Body-Worn - 1.2 cm Metal Belt-Clip Separation Distance - Mid Channel/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 8.99 W/kg
SAR(1 g) = 6.70 mW/g; SAR(10 g) = 4.67 mW/g
Reference Value = 18 V/m;
Power Drift = 0.670 dB



Body-Worn SAR - NiMH Battery Pack

Date Tested: 03/23/04

DUT: M/A-COM Model: P800; Type: Portable FM PTT Radio Transceiver; Serial: A40007100071

Ambient Temp: 25.1 °C; Fluid Temp: 20.5 °C; Barometric Pressure: 100.8 kPa; Humidity: 31%

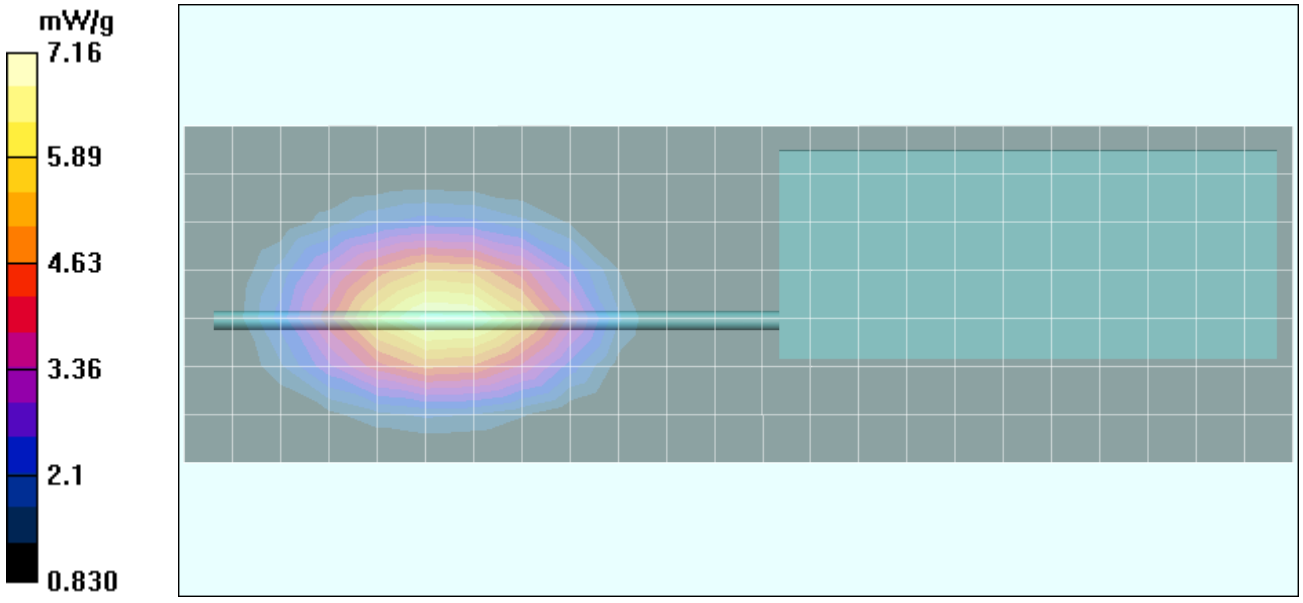
Body-Worn Accessories: Metal Belt-Clip (P/N: J29-0652-35) & Evolution Speaker-Microphone (P/N: MC102823V1)

Communication System: FM Talk-Around
RF Output Power: 2.74 Watts (Conducted)
Frequency: 861.3625 MHz; Duty Cycle: 1:1
7.2V, 2100mAh NiMH Battery Pack (P/N: KNB-22N)
Medium: M861 (σ = 1.02 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3)

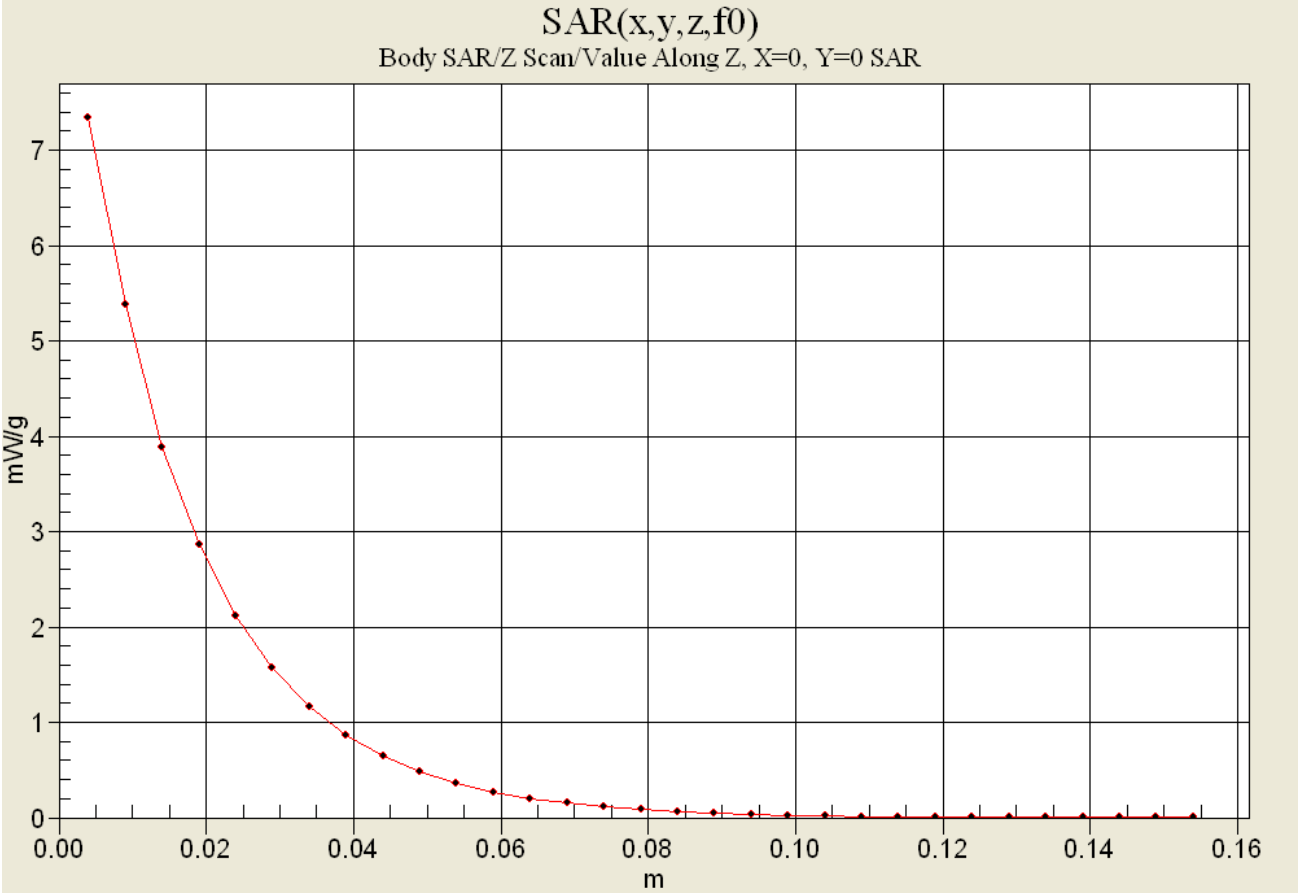
- Probe: ET3DV6 - SN1590; ConvF(6.8, 6.8, 6.8); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

Body-Worn - 1.2 cm Metal Belt-Clip Separation Distance - Mid Channel/Area Scan (8x24x1):
Measurement grid: dx=15mm, dy=15mm

Body-Worn - 1.2 cm Metal Belt-Clip Separation Distance - Mid Channel/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 8.93 W/kg
SAR(1 g) = 6.72 mW/g; SAR(10 g) = 4.72 mW/g
Reference Value = 16 V/m;
Power Drift = 0.689 dB



Z-Axis Scan


SAR(x,y,z,f0)
Body SAR/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0
1
2
3
4
5
6
7
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Body-Worn SAR - NiMH Battery Pack

Date Tested: 03/23/04

DUT: M/A-COM Model: P800; Type: Portable FM PTT Radio Transceiver; Serial: A40007100071

Ambient Temp: 25.1 °C; Fluid Temp: 20.5 °C; Barometric Pressure: 100.8 kPa; Humidity: 31%

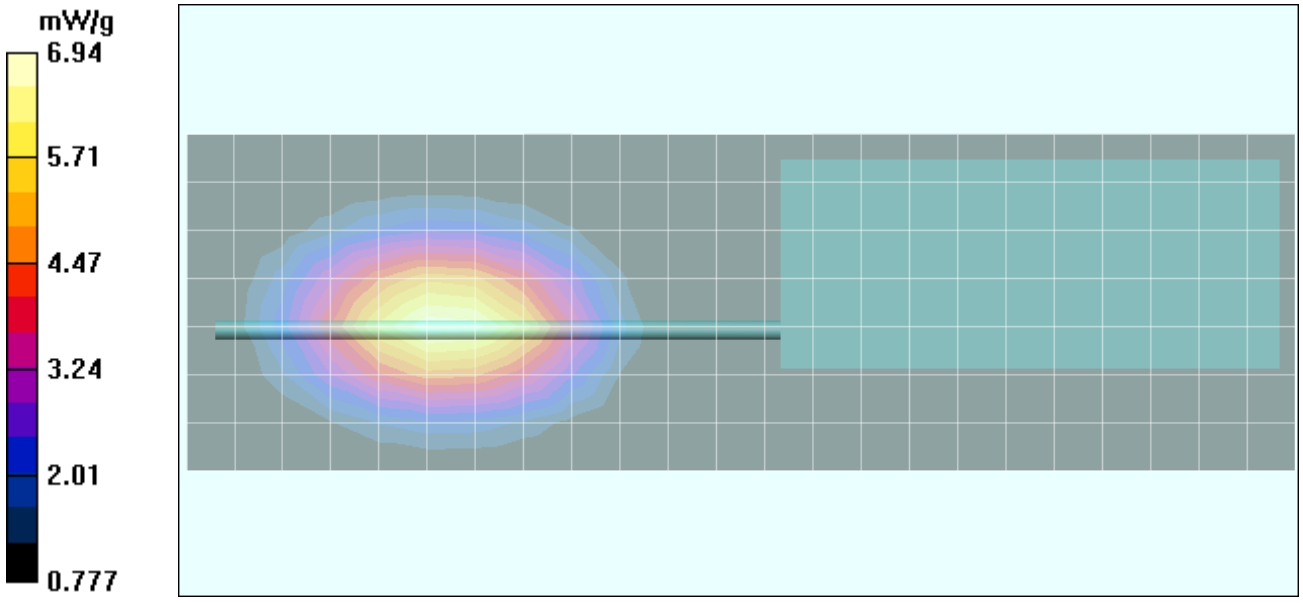
Body-Worn Accessories: Metal Belt-Clip (P/N: J29-0652-35), Earphone (P/N: OT-V1-10291), Audio Adapter (P/N: OT-V1-10430)

Communication System: FM Talk-Around
RF Output Power: 2.70 Watts (Conducted)
Frequency: 861.3625 MHz; Duty Cycle: 1:1
7.2V 2100mAh NiMH Battery Pack (P/N: KNB-22N)
Medium: M861 (σ = 1.02 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(6.8, 6.8, 6.8); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

Body-Worn - 1.2 cm Metal Belt-Clip Separation Distance - Mid Channel/Area Scan (8x24x1):
Measurement grid: dx=15mm, dy=15mm

Body-Worn - 1.2 cm Metal Belt-Clip Separation Distance - Mid Channel/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 8.64 W/kg
SAR(1 g) = 6.48 mW/g; SAR(10 g) = 4.54 mW/g
Reference Value = 16.7 V/m;
Power Drift = 0.597 dB



Body-Worn SAR - NiMH Battery Pack

Date Tested: 03/23/04

DUT: M/A-COM Model: P800; Type: Portable FM PTT Radio Transceiver; Serial: A40007100071

Ambient Temp: 25.1 °C; Fluid Temp: 20.5 °C; Barometric Pressure: 100.8 kPa; Humidity: 31%

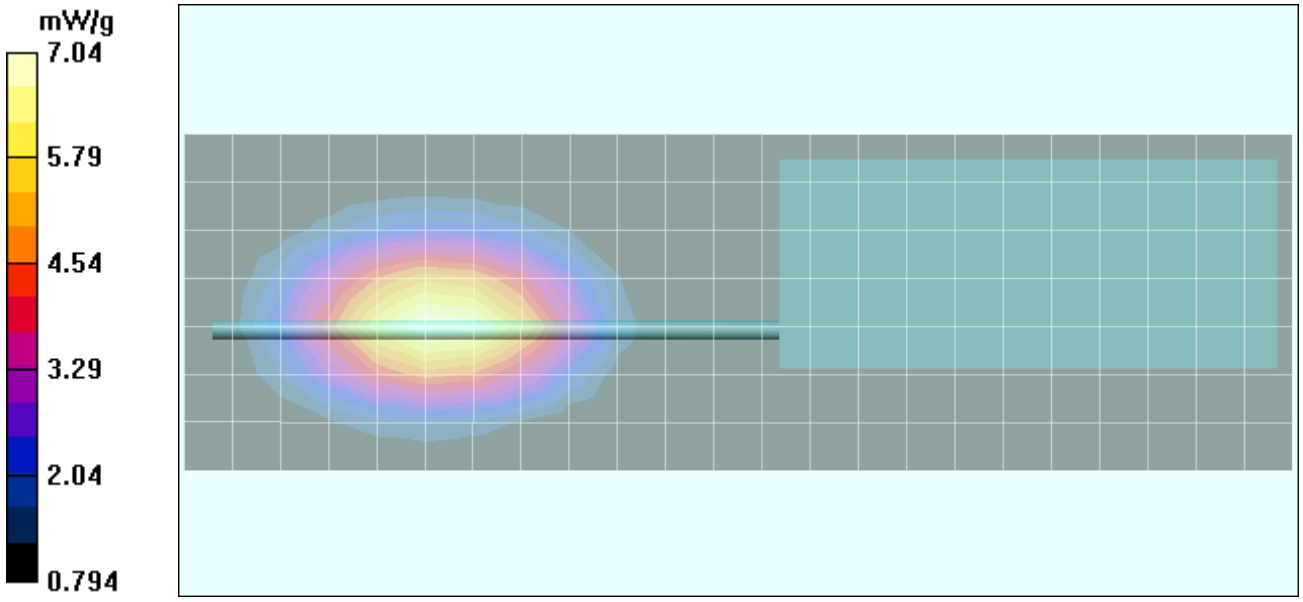
Body-Worn Accessories: Metal Belt-Clip (P/N: J29-0652-35) & Over-the-Head Headset (P/N: OT-V4-10080)

Communication System: FM Talk-Around
RF Output Power: 2.75 Watts (Conducted)
Frequency: 861.3625 MHz; Duty Cycle: 1:1
7.2V 2100mAh NiMH Battery Pack (P/N: KNB-22N)
Medium: M861 (σ = 1.02 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(6.8, 6.8, 6.8); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

Body-Worn - 1.2 cm Metal Belt-Clip Separation Distance - Mid Channel/Area Scan (8x24x1):
Measurement grid: dx=15mm, dy=15mm

Body-Worn - 1.2 cm Metal Belt-Clip Separation Distance - Mid Channel/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 8.79 W/kg
SAR(1 g) = 6.61 mW/g; SAR(10 g) = 4.64 mW/g
Reference Value = 18.2 V/m;
Power Drift = 0.577 dB



Body-Worn SAR - NiMH Battery Pack

Date Tested: 03/23/04

DUT: M/A-COM Model: P800; Type: Portable FM PTT Radio Transceiver; Serial: A40007100071

Ambient Temp: 25.1 °C; Fluid Temp: 20.5 °C; Barometric Pressure: 100.8 kPa; Humidity: 31%

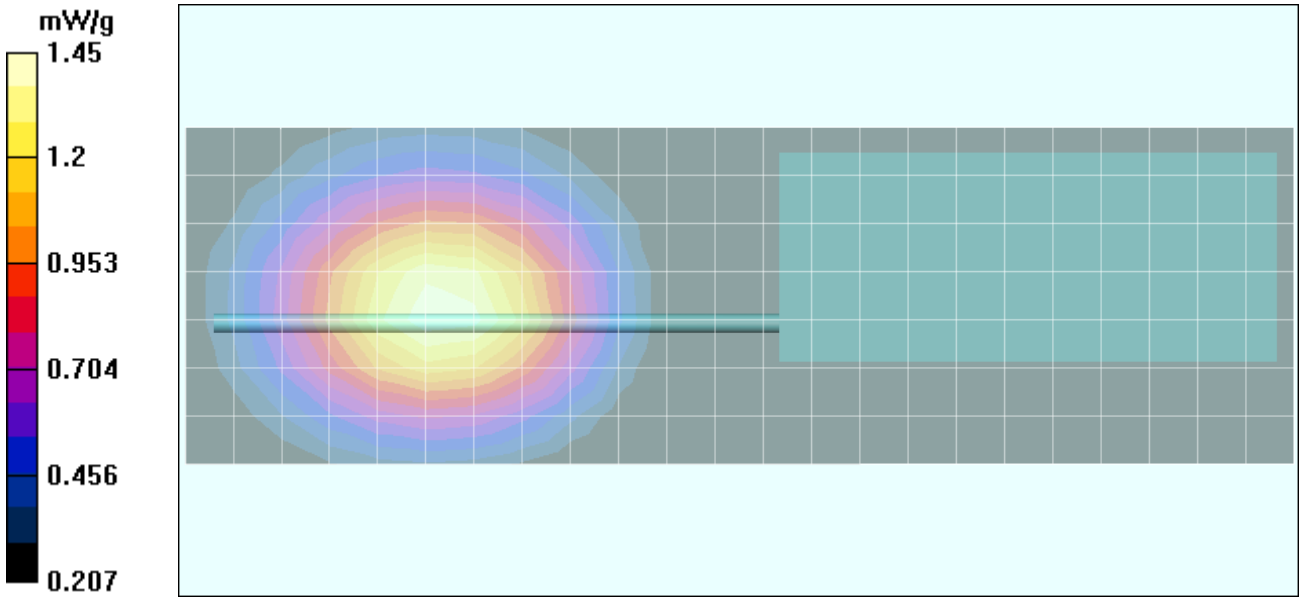
Body-Worn Accessories: Leather Holster (P/N: MAHROS0013), Swivel Belt-Loop (P/N: MAHROS0041), T-Strap Hold Down (P/N: MAHROS0042), & Speaker-Microphone (P/N: MC102823V1)

Communication System: FM Talk-Around
RF Output Power: 2.68 Watts (Conducted)
Frequency: 861.3625 MHz; Duty Cycle: 1:1
7.2V 2100mAh NiMH Battery Pack (P/N: KNB-22N)
Medium: M861 (σ = 1.02 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(6.8, 6.8, 6.8); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: Planar; Type: Plexiglas; Serial: 161
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

Body-Worn - 4.0 cm Leather Holster & Swivel Belt-Loop Separation Distance - Mid Channel/Area Scan (8x24x1):
Measurement grid: dx=15mm, dy=15mm

Body-Worn - 4.0 cm Leather Holster & Swivel Belt-Loop Separation Distance - Mid Channel/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.76 W/kg
SAR(1 g) = 1.36 mW/g; SAR(10 g) = 1 mW/g
Reference Value = 6.14 V/m;
Power Drift = 0.412 dB



APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

System Performance Check - 835 MHz Dipole

Date Tested: 03/23/04

DUT: Dipole 835 MHz; Model: D835V2; Type: System Performance Check; Serial: 411

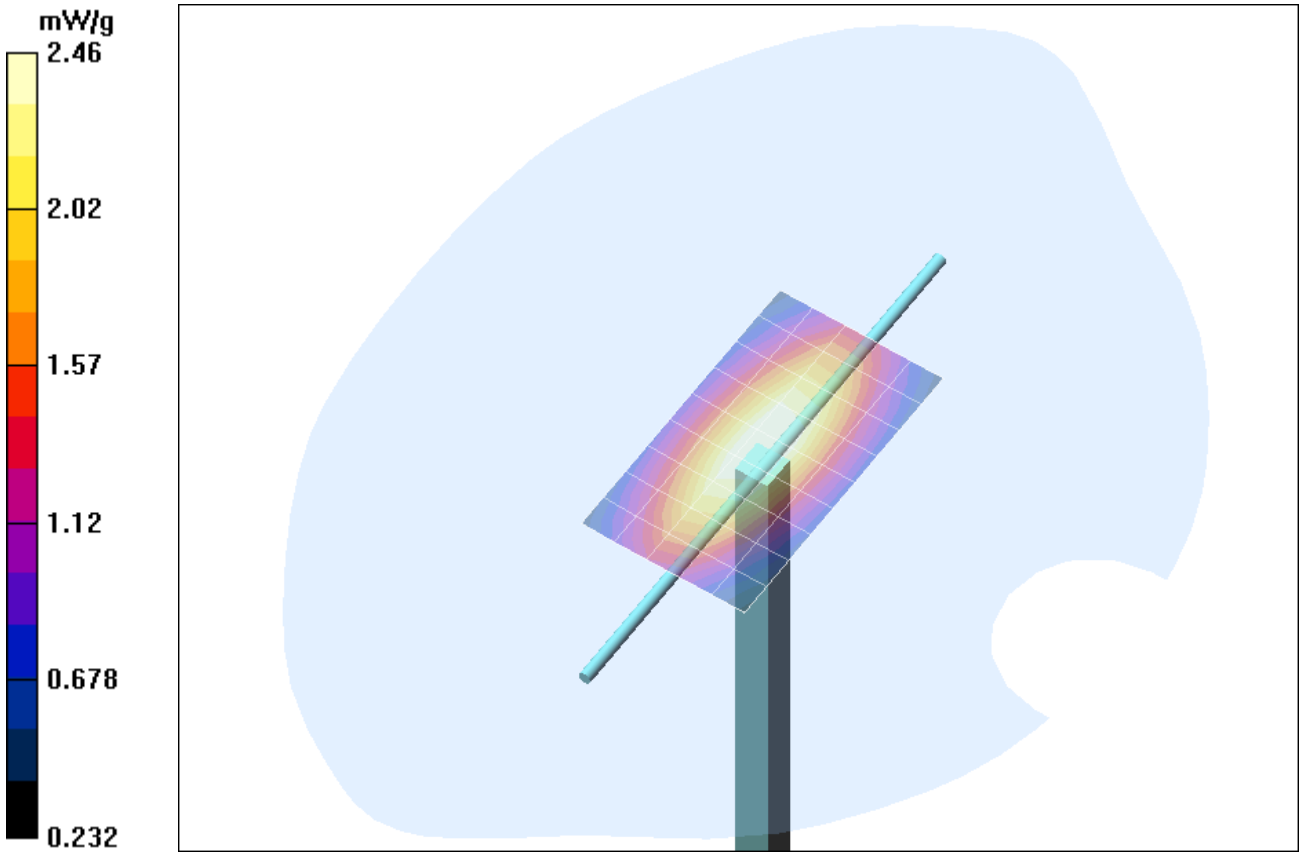
Ambient Temp: 23.6 °C; Fluid Temp: 21.5 °C; Barometric Pressure: 99.6 kPa; Humidity: 50%

Communication System: CW
Forward Conducted Power: 250 mW
Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL835 (σ = 0.92 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3)

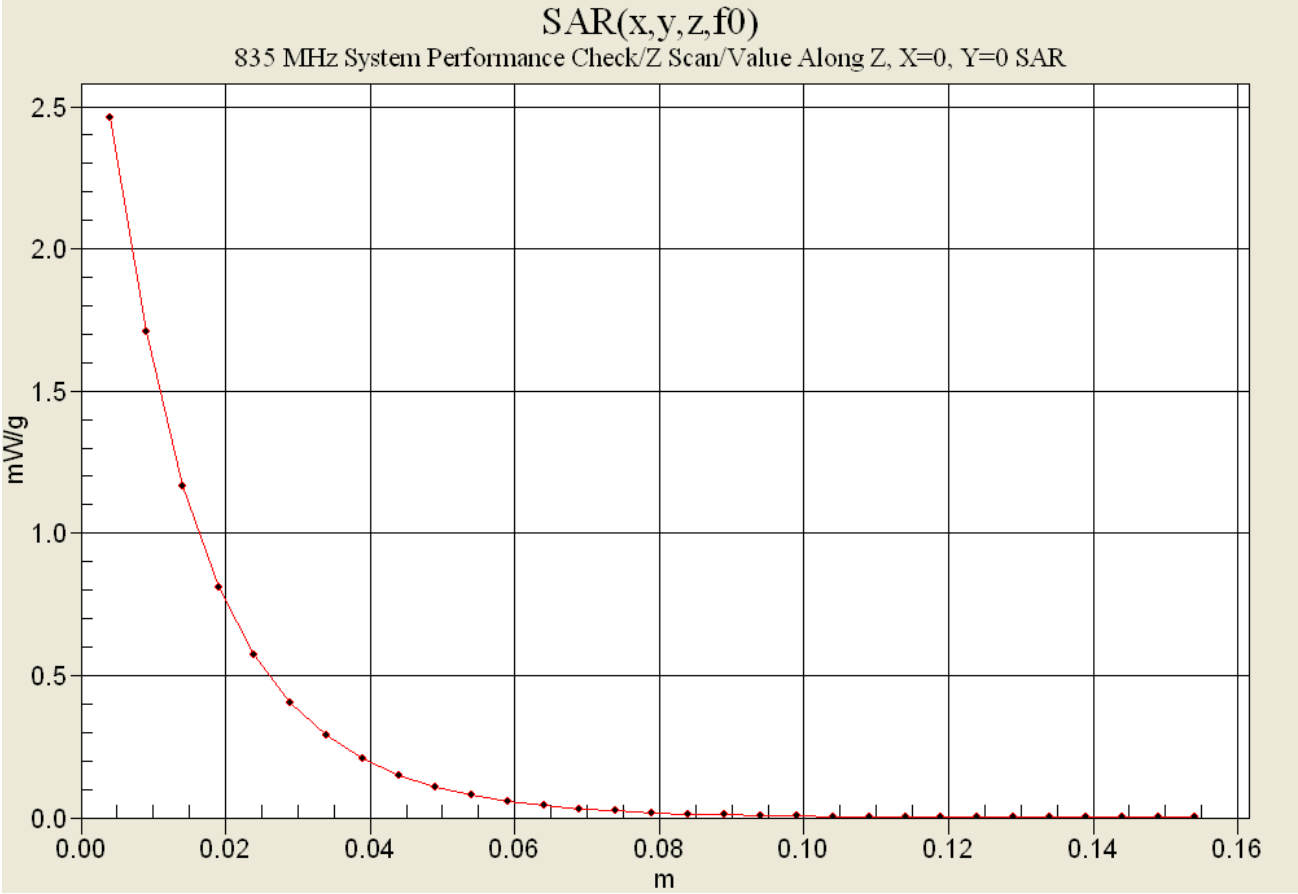
- Probe: ET3DV6 - SN1590; ConvF(7, 7, 7); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

835 MHz System Performance Check/Area Scan (6x10x1):
Measurement grid: dx=10mm, dy=10mm

835 MHz System Performance Check/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 3.17 W/kg
SAR(1 g) = 2.28 mW/g; SAR(10 g) = 1.51 mW/g
Reference Value = 55.8 V/m;
Power Drift = -0.004 dB



Z-Axis Scan


SAR(x,y,z,f0)
835 MHz System Performance Check/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

System Performance Check - 835 MHz Dipole

Date Tested: 03/24/04

DUT: Dipole 835 MHz; Model: D835V2; Type: System Performance Check; Serial: 411

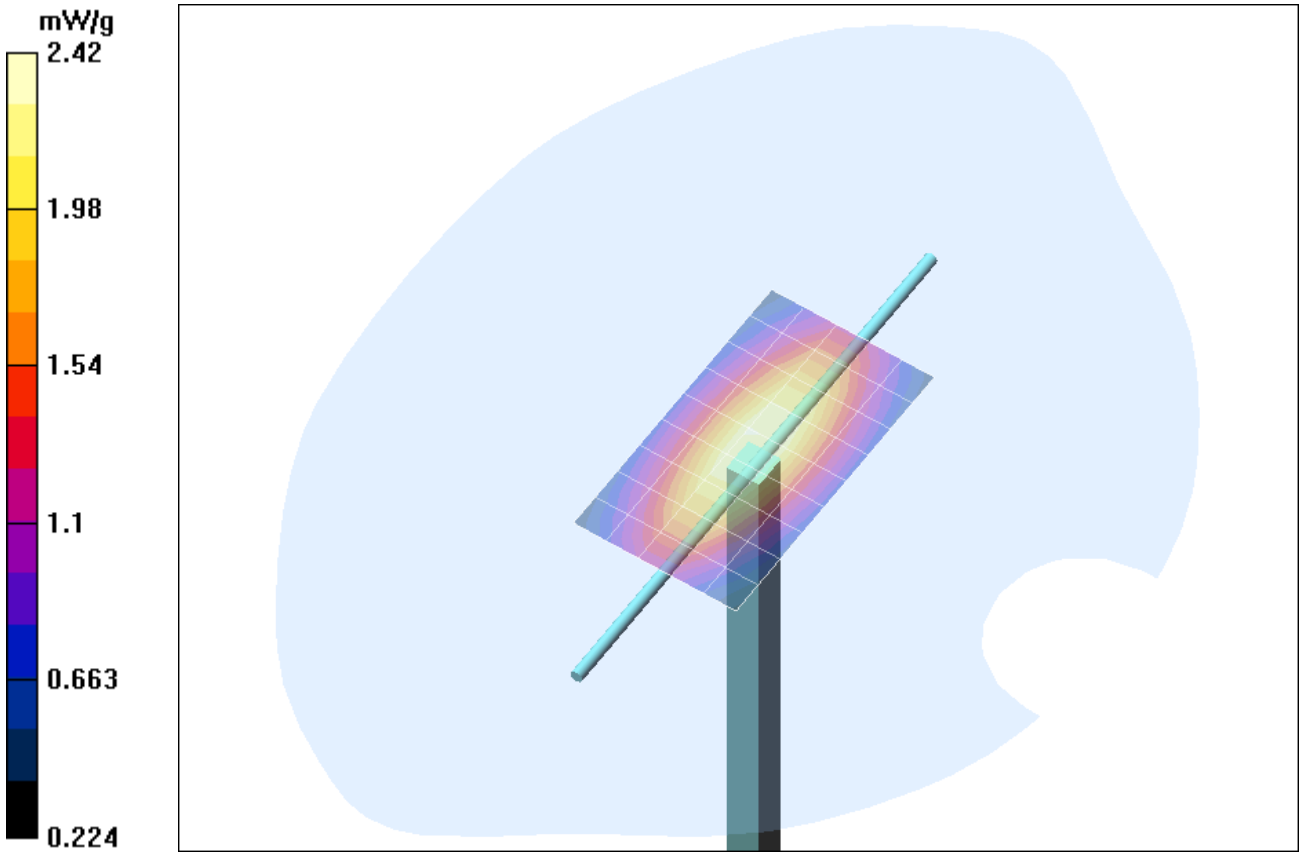
Ambient Temp: 22.9 °C; Fluid Temp: 22.7 °C; Barometric Pressure: 100.8 kPa; Humidity: 54%

Communication System: CW
Forward Conducted Power: 250mW
Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL835 (σ = 0.90 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3)

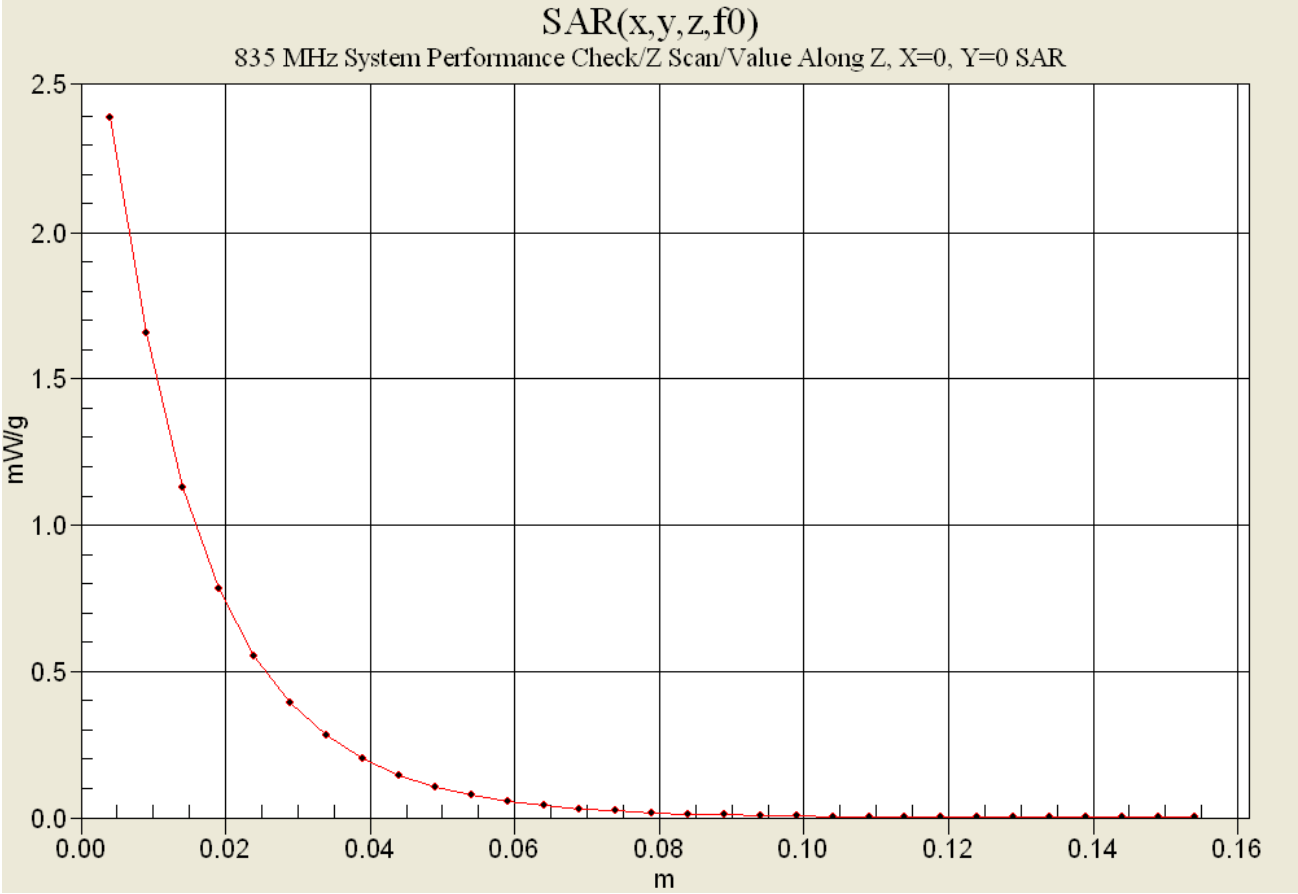
- Probe: ET3DV6 - SN1590; ConvF(7, 7, 7); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

835 MHz System Performance Check/Area Scan (6x10x1):
Measurement grid: dx=10mm, dy=10mm

835 MHz System Performance Check/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 3.11 W/kg
SAR(1 g) = 2.22 mW/g; SAR(10 g) = 1.47 mW/g
Reference Value = 55 V/m;
Power Drift = -0.0 dB



Z-Axis Scan


SAR(x,y,z,f0)
835 MHz System Performance Check/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

APPENDIX C - SYSTEM VALIDATION

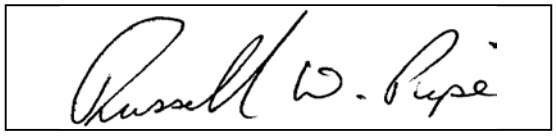
Celltech
Testing and Engineering Services Lab

835 MHz SYSTEM VALIDATION DIPOLE

Type:	**835 MHz Validation Dipole**
Serial Number:	**411**
Place of Calibration:	**Celltech Labs Inc.**
Date of Calibration:	**March 16, 2004**

Celltech Labs Inc. hereby certifies that this device has been calibrated on the date indicated above.

Calibrated by: 

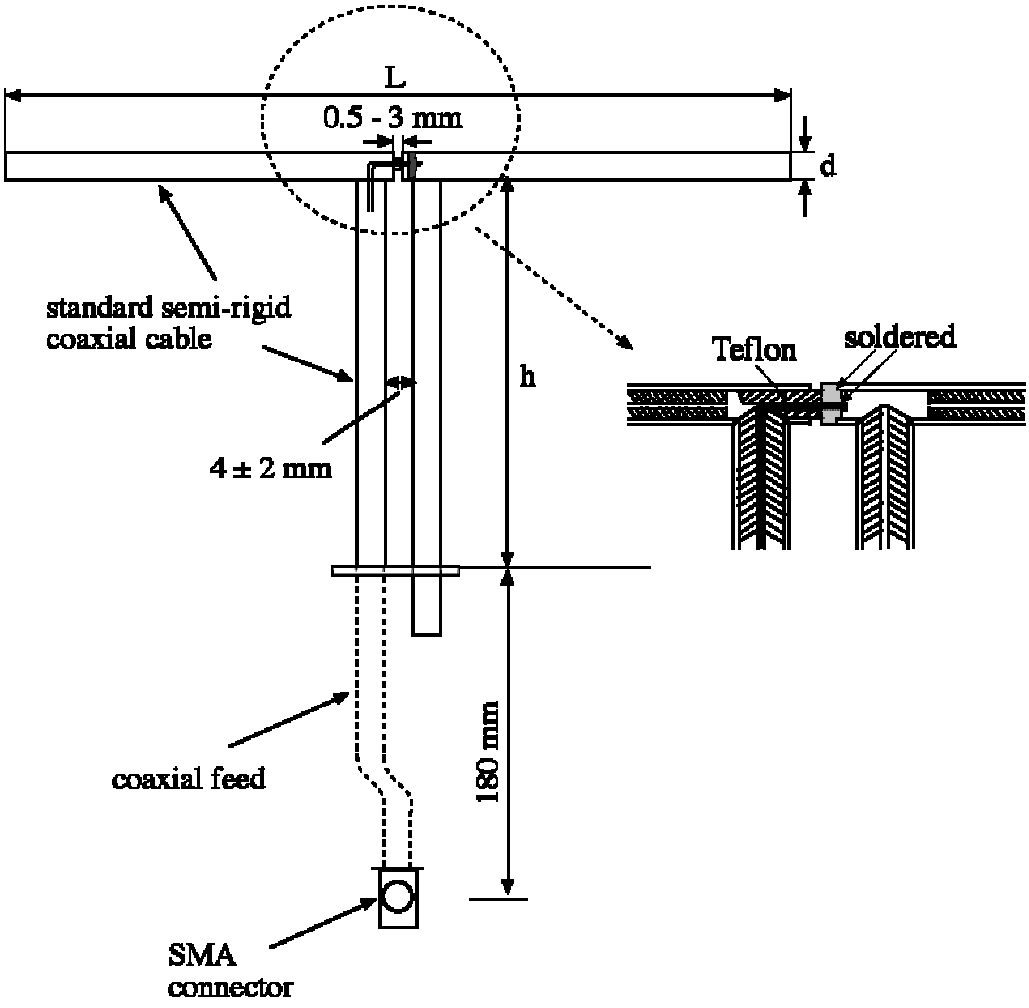
Approved by: 

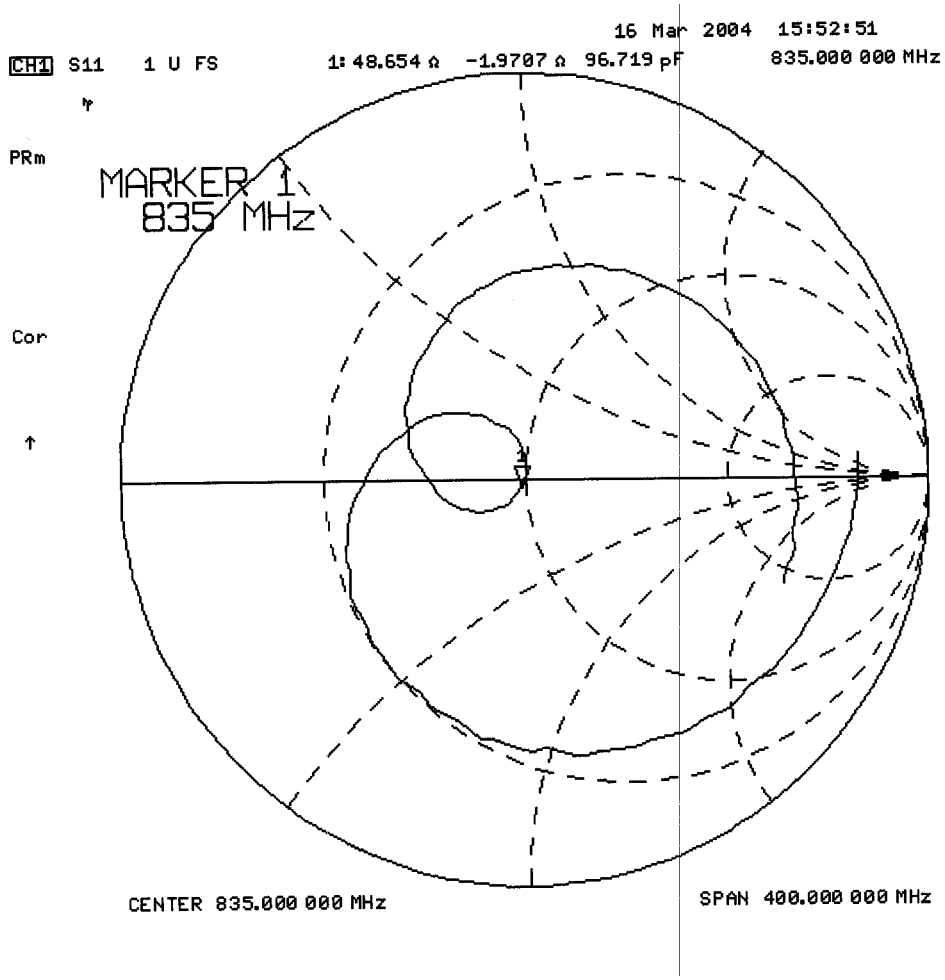
Celltech Labs Inc. 1955 Moss Court, Kelowna, B.C. Canada V1Y 9L3
Tel. 250-448-7047 • Fax. 250-448-7046 • e-mail: info@celltechlabs.com
www.celltechlabs.com

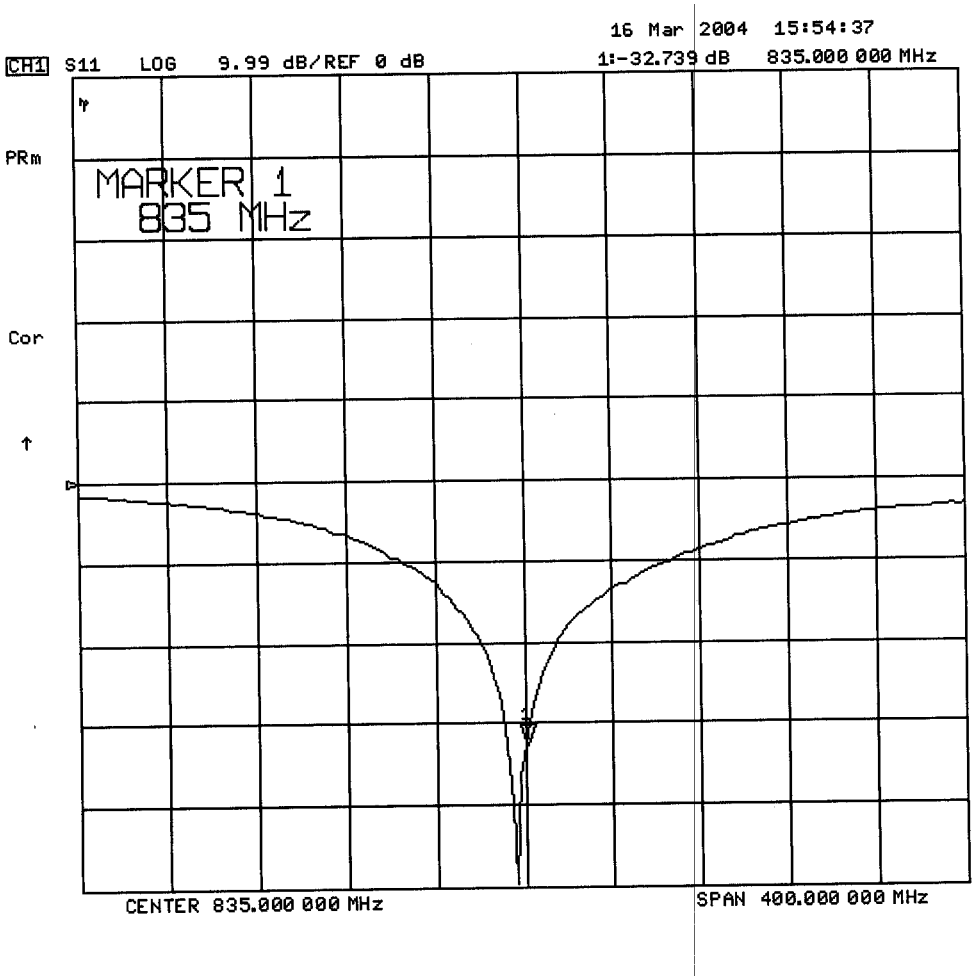
1. Dipole Construction & Electrical Characteristics

The validation dipole was constructed in accordance with the IEEE Standard "Annex G (informative) Reference dipoles for use in system validation". The electrical properties were measured using an HP 8753E Network Analyzer. The network analyzer was calibrated to the validation dipole N-type connector feed point using an HP85032E Type N calibration kit. The dipole was placed parallel to a planar phantom at a separation distance of 15.0mm from the simulating fluid using a loss-less dielectric spacer. The measured input impedance is:

Feed point impedance at 835MHz	Re{Z} = 48.654Ω
	Im{Z} = -1.9707Ω
Return Loss at 835MHz	-32.739dB




16 Mar 2004 15:52:51
CH1 S11 1 U FS
1: 48.654 Ω -1.9707 Ω 96.719 pF
835.000 000 MHz
PRm
MARKER 1
835 MHz
Cor
CENTER 835.000 000 MHz
SPAN 400.000 000 MHz


16 Mar 2004 15:54:37
CH1 S11 LOG 9.99 dB/REF 0 dB
1:-32.739 dB 835.000 000 MHz
PRm
MARKER 1
835 MHz
Cor
CENTER 835.000 000 MHz
SPAN 400.000 000 MHz

Validation Dipole Dimensions

Frequency (MHz)	L (mm)	h (mm)	d (mm)
300	420.0	250.0	6.2
450	288.0	167.0	6.2
835	161.0	89.8	3.6
900	149.0	83.3	3.6
1450	89.1	51.7	3.6
1800	72.0	41.7	3.6
1900	68.0	39.5	3.6
2000	64.5	37.5	3.6
2450	51.8	30.6	3.6
3000	41.5	25.0	3.6

2. Validation Phantom

The validation phantom is the SAM (Specific Anthropomorphic Mannequin) phantom manufactured by Schmid & Partner Engineering AG. The SAM phantom is a Fiberglass shell integrated in a wooden table. The shape of the shell corresponds to the phantom defined by SCC34-SC2. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

Shell Thickness: 2.0 ± 0.1 mm
Filling Volume: Approx. 20 liters
Dimensions: 50 cm (W) x 100 cm (L)

835 MHz System Validation Setup

835 MHz System Validation Setup

3. Measurement Conditions

The SAM phantom was filled with 835 MHz brain simulating tissue.

Relative Permittivity:	42.6
Conductivity:	0.94 mho/m
Ambient Temperature:	24.6 °C
Fluid Temperature:	21.9 °C
Fluid Depth:	≥ 15.0 cm
Barometric Pressure:	101.6 kPa
Humidity:	31%

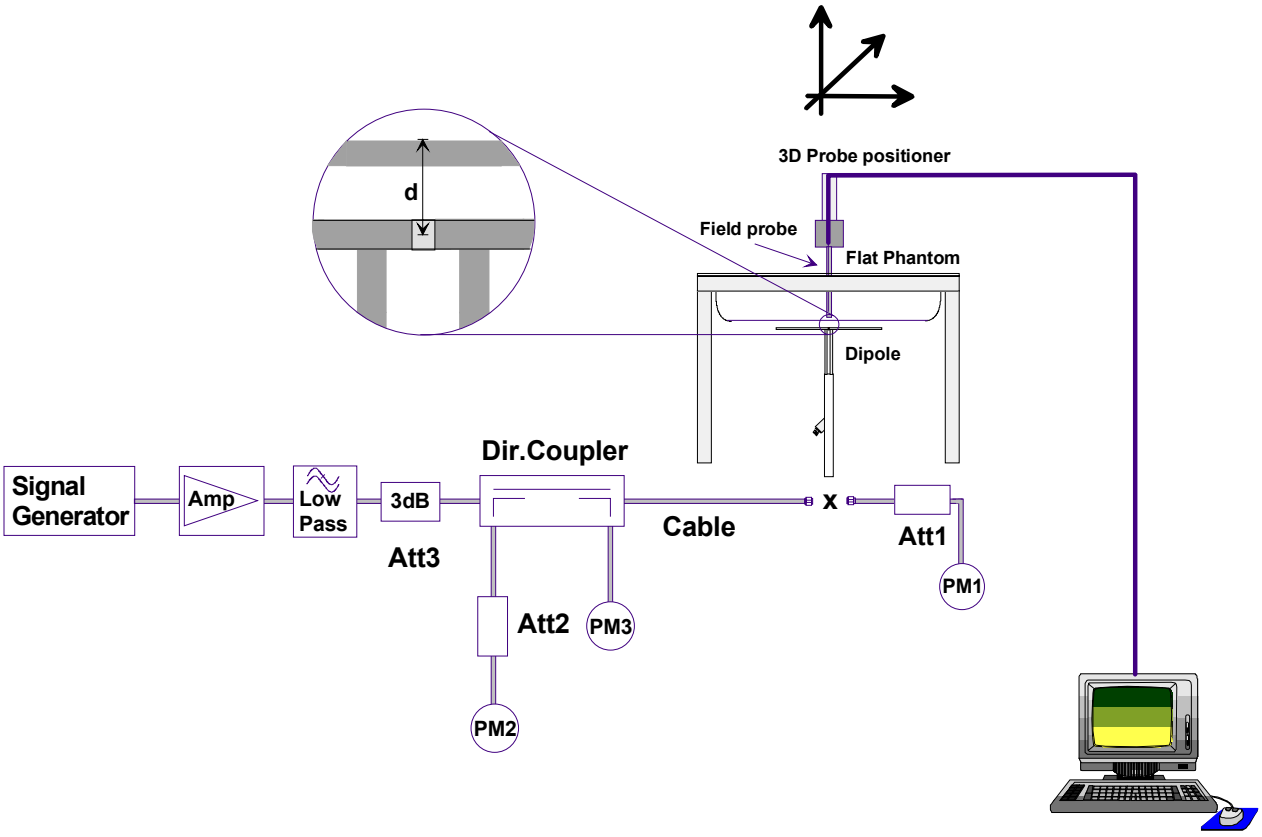
The 835 MHz simulating tissue consists of the following ingredients:

Ingredient	Percentage by weight
Water	40.71%
Sugar	56.63%
Salt	1.48%
HEC	0.99%
Dowicil 75	0.19%
Target Dielectric Parameters at 22 °C	ε_r = 41.5 σ = 0.90 S/m

Measurements were taken in the flat section of the SAM phantom using a dosimetric E-field probe ET3DV5 (s/n: 1590, conversion factor 7.0).

4. SAR Measurement

The SAR measurement was performed with the E-field probe in mechanical detection mode only. The setup and determination of the forward power into the dipole was performed using the following procedures.



First the power meter PM1 (including attenuator Att1) is connected to the cable to measure the forward power at the location of the dipole connector (X). The signal generator is adjusted for the desired forward power at the dipole connector (taking into account the attenuation of Att1) as read by power meter PM2. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2. If the signal generator does not allow adjustment in 0.01dB steps, the remaining difference at PM2 must be taken into consideration. PM3 records the reflected power from the dipole to ensure that the value is not changed from the previous value. The reflected power should be 20dB below the forward power.

Ten SAR measurements were performed in order to achieve repeatability and to establish an average target value.

Validation Dipole SAR Test Results

Validation Measurement	SAR @ 0.25W Input averaged over 1g	SAR @ 1W Input averaged over 1g	SAR @ 0.25W Input averaged over 10g	SAR @ 1W Input averaged over 10g	Peak SAR @ 0.25W Input
Test 1	2.46	9.84	1.61	6.44	3.56
Test 2	2.45	9.80	1.60	6.40	3.56
Test 3	2.45	9.80	1.61	6.44	3.56
Test 4	2.44	9.76	1.60	6.40	3.55
Test 5	2.43	9.72	1.60	6.40	3.53
Test 6	2.44	9.76	1.60	6.40	3.53
Test 7	2.44	9.76	1.60	6.40	3.55
Test 8	2.44	9.76	1.60	6.40	3.54
Test 9	2.47	9.88	1.62	6.48	3.58
Test10	2.47	9.88	1.62	6.48	3.62
Average Value	2.45	9.80	1.61	6.42	3.56

The results have been normalized to 1W (forward power) into the dipole.

Averaged over 1cm (1g) of tissue: 9.80 mW/g

Averaged over 10cm (10g) of tissue: 6.42 mW/g

835 MHz System Validation - March 16, 2004

DUT: Dipole 835 MHz; Type: D835V2; Serial: 411
Ambient Temp: 24.6°C; Fluid Temp: 21.9°C; Barometric Pressure: 101.6 kPa; Humidity: 31%

Communication System: CW
Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL835 (σ = 0.94 mho/m; ε_r = 42.6; ρ = 1000 kg/m^3)

- Probe: ET3DV6 - SN1590; ConvF(7, 7, 7); Calibrated: 15/05/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn353; Calibrated: 19/12/2003
- Phantom: SAM 4.0; Type: Fiberglas; Serial: 1033
- Measurement SW: DASY4, V4.2 Build 37; Postprocessing SW: SEMCAD, V1.8 Build 109

835 MHz System Validation/Area Scan (6x10x1): Measurement grid: dx=10mm, dy=10mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB

835 MHz System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.56 W/kg
SAR(1 g) = 2.46 mW/g; SAR(10 g) = 1.61 mW/g

835 MHz System Validation/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.56 W/kg
SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.6 mW/g

835 MHz System Validation/Zoom Scan 3 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.56 W/kg
SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.61 mW/g

835 MHz System Validation/Zoom Scan 5 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.55 W/kg
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g

835 MHz System Validation/Zoom Scan 6 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.6 mW/g

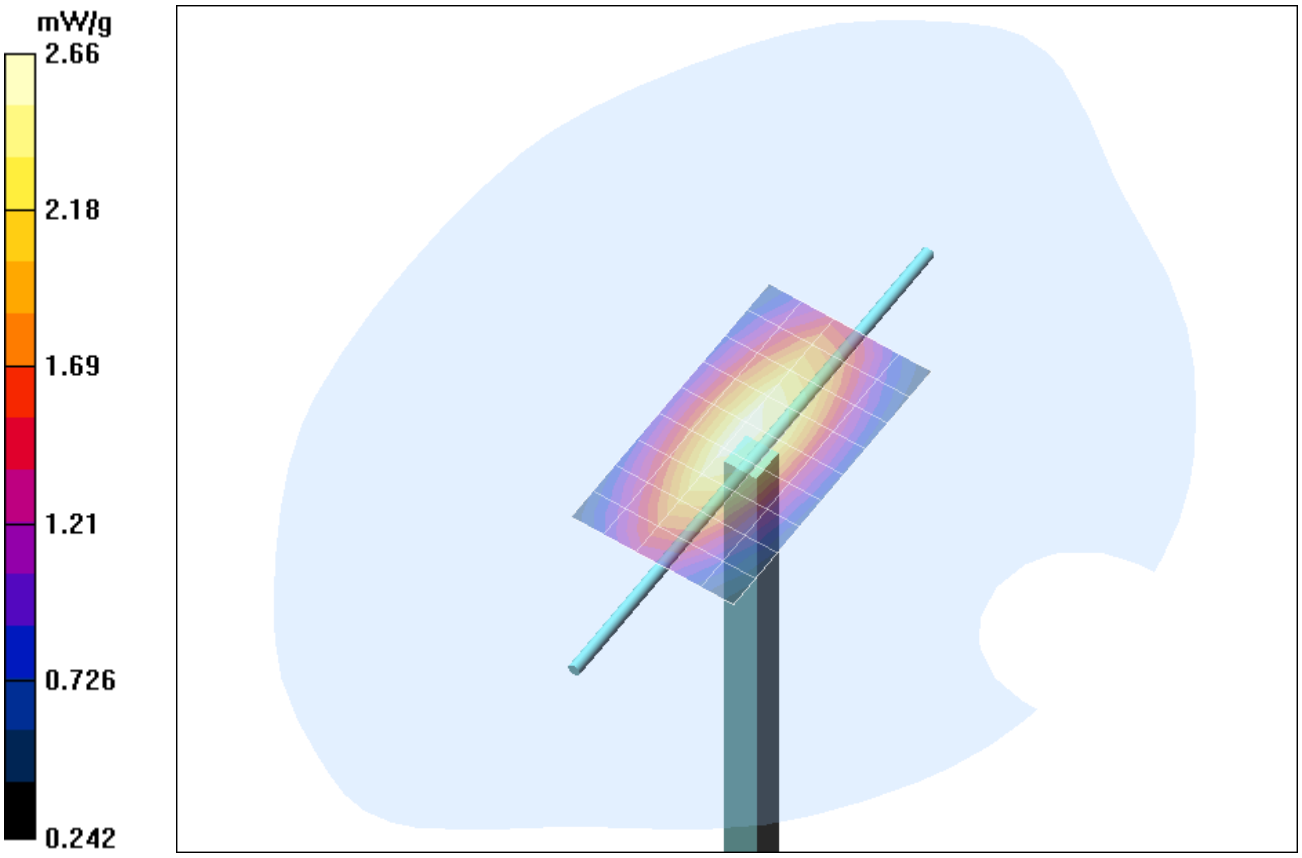
835 MHz System Validation/Zoom Scan 7 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g

835 MHz System Validation/Zoom Scan 8 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.55 W/kg
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g

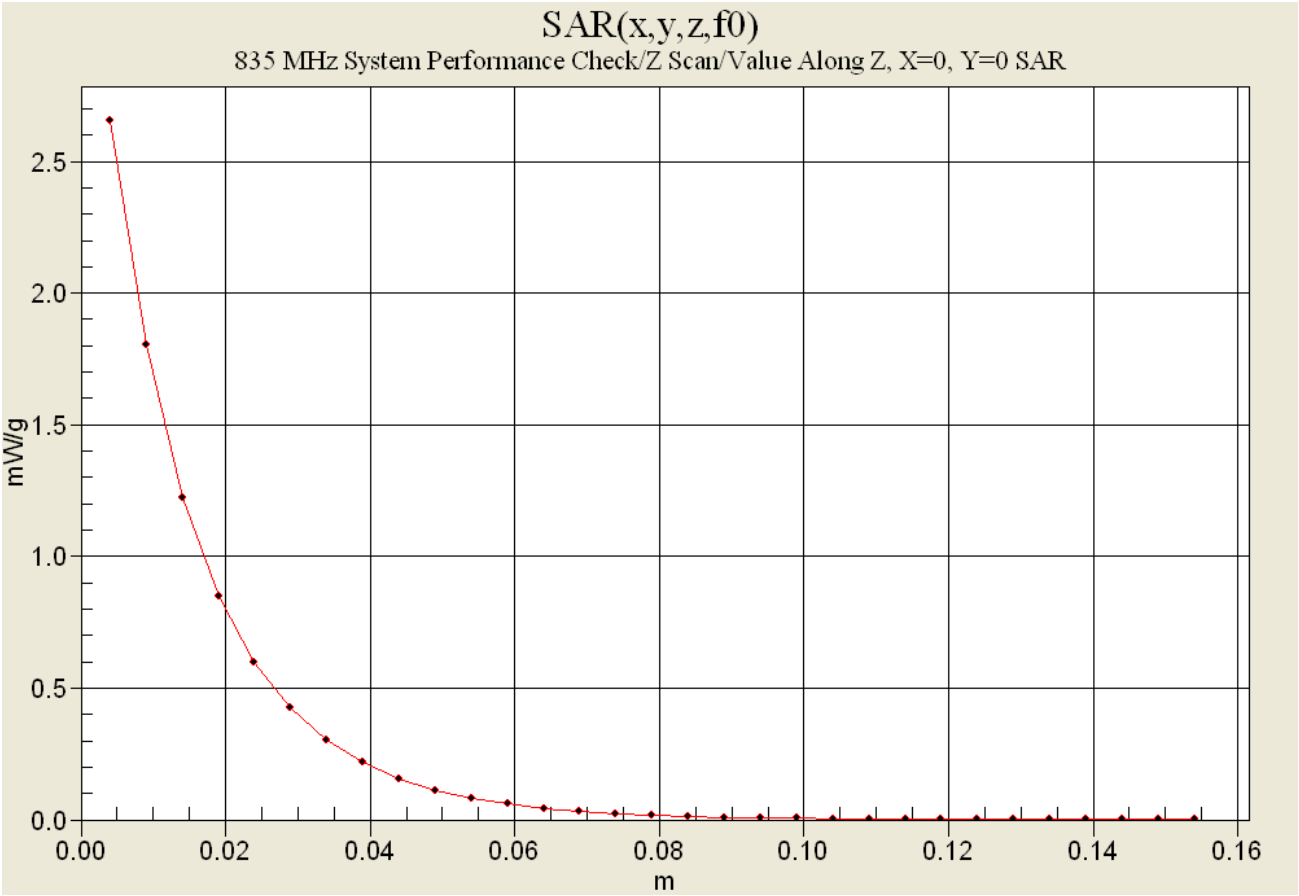
835 MHz System Validation/Zoom Scan 9 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.54 W/kg
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g

835 MHz System Validation/Zoom Scan 11 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.58 W/kg
SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.62 mW/g

835 MHz System Validation/Zoom Scan 12 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.62 mW/g



1 g average of 10 measurements: 2.449 mW/g
10 g average of 10 measurements: 1.606 mW/g



835 MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

March 16, 2004

Frequency	e'	e"
735.000000 MHz	43.8577	20.6938
745.000000 MHz	43.6899	20.6481
755.000000 MHz	43.5341	20.5840
765.000000 MHz	43.4161	20.5576
775.000000 MHz	43.3026	20.5312
785.000000 MHz	43.2065	20.5122
795.000000 MHz	43.1067	20.5061
805.000000 MHz	43.0154	20.4762
815.000000 MHz	42.8927	20.4182
825.000000 MHz	42.7420	20.3806
835.000000 MHz	42.6206	20.2993
845.000000 MHz	42.4357	20.2595
855.000000 MHz	42.2984	20.1872
865.000000 MHz	42.1422	20.1432
875.000000 MHz	42.0082	20.1253
885.000000 MHz	41.8996	20.1110
895.000000 MHz	41.8514	20.0192
905.000000 MHz	41.7550	20.0083
915.000000 MHz	41.6535	19.9701
925.000000 MHz	41.5521	19.9380
935.000000 MHz	41.4477	19.9175

APPENDIX D - PROBE CALIBRATION

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

Client **Celltech Labs**

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1590
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	May 15, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Power sensor E4412A	MY41495277	2-Apr-03 (METAS, No 252-0250)	Apr-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (Agilent, No. 20020918)	Sep-03
Power meter EPM E4419B	GB41293874	2-Apr-03 (METAS, No 252-0250)	Apr-04
Network Analyzer HP 8753E	US38432426	3-May-00 (Agilent, No. 8702K064602)	In house check: May 03
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01 (ELCAL, No.2360)	Sep-03

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: May 15, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Probe ET3DV6

SN:1590

Manufactured:	March 19, 2001
Last calibration:	April 26, 2002
Recalibrated:	May 15, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1590

Sensitivity in Free Space

Diode Compression

NormX	**1.76** $\mu V/(V/m)^2$	DCP X	**92**	mV
NormY	**1.91** $\mu V/(V/m)^2$	DCP Y	**92**	mV
NormZ	**1.66** $\mu V/(V/m)^2$	DCP Z	**92**	mV

Sensitivity in Tissue Simulating Liquid

Head 900 MHz ε_r = 41.5 ± 5% σ = 0.97 ± 5% mho/m

Valid for f=800-1000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**7.0** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**7.0** ± 9.5% (k=2)	Alpha	**0.33**
ConvF Z	**7.0** ± 9.5% (k=2)	Depth	**2.56**

Head 1800 MHz ε_r = 40.0 ± 5% σ = 1.40 ± 5% mho/m

Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**5.5** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.5** ± 9.5% (k=2)	Alpha	**0.44**
ConvF Z	**5.5** ± 9.5% (k=2)	Depth	**2.69**

Boundary Effect

Head **900 MHz** **Typical SAR gradient: 5 % per mm**

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	8.7	5.0
SAR_{be} [%]	With Correction Algorithm	0.3	0.5

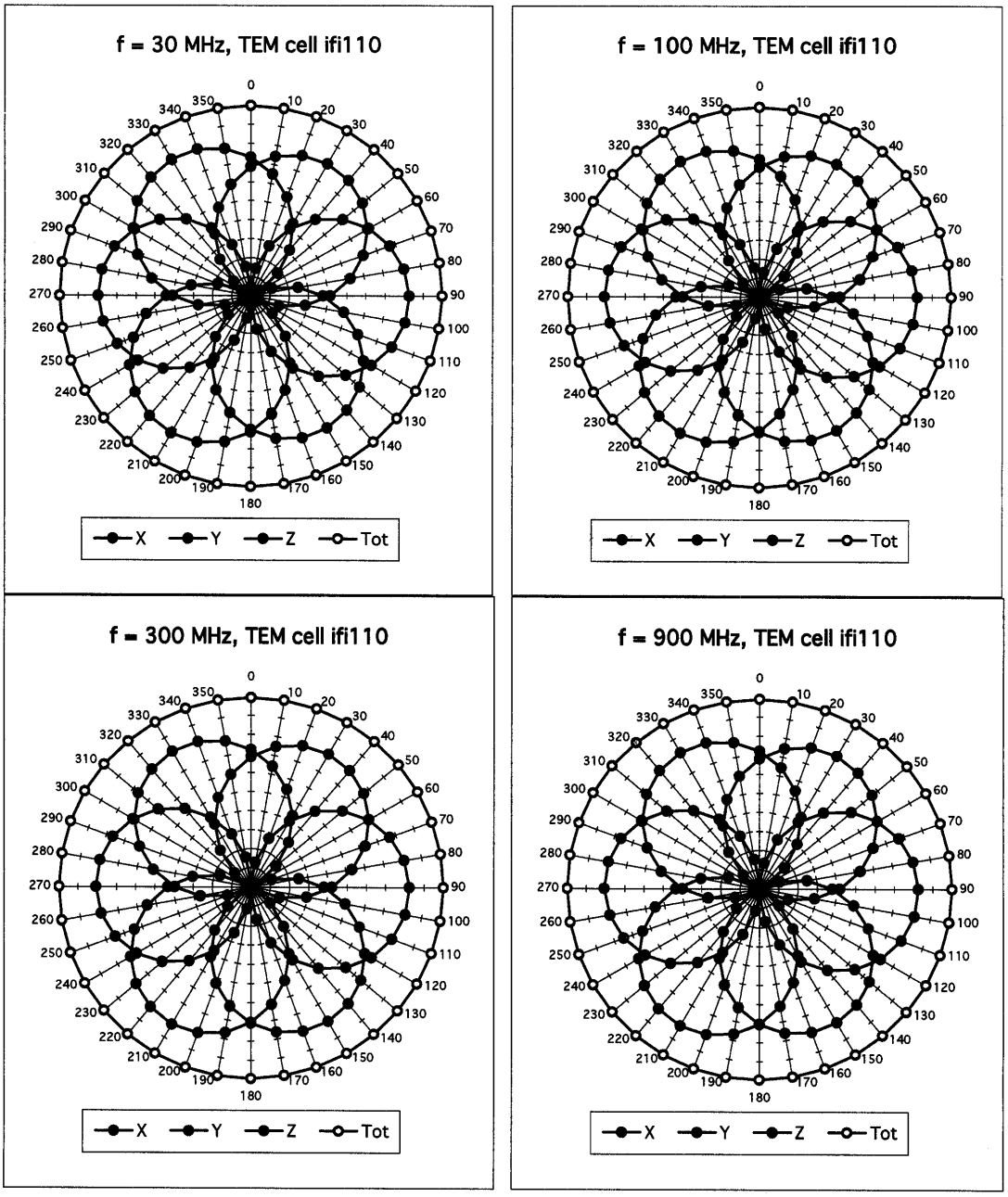
Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

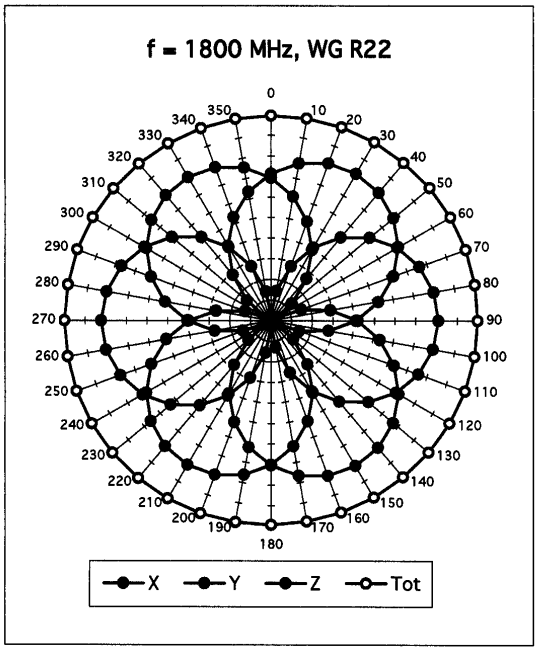
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	12.3	8.5
SAR_{be} [%]	With Correction Algorithm	0.2	0.1

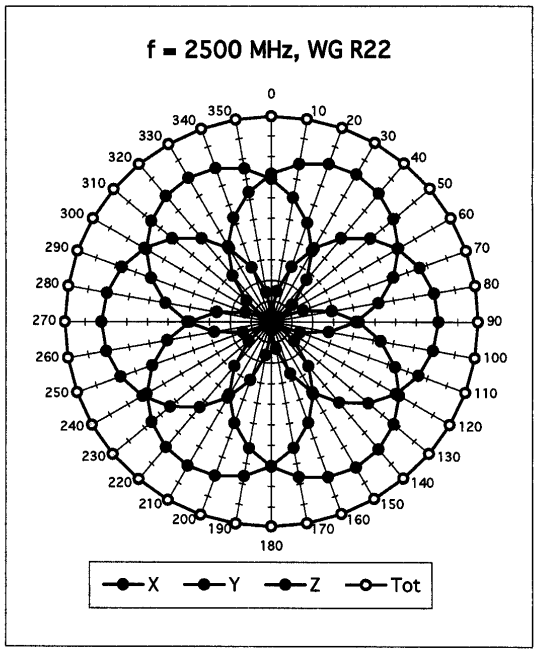
Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.4 ± 0.2**	mm

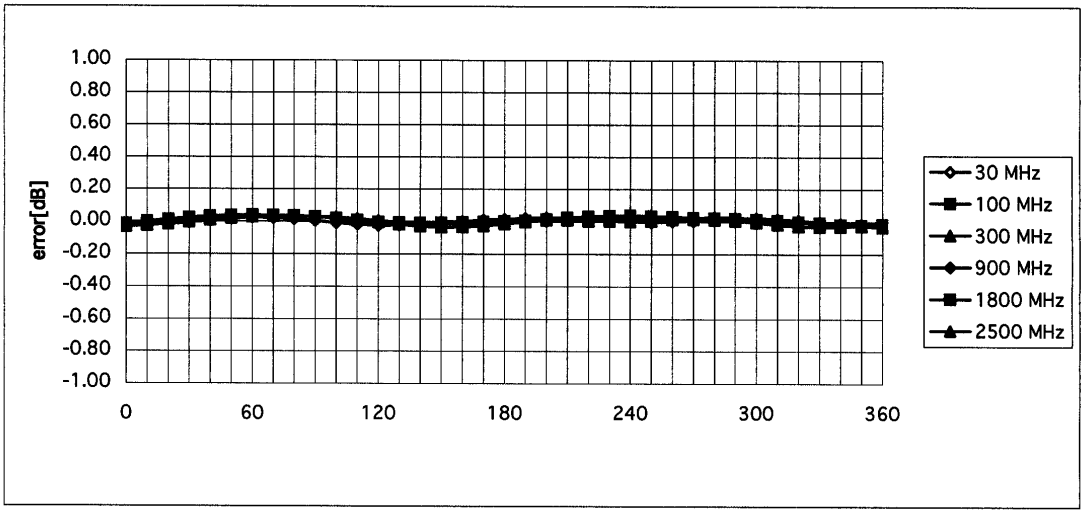
Receiving Pattern (ϕ), θ = 0°





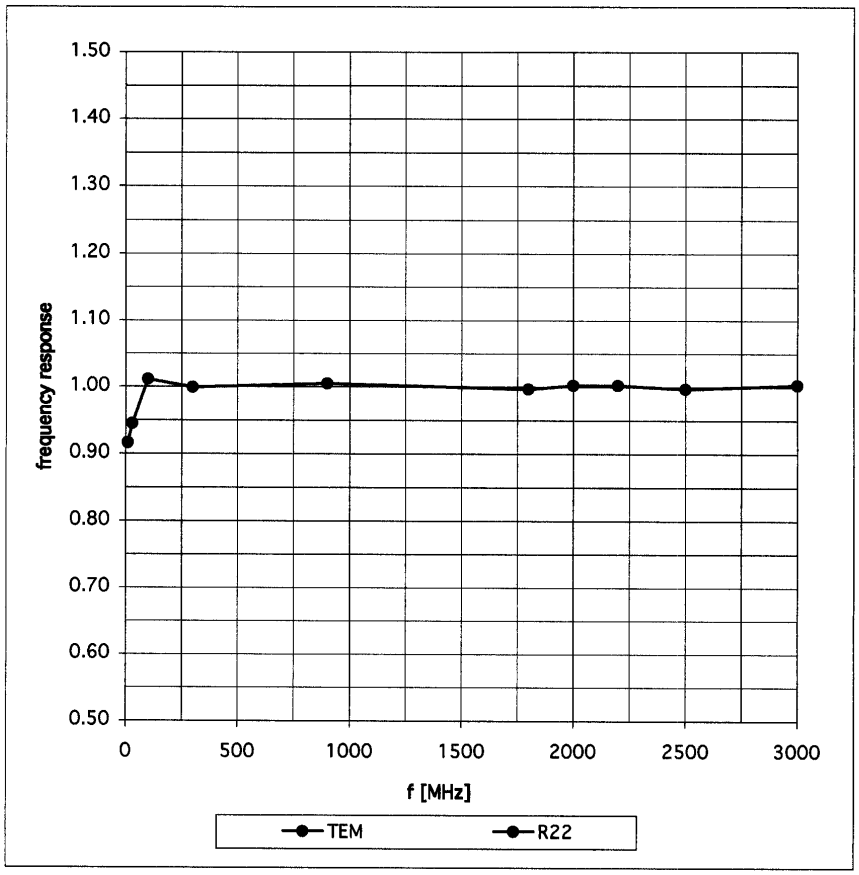


Isotropy Error (ϕ), θ = 0°



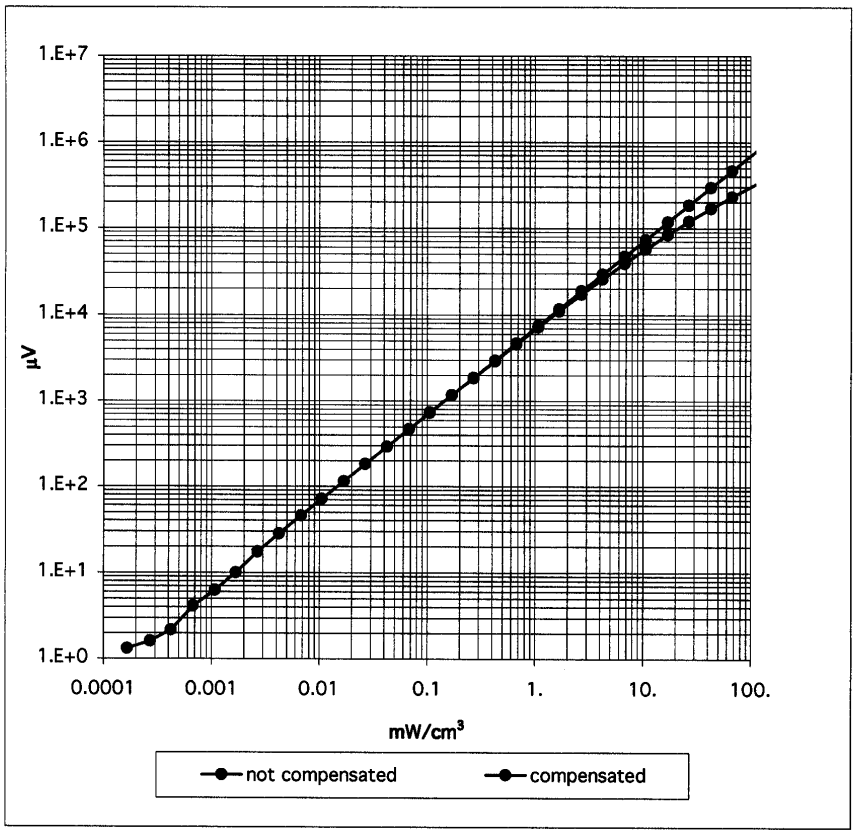
Frequency Response of E-Field

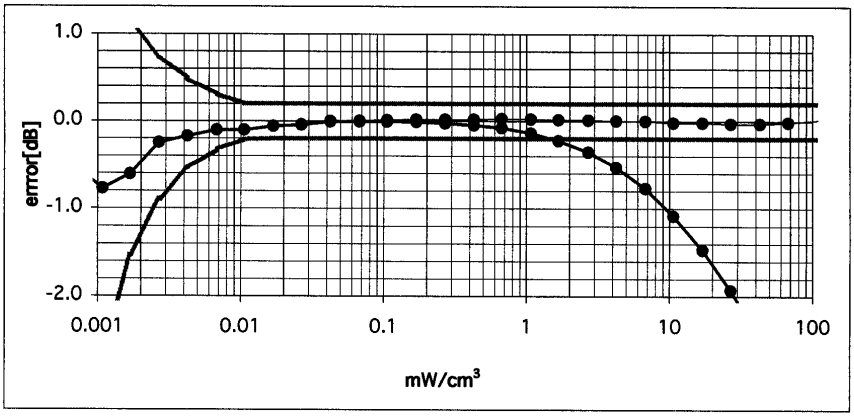
(TEM-Cell:ifi110, Waveguide R22)



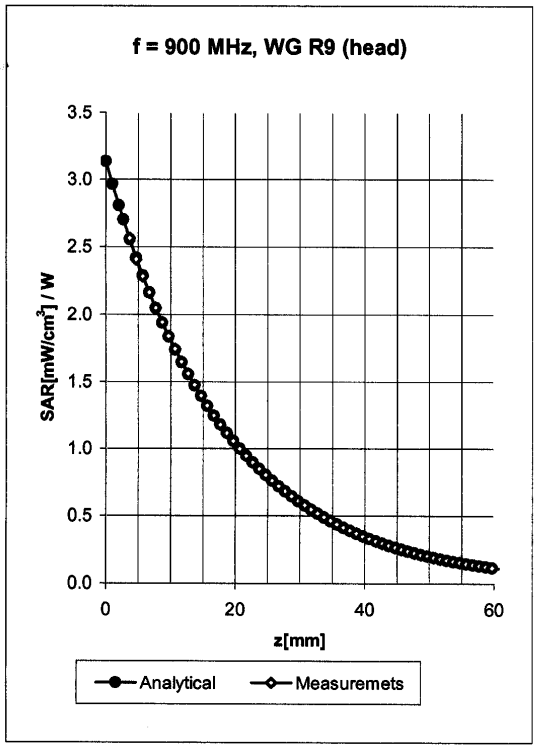
Dynamic Range f(SAR_{brain})

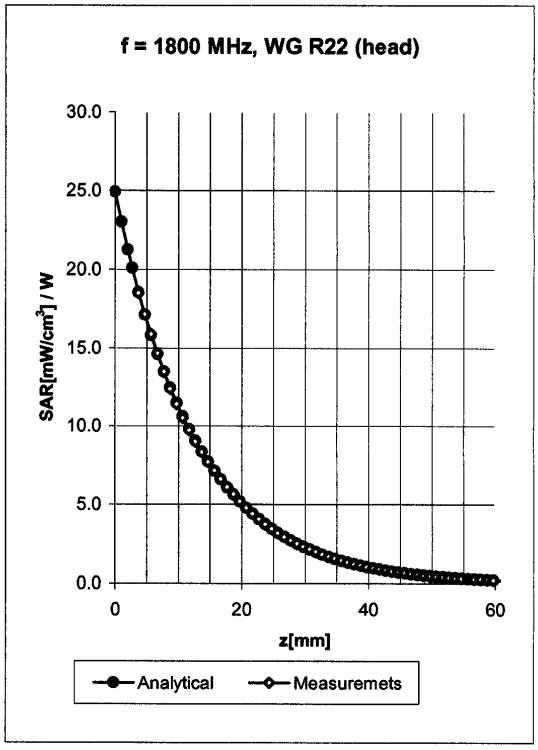
(Waveguide R22)





Conversion Factor Assessment





Head	900 MHz	ε_r = 41.5 ± 5%	σ = 0.97 ± 5% mho/m

Valid for f=800-1000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

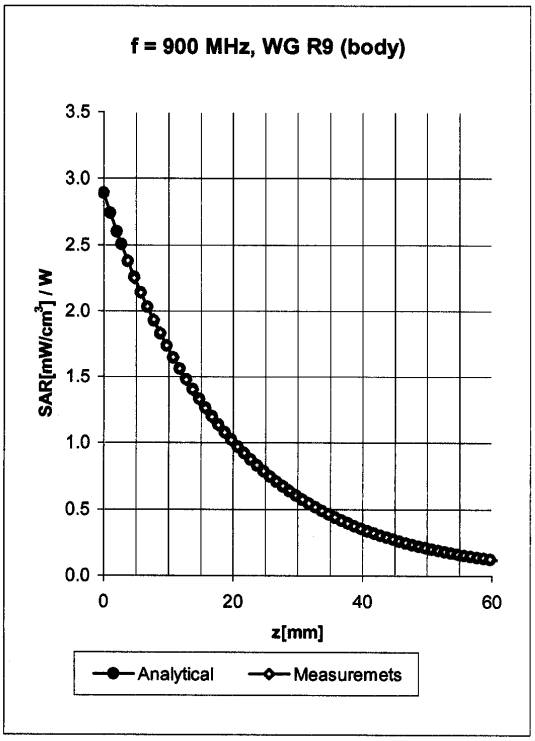
ConvF X	7.0 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	7.0 ± 9.5% (k=2)	Alpha	**0.33**
ConvF Z	7.0 ± 9.5% (k=2)	Depth	**2.56**

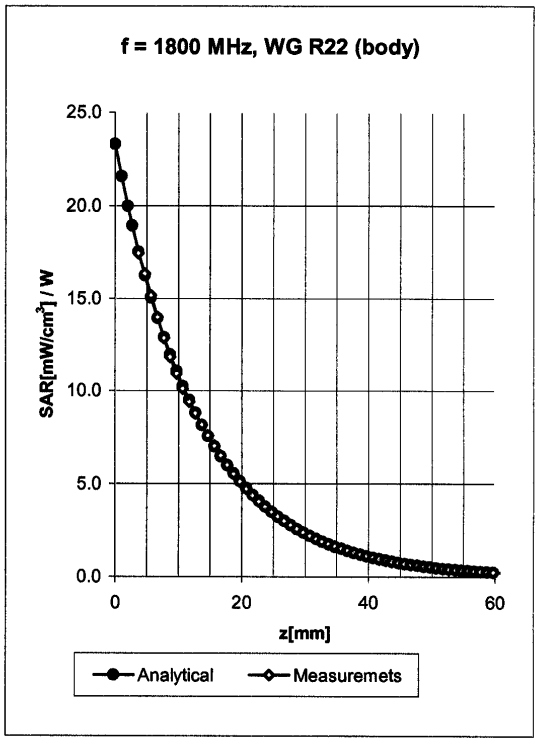
Head	1800 MHz	ε_r = 40.0 ± 5%	σ = 1.40 ± 5% mho/m

Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	5.5 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.5 ± 9.5% (k=2)	Alpha	**0.44**
ConvF Z	5.5 ± 9.5% (k=2)	Depth	**2.69**

Conversion Factor Assessment





Body 900 MHz ε_r = 55.0 ± 5% σ = 1.05 ± 5% mho/m

Valid for f=800-1000 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

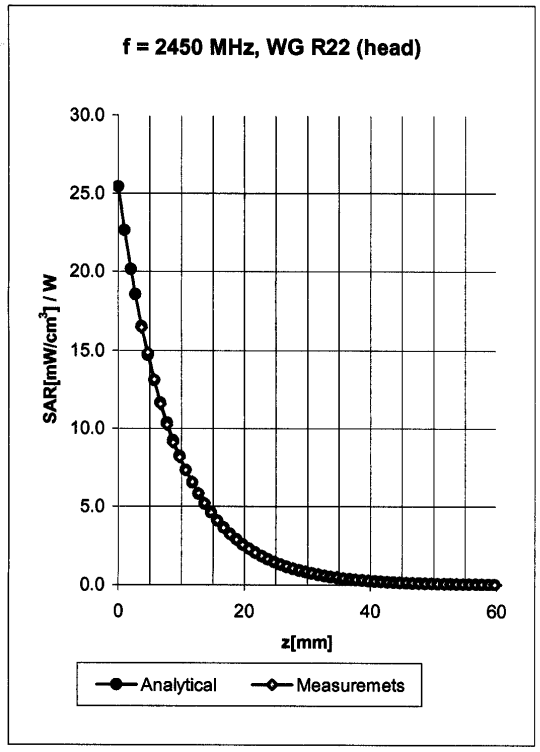
ConvF X	6.8 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.8 ± 9.5% (k=2)	Alpha	**0.34**
ConvF Z	6.8 ± 9.5% (k=2)	Depth	**2.61**

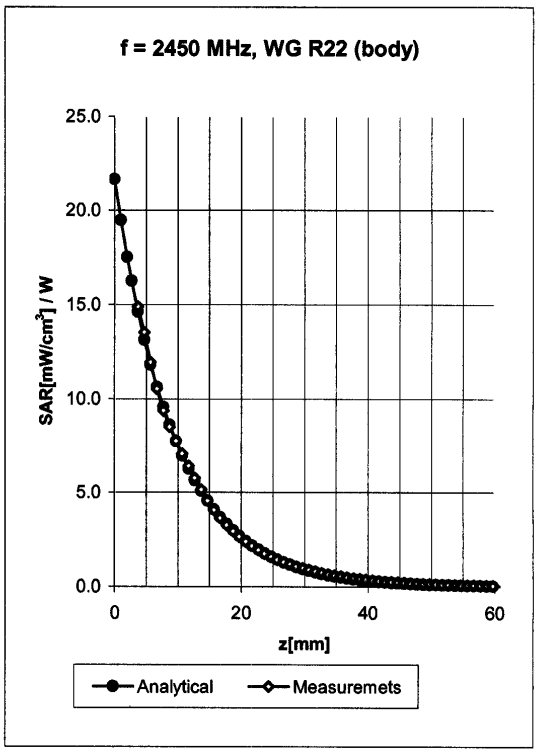
Body 1800 MHz ε_r = 53.3 ± 5% σ = 1.52 ± 5% mho/m

Valid for f=1710-1910 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	5.0 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.0 ± 9.5% (k=2)	Alpha	**0.52**
ConvF Z	5.0 ± 9.5% (k=2)	Depth	**2.69**

Conversion Factor Assessment





Head	2450	MHz	ε_r = 39.2 ± 5%	σ = 1.80 ± 5% mho/m

Valid for f=2400-2500 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	5.0 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	5.0 ± 8.9% (k=2)	Alpha	**0.88**
ConvF Z	5.0 ± 8.9% (k=2)	Depth	**1.92**

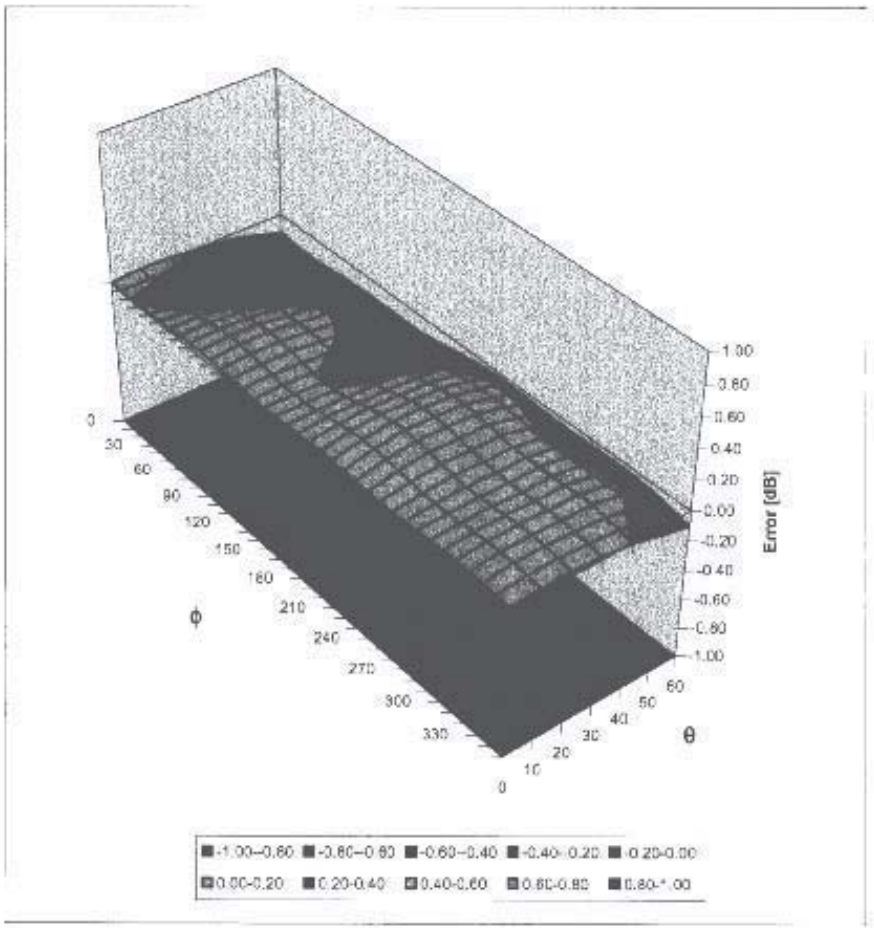
Body	2450	MHz	ε_r = 52.7 ± 5%	σ = 1.95 ± 5% mho/m

Valid for f=2400-2500 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	4.4 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	4.4 ± 8.9% (k=2)	Alpha	**0.90**
ConvF Z	4.4 ± 8.9% (k=2)	Depth	**1.87**

Deviation from Isotropy in HSL

Error (θ,φ), f = 900 MHz



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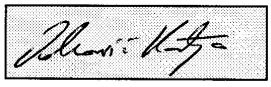
Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1590**
Place of Assessment:	**Zurich**
Date of Assessment:	**May 19, 2003**
Probe Calibration Date:	**May 15, 2003**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:



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Dosimetric E-Field Probe ET3DV6 SN:1590

Conversion factor (± standard deviation)

150 MHz	ConvF	**9.6 ± 8%**	**ε_r = 52.3 ± 5%** **σ = 0.76 ± 5% mho/m** (head tissue)
300 MHz	ConvF	**8.3 ± 8%**	**ε_r = 45.3 ± 5%** **σ = 0.87 ± 5% mho/m** (head tissue)
450 MHz	ConvF	**7.9 ± 8%**	**ε_r = 43.5 ± 5%** **σ = 0.87 ± 5% mho/m** (head tissue)
150 MHz	ConvF	**9.2 ± 8%**	**ε_r = 61.9 ± 5%** **σ = 0.80 ± 5% mho/m** (body tissue)
450 MHz	ConvF	**8.1 ± 8%**	**ε_r = 56.7 ± 5%** **σ = 0.94 ± 5% mho/m** (body tissue)

APPENDIX E - MEASURED FLUID DIELECTRIC PARAMETERS

835 MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

March 23, 2004

Frequency	e'	e"
785.000000 MHz	42.0050	19.9344
790.000000 MHz	41.9419	19.9080
795.000000 MHz	41.8853	19.9021
800.000000 MHz	41.8446	19.8703
805.000000 MHz	41.7798	19.8671
810.000000 MHz	41.7248	19.8561
815.000000 MHz	41.6899	19.8560
820.000000 MHz	41.6277	19.8313
825.000000 MHz	41.5439	19.8023
830.000000 MHz	41.4710	19.8079
835.000000 MHz	41.4125	19.8045
840.000000 MHz	41.3620	19.7885
845.000000 MHz	41.2600	19.7350
850.000000 MHz	41.1853	19.7370
855.000000 MHz	41.1404	19.7309
860.000000 MHz	41.0706	19.6702
865.000000 MHz	40.9720	19.6493
870.000000 MHz	40.9232	19.6554
875.000000 MHz	40.8819	19.6493
880.000000 MHz	40.8173	19.6299
885.000000 MHz	40.7537	19.6106

861 MHz DUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

March 23, 2004

Frequency	e'	e"
811.000000 MHz	54.1979	21.6500
813.000000 MHz	54.1778	21.6461
815.000000 MHz	54.1562	21.6372
817.000000 MHz	54.1429	21.6197
819.000000 MHz	54.1275	21.5806
821.000000 MHz	54.1153	21.5964
823.000000 MHz	54.0727	21.5897
825.000000 MHz	54.0546	21.5574
827.000000 MHz	53.9977	21.5560
829.000000 MHz	53.9965	21.5234
831.000000 MHz	53.9535	21.5282
833.000000 MHz	53.9232	21.5064
835.000000 MHz	53.9294	21.4934
837.000000 MHz	53.8702	21.4823
839.000000 MHz	53.8599	21.4534
841.000000 MHz	53.8216	21.4679
843.000000 MHz	53.7948	21.4233
845.000000 MHz	53.7691	21.4113
847.000000 MHz	53.7244	21.4065
849.000000 MHz	53.7027	21.4041
851.000000 MHz	53.6680	21.3957
853.000000 MHz	53.6551	21.3575
855.000000 MHz	53.6077	21.3431
857.000000 MHz	53.6093	21.3431
859.000000 MHz	53.5683	21.3158
861.000000 MHz	53.5417	21.3263
863.000000 MHz	53.5306	21.3203
865.000000 MHz	53.4961	21.2801
867.000000 MHz	53.4701	21.2905
869.000000 MHz	53.4442	21.3009
871.000000 MHz	53.4244	21.2984
873.000000 MHz	53.4141	21.2922
875.000000 MHz	53.3910	21.2802
877.000000 MHz	53.3531	21.2846
879.000000 MHz	53.3374	21.2911
881.000000 MHz	53.3405	21.2906
883.000000 MHz	53.3145	21.2693
885.000000 MHz	53.3086	21.2721
887.000000 MHz	53.2786	21.2947
889.000000 MHz	53.2750	21.2755
891.000000 MHz	53.2751	21.2655
893.000000 MHz	53.2611	21.2188
895.000000 MHz	53.2539	21.2169

835 MHz System Performance Check & 861 MHz DUT Evaluation (Face)

Measured Fluid Dielectric Parameters (Brain)

March 24, 2004

Frequency	e'	e"
811.000000 MHz	40.9116	19.4443
813.000000 MHz	40.8982	19.3621
815.000000 MHz	40.8444	19.4088
817.000000 MHz	40.8304	19.4234
819.000000 MHz	40.8298	19.4077
821.000000 MHz	40.8013	19.3676
823.000000 MHz	40.7814	19.3784
825.000000 MHz	40.7150	19.4125
827.000000 MHz	40.7220	19.3842
829.000000 MHz	40.6780	19.3436
831.000000 MHz	40.6307	19.3672
833.000000 MHz	40.6326	19.3774
835.000000 MHz	40.6168	19.3610
837.000000 MHz	40.5914	19.3472
839.000000 MHz	40.5494	19.3485
841.000000 MHz	40.5022	19.3304
843.000000 MHz	40.4686	19.3608
845.000000 MHz	40.4649	19.3101
847.000000 MHz	40.3991	19.2975
849.000000 MHz	40.3661	19.3277
851.000000 MHz	40.3829	19.3131
853.000000 MHz	40.3439	19.2831
855.000000 MHz	40.2886	19.2680
857.000000 MHz	40.2770	19.2614
859.000000 MHz	40.2492	19.2697
861.000000 MHz	40.2420	19.2415
863.000000 MHz	40.1903	19.2361
865.000000 MHz	40.1482	19.2280
867.000000 MHz	40.1237	19.2457
869.000000 MHz	40.1035	19.2418
871.000000 MHz	40.0674	19.2170
873.000000 MHz	40.0462	19.2085
875.000000 MHz	40.0276	19.2446
877.000000 MHz	40.0213	19.2168
879.000000 MHz	39.9686	19.2021
881.000000 MHz	39.9545	19.2169
883.000000 MHz	39.9419	19.2010
885.000000 MHz	39.9069	19.2117
887.000000 MHz	39.8761	19.2011
889.000000 MHz	39.8770	19.2315
891.000000 MHz	39.8767	19.2222
893.000000 MHz	39.8764	19.1435
895.000000 MHz	39.8644	19.1278

APPENDIX F - SAM PHANTOM CERTIFICATE OF CONFORMITY

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 BA
Series No	TP-1002 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

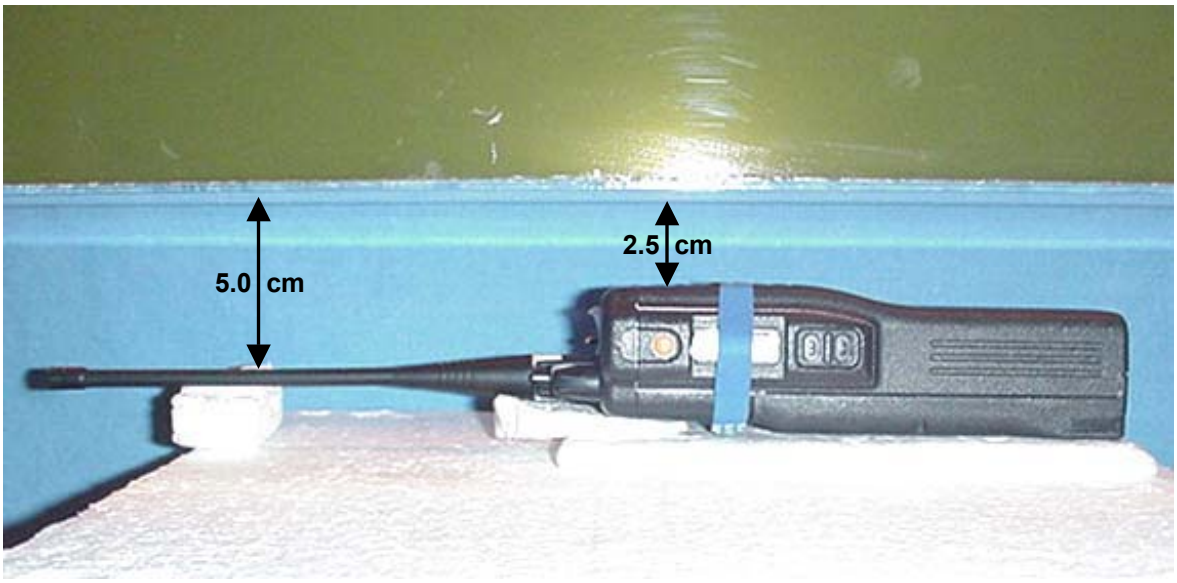
Date 18.11.2001

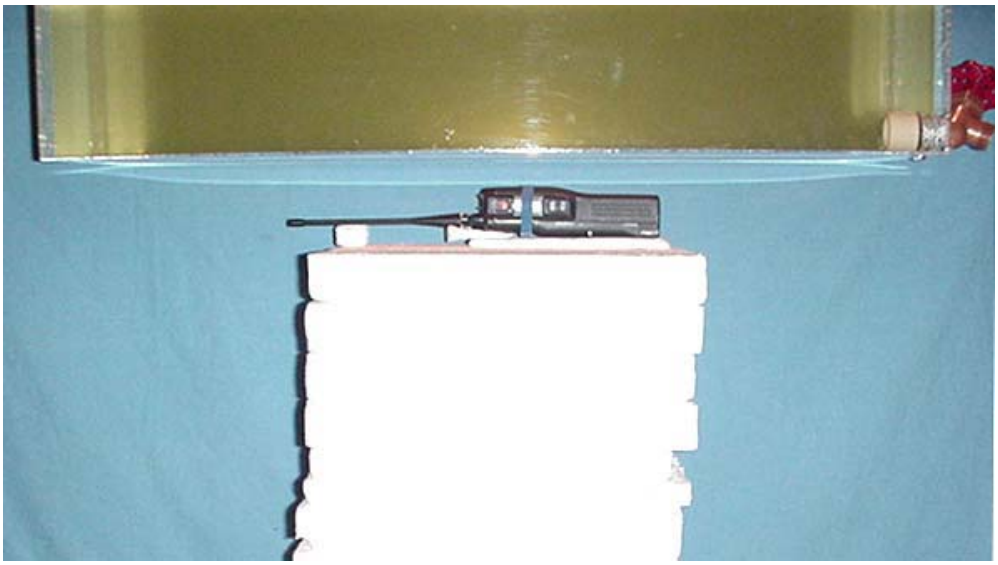
Signature / Stamp Schmid & Partner Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

APPENDIX G - SAR TEST SETUP & DUT PHOTOGRAPHS

FACE-HELD SAR TEST SETUP PHOTOGRAPHS

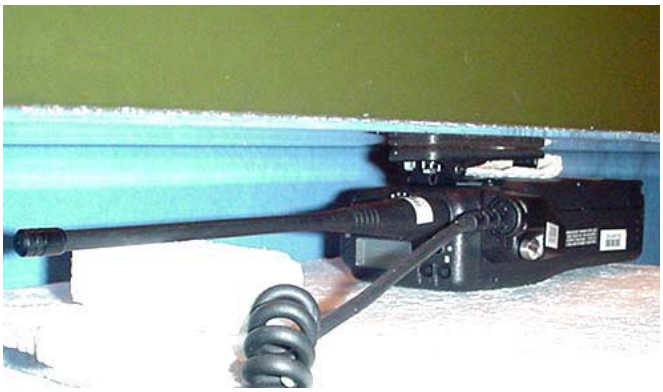
2.5 cm Separation Distance from Front of Radio to Planar Phantom





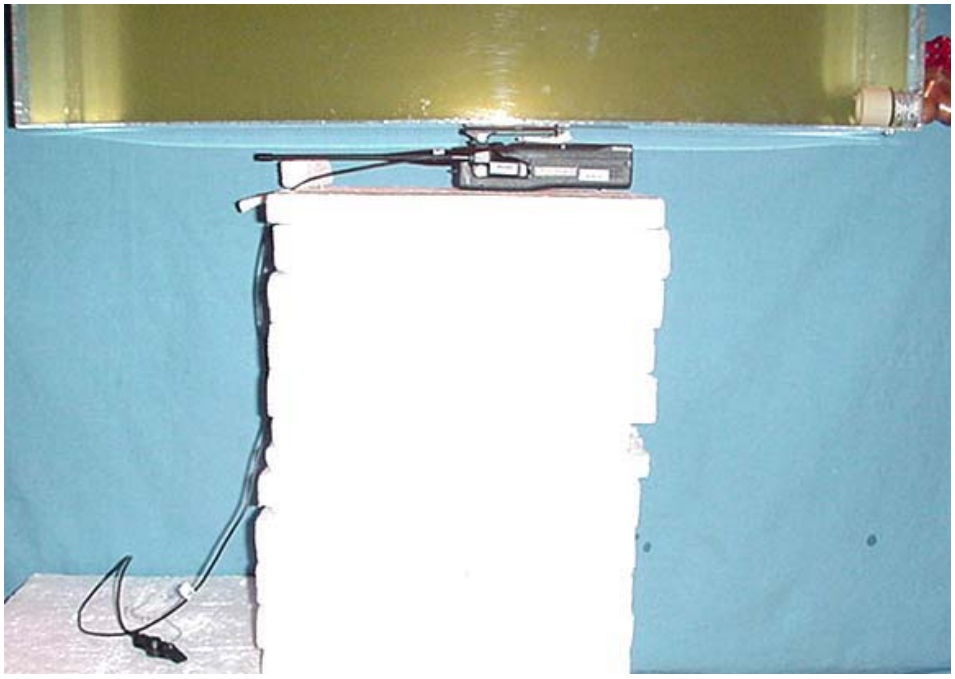
BODY-WORN SAR TEST SETUP PHOTOGRAPHS

1.2 cm Metal Belt-Clip Separation Distance to Planar Phantom with Evolution Speaker-Microphone Accessory (P/N: MC102823V1)



BODY-WORN SAR TEST SETUP PHOTOGRAPHS

1.2 cm Metal Belt-Clip Separation Distance to Planar Phantom
with Earphone (P/N: OT-V1-10291) & Audio Adapter (P/N: OT-V1-10430) Accessories

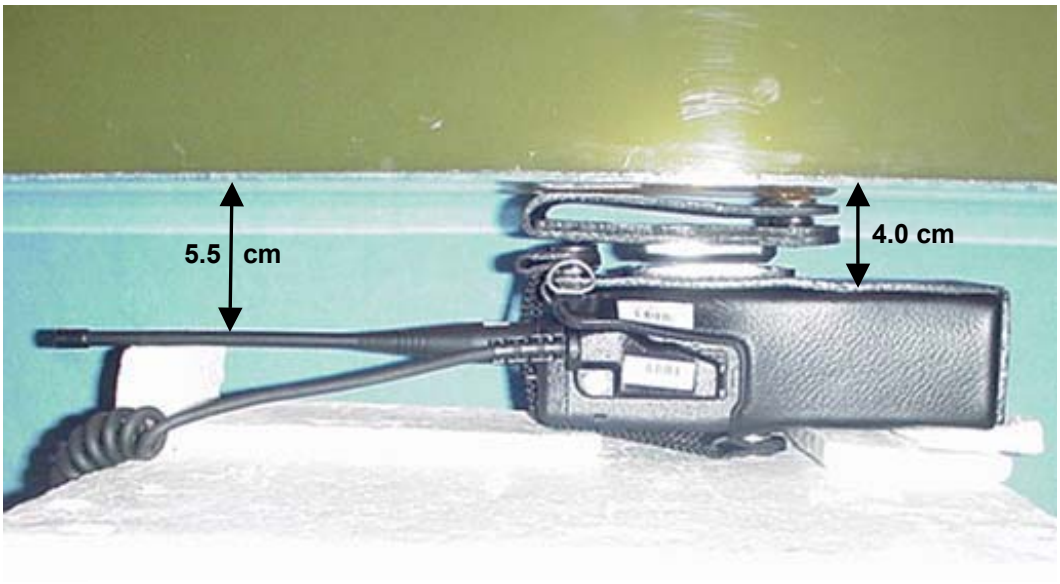


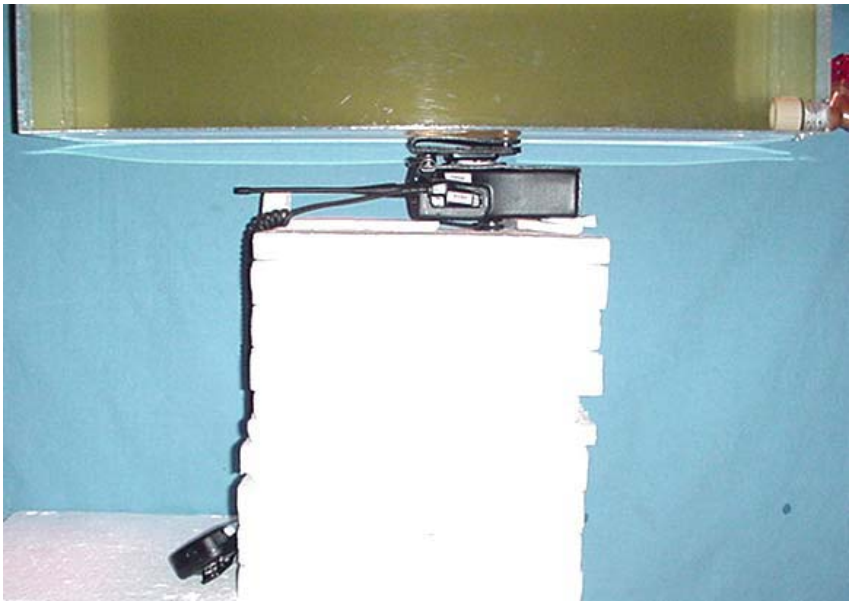
BODY-WORN SAR TEST SETUP PHOTOGRAPHS

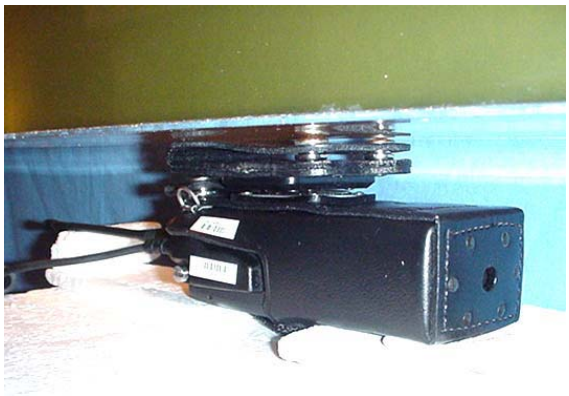
1.2 cm Metal Belt-Clip Separation Distance to Planar Phantom with Over-the-Head Headset Accessory (P/N: OT-V4-10080)

BODY-WORN SAR TEST SETUP PHOTOGRAPHS

4.0 cm Leather Holster & Swivel Belt-Loop Separation Distance to Planar Phantom with Evolution Speaker-Microphone Accessory (P/N: MC102823V1)







DUT PHOTOGRAPHS

Front of DUT

Back of DUT

Back of DUT with Metal Belt-Clip

DUT PHOTOGRAPHS

Left Side of DUT with Metal Belt-Clip

Right Side of DUT with Metal Belt-Clip & Audio Accessory Connector

Metal Belt-Clip (P/N: J29-0652-35)

DUT PHOTOGRAPHS

Bottom Side of DUT

Top Side of DUT

½ Wave Helical Whip Antenna (P/N: MAHROS0006)

DUT PHOTOGRAPHS

DUT Battery Compartment

NiMH Battery Pack (P/N: KNB-22N)

NiCd Battery Pack (P/N: KNB-17A)

DUT PHOTOGRAPHS

DUT with Evolution Speaker-Microphone Accessory (P/N: MC102823V1)

DUT with Earphone Accessory (P/N: OT-V1-10291) & Audio Adapter Accessory (P/N: OT-V1-10430)

DUT PHOTOGRAPHS

DUT with Audio Adapter Accessory
(P/N: OT-V1-10430)

Audio Adapter Accessory
(P/N: OT-V1-10430)

Audio Adapter Accessory
(P/N: OT-V1-10430)

DUT PHOTOGRAPHS

DUT with Over-the-Head Headset Accessory
(P/N: OT-V4-10080)

DUT PHOTOGRAPHS

Leather Holster (P/N: MAHROS0013)
Swivel Belt-Loop (P/N: MAHROS0041)
T-Strap Hold Down ((P/N: MAHROS0042)
Evolution Speaker-Microphone (P/N: MC102823V1)

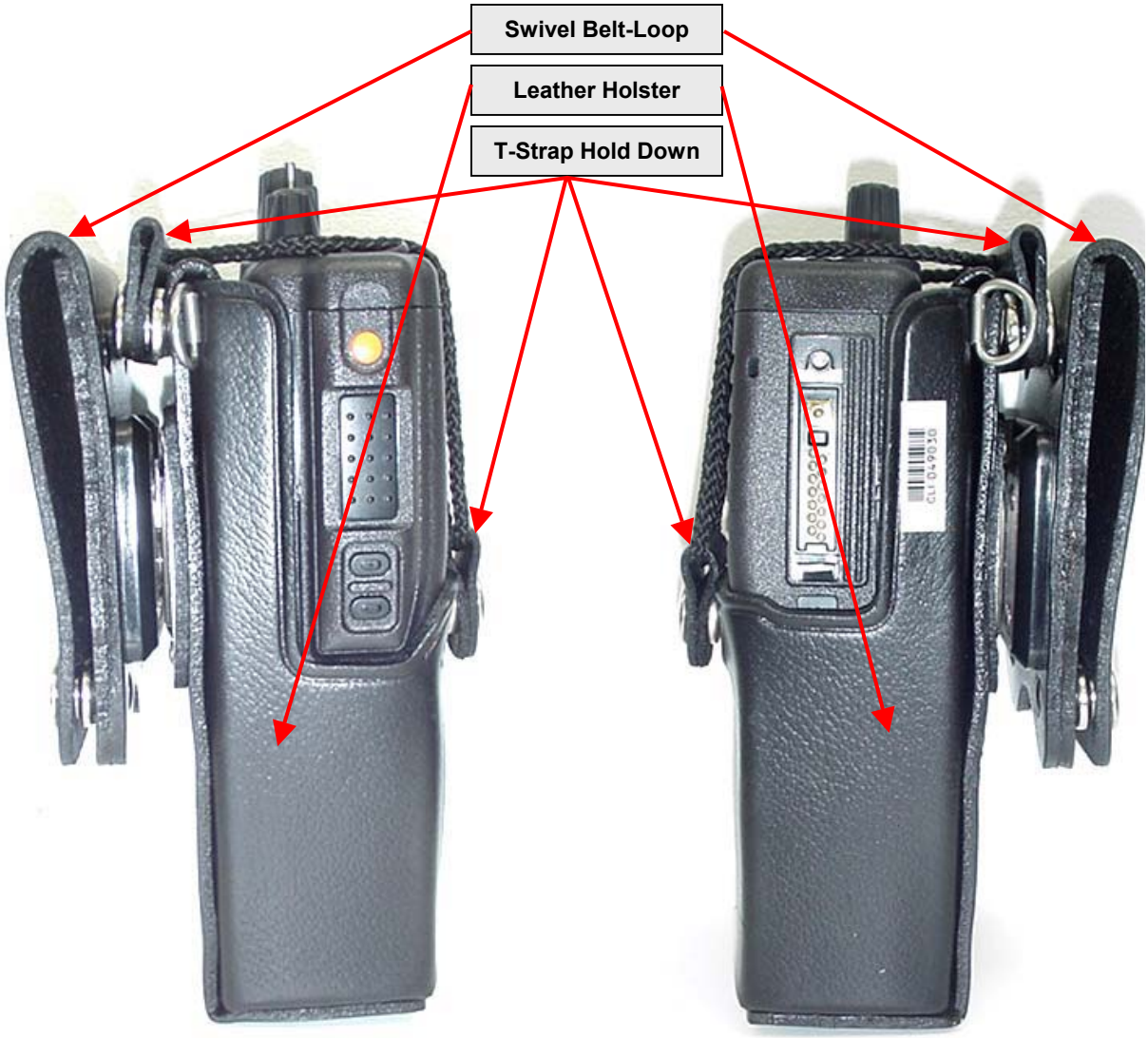
T-Strap Hold Down

Front of Leather Holster (P/N: MAHROS0013)
with Swivel Belt-Loop (P/N: MAHROS0041)
& T-Strap Hold Down ((P/N: MAHROS0042)

Swivel Belt-Loop

Back of Leather Holster (P/N: MAHROS0013)
with Swivel Belt-Loop (P/N: MAHROS0041)
& T-Strap Hold Down ((P/N: MAHROS0042)

DUT PHOTOGRAPHS



Left Side of Leather Holster (P/N: MAHROS0013) with Swivel Belt-Loop (P/N: MAHROS0041) & T-Strap Hold Down ((P/N: MAHROS0042)

Right Side of Leather Holster (P/N: MAHROS0013) with Swivel Belt-Loop (P/N: MAHROS0041) & T-Strap Hold Down ((P/N: MAHROS0042)