APPENDIX A: RF EXPOSURE

Please see the SAR Report that follows.

CERTIFICATE OF COMPLIANCE
SAR EVALUATION

Test Lab	Applicant Information
CELLTECH RESEARCH INC. Testing and Engineering Lab 1955 Moss Court Kelowna, B.C., Canada V1Y 9L3 Phone: 250 - 860-3130 Fax: 250 - 860-3110 e-mail: info@celltechlabs.com web site: www.celltechlabs.com	**EF JOHNSON CO.** 299 Johnson Ave. SW Waseca, MN 56093

FCC Rule Part(s):	**2.1093; ET Docket 96-326**
FCC ID:	**ATH2425130**
Model(s):	**242-5130**
EUT Type:	**Portable UHF PTT Radio Transceiver**
Modulation:	**FM**
Tx Frequency Range:	**403 - 470 MHz**
Nominal RF Conducted Power:	**4 Watts**
Antenna Type(s):	**Helical Whip**
Battery Type(s):	**7.5V NiMH / 7.5V NiCD**
Body-Worn Accessories:	**1. Belt-Clip** **2. Speaker-Microphone** **3. Boom-Microphone Headset** **4. Ear-Microphone**

Celltech Research Inc. declares under its sole responsibility that this device was found to be in compliance with the Specific Absorption Rate (SAR) RF exposure requirements specified in FCC OET Bulletin 65, Supplement C, Edition 01-01, and Industry Canada RSS-102 Issue 1 (Occupational/Controlled Exposure), and was tested in accordance with the appropriate measurement standards, guidelines, and recommended practices specified in American National Standards Institute C95.1-1992.

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

This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Research Inc. The results and statements contained in this report pertain only to the device(s) evaluated.

Shawn McMillen
General Manager
Celltech Research Inc.

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1.0 INTRODUCTION

This measurement report shows compliance of EF JOHNSON Model: 242-5130 Portable FM UHF PTT Radio Transceiver FCC ID: ATH2425130 with the regulations and procedures specified in FCC Part 2.1093, ET Docket 93-62 (see reference [1]) and Industry Canada RSS-102 Issue 1 (see reference [2]) for controlled exposure. The test procedures, as described in American National Standards Institute C95.1-1992 (see reference [3]), and FCC OET Bulletin 65, Supplement C, Edition 01-01 (see reference [4]) were employed. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used, and the various provisions of the rules are included within this test report.

2.0 DESCRIPTION of Equipment Under Test (EUT)

FCC Rule Part(s)	2.1093; ET Docket 96.326
EUT Type	Portable FM UHF PTT Radio Transceiver
FCC ID	ATH2425130
Model No.(s)	242-5130
Antenna Type	Helical Whip
Antenna Length	148 mm
Modulation	FM (UHF)
Tx Frequency Range	403 - 470 MHz
Nominal RF Conducted Power	4 Watts
Battery Type(s)	1. 7.5V NiCd 2. 7.5V NiMH
Body-Worn Accessories	1. Belt-Clip 2. Speaker-Microphone 3. Boom-Microphone Headset 4. Ear-Microphone

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3.0 SAR MEASUREMENT SYSTEM

Celltech Research SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, specific anthropomorphic mannequin (SAM) phantom, and various planar phantoms for brain 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 PC plug-in card. The DAE3 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 PC-card 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. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

DASY3 SAR Measurement System with Small Planar Phantom

DASY3 SAR Measurement System with Validation Phantom

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4.0 MEASUREMENT SUMMARY

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the EUT are reported in Appendix A.

FACE-HELD SAR MEASUREMENT RESULTS								
Freq. (MHz)	**Channel**	**Mode**	**Cond. Power Before (W)**	**Cond. Power After (W)**	**Battery Type**	**Separation Distance (cm)**	**SAR 1g (w/kg)**	
							100% Duty Cycle	**50% Duty Cycle**
435.1	Mid	CW	4.21	4.04	NiCd	2.5	4.03	2.02
435.1	Mid	CW	4.21	4.16	NiMH	2.5	4.58	2.29
403.1	Low	CW	4.13	4.15	NiMH	2.5	4.43	2.22
469.9	High	CW	4.15	4.02	NiMH	2.5	4.25	2.13

ANSI / IEEE C95.1 1992 - SAFETY LIMIT BRAIN: 8.0 W/kg (averaged over 1 gram) Spatial Peak - Controlled Exposure / Occupational			
Measured Mixture Type	**Brain (450MHz)**	**Relative Humidity**	**61 %**
Dielectric Constant	**44.8**	**Atmospheric Pressure**	**101.4 kPa**
Conductivity	**0.91**	**Fluid Temperature**	**≈ 23.0 °C**
Ambient Temperature	**22.8 °C**	**Fluid Depth**	**≥ 15 cm**

Notes:

1. The SAR values measured were below the maximum limit of 8.0 w/kg (controlled exposure).
2. The highest face-held SAR value measured was 4.58 w/kg (100% duty cycle, mid channel, NiMH battery).
3. The EUT was tested for face-held SAR with a 2.5cm separation distance between the front of the EUT and the outer surface of the planar phantom.
4. During the entire test the conducted power was maintained to within 5% of the initial conducted power.

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MEASUREMENT SUMMARY (Cont.)

BODY-WORN SAR MEASUREMENT RESULTS									
Freq. (MHz)	**Channel**	**Mode**	**Cond. Power Before (W)**	**Cond. Power After (W)**	**Battery Type**	**Body-Worn Accessory**	**Belt-Clip Separation Distance (cm)**	**SAR 1g (w/kg)**	
								100% Duty Cycle	**50% Duty Cycle**
435.1	Mid	CW	4.20	4.01	NiCd	Speaker-Mic	1.0	5.48	2.74
435.1	Mid	CW	4.23	4.03	NiMH	Speaker-Mic	1.0	6.64	3.32
403.1	Low	CW	4.06	3.98	NiMH	Speaker-Mic	1.0	7.14	3.57
469.9	High	CW	4.08	3.95	NiMH	Speaker-Mic	1.0	6.57	3.29
435.1	Mid	CW	4.21	4.05	NiMH	Boom-Mic	1.0	4.91	2.46
435.1	Mid	CW	4.20	4.03	NiMH	Ear-Mic	1.0	5.60	2.80

ANSI / IEEE C95.1 1992 - SAFETY LIMIT **BODY: 8.0 W/kg (averaged over 1 gram)** **Spatial Peak - Controlled Exposure / Occupational**			
Measured Mixture Type	**Body (450MHz)**	**Relative Humidity**	**61 %**
Dielectric Constant	**58.3**	**Atmospheric Pressure**	**101.4 kPa**
Conductivity	**0.92**	**Fluid Temperature**	**≈ 23.0 °C**
Ambient Temperature	**22.8 °C**	**Fluid Depth**	**≥ 15 cm**

Notes:

1. The SAR values measured were below the maximum limit of 8.0 w/kg (controlled exposure).
2. The highest body-worn SAR value measured was 7.14 w/kg (100% duty cycle, low-channel, with speaker-microphone and NiMH battery).
3. The EUT was tested for body-worn SAR with the attached belt-clip providing a 1.0 cm separation distance between the back of the EUT and the outer surface of the planar phantom.
4. During the entire test the conducted power was maintained to within 5% of the initial conducted power.

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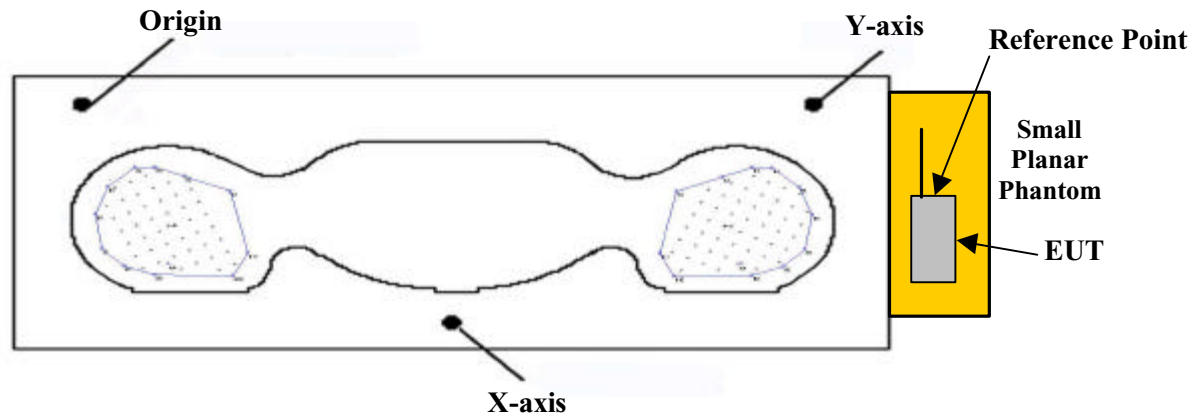
5.0 DETAILS OF SAR EVALUATION

The EF JOHNSON Model: 242-5130 Portable FM UHF PTT Radio Transceiver FCC ID: ATH2425130 was found to be compliant for localized Specific Absorption Rate (Controlled Exposure) based on the following test provisions and conditions:

1. The EUT was tested in a face-held configuration with the front of the device placed parallel to the outer surface of the planar phantom. A 2.5 cm separation distance was maintained between the front of the EUT and the outer surface of the planar phantom for the duration of the test.
2. The EUT was tested in a body-worn configuration with the back of the EUT placed parallel to the outer surface of the planar phantom and speaker-microphone accessory connected to the EUT. The attached belt-clip was touching the outer surface of the planar phantom and provided a 1.0 cm separation distance between the back of the EUT and the outer surface of the planar phantom.
3. The EUT was tested in a body-worn configuration with the back of the EUT placed parallel to the outer surface of the planar phantom and boom microphone headset accessory connected to the EUT. The attached belt-clip was touching the outer surface of the planar phantom and provided a 1.0 cm separation distance between the back of the EUT and the outer surface of the planar phantom.
4. The EUT was tested in a body-worn configuration with the back of the EUT placed parallel to the outer surface of the planar phantom and ear-microphone accessory connected to the EUT. The attached belt-clip was touching the outer surface of the planar phantom and provided a 1.0 cm separation distance between the back of the EUT and the outer surface of the planar phantom.
5. The EUT was evaluated for SAR at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimize drift. The conducted power levels were checked before and after each test. If the conducted power level dropped more than 5% of the initial power level, then the EUT was retested. Any unusual anomalies over the course of the test also warranted a re-evaluation.
6. The conducted power was measured according to the procedures described in FCC Part 2.1046.
7. The EUT was tested with the transmitter in continuous operation (100% duty cycle) throughout the SAR evaluation. For a push-to-talk device the 50% duty cycle compensation reported assumes a transmit/receive cycle of equal time base.
8. The location of the maximum spatial SAR distribution (Hot Spot) was determined relative to the device and its antenna.
9. The EUT was tested with fully charged NiCd and NiMH batteries.



Phantom Reference Point & EUT Positioning (Body SAR)

6.0 EVALUATION PROCEDURES

The Specific Absorption Rate (SAR) evaluation was performed as follows:

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 at maximum power for all antenna modes and battery options. The positioning of the ear-held device relative to the SAM phantom was performed in accordance with FCC OET Bulletin 65, Supplement C (Edition 01-01).

b. (ii) For face-held and body-worn devices a planar phantom was used. For this particular evaluation the device was first evaluated for face-held SAR at maximum power for mid channel with each battery option. The battery option yielding the highest SAR was further evaluated at the low and high frequencies of the band. The device was then evaluated for body SAR at maximum power for mid channel with each battery option and body-worn voice accessory. The battery option and body-worn voice accessory yielding the highest SAR was further evaluated at the low and high frequencies of the band.

c. The SAR was determined by a pre-defined procedure within the DASY3 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface using uniform grid spacing.

d. A 5x5x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

e. The depth of the simulating tissue in the phantom used for the SAR evaluation and system validation was no less than 15.0cm for the duration of the tests.

f. For this particular evaluation a stack of low-density, low-loss dielectric foamed polystyrene was used in place of the device holder.

Face-held SAR Test Setup

Body-worn SAR Test Setup

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7.0 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.

8.0 SIMULATED TISSUES

The brain and body 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).

TISSUE MIXTURES - SYSTEM VALIDATION & EUT EVALUATION		
INGREDIENT	**450MHz Brain Mixture (System Validation & EUT Evaluation)**	**450MHz Body Mixture (EUT Evaluation)**
Water	38.56 %	52.00 %
Sugar	56.32 %	45.65 %
Salt	3.95 %	1.75 %
HEC	0.98 %	0.50 %
Bactericide	0.19 %	0.10 %

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9.0 SYSTEM VALIDATION

Prior to the assessment, the system was verified in a planar phantom with a 450MHz dipole. A forward power of 250mW was applied to the dipole and the system was verified to a tolerance of ±10%. The applicable verifications are shown below (see Appendix B for system validation test plot and Appendix C for dipole calibration information).

Dipole Validation Kit	Target SAR 1g (w/kg)	Measured SAR 1g (w/kg)	Ambient Temperature	Fluid Temperature	Fluid Depth	Validation Date
450MHz	1.34	1.31	22.8 °C	≈23.0 °C	≥ 15 cm	05/06/02

10.0 TISSUE PARAMETERS

The dielectric parameters of the fluids were verified prior to the SAR evaluation using an 85070C Dielectric Probe Kit and an 8753E Network Analyzer. The dielectric parameters of the fluid are listed below (see Appendix E for printout of measured fluid dielectric parameters).

TISSUE PARAMETERS - SYSTEM VALIDATION AND EUT EVALUATION			
Equivalent Tissue	**Dielectric Constant ε_r**	**Conductivity σ (mho/m)**	**ρ (Kg/m^3)**
450MHz Brain (Target)	**43.5 ± 5%**	**0.87 ± 5%**	**1000**
450MHz Brain (Measured: 05/06/02)	44.8	0.91	1000
450MHz Body (Target)	**56.7 ±5%**	**0.94 ±5%**	**1000**
450MHz Body (Measured: 05/06/02)	58.3	0.92	1000

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11.0 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:	Pentium III
Clock Speed:	450 MHz
Operating System:	Windows NT
Data Card:	DASY3 PC-Board

Data Converter

Features:	Signal Amplifier, multiplexer, A/D converter, and control logic
Software:	DASY3 software
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock

PC Interface Card

Function:	24 bit (64 MHz) DSP for real time processing Link to DAE3 16-bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot

E-Field Probe

Model:	ET3DV6
Serial No.:	1387
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:	Small Planar Phantom
Shell Material:	Plexiglas
Bottom Thickness:	2.0 mm ± 0.1mm
Dimensions:	Box: 36.5cm (L) x 22.5cm (W) x 20.3cm (H); Back Plane: 25.3cm (H)

Validation Phantom (for devices ≤ 450MHz)

Type:	Large Planar Phantom
Shell Material:	Plexiglas
Bottom Thickness:	6.2 mm ± 0.1mm
Dimensions:	86.0cm (L) x 39.5cm (W) x 21.8cm (H)

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12.0 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)
Dynam. Rnge:	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Srfce. Detect.	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions:	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application:	General dosimetry up to 3 GHz Compliance tests of mobile phone


ET3DV6 E-Field Probe

13.0 SMALL PLANAR PHANTOM

The small planar phantom is constructed of Plexiglas material with a 2.0mm shell thickness for face-held and body-worn SAR evaluations. The small planar phantom is mounted onto the outer left hand section of the DASY3 system.


Small Planar Phantom

14.0 VALIDATION PHANTOM

The validation phantom is a large planar phantom constructed of Plexiglas material with a 6.0 mm shell thickness for SAR validations at and below 450MHz. The large planar phantom is mounted in the DASY3 compact system in place of the SAM phantom.


Large Planar Phantom

15.0 DEVICE HOLDER

The DASY3 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.


Device Holder

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16.0 TEST EQUIPMENT LIST

SAR MEASUREMENT SYSTEM		
EQUIPMENT	**SERIAL NO.**	**CALIBRATION DATE**
DASY3 System -Robot -ET3DV6 E-Field Probe -300MHz Validation Dipole -450MHz Validation Dipole -900MHz Validation Dipole -1800MHz Validation Dipole -2450MHz Validation Dipole -SAM Phantom V4.0C -Small Planar Phantom -Large Planar Phantom	 599396-01 1387 135 136 054 247 150 N/A N/A N/A	 N/A Feb 2002 Oct 2001 Oct 2001 June 2001 June 2001 Oct 2001 N/A N/A N/A
85070C Dielectric Probe Kit	N/A	N/A
Gigatronics 8652A Power Meter -Power Sensor 80701A -Power Sensor 80701A	1835272 1833535 1833542	Feb 2002 Feb 2002 Mar 2002
E4408B Spectrum Analyzer	US39240170	Nov 2001
8594E Spectrum Analyzer	3543A02721	Feb 2002
8753E Network Analyzer	US38433013	Feb 2002
8648D Signal Generator	3847A00611	Feb 2002
5S1G4 Amplifier Research Power Amplifier	26235	N/A

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17.0 MEASUREMENT UNCERTAINTIES

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	∞
Extrap. & 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)	± 10.0	Rectangular	√3	0.6	± 3.5	∞
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					**± 13.7**	
Expanded Uncertainty (k=2)					**± 27.5**	

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

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18.0 REFERENCES

[1] Federal Communications Commission, ET Docket 93-62, "Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation", Aug. 1996.

[2] 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.

[3] ANSI, ANSI/IEEE C95.1: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 GHz, The Institute of Electrical and Electronics Engineers, Inc., New York, NY: 1992.

[4] 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.

[5] IEEE Standards Coordinating Committee 34, Std. P1528, DRAFT Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques: Draft, December 2001.

[6] Thomas Schmid, Oliver Egger, and Niels Kuster, "Automated E-field scanning system for dosimetric assessments", IEEE Transaction on Microwave Theory and Techniques, Vol. 44, pp. 105-113: January 1996.

[7] Niels Kuster, Ralph Kastle, and Thomas Schmid, "Dosimetric evaluation of mobile communications equipment with know precision", IEICE Transactions of Communications, vol. E80-B, no. 5, pp. 645-652: May 1997.

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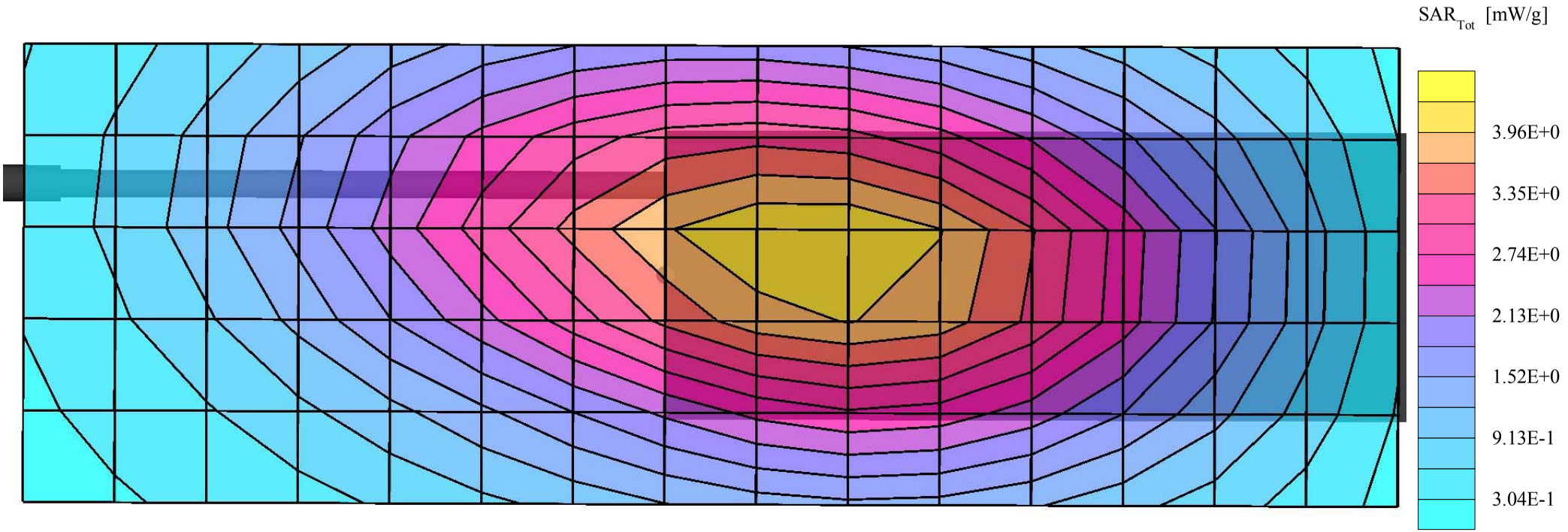
APPENDIX A - SAR MEASUREMENT DATA

EF Johnson FCC ID: ATH2425130

Small Planar Phantom; Planar Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(7.30,7.30,7.30); Crest factor: 1.0
450 MHz Brain: $\sigma = 0.91$ mho/m $\varepsilon_r = 44.8$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.18 dB
SAR (1g): 4.03 mW/g, SAR (10g): 2.94 mW/g

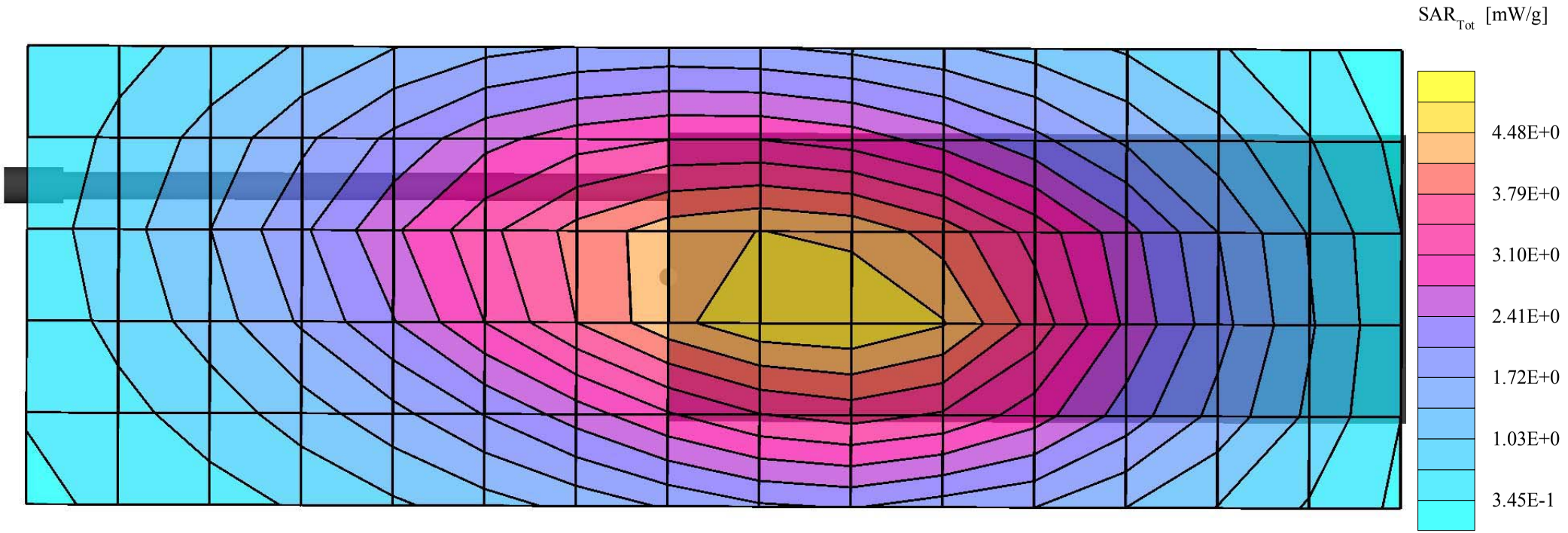
Face SAR at 2.5 cm Separation Distance
Portable FM PTT Radio Transceiver
EF Johnson Model: 242-5130
NiCd Battery
Continuous Wave Mode
Mid Channel [435.10 Mhz]
Conducted Power: 4.21 Watts
Ambient Temp. 22.8 °C; Fluid Temp. 23.0 °C
Date Tested: May 06, 2002



EF Johnson FCC ID: ATH2425130

Small Planar Phantom; Planar Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(7.30,7.30,7.30); Crest factor: 1.0
450 MHz Brain: $\sigma = 0.91$ mho/m $\varepsilon_r = 44.8$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.09 dB
SAR (1g): 4.58 mW/g, SAR (10g): 3.33 mW/g

Face SAR at 2.5 cm Separation Distance
Portable FM PTT Radio Transceiver
EF Johnson Model: 242-5130
NiMH Battery
Continuous Wave Mode
Mid Channel [435.10 Mhz]
Conducted Power: 4.21 Watts
Ambient Temp. 22.8 °C; Fluid Temp. 23.0 °C
Date Tested: May 06, 2002

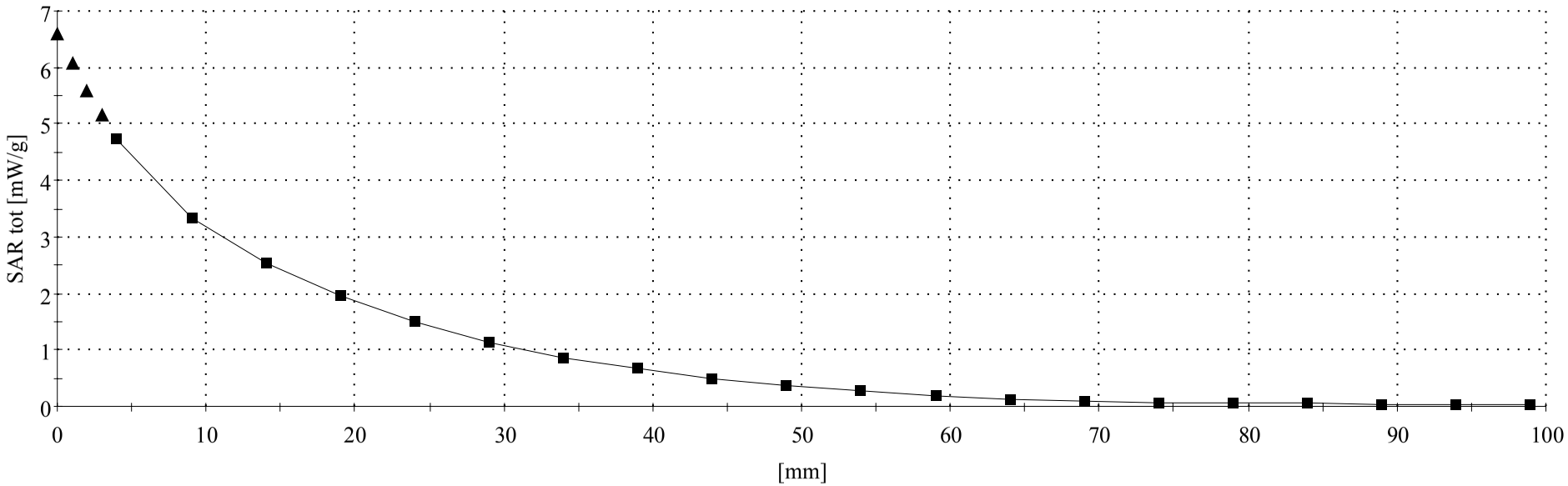


EF Johnson FCC ID: ATH2425130

Small Planar Phantom; Planar Section
Probe: ET3DV6 - SN1387; ConvF(7.30,7.30,7.30); Crest factor: 1.0;
450 MHz Brain: $\sigma = 0.91$ mho/m $\varepsilon_r = 44.8$ $\rho = 1.00$ g/cm^3

Z-Axis Extrapolation at Peak SAR Location

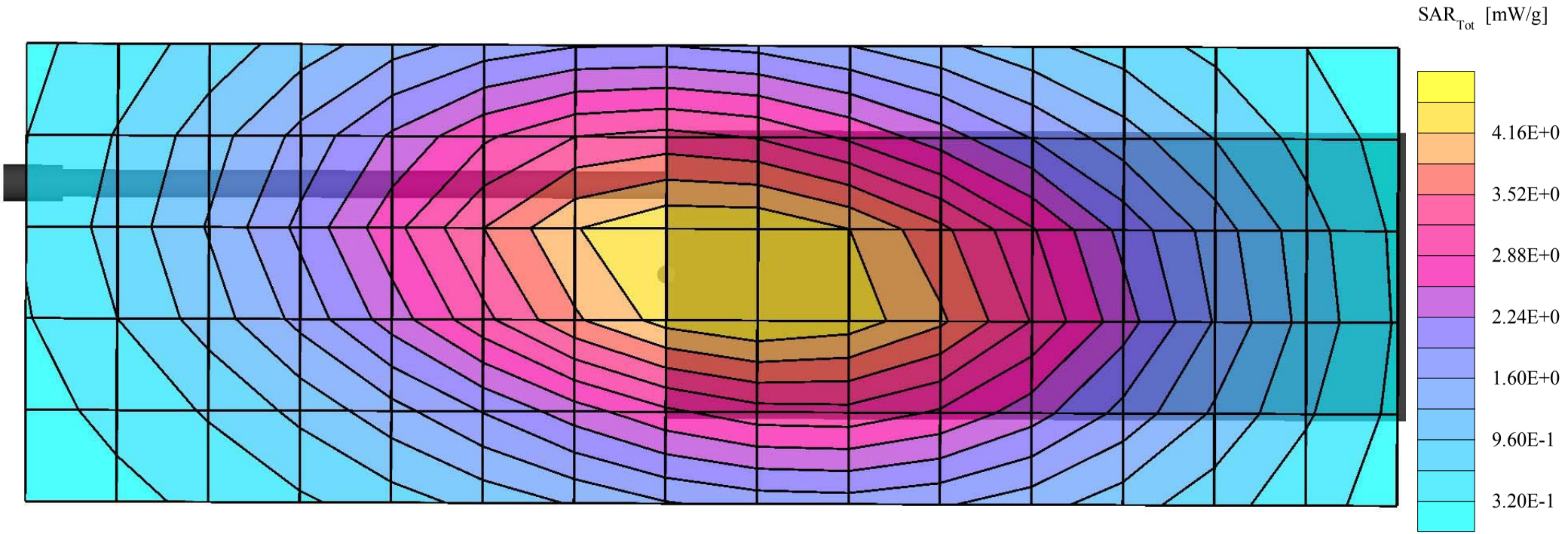
Face SAR at 2.5 cm Separation Distance
Portable FM PTT Radio Transceiver
EF Johnson Model: 242-5130
NiMH Battery
Continuous Wave Mode
Mid Channel [435.10 Mhz]
Conducted Power: 4.21 Watts
Ambient Temp. 22.8 °C; Fluid Temp. 23.0 °C
Date Tested: May 06, 2002



EF Johnson FCC ID: ATH2425130

Small Planar Phantom; Planar Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(7.30,7.30,7.30); Crest factor: 1.0
450 MHz Brain: $\sigma = 0.91$ mho/m $\varepsilon_r = 44.8$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: 0.04 dB
SAR (1g): 4.43 mW/g, SAR (10g): 3.25 mW/g

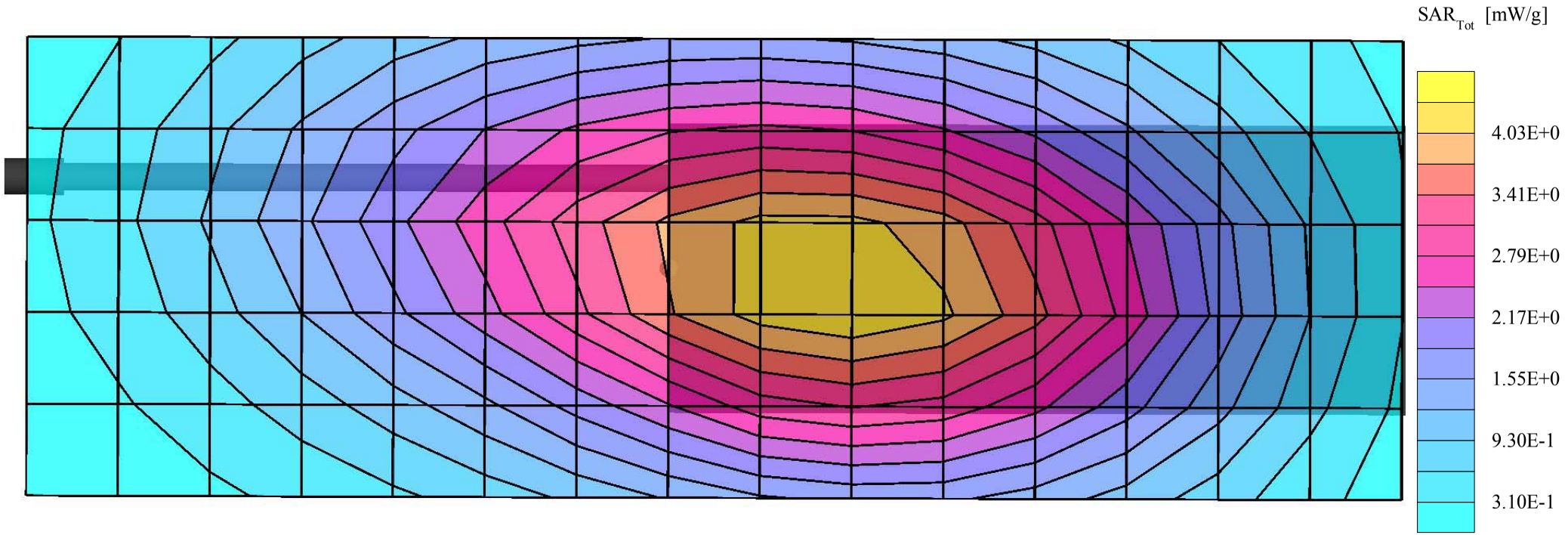
Face SAR at 2.5 cm Separation Distance
Portable FM PTT Radio Transceiver
EF Johnson Model: 242-5130
NiMH Battery
Continuous Wave Mode
Low Channel [403.10 Mhz]
Conducted Power: 4.13 Watts
Ambient Temp. 22.8 °C; Fluid Temp. 23.0 °C
Date Tested: May 06, 2002



EF Johnson FCC ID: ATH2425130

Small Planar Phantom; Planar Section; Position: (90°,180°)
Probe: ET3DV6 - SN1387; ConvF(7.30,7.30,7.30); Crest factor: 1.0
450 MHz Brain: $\sigma = 0.91$ mho/m $\varepsilon_r = 44.8$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.17 dB
SAR (1g): 4.25 mW/g, SAR (10g): 2.99 mW/g

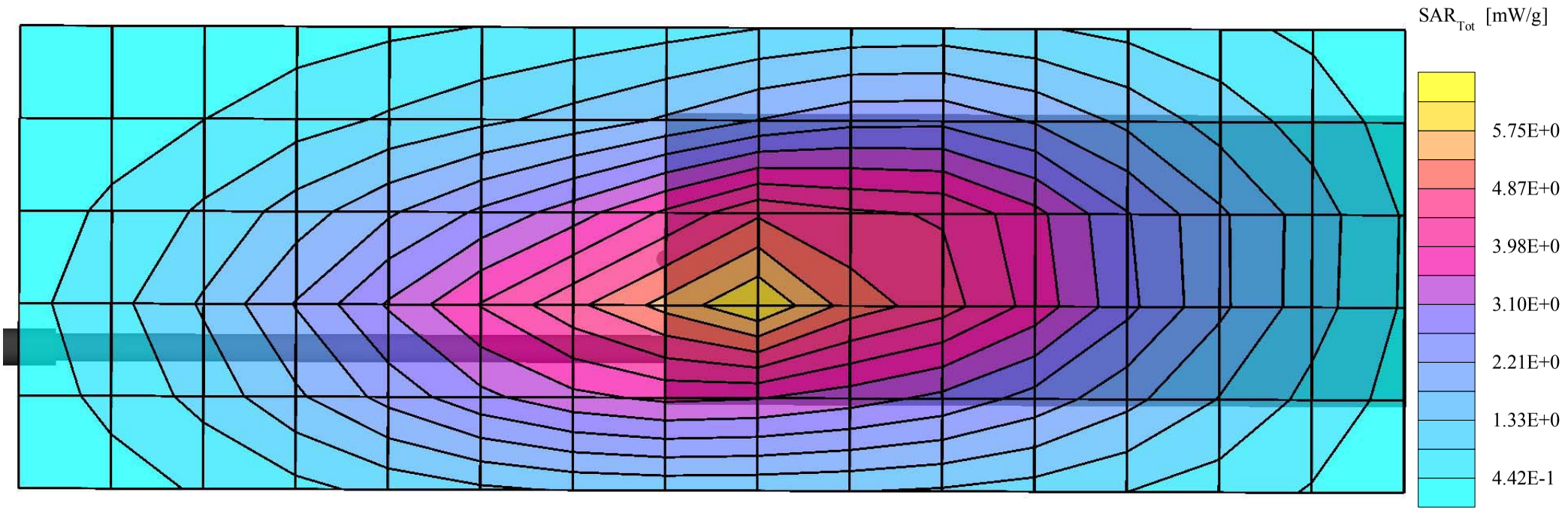
Face SAR at 2.5 cm Separation Distance
Portable FM PTT Radio Transceiver
EF Johnson Model: 242-5130
NiMH Battery
Continuous Wave Mode
High Channel [469.90 Mhz]
Conducted Power: 4.15 Watts
Ambient Temp. 22.8 °C; Fluid Temp. 23.0 °C
Date Tested: May 06, 2002



EF Johnson FCC ID: ATH2425130

Small Planar Phantom; Planar Section; Position: (270°,0°)
Probe: ET3DV6 - SN1387; ConvF(7.70,7.70,7.70); Crest factor: 1.0
450 MHz Muscle: $\sigma = 0.92$ mho/m $\varepsilon_r = 58.3$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.20 dB
SAR (1g): 5.48 mW/g, SAR (10g): 3.74 mW/g

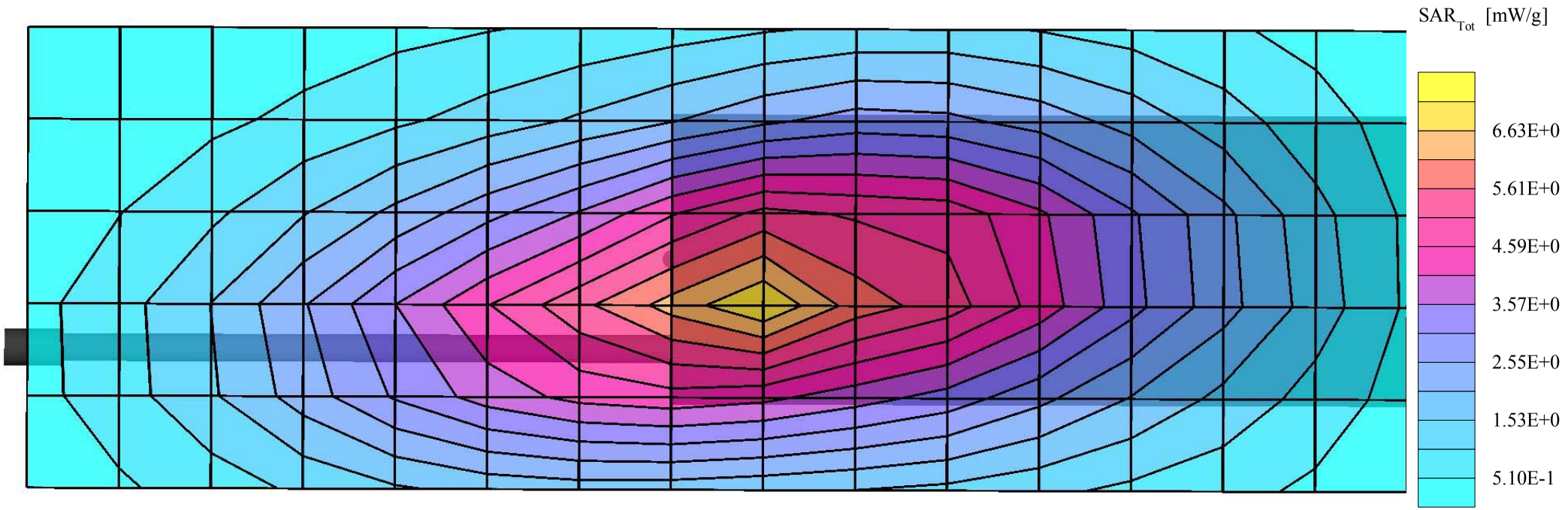
Body-Worn SAR with 1.0 cm Belt-Clip
Portable FM PTT Radio Transceiver
EF Johnson Model: 242-5130
With Speaker-Mic
NiCd Battery
Continuous Wave Mode
Mid Channel [435.10 Mhz]
Conducted Power: 4.20 Watts
Ambient Temp. 22.8 °C; Fluid Temp. 23.0 °C
Date Tested: May 06, 2002



EF Johnson FCC ID: ATH2425130

Small Planar Phantom; Planar Section; Position: (270°,0°)
Probe: ET3DV6 - SN1387; ConvF(7.70,7.70,7.70); Crest factor: 1.0
450 MHz Muscle: σ = 0.92 mho/m ε_r = 58.3 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.20 dB
SAR (1g): 6.64 mW/g, SAR (10g): 4.54 mW/g

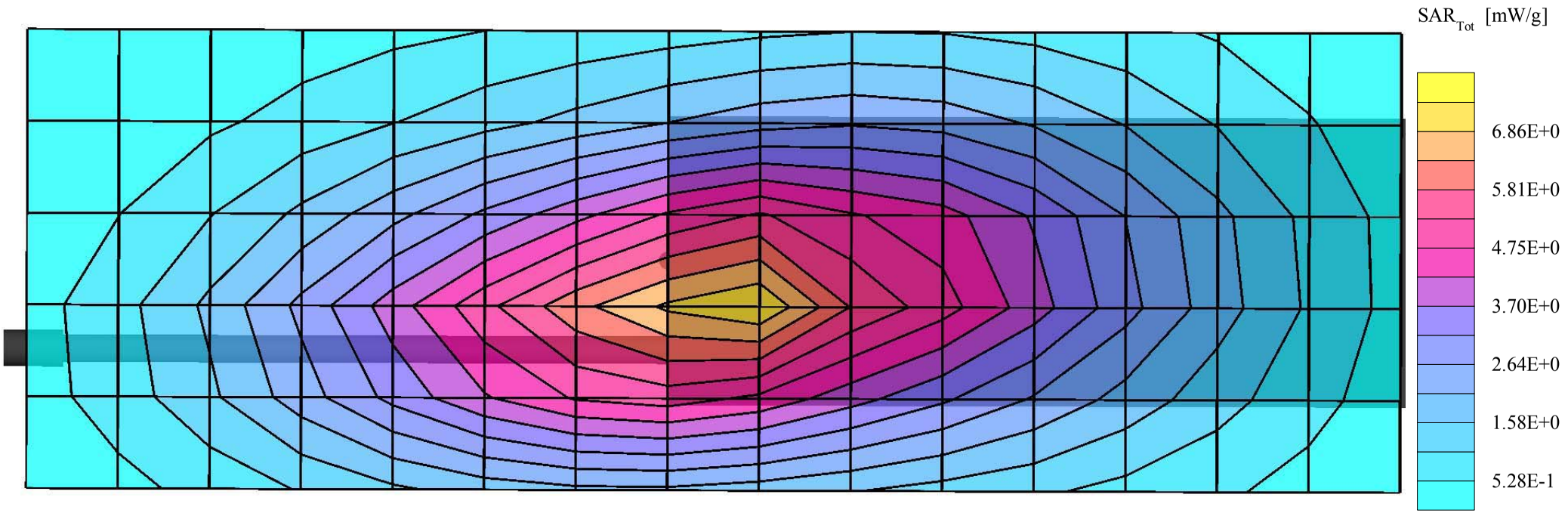
Body-Worn SAR with 1.0 cm Belt-Clip
Portable FM PTT Radio Transceiver
EF Johnson Model: 242-5130
With Speaker-Mic
NiMH Battery
Continuous Wave Mode
Mid Channel [435.10 Mhz]
Conducted Power: 4.23 Watts
Ambient Temp. 22.8 °C; Fluid Temp. 23.0 °C
Date Tested: May 06, 2002



EF Johnson FCC ID: ATH2425130

Small Planar Phantom; Planar Section; Position: (270°,0°)
Probe: ET3DV6 - SN1387; ConvF(7.70,7.70,7.70); Crest factor: 1.0
450 MHz Muscle: $\sigma = 0.92$ mho/m $\varepsilon_r = 58.3$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.11 dB
SAR (1g): 7.14 mW/g, SAR (10g): 4.96 mW/g

Body-Worn SAR with 1.0 cm Belt-Clip
Portable FM PTT Radio Transceiver
EF Johnson Model: 242-5130
With Speaker-Mic
NiMH Battery
Continuous Wave Mode
Low Channel [403.10 Mhz]
Conducted Power: 4.06 Watts
Ambient Temp. 22.8 °C; Fluid Temp. 23.0 °C
Date Tested: May 06, 2002

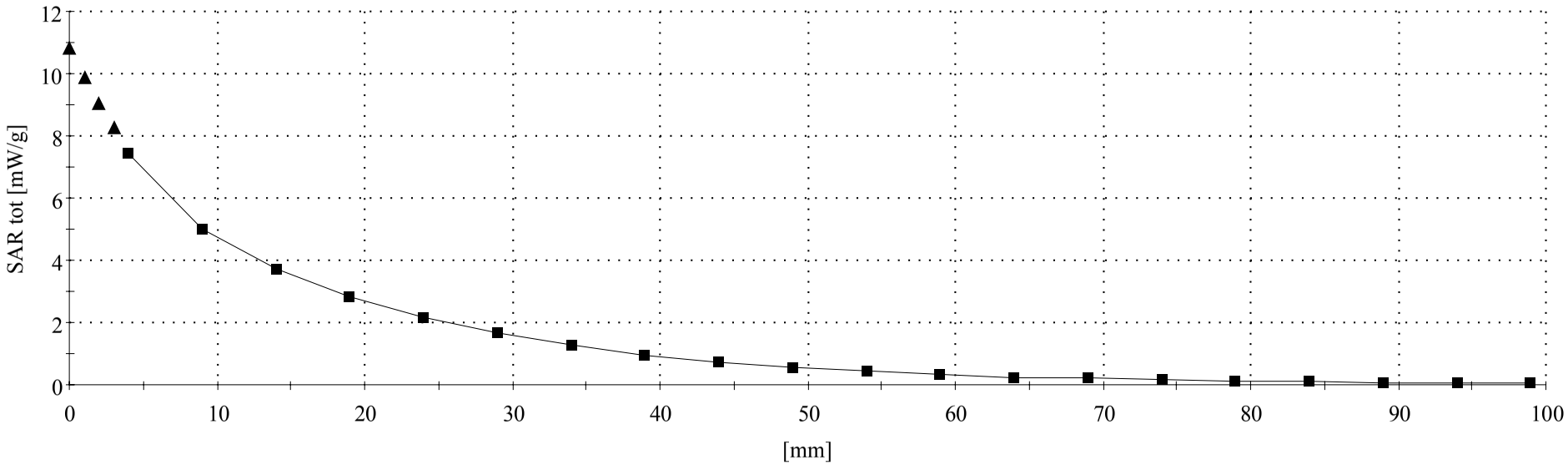


EF Johnson FCC ID: ATH2425130

Small Planar Phantom; Planar Section
Probe: ET3DV6 - SN1387; ConvF(7.70,7.70,7.70); Crest factor: 1.0;
450 MHz Muscle: $\sigma = 0.92$ mho/m $\varepsilon_r = 58.3$ $\rho = 1.00$ g/cm^3

Z-Axis Extrapolation at Peak SAR Location

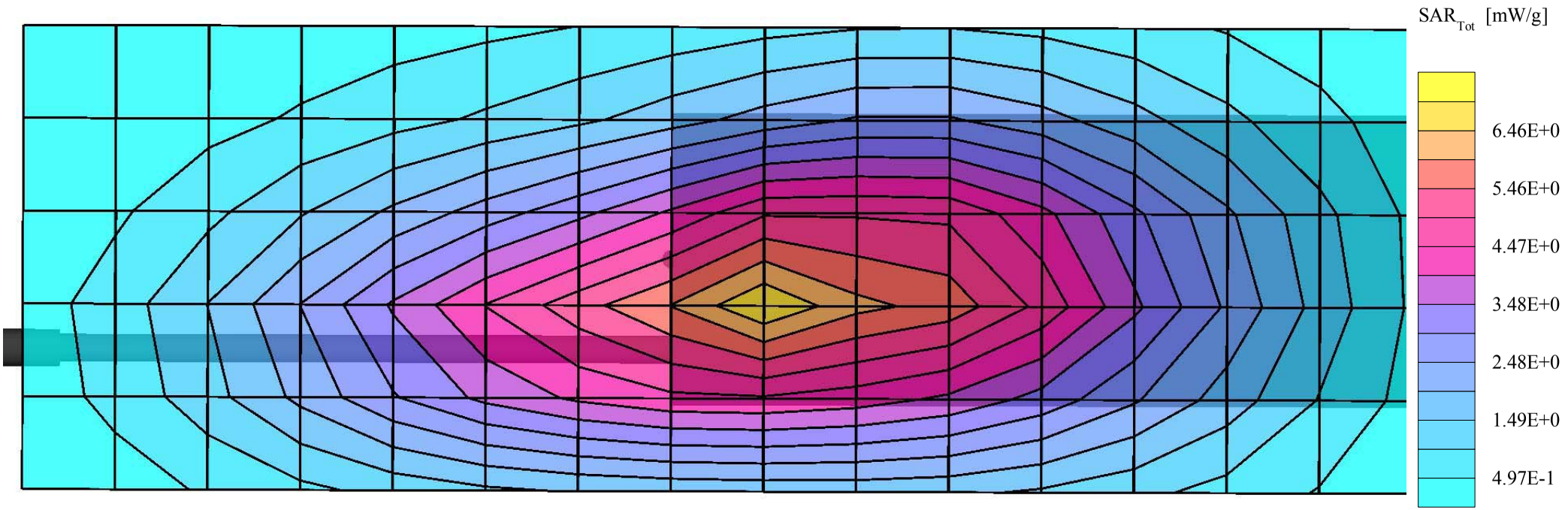
Body-Worn SAR with 1.0 cm Belt-Clip
Portable FM PTT Radio Transceiver
EF Johnson Model: 242-5130
With Speaker-Mic
NiMH Battery
Continuous Wave Mode
Low Channel [403.10 Mhz]
Conducted Power: 4.06 Watts
Ambient Temp. 22.8 °C; Fluid Temp. 23.0 °C
Date Tested: May 06, 2002



EF Johnson FCC ID: ATH2425130

Small Planar Phantom; Planar Section; Position: (270°,0°)
Probe: ET3DV6 - SN1387; ConvF(7.70,7.70,7.70); Crest factor: 1.0
450 MHz Muscle: σ = 0.92 mho/m ε_r = 58.3 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.16 dB
SAR (1g): 6.57 mW/g, SAR (10g): 4.52 mW/g

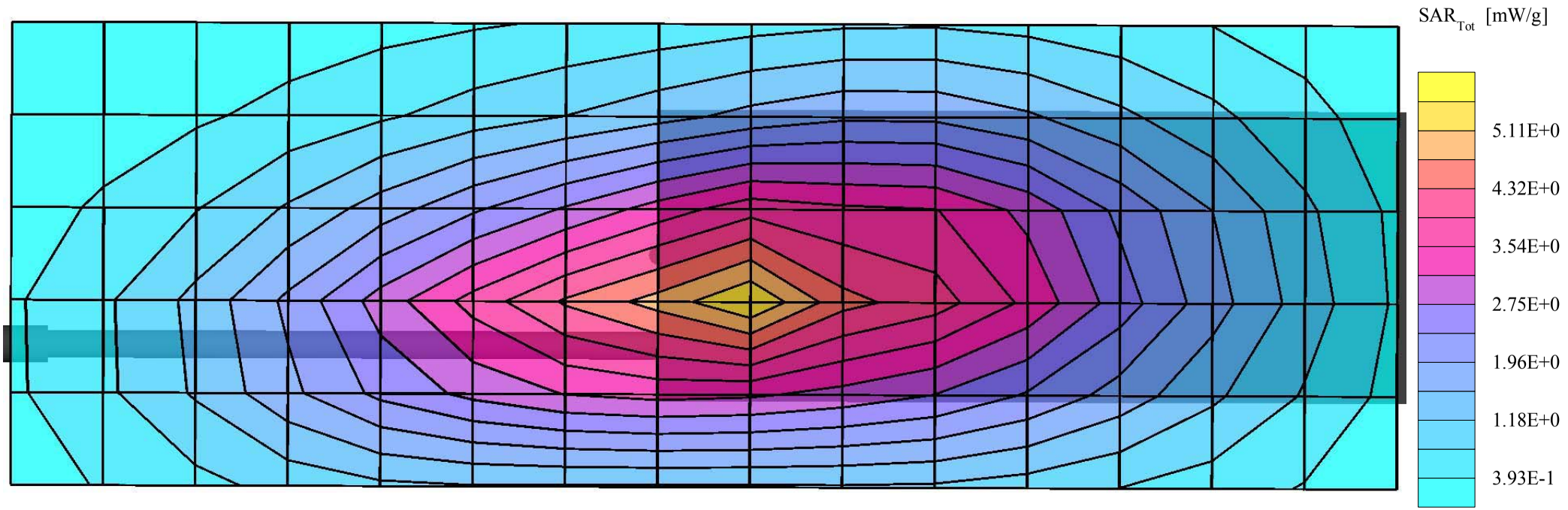
Body-Worn SAR with 1.0 cm Belt-Clip
Portable FM PTT Radio Transceiver
EF Johnson Model: 242-5130
With Speaker-Mic
NiMH Battery
Continuous Wave Mode
High Channel [469.90 Mhz]
Conducted Power: 4.08 Watts
Ambient Temp. 22.8 °C; Fluid Temp. 23.0 °C
Date Tested: May 06, 2002



EF Johnson FCC ID: ATH2425130

Small Planar Phantom; Planar Section; Position: (270°,0°)
Probe: ET3DV6 - SN1387; ConvF(7.70,7.70,7.70); Crest factor: 1.0
450 MHz Muscle: $\sigma = 0.92$ mho/m $\varepsilon_r = 58.3$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.18 dB
SAR (1g): 4.91 mW/g, SAR (10g): 3.33 mW/g

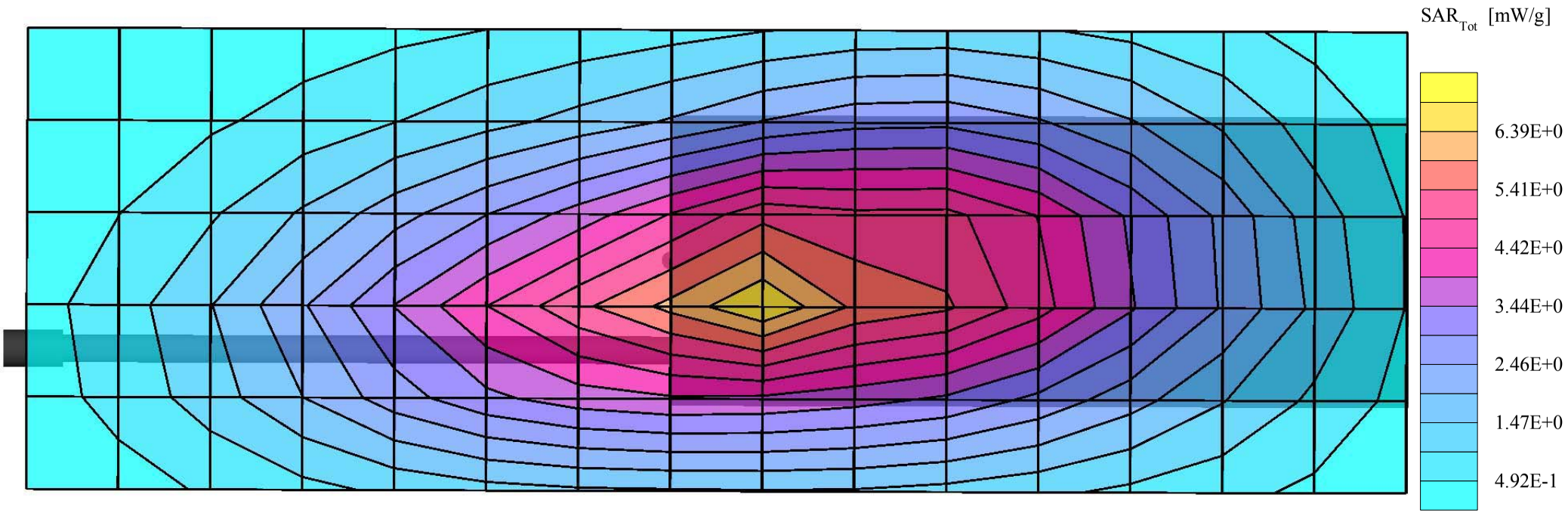
Body-Worn SAR with 1.0 cm Belt-Clip
Portable FM PTT Radio Transceiver
EF Johnson Model: 242-5130
With Boom-Mic Headset
NiMH Battery
Continuous Wave Mode
Mid Channel [435.10 Mhz]
Conducted Power: 4.21 Watts
Ambient Temp. 22.8 °C; Fluid Temp. 23.0 °C
Date Tested: May 06, 2002



EF Johnson FCC ID: ATH2425130

Small Planar Phantom; Planar Section; Position: (270°,0°)
Probe: ET3DV6 - SN1387; ConvF(7.70,7.70,7.70); Crest factor: 1.0
450 MHz Muscle: σ = 0.92 mho/m ε_r = 58.3 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7; Powerdrift: -0.19 dB
SAR (1g): 5.60 mW/g , SAR (10g): 3.01 mW/g

Body-Worn SAR with 1.0 cm Belt-Clip
Portable FM PTT Radio Transceiver
EF Johnson Model: 242-5130
With Ear-Mic
NiMH Battery
Continuous Wave Mode
Mid Channel [435.10 Mhz]
Conducted Power: 4.20 Watts
Ambient Temp. 22.8 °C; Fluid Temp. 23.0 °C
Date Tested: May 06, 2002



APPENDIX B - SYSTEM VALIDATION

05/06/02

Dipole 450MHz

Large Planar Phantom; Planar Section

Probe: ET3DV6 - SN1387; ConvF(7.30,7.30,7.30); Crest factor: 1.0; 450 MHz Brain: $\sigma = 0.91$ mho/m $\varepsilon_r = 44.8$ $\rho = 1.00$ g/cm^3

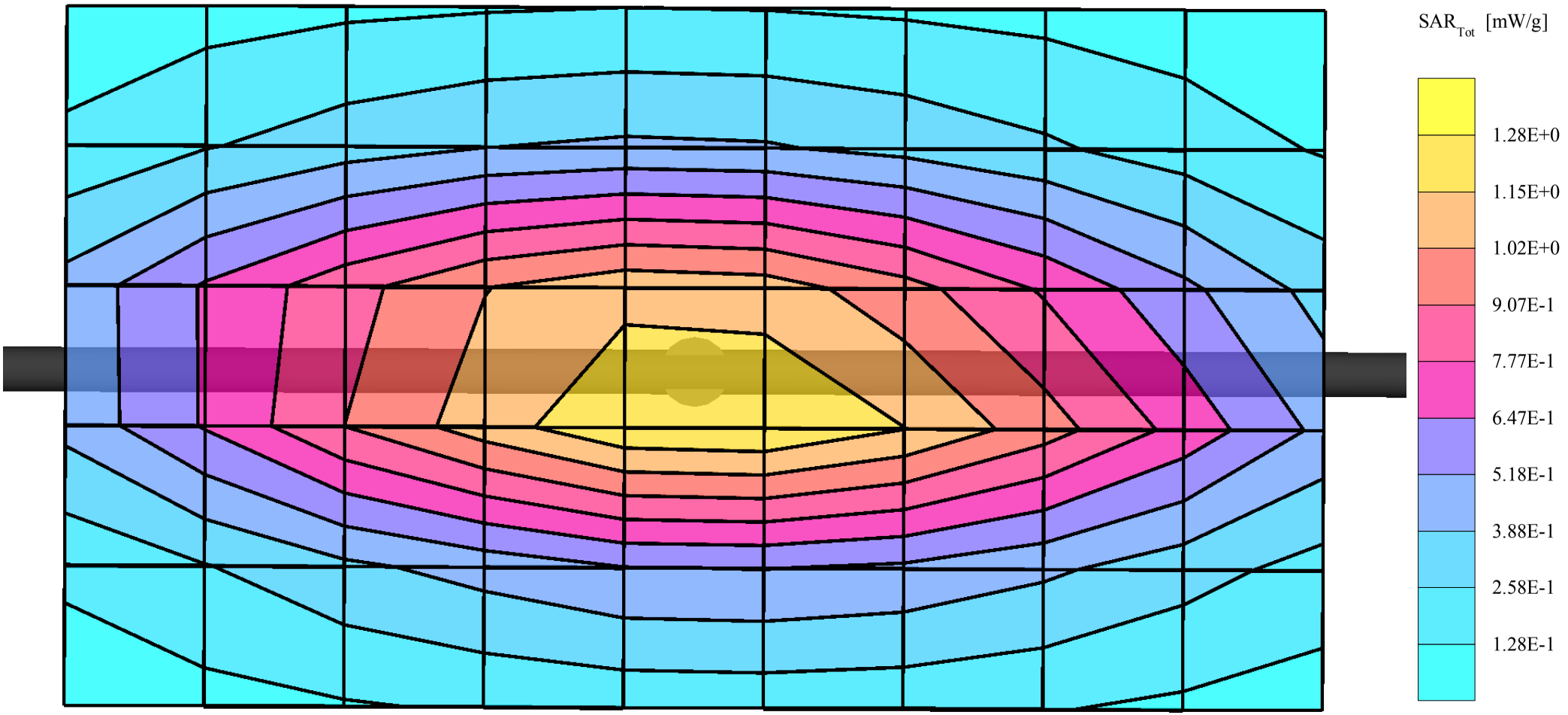
Cube 5x5x7: Peak: 2.12 mW/g, SAR (1g): 1.31 mW/g, SAR (10g): 0.877 mW/g, (Worst-case extrapolation)

Penetration depth: 12.5 (10.7, 14.9) [mm]; Ambient Temp. 23.9°C; Fluid Temp. 23.1°C

Powerdrift: -0.01 dB

Date Tested: May 06, 2002

Antenna Input Power: 250 mW



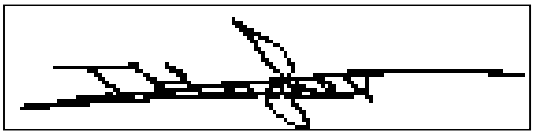
APPENDIX C - DIPOLE CALIBRATION

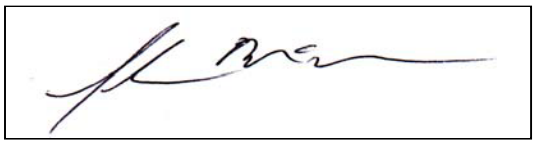
Celltech
Testing and Engineering Services Lab

450MHz SYSTEM VALIDATION DIPOLE

Type:	**450MHz Validation Dipole**
Serial Number:	**136**
Place of Calibration:	**Celltech Research Inc.**
Date of Calibration:	**October 17, 2001**

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

Calibrated by: 

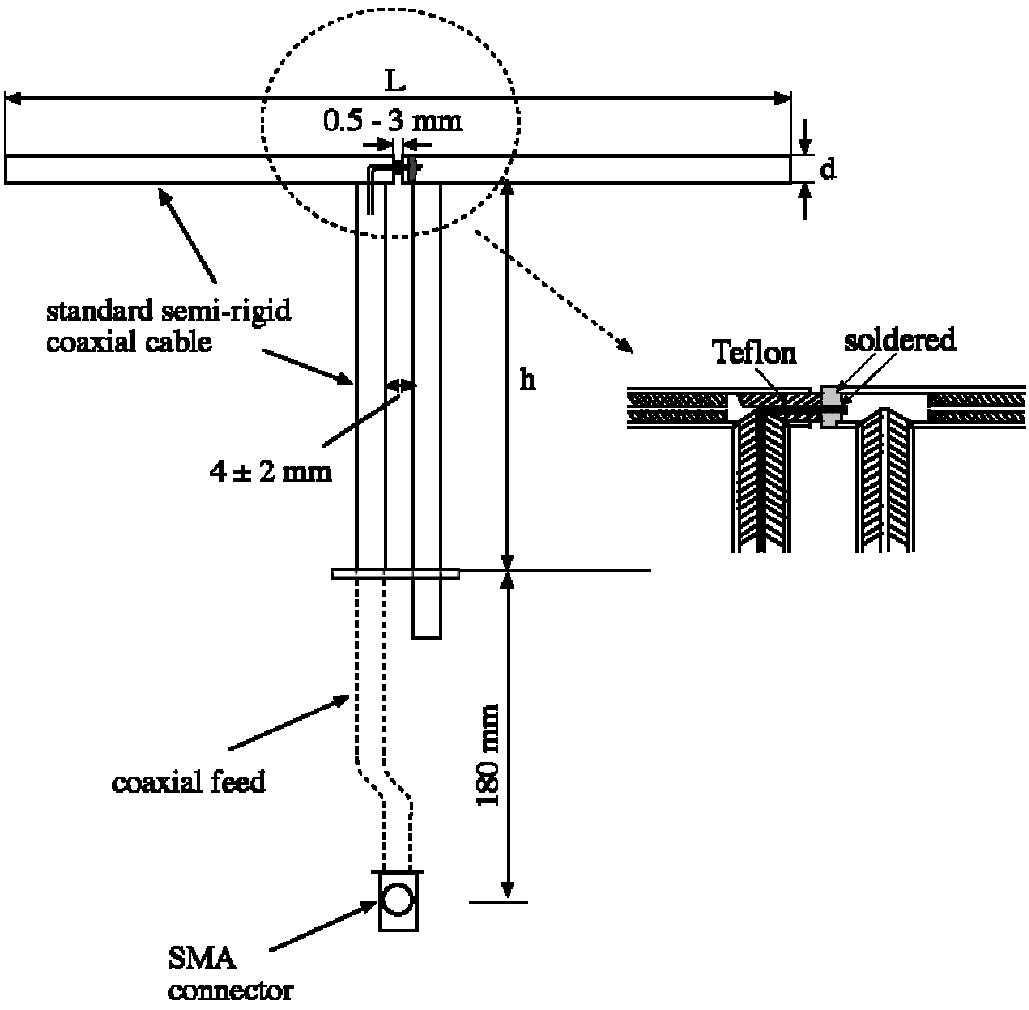
Approved by: 

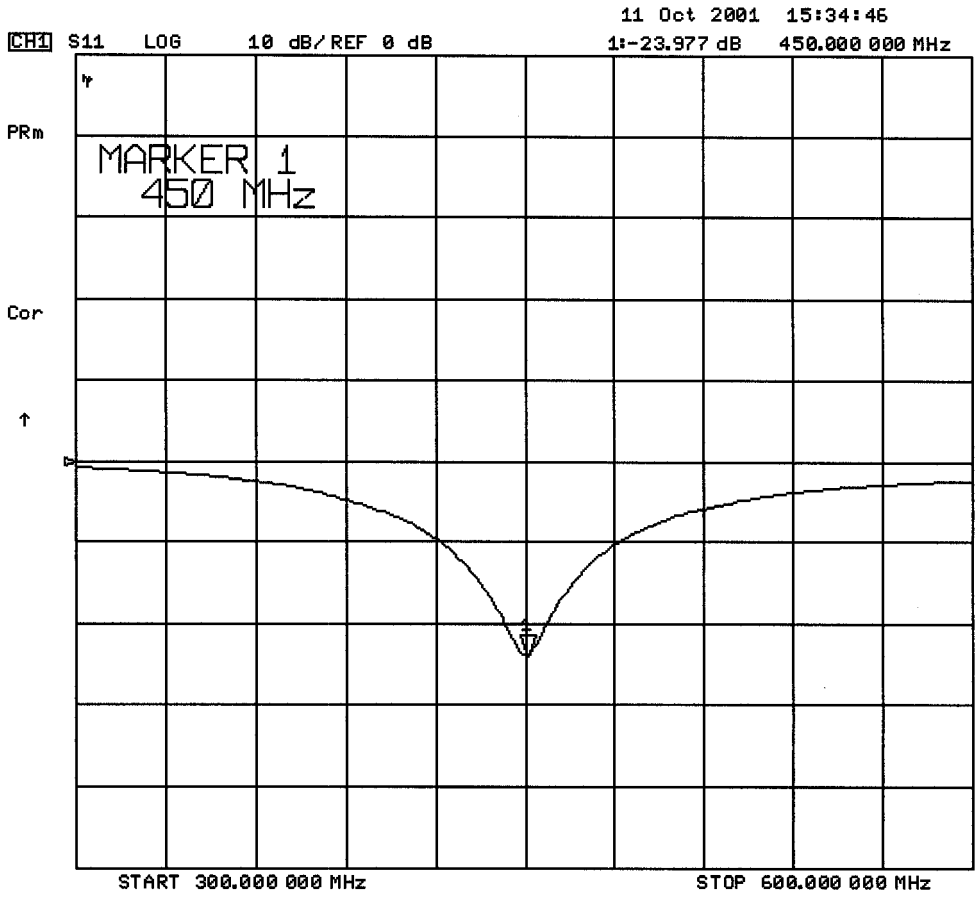
Celltech Research Inc. 1955 Moss Court, Kelowna, B.C. Canada V1Y 9L3
Tel. 250-860-3130 • Fax. 250-860-3110 • e-mail: info@celltechlabs.com
www.celltechlabs.com

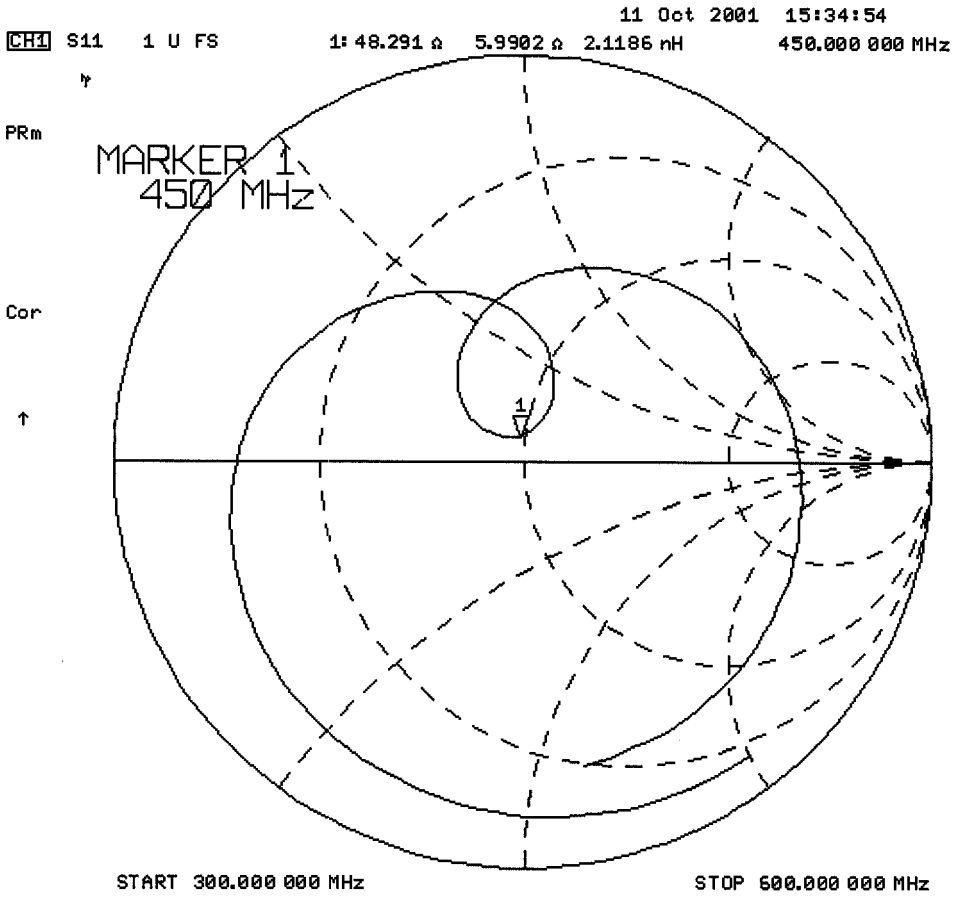
1. Dipole Construction & Electrical Characteristics

The validation dipole was constructed in accordance with the IEEE Std "Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques". 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 450MHz	$\mathrm{Re}\{Z\} = 49.982\Omega$
	$\mathrm{Im}\{Z\} = 5.8594\Omega$
Return Loss at 450MHz	-24.714dB




11 Oct 2001 15:34:46
CH1 S11 LOG 10 dB/ REF 0 dB
1:-23.977 dB 450.000 000 MHz
PRm
MARKER 1
450 MHz
Cor
START 300.000 000 MHz
STOP 600.000 000 MHz


11 Oct 2001 15:34:54
CH1 S11 1 U FS
1: 48.291 Ω 5.9902 Ω 2.1186 nH
450.000 000 MHz
PRm
MARKER 1
450 MHz
Cor
START 300.000 000 MHz
STOP 600.000 000 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

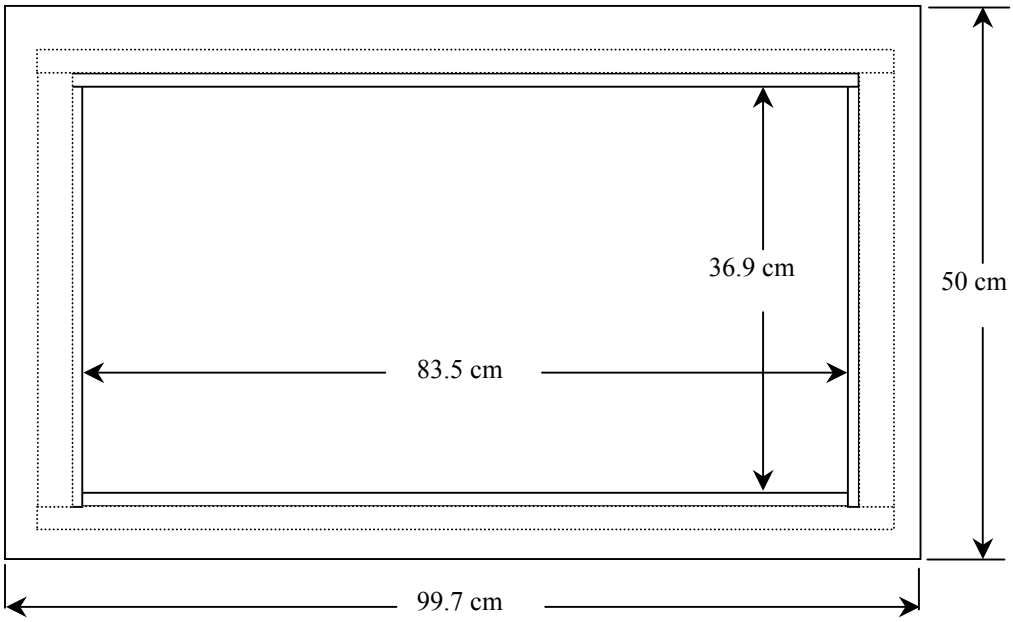
2. Validation Phantom

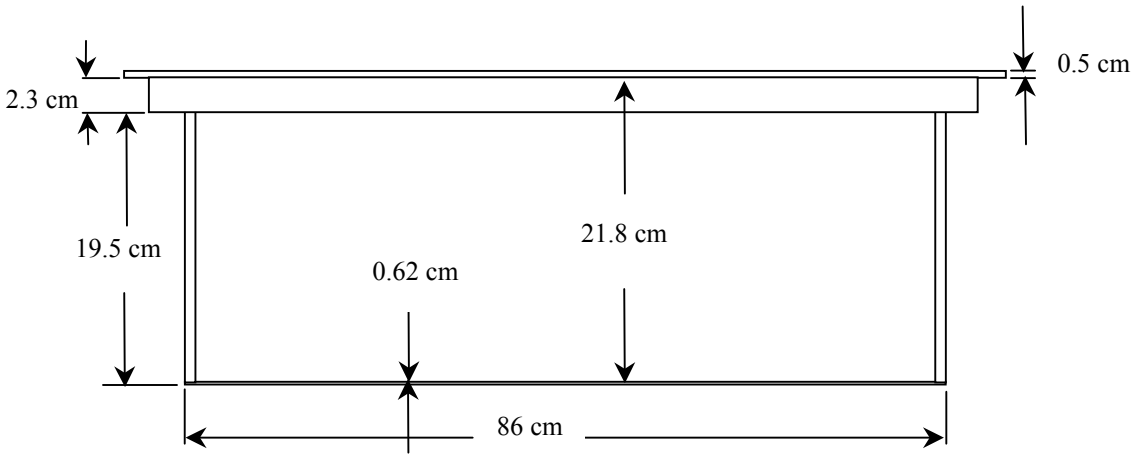
The validation phantom was constructed using relatively low-loss tangent Plexiglas material. The dimensions of the phantom are as follows:

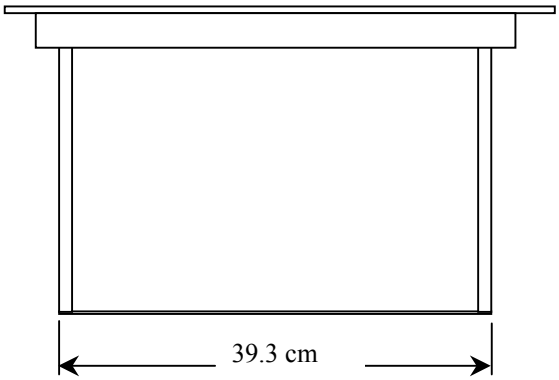
Length: 83.5 cm
Width: 36.9 cm
Height: 21.8 cm

The bottom of the phantom is constructed of 6.2 ± 0.1mm Plexiglas.

Dimensions of Plexiglas Planar Phantom







450MHz Dipole Calibration Photo

450MHz Dipole Calibration Photo

3. Measurement Conditions

The planar phantom was filled with brain simulating tissue having the following electrical parameters at 450MHz:

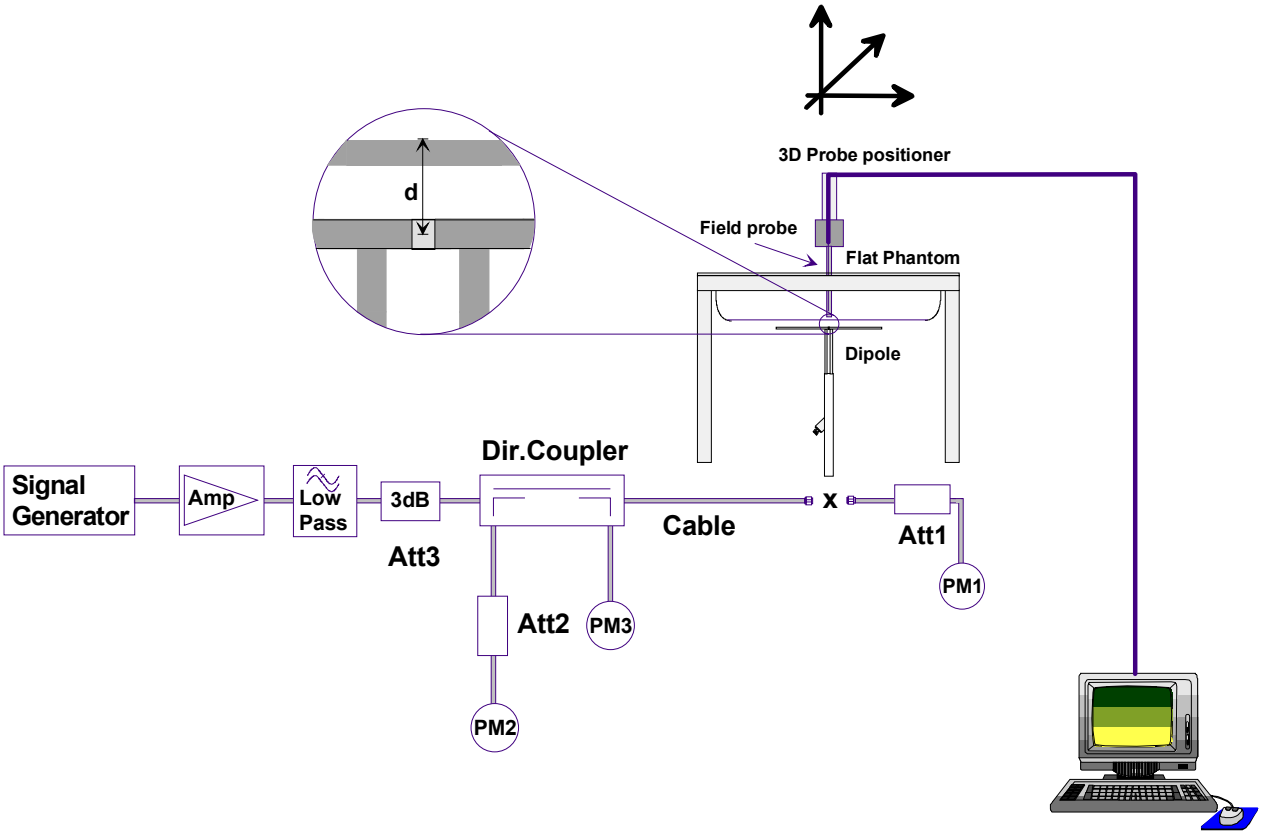
Relative Permitivity:	43.8	± 5%
Conductivity:	0.86 mho/m	± 5%
Temperature:	23.1°C	

The 450MHz simulating tissue consists of the following ingredients:

Ingredient	Percentage by weight
Water	38.56%
Sugar	56.32%
Salt	3.95%
HEC	0.98%
Dowicil 75	0.19%
Target Dielectric Parameters at 22°C	$\varepsilon_r = 43.5$ $\sigma = 0.87$ S/m

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	1.47	5.88	0.971	3.88	2.31
Test 2	1.43	5.72	0.949	3.80	2.25
Test 3	1.45	5.80	0.961	3.84	2.27
Test 4	1.44	5.76	0.954	3.82	2.26
Test 5	1.46	5.84	0.969	3.88	2.29
Test 6	1.42	5.68	0.939	3.76	2.23
Test 7	1.45	5.80	0.960	3.84	2.27
Test 8	1.41	5.64	0.928	3.71	2.22
Test 9	1.43	5.72	0.950	3.80	2.25
Test10	1.46	5.84	0.971	3.88	2.29
Average Value	1.44	5.77	0.946	3.82	2.26

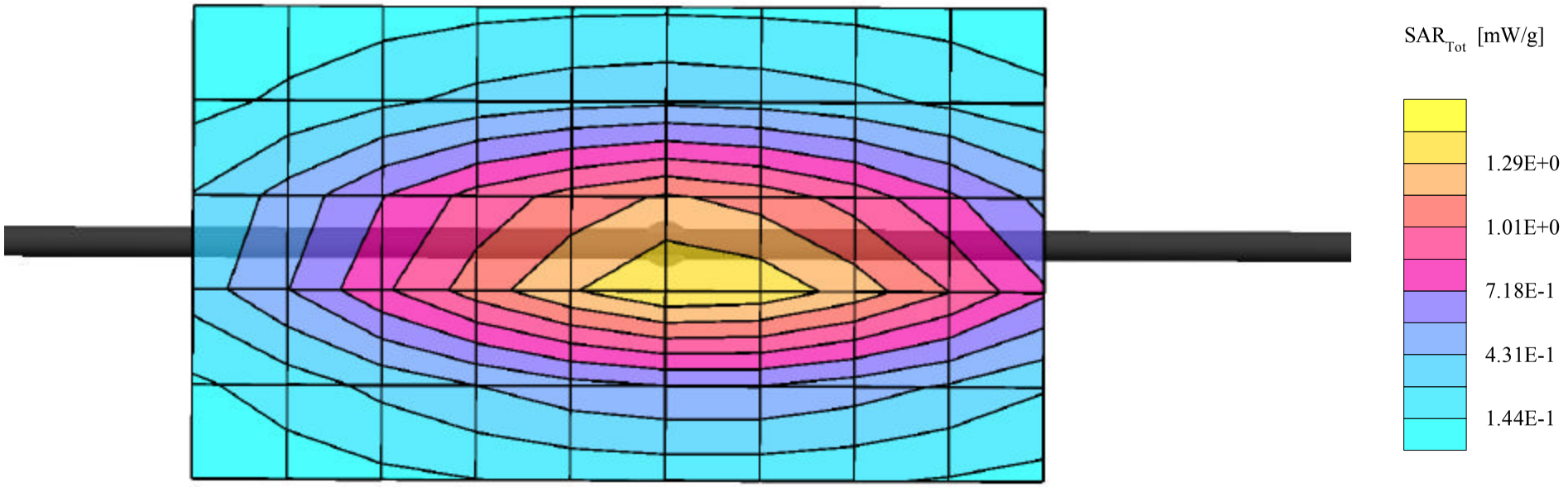
The results have been normalized to 1W (forward power) into the dipole.

Averaged over 1cm (1g) of tissue: 5.77 mW/g

Averaged over 10cm (10g) of tissue: 3.82 mW/g

Validation Dipole 450MHz, d = 15 mm

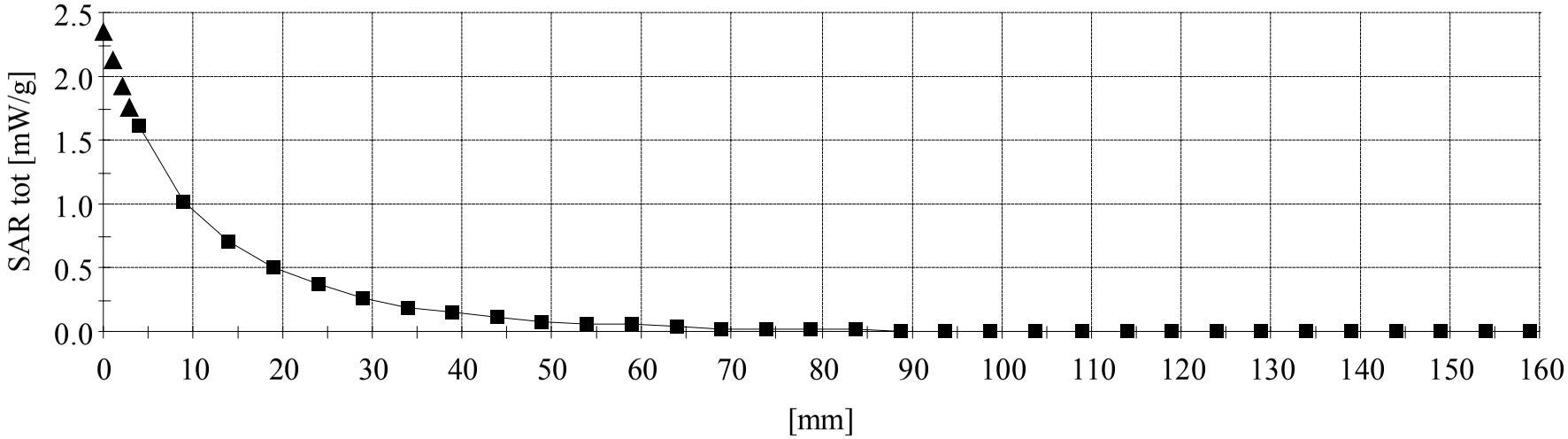
Frequency: 450 MHz; Antenna Input Power: 250 [mW]
Flat Phantom; Planar Section
Probe: ET3DV6 - SN1590; ConvF(7.36,7.36,7.36); Crest factor: 1.0
450 MHz Brain: $\sigma = 0.87$ mho/m $\varepsilon_r = 43.5$ $\rho = 1.00$ g/cm^3
Cube 5x5x7: Peak: 2.34 mW/g, SAR (1g): 1.47 mW/g, SAR (10g): 0.963 mW/g, (Worst-case extrapolation)
Penetration depth: 12.3 (10.7, 14.4) [mm]
Powerdrift: 0.02 dB
Calibration Date: Oct. 17, 2001



Validation Dipole 450MHz, d = 15 mm

Flat Phantom; Planar Section
Probe: ET3DV6 - SN1590; ConvF(7.36,7.36,7.36); Crest factor: 1.0
450 MHz Brain: σ = 0.87 mho/m ε_r = 43.5 ρ = 1.00 g/cm^3
Z-Axis: Dx = 0.0, Dy = 0.0, Dz = 5.0

Test Date: October 17, 2001
conducted power: 250 mW



APPENDIX D - PROBE CALIBRATION

Schmid & Partner
Engineering AG

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

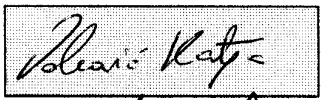
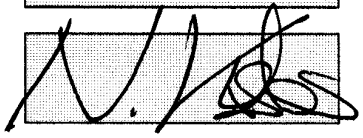
Calibration Certificate

Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1387**
Place of Calibration:	**Zurich**
Date of Calibration:	**February 22, 2002**
Calibration Interval:	**12 months**

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	
Approved by:	

Probe ET3DV6

SN:1387

Manufactured:	September 21, 1999
Last calibration:	September 22, 1999
Recalibrated:	February 22, 2002

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1387

Sensitivity in Free Space

Diode Compression

NormX	**1.58** $\mu V/(V/m)^2$		DCP X	**97**	mV
NormY	**1.67** $\mu V/(V/m)^2$		DCP Y	**97**	mV
NormZ	**1.67** $\mu V/(V/m)^2$		DCP Z	**97**	mV

Sensitivity in Tissue Simulating Liquid

Head **900 MHz** ε_r **= 41.5 ± 5%** σ **= 0.97 ± 5% mho/m**
Head **835 MHz** ε_r **= 41.5 ± 5%** σ **= 0.90 ± 5% mho/m**

ConvF X	**6.6** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**6.6** ± 9.5% (k=2)		Alpha	**0.40**
ConvF Z	**6.6** ± 9.5% (k=2)		Depth	**2.38**

Head **1800 MHz** ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**
Head **1900 MHz** ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

ConvF X	**5.4** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**5.4** ± 9.5% (k=2)		Alpha	**0.57**
ConvF Z	**5.4** ± 9.5% (k=2)		Depth	**2.18**

Boundary Effect

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

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	9.7	5.4
SAR_{be} [%]	With Correction Algorithm	0.3	0.6

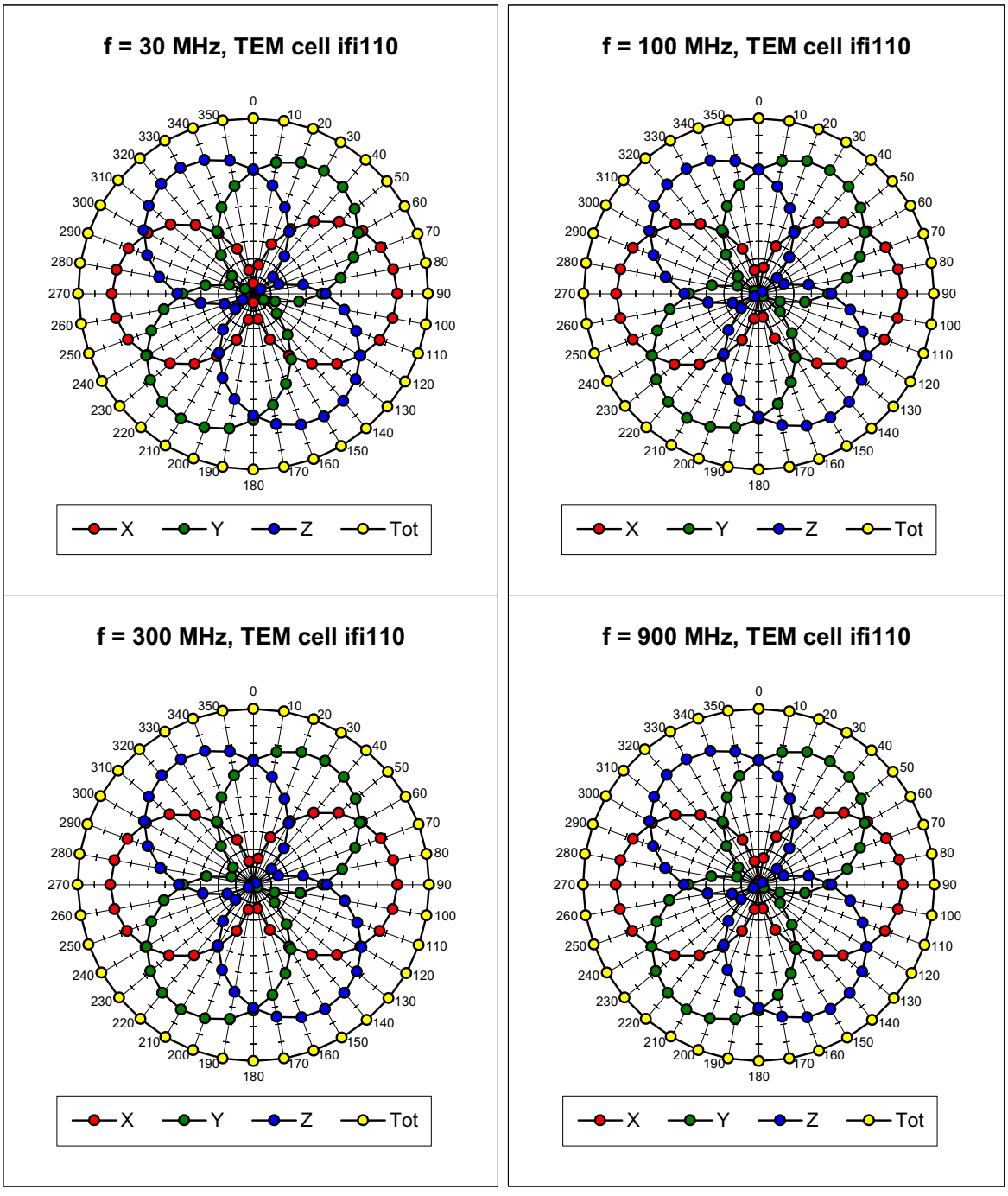
Head **1800 MHz** **Typical SAR gradient: 10 % per mm**

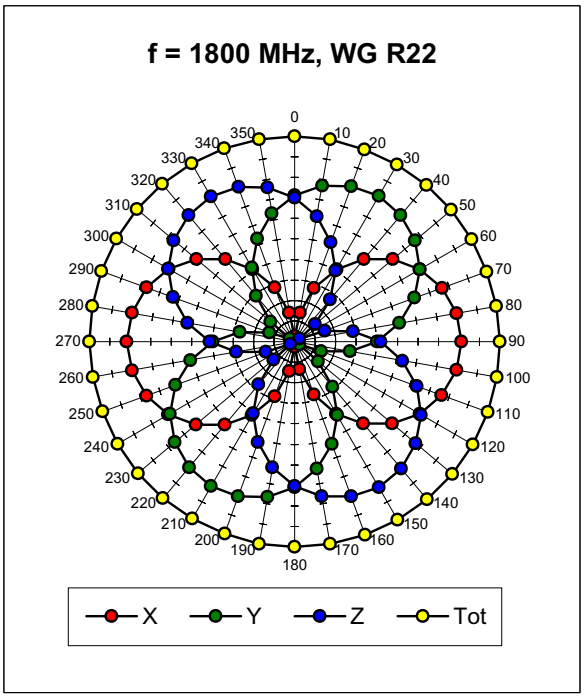
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	11.5	7.3
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

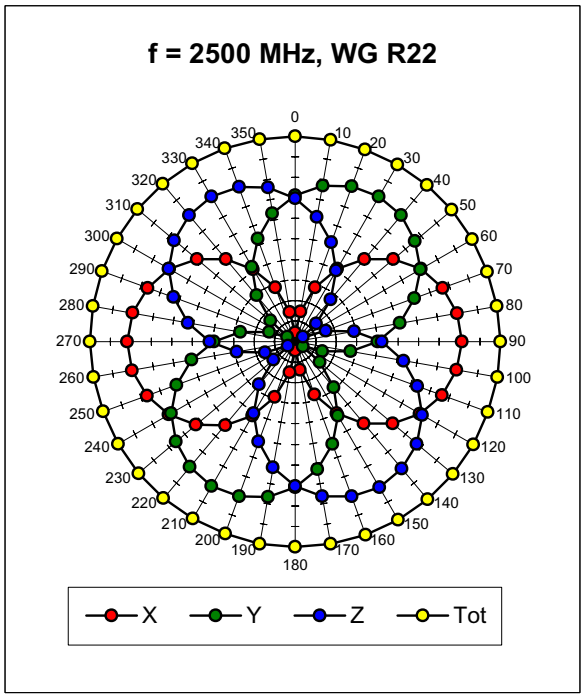
Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.3 ± 0.2**	mm

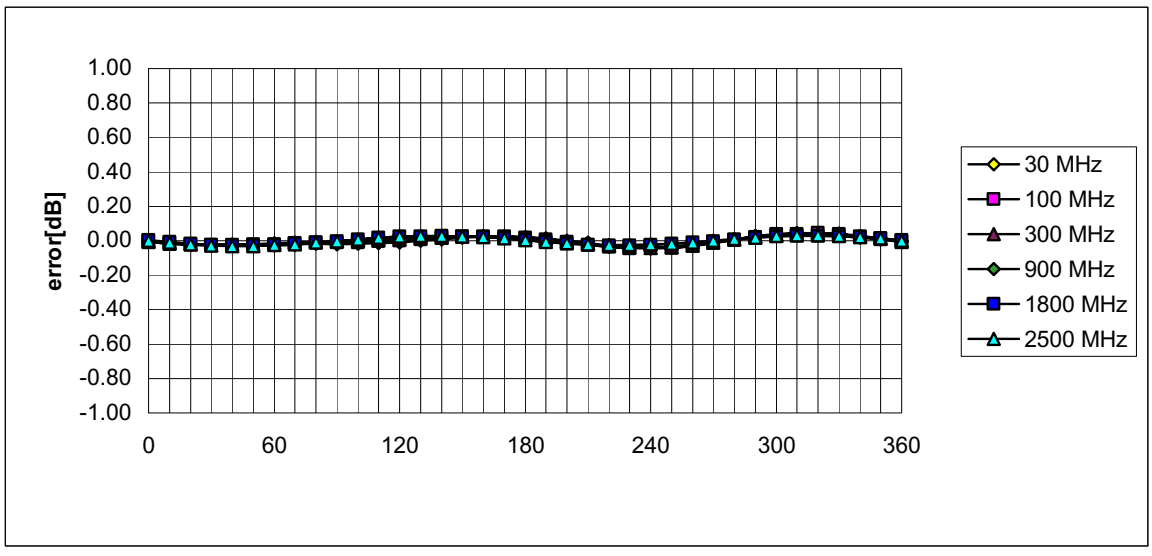
Receiving Pattern (ϕ , θ = 0°





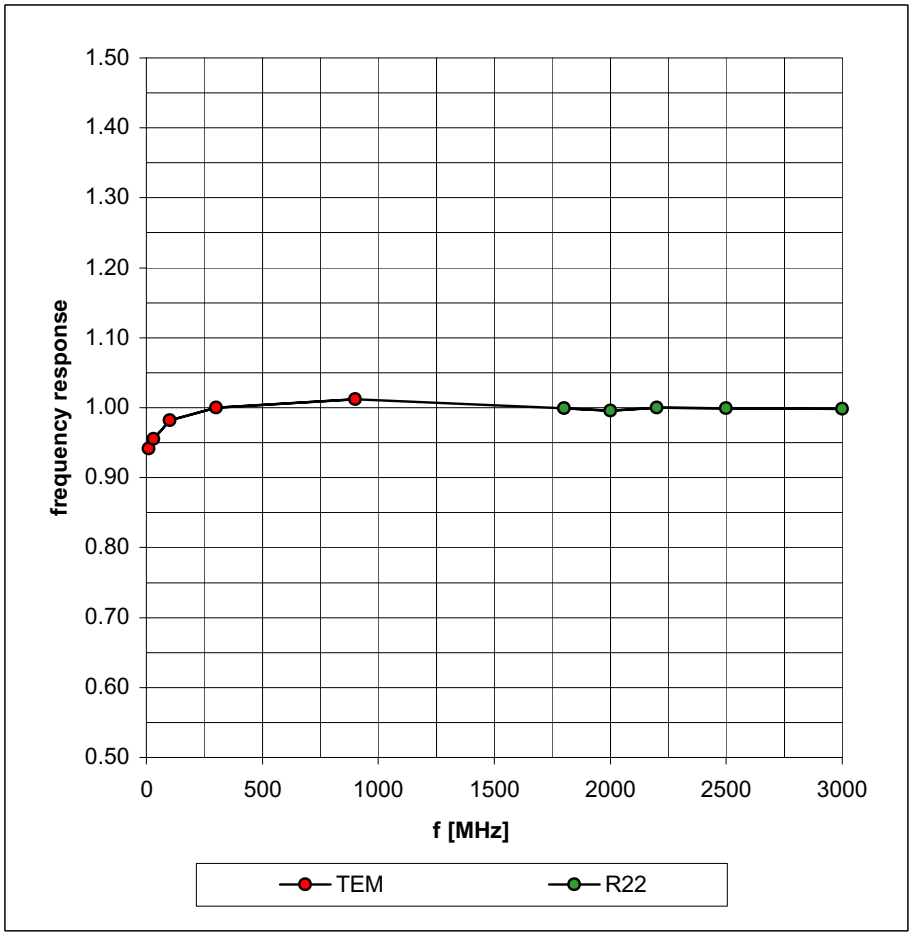


Isotropy Error (ϕ), θ = 0°



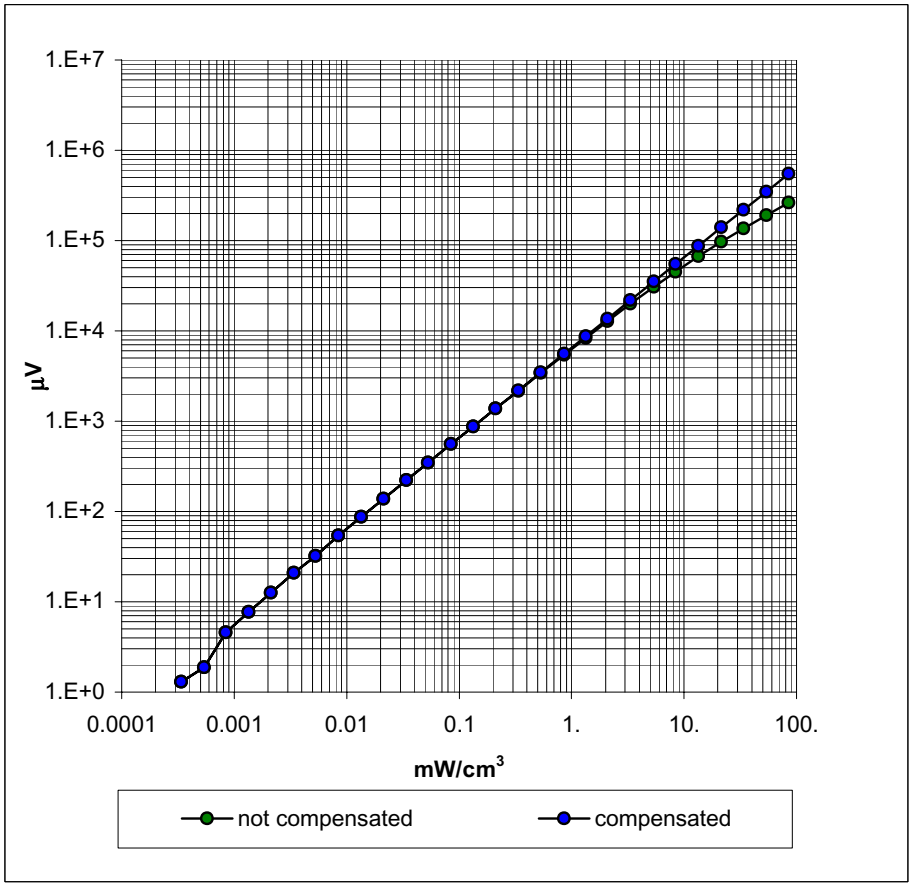
Frequency Response of E-Field

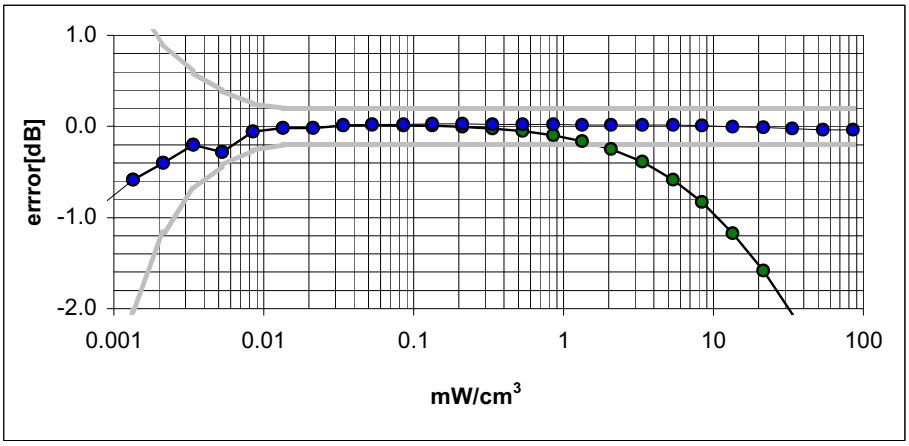
(TEM-Cell:ifi110, Waveguide R22)



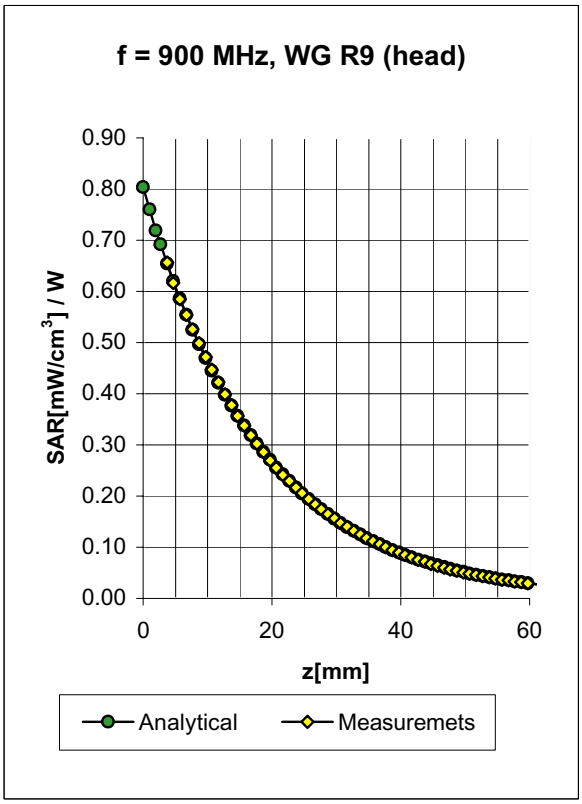
Dynamic Range f(SAR_{brain})

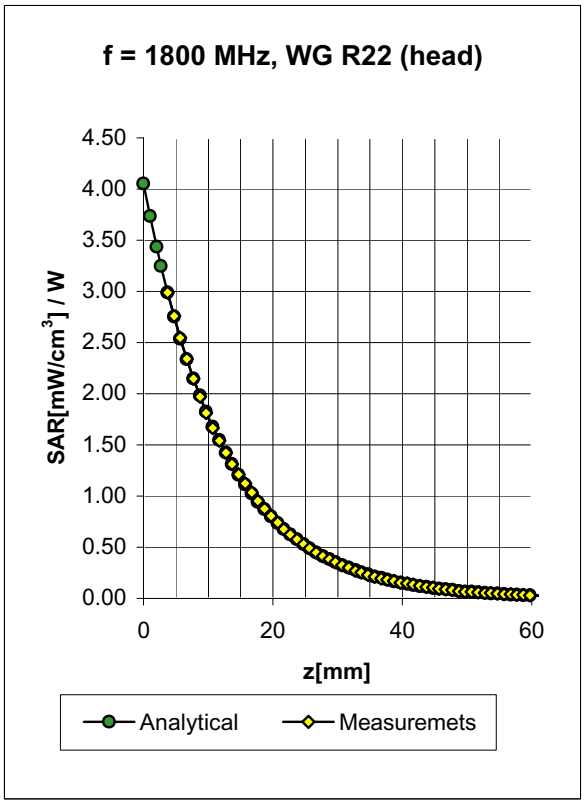
(Waveguide R22)





Conversion Factor Assessment



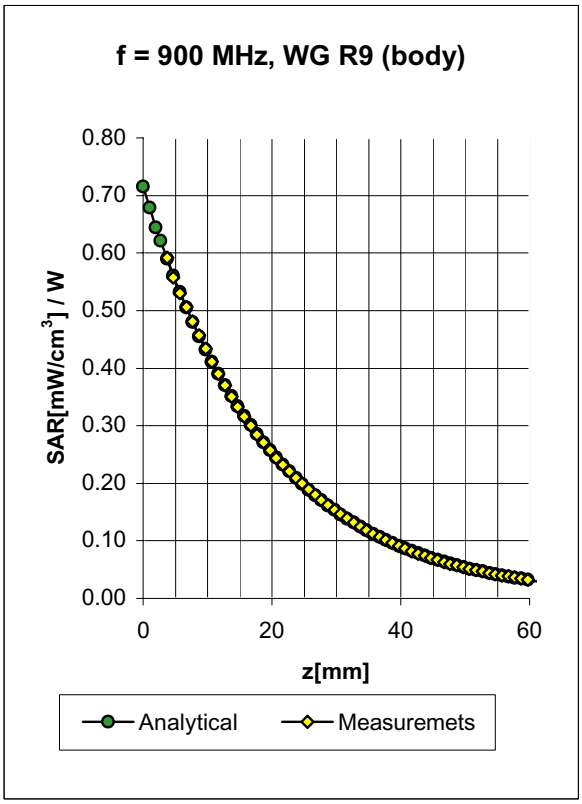


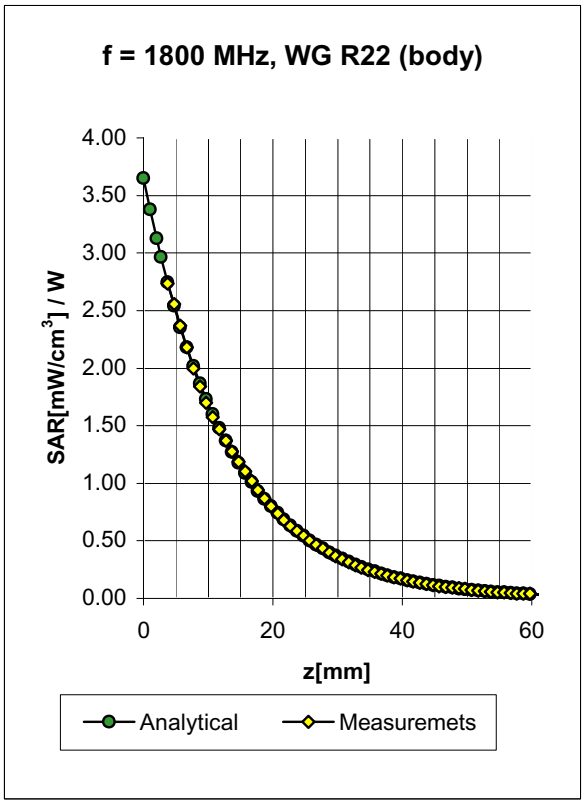
Head	**900 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.97 ± 5% mho/m**	
Head	**835 MHz**		**ε_r = 41.5 ± 5%**	**σ = 0.90 ± 5% mho/m**	
	ConvF X	**6.6** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**6.6** ± 9.5% (k=2)		Alpha	**0.40**
	ConvF Z	**6.6** ± 9.5% (k=2)		Depth	**2.38**

Head	**1800 MHz**		**ε_r = 40.0 ± 5%**	**σ = 1.40 ± 5% mho/m**	
Head	**1900 MHz**		**ε_r = 40.0 ± 5%**	**σ = 1.40 ± 5% mho/m**	
	ConvF X	**5.4** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**5.4** ± 9.5% (k=2)		Alpha	**0.57**
	ConvF Z	**5.4** ± 9.5% (k=2)		Depth	**2.18**

ET3DV6 SN:1387 **February 22, 2002**

Conversion Factor Assessment





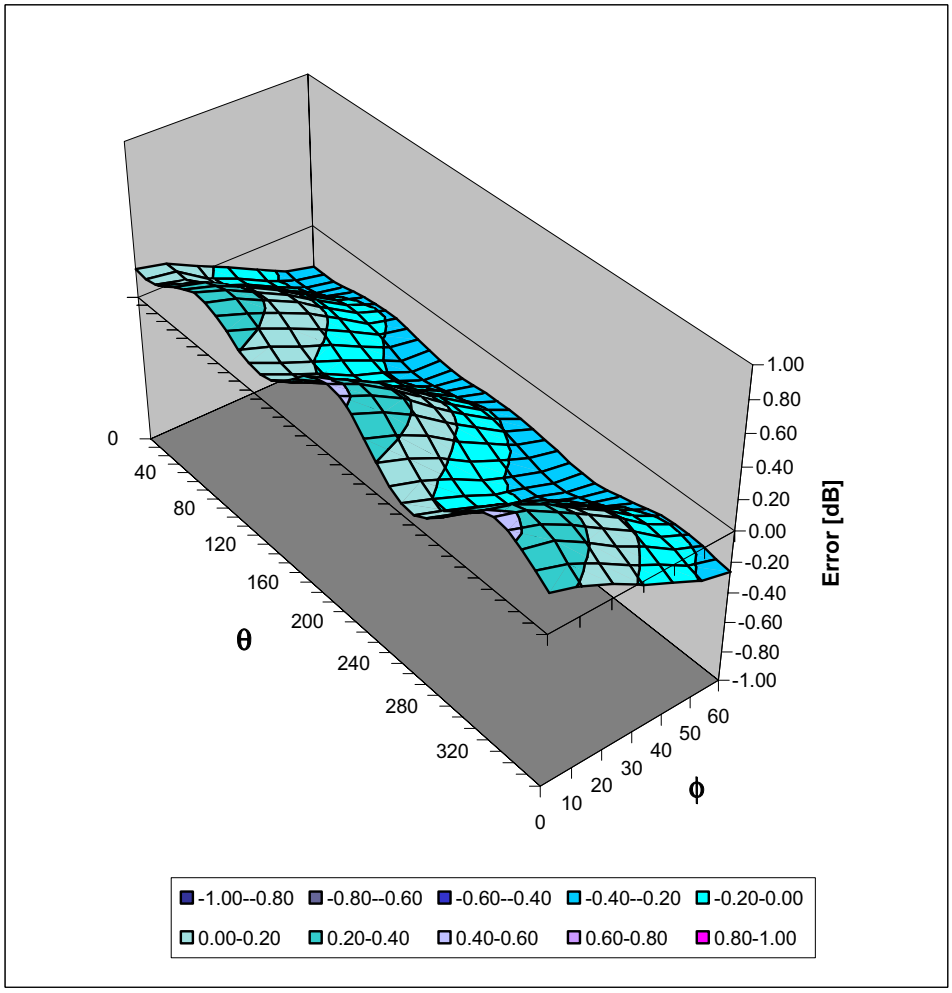
Body	**900 MHz**	ε_r **= 55.0 ± 5%**	**σ = 1.05 ± 5% mho/m**	
Body	**835 MHz**	ε_r **= 55.2 ± 5%**	**σ = 0.97 ± 5% mho/m**	
	ConvF X	**6.3** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.3** ± 9.5% (k=2)	Alpha	**0.42**
	ConvF Z	**6.3** ± 9.5% (k=2)	Depth	**2.44**

Body	**1800 MHz**	ε_r **= 53.3 ± 5%**	**σ = 1.52 ± 5% mho/m**	
Body	**1900 MHz**	ε_r **= 53.3 ± 5%**	**σ = 1.52 ± 5% mho/m**	
	ConvF X	**5.0** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.0** ± 9.5% (k=2)	Alpha	**0.76**
	ConvF Z	**5.0** ± 9.5% (k=2)	Depth	**2.01**

ET3DV6 SN:1387 **February 22, 2002**

Deviation from Isotropy in HSL

Error ($\theta\phi$), f = 900 MHz



Schmid & Partner
Engineering AG

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

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1387**
Place of Assessment:	**Zurich**
Date of Assessment:	**February 25, 2002**
Probe Calibration Date:	**February 22, 2002**

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:

Dosimetric E-Field Probe ET3DV6 SN:1387

Conversion Factor (± standard deviation)

150 MHz	ConvF	**9.2 ± 8%**	**ε_r = 52.3** **σ = 0.76 mho/m** (head tissue)
300 MHz	ConvF	**8.0 ± 8%**	**ε_r = 45.3** **σ = 0.87 mho/m** (head tissue)
450 MHz	ConvF	**7.3 ± 8%**	**ε_r = 43.5** **σ = 0.87 mho/m** (head tissue)
2450 MHz	ConvF	**4.7 ± 8%**	**ε_r = 39.2** **σ = 1.80 mho/m** (head tissue)
150 MHz	ConvF	**8.8 ± 8%**	**ε_r = 61.9** **σ = 0.80 mho/m** (body tissue)
450 MHz	ConvF	**7.7 ± 8%**	**ε_r = 56.7** **σ = 0.94 mho/m** (body tissue)
2450 MHz	ConvF	**4.3 ± 8%**	**ε_r = 52.7** **σ = 1.95 mho/m** (body tissue)

APPENDIX E - MEASURED FLUID DIELECTRIC PARAMETERS

450MHz System Validation & EUT Evaluation (Face)

Measured Fluid Dielectric Parameters (Brain)

May 06, 2002

Frequency	e'	e''
350.000000 MHz	46.8877	42.0948
355.000000 MHz	46.8229	41.7574
360.000000 MHz	46.7751	41.5312
365.000000 MHz	46.8073	41.2076
370.000000 MHz	46.7492	41.0520
375.000000 MHz	46.8524	40.8323
380.000000 MHz	46.6960	40.7438
385.000000 MHz	46.6712	40.4744
390.000000 MHz	46.3886	40.3583
395.000000 MHz	46.3543	39.9949
400.000000 MHz	46.0386	39.7252
405.000000 MHz	46.0012	39.3161
410.000000 MHz	45.7804	38.9241
415.000000 MHz	45.6984	38.4793
420.000000 MHz	45.5066	38.1026
425.000000 MHz	45.5009	37.7451
430.000000 MHz	45.3340	37.3718
435.000000 MHz	45.2468	37.1114
440.000000 MHz	45.0980	36.8186
445.000000 MHz	45.0117	36.5987
450.000000 MHz	44.8620	36.3847
455.000000 MHz	44.7693	36.2129
460.000000 MHz	44.6448	36.0596
465.000000 MHz	44.5104	35.9392
470.000000 MHz	44.3707	35.8227
475.000000 MHz	44.2202	35.7290
480.000000 MHz	44.0674	35.6025
485.000000 MHz	43.7749	35.4683
490.000000 MHz	43.6529	35.2728
495.000000 MHz	43.3959	35.0880
500.000000 MHz	43.3267	34.7710
505.000000 MHz	43.1673	34.6127
510.000000 MHz	43.1318	34.2833
515.000000 MHz	43.0754	34.1144
520.000000 MHz	43.0509	33.8430

450MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

May 06, 2002

Frequency	e'	e''
400.000000 MHz	59.1062	39.8618
405.000000 MHz	58.9400	39.4522
410.000000 MHz	58.8377	39.1444
415.000000 MHz	58.7547	38.8193
420.000000 MHz	58.6547	38.5046
425.000000 MHz	58.5849	38.1304
430.000000 MHz	58.5825	37.8403
435.000000 MHz	58.4898	37.5443
440.000000 MHz	58.3982	37.3423
445.000000 MHz	58.3036	37.0678
450.000000 MHz	58.2730	36.8623
455.000000 MHz	58.2072	36.6205
460.000000 MHz	58.1716	36.4710
465.000000 MHz	58.0864	36.2137
470.000000 MHz	57.9825	36.0762
475.000000 MHz	57.9070	35.8896
480.000000 MHz	57.8033	35.7310
485.000000 MHz	57.6379	35.4457
490.000000 MHz	57.5404	35.2935
495.000000 MHz	57.4360	35.0225
500.000000 MHz	57.3529	34.8391
505.000000 MHz	57.2824	34.5523
510.000000 MHz	57.2650	34.3441
515.000000 MHz	57.2039	34.1663
520.000000 MHz	57.1889	33.9638
525.000000 MHz	57.1077	33.7634
530.000000 MHz	57.0794	33.5703
535.000000 MHz	56.9397	33.3907
540.000000 MHz	56.9456	33.1629
545.000000 MHz	56.8583	32.9854
550.000000 MHz	56.8127	32.8407
555.000000 MHz	56.6881	32.7260
560.000000 MHz	56.6723	32.6256
565.000000 MHz	56.6279	32.4711
570.000000 MHz	56.5190	32.3042

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].

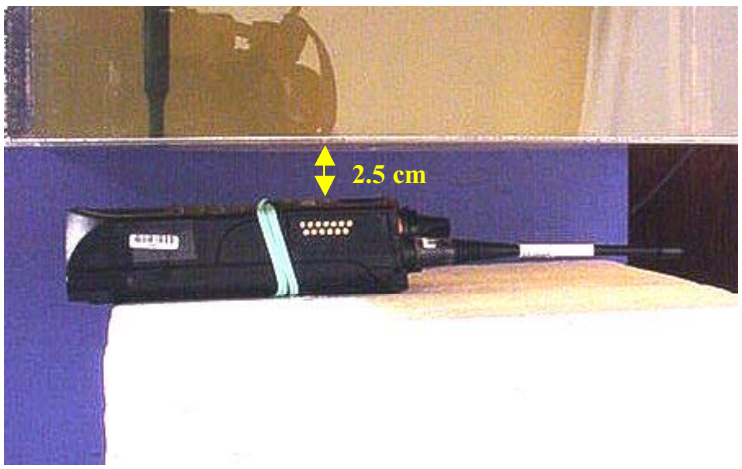
Date 18.11.2001

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 & EUT PHOTOGRAPHS

FACE-HELD SAR TEST SETUP PHOTOGRAPHS

2.5cm Separation Distance



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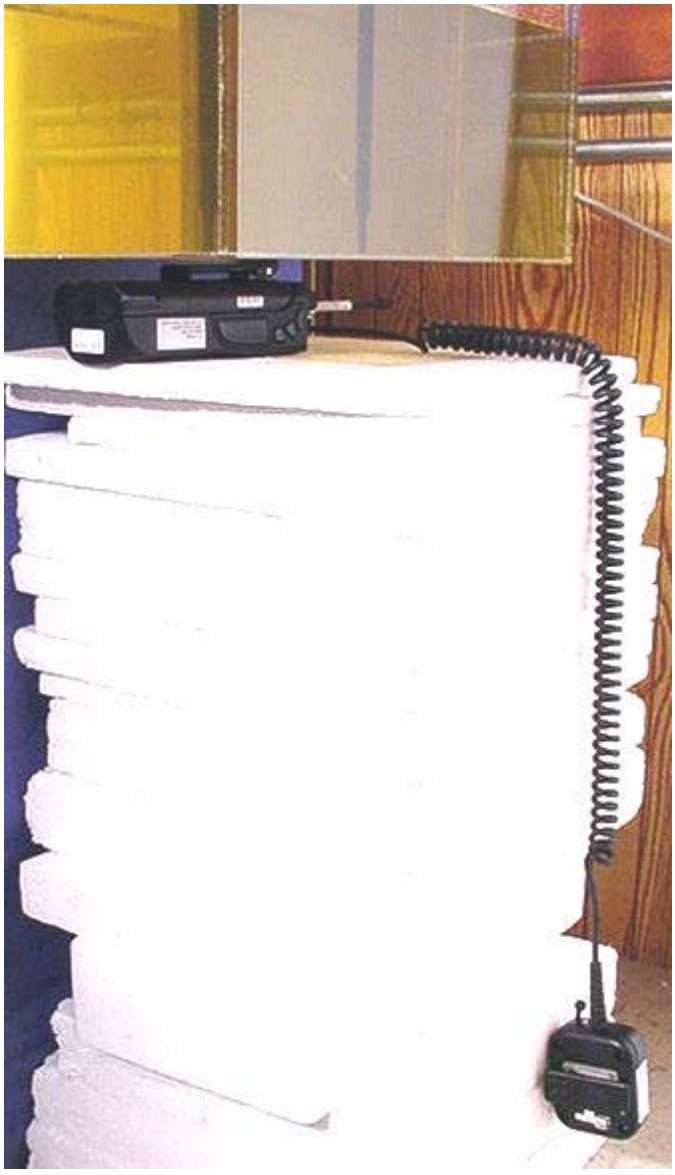
BODY-WORN SAR TEST SETUP PHOTOGRAPHS
with 1.0cm Belt-Clip Separation Distance
Speaker-Microphone Accessory



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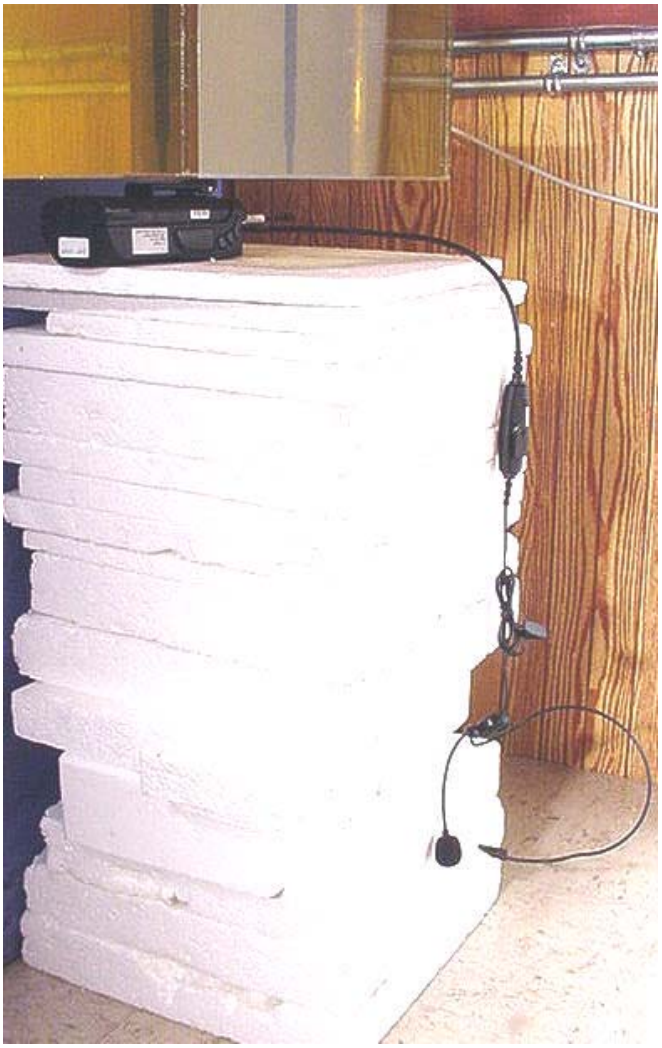
BODY-WORN SAR TEST SETUP PHOTOGRAPHS
with 1.0cm Belt-Clip Separation Distance
Boom-Microphone Headset Accessory



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BODY-WORN SAR TEST SETUP PHOTOGRAPHS
with 1.0cm Belt-Clip Separation Distance
Ear-Microphone Accessory

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EUT PHOTOGRAPHS
with Speaker-Microphone

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EUT PHOTOGRAPHS
with Boom-Microphone Headset & Ear-Microphone

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EUT PHOTOGRAPHS
with Belt-Clip

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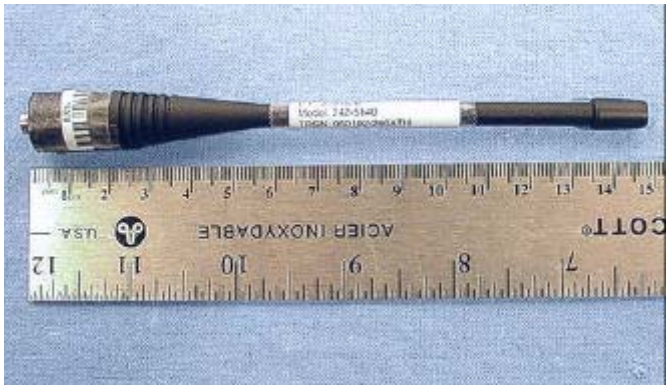
EUT PHOTOGRAPHS
NiCD & NiMH Batteries & Antenna



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