APPENDIX C: RF EXPOSURE INFORMATION

FCC Rules and Regulations Part 1.1307, 1.1310, 2.1091, 2.1093: RF EXPOSURE COMPLIANCE

The SAR Evaluation is provided on the following pages.

DECLARATION OF COMPLIANCE
SAR EVALUATION

Test Lab

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Applicant Information

E.F. JOHNSON CO.
299 Johnson Ave. SW
Waseca, MN 56093

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)**
Equipment Class:	**Licensed Non-Broadcast Transmitter Held to Face (TNF)**
Equipment Type:	**Portable FM PTT Radio Transceiver & Speaker-Microphone with Antenna**
FCC ID:	**ATH2425180**
Model(s):	**242-5180**
Modulation:	**FM**
Tx Frequency Range(s):	**806-824 MHz (25kHz Analog, NPSPAC Analog, P25 Digital)** **851-869 MHz (25kHz Analog, NPSPAC Analog, P25 Digital)**
Max. Cond. Power Tested:	**3.55 Watts**
Antenna Type(s):	**Helical Whip**
Battery Type(s):	**7.5V Nickel Cadmium** **7.5V Nickel Metal Hydride**
Body-Worn Accessory:	**Speaker-Microphone with Antenna & Lapel Clip (589-0015-058)**
Class II Change(s):	**Add Speaker-Microphone with Antenna (589-0015-058)**
Max SAR Measured:	**2.11 W/kg Face-held (50% Duty Cycle)** **4.62 W/kg Body-worn (50% Duty Cycle)**

Celltech Labs 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 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.

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

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

Russell W. Pipe
Senior Compliance Technologist
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1.0 INTRODUCTION

This measurement report demonstrates that the E.F. Johnson Co. Model: 242-5180 Portable FM PTT Radio Transceiver FCC ID: ATH2425180, with the Class II Permissive Change of adding a Speaker-Microphone with Antenna accessory, complies with the 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 EQUIPMENT UNDER TEST (EUT)

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)
Equipment Class	Licensed Non-Broadcast Transmitter Held to Face (TNF)
Equipment Type	Portable FM PTT Radio Transceiver & Speaker-Microphone with Antenna
FCC ID	ATH2425180
Model(s)	242-5180
Serial No.	Pre-production
Modulation	FM
Tx Frequency Range	806-824 MHz (25kHz Analog, NPSPAC Analog, P25 Digital) 851-869 MHz (25kHz Analog, NPSPAC Analog, P25 Digital)
Max. RF Conducted Power Measured	3.55 Watts
Antenna Type(s)	Helical Whip
Battery Type(s)	7.5V Nickel Cadmium 7.5V Nickel Metal Hydride
Body-worn Accessory Tested	Speaker-Microphone with Antenna & Lapel Clip (589-0015-058)
Class II Permissive Change(s)	Add Speaker-Microphone with Antenna (589-0015-058)

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3.0 SAR MEASUREMENT SYSTEM

The Celltech Labs SAR measurement facility utilizes the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The SAR measurement 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 and/or body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe at 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 Planar Phantom

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

Speaker-Microphone with Antenna

Freq. (MHz)	Channel	Test Mode	Battery Type	Separation Distance to Planar Phantom (cm)	Conducted Power			Measured SAR 1g (W/kg)		Scaled SAR 1g (W/kg)	
					Before (W)	After (W)	Drift (dB)	100% Duty Cycle	50% Duty Cycle	100% Duty Cycle	50% Duty Cycle
815.0125	LB Mid	CW	NiMH	2.5	3.53	3.32	-0.27	3.83	1.92	4.08	2.04
860.0125	HB Mid	CW	NiMH	2.5	3.52	3.47	-0.07	3.29	1.65	3.34	1.67
806.0125	LB Low	CW	NiMH	2.5	3.52	3.26	-0.34	2.75	1.38	2.97	1.49
823.9875	LB High	CW	NiMH	2.5	3.51	3.35	-0.20	4.21	2.11	4.41	2.21
815.0125	LB Mid	CW	NiCd	2.5	3.50	3.33	-0.22	3.84	1.95	4.04	2.02
860.0125	HB Mid	CW	NiCd	2.5	3.52	3.45	-0.09	3.16	1.58	3.23	1.62
806.0125	LB Low	CW	NiCd	2.5	3.48	3.47	-0.02	3.94	1.97	3.96	1.98
823.9875	LB High	CW	NiCd	2.5	3.55	3.43	-0.15	2.73	1.37	2.83	1.42

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

Measured Mixture Type	835MHz Brain		**Relative Humidity**	52 %
Dielectric Constant	**IEEE Target**	**Measured**	**Ambient Temperature**	24.2 °C
	41.5 (+/-5%)	40.0	**Fluid Temperature**	22.4 °C
Conductivity	**IEEE Target**	**Measured**	**Fluid Depth**	≥ 15 cm
	0.90 (+/-5%)	0.88	**Atmospheric Pressure**	101.6 kPa
ρ (Kg/m^3)	1000		**Abbreviation(s)**	LB = Low Band HB = High Band

Note(s):

1. The EUT was tested at the mid channel of the frequency bands (815.0125MHz, 860.0125MHz) with both NiMH and NiCd batteries. The frequency band with the highest SAR level at the mid channel was further tested at the low and high channels.
2. 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.
3. The dielectric properties of the simulated brain fluid were verified 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).

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MEASUREMENT SUMMARY (Cont.)

BODY-WORN SAR MEASUREMENT RESULTS

Speaker-Microphone with Antenna

Freq. (MHz)	Channel	Test Mode	Battery Type	Separation Distance to Planar Phantom (cm)	Conducted Power			Measured SAR 1g (W/kg)		Scaled SAR 1g (W/kg)	
					Before (W)	After (W)	Drift (dB)	100% Duty Cycle	50% Duty Cycle	100% Duty Cycle	50% Duty Cycle
815.0125	LB Mid	CW	NiMH	1.2	3.50	3.31	-0.24	8.66	4.33	9.15	4.58
860.0125	HB Mid	CW	NiMH	1.2	3.45	3.41	-0.05	7.63	3.82	7.72	3.86
806.0125	LB Low	CW	NiMH	1.2	3.46	3.22	-0.31	6.01	3.01	6.45	3.23
823.9875	LB High	CW	NiMH	1.2	3.50	3.32	-0.23	9.14	4.57	9.64	4.82
815.0125	LB Mid	CW	NiCd	1.2	3.40	3.25	-0.19	7.85	3.93	8.20	4.10
860.0125	HB Mid	CW	NiCd	1.2	3.49	3.42	-0.09	6.48	3.24	6.62	3.31
806.0125	LB Low	CW	NiCd	1.2	3.44	3.45	0.01	9.24	4.62	9.24	4.62
823.9875	LB High	CW	NiCd	1.2	3.51	3.43	-0.10	7.24	3.62	7.41	3.71

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

Measured Mixture Type	835MHz Body		**Relative Humidity**	52 %
Dielectric Constant	**IEEE Target**	**Measured**	**Ambient Temperature**	24.2 °C
	55.2 (+/-5%)	56.9	**Fluid Temperature**	21.6 °C
Conductivity	**IEEE Target**	**Measured**	**Fluid Depth**	≥ 15 cm
	0.97 (+/-5%)	1.01	**Atmospheric Pressure**	101.6 kPa
ρ (Kg/m^3)	1000		**Abbreviation(s)**	LB = Low Band HB = High Band

Note(s):

1. The EUT was tested at the mid channel of the frequency bands (815.0125MHz, 860.0125MHz) with both NiMH and NiCd batteries. The frequency band with the highest SAR level at the mid channel was further tested at the low and high channels.
2. 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.
3. The dielectric properties of the simulated body fluid were verified 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).

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5.0 DETAILS OF SAR EVALUATION

The E.F. Johnson Co. Model: 242-5180 Portable FM PTT Radio Transceiver FCC ID: ATH2425180, with the Class II Permissive Change of adding a Speaker-Microphone with Antenna accessory, was found to be compliant for localized Specific Absorption Rate (Controlled Exposure) based on the test provisions and conditions described below. Detailed photographs of the test setup are shown in Appendix F.

1. The speaker microphone with antenna was tested in a face-held configuration with the front of the speaker-microphone placed parallel to the outer surface of the planar phantom with a 2.5 cm separation distance. The speaker-microphone was connected to the portable radio transceiver for the duration of the tests.
2. The speaker microphone with antenna was tested in a body-worn configuration with the back of the speaker-microphone placed parallel to the outer surface of the planar phantom. The attached lapel-clip was touching the outer surface of the planar phantom and provided a 1.2 cm separation distance between the back of the speaker-microphone and the planar phantom. The speaker-microphone was connected to the portable radio transceiver for the duration of the tests.
3. The conducted power levels were measured before and after each test according to the procedures described in FCC 47 CFR §2.1046.
4. The EUT 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.
5. Due to the dimensions of the EUT a Plexiglas planar phantom was used in place of the SAM phantom. Please note there is currently no approved flat phantom available that is twice the dimensions of this device.
6. A stack of low-density, low-loss dielectric foamed polystyrene was used in place of the device holder.
7. The EUT was tested with fully charged NiMH and NiCd batteries.

6.0 SAR EVALUATION PROCEDURES

a. (i) The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For devices held to the ear during normal operation, both the left and right ear positions were evaluated in accordance with FCC OET Bulletin 65, Supplement C (Edition 01-01) 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 DASY3 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 20mm x 20mm.
c. Based on the area scan data, the area of maximum absorption was determined by spline interpolation. Around this point, a volume of 40 x 40 x 35 mm (fine resolution volume scan, zoom scan) was assessed by measuring 5 x 5 x 7 points.
d. The 1g and 10g spatial peak SAR was determined as follows:
1. The first step was an extrapolation 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 1.3 mm (see probe calibration document in Appendix D). The extrapolation was based on a least square algorithm [W. Gander, Computermathematik, p.168-180] (see reference [6]). Through the points in the first 3 cm in all z-axis, polynomials of the fourth order were calculated. This polynomial was then used to evaluate the points between the surface and the probe tip.
2. The next step used 3D-spline interpolation to get all points within the measured volume in a 1mm grid (35000 points). The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition [W. Gander, Computermathematik, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff] (see reference [6]).
3. The maximal interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-spline interpolation algorithm. 8000 points (20x20x20) were interpolated to calculate the average.

SAR EVALUATION PROCEDURES (Cont.)

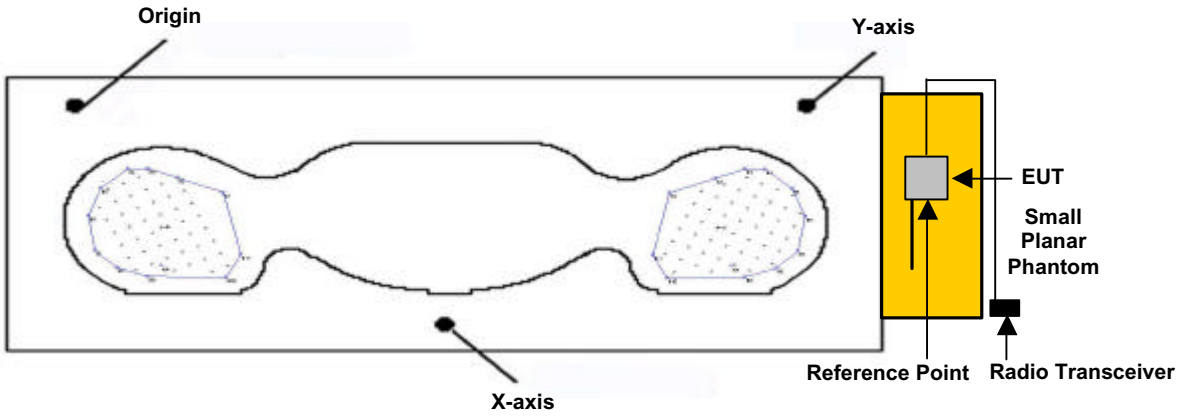

Figure 1. Phantom Reference Point & EUT Positioning
Speaker-Microphone Antenna Version - Face-Held Configuration

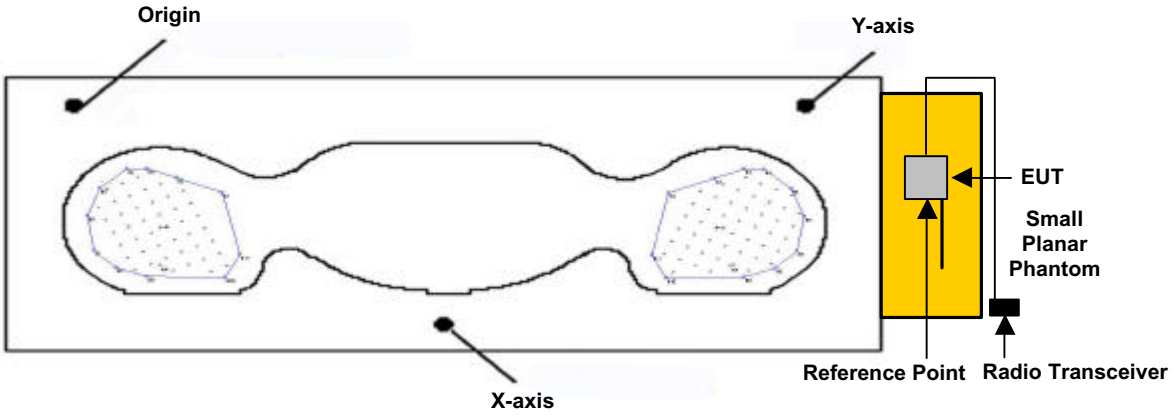

Figure 2. Phantom Reference Point & EUT Positioning
Speaker-Microphone Antenna Version - Body-Worn Configuration

7.0 SYSTEM VALIDATION

Prior to the SAR evaluation a system check was performed at the planar section of the SAM phantom with a 900MHz dipole (see Appendix C for system validation procedures). Prior to the system check the dielectric parameters of the simulated brain tissue mixture were verified 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 check test plot).

Test Date	900MHz Equiv. Tissue	SAR 1g (W/kg)		Dielectric Constant ε_r		Conductivity σ (mho/m)		ρ (Kg/m^3)	Ambient Temp.	Fluid Temp.	Fluid Depth
		IEEE Target	Measured	IEEE Target	Measured	IEEE Target	Measured				
04/08/03	Brain	2.70 ±10%	2.73	41.5 ±5%	39.6	0.97 ±5%	0.95	1000	24.2 °C	22.4 °C	≥ 15 cm

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

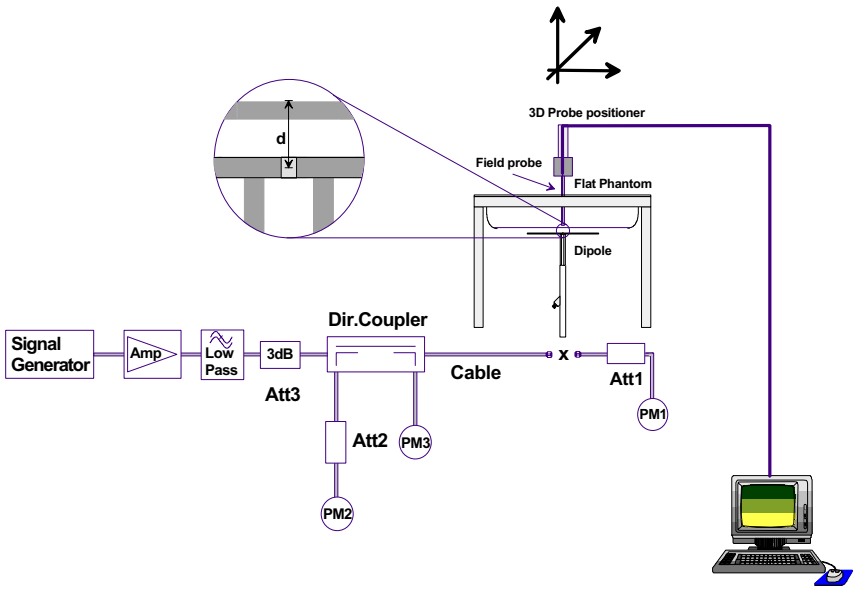

Figure 3. System Check Setup Diagram

900MHz System Check Setup

8.0 SIMULATED TISSUES

The 835MHz and 900MHz 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).

TISSUE MIXTURES			
INGREDIENT	**900MHz Brain Mixture (System Check)**	**835MHz Brain Mixture (EUT Evaluation)**	**835MHz Body Mixture (EUT Evaluation)**
Water	40.71 %	40.71 %	53.70 %
Sugar	56.63 %	56.63 %	45.10 %
Salt	1.48 %	1.48 %	0.97 %
HEC	1.00 %	1.00 %	0.13%
Bactericide	0.18 %	0.18 %	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:	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.:	1590
Construction:	Triangular core fiber optic detection system
Frequency:	10 MHz to 6 GHz
Linearity:	±0.2 dB (30 MHz to 3 GHz)

Phantom Type(s)

Type 1:	SAM V4.0C
Shell Material:	Fiberglass
Thickness:	2.0 ±0.1 mm
Volume:	Approx. 20 liters
Type 2:	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)

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 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

12.0 SAM PHANTOM V4.0C

The SAM phantom V4.0C is a fiberglass shell phantom with a 2.0 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.

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. The planar phantom is mounted onto the outer left hand section of the DASY3 compact system.

Planar Phantom

14.0 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

15.0 TEST EQUIPMENT LIST

SAR MEASUREMENT SYSTEM		
EQUIPMENT	**SERIAL NO.**	**CALIBRATION DATE**
Schmid & Partner DASY3 Compact System	-	-
-Robot	599396-01	N/A
-ET3DV6 E-Field Probe	1590	Dec 2002
-300MHz Validation Dipole	135	Oct 2002
-450MHz Validation Dipole	136	Oct 2002
-900MHz Validation Dipole	054	June 2001
-1800MHz Validation Dipole	247	June 2001
-2450MHz Validation Dipole	150	Oct 2002
-SAM Phantom V4.0C	N/A	N/A
-Planar Phantom	N/A	N/A
HP 85070C Dielectric Probe Kit	N/A	N/A
Gigatronics 8652A Power Meter	1835272	Feb 2003
-Power Sensor 80701A	1833535	Feb 2003
-Power Sensor 80701A	1833542	Feb 2003
HP E4408B Spectrum Analyzer	US39240170	Dec 2002
HP 8594E Spectrum Analyzer	3543A02721	Feb 2003
HP 8753E Network Analyzer	US38433013	Feb 2003
HP 8648D Signal Generator	3847A00611	Feb 2003
Amplifier Research 5S1G4 Power Amplifier	26235	N/A

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16.0 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	∞
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					**± 13.7**	
Expanded Uncertainty (k=2)					**± 27.5**	

Measurement Uncertainty Table in accordance with IEEE Std 1528-200X (Draft - 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 Standards Coordinating Committee 34, Std 1528-200X, “DRAFT Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques”.

[6] W. Gander, *Computermathematick*, Birkhaeuser, Basel: 1992.

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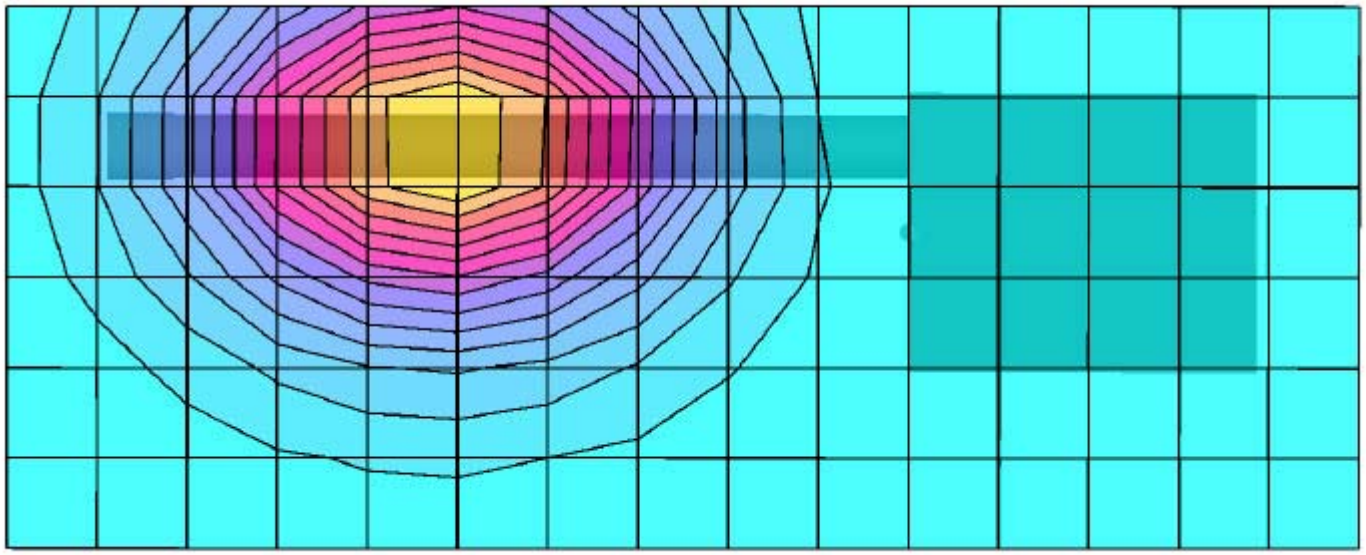
APPENDIX A - SAR MEASUREMENT DATA

EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (90°,0°)
Probe: ET3DV6 - SN1590; ConvF(6.90,6.90,6.90); Crest factor: 1.0
835 MHz Brain: $\sigma = 0.88$ mho/m $\varepsilon_r = 40.0$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 3.83 mW/g, SAR (10g): 2.79 mW/g

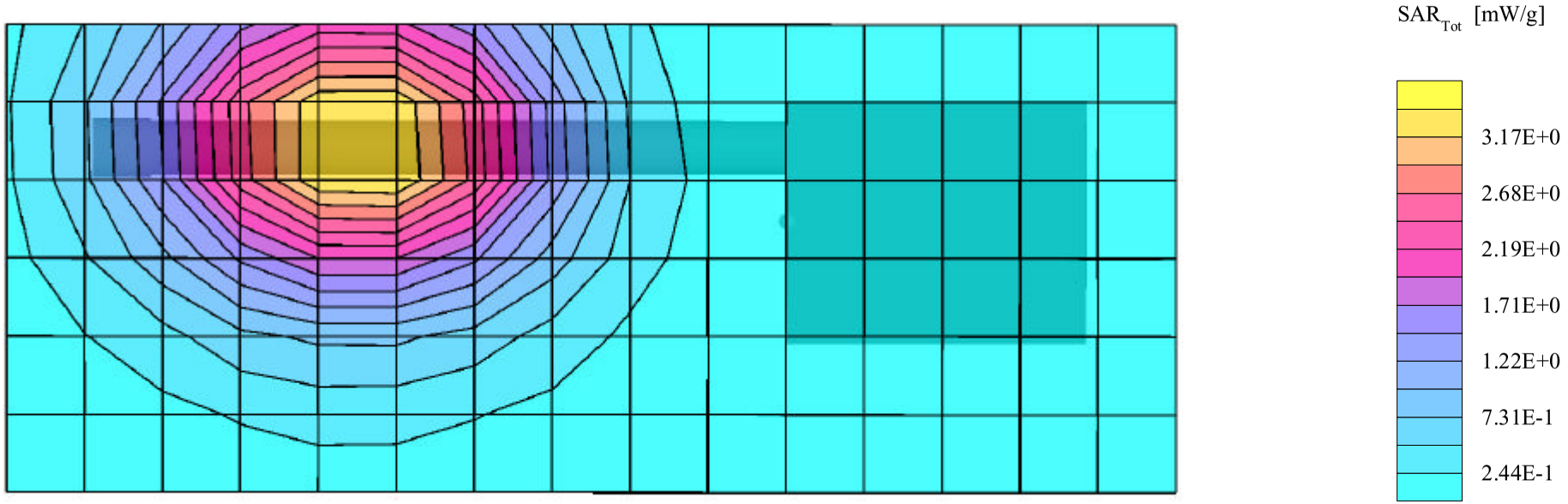
Face-Held SAR - Speaker-Microphone with Antenna
2.5 cm Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiMH Battery
Continuous Wave Mode
Low Band Mid Channel [815.0125 MHz]
Conducted Power: 3.53 Watts
Ambient Temp. 24.2°C; Fluid Temp. 22.4°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (90°,0°)
Probe: ET3DV6 - SN1590; ConvF(6.90,6.90,6.90); Crest factor: 1.0
835 MHz Brain: $\sigma = 0.88$ mho/m $\varepsilon_r = 40.0$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 3.29 mW/g, SAR (10g): 2.36 mW/g

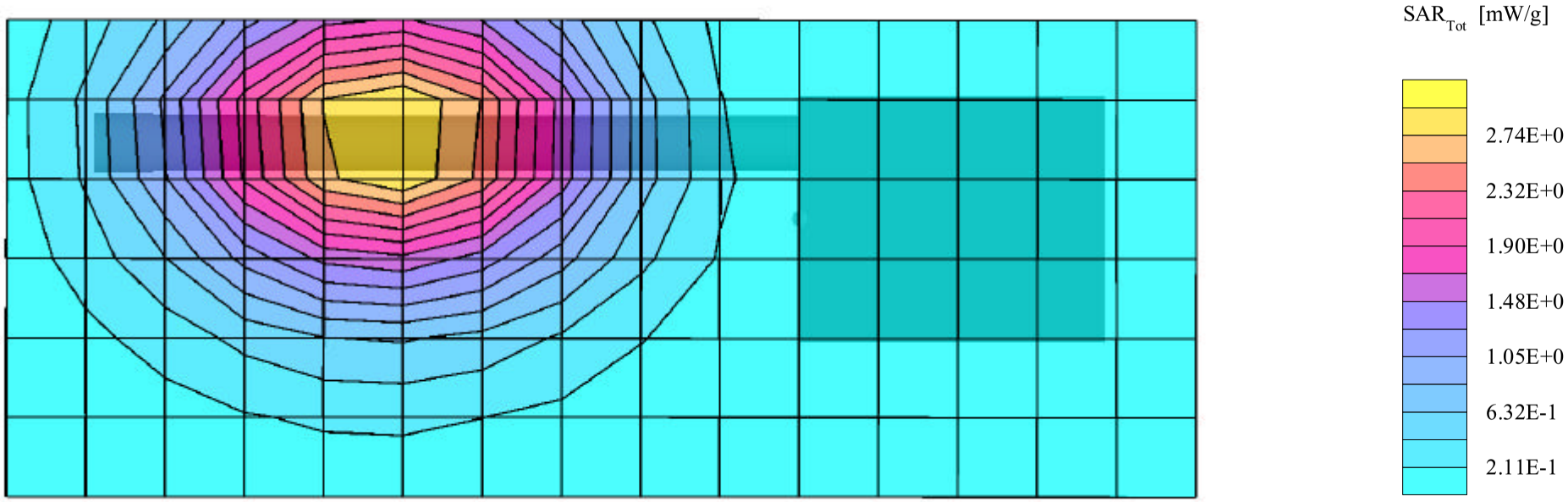
Face-Held SAR - Speaker-Microphone with Antenna
2.5 cm Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiMH Battery
Continuous Wave Mode
High Band Mid Channel [860.0125 MHz]
Conducted Power: 3.52 Watts
Ambient Temp. 24.2°C; Fluid Temp. 22.4°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (90°,0°)
Probe: ET3DV6 - SN1590; ConvF(6.90,6.90,6.90); Crest factor: 1.0
835 MHz Brain: $\sigma = 0.88$ mho/m $\varepsilon_r = 40.0$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 2.75 mW/g, SAR (10g): 2.00 mW/g

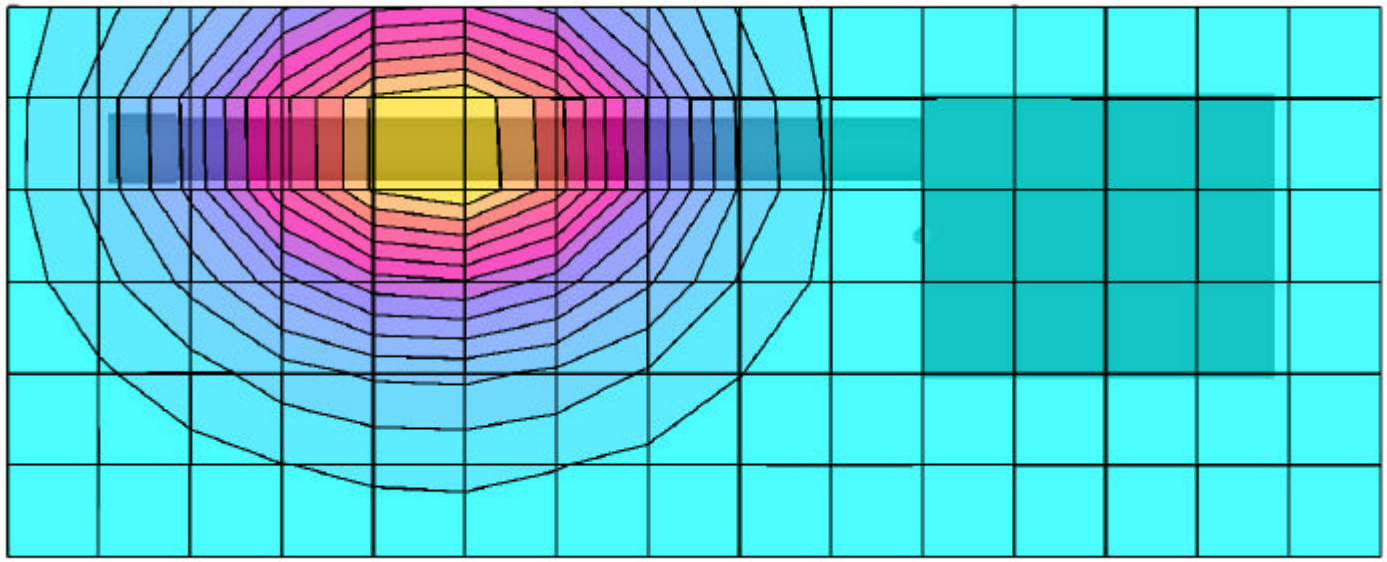
Face-Held SAR - Speaker-Microphone with Antenna
2.5 cm Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiMH Battery
Continuous Wave Mode
Low Band Low Channel [806.0125 MHz]
Conducted Power: 3.52 Watts
Ambient Temp. 24.2°C; Fluid Temp. 22.4°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (90°,0°)
Probe: ET3DV6 - SN1590; ConvF(6.90,6.90,6.90); Crest factor: 1.0
835 MHz Brain: $\sigma = 0.88$ mho/m $\varepsilon_r = 40.0$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 4.21 mW/g, SAR (10g): 3.06 mW/g

Face-Held SAR - Speaker-Microphone with Antenna
2.5 cm Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiMH Battery
Continuous Wave Mode
Low Band High Channel [823.9875 MHz]
Conducted Power: 3.51 Watts
Ambient Temp. 24.2°C; Fluid Temp. 22.4°C
Date Tested: April 8, 2003

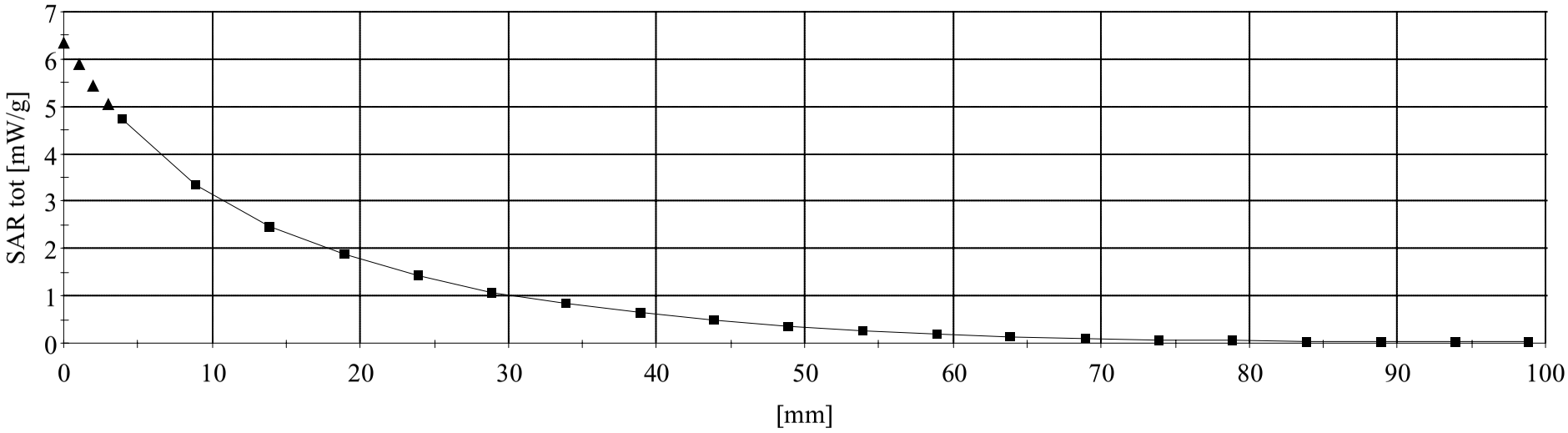


EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section
Probe: ET3DV6 - SN1590; ConvF(6.90,6.90,6.90); Crest factor: 1.0
835 MHz Brain: $\sigma = 0.88$ mho/m $\varepsilon_r = 40.0$ $\rho = 1.00$ g/cm^3

Z-Axis Extrapolation at Peak SAR Location

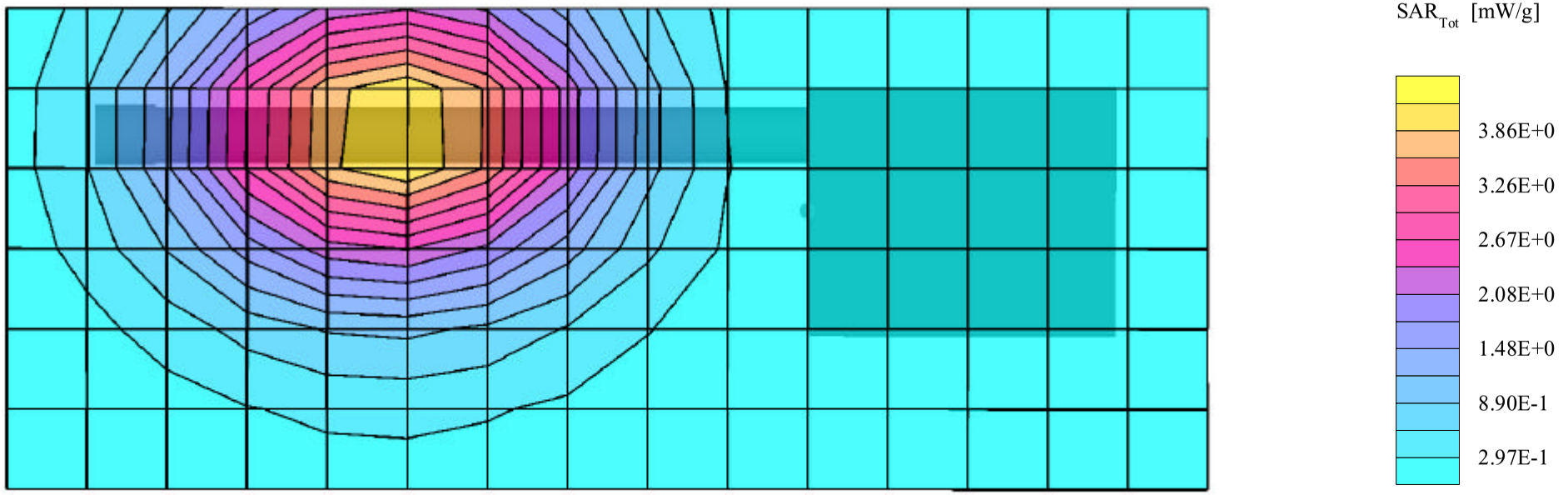
Face-Held SAR - Speaker-Microphone with Antenna
2.5 cm Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiMH Battery
Continuous Wave Mode
Low Band High Channel [823.9875 MHz]
Conducted Power: 3.51 Watts
Ambient Temp. 24.2°C; Fluid Temp. 22.4°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (90°,0°)
Probe: ET3DV6 - SN1590; ConvF(6.90,6.90,6.90); Crest factor: 1.0
835 MHz Brain: $\sigma = 0.88$ mho/m $\varepsilon_r = 40.0$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 3.84 mW/g, SAR (10g): 2.80 mW/g

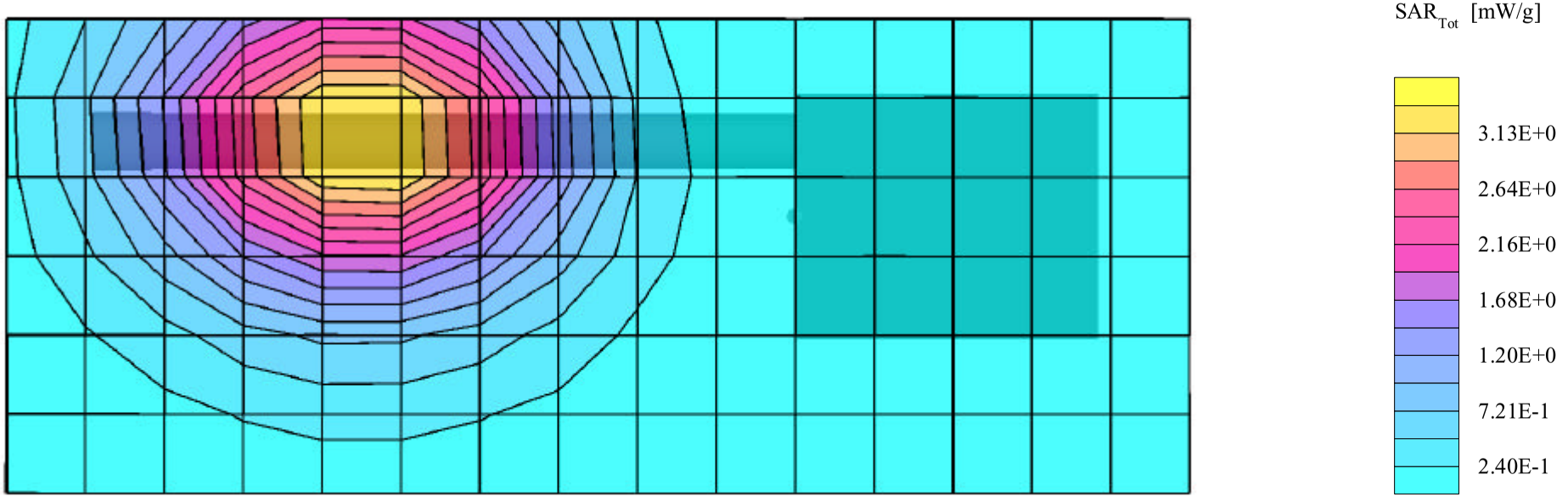
Face-Held SAR - Speaker-Microphone with Antenna
2.5 cm Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiCd Battery
Continuous Wave Mode
Low Band Mid Channel [815.0125 MHz]
Conducted Power: 3.50 Watts
Ambient Temp. 24.2°C; Fluid Temp. 22.4°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (90°,0°)
Probe: ET3DV6 - SN1590; ConvF(6.90,6.90,6.90); Crest factor: 1.0
835 MHz Brain: $\sigma = 0.88$ mho/m $\varepsilon_r = 40.0$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 3.16 mW/g, SAR (10g): 2.27 mW/g

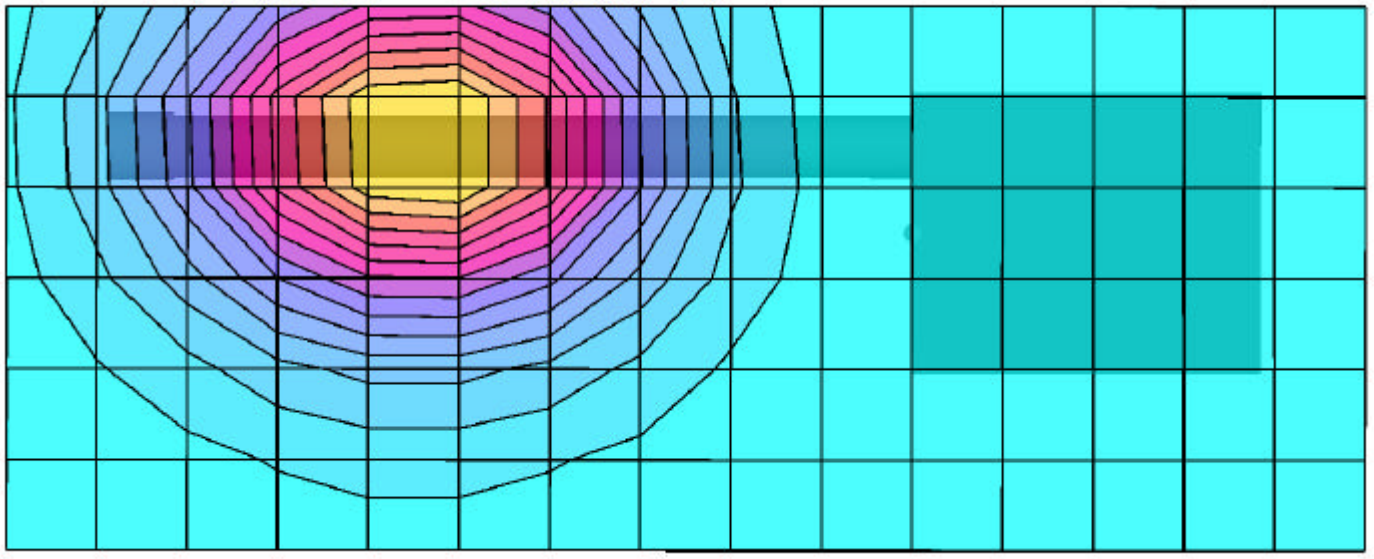
Face-Held SAR - Speaker-Microphone with Antenna
2.5 cm Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiCd Battery
Continuous Wave Mode
High Band Mid Channel [860.0125 MHz]
Conducted Power: 3.52 Watts
Ambient Temp. 24.2°C; Fluid Temp. 22.4°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (90°,0°)
Probe: ET3DV6 - SN1590; ConvF(6.90,6.90,6.90); Crest factor: 1.0
835 MHz Brain: $\sigma = 0.88$ mho/m $\varepsilon_r = 40.0$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 3.94 mW/g, SAR (10g): 2.84 mW/g

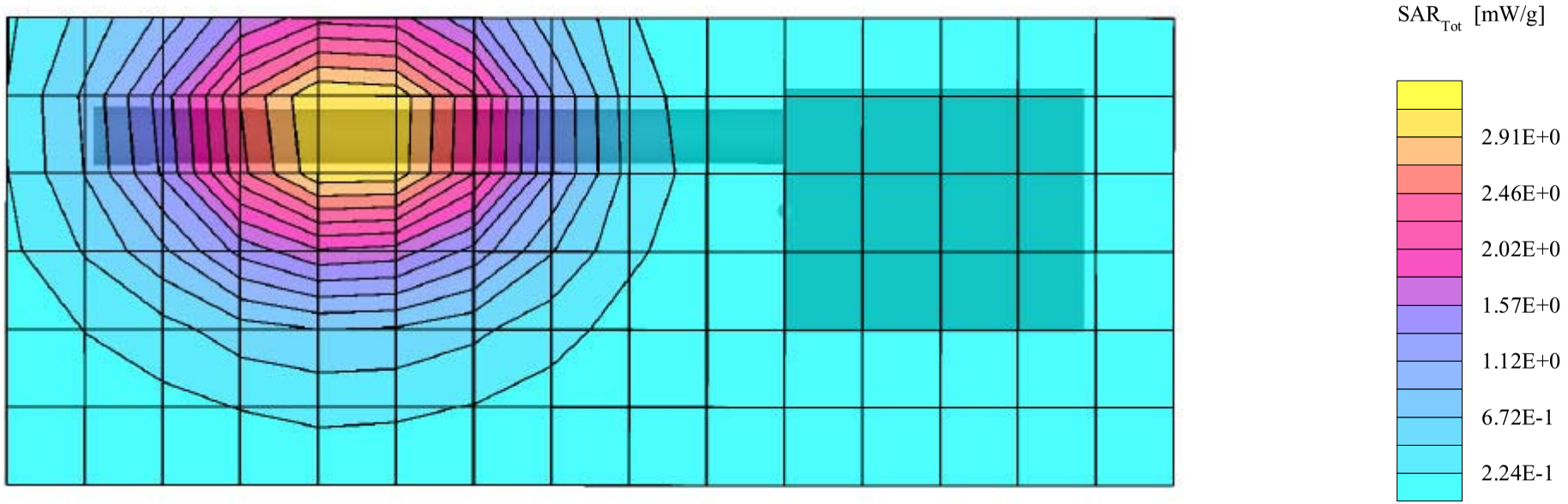
Face-Held SAR - Speaker-Microphone with Antenna
2.5 cm Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiCd Battery
Continuous Wave Mode
Low Band Low Channel [806.0125 MHz]
Conducted Power: 3.48 Watts
Ambient Temp. 24.2°C; Fluid Temp. 22.4°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (90°,0°)
Probe: ET3DV6 - SN1590; ConvF(6.90,6.90,6.90); Crest factor: 1.0
835 MHz Brain: $\sigma = 0.88$ mho/m $\varepsilon_r = 40.0$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 2.73 mW/g, SAR (10g): 1.55 mW/g

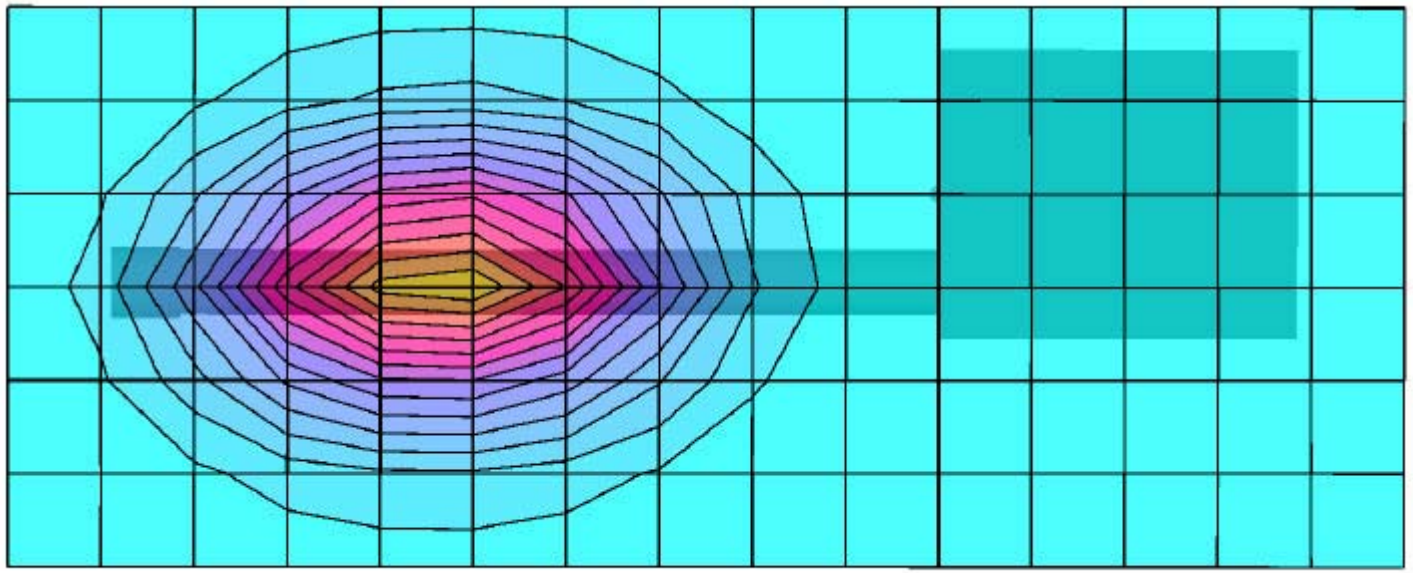
Face-Held SAR - Speaker-Microphone with Antenna
2.5 cm Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiCd Battery
Continuous Wave Mode
Low Band High Channel [823.9875 MHz]
Conducted Power: 3.55 Watts
Ambient Temp. 24.2°C; Fluid Temp. 22.4°C
Date Tested: April 8, 2003

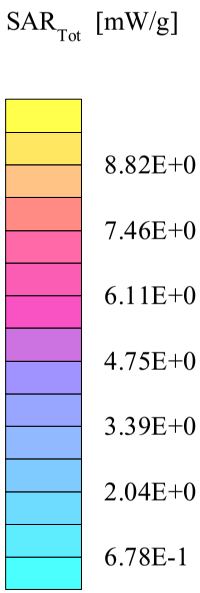


EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (270°,180°)
Probe: ET3DV6 - SN1590; ConvF(6.70,6.70,6.70); Crest factor: 1.0
835 MHz Muscle: σ = 1.01 mho/m ε_r = 56.9 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 8.66 mW/g, SAR (10g): 6.02 mW/g

Body-Worn SAR - Speaker-Microphone with Antenna
1.2 cm Lapel-Clip Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiMH Battery
Continuous Wave Mode
Low Band Mid Channel [815.0125 MHz]
Conducted Power: 3.50 Watts
Ambient Temp. 24.2°C; Fluid Temp. 21.6°C
Date Tested: April 8, 2003

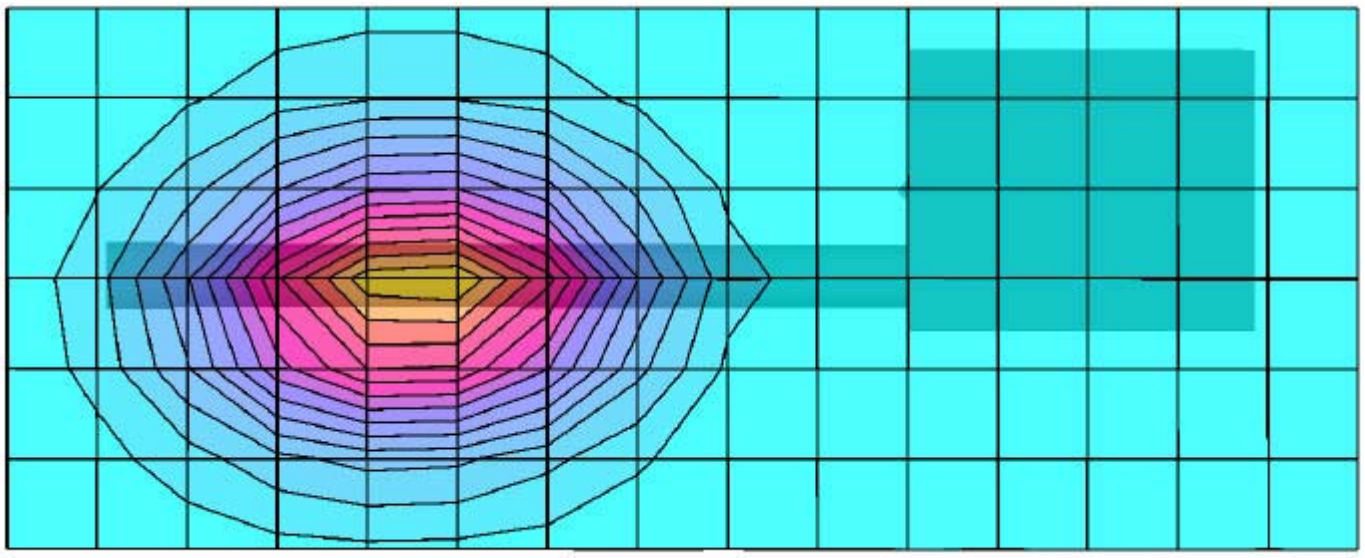




EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (270°,180°)
Probe: ET3DV6 - SN1590; ConvF(6.70,6.70,6.70); Crest factor: 1.0
835 MHz Muscle: σ = 1.01 mho/m ε_r = 56.9 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 7.63 mW/g, SAR (10g): 5.25 mW/g

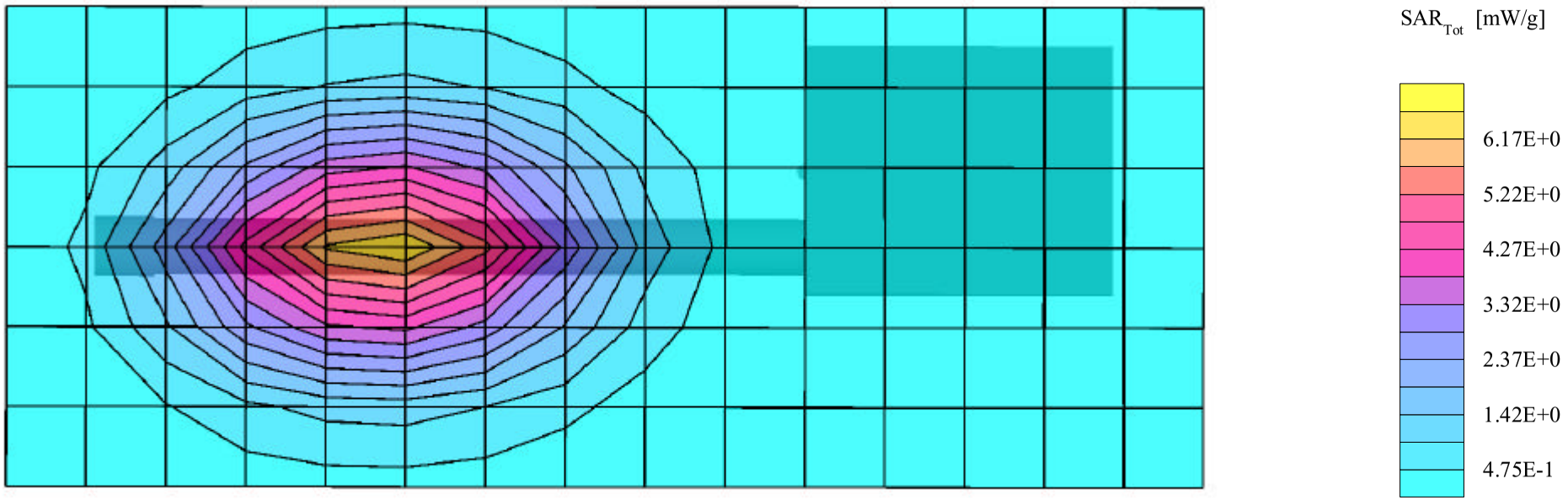
Body-Worn SAR - Speaker-Microphone with Antenna
1.2 cm Lapel-Clip Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiMH Battery
Continuous Wave Mode
High Band Mid Channel [860.0125 MHz]
Conducted Power: 3.45 Watts
Ambient Temp. 24.2°C; Fluid Temp. 21.6°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (270°,180°)
Probe: ET3DV6 - SN1590; ConvF(6.70,6.70,6.70); Crest factor: 1.0
835 MHz Muscle: σ = 1.01 mho/m ε_r = 56.9 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 6.01 mW/g, SAR (10g): 4.20 mW/g

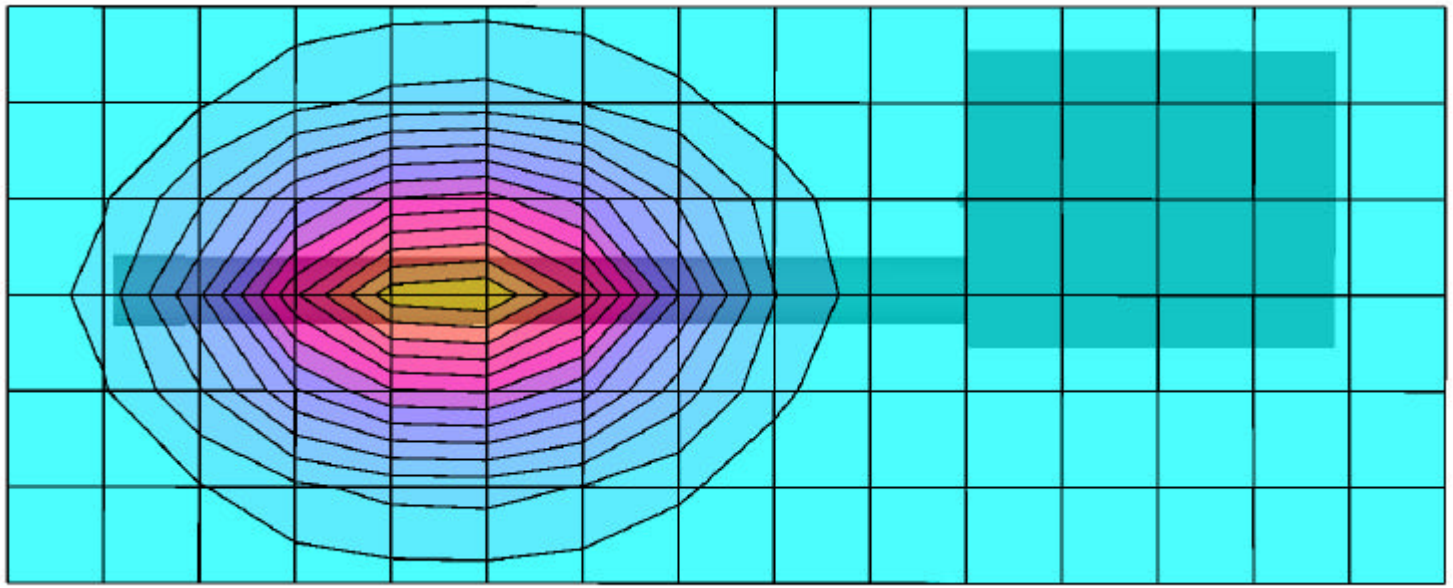
Body-Worn SAR - Speaker-Microphone with Antenna
1.2 cm Lapel-Clip Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiMH Battery
Continuous Wave Mode
Low Band Low Channel [806.0125 MHz]
Conducted Power: 3.46 Watts
Ambient Temp. 24.2°C; Fluid Temp. 21.6°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (270°,180°)
Probe: ET3DV6 - SN1590; ConvF(6.70,6.70,6.70); Crest factor: 1.0
835 MHz Muscle: σ = 1.01 mho/m ε_r = 56.9 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 9.14 mW/g, SAR (10g): 6.39 mW/g

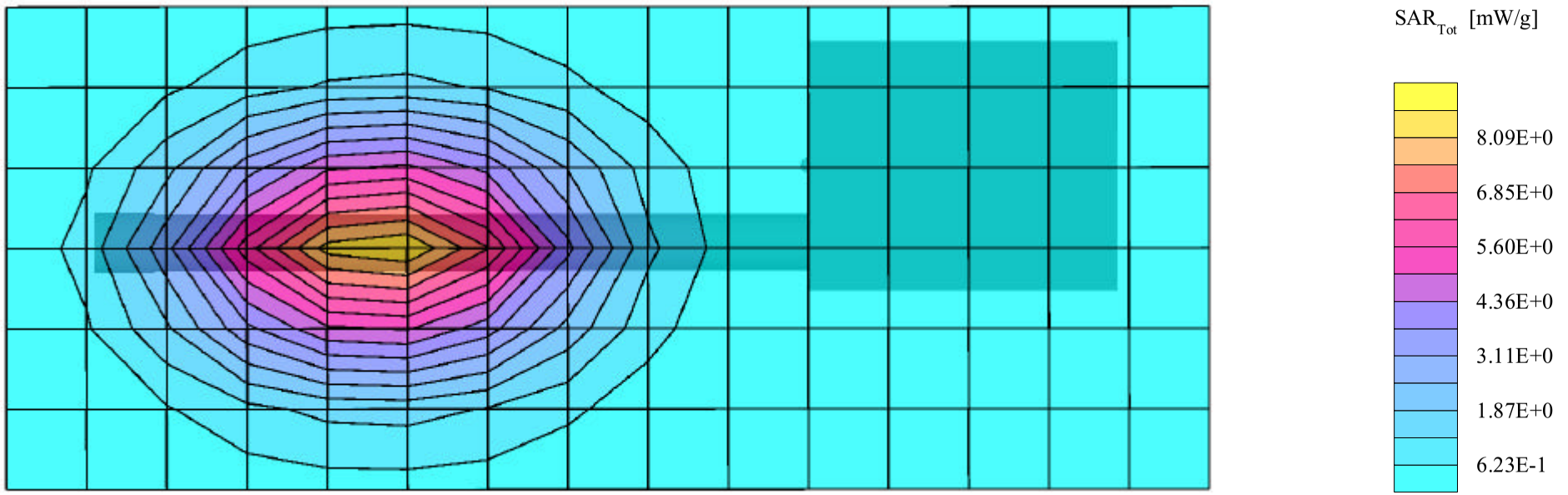
Body-Worn SAR - Speaker-Microphone with Antenna
1.2 cm Lapel-Clip Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiMH Battery
Continuous Wave Mode
Low Band High Channel [823.9875 MHz]
Conducted Power: 3.50 Watts
Ambient Temp. 24.2°C; Fluid Temp. 21.6°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (270°,180°)
Probe: ET3DV6 - SN1590; ConvF(6.70,6.70,6.70); Crest factor: 1.0
835 MHz Muscle: σ = 1.01 mho/m ε_r = 56.9 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 7.85 mW/g, SAR (10g): 5.50 mW/g

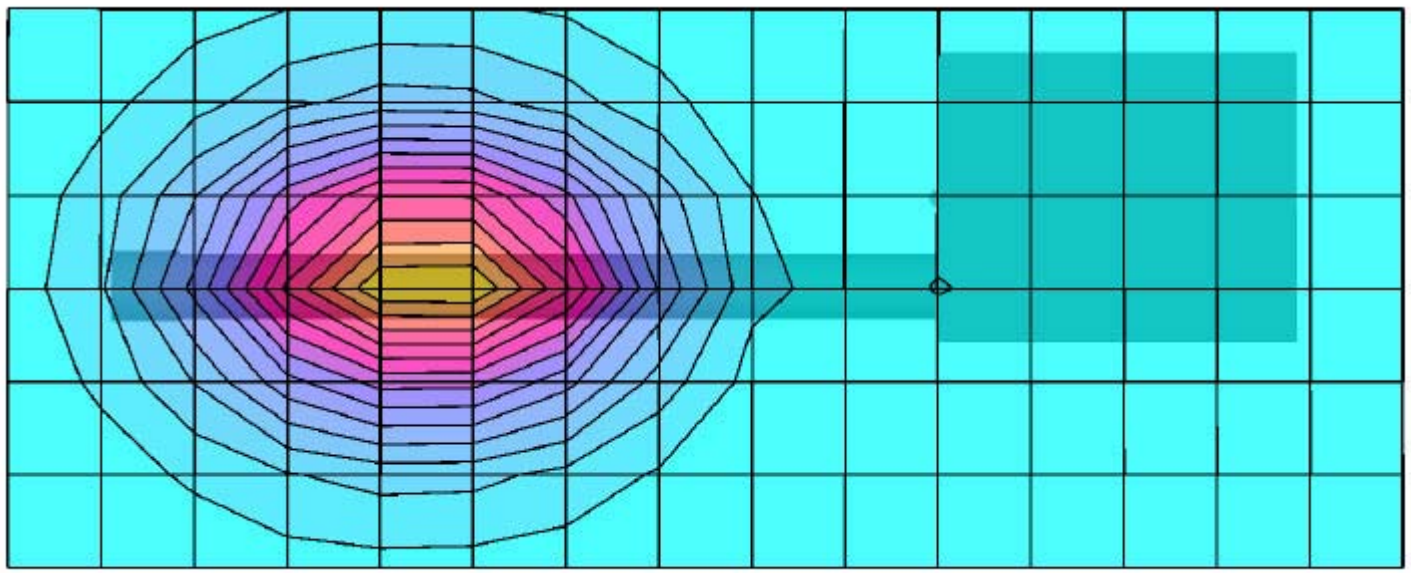
Body-Worn SAR - Speaker-Microphone with Antenna
1.2 cm Lapel-Clip Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiCd Battery
Continuous Wave Mode
Low Band Mid Channel [815.0125 MHz]
Conducted Power: 3.40 Watts
Ambient Temp. 24.2°C; Fluid Temp. 21.6°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (270°,180°)
Probe: ET3DV6 - SN1590; ConvF(6.70,6.70,6.70); Crest factor: 1.0
835 MHz Muscle: σ = 1.01 mho/m ε_r = 56.9 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 6.48 mW/g, SAR (10g): 4.53 mW/g

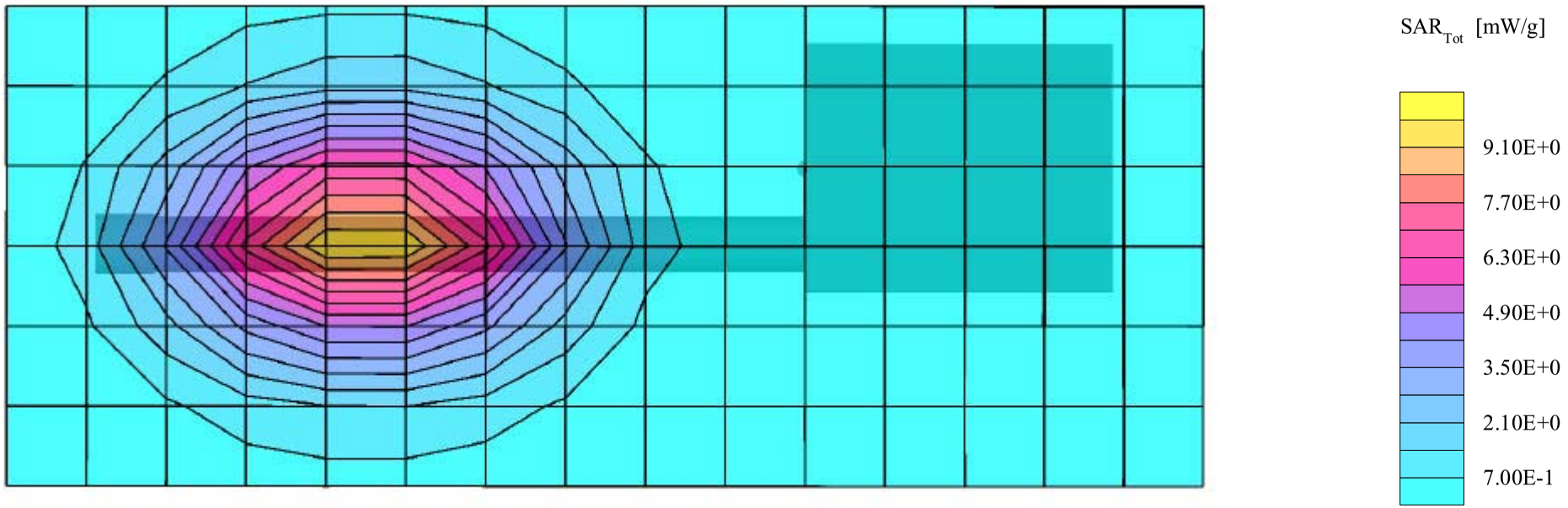
Body-Worn SAR - Speaker-Microphone with Antenna
1.2 cm Lapel-Clip Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiCd Battery
Continuous Wave Mode
High Band Mid Channel [860.0125 MHz]
Conducted Power: 3.49 Watts
Ambient Temp. 24.2°C; Fluid Temp. 21.6°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (270°,180°)
Probe: ET3DV6 - SN1590; ConvF(6.70,6.70,6.70); Crest factor: 1.0
835 MHz Muscle: $\sigma = 1.01$ mho/m $\varepsilon_r = 56.9$ $\rho = 1.00$ g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 9.24 mW/g, SAR (10g): 6.42 mW/g

Body-Worn SAR - Speaker-Microphone with Antenna
1.2 cm Lapel-Clip Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiCd Battery
Continuous Wave Mode
Low Band Low Channel [806.0125 MHz]
Conducted Power: 3.44 Watts
Ambient Temp. 24.2°C; Fluid Temp. 21.6°C
Date Tested: April 8, 2003

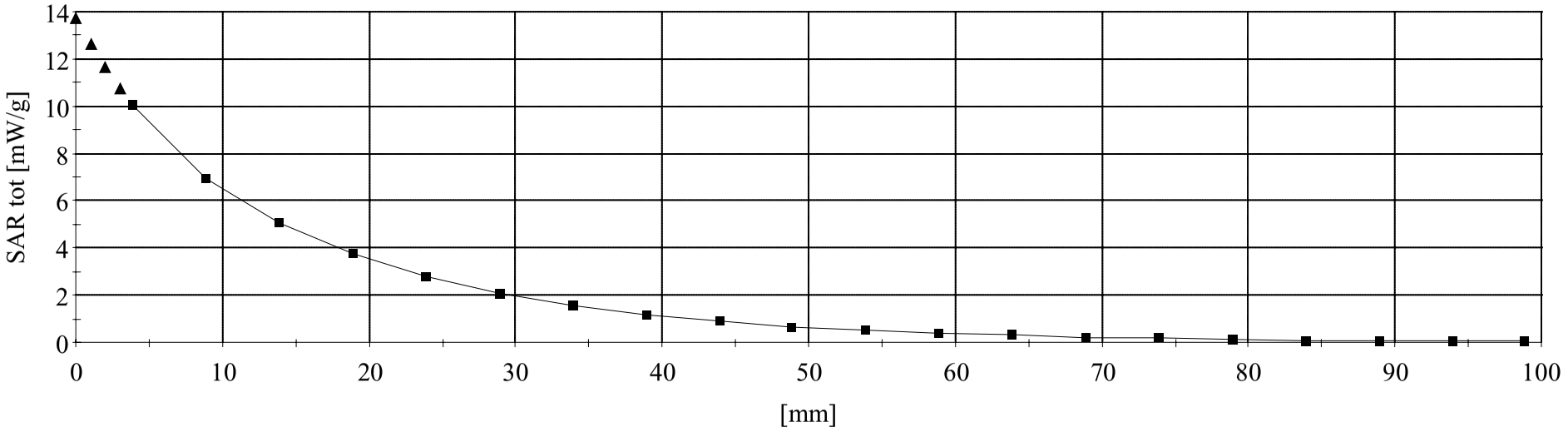


EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section
Probe: ET3DV6 - SN1590; ConvF(6.70,6.70,6.70); Crest factor: 1.0
835 MHz Muscle: σ = 1.01 mho/m ε_r = 56.9 ρ = 1.00 g/cm^3

Z-Axis Extrapolation at Peak SAR Location

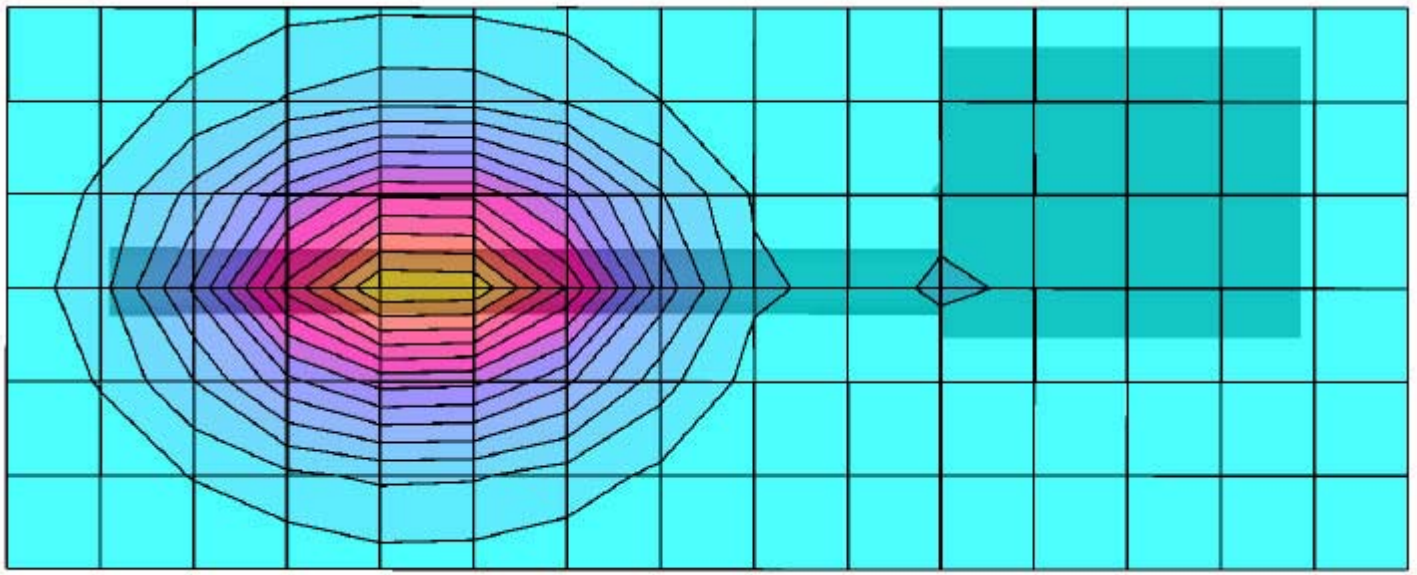
Body-Worn SAR - Speaker-Microphone with Antenna
1.2 cm Lapel-Clip Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiCd Battery
Continuous Wave Mode
Low Band Low Channel [806.0125 MHz]
Conducted Power: 3.44 Watts
Ambient Temp. 24.2°C; Fluid Temp. 21.6°C
Date Tested: April 8, 2003



EF Johnson Co. FCC ID: ATH2425180

Small Planar Phantom; Planar Section; Position: (270°,180°)
Probe: ET3DV6 - SN1590; ConvF(6.70,6.70,6.70); Crest factor: 1.0
835 MHz Muscle: σ = 1.01 mho/m ε_r = 56.9 ρ = 1.00 g/cm^3
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Cube 5x5x7
SAR (1g): 7.24 mW/g, SAR (10g): 3.92 mW/g

Body-Worn SAR - Speaker-Microphone with Antenna
1.2 cm Lapel-Clip Separation Distance to Planar Phantom
Model: 242-5180 Portable FM PTT Radio Transceiver
NiCd Battery
Continuous Wave Mode
Low Band High Channel [823.9875 MHz]
Conducted Power: 3.51 Watts
Ambient Temp. 24.2°C; Fluid Temp. 21.6°C
Date Tested: April 8, 2003



APPENDIX B - SYSTEM PERFORMANCE CHECK DATA

System Performance Check - 900MHz Dipole

SAM Phantom; Flat Section

Probe: ET3DV6 - SN1590; ConvF(6.90,6.90,6.90); Crest factor: 1.0; 900 MHz Brain: $\sigma = 0.95$ mho/m $\varepsilon_r = 39.6$ $\rho = 1.00$ g/cm^3

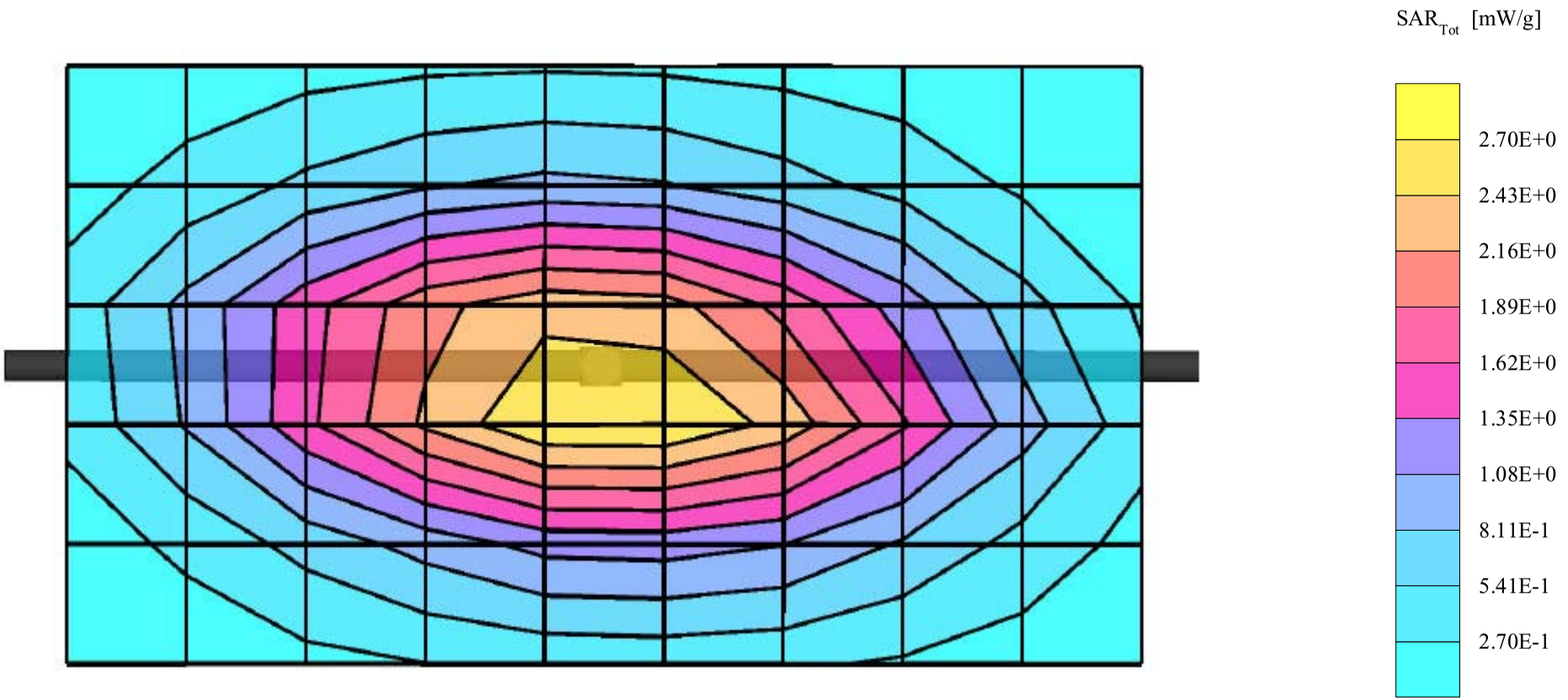
Cube 5x5x7: Peak: 4.42 mW/g, SAR (1g): 2.73 mW/g, SAR (10g): 1.71 mW/g, (Worst-case extrapolation)

Penetration depth: 11.2 (10.1, 12.7) [mm]; Powerdrift: -0.05 dB

Ambient Temp. 24.2°C; Fluid Temp. 22.4°C

Forward Conducted Power: 250 mW

Date Tested: April 8, 2003



APPENDIX C - SYSTEM VALIDATION

Schmid & Partner
Engineering AG

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

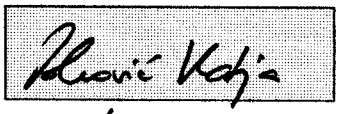
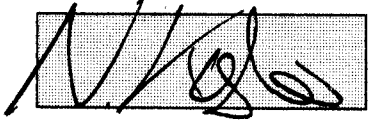
Calibration Certificate

900 MHz System Validation Dipole

Type:	**D900V2**
Serial Number:	**054**
Place of Calibration:	**Zurich**
Date of Calibration:	**June 20, 2001**
Calibration Interval:	**24 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:	

Schmid & Partner
Engineering AG

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

DASY

Dipole Validation Kit

Type: D900V2

Serial: 054

Manufactured: August 25, 1999
Calibrated: June 20, 2001

1. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with head simulating solution of the following electrical parameters at 900 MHz:

Relative Dielectricity	**42.4**	± 5%
Conductivity	**0.97 mho/m**	± 5%

The DASY3 System (Software version 3.1c) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.27 at 900 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15mm from dipole center to the solution surface. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging.
The dipole input power (forward power) was 250mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement

Standard SAR-measurements were performed with the phantom according to the measurement conditions described in section 1. The results have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm^3 (1 g) of tissue:	**11.12 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**7.04 mW/g**

Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well.

3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.413 ns**	(one direction)
Transmission factor:	**0.989**	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 900 MHz:	Re{Z} = **51.3 Ω**
	Im {Z} = **-0.5 Ω**
Return Loss at 900 MHz	**-36.9 dB**

4. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with brain simulating solution of the following electrical parameters at 900 MHz:

Relative Dielectricity	**41.0**	± 5%
Conductivity	**0.86 mho/m**	± 5%

The DASY3 System (Software version 3.1c) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.22 at 900 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15mm from dipole center to the solution surface. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging.
The dipole input power (forward power) was 250mW ± 3 %. The results are normalized to 1W input power.

5. SAR Measurement

Standard SAR-measurements were performed with the phantom according to the measurement conditions described in section 4. The results have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm^3 (1 g) of tissue:	**10.12 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**6.52 mW/g**

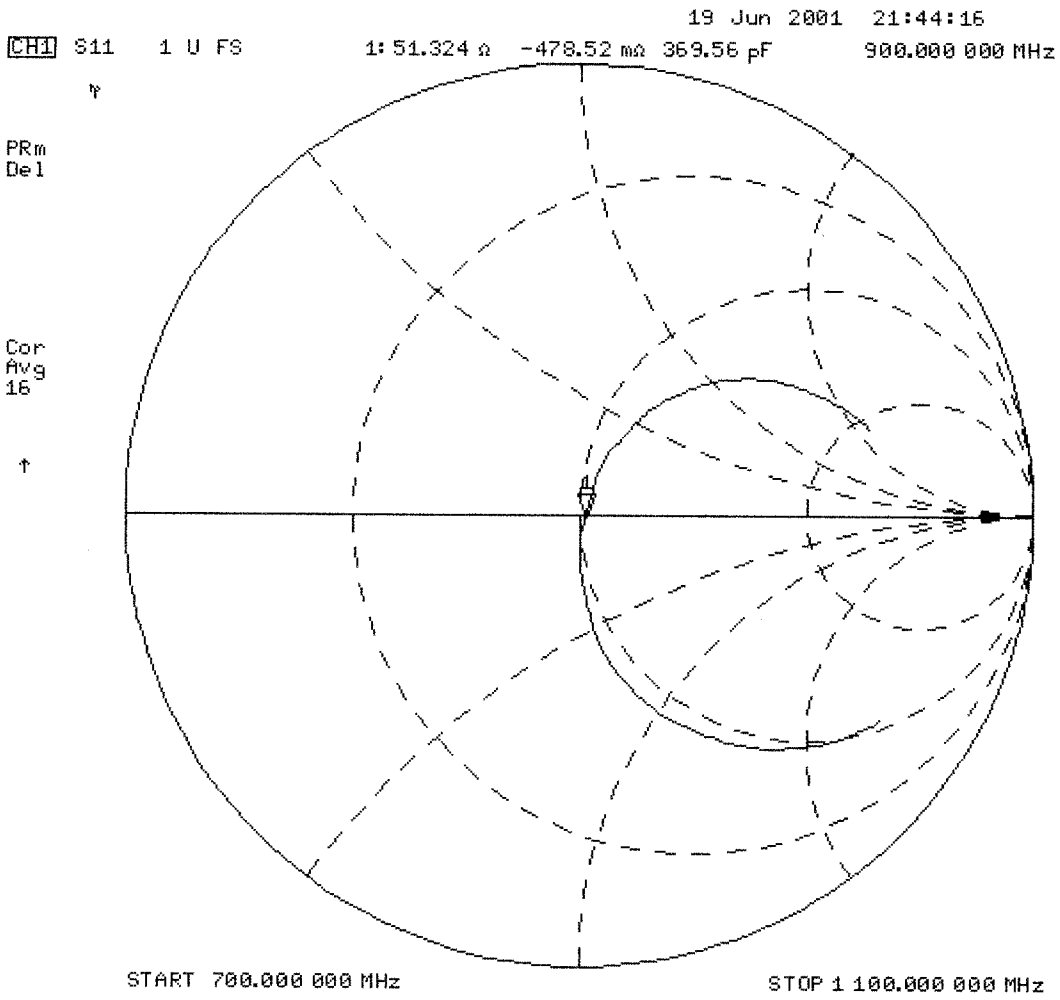
Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well.

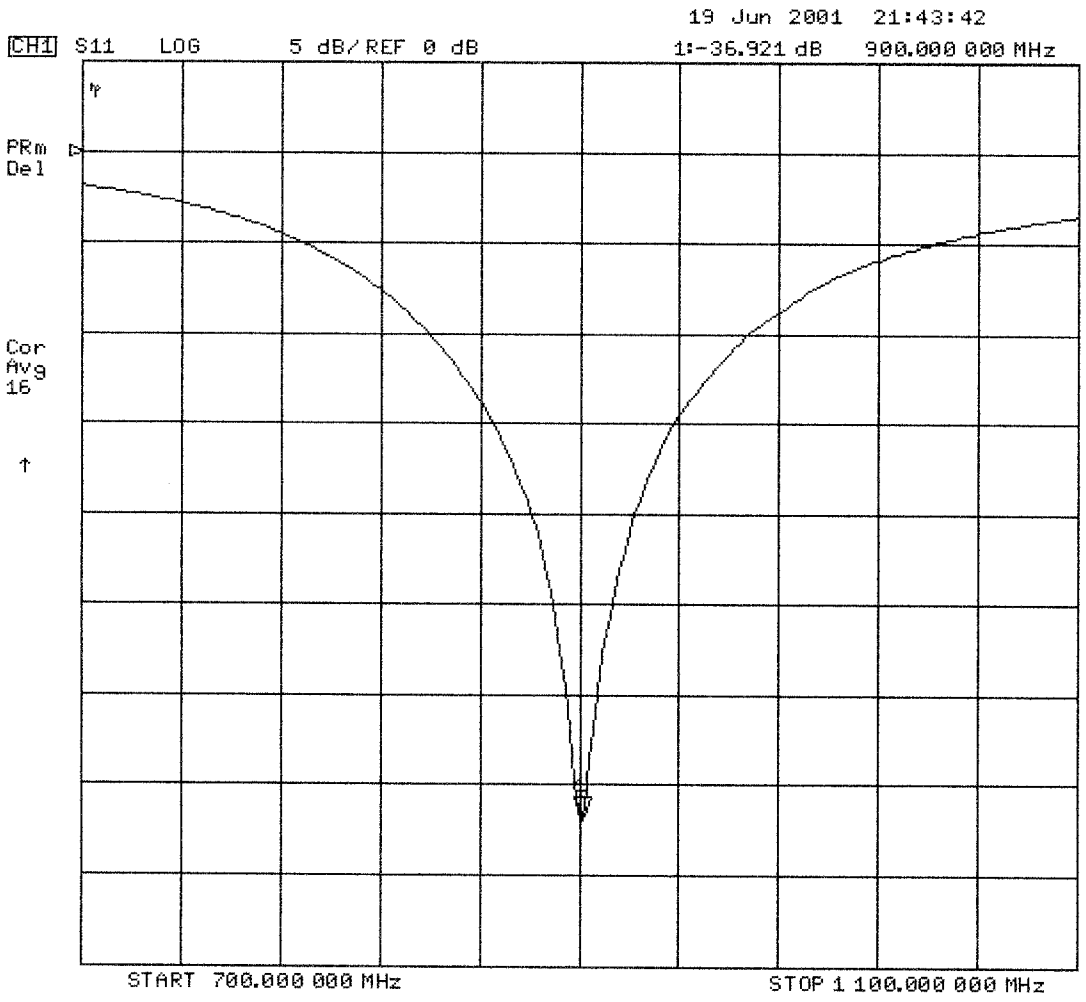
6. Handling

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

Do not apply excessive force to the dipole arms, because they might bend. If the dipole arms have to be bent back, take care to release stress to the soldered connections near the feedpoint; they might come off.

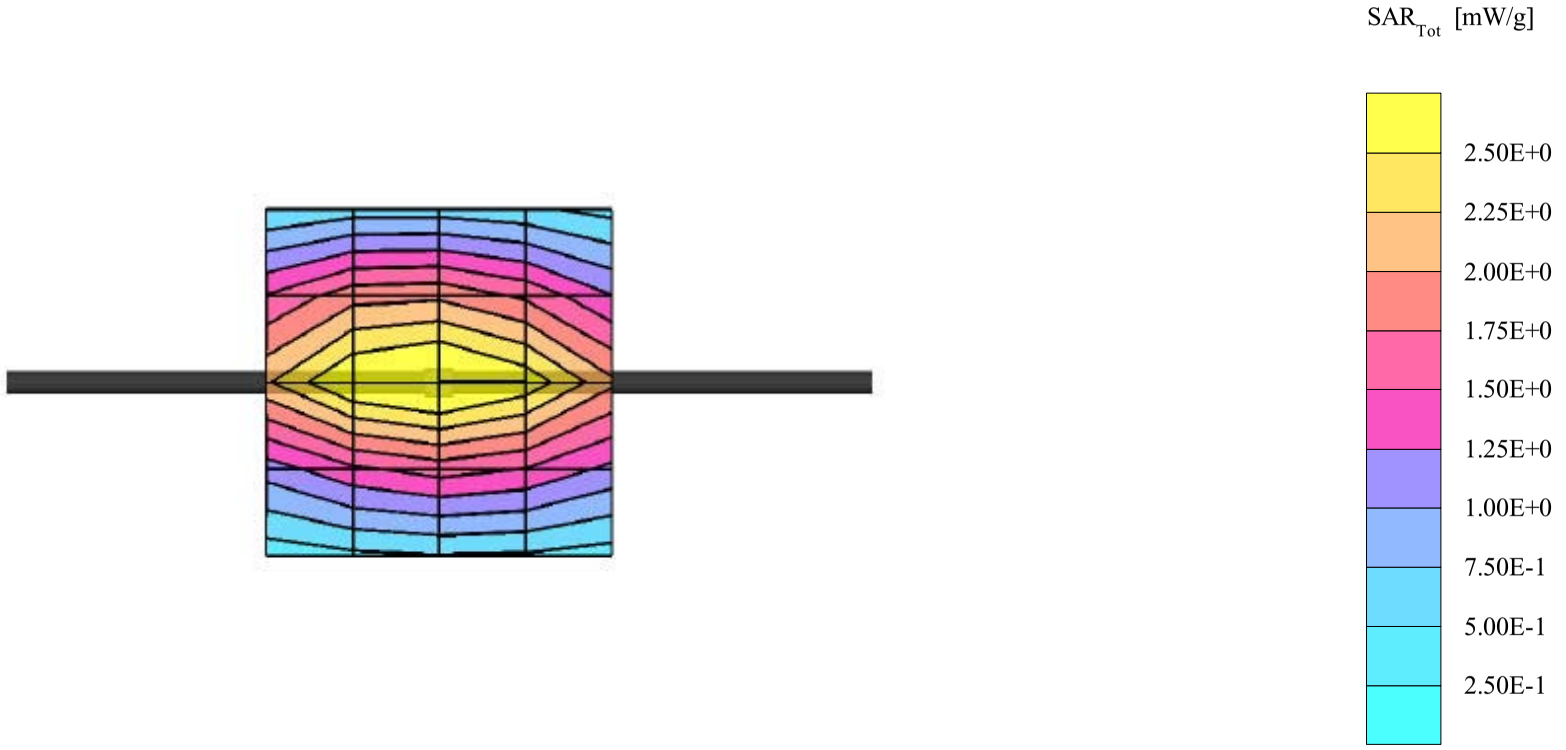
After prolonged use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.


19 Jun 2001 21:44:16
CH1 S11 1 U FS
1: 51.324 Ω -478.52 mΩ 369.56 pF
900.000 000 MHz
PRm
Del
Cor
Avg
16
START 700.000 000 MHz
STOP 1 100.000 000 MHz


19 Jun 2001 21:43:42
CH1 S11 LOG 5 dB/ REF 0 dB
1:-36.921 dB 900.000 000 MHz
PRm
Del
Cor
Avg
16
START 700.000 000 MHz
STOP 1 100.000 000 MHz

Validation Dipole D900V2 SN:054, d = 15 mm

Frequency: 900 MHz; Antenna Input Power: 250 [mW]
Generic Twin Phantom; Flat Section; Grid Spacing:Dx = 15.0, Dy = 15.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(6.27,6.27,6.27); Crest factor: 1.0; IEEE1528 900 MHz: σ = 0.97 mho/m ε_r = 42.4 ρ = 1.00 g/cm^3
Cubes (2): Peak: 4.47 mW/g ± 0.05 dB, SAR (1g): 2.78 mW/g ± 0.04 dB, SAR (10g): 1.76 mW/g ± 0.02 dB, (Worst-case extrapolation)
Penetration depth: 11.5 (10.3, 13.2) [mm]
Powerdrift: -0.00 dB



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:	**1590**
Place of Calibration:	**Zurich**
Date of Calibration:	**December 1, 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:	

Schmid & Partner
Engineering AG

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

Probe ET3DV6

SN:1590

Manufactured:	March 19, 2001
Last calibration:	April 26, 2002
Recalibrated:	December 1, 2002

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1590

Sensitivity in Free Space

NormX	**1.75**	$\mu V/(V/m)^2$	
NormY	**1.89**	$\mu V/(V/m)^2$	
NormZ	**1.63**	$\mu V/(V/m)^2$	

Diode Compression

DCP X	**92**	mV
DCP Y	**92**	mV
DCP Z	**92**	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	**6.9** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.9** ± 9.5% (k=2)	Alpha	**0.30**
	ConvF Z	**6.9** ± 9.5% (k=2)	Depth	**2.71**
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	**5.6** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.6** ± 9.5% (k=2)	Alpha	**0.42**
	ConvF Z	**5.6** ± 9.5% (k=2)	Depth	**2.56**

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**

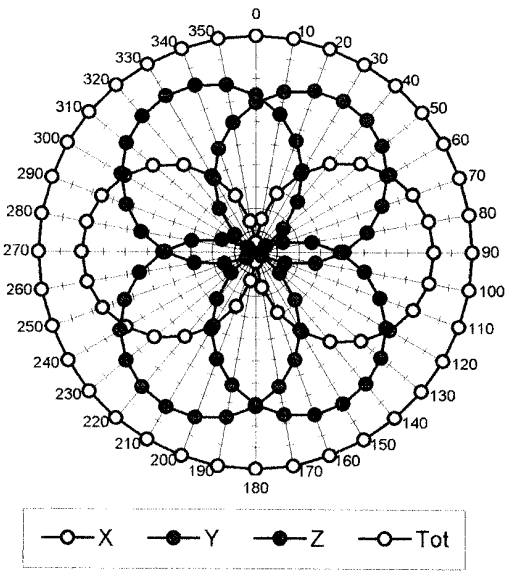
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	10.7	7.4
SAR_{be} [%]	With Correction Algorithm	0.1	0.3

Sensor Offset

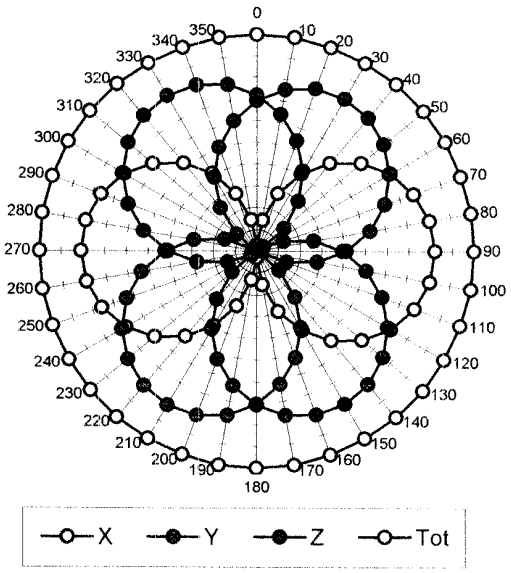
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.2 ± 0.2**	mm

Receiving Pattern (ϕ), θ = 0°

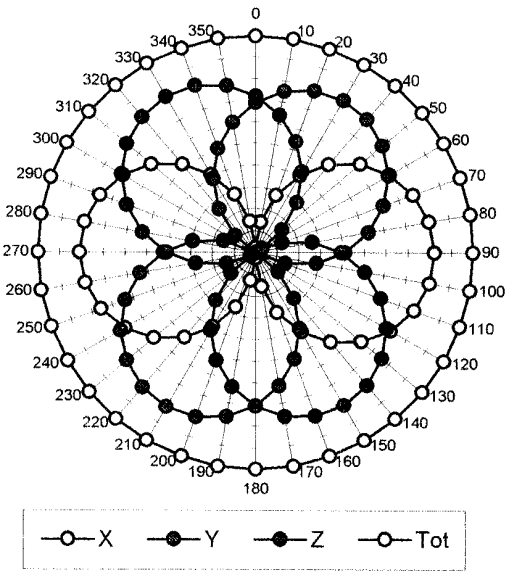
f = 30 MHz, TEM cell ifi110



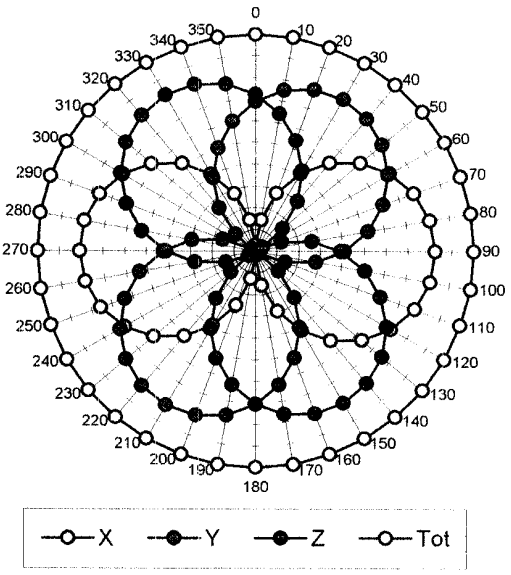
f = 100 MHz, TEM cell ifi110

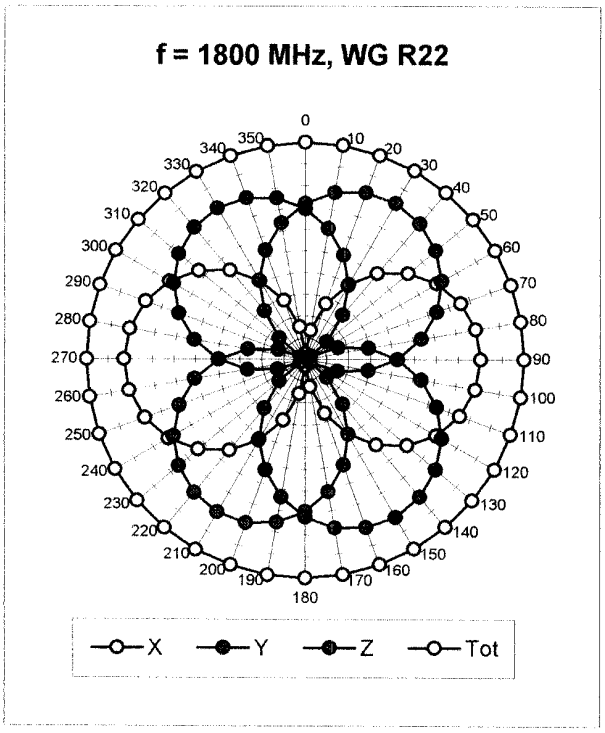


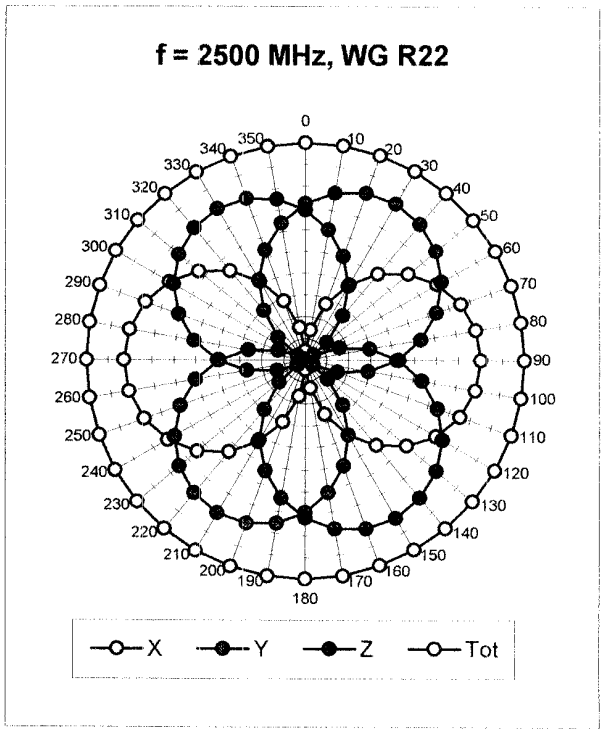
f = 300 MHz, TEM cell ifi110



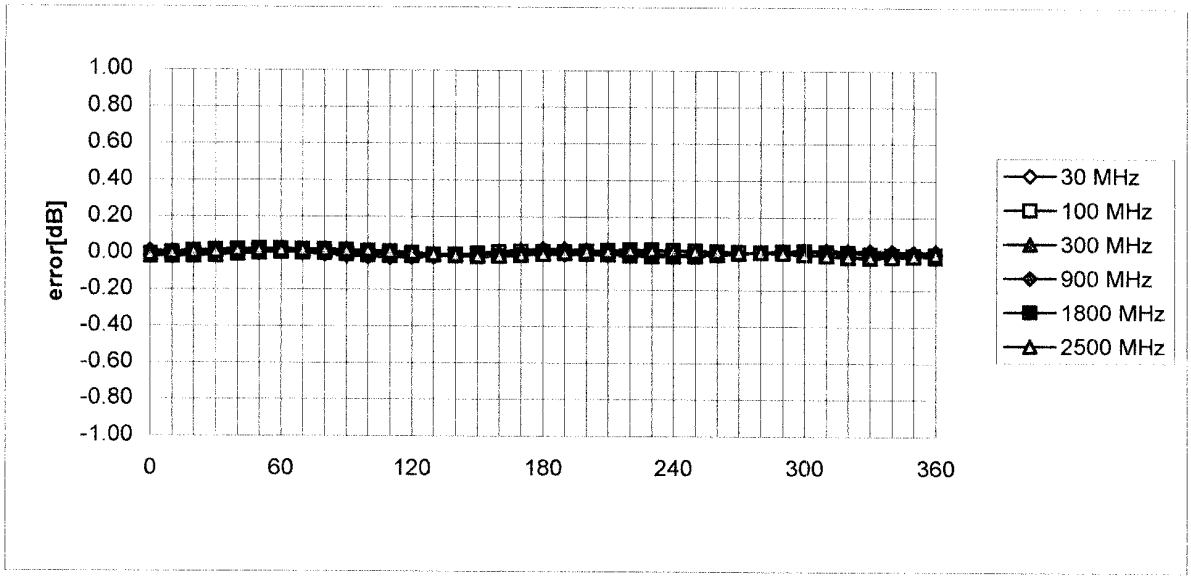
f = 900 MHz, TEM cell ifi110





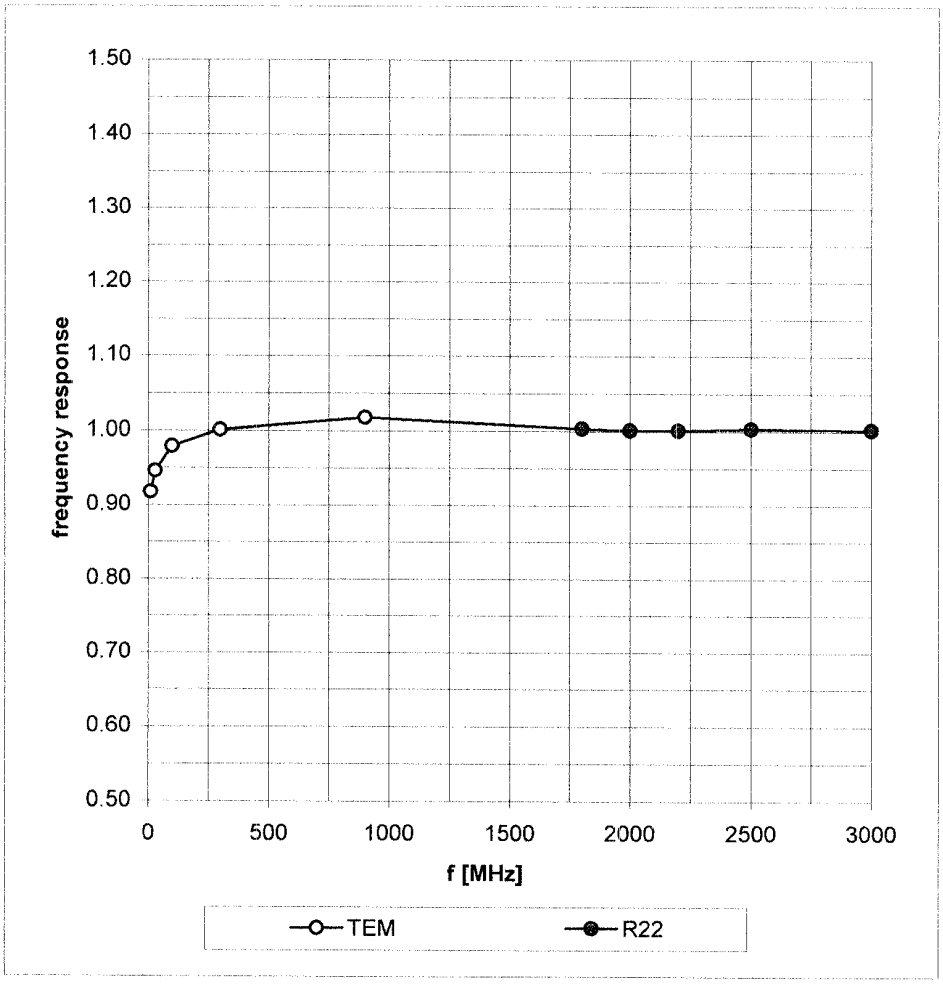


Isotropy Error (ϕ), θ = 0°



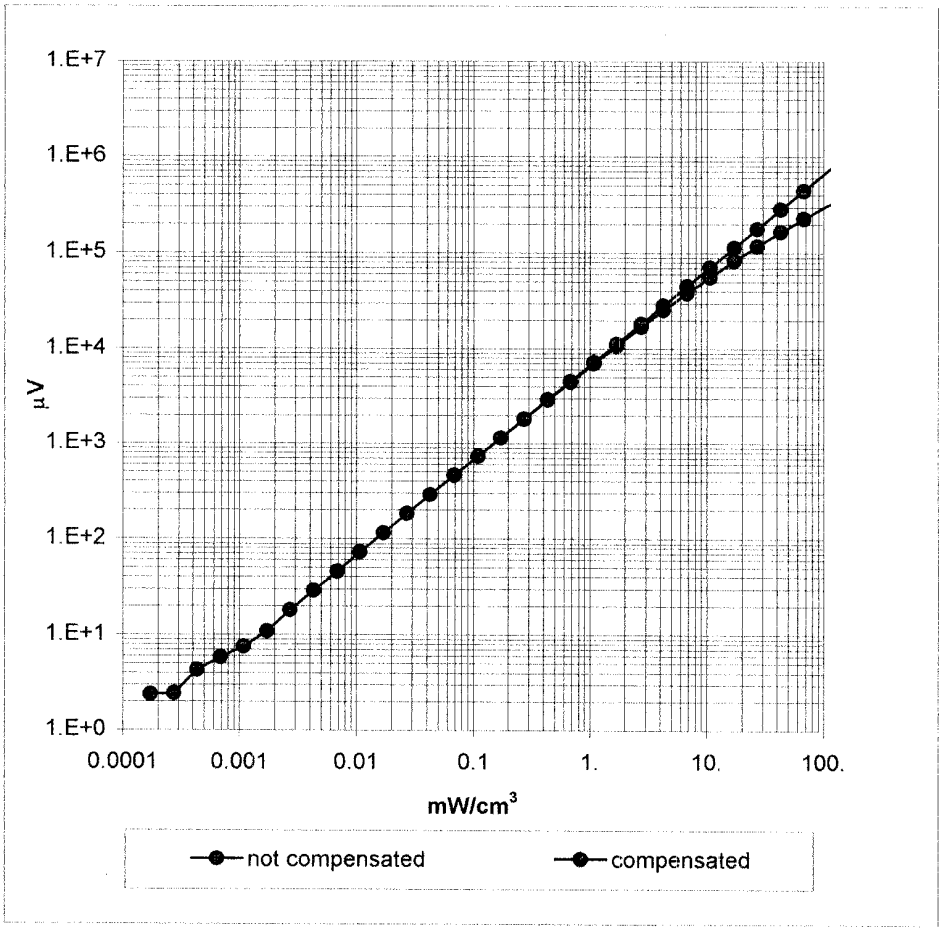
Frequency Response of E-Field

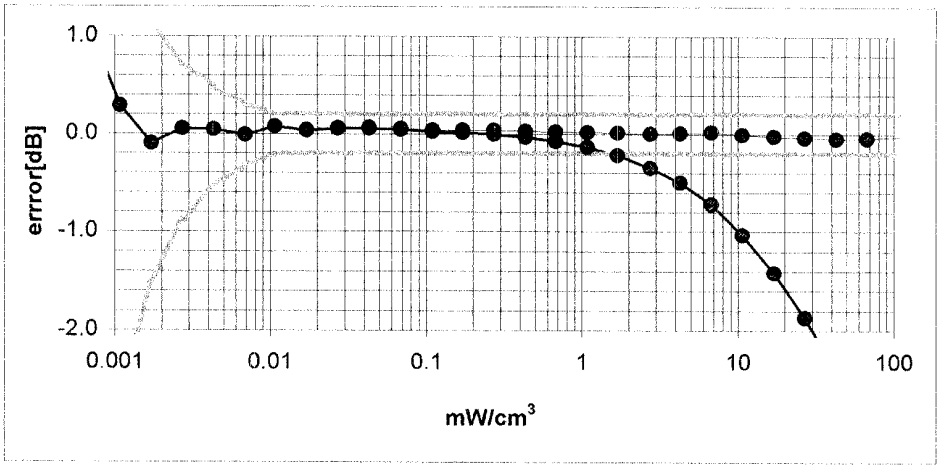
(TEM-Cell:ifi110, Waveguide R22)



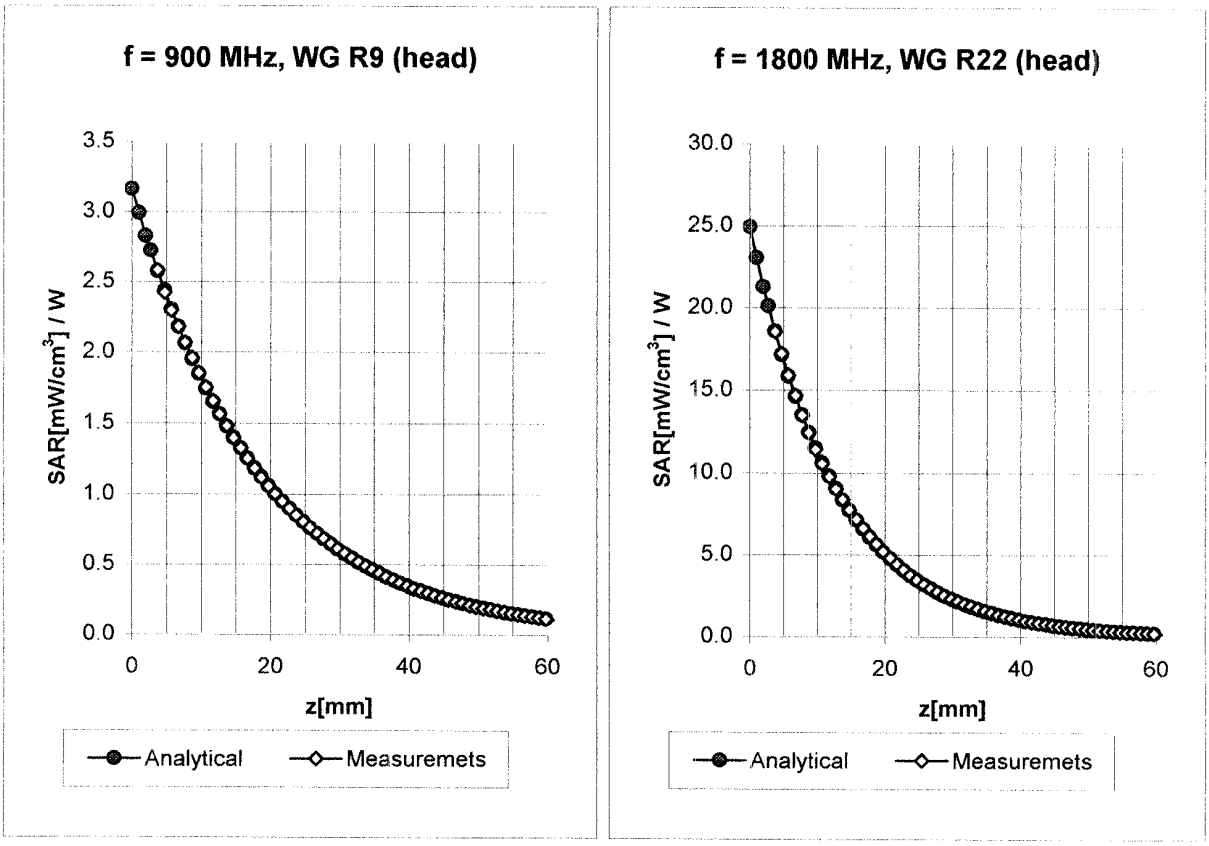
Dynamic Range f(SAR_{brain})

(Waveguide R22)





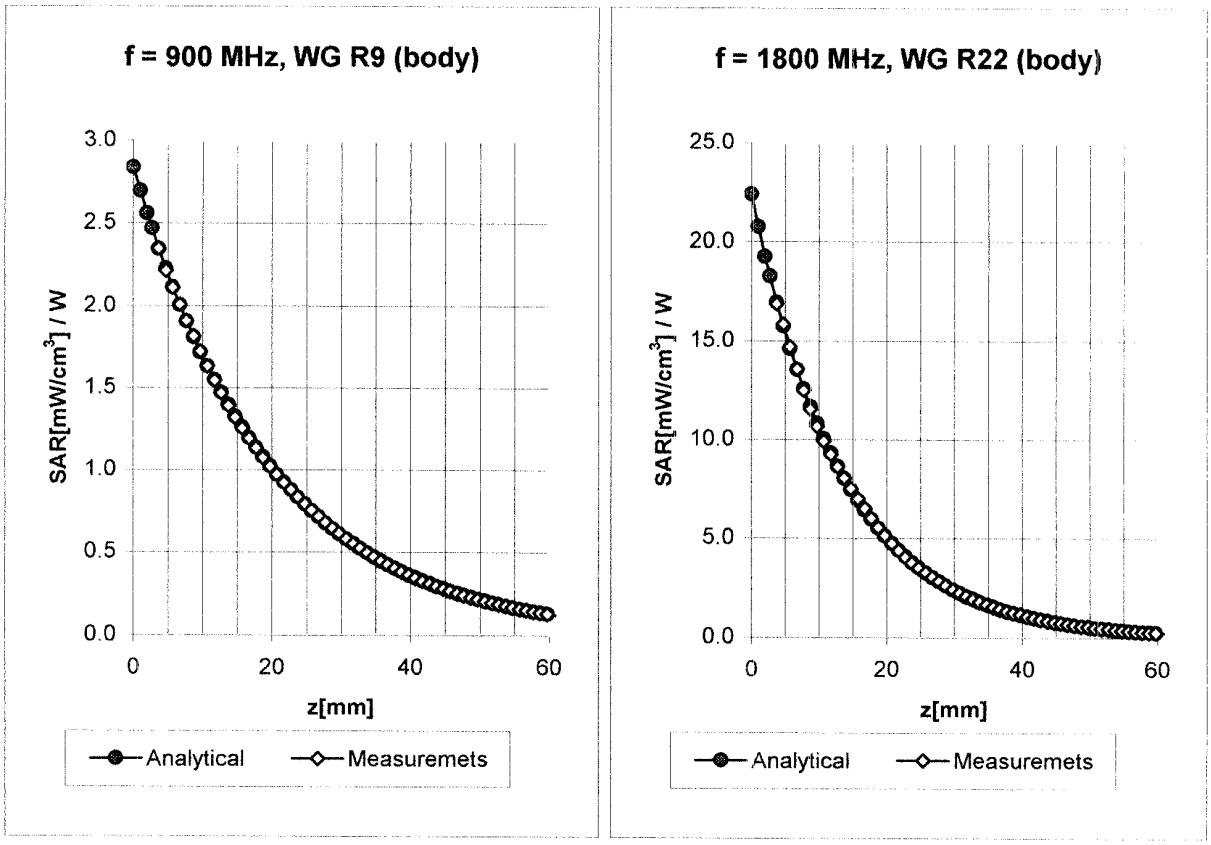
Conversion Factor Assessment



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	**6.9** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.9** ± 9.5% (k=2)	Alpha	**0.30**
	ConvF Z	**6.9** ± 9.5% (k=2)	Depth	**2.71**

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	**5.6** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.6** ± 9.5% (k=2)	Alpha	**0.42**
	ConvF Z	**5.6** ± 9.5% (k=2)	Depth	**2.56**

Conversion Factor Assessment

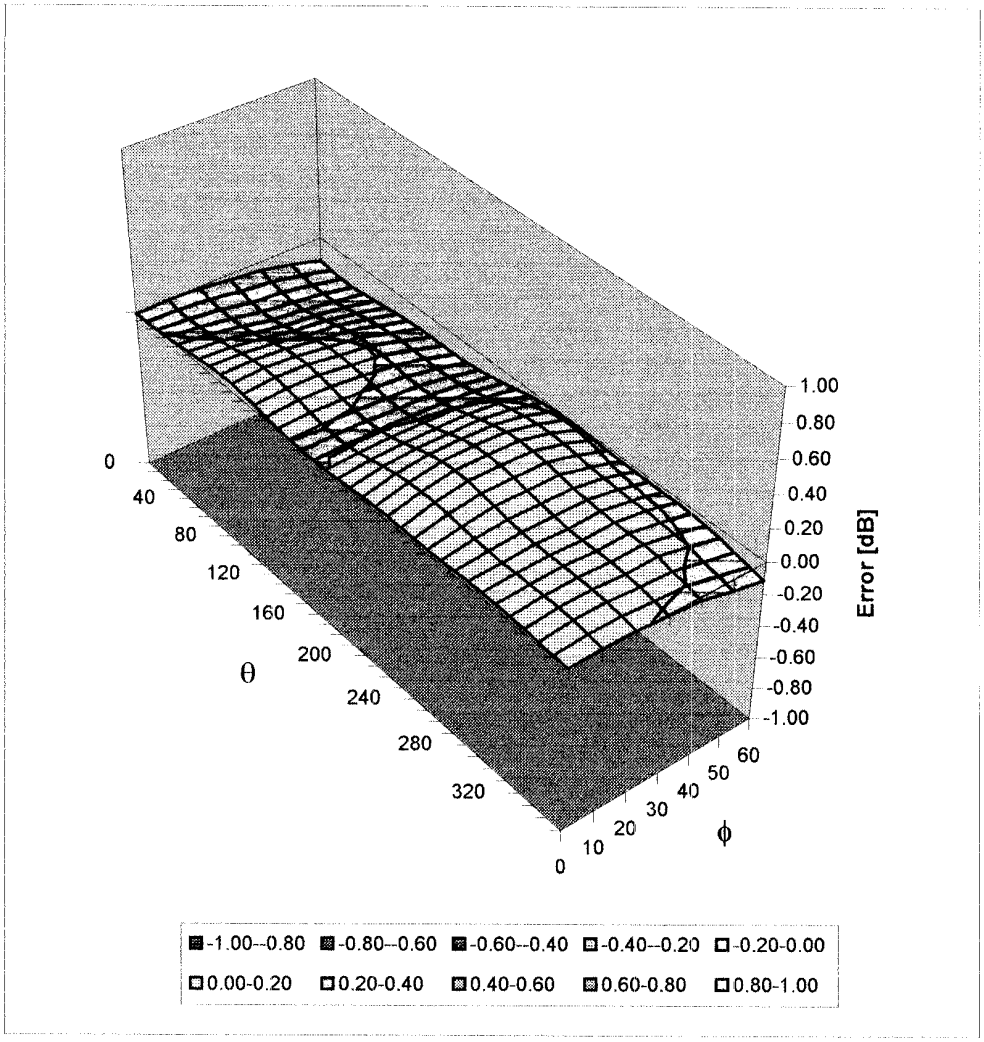


Body	**900 MHz**	ε_r = **55.0 ± 5%**	σ = **1.05 ± 5% mho/m**	
Body	**835 MHz**	ε_r = **55.2 ± 5%**	σ = **0.97 ± 5% mho/m**	
	ConvF X	**6.7** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.7** ± 9.5% (k=2)	Alpha	**0.34**
	ConvF Z	**6.7** ± 9.5% (k=2)	Depth	**2.57**

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	**5.3** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.3** ± 9.5% (k=2)	Alpha	**0.52**
	ConvF Z	**5.3** ± 9.5% (k=2)	Depth	**2.46**

Deviation from Isotropy in HSL

Error (θ,φ), f = 900 MHz



Schmid & Partner
Engineering AG

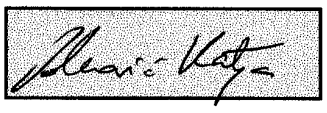
Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1590**
Place of Assessment:	**Zurich**
Date of Assessment:	**May 1, 2002**
Probe Calibration Date:	**April 26, 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:1590

Conversion factor (± standard deviation)

150 MHz	ConvF	**9.4 ± 8%**	**ε_r = 52.3** **σ = 0.76 mho/m** (head tissue)
300 MHz	ConvF	**8.2 ± 8%**	**ε_r = 45.3** **σ = 0.87 mho/m** (head tissue)
450 MHz	ConvF	**7.8 ± 8%**	**ε_r = 43.5** **σ = 0.87mho/m** (head tissue)
150 MHz	ConvF	**9.1 ± 8%**	**ε_r = 61.9** **σ = 0.80 mho/m** (body tissue)
450 MHz	ConvF	**7.9 ± 8%**	**ε_r = 56.7** **σ = 0.94 mho/m** (body tissue)
2450 MHz	ConvF	**4.5 ± 8%**	**ε_r = 39.2** **σ = 1.80 mho/m** (head tissue)
2450 MHz	ConvF	**4.1 ± 8%**	**ε_r = 52.7** **σ = 1.95 mho/m** (body tissue)

APPENDIX E - MEASURED FLUID DIELECTRIC PARAMETERS

900MHz System Performance Check

Measured Fluid Dielectric Parameters (Brain)

April 08, 2003

Frequency	e'	e''
800.000000 MHz	40.7601	19.3965
810.000000 MHz	40.6633	19.3759
820.000000 MHz	40.5020	19.3201
830.000000 MHz	40.3872	19.3224
840.000000 MHz	40.2114	19.2583
850.000000 MHz	40.0807	19.2670
860.000000 MHz	39.9478	19.2154
870.000000 MHz	39.8455	19.1875
880.000000 MHz	39.7398	19.1716
890.000000 MHz	39.6441	19.1438
900.000000 MHz	39.5702	19.0269
910.000000 MHz	39.4723	18.9729
920.000000 MHz	39.3474	18.9332
930.000000 MHz	39.2343	18.9058
940.000000 MHz	39.1243	18.8786
950.000000 MHz	38.9967	18.8767
960.000000 MHz	38.8905	18.8410
970.000000 MHz	38.7924	18.8227
980.000000 MHz	38.7016	18.8490
990.000000 MHz	38.5803	18.8254
1.000000000 GHz	38.4952	18.7918

835MHz EUT Evaluation (Face)

Measured Fluid Dielectric Parameters (Brain)

April 08, 2003

Frequency	e'	e''
735.000000 MHz	41.2455	19.4375
745.000000 MHz	41.0936	19.4099
755.000000 MHz	40.9388	19.3503
765.000000 MHz	40.8314	19.2811
775.000000 MHz	40.6965	19.2652
785.000000 MHz	40.5582	19.2182
795.000000 MHz	40.4576	19.1741
805.000000 MHz	40.3352	19.1155
815.000000 MHz	40.2308	19.0912
825.000000 MHz	40.1189	19.0646
835.000000 MHz	39.9902	19.0593
845.000000 MHz	39.8766	19.0559
855.000000 MHz	39.7277	19.0218
865.000000 MHz	39.5898	18.9760
875.000000 MHz	39.4662	18.9682
885.000000 MHz	39.3583	18.9669
895.000000 MHz	39.2736	18.8608
905.000000 MHz	39.1888	18.8157
915.000000 MHz	39.0683	18.7723
925.000000 MHz	38.9714	18.7332
935.000000 MHz	38.8299	18.7273

835MHz EUT Evaluation (Body)

Measured Fluid Dielectric Parameters (Muscle)

April 08, 2003

Frequency	e'	e''
735.000000 MHz	57.8105	22.4255
745.000000 MHz	57.7296	22.3433
755.000000 MHz	57.6315	22.2685
765.000000 MHz	57.5485	22.1898
775.000000 MHz	57.4211	22.1403
785.000000 MHz	57.3260	22.0687
795.000000 MHz	57.2681	22.0544
805.000000 MHz	57.2052	21.9842
815.000000 MHz	57.0778	21.8995
825.000000 MHz	56.9787	21.8625
835.000000 MHz	56.8502	21.8098
845.000000 MHz	56.7617	21.7764
855.000000 MHz	56.6146	21.7227
865.000000 MHz	56.5308	21.6785
875.000000 MHz	56.4264	21.6541
885.000000 MHz	56.3852	21.6157
895.000000 MHz	56.3261	21.4997
905.000000 MHz	56.2586	21.4468
915.000000 MHz	56.1763	21.4009
925.000000 MHz	56.0824	21.3556
935.000000 MHz	55.9882	21.3012

APPENDIX F - SAR TEST SETUP & EUT PHOTOGRAPHS

FACE-HELD SAR TEST SETUP PHOTOGRAPHS

Front of Speaker-Microphone with Antenna
2.5 cm Separation Distance to Planar Phantom

© 2003 Celltech Labs Inc.

BODY-WORN SAR TEST SETUP PHOTOGRAPHS

Back of Speaker-Microphone with Antenna
1.2 cm Lapel-Clip Separation Distance to Planar Phantom

© 2003 Celltech Labs Inc.

EUT PHOTOGRAPHS

EUT PHOTOGRAPHS