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Exhibit 11: SAR Test Report IHDT56CB2

Date of test: 04/11/2003 – 04/15/2003
Date of Report: 07/21/2003

Laboratory:
Motorola Personal Communications Sector Product Safety & Compliance Laboratory
600 N. US Highway 45
Room: MW113
Libertyville, Illinois 60048

Test Responsible:
Firass Badaruzzaman
Senior RF Engineer

Accreditation: This laboratory is accredited to ISO/IEC 17025-1999 to perform the following tests:

ACCREDITED

Tests:	Procedures:
Electromagnetic Specific Absorption Rate	ANSI/IEEE C95.1-1992, 1999 (SAR) IEEE C95.3-1991 IEEE P1528 (*DRAFT*) FCC OET Bulletin 65 (*including Supplements A, B, C*) Australian Communications Authority Radio Communications (Electromagnetic Radiation – Human Exposure) Standard 1999 CENELEC EN 50361 (2001)
Simulated Tissue Preparation	APP-0247
RF Power Measurement	DOI-0876, 0900, 0902, 0904, 0915

On the following products or types of products:
Wireless Communications Devices (Examples): Two Way Radios; Portable Phones (including Cellular,
Licensed Non-Broadcast and PCS); Low Frequency Readers; and Pagers

A2LA certificate #1651-01

Statement of Compliance:

Motorola declares under its sole responsibility that portable cellular telephone FCC ID IHDT56CB2 to which this declaration relates, is in conformity with the appropriate General Population/Uncontrolled RF exposure standards, recommendations and guidelines (FCC 47 CFR §2.1093). It also declares that the product was tested in accordance with the appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

(none)

The results and statements contained herein relate only to the items tested. The names of individuals involved may be mentioned only in connection with the statements or results from this report.

Motorola encourages all feedback, both positive and negative, on this test report.

Table of Contents

References:

1. Introduction

The Motorola Personal Communications Sector Product Safety Laboratory has performed measurements of the maximum potential exposure to the user of portable cellular phone (FCC ID IHDT56CB2). The Specific Absorption Rate (SAR) of this product was measured. The portable cellular phone was tested in accordance with FCC OET Bulletin 65 Supplement C 01-01.

2. Description of the Device Under Test

Antenna description

Type	Stubby	
Location	External: Upper Right Corner	
Dimensions	Length	17mm
	Width	9mm
Configuration	Helix	

Device description

FCC ID Number	IHDT56CB2	
Serial number	TA88300272	
Mode(s) of Operation	GSM 850	GSM 1900
Modulation Mode(s)	GSM	GSM
Maximum Output Power Setting	32.00 dBm	29.40 dBm
Duty Cycle	1:8	1:8
Transmitting Frequency Rang(s)	824.20 - 848.80 MHz	1850.20 – 1909.80 MHz
Production Unit or Identical Prototype (47 CFR §2..908)	Identical Prototype	
Device Category	Portable	
RF Exposure Limits	General Population / Uncontrolled	

3. Test Equipment Used

3.1 Dosimetric System

The Motorola Personal Communications Sector Product Safety & Compliance Laboratory utilizes a Dosimetric Assessment System (Dasy3™ v3.1d) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall RSS uncertainty of the measurement system is ±11.7% (K=1) with an expanded uncertainty of ±23.0% (K=2). The measurement uncertainty budget is given in Appendix 6. Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4 W/kg to 10 W/kg. The list of calibrated equipment used for the measurements is shown below.

Description	Serial Number	Cal Due Date
DASY3 DAE V1	SN367	26-Aug-03
	SN383	02-Sep-03
E-Field Probe ET3DV6	SN1514	25-July-03
	SN1523	17-Jan-04
Dipole Validation Kit, D900V2	SN79	24-Jun-04
S.A.M. Phantom used for 800MHz	TP-1132	
Dipole Validation Kit, D1800V2	SN258tr	24-Jun-04
	SN250tr	24-Jun-04
S.A.M. Phantom used for 1900MHz	TP-1133	

3.2 Additional Equipment

Description	Serial Number	Cal Due Date
Signal Generator HP8648C	3847A04632	10/10/04
Power Meter E4419B	GB39511090	02/06/04
Power Sensor #1 - 8481A	US39211007	02/06/04
Power Sensor #2 - 8481A	US39210931	02/23/04
Network Analyzer HP8753ES	US39172529	6/18/2003
Dielectric Probe Kit HP85070B	US33020235	

Description	Serial Number	Cal Due Date
Signal Generator HP8648C	3847A04633	10/11/04
Power Meter E4419B	US37360825	04/21/04
Power Sensor #1 - 8481A	US337296475	11/05/03
Power Sensor #2 - 8481A	US3318A25036	11/05/03
Network Analyzer HP8753ES	US39172529	6/18/2003
Dielectric Probe Kit HP85070B	US33020235	

4. Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, ε_r, and the conductivity, σ, of the tissue simulating liquids were measured with the HP85070 Dielectric Probe Kit These values, along with the temperature of the tissue simulate are shown in the table below. The recommended limits for maximum permittivity and minimum conductivity are also shown. These come from the Federal Communication Commission, OET Bulletin 65 Supplement C 01-01. It is seen that the measured parameters are satisfactory for compliance testing.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ε_r	σ (S/m)	Temp (°C)
835	**Head**	**Measured,** 04/08/2003	43.2	0.93	20.30-20.60
		Recommended Limits	41.5	0.90	20-25
	Body	**Measured,** 04/09/2003	54.7	0.98	20.30-20.60
		Recommended Limits	55.2	0.97	20-25
1880	**Head**	**Measured,** 04/09/2003	38.1	145	20.30-20.60
		Recommended Limits	40.0	1.40	20-25
	Body	**Measured,** 04/11/2003	51.5	1.58	20.30-20.60
		Recommended Limits	53.3	1.52	20-25

The list of ingredients and the percent composition used for the tissue simulates are indicated in the table below.

Ingredient	800MHz Head	800MHz Body	1900MHz Head	1900MHz Body
Sugar	57.0	44.9	--	30.80
DGBE	--	--	47.0	--
Water	40.45	53.06	52.8	68.91
Salt	1.45	0.94	0.2	0.29
HEC	1.0	1.0	--	--
Bact.	0.1	0.1	--	--

5. System Accuracy Verification

A system accuracy verification of the DASY3 was performed using the measurement equipment listed in Section 3.1. The daily system accuracy verification occurs within center section of the SAM phantom.

A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR indicated on the dipole certification sheet. These tests were done at 900MHz and/or 1800MHz. These frequencies are within 100MHz of the mid-band frequency of the test device. This is within the allowable window given in Supplement C 01-01 *Appendix D System Verification* section item #5. The test was conducted on the same days as the measurement of the DUT. Recommended limits for maximum permittivity, minimum conductivity are shown in the table below. These come from the Federal Communication Commission, OET Bulletin 65 Supplement C 01-01. The obtained results from the system accuracy verification are displayed in the table below. The distributions of SAR compare well with those of the reference measurements (see Appendix 1). The tissue stimulant depth was verified to be 15.0cm ±0.5cm. Z-axis scans showing the SAR penetration are also included in Appendix 1. SAR values are normalized to 1W forward power delivered to the dipole.

f (MHz)	Description	SAR (W/kg), 1gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
			ε_r	σ (S/m)		
900	**Measured, 04/08/2003**	11.46	42.30	0.98	21	20.9
	Recommended Limits	11.40	40.30	0.95	n/a	n/a
	Measured, 04/09/2003	11.50	41.70	0.98	21	20.8
	Recommended Limits	11.40	40.30	0.95	n/a	n/a
1800	**Measured, 04/09/2003**	38.67	38.50	1.38	21	20.9
	Recommended Limits	38.60	40.30	1.36	n/a	n/a
	Measured, 04/11/2003	39.68	39.00	1.37	21	21
	Recommended Limits	38.80	39.60	1.37	n/a	n/a

The following probe conversion factors were used on the E-Field probe(s) used for the system accuracy verification measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ETDV6	**SN1514**	900	6.2	2 of 8
		1800	5.2	2 of 8
	SN1523	900	n/a	
		1800	5.3	2 of 10

6. Test Results

The test sample was operated in a test mode that allows control of the transmitter without the need to place actual phone calls. For the purposes of this test the unit is commanded to test mode and manually set to the proper channel, transmitter power level and transmit mode of operation. The phone was tested in the configurations stipulated in OET Bulletin 65 Supplement C 01-01. Motorola also followed the requirements in Supplement. C / Appendix D: SAR Measurement Procedures, section titled "*Devices Operating Next To A Person's Ear* ". These directions state "The device should be tested on the left and right side of the head phantom in the "Cheek/Touch" and "Ear/Tilt" positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tile/Ear, extended and retracted) is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s)."

The DASY v3.1d SAR measurement system specified in section 3.1 was utilized within the intended operations as set by the SPEAG™ setup. The phone was positioned into the measurement configurations using the positioner supplied with the DASY 3.1d SAR measurement system. The measured dielectric constant of the material used for the positioner is less than 2.9 and the loss tangent is less than 0.02 (± 30%) at 850MHz. The default settings for the "coarse" and "cube" scans were chosen and use for measurements. The grid spacing of the course scan was set to 15cm as shown in the SAR plots included in appendix 2 and 3. Please refer to the DASY manual for additional information on SAR scanning procedures and algorithms used.

The Cellular Phone (FCC ID IHDT56CB2) has the following battery options:

SNN5588AA

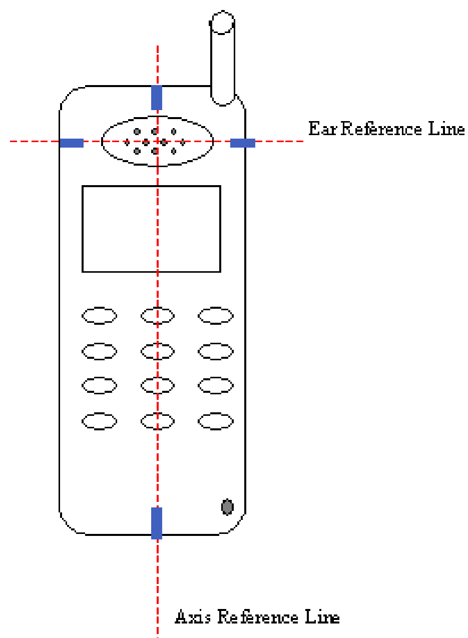
This battery was used to do all of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery. The configuration that resulted in the highest SAR values were tested using the other batteries listed above.

6.1 Head Adjacent Test Results

To aid in positioning repeatability, the ear reference line of the device and the axis reference line of the device have been physically added using a non-metallic marker.

- Per Figure 1, the "Ear Reference Line" is centered vertically through the center of the listening area (as defined by the speaker holes in the housing).
- The "Axis Reference Line" bisects the front surface of the device at its top and bottom edges.
- The intersection of these two lines defines the location of the "Ear Reference Point".

The lines drawn on the device extended to the outside edges, as shown in blue in the figure below, & wrap around the sides of the device.



The SAR results shown in tables 1 through 4 are maximum SAR values averaged over 1 gram of phantom tissue. Also shown are the measured conducted output powers, the temperature of the test facility during the test, the temperature of the tissue simulate after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is New SAR = Old SAR * 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test. The test conditions indicated as bold numbers in the following table are included in Appendix 2

The SAR measurements were performed using the SAM phantoms listed in section 3.1. Since same phantoms and tissue simulate are used for the system accuracy verification as the device SAR measurements, the Z-axis scans included in within Appendix 1 are applicable for verification of tissue simulate depth to be 15.0cm ±0.5cm. All other test conditions measured lower SAR values than those included in Appendix 2. Note that 800MHz digital mode SAR measurements were performed in accordance with Supplement C.

The following probe conversion factors were used on the E-Field probe(s) used for the head adjacent measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ETDV6	SN1514	850	6.2	2 of 8
		1900	5.2	2 of 8

f (MHz)	Description	Conducted Output Power (dBm)	Left Head (Cheek / Touch Position) Ant Fixed Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Digital 850MHz	Channel 128	31.94	0.95	0.04	0.95	20.90
	Channel 189	31.95	1.01	0.12	1.01	20.90
	Channel 251	31.90	1.01	0.05	1.01	20.90
Digital 1900MHz	Channel 512	29.37				
	Channel 661	29.34	0.711	0.03	0.71	20.90
	Channel 810	29.46				

Table 1: SAR measurement results for the portable cellular telephone FCC ID IHDT56CB2 at highest possible output power. Measured against the left head in the Cheek/Touch Position.

f (MHz)	Description	Conducted Output Power (dBm)	Right Head (Cheek / Touch Position) Ant Fixed Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Digital 850MHz	Channel 128	31.94	0.977	-0.15	1.01	20.9
	Channel 189	31.95	1.06	-0.09	1.08	20.9
	Channel 251	31.90	1.06	-0.14	1.09	20.9
Digital 1900MHz	Channel 512	29.37				
	Channel 661	29.34	0.666	-0.43	0.74	20.9
	Channel 810	29.46				

Table 2: SAR measurement results for the portable cellular telephone FCC ID IHDT56CB2 at highest possible output power. Measured against the right head in the Cheek/Touch Position.

f (MHz)	Description	Conducted Output Power (dBm)	Left Head (15º tilt Position) Ant Fixed Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Digital 850MHz	Channel 128	31.94				
	Channel 189	31.95	0.224	-0.06	0.23	20.9
	Channel 251	31.90				
Digital 1900MHz	Channel 512	29.37				
	Channel 661	29.34	0.11	0.11	0.11	20.90
	Channel 810	29.46				

Table 3: SAR measurement results for the portable cellular telephone FCC ID IHDT56CB2 at highest possible output power. Measured against the left head in the 15° Tilt Position.

f (MHz)	Description	Conducted Output Power (dBm)	Right Head (15º tilt Position) Ant Fixed Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Digital 850MHz	Channel 128	31.94				
	Channel 189	31.95	0.233	0.11	0.23	20.9
	Channel 251	31.90				
Digital 1900MHz	Channel 512	29.37				
	Channel 661	29.34	0.0978	-0.23	0.10	20.90
	Channel 810	29.46				

Table 4: SAR measurement results for the portable cellular telephone FCC ID IHDT56CB2 at highest possible output power. Measured against the right head in the 15° Tilt Position.

6.2 Body-Worn Test Results

The SAR results shown in table 5 are the maximum SAR values averaged over 1 gram of phantom tissue. Also shown are the measured conducted output powers, the temperature of the test facility during the test, the temperature of the tissue simulate after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is New SAR = Old SAR * 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test. The test conditions indicated as bold numbers in the following table are included in Appendix 3. Note that 800MHz digital mode SAR measurements were performed in accordance with OET Bulletin 65 Supplement C 01-01. All other test conditions measured lower SAR values than those included in Appendix 3.

A “flat” phantom was for the body-worn tests. This “flat” phantom is made out of 1” thick natural High Density Polyethylene with a thickness at the bottom equal to 2.0mm. It measures 52.7cm(long) x 26.7cm(wide) x 21.2cm(tall). The measured dielectric constant of the material used is less than 2.3 and the loss tangent is less than 0.0046 all the way up to 2.184GHz.

The tissue stimulant depth was verified to be 15.0cm ±0.5cm. The same device holder described in section 6 was used for positioning the phone. The functional accessories were divided into two categories, the ones with metal components and the ones with non-metal components. For non-metallic component accessories’, testing was performed on the accessory that displayed the closest proximity to the flat phantom. Each metallic component accessory, if any, was checked for uniqueness of metal component so that each is tested with the device. If multiple accessories shared an identical metal component, only the accessory that dictates the closest spacing to the body was tested. The cellular phone was tested with a headset connected to the device for all body-worn SAR measurements.

There are five Body-Worn Accessories available for this phone:
Leather Case
Navy Pouch
Plastic Holster with wishbone belt clip and universal belt clip

The Leather Case causes closer proximity and does not differ in metal components and was used for the SAR measurements.

The following probe conversion factors were used on the E-Field probe(s) used for the body worn measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ETDV6	SN1514	850	6.0	2 of 2
		1900		
	SN1523	850		
		1900	4.8	8 of 10

f (MHz)	Description	Conducted Output Power (dBm)	Body Worn with leather case MT-04242			
			Ant Fixed			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Digital 850MHz	Channel 128	31.94	0.718	0.01	0.72	21
	Channel 189	31.95	0.828	-0.03	0.83	21
	Channel 251	31.90	0.875	0.00	0.88	21
Digital 1900MHz	Channel 512	29.37				
	Channel 661	29.34	0.202	-0.02	0.20	21.20
	Channel 810	29.46				

Table 5: SAR measurement results for the portable cellular telephone FCC ID IHDT56CB2 at highest possible output power. Measured against the body.

Appendix 1

SAR distribution comparison for the system accuracy verification

Dipole 900 MHz

900 MHz Dipole Validation / Dipole Sn# 079 / Forward Power = 253mW / Acceptable Temp Range is 18-25°C Room Temp at time of measurement = 21C Simulant Temp at time of measurement = 20.9C

R5 TP-1132 Sugar SAM Expanded (Rev. 2)-9Jan03 Phantom; Flat Section; Position: (90°,90°); Frequency: 900 MHz

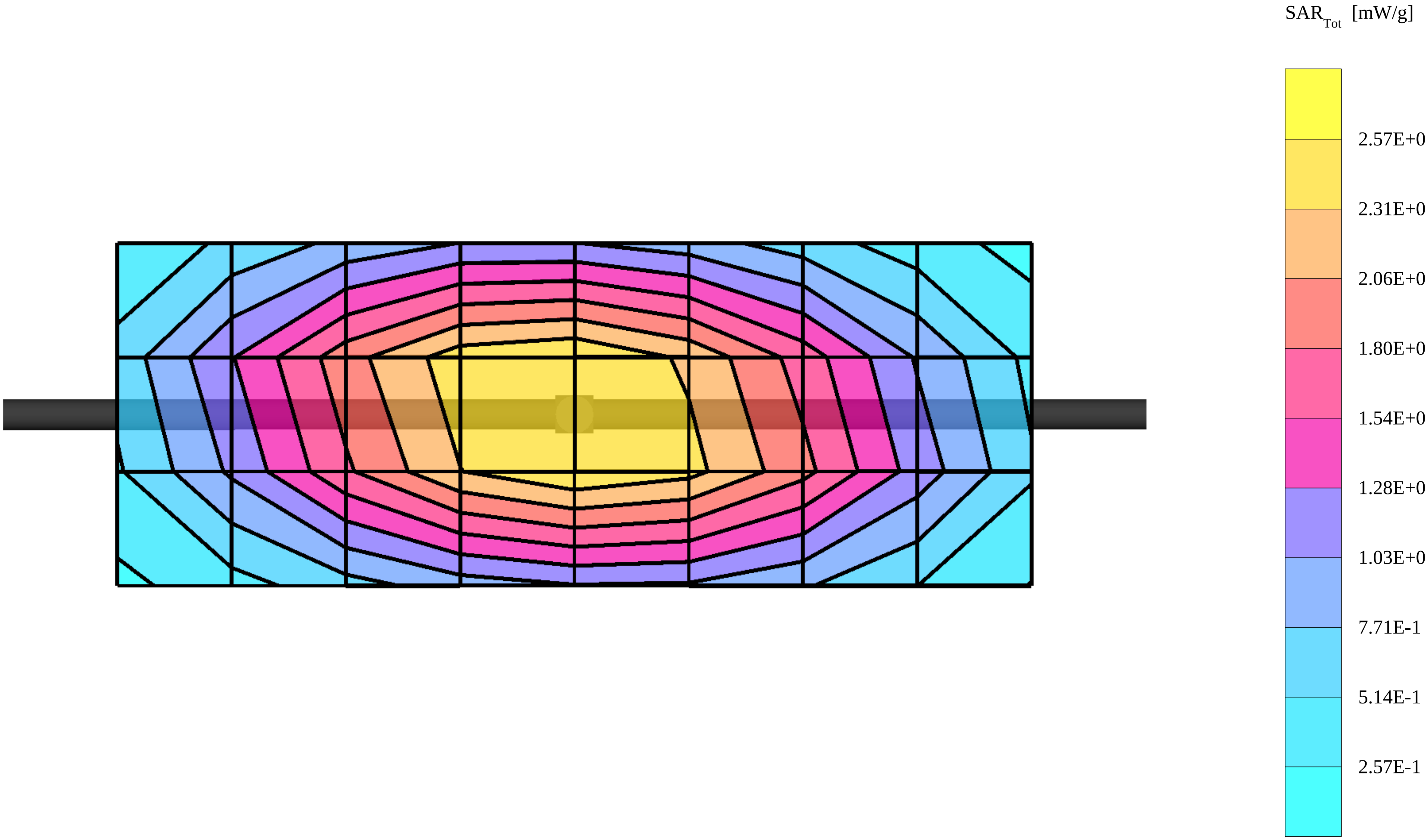
Probe: ET3DV6 - SN1514 - VALIDATION; ConvF(6.20,6.20,6.20); Crest factor: 1.0; 900 MHz VALIDATION: σ = 0.98 mho/m ε_r = 42.3 ρ = 1.00 g/cm^3

Cubes (2): SAR (1g): 2.90 mW/g ± 0.01 dB, SAR (10g): 1.83 mW/g ± 0.01 dB, (Worst-case extrapolation)

Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0

Penetration depth: 11.4 (10.6, 12.6) [mm]

Powerdrift: 0.03 dB



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Dipole 900 MHz

900 MHz Dipole Validation / Dipole Sn# 079 / Forward Power = 253mW / Acceptable Temp Range is 18-25°C Room Temp at time of measurement = 21C Simulant Temp at time of measurement = 20.8C

R5 TP-1132 Sugar SAM Expanded (Rev. 2)-9Jan03 Phantom; Flat Section; Position: (90°,90°); Frequency: 900 MHz

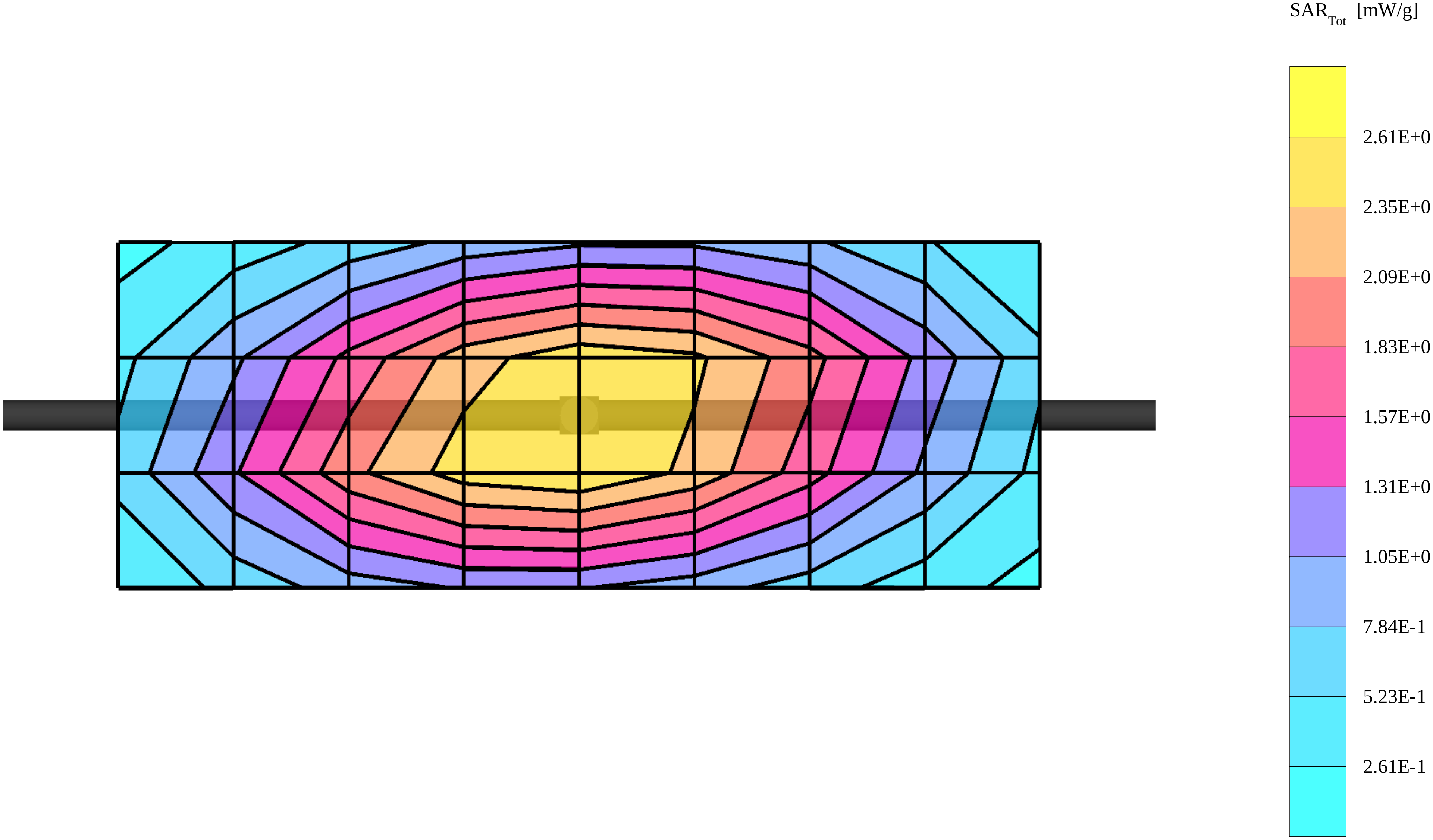
Probe: ET3DV6 - SN1514 - VALIDATION; ConvF(6.20,6.20,6.20); Crest factor: 1.0; 900 MHz VALIDATION: σ = 0.98 mho/m ε_r = 41.7 ρ = 1.00 g/cm^3

Cubes (2): SAR (1g): 2.91 mW/g ± 0.00 dB, SAR (10g): 1.83 mW/g ± 0.00 dB, (Worst-case extrapolation)

Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0

Penetration depth: 11.5 (10.6, 12.7) [mm]

Powerdrift: 0.01 dB



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Dipole 1800 MHz

1800 MHz Dipole Validation / Dipole Sn# 258TR / Forward Power = 249mW / Acceptable Temp Range is 18-25°C Room Temp at time of measurement = 21C Simulant Temp at time of measurement = 20.9C

R5 TP-1133 Glycol SAM Expanded (Rev. 2)-9Jan03 Phantom; Flat Section; Position: (90°,90°); Frequency: 1800 MHz

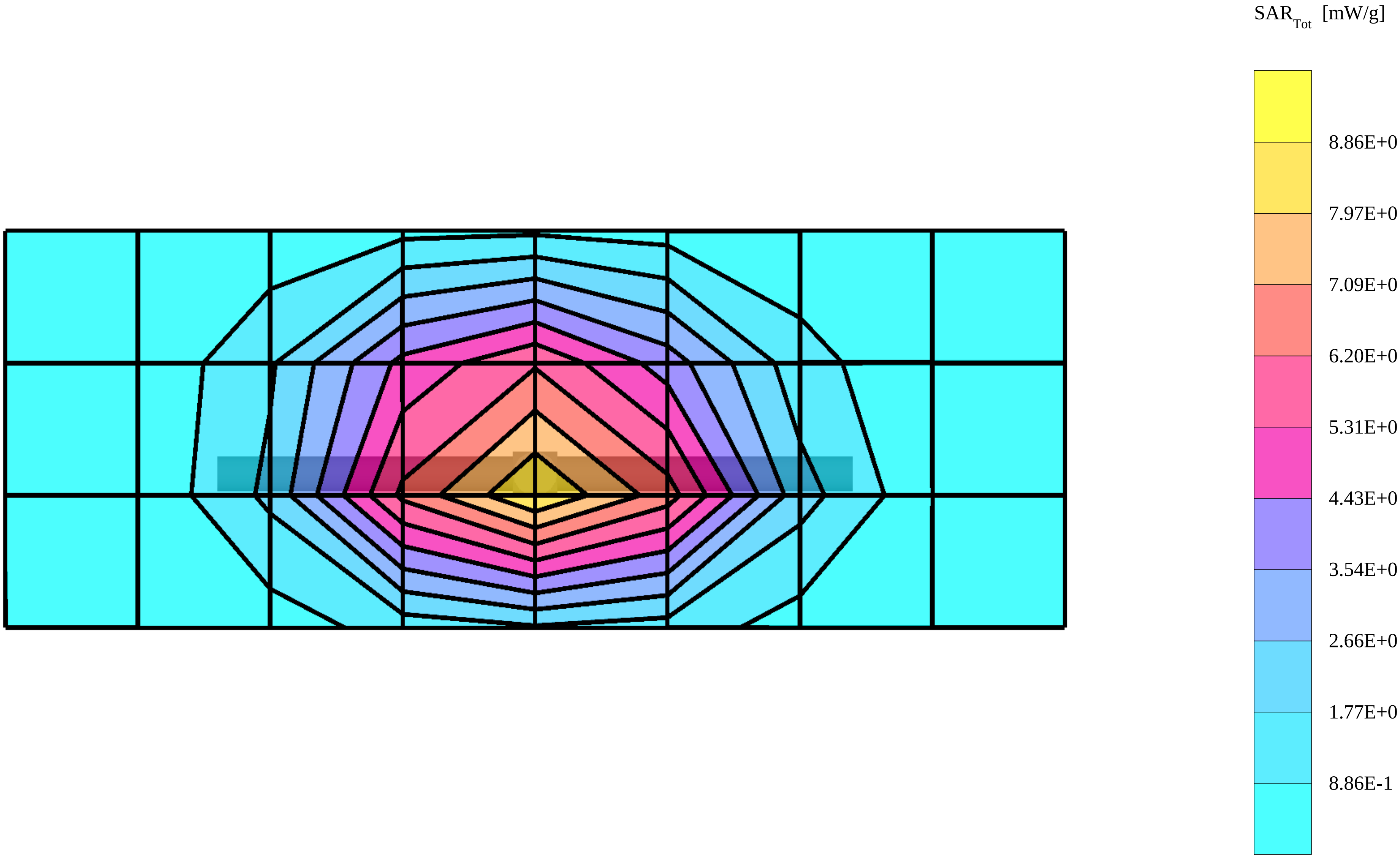
Probe: ET3DV6 - SN1514 - VALIDATION; ConvF(5.20,5.20,5.20); Crest factor: 1.0; 1800 MHz VALIDATION: σ = 1.38 mho/m ε_r = 38.5 ρ = 1.00 g/cm^3

Cubes (2): SAR (1g): 9.63 mW/g ± 0.01 dB, SAR (10g): 5.07 mW/g ± 0.02 dB, (Worst-case extrapolation)

Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0

Penetration depth: 8.5 (8.2, 9.2) [mm]

Powerdrift: -0.02 dB



Dipole 1800 MHz

1800 MHz Dipole Validation / Dipole Sn# 250TR / Forward Power = 252mW / Acceptable Temp Range is 18-25°C Room Temp at time of measurement =21 C Simulant Temp at time of measurement = 21 C

R1 Amy Twin Phantom Rev.3 Phantom; section 2 Section; Position: (90°,180°); Frequency: 1800 MHz

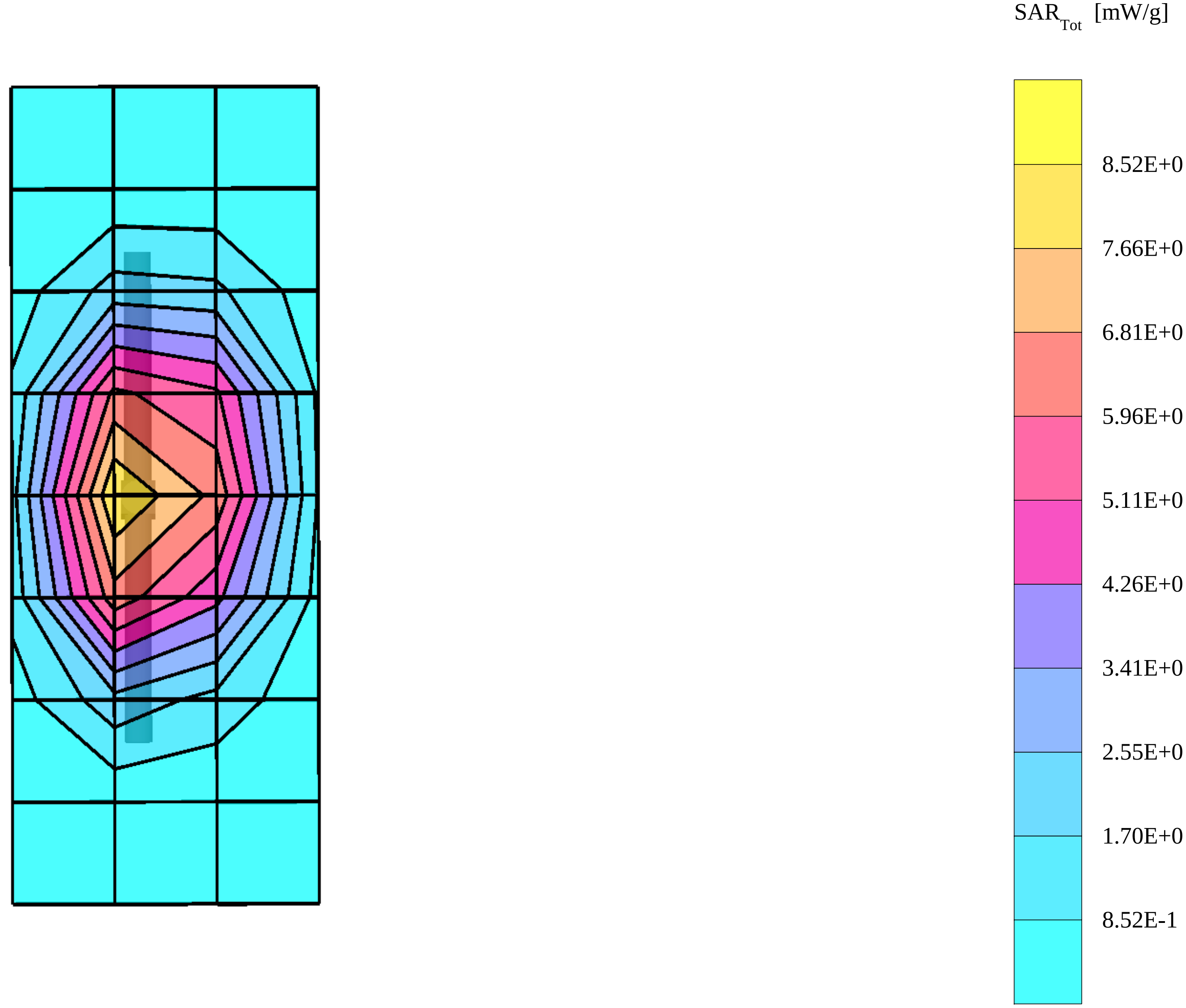
Probe: ET3DV6 - SN1523 - Validation.2; ConvF(5.30,5.30,5.30); Crest factor: 1.0; 1800 MHz VALIDATION: σ = 1.37 mho/m ε_r = 39.0 ρ = 1.00 g/cm^3

Cubes (2): SAR (1g): 10.0 mW/g ± 0.12 dB, SAR (10g): 5.26 mW/g ± 0.10 dB, (Worst-case extrapolation)

Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0

Penetration depth: 8.3 (7.9, 9.2) [mm]

Powerdrift: 0.01 dB



Dipole 900 MHz

R5 TP-1132 Sugar SAM Expanded (Rev. 2)-9Jan03;

Probe: ET3DV6 - SN1514 - VALIDATION; ConvF(6.20,6.20,6.20); Crest factor: 1.0; 900 MHz VALIDATION: $\sigma = 0.98$ mho/m $\varepsilon_r = 42.3$ $\rho = 1.00$ g/cm^3

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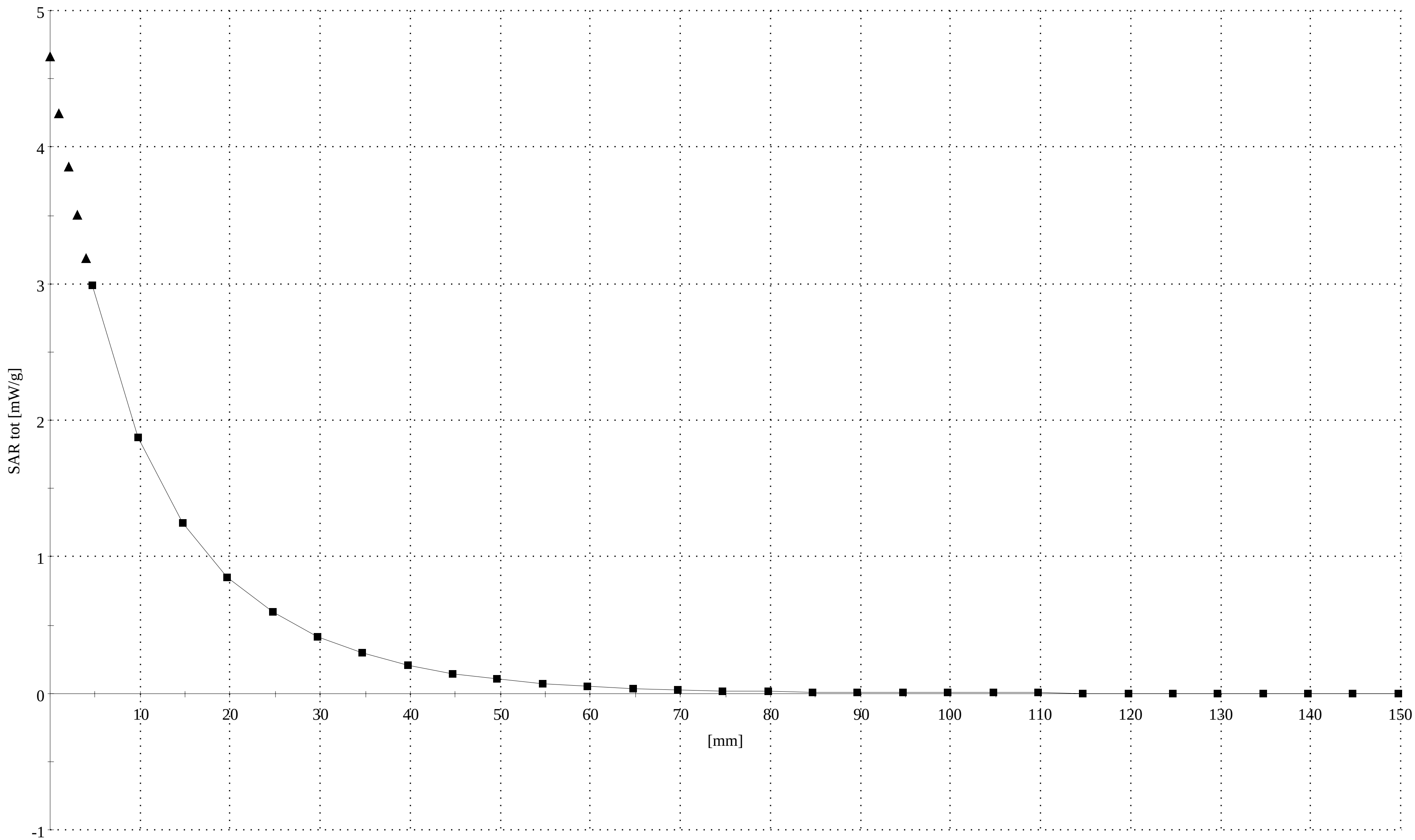
Penetration depth: 11.4 (10.6, 12.5) [mm]



Dipole 900 MHz

900 MHz Dipole Validation / Dipole Sn# 079 / Forward Power = 253mW / Acceptable Temp Range is 18-25°C Room Temp at time of measurement = 21C Simulant Temp at time of measurement = 20.8C

R5 TP-1132 Sugar SAM Expanded (Rev. 2)-9Jan03 Phantom; Section; Position: ; Frequency: 900 MHz

Probe: ET3DV6 - SN1514 - VALIDATION; ConvF(6.20,6.20,6.20); Crest factor: 1.0; 900 MHz VALIDATION: σ = 0.98 mho/m ε_r = 41.7 ρ = 1.00 g/cm^3

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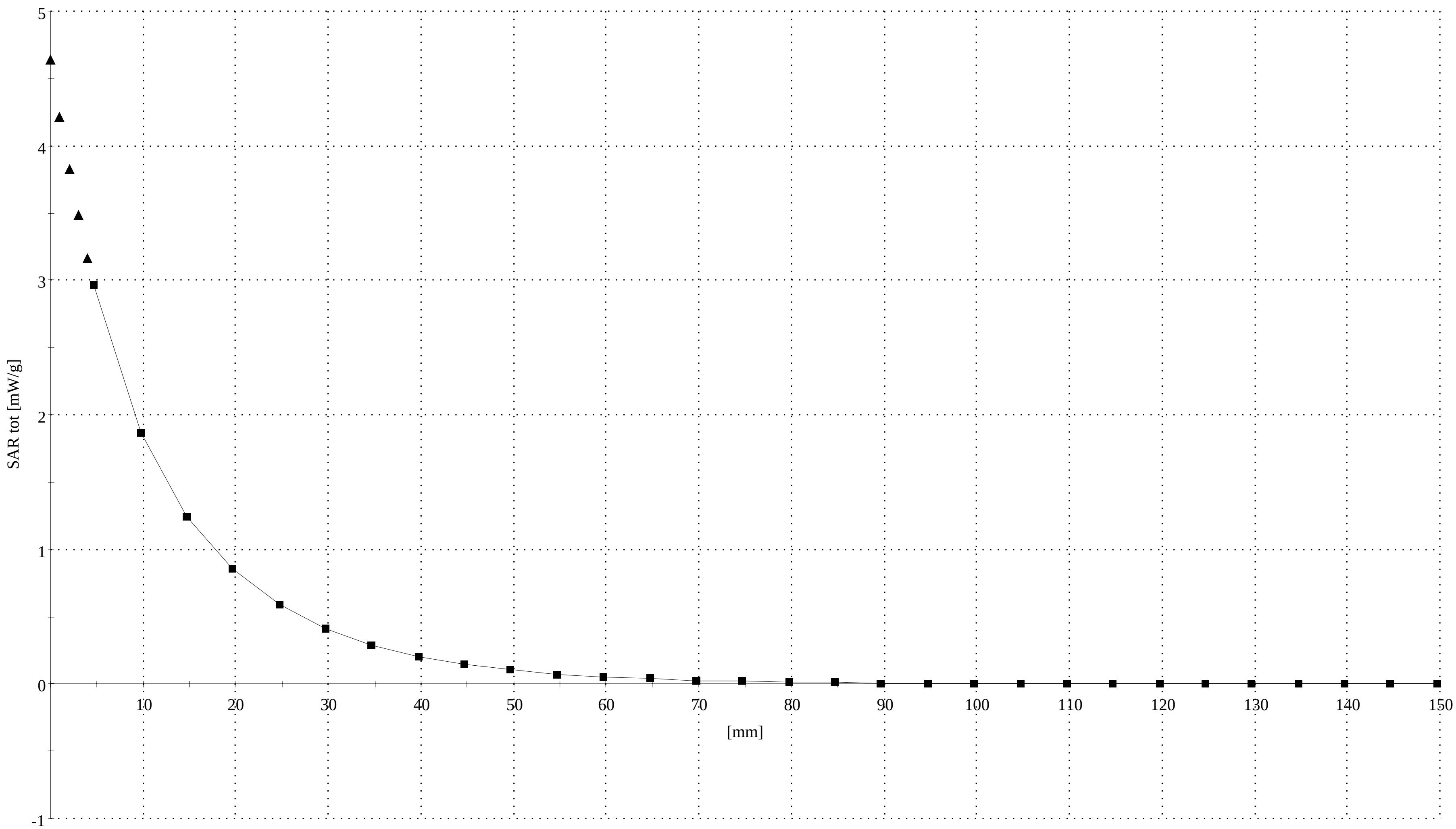
Z-Axis: Dx = 0.0, Dy = 0.0, Dz = 5.0

Penetration depth: 11.4 (10.6, 12.6) [mm]



Dipole 1800 MHz

1800 MHz Dipole Validation / Dipole Sn# 258TR / Forward Power = 249mW / Acceptable Temp Range is 18-25°C Room Temp at time of measurement = 21C Simulant Temp at time of measurement = 20.9C

R5 TP-1133 Glycol SAM Expanded (Rev. 2)-9Jan03 Phantom; Section; Position: ; Frequency: 1800 MHz

Probe: ET3DV6 - SN1514 - VALIDATION; ConvF(5.20,5.20,5.20); Crest factor: 1.0; 1800 MHz VALIDATION: σ = 1.38 mho/m ε_r = 38.5 ρ = 1.00 g/cm^3

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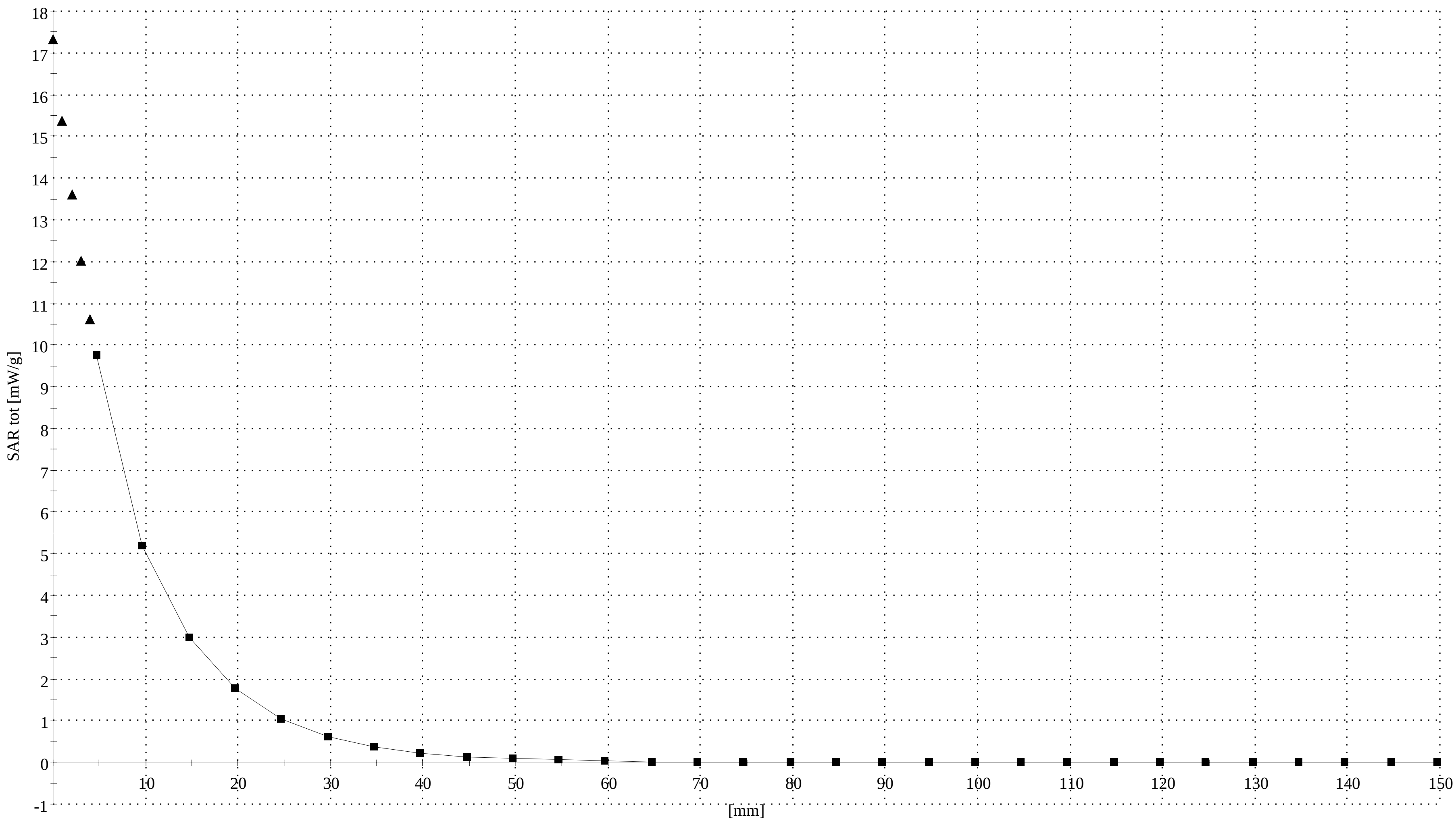
Z-Axis: Dx = 0.0, Dy = 0.0, Dz = 5.0

Penetration depth: 8.3 (8.0, 9.1) [mm]



Dipole 1800 MHz

1800 MHz Dipole Validation / Dipole Sn# 250TR / Forward Power = 252mW / Acceptable Temp Range is 18-25°C Room Temp at time of measurement =21 C Simulant Temp at time of measurement = 21 C

R1 Amy Twin Phantom Rev.3 Phantom; Section; Position: ; Frequency: 1800 MHz

Probe: ET3DV6 - SN1523 - Validation.2; ConvF(5.30,5.30,5.30); Crest factor: 1.0; 1800 MHz VALIDATION: σ = 1.37 mho/m ε_r = 39.0 ρ = 1.00 g/cm³

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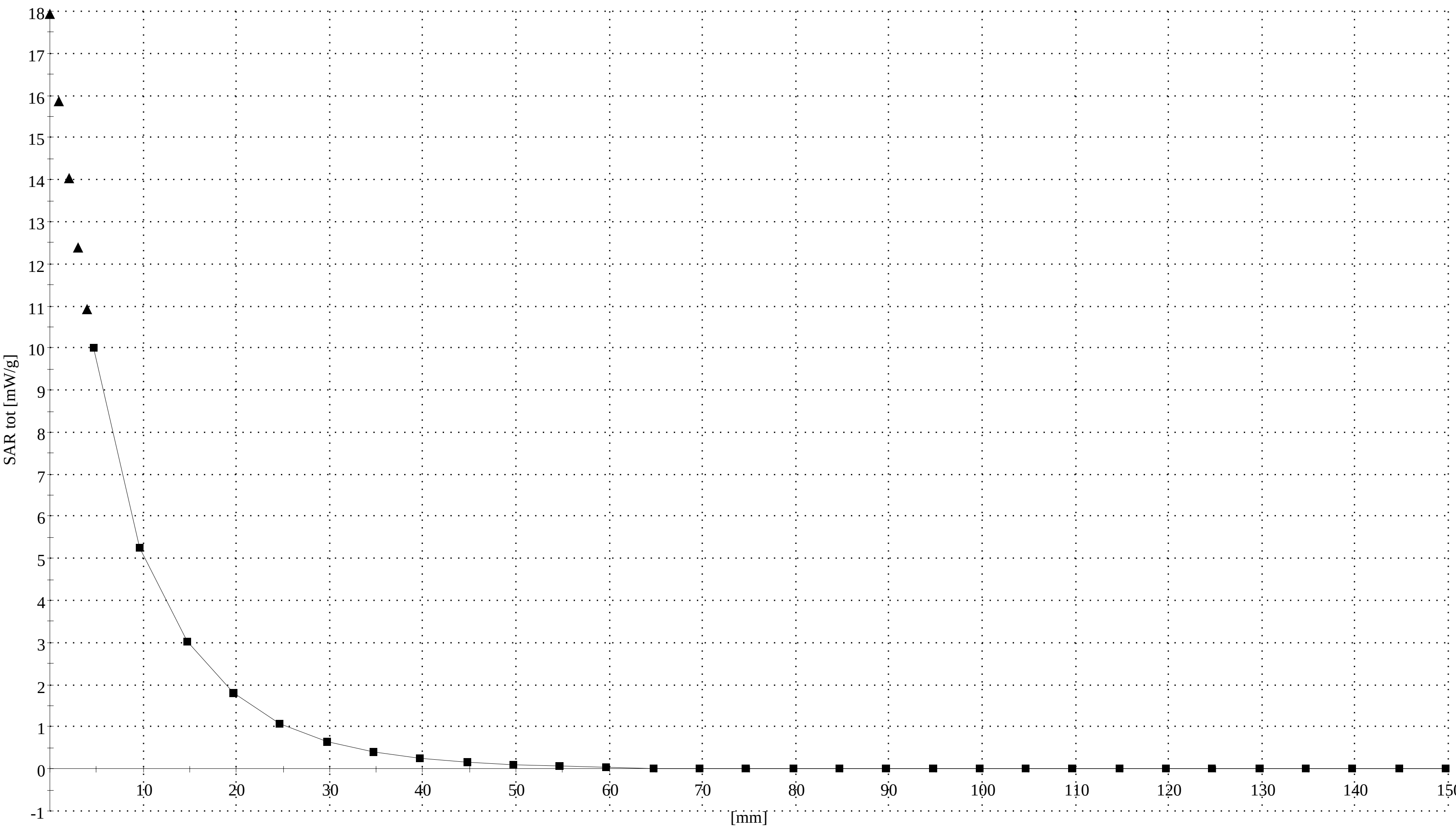
Z-Axis: Dx = 0.0, Dy = 0.0, Dz = 5.0

Penetration depth: 8.2 (7.8, 9.1) [mm]

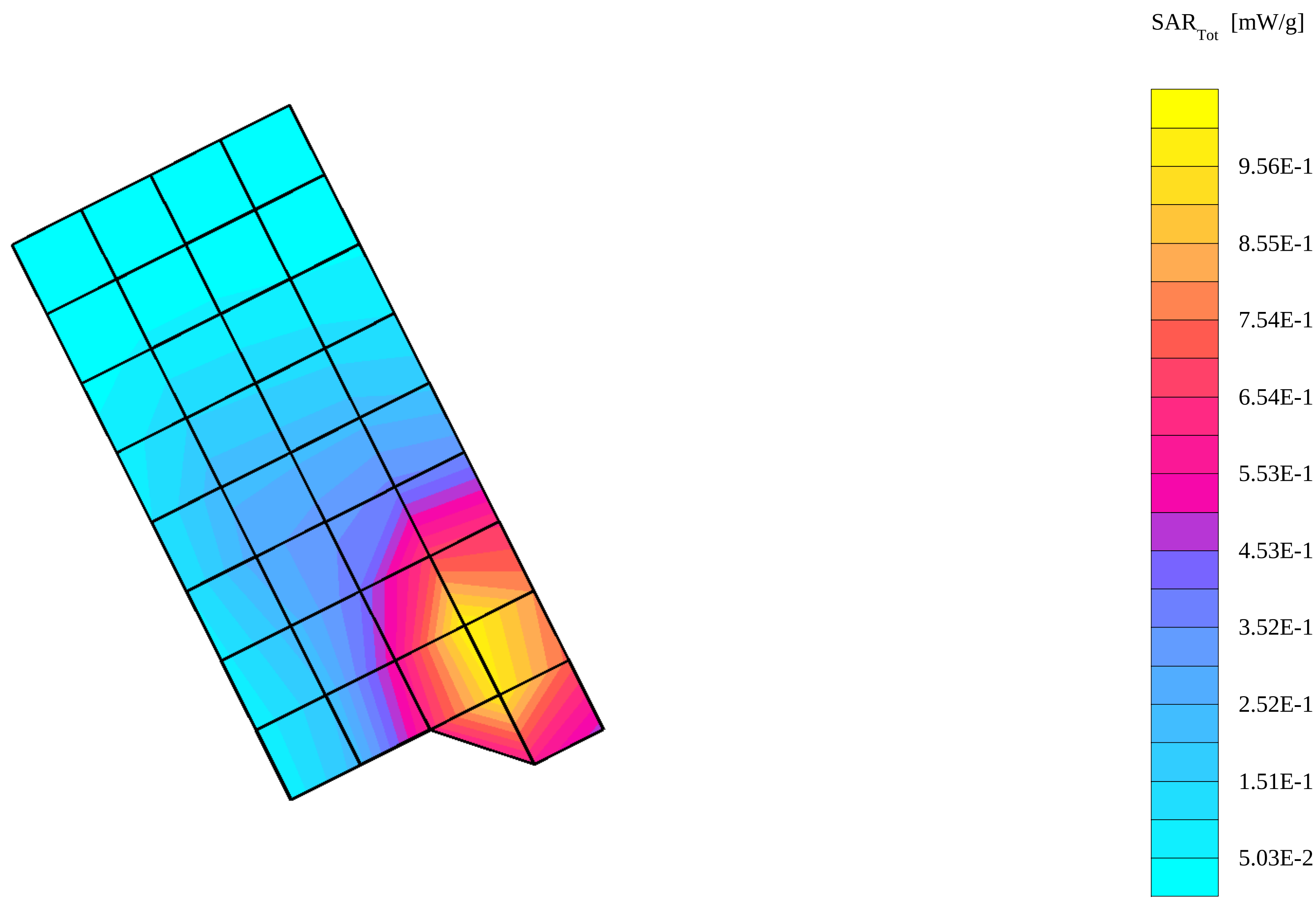


Appendix 2

SAR distribution plots for Phantom Head Adjacent Use

SN# TA88300272

Ch# 189 / Pwr Step: 05 (OTA) / Antenna Position: FIXED / Battery Model #: SNN5588AA / DEVICE POSITION : Cheek
R5 TP-1132 Sugar SAM Expanded (Rev. 2)-9Jan03 Phantom; Right Hand Section; Position: (90°,180°); Frequency: 836 MHz
Probe: ET3DV6 - SN1514 - IEEE Head; ConvF(6.20,6.20,6.20); Crest factor: 8.0; 835 MHz Head & Body: σ = 0.93 mho/m ε_r = 43.2 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 1.06 mW/g, SAR (10g): 0.685 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 14.1 (12.4, 16.2) [mm]
Powerdrift: -0.09 dB



SN# TA88300272

Ch# 189 / Pwr Step: 05 (OTA) / Antenna Position: FIXED/ Battery Model #: SNN5588AA / DEVICE POSITION : Tilt 15*

R5 TP-1132 Sugar SAM Expanded (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 836 MHz

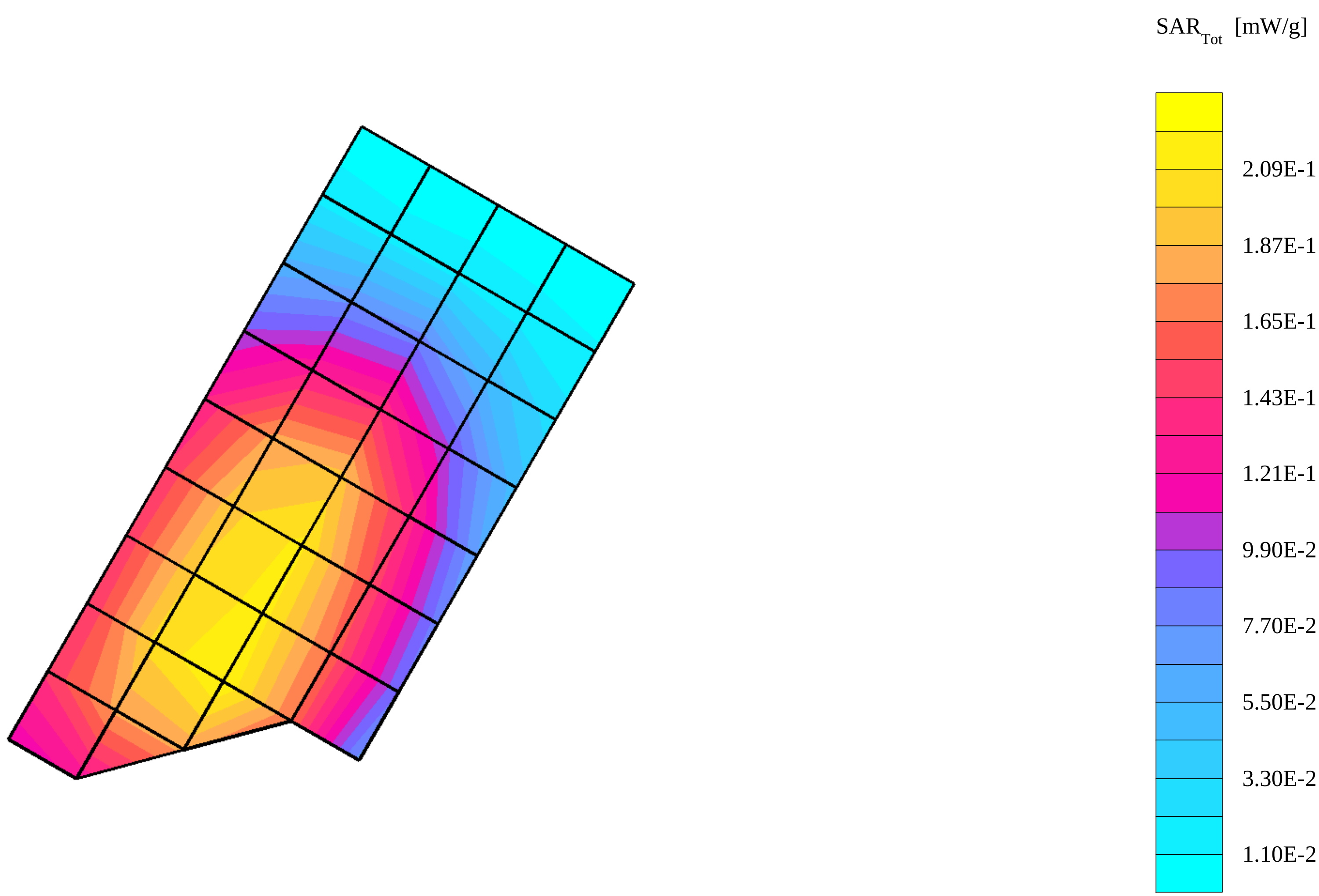
Probe: ET3DV6 - SN1514 - IEEE Head; ConvF(6.20,6.20,6.20); Crest factor: 8.0; 835 MHz Head & Body: σ = 0.93 mho/m ε_r = 43.2 ρ = 1.00 g/cm^3

Cube 7x7x7: SAR (1g): 0.224 mW/g, SAR (10g): 0.164 mW/g, (Worst-case extrapolation)

Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0

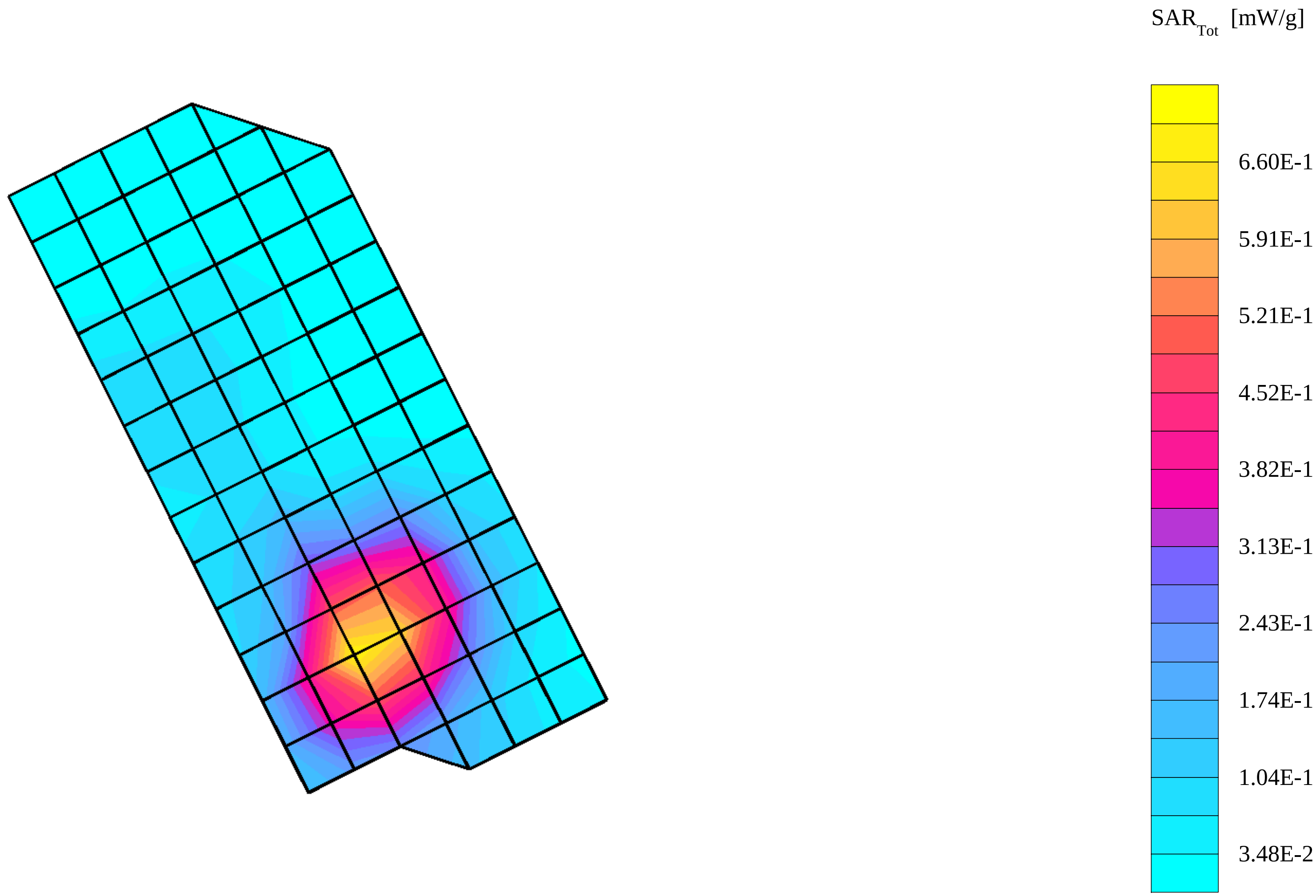
Penetration depth: 17.2 (14.7, 20.2) [mm]

Powerdrift: -0.06 dB



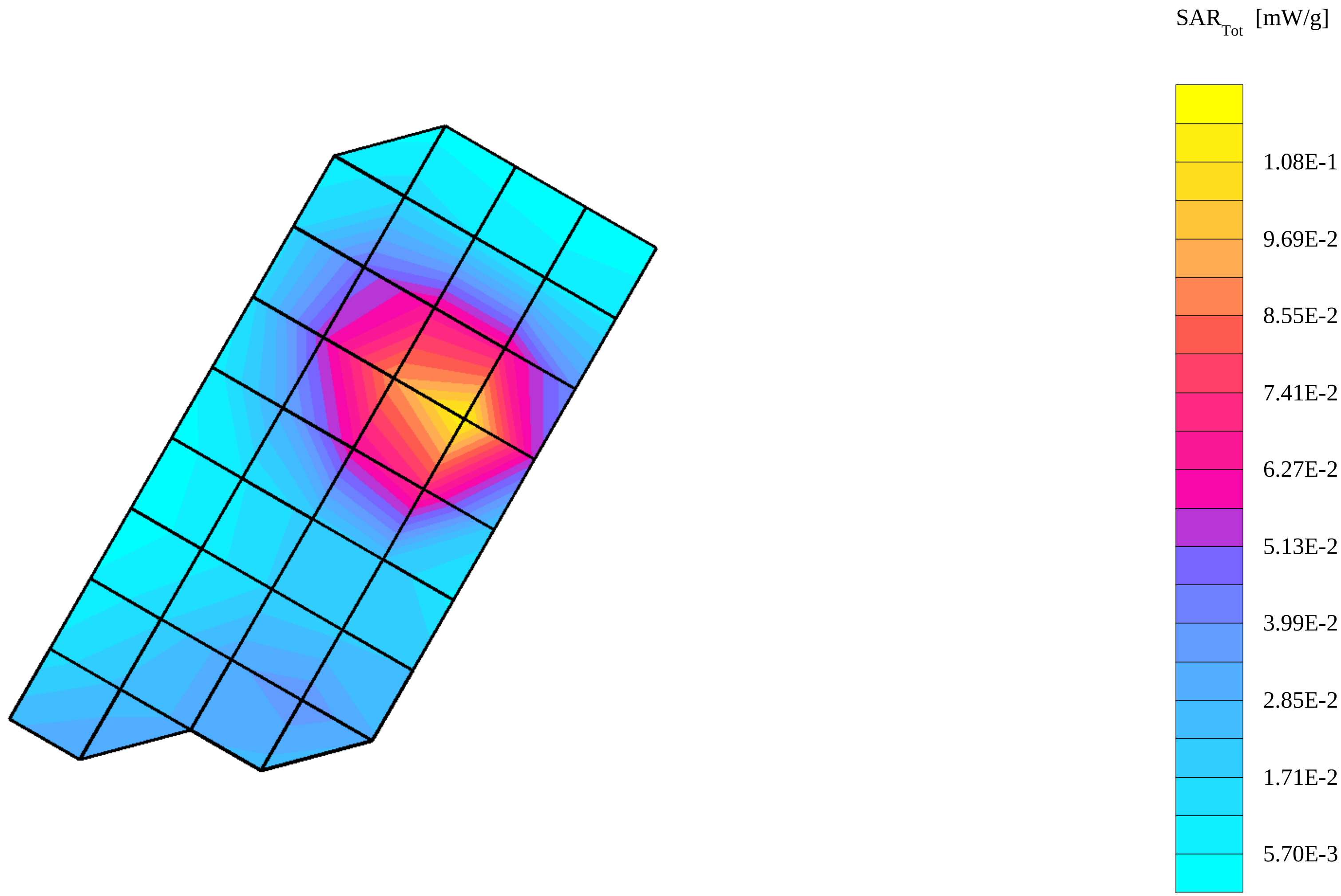
SN# TA88300272

Ch# 661 / Pwr Step: 00 (OTA) / Antenna Position: FIXED/ Battery Model #: SNN5588AA / DEVICE POSITION : Cheek
R5 TP-1133 Glycol SAM Expanded (Rev. 2)-9Jan03 Phantom; Right Hand Section; Position: (90°,180°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1514 - IEEE Head; ConvF(5.20,5.20,5.20); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.45 mho/m ε_r = 38.1 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.666 mW/g, SAR (10g): 0.362 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Penetration depth: 9.0 (8.6, 9.9) [mm]
Powerdrift: -0.43 dB



SN# TA88300272

Ch# 661 / Pwr Step: 0 (OTA) / Antenna Position: FIXED / Battery Model #: SNN5588A / DEVICE POSITION: 15 deg TILT
R5 TP-1133 Glycol SAM Expanded (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1514 - IEEE Head; ConvF(5.20,5.20,5.20); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.45 mho/m ε_r = 38.1 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.110 mW/g, SAR (10g): 0.0657 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 11.5 (10.1, 13.2) [mm]
Powerdrift: 0.11 dB



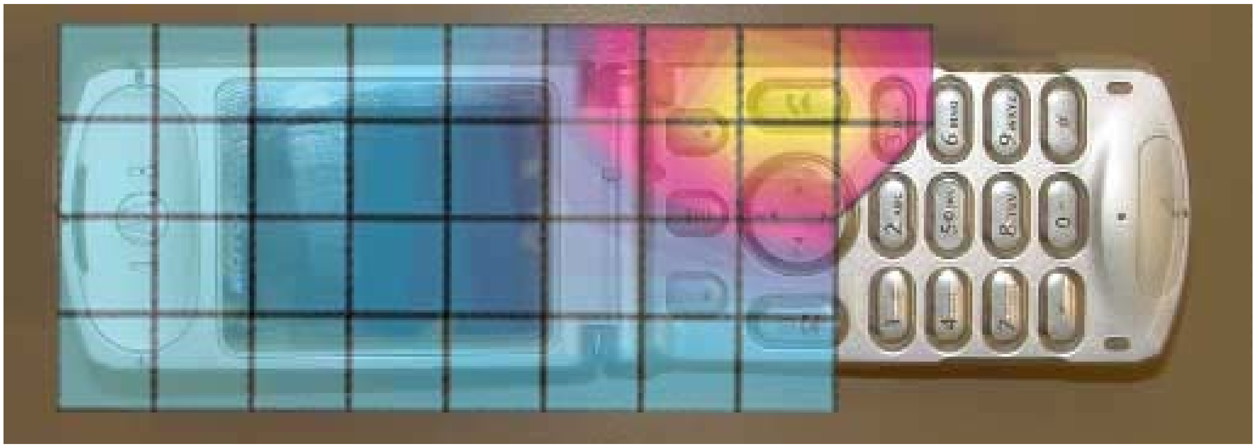


Figure 1.Typical 800MHz Left Head Adjacent Contour Overlaid on Phone with Antenna Fixed (Cheek Touch)

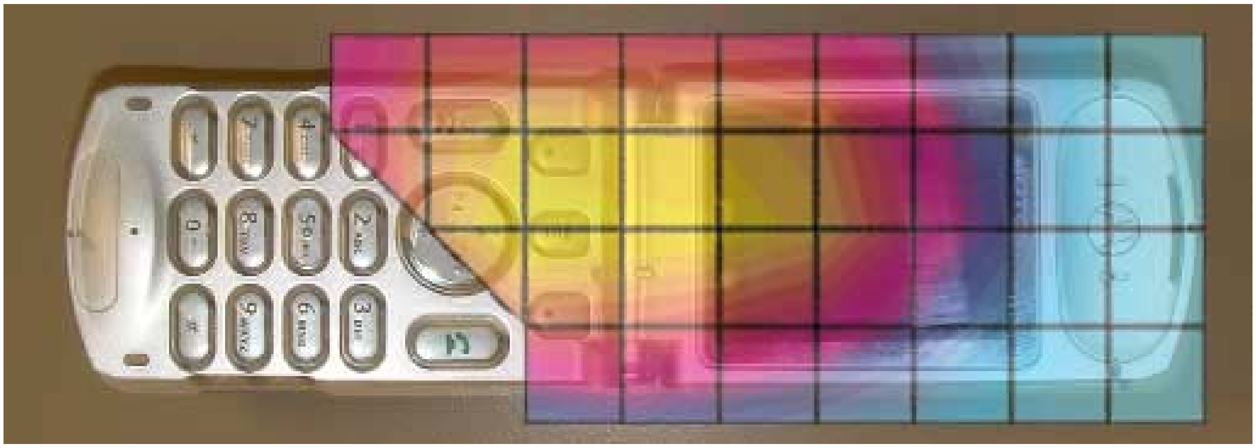


Figure 2.Typical 800MHz Right Head Adjacent Contour Overlaid on Phone with Antenna Fixed (15º Tilt)

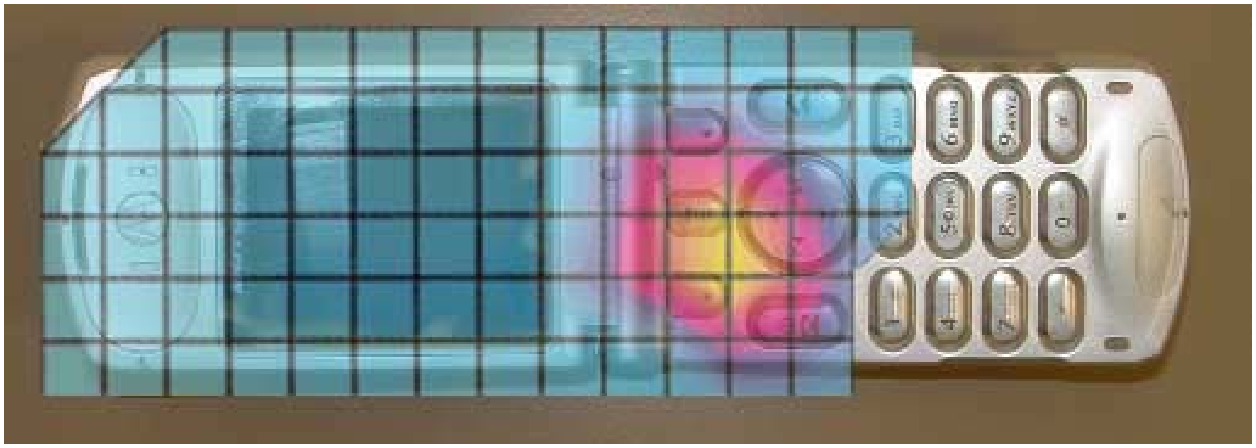


Figure 3.Typical 1900MHz Left Head Adjacent Contour Overlaid on Phone with Antenna Fixed (Cheek Touch)

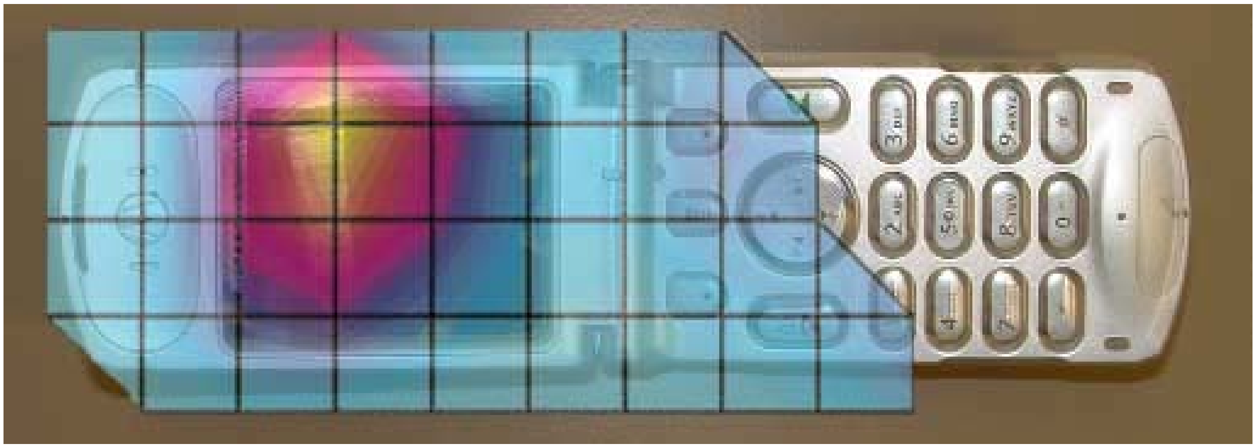


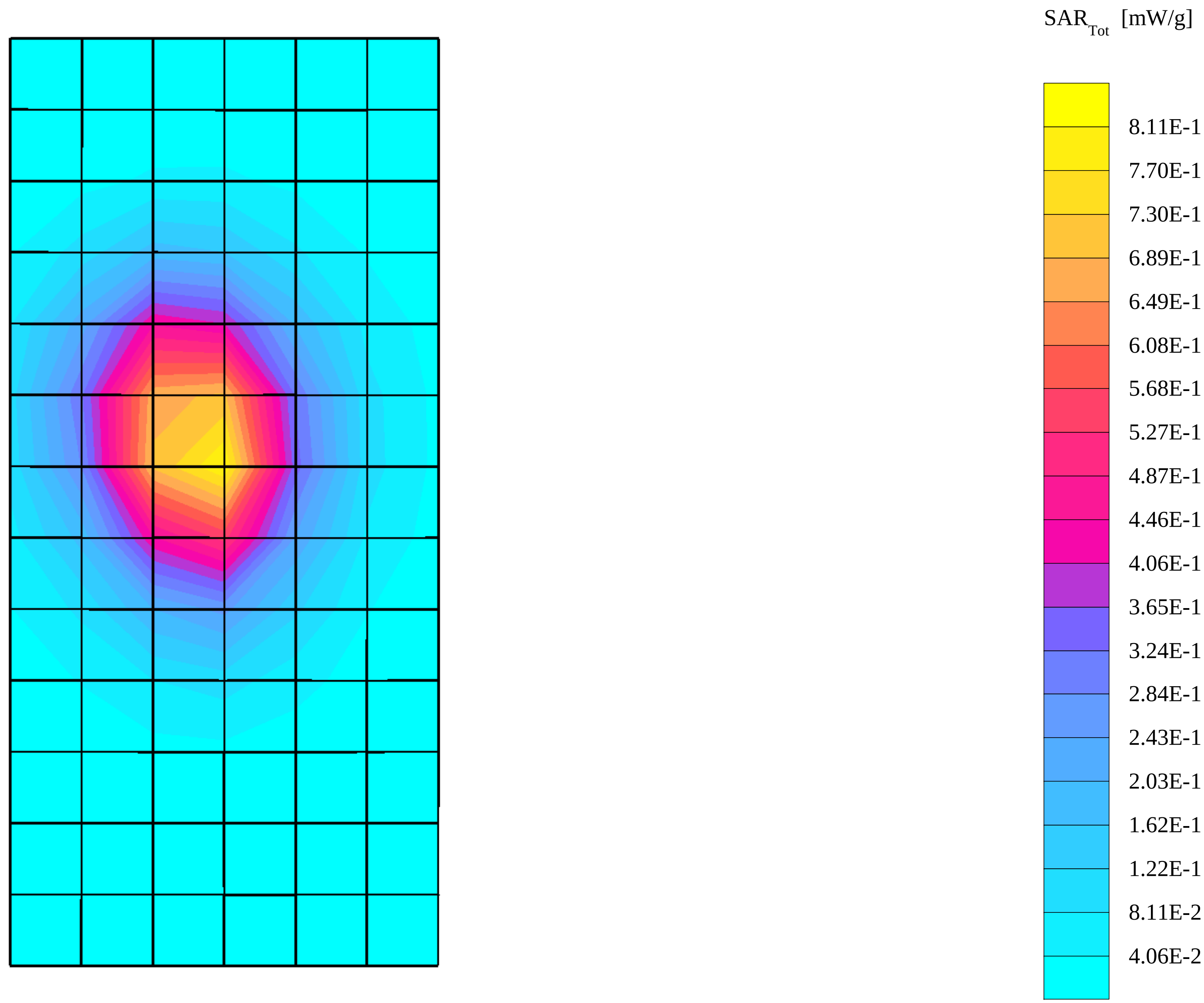
Figure 4.Typical 1900MHz Left Head Adjacent Contour Overlaid on Phone with Antenna Fixed (15º Tilt)

Appendix 3

SAR distribution plots for Body Worn Configuration

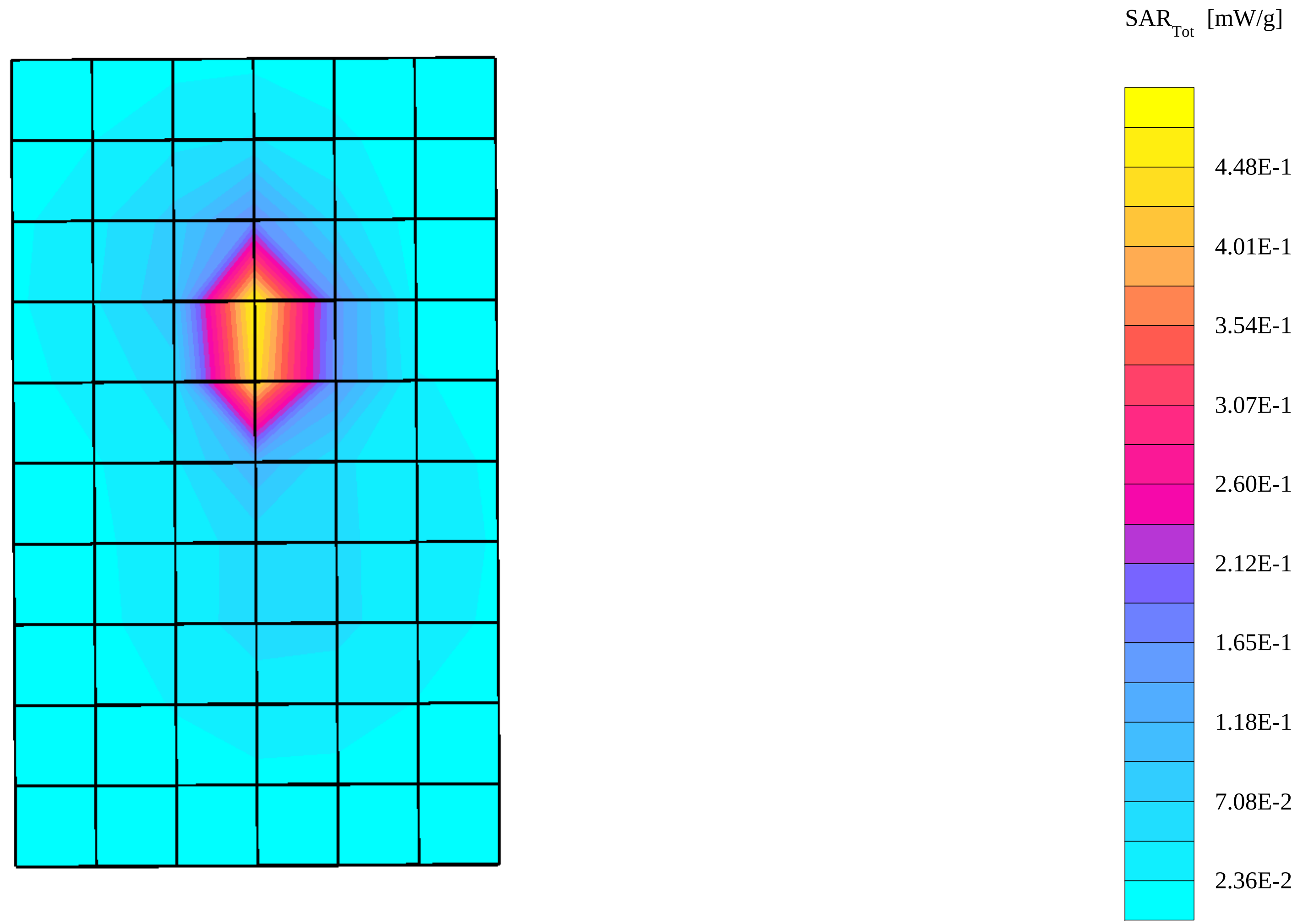
SN# TA88300272

Ch# 251 / Pwr Step: 05 (OTA) / Antenna Position: FIXED / Battery Model #: SNN5588A / Accessory Model # = Leather Case - MT-04242
R5 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 1 Section; Position: (0°,0°); Frequency: 849 MHz
Probe: ET3DV6 - SN1514 - FCC Body; ConvF(6.00,6.00,6.00); Crest factor: 8.0; 835 MHz Head & Body: σ = 0.98 mho/m ε_r = 54.7 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.875 mW/g, SAR (10g): 0.554 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 12.6 (11.4, 14.1) [mm]
Powerdrift: -0.00 dB



SN# TA88300272

Ch# 661 / Pwr Step: 0 ota Antenna Position: Fixed / Battery Model #: snn5588a / Accessory Model #: Plastic Holster(SYN0624D) Universal Belt Clip(SYN8763A)
R1 Amy Twin Phantom Rev.3 Phantom; section 2 Section; Position: (0°,0°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1523 - FCC Body; ConvF(4.80,4.80,4.80); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.58 mho/m ε_r = 51.5 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.529 mW/g, SAR (10g): 0.247 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 8.2 (7.9, 9.0) [mm]
Powerdrift: -0.10 dB



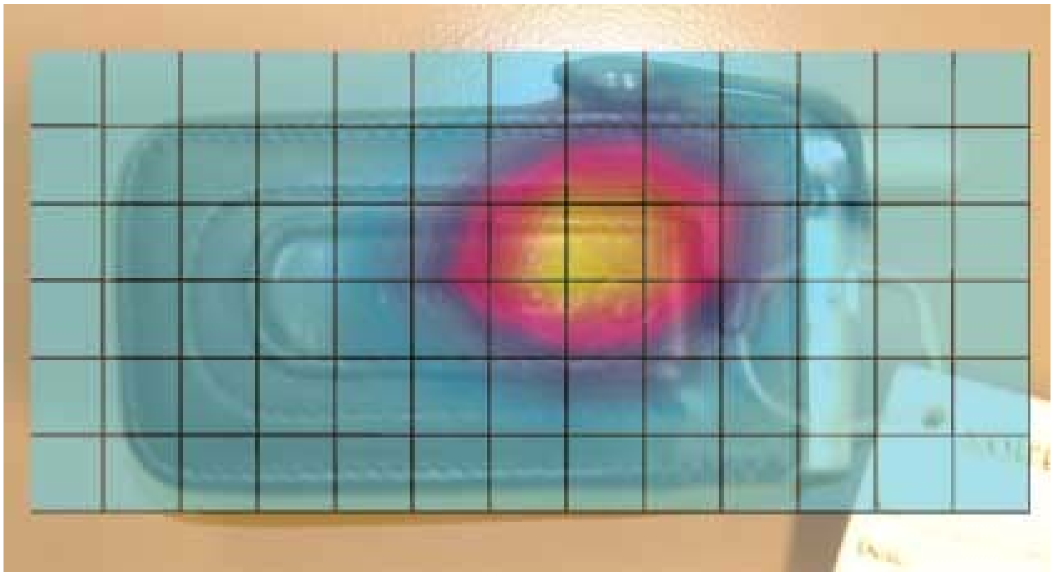


Figure 5.Typical 800 MHz Body-Worn Contour Overlaid on Phone with Antenna Fixed

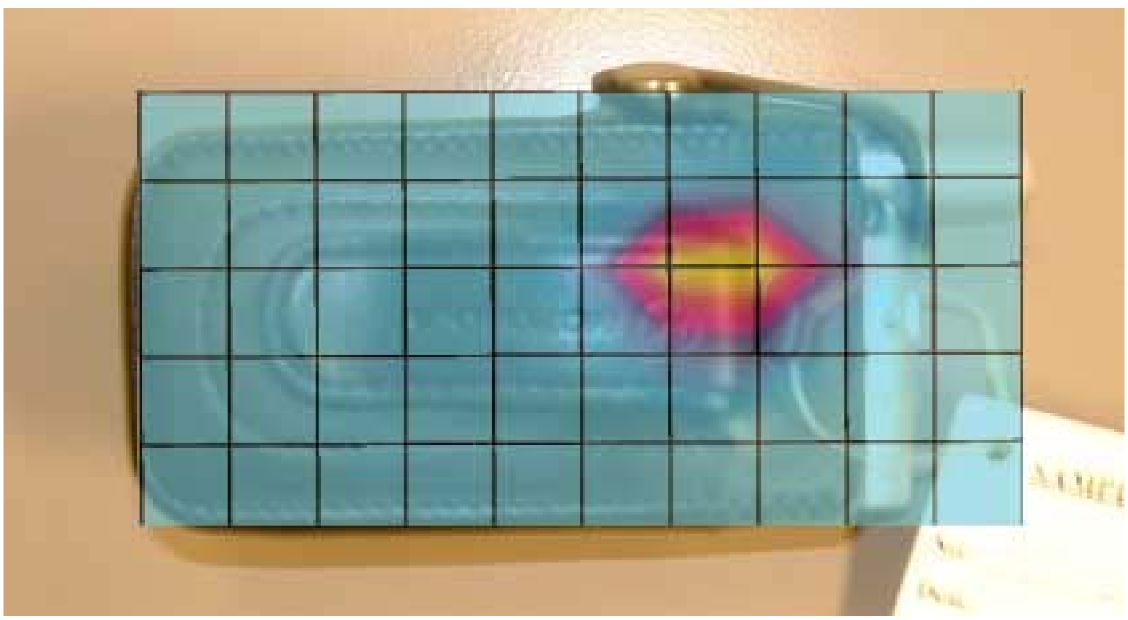


Figure 6. Typical 1900 MHz Body-Worn Contour Overlaid on Phone with Antenna Fixed

Appendix 4

Probe Calibration Certificate

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:	1514
Place of Calibration:	Zurich
Date of Calibration:	July 25, 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: N. Vetter

Approved by: [signature]

Schmid & Partner
Engineering AG

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

Probe ET3DV6

SN:1514

Manufactured:	November 24, 1999
Last calibration:	October 25, 2002
Repaired:	June 28, 2002
Recalibrated:	July 25, 2002

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1514

Sensitivity in Free Space

NormX	1.70 $\mu V/(V/m)^2$
NormY	1.88 $\mu V/(V/m)^2$
NormZ	1.81 $\mu V/(V/m)^2$

Diode Compression

DCP X	93	mV
DCP Y	93	mV
DCP Z	93	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	**6.2** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**6.2** ± 9.5% (k=2)		Alpha	**0.48**
ConvF Z	**6.2** ± 9.5% (k=2)		Depth	**2.19**

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	**5.2** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**5.2** ± 9.5% (k=2)		Alpha	**0.57**
ConvF Z	**5.2** ± 9.5% (k=2)		Depth	**2.30**

Boundary Effect

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

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	9.9	5.4
SAR_{be} [%]	With Correction Algorithm	0.2	0.5

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

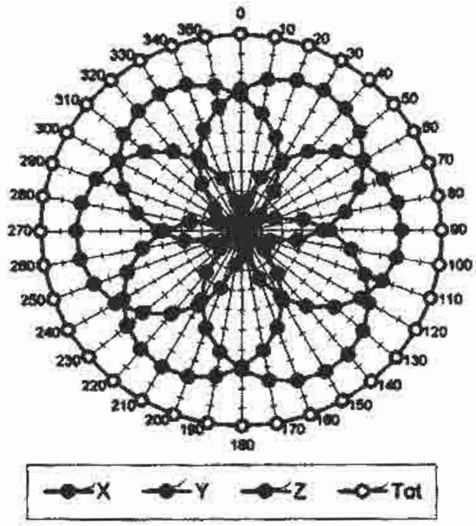
Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	12.7	8.2
SAR_{be} [%]	With Correction Algorithm	0.2	0.2

Sensor Offset

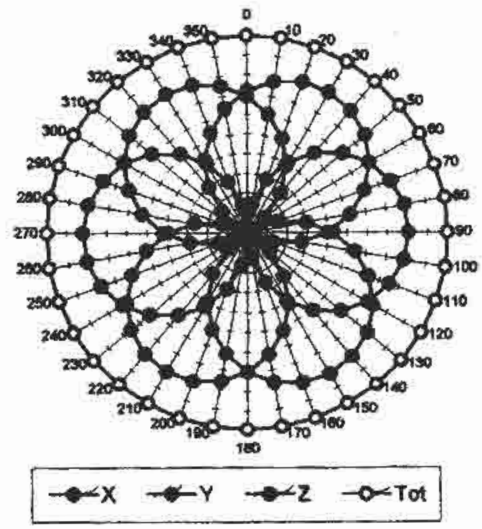
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.5 ± 0.2**	mm

Receiving Pattern (ϕ), $\theta = 0°$

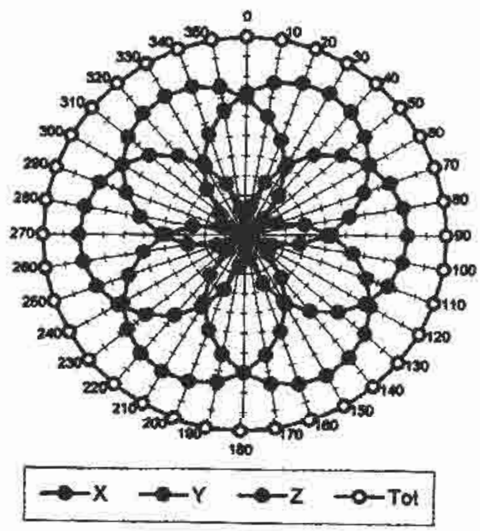
f = 30 MHz, TEM cell ifi110



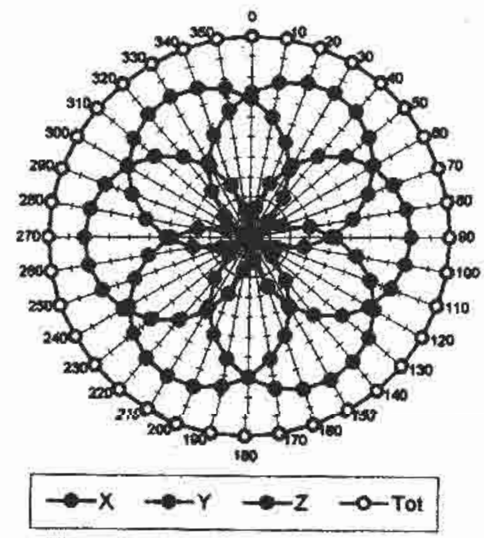
f = 100 MHz, TEM cell ifi110

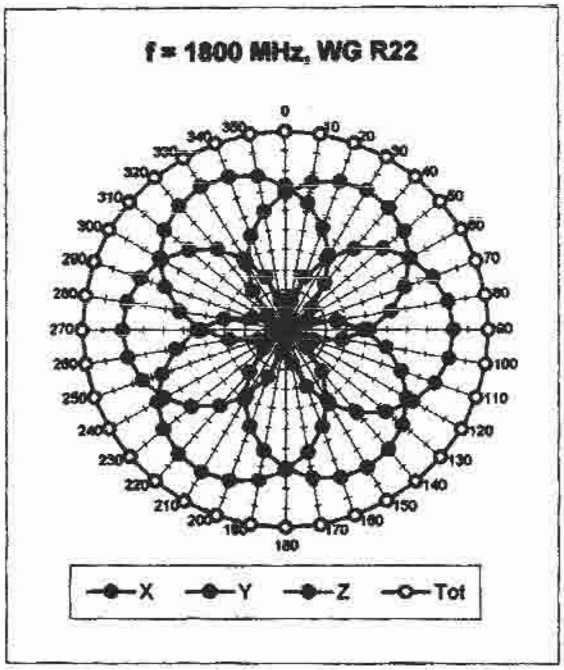


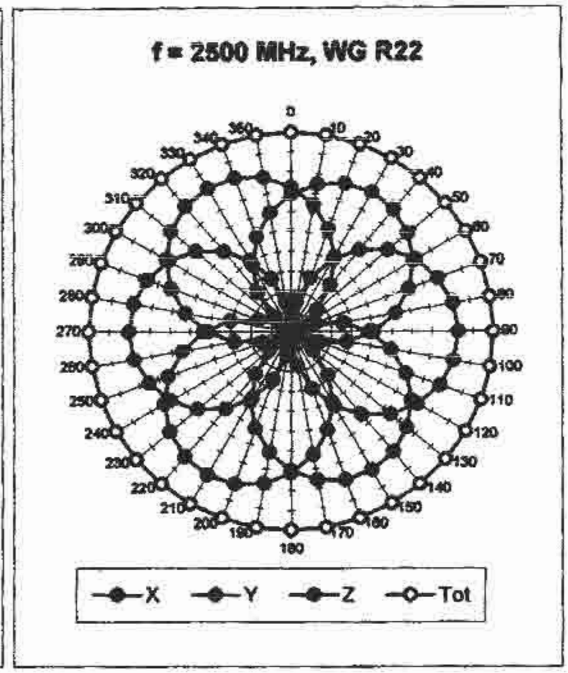
f = 300 MHz, TEM cell ifi110



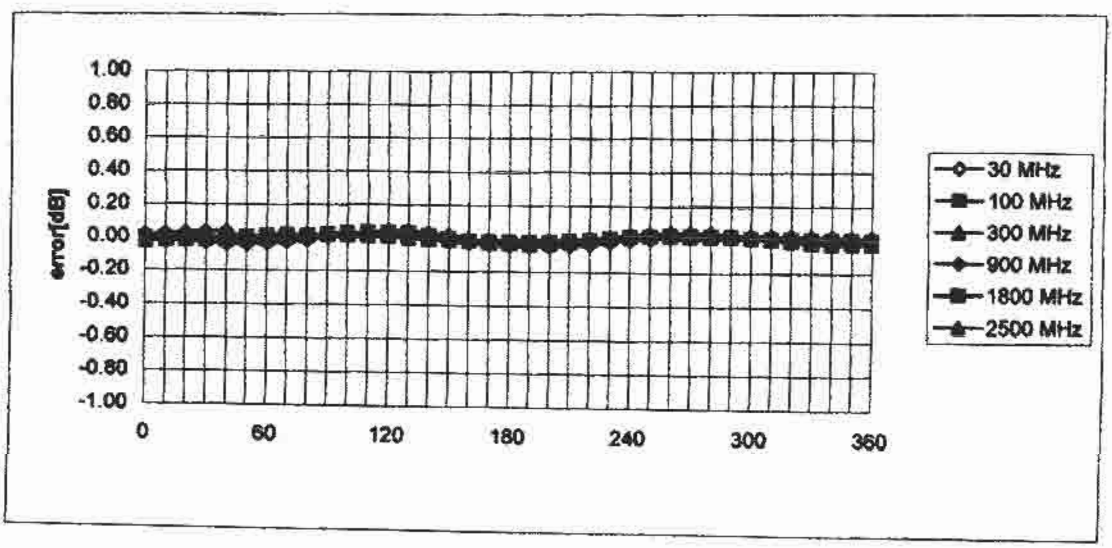
f = 900 MHz, TEM cell ifi110





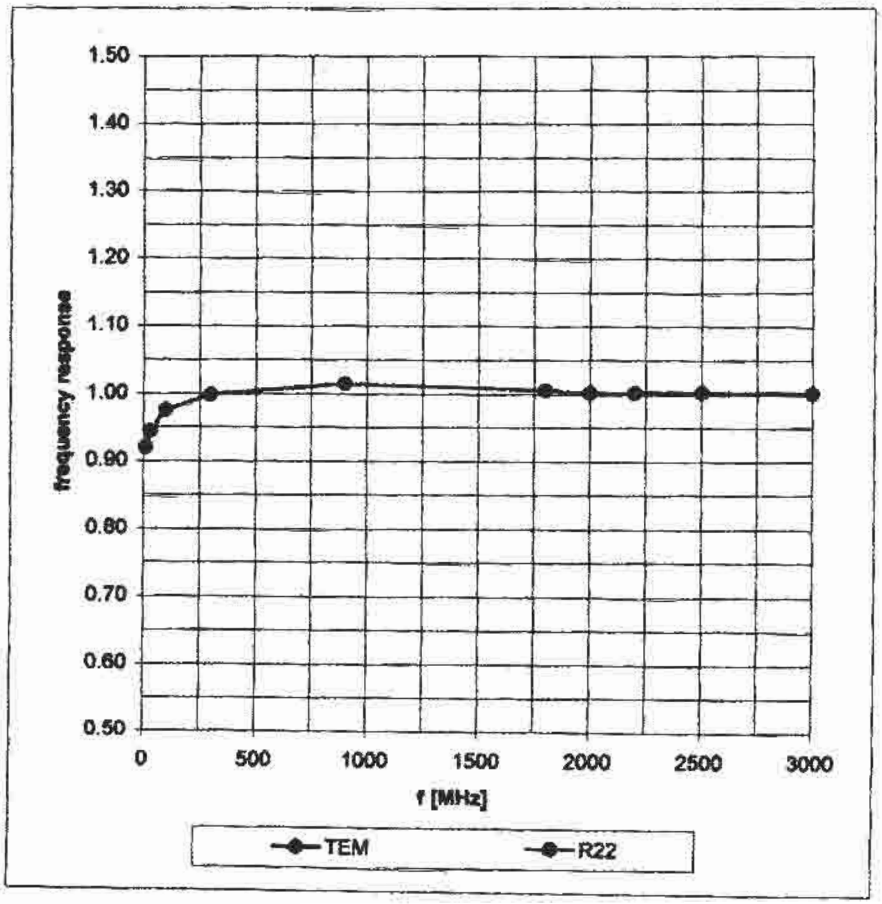


Isotropy Error (ϕ), θ = 0°



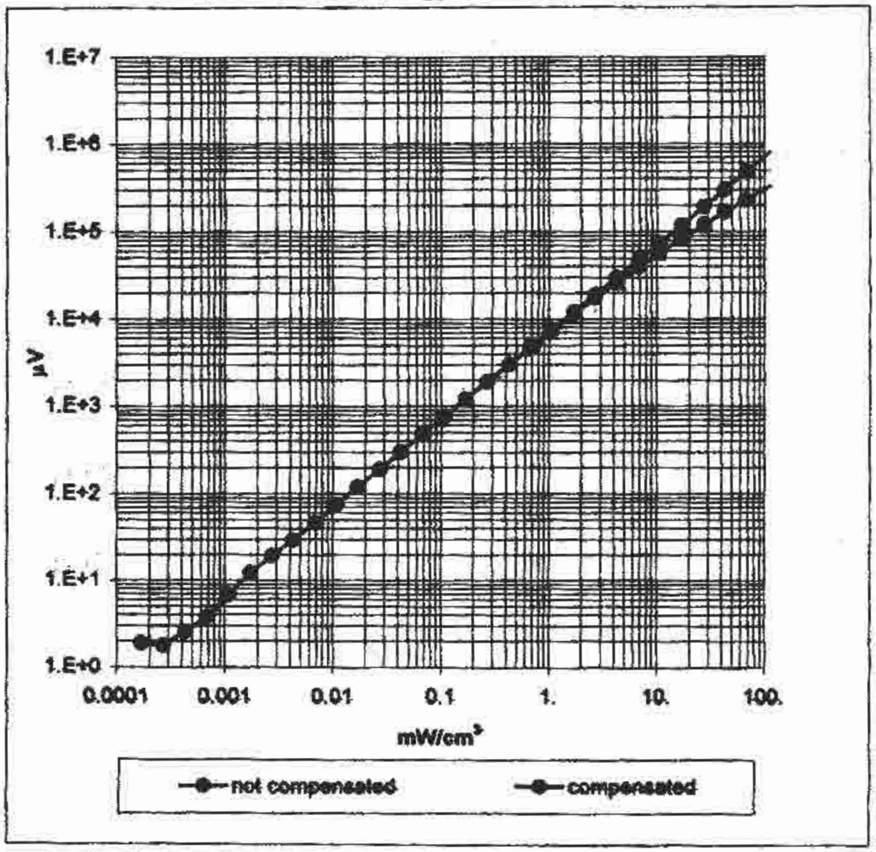
Frequency Response of E-Field

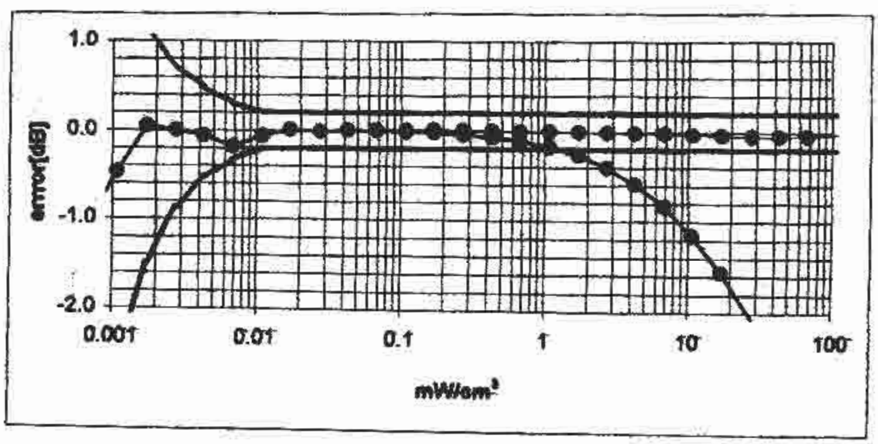
(TEM-Cell:ifi110, Waveguide R22)



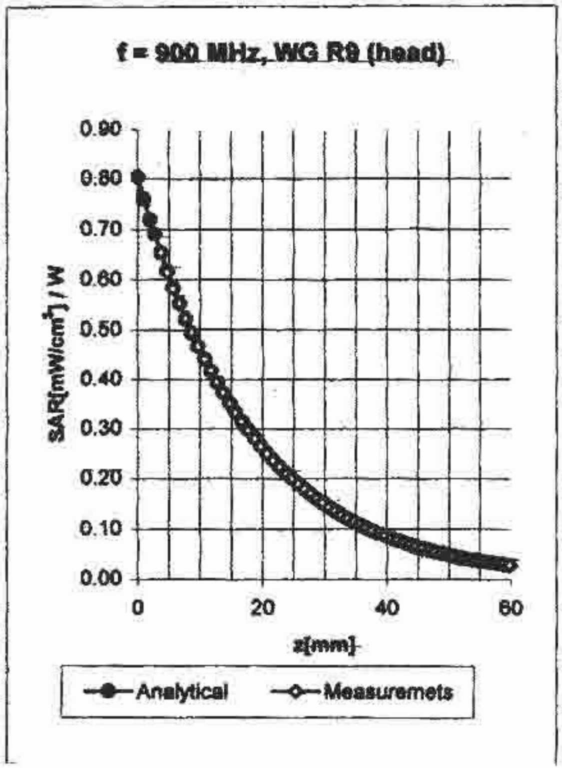
Dynamic Range f(SAR_{brain})

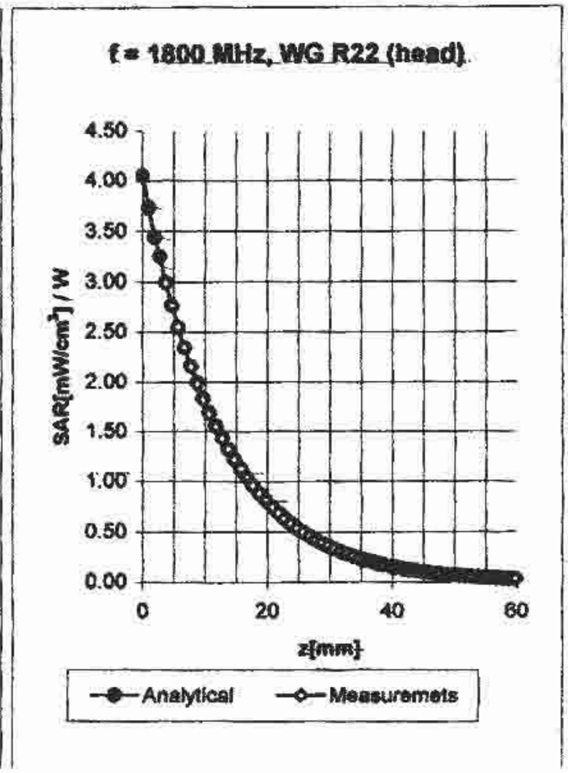
(Waveguide R22)





Conversion Factor Assessment



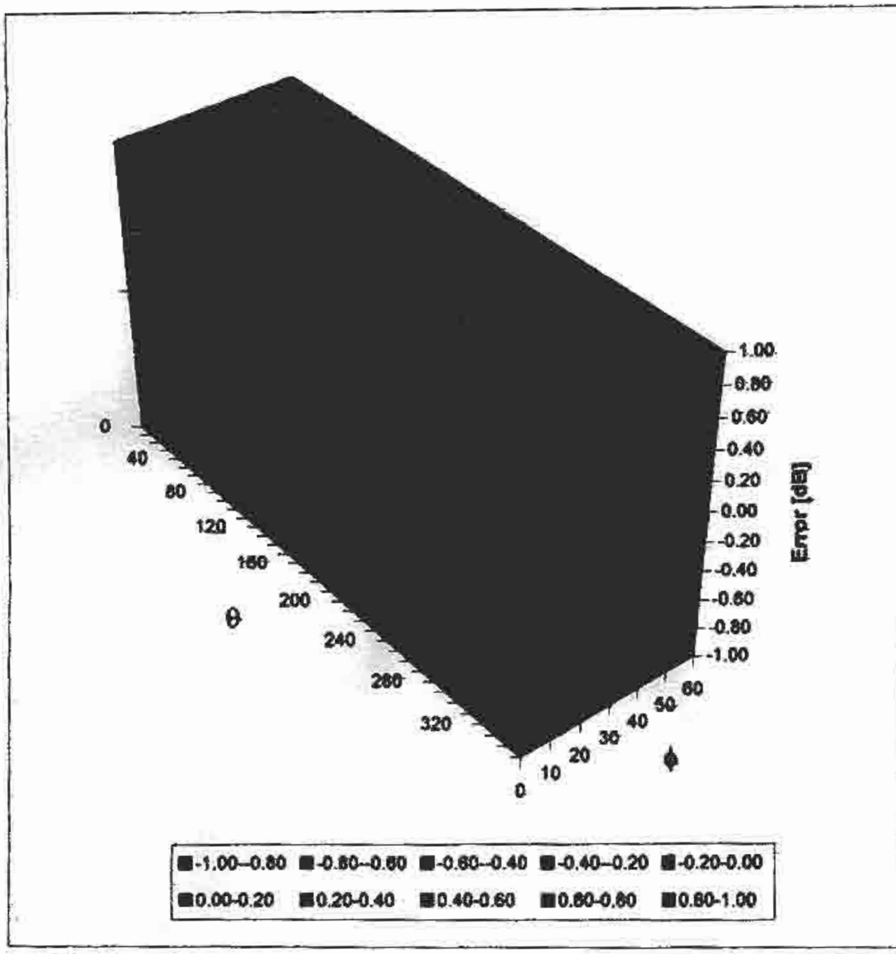


Head	900 MHz		ε_r = 41.5 ± 5%	σ = 0.97 ± 5% mho/m	
Head	835 MHz		ε_r = 41.5 ± 5%	σ = 0.90 ± 5% mho/m	
	ConvF X	**6.2**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.2**	± 9.5% (k=2)	Alpha	**0.48**
	ConvF Z	**6.2**	± 9.5% (k=2)	Depth	**2.19**

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	**5.2**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.2**	± 9.5% (k=2)	Alpha	**0.57**
	ConvF Z	**5.2**	± 9.5% (k=2)	Depth	**2.30**

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:	**1514**
Place of Assessment:	**Zurich**
Date of Assessment:	**July 26, 2002**
Probe Calibration Date:	**July 25, 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:1514

Conversion factor (± standard deviation)

835 MHz	ConvF	**6.0 ± 8%**	**ε_r = 55.2 ± 5%** **σ = 0.97 ± 5% mho/m** (body tissue)
900 MHz	ConvF	**5.9 ± 8%**	**ε_r = 55.0 ± 5%** **σ = 1.05 ± 5% mho/m** (body tissue)
1800 MHz	ConvF	**4.8 ± 8%**	**ε_r = 53.3 ± 5%** **σ = 1.52 ± 5% mho/m** (body tissue)
1900 MHz	ConvF	**4.6 ± 8%**	**ε_r = 53.3 ± 5%** **σ = 1.52 ± 5% mho/m** (body tissue)
1950 MHz	ConvF	**4.5 ± 8%**	**ε_r = 53.3 ± 5%** **σ = 1.52 ± 5% mho/m** (body tissue)
1950 MHz	ConvF	**4.9 ± 8%**	**ε_r = 40.0 ± 5%** **σ = 1.40 ± 5% mho/m** (head tissue)

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

Client **Motorola MRO (Harvard)**

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1523
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	January 17, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

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

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

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date	Scheduled Calibration
RF generator HP 8684C	US3642U01700	4-Aug-99 (in house check Aug-02)	In house check: Aug 05
Power sensor E4412A	MY41495277	8-Mar-02	Mar-03
Power sensor HP 8481A	MY41092180	18-Sep-02	Sep-03
Power meter EPM E4419B	GB41293874	13-Sep-02	Sep-03
Network Analyzer HP 8753E	US38432426	3-May-00	In house check: May 03
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01	Sep-03

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

Date issued: January 17, 2003

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

Engineering AG

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

Probe ET3DV6

SN:1523

Manufactured: March 21, 2000
Last calibration: January 25, 2002
Recalibrated: January 17, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1523

Sensitivity in Free Space

NormX	1.59	$\mu V/(V/m)^2$
NormY	1.51	$\mu V/(V/m)^2$
NormZ	1.53	$\mu V/(V/m)^2$

Diode Compression

DCP X	94	mV
DCP Y	94	mV
DCP Z	94	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	6.5 ± 9.5% (k=2)		Boundary effect:	
ConvF Y	6.5 ± 9.5% (k=2)		Alpha	0.52
ConvF Z	6.5 ± 9.5% (k=2)		Depth	2.06

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	5.3 ± 9.5% (k=2)		Boundary effect:	
ConvF Y	5.3 ± 9.5% (k=2)		Alpha	0.51
ConvF Z	5.3 ± 9.5% (k=2)		Depth	2.66

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	5.1
SAR_{be} [%] With Correction Algorithm	0.2	0.4

Head 1800 MHz Typical SAR gradient: 10 % per mm

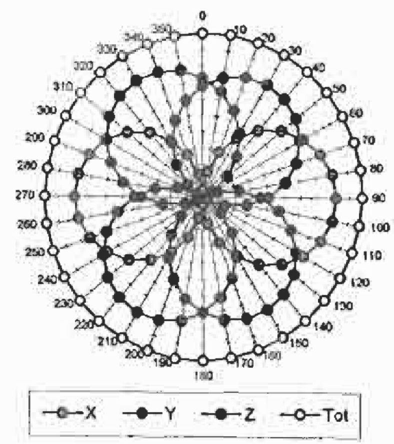
Probe Tip to Boundary	1 mm	2 mm
SAR_{be} [%] Without Correction Algorithm	14.2	9.5
SAR_{be} [%] With Correction Algorithm	0.2	0.0

Sensor Offset

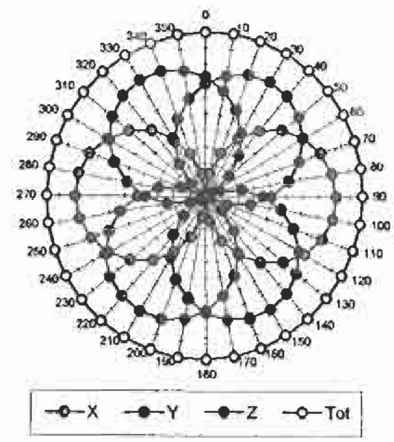
Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.5 ± 0.2	mm

Receiving Pattern (ϕ), $\theta = 0°$

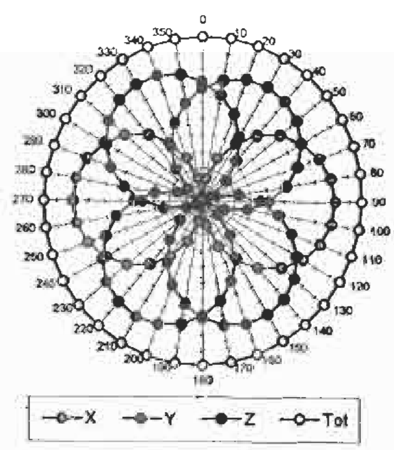
f = 30 MHz, TEM cell ifi110



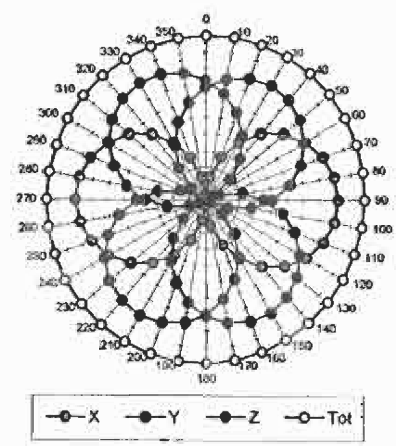
f = 100 MHz, TEM cell ifi110

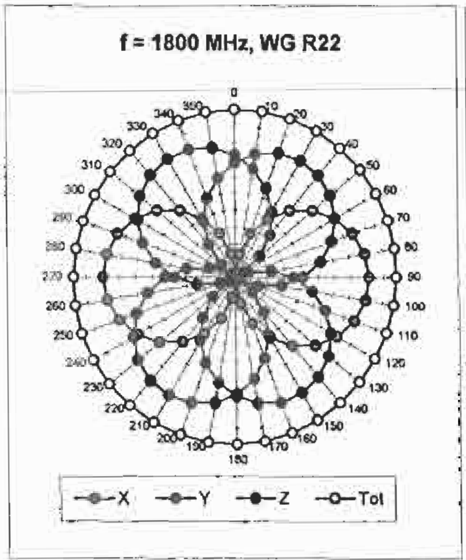


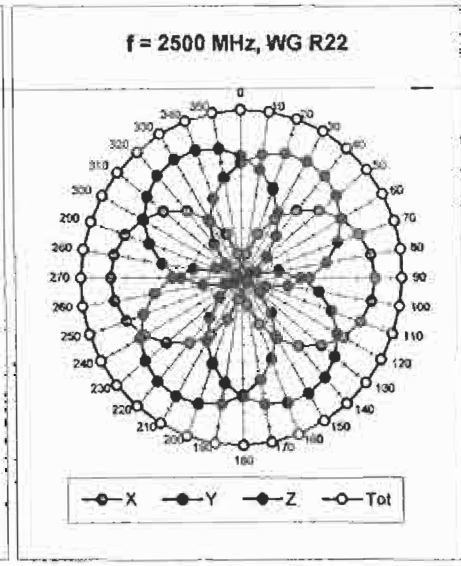
f = 300 MHz, TEM cell ifi110



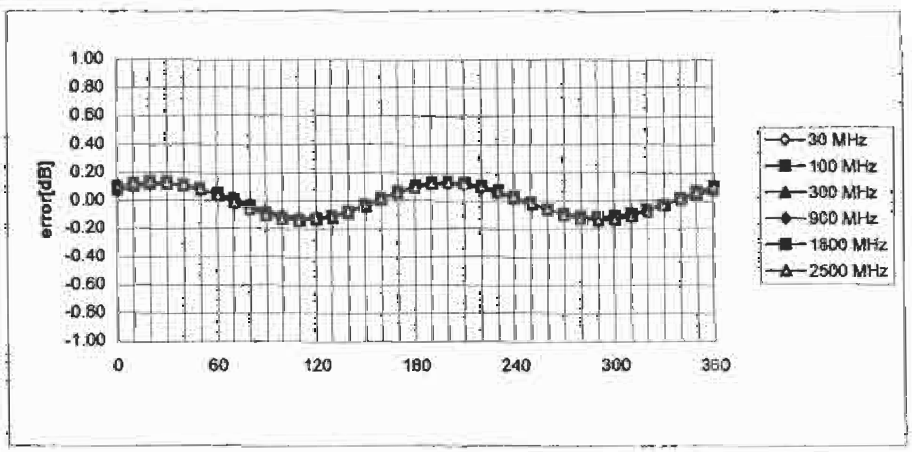
f = 900 MHz, TEM cell ifi110





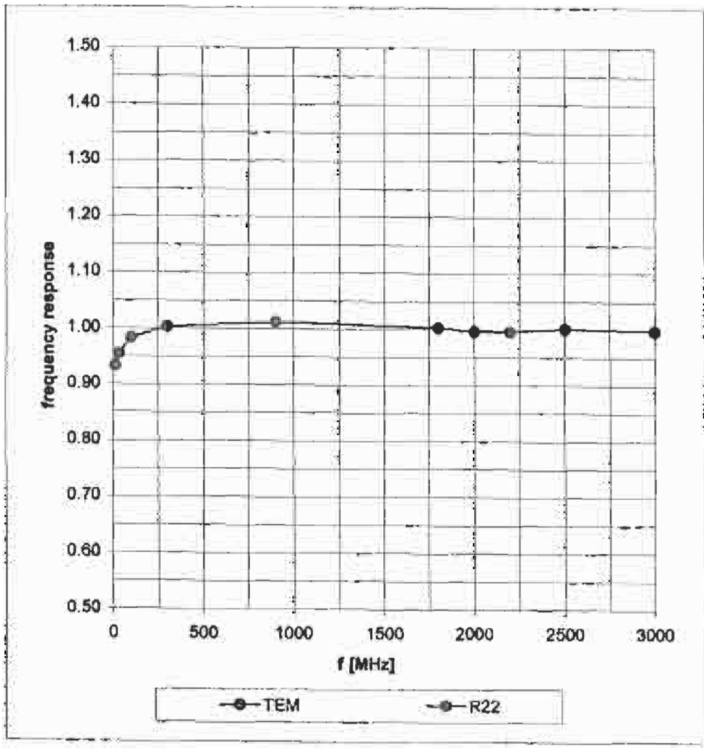


Isotropy Error (ϕ), θ = 0°



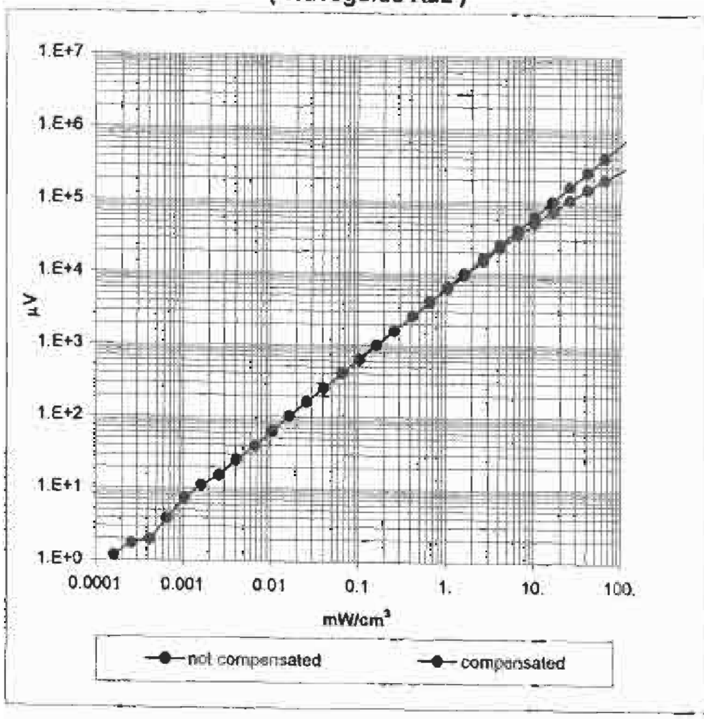
Frequency Response of E-Field

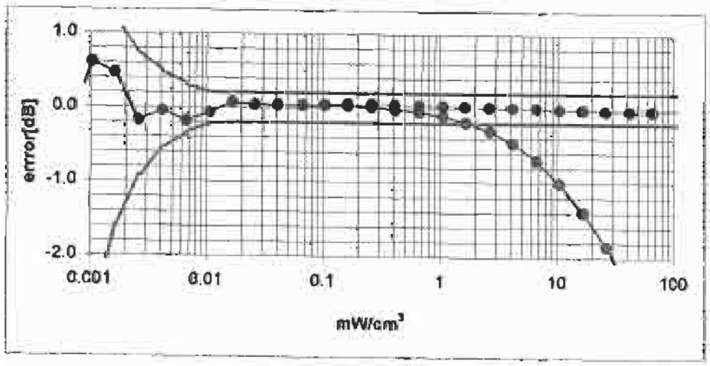
(TEM-Cell:ifi110, Waveguide R22)



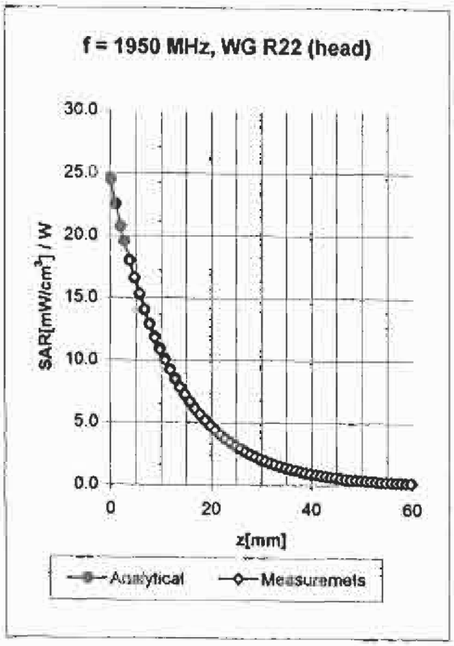
Dynamic Range f(SAR_{brain})

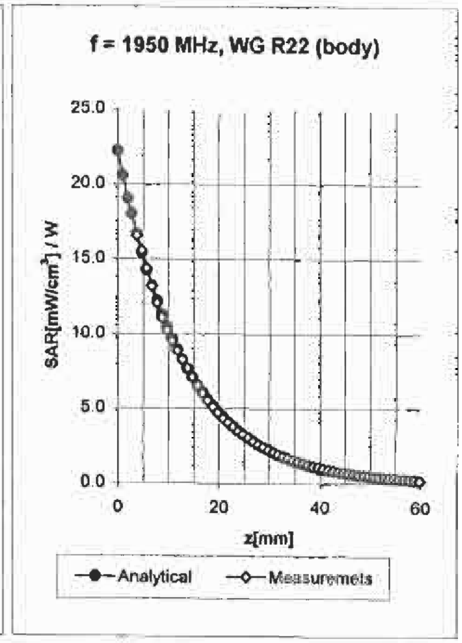
(Waveguide R22)





Conversion Factor Assessment





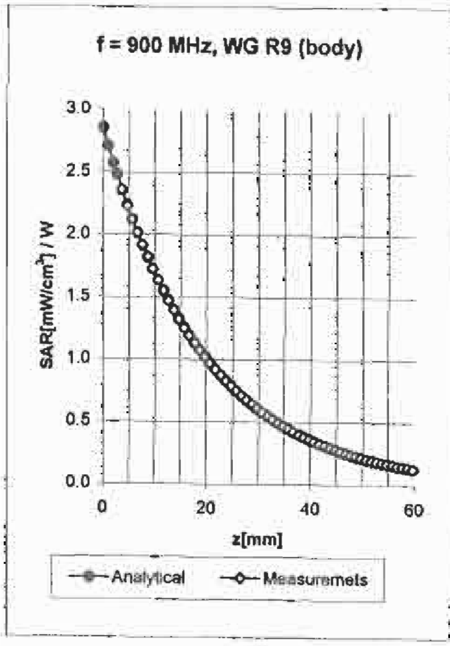
Head	**1950**	**MHz**	**ε_r = 40.0 ± 5%**	**σ = 1.40 ± 5% mho/m**

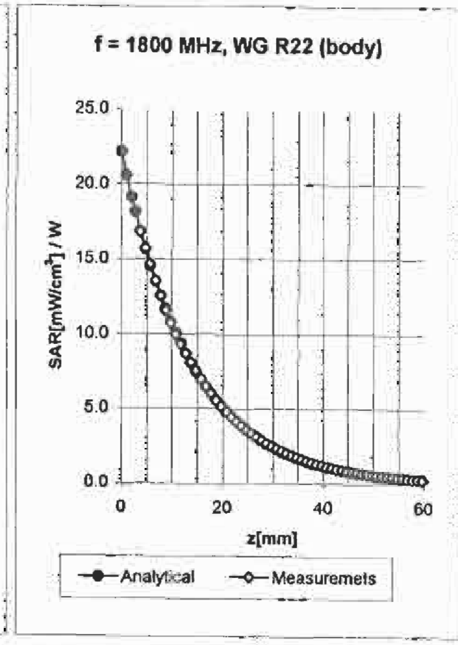
ConvF X	**4.9** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**4.9** ± 8.9% (k=2)	Alpha	**0.54**
ConvF Z	**4.9** ± 8.9% (k=2)	Depth	**2.57**

Body	**1950**	**MHz**	**ε_r = 53.3 ± 5%**	**σ = 1.52 ± 5% mho/m**

ConvF X	**4.5** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**4.5** ± 8.9% (k=2)	Alpha	**0.75**
ConvF Z	**4.5** ± 8.9% (k=2)	Depth	**2.23**

Conversion Factor Assessment

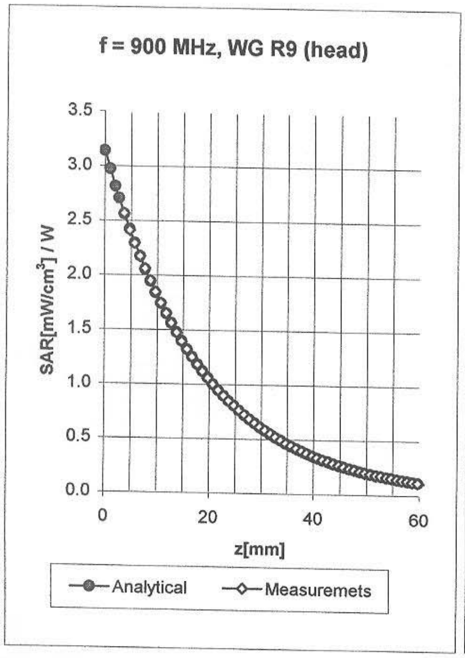


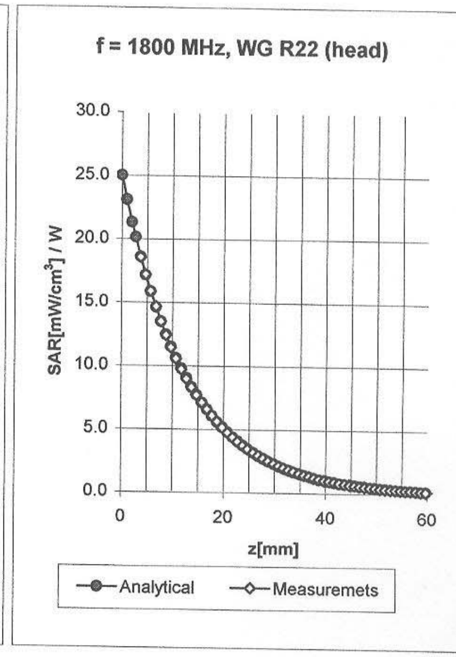


Body	900 MHz		ε_r = 55.0 ± 5%	σ = 1.05 ± 5% mho/m	
Body	835 MHz		ε_r = 55.2 ± 5%	σ = 0.97 ± 5% mho/m	
	ConvF X	**6.2** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**6.2** ± 9.5% (k=2)		Alpha	**0.46**
	ConvF Z	**6.2** ± 9.5% (k=2)		Depth	**2.35**

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	**4.8** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**4.8** ± 9.5% (k=2)		Alpha	**0.57**
	ConvF Z	**4.8** ± 9.5% (k=2)		Depth	**2.65**

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	**6.5**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.5**	± 9.5% (k=2)	Alpha	**0.52**
	ConvF Z	**6.5**	± 9.5% (k=2)	Depth	**2.06**

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	**5.3**	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.3**	± 9.5% (k=2)	Alpha	**0.51**
	ConvF Z	**5.3**	± 9.5% (k=2)	Depth	**2.66**

Appendix 5

Dipole Characterization Certificate

Interim Dipole Correlation Certificate

FCD-0359, Rev.001

Dipole Serial Number:	# 079	Last Calibration Date:	26-Oct-00
Dipole Type (MHz):	900 MHz	Calibration Due:	26-Oct-02
		Manufacturer:	SPEAG

-Manufacturer's Original Calibration Information-

Dipole to be correlated: [Serial Number: 079]

1g SAR normalized to 1W forward power (mW/g):	10.2 mW/g
Relative Dielectric:	40.0
Conductivity:	0.85
Probe Serial Number:	SN 1507
Forward Power:	250mW +/-3%

Primary Dipole Referenced: [Serial Number: 077]

1g SAR normalized to 1W forward power (mW/g):	11.4 mW/g
Relative Dielectric:	40.3
Conductivity:	0.95
Probe Serial Number:	SN 1507
Forward Power:	250mW +/-3%

-Correlation Method Utilized- per DOI-1265

(select one)

By Similarity: X By Transfer Calibration:

-Measured Data-

Probe S/N:	SN 1515	Conductivity (meas.):	0.97
Robot Cell #:	[illegible]	Permittivity (meas.):	42.5

Primary Standard (average of 0-degree & 90-degree 1g cubes):

2.875 mW/g	N/R	N/R
	(if required)	(if required)

Secondary Standard (average of 0-degree & 90-degree 1g cubes):

2.82 mW/g	N/R	N/R
	(if required)	(if required)

-NEW Correlated Target-

1g SAR normalized to 1W forward power (mW/g):	11.4 mW/g
Relative Dielectric:	40.3
Conductivity:	0.95

Approved by: [signature] **Date:** 11/13/2001

Comments: Secondary dipole measured –1.9% from primary dipole.

Interim Dipole Correlation Certificate

FCD-0359, Rev.001

Dipole Serial Number:	250(TR)	Last Calibration Date:	24-Aug-01
Dipole Type (MHz):	D1900V2 w/ Teflon Rings	Calibration Due:	24-Aug-03
		Manufacturer:	SPEAG

-Manufacturer's Original Calibration Information-

Dipole to be correlated: [Serial Number: 250(TR)]

1g SAR normalized to 1W forward power (mW/g):	38.4 mW/g
Relative Dielectric:	40.2
Conductivity:	1.38
Probe Serial Number:	1507
Forward Power:	250mW

Primary Dipole Referenced: [Serial Number: 246(TR)]

1g SAR normalized to 1W forward power (mW/g):	38.8 mW/g
Relative Dielectric:	39.6
Conductivity:	1.37
Probe Serial Number:	1507
Forward Power:	250 mW

-Correlation Method Utilized- per DOI-1265

(select one)

By Similarity: X By Transfer Calibration:

-Measured Data-

Probe S/N:	1275	Conductivity (meas.):	1.38
Robot Cell #:	HVD-4	Permittivity (meas.):	38.4

Primary Standard (average of 0-degree & 90-degree 1g cubes):

9.815 mW/g		
	(if required)	(if required)

Secondary Standard (average of 0-degree & 90-degree 1g cubes):

9.88 mW/g		
	(if required)	(if required)

-NEW Correlated Target-

1g SAR normalized to 1W forward power (mW/g):	38.8 mW/g
Relative Dielectric:	39.6
Conductivity:	1.37

Approved by: Antonio Ferreira **Date:** 3/8/02

Comments: Secondary dipole measured +0.7% from primary dipole.

Schmid & Partner
Engineering AG

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

Calibration Certificate

1800 MHz System Validation Dipole

Type:	D1800V2
Serial Number:	258
Place of Calibration:	Zurich
Date of Calibration:	September 24, 2002
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:	D. Vetter
Approved by:	[signature]

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: D1800V2

Serial: 258

Manufactured: November 20, 1999
Calibrated: September 24, 2002

1. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with head simulating glycol solution of the following electrical parameters at 1800 MHz:

Relative Dielectricity	**40.3**	± 5%
Conductivity	**1.36 mho/m**	± 5%

The DASY System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.3 at 1800 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 10mm 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 20mm 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.

2.1. SAR Measurement with DASY3 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the worst-case extrapolation are:

averaged over 1 cm^3 (1 g) of tissue:	**38.6 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**20.4 mW/g**

2.2 SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue:	**35.5 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**19.2 mW/g**

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:	**1.199 ns**	(one direction)
Transmission factor:	**0.980**	(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 1800 MHz:	Re{Z} = **52.0 Ω**
	Im {Z} = **5.9 Ω**
Return Loss at 1800 MHz	**-24.2 dB**

4. Modification

Small end caps (3 mm in length) made of Teflon have been added to the dipole arms by the Client.

5. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

6. Design

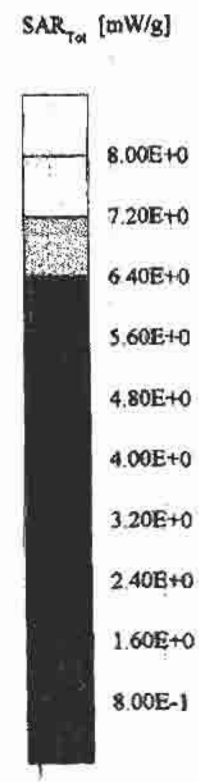
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

7. Power Test

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

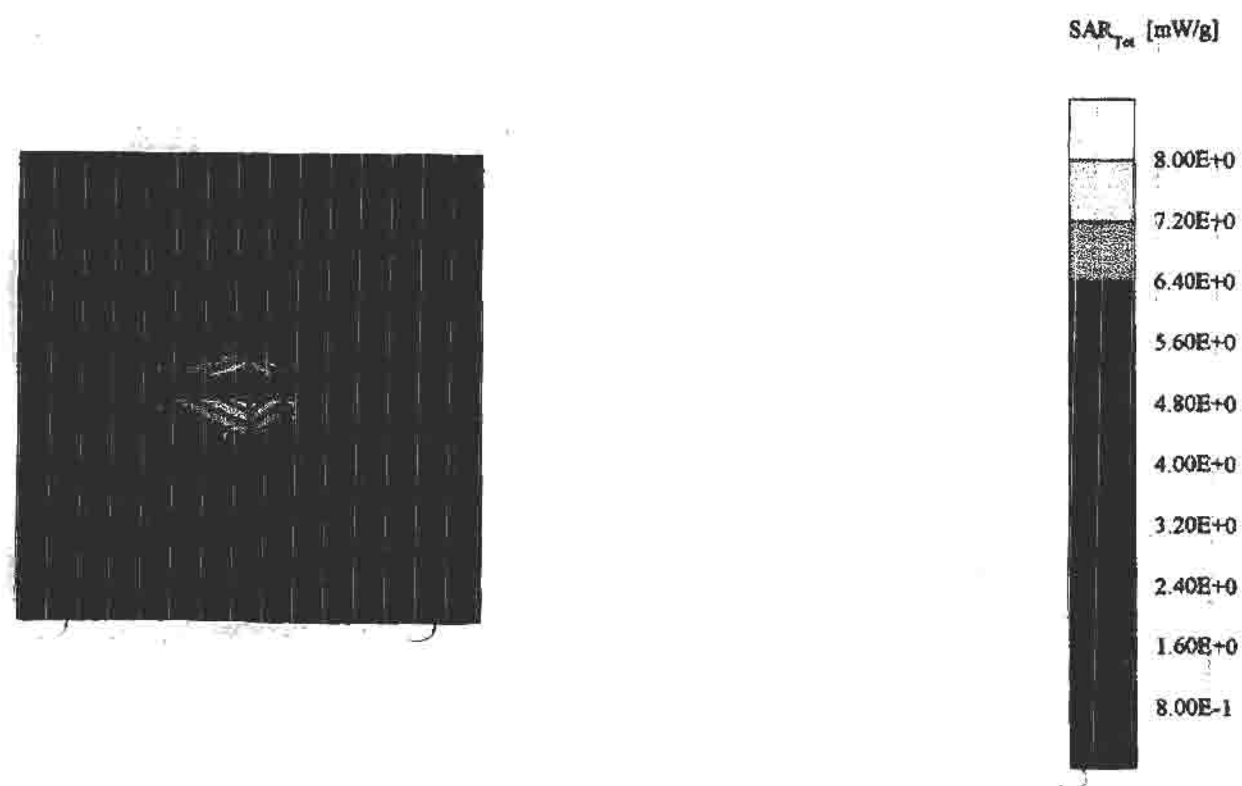
Validation Dipole D1800V2 SN:258, d = 10 mm

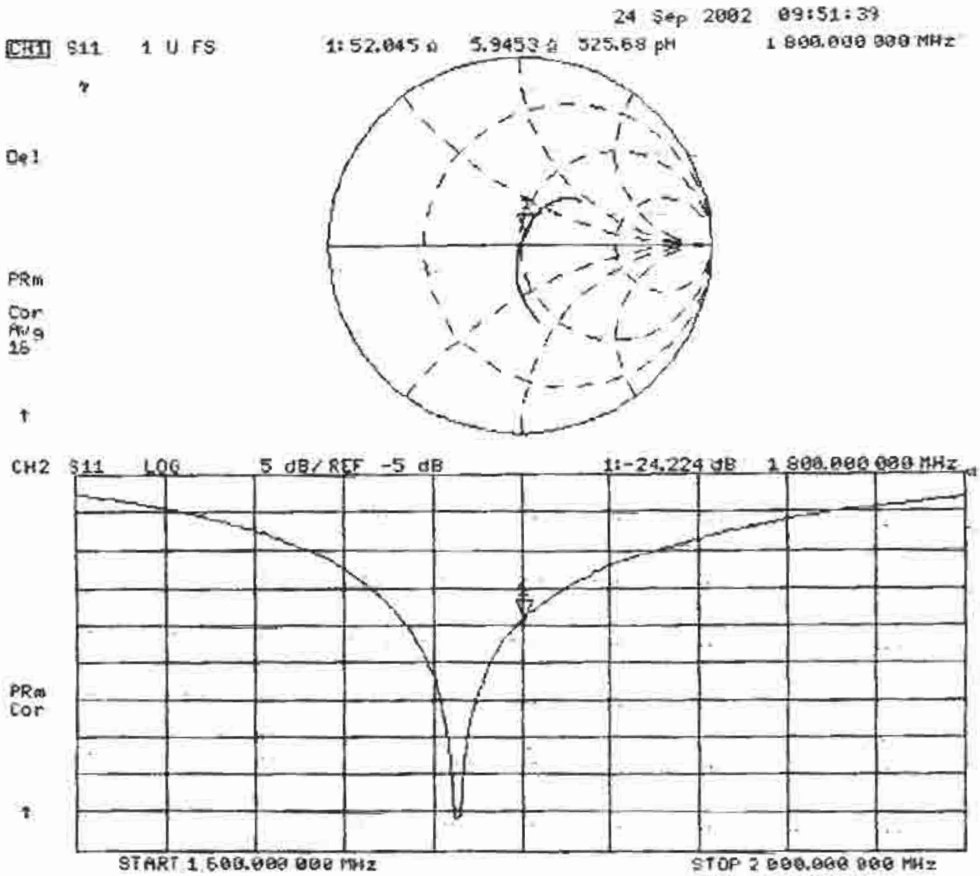
Frequency: 1800 MHz; Antenna Input Power: 250 [mW]
SAM Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(5.30,5.30,5.30) at 1800 MHz; IEEE1528 1800 MHz: σ = 1.36 mho/m ε_r = 40.3 ρ = 1.00 g/cm³
Cubes (2): Peak: 17.7 mW/g ± 0.03 dB, SAR (1g): 9.64 mW/g ± 0.00 dB, SAR (10g): 5.11 mW/g ± 0.03 dB, (Worst-case extrapolation)
Penetration depth: 8.5 (8.1, 9.3) [mm]
Powerdrift: -0.01 dB



Validation Dipole D1800V2 SN:258, d = 10 mm

Frequency: 1800 MHz; Antenna Input Power: 250 [mW]
SAM Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(5.30,5.30,5.30) at 1800 MHz; IEEE1528 1800 MHz: σ = 1.36 mho/m ε_r = 40.3 ρ = 1.00 g/cm³
Cubes (2): Peak: 15.4 mW/g ± 0.03 dB, SAR (1g): 8.87 mW/g ± 0.00 dB, SAR (10g): 4.81 mW/g ± 0.03 dB, (Advanced extrapolation)
Penetration depth: 9.2 (9.1, 9.5) [mm]
Powerdrift: -0.01 dB




24 Sep 2002 09:51:39
CH1 S11 1 U FS
1: 52.045 Ω 5.9453 Ω 525.68 pH 1 800.000 000 MHz
Del
PRm
Cor
Avg
16
CH2 S11 LOG 5 dB/ REF -5 dB 1:-24.224 dB 1 800.000 000 MHz
PRm
Cor
START 1 600.000 000 MHz
STOP 2 000.000 000 MHz

Appendix 6

Measurement Uncertainty Budget

Uncertainty Budget for Device Under Test									
a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h =* *c x f / e*	*i =* *c x g / e*	*k*
Uncertainty Component	**Sec.**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	9.5	N	2.00	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Spherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	5.8	R	1.73	1	1	3.3	3.3	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1.0	N	1.00	1	1	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	1.3	R	1.73	1	1	0.8	0.8	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.3	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	1.1	R	1.73	1	1	0.6	0.6	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	3.9	R	1.73	1	1	2.3	2.3	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.6	N	1.00	1	1	3.6	3.6	29
Device Holder Uncertainty	E.4.1	2.8	N	1.00	1	1	2.8	2.8	8
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	10.0	R	1.73	0.64	0.43	3.7	2.5	∞
Liquid Permittivity - deviation from target values	E.3.2	10.0	R	1.73	0.6	0.49	3.5	2.8	∞
Liquid Permittivity - measurement uncertainty	E.3.3	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Combined Standard Uncertainty			RSS				11.72	11.09	1363
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k* =2				22.98	21.75	

Uncertainty Budget for System Performance Check (dipole & flat phantom)

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	Sec.	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	v_i
Measurement System									
Probe Calibration	E.2.1	9.5	N	2.00	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	1	1	2.7	2.7	∞
Spherical Isotropy	E.2.2	9.6	R	1.73	0	0	0.0	0.0	∞
Boundary Effect	E.2.3	5.8	R	1.73	1	1	3.3	3.3	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1.0	N	1.00	1	1	1.0	1.0	∞
Response Time	E.2.7	0.0	R	1.73	1	1	0.0	0.0	∞
Integration Time	E.2.8	0.0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.3	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	1.1	R	1.73	1	1	0.6	0.6	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	3.9	R	1.73	1	1	2.3	2.3	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.4.2	1.0	R	1.73	1	1	0.6	0.6	∞
Input Power and SAR Drift Measurement	8, 6.6.2	4.7	R	1.73	1	1	2.7	2.7	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	10.0	R	1.73	0.64	0.43	3.7	2.5	∞
Liquid Permittivity - deviation from target values	E.3.2	10.0	R	1.73	0.6	0.49	3.5	2.8	∞
Liquid Permittivity - measurement uncertainty	E.3.3	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Combined Standard Uncertainty			RSS				10.16	9.43	99999
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				19.92	18.48	

Appendix 7

Photographs of the device under test

Figure7. Front of Phone

Figure 8. Back of phone

Figure 9. Side View

Figure 10. Front View Flip Open

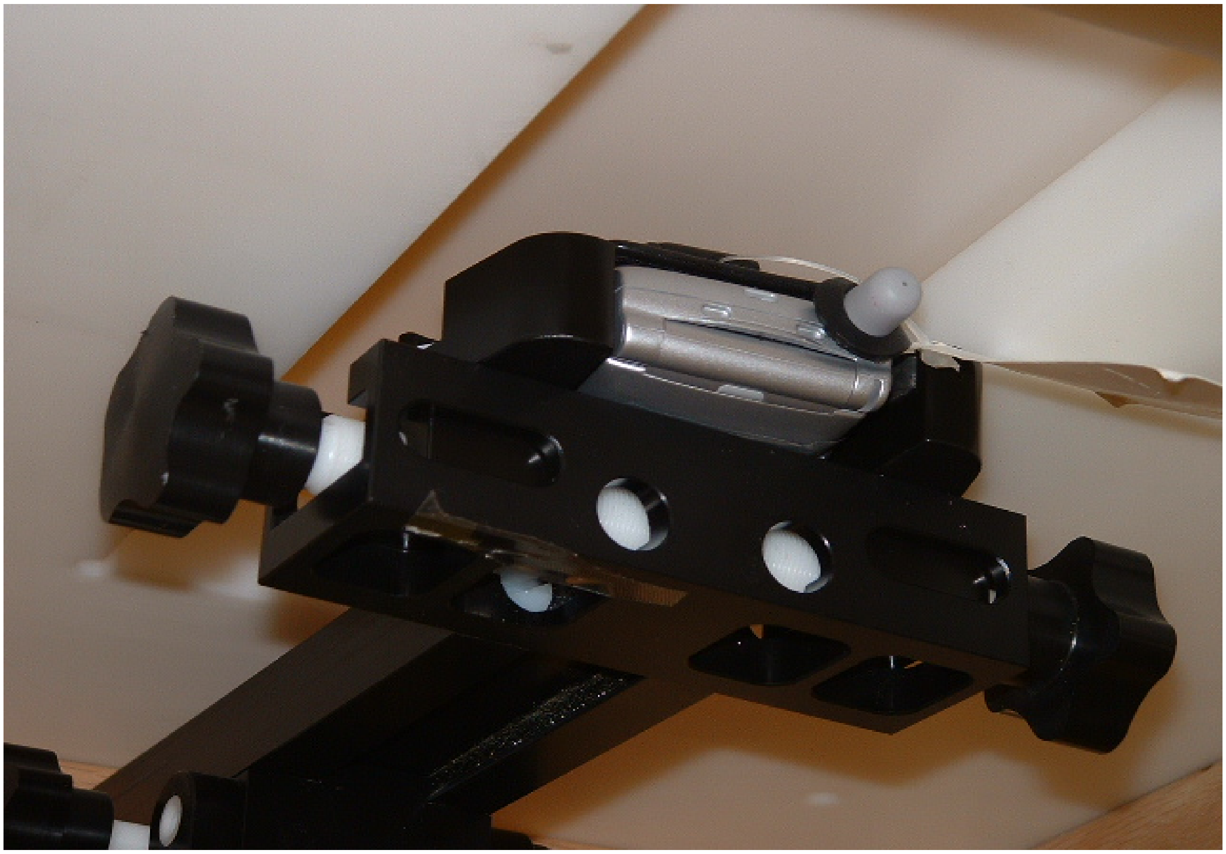


Figure 11. Phone in leather case against a flat phantom

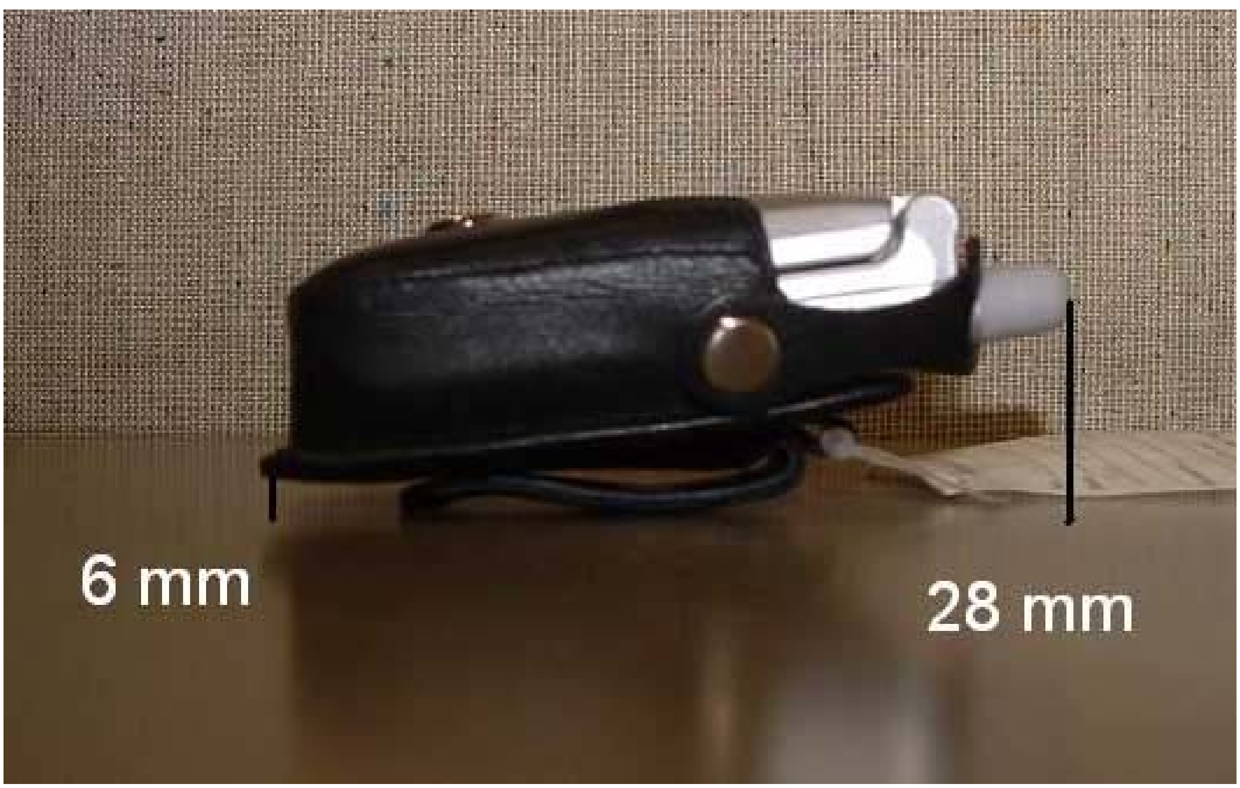


Figure 12. Separation distance shown between the phone and the base

Figure 13. Phone against the Head (Cheek Touch - Front)

Figure 14. Phone against the Head (Cheek Touch – Back)

Figure 15. Phone against the Head (15°Tilt – Front)

Figure 16. Phone against the Head (15°Tilt – Back)