Exhibit 11: SAR Test Report IHDT56DN1

Date of test: 20-29 Oct, 2003
Date of Report: 31 Oct, 2003

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

Test Responsible:
Steven Hauswirth
Principal Staff Engineer

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

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 IHDT56DN1 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)

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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.

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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 IHDT56DN1). 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

a. Antenna description

Type	Helix	
Location	Right Side	
Dimensions	Length	75 mm
	Width	8 mm
Configuration	Extendable	

b. Device description

FCC ID Number	IHDT56DN1		
Serial number	A8EE70AC		
Mode(s) of Operation	800 AMPS	800 CDMA	1900 PCS
Modulation Mode(s)	AMPS	CDMA	PCS
Maximum Output Power Setting	27.80 dBm	25.00 dBm	25.00 dBm
Duty Cycle	1:1	1:1	1:1
Transmitting Frequency Rang(s)	824.04 – 848.97 MHz	824.70 – 848.31 MHz	1851.25 – 1908.75 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	SN385	14-May-04
E-Field Probe ET3DV6	SN1506	14-May-04
Dipole Validation Kit, D900V2	SN425TR	24-Jun-04
S.A.M. Phantom used for 800MHz	TP-1005	
Dipole Validation Kit, D1800V2	SN250TR	24-Jun-04
S.A.M. Phantom used for 1900MHz	TP-1154	

3.2 Additional Equipment

Description	Serial Number	Cal Due Date
Signal Generator HP8648C	3847A04822	6-Feb-05
Power Meter E4419B	GB39511087	6-Feb-04
Power Sensor #1 - 8481A	US39210929	6-Feb-04
Power Sensor #2 - 8481A	US39210933	6-Feb-04
Network Analyzer HP8753ES	US39172529	18-Jun-04
Dielectric Probe Kit HP85070B	US33020235	N/A

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,** 20-Oct-03	42.2	0.91	19.3
		Measured, 21-Oct-03	41.9	0.91	18.9
		Recommended Limits	41.5 ±5%	0.90 ±5%	18-25
	Body	**Measured,** 29-Oct-03	53.7	0.97	19.1
		Recommended Limits	55.2 ±5%	0.97 ±5%	18-25
1880	**Head**	**Measured,** 28-Oct-03	38.2	1.47	18.5
		Recommended Limits	40.0 ±5%	1.40 ±5%	18-25
	Body	**Measured,** 29-Oct-03	51.2	1.57	19.4
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25

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)		
835	**Measured,** 20-Oct-03	9.8	42.2	0.91	20	20.0
	Measured, 21-Oct-03	9.8	41.9	0.91	20	19.3
	Measured, 29-Oct-03	10.1	42.3	0.92	20	19.4
	Recommended Limits	10.1	41.5 ±5%	0.90 ±5%	18-25	18-25
1800	**Measured,** 28-Oct-03	41.2	38.6	1.39	20	19.7
	Measured, 29-Oct-03	41.4	38.7	1.38	20	19.8
	Recommended Limits	39.7	40.0 ±5%	1.4 ±5%	18-25	18-25

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 ET3DV6	SN1506	900	6.1	7 of 11
		1800	4.9	7 of 11

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.

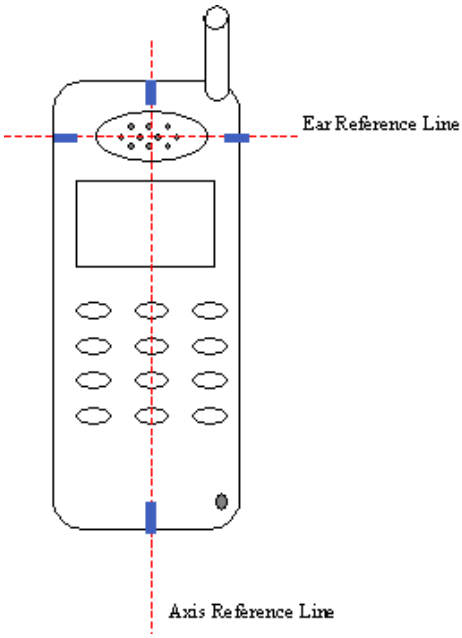
The Cellular Phone (FCC ID IHDT56DN1) has the SNN5723A as the only available battery options. This battery was used to do all of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery.

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 ET3DV6	SN1506	835	6.1	7 of 11
		1900	4.9	7 of 11

f (MHz)	Description	Conducted Output Power (dBm)	Left Head (Cheek / Touch Position)							
			Ant Extended				Ant Retracted			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)	Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Analog 800MHz	Channel 991	27.77	1.30	-0.06	1.32	19.3	1.16	-0.10	1.19	19.3
	Channel 384	27.76	**1.43**	**-0.01**	**1.43**	**19.3**	1.28	-0.15	1.32	19.3
	Channel 799	27.73	1.35	-0.19	1.41	19.5	1.15	-0.10	1.18	19.3
Digital 800MHz	Channel 1013	24.96	1.22	-0.05	1.23	19.4	1.09	-0.30	1.17	19.5
	Channel 384	24.96	**1.40**	**-0.09**	**1.43**	**19.5**	1.23	-0.35	1.33	19.5
	Channel 779	24.90	1.27	-0.12	1.31	19.6	1.12	-0.29	1.20	19.6
Digital 1900MHz	Channel 25	24.90					**1.34**	**0.05**	**1.34**	**18.3**
	Channel 600	24.90	0.657	0.02	0.66	18.3	0.976	0.02	0.98	18.3
	Channel 1175	25.01					1.07	0.09	1.08	18.3

Table 1: SAR measurement results for the portable cellular telephone FCC ID IHDT56DN1 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 Extended				Ant Retracted			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)	Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Analog 800MHz	Channel 991	27.77	1.27	0.01	1.27	18.6	1.10	-0.08	1.12	18.8
	Channel 384	27.76	**1.40**	**-0.21**	**1.47**	**18.8**	1.25	-0.08	1.28	18.8
	Channel 799	27.73	1.28	-0.10	1.31	18.8	1.11	-0.05	1.12	18.6
Digital 800MHz	Channel 1013	24.96	1.19	-0.18	1.24	19.1	1.07	-0.16	1.11	19.2
	Channel 384	24.96	**1.36**	**-0.18**	**1.42**	**19.1**	1.23	-0.07	1.25	19.2
	Channel 779	24.90	1.23	-0.11	1.26	18.8	1.07	-0.26	1.14	19.2
Digital 1900MHz	Channel 25	24.90					**1.10**	**-0.02**	**1.11**	**18.3**
	Channel 600	24.90	0.647	-0.15	0.67	18.3	0.903	-0.06	0.92	18.3
	Channel 1175	25.01					0.939	-0.05	0.95	18.3

Table 2: SAR measurement results for the portable cellular telephone FCC ID IHDT56DN1 at highest possible output power. Measured against the right head in the Cheek/Touch Position.

f (MHz)	Description	Conducted Output Power (dBm)	Left Head (15° Tilt Position)							
			Ant Extended				Ant Retracted			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)	Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Analog 800MHz	Channel 991	27.77								
	Channel 384	27.76	**0.758**	**0.01**	**0.76**	**19.6**	0.688	0.18	0.69	19.6
	Channel 799	27.73								
Digital 800MHz	Channel 1013	24.96	0.697	-0.03	0.70	19.0				
	Channel 384	24.96	**0.801**	**-0.31**	**0.86**	**19.2**	0.657	-0.06	0.67	19.1
	Channel 779	24.90	0.689	-0.12	0.71	19.1				
Digital 1900MHz	Channel 25	24.90					**1.51**	**-0.04**	**1.52**	**19.7**
	Channel 600	24.90	0.743	-0.03	0.75	19.0	1.04	-0.12	1.07	19.7
	Channel 1175	25.01					1.12	-0.13	1.15	20.0

Table 3: SAR measurement results for the portable cellular telephone FCC ID IHDT56DN1 at highest possible output power. Measured against the left head in the 15° Tilt Position.

f (MHz)	Description	Conducted Output Power (dBm)	Right Head (15° Tilt Position)							
			Ant Extended				Ant Retracted			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)	Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Analog 800MHz	Channel 991	27.77								
	Channel 384	27.76	**0.750**	**-0.05**	**0.76**	**19.5**	0.66	0.06	0.66	19.0
	Channel 799	27.73								
Digital 800MHz	Channel 1013	24.96								
	Channel 384	24.96	**0.725**	**-0.33**	**0.78**	**18.8**	0.608	0.01	0.61	18.5
	Channel 779	24.90								
Digital 1900MHz	Channel 25	24.90					**1.27**	**0.02**	**1.27**	**18.5**
	Channel 600	24.90	0.719	0.02	0.72	18.5	0.944	0.11	0.94	18.5
	Channel 1175	25.01					1.07	0.10	1.07	18.5

Table 4: SAR measurement results for the portable cellular telephone FCC ID IHDT56DN1 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 is only the MOTPSC001 Body-Worn Accessories available for this phone.

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 ET3DV6	SN1506	835	5.8	8 of 11
		1900	4.5	8 of 11

f (MHz)	Description	Conducted Output Power (dBm)	Body Worn							
			Ant Extended				Ant Retracted			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)	Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Analog 800MHz	Channel 991	27.77								
	Channel 384	27.76	**0.769**	**-0.02**	**0.77**	**19.2**	0.741	-0.18	0.77	19.2
	Channel 799	27.73								
Digital 800MHz	Channel 1013	24.96								
	Channel 384	24.96	0.617	-0.30	0.66	19.3	**0.687**	**-0.22**	**0.72**	**19.1**
	Channel 779	24.90								
Digital 1900MHz	Channel 25	24.90								
	Channel 600	24.90	**0.32**	**0.01**	**0.32**	**19.5**	0.299	-0.06	0.30	19.4
	Channel 1175	25.01								

Table 5: SAR measurement results for the portable cellular telephone FCC ID IHDT56DN1 at highest possible output power. Measured against the body.

6.3 Push-to-Talk/Dispatch Mode Test Results

The SAR results shown in table #6 are maximum SAR values averaged over 1 gram of phantom tissue for the Push-to-Talk/Dispatch Mode SAR measurements. Also shown are the measured conducted output powers.

The test sample was operated in an over the air call in CDMA 800 and 1900 MHz only. For the purposes of this test the unit is commanded to the proper channel, transmitter power level and transmit mode of operation. The radio was then placed in the SAR measurement system with a fully charged battery. The radio was placed with the front of the device positioned at 2.5 cm from a flat phantom, as per Supplement C 01-01.

A full data set output of two test conditions with the highest SAR values from the Dasy™ measurement system is included as appendix 4. The test conditions included are indicated as bold numbers in the following table. All other test conditions measured lower SAR values than those included.

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 ET3DV6	SN1506	835	6.1	7 of 11
		1900	4.9	7 of 11

f (MHz)	Description	Conducted Output Power (dBm)	Push-To-Talk Mode							
			Ant Extended				Ant Retracted			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)	Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
Digital 800MHz	Channel 1013	24.96								
	Channel 384	24.96	**0.444**	**-0.11**	**0.45**	**19.8**	0.361	-0.40	0.40	20.0
	Channel 779	24.90								
Digital 1900MHz	Channel 25	24.90								
	Channel 600	24.90	0.153	-0.12	0.158	19.9	**0.158**	**-0.09**	**0.16**	**19.7**
	Channel 1175	25.01								

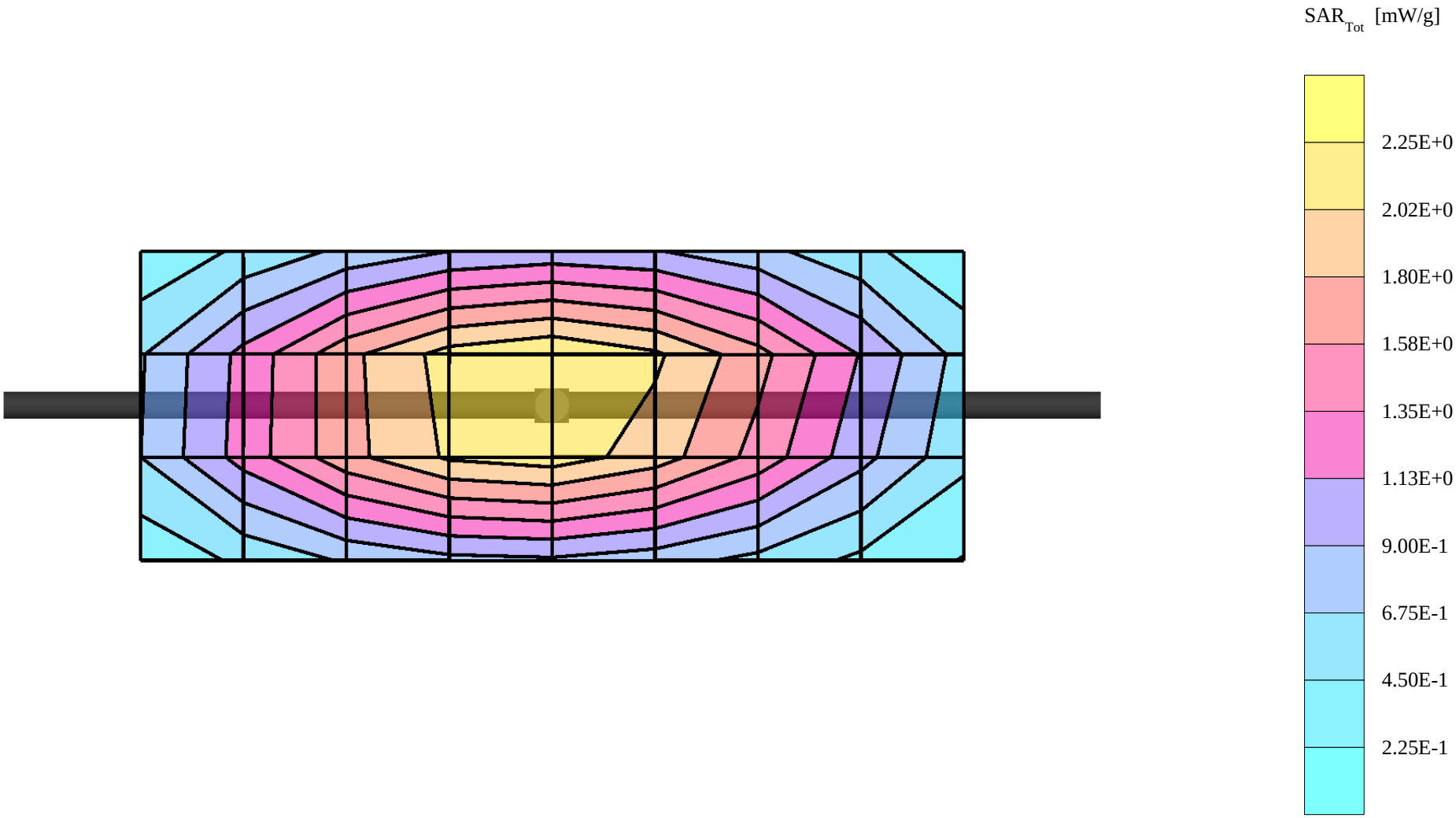
Table 6: SAR measurement results for the portable cellular telephone FCC ID IHDT56DN1 against a flat phantom in PTT Mode.

Appendix 1

SAR distribution comparison for the system accuracy verification

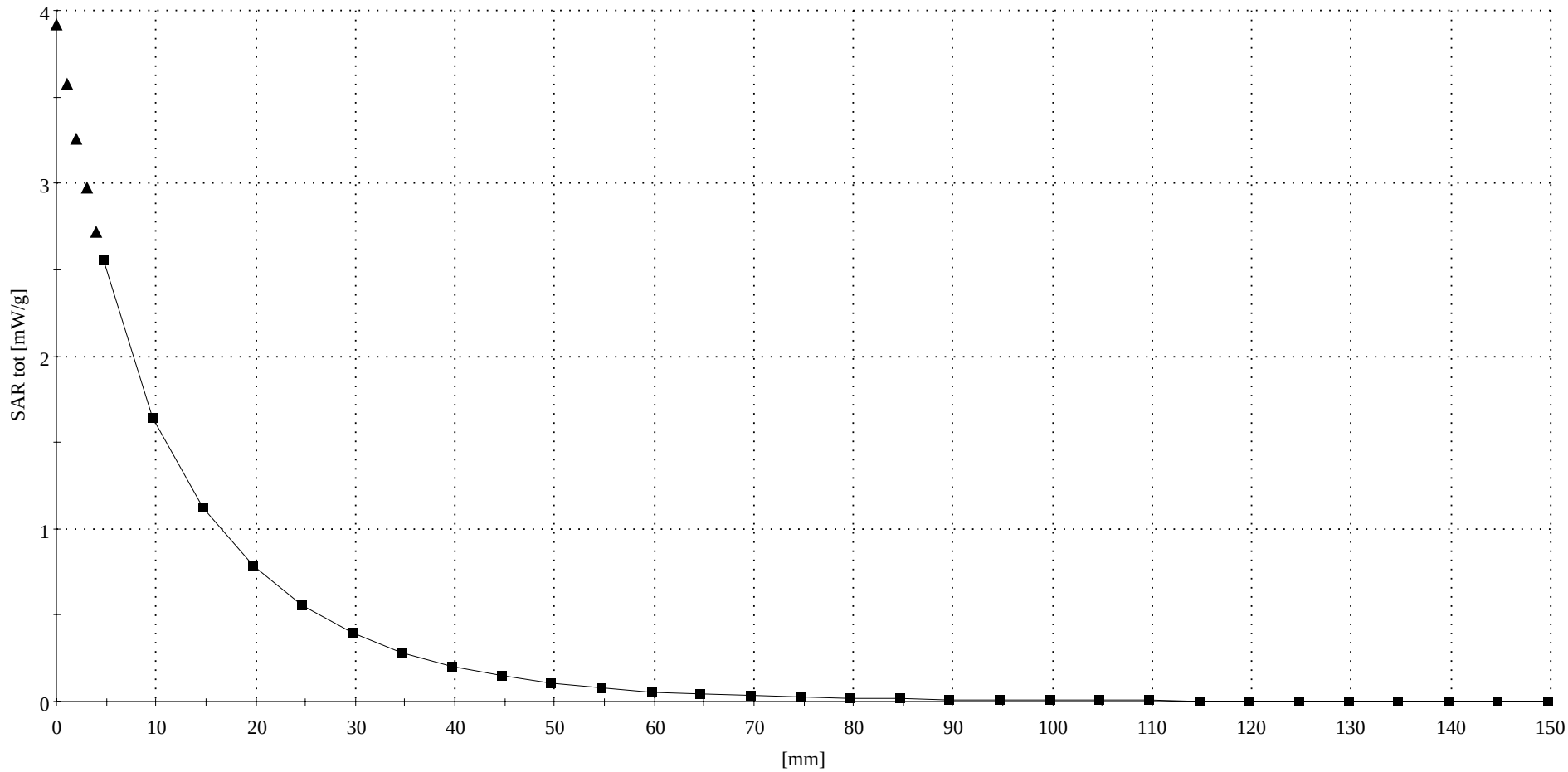
Dipole 835 MHz

835 MHz System Performance Check / Dipole Sn# 425tr
Forward Power =254mW Reflected Power =-27.72dB
Room Temp at time of measurement =20.0°C Simulant Temp at time of measurement =20.0°C
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03; Flat
Probe: ET3DV6R - SN1506 - Validation.2; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz VALIDATION: σ = 0.91 mho/m ε_r = 42.2 ρ = 1.00 g/cm^3
Cubes (2): Peak: 3.90 mW/g ± 0.03 dB, SAR (1g): 2.50 mW/g ± 0.04 dB, SAR (10g): 1.61 mW/g ± 0.04 dB, (Worst-case extrapolation)
Penetration depth: 12.1 (11.1, 13.4) [mm]
Powerdrift: -0.01 dB



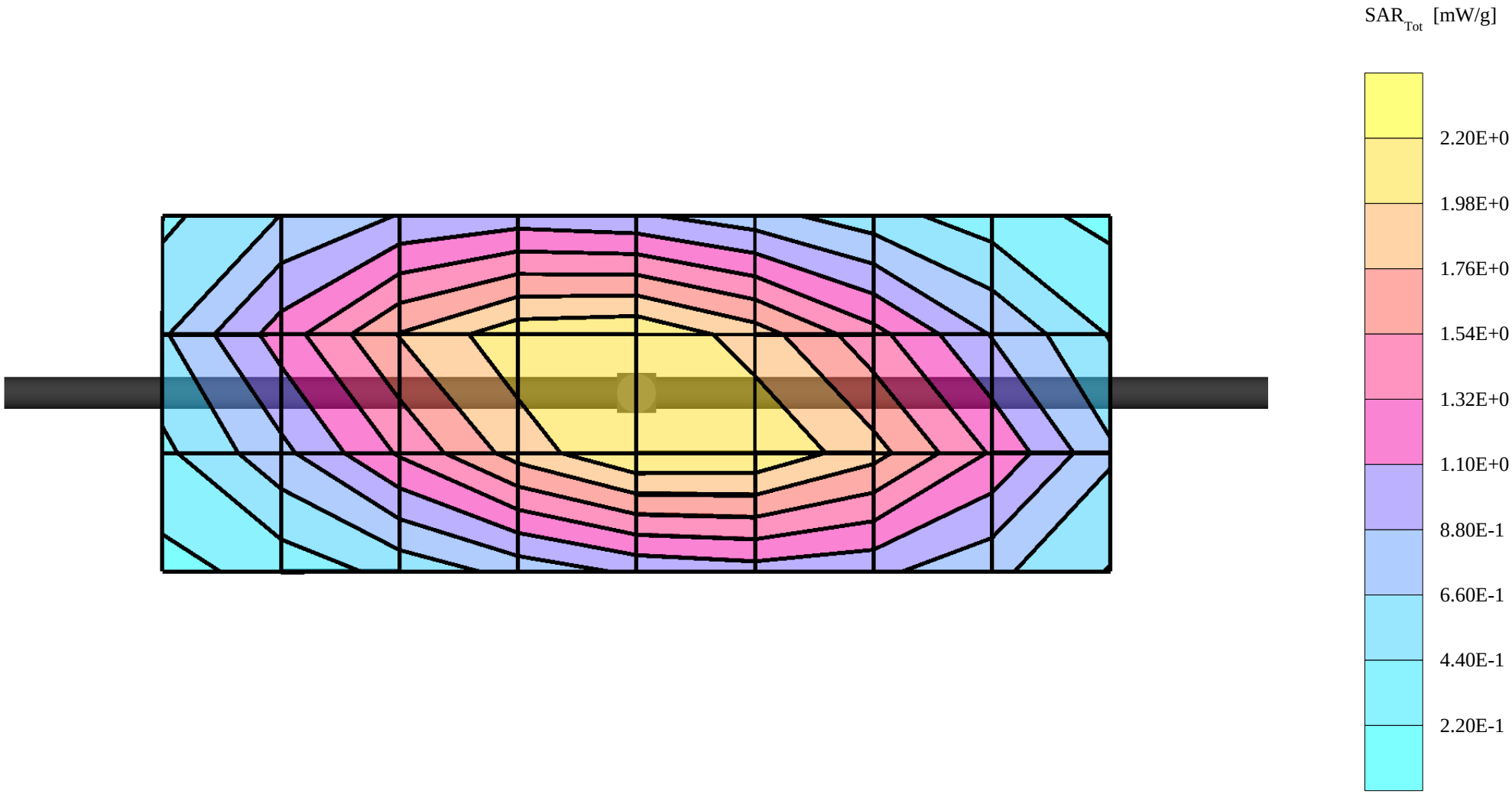
Dipole 835 MHz

835 MHz System Performance Check / Dipole Sn# 425tr
Forward Power =254mW Reflected Power =-27.72dB
Room Temp at time of measurement =20.0°C Simulant Temp at time of measurement =20.0°C
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03;
Probe: ET3DV6R - SN1506 - Validation.2; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz VALIDATION: σ = 0.91 mho/m ε_r = 42.2 ρ = 1.00 g/cm^3
: , , ()
Penetration depth: 12.1 (11.1, 13.4) [mm]



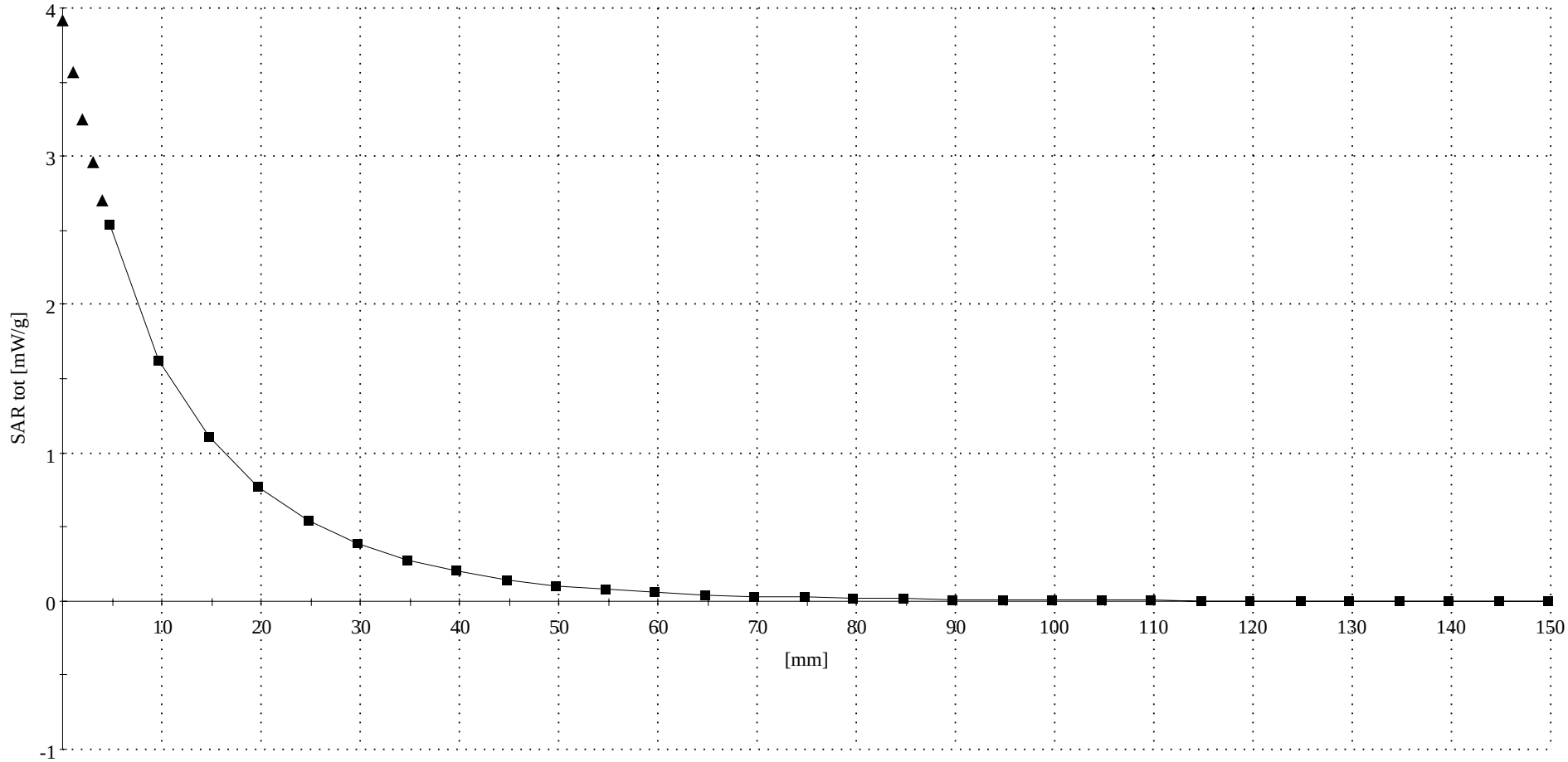
Dipole 835 MHz

835 MHz System Performance Check / Dipole Sn# 425TR
Forward Power = 254mW Reflected Power = -27.90dB
Room Temp at time of measurement = 20 Simulant Temp at time of measurement = 19.3
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03; Flat
Probe: ET3DV6R - SN1506 - Validation.3; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz VALIDATION: σ = 0.91 mho/m ε_r = 41.9 ρ = 1.00 g/cm^3
Cubes (2): Peak: 3.91 mW/g ± 0.05 dB, SAR (1g): 2.48 mW/g ± 0.05 dB, SAR (10g): 1.59 mW/g ± 0.04 dB, (Worst-case extrapolation)
Penetration depth: 12.0 (11.0, 13.3) [mm]
Powerdrift: -0.02 dB



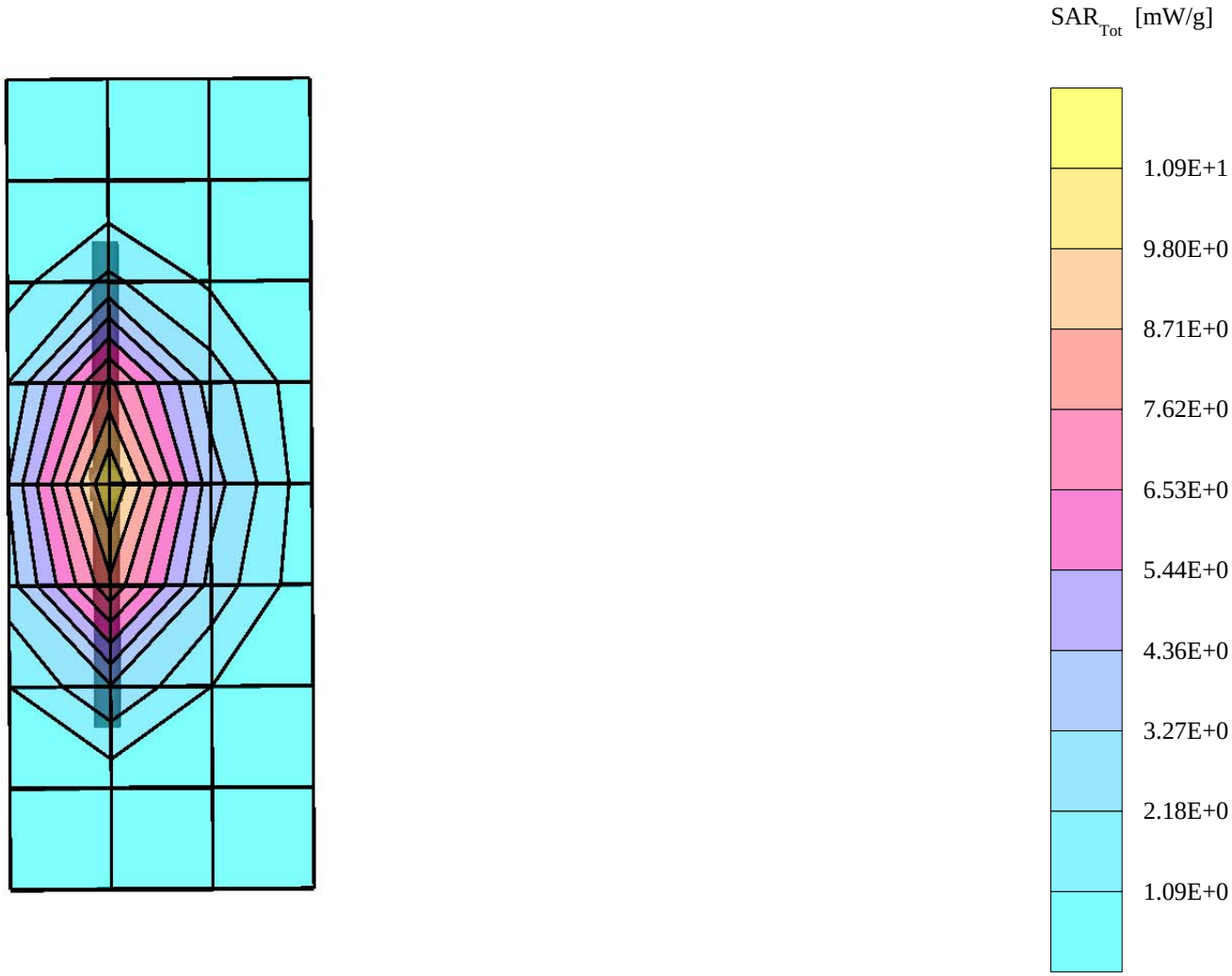
Dipole 835 MHz

835 MHz System Performance Check / Dipole Sn# 425TR
Forward Power = 254mW Reflected Power = -27.90dB
Room Temp at time of measurement = 20 Simulant Temp at time of measurement = 19.3
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03 Phantom; Section; Position: ; Frequency: 835 MHz
Probe: ET3DV6R - SN1506 - Validation.3; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz VALIDATION: σ = 0.91 mho/m ε_r = 41.9 ρ = 1.00 g/cm^3
: , , ()
Z-Axis: Dx = 0.0, Dy = 0.0, Dz = 5.0
Penetration depth: 12.0 (11.0, 13.3) [mm]



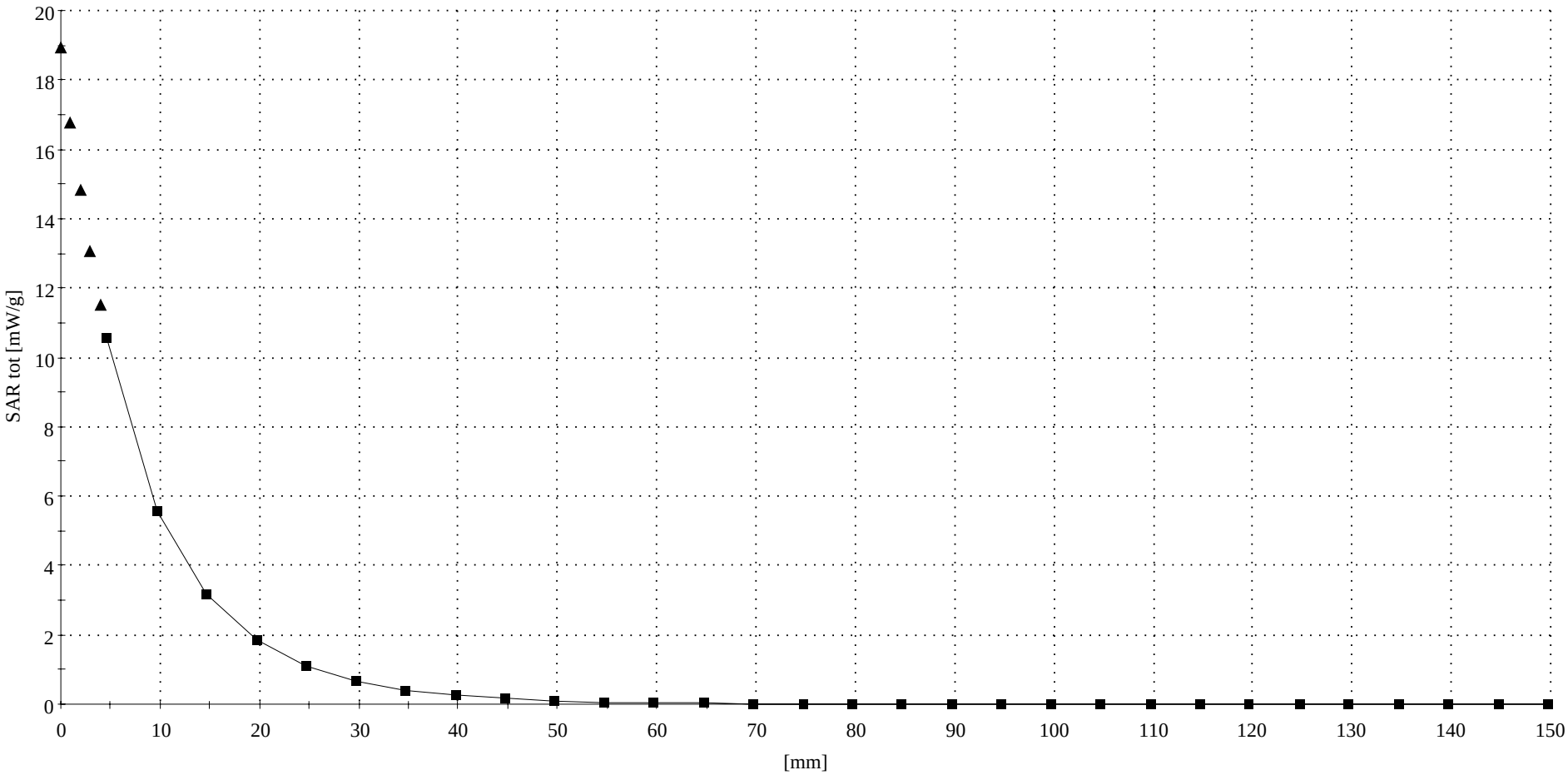
Dipole 1800 MHz

1800 MHz System Performance Check / Dipole Sn# 250tr
Forward Power = 250mW Reflected Power =-22.91dB
Room Temp at time of measurement = 20 Simulant Temp at time of measurement = 20
R1 Amy Twin Phantom Rev.4 (22Aug02); section 2
Probe: ET3DV6R - SN1506 - Validation.3; ConvF(4.90,4.90,4.90); Crest factor: 1.0; 1800 MHz VALIDATION: σ = 1.39 mho/m ε_r = 38.6 ρ = 1.00 g/cm^3
Cubes (2): Peak: 19.0 mW/g ± 0.04 dB, SAR (1g): 10.3 mW/g ± 0.06 dB, SAR (10g): 5.43 mW/g ± 0.07 dB, (Worst-case extrapolation)
Penetration depth: 8.4 (8.0, 9.1) [mm]
Powerdrift: 0.00 dB



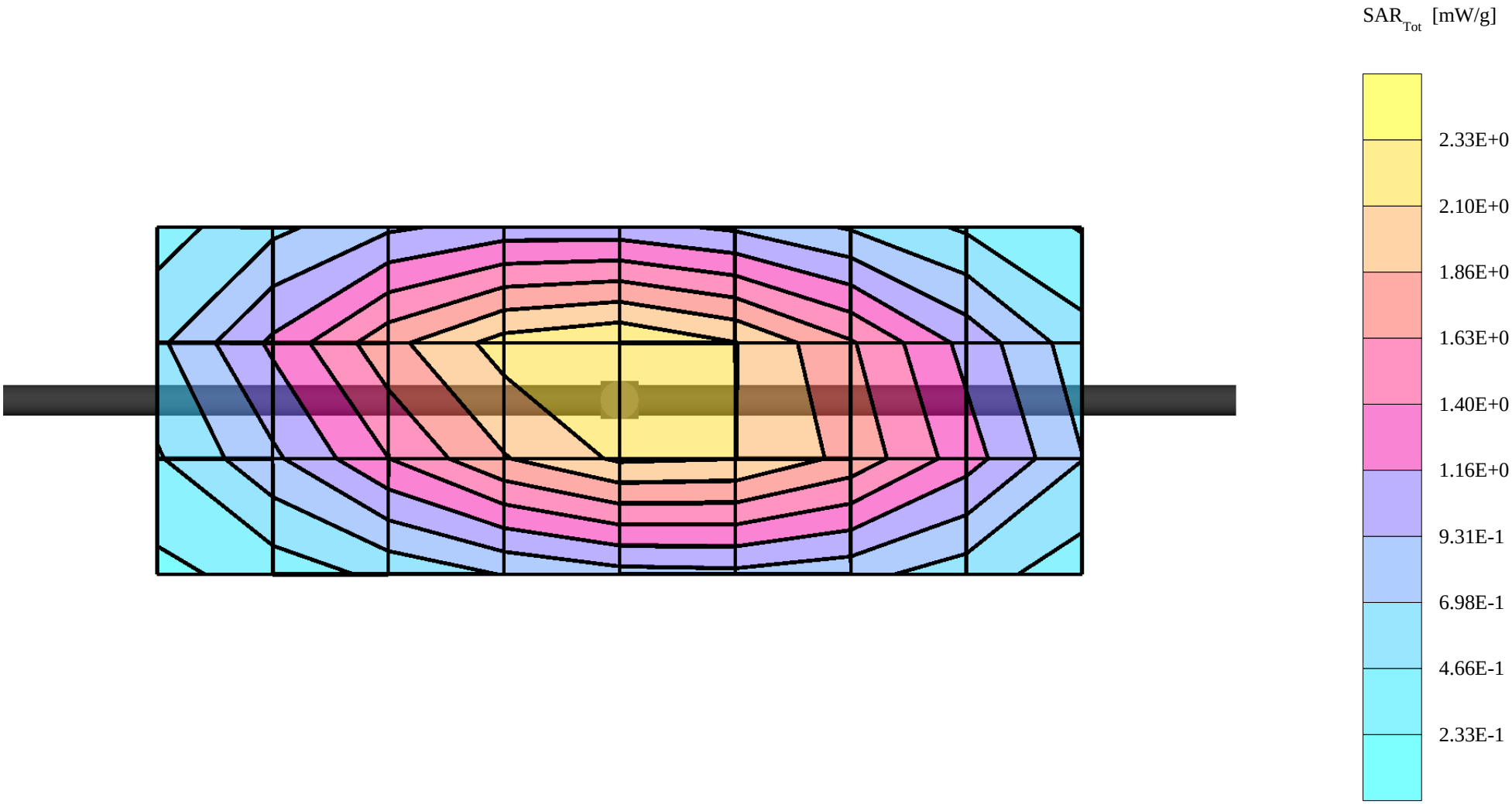
Dipole 1800 MHz

1800 MHz System Performance Check / Dipole Sn# 250tr
Forward Power = 250mW Reflected Power =-22.91dB
Room Temp at time of measurement = 20 Simulant Temp at time of measurement = 20
R1 Amy Twin Phantom Rev.4 (22Aug02);
Probe: ET3DV6R - SN1506 - Validation.3; ConvF(4.90,4.90,4.90); Crest factor: 1.0; 1800 MHz VALIDATION: σ = 1.39 mho/m ε_r = 38.6 ρ = 1.00 g/cm^3
: , , ()
Penetration depth: 8.2 (7.8, 9.0) [mm]



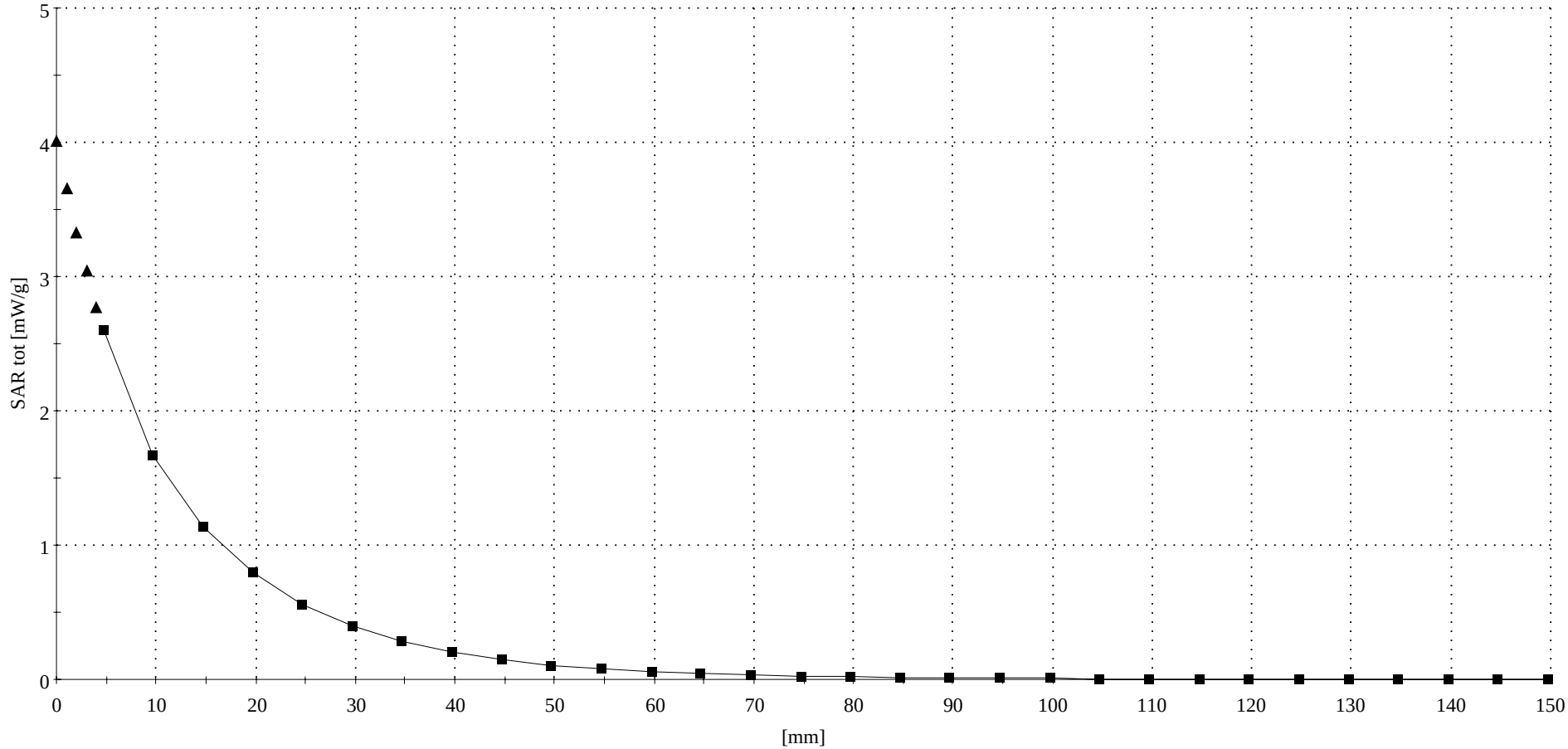
Dipole 835 MHz

835 MHz System Performance Check / Dipole Sn# 425TR
Forward Power = 253mW Reflected Power =-26.5dB
Room Temp at time of measurement = 20 Simulant Temp at time of measurement = 19.4
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03; Flat
Probe: ET3DV6R - SN1506 - Validation.3; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz VALIDATION: σ = 0.92 mho/m ε_r = 42.3 ρ = 1.00 g/cm^3
Cubes (2): Peak: 4.00 mW/g ± 0.04 dB, SAR (1g): 2.55 mW/g ± 0.04 dB, SAR (10g): 1.63 mW/g ± 0.05 dB, (Worst-case extrapolation)
Penetration depth: 12.0 (11.0, 13.3) [mm]
Powerdrift: -0.07 dB



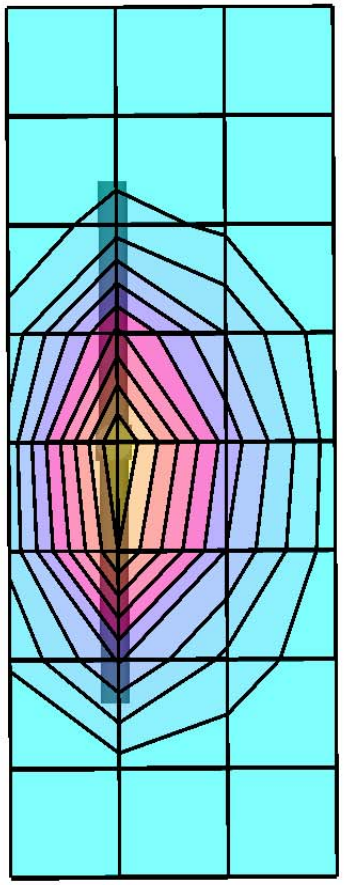
Dipole 835 MHz

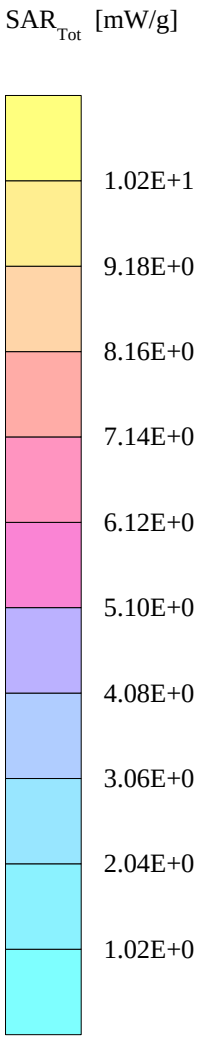
835 MHz System Performance Check / Dipole Sn# 425TR
Forward Power = 253mW Reflected Power =-26.5dB
Room Temp at time of measurement = 20 Simulant Temp at time of measurement = 19.4
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03 Phantom; Section; Position: ; Frequency: 835 MHz
Probe: ET3DV6R - SN1506 - Validation.3; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz VALIDATION: σ = 0.92 mho/m ε_r = 42.3 ρ = 1.00 g/cm^3
: , , ()
Z-Axis: Dx = 0.0, Dy = 0.0, Dz = 5.0
Penetration depth: 12.0 (11.0, 13.3) [mm]



Dipole 1800 MHz

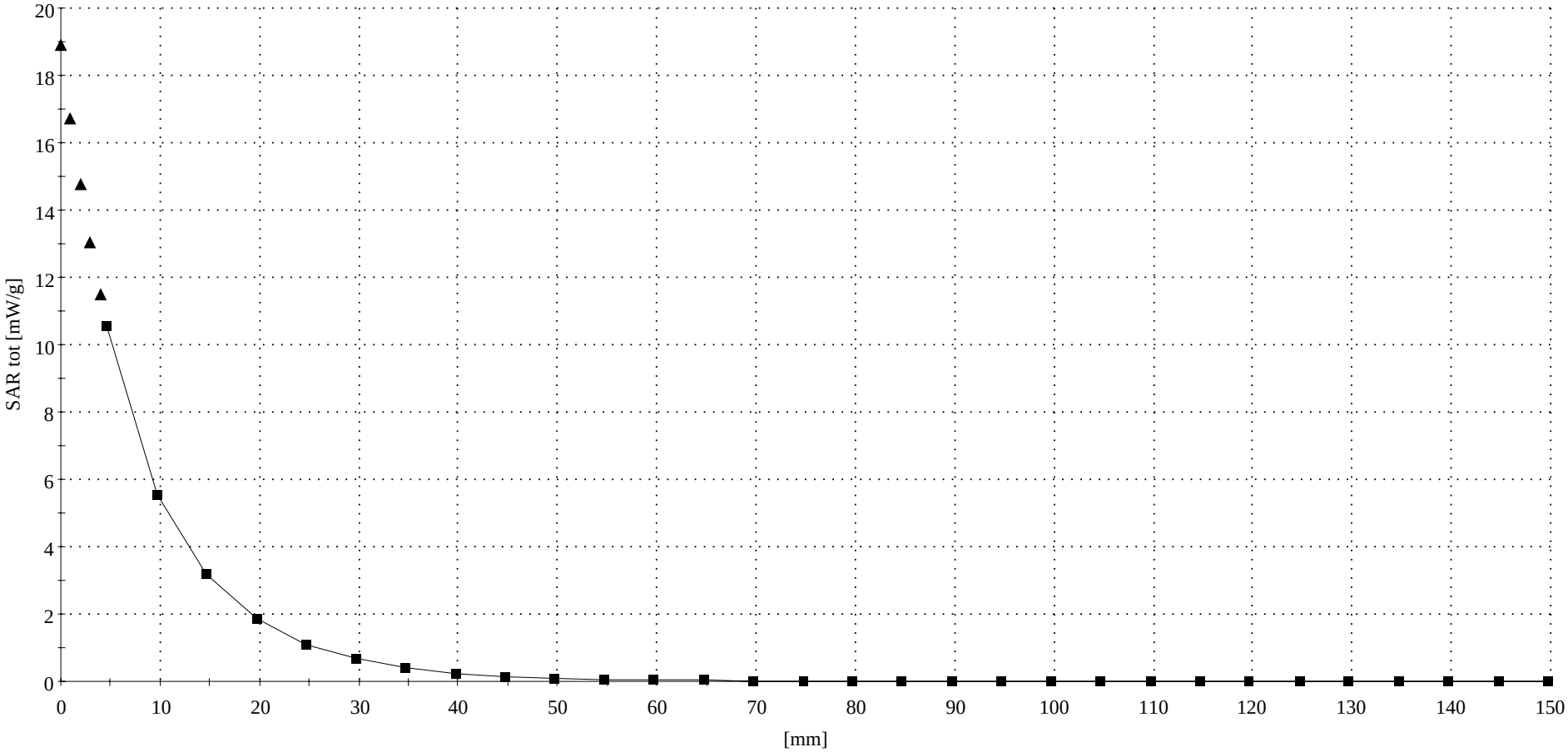
1800MHz System Performance Check / Dipole Sn# 250tr
Forward Power = 249mW Reflected Power = -22.03dB
Room Temp at time of measurement = 20 Simulant Temp at time of measurement = 19.8
R1 Amy Twin Phantom Rev.4 (22Aug02); section 2
Probe: ET3DV6R - SN1506 - Validation.3; ConvF(4.90,4.90,4.90); Crest factor: 1.0; 1800 MHz VALIDATION: σ = 1.38 mho/m ε_r = 38.7 ρ = 1.00 g/cm^3
Cubes (2): Peak: 19.0 mW/g ± 0.02 dB, SAR (1g): 10.3 mW/g ± 0.05 dB, SAR (10g): 5.41 mW/g ± 0.08 dB, (Worst-case extrapolation)
Penetration depth: 8.4 (8.1, 9.2) [mm]
Powerdrift: 0.00 dB





Dipole 1800 MHz

1800MHz System Performance Check / Dipole Sn# 250tr
Forward Power = 249mW Reflected Power = -22.03dB
Room Temp at time of measurement = 20 Simulant Temp at time of measurement = 19.8
R1 Amy Twin Phantom Rev.4 (22Aug02) Phantom; Section; Position: ; Frequency: 1800 MHz
Probe: ET3DV6R - SN1506 - Validation.3; ConvF(4.90,4.90,4.90); Crest factor: 1.0; 1800 MHz VALIDATION: σ = 1.38 mho/m ε_r = 38.7 ρ = 1.00 g/cm^3
: , , ()
Z-Axis: Dx = 0.0, Dy = 0.0, Dz = 5.0
Penetration depth: 8.2 (7.8, 9.0) [mm]



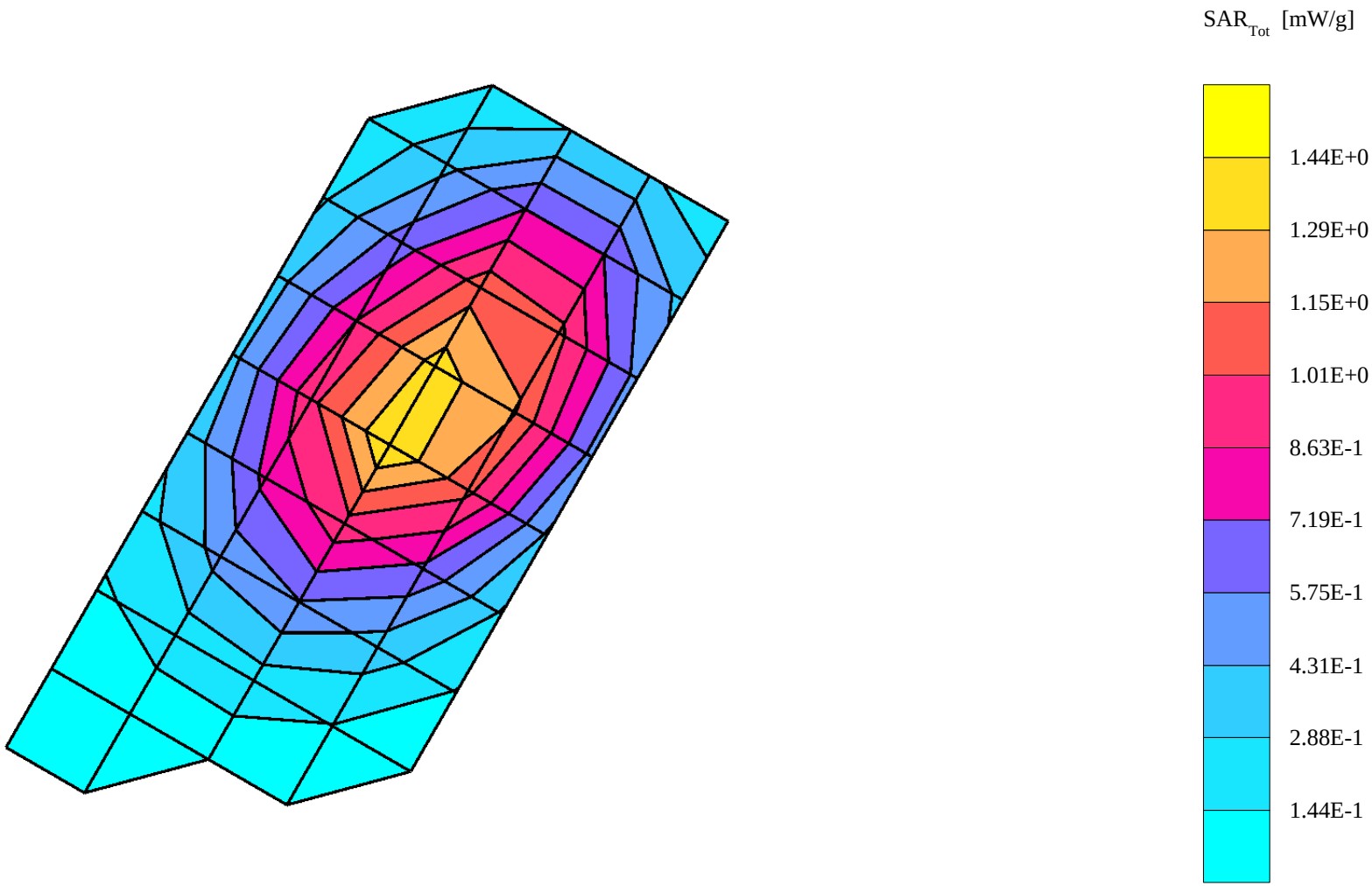
Appendix 2

SAR distribution plots for Phantom Head Adjacent Use

10/20/03

s/n: A8EE70AC

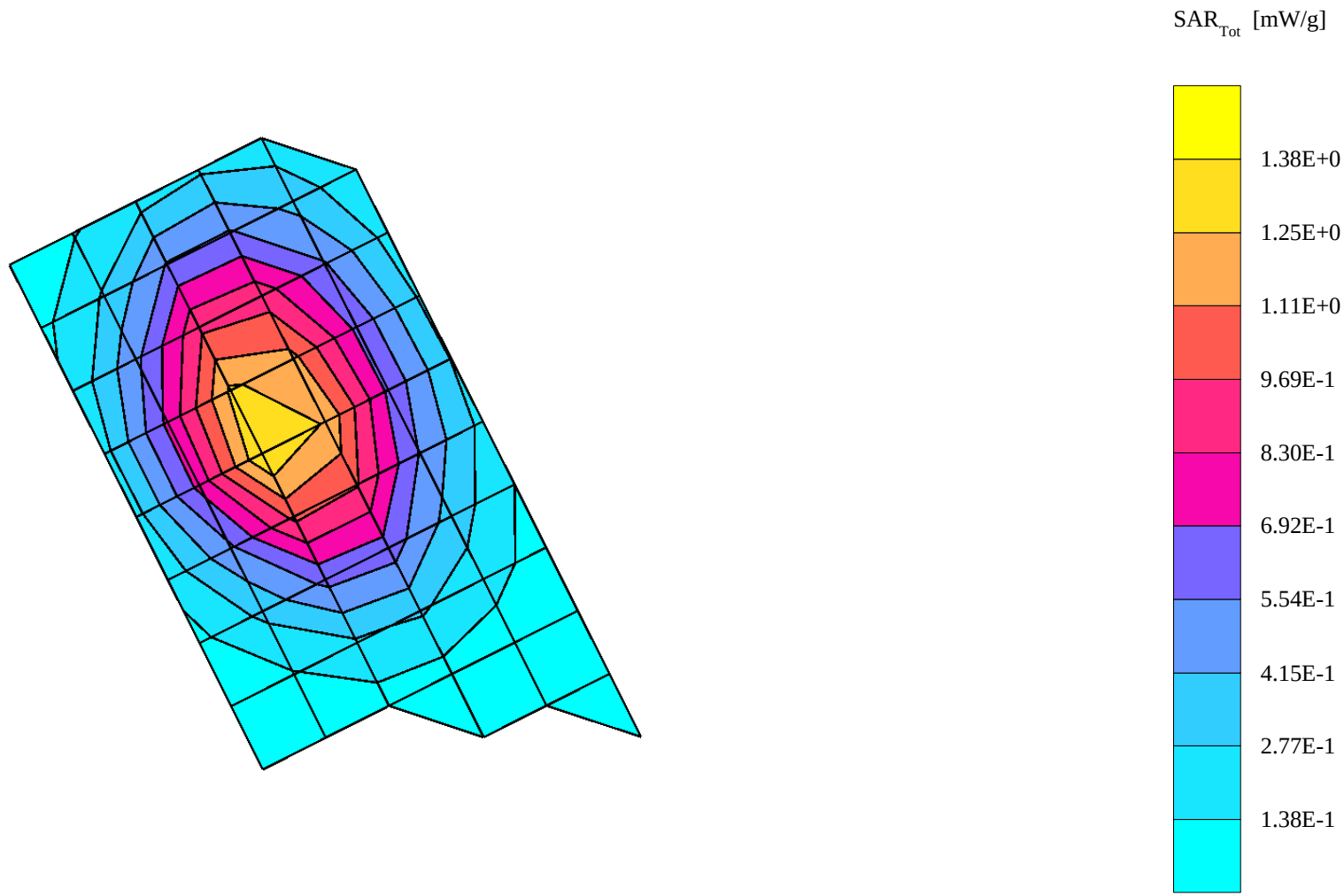
Ch# 384 / Pwr Step: 2 (OTA) Antenna Position: Ext
Type of Modulation: Analog Battery Model #: SNN5723A
DEVICE POSITION (cheek or rotated):Cheek
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 837 MHz
Probe: ET3DV6R - SN1506 - IEEE Head; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz Head & Body: σ = 0.91 mho/m ε_r = 42.2 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 1.43 mW/g, SAR (10g): 0.988 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 15.2 (14.1, 16.5) [mm]
Powerdrift: -0.01 dB



10/21/03

s/n: A8EE70AC

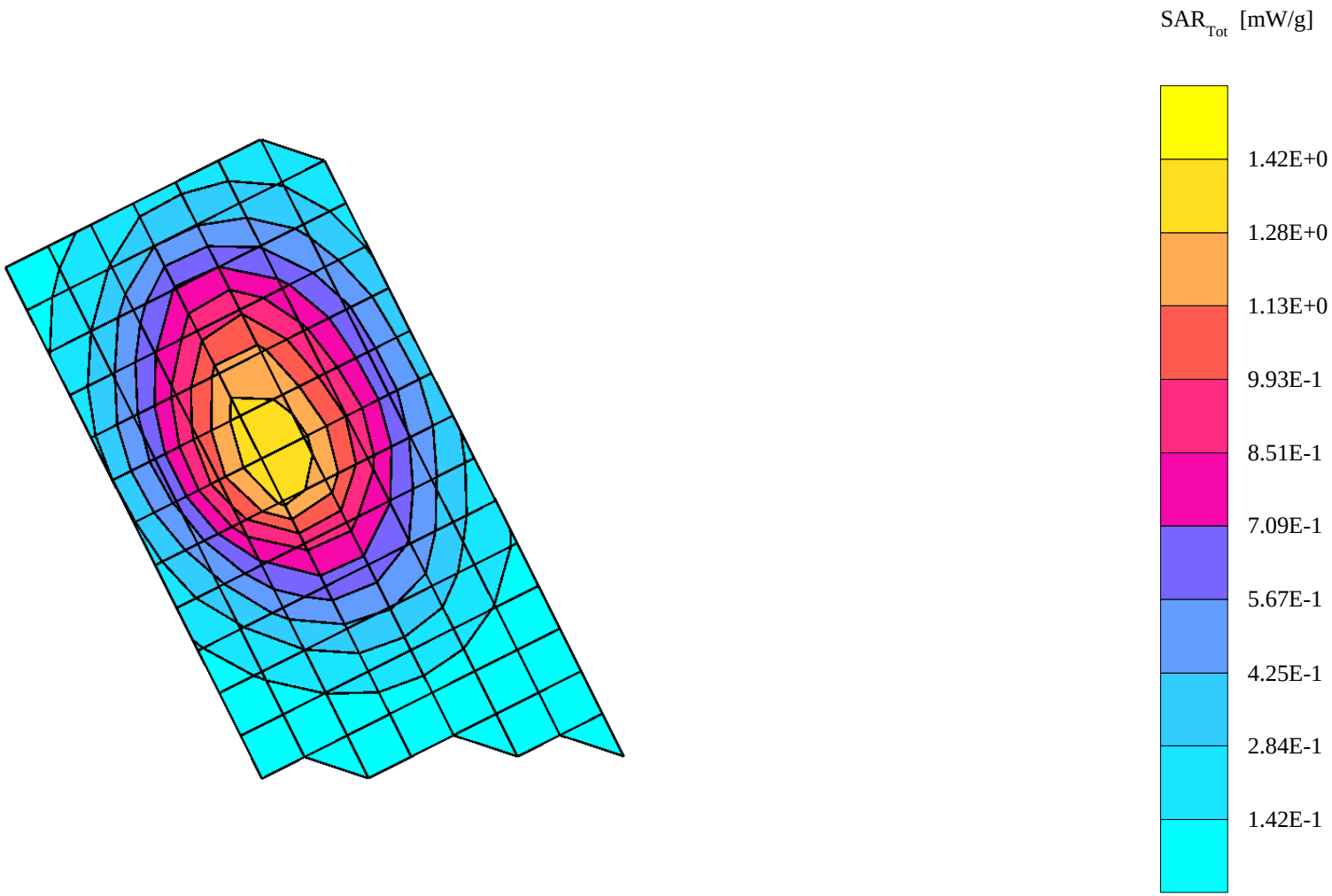
Ch#384 / Pwr Step: 02 Antenna Position EXT
Type of Modulation:800 ANALOG Battery Model #: SNN5723A
DEVICE POSITION (cheek or rotated): CHEEK
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03 Phantom; Right Hand Section; Position: (90°,180°); Frequency: 837 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz Head & Body: σ = 0.91 mho/m ε_r = 41.9 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 1.40 mW/g, SAR (10g): 0.957 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 15.0 (13.4, 16.8) [mm]
Powerdrift: -0.21 dB



10/21/03

s/n: A8EE70AC

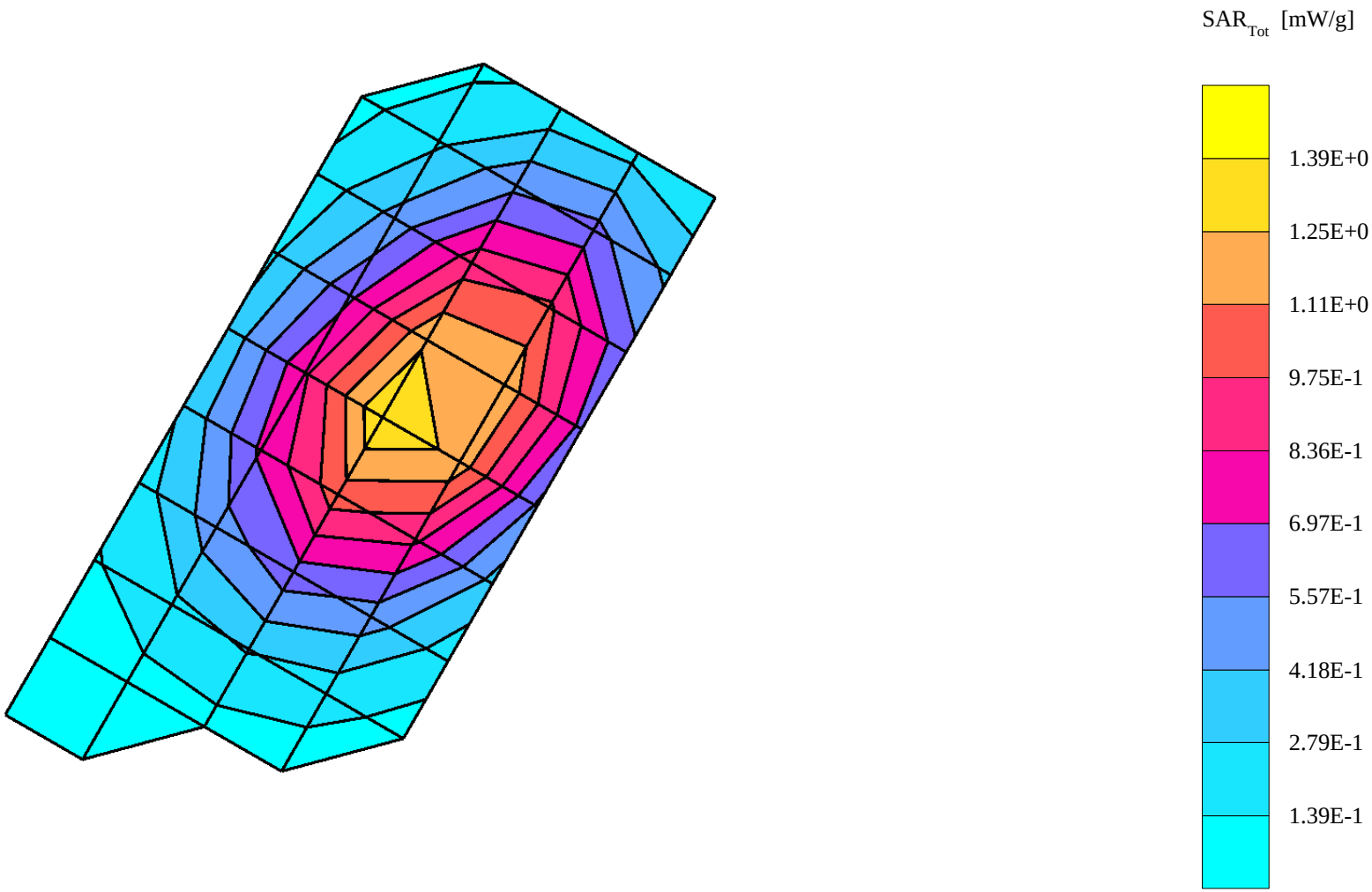
Ch#384 / Pwr Step:ALWAYS UP Antenna PositionEXT
Type of Modulation:800 CDMA Battery Model #: SNN5723A
DEVICE POSITION (cheek or rotated): CHEEK
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03 Phantom; Right Hand Section; Position: (90°,180°); Frequency: 837 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz Head & Body: σ = 0.91 mho/m ε_r = 41.9 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 1.36 mW/g, SAR (10g): 0.930 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Penetration depth: 15.8 (13.9, 17.6) [mm]
Powerdrift: -0.18 dB



10/20/03

s/n: A8EE70AC

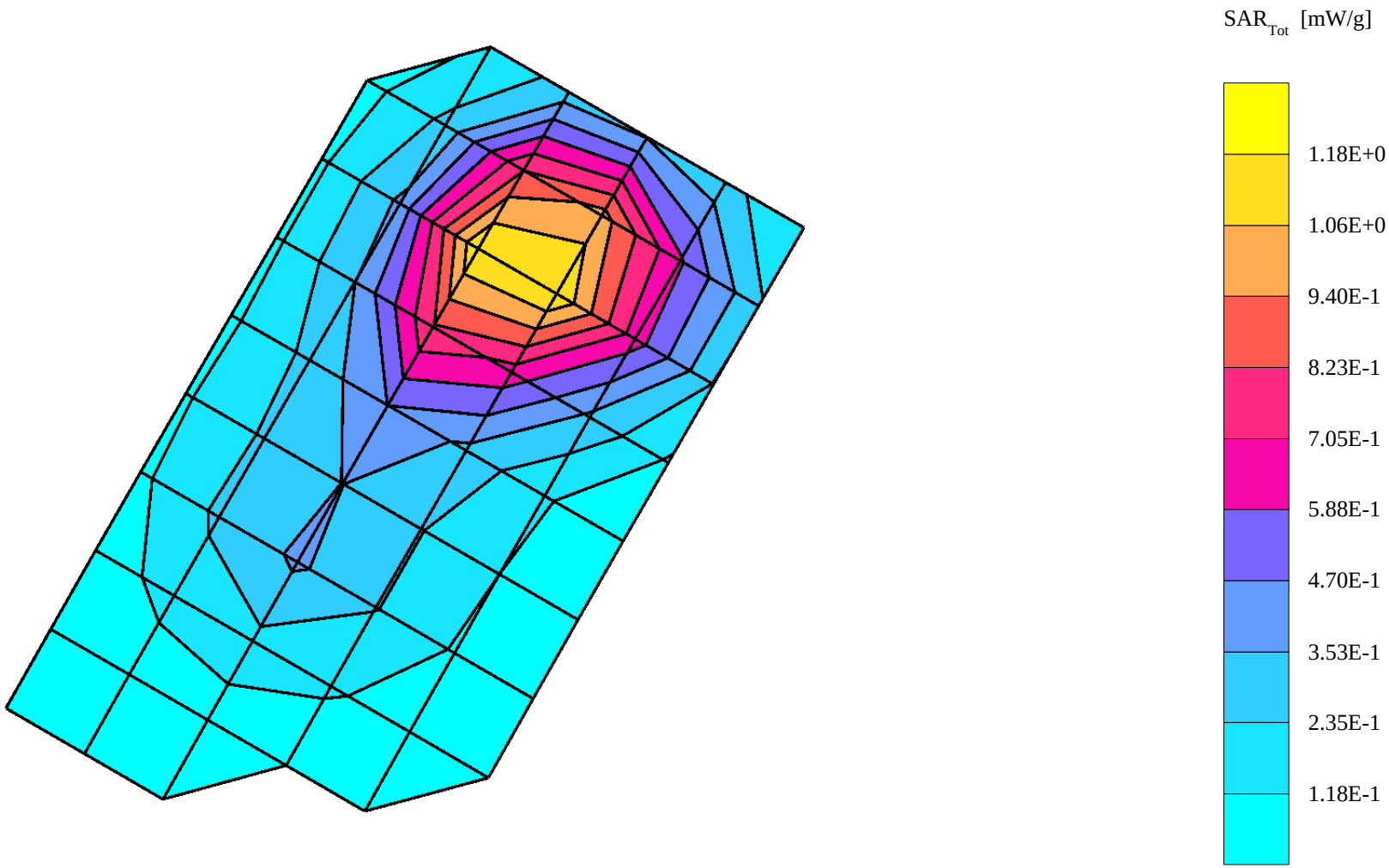
Ch# 384 / Pwr Step: Always Up Antenna Position: EXT
Type of Modulation: 800 CDMA Battery Model #: SNN5723A
DEVICE POSITION : Cheek
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 837 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz Head & Body: σ = 0.91 mho/m ε_r = 42.2 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 1.40 mW/g, SAR (10g): 0.967 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 15.3 (14.2, 16.5) [mm]
Powerdrift: -0.09 dB



10/28/03

s/n: ABEE70AC

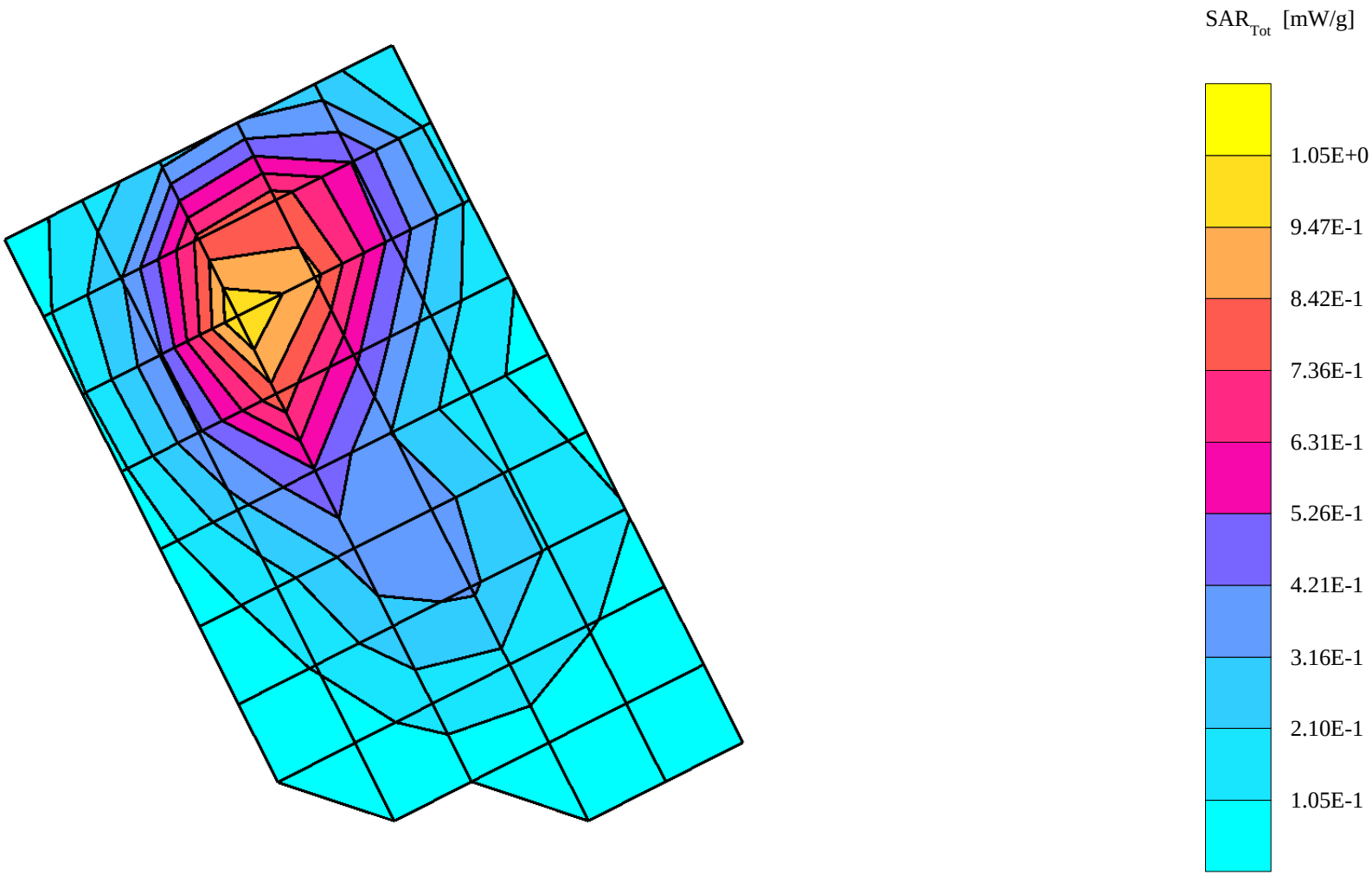
Ch# 25 Pwr Step:ALWAYS UP Antenna Position: RET
Type of Modulation:1900 CDMA Battery Model #: SNN5723A
DEVICE POSITION (cheek or rotated): CHEEK
R1 TP-1154 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 1851 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(4.90,4.90,4.90); Crest factor: 1.0; 1880 MHz Head & Body: σ = 1.47 mho/m ε_r = 38.2 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 1.34 mW/g, SAR (10g): 0.774 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 10.3 (10.1, 10.7) [mm]
Powerdrift: 0.05 dB



10/28/03

s/n: ABEE70AC

Ch# 25 Pwr Step:ALWAYS UP Antenna Position: RET
Type of Modulation:1900 CDMA Battery Model #: SNN5723A
DEVICE POSITION (cheek or rotated): CHEEK
R1 TP-1154 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Right Hand Section; Position: (90°,180°); Frequency: 1851 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(4.90,4.90,4.90); Crest factor: 1.0; 1880 MHz Head & Body: σ = 1.47 mho/m ε_r = 38.2 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 1.10 mW/g, SAR (10g): 0.645 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 11.0 (10.8, 11.3) [mm]
Powerdrift: -0.02 dB



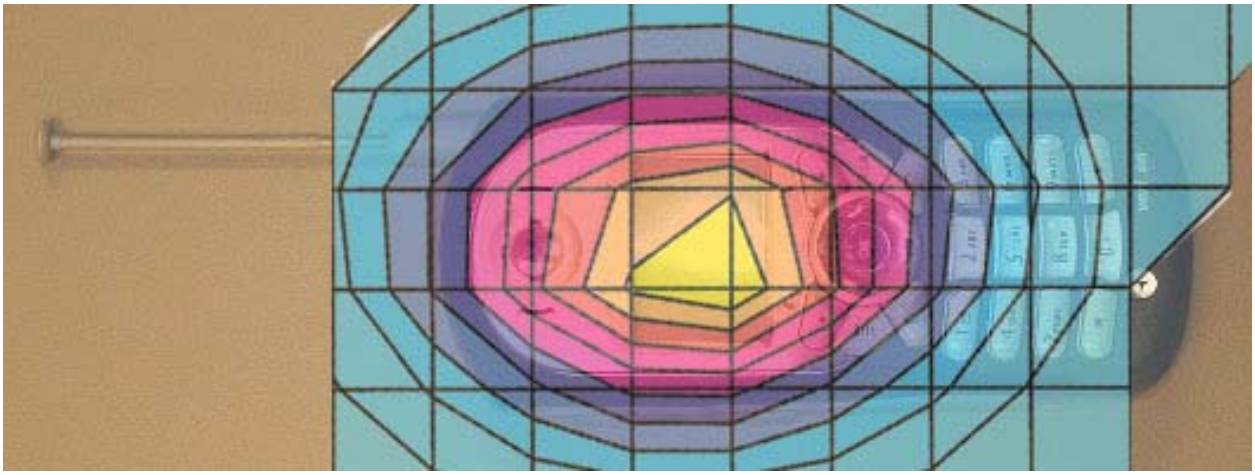


Figure 1.Typical 800MHz Head Adjacent Contour Overlaid on Phone (Cheek Touch)

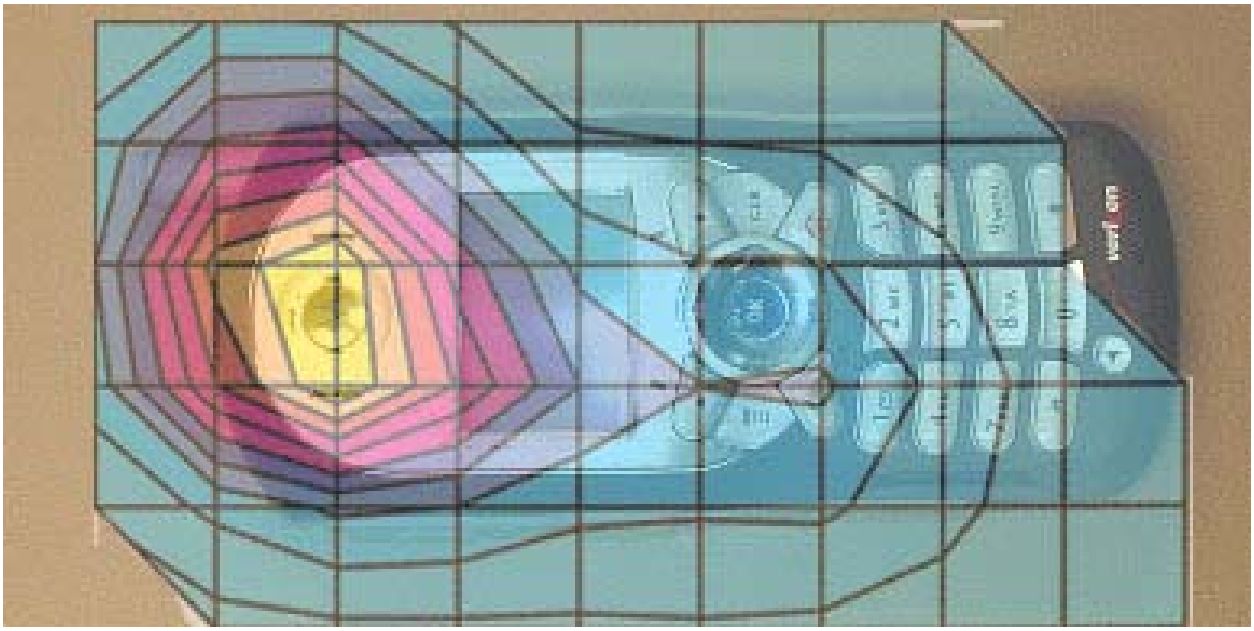
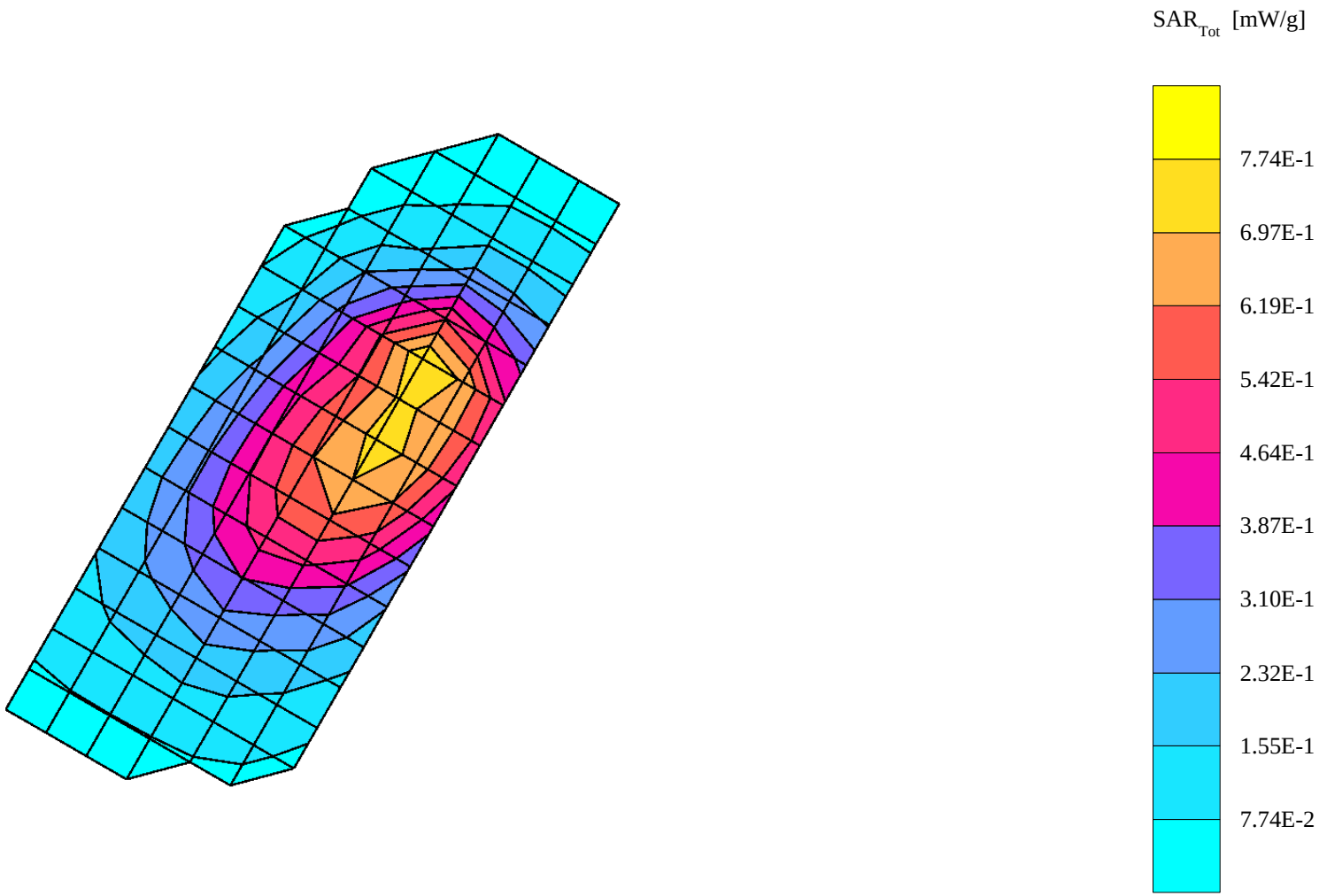


Figure 2.Typical 1900MHz Head Adjacent Contour Overlaid on Phone (Cheek Touch)

10/20/03

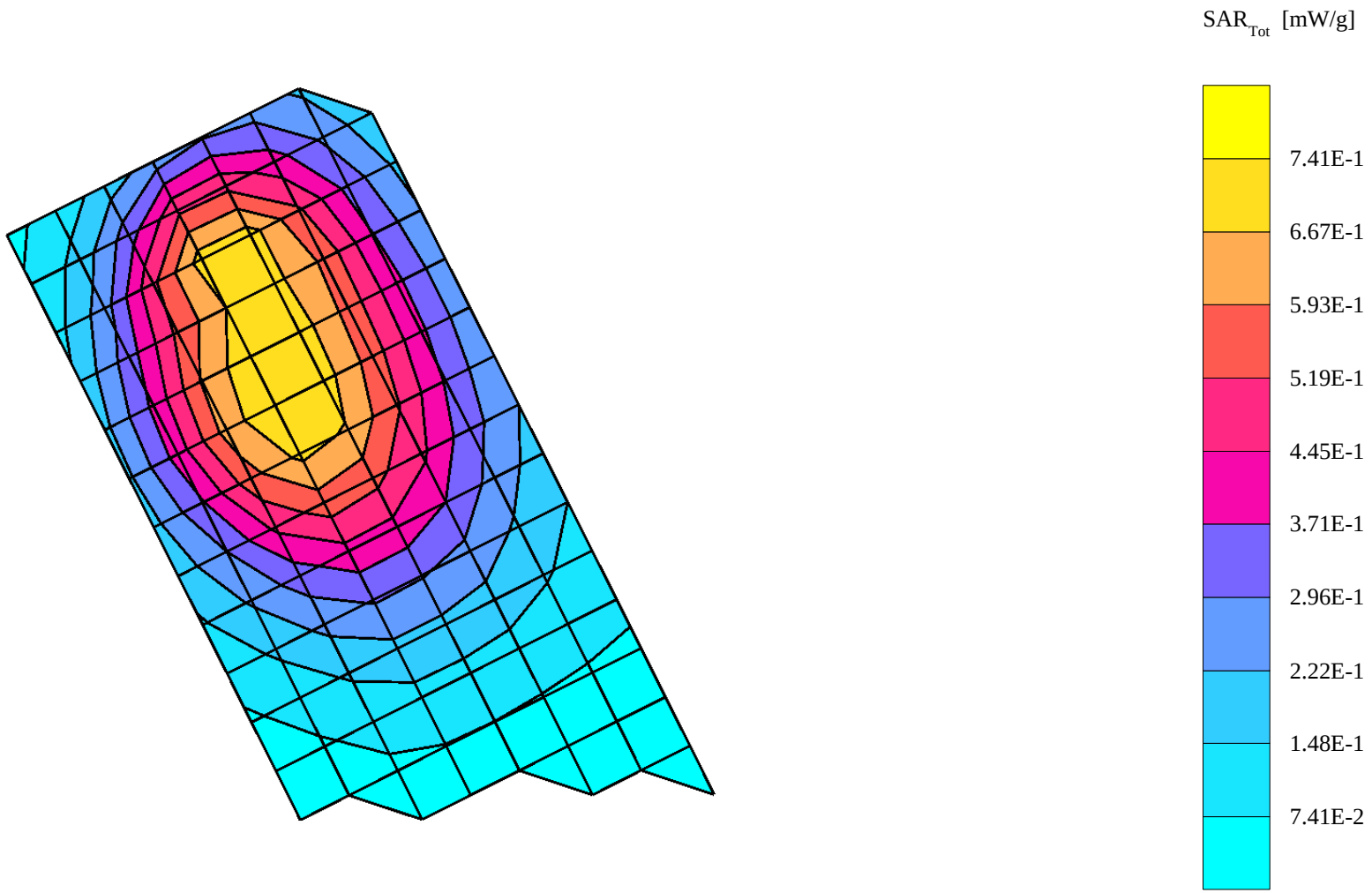
s/n: A8EE70AC

Ch# 384 / Pwr Step: Always Up Antenna Position: EXT
Type of Modulation: 800 AMPS Battery Model #: SNN5723A
DEVICE POSITION : Tilt 15*
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 837 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz Head & Body: σ = 0.91 mho/m ε_r = 42.2 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.758 mW/g, SAR (10g): 0.501 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Penetration depth: 12.2 (11.4, 13.3) [mm]
Powerdrift: 0.01 dB



s/n: A8EE70AC

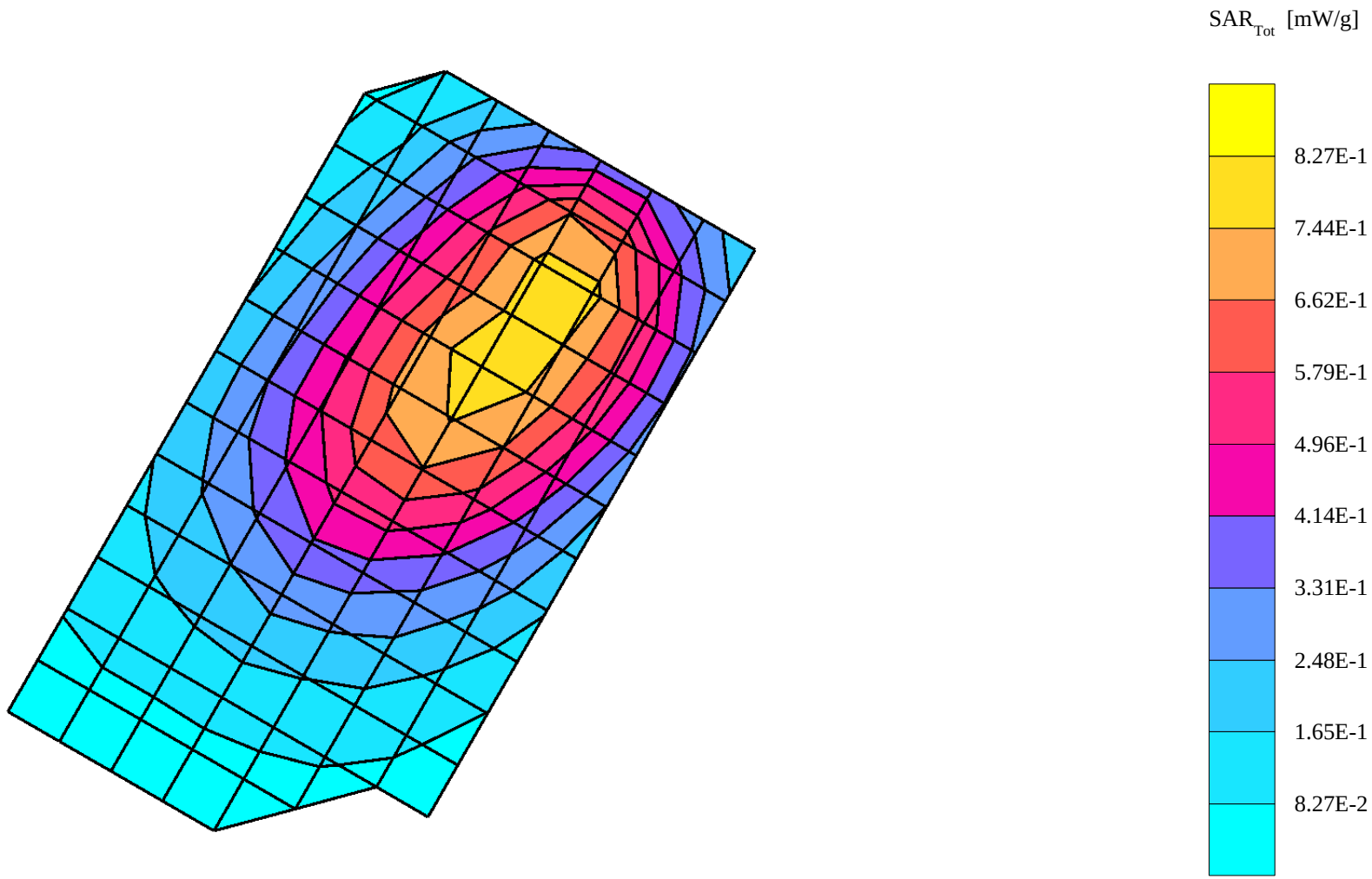
Ch# 384 / Pwr Step: 02 Antenna Position: EXT
Type of Modulation: ANALOG Battery Model #: SNN5723A
DEVICE POSITION (cheek or rotated): TILTED
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03 Phantom; Right Hand Section; Position: (90°,180°); Frequency: 837 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz Head & Body: σ = 0.90 mho/m ε_r = 41.6 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.750 mW/g, SAR (10g): 0.535 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Penetration depth: 16.4 (14.8, 18.1) [mm]
Powerdrift: -0.05 dB



10/21/03

s/n: A8EE70AC

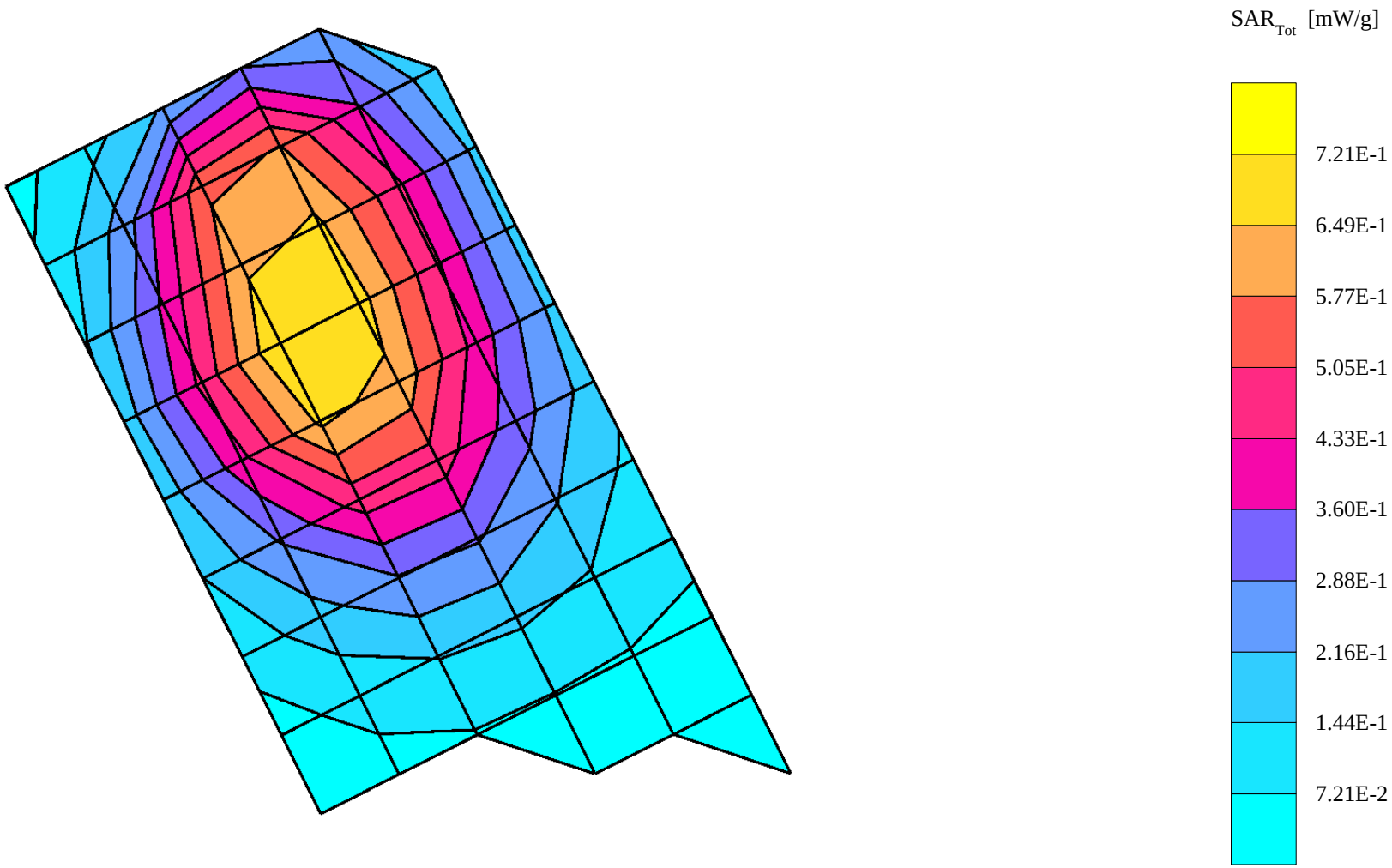
Ch# 384 / Pwr Step:ALWAYS UP Antenna Position:EXT
Type of Modulation: 800 CDMA Battery Model #: SNN5723A
DEVICE POSITION (cheek or rotated): TILTED
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 837 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz Head & Body: σ = 0.91 mho/m ε_r = 41.9 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.801 mW/g, SAR (10g): 0.568 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Penetration depth: 16.5 (15.1, 17.8) [mm]
Powerdrift: -0.31 dB



10/21/03

s/n: A8EE70AC

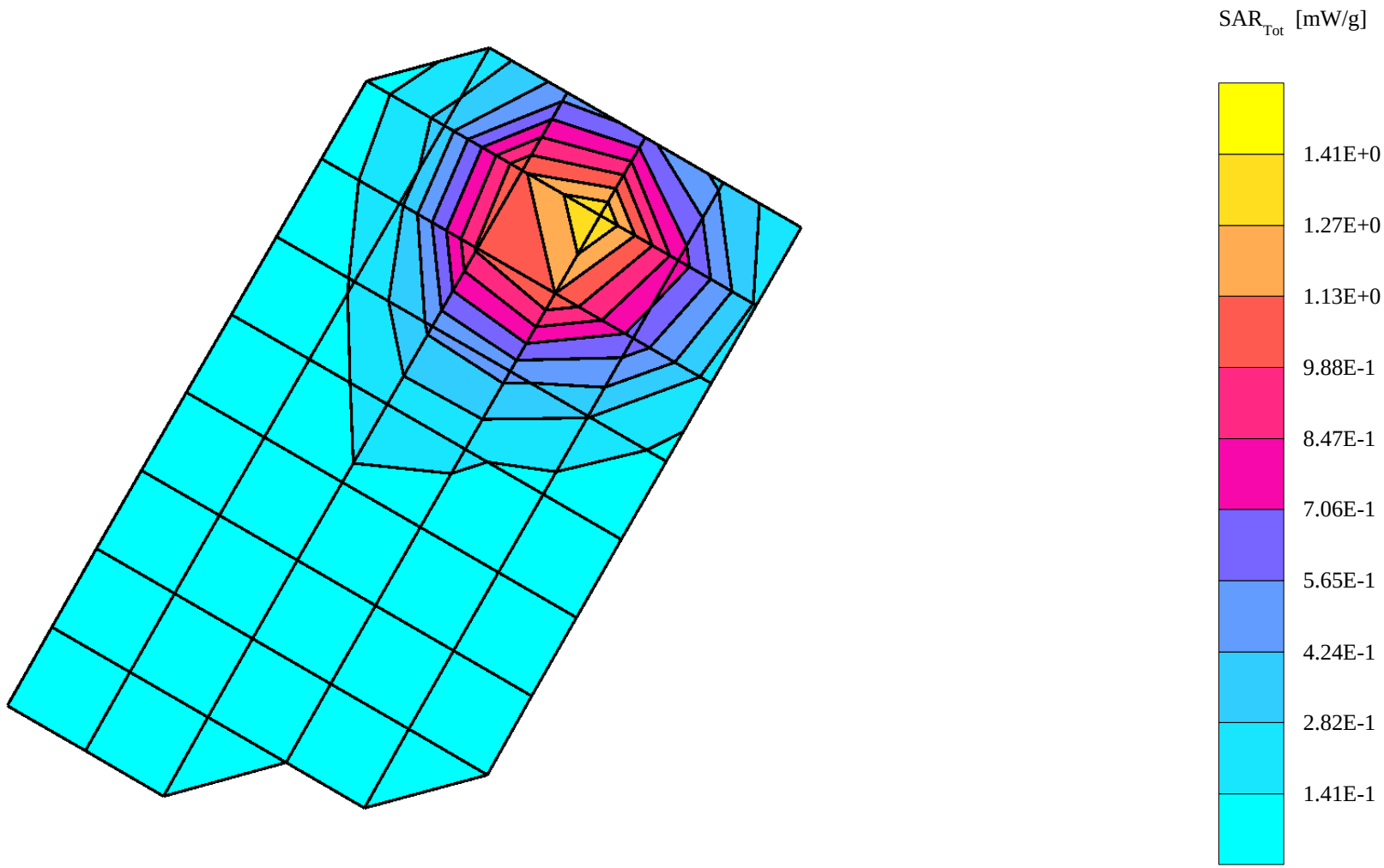
Ch#384 / Pwr Step:ALWAYS UP Antenna Position EXT
Type of Modulation:800 CDMA Battery Model #: SNN5723A
DEVICE POSITION (cheek or rotated): TILT
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03 Phantom; Right Hand Section; Position: (90°,180°); Frequency: 837 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz Head & Body: σ = 0.91 mho/m ε_r = 41.9 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.725 mW/g, SAR (10g): 0.522 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 16.7 (15.3, 18.2) [mm]
Powerdrift: -0.33 dB



10/28/03

s/n: ABEE70AC

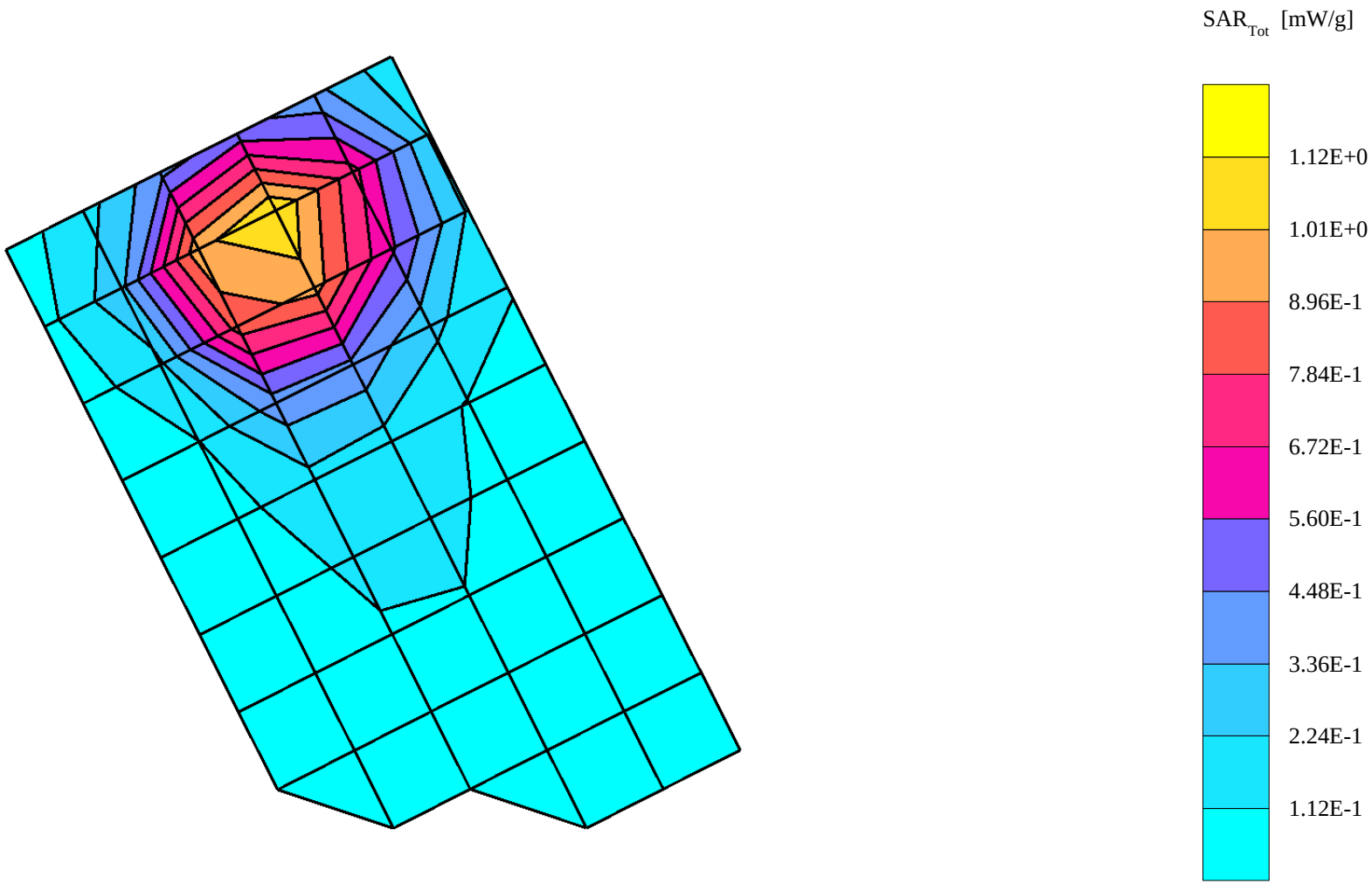
Ch# 25 Pwr Step:0 Antenna Position: RET
Type of Modulation:1900 CDMA Battery Model #: SNN5723A
DEVICE POSITION (cheek or rotated): TILTED
R1 TP-1154 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 1851 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(4.90,4.90,4.90); Crest factor: 1.0; 1880 MHz Head & Body: σ = 1.47 mho/m ε_r = 38.2 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 1.51 mW/g, SAR (10g): 0.861 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 9.7 (9.4, 10.3) [mm]
Powerdrift: -0.04 dB



10/28/03

s/n: ABEE70AC

Ch# 25 Pwr Step:ALWAYS UP Antenna Position: RET
Type of Modulation:1900 CDMA Battery Model #: SNN5723A
DEVICE POSITION (cheek or rotated): TILT
R1 TP-1154 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Right Hand Section; Position: (90°,180°); Frequency: 1851 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(4.90,4.90,4.90); Crest factor: 1.0; 1880 MHz Head & Body: σ = 1.47 mho/m ε_r = 38.2 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 1.27 mW/g, SAR (10g): 0.720 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 9.7 (9.5, 10.1) [mm]
Powerdrift: 0.02 dB



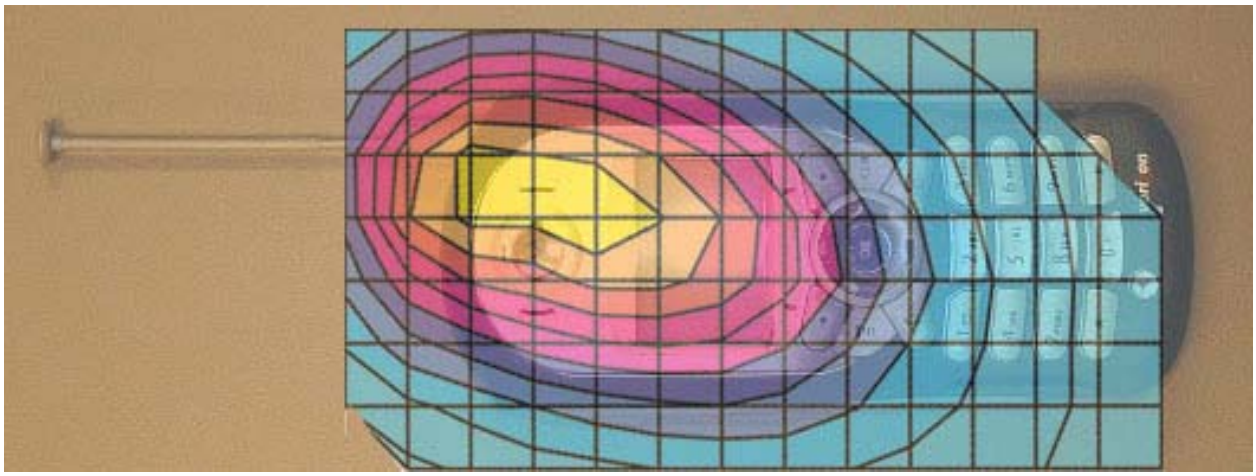


Figure 3.Typical 800MHz Head Adjacent Contour Overlaid on Phone (15 ˚ Tilt)

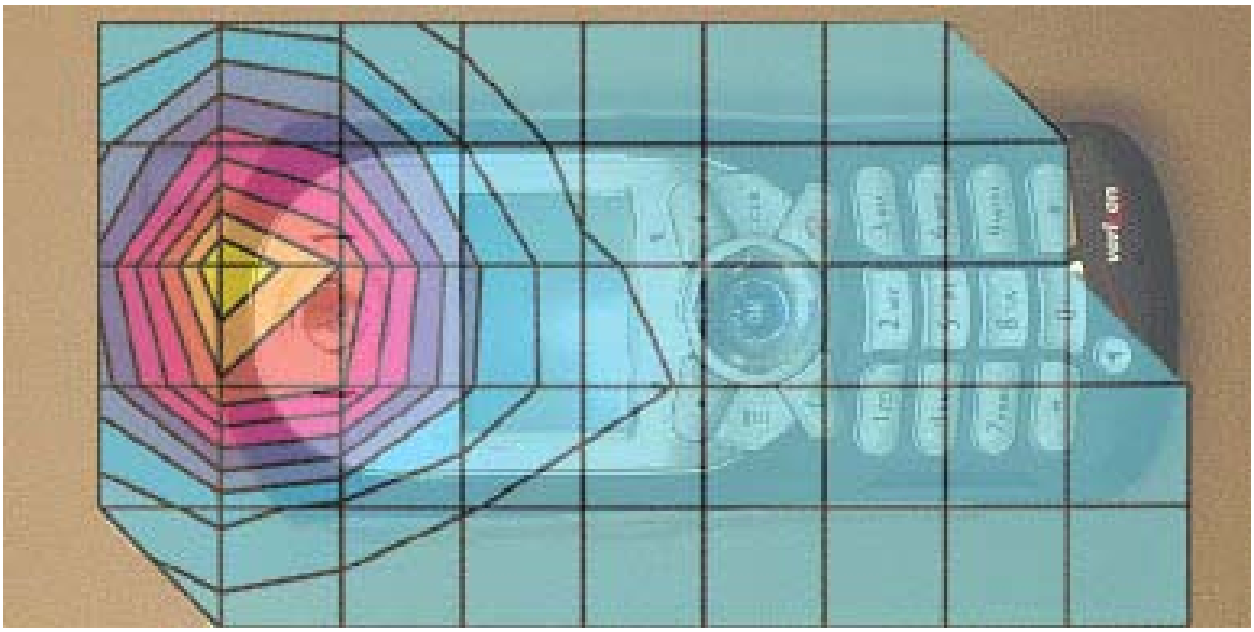


Figure 4.Typical 1900MHz Head Adjacent Contour Overlaid on Phone (15 ˚ Tilt)

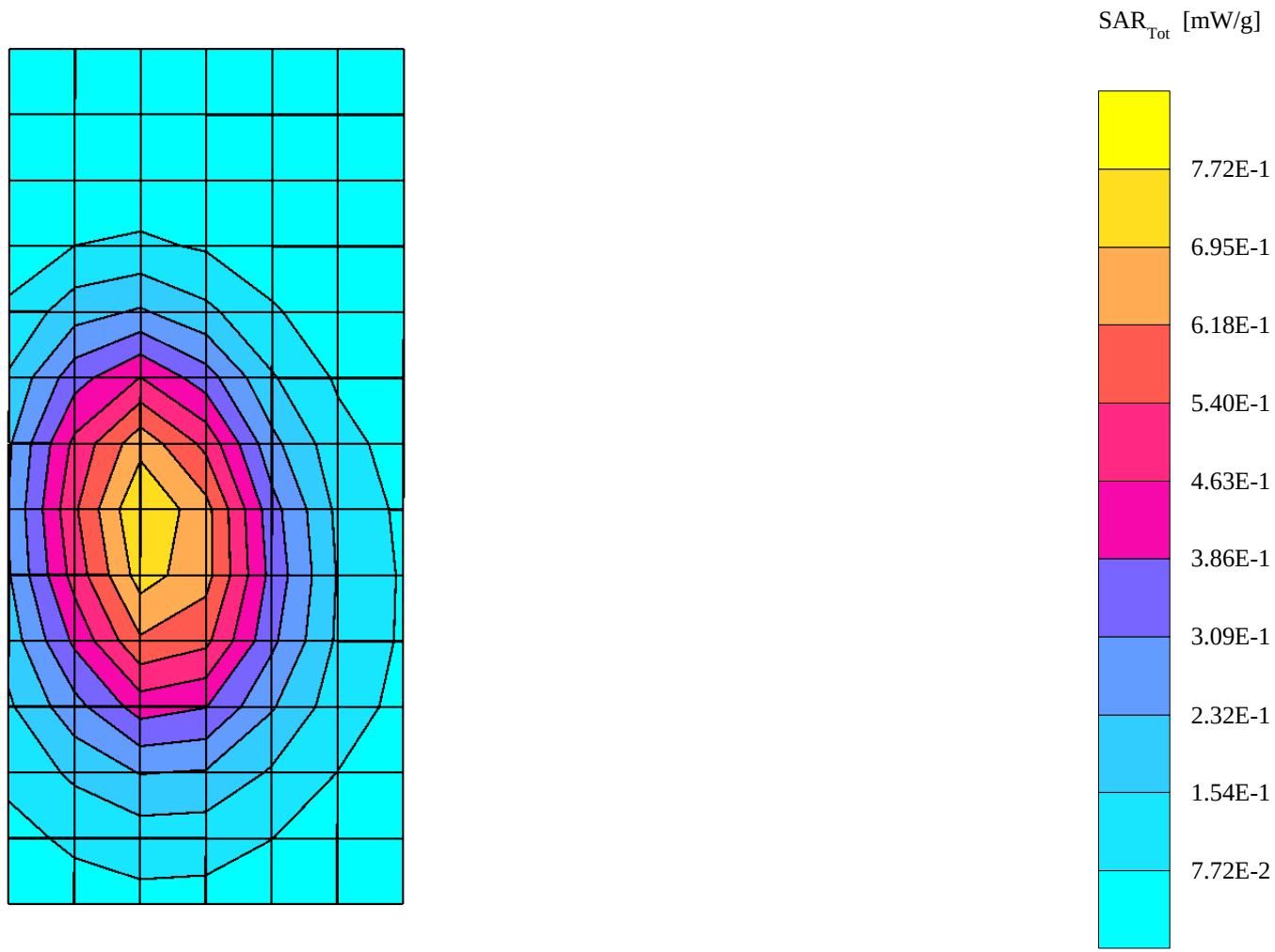
Appendix 3

SAR distribution plots for Body Worn Configuration

10/29/03

s/n: ABEE70AC

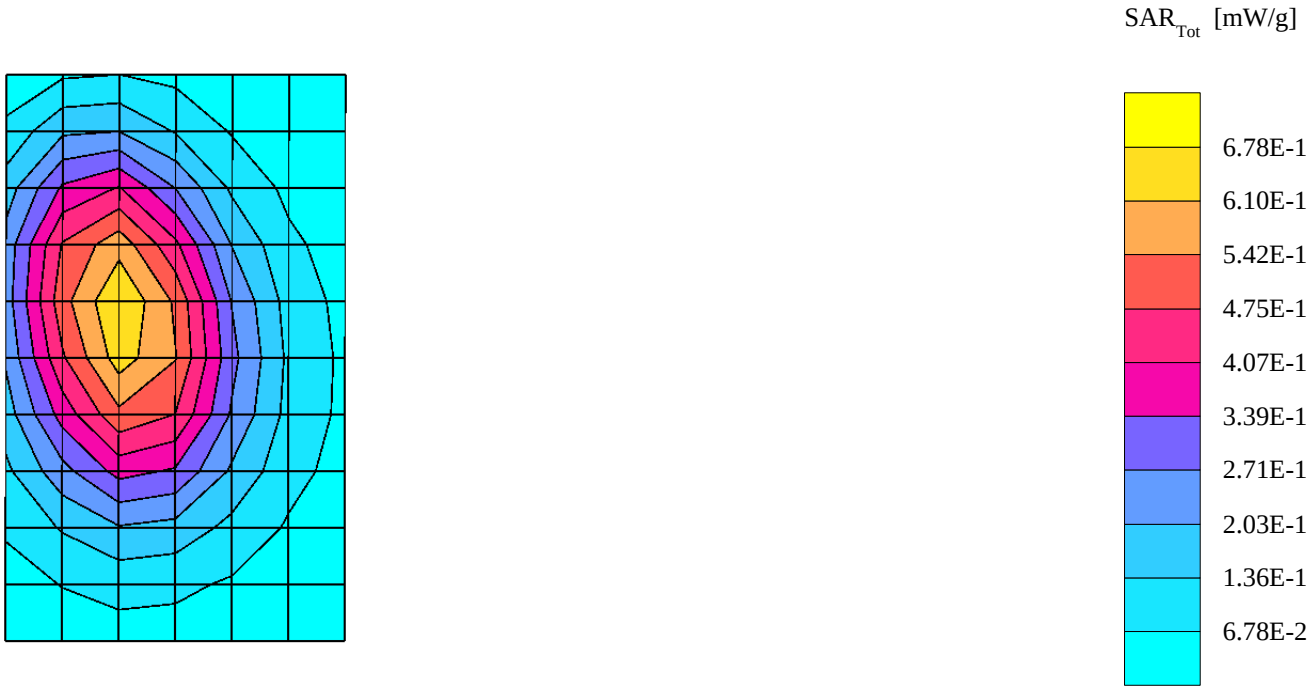
Ch384 / Pwr Step: 02 Antenna Position:EXT
Type of Modulation:ANALOG Battery Model #: SNN5723A
Accessory Model # =MOTPSC001
R1 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 1 Section; Position: (0°,0°); Frequency: 836 MHz
Probe: ET3DV6R - SN1506 - FCC Body.2; ConvF(5.80,5.80,5.80); Crest factor: 1.0; 835 MHz Head & Body: σ = 0.97 mho/m ε_r = 53.7 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.769 mW/g, SAR (10g): 0.544 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 15.9 (14.9, 17.0) [mm]
Powerdrift: -0.02 dB



10/29/03

s/n: A8EE70AC

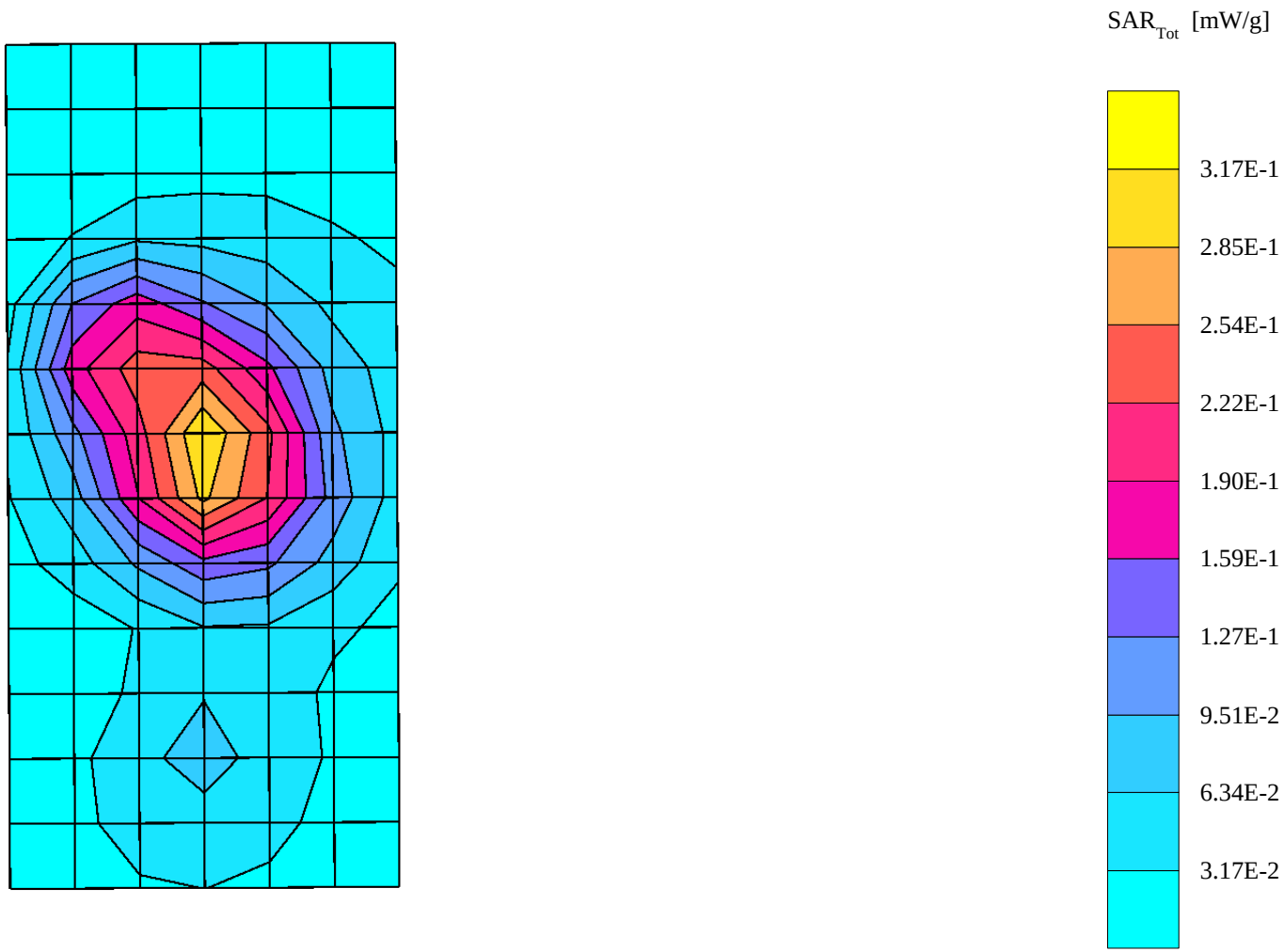
Ch384 / Pwr Step:ALWAYS UP Antenna Position: RET
Type of Modulation:800 CDMA Battery Model #: SNN5723A
Accessory Model # = MOTPSC001
R1 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 1 Section; Position: (0°,0°); Frequency: 836 MHz
Probe: ET3DV6R - SN1506 - FCC Body.2; ConvF(5.80,5.80,5.80); Crest factor: 1.0; 835 MHz Head & Body: σ = 0.97 mho/m ε_r = 53.7 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.687 mW/g, SAR (10g): 0.481 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 15.4 (14.2, 16.8) [mm]
Powerdrift: -0.22 dB



10/29/03

s/n: A8EE70AC

Ch600 / Pwr Step: ALWAYS UP Antenna PositionEXT
Type of Modulation1900 CDMA Battery Model #: SNN5723A
Accessory Model # = MOTPSC001
R1 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 2 Section; Position: (0°,0°); Frequency: 1880 MHz
Probe: ET3DV6R - SN1506 - FCC Body.2; ConvF(4.50,4.50,4.50); Crest factor: 1.0; 1880 MHz Head & Body: σ = 1.57 mho/m ε_r = 51.2 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.320 mW/g, SAR (10g): 0.194 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 10.2 (9.0, 11.8) [mm]
Powerdrift: 0.01 dB



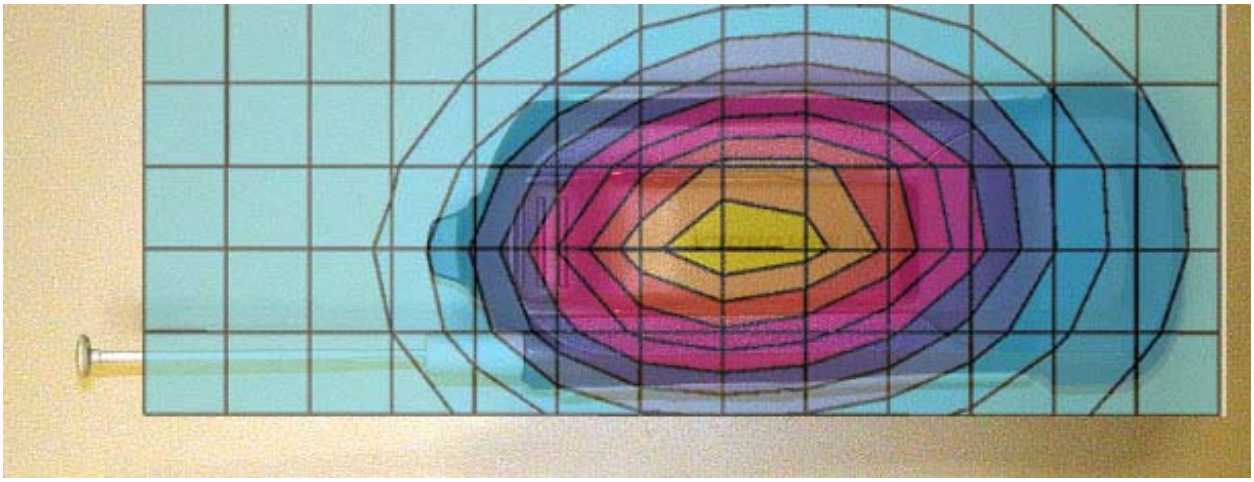


Figure 5.Typical 800MHz Body-Worn Contour Overlaid on Phone.

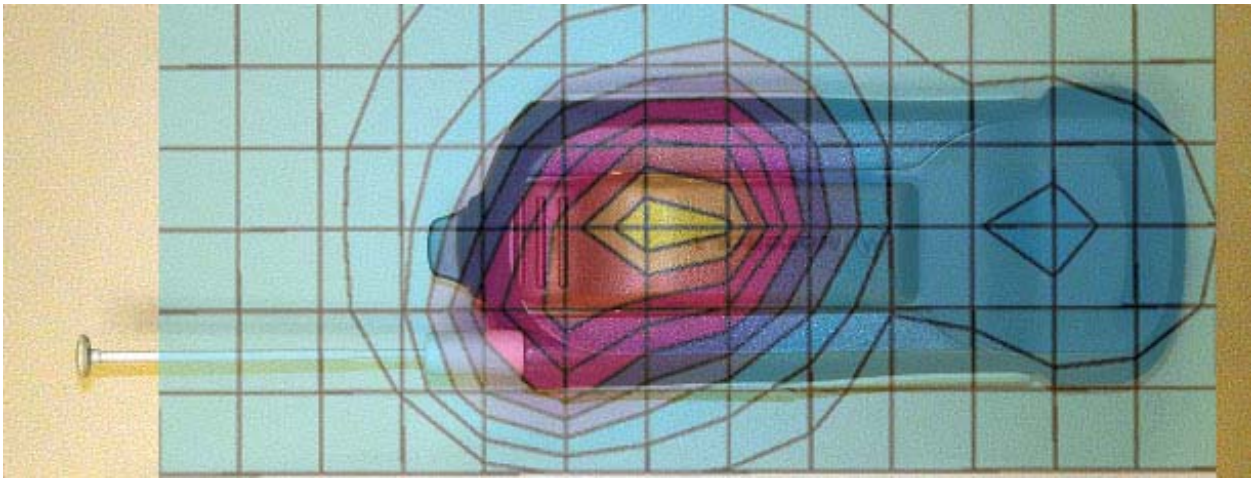


Figure 6. Typical 1900 MHz Body-Worn Contour Overlaid on Phone.

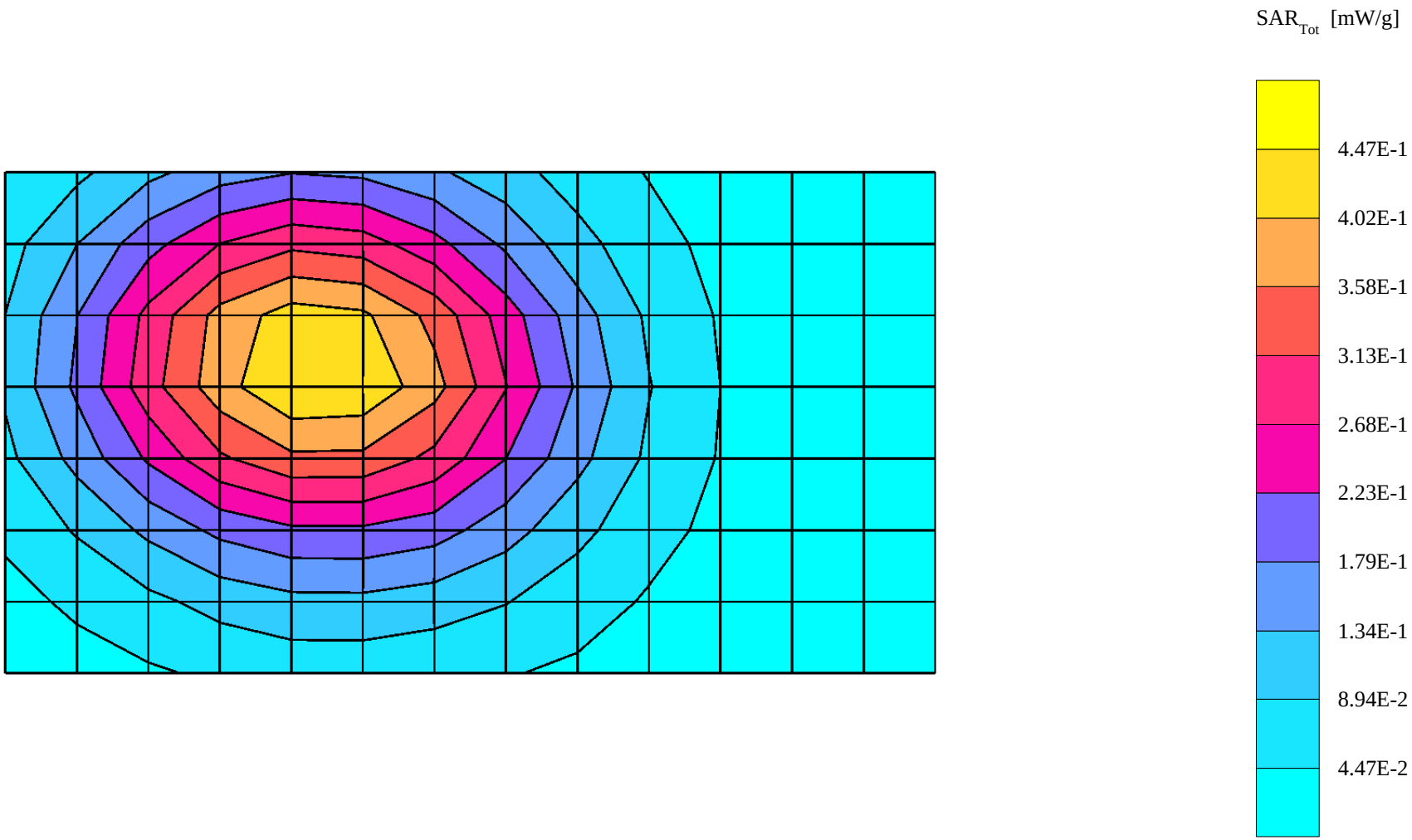
Appendix 4

SAR distribution plots for Push to Talk Configuration

10/31/03

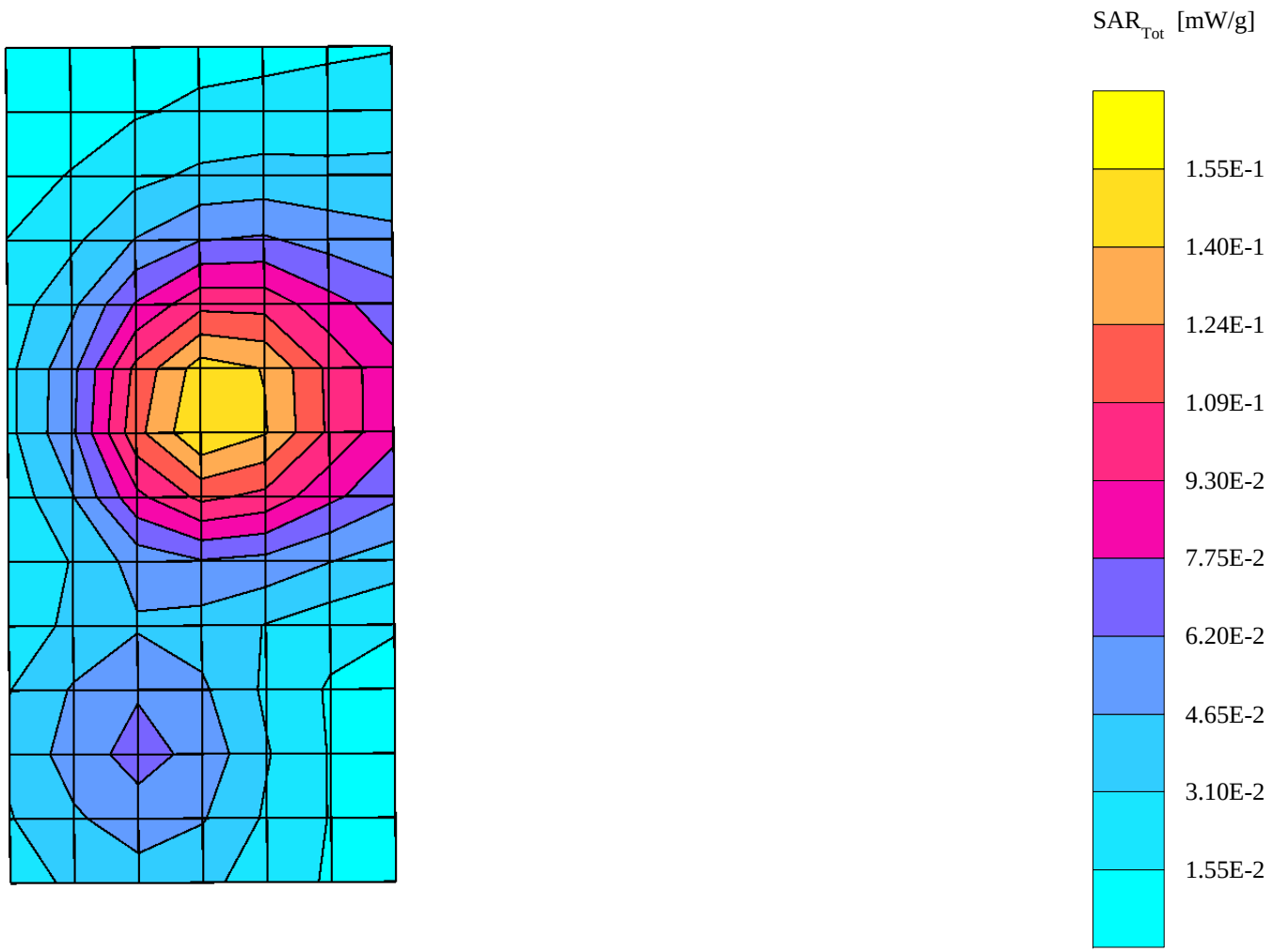
s/n: ABEE70AC

Ch# 384 / Pwr Step: Always Up Antenna Position:Extended
Type of Modulation: CDMA PTT Battery Model #: SNN5723A
Accessory Model # = Front of Phone 1 Inch From Phantom
R1 TP-1005 SAM Expanded Sugar (Rev. 2)-9Jan03 Phantom; Flat Section; Position: (0°,0°); Frequency: 836 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 MHz Head & Body: σ = 0.91 mho/m ε_r = 42.1 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.444 mW/g, SAR (10g): 0.316 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 15.4 (14.3, 16.5) [mm]
Powerdrift: -0.11 dB



s/n: ABEE70AC

Ch# 600 / Pwr Step: All Up Bits
Antenna Position: Retracted
Type of Modulation: CDMA 1900 PTT
Battery Model #: SNN5723A
Front of Phone 1in. from Phantom
R1 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 2 Section; Position: (0°,0°); Frequency: 1880 MHz
Probe: ET3DV6R - SN1506 - IEEE Head.2; ConvF(4.90,4.90,4.90); Crest factor: 1.0; 1880 MHz Head & Body: σ = 1.45 mho/m ε_r = 38.2 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.158 mW/g, SAR (10g): 0.0987 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 9.9 (9.4, 10.8) [mm]
Powerdrift: -0.09 dB



Appendix 5

Probe Calibration Certificate

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

Client Motorola MRO

CALIBRATION CERTIFICATE

Object(s)	ET3DV6R - SN:1506
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	May 14, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

Date issued: May 15, 2003

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

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

Probe ET3DV6R

SN:1506

Manufactured:	October 24, 1999
Last calibration:	May 3, 2002
Recalibrated:	May 14, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6R SN:1506

Sensitivity in Free Space

NormX	**2.22**	$\mu V/(V/m)^2$
NormY	**2.04**	$\mu V/(V/m)^2$
NormZ	**1.22**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**97**	mV
DCP Y	**97**	mV
DCP Z	**97**	mV

Sensitivity in Tissue Simulating Liquid

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

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

ConvF X	**6.1**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.1**	± 9.5% (k=2)	Alpha	**0.60**
ConvF Z	**6.1**	± 9.5% (k=2)	Depth	**2.02**

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

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

ConvF X	**4.9**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.9**	± 9.5% (k=2)	Alpha	**0.61**
ConvF Z	**4.9**	± 9.5% (k=2)	Depth	**2.37**

Boundary Effect

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

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	11.0	5.7
SAR_{be} [%]	With Correction Algorithm	0.3	0.5

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

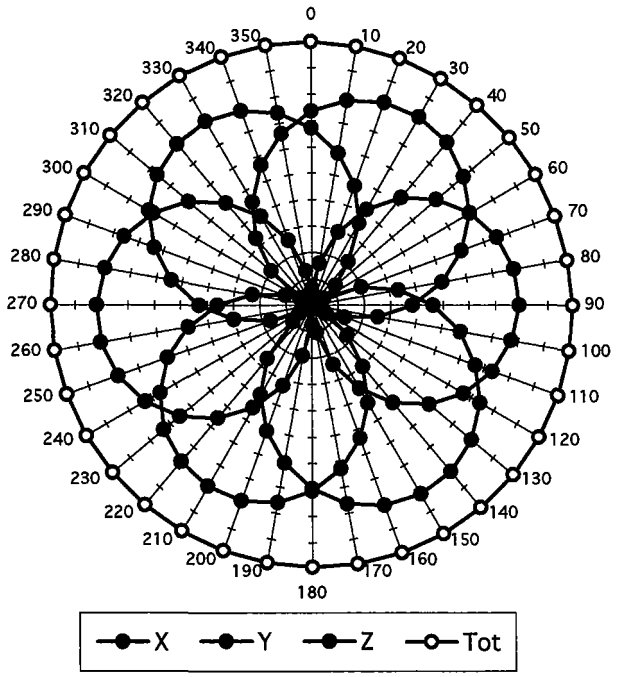
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	14.6	9.3
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

Sensor Offset

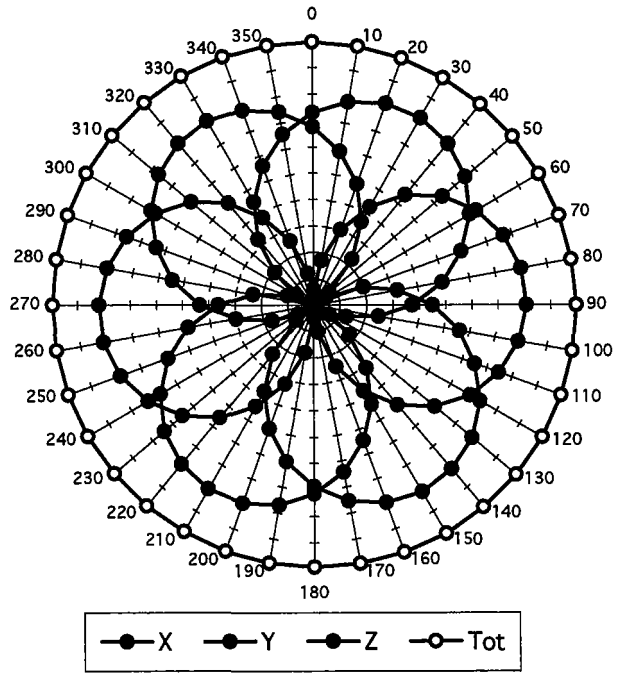
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection		mm

Receiving Pattern (ϕ), θ = 0°

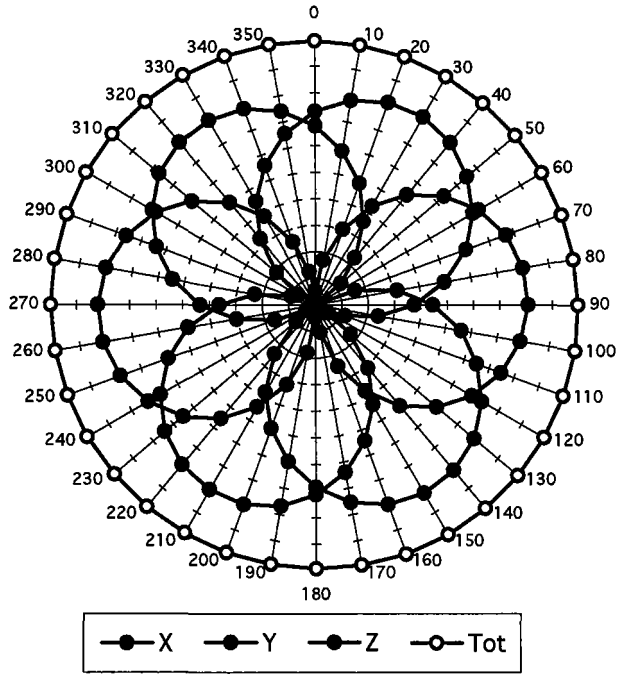
f = 30 MHz, TEM cell ifi110



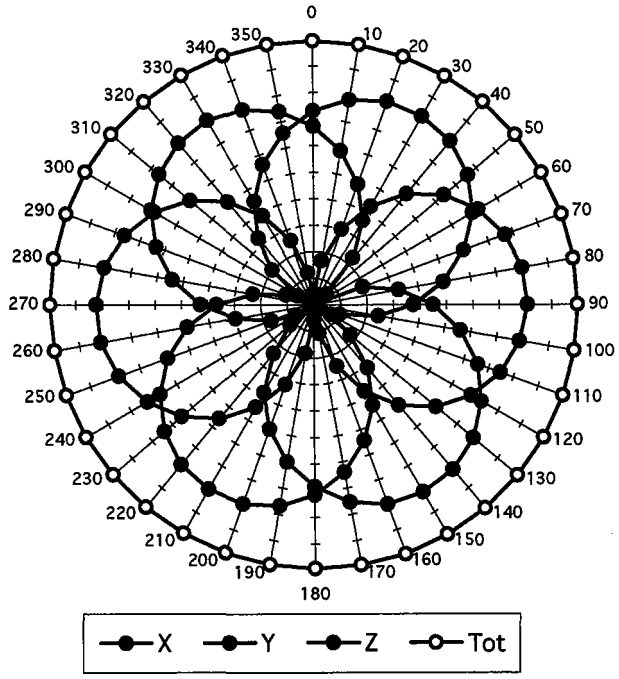
f = 100 MHz, TEM cell ifi110

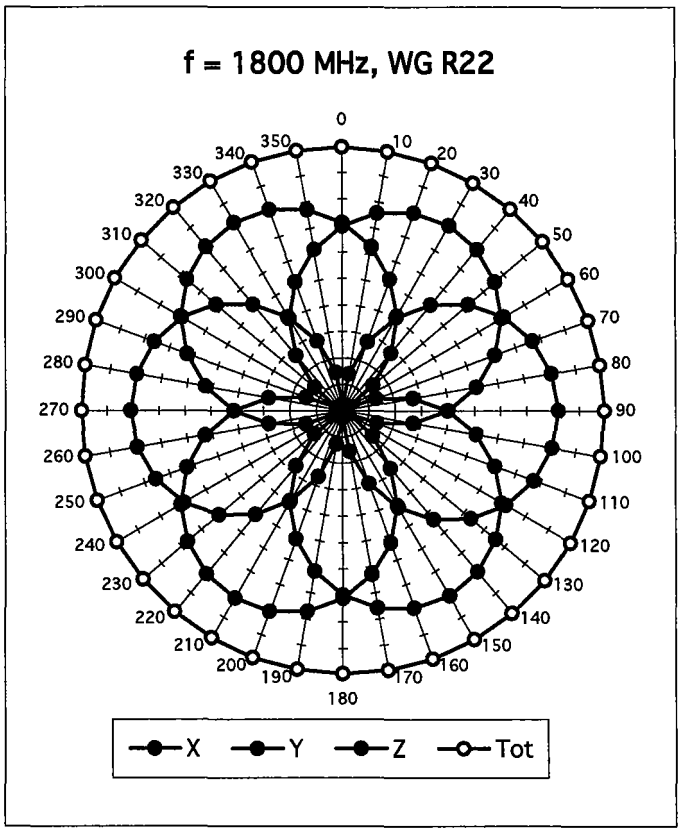


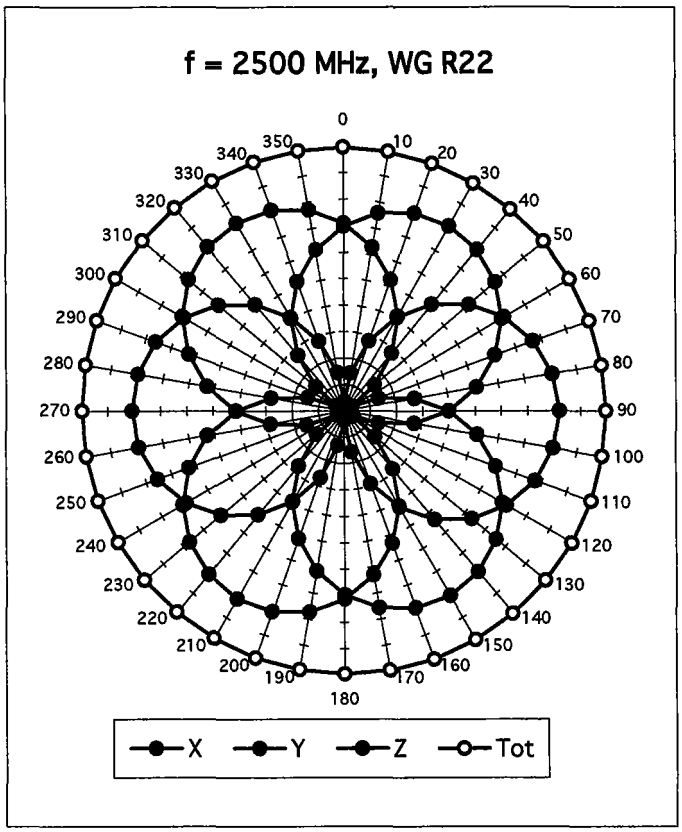
f = 300 MHz, TEM cell ifi110



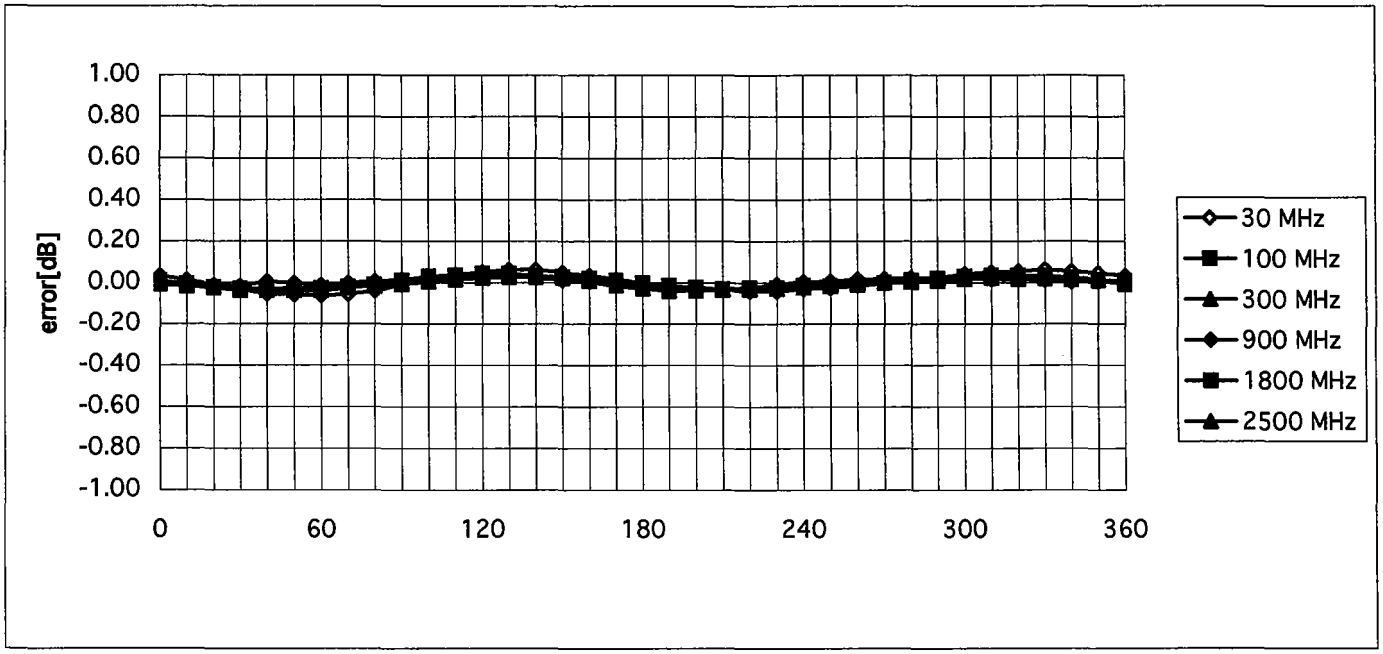
f = 900 MHz, TEM cell ifi110





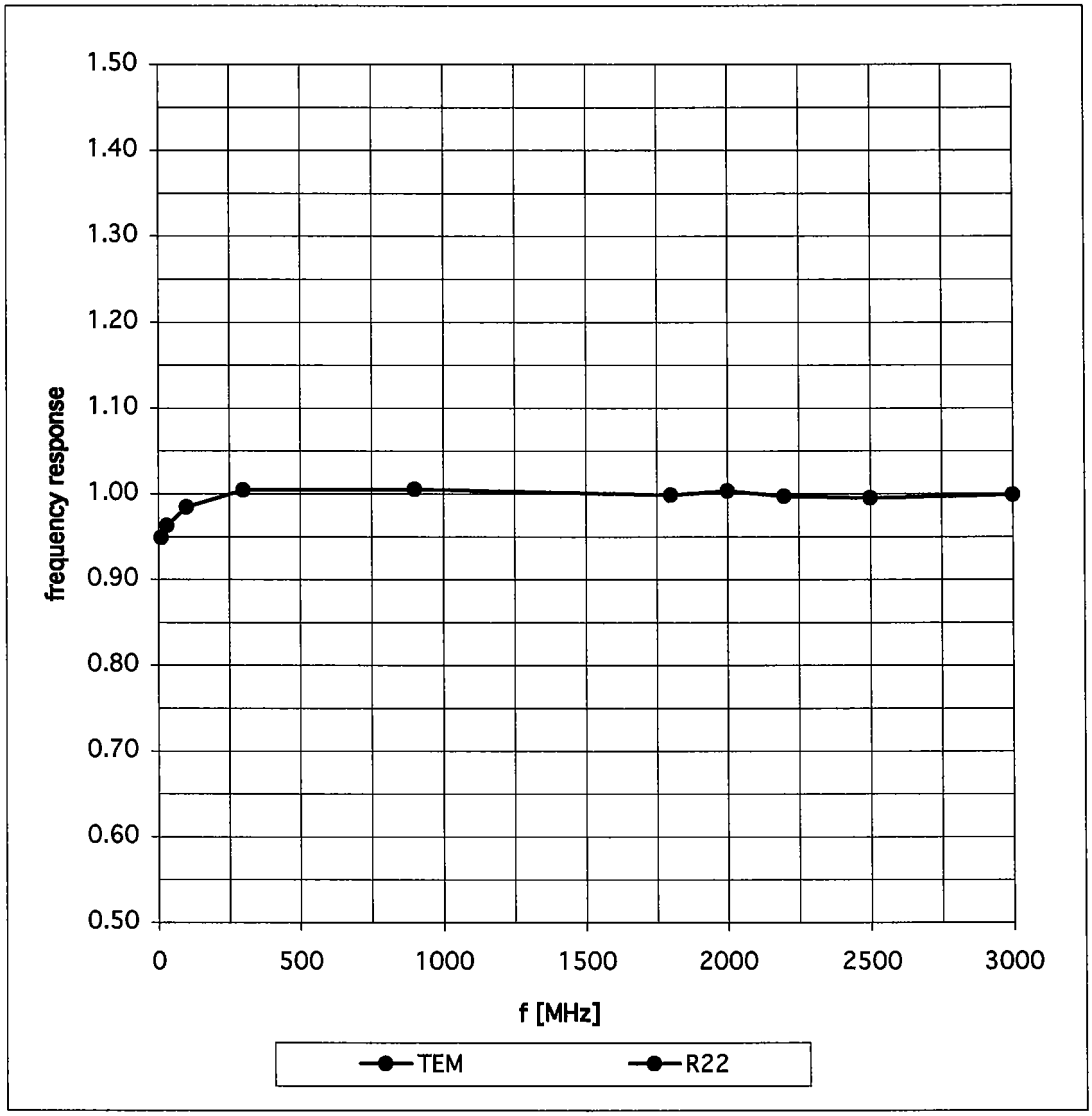


Isotropy Error (ϕ), θ = 0°



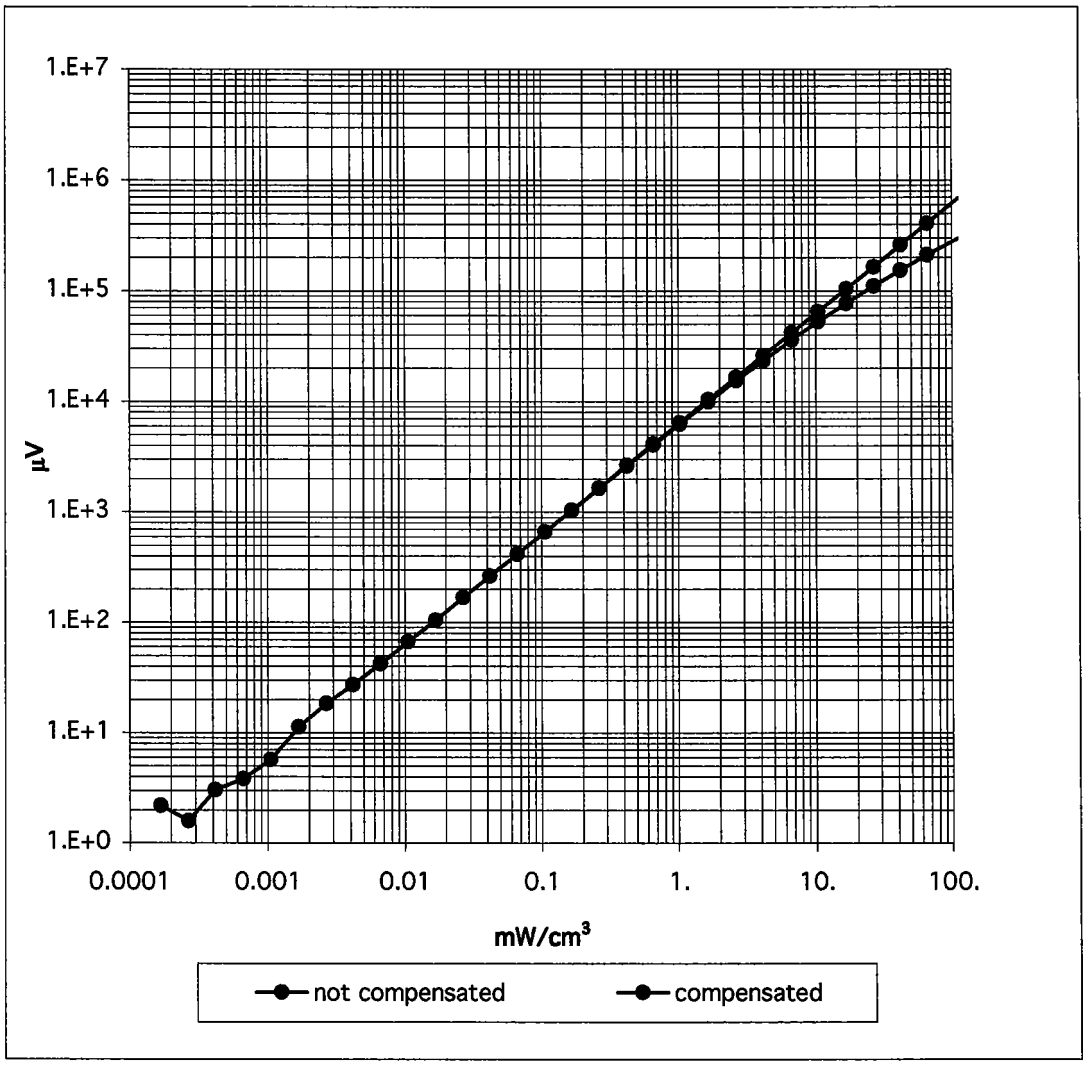
Frequency Response of E-Field

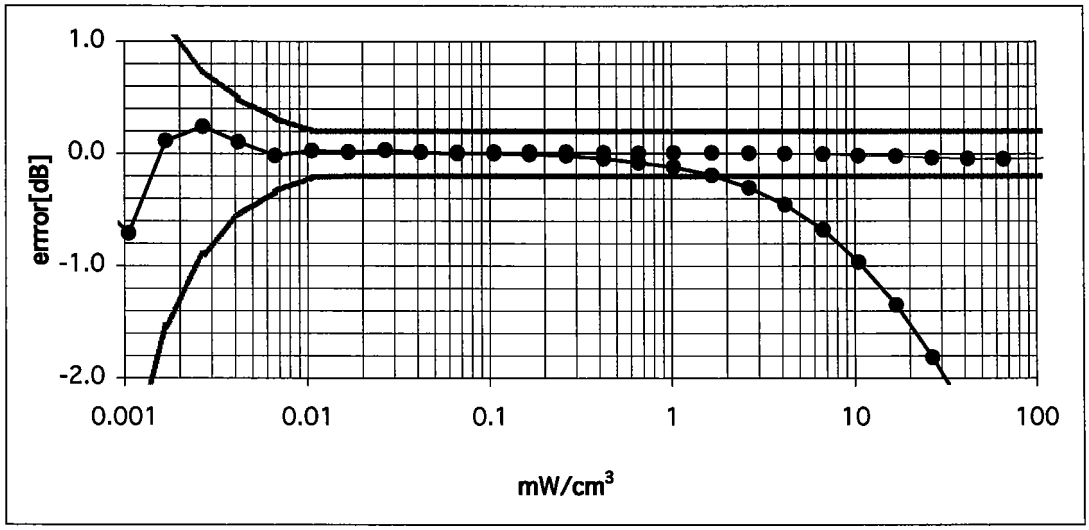
(TEM-Cell:ifi110, Waveguide R22)



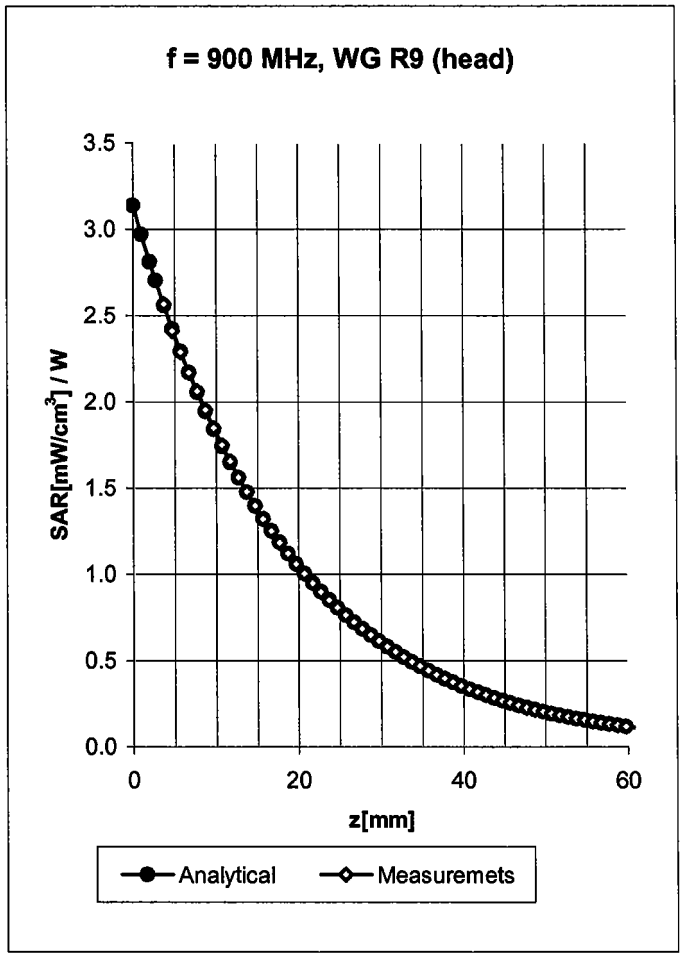
Dynamic Range f(SAR_{brain})

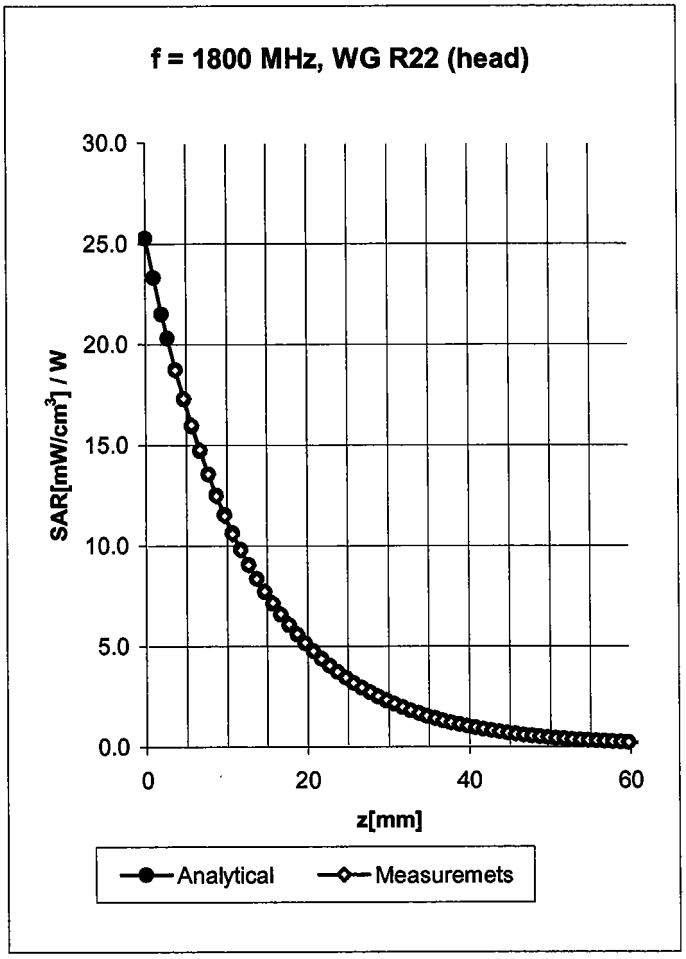
(Waveguide R22)





Conversion Factor Assessment





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

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

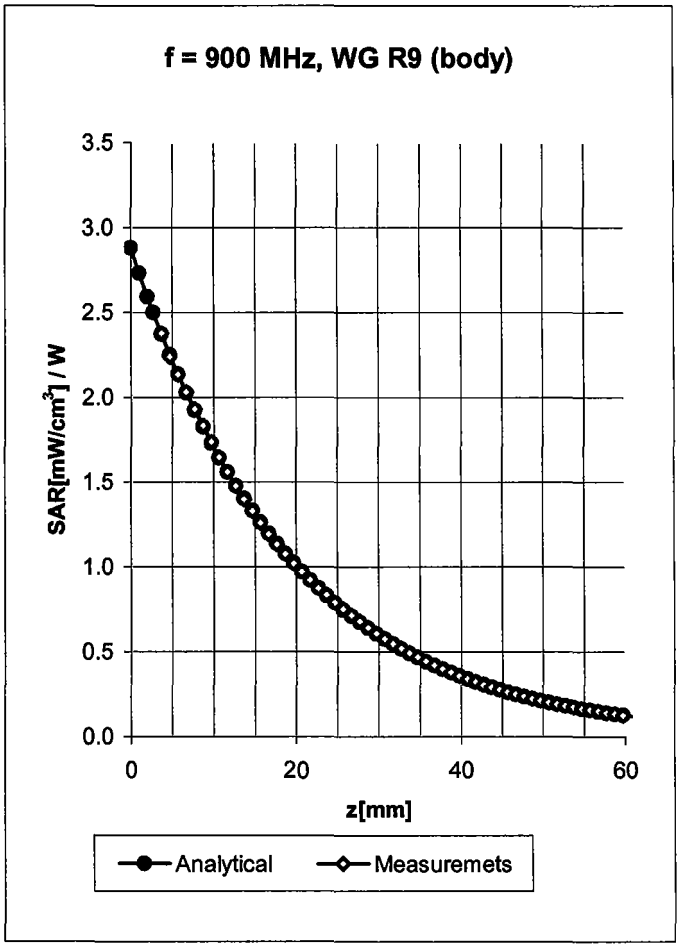
ConvF X	6.1 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.1 ± 9.5% (k=2)	Alpha	**0.60**
ConvF Z	6.1 ± 9.5% (k=2)	Depth	**2.02**

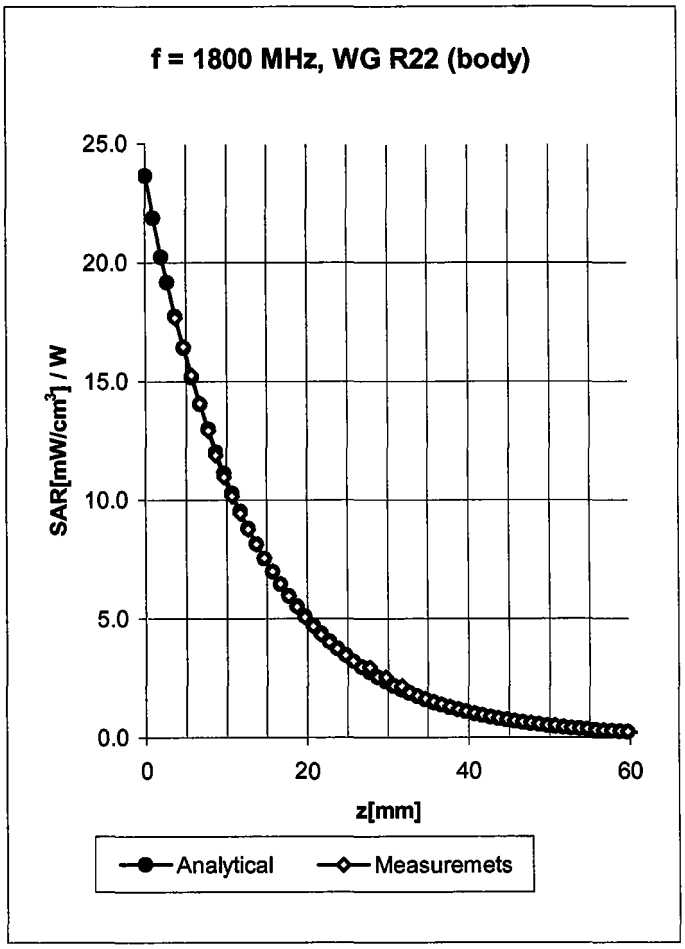
Head	1800 MHz	ε_r = 40.0 ± 5%	σ = 1.40 ± 5% mho/m

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

ConvF X	4.9 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	4.9 ± 9.5% (k=2)	Alpha	**0.61**
ConvF Z	4.9 ± 9.5% (k=2)	Depth	**2.37**

Conversion Factor Assessment





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

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

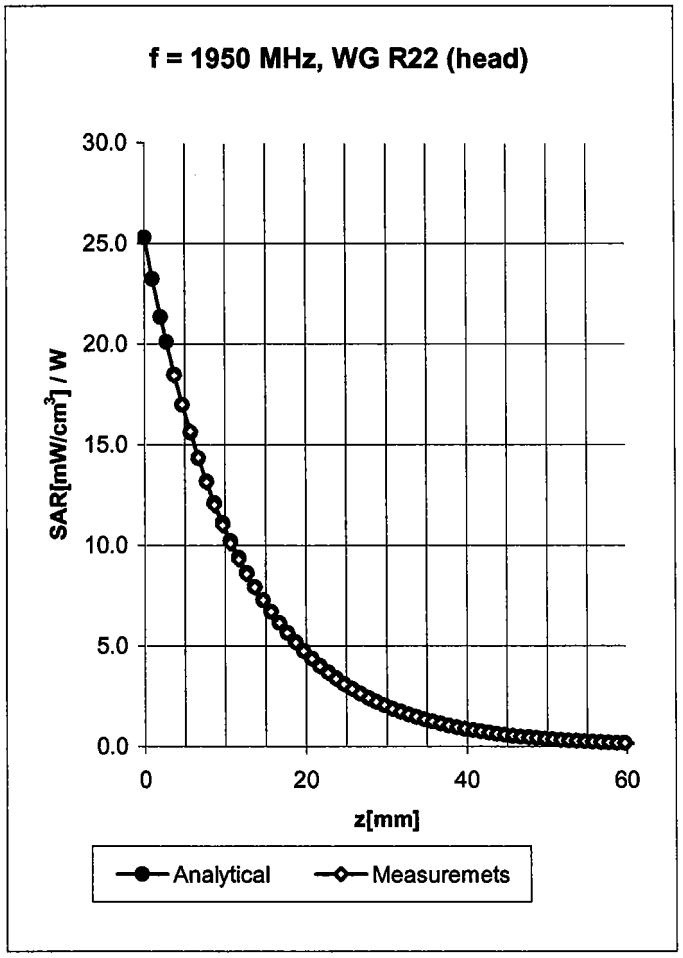
ConvF X	5.8 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.8 ± 9.5% (k=2)	Alpha	**0.53**
ConvF Z	5.8 ± 9.5% (k=2)	Depth	**2.24**

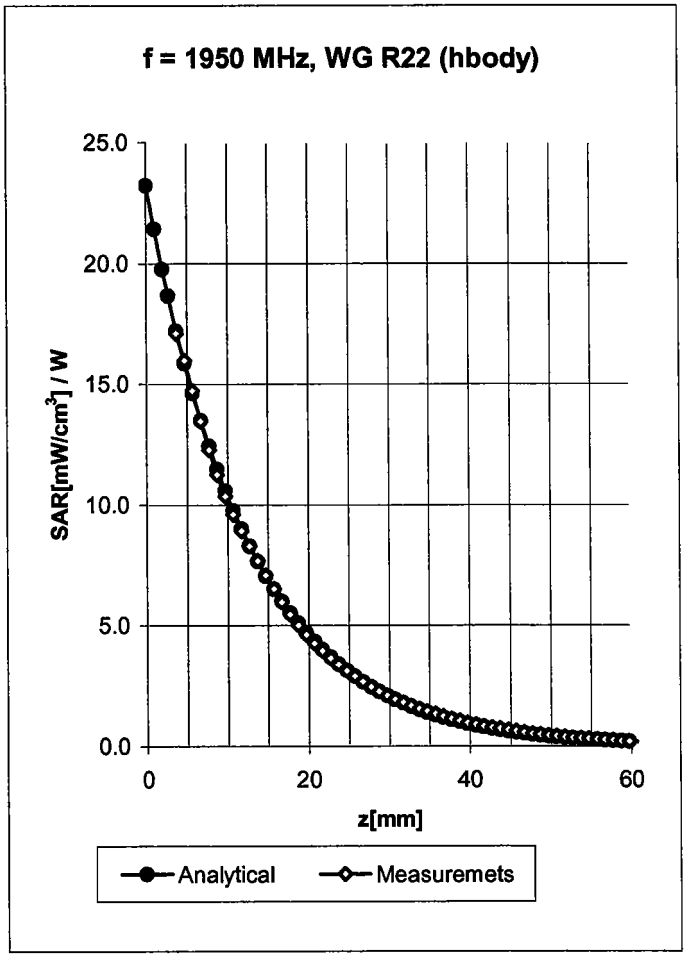
Body	1800 MHz	ε_r = 53.3 ± 5%	σ = 1.52 ± 5% mho/m

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

ConvF X	4.5 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	4.5 ± 9.5% (k=2)	Alpha	**0.69**
ConvF Z	4.5 ± 9.5% (k=2)	Depth	**2.34**

Conversion Factor Assessment





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

Valid for f=1910-2100 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

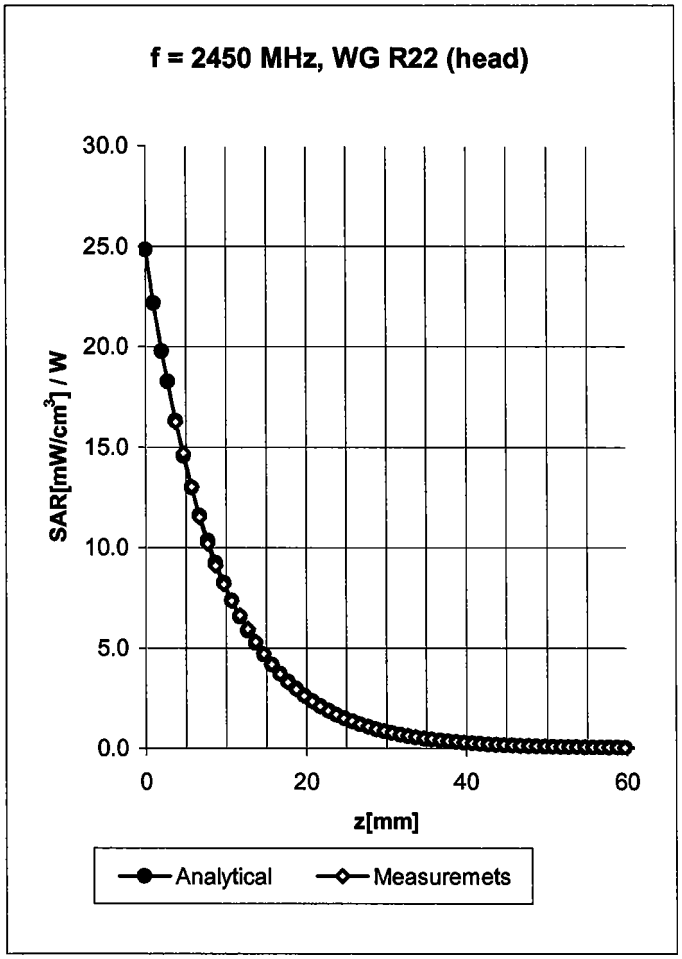
ConvF X	**4.6** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**4.6** ± 8.9% (k=2)	Alpha	**0.62**
ConvF Z	**4.6** ± 8.9% (k=2)	Depth	**2.45**

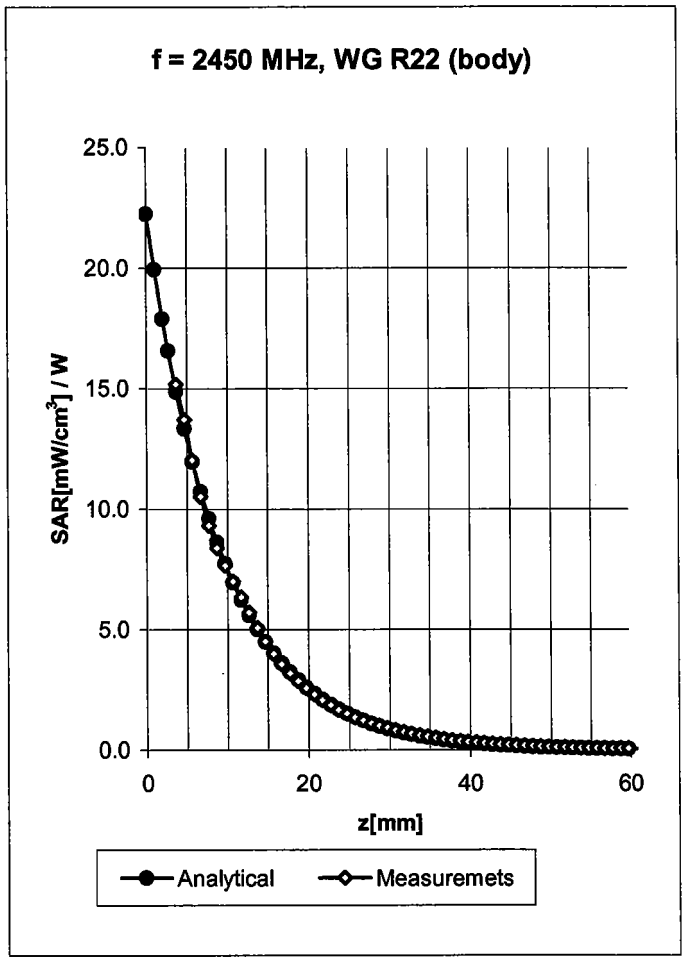
Body 1950 MHz ε_r = 53.3 ± 5% σ = 1.52 ± 5% mho/m

Valid for f=1910-2100 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**4.3** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**4.3** ± 8.9% (k=2)	Alpha	**0.85**
ConvF Z	**4.3** ± 8.9% (k=2)	Depth	**2.17**

Conversion Factor Assessment





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

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

ConvF X	4.5 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	4.5 ± 8.9% (k=2)	Alpha	1.22
ConvF Z	4.5 ± 8.9% (k=2)	Depth	1.73

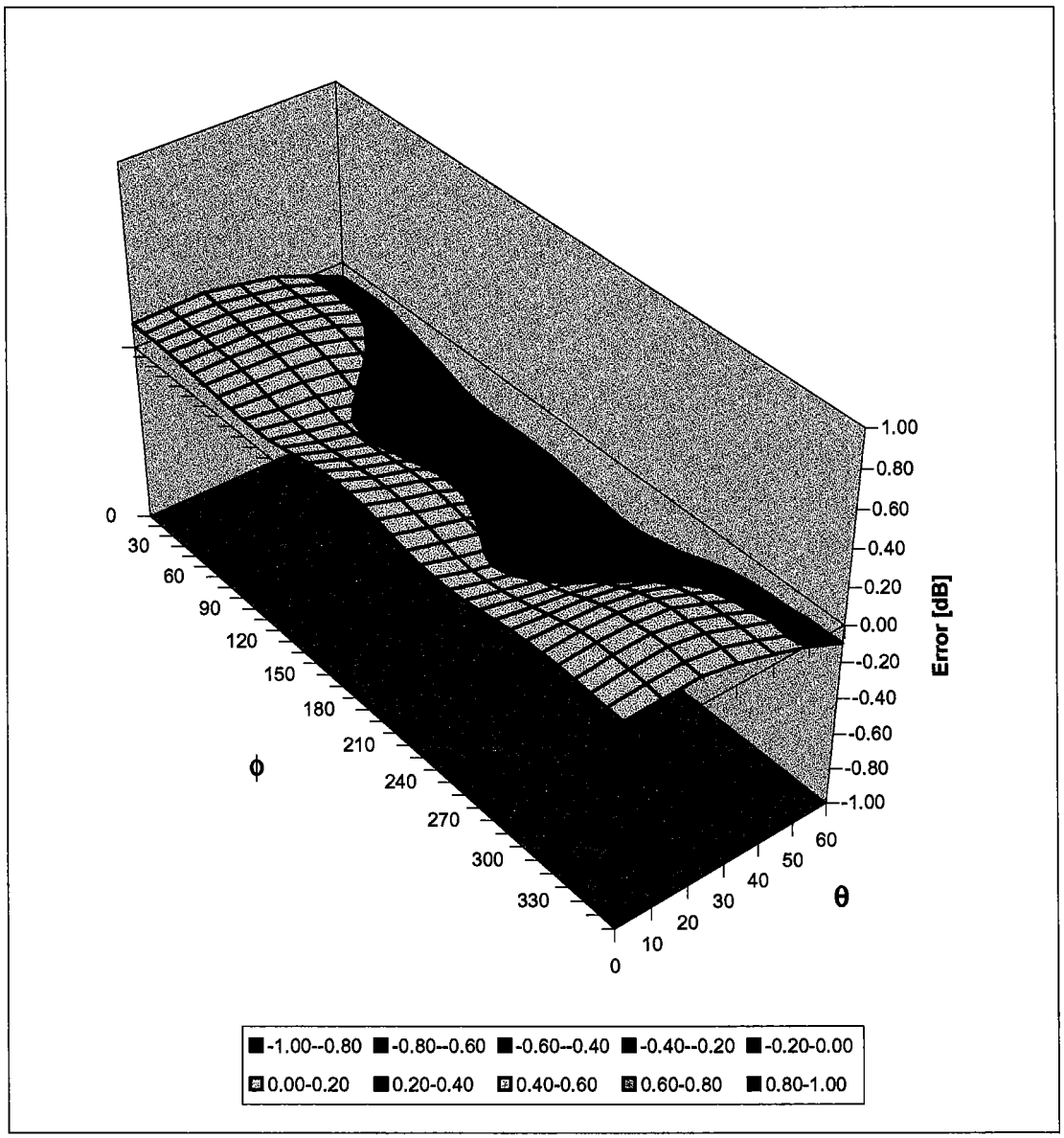
Body	2450	MHz	ε_r = 52.7 ± 5%	σ = 1.95 ± 5% mho/m

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

ConvF X	4.2 ± 8.9% (k=2)	Boundary effect:	
ConvF Y	4.2 ± 8.9% (k=2)	Alpha	1.90
ConvF Z	4.2 ± 8.9% (k=2)	Depth	1.35

Deviation from Isotropy in HSL

Error (θ,ϕ), f = 900 MHz



Appendix 6

Dipole Characterization Certificate

Certification of System Performance Check Targets

Based on APP-0396

-Historical Data-

	835MHz	900MHz	1800MHz	1900MHz	
P1528 Target: Advanced Extrapolation	9.5	10.8	38.1	39.7	**(W/kg)**
Measurement Uncertainty (k=1):	10.2%	10.2%	10.2%	10.2%	
Measurement Period:	*November '02 - June '03*	*November '02 - June '03*	*November '02 - June '03*	*November '02 - June '03*	
# of tests performed:	169	728	868	26	
Grand Average: Worst Case Extrapolation	10.1	11.6	39.7	42.0	**(W/kg)**
% Delta (Average - P1528 Target)	6.5%	7.7%	4.2%	5.9%	
Is % Delta <= Measurement Uncertainty?	**Yes**	**Yes**	**Yes**	**Yes**	
Accept/Reject Average as new system performance check target?	**ACCEPT**	**ACCEPT**	**ACCEPT**	**ACCEPT**	
	Applicable 835MHz Dipole Serial Numbers:	**Applicable 900MHz Dipole Serial Numbers:**	**Applicable 1800MHz Dipole Serial Numbers:**	**Applicable 1900Mhz Dipole Serial Numbers:**	
	420(TR), 421(TR)	77, 78	246(TR), 250(TR)	514(TR), 518(TR)	
	422(TR), 423(TR)	79, 80	251(TR), 258(TR)	519(TR), 520(TR)	
	424(TR), 425(TR)	91, 92	259(TR), 262(TR)	523(TR), 524(TR)	
	431(TR), 432(TR)	93, 94	263(TR), 271(TR)	526(TR), 527(TR)	
	433(TR), 434(TR)	95, 96	272(TR), 273(TR)	528(TR), 529(TR)	
	436(TR)	97	276(TR), 277(TR)	530(TR), 533(TR)	
			279(TR), 280(TR)		
			281(TR), 282(TR)		
			283(TR), 284(TR)		

-New System Performance Check Targets- per APP-0396

(based on analysis of historical data)

Frequency	SAR Target (W/kg)	Permittivity	Conductivity (S/m)
835MHz	**10.1**	41.5 ± 5%	0.90 ± 5%
900MHz	**11.6**	41.5 ± 5%	0.97 ± 5%
1800MHz	**39.7**	40.0 ± 5%	1.40 ± 5%
1900MHz	**42.0**	40.0 ± 5%	1.40 ± 5%

-Approvals-

Submitted by: Marge Kaunas Date: 24-Jun-03

Signed: Marge Kaunas

Comments: spreadsheet detailing all measurements available upon request

Approved by: Antonio Faraone **Date:** 24-Jun-03

Signed: Antonio Faraone

Comments: Targets and associated simulant properties are derived from the IEEE P1528 draft standard

Appendix 7

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	

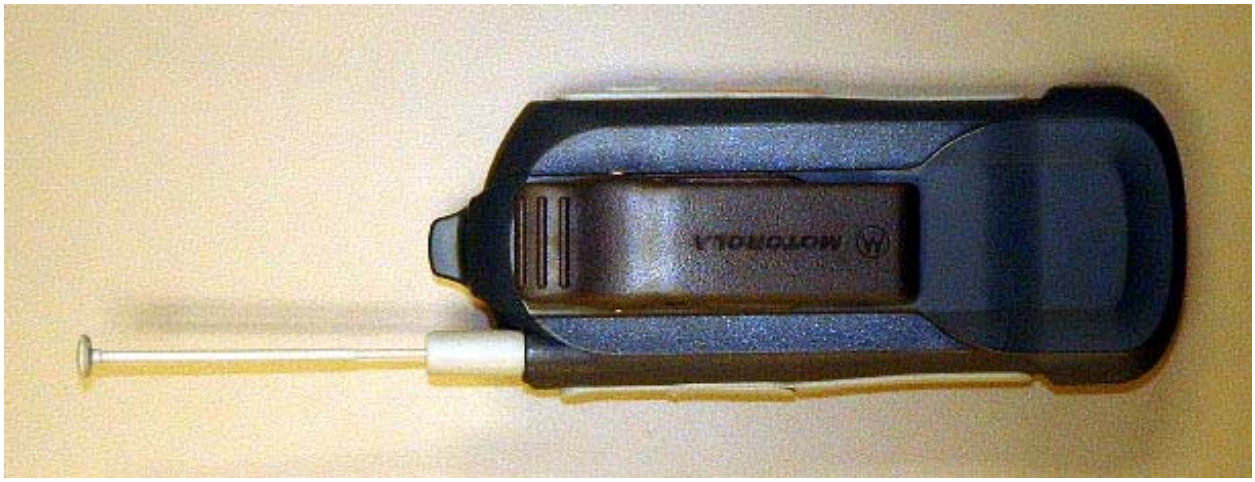
Uncertainty Budget for System Performance Check (dipole & flat phantom)

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 8

Photographs of the device under test

OK
CLR
verizon


MOTOROLA

MOTOROLA
27mm
5mm