NOKIA

NOKIA MOBILE PHONES
6000 Connection Drive
Irving, TX 75039
972-894-5000
972-894-4988

December 7, 2001

Federal Communications Commission,
Authorization & Evaluation Division,
7435 Oakland Mills Road
Columbia, MD. 21046

Attention: Equipment Authorization Branch

We hereby certify that the transceiver FCC ID: GMLNPW-3 complies with ANSI/IEEE C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

Compliance was determined by testing appropriate parameters according to standard.

NOKIA MOBILE PHONES

Esa Posio
Product Program Manager, Dallas

If certain features are in use (Keyguard, fixed dialing, restrict calls, and so on), you might first need to turn those features off before you can make an emergency call. Consult this guide and your local cellular service provider.

When making an emergency call, remember to give all of the necessary information as accurately as possible. Remember that your wireless phone might be the only means of communication at the scene of an accident—do not terminate the call until given permission to do so.

• CERTIFICATION INFORMATION (SAR)

THIS MODEL PHONE MEETS THE GOVERNMENT'S REQUIREMENTS FOR EXPOSURE TO RADIO WAVES.

Your wireless phone is a radio transmitter and receiver. It is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of the U.S. Government. These limits are part of comprehensive guidelines and establish permitted levels of RF energy for the general population. The guidelines are based on standards that were developed by independent scientific organizations through periodic and thorough evaluation of scientific studies. The standards include a substantial safety margin designed to assure the safety of all persons, regardless of age and health.

The exposure standard for wireless mobile phones employs a unit of measurement known as the Specific Absorption Rate, or SAR. The SAR limit set by the FCC is 1.6 W/kg.* Tests for SAR are conducted using standard operating positions accepted by the FCC with the phone transmitting at its highest certified power level in all tested frequency bands. Although the SAR is determined at the highest certified power level, the actual SAR level of the phone while operating can be well below the maximum value. This is because the phone is designed to operate at multiple power levels so as to use only the power required to reach the network. In general, the closer you are to a wireless base station antenna, the lower the power output.

Before a phone model is available for sale to the public, it must be tested and certified to the FCC that it does not exceed the limit established by the government-adopted requirement for safe exposure. The tests are performed in positions and locations (for example, at the ear and worn on the body) as required by the FCC for each model. The highest SAR value for this model phone as reported to the FCC when tested for use at the ear is ______ W/kg and when worn on the body, as described in this user guide, is _______ W/kg. (Body-worn measurements differ among phone models, depending upon available accessories and FCC requirements).

While there may be differences between the SAR levels of various phones and at various positions, they all meet the government requirement.

The FCC has granted an Equipment Authorization for this model phone with all reported SAR levels evaluated as in compliance with the FCC RF exposure guidelines. SAR information on this model phone is on file with the FCC and can be found under the Display Grant section of http://www.fcc.gov/oet/fccid after searching on FCC ID ______________.

For body worn operation, to maintain compliance with FCC RF exposure guidelines, use only Nokia-approved accessories. When carrying the phone while it is on, use the specific Nokia belt-clip that has been tested for compliance.

Use of non-Nokia-approved accessories may violate FCC RF exposure guidelines and should be avoided.

*In the United States and Canada, the SAR limit for mobile phones used by the public is 1.6 watts/kilogram (W/kg) averaged over one gram of tissue. The standard incorporates a substantial margin of safety to give additional protection for the public and to account for any variations in measurements. SAR values may vary depending on national reporting requirements and the network band. For SAR information in other regions please look under product information at http://www.nokia.com.

SAR Compliance Test Report

Test report no.:	Not numbered	**Date of report:**	2001-12-8
Number of pages:	49	**Contact person:**	Olli Kautio
		Responsible test engineer:	Pertti Mäkikyrö

Testing laboratory:	Nokia Oyj Elektroniikkatie 10 P.O. Box 50 FIN-90571 OULU Finland Tel. +358-10-5051 Fax. +358-10-505 7222	**Client:**	Nokia Inc. 6000 Connection Dr. Mailstop 2:200 Irving Tx, 75039 USA Tel. +1 972 894 5000 Fax. +1 972 894 4589

Tested devices:	**GMLNPW-3** CSL-22, CSL-23
Supplement reports:	-
Testing has been carried out in accordance with:	IEEE P1528-200X Draft 6.4 Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques
Documentation:	The documentation of the testing performed on the tested devices is archived for 15 years at PC Site Oulu
Test results:	**The tested device complies with the requirements in respect of all parameters subject to the test.** The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.

Date and signatures:

For the contents:

2001-12-11

Pertti Mäkikyrö
Engineering Manager, EMC

Miia Nurkkala
Test Engineer

CONTENTS

1. SUMMARY FOR SAR TEST REPORT

Date of test	2001-12-26 – 2001-12-30
Contact person	Olli Kautio
Test plan referred to	-
FCC ID	GMLNPW-3
SN, HW, SW and DUT numbers of tested device	SN: 23513986525 HW: B3.1 SW: Vr03.00 DUT: A261101/52
Accessories used in testing	battery BLB-3, headset HDE-2
Notes	-
Document code	DTX03527-EN
Responsible test engineer	Pertti Mäkikyrö
Measurement performed by	Miia Nurkkala

1.1 Maximum Results Found during SAR Evaluation

The equipment is deemed to fulfil the requirements if the measured values are less than or equal to the limit.

1.1.1 Head Configuration

Ch / f (MHz)	Power	Position	Limit	Measured	Result
799/848.97	24.8 dBm	Cheek	1.6 mW/g	1.19 mW/g	**PASSED**

1.1.2 Body Worn Configuration

Ch / f (MHz)	Power	Accesory	Limit	Measured	Result
991/824.04	24.7 dBm	CSL-22	1.6 mW/g	1.29 mW/g	**PASSED**

1.1.3 Measurement Uncertainty

Combined Uncertainty (Assessment & Source)	**± 12.2%**
Extended Uncertainty (k=2) 95.5%	**± 24%**

2. DESCRIPTION OF TESTED DEVICE

Device category	Portable device		
Exposure environment	Uncontrolled exposure		
Unit type	Prototype unit		
Case type	Fixed case		
Modes of Operation	AMPS	IS136-800	IS136-1900
Modulation Mode		π/4 Quadrature Phase Shift Keying	π/4 Quadrature Phase Shift Keying
Duty Cycle	1	1/3	1/3
Transmitter Frequency Range (MHz)	824.04 - 848.97	824.04 - 848.97	1850.04 - 1909.92

2.1 Picture of Phone

2.2 Description of the Antenna

Type	Internal integrated antenna
Location	Inside the back cover, near the top of the device

2.3 Battery Options

There is only one battery option available for tested device.

In body worn configuration it does not affect the separation distance between flat-phantom and tested device and thus should not affect the SAR values.

2.4 Body worn accessories

Following body worn accessories are available for GMLNPW-3:

- Carry Sleeve CSL-22

- Carrying Case CSL-23

3. TEST CONDITIONS

3.1 Ambient Conditions

Ambient temperature (°C)	22±1
Tissue simulating liquid temperature (°C)	22±1
Humidity (%)	35

3.2 RF characteristics of the test site

Tests were performed in a fully enclosed RF shielded environment.

3.3 Test Signal, Frequencies, and Output Power

The device was controlled by using a radio tester and special test mode.

In all operating bands the measurements were performed on lowest, middle and highest channels.

The phone was set to maximum power level during the all tests and at the beginning of the each test the battery was fully charged.

DASY3 System measures power drift during SAR testing by comparing e-field in the same location at the beginning and at the end of measurement. These records were used to monitor stability of power output.

4. DESCRIPTION OF THE TEST EQUIPMENT

The measurements were performed with an automated near-field scanning system, DASY3, manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland.

Test Equipment	Serial Number	Due Date
DASY3 DAE V1	371	10/02
E-field Probe ET3DV6	1381	10/02
Dipole Validation Kit, D835V2	405	02/03
Dipole Validation Kit, D1900V2	511	02/03

E-field probe calibration records are presented in Appendix C.

Additional equipment needed in validation:

Test Equipment	Model	Serial Number	Due Date
Signal Generator	R&S SMIQ03B	100012	02/02
Amplifier	Amplifier Research 5S1G4	27573	-
Power Meter	R&S NRT	835065/049	05/02
Power Sensor	R&S NRT-Z44	835374/021	05/02
Thermometer	DO9416	1505985462	-
Vector Network Analyzer	Anritsu 37347A	992604	02/02
Transmission Line Dielectric Probe	Damaskos T1500	-	-

Equipment used to measure conducted power output:

Test Equipment	Model	Serial Number	Due Date
Power Meter	Agilent E4416A	GB41050565	07/02
Power Sensor	Agilent E9327A	US40440339	05/02

4.1 System Accuracy Verification

The probes are calibrated annually by the manufacturer. Dielectric parameters of the simulating liquids are measured using a Damaskos Inc. transmission line model T1500 and Anritsu 37347A vector network analyzer.

The SAR measurement of the DUT were done within 24 hours of system accuracy verification, which was done using the dipole validation kit. Power level of 250 mW was supplied to a dipole antenna placed under the flat section of SAM phantom. The validation results are in the table below and printout of the validation test is presented in Appendix A. All the measured parameters were within the specification.

Tissue	*f* (MHz)	Description	SAR (W/kg), 1g	Dielectric Parameters		Temp (°C)
				ε_r	σ (S/m)	
Head	835	Measured 11/25/01	2.59	39.6	0.90	22
		Reference Result	2.47	42.0	0.88	N/A
Head	835	Measured 11/27/01	2.62	39.4	0.89	22
		Reference Result	2.47	42.0	0.88	N/A
Head	1900	Measured 11/29/01	11.1	38.4	1.44	22
		Reference Result	10.7	39.2	1.47	N/A
Muscle	835	Measured 11/28/01	2.61	57.4	0.95	22
		Reference Result	2.53	56.6	0.93	N/A
Muscle	1900	Measured 11/30/01	10.5	53.0	1.52	22
		Reference Result	10.6	53.5	1.46	N/A

4.2 Tissue Simulants

All dielectric parameters of tissue simulants were measured within 24 hours of SAR measurements.

4.2.1 Head Tissue Simulant

The composition of the brain tissue simulating liquid for 835MHz is

58.31% Sugar
39.74% De-Ionized Water
1.55% Salt
0.25% HEC
0.15% Bactericide

and for 1900MHz

44.91% 2-(2-butoxyethoxy) Ethanol
54.88% De-Ionized Water
0.21% Salt

f (MHz)	Description	Dielectric Parameters		Temp (°C)
		ε_r	σ (S/m)	
835	Measured 11/25/01	39.6	0.90	22
	Measured 11/27/01	39.4	0.89	22
	Recommended Values	41.5	0.90	20-26
1880	Measured 11/28/01	38.4	1.43	22
	Recommended Values	40.0	1.40	20-26

Recommended values are adopted from OET Bulletin 65 (97-01) Supplement C (01-01).

4.2.2 Muscle Tissue Simulant

The composition of the muscle tissue simulating liquid for 835MHz is

55.97% De-Ionized Water
41.76% Sugar

1.21% HEC
0.79% Salt
0.27% Preservative

and for 1900MHz
69.02% De-Ionized Water
30.76% Diethylene Glycol Monobutyl Ether
0.22% Salt

f (MHz)	Description	Dielectric Parameters		Temp (°C)
		ε_r	σ (S/m)	
835	Measured 11/28/01	57.4	0.95	22
	Recommended Values	55.2	0.97	20-26
1880	Measured 11/30/01	53.0	1.50	22
	Recommended Values	53.3	1.52	20-26

Recommended values are adopted from OET Bulletin 65 (97-01) Supplement C (01-01).

4.3 Phantoms

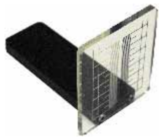
"SAM v4.0" phantom", manufactured by SPEAG, was used during the measurement. It has fiberglass shell integrated in a wooden table. The shape of the shell corresponds to the phantom defined by SCC34-SC2. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

The thickness of phantom shell is 2 mm except for the ear, where an integrated ear spacer provides a 6 mm spacing from the tissue boundary. Manufacturer reports tolerance in shell thickness to be ±0.1mm.

5. DESCRIPTION OF THE TEST PROCEDURE

5.1 Test Positions

The device was placed in holder using a special positioning tool, which aligns the bottom of the device with holder and ensures that holder contacts only to the sides of the device. After positioning is done, tool is removed. This method provides standard positioning and separation, and also ensures free space for antenna.



Device holder was provided by SPEAG together with DASY3.

5.1.1 Against Phantom Head

Measurements were made on both the "left hand" and "right hand" side of the phantom.

The device was positioned against phantom according to OET Bulletin 65 (97-01) Supplement C (01-01) . Definitions of terms used in aligning the device to a head phantom are available in IEEE Draft Standard P1528-2001 “Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques”

5.1.1.1 Initial Ear Position

The device was initially positioned with the earpiece region pressed against the ear spacer of a head phantom parallel to the “Neck-Front” line defined along the base of the ear spacer that contains the “ear reference point”. The “test device reference point” is aligned to the “ear reference point” on the head phantom and the “vertical centerline” is aligned to the “phantom reference plane”.

5.1.1.2 Cheek Position

“Initial ear position” alignments are maintained and the device is brought toward the mouth of the head phantom by pivoting along the “Neck-Front” line until any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom or when any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

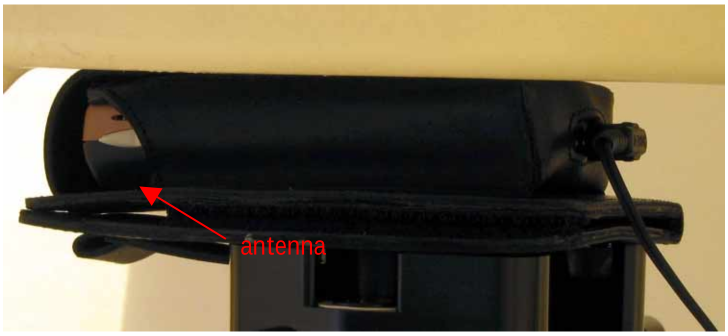
5.1.1.3 Tilt Position

In the “Cheek Position”, if the earpiece of the device is not in full contact with the phantom’s ear spacer and the peak SAR location for the “cheek position” is located at the ear spacer region or corresponds to the earpiece region of the handset, the device is returned to the “initial ear position” by rotating it away from the mouth until the earpiece is in full contact with the ear spacer. Otherwise, the device is moved away from the cheek perpendicular to the line passes through both “ear reference points” for approximate 2-3 cm. While it is in this position, the device is tilted away from the mouth with respect to the “test device reference point” by 15°. After the tilt, it is then moved back toward the head perpendicular to the line passes through both “ear reference points” until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process is repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously.

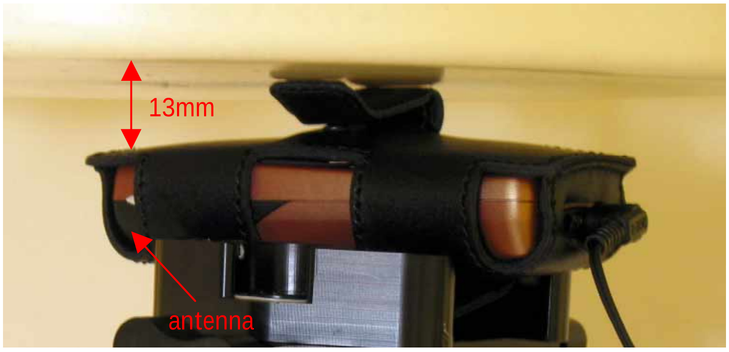
5.1.2 Body Worn Configuration

Body worn accessories listed in section 2.4 tested for the FCC RF exposure compliance. The phone was positioned into the accessory and placed below of the flat phantom. Headset was connected during measurements. Both body worn accessories are designed so that headset can be connected only if the phone is positioned into the accessory correctly. Carry sleeve CSL-22 was measured from both sides since it has a carrying strap.

- Backside of CSL-22 facing the phantom



- Front of CSL-22 facing the phantom



- CSL-23

5.2 Scan Procedures

First coarse scans are used for quick determination of the field distribution. Next a cube scan, 5x5x7 points; spacing between each point 8x8x5 mm, is performed around the highest E-field value to determine the averaged SAR-distribution over 1g.

5.3 SAR Averaging Methods

The maximum SAR value is averaged over its volume using interpolation and extrapolation.

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot" -condition [W. Gander, Computermathematik, p. 141-150] (x, y and z -directions) [Numerical Recipes in C, Second Edition, p 123].

The extrapolation is based on least square algorithm [W. Gander, Computermathematik, p.168-180]. Through the points in the first 30 mm in all z-axis, polynomials of order four are calculated. This polynomial is then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1mm from one another.

6. MEASUREMENT UNCERTAINTY

6.1 Description of Individual Measurement Uncertainty

6.1.1 Assessment Uncertainty

Uncertainty description	Error	Distrib.	Weight	St. Dev.
Probe Uncertainty				
- Axial Isotropy	±0.2 dB	U-shape	0.5	±2.4%
- Spherical Isotropy	±0.4 dB	U-shape	0.5	±4.8%
- Isotropy from Gradient	±0.5 dB	U-shape	0	
- Spatial Resolution	±0.5 %	Normal	1	±0.5%
- Linearity Error	±0.2 dB	Rectang.	1	±2.7%
- Calibration Error	±3.6 %	Normal	1	±3.6%
Evaluation Uncertainty				
- Data Acquisition Error	±1%	Rectang.	1	±0.6%
- ELF and RF Disturbances	±0.25%	Normal	1	±0.25%
- Dielectric Parameters	±10%	Rectang.	1	±5.8%
Spatial Peak SAR Evaluation Uncertainty				
- Extrapolation	±3%	Normal	1	±3%
- Probe Positioning Error	±0.1mm	Normal	1	±1%
- Cube - Orientation/Integration	±3%	Normal	1	±3%
- Cube Shape Inaccuracies	±2%	Rectang.	1	±1.2%
Total Measurement Uncertainty				±**10.2%**

6.1.2 Source Uncertainty

Uncertainty description	Error	Distrib.	Weight	St. Dev.
- Device Positioning	±6%	Normal	1	±6%
- Laboratory Setup	±3%	Normal	1	±3%
Total Source Uncertainty				±**6.7%**

6.1.3 Combined Uncertainty

Uncertainty description	Uncertainty
- Total Assessment Uncertainty	±10.2%
- Total Source Uncertainty	±6.7%
Combined Uncertainty (Assessment & Source)	±12.2%
Extended Uncertainty (k=2)	±**24%**

7. RESULTS

Corresponding SAR distribution printouts of maximum results in every operating mode and position are shown in Appendix B. Field distribution is similar regardless of used channel in each mode and position.

7.1 Head Configuration

Mode	Channel/ *f* (MHz)	Power (dBm)	SAR, averaged over 1g (mW/g)			
			Left-hand		Right-hand	
			Cheek	Tilted	Cheek	Tilted
AMPS 800	991/824.04	24.7	0.87	0.54	0.87	0.52
	383/836.49	24.8	1.04	0.64	1.08	0.64
	799/848.97	24.8	1.09	**0.64**	**1.19**	0.57
TDMA 800	991/824.04	26.9	0.40	0.25	0.42	0.25
	383/836.49	27.1	0.56	0.36	0.57	0.35
	799/848.97	27.0	**0.62**	**0.37**	0.61	0.36
TDMA 1900	2/1850.04	26.1	**0.77**	**0.93**	0.55	0.76
	1000/1879.98	26.1	0.69	0.81	0.54	0.70
	1998/1909.92	24.8	0.43	0.50	0.36	0.45

7.2 Body Worn Configuration

Mode	Channel/ *f* (MHz)	Power (dBm)	SAR, averaged over 1g (mW/g)	
			CSL-22 Backside facing phantom	CSL-22 Front facing phantom
AMPS 800	991/824.04	24.7	**1.29**	0.82
	383/836.49	24.8	1.25	**0.86**
	799/848.97	24.8	1.09	0.79
TDMA 800	991/824.04	26.9	**0.55**	**0.44**
	383/836.49	27.1	0.52	0.41
	799/848.97	27.0	0.49	0.38
TDMA 1900	2/1850.04	26.1	**0.71**	**0.18**
	1000/1879.98	26.1	0.70	0.14
	1998/1909.92	24.8	0.60	0.13

Mode	Channel/ *f* (MHz)	Power (dBm)	SAR, averaged over 1g (mW/g)
			CSL-23
AMPS 800	991/824.04	24.7	0.29
	383/836.49	24.8	**0.36**
	799/848.97	24.8	0.32
TDMA 800	991/824.04	26.9	0.13
	383/836.49	27.1	0.16
	799/848.97	27.0	**0.17**
TDMA 1900	2/1850.04	26.1	**0.11**
	1000/1879.98	26.1	0.08
	1998/1909.92	24.8	0.07

APPENDIX A.

Validation Test Printouts

Dipole 835 MHz

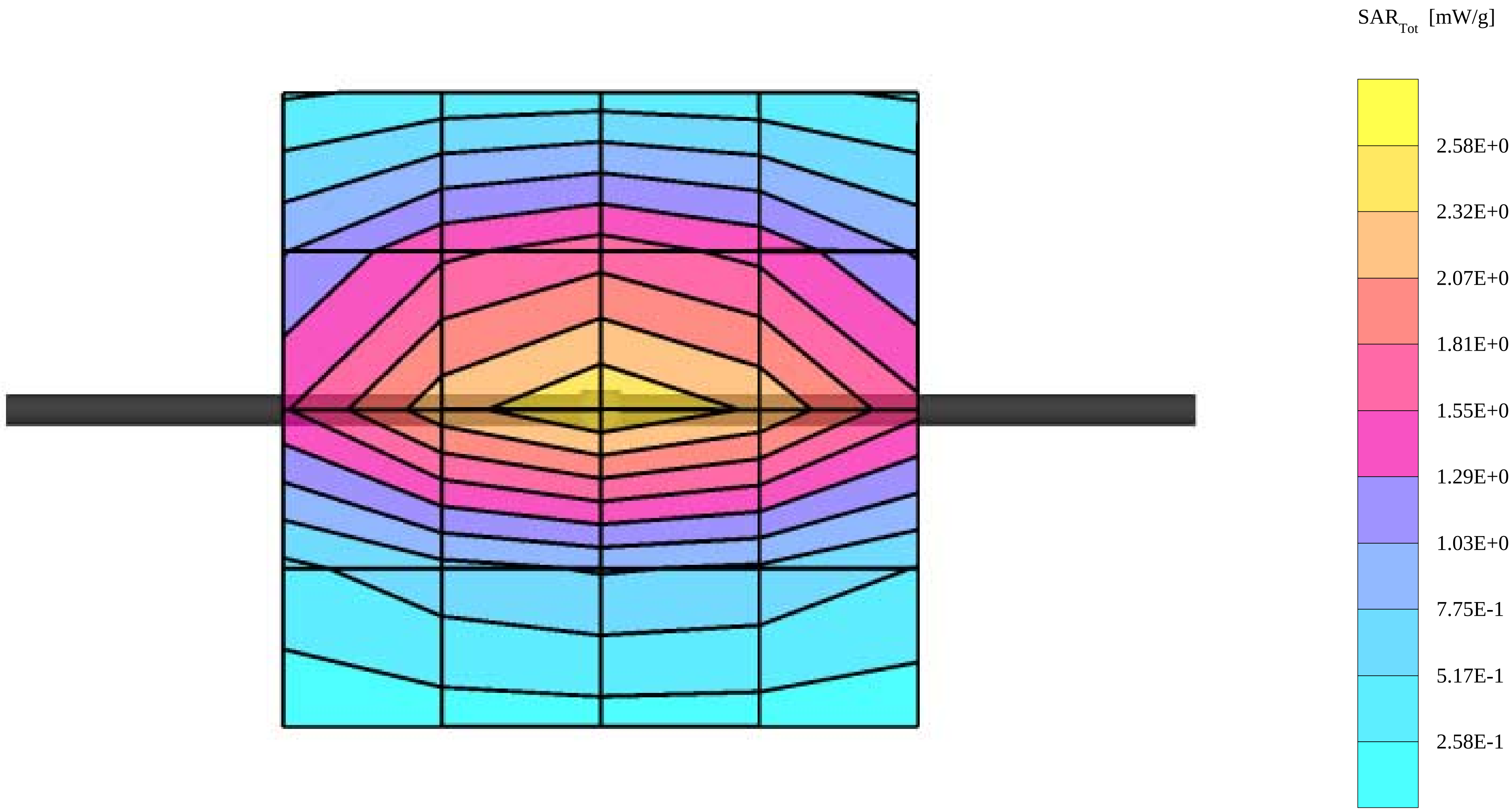
SAM; Flat

Probe: ET3DV6 - SN1381; ConvF(6.20,6.20,6.20); Crest factor: 1.0; Brain 836 MHz SCC34: σ = 0.90 mho/m ε = 39.6 ρ = 1.00 g/cm^3

Cubes (2): Peak: 4.16 mW/g ± 0.03 dB, SAR (1g): 2.59 mW/g ± 0.01 dB, SAR (10g): 1.64 mW/g ± 0.03 dB

Penetration depth: 11.9 (10.6, 13.5) [mm]

Powerdrift: -0.06 dB



Dipole 835 MHz

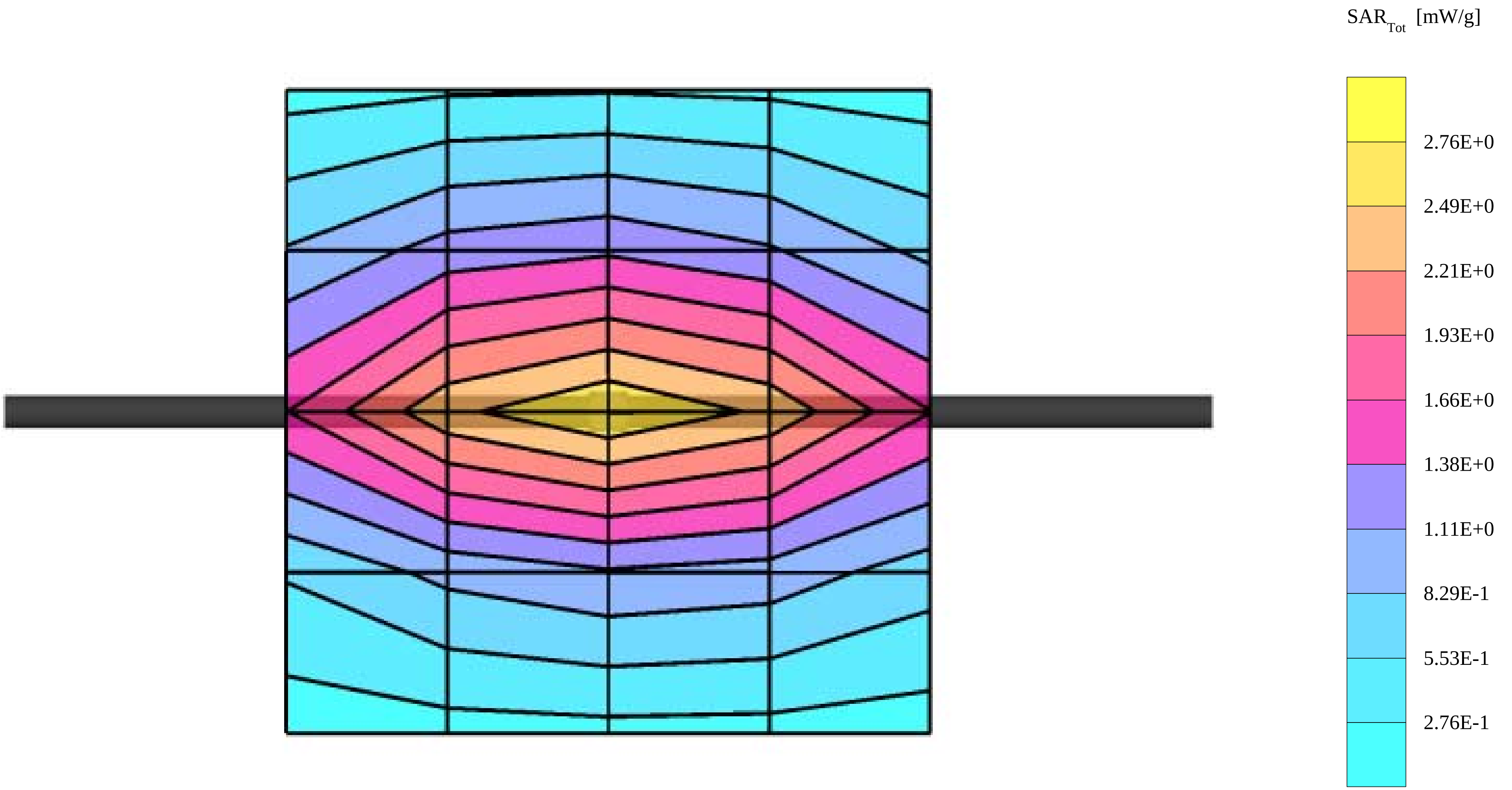
SAM; Flat

Probe: ET3DV6 - SN1381; ConvF(6.20,6.20,6.20); Crest factor: 1.0; Brain 836 MHz SCC34: σ = 0.89 mho/m ε = 39.4 ρ = 1.00 g/cm^3

Cubes (2): Peak: 4.21 mW/g ± 0.03 dB, SAR (1g): 2.62 mW/g ± 0.03 dB, SAR (10g): 1.67 mW/g ± 0.02 dB

Penetration depth: 11.7 (10.4, 13.5) [mm]

Powerdrift: -0.05 dB



Dipole 1900 MHz

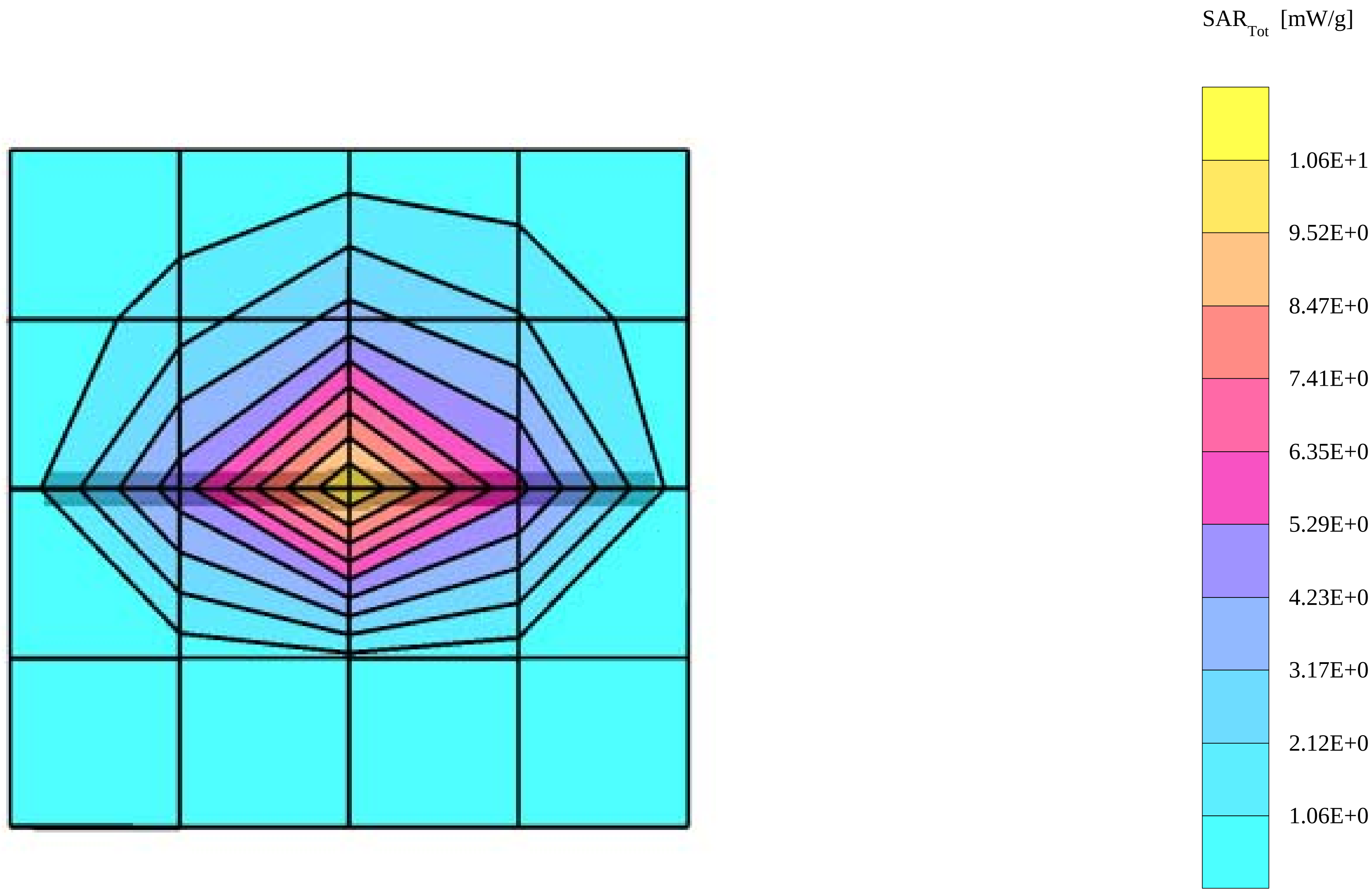
SAM; Flat

Probe: ET3DV6 - SN1381; ConvF(5.22,5.22,5.22); Crest factor: 1.0; Brain 1900 MHz SCC34: σ = 1.44 mho/m ε = 38.4 ρ = 1.00 g/cm^3

Cubes (2): Peak: 21.2 mW/g ± 0.03 dB, SAR (1g): 11.1 mW/g ± 0.00 dB, SAR (10g): 5.60 mW/g ± 0.03 dB

Penetration depth: 8.0 (7.5, 9.0) [mm]

Powerdrift: -0.06 dB



Dipole 835 MHz

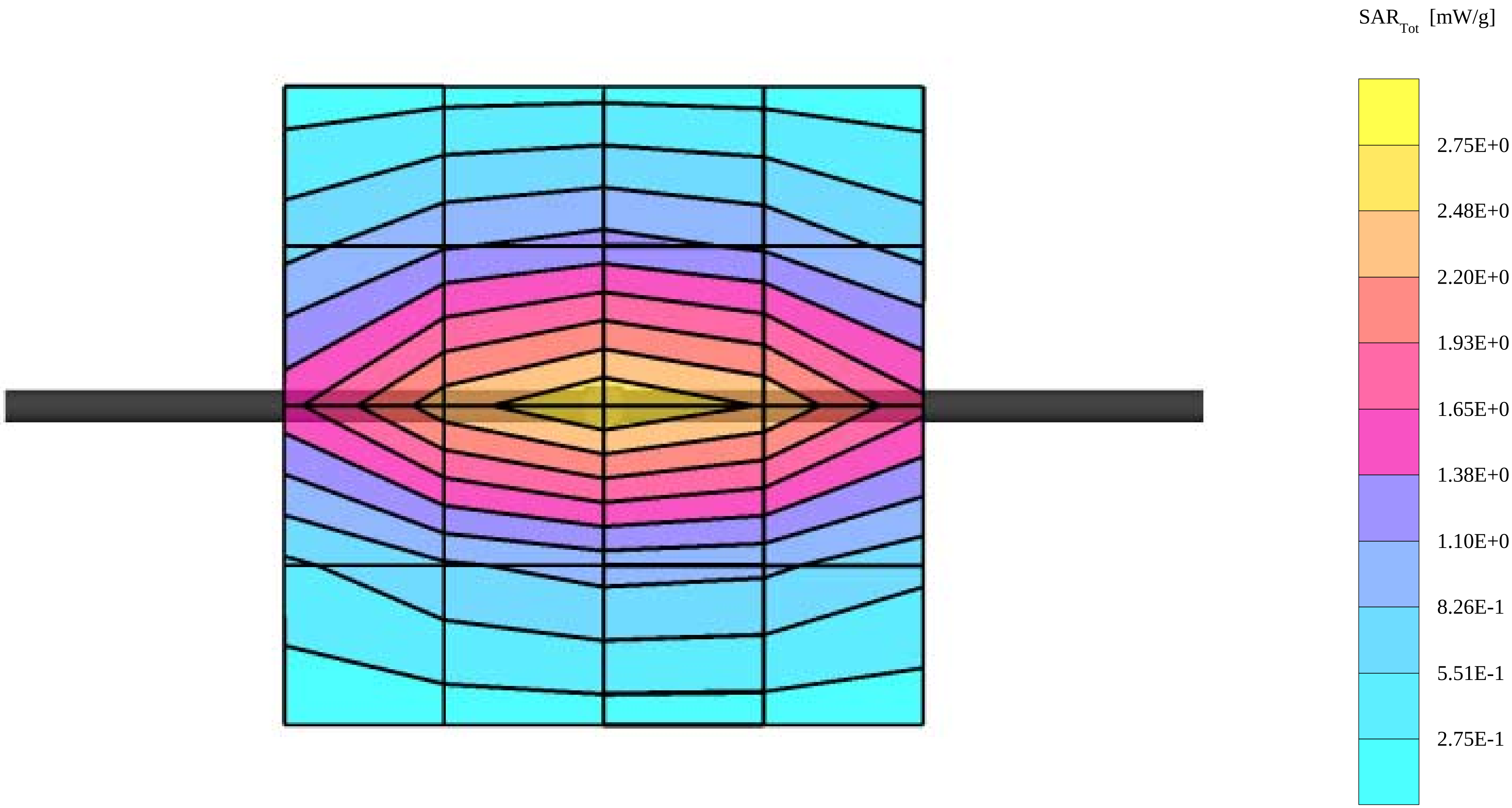
SAM; Flat

Probe: ET3DV6 - SN1381; ConvF(6.04,6.04,6.04); Crest factor: 1.0; Muscle 836 MHz: σ = 0.95 mho/m ε = 57.4 ρ = 1.00 g/cm³

Cubes (2): Peak: 4.10 mW/g ± 0.01 dB, SAR (1g): 2.61 mW/g ± 0.01 dB, SAR (10g): 1.69 mW/g ± 0.02 dB

Penetration depth: 12.7 (11.1, 14.8) [mm]

Powerdrift: -0.11 dB



Dipole 1900 MHz

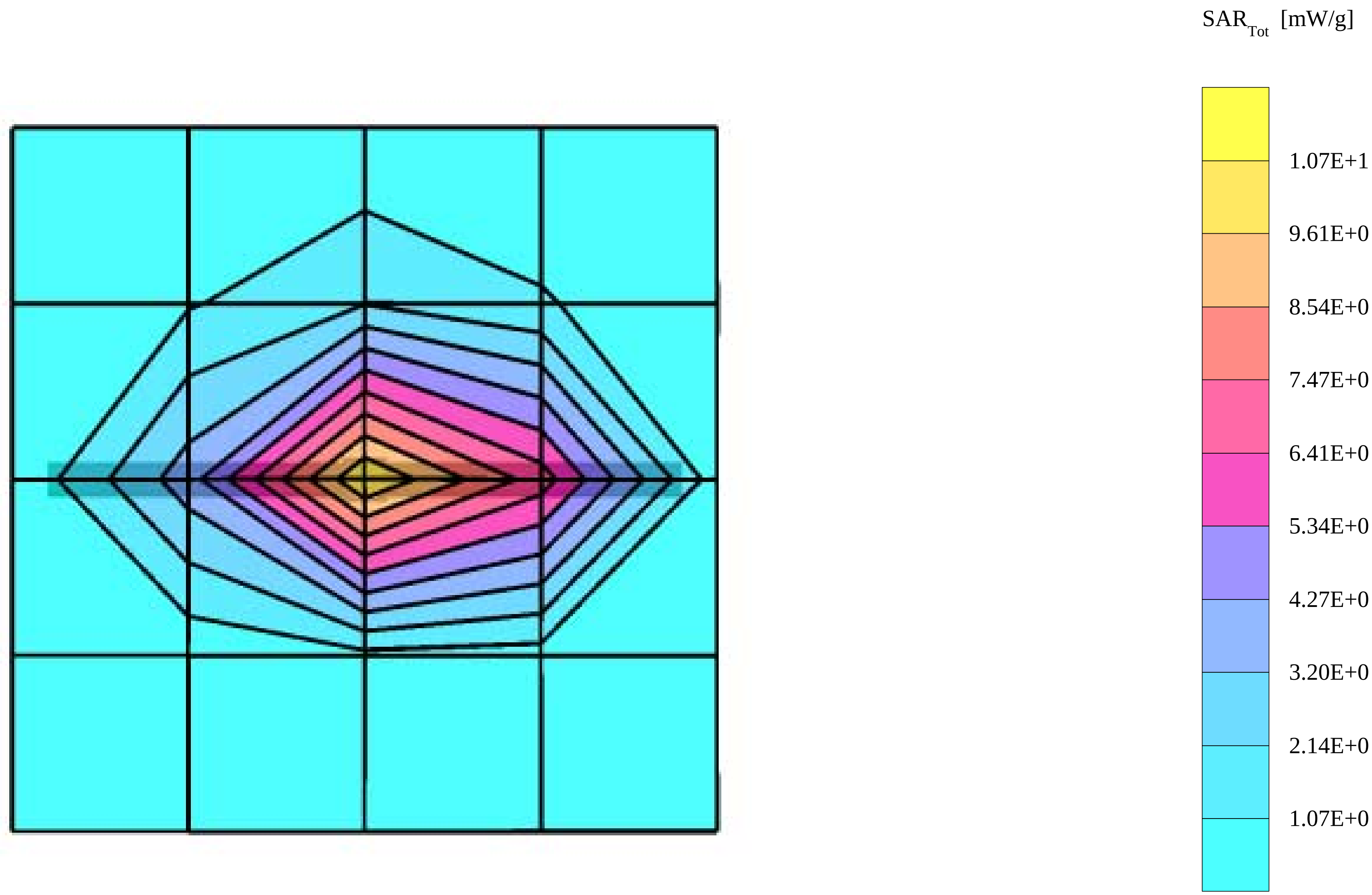
SAM; Flat

Probe: ET3DV6 - SN1381; ConvF(4.96,4.96,4.96); Crest factor: 1.0; Muscle 1900 MHz: σ = 1.52 mho/m ε = 53.0 ρ = 1.00 g/cm^3

Cubes (2): Peak: 19.9 mW/g ± 0.07 dB, SAR (1g): 10.5 mW/g ± 0.03 dB, SAR (10g): 5.36 mW/g ± 0.01 dB

Penetration depth: 8.7 (7.9, 10.1) [mm]

Powerdrift: -0.08 dB



APPENDIX B.

SAR Distribution Printouts

11/26/01

GMLNPW-3

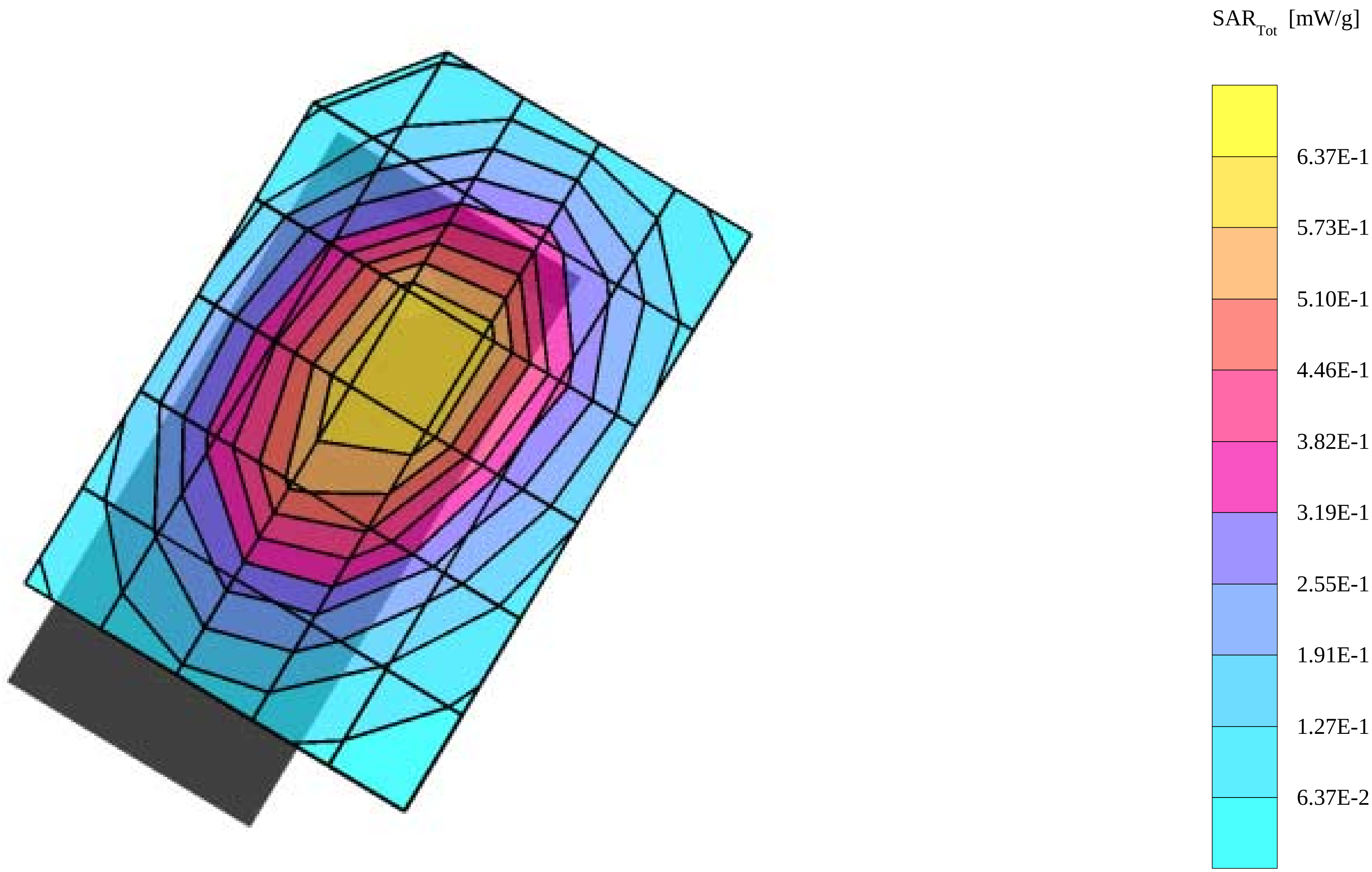
SAM Phantom; Left Hand Section; Position: tilted; Frequency: 849 MHz

Probe: ET3DV6 - SN1381; ConvF(6.20,6.20,6.20); Crest factor: 1.0; Brain 836 MHz SCC34: σ = 0.90 mho/m ε = 39.6 ρ = 1.00 g/cm³

Cube 5x5x7: SAR (1g): 0.644 mW/g, SAR (10g): 0.445 mW/g

Coarse: Dx = 19.0, Dy = 15.0, Dz = 10.0

Powerdrift: -0.08 dB



GMLNPW-3

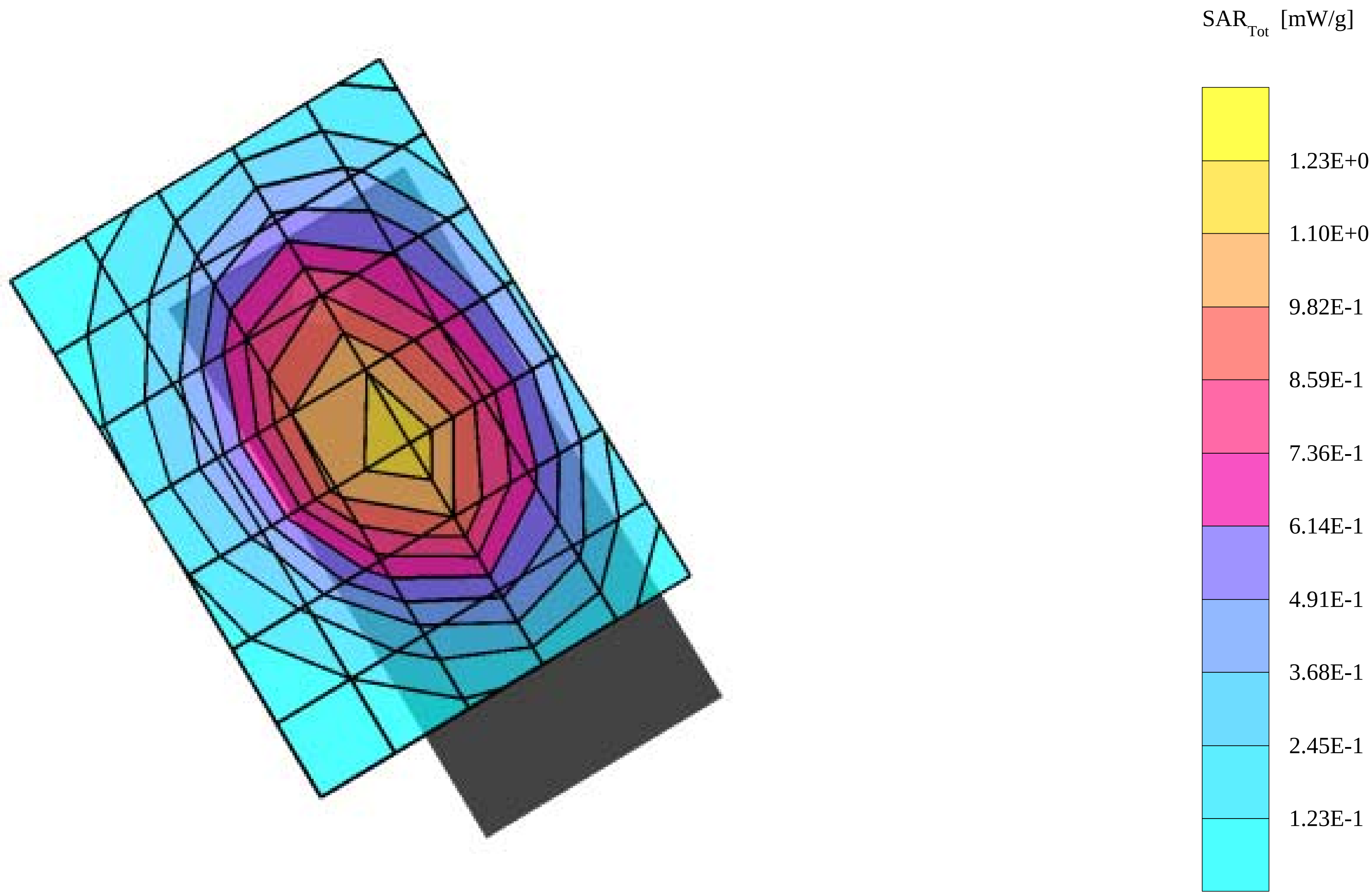
SAM Phantom; Righ Hand Section; Position: cheek ; Frequency: 849 MHz

Probe: ET3DV6 - SN1381; ConvF(6.20,6.20,6.20); Crest factor: 1.0; Brain 836 MHz SCC34: $\sigma = 0.90$ mho/m $\varepsilon = 39.6$ $\rho = 1.00$ g/cm^3

Cube 5x5x7: SAR (1g): 1.19 mW/g, SAR (10g): 0.820 mW/g

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

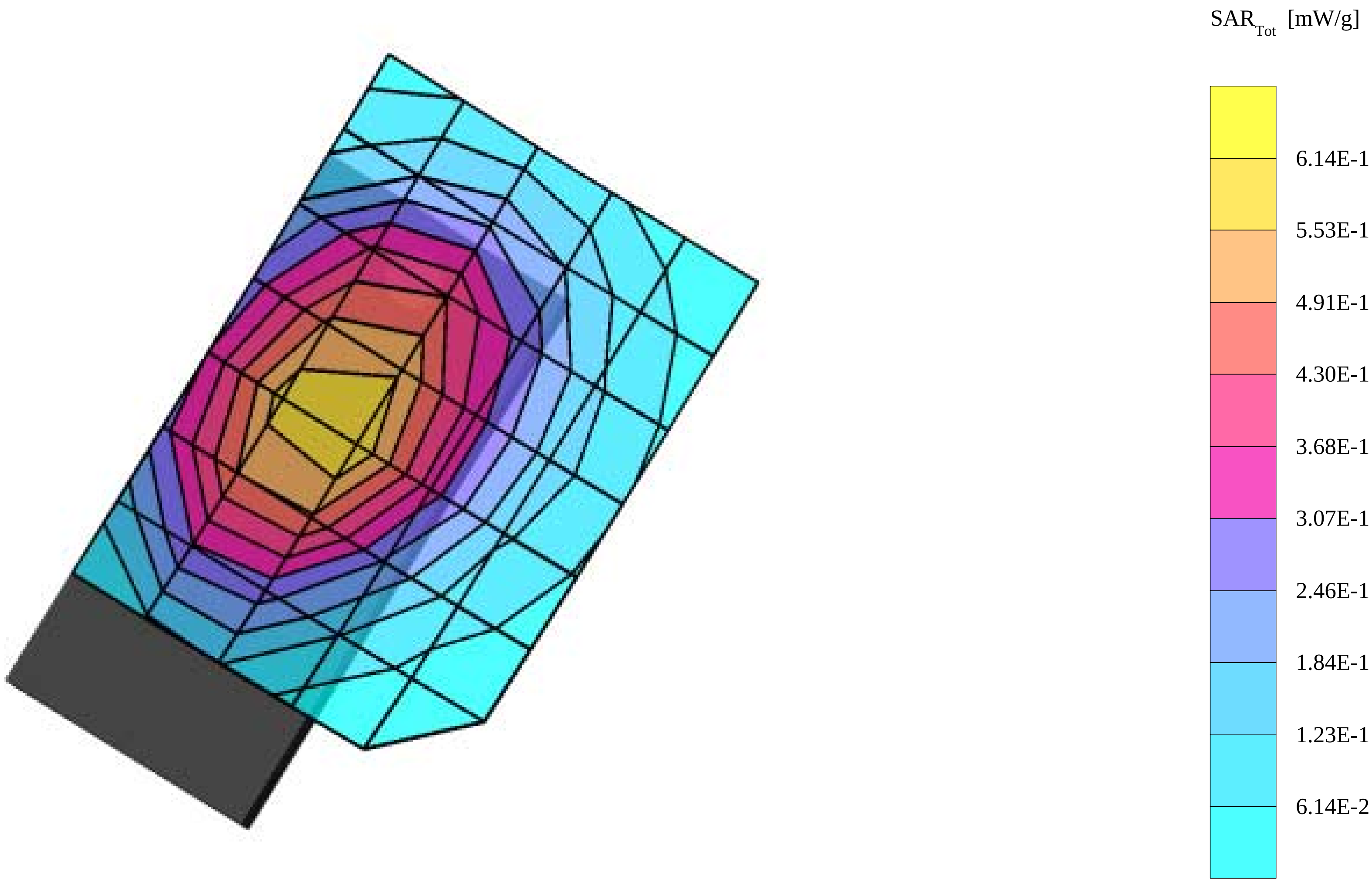
Powerdrift: -0.11 dB



11/27/01

GMLNPW-3

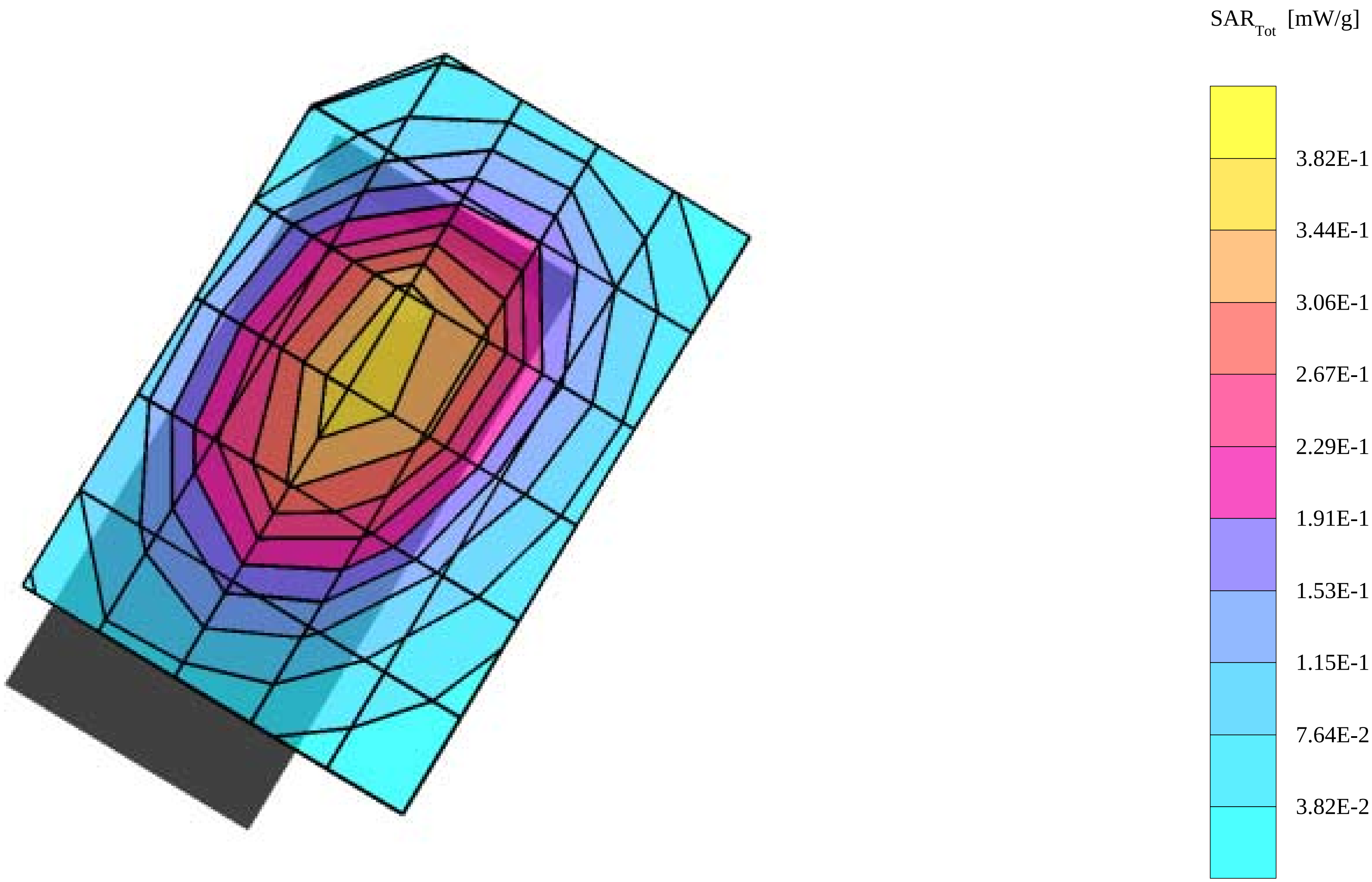
SAM Phantom; Left Hand Section; Position: cheek ; Frequency: 849 MHz
Probe: ET3DV6 - SN1381; ConvF(6.20,6.20,6.20); Crest factor: 3.0; Brain 836 MHz SCC34: σ = 0.89 mho/m ε = 39.4 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.615 mW/g, SAR (10g): 0.427 mW/g
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.10 dB



11/27/01

GMLNPW-3

SAM Phantom; Left Hand Section; Position: tilted; Frequency: 849 MHz
Probe: ET3DV6 - SN1381; ConvF(6.20,6.20,6.20); Crest factor: 3.0; Brain 836 MHz SCC34: σ = 0.89 mho/m ε = 39.4 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.367 mW/g, SAR (10g): 0.255 mW/g
Coarse: Dx = 19.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.06 dB



11/29/01

GMLNPW-3

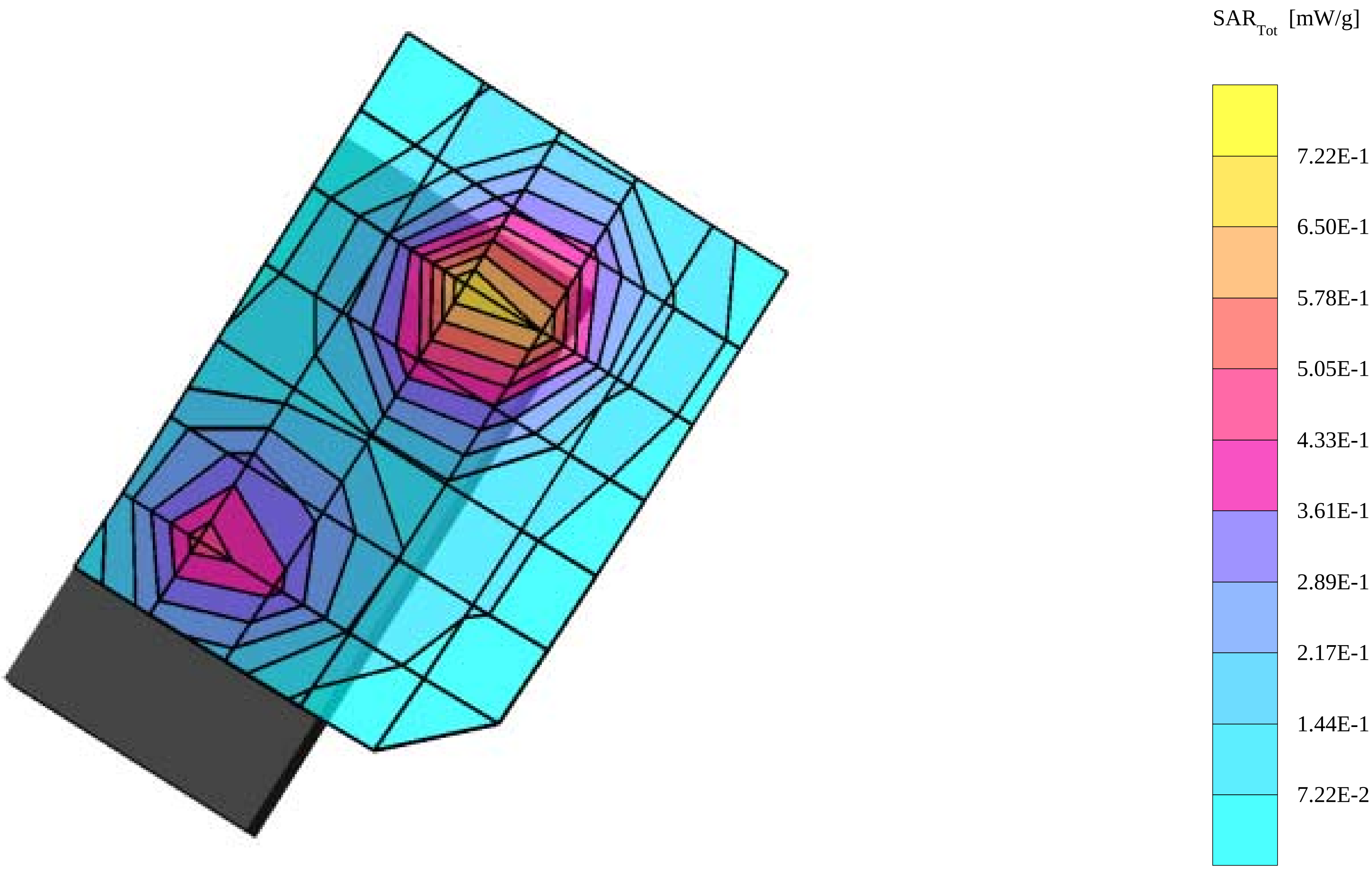
SAM Phantom; Left Hand Section; Position: cheek; Frequency:1850 MHz

Probe: ET3DV6 - SN1381; ConvF(5.22,5.22,5.22); Crest factor: 3.0; Brain 1880 MHz SCC34: σ = 1.43 mho/m ε = 38.4 ρ = 1.00 g/cm^3

Cube 5x5x7: SAR (1g): 0.774 mW/g, SAR (10g): 0.411 mW/g

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

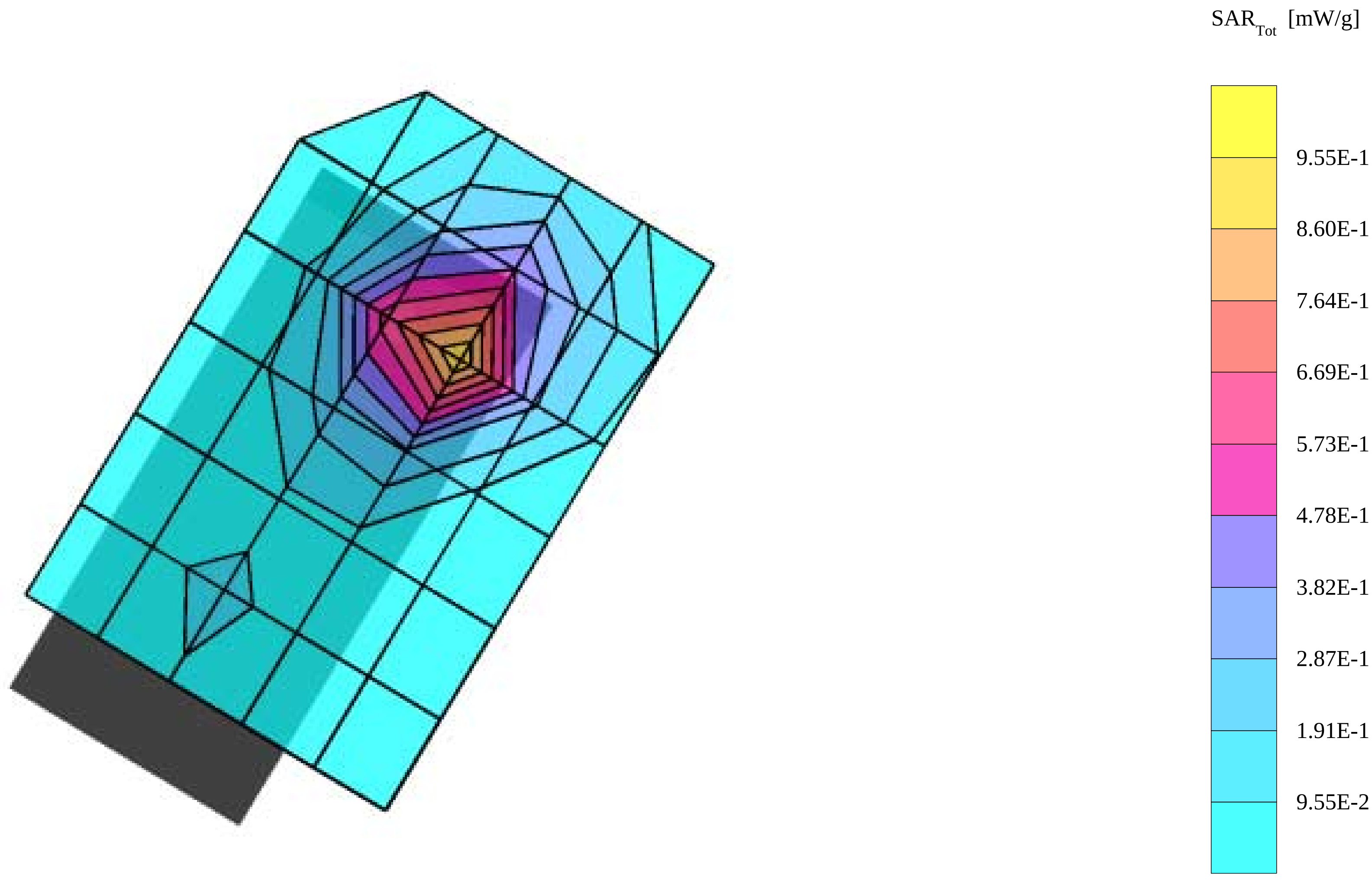
Powerdrift: -0.04 dB



11/29/01

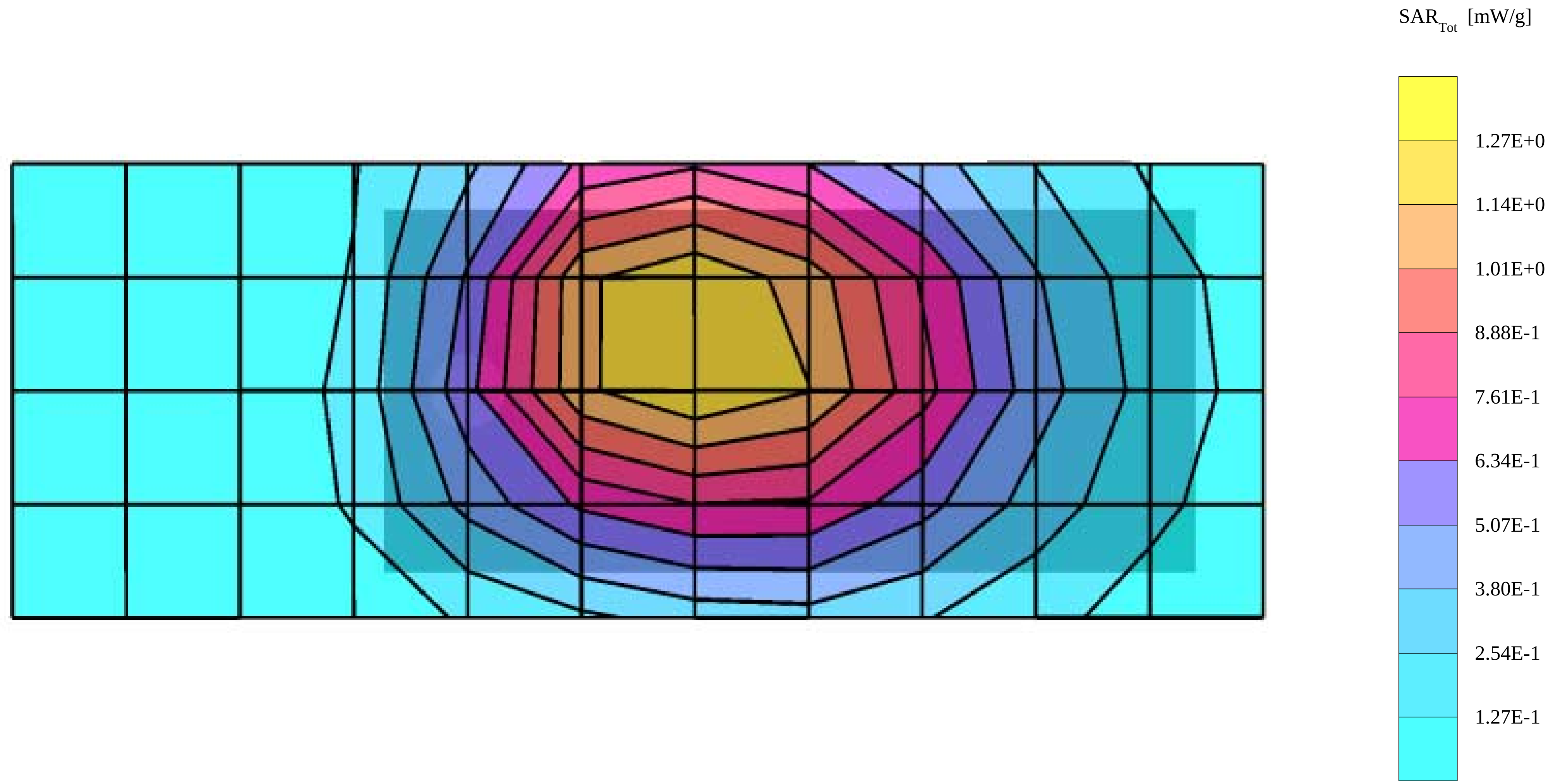
GMLNPW-3

SAM Phantom; Left Hand Section; Position: tilted ; Frequency: 1850 MHz
Probe: ET3DV6 - SN1381; ConvF(5.22,5.22,5.22); Crest factor: 3.0; Brain 1880 MHz SCC34: σ = 1.43 mho/m ε = 38.4 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.925 mW/g, SAR (10g): 0.482 mW/g
Coarse: Dx = 19.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.06 dB



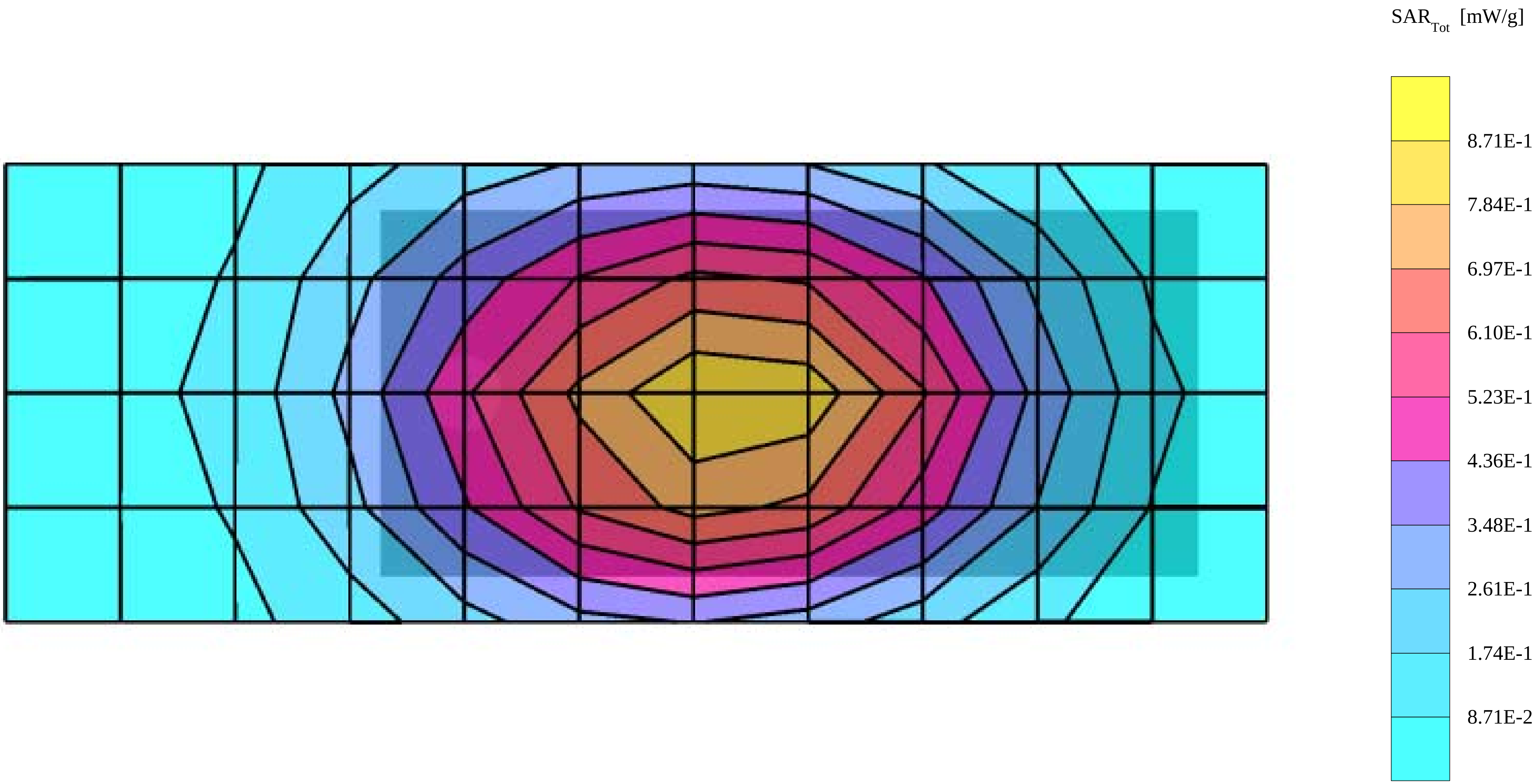
GMLNPW-3, CLS-22

SAM Phantom; Flat Section; Position: body worn, backside of CSL-22 facing the phantom; Frequency: 824 MHz
Probe: ET3DV6 - SN1381; ConvF(6.04,6.04,6.04); Crest factor: 1.0; Muscle 836 MHz: σ = 0.95 mho/m ε = 57.4 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 1.29 mW/g, SAR (10g): 0.910 mW/g,
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Powerdrift: -0.03 dB



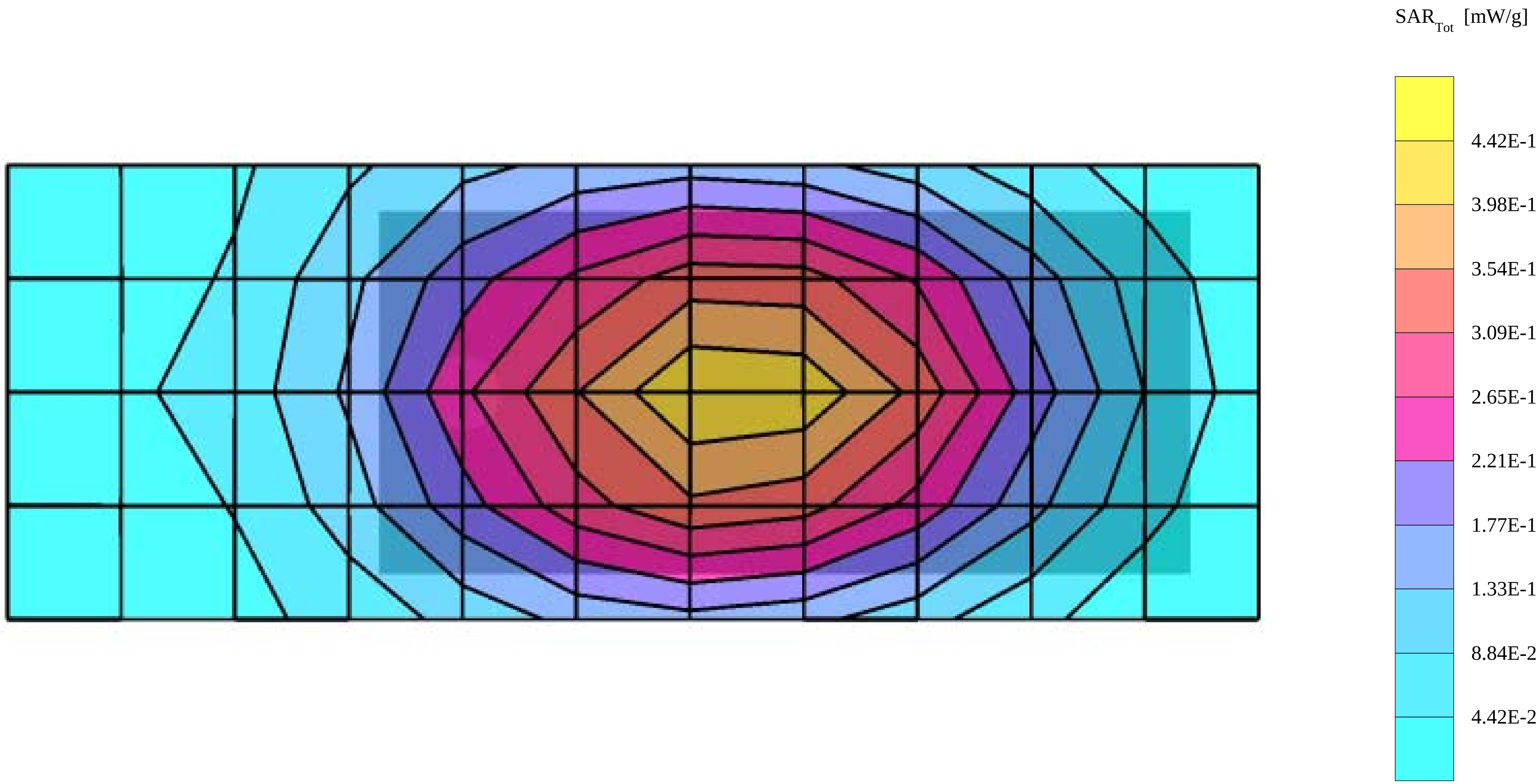
GMLNPW-3, CSL-22

SAM Phantom; Flat Section; Position: body worn, front of CSL-22 facing the phantom; Frequency: 836 MHz
Probe: ET3DV6 - SN1381; ConvF(6.04,6.04,6.04); Crest factor: 1.0; Muscle 836 MHz: $\sigma = 0.95$ mho/m $\varepsilon = 57.4$ $\rho = 1.00$ g/cm^3
Cube 5x5x7: SAR (1g): 0.861 mW/g, SAR (10g): 0.614 mW/g
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Powerdrift: 0.05 dB



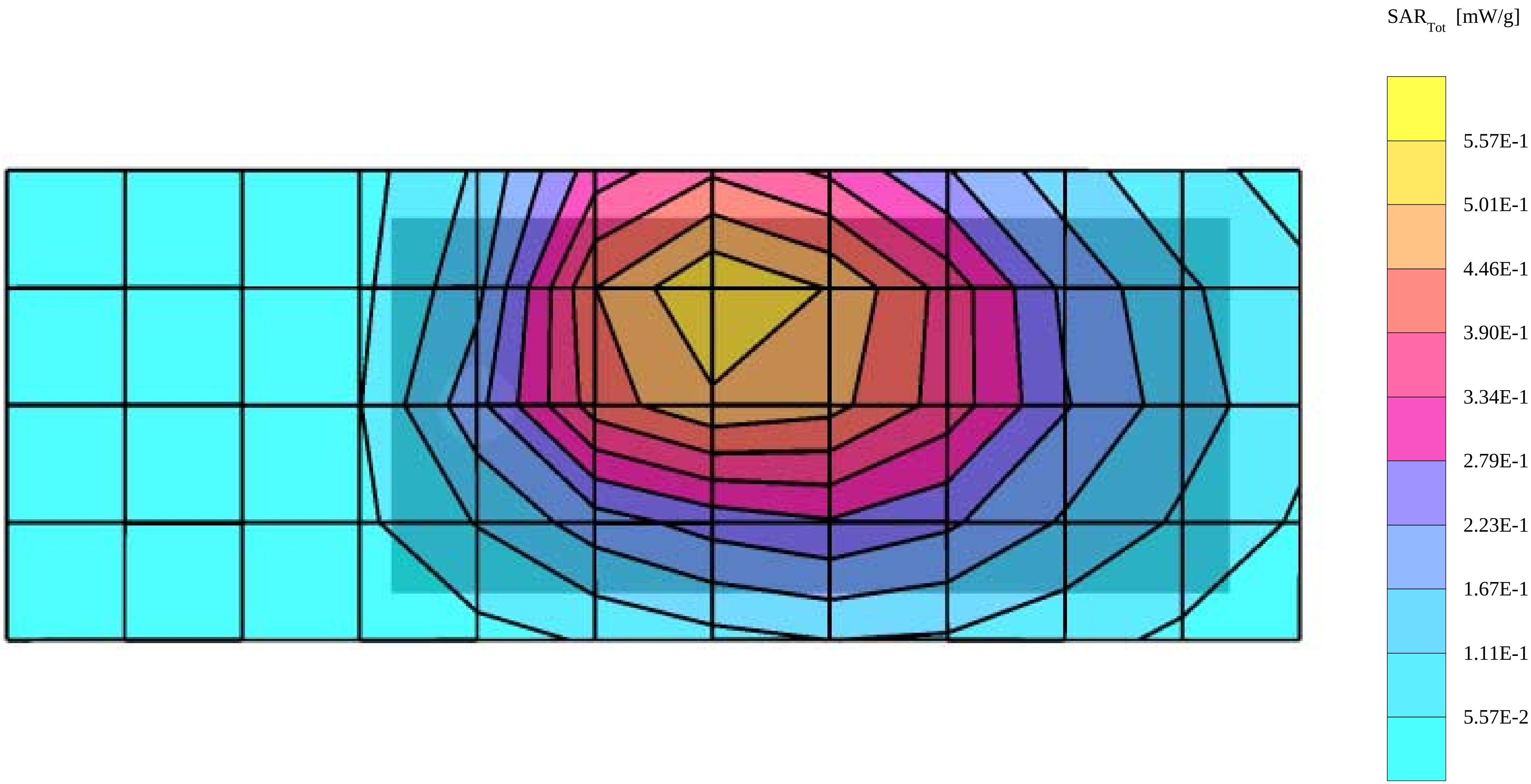
GMLNPW-3, CSL-22

SAM Phantom; Flat Section; Position: body worn, front of CSL-22 facing the phantom; Frequency: 824 MHz
Probe: ET3DV6 - SN1381; ConvF(6.04,6.04,6.04); Crest factor: 3.0; Muscle 836 MHz: σ = 0.95 mho/m ε = 57.4 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.435 mW/g, SAR (10g): 0.306 mW/g
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Powerdrift: -0.02 dB



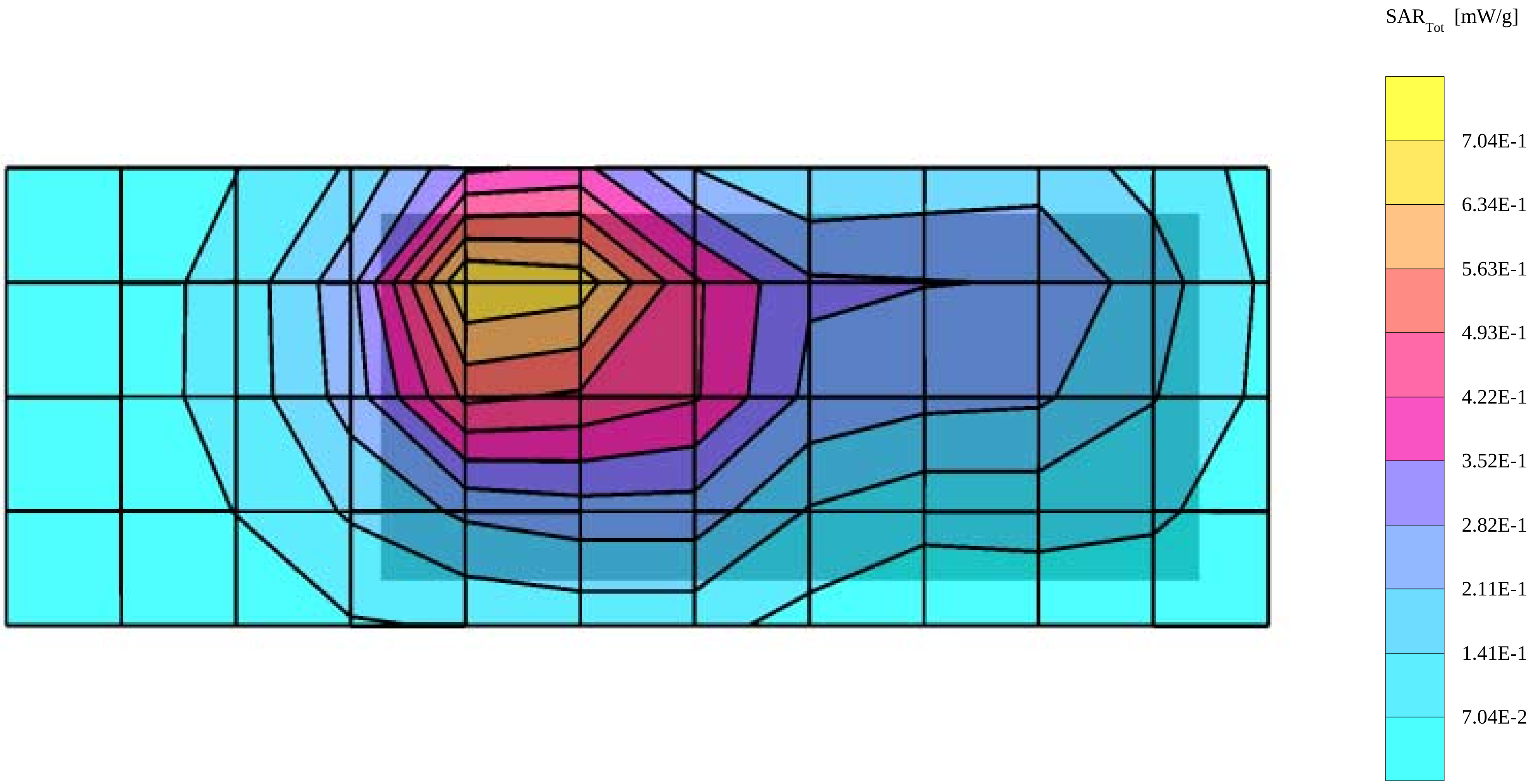
GMLNPW-3, CSL-22

SAM Phantom; Flat Section; Position: body worn, backside of CSL-22 facing the phantom; Frequency: 824 MHz
Probe: ET3DV6 - SN1381; ConvF(6.04,6.04,6.04); Crest factor: 3.0; Muscle 836 MHz: σ = 0.95 mho/m ε = 57.4 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.547 mW/g, SAR (10g): 0.383 mW/g
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Powerdrift: -0.06 dB



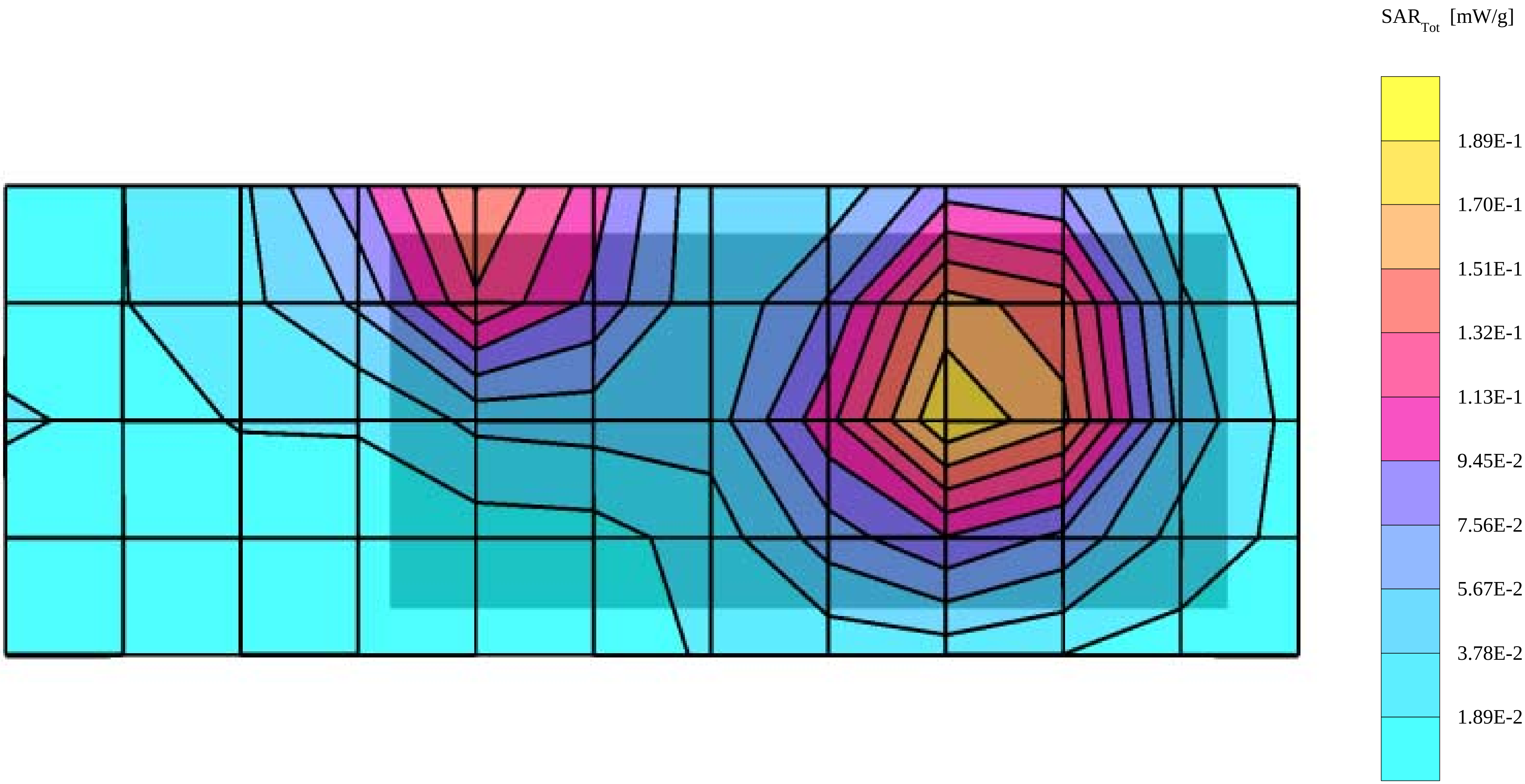
GMLNPW-3, CSL-22

SAM Phantom; Flat Section; Position: body worn, backside of CSL-22 facing the phantom; Frequency: 1850 MHz
Probe: ET3DV6 - SN1381; ConvF(4.96,4.96,4.96); Crest factor: 3.0; Muscle 1880MHz: σ = 1.50 mho/m ε = 53.0 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.711 mW/g, SAR (10g): 0.416 mW/g
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Powerdrift: -0.03 dB



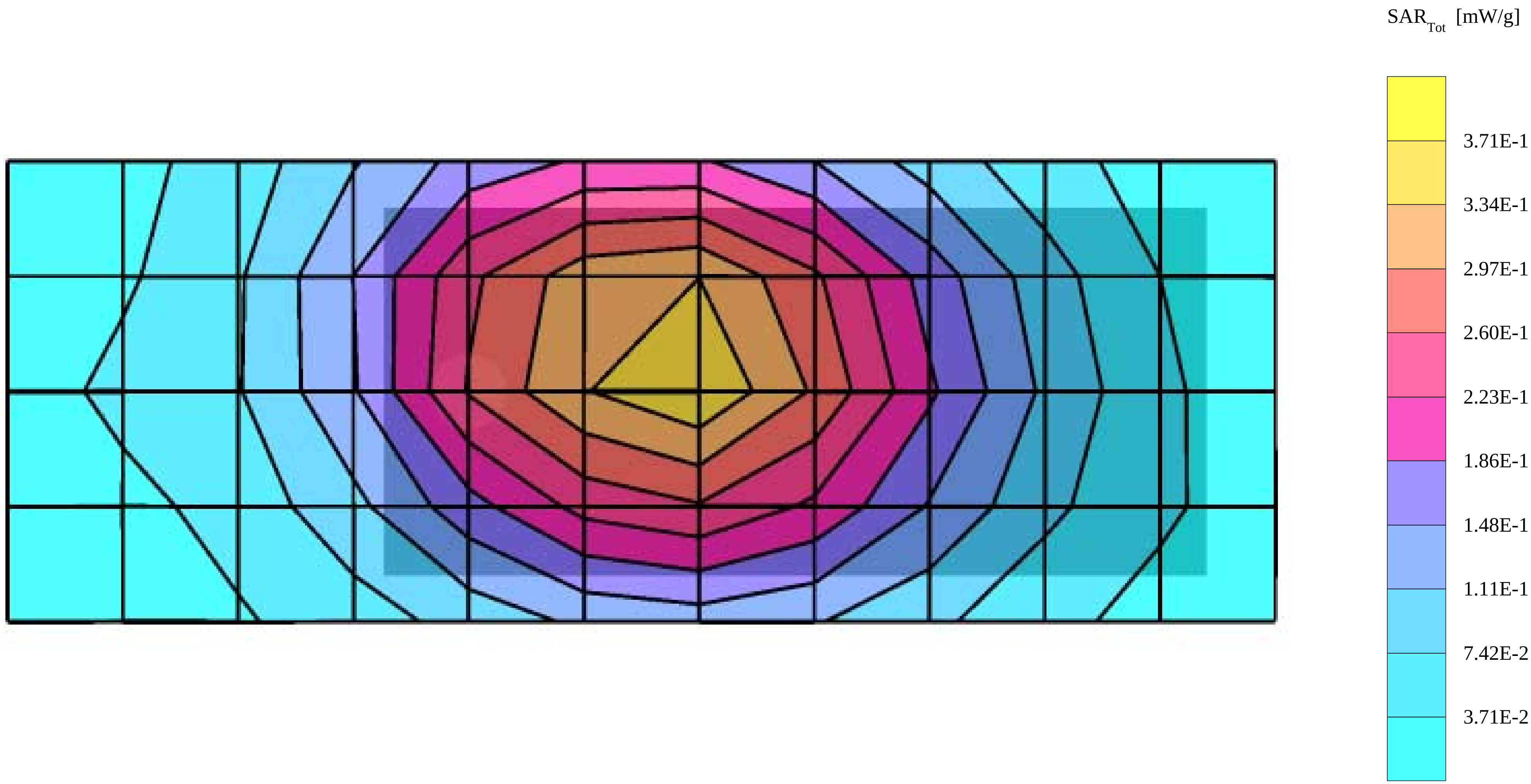
GMLNPW-3, CSL-22

SAM Phantom; Flat Section; Position: body worn, front of CSL-22 facing the phantom; Frequency: 1850 MHz
Probe: ET3DV6 - SN1381; ConvF(4.96,4.96,4.96); Crest factor: 3.0; Muscle 1880MHz: σ = 1.50 mho/m ε = 53.0 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.184 mW/g, SAR (10g): 0.115 mW/g
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Powerdrift: -0.20 dB



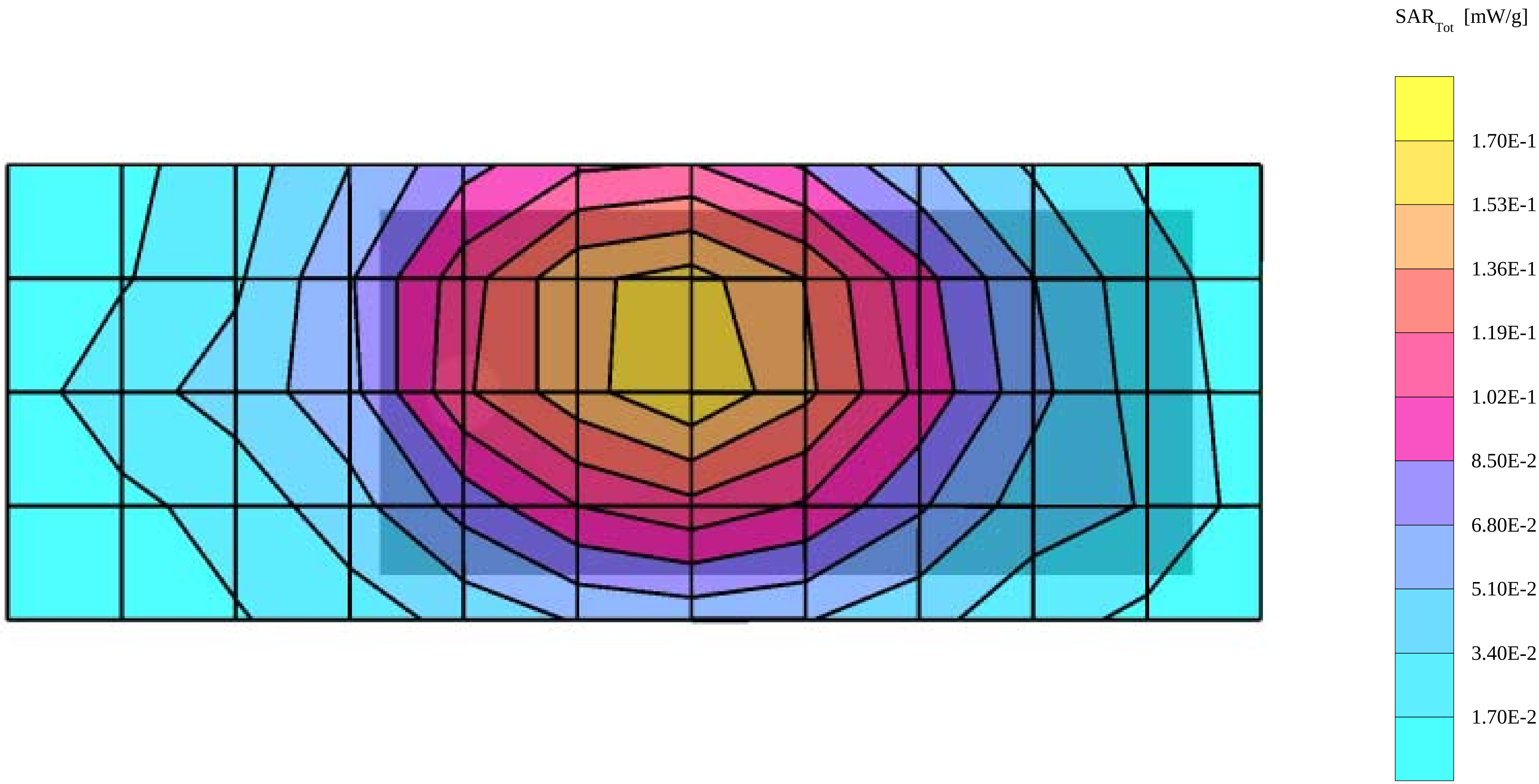
GMLNPW-3, CSL-23

SAM Phantom; Flat Section; Position: body worn; Frequency: 836 MHz
Probe: ET3DV6 - SN1381; ConvF(6.04,6.04,6.04); Crest factor: 1.0; Muscle 836 MHz: $\sigma = 0.95$ mho/m $\varepsilon = 57.4$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.361 mW/g, SAR (10g): 0.255 mW/g
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Powerdrift: -0.04 dB



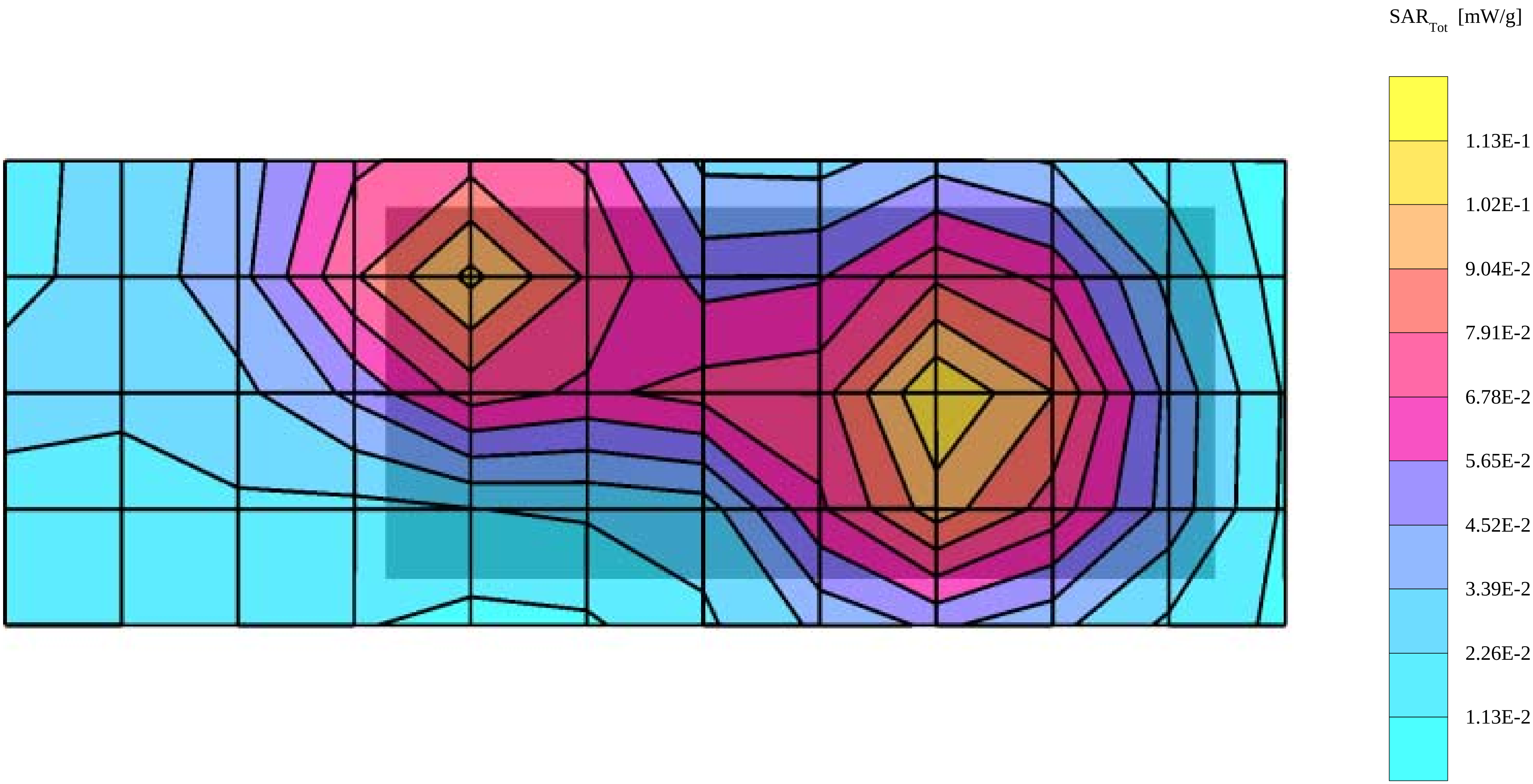
GMLNPW-3, CSL-23

SAM Phantom; Flat Section; Position: body worn; Frequency: 849 MHz
Probe: ET3DV6 - SN1381; ConvF(6.04,6.04,6.04); Crest factor: 3.0; Muscle 836 MHz: σ = 0.95 mho/m ε = 57.4 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.172 mW/g, SAR (10g): 0.119 mW/g
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Powerdrift: -0.07 dB



GMLNPW-3, CSL-23

SAM Phantom; Flat Section; Position: body worn; Frequency: 1850 MHz
Probe: ET3DV6 - SN1381; ConvF(4.96,4.96,4.96); Crest factor: 3.0; Muscle 1880MHz: σ = 1.50 mho/m ε = 53.0 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.109 mW/g, SAR (10g): 0.0678 mW/g
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Powerdrift: -0.09 dB



APPENDIX C.

Calibration Certificate(s)

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:	**1381**
Place of Calibration:	**Zurich**
Date of Calibration:	**October 25, 2001**
Calibration Interval:	**12 months**

Schmid & Partner Engineering AG hereb y 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 pr ocess are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	
Approved by:	

Probe ET3DV6

SN:1381

Manufactured:	September 18, 1999
Last calibration:	October 6, 2000
Recalibrated:	October 25, 2001

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1381

Sensitivity in Free Space

NormX	**1.57**	$\mu V/(V/m)^2$
NormY	**1.70**	$\mu V/(V/m)^2$
NormZ	**1.78**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**95**	mV
DCP Y	**95**	mV
DCP Z	**95**	mV

Sensitivity in Tissue Simulating Liquid

Head 450 MHz **e_r = 43.5 ± 5%** **s = 0.87 ± 10% mho/m**

ConvF X	**6.66**	extrapolated	Boundary effect:	
ConvF Y	**6.66**	extrapolated	Alpha	**0.29**
ConvF Z	**6.66**	extrapolated	Depth	**2.78**

Head 800 - 1000 MHz **e_r = 39.0 - 43.5** **s = 0.80 - 1.10 mho/m**

ConvF X	**6.21**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.21**	± 9.5% (k=2)	Alpha	**0.40**
ConvF Z	**6.21**	± 9.5% (k=2)	Depth	**2.61**

Head 1500 MHz **e_r = 40.4 ± 5%** **s = 1.23 ± 10% mho/m**

ConvF X	**5.61**	interpolated	Boundary effect:	
ConvF Y	**5.61**	interpolated	Alpha	**0.55**
ConvF Z	**5.61**	interpolated	Depth	**2.38**

Head 1700 - 1910 MHz **e_r = 39.5 - 41.0** **s = 1.20 - 1.55 mho/m**

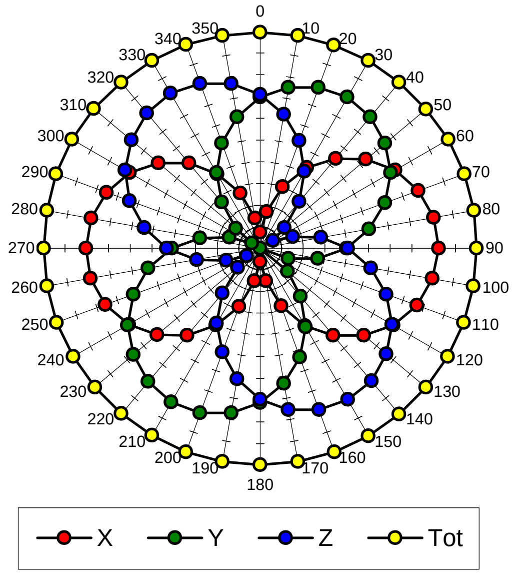
ConvF X	**5.31**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.31**	± 9.5% (k=2)	Alpha	**0.62**
ConvF Z	**5.31**	± 9.5% (k=2)	Depth	**2.27**

Sensor Offset

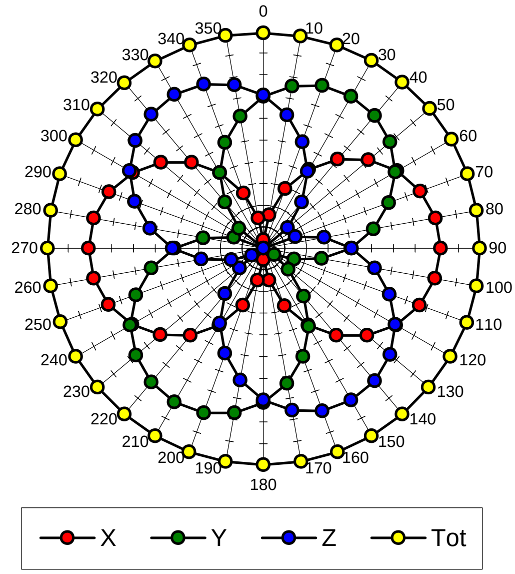
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.6 ± 0.2**	mm

Receiving Pattern (f), q = 0°

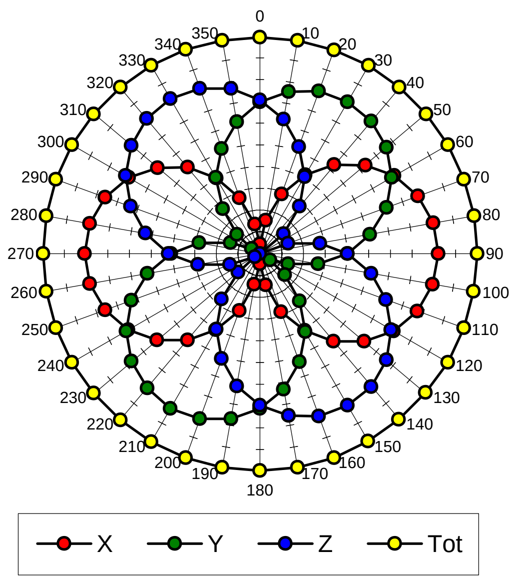
f = 30 MHz, TEM cell ifi110



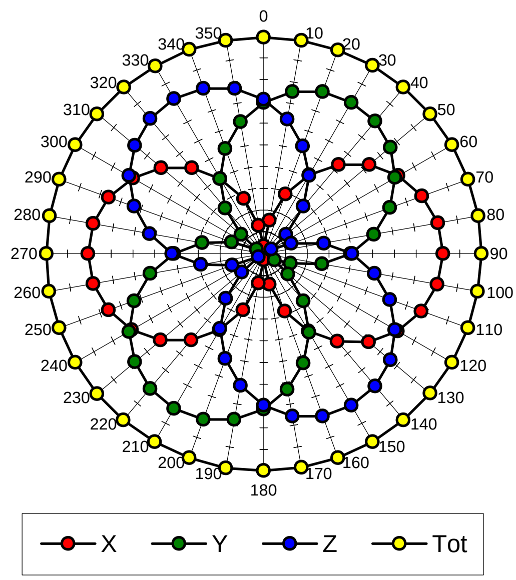
f = 100 MHz, TEM cell ifi110

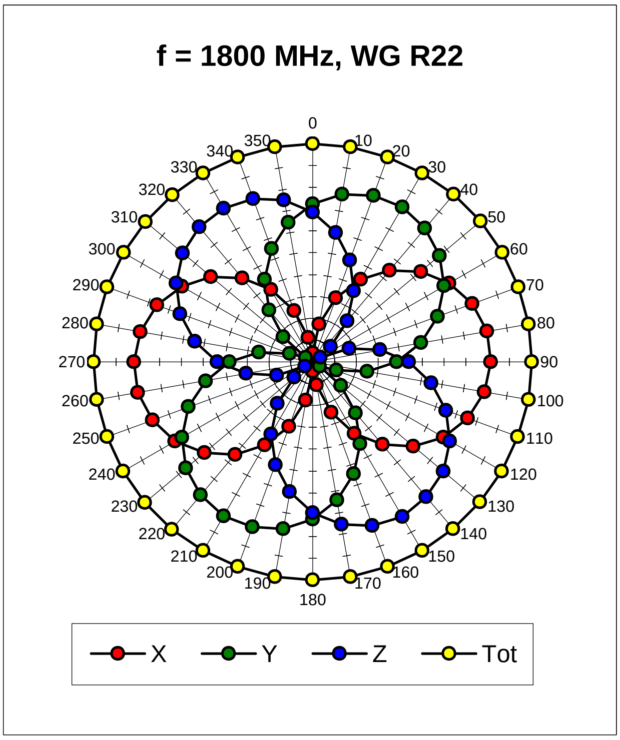


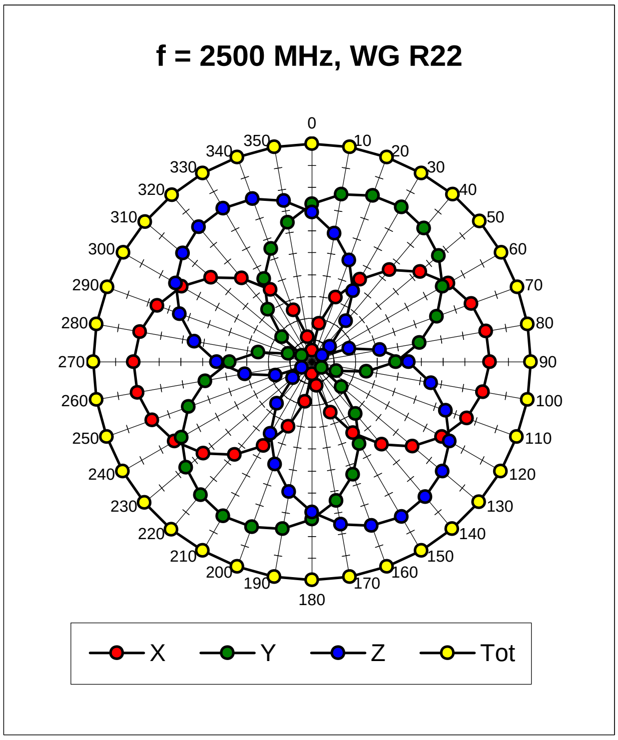
f = 300 MHz, TEM cell ifi110



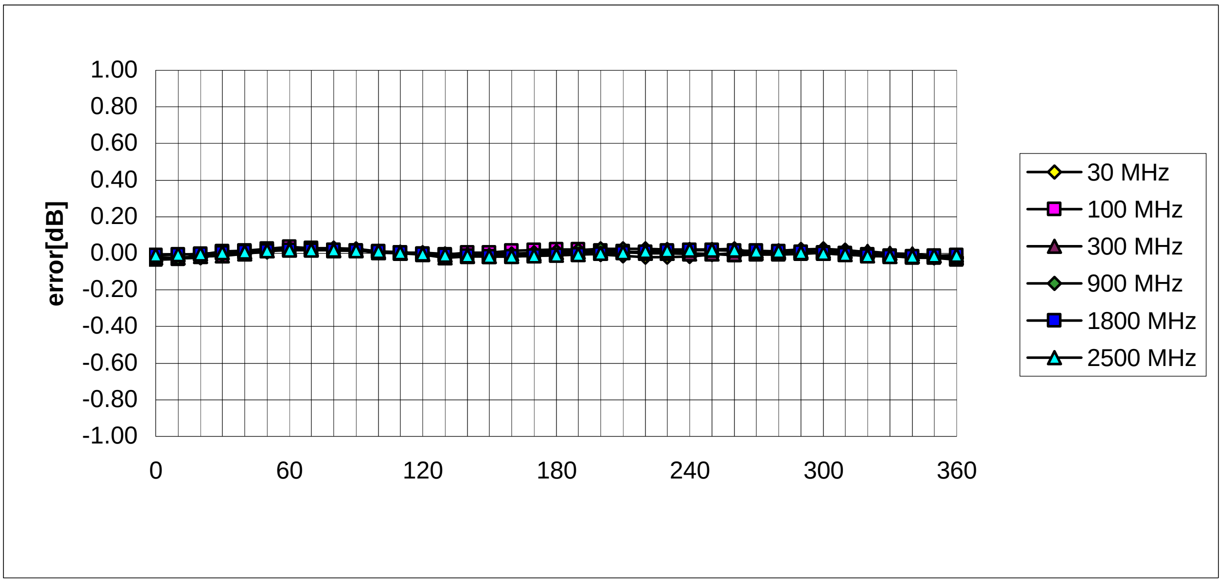
f = 900 MHz, TEM cell ifi110





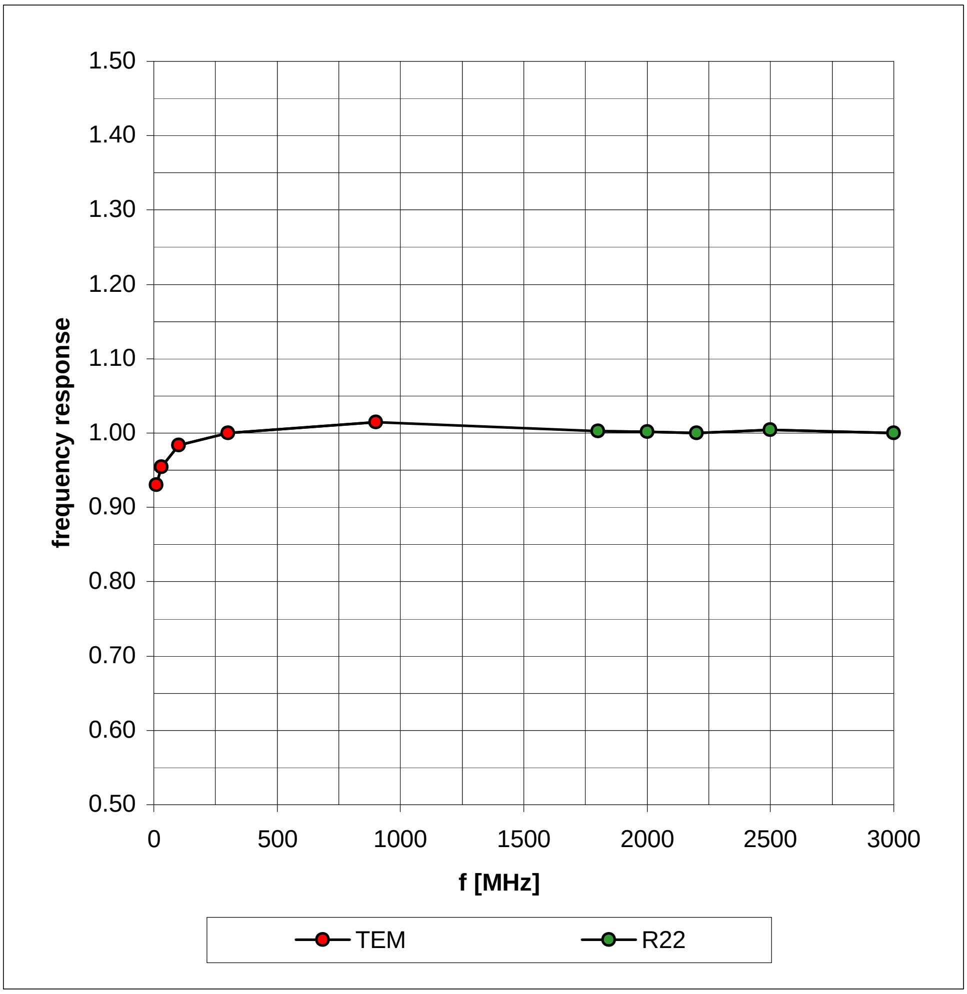


Isotropy Error (f), q = 0°



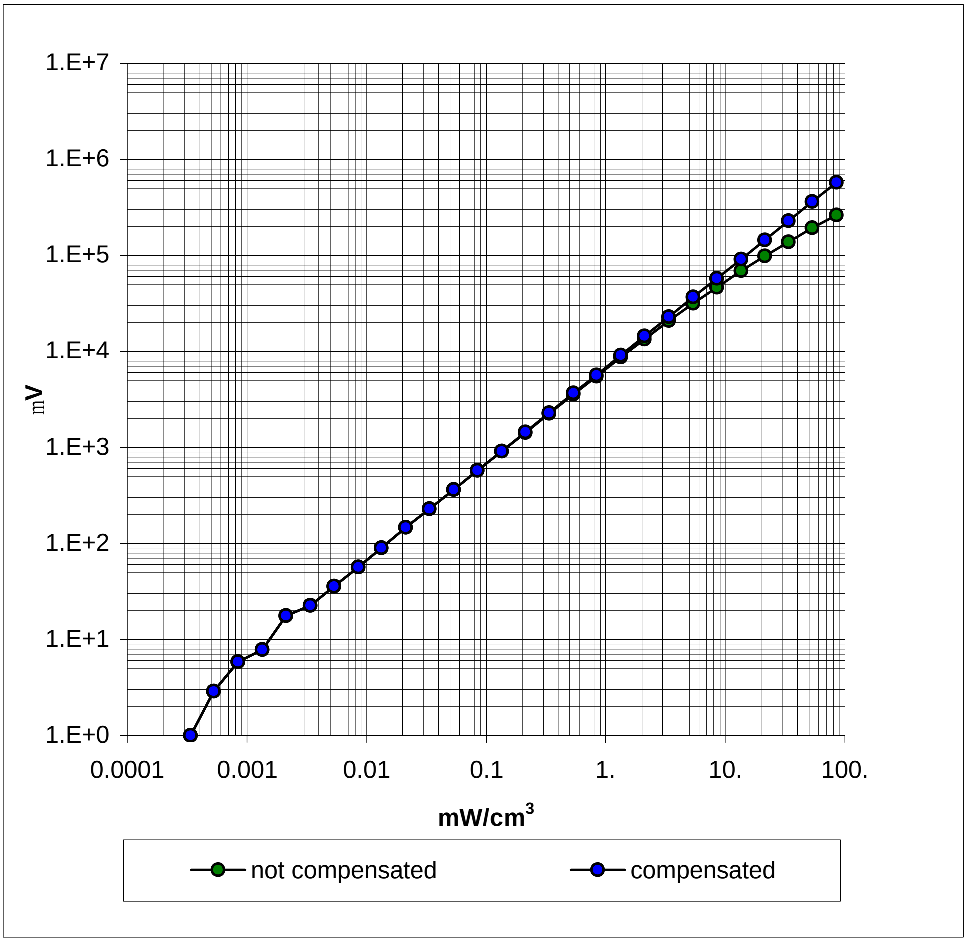
Frequency Response of E-Field

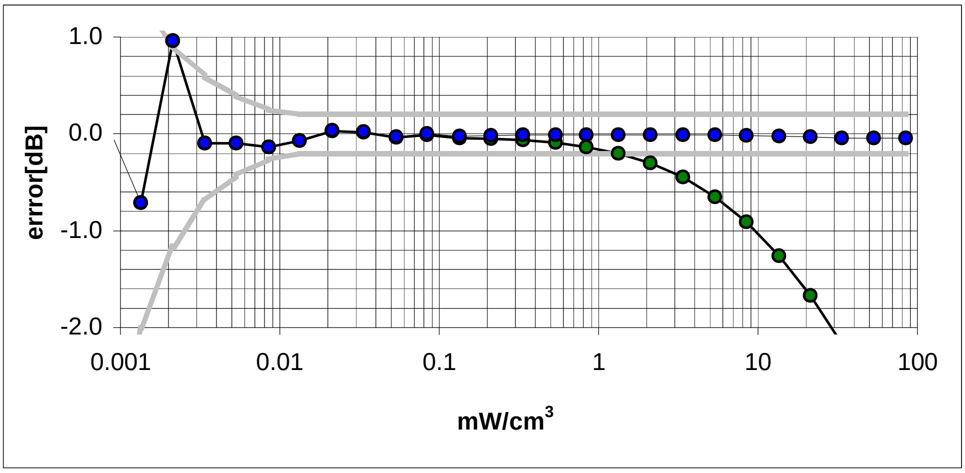
(TEM-Cell:ifi110, Waveguide R22)



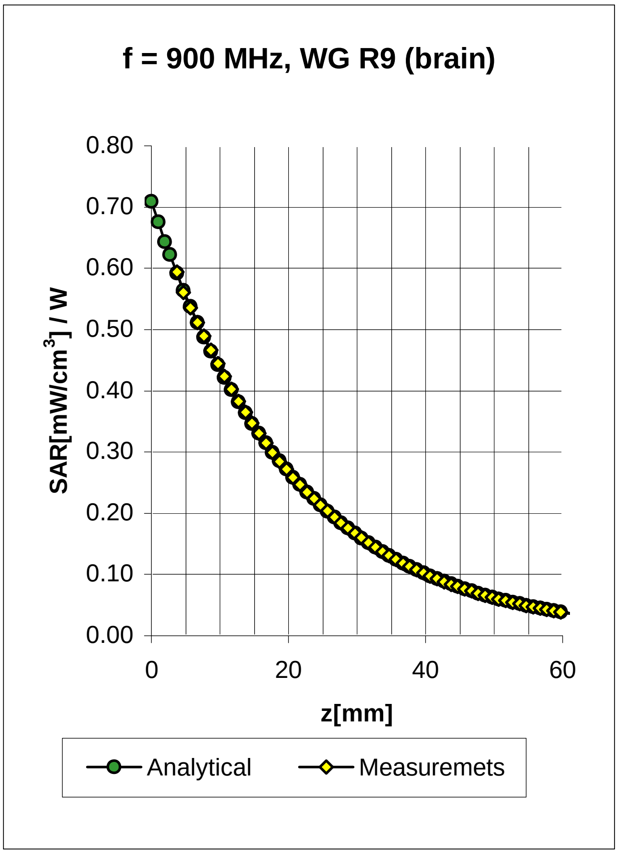
Dynamic Range f(SAR_{brain})

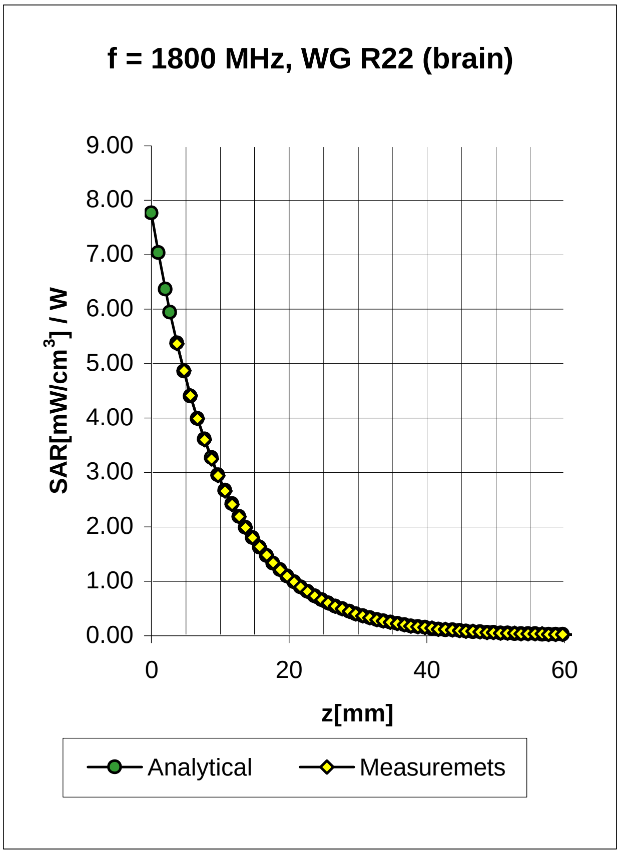
(Waveguide R22)





Conversion Factor Assessment





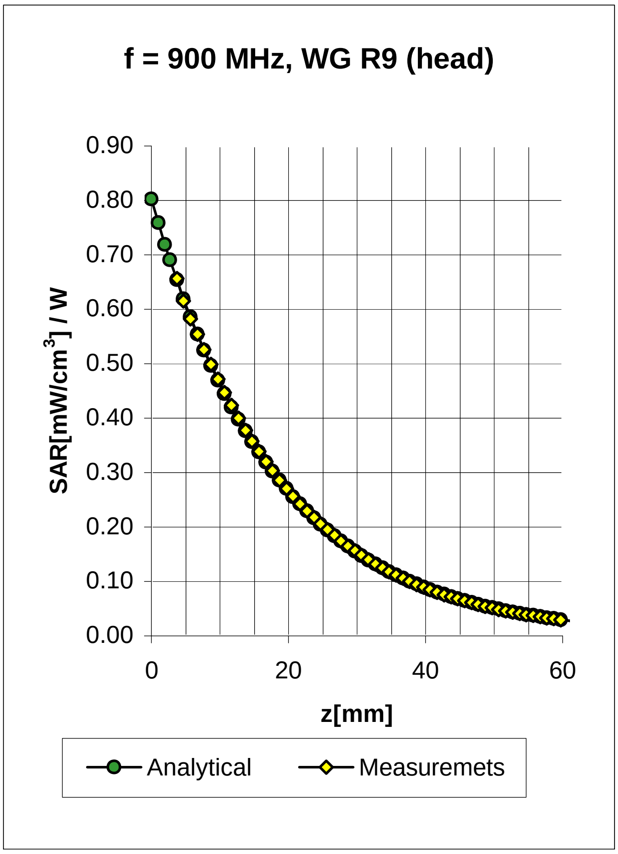
Brain **800 - 1000 MHz** e_r **= 39.3 - 43.0** s **= 0.75 - 1.00 mho/m**

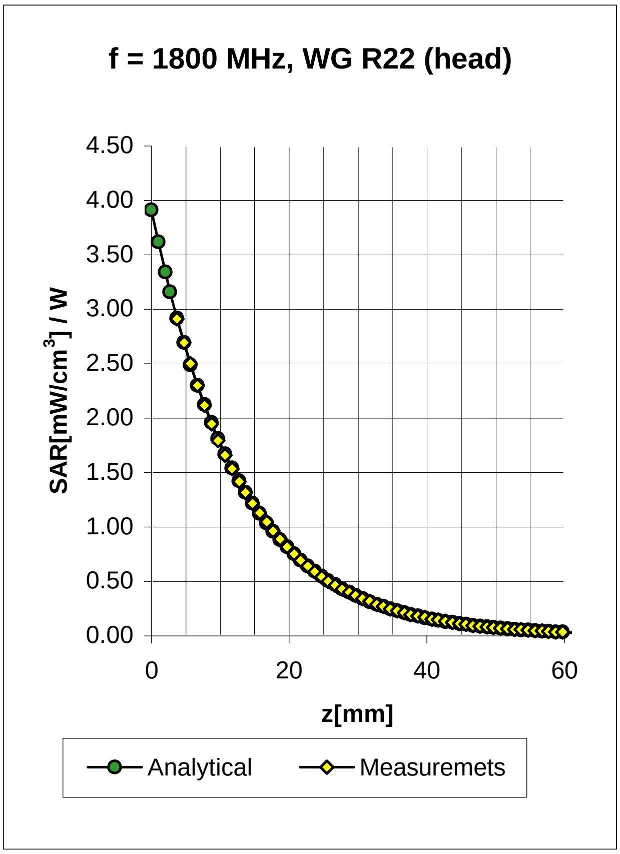
ConvF X	**6.13**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.13**	± 9.5% (k=2)	Alpha	**0.45**
ConvF Z	**6.13**	± 9.5% (k=2)	Depth	**2.36**

Brain **1700 - 1910 MHz** e_r **= 39.3 - 41.6** s **= 1.53 - 1.90 mho/m**

ConvF X	**5.53**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.53**	± 9.5% (k=2)	Alpha	**0.66**
ConvF Z	**5.53**	± 9.5% (k=2)	Depth	**2.07**

Conversion Factor Assessment





Head **800 - 1000 MHz** e_r **= 39.0 - 43.5** s **= 0.80 - 1.10 mho/m**

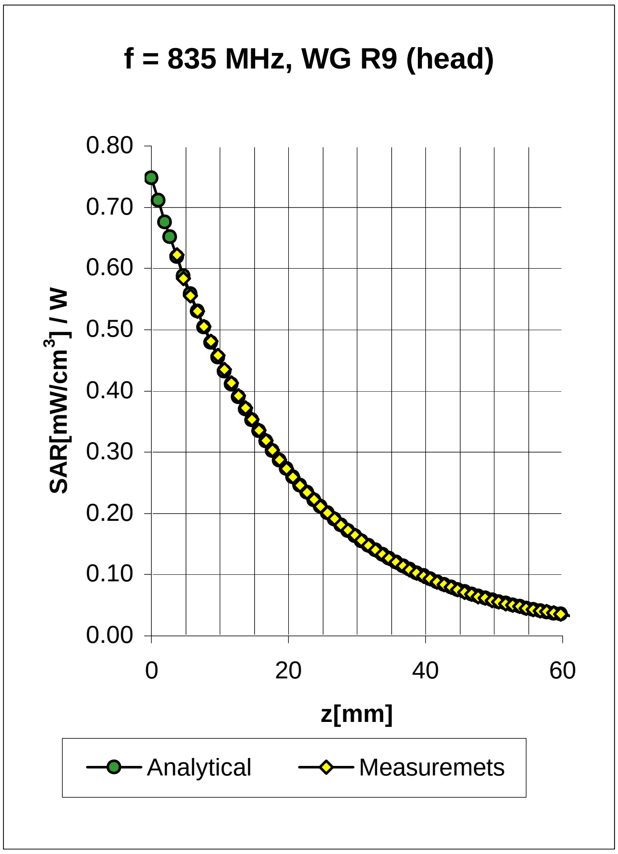
ConvF X	**6.21**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.21**	± 9.5% (k=2)	Alpha	**0.40**
ConvF Z	**6.21**	± 9.5% (k=2)	Depth	**2.61**

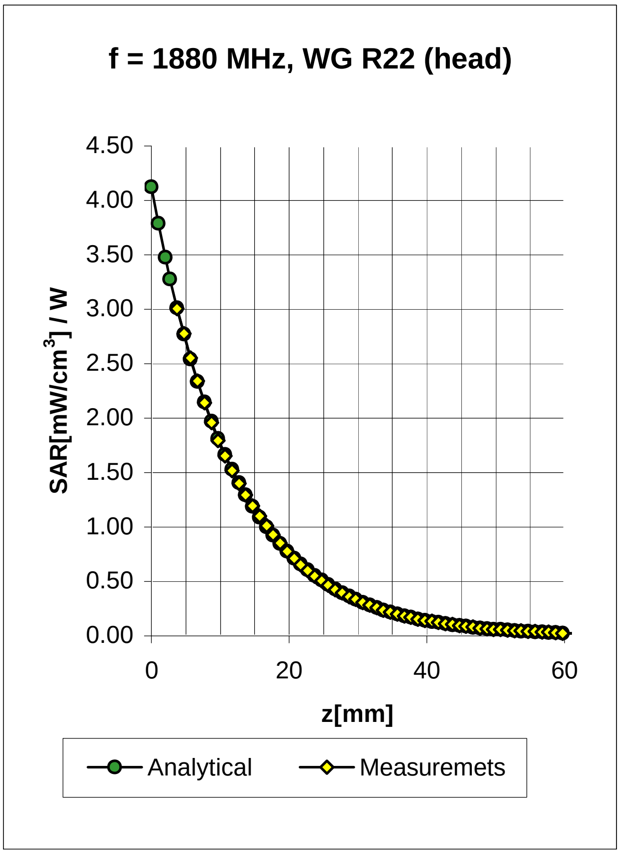
Head **1700 - 1910 MHz** e_r **= 39.5 - 41.0** s **= 1.20 - 1.55 mho/m**

ConvF X	**5.31**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.31**	± 9.5% (k=2)	Alpha	**0.62**
ConvF Z	**5.31**	± 9.5% (k=2)	Depth	**2.27**

ET3DV6 SN:1381

Conversion Factor Assessment





Head **835 MHz** e_r **= 41.5 ± 5%** s **= 0.90 ± 5% mho/m**

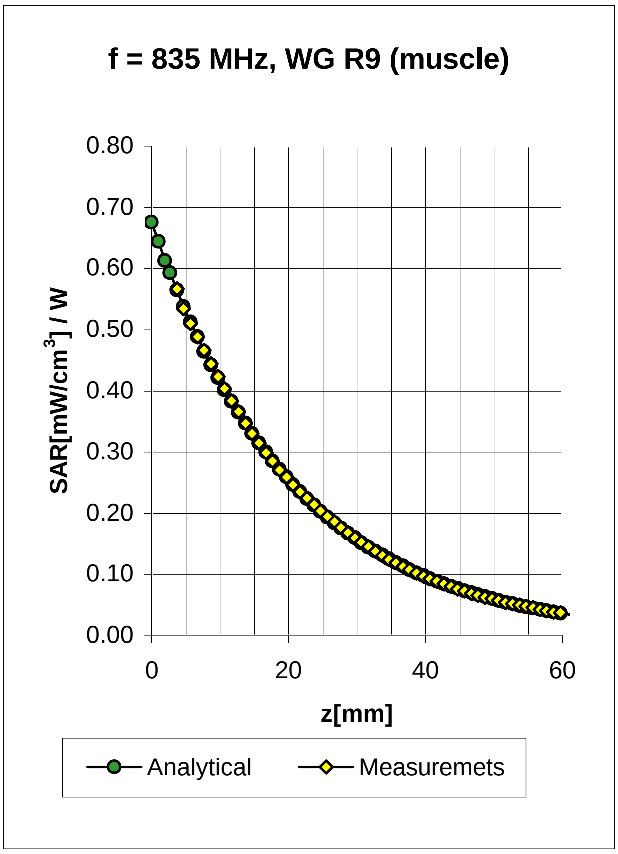
ConvF X	**6.20**	± 8.9% (k=2)	Boundary effect:	
ConvF Y	**6.20**	± 8.9% (k=2)	Alpha	**0.41**
ConvF Z	**6.20**	± 8.9% (k=2)	Depth	**2.58**

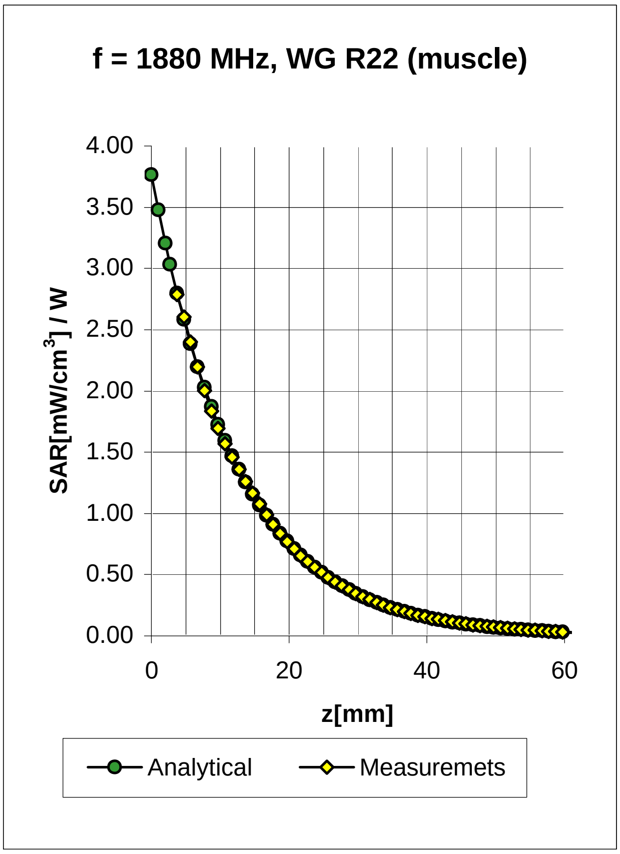
Head **1880 MHz** e_r **= 40.0 ± 5%** s **= 1.540 ± 5% mho/m**

ConvF X	**5.22**	± 8.9% (k=2)	Boundary effect:	
ConvF Y	**5.22**	± 8.9% (k=2)	Alpha	**0.64**
ConvF Z	**5.22**	± 8.9% (k=2)	Depth	**2.23**

ET3DV6 SN:1381

Conversion Factor Assessment





Muscle **835 MHz** e_r **= 55.2 ± 5%** s **= 0.97 ± 5% mho/m**

ConvF X	**6.04** ± 8.9% (k=2)		Boundary effect:	
ConvF Y	**6.04** ± 8.9% (k=2)		Alpha	**0.42**
ConvF Z	**6.04** ± 8.9% (k=2)		Depth	**2.73**

Muscle **1880 MHz** e_r **= 53.3 ± 5%** s **= 1.52 ± 5% mho/m**

ConvF X	**4.96** ± 8.9% (k=2)		Boundary effect:	
ConvF Y	**4.96** ± 8.9% (k=2)		Alpha	**0.91**
ConvF Z	**4.96** ± 8.9% (k=2)		Depth	**1.88**

ET3DV6 SN:1381

Deviation from Isotropy in HSL

Error (q, f), f = 900 MHz