

7. RESULTS

The measured Head SAR values for the test device are tabulated below:

Head SAR Results

Mode and Band	Position		SAR, averaged over 1g (W/kg)		
			Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz
GSM 850	Power level		27.2 dBm	28.1 dBm	29.7 dBm
	Left	Cheek	0.54	0.69	0.73
		Tilt	-	0.36	-
	Right	Cheek	-	0.62	-
		Tilt	-	0.42	-

Mode and Band	Position		SAR, averaged over 1g (W/kg)		
			Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz
GSM 1900	Power level		31.7 dBm	31.1 dBm	30.0 dBm
	Left	Cheek	-	0.37	-
		Tilt	-	0.55	-
	Right	Cheek	-	0.47	-
		Tilt	0.70	0.61	0.40

The measured Body SAR values for the test device are tabulated below:

Body SAR Results

Mode and Band	Body-worn location setup	SAR, averaged over 1g (W/kg)		
		Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz
GSM 850	Power level	27.2 dBm	28.1 dBm	29.7 dBm
	HDC-5 Headset	0.95	1.02	0.83

Mode and Band	Body-worn location setup	SAR, averaged over 1g (W/kg)		
		Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz
GSM 1900	Power level	31.7 dBm	31.1 dBm	30.0 dBm
	HDC-5 Headset	0.89	0.90	0.68

Plots of the Measurement scans are given in Appendix B.



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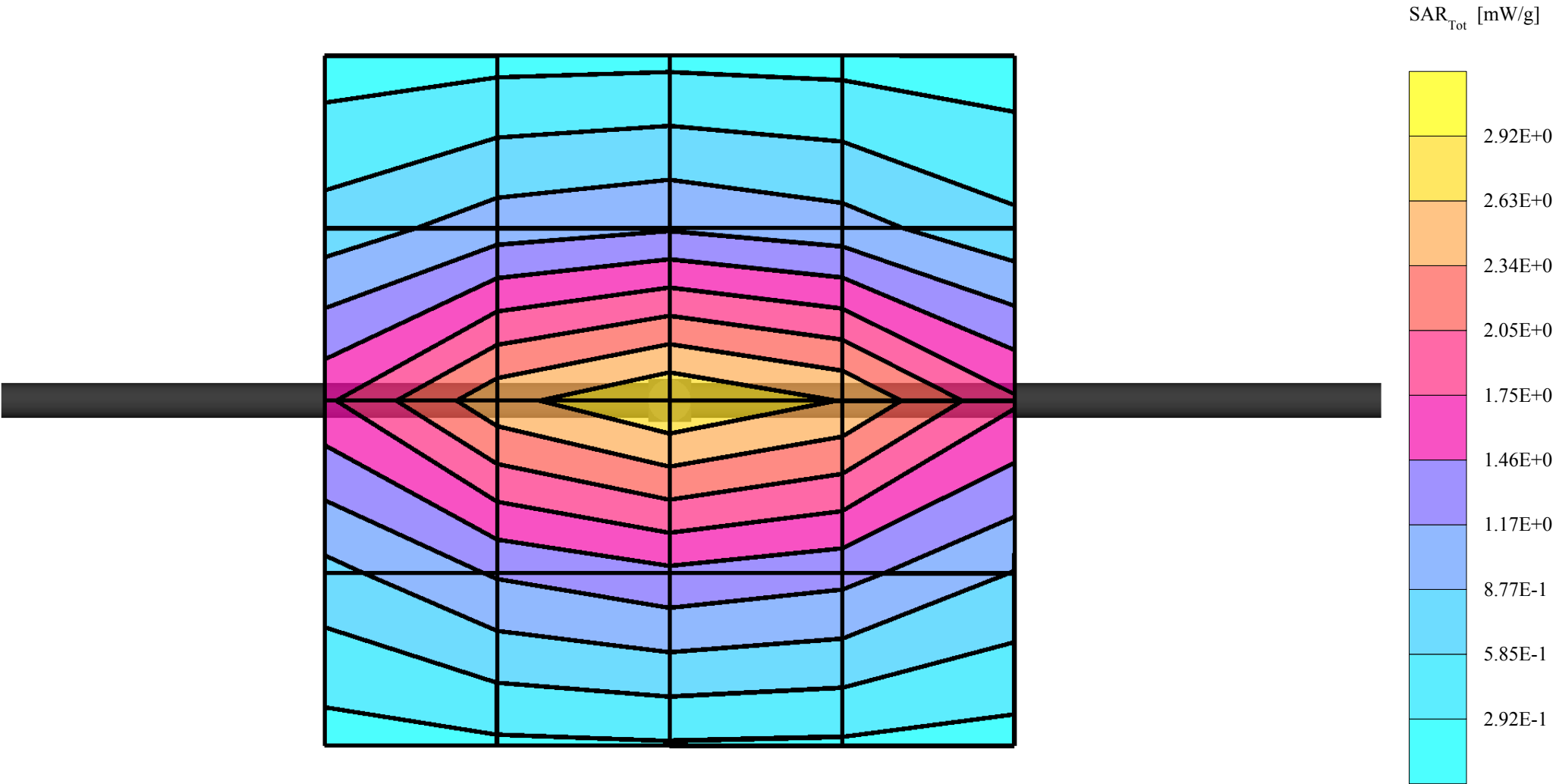


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APPENDIX A: VALIDATION SCANS

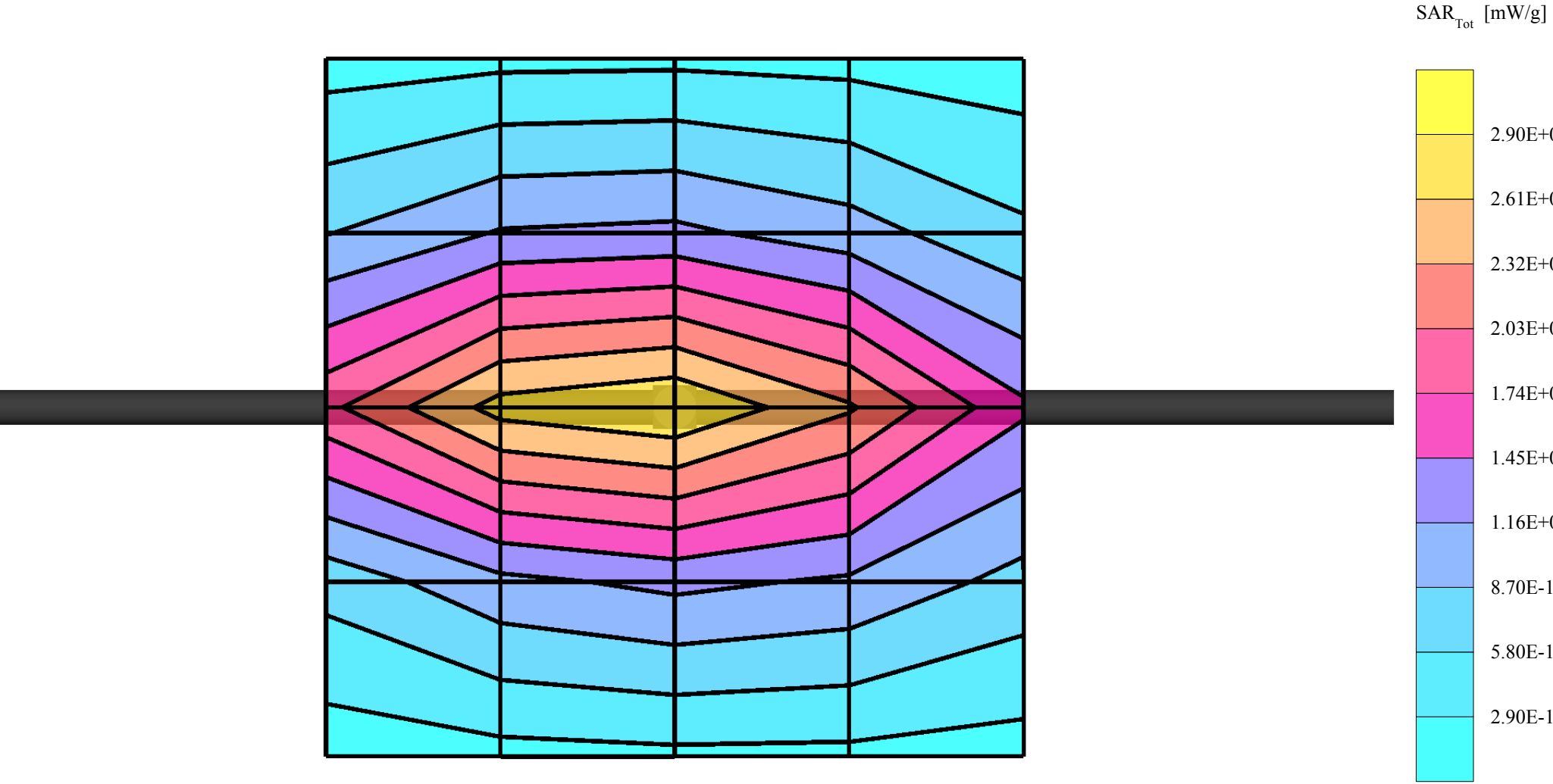
Dipole 835 MHz, Head Validation

SAM 1 (Cellular - Brain Tissue)
Frequency: 835 MHz; Crest factor: 1.0
Validation 835MHz - Brain Tissue: $\sigma = 0.93 \text{ mho/m}$ $\epsilon_r = 43.0$ $\rho = 1.00 \text{ g/cm}^3$
Probe: ET3DV6 - SN1504; ConvF(6.20,6.20,6.20)
Cubes (2): Peak: $3.80 \text{ mW/g} \pm 0.01 \text{ dB}$, SAR (1g): $2.55 \text{ mW/g} \pm 0.01 \text{ dB}$, SAR (10g): $1.67 \text{ mW/g} \pm 0.01 \text{ dB}$, (Advanced extrapolation)
Penetration depth: 13.0 (12.5, 13.6) [mm]
Powerdrift: -0.04 dB
Liquid Temperature: 21.1



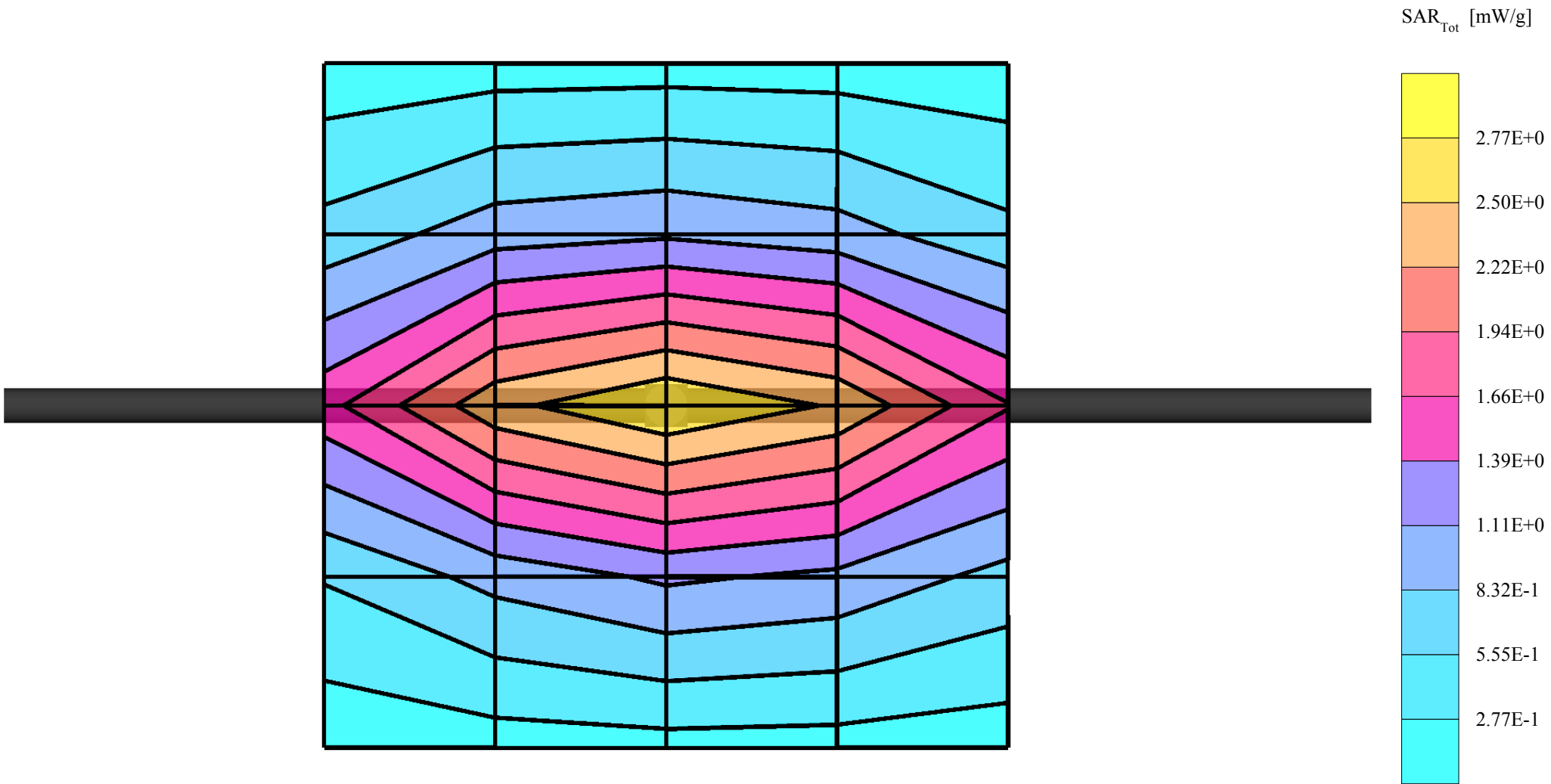
Dipole 835 MHz, Head Validation

SAM 1 (Cellular - Brain Tissue)
Frequency: 835 MHz; Crest factor: 1.0
Validation 835MHz - Brain Tissue: $\sigma = 0.92$ mho/m $\epsilon_r = 43.6$ $\rho = 1.00$ g/cm³
Probe: ET3DV6 - SN1504; ConvF(6.20,6.20,6.20)
Cubes (2): Peak: 3.75 mW/g ± 0.01 dB, SAR (1g): 2.51 mW/g ± 0.00 dB, SAR (10g): 1.65 mW/g ± 0.00 dB, (Advanced extrapolation)
Penetration depth: 12.9 (12.4, 13.6) [mm]
Powerdrift: -0.04 dB
Liquid Temperature: 20.9



Dipole 835 MHz, Body Validation

SAM 2 (Cellular - Muscle Tissue)
Frequency: 835 MHz; Crest factor: 1.0
Validation 835MHz - Muscle Tissue: $\sigma = 0.94$ mho/m $\epsilon_r = 52.4$ $\rho = 1.00$ g/cm³
Probe: ET3DV6 - SN1504; ConvF(6.20,6.20,6.20)
Cube 5x5x7: Peak: 3.49 mW/g, SAR (1g): 2.39 mW/g, SAR (10g): 1.58 mW/g, (Advanced extrapolation)
Penetration depth: 13.7 (13.3, 14.3) [mm]
Powerdrift: -0.06 dB
Liquid Temperature: 21.5



Dipole 1900 MHz, Head Validation

SAM 3 (PCS - Brain / Muscle Tissue)
Frequency: 1900 MHz; Crest factor: 1.0
Validation 1900MHz - Brain Tissue: $\sigma = 1.45$ mho/m $\epsilon_r = 38.6$ $\rho = 1.00$ g/cm³

Unable to print Validation Plot for Dipole 1900MHz, Head Validation - data file corrupted. We attest that the values quoted in section 4.3.2 of the test report are correct.

SAR_{Tot} [mW/g]



1.09E+1

9.82E+0

8.72E+0

7.63E+0

6.54E+0

5.45E+0

4.36E+0

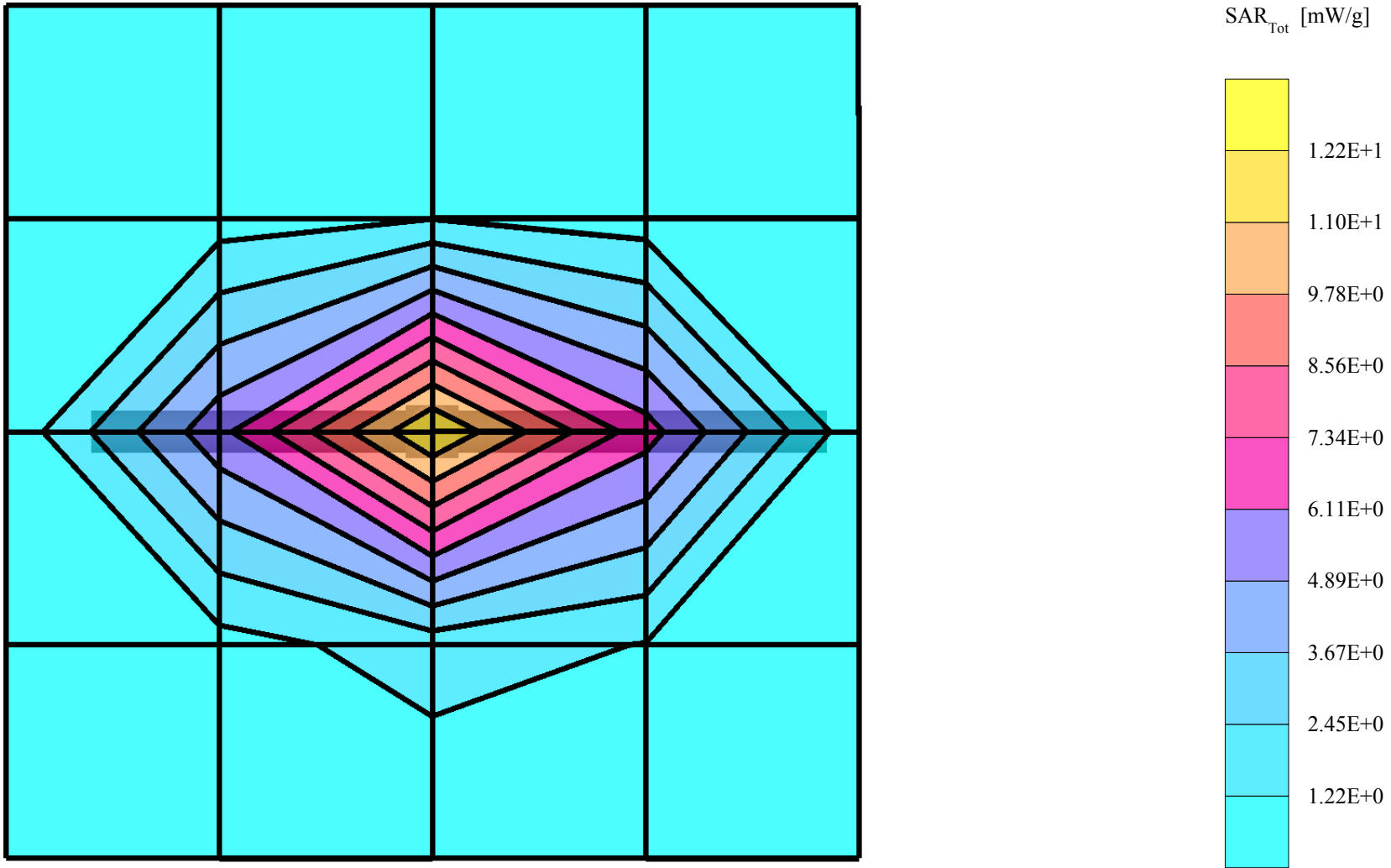
3.27E+0

2.18E+0

1.09E+0

Dipole 1900 MHz, Body Validation

SAM 3 (PCS - Brain / Muscle Tissue)
Frequency: 1900 MHz; Crest factor: 1.0
Validation 1900MHz - Muscle Tissue: $\sigma = 1.60$ mho/m $\epsilon_r = 51.0$ $\rho = 1.00$ g/cm³
Probe: ET3DV6 - SN1504; ConvF(4.50,4.50,4.50)
Cubes (2): Peak: 16.9 mW/g $\pm$ 0.01 dB, SAR (1g): 9.60 mW/g $\pm$ 0.01 dB, SAR (10g): 5.04 mW/g $\pm$ 0.00 dB, (Advanced extrapolation)
Penetration depth: 9.0 (8.9, 9.3) [mm]
Powerdrift: -0.03 dB
Liquid Temperature: 20.1





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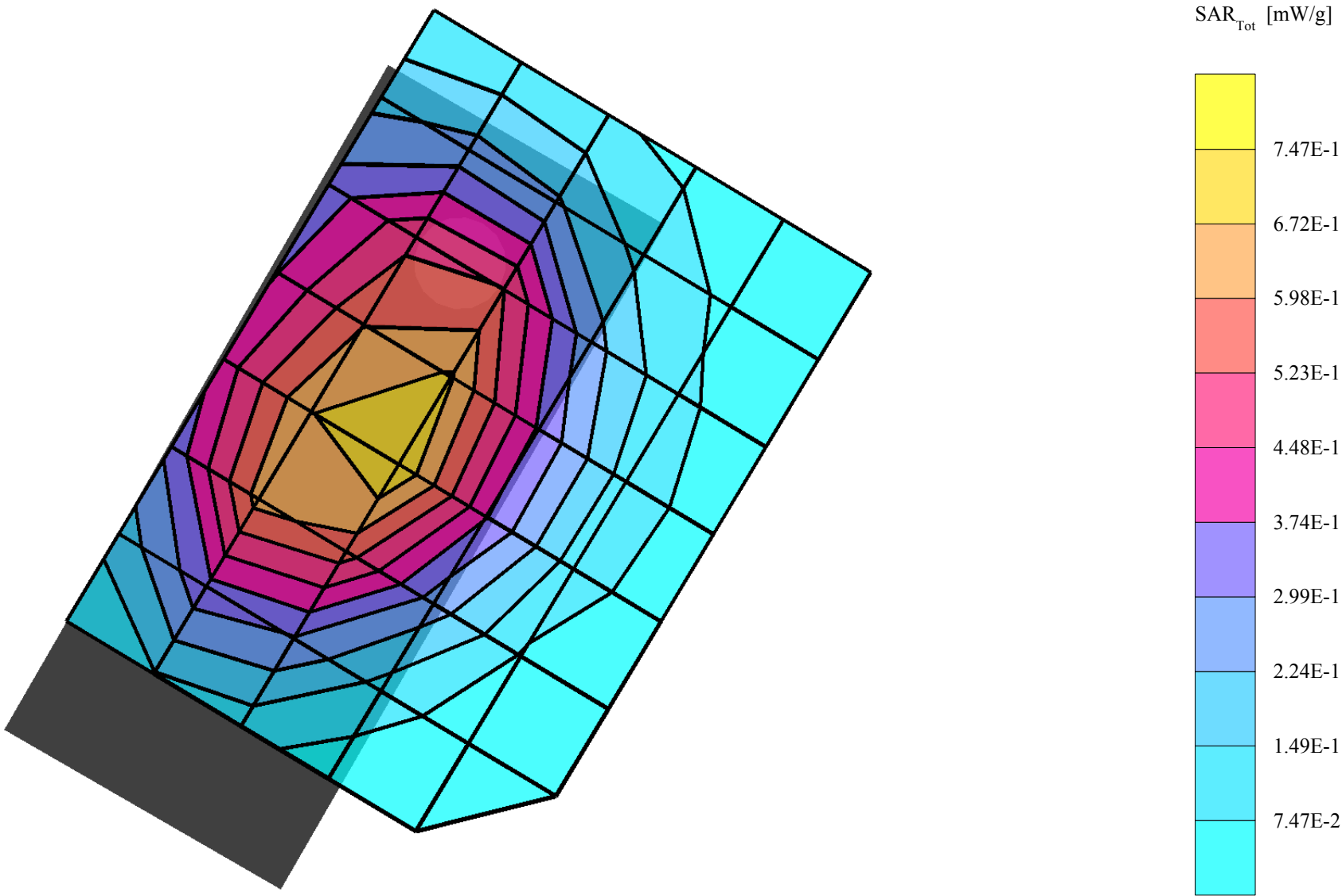


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APPENDIX B: MEASUREMENT SCANS

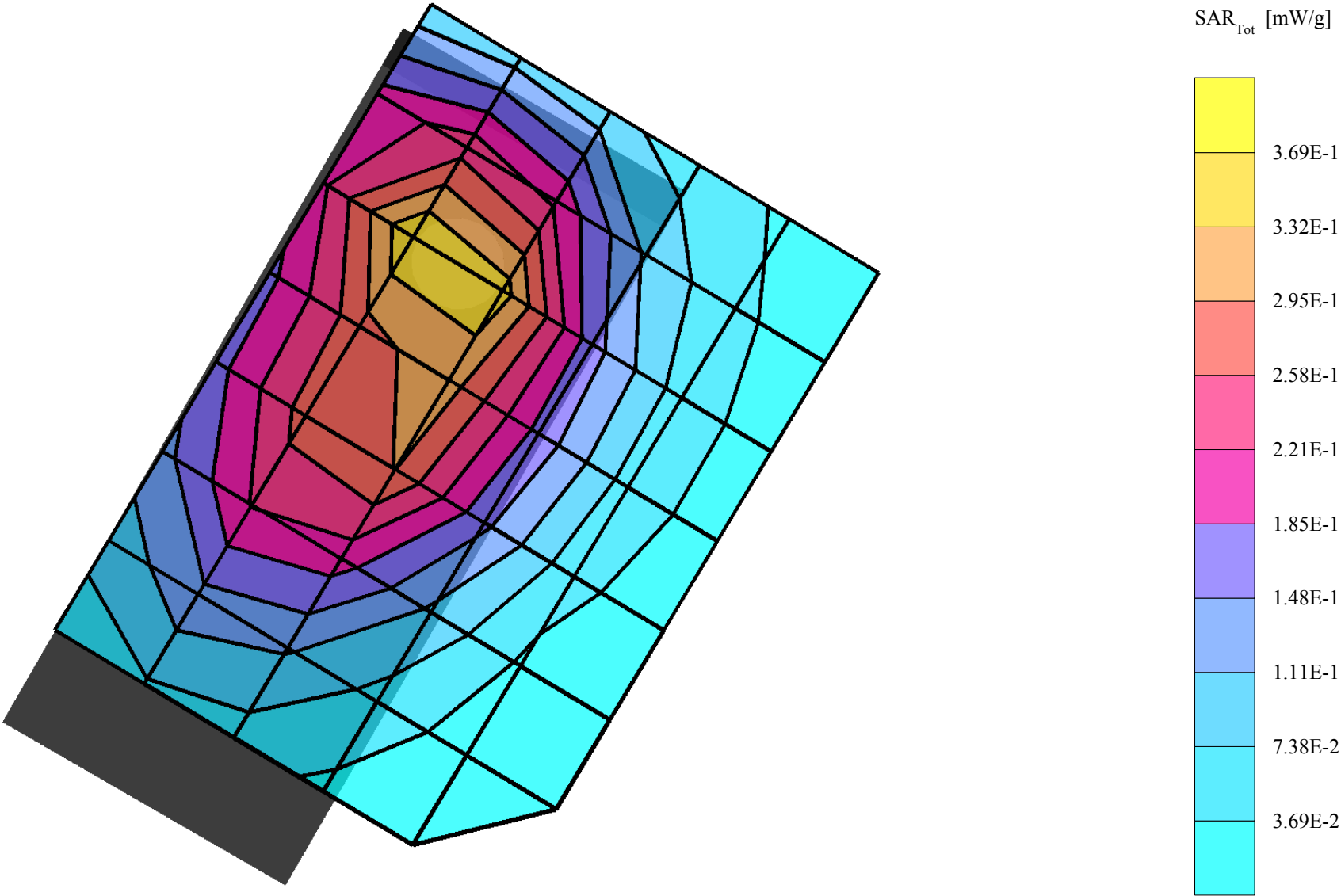
RH-36, GSM 850, Channel 251, Left Cheek Position

SAM 1 (Cellular - Brain Tissue) Phantom
Frequency: 849 MHz; Crest factor: 8.0
Cellular Band - Brain Tissue: $\sigma = 0.93 \text{ mho/m}$ $\epsilon_r = 43.0$ $\rho = 1.00 \text{ g/cm}^3$
Probe: ET3DV6 - SN1504; ConvF(6.20,6.20,6.20)
Cube 5x5x7: SAR (1g): 0.729 mW/g, SAR (10g): 0.496 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.25 dB
Liquid Temperature: 21.1



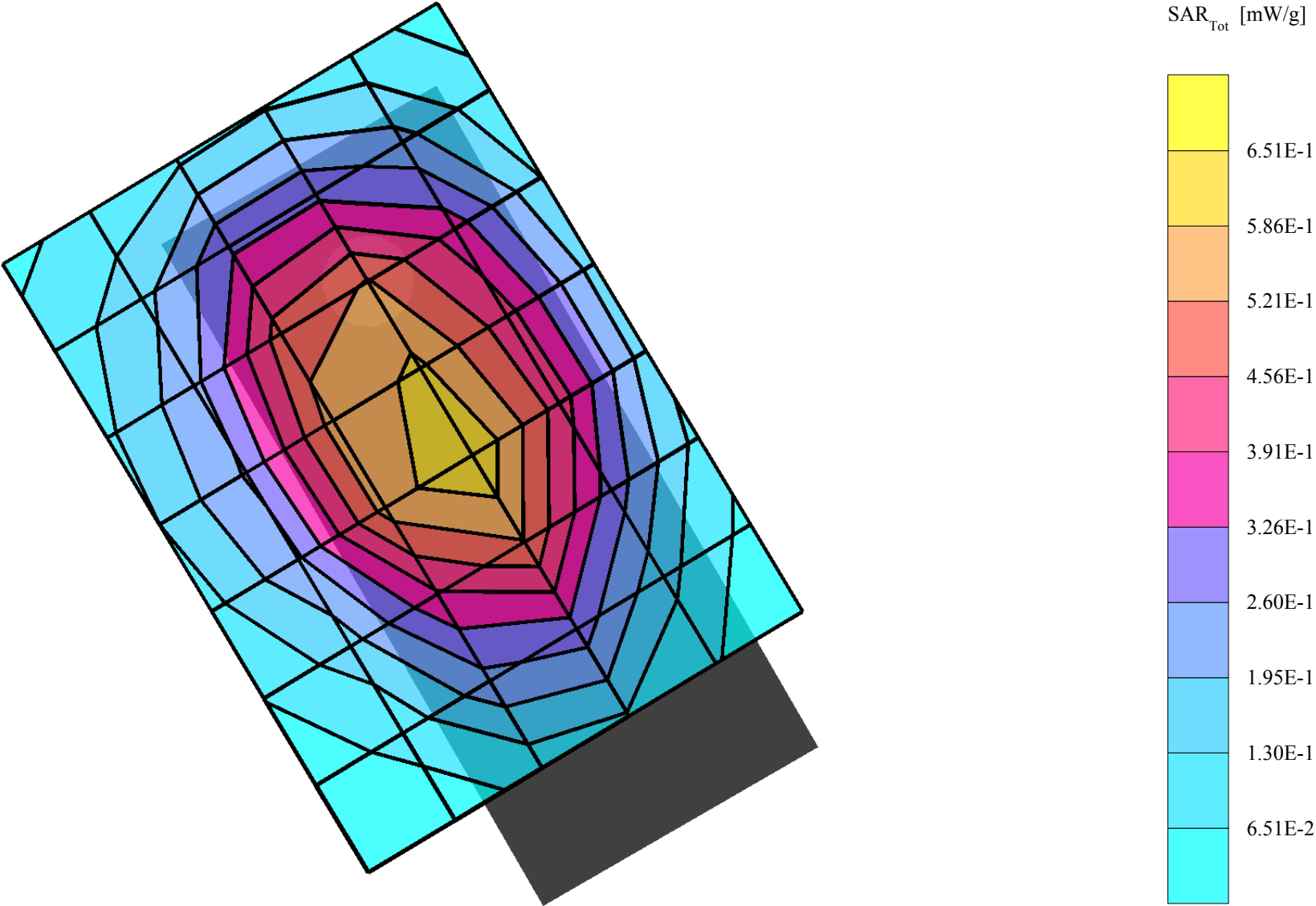
RH-36, GSM 850, Channel 190, Left Tilt Position

SAM 1 (Cellular - Brain Tissue) Phantom
Frequency: 837 MHz; Crest factor: 8.0
Cellular Band - Brain Tissue: $\sigma = 0.93$ mho/m $\epsilon_r = 43.0$ $\rho = 1.00$ g/cm³
Probe: ET3DV6 - SN1504; ConvF(6.20,6.20,6.20)
Cube 5x5x7: SAR (1g): 0.359 mW/g, SAR (10g): 0.223 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.18 dB
Liquid Temperature: 21.1



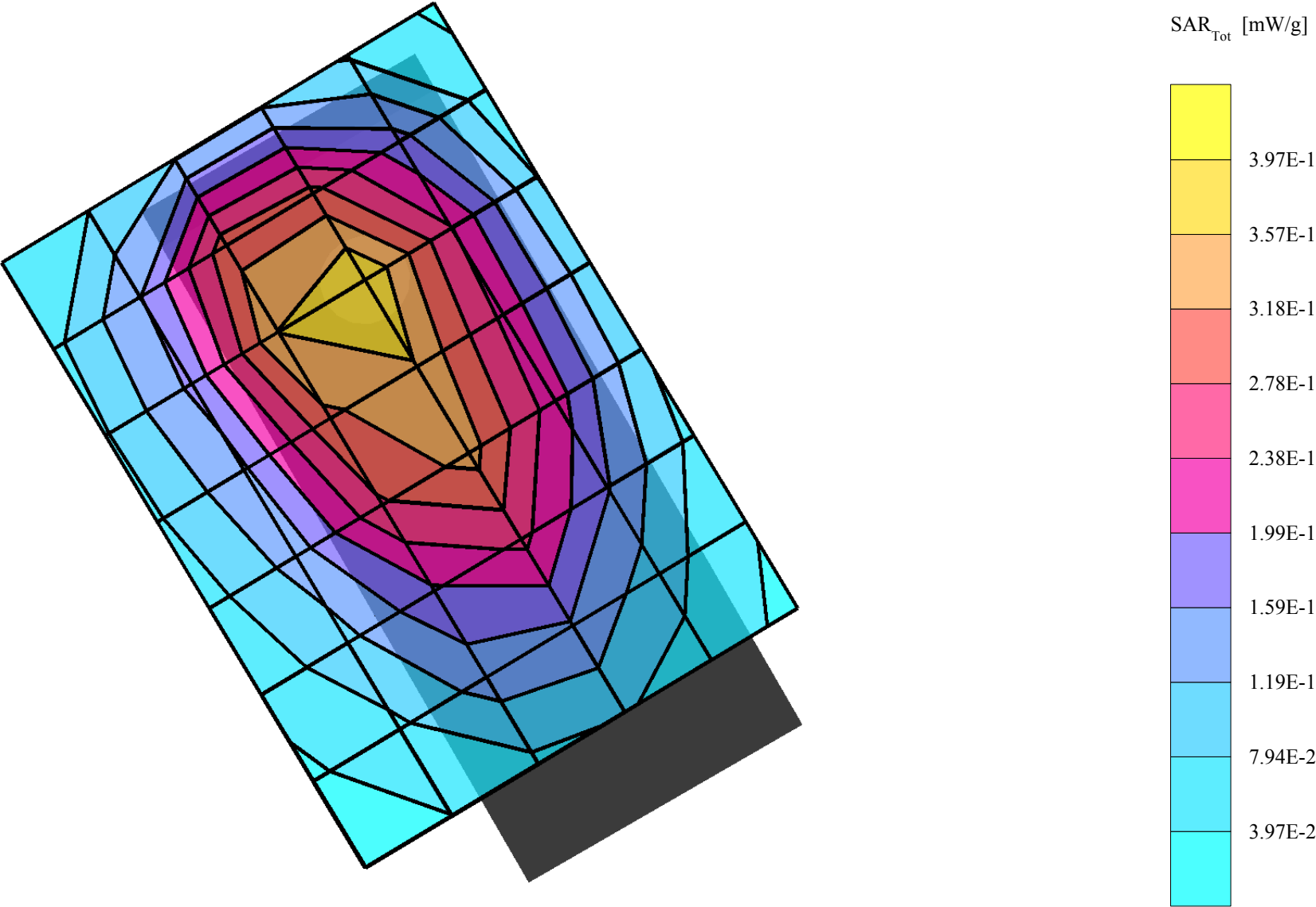
RH-36, GSM 850, Channel 190, Right Cheek Position

SAM 1 (Cellular - Brain Tissue) Phantom
Frequency: 837 MHz; Crest factor: 8.0
Cellular Band - Brain Tissue: $\sigma = 0.93$ mho/m $\epsilon_r = 43.0$ $\rho = 1.00$ g/cm³
Probe: ET3DV6 - SN1504; ConvF(6.20,6.20,6.20)
Cube 5x5x7: SAR (1g): 0.622 mW/g, SAR (10g): 0.432 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.24 dB
Liquid Temperature: 21.1



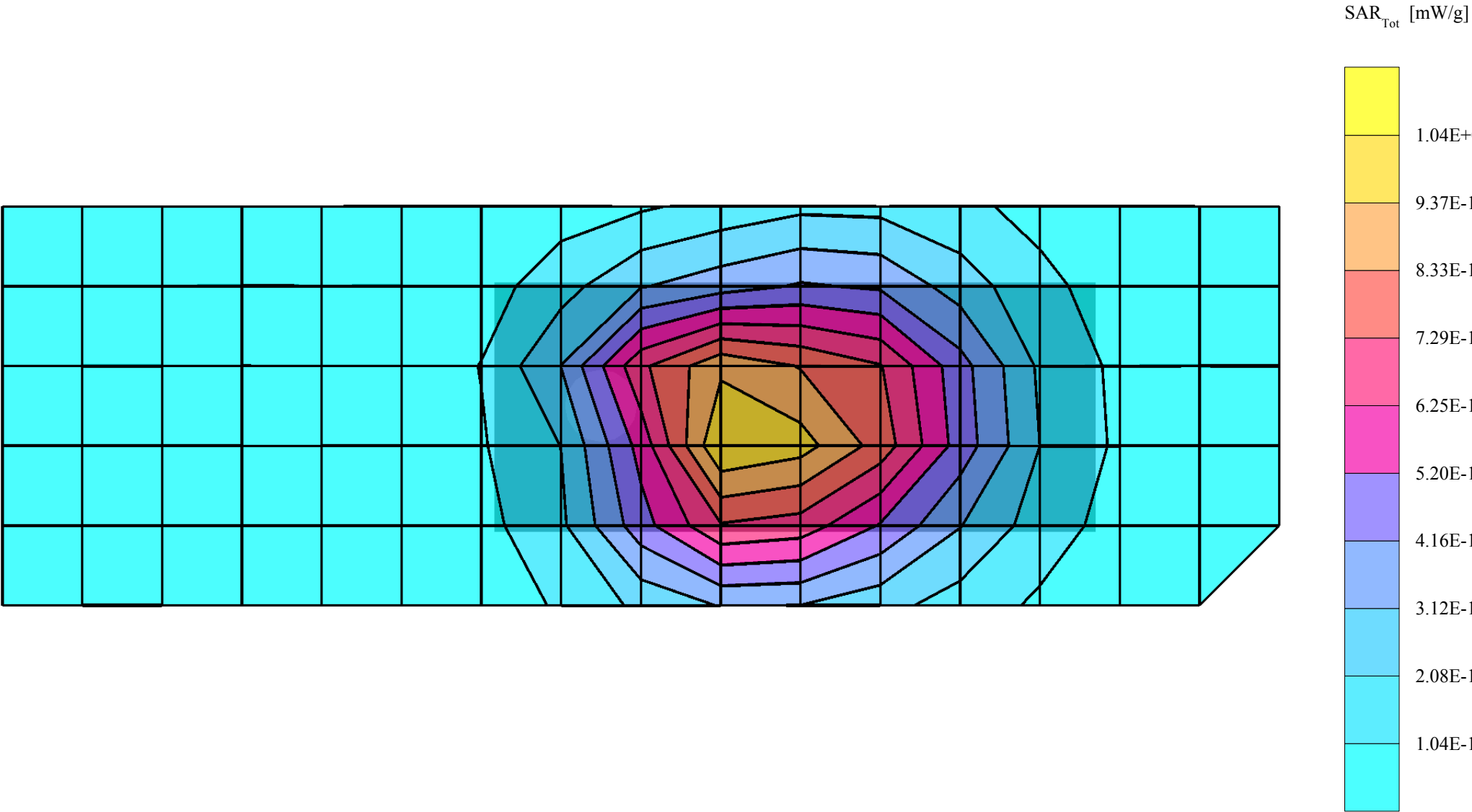
RH-36, GSM 850, Channel 190, Right Tilt Position

SAM 1 (Cellular - Brain Tissue) Phantom
Frequency: 837 MHz; Crest factor: 8.0
Cellular Band - Brain Tissue: $\sigma = 0.93$ mho/m $\epsilon_r = 43.0$ $\rho = 1.00$ g/cm³
Probe: ET3DV6 - SN1504; ConvF(6.20,6.20,6.20)
Cube 5x5x7: SAR (1g): 0.415 mW/g, SAR (10g): 0.254 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.22 dB
Liquid Temperature: 21.1



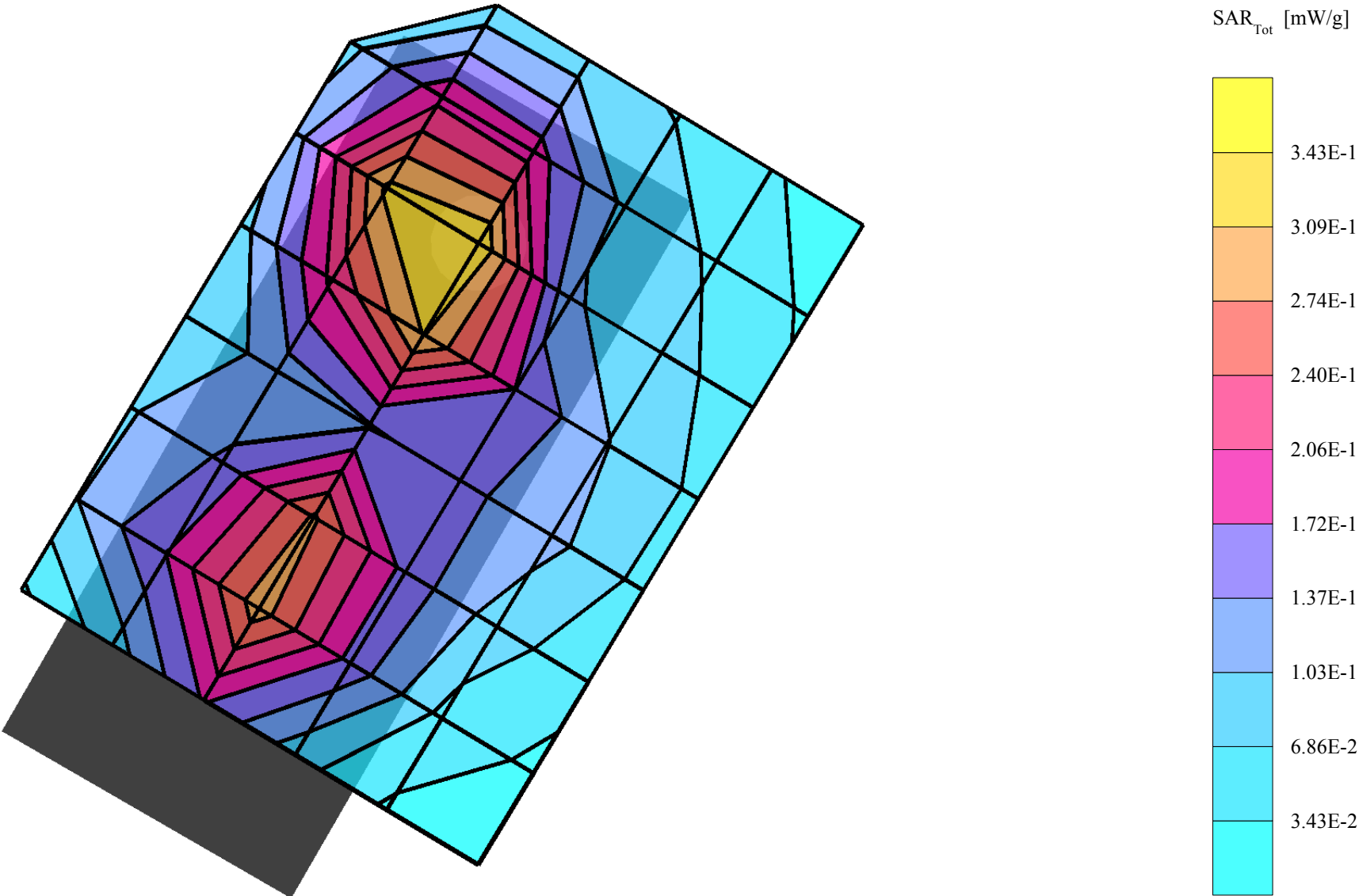
RH-36, GSM 850, Channel 190, Flat Position with 15mm Spacer and HDC-5 Headset

SAM 2 (Cellular - Muscle Tissue) Phantom
Frequency: 837 MHz; Crest factor: 8.0
Cellular Band - Muscle Tissue: $\sigma = 0.94 \text{ mho/m}$ $\epsilon_r = 52.4$ $\rho = 1.00 \text{ g/cm}^3$
Probe: ET3DV6 - SN1504; ConvF(6.20,6.20,6.20)
Cube 5x5x7: SAR (1g): 1.02 mW/g, SAR (10g): 0.688 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 12.0
Powerdrift: -0.08 dB
Liquid Temperature: 21.5



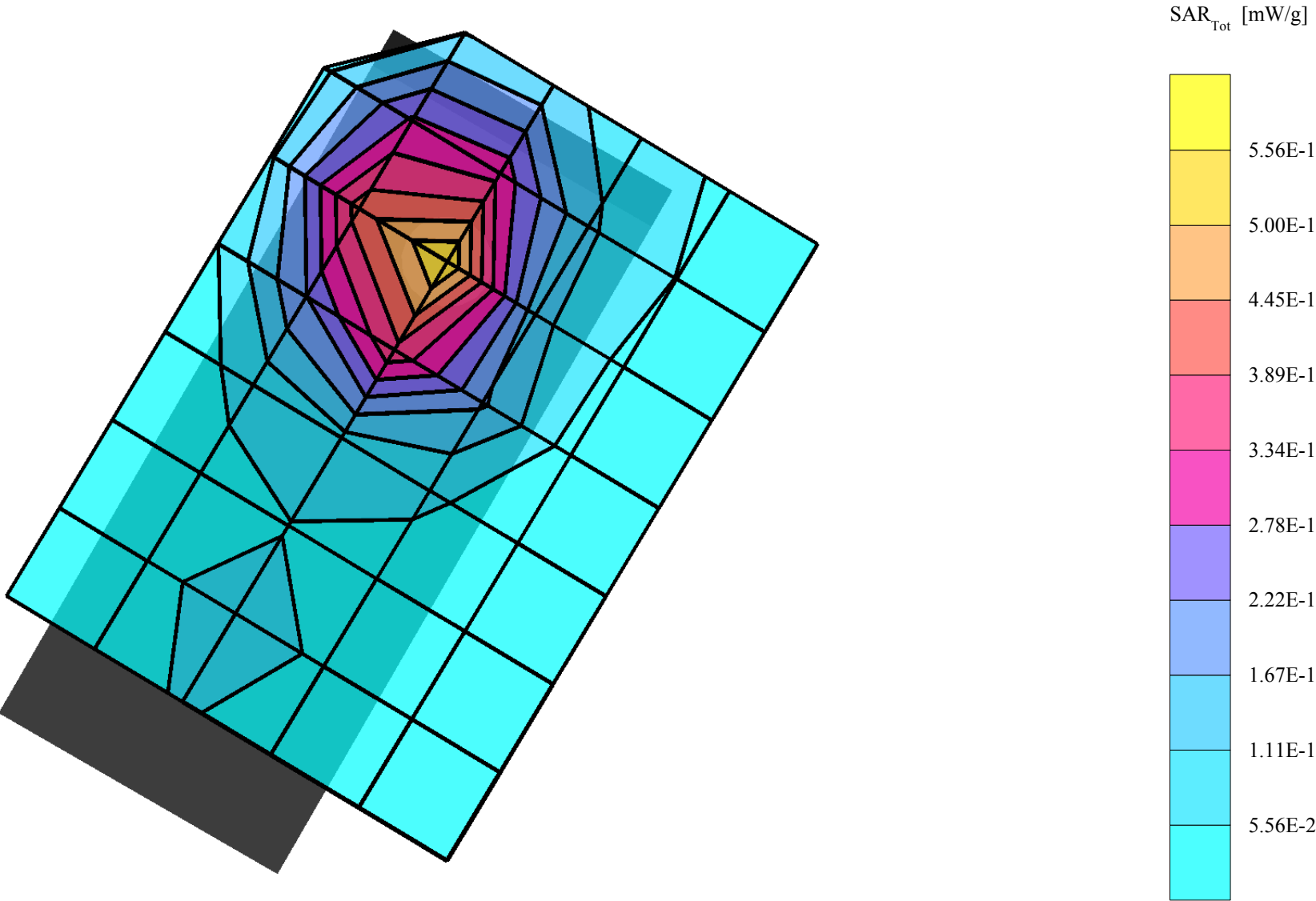
RH-36, GSM 1900, Channel 661, Left Cheek Position

SAM 3 (PCS - Brain / Muscle Tissue) Phantom
Frequency: 1880 MHz; Crest factor: 8.0
PCS Band - Brain Tissue: $\sigma = 1.44 \text{ mho/m}$ $\epsilon_r = 38.7$ $\rho = 1.00 \text{ g/cm}^3$
Probe: ET3DV6 - SN1504; ConvF(5.00,5.00,5.00)
Cube 5x5x7: SAR (1g): 0.369 mW/g, SAR (10g): 0.202 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.11 dB
Liquid Temperature: 19.7



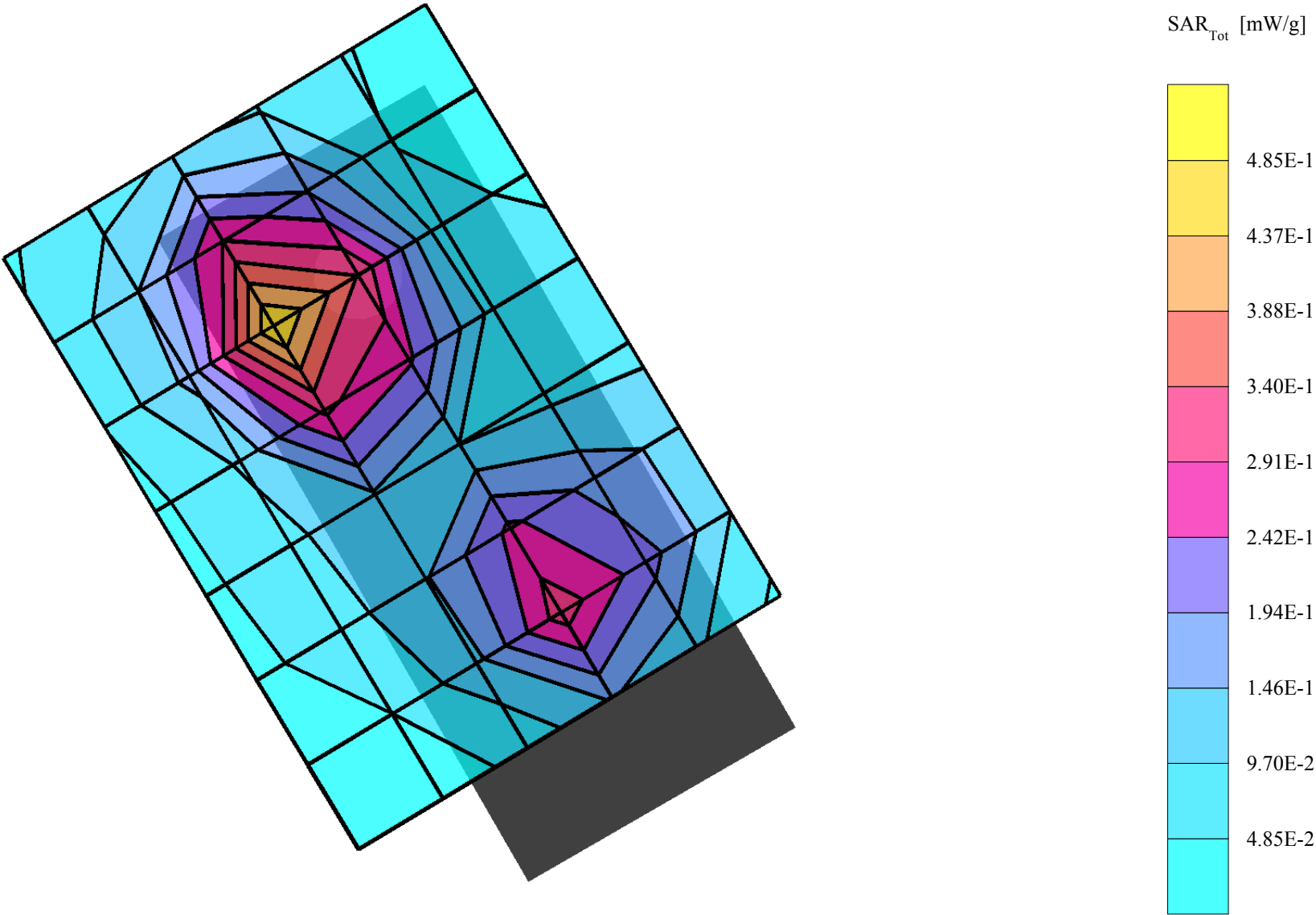
RH-36, GSM 1900, Channel 661, Left Tilt Position

SAM 3 (PCS - Brain / Muscle Tissue) Phantom
Frequency: 1880 MHz; Crest factor: 8.0
PCS Band - Brain Tissue: $\sigma = 1.44$ mho/m $\epsilon_r = 38.7$ $\rho = 1.00$ g/cm³
Probe: ET3DV6 - SN1504; ConvF(5.00,5.00,5.00)
Cube 5x5x7: SAR (1g): 0.547 mW/g, SAR (10g): 0.288 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.11 dB
Liquid Temperature: 19.7



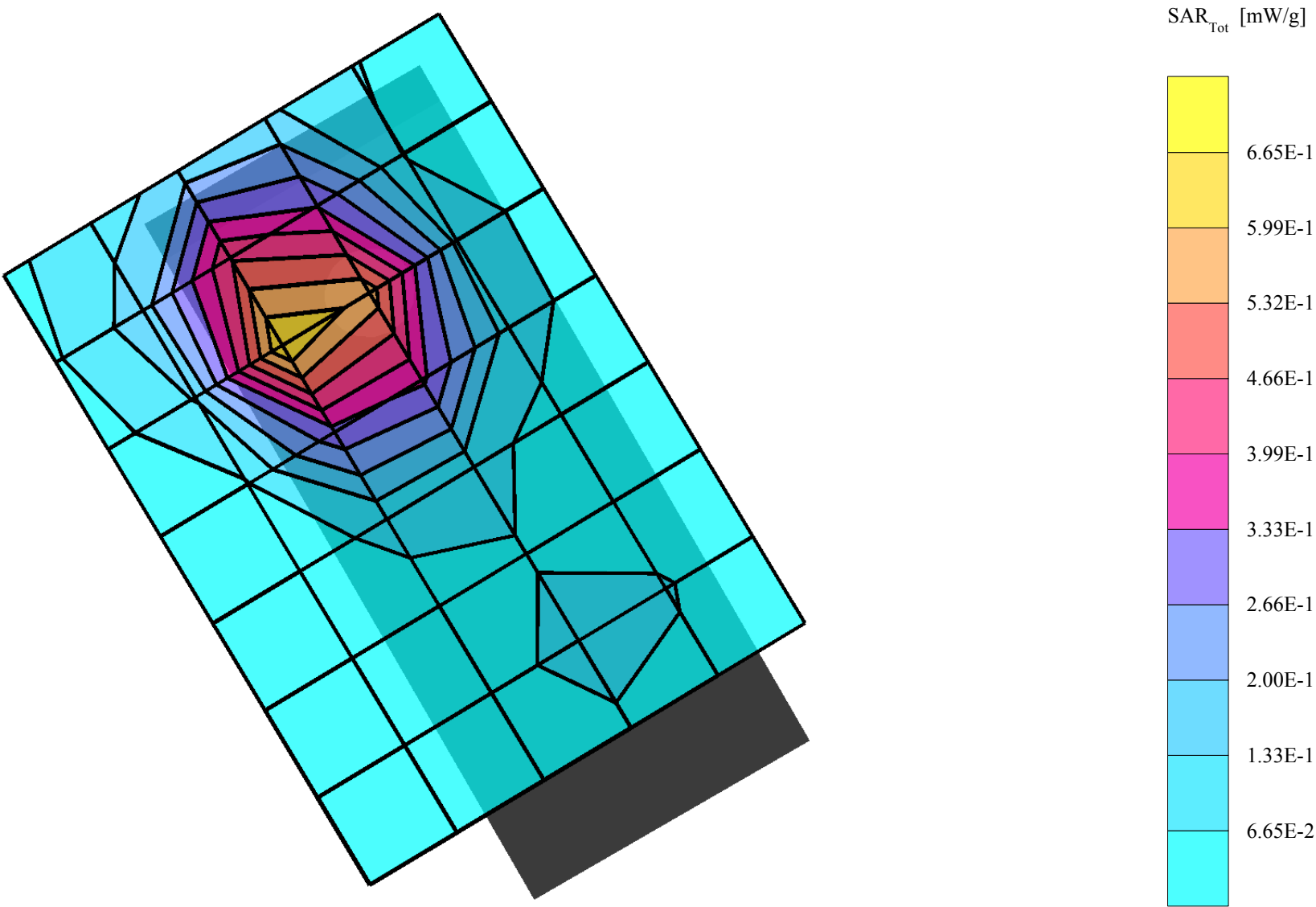
RH-36, GSM 1900, Channel 661, Right Cheek Position

SAM 3 (PCS - Brain / Muscle Tissue) Phantom
Frequency: 1880 MHz; Crest factor: 8.0
PCS Band - Brain Tissue: $\sigma = 1.44$ mho/m $\epsilon_r = 38.7$ $\rho = 1.00$ g/cm³
Probe: ET3DV6 - SN1504; ConvF(5.00,5.00,5.00)
Cube 5x5x7: SAR (1g): 0.469 mW/g, SAR (10g): 0.247 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.09 dB
Liquid Temperature: 19.7



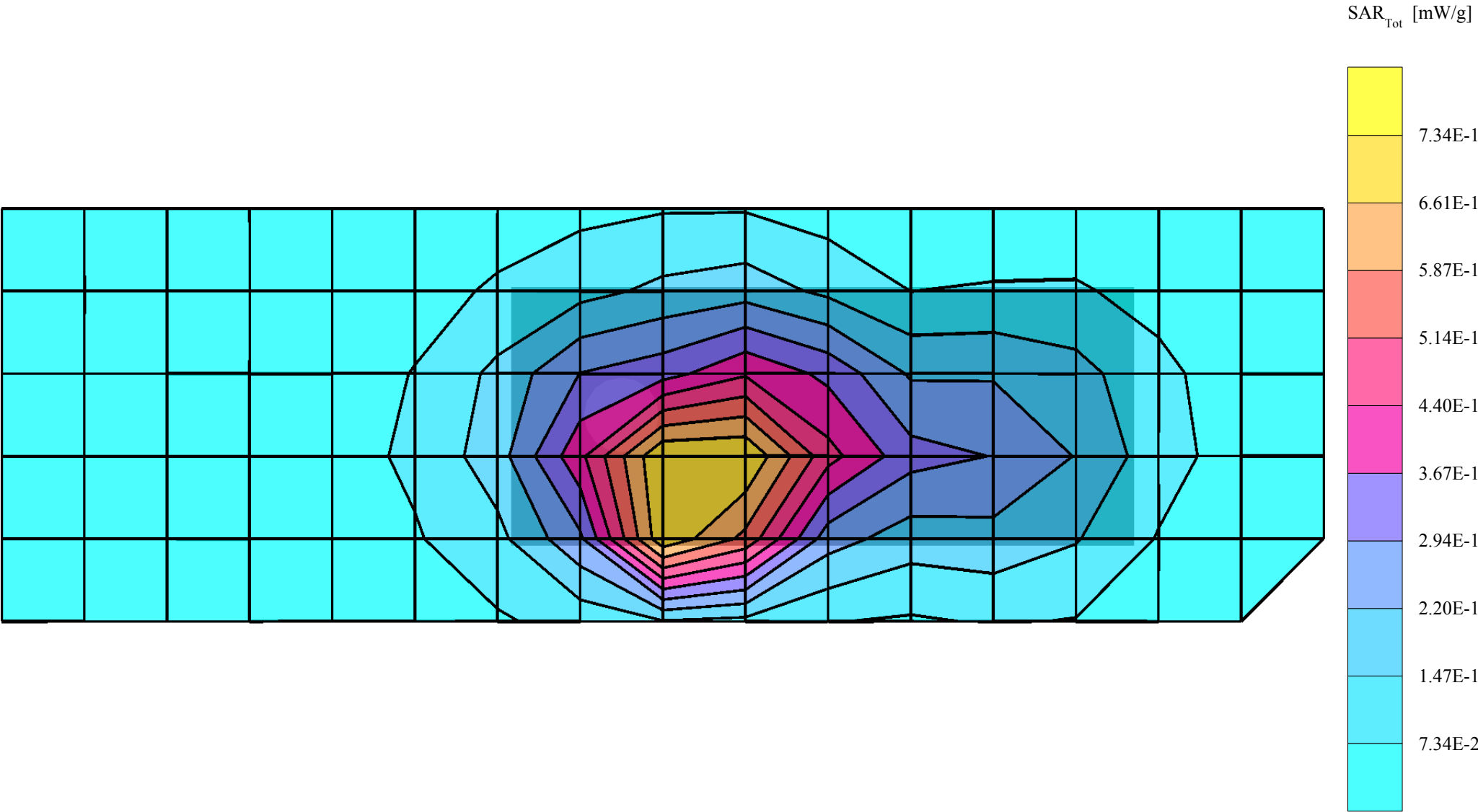
RH-36, GSM 1900, Channel 512, Right Tilt Position

SAM 3 (PCS - Brain / Muscle Tissue) Phantom
Frequency: 1850 MHz; Crest factor: 8.0
PCS Band - Brain Tissue: $\sigma = 1.44$ mho/m $\epsilon_r = 38.7$ $\rho = 1.00$ g/cm³
Probe: ET3DV6 - SN1504; ConvF(5.00,5.00,5.00)
Cube 5x5x7: SAR (1g): 0.703 mW/g, SAR (10g): 0.361 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.01 dB
Liquid Temperature: 19.7



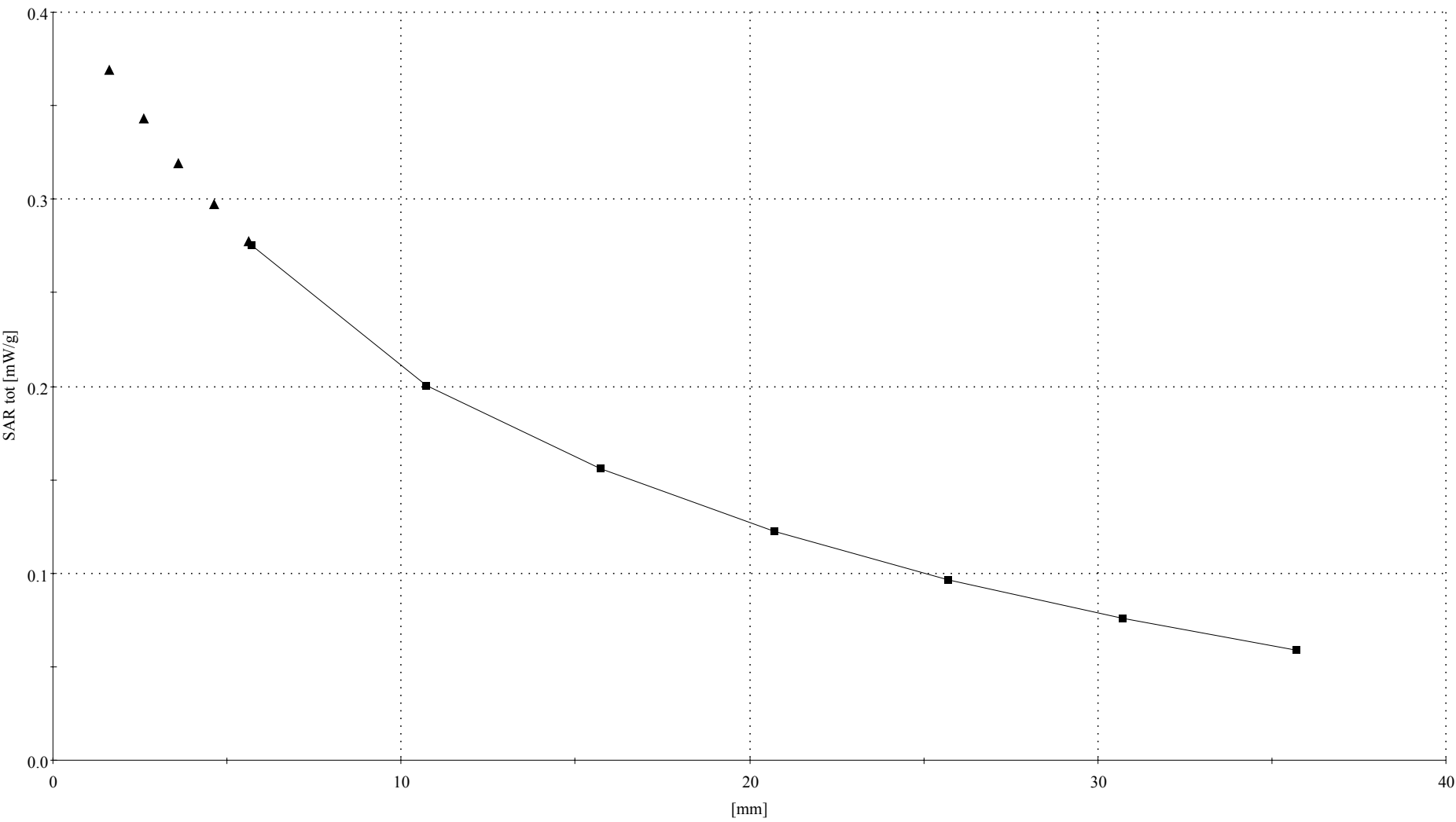
RH-36, GSM 1900, Channel 661, Flat Position with 15mm Spacer and HDC-5 Headset

SAM 3 (PCS - Brain / Muscle Tissue) Phantom
Frequency: 1880 MHz; Crest factor: 8.0
PCS Band - Muscle Tissue: $\sigma = 1.58 \text{ mho/m}$ $\epsilon_r = 51.1$ $\rho = 1.00 \text{ g/cm}^3$
Probe: ET3DV6 - SN1504; ConvF(4.50,4.50,4.50)
Cube 5x5x7: SAR (1g): 0.897 mW/g, SAR (10g): 0.482 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 12.0
Powerdrift: -0.06 dB
Liquid Temperature: 20.1



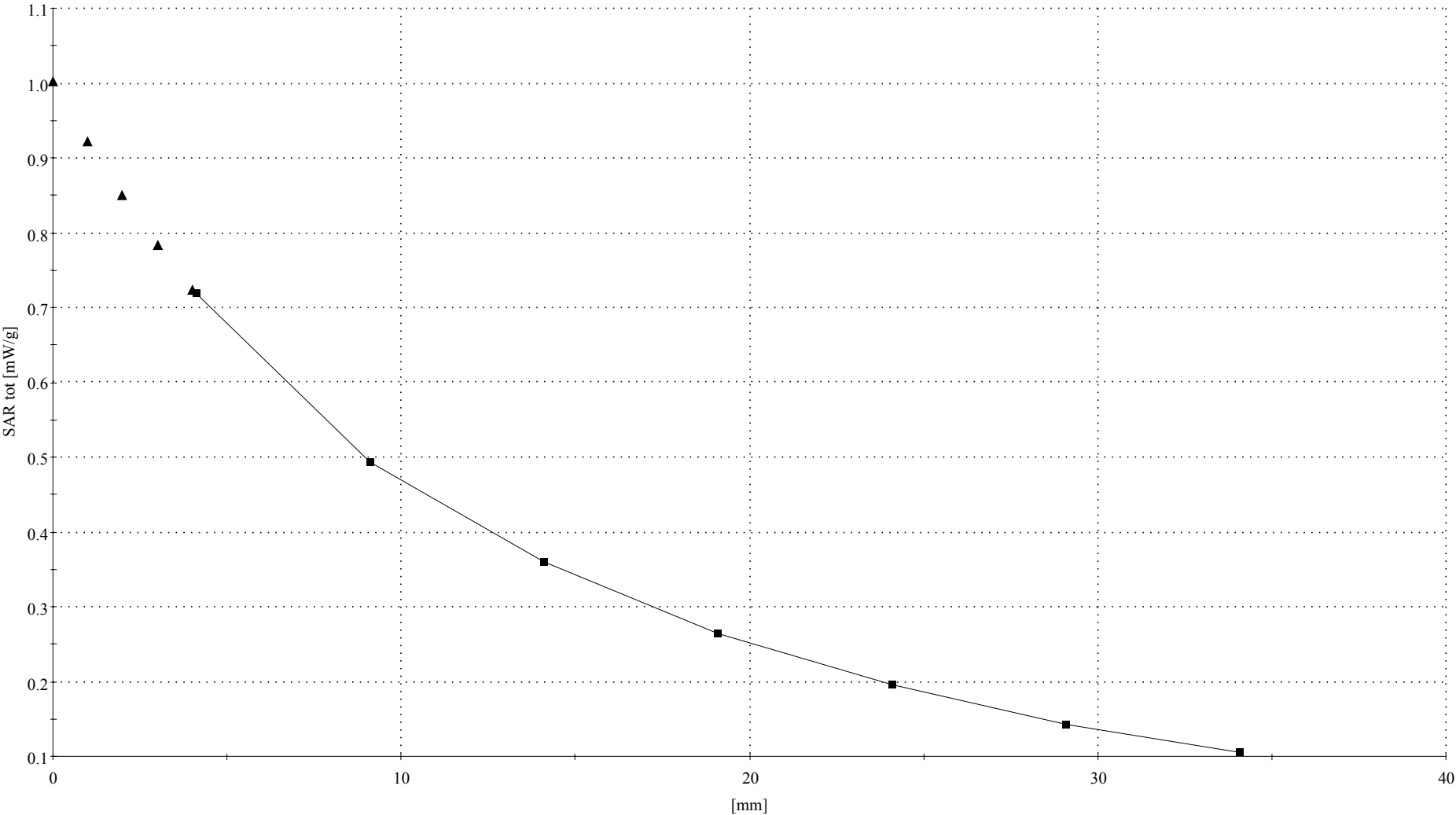
RH-36, GSM 850, Channel 251, Left Cheek Position

SAM 1 (Cellular - Brain Tissue) Phantom
Frequency: 849 MHz; Crest factor: 8.0
Cellular Band - Brain Tissue: $\sigma = 0.93 \text{ mho/m}$ $\epsilon_r = 43.0$ $\rho = 1.00 \text{ g/cm}^3$
Probe: ET3DV6 - SN1504; ConvF(6.20,6.20,6.20)
Cube 5x5x7: SAR (1g): 0.729 mW/g, SAR (10g): 0.496 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0
Liquid Temperature: 21.1



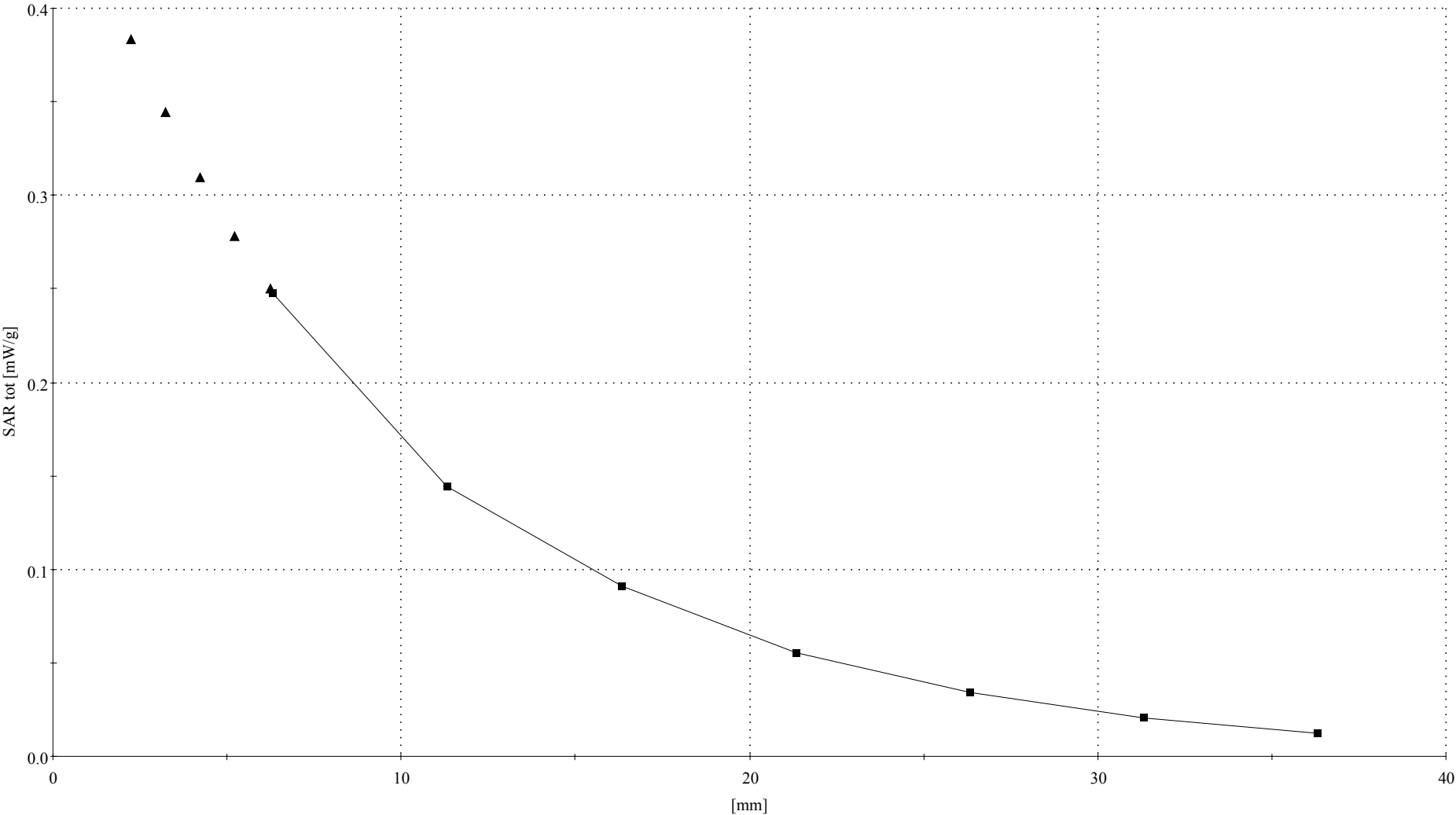
RH-36, GSM 850, Channel 190, Flat Position with 15mm Spacer and HDC-5 Headset

SAM 2 (Cellular - Muscle Tissue) Phantom
Frequency: 837 MHz; Crest factor: 8.0
Cellular Band - Muscle Tissue: $\sigma = 0.94 \text{ mho/m}$ $\epsilon_r = 52.4$ $\rho = 1.00 \text{ g/cm}^3$
Probe: ET3DV6 - SN1504; ConvF(6.20,6.20,6.20)
Cube 5x5x7: SAR (1g): 1.02 mW/g, SAR (10g): 0.688 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0
Liquid Temperature: 21.5



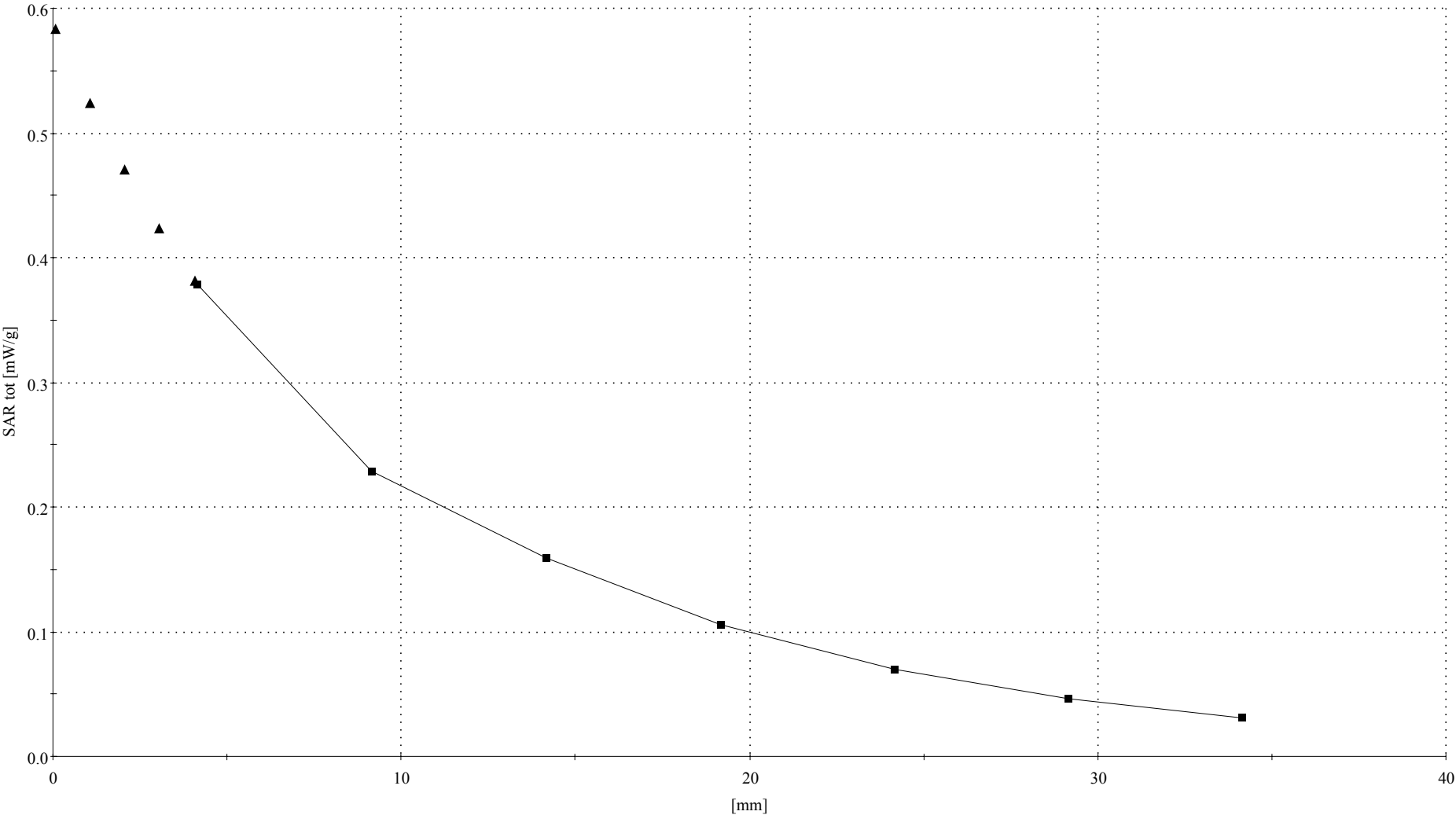
RH-36, GSM 1900, Channel 512, Right Tilt Position

SAM 3 (PCS - Brain / Muscle Tissue) Phantom
Frequency: 1850 MHz; Crest factor: 8.0
PCS Band - Brain Tissue: $\sigma = 1.44 \text{ mho/m}$ $\epsilon_r = 38.7$ $\rho = 1.00 \text{ g/cm}^3$
Probe: ET3DV6 - SN1504; ConvF(5.00,5.00,5.00)
Cube 5x5x7: SAR (1g): 0.703 mW/g, SAR (10g): 0.361 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0
Liquid Temperature: 19.7



RH-36, GSM 1900, Channel 661, Flat Position with 15mm Spacer and HDC-5 Headset

SAM 3 (PCS - Brain / Muscle Tissue) Phantom
Frequency: 1880 MHz; Crest factor: 8.0
PCS Band - Muscle Tissue: $\sigma = 1.58 \text{ mho/m}$ $\epsilon_r = 51.1$ $\rho = 1.00 \text{ g/cm}^3$
Probe: ET3DV6 - SN1504; ConvF(4.50,4.50,4.50)
Cube 5x5x7: SAR (1g): 0.897 mW/g, SAR (10g): 0.482 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0
Liquid Temperature: 20.1





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Certificate Number: 1819-01

APPENDIX C: RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)

Client **Nokia Inc. TX**

CALIBRATION CERTIFICATE

Object(s) **ET3DV6 - SN:1504**

Calibration procedure(s) **QA CAL-01.v2
Calibration procedure for dosimetric E-field probes**

Calibration date: **December 18, 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
Power meter EPM E4419B	GB41293874	2-Apr-03 (METAS, No 252-0250)	Apr-04
Power sensor E4412A	MY41495277	2-Apr-03 (METAS, No 252-0250)	Apr-04
Reference 20 dB Attenuator	SN: 5086 (20b)	3-Apr-03 (METAS No. 251-0340)	Apr-04
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-03)	In house check: Oct 05

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

Date issued: December 18, 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.

DASY - Parameters of Probe: ET3DV6 SN:1504

Sensitivity in Free Space

Diode Compression

NormX	2.20 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	93	mV
NormY	1.86 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	93	mV
NormZ	1.75 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	93	mV

Sensitivity in Tissue Simulating Liquid

Head **835 MHz** $\epsilon_r = 41.5 \pm 5\%$ $\sigma = 0.90 \pm 5\%$ mho/m

Valid for f=750-950 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	6.2 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	6.2 $\pm 9.5\%$ (k=2)	Alpha	0.35
ConvF Z	6.2 $\pm 9.5\%$ (k=2)	Depth	2.67

Head **1880 MHz** $\epsilon_r = 40.0 \pm 5\%$ $\sigma = 1.40 \pm 5\%$ mho/m

Valid for f=1800-2000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	5.0 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	5.0 $\pm 9.5\%$ (k=2)	Alpha	0.53
ConvF Z	5.0 $\pm 9.5\%$ (k=2)	Depth	2.49

Boundary Effect

Head **835 MHz** Typical SAR gradient: 5 % per mm

Probe Tip to Boundary		1 mm	2 mm
SAR _{be} [%] Without Correction Algorithm		10.1	5.8
SAR _{be} [%] With Correction Algorithm		0.4	0.6

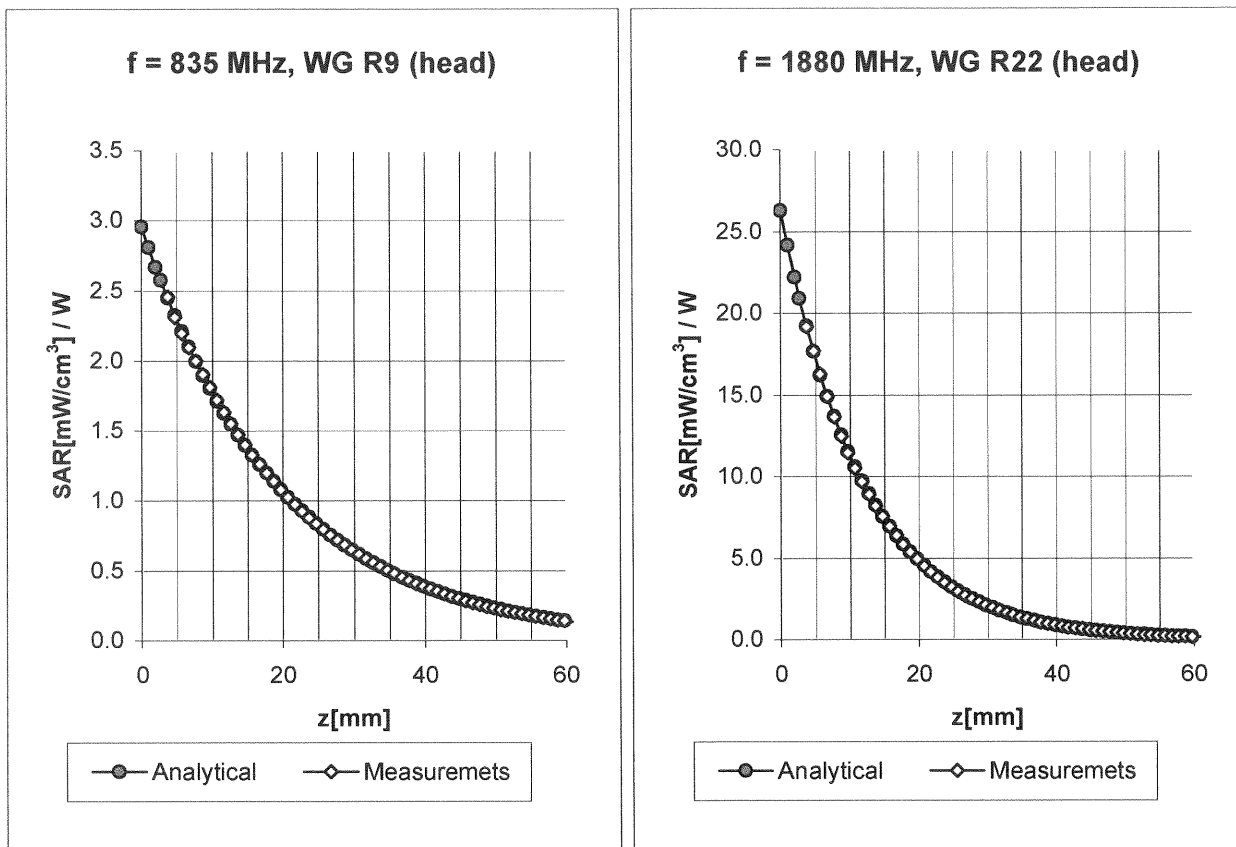
Head **1880 MHz** Typical SAR gradient: 10 % per mm

Probe Tip to Boundary		1 mm	2 mm
SAR _{be} [%] Without Correction Algorithm		13.4	8.9
SAR _{be} [%] With Correction Algorithm		0.2	0.2

Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.4 $\pm$ 0.2	mm

Conversion Factor Assessment

**Head****835 MHz** $\epsilon_r = 41.5 \pm 5\%$ $\sigma = 0.90 \pm 5\% \text{ mho/m}$

Valid for f=750-950 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X **6.2** $\pm 9.5\%$ (k=2)

Boundary effect:

ConvF Y **6.2** $\pm 9.5\%$ (k=2)Alpha **0.35**ConvF Z **6.2** $\pm 9.5\%$ (k=2)Depth **2.67****Head****1880 MHz** $\epsilon_r = 40.0 \pm 5\%$ $\sigma = 1.40 \pm 5\% \text{ mho/m}$

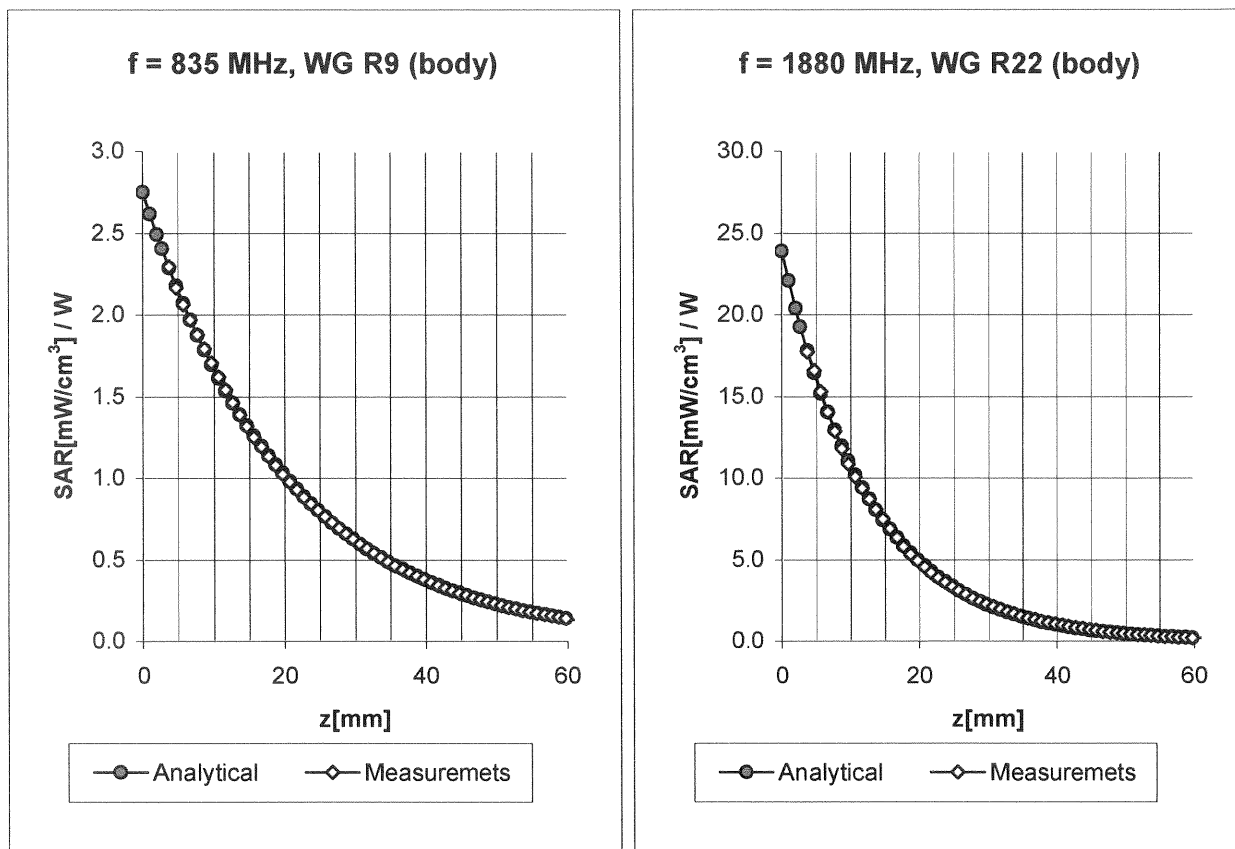
Valid for f=1800-2000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X **5.0** $\pm 9.5\%$ (k=2)

Boundary effect:

ConvF Y **5.0** $\pm 9.5\%$ (k=2)Alpha **0.53**ConvF Z **5.0** $\pm 9.5\%$ (k=2)Depth **2.49**

Conversion Factor Assessment



Body 835 MHz $\epsilon_r = 55.2 \pm 5\%$ $\sigma = 0.97 \pm 5\%$ mho/m

Valid for f=750-950 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	6.2 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	6.2 $\pm 9.5\%$ (k=2)	Alpha	0.42
ConvF Z	6.2 $\pm 9.5\%$ (k=2)	Depth	2.41

Body 1880 MHz $\epsilon_r = 53.3 \pm 5\%$ $\sigma = 1.52 \pm 5\%$ mho/m

Valid for f=1800-2000 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	4.5 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	4.5 $\pm 9.5\%$ (k=2)	Alpha	0.65
ConvF Z	4.5 $\pm 9.5\%$ (k=2)	Depth	2.47



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Accredited Laboratory
Certificate Number: 1819-01

APPENDIX D: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORT(S)

Client **Nokia Inc. Texas**

CALIBRATION CERTIFICATE

Object(s) **D835V2 - SN:486**

Calibration procedure(s) **QA CAL-05.v2
Calibration procedure for dipole validation kits**

Calibration date: **May 26, 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.

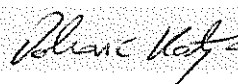
All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check: Mar-05
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
Power sensor HP 8481A	US37292783	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Power meter EPM E442	GB37480704	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Network Analyzer HP 8753E	US38432426	3-May-00 (Agilent, No. 8702K064602)	In house check: May 03

	Name	Function	Signature
Calibrated by:	Judith Mueller	Technician	

Approved by:	Katja Pokovic	Laboratory Director
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Date issued: May 26, 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.

Date/Time: 05/26/03 17:23:08

Test Laboratory: SPEAG, Zurich, Switzerland
 File Name: SN486 SN1507 HSL835 260503.da4

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN486
Program: Dipole Calibration

Communication System: CW-835; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL 835 MHz ($\sigma = 0.89$ mho/m, $\epsilon_r = 42.8$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.7, 6.7, 6.7); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Pin = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 56.8 V/m

Power Drift = -0.004 dB

Maximum value of SAR = 2.61 mW/g

Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

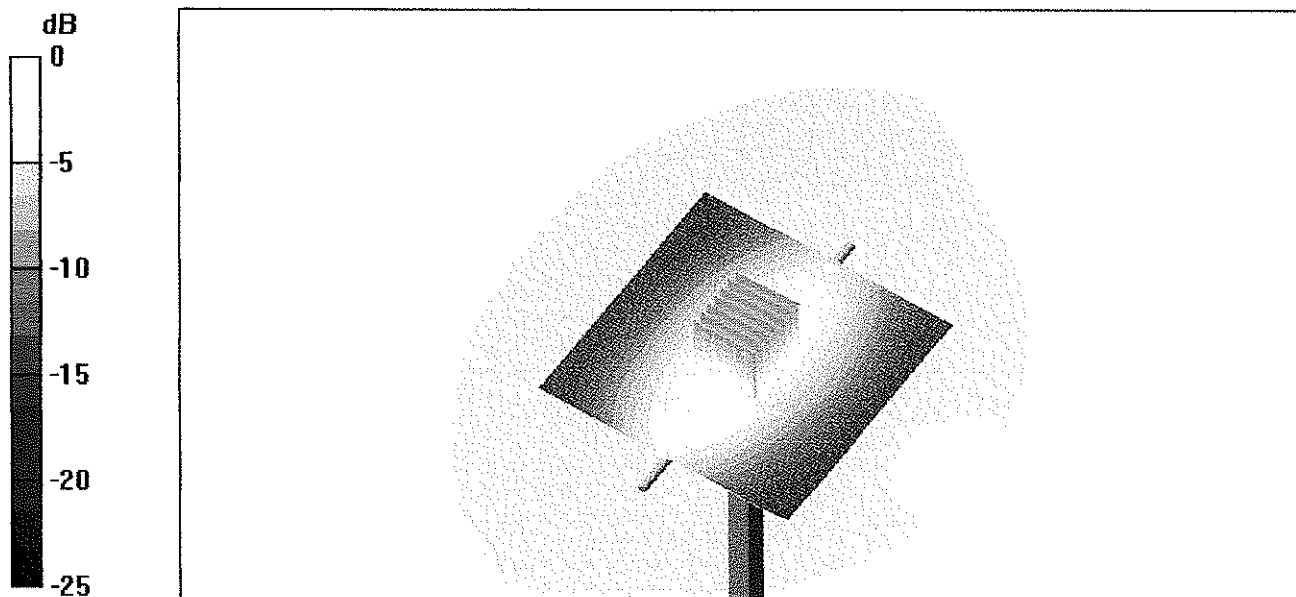
Peak SAR (extrapolated) = 3.56 W/kg

SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.6 mW/g

Reference Value = 56.8 V/m

Power Drift = -0.004 dB

Maximum value of SAR = 2.61 mW/g



0 dB = 2.61mW/g

Client

Nokia Inc., Texas

CALIBRATION CERTIFICATE

Object(s)

D835V2 - SN:486

Calibration procedure(s)

QA CAL-05.v2
Calibration procedure for dipole validation kits

Calibration date:

October 2, 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
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
Power sensor HP 8481A	US37292783	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Power meter EPM E442	GB37480704	30-Oct-02 (METAS, No. 252-0236)	Oct-03
RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check: Mar-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03

Calibrated by:

Name
Judith Mueller

Function
Technician

Signature

Approved by:

Katja Pokovic

Laboratory Director

Date issued: October 9, 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.

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN486

Communication System: CW-835; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: Muscle 835 MHz ($\sigma = 0.98$ mho/m, $\epsilon_r = 54.98$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.3, 6.3, 6.3); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 60

Pin = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 54.4 V/m

Power Drift = 0.003 dB

Maximum value of SAR = 2.66 mW/g

Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

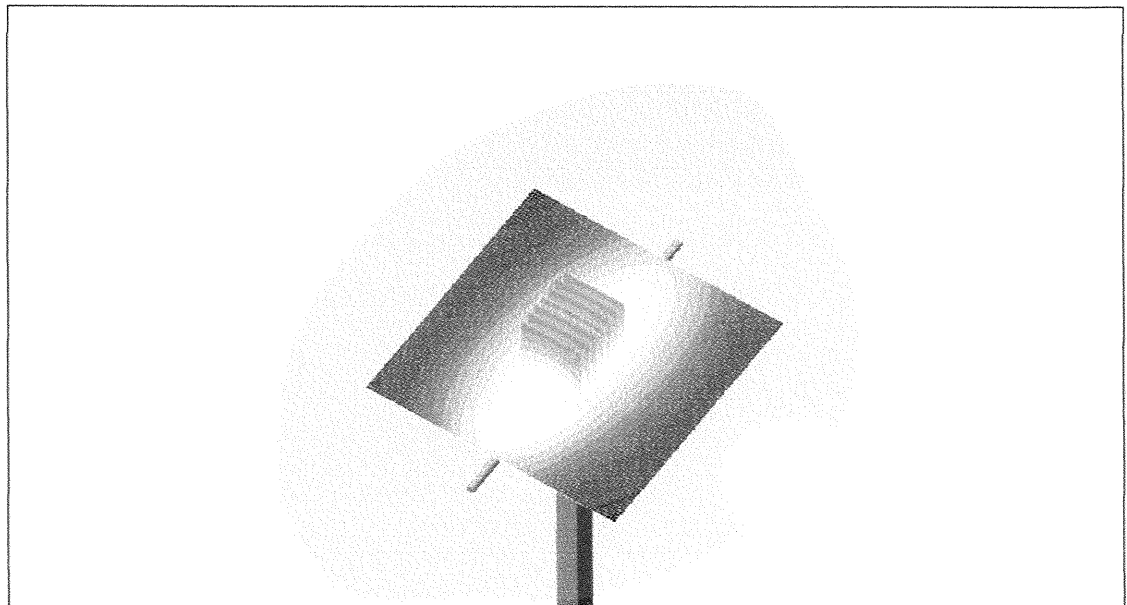
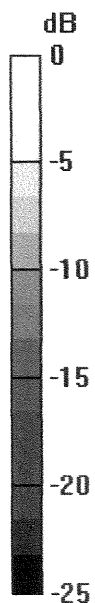
Peak SAR (extrapolated) = 3.57 W/kg

SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.63 mW/g

Reference Value = 54.4 V/m

Power Drift = 0.003 dB

Maximum value of SAR = 2.67 mW/g



0 dB = 2.67mW/g

Client

Nokia Inc. Texas

CALIBRATION CERTIFICATE

Object(s) D1900V2 - SN:504

Calibration procedure(s) QA CAL-05.v2
Calibration procedure for dipole validation kits

Calibration date: July 16, 2003

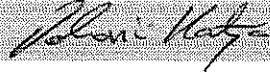
Condition of the calibrated item In Tolerance (according to the specific calibration document)

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 R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check: Mar-05
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
Power sensor HP 8481A	US37292783	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Power meter EPM E442	GB37480704	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03

	Name	Function	Signature
Calibrated by:	Judith Mueller	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: July 17, 2003

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

Date/Time: 07/16/03 17:31:56

Test Laboratory: SPEAG, Zurich, Switzerland
 File Name: SN504_SN1507_HSL1900_160703.da4

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN504
Program: Dipole Calibration

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1
 Medium: HSL 1900 MHz ($\sigma = 1.46$ mho/m, $\epsilon_r = 40.17$, $\rho = 1000$ kg/m³)
 Phantom section: Flat Section
 Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(5.2, 5.2, 5.2); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 93.5 V/m

Power Drift = -0.02 dB

Maximum value of SAR = 11.4 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

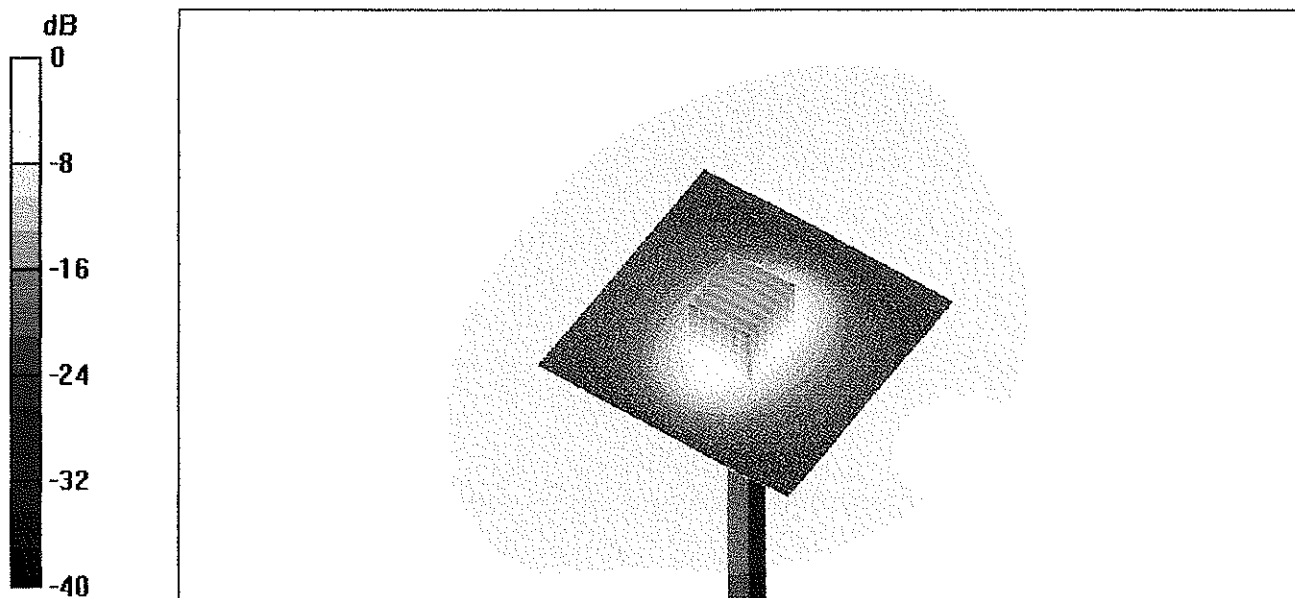
Peak SAR (extrapolated) = 17.6 W/kg

SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.29 mW/g

Reference Value = 93.5 V/m

Power Drift = -0.02 dB

Maximum value of SAR = 11.4 mW/g



0 dB = 11.4mW/g

Date/Time: 07/16/03 11:37:18

Test Laboratory: SPEAG, Zurich, Switzerland
 File Name: SN504_SN1507_M1900_160703.da4

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN504
Program: Dipole Calibration

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: Muscle 1900 MHz ($\sigma = 1.6$ mho/m, $\epsilon_r = 50.87$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(4.8, 4.8, 4.8); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 92 V/m

Power Drift = 0.02 dB

Maximum value of SAR = 11.7 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

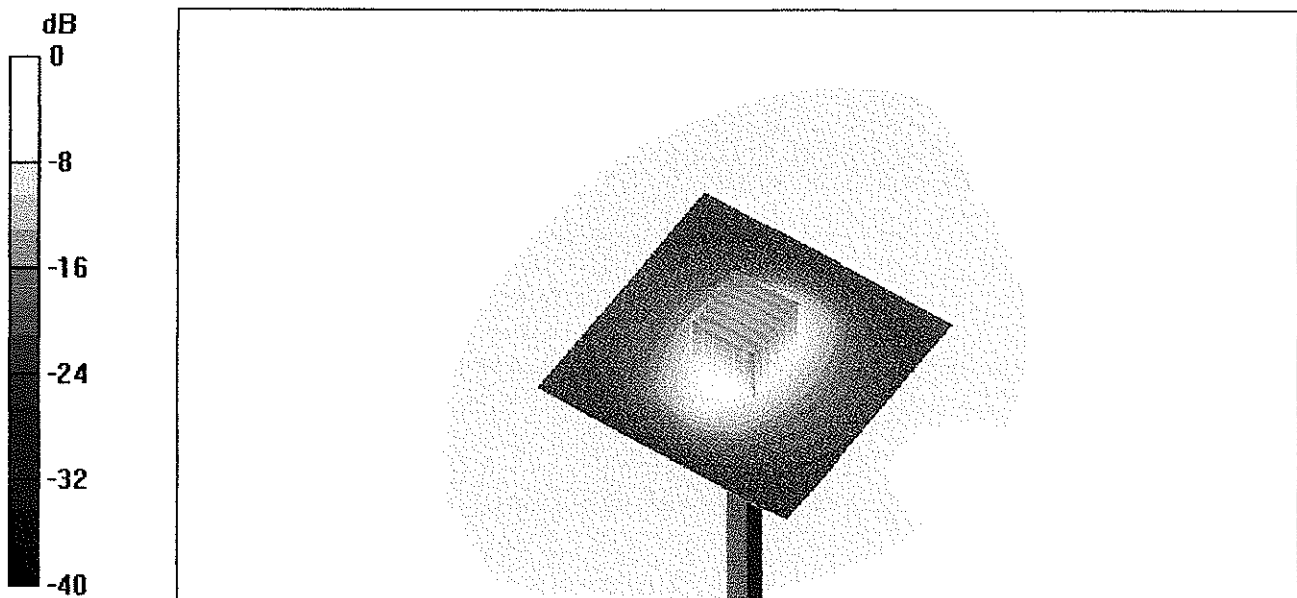
Peak SAR (extrapolated) = 18.2 W/kg

SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.45 mW/g

Reference Value = 92 V/m

Power Drift = 0.02 dB

Maximum value of SAR = 11.8 mW/g



0 dB = 11.8mW/g