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LD/SEMC/BGUG/NM Ramadan Plicanic

Approved

LD/SEMC/BGUG/NMC Mats Hansson

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030617

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REPORT**

No.

GUG/N 03:174

Date

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Rev

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Reference

File

SAR Test Report: PY7A1021031**Date of test:** June 5 and 10, 2003**Laboratory:** Electromagnetic Near Field and Radio Frequency Dosimetry Lab
Soniericsson Mobile Communications AB
Nya Vatentorget
SE-221 82 LUND, Sweden**Test Responsible:** Ramadan Plicanic
Senior Staff Engineer, EMF & Safety
Ramadan.Plicanic@sonyericsson.com
+ 46 46 19 38 62**Statement of Compliance**

Sony Ericsson Mobile Communications AB declares under its sole responsibility that the product

Sony Ericsson Type AAB-1021031-BV ; FCC ID: PY7A1021031

to which this declaration relates, is in conformity with the appropriate RF exposure standards recommendations and guidelines. 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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This test report shall not be reproduced except in full, without written approval of the laboratory.

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.

Sony Ericsson encourages all feedback, both positive and negative, on this report.



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2 Introduction

In this test report, compliance of the Sony Ericsson PY7A1021031 portable telephone with RF safety guidelines is demonstrated. The applicable RF safety guidelines and the SAR measurement specifications used for the test are described in the *SAR Measurement Specifications of Wireless Handsets* [1].

3 Device Under Test

3.1 Antenna Description

Type	Internal antenna	
Location	Inside the over flip, near the top	
Dimensions	Max length	38mm
	Max width	14mm
Configuration	PIFA	

3.2 Device description

Device model	Z600
Serial number	182
Mode	GSM 1900
Multiple Access Scheme	TDMA
Maximum Output Power Setting	29.7dBm
Factory Tolerance in Power Setting	± 0.3dB
Maximum Peak Output Power	30.0dBm
Crest Factor	8
Transmitting Frequency Range	1850.2 – 1909.8 MHz
Prototype or Production Unit	Preproduction
Device Category	Portable
RF exposure environment	General population / uncontrolled



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4 Test equipment

4.1 Dosimetric system

SAR measurements were made using the DASY3 professional system (software version 3.1c) with SAM twin phantom, manufactured by Schmid & Partner Engineering AG (SPEAG). The list of calibrated equipment is given below.

Description	Serial Number	Due Date
DASY3 DAE V1	428	4/2004
E-field probe ETDV6	1585	4/2004
Dipole Validation Kit, D1900 V2	5d002	2/2006

4.2 Additional equipment

Description	Inventory Number	Due Date
Signal generator ESG-D4000A	INV 462935	9/2003
Directional coupler HP778D	INV 2903	1/2004
Power meter R&S NRVD	INV 483920	1/2004
Power sensor R&S NRV-Z5	INV 2333	1/2004
Power sensor R&S NRV-Z5	INV 2334	1/2004
Termination 65N50-0-11	INV 2903	1/2004
Network analyzer HP8753C	INV421671	8/2003
S-parameter test set HP85047A	INV 421670	8/2003
Dielectric probe kit HP8507D	INV 20000053	2/2004
Wavetek STABLOK 4031D	INV 421578	7/2003

5 Electrical parameters on 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 dielectric probe kit. These values are shown in the table below. The mass density, ρ , entered into the DASY3 software is also given. Recommended limits for permittivity ϵ_r , conductivity σ and mass density ρ are also shown.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ϵ_r	σ (S/m)	ρ (g/cm ³)
1900	Head	Measured, 06/05/03	38.2	1.45	1.0
		Recommended	40.0	1.4	1.0
	Muscle	Measured, 06/10/03	50.8	1.45	1.0
		Recommended	53.3	1.52	1.0



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6 System accuracy verification

A system accuracy verification of the DASY3 was performed using the dipole validation kit listed in section 3.1. The system verification test was conducted on the same day as the measurement of the DUT. Measurement made in ambient temperature 23.2 °C and humidity 43.5%. The obtained results are displayed in the table below.

RF noise had been measured in liquid when all RF equipment in lab was set off. Measured value was 0.0013 mW/g in 1g mass.

f (MHz)	Tissue type	Measured / Reference	SAR (W/kg) 1g mass	Dielectric Parameters			t (°C)
				ϵ_r	σ (S/m)	ρ (g/cm ³)	
1900	Head	Measured, 06/05/03	43.0	38.2	1.45	1.0	21.0
		Reference	41.6	38.8	1.44	1.0	-
	Muscle	Measured, 06/10/03	43.6	51.0	1.54	1.0	23.1
		Reference	43.2	51.2	1.59	1.0	-

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7 SAR measurement uncertainty

Error description	Uncertainty (%)	Distribution	Divisor	c_i 1g	Standard Uncertainty Head	Standard Uncertainty Body
Measurement system						
Probe calibration	±4.4	Normal	1	1	±4.4	±4.4
Axial isotropy	±4.7	Rectangular	√3	$(1-c_p)^{1/2}$	±1.9	±1.9
Spherical isotropy	±9.6	Rectangular	√3	$(c_p)^{1/2}$	±3.9	±3.9
Spatial resolution	±0.0	Rectangular	√3	1	±0.0	±0.0
Boundary effects	±5.5	Rectangular	√3	1	±3.2	±3.2
Probe linearity	±4.7	Rectangular	√3	1	±2.7	±2.7
Detection limit	±1.0	Rectangular	√3	1	±0.6	±0.6
Readout electronics	±1.0	Normal	1	1	±1.0	±1.0
Response time	±0.8	Rectangular	√3	1	±0.5	±0.5
Integration time	±1.4	Rectangular	√3	1	±0.8	±0.8
RF ambient conditions	±3.0	Rectangular	√3	1	±1.7	±1.7
Mech. Constraints of robot	±0.4	Rectangular	√3	1	±0.2	±0.2
Probe positioning	±2.9	Rectangular	√3	1	±1.7	±1.7
Extrap. and integration	±3.9	Rectangular	√3	1	±2.3	±2.3
					±8.3	±8.3
Test sample related						
Device positioning	±6.0	Normal	0.89	1	±6.7	±6.7
Device holder	±5.0	Normal	0.84	1	±5.9	±5.9
Power drift	±2.0	Rectangular	√3	1	±1.6	±1.6
					±9.1	±9.1
Phantom and setup						
Phantom uncertainty	±4.0	Rectangular	√3	1	±2.3	±2.3
Liquid conductivity (target)	±5.0	Rectangular	√3	0.6	±1.7	±1.7
Liquid conductivity (meas)	-1.4/-4.6	Rectangular	√3	0.6	±0.5	±1.6
Liquid permittivity (target)	±5.0	Rectangular	√3	0.6	±1.7	±1.7
Liquid permittivity (meas)	-1.8/-4.7	Rectangular	√3	0.6	±0.6	±1.6
					±3.4	±4.0
Combined standard uncertainty						
					±12.8	±13.0
Extended standard uncertainty(k=2)						
					±25.6	±26.0



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8 Test results

The measured 1-gram averaged SAR values of the device against the head and the body are provided in Tables 1 and 2 respectively. The humidity and ambient temperature of test facility were 44.4% - 40.8% and 22.2 °C – 24.8 °C respectively. The depth of the head tissue simulating liquid was 15.1cm and of the muscle tissue simulating liquid was 15.5cm. A base station simulator was used to control the device during the SAR measurement. The phone was supplied with full-charged battery for each measurement.

For head measurement, the device was tested on the right-hand phantom (corresponding to the right side of the head) and the left-hand phantom in two phone position, cheek (touch) and tilt (cheek + 15deg). For GSM 1900 modes, the device was tested at the lowest, middle and highest frequencies in the transmit band. On position and frequency when find max SAR values had been measured SAR with BT ON. Phone had been pared with Sony Ericsson HBH-60 hand free set. Result are provided in table1, row "Cheek + BT".

Mode	Channel	Peak Output Power (dBm)	Phone Position	Liquid temp(°C)	SAR (W/kg) in 1g mass	
					Right-hand	Left-hand
1900 GSM	512	29.8	Cheek	20.3/20.5	0.31	0.23
			Tilt	20.5/20.8	0.31	0.14
	661	29.8	Cheek	20.3/20.6	0.35	0.27
			Tilt	20.5/20.8	0.30	0.16
	810	29.5	Cheek	20.4/20.7	0.39	0.29
			Cheek+BT	20.8	0.38	
			Tilt	20.4/20.7	0.32	0.17

Table1: SAR measurement result for Sony Ericsson PY7A1021031 telephone. Measured against the head.

For body-worn measurements, the device was tested against flat phantom representing the user body. Under measurement phone was put on 15mm from the flat phantom and measurement provides for both front and back part the phone to the phantom.

Mode	Channel	Peak Output Power(dBm)	Phone Position	Liquid temp(°C)	SAR(W/kg) in 1g mass
1900 GSM	512	29.8	Ant to Ph	20.4	0.56
			Back	20.5	0.05
	661	29.8	Ant to Ph	20.4	0.80
			Back	20.6	0.07
	810	29.5	Ant to Ph	20.5	0.84
			Back	20.6	0.08

Table 2: SAR measurement result for Sony Ericsson PY7A1021031 telephone. Measured against the body.

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9**References**

[1] R.Plicanic, "SAR Measurement Specification of Wireless Handsets", Sony Ericsson internal document LD/SEMC/GUG/N 03:141

[2] FCC, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields: Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radio Frequency Emissions," Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01).

[3] IEEE, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques," Std 1528-200x, Draft 6.5 – August 20, 2001.



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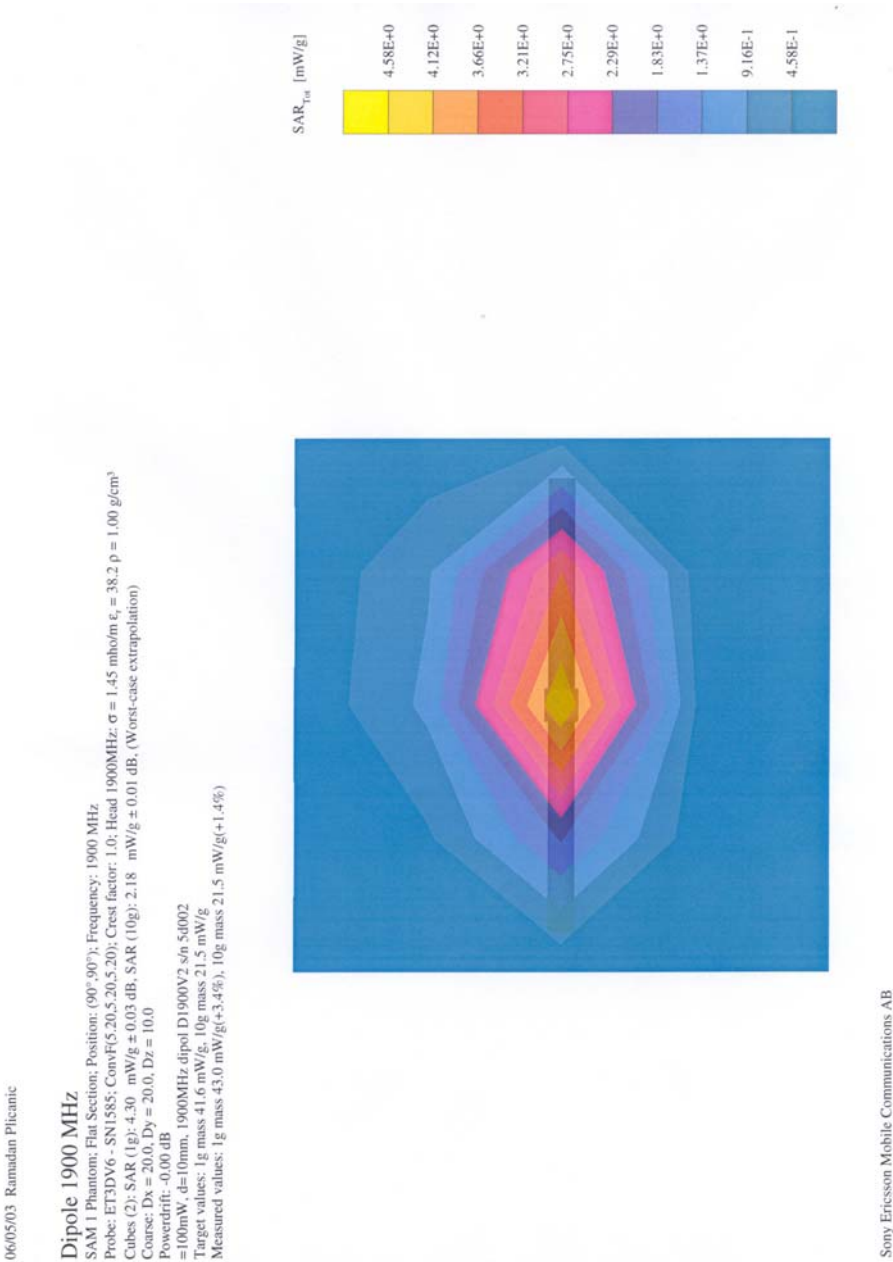
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Reference

File

10 Appendix

10.1 SAR distribution comparison for system accuracy verification



Validation Dipole, measured with head simulating tissue on 06/06/03

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Date/Time: 04/09/03 18:49:39

Test Laboratory: SPEAG, Zurich, Switzerland

File Name: [SN5d002_SN1507_HSL1900_090403.da4](#)
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN5d002
Program: Dipole Calibration

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

Medium: HSL 1900 MHz ($\sigma = 1.44$ mho/m, $\epsilon_r = 38.78$, $\rho = 1000$ kg/m³)

Phantom section: Flat Section

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 33; Postprocessing SW: SEMCAD, V1.6 Build 109

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

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

Reference Value = 95.2 V/m

Peak SAR = 18.2 W/kg

SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.38 mW/g

Power Drift = 0.01 dB


1900MHz SAR distribution of validation dipole from reference measurement with head simulating tissue



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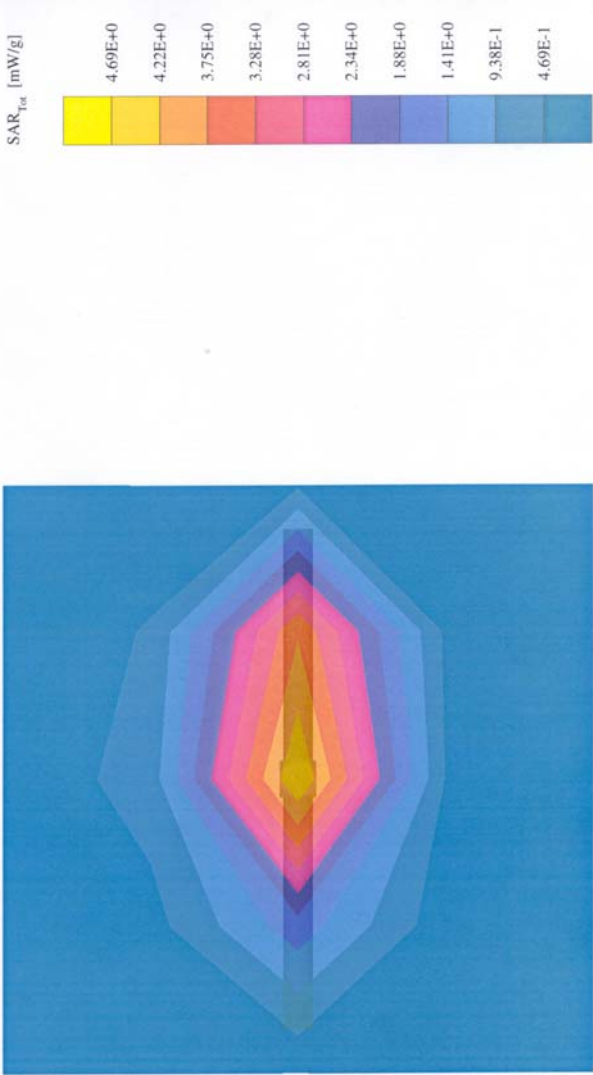
Reference

File

06/10/03 Ramadan Plicanic

Dipole 1900 MHz

SAM 1 Phantom; Flat Section; Position: (90°;90°); Frequency: 1900 MHz
Probe: ET3DV6 - SN1585; ConvF(4.80,4.80,4.80); Crest factor: 1.0; Body 1900MHz: $\sigma = 1.45$ mho/m $\epsilon_r = 50.8$ $\rho = 1.00$ g/cm³
Cubes (2): SAR (1g): 4.36 mW/g ± 0.01 dB, SAR (10g): 2.21 mW/g ± 0.02 dB, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.05 dB
P=100mW, d=10mm, 1900MHz dipol D1900V2 s/n 5d002
Target values: 1g mass 43.2 mW/g, 10g mass 22.4 mW/g
Measured values: 1g mass 43.6 mW/g(+0.9%), 10g mass 22.1 mW/g(-1.3%)
BODY LIQUID



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Validation Dipole, measured with muscle simulating tissue on 06/10/03



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File

Date/Time: 04/08/03 12:31:50

Test Laboratory: SPEAG, Zurich, Switzerland
File Name: [SN5d002_SN1507_M1900_080403.da4](#)

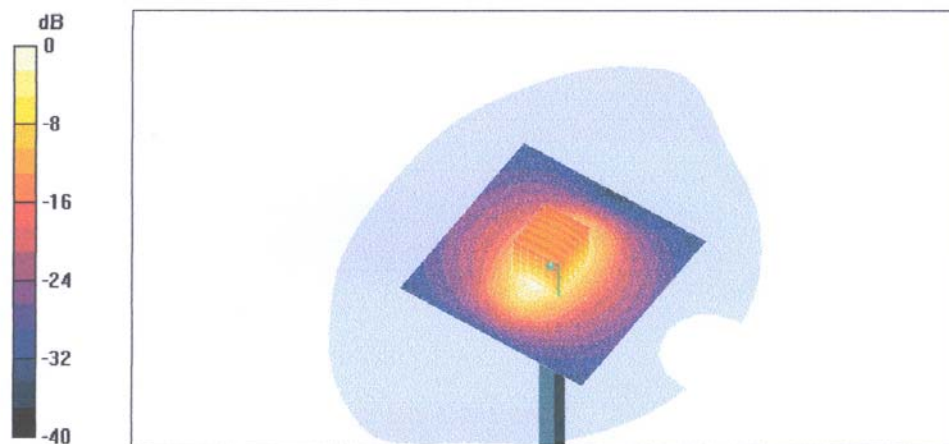
DUT: Dipole 1900 MHz; Serial: D1900V2 - SN5d002
Program: Dipole Calibration

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: Muscle 1900 MHz; ($\sigma = 1.59$ mho/m, $\epsilon_r = 51.2$, $\rho = 1000$ kg/m³)
Phantom section: Flat Section

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 33; Postprocessing SW: SEMCAD, V1.6 Build 109

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.8 V/m
Peak SAR = 18.9 W/kg
SAR(1 g) = 10.8 mW/g; SAR(10 g) = 5.6 mW/g
Power Drift = 0.02 dB



**1900MHz SAR distribution of validation dipole from reference measurement
with muscle simulating tissue**

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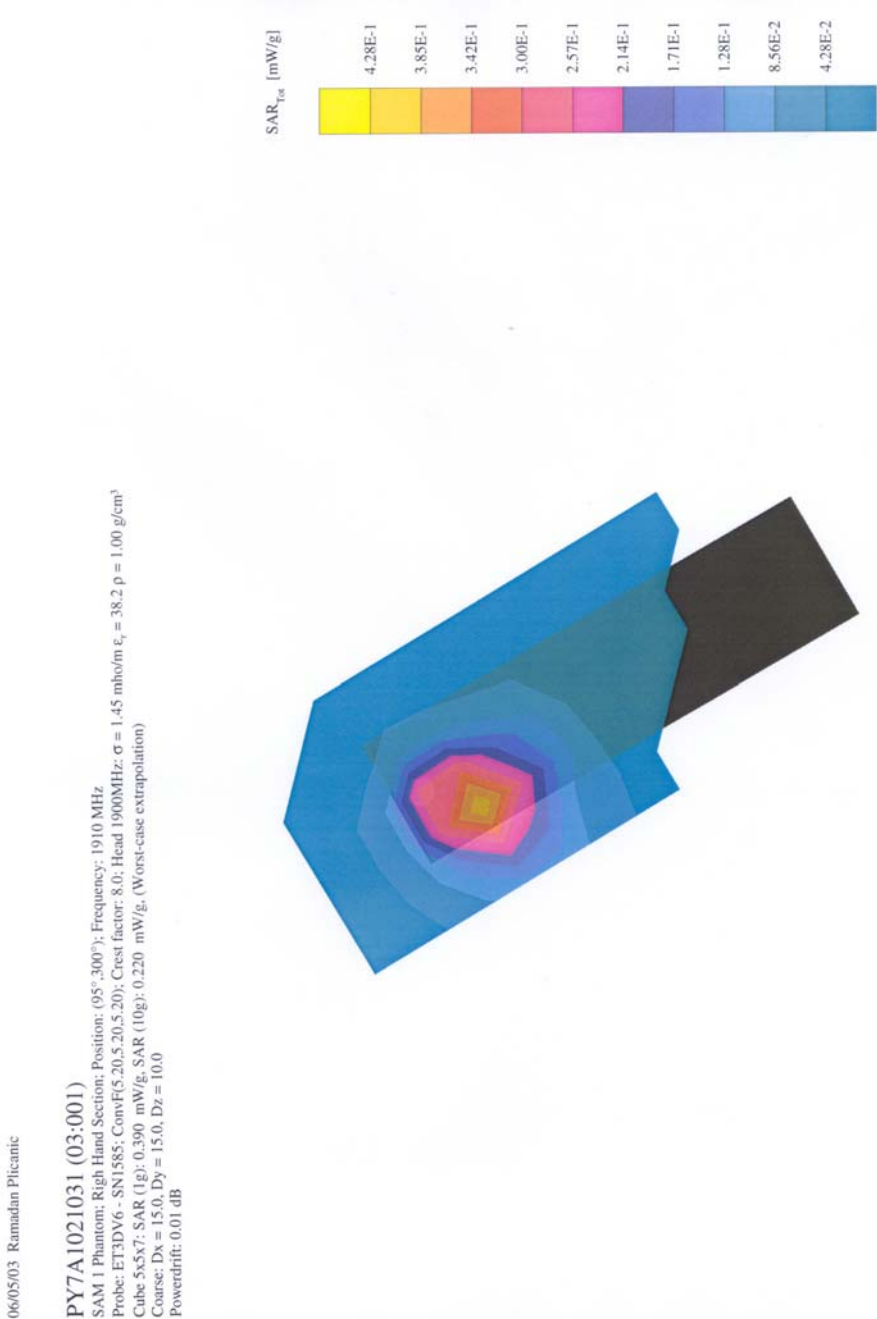
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10.2 SAR distribution plot



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Distribution of max SAR in GSM1900 mode at ch810. Measured against the head for cheek phone position



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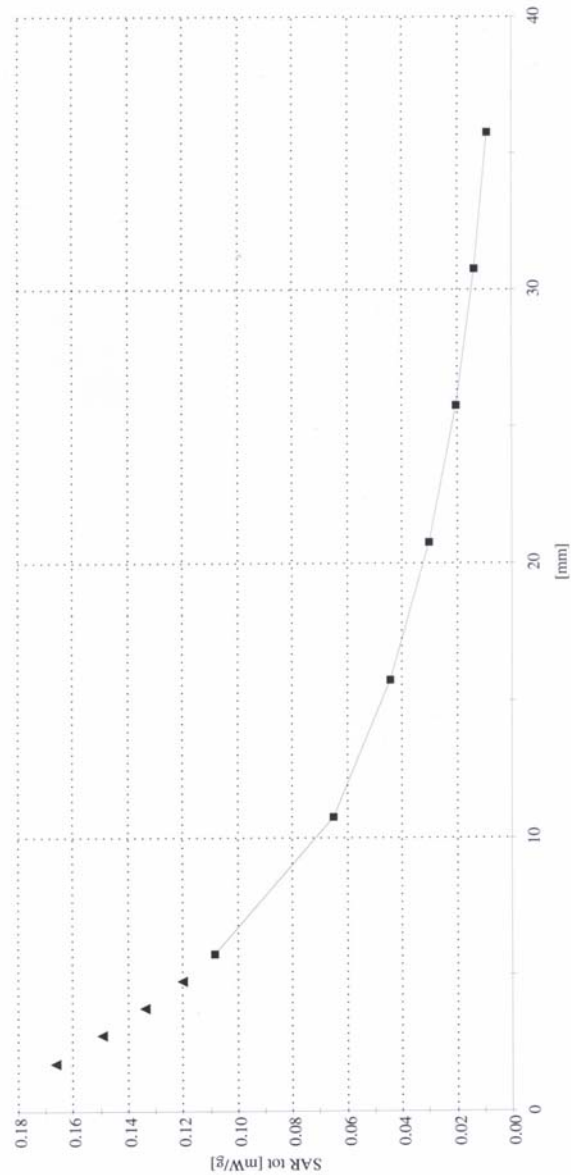
PY7A1021031 (03:001)

SAM 1 Phantom; Right Hand Section; Position: (95°, 300°); Frequency: 1910 MHz

Probe: ET3DV6 - SNI585; ConvF(5.20,5.20,5.20); Crest factor: 8.0; Head 1900MHz; $\sigma = 1.45$ mho/m $\epsilon_r = 38.2$ $\rho = 1.00$ g/cm³

Cube 5x5x7; SAR (1g): 0.390 mW/g; SAR (10g): 0.220 mW/g; (Worst-case extrapolation)

Cube 5x5x7; Dx = 8.0, Dy = 8.0, Dz = 5.0



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Z(x) distribution of max SAR in GSM1900 mode at ch810. Measured against the head for cheek phone position

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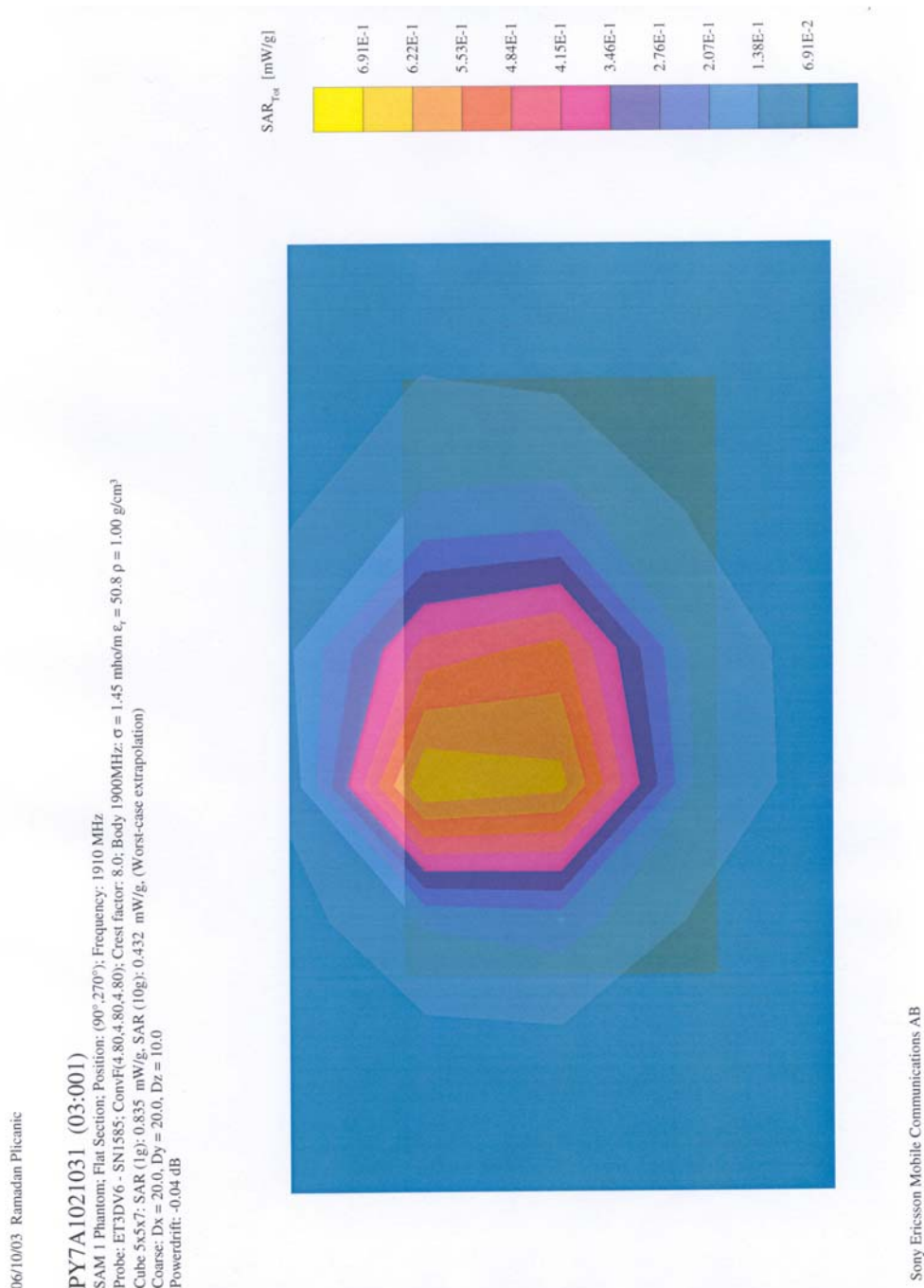
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Distribution of max SAR in GSM1900 mode at ch810. Measured against the body for antenna part to the phantom position

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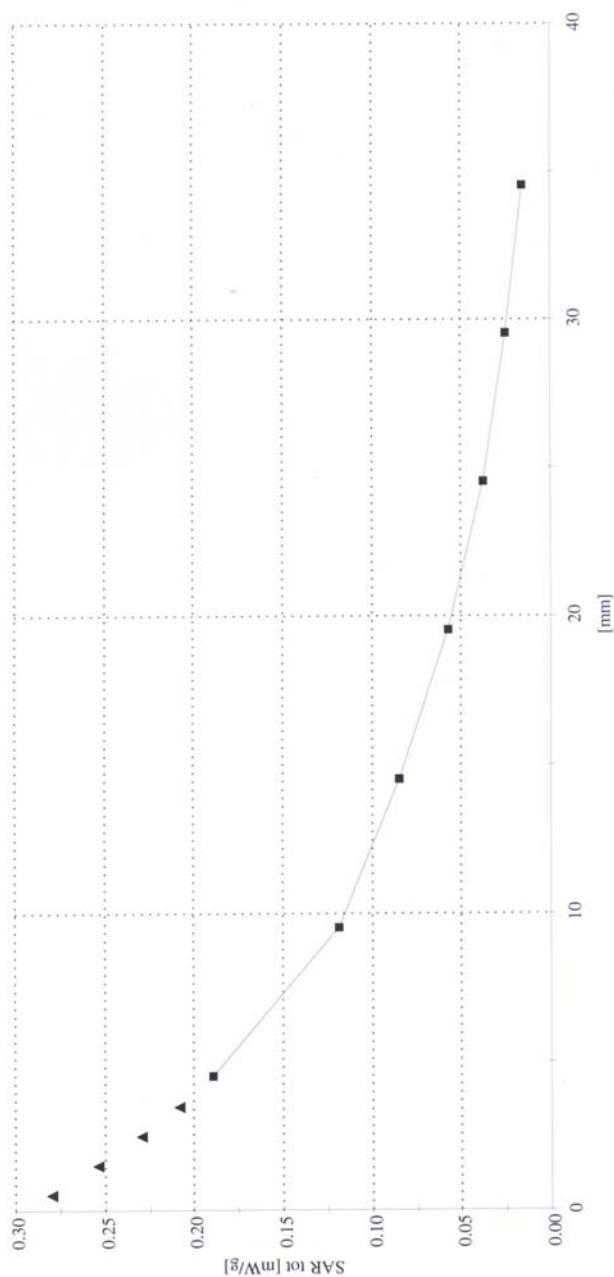
PY7A1021031 (03:001)

SAM 1 Phantom; Flat Section; Position: (90°;270°); Frequency: 1910 MHz

Probe: ET3DV6 - SNI585; ConvF(4.80,4.80); Crest factor: 8.0; Body 1900MHz: $\sigma = 1.45$ mho/m $\epsilon_r = 50.8$ $\rho = 1.00$ g/cm³

Cube 5x5x7; SAR (1g): 0.835 mW/g; SAR (10g): 0.432 mW/g (Worst-case extrapolation)

Cube 5x5x7; Dx = 8.0, Dy = 8.0, Dz = 5.0



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Z(x) distribution of max SAR in GSM1900 mode at ch810. Measured against the body

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10.3 Photographs of the device under test



Front side



Left side

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Back side

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10.4 Device position on SAM Twins Phantom



Device position against the head: Cheek (touch) phone position



Device position against the head: Tilt (cheek+15deg) phone position

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Device position against the body: Phone on 15mm from the phantom



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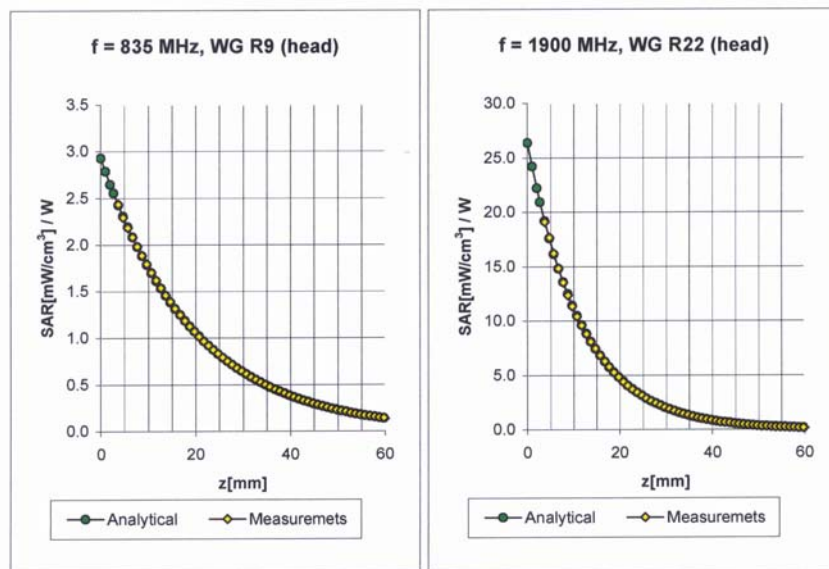
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10.5 Probe calibration parameters

ET3DV6 SN:1585

April 16, 2003

Conversion Factor Assessment



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

ConvF X $7.0 \pm 8.9\%$ (k=2)

ConvF Y $7.0 \pm 8.9\%$ (k=2)

ConvF Z $7.0 \pm 8.9\%$ (k=2)

Boundary effect:

Alpha **0.35**

Depth **2.43**

Head 1900 MHz $\epsilon_r = 40.0 \pm 5\%$ $\sigma = 1.40 \pm 5\%$ mho/m

ConvF X $5.2 \pm 8.9\%$ (k=2)

ConvF Y $5.2 \pm 8.9\%$ (k=2)

ConvF Z $5.2 \pm 8.9\%$ (k=2)

Boundary effect:

Alpha **0.51**

Depth **2.53**



Prepared (also subject responsible if other)

LD/SEMC/BGUG/NM Ramadan Plicanic

Approved

LD/SEMC/BGUG/NMC Mats Hansson

Checked

030617

SecurityClass REPORT

No.

GUG/N 03:174

Date

030617

Rev

A

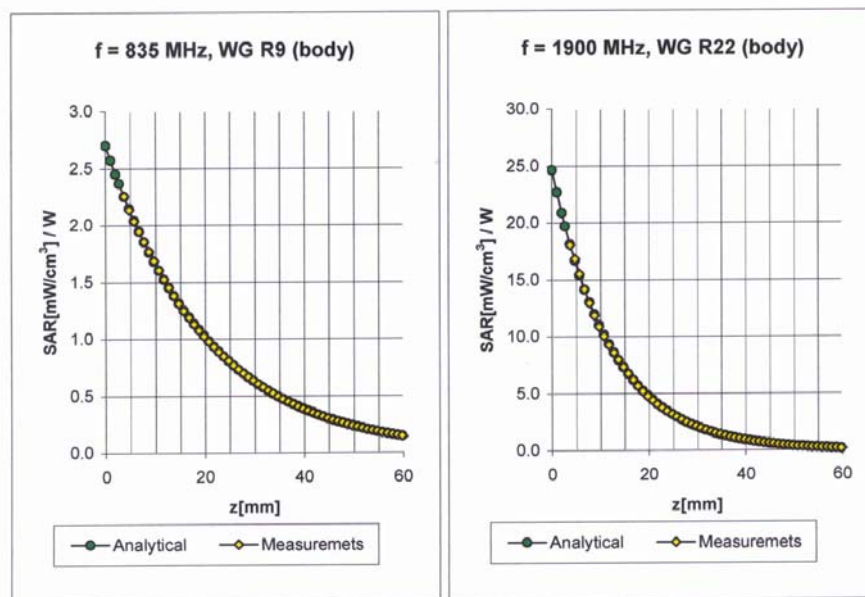
Reference

File

ET3DV6 SN:1585

April 16, 2003

Conversion Factor Assessment



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

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

ConvF X	6.7 $\pm 9.5\%$ (k=2)	Boundary effect:
ConvF Y	6.7 $\pm 9.5\%$ (k=2)	Alpha 0.34
ConvF Z	6.7 $\pm 9.5\%$ (k=2)	Depth 2.48

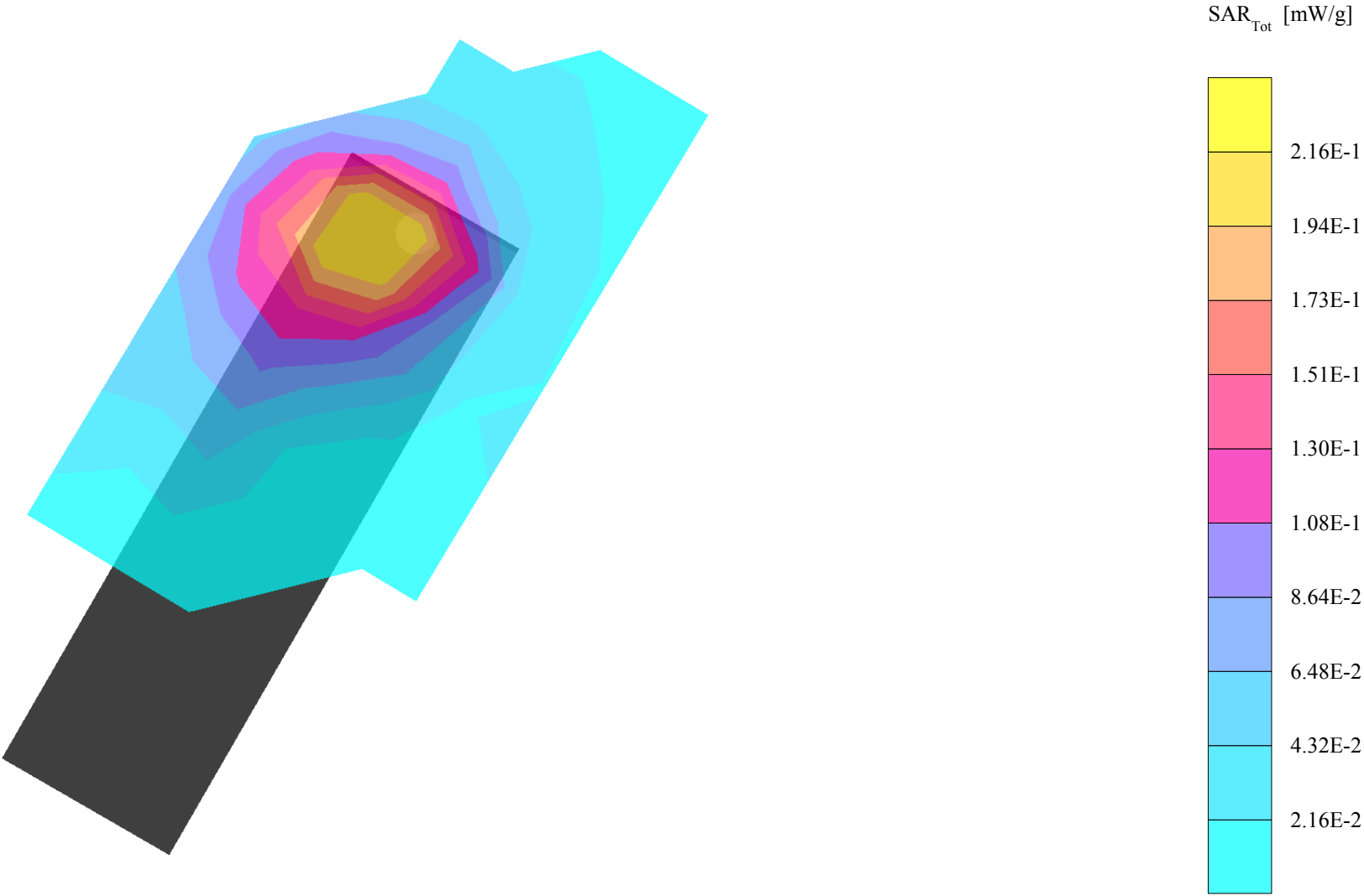
Body 1900 MHz $\epsilon_r = 53.3 \pm 5\%$ $\sigma = 1.52 \pm 5\%$ mho/m

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

ConvF X	4.8 $\pm 9.5\%$ (k=2)	Boundary effect:
ConvF Y	4.8 $\pm 9.5\%$ (k=2)	Alpha 0.59
ConvF Z	4.8 $\pm 9.5\%$ (k=2)	Depth 2.55

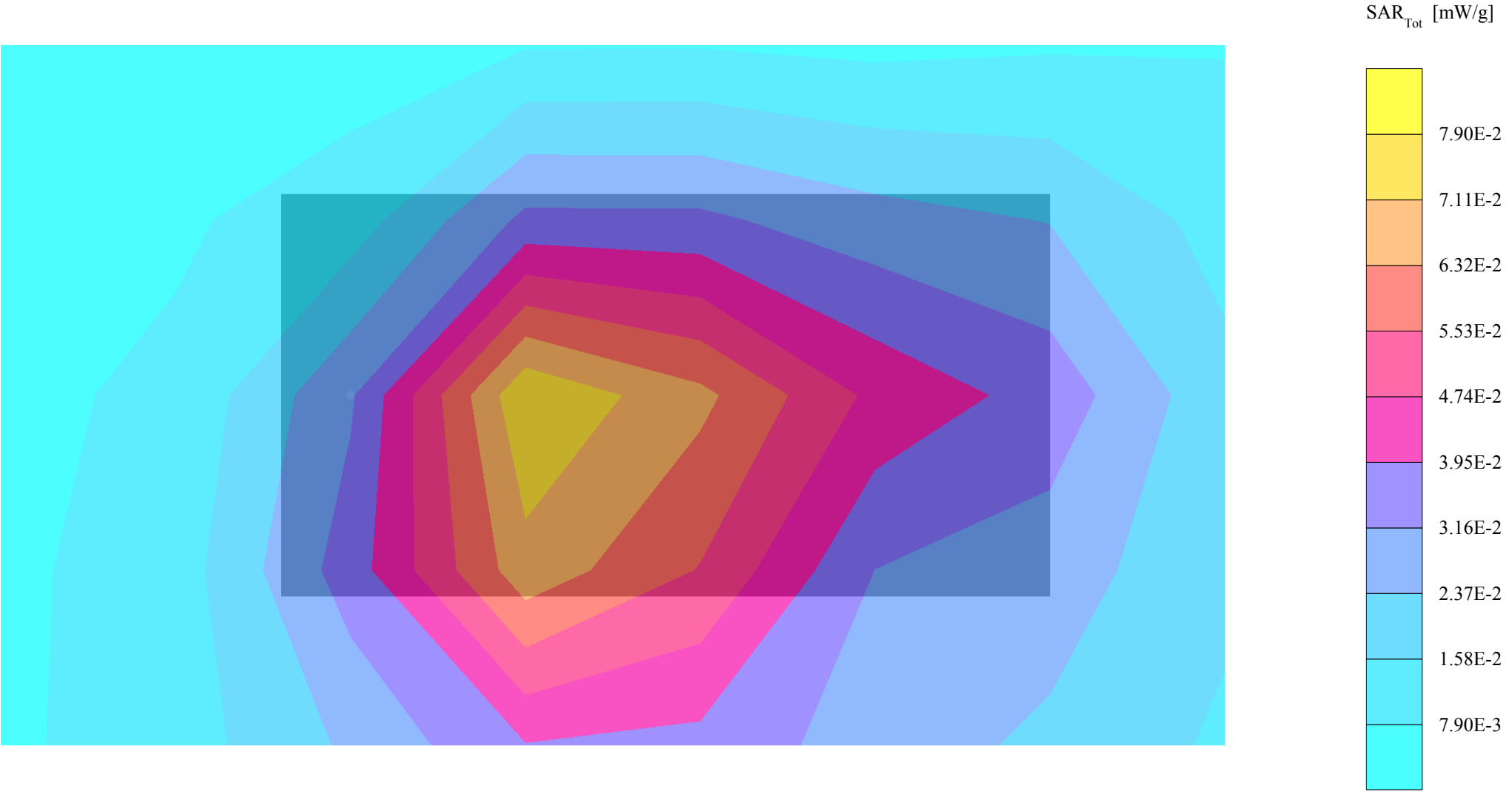
PY7A1021031 (03:001)

SAM 1 Phantom; Left Hand Section; Position: (95°,60°); Frequency: 1850 MHz
Probe: ET3DV6 - SN1585; ConvF(5.40,5.40,5.40); Crest factor: 8.0; Head 1900MHz: $\sigma = 1.45$ mho/m $\epsilon_r = 38.2$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.233 mW/g, SAR (10g): 0.135 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.01 dB



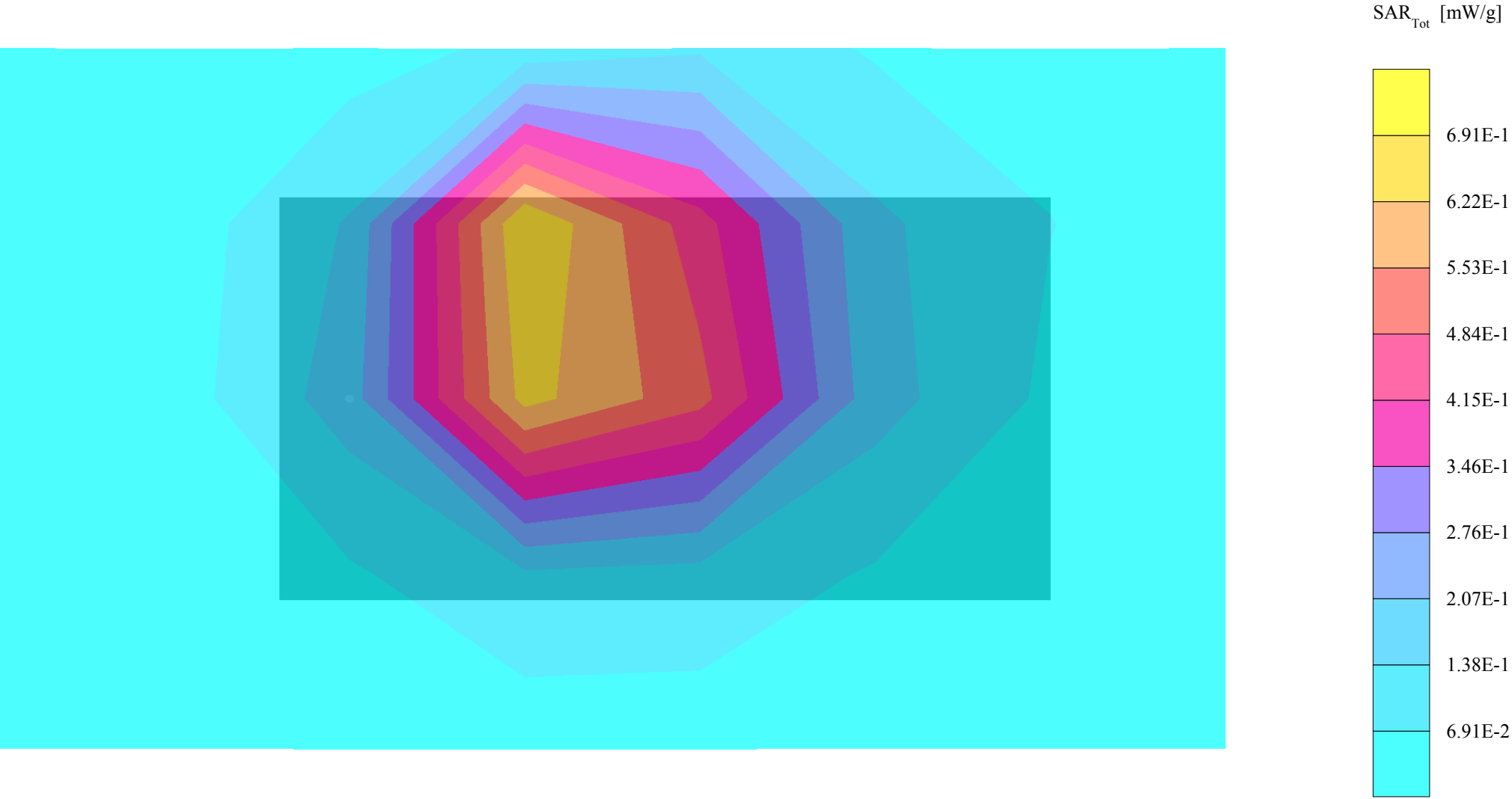
PY7A1021031 (03:001)

SAM 1 Phantom; Flat Section; Position: (90°,270°); Frequency: 1910 MHz
Probe: ET3DV6 - SN1585; ConvF(4.80,4.80,4.80); Crest factor: 8.0; Body 1900MHz: $\sigma = 1.45 \text{ mho/m}$ $\epsilon_r = 50.8$ $\rho = 1.00 \text{ g/cm}^3$
Cube 5x5x7: SAR (1g): 0.0774 mW/g, SAR (10g): 0.0470 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.02 dB



PY7A1021031 (03:001)

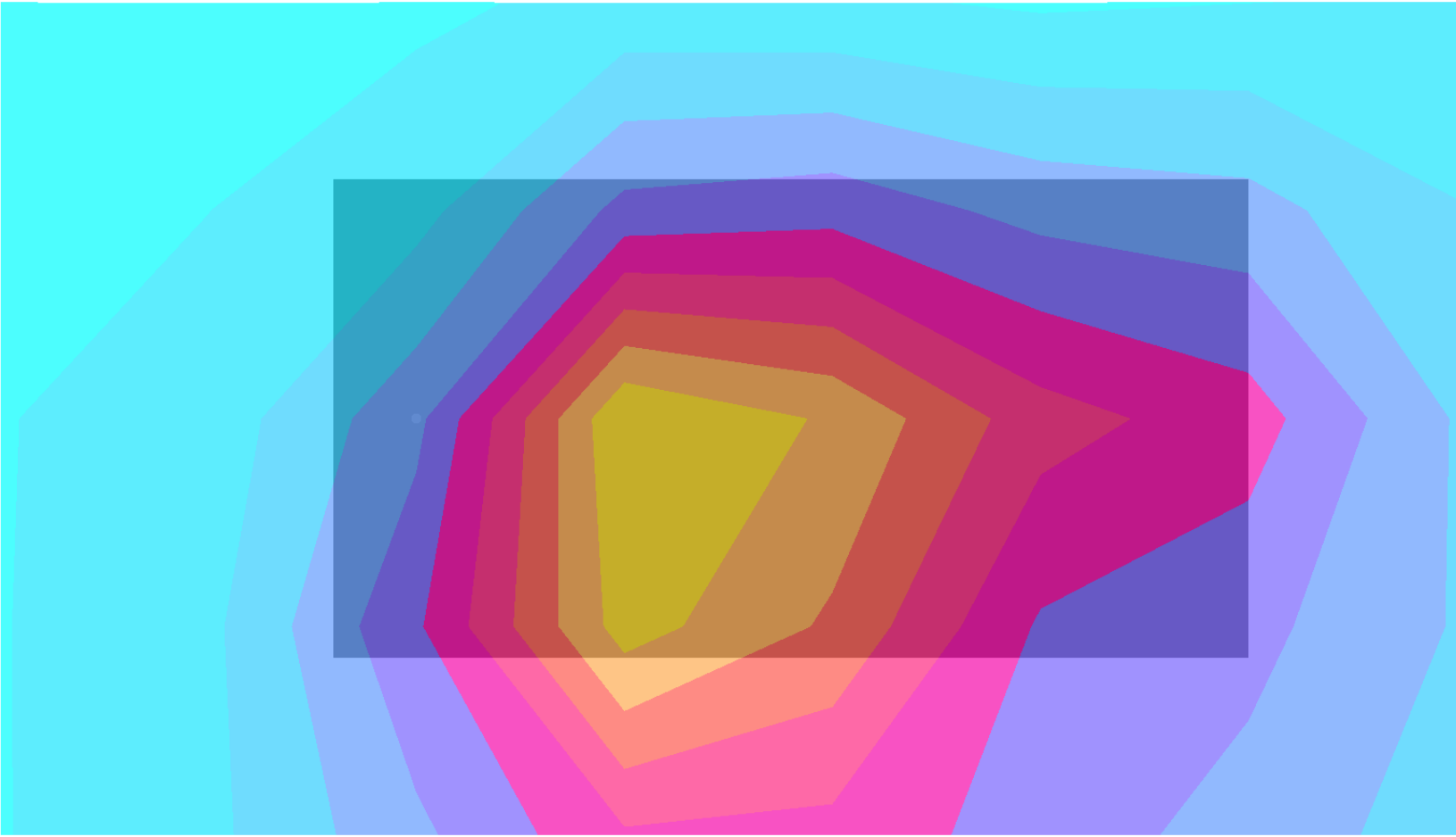
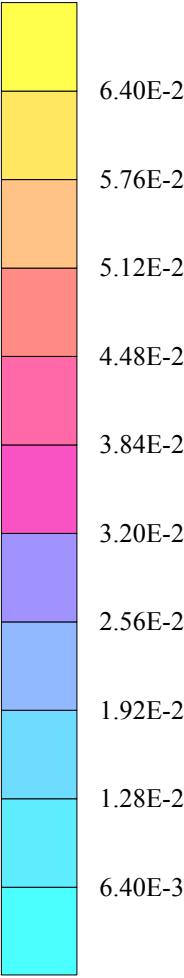
SAM 1 Phantom; Flat Section; Position: (90°,270°); Frequency: 1910 MHz
Probe: ET3DV6 - SN1585; ConvF(4.80,4.80,4.80); Crest factor: 8.0; Body 1900MHz: $\sigma = 1.45$ mho/m $\epsilon_r = 50.8$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.835 mW/g, SAR (10g): 0.432 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.04 dB



PY7A1021031 (03:001)

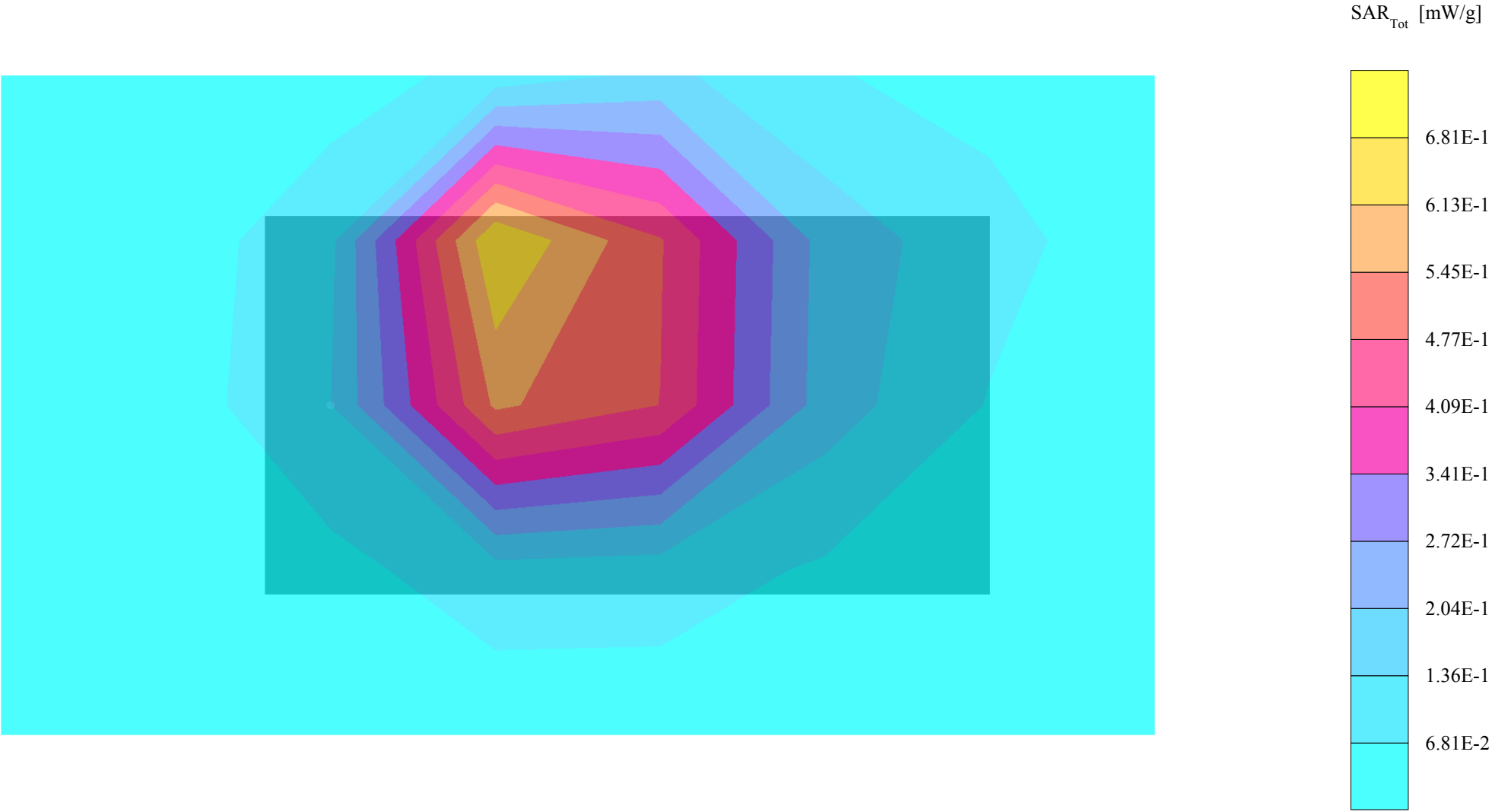
SAM 1 Phantom; Flat Section; Position: (90°,270°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1585; ConvF(4.80,4.80,4.80); Crest factor: 8.0; Body 1900MHz: $\sigma = 1.45 \text{ mho/m}$ $\epsilon_r = 50.8$ $\rho = 1.00 \text{ g/cm}^3$
Cube 5x5x7: SAR (1g): 0.0657 mW/g, SAR (10g): 0.0403 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.01 dB

SAR_{Tot} [mW/g]



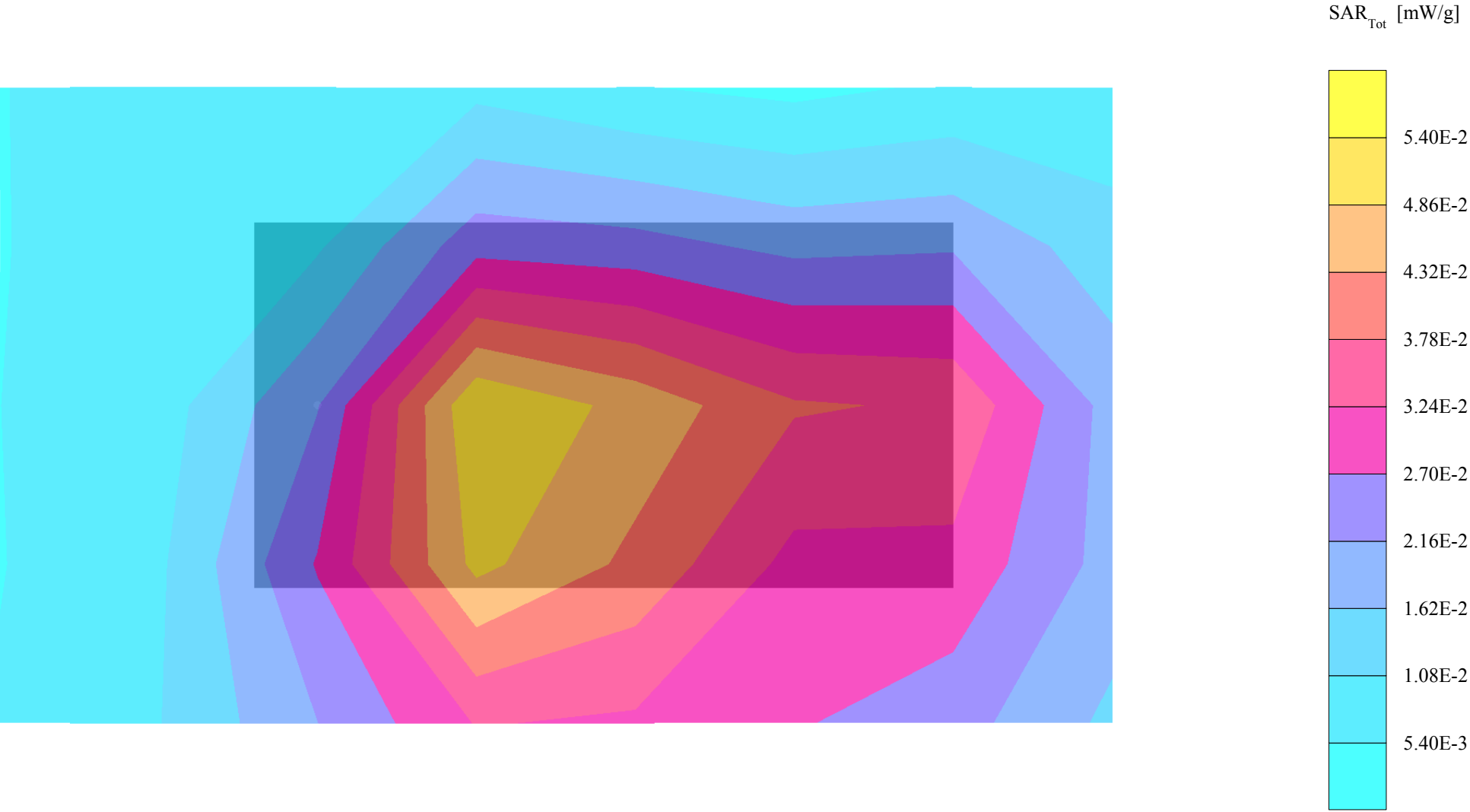
PY7A1021031 (03:001)

SAM 1 Phantom; Flat Section; Position: (90°,270°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1585; ConvF(4.80,4.80,4.80); Crest factor: 8.0; Body 1900MHz: $\sigma = 1.45 \text{ mho/m}$ $\epsilon_r = 50.8$ $\rho = 1.00 \text{ g/cm}^3$
Cube 5x5x7: SAR (1g): 0.799 mW/g, SAR (10g): 0.415 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: 0.03 dB



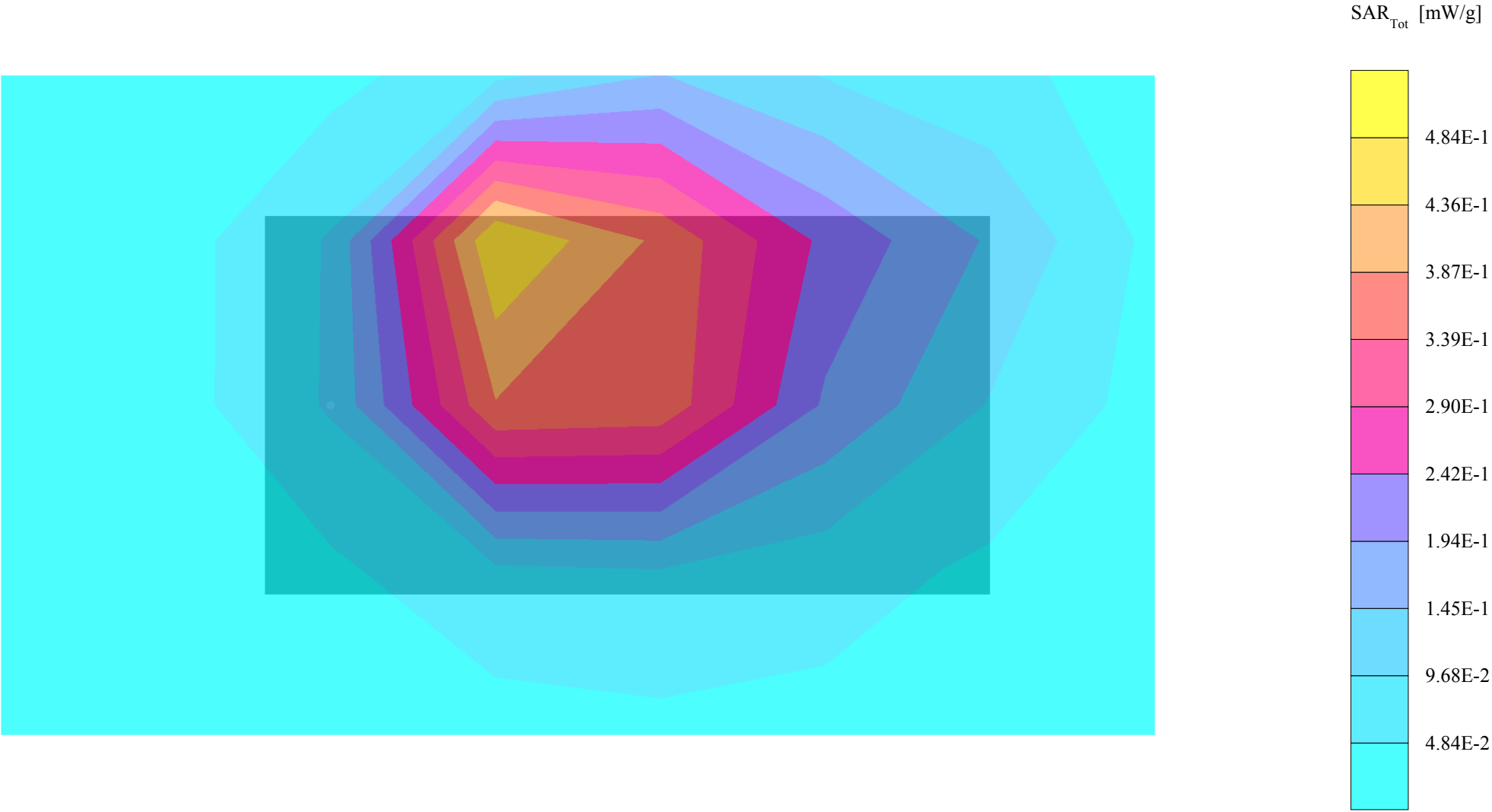
PY7A1021031 (03:001)

SAM 1 Phantom; Flat Section; Position: (90°,270°); Frequency: 1850 MHz
Probe: ET3DV6 - SN1585; ConvF(4.80,4.80,4.80); Crest factor: 8.0; Body 1900MHz: $\sigma = 1.45 \text{ mho/m}$ $\epsilon_r = 50.8$ $\rho = 1.00 \text{ g/cm}^3$
Cube 5x5x7: SAR (1g): 0.0540 mW/g, SAR (10g): 0.0335 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.00 dB



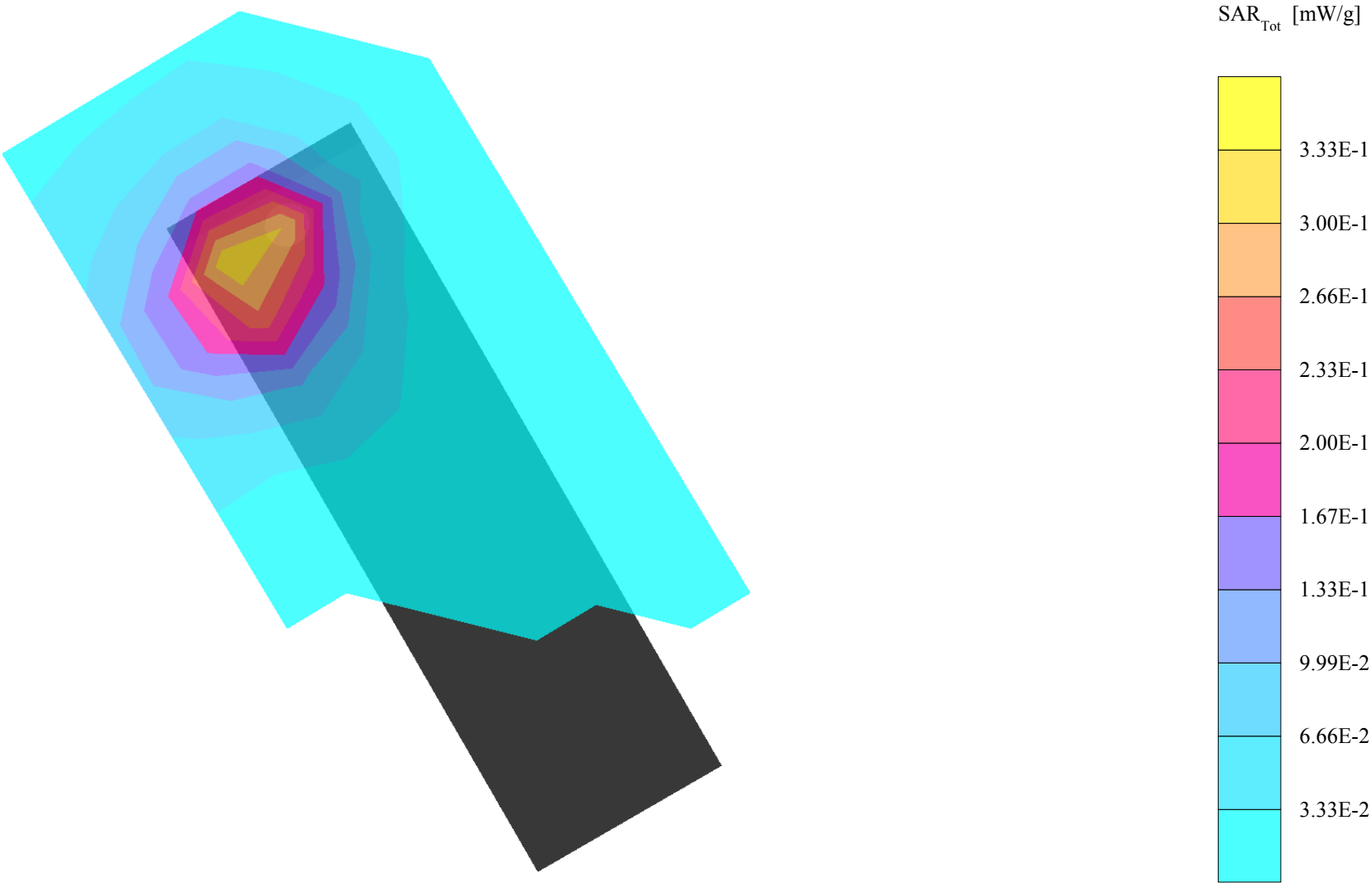
PY7A1021031 (03:001)

SAM 1 Phantom; Flat Section; Position: (90°,270°); Frequency: 1850 MHz
Probe: ET3DV6 - SN1585; ConvF(4.80,4.80,4.80); Crest factor: 8.0; Body 1900MHz: $\sigma = 1.45$ mho/m $\epsilon_r = 50.8$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.564 mW/g, SAR (10g): 0.301 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.05 dB



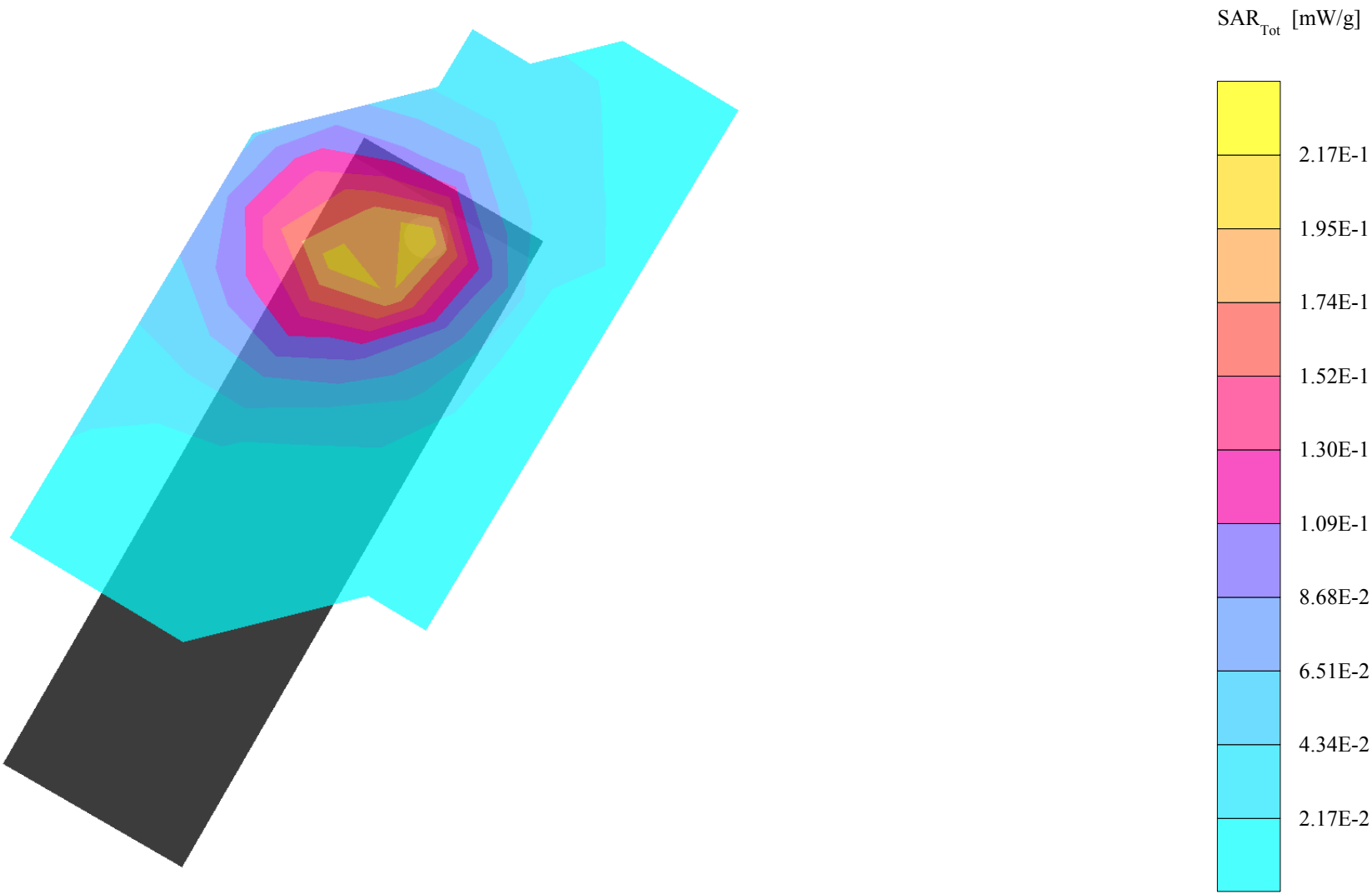
PY7A1021031 (03:001)

SAM 1 Phantom; Righ Hand Section; Position: (110°,300°); Frequency: 1910 MHz
Probe: ET3DV6 - SN1585; ConvF(5.20,5.20,5.20); Crest factor: 8.0; Head 1900MHz: $\sigma = 1.45$ mho/m $\epsilon_r = 38.2$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.320 mW/g, SAR (10g): 0.175 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.09 dB



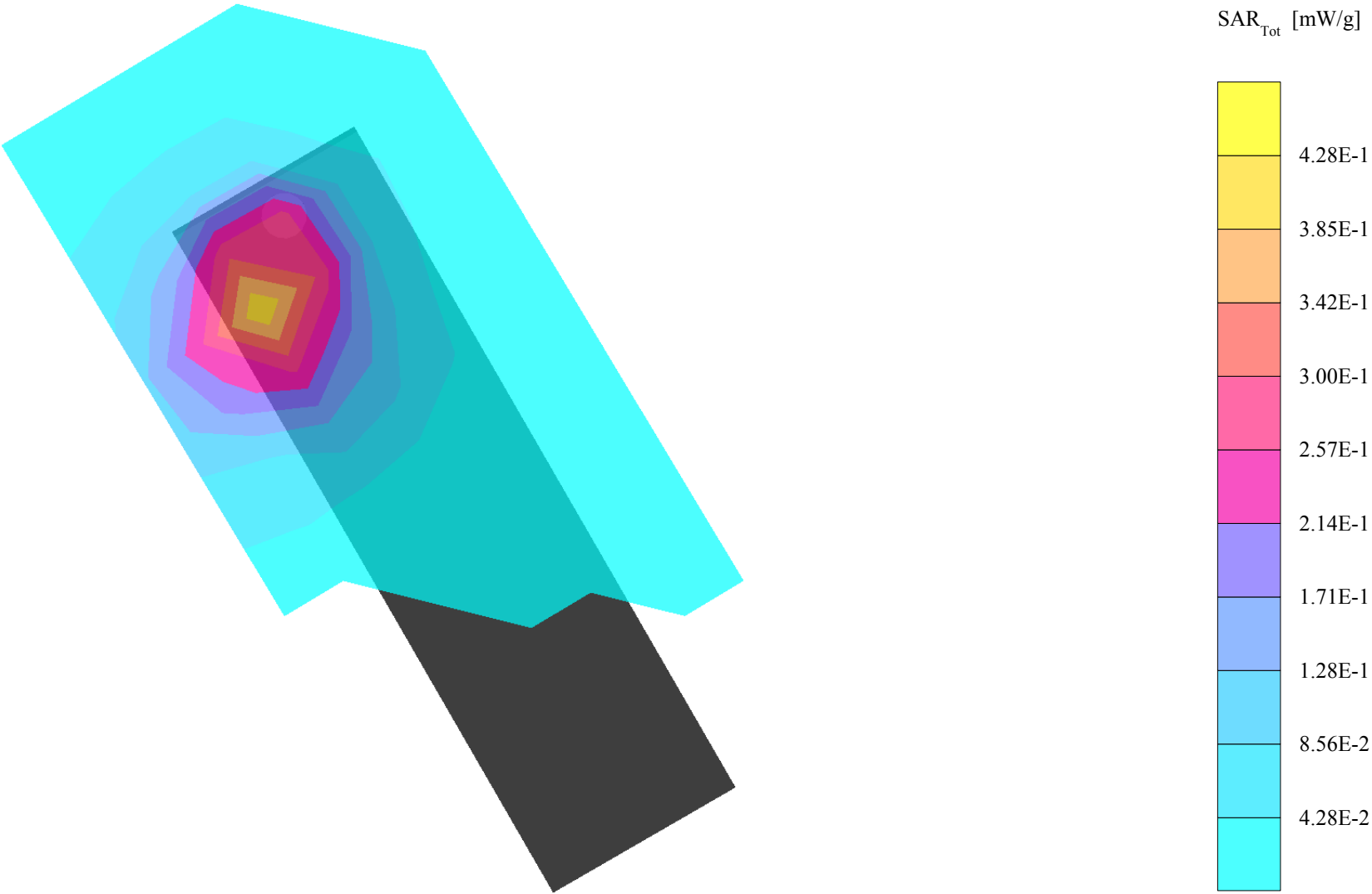
PY7A1021031 (03:001)

SAM 1 Phantom; Left Hand Section; Position: (110°,60°); Frequency: 1910 MHz
Probe: ET3DV6 - SN1585; ConvF(5.20,5.20,5.20); Crest factor: 8.0; Head 1900MHz: $\sigma = 1.45 \text{ mho/m}$ $\epsilon_r = 38.2$ $\rho = 1.00 \text{ g/cm}^3$
Cube 5x5x7: SAR (1g): 0.225 mW/g, SAR (10g): 0.126 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.09 dB



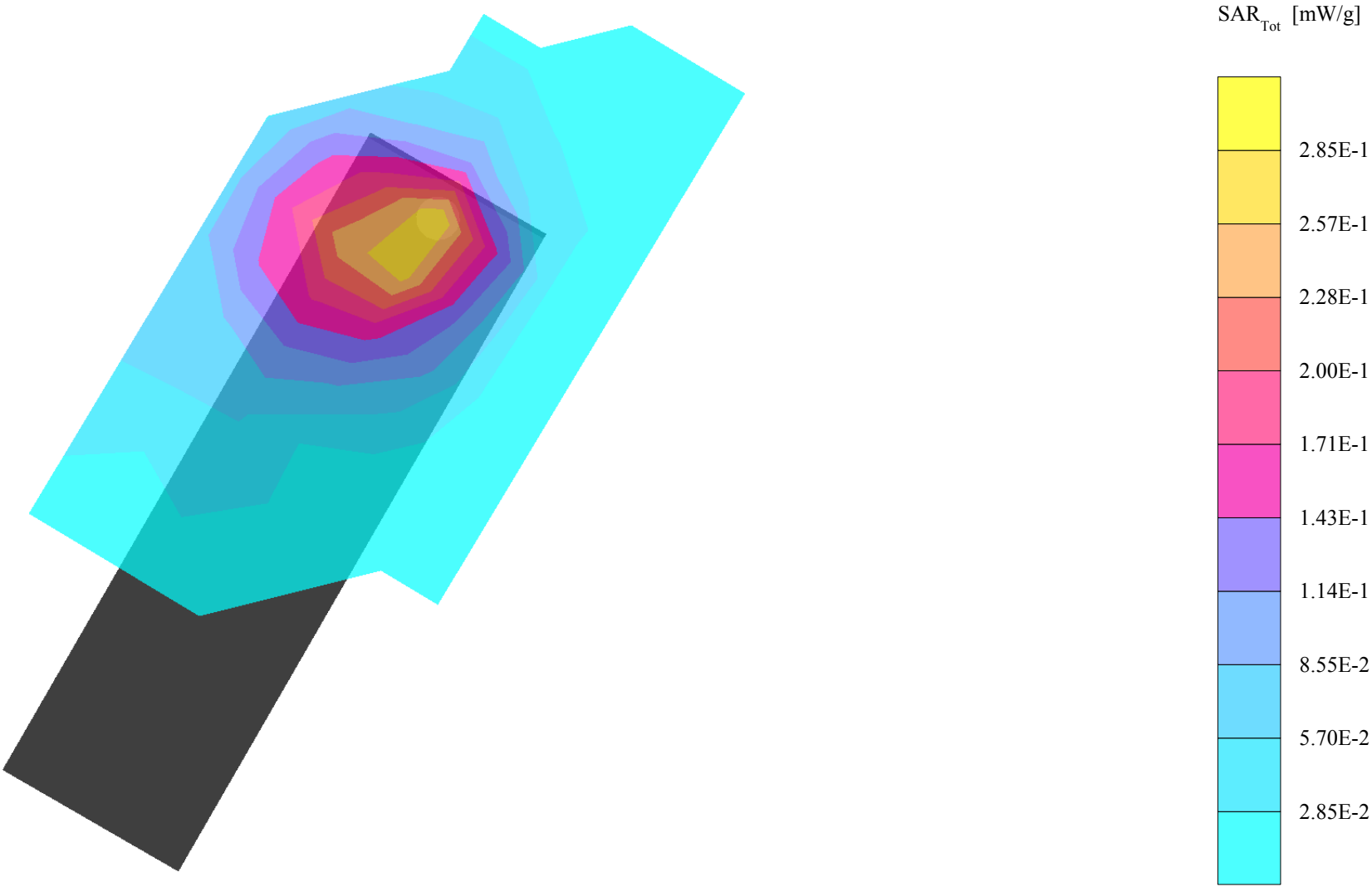
PY7A1021031 (03:001)

SAM 1 Phantom; Righ Hand Section; Position: (95°,300°); Frequency: 1910 MHz
Probe: ET3DV6 - SN1585; ConvF(5.20,5.20,5.20); Crest factor: 8.0; Head 1900MHz: $\sigma = 1.45$ mho/m $\epsilon_r = 38.2$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.390 mW/g, SAR (10g): 0.220 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.01 dB



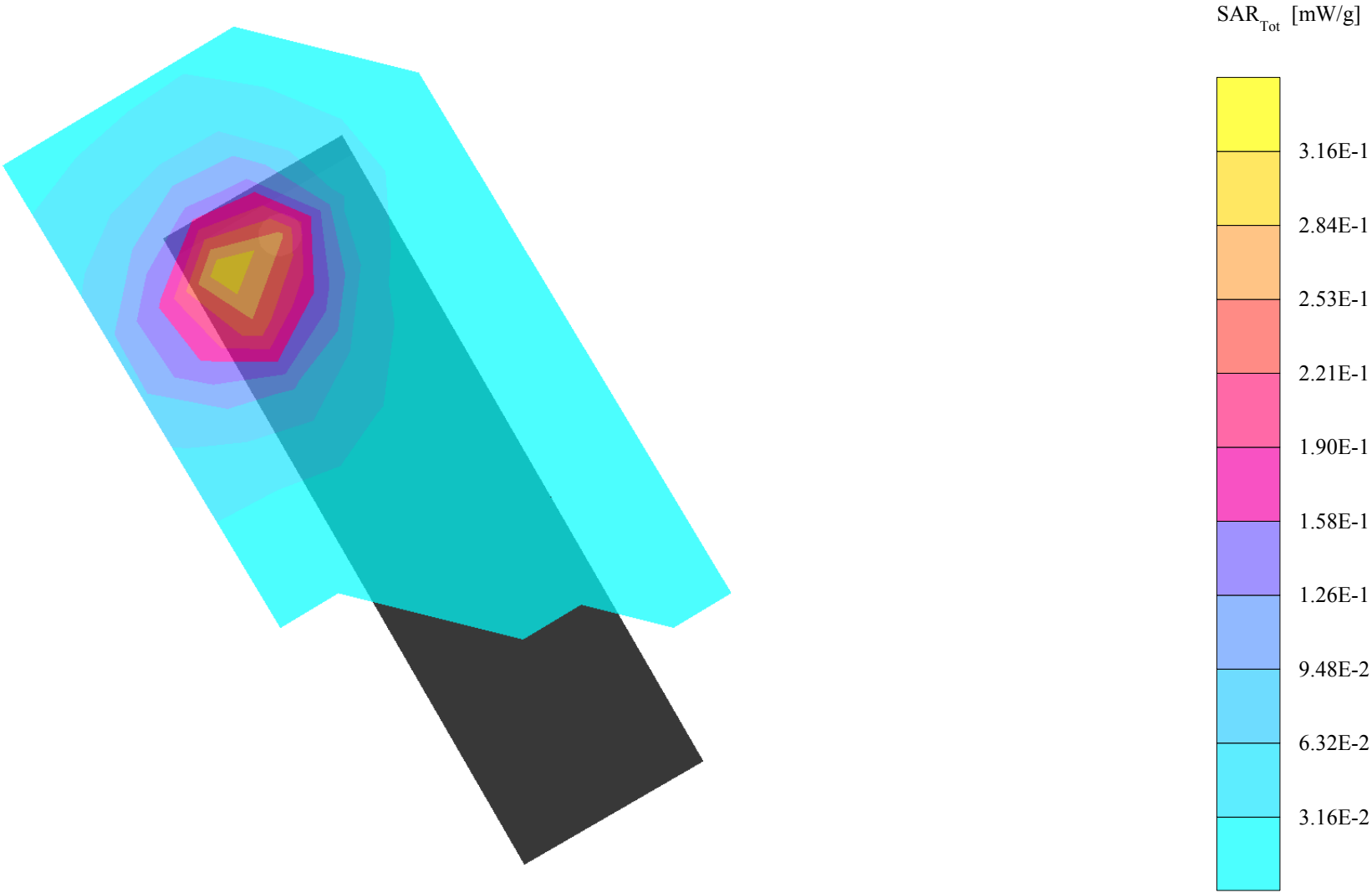
PY7A1021031 (03:001)

SAM 1 Phantom; Left Hand Section; Position: (95°,60°); Frequency: 1910 MHz
Probe: ET3DV6 - SN1585; ConvF(5.20,5.20,5.20); Crest factor: 8.0; Head 1900MHz: $\sigma = 1.45 \text{ mho/m}$ $\epsilon_r = 38.2$ $\rho = 1.00 \text{ g/cm}^3$
Cube 5x5x7: SAR (1g): 0.293 mW/g, SAR (10g): 0.165 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.08 dB



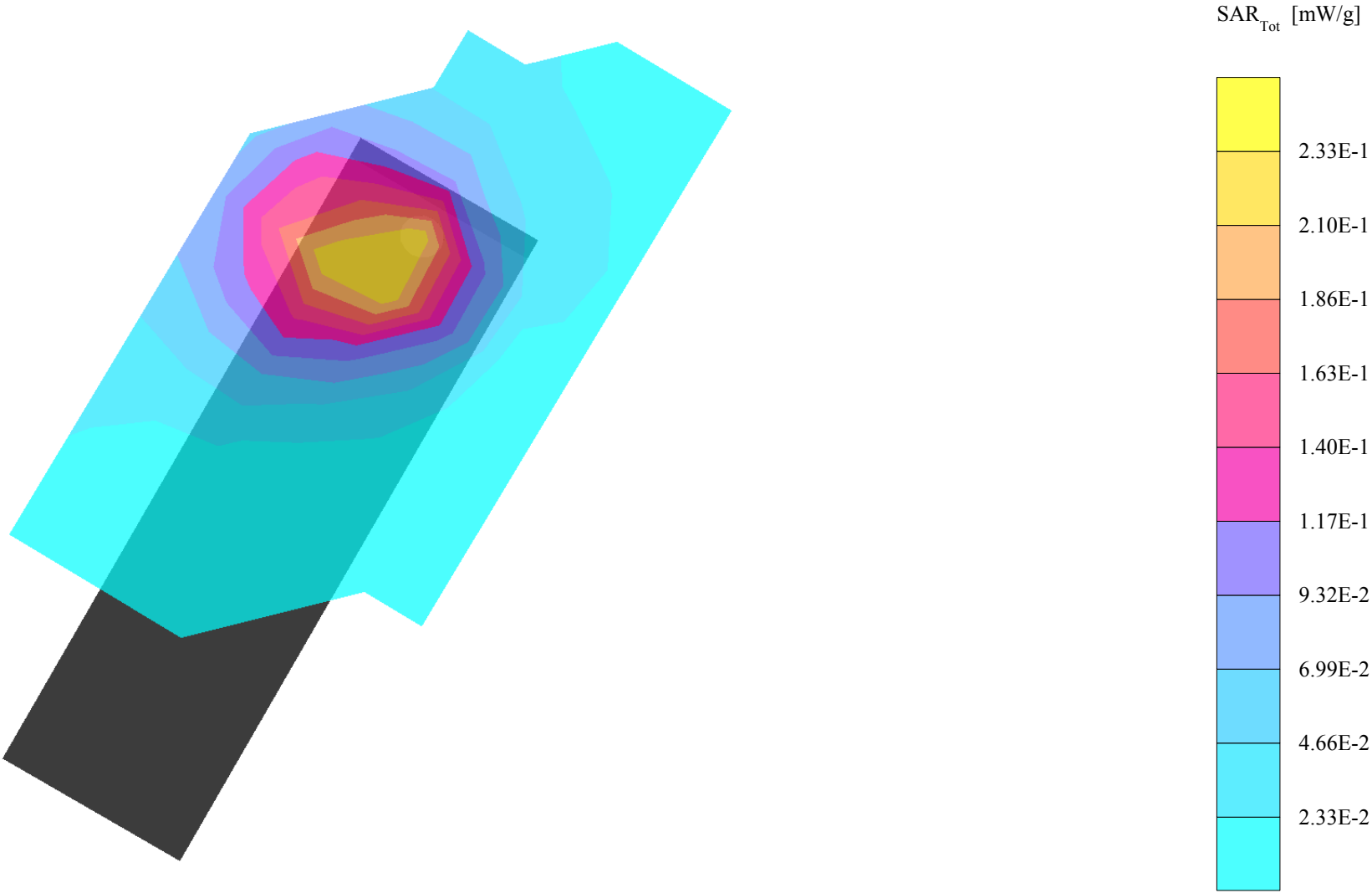
PY7A1021031 (03:001)

SAM 1 Phantom; Righ Hand Section; Position: (110°,300°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1585; ConvF(5.20,5.20,5.20); Crest factor: 8.0; Head 1900MHz: $\sigma = 1.45 \text{ mho/m}$ $\epsilon_r = 38.2$ $\rho = 1.00 \text{ g/cm}^3$
Cube 5x5x7: SAR (1g): 0.297 mW/g, SAR (10g): 0.163 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.00 dB



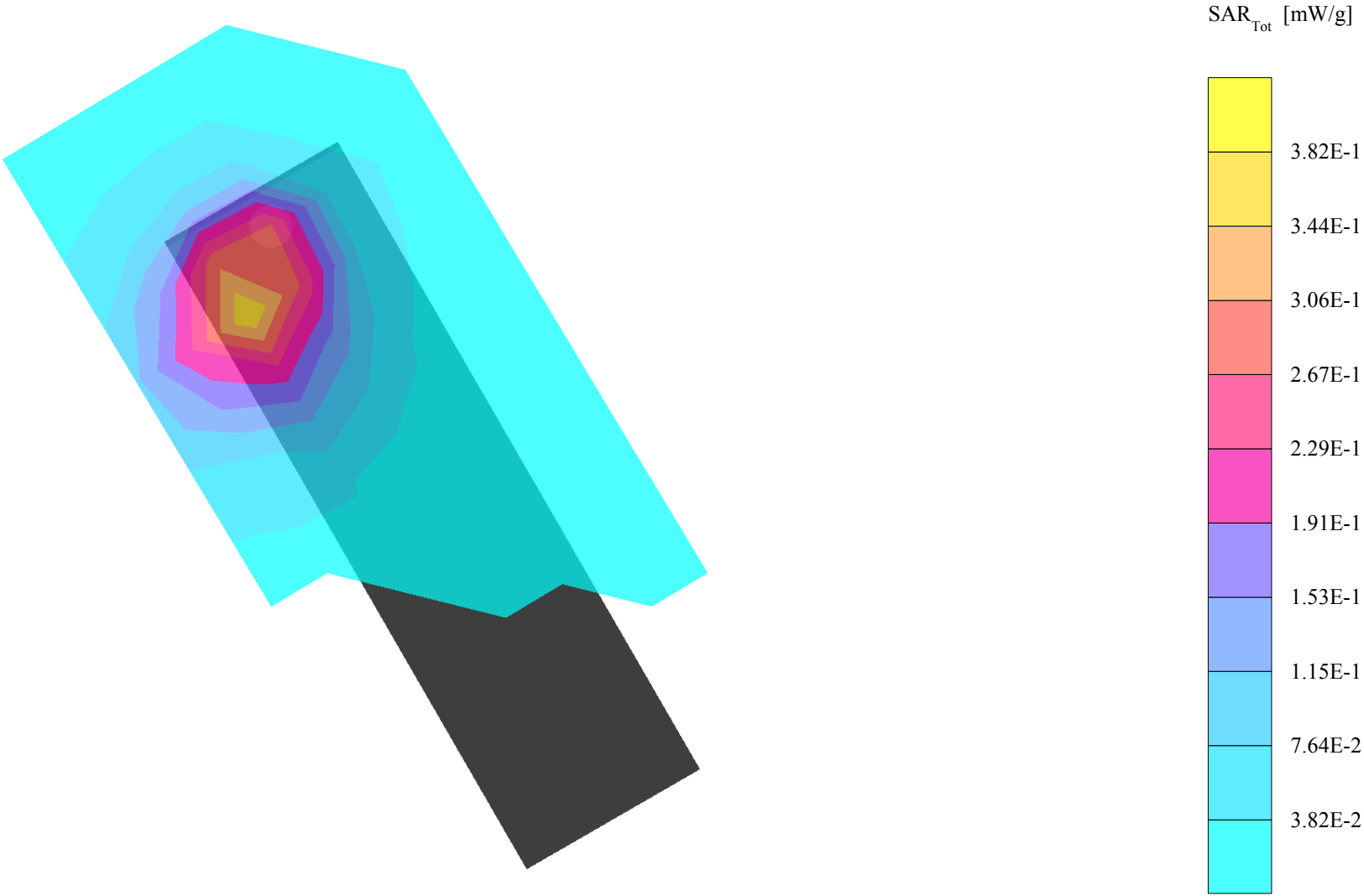
PY7A1021031 (03:001)

SAM 1 Phantom; Left Hand Section; Position: (110°,60°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1585; ConvF(5.20,5.20,5.20); Crest factor: 8.0; Head 1900MHz: $\sigma = 1.45 \text{ mho/m}$ $\epsilon_r = 38.2$ $\rho = 1.00 \text{ g/cm}^3$
Cube 5x5x7: SAR (1g): 0.252 mW/g, SAR (10g): 0.139 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.03 dB



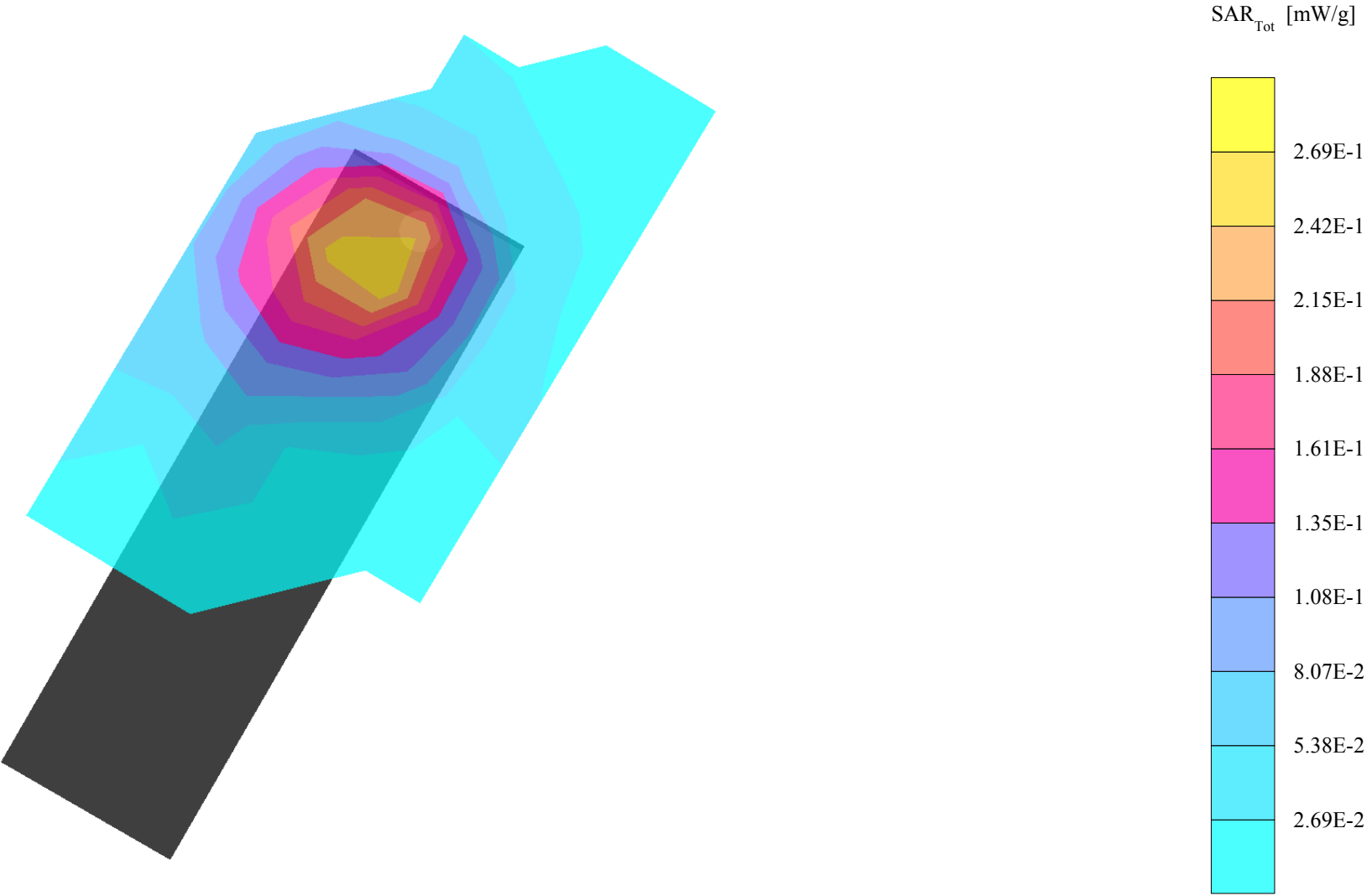
PY7A1021031 (03:001)

SAM 1 Phantom; Righ Hand Section; Position: (95°,300°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1585; ConvF(5.20,5.20,5.20); Crest factor: 8.0; Head 1900MHz: $\sigma = 1.45 \text{ mho/m}$ $\epsilon_r = 38.2$ $\rho = 1.00 \text{ g/cm}^3$
Cube 5x5x7: SAR (1g): 0.347 mW/g, SAR (10g): 0.197 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.02 dB



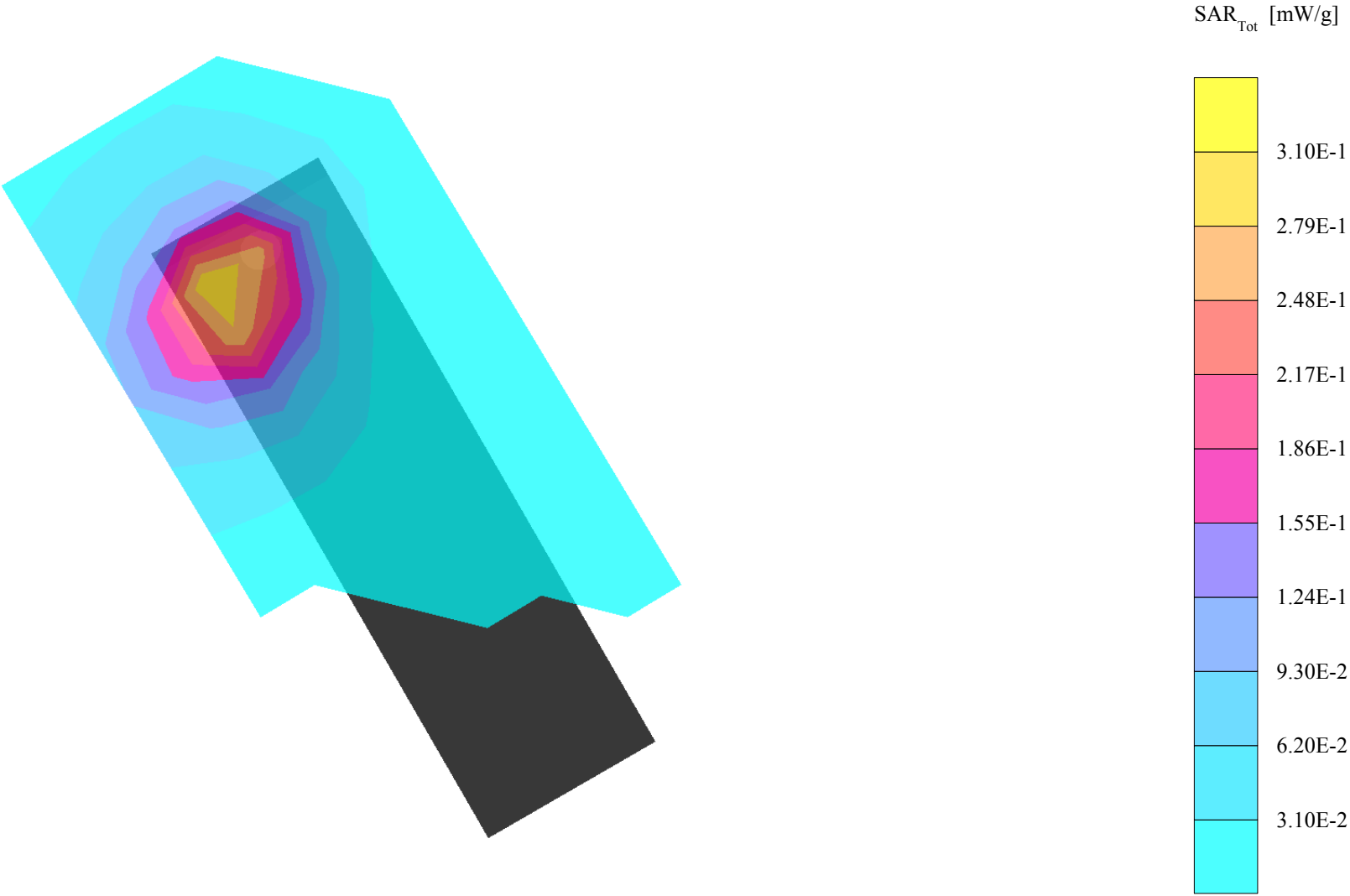
PY7A1021031 (03:001)

SAM 1 Phantom; Left Hand Section; Position: (95°,60°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1585; ConvF(5.20,5.20,5.20); Crest factor: 8.0; Head 1900MHz: $\sigma = 1.45 \text{ mho/m}$ $\epsilon_r = 38.2$ $\rho = 1.00 \text{ g/cm}^3$
Cube 5x5x7: SAR (1g): 0.274 mW/g, SAR (10g): 0.157 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: -0.02 dB



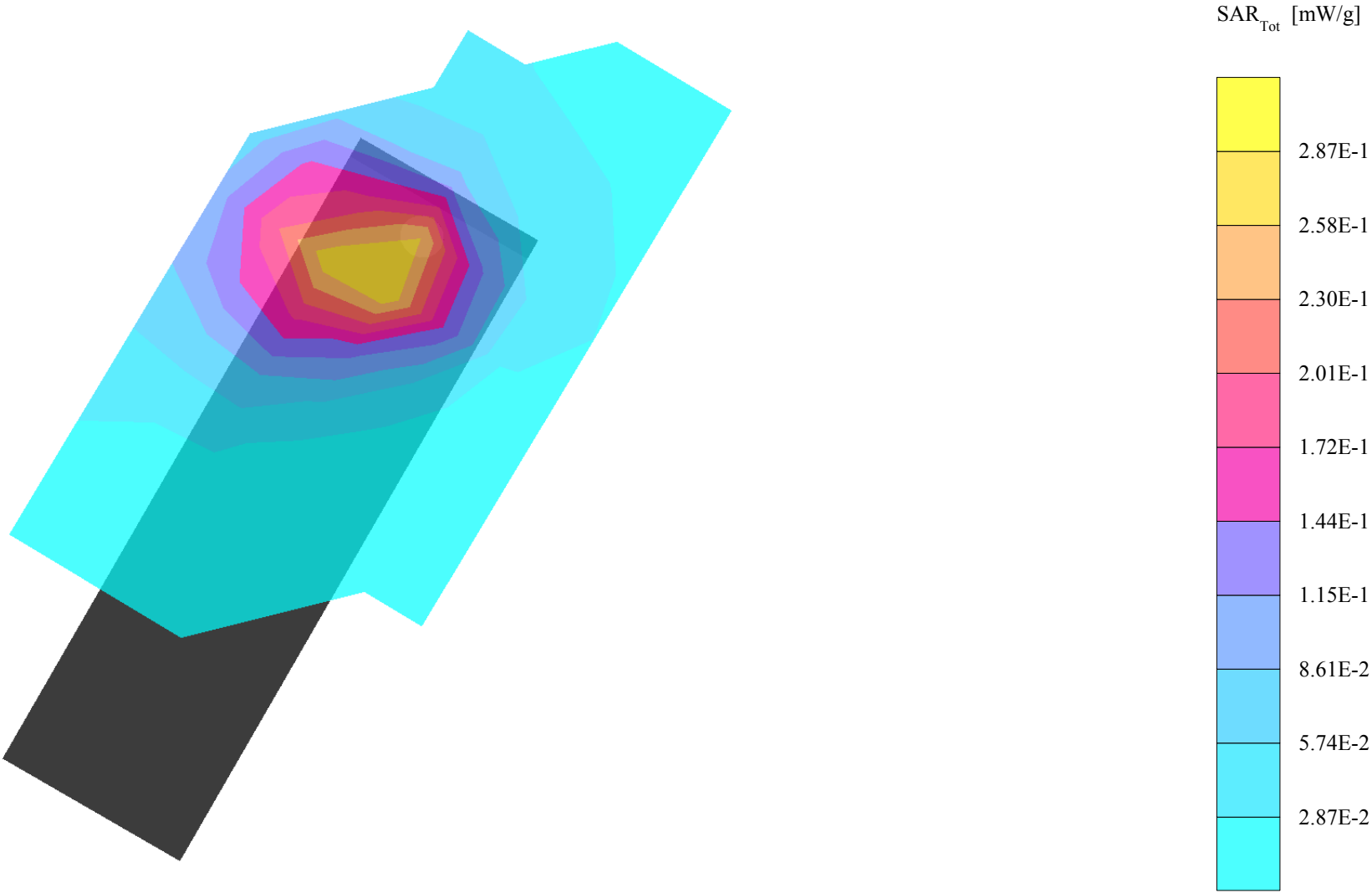
PY7A1021031 (03:001)

SAM 1 Phantom; Righ Hand Section; Position: (110°,300°); Frequency: 1850 MHz
Probe: ET3DV6 - SN1585; ConvF(5.40,5.40,5.40); Crest factor: 8.0; Head 1900MHz: $\sigma = 1.45$ mho/m $\epsilon_r = 38.2$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.306 mW/g, SAR (10g): 0.170 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.01 dB



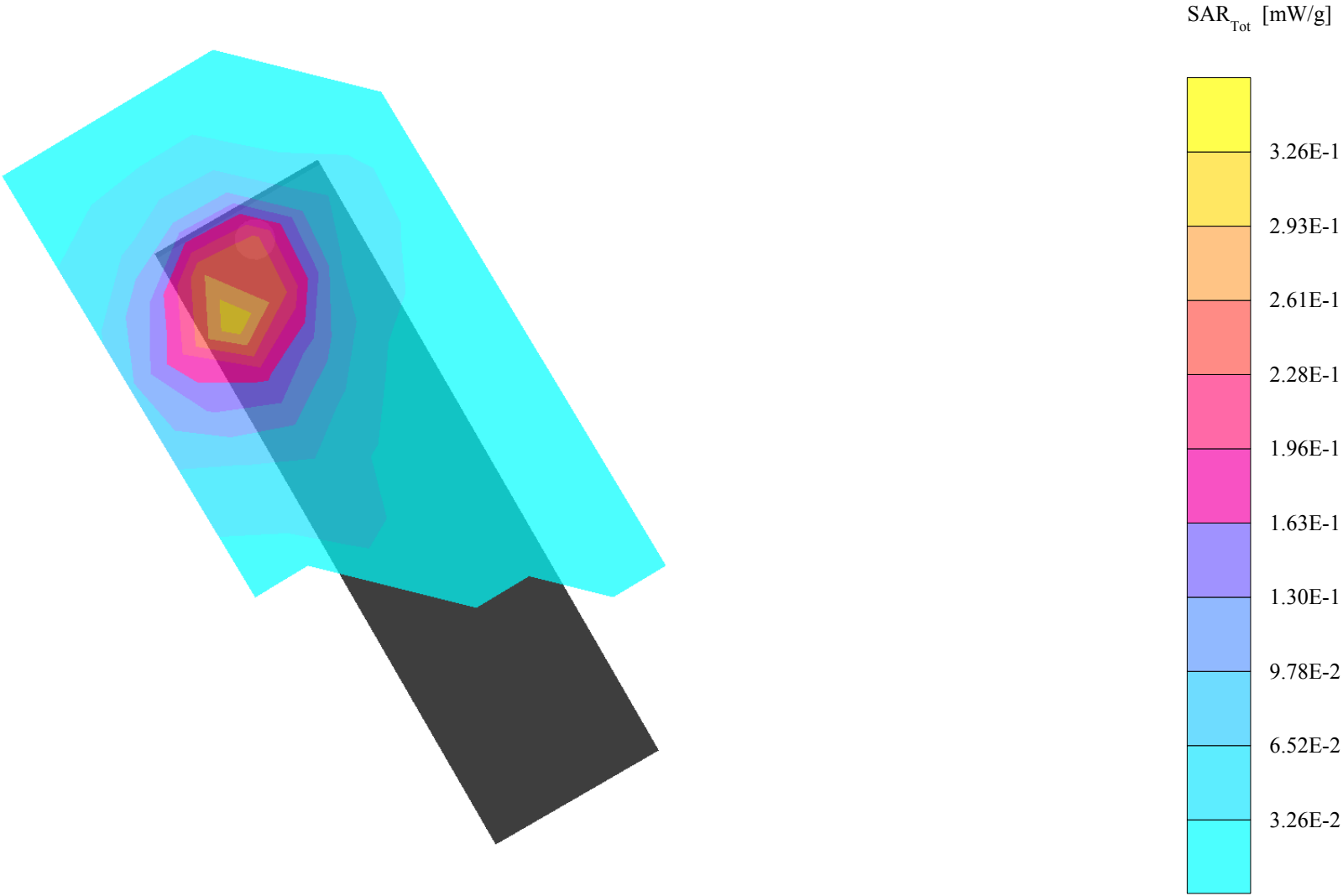
PY7A1021031 (03:001)

SAM 1 Phantom; Left Hand Section; Position: (110°,60°); Frequency: 1850 MHz
Probe: ET3DV6 - SN1585; ConvF(5.40,5.40,5.40); Crest factor: 8.0; Head 1900MHz: $\sigma = 1.45 \text{ mho/m}$ $\epsilon_r = 38.2$ $\rho = 1.00 \text{ g/cm}^3$
Cube 5x5x7: SAR (1g): 0.313 mW/g, SAR (10g): 0.171 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.03 dB



PY7A1021031 (03:001)

SAM 1 Phantom; Righ Hand Section; Position: (95°,300°); Frequency: 1850 MHz
Probe: ET3DV6 - SN1585; ConvF(5.40,5.40,5.40); Crest factor: 8.0; Head 1900MHz: $\sigma = 1.45$ mho/m $\epsilon_r = 38.2$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.307 mW/g, SAR (10g): 0.174 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Powerdrift: 0.01 dB



Client

Sony Ericsson Lund

CALIBRATION CERTIFICATE

Object(s)

ET3DV6 - SN:1585

Calibration procedure(s)

QA CAL-01.v2
Calibration procedure for dosimetric E-field probes

Calibration date:

April 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	Scheduled Calibration
RF generator HP 8684C	US3642U01700	4-Aug-99 (in house check Aug-02)	In house check: Aug-05
Power sensor E4412A	MY41495277	2-Apr-03	Apr-04
Power sensor HP 8481A	MY41092180	18-Sep-02	Sep-03
Power meter EPM E4419B	GB41293874	13-Sep-02	Sep-03
Network Analyzer HP 8753E	US38432426	3-May-00	In house check: May 03
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01	Sep-03

Calibrated by:

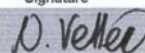
Name

Nico Vetterli

Function

Technician

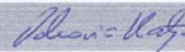
Signature



Approved by:

Katja Pokovic

Laboratory Director



Date issued: April 16, 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.

Probe ET3DV6

SN:1585

Manufactured:	May 7, 2001
Last calibration:	April 25, 2002
Recalibrated:	April 16, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1585**Sensitivity in Free Space****Diode Compression**

NormX	1.80 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	95	mV
NormY	1.67 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	95	mV
NormZ	1.83 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	95	mV

Sensitivity in Tissue Simulating Liquid

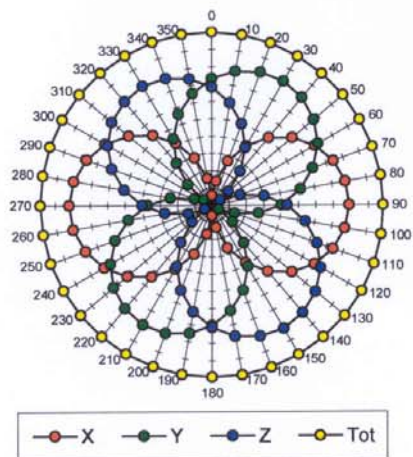
Head	900 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.97 \pm 5\% \text{ mho/m}$
ConvF X	6.9 $\pm 8.9\%$ (k=2)	Boundary effect:	
ConvF Y	6.9 $\pm 8.9\%$ (k=2)	Alpha	0.33
ConvF Z	6.9 $\pm 8.9\%$ (k=2)	Depth	2.58
Head	1800 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\% \text{ mho/m}$
ConvF X	5.4 $\pm 8.9\%$ (k=2)	Boundary effect:	
ConvF Y	5.4 $\pm 8.9\%$ (k=2)	Alpha	0.49
ConvF Z	5.4 $\pm 8.9\%$ (k=2)	Depth	2.48

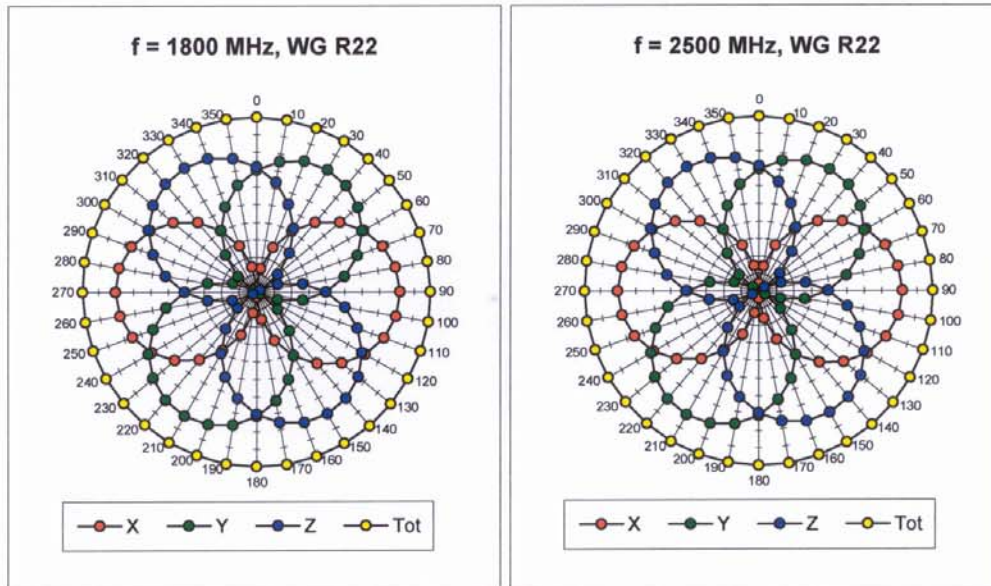
Boundary Effect

Head	900 MHz	Typical SAR gradient: 5 % per mm	
Probe Tip to Boundary		1 mm	2 mm
SAR _{be} [%] Without Correction Algorithm		9.0	5.2
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		12.1	8.2
SAR _{be} [%] With Correction Algorithm		0.2	0.3

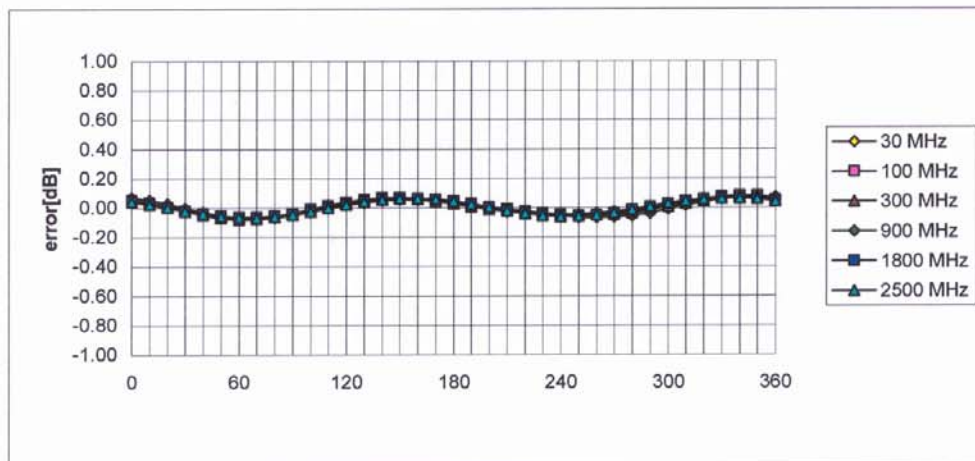
Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.3 $\pm$ 0.2	mm

Receiving Pattern (ϕ , $\theta = 0^\circ$)**f = 30 MHz, TEM cell ifi110**

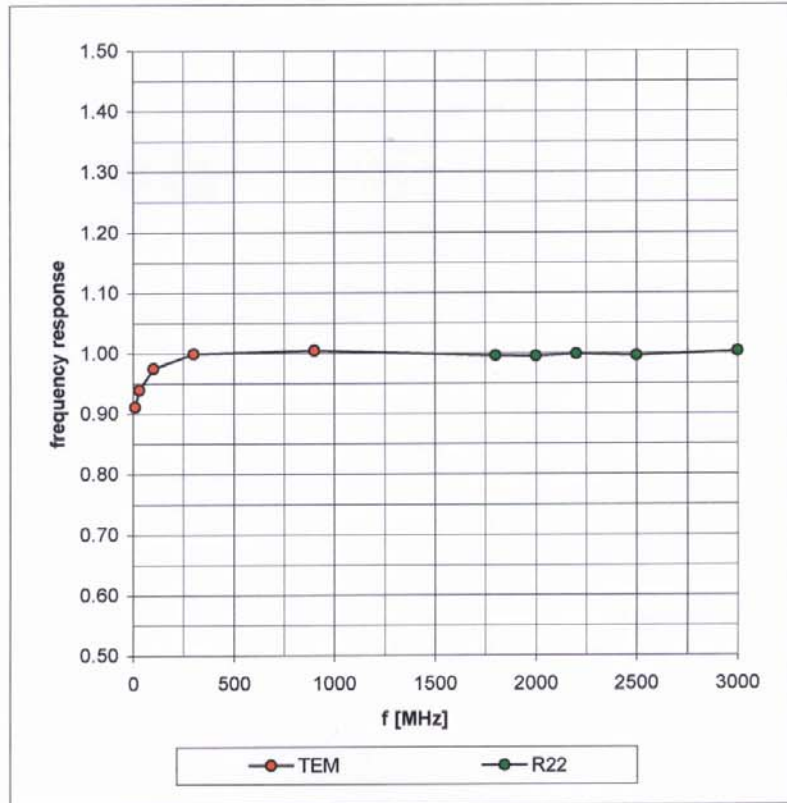


Isotropy Error (ϕ), $\theta = 0^\circ$

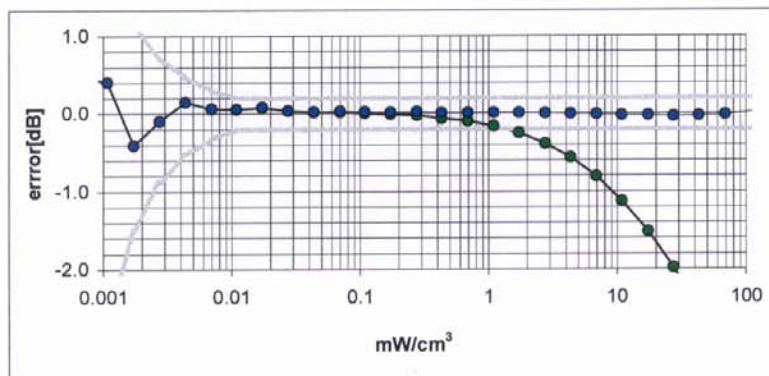
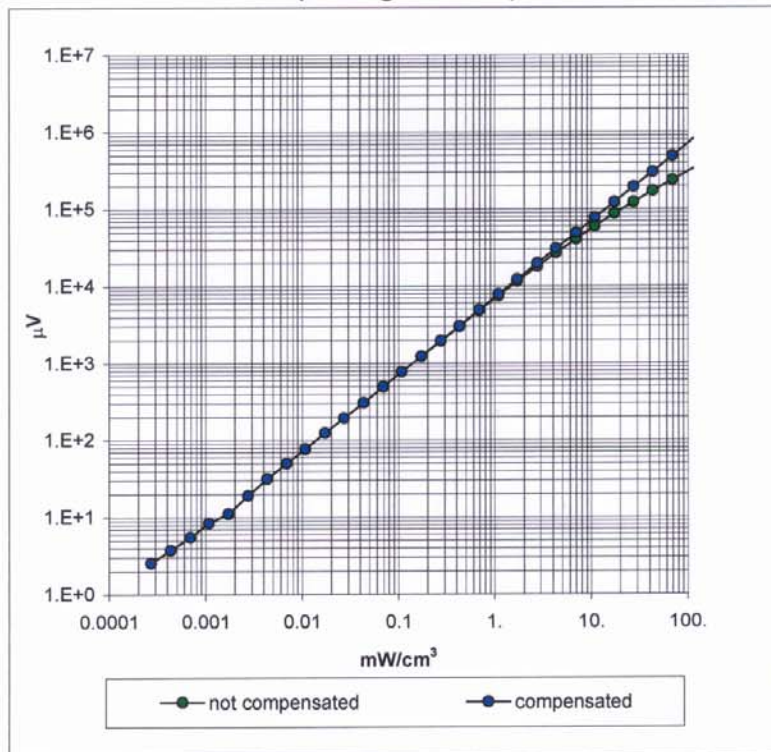


Frequency Response of E-Field

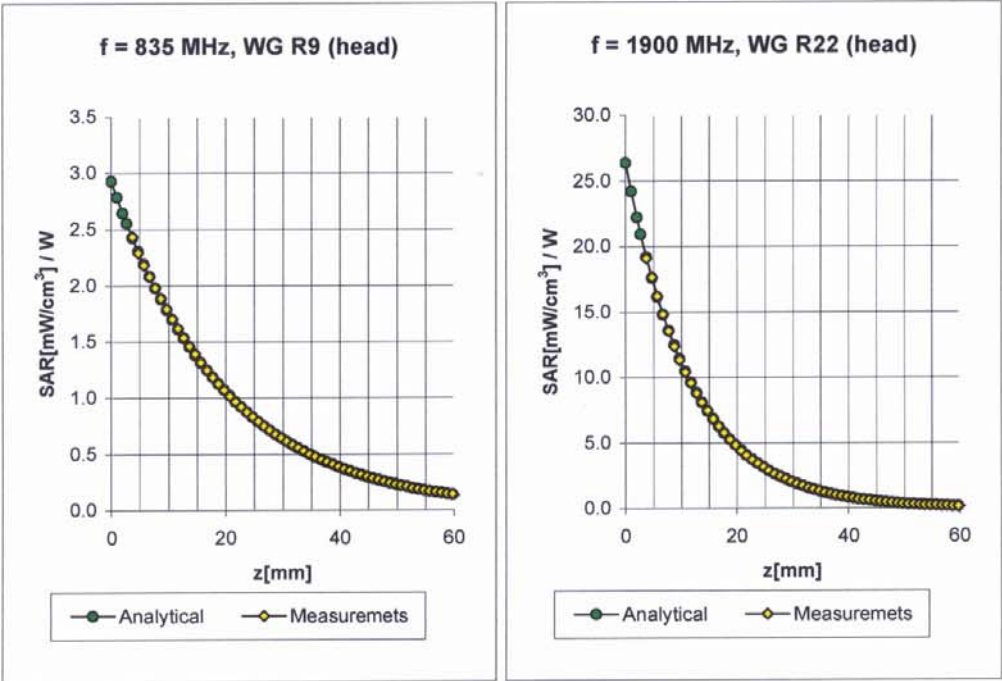
(TEM-Cell:ifi110, Waveguide R22)



Dynamic Range $f(\text{SAR}_{\text{brain}})$ (Waveguide R22)

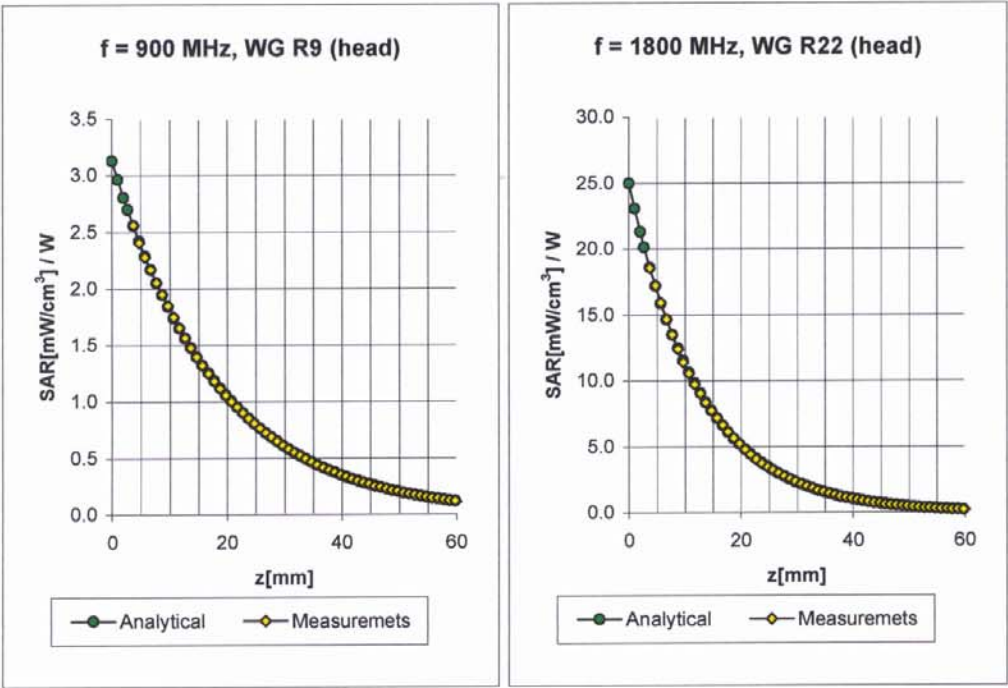


Conversion Factor Assessment



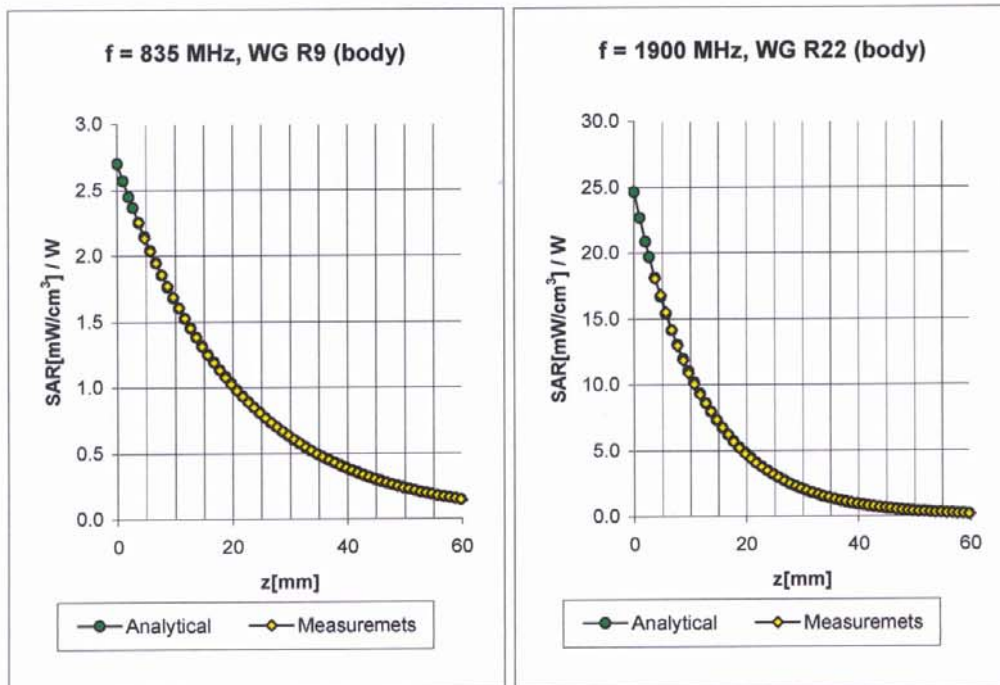
Head	835 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.90 \pm 5\%$ mho/m
ConvF X	7.0 $\pm$ 8.9% (k=2)	Boundary effect:	
ConvF Y	7.0 $\pm$ 8.9% (k=2)	Alpha	0.35
ConvF Z	7.0 $\pm$ 8.9% (k=2)	Depth	2.43
Head	1900 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\%$ mho/m
ConvF X	5.2 $\pm$ 8.9% (k=2)	Boundary effect:	
ConvF Y	5.2 $\pm$ 8.9% (k=2)	Alpha	0.51
ConvF Z	5.2 $\pm$ 8.9% (k=2)	Depth	2.53

Conversion Factor Assessment



Head	900 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.97 \pm 5\% \text{ mho/m}$
	ConvF X	6.9 $\pm 8.9\%$ (k=2)	Boundary effect:
	ConvF Y	6.9 $\pm 8.9\%$ (k=2)	Alpha 0.33
	ConvF Z	6.9 $\pm 8.9\%$ (k=2)	Depth 2.58
Head	1800 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\% \text{ mho/m}$
	ConvF X	5.4 $\pm 8.9\%$ (k=2)	Boundary effect:
	ConvF Y	5.4 $\pm 8.9\%$ (k=2)	Alpha 0.49
	ConvF Z	5.4 $\pm 8.9\%$ (k=2)	Depth 2.48

Conversion Factor Assessment



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

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

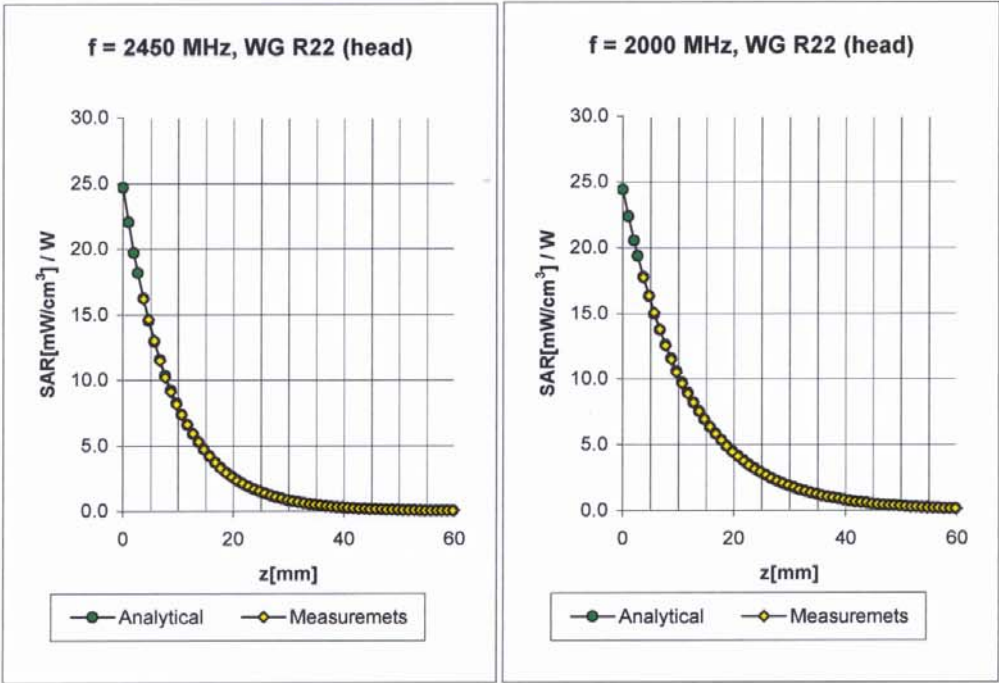
ConvF X	6.7 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	6.7 $\pm 9.5\%$ (k=2)	Alpha	0.34
ConvF Z	6.7 $\pm 9.5\%$ (k=2)	Depth	2.48

Body 1900 MHz $\epsilon_r = 53.3 \pm 5\%$ $\sigma = 1.52 \pm 5\%$ mho/m

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

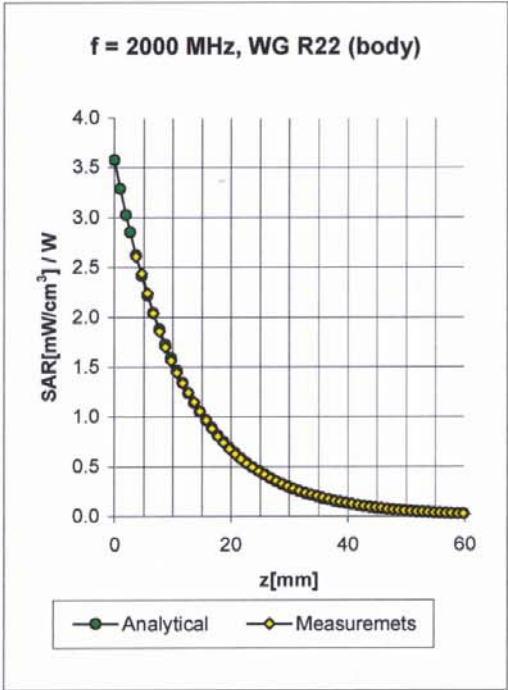
ConvF X	4.8 $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	4.8 $\pm 9.5\%$ (k=2)	Alpha	0.59
ConvF Z	4.8 $\pm 9.5\%$ (k=2)	Depth	2.55

Conversion Factor Assessment



Head	2450	MHz	$\epsilon_r = 39.2 \pm 5\%$	$\sigma = 1.80 \pm 5\% \text{ mho/m}$
	ConvF X	4.9 $\pm 8.9\%$ (k=2)	Boundary effect:	
	ConvF Y	4.9 $\pm 8.9\%$ (k=2)	Alpha	0.91
	ConvF Z	4.9 $\pm 8.9\%$ (k=2)	Depth	1.89
Head	2000	MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\% \text{ mho/m}$
	ConvF X	5.1 $\pm 8.9\%$ (k=2)	Boundary effect:	
	ConvF Y	5.1 $\pm 8.9\%$ (k=2)	Alpha	0.46
	ConvF Z	5.1 $\pm 8.9\%$ (k=2)	Depth	2.90

Conversion Factor Assessment



Body	2000 MHz	$\epsilon_r = 53.3 \pm 5\%$	$\sigma = 1.52 \pm 5\%$ mho/m
ConvF X	4.7 $\pm$ 8.9% (k=2)	Boundary effect:	
ConvF Y	4.7 $\pm$ 8.9% (k=2)	Alpha	0.69
ConvF Z	4.7 $\pm$ 8.9% (k=2)	Depth	2.35

Deviation from Isotropy in HSL

Error ($\theta\phi$), $f = 900$ MHz

