



# SUPPLEMENTARY TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test of: Sendo Ltd.  
Z100 Tri-Band Mobile Phone

To: OET Bulletin 65 Supplement C (2001-01)

**Supplementary Test Report Serial No:**  
RFI/SARB1/SUP43987JD05A

This Supplementary Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director:  	Checked By:  
Tested By:  	Release Version No: PDF01
Issue Date: 26 March 2003	Test Dates: 19 March 2003

Note: This supplementary test report is issued as an addendum to RFI Test Report Serial No: RFI/SARB2/RP43987JD02C. It has been issued to include additional measurements requested by the FCC.

**It should be noted that the standard, OET Bulletin 65 Supplement C: (2001-01) is not listed on RFIs current UKAS schedule and is therefore "not UKAS accredited".**

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The results in this Supplementary Test Report apply only to the sample(s) tested.

Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, ENGLAND. Tel: +44 (0) 1256 851193 Fax: +44 (0) 1256 851192	Registered in England, No. 211 7901. Registered Office: Ewhurst Park, Ramsdell, Basingstoke, Hampshire RG26 5RQ	
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**RADIO FREQUENCY INVESTIGATION LTD.**

**Operations Department**

**Test Of: Sendo Ltd.**

**Z100 Tri-Band Mobile Phone**

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**TEST REPORT**

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## **1. Client Information**

### **1.1. Client Details**

<b>Company Name:</b>	Sendo Ltd.
<b>Address:</b>	Hatchford Brook Hatchford Way Sheldon Birmingham B26 3QA
<b>Contact Name:</b>	Mr M Roper

### **1.2. Test Laboratory**

<b>Company Name:</b>	Radio Frequency Investigation Ltd.
<b>Address:</b>	Ewhurst Park Ramsdell Basingstoke Hampshire RG26 5RQ.
<b>Contact Name:</b>	Mr G Taylor

## **2. Equipment Under Test (EUT)**

The following information (with the exception of the Date of Receipt) has been supplied by the client:

### **2.1. Identification Of Equipment Under Test (EUT)**

<b>Brand Name</b>	Sendo
<b>Model Name or Number</b>	Z100
<b>FCC ID.</b>	P6PSND100
<b>Unique Type Identification</b>	SND 100
<b>IMEI Number</b>	00 44 000 420 504 8200
<b>Battery Serial Number</b>	8D48-07180-00000 040921
<b>Country Of Manufacture</b>	UK
<b>Date Of Receipt</b>	19 March 2003

### **2.2. Modifications Incorporated In EUT**

The client stated that the EUT has not been modified from what is described by the Model Name and Unique Type Identification stated above.

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**2.3. Additional Information Related to the EUT**

<b>Equipment Class:</b>	Handheld Mobile Telephone
<b>FCC Rule Part(s):</b>	OET Bulletin 65 Supplement C
<b>Application Type:</b>	Certification
<b>Transmitter Frequency Range (MHz):</b>	1850 - 1910
<b>Receiver Frequency Range (MHz):</b>	1930 - 1990
<b>Transmit Frequency Allocation Of EUT When Under Test (Channels):</b>	Bottom Channel – 512 Centre Channel – 660 Top Channel - 810
<b>Modulation(s):</b>	GSM 1900
<b>Modulation Scheme (Crest Factor)</b>	GSM (Crest Factor 8)
<b>Maximum RF Output Power:</b>	1900 MHz – 28.97 dBm
<b>Battery Type(s):</b>	Lithium Ion
<b>Antenna Length and Type:</b>	Fixed Integral (Internal)
<b>Number Of Antenna Positions:</b>	1 (Fixed Antenna)
<b>Intended Operating Environment:</b>	Mobile
<b>Weight:</b>	Approx. 115 g
<b>Dimensions (without Antenna) mm:</b>	Approx. 120 x 50 x 20 mm
<b>Power Supply Requirement:</b>	
<b>DC Supply (Volts/Amps)</b>	Not applicable
<b>AC Supply (Volts/Amps)</b>	Not applicable
<b>Internal Battery (Volts/Amps)</b>	3.7 V
<b>Port(s):</b>	Enclosure Accessory Connector

**2.4. Support Equipment**

<b>Description:</b>	Wavetek
<b>Model Name or Number:</b>	4201S
<b>Unique Type Identification:</b>	Not applicable
<b>Serial Number:</b>	0313605
<b>Cable Length And Type:</b>	N/A (Air Link)
<b>Connected to Port:</b>	Antenna

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**3. Test Results For Specific Absorption Rate - 1900 MHz****3.1. Specific Absorption Rate - 1900 MHz Band****Environmental Conditions:**

Temperature Variation in Lab (°C):	21.5 to 22.0
Temperature Variation in Liquid (°C):	20.3 to 20.4

**Results:**

Position	Side of Head	Frequency Channel No	Distance from antenna to phantom (mm)	SAR Level (W/kg) 1g	SAR Limit (W/kg) 1g	Margin (W/kg) 1g	Result
Cheek	Left	660	10	0.366	1.6	1.234	Complied
Tilted	Left	660	8	0.452	1.6	1.148	Complied
Cheek	Right	660	10	0.400	1.6	1.200	Complied
Tilted	Right	660	8	0.507	1.6	1.093	Complied
Tilted	Right	512	8	0.426	1.6	1.174	Complied
Tilted	Right	810	8	0.633	1.6	0.967	Complied

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## **4. Validation results – 1900 MHz HEAD**

### **4.1. System Validation**

4.1.1. Validation of the system test configuration was carried out prior to testing.

Validation Dipole Type and Serial No.	Calibrated Value of SAR in 1g volume (W/kg) at 1900 MHz	Measured Value of SAR in 1g volume (W/kg) at 1900 MHz	Percentage Difference (<6%)
D1900V2/540	42.4	41.6	Yes

### **4.2. Liquid Properties - Brain**

4.2.1. Properties of the tissue simulating liquid were measured prior to testing.

Property	Target Value (1900 MHz)	Measured/Calculated Value (1900 MHz)	Percentage Difference (<5.0%)
Relative Permittivity	40.0	38.57	Yes
Conductivity	1.4	1.47	Yes

### **4.3. Temperature Variation**

4.3.1. The temperature of the laboratory and within the tissue simulating liquid for this test shall not exceed the range +15°C to +25°C.

4.3.2. The actual temperature measured at the beginning and end of each test was recorded and the maximum range is shown below:

Measurement	Maximum Temperature	Minimum Temperature
Laboratory	22.0	21.5
Tissue Simulating Liquid	20.4	20.3

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**Appendix 1. Conducted Power Measurement****Conducted Output Power.**

Before and after testing, the EUT was mounted in a test jig. The conducted output power was then measured.

The conducted power output of the EUT is as follow: -

Frequency Channel	Tx Power Before test	Tx Power After test
660	28.25	28.24
512	28.48	28.45
810	28.97	28.97

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**Appendix 2. Test Equipment Used**

Instrument	Manufacturer	Model Number	RFI No.
Dielectric Probe Kit	Agilent Technologies	85070C	A1174
Probe	Schmid & Partners	ET3 DV6	A1186
Low noise Amplifier	Mini Circuits	ZHL-42	A1225
1900MHz Validation Dipole	Schmid & Partners	D1900V2	A1237
SAM Phantom	Schmid & Partners	001	A1238
20 dB Attenuator	Narda	766-20	A215
Cable	RFI	None	C055
Cable	Utiflex	FA210A0030M3030	C1052
Cable	Utiflex	FA210A0003M3030	C1053
Cable	Utiflex	FA210A0001M3050A	C1054
Signal Generator	Gigatronics	7100/.01-20	G046
Robot Power Supply	Schmid & Partner	Dasy3	G0528
PSU	Thurlby Thandar	CPX200	G088
Wavetek	Willtek	4201S	L0672
RF Power Meter	Rohde & Schwarz	URY	M037
URY Power Meter	Rohde & Schwarz	URY	M094
Network Analyser	Agilent Technologies	8753ES	M1015
Robot Arm	Staubli	RX908 L	M1047
Diode Power Sensor	Rohde & Schwarz	NRV-Z2	M1069
Will tek	Will tek	4202S	M1093
Baro/Hygro/Thermo meter	Oregon Scientific	BA888	M292
Thermometer	Testo	110	M509
Site	RFI	N/A	S256

**NB** In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

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### **Appendix 3. SAR Distribution Scans**

This appendix contains the SAR Distribution Scans.

**These scans are not included in the total number of pages for this report.**

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# Dipole 1900 MHz

## Validation

SAM Phantom; Flat

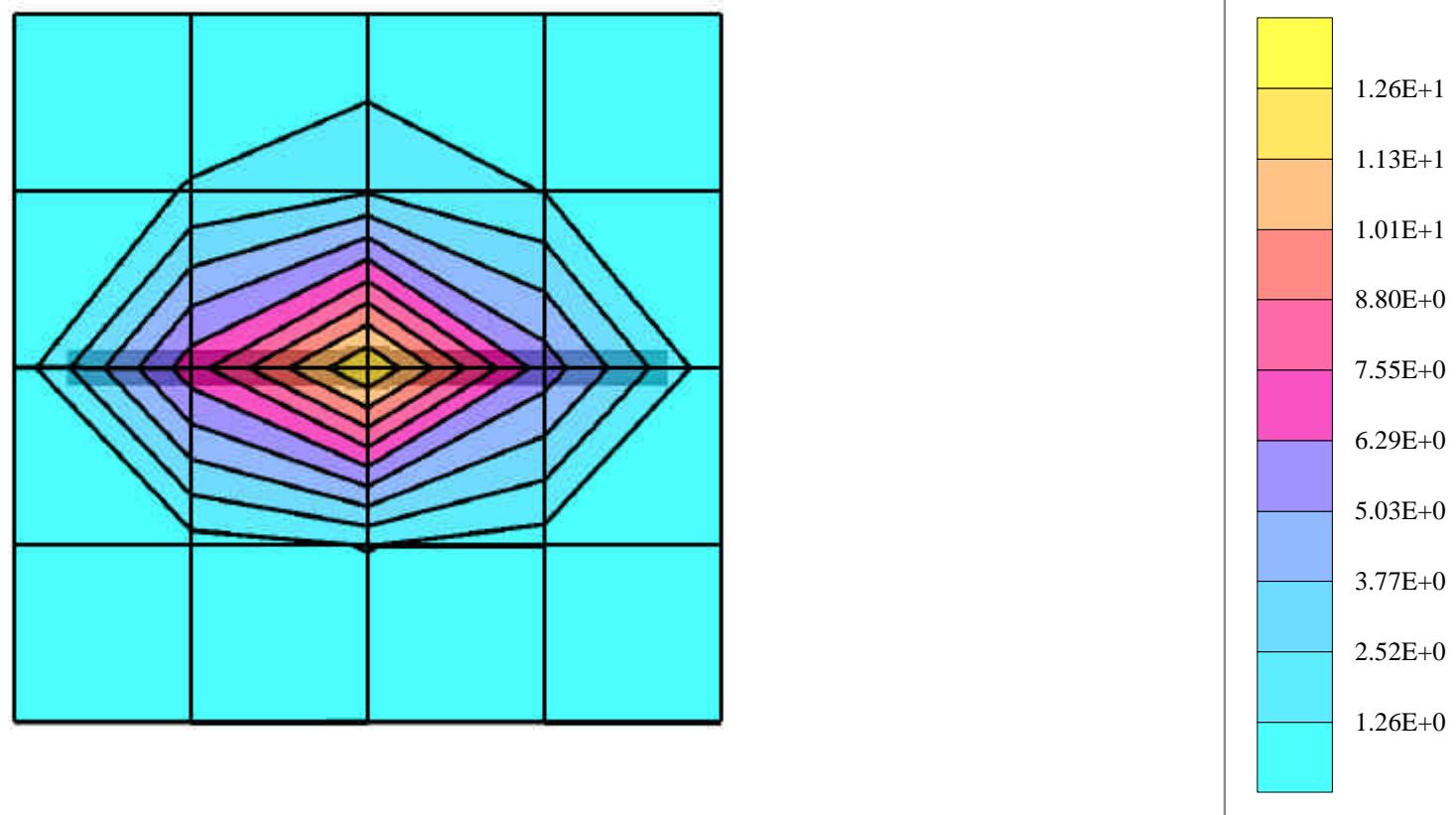
Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

Crest factor: 1.0; Brain 1900MHz:  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

03/19/03

$\text{SAR}_{\text{Tot}}$  [mW/g]



# Dipole 1900 MHz

## Validation

SAM Phantom; Flat

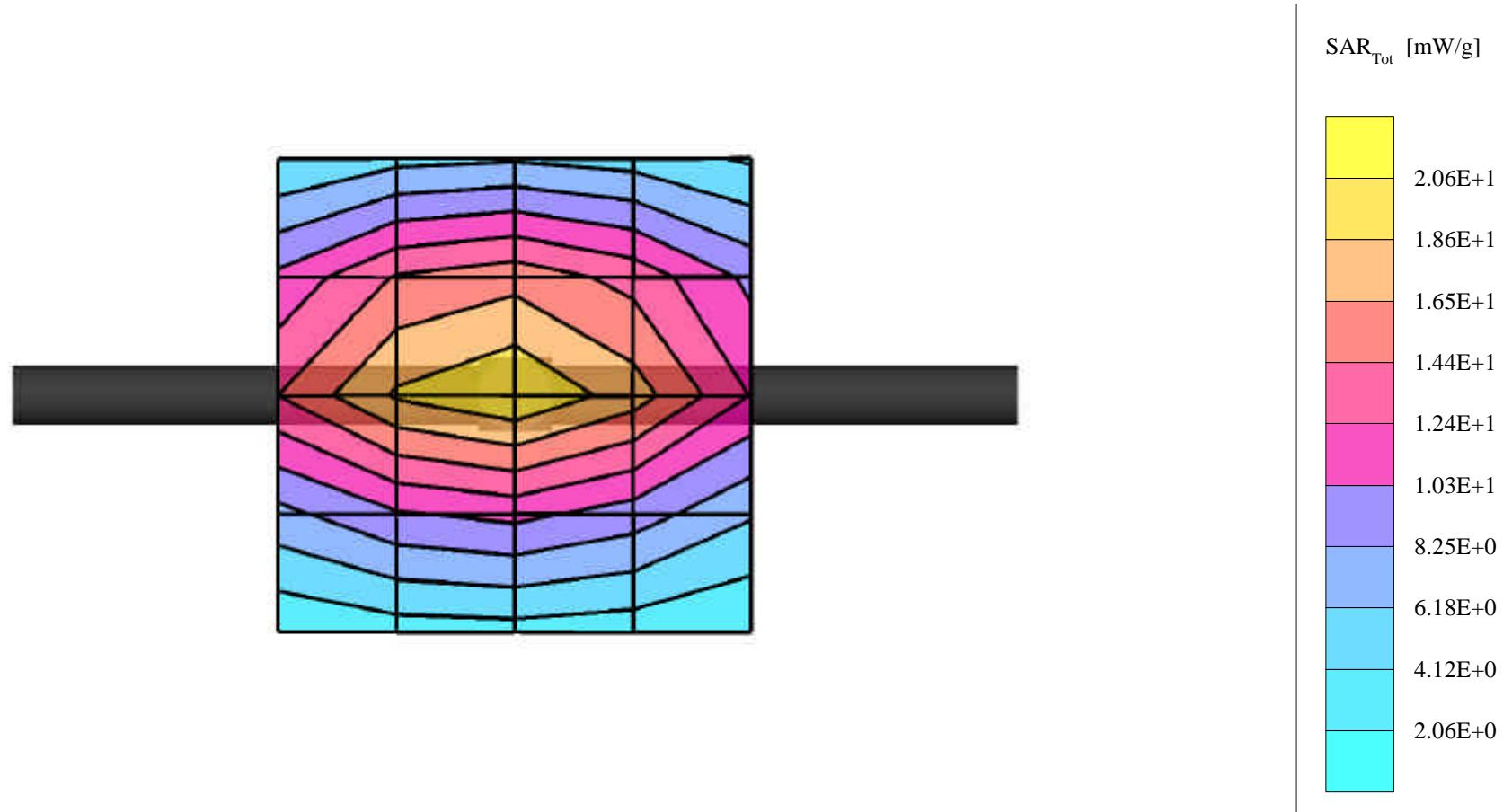
Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

Crest factor: 1.0; Brain 1900MHz:  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Peak: 20.8 mW/g  $\pm 0.01 \text{ dB}$ , SAR (1g): 10.4 mW/g  $\pm 0.03 \text{ dB}$

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

03/19/03



Z100

Cheek Left Centre Channel (660)

SAM Phantom; Left Hand

Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

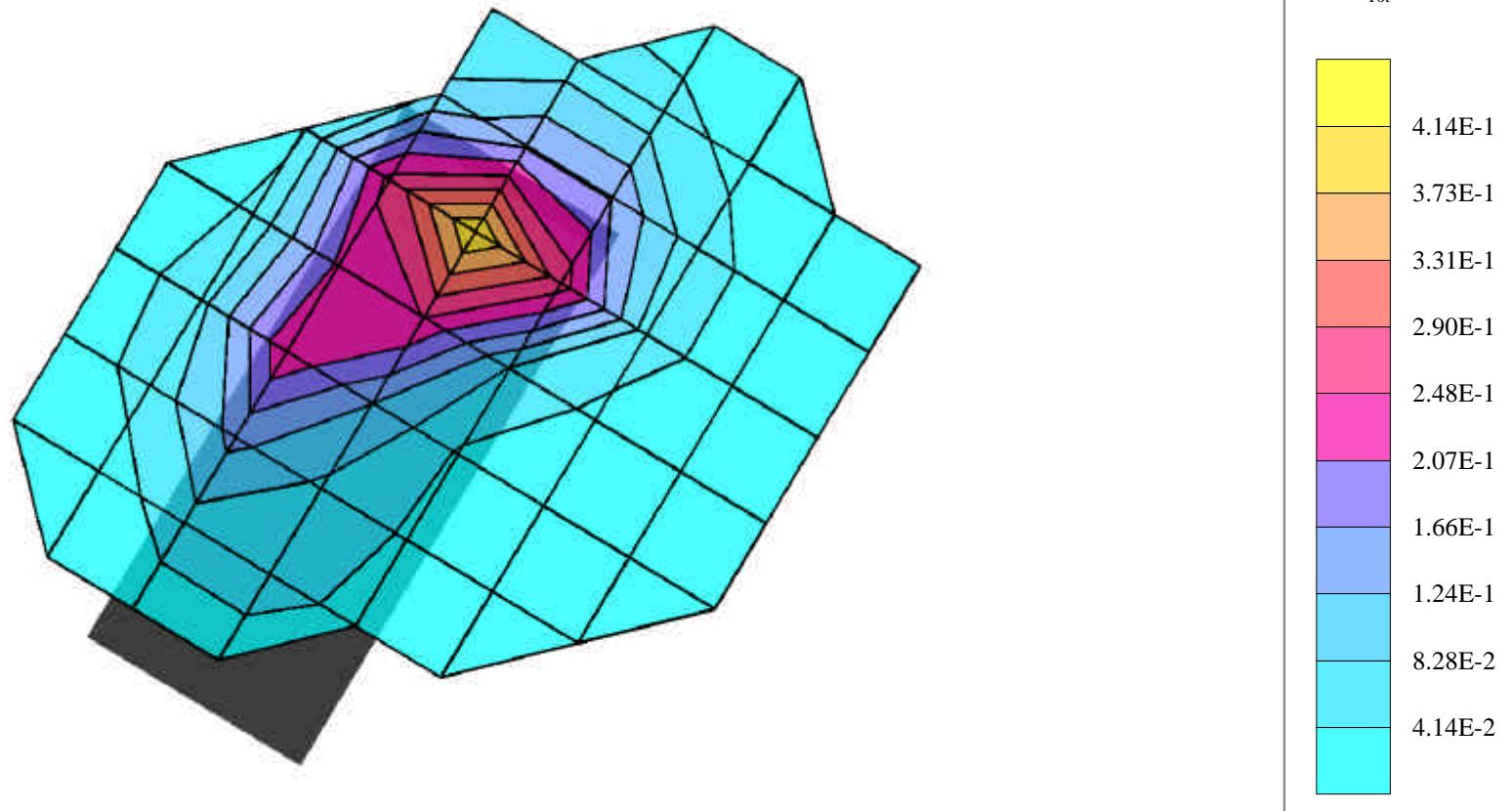
Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

SAR Drift 0.69%

03/19/03

SAR<sub>Tot</sub> [mW/g]



# Z100

Cheek Left Centre Channel (660)

SAM Phantom; Left Hand

Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

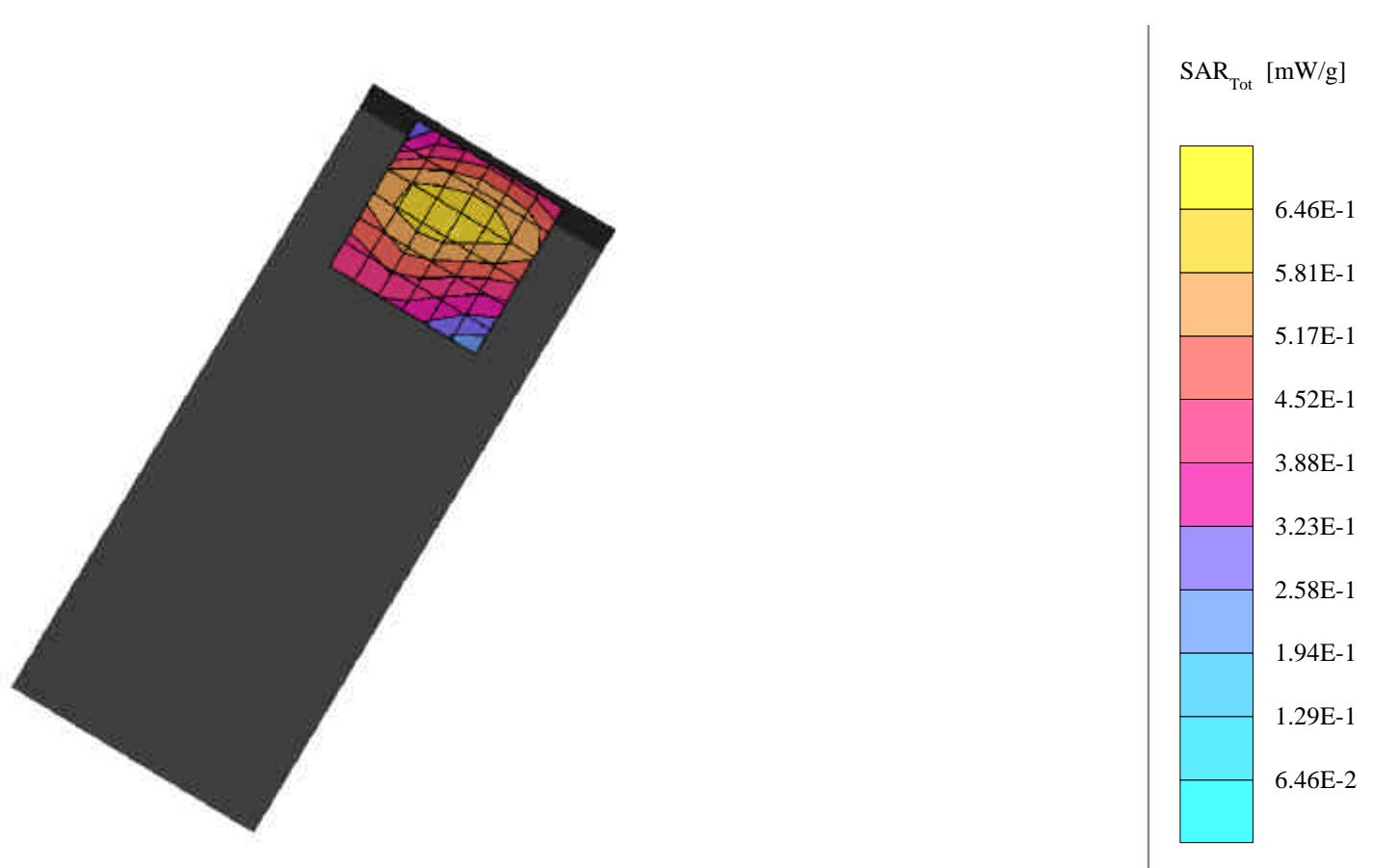
Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Peak: 0.647 mW/g, SAR (1g): 0.366 mW/g

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

SAR Drift 0.69%

03/19/03



Z100

Tilted Left Centre Channel (660)

SAM Phantom; Left Hand

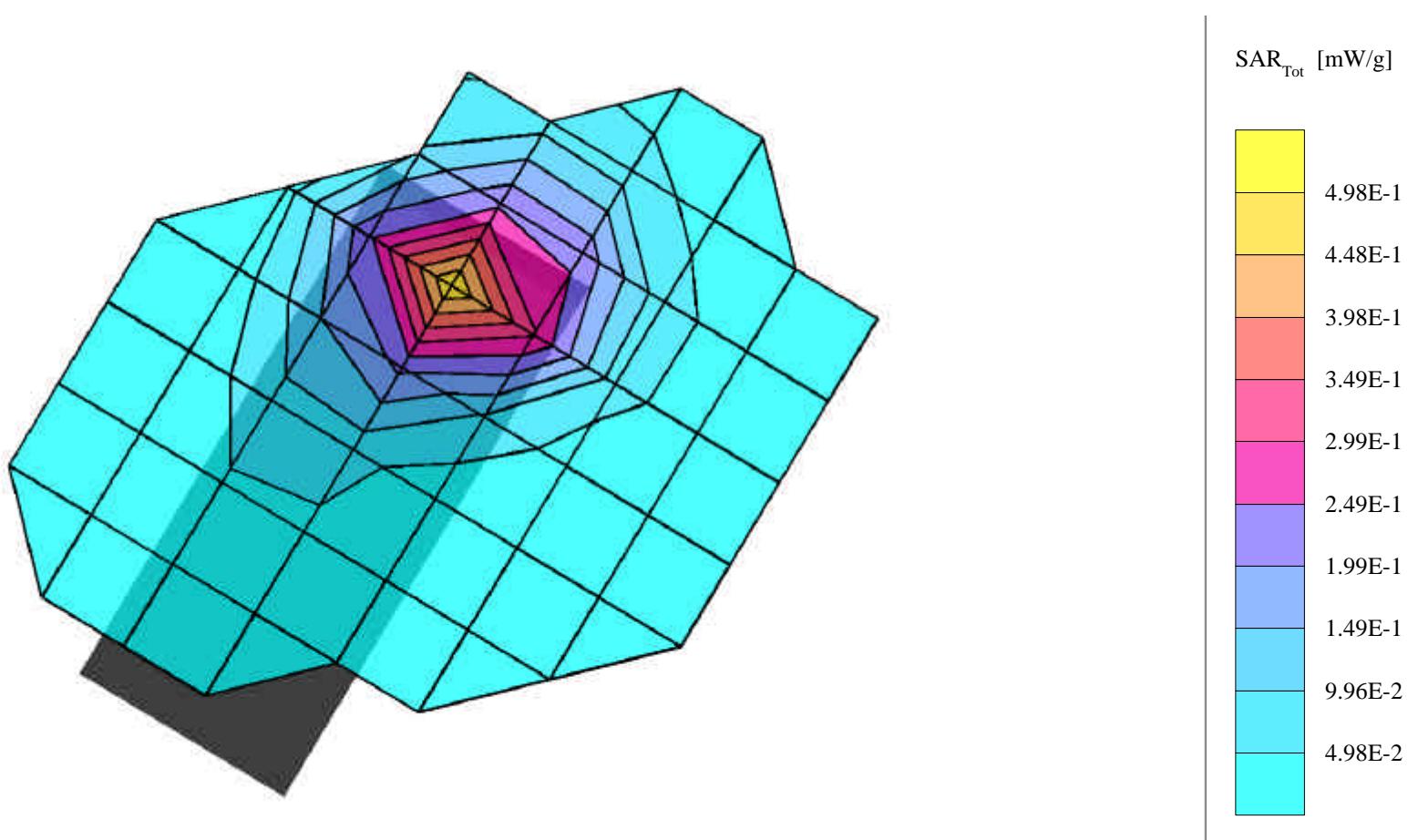
Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

SAR Drift 0.28%

03/19/03



# Z100

Tilted Left Centre Channel (660)

SAM Phantom; Left Hand

Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

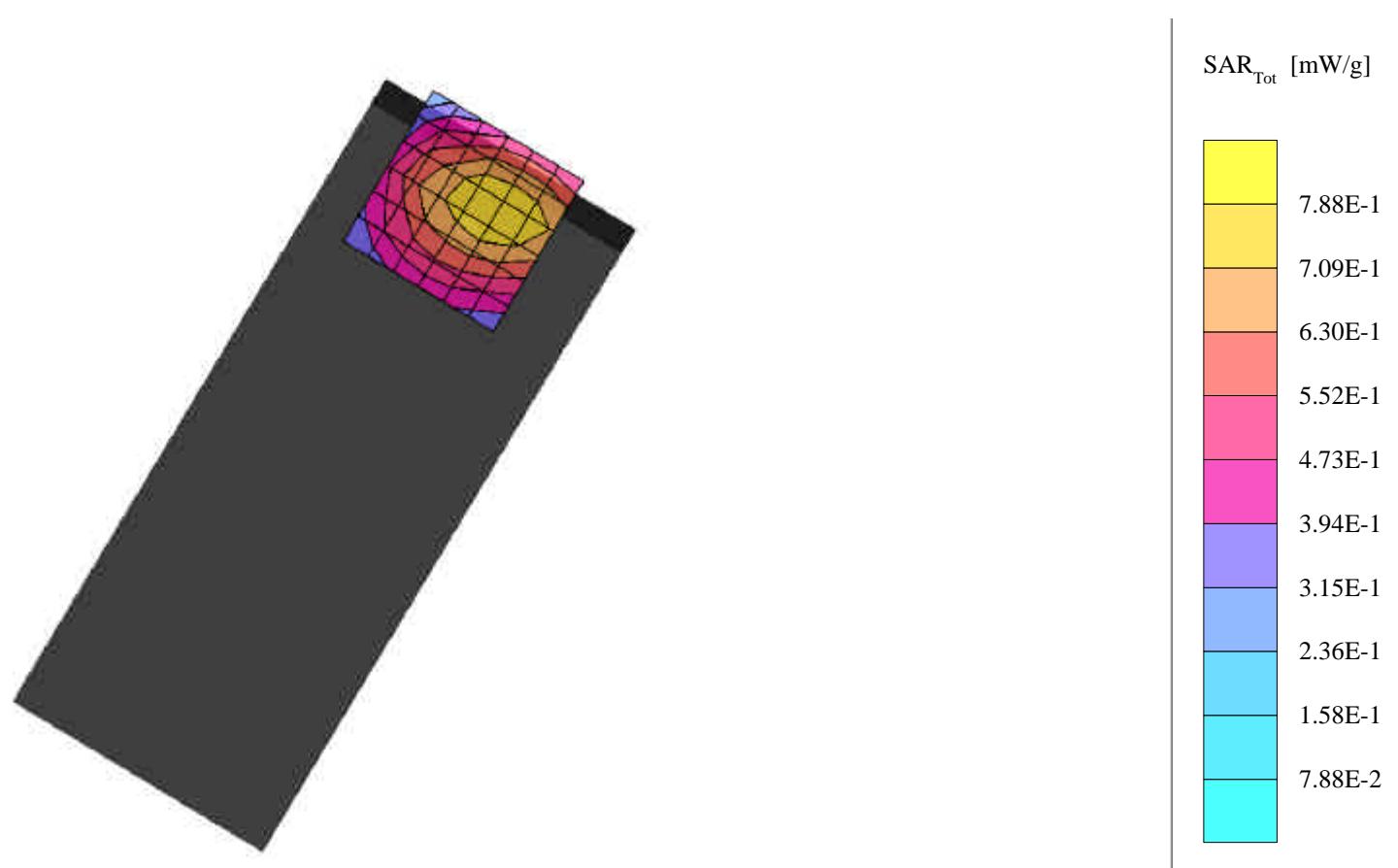
Crest factor: 8.0; Brain 1900MHz;  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Peak: 0.803 mW/g, SAR (1g): 0.452 mW/g

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

SAR Drift 0.28%

03/19/03



Z100

Cheek Right Centre Channel (660)

SAM Phantom; Righ Hand

Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

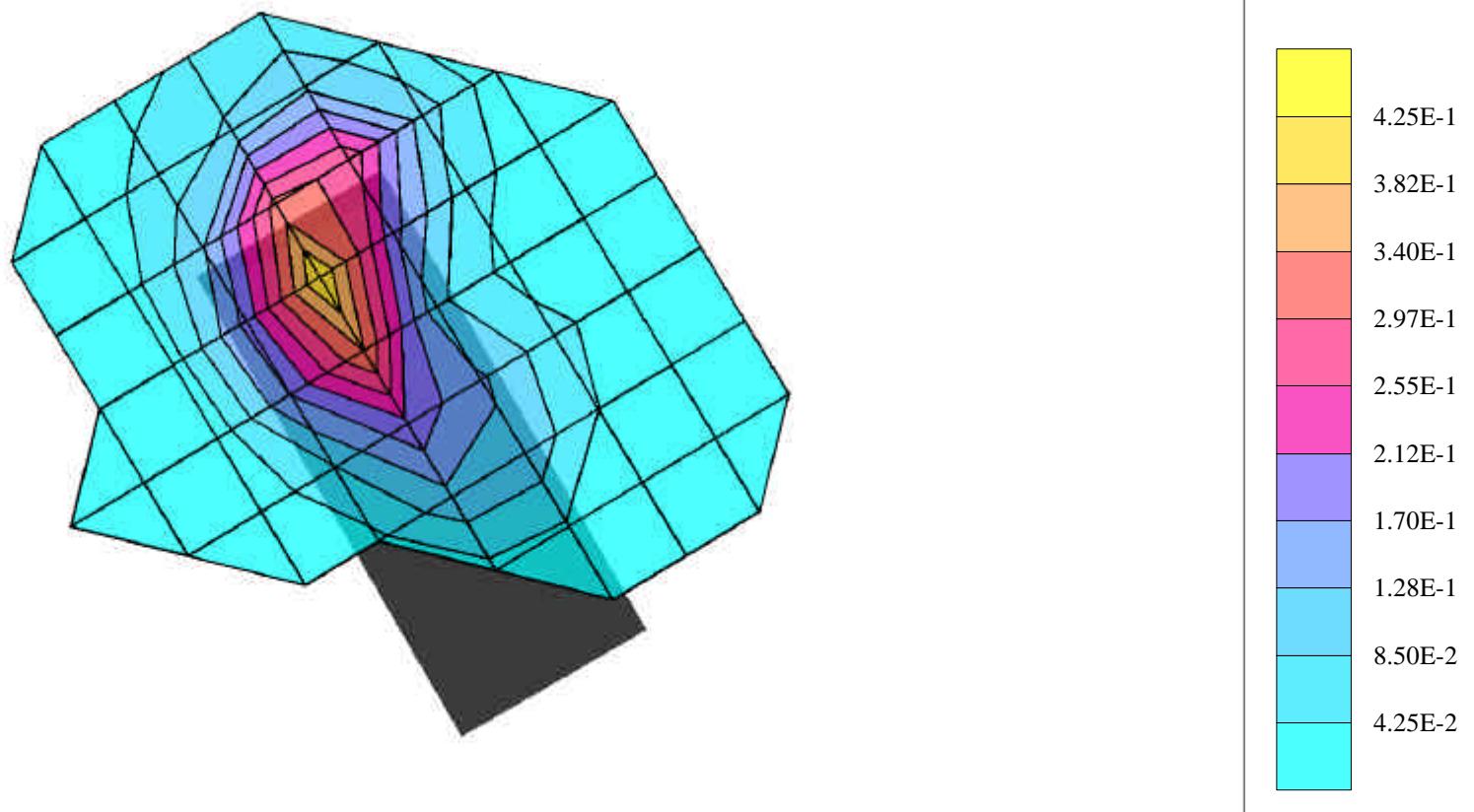
Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

SAR Drift 4.58%

03/19/03

SAR<sub>Tot</sub> [mW/g]



# Z100

Cheek Right Centre Channel (660)

SAM Phantom; Righ Hand

Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

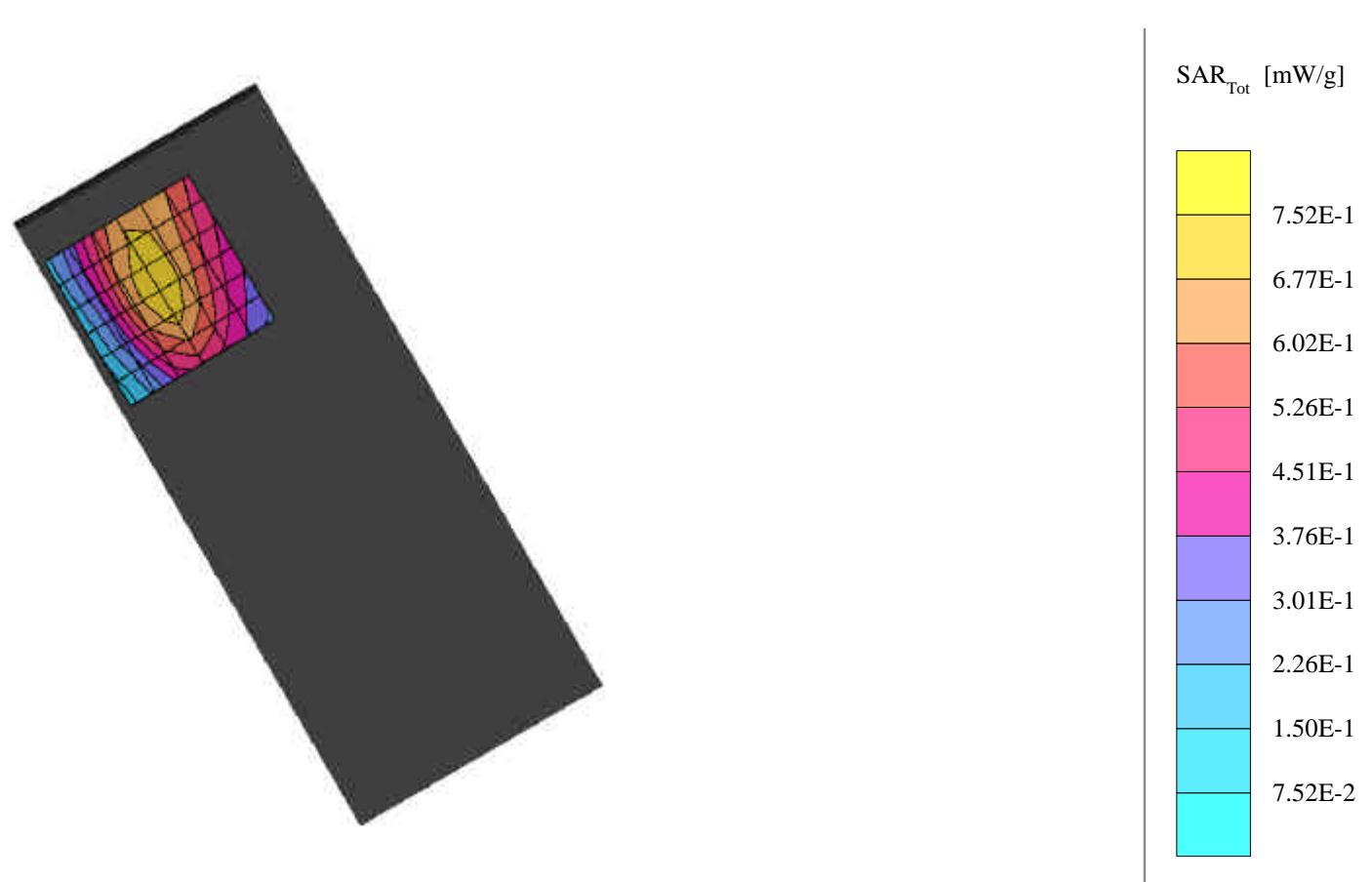
Crest factor: 8.0; Brain 1900MHz;  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Peak: 0.753 mW/g, SAR (1g): 0.400 mW/g

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

SAR Drift 4.58%

03/19/03



Z100

Tilted Right Centre Channel (660)

SAM Phantom; Righ Hand

Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

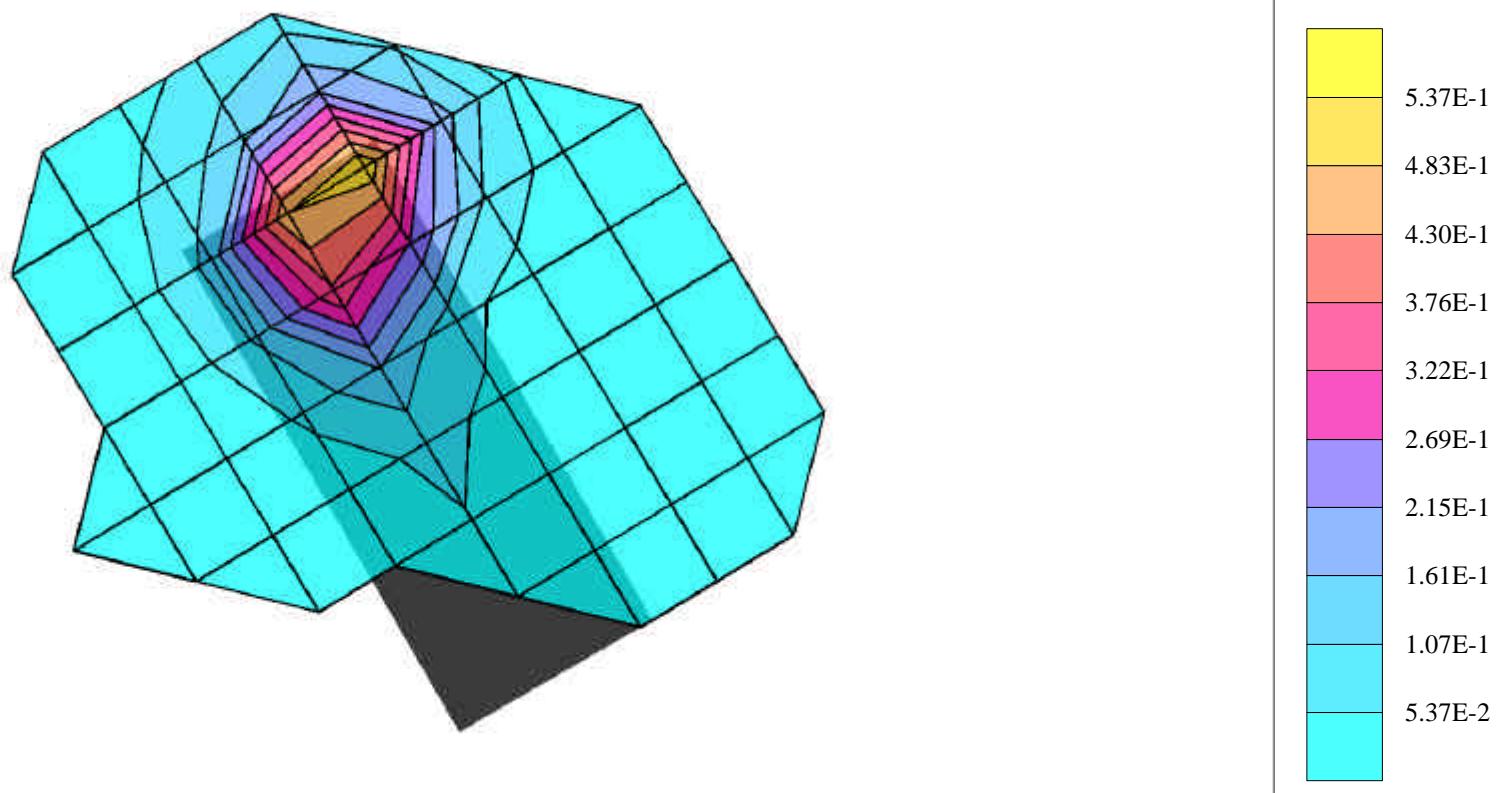
Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

SAR Drift 5.00%

03/19/03

SAR<sub>Tot</sub> [mW/g]



# Z100

Tilted Right Centre Channel (660)

SAM Phantom; Righ Hand

Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

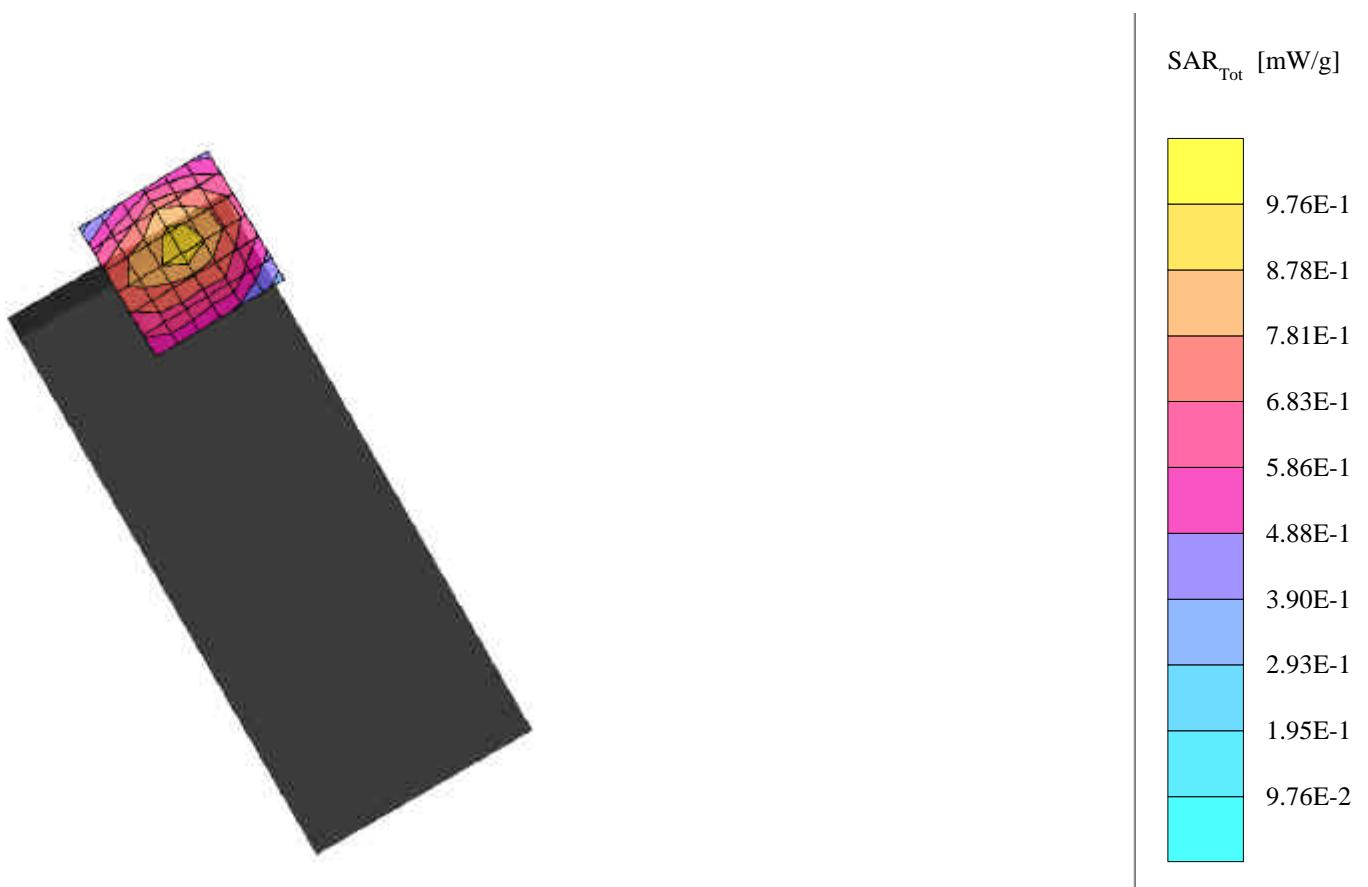
Crest factor: 8.0; Brain 1900MHz;  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Peak: 0.981 mW/g, SAR (1g): 0.507 mW/g

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

SAR Drift 5.00%

03/19/03



Z100

Tilted Right Bottom Channel (512)

SAM Phantom; Righ Hand

Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

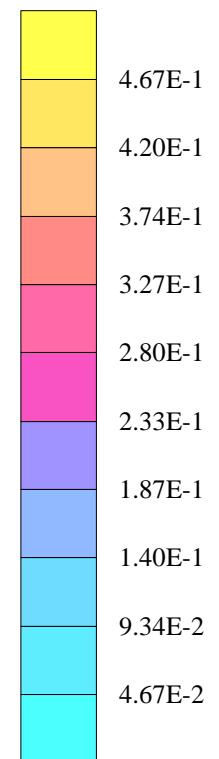
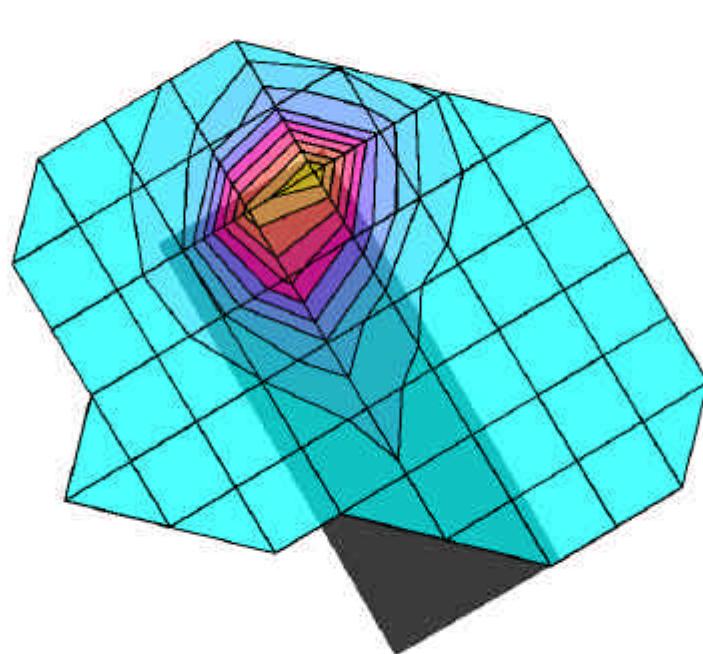
Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

SAR Drift 4.83%

03/19/03

SAR<sub>Tot</sub> [mW/g]



# Z100

Tilted Right Bottom Channel (512)

SAM Phantom; Righ Hand

Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

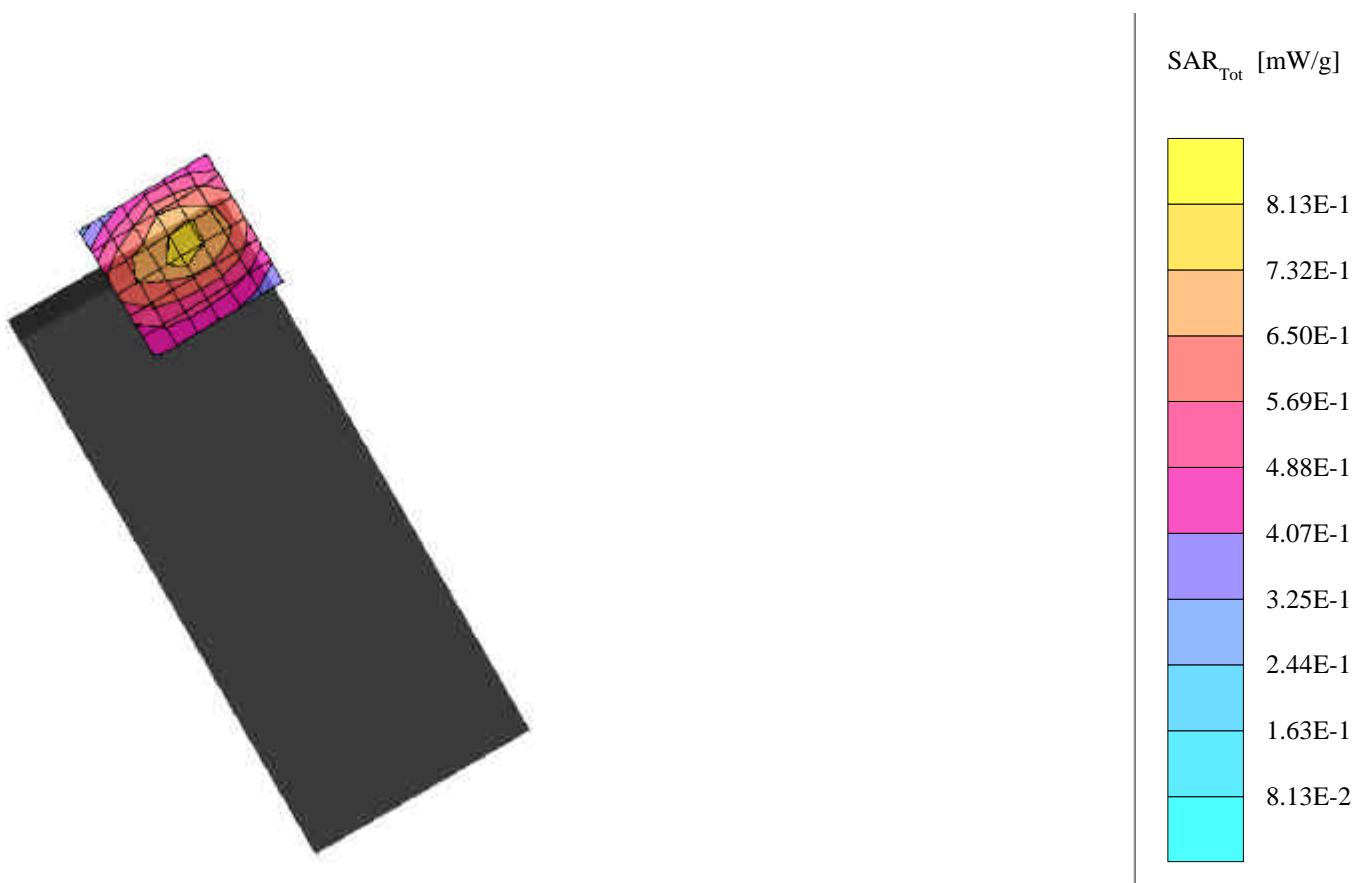
Crest factor: 8.0; Brain 1900MHz;  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Peak: 0.816 mW/g, SAR (1g): 0.426 mW/g

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

SAR Drift 4.83%

03/19/03



Z100

Tilted Right Top Channel (810)

SAM Phantom; Righ Hand

Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

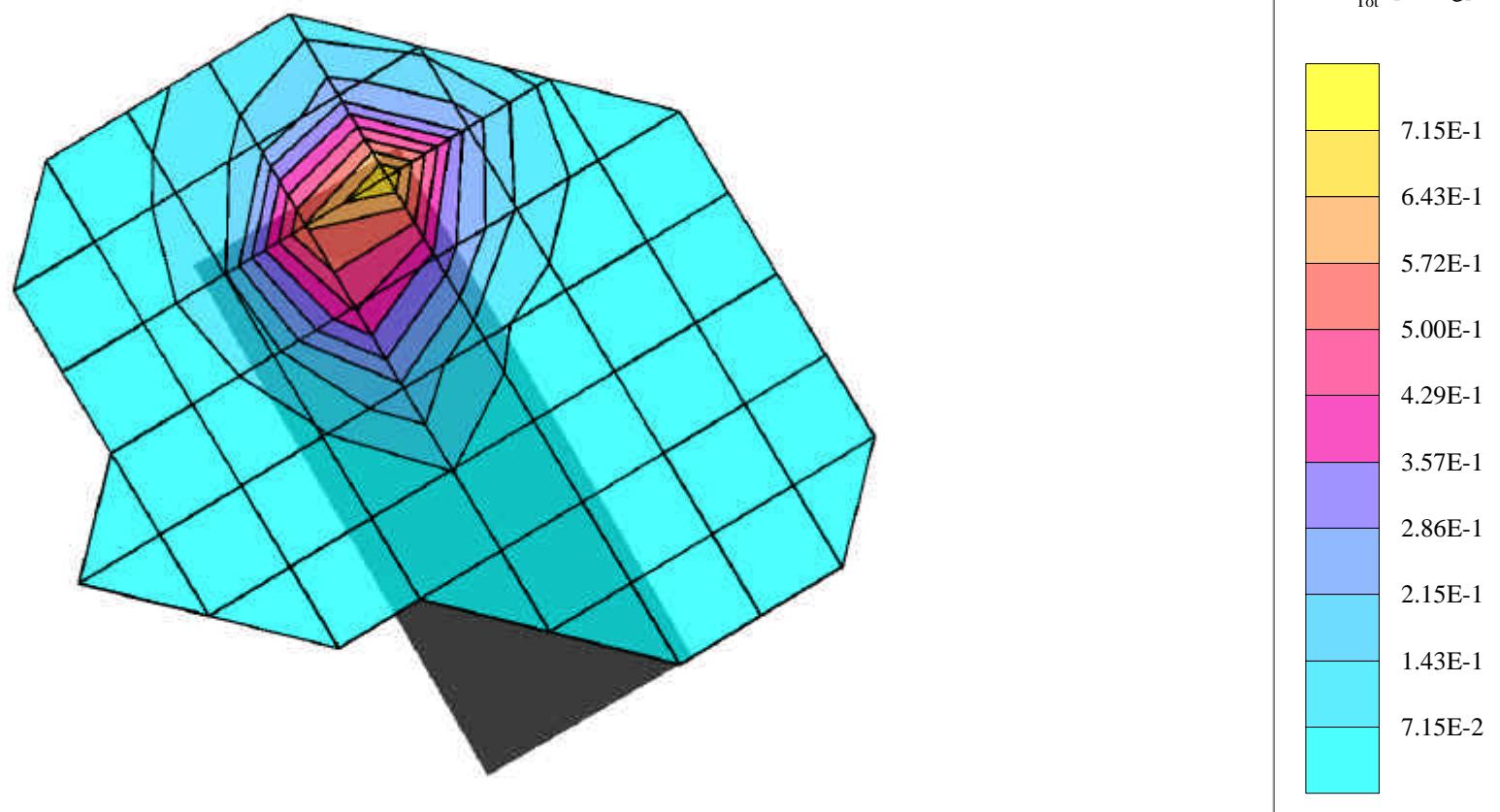
Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

SAR Drift 3.04%

03/19/03

SAR<sub>Tot</sub> [mW/g]



Z100

Tilted Right Top Channel (810)

SAM Phantom; Righ Hand

Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.47 \text{ mho/m}$   $\epsilon_r = 38.6$   $\rho = 1.00 \text{ g/cm}^3$

Peak: 1.21 mW/g, SAR (1g): 0.633 mW/g

Lab Temperature 22.0 deg C, Fluid Temperature 20.4 deg C

SAR Drift 3.04%

03/19/03

