

# TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test Of: Danger Inc.  
Hiptop Mobile Telephone Handset with Personal Hands Free Kit

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

**Test Report Serial No:**  
RFI/SARB1/RP43528A

This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director:  	Checked By:  
Tested By:  	Release Version No: PDF01
Issue Date: 09 August 2002	Test Dates: 17 June 2002

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

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**RADIO FREQUENCY INVESTIGATION LTD.**

**EMC Department**

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## 1. Client Information

### 1.1. Client Details

<b>Company Name:</b>	Danger Inc
<b>Address:</b>	124 University Avenue Palo Alto Ca 94301 USA
<b>Contact Name:</b>	Mr M Walgren

### 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

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## **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>	T Mobile
<b>Model Name or Number</b>	Hiptop
<b>Unique Type Identification</b>	0227004
<b>IMEI Number</b>	001028000012440
<b>Battery Serial Number</b>	Not accessible to user
<b>Country Of Manufacture</b>	Taiwan
<b>Date Of Receipt</b>	17 June 2002

<b>Brand Name</b>	Personal Hands Free Kit
<b>Model Name or Number</b>	Sun Let
<b>Unique Type Identification</b>	YH 3688
<b>Country Of Manufacture</b>	None Stated by Client
<b>Date Of Receipt</b>	17 June 2002

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

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>	1900 MHz – 512, 660, 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 – 30dBm
<b>Measured Radiated Output Power (Max):</b>	Bottom Channel (512): 29.1 dBm Middle Channel (660): 28.5 dBm Top Channel (810): 29.2 dBm
<b>Battery Type(s):</b>	Internal (non-removable)
<b>Antenna Length and Type:</b>	Fixed Integral
<b>Number Of Antenna Positions</b>	1 (Fixed Antenna)
<b>Intended Operating Environment:</b>	Residential, Commercial, Light Industry
<b>Weight:</b>	Approx. 188 g
<b>Dimensions (without Antenna) mm:</b>	Approx. 120 x 70 x 30
<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>	4.2 V
<b>Port(s):</b>	Enclosure Personal Hands Free Connector

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## 2.4. Support Equipment

<b>Description:</b>	GSM Test set
<b>Brand Name:</b>	Hewlett Packard
<b>Model Name or Number:</b>	HP 8922M
<b>Serial Number:</b>	3639U01708
<b>FCC ID Number:</b>	Not applicable
<b>Cable Length And Type:</b>	Not applicable (Air Link)
<b>Connected to Port:</b>	Antenna

<b>Description:</b>	GSM Test set
<b>Brand Name:</b>	Hewlett Packard
<b>Model Name or Number:</b>	HP 83220E
<b>Serial Number:</b>	3741UO2579
<b>FCC ID Number:</b>	Not applicable
<b>Cable Length And Type:</b>	Not applicable (Air Link)
<b>Connected to Port:</b>	Antenna

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### **3. Test Specification, Methods And Procedures**

#### **3.1. Test Specification**

<b>Reference:</b>	OET Bulletin 65 Supplement C: (2001-01)
<b>Title:</b>	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields.
<b>Purpose of Test:</b>	To determine whether the equipment complied with the requirements of the specification.

#### **3.2. Methods And Procedures**

The methods and procedures used were as detailed in:

EN 50361: 2001

Title: Basic standard for the measurement of specific absorption rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz).

ANSI/IEEE C95.1: 1999

IEEE standard for safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz.

Federal Communications Commission, "Evaluating compliance with FCC Guidelines for human exposure to radio frequency electromagnetic fields", OET Bulletin 65 Supplement C, FCC, Washington, D.C, 20554, 1997.

Thomas Schmid, Oliver Egger and Neils Kuster, "Automated E-field scanning system for dosimetric assessments", IEEE Transaction on microwave theory and techniques, Vol. 44, pp. 105-113, January 1996.

Neils Kuster, Ralph Kastle and Thomas Schmid, "Dosimetric evaluation of mobile communications equipment with known precision", IEICE Transactions of communications, Vol. E80-B, No.5, pp. 645-652, May 1997.

#### **3.3. Definition Of Measurement Equipment**

The measurement equipment used complied with the requirements as detailed in OET Bulletin 65 Supplement C, Appendix D.

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#### **4. Deviations From The Test Specification**

Due to the EUT not having a direct connection it was not possible to measure the EUT conducted power.

The SAR at a reference point was measured before and after each test case. The SAR at the reference point did not change by more than 15% for any test case.

## **5. Operation Of The EUT During Testing**

The equipment under test is a standard production model.

### **5.1. Operating Modes**

The EUT was tested in the following operating configurations:

1) Operating Mode (including maximum device rating):

The EUT was tested in GSM Allocated Mode. The EUT was tested at full transmit power, at the maximum duty factor (1/8). In GPRS mode the EUT can only operate one transmit (uplink) timeslot, therefore the maximum EUT duty cycle is 1/8. As a result of this the EUT was tested in normal GSM mode only.

2) Operating Frequency Range (including maximum device rating):

The EUT was tested at the Centre, Top and Bottom channels (refer to Section 2.3, Transmitter/Receiver Frequency Range).

3) Operating Tolerances:

Not applicable.

4) Antenna Type and Operating Position(s):

The EUT has a fixed internal antenna.

5) Applicable Body-Worn Configuration:

The EUT was tested in a case for body worn configuration and with a personal hands free kit. The case is the item specified in the user manual.

6) Battery Options that could affect the results:

The EUT has an internal battery that is not removable by the user.

7) The EUT was exercised during the test with a HP8922/83220E GSM test set. The maximum radiated power from the EUT was measured as 28.5 dBm at the centre channel prior to the test. The GSM test set was then set to operate the EUT at power control level 0 (maximum power) at all times.

The EUT has no external antenna connection, therefore the maximum power was measured before the test and the SAR drift was recorded before and after each test case to check for any drift.

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## **6. Summary Of Test Results**

### **6.1. Summary Of Tests**

Test Name	Specification Reference	Compliancy Status
Specific Absorption Rate (SAR)	OET Bulletin 65 Supplement C	Complied

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**6.2. Test Results For Specific Absorption Rate - 1900 MHz****6.2.1. Specific Absorption Rate - 1900 MHz Band****Environmental Conditions**

Temperature Variation in Lab (°C):	22.0 to 22.5
Temperature Variation in Liquid (°C):	20.9 to 20.1

Conducted Power before Test:	Not applicable (Refer to section 4)
Conducted Power after Test:	Not applicable (Refer to section 4)

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	0.075	1.6	1.525	Complied
Tilted	Left	660	3	0.052	1.6	1.548	Complied
Cheek	Right	660	10	0.068	1.6	1.532	Complied
Tilted	Right	660	3	0.058	1.6	1.542	Complied
Cheek	Left	512	10	0.079	1.6	1.521	Complied
Cheek	Left	810	10	0.039	1.6	1.561	Complied

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**6.3. Test Results For Specific Absorption Rate - 1900 MHz****6.3.1. Specific Absorption Rate - 1900 MHz Band – Body Worn Position****Environmental Conditions**

Temperature Variation in Lab (°C):	22.0 to 22.5
Temperature Variation in Liquid (°C):	21.9 to 21.8

Conducted Power before Test:	Not applicable (Refer to section 4)
Conducted Power after Test:	Not applicable (Refer to section 4)

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
Standalone (MS with case)	Body	660	10	0.803	1.6	0.797	Complied
Standalone (MS with case and Handsfree)	Body	660	10	0.535	1.6	1.065	Complied

## **7. SAR Measurement System**

7.1. Radio Frequency Investigation SAR measurement facility utilises the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, and the SAM phantom containing brain or muscle equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card. The DAE3 utilises a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

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## **8. SAR Safety Limits**

<b>Exposure Limits</b> (General populations/Uncontrolled Exposure Environment)	<b>SAR</b> (W/Kg)
Spatial Peak (averaged over any 1 g of tissue)	1.60

**Notes:**

1. The FCC SAR safety limits specified in the table above apply to devices operated in the General Population / Uncontrolled Exposure Environment.
2. Uncontrolled environments are defined as locations where there is exposure of individuals who have no knowledge or control of their exposure.

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## **9. Details of SAR Evaluation**

9.1. The equipment under test was found to be compliant for localised specific absorption rate (SAR) based on the following provisions and conditions:

- a) The handset was placed in a normal operating position with the centre of the ear-piece aligned with the ear canal on the phantom.
- b) With the ear-piece touching the phantom the centre line of the handset was aligned with an imaginary plane (X and Y axis) consisting of three lines connecting both ears and the mouth.
- c) For the cheek position the handset was gradually moved towards the cheek until any point of the mouth-piece or keypad touched the cheek.
- d) For the tilted position the EUT was positioned as for the cheek position, then the horizontal angle was increased by fifteen degrees (the phone keypad was moved away from the cheek by fifteen degrees).
- e) The EUT was tested in a body-worn configuration with the handset placed in the belt holster which was placed on the device holder with the back of the phone facing parallel to, and the belt-clip touching, the outer surface of the phantom flat section. The belt holster provided a spacing between the back of the phone and the outer surface of the phantom flat section.
- f) SAR measurements were evaluated at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimise the drift.
- g) The device was keyed to operate continuously in the transmit mode for the duration of the test.
- h) The location of the maximum spatial SAR distribution (Hot Spot) was determined relative to the handset and its antenna.
- i) The EUT was tested with a fully charged battery.

## **10. Evaluation Procedures**

10.1. The Specific Absorption Rate (SAR) evaluation was performed in the following manner:

- a) (i) The evaluation was performed in an applicable area of the phantom depending on the type of device being tested. For devices worn about the ear during normal operation, both the left and right ear positions were evaluated at the centre frequency of the band at maximum power. The side, which produced the greatest SAR, determined which side of the phantom would be used for the entire evaluation. The positioning of the head worn device relative to the phantom was dictated by FCC OET bulletin 65 Supplement C.  
(ii) For body worn devices or devices which can be operated within 20 cm of the body, the flat section of the phantom was used. The type of device being evaluated dictated the distance of the EUT to the outer surface of the phantom flat section.
- b) The SAR was determined by a pre-defined procedure within the DASY3 software. The exposed region of the phantom was scanned near the inner surface with a grid spacing of 20mm x 20mm.
- c) A 7x7x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.
- d) If the EUT had any appreciable drift over the course of the evaluation, then the EUT was re-evaluated. Any unusual anomalies over the course of the test also warranted a re-evaluation.

## **11. System Validation**

11.1. Prior to the assessment, the system was verified in the flat region of the phantom. A 1900 MHz dipole was used. A forward power of 250 mW was applied to the dipole and system was verified to a tolerance of  $\pm 5$  for the 1900 MHz dipole. The applicable verification (normalised to 1 Watt) is as follows:

<b>Dipole Validation Kit</b>	<b>Target SAR 1g (w/kg)</b>	<b>Measured SAR 1g (w/kg)</b>
D1900V2	42.4	43.6

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## **12. Simulated Tissues**

12.1. The brain and muscle mixtures consist of water and glycol. Visual inspection is made to ensure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the tissue.

Ingredient	Frequency	
	1900 MHz Brain	1900 MHz Muscle
Water	10.96 Litres	14.01 Litres
D.G.B.E. (Glycol)	8.97 Litres	6.0 Litres
Salt	0.064 grams	42 grams

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### **13. Tissue Parameters**

13.1. The dielectric parameters of the fluids were verified prior to the SAR evaluation using an 58070C Dielectric Probe Kit and an 8753E Network Analyser. The dielectric parameters of the fluid are as follows:

<b>Frequency (MHz)</b>	<b>Equivalent Tissue</b>	<b>Dielectric Constant <math>\epsilon_r</math></b>	<b>Conductivity <math>\sigma</math> (mho/m)</b>
1850-1910	Brain	38.87 $\pm$ 10%	1.5 $\pm$ 10%
1850-1910	Muscle	53.68 $\pm$ 10%	1.55 $\pm$ 10%

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## **14. DASY3 Systems Specifications**

### **Robot System**

<b>Positioner:</b>	Stäubli Unimation Corp. Robot Model: RX90L
<b>Repeatability:</b>	0.025 mm
<b>No. of axis:</b>	6
<b>Serial Number:</b>	F00/SD89A1/A/01
<b>Reach:</b>	1185 mm
<b>Payload:</b>	3.5 kg
<b>Control Unit:</b>	CS7
<b>Programming Language:</b>	V+

### **Data Acquisition Electronic (DAE) System**

#### **Cell Controller**

<b>PC:</b>	Dell Optiplex GX110
<b>Operating System:</b>	Windows NT
<b>Data Card:</b>	DASY3 PC-Board
<b>Serial Number:</b>	220

#### **Data Converter**

<b>Features:</b>	Signal Amplifier, multiplexer, A/D converter and control logic.
<b>Software:</b>	DASY3 Software
<b>Connecting Lines:</b>	Optical downlink for data and status info. Optical uplink for commands and clock.

### **PC Interface Card**

<b>Function:</b>	24 bit (64 MHz) DSP for real time processing Link to DAE3 16 bit A/D converter for surface detection system serial link to robot direct emergency stop output for robot.
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### **E-Field Probe**

<b>Model:</b>	ET3DV6
<b>Serial No:</b>	1529
<b>Construction:</b>	Triangular core fibre optic detection system
<b>Frequency:</b>	10 MHz to 3 GHz
<b>Linearity:</b>	$\pm 0.2$ dB (30 MHz to 3 GHz)
<b>Probe Length (mm):</b>	337
<b>Probe Diameter (mm):</b>	12
<b>Tip Length (mm):</b>	10
<b>Tip Diameter (mm):</b>	6.8
<b>Sensor X Offset (mm):</b>	2.7
<b>Sensor Y Offset (mm):</b>	2.7
<b>Sensor Z Offset (mm):</b>	2.7

### **Phantom**

<b>Phantom:</b>	SAM Phantom
<b>Shell Material:</b>	Fibreglass
<b>Thickness:</b>	2.0 $\pm 0.1$ mm

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## **15. Validation results – 1900 MHz**

### **15.1. System Validation**

15.1.1. 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	43.6	Yes

### **15.2. Liquid Properties - Brain**

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

Property	Target Value (1900 MHz)	Measured/Calculated Value (1900 MHz)	Percentage Difference (<10%)
Relative Permittivity	40.0	38.87	Yes
Conductivity	1.4	1.5	Yes

### **15.3. Liquid Properties - Body**

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

Property	Target Value (1900 MHz)	Measured/Calculated Value (1900 MHz)	Percentage Difference (<10%)
Relative Permittivity	53.3	53.68	Yes
Conductivity	1.52	1.55	Yes

### **15.4. Temperature Variation**

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

15.4.2. 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	22.5
Tissue Simulating Liquid	20.9	20.1

## **16. Measurement Uncertainty**

16.1. No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

16.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

16.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

16.4. The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level	Calculated Uncertainty
Specific Absorption Rate	1900MHz	95%	± 18.02%

16.5. The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

16.6. Measurement uncertainties in SAR measurements are difficult to quantify due to several variables including biological, physiological, and environment. However, the estimated measurement uncertainties in SAR are less than 30%.

16.7. According to ANSI/IEEE C95.3, the overall uncertainties are difficult to assess and will vary with the type of meter and usage situation. However, accuracy's of ±1 to 3 dB can be expected in practice, with greater uncertainties in near-field situations and at higher frequencies (shorter wavelengths), or areas where large reflecting objects are present. Under optimum measurement conditions, SAR measurement uncertainties of at least ±2 dB can be expected.

16.8. According to CENELEC, typical worst-case uncertainty of field measurements is ±5 dB. For well-defined modulation characteristics the uncertainty can be reduced to ±3 dB.

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Specific Absorption Rate Uncertainty at 1900 MHz, GSM Modulation Scheme calculated in accordance with IEEE 1528-200X							
Type of Uncertainty	Source of uncertainty		Value ±%	Probability distribution	Divisor	C <sub>i</sub>	U <sub>i</sub> ( ) ±
B	Probe Calibration		9.5000	Normal	2.0000	1.0000	4.7500
B	Axial Isotropy		2.3000	Rectangular	1.7321	0.7000	0.9295
B	Hemispherical Isotropy		4.7000	Rectangular	1.7321	0.7000	1.8995
B	Spatial Resolution		0.5000	Rectangular	1.7321	1.0000	0.2887
B	Boundary Effect		0.7390	Rectangular	1.7321	1.0000	0.4267
B	Linearity		2.3300	Rectangular	1.7321	1.0000	1.3452
B	Detecton Limits		0.2000	Rectangular	1.7321	1.0000	0.1155
B	Readout Electronics		0.6500	Normal	2.0000	1.0000	0.3250
B	Response time		0.0000	Rectangular	1.7321	1.0000	0.0000
B	Integration Time		0.0040	Rectangular	1.7321	1.0000	0.0023
B	RF Ambient Conditions		3.0000	Rectangular	1.7321	1.0000	1.7321
B	Probe Positioner Mech. Restrictions		6.6700	Rectangular	1.7321	1.0000	3.8509
B	Probe Positioning with regard to Phantom Shell		2.8500	Rectangular	1.7321	1.0000	1.6454
B	Extrapolation and Integration/Max SAR Evaluation		5.0800	Rectangular	1.7321	1.0000	2.9329
A	Test Sample Positioning		0.5840	Normal	1.0000	1.0000	0.5840
A	Device Holder Uncertainty		0.1540	Rectangular	1.7321	1.0000	0.0889
B	Drift of output power		5.0000	Rectangular	1.7321	1.0000	2.8868
B	Phantom Uncertainty		4.0000	Rectangular	1.7321	1.0000	2.3094
B	Liquid conductivity (target value)		5.0000	Rectangular	1.7321	0.7000	2.0207
B	Liquid conductivity (measured value)		2.4400	Rectangular	1.7321	0.7000	0.9861
B	Liquid Permittivity (target value)		5.0000	Rectangular	1.7321	0.6000	1.7321
B	Liquid Permittivity (measured value)		2.4400	Rectangular	1.7321	0.6000	0.8452
	Combined standard uncertainty			normal			9.01
	Expanded uncertainty			normal k=2			18.02

Test Of: Danger Inc.

Hiptop Mobile Telephone Handset with Personal Hands Free Kit

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

**Appendix 1. Test Equipment Used**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A1174	Dielectric Probe Kit	Agilent Technologies	85070C	Us99360072
A1182	Handset Positioner	Schmid & Partners	V3.0	None
A1184	Data Acquisition Electronics	Schmid & Partners	DAE	394
A1186	Probe	Schmid & Partners	ET3 DV6	1529
A1225	Low noise Amplifier	Mini Circuits	ZHL-42	E022601
A1237	1900MHz Validation Dipole	Schmid & Partners	D1900V2	540
A1238	SAM Phantom	Schmid & Partners	001	001
A532	RHT & Barometer	RS Components	216-935	N/A
C1024	Rosenberger Cable	Rosenberger	FA210A-1-020m	FA00B 7565
C1052	Cable	Utiflex	FA210A0030 M3030	001
C1053	Cable	Utiflex	FA210A0003 M3030	001
C1054	Cable	Utiflex	FA210A0001 M3050A	001
G046	Signal Generator	Gigatronics	7100/01-20	749474
G0528	Robot Power Supply	Schmid & Partner	Dasy3	None
M037	RF Power Meter	Rohde & Schwarz	URY	891.259/053
M1047	Robot Arm	Staubli	RX908 L	F00/SD89A1/A/01
M1049	Power meter head	Rohde & Schwarz	URY Z2	891 647/80
M1069	Diode Power Sensor	Rohde & Schwarz	NRV-Z2	838824/010
S256	blank	RFI	N/A	N/A

Test Of:

Danger Inc.

Hiptop Mobile Telephone Handset with Personal Hands Free Kit

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## Appendix 2. Measurement Methods

Test Dates: 05 June 2002 to 19 June 2002

### FCC Part 24.232: Effective Isotropic Radiated Power (EIRP)

EIRP measurements were performed in accordance with the standard, against appropriate limits.

The EIRP was measured with the EUT arranged on a non-conducting table on an open area test site using an antenna height of 1.5 m and a measurement distance of 3 m

The level of the EIRP was maximised by rotating the non-conducting table.

Once the final amplitude (maximised) had been ascertained, the EIRP was measured using a substitution method whereby the EUT was replaced by a broadband horn antenna and a signal generator. The level of the signal generator is increased or decreased until the amplitude indicated on the measurement receiver matches that from the EUT. Once this has been achieved the final EIRP is calculated as being the signal generator output level minus the interconnecting cable loss plus the substitution antenna gain.

This procedure is repeated for all three channels of the EUT.

The test equipment settings for EIRP measurements were as follows:

Receiver Function	Final Measurements
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	1 MHz
Amplitude Range:	20 dB
Measurement Time:	> 1 s
Observation Time:	> 15 s
Sweep Time:	Coupled

**Carrier Output Power: Call Mode: (EIRP): Section 24.232**

Tests were performed to identify the maximum transmit power in accordance with FCC Part 24.232 for EIRP.

Results are shown for the EUT set to Bottom, Middle and Top channels using a fully charged battery. The battery nominally charged voltage is declared at 4.2 Volts:

**Results**

<b>Channel</b>	<b>Antenna Polarity (H/V)</b>	<b>Maximum Transmitter EIRP (dBm)</b>
Bottom (512)	Vert	29.1
Middle (660)	Vert	28.5
Top (810)	Vert	29.2

**RADIO FREQUENCY INVESTIGATION LTD.**

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

This appendix contains SAR Distribution Scans.

# Danger Hiptop

Cheek Left Centre Channel (660)

SAM Phantom; Left Hand

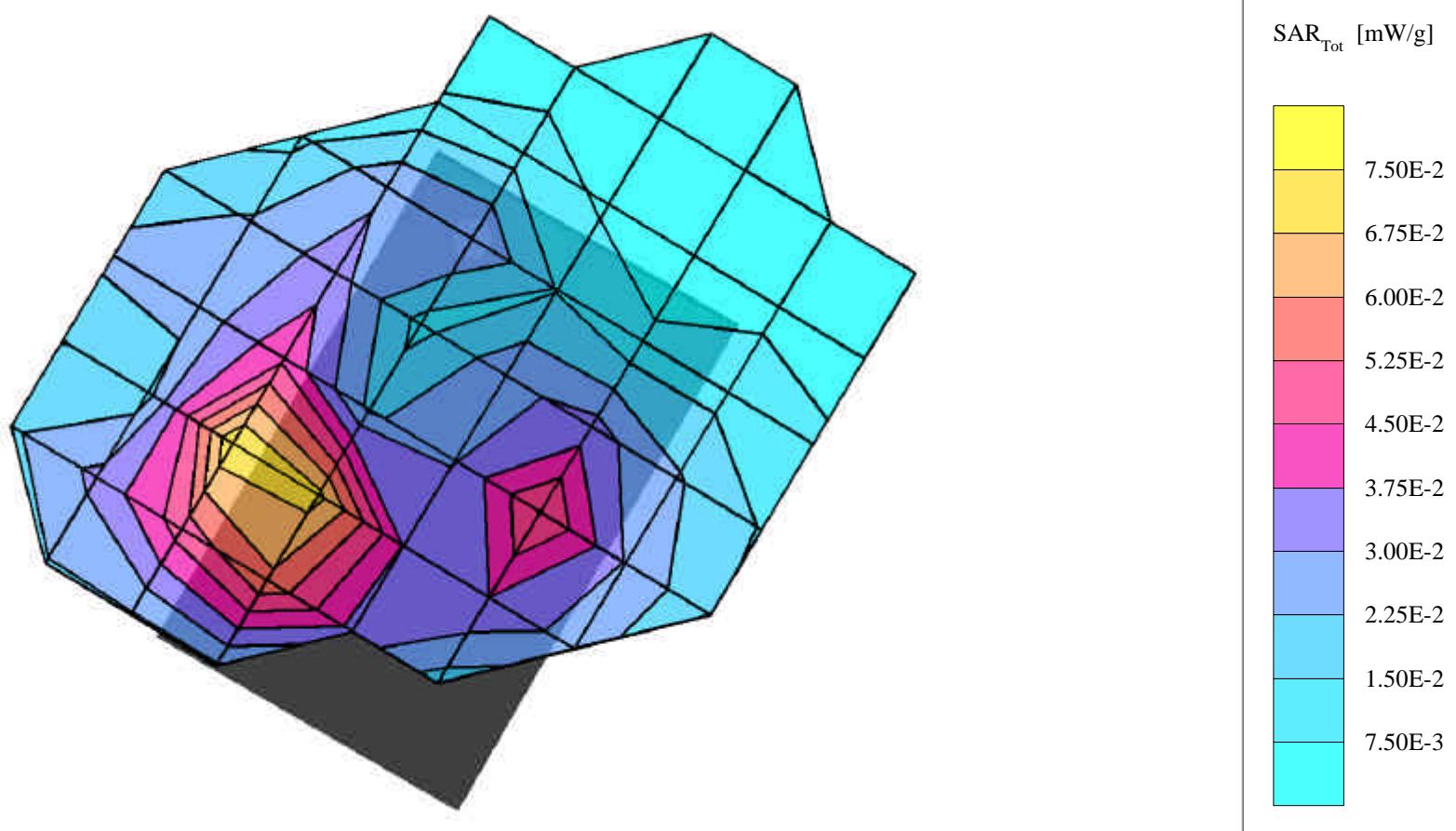
Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.50 \text{ mho/m}$   $\epsilon_r = 38.9$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.5 deg C, Fluid Temperature 20.9 deg C

SAR Drift 5.5%

06/18/02



# Danger Hiptop

Cheek Left Centre Channel (660)

SAM Phantom; Left Hand

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

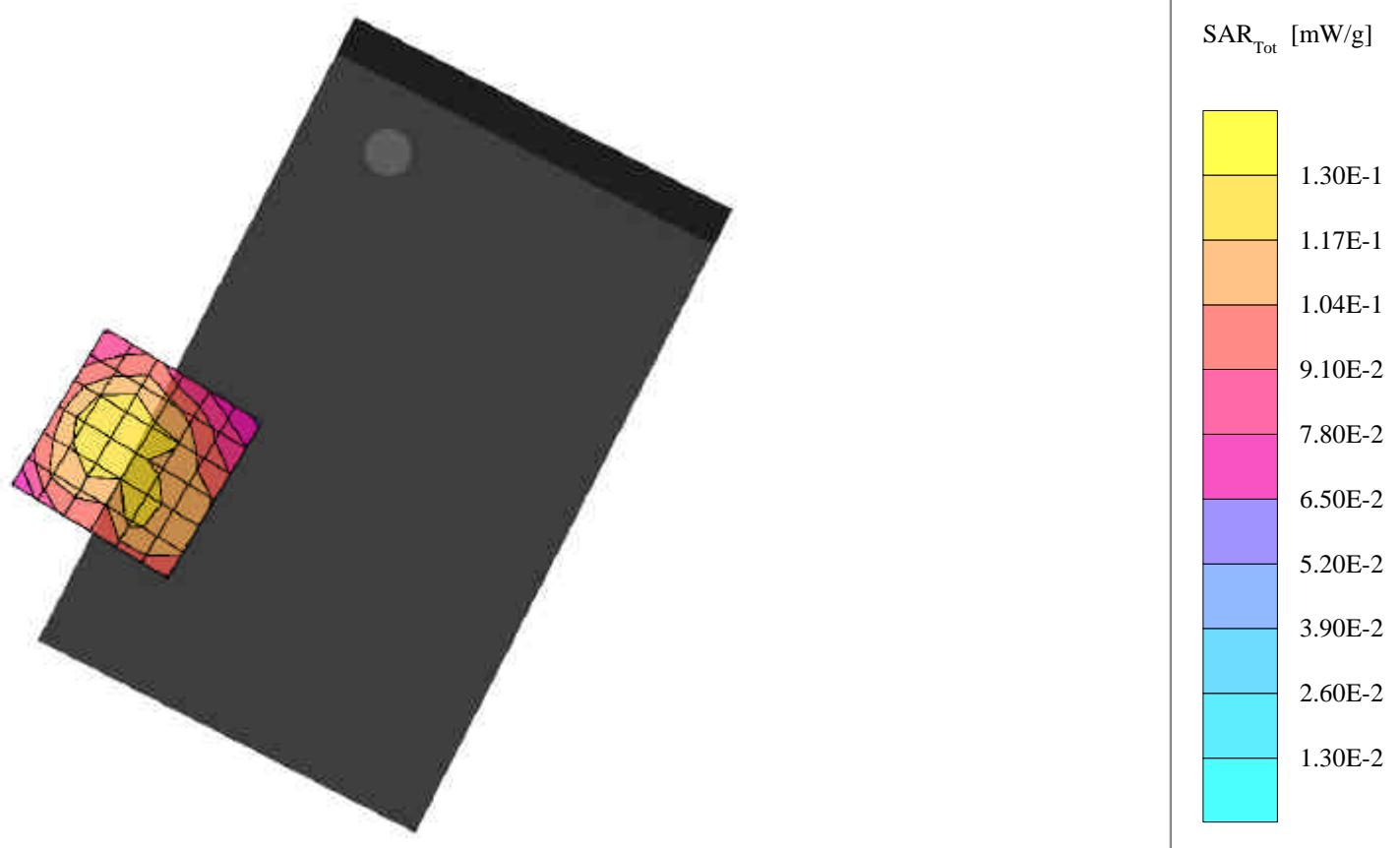
Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.50 \text{ mho/m}$   $\epsilon_r = 38.9$   $\rho = 1.00 \text{ g/cm}^3$

Peak: 0.131 mW/g, SAR (1g): 0.0754 mW/g

Lab Temperature 22.5 deg C, Fluid Temperature 20.9 deg C

SAR Drift 5.5%

06/18/02



# Danger Hiptop

Tilted Left Centre Channel (660)

SAM Phantom; Left Hand

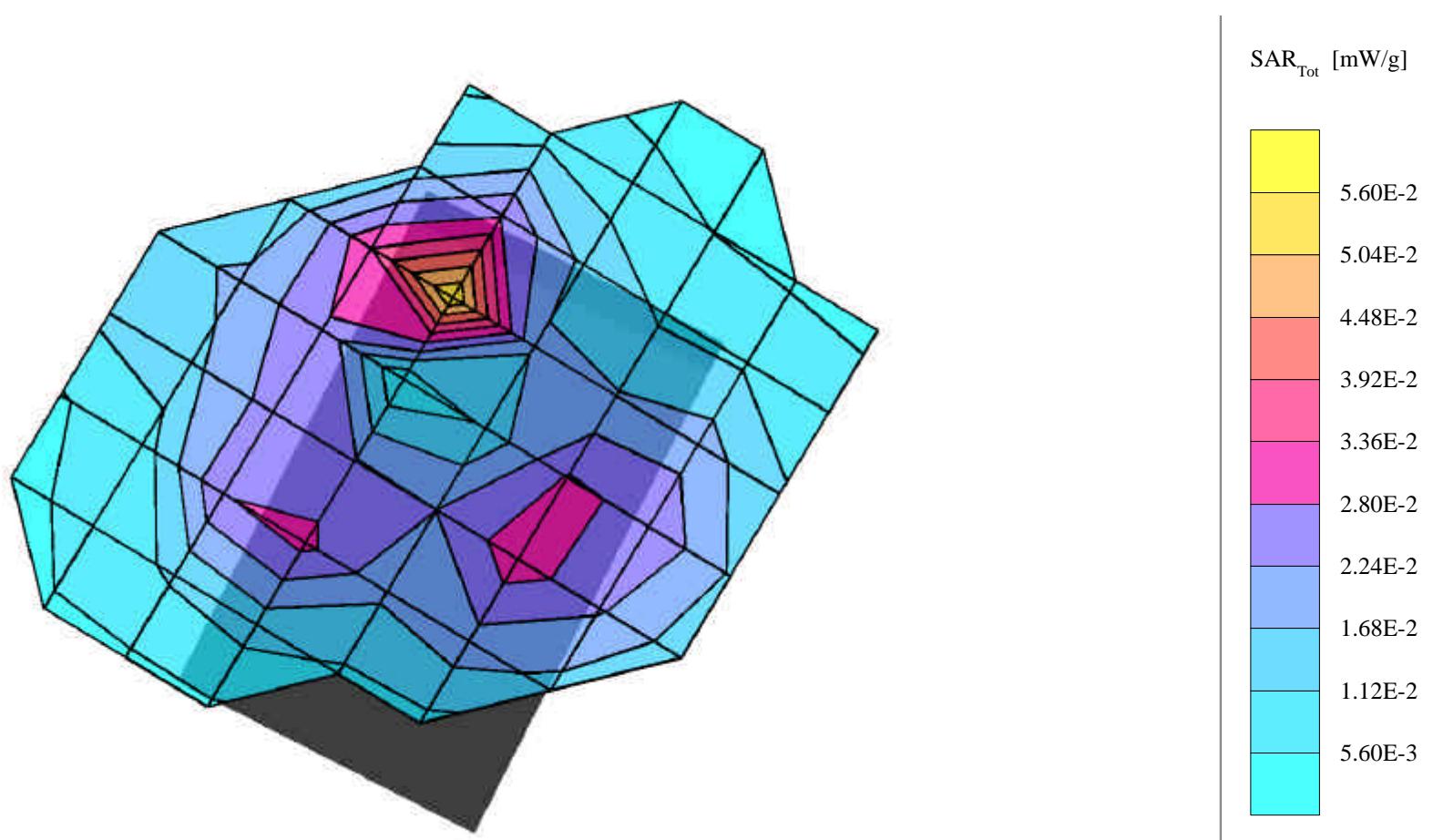
Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.50 \text{ mho/m}$   $\epsilon_r = 38.9$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.5 deg C, Fluid Temperature 20.9 deg C

SAR Drift 9.1%

06/18/02



# Danger Hiptop

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:  $\sigma = 1.50 \text{ mho/m}$   $\epsilon_r = 38.9$   $\rho = 1.00 \text{ g/cm}^3$

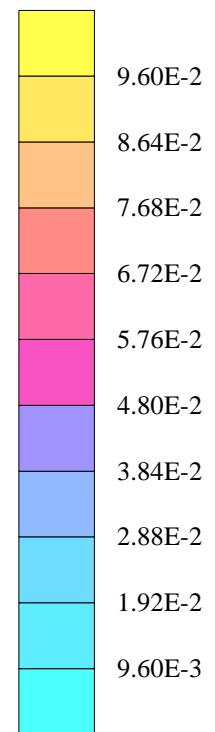
Peak: 0.0959 mW/g, SAR (1g): 0.0520 mW/g

Lab Temperature 22.5 deg C, Fluid Temperature 20.9 deg C

SAR Drift 9.1%

06/18/02

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



# Danger Hiptop

Cheek Right Centre Channel (660)

SAM Phantom; Righ Hand

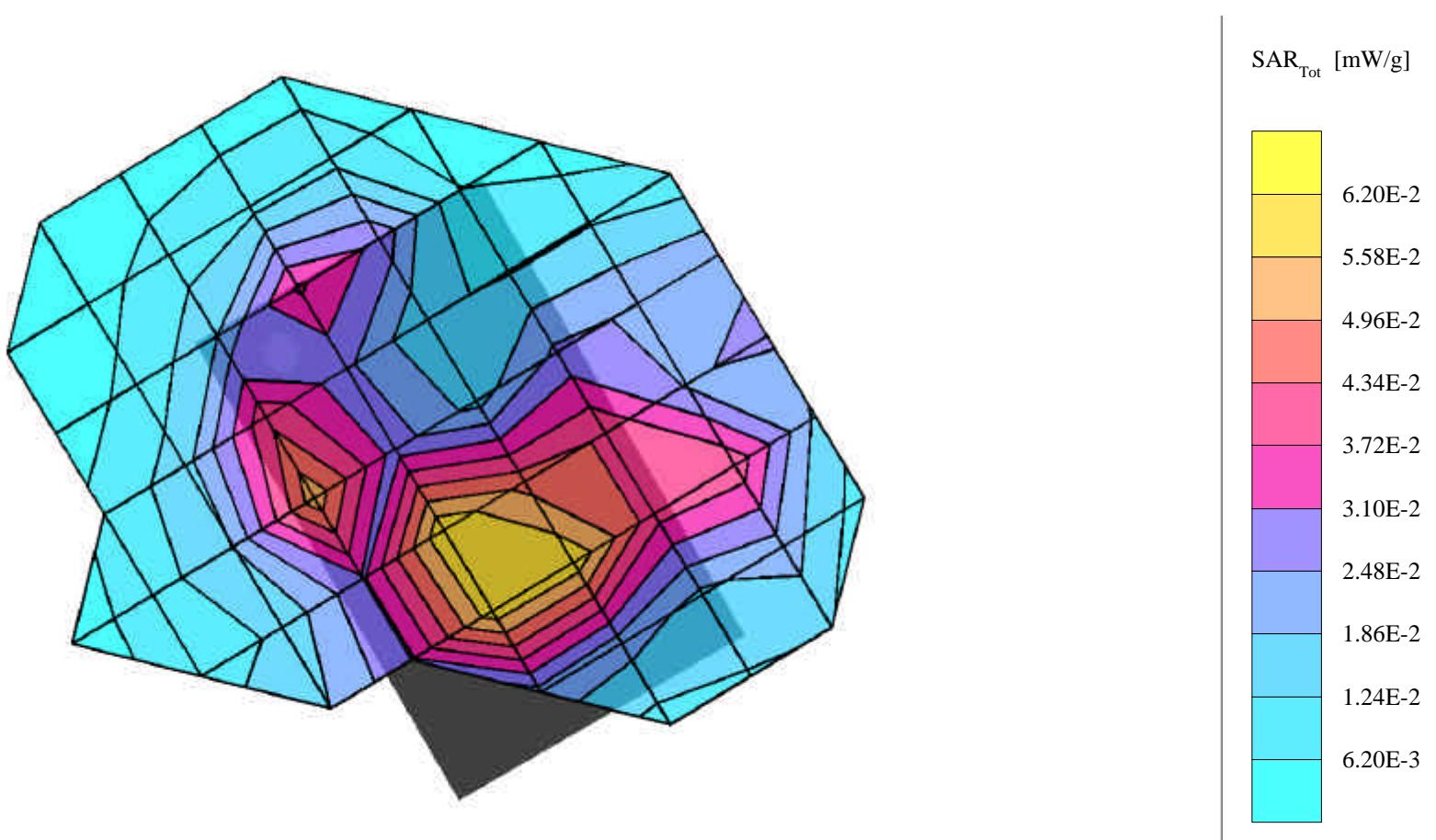
Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.50 \text{ mho/m}$   $\epsilon_r = 38.9$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.5 deg C, Fluid Temperature 20.9 deg C

SAR Drift 13.6%

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# Danger Hiptop

Cheek Right Centre Channel (660)

SAM Phantom; Righ Hand

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

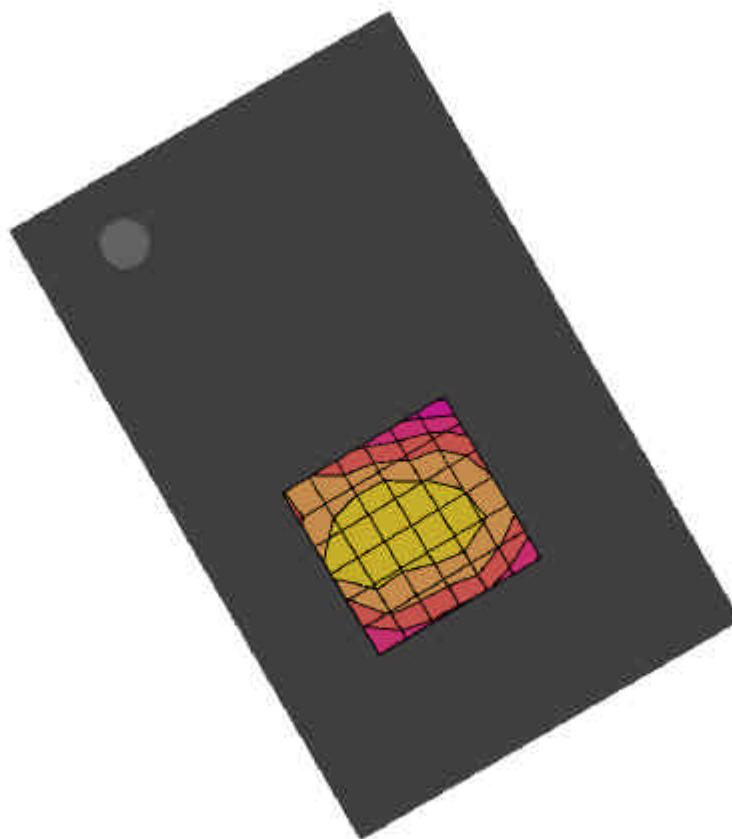
Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.50 \text{ mho/m}$   $\epsilon_r = 38.9$   $\rho = 1.00 \text{ g/cm}^3$

Peak: 0.116 mW/g, SAR (1g): 0.0677 mW/g

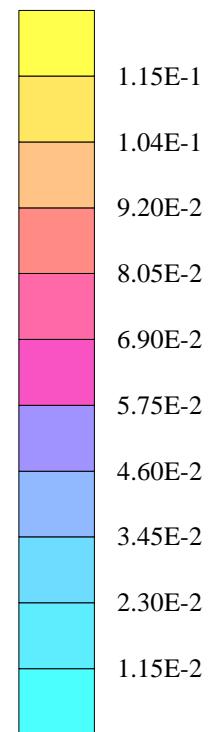
Lab Temperature 22.5 deg C, Fluid Temperature 20.9 deg C

SAR Drift 13.6%

06/19/02



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



# Danger Hiptop

Tilted Right Centre Channel (660)

SAM Phantom; Righ Hand

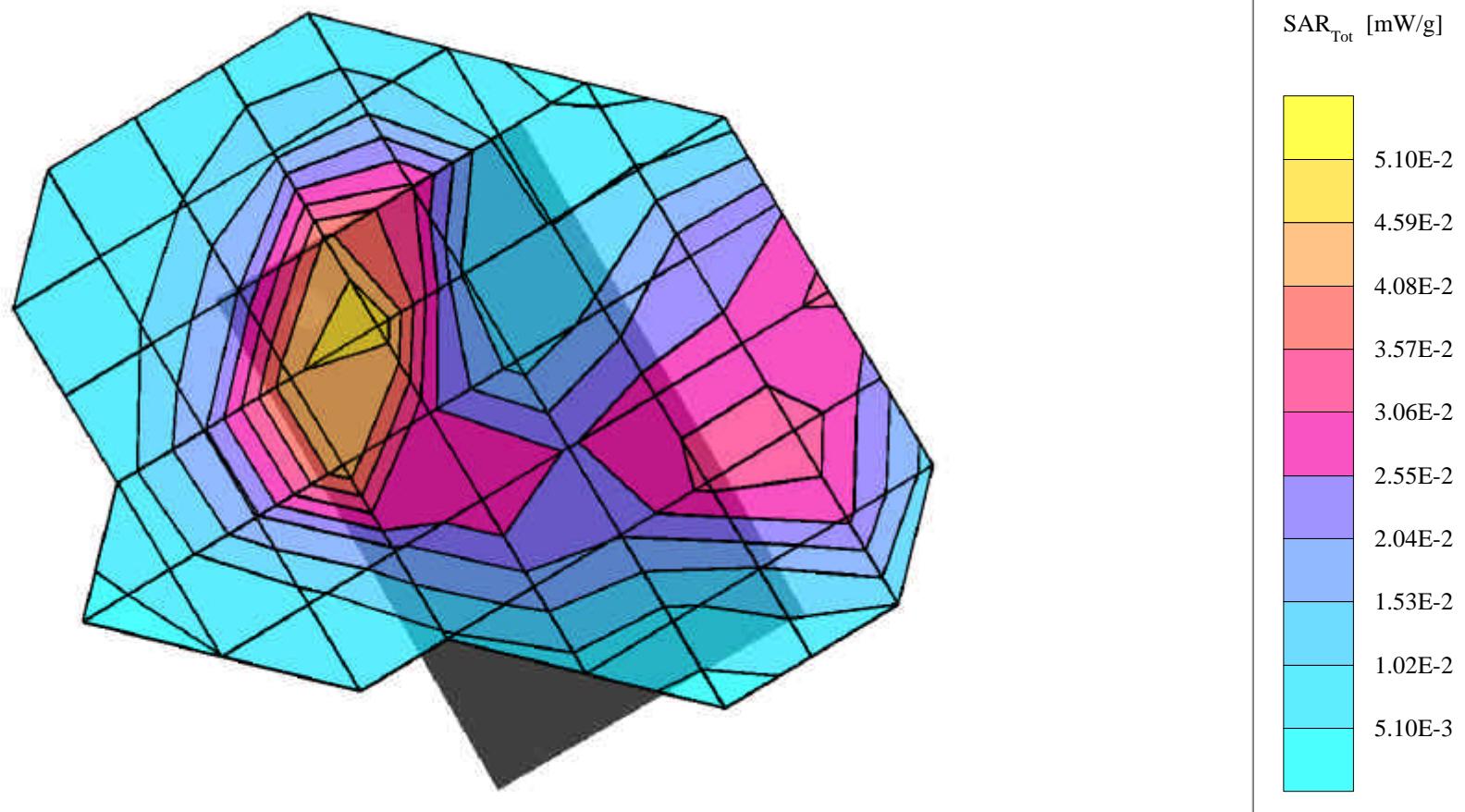
Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.50 \text{ mho/m}$   $\epsilon_r = 38.9$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.5 deg C, Fluid Temperature 20.9 deg C

SAR Drift 3.4%

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# Danger Hiptop

Tilted Right Centre Channel (660)

SAM Phantom; Righ Hand

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

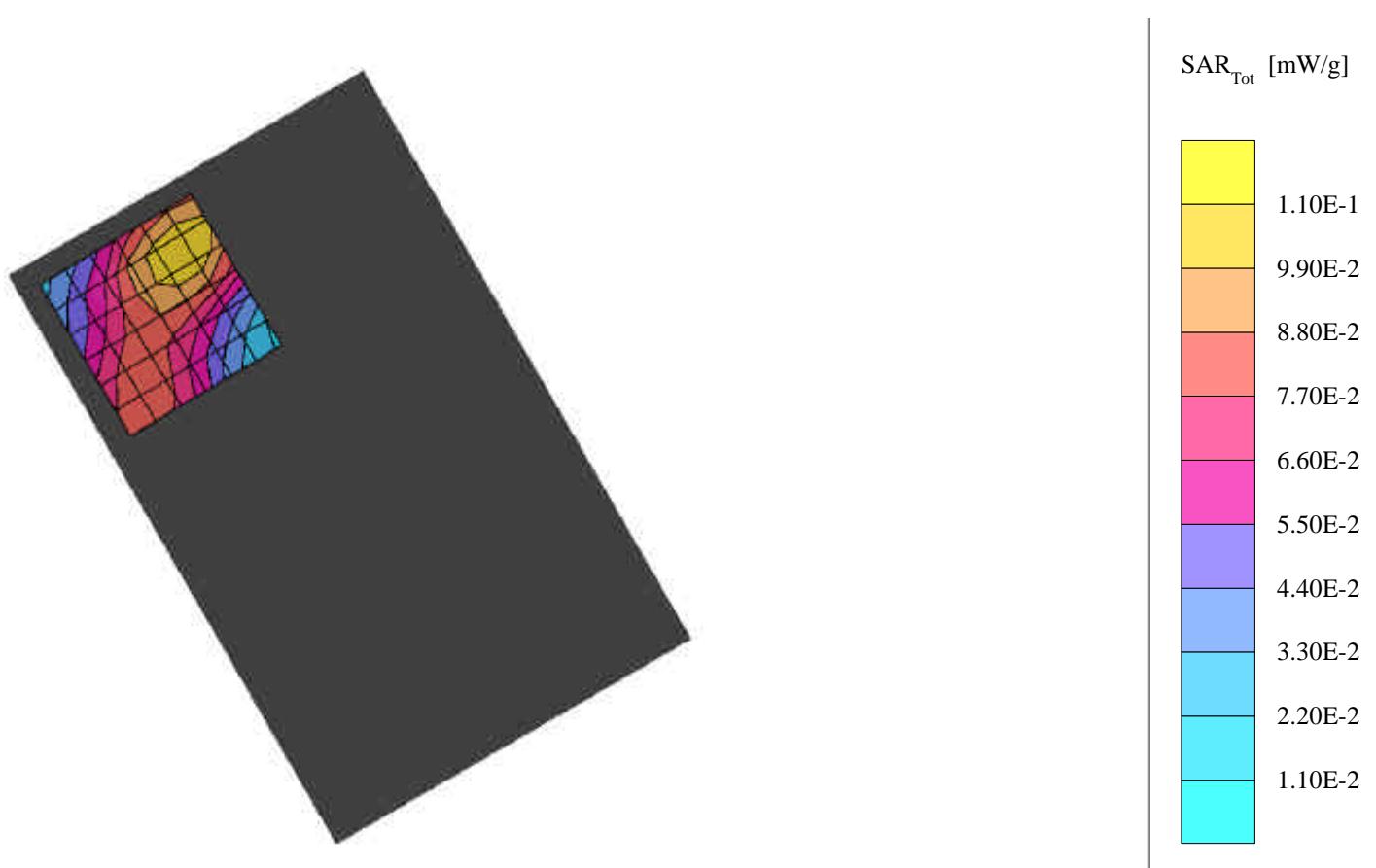
Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.50 \text{ mho/m}$   $\epsilon_r = 38.9$   $\rho = 1.00 \text{ g/cm}^3$

Peak: 0.113 mW/g, SAR (1g): 0.0582 mW/g

Lab Temperature 22.5 deg C, Fluid Temperature 20.9 deg C

SAR Drift 3.4%

06/18/02



# Danger Hiptop

Cheek Left Bottom Channel (512)

SAM Phantom; Left Hand

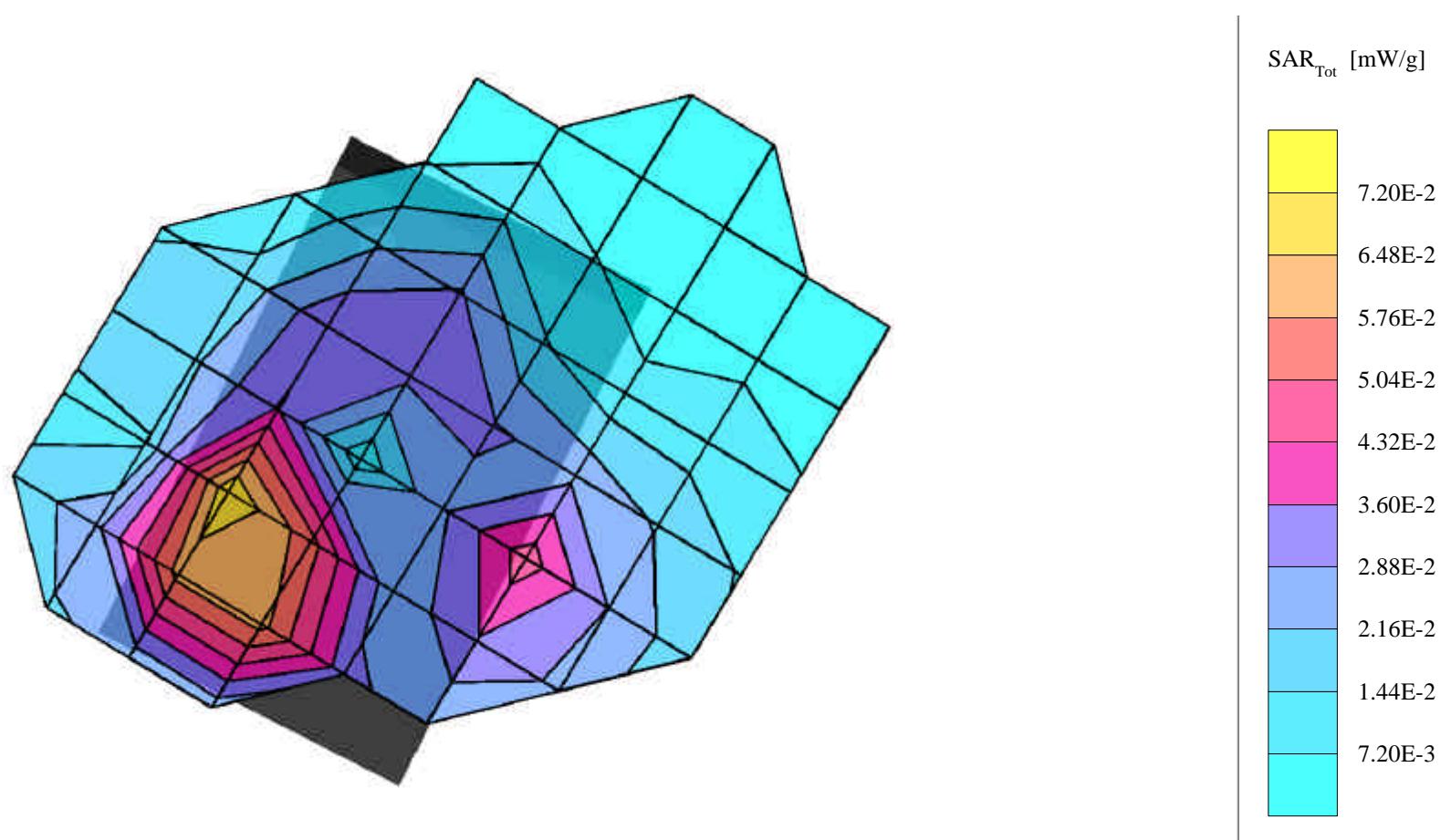
Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20);

Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.50 \text{ mho/m}$   $\epsilon_r = 38.9$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.5 deg C, Fluid Temperature 20.9 deg C

SAR Drift 2.6%

06/18/02



# Danger Hiptop

Cheek Left Bottom Channel (512)

SAM Phantom; Left Hand

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

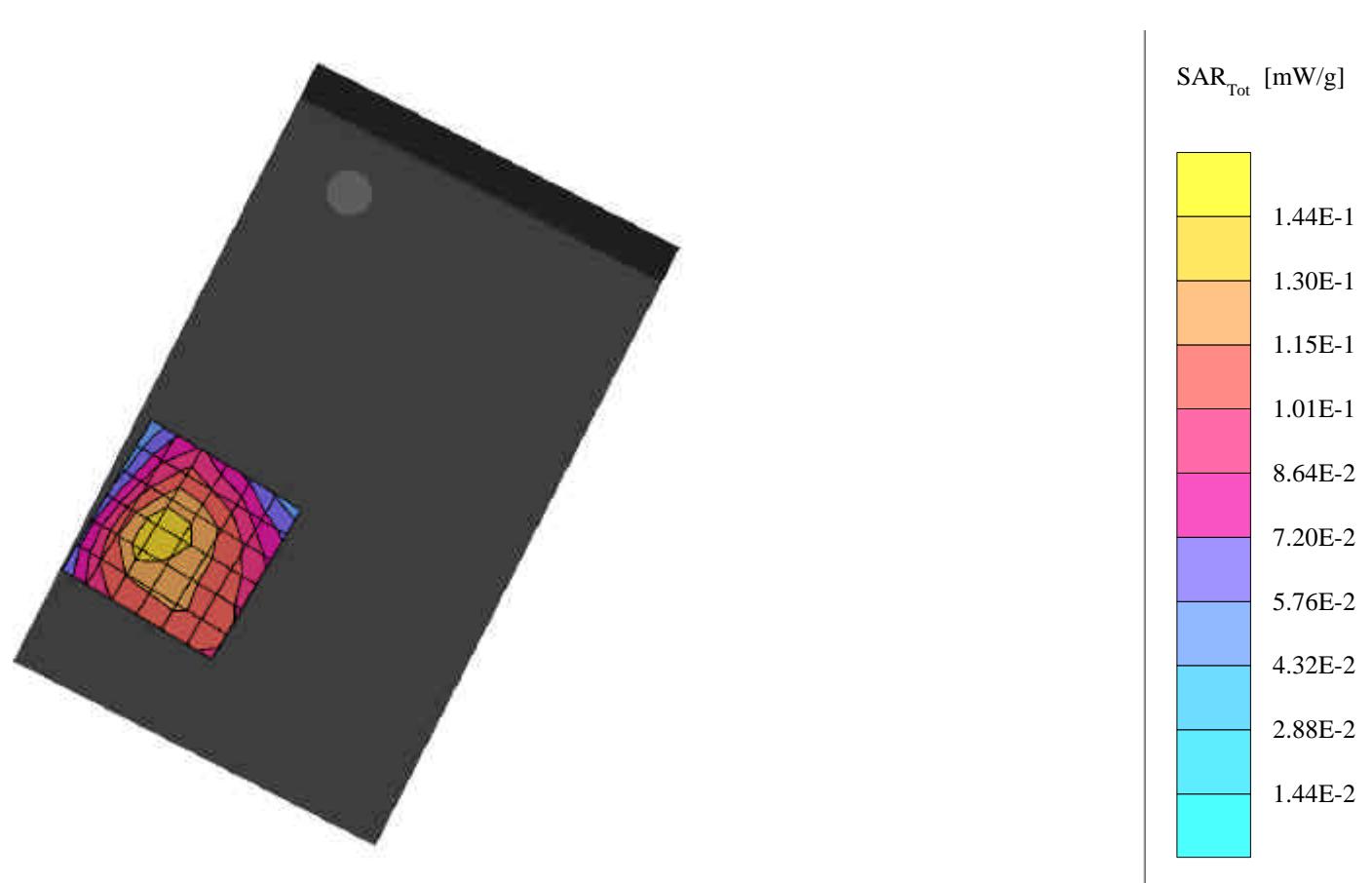
Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.50 \text{ mho/m}$   $\epsilon_r = 38.9$   $\rho = 1.00 \text{ g/cm}^3$

Peak: 0.146 mW/g, SAR (1g): 0.0789 mW/g

Lab Temperature 22.5 deg C, Fluid Temperature 20.9 deg C

SAR Drift 2.6%

06/18/02



# Danger Hiptop

Cheek Left Top Channel (810)

SAM Phantom; Left Hand

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

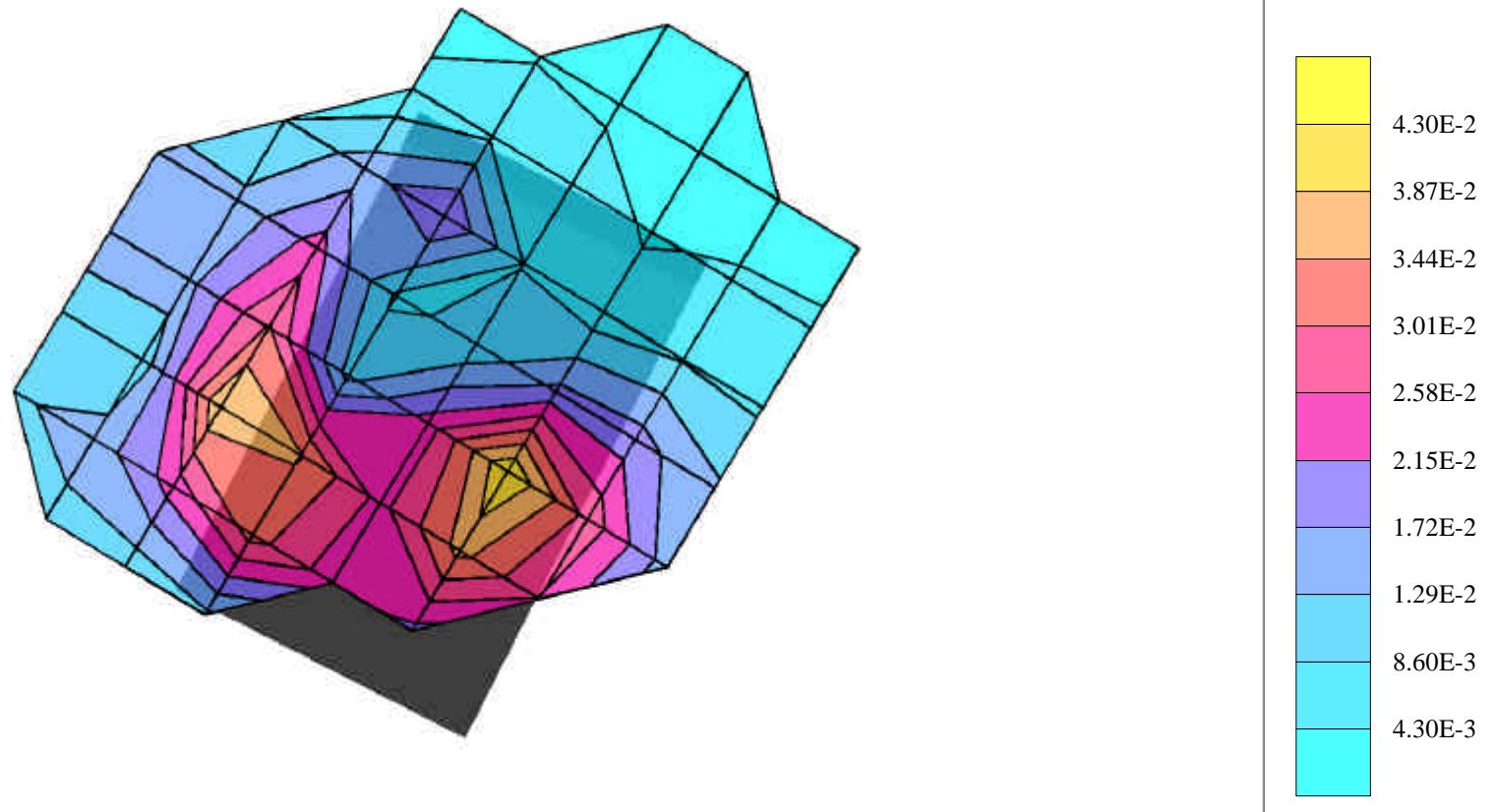
Crest factor: 8.0; Brain 1900MHz:  $\sigma = 1.50 \text{ mho/m}$   $\epsilon_r = 38.9$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.5 deg C, Fluid Temperature 20.9 deg C

SAR Drift 2.3%

06/18/02

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



# Danger Hiptop

Cheek Left Top Channel (810)

SAM Phantom; Left Hand

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

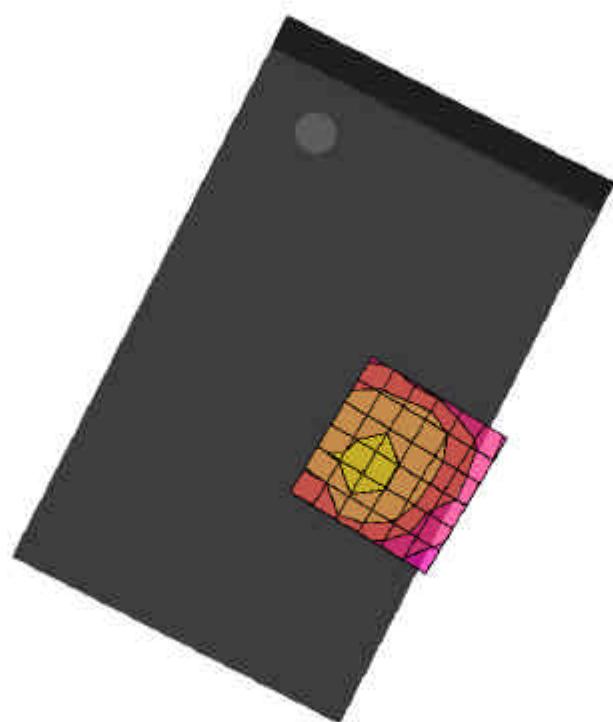
Crest factor: 8.0; Brain 1900MHz;  $\sigma = 1.50 \text{ mho/m}$   $\epsilon_r = 38.9$   $\rho = 1.00 \text{ g/cm}^3$

Peak: 0.0736 mW/g, SAR (1g): 0.0391 mW/g

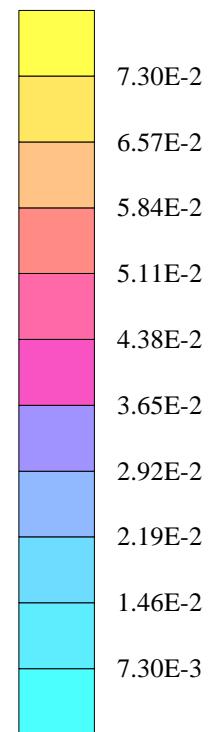
Lab Temperature 22.5 deg C, Fluid Temperature 20.9 deg C

SAR Drift 2.3%

06/18/02



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



# Danger Hiptop

Hiptop in Case Centre Channel (660)

SAM Phantom; Flat

Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70);

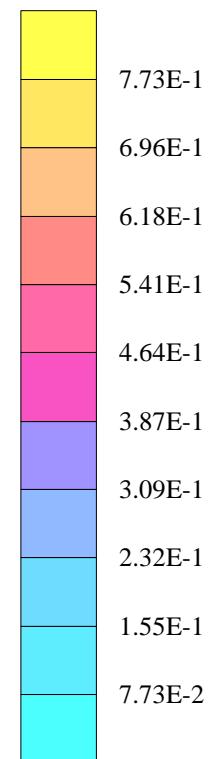
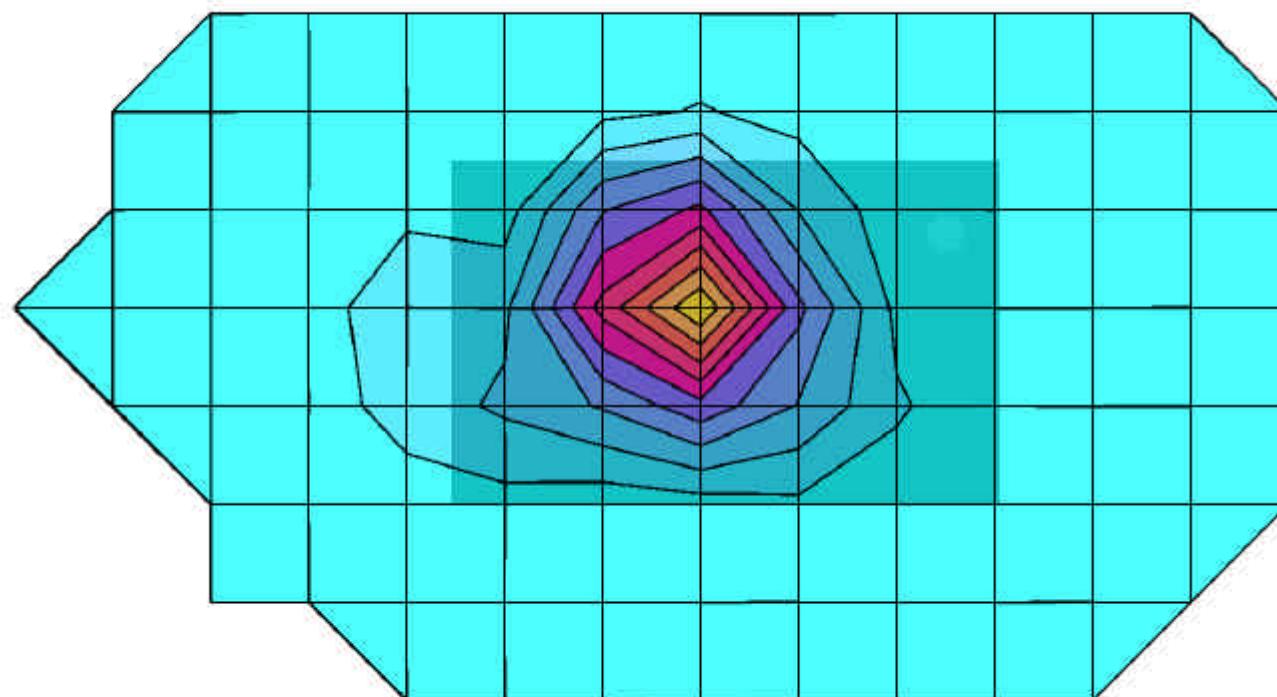
Crest factor: 8.0; Body 1900MHz FCC:  $\sigma = 1.55 \text{ mho/m}$   $\epsilon_r = 53.7$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.5 deg C, Fluid Temperature 21.8 deg C

SAR Drift 3.3%

06/19/02

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



# Danger Hiptop

Hiptop in Case Centre Channel (660)

SAM Phantom; Flat

Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70);

Crest factor: 8.0; Body 1900MHz FCC:  $\sigma = 1.55 \text{ mho/m}$   $\epsilon_r = 53.7$   $\rho = 1.00 \text{ g/cm}^3$

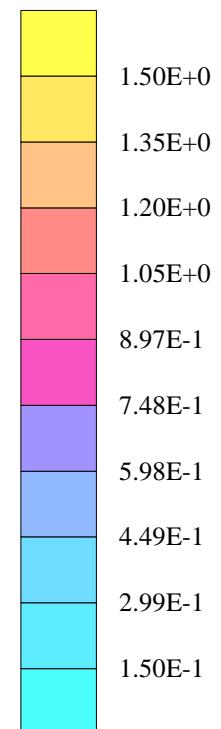
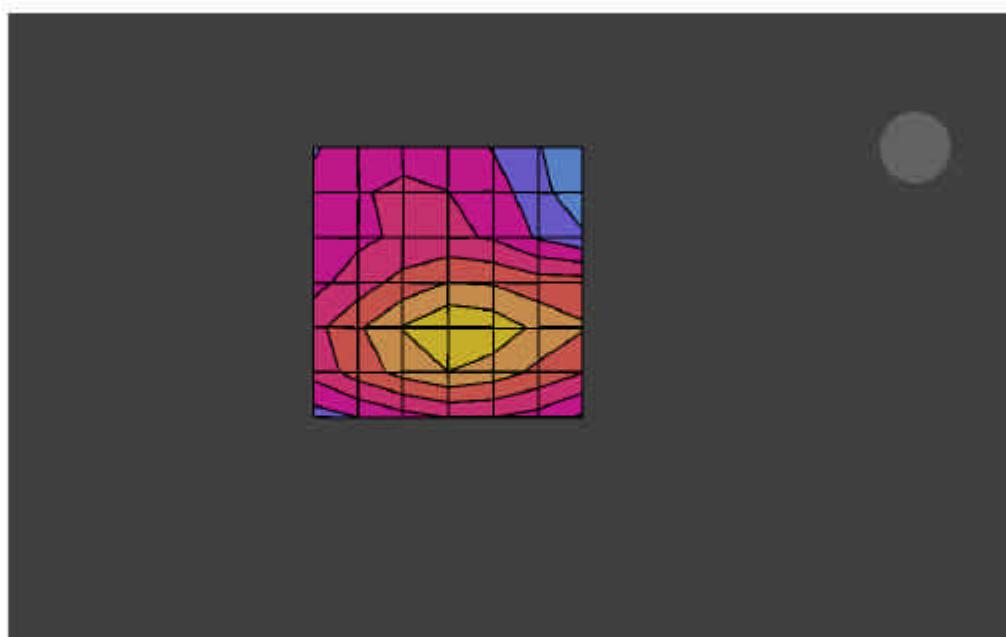
Peak: 1.51 mW/g, SAR (1g): 0.803 mW/g

Lab Temperature 22.5 deg C, Fluid Temperature 21.8 deg C

SAR Drift 3.3%

06/19/02

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



1.50E+0

1.35E+0

1.20E+0

1.05E+0

8.97E-1

7.48E-1

5.98E-1

4.49E-1

2.99E-1

1.50E-1

# Danger Hiptop

Hiptop in Case with Personal Handsfree Centre Channel (660)

SAM Phantom; Flat

Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70);

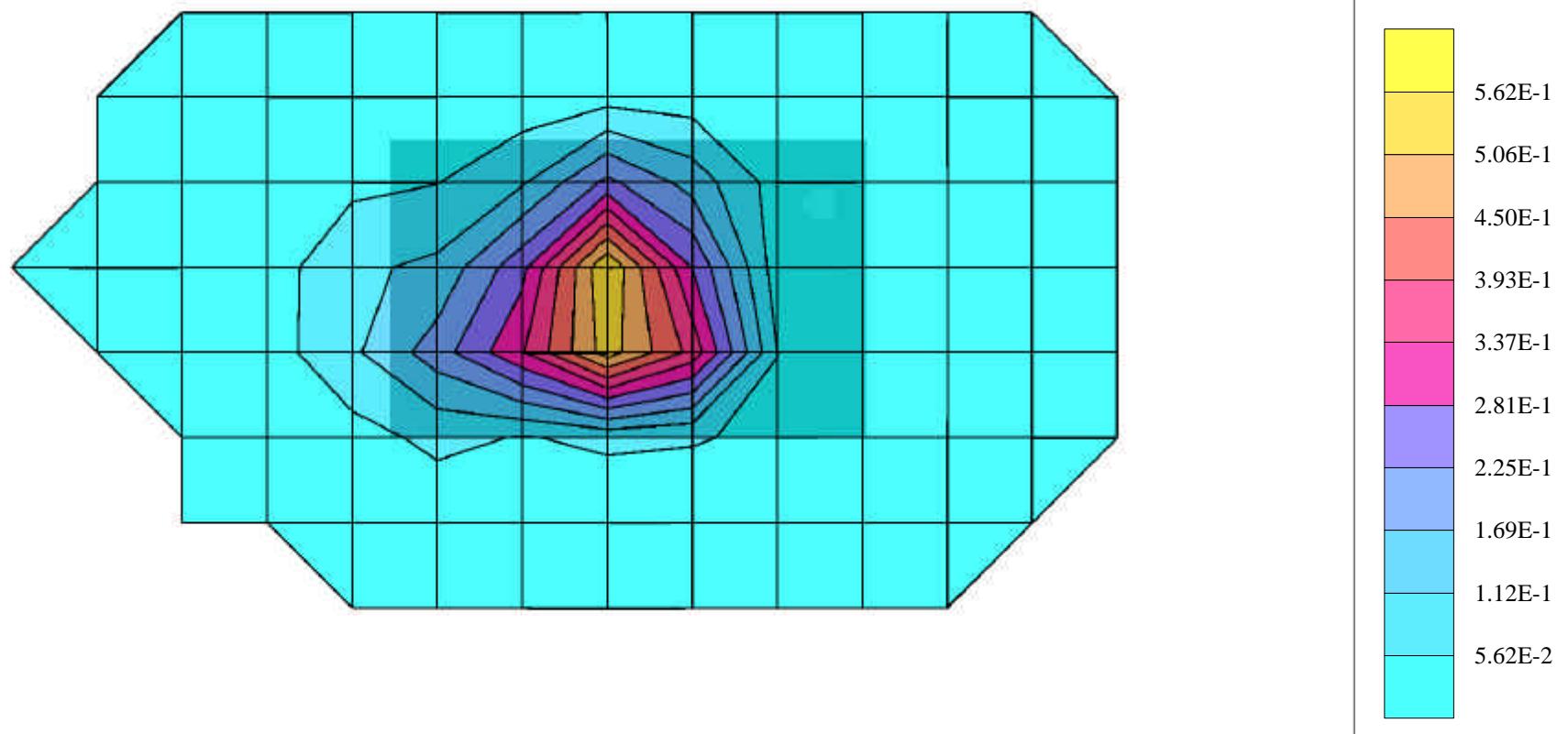
Crest factor: 8.0; Body 1900MHz FCC:  $\sigma = 1.55 \text{ mho/m}$   $\epsilon_r = 53.7$   $\rho = 1.00 \text{ g/cm}^3$

Lab Temperature 22.5 deg C, Fluid Temperature 21.8 deg C

SAR Drift 0.7%

06/19/02

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



# Danger Hiptop

Hiptop in Case with Personal Handsfree Centre Channel (660)

SAM Phantom; Flat

Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70);

Crest factor: 8.0; Body 1900MHz FCC:  $\sigma = 1.55 \text{ mho/m}$   $\epsilon_r = 53.7$   $\rho = 1.00 \text{ g/cm}^3$

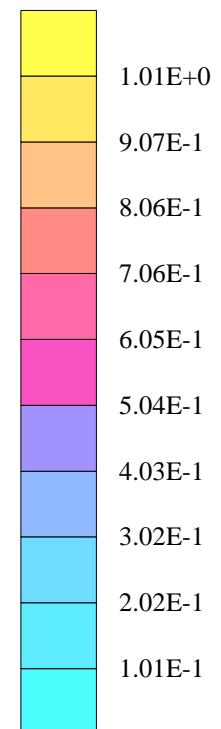
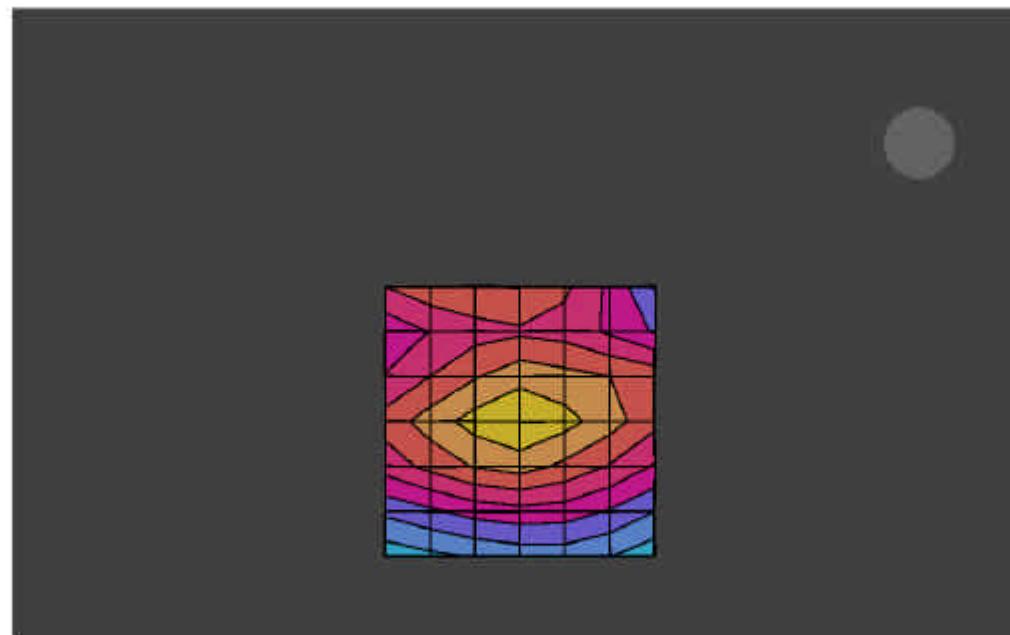
Peak: 1.01 mW/g, SAR (1g): 0.535 mW/g

Lab Temperature 22.5 deg C, Fluid Temperature 21.8 deg C

SAR Drift 0.7%

06/19/02

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



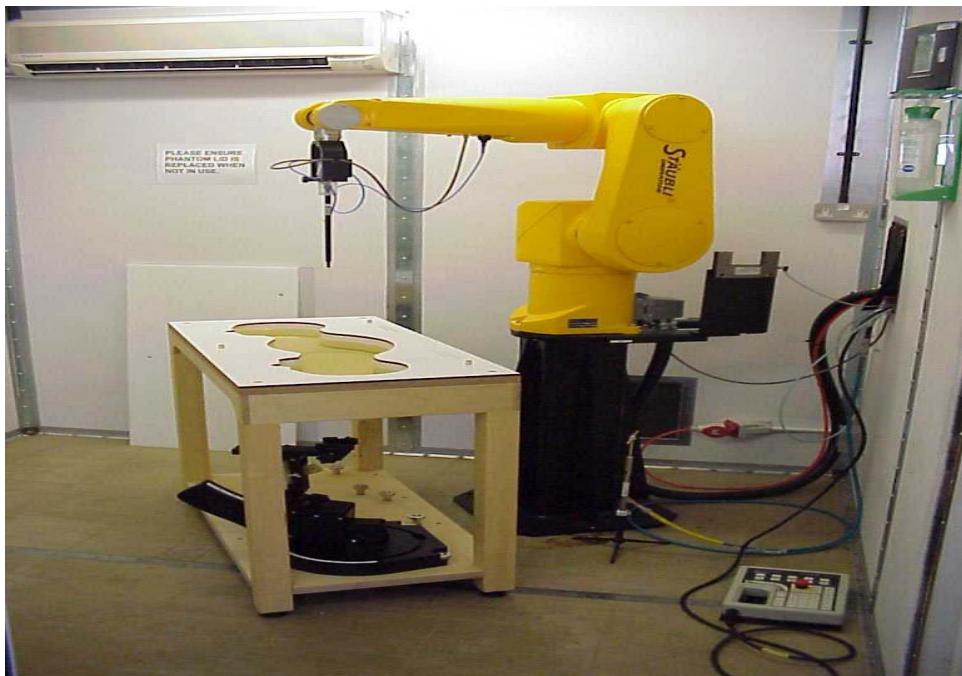
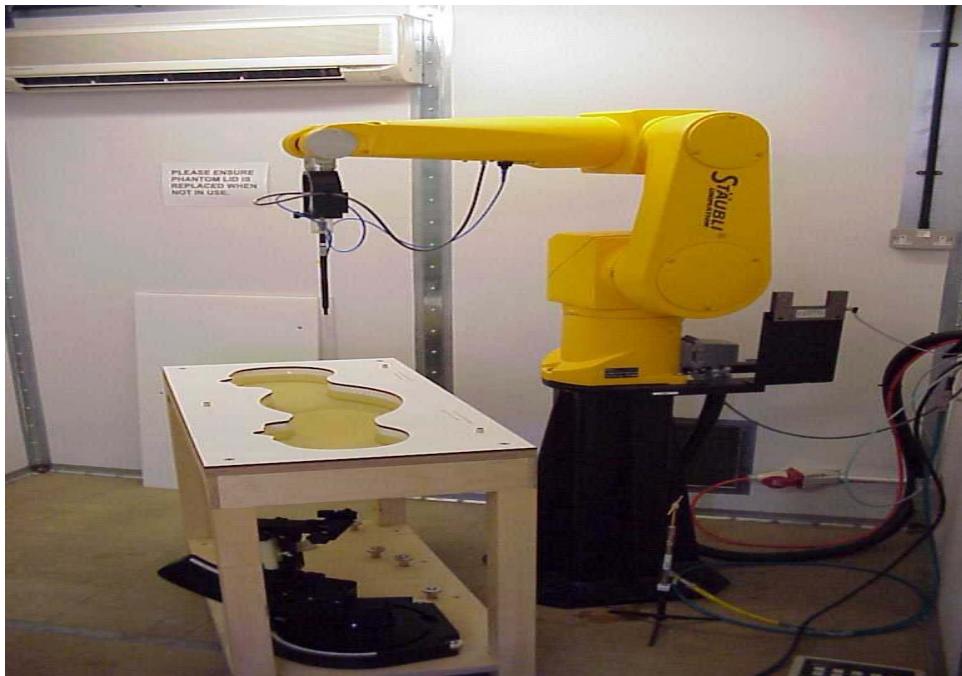
Test Of: Danger Inc.

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## Appendix 4. Test Configuration Photograph

This appendix contains photographs showing the test configuration for the measurement of Specific Absorption Rate (SAR)



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## **Appendix 5. Photographs of EUT**

This appendix contains the following photographs:

<b>Photo Reference Number</b>	<b>Title</b>
PHT/43528JD02/001	Hiptop in case with body position.
PHT/43528JD02/002	Hiptop in case with personal hands free.
PHT/43528JD02/003	Hiptop in case with personal hands free.
PHT/43528JD02/004	Cheek left position.
PHT/43528JD02/005	Cheek right position.
PHT/43528JD02/006	Tilted left position.
PHT/43528JD02/007	Tilted right position.
PHT/43528JD02/008	Front view of EUT on Open Area Test Site

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

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**PHT/43528JD02/001 Hiptop in case with body position.**

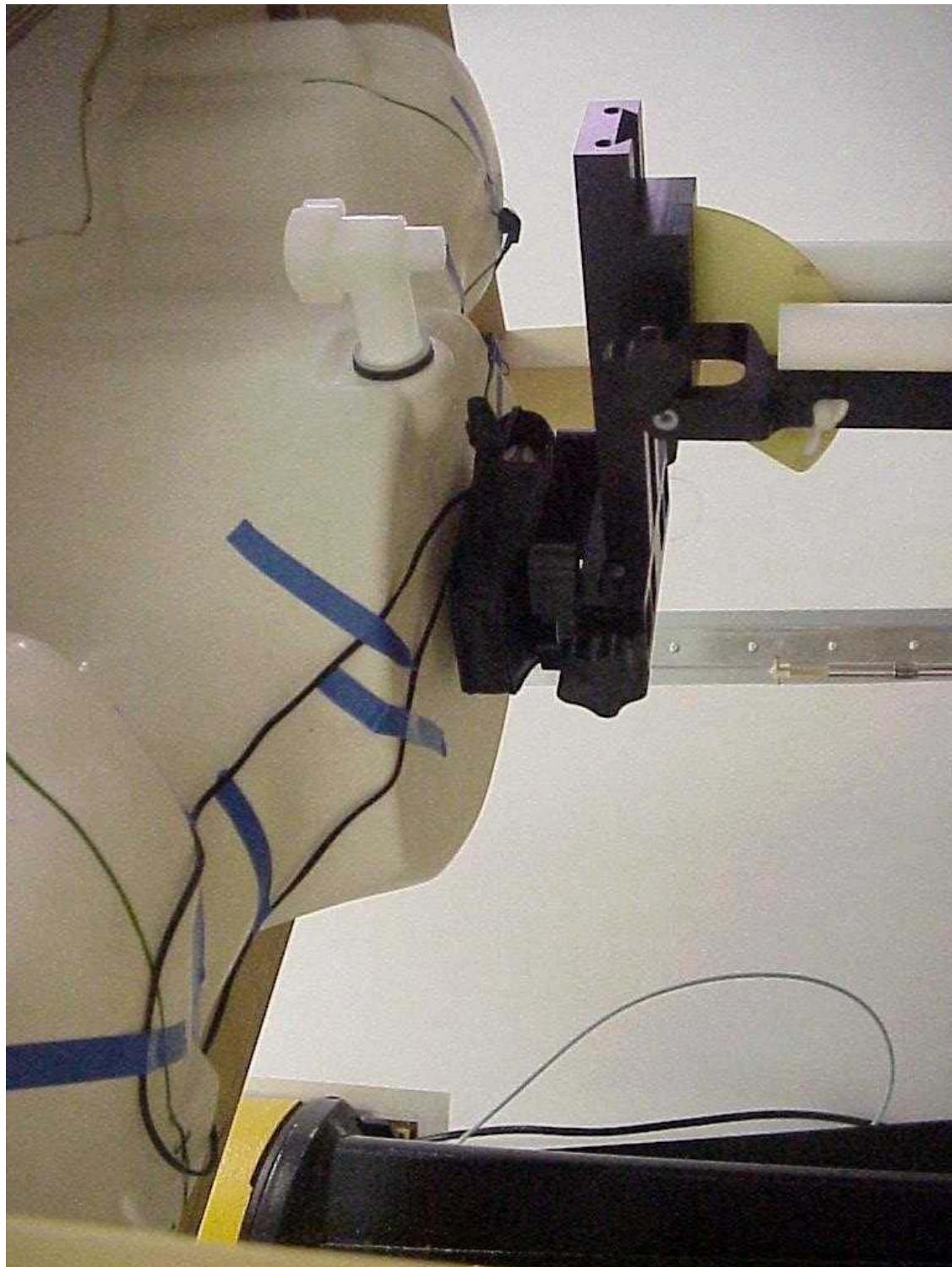


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PHT/43528JD02/002 Hiptop in case with personal hands free.

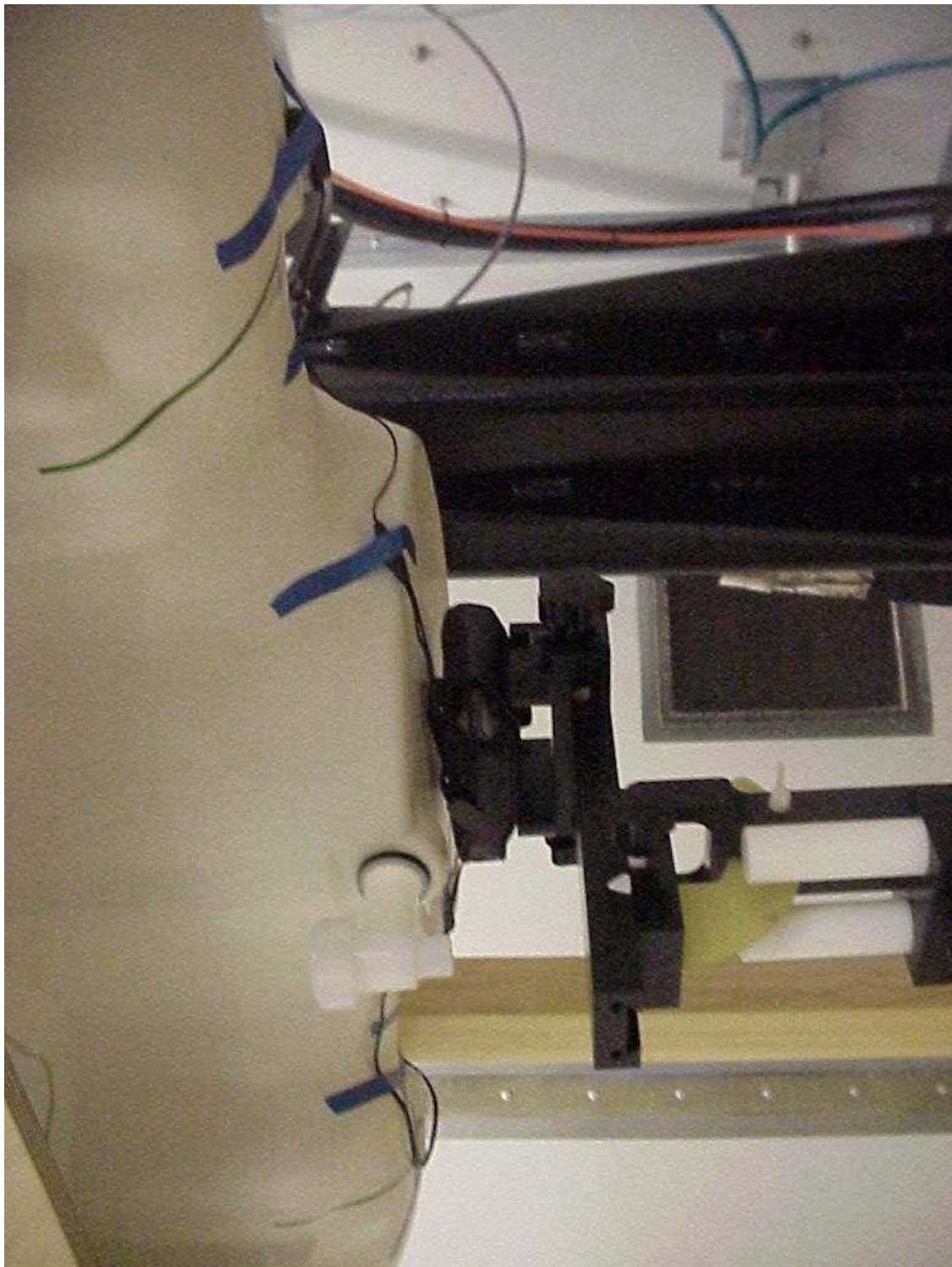


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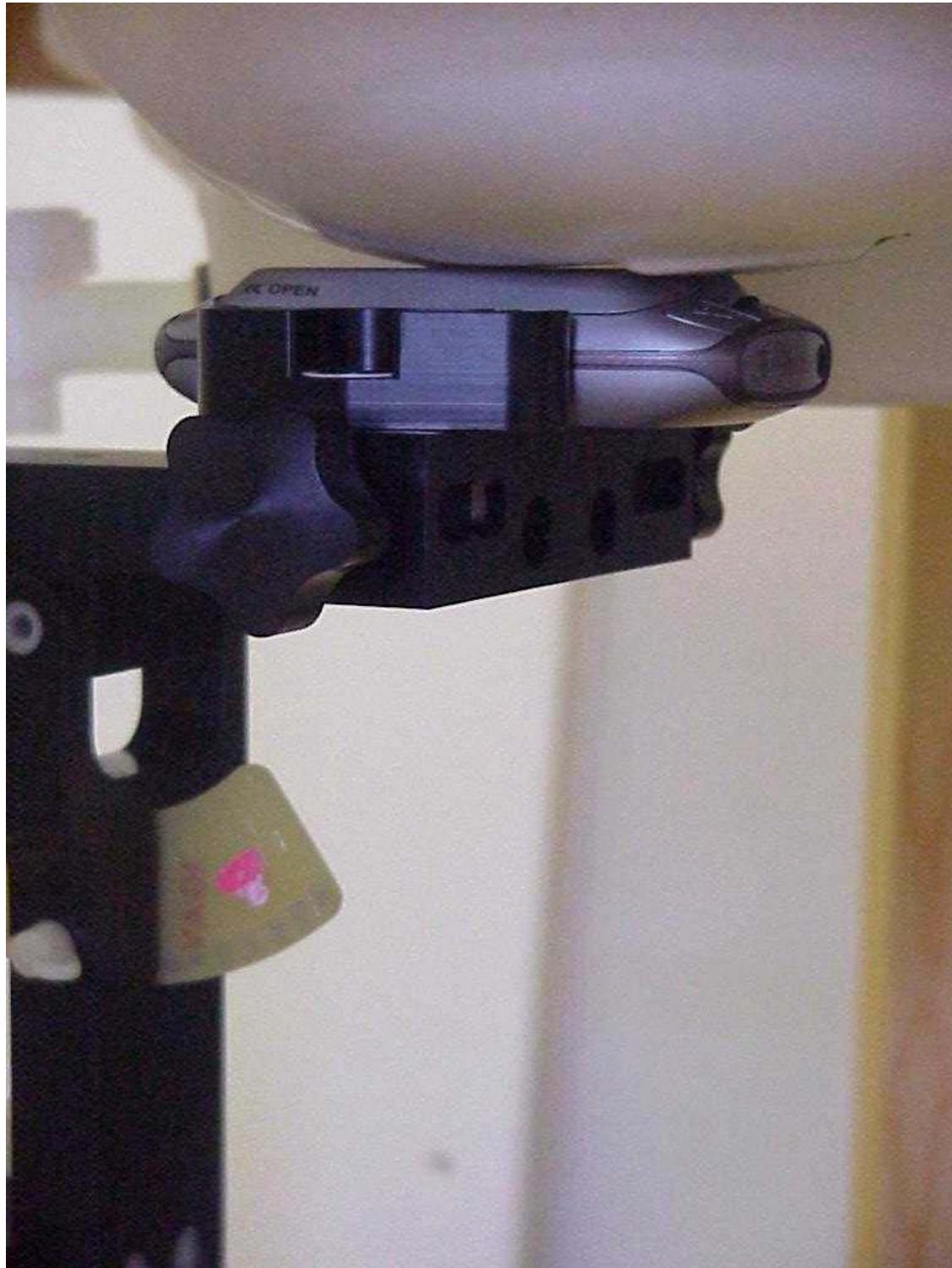
PHT/43528JD02/003 Hiptop in case with personal hands free.



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PHT/43528JD02/004 Cheek left position.

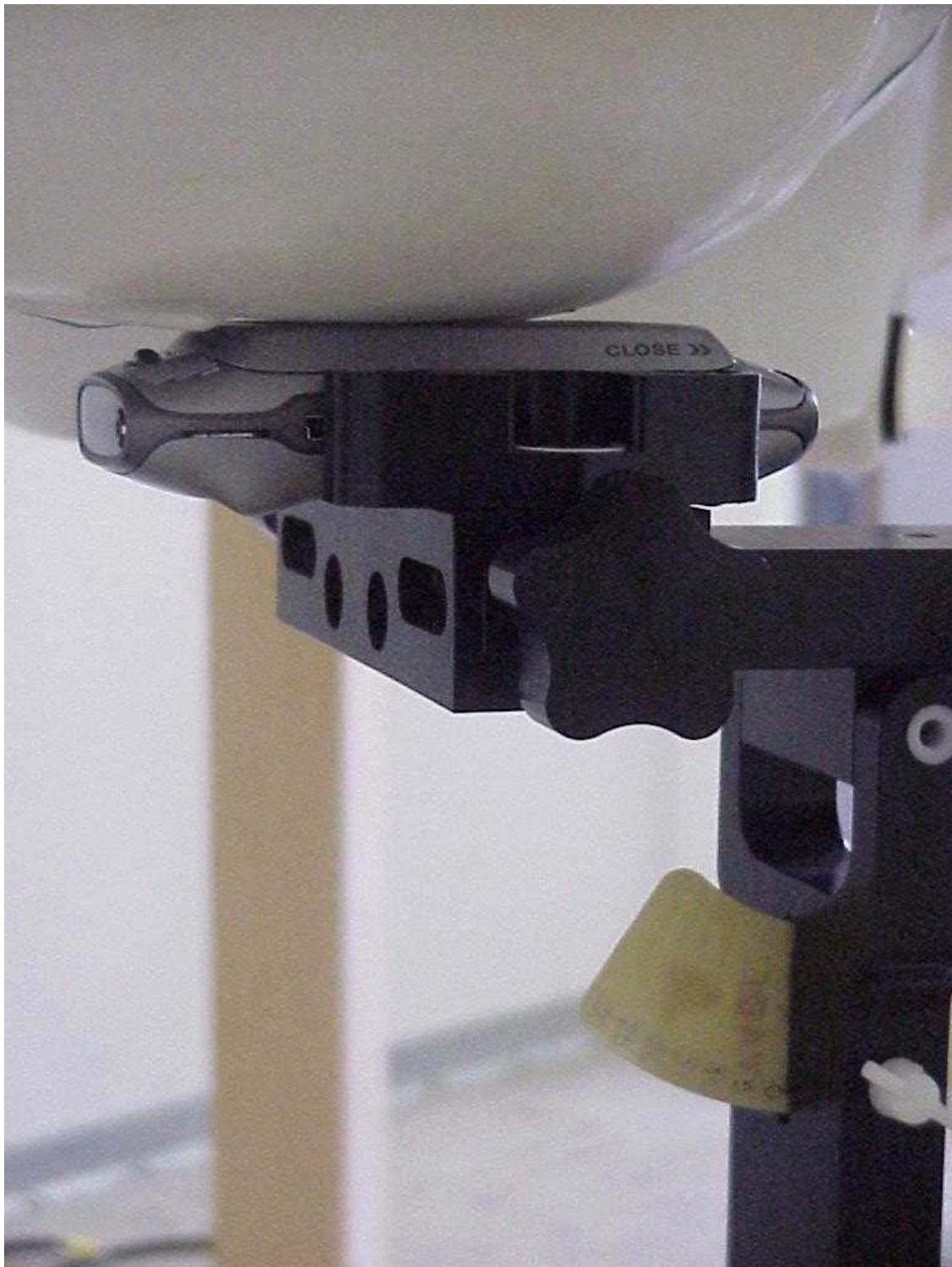


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PHT/43528JD02/005 Cheek right position.



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PHT/43528JD02/006 Tilted left position.

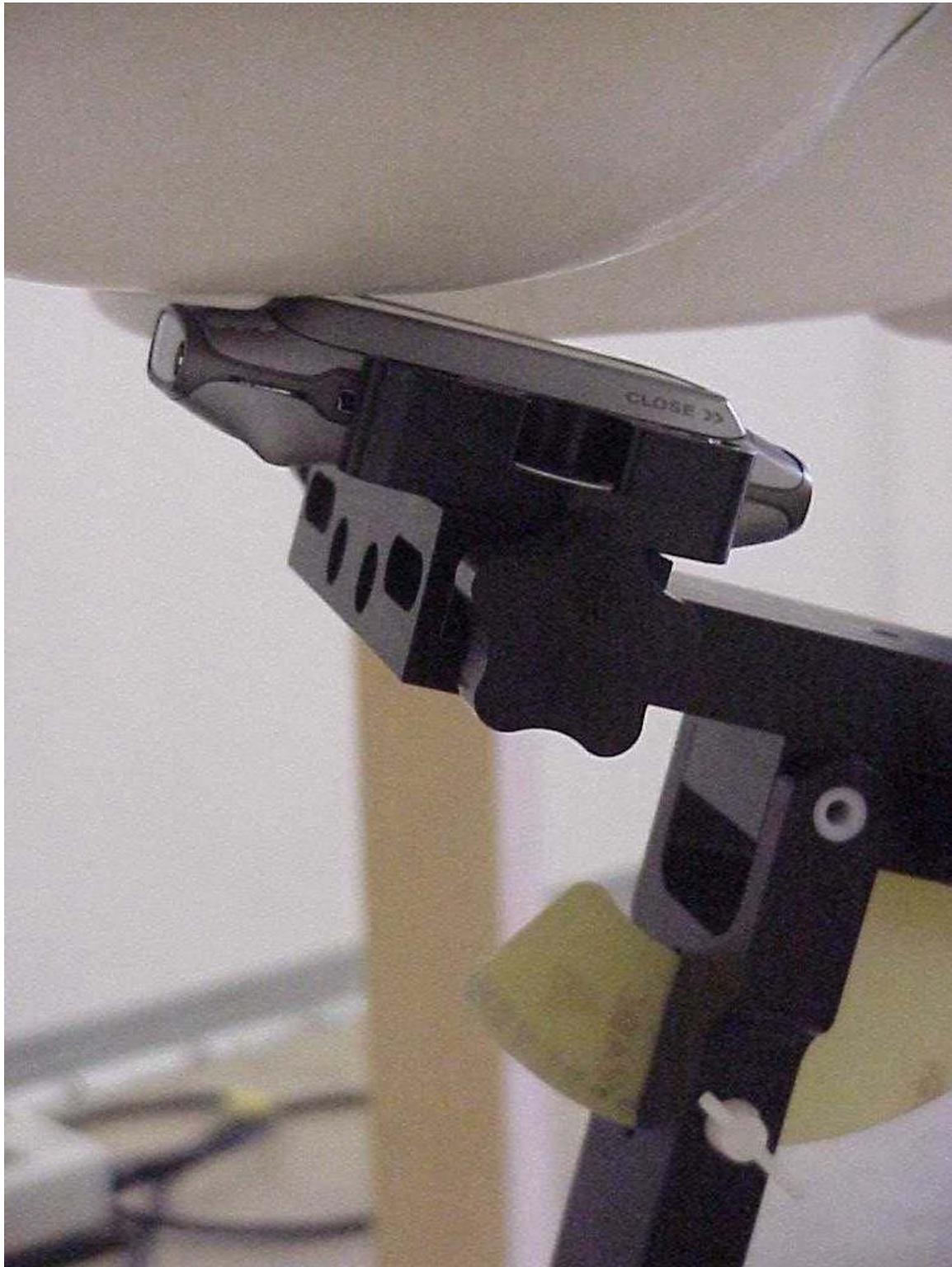


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PHT/43528JD02/007 Tilted right position.



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**PHT/43528JD02/008 Front view of EUT on Open Area Test Site**

