



Global Product Certification  
EMC-EMF-Safety Approvals

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## SAR Test Report

**Report Number: M100558**

**Test Sample:** Iridium Satellite Phone

**Model Number:** 9555

**Tested For:** TRaC

**Date of Issue:** 27<sup>th</sup> May 2010

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**SAR EVALUATION**Iridium Satellite Phone, **Model: 9555 Report Number: M100558****1.0 GENERAL INFORMATION**

**Test Sample:** Iridium Satellite Phone  
**Model Number:** 9555  
**FCC ID** Q639555A  
**IC** 4629A-9555  
**Manufacturer:** Iridium Satellite LLC

**Device Category:** Portable Transmitter  
**Test Device:** Production Unit / Prototype Sample  
**RF exposure Category:** General Public/Unaware user

**Tested for:** TRaC  
**Address:** Moss View, Nipe Lane, Up Holland. Lancs WN8 9PY  
**Contact:** John Charters  
**Phone:** +44(0)1695 556666  
**Fax:** +44(0)7801185874 Skype jcharters\_trl  
**Email:** john.charters@tracglobal.com

**Test Standard/s:**

1. Evaluating Compliance with FCC Guidelines For Human Exposure to Radiofrequency Electromagnetic Fields, Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01)
2. Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) RSS-102 Issue 3 June 2009

**Statement Of Compliance:** The Iridium Satellite Phone, model 9555, complied with the FCC and Canadian General public/uncontrolled RF exposure limits of 1.6mW/g per requirements of 47CFR2.1093(d) and RSS-102

**Test Dates:** 19<sup>th</sup> May 2010

**Test Officer:**



**Peter Jakubiec**

**Authorised Signature:**



**Chris Zombolas**  
**Technical Director**

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## 2.0 DESCRIPTION OF DEVICE

### 2.1 Description of Test Sample

The device tested was an Iridium Satellite Phone, Model: 9555 operating in 1616 MHz to 1626 MHz frequency band. It will be referred to as the device under test (DUT) throughout this report. It was tested in the Touch and Tilted Positions with the antenna retracted and extended.

**Table: DUT Parameters**

Operating Mode during Testing	: See Clause 2.3
Operating Mode production sample	: Globalstar Satellite
Modulation:	: Qualcomm Digital CDMA
Device Dimensions (LxWxH)	: 143mm x 55 mm x 30 mm
Antenna type	: Extendable
Applicable Head Configurations	: Touch and Tilted
Applicable Body Worn-Configurations	: None
Battery Options	: One Battery Type

### 2.2 Test sample Accessories

#### 2.2.1 Battery Types

One type of battery can be used with DUT. SAR measurements were performed with a standard 3.7 V battery.

### 2.3 Test Signal, Frequency and Output Power

The test sample operates in the 1616 MHz to 1626 MHz frequency band. The test sample was configured into a test mode using test software provided by the customer. The channels utilised in the measurements were the traffic channels shown in the table below.

**Table: Test Frequencies**

Frequency Range	Traffic Channels	Band Power Class	Nominal Power (dBm)
1616 – 1626 MHz	001, 121, and 240	N/A	36.5

### 2.4 Conducted Power Measurements

The conducted power of the DUT was not measured because there was no RF test ports setup available during the testing.

### 2.5 Battery Status

The device battery was fully charged prior to commencement of each measurement. Each SAR test was completed within 30 minutes. The battery condition was monitored by measuring the RF power at a defined position inside the phantom before the commencement of each test and again after the completion of the test.

**Table: Battery Details**

<b>Battery #1:</b> Rechargeable Li-ion 3.7V	<b>Battery #2:</b> Rechargeable Li-ion 3.7V
<b>Model No.:</b> BAT20801	<b>Model No.:</b> BAT20801
<b>Serial No.:</b> 26082175	<b>Serial No.:</b> 26082175



## 2.6 Details of Test Laboratory

### 2.6.1 Location

EMC Technologies Pty Ltd  
176 Harrick Road  
Keilor Park, (Melbourne) Victoria  
Australia 3042

**Telephone:** +61 3 9365 1000  
**Facsimile:** +61 3 9331 7455  
**email:** [melb@emctech.com.au](mailto:melb@emctech.com.au)  
**website:** [www.emctech.com.au](http://www.emctech.com.au)

### 2.6.2 Accreditations

EMC Technologies Pty. Ltd. is accredited by the National Association of Testing Authorities, Australia (NATA). **NATA Accredited Laboratory Number: 5292**

EMC Technologies Pty Ltd is NATA accredited for the following standards:

**ARPANSA Standard** RF and microwave radiation hazard measurement

**AS/NZS 2772.2:**

**ACA:** Radio communications (Electromagnetic Radiation - Human Exposure)  
Standard 2003+Amdt 1:2007

**FCC:** Guidelines for Human Exposure to RF Electromagnetic Field OET65C 01/01

**EN 50360: 2001** Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)

**EN 62209-1:2006** Human exposure to radio frequency fields from hand-held and body-mounted devices-Human models, instrumentation and procedures.  
**Part 1:** Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range 300 MHz to 3 GHz)

**IEEE 1528: 2003** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Measurement Techniques.

Refer to NATA website [www.nata.asn.au](http://www.nata.asn.au) for the full scope of accreditation.

### 2.6.3 Environmental Factors

The measurements were performed in a shielded room with no background network signals. The temperature in the laboratory was controlled to within  $20 \pm 1$  °C, the humidity was 37 %. The liquid parameters were measured prior to the commencement of the tests. Tests were performed to check that reflections within the environment did not influence the SAR measurements. The noise floor of the DASY4 SAR measurement system using the SN1380 probe is less than  $5\mu\text{V}$  in both air and liquid mediums.



### 3.0 DESCRIPTION OF SAR MEASUREMENT SYSTEM

#### 3.1 Probe Positioning System

The measurements were performed with an automated near-field scanning system **DASY4 Version V4.7 Build 53** from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision 6-axis robot (working range greater than 1.1m), which positions the SAR measurement probes with a positional repeatability of better than  $\pm 0.02$  mm. The DASY4 fully complies with the OET65 C (01-01), IEEE 1528 and EN 62209-1 SAR measurement requirements.

#### 3.2 E-Field Probe Type and Performance

The SAR measurements were conducted with the dosimetric probe ET3DV6 Serial: 1380 (manufactured by SPEAG) designed in the classical triangular configuration and optimised for dosimetric evaluation. The probe has been calibrated and found to be accurate to better than  $\pm 0.25$  dB. The probe is suitable for measurements close to material discontinuity at the surface of the phantom. The sensors of the probe are directly loaded with Schottky diodes and connected via highly resistive lines (length = 300 mm) to the data acquisition unit.

#### 3.3 Data Acquisition Electronics

The data acquisition electronics (DAE3) consists of 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. The input impedance of the DAE3 box is 200 M $\Omega$ ; the inputs are symmetrical and floating. Common mode rejection is above 80dB. Transmission to the PC-card is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The mechanical probe-mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

#### 3.4 Calibration and Validation Procedures and Data

Prior to the SAR assessment, the system validation kit was used to verify that the DASY4 was operating within its specifications. The verification was performed at 1640 MHz with the SPEAG D1640V2 calibrated validation dipole.

The validation dipoles are highly symmetric and matched at the centre frequency for the specified liquid and distance to the phantom. The accurate distance between the liquid surface and the dipole centre is achieved with a distance holder that snaps onto the dipole.

System validation is performed by feeding a known power level into a reference dipole, set at a known distance from the phantom. The measured SAR is compared to the theoretically derived level.

##### 3.4.1 Verification Results (1640 MHz)

The following table lists the dielectric properties of the tissue simulating liquid measured prior to each SAR verification. The results of the verification are listed in columns 5 and 6. The forward power into the reference dipole for each SAR validation was adjusted to 250 mW.

**Table: Validation Results (SPEAG calibrated dipoles)**

1 Validation Date	2 Frequency (MHz)	3 $\epsilon_r$ (measured)	4 $\sigma$ (mho/m) (measured)	5 Measured SAR 1g	6 Measured SAR 10g
19 <sup>th</sup> May 2010	1640	39.6	1.35	8.91	4.90



**3.4.2 Deviation from reference validation values**

The SPEAG calibration reference SAR value is the SAR validation result obtained in a specific dielectric liquid using the validation dipole (DV1640V2) during calibration. The measured one-gram SAR should be within 10% of the expected target reference values shown in table below.

**Table: Deviation from reference validation values**

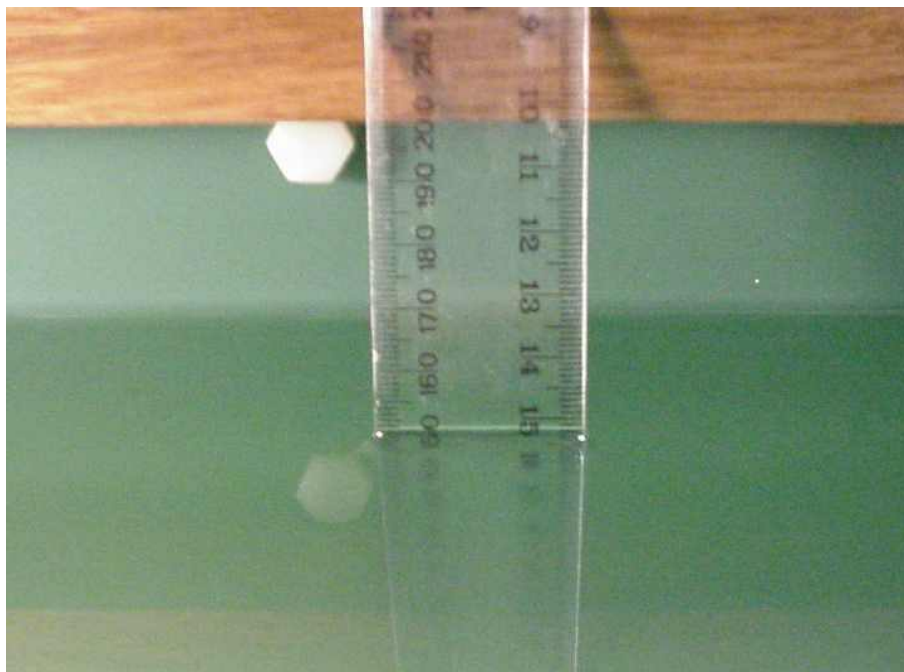
Validation Frequency	Measured SAR 1g (input power = 250mW)	Measured SAR 1g (Normalized to 1W)	SPEAG Calibration Reference SAR Value 1g (mW/g)	Deviation From SPEAG 1g (%)
1640 MHz	8.91	35.64	33	8.00

**Note:** All reference validation values are referenced to 1W input power.

**3.4.3 Liquid Depth 15cm**

During the SAR measurement process the liquid level was maintained to a level of 15cm with a tolerance of ±0.5cm. The following photo shows the depth of the liquid maintained during the testing.

**Photo of liquid Depth in Flat Phantom**



### 3.5 Phantom Properties (Size, Shape, Shell Thickness)

The phantom used during the SAR testing in Touch, Tilted positions and the validation was the “SAM” phantom from SPEAG. The phantom thickness is 2.0mm+/-0.2 mm and was filled with the required tissue simulating liquid.

### 3.6 Tissue Material Properties

The dielectric parameters of the tissue simulating liquid were measured prior to SAR assessment using the HP85070A dielectric probe kit and HP8753ES Network Analyser. The actual dielectric parameters are shown in the following table.

**Table: Measured Brain Simulating Liquid Dielectric Values**

Frequency Band	$\epsilon_r$ (measured range)	$\epsilon_r$ (target)	$\sigma$ (mho/m) (measured range)	$\sigma$ (target)	$\rho$ kg/m <sup>3</sup>
1616 MHz Brain	39.6	40.3 $\pm$ 5% (38.3 to 42.3)	1.33	1.29 $\pm$ 5% (1.23 to 1.35)	1000
1621 MHz Brain	39.6	40.3 $\pm$ 5% (38.3 to 42.3)	1.33	1.29 $\pm$ 5% (1.23 to 1.35)	1000
1626 MHz Brain	39.6	40.3 $\pm$ 5% (38.3 to 42.3)	1.34	1.29 $\pm$ 5% (1.23 to 1.35)	1000

**Note:** The brain and muscle liquid parameters were within the required tolerances of  $\pm$ 5%.

#### 3.6.1 Liquid Temperature and Humidity

The humidity and dielectric/ambient temperatures are recorded during the assessment of the tissue material dielectric parameters. The difference between the ambient temperature of the liquid during the dielectric measurement and temperature during the tests was less than  $|2|^\circ\text{C}$ .

**Table: Temperature and Humidity recorded for each day**

Date	Ambient Temperature ( $^\circ\text{C}$ )	Liquid Temperature ( $^\circ\text{C}$ )	Humidity (%)
19 <sup>th</sup> May 2010	20.8	20.5	37.0

### 3.7 Simulated Tissue Composition Used for SAR Test

The tissue simulating liquids are created prior to the SAR evaluation and often require slight modification each day to obtain the correct dielectric parameters.

**Table: Tissue Type: Brain @ 1600MHz**

Volume of Liquid: 30 Litres

Approximate Composition	% By Weight
Distilled Water	61.17
Salt	0.31
Bactericide	0.29
Triton X-100	38.23

\*Refer “OET Bulletin 65 97/01 P38”





### 3.8 Device Holder for DASY4

The DASY4 device holder supplied by SPEAG is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The rotation centres for both scales is the ear opening. Thus the device needs no repositioning when changing the angles.

The DASY4 device holder is made of low-loss material having the following dielectric parameters: relative permittivity  $\epsilon=3$  and loss tangent  $\delta=0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, to reduce the influence on the clamp on the test results.

Refer to Appendix A for photographs of device positioning

### 4.0 SAR MEASUREMENT PROCEDURE USING DASY4

The SAR evaluation was performed with the SPEAG DASY4 System (**DASY4 Version V4.7 Build 53**). A summary of the procedure follows:

- a) A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the DUT. The SAR at this point is measured at the start of the test and then again at the end of the test.
- b) The SAR distribution at the exposed side of the head or the flat section of the flat phantom is measured at a distance of 3.9 mm from the inner surface of the shell. The area covers the entire dimension of the head and the horizontal grid spacing is 15 mm x 15 mm. The actual Area Scan has dimensions of 300 mm x 180 mm surrounding the test device. Based on this data, the area of the maximum absorption is determined by Spline interpolation.
- c) Around this point, a volume of 30 mm x 30 mm x 30 mm is assessed by measuring 7 x 7 x 7 points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:
  - (i) The data at the surface are extrapolated, since the centre of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axis. This polynomial is then used to evaluate the points between the surface and the probe tip.
  - (ii) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g and 10 g) are computed using the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one-dimensional splines with the "Not a knot"- condition (in x, y and z-direction). The volume is integrated with the trapezoidal – algorithm. One thousand points (10 x 10 x 10) are interpolated to calculate the averages.
  - (iii) All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.
  - (iv) The SAR value at the same location as in Step (a) is again measured



## 5.0 MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528-2003 for both Handset SAR tests and Validation uncertainty. The measurement uncertainty of a specific device is evaluated independently and the total uncertainty for both evaluations (95% confidence level) must be less than 30%.

**Table: Uncertainty Budget for DASY4 Version V4.7 Build 53 – DUT SAR test**

Uncertainty Component	Tol. (6%)	Prob. Dist.	Div.	C <sub>i</sub> (1g)	C <sub>i</sub> (10g)	1g u <sub>i</sub> (6%)	10g u <sub>i</sub> (6%)	V <sub>i</sub>
<b>Measurement System</b>								
Probe Calibration	5.5	N	1	1	1	5.5	5.5	∞
Axial Isotropy	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effects	1	R	1.73	1	1	0.6	0.6	∞
Linearity	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	1	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	0.3	N	1	1	1	0.3	0.3	∞
Response Time	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Noise	3	R	1.73	1	1	1.7	1.7	∞
RF Ambient Reflections	3	R	1.73	1	1	1.7	1.7	∞
Probe Positioner	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning	2.9	R	1.73	1	1	1.7	1.7	∞
Max. SAR Eval.	1	R	1.73	1	1	0.6	0.6	∞
<b>Test Sample Related</b>								
Test Sample Positioning	1.61	N	1	1	1	1.6	1.6	11
Device Holder Uncertainty	3.6	N	1	1	1	3.6	3.6	7
Output Power Variation – SAR Drift Measurement	7.30	R	1.73	1	1	4.2	4.2	∞
<b>Phantom and Setup</b>								
Phantom Uncertainty	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.64	0.43	1.6	1.1	5
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.6	0.49	1.5	1.2	5
Combined standard Uncertainty		RSS				10.8	10.6	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)		k=2				21.6	21.20	

Estimated total measurement uncertainty for the DASY4 measurement system was  $\pm 10.8\%$ . The extended uncertainty ( $K = 2$ ) was assessed to be  $\pm 21.6\%$  based on 95% confidence level. The uncertainty is not added to the measurement result.



**Table: Uncertainty Budget for DASY4 Version V4.7 Build 53 - Validation**

Uncertainty Component	Tol. (6%)	Prob. Dist.	Div.	C <sub>i</sub> (1g)	C <sub>i</sub> (10g)	1g u <sub>i</sub> (6%)	10g u <sub>i</sub> (6%)	v <sub>i</sub>
<b>Measurement System</b>								
Probe Calibration	5.5	N	1	1	1	5.5	5.5	∞
Axial Isotropy	4.7	R	1.73	1	1	2.7	2.7	∞
Hemispherical Isotropy	9.6	R	1.73	0	0	0.0	0.0	∞
Boundary Effects	1	R	1.73	1	1	0.6	0.6	∞
Linearity	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	1	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	0.3	N	1	1	1	0.3	0.3	∞
Response Time	0	R	1.73	1	1	0.0	0.0	∞
Integration Time	0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Noise	3	R	1.73	1	1	1.7	1.7	∞
RF Ambient Reflections	3	R	1.73	1	1	1.7	1.7	∞
Probe Positioner	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning	2.9	R	1.73	1	1	1.7	1.7	∞
Max. SAR Eval.	1	R	1.73	1	1	0.6	0.6	∞
<b>Dipole</b>								
Dipole Axis to Liquid Distance	2	N	1.73	1	1	1.2	1.2	11
Input Power and SAR drift meas.	4.7	R	1.73	1	1	2.7	2.7	∞
<b>Phantom and Tissue Param.</b>								
Phantom Uncertainty	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.64	0.43	1.6	1.1	5
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.6	0.49	1.5	1.2	5
Combined standard Uncertainty		RSS				<b>9.0</b>	<b>8.7</b>	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)		k=2				<b>17.9</b>	<b>17.34</b>	

Estimated total measurement uncertainty for the DASY4 measurement system was  $\pm 9.0\%$ . The extended uncertainty ( $K = 2$ ) was assessed to be  $\pm 17.9\%$  based on 95% confidence level. The uncertainty is not added to the Validation measurement result.



## 6.0 EQUIPMENT LIST AND CALIBRATION DETAILS

Table: SPEAG DASY4 Version V4.7 Build 53

Equipment Type	Manufacturer	Model Number	Serial Number	Calibration Due	Used For this Test?
Robot - Six Axes	Staubli	RX90BL	N/A	Not applicable	✓
Robot Remote Control	SPEAG	CS7MB	RX90B	Not applicable	✓
SAM Phantom	SPEAG	N/A	1260	Not applicable	✓
SAM Phantom	SPEAG	N/A	1060	Not applicable	
Flat Phantom	AndreT	10.1	P 10.1	Not Applicable	
Flat Phantom	AndreT	9.1	P 9.1	Not Applicable	
Flat Phantom	SPEAG	PO1A 6mm	1003	Not Applicable	
Data Acquisition Electronics	SPEAG	DAE3 V1	359	08-July-2010	
Data Acquisition Electronics	SPEAG	DAE3 V1	442	10-Dec-2009	✓
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	
Probe E-Field	SPEAG	ET3DV6	1380	18-Dec-2009	✓
Probe E-Field	SPEAG	ET3DV6	1377	14-July-2010	
Probe E-Field	SPEAG	ES3DV6	3029	Not Used	
Probe E-Field	SPEAG	EX3DV4	3563	16-July-2010	
Antenna Dipole 300 MHz	SPEAG	D300V2	1005	14-Dec-2009	
Antenna Dipole 450 MHz	SPEAG	D450V2	1009	17-Dec-2010	
Antenna Dipole 900 MHz	SPEAG	D900V2	047	7-July-2010	
Antenna Dipole 1640 MHz	SPEAG	D1640V2	314	16-July-2010	✓
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	8-July-2010	
Antenna Dipole 1950 MHz	SPEAG	D1950V3	1113	12-Dec -2010	
Antenna Dipole 3500 MHz	SPEAG	D3500V2	1002	17-July-2010	
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	10-Dec-2010	
Antenna Dipole 5600 MHz	SPEAG	D5GHzV2	1008	07-Dec-2009	
RF Amplifier	EIN	603L	N/A	*In test	
RF Amplifier	Mini-Circuits	ZHL-42	N/A	*In test	✓
RF Amplifier	Mini-Circuits	ZVE-8G	N/A	*In test	
Synthesized signal generator	Hewlett Packard	ESG-D3000A	GB37420238	*In test	✓
RF Power Meter Dual	Hewlett Packard	437B	3125012786	29-June-2010	✓
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	01-July-2010	✓
RF Power Meter Dual	Gigatronics	8542B	1830125	26-Mar-2010	
RF Power Sensor	Gigatronics	80301A	1828805	26-Mar-2010	
RF Power Meter Dual	Hewlett Packard	435A	1733A05847	*In test	✓
RF Power Sensor	Hewlett Packard	8482A	2349A10114	*In test	✓
Network Analyser	Hewlett Packard	8714B	GB3510035	18-Sept-2009	
Network Analyser	Hewlett Packard	8753ES	JP39240130	11-Nov-2009	✓
Dual Directional Coupler	Hewlett Packard	778D	1144 04700	*In test	
Dual Directional Coupler	NARDA	3022	75453	*In test	✓

\* Calibrated during the test for the relevant parameters.



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## 7.0 SAR TEST METHOD

### 7.1 Description of the Test Positions

The SAR measurements are performed in a SAM Phantom on the left and right sides of the head in the Touch/Tilted positions using the centre frequency of the operating band. The configuration giving the maximum mass-averaged SAR is used to test the low-end and high-end frequencies of the transmitting band. See Appendix A for photos of test positions.

#### 7.1.1 “Touch Position”

The device was positioned with the vertical centre line of the body of the device and the horizontal line crossing the centre of the ear piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, the vertical centre line was aligned with the reference plane containing the three ear and mouth reference points. (Left Ear, Right Ear and Mouth). The centre of the earpiece was then aligned with the Right Ear and Left Ear.

The phone was then moved towards the phantom with the earpiece aligned with the line between the Left Ear and the Right Ear, until the phone just touched the ear. With the device maintained in the reference plane, and the phone in contact with the ear, the bottom of the phone was moved until the front side of the phone was in contact with the cheek of the phantom, or until contact with the ear was lost.

#### 7.1.2 “Tilted Position”

The device was positioned in the “Touch” position described above. While maintaining the device in the reference plane describe above, and pivoting against the ear, the device was moved away from the mouth by an angle of 15 degrees or until contact with the ear was lost

### 7.2 List of All Test Cases (Antenna In/Out, Test Frequencies, User Modes)

The SAR was measured at three test channels for the band of operation with the test sample operating at maximum power, as specified in section 2.3. The satellite mode antenna was extended or retracted as per the user manual.

### 7.3 FCC RF Exposure Limits for Occupational/ Controlled Exposure

SPATIAL PEAK SAR LIMITS FOR:	
Partial-Body:	8.0 mW/g (averaged over any 1g cube of tissue)
Hands, Wrists, Feet and Ankles:	20.0 mW/g (averaged over 10g cube of tissue)

### 7.4 FCC RF Exposure Limits for Un-controlled/Non-occupational

SPATIAL PEAK SAR LIMITS FOR:	
Partial-Body:	1.6 mW/g (averaged over any 1g cube of tissue)
Hands, Wrists, Feet and Ankles:	4.0 mW/g (averaged over 10g cube of tissue)



## 8.0 SAR MEASUREMENT RESULTS

The SAR values averaged over 1 g tissue masses were determined for the sample device for the Left and Right ear configurations of the phantom. The results are given in table below.

The plots with the corresponding SAR distributions, which reveal information about the location of the maximum SAR with respect to the device, are contained in Appendix B of this report.

**Table: SAR Measurement Results**

Test Position	Antenna	Plot Number	Test Channel	Test Freq. (MHz)	SAR Level for (1g) mW/g	DASY4 Measured Drift (dB)
Touch Right	Retracted (IN)	1	121	1621	0.175	-0.269
	Extended (OUT)	2	121	1621	0.036	0.099
Tilted Right	Extended (OUT)	3	121	1621	0.075	-0.002
Tilted Right	Retracted (IN)	4	001	1616	0.213	-0.061
		5	121	1621	<b>0.576</b>	-0.199
		6	240	1626	0.167	0.005
Touch Left	Retracted (IN)	7	121	1621	0.160	0.127
	Extended (OUT)	8	121	1621	0.072	-0.151
Tilted Left	Retracted (IN)	9	121	1621	0.433	0.306
	Extended (OUT)	10	121	1621	0.240	0.201

**Note:** The uncertainty of the system ( $\pm 21.6\%$ ) has not been added to the results.

The maximum measured SAR level in the 1600 MHz band was 0.576 mW/g for a 1 gram cube this value was measured in the Tilted Right position with Antenna Retracted (IN) at a frequency of 1621 MHz (Channel 121).

The FCC SAR limit for Non-occupational exposure is 1.6 m W/g measurement in a 1g cube of tissue.



## 9.0 COMPLIANCE STATEMENT

The Iridium Satellite Phone, Model 9555 was tested on behalf of TRaC. It complied with the FCC and Industry Canada SAR requirements.

The highest SAR level recorded for the 1600 MHz Satellite band was 0.576 mW/g, which is below the uncontrolled limit of 1.6 mW/g, even taking into account the measurement uncertainty of 21.6 %.

This document is issued in accordance with NATA's accreditation requirements. The results of tests, calibration and/or measurements included in this document are traceable to Australian/national standards. NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing and calibration reports.



Accreditation No. 5292

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## APPENDIX A1 Test Sample Photographs

Battery 1



Battery 2



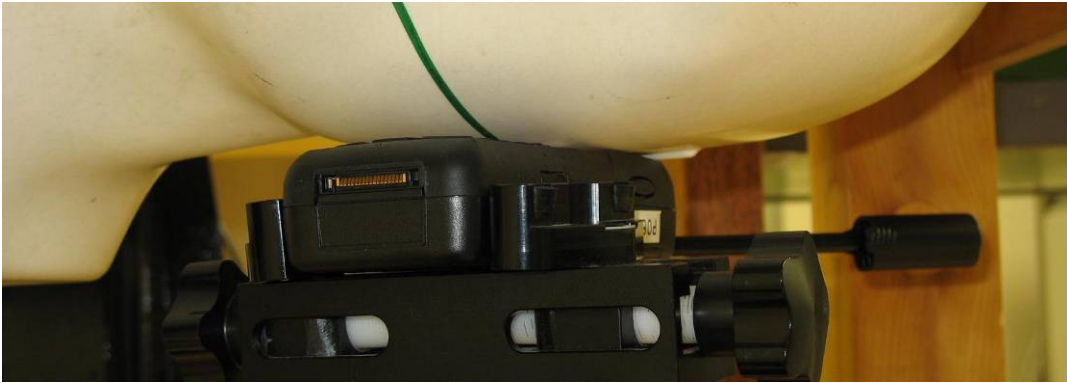
DUT





## Appendix A2 Test Setup Photographs

Touch Left Position - Antenna Extended (OUT)



Touch Right Position - Antenna Extended (OUT)



### Appendix A3 Test Setup Photographs

Tilted Left Position - Antenna Extended (OUT)



Tilted Right Position - Antenna Extended (OUT)



## Appendix A4 Test Setup Photographs

Tilted Left Position - Antenna Retracted (IN)



Tilted Right Position - Antenna Retracted (IN)



## Appendix A5 Test Setup Photographs

Touch Left Position - Antenna Retracted (IN)



Touch Right Position - Antenna Retracted (IN)



## APPENDIX B: PLOTS OF THE SAR MEASUREMENTS

Plots of the measured SAR distributions inside the phantom are given in this Appendix for all tested configurations. The spatial peak SAR values were assessed with the procedure described in this report.

**Table: 1600 MHz SAR Plots**

Test Position	Antenna	Plot Number	Test Channel
Touch Right	Retracted (IN)	1	121
	Extended (OUT)	2	121
Tilted Right	Extended (OUT)	3	121
Tilted Right	Retracted (IN)	4	001
		5	121
		6	240
Touch Left	Retracted (IN)	7	121
	Extended (OUT)	8	121
Tilted Left	Retracted (IN)	9	121
	Extended (OUT)	10	121

**Table: SAR Validation Plots**

Date	Plot Number	Frequency
19 <sup>th</sup> May 2010	11	1640 MHz



Accreditation No. 5292

Test Date: 19 May 2010

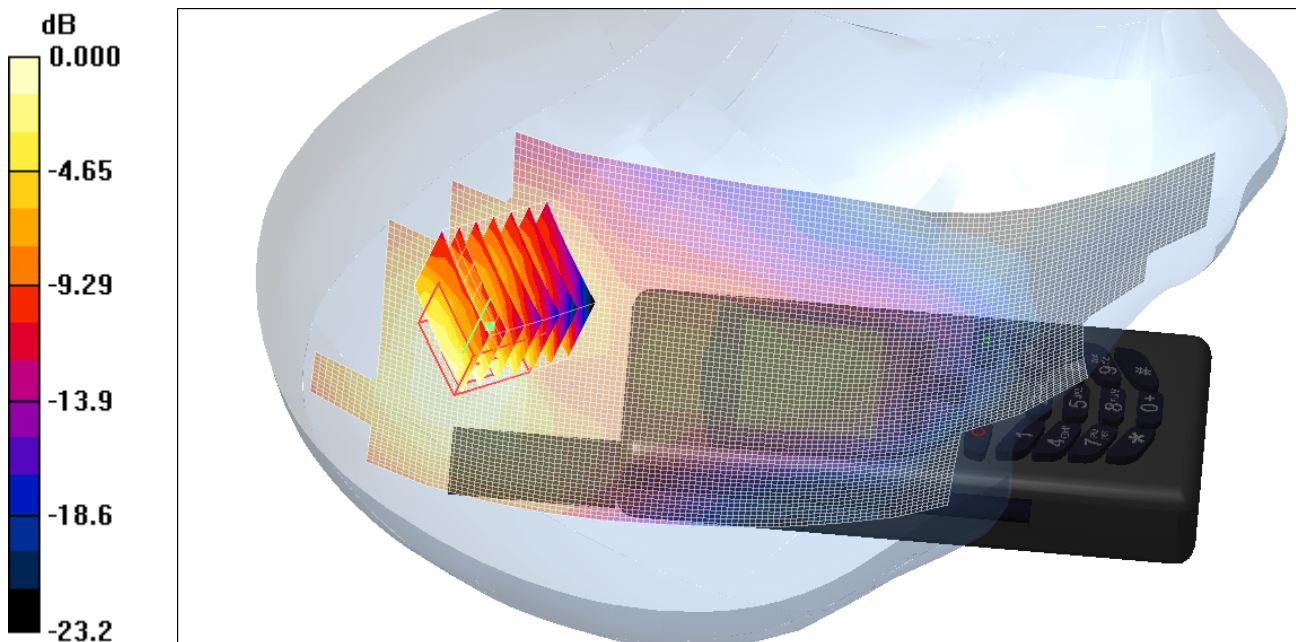
File Name: M100558 Touch Right 1600 MHz (DAE442 Probe1380) 19-05-10.da4

DUT: Iridium Satellite Phone; Type: 9555; Serial: IMEI: 309115010004030

- \* Communication System: 1600 MHz Satellite; Frequency: 1621 MHz; Duty Cycle: 1:9.2
- \* Medium parameters used:  $f = 1620$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.33, 5.33, 5.33)
- Phantom: SAM 22; Serial: 1260; Phantom section: Right Section

**Channel 121 Test/Area Scan (201x121x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.181 mW/g

**Channel 121 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 6.21 V/m; Power Drift = -0.269 dB  
Peak SAR (extrapolated) = 0.255 W/kg  
**SAR(1 g) = 0.175 mW/g; SAR(10 g) = 0.107 mW/g**  
Maximum value of SAR (measured) = 0.198 mW/g



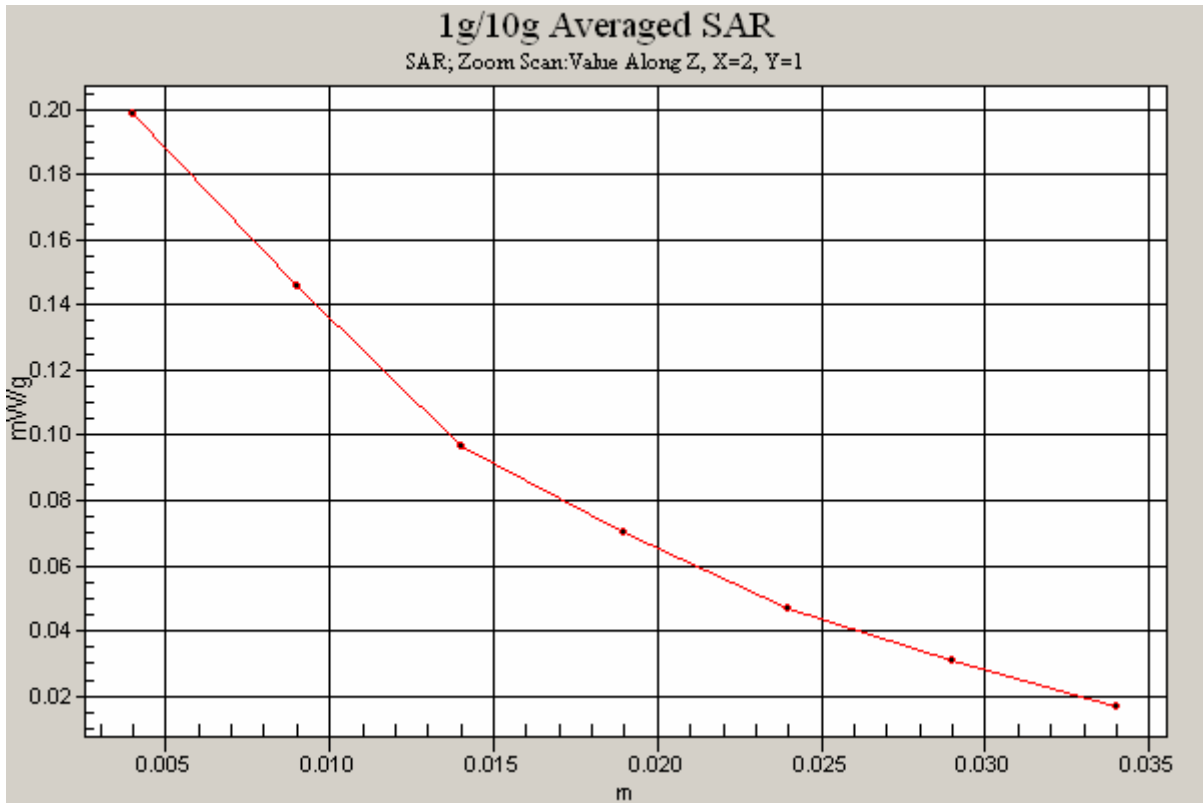
0 dB = 0.198mW/g

**SAR MEASUREMENT PLOT 1**

Ambient Temperature  
Liquid Temperature  
Humidity

20.8 Degrees Celsius  
20.5 Degrees Celsius  
37.0 %





Test Date: 19 May 2010

File Name: M100558 Touch Right Antenna Out 1600 MHz (DAE442 Probe1380) 19-05-10.da4

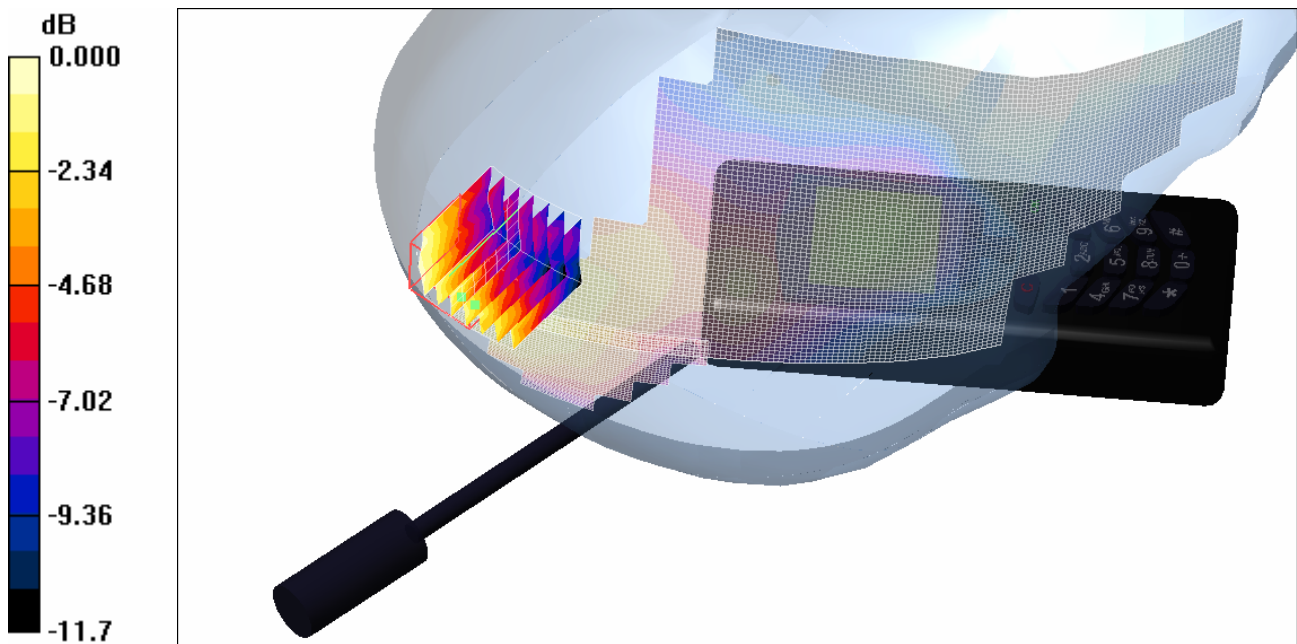
**DUT: Iridium Satellite Phone; Type: 9555; Serial: IMEI: 309115010004030**

- \* Communication System: 1600 MHz Satellite; Frequency: 1621 MHz; Duty Cycle: 1:9.2
- \* Medium parameters used:  $f = 1620$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.33, 5.33, 5.33)
- Phantom: SAM 22; Serial: 1260; Phantom section: Right Section

**Channel 121 Test/Area Scan (201x71x1):** Measurement grid: dx=15mm, dy=15mm  
 Maximum value of SAR (interpolated) = 0.037 mW/g

**Channel 121 Test/Area Scan 2 (301x101x1):** Measurement grid: dx=10mm, dy=10mm  
 Maximum value of SAR (interpolated) = 0.038 mW/g

**Channel 121 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
 Reference Value = 5.15 V/m; Power Drift = 0.099 dB  
 Peak SAR (extrapolated) = 0.059 W/kg  
**SAR(1 g) = 0.036 mW/g; SAR(10 g) = 0.026 mW/g**  
 Maximum value of SAR (measured) = 0.041 mW/g



0 dB = 0.041mW/g

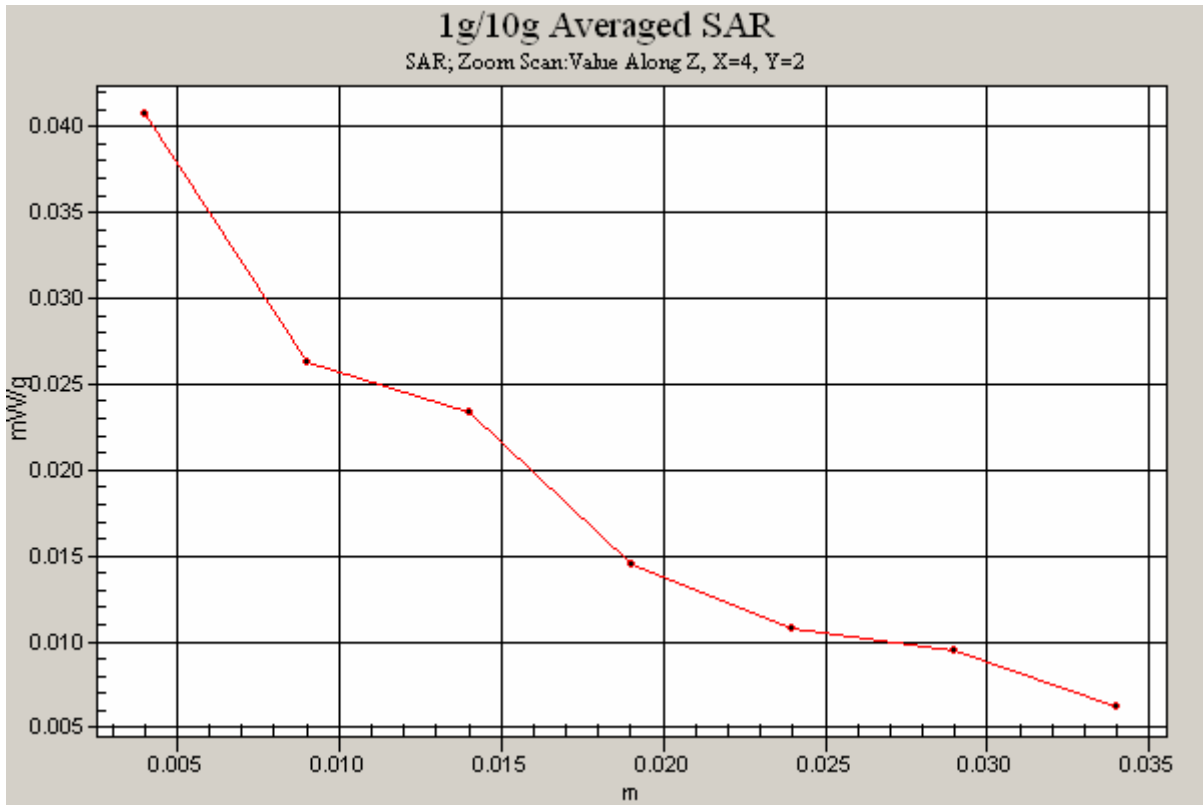
**SAR MEASUREMENT PLOT 2**

Ambient Temperature  
 Liquid Temperature  
 Humidity

20.8 Degrees Celsius  
 20.5 Degrees Celsius  
 37.0 %







Test Date: 19 May 2010

File Name: M100558 Tilted Right Antenna Out 1600 MHz (DAE442 Probe1380) 19-05-10.da4

**DUT: Iridium Satellite Phone; Type: 9555; Serial: IMEI: 309115010004030**

\* Communication System: 1600 MHz Satellite; Frequency: 1621 MHz; Duty Cycle: 1:9.2

\* Medium parameters used:  $f = 1620$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

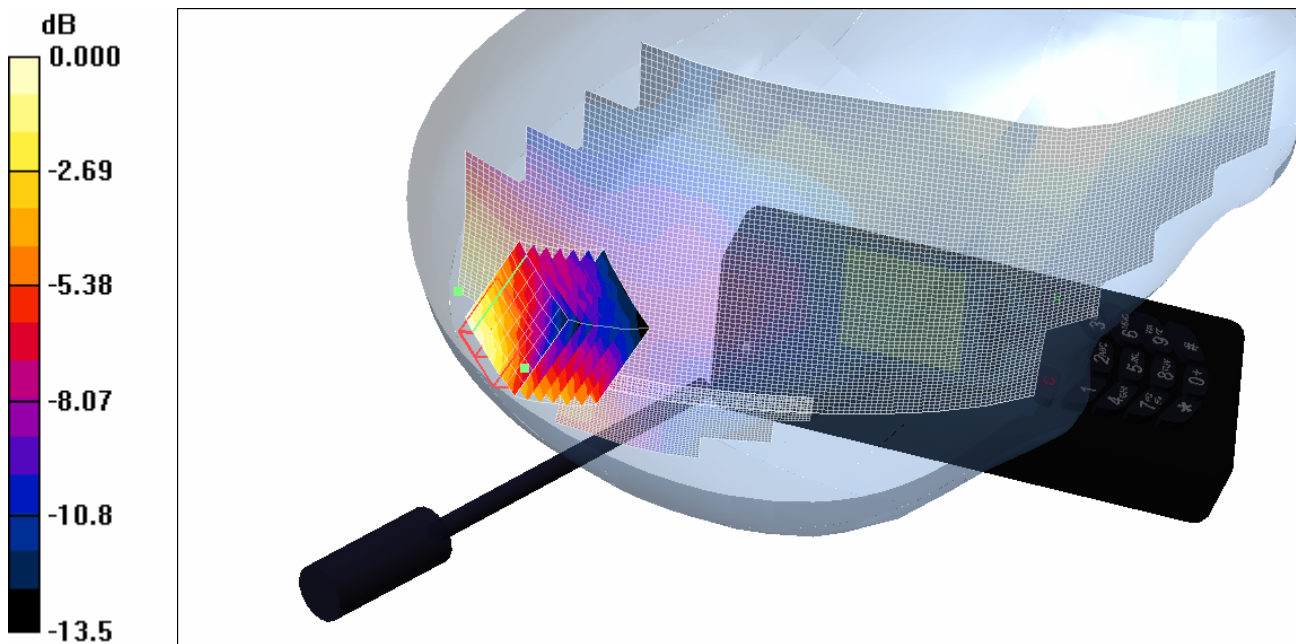
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.33, 5.33, 5.33)

- Phantom: SAM 22; Serial: 1260; Phantom section: Right Section

**Channel 121 Test/Area Scan (201x71x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.078 mW/g

**Channel 121 Test/Area Scan 2 (301x101x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 0.061 mW/g

**Channel 121 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 6.84 V/m; Power Drift = -0.002 dB  
Peak SAR (extrapolated) = 0.110 W/kg  
**SAR(1 g) = 0.075 mW/g; SAR(10 g) = 0.048 mW/g**  
Maximum value of SAR (measured) = 0.092 mW/g



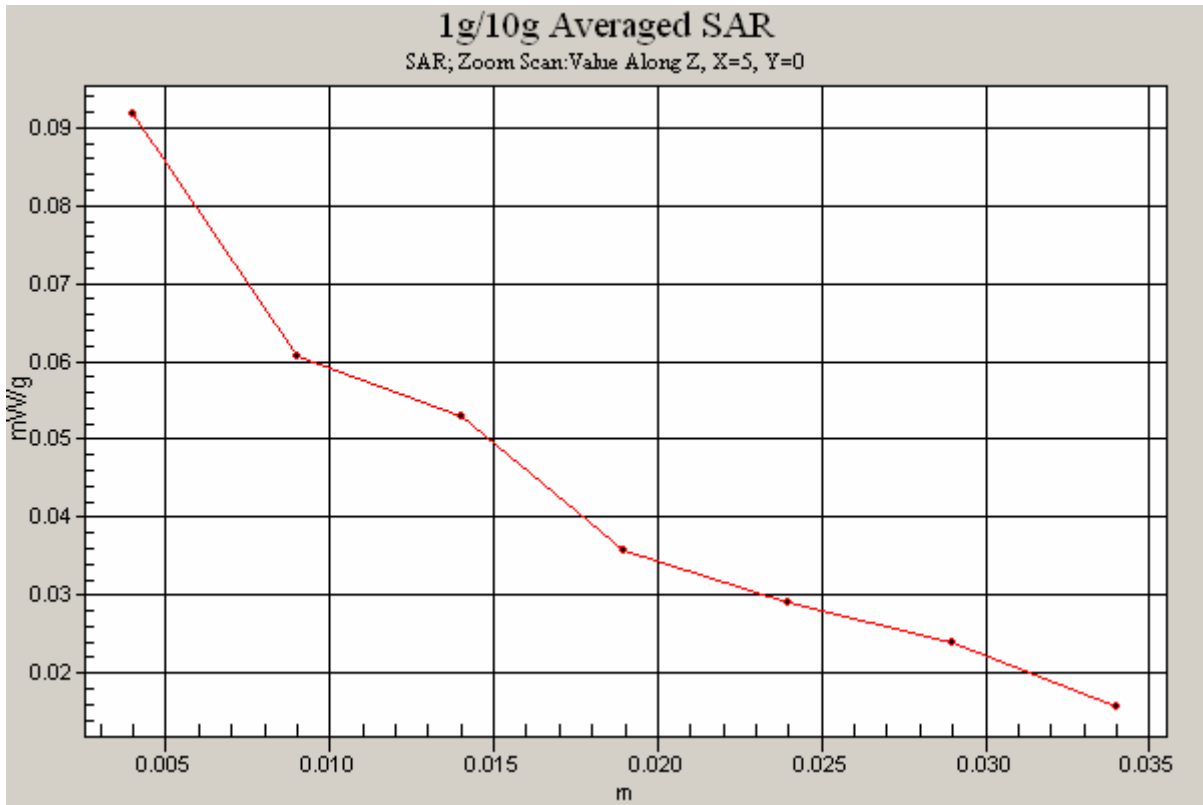
0 dB = 0.092mW/g

**SAR MEASUREMENT PLOT 3**

Ambient Temperature  
Liquid Temperature  
Humidity

20.8 Degrees Celsius  
20.5 Degrees Celsius  
37.0 %





Test Date: 19 May 2010

File Name: M100558 Tilted Right 1600 MHz (DAE442 Probe1380) 19-05-10.da4

**DUT: Iridium Satellite Phone; Type: 9555; Serial: IMEI: 309115010004030**

\* Communication System: 1600 MHz Satellite; Frequency: 1616 MHz; Duty Cycle: 1:9.2

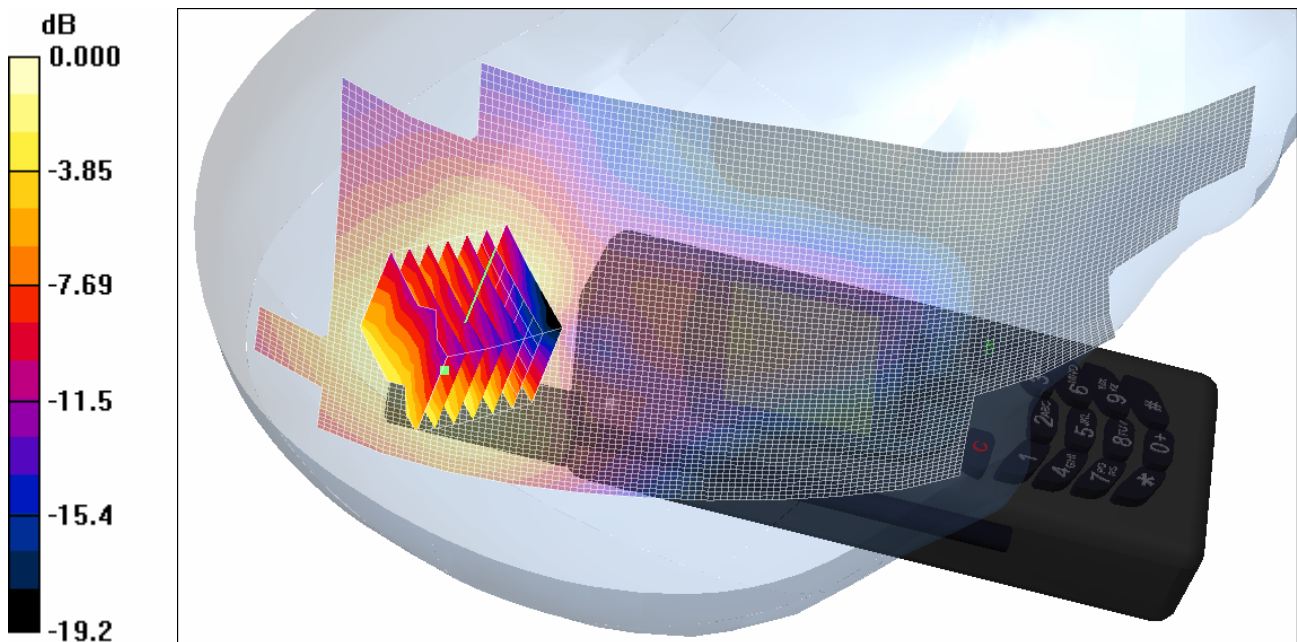
\* Medium parameters used:  $f = 1616 \text{ MHz}$ ;  $\sigma = 1.33 \text{ mho/m}$ ;  $\epsilon_r = 39.6$ ;  $\rho = 1000 \text{ kg/m}^3$

- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.33, 5.33, 5.33)

- Phantom: SAM 22; Serial: 1260; Phantom section: Right Section

**Channel 001 Test/Area Scan (201x121x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$   
 Maximum value of SAR (interpolated) = 0.214 mW/g

**Channel 001 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  
 $dy=5\text{mm}$ ,  $dz=5\text{mm}$   
 Reference Value = 5.30 V/m; Power Drift = -0.061 dB  
 Peak SAR (extrapolated) = 0.299 W/kg  
**SAR(1 g) = 0.213 mW/g; SAR(10 g) = 0.127 mW/g**  
 Maximum value of SAR (measured) = 0.241 mW/g



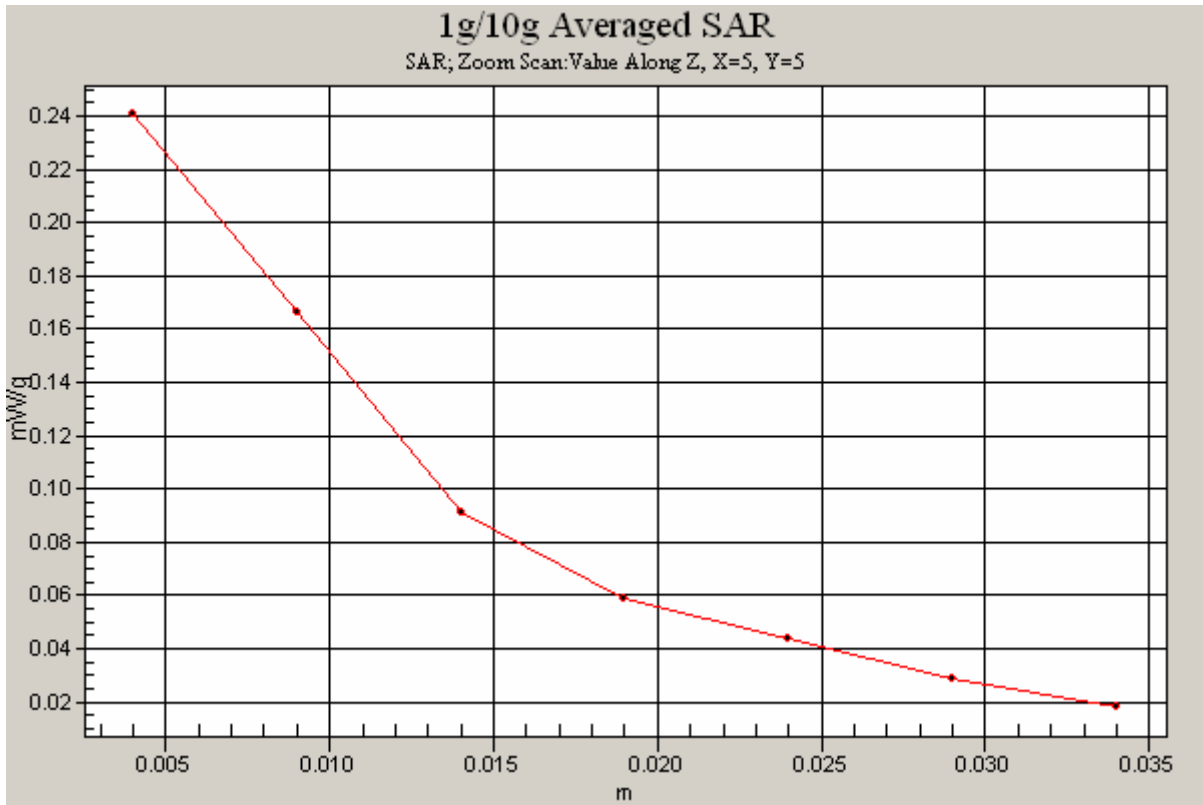
0 dB = 0.241mW/g

**SAR MEASUREMENT PLOT 4**

Ambient Temperature  
 Liquid Temperature  
 Humidity

20.8 Degrees Celsius  
 20.5 Degrees Celsius  
 37.0 %





Test Date: 19 May 2010

File Name: M100558 Tilted Right 1600 MHz (DAE442 Probe1380) 19-05-10.da4

**DUT: Iridium Satellite Phone; Type: 9555; Serial: IMEI: 309115010004030**

\* Communication System: 1600 MHz Satellite; Frequency: 1621 MHz; Duty Cycle: 1:9.2

\* Medium parameters used:  $f = 1620$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.33, 5.33, 5.33)

- Phantom: SAM 22; Serial: 1260; Phantom section: Right Section

**Channel 121 Test/Area Scan (201x121x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.723 mW/g

**Channel 121 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm,

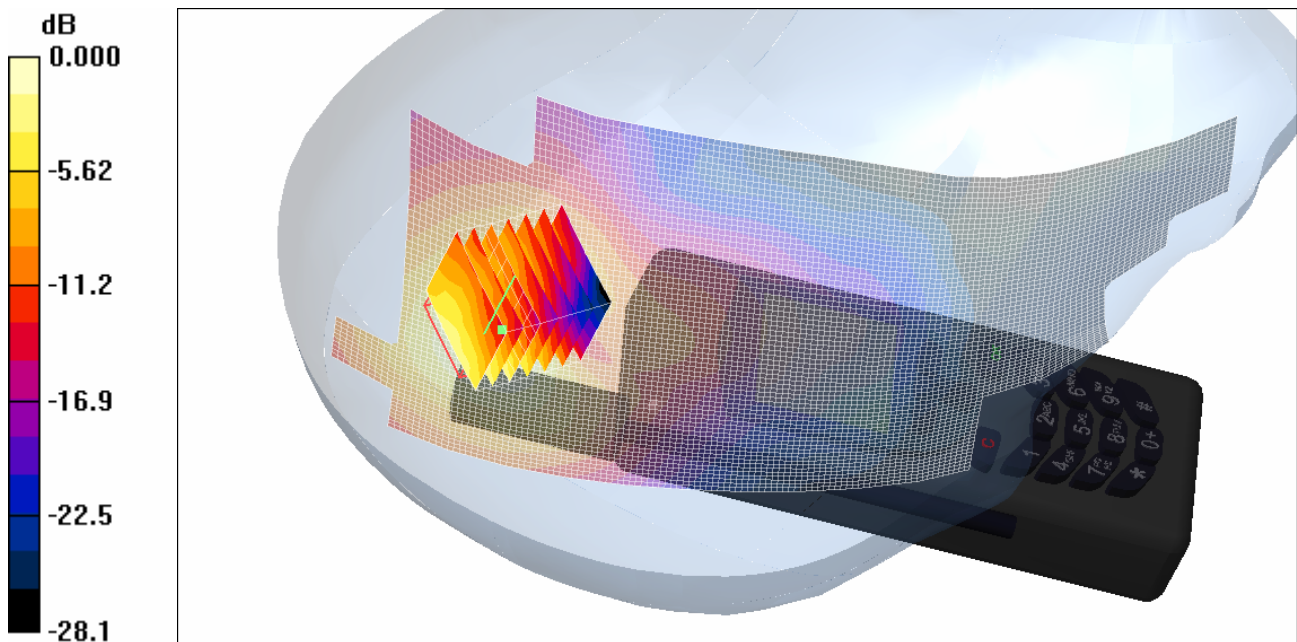
dy=5mm, dz=5mm

Reference Value = 5.99 V/m; Power Drift = -0.199 dB

Peak SAR (extrapolated) = 1.00 W/kg

**SAR(1 g) = 0.576 mW/g; SAR(10 g) = 0.331 mW/g**

Maximum value of SAR (measured) = 0.708 mW/g

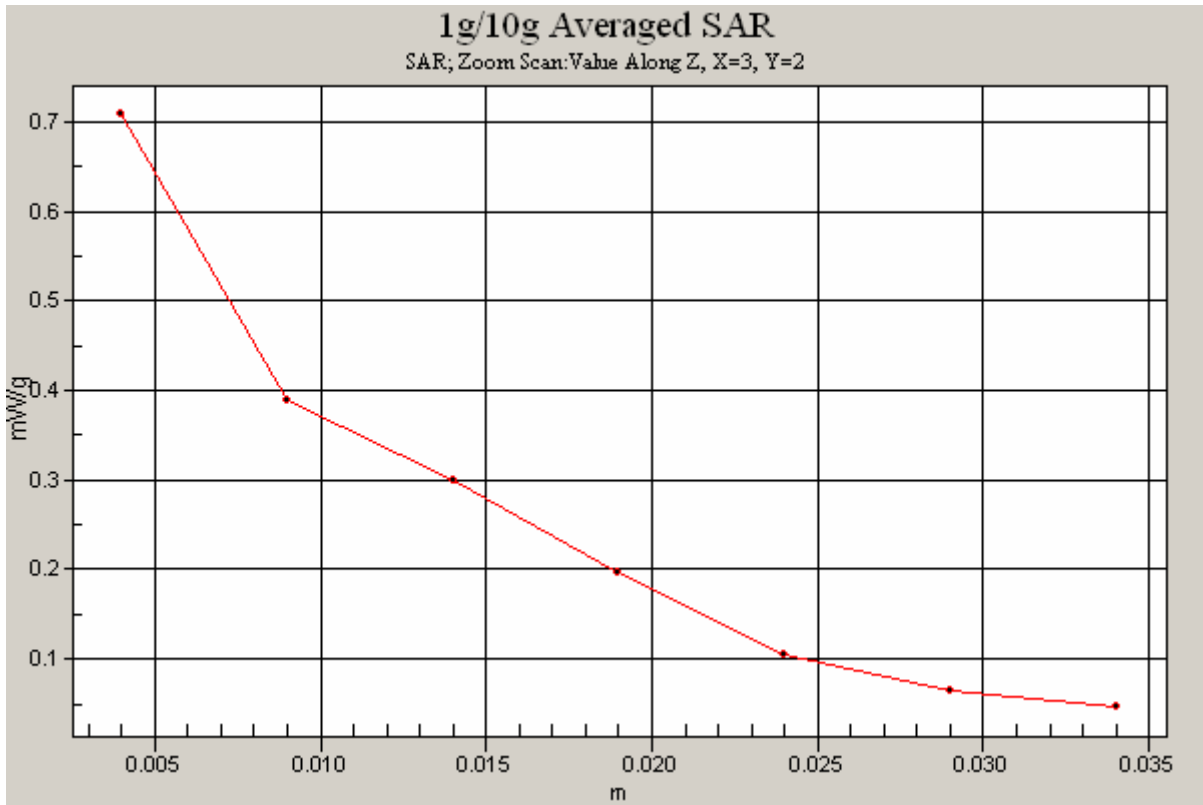


**SAR MEASUREMENT PLOT 5**

Ambient Temperature  
Liquid Temperature  
Humidity

20.8 Degrees Celsius  
20.5 Degrees Celsius  
37.0 %





Test Date: 19 May 2010

File Name: M100558 Tilted Right 1600 MHz (DAE442 Probe1380) 19-05-10.da4

DUT: **Iridium Satellite Phone; Type: 9555; Serial: IMEI: 309115010004030**

\* Communication System: 1600 MHz Satellite; Frequency: 1626 MHz; Duty Cycle: 1:9.2

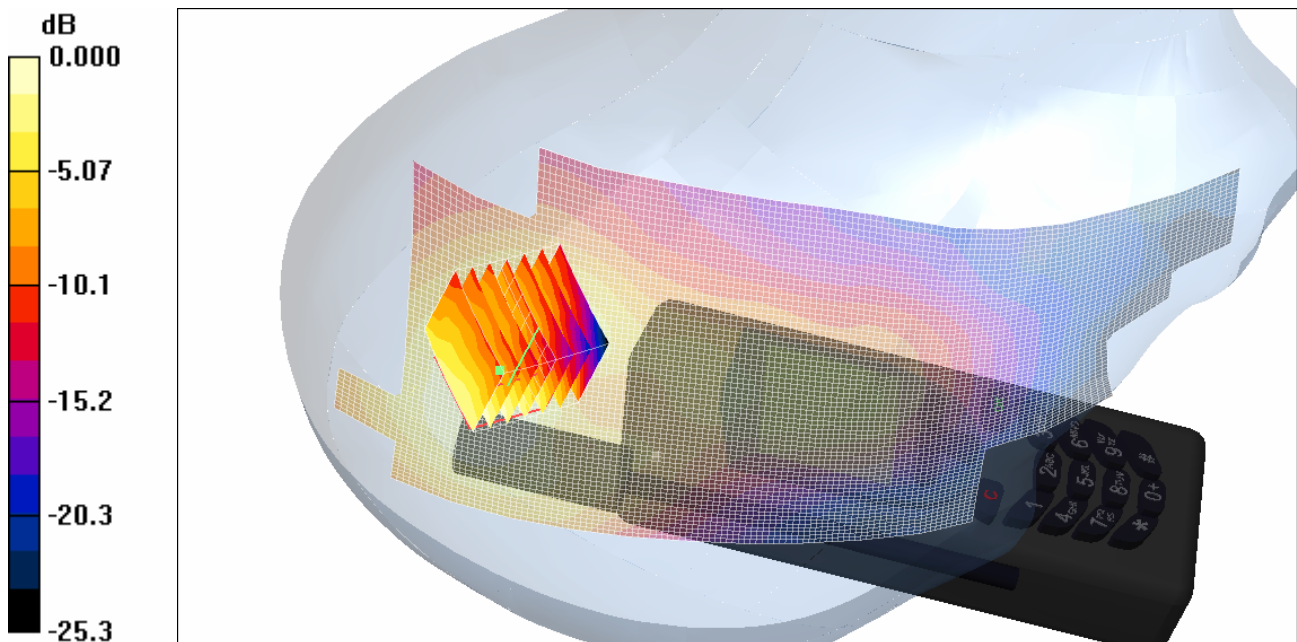
\* Medium parameters used:  $f = 1626 \text{ MHz}$ ;  $\sigma = 1.34 \text{ mho/m}$ ;  $\epsilon_r = 39.6$ ;  $\rho = 1000 \text{ kg/m}^3$

- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.33, 5.33, 5.33)

- Phantom: SAM 22; Serial: 1260; Phantom section: Right Section

**Channel 240 Test/Area Scan (201x121x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$   
 Maximum value of SAR (interpolated) = 0.177 mW/g

**Channel 240 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  
 $dy=5\text{mm}$ ,  $dz=5\text{mm}$   
 Reference Value = 6.35 V/m; Power Drift = 0.005 dB  
 Peak SAR (extrapolated) = 0.237 W/kg  
**SAR(1 g) = 0.167 mW/g; SAR(10 g) = 0.107 mW/g**  
 Maximum value of SAR (measured) = 0.194 mW/g



0 dB = 0.194mW/g

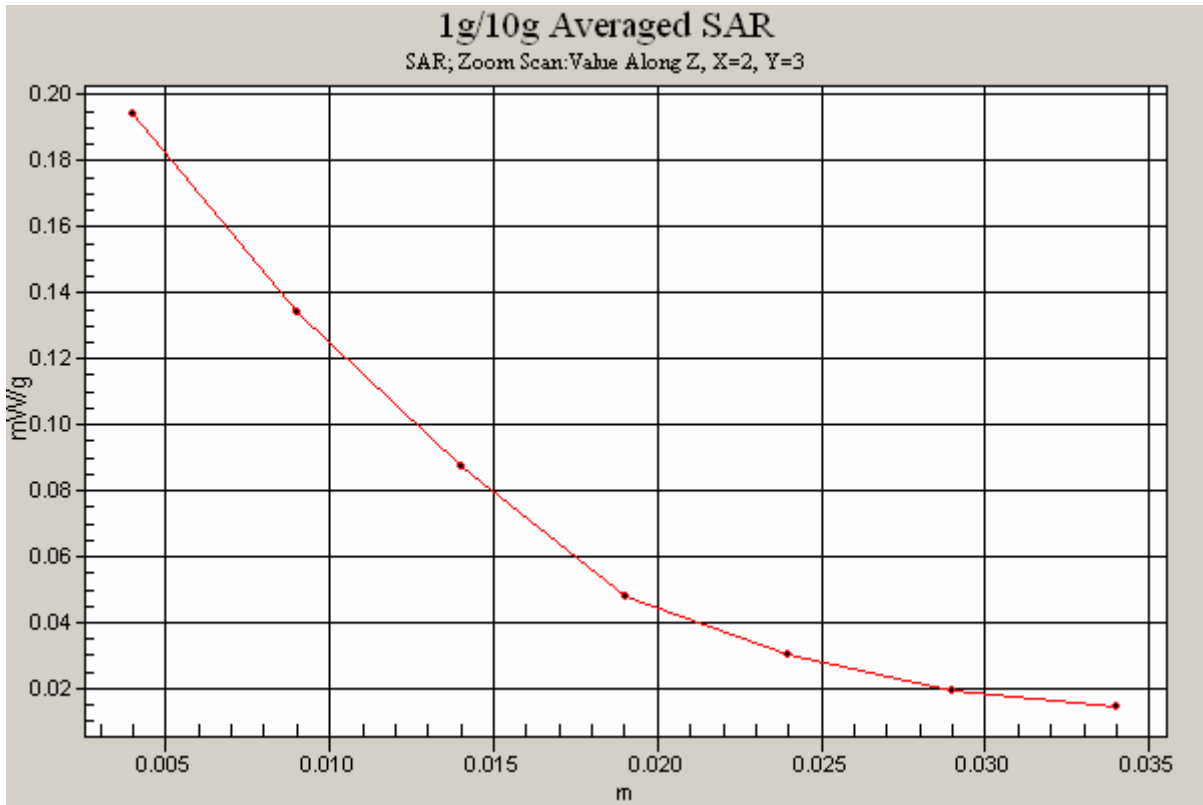
**SAR MEASUREMENT PLOT 6**

Ambient Temperature  
 Liquid Temperature  
 Humidity

20.8 Degrees Celsius  
 20.5 Degrees Celsius  
 37.0 %







Test Date: 19 May 2010

File Name: M100558 Touch Left 1600 MHz (DAE442 Probe1380) 19-05-10.da4

DUT: Iridium Satellite Phone; Type: 9555; Serial: IMEI: 309115010004030

\* Communication System: 1600 MHz Satellite; Frequency: 1621 MHz; Duty Cycle: 1:9.2

\* Medium parameters used:  $f = 1620$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.33, 5.33, 5.33)

- Phantom: SAM 22; Serial: 1260; Phantom section: Left Section

**Channel 121 Test/Area Scan (201x111x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.178 mW/g

**Channel 121 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm,

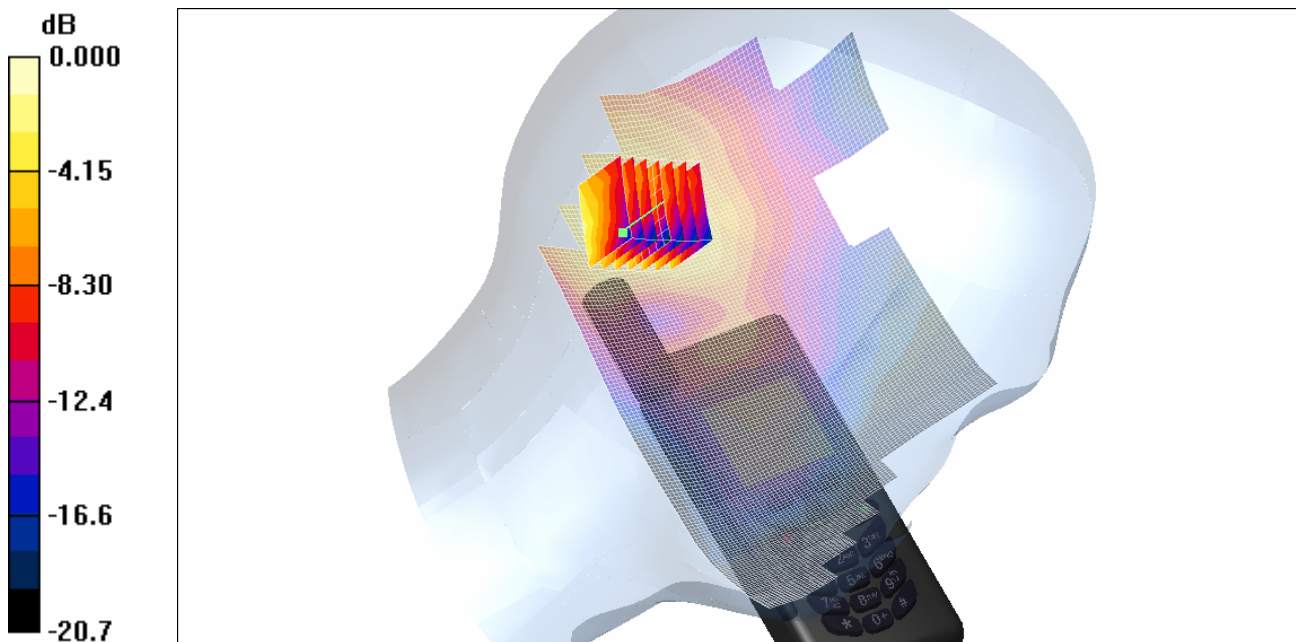
dy=5mm, dz=5mm

Reference Value = 5.12 V/m; Power Drift = 0.127 dB

Peak SAR (extrapolated) = 0.242 W/kg

**SAR(1 g) = 0.160 mW/g; SAR(10 g) = 0.100 mW/g**

Maximum value of SAR (measured) = 0.180 mW/g



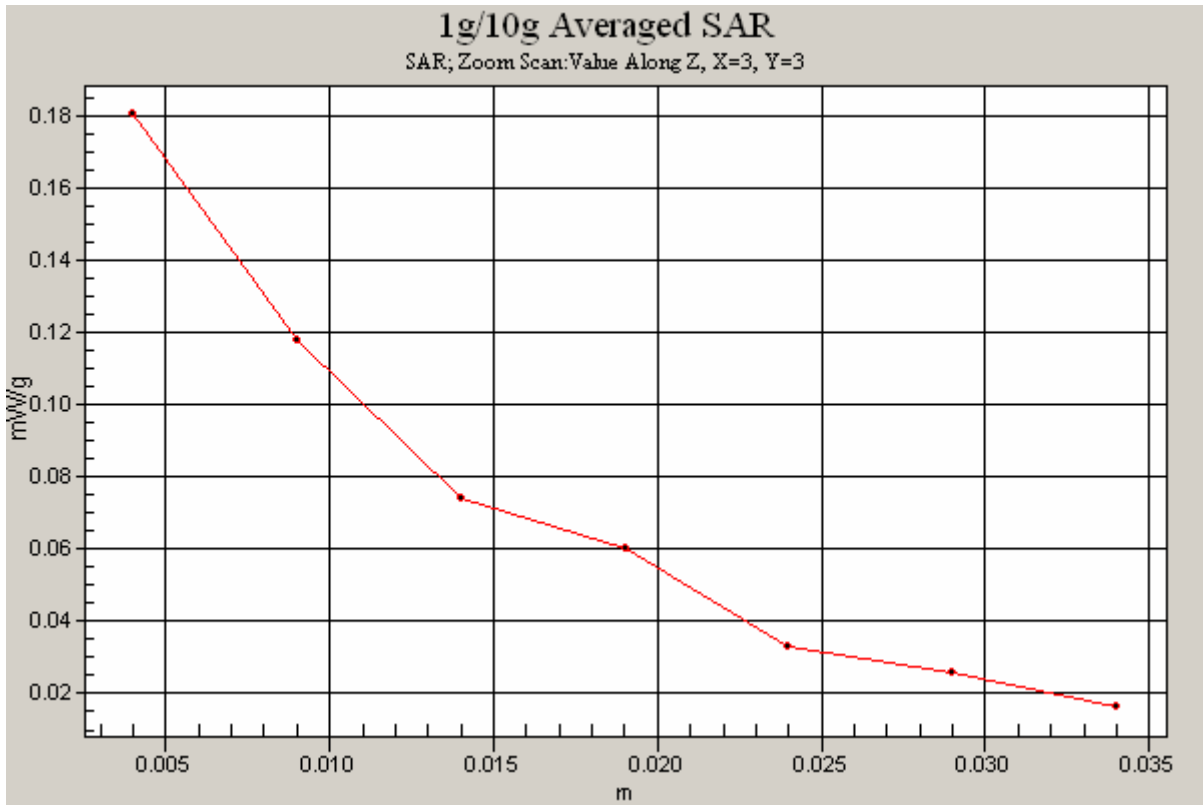
0 dB = 0.180mW/g

**SAR MEASUREMENT PLOT 7**

Ambient Temperature  
Liquid Temperature  
Humidity

20.8 Degrees Celsius  
20.5 Degrees Celsius  
37.0 %





Test Date: 19 May 2010

File Name: M100558 Touch Left Antenna Out 1600 MHz (DAE442 Probe1380) 19-05-10.da4

**DUT: Iridium Satellite Phone; Type: 9555; Serial: IMEI: 309115010004030**

\* Communication System: 1600 MHz Satellite; Frequency: 1621 MHz; Duty Cycle: 1:9.2

\* Medium parameters used:  $f = 1620$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

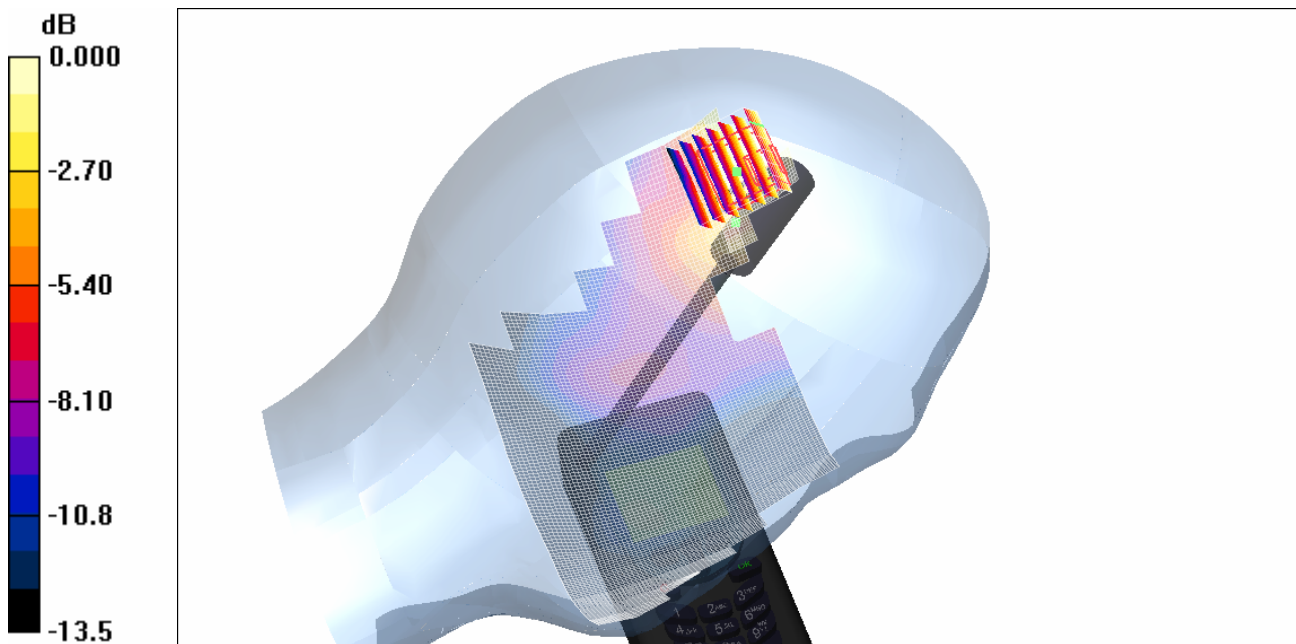
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.33, 5.33, 5.33)

- Phantom: SAM 22; Serial: 1260; Phantom section: Left Section

**Channel 121 Test/Area Scan (201x71x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (interpolated) = 0.051 mW/g

**Channel 121 Test/Area Scan 2 (301x101x1):** Measurement grid: dx=10mm, dy=10mm  
Maximum value of SAR (interpolated) = 0.572 mW/g

**Channel 121 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 6.47 V/m; Power Drift = -0.151 dB  
Peak SAR (extrapolated) = 0.108 W/kg  
**SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.046 mW/g**  
Maximum value of SAR (measured) = 0.085 mW/g

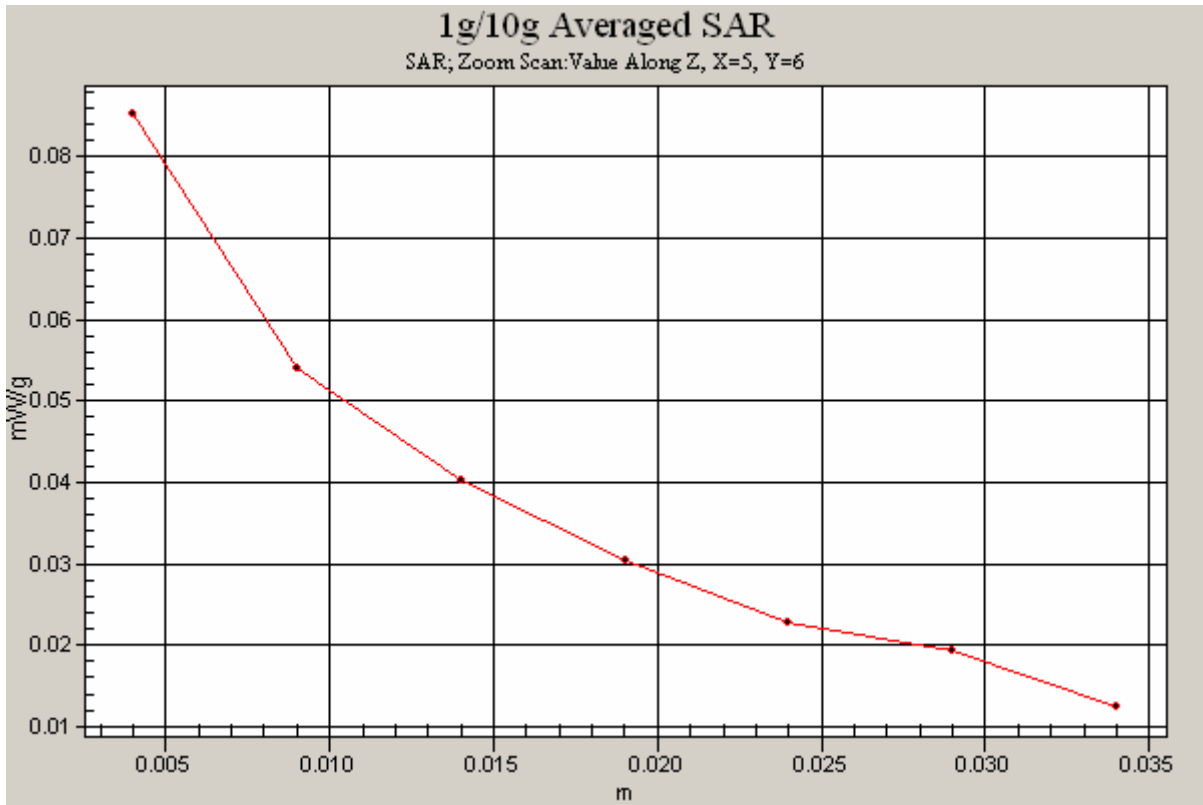


**SAR MEASUREMENT PLOT 8**

**Ambient Temperature**  
**Liquid Temperature**  
**Humidity**

**20.8 Degrees Celsius**  
**20.5 Degrees Celsius**  
**37.0 %**





Test Date: 19 May 2010

File Name: M100558 Tilted Left 1600 MHz (DAE442 Probe1380) 19-05-10.da4

**DUT: Iridium Satellite Phone; Type: 9555; Serial: IMEI: 309115010004030**

\* Communication System: 1600 MHz Satellite; Frequency: 1621 MHz; Duty Cycle: 1:9.2

\* Medium parameters used:  $f = 1620$  MHz;  $\sigma = 1.33$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.33, 5.33, 5.33)

- Phantom: SAM 22; Serial: 1260; Phantom section: Left Section

**Channel 121 Test/Area Scan (191x111x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.417 mW/g

**Channel 121 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm,

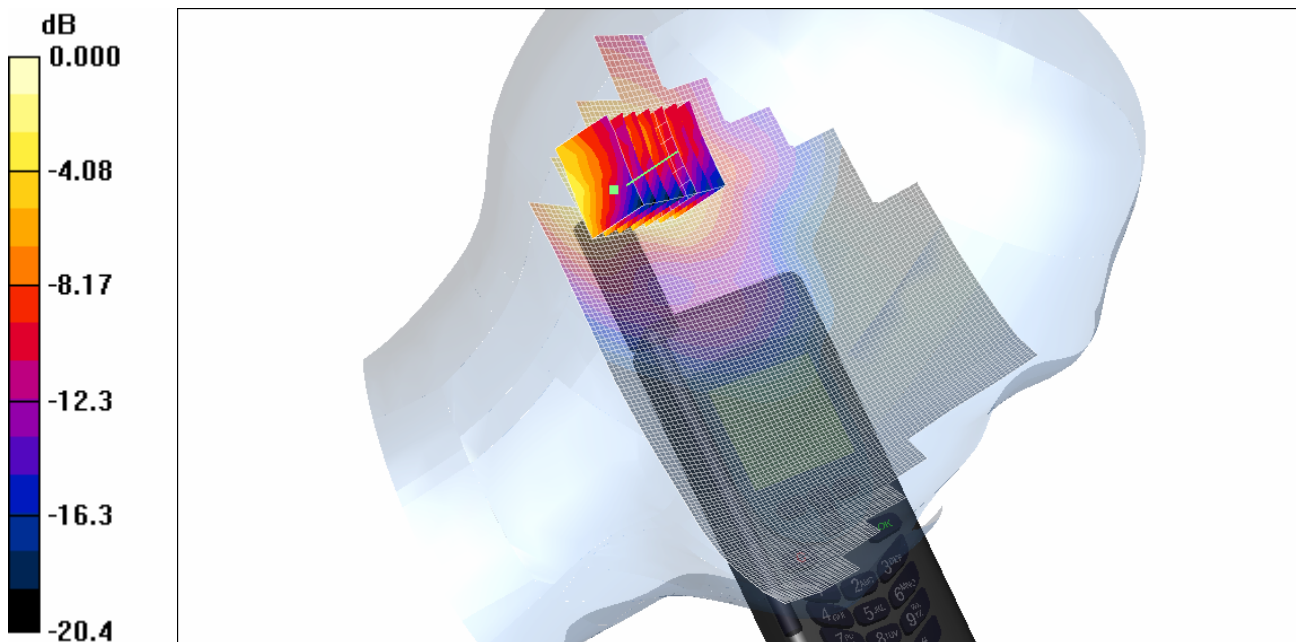
dy=5mm, dz=5mm

Reference Value = 4.89 V/m; Power Drift = 0.306 dB

Peak SAR (extrapolated) = 0.756 W/kg

**SAR(1 g) = 0.433 mW/g; SAR(10 g) = 0.259 mW/g**

Maximum value of SAR (measured) = 0.480 mW/g



0 dB = 0.480mW/g

**SAR MEASUREMENT PLOT 9**

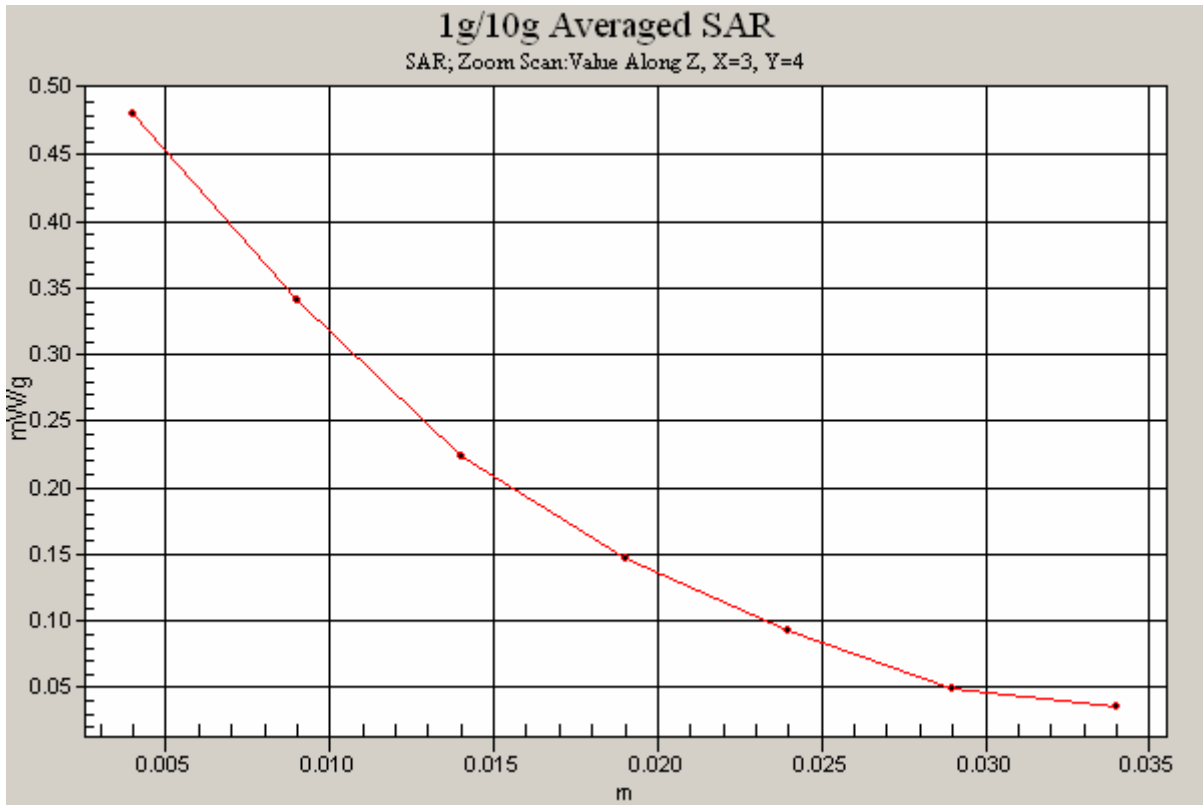
Ambient Temperature  
Liquid Temperature  
Humidity

20.8 Degrees Celsius  
20.5 Degrees Celsius  
37.0 %



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Test Date: 19 May 2010

File Name: M100558 Tilted Left Antenna Out 1600 MHz (DAE442 Probe1380) 19-05-10.da4

**DUT: Iridium Satellite Phone; Type: 9555; Serial: IMEI: 309115010004030**

\* Communication System: 1600 MHz Satellite; Frequency: 1621 MHz; Duty Cycle: 1:9.2

\* Medium parameters used:  $f = 1620 \text{ MHz}$ ;  $\sigma = 1.33 \text{ mho/m}$ ;  $\epsilon_r = 39.6$ ;  $\rho = 1000 \text{ kg/m}^3$

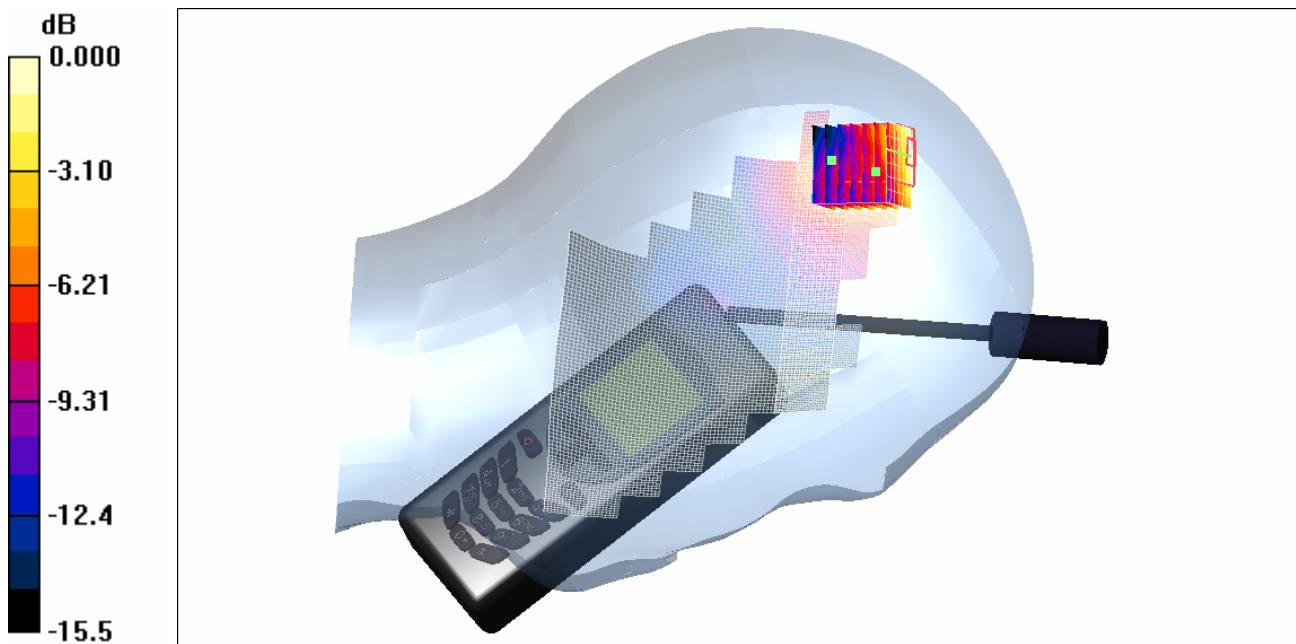
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.33, 5.33, 5.33)

- Phantom: SAM 22; Serial: 1260; Phantom section: Left Section

**Channel 121 Test/Area Scan (201x71x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$   
 Maximum value of SAR (interpolated) = 0.101 mW/g

**Channel 121 Test/Area Scan 2 (301x121x1):** Measurement grid:  $dx=10\text{mm}$ ,  
 $dy=10\text{mm}$   
 Maximum value of SAR (interpolated) = 0.172 mW/g

**Channel 121 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  
 $dy=5\text{mm}$ ,  $dz=5\text{mm}$   
 Reference Value = 9.31 V/m; Power Drift = 0.201 dB  
 Peak SAR (extrapolated) = 0.383 W/kg  
**SAR(1 g) = 0.240 mW/g; SAR(10 g) = 0.130 mW/g**  
 Maximum value of SAR (measured) = 0.267 mW/g



0 dB = 0.267mW/g

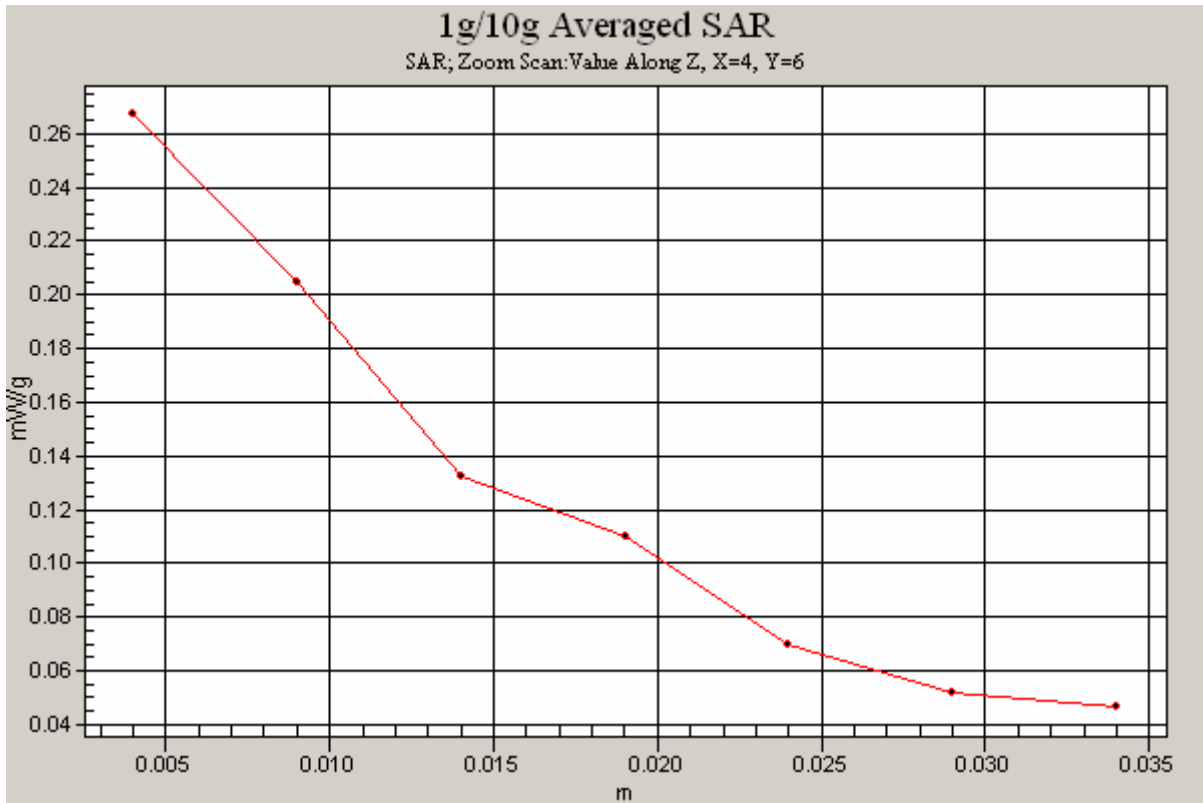
**SAR MEASUREMENT PLOT 10**

Ambient Temperature  
 Liquid Temperature  
 Humidity

20.8 Degrees Celsius  
 20.5 Degrees Celsius  
 37.0 %







Test Date: 19 May 2010

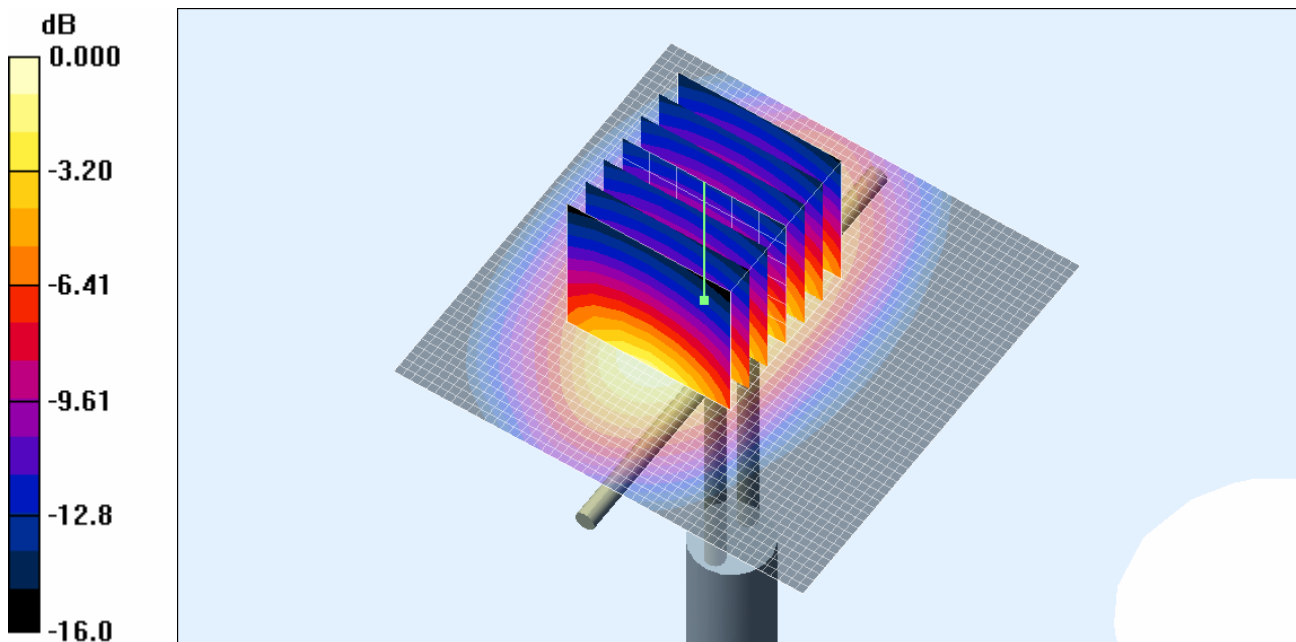
File Name: Validation 1640 MHz (DAE442 Probe1380) 19-05-10.da4

DUT: Dipole 1640 MHz; Type: DV1640V2; Serial: 314

- \* Communication System: CW 1640 MHz; Frequency: 1640 MHz; Duty Cycle: 1:1
- \* Medium parameters used:  $f = 1640$  MHz;  $\sigma = 1.35$  mho/m;  $\epsilon_r = 39.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.33, 5.33, 5.33)
- Phantom: SAM 22; Serial: 1260; Phantom section: Flat Section

**Channel 1 Test/Area Scan (51x51x1):** Measurement grid: dx=15mm, dy=15mm  
 Maximum value of SAR (interpolated) = 10.9 mW/g

**Channel 1 Test/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
 Reference Value = 89.0 V/m; Power Drift = -0.038 dB  
 Peak SAR (extrapolated) = 14.8 W/kg  
**SAR(1 g) = 8.91 mW/g; SAR(10 g) = 4.9 mW/g**  
 Maximum value of SAR (measured) = 10.2 mW/g



0 dB = 10.2mW/g

**SAR MEASUREMENT PLOT 11**

Ambient Temperature  
 Liquid Temperature  
 Humidity

20.8 Degrees Celsius  
 20.5 Degrees Celsius  
 37.0 %



