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SAR Test Report

Report Number: M080502

Test Sample: Iridium Satellite Phone

Model Number: H2

Tested For: TRL Compliance

Date of Issue: 5th June 2008

CONTENTS

SAR EVALUATION
Iridium Satellite Phone, **Model:** H2
Report Number: M080502

1.0 GENERAL INFORMATION

Test Sample:	Iridium Satellite Phone
Model Number:	H2
Manufacturer:	Iridium Satellite LLC
Device Category:	Portable Transmitter
Test Device:	Production Unit / Prototype Sample
RF exposure Category:	General Public/Unaware user
Tested for:	TRL Compliance
Address:	Nipe Lane, Up Holland, West Lancashire WN8 9PY UK
Contact:	John Charters
Phone:	+44 0 1923 229818
Fax:	+44 0 1695 556666
Email:	John.Charters@trac-trl.com
Test Standard/s:	Evaluating Compliance with FCC Guidelines For Human Exposure to Radiofrequency Electromagnetic Fields Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01)
SAR References:	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Measurement Techniques.
Statement Of Compliance:	The Iridium Satellite Phone, model H2. Complied with the FCC General public/uncontrolled RF exposure limits of 1.6mW/g per requirements of 47CFR2.1093(d).
Test Dates:	15th May 2008
Test Officer:	**Jason Cameron**
Authorised Signature:	**Peter Jakubiec**

2.0 DESCRIPTION OF DEVICE

2.1 Description of Test Sample

The device tested was Iridium Satellite Phone, operating in the 1616 – 1626 MHz frequency band. It has an integral antenna. The test device was tested in the Touch and Tilted Positions with the antenna retracted and extended.

The DUT is designed to operate at a lower power level when the antenna is retracted. SAR measurements were conducted with the device operating at the appropriate power level for each configuration.

Table: EUT Parameters

Operating Mode during Testing	: See Clause 2.3
Operating Mode production sample	: Globalstar Satellite
Modulation:	: Qualcomm Digital CDMA
Antenna type	: Retractable
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 the standard 3.7V battery.

2.3 Test Signal, Frequency and Output Power

The test was performed on the DUT, for this evaluation. For the 1616 – 1626 MHz Satellite band the test sample was put into maximum continuous transmit mode operation using test software provided by the customer. The channels utilised in the measurements were the traffic channels shown in the table below.

The test sample operates in the 1616 – 1626 MHz frequency band. The test sample was configured into a test mode that ensured a continuous RF transmission for the duration of each SAR scan.

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 measured at 1621 MHz with a calibrated Power Meter. The DUT is designed to operate at 2 different power levels depending on the antenna configuration (extended or retracted). The results of these measurements are listed in the following table.

Table: Frequency and Output Power

Channel	Power Level Setting	Channel Frequency MHz	Maximum Conducted Output Power dBm
121	0 (Antenna Extended)	1621	37.57
	2 (Antenna Retracted)	1621	35.74

Note: **The loss's due to cabling and attenuation has been taken into account.**

2.5 Battery Status

The device battery was fully charged prior to commencement of 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

Battery #1:	Li-ion Rechargeable 3.7V; 2200mAh	**Battery #2:**	Li-ion Rechargeable 3.7V; 2200mAh
Model No.:	BAT20801	**Model No.:**	BAT20801
Serial No.:	C7818-GR-168	**Serial No.:**	C7818-GR-150

2.5 Details of Test Laboratory

2.5.1 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
website: www.emctech.com.au

2.5.2 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 AS/NZS 2772.2:	RF and microwave radiation hazard measurement
ACA:	Radiocommunications (Electromagnetic Radiation — Human Exposure) Standard 2003, Amdt (No. 1) 2007, ACMA
FCC:	Guidelines for Human Exposure to RF Electromagnetic Field OET65C 01/01
CENELEC:	ES59005: 1998
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 50361: 2001	Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300MHz – 3GHz)
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 for the full scope of accreditation.

2.5.3 Environmental Factors

The measurements were performed in a shielded room with no background RF signals. The temperature in the laboratory was controlled to within 22 ± 1 °C, the humidity was 41%. See section 3.5.1 for measured temperature and humidity. The liquid parameters were measured daily prior to the commencement of each test. 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 5μV in both air and liquid mediums.

3.0 DESCRIPTION OF SAR MEASUREMENT SYSTEM

3.1 Probe Positioning System

The measurements were performed with the state of the art 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 that 1.1m), which positions the SAR measurement probes with a positional repeatability of better than ±0.02 mm. The DASY4 fully complies with the OET65 C (01-01), IEEE 1528 and EN50361SAR 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 ±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 MΩ; 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 validation was performed at 1640 MHz with the SPEAG D1640V2 calibrated 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 know distance from the phantom. The measured SAR is compared to the theoretically derived level.

3.4.1 Validation Results (1640 MHz)

The following table lists the dielectric properties of the tissue simulating liquid measured prior to each SAR validation. The results of the validation for each day 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 ∈r (measured)	4 σ (mho/m) (measured)	5 Measured SAR 1g	6 Measured SAR 10g
15th May 2008	1640	41.0	1.32	7.9	4.4

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

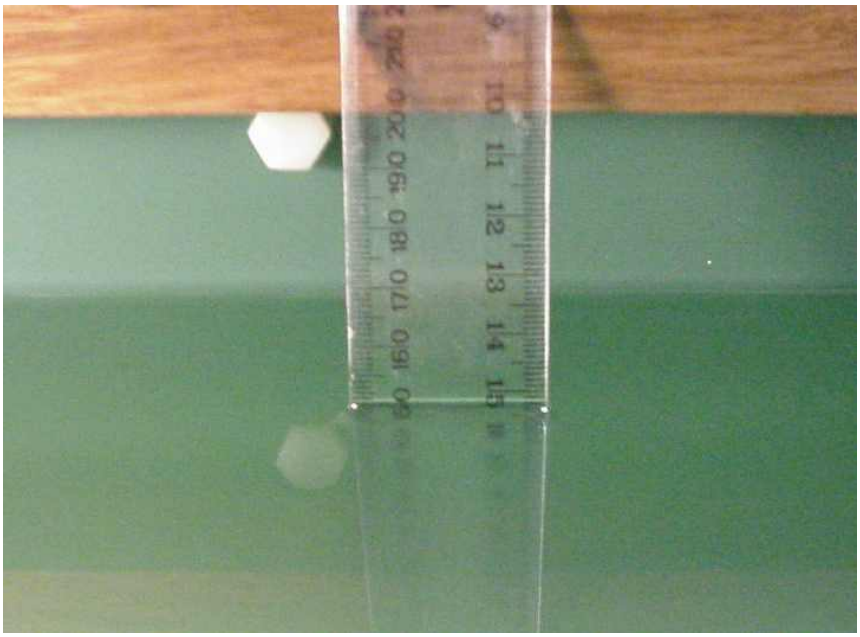
Validation Frequency	Measured SAR 1g (input power = 250mW)	Measured SAR 1g (Normalized to 1W)	SPEAG Calibration Reference SAR Value 1g (mW/g)	Deviation From SPEAG 1g (%)
15th May 2008 1640 MHz	7.9	31.60	32.4	-2.47

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 HP8714B Network Analyser. The actual dielectric parameters are shown in the following table.

Table: Measured Brain Simulating Liquid Dielectric Values

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
1610.73 MHz Brain	41.0	40.3 ±5% (38.3 to 42.3)	1.31	1.29 ±5% (1.23 to 1.35)	1000
1618.11 MHz Brain	41.0	40.3 ±5% (38.3 to 42.3)	1.31	1.29 ±5% (1.23 to 1.35)	1000
1625.49 MHz Brain	41.0	40.3 ±5% (38.3 to 42.3)	1.31	1.29 ±5% (1.23 to 1.35)	1000

Note: The brain and muscle liquid parameters were within the required tolerances of ±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 the temperature during tests was less than |2|°C.

Table: Temperature and Humidity recorded for each day

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
15th May 2008	22.4	21.5	41.0

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 ε=3 and loss tangent δ=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 (**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 EUT. 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 300mm x 165mm 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 1.2 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axes. 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 (1g and 10g) 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 and the power drift is recorded.

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 – EUT SAR test

a	b	c	d	e= f(d,k)	f	g	h=cxf/e	i=cxg/e	k
Uncertainty Component	Sec.	Tol. (%)	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i (%)	10g u_i (%)	v_i
Measurement System									
Probe Calibration (k=1) (standard calibration)	E.2.1	4.8	N	1	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	1	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1	N	1	1	1	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Conditions	E.6.1	0.05	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	2.9	R	1.73	1	1	1.7	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	1	R	1.73	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	1.61	N	1	1	1	1.6	1.6	11
Device Holder Uncertainty	E.4.1	3.34	N	1	1	1	3.3	3.3	7
Output Power Variation – SAR Drift Measurement	6.6.2	11.17	R	1.73	1	1	6.4	6.4	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	E.3.2	5	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – Measurement uncertainty	E.3.3	4.3	N	1	0.64	0.43	2.8	1.8	5
Liquid Permittivity – Deviation from target values	E.3.2	5	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – Measurement uncertainty	E.3.3	4.3	N	1	0.6	0.49	2.6	2.1	5
Combined standard Uncertainty			RSS				11.8	11.4	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				23.5	22.70	

Estimated total measurement uncertainty for the DASY4 measurement system was ±11.8%. The extended uncertainty (K = 2) was assessed to be ±23.5% 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

a	b	c	d	e= f(d,k)	f	g	h=cxf/e	i=cxg/e	k
Uncertainty Component	Sec.	Tol. (%)	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i (%)	10g u_i (%)	v_i
Measurement System									
Probe Calibration (k=1) (standard calibration)	E.2.1	4.8	N	1	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	1	1	2.7	2.7	∞
Hemispherical Isotropy	E.2.2	0	R	1.73	1	1	0.0	0.0	∞
Boundary Effect	E.2.3	1	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1	N	1	1	1	1.0	1.0	∞
Response Time	E.2.7	0	R	1.73	1	1	0.0	0.0	∞
Integration Time	E.2.8	0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Conditions	E.6.1	0.05	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	2.9	R	1.73	1	1	1.7	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	1	R	1.73	1	1	0.6	0.6	∞
Test Sample Related									
Dipole Axis to Liquid Surface		2	R	1.73	1	1	1.2	1.2	∞
Power Drift		4.7	R	1.73	1	1	2.7	2.7	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	E.3.2	5	R	1.73	0.6	0.43	1.7	1.2	∞
Liquid Conductivity – Measurement uncertainty	E.3.3	2.5	N	1.73	0.6	0.43	0.9	0.6	5
Liquid Permittivity – Deviation from target values	E.3.2	5	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – Measurement uncertainty	E.3.3	2.5	N	1.73	0.6	0.49	0.9	0.7	5
Combined standard Uncertainty			RSS				8.0	7.8	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				16.0	15.63	

Estimated total measurement uncertainty for the DASY4 measurement system was ±8.0%. The extended uncertainty (K = 2) was assessed to be ±16.0% 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	03-July-2008	
Data Acquisition Electronics	SPEAG	DAE3 V1	442	26-Feb-09	✓
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	
Probe E-Field	SPEAG	ET3DV6	1380	18-Dec-2008	✓
Probe E-Field	SPEAG	ET3DV6	1377	09-July-2008	
Probe E-Field	SPEAG	ES3DV6	3029	Not Used	
Probe E-Field	SPEAG	EX3DV4	3563	13-July-2008	
Antenna Dipole 300 MHz	SPEAG	D300V2	1005	14-Dec-2009	
Antenna Dipole 450 MHz	SPEAG	D450V2	1009	14-Dec-2008	
Antenna Dipole 900 MHz	SPEAG	D900V2	047	6-July-2008	
Antenna Dipole 1640 MHz	SPEAG	D1640V2	314	30-June-2008	✓
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	3-July-2008	
Antenna Dipole 1950 MHz	SPEAG	D1950V3	1113	5-March-2009	
Antenna Dipole 3500 MHz	SPEAG	D3500V2	1002	06-July-2008	
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	13-Dec-2008	
Antenna Dipole 5600 MHz	SPEAG	D5GHzV2	1008	07-Dec-2009	
RF Amplifier	EIN	603L	N/A	Not applicable	
RF Amplifier	Mini-Circuits	ZHL-42	N/A	Not applicable	✓
RF Amplifier	Mini-Circuits	ZVE-8G	N/A	Not applicable	
Synthesized signal generator	Hewlett Packard	ESG-D3000A	GB37420238	*In test	✓
RF Power Meter Dual	Hewlett Packard	437B	3125012786	30-May-2008	✓
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	30-May-2008	✓
RF Power Meter Dual	Gigatronics	8542B	1830125	11-May-2008	
RF Power Sensor	Gigatronics	80301A	1828805	11-May-2008	
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	06-Sept-2008	
Network Analyser	Hewlett Packard	8753ES	JP39240130	02 Oct-2008	✓
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.

7.0 SAR TEST METHOD

7.1 Description of the Test Positions

The SAR measurements are performed on the left and right sides of the head in the Touch/Tilted positions using the centre frequency of each 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. All SAR measurements were performed in the SAM phantom.
See Appendix A for photos of test positions.

7.1.1 "Touch Position"

The devices 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 each band of operation with the test sample operating as maximum power, as specified in section 2.2. The satellite mode antenna was extended and adjusted as per user's 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 devices, 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	Extended	1	121	1621	0.077	0.358
	Retracted	2	121	1621	0.608	0.107
Tilted Right	Extended	3	121	1621	0.099	-0.072
	Retracted	4	001	1616	1.30	0.460
		5	121	1621	1.45	0.359
		6	240	1626	1.38	0.091
Touch Left	Extended	7	121	1621	0.163	-0.049
	Retracted	8	121	1621	0.505	0.298
Tilted Left	Extended	9	121	1621	0.262	0.162
	Retracted	10	001	1616	0.956	0.065
		11	121	1621	0.899	0.158
		12	240	1626	0.866	0.179

Note: The uncertainty of the system (± 23.5 %) has not been added to the results.

The maximum measured SAR level in the 1600 MHz band was 1.45mW/g for a 1 gram cube this value was measured in the Tilted Right position with Antenna Retracted 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 H2 was tested on behalf of TRL Compliance. It complied with the FCC SAR requirements.

The highest SAR level recorded for the 1600 MHz Satellite band was 1.45 mW/g, which is below the uncontrolled limit of 1.6 mW/g. The recorded SAR level complied with the limit however the compliance margin was less than the measurement uncertainty of 23.5 %.

APPENDIX A1 Test Sample Photographs

Battery 1

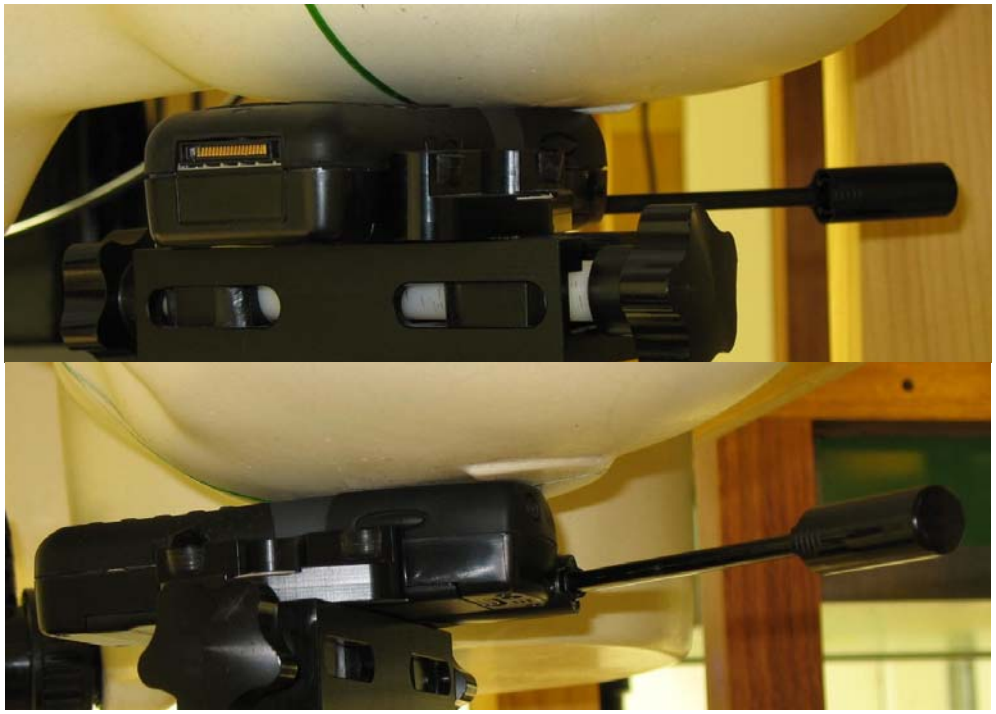
Battery 2

DUT

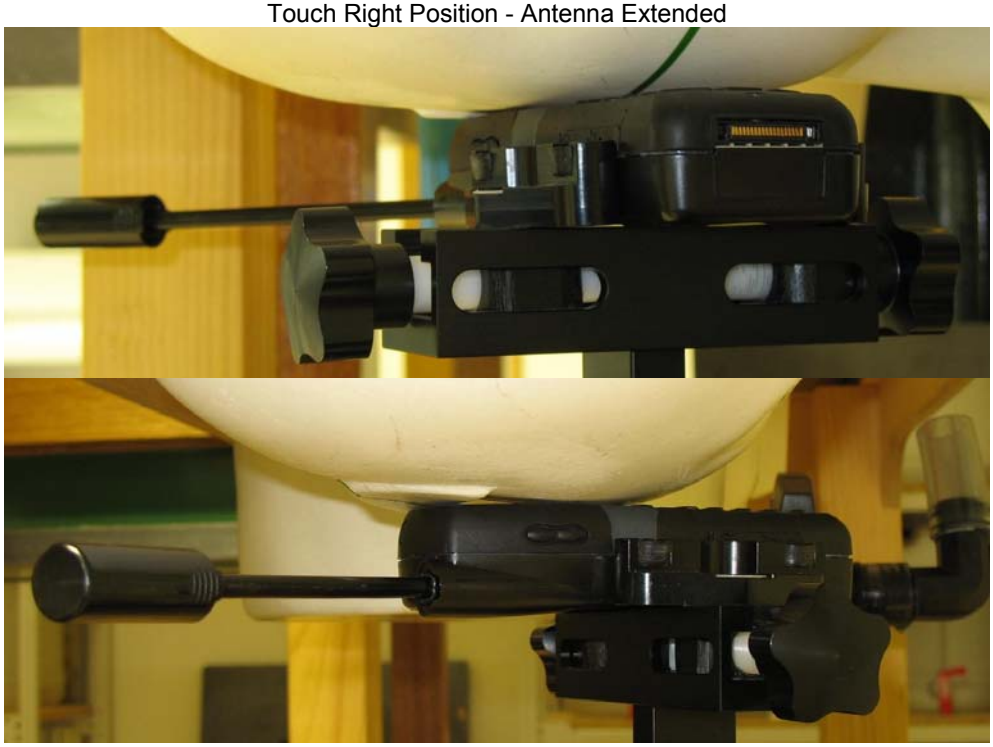
DUT

Appendix A2 Test Setup Photographs

Touch Left Position - Antenna Extended

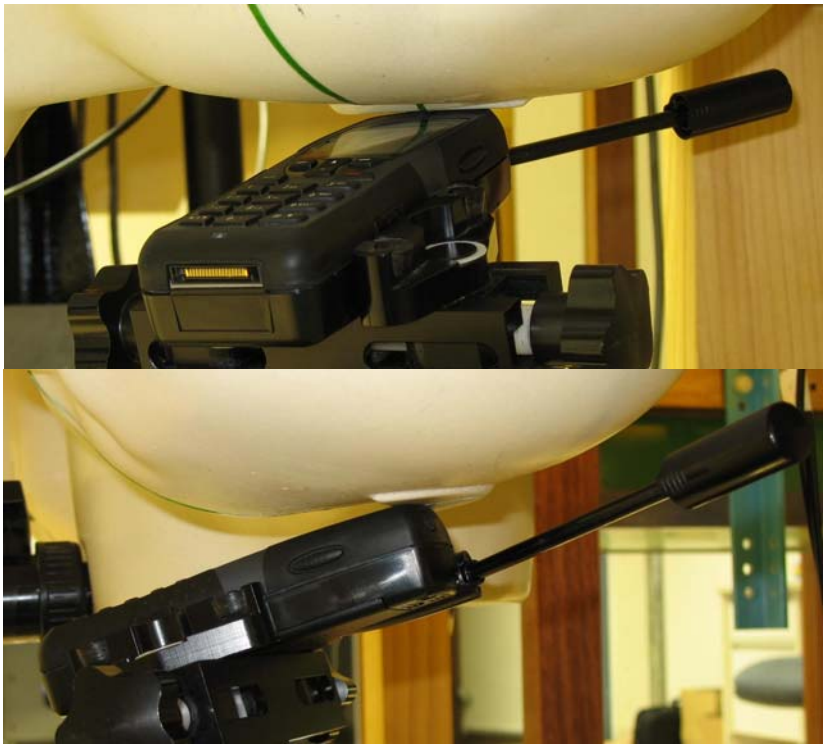


Touch Right Position - Antenna Extended



Appendix A3 Test Setup Photographs

Tilted Left Position - Antenna Extended

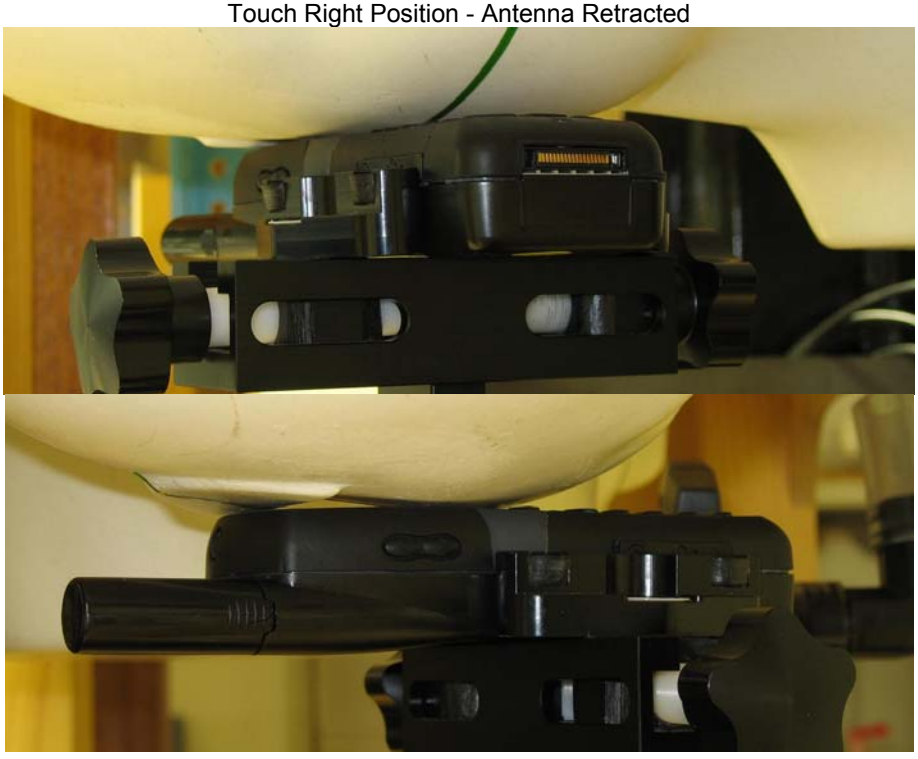


Tilted Right Position - Antenna Extended

Appendix A4 Test Setup Photographs

Touch Left Position - Antenna Retracted

Touch Right Position - Antenna Retracted



Appendix A5 Test Setup Photographs

Tilted Left Position - Antenna Retracted

Tilted Right Position - Antenna Retracted

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	Extended	**1**	121
	Retracted	**2**	121
Tilted Right	Extended	**3**	121
	Retracted	**4**	001
		5	121
		6	240
Touch Left	Extended	**7**	121
	Retracted	**8**	121
Tilted Left	Extended	**9**	121
	Retracted	**10**	001
		11	121
		12	240

Table: SAR Validation Plots

Date	Plot Number	Frequency
15th May 2008	**13**	1640 MHz

Test Date: 15 May 2008

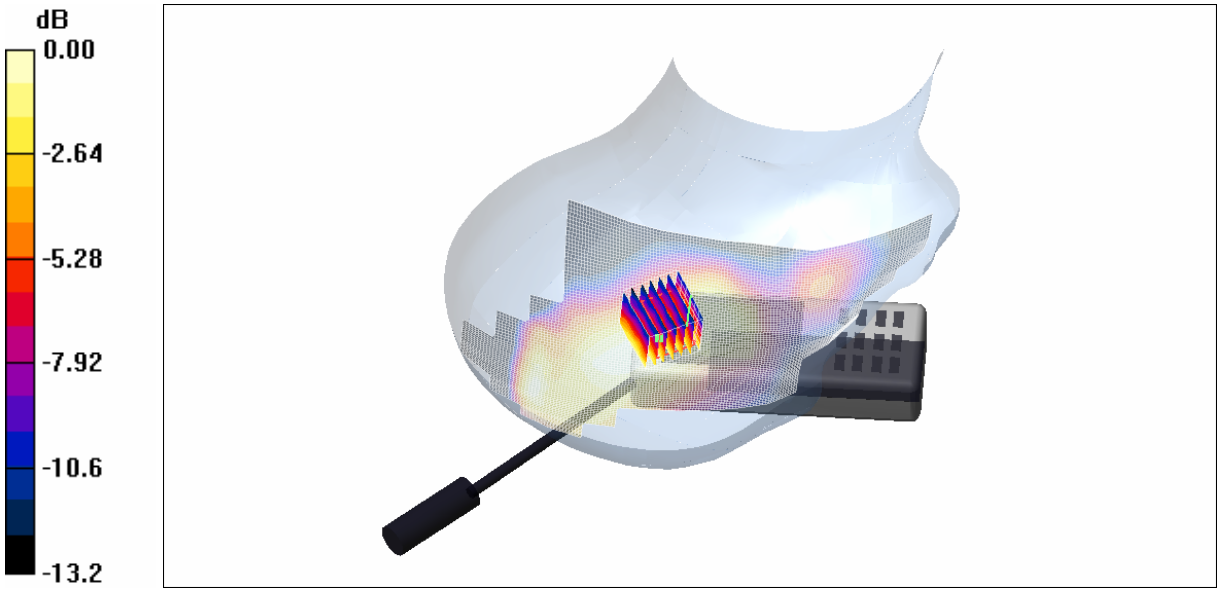
File Name: Touch Right 1600 MHz (DAE442 Probe1380) 15-05-08.da4

DUT: Iridium Satelite Phone; Type: H2; Serial: Prototype

* Communication System: 1600 MHz Satelite; Frequency: 1621 MHz; Duty Cycle: 1:9.2
* Medium parameters used: σ = 1.30923 mho/m, ε_r = 41.0247; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Right Section

Channel 121 Test/Area Scan (191x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.103 mW/g

Channel 121 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.55 V/m; Power Drift = 0.358 dB
Peak SAR (extrapolated) = 0.136 W/kg
SAR(1 g) = 0.077 mW/g; SAR(10 g) = 0.050 mW/g
Maximum value of SAR (measured) = 0.088 mW/g



0 dB = 0.088mW/g

SAR MEASUREMENT PLOT 3

Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

Test Date: 15 May 2008

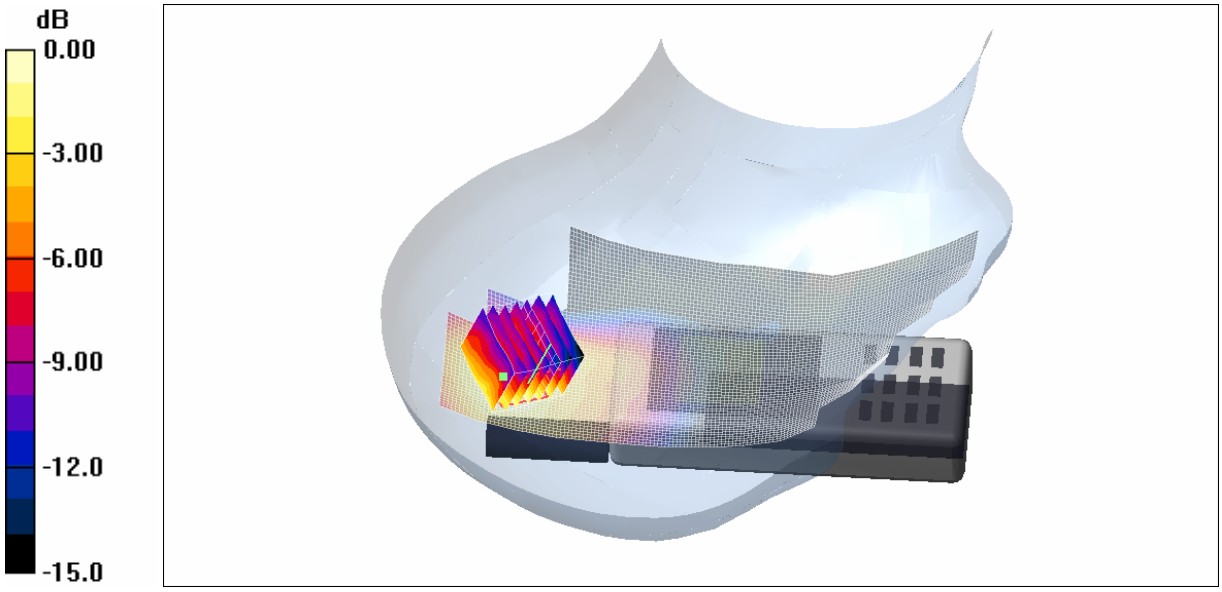
File Name: Touch Right Antenna Retructed 1600 MHz (DAE442 Probe1380) 15-05-08.da4

DUT: Iridium Satelite Phone; Type: H2; Serial: Prototype

* Communication System: 1600 MHz Satelite; Frequency: 1621 MHz; Duty Cycle: 1:9.2
* Medium parameters used: σ = 1.30923 mho/m, ε_r = 41.0247; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Right Section

Channel 121 Test/Area Scan (201x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.606 mW/g

Channel 121 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.7 V/m; Power Drift = 0.107 dB
Peak SAR (extrapolated) = 0.862 W/kg
SAR(1 g) = 0.608 mW/g; SAR(10 g) = 0.396 mW/g
Maximum value of SAR (measured) = 0.684 mW/g



0 dB = 0.684mW/g

SAR MEASUREMENT PLOT 2

Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

Test Date: 15 May 2008

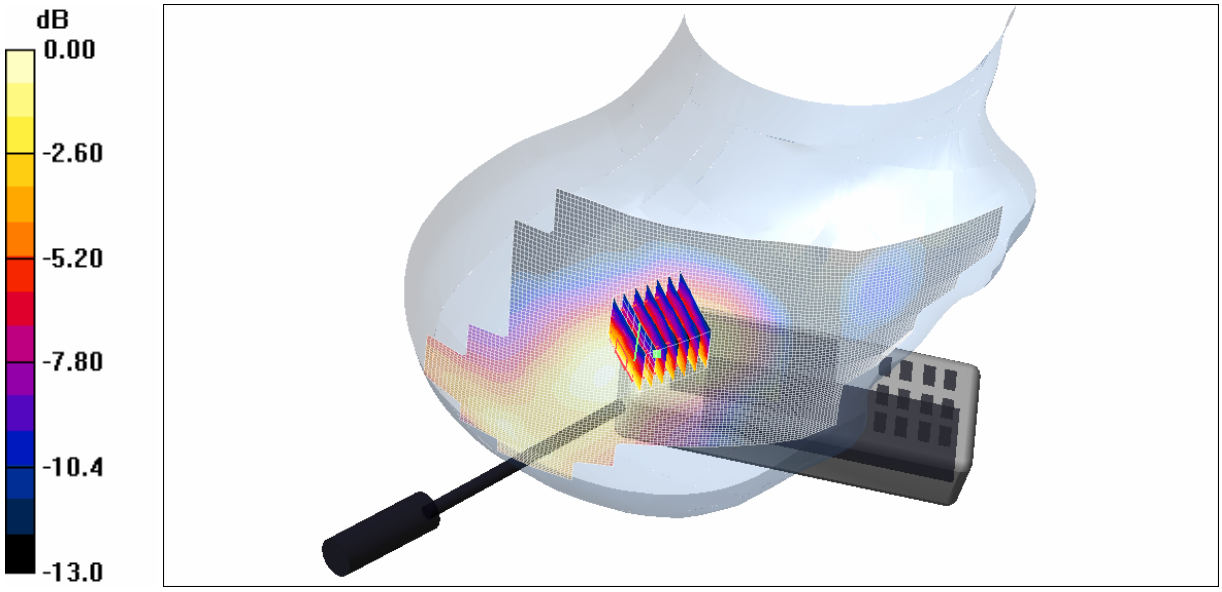
File Name: Tilted Right 1600 MHz (DAE442 Probe1380) 15-05-08.da4

DUT: Iridium Satelite Phone; Type: H2; Serial: Prototype

* Communication System: 1600 MHz Satelite; Frequency: 1621 MHz; Duty Cycle: 1:9.2
* Medium parameters used: σ = 1.30923 mho/m, ε_r = 41.0247; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Right Section

Channel 121 Test/Area Scan (201x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.106 mW/g

Channel 121 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.03 V/m; Power Drift = -0.072 dB
Peak SAR (extrapolated) = 0.195 W/kg
SAR(1 g) = 0.099 mW/g; SAR(10 g) = 0.064 mW/g
Maximum value of SAR (measured) = 0.115 mW/g



0 dB = 0.115mW/g

SAR MEASUREMENT PLOT 3

Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

Test Date: 15 May 2008

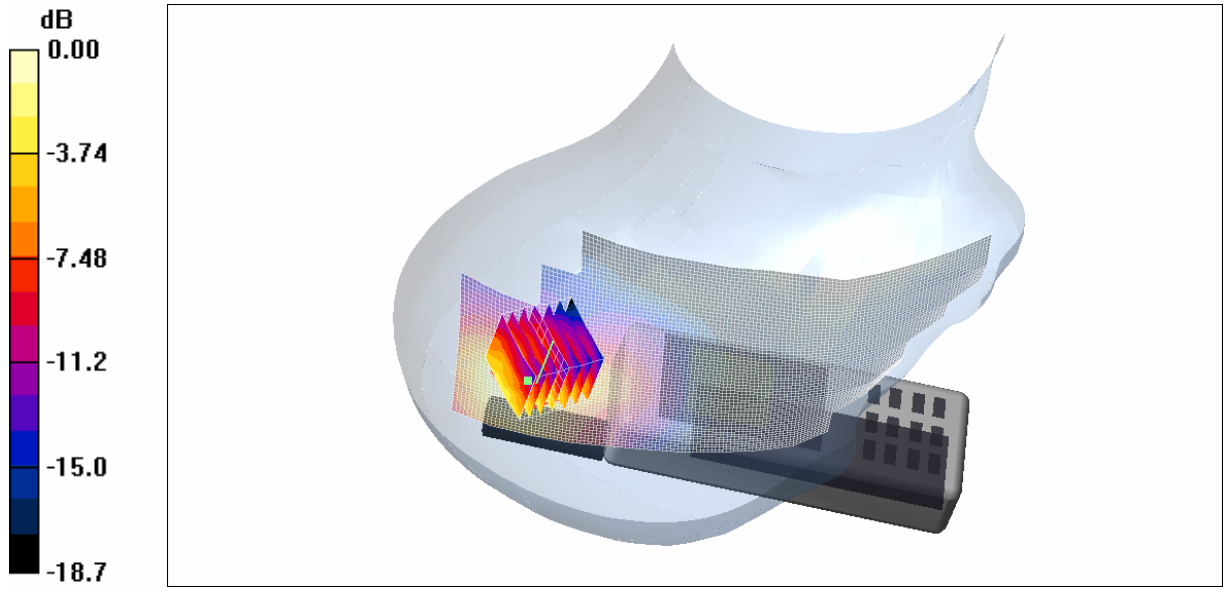
File Name: Tilted Right Antenna Retructed 1600 MHz (DAE442 Probe1380) 15-05-08.da4

DUT: Iridium Satelite Phone; Type: H2; Serial: Prototype

* Communication System: 1600 MHz Satelite; Frequency: 1616 MHz; Duty Cycle: 1:9.2
* Medium parameters used: σ = 1.30652 mho/m, ε_r = 41.0409; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Right Section

Channel 001 Test/Area Scan (201x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.39 mW/g

Channel 001 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.8 V/m; Power Drift = 0.460 dB
Peak SAR (extrapolated) = 2.28 W/kg
SAR(1 g) = 1.3 mW/g; SAR(10 g) = 0.754 mW/g
Maximum value of SAR (measured) = 1.50 mW/g



0 dB = 1.50mW/g

SAR MEASUREMENT PLOT 4

Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

Test Date: 15 May 2008

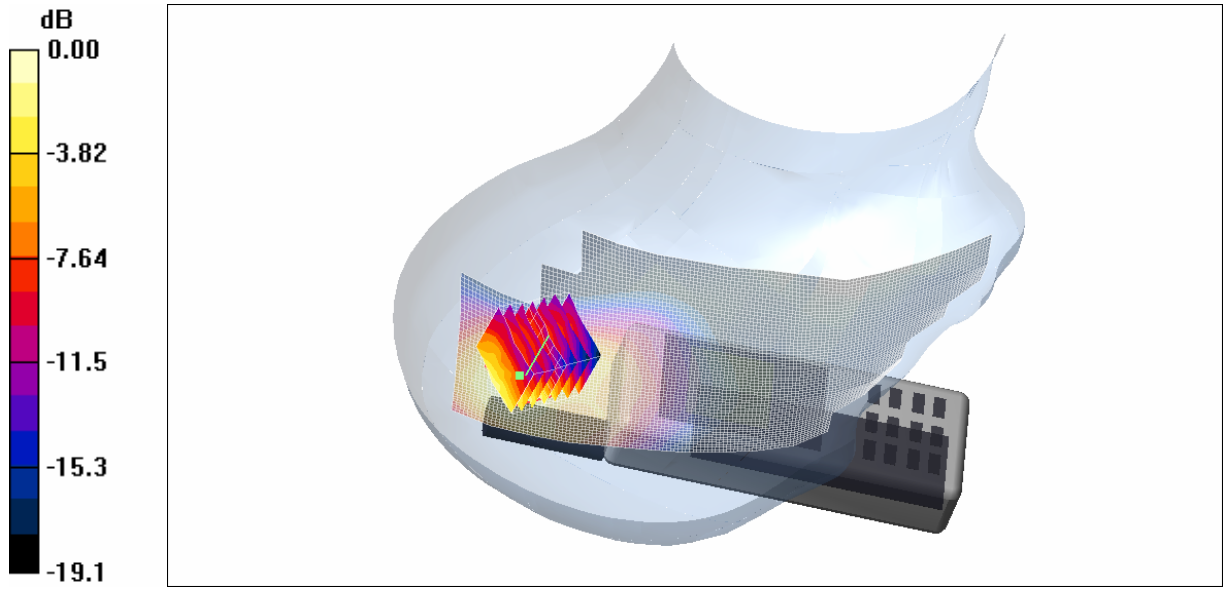
File Name: Tilted Right Antenna Retructed 1600 MHz (DAE442 Probe1380) 15-05-08.da4

DUT: Iridium Satelite Phone; Type: H2; Serial: Prototype

* Communication System: 1600 MHz Satelite; Frequency: 1621 MHz; Duty Cycle: 1:9.2
* Medium parameters used: σ = 1.30923 mho/m, ε_r = 41.0247; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Right Section

Channel 121 Test/Area Scan (201x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.27 mW/g

Channel 121 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.4 V/m; Power Drift = 0.359 dB
Peak SAR (extrapolated) = 2.35 W/kg
SAR(1 g) = 1.45 mW/g; SAR(10 g) = 0.864 mW/g
Maximum value of SAR (measured) = 1.64 mW/g



0 dB = 1.64mW/g

SAR MEASUREMENT PLOT 5

Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

Test Date: 15 May 2008

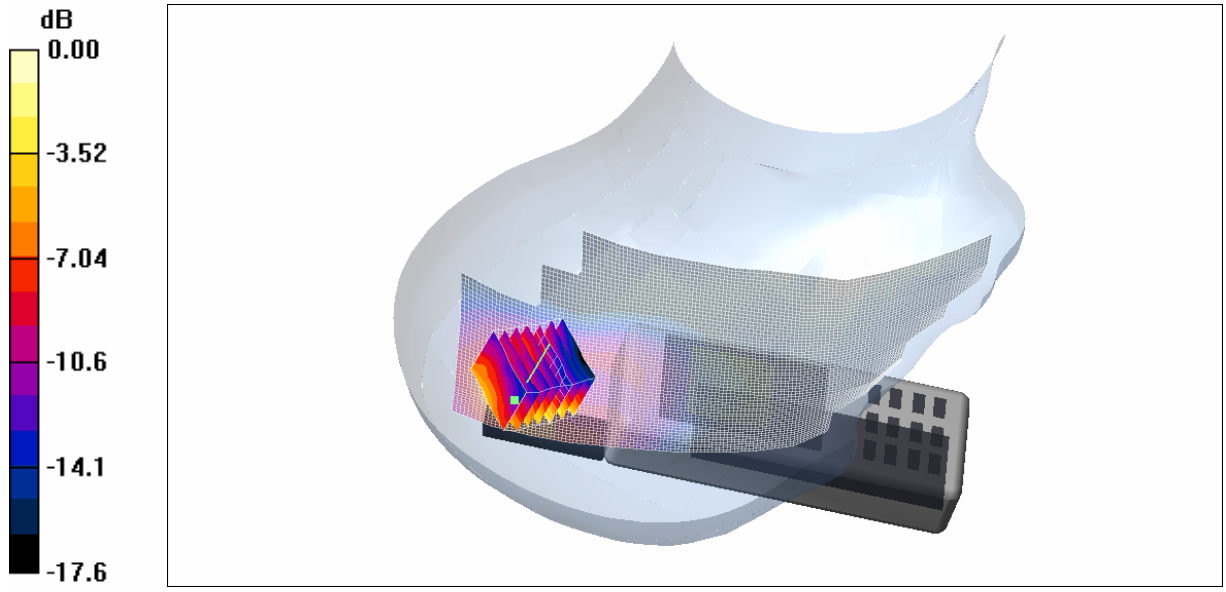
File Name: Tilted Right Antenna Retructed 1600 MHz (DAE442 Probe1380) 15-05-08.da4

DUT: Iridium Satelite Phone; Type: H2; Serial: Prototype

* Communication System: 1600 MHz Satelite; Frequency: 1626 MHz; Duty Cycle: 1:9.2
* Medium parameters used: σ = 1.31286 mho/m, ε_r = 41.0079; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Right Section

Channel 240 Test/Area Scan (201x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.541 mW/g

Channel 240 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.3 V/m; Power Drift = 0.091 dB
Peak SAR (extrapolated) = 2.09 W/kg
SAR(1 g) = 1.38 mW/g; SAR(10 g) = 0.839 mW/g
Maximum value of SAR (measured) = 1.69 mW/g



0 dB = 1.69mW/g

SAR MEASUREMENT PLOT 6

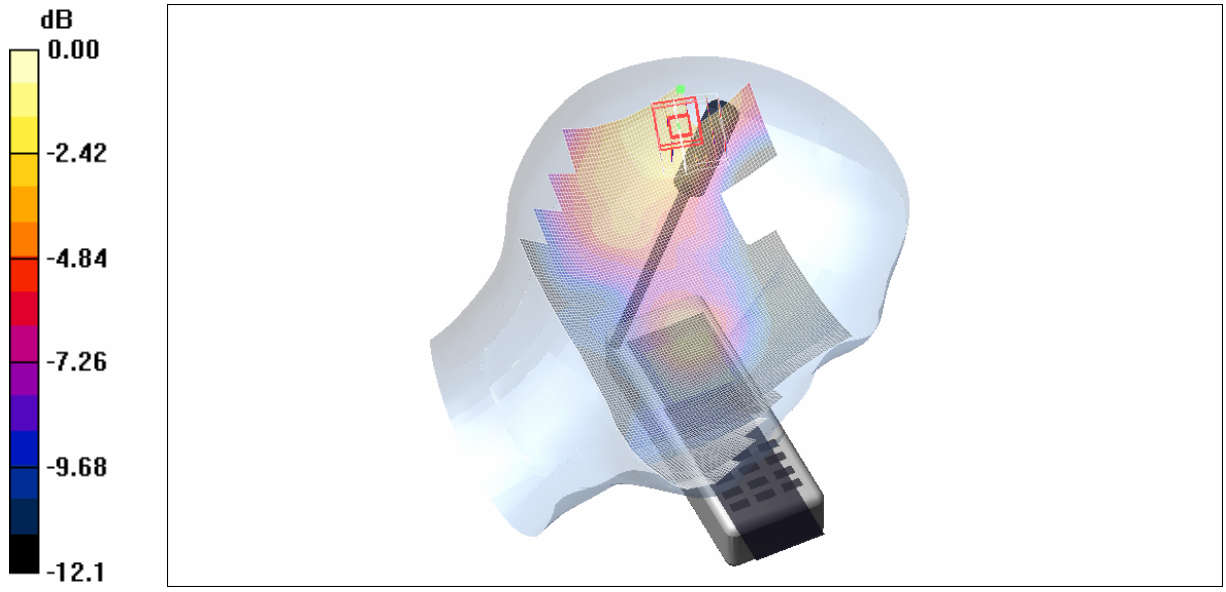
Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

Test Date: 15 May 2008
File Name: Touch Left 1600 MHz (DAE442 Probe1380) 15-05-08.da4
DUT: Iridium Satelite Phone; Type: H2; Serial: Prototype

* Communication System: 1600 MHz Satelite; Frequency: 1621 MHz; Duty Cycle: 1:9.2
* Medium parameters used: σ = 1.30923 mho/m, ε_r = 41.0247; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Left Section

Channel 121 Test/Area Scan (191x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.112 mW/g

Channel 121 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.66 V/m; Power Drift = -0.049 dB
Peak SAR (extrapolated) = 0.233 W/kg
SAR(1 g) = 0.163 mW/g; SAR(10 g) = 0.110 mW/g
Maximum value of SAR (measured) = 0.177 mW/g



0 dB = 0.177mW/g

SAR MEASUREMENT PLOT 7

Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

Test Date: 15 May 2008

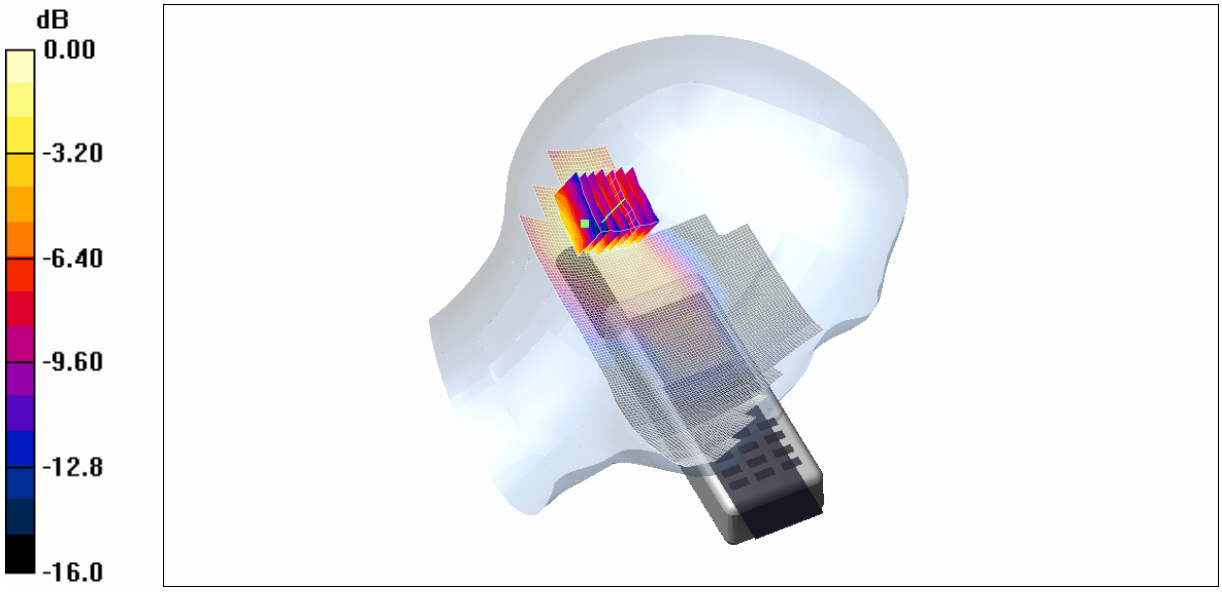
File Name: Touch Left Antenna Retructed 1600 MHz (DAE442 Probe1380) 15-05-08.da4

DUT: Iridium Satelite Phone; Type: H2; Serial: Prototype

* Communication System: 1600 MHz Satelite; Frequency: 1621 MHz; Duty Cycle: 1:9.2
* Medium parameters used: σ = 1.30923 mho/m, ε_r = 41.0247; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Left Section

Channel 121 Test/Area Scan (201x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.536 mW/g

Channel 121 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.3 V/m; Power Drift = 0.298 dB
Peak SAR (extrapolated) = 0.740 W/kg
SAR(1 g) = 0.505 mW/g; SAR(10 g) = 0.326 mW/g
Maximum value of SAR (measured) = 0.564 mW/g



0 dB = 0.564mW/g

SAR MEASUREMENT PLOT 8

Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

Test Date: 15 May 2008
File Name: Tilted Left 1600 MHz (DAE442 Probe1380) 15-05-08.da4
DUT: Iridium Satelite Phone; Type: H2; Serial: Prototype

* Communication System: 1600 MHz Satelite; Frequency: 1621 MHz; Duty Cycle: 1:9.2
* Medium parameters used: σ = 1.30923 mho/m, ε_r = 41.0247; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Left Section

Channel 121 Test/Area Scan (191x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.270 mW/g

Channel 121 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.99 V/m; Power Drift = 0.162 dB
Peak SAR (extrapolated) = 0.424 W/kg
SAR(1 g) = 0.262 mW/g; SAR(10 g) = 0.174 mW/g
Maximum value of SAR (measured) = 0.297 mW/g

0 dB = 0.297mW/g

SAR MEASUREMENT PLOT 9

Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

Test Date: 15 May 2008

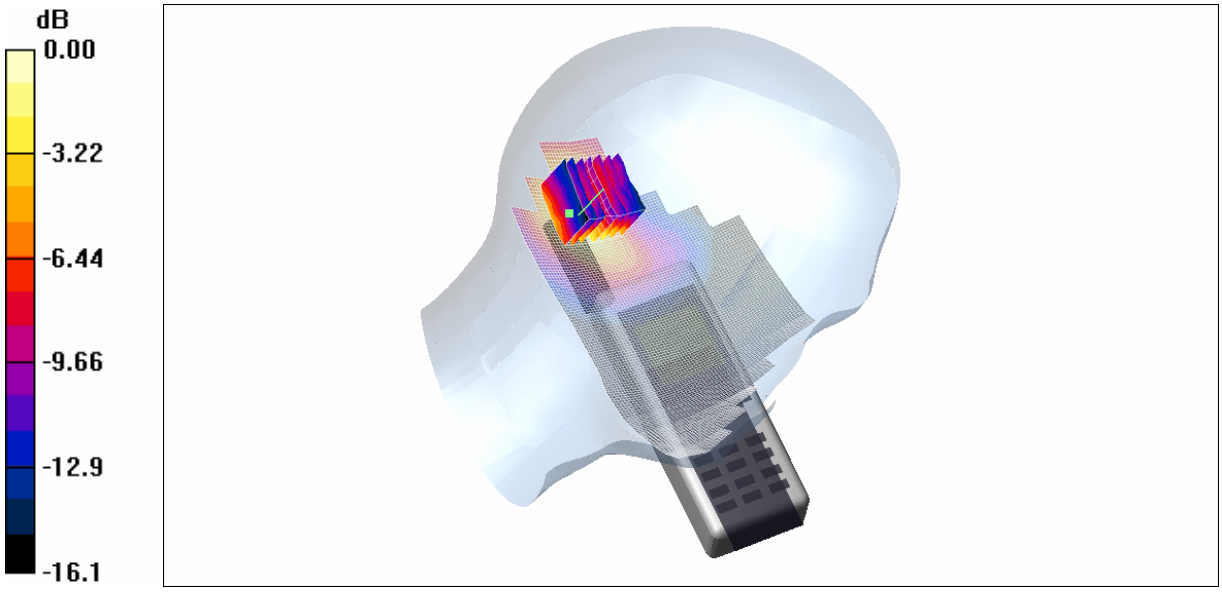
File Name: Tilted Left Antenna Retructed 1600 MHz (DAE442 Probe1380) 15-05-08.da4

DUT: Iridium Satelite Phone; Type: H2; Serial: Prototype

* Communication System: 1600 MHz Satelite; Frequency: 1616 MHz; Duty Cycle: 1:9.2
* Medium parameters used: σ = 1.30652 mho/m, ε_r = 41.0409; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Left Section

Channel 001 Test/Area Scan (201x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.08 mW/g

Channel 001 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.2 V/m; Power Drift = 0.065 dB
Peak SAR (extrapolated) = 1.59 W/kg
SAR(1 g) = 0.956 mW/g; SAR(10 g) = 0.576 mW/g
Maximum value of SAR (measured) = 1.09 mW/g



0 dB = 1.09mW/g

SAR MEASUREMENT PLOT 10

Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

Test Date: 15 May 2008

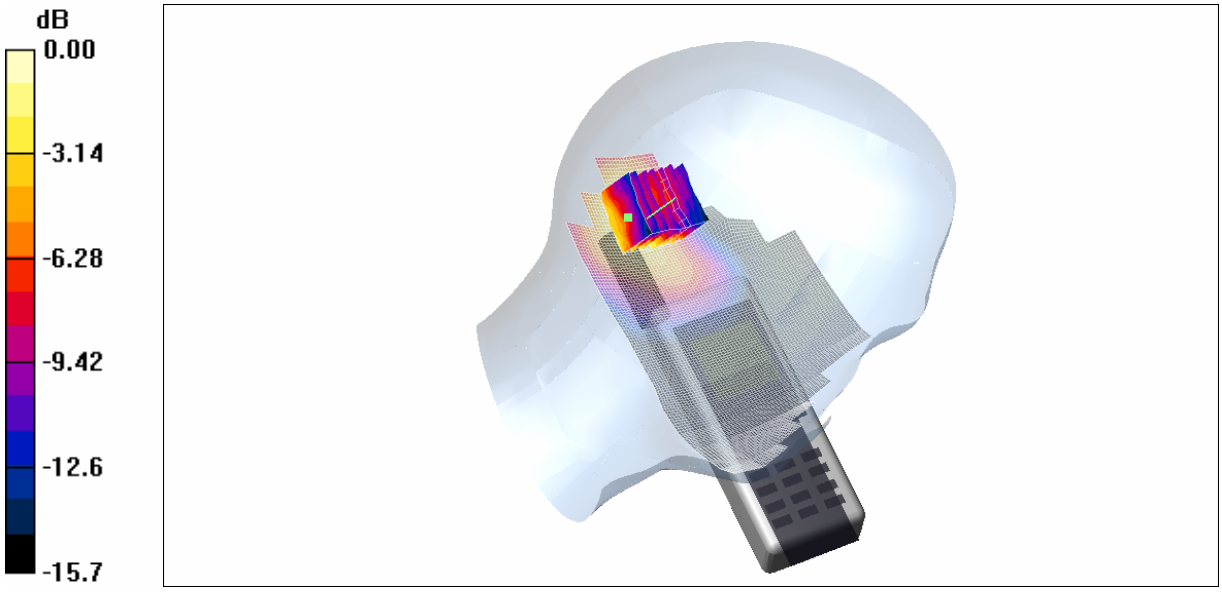
File Name: Tilted Left Antenna Retructed 1600 MHz (DAE442 Probe1380) 15-05-08.da4

DUT: Iridium Satelite Phone; Type: H2; Serial: Prototype

* Communication System: 1600 MHz Satelite; Frequency: 1621 MHz; Duty Cycle: 1:9.2
* Medium parameters used: σ = 1.30923 mho/m, ε_r = 41.0247; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Left Section

Channel 121 Test/Area Scan (201x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.875 mW/g

Channel 121 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.7 V/m; Power Drift = 0.158 dB
Peak SAR (extrapolated) = 1.30 W/kg
SAR(1 g) = 0.899 mW/g; SAR(10 g) = 0.579 mW/g
Maximum value of SAR (measured) = 1.03 mW/g



0 dB = 1.03mW/g

SAR MEASUREMENT PLOT 11

Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

Test Date: 15 May 2008

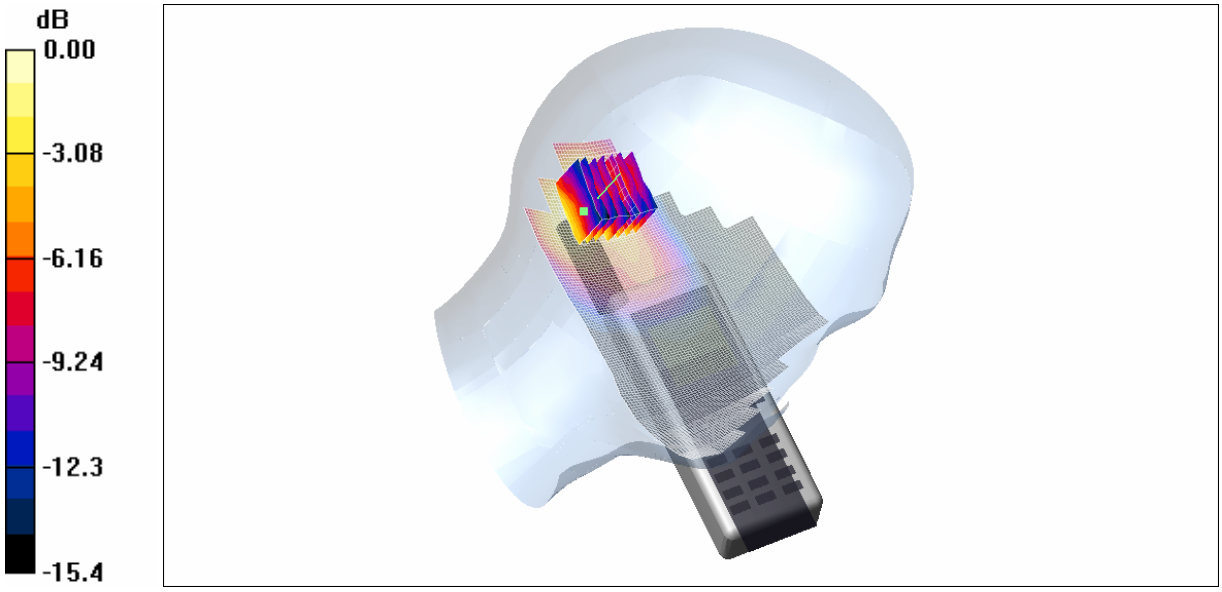
File Name: Tilted Left Antenna Retructed 1600 MHz (DAE442 Probe1380) 15-05-08.da4

DUT: Iridium Satelite Phone; Type: H2; Serial: Prototype

* Communication System: 1600 MHz Satelite; Frequency: 1626 MHz; Duty Cycle: 1:9.2
* Medium parameters used: σ = 1.31286 mho/m, ε_r = 41.0079; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Left Section

Channel 240 Test/Area Scan (201x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.000 mW/g

Channel 240 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.5 V/m; Power Drift = 0.179 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.866 mW/g; SAR(10 g) = 0.539 mW/g
Maximum value of SAR (measured) = 0.924 mW/g



0 dB = 0.924mW/g

SAR MEASUREMENT PLOT 12

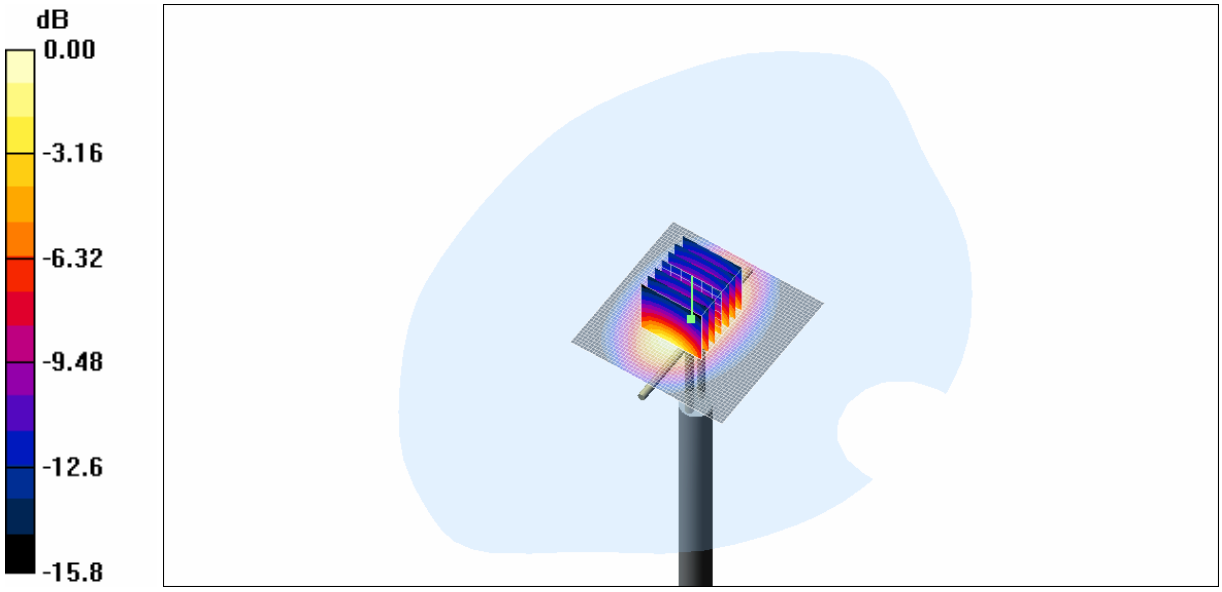
Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

Test Date: 15 May 2008
File Name: Validation 1640 MHz (DAE442 Probe1380) 13-05-08.da4
DUT: Dipole 1640 MHz; Type: DV1640V2; Serial: 314

* Communication System: CW 1640 MHz; Frequency: 1640 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 1.32476 mho/m, ε_r = 40.975; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(5.6, 5.6, 5.6)
- Phantom: SAM 12; Serial: 1060; Phantom section: Flat Section

Channel 1 Test/Area Scan (51x51x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 9.86 mW/g

Channel 1 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.9 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 12.7 W/kg
SAR(1 g) = 7.9 mW/g; SAR(10 g) = 4.4 mW/g
Maximum value of SAR (measured) = 8.90 mW/g



0 dB = 8.90mW/g

SAR MEASUREMENT PLOT 13

Ambient Temperature	**22.4 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**41.0 %**

APPENDIX C CALIBRATION DOCUMENTS

1. SN: 1380 Probe Calibration Certificate
2. SN: D1640V2 Dipole Calibration Certificate

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client EMC Technologies

Certificate No: ET3-1380_Dec07

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1380
Calibration procedure(s)	QA CAL-01.v6 and QA CAL-12.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	December 18, 2007
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (METAS, No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (METAS, No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: December 18, 2007

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

ET3DV6 SN:1380 December 18, 2007

DASY - Parameters of Probe: ET3DV6 SN:1380

Sensitivity in Free Space[A] Diode Compression[B]

NormX	**1.64** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**90** mV
NormY	**1.59** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**89** mV
NormZ	**1.69** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**92** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL **900 MHz** **Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	11.0	6.4
SAR_{be} [%]	With Correction Algorithm	0.8	0.6

TSL **1810 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	12.4	7.9
SAR_{be} [%]	With Correction Algorithm	0.5	0.9

Sensor Offset

Probe Tip to Sensor Center	**2.7** mm

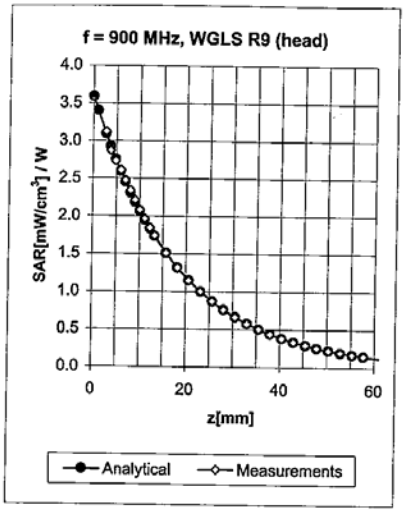
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

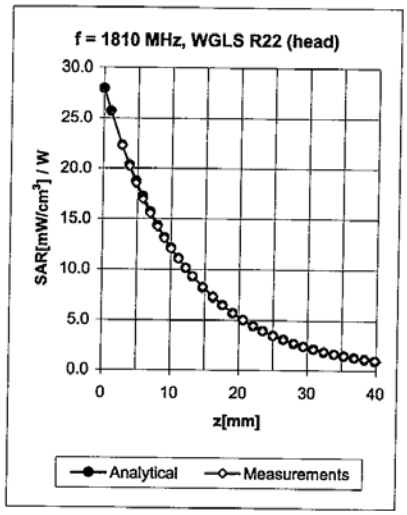
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1380 December 18, 2007

Conversion Factor Assessment





f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.38	1.95	6.93 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.77	1.96	6.30 ± 11.0% (k=2)
1640	± 50 / ± 100	Head	40.3 ± 5%	1.29 ± 5%	0.62	2.51	5.60 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.73	2.11	5.11 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.64	2.38	4.92 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.95	1.68	4.55 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.32	1.99	7.44 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.82	1.93	6.03 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.89	1.79	4.79 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.71	2.12	4.55 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.99	1.58	4.18 ± 11.8% (k=2)

[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

S-039-21

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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **EMC Technologies** Certificate No: **D1640V2_314_Jun06**

CALIBRATION CERTIFICATE

Object	D1640V2 - SN: 314
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	June 30, 2006
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference 10 dB Attenuator	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference Probe ET3DV6	SN: 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
DAE4	SN: 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov-06

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 4, 2006

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Area Scan resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1640 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.3	1.29 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.9 ± 6 %	1.31mho/m ± 6 %
Head TSL temperature during test	(22.5 ± 0.2) °C	—	—

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	condition	
SAR measured	250 mW input power	8.20 mW / g
SAR normalized	normalized to 1W	32.8 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**32.4 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.50 mW / g
SAR normalized	normalized to 1W	18.0 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**17.9 mW / g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

DASY4 Validation Report for Head TSL

Date/Time: 30.06.2006 15:07:38

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1640 MHz; Type: D1640V2; Serial: D1640V2 - SN314

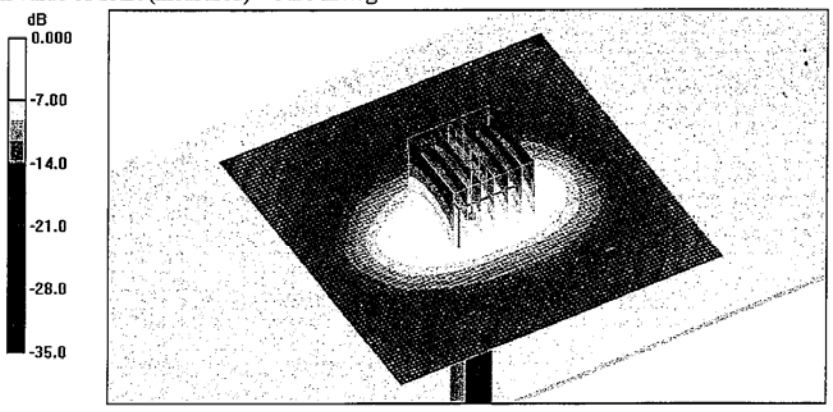
Communication System: CW-1640; Frequency: 1640 MHz;Duty Cycle: 1:1
Medium: HSL 1640 MHz;
Medium parameters used: f = 1640 MHz; σ = 1.31 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(5.23, 5.23, 5.23); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 171

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 9.30 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.4 V/m; Power Drift = 0.026 dB
Peak SAR (extrapolated) = 13.7 W/kg
SAR(1 g) = 8.2 mW/g; SAR(10 g) = 4.5 mW/g
Maximum value of SAR (measured) = 9.26 mW/g



0 dB = 9.26mW/g