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SAR Test Report

Report Number: M070532

Test Sample: TMC Radio Push to Talk Transmitter

Model Number: Simoco SRP9130TU

Tested For: TMC Radio Pty. Ltd.

Date of Issue: 30th May 2007

Nata Accredited
Laboratory
Number: 5292

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SAR Test Report
TMC Radio Push to Talk Transmitter, **Model:** Simoco SRP9130TU
Report Number: M070532

1.0 GENERAL INFORMATION

Test Sample:	TMC Radio Push to Talk Transmitter
Model Number:	Simoco SRP9130TU
Serial Number:	ES3VX070557PE
Manufacturer:	TMC Radio Communications
Device Category:	Portable Transmitter
Test Device:	Production Unit / Prototype Sample
RF exposure Category:	Occupational/controlled
Tested for:	TMC Radio Pty. Ltd.
Address:	1270 Ferntree Gully Rd SCORESBY VIC 3179
Contact:	Robert Stowell
Phone:	(03) 9730 3800
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) Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields - RSS-102. RSS-102 Issue 1 (Provisional) September 25, 1999
SAR References:	IEEE 1528: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.
Statement Of Compliance:	The TMC Radio Push to Talk Transmitter, model Simoco SRP9130TU. Complied with the FCC Occupational/controlled RF exposure limits of 8.0mW/g per requirements of 47CFR2.1093(d). It also complied with the RSS-102 requirements for human exposure.
Test Dates:	18th to 21st May 2007

Test Officer:

Peter Jakubiec

Authorised Signature:

Chris Zombolas
Technical Director

2.0 DESCRIPTION OF DEVICE

2.1 Description of Test Sample

The device tested was a TMC Radio Push to Talk Transmitter, Model: Simoco SRP9130TU operating in 440 MHz frequency band. It will be referred to as the Device Under Test (DUT) throughout this report. It has an external integral fixed length antenna and was tested in the Face Frontal and Belt Clip configurations of the phantom.

Operating Mode during Testing	: Continuous Wave 100% duty cycle
Operating Mode production sample	: 50% duty cycle
Modulation:	: FM
Device Power Rating for test sample and identical production unit	: 5 W
Device Dimensions (LxWxH)	: 146mm x 62mm x 45mm
Antenna type	: Whip
Applicable Head Configurations	: Face Frontal
Applicable Body Configurations	: Belt Clip Position
Battery Options	: 7.2V 3000mAh Li-ion Battery Pack

2.2 Test sample Accessories

2.2.1 Battery Types

A 7.2V 3000mAh Li-ion Battery Pack is used to power the DUT. The maximum rated power is 5 W. SAR measurements were performed with a standard 7.2 V battery.

2.2.2 Belt Clip

One type of leather pouch containing metallic belt clip is sold with the device. The pouch provides a spacing of 12 mm between the device and flat phantom. The DUT was in the belt clip pouch during testing in the Belt-Clip position.

2.3 Test Signal, Frequency and Output Power

The DUT is a 3-channel device that operates in the 440 MHz frequency band. The frequency range is 400.075 MHz to 479.975 MHz. The transmitter was configured into a test mode that ensured a continuous RF transmission for the duration of each SAR scan. The DUT transmission characteristics were also monitored during testing to confirm that it was transmitting continuously. It has a headset output to which a supplied Hands free speaker/microphone was connected during all testing in the belt-clip position. Excluding the speaker/microphone accessory, there were no wires or other connections to the Handheld Transceiver during the SAR measurements.

Table: Test Frequencies

Frequency Range	Traffic Channels	Nominal Power (dBm)
400.075 – 479.975 MHz	3	37

2.4 Conducted Power Measurements

The conducted power of the DUT was measured in the 400.075 MHz to 479.975 MHz frequency range with a calibrated Power Meter. The results of this measurement are listed in table below.

Table: Frequency and Output Power

Channel	Channel Frequency MHz	Maximum Conducted Output Power dBm
00	400.075	36.49
01	440.075	36.56
02	479.975	36.15

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 conducted RF at the antenna port before the commencement of each test and again after the completion of the test.

Table: Battery Details

Battery #1:	Simoco Li-ion 7.2V 3000mAh	**Battery #2:**	Simoco Li-ion 7.2V 3000mAh
Model No.:	PA-BATL	**Model No.:**	PA-BATL
Serial No.:	50806	**Serial No.:**	50806

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
website: 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:

AS/NZS 2772.1:	RF and microwave radiation hazard measurement
ACA:	Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003
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.

2.6.3 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 ± 1 °C, the humidity was 19.8 to 20.6 %. 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 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 450 MHz with the SPEAG D450V2 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 @ 450 MHz

The following table lists the dielectric properties of the tissue simulating liquid measured prior to SAR system validation. The results of the validation are listed in columns 4 and 5. The forward power into the reference dipole for each SAR validation was adjusted to 400mW.

Table: Validation Results (Dipole: SPEAG D450V2 SN: 1009)

1. Validation Date	2. ∈r (measured)	3. σ (mho/m) (measured)	4. Measured SAR 1g (mW/g)	5. Measured SAR 10g (mW/g)
18th May 07	42.3	0.84	2.07	1.38
21st May 07	43.5	0.85	2.12	1.41

3.4.2 Deviation from reference validation values

The reference SAR values are derived using a reference dipole and flat phantoms suitable for a centre frequency of 450 MHz. These reference SAR values are obtained from the IEEE Std 1528-2003 and are normalized to 1W.

The SPEAG calibration reference SAR value is the SAR validation result obtained in a specific dielectric liquid using the validation dipole (D450V2) 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

Date	Measured SAR 1g (mW/g)	Measured SAR 1g (Normalized to 1W)	SPEAG Calibration reference SAR Value 1g (mW/g)	Deviation From SPEAG (%)	IEEE Std 1528 reference SAR value 1g (mW/g)	Deviation From IEEE (%)
18th May 07	2.07	5.175	5.18	-0.10	4.90	5.61
21st May 07	2.12	5.300	5.18	2.32	4.90	8.16

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.

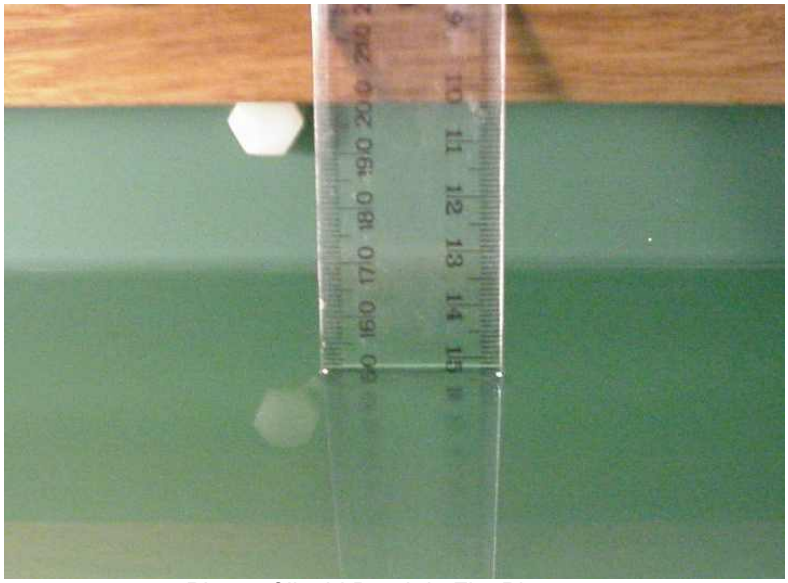


Photo of liquid Depth in Flat Phantom

3.5 Phantom Properties (Size, Shape, Shell Thickness)

The phantom used during the validations was the "Flat Phantom" model: PO1A V4.4e from SPEAG. It is a strictly validation phantom with a single thickness of 6mm and was filled with the required tissue simulating liquid. The flat phantom support structures were all non-metallic and spaced more than one device width away in transverse directions.

For SAR testing in the Face Frontal and Belt Clip positions an AndreT Flat Phantom V10.1 was used. The phantom thickness is 2.0mm +/-0.2 mm and the phantom was filled with the required tissue simulating liquid. Table below provides a summary of the measured phantom properties

Table: Phantom Properties (300MHz-2500MHz)

Phantom Properties	Requirement for specific EUT	Measured
Depth of Phantom		200mm
Width of flat section		540mm
Length of flat section		620mm
Thickness of flat section	2.0mm +/-0.2mm (flat section)	2.08 – 2.20mm
Dielectric Constant	<5.0	4.603 @ 300MHz (worst-case frequency)
Loss Tangent	<0.05	0.0379 @ 2500MHz (worst-case frequency)

Photo 1: Flat_Phantom V10.1 2mm

3.6 Tissue Material Properties

The dielectric parameters of the 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
400MHz	44.6	43.5 ±5% (41.3 to 45.7)	0.84	0.87 ±5% (0.83 to 0.91)	1000
440MHz	43.6	43.5 ±5% (41.3 to 45.7)	0.87	0.87 ±5% (0.83 to 0.91)	1000
480MHz	43.0	43.5 ±5% (41.3 to 45.7)	0.91	0.87 ±5% (0.83 to 0.91)	1000

Table: Measured Body Simulating Liquid Dielectric Values

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
400MHz	56.8	56.7 ±5% (53.9 to 59.5)	0.90	0.94 ±5% (0.89 to 0.99)	1000
440MHz	56.1	56.7 ±5% (53.9 to 59.5)	0.94	0.94 ±5% (0.89 to 0.99)	1000
480MHz	55.5	56.7 ±5% (53.9 to 59.5)	0.96	0.94 ±5% (0.89 to 0.99)	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 (%)
18th May 2007	19.8	19.6	61
21st May 2007	20.6	19.9	57

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 @ 450MHz
Volume of Liquid: 60 Litres

Approximate Composition	% By Weight
Distilled Water	38.3
Salt	5.08
Sugar	55.94
HEC	0.50
Bactericide	0.19

Table: Tissue Type: Muscle @ 450MHz
Volume of Liquid: 60 Litres

Approximate Composition	% By Weight
Distilled Water	50.28
Salt	2.22
Sugar	47.44
HEC	0.51
Bactericide	0.06

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 (when used for testing devices used at the ear).

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 A1 to A3 for photographs of device positioning.

4.0 SAR MEASUREMENT PROCEDURE USING DASY4

The SAR evaluation was performed with the SPEAG DASY4 system. A summary of the procedure follows:

a) A measurement of the conducted power value at the antenna port is used as a reference value for assessing the power drop of the DUT. Also a measurement of the SAR value at a fixed location is used. The power 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 20 mm x 20 mm. The actual Area Scan has dimensions of 51 mm x 161 mm surrounding the test device hot spot location. Based on this data, the area of the maximum absorption is determined by Spline interpolation. A pre-scan is performed for each phantom configuration to ensure that entire hot spot is identified.

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-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 (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 – 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)	7.2.1	4.8	N	1	1	1	4.8	4.8	∞
Axial Isotropy	7.2.1	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	7.2.1	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	7.2.1	1	R	1.73	1	1	0.6	0.6	∞
Linearity	7.2.1	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	7.2.1	1	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	7.2.1	1	N	1	1	1	1.0	1.0	∞
Response Time	7.2.1	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	7.2.1	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Conditions	7.2.3	0.05	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	7.2.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	7.2.2	2.9	R	1.73	1	1	1.7	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	7.2.4	1	R	1.73	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	7.2.2	1.61	N	1	1	1	1.6	1.6	11
Device Holder Uncertainty									
Output Power Variation – SAR Drift Measurement	7.2.3	10.41	R	1.73	1	1	6.0	6.0	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	7.2.2	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	7.2.3	5	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – Measurement uncertainty	7.2.3	4.3	N	1	0.64	0.43	2.8	1.8	5
Liquid Permittivity – Deviation from target values	7.2.3	5	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – Measurement uncertainty	7.2.3	4.3	N	1	0.6	0.49	2.6	2.1	5
Combined standard Uncertainty			RSS				11.0	10.6	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				22.0	21.19	

Estimated total measurement uncertainty for the DASY4 measurement system was ± 11.0. The extended uncertainty (K = 2) was assessed to be ±22 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. (6%)	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i (6%)	10g u_i (6%)	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	Yes
Robot Remote Control	SPEAG	CS7MB	RX90B	Not applicable	Yes
SAM Phantom	SPEAG	N/A	1260	Not applicable	No
SAM Phantom	SPEAG	N/A	1060	Not applicable	No
Flat Phantom	AndreT	10.1	P 10.1	Not Applicable	No
Flat Phantom	AndreT	9.1	P 9.1	Not Applicable	Yes
Flat Phantom	SPEAG	PO1A 6mm	1003	Not Applicable	Yes
Data Acquisition Electronics	SPEAG	DAE3 V1	359	12-July-2007	No
Data Acquisition Electronics	SPEAG	DAE3 V1	442	13-Oct-2007	Yes
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	No
Probe E-Field	SPEAG	ET3DV6	1380	12-Dec-2007	Yes
Probe E-Field	SPEAG	ET3DV6	1377	14-July-2007	No
Probe E-Field	SPEAG	ES3DV6	3029	Not Used	No
Probe E-Field	SPEAG	EX3DV4	3563	14-July-2007	No
Antenna Dipole 300 MHz	SPEAG	D300V2	1005	26-Oct-2007	No
Antenna Dipole 450 MHz	SPEAG	D450V2	1009	14-Dec-2008	Yes
Antenna Dipole 900 MHz	SPEAG	D900V2	047	6-July-2008	No
Antenna Dipole 1640 MHz	SPEAG	D1640V2	314	30-June-2008	No
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	3-July-2008	No
Antenna Dipole 1950 MHz	SPEAG	D1950V3	1113	5-March-2007	No
Antenna Dipole 3500 MHz	SPEAG	D3500V2	1002	1-July-2007	No
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	13-Dec-2008	No
Antenna Dipole 5600 MHz	SPEAG	D5GHzV2	1008	27-Oct-2007	No
RF Amplifier	EIN	603L	N/A	*In test	Yes
RF Amplifier	Mini-Circuits	ZHL-42	N/A	*In test	No
RF Amplifier	Mini-Circuits	ZVE-8G	N/A	*In test	No
Synthesized signal generator	Hewlett Packard	ESG-D3000A	GB37420238	*In test	Yes
RF Power Meter Dual	Hewlett Packard	437B	3125012786	*In test	Yes
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	*In test	Yes
RF Power Meter Dual	Gigatronics	8542B	1830125	11-May-2008	Yes
RF Power Sensor	Gigatronics	80301A	1828805	11-May-2008	Yes
RF Power Meter Dual	Hewlett Packard	435A	1733A05847	*In test	Yes
RF Power Sensor	Hewlett Packard	8482A	2349A10114	*In test	Yes
Network Analyser	Hewlett Packard	8714B	GB3510035	31-Aug-2007	Yes
Network Analyser	Hewlett Packard	8753ES	JP39240130	30-Sept-2007	No
Dual Directional Coupler	Hewlett Packard	778D	1144 04700	*In test	Yes
Dual Directional Coupler	NARDA	3022	75453	*In test	No

* Calibrated during the test for the relevant parameters.

7.0 SAR TEST METHOD

7.1 Description of the Test Positions (Face Frontal and Belt Clip)

SAR measurements were performed in the "Face Frontal" and "Belt Clip" positions. Both the "Face Frontal" and "Belt Clip" positions were measured in the flat section of the AndreT 10.1 phantom.
See Appendix A1 to A3 for photos of test positions.

7.1.1 "Face Frontal Position"

The SAR evaluation was performed in the flat section of the AndreT phantom. The DUT was placed 25mm from the phantom, this position is equivalent to the DUT being used in front of the nose. A supporting hand was not used.

7.1.2 "Belt Clip" Position

The device was tested in the (2.00 mm) flat section of the AndreT phantom for the "Belt Clip" position. A belt clip maintained a distance of approximately 12 mm between the back of the DUT and the flat phantom. The DUT was placed at the flat section of the phantom and suspended until the Belt Clip touched the phantom. The belt clip was made of plastic and the hands free earpiece/microphone was connected.

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

The device has a fixed antenna. The SAR was measured at three test channels with the test sample operating at maximum power, as specified in section 2.3.

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 mass were determined for the DUT for the Face Frontal and Belt Clip configurations of the phantom.

Table: SAR MEASUREMENT RESULTS– Face Frontal and Belt Clip positions

1. Test Position	2. Plot No.	3. Test Channel	4. Test Freq (MHz)	5. Measured 1g SAR Results (mW/g)	5.1 Measured 1g SAR Results Scaled for 50% Duty Cycle (mW/g)	6. Measured Drift (dB)
Face Frontal	1	00	400.075	5.02	2.51	-0.02
	2	01	440.075	5.00	2.50	-0.19
	3	02	479.975	2.61	1.305	-0.12
Belt Clip	4	00	400.075	8.22	4.11	-0.30
	5	01	440.075	12.2	6.1	-0.31
	6	02	479.975	5.61	2.805	-0.43

Note: The uncertainty of the system (± 22 %) has not been added to the results.

The FCC SAR limit for Occupational exposure is 8.0 m W/g measurement in a 1g cube of tissue.

9.0 COMPLIANCE STATEMENT

The TMC Radio Push to Talk Transmitter model Simoco SRP9130TU was tested on behalf of TMC Radio Pty. Ltd. It complied with the FCC and RSS-102 SAR requirements.

The highest SAR level recorded for continuous transmit mode was 12.2 mW/g for a 1g cube. After scaling of the results for 50% duty cycle the highest SAR level recorded was 6.1 mW/g for a 1g cube. This value was measured in the “Belt Clip” position, and was below the controlled limit of 8.0 mW/g, even taking into account the measurement uncertainty of 22 %.

APPENDIX A1 Test Sample Photographs

Battery 1

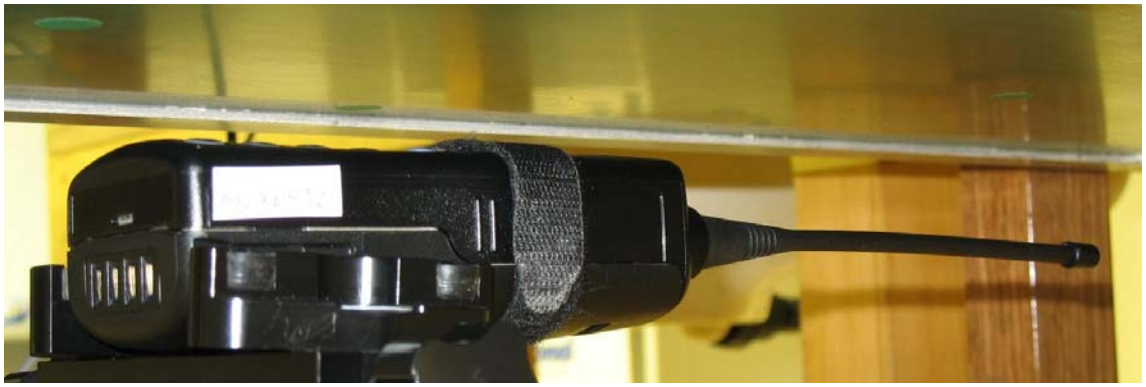
Battery 2

DUT

DUT

APPENDIX A2 Test Setup Photographs

Face Frontal Position



Belt Clip Position

APPENDIX A3 Test Setup Photographs

Face Frontal Position

Belt Clip Position

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: SAR Measurement Plot Numbers

Test Position	Plot Number	Test Channel
Face Frontal Position	1	00
	2	01
	3	02
Z-axis graphs for plots No. 1 to 3		
Belt Clip Position	4	00
	5	01
	6	02
Z-axis graphs for plots No. 4 to 6		

Table: Validation Plot Numbers

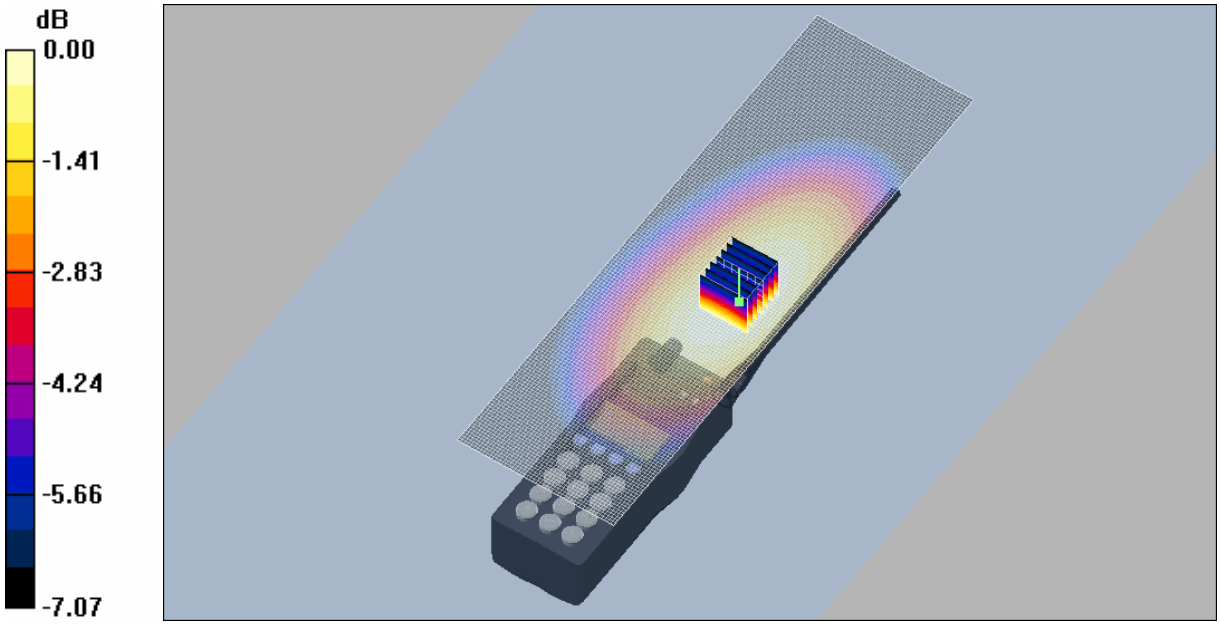
Date	Plot Number	Frequency
18th May 2007	7	450 MHz
21st May 2007	8	450 MHz
Z-axis graphs for plots No. 7 to 8		

Test Date: 21 May 2007
File Name: 440 MHz Face Frontal (DAE442 Probe1380) 21-05-07.da4
DUT: TMC Radio Handheld Transmitter; Type: SRP9130TU; Serial: ES3VX070557PE

* Communication System: CW 440 MHz; Frequency: 400.075 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 0.839092 mho/m, ε_r = 44.5701; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.04, 7.04, 7.04)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 00 Test/Area Scan (51x171x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 5.32 mW/g

Channel 00 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 67.1 V/m; Power Drift = -0.130 dB
Peak SAR (extrapolated) = 6.70 W/kg
SAR(1 g) = 5.02 mW/g; SAR(10 g) = 3.78 mW/g
Maximum value of SAR (measured) = 5.27 mW/g



0 dB = 5.27mW/g

SAR MEASUREMENT PLOT 1

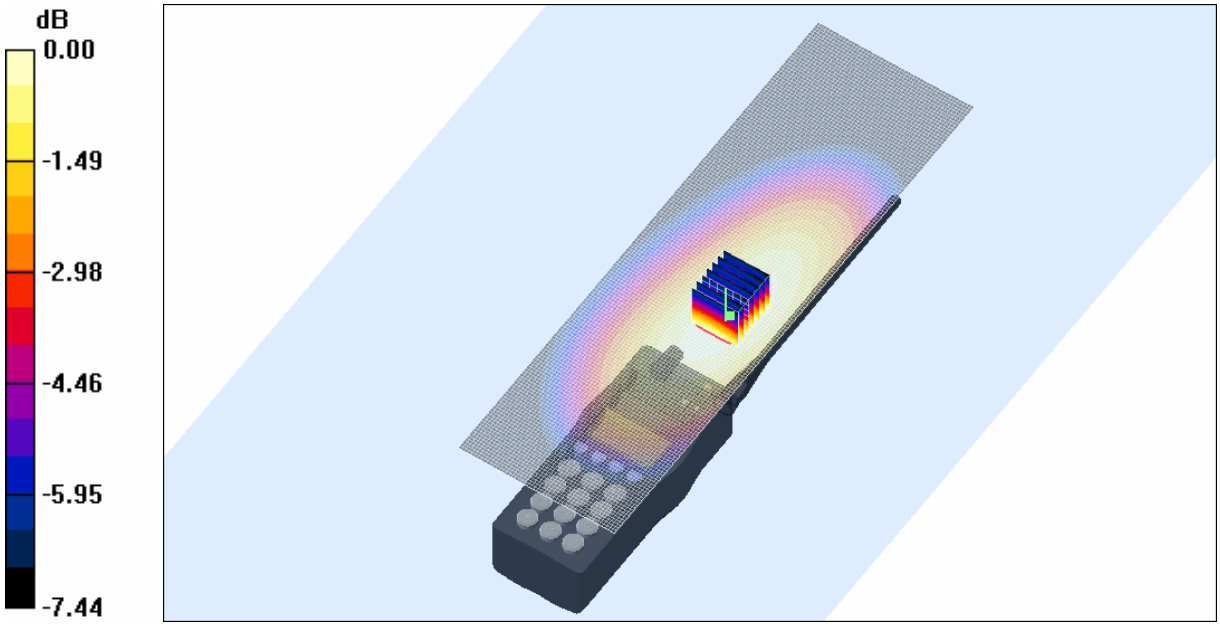
Ambient Temperature	**20.6 Degrees Celsius**
Liquid Temperature	**19.9 Degrees Celsius**
Humidity	**57.0 %**

Test Date: 21 May 2007
File Name: 440 MHz Face Frontal (DAE442 Probe1380) 21-05-07.da4
DUT: TMC Radio Handheld Transmitter; Type: SRP9130TU; Serial: ES3VX070557PE

* Communication System: CW 440 MHz; Frequency: 440.075 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 0.873909 mho/m, ε_r = 43.5548; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.04, 7.04, 7.04)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 01 Test/Area Scan (51x171x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 5.12 mW/g

Channel 01 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 65.1 V/m; Power Drift = 0.016 dB
Peak SAR (extrapolated) = 6.70 W/kg
SAR(1 g) = 5 mW/g; SAR(10 g) = 3.75 mW/g
Maximum value of SAR (measured) = 5.26 mW/g



0 dB = 5.26mW/g

SAR MEASUREMENT PLOT 2

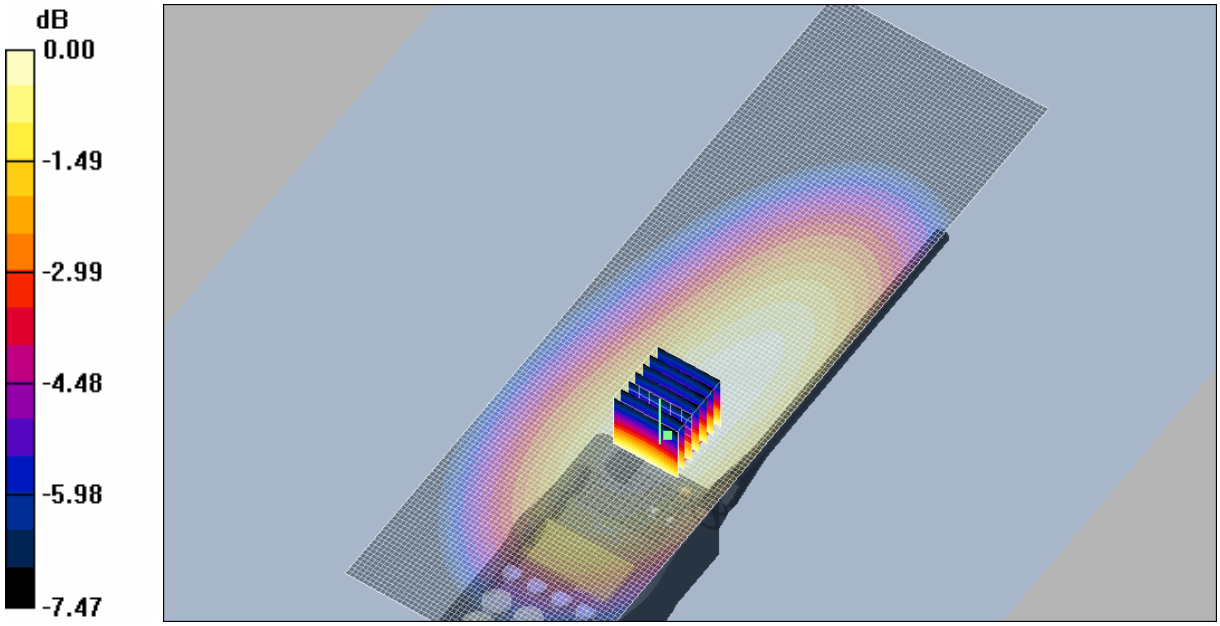
Ambient Temperature	**20.6 Degrees Celsius**
Liquid Temperature	**19.9 Degrees Celsius**
Humidity	**57.0 %**

Test Date: 21 May 2007
File Name: 440 MHz Face Frontal (DAE442 Probe1380) 21-05-07.da4
DUT: TMC Radio Handheld Transmitter; Type: SRP9130TU; Serial: ES3VX070557PE

* Communication System: CW 440 MHz; Frequency: 479.975 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 0.905604 mho/m, ε_r = 42.9715; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.04, 7.04, 7.04)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 02 Test/Area Scan (51x171x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 2.78 mW/g

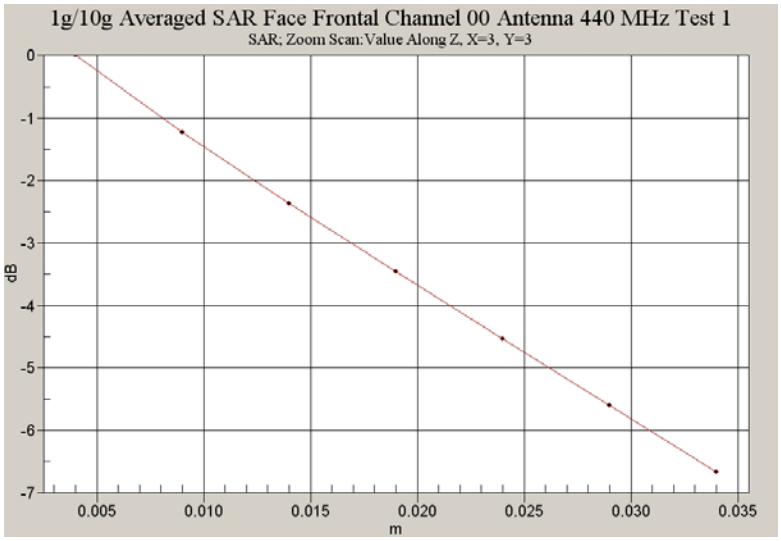
Channel 02 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 45.5 V/m; Power Drift = -0.039 dB
Peak SAR (extrapolated) = 3.45 W/kg
SAR(1 g) = 2.61 mW/g; SAR(10 g) = 1.97 mW/g
Maximum value of SAR (measured) = 2.74 mW/g

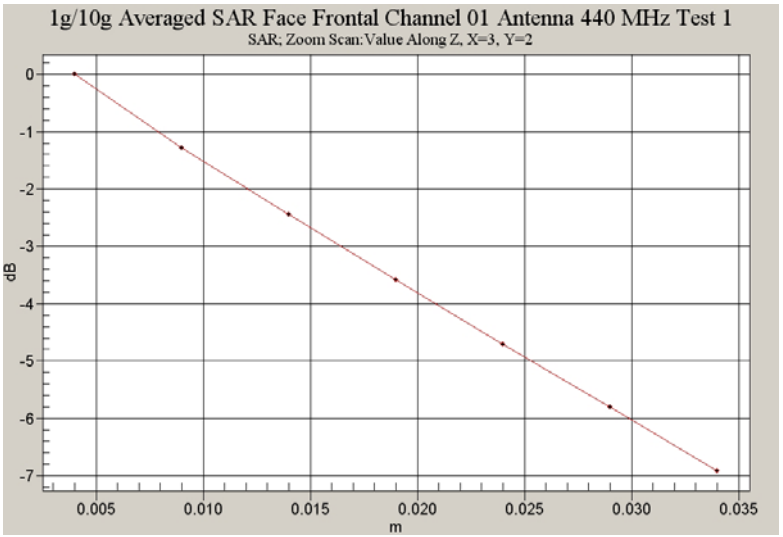


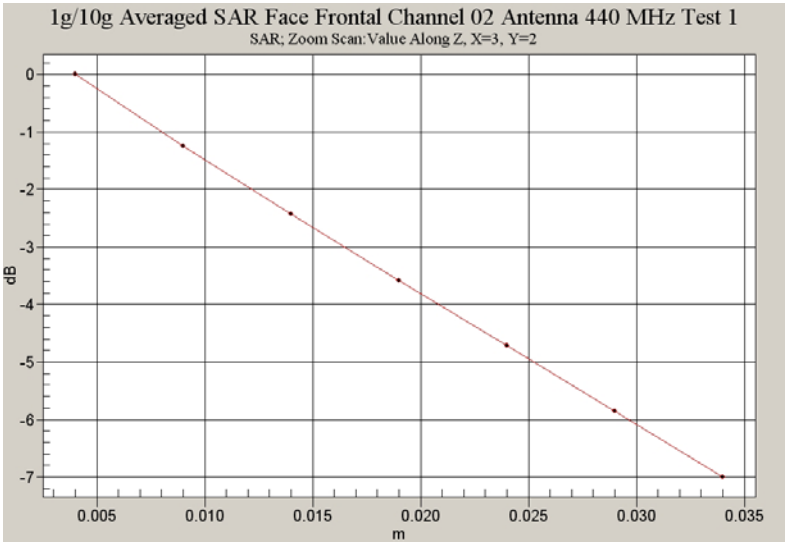
0 dB = 2.74mW/g

SAR MEASUREMENT PLOT 3

Ambient Temperature	**20.6 Degrees Celsius**
Liquid Temperature	**19.9 Degrees Celsius**
Humidity	**57.0 %**





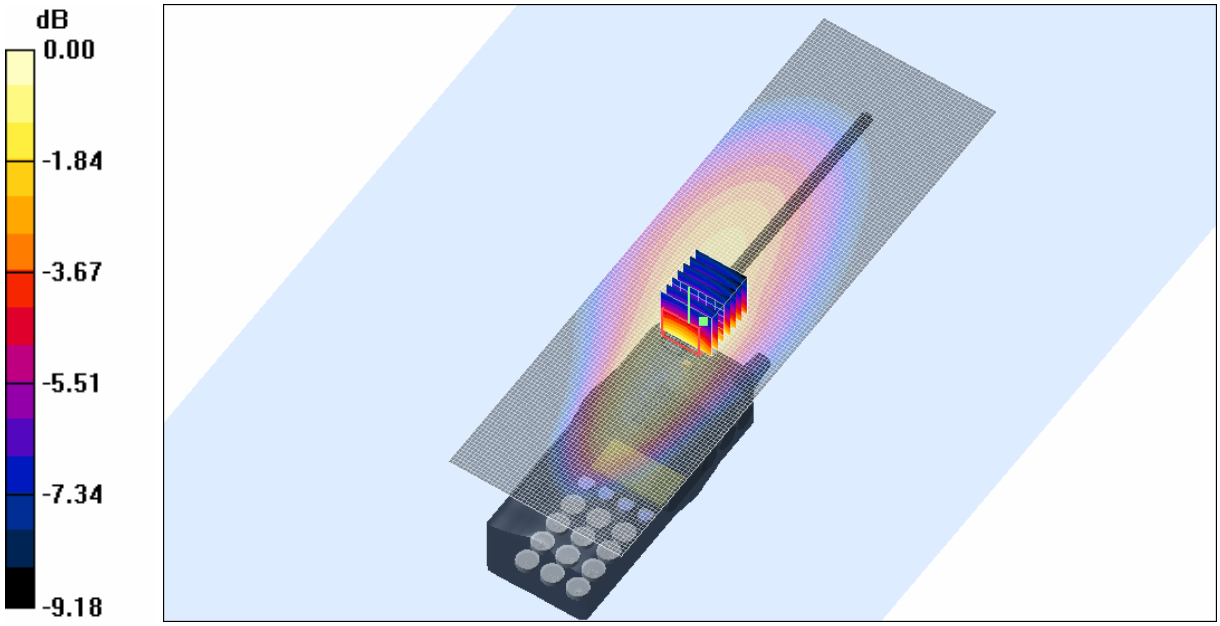


Test Date: 18 May 2007
File Name: 440 MHz Belt Clip (DAE442 Probe1380) 18-05-07.da4
DUT: TMC Radio Handheld Transmitter; Type: SRP9130TU; Serial: ES3VX070557PE

* Communication System: CW 440 MHz; Frequency: 400.075 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 0.900892 mho/m, ε_r = 56.7712; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.57, 7.57, 7.57)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 00 Test/Area Scan (51x161x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 7.91 mW/g

Channel 00 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 81.0 V/m; Power Drift = -0.037 dB
Peak SAR (extrapolated) = 14.3 W/kg
SAR(1 g) = 8.22 mW/g; SAR(10 g) = 5.35 mW/g
Maximum value of SAR (measured) = 8.70 mW/g



0 dB = 8.70mW/g

SAR MEASUREMENT PLOT 4

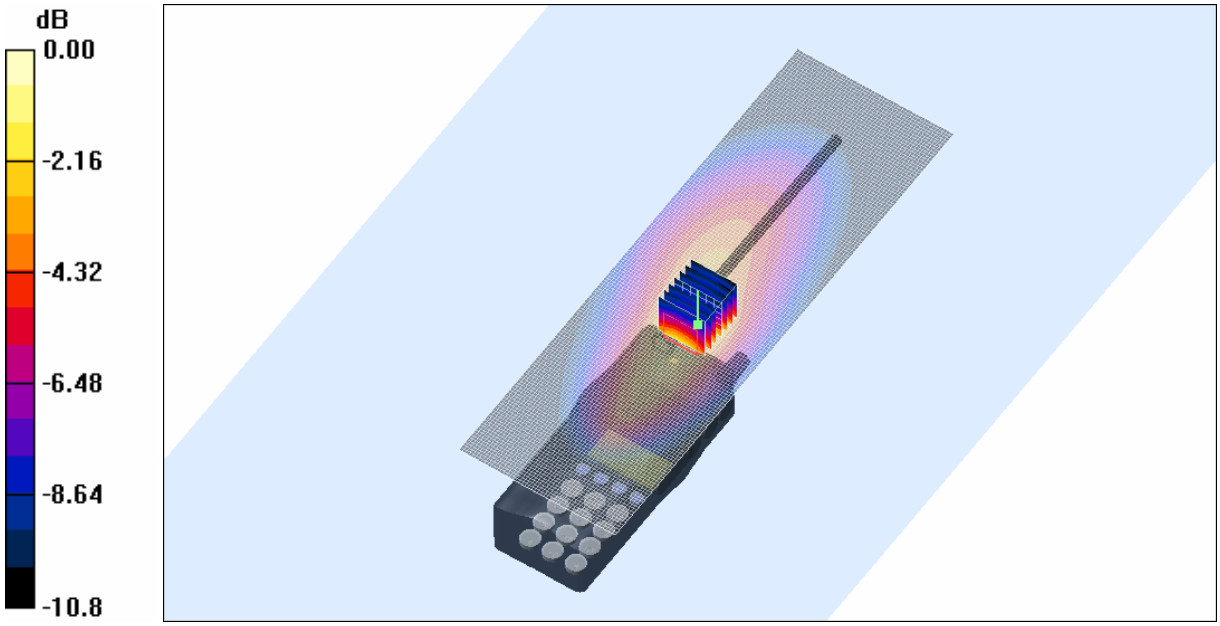
Ambient Temperature	**19.8 Degrees Celsius**
Liquid Temperature	**19.6 Degrees Celsius**
Humidity	**61.0 %**

Test Date: 18 May 2007
File Name: 440 MHz Belt Clip (DAE442 Probe1380) 18-05-07.da4
DUT: TMC Radio Handheld Transmitter; Type: SRP9130TU; Serial: ES3VX070557PE

* Communication System: CW 440 MHz; Frequency: 440.075 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 0.935055 mho/m, ε_r = 56.0556; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.57, 7.57, 7.57)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 01 Test/Area Scan (51x161x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 13.7 mW/g

Channel 01 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.9 V/m; Power Drift = 0.192 dB
Peak SAR (extrapolated) = 27.6 W/kg
SAR(1 g) = 12.2 mW/g; SAR(10 g) = 6.74 mW/g
Maximum value of SAR (measured) = 12.9 mW/g



0 dB = 12.9mW/g

SAR MEASUREMENT PLOT 5

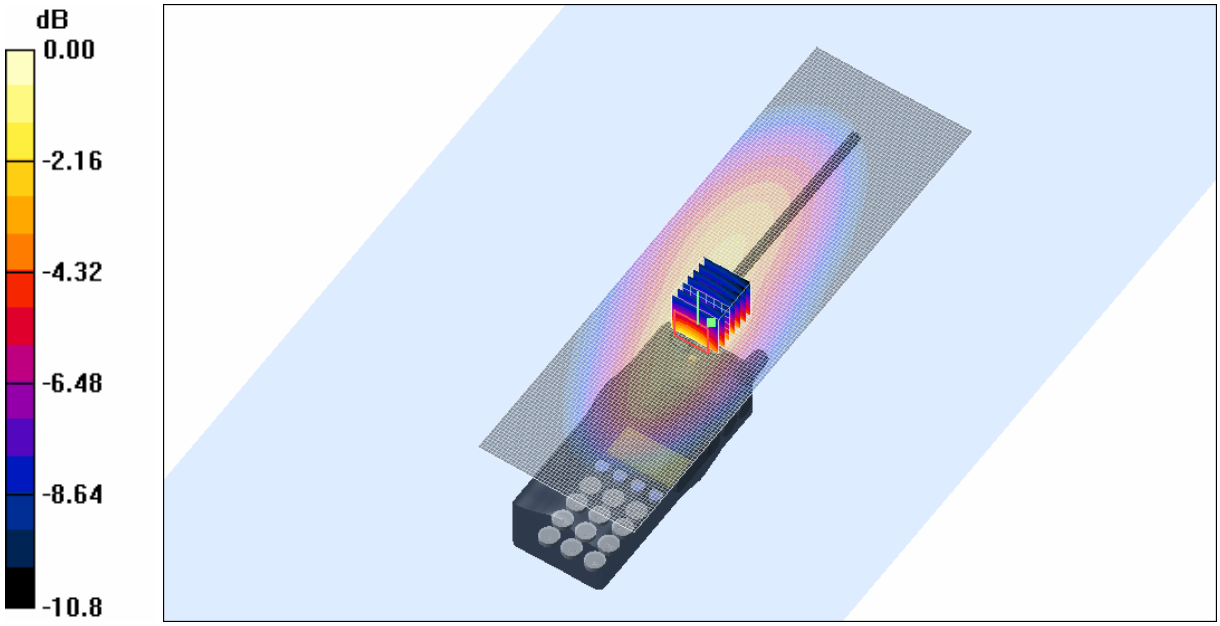
Ambient Temperature	**19.8 Degrees Celsius**
Liquid Temperature	**19.6 Degrees Celsius**
Humidity	**61.0 %**

Test Date: 18 May 2007
File Name: 440 MHz Belt Clip (DAE442 Probe1380) 18-05-07.da4
DUT: TMC Radio Handheld Transmitter; Type: SRP9130TU; Serial: ES3VX070557PE

* Communication System: CW 440 MHz; Frequency: 479.975 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 0.964159 mho/m, ε_r = 55.4917; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.57, 7.57, 7.57)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 02 Test/Area Scan (51x161x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 4.96 mW/g

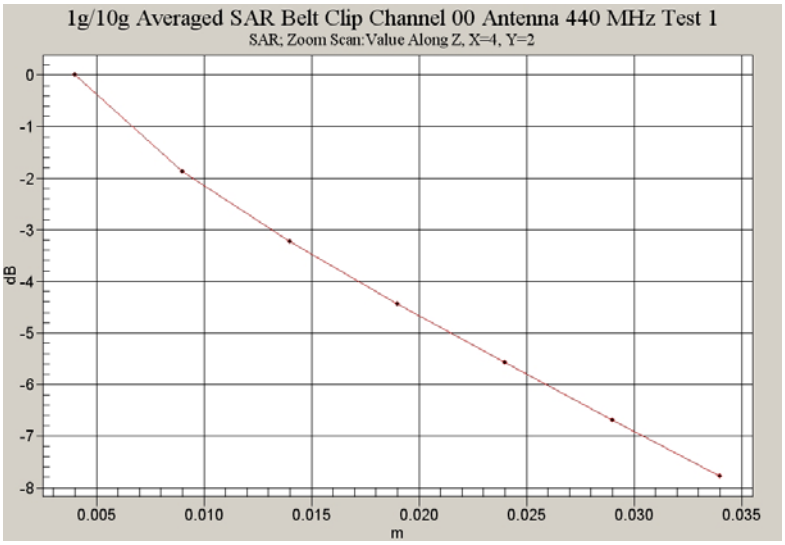
Channel 02 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.4 V/m; Power Drift = -0.355 dB
Peak SAR (extrapolated) = 11.7 W/kg
SAR(1 g) = 5.61 mW/g; SAR(10 g) = 3.26 mW/g
Maximum value of SAR (measured) = 6.08 mW/g

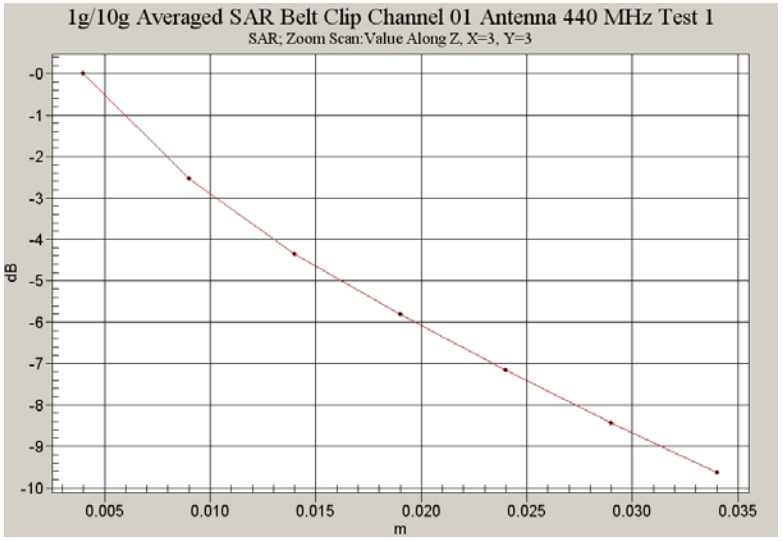


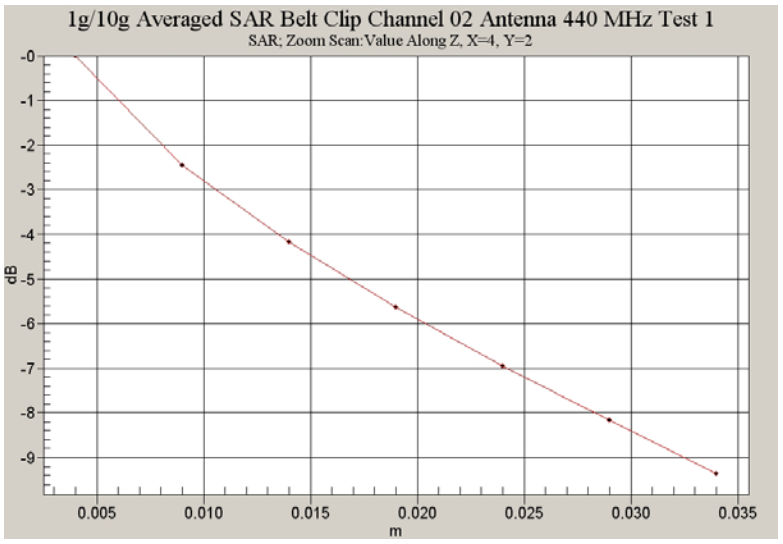
0 dB = 6.08mW/g

SAR MEASUREMENT PLOT 6

Ambient Temperature	**19.8 Degrees Celsius**
Liquid Temperature	**19.6 Degrees Celsius**
Humidity	**61.0 %**





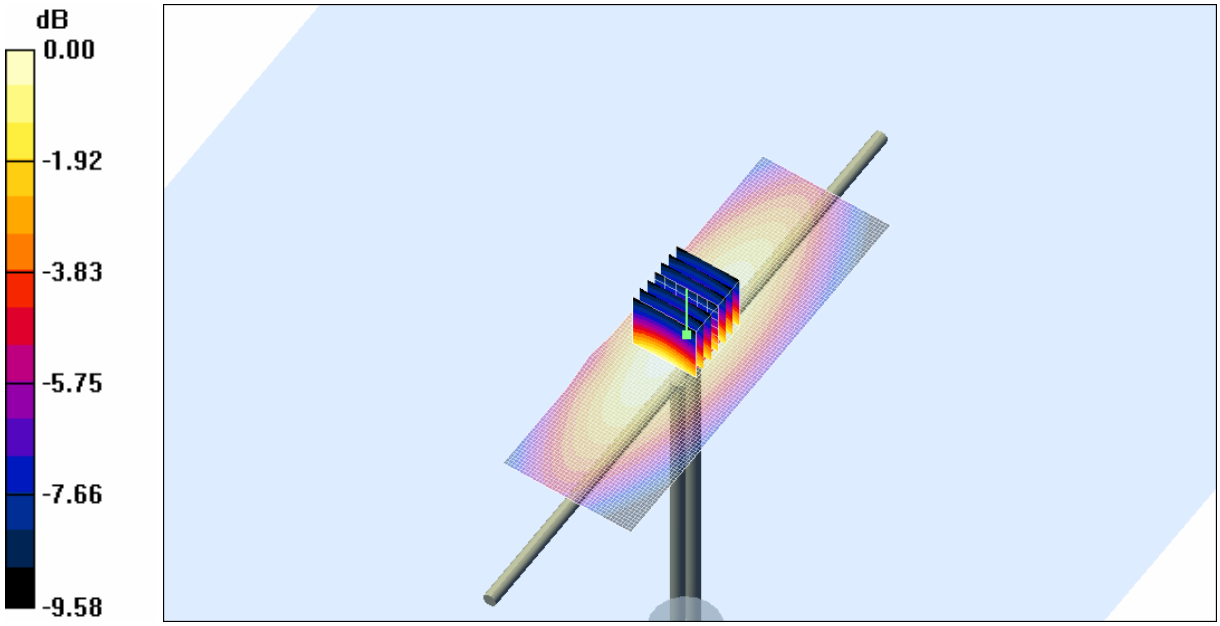


Test Date: 18 May 2007
File Name: Validation 450 MHz Head (DAE442 Probe1380) 18-05-07.da4
DUT: Dipole 450 MHz; Type: D450V2; Serial: 1009

* Communication System: CW 450 MHz; Frequency: 450 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 0.844698 mho/m, ε_r = 42.2566; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.04, 7.04, 7.04)
- Phantom: Flat Phantom 4.4; Serial: P 4.4; Phantom section: Flat Section

Channel 1Test 2/Area Scan (41x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.17 mW/g

Channel 1Test 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.7 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.18 W/kg
SAR(1 g) = 2.07 mW/g; SAR(10 g) = 1.38 mW/g
Maximum value of SAR (measured) = 2.22 mW/g



0 dB = 2.22mW/g

SAR MEASUREMENT PLOT 7

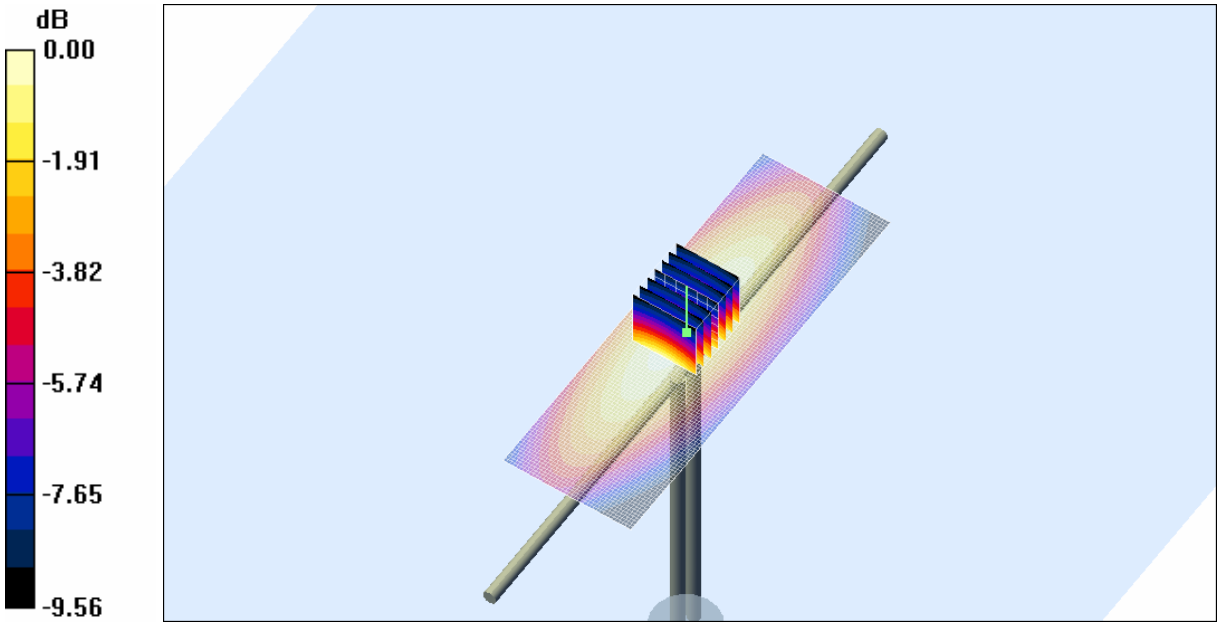
Ambient Temperature	**19.8 Degrees Celsius**
Liquid Temperature	**19.6 Degrees Celsius**
Humidity	**61.0 %**

Test Date: 21 May 2007
File Name: Validation 450 MHz Head (DAE442 Probe1380) 21-05-07.da4
DUT: Dipole 450 MHz; Type: D450V2; Serial: 1009

* Communication System: CW 450 MHz; Frequency: 450 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 0.850283 mho/m, ε_r = 43.5441; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.04, 7.04, 7.04)
- Phantom: Flat Phantom 4.4; Serial: P 4.4; Phantom section: Flat Section

Channel 1Test 2/Area Scan (41x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.22 mW/g

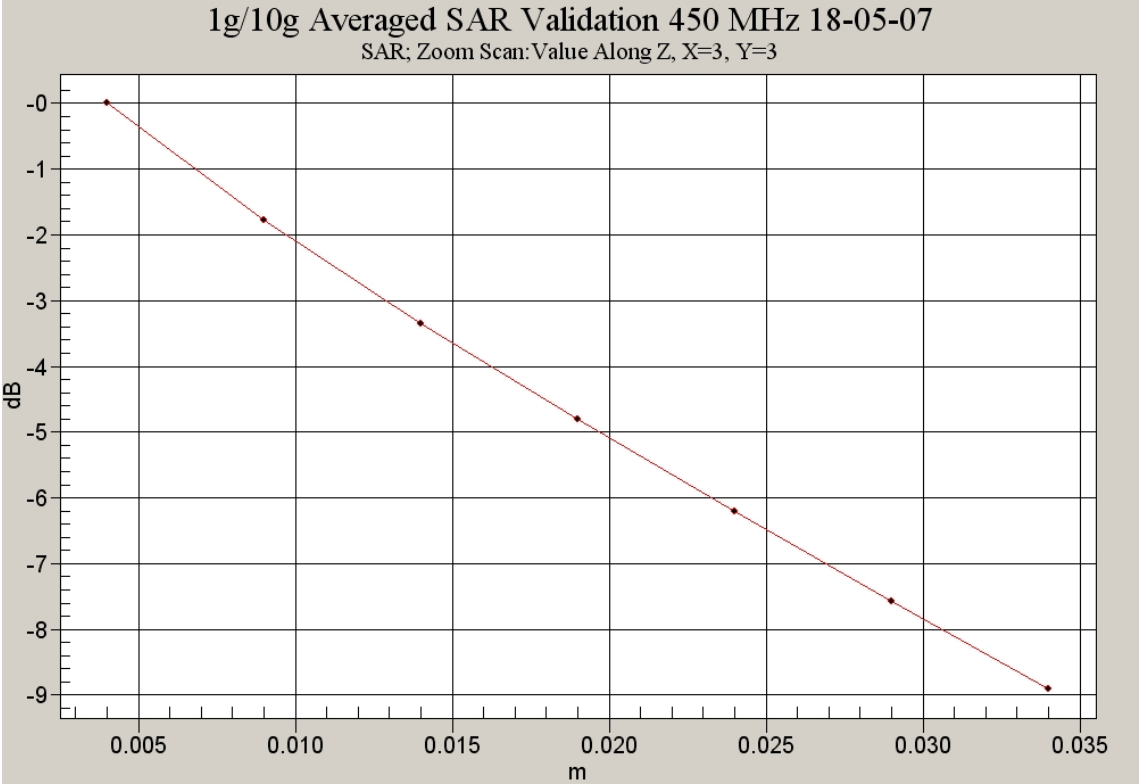
Channel 1Test 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.1 V/m; Power Drift = -0.024 dB
Peak SAR (extrapolated) = 3.28 W/kg
SAR(1 g) = 2.12 mW/g; SAR(10 g) = 1.41 mW/g
Maximum value of SAR (measured) = 2.28 mW/g

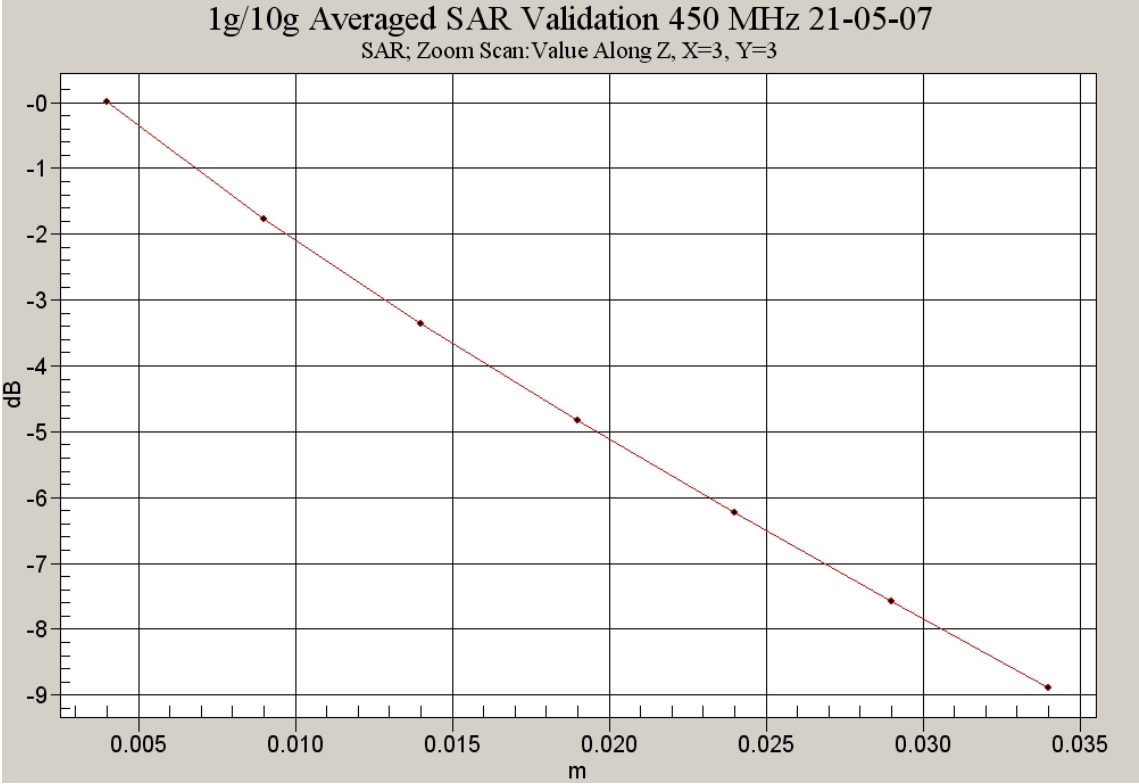


0 dB = 2.28mW/g

SAR MEASUREMENT PLOT 8

Ambient Temperature	**20.6 Degrees Celsius**
Liquid Temperature	**19.9 Degrees Celsius**
Humidity	**57.0 %**





APPENDIX C Probe and Dipole Calibration Documents

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 Federal Office of Metrology and Accreditation
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: D450V2-1009_Dec06

CALIBRATION CERTIFICATE

Object	D450V2 - SN: 1009
Calibration procedure(s)	QA CAL-15.v4 Calibration Procedure for dipole validation kits below 800 MHz
Calibration date:	December 14, 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 E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference Probe ET3DV6	SN 1507	19-Oct-06 (SPEAG, No. ET3-1507_Oct06)	Oct-07
DAE4	SN 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	19-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct 07

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

Issued: December 14, 2006

Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Flat Phantom V4.4	Shell thickness: 6 ± 0.2 mm
Distance Dipole Center - TSL	15 mm	with Spacer
Area Scan resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	43.5	0.87 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	43.6 ± 6 %	0.86 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	condition	
SAR measured	398 mW input power	2.06 mW / g
SAR normalized	normalized to 1W	5.18 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**5.21 mW / g ± 18.1 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	398 mW input power	1.39 mW / g
SAR normalized	normalized to 1W	3.49 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**3.50 mW / g ± 17.6 % (k=2)**

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

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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S Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
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_Dec06**

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1380
Calibration procedure(s)	QA CAL-01.v5 and QA CAL-12.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	December 12, 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 E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

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

Issued: December 13, 2006

DASY - Parameters of Probe: ET3DV6 SN:1380

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

NormX	**1.79** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**91** mV
NormY	**1.62** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**90** mV
NormZ	**1.75** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**89** 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	5.5	2.2
SAR_{be} [%]	With Correction Algorithm	0.0	0.0

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	13.3	8.5
SAR_{be} [%]	With Correction Algorithm	0.4	0.3

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.

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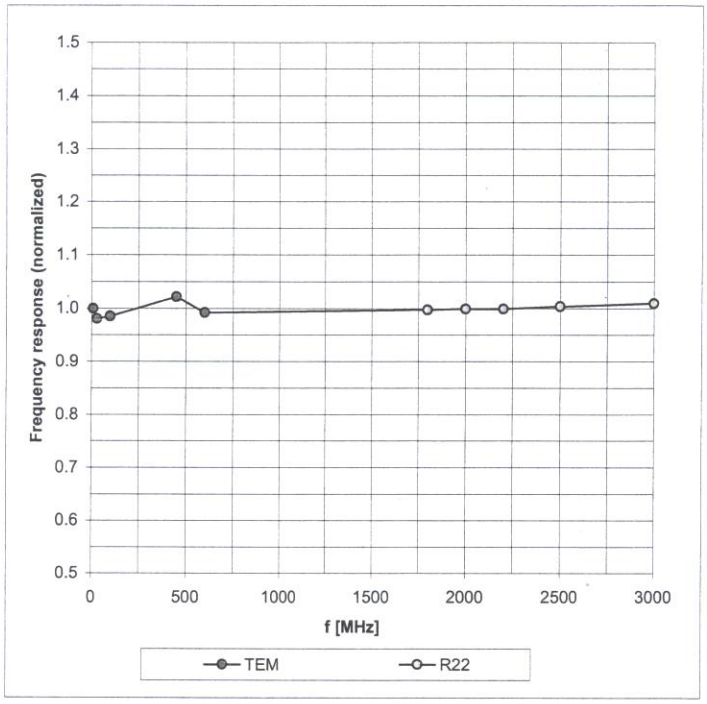
Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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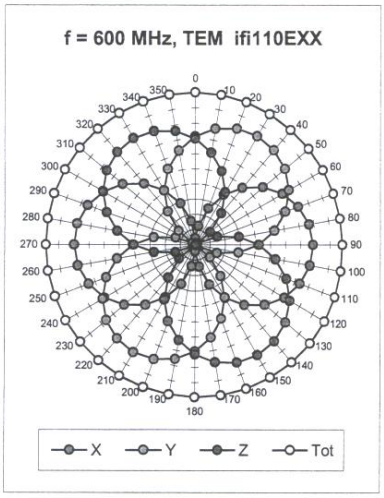
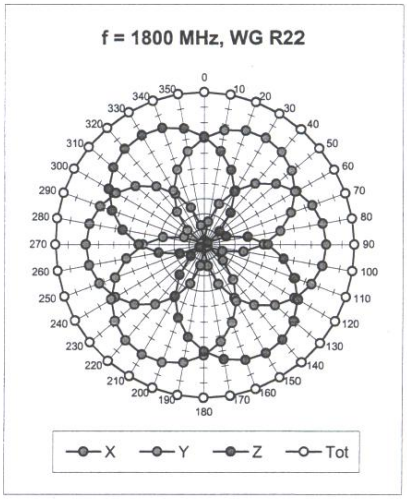
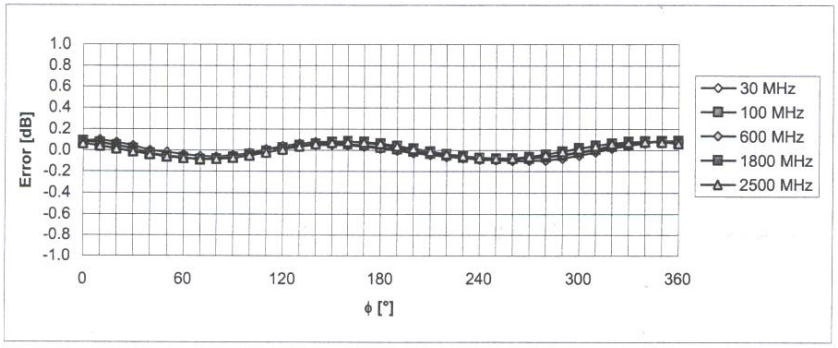
Receiving Pattern (ϕ), ϑ = 0°







Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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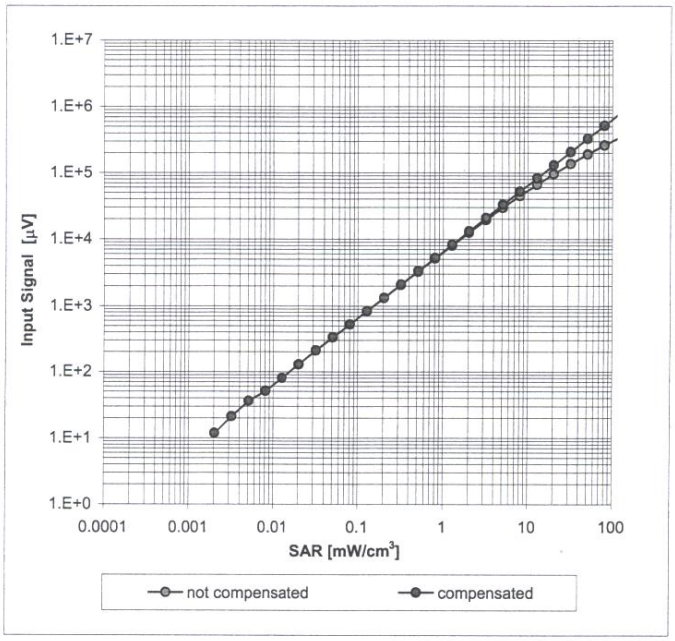
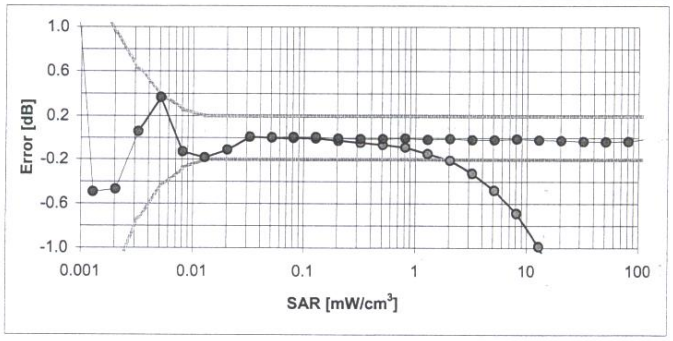
Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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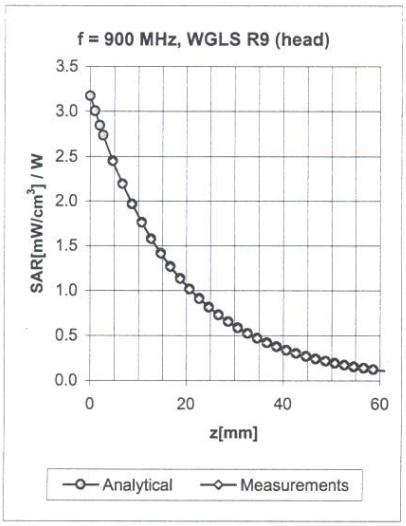
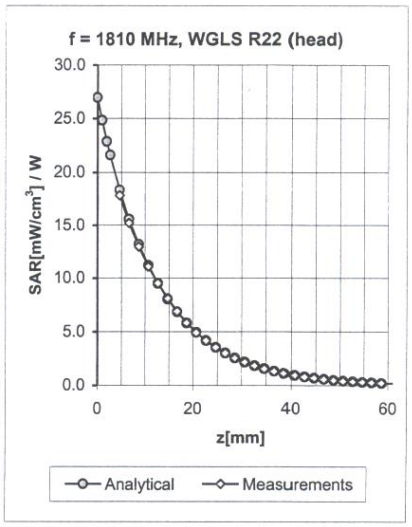
Conversion Factor Assessment





f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.39	1.95	7.04 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.41	2.29	6.21 ± 11.0% (k=2)
1640	± 50 / ± 100	Head	40.3 ± 5%	1.29 ± 5%	0.54	2.57	5.39 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.61	2.42	5.19 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.85	1.68	4.32 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.32	2.01	7.57 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.34	2.76	6.07 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.65	2.60	4.52 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.80	1.72	4.21 ± 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.

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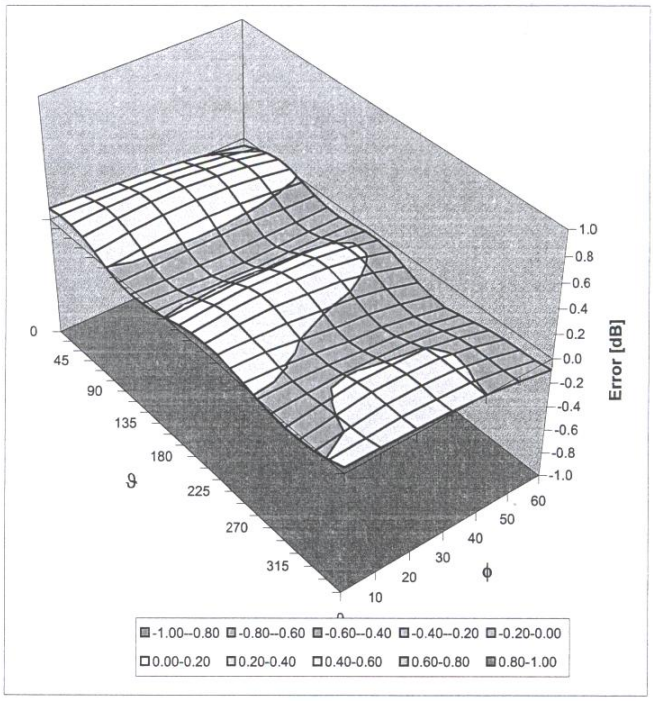
Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)