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SAR Test Report

Report Number: M090819

Test Sample: SIMOCO Push to Talk Transmitter
Model Number: SRP9180 AC
Tested For: ComGroup Australia

FCC ID: STZSRP9170AC
IC ID: 7068A-P9170AC

Date of Issue: 14th September 2009

CONTENTS

SAR EVALUATION

SIMOCO Push to Talk Transmitter, **Model:** SRP9180 AC

Report Number: M090819

1.0 GENERAL INFORMATION

Test Sample:	SIMOCO Push to Talk Transmitter
Model Number:	SRP9180 AC
Serial Number:	ET9AX0910010B
FCC ID:	STZSRP9170AC
IC ID:	7068A-P9170AC
Manufacturer:	TMC Pty Ltd
Device Category:	Portable Transmitter
Test Device:	Production Unit / Prototype Sample
RF exposure Category:	Occupational/Aware user
Tested for:	ComGroup Australia
Address:	1270 Ferntree Gully Road Scoresby Victoria 3179
Contact:	Robert Stowell
Phone:	(03) 9730 3800
Fax:	(03) 9730 3968
Email:	bstowell@tmcradio.com
Test Standard/s:	1 Evaluating Compliance with FCC Guidelines For Human Exposure to Radiofrequency Electromagnetic Fields Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01) 2 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) RSS-102 Issue 2 November 2005
Statement Of Compliance:	The SIMOCO Push to Talk Transmitter, model SRP9180 AC, complied with the FCC and Canadian Occupational/Controlled RF exposure limits of 8.0mW/g per requirements of 47CFR2.1093(d).
Test Dates:	25th – 26th August 2009
Test Officer:	**Arun Gurung**
Authorised Signature:	**Chris Zombolas** **Technical Director**

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2.0 DESCRIPTION OF DEVICE

2.1 Description of Test Sample

The device tested was a SIMOCO Push to Talk Transmitter, Model: SRP9180 AC operating in 150 MHz frequency band. It will be referred to as the Device Under Test (DUT) throughout this report. It has three types of 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	: 5W
Device Dimensions (LxWxH)	: 147mm x 60mm x 35mm
Antenna type	: Helical
Applicable Head Configurations	: Face Frontal
Applicable Body Configurations	: Belt Clip Position
Battery Options	: 7.2V 2200mAh Li-ion Battery Pack

2.2 Test sample Accessories

2.2.1 Battery Types

A 7.2V 2200mAh Li-ion Battery Pack is used to power the DUT. The maximum rated power is 5W. SAR measurements were performed with a standard 7.2V battery.

2.2.2 Belt Clip

One type of plastic belt clip is sold with the device. The belt clip is fixed to the back of the device and provides a spacing of 10 mm between the device and flat phantom. This plastic belt-clip was attached to the device during testing in the Belt-Clip position.

2.3 Test Signal, Frequency and Output Power

The DUT is a multi-channel device that operates in the 150 MHz frequency band. The frequency range is 136 MHz to 174 MHz. The transmitter was configured into a test mode that ensured a continuous RF transmission for the duration of each SAR scan. The device transmission characteristics were also monitored during testing to confirm the device was transmitting continuously. The device 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)
136 – 174 MHz	0, 1 and 2	37

2.3.1 Conducted Power Measurements

The conducted power of the EUT was measured in the 136 MHz to 174 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	Battery Type	Maximum Conducted Output Power dBm
0	136MHz	7.2V Li-ion	36.78
1	155MHz	7.2V Li-ion	36.73
2	174MHz	7.2V Li-ion	36.72

2.4 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:	7.2V Li-ion Rechargeable	**Battery #2:**	7.2V Li-ion Rechargeable
Model No.:	PAR-9180 BATL2x	**Model No.:**	PAR-9180 BATL2x

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:

AS/NZS 2772.1:	RF and microwave radiation hazard measurement
ACA:	Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003 +Amdt1:2007
FCC:	Guidelines for Human Exposure to RF Electromagnetic Field OET65C 01/01
EN 62209-1:2006	Human exposure to radio frequency fields from hand-held and body-mounted devices-Human models, instrumentation and procedures. **Part 1:** Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range 300 MHz to 3 GHz)
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 network signals. The temperature in the laboratory was controlled to within 21 ± 1 °C, the humidity was 42 %. 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 300 MHz with the SPEAG D300V2 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 @ 300 MHz

The following table lists the dielectric properties of the tissue simulating liquid measured prior to SAR 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 D300V2 SN: 1005)

1. Validation Date	2. ∈r (measured)	3. σ (mho/m) (measured)	4. Measured SAR 1g (mW/g)	5. Measured SAR 10g (mW/g)
25th Aug. 2009	43.5	0.84	1.26	0.82

3.4.2 Deviation from reference validation values

The reference SAR values are derived using a reference dipole and flat phantom suitable for a centre frequency of 300 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 (D300V2) 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

Frequency and 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 (%)
300 MHz 25th Sept. 2009	1.26	3.15	2.95	6.78	3	5.00

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

3.4.3 Liquid Depth 15cm

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

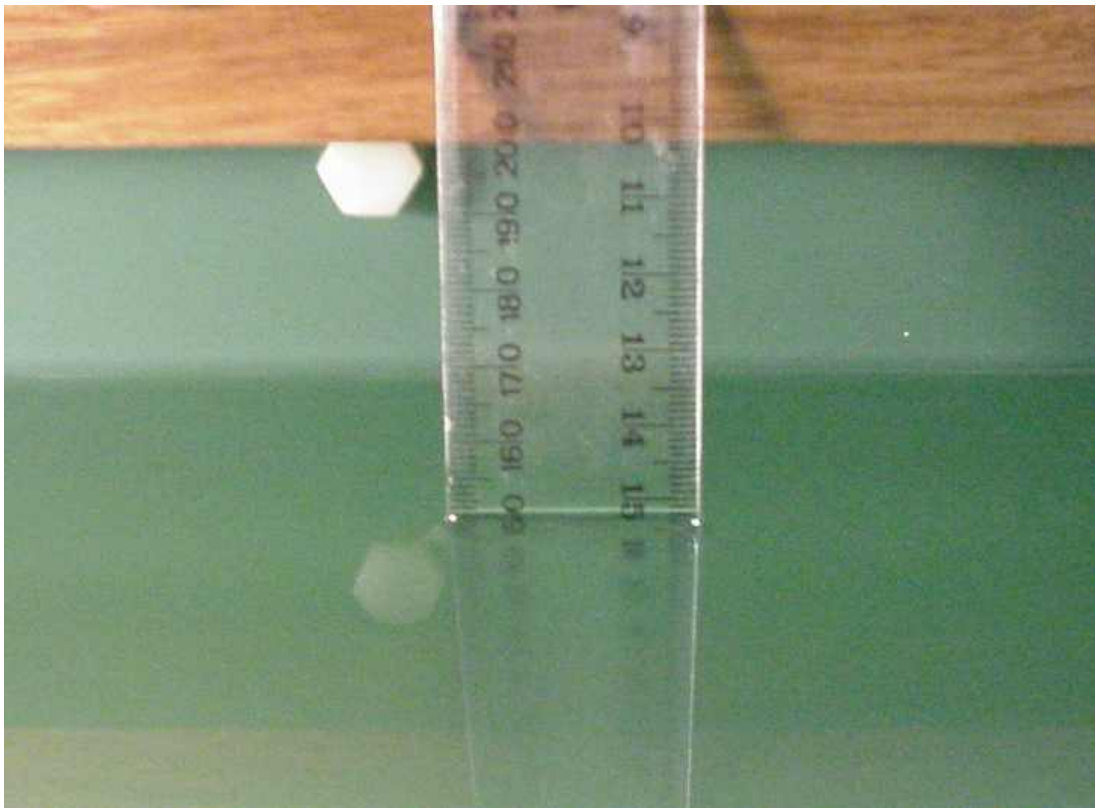


Photo of liquid Depth in Flat Phantom

3.5 Phantom Properties (Size, Shape, Shell Thickness)

The phantom used during the 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 V9.1 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

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
Loss Tangent	<0.05	0.0379

Photo 1: Flat_Phantom V9.1 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 8753ES 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
136MHz	54.3	52.3 ±5% (49.7 to 54.9)	0.70	0.76 ±5% (0.70 to 0.80)	1000
155MHz	52.5	52.3 ±5% (49.7 to 54.9)	0.72	0.76 ±5% (0.70 to 0.80)	1000
174MHz	51.0	52.3 ±5% (49.7 to 54.9)	0.74	0.76 ±5% (0.70 to 0.80)	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
136MHz	61.7	61.9 ±5% (58.8 to 65.0)	0.78	0.80 ±5% (0.76 to 0.84)	1000
155MHz	61.0	61.9 ±5% (58.8 to 65.0)	0.80	0.80 ±5% (0.76 to 0.84)	1000
174MHz	60.1	61.9 ±5% (58.8 to 65.0)	0.81	0.80 ±5% (0.76 to 0.84)	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 (%)
25th September 2009	20.5	20.2	42.0

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 @ 150MHz
Volume of Liquid: 60 Litres

Approximate Composition	% By Weight
Distilled Water	37.50
Salt	6.41
Sugar	55.56
HEC	0.48
Bactericide	0.05

Table: Tissue Type: Muscle @ 150MHz
Volume of Liquid: 60 Litres

Approximate Composition	% By Weight
Distilled Water	48.43
Salt	2.86
Sugar	48.13
HEC	0.53
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). 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 A2-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 EUT. 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 15 mm x 15 mm. The actual Area Scan has dimensions of 120 mm x 360 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 – DUT SAR test

Uncertainty Component	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	10	N	1	1	1	10.0	10.0	∞
Axial Isotropy	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effects	1	R	1.73	1	1	0.6	0.6	∞
Linearity	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	1	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	0.3	N	1	1	1	0.3	0.3	∞
Response Time	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Noise	3	R	1.73	1	1	1.7	1.7	∞
RF Ambient Reflections	3	R	1.73	1	1	1.7	1.7	∞
Probe Positioner	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning	2.9	R	1.73	1	1	1.7	1.7	∞
Max. SAR Eval.	1	R	1.73	1	1	0.6	0.6	∞
Test Sample Related								
Test Sample Positioning	1.61	N	1	1	1	1.6	1.6	11
Device Holder Uncertainty	3.6	N	1	1	1	3.6	3.6	7
Output Power Variation – SAR Drift Measurement	5.44	R	1.73	1	1	3.1	3.1	∞
Phantom and Setup								
Phantom Uncertainty	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.64	0.43	1.6	1.1	5
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.6	0.49	1.5	1.2	5
Combined standard Uncertainty		RSS				13.4	13.3	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)		k=2				26.9	26.51	

Estimated total measurement uncertainty for the DASY4 measurement system was ±13.4%. The extended uncertainty (K = 2) was assessed to be ±26.9% based on 95% confidence level. The uncertainty is not added to the measurement result.

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

Uncertainty Component	Tol. (6%)	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i (6%)	10g u_i (6%)	v_i
Measurement System								
Probe Calibration	6.65	N	1	1	1	6.7	6.7	∞
Axial Isotropy	4.7	R	1.73	1	1	2.7	2.7	∞
Hemispherical Isotropy	9.6	R	1.73	0	0	0.0	0.0	∞
Boundary Effects	1	R	1.73	1	1	0.6	0.6	∞
Linearity	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	1	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	0.3	N	1	1	1	0.3	0.3	∞
Response Time	0	R	1.73	1	1	0.0	0.0	∞
Integration Time	0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Noise	3	R	1.73	1	1	1.7	1.7	∞
RF Ambient Reflections	3	R	1.73	1	1	1.7	1.7	∞
Probe Positioner	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning	2.9	R	1.73	1	1	1.7	1.7	∞
Max. SAR Eval.	1	R	1.73	1	1	0.6	0.6	∞
Dipole								
Dipole Axis to Liquid Distance	2	N	1.73	1	1	1.2	1.2	11
Input Power and SAR drift meas.	4.7	R	1.73	1	1	2.7	2.7	∞
Phantom and Tissue Param.								
Phantom Uncertainty	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.64	0.43	1.6	1.1	5
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.6	0.49	1.5	1.2	5
Combined standard Uncertainty		RSS				9.7	9.4	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)		k=2				19.4	18.88	

Estimated total measurement uncertainty for the DASY4 measurement system was ±9.7%. The extended uncertainty (K = 2) was assessed to be ±19.4% based on 95% confidence level. The uncertainty is not added to the Validation measurement result.

6.0 EQUIPMENT LIST AND CALIBRATION DETAILS

Table: SPEAG DASY4 Version V4.7 Build 53

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

* Calibrated during the test for the relevant parameters.

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 9.1 phantom.
See Appendix A 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 device was placed 25mm from the phantom, this position is equivalent to the device placed in front of the nose. The 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 10 mm between the back of the device and the flat phantom. The Transceiver 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 contained metal parts, the device was connected with the hands free earpiece/microphone.

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 sample device 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. Antenna Size (mm)	6. Measured 1g SAR Results (mW/g)	7. Measured 1g SAR Results 50% Duty Cycle (mW/g)	8. Measured Drift (dB)
Face Frontal	1	0	136MHz	182	1.64	0.82	-0.18
	2	1	155MHz	165	2.68	1.34	-0.09
	3	2	174MHz	140	1.62	0.81	-0.07
Belt Clip	4	0	136MHz	182	1.70	0.85	-0.18
	5	1	155MHz	165	2.18	1.09	-0.11
	6	2	174MHz	140	3.95	1.98	-0.23
Belt Clip with Holster	7	2	174MHz	140	4.33	2.17	-0.16

Note: The uncertainty of the system (± 26.9 %) has not been added to the results.

The FCC SAR limit for occupational exposure is 8.0 mW/g measurements in a 1g cube of tissue.

9.0 COMPLIANCE STATEMENT

The SIMOCO Push to Talk Transmitter model SRP9180 AC was tested on behalf of ComGroup Australia. It complied with the FCC and Canadian SAR requirements.

The highest SAR level recorded for 100% duty cycle was 4.33 mW/g for a 1g cube. After extrapolating to a 50% duty cycle the highest SAR level recorded was 2.17 mW/g for a 1g cube. This value was measured in the “Belt Clip with Holster” position, and was below the controlled limit of 8.0 mW/g, even taking into account the measurement uncertainty of 26.9 %.

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

APPENDIX A1 Test Sample Photographs

Batteries

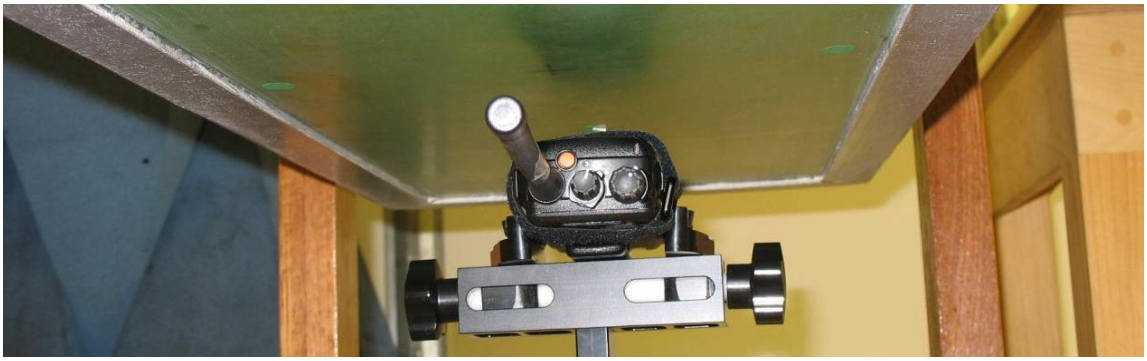
DUT

Accessories - Speaker - Microphone

Accessories – Holster

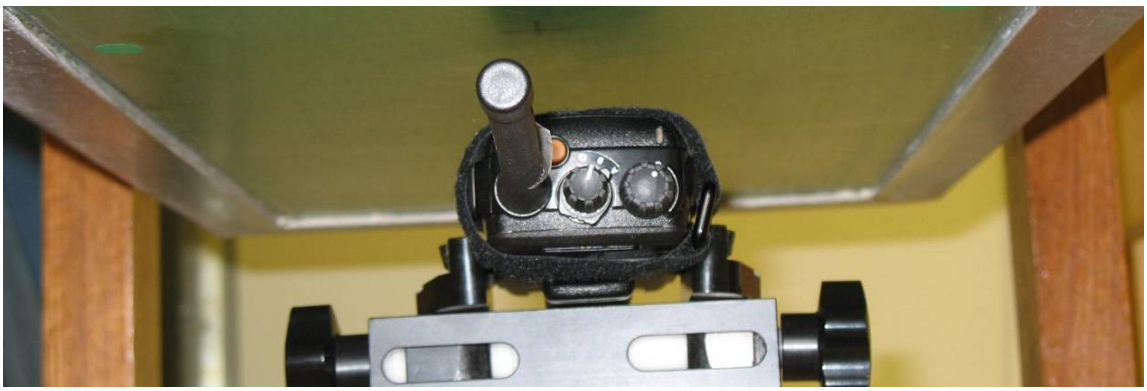
APPENDIX A2 Test Setup Photographs

Face Frontal Position with 182mm Antenna

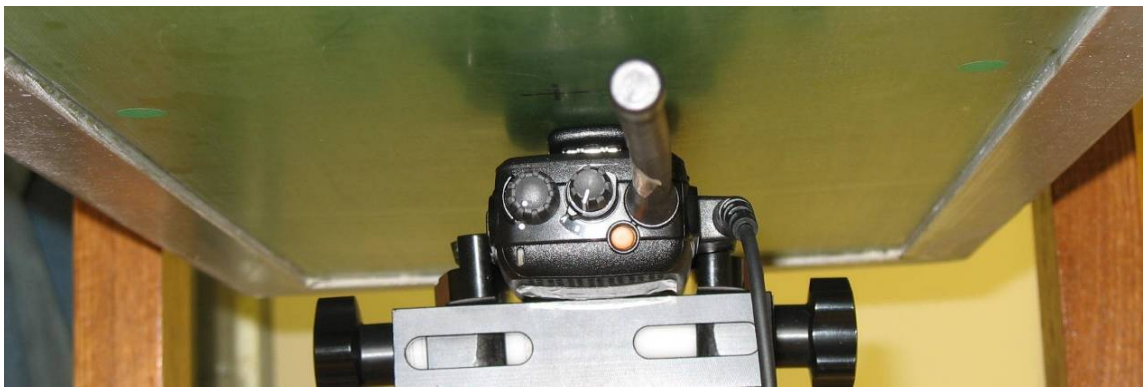


Face Frontal Position with 165mm Antenna

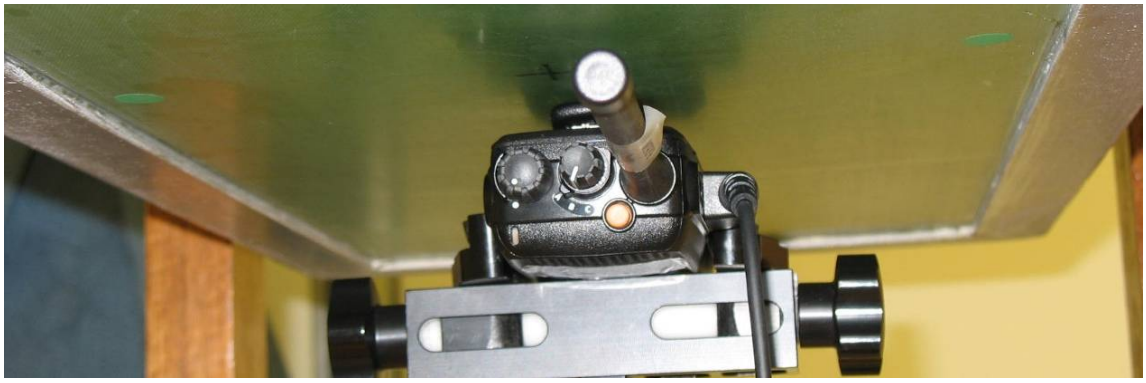
Face Frontal Position with 140mm Antenna



Belt Clip Position with 182mm Antenna

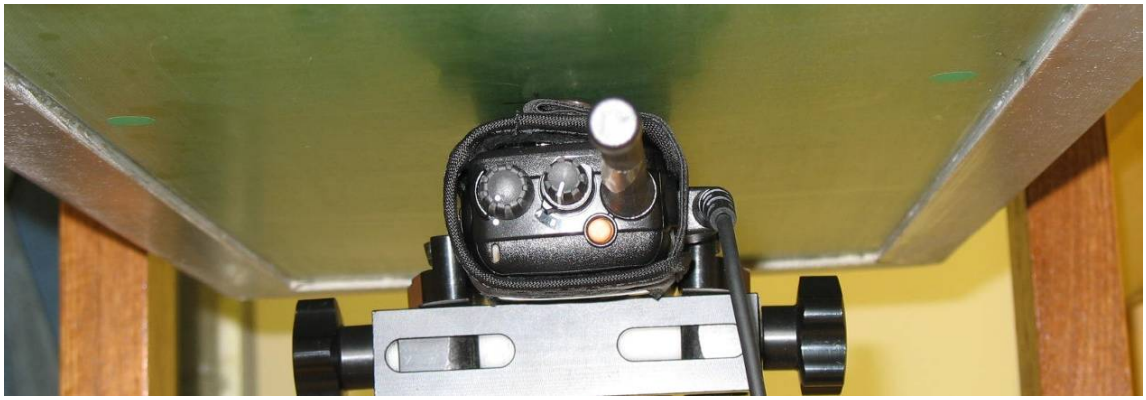


Belt Clip Position with 165mm Antenna



Belt Clip Position with 140mm Antenna

Belt Clip with Holster Position with 140mm Antenna



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

1. Test Position	2. Plot No.	3. Test Channel	4. Test Freq (MHz)
Face Frontal	1	0	136MHz
	2	1	155MHz
	3	2	174MHz
Belt Clip	4	0	136MHz
	5	1	155MHz
	6	2	174MHz
Belt Clip with Holster	7	2	174MHz

Table: Validation Plot Numbers

Date	Plot Number	Frequency
25th August 2009	8	300 MHz

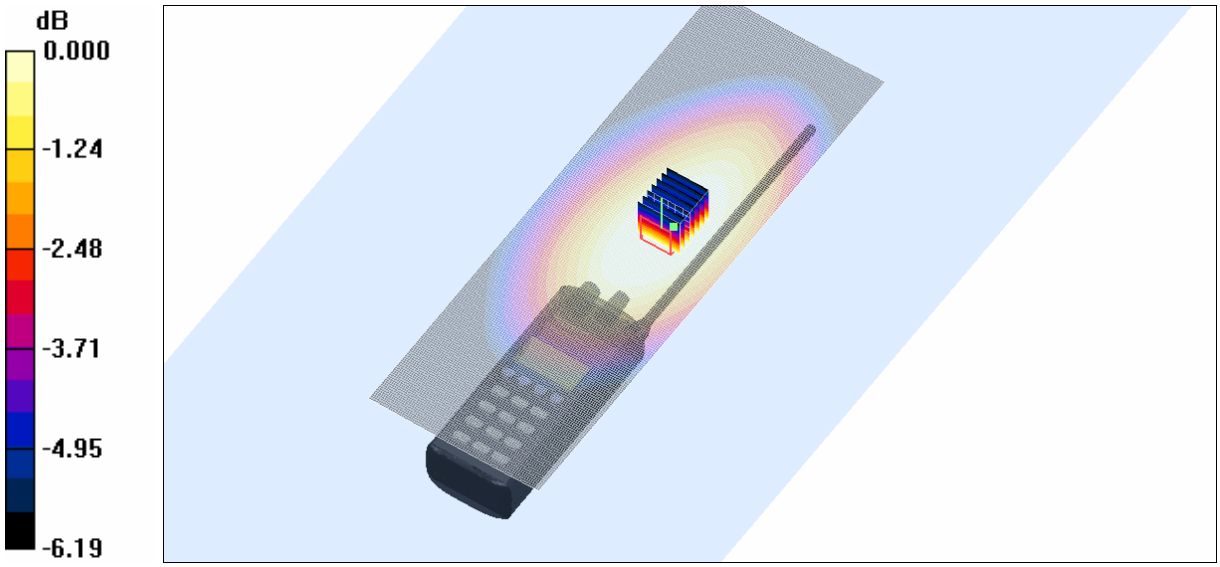
Test Date: 25 August 2009
File Name: M090819 Face Frontal 136 MHz 182mm Antenna (DAE442 Probe1380) 25-08-09.da4
DUT: Simoco Push to Talk Transmitter; Type: SRP 9180 AC; Serial: ET9AX0910010B

* Communication System: CW 150 MHz; Frequency: 136 MHz; Duty Cycle: 1:1
* Medium parameters used: f = 135.2 MHz; σ = 0.7 mho/m; ε_r = 54.3; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.8, 7.8, 7.8)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 0 Test/Area Scan (81x241x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.85 mW/g

Channel 0 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.8 V/m; Power Drift = -0.105 dB
Peak SAR (extrapolated) = 2.48 W/kg
SAR(1 g) = 1.64 mW/g; SAR(10 g) = 1.24 mW/g

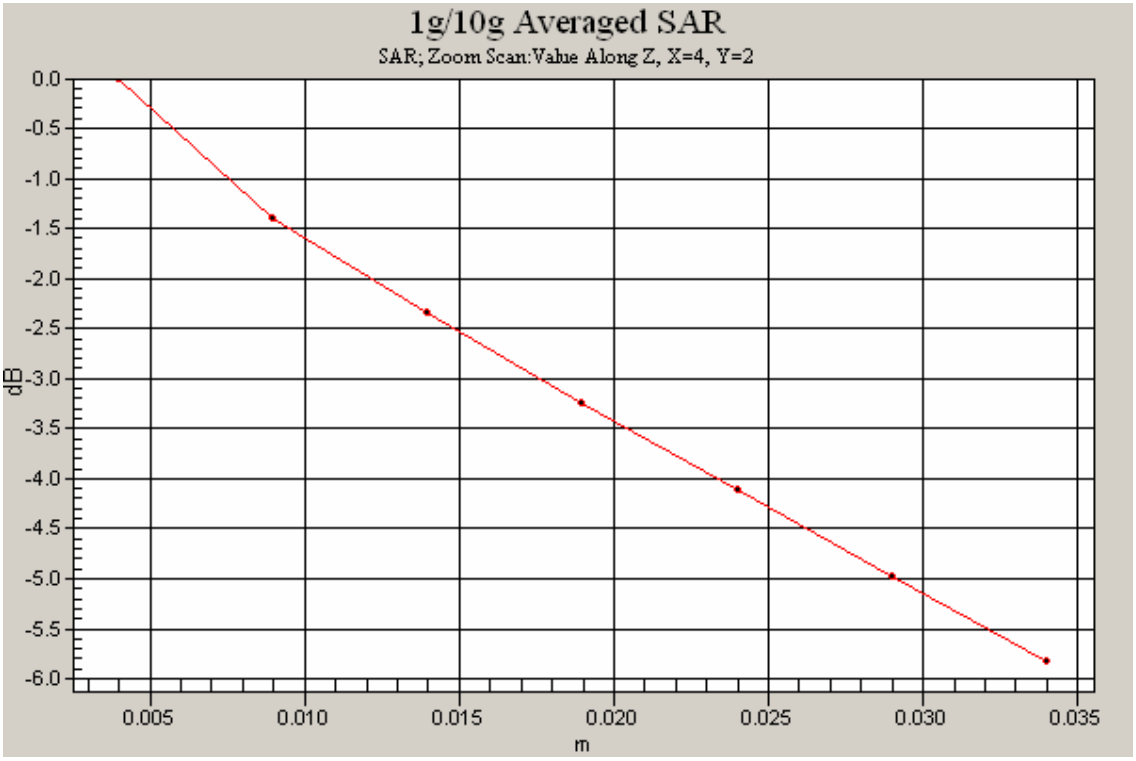
Maximum value of SAR (measured) = 1.70 mW/g



0 dB = 1.70mW/g

SAR MEASUREMENT PLOT 1

Ambient Temperature	**20.5 Degrees Celsius**
Liquid Temperature	**20.2 Degrees Celsius**
Humidity	**42.0 %**

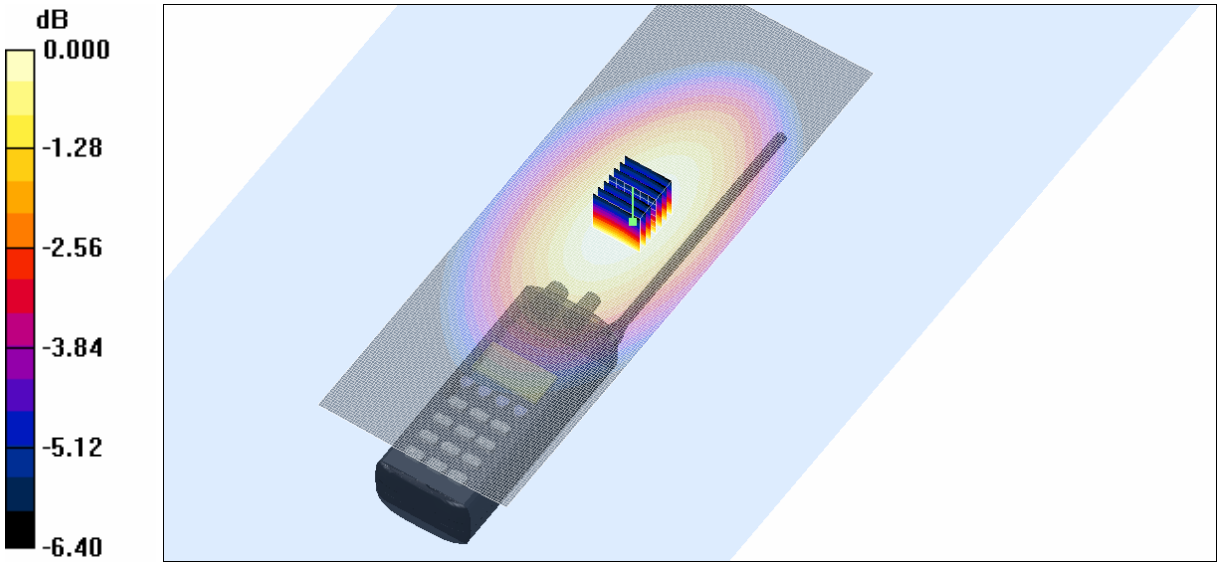


Test Date: 25 August 2009
File Name: M090819 Face Frontal 155 MHz 165mm Antenna (DAE442 Probe1380) 25-08-09.da4
DUT: Simoco Push to Talk Transmitter; Type: SRP 9180 AC; Serial: ET9AX0910010B

* Communication System: CW 150 MHz; Frequency: 155 MHz; Duty Cycle: 1:1
* Medium parameters used: f = 154.2 MHz; σ = 0.717 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.8, 7.8, 7.8)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 1 Test/Area Scan (81x231x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.77 mW/g

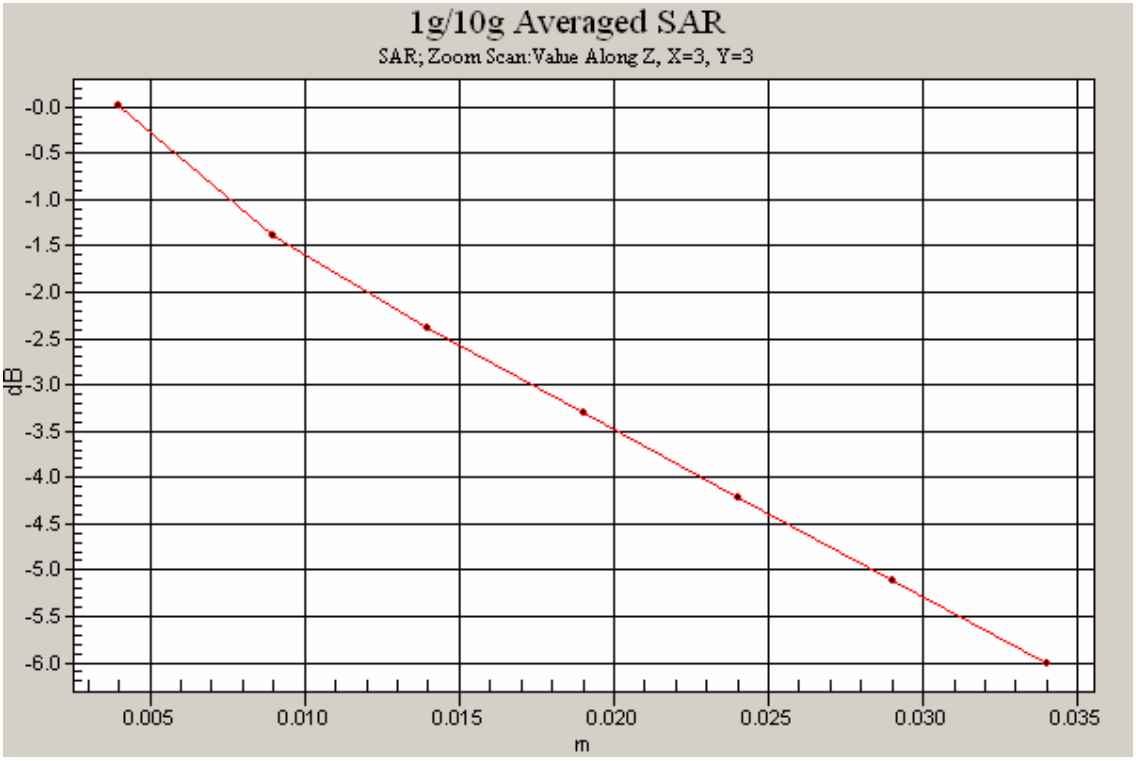
Channel 1 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.1 V/m; Power Drift = -0.054 dB
Peak SAR (extrapolated) = 4.05 W/kg
SAR(1 g) = 2.68 mW/g; SAR(10 g) = 2.02 mW/g
Maximum value of SAR (measured) = 2.76 mW/g



0 dB = 2.76mW/g

SAR MEASUREMENT PLOT 2

Ambient Temperature	**20.5 Degrees Celsius**
Liquid Temperature	**20.2 Degrees Celsius**
Humidity	**42.0 %**

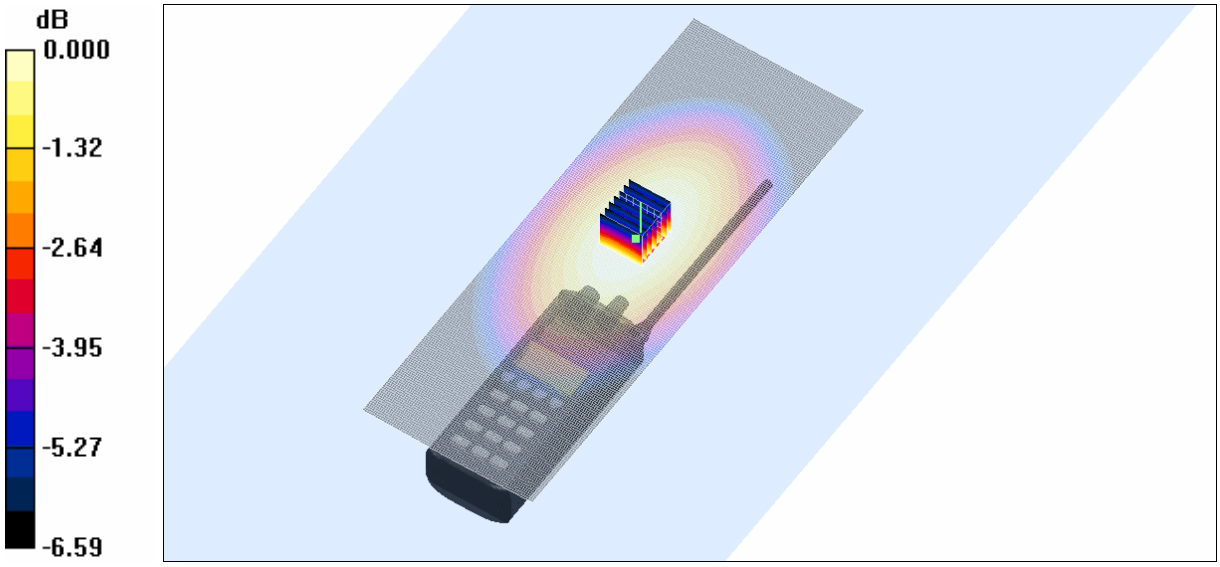


Test Date: 25 August 2009
File Name: M090819 Face Frontal 174 MHz 140mm Antenna (DAE442 Probe1380) 25-08-09.da4
DUT: Simoco Push to Talk Transmitter; Type: SRP 9180 AC; Serial: ET9AX0910010B

* Communication System: CW 150 MHz; Frequency: 174 MHz; Duty Cycle: 1:1
* Medium parameters used: f = 173.2 MHz; σ = 0.736 mho/m; ε_r = 51; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.8, 7.8, 7.8)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 2 Test/Area Scan (81x231x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.74 mW/g

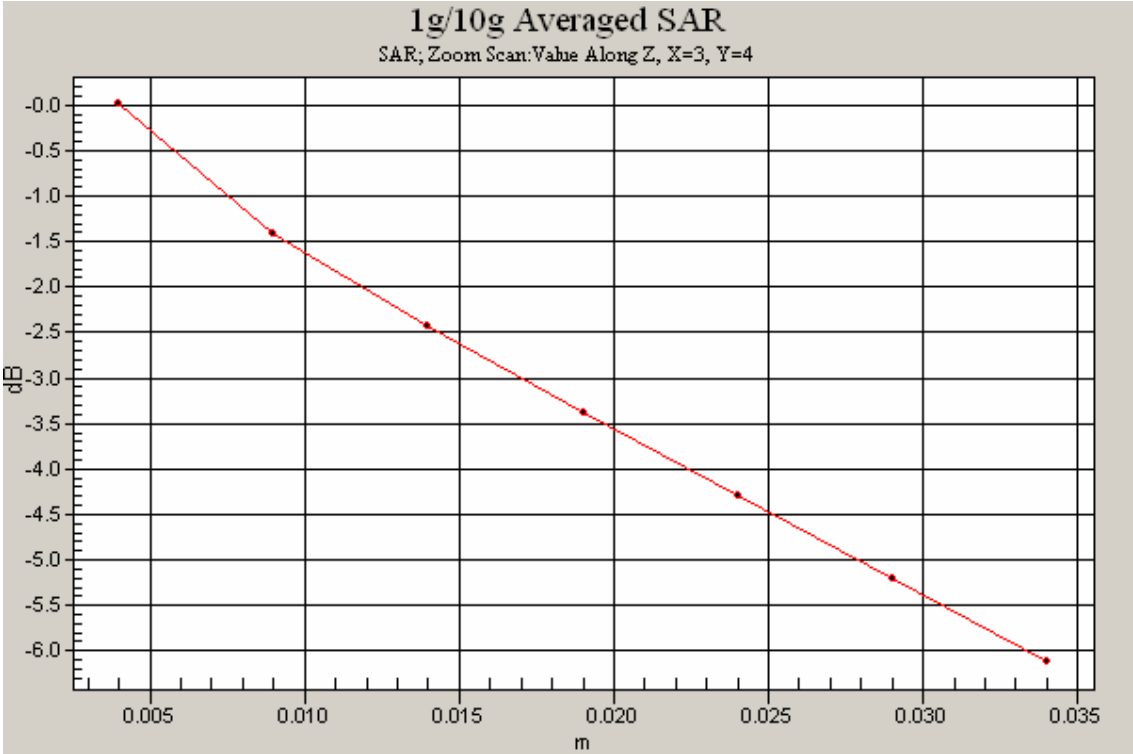
Channel 2 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 47.3 V/m; Power Drift = 0.094 dB
Peak SAR (extrapolated) = 2.46 W/kg
SAR(1 g) = 1.62 mW/g; SAR(10 g) = 1.21 mW/g
Maximum value of SAR (measured) = 1.67 mW/g



0 dB = 1.67mW/g

SAR MEASUREMENT PLOT 3

Ambient Temperature	**20.5 Degrees Celsius**
Liquid Temperature	**20.2 Degrees Celsius**
Humidity	**42.0 %**



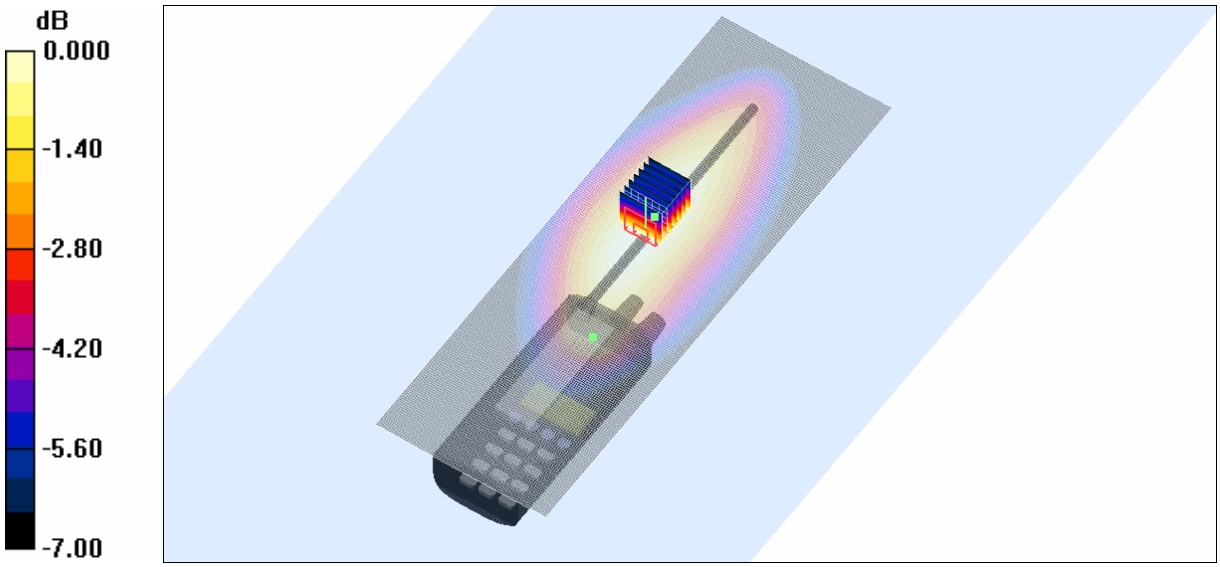
Test Date: 25 August 2009
File Name: M090819 Belt Clip 136 MHz 182mm Antenna (DAE442 Probe1380) 25-08-09.da4
DUT: Simoco Push to Talk Transmitter; Type: SRP 9180 AC; Serial: ET9AX0910010B

* Communication System: CW 150 MHz; Frequency: 136 MHz; Duty Cycle: 1:1
* Medium parameters used: f = 135.2 MHz; σ = 0.781 mho/m; ε_r = 61.7; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.7, 7.7, 7.7)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 0 Test/Area Scan (81x241x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.74 mW/g

Channel 0 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 46.1 V/m; Power Drift = -0.099 dB
Peak SAR (extrapolated) = 2.64 W/kg
SAR(1 g) = 1.7 mW/g; SAR(10 g) = 1.25 mW/g

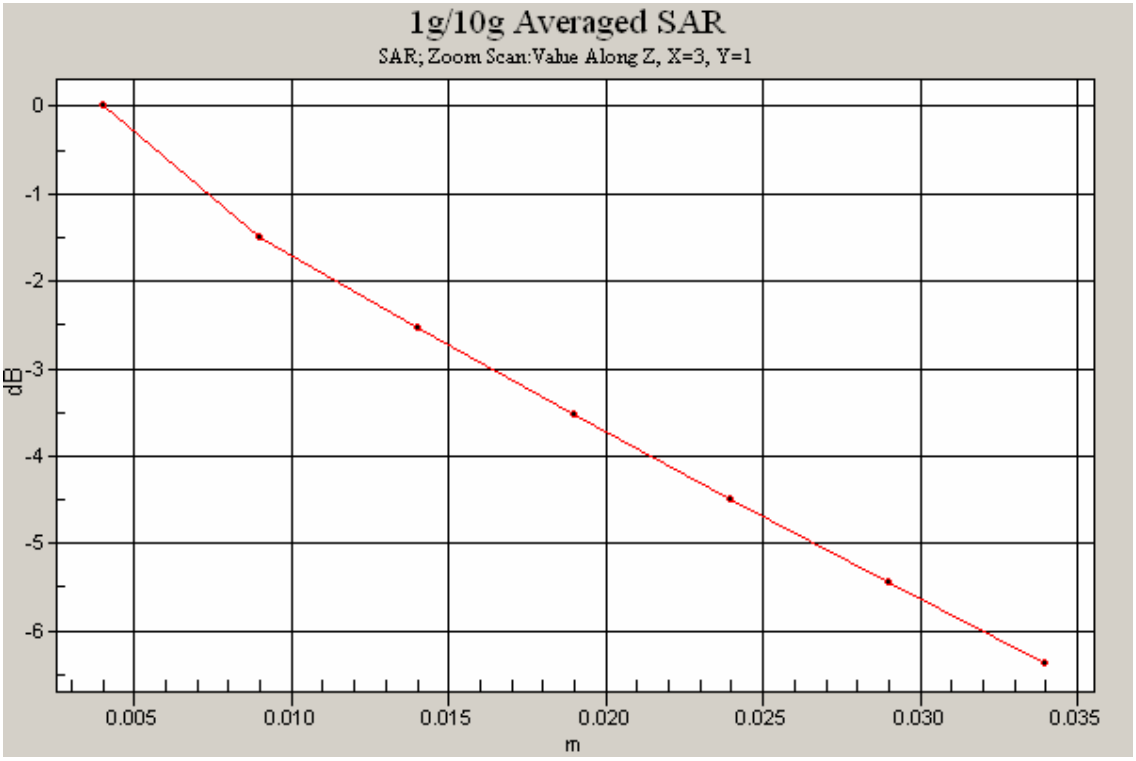
Maximum value of SAR (measured) = 1.76 mW/g



0 dB = 1.76mW/g

SAR MEASUREMENT PLOT 4

Ambient Temperature	**20.5 Degrees Celsius**
Liquid Temperature	**20.2 Degrees Celsius**
Humidity	**42.0 %**



Test Date: 25 August 2009

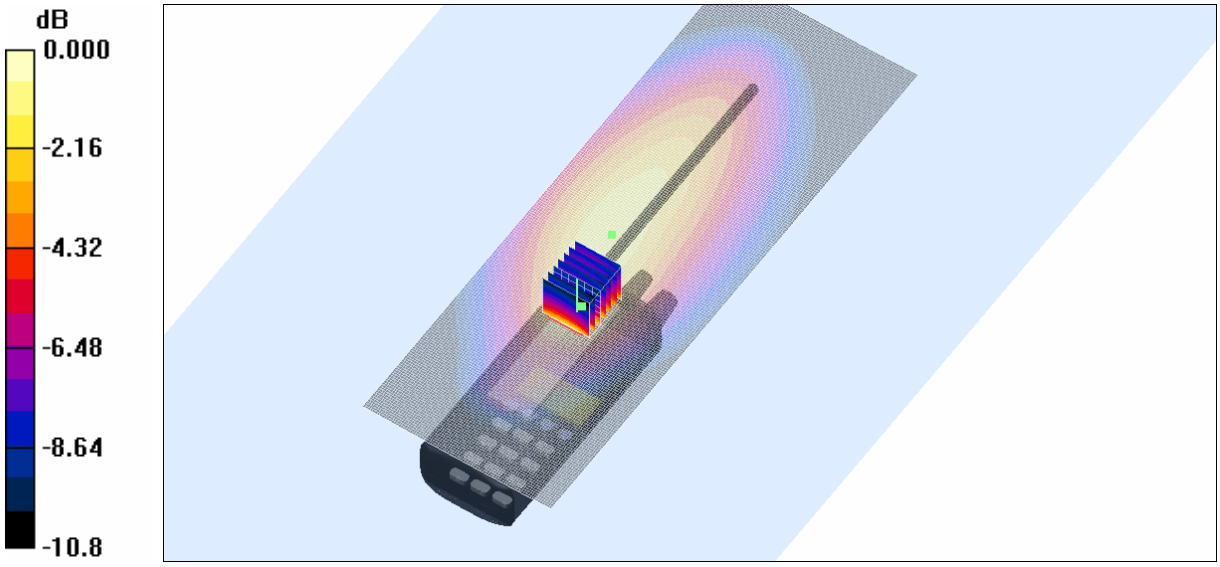
File Name: M090819 Belt Clip 155 MHz 165mm Antenna (DAE442 Probe1380) 25-08-09.da4

DUT: Simoco Push to Talk Transmitter; Type: SRP 9180 AC; Serial: ET9AX0910010B

* Communication System: CW 150 MHz; Frequency: 155 MHz; Duty Cycle: 1:1
* Medium parameters used: f = 154.2 MHz; σ = 0.795 mho/m; ε_r = 61; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.7, 7.7, 7.7)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 1 Test/Area Scan (81x231x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.01 mW/g

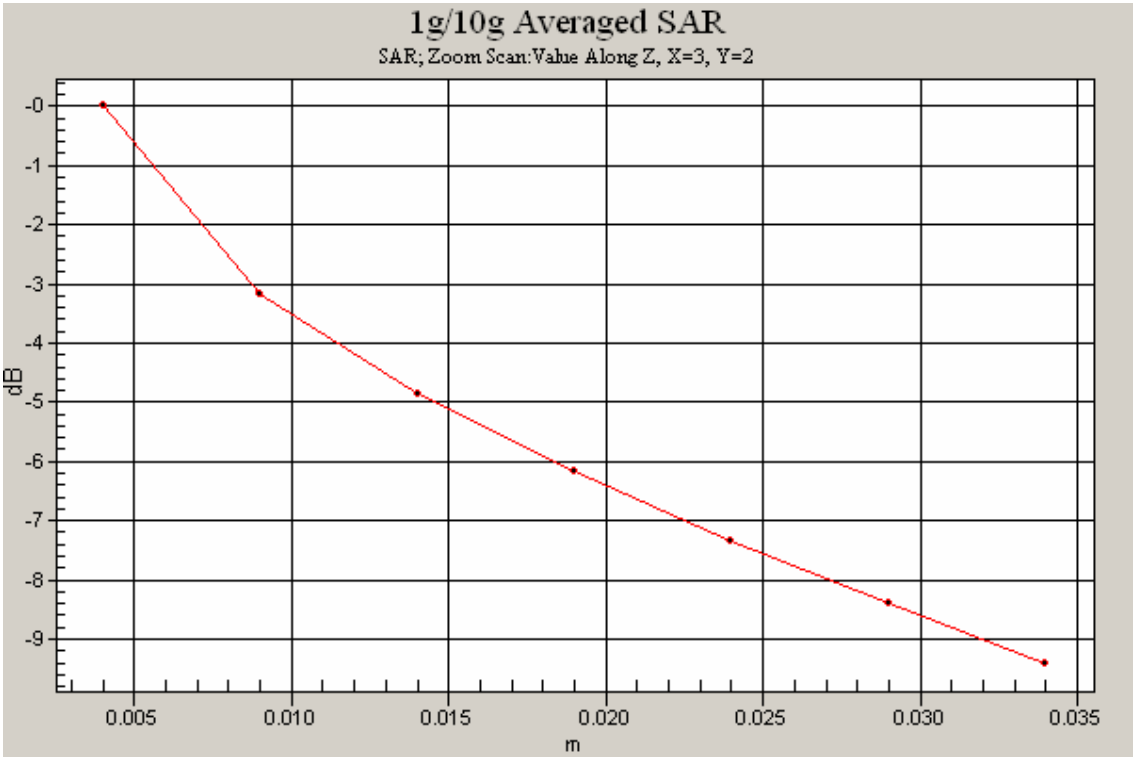
Channel 1 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 44.5 V/m; Power Drift = -0.466 dB
Peak SAR (extrapolated) = 7.15 W/kg
SAR(1 g) = 2.18 mW/g; SAR(10 g) = 1.16 mW/g
Maximum value of SAR (measured) = 2.22 mW/g



0 dB = 2.22mW/g

SAR MEASUREMENT PLOT 5

Ambient Temperature	**20.5 Degrees Celsius**
Liquid Temperature	**20.2 Degrees Celsius**
Humidity	**42.0 %**



Test Date: 25 August 2009

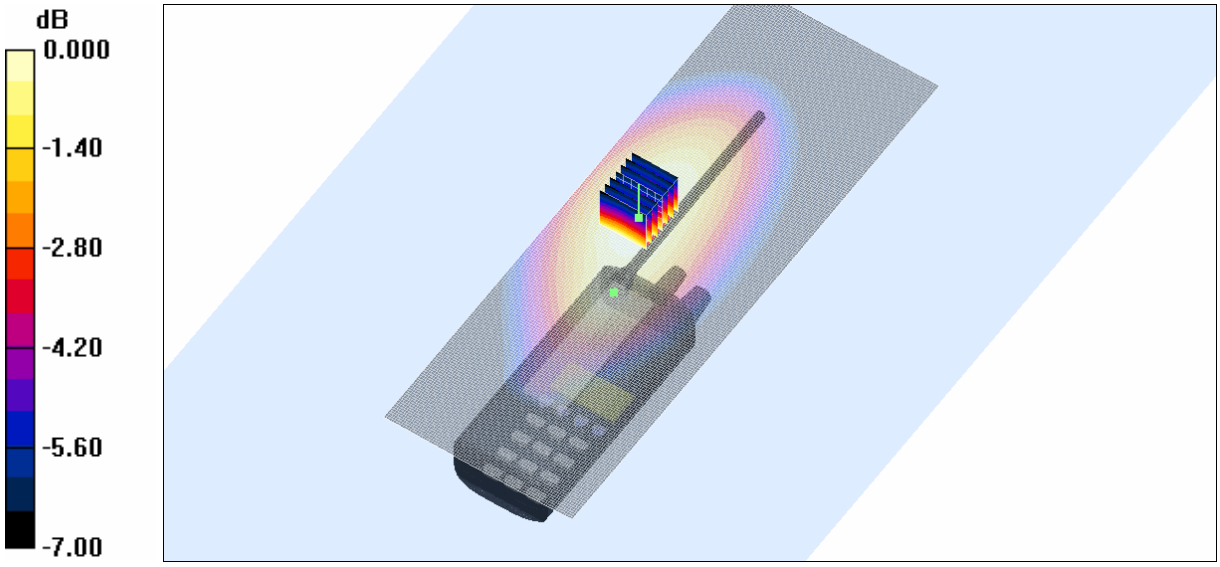
File Name: M090819 Belt Clip 174 MHz 140mm Antenna (DAE442 Probe1380) 25-08-09.da4

DUT: Simoco Push to Talk Transmitter; Type: SRP 9180 AC; Serial: ET9AX0910010B

* Communication System: CW 150 MHz; Frequency: 174 MHz; Duty Cycle: 1:1
* Medium parameters used: f = 173.2 MHz; σ = 0.809 mho/m; ε_r = 60.1; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.7, 7.7, 7.7)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 2 Test/Area Scan (81x231x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.00 mW/g

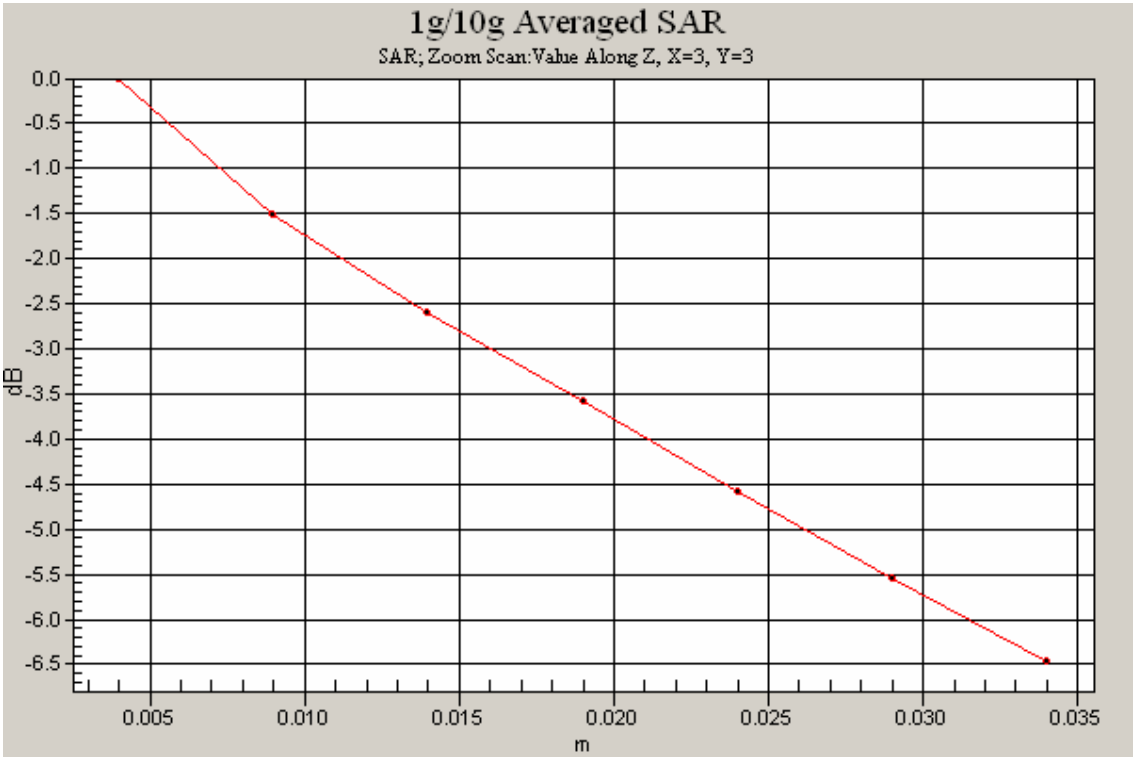
Channel 2 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 69.9 V/m; Power Drift = -0.047 dB
Peak SAR (extrapolated) = 6.13 W/kg
SAR(1 g) = 3.95 mW/g; SAR(10 g) = 2.89 mW/g
Maximum value of SAR (measured) = 4.10 mW/g



0 dB = 4.10mW/g

SAR MEASUREMENT PLOT 6

Ambient Temperature	**20.5 Degrees Celsius**
Liquid Temperature	**20.2 Degrees Celsius**
Humidity	**42.0 %**



Test Date: 25 August 2009

File Name: M090819 Belt Clip with Holster 155 MHz 165mm Antenna (DAE442 Probe1380) 25-08-09.da4

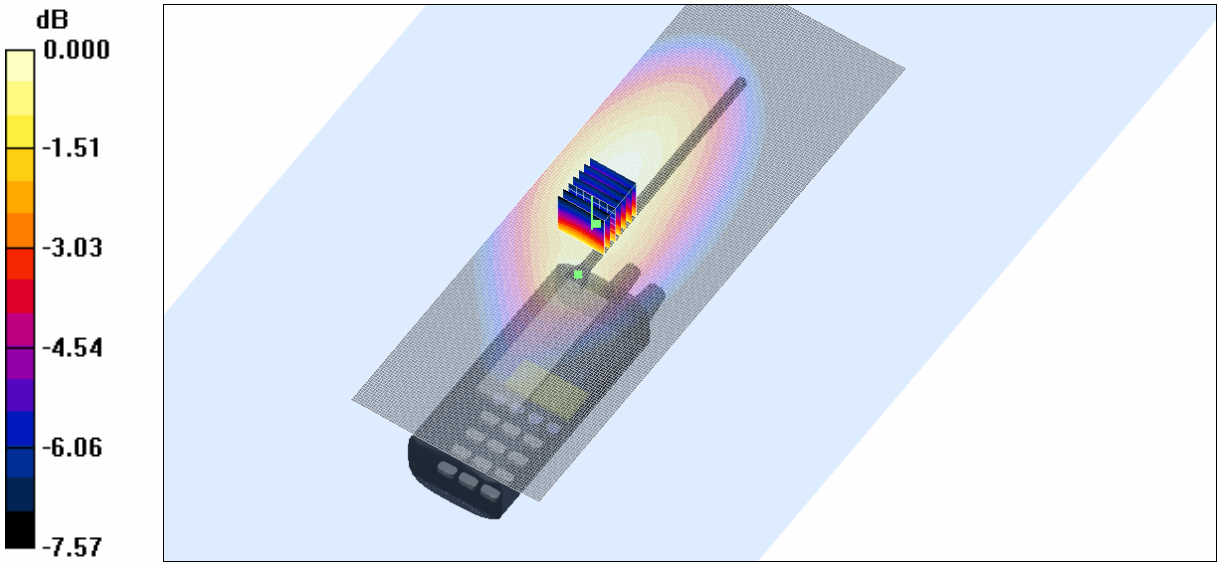
DUT: Simoco Push to Talk Transmitter; Type: SRP 9180 AC; Serial: ET9AX0910010B

* Communication System: CW 150 MHz; Frequency: 174 MHz; Duty Cycle: 1:1
* Medium parameters used: f = 173.2 MHz; σ = 0.809 mho/m; ε_r = 60.1; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.7, 7.7, 7.7)
- Phantom: Flat Phantom 9.1; Serial: P 9.1; Phantom section: Flat 2.2 Section

Channel 1 Test/Area Scan (81x231x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.47 mW/g

Channel 1 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 72.6 V/m; Power Drift = -0.127 dB
Peak SAR (extrapolated) = 7.70 W/kg
SAR(1 g) = 4.33 mW/g; SAR(10 g) = 3.06 mW/g

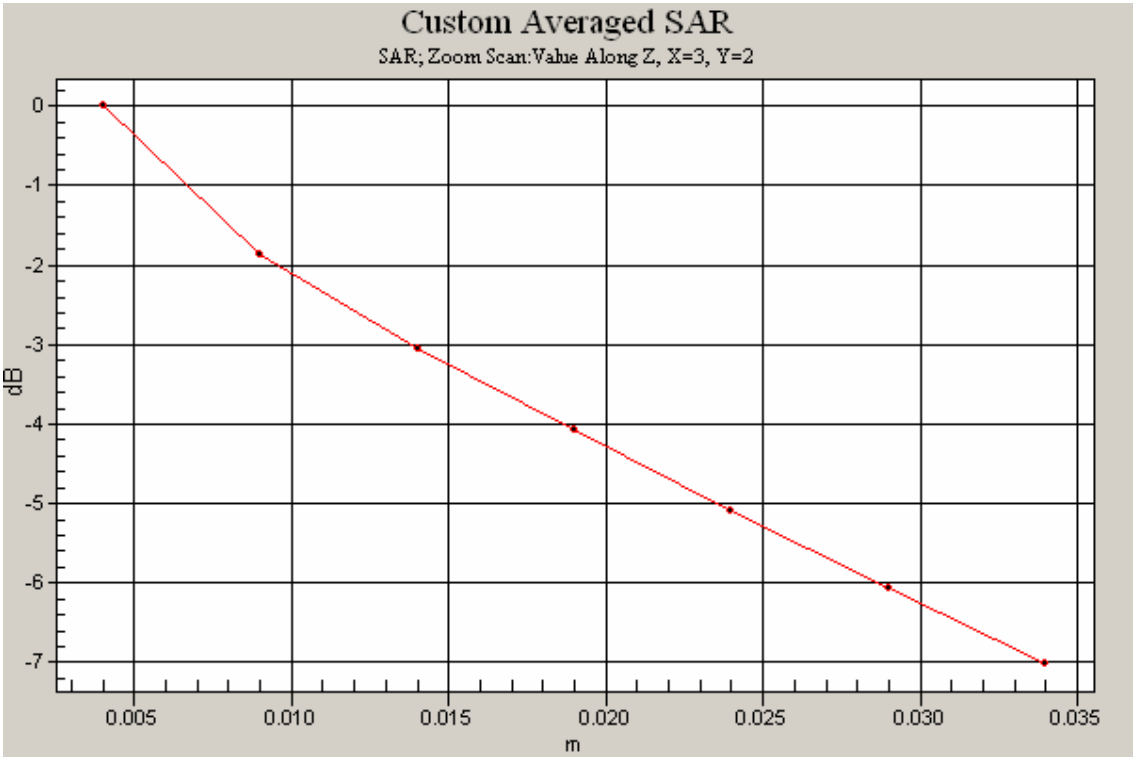
Maximum value of SAR (measured) = 4.49 mW/g



0 dB = 4.49mW/g

SAR MEASUREMENT PLOT 7

Ambient Temperature	**20.5 Degrees Celsius**
Liquid Temperature	**20.2 Degrees Celsius**
Humidity	**42.0 %**

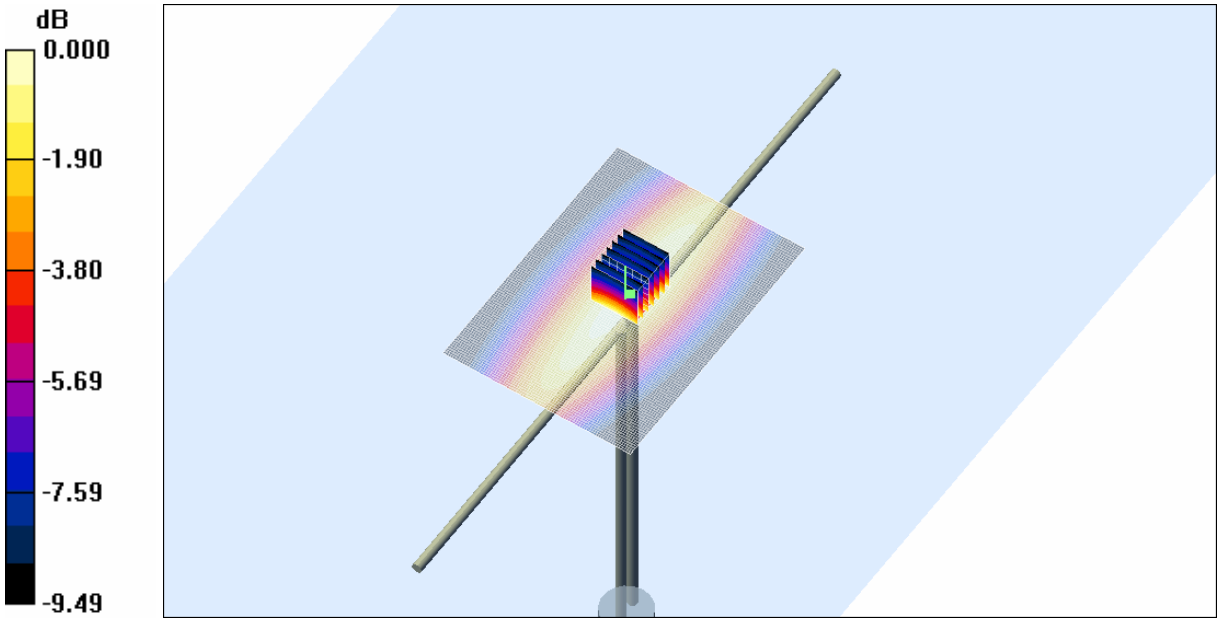


Test Date: 25 August 2009
File Name: Validation 300 MHz Head (DAE442 Probe1380) 25-08-09.da4
DUT: Dipole 300 MHz; Type: D300V2; Serial: 1005

* Communication System: CW 300 MHz; Frequency: 300 MHz; Duty Cycle: 1:1
* Medium parameters used: f = 299.6 MHz; σ = 0.844 mho/m; ε_r = 43.5; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(7.3, 7.3, 7.3)
- Phantom: Flat Phantom 4.4; Serial: P 4.4; Phantom section: Flat Section

Channel 1Test/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.33 mW/g

Channel 1Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.8 V/m; Power Drift = -0.031 dB
Peak SAR (extrapolated) = 2.23 W/kg
SAR(1 g) = 1.26 mW/g; SAR(10 g) = 0.824 mW/g
Maximum value of SAR (measured) = 1.33 mW/g



0 dB = 1.33mW/g

SAR MEASUREMENT PLOT 8

Ambient Temperature	**20.5 Degrees Celsius**
Liquid Temperature	**20.2 Degrees Celsius**
Humidity	**42.0 %**