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SAR Test Report - IC
Industry Canada ID: 2813A-K78205
Report Number: M031214-IC

Test Sample: Dual Band GSM EFTPOS Terminal
Model Number: K78
Tested For: Keycorp Ltd

Date of Issue: 30th January 2004

CONTENTS

SAR EVALUATION
Dual Band GSM EFTPOS Terminal
Model: K78
Report Number: M031214-IC

1.0 GENERAL INFORMATION

Test Sample:	Dual Band GSM EFTPOS Terminal
Device Category:	Portable Transmitter
Test Device:	Production Unit
Model Name:	K78
RF exposure Category:	General Population/Uncontrolled
Manufacturer:	Keycorp LTD
Address:	Level 5, Keycorp Tower, 799 Pacific Highway, Chatswood NSW 2067
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.** 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 Issue 1 (Provisional) September 25, 1999
Statement Of Compliance:	The Keycorp GSM EFTPOS Terminal model K78 Complied with the FCC General public/uncontrolled RF exposure limits of 1.6mW/g per requirements of 47CFR2.1093(d). It also complied with IC RSS-102 requirements.
Test Dates:	12th – 14th January 2004
Tested for:	Keycorp Ltd
Address:	Level 5, Keycorp Tower, 799 Pacific Highway, Chatswood NSW 2067
Contact:	Ken McAnulty
Phone:	(02) 9415 2900
Fax:	(02) 9415 3562
Email:	KMcAnulty@keycorp.net

Test Officer:

Peter Jakubiec
Assoc Dip Elec Eng

Authorised Signature:

Aaron Sargent B.Eng
EMR Engineer

SAR EVALUATION
Dual Band GSM EFTPOS Terminal
Model: K78
Report Number: M031214-IC

2.0 DESCRIPTION OF DEVICE

2.1 Description of Test Sample

The device tested was a Dual Band GSM EFTPOS Terminal operating in the GSM and DCS frequency bands. It has one integral, fixed length antenna. The test device was tested in the Hand Held and Belt-clip positions.

Table 1: EUT Parameters

Operating Mode during Testing	: See table 2
Operating Mode production sample	: Standard GSM
GPRS Modes:	: Class B (1 uplink slot only)
Modulation:	: Standard TDMA
Antenna type	: External
Applicable Head Configurations	: None
Applicable Body Worn-Configurations	: Belt-Clip and Hand held Position
Battery Options 1.	: Ni-Mh 4.8V, 1450mAh

2.2 Test sample Accessories

2.2.1 Battery Types

One type of battery can be used with Dual Band GSM EFTPOS Terminal.

2.3 Test Signal, Frequency and Output Power

The SAR tests were performed on a Keycorp Dual Band GSM Cellular EFTPOS Terminal for this evaluation. The GSM EFTPOS Terminal was put into operation using a Sony Ericsson Radio Communication Tester. The channels utilised in the measurements were the traffic channels shown in the table below. The power level was set to Class 5 for 850 MHz and Class 1 for 1900 MHz band. The SAR level of the test sample was measured for both frequency bands of operation. Communication between the tester and the GSM EFTPOS Terminal was maintained by an air link.

Table 2: Test Frequencies

Band	Frequency Range	Traffic Channels	Band Power Class	Power (dBm)
1	824 – 849 MHz	128, 190 and 251	5	29
2	1850 - 1910 MHz	512, 661 and 810	1	30

2.4 Conducted Power Measurements

Table 2B: Conducted Power Measurements

Band	Freq MHz	Traffic Channel	Measured Power dBm		Band	Freq MHz	Traffic Channel	Measured Power dBm
1	824	128	29.8		2	1850	512	28.8
1	836	190	29.7		2	1880	661	28.7
1	849	251	29.7		2	1910	810	28.8

2.5 Battery Status

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

Table 3: Battery Details

Battery #1: Ni-Mh 4.8V, 1450mAh
Model No.: N/A
Serial No.: N/A

2.6 Details of Test Laboratory

2.6.1 Location

EMC Technologies Pty Ltd
57 Assembly Drive
Tullamarine, (Melbourne) Victoria
Australia 3043

Telephone: +61 3 9335 3333
Facsimile: +61 3 9338 9260
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 Fields Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01)
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: Experimental 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 RF signals. The temperature in the laboratory was controlled to within 21± 1 °C, the humidity was in the range 45% to 49%. See section 3.5.1 for measured temperature and humidity. The liquid parameters were measured daily prior to the commencement of each test. Tests were performed to check that reflections within the environment did not influence the SAR measurements. The noise floor of the DASY4 SAR measurement system using the SN1377 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 V4.0 Build 51** 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 EN50361 SAR measurement requirements.

3.2 E-Field Probe Type and Performance

The SAR measurements were conducted with the dosimetric probe ET3DV6 Serial: 1377 (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 both 900 MHz and 1800 MHz with the SPEAG calibrated dipoles.

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 (900 MHz and 1800 MHz)

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

Table 4: Validation Results (SPEAG calibrated dipoles)

1 Validation Date	2 Frequency (MHz)	3 ∈r (measured)	4 σ (mho/m) (measured)	5 Measured SAR 1g	6 Measured SAR 10g
12-Jan-2004	1800	52.7	1.59	9.56	5.06
13-Jan-2004	1800	53.8	1.47	9.24	4.93
14-Jan-2004	900	41.2	0.96	2.62	1.68

3.4.2 Deviation from reference validation values

The reference SAR values are derived using a reference dipole and flat phantom suitable for centre frequencies of 900 MHz and 1800 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 during calibration. The measured one-gram SAR should be within 10% of the expected target reference values shown in table 5 below.

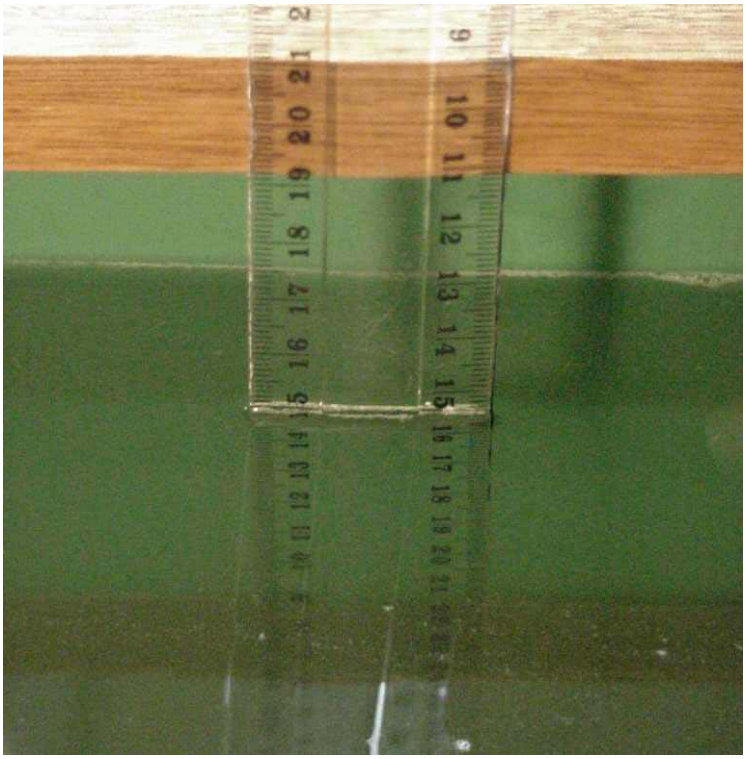
Table 5: Deviation from reference validation values

Validation Frequency & Date	Measured SAR 1g (input power = 250mW)	Measured SAR 1g (Normalized to 1W)	SPEAG Calibration reference SAR Value 1g (mW/g)	Deviation From SPEAG 1g (%)	IEEE Std 1528 reference SAR value 1g (mW/g)	Deviation From IEEE 1g (%)
1800MHz 12-Jan-2004	9.56	38.20	36.2	5.5	38.1	0.2
1800MHz 13-Jan-2004	9.24	36.96	36.2	2.1	38.1	3.0
900MHz 14-Jan-2004	2.62	10.48	10.2	2.7	10.8	3.0

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 a least 15cm with a tolerance of ± 0.5cm.



3.5 Phantom Properties (Size, Shape, Shell Thickness, Tissue Material Properties)

The phantom used during the SAR validation was the "SAM" phantom from. The phantom shape is based on the size and dimensions of the 90 percentile large adult male reported in a 1989 anthropomorphic study. The phantom thickness is 2.0mm+/-0.2 mm and the phantom 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 body worn positions the PL550 phantom was used. The thickness of the PL550 phantom is 2.0mm±0.2mm and the phantom was filled with the required tissue simulating liquid.

The dielectric parameters of the Muscle 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 6: Measured Muscle Simulating Liquid Dielectric Values at 850MHz

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
824 MHz Muscle	55.1	55 ±5% (52.4 to 58)	0.97	0.97 ±5% (0.92 to 1.02)	1000
836 MHz Muscle	55.1	55 ±5% (52.4 to 58)	0.98	0.97 ±5% (0.92 to 1.02)	1000
849 MHz Muscle	54.9	55 ±5% (52.4 to 58)	0.99	0.97 ±5% (0.92 to 1.02)	1000

Table 7: Measured Muscle Simulating Liquid Dielectric Values at 1900MHz

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
1850 MHz Muscle	54.1	53.3 ±5% (50.6 to 56.0)	1.56-1.57	1.52 ±5% (1.44 to 1.60)	1000
1880 MHz Muscle	52.8-53.9	53.3 ±5% (50.6 to 56.0)	1.57-1.58	1.52 ±5% (1.44 to 1.60)	1000
1910 MHz Muscle	53.8	53.3 ±5% (50.6 to 56.0)	1.58-1.59	1.52 ±5% (1.44 to 1.60)	1000

NOTE: The Muscle liquid parameters were within the required tolerances of ±5%.

3.5.1 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 8: Temperature and Humidity recorded for each day

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
12-Jan-2004	21.2	20.6	45
13-Jan-2004	21.7	20.9	49
14-Jan-2004	21.0	20.4	45

3.6 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. Head liquid was used for the SAR validations.

Table 9: Tissue Type: Muscle @ 850MHz
Volume of Liquid: 30 Litres

Approximate Composition	% By Weight
Distilled Water	41.05
Salt	1.35
Sugar	56.5
HEC	1.0
Bactericide	0.1

Table 10: Tissue Type: Muscle @ 1900MHz
Volume of Liquid: 30 Litres

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

*Refer "OET Bulletin 65 97/01 P38"

3.7 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 photograph of device positioning.

4.0 SAR MEASUREMENT PROCEDURE USING DASY4

The SAR evaluation was performed with the SPEAG DASY4 System (Build 51, Software version 4.0). A summary of the procedure follows:

a) A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the EUT. The SAR at this point is measured at the start of the test and then again at the end of the test.

b) The SAR distribution at the exposed side of the head or the flat section of the flat phantom is measured at a distance of 3.9 mm from the inner surface of the shell. The area covers the entire dimension of the head and the horizontal grid spacing is 15 mm x 15 mm. The actual Area Scan has dimensions of 181 mm x 71 mm surrounding the test device. Based on this data, the area of the maximum absorption is determined by Spline interpolation.

c) Around this point, a volume of 30 mm x 30 mm x 30 mm is assessed by measuring 7 x 7 x 7 points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

   (i) The data at the surface are extrapolated, since the centre of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axes. This polynomial is then used to evaluate the points between the surface and the probe tip.

   (ii) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (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 11: Uncertainty Budget for DASY4 Version V4.0 Build 51 – EUT SAR test

a	b	c	d	e= f(d,k)	f	g	h=cxf/e	i=cxg/e	k
Uncertainty Component	Sec.	Tol. (%)	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i (%)	10g u_i (%)	v_i
Measurement System									
Probe Calibration (k=1) (standard calibration)	E.2.1	4.8	N	1	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	1	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1	N	1	1	1	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	4.32	R	1.73	1	1	2.5	2.5	∞
RF Ambient Conditions	E.6.1	0.05	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	2.9	R	1.73	1	1	1.7	1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	1	R	1.73	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6	N	1	1	1	6.0	6.0	11
Device Holder Uncertainty	E.4.1	3.6	N	1	1	1	3.6	3.6	7
Output Power Variation – SAR Drift Measurement	6.6.2	9.6	R	1.73	1	1	5.5	5.5	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	E.3.2	5	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – Measurement uncertainty	E.3.3	10	N	1	0.64	0.43	6.4	4.3	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	5	N	1	0.6	0.49	3.0	2.5	5
Combined standard Uncertainty			RSS				14.2	13.2	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				28.4	26.37	

Estimated total measurement uncertainty for the DASY4 measurement system was ± 12.7%. The extended uncertainty (K = 2) was assessed to be ± 28.4% based on 95% confidence level. The uncertainty is not added to the measurement result.

Table 12: Uncertainty Budget for DASY4 Version V4.0 Build 51 - Validation

a	b	c	d	e= f(d,k)	f	g	h=cxf/e	i=cxg/e	k
Uncertainty Component	Sec.	Tol. (%)	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i (%)	10g u_i (%)	v_i
Measurement System									
Probe Calibration (k=1) (standard calibration)	E.2.1	4.4	N	1	1	1	4.4	4.4	∞
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	8.3	R	1.73	1	1	4.8	4.8	∞
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	3.9	R	1.73	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning		1	R	1.73	1	1	0.6	0.6	∞
Device Holder Uncertainty		4.7	R	1.73	1	1	2.7	2.7	∞
Output Power Variation – SAR Drift Measurement									
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	10	N	1.73	0.6	0.43	3.5	2.5	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	5	N	1.73	0.6	0.49	1.7	1.4	5
Combined standard Uncertainty			RSS				±10.0	±9.5	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				±20.0	±19.1	

Estimated total measurement uncertainty for the DASY4 measurement system was ±9.5%. The extended uncertainty (K = 2) was assessed to be ±20% based on 95% confidence level. The uncertainty is not added to the Validation measurement result.

6.0 EQUIPMENT LIST AND CALIBRATION DETAILS

Table 15: SPEAG DASY4 Version 4.0 Build 51

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	Yes
Flat Phantom	AndreT	PL550	P10.1	Not Applicable	Yes
Flat Phantom	SPEAG	PO1A V4.4e 6mm	1003	Not Applicable	No
Data Acquisition Electronics	SPEAG	DAE3 V1	359	16-July-2004	No
Data Acquisition Electronics	SPEAG	DAE3 V1	442	9-Sept-2004	Yes
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	No
Probe E-Field	SPEAG	ET3DV6	1380	18-July-2004	No
Probe E-Field	SPEAG	ET3DV6	1377	19-Sept-2004	Yes
Antenna Dipole 450 MHz	SPEAG	D450V2	1009	24-Jan-05	No
Antenna Dipole 900 MHz	SPEAG	D900V2	047	27-Aug-2004	Yes
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	28-Aug-2004	Yes
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	9-Nov-2004	No
RF Amplifier	Mini-Circuits	ZHL-42	N/A	Not applicable	Yes
Synthesized signal generator	Hewlett Packard	ESG-D3000A	GB37420238	In test	Yes
RF Power Meter Dual	Hewlett Packard	437B	3125012786	25-May-2004	Yes
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	25-May-2004	Yes
RF Power Meter Dual	Hewlett Packard	435A	1733A05847	*Not Required	Yes
RF Power Sensor	Hewlett Packard	8482A	2349A10114	*Not Required	Yes
Network Analyser	Hewlett Packard	8714B	GB3510035	13-June-2004	Yes
Dual Directional Coupler	NARDA	3022	75453	In test	Yes

*Reference meter only

7.0 SAR TEST METHOD

7.1 Description of the Test Positions (Body Sections)

The SAR measurements were performed in the test positions listed below, using the centre frequency of the transmitter. The test positions were derived to account for all possible scenarios of device usage. The configuration giving the maximum mass-averaged SAR is used to test the low-end and high-end frequencies of the transmitting band. All SAR measurements were performed in the flat phantom. The SAR validation was performed in the SAM phantom.
See Appendix A for photos of test positions.

7.1.1 *"Belt-Clip Position"*
The device was positioned with the vertical centre line of the device edge parallel to the longest dimension of the PL550 phantom. While maintaining the device in this plane, the vertical centre line was rotated until belt-clip (left side of the device was facing the flat phantom. Once in this position the device is moved towards the phantom until the device is touching the phantom in two sections. This was performed with and without the holster. See Appendix A4 for photos.

7.1.2 *"Right side of device facing phantom"*
The device was positioned with the vertical centre line of the device edge parallel to the longest dimension of the PL550 phantom. While maintaining the device in this plane, the vertical centre line was rotated until the right side of the device was facing the flat phantom. Once in this position the device is moved towards the phantom until the device is touching the phantom in two sections. See Appendix A6 for photos.

7.1.3 *"Keypad Position"*
The device was positioned with the vertical centre line of the device parallel to the longest dimension of the PL550 phantom. While maintaining the device in this plane, the vertical centre line was rotated until the keypad side of the device was facing the flat phantom. Once in this position the device is moved towards the phantom until the device is touching the phantom. This was performed with and without the holster. See Appendix A5 for photos.

7.1.4 *"Hand Held Position"*
The device was positioned with the vertical centre line of the device parallel to the longest dimension of the PL550 phantom. While maintaining the device in this plane, the vertical centre line was rotated until the keypad was facing away from the flat phantom. Once in this position the device is moved towards the phantom until the device is touching the phantom in two sections. This position was repeated with and without the non-metallic holster. See Appendix A3 for photos.

7.2 List of All Test Cases (Antenna In/Out, Test Frequencies, User Modes etc)
The SAR was measured at three test channels for each band of operation with the test sample operating as maximum power, as specified in section 2.2.

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 EVALUATION RESULTS

The SAR values averaged over 1g and 10g tissue masses were determined for the sample device for the belt-clip and hand-held configurations of the phantom. The results are given in Table 17 (850 MHz) and Table 18 (1900 MHz).

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

8.1 SAR Measurement Results for 850 MHz

Table 14: SAR Measurement Results – 850 MHz

Test Position	Plot Number	Test Channel	Test Freq. (MHz)	SAR Level for (1g) mW/g	DASY4 Measured Drift (dB)
Hand Held Position without Holster	1	128	824	0.056	-0.0
	2	190	836	0.059	0.1
	3	251	849	0.067	-0.0
Belt-Clip – No Holster	4	128	824	0.068	-0.0
	5	190	836	0.079	-0.1
	6	251	849	0.092	-0.2
*Belt-Clip – with holster	-	190	836	0.045	-0.2
*Keypad position – No Holster	-	190	836	0.005	-0.4
*Right side of device	-	190	836	0.012	0.4

Note: The uncertainty of the system (±28.4%) has not been added to the result.
* This is a prescan only

The maximum measured SAR level in the 850MHz band was 0.092 mW/g for a 1-gram cube this value was measured in the Belt-Clip Position without a Holster at a frequency of 849 MHz (Channel 251).

The FCC SAR limit is 1.6 mW/g measured in a 1g cube of tissue for un-controlled partial body exposure.

8.2 SAR Measurement Results for 1900 MHz

Table 15: SAR Measurement Results – 1900 MHz

Test Position	Plot Number	Test Channel	Test Freq. (MHz)	SAR Level for (1g) mW/g	DASY4 Measured Drift (dB)
Hand Held Position without Holster	7	512	1850	0.835	0.0
	8	661	1880	0.819	0.0
	9	810	1910	0.791	0.0
Belt-Clip – No Holster	10	512	1850	0.821	-0.1
	11	661	1880	0.812	0.0
	12	810	1910	0.760	-0.4
*Belt-Clip – With Holster	-	661	1880	0.312	-0.1
*Keypad position – No Holster	-	661	1880	0.113	-0.0
*Right side of device No Holster	-	661	1880	0.224	0.0

Note: The uncertainty of the system (±28.4%) has not been added to the result.
* This is a prescan only

The maximum measured SAR level in the 1900MHz band was 0.835 mW/g for a 1-gram cube this value was measured in the “Hand Held Position without holster” at a frequency of 1850 MHz (Channel 512).

The FCC SAR limit for RF devices used at the body or head is 1.6 mW/g measured in a 1g cube of tissue. The SAR limit for the hands is 4.0mW/g measured in a 10g cube of tissue.

9.0 COMPLIANCE STATEMENT

The Keycorp LTD, Dual Band GSM Cellular EFTPOS Terminal was tested on behalf of Keycorp Ltd It complied with the FCC and RSS-102 SAR requirements.

The highest SAR level recorded for the 850 MHz GSM band was 0.092 mW/g, which is below the limit of 1.6 mW/g into a 1g cube averaging mass, even taking into account the measurement uncertainty of 28.4%.

The highest SAR level recorded for the 1900 MHz GSM band was 0.835 mW/g, which is below the limit of 1.6 mW/g into a 1g cube averaging mass, even taking into account the measurement uncertainty of 28.4%.

APPENDIX A1
TEST SAMPLE PHOTOGRAPHS

Battery

Keycorp K78

Keycorp K78

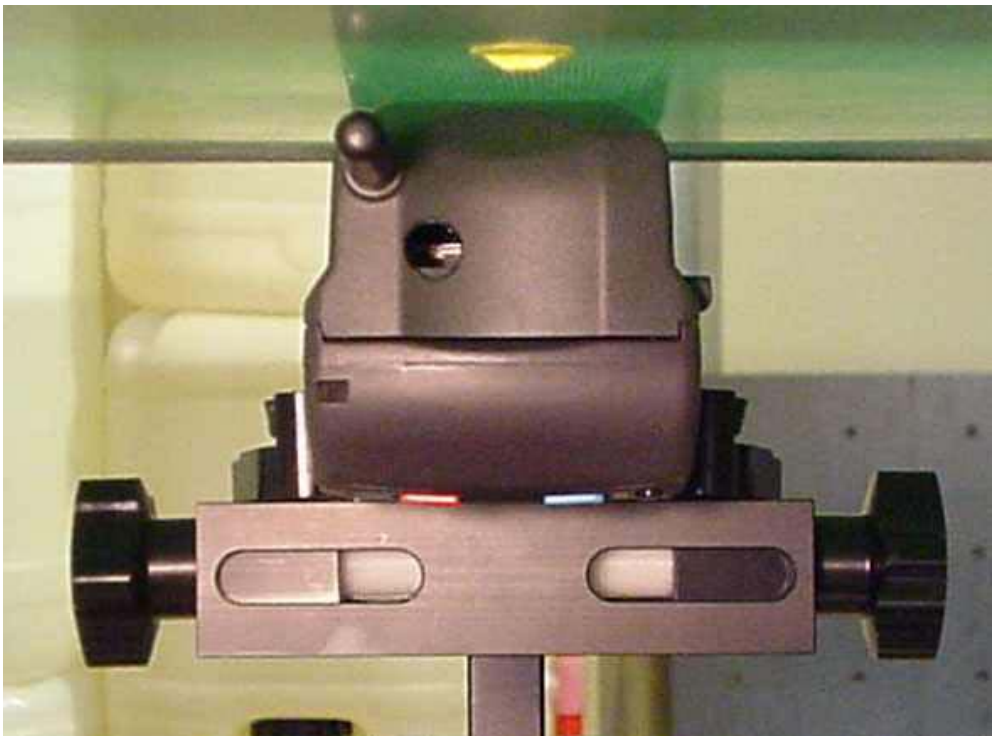
APPENDIX A2
TEST SAMPLE PHOTOGRAPHS

Keycorp K78

Keycorp K78

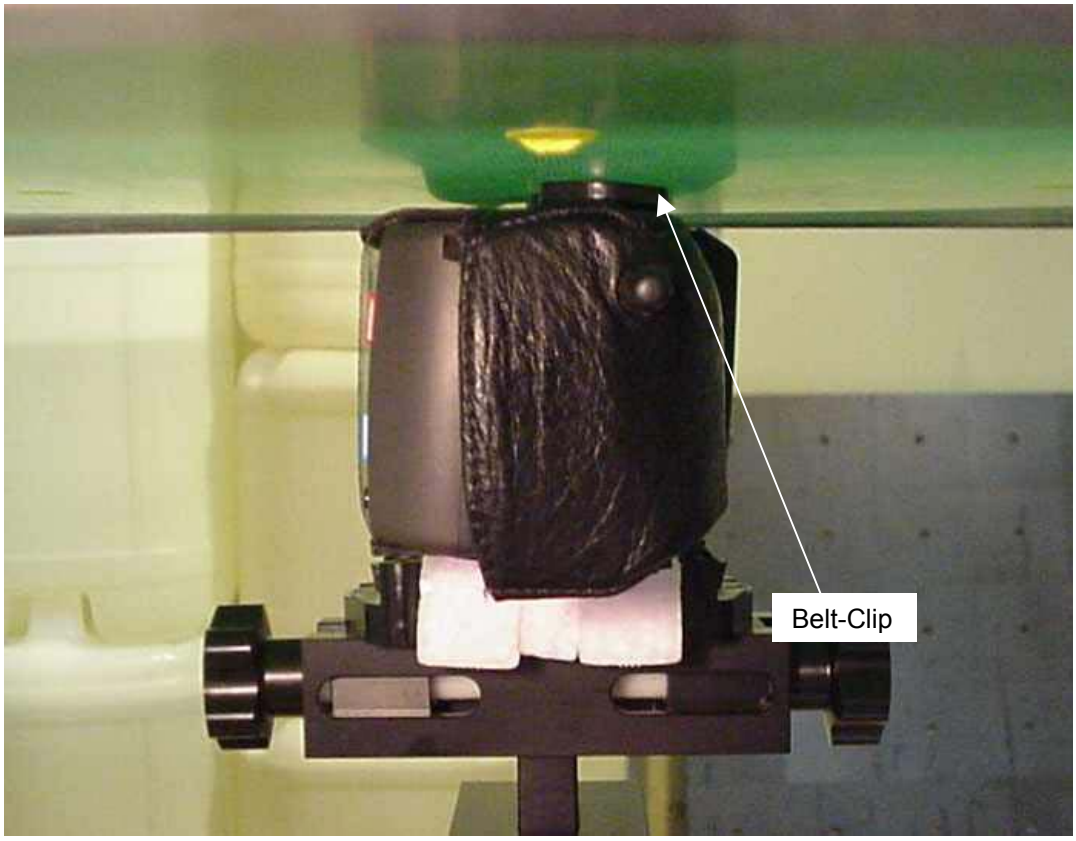
APPENDIX A3
TEST SETUP PHOTOGRAPHS

Hand Held Position - without Holster



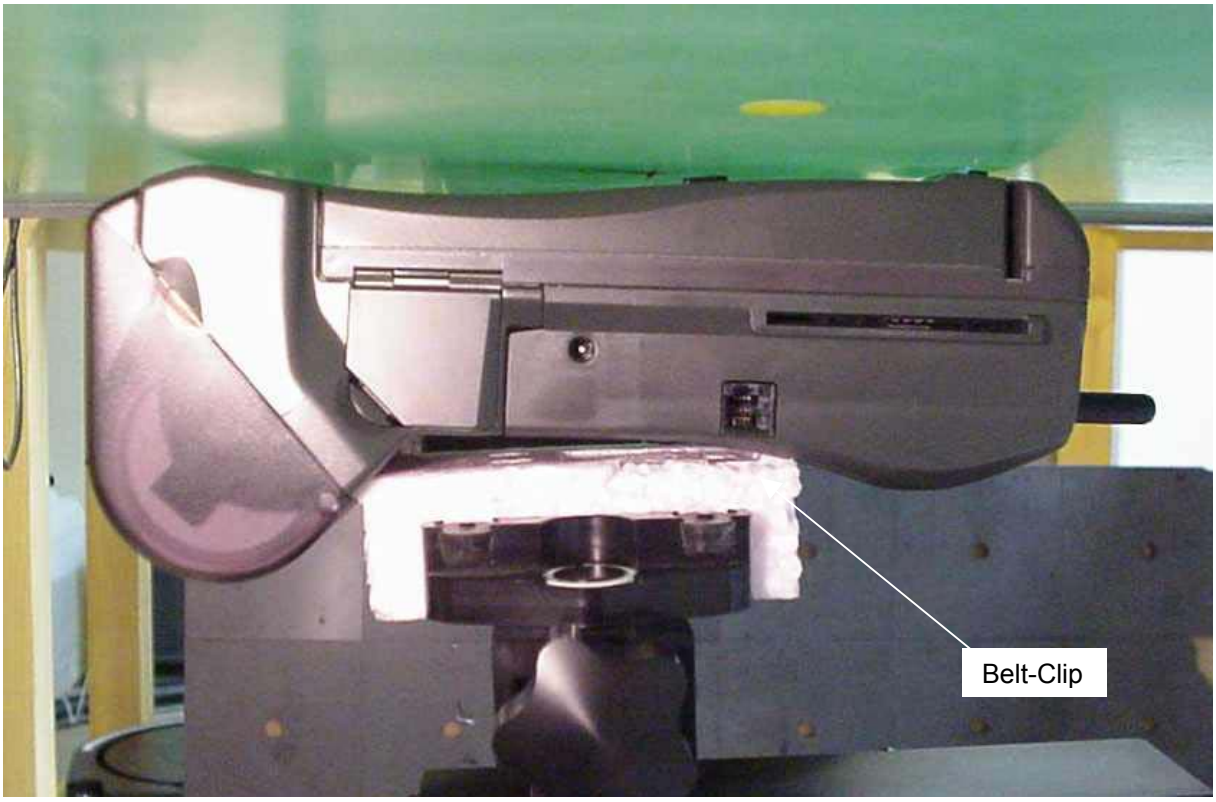
APPENDIX A4
TEST SETUP PHOTOGRAPHS

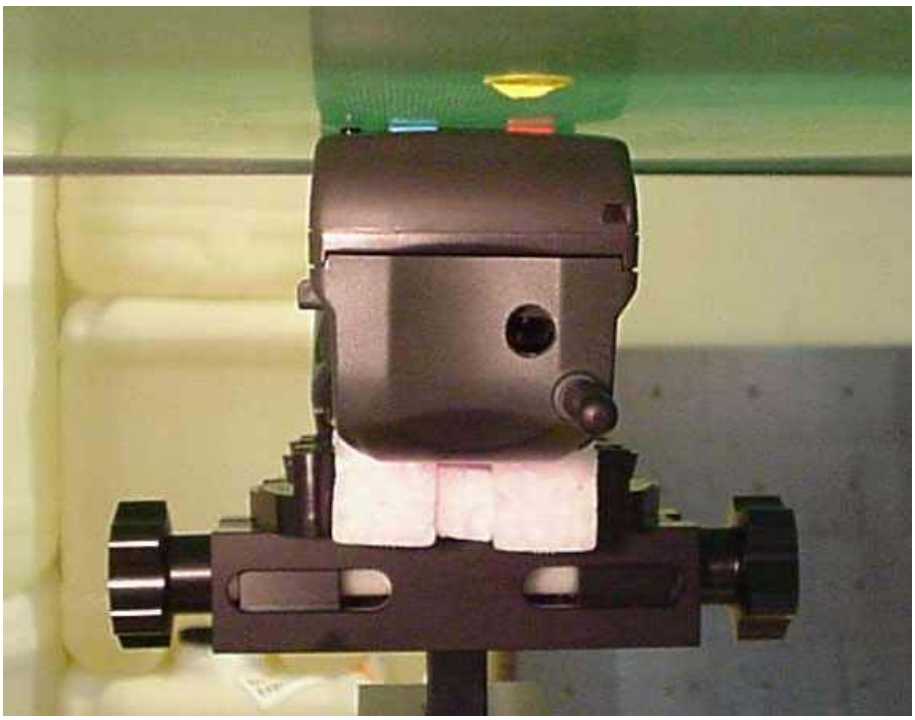
Belt-Clip Position - without Holster



APPENDIX A5
TEST SETUP PHOTOGRAPHS

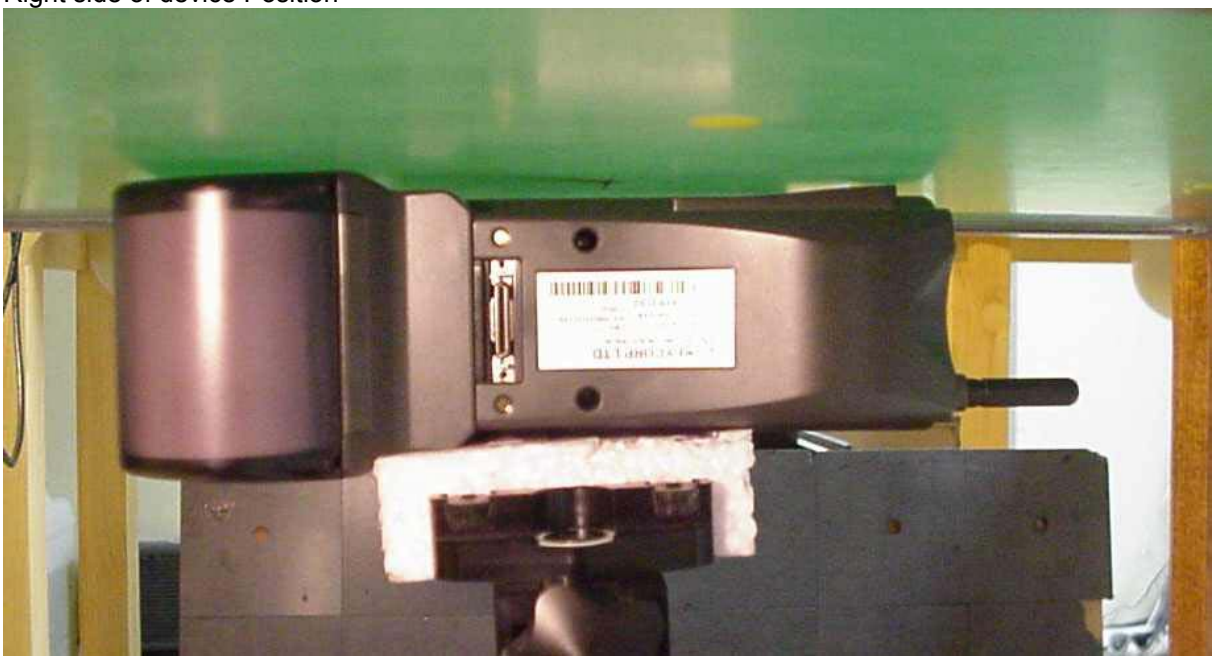
Keypad Position

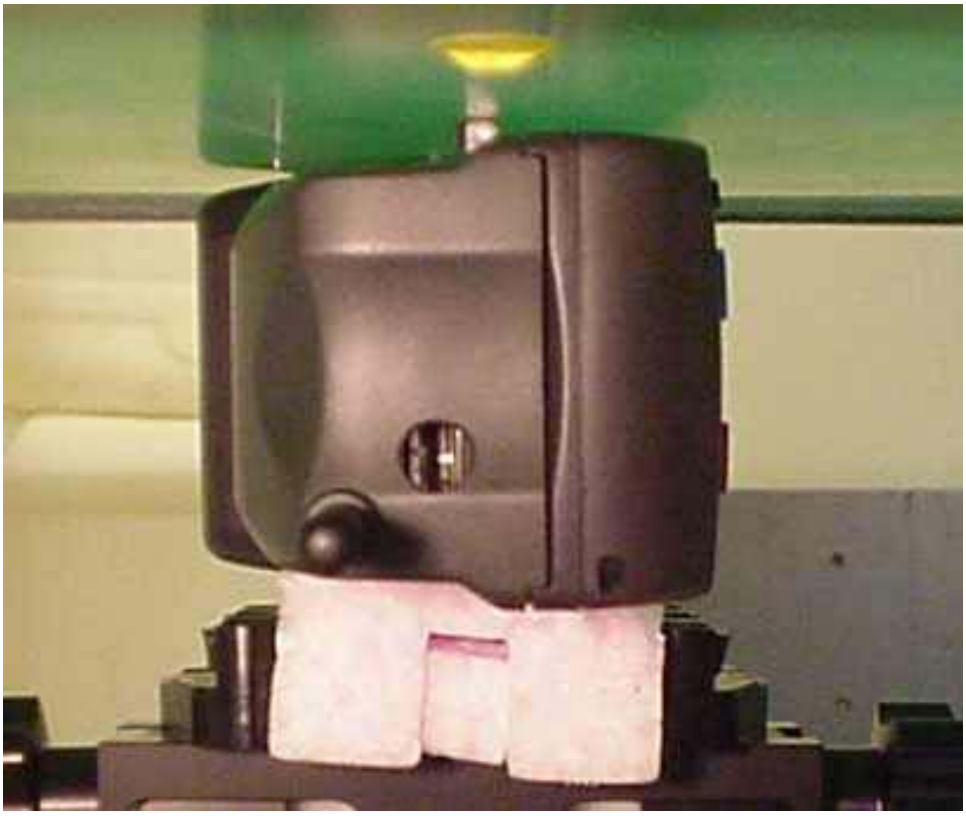




APPENDIX A6
TEST SETUP PHOTOGRAPHS

Right side of device 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 16: 850 MHz SAR Plots

Page	Plot Number	Position	Channel Number
24	**Plot 1**	Hand Held – without Holster	128
25	**Plot 2**	Hand Held – without Holster	190
26	**Plot 3**	Hand Held – without Holster	251
27	**Plot 4**	Belt-Clip - No Holster	128
28	**Plot 5**	Belt-Clip - No Holster	190
29	**Plot 6**	Belt-Clip - No Holster	251
30	**Z-Axis Scans for Plots 1 to 6**		

Table 17: 1900 MHz SAR Plots

Page	Plot Number	Position	Channel Number
31	**Plot 7**	Hand Held – without Holster	512
32	**Plot 8**	Hand Held – without Holster	661
33	**Plot 9**	Hand Held – without Holster	810
34	**Plot 10**	Belt-Clip - No Holster	512
35	**Plot 11**	Belt-Clip - No Holster	661
36	**Plot 12**	Belt-Clip - No Holster	810
37	**Z-Axis Scans for plots 7-12**		

Table 21: SAR Validation Plots

Page	Plot Number	Date	Frequency
38	**Plot 13**	Validation 12-Jan-2004	1900MHz
39	**Plot 14**	Validation 13-Jan-2004	1900MHz
40	**Plot 15**	Validation 14-Jan-2004	900MHz

Test Date: 14 January 2004

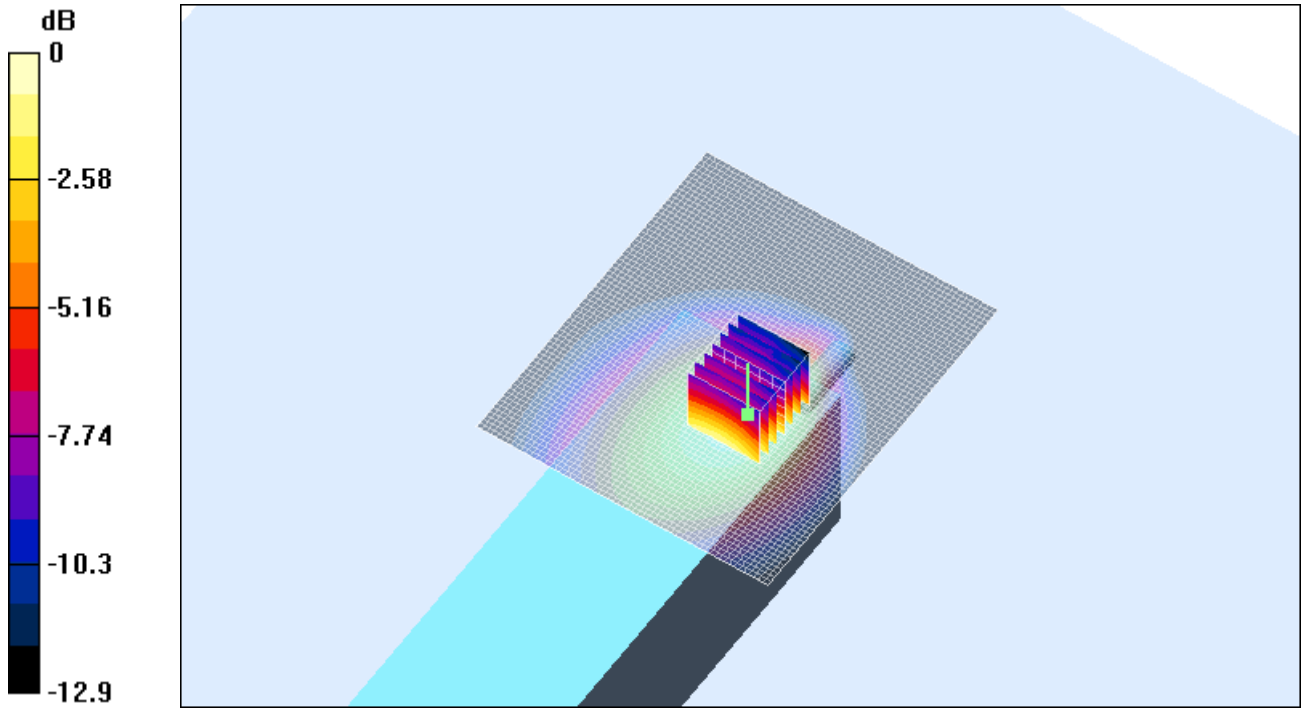
File Name: Hand Held Back Side No Holster 835 MHz GSM (DAE442 Probe1377) 14-01-04.da4

DUT: GSM Portable EFTPOS Terminal; Type: K78 -205; Serial: IMEI: 010110-83-018182

* Communication System: GSM850/1900 FCC; Frequency: 824 MHz; Duty Cycle: 1:8.3
* Medium: Body 835 MHz; (σ = 0.974824 mho/m, ε_r = 55.1445, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(6.1, 6.1, 6.1)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 128 Test/Area Scan (71x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 3.43 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 0.064 mW/g

Channel 128 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.082 W/kg
SAR(1 g) = 0.056 mW/g; SAR(10 g) = 0.038 mW/g
Reference Value = 3.43 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 0.061 mW/g



0 dB = 0.061mW/g

SAR MEASUREMENT PLOT 1

Ambient Temperature	**21.0 Degrees Celsius**
Liquid Temperature	**20.4 Degrees Celsius**
Humidity	**45 %**

Test Date: 14 January 2004

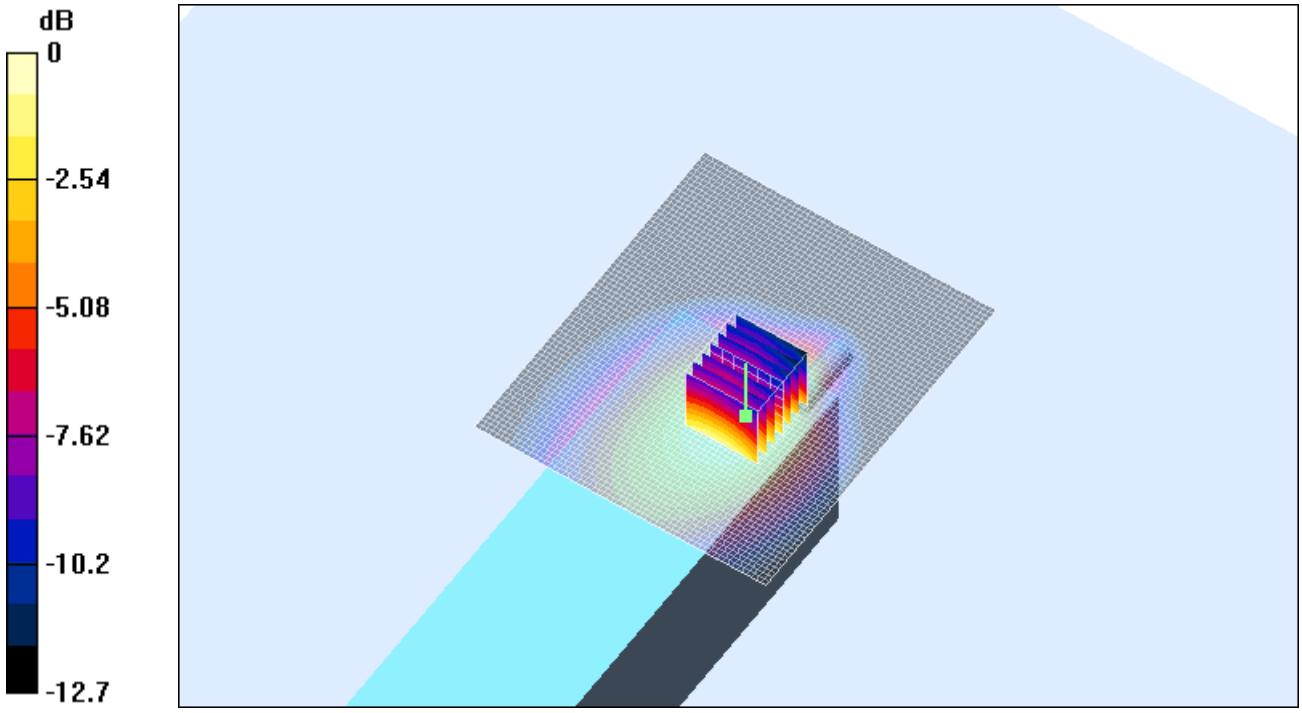
File Name: Hand Held Back Side No Holster 835 MHz GSM (DAE442 Probe1377) 14-01-04.da4

DUT: GSM Portable EFTPOS Terminal; Type: K78 -205; Serial: IMEI: 010110-83-018182

* Communication System: GSM850/1900 FCC; Frequency: 836 MHz; Duty Cycle: 1:8.3
* Medium: Body 835 MHz; (σ = 0.984119 mho/m, ε_r = 55.0555, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(6.1, 6.1, 6.1)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 190 Test 2/Area Scan (71x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 3.63 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.067 mW/g

Channel 190 Test 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.088 W/kg
SAR(1 g) = 0.059 mW/g; SAR(10 g) = 0.039 mW/g
Reference Value = 3.63 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.064 mW/g



0 dB = 0.064mW/g

SAR MEASUREMENT PLOT 2

Ambient Temperature	**21.0 Degrees Celsius**
Liquid Temperature	**20.4 Degrees Celsius**
Humidity	**45 %**

Test Date: 14 January 2004

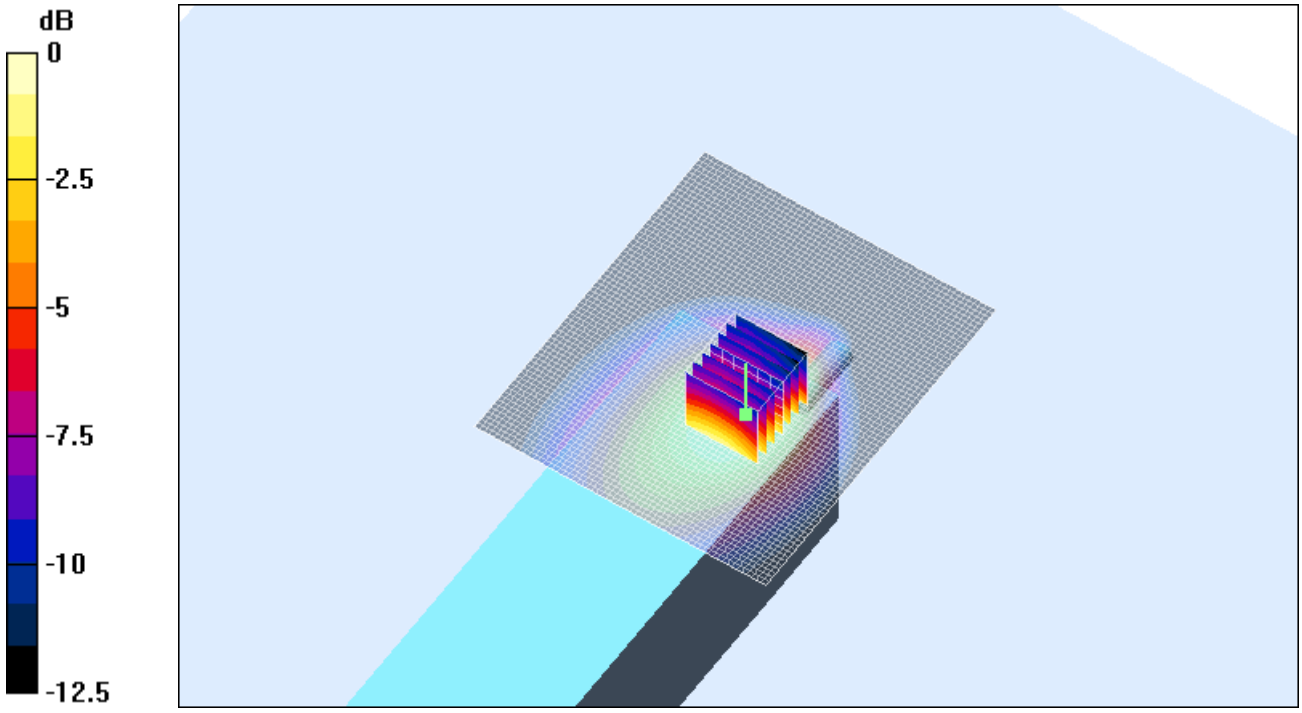
File Name: Hand Held Back Side No Holster 835 MHz GSM (DAE442 Probe1377) 14-01-04.da4

DUT: GSM Portable EFTPOS Terminal; Type: K78 -205; Serial: IMEI: 010110-83-018182

* Communication System: GSM850/1900 FCC; Frequency: 849 MHz; Duty Cycle: 1:8.3
* Medium: Body 835 MHz; (σ = 0.999207 mho/m, ε_r = 54.9148, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(6.1, 6.1, 6.1)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 251 Test/Area Scan (71x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 3.89 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 0.075 mW/g

Channel 251 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.101 W/kg
SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.044 mW/g
Reference Value = 3.89 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 0.073 mW/g



0 dB = 0.073mW/g

SAR MEASUREMENT PLOT 3

Ambient Temperature	**21.0 Degrees Celsius**
Liquid Temperature	**20.4 Degrees Celsius**
Humidity	**45 %**

Test Date: 14 January 2004

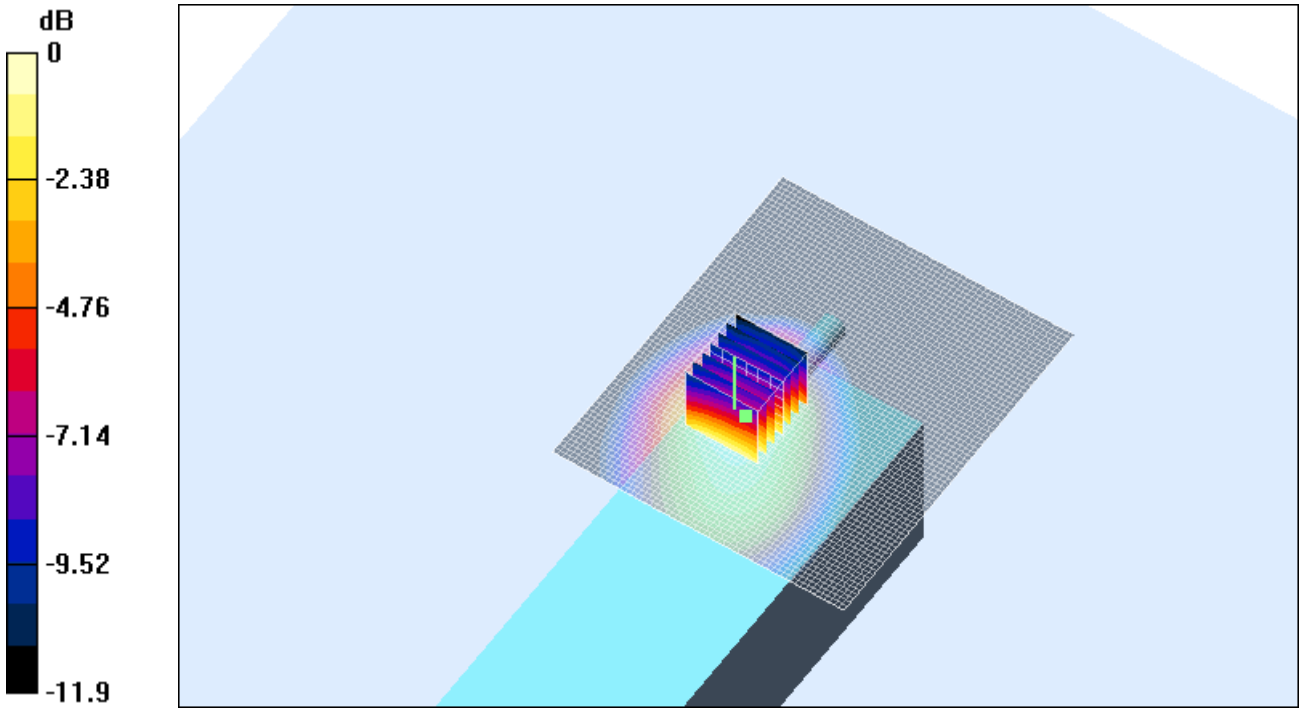
File Name: Hand Held Belt Clip Side No Holster 835 MHz GSM (DAE442 Probe1377) 14-01-04.da4

DUT: GSM Portable EFTPOS Terminal; Type: KT-78 -205; Serial: IMEI: 010110-83-018182-7

* Communication System: GSM850/1900 FCC; Frequency: 824 MHz; Duty Cycle: 1:8.3
* Medium: Body 835 MHz; (σ = 0.974824 mho/m, ε_r = 55.1445, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(6.1, 6.1, 6.1)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 128 Test 2/Area Scan (71x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 4.12 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 0.079 mW/g

Channel 128 Test 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.107 W/kg
SAR(1 g) = 0.068 mW/g; SAR(10 g) = 0.045 mW/g
Reference Value = 4.12 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 0.074 mW/g



0 dB = 0.074mW/g

SAR MEASUREMENT PLOT 4

Ambient Temperature	**21.0 Degrees Celsius**
Liquid Temperature	**20.4 Degrees Celsius**
Humidity	**45 %**

Test Date: 14 January 2004

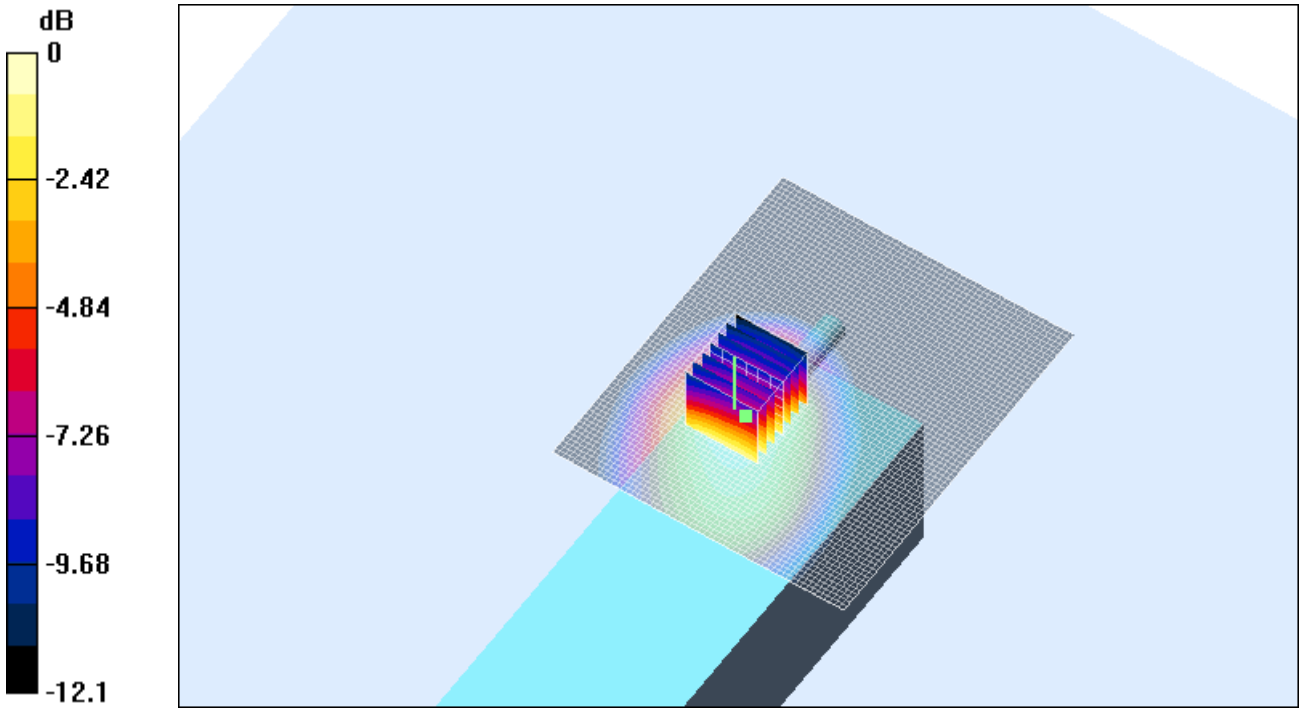
File Name: Hand Held Belt Clip Side No Holster 835 MHz GSM (DAE442 Probe1377) 14-01-04.da4

DUT: GSM Portable EFTPOS Terminal; Type: KT-78 -205; Serial: IMEI: 010110-83-018182-7

* Communication System: GSM850/1900 FCC; Frequency: 836 MHz; Duty Cycle: 1:8.3
* Medium: Body 835 MHz; (σ = 0.984119 mho/m, ε_r = 55.0555, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(6.1, 6.1, 6.1)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 190 Test/Area Scan (71x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 4.55 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.091 mW/g

Channel 190 Test 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.122 W/kg
SAR(1 g) = 0.079 mW/g; SAR(10 g) = 0.052 mW/g
Reference Value = 4.55 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.084 mW/g



0 dB = 0.084mW/g

SAR MEASUREMENT PLOT 5

Ambient Temperature	**21.0 Degrees Celsius**
Liquid Temperature	**20.4 Degrees Celsius**
Humidity	**45 %**

Test Date: 14 January 2004

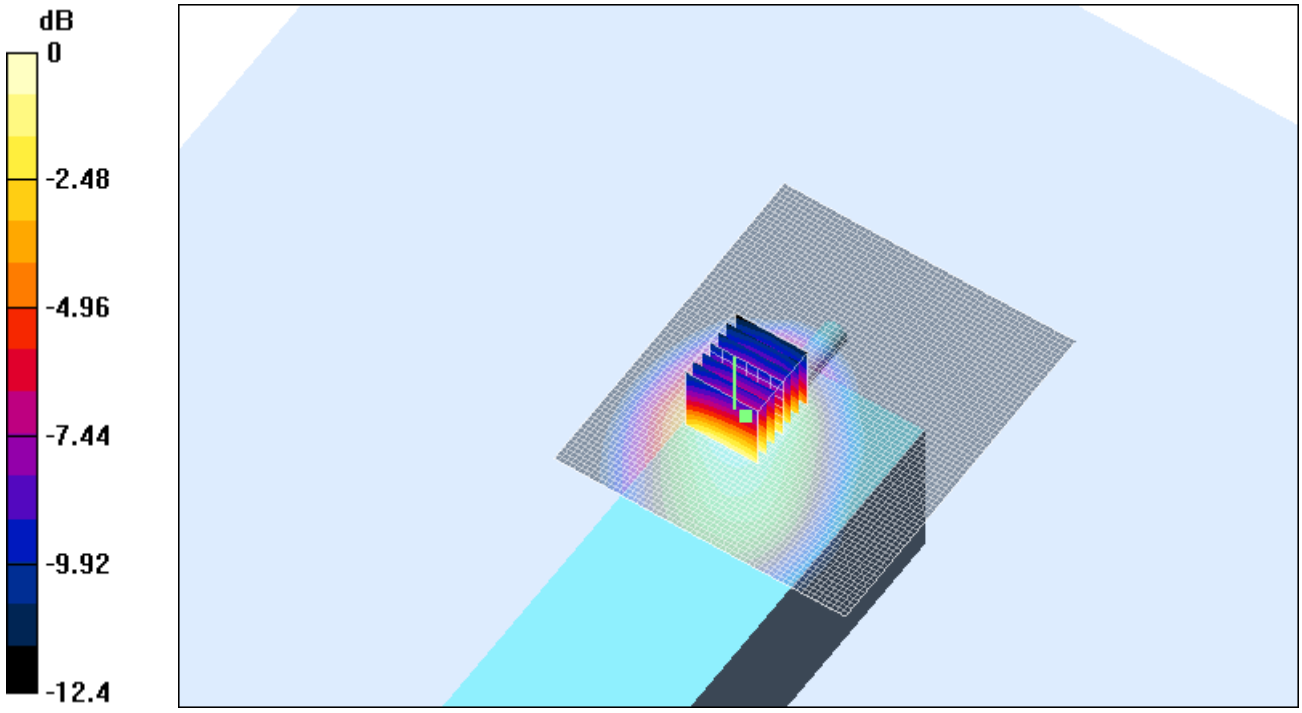
File Name: Hand Held Belt Clip Side No Holster 835 MHz GSM (DAE442 Probe1377) 14-01-04.da4

DUT: GSM Portable EFTPOS Terminal; Type: KT-78 -205; Serial: IMEI: 010110-83-018182-7

* Communication System: GSM850/1900 FCC; Frequency: 849 MHz; Duty Cycle: 1:8.3
* Medium: Body 835 MHz; (σ = 0.999207 mho/m, ε_r = 54.9148, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(6.1, 6.1, 6.1)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 251 Test/Area Scan (71x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 4.9 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.107 mW/g

Channel 251 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.142 W/kg
SAR(1 g) = 0.092 mW/g; SAR(10 g) = 0.060 mW/g
Reference Value = 4.9 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.099 mW/g



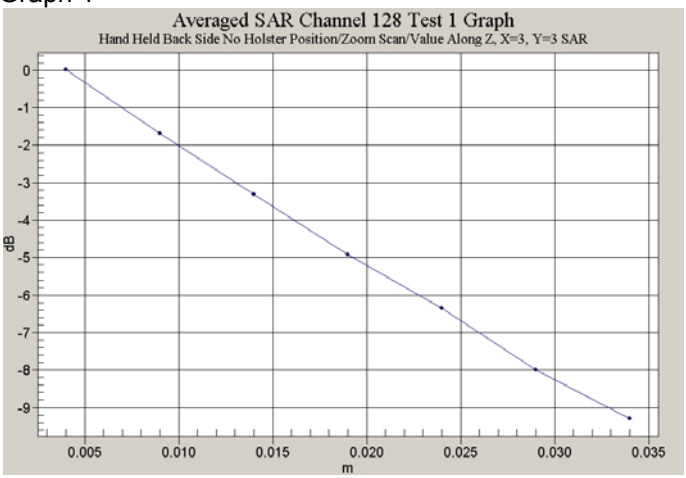
0 dB = 0.099mW/g

SAR MEASUREMENT PLOT 6

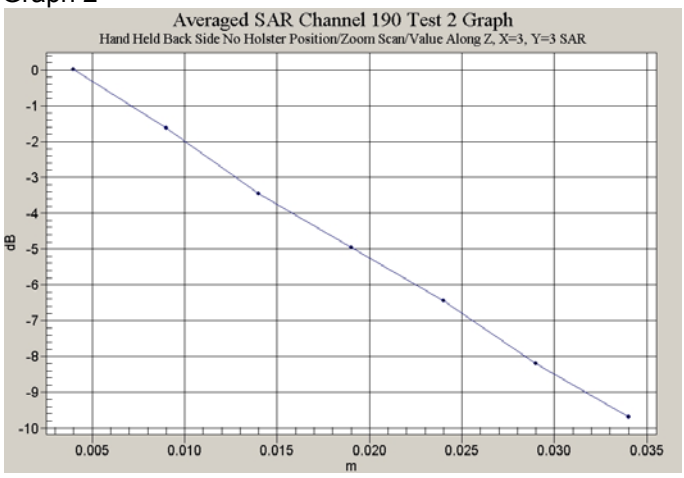
Ambient Temperature	**21.0 Degrees Celsius**
Liquid Temperature	**20.4 Degrees Celsius**
Humidity	**45 %**

Z-Axis scans for plots 1-6

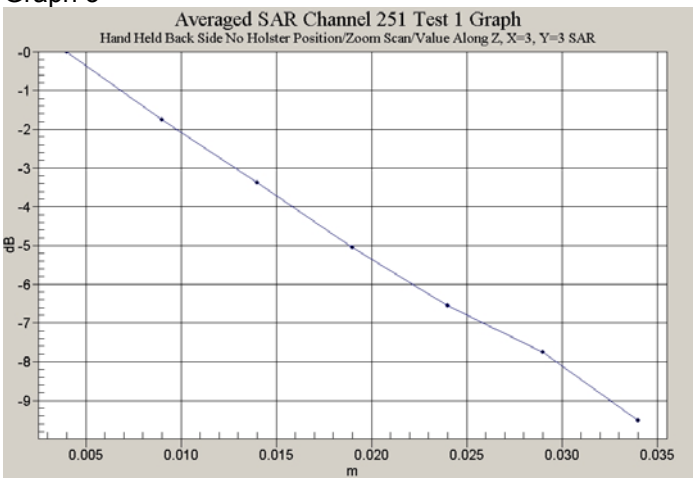
Graph 1



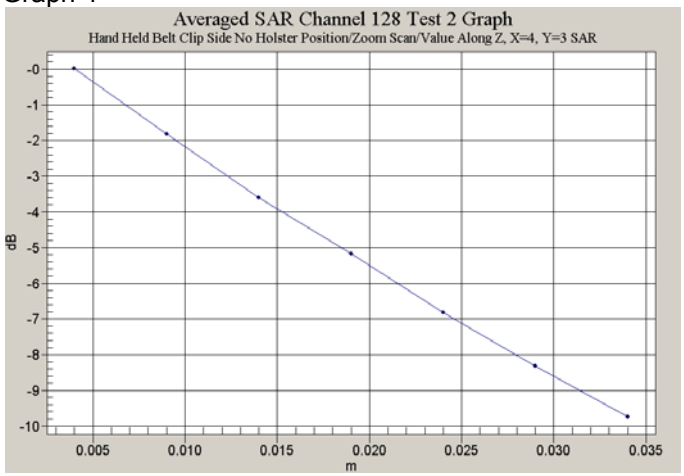
Graph 2



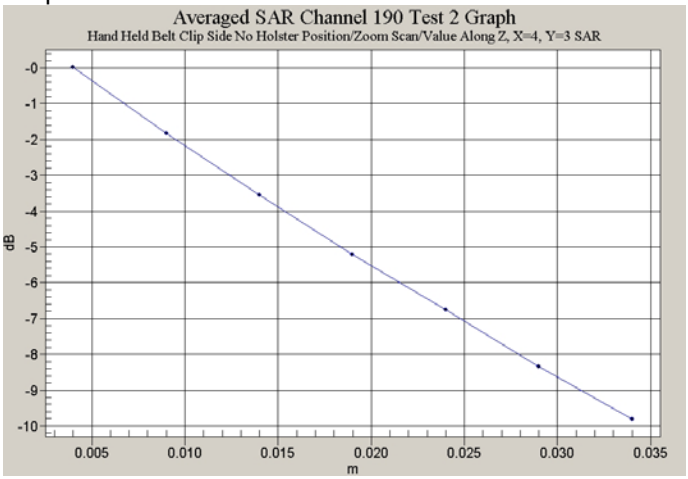
Graph 3



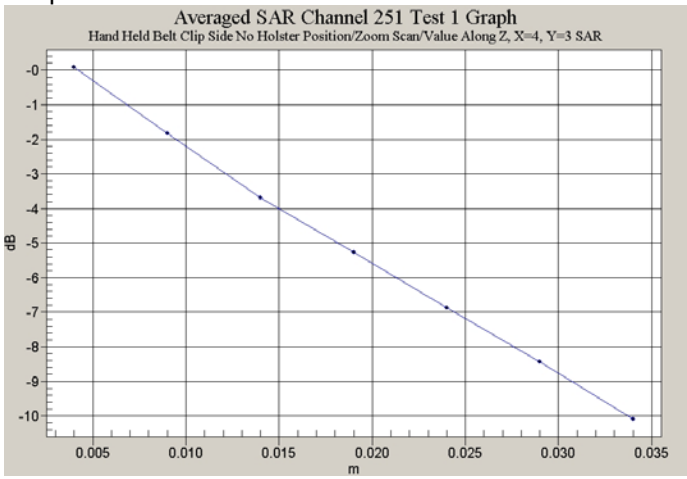
Graph 4



Graph 5



Graph 6

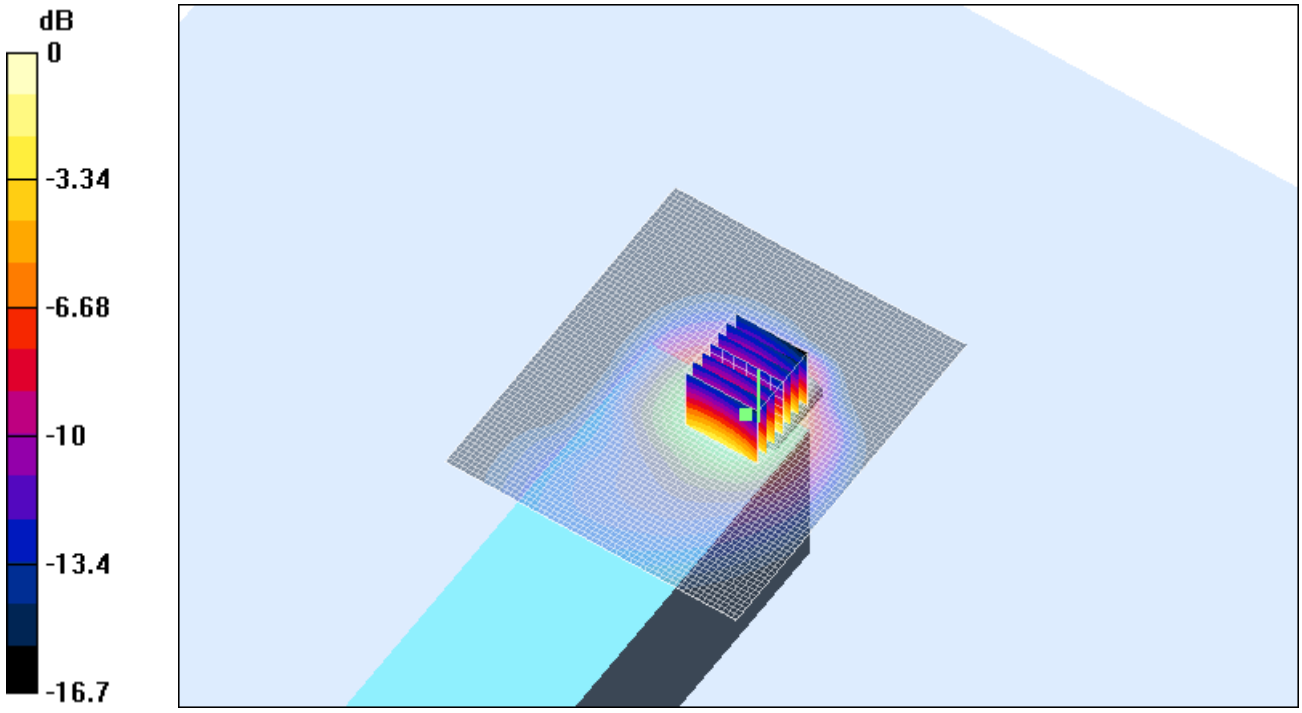


Test Date: 13 January 2004

File Name: Hand Held Back Side No Holster 1800 MHz GSM (DAE442 Probe1377) 13-01-04.da4
DUT: GSM Portable EFTPOS Terminal; Type: K78 -205; Serial: IMEI: 010110-83-018182

* Communication System: GSM850/1900 FCC; Frequency: 1850 MHz; Duty Cycle: 1:8.3
* Medium: Body 1800 MHz; (σ = 1.55596 mho/m, ε_r = 54.0857, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(4.6, 4.6, 4.6)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section
Channel 512 Test/Area Scan (71x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 7.08 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 1.06 mW/g

Channel 512 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.41 W/kg
SAR(1 g) = 0.835 mW/g; SAR(10 g) = 0.482 mW/g
Reference Value = 7.08 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 0.907 mW/g



0 dB = 0.907mW/g

SAR MEASUREMENT PLOT 7

Ambient Temperature	**21.7 Degrees Celsius**
Liquid Temperature	**20.9 Degrees Celsius**
Humidity	**49 %**

Test Date: 13 January 2004

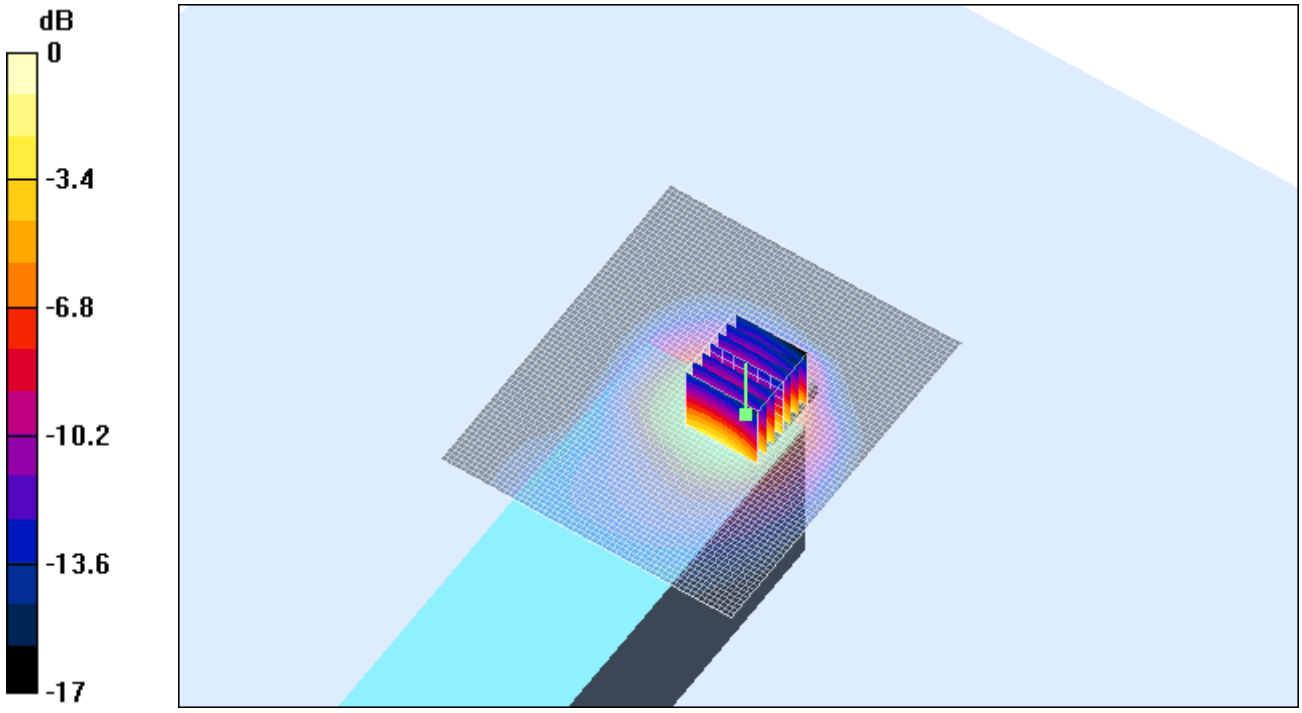
File Name: Hand Held Back Side No Holster 1800 MHz GSM (DAE442 Probe1377) 13-01-04.da4

DUT: GSM Portable EFTPOS Terminal; Type: K78 -205; Serial: IMEI: 010110-83-018182

* Communication System: GSM850/1900 FCC; Frequency: 1880 MHz; Duty Cycle: 1:8.3
* Medium: Body 1800 MHz; (σ = 1.57286 mho/m, ε_r = 53.9829, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(4.6, 4.6, 4.6)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 661 Test 2/Area Scan (71x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 6.24 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 1.04 mW/g

Channel 661 Test 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.39 W/kg
SAR(1 g) = 0.819 mW/g; SAR(10 g) = 0.464 mW/g
Reference Value = 6.24 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 0.898 mW/g



0 dB = 0.898mW/g

SAR MEASUREMENT PLOT 8

Ambient Temperature	**21.7 Degrees Celsius**
Liquid Temperature	**20.9 Degrees Celsius**
Humidity	**49 %**

Test Date: 13 January 2004

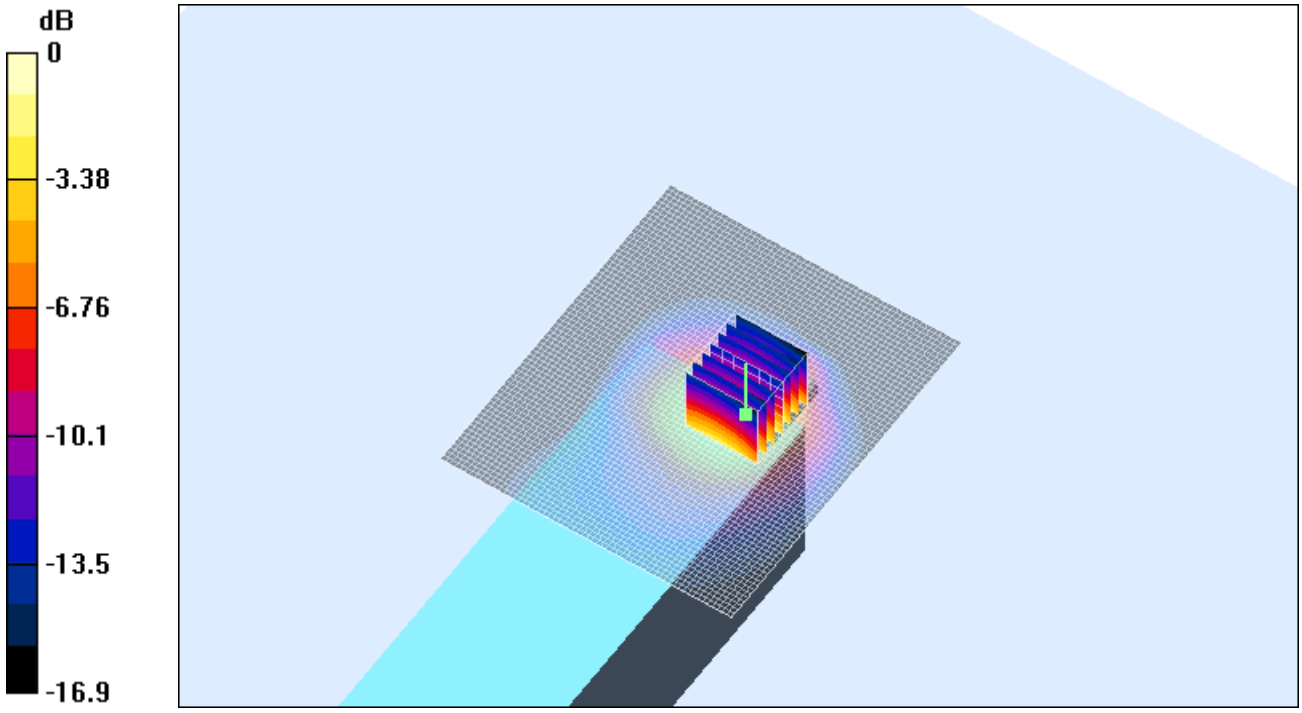
File Name: Hand Held Back Side No Holster 1800 MHz GSM (DAE442 Probe1377) 13-01-04.da4

DUT: GSM Portable EFTPOS Terminal; Type: K78-205; Serial: IMEI: 010110-83-018182

* Communication System: GSM850/1900 FCC; Frequency: 1910 MHz; Duty Cycle: 1:8.3
* Medium: Body 1800 MHz; (σ = 1.58671 mho/m, ε_r = 53.8492, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(4.6, 4.6, 4.6)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 810 Test/Area Scan (71x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 5.47 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 1.01 mW/g

Channel 810 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.4 W/kg
SAR(1 g) = 0.791 mW/g; SAR(10 g) = 0.438 mW/g
Reference Value = 5.47 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 0.876 mW/g



0 dB = 0.876mW/g

SAR MEASUREMENT PLOT 9

Ambient Temperature	**21.7 Degrees Celsius**
Liquid Temperature	**20.9 Degrees Celsius**
Humidity	**49 %**

Test Date: 13 January 2004

File Name: Hand Held Belt Clip Side No Holster 1800 MHz GSM (DAE442 Probe1377) 13-01-04.da4

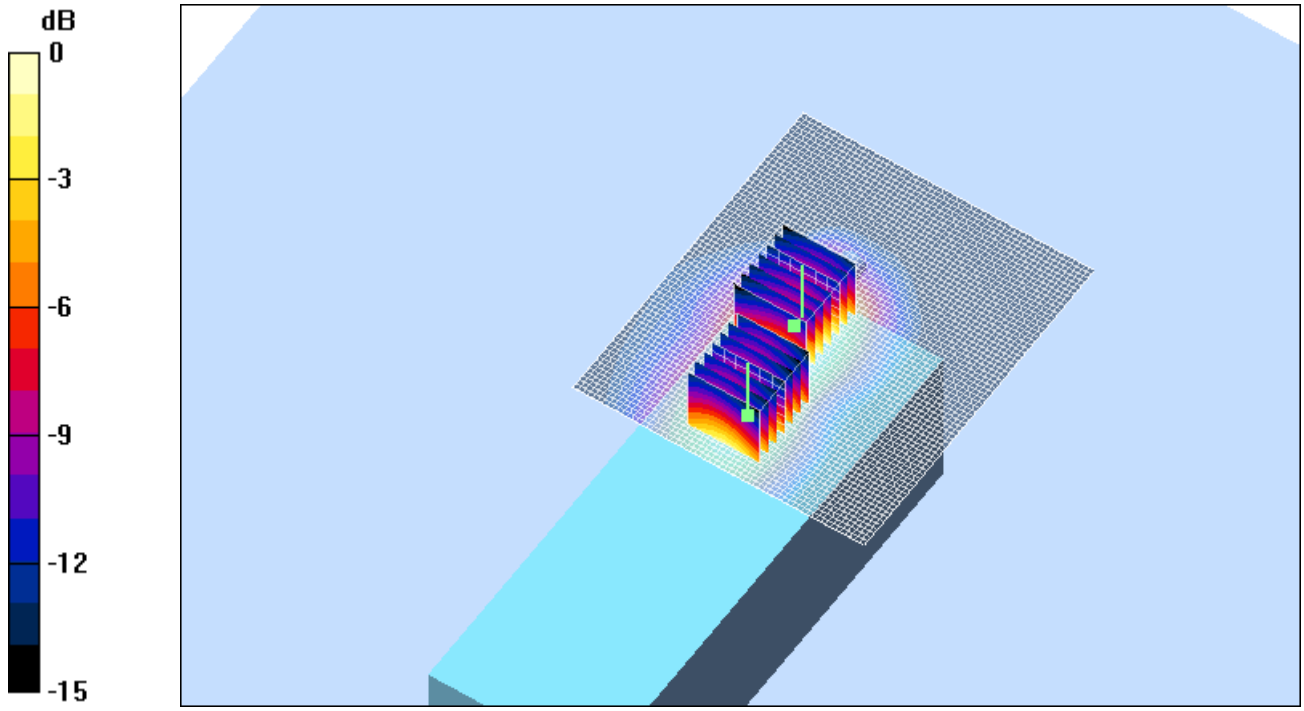
DUT: GSM Portable EFTPOS Terminal; Type: KT-78 -205; Serial: IMEI: 010110-83-018182-7

* Communication System: GSM850/1900 FCC; Frequency: 1850 MHz; Duty Cycle: 1:8.3
* Medium: Body 1800 MHz; (σ = 1.55596 mho/m, ε_r = 54.0857, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(4.6, 4.6, 4.6)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 512 Test 2/Area Scan (71x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 6.78 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 1 mW/g

Channel 512 Test 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.39 W/kg
SAR(1 g) = 0.821 mW/g; SAR(10 g) = 0.469 mW/g
Reference Value = 6.78 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.890 mW/g

Channel 512 Test 2/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.973 W/kg
SAR(1 g) = 0.602 mW/g; SAR(10 g) = 0.355 mW/g
Reference Value = 6.78 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.663 mW/g



0 dB = 0.663mW/g

SAR MEASUREMENT PLOT 10

Ambient Temperature	**21.7 Degrees Celsius**
Liquid Temperature	**20.9 Degrees Celsius**
Humidity	**49 %**

Test Date: 13 January 2004

File Name: Hand Held Belt Clip Side No Holster Presan 1800 MHz GSM (DAE442 Probe1377) 13-01-04.da4

DUT: GSM Portable EFTPOS Terminal; Type: KT-78 -205; Serial: IMEI: 010110-83-018182-7

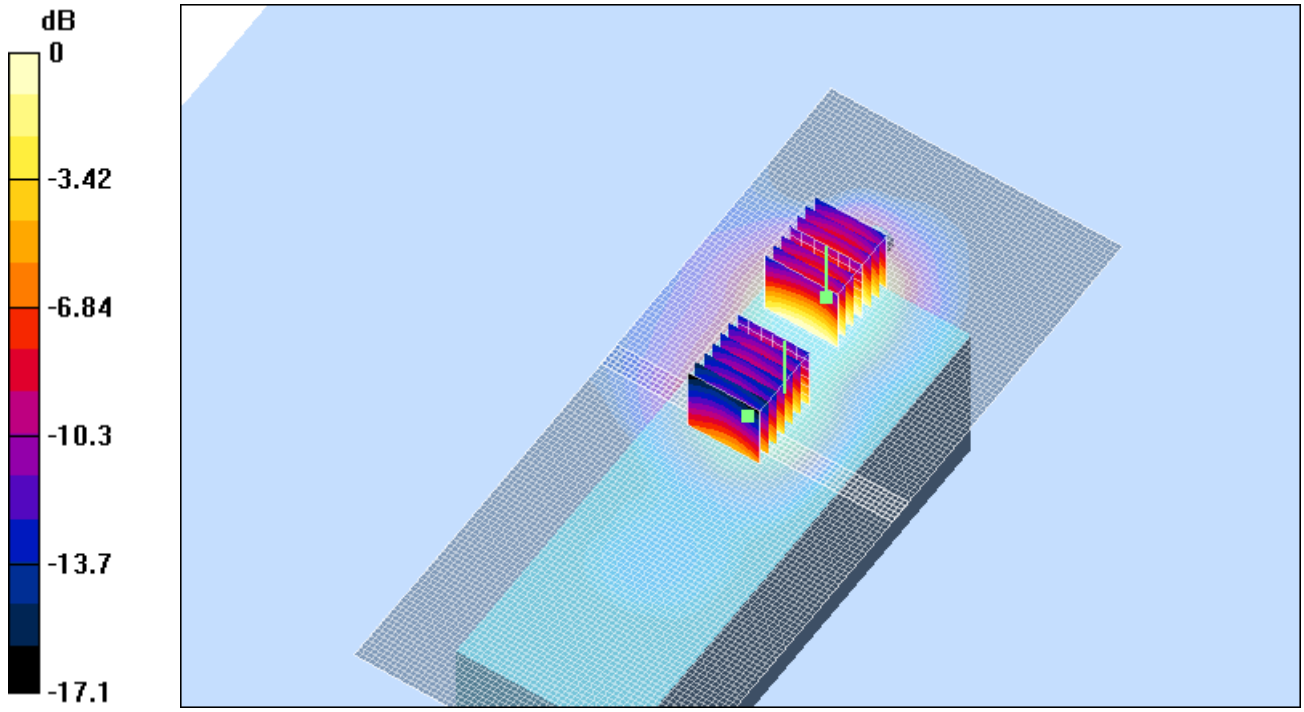
* Communication System: GSM850/1900 FCC; Frequency: 1880 MHz; Duty Cycle: 1:8.3
* Medium: Body 1800 MHz; (σ = 1.57286 mho/m, ε_r = 53.9829, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(4.6, 4.6, 4.6)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 661 Test 4/Area Scan (71x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 6.03 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.963 mW/g

Channel 661 Test 4/Area Scan 2 (81x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 6.03 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.441 mW/g

Channel 661 Test 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.4 W/kg
SAR(1 g) = 0.812 mW/g; SAR(10 g) = 0.460 mW/g
Reference Value = 6.03 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.881 mW/g

Channel 661 Test 4/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 0.796 W/kg
SAR(1 g) = 0.458 mW/g; SAR(10 g) = 0.252 mW/g
Reference Value = 6.03 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.514 mW/g



0 dB = 0.514mW/g

SAR MEASUREMENT PLOT 11

Ambient Temperature	**21.7 Degrees Celsius**
Liquid Temperature	**20.9 Degrees Celsius**
Humidity	**49 %**

Test Date: 13 January 2004

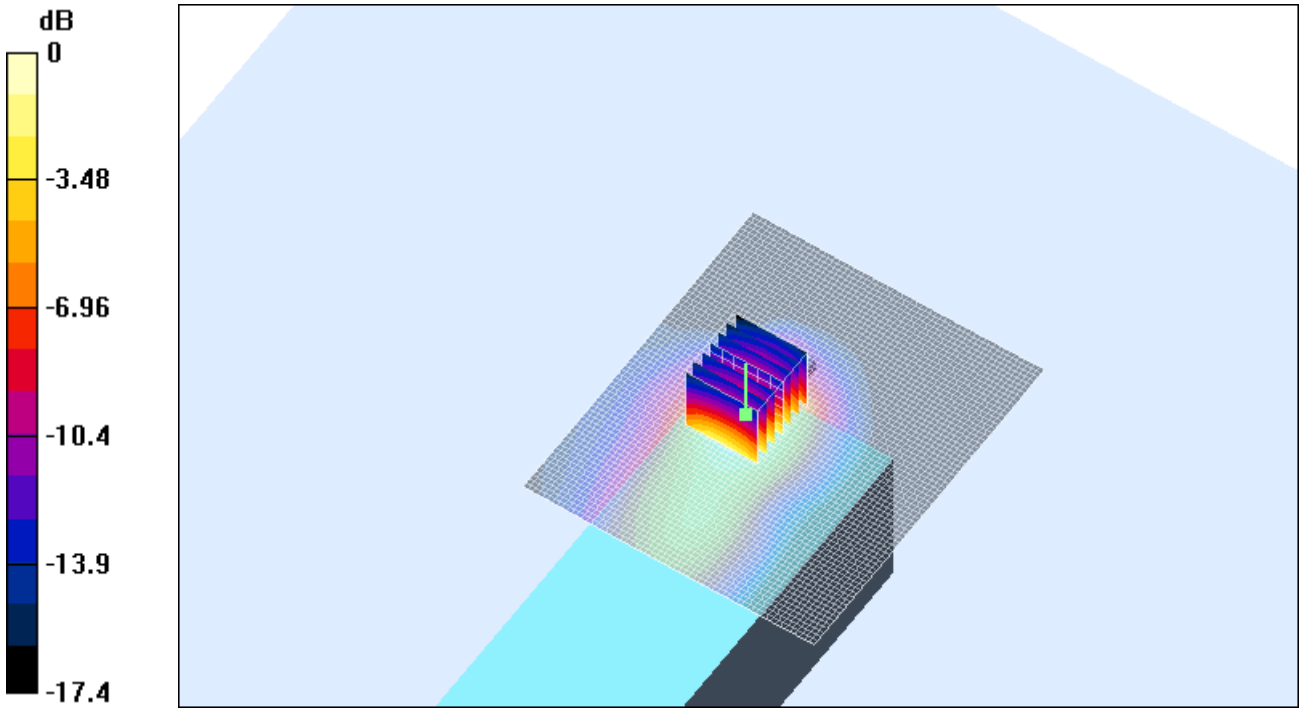
File Name: Hand Held Belt Clip Side No Holster 1800 MHz GSM (DAE442 Probe1377) 13-01-04.da4

DUT: GSM Portable EFTPOS Terminal; Type: KT-78 -205; Serial: IMEI: 010110-83-018182-7

* Communication System: GSM850/1900 FCC; Frequency: 1910 MHz; Duty Cycle: 1:8.3
* Medium: Body 1800 MHz; (σ = 1.58671 mho/m, ε_r = 53.8492, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(4.6, 4.6, 4.6)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 810 Test 2/Area Scan (71x61x1): Measurement grid: dx=20mm, dy=20mm
Reference Value = 5.51 V/m
Power Drift = -0.4 dB
Maximum value of SAR = 0.929 mW/g

Channel 810 Test 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 1.35 W/kg
SAR(1 g) = 0.760 mW/g; SAR(10 g) = 0.426 mW/g
Reference Value = 5.51 V/m
Power Drift = -0.4 dB
Maximum value of SAR = 0.838 mW/g



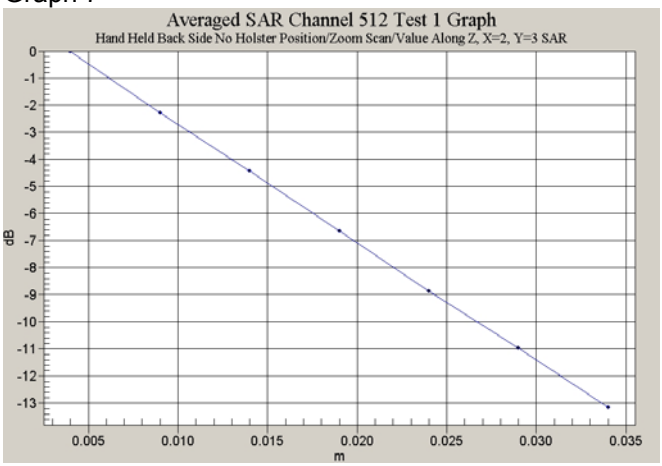
0 dB = 0.838mW/g

SAR MEASUREMENT PLOT 12

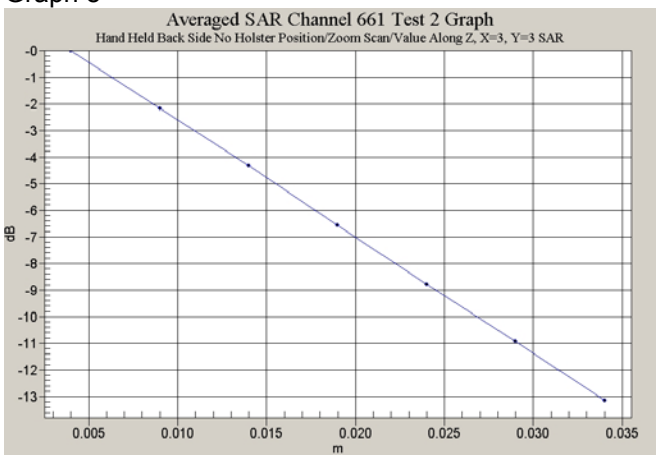
Ambient Temperature	**21.7 Degrees Celsius**
Liquid Temperature	**20.9 Degrees Celsius**
Humidity	**49 %**

Z-Axis Scans for plots 7-12

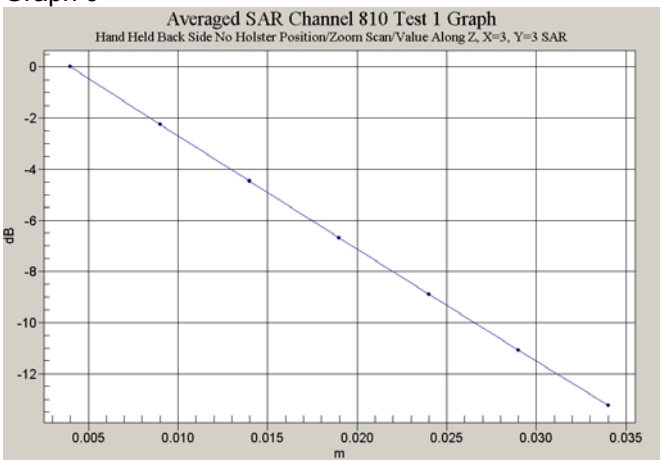
Graph 7



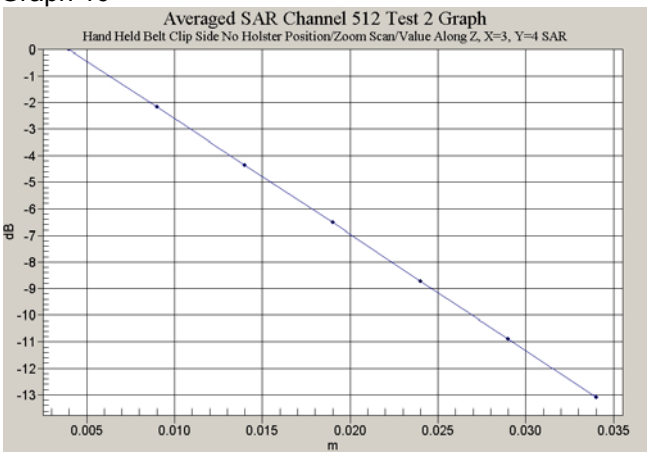
Graph 8



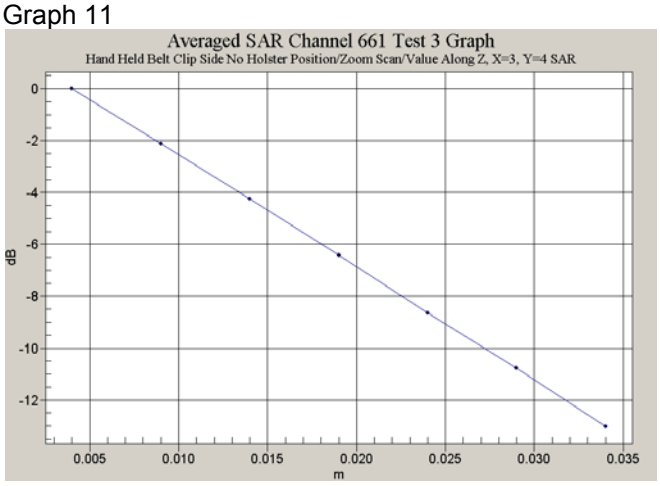
Graph 9



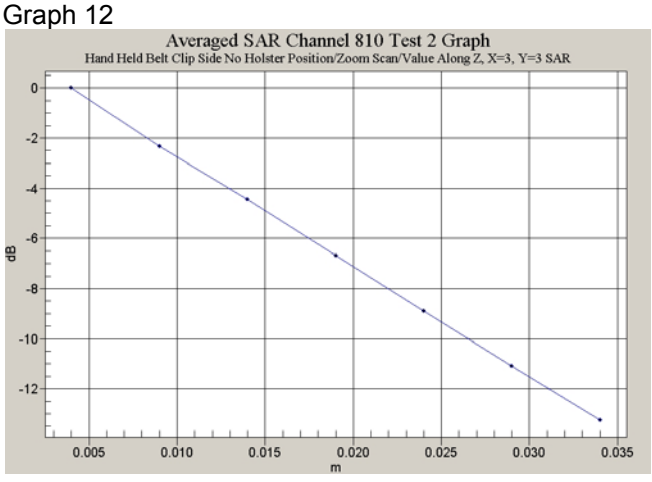
Graph 10



Graph 11



Graph 12

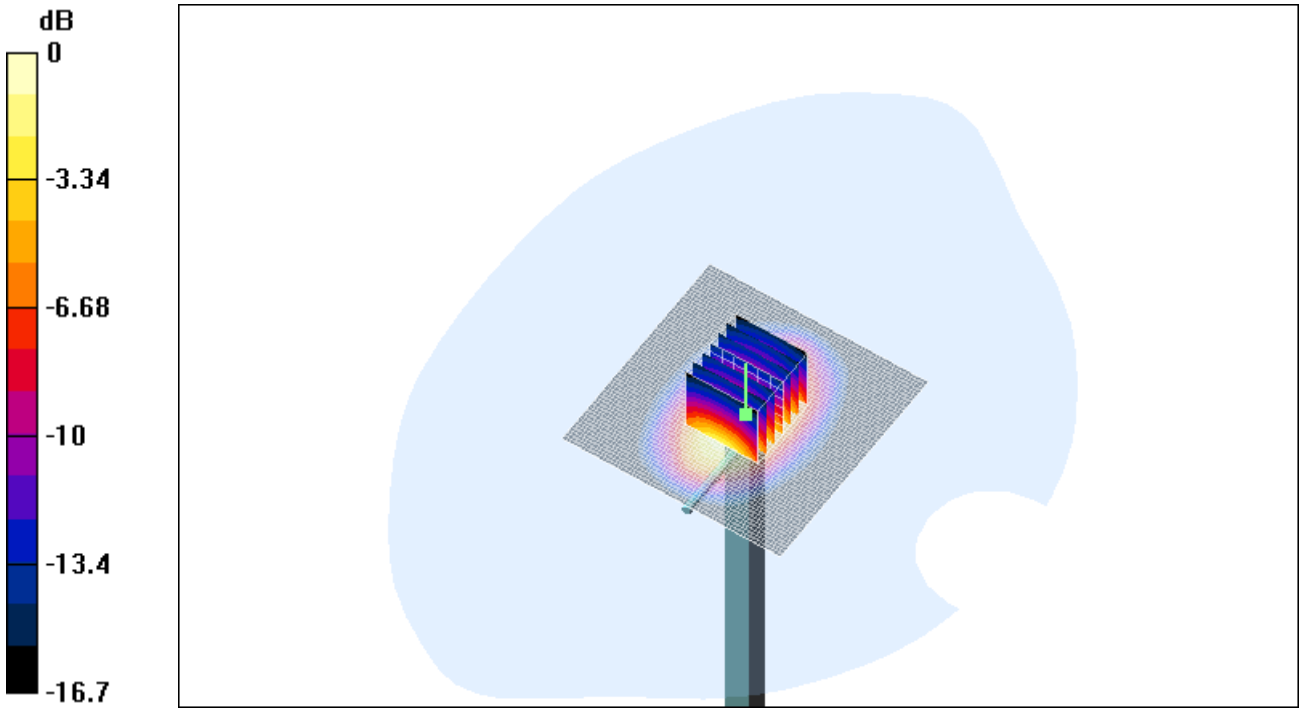


Test Date: 12 January 2004

File Name: Validation 1800 MHz (DAE442 Probe1377) 12-01-04.da4
DUT: Dipole 1800 MHz; Type: DV1800V2; Serial: 242

* Communication System: CW 1800 MHz; Frequency: 1800 MHz; Duty Cycle: 1:1
* Medium: Head 1800 MHz; (σ = 1.43972 mho/m, ε_r = 41.137, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(5.1, 5.1, 5.1)
- Phantom: SAM 22; Serial: 1260; Phantom section: Flat Section
Channel 1 Test/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 93.1 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 10.9 mW/g

Channel 1 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 16.6 W/kg
SAR(1 g) = 9.56 mW/g; SAR(10 g) = 5.06 mW/g
Reference Value = 93.1 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 11 mW/g



0 dB = 11mW/g

SAR MEASUREMENT PLOT 13

Ambient Temperature	**21.2 Degrees Celsius**
Liquid Temperature	**20.6 Degrees Celsius**
Humidity	**45 %**

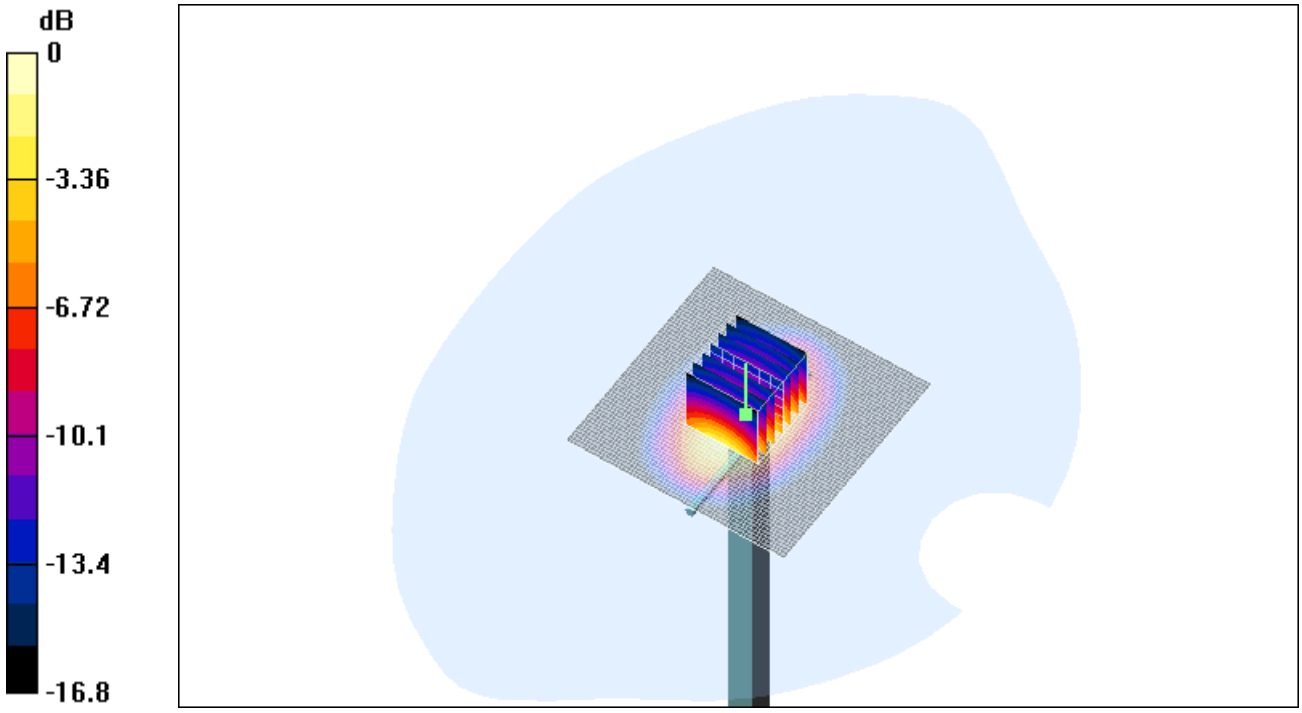
Test Date: 13 January 2004

File Name: Validation 1800 MHz (DAE442 Probe1377) 13-01-04.da4
DUT: Dipole 1800 MHz; Type: DV1800V2; Serial: 242

* Communication System: CW 1800 MHz; Frequency: 1800 MHz; Duty Cycle: 1:1
* Medium: Head 1800 MHz; (σ = 1.38779 mho/m, ε_r = 39.7182, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(5.1, 5.1, 5.1)
- Phantom: SAM 22; Serial: 1260; Phantom section: Flat Section

Channel 1 Test/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 94.3 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 10.5 mW/g

Channel 1 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 9.24 mW/g; SAR(10 g) = 4.93 mW/g
Reference Value = 94.3 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 10.5 mW/g



0 dB = 10.5mW/g

SAR MEASUREMENT PLOT 14

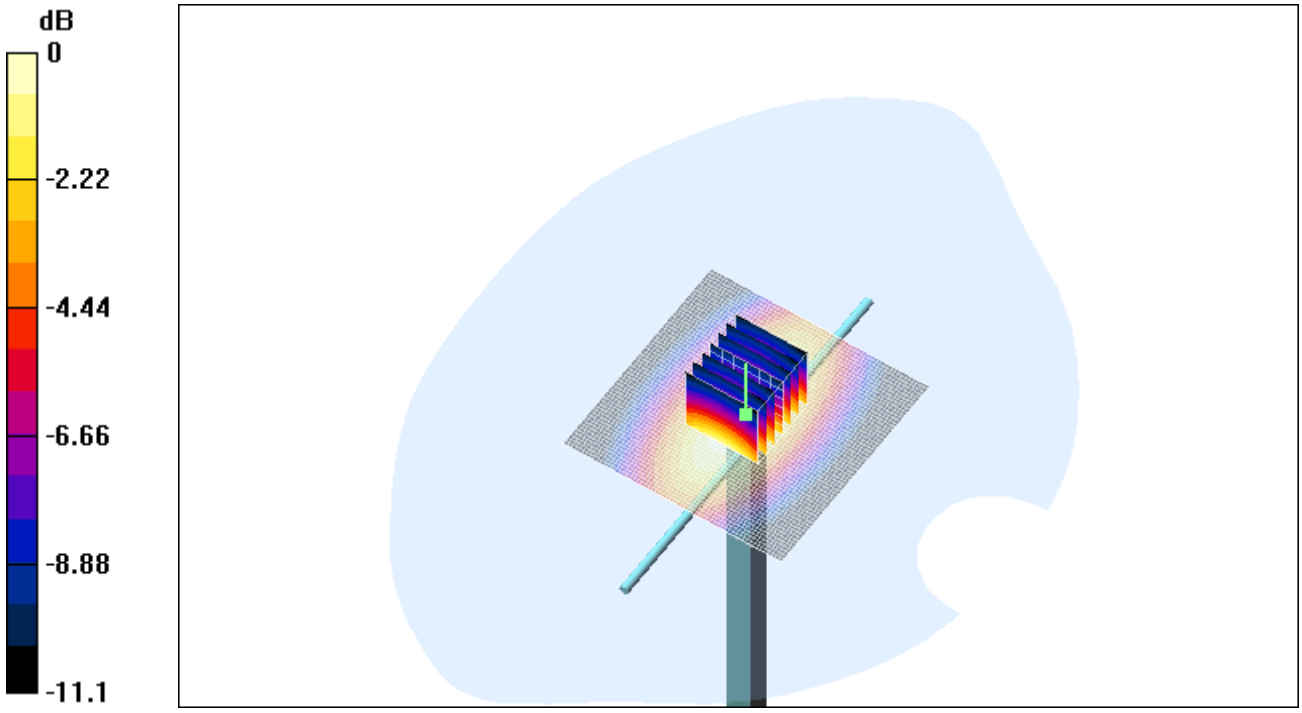
Ambient Temperature	**21.7 Degrees Celsius**
Liquid Temperature	**20.9 Degrees Celsius**
Humidity	**49 %**

Test Date: 14 January 2004

File Name: Validation 900 MHz (DAE442 Probe1377) 14-01-04.da4
DUT: Dipole 900 MHz; Type: DV900; Serial: 047

* Communication System: CW 900 MHz; Frequency: 900 MHz; Duty Cycle: 1:1
* Medium: Head 900 MHz; (σ = 0.958696 mho/m, ε_r = 41.1672, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1377; ConvF(6.2, 6.2, 6.2)
- Phantom: SAM 12; Serial: 1060; Phantom section: Flat Section
Channel 1 Test/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 56.4 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 2.78 mW/g

Channel 1 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 3.87 W/kg
SAR(1 g) = 2.62 mW/g; SAR(10 g) = 1.68 mW/g
Reference Value = 56.4 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 2.84 mW/g



0 dB = 2.84mW/g

SAR MEASUREMENT PLOT 15

Ambient Temperature	**21.0 Degrees Celsius**
Liquid Temperature	**20.4 Degrees Celsius**
Humidity	**45 %**