TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Panasonic Mobile Communications Development of Europe
X800 Mobile Station with Personal Handsfree Accessory

To: OET Bulletin 65 Supplement C: (2001-01)

Measurements were performed on the DASY4 System

Test Report Serial No:
RFI/SARE2/RP70944JD05A
Supersedes Test Report Serial No:
RFI/SARE1/RP70944JD05A

This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager: 	
Tested By: Scott D'Adamo 	**Checked By:** Joe Lomako  **pp**
Report Copy No: PDF01	
Issue Date: 01 Feburary 2005	**Test Dates: 10 December 2004 to 13 December 2004**

It should be noted that the standard, OET Bulletin 65 Supplement C: (2001-01) is not listed on RFI's current UKAS schedule and is therefore "not UKAS accredited".

The results in this report apply only to the sample(s) tested.

RFI Global Services Ltd
Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire RG23 8BG
Telephone: +44 (0)1256 312000 Facsimile: +44 (0)1256 312001
Email: info@rfi-global.com Website: www.rfi-global.com

Registered in England and Wales. Company number:2117901

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Test Of: Panasonic Mobile Communications Development of Europe
X800 Mobile Station with Personal Handsfree Accessory
To: OET Bulletin 65 Supplement C: (2001-01)

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1. Client Information

Company Name:	Panasonic Mobile Communications Development of Europe.
Address:	2 Gables Way Colthrop Thatcham Berkshire RG19 4ZB
Contact Name:	Mr M Hargreaves

Test Laboratory

Company Name:	RFI Global Services Ltd.
Address:	Ewhurst Park Ramsdell Basingstoke Hampshire RG26 5RQ.
Contact Name:	Mr A Brown

2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification of Equipment Under Test (EUT)

Brand Name:	Panasonic
Model Name or Number:	X800
Unique type Identification:	C10
FCC ID Number:	NWJ21C001A
Serial Number:	004400000227163
Battery Serial Number:	#731 /#800
Country Of Manufacture:	Japan
Date Of Receipt:	10 December 2004

2.2. Accessories

The following accessories were supplied with the EUT:

Description:	Personal Handsfree (PHF)
Brand Name:	Panasonic
Model Name or Number:	X800 P4
Serial Number:	PHF #2
Cable Length And Type:	1.0m Audio
Connected to Port:	Multifunction

Description:	8 MB Memory Card
Brand Name:	Panasonic
Model Name or Number:	Mini SD RP-SS008B
Serial Number:	D000 ST3JA001504
Cable Length And Type:	Not Applicable
Connected to Port:	Memory Card Input

2.3. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Communications Test Set
Brand Name:	Will'tek
Model Name or Number:	4202S
Serial Number:	0513018
Cable Length And Type:	5m Rosenberger
Connected to Port:	RF In / Out (Air Link)

Description:	Bluetooth Development Kit
Brand Name:	Casira
Model Name or Number:	BCES 301199/1
Serial Number:	4792 100101
Cable Length And Type:	1.5m DC Input 2 Core / 1.5m Audio
Connected to Port:	DC Input / Audio Jack

Description:	Headset
Brand Name:	Emkay
Model Name or Number:	None Stated
Serial Number:	None Stated
Cable Length And Type:	1.5m Audio
Connected to Port:	Audio Jack

Description:	AC / DC Adaptor
Brand Name:	ARTESYN
Model Name or Number:	AES20US0S
Serial Number:	ZCXV2736
Cable Length And Type:	1.5m AC Input, 1.5m DC Output 2 Core
Connected to Port:	DC Input / AC Mains

2.4. Description of EUT

The equipment under test is a Tri Band GSM / GPRS Mobile Station with PHF Accessory. The Mobile Station has Bluetooth Capabilities and a communication link was established with a Bluetooth Development Kit and Headset.

2.5. Modifications Incorporated in the EUT

During the course of testing the EUT was not modified.

2.6. Additional Information Related to the EUT

Equipment Class:	1900 MHz		
FCC Rule Part(s):	OET Bulletin 65 Supplement C		
Device Category:	Portable		
Application Type:	Certification		
Maximum Power Output:	30 dBm		
Transmitter Frequency Range:	1850.0 MHz to 1910.0 MHz		
Transmit Frequency Allocation Of EUT When Under Test (Channels):	**Channel Number**	**Channel Description**	**Frequency (MHz)**
	512	Low	1850.2
	660	Middle	1879.8
	810	High	1909.8
Modulation(s):	217 Hz		
Modulation Scheme (Crest Factor):	8.3		
Battery Type(s):	Unknown		
Antenna Length and Type:	Unknown, Internal		
Number Of Antenna Positions:	1 Fixed		
Intended Operating Environment:	Within Network Coverage		
Weight:	97.39g		
Dimensions (without Antenna) mm:	190 (L) x 48 (W) x 16 (H) mm		
Power Supply Requirement:			
DC Supply (Volts/Amps)	Not Applicable		
AC Supply (Volts/Amps)	Not Applicable		
Internal Battery Supply:	3.7 V		

2.7. Port Identification

Port	Description	Type	Applicable
1	Enclosure	-	Y
2	Multifunction Port	Unique to Manufacturer	N
3	Memory Card Port	11-Pin	N

3. Test Specification, Methods and Procedures

3.1. Test Specification

Reference:	OET Bulletin 65 Supplement C: (2001-01)
Title:	Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification.

3.2. Methods and Procedures

The methods and procedures used were as detailed in:

EN 50361: 2001
Title: Basic standard for the measurement of specific absorption rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz).

ANSI/IEEE C95.1: 1999
IEEE standard for safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz.

Federal Communications Commission, “Evaluating compliance with FCC Guidelines for human exposure to radio frequency electromagnetic fields”, OET Bulletin 65 Supplement C, FCC, Washington, D.C, 20554, 2001.

Thomas Schmid, Oliver Egger and Neils Kuster, “Automated E-field scanning system for dosimetric assessments”, IEEE Transaction on microwave theory and techniques,
Vol. 44, pp. 105-113, January 1996.

Neils Kuster, Ralph Kastle and Thomas Schmid, “Dosimetric evaluation of mobile communications equipment with know precision”, IEICE Transactions of communications, Vol. E80-B, No.5, pp. 645-652, May 1997.

3.3. Definition Of Measurement Equipment

The measurement equipment used complied with the requirements as detailed in OET Bulletin 65 Supplement C, Appendix D.

4. Deviations from the Test Specification

None.

5. Operation of the EUT During Testing

5.1. Operating Conditions

The EUT was tested in a normal laboratory environment.

During testing, the EUT was powered by a Internal battery supply of 3.7 V.

5.2. Operating Modes

At the client's request the EUT was tested in the following operating mode(s):

GSM1900 Call Allocated Mode only. A Bluetooth link was enabled and verified in the worst case head configuration.

5.3. Configuration and Peripherals

The EUT was tested in the following configuration(s):

Standalone with Memory Card in head configuration.
Standalone without Memory Card in worst-case head configuration.
Standalone with Bluetooth Enabled in worst-case head configuration.
Mobile Station with PHF in Body Mounted configuration – 15mm Distance Spacing.

6. Summary of Test Results

6.1. Summary Of Tests

Test Name	Specification Reference	Compliancy Status
Specific Absorption Rate (SAR)	OET Bulletin 65 Supplement C	Complied

6.2. Location of Tests

All the measurements described in this report were performed at the premises of
RFI Global Services Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ.

6.3. Test Results For Specific Absorption Rate – 1900 MHz Head

Test Summary:

Maximum Level (W/kg):	0.825
Limit (W/kg):	1.600
Margin (W/kg):	0.775

Environmental Conditions:

Temperature Variation in Lab (°C):	21.0 to 22.0
Temperature Variation in Liquid (°C):	21.3 to 21.3

E.I.R.P After Test:	Refer to Section 6.5

Results:

Position	Side of Head	Channel Number	Level 1g (W/kg)	Limit 1g (W/kg)	Margin 1g (W/kg)	Note(s)	Result
Touch with Memory Card	Left	660	0.825	1.600	0.775	-	Complied
Tilt with Memory Card	Left	660	0.411	1.600	1.189	-	Complied
Touch with Memory Card	Right	660	0.787	1.600	0.813	-	Complied
Tilt with Memory Card	Right	660	0.390	1.600	1.210	-	Complied
Touch with Memory Card	Left	512	0.825	1.600	0.775	-	Complied
Touch with Memory Card	Left	810	0.742	1.600	0.858	-	Complied
Touch without Memory Card	Left	512	0.695	1.600	0.905	-	Complied
Touch with Memory Card and Bluetooth Enabled	Left	512	0.778	1.600	0.822	-	Complied

6.4. Test Results For Specific Absorption Rate – 1900 MHz Body

Test Summary:

Maximum Level (W/kg):	0.687
Limit (W/kg):	1.600
Margin (W/kg):	0.913

Environmental Conditions:

Temperature Variation in Lab (°C):	21.0 to 22.0
Temperature Variation in Liquid (°C):	21.1 to 21.2

E.I.R.P After Test:	Refer to Section 6.6

Results:

Position	Section	Channel Number	Level 1g (W/kg)	Limit 1g (W/kg)	Margin 1g (W/kg)	Note(s)	Result
Rear of Closed EUT Facing Phantom with PHF	Flat	660	0.687	1.600	0.913	-	Complied
Front of Closed EUT Facing Phantom with PHF	Flat	660	0.094	1.600	1.506	-	Complied
Rear of Open EUT Facing Phantom with PHF	Flat	660	0.164	1.600	1.436	-	Complied
Display of Open EUT Facing Phantom with PHF	Flat	660	0.255	1.600	1.345	-	Complied
Rear of Closed EUT Facing Phantom with PHF	Flat	512	0.324	1.600	1.276	-	Complied
Rear of Closed EUT Facing Phantom with PHF	Flat	810	0.319	1.600	1.281	-	Complied

6.5. E.I.R.P Measurement

The E.I.R.P output of the EUT is as follows:

Date: 10 December 2004

Channel	Frequency	TX Power After Test / dBm
512	1850.2	28.4
660	1879.8	28.2
810	1909.8	27.9

Note(s):

1. E.I.R.P measurements are performed after testing only.

6.6. E.I.R.P Measurement

The E.I.R.P output of the EUT is as follows:

Date: 13 December 2004

Channel	Frequency	TX Power After Test / dBm
512	1850.2	28.6
660	1879.8	28.4
810	1909.8	28.0

Note(s):

1. E.I.R.P measurements are performed after testing only.

7. SAR Measurement System

RFI Global Services Ltd SAR measurement facility utilises the Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY4 system is comprised of the robot controller, computer, near-field probe, probe alignment sensor, and the SAM phantom containing brain or muscle equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller; teach pendant (Joystick), and remote control. This is used to drive the robot motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. The data acquisition electronics (DAE) performs signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection etc. The DAE is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card. The DAE3 utilises a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching mulitplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

8. SAR Safety Limits

Exposure Limits (General populations/Uncontrolled Exposure Environment)	SAR (W/Kg)
Spatial Peak (averaged over any 1 g of tissue)	1.6

Note(s):

1. OET Bulletin 65 Supplement C SAR safety limits specified in the table above apply to devices operated in the General Population / Uncontrolled Exposure Environment.

2. Uncontrolled environments are defined as locations where there is exposure of individuals who have no knowledge or control of their exposure.

9. Details of SAR Evaluation

The equipment under test was found to be compliant for localised Specific Absorption Rate (SAR) based on the following provisions and conditions:

a) The handset was placed in a normal operating position with the centre of the ear-piece aligned with the ear canal on the phantom.

b) With the ear-piece touching the phantom the centre line of the handset was aligned with an imaginary plane (X and Y axis) consisting of three lines connecting both ears and the mouth.

c) For the cheek position the handset was gradually moved towards the cheek until any point of the mouth-piece or keypad touched the cheek.

d) For the tilted position the EUT was positioned as for the cheek position, then the horizontal angle was increased by fifteen degrees (the phone keypad was moved away from the cheek by fifteen degrees).

e) SAR measurements were evaluated at maximum power and the unit was operated for an appropriate period prior to the evaluation in order to minimise the drift.

f) The device was keyed to operate continuously in the transmit mode for the duration of the test.

g) The location of the maximum spatial SAR distribution (Hot Spot) was determined relative to the handset and its antenna.

h) The EUT was tested with a fully charged battery.

10. Evaluation Procedures

The Specific Absorption Rate (SAR) evaluation was performed in the following manner:

a) (i) The evaluation was performed in an applicable area of the phantom depending on the type of device being tested. For devices worn about the ear during normal operation, both the left and right ear positions were evaluated at the centre frequency of the band at maximum power. The side, which produced the greatest SAR, determined which side of the phantom would be used for the entire evaluation. The positioning of the head worn device relative to the phantom was dictated by FCC OET bulletin 65 Supplement C.

(ii) For body worn devices or devices which can be operated within 20 cm of the body, the flat section of the phantom was used. The type of device being evaluated dictated the distance of the EUT to the outer surface of the phantom flat section.

b) The SAR was determined by a pre-defined procedure within the DASY4 software. The exposed region of the phantom was scanned near the inner surface with a grid spacing of 20mm x 20mm or appropriate resolution.

c) A 7x7x7 matrix was performed around the greatest spatial SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.

d) If the EUT had any appreciable drift over the course of the evaluation, then the EUT was re-evaluated. Any unusual anomalies over the course of the test also warranted a re-evaluation.

11. System Validation

Prior to the assessment, the system was verified in the flat region of the phantom.
A 1800 MHz and 1900 MHz dipole was used. A forward power of 250 mW was applied to the dipole and system was verified to a tolerance of ±5% for the 1800MHz and 1900 MHz dipole respectively.
The applicable verification (normalised to 1 Watt) is as follows:

Dipole Validation Kit	Target SAR 1g (W/kg)	Measured SAR 1g (W/kg)
D1900V2 / 540 (10/12/04)	41.20	39.24
D1900V2 / 540 (13/12/04)	41.20	40.80
D1800V2 / 264 (13/12/04)	37.20	36.72

12. Simulated Tissues

The body mixture consists of water and glycol. Visual inspection is made to ensure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the tissue.

Ingredient	Frequency
	1900 MHz Brain
De-Ionised Water	55.41%
DGMBE	44.51%
Salt	0.08%

Ingredient	Frequency
	1800 MHz Body
De-Ionised Water	69.79%
DGMBE	30.00%
Salt	0.20%

13. Tissue Parameters

The dielectric parameters of the fluids were verified prior to the SAR evaluation using a 58070C Dielectric Probe Kit and an 8753E Network Analyser. The dielectric parameters of the fluid are as follows:

Frequency (MHz)	Equivalent Tissue	Dielectric Constant ε_r	Conductivity σ (mho/m)
1900	Head	38.62	1.46
1900	Head	38.62	1.46
1800	Body	52.34	1.57

14. DASY4 Systems Specifications

Robot System

Positioner:	Stäubli Unimation Corp. Robot Model: RX90L
Repeatability:	0.025 mm
No. of axis:	6
Serial Number:	F00/SD89A1/A/01
Reach:	1185 mm
Payload:	3.5 kg
Control Unit:	CS7
Programming Language:	V+

Data Acquisition Electronic (DAE) System

Cell Controller

PC:	Dell Precision 340
Operating System:	Windows NT
Data Card:	DASY4 Measurement Server
Serial Number:	1080

Data Converter

Features:	Signal Amplifier, multiplexer, A/D converter and control logic.
Software:	DASY4 Software
Connecting Lines:	Optical downlink for data and status info. Optical uplink for commands and clock.

PC Interface Card

Function:	24 bit (64 MHz) DSP for real time processing Link to DAE3 16 nit A/D converter for surface detection system serial link to robot direct emergency stop output for robot.

E-Field Probe

Model:	ET3DV6
Serial No:	1529
Construction:	Triangular core fibre optic detection system
Frequency:	10 MHz to 3 GHz
Linearity:	±0.2 dB (30 MHz to 3 GHz)
Probe Length (mm):	337
Probe Diameter (mm):	12
Tip Length (mm):	10
Tip Diameter (mm):	6.8
Sensor X Offset (mm):	2.7
Sensor Y Offset (mm):	2.7
Sensor Z Offset (mm):	2.7

Phantom

Phantom:	SAM Phantom
Shell Material:	Fibreglass
Thickness:	2.0 ±0.1 mm

15. Validation Results – 1900 MHz Band (Head)

Date: 10 December 2004

15.1. System Validation

Validation of the system test configuration was carried out prior to testing.

Validation Dipole Type and Serial No.	Calibrated Value of SAR in 1g volume (W/kg) at 1900 MHz	Measured Value of SAR in 1g volume (W/kg) at 1900 MHz	Percentage Difference (≤5%)
D1900V2 / 540	41.20	39.24	(-4.81) Yes

16.2. Liquid Properties

Properties of the tissue simulating liquid were measured prior to testing.

Property	Target Value (1900 MHz)	Measured/Calculated Value (1900 MHz)	Percentage Difference (≤5%)
Relative Permittivity	40.00	38.62	(-3.45%) Yes
Conductivity	1.40	1.46	(4.30%) Yes

16.3. Temperature Variation

The temperature of the laboratory and within the tissue simulating liquid for this test shall not exceed the range +15.0 ºC to +30.0 ºC.

The actual temperature measured at the beginning and end of each test was recorded and the maximum range is shown below:

Measurement	Maximum Temperature	Minimum Temperature
Laboratory	22.0	21.0
Tissue Simulating Liquid	21.3	21.3

16. Validation Results – 1900 MHz Band (Head)

Date: 13 December 2004

16.1. System Validation

Validation of the system test configuration was carried out prior to testing.

Validation Dipole Type and Serial No.	Calibrated Value of SAR in 1g volume (W/kg) at 1900 MHz	Measured Value of SAR in 1g volume (W/kg) at 1900 MHz	Percentage Difference (≤5%)
D1900V2 / 540	41.20	40.80	(-1.00%) Yes

16.2. Liquid Properties

Properties of the tissue simulating liquid were measured prior to testing.

Property	Target Value (1900 MHz)	Measured/Calculated Value (1900 MHz)	Percentage Difference (≤5%)
Relative Permittivity	40.00	38.62	(-3.45%) Yes
Conductivity	1.40	1.46	(4.30%) Yes

16.3. Temperature Variation

The temperature of the laboratory and within the tissue simulating liquid for this test shall not exceed the range +15.0 ºC to +30.0 ºC.

The actual temperature measured at the beginning and end of each test was recorded and the maximum range is shown below:

Measurement	Maximum Temperature	Minimum Temperature
Laboratory	21.0	21.0
Tissue Simulating Liquid	21.2	21.2

17. Validation Results – 1800 MHz Band (Body)

Date: 13 December 2004

17.1. System Validation

Validation of the system test configuration was carried out prior to testing.

Validation Dipole Type and Serial No.	Calibrated Value of SAR in 1g volume (W/kg) at 1800 MHz	Measured Value of SAR in 1g volume (W/kg) at 1800 MHz	Percentage Difference (≤5%)
D1800V2 / 264	37.00	36.72	(-0.80%) Yes

An 1800 MHz dipole was used to perform 1900 MHz Body system validation. This was possible as the device centre frequency is within ± 100 MHz of the verification frequency.

15.2 Liquid Properties

Properties of the tissue simulating liquid were measured prior to testing.

Property	Target Value (1800 MHz)	Measured/Calculated Value (1800 MHz)	Percentage Difference (≤5%)
Relative Permittivity	53.30	52.34	(-1.81%) Yes
Conductivity	1.52	1.57	(3.30%) Yes

15.3Temperature Variation

The temperature of the laboratory and within the tissue simulating liquid for this test shall not exceed the range +15.0 ºC to +30.0 ºC.

The actual temperature measured at the beginning and end of each test was recorded and the maximum range is shown below:

Measurement	Maximum Temperature	Minimum Temperature
Laboratory	22.0	21.0
Tissue Simulating Liquid	21.5	20.5

18. Measurement Uncertainty

18.1. No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

18.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

18.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

18.4. The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level	Calculated Uncertainty
Specific Absorption Rate	1900	95%	± 17.12

18.5. The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

18.6. Measurement uncertainties in SAR measurements are difficult to quantify due to several variables including biological, physiological, and environment. However, the estimated measurement uncertainties in SAR are less than 30%.

18.7. According to ANSI/IEEE C95.3, the overall uncertainties are difficult to assess and will vary with the type of meter and usage situation. However, accuracy’s of ±1 to 3 dB can be expected in practice, with greater uncertainties in near-field situations and at higher frequencies (shorter wavelengths), or areas where large reflecting objects are present. Under optimum measurement conditions, SAR measurement uncertainties of at least ±2 dB can be expected.

18.8. According to CENELEC, typical worst-case uncertainty of field measurements is ±5 dB. For well-defined modulation characteristics the uncertainty can be reduced to ±3 dB.

Measurement Uncertainty (Continued)

Specific Absorption Rate Uncertainty at 1900 MHz, GSM Modulation Scheme calculated in accordance with IEEE 1528-200X

Type	Source of uncertainty	+ Value	- Value	Probability Distribution	Divisor	c_i	Standard Uncertainty		υ_i or υ_{eff}	Note
							+ u (dBµV)	- u (dBµV)		
B	Probe calibration	8.900	8.900	normal (k=2)	2.0000	1.0000	4.450	4.450	¥	
B	Axail Isotropy	0.100	0.100	normal (k=2)	2.0000	1.0000	0.050	0.050	¥	
B	Hemispherical Isotropy	0.100	0.100	normal (k=2)	2.0000	1.0000	0.050	0.050	¥	
B	Spatial Resolution	0.500	0.500	Rectangular	1.7321	1.0000	0.289	0.289	¥	
B	Boundary Effect	0.769	0.769	Rectangular	1.7321	1.0000	0.444	0.444	¥	
B	Linearity	2.330	2.330	Rectangular	1.7321	1.0000	1.345	1.345	¥	
B	Detection Limits	0.200	0.200	Rectangular	1.7321	1.0000	0.115	0.115	¥	
B	Readout Electronics	0.650	0.650	normal (k=2)	2.0000	1.0000	0.325	0.325	¥	
B	Response Time	0.000	0.000	Rectangular	1.7321	1.0000	0.000	0.000	¥	
B	Integration Time	0.005	0.005	Rectangular	1.7321	1.0000	0.003	0.003	¥	
B	RF Ambinet conditions	3.000	3.000	Rectangular	1.7321	1.0000	1.732	1.732	¥	
B	Probe Positioner Mechanical Restrictions	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	¥	
B	Probe Positioning with regard to Phantom Shell	2.850	2.850	Rectangular	1.7321	1.0000	1.645	1.645	¥	
B	Extrapolation and integration/ Maximum SAR evaluation	5.080	5.080	Rectangular	1.7321	1.0000	2.933	2.933	¥	
A	Test Sample Positioning	0.584	0.584	normal (k=1)	1.0000	1.0000	0.584	0.584	10	
A	Device Holder uncertainty	0.154	0.154	normal (k=1)	1.0000	1.0000	0.154	0.154	10	
B	Phantom Uncertainty	4.000	4.000	Rectangular	1.7321	1.0000	2.309	2.309	¥	
B	Drit of output power	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	¥	
B	Liquid Conductivity (target value)	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	¥	
B	Liquid Conductivity (measured value)	2.440	2.440	Rectangular	1.7321	1.0000	1.409	1.409	¥	
B	Liquid Permittivity (target value)	5.000	5.000	Rectangular	1.7321	1.0000	2.887	2.887	¥	
B	Liquid Permittivity (measured value)	2.440	2.440	Rectangular	1.7321	1.0000	1.409	1.409	¥	
	Combined standard uncertainty			t-distribution			8.74	8.74	>500	>500
	Expanded uncertainty			k = 1.96			17.12	17.12	>500	

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Model Number
A034	Narda 20W Termination	Narda	374BNM
A1094	Sony MVC FD-81	Sony	MVC - FD81
A1097	SMA Directional Coupler	MiDISCO	MDC6223-30
A1137	3dB Attenuator	Narda	779
A1174	Dielectric Probe Kit	Agilent Technologies	85070C
A1184	Data Acquisition Electronics	Schmid & Partner	DAE3
A1186	Probe	Schmid & Partner	ET3 DV6
A1190	1800 MHz Validation Dipole	Schmid & Partner	D1800V2
A1225	Low noise Amplifier	Mini Circuits	ZHL-42
A1234	Data Acquisition Electronics	Schmid & Partner	DAE3
A1237	1900 MHz Validation Dipole	Schmid & Partner	D1900V2
A1238	SAM Phantom	Schmid & Partner	001
A1328	Handset Positioner	Schmid & Partner	Modification
A1410	DC-4.0GHz 3dB	Omni Spectra	FSC 16179
A215	20 dB Attenuator	Narda	766-20
C1025	Cable	Rosenberger	FA210A-1-020m
C1052	Cable	Utiflex	FA210A0030M3030
C1053	Cable	Utiflex	FA210A0003M3030
C1054	Cable	Utiflex	FA210A0001M3050A
C1090	Cable	Rosenberger	FA210A1050005050
G046	Signal Generator	Gigatronics	7100/.01-20
G0528	Robot Power Supply	Schmid & Partner	DASY
G088	PSU	Thurlby Thandar	CPX200
M1001	Spectrum Analyser 8594A	Hewlett Packard	8594A
M1015	Network Analyser	Agilent Technologies	8753ES
M103	URY Power Meter	Rohde & Schwarz	URY
M1047	Robot Arm	Staubli	RX908 L
M1069	Diode Power Sensor	Rohde & Schwarz	NRV-Z2

Test Equipment Used (Continued)

RFI No.	Instrument	Manufacturer	Model Number
M1093	Communications Test Set	Will'tek	4202S
M1129	Insertion Unit	Rohde & Schwarz	URY-Z2
M136	Temperature/Humidity/Pressure Meter	RS Components	None
M509	Thermometer	Testo	110
S256	Site 56	RFI	N/A

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. SAR Distribution Scans

This appendix contains SAR Distribution Scans.

Scan Reference Number	Title
SCN/70944/001	Touch Left 660
SCN/70944/002	Tilt Left 660
SCN/70944/003	Touch Right 660
SCN/70944/004	Tilt Right 660
SCN/70944/005	Touch Left 512
SCN/70944/006	Touch Left 810
SCN/70944/007	Touch Left 512 (Without Memory Card)
SCN/70944/008	Touch Left 512 (With Bluetooth Enabled)
SCN/70944/009	Rear of Closed EUT with PHF 660
SCN/70944/010	Front of Closed EUT with PHF 660
SCN/70944/011	Rear of Open EUT with PHF 660
SCN/70944/012	Display of Open EUT with PHF 660
SCN/70944/013	Rear of Closed EUT with PHF 512
SCN/70944/014	Rear of Closed EUT with PHF 810
SCN/70944/015	System Performance Check-D1900 10/12/04
SCN/70944/016	System Performance Check-D1900 13/12/04
SCN/70944/017	System Performance Check-D1800 13/12/04

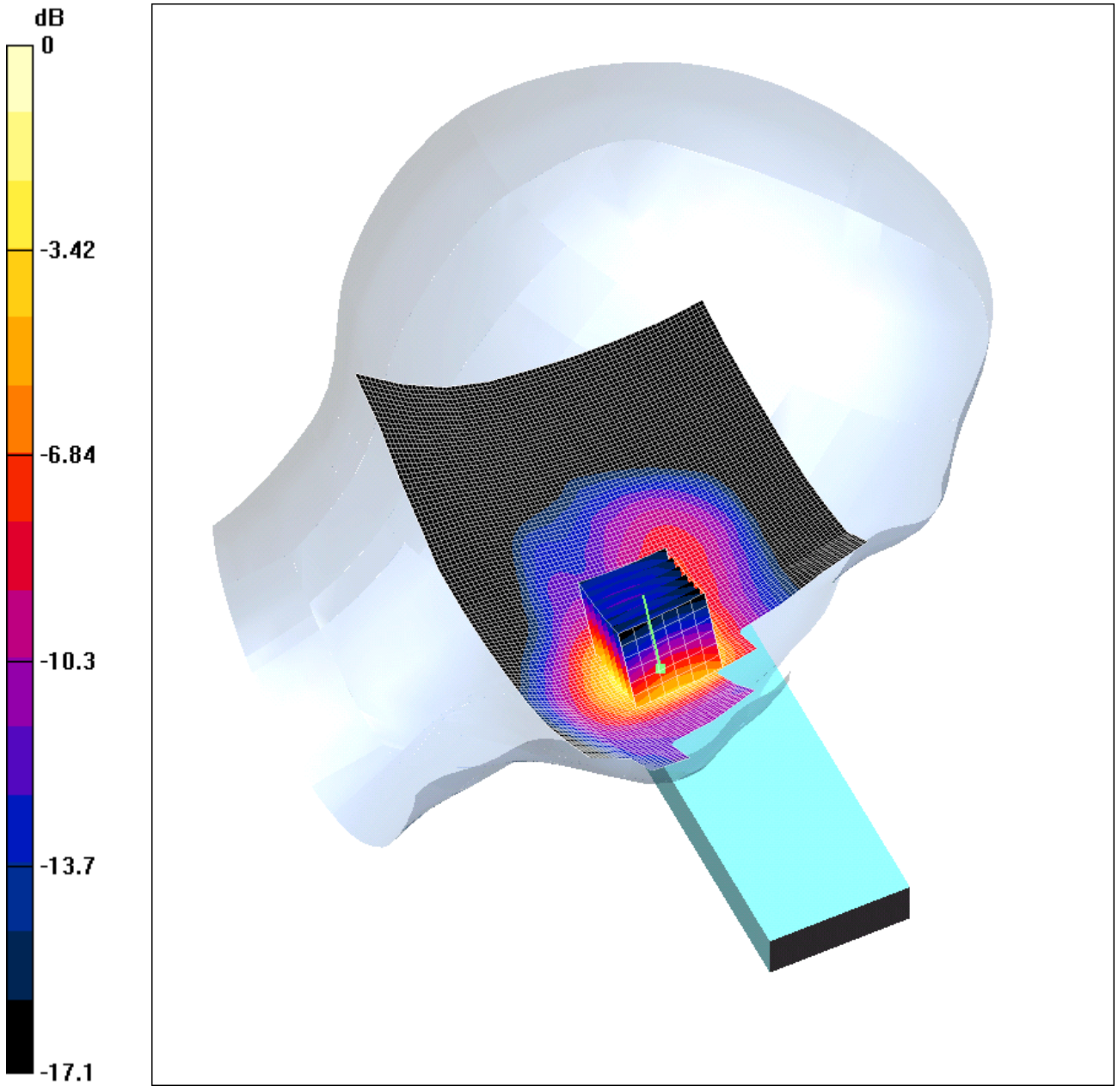
Date: 10/12/04

70944_05_001

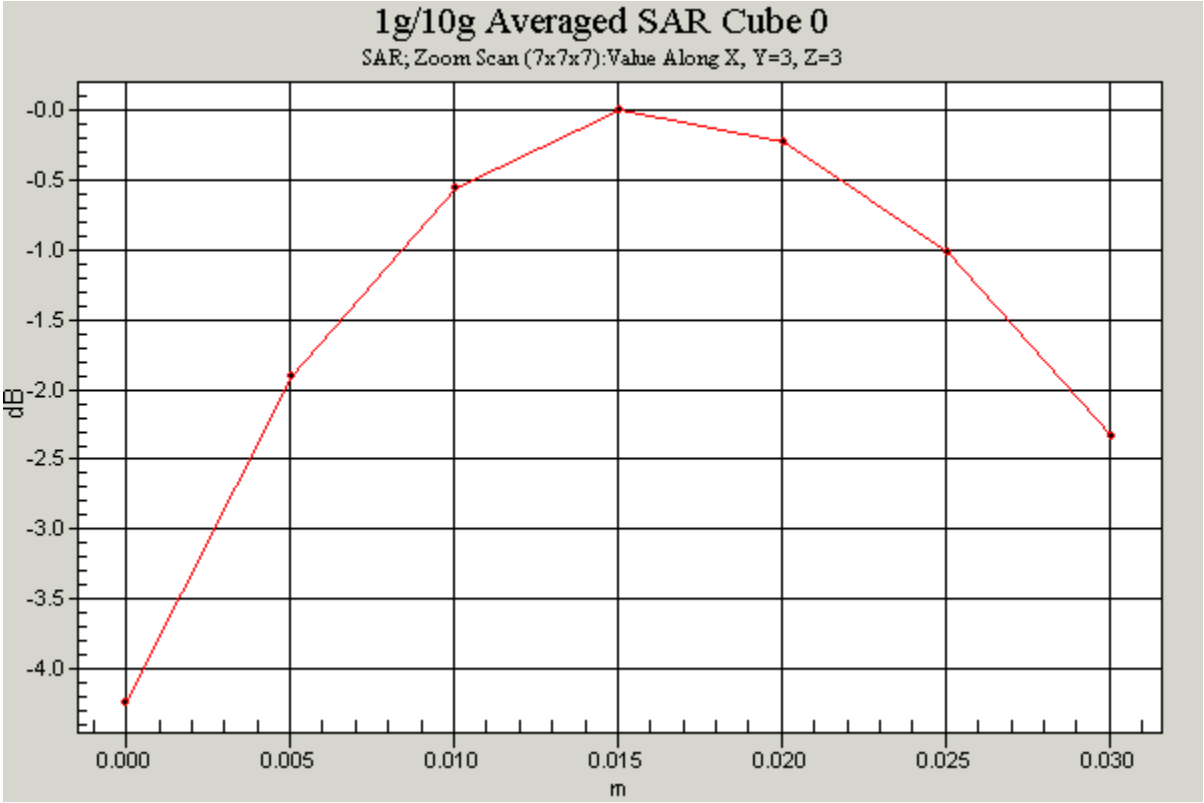
Test Laboratory: RFI GLOBAL SERVICES LTD.

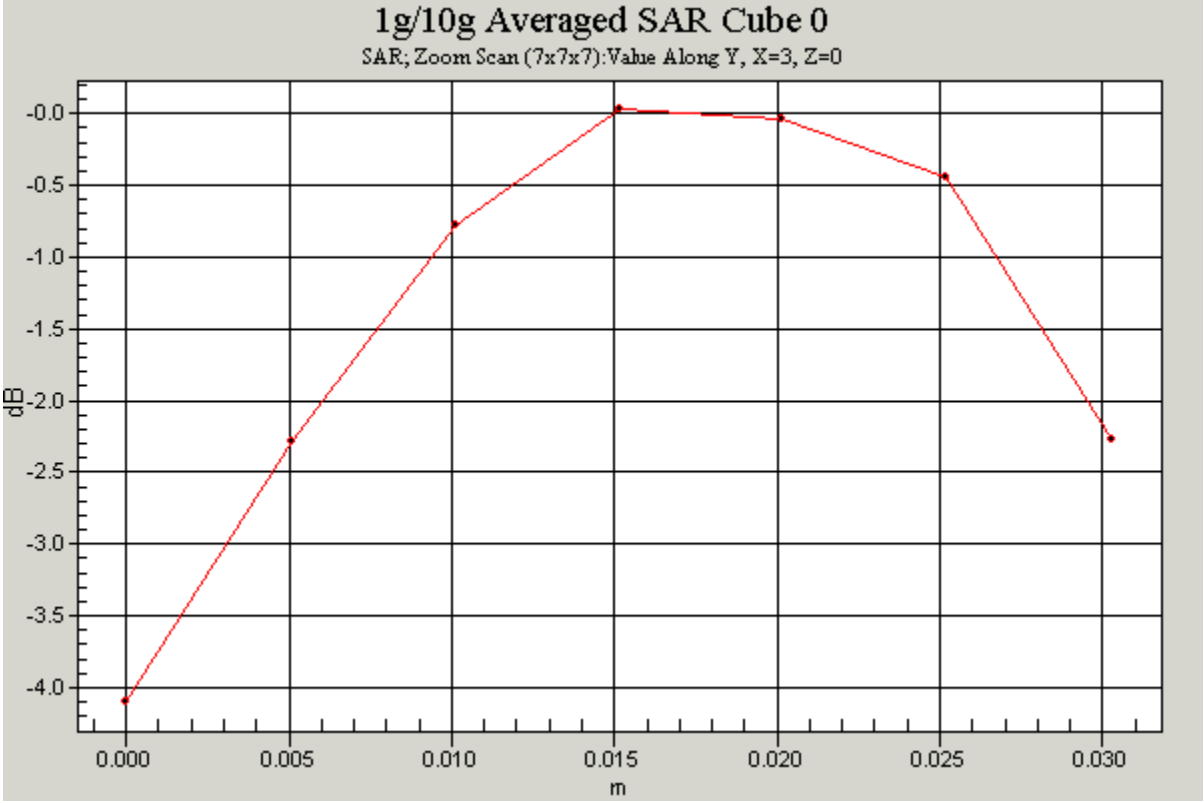
70944_JD05_001_Touch_Left_660

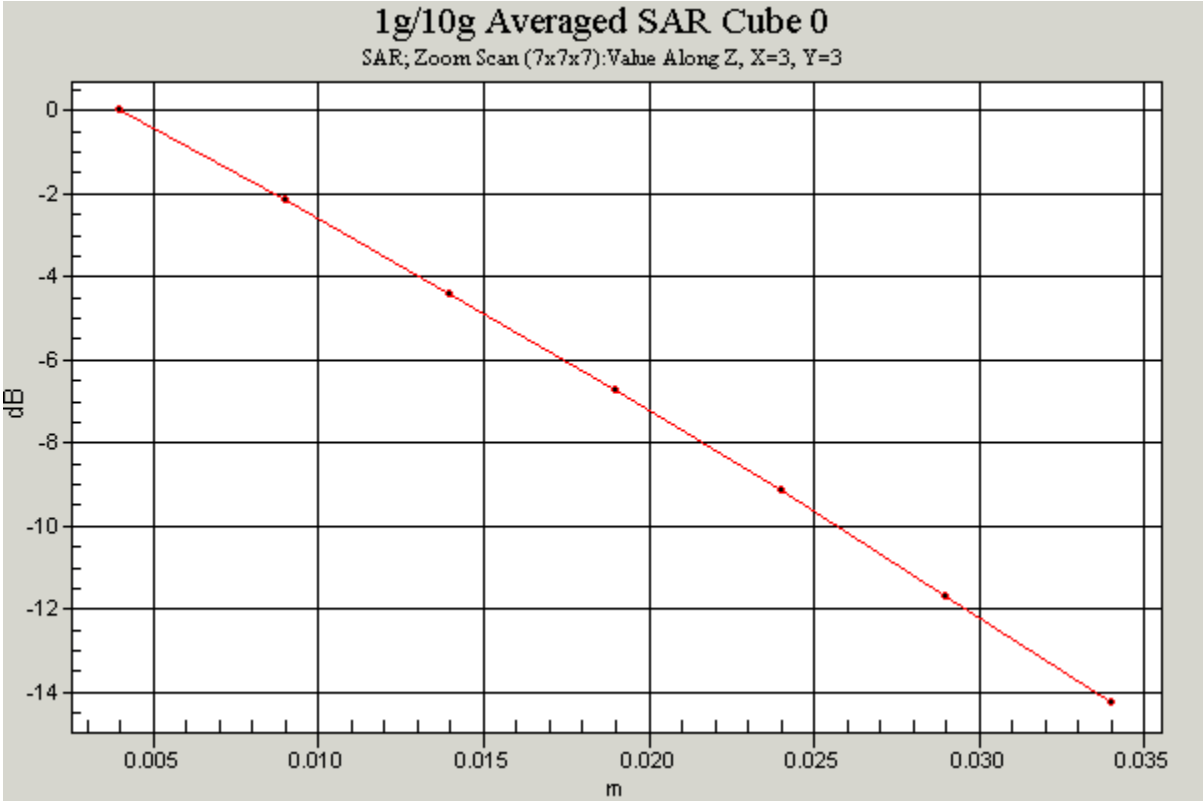
DUT: Panasonic; Type: X800; Serial: 004400000227163



0 dB = 0.896mW/g


1g/10g Averaged SAR Cube 0
SAR; Zoom Scan (7x7x7):Value Along X, Y=3, Z=3
dB
-0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m


1g/10g Averaged SAR Cube 0
SAR; Zoom Scan (7x7x7):Value Along Y, X=3, Z=0
dB
-0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m



Communication System: DCS 1900; Frequency: 1879.8 MHz;Duty Cycle: 1:8.3
Medium: 1900 MHz HSL Medium parameters used (interpolated): f = 1879.8 MHz; σ = 1.44 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1529; ConvF(4.9, 4.9, 4.9); Calibrated: 10/06/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 16/06/2004
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1197
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

Touch position with Memory Card- Middle/Area Scan (81x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.881 mW/g

Touch position with Memory Card- Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.16 V/m; Power Drift = -0.4 dB
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 0.825 mW/g; SAR(10 g) = 0.450 mW/g
Maximum value of SAR (measured) = 0.896 mW/g

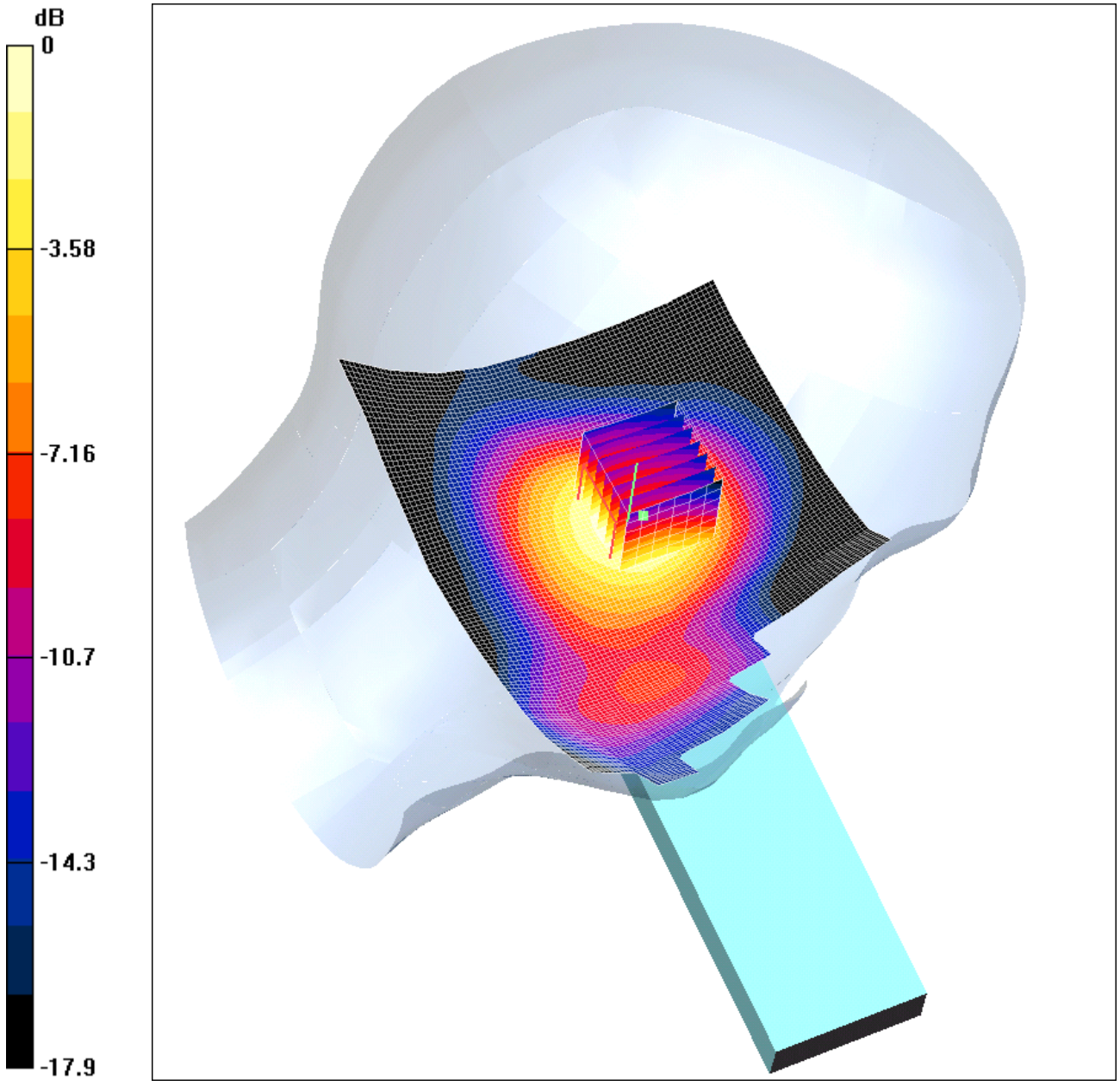
Date: 10/12/04

70944_05_002

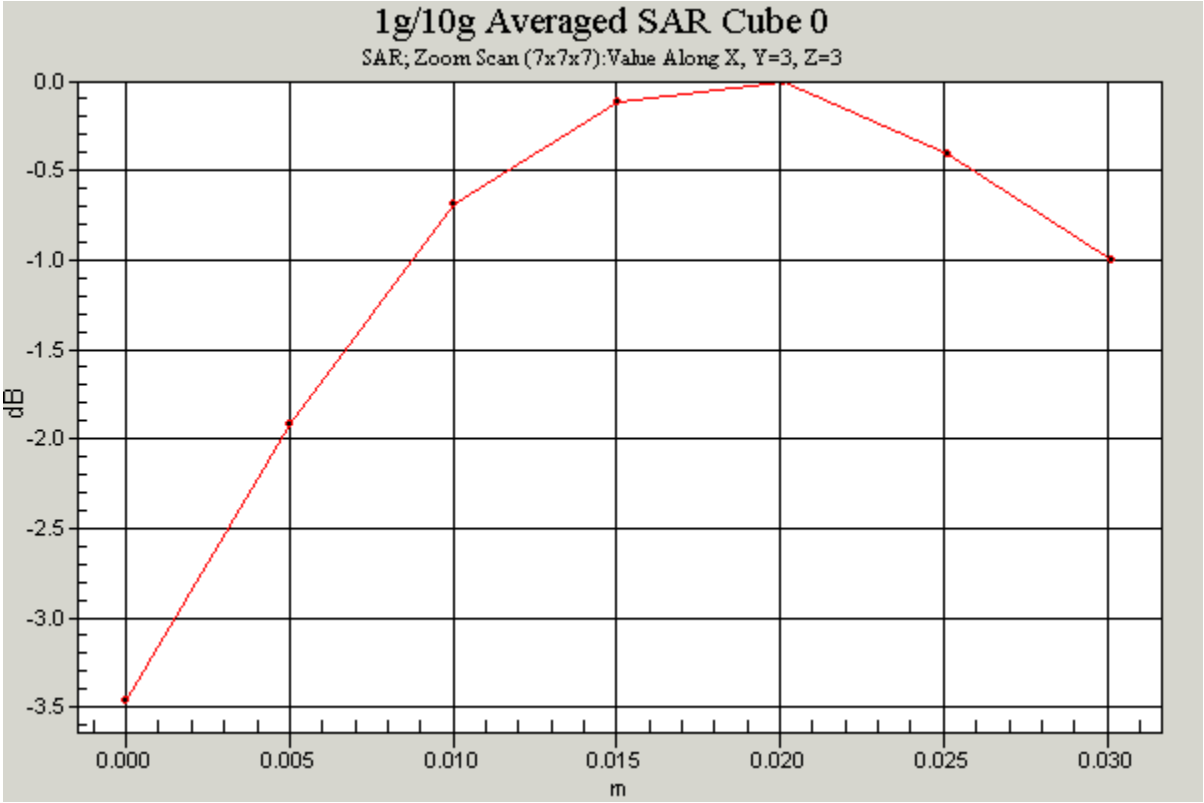
Test Laboratory: RFI GLOBAL SERVICES LTD.

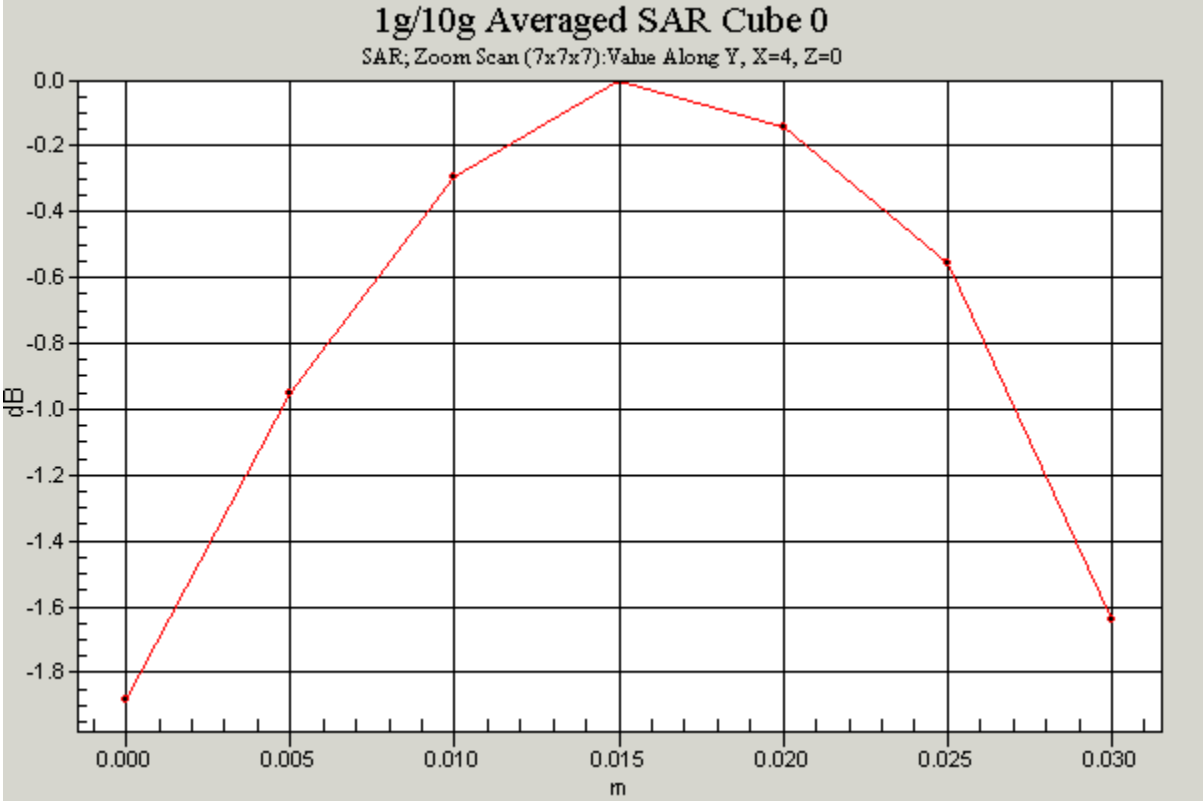
70944_JD05_002_Tilt_Left_660

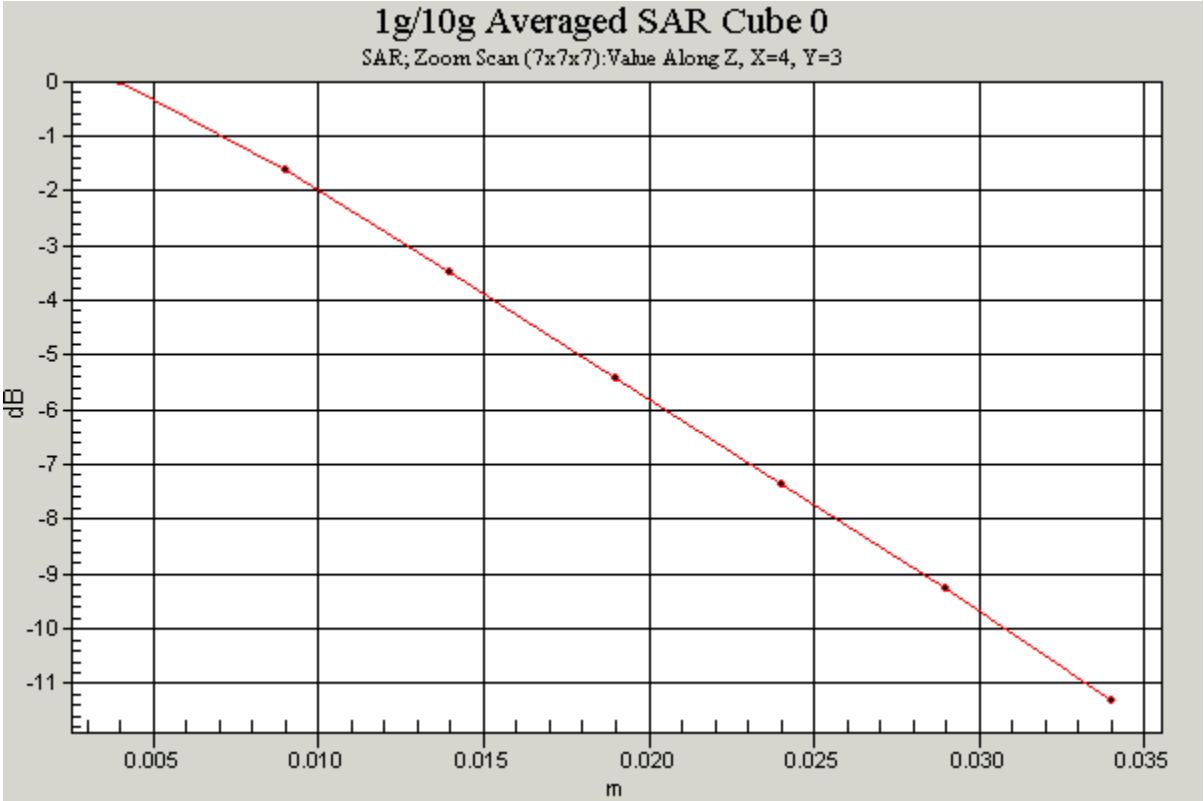
DUT: Panasonic; Type: X800; Serial: 004400000227163



0 dB = 0.447mW/g


1g/10g Averaged SAR Cube 0
SAR; Zoom Scan (7x7x7):Value Along X, Y=3, Z=3
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
dB
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m


1g/10g Averaged SAR Cube 0
SAR; Zoom Scan (7x7x7):Value Along Y, X=4, Z=0
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
-1.4
-1.6
-1.8
dB
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m



Communication System: DCS 1900; Frequency: 1879.8 MHz;Duty Cycle: 1:8.3
Medium: 1900 MHz HSL Medium parameters used (interpolated): f = 1879.8 MHz; σ = 1.44 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1529; ConvF(4.9, 4.9, 4.9); Calibrated: 10/06/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 16/06/2004
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1197
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

Tilt position with Memory Card- Middle/Area Scan (81x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.452 mW/g

Tilt position with Memory Card- Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.2 V/m; Power Drift = 0.008 dB
Peak SAR (extrapolated) = 0.587 W/kg
SAR(1 g) = 0.411 mW/g; SAR(10 g) = 0.252 mW/g
Maximum value of SAR (measured) = 0.447 mW/g

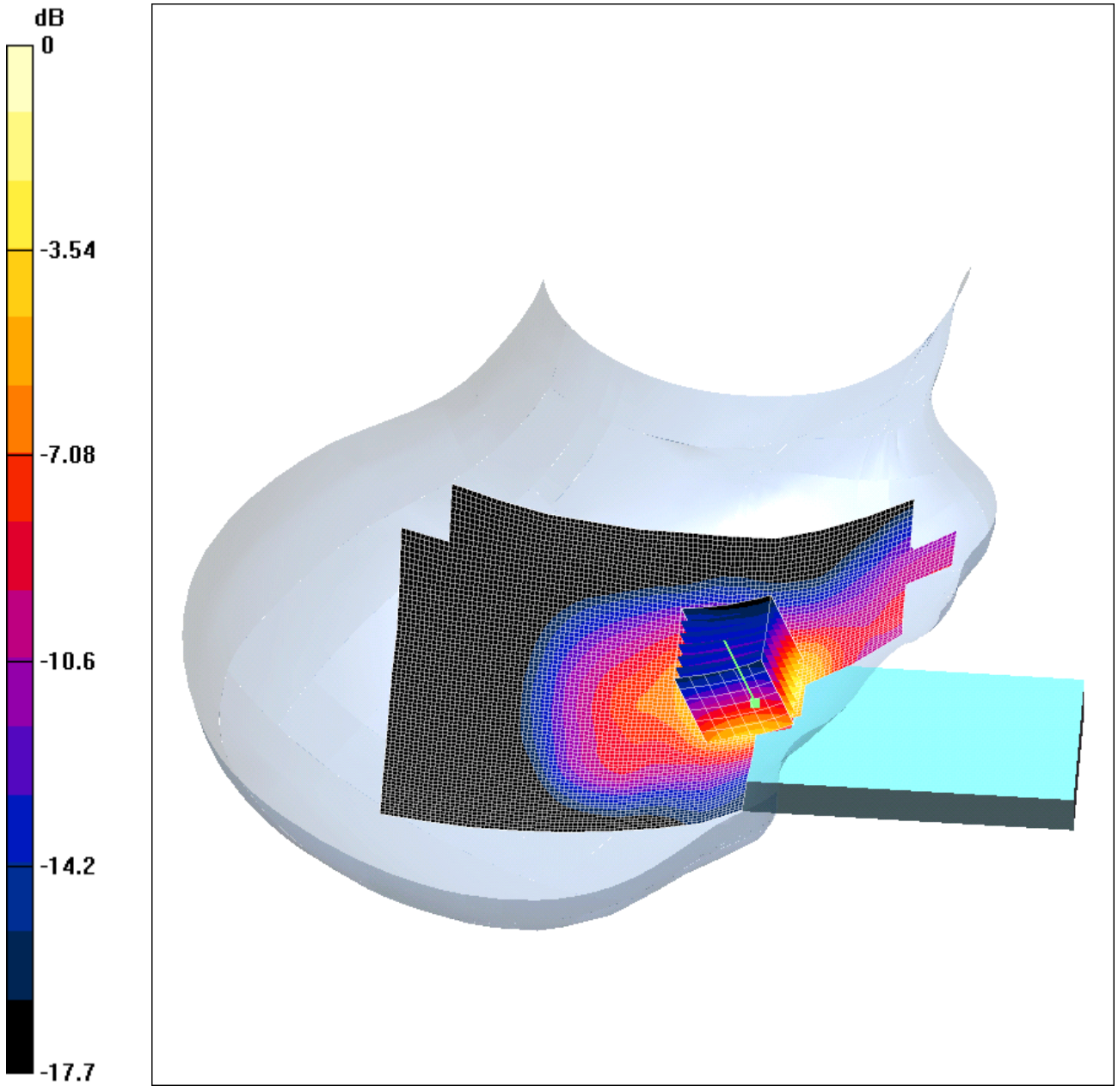
Date: 10/12/04

70944_05_003

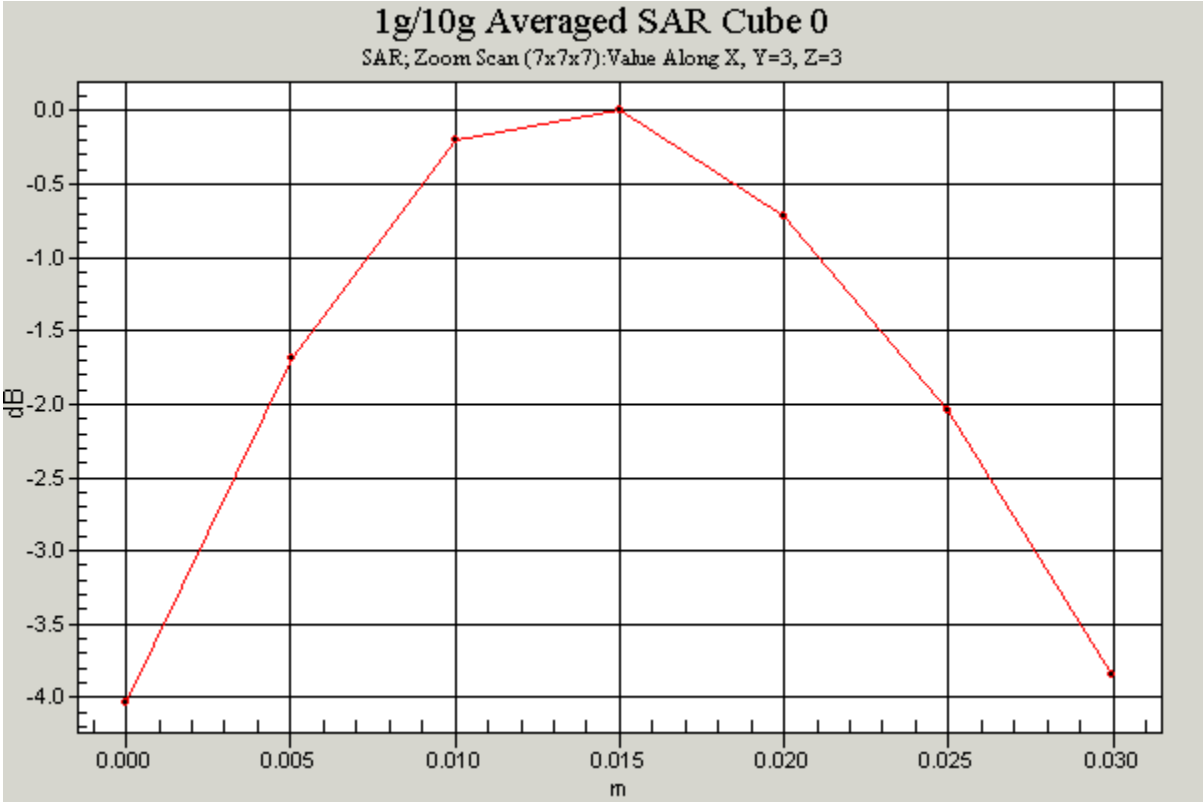
Test Laboratory: RFI GLOBAL SERVICES LTD.

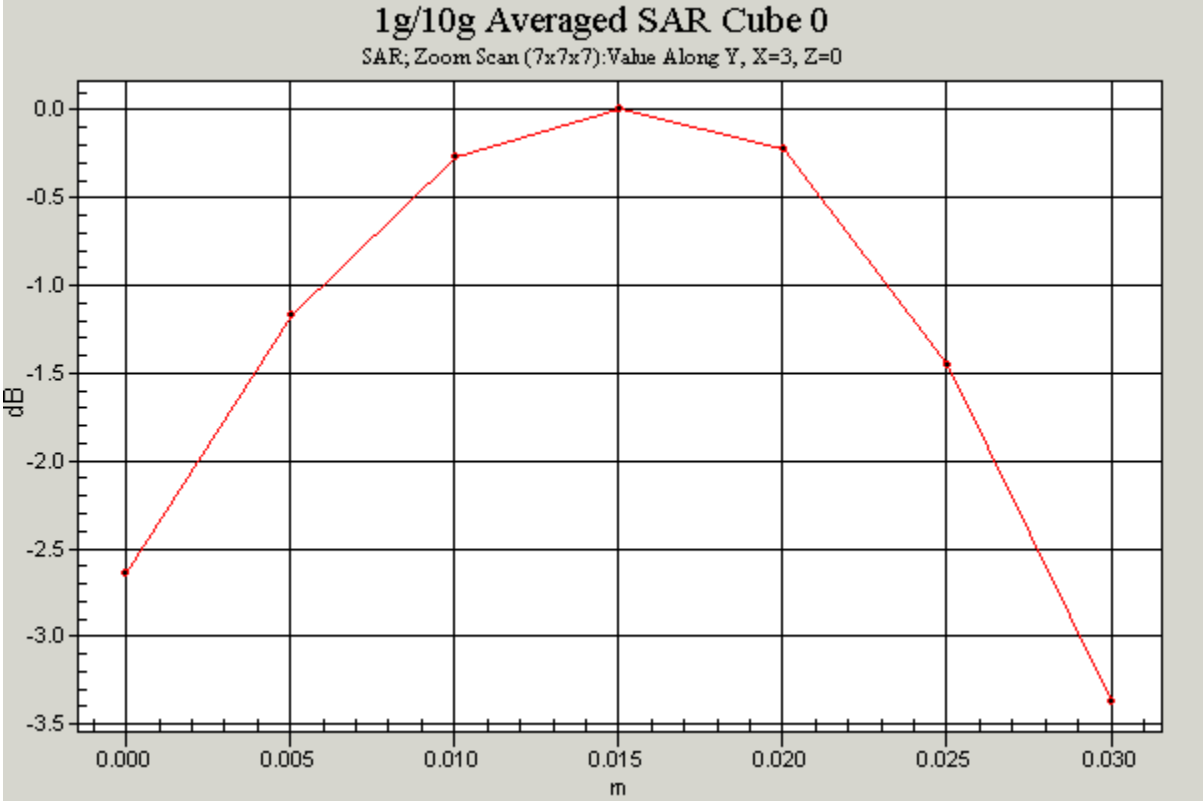
70944_JD05_003_Touch_Right_660

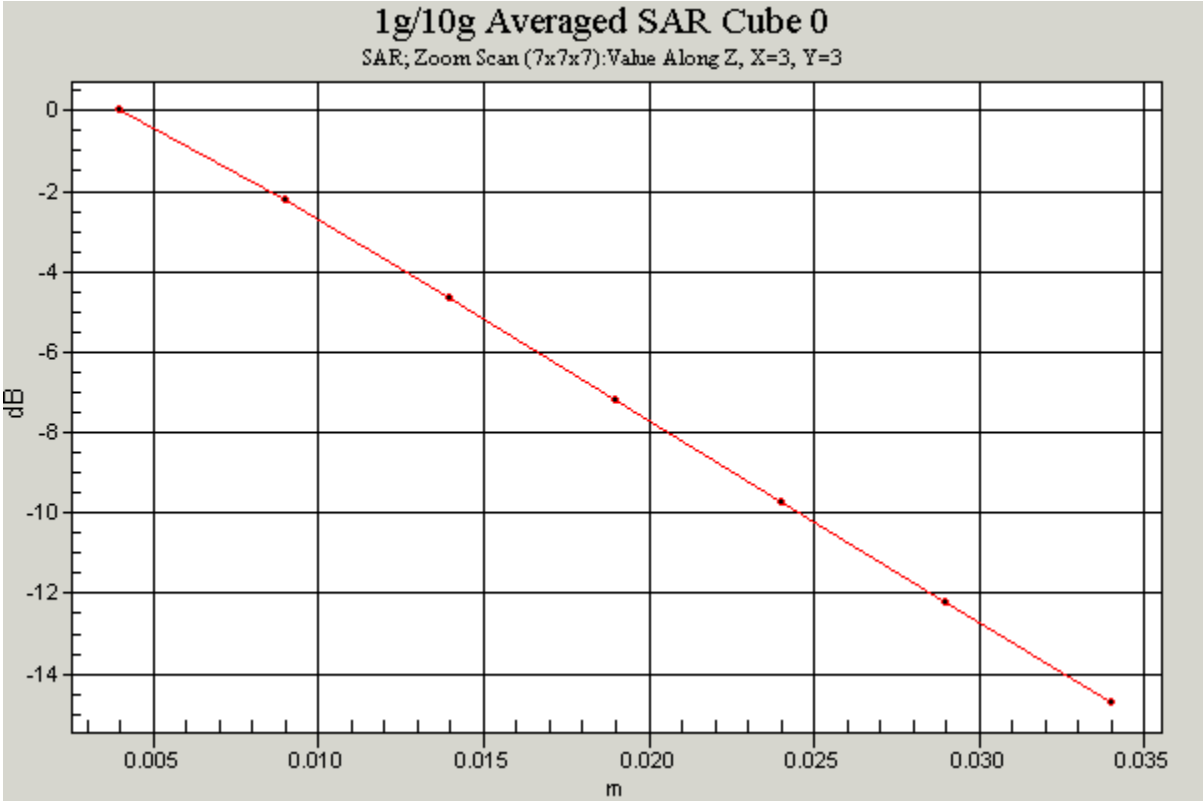
DUT: Panasonic; Type: X800; Serial: 004400000227163



0 dB = 0.870mW/g


1g/10g Averaged SAR Cube 0
SAR; Zoom Scan (7x7x7):Value Along X, Y=3, Z=3
dB
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m


1g/10g Averaged SAR Cube 0
SAR; Zoom Scan (7x7x7):Value Along Y, X=3, Z=0
dB
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m



Communication System: DCS 1900; Frequency: 1879.8 MHz;Duty Cycle: 1:8.3
Medium: 1900 MHz HSL Medium parameters used (interpolated): f = 1879.8 MHz; σ = 1.44 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1529; ConvF(4.9, 4.9, 4.9); Calibrated: 10/06/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 16/06/2004
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1197
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

Touch position with Memory Card - Middle/Area Scan (81x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.882 mW/g

Touch position with Memory Card - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.42 V/m; Power Drift = -0.0 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.787 mW/g; SAR(10 g) = 0.414 mW/g
Maximum value of SAR (measured) = 0.870 mW/g

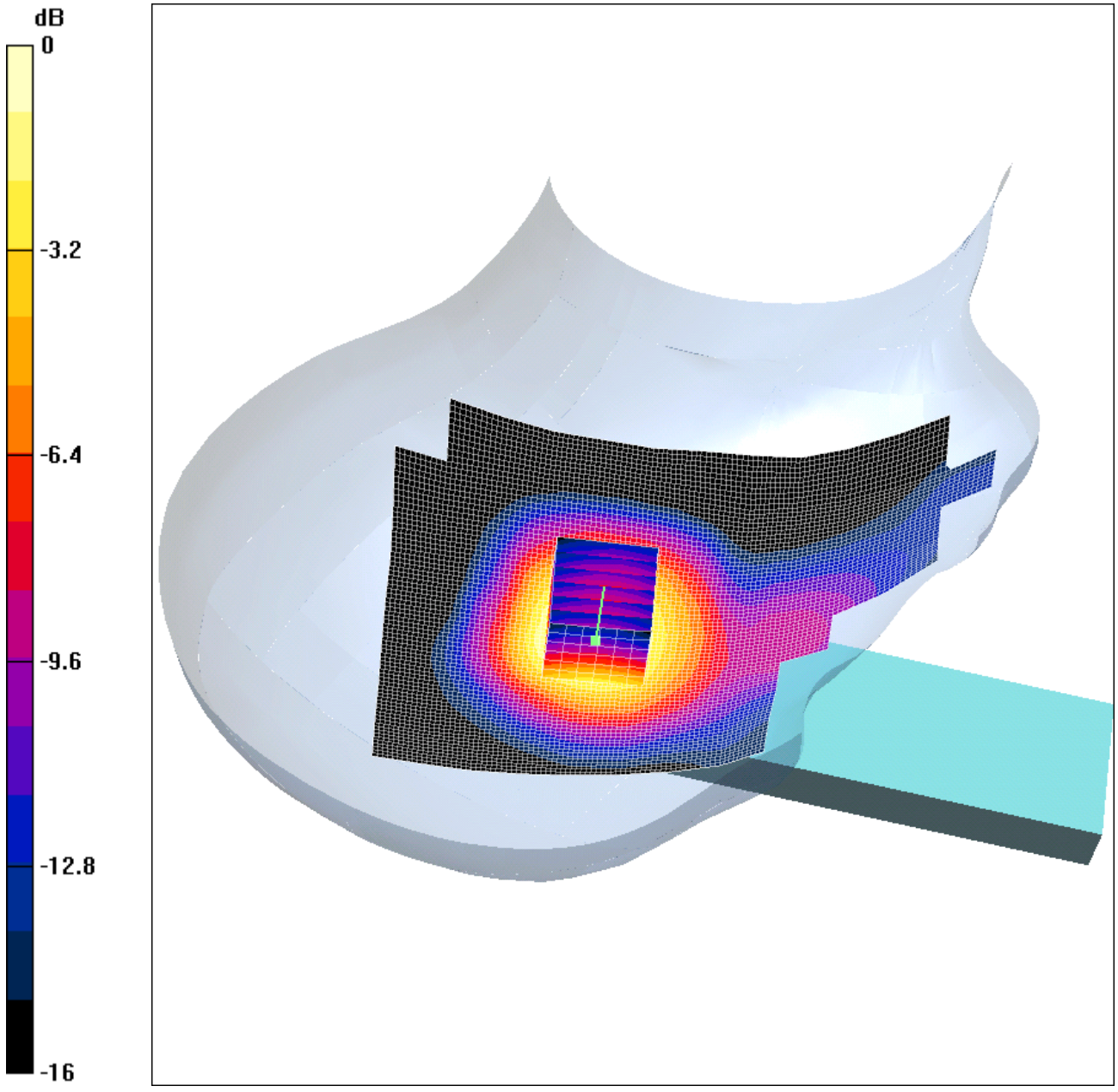
Date: 10/12/04

70944_05_004

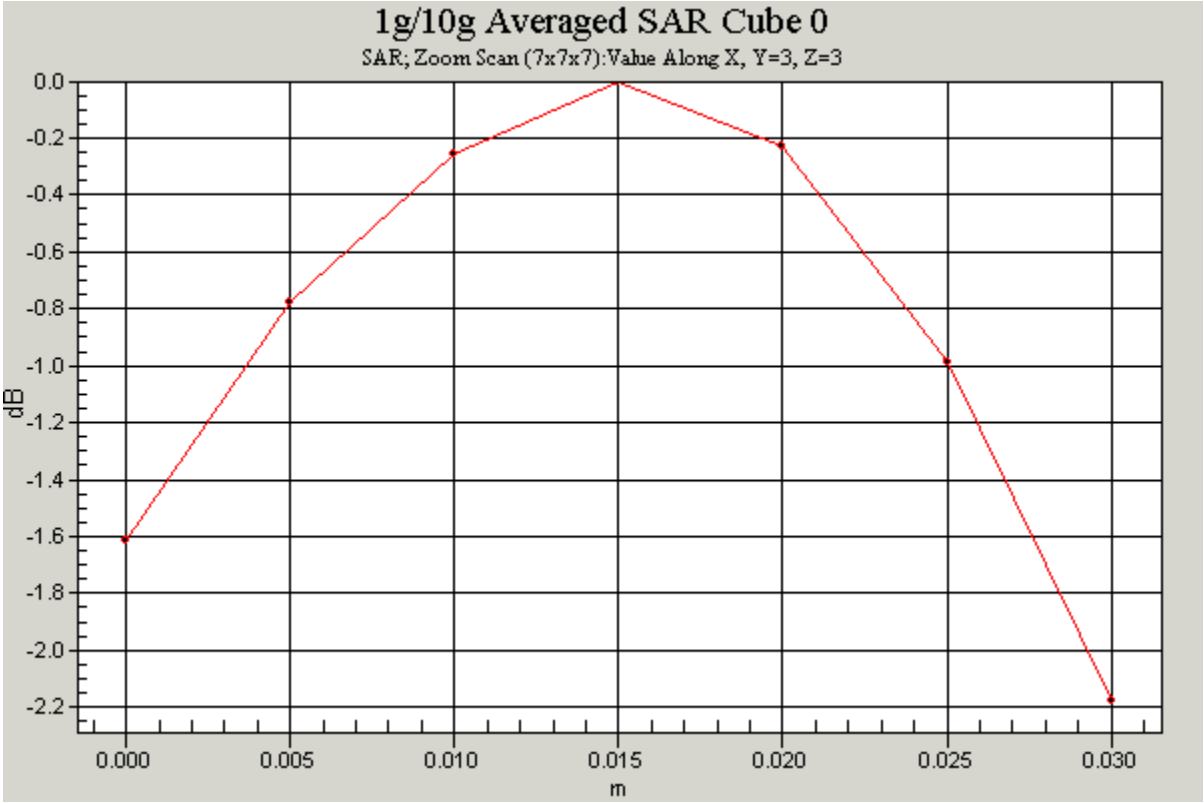
Test Laboratory: RFI GLOBAL SERVICES LTD.

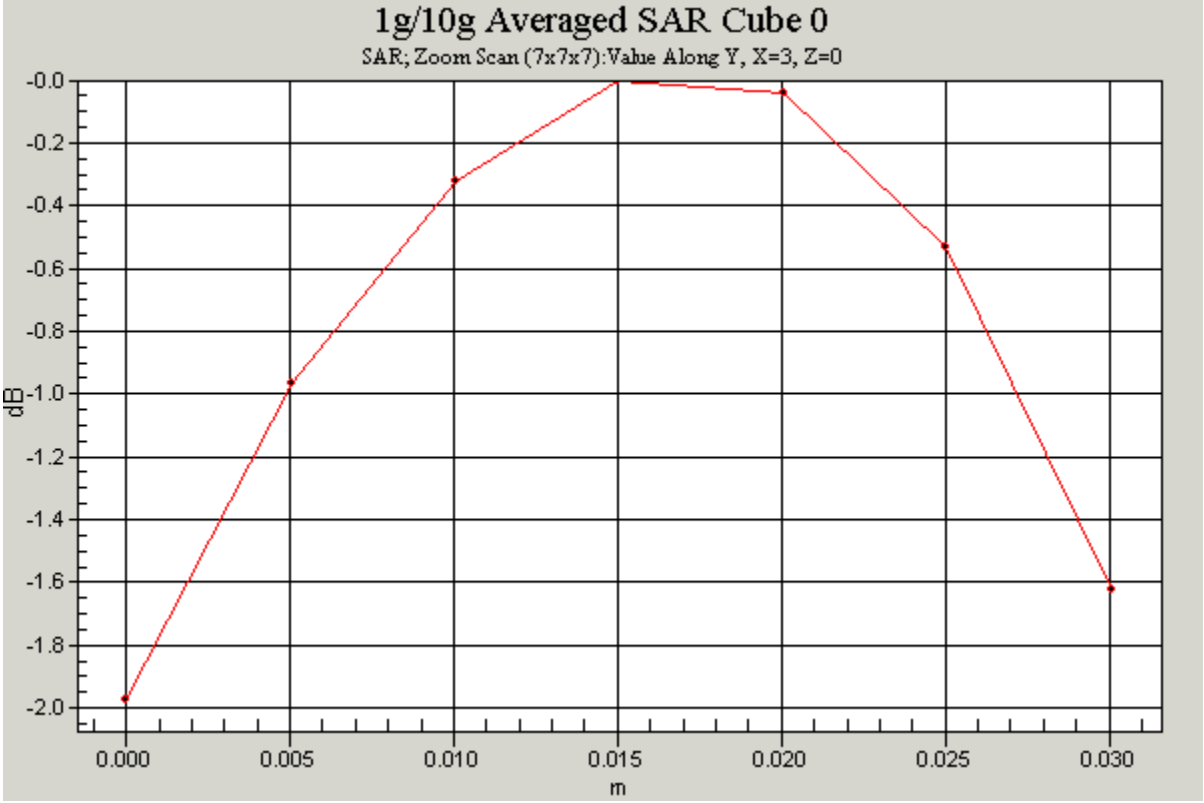
70944_JD05_004_Tilt_Right_660

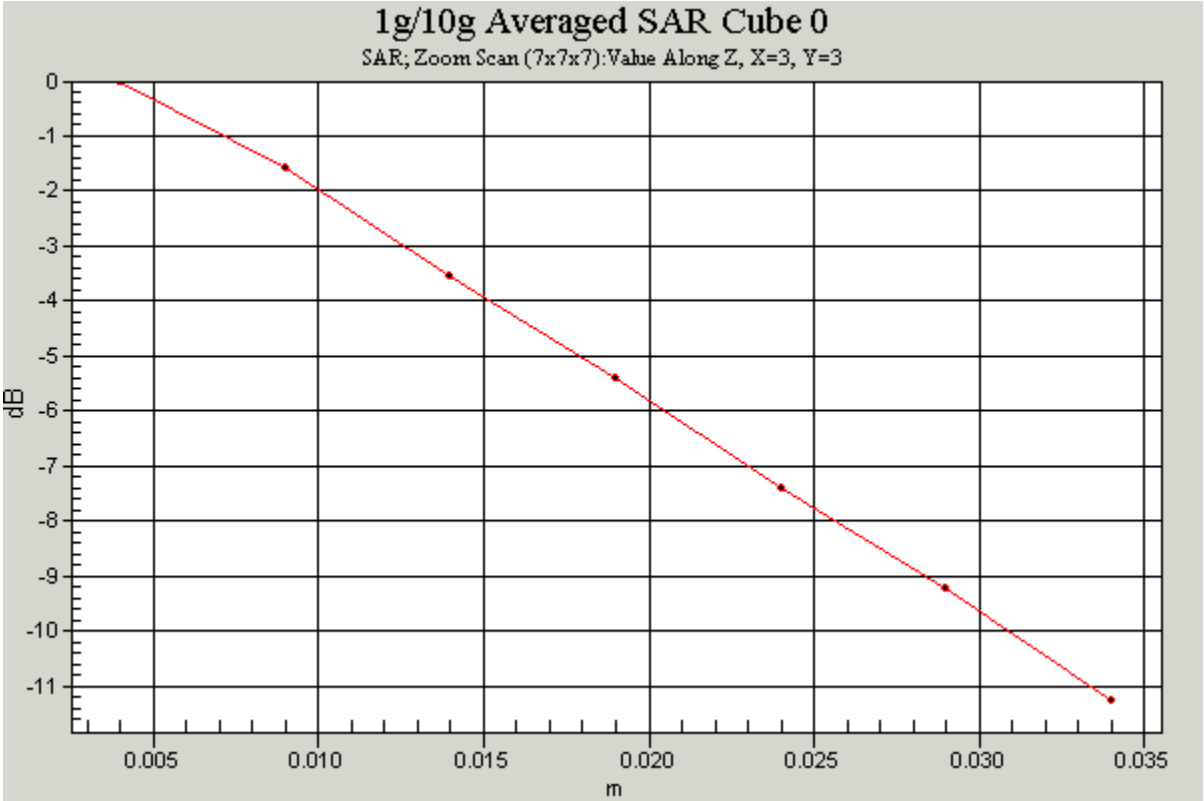
DUT: Panasonic; Type: X800; Serial: 004400000227163



0 dB = 0.426mW/g


1g/10g Averaged SAR Cube 0
SAR; Zoom Scan (7x7x7):Value Along X, Y=3, Z=3
dB
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
-1.4
-1.6
-1.8
-2.0
-2.2
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m


1g/10g Averaged SAR Cube 0
SAR; Zoom Scan (7x7x7):Value Along Y, X=3, Z=0
dB
-0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
-1.4
-1.6
-1.8
-2.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m



Communication System: DCS 1900; Frequency: 1879.8 MHz;Duty Cycle: 1:8.3
Medium: 1900 MHz HSL Medium parameters used (interpolated): f = 1879.8 MHz; σ = 1.44 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1529; ConvF(4.9, 4.9, 4.9); Calibrated: 10/06/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 16/06/2004
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1197
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

Tilt position with Memory Card - Middle/Area Scan (81x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.448 mW/g

Tilt position with Memory Card - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.8 V/m; Power Drift = -0.2 dB
Peak SAR (extrapolated) = 0.546 W/kg
SAR(1 g) = 0.390 mW/g; SAR(10 g) = 0.240 mW/g
Maximum value of SAR (measured) = 0.426 mW/g

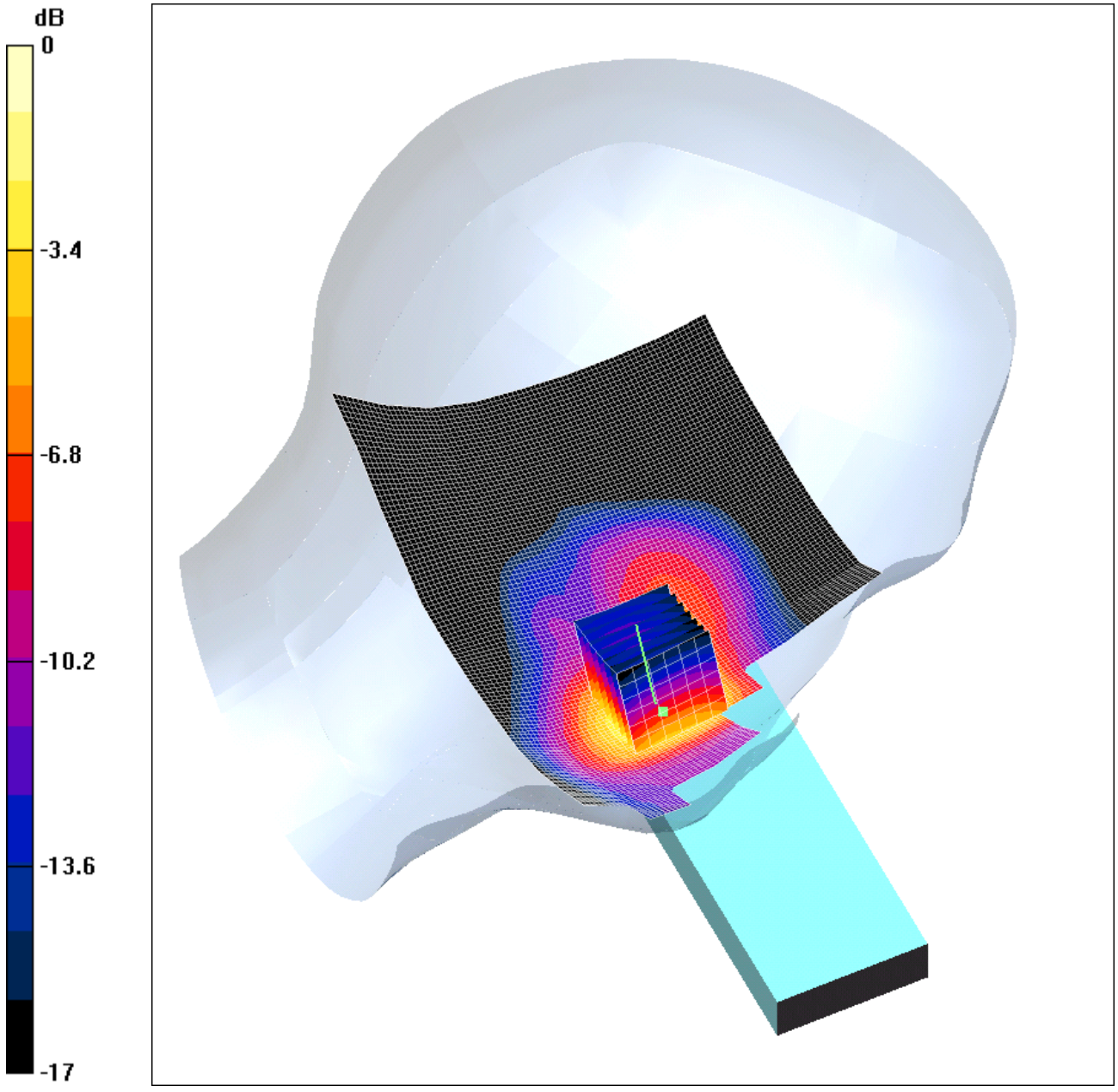
Date: 10/12/04

70944_05_005

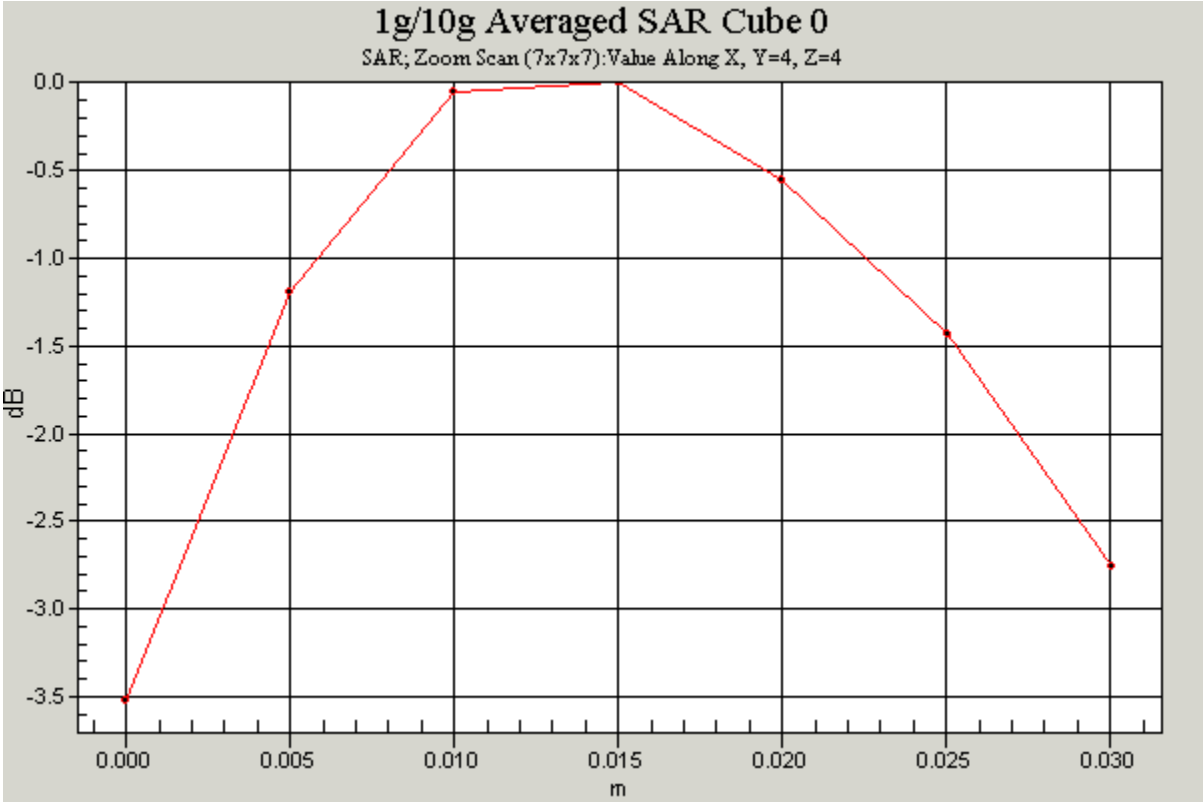
Test Laboratory: RFI GLOBAL SERVICES LTD.

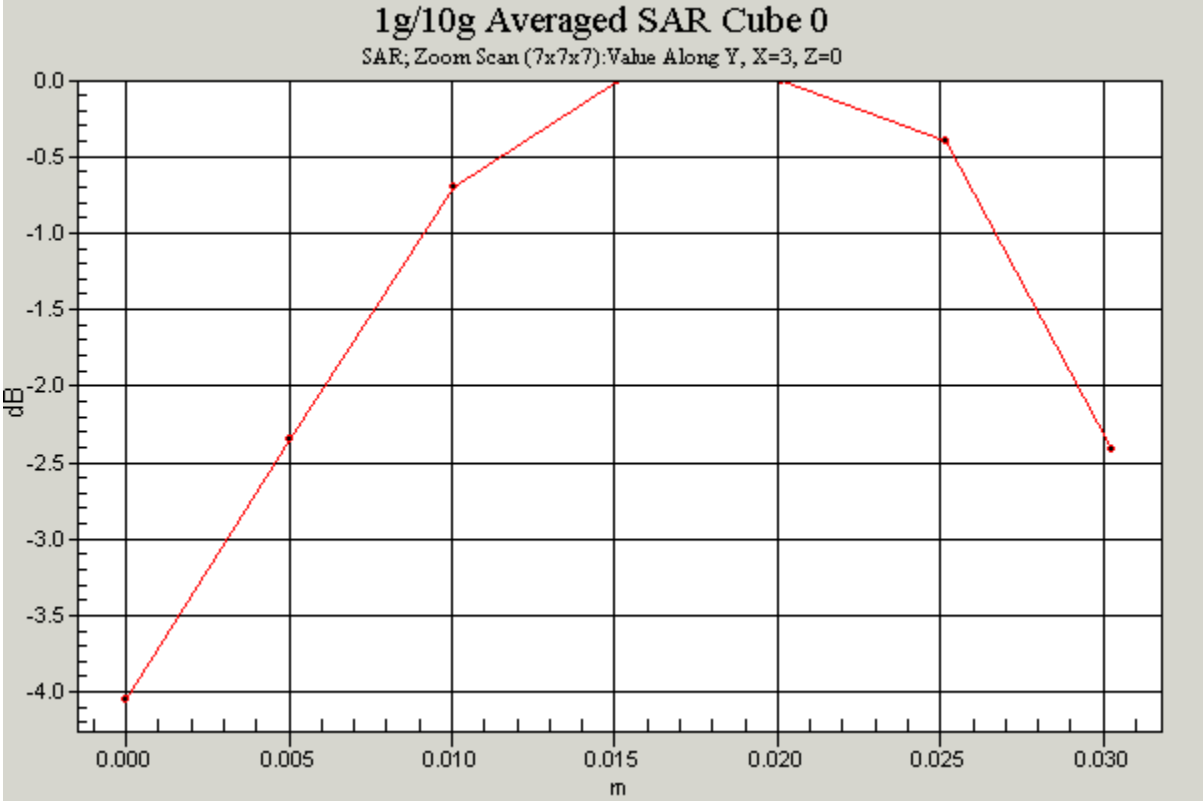
70944_JD05_005_Touch_Left_512

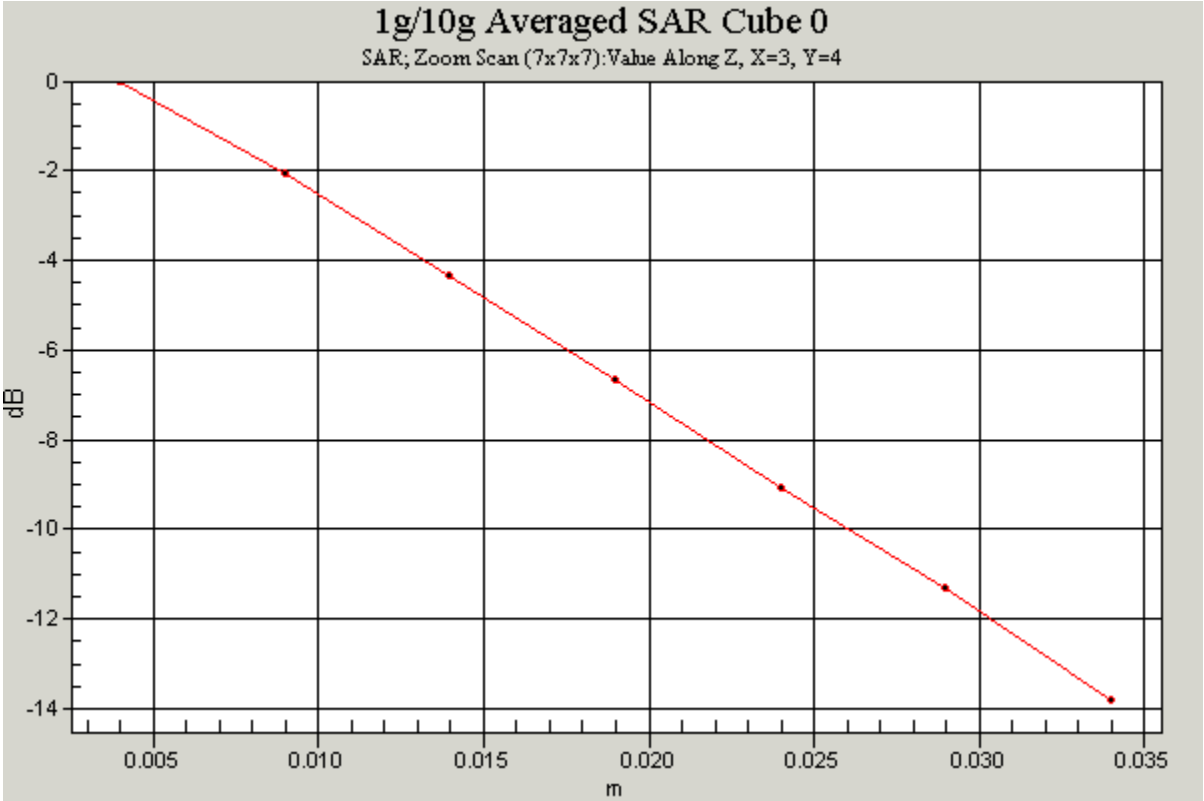
DUT: Panasonic; Type: X800; Serial: 004400000227163



0 dB = 0.891mW/g


1g/10g Averaged SAR Cube 0
SAR; Zoom Scan (7x7x7):Value Along X, Y=4, Z=4
dB
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m


1g/10g Averaged SAR Cube 0
SAR; Zoom Scan (7x7x7):Value Along Y, X=3, Z=0
dB
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
m



Communication System: DCS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: 1900 MHz HSL Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.41 mho/m; ε_r = 38.9; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1529; ConvF(4.9, 4.9, 4.9); Calibrated: 10/06/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn450; Calibrated: 16/06/2004
- Phantom: SAM 12b; Type: SAM 4.0; Serial: TP:1197
- Measurement SW: DASY4, V4.4 Build 3; Postprocessing SW: SEMCAD, V1.8 Build 130

Touch position with Memory Card - Middle/Area Scan (81x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.874 mW/g

Touch position with Memory Card - Middle/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.87 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 0.825 mW/g; SAR(10 g) = 0.454 mW/g
Maximum value of SAR (measured) = 0.891 mW/g