EMC Technologies Pty Ltd
A.C.N. 057 105 549
57 Assembly Drive
Tullamarine Victoria Australia 3043

Ph: + 613 9335 3333
Fax: + 613 9338 9260
email: melb@emctech.com.au

SAR Test Report

Report Number: M030531

Test Sample:	Portable Tablet Computer Wireless LAN
Model Number:	WLL3010-ALBION2
Tested For:	Fujitsu Australia Pty Ltd
FCC ID:	QK3-WL0006
IC:	337H-WL0006
Date of Issue:	30th May 2003

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Portable Tablet Computer Wireless LAN
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IC: 337H-WL0006

1.0 GENERAL INFORMATION

Test Sample:	Portable Tablet Computer Wireless LAN
Model Name:	Broadcom
Interface Type:	Mini-PCI Module
Device Category:	Portable Transmitter
Test Device:	Production Unit
Model Number:	WLL3010-ALBION2
FCC ID:	QK3-WL0006
IC:	337H-WL0006
RF exposure Category:	General Population/Uncontrolled
Manufacturer:	Askey Computer Corp
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 Fujitsu Australia Pty Ltd Portable Tablet Computer Wireless LAN model WLL3010-ALBION2 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 Date:	24th May 2003
Tested for:	Fujitsu Australia Pty Ltd
Address:	5 Lakeside Drive, Burwood East, Vic. 3151
Contact:	Praveen Rao
Test Officer:	Aaron Sargent **Aaron Sargent B.Eng**
Authorised Signature:	C. Zombolas **Chris Zombolas** **Technical Director,** **EMC Technologies Pty Ltd**

SAR EVALUATION
Portable Tablet Computer Wireless LAN
Model: WLL3010-ALBION2
Report Number: M030531

2.0 DESCRIPTION OF DEVICE

2.1 Description of Test Sample

The EUT is a Fujitsu LifeBook incorporating a Mini-PCI wireless LAN (WLAN) module (Broadcom WLL3010-ALBION2). The Broadcom module is an OEM product. The Mini-PCI wireless LAN (WLAN) module was tested in the dedicated host, a LifeBook ST Series "Albion2".

2.1.1 Summary of EUT Details

Operating Mode during Testing	: Crest Factor - OFDM = 3.76 - DSSS = 2.20
Operating Mode production sample	: Crest Factor - OFDM = 3.76 - DSSS = 2.20
Modulation Scheme	: Orthogonal Frequency Division Multiplexing (OFDM) : Direct Sequence Spread Spectrum (DSSS)
Device Power Rating for test sample and identical production unit	: 10.25 dBm (10.59 mW) for OFDM Modulation AVR : 12.60 dBm (18.20 mW) for DSSS Modulation AVR : Peak Power for both modes is 16 dBm
Device Dimensions (LxWxH)	: 301.3 x 220 x 22.3 cm
Spacing between WLAN and Laptop outside surface	: 3mm
Spacing between WLAN Antenna and Laptop outside surface.	:5mm
Antenna type	: Monopole
Applicable Head Configurations	: None
Applicable Body Worn-Configurations	: Lap Top with 0mm phantom spacing, Lap Top with 5mm phantom spacing
Battery Options	: Lithium Ion 10.8V 4000mAh Battery 1 S/N: Wo2B-G51B Battery 2 S/N: Wo2B-G37B

2.1.2 EUT Host Details

Test Sample:	LifeBook ST Series
Models:	ST4110, ST4110P, ST4120, ST4120P, ST4121, ST4121P
Codename:	Albion2
CPU Speed:	Pentium3-933ULV
Manufacturer:	Fujitsu Ltd.
LAN:	Rialtek Onboard 10/100MB
Tablet Dock Kit:	FPCPR33AP

2.2 Test sample Accessories

2.2.1 Battery Types

A Fujitsu FPCBP63 Lithium Ion Battery is used to power the Portable Tablet Computer Wireless LAN Model: WLL3010-ALBION2. The maximum rated power is 12.60 mW using the DSSS Modulation. SAR measurements were performed with a standard 10.8V Fujitsu battery.

2.3 Test Signal, Frequency and Output Power

The Portable Tablet Computer Wireless LAN had a total of 11 channels (USA model) within the 2412 to 2462 MHz frequency band. The frequency range is 2412 MHz to 2462 MHz. For the SAR measurements the device was operating in continuous mode. The fixed frequency channels used in the testing are shown in Table 1. The frequency span of the 2450 MHz Band was more than 10MHz consequently; the SAR levels of the test sample were measured for the centre channel in OFDM mode and lowest, centre and highest channels in DSSS mode. There were no wires or other connections to the Portable Tablet Computer during the SAR measurements.

On completion of the SAR tests, conducted power of the device was measured after temporary modification of antenna connector inside the device's TX RX compartment. Measurements were conducted with a calibrated Power Meter. The results of this measurement are listed in table 1.

Table 1: Frequency and Output Power

Channel	Channel Frequency MHz	Battery Type	Maximum Conducted Output Power Measured
OFDM Channel 06	2437	FPCBP63 Lithium Ion	10.25 dBm (10.59mW)
DSSS Channel 06	2437	FPCBP63 Lithium Ion	12.60 dBm (18.20mW)
DSSS Channel 01	2412	FPCBP63 Lithium Ion	N/A
DSSS Channel 11	2462	FPCBP63 Lithium Ion	N/A

2.4 Battery Status

The device battery was fully charged prior to commencement of measurement. Each SAR test was completed within 30 minutes. The battery condition was monitored by measuring the RF field at a defined position inside the phantom before the commencement of each test and again after the completion of the test. It was not possible to perform conducted power measurements at the output of the device, at the beginning and end of each scan due to lack of a suitable antenna port. The uncertainty associated with the power drift was less than 12% and was factored into the final SAR results.

2.5 Details of Test Laboratory

2.5.1 Location

EMC Technologies Pty Ltd - ACN/ABN: 82057105549
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

2.5.2 Accreditations

EMC Technologies Pty. Ltd. is accredited by the National Association of Testing Authorities, Australia (NATA). **NATA Accredited Laboratory Number: 5292**

EMC Technologies Pty Ltd is NATA accredited for the following standards:

AS/NZS 2772.1:	RF and microwave radiation hazard measurement
ACA:	Electromagnetic Radiation Human Exposure Standard
CENELEC:	ES59005

The scope of the NATA accreditation does not cover the SAR measurements in this report.

Refer to NATA website www.nata.asn.au for the full scope of accreditation.

2.5.3 Environmental Factors

The measurements were performed in a shielded room with no background network signals. The temperature in the laboratory was controlled to within 20.5±1.5 °C, the humidity was 35%. The liquid parameters are measured daily prior to the commencement of each test. Tests were performed to check that reflections within the environment did not influence the SAR measurements. The noise floor of the DASY4 SAR measurement system using the SN1380 probe is less than 5μV in both air and liquid mediums.

3.0 DESCRIPTION OF SAR MEASUREMENT SYSTEM

3.1 Probe Positioning System

The measurements were performed with the state of the art automated near-field scanning system **DASY4 V4.1 Build 33** 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: 1380 (manufactured by SPEAG) designed in the classical triangular configuration and optimised for dosimetric evaluation. The probe has been calibrated and found to be accurate to better than ±0.25 dB. The probe is suitable for measurements close to material discontinuity at the surface of the phantom. The sensors of the probe are directly loaded with Schottky diodes and connected via highly resistive lines (length = 300 mm) to the data acquisition unit.

3.3 Data Acquisition Electronics

The data acquisition electronics (DAE3) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. The input impedance of the DAE3 box is 200 MΩ; the inputs are symmetrical and floating. Common mode rejection is above 80dB.Transmission to the PC-card is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The mechanical probe-mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

3.4 Calibration and Validation Procedures and Data

Prior to the SAR assessment, the system validation kit was used to verify that the DASY4 was operating within its specifications. The validation was performed at 2450 MHz with the SPEAG 2450V2 calibrated dipole.

The validation dipoles are highly symmetric and matched at the centre frequency for the specified liquid and distance to the phantom. The accurate distance between the liquid surface and the dipole centre is achieved with a distance holder that snaps onto the dipole.

System validation is performed by feeding a known power level into a reference dipole, set at a know distance from the phantom. The measured SAR is compared to the theoretically derived level.

3.4.1 Validation Results @ 2450MHz

The following table lists the dielectric properties of the tissue simulating liquid measured prior to SAR validation. The results of the validation are listed in columns 4 and 5. The forward power into the reference dipole for SAR validation was adjusted to 101 mW.

Table 2: Validation Results (Dipole: SPEAG D450V2 SN: 1009)

1. Validation Date	2. ϵr (measured)	3. σ (mho/m) (measured)	4. Measured SAR 1g (mW/g)	5. Measured SAR 10g (mW/g)
24 May 2003	37.9	1.84	5.68	2.65

3.4.2 Deviation from reference validation values

The reference SAR values are derived using a reference dipole and flat section of the SAM phantom suitable for a centre frequency of 2450MHz. These reference SAR values are obtained from the IEEE Std 1528-200X 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 (D2450V2) during calibration. The measured one-gram SAR should be within 10% of the expected target reference values shown in table 3 below.

Table 3: Deviation from reference validation values

Frequency and Date	Measured SAR 1g (mW/g)	Measured SAR 1g (Normalized to 1W)	SPEAG Calibration reference SAR Value 1g (mW/g)	Deviation From SPEAG Reference (1g)	IEEE Std 1528 reference SAR value 1g (mW/g)	Deviation From IEEE (1g)
24th May 2003	5.68	56.8	55.6	2.16%	52.4	8.34%

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 0.2cm. The following photo shows the depth of the liquid in the SAM phantom maintained during the testing.

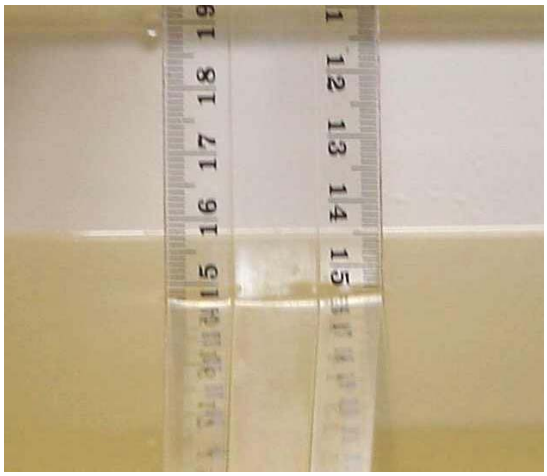


Photo of liquid Depth in Flat Phantom

3.5 Phantom Properties (Size, Shape, Shell Thickness)

The phantom used during the validations was the SAM Phantom model: TP - 1060 from SPEAG. It is a phantom with a single thickness of 2 mm and was filled with the required tissue simulating liquid. The SAM 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 a Flat phantom PL870 was used. The phantom thickness is 2.0mm+/-0.2 mm and the phantom was filled with the required tissue simulating liquid. Table 4 provides a summary of the measured phantom properties. *Refer to Appendix C Part 4, for details of PL870 phantom thickness tolerance, corresponding dielectric properties, and loss tangent*.

Table 4: Phantom Properties (300MHz-2500MHz)

Phantom Properties	Required	Measured
Thickness of flat section	2.0mm ± 0.2mm (bottom section)	2.08 – 2.20mm
Dielectric Constant	<5.0	4.603 @ 300MHz (worst-case frequency)
Loss Tangent	<0.05	0.0379 @ 2500MHz (worst-case frequency)

Depth of Phantom	200mm
Length of Flat Section	870mm
Width of Flat Section	320mm

Photo 1: Flat phantom PL870 (2 mm)

Photo 2: Flat phantom PL870 (2 mm)

3.6 Tissue Material Properties

The dielectric parameters of the brain 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 5: Measured Brain Simulating Liquid Dielectric Values

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
2450 MHz Brain	37.9	39.8 ±5% (37.8 to 41.8)	1.84	1.88 ±5% (1.79 to 1.97)	1000

Table 6: Measured Body Simulating Liquid Dielectric Values

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
2412 MHz Muscle	51.9	52.7 ±5% (50.1 to 55.3)	1.95	1.95 ±5% (1.85 to 2.05)	1000
2437 MHz Muscle	51.7	52.7 ±5% (50.1 to 55.3)	2.02	1.95 ±5% (1.85 to 2.05)	1000
2462 MHz Muscle	51.6	52.7 ±5% (50.1 to 55.3)	2.05	1.95 ±5% (1.85 to 2.05)	1000

NOTE: The brain and muscle liquid parameters were within the required tolerances of ±5%.

3.6.1 Liquid Temperature and Humidity

The humidity and dielectric/ambient temperatures were 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 7: Temperature and Humidity recorded for each day

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
24th May 2003	21.8	21.5	35

3.7 Simulated Tissue Composition Used for SAR Test

The tissue simulating liquids are created prior to the SAR evaluation and often require slight modification each day to obtain the correct dielectric parameters.

Table 8: Tissue Type: Brain @ 2450MHz
Volume of Liquid: 30 Litres

Approximate Composition	% By Weight
Distilled Water	62.7
Salt	0.5
Triton X-100	36.8

Table 9: Tissue Type: Muscle @ 2450MHz
Volume of Liquid: 60 Litres

Approximate Composition	% By Weight
Distilled Water	73.2
Salt	0.04
DGBE	26.7

*Refer "OET Bulletin 65 97/01 P38"

3.8 Device Holder for DASY4

The DASY4 device holder supplied by SPEAG is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The rotation centres for both scales is the ear opening. Thus the device needs no repositioning when changing the angles.

The DASY4 device holder is made of low-loss material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, to reduce the influence on the clamp on the test results.

A foam spacer is used to raise the device above the clamp of the device holder to minimise any affect on the radiation characteristics of the device. In cases where foam is not used the device is mounted so that the antenna is unobstructed.

Refer to Appendix A2 for photograph of device positioning.

4.0 SAR MEASUREMENT PROCEDURE USING DASY4

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

a) A measurement of the 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, 3 minutes after the start (to make sure that the power drift is not higher than 5%) 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 110mm x 110mm surrounding the test device. Based on this data, the area of the maximum absorption is determined by Spline interpolation. The first scan covered an area of 240 mm x 320 mm to ensure that only the section of interest (transmitter and antenna) was emitting RF (Plot No. 1 in Appendix B).

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 to evaluate the actual power drift.

5.0 MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528-200X 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 10: Uncertainty Budget for DASY4 Version V4.1 Build 33 – 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) (numerical calibration)	E.2.1	4.4	N	1	1	1	4.4	4.4	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	0	R	1.73	0.707	0.707	0.0	0.0	∞
Boundary Effect	E.2.3	0.4	R	1.73	1	1	0.2	0.2	∞
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	3.9	R	1.73	1	1	2.3	2.3	∞
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	3.1	N	1	1	1	3.1	3.1	7
Output Power Variation – SAR Drift Measurement	6.6.2	12	R	1.73	1	1	6.9	6.9	∞
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	±26.32	

Estimated total measurement uncertainty for the DASY4 measurement system was ±14.2%. 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 11: 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 ±10.0%. The extended uncertainty (K = 2) was assessed to be ±20.0% based on 95% confidence level. The uncertainty is not added to the Validation measurement result.

6.0 EQUIPMENT LIST AND CALIBRATION DETAILS

Table 12: 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	PL870	011	Not Applicable	Yes
Flat Phantom	SPEAG	PO1A V4.4e 6mm	1003	Not Applicable	No
Data Acquisition Electronics	SPEAG	DAE3 V1	359	27-Aug-2003	No
Data Acquisition Electronics	SPEAG	DAE3 V1	442	Oct – 03	Yes
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	No
Probe E-Field	SPEAG	ETDV6	1380	9-Nov-2003	Yes
Probe E-Field	SPEAG	ET3DV6	1377	6–Sept-03	No
Antenna Dipole 450 MHz	SPEAG	D450V2	1009	24-Jan-05	No
Antenna Dipole 900 MHz	SPEAG	D900V2	047	27-Aug-2004	No
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	28-Aug-2004	No
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	9-Nov-2004	Yes
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	23-May-03	No
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	23-May-03	No
RF Power Meter Dual	Gigatronics	8542B	1830125	10-Sept-03	Yes
RF Power Sensor	Gigatronics	80301A	1828805	10-Sept-03	Yes
Network Analyser	Hewlett Packard	8714B	GB3510035	10-Sept-03	Yes
Dual Directional Coupler	NARDA	3022	75453	In test	Yes
Spectrum Analyser 9 kHz - 22 GHz	Hewlett Packard	8593EM	3412A00105	23-May-03	Yes

7.0 OET BULLETIN 65 – SUPPLEMENT C TEST METHOD

7.1 Description of the Test Positions (Lap Top)

SAR measurements were performed in the "Lap Top" position and measured in the flat section of the Flat phantom (PL870). See Appendix A for photos of test positions.

7.1.1 "Lap Top no Spacer" Position

The device was tested in the 2.00 mm flat section of the Flat phantom PL870 for the "Lap Top" position. The Transceiver was placed at the bottom of the phantom and suspended in such way that it's back was touching the phantom. This device orientation simulates the tablet's normal use – being held on the lap of the user. A spacing of 0mm ensures that the SAR results are conservative and represent a worst-case position.

7.1.2 "Lap Top with 5mm Spacer" Position

The SAR evaluation was performed in the flat section of the Flat phantom PL870. The device was placed 5 mm from the phantom, this position is equivalent to the device placed on thick cloth of the users dress covering the laps.

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

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

7.3 FCC RF Exposure Limits for Occupational/ Controlled Exposure

Spatial Peak SAR Limits For:	
Partial-Body:	8.0 mW/g (averaged over any 1g cube of tissue)
Hands, Wrists, Feet and Ankles:	20.0 mW/g (averaged over 10g cube of tissue)

7.4 FCC RF Exposure Limits for Un-controlled/Non–occupational

Spatial Peak SAR Limits For:	
Partial-Body:	1.6 mW/g (averaged over any 1g cube of tissue)
Hands, Wrists, Feet and Ankles:	4.0 mW/g (averaged over 10g cube of tissue)

8.0 SAR MEASUREMENT RESULTS

The SAR values averaged over 1 g and 10 g tissue masses were determined for the sample device for the Lap Top with 0mm spacer and Lap Top with 5 mm Spacer.

Table 13: SAR MEASUREMENT RESULTS– Lap Top Positions

1. Test Position	2. Plot No.	3. Test Channel	4. Test Freq (MHz)	5. Measured 1g SAR Results (mW/g)	6. Measured Drift (dB)
Lap Top OFDM	1	06	2437	0.467	0.10
Lap Top DSSS	2	01	2412	1.05	-0.30
Lap Top DSSS	3	06	2437	0.516	0.06
Lap Top DSSS	4	11	2462	0.511	0.20
Lap Top DSSS with 5 mm Spacer	5	01	2412	0.23	-0.50

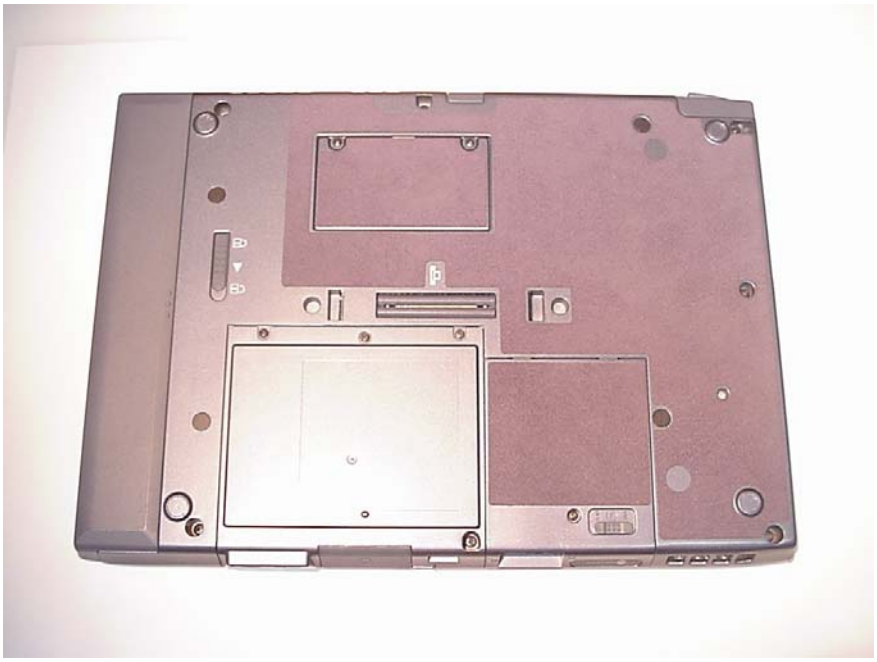
9.0 COMPLIANCE STATEMENT

The Model WLL3010-ALBION2 FCC ID: QK3-WL0006, IC:337H-WL0006 band Portable Tablet Computer Wireless LAN was found to comply with the FCC and RSS-102 SAR requirements.

The highest SAR level recorded was 1.05 mW/g for a 1g cube. This value was measured on channel 01 in the “Lap Top” position in DSSS modulation mode. This was below the limit of 1.6 mW/g for uncontrolled exposure, even taking into account the measurement uncertainty of 28.4%.

APPENDIX A1
TEST SAMPLE PHOTOGRAPHS

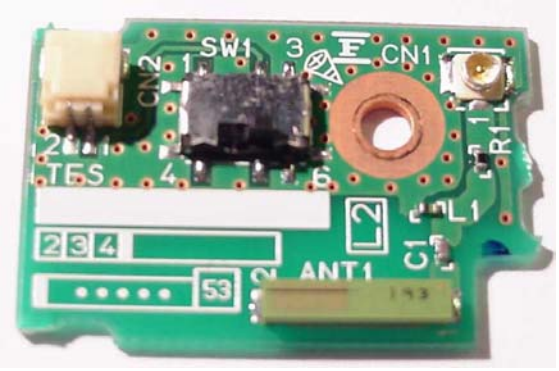
Model: WLL3010-ALBION2 External Front View



Model: WLL3010-ALBION2 External - Rear View

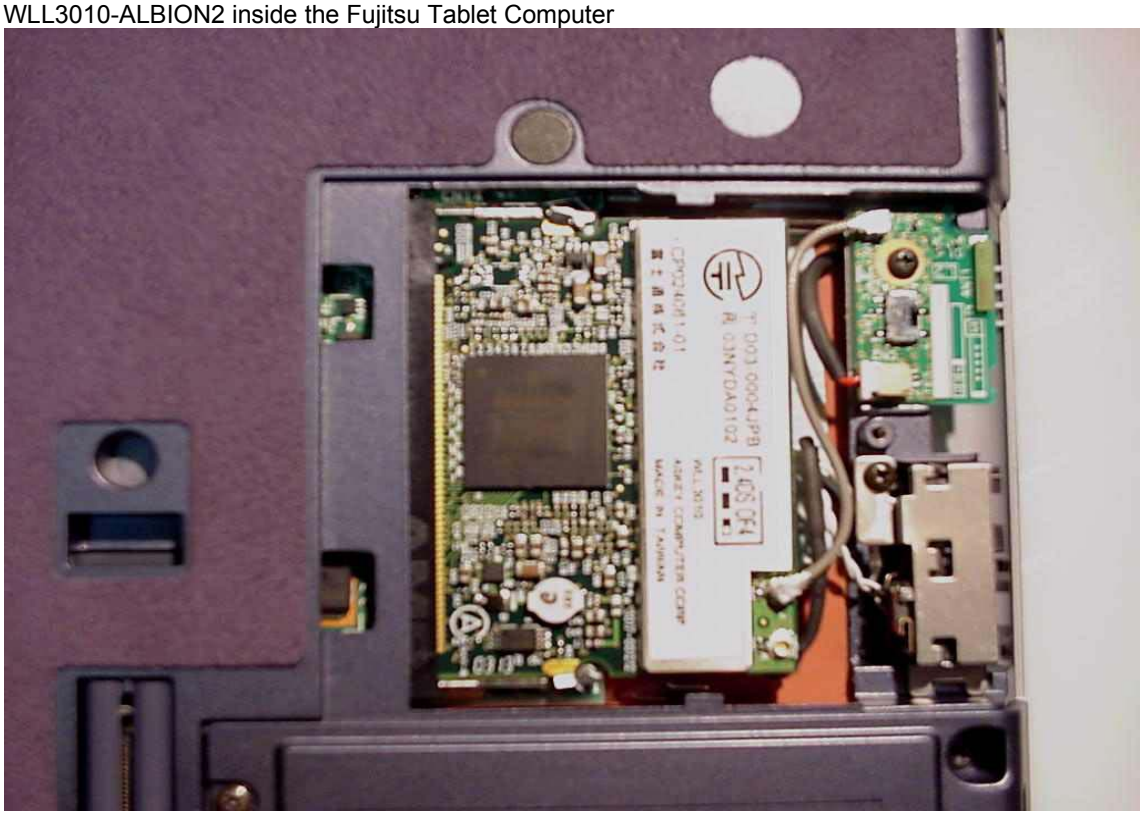
Model: WLL3010-ALBION2 Front

Antenna Board



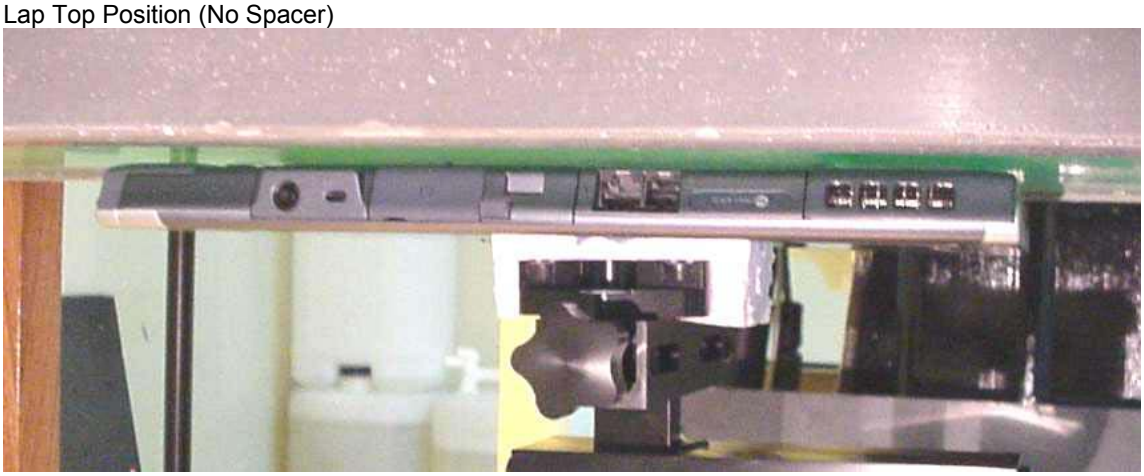
FPCBP63 Battery

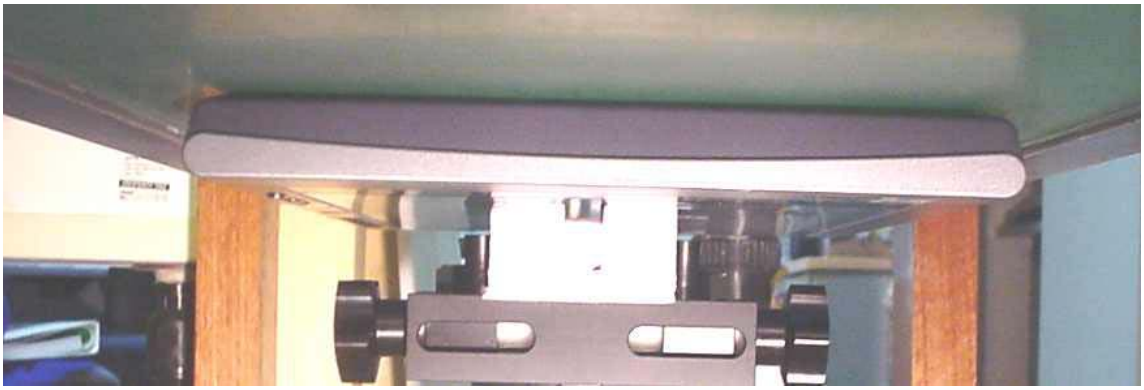
WLL3010-ALBION2 inside the Fujitsu Tablet Computer



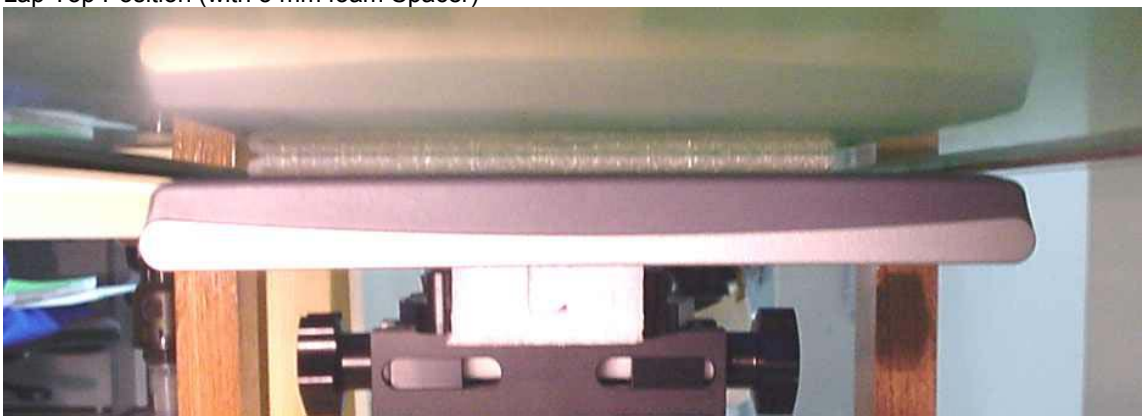
APPENDIX A2
TEST SETUP PHOTOGRAPHS

Lap Top Position (No Spacer)





Lap Top Position (with 5 mm foam Spacer)



NOTE: The distance between the edge of the phantom and the edge of the device is 60 mm – more than required 50% (32 mm) of the device (Transmitter Compartment) width, which is 64 mm.

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: 2450 MHz Band SAR Measurement Plot Numbers

Refer to table 13 for a numbered list of the SAR plots.

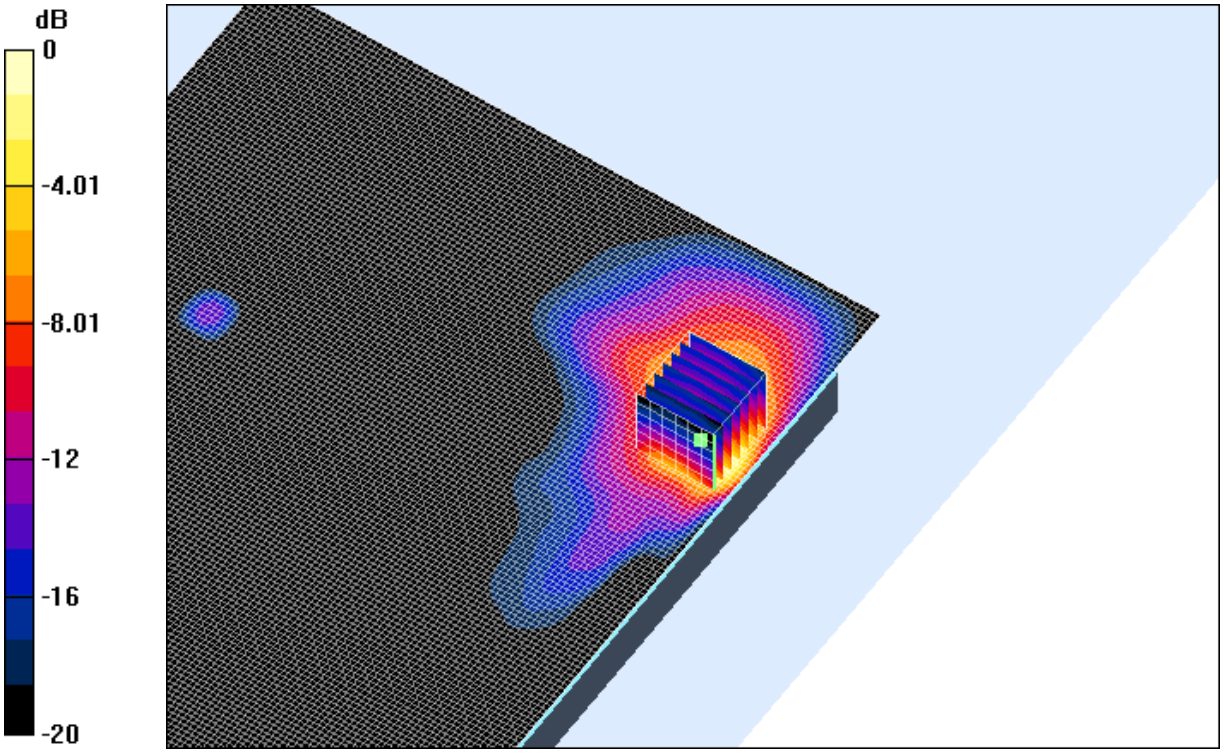
Table 17: 2450MHz Validation Plot

Test Laboratory: EMC Technologies Pty Ltd
File Name: M030531- Fujitsu - Lap Top OFDM - 24-05-03.da4

DUT: Fujitsu Tablet; Type: FMV Stylistic;
Program: LapTop Position

Communication System: OFDM 2450 MHz; Frequency: 2437 MHz; Duty Cycle: 1:3.76
Medium: Body 2450 MHz; (σ = 2.0166 mho/m, ε_r = 51.6821, ρ = 1000 kg/m^3)
Phantom section: Flat 2.2 Section

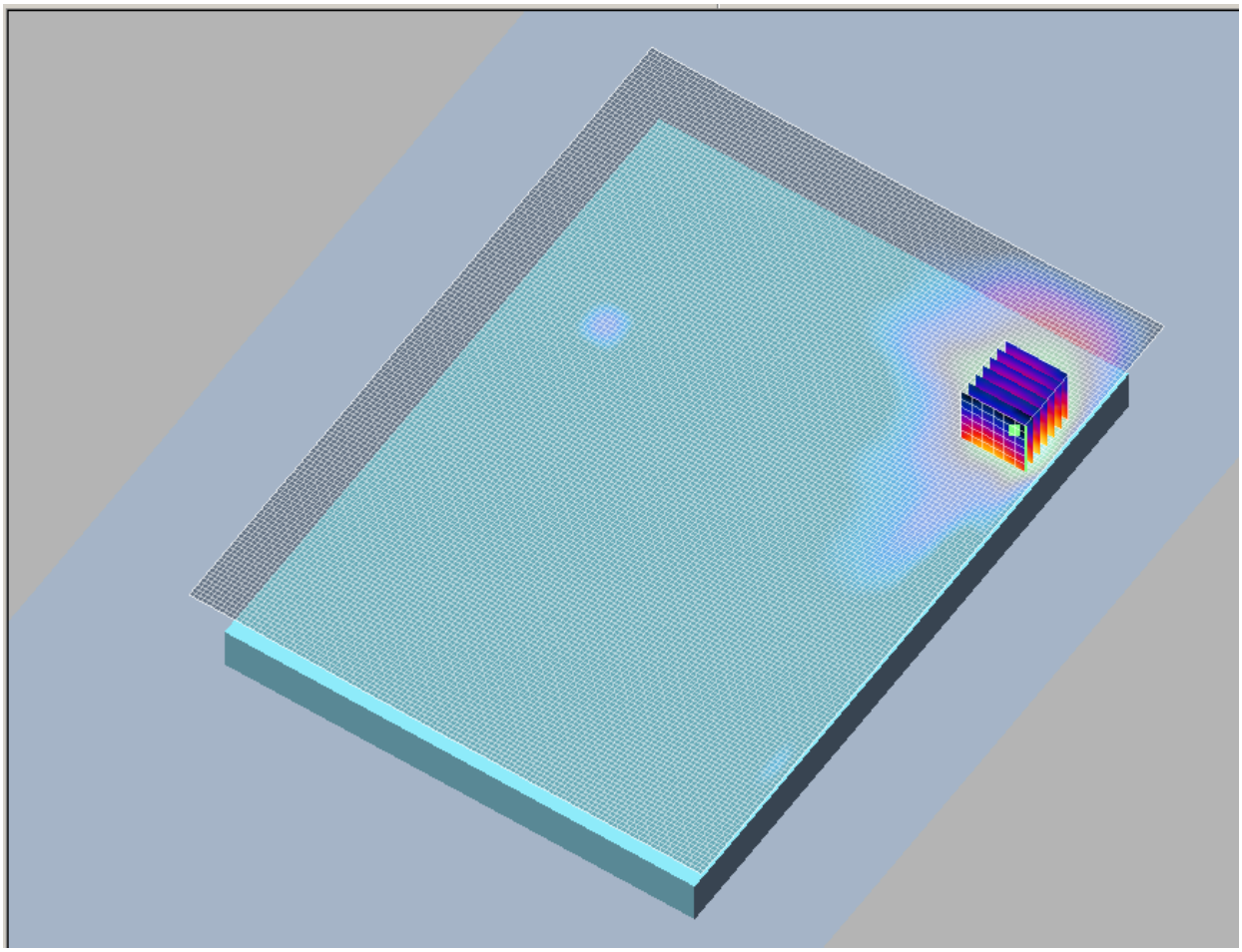
Dasy Configuration:
-Probe: ET3DV6 - SN1380; ConvF(4.5, 4.5, 4.5); Calibrated: 9/11/2002
-Sensor-Surface: 10mm (Mechanical Surface Detection)
-Electronics: DAE3 Sn442; Calibrated: 23/10/2002
-Phantom: Flat Phantom PL870; Serial: P 9.1
-Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 109
Channel 06 Test/Area Scan (161x121x1): Measurement grid: dx=20mm, dy=20mm
Channel 06 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.573 V/m
Peak SAR = 1.47 W/kg
SAR(1 g) = 0.467 mW/g; SAR(10 g) = 0.217 mW/g
Power Drift = 0.1 dB



SAR MEASUREMENT PLOT 1

Ambient Temperature	**21.8 °C**
Liquid Temperature	**21.5 °C**
Humidity	**35 %**

Extended View of the Plot 1

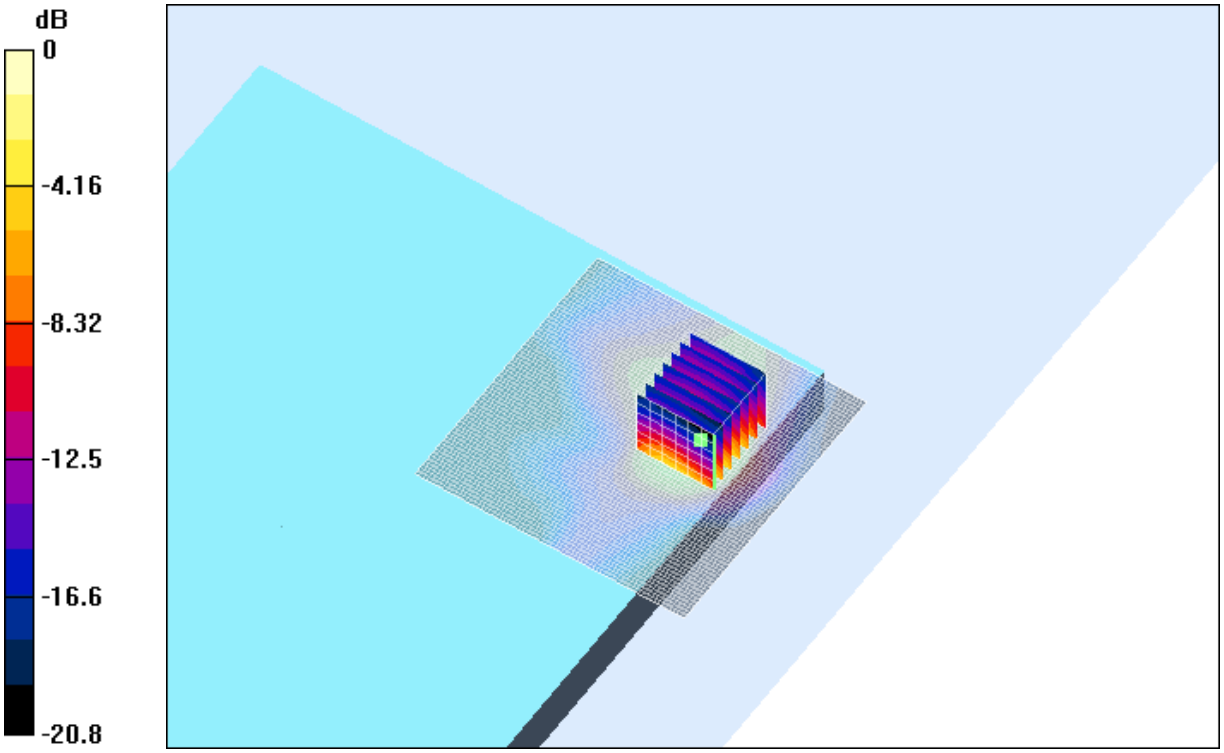


Test Date: 24th May 2003
Test Laboratory: EMC Technologies Pty Ltd
File Name: M030531- Fujitsu - Lap Top DSSS - 24-05-03C.da4

DUT: Fujitsu Tablet; Type: FMV Stylistic;
Program: LapTop Position

Communication System: DSSS 2450 MHz; Frequency: 2412 MHz; Duty Cycle: 1:2.2
Medium: Body 2450 MHz; (σ = 1.97593 mho/m, ε_r = 51.8338, ρ = 1000 kg/m^3)
Phantom section: Flat 2.2 Section

Dasy Configuration:
-Probe: ET3DV6 - SN1380; ConvF(4.5, 4.5, 4.5); Calibrated: 9/11/2002
-Sensor-Surface: 10mm (Mechanical Surface Detection)
-Electronics: DAE3 Sn442; Calibrated: 23/10/2002
-Phantom: Flat Phantom PL870; Serial: P 9.1
-Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 109
Channel 01 Test 2/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Channel 01 Test 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.583 V/m
Peak SAR = 12.3 W/kg
SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.37 mW/g
Power Drift = -0.3 dB



SAR MEASUREMENT PLOT 2

Ambient Temperature	**21.8 °C**
Liquid Temperature	**21.5 °C**
Humidity	**35 %**

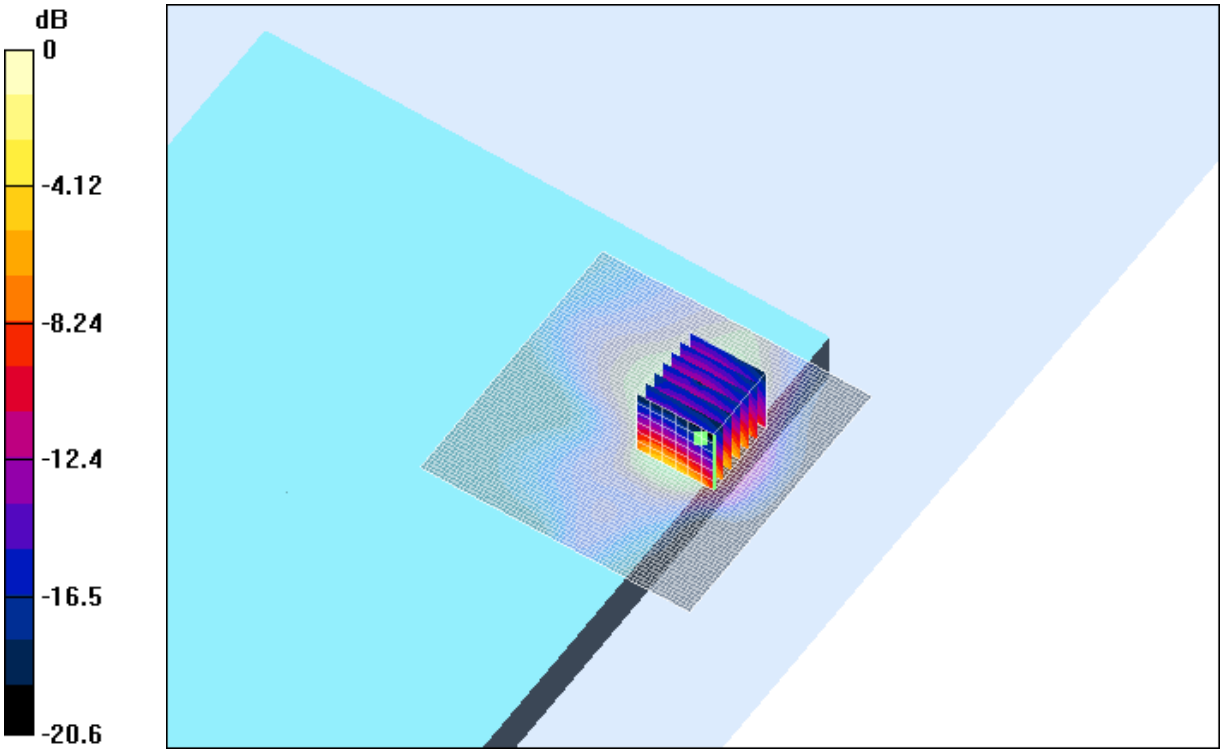
Test Date: 24th May 2003
Test Laboratory: EMC Technologies Pty Ltd
File Name: M030531- Fujitsu - Lap Top DSSS - 24-05-03.da4

DUT: Fujitsu Tablet; Type: FMV Stylistic;
Program: LapTop Position

Communication System: DSSS 2450 MHz; Frequency: 2437 MHz; Duty Cycle: 1:2.2
Medium: Body 2450 MHz; (σ = 2.0166 mho/m, ε_r = 51.6821, ρ = 1000 kg/m^3)
Phantom section: Flat 2.2 Section

Dasy Configuration:
-Probe: ET3DV6 - SN1380; ConvF(4.5, 4.5, 4.5); Calibrated: 9/11/2002
-Sensor-Surface: 10mm (Mechanical Surface Detection)
-Electronics: DAE3 Sn442; Calibrated: 23/10/2002
-Phantom: Flat Phantom PL870; Serial: P 9.1
-Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 109

Channel 06 Test/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Channel 06 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.49 V/m
Peak SAR = 1 W/kg
SAR(1 g) = 0.516 mW/g; SAR(10 g) = 0.239 mW/g
Power Drift = 0.06 dB



SAR MEASUREMENT PLOT 3

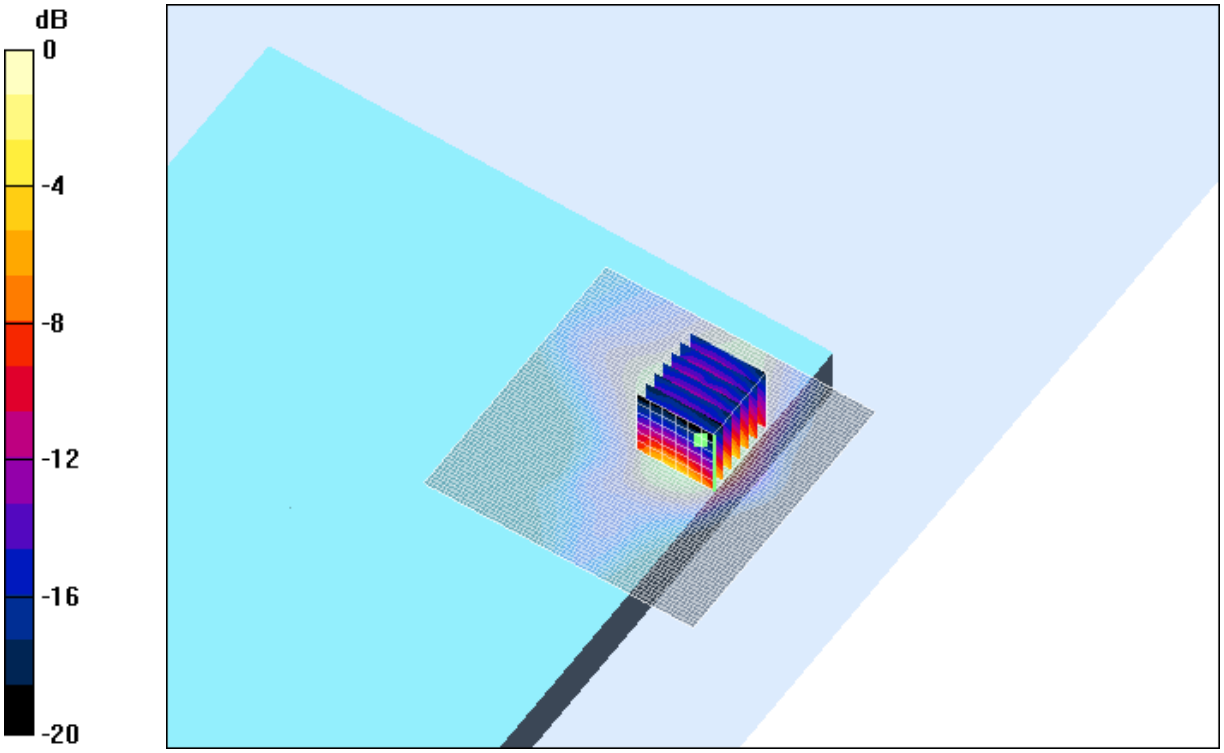
Ambient Temperature	**21.8 °C**
Liquid Temperature	**21.5 °C**
Humidity	**35 %**

Test Date: 24th May 2003
Test Laboratory: EMC Technologies Pty Ltd
File Name: M030531- Fujitsu - Lap Top DSSS - 24-05-03B.da4

DUT: Fujitsu Tablet; Type: FMV Stylistic;
Program: LapTop Position

Communication System: DSSS 2450 MHz; Frequency: 2462 MHz; Duty Cycle: 1:2.2
Medium: Body 2450 MHz; (σ = 2.048 mho/m, ε_r = 51.5594, ρ = 1000 kg/m^3)
Phantom section: Flat 2.2 Section

Dasy Configuration:
-Probe: ET3DV6 - SN1380; ConvF(4.5, 4.5, 4.5); Calibrated: 9/11/2002
-Sensor-Surface: 10mm (Mechanical Surface Detection)
-Electronics: DAE3 Sn442; Calibrated: 23/10/2002
-Phantom: Flat Phantom PL870; Serial: P 9.1
-Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 109
Channel 11 Test/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Channel 11 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.463 V/m
Peak SAR = 1.01 W/kg
SAR(1 g) = 0.511 mW/g; SAR(10 g) = 0.235 mW/g
Power Drift = 0.2 dB



SAR MEASUREMENT PLOT 4

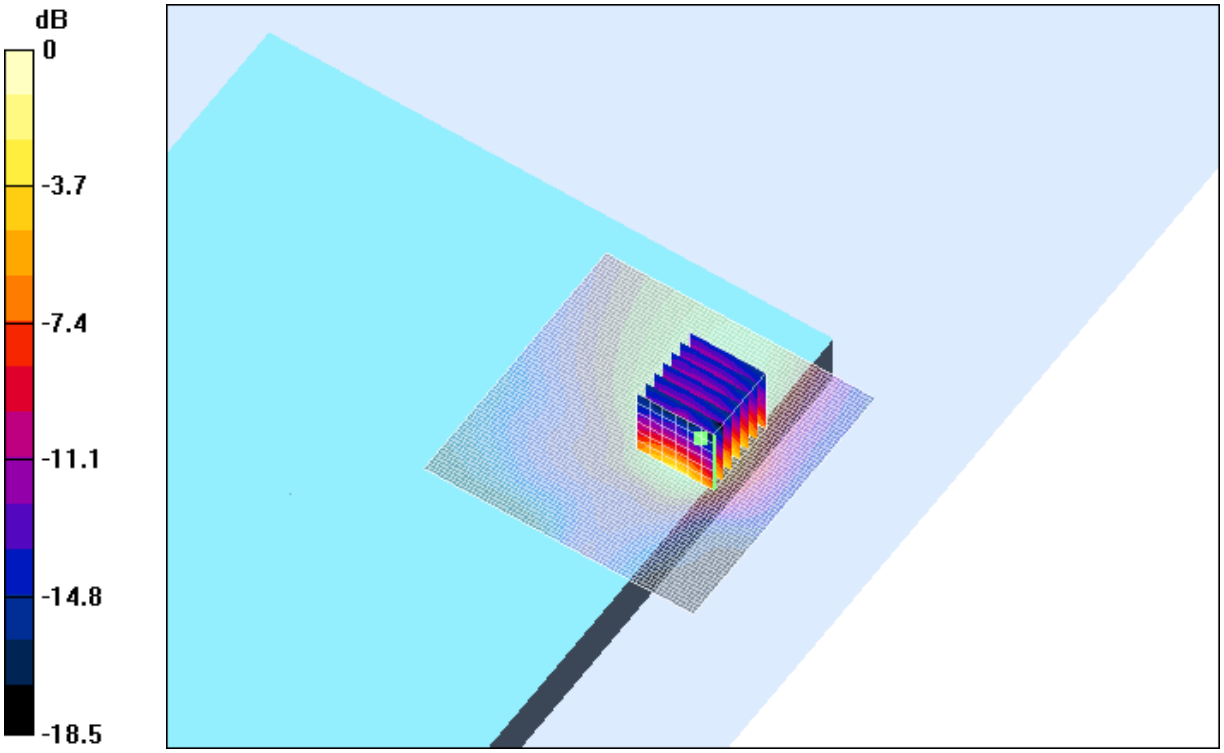
Ambient Temperature	**21.8 °C**
Liquid Temperature	**21.5 °C**
Humidity	**35 %**

Test Date: 24th May 2003
Test Laboratory: EMC Technologies Pty Ltd
File Name: M030531- Fujitsu - Lap Top With 5mm Spacer DSSS - 24-05-03.da4

DUT: Fujitsu Tablet; Type: FMV Stylistic;
Program: LapTop Position

Communication System: DSSS 2450 MHz; Frequency: 2412 MHz; Duty Cycle: 1:2.2
Medium: Body 2450 MHz; (σ = 1.97593 mho/m, ε_r = 51.8338, ρ = 1000 kg/m^3)
Phantom section: Flat 2.2 Section

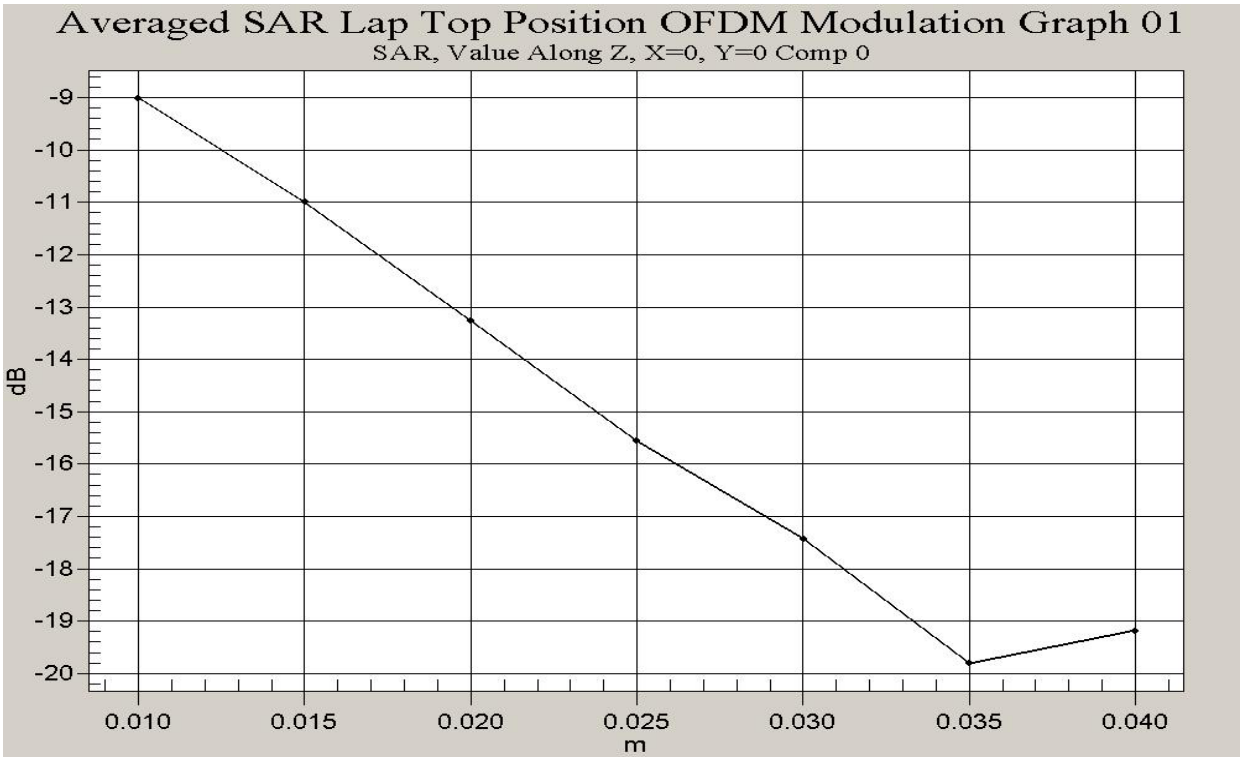
Dasy Configuration:
-Probe: ET3DV6 - SN1380; ConvF(4.5, 4.5, 4.5); Calibrated: 9/11/2002
-Sensor-Surface: 10mm (Mechanical Surface Detection)
-Electronics: DAE3 Sn442; Calibrated: 23/10/2002
-Phantom: Flat Phantom PL870; Serial: P 9.1
-Measurement SW: DASY4, V4.1 Build 33; Postprocessing SW: SEMCAD, V1.6 Build 109
Channel 01 Test/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Channel 01 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.834 V/m
Peak SAR = 1.69 W/kg
SAR(1 g) = 0.23 mW/g; SAR(10 g) = 0.109 mW/g
Power Drift = -0.5 dB



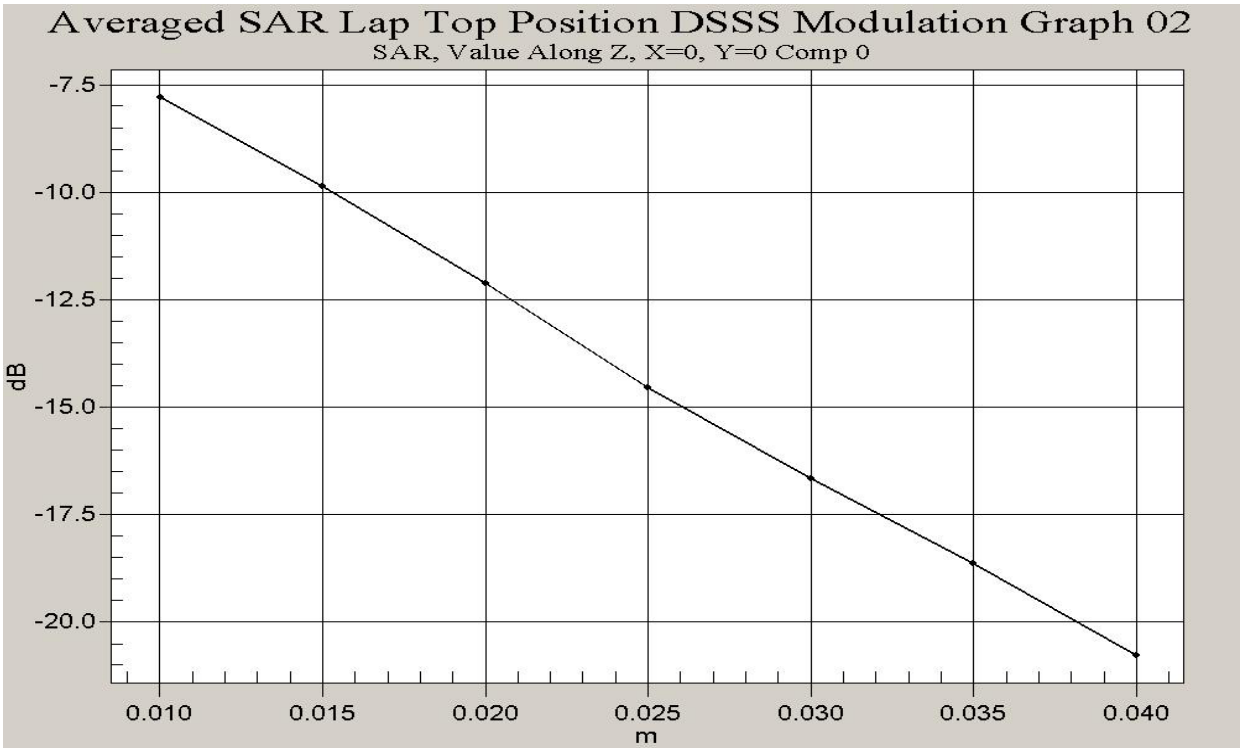
SAR MEASUREMENT PLOT 5

Ambient Temperature	**21.8 °C**
Liquid Temperature	**21.5 °C**
Humidity	**35 %**

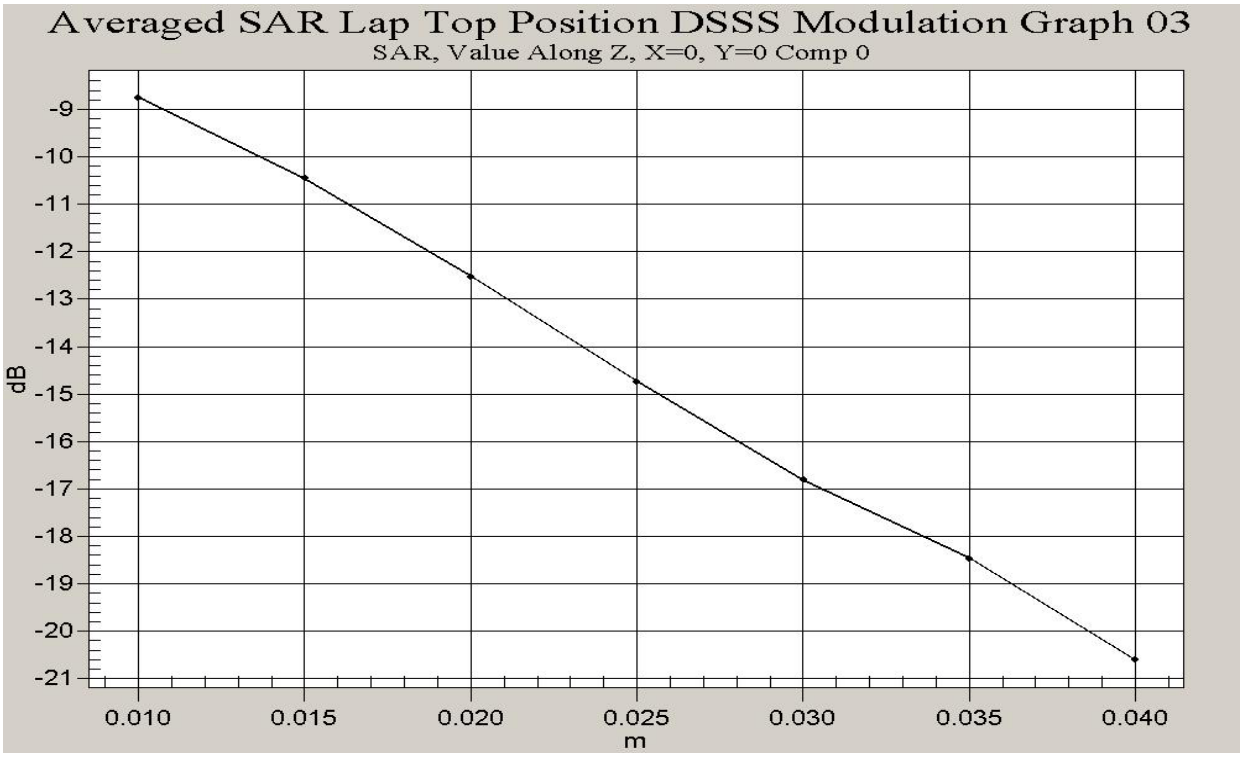
Test Date: 24th May 2003 – Lap Top Position OFDM CH# 06



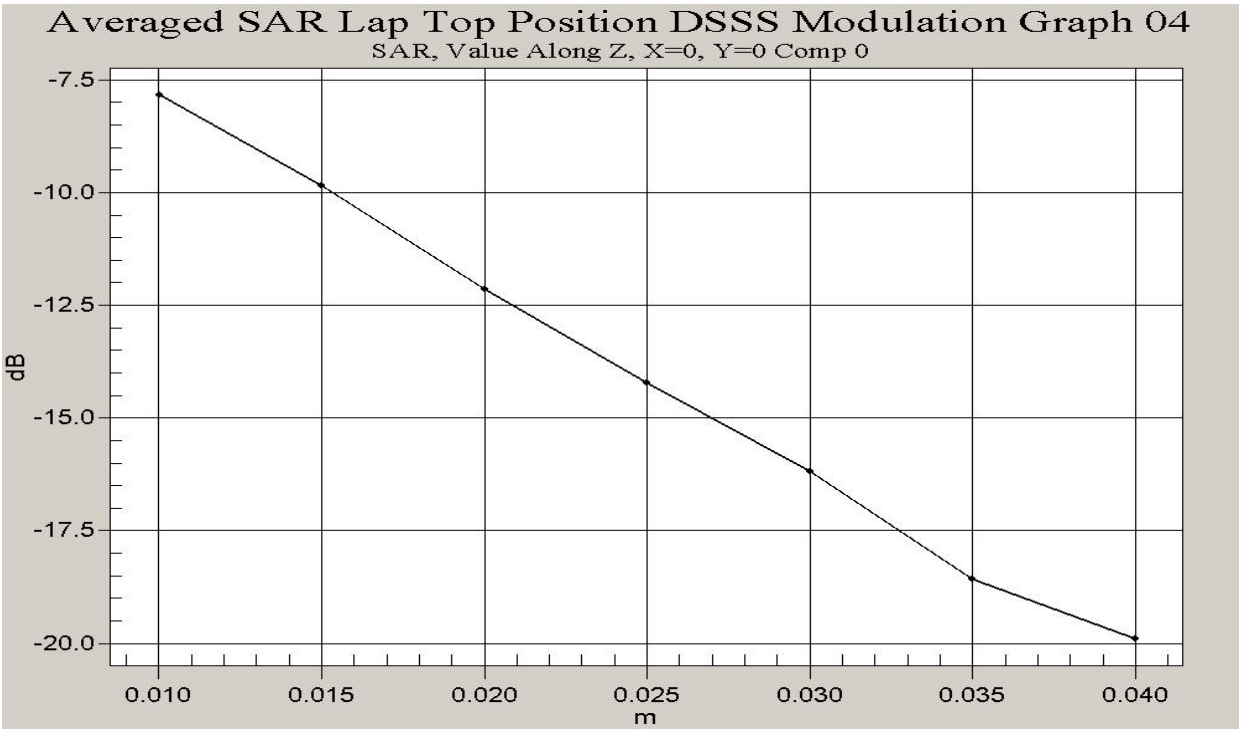
Test Date: 24th May 2003 – Lap Top Position DSSS CH# 01



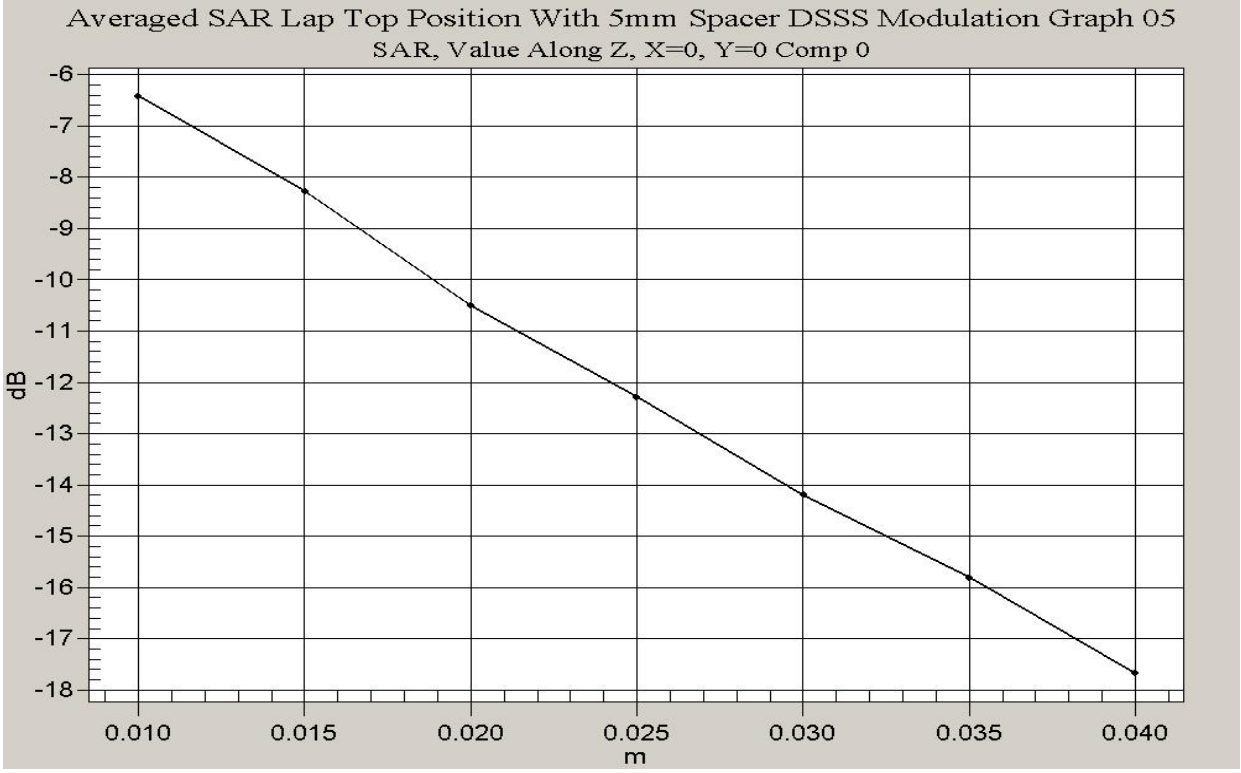
Test Date: 24th May 2003 – Lap Top Position DSSS CH# 06



Test Date: 24th May 2003 – Lap Top Position DSSS CH# 11



Test Date: 24th May 2003 – Lap Top Position DSSS with 5 mm Spacer CH# 01



Test Date: 24 May 2003

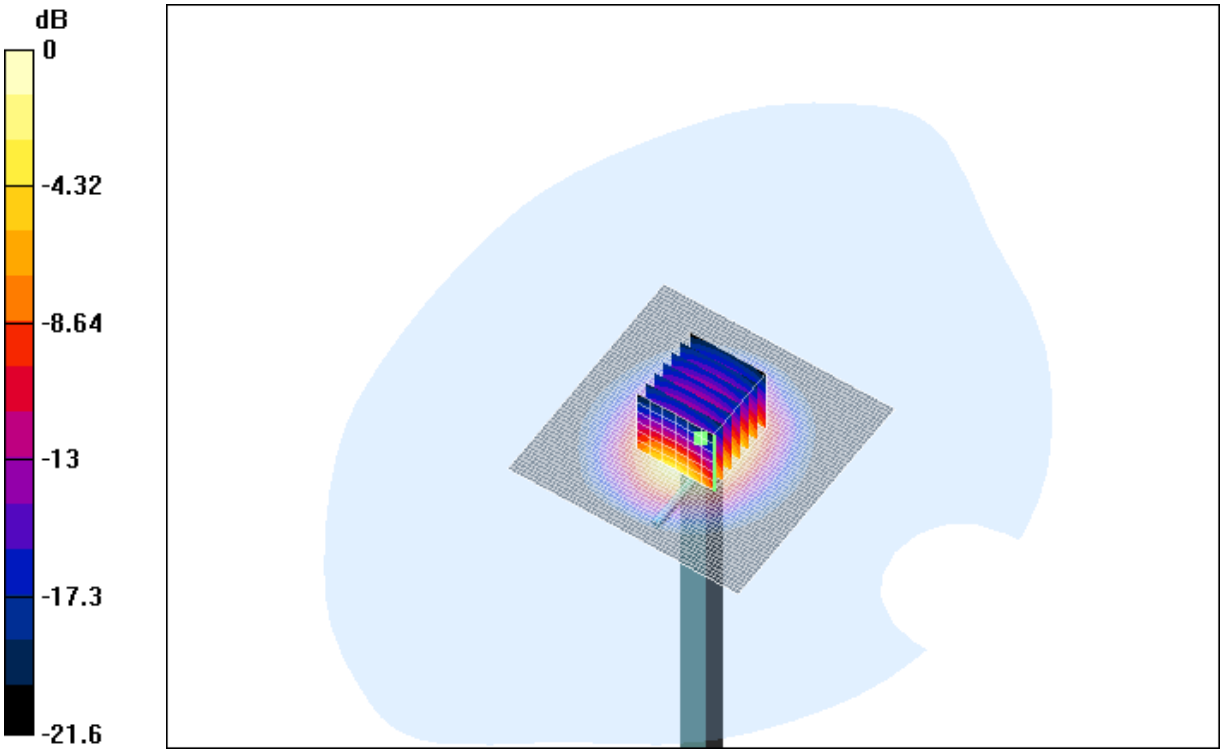
File Name: Validation 2450 MHz (DAE442 Probe1380)24-05-03.da4

DUT: Dipole 2450 MHz; Type: DV2450V2; Serial: 724

* Communication System: CW 2450 MHz; Frequency: 2450 MHz; Duty Cycle: 1:1
* Medium: Head 2450 MHz; (σ = 1.84275 mho/m, ε_r = 37.9025, ρ = 1000 kg/m^3)
- Electronics: DAE3 Sn442; Probe: ET3DV6 - SN1380; ConvF(4.5, 4.5, 4.5)
- Phantom: SAM 12; Serial: 1060; Phantom section: Flat Section

Channel 1 Test/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 68.8 V/m
Power Drift = -0.04 dB
Maximum value of SAR = 6.38 mW/g

Channel 1 Test/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.3 W/kg
SAR(1 g) = 5.68 mW/g; SAR(10 g) = 2.65 mW/g
Reference Value = 68.8 V/m
Power Drift = -0.04 dB
Maximum value of SAR = 6.43 mW/g

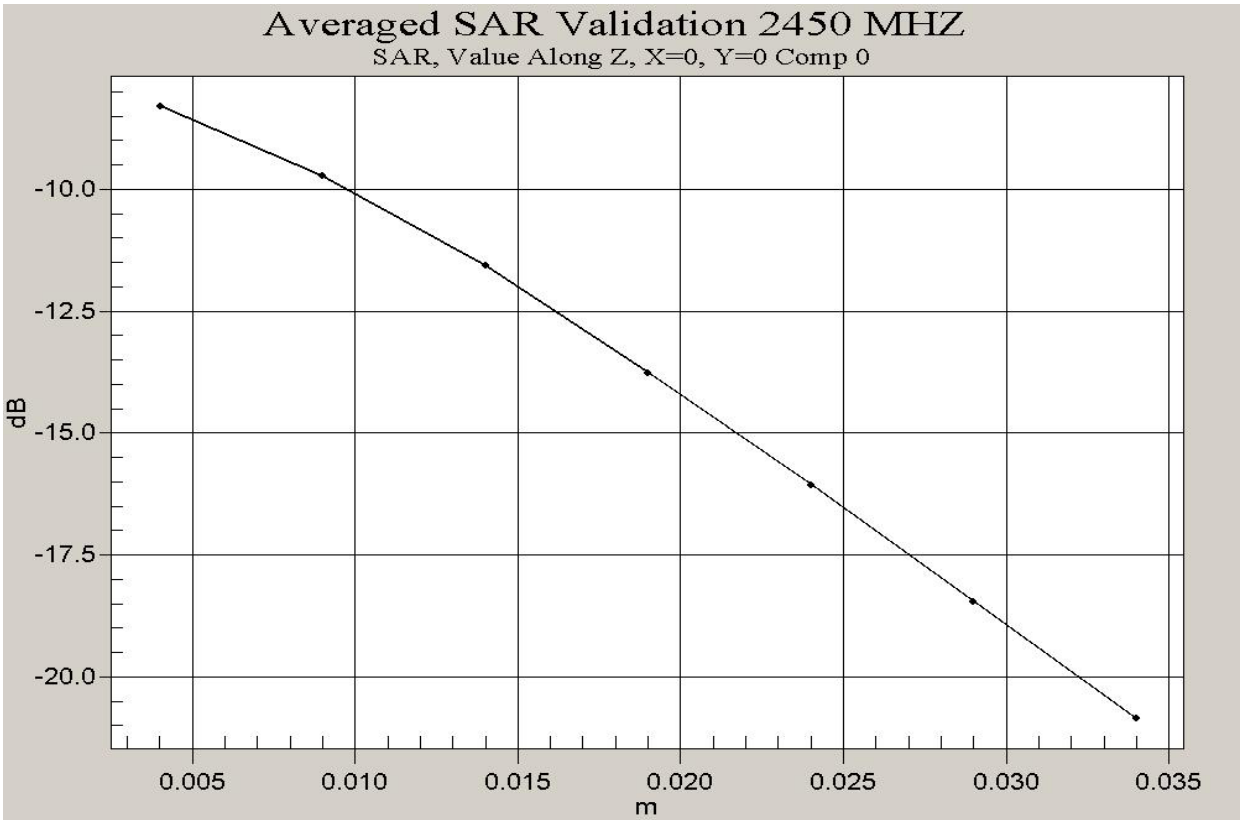


0 dB = 6.43mW/g

SAR VALIDATION PLOT 1

Ambient Temperature	**21.8 Degrees Celsius**
Liquid Temperature	**21.5 Degrees Celsius**
Humidity	**35 %**

Validation Graph: 24th MAY 2003



APPENDIX C
SAR TESTING EQUIPMENT CALIBRATION CERTIFICATE ATTACHMENTS

Calibration Certificate Attachments

1. 2450 MHz Dipole Calibration Sheet	6 Pages
2. E-Field Probe Calibration Sheet	12 Pages
3. Thickness Details of Flat phantom PL870 Flat Phantom	1 Page
4. Dielectric Properties of Flat phantom PL870 Phantom	1 Page