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SAR Test Report

Report Number: M080506 _ CERT_512AN_HMW _SAR_5.6

Test Sample:	Portable Tablet Computer
Host PC Model Number:	T1010
Radio Modules:	WLAN 512AN_HMW & Bluetooth EYSMJCS
Tested For:	Fujitsu Australia Pty Ltd
HOST PC FCC ID:	EJE-WB0060
HOST PC IC:	337J-WB0060
Date of Issue:	3rd June 2008

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HOST PC IC: 337J-WB0060

1.0 GENERAL INFORMATION

Test Sample:	Portable Tablet Computer
Model Name:	T1010
Radio Modules:	WLAN 512AN_HMW & Bluetooth EYSMJCS
Interface Type:	Mini-PCI Module
Device Category:	Portable Transmitter
Test Device:	Pre-Production Unit
FCC ID:	EJE-WB0060
HOST PC IC:	337J-WB0060
RF exposure Category:	General Population/Uncontrolled
Manufacturer:	Fujitsu Limited
Test Standard/s:	**1.** Evaluating Compliance with FCC Guidelines For Human Exposure to Radiofrequency Electromagnetic Fields Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01) **2.** Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) RSS-102 Issue 2 November 2005
Statement Of Compliance:	The Fujitsu Tablet Computer T1010 with Wireless LAN model 512AN_HMW and Bluetooth module EYSMJCS 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:	9th to 14th May 2008

Tested for:	Fujitsu Australia Pty Ltd
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Contact:	Praveen Rao
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Peter Jakubiec

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Peter Jakubiec

SAR TEST REPORT
Portable Tablet Computer
Model: T1010
Report Number: M080506 _ CERT_512AN_HMW _SAR_5.6

2.0 INTRODUCTION

Testing was performed on the Fujitsu Tablet PC, Model: T1010 with INTEL Mini-PCI Wireless LAN Module (Shirley Peak IEEE802.11a/b/g/n, 1x2), Model: 512AN_HMW & TAIYO YUDEN Bluetooth Module, Model: EYSMJCS. The Shirley Peak IEEE802.11a/b/g/n, 1x2 module is an OEM product. The Mini-PCI Wireless LAN (WLAN) was tested in the dedicated host – LifeBook T series, Model T1010.

The measurement test results mentioned hereon only apply to the 5GHz frequency band; an additional report titled "M080506 _ CERT_512AN_HMW _SAR_2.4" applies to the 2450MHz frequency range.

3.0 SAMPLE TECHNICAL INFORMATION

(Information supplied by the client)

3.1 EUT (WLAN) Details

Transmitter:	Mini-Card Wireless LAN Module
FCC ID:	PD9512ANH
IC:	1000M-512ANH
Wireless Module:	Shirley Peak IEEE802.11a/b/g/n, 1x2
Model Number:	512AN_HMW
Manufacturer:	Intel Corporation
Modulation Type:	DSSS for 802.11b OFDM for 802.11g OFDM for 802.11a OFDM for 802.11n
2.4 GHz (802.11b/g/n):	CCK, DQPSK, DBPSK, 16QAM, 64QAM
5 GHz (802.11a/n):	BPSK, QPSK, 16QAM, 64QAM
Maximum Data Rate:	802.11b = 11 Mbps, 802.11g and 802.11a = 54 Mbps 802.11n = Tx 150 Mbps Rx 300 Mbps
Frequency Ranges:	2.412 –2.472 GHz for 11b/g/n 5.18 - 5.32 GHz and 5.745 - 5.825 GHz for 11a/n
Number of Channels:	11 channels for 11b/g/n 24 channels for 11a/n with 20MHz Bandwidth 18 channels for 11n with 40MHz Bandwidth
Antenna Types:	Nissei Electric Inverted F Antenna Model: refer to WLAN antenna data Location: Top edge of LCD screen
Power Supply:	3.3 VDC from PCI bus

Channels and Output power setting:

Modes	Channels	Frequency MHz	Average Output Power (dBm)
802.11b	1	2412	18.8
	6	2437	16.5
	11	2462	19.6
802.11g	1	2412	14.5
	6	2437	16.5
	11	2462	14.0
802.11a	36	5180	18.4
	40 and 48	5200 and 5240	16.5
	52, 60 and 64	5260, 5300 and 5320	
	100	5500	19.1
	120 and 140	5600 and 5700	16.5
	149, 157 and 165	5745, 5785 and 5825	
802.11n 20MHz Bandwidth	1	2412	13.1
	6	2437	16.5
	11	2462	14.0
	36, 40 and 48	5180, 5200 and 5240	16.5
	52, 60 and 64	5260, 5300 and 5320	
	100, 120 and 140	5500, 5600 and 5700	
	149, 157 and 165	5745, 5785 and 5825	
802.11n 40MHz Bandwidth	3	2422	10.1
	6	2437	16.5
	9	2452	14.1
	38, 54 and 62	5190, 5270 and 5310	16.5
	102, 118 and 134	5510, 5590 and 5670	
	151 and 159	5755 and 5795	

NOTE: For 2450 MHz SAR results refer to report titled “M080506 _ CERT_512AN_HMW _SAR_2.4”.

3.2 EUT (Bluetooth) Details

Transmitter:	Bluetooth
FCC ID:	RYYEYSMJCS
IC:	4389B-EYSMJCS
Model Number:	EYSMJCS
Manufacturer:	TAIYO YUDEN
Network Standard:	Bluetooth™ RF Test Specification
Modulation Type:	Frequency Hopping Spread Spectrum (FHSS)
Frequency Range:	2402 MHz to 2480 MHz
Number of Channels:	79
Carrier Spacing:	1.0 MHz
Antenna Types:	Included BT module Location: left side of hinge
Max. Output Power:	4 dBm
Reference Oscillator:	16 MHz (Built-in)
Power Supply:	3.3 VDC from host.

Frequency allocation:

Channel Number	Frequency (MHz)	Bluetooth Utility power setting
1	**2402**	Power (Ext, Int) = 0, 96
2	2403	
-	-	
39	2440	
40	**2441**	
41	2442	
-	-	
78	2479	
79	**2480**	

3.3 EUT (Notebook PC) Details

Model Name:	LifeBook T series
Serial Number:	T1010
Manufacturer:	Pre-production Sample
	FUJITSU LIMITED
CPU Type and Speed:	
LCD	Core2 Duo T9600 2.8GHz
Wired LAN:	13.3"WXGA (CCFL: T1010)
Modem:	Marvell 88E8055 : 10 Base-T/100 Base-TX/1000Base-T
Port Replicator Model:	Agere MDC1.5 modem Model: D40
	FPCPR85
AC Adapter Model:	
Voltage:	SEC100P2-19.0(Sanken) / SEC100P3-19.0(Sanken, 3pin) / ADP-80NB A(Delta) / SED100P2-19.0(Sanken)
Current Specs:	19 V
Watts:	4.22A

3.4 Test sample Accessories

3.4.1 Battery Types

One type of Fujitsu Lithium Ion Battery is used to power the Portable Tablet Computer Wireless LAN Model: 512AN_HMW. SAR measurements were performed with the battery as shown below.

Standard Battery

Model	FPCBP/155
V/mAh	10.8V/5200mAh
Cell No.	6

4.0 TEST SIGNAL, FREQUENCY AND OUTPUT POWER

INTEL's CRTU test tool was used to configure the WLAN for testing. The Portable Tablet Computer Wireless LAN had a total of 11 channels within the 2412 to 2462 MHz frequency band and 24 channels within the frequency range 5180 – 5825 MHz. In The frequency range 2412 MHz to 2462 MHz the device operates in 2 modes, OFDM and DSSS. Within the 5180 – 5825 MHz frequency range the device operates in OFDM mode only. For the SAR measurements the device was operating in continuous transmit mode using programming codes supplied by Fujitsu. The fixed frequency channels used in the testing are shown in Table Below.

The Bluetooth module operates over 79 channels within the frequency range 2402 to 2480 MHz. It is possible for the Bluetooth module to operate simultaneously with the WLAN module (co-transmission). For the SAR measurements the device was operating in continuous transmit mode using programming codes supplied by Fujitsu. The tests were conducted with only the WLAN operating and also with the WLAN and Bluetooth module operating in co-transmission. The fixed frequency channels used in the testing are shown in the table below. The Bluetooth interface utilizes dedicated antenna, for the purpose of this report labelled antenna "D".

The test results mentioned in this report only apply to the 5200/5800MHz frequency range. An additional report titled *"M080506 _ CERT_512AN_HMW _SAR_2.4"* is specific to the 2450MHz range.

The WLAN modules can be configured in a number of different data rates. It was found that the highest source based time averaged power was measured when using the lowest data rates available in each mode. This lowest data rate corresponds to 6Mbps in OFDM mode and 1Mbps in DSSS mode.

The frequency span of the 2450 MHz range and 5600MHz Bands was more than 10MHz consequently; the SAR levels of the test sample were measured for lowest, centre and highest channels in the applicable modes. There were no wires or other connections to the Portable Tablet Computer during the SAR measurements.

At the beginning and at the completion of the SAR tests, the conducted power of the device was measured after temporary modification of antenna connector inside the device's TX RX compartment. Measurements were performed with a calibrated Power Meter. The Transmitter power was set to be equal or higher than power specified by the manufacturer.

4.1 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 assessed in the uncertainty budget.

5.0 DETAILS OF TEST LABORATORY

5.1 Location

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5.2 Accreditations

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

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

AS/NZS 2772.1:	RF and microwave radiation hazard measurement
ACA:	Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003
FCC:	Guidelines for Human Exposure to RF Electromagnetic Field OET65C 01/01
EN 50360: 2001	Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)
EN 50361: 2001	Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300MHz – 3GHz)
IEEE 1528: 2003	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Measurement Techniques.

The 5.2 to 5.8 GHz SAR measurement range is not within the current scope of NATA accreditation.
Refer to NATA website www.nata.asn.au for the full scope of accreditation.

5.3 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 43% to 52%. 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 SN3563 probe was less than 5μV in both air and liquid mediums.

6.0 DESCRIPTION OF SAR MEASUREMENT SYSTEM

Applicable Head Configurations	: None
Applicable Body Configurations	: Tablet Position
	: Edge On Position

6.1 Probe Positioning System

The measurements were performed with the state-of-the-art automated near-field scanning system **DASY4 V4.7 Build 53** from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision 6-axis robot (working range greater that 1.1m), which positions the SAR measurement probes with a positional repeatability of better than ±0.02 mm. The DASY4 fully complies with the OET65 C (01-01), IEEE 1528 and EN50361 SAR measurement requirements.

6.2 E-Field Probe Type and Performance

The SAR measurements were conducted with SPEAG dosimetric probe EX3DV4 Serial: 3563 (5.6 GHz) 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.

6.3 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.

6.4 Validation

6.4.1 Validation Results @ 5GHz

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 250 mW.

Table: Validation Results (Dipole: SPEAG D5GHzV2 SN: 1008)

1. Validation Date	2. ∈r (measured)	3. σ (mho/m) (measured)	4. Measured SAR 1g (mW/g)	5. Measured SAR 10g (mW/g)
9th May 2008	35.2	4.74	20.2	5.74
12th May 2008	35.3	4.90	20.5	5.79
14th May 2008	33.9	5.37	19.9	5.66

6.4.2 Deviation from reference validation values

Currently no IEEE Std 1528-2003 SAR reference values are available in 5.6 GHz band, as a consequence all validation results were compared against the SPEAG calibration reference SAR values.

The SPEAG calibration reference SAR value is the SAR validation result obtained in a specific dielectric liquid using the validation dipole (D5GHzV2) during calibration. The measured one-gram SAR should be within 10% of the expected target reference values shown in below.

Table: Deviation from reference validation values in 5.6 GHz band.

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)
5200MHz 9th May 2008	20.2	80.8	77.6	4.12
5500MHz 12th May 2008	20.5	82.0	79.8	2.76
5800MHz 14th May 2008	19.9	79.6	76.3	4.33

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

6.4.3 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.

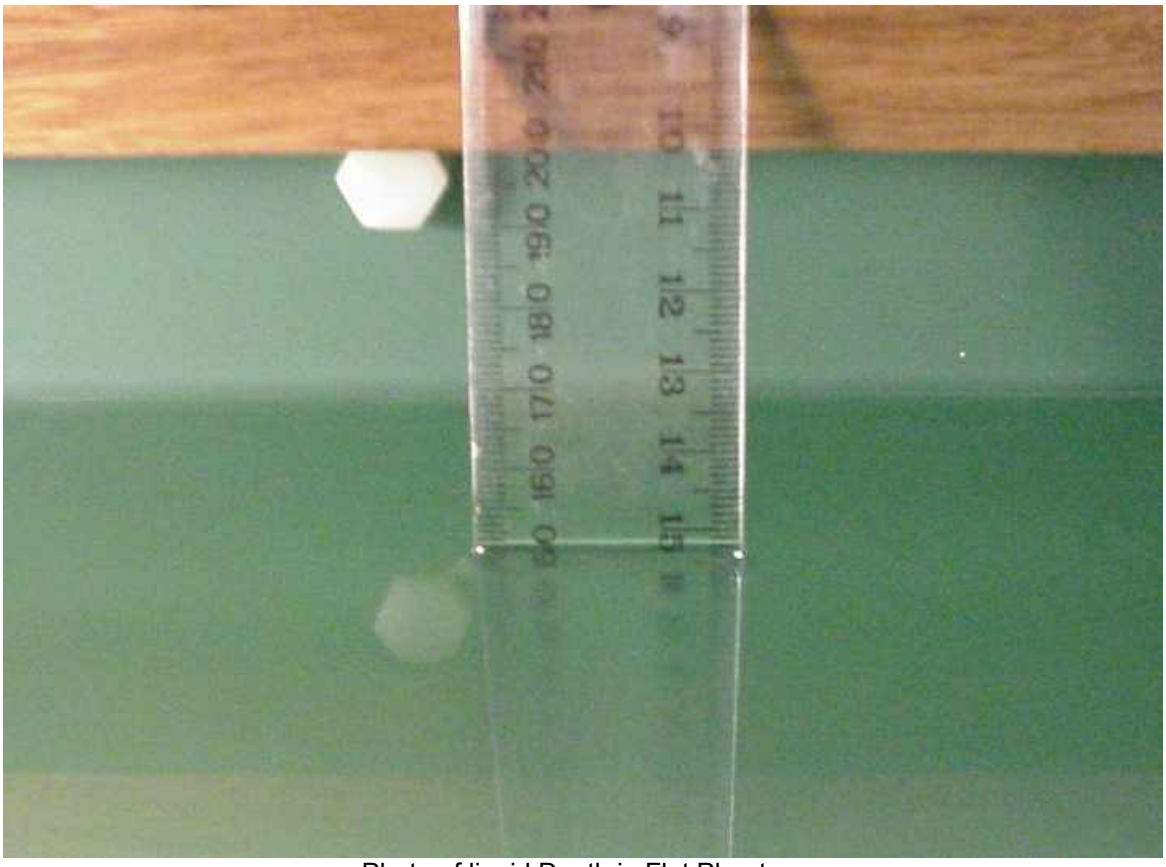


Photo of liquid Depth in Flat Phantom

6.5 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 an AndreT Flat phantom P 10.1 was used. The phantom thickness is 2.0mm+/-0.2 mm and was filled with the required tissue simulating liquid. Table below provides a summary of the measured phantom properties.

Table: Phantom Properties

Phantom Properties	Required
Thickness of flat section	2.0mm ± 0.2mm (bottom section)
Dielectric Constant	<5.0
Loss Tangent	<0.05

Depth of Phantom	200mm
Length of Flat Section	620mm
Width of Flat Section	540mm

P 10.1 Flat Phantom

P 10.1 Flat Phantom

6.6 Tissue Material Properties

The dielectric parameters of the brain simulating liquid were measured prior to SAR assessment using the HP85070A dielectric probe kit and HP8753ES Network Analyser. The actual dielectric parameters are shown in the following table.

Table: Measured Brain Simulating Liquid Dielectric Values for Validations

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
5200 MHz Brain	35.2	36.0 ±5% (34.2 to 37.8)	4.74	4.76 ±5% (4.43 to 4.90)	1000
5500 MHz Brain	35.3	35.6 ±5% (33.8 to 37.4)	4.90	4.96 ±5% (4.71 to 5.21)	1000
5800 MHz Brain	33.9	35.3 ±5% (33.5 to 37.1)	5.37	5.27 ±5% (5.01 to 5.53)	1000

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

Table: Measured Body Simulating Liquid Dielectric Values for 5200MHz range

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
5180 MHz Muscle	46.1	49.0 ±10% (44.1 to 53.9)	5.23	5.3 ±10% (4.77 to 5.83)	1000
5260 MHz Muscle	45.8	48.9 ±10% (44.0 to 53.8)	5.39	5.4 ±10% (4.86 to 5.94)	1000
5320 MHz Muscle	45.6	48.8 ±10% (43.9 to 53.7)	5.49	5.4 ±10% (4.86 to 5.94)	1000

Table: Measured Body Simulating Liquid Dielectric Values for 5600MHz range

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
5500 MHz Muscle	45.6	48.6 ±10% (43.7 to 53.4)	5.56	5.6 ±10% (5.04 to 6.16)	1000
5600 MHz Muscle	45.3	48.5 ±10% (43.8 to 53.5)	5.75	5.77 ±10% (5.20 to 6.34)	1000
5700 MHz Muscle	44.9	48.4 ±10% (43.6 to 53.2)	5.90	5.9 ±10% (5.31 to 6.49)	1000

Table: Measured Body Simulating Liquid Dielectric Values for 5800MHz range

Frequency Band	∈r (measured range)	∈r (target)	σ (mho/m) (measured range)	σ (target)	ρ kg/m^3
5745 MHz Muscle	44.7	48.3 ±10% (43.47 to 53.13)	6.08	5.9 ±10% (5.31 to 6.49)	1000
5785 MHz Muscle	44.6	48.2 ±10% (43.38 to 53.02)	6.15	6.0 ±10% (5.4 to 6.60)	1000
5825 MHz Muscle	44.4	48.2 ±10% (43.38 to 53.02)	6.21	6.0 ±10% (5.4 to 6.60)	1000

NOTE: The muscle liquid parameters were within the required tolerances of ±10%.

6.6.1 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: Temperature and Humidity recorded for each day

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
9th May 2008	21.1	20.8	52
12th May 2008	21.7	20.9	48
14th May 2008	21.9	21.7	43

6.7 Simulated Tissue Composition Used for SAR Test

A low loss clamp was used to position the Tablet underneath the phantom surface. Small pieces of foam were then used to press the Tablet flush against the phantom surface.

Table: Tissue Type: Muscle @ 5600MHz

Volume of Liquid: 60 Litres

EMCT Liquid

Composition
Distilled Water
Salt
Triton X-100

6.8 Device Holder for Laptops and P 10.1 Phantom

A low loss clamp was used to position the Laptop underneath the phantom surface. Small pieces of foam were then used to press the laptop flush against the phantom surface.

Refer to Appendix A for photographs of device positioning

7.0 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, and then again at the end of the test.

b) The SAR distribution at the exposed flat section of the flat phantom is measured at a distance of 2.0 mm from the inner surface of the shell. The area covers the entire dimension of the EUT and the horizontal grid spacing is 15 mm x 15 mm. The actual Area Scan has dimensions of 120mm x 150mm 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 24 mm x 24 mm x 20 mm is assessed by measuring 7 x 7 x 9 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 1.0 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 2.0 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.

8.0 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.

Table: Uncertainty Budget for DASY4 Version V4.7 Build 53 – EUT SAR test 5GHz

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	6.8	N	1	1	1	6.8	6.8	∞
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	2	R	1.73	1	1	1.2	1.2	∞
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	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Conditions	E.6.1	0.075	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.8	R	1.73	1	1	0.5	0.5	∞
Probe Positioning with respect to Phantom Shell	E.6.3	5.7	R	1.73	1	1	3.3	3.3	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	4	R	1.73	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.9	N	1	1	1	2.9	2.9	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	11.02	R	1.73	1	1	6.4	6.4	∞
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	10	R	1.73	0.64	0.43	3.7	2.5	∞
Liquid Conductivity – Measurement uncertainty	E.3.3	2.5	N	1	0.64	0.43	1.6	1.1	5
Liquid Permittivity – Deviation from target values	E.3.2	10	R	1.73	0.6	0.49	3.5	2.8	∞
Liquid Permittivity – Measurement uncertainty	E.3.3	2.5	N	1	0.6	0.49	1.5	1.2	5
Combined standard Uncertainty			RSS				13.8	13.3	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				27.7	26.70	

Estimated total measurement uncertainty for the DASY4 measurement system was ±13.8%. The extended uncertainty (K = 2) was assessed to be ±27.7% based on 95% confidence level. The uncertainty is not added to the measurement result.

Table: Uncertainty Budget for DASY4 Version V4.7 Build 53 – Validation 5GHz

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	6.6	N	1	1	1	6.6	6.6	∞
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	2	R	1.73	1	1	1.2	1.2	∞
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	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	0.075	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.8	R	1.73	1	1	0.5	0.5	∞
Probe Positioning with respect to Phantom Shell	E.6.3	5.7	R	1.73	1	1	3.3	3.3	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	4	R	1.73	1	1	2.3	2.3	∞
Test Sample Related									
Dipole Axis to Liquid distance	E.4.2	2	N	1	1	1	2.0	2.0	11
Output Power Variation – SAR Drift Measurement	6.6.2	4.7	R	1.73	1	1	2.7	2.7	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity – Deviation from target values	E.3.2	5	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – Measurement uncertainty	E.3.3	2.5	N	1	0.64	0.43	1.6	1.1	5
Liquid Permittivity – Deviation from target values	E.3.2	5	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity – Measurement uncertainty	E.3.3	2.5	N	1	0.6	0.49	1.5	1.2	5
Combined standard Uncertainty			RSS				10.3	10.0	154
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				20.5	20.02	

Estimated total measurement uncertainty for the DASY4 measurement system was ±10.3%. The extended uncertainty (K = 2) was assessed to be ±20.5% based on 95% confidence level. The uncertainty is not added to the measurement result.

9.0 QUIPMENT LIST AND CALIBRATION DETAILS

Table: SPEAG DASY4 Version V4.7 Build 53

Equipment Type	Manufacturer	Model Number	Serial Number	Calibration Due	Used For this Test?
Robot - Six Axes	Staubli	RX90BL	N/A	Not applicable	✓
Robot Remote Control	SPEAG	CS7MB	RX90B	Not applicable	✓
SAM Phantom	SPEAG	N/A	1260	Not applicable	✓
SAM Phantom	SPEAG	N/A	1060	Not applicable	
Flat Phantom	AndreT	10.1	P 10.1	Not Applicable	✓
Flat Phantom	AndreT	9.1	P 9.1	Not Applicable	
Flat Phantom	SPEAG	PO1A 6mm	1003	Not Applicable	
Data Acquisition Electronics	SPEAG	DAE3 V1	359	03-July-2008	
Data Acquisition Electronics	SPEAG	DAE3 V1	442	26-Feb-09	✓
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	
Probe E-Field	SPEAG	ET3DV6	1380	18-Dec-2008	
Probe E-Field	SPEAG	ET3DV6	1377	09-July-2008	
Probe E-Field	SPEAG	ES3DV6	3029	Not Used	
Probe E-Field	SPEAG	EX3DV4	3563	13-July-2008	✓
Antenna Dipole 300 MHz	SPEAG	D300V2	1005	14-Dec-2009	
Antenna Dipole 450 MHz	SPEAG	D450V2	1009	14-Dec-2008	
Antenna Dipole 900 MHz	SPEAG	D900V2	047	6-July-2008	
Antenna Dipole 1640 MHz	SPEAG	D1640V2	314	30-June-2008	
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	3-July-2008	
Antenna Dipole 1950 MHz	SPEAG	D1950V3	1113	5-March-2009	
Antenna Dipole 3500 MHz	SPEAG	D3500V2	1002	06-July-2008	
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	13-Dec-2008	
Antenna Dipole 5600 MHz	SPEAG	D5GHzV2	1008	07-Dec-2009	✓
RF Amplifier	EIN	603L	N/A	Not applicable	
RF Amplifier	Mini-Circuits	ZHL-42	N/A	Not applicable	
RF Amplifier	Mini-Circuits	ZVE-8G	N/A	Not applicable	✓
Synthesized signal generator	Hewlett Packard	ESG-D3000A	GB37420238	*In test	✓
RF Power Meter Dual	Hewlett Packard	437B	3125012786	30-May-2008	✓
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	30-May-2008	✓
RF Power Meter Dual	Gigatronics	8542B	1830125	11-May-2008	
RF Power Sensor	Gigatronics	80301A	1828805	11-May-2008	
RF Power Meter Dual	Hewlett Packard	435A	1733A05847	*In test	✓
RF Power Sensor	Hewlett Packard	8482A	2349A10114	*In test	✓
Network Analyser	Hewlett Packard	8714B	GB3510035	06-Sept-2008	
Network Analyser	Hewlett Packard	8753ES	JP39240130	02 Oct-2008	✓
Dual Directional Coupler	Hewlett Packard	778D	1144 04700	*In test	
Dual Directional Coupler	NARDA	3022	75453	*In test	✓

* Calibrated during the test for the relevant parameters.

10.0 OET BULLETIN 65 – SUPPLEMENT C TEST METHOD

Notebooks should be evaluated in normal use positions, typical for lap-held bottom-face only. However the number of positions will depend on the number of configurations the laptop can be operated in. The "LifeBook T series" can be used in either a conventional laptop position (see Appendix A1) or a Tablet configuration. The antenna location in the "LifeBook T series" is closest to the top of the screen when used in a conventional laptop configuration and due to the separation distances involved between the phantom and the laptop antenna, testing is not required in this position.

10.1 Positions

10.1.1 "Tablet" Position Definition (0mm spacing)

The device was tested in the 2.00 mm flat section of the AndreT Flat phantom P 10.1 for the "Tablet" position. The Transceiver was placed at the bottom of the phantom and suspended in such way that the back of the device was touching the phantom. This device orientation simulates the PC'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.

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

The device has a fixed antenna. Depending on the measured SAR level up to three test channels with the test sample operating at maximum power, as specified in section 4.0 were recorded. The following table represents the matrix used to determine what testing was required.

Table: Testing configurations

Phantom Configuration	*Device Mode	Antenna	Test Configurations		
			Channel (Low)	Channel (Middle)	Channel (High)
Tablet	OFDM 5GHz	A		X	

Note: Due to low SAR levels (more than 3dB below the SAR limit) the HT0(20MHz) and HT0(40MHz) modes were not investigated.

Legend

X	Testing Required in this configuration
	Testing required in this configuration only if SAR of middle channel is more than 3dB below the SAR limit or it is the worst case.

10.3 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)

10.4 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)

11.0 SAR MEASUREMENT RESULTS

The SAR values averaged over 1g tissue masses were determined for the sample device for all test configurations listed in section 10.2.

11.1 GHz Band SAR Results

Table: SAR MEASUREMENT RESULTS Lower Band – OFDM Mode

Test Position	Plot No.	Ant	Bit rate Mode	Channel Bandwidth (MHz)	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Tablet	1	A	OFDM	-	036	5180	0.047	-0.127
Tablet	2	A	OFDM	-	052	5260	0.025	0.181
Tablet	3	A	OFDM	-	064	5320	0.00137	0.314

NOTE: The measurement uncertainty of 27.7% for 5GHz testing is not added to the result.

The highest SAR level recorded in the 5.2 GHz band was 0.047 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Tablet position in OFDM mode, utilizing channel 36 (5180MHz) and antenna A.

Table: SAR MEASUREMENT RESULTS Middle Band – OFDM Mode

Test Position	Plot No.	Ant	Bit rate Mode	Channel Bandwidth (MHz)	Test Channel	Test Freq (MHz)	Measured 10g SAR Results (mW/g)	Measured Drift (dB)
Tablet	4	A	OFDM	-	100	5500	0.030	0.271
Tablet	5	A	OFDM	-	120	5600	0.00157	0.066
Tablet	6	A	OFDM	-	140	5700	0.026	0.445

NOTE: The measurement uncertainty of 27.7% for 5GHz testing is not added to the result.

The highest SAR level recorded in the 5.6 GHz band was 0.030 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Tablet position in OFDM mode, utilizing channel 100 (5500MHz) and antenna A.

Table: SAR MEASUREMENT RESULTS Upper Band – OFDM Mode

Test Position	Plot No.	Ant	Bit rate Mode (Mbps)	Channel Bandwidth (MHz)	Test Channel	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured Drift (dB)
Tablet	7	A	OFDM	-	149	5745	0.035	-0.143
Tablet	8	A	OFDM	-	157	5785	0.035	0.449
Tablet	9	A	OFDM	-	165	5825	0.036	-0.198

NOTE: The measurement uncertainty of 27.7% for 5GHz testing is not added to the result.

The highest SAR level recorded in the 5.8 GHz band was 0.036 mW/g as evaluated in a 1g cube of averaging mass. This value was obtained in Tablet position in OFDM mode, utilizing channel 165 (5825MHz) and antenna A.

12.0 COMPLIANCE STATEMENT

The Fujitsu Tablet PC, Model: T1010 with INTEL Mini-PCI Wireless LAN Module (Shirley Peak IEEE802.11a/b/g/n, 1x2 802.11a/b/g/n), Model: 512AN_HMW & TAIYO YUDEN Bluetooth Module, Model: EYSMJCS was found to comply with the FCC and RSS-102 SAR requirements.

The highest SAR level recorded was 0.047 mW/g for a 1g cube. This value was measured at 5180 MHz (channel 36) in the “Tablet” position in OFDM modulation mode at the antenna A. This was below the limit of 1.6 mW/g for uncontrolled exposure, even taking into account the measurement uncertainty of 27.7 %.

APPENDIX A1 TEST SAMPLE PHOTOGRAPHS

T1010 Host - Conventional Laptop Configuration

T1010 Host - Tablet Configuration

APPENDIX A2 TEST SAMPLE PHOTOGRAPHS

Model: 512AN_HMW – WLAN Module
Front

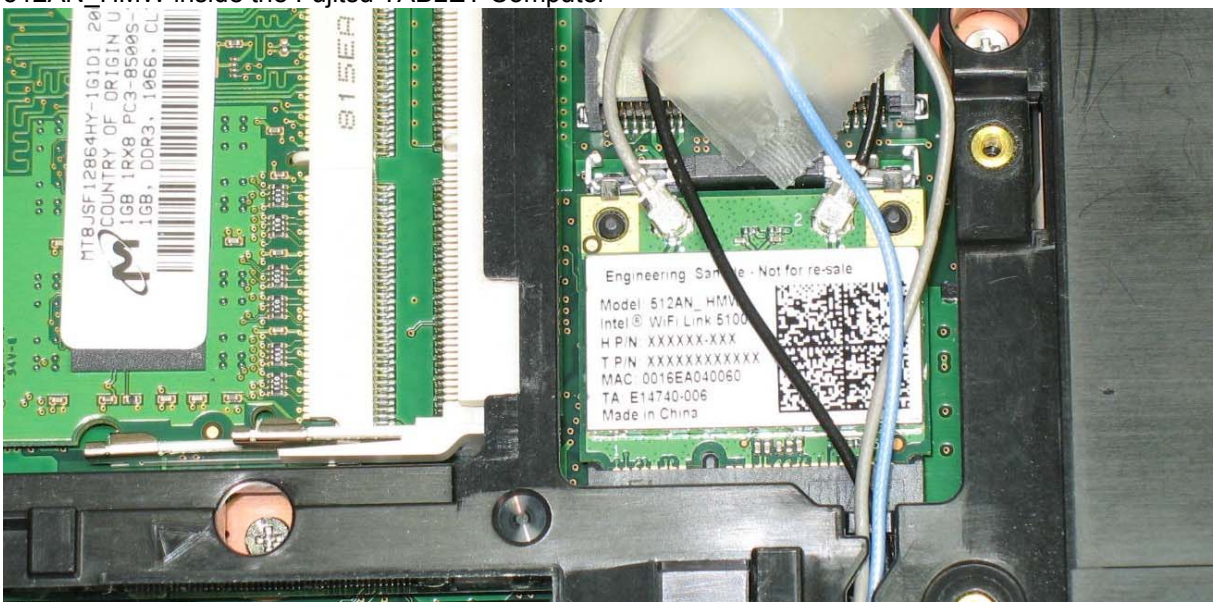
Back

APPENDIX A3 TEST SAMPLE PHOTOGRAPHS

Battery 1

Battery 2

512AN_HMW inside the Fujitsu TABLET Computer



APPENDIX A4 TEST SETUP PHOTOGRAPHS

Tablet 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: 5200 MHz Band SAR Measurement Plot Numbers

Test Position	Plot No.	Ant	Bit rate Mode	Channel Bandwidth (MHz)	Test Channel
Tablet	1	A	OFDM	-	036
Tablet	2	A	OFDM	-	052
Tablet	3	A	OFDM	-	064
Z-Axis graphs for Plots 1 to 3					

Table: 5600 MHz Band SAR Measurement Plot Numbers

Test Position	Plot No.	Ant	Bit rate Mode	Channel Bandwidth (MHz)	Test Channel
Tablet	4	A	OFDM	-	100
Tablet	5	A	OFDM	-	120
Tablet	6	A	OFDM	-	140
Z-Axis graphs for Plots 4 to 6					

Table: 5800 MHz Band SAR Measurement Plot Numbers

Test Position	Plot No.	Ant	Bit rate Mode (Mbps)	Channel Bandwidth (MHz)	Test Channel
Tablet	7	A	OFDM	-	149
Tablet	8	A	OFDM	-	157
Tablet	9	A	OFDM	-	165
Z-Axis graphs for Plots 7 to 9					

Table: Validation Plots

Plot 10	Validation 5200 MHz 9th May 2008
Plot 11	Validation 5500 MHz 12th May 2008
Plot 12	Validation 5800 MHz 14th May 2008
Z-Axis graphs for Plots 10 to 12	

Test Date: 09 May 2008

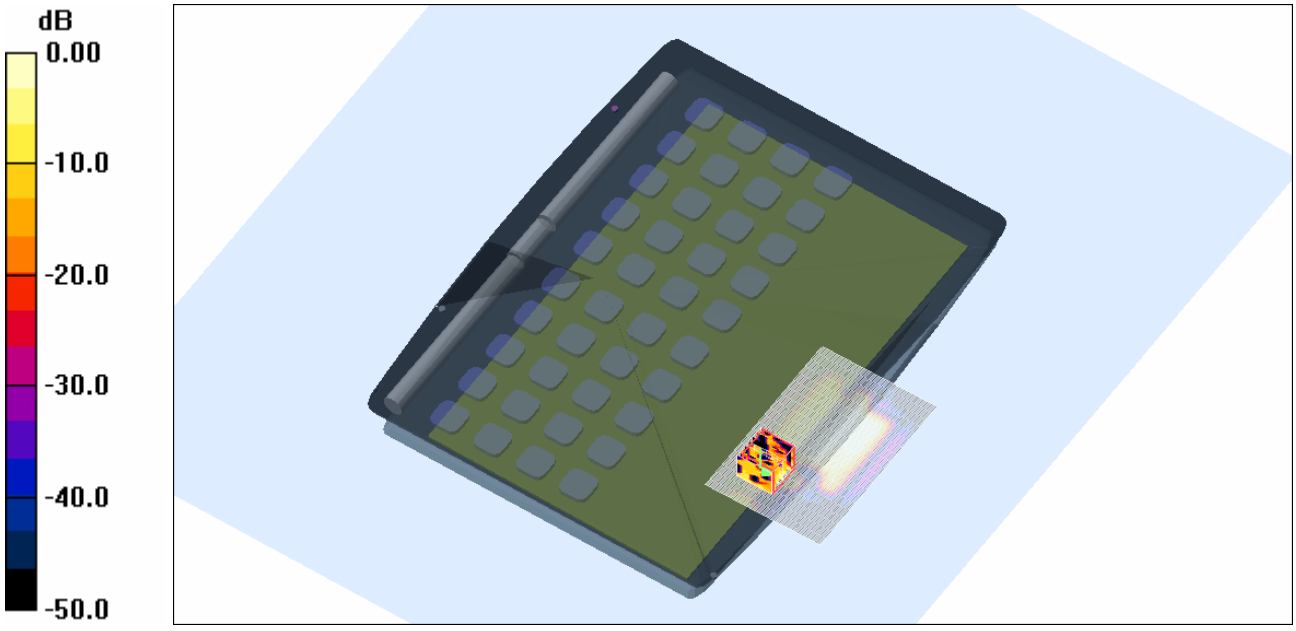
File Name: Tablet OFDM 5.2 GHz Ant A Bluetooth Off 09-05-08.da4

DUT: Fujitsu Notebook Seneca with Shirley Peak 11abgn and Bluetooth; Type: 512AN_HMW; Serial: MAC: 0016EA040060

* Communication System: OFDM 5250 MHz; Frequency: 5180 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 5.23065 mho/m, ε_r = 46.0541; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: EX3DV4 - SN3563; ConvF(3.79, 3.79, 3.79)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 036 Test/Area Scan (81x121x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.287 mW/g

Channel 036 Test/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.73 V/m; Power Drift = -0.127 dB
Peak SAR (extrapolated) = 0.250 W/kg
SAR(1 g) = 0.047 mW/g; SAR(10 g) = 0.015 mW/g
Maximum value of SAR (measured) = 0.100 mW/g



0 dB = 0.100mW/g

SAR MEASUREMENT PLOT 1

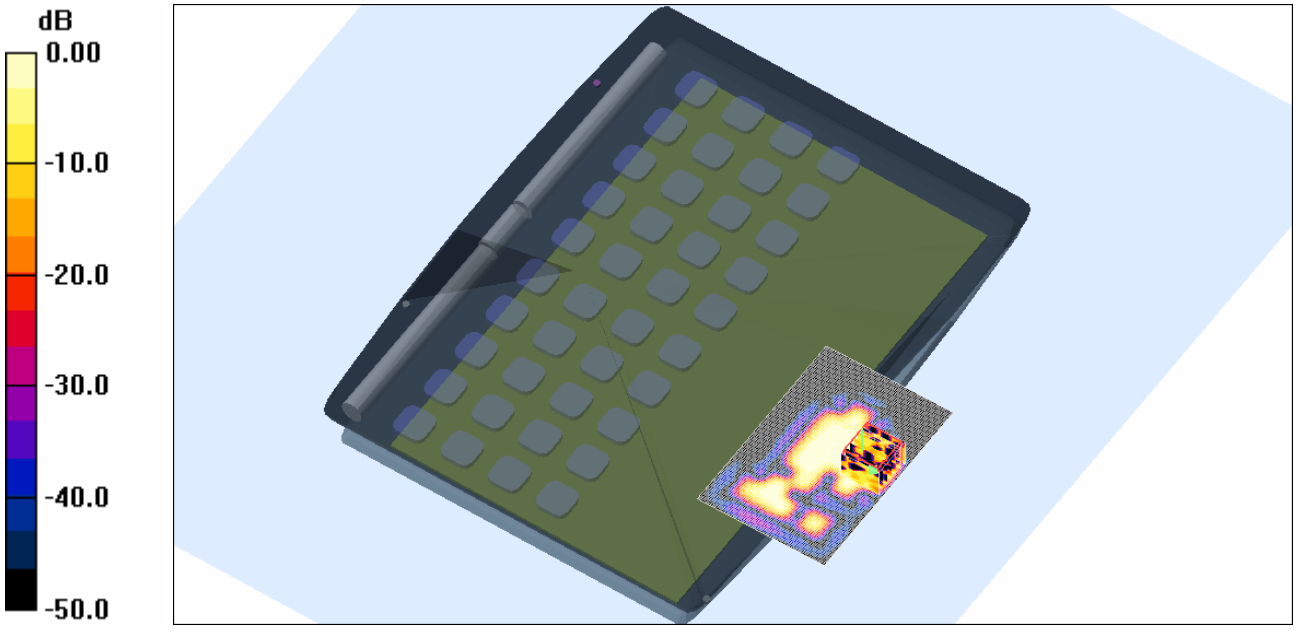
Ambient Temperature	**21.1 Degrees Celsius**
Liquid Temperature	**20.8 Degrees Celsius**
Humidity	**52.0 %**

Test Date: 09 May 2008
File Name: Tablet OFDM 5.2 GHz Ant A Bluetooth Off 09-05-08.da4
DUT: Fujitsu Notebook Seneca with Shirley Peak 11abgn and Bluetooth; Type: 512AN_HMW; Serial: MAC: 0016EA040060

* Communication System: OFDM 5250 MHz; Frequency: 5260 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 5.39136 mho/m, ε_r = 45.7843; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: EX3DV4 - SN3563; ConvF(3.79, 3.79, 3.79)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 052 Test/Area Scan (81x121x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.142 mW/g

Channel 052 Test/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.21 V/m; Power Drift = 0.181 dB
Peak SAR (extrapolated) = 0.241 W/kg
SAR(1 g) = 0.025 mW/g; SAR(10 g) = 0.00841 mW/g
Maximum value of SAR (measured) = 0.055 mW/g



0 dB = 0.055mW/g

SAR MEASUREMENT PLOT 2

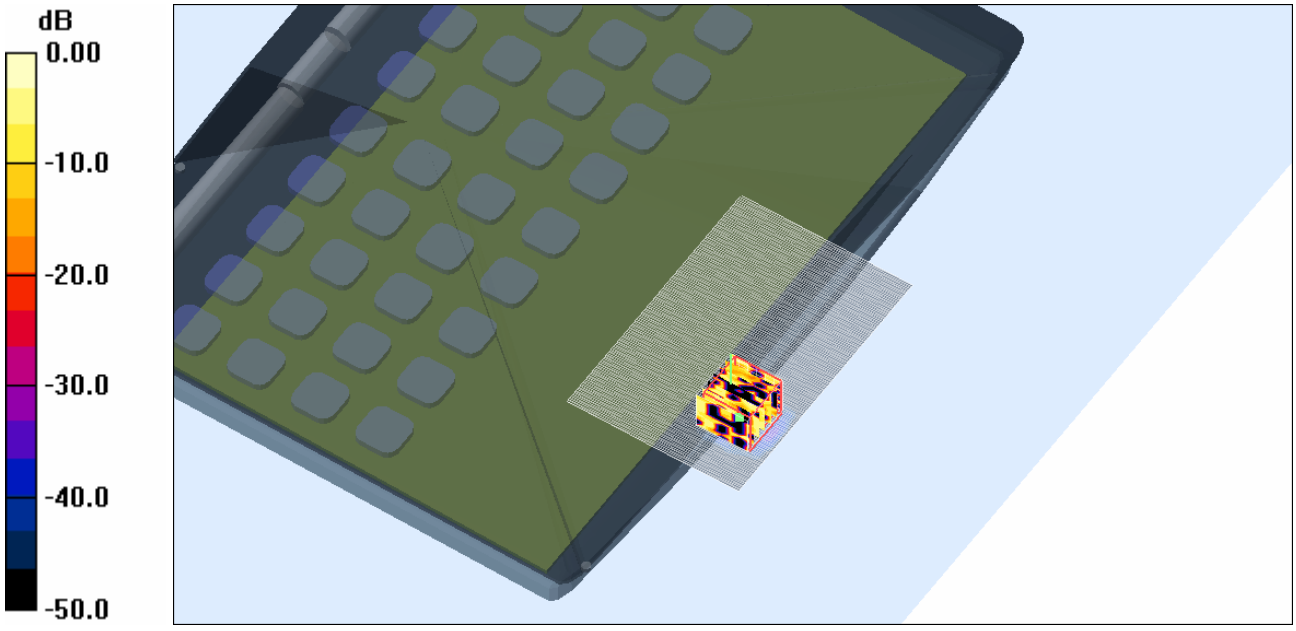
Ambient Temperature	**21.1 Degrees Celsius**
Liquid Temperature	**20.8 Degrees Celsius**
Humidity	**52.0 %**

Test Date: 09 May 2008
File Name: Tablet OFDM 5.2 GHz Ant A Bluetooth Off 09-05-08.da4
DUT: Fujitsu Notebook Seneca with Shirley Peak 11abgn and Bluetooth; Type: 512AN_HMW; Serial: MAC: 0016EA040060

* Communication System: OFDM 5250 MHz; Frequency: 5320 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 5.49282 mho/m, ε_r = 45.6323; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: EX3DV4 - SN3563; ConvF(3.79, 3.79, 3.79)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 064 Test 2/Area Scan (81x121x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.025 mW/g

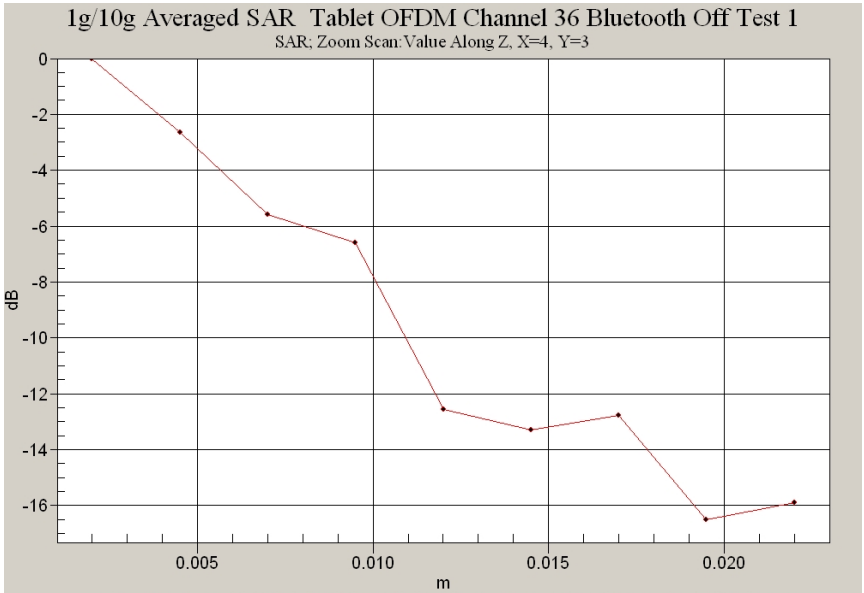
Channel 064 Test 2/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.22 V/m; Power Drift = -0.511 dB
Peak SAR (extrapolated) = 0.030 W/kg
SAR(1 g) = 0.00137 mW/g; SAR(10 g) = 0.000292 mW/g
Maximum value of SAR (measured) = 0.027 mW/g

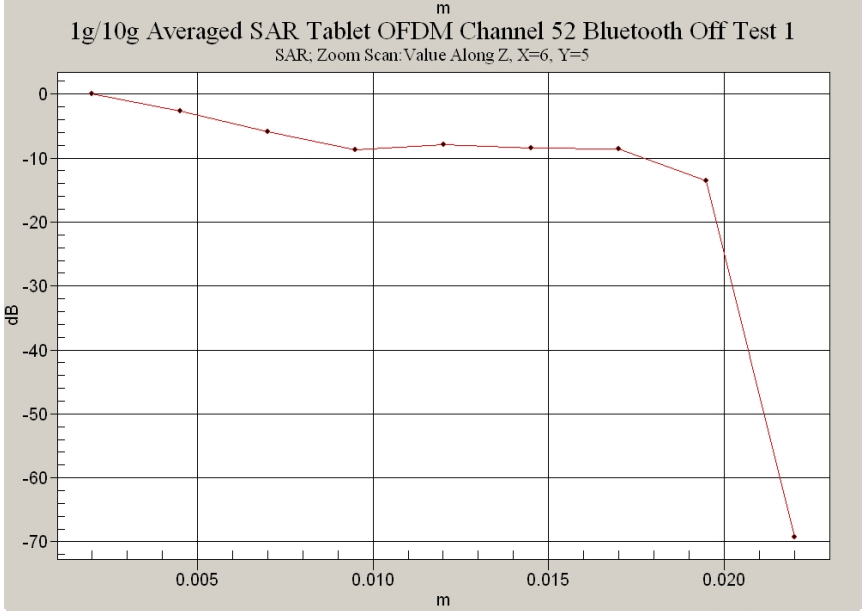


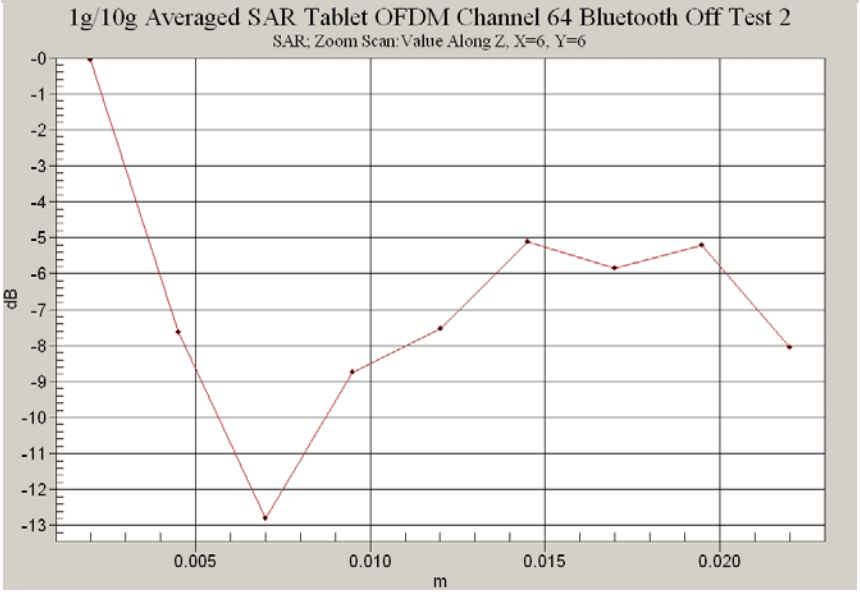
0 dB = 0.027mW/g

SAR MEASUREMENT PLOT 3

Ambient Temperature	**21.1 Degrees Celsius**
Liquid Temperature	**20.8 Degrees Celsius**
Humidity	**52.0 %**





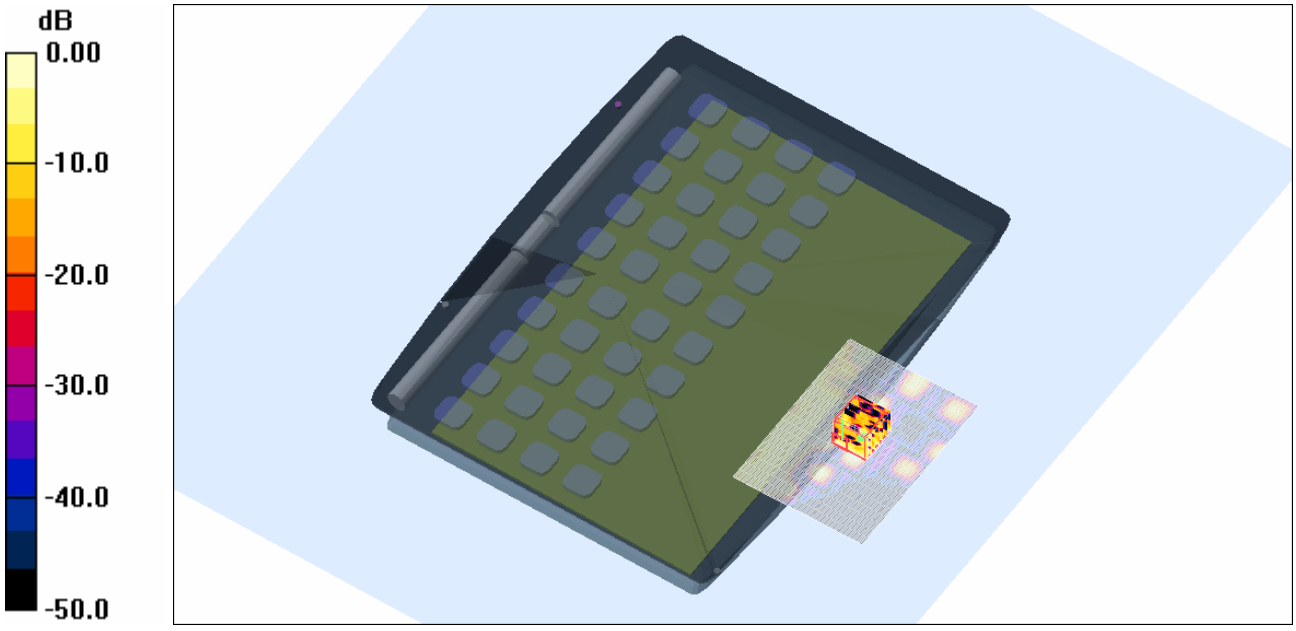


Test Date: 12 May 2008
File Name: Tablet OFDM 5.6 GHz Ant A Bluetooth Off 12-05-08.da4
DUT: Fujitsu Notebook Seneca with Shirley Peak 11abgn and Bluetooth; Type: 512AN_HMW; Serial: MAC: 0016EA040060

* Communication System: OFDM 5600 MHz; Frequency: 5500 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 5.55625 mho/m, ε_r = 45.5696; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: EX3DV4 - SN3563; ConvF(3.68, 3.68, 3.68)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 100 Test/Area Scan (91x121x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.102 mW/g

Channel 100 Test/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.00 V/m; Power Drift = 0.271 dB
Peak SAR (extrapolated) = 0.322 W/kg
SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.00675 mW/g
Maximum value of SAR (measured) = 0.060 mW/g



0 dB = 0.060mW/g

SAR MEASUREMENT PLOT 4

Ambient Temperature	**21.7 Degrees Celsius**
Liquid Temperature	**20.9 Degrees Celsius**
Humidity	**48.0 %**

Test Date: 12 May 2008

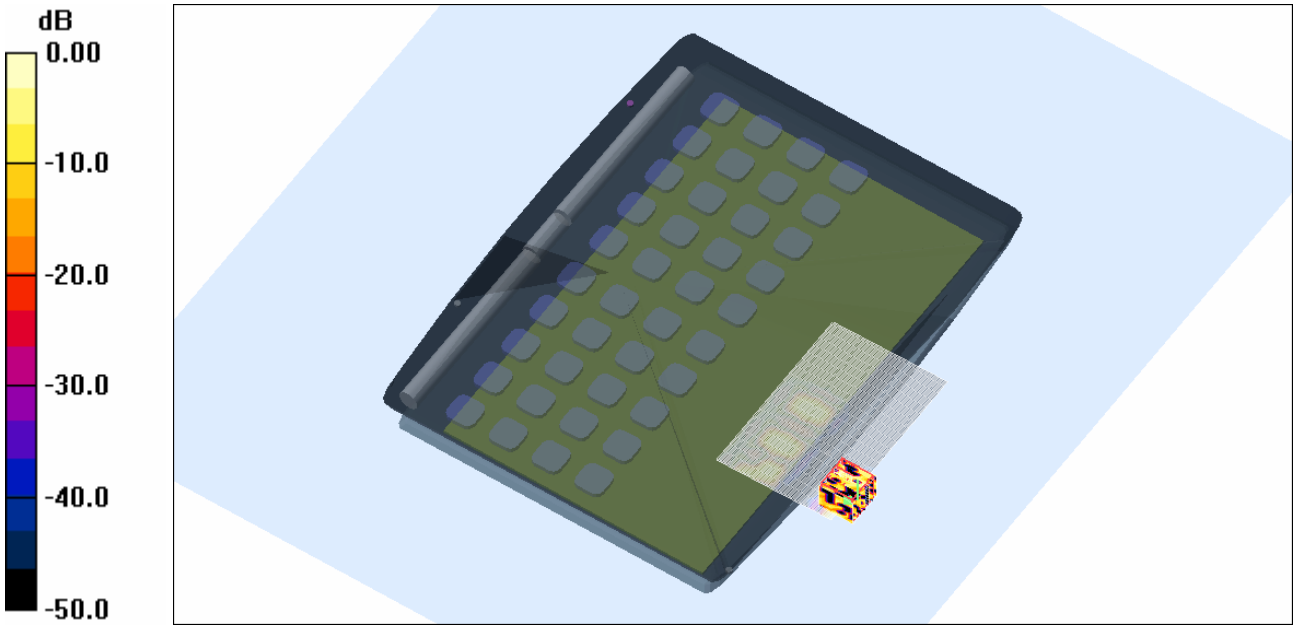
File Name: Tablet OFDM 5.6 GHz Ant A Bluetooth Off 12-05-08.da4

DUT: Fujitsu Notebook Seneca with Shirley Peak 11abgn and Bluetooth; Type: 512AN_HMW; Serial: MAC: 0016EA040060

* Communication System: OFDM 5600 MHz; Frequency: 5600 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 5.74955 mho/m, ε_r = 45.2725; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: EX3DV4 - SN3563; ConvF(3.68, 3.68, 3.68)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 120 Test/Area Scan (81x121x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.069 mW/g

Channel 120 Test/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.82 V/m; Power Drift = 0.066 dB
Peak SAR (extrapolated) = 0.030 W/kg
SAR(1 g) = 0.00157 mW/g; SAR(10 g) = 0.000403 mW/g
Maximum value of SAR (measured) = 0.026 mW/g



0 dB = 0.026mW/g

SAR MEASUREMENT PLOT 5

Ambient Temperature	**21.7 Degrees Celsius**
Liquid Temperature	**20.9 Degrees Celsius**
Humidity	**48.0 %**

Test Date: 12 May 2008

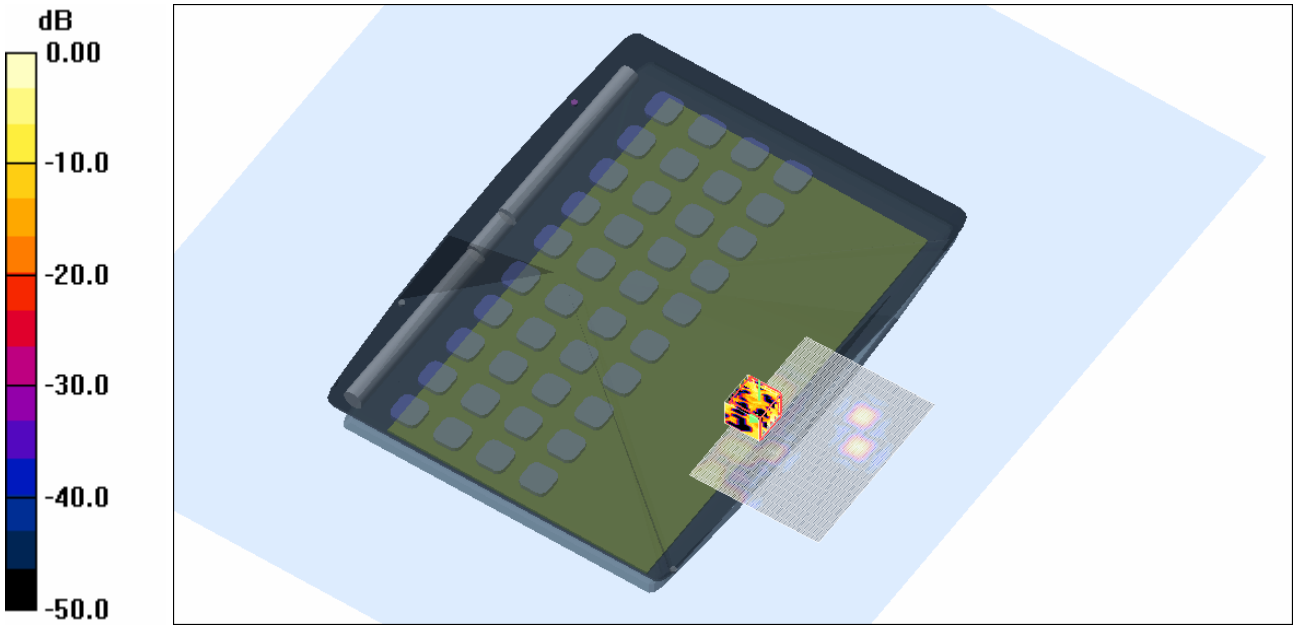
File Name: Tablet OFDM 5.6 GHz Ant A Bluetooth Off 12-05-08.da4

DUT: Fujitsu Notebook Seneca with Shirley Peak 11abgn and Bluetooth; Type: 512AN_HMW; Serial: MAC: 0016EA040060

* Communication System: OFDM 5600 MHz; Frequency: 5700 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 5.90109 mho/m, ε_r = 44.944; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: EX3DV4 - SN3563; ConvF(3.68, 3.68, 3.68)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 140 Test/Area Scan (91x121x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.062 mW/g

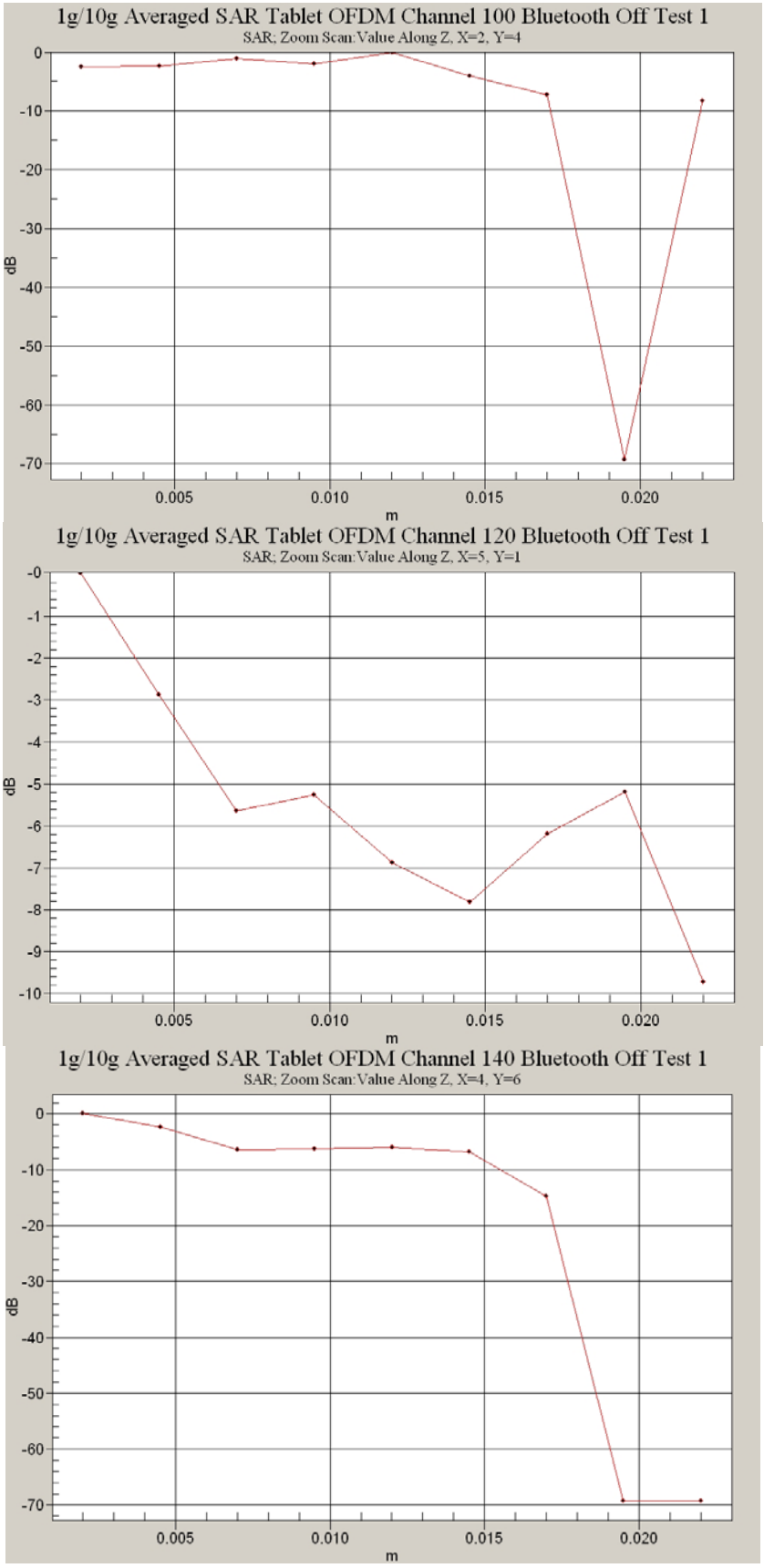
Channel 140 Test/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.28 V/m; Power Drift = 0.445 dB
Peak SAR (extrapolated) = 0.253 W/kg
SAR(1 g) = 0.026 mW/g; SAR(10 g) = 0.00681 mW/g
Maximum value of SAR (measured) = 0.056 mW/g



0 dB = 0.056mW/g

SAR MEASUREMENT PLOT 6

Ambient Temperature	**21.7 Degrees Celsius**
Liquid Temperature	**20.9 Degrees Celsius**
Humidity	**48.0 %**



Test Date: 14 May 2008

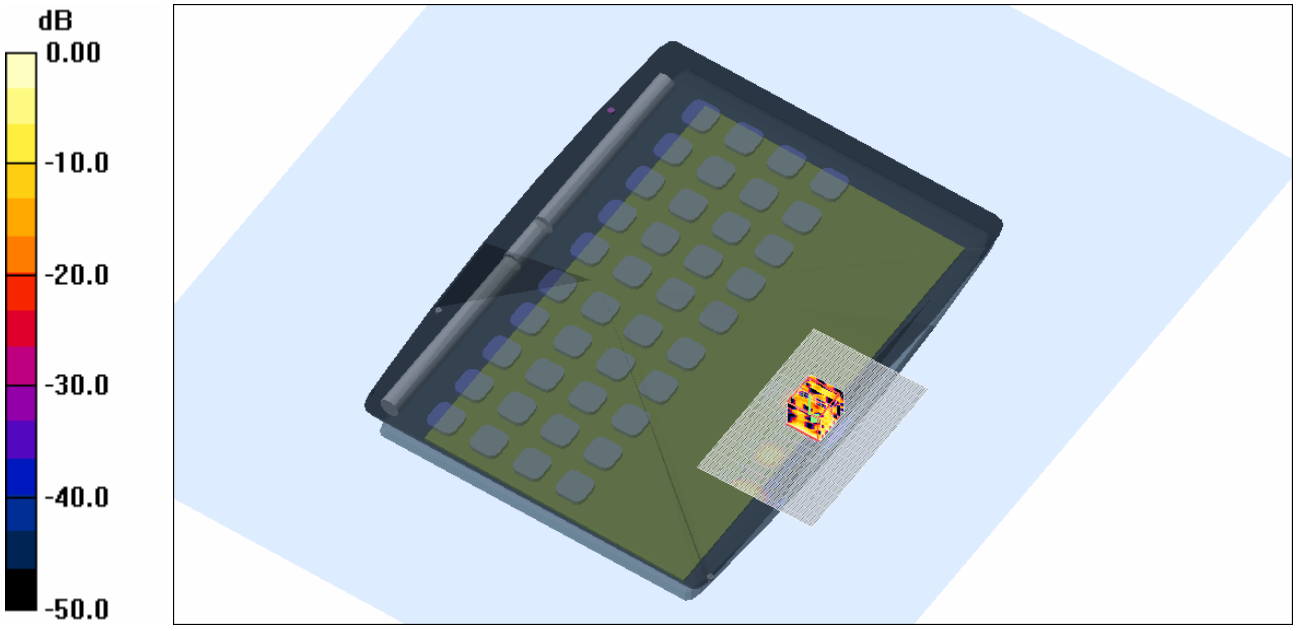
File Name: Tablet OFDM 5.8 GHz Ant A Bluetooth Off 14-05-08.da4

DUT: Fujitsu Notebook Seneca with Shirley Peak 11abgn and Bluetooth; Type: 512AN_HMW; Serial: MAC: 0016EA040060

* Communication System: OFDM 5770 MHz; Frequency: 5745 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 6.08119 mho/m, ε_r = 44.726; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: EX3DV4 - SN3563; ConvF(3.72, 3.72, 3.72)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 149 Test/Area Scan (81x121x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.083 mW/g

Channel 149 Test/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.01 V/m; Power Drift = -0.143 dB
Peak SAR (extrapolated) = 0.364 W/kg
SAR(1 g) = 0.035 mW/g; SAR(10 g) = 0.010 mW/g
Maximum value of SAR (measured) = 0.068 mW/g



0 dB = 0.068mW/g

SAR MEASUREMENT PLOT 7

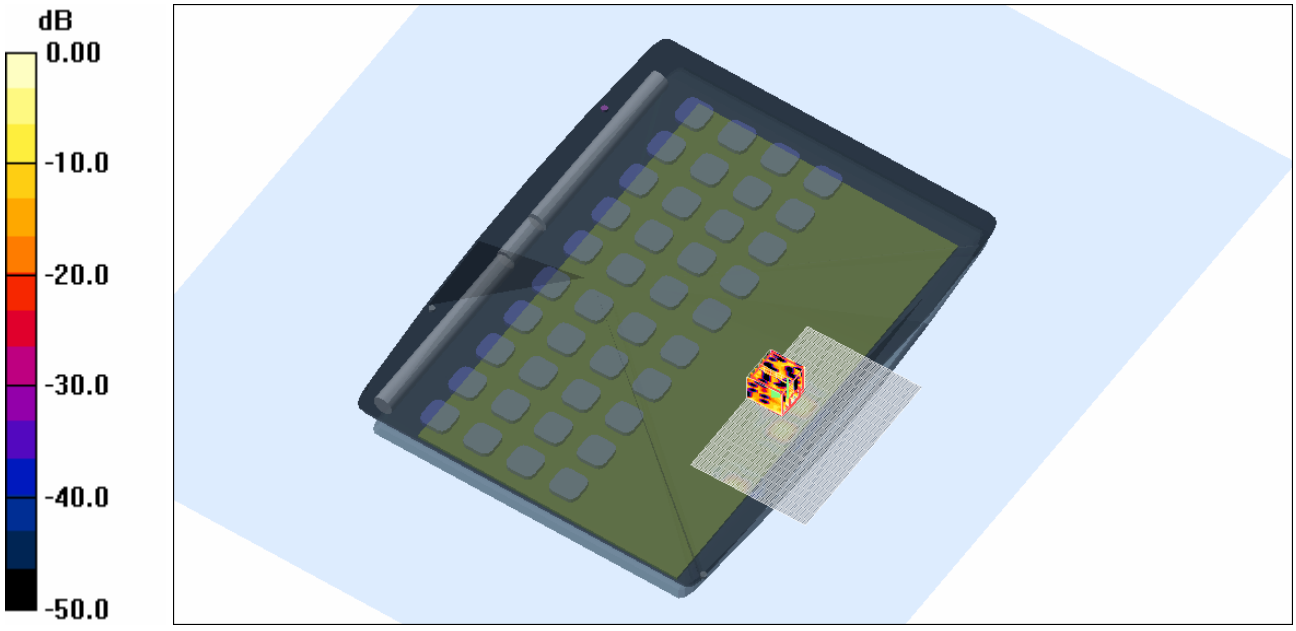
Ambient Temperature	**21.9 Degrees Celsius**
Liquid Temperature	**21.7 Degrees Celsius**
Humidity	**43.0 %**

Test Date: 14 May 2008
File Name: Tablet OFDM 5.8 GHz Ant A Bluetooth Off 14-05-08.da4
DUT: Fujitsu Notebook Seneca with Shirley Peak 11abgn and Bluetooth; Type: 512AN_HMW; Serial: MAC: 0016EA040060

* Communication System: OFDM 5770 MHz; Frequency: 5785 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 6.15365 mho/m, ε_r = 44.5767; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: EX3DV4 - SN3563; ConvF(3.72, 3.72, 3.72)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 157 Test/Area Scan (81x121x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.071 mW/g

Channel 157 Test/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 2.47 V/m; Power Drift = 0.449 dB
Peak SAR (extrapolated) = 0.402 W/kg
SAR(1 g) = 0.035 mW/g; SAR(10 g) = 0.00973 mW/g
Maximum value of SAR (measured) = 0.078 mW/g



0 dB = 0.078mW/g

SAR MEASUREMENT PLOT 8

Ambient Temperature	**21.9 Degrees Celsius**
Liquid Temperature	**21.7 Degrees Celsius**
Humidity	**43.0 %**

Test Date: 14 May 2008

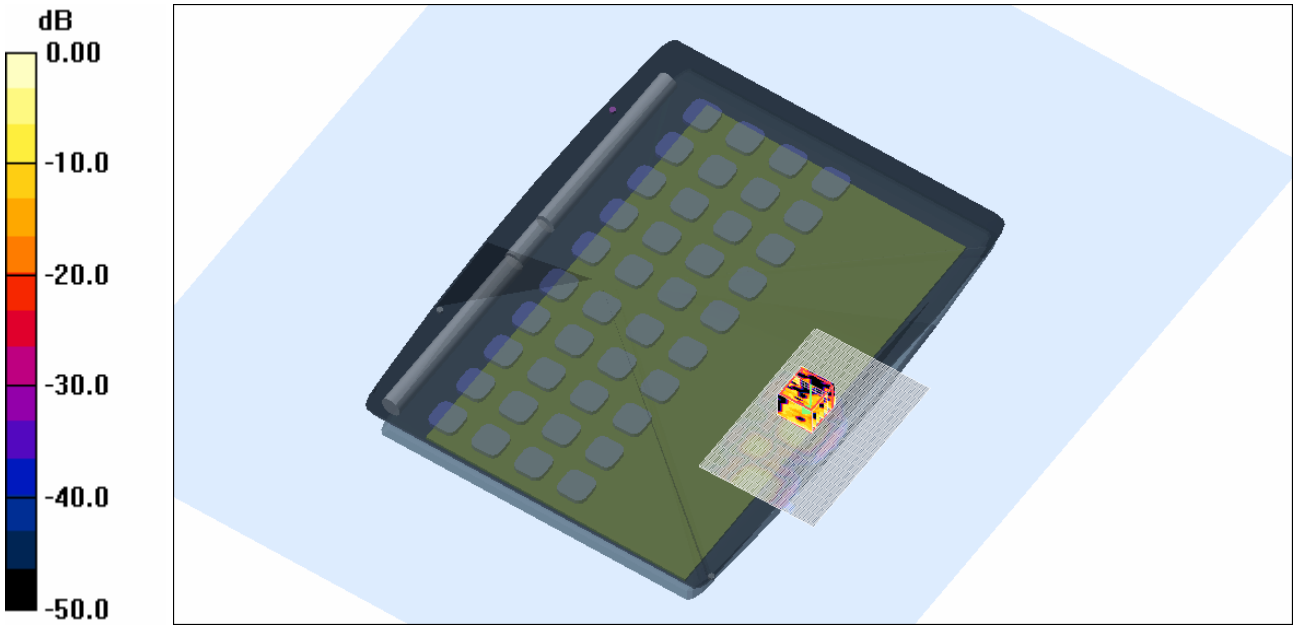
File Name: Tablet OFDM 5.8 GHz Ant A Bluetooth Off 14-05-08.da4

DUT: Fujitsu Notebook Seneca with Shirley Peak 11abgn and Bluetooth; Type: 512AN_HMW; Serial: MAC: 0016EA040060

* Communication System: OFDM 5770 MHz; Frequency: 5825 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 6.21135 mho/m, ε_r = 44.4314; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: EX3DV4 - SN3563; ConvF(3.72, 3.72, 3.72)
- Phantom: Flat Phantom 10.1; Serial: P 10.1; Phantom section: Flat 2.2 Section

Channel 165 Test/Area Scan (81x121x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.077 mW/g

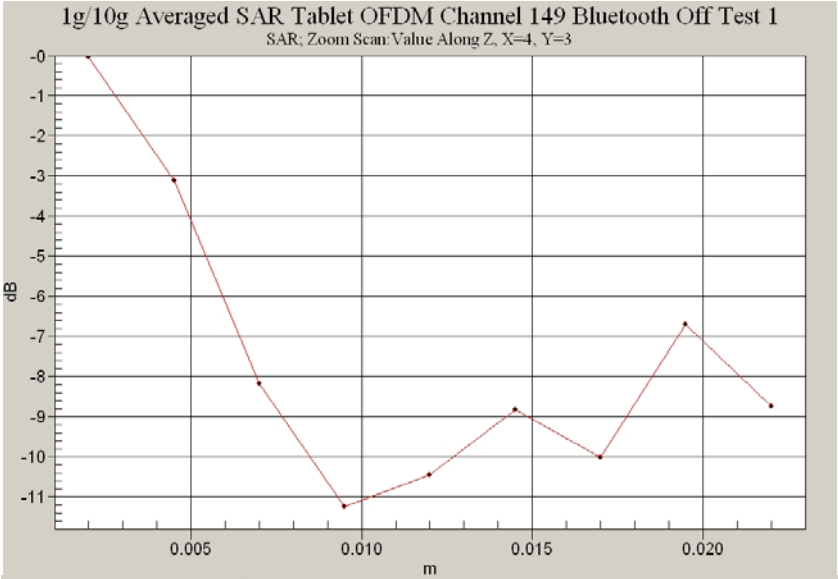
Channel 165 Test/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.30 V/m; Power Drift = -0.198 dB
Peak SAR (extrapolated) = 0.377 W/kg
SAR(1 g) = 0.036 mW/g; SAR(10 g) = 0.012 mW/g
Maximum value of SAR (measured) = 0.071 mW/g

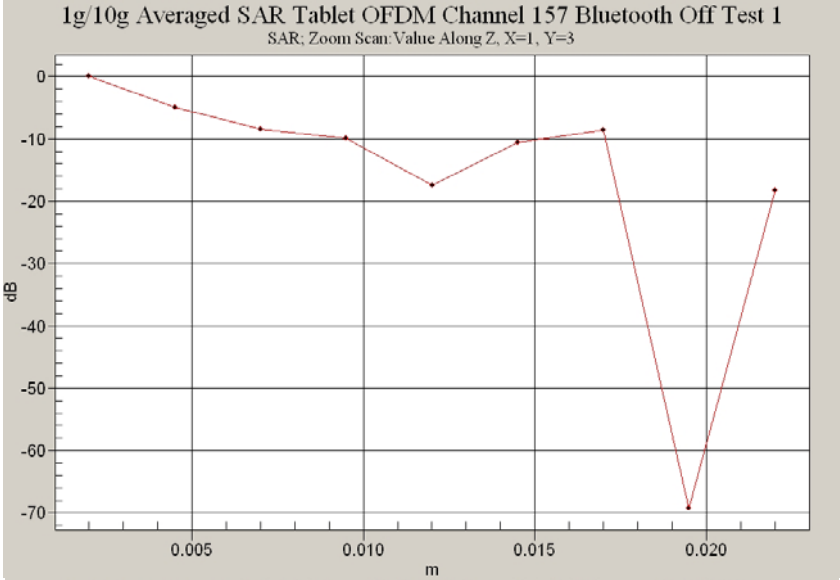


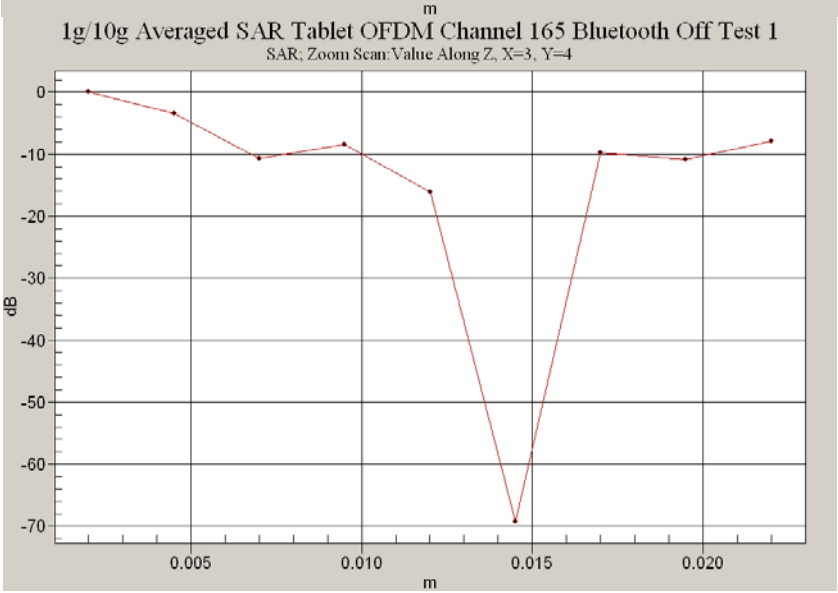
0 dB = 0.071mW/g

SAR MEASUREMENT PLOT 9

Ambient Temperature	**21.9 Degrees Celsius**
Liquid Temperature	**21.7 Degrees Celsius**
Humidity	**43.0 %**





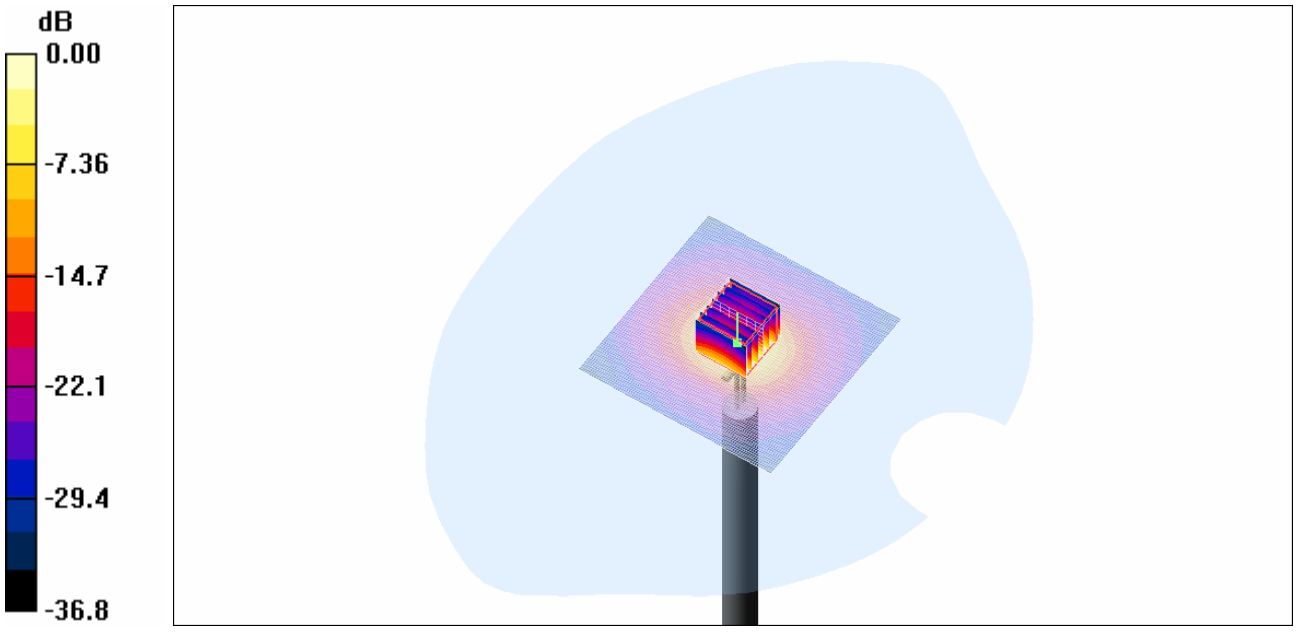


Test Date: 09 May 2008
File Name: Validation 5200MHz (DAE 442 Probe EX3DV4) 09-05-08.da4
DUT: Dipole 5200_5800 MHz; Type: D5GHzV2; Serial: 1008

* Communication System: CW 5200 MHz; Frequency: 5200 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 4.73901 mho/m, ε_r = 35.1914; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: EX3DV4 - SN3563; ConvF(4.25, 4.25, 4.25)
- Phantom: SAM 22; Serial: 1260; Phantom section: Flat Section

Channel 1 Test/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 43.4 mW/g

Channel 1 Test/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 99.6 V/m; Power Drift = 0.041 dB
Peak SAR (extrapolated) = 78.0 W/kg
SAR(1 g) = 20.2 mW/g; SAR(10 g) = 5.74 mW/g
Maximum value of SAR (measured) = 43.0 mW/g



0 dB = 43.0mW/g

SAR MEASUREMENT PLOT 10

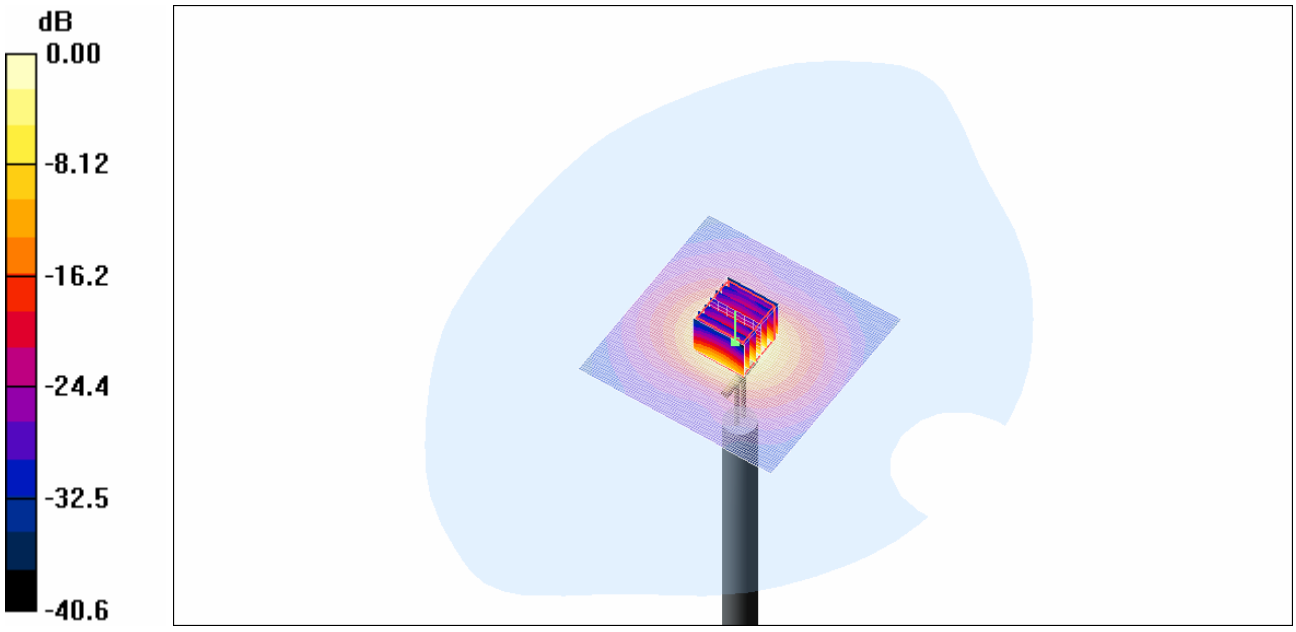
Ambient Temperature	**21.1 Degrees Celsius**
Liquid Temperature	**20.8 Degrees Celsius**
Humidity	**52.0 %**

Test Date: 12 May 2008
File Name: Validation 5500MHz (DAE 442 Probe EX3DV4) 14-05-08.da4
DUT: Dipole 5200_5800 MHz; Type: D5GHzV2; Serial: 1008

* Communication System: CW 5500 MHz; Frequency: 5500 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 4.90262 mho/m, ε_r = 35.3104; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: EX3DV4 - SN3563; ConvF(4.03, 4.03, 4.03)
- Phantom: SAM 22; Serial: 1260; Phantom section: Flat Section

Channel 1 Test 2/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 43.9 mW/g

Channel 1 Test 2/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 98.1 V/m; Power Drift = 0.049 dB
Peak SAR (extrapolated) = 83.0 W/kg
SAR(1 g) = 20.5 mW/g; SAR(10 g) = 5.79 mW/g
Maximum value of SAR (measured) = 43.1 mW/g



0 dB = 43.1mW/g

SAR MEASUREMENT PLOT 11

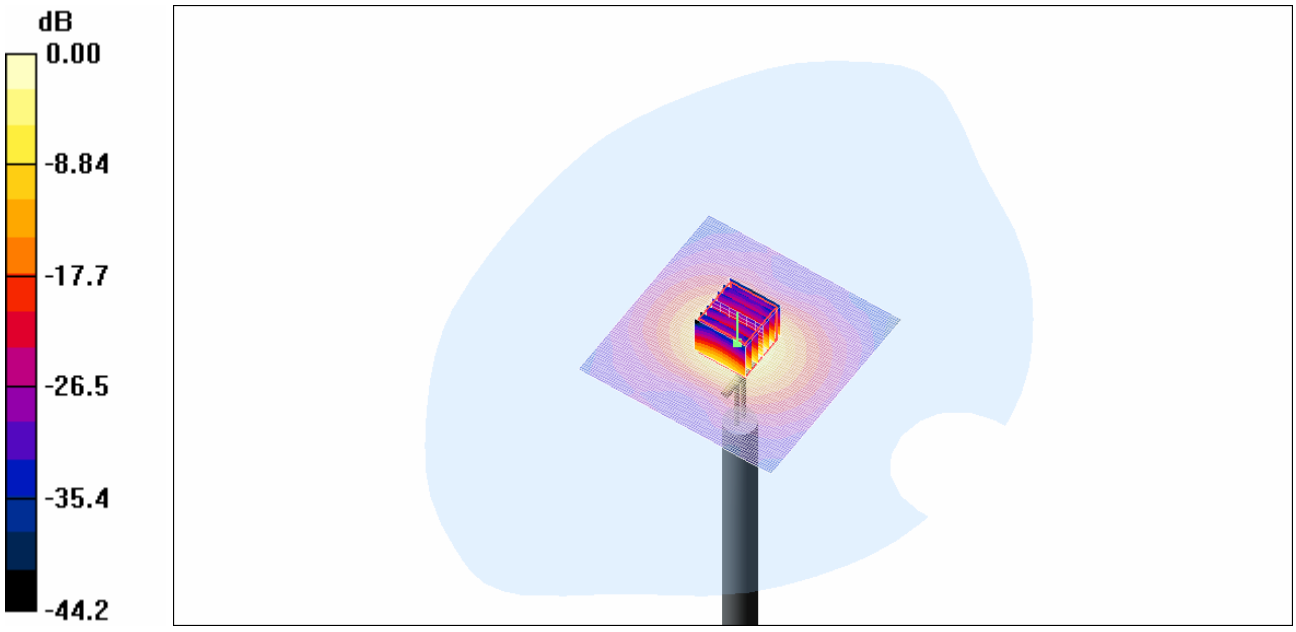
Ambient Temperature	**21.7 Degrees Celsius**
Liquid Temperature	**20.9 Degrees Celsius**
Humidity	**48.0 %**

Test Date: 14 May 2008
File Name: Validation 5800MHz (DAE 442 Probe EX3DV4) 14-05-08.da4
DUT: Dipole 5200_5800 MHz; Type: D5GHzV2; Serial: 1008

* Communication System: CW 5800 MHz; Frequency: 5800 MHz; Duty Cycle: 1:1
* Medium parameters used: σ = 5.37106 mho/m, ε_r = 33.8925; ρ = 1000 kg/m^3
- Electronics: DAE3 Sn442; Probe: EX3DV4 - SN3563; ConvF(3.65, 3.65, 3.65)
- Phantom: SAM 22; Serial: 1260; Phantom section: Flat Section

Channel 1 Test/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 43.1 mW/g

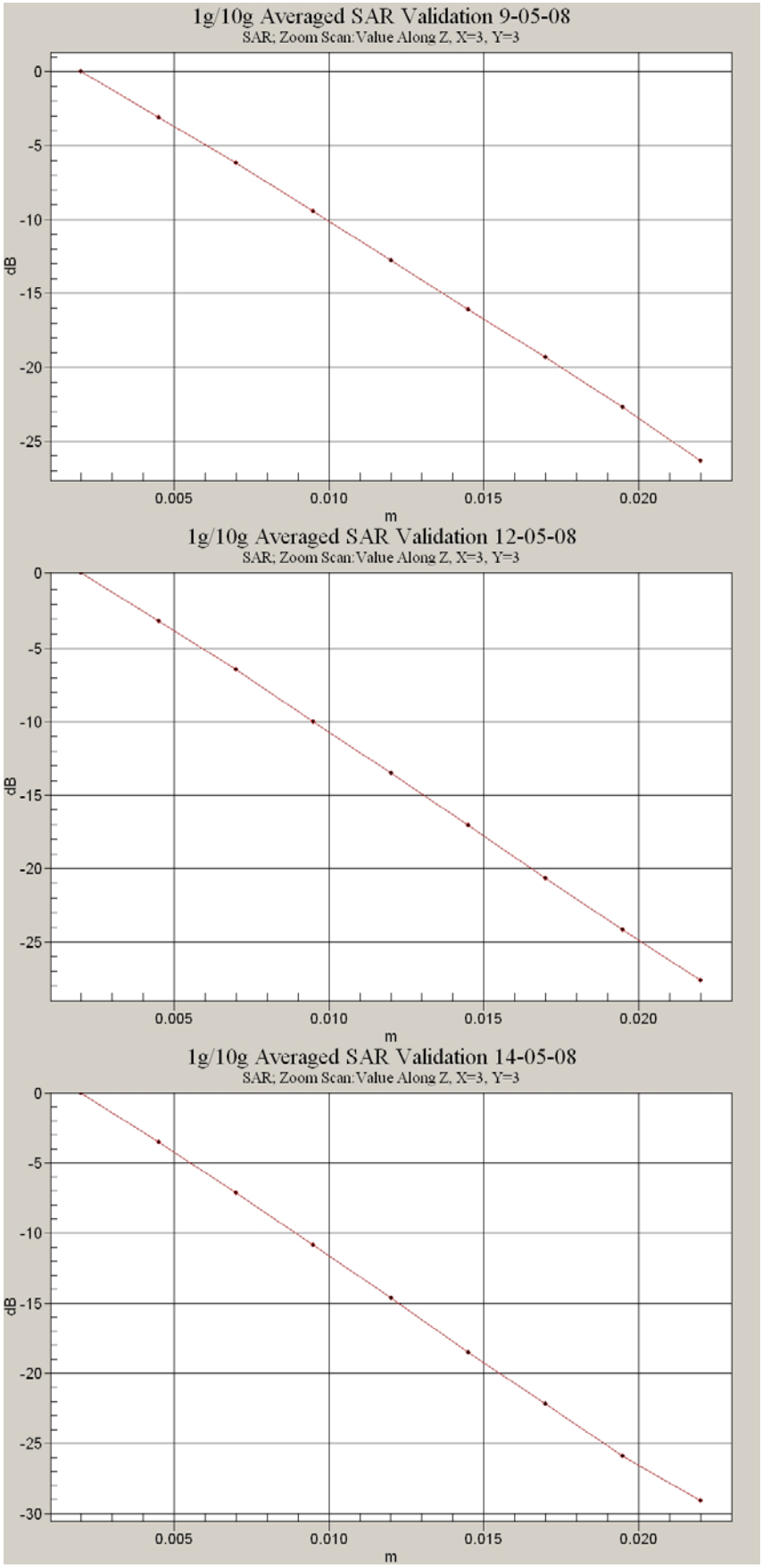
Channel 1 Test/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 93.5 V/m; Power Drift = 0.165 dB
Peak SAR (extrapolated) = 84.8 W/kg
SAR(1 g) = 19.9 mW/g; SAR(10 g) = 5.66 mW/g
Maximum value of SAR (measured) = 42.5 mW/g



0 dB = 42.5mW/g

SAR MEASUREMENT PLOT 12

Ambient Temperature	**21.9 Degrees Celsius**
Liquid Temperature	**21.7 Degrees Celsius**
Humidity	**43.0 %**



APPENDIX C CALIBRATION DOCUMENTS

1. SN: EX3DV4 Probe Calibration Certificate
2. SN: D5GHzV2 Dipole Calibration Certificate

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client EMC Technologies

Certificate No: EX3-3563_Sep06

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3563
Calibration procedure(s)	QA CAL-14.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	September 27, 2006 (**Additional Conversion Factors**)
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07

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

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

Issued: September 27, 2006

EX3DV4 SN:3563 **September 27, 2006**

DASY - Parameters of Probe: EX3DV4 SN:3563

Sensitivity in Free Space[A]

Diode Compression[B]

NormX	**0.390** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**88** mV
NormY	**0.390** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**80** mV
NormZ	**0.460** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**90** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 5.

Boundary Effect

TSL **5600 MHz** **Typical SAR gradient: 29 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	10.5	3.3
SAR_{be} [%]	With Correction Algorithm	0.0	0.0

TSL **5600 MHz** **Typical SAR gradient: 29 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	7.5	0.5
SAR_{be} [%]	With Correction Algorithm	0.0	0.1

Sensor Offset

Probe Tip to Sensor Center	**1.0** mm

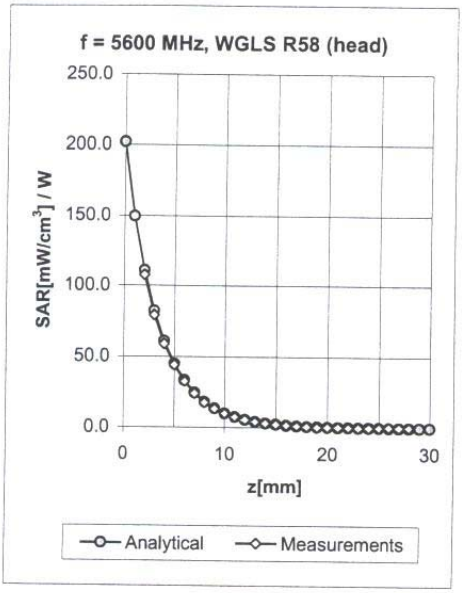
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

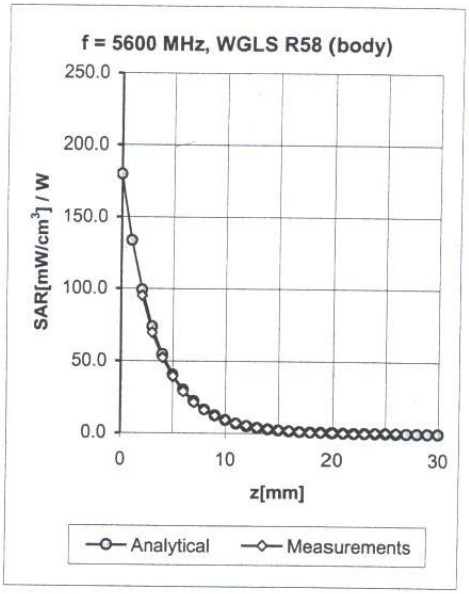
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

EX3DV4 SN:3563 September 27, 2006

Conversion Factor Assessment





f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
5600	± 50 / ± 100	Head	35.5 ± 5%	5.07 ± 5%	0.38	1.75	4.02 ± 13.1% (k=2)
5600	± 50 / ± 100	Body	48.5 ± 5%	5.77 ± 5%	0.35	1.70	3.63 ± 13.1% (k=2)

[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client EMC Technologies

Certificate No: D5GHzV2-1008_Sep06

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN: 1008
Calibration procedure(s)	QA CAL-22.v1 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	September 28, 2006
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe EX3DV4	SN: 3503	19-Mar-05 (SPEAG, No. EX3-3503_Mar06)	Mar-07
DAE4	SN: 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov 06

	Name	Function	Signature
Calibrated by:	Marcel Fehr	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 29, 2006

Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Area Scan resolution	dx, dy = 10 mm	
Zoom Scan Resolution	dx, dy = 4.3 mm, dz = 3 mm	
Frequency	5500 MHz ± 1 MHz	

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.0 ± 6 %	4.89 mho/m ± 6 %
Head TSL temperature during test	(21.6 ± 0.2) °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	condition	
SAR measured	250 mW input power	21.7 mW / g
SAR normalized	normalized to 1W	86.8 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**86.3 mW / g ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.08 mW / g
SAR normalized	normalized to 1W	24.3 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**24.2 mW / g ± 19.5 % (k=2)**

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

DASY4 Validation Report for Head TSL

Date/Time: 28.09.2006 12:05:42

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHz; Serial: D5GHzV2 - SN:1008

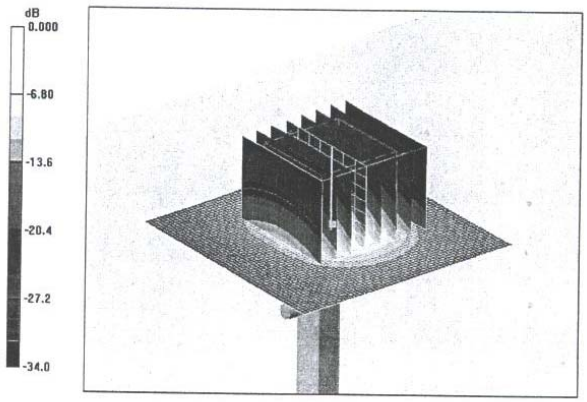
Communication System: CW-5GHz; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: HSL 5800 MHz;
Medium parameters used: f = 5500 MHz; σ = 4.89 mho/m; ε_r = 35; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.18, 5.18, 5.18); Calibrated: 18.03.2006
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

d=10mm, Pin=250mW, f=5500 MHz/Area Scan (61x61x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 49.7 mW/g

d=10mm, Pin=250mW, f=5500 MHz/Zoom Scan (8x8x8), dist=2mm (8x8x8)/Cube 0:
Measurement grid: dx=4.3mm, dy=4.3mm, dz=3mm
Reference Value = 77.4 V/m; Power Drift = -0.002 dB
Peak SAR (extrapolated) = 84.2 W/kg
SAR(1 g) = 21.7 mW/g; SAR(10 g) = 6.08 mW/g
Maximum value of SAR (measured) = 42.2 mW/g



0 dB = 42.2mW/g