ANSI/IEEE Std. C95.1-1992

in accordance with the requirements of

FCC Report and Order: ET Docket 93-62, and OET Bulletin 65 Supplement C

TEST REPORT

For

IOGEAR, Inc.

802.11b/g Wireless LAN CardBus PC Card

Model: GWP512

Trade Name: IOGEAR

Prepared for

IOGEAR, Inc.
23 Hubble Drive, Irvine, California 92618

Prepared by

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CERTIFICATE OF COMPLIANCE (SAR EVALUATION)

Dates of Tests: March 24, 2004

Applicant:	IOGEAR, Inc. 23 Hubble Drive, Irvine, California 92618
Model Number:	GWP512
FCC ID:	QLEGWP512
Device Category:	PORTABLE DEVICES
Exposure Category:	GENERAL POPULATION/UNCONTROLLED EXPOSURE

Test Sample is a: Production unit

Modulation type: 802.11b
Direct Sequence Spread Spectrum
802.11g
Orthogonal Frequency Division Multiplexing
(OFDM)

Tx Frequency: 2412 ~ 2462 MHz

Max. O/P Power: 19.01dBm
(Conducted/Peak)

Max. SAR (1g):   0.201W/kg

Application Type: Certification

FCC Rule Part(s):   15C

MWL-3761

Note: This Report is only applicable for 802.11b/g.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1-1992 and had been tested in accordance with the measurement procedures specified in FCC OET 65 Supplement C (released on 6/29/2001 see Test Report).

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Approved by:

Jonson Lee / Director
Compliance Certification Services Inc.

Reviewed by:

James Lee / Senior engineer
Compliance Certification Services Inc.

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1. EUT DESCRIPTION

Applicant:	IOGEAR, Inc. 23 Hubble Drive, Irvine, California 92618
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Tx Frequency:	2412 ~ 2462 MHz	
Max. O/P Power: (Conducted/Peak)	19.01dBm	
Max. SAR (1g):	0.201W/kg	
Application Type:	Certification	
FCC Rule Part(s):	15C	
Antennas:	Printed Ant.	
Test Host:		

2. REQUIREMENTS FOR COMPLIANCE TESTING DEFINED BY THE FCC

The US Federal Communications Commission has released the report and order "Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996 [1]. The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g for an uncontrolled environment and 8.0 mW/g for an occupational/controlled environment as recommended by the ANSI/IEEE standard C95.1-1992 [6]. According to the Supplement C of OET Bulletin 65 "Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under "worst-case" conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

3. DOSIMETRIC ASSESSMENT SYSTEM

These measurements were performed with the automated near-field scanning system DASY4 from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9 m) which positions the probes with a positional repeatability of better than ± 0.02 mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines to the data acquisition unit. The SAR measurements were conducted with the dosimetric probe ET3DV6-SN: 1762 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the procedure with accuracy of better than ±10%. The spherical isotropy was evaluated with the procedure and found to be better than ±0.25 dB. The phantom used was the SAM Twin Phantom as described in FCC supplement C, IEEE P1528 and EN50361.

3.1 MEASUREMENT SYSTEM DIAGRAM
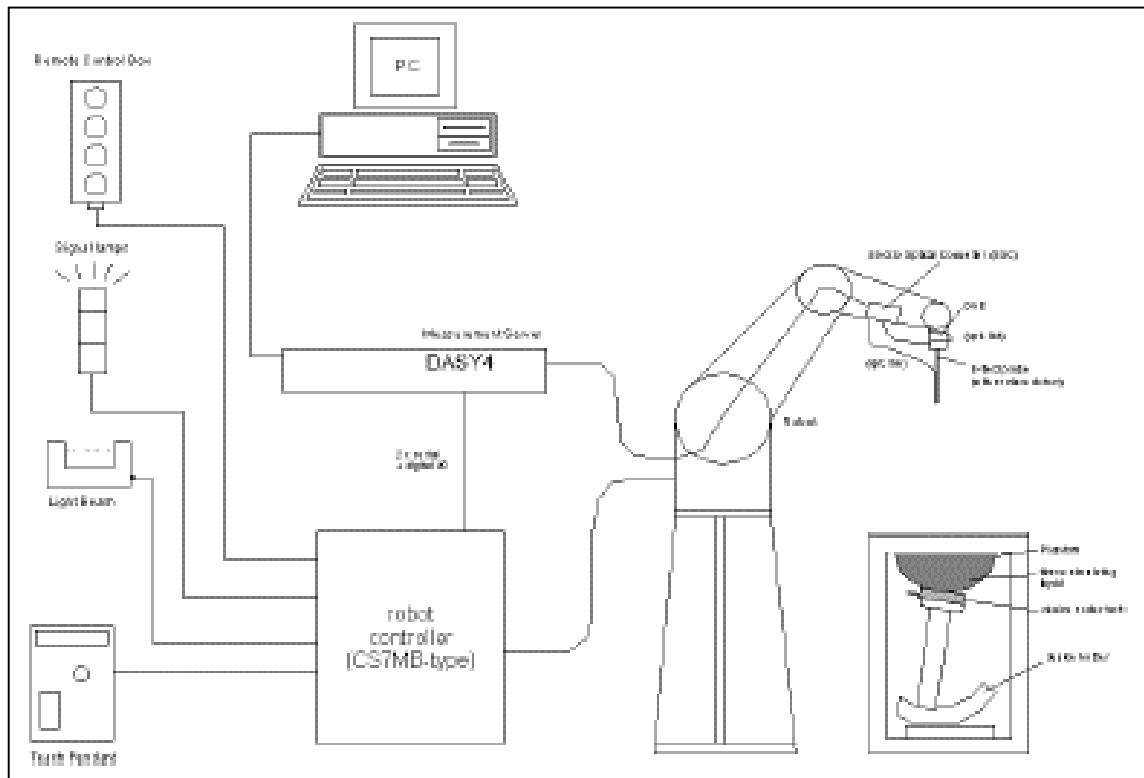
The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (St¨aubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).

- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.

- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.

- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.

- A computer operating Windows 2000 or Windows XP.

- DASY4 software.

- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.

- The SAM twin phantom enabling testing left-hand and right-hand usage.

- The device holder for handheld mobile phones.

- Tissue simulating liquid mixed according to the given recipes.

- Validation dipole kits allowing validating the proper functioning of the system.

3.2 SYSTEM COMPONENTS

DASY4 Measurement Server

The DASY4 measurement server is based on a PC/104 CPU board with a 166MHz low-power Pentium, 32MB chip disk and 64MB RAM. The necessary circuits for communication with either the DAE3 electronic box as well as the 16-bit AD-converter system for optical detection and digital I/O interface are contained on the DASY4 I/O-board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation.

The PC-operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with two expansion slots which are reserved for future applications. Please note that the expansion slots do not have a standardized pinout and therefore only the expansion cards provided by SPEAG can be inserted. Expansion cards from any other supplier could seriously damage the measurement server. Calibration: No calibration required.

Data Acquisition Electronics (DAE)

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. Transmission to the measurement server 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. The input impedance of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

ET3DV6 Isotropic E-Field Probe for Dosimetric Measurements

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Construction:	Symmetrical design with triangular core Built-in optical fiber for surface detection system (ET3DV6 only) Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)
Calibration:	Basic Broad Band Calibration in air: 10-2500 MHz. Conversion Factors (CF) for HSL 900 and HSL 1800 CF-Calibration for other liquids and frequencies upon request.
Frequency:	10 MHz to 3 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity:	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic Range:	2 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
Optical Surface Detection:	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces (ET3DV6 only)
Dimensions:	Overall length: 330 mm (Tip: 16 mm) Tip diameter: 6.8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.7 mm
Application:	General dosimetric measurements up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms (ET3DV6)

Interior of probe

E-Field probe

SAM Phantom (V4.0)

Construction: The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.
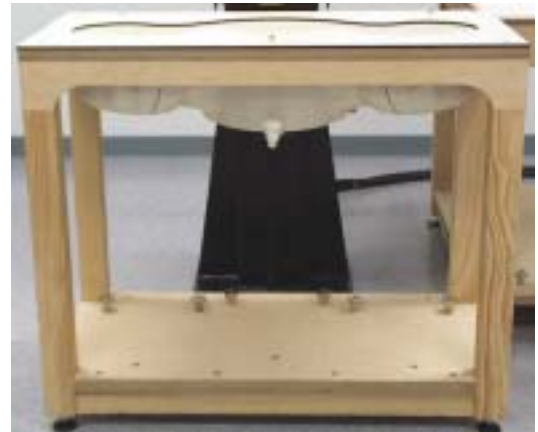
Shell Thickness: 2 ±0.2 mm

Filling Volume: Approx. 25 liters

Dimensions: Height: 810mm; Length: 1000mm; Width: 500mm

Device Holder for SAM Twin Phantom

Construction: In combination with the Twin SAM Phantom V4.0 or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

System Validation Kits

Construction: Symmetrical dipole with l/4 balun Enables measurement of feedpoint impedance with NWA Matched for use near flat phantoms filled with brain simulating solutions Includes distance holder and tripod adaptor.

Frequency: 450, 900, 1800, 2450, 5800 MHz

Return loss: > 20 dB at specified validation position

Power capability: > 100 W (f < 1GHz); > 40 W (f > 1GHz)

Dimensions: 450V2: dipole length: 270 mm; overall height: 330 mm
D900V2: dipole length: 149 mm; overall height: 330 mm
D1800V2: dipole length: 72 mm; overall height: 300 mm
D2450V2: dipole length: 51.5 mm; overall height: 300 mm D5GHzV2: dipole length: 25.5 mm; overall height: 290 mm

4. EVALUATION PROCEDURES

DATA EVALUATION

The DASY4 post processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	dcp_i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

with
V_i = Compensated signal of channel i (i = x, y, z)
U_i = Input signal of channel i (i = x, y, z)
cf = Crest factor of exciting field (DASY parameter)
dcp_i = Diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:
$$E_i = \sqrt{\frac{V_i}{Norm_i \bullet ConvF}}$$

H-field probes:
$$H_i = \sqrt{Vi} \cdot \frac{a_{i10} + a_{i11}f + a_{i12}f^2}{f}$$

with
V_i = Compensated signal of channel i (i = x, y, z)
$Norm_i$ = Sensor sensitivity of channel i (i = x, y, z)
$\mu V/(V/m)^2$ for E0field Probes
$ConvF$ = Sensitivity enhancement in solution
aij = Sensor sensitivity factors for H-field probes
f = Carrier frequency (GHz)
Ei = Electric field strength of channel i in V/m
Hi = Magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

with SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m

σ = conductivity in [mho/m] or [Siemens/m]

ρ = equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

The power flow density is calculated assuming the excitation field as a free space field.

$$P_{pwe} = \frac{E_{tot}^2}{3770} \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with P_{pwe} = Equivalent power density of a plane wave in mW/cm^2

E_{tot} = total electric field strength in V/m

H_{tot} = total magnetic field strength in A/m

SAR MEASUREMENT PROCEDURES

The procedure for assessing the peak spatial-average SAR value consists of the following steps:

- **Power Reference Measurement**

    The reference and drift jobs are useful jobs for monitoring the power drift of the device under test in the batch process. Both jobs measure the field at a specified reference position, at a selectable distance from the phantom surface. The reference position can be either the selected section's grid reference point or a user point in this section. The reference job projects the selected point onto the phantom surface, orients the probe perpendicularly to the surface, and approaches the surface using the selected detection method.

- **Area Scan**

    The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot. The sophisticated interpolation routines implemented in DASY4 software can find the maximum locations even in relatively coarse grids. The scan area is defined by an editable grid. This grid is anchored at the grid reference point of the selected section in the phantom. When the area scan's property sheet is brought-up, grid was at to **15 mm by 15 mm** and can be edited by a user.

- **Zoom Scan**

    Zoom scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default zoom scan measures **5x5x7** points within a cube whose base faces are centered around the maximum found in a preceding area scan job within the same procedure. If the preceding Area Scan job indicates more then one maximum, the number of Zoom Scans has to be enlarged accordingly (The default number inserted is 1).

- **Power Drift measurement**

    The drift job measures the field at the same location as the most recent reference job within the same procedure, and with the same settings. The drift measurement gives the field difference in dB from the reading conducted within the last reference measurement. Several drift measurements are possible for one reference measurement. This allows a user to monitor the power drift of the device under test within a batch process. In the properties of the Drift job, the user can specify a limit for the drift and have DASY4 software stop the measurements if this limit is exceeded.

- **Z-Scan**

    The Z Scan job measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. A user can anchor the grid to the current probe location. As with any other grids, the local Z-axis of the anchor location establishes the Z-axis of the grid.

5. MEASUREMENT UNCERTAINTY

UNCERTAINTY BUDGE ACCORDING TO IEEE P1528						
Error Description	**Uncertainty Value ±%**	**Probability distribution**	**Divisor**	**C_1 1g**	**Standard unc.(1g) ±%**	**V_1 or V_{eff}**
Measurement System						
Probe calibration	±4.8	normal	1	1	±4.8	∞
Axial isotropy of probe	±4.6	rectangular	$\sqrt{3}$	$(1-Cp)^{1/2}$	±1.9	∞
Sph. Isotropy of probe	±9.7	rectangular	$\sqrt{3}$	$(Cp)^{1/2}$	±3.9	∞
Probe linearity	±4.5	rectangular	$\sqrt{3}$	1	±2.7	∞
Detection Limit	±0.9	rectangular	$\sqrt{3}$	1	±0.6	∞
Boundary effects	±8.5	rectangular	$\sqrt{3}$	1	±4.8	∞
Readoutelectronics	±1.0	normal	1	1	±1.0	∞
Response time	±0.9	rectangular	$\sqrt{3}$	1	±0.5	∞
Integration time	±1.2	rectangular	$\sqrt{3}$	1	±0.8	∞
Mech Constrains of robot	±0.5	rectangular	$\sqrt{3}$	1	±0.2	∞
Probe positioning	±2.7	rectangular	$\sqrt{3}$	1	±1.7	∞
Extrap. And integration	±4.0	rectangular	$\sqrt{3}$	1	±2.3	∞
RF ambient conditiona	±0.54	rectangular	$\sqrt{3}$	1	±0.43	∞
Test Sample Related						
Device positioning	±2.2	normal	1	1	±2.23	11
Device holder uncertainty	±5	normal	1	1	±5.0	7
Power drift	±5	rectangular	$\sqrt{3}$	1	±2.9	∞
Phantom and Set up						
Phantom uncertainty	±4	rectangular	$\sqrt{3}$	1	±2.3	∞
Liquid conductivity	±5	rectangular	$\sqrt{3}$	0.6	±1.7	∞
Liquid conductivity	±5	rectangular	$\sqrt{3}$	0.6	±3.5/1.7	∞
Liquid permittivity	±5	rectangular	$\sqrt{3}$	0.6	±1.7	∞
Liquid permittivity	±5	rectangular	$\sqrt{3}$	0.6	±1.7	∞
Combined Standard Uncertainty					±12.14/11.76	
Coverage Factor for 95%		kp=2				
Expanded Standard Uncertainty					±24.29/23.51	

Table: Worst-case uncertainty for DASY4 assessed according to IEEE P1528.
The budge is valid for the frequency range 300 MHz to 3G Hz and represents a worst-case analysis.

6. EXPOSURE LIMIT

(A). Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	2.0

(B). Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

NOTE: ***Whole-Body SAR*** is averaged over the entire body, ***partial-body SAR*** is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. ***SAR for hands, wrists, feet and ankles*** is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

Population/Uncontrolled Environments:

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

Occupational/Controlled Environments:

are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

NOTE
GENERAL POPULATION/UNCONTROLLED EXPOSURE
PARTIAL BODY LIMIT
1.6 W/kg

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7. MEASUREMENT RESULTS

7.1 SYSTEM PERFORMANCE CHECK

The system performance check is performed prior to any usage of the system in order to guarantee reproducible results. The system performance check verifies that the system operates within its specifications. The system performance check results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

SYSTEM PERFORMANCE CHECK MEASUREMENT CONDITIONS

- The measurements were performed in the flat section of the SAM twin phantom filled with Head simulating liquid of the following parameters.

- The DASY4 system with an E-fileld probe ET3DV6 SN: 1762 was used for the measurements.

- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) from dipole center to the simulating liquid surface.

- The coarse grid with a grid spacing of 10mm was aligned with the dipole.

- Special 5x5x7 fine cube was chosen for cube integration (dx=dy= 7.5 mm, dz= 3 mm).

- Distance between probe sensors and phantom surface was set to 3.0 mm.

- The dipole input power (forward power) was 250 mW±3%.

- The results are normalized to 1 W input power.

Reference SAR values

The reference SAR values were using measurement results indicated in the dipole calibration document (see table below)

Frequency (MHz)	1g SAR	10g SAR	Local SAR at Surface (Above Feed Point)	Local SAR at Surface (y = 2cm offset from feed point)
900	10.3	6.57	16.4	5.4
1800	38.2	20.3	69.5	6.8
2450(Body)	53.2	24.3	104.2	7.7

SYSTEM PERFORMANCE CHECK RESULTS

Dipole: D2450V2 SN: 731
Date: March 24, 2004
Ambient condition: Temperature 24.8°C; Relative humidity: 49%

Head Simulating Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
f(MHz)	Temp. [°C]	Depth [cm]					
2450.00	23.80	15.00	Permitivity:	52.70	51.40	-2.47	± 5
			Conductivity:	1.95	1.98	1.54	± 5
			1g SAR:	53.20	52.40	-1.50	± 5

7.2 TEST LIQUID CONFIRMATION

SIMULATING LIQUIDS PARAMETER CHECK

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values

The relative permittivity and conductivity of the tissue material should be within ± 5% of the values given in the table below. 5% may not be easily achieved at certain frequencies. Under such circumstances, 10% tolerance may be used until more precise tissue recipes are available

IEEE SCC-34/SC-2 P1528 RECOMMENDED TISSUE DIELECTRIC PARAMETERS

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in P1528

Target Frequency	Head		Body	
(MHz)	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	45.3	5.27	48.2	6.00

SIMULATING LIQUIDS PARAMETER CHECK RESULTS

Ambient condition: Temperature: 24.8°C; Relative humidity: 49%   **Date:** March 24, 2004

Body Simulating Liquid			Parameters	Target	Measured	Deviation[%]	Limited[%]
f (MHz)	Temp. [°C]	Depth (cm)					
2450.00	23.80	15.00	Permitivity:	52.70	51.40	-2.47	± 5
			Conductivity:	1.95	1.98	1.54	± 5

7.3 EUT TUNE-UP PROCEDURES

The following procedure had been used to prepare the EUT for the SAR test.

o   The client supplied a special driver to program the EUT, allowing it to continually transmit the specified maximum power and change the channel frequency.

o   The conducted power was measured at the high, middle and low channel frequency before and after the SAR measurement.

o   The output power(dBm) we measured before SAR test in different transition rate and channel

IEEE802.11b:

Rate CH	1M	2M	5.5M	11M
1	18.17	18.27	18.37	18.47
6	18.51	18.61	18.71	18.81
11	18.71	18.81	18.91	**19.01**

IEEE802.11g:

Rate CH	6M
1	18.60
6	18.50
11	18.28

7.4 SAR MEASUREMENTS RESULTS

EUT Setup Configuration 1

802.11b (DSSS)with host (Compaq): Duty Cycle =100 %, Crest Factor: 1.   Depth of liquid: 15.0 cm

Sep. [mm]	Antenna	Channel	Frequency [MHz]	*Conducted Power_dBm		Liquid Temp [°C]	SAR (W/kg)	Limit (W/kg)
				Before	After			
0	A	6	2437	18.80	18.78	23.8	0.077	1.6

Sep. [mm]	Antenna	Channel	Frequency [MHz]	*Conducted Power_dBm		Liquid Temp [°C]	SAR (W/kg)	Limit (W/kg)
				Before	After			
0	B	1	2412	18.47	18.45	23.8	0.067	1.6
0	B	6	2437	18.81	18.79	23.8	0.179	1.6
0	B	11	2462	**19.01**	18.89	23.8	**0.201**	1.6

802.11g (OFDM)with host (Compaq): Duty Cycle =100 %, Crest Factor: 1.   Depth of liquid: 15.0 cm

Sep. [mm]	Antenna	Channel	Frequency [MHz]	*Conducted Power_dBm		Liquid Temp [°C]	SAR (W/kg)	Limit (W/kg)
				Before	After			
0	B	1	2412	18.60	18.58	23.8	0.046	1.6
0	B	6	2437	18.50	18.48	23.8	0.117	1.6
0	B	11	2462	18.28	18.26	23.8	0.050	1.6

Notes:

1. *: Peak power.
2. Bottom face in parallel with flat phantom.
3. See attachment for the result presentation in plot format.

EUT Setup Configuration 2

802.11b (DSSS) with host(Compaq): Duty Cycle = 100 %, Crest Factor: 1.   Depth of liquid: 15.0 cm

Sep. [mm]	Antenna	Channel	Frequency [MHz]	*Conducted Power_dBm		Liquid Temp [°C]	SAR (W/kg)	Limit (W/kg)
				Before	After			
15	A	6	2437	18.80	18.78	23.8	0.049	1.6

Sep. [mm]	Antenna	Channel	Frequency [MHz]	*Conducted Power_dBm		Liquid Temp [°C]	SAR (W/kg)	Limit (W/kg)
				Before	After			
15	B	6	2437	18.81	18.79	23.8	0.063	1.6

802.11g (OFDM)with host (Compaq): Duty Cycle =100 %, Crest Factor: 1.   Depth of liquid: 15.0 cm

Sep. [mm]	Antenna	Channel	Frequency [MHz]	*Conducted Power_dBm		Liquid Temp [°C]	SAR (W/kg)	Limit (W/kg)
				Before	After			
0	B	6	2437	18.50	18.48	23.8	0.033	1.6

Notes:

1. *: Peak power.
2. Host device perpendicular to flat phantom.
3. See attachment for the result presentation in plot format.

8. EUT PHOTOS

9. EQUIPMENT LIST & CALIBRATION STATUS

Name of Equipment	Manufacturer	Type/Model	Serial Number	Calibration Due
S-Parameter Network Analyzer	Agilent	E8358A	US40280243	03/24/04
Electronic Probe kit	Hewlett Packard	85070D	N/A	N/A
Power Meter	Boonton	4531	13061	07/13/04
Power Sensor	Boonton	56218	2240	07/13/04
Power Meter	Agilent	E4416A	GB41291611	03/15/04
Power Sensor	Agilent	E9327A	US40441097	03/15/04
Thermometer	Amarell	4046	24775	10/10/13
Thermometer	Amarell	4046	23641	12/12/12
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	1100.0008.02	N/A
Signal Generator	Agilent	E8257C	US542340383	04/22/04
Amplifier	Mini-Circuit	ZHL-1724HLN	N/A	N/A
DC Power generator	ABM	8301HD		N/A
Data Acquisition Electronics (DAE)	SPEAG	DAE3	558	03/07/04
Dosimetric E-Field Probe	SPEAG	ET3DV6	1762	03/31/04
900 MHz System Validation Dipole	SPEAG	D900V2	172	01/12/05
1800 MHz System Validation Dipole	SPEAG	D1800V2	2d057	02/09/05
2450 MHz System Validation Dipole	SPEAG	D2450V2	731	03/21/04
Probe Alignment Unit	SPEAG	LB (V2)	348	N/A
Robot	Staubli	RX90B L	F02/5T69A1/A/01	N/A
SAM Twin Phantom V4.0	SPEAG	N/A	N/A	N/A
Devices Holder	SPEAG	N/A	N/A	N/A
Head 835 MHz	CCS	H835A	N/A	N/A
Muscle 835 MHz	CCS	M835A	N/A	N/A
Head 900 MHz	CCS	H900A	N/A	N/A
Muscle 900 MHz	CCS	M900A	N/A	N/A
Head 1800 MHz	CCS	H1800A	N/A	N/A
Muscle 1800 MHz	CCS	M1800A	N/A	N/A
Head 1900 MHz	CCS	H1900A	N/A	N/A
Muscle 1900 MHz	CCS	M1900A	N/A	N/A
Head 2450 MHz	CCS	H2450A	N/A	N/A
Muscle 2450 MHz	CCS	M2450A	N/A	N/A
Note: SPEAG will arrange the calibration date for equipment DAE3. The equipment accuracy, please refer to " The System performance check " of this test report on P.16-17.				

10. FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang, Taoyuan Hsien, Taiwan, R.O.C.

☒ No. 11, Wu-Kung 6 Rd, Wu-Ku Hsiang, Wu-Ku Industrial District, Taipei Hsien, (248) Taiwan.

☐ No. 199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

11. REFERENCES

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[2]   David L. Means Kwok Chan, Robert F. Cleveland, \Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields", Tech. Rep., Federal Communication Commision, O_ce of Engineering & Technology, Washington, DC, 1997.

[3]   Thomas Schmid, Oliver Egger, and Niels Kuster, \Automated E-_eld scanning system for dosimetric assessments", IEEE Transactions on Microwave Theory and Techniques, vol. 44, pp. 105{113, Jan. 1996.

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[11]   W. Gander, Computermathematik, Birkhaeuser, Basel, 1992.

[12]   W. H. Press, S. A. Teukolsky, W. T. Vetterling, and B. P. Flannery, Numerical Recepies in C, The Art of Scientific Computing, Second Edition, Cambridge University Press, 1992..Dosimetric Evaluation of Sample device, month 1998 9

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12. ATTACHMENTS

Exhibit	Content
1	Data Acquisition Electronics (DAE)-DAE3, S/N: 558
2	Dosimetric E-Field Probe - ET3DV6, S/N: 1762
3	Validation Dipole - D2450V2, S/N: 731
4	System Performance Check Plots
5	SAR Test Plots

END OF REPORT

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

Client

CALIBRATION CERTIFICATE

Object(s)	DAE3 - SN:558
Calibration procedure(s)	QA CAL-06.v2 Calibration procedure for the data acquisition unit (DAE)
Calibration date:	March 07, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 International standard.

All calibrations have been conducted in the closed laboratory facility; environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01	Sep-03

	Name	Function	Signature
Calibrated by:	Eric Hainfeld	Technician	
Approved by:	Fin Bornholt	R&D Director	

Date Issued: March 07, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

1. DC Voltage Measurement

DA - Converter Values from DAE
High Range: 1LSB =   6.1µV ,   full range =   400 mV
Low Range: 1LSB =   61nV ,   full range =   4 mV

Software Set-up: Calibration time: 3 sec   Measuring time: 3 sec

Setup	X	Y	Z
High Range	405.010098	404.9037428	405.0817835
Low Range	3.972	3.95185	3.96828
Connector Position	86 °		

High Range		Input	Reading in µV	% Error
Channel X	+ Input	200mV	200000	0.00
		20mV	20003.4	0.02
Channel X	- Input	20mV	-19993	-0.04
Channel Y	+ Input	200mV	200001	0.00
		20mV	20002.7	0.01
Channel Y	- Input	20mV	-19993	-0.04
Channel Z	+ Input	200mV	200000	0.00
		20mV	20000.8	0.00
Channel Z	- Input	20mV	-19997.7	-0.01

Low Range		Input	Reading in µV	% Error
Channel X	+ Input	2mV	2000.2	0.01
		0.2mV	200.04	0.02
Channel X	- Input	0.2mV	-200.81	0.41
Channel Y	+ Input	2mV	2000.1	0.00
		0.2mV	199.47	-0.27
Channel Y	- Input	0.2mV	-201.01	0.50
Channel Z	+ Input	2mV	1999.9	0.00
		0.2mV	198.68	-0.66
Channel Z	- Input	0.2mV	-201.1	0.55

2. Common mode sensitivity

Software Set-up
    Calibration time: 3 sec, Measuring time: 3 sec
    High/Low Range

in µV	Common mode Input Voltage	High Range Reading	Low Range Reading
Channel X	200mV	-1.0284	-1.5716
	- 200mV	3.9204	1.3725
Channel Y	200mV	6.7686	5.874
	- 200mV	-6.8145	-8.0898
Channel Z	200mV	2.1943	2.766
	- 200mV	-2.52	-4.6218

3. Channel separation

Software Set-up
    Calibration time: 3 sec, Measuring time: 3 sec
    High Range

in µV	Input Voltage	Channel X	Channel Y	Channel Z
Channel X	200mV	-	0.88082	0.19177
Channel Y	200mV	0.049124	-	0.25676
Channel Z	200mV	-2.1226	-0.89508	-

4. AD-Converter Values with inputs shorted

in LSB	Low Range	High Range
Channel X	16492	16236
Channel Y	16307	15690
Channel Z	16461	16033

5. Input Offset Measurement

Measured after 15 min warm-up time of the Data Acquisition Electronic.
Every Measurement is preceded by a calibration cycle.

Software set-up:
Calibration time:	3 sec
Measuring time:	3 sec
Number of measurements:	100, Low Range

Input 10MΩ

in µV	Average	min. Offset	max. Offset	Std. Deviation
Channel X	-0.52	-1.64	0.60	0.43
Channel Y	-2.05	-3.65	0.06	0.51
Channel Z	-0.34	-2.05	0.43	0.37

Input shorted

in µV	Average	min. Offset	max. Offset	Std. Deviation
Channel X	0.04	-0.84	1.09	0.41
Channel Y	-0.77	-2.08	0.17	0.40
Channel Z	-1.01	-1.68	-0.38	0.24

6. Input Offset Current

in fA	Input Offset Current
Channel X	< 25
Channel Y	< 25
Channel Z	< 25

7. Input Resistance

	Calibrating	Measuring
Channel X	200 kΩ	200 MΩ
Channel Y	200 kΩ	200 MΩ
Channel Z	200 kΩ	200 MΩ

8. Low Battery Alarm Voltage

in V	Alarm Level
Supply (+ Vcc)	7.66 V
Supply (- Vcc)	-7.53 V

9. Power Consumption

in mA	Switched off	Stand by	Transmitting
Supply (+ Vcc)	0.000	5.83	14.1
Supply (- Vcc)	-0.011	-7.86	-9.13

10. Functional test

Touch async pulse 1	ok
Touch async pulse 2	ok
Touch status bit 1	ok
Touch status bit 2	ok
Remote power off	ok
Remote analog Power control	ok
Modification Status -	B – C

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

Client   C&C (Auden)

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1762
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	March 31, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date	Scheduled Calibration
RF generator HP 8684C	US3642U01700	4-Aug-99 (In house check Aug-02)	In house check: Aug-05
Power sensor E4412A	MY41495277	Mar-02	Mar-03
Power sensor HP 8481A	MY41092180	18-Sep-02	Sep-03
Power meter EPM E4419B	GB41293874	13-Sep-02	Sep-03
Network Analyzer HP 8753E	US38432426	3-May-00	In house check: May 03
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01	Sep-03

	Name	Function	Signature
Calibrated by:	Nino Vettori	Technician	D.Vettori
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: April 2, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Probe ET3DV6

SN:1762

Manufactured: January 20, 2003
Last calibration: March 31, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1762

Sensitivity in Free Space

NormX	$1.90 \ \mu V/(V/m)^2$		
NormY	$1.78 \ \mu V/(V/m)^2$		
NormZ	$1.82 \ \mu V/(V/m)^2$		

Diode Compression

DCP X	96	mV
DCP Y	96	mV
DCP Z	96	mV

Sensitivity in Tissue Simulating Liquid

Head	900 MHz	$\varepsilon_r = 41.5 \pm 5\%$	$\sigma = 0.97 \pm 5\%$ mho/m
Head	835 MHz	$\varepsilon_r = 41.5 \pm 5\%$	$\sigma = 0.90 \pm 5\%$ mho/m

		Boundary effect:	
ConvF X	$6.7 \pm 9.5\%$ (k=2)		
ConvF Y	$6.7 \pm 9.5\%$ (k=2)	Alpha	0.67
ConvF Z	$6.7 \pm 9.5\%$ (k=2)	Depth	1.74

Head	1800 MHz	$\varepsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\%$ mho/m
Head	1900 MHz	$\varepsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\%$ mho/m

		Boundary effect:	
ConvF X	$5.4 \pm 9.5\%$ (k=2)		
ConvF Y	$5.4 \pm 9.5\%$ (k=2)	Alpha	0.50
ConvF Z	$5.4 \pm 9.5\%$ (k=2)	Depth	2.63

Boundary Effect

Head 900 MHz Typical SAR gradient: 5 % per mm

		1 mm	2 mm
Probe Tip to Boundary			
SAR_{be} [%]	Without Correction Algorithm	8.8	4.5
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

Head 1800 MHz Typical SAR gradient: 10 % per mm

		1 mm	2 mm
Probe Tip to Boundary			
SAR_{be} [%]	Without Correction Algorithm	13.8	9.3
SAR_{be} [%]	With Correction Algorithm	0.2	0.1

Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.4 ± 0.2	mm

Receiving Pattern (ϕ), $\theta = 0°$

f = 30 MHz, TEM cell ifi110

f = 100 MHz, TEM cell ifi110

f = 300 MHz, TEM cell ifi110

f = 900 MHz, TEM cell ifi110

f = 1800 MHz, WG R22

f = 2500 MHz, WG R22
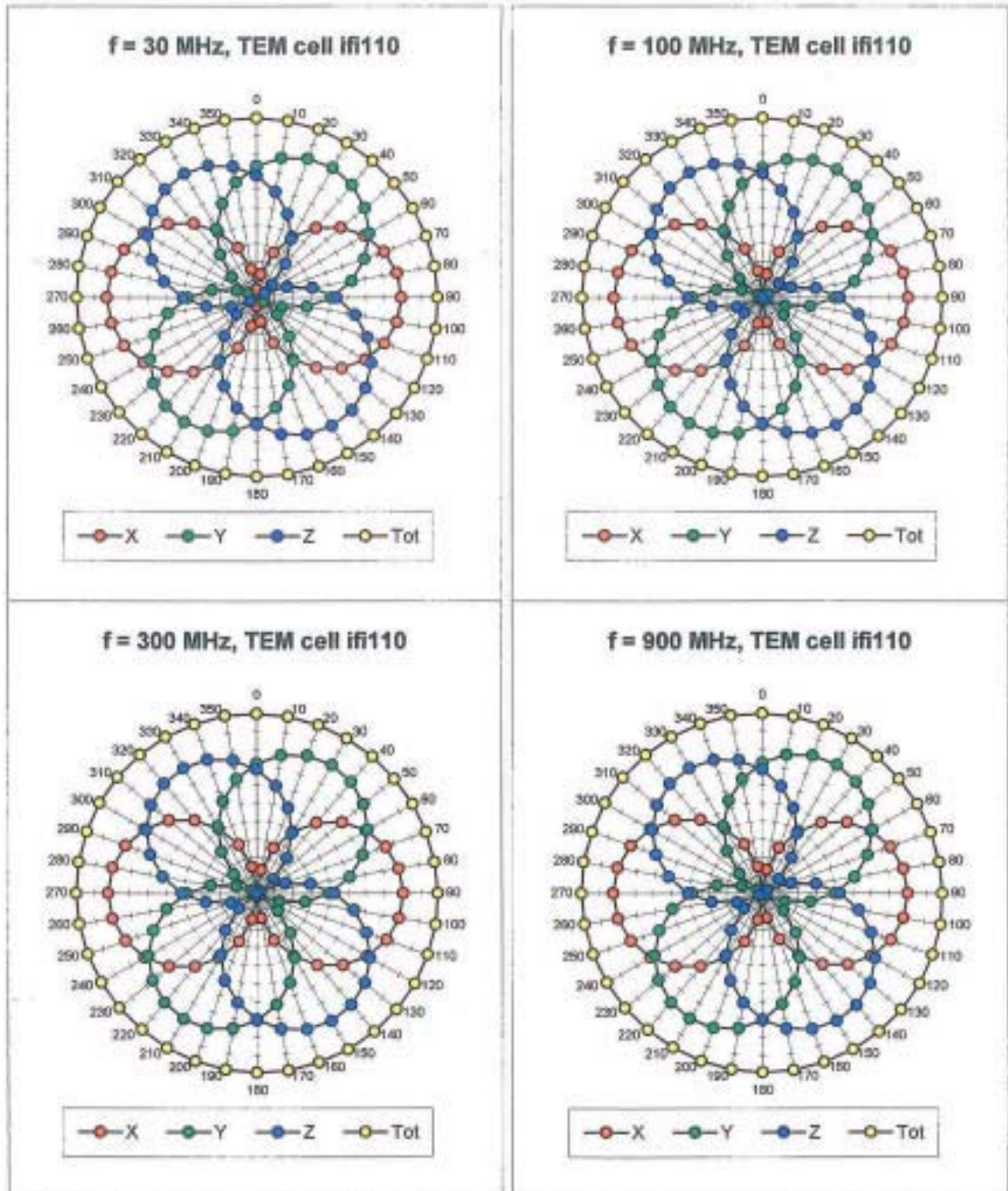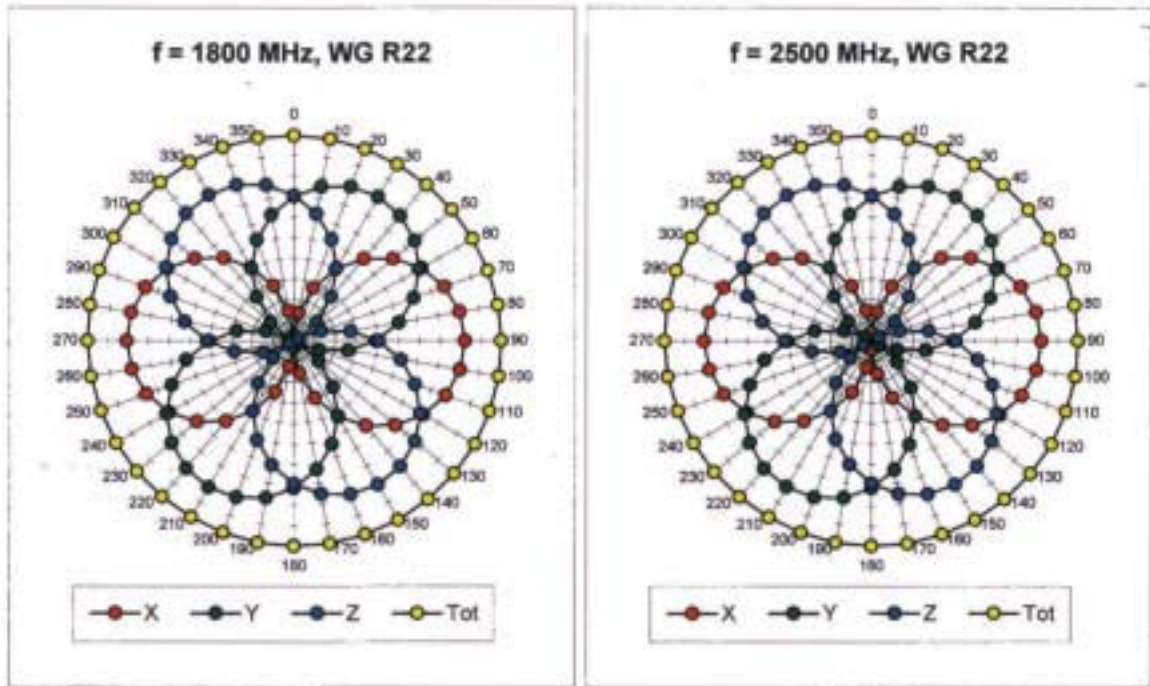
Isotropy Error (φ), θ = 0°
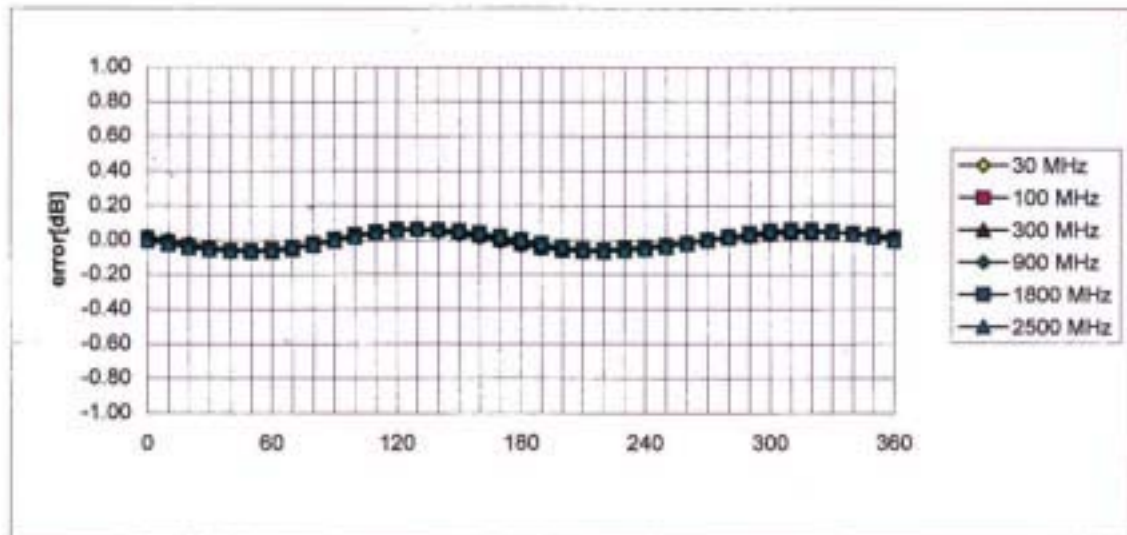
Frequency Response of E-Field

(TEM-Cell:ifi110, Waveguide R22)
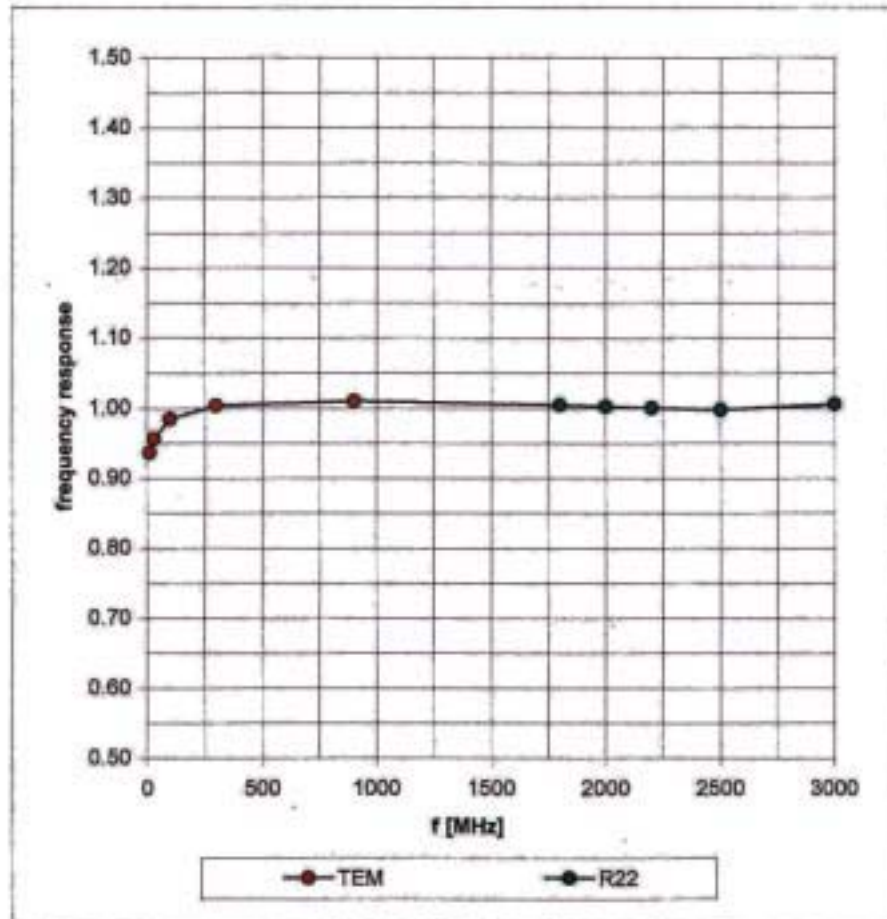
Dynamic Range f(SAR$_{brain}$)
(Waveguide R22)

Conversion Factor Assessment

f = 900 MHz, WG R9 (head)

f = 1800 MHz, WG R22 (head)

Head	900 MHz	ε_r = 41.5 ± 5%	σ = 0.97 ± 5% mho/m
Head	835 MHz	ε_r = 41.5 ± 5%	σ = 0.90 ± 5% mho/m

ConvF X	**6.7** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.7** ± 9.5% (k=2)	Alpha	**0.67**
ConvF Z	**6.7** ± 9.5% (k=2)	Depth	**1.74**

Head	1800 MHz	ε_r = 40.0 ± 5%	σ = 1.40 ± 5% mho/m
Head	1900 MHz	ε_r = 40.0 ± 5%	σ = 1.40 ± 5% mho/m

ConvF X	**5.4** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.4** ± 9.5% (k=2)	Alpha	**0.50**
ConvF Z	**5.4** ± 9.5% (k=2)	Depth	**2.63**

Conversion Factor Assessment

f = 900 MHz, WG R9 (body)

f = 1800 MHz, WG R22 (body)
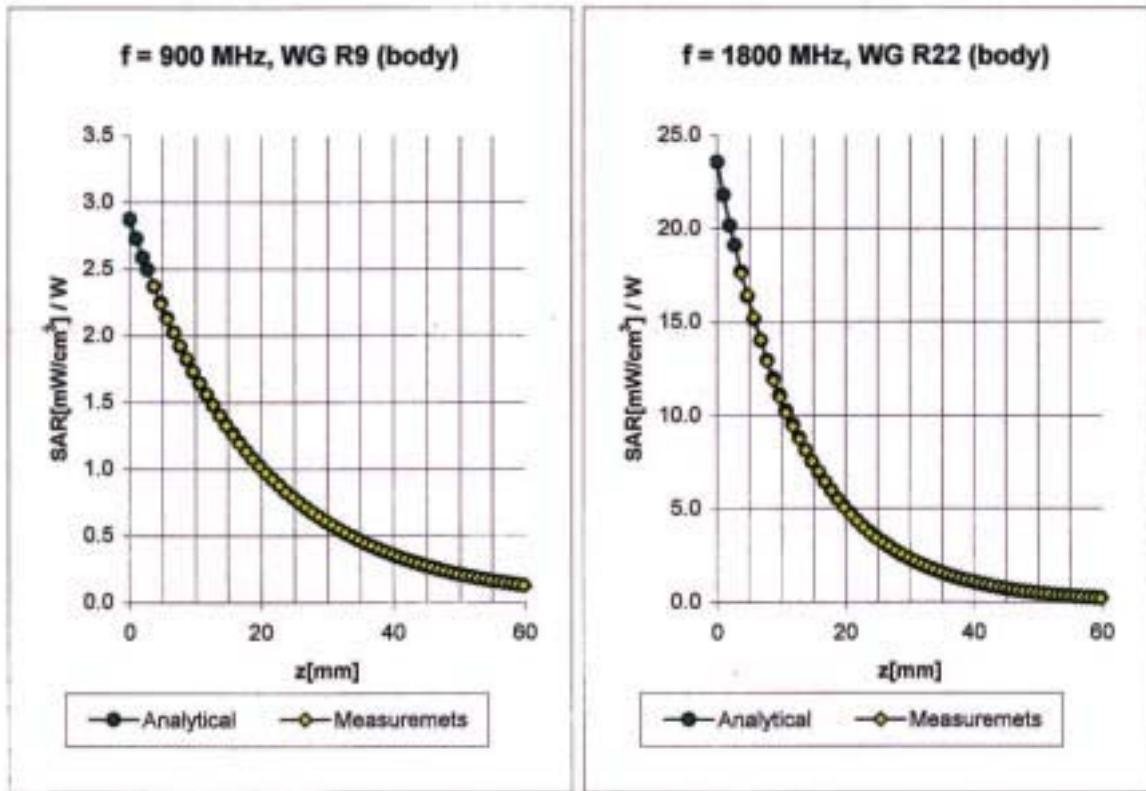
Body	900 MHz	$\varepsilon_r = 55.0 \pm 5\%$	$\sigma = 1.05 \pm 5\%$ mho/m
Body	835 MHz	$\varepsilon_r = 55.2 \pm 5\%$	$\sigma = 0.97 \pm 5\%$ mho/m

ConvF X	**6.5** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.5** ± 9.5% (k=2)	Alpha	**0.43**
ConvF Z	**6.5** ± 9.5% (k=2)	Depth	**2.34**

Body	1800 MHz	$\varepsilon_r = 53.3 \pm 5\%$	$\sigma = 1.52 \pm 5\%$ mho/m
Body	1900 MHz	$\varepsilon_r = 53.3 \pm 5\%$	$\sigma = 1.52 \pm 5\%$ mho/m

ConvF X	**5.0** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.0** ± 9.5% (k=2)	Alpha	**0.57**
ConvF Z	**5.0** ± 9.5% (k=2)	Depth	**2.65**

Conversion Factor Assessment

	f = 2450 MHz, WG R22 (head)	f = 2450 MHz, WG R22 (body)
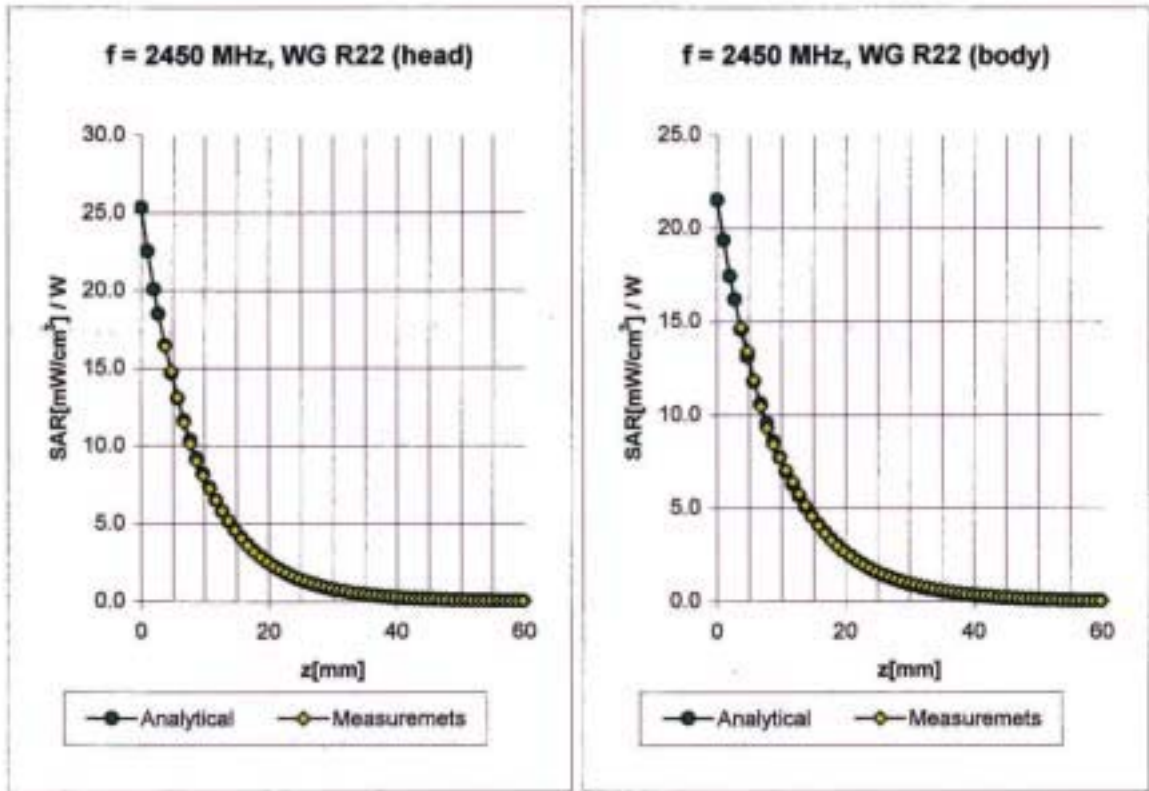
Head	2450	MHz	ε_r = 39.2 ± 5%	σ = 1.80 ± 5% mho/m

	ConvF X	**5.1** ± 8.9% (k=2)	Boundary effect:	
	ConvF Y	**5.1** ± 8.9% (k=2)	Alpha	**1.32**
	ConvF Z	**5.1** ± 8.9% (k=2)	Depth	**1.61**

Body	2450	MHz	ε_r = 52.7 ± 5%	σ = 1.95 ± 5% mho/m

	ConvF X	**4.6** ± 8.9% (k=2)	Boundary effect:	
	ConvF Y	**4.6** ± 8.9% (k=2)	Alpha	**1.39**
	ConvF Z	**4.6** ± 8.9% (k=2)	Depth	**1.60**

Deviation from Isotropy in HSL

Error (θ,ϕ), f = 900 MHz
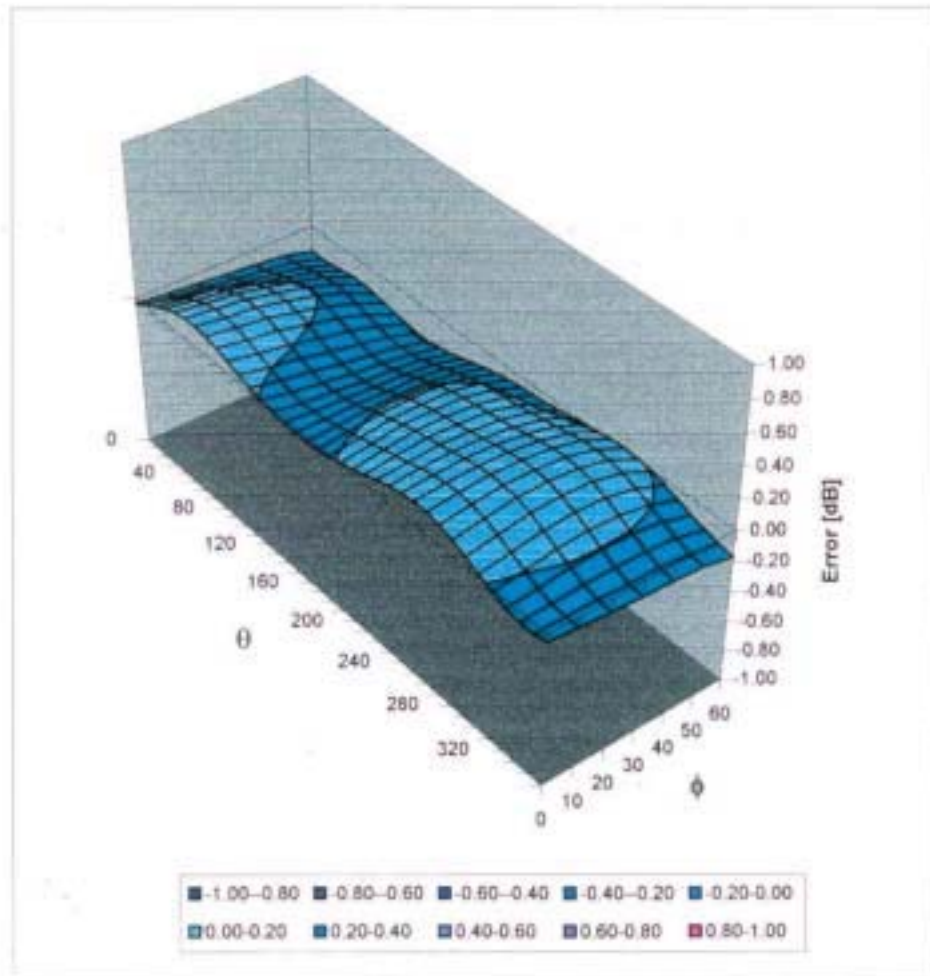
Calibration Laboratory of
Schmid & Partner
  Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

Client   **JWIT (Auden)**

CALIBRATION CERTIFICATE

Object(s)	D2450V2 - SN:731
Calibration procedure(s)	QA CAL-05.v2 Calibration procedure for dipole validation kits
Calibration date:	May 21, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92369)	In house check: Mar-05
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
Power sensor HP 8481A	US37292783	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Power meter EPM E442	GB37480704	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Network Analyzer HP 8753E	US38432426	3-May-00 (Agilent, No. 8702K084602)	In house check: May 03

	Name	Function	Signature
Calibrated by:	Judith Mueller	Technician	_(signature)_
Approved by:	Katja Polovic	Laboratory Director	_(signature)_

Date issued: May 21, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

DASY

Dipole Validation Kit

Type: D2450V2

Serial: 731

Manufactured: May 7, 2003
Calibrated: May 21, 2003

1.   Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with **head simulating solution** of the following electrical parameters at 2450 MHz:

Relative Dielectricity	**37.5**	± 5%
Conductivity	**1.89 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe ES3DV2 (SN:3013, Conversion factor 4.8 at 2450 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm from dipole center to the solution surface. Lossless spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.
The dipole input power (forward power) was 250mW ± 3 %. The results are normalized to 1W input power.

2.   SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ES3DV2 SN:3013 and applying the advanced extrapolation are:

averaged over 1 cm³ (1 g) of tissue:	**55.2 mW/g** ± 16.8 % (k=2)[1]
averaged over 10 cm³ (10 g) of tissue:	**24.5 mW/g** ± 16.2 % (k=2)[1]

[1] validation uncertainty

3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.150 ns**	(one direction)
Transmission factor:	**0.990**	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 2450 MHz: $Re\{Z\} = $ **52.9** Ω

$Im\{Z\} = $ **3.9** Ω

Return Loss at 2450 MHz   **-26.4 dB**

4. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with **body simulating solution** of the following electrical parameters at 2450 MHz:

Relative Dielectricity	**50.5**	± 5%
Conductivity	**1.97 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe ES3DV2 (SN:3013, Conversion factor 4.2 at 2450 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm from dipole center to the solution surface. Lossless spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.

The dipole input power (forward power) was 250mW ± 3 %. The results are normalized to 1W input power.

5. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 4. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ES3DV2 SN:3013 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue: **53.2 mW/g** $\pm$ 16.8 % (k=2)[2]

averaged over 10 cm^3 (10 g) of tissue: **24.3 mW/g** $\pm$ 16.2 % (k=2)[2]

6. Dipole Impedance and Return Loss

The dipole was positioned at the flat phantom sections according to section 4 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 2450 MHz: Re{Z} = **49.1** Ω

Im {Z} = **5.0** Ω

Return Loss at 2450 MHz **-25.7 dB**

7. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

8. Design

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

Small end caps have been added to the dipole arms in order to improve matching when loaded according to the position as explained in Sections 1 and 4. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

9. Power Test

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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[2] validation uncertainty

Test Laboratory: SPEAG, Zurich, Switzerland
File Name: SN731_SN3013_HSL2450_190503.da4

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN731
Program: Dipole Calibration

Communication System: CW-2450; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: HSL 2450 MHz ($\sigma = 1.89$ mho/m, $\varepsilon_r = 37.52$, $\rho = 1000$ kg/m^3)

Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3013; ConvF(4.8, 4.8, 4.8); Calibrated: 1/19/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 91 V/m
Power Drift = -0.003 dB
Maximum value of SAR = 15.1 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
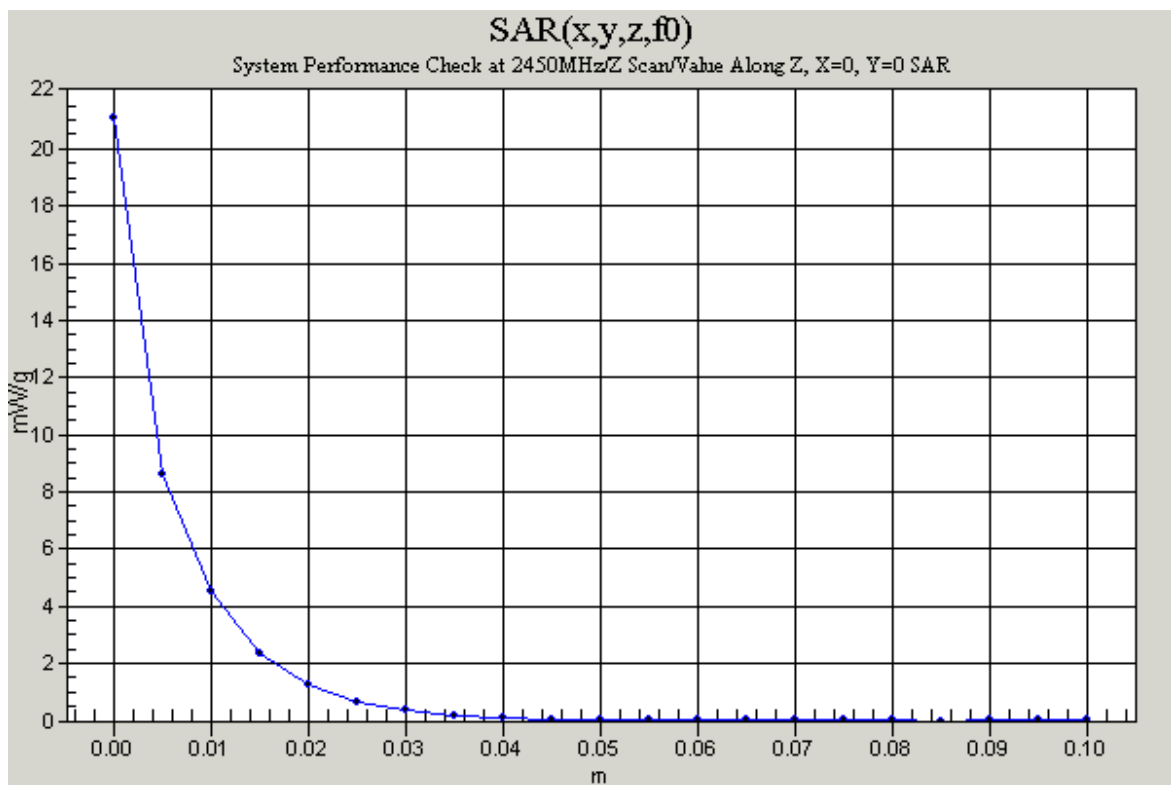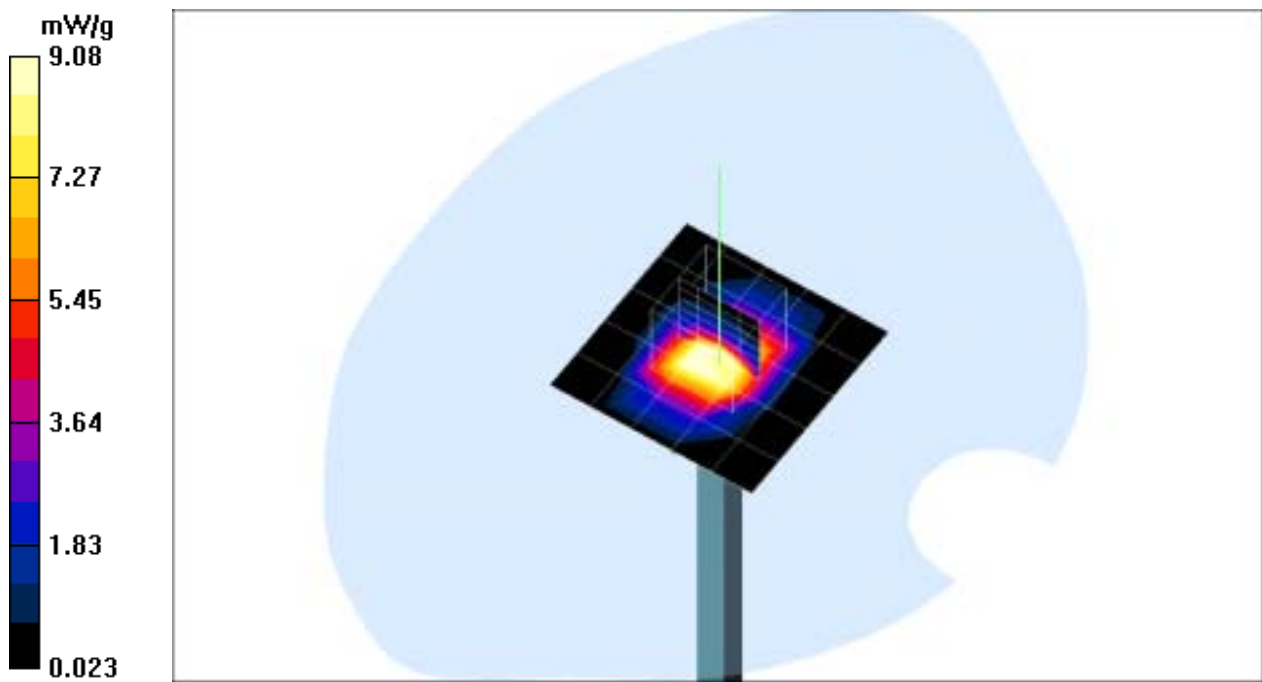Peak SAR (extrapolated) = 30.3 W/kg
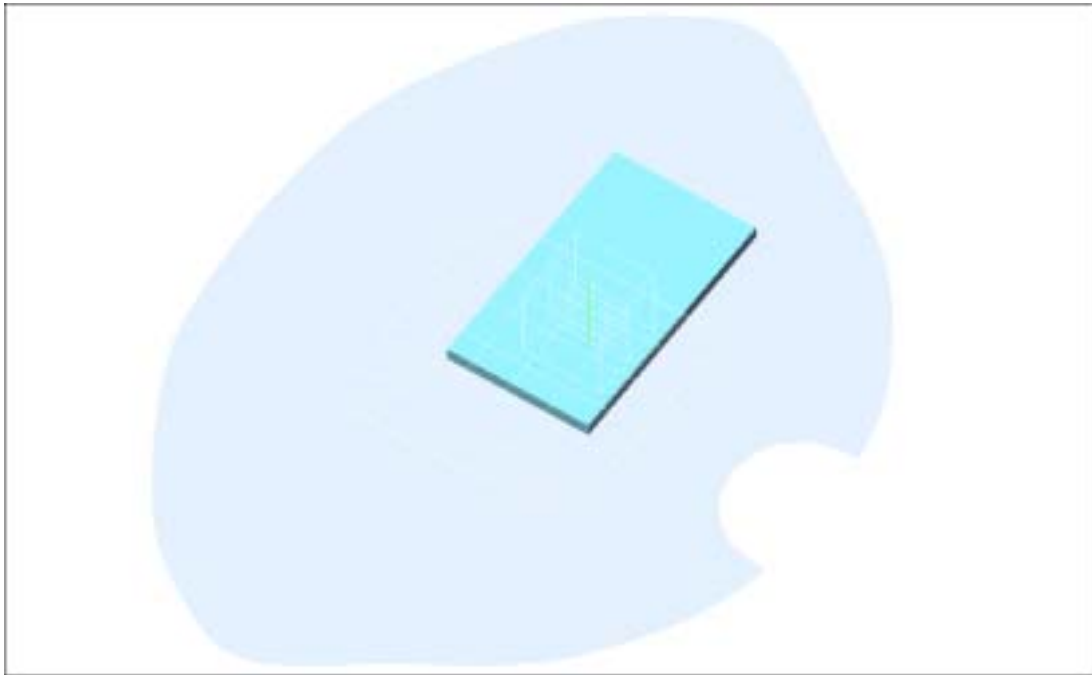SAR(1 g) = 13.8 mW/g; SAR(10 g) = 6.13 mW/g
Reference Value = 91 V/m
Power Drift = -0.003 dB
Maximum value of SAR = 15.3 mW/g

0 dB = 15.3mW/g
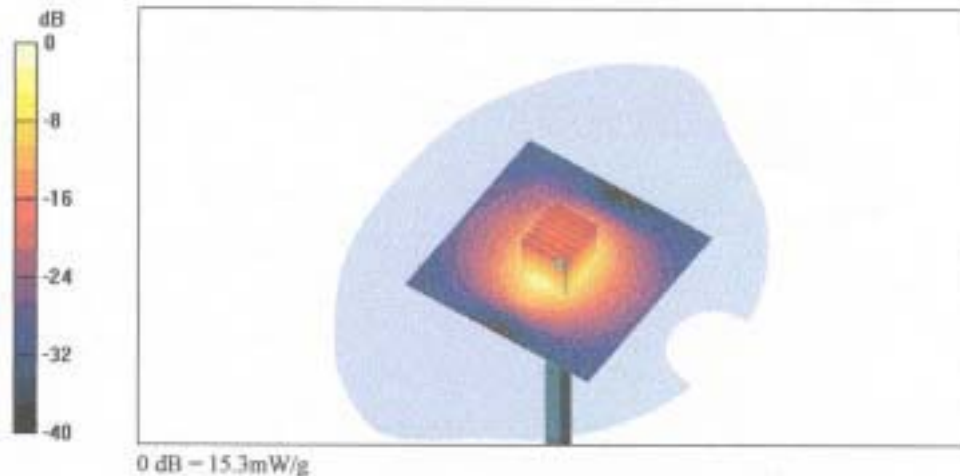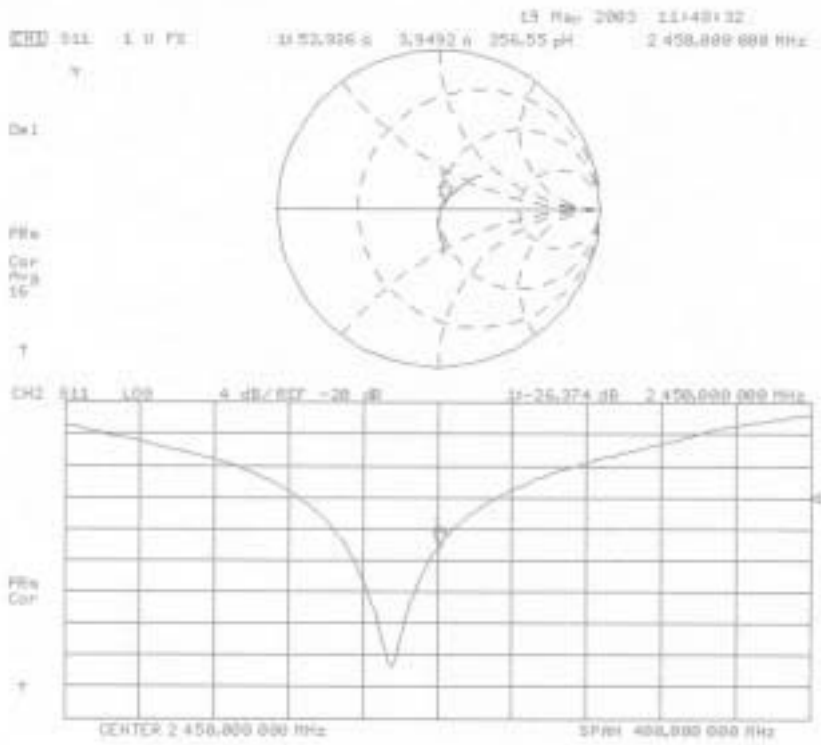
Date/Time: 05/21/03 11:32:43

Test Laboratory: SPEAG, Zurich, Switzerland
File Name: SN731_SN3013_M2450_210503.da4

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN731
Program: Dipole Calibration

Communication System: CW-2450; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: Muscle 2450 MHz (σ = 1.97 mho/m, ε_r = 50.47, ρ = 1000 kg/m^3)

Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3013; ConvF(4.2, 4.2, 4.2); Calibrated: 1/19/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 89.5 V/m
Power Drift = 0.06 dB
Maximum value of SAR = 14.8 mW/g

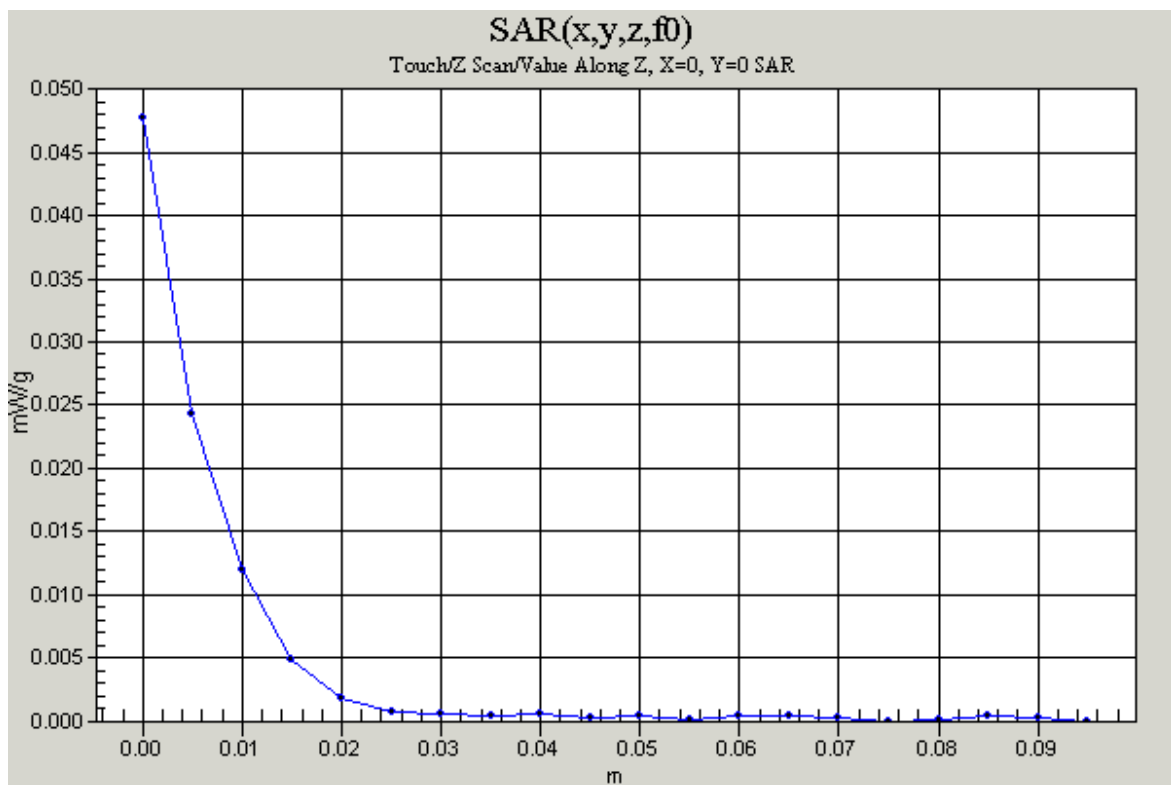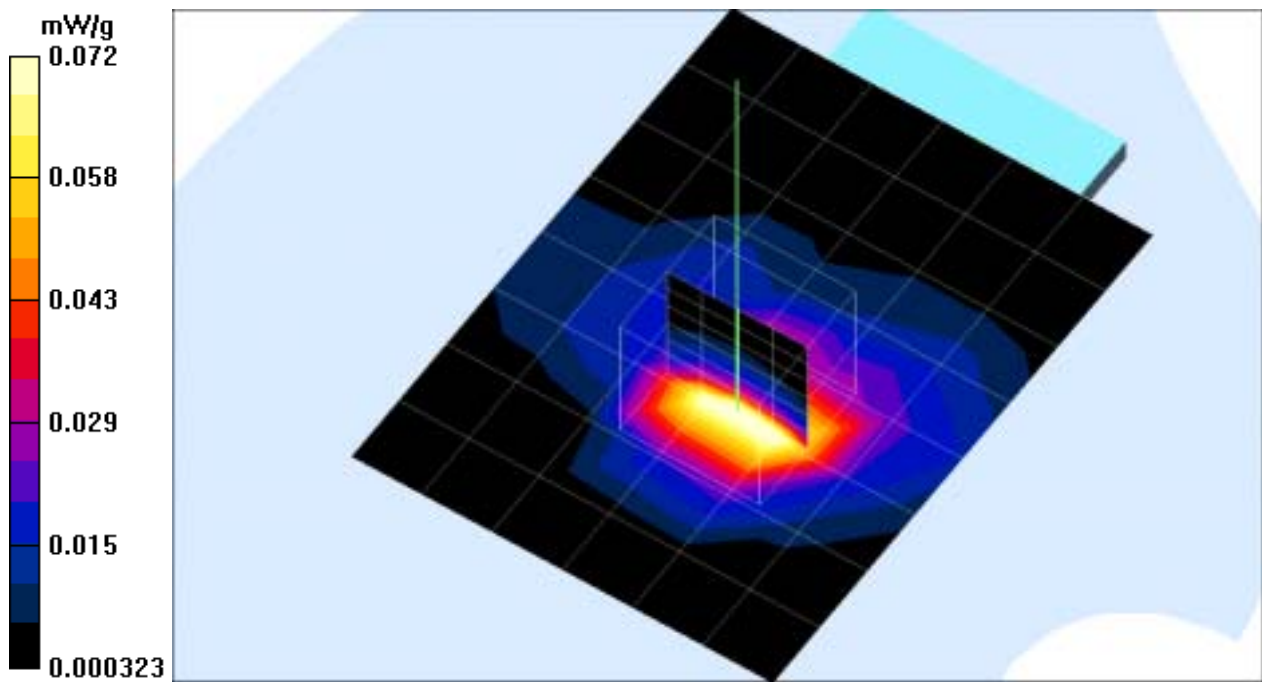**Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm,
dz=5mm
Peak SAR (extrapolated) = 26.6 W/kg
SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.08 mW/g
Reference Value = 89.5 V/m
Power Drift = 0.06 dB
Maximum value of SAR = 14.9 mW/g
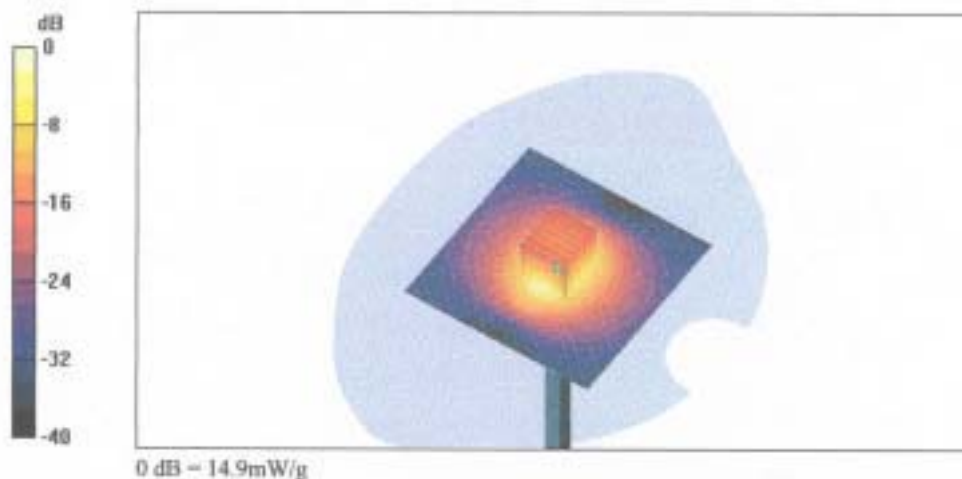
0 dB = 14.9mW/g

Test Laboratory: Compliance Certification Services Inc.

D2450V2 SN 731

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:731

Communication System: CW2450; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 1.98 mho/m, ε_r = 51.4, ρ = 1000 kg/m^3)
Air Temperature 24.8 deg C ;Liquid Temperature 23.8 deg C
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
  Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1271
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

Pin=250mW,d=10mm/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 91.2 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 9.08 mW/g

Pin=250mW,d=10mm/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 91.2 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 21.1 mW/g

Pin=250mW,d=10mm/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 29.2 W/kg
SAR(1 g) = 13.1 mW/g; SAR(10 g) = 5.97 mW/g
Reference Value = 91.2 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 14.7 mW/g

SAR(x,y,z,f0)

System Performance Check at 2450MHz/Z Scan/Value Along Z, X=0, Y=0 SAR

Test Configuration-1

Test Laboratory: Compliance Certification Services Inc.

Touch-b mode-ANT A

DUT: 802.11b/g Wireless LAN Cardbus PC Card; Type: GWP512,MWL-37G1; Serial: N/A

Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 1.98 mho/m, ε_r = 51.4, ρ = 1000 kg/m^3)
Air Temperature 24.8 deg C ;Liquid Temperature 23.8 deg C
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

CH=6 11M/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 3.18 V/m
Power Drift = 0.2 dB
Maximum value of SAR = 0.072 mW/g

CH=6 11M/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 3.18 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.048 mW/g

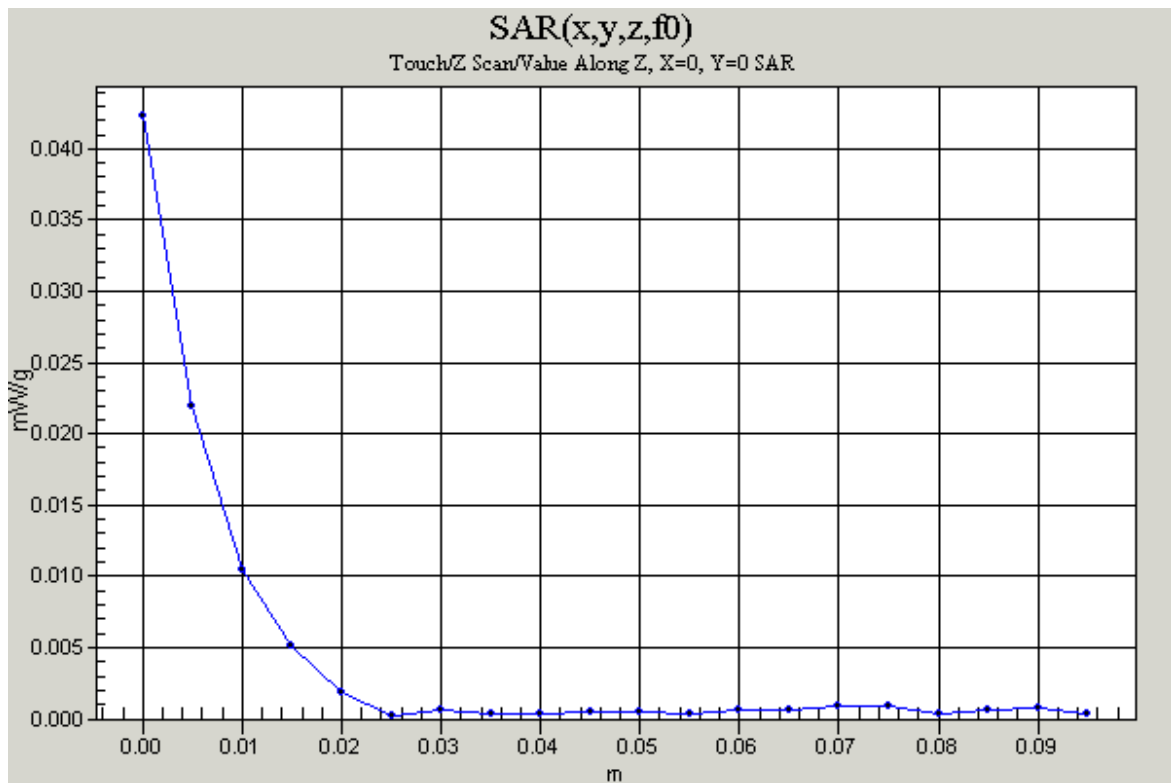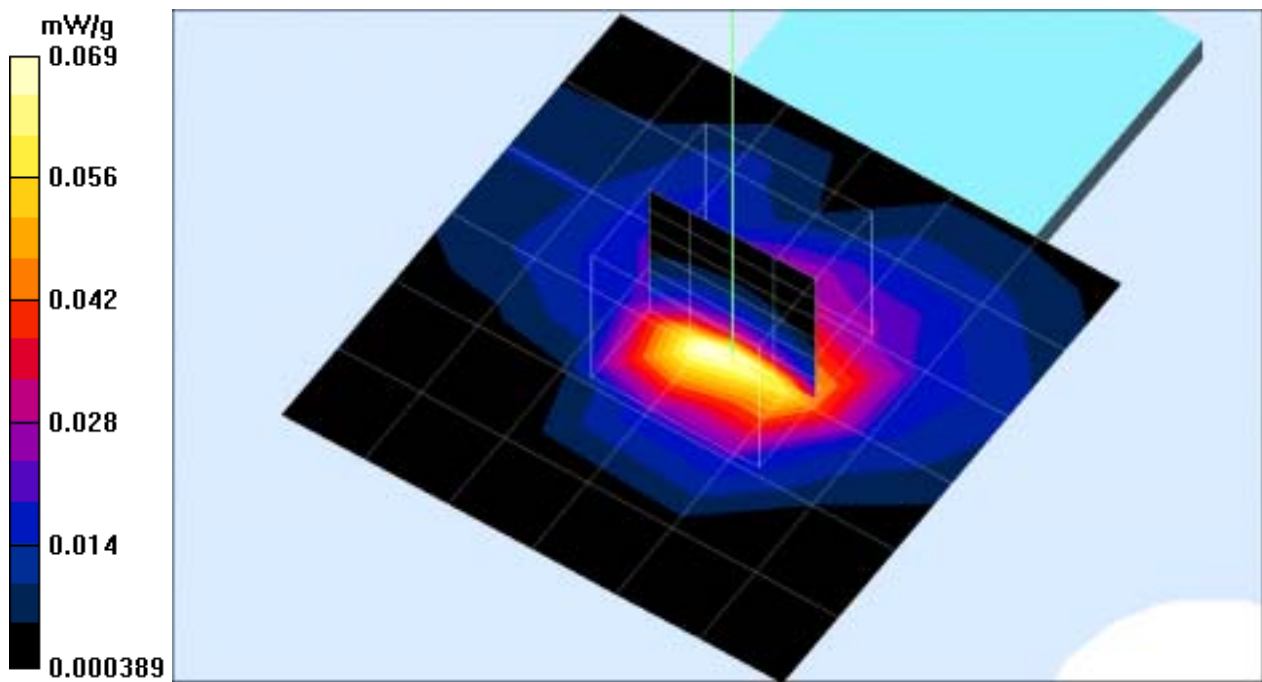**CH=6 11M/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.189 W/kg
SAR(1 g) = 0.077 mW/g; SAR(10 g) = 0.035 mW/g
Reference Value = 3.18 V/m
Power Drift = 0.2 dB
Maximum value of SAR = 0.084 mW/g

SAR(x,y,z,f0)
Touch/Z Scan/Value Along Z, X=0, Y=0 SAR

Test Laboratory: Compliance Certification Services Inc.

Touch-b mode-ANT B

DUT: 802.11b/g Wireless LAN Cardbus PC Card; Type: GWP512,MWL-37G1; Serial: N/A

Communication System: IEEE 802.11b; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 1.98 mho/m, ε_r = 51.4, ρ = 1000 kg/m^3)
Air Temperature 24.8 deg C ;Liquid Temperature 23.8 deg C
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
  Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

CH=1 11M/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 3.2 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 0.069 mW/g

CH=1 11M/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 3.2 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.042 mW/g

CH=1 11M/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
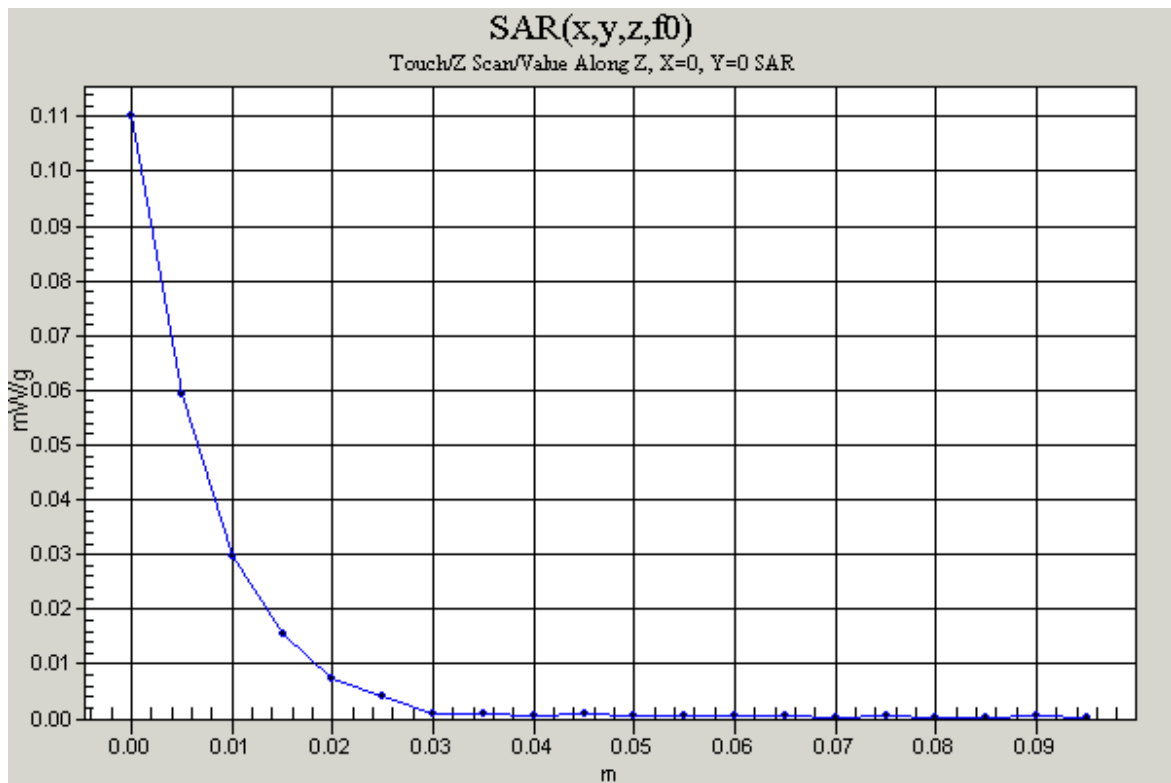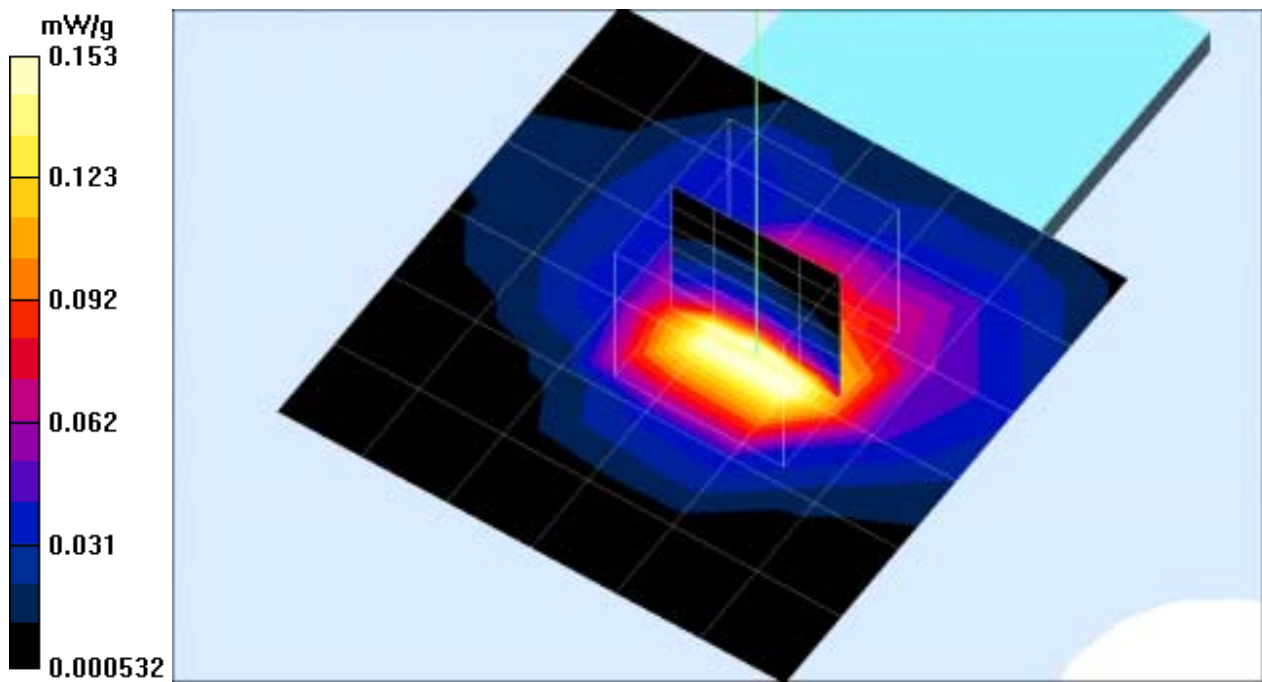Peak SAR (extrapolated) = 0.164 W/kg
SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.031 mW/g
Reference Value = 3.2 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 0.074 mW/g

Test Laboratory: Compliance Certification Services Inc.

Touch-b mode-ANT B

DUT: 802.11b/g Wireless LAN Cardbus PC Card; Type: GWP512,MWL-37G1; Serial: N/A

Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium: BSL2450 (σ = 1.98 mho/m, ε_r = 51.4, ρ = 1000 kg/m^3)

Air Temperature 24.8 deg C ;Liquid Temperature 23.8 deg C
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

CH=6 11M/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 4.6 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.153 mW/g

CH=6 11M/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 4.6 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.110 mW/g

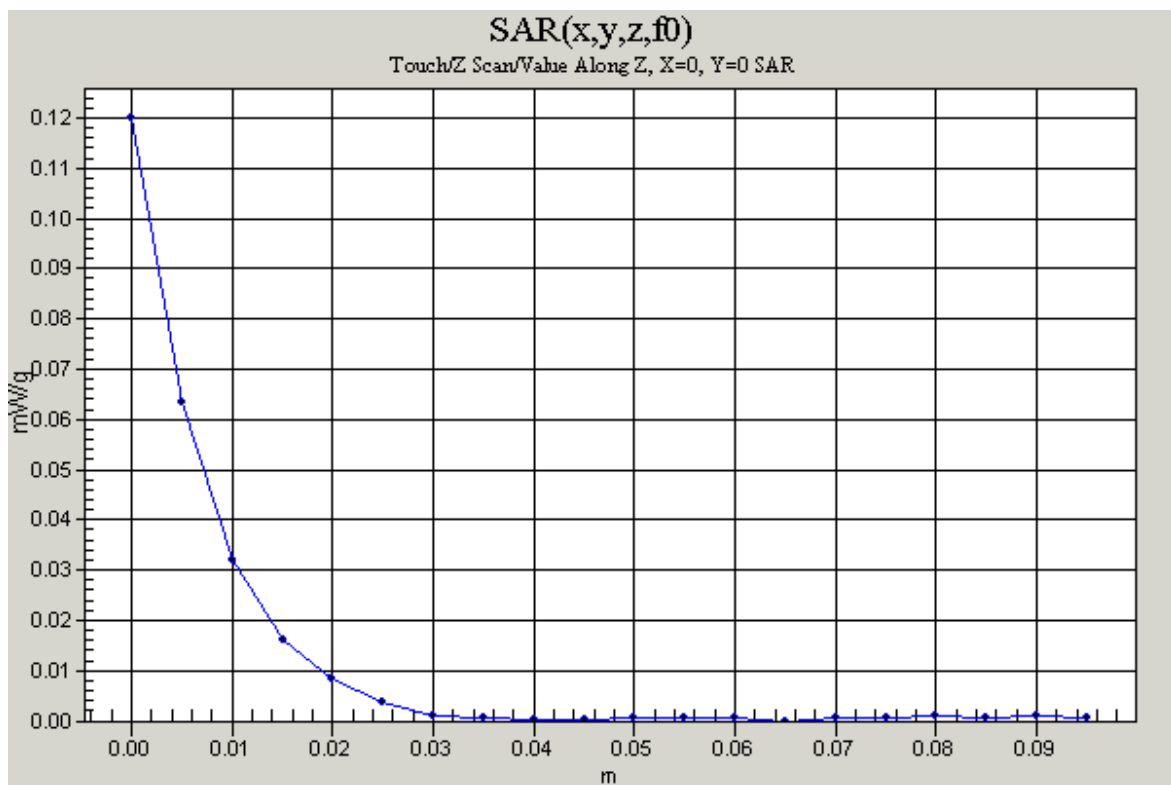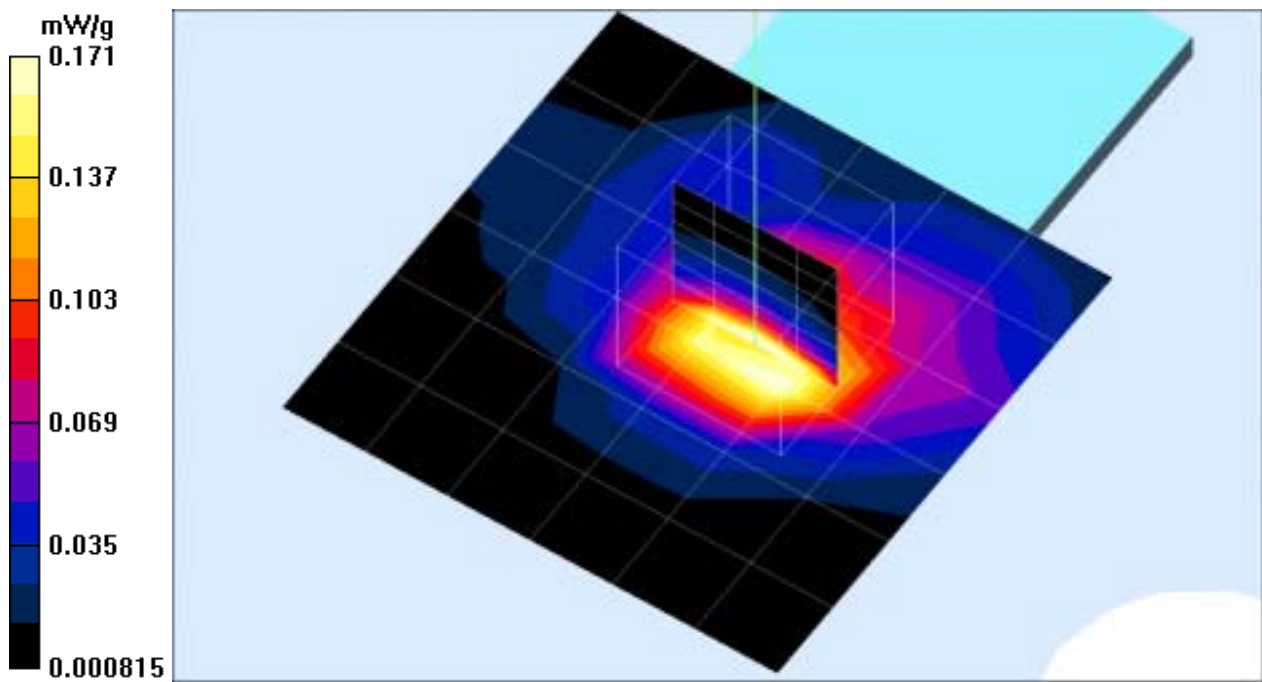**CH=6 11M/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.426 W/kg
SAR(1 g) = 0.179 mW/g; SAR(10 g) = 0.085 mW/g
Reference Value = 4.6 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.197 mW/g

SAR(x,y,z,f0)
Touch/Z Scan/Value Along Z, X=0, Y=0 SAR

Test Laboratory: Compliance Certification Services Inc.

Touch-b mode-ANT B

DUT: 802.11b/g Wireless LAN Cardbus PC Card; Type: GWP512,MWL-37G1; Serial: N/A

Communication System: IEEE 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 1.98 mho/m, ε_r = 51.4, ρ = 1000 kg/m^3)
Air Temperature 24.8 deg C ;Liquid Temperature 23.8 deg C
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

CH=11 11M/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 4.14 V/m
Power Drift = 0.006 dB
Maximum value of SAR = 0.171 mW/g

CH=11 11M/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 4.14 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 0.120 mW/g

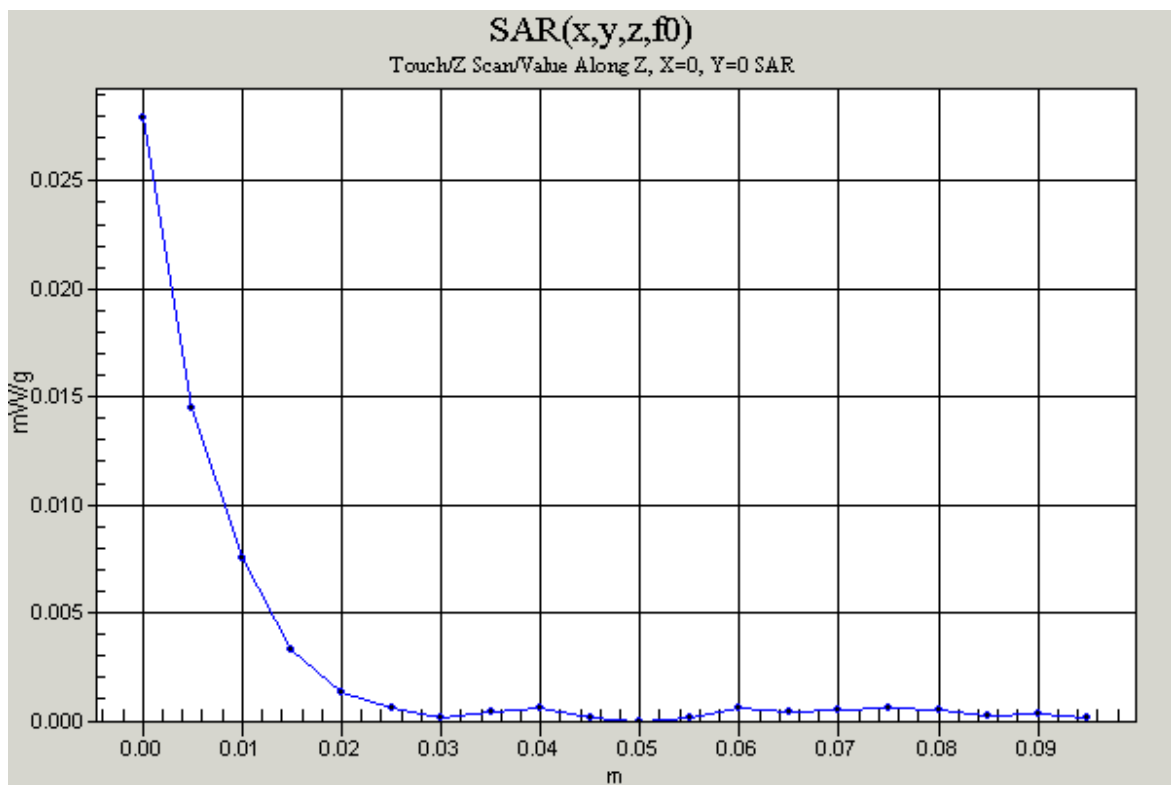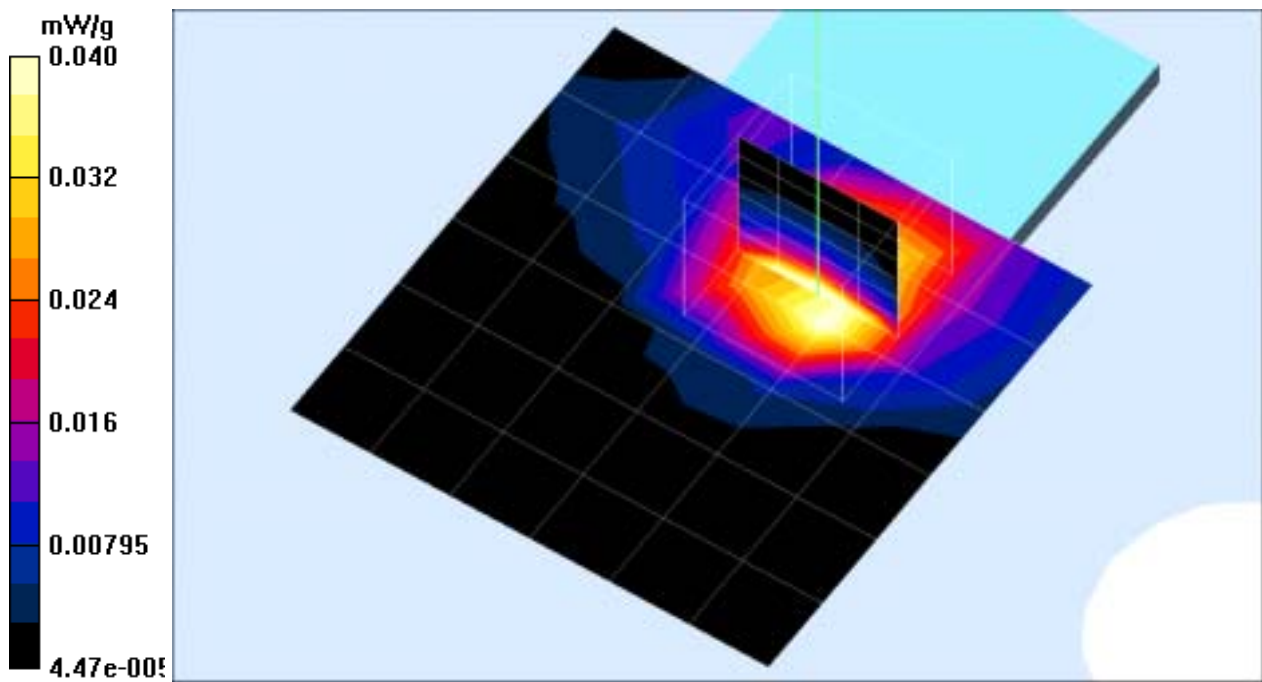**CH=11 11M/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.482 W/kg
SAR(1 g) = 0.201 mW/g; SAR(10 g) = 0.095 mW/g
Reference Value = 4.14 V/m
Power Drift = 0.006 dB
Maximum value of SAR = 0.222 mW/g

Test Laboratory: Compliance Certification Services Inc.

Touch-G mode-ANT B

DUT: 802.11b/g Wireless LAN Cardbus PC Card; Type: GWP512,MWL-37G1; Serial: N/A

Communication System: IEEE 802.11G; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 1.98 mho/m, ε_r = 51.4, ρ = 1000 kg/m^3)
Air Temperature 24.8 deg C ;Liquid Temperature 23.8 deg C
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

CH=1 6M/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 2.38 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.040 mW/g

CH=1 6M/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 2.38 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.028 mW/g

**CH=1 6M/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.108 W/kg
SAR(1 g) = 0.046 mW/g; SAR(10 g) = 0.022 mW/g
Reference Value = 2.38 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.051 mW/g

SAR(x,y,z,f0)
Touch/Z Scan/Value Along Z, X=0, Y=0 SAR

Test Laboratory: Compliance Certification Services Inc.

Touch-G mode-ANT B

DUT: 802.11b/g Wireless LAN Cardbus PC Card; Type: GWP512,MWL-37G1; Serial: N/A

Communication System: IEEE 802.11G; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 1.98 mho/m, ε_r = 51.4, ρ = 1000 kg/m^3)
Air Temperature 24.8 deg C ;Liquid Temperature 23.8 deg C
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

CH=6 6M/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 3.11 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 0.090 mW/g

CH=6 6M/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 3.11 V/m
Power Drift = 0.2 dB
Maximum value of SAR = 0.072 mW/g

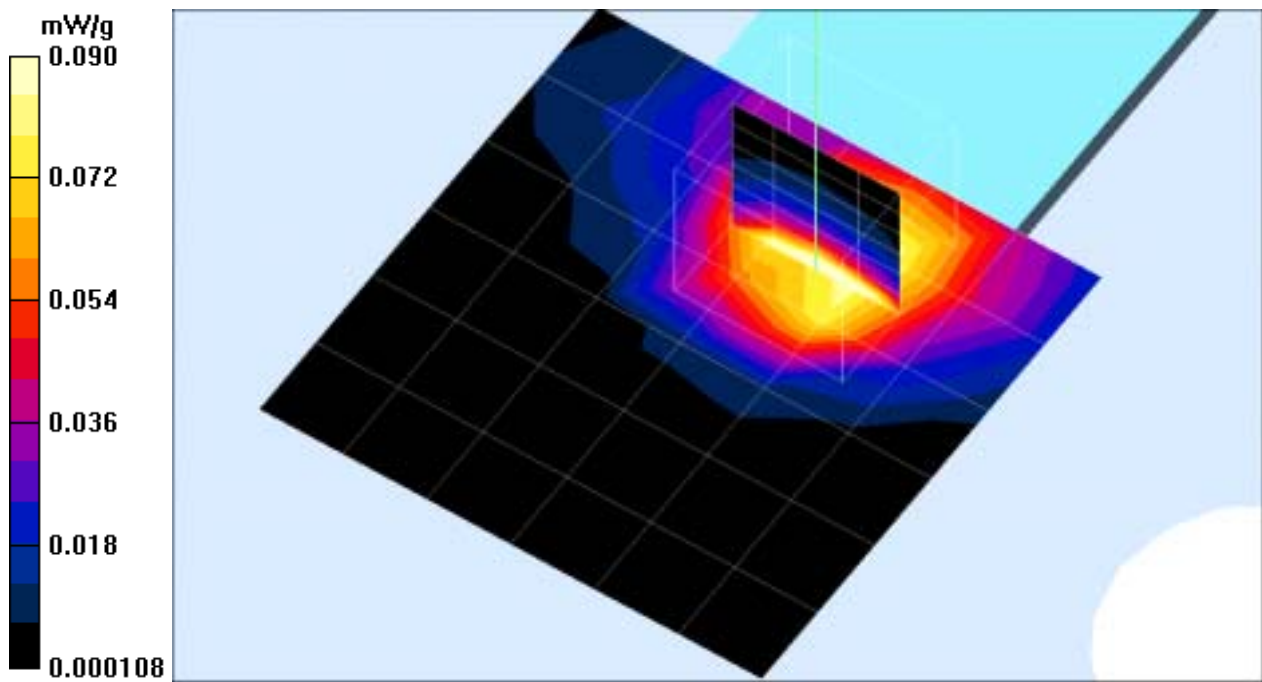**CH=6 6M/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.268 W/kg
SAR(1 g) = 0.117 mW/g; SAR(10 g) = 0.057 mW/g
Reference Value = 3.11 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 0.126 mW/g
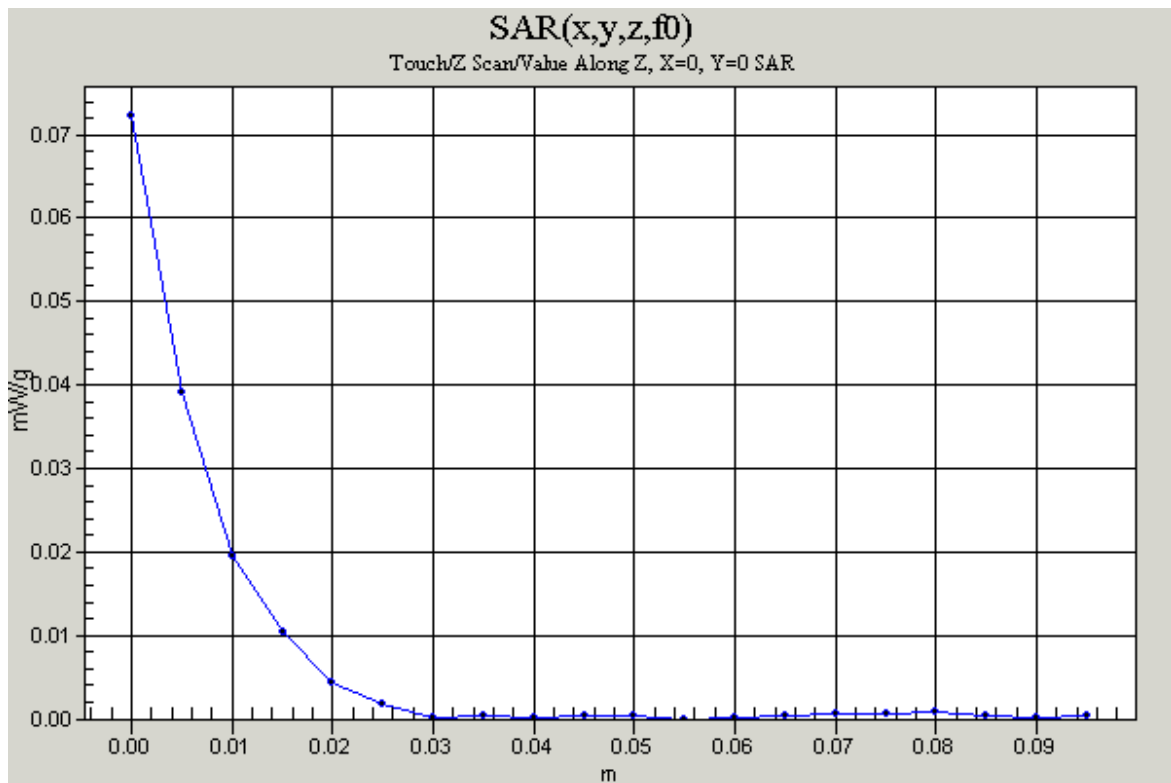
SAR(x,y,z,f0)

Touch/Z Scan/Value Along Z, X=0, Y=0 SAR

Test Laboratory: Compliance Certification Services Inc.

Touch-G mode-ANT B

DUT: 802.11b/g Wireless LAN Cardbus PC Card; Type: GWP512,MWL-37G1; Serial: N/A

Communication System: IEEE 802.11G; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: BSL2450 ($\sigma = 1.98$ mho/m, $\varepsilon_r = 51.4$, $\rho = 1000$ kg/m^3)
Air Temperature 24.8 deg C ;Liquid Temperature 23.8 deg C
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
  Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

CH=11 6M/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 2.63 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.038 mW/g

CH=11 6M/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 2.63 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.030 mW/g

CH=11 6M/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
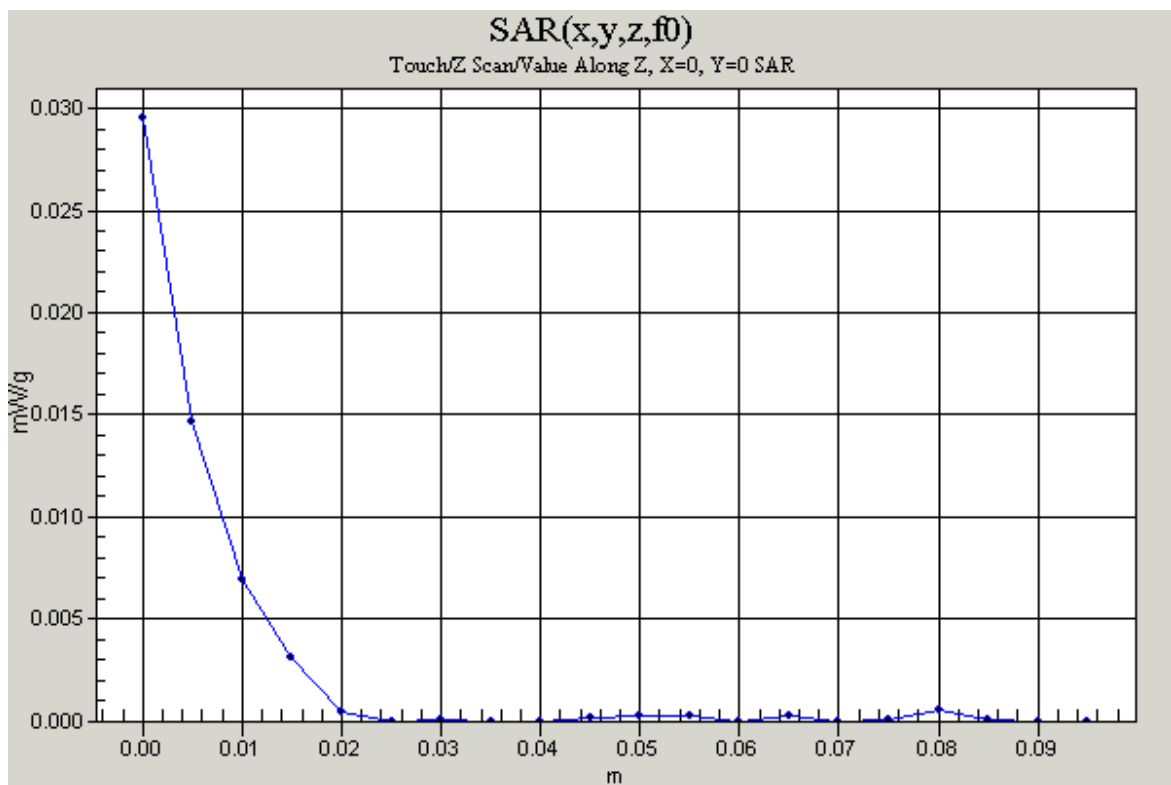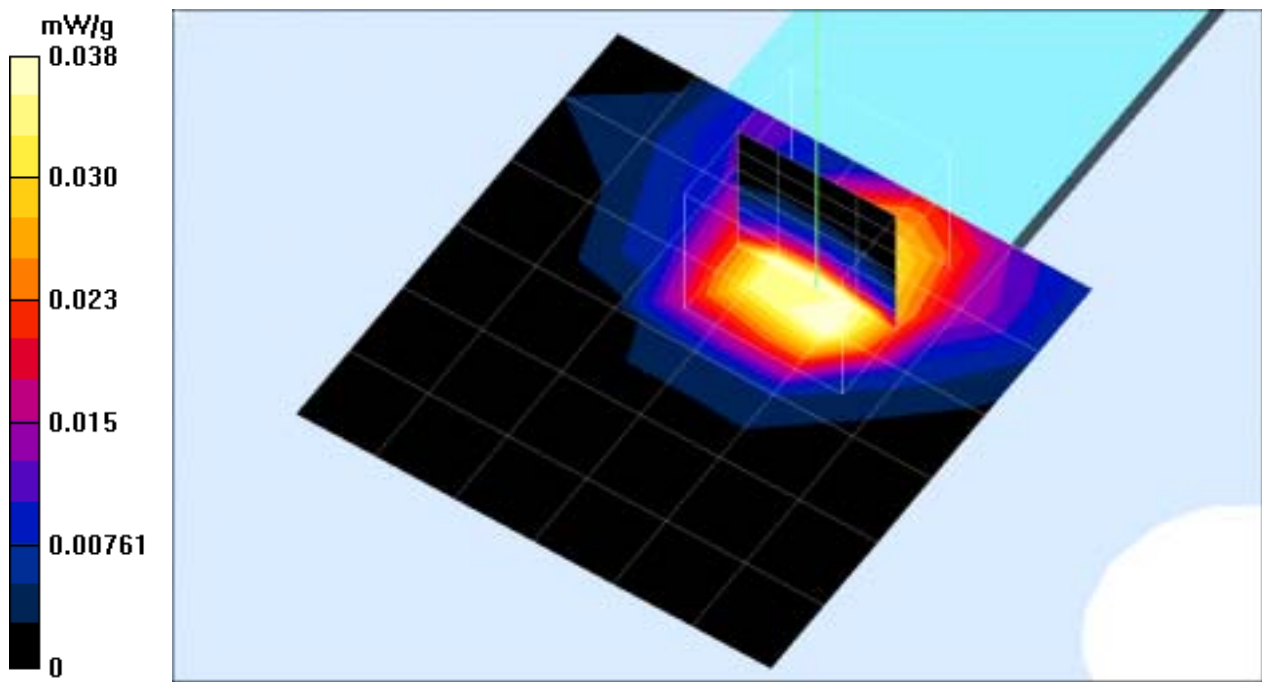Peak SAR (extrapolated) = 0.118 W/kg
SAR(1 g) = 0.050 mW/g; SAR(10 g) = 0.023 mW/g
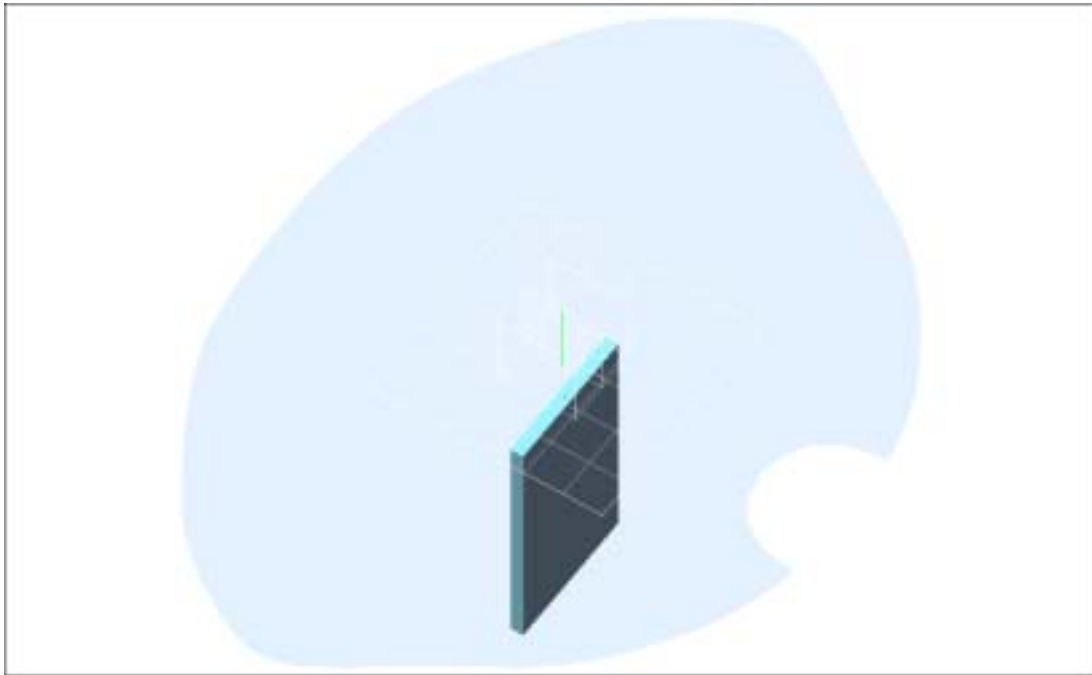Reference Value = 2.63 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.054 mW/g

SAR(x,y,z,f0)
Touch/Z Scan/Value Along Z, X=0, Y=0 SAR

Test Laboratory: Compliance Certification Services Inc.

Test Configuration-2

Test Laboratory: Compliance Certification Services Inc.

15mm-b mode-ANT A

DUT: 802.11b/g Wireless LAN Cardbus PC Card; Type: GWP512,MWL-37G1; Serial: N/A

Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 1.98 mho/m, ε_r = 51.4, ρ = 1000 kg/m^3)
Air Temperature 24.8 deg C ;Liquid Temperature 23.8 deg C
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

CH=Mid 11M/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 5.63 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.053 mW/g

CH=Mid 11M/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 5.63 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.031 mW/g

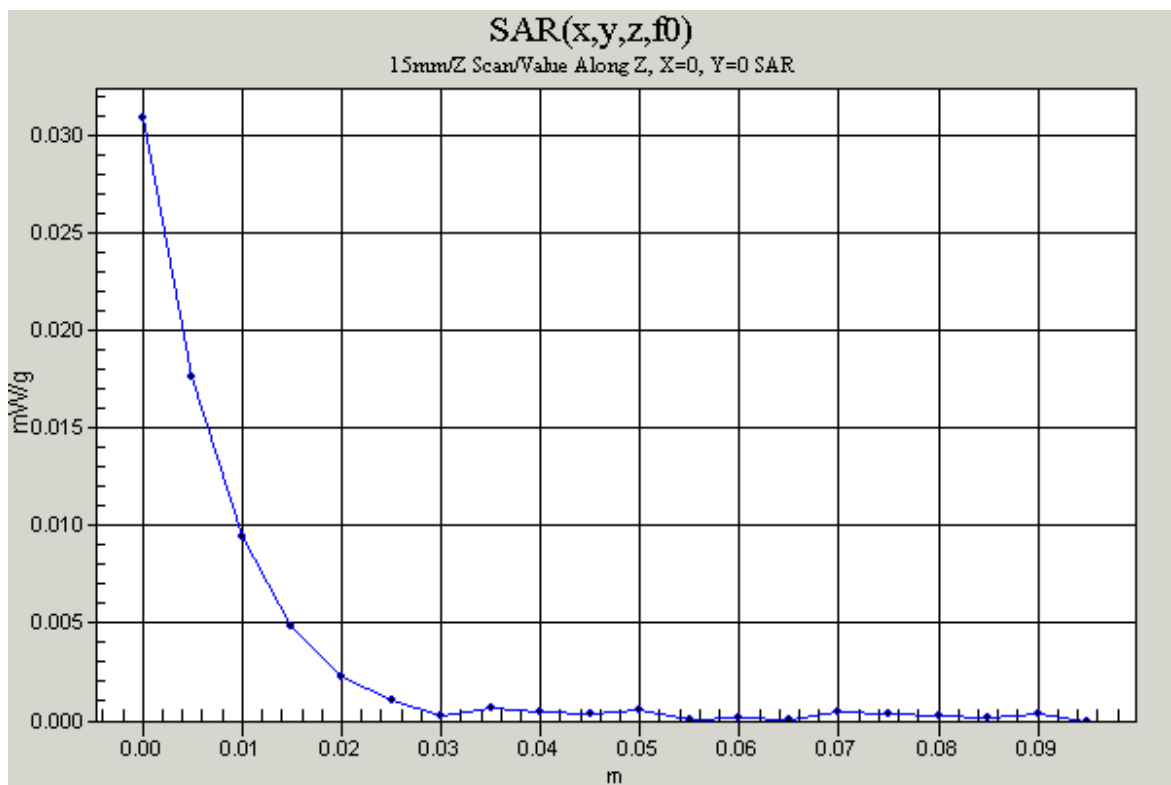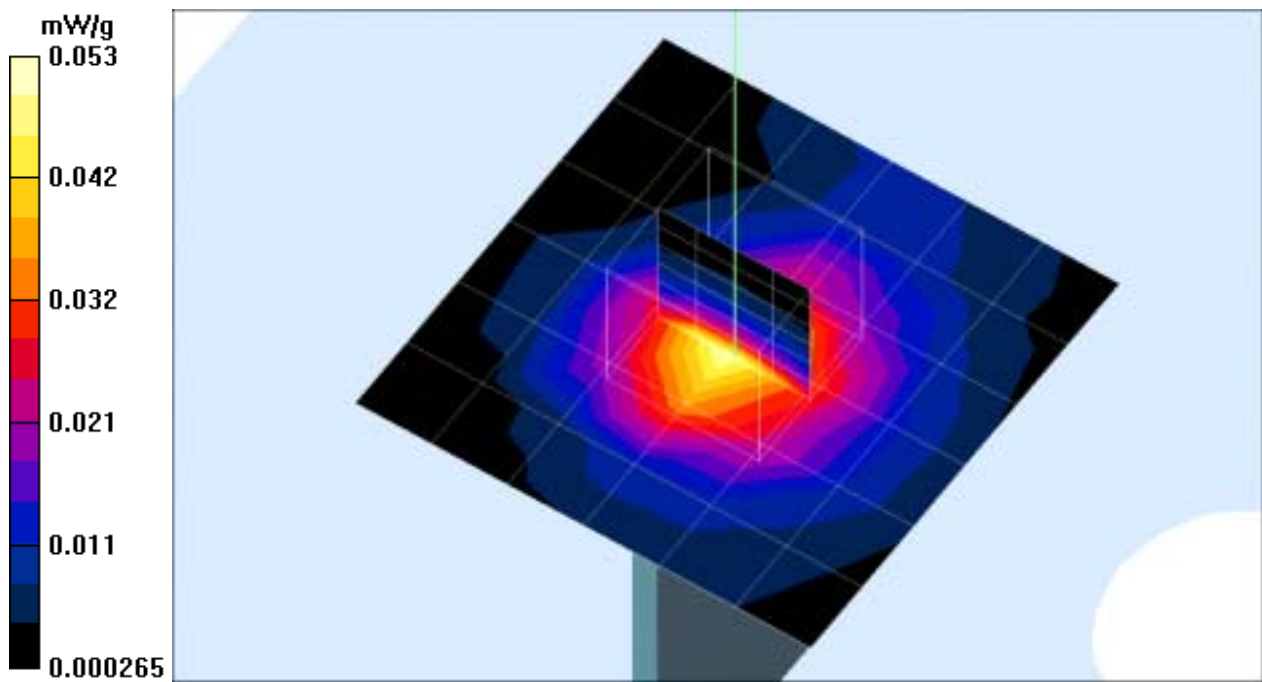**CH=Mid 11M/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.098 W/kg
SAR(1 g) = 0.049 mW/g; SAR(10 g) = 0.026 mW/g
Reference Value = 5.63 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.053 mW/g

Test Laboratory: Compliance Certification Services Inc.

15mm-b mode-ANT B

DUT: 802.11b/g Wireless LAN Cardbus PC Card; Type: GWP512,MWL-37G1; Serial: N/A

Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 1.98 mho/m, ε_r = 51.4, ρ = 1000 kg/m^3)
Air Temperature 24.8 deg C ;Liquid Temperature 23.8 deg C
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

CH=Mid 11M 2/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 6.33 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.068 mW/g

CH=Mid 11M 2/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 6.33 V/m
Power Drift = -0.2 dB
Maximum value of SAR = 0.040 mW/g

CH=Mid 11M 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
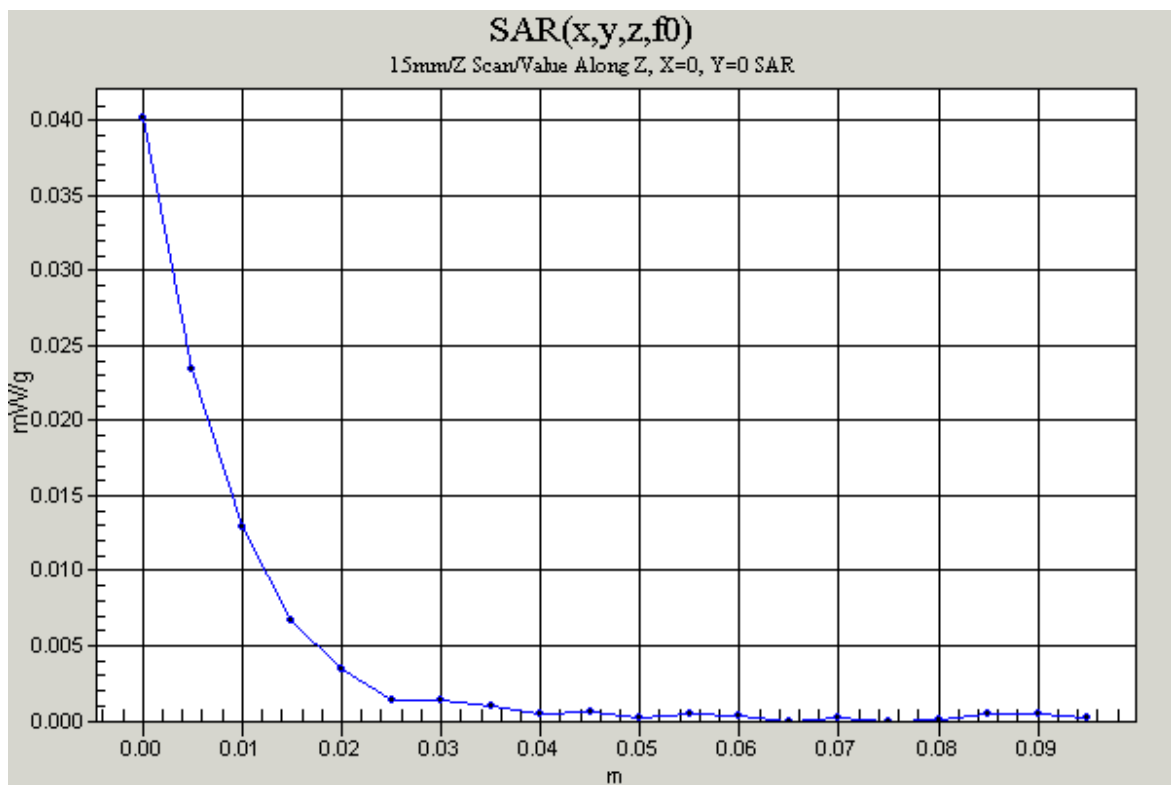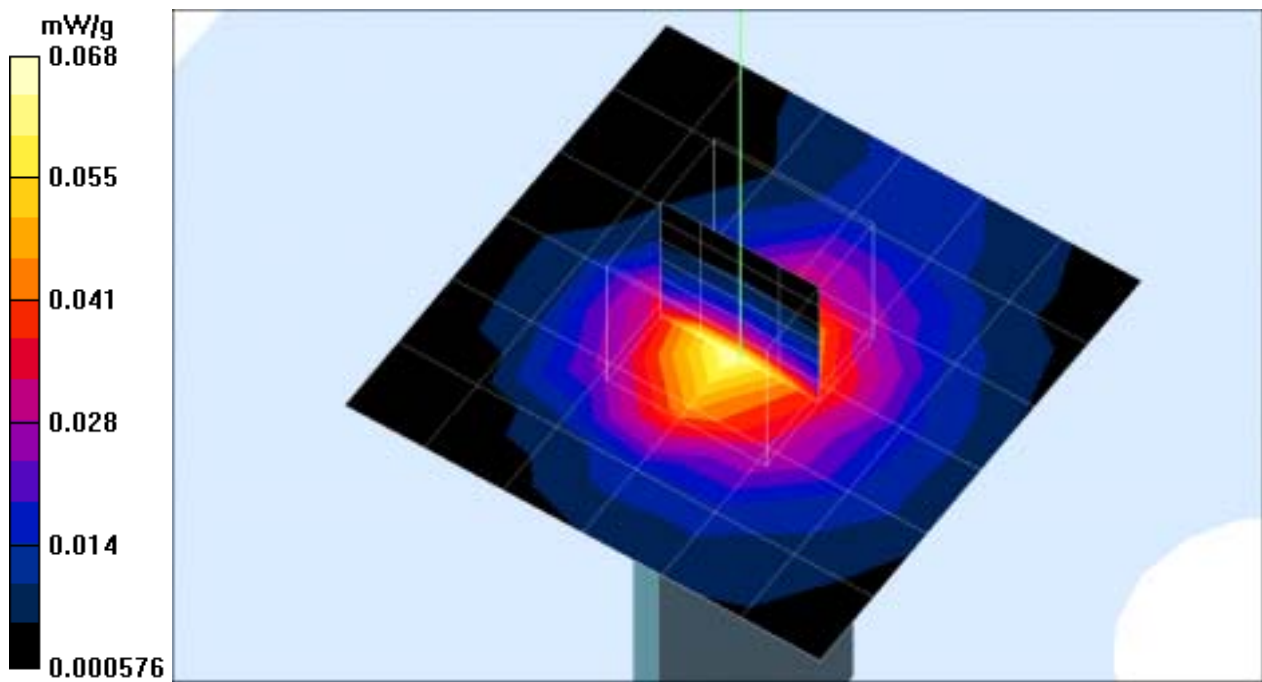Peak SAR (extrapolated) = 0.129 W/kg
SAR(1 g) = 0.063 mW/g; SAR(10 g) = 0.033 mW/g
Reference Value = 6.33 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.067 mW/g

Test Laboratory: Compliance Certification Services Inc.

15mm-G mode-ANT B

DUT: 802.11b/g Wireless LAN Cardbus PC Card; Type: GWP512,MWL-37G1; Serial: N/A

Communication System: IEEE 802.11G; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 1.98 mho/m, ε_r = 51.4, ρ = 1000 kg/m^3)
Air Temperature 24.8 deg C ;Liquid Temperature 23.8 deg C
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

CH=Mid 6M/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 4.45 V/m
Power Drift = -0.003 dB
Maximum value of SAR = 0.030 mW/g

CH=Mid 6M/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 4.45 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 0.050 mW/g

CH=Mid 6M/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.070 W/kg
SAR(1 g) = 0.033 mW/g; SAR(10 g) = 0.017 mW/g
Reference Value = 4.45 V/m
Power Drift = -0.003 dB
Maximum value of SAR = 0.036 mW/g

SAR(x,y,z,f0)

15mm/Z Scan/Value Along Z, X=0, Y=0 SAR