TEST REPORT

Equipment Under Test	:	USB Dongle
Model No.	:	DFBD-CR210, DFBD-CR21I, DFBD-CR21T, BD-110, SJD01, BM-2217, BGA3161, CS8050
FCC ID	:	H79DFBD-CR210
Applicant	:	DELTA ELECTRONICS, INC
Address of Applicant	:	252,Shang Ying Road, Kuei San Taoyuan Hsien 333, Taiwan, R.O.C
Date of Receipt	:	2005.07.13
Date of Test(s)	:	2005.07.21-2005.07.28
Date of Issue	:	2005.07.28

Standards:

FCC OET Bulletin 65 supplement C,
ANSI / IEEE C95.1 , C95.3, IEEE 1528-2002

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan E&E Services or testing done by SGS Taiwan E&E Services in connection with distribution or use of the product described in this report must be approved by SGS Taiwan E&E Services in writing.

Tested by	:	**Dikin Yang**	**Date**	:	**2005.07.28**
Approved by	:	**Robert Chang**	**Date**	:	**2005.07.28**

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1. General Information

1.1 Testing Laboratory

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Taipei county , Taiwan , R.O.C.
Telephone : +886-2-2299-3279
Fax : +886-2-2298-2698
Internet : http://www.sgs.com.tw

1.2 Details of Applicant

Applicant : DELTA ELECTRONICS, INC
Address : 252,Shang Ying Road, Kuei San Taoyuan Hsien 333, Taiwan, R.O.C
Contact Person : Richard Meng
Telephone / Fax : +886-3-3591968-2930 / +886-3-3591991
Email address : Richard.meng@delta.com.tw
Website : http://www.deltaww.com

1.3 Description of EUT(s)

Equipment Type	USB Dongle
Test Procedure	FCC OET Bulletin 65, Supplement C
TX Frequency range	2402-2480MHz
FCC ID	H79DFBD-CR210
Model No.	DFBD-CR210, DFBD-CR21I, DFBD-CR21T, BD-110, SJD01, BM-2217, BGA3161, CS8050
Number Of Channel	0-78
Modulation	Frequency Hopping, GFSK
Max. SAR Measured (1 g)	1.44 W/kg (At 78 Channel)
Antenna Gain	1.18 dbi

Antenna Type	Micro Strip
Power Supply	From USB Host Slot 5V
Host Laptop PC(s) Tested	IBM ThinkPad T30 (S/N: 99AMZM5)

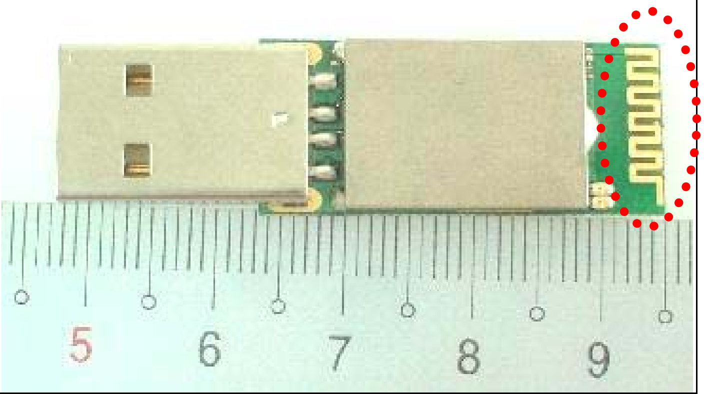
1.4 Test Environment

Ambient temperature : 22.1° C

Tissue Simulating Liquid : 21.7° C

Relative Humidity : 60 %

1.5 Operation Configuration

Channel Frequency Under Test And Its Conducted Output Power (Peak)	13.30 dBm (2402MHz) 11.66 dBm (2441MHz) 10.19 dBm (2480MHz)
Antenna Configuration	Micro Strip
Antenna Position	
EUT Power Source	From USB Host Slot 5V

The EUT is USB Dongle, which is installed inside a Notebook. Since the Notebook is placed on the top of the leg, when it operates, it is to be defined as a portable device. SAR measurement is mandatory. In order to measure SAR value, we used continuous transmission mode. The test set up mode was prepared by manufacturer. Value of Crest Factor = 1 was used for SAR testing according to the nature of the EUT. The test configuration tested at the low, middle and high frequency channels (2402MHz,2441MHz and 2480MHz).By using the program subordinated in the computer, and change into the written channel, and then set in highest power. Finally, we will test it by dividing into 2 ways.

Configuration 1: Vertical of the PC at 90° and at a distance of 0.0 cm from the base of the phantom, and the antenna tip upward.(Fig.3 & Fig.4 & Fig.5)

Configuration 2: Bottom of the PC is paralleled and at a distance of 0.0 cm from the base of the phantom, but 0.6 cm Spacing between EUT & Planar Phantom. (Fig.6 & Fig.7 & Fig.8)

1.6 EVALUATION PROCEDURES

The evaluation was performed with the following procedure:

(1). Measurement of the SAR value at a fixed location above the ear point or central position of flat phantom was used as a reference value for assessing the power drop.

(2). The SAR distribution at the exposed side of head or body position was measured at a distance of each device from the inner surface of the shell. The area covered the entire dimension of the head or EUT and the horizontal grid spacing was 15 mm x 15 mm. Based on these data, the area of the maximum absorption was determined by splint interpolation.

(3). Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7 x7 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

1. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm [1]. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
2. The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one-dimensional splints with the "Not a knot"-condition (in x, y and z-directions) [1], [2]. The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.
3. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. Re-measurement of the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation was repeated.

1.7 The SAR Measurement System

A photograph of the SAR measurement System is given in Fig. a. This SAR Measurement

System uses a Computer-controlled 3-D stepper motor system (Speag Dasy 4 professional system). A Model ET3DV6 1759 E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ ($|Ei|^2$)/ ρ where σ and ρ are the conductivity and mass density of the tissue-simulant.

The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Staubli 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.

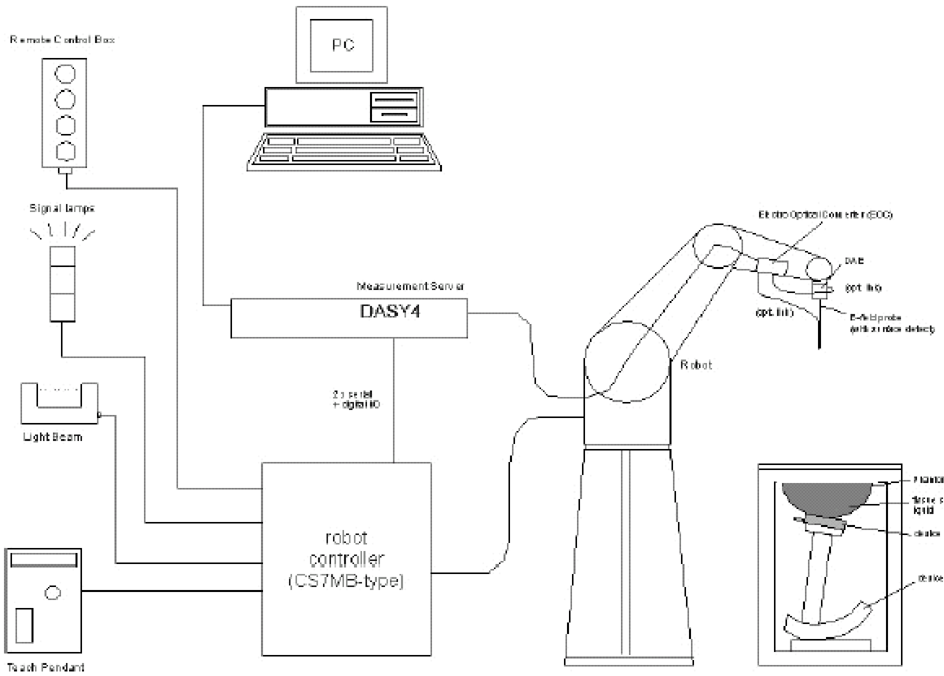


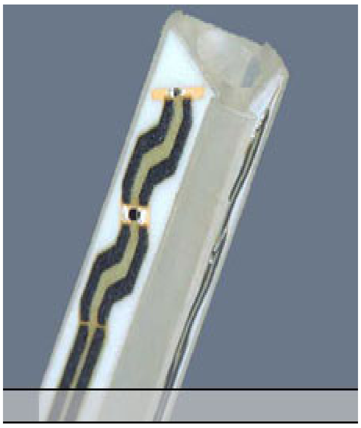
Fig. a The microwave circuit arrangement used for SAR system verification

- 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 to validate the proper functioning of the system.

1.8 System Components

ET3DV6 E-Field Probe



ET3DV6 E-Field Probe

Construction:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g. glycol)
Calibration:	In air from 10 MHz to 2.5 GHz In brain simulating tissue at frequencies of 2450 MHz (accuracy ± 8%)
Frequency:	10 MHz to >6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity:	±0.2 dB in brain tissue (rotation around probe axis) ±0.4 dB in brain tissue (rotation normal to probe axis)
Dynamic Rnge:	5 µW/g to >100 mW/g; Linearity: ±0.2 dB
Srfce. Detect:	±0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions:	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application:	General dosimetry up to 3 GHz

Compliance tests of mobile phone

SAM PHANTOM V4.0C

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

PHANTOM v4.0C

DEVICE HOLDER

Construction In combination with the Twin SAM Phantom V4.0/V4.0C 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).

Device Holder

1.9 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A

SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. These tests were done at 2450MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was in the range 22.1 °C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

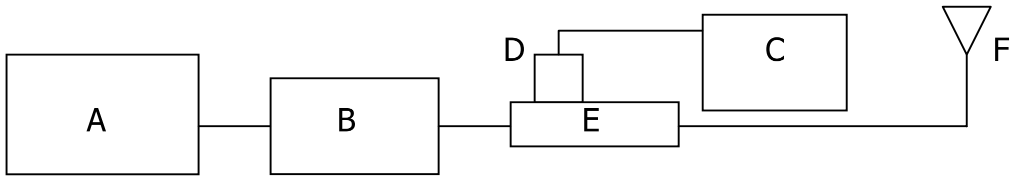


Fig. b The microwave circuit arrangement used for SAR system verification

A. Agilent Model 8648D Signal Generator
B. Mini circuits Model ZHL-42 Amplifier
C. Agilent Model E4416A Power Meter
D. Agilent Model 8481H Power Sensor
E. Agilent Model 773D Dual directional coupling
F. Reference dipole antenna

Photograph of the 2450MHz System Check

Validation Kit	Frequency	Target SAR 1g (250mW)	Target SAR 10g (250mW)	Measured SAR 1g (250mW)	Measured SAR 10g (250mW)	Measured date
DT3DV6 S/N :1759	2450 MHz	13.4 m W/g	6.18 m W/g	13.6 m W/g	6.3 m W/g	2005-07-21
DT3DV6 S/N :1759	2450 MHz	13.4 m W/g	6.18 m W/g	13.3m W/g	6.1m W/g	2005-07-28

Table 1. Results system validation

1.10 Tissue Simulant Fluid for the Frequency Band 2.4 to 2.5 GHz

The dielectric properties for this body-simulant fluid were measured by using the HP Model 85070D Dielectric Probe (rates frequence band 200 MHz to 20 GHz) in conjuncation with HP 8753D Network Analyzer(30 KHz-6000 MHz) by using a procedure detailed in Section V.

F (Mhz)	Tissue type	Limits/ Measured	Dielectric Parameters		
			Permittivity	Conductivity	Simulated Tissue Temp(° C)
2450	Body	Measured,2005.07.21	51.3	1.99	21.6
		Measured,2005.07.28	52.13	2.008	21.7
		Recommended Limits	50.1-55.3	1.85-2.05	20-24

Table 2. Dielectric Parameters of Tissue Simulant Fluid

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The depth of the tissue simulant in the ear reference point of the phantom was 15cm±5mm during all tests. (Fig .2)
The composition of the brain tissue simulating liquid for 2450 MHz is:

Ingredient	2450Mhz (Head)	2450Mhz (Body)
DGMBE	550.0 g	301.7 ml
Water	450.0 g	698.3 ml
Total amount	1 L (1.0kg)	1 L (1.0kg)

Table 3. Recipes for 2450 MHz tissue simulating liquid

1.11 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (‵‵SAR'') in Section 4.2 of ‵‵IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,'' ANSI/IEEE C95.1–1992, Copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in ‵‵Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,'' NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

(1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube). Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

(2) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.(Table .4)

Human Exposure	**Uncontrolled Environment General Population**	**Controlled Environment Occupational**
Spatial Peak SAR (Brain)	1.60 m W/g	8.00 m W/g
Spatial Average SAR (Whole Body)	0.08 m W/g	0.40 m W/g
Spatial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 m W/g	20.00 m W/g

Table .4 RF exposure limits

Notes:

1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

2. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	ET3DV6	1759	APR.17.2005
Schmid & Partner Engineering AG	2450 MHz System Validation Dipole	D2450V2	727	FEB.10.2005
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE3	547	Feb.16.2005
Schmid & Partner Engineering AG	Software	DASY 4 V4.5c Build 19	---	Calibration isn't necessary
Schmid & Partner Engineering AG	Phantom	SAM	---	Calibration isn't necessary
Agilent	Network Analyzer	8753D	3410A05547	Jun.02.2005
Agilent	Dielectric Probe Kit	85070D	US01440168	Calibration isn't necessary
Agilent	Dual-directional coupler	773D	MY28390396	APR.07.2005
Agilent	RF Signal Generator	8648D	3847M00432	APR.15.2005
Agilent	Power Sensor	8481H	MY41091361	May.27.2005

3.Summary of Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum SAR location of the EUT are reported in 4.Measurements

SAR MEASUREMENT							
Crest factor : 1 (Duty cycle: 100%) Laptop PC : IBM ThinkPad T30 (S/N: 99AMZM5) Depth of Liquid : 15.0 cm							
EUT Configuration 1(Vertical)							
EUT Set-up conditions		Frequency		Conducted Power [dBm] (Peak)	Liquid Temp[°C]	SAR (W/kg)	Limit (W/kg)
Sep. [cm]	Antenna	Channel	MHz				
0.0	Printed	0	2402	13.30 dbm	21.8	0.08	1.6
		39	2441	11.66 dbm	21.8	0.121	
		78	2480	10.19 dbm	21.8	0.154	
EUT Configuration 2(Horizontal)							
EUT Set-up conditions		Frequency		Conducted Power [dBm] (Peak)	Liquid Temp[°C]	SAR (W/kg)	Limit (W/kg)
Sep. [cm]	Antenna	Channel	MHz				
0.0	Printed	0	2402	13.30 dbm	21.7	0.842	1.6
		39	2441	11.66 dbm	21.7	1.25	
		78	2480	10.19 dbm	21.7	1.44	

Measured Mixture Type	Body	Relative Humidity	60%
Ambient Temperature	22.1 °C	Fluid Temperature	21.7°C

Note: SAR measured results for the USB Dongle at maximum output power.

4.Measurements

Vertical position, lowest channel

Date/Time: 2005/7/28 12:03:14

DUT: USB Dongle ; Type: Bluetooth;
Program: CSR Bluetest

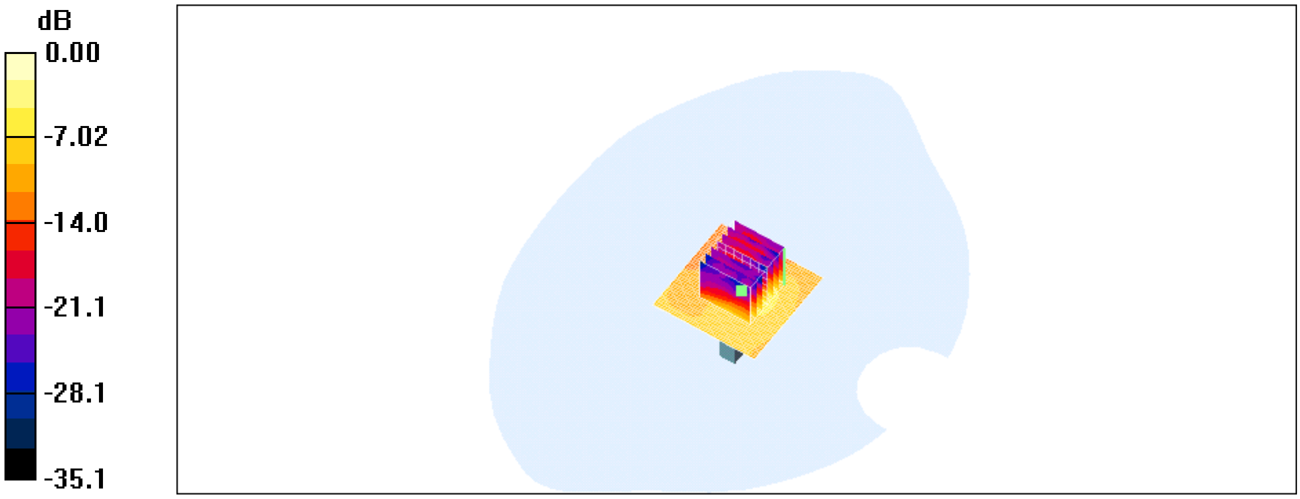
Communication System: Bluetooth; Frequency: 2402 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2402 MHz; σ = 2.01 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:

- Probe: ET3DV6 - SN1759; ConvF(4.13, 4.13, 4.13); Calibrated: 2005/3/23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn547; Calibrated: 2005/2/16
- Phantom: SAM 12; Type: SAM 4.0; Serial: TP:1150
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

DELTA Dongle/Area Scan (41x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.089 mW/g

DELTA Dongle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.08 V/m; Power Drift = -0.030 dB
Peak SAR (extrapolated) = 0.316 W/kg

SAR(1 g) = 0.080 mW/g; SAR(10 g) = 0.027 mW/g
Maximum value of SAR (measured) = 0.097 mW/g



0 dB = 0.097mW/g

Vertical position, middle channel

Date/Time: 2005/7/28 13:40:07

DUT: USB Dongle ; Type: Bluetooth;
Program: CSR Bluetest

Communication System: Bluetooth; Frequency: 2441 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2441 MHz; σ = 2.01 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

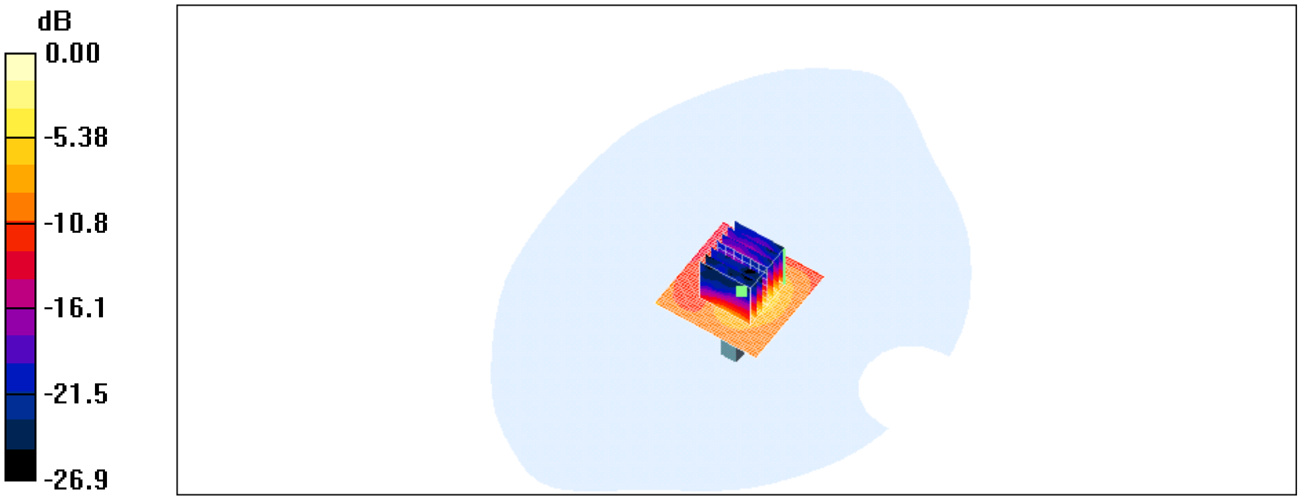
DASY4 Configuration:

- Probe: ET3DV6 - SN1759; ConvF(4.13, 4.13, 4.13); Calibrated: 2005/3/23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn547; Calibrated: 2005/2/16
- Phantom: SAM 12; Type: SAM 4.0; Serial: TP:1150
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

DELTA Dongle/Area Scan (41x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.147 mW/g

DELTA Dongle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.71 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.488 W/kg

SAR(1 g) = 0.121 mW/g; SAR(10 g) = 0.042 mW/g
Maximum value of SAR (measured) = 0.150 mW/g



0 dB = 0.150mW/g

Vertical position, highest channel

Date/Time: 2005/7/28 14:45:57

DUT: USB Dongle ; Type: Bluetooth;
Program: CSR Bluetest

Communication System: Bluetooth; Frequency: 2480 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2480 MHz; σ = 2.05 mho/m; ε_r = 51.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

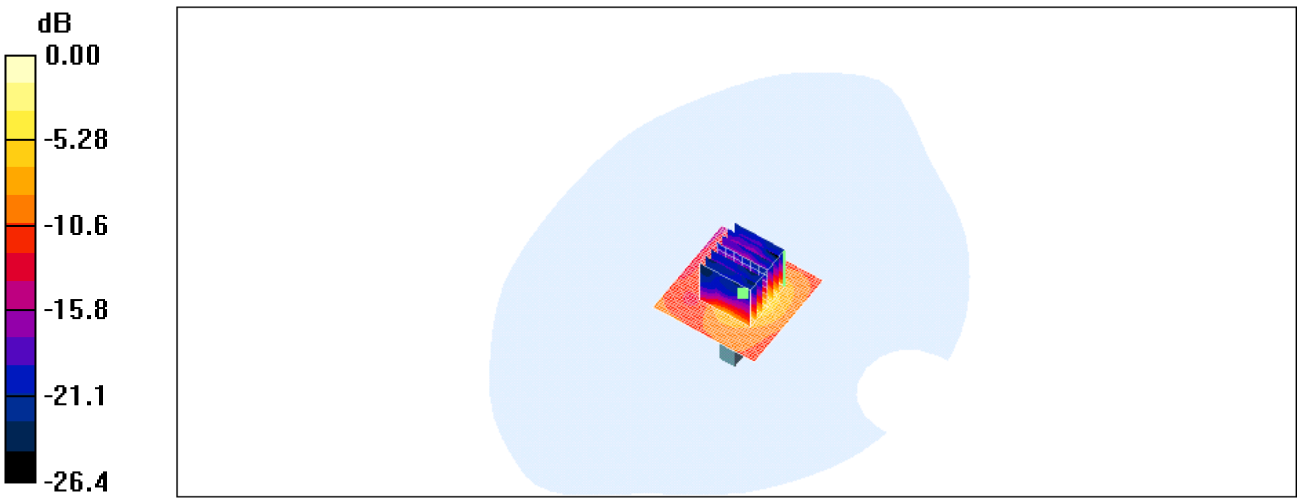
DASY4 Configuration:

- Probe: ET3DV6 - SN1759; ConvF(4.13, 4.13, 4.13); Calibrated: 2005/3/23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn547; Calibrated: 2005/2/16
- Phantom: SAM 12; Type: SAM 4.0; Serial: TP:1150
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

DELTA Dongle/Area Scan (41x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.184 mW/g

DELTA Dongle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.86 V/m; Power Drift = 0.024 dB
Peak SAR (extrapolated) = 0.574 W/kg

SAR(1 g) = 0.154 mW/g; SAR(10 g) = 0.054 mW/g
Maximum value of SAR (measured) = 0.185 mW/g



0 dB = 0.185mW/g

Horizontal position, lowest channel

Date/Time: 2005/7/21 16:18:38

DUT: USB Dongle ; Type: Bluetooth;
Program: CSR Bluetest

Communication System: Bluetooth; Frequency: 2402 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2402 MHz; σ = 1.97 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

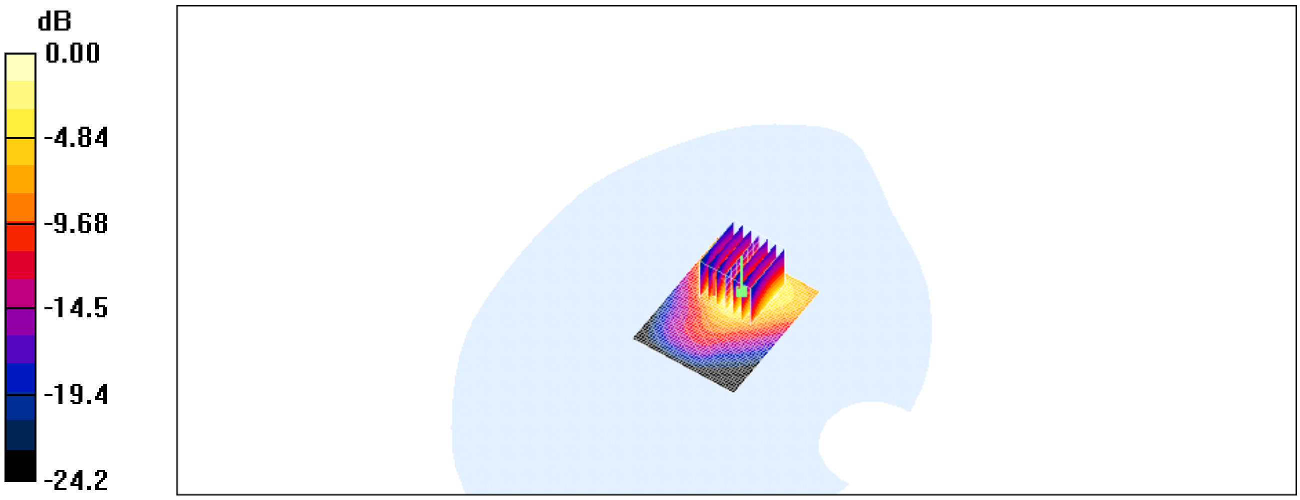
DASY4 Configuration:

- Probe: ET3DV6 - SN1759; ConvF(4.13, 4.13, 4.13); Calibrated: 2005/3/23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn547; Calibrated: 2005/2/16
- Phantom: SAM 12; Type: SAM 4.0; Serial: TP:1150
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

DELTA Dongle/Area Scan (51x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.853 mW/g

DELTA Dongle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.05 V/m; Power Drift = 0.068 dB
Peak SAR (extrapolated) = 1.92 W/kg

SAR(1 g) = 0.842 mW/g; SAR(10 g) = 0.399 mW/g
Maximum value of SAR (measured) = 0.937 mW/g



0 dB = 0.937mW/g

Horizontal position, middle channel

Date/Time: 2005/7/21 15:55:05

DUT: USB Dongle ; Type: Bluetooth;
Program: CSR Bluetest

Communication System: Bluetooth; Frequency: 2441 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2441 MHz; σ = 2.01 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

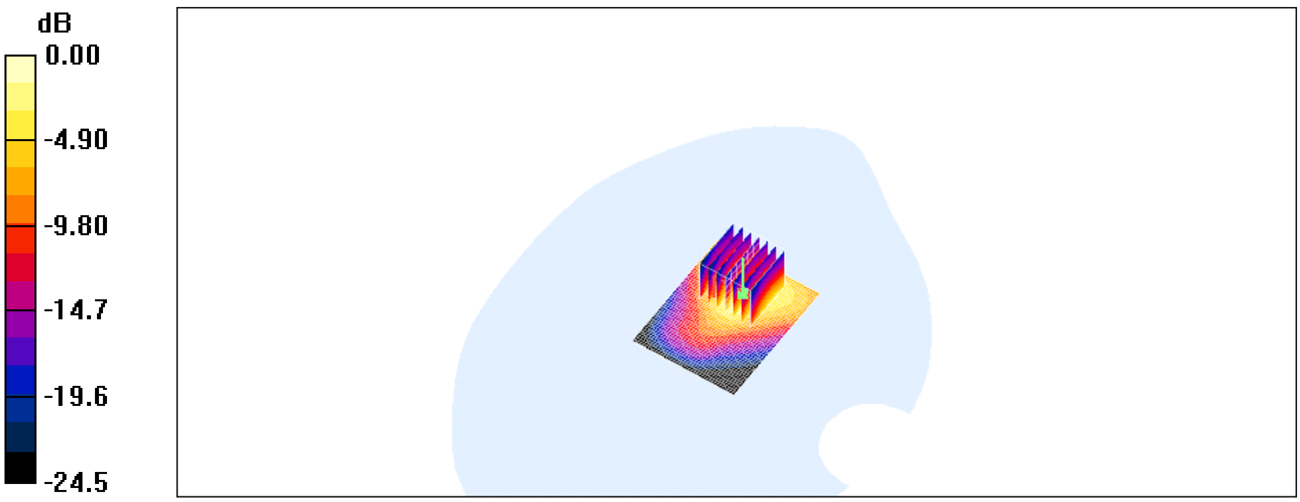
DASY4 Configuration:

- Probe: ET3DV6 - SN1759; ConvF(4.13, 4.13, 4.13); Calibrated: 2005/3/23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn547; Calibrated: 2005/2/16
- Phantom: SAM 12; Type: SAM 4.0; Serial: TP:1150
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

DELTA Dongle/Area Scan (51x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.24 mW/g

DELTA Dongle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.42 V/m; Power Drift = 0.048 dB
Peak SAR (extrapolated) = 2.89 W/kg

SAR(1 g) = 1.25 mW/g; SAR(10 g) = 0.586 mW/g
Maximum value of SAR (measured) = 1.40 mW/g



0 dB = 1.40mW/g

Horizontal position, highest channel

Date/Time: 2005/7/21 15:27:17

DUT: USB Dongle ; Type: Bluetooth;
Program: CSR Bluetest

Communication System: Bluetooth; Frequency: 2480 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2480 MHz; σ = 2.05 mho/m; ε_r = 51.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

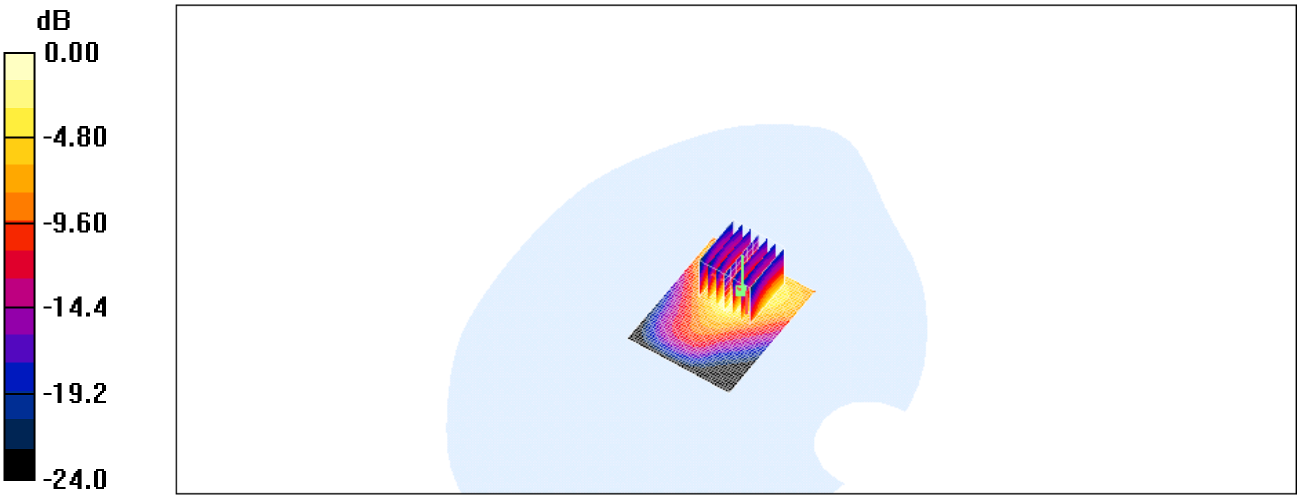
DASY4 Configuration:

- Probe: ET3DV6 - SN1759; ConvF(4.13, 4.13, 4.13); Calibrated: 2005/3/23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn547; Calibrated: 2005/2/16
- Phantom: SAM 12; Type: SAM 4.0; Serial: TP:1150
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

DELTA Dongle/Area Scan (51x41x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.43 mW/g

DELTA Dongle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.13 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.37 W/kg

SAR(1 g) = 1.44 mW/g; SAR(10 g) = 0.664 mW/g
Maximum value of SAR (measured) = 1.58 mW/g



0 dB = 1.58mW/g

SAR System Performance Verification

Date/Time: 2005/07/21 10:10:10

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:727
Program: 2005-07-21

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2450 MHz; σ = 1.99 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

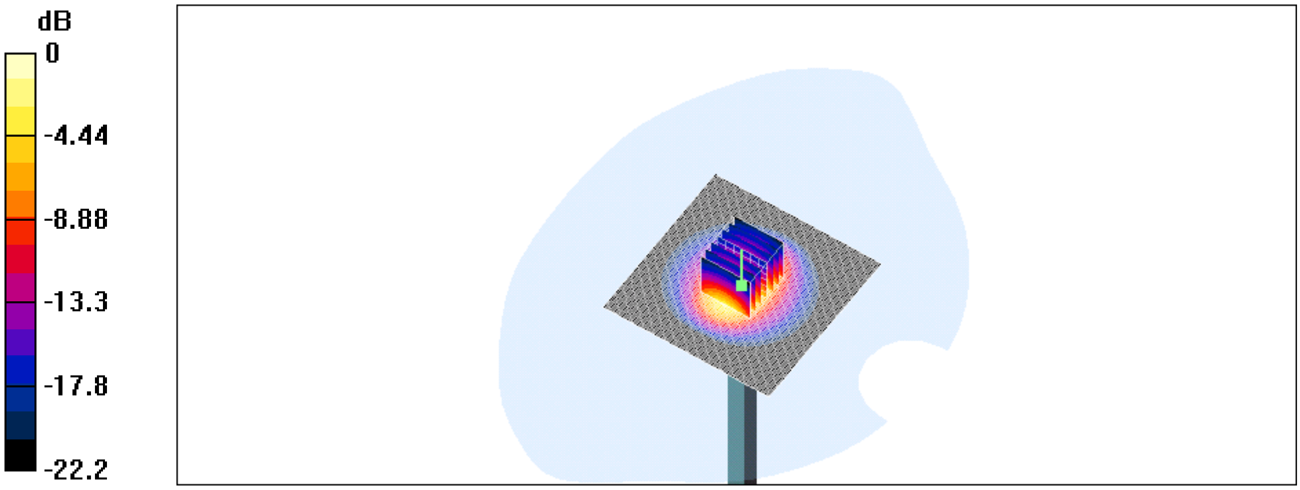
DASY4 Configuration:

- Probe: ET3DV6 - SN1759; ConvF(4.13, 4.13, 4.13); Calibrated: 2005/3/23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn547; Calibrated: 2005/2/16
- Phantom: SAM 12; Type: SAM 4.0; Serial: TP:1150
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Pin=250mw/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 16.3 mW/g

Pin=250mw/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.2 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 28.1 W/kg

SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.3 mW/g
Maximum value of SAR (measured) = 15.3 mW/g



0 dB = 15.3mW/g

SAR System Performance Verification

Date/Time: 2005/07/28 10:37:46

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:727
Program: 2005-07-28

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used (interpolated): f = 2450 MHz; σ = 2.01 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

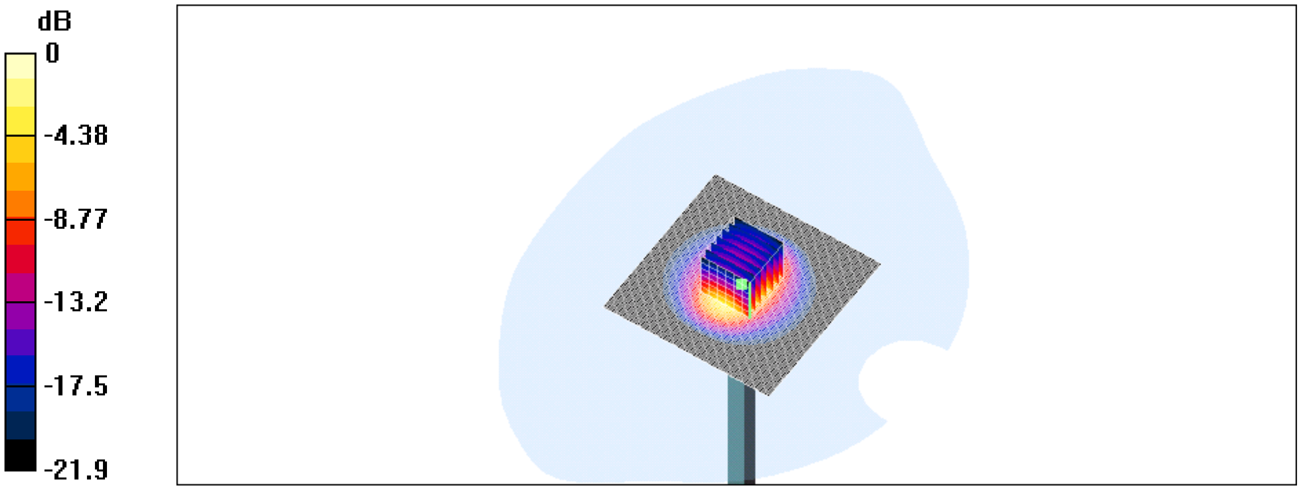
DASY4 Configuration:

- Probe: ET3DV6 - SN1759; ConvF(4.13, 4.13, 4.13); Calibrated: 2005/3/23
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn547; Calibrated: 2005/2/16
- Phantom: SAM 12; Type: SAM 4.0; Serial: TP:1150
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

Pin=250mw/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 16.1 mW/g

Pin=250mw/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.2 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 29.3 W/kg

SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.1 mW/g
Maximum value of SAR (measured) = 14.8 mW/g



0 dB = 14.8mW/g

Appendix
Photographs of Test Setup

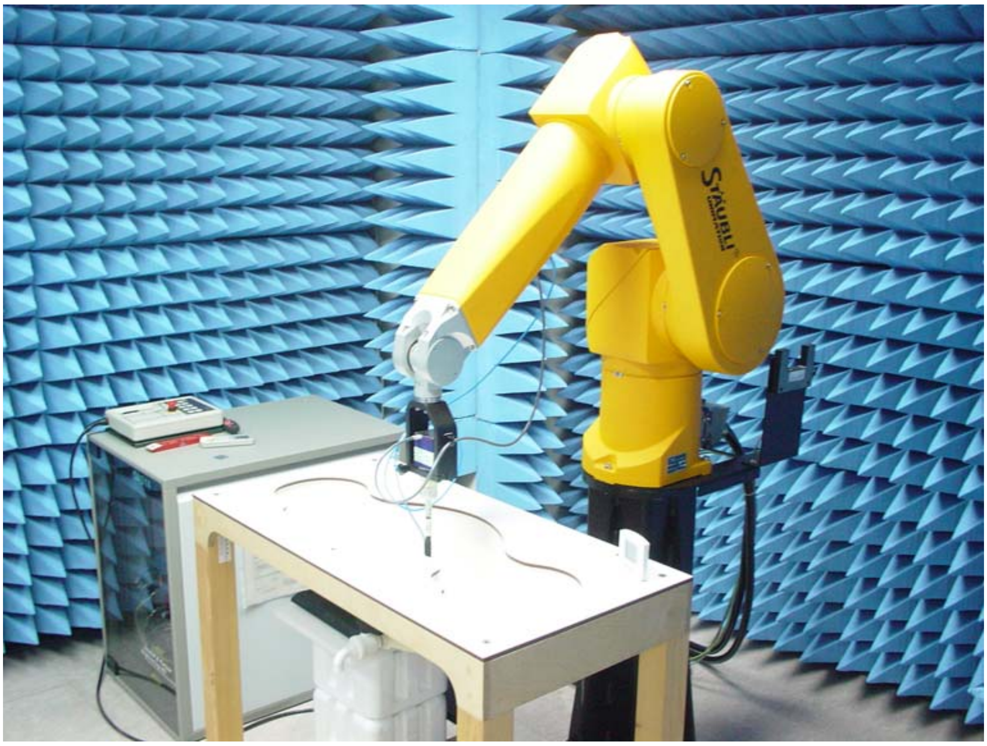


Fig.1 Photograph of the SAR measurement System

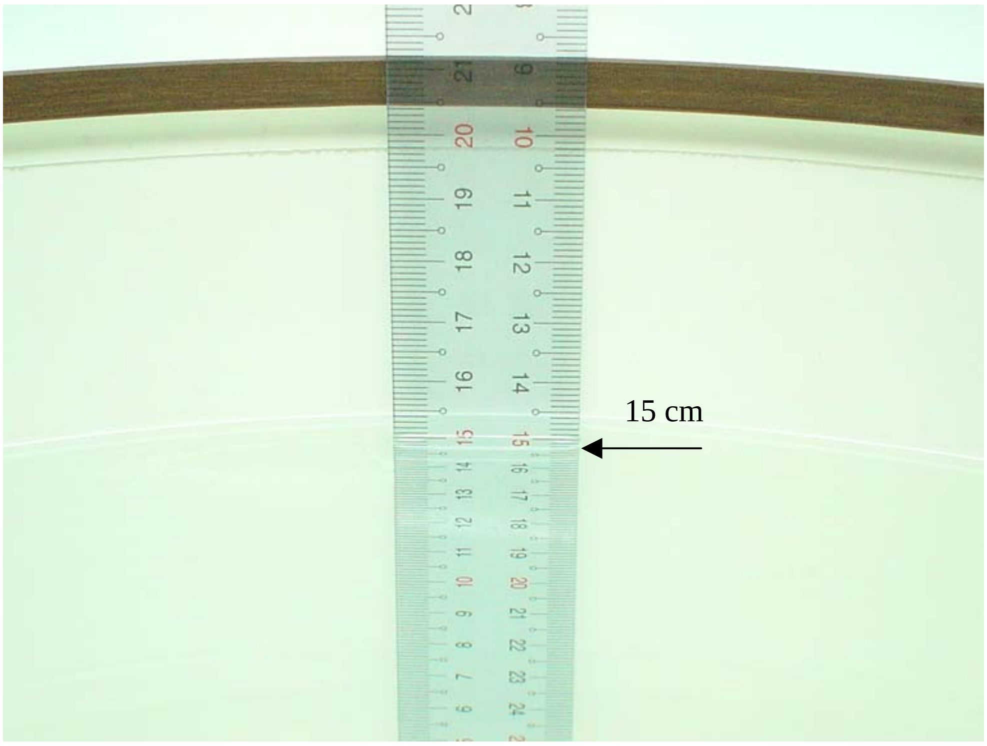


Fig.2 Photograph of the Tissue Simulant Fluid liquid depth 15cm

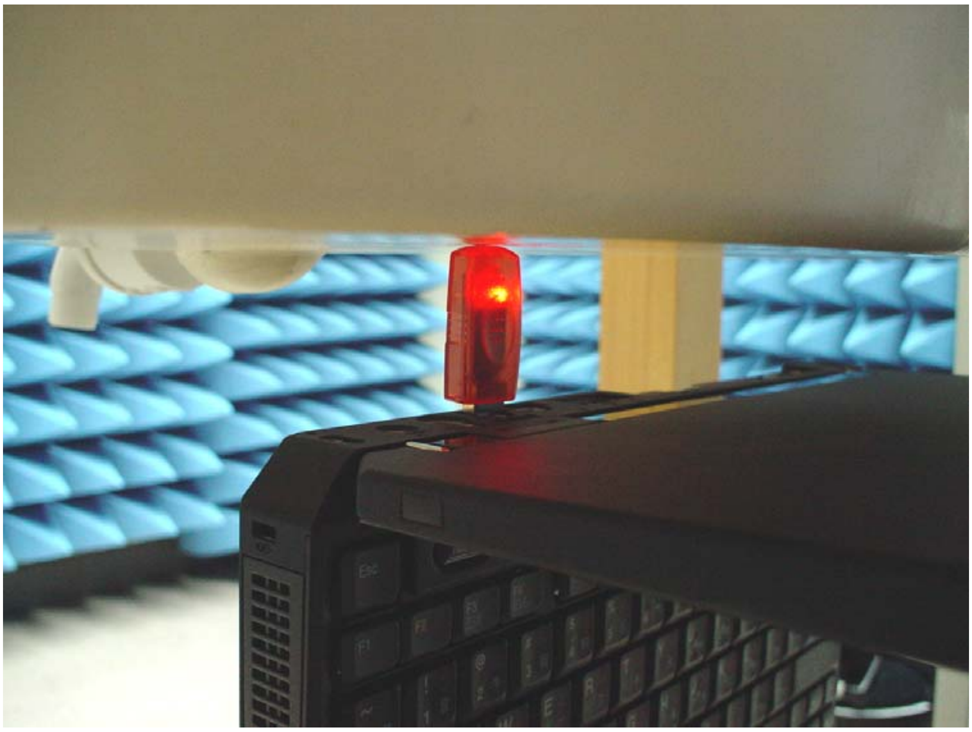


Fig.3 Photograph of the antenna tip is upward and at a distance of 0.0 cm from the base of the phantom.

Fig.4 Photograph of the antenna tip is upward and at a distance of 0.0 cm from the base of the phantom.

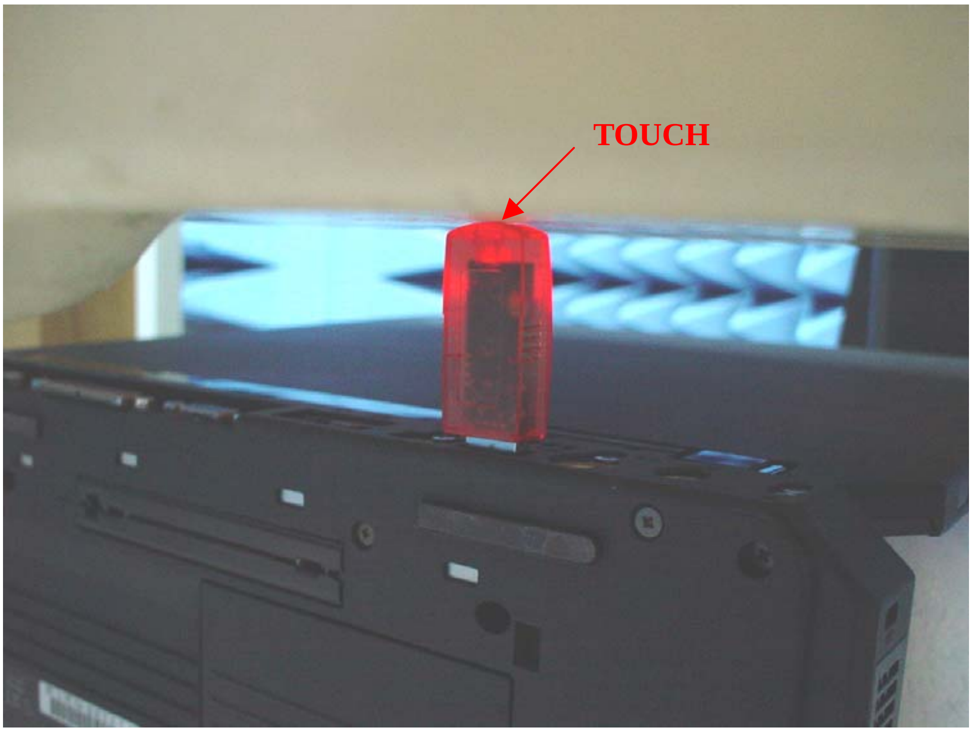


Fig.5 Photograph of the antenna tip is upward and at a distance of 0.0 cm from the base of the phantom.

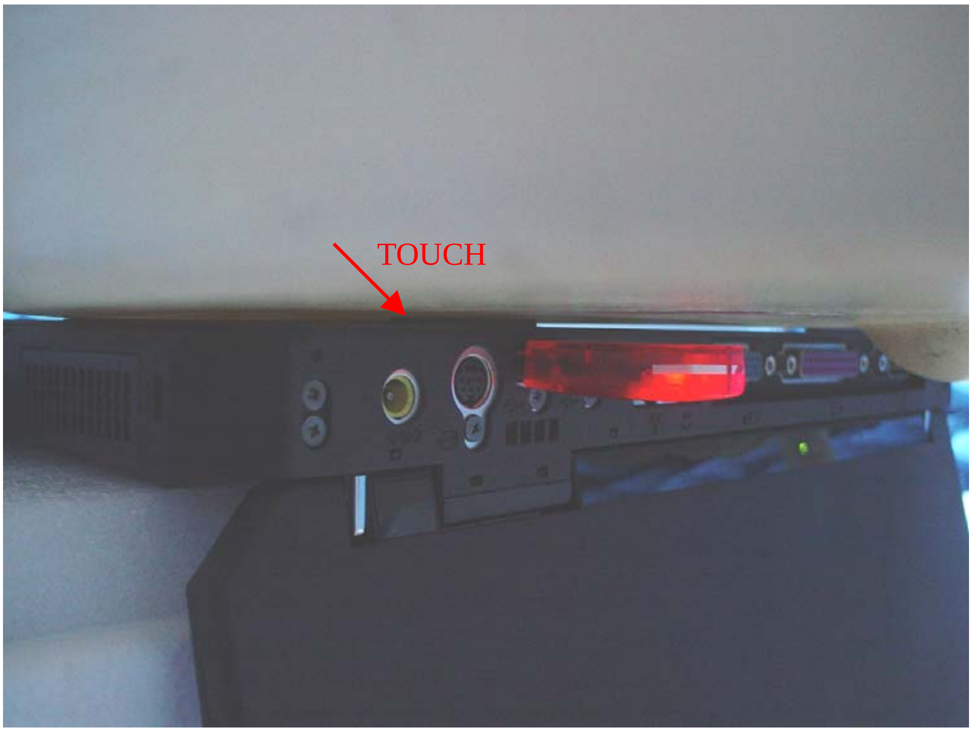


Fig.6 Photograph of the Bottom of the Pc is paralleled and at a distance of 0.0 cm from the base of the phantom.

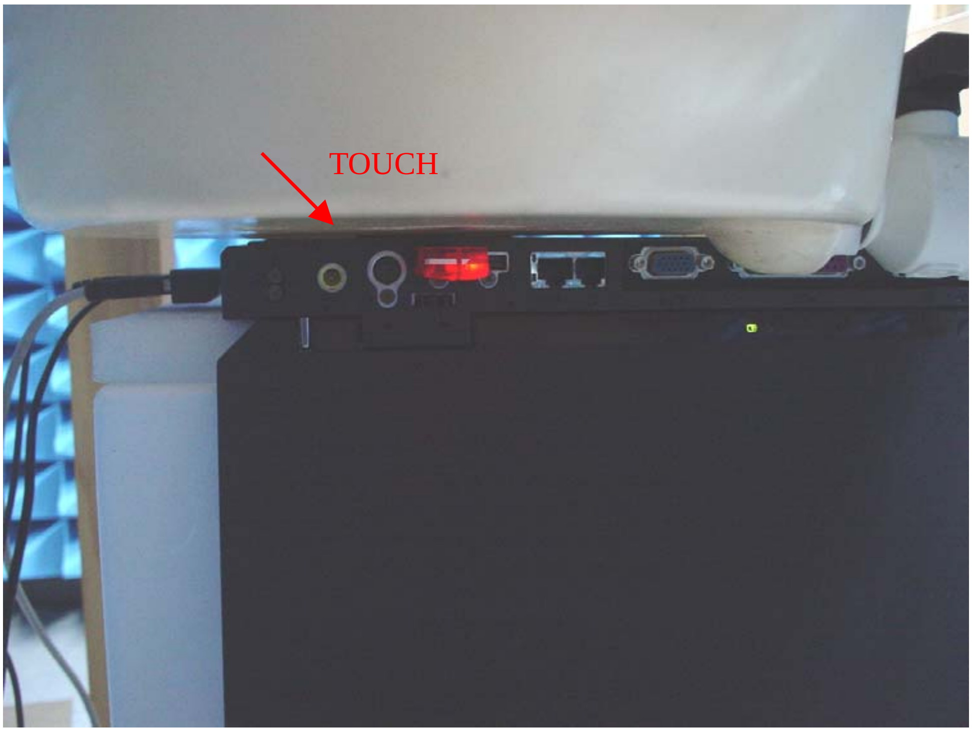


Fig.7 Photograph of the Bottom of the Pc is paralleled and at a distance of 0.0 cm from the base of the phantom.

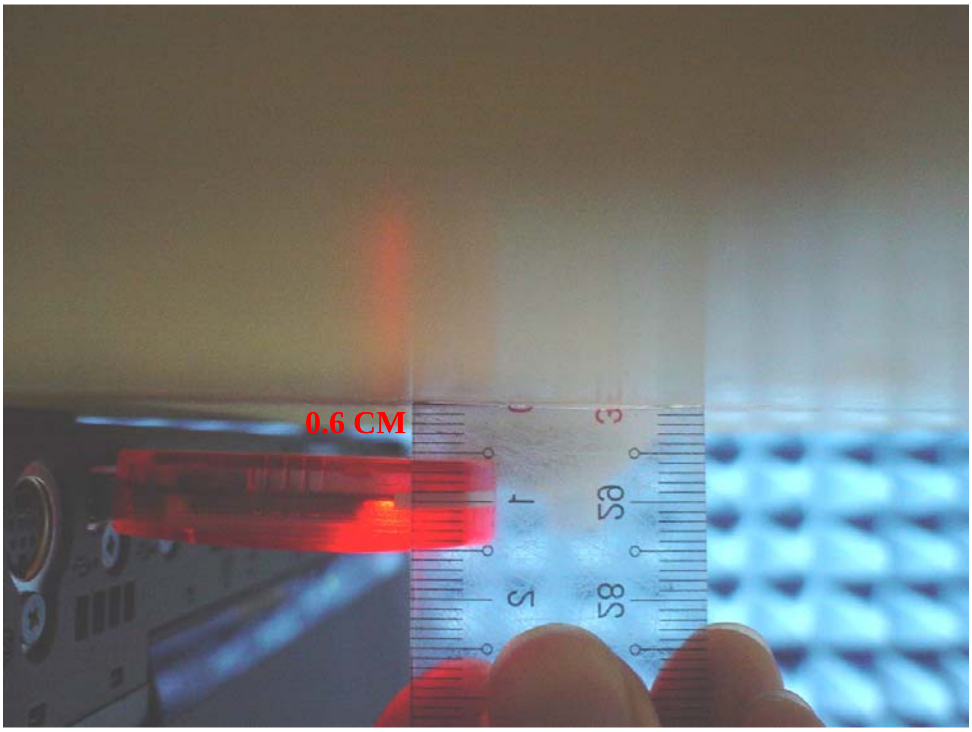


Fig.8 Photograph of the Bottom of the Pc is paralleled and at a distance of 0.0 cm from the base of the phantom, but 0.6 cm Spacing between EUT & Planar Phantom.

Photographs of the EUT

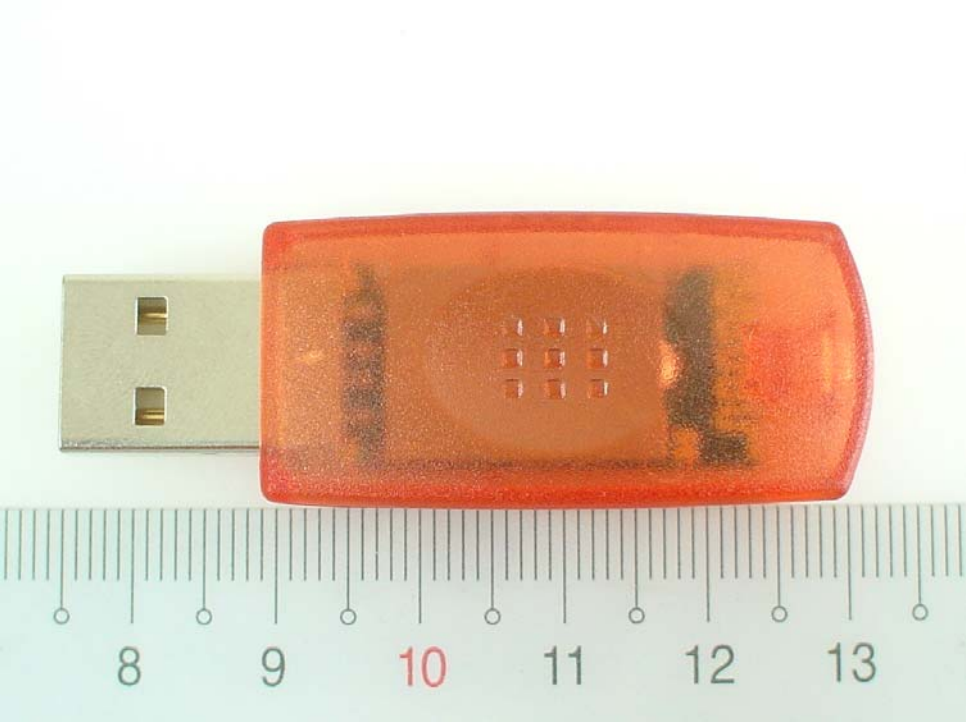


Fig.9 Front view of device

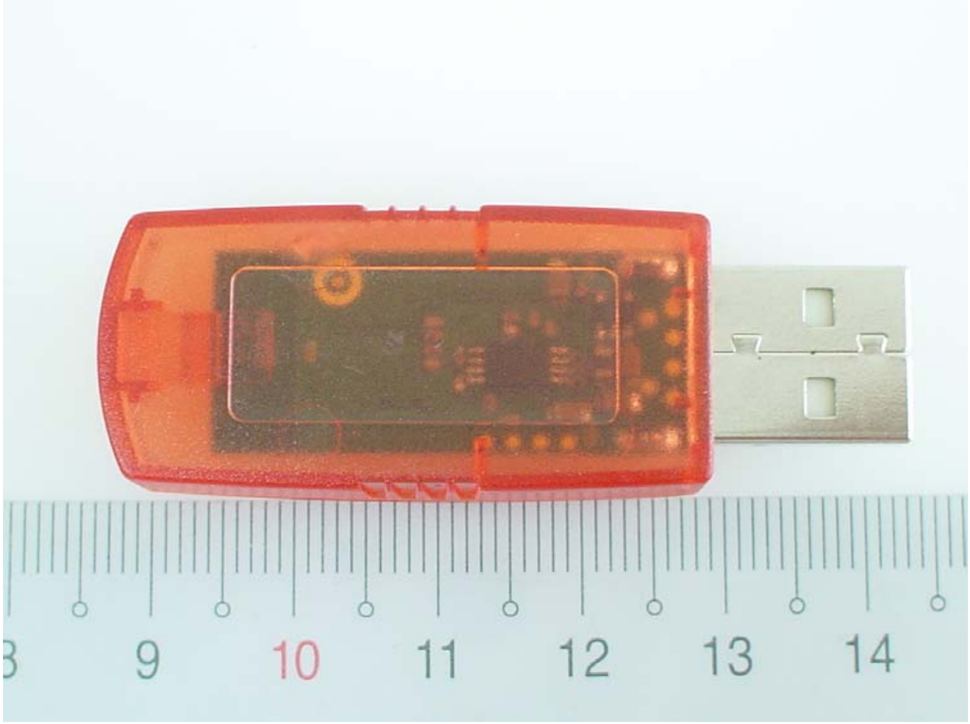


Fig.10 Back view of device

Fig.11 With IBM T30 USB slot

Fig.12 With IBM T30 USB slot

Probe Calibration certificate

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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 **SGS (Auden)**

Certificate No: **ET3-1759_Apr05**

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1759
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	April 25, 2005
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-May-04 (METAS, No. 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No. 251-00388)	May-05
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-04 (METAS, No. 251-00403)	Aug-05
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-04 (METAS, No. 251-00389)	May-05
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-04 (METAS, No. 251-00404)	Aug-05
Reference Probe ES3DV2	SN: 3013	7-Jan-05 (SPEAG, No. ES3-3013_Jan05)	Jan-06
DAE4	SN: 617	19-Jan-05 (SPEAG, No. DAE4-617_Jan05)	Jan-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Laboratory Technician	D.Vetterli
Approved by:	Katja Pokovic	Technical Manager	Katja Pokovic

Issued: April 25, 2005

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Probe ET3DV6

SN:1759

Additional Conversion Factors

Manufactured:	November 12, 2002
Last calibrated:	March 23, 2005
Recalibrated:	April 25, 2005

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1759

Sensitivity in Free Space[A]

NormX	**1.56** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**94** mV
NormY	**1.38** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**94** mV
NormZ	**1.61** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**94** mV

Diode Compression[B]

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 5.

Sensor Offset

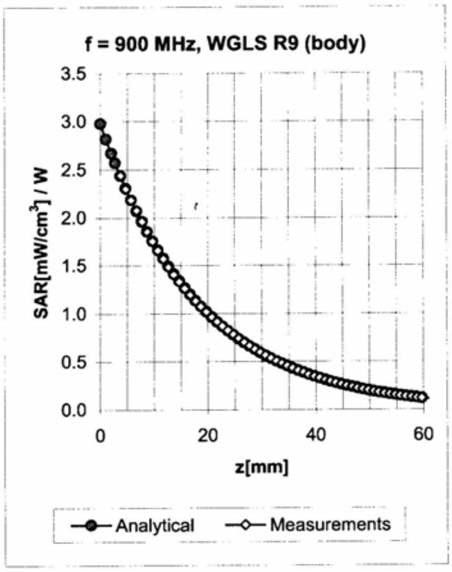
Probe Tip to Sensor Center **2.7** mm

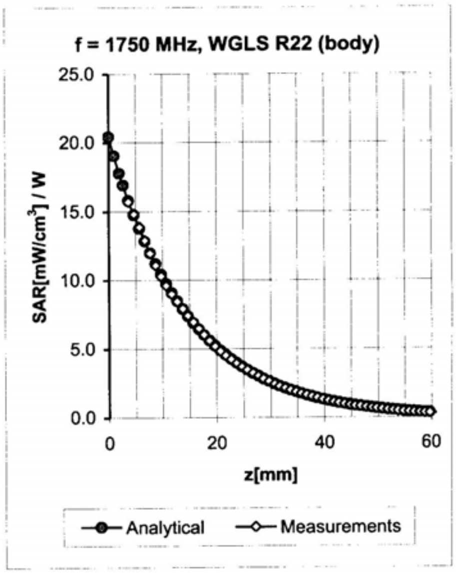
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[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.

Conversion Factor Assessment





f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.64	2.30	4.48 ± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.55	2.04	6.25 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.56	2.77	4.67 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.55	3.00	4.52 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.70	2.19	4.13 ± 11.8% (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.**

Uncertainty Analysis

DASY4 Uncertainty Budget
According to IEEE P1528 [1]

Error Description	Uncertainty value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±4.8 %	N	1	1	1	±4.8 %	±4.8 %	∞
Axial Isotropy	±4.7 %	R	$\sqrt{3}$	0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	$\sqrt{3}$	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Linearity	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %	∞
System Detection Limits	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Readout Electronics	±1.0 %	N	1	1	1	±1.0 %	±1.0 %	∞
Response Time	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	$\sqrt{3}$	1	1	±1.5 %	±1.5 %	∞
RF Ambient Conditions	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.4 %	R	$\sqrt{3}$	1	1	±0.2 %	±0.2 %	∞
Probe Positioning	±2.9 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Max. SAR Eval.	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Test Sample Related								
Device Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	875
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Power Drift	±5.0 %	R	$\sqrt{3}$	1	1	±2.9 %	±2.9 %	∞
Phantom and Setup								
Phantom Uncertainty	±4.0 %	R	$\sqrt{3}$	1	1	±2.3 %	±2.3 %	∞
Liquid Conductivity (target)	±5.0 %	R	$\sqrt{3}$	0.64	0.43	±1.8 %	±1.2 %	∞
Liquid Conductivity (meas.)	±2.5 %	N	1	0.64	0.43	±1.6 %	±1.1 %	∞
Liquid Permittivity (target)	±5.0 %	R	$\sqrt{3}$	0.6	0.49	±1.7 %	±1.4 %	∞
Liquid Permittivity (meas.)	±2.5 %	N	1	0.6	0.49	±1.5 %	±1.2 %	∞
Combined Std. Uncertainty						±10.3 %	±10.0 %	331
Expanded STD Uncertainty						**±20.6 %**	**±20.1 %**	

Phantom description

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Certificate of conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 CA
Series No	TP-1150 and higher
Manufacturer / Origin	Untersee Composites Hauptstr. 69 CH-8559 Fruthwilen Switzerland

Tests

The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series units (called samples).

Test	Requirement	Details	Units tested
Shape	Compliance with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness	Compliant with the requirements according to the standards	2mm +/- 0.2mm in specific areas	First article, Samples
Material parameters	Dielectric parameters for required frequencies	200 MHz – 3 GHz Relative permittivity < 5 Loss tangent < 0.05.	Material sample TP 104-5
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards	Liquid type HSL 1800 and others according to the standard.	Pre-series, First article

Standards

[1] CENELEC EN 50361
[2] IEEE P1528-200x draft 6.5
[3] IEC PT 62209 draft 0.9
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of [1] and [3].

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standard [1] and draft standards [2] and [3].

Date 28.02.2002

Signature / Stamp

F. Bomholt

Schmid & Partner Engineering AG
Zeughausstrasse 43, CH-8004 Zurich
Tel. +41 1 245 97 00, Fax +41 1 245 97 79

System Validation from Original equipment supplier SPEAG Schmid & Partner

DASY4 Validation Report for Body TSL

Date/Time: 10.02.2005 11:13:48Date/Time: 10.02.2005 11:21:47

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN727

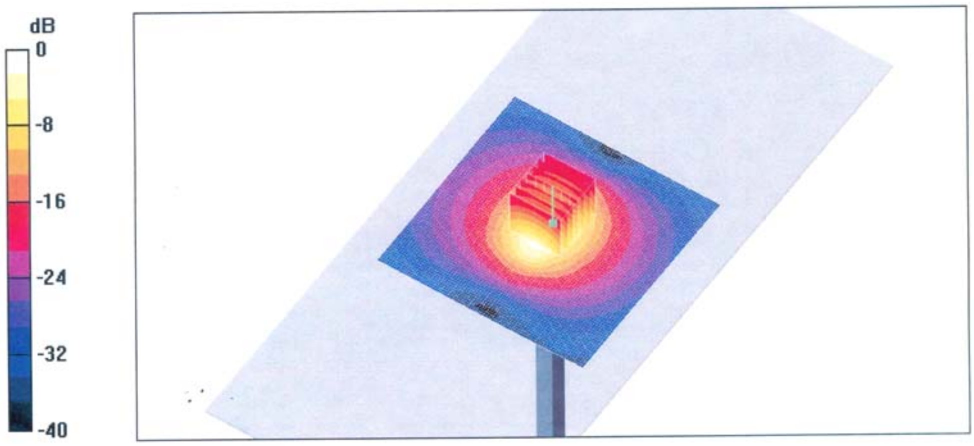
Communication System: CW-2450; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: M2450;
Medium parameters used: f = 2450 MHz; $\sigma = 2.01$ mho/m; $\varepsilon_r = 52.3$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.13, 4.13, 4.13); Calibrated: 29.10.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 22.07.2004
- Phantom: Flat Phantom 5.0; Type: QD000P50AA; Serial: 1001;
- Measurement SW: DASY4, V4.5 Build 11; Postprocessing SW: SEMCAD, V1.8 Build 142

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 16.1 mW/g

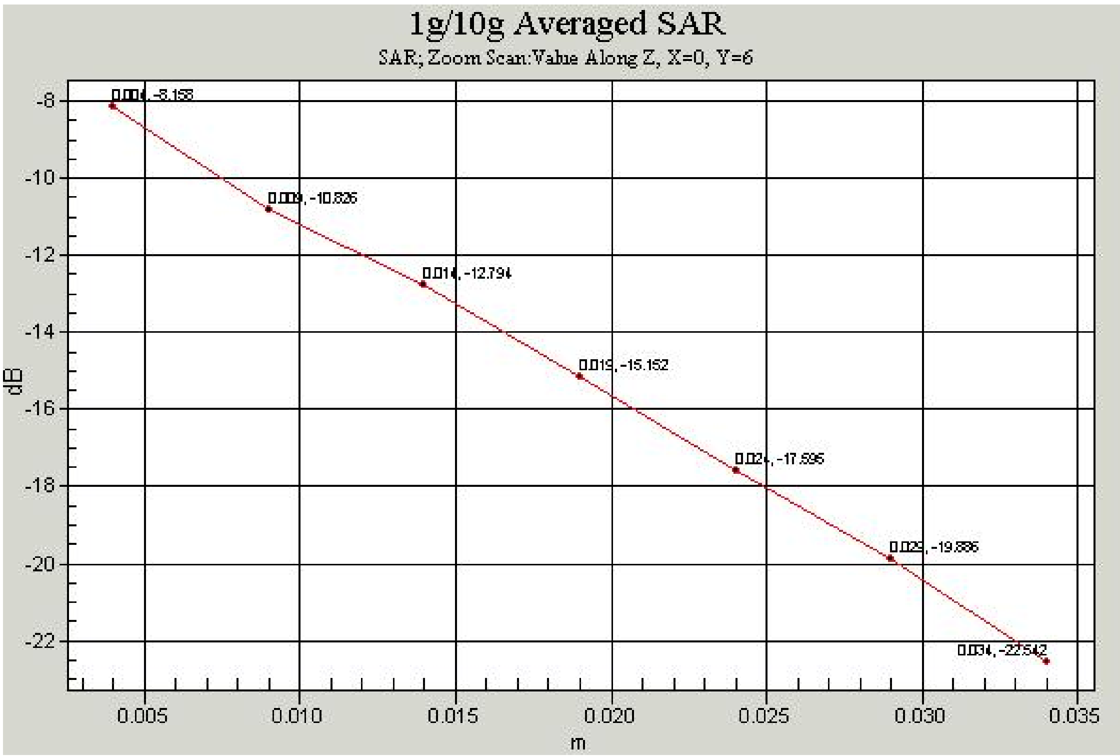
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.5 V/m; Power Drift = 0.0 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 13.4 mW/g; SAR(10 g) = 6.18 mW/g
Maximum value of SAR (measured) = 15.2 mW/g



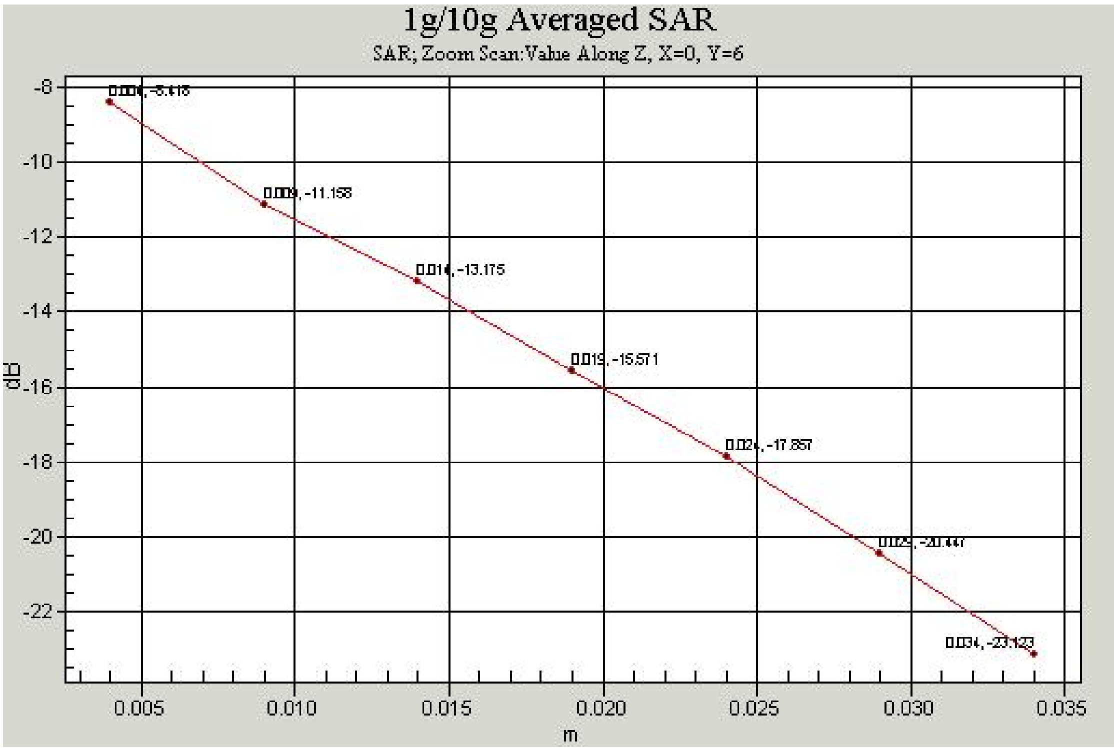
0 dB = 15.2 mW/g

Z-axis Plot

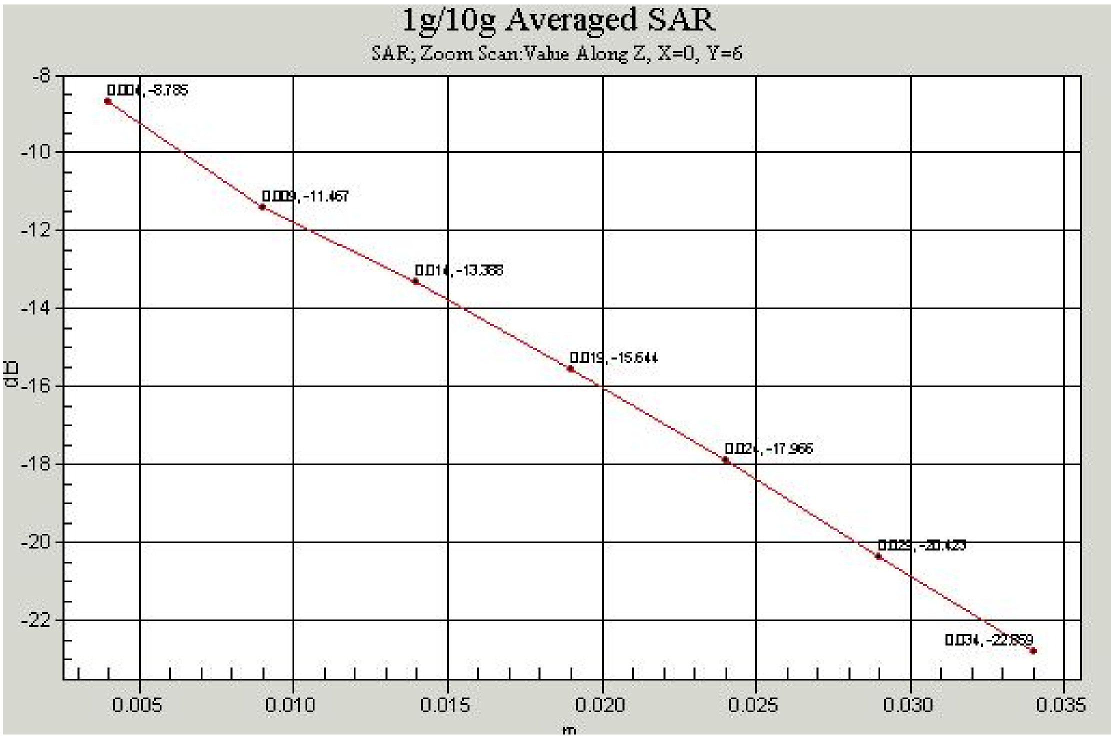
Vertical



4.1.1 Vertical position, lowest channel

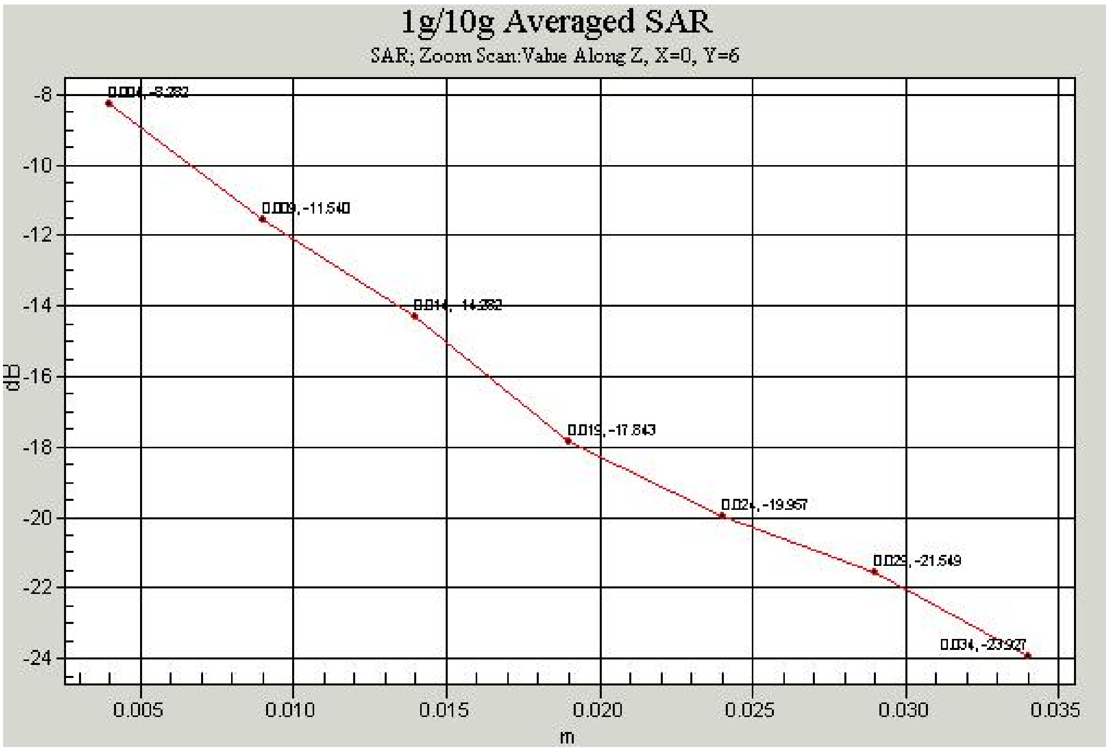


4.1.2 Vertical position, middle channel

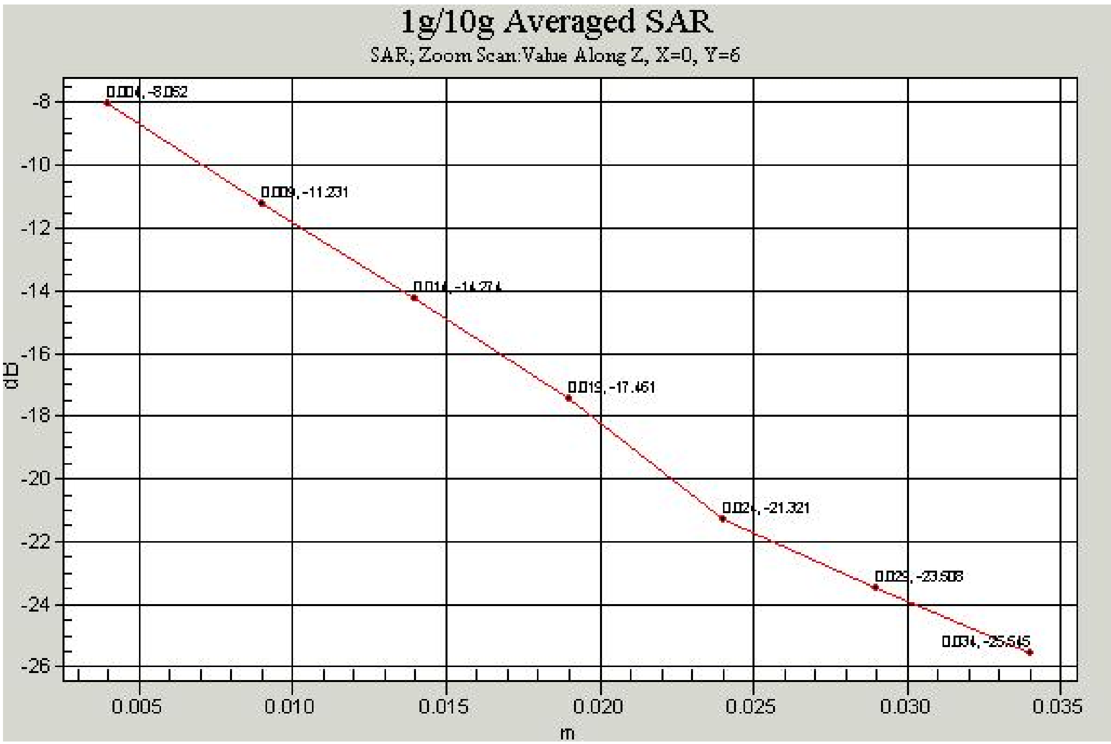


4.1.3 Vertical position, highest channel

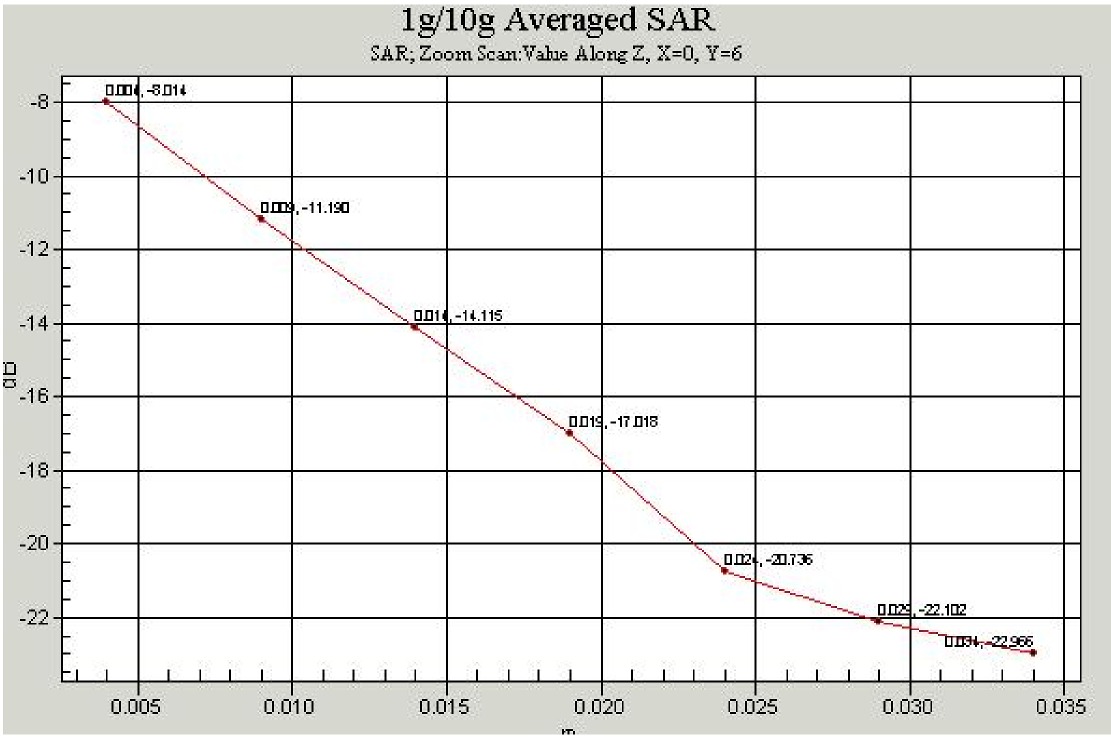
Horizontal



4.1.4 Horizontal position, lowest channel



4.1.5 Horizontal position, middle channel



4.1.6 Horizontal position, highest channel