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 Bomholt	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
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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:	Nico Vetterli	Technician	
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.

Schmid & Partner Engineering AG

s p e a g

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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** 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**

Boundary Effect

Head **900 MHz** **Typical SAR gradient: 5 % per mm**

Probe Tip to Boundary		**1 mm**	**2 mm**
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**

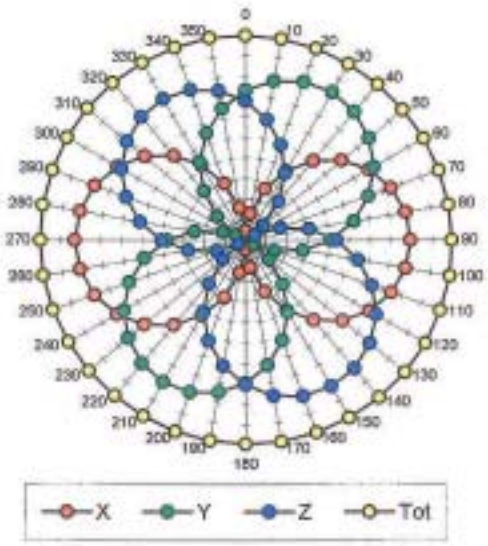
Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	13.8	9.3
SAR_{be} [%]	With Correction Algorithm	0.2	0.1

Sensor Offset

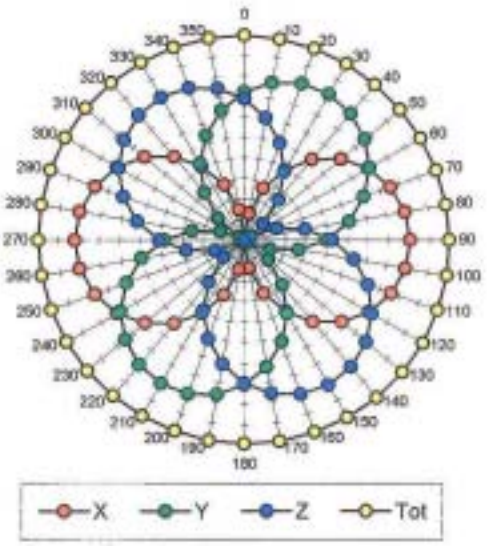
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.4 ± 0.2**	mm

Receiving Pattern (ϕ), θ = 0°

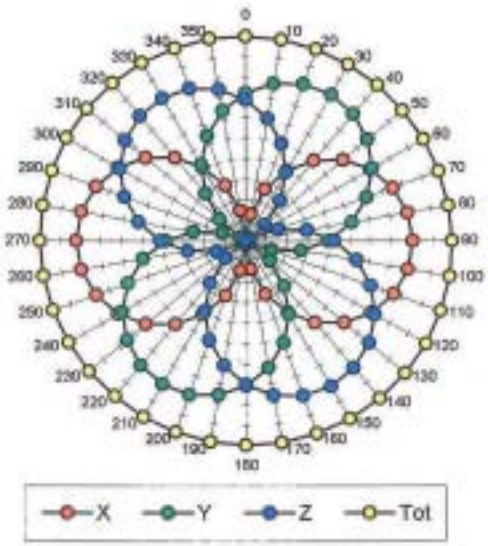
f = 30 MHz, TEM cell ifi110



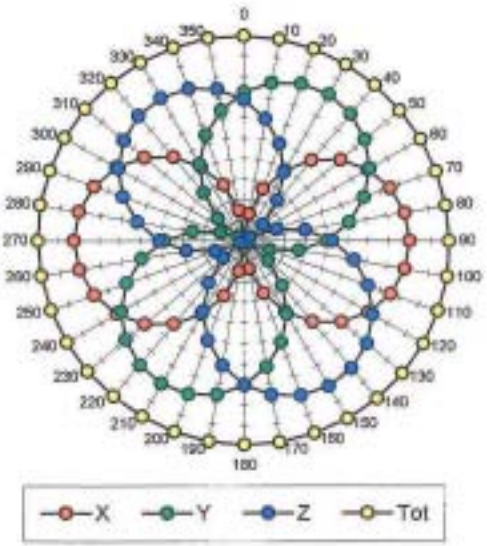
f = 100 MHz, TEM cell ifi110

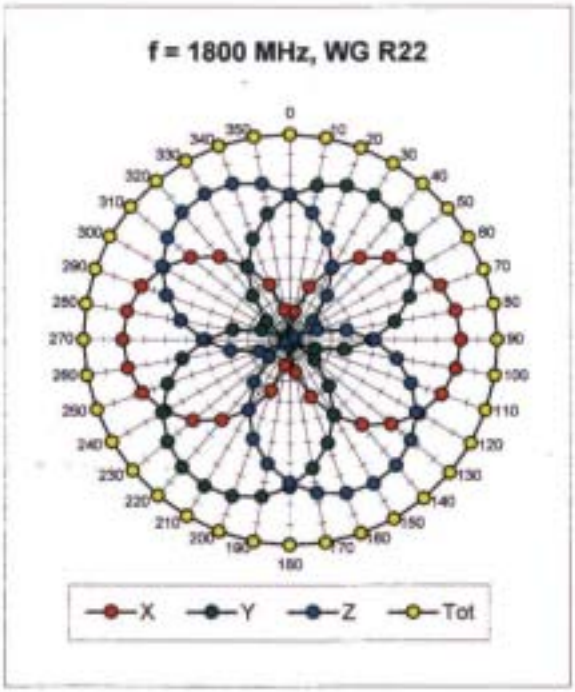


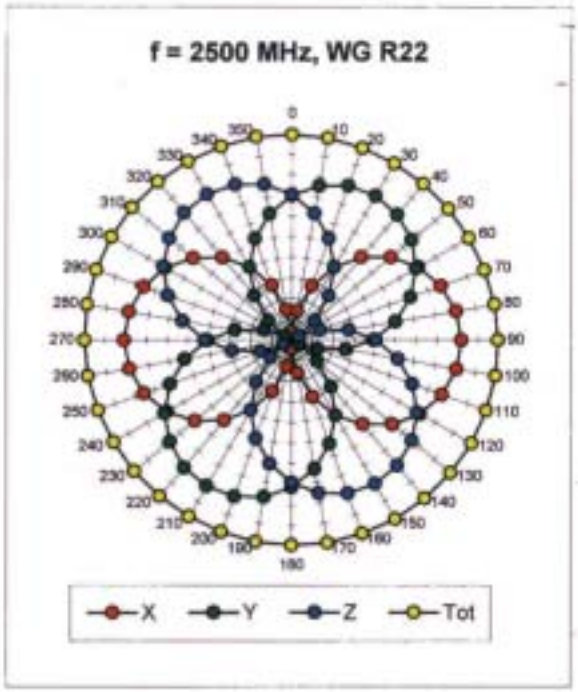
f = 300 MHz, TEM cell ifi110



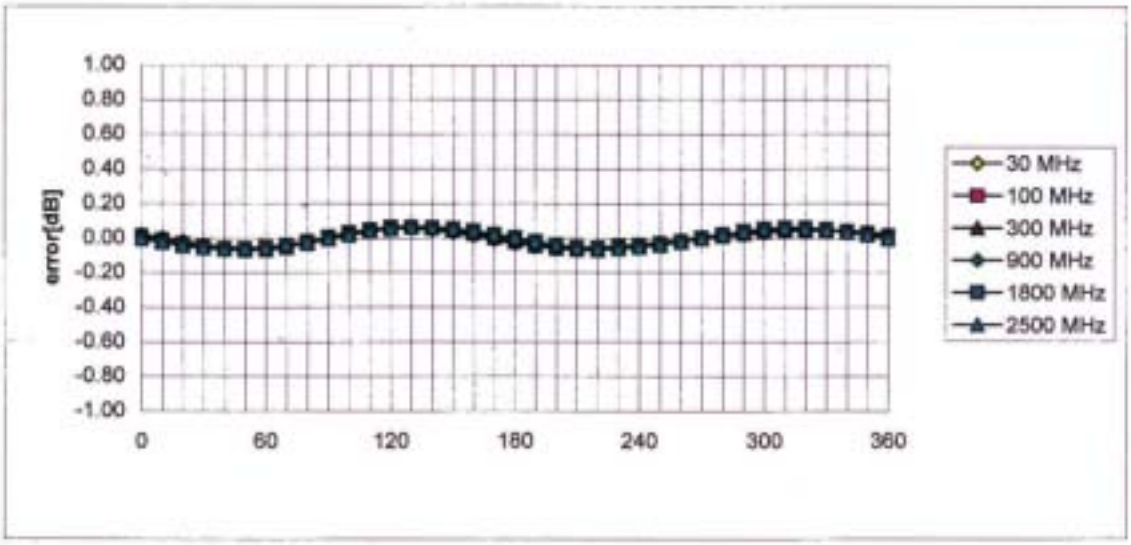
f = 900 MHz, TEM cell ifi110





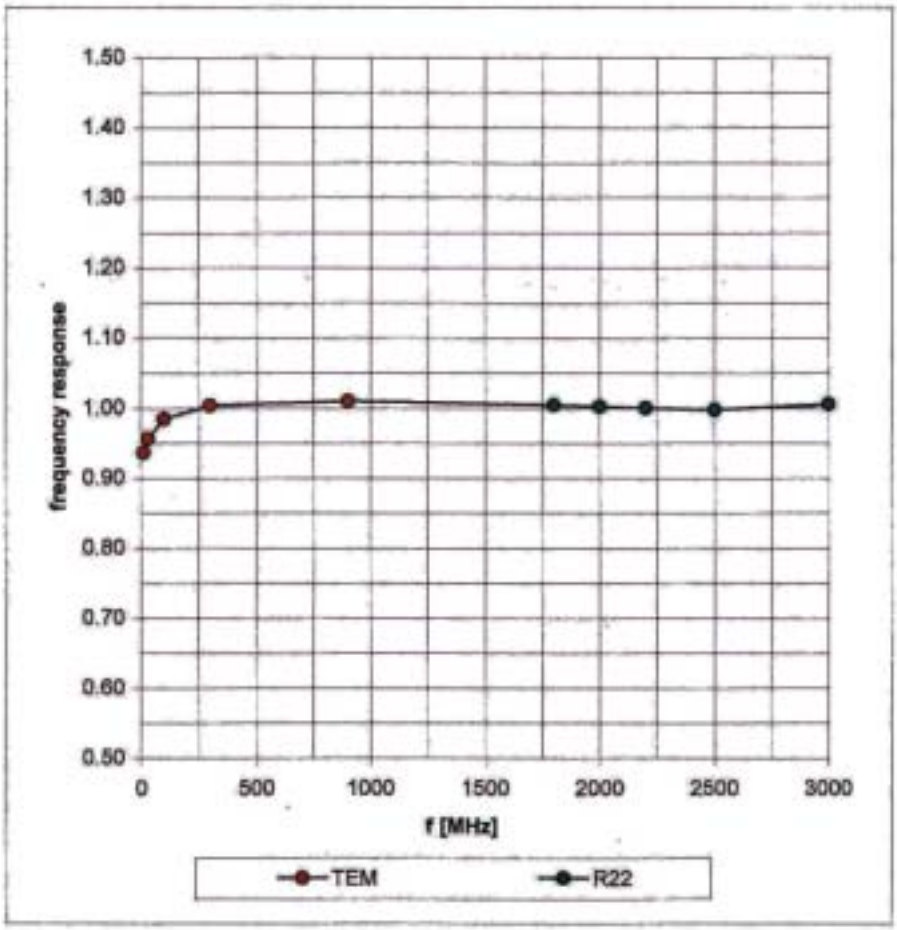


Isotropy Error (ϕ), θ = 0°



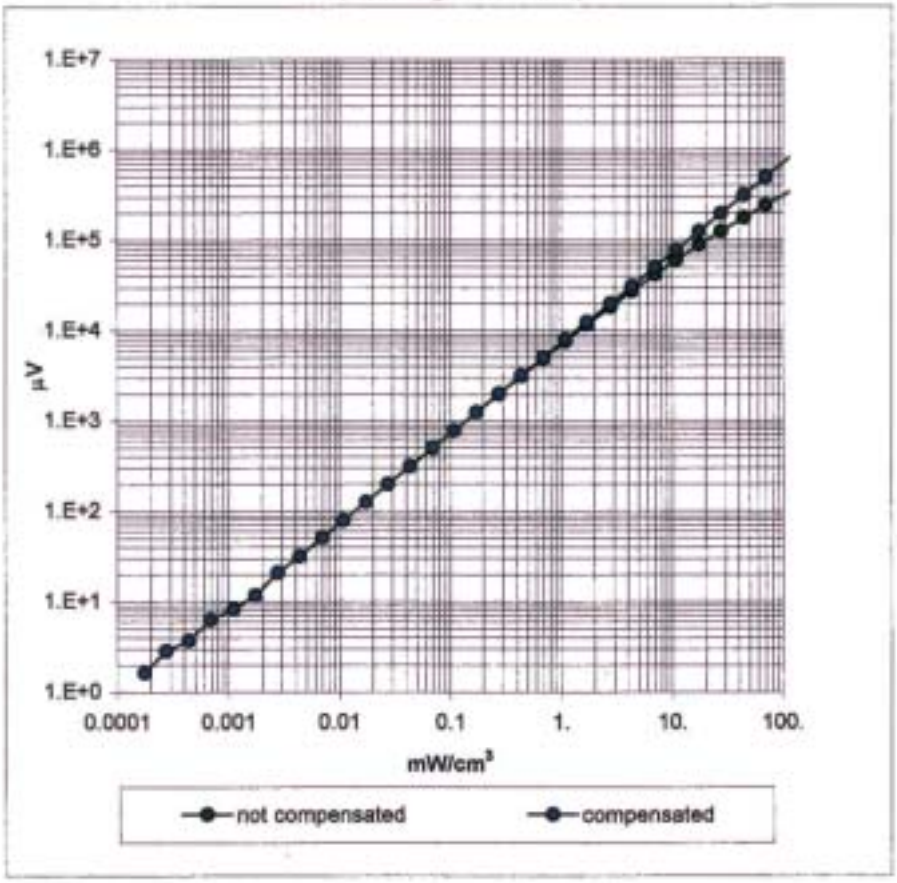
Frequency Response of E-Field

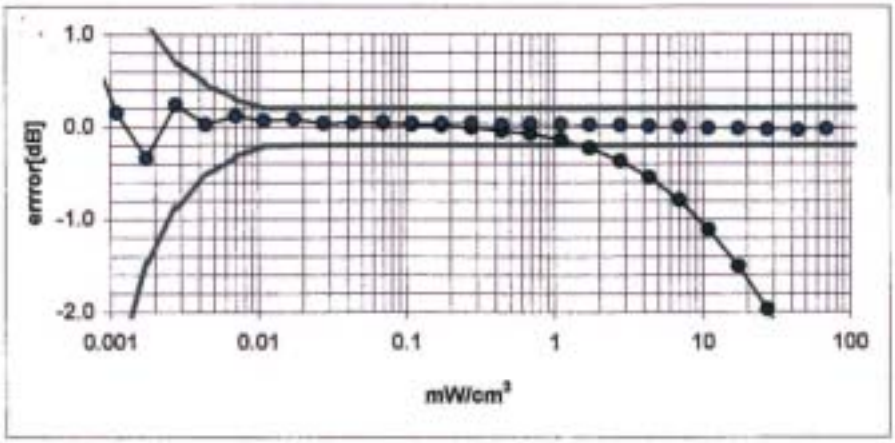
(TEM-Cell:ifi110, Waveguide R22)



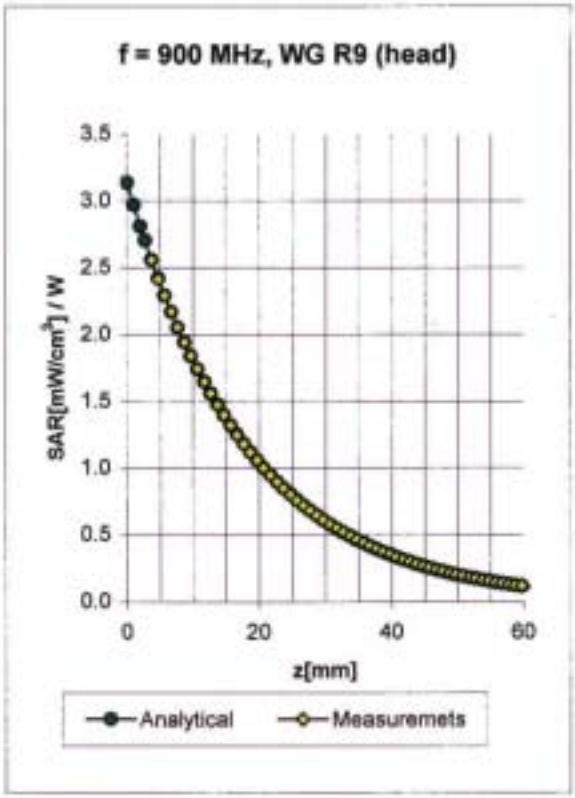
Dynamic Range f(SAR_{brain})

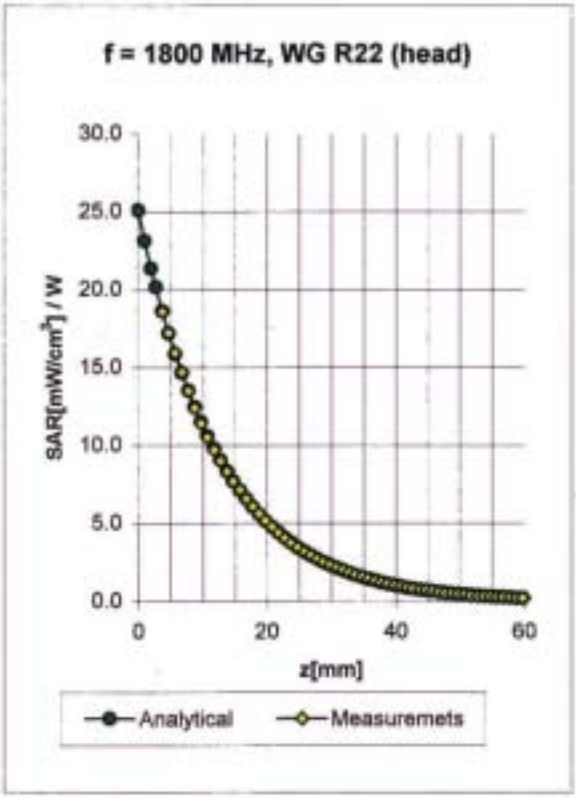
(Waveguide R22)





Conversion Factor Assessment

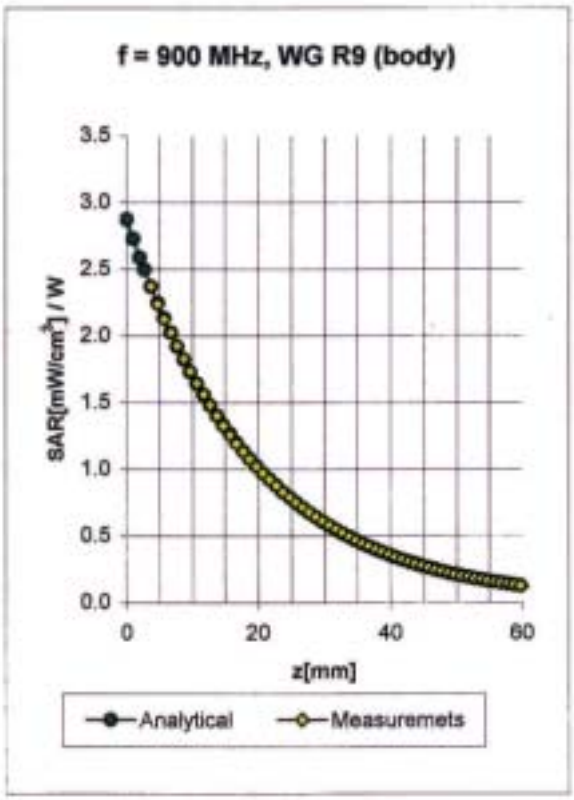


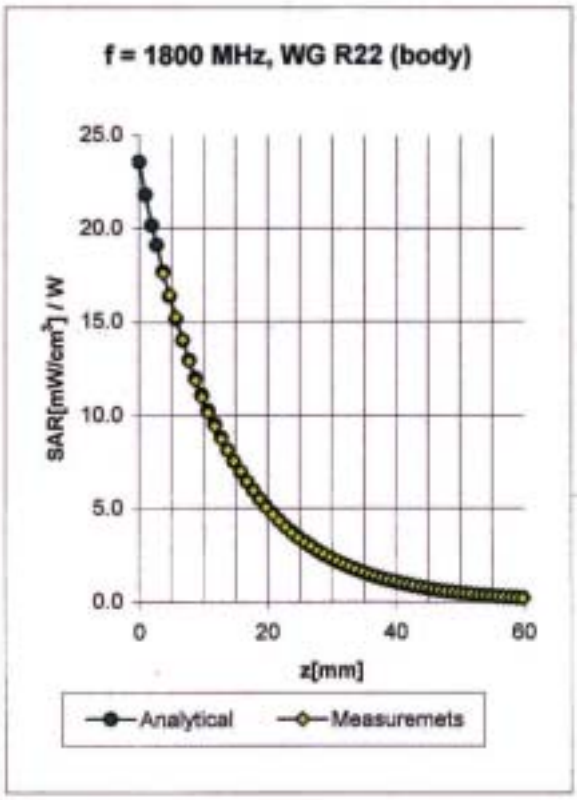


Head	**900 MHz**		ε_r = **41.5 ± 5%**	σ = **0.97 ± 5% mho/m**
Head	**835 MHz**		ε_r = **41.5 ± 5%**	σ = **0.90 ± 5% mho/m**
	ConvF X	**6.7** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**6.7** ± 9.5% (k=2)		Alpha **0.67**
	ConvF Z	**6.7** ± 9.5% (k=2)		Depth **1.74**

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

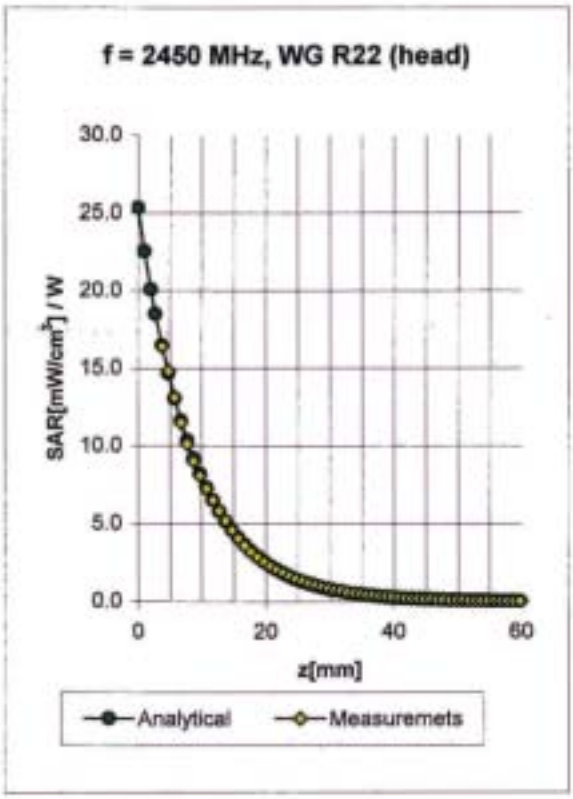


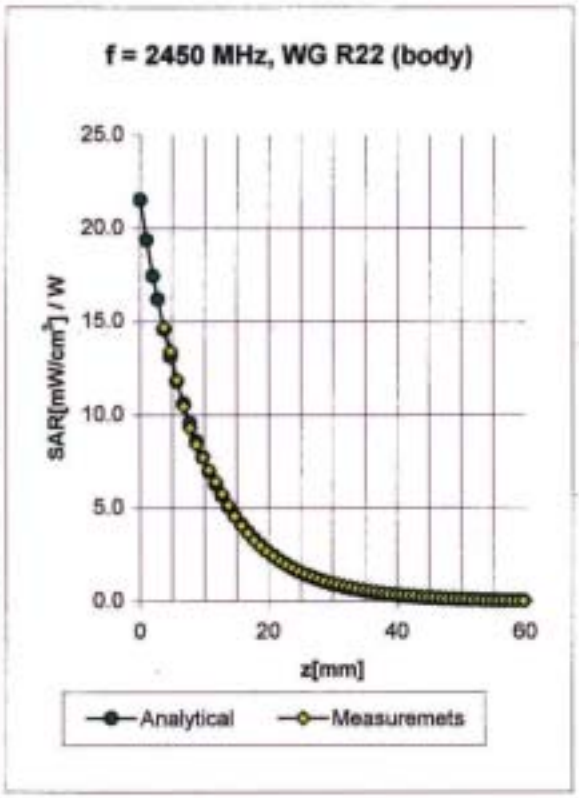


Body	**900 MHz**		ε_r = **55.0 ± 5%**	σ = **1.05 ± 5% mho/m**
Body	**835 MHz**		ε_r = **55.2 ± 5%**	σ = **0.97 ± 5% mho/m**
	ConvF X	**6.5** ± 9.5% (k=2)		Boundary effect:
	ConvF Y	**6.5** ± 9.5% (k=2)		Alpha **0.43**
	ConvF Z	**6.5** ± 9.5% (k=2)		Depth **2.34**

Body	**1800 MHz**		ε_r = **53.3 ± 5%**	σ = **1.52 ± 5% mho/m**
Body	**1900 MHz**		ε_r = **53.3 ± 5%**	σ = **1.52 ± 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





Head	**2450**	**MHz**	ε_r = **39.2 ± 5%**	σ = **1.80 ± 5% mho/m**

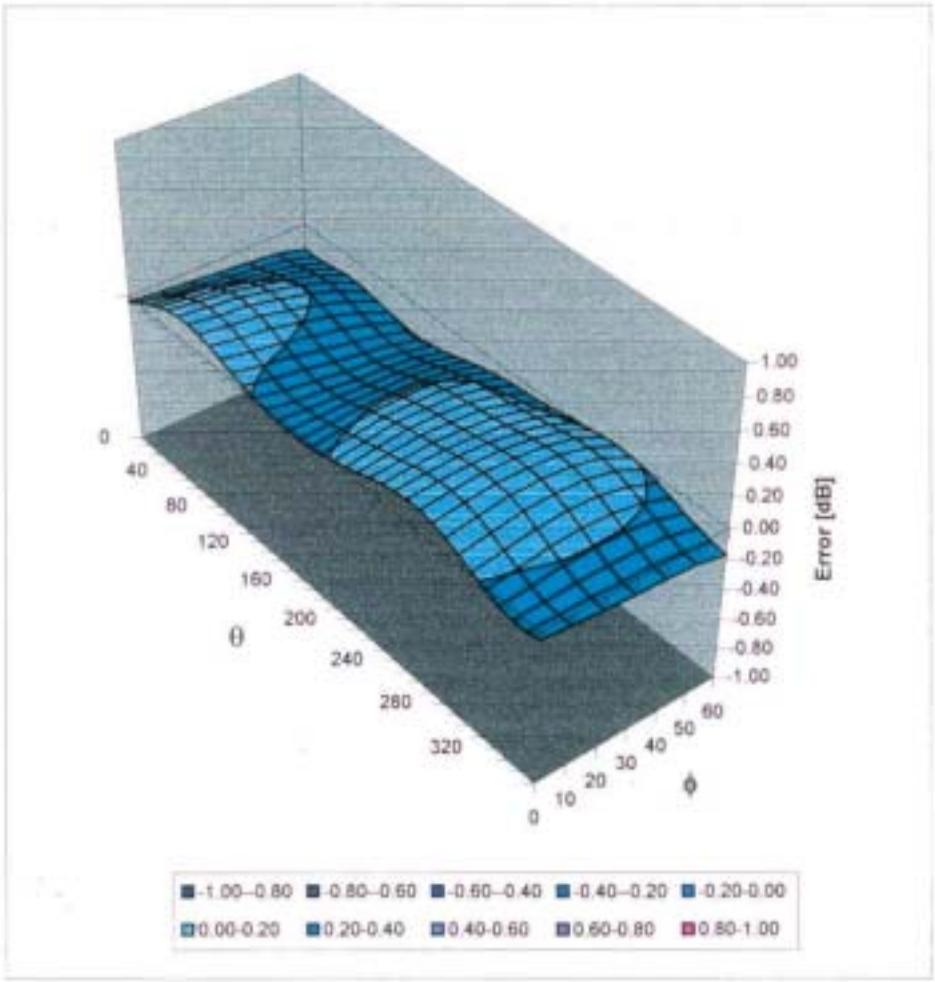
ConvF X	**5.1** ± 8.9% (k=2)	Boundary effect:	
ConvF Y	**5.1** ± 8.9% (k=2)	Alpha	**1.32**
ConvF Z	**5.1** ± 8.9% (k=2)	Depth	**1.61**

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



Schmid & Partner Engineering AG

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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

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F. Bomholt

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USAGE OF ORGANIC SOLVENTS

Diethylene Gycol Monobuthy Ether (used as basis for HSL1800 and M1800 liquids), as many other organic solvents, is a very effective softener for synthetic materials. These solvents can cause irreparable damage to certain SPEAG products except those which are explicitly declared as compliant with organic solvents.

Compatible Probes:
- ET3DV6
- ES3DV2
- ER3DV6
- H3DV6

The probes shall not be exposed to solvents longer than necessary for the measurements and shall daily after use be cleaned with water and stored dry.

Compatible Phantom:
- SAM V4.0

The phantom shall not be exposed longer than necessary to solvents. After such use, it shall be cleaned with water and dried.

Note: If you intend to use these probes and phantom in acids or solvents other than specified in the standards/guidelines for compliance testing, please contact SPEAG before hand.

Phantoms with Restricted Compatibility:
The solvents will also act as a softener for the fiberglass of phantoms V2 & V3, i.e., V2.0, V3.0, V3.5, V3.6. However, it will not damage the phantom, provided the following precaution is considered: Do not keep the liquid in the phantom overnight, i.e., empty and dry the phantom every evening.

Other Products:
For all other SPEAG products we are forced to waive the warranty if used with organic solvents without the written consent from SPEAG.

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

Client C&C (Auden)

CALIBRATION CERTIFICATE

Object(s)	D2450V2 - SN:728
Calibration procedure(s)	QA CAL-05.v2 Calibration procedure for dipole validation kits
Calibration date:	March 5, 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 R&S SML-03	100698	27-Mar-2002	In house check: Mar-05
Power sensor HP 8481A	MY41092317	18-Oct-02	Oct-04
Power sensor HP 8481A	US37292783	30-Oct-02	Oct-03
Power meter EPM E442	GB37480704	30-Oct-02	Oct-03
Network Analyzer HP 8753E	US38432426	3-May-00	In house check: May 03

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	
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.

Schmid & Partner Engineering AG

s p e a g

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info@speag.com, http://www.speag.com

DASY

Dipole Validation Kit

Type: D2450V2

Serial: 728

Manufactured: January 9, 2003
Calibrated: March 5, 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	**37.4**	± 5%
Conductivity	**1.88 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. The included distance holder 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 cm^3 (1 g) of tissue:	**54.8 mW/g** ± 16.8 % (k=2)[1]
averaged over 10 cm^3 (10 g) of tissue:	**24.2 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:	**1.153 ns**	(one direction)
Transmission factor:	**0.997**	(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} = **53.7 Ω**
	Im {Z} = **3.8 Ω**
Return Loss at 2450 MHz	**-25.9 dB**

4. 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.

5. 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 Section 1. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

6. Power Test

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

Date/Time: 03/05/03 12:24:05

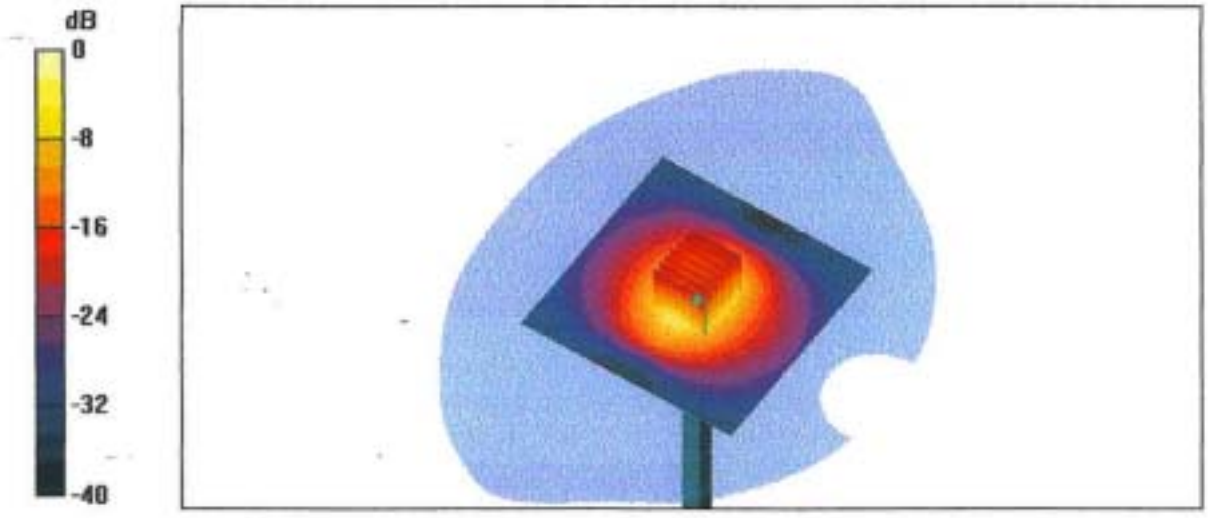
Test Laboratory: SPEAG, Zurich, Switzerland
File Name: SN728_SN3013_HSL2450_050303.da4

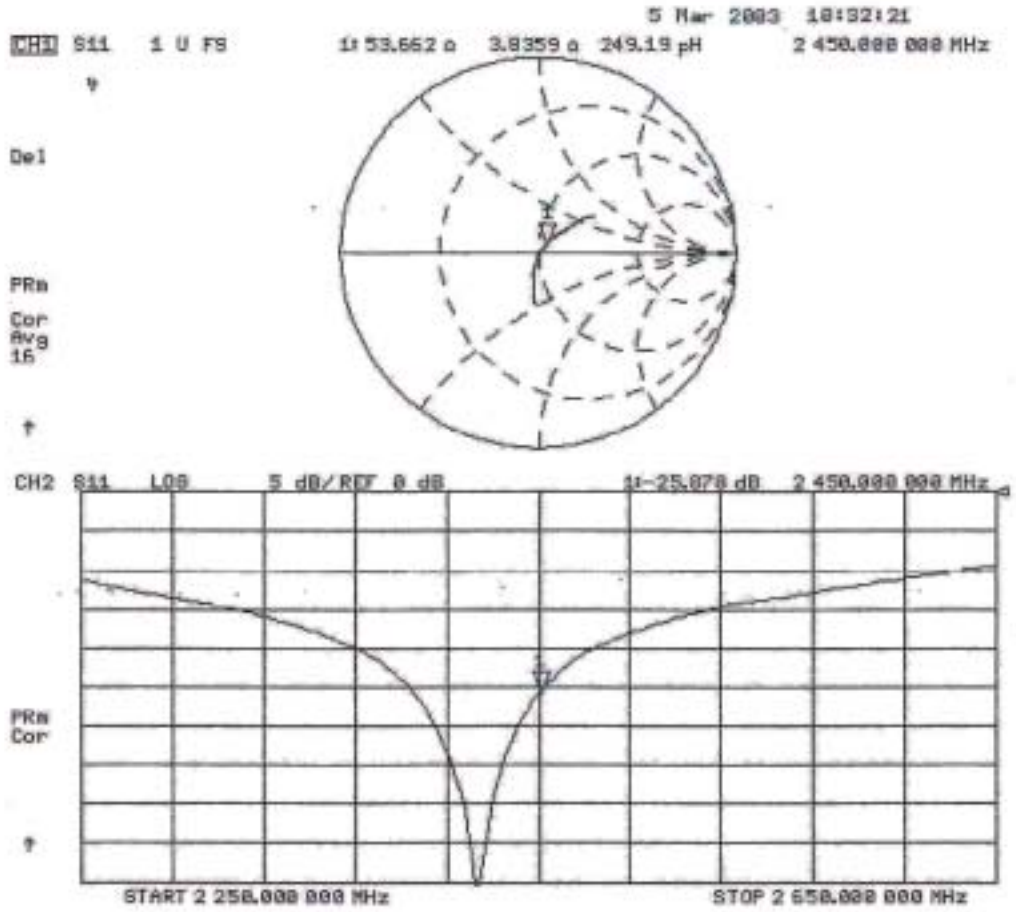
DUT: Dipole 2450 MHz; Serial: D2450V2 - SN728
Program: Dipole Calibration

Communication System: CW-2450; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL 2450 MHz; (σ = 1.88 mho/m, ε_r = 37.4, ρ = 1000 kg/m^3)
Phantom section: Flat Section

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 25; Postprocessing SW: SEMCAD, V1.6 Build 105

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.6 V/m
Peak SAR = *30.6 W/kg*
SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.04 mW/g
Power Drift = 0.02 dB




5 Mar 2003 10:32:21
CH1 S11 1 U FS
1: 53.662 Ω 3.8359 Ω 249.19 pH
2 450.000 000 MHz
Del
PRm
Cor
Avg
16
CH2 S11 LOG 5 dB/ REF 0 dB
1: -25.078 dB 2 450.000 000 MHz
PRm
Cor
START 2 250.000 000 MHz
STOP 2 650.000 000 MHz

728

Head

Date/Time: 01/13/04 15:35:14

Test Laboratory: Compliance Certification Services Inc.

D2450V2 SN 728

DUT: Dipole 2450 MHz; Type: D2450V2; Serial:728

Communication System: CW2450; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: HSL2450 (σ = 1.85 mho/m, ε_r = 39.07, ρ = 1000 kg/m^3)
Air Temperature:24.5 deg C;Liquid Temperature:23 deg C
Phantom section: Flat Section

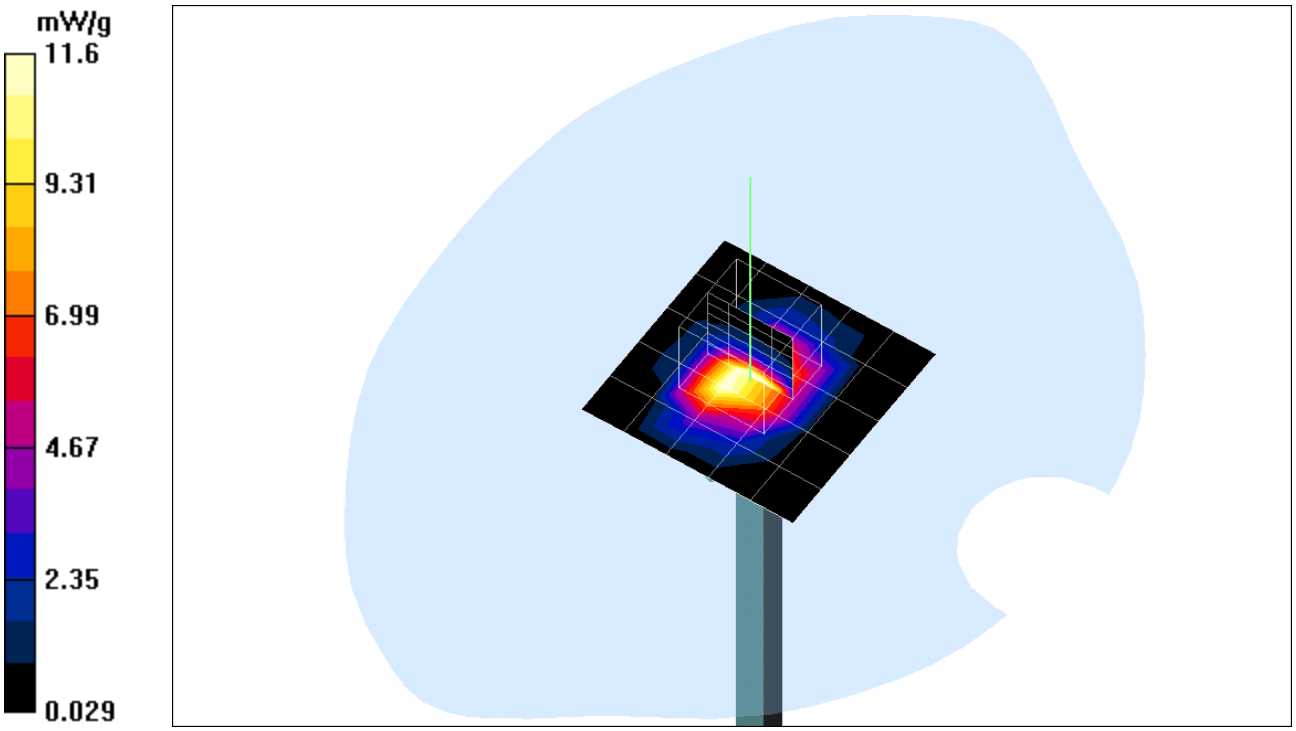
DASY4 Configuration:

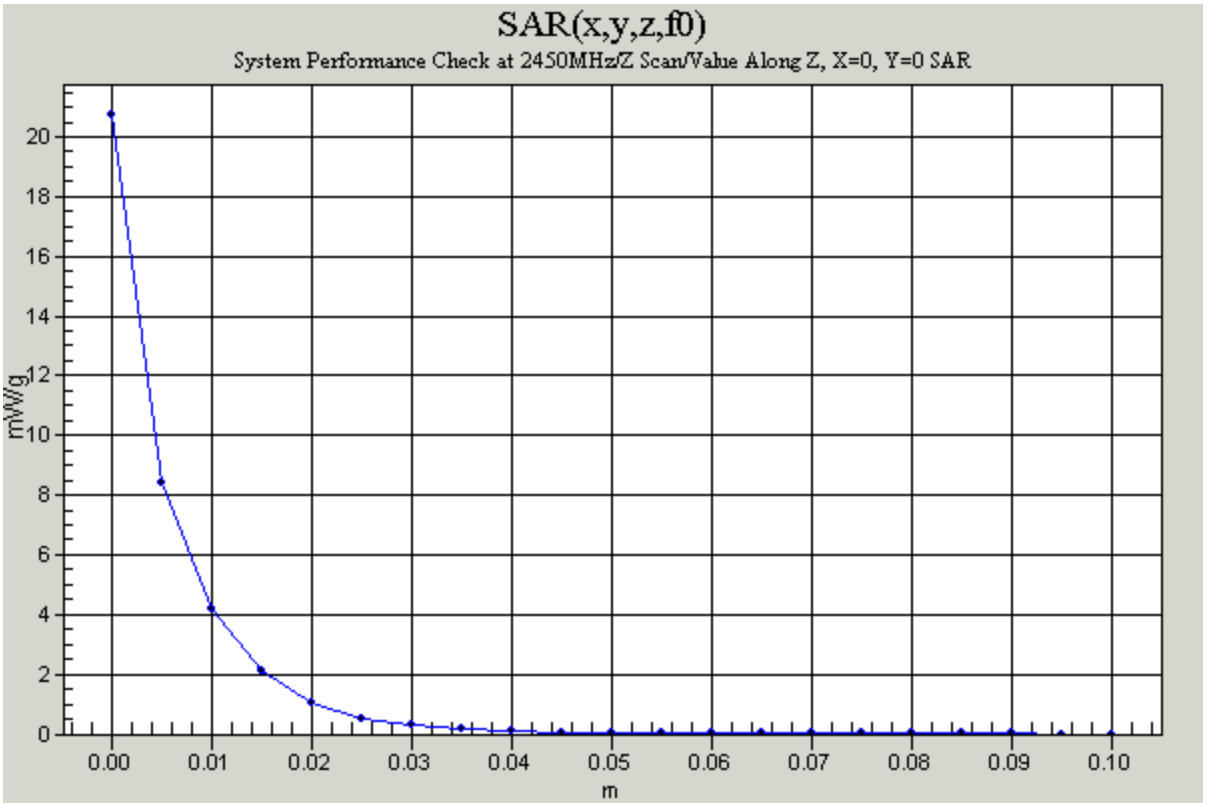
- Probe: ET3DV6 - SN1762; ConvF(5.1, 5.1, 5.1); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1271
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

Pin=250mW,d=10mm/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 94.1 V/m
Power Drift = -0.008 dB
Maximum value of SAR = 11.6 mW/g

Pin=250mW,d=10mm/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 94.1 V/m
Power Drift = -0.0 dB
Maximum value of SAR = 20.7 mW/g

Pin=250mW,d=10mm/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 30.7 W/kg
SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.36 mW/g
Reference Value = 94.1 V/m
Power Drift = -0.008 dB
Maximum value of SAR = 15.6 mW/g

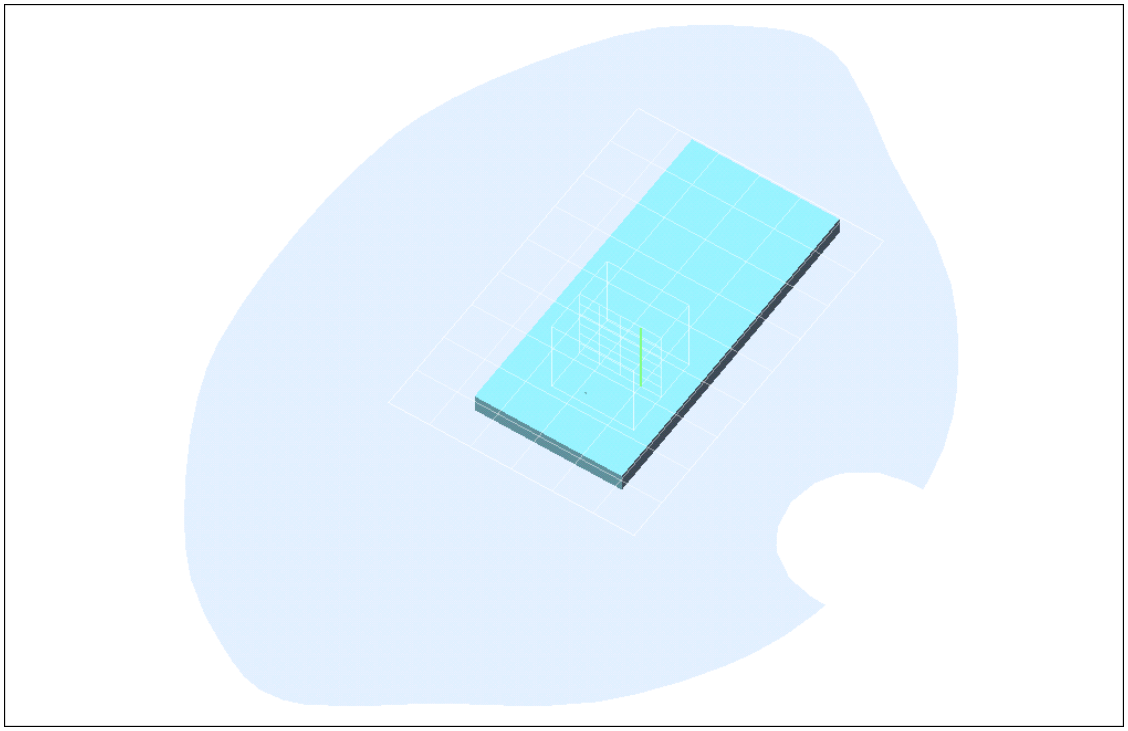

mW/g
11.6
9.31
6.99
4.67
2.35
0.029


SAR(x,y,z,f0)
System Performance Check at 2450MHz/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
20
18
16
14
12
10
8
6
4
2
0
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
m

Date/Time: 01/13/04 19:27:39

Test Laboratory: Compliance Certification Services Inc.

Test Configuration-1



Date/Time: 01/13/04 22:28:22

Test Laboratory: Compliance Certification Services Inc.

Touch mode-Ant1

DUT: Wireless LAN PC Card ; Type: C110; Serial: N/A

Communication System: Wireless LAN PC Card ; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 2.01 mho/m, ε_r = 51.58, ρ = 1000 kg/m^3)
Air Temperature:24.5 deg C;Liquid Temperature:23 deg C
Phantom section: Flat Section

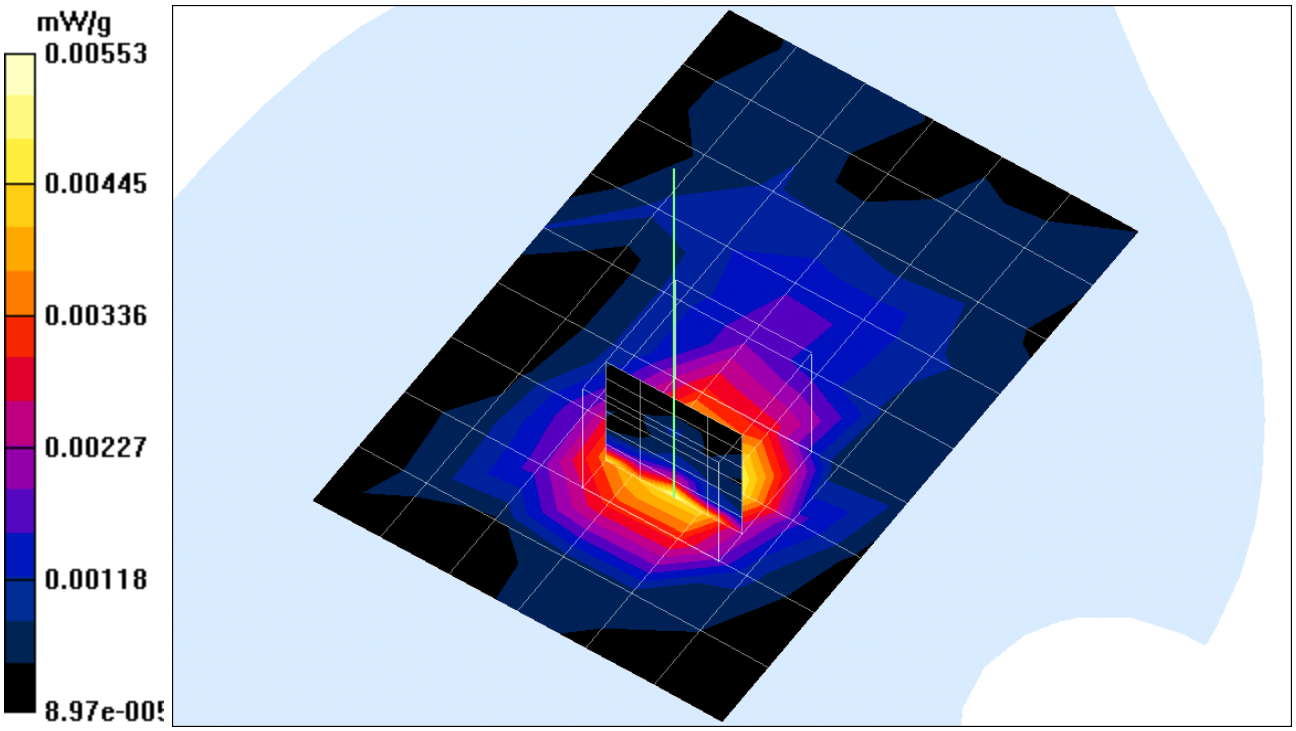
DASY4 Configuration:

- 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 34; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

Low Rate=11M bit/Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 1.64 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.00553 mW/g

Low Rate=11M bit/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 1.64 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.00256 mW/g

Low Rate=11M bit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.022 W/kg
SAR(1 g) = 0.00529 mW/g; SAR(10 g) = 0.00254 mW/g
Reference Value = 1.64 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.00552 mW/g


mW/g
0.00553
0.00445
0.00336
0.00227
0.00118
8.97e-005

Date/Time: 01/13/04 22:28:22

Test Laboratory: Compliance Certification Services Inc.

Touch mode-Ant1

DUT: Wireless LAN PC Card ; Type: C110; Serial: N/A

Communication System: Wireless LAN PC Card ; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 2.01 mho/m, ε_r = 51.58, ρ = 1000 kg/m^3)
Air Temperature:24.5 deg C;Liquid Temperature:23 deg C
Phantom section: Flat Section

DASY4 Configuration:

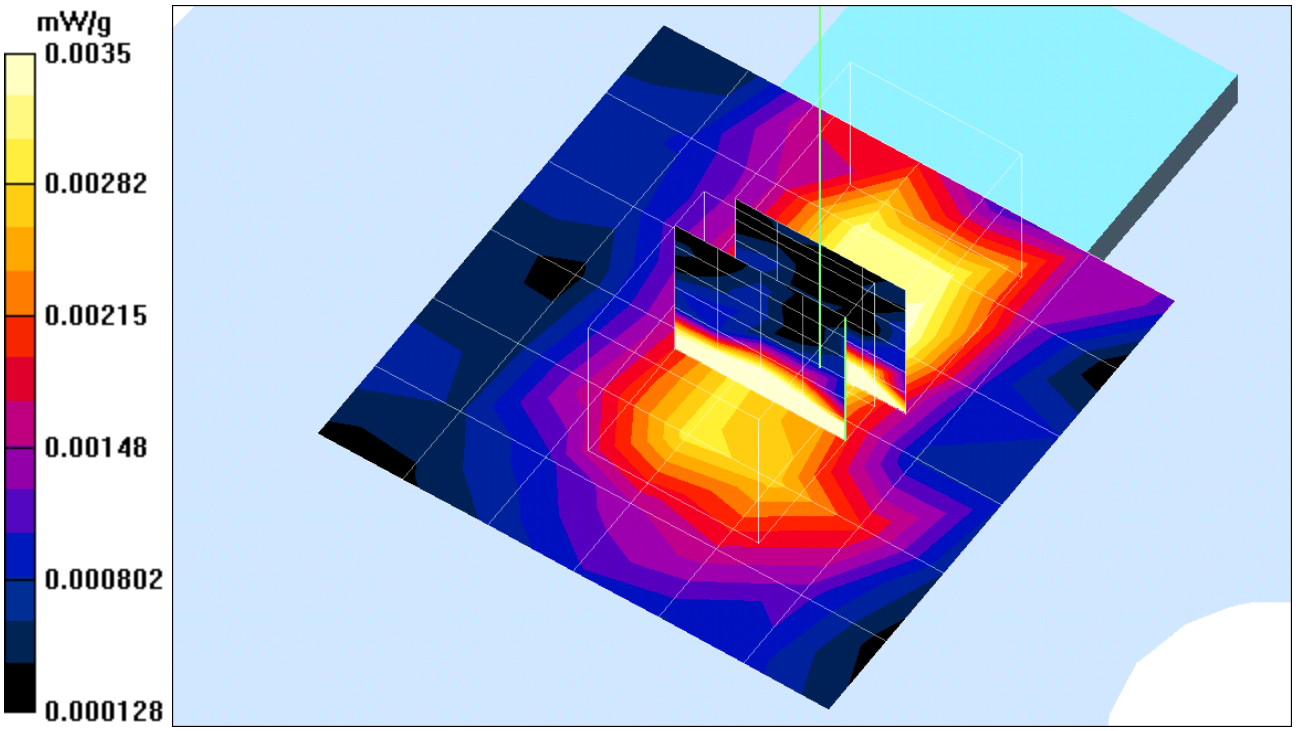
- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 34; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

mid Rate=11M bit/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 2.01 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.0035 mW/g

mid Rate=11M bit/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 2.01 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.00492 mW/g

mid Rate=11M bit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.016 W/kg
SAR(1 g) = 0.00541 mW/g; SAR(10 g) = 0.00235 mW/g
Reference Value = 2.01 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.00705 mW/g

mid Rate=11M bit/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.029 W/kg
SAR(1 g) = 0.00786 mW/g; SAR(10 g) = 0.00399 mW/g
Reference Value = 2.01 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.00809 mW/g


mW/g
0.0035
0.00282
0.00215
0.00148
0.000802
0.000128

Date/Time: 01/13/04 22:28:22

Test Laboratory: Compliance Certification Services Inc.

Touch mode-Ant1

DUT: Wireless LAN PC Card ; Type: C110; Serial: N/A

Communication System: Wireless LAN PC Card ; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 2.01 mho/m, ε_r = 51.58, ρ = 1000 kg/m^3)
Air Temperature:24.5 deg C;Liquid Temperature:23 deg C
Phantom section: Flat Section

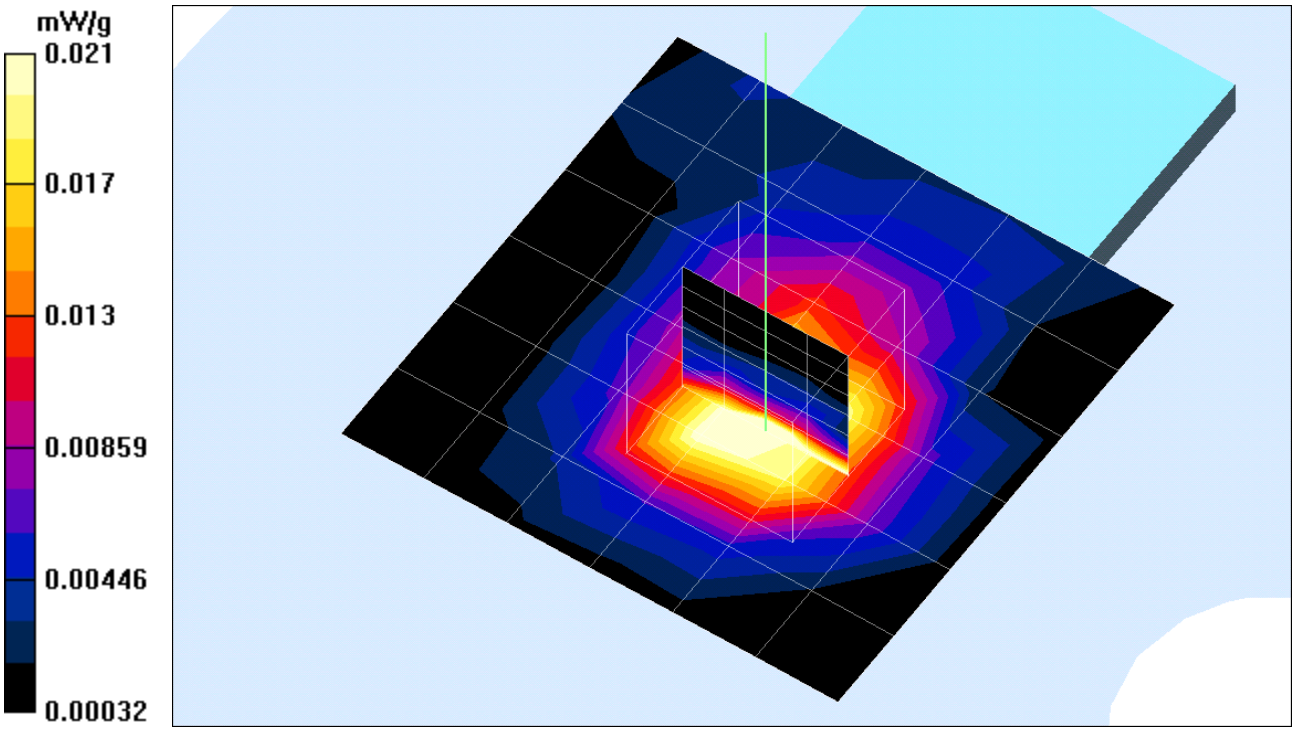
DASY4 Configuration:

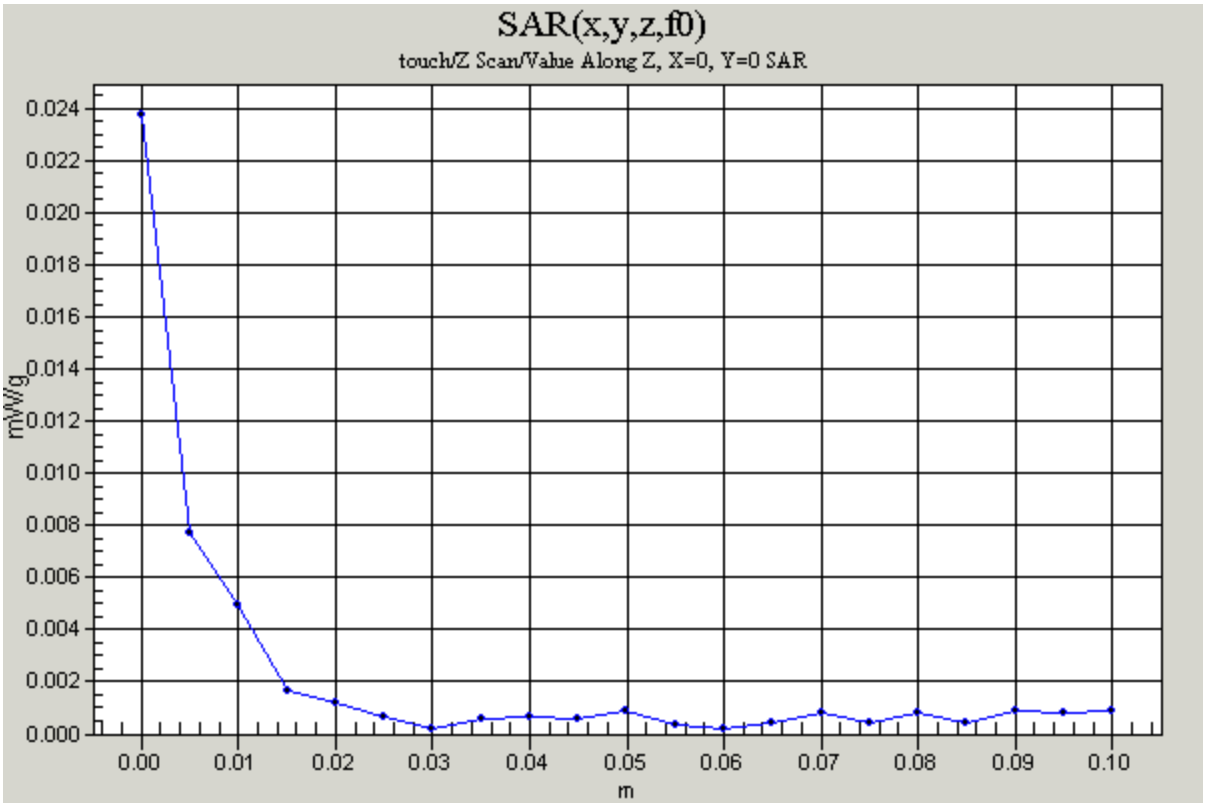
- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 34; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

High Rate=11M bit/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 3.38 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.021 mW/g

High Rate=11M bit/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 3.38 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.024 mW/g

High Rate=11M bit/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) = 0.025 mW/g; SAR(10 g) = 0.012 mW/g
Reference Value = 3.38 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.032 mW/g

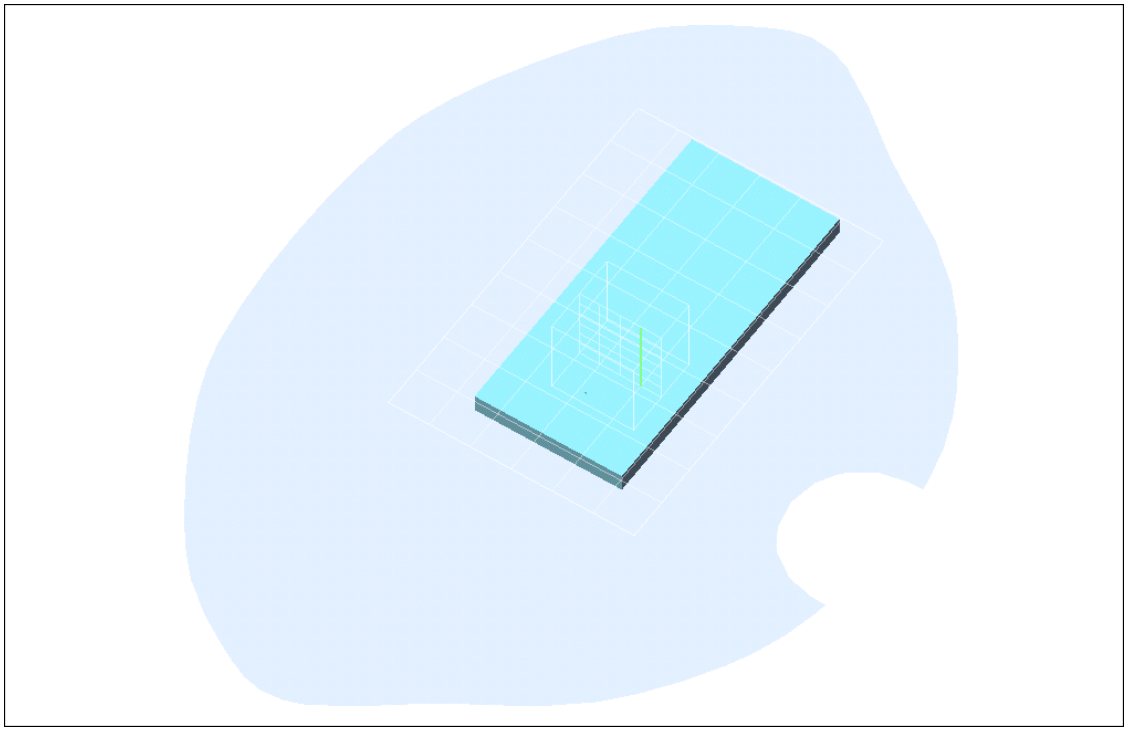

mW/g
0.021
0.017
0.013
0.00859
0.00446
0.00032


SAR(x,y,z,f0)
touch/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
m

Date/Time: 01/13/04 19:27:39

Test Laboratory: Compliance Certification Services Inc.

Test Configuration-2



Date/Time: 01/13/04 19:27:39

Test Laboratory: Compliance Certification Services Inc.

Touch mode-Ant2

DUT: Wireless LAN PC Card ; Type: C110; Serial: N/A

Communication System: Wireless LAN PC Card ; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 2.01 mho/m, ε_r = 51.58, ρ = 1000 kg/m^3)
Air Temperature:24.5 deg C;Liquid Temperature:23 deg C
Phantom section: Flat Section

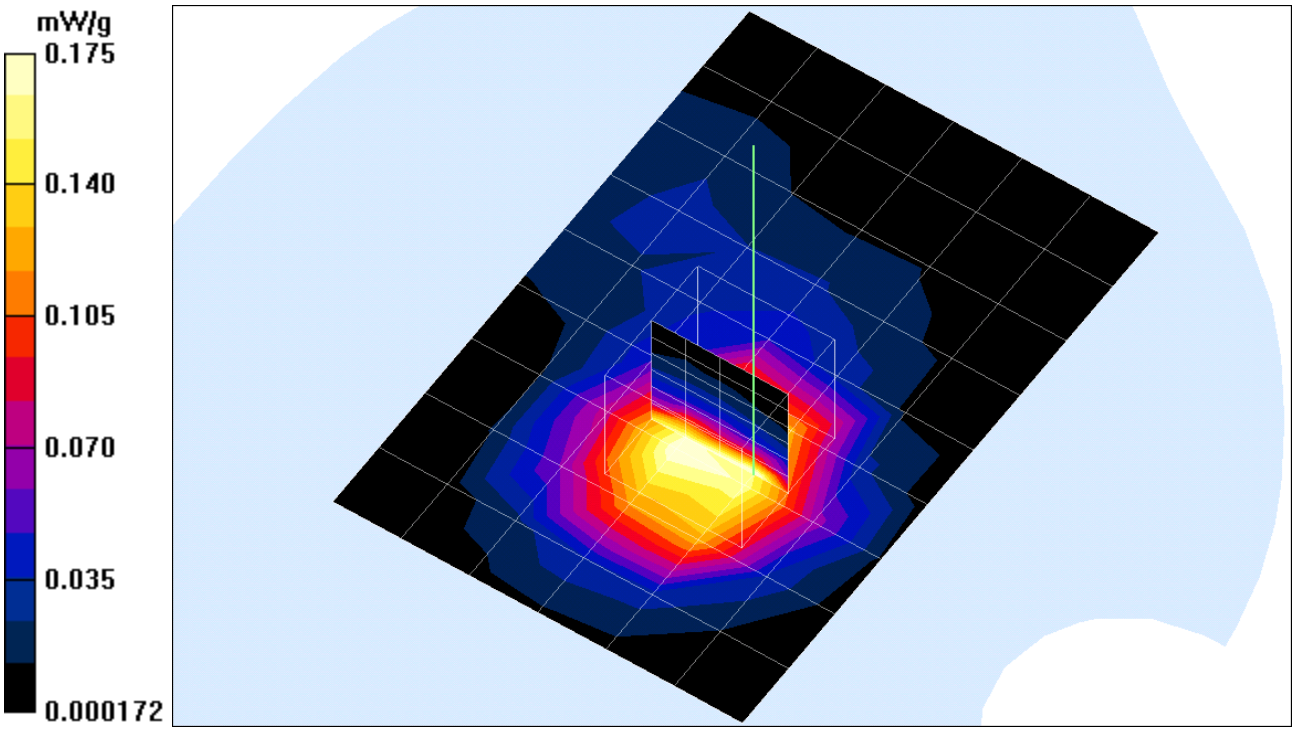
DASY4 Configuration:

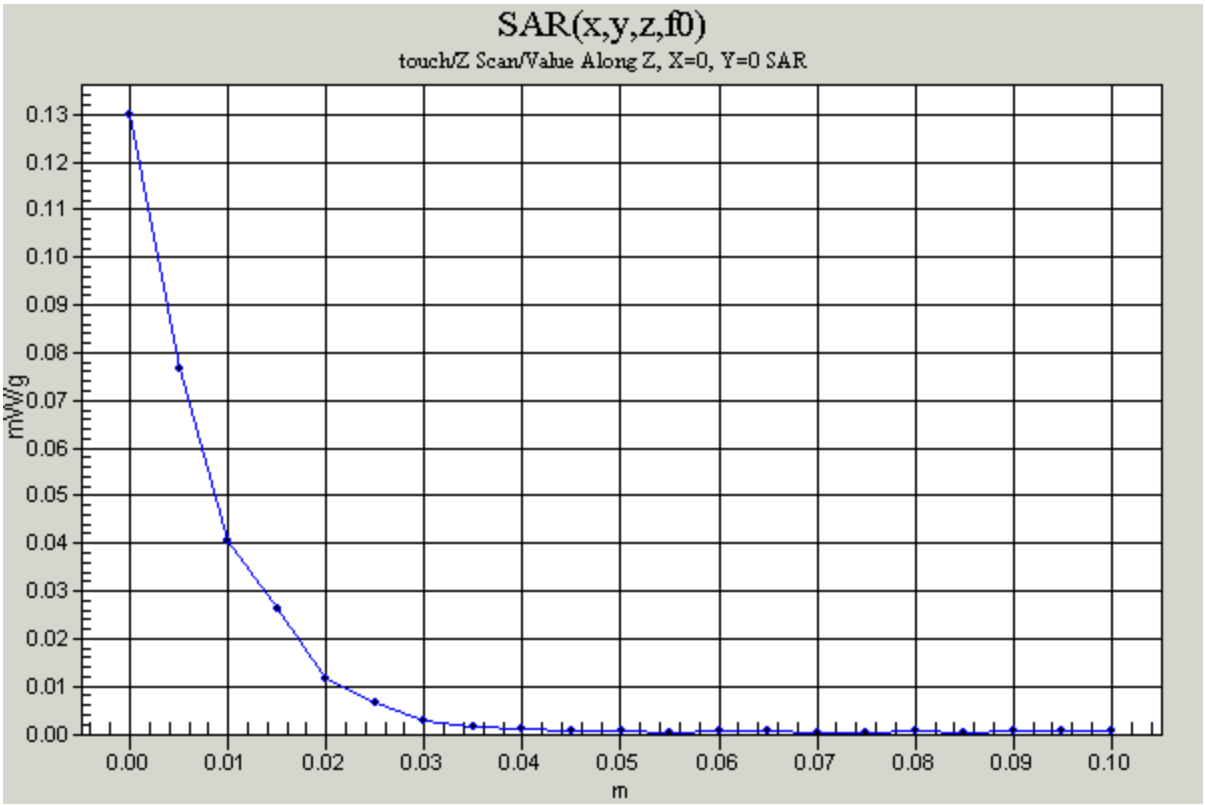
- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 34; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

Low Rate=11M bit/Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 10.3 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.175 mW/g

Low Rate=11M bit/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 10.3 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.130 mW/g

Low Rate=11M bit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.381 W/kg
SAR(1 g) = 0.179 mW/g; SAR(10 g) = 0.100 mW/g
Reference Value = 10.3 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.189 mW/g


mW/g
0.175
0.140
0.105
0.070
0.035
0.000172


SAR(x,y,z,f0)
touch/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
m

Date/Time: 01/13/04 19:27:39

Test Laboratory: Compliance Certification Services Inc.

Touch mode-Ant2

DUT: Wireless LAN PC Card ; Type: C110; Serial: N/A

Communication System: Wireless LAN PC Card ; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 2.01 mho/m, ε_r = 51.58, ρ = 1000 kg/m^3)
Air Temperature:24.5 deg C;Liquid Temperature:23 deg C
Phantom section: Flat Section

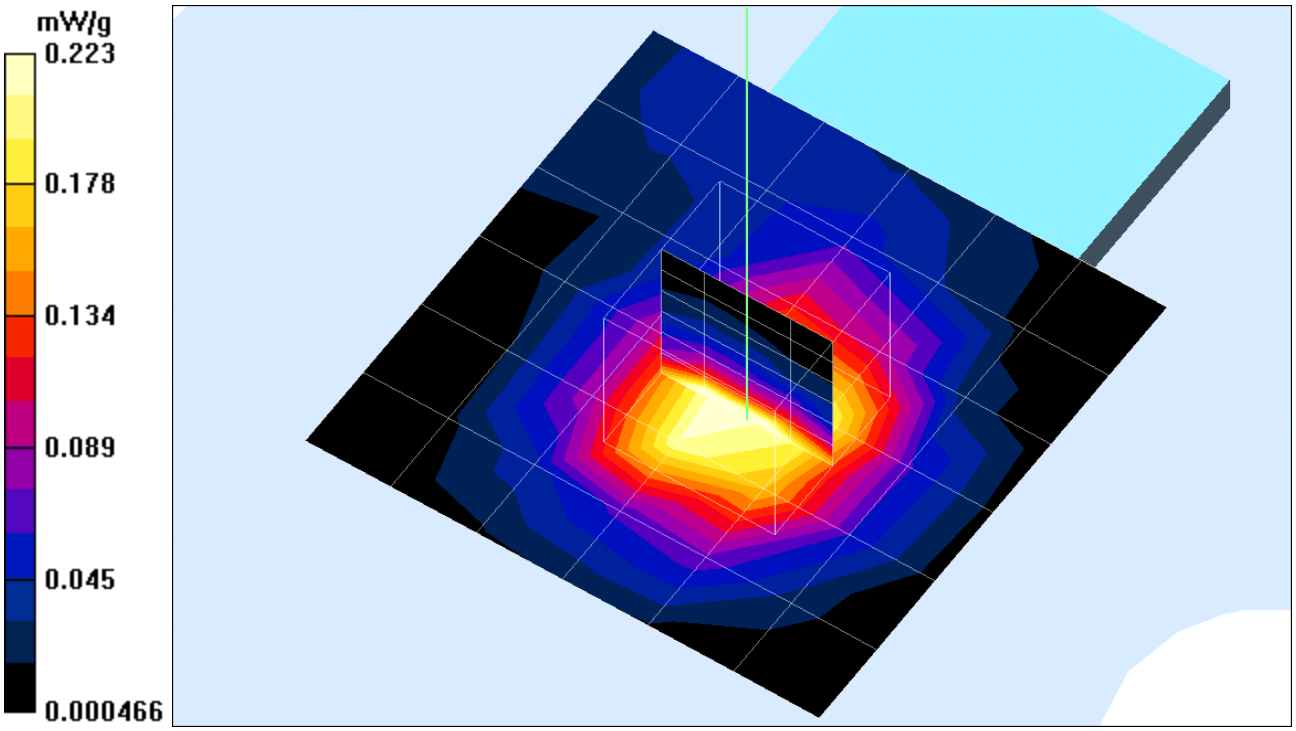
DASY4 Configuration:

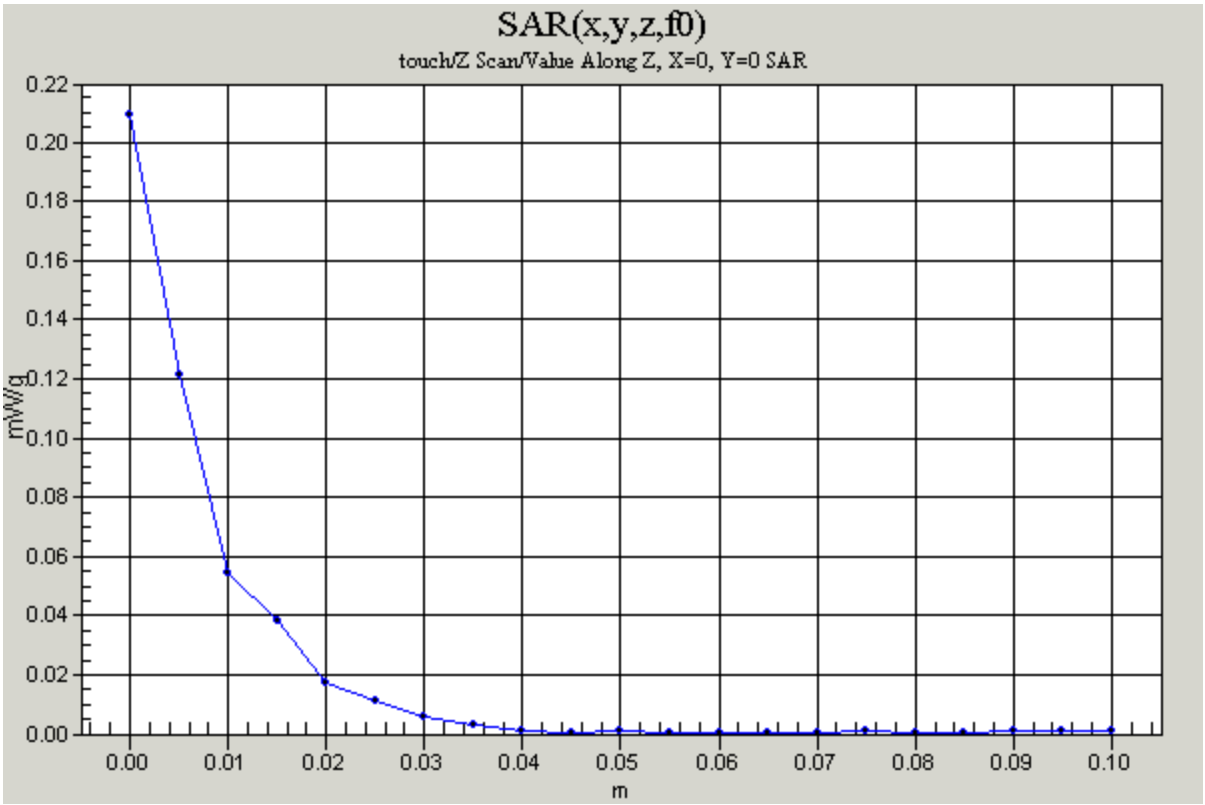
- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 34; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

mid Rate=11M bit/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 11.9 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.223 mW/g

mid Rate=11M bit/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 11.9 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.209 mW/g

mid Rate=11M bit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.526 W/kg
SAR(1 g) = 0.245 mW/g; SAR(10 g) = 0.130 mW/g
Reference Value = 11.9 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.268 mW/g


mW/g
0.223
0.178
0.134
0.089
0.045
0.000466


SAR(x,y,z,f0)
touch/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
m

Date/Time: 01/13/04 19:27:39

Test Laboratory: Compliance Certification Services Inc.

Touch mode-Ant2

DUT: Wireless LAN PC Card ; Type: C110; Serial: N/A

Communication System: Wireless LAN PC Card ; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 2.01 mho/m, ε_r = 51.58, ρ = 1000 kg/m^3)
Air Temperature:24.5 deg C;Liquid Temperature:23 deg C
Phantom section: Flat Section

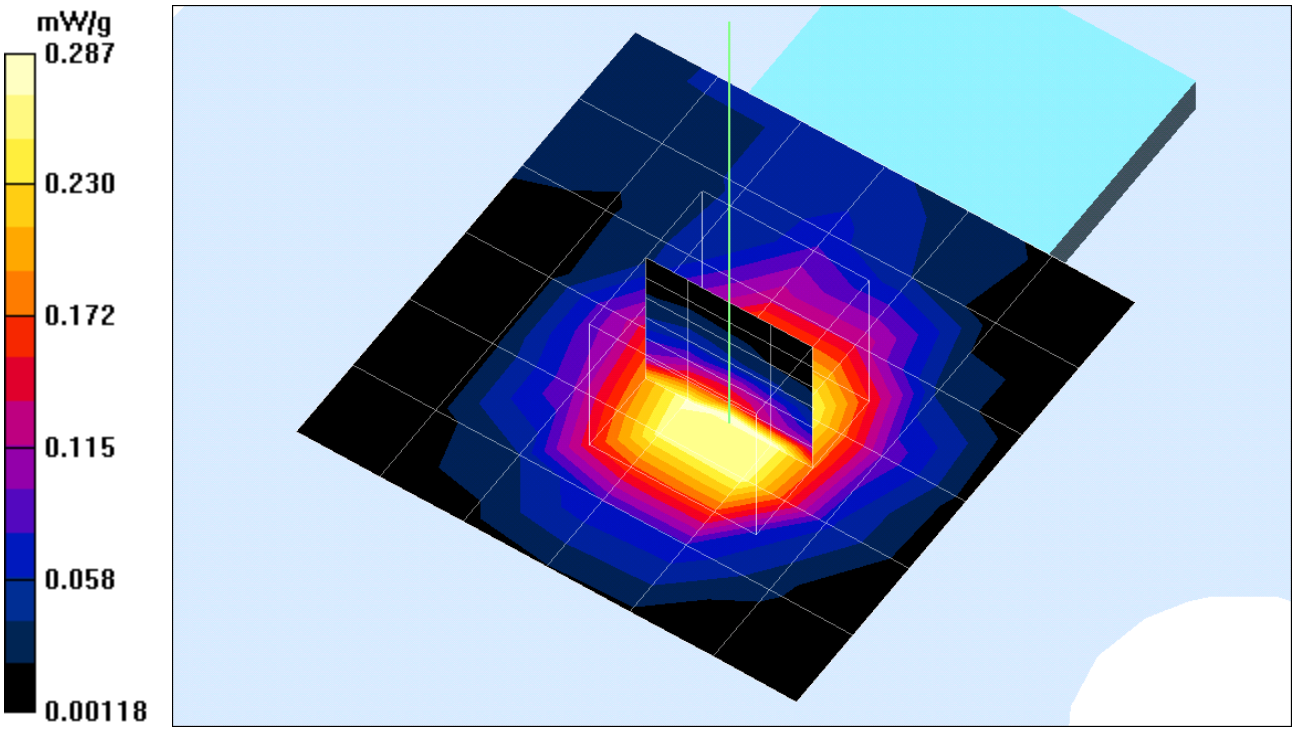
DASY4 Configuration:

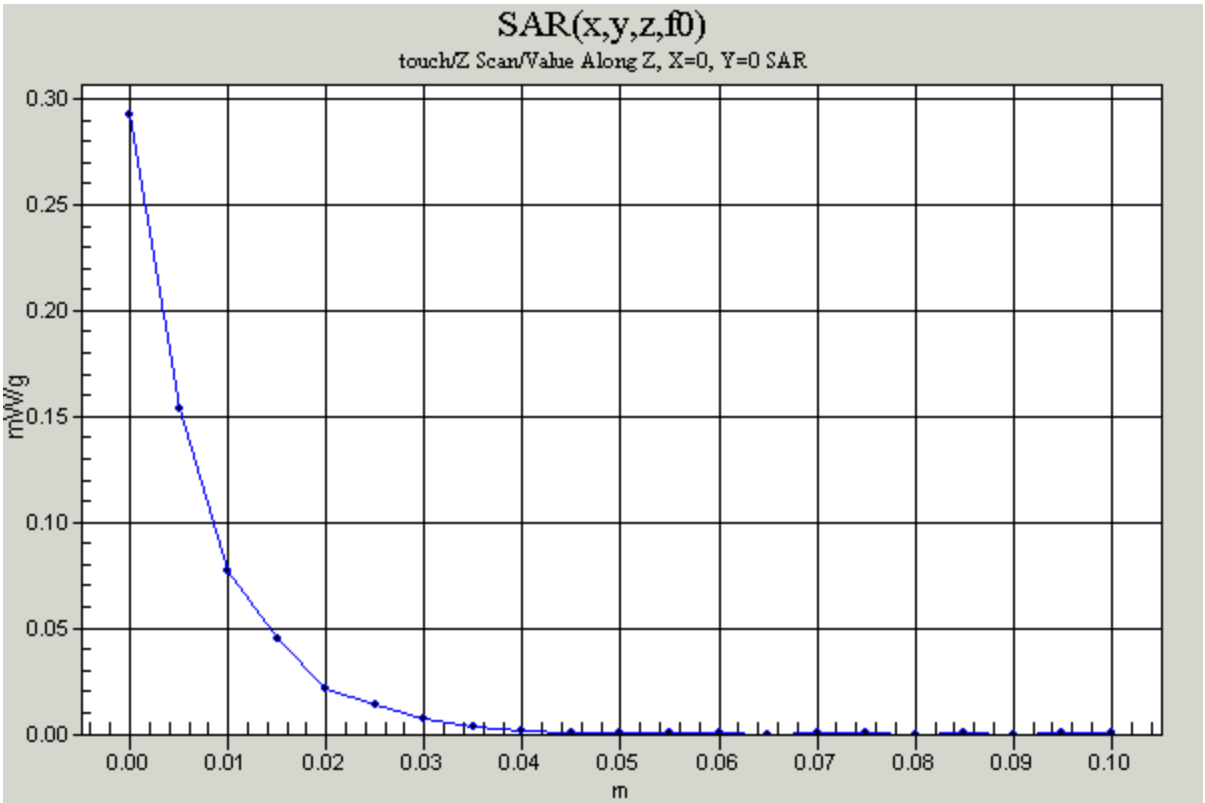
- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 34; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

High Rate=11M bit/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 13 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 0.287 mW/g

High Rate=11M bit/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 13 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 0.293 mW/g

High Rate=11M bit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.788 W/kg
SAR(1 g) = 0.312 mW/g; SAR(10 g) = 0.165 mW/g
Reference Value = 13 V/m
Power Drift = 0.0 dB
Maximum value of SAR = 0.338 mW/g

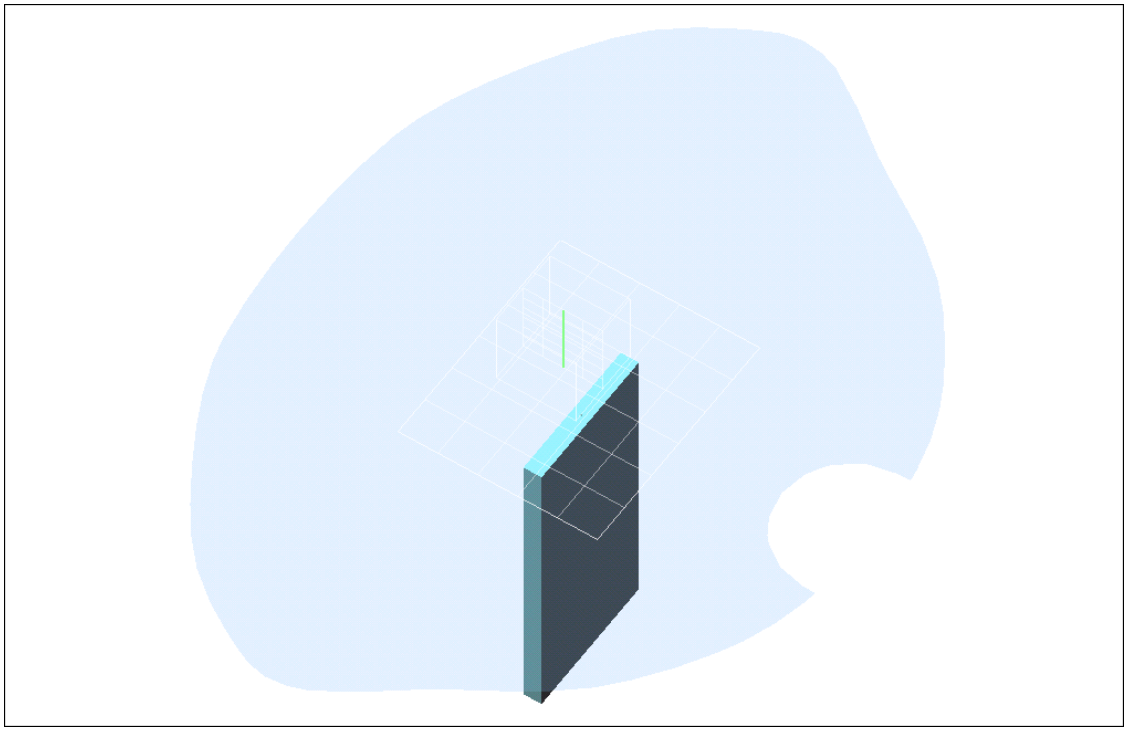

mW/g
0.287
0.230
0.172
0.115
0.058
0.00118


SAR(x,y,z,f0)
touch/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
m

Date/Time: 01/13/04 22:28:10

Test Laboratory: Compliance Certification Services Inc.

Test Configuration-3



Date/Time: 01/13/04 22:28:10

Test Laboratory: Compliance Certification Services Inc.

15mm mode-Ant2

DUT: Wireless LAN PC Card ; Type: C110; Serial: N/A

Communication System: Wireless LAN PC Card ; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 2.01 mho/m, ε_r = 51.58, ρ = 1000 kg/m^3)
Air Temperature:24.5 deg C;Liquid Temperature:23 deg C
Phantom section: Flat Section

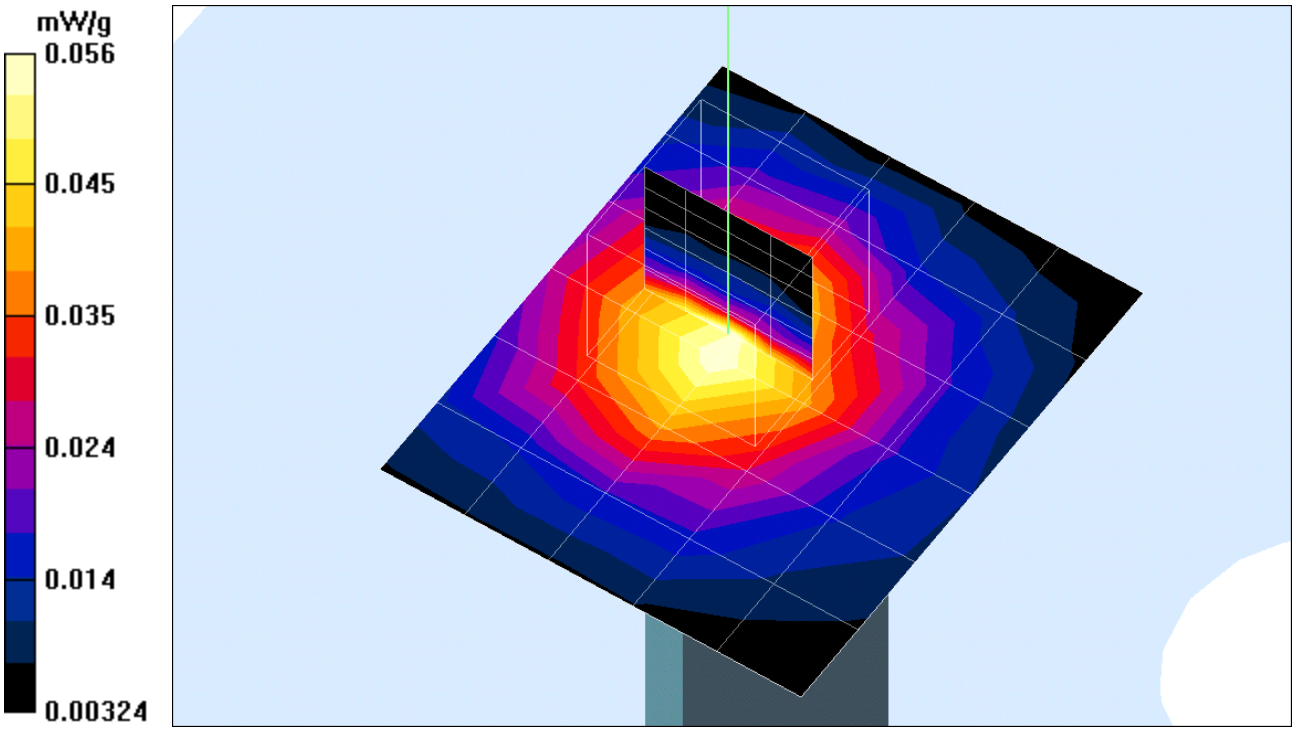
DASY4 Configuration:

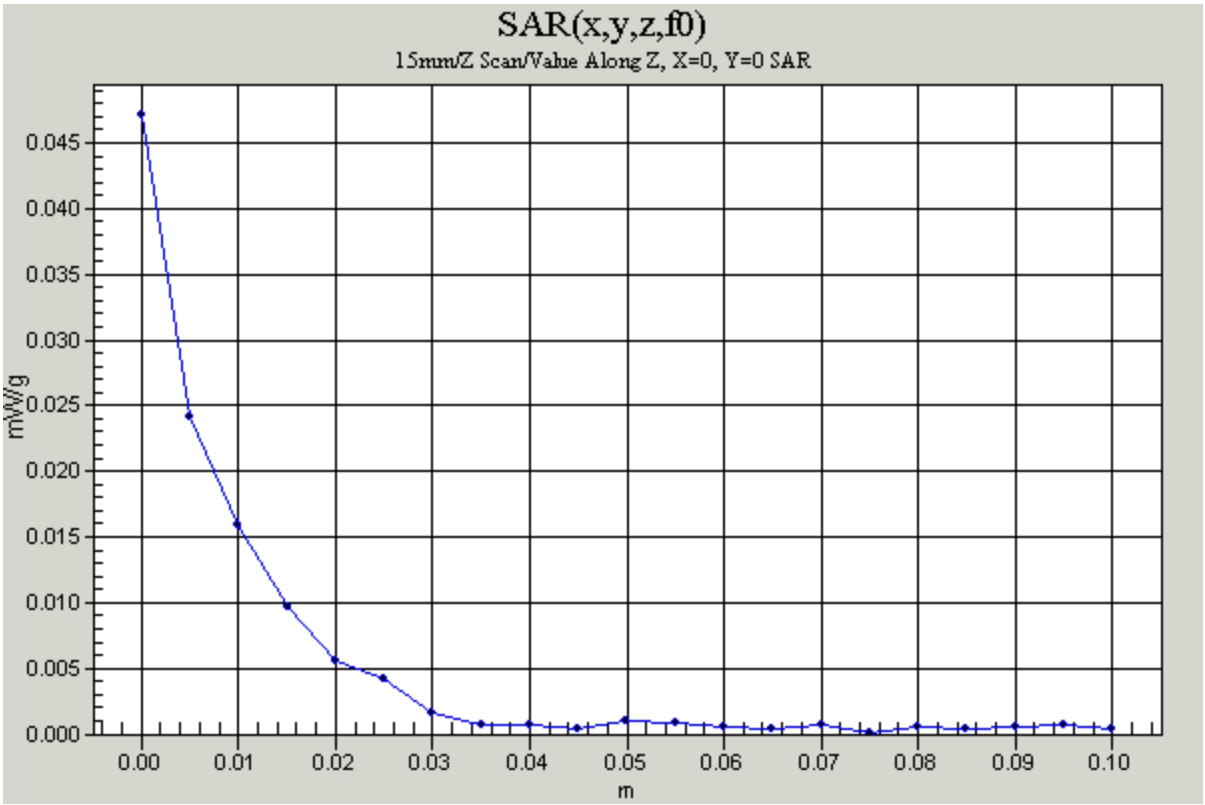
- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 34; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

Low Rate=11M bit/Area Scan (6x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 5.52 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.056 mW/g

Low Rate=11M bit/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 5.52 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.047 mW/g

Low Rate=11M bit/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) = 0.055 mW/g; SAR(10 g) = 0.031 mW/g
Reference Value = 5.52 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.060 mW/g


mW/g
0.056
0.045
0.035
0.024
0.014
0.00324


SAR(x,y,z,f0)
15mm/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
m

Date/Time: 01/13/04 22:28:10

Test Laboratory: Compliance Certification Services Inc.

15mm mode-Ant2

DUT: Wireless LAN PC Card ; Type: C110; Serial: N/A

Communication System: Wireless LAN PC Card ; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 2.01 mho/m, ε_r = 51.58, ρ = 1000 kg/m^3)
Air Temperature:24.5 deg C;Liquid Temperature:23 deg C
Phantom section: Flat Section

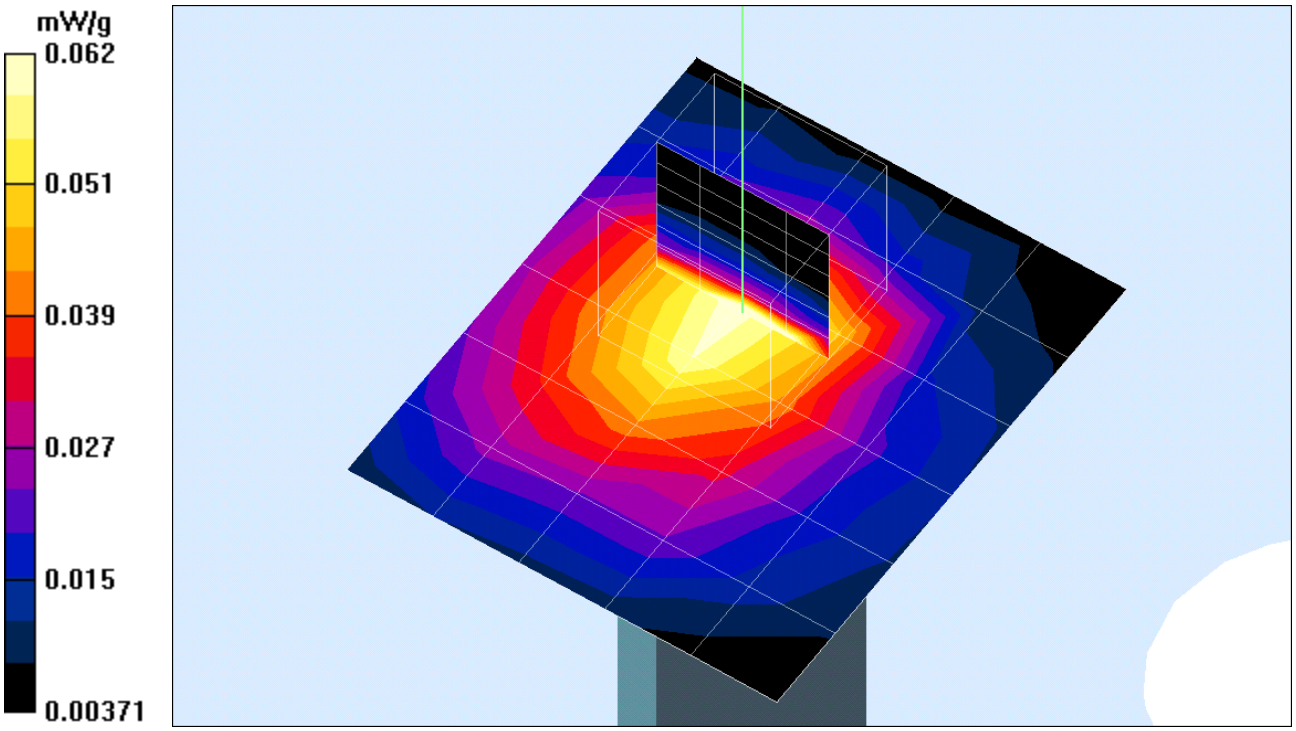
DASY4 Configuration:

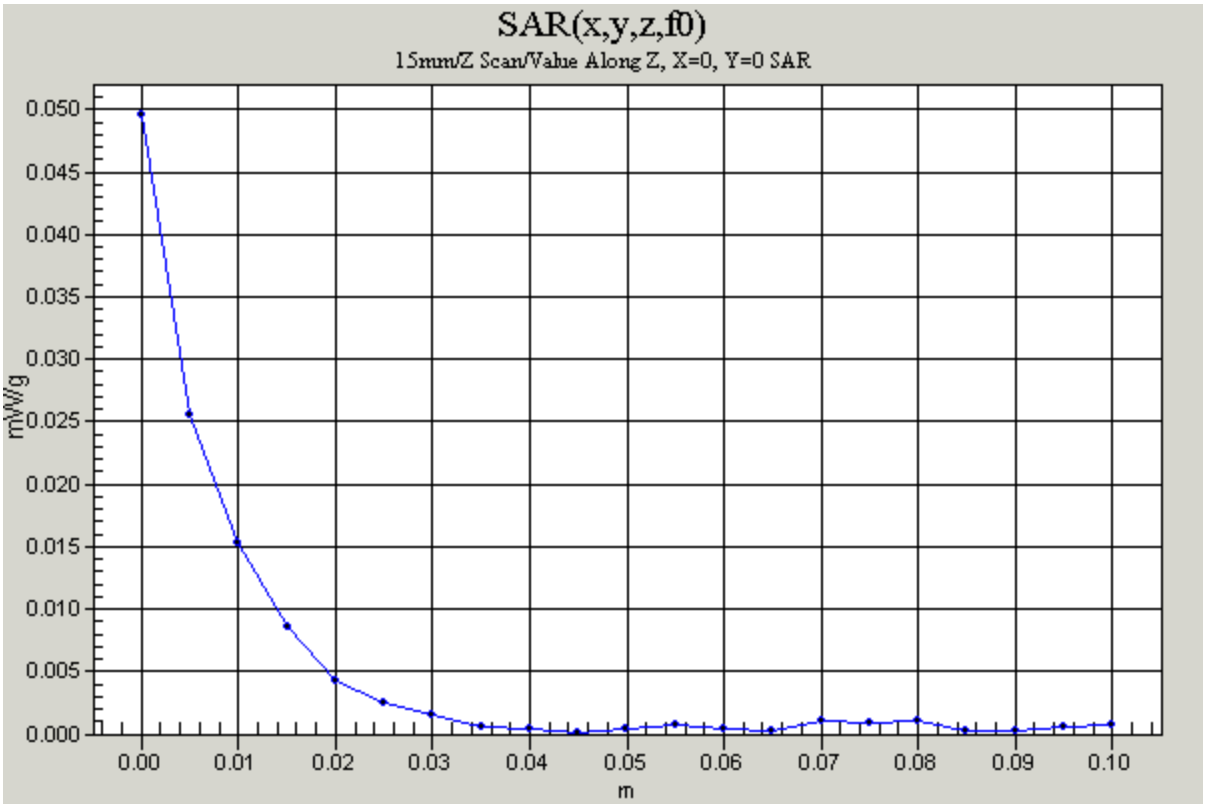
- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 34; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

mid Rate=11M bit/Area Scan (6x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 5.75 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.062 mW/g

mid Rate=11M bit/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 5.75 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.050 mW/g

mid Rate=11M bit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.187 W/kg
SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.035 mW/g
Reference Value = 5.75 V/m
Power Drift = 0.1 dB
Maximum value of SAR = 0.075 mW/g


mW/g
0.062
0.051
0.039
0.027
0.015
0.00371


SAR(x,y,z,f0)
15mm/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
m

Date/Time: 01/13/04 22:28:10

Test Laboratory: Compliance Certification Services Inc.

15mm mode-Ant2

DUT: Wireless LAN PC Card ; Type: C110; Serial: N/A

Communication System: Wireless LAN PC Card ; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: BSL2450 (σ = 2.01 mho/m, ε_r = 51.58, ρ = 1000 kg/m^3)
Air Temperature:24.5 deg C;Liquid Temperature:23 deg C
Phantom section: Flat Section

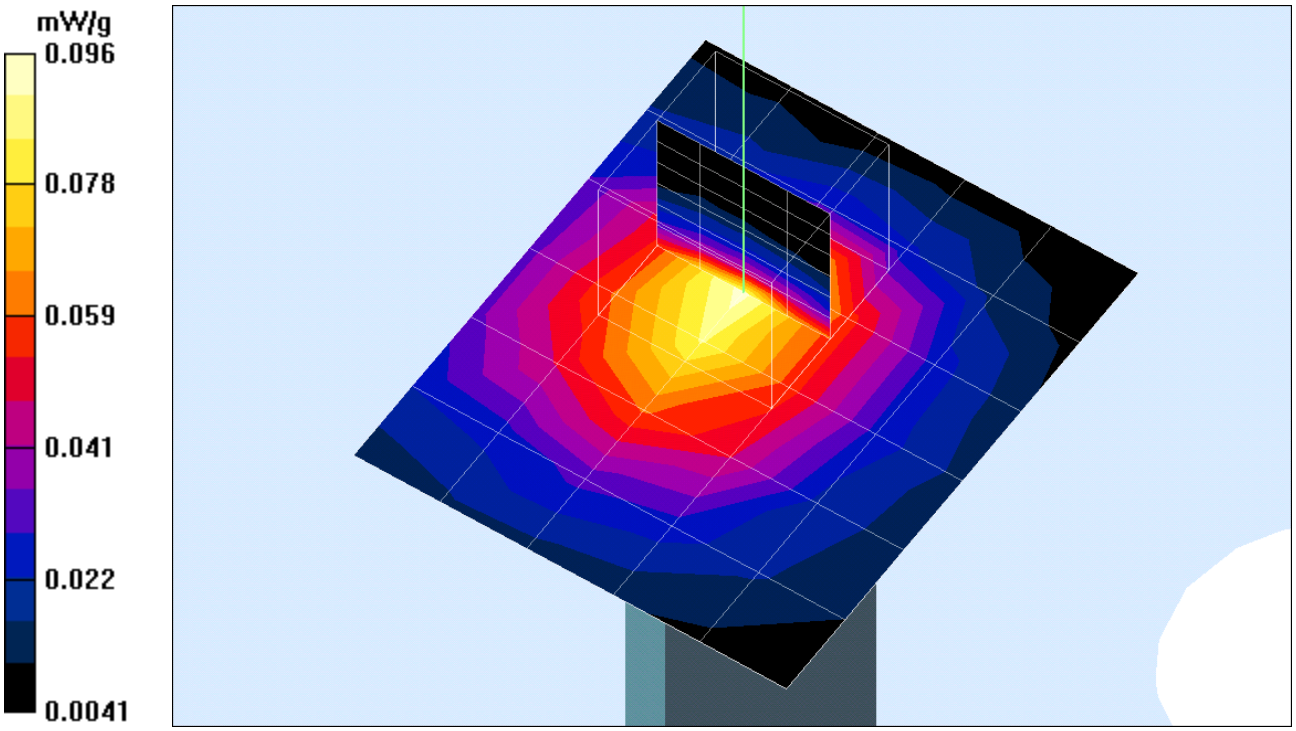
DASY4 Configuration:

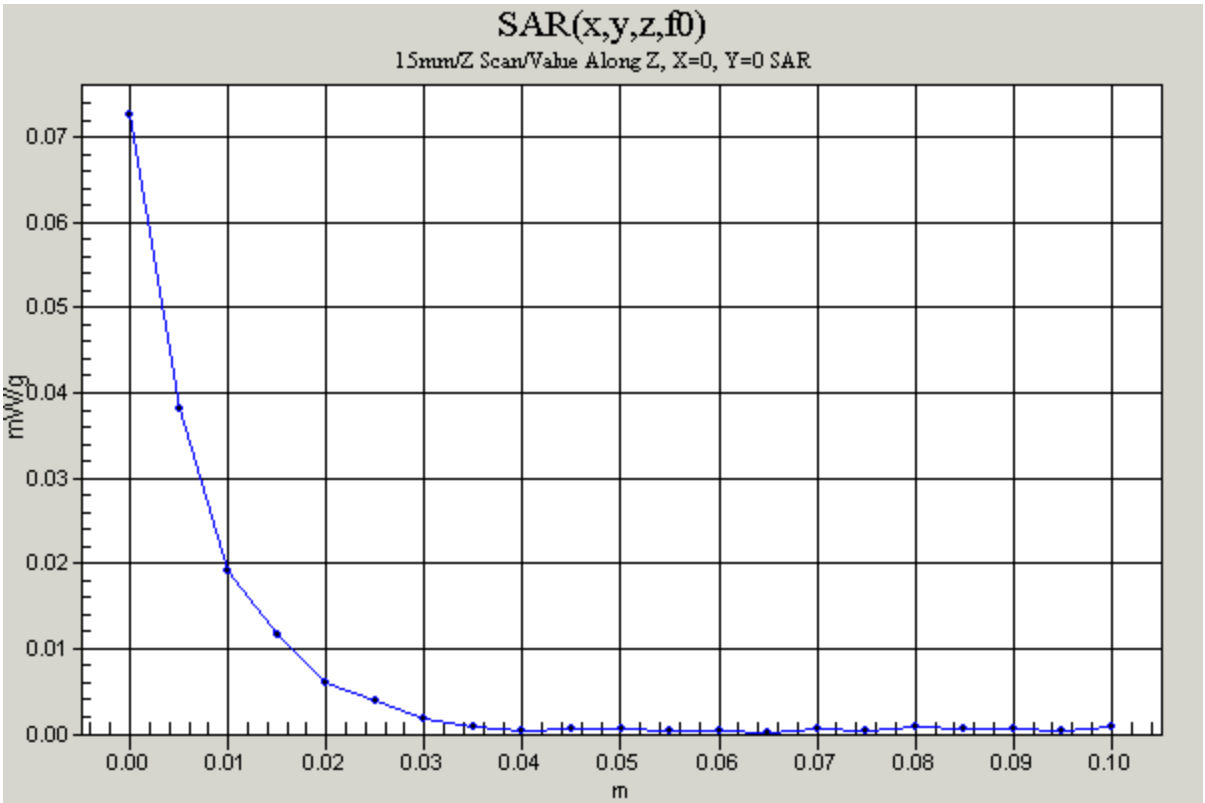
- Probe: ET3DV6 - SN1762; ConvF(4.6, 4.6, 4.6); Calibrated: 3/31/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
  Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn558; Calibrated: 3/7/2003
- Phantom: SAM 34; Type: SAM V4.0; Serial: TP-1150
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.8 Build 62

High Rate=11M bit/Area Scan (6x7x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 7.01 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.096 mW/g

High Rate=11M bit/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Reference Value = 7.01 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.073 mW/g

High Rate=11M bit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Peak SAR (extrapolated) = 0.145 W/kg
SAR(1 g) = 0.076 mW/g; SAR(10 g) = 0.044 mW/g
Reference Value = 7.01 V/m
Power Drift = -0.1 dB
Maximum value of SAR = 0.087 mW/g


mW/g
0.096
0.078
0.059
0.041
0.022
0.0041


SAR(x,y,z,f0)
15mm/Z Scan/Value Along Z, X=0, Y=0 SAR
mW/g
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
m