Test Report No. S09EEC00652
dated 31 Mar 2009

PSB Singapore

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COMPLIANCE REPORT ON TESTING IN ACCORDANCE WITH
SAR (SPECIFIC ABSORPTION RATE) REQUIREMENTS

Supplement C (Edition 01-01)
FCC OET Bulletin 65 (Edition 97-01)

OF A Notebook
[Model:PC-88012N]

TEST FACILITY	TÜV SÜD PSB Pte Ltd, Electrical & Electronics Centre (EEC), Product Services, 1 Science Park Drive, Singapore 118221
PREPARED FOR	Wanlida Group Co., Ltd. No. 618 Jiahe Road Xiamen Fujian, China Tel : (+86) 596-7653999-8266 Fax : (+86) 596-7662886
QUOTATION NUMBER	Q09EEC00880
JOB NUMBER	S09EEC00652
TEST PERIOD	23-Mar-2009 – 31-Mar-2009

PREPARED BY

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LA-2007-0380-A
LA-2007-0380-A-1
LA-2007-0381-F
LA-2007-0382-B
LA-2007-0383-G
LA-2007-0384-G
LA-2007-0385-E
LA-2007-0386-C

The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

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TABLE OF CONTENTS

TEST SUMMARY

The product was tested in accordance with the following standards.

Test Results Summary

Test Standards	Description	Pass / Fail
• Supplement C (Edition 01-01) to FCC OET Bulletin 65 (Edition 97-01) • ANSI/IEEE Standard C95.1-1993	SAR Measurement (Wi-Fi 2450MHz) Body worn Configuration Only	Pass *

1. The worst-case SAR value was found to be **0.082W/kg** which is lower than the maximum limit of 1.60 W/kg, over 1g of tissue. The device conforms to the requirements of the standard when the maximum measured SAR value is less than or equal to the limit.

* Based on spatial peak uncontrolled exposure / general population level:
Head: 1.60 W/kg, over 1g of tissue.
Body: 1.60 W/kg, over 1g of tissue.

Modifications

No modifications were made.

DEVICE DESCRIPTION

Description	The Equipment Under Test (EUT) is a **Wi-Fi Notebook**
Device Category	Portable Device
Exposure Environment	General Population/Uncontrolled exposure
Test Device Type	Production Unit
Brand Name	Malata
Serial Numbers	Nil
Model	PC-88012N
FCC ID	SMFPC88012N

DEVICE OPERATING CONFIGURATION

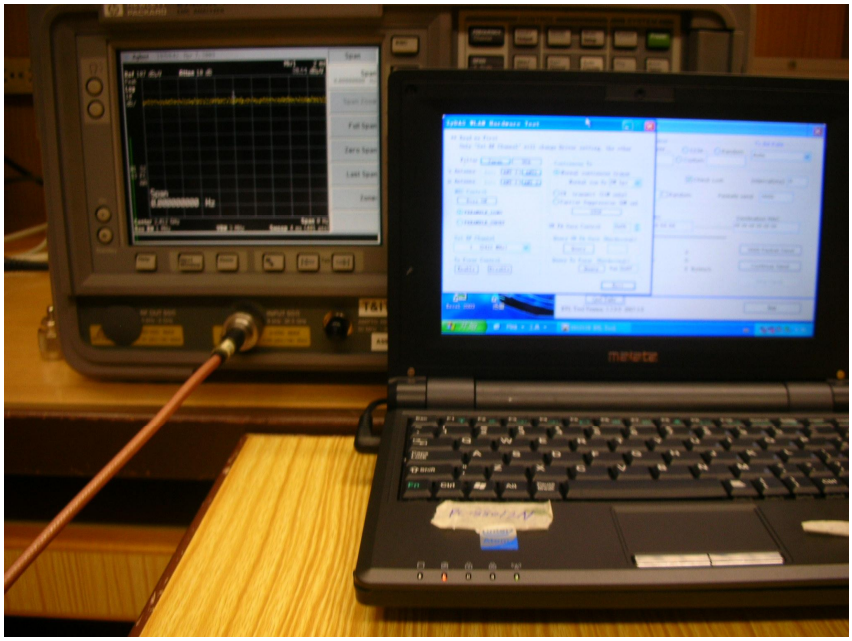
Operating Frequencies	Wi-Fi mode Channel 1 (2412Mhz) Channel 2 (2442Mhz) Channel 3 (2462Mhz)
Operating Temperature Tolerance	(0 ~ 80) Degree Celsius
Operating Voltage Tolerance	(3.3 ±5%) Volt DC
Continuous Transmission Tolerance	The EUT shall cause no problem after transmitting for 4 hours.
Rated Output Power	16dBm ± 1.5dBm, Maximum (802.11b) 13dBm ± 1.5dBm, Maximum (802.11g)
Antenna Type	PIFA
	Integrated Antenna
EUT Crest Factor	1.0
Input Power	AC 100~240V, DC 12V, Rechargeable Battery
Accessories	Power adapter

MANUFACTURER

Manufacturer Address	Wanlida Group Co., Ltd. No. 618 Jiahe Road Xiamen Fujian, China
DID	(+86) 596-7653999-826
Fax	(+86) 596-7662886

DEVICE OPERATING CONDITION

The EUT has only one single transmit antenna. SAR was evaluated with the radio transmitting at the 6Mbps and 11Mbps data rate for each mode based on the measured conducted peak power.
The EUT was put into exercised by using software control operating at the following frequencies 2.412GHz, 2.442GHz and 2.462GHz (lowest, middle and highest channel). The EUT was set to maximum output power level transmission (greater than 90% on-time),this was confirm with a spectrum analyser set to zero span as shown below set up.



TEMPERATURE AND HUMIDITY

802.11b/g (Body)

Ambient Temperature:	24 ± 1^0 C
Tissue Temperature:	24 ± 1^0 C
Humidity:	54% to 59%

TEST RESULTS

The measurement results were obtained with the EUT tested in the conditions described in this report (Annex A).

Table 1 - Body Worn Position SAR Test Results – (Wi-Fi) 6Mbps

Phantom Configuration	Device Test Positions	Antenna Position	SAR (W/kg), average over 1g Tissue Device Test Channel & Frequency		
			Channel: 1 2412MHz	Channel: 2 2442MHz	Channel: 3 2462MHz
Flat Phantom	EUT **Closed (under arm)** Touched Phantom	fixed	0.058	0.030	0.063
Flat Phantom	EUT **Lap** Touched Phantom	fixed	0.039	0.043	0.046
Output Peak Power (dBm) Before Test			16.94	16.86	16.62
Output Peak Power (dBm) After Test			16.92	16.85	16.61

Table 2 - Body Worn Position SAR Test Results – (Wi-Fi) 11Mbps

Phantom Configuration	Device Test Positions	Antenna Position	SAR (W/kg), average over 1g Tissue Device Test Channel & Frequency		
			Channel: 1 2412MHz	Channel: 2 2442MHz	Channel: 3 2462MHz
Flat Phantom	EUT **Closed (under arm)** Touched Phantom	fixed	0.062	0.039	0.046
Flat Phantom	EUT **Lap** Touched Phantom	fixed	0.073	0.082	0.012
Output Peak Power (dBm) Before Test			16.93	16.67	16.60
Output Peak Power (dBm) After Test			16.92	16.67	16.60

Comment:
Since the SAR measurements values are very low and power distribution for Z-plot does look erratic which usually in the case for very low SAR value (noise floor <0.01mW/g) which the above test SAR results had shown . For SAR value >0.1mW/g, the Z-plot will be more obvious with a logarithmic decay unlike the Z-plot might not show this decay in the obtained results of the device which is close to the floor noise.

Remarks:

1. All modes of operations were investigated and the worst-case SAR levels are reported.
2. A fully charged **Li-Polymer** Battery Description **DC 7.4V, 4400mAh** was used for each mode of operation.
3. For the peak power measurement across all the data rates are listed in page 32 and 33 of this report.
4. For **Wi-Fi 6Mbps** the worst-case SAR value was found to be **0.0.63W/Kg** (over a 1g tissue) at **Channel 3** which is lower than the maximum limit of 1.60 W/Kg, please refer to the above table.
5. For **Wi-Fi 11Mbps**, the worst-case SAR value was found to be **0.082W/Kg** (over a 1g tissue) at **Channel 2** which is lower than the maximum limit of 1.60 W/Kg, please refer to the above table.
6. The SAR limit of 1.60W/Kg (Spatial Peak level for Uncontrolled Exposure / General Population) is based on the Test Standards:
   a) Supplement C (Edition 01-01) to FCC OET Bulletin 65 (Edition 97-01)
   b) ANSI/IEEE Standard C95.1-1993
7. Others consideration used for the above test;
   i) KDB 248227 dated May 2007
   ii) KDB 447498 D01 dated Jan 2009

TEST RESULTS

Ambient Temperature:	**24 ± 1^{0}C**
Tissue Temperature:	**24 ± 1^{0}C**
Humidity:	**54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/31/2009 11:07:18 AM

File Name: EUT Lap_Ch 1_2412MHz_6mbps.da4

Program Name: EUT Lap_Ch 1_2412MHz_Data 1.da4

Phantom section: Flat Section

DUT: Notebook

Communication System: 2450 Mhz

Frequency: 2412 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

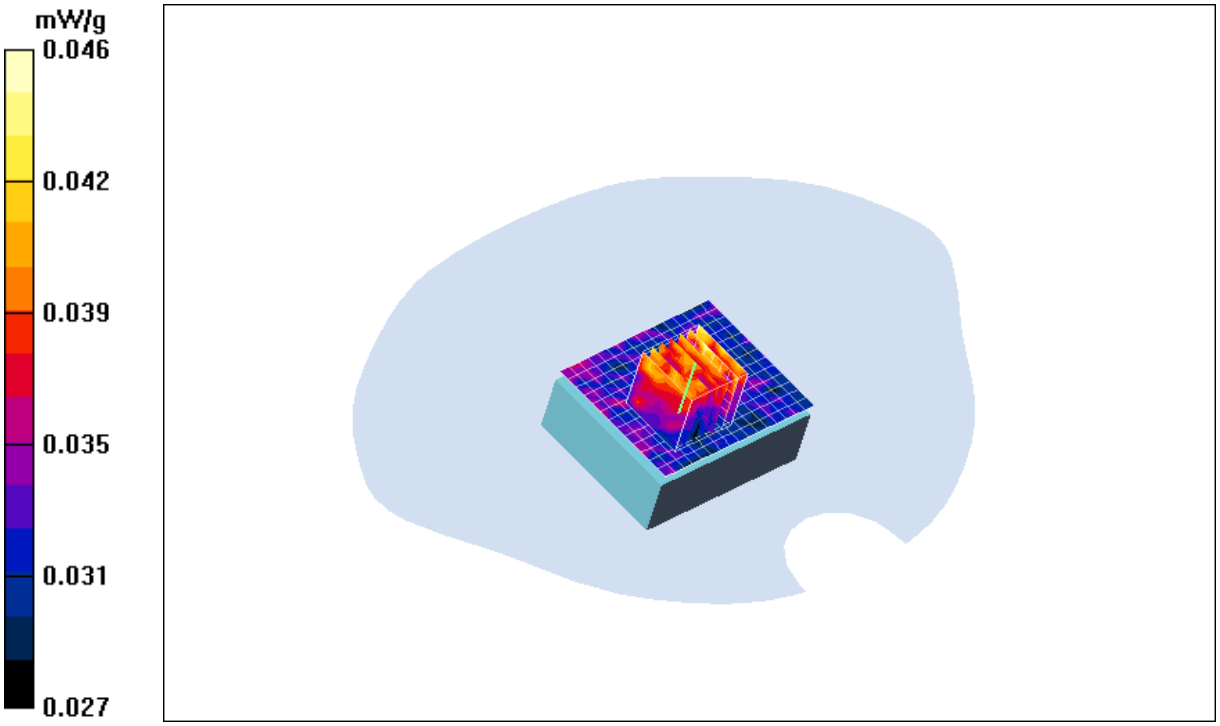
Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

Post processing SW: SEMCAD, V1.8 Build 186

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Rear_Ch 1_2412MHz_Data 1/Area Scan (14x17x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.037 mW/g

EUT Rear_Ch 1_2412MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.05 V/m; Power Drift = 0.063 dB
Peak SAR (extrapolated) = 0.046 W/kg
SAR(1 g) = 0.039 mW/g; SAR(10 g) = 0.036 mW/g
Maximum value of SAR (measured) = 0.046 mW/g


mW/g
0.046
0.042
0.039
0.035
0.031
0.027

TEST RESULTS

Ambient Temperature:	**24 ± 1^{0}C**
Tissue Temperature:	**24 ± 1^{0}C**
Humidity:	**54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/31/2009 12:07:06 PM

File Name: EUT Lap_Ch 2_2442MHz_6mbps.da4

Program Name: EUT Lap _Ch 2_2442MHz_Data 1.da4

Phantom section: Flat Section

DUT: Notebook

Communication System: 2450 Mhz

Frequency: 2442 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

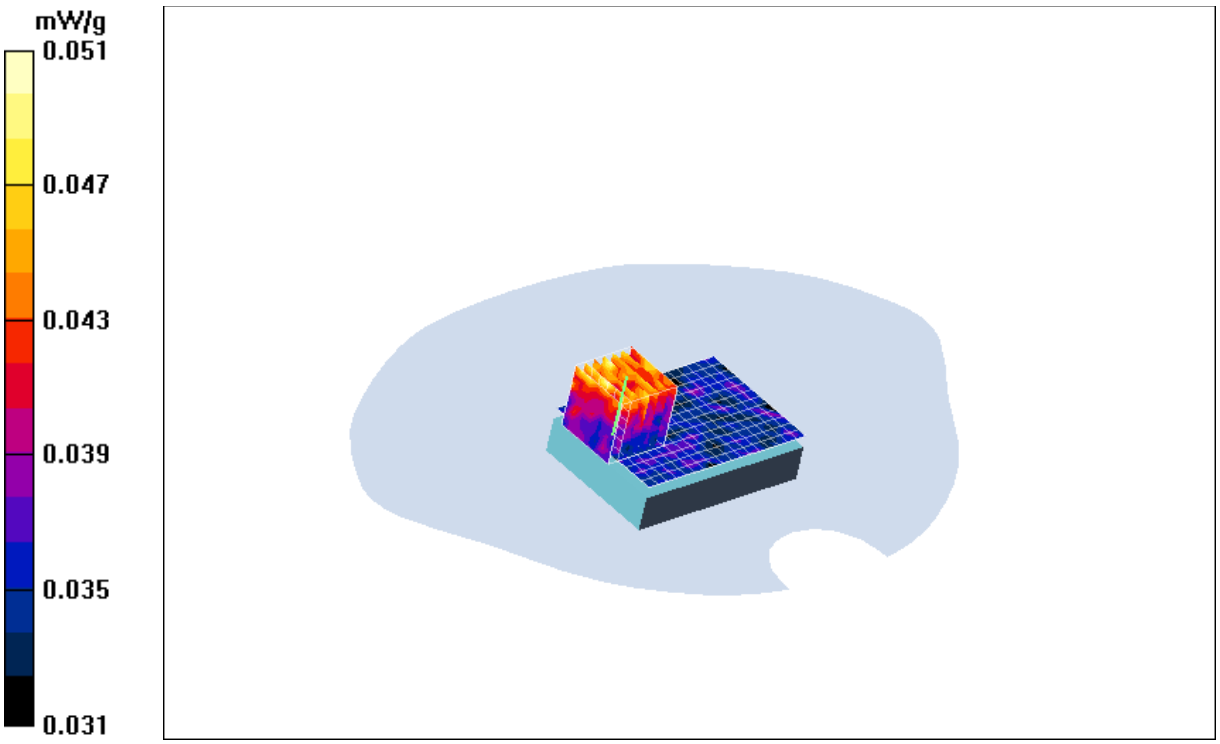
Post processing SW: SEMCAD, V1.8 Build 186

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Rear_Ch 2_2442MHz_Data 1/Area Scan (13x18x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.043 mW/g

EUT Rear_Ch 2_2442MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.33 V/m; Power Drift = 0.177 dB
Peak SAR (extrapolated) = 0.051 W/kg
SAR(1 g) = 0.043 mW/g; SAR(10 g) = 0.041 mW/g

Maximum value of SAR (measured) = 0.051 mW/g


mW/g
0.051
0.047
0.043
0.039
0.035
0.031

TEST RESULTS

Ambient Temperature:	**24 ± 1^{0}C**
Tissue Temperature:	**24 ± 1^{0}C**
Humidity:	**54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/31/2009 1:50:40 PM

File Name: EUT Lap_Ch 3_2462MHz_6mbps.da4

Program Name: EUT Lap_Ch 3_2462MHz_Data 1.da4

Phantom section: Flat Section

DUT: Notebook

Communication System: 2450 Mhz

Frequency: 2462 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

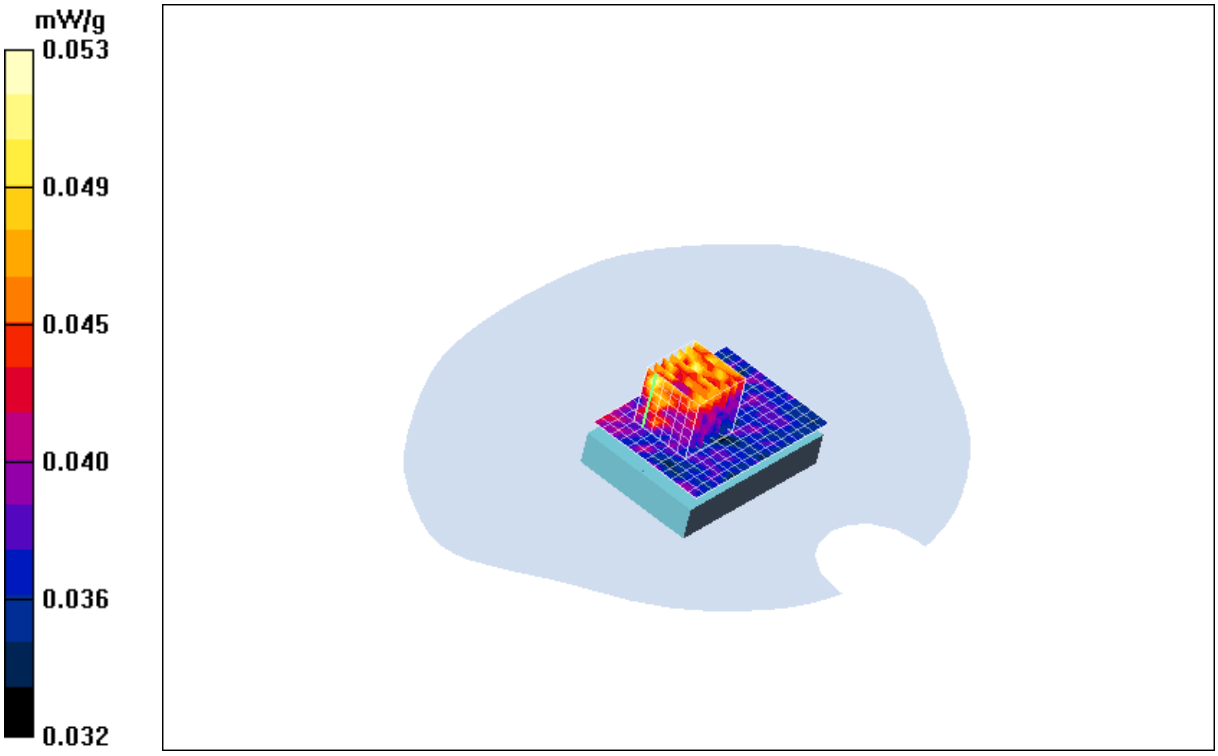
Post processing SW: SEMCAD, V1.8 Build 186

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Lap_Ch 3_2462MHz_Data 1/Area Scan (13x18x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.043 mW/g

EUT Lap_Ch 3_2462MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.18 V/m; Power Drift = 0.555 dB
Peak SAR (extrapolated) = 0.062 W/kg
SAR(1 g) = 0.046 mW/g; SAR(10 g) = 0.042 mW/g

Maximum value of SAR (measured) = 0.053 mW/g


mW/g
0.053
0.049
0.045
0.040
0.036
0.032

TEST RESULTS

Ambient Temperature:	**24 ± 1^{0}C**
Tissue Temperature:	**24 ± 1^{0}C**
Humidity:	**54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/28/2009 11:01:40 AM

File Name: EUT Closed_Ch 1_2412MHz_6mbps.da4

Program Name: EUT Closed_Ch 1_2412MHz_Data 1.da4

Phantom section: Flat Section

DUT: Notebook

Communication System: 2450 Mhz

Frequency: 2412 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

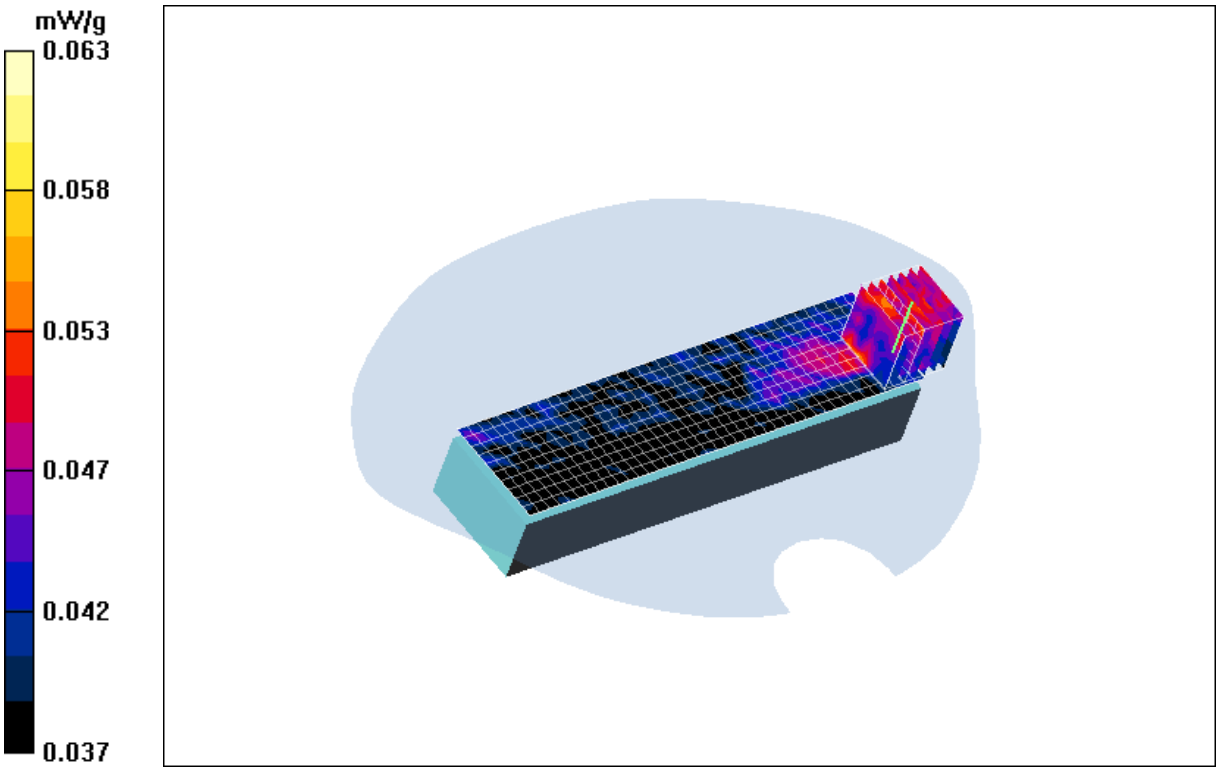
Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

Post processing SW: SEMCAD, V1.8 Build 186

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Front_Ch 1_2412MHz_Data 1/Area Scan (11x41x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.061 mW/g

EUT Front_Ch 1_2412MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.33 V/m; Power Drift = 0.496 dB
Peak SAR (extrapolated) = 0.079 W/kg
SAR(1 g) = 0.058 mW/g; SAR(10 g) = 0.050 mW/g
Maximum value of SAR (measured) = 0.063 mW/g


mW/g
0.063
0.058
0.053
0.047
0.042
0.037

TEST RESULTS

Ambient Temperature:	**24 ± 1^{0}C**
Tissue Temperature:	**24 ± 1^{0}C**
Humidity:	**54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/28/2009 2:49:33 PM

File Name: EUT Closed_Ch 2_2442MHz_6mbps.da4

Program Name: EUT closed _Ch 2_2442MHz_Data 1.da4

Phantom section: Flat Section

DUT: Notebook

Communication System: 2450 Mhz

Frequency: 2442 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

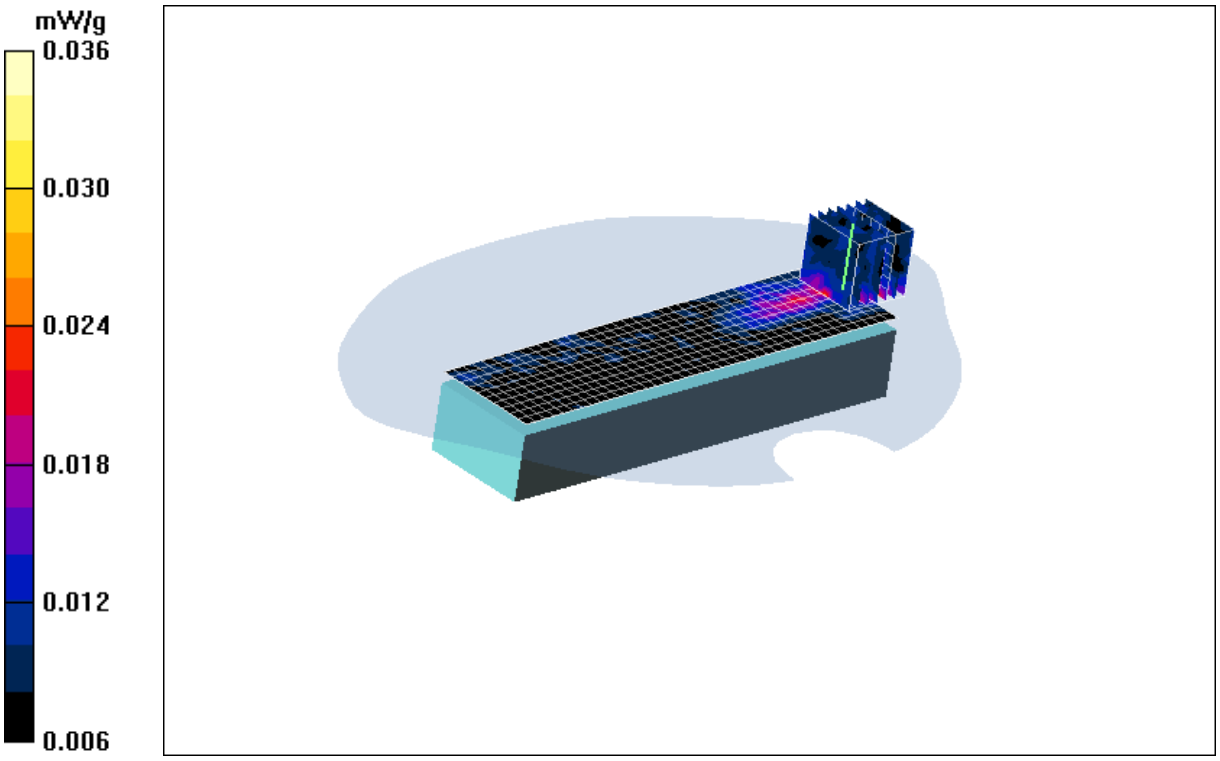
Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

Post processing SW: SEMCAD, V1.8 Build 186

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT closed_Ch 2_2442MHz_Data 1/Area Scan (11x41x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.031 mW/g

EUT closed_Ch 2_2442MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.86 V/m; Power Drift = 0.867 dB
Peak SAR (extrapolated) = 0.122 W/kg
SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.018 mW/g
Maximum value of SAR (measured) = 0.036 mW/g


mW/g
0.036
0.030
0.024
0.018
0.012
0.006

TEST RESULTS

Ambient Temperature:	**24 ± 1^{0}C**
Tissue Temperature:	**24 ± 1^{0}C**
Humidity:	**54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/29/2009 8:51:55 AM

File Name: EUT Closed_Ch 3_2462MHz_6mbps scan2.da4

Program Name: EUT Closed _Ch 3_2462MHz_Data 1.da4

Phantom section: Flat Section

DUT: Notebook

Communication System: 2450 Mhz

Frequency: 2462 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

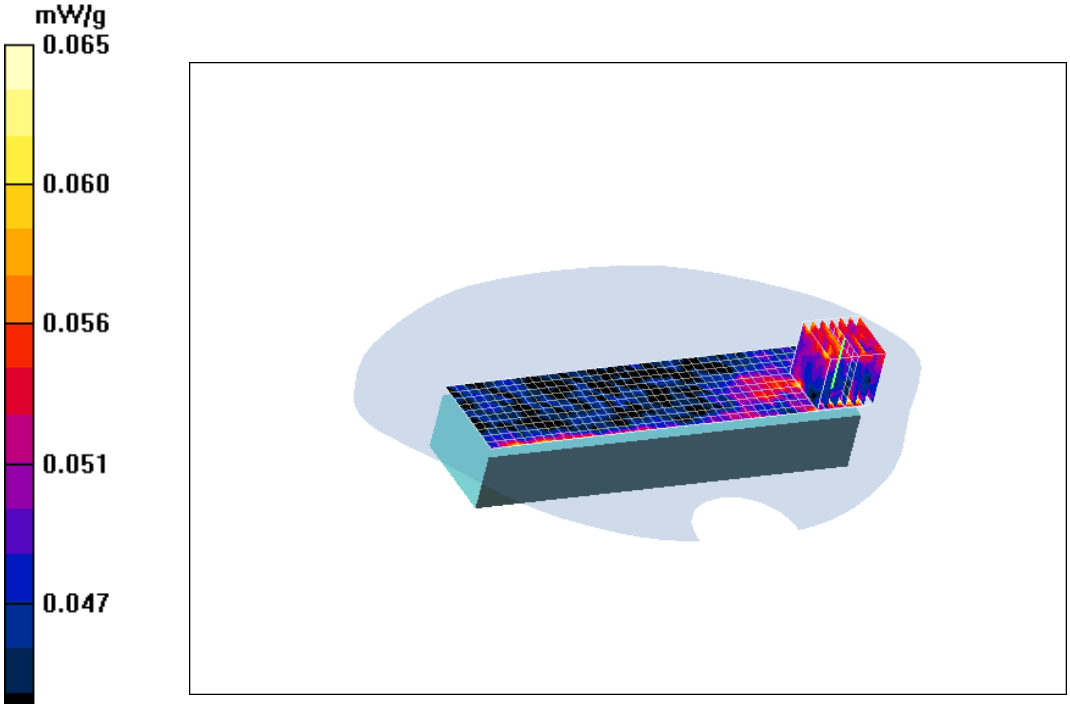
Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

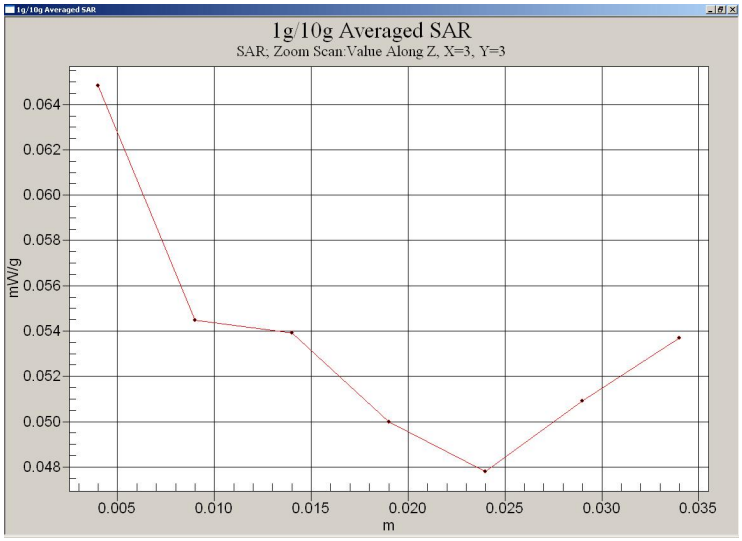
Post processing SW: SEMCAD, V1.8 Build 186

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Front_Ch 3_2462MHz_Data 1/Area Scan (11x41x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.067 mW/g

EUT Front_Ch 3_2462MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.21 V/m; Power Drift = -0.768 dB
Peak SAR (extrapolated) = 0.101 W/kg
SAR(1 g) = 0.063 mW/g; SAR(10 g) = 0.054 mW/g
Maximum value of SAR (measured) = 0.065 mW/g


mW/g
0.065
0.060
0.056
0.051
0.047
0.042


1g/10g Averaged SAR
SAR; Zoom Scan:Value Along Z, X=3, Y=3
mW/g
0.064
0.062
0.060
0.058
0.056
0.054
0.052
0.050
0.048
0.005
0.010
0.015
0.020
0.025
0.030
0.035
m

TEST RESULTS

Ambient Temperature:	**24 ± 1^{0}C**
Tissue Temperature:	**24 ± 1^{0}C**
Humidity:	**54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/29/2009 1:40:10 PM

File Name: EUT Lap_Ch 1_2412MHz_11mbps.da4

Program Name: EUT Lap _Ch 1_2412MHz_Data 1.da4

Phantom section: Flat Section

DUT: Notebook

Communication System: 2450 Mhz

Frequency: 2412 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

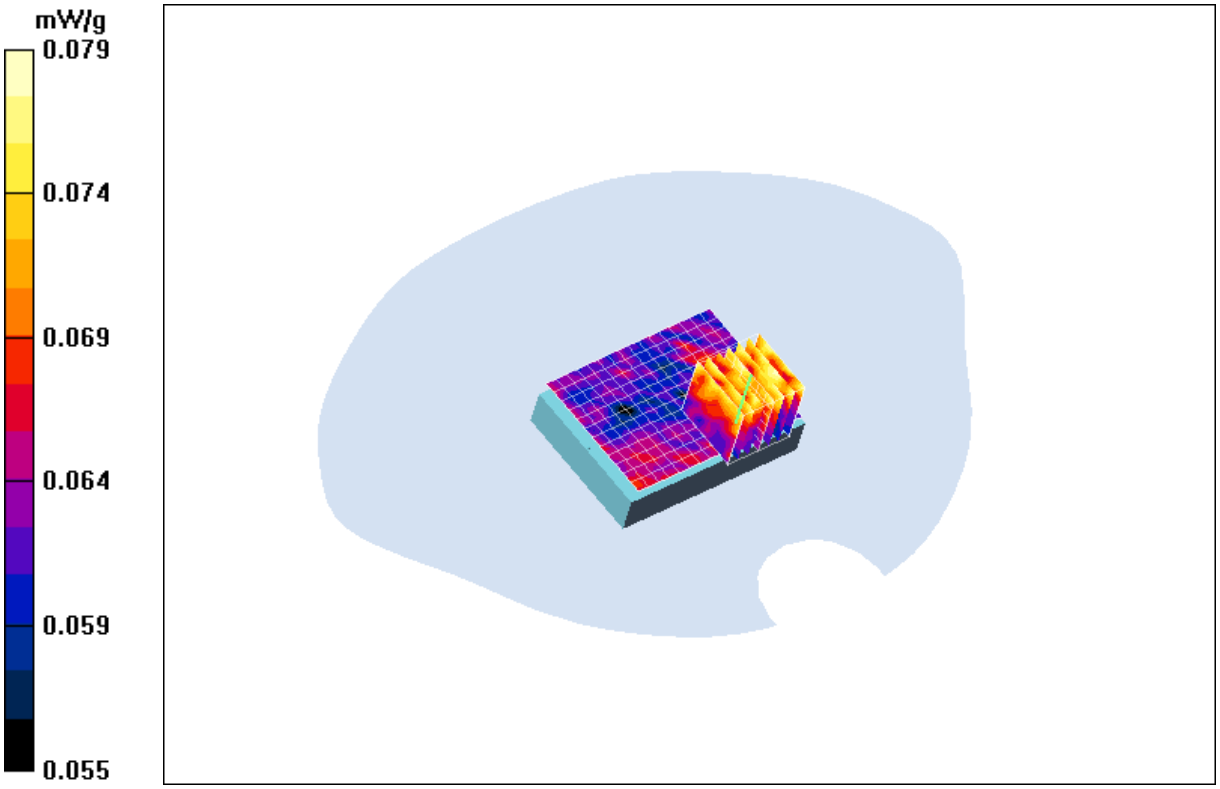
Post processing SW: SEMCAD, V1.8 Build 186

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Rear_Ch 1_2412MHz_Data 1/Area Scan (13x17x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.070 mW/g

EUT Rear_Ch 1_2412MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.63 V/m; Power Drift = -0.384 dB
Peak SAR (extrapolated) = 0.079 W/kg
SAR(1 g) = 0.073 mW/g; SAR(10 g) = 0.068 mW/g

Maximum value of SAR (measured) = 0.079 mW/g


mW/g
0.079
0.074
0.069
0.064
0.059
0.055

TEST RESULTS

Ambient Temperature:	**24 ± 1^{0}C**
Tissue Temperature:	**24 ± 1^{0}C**
Humidity:	**54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/29/2009 2:07:01 PM

File Name: EUT Lap_Ch 2_2442MHz_11mbps.da4

Program Name: EUT Rear _Ch 2_2442MHz_Data 1.da4

Phantom section: Flat Section

DUT: notebook

Communication System: 2450 Mhz

Frequency: 2442 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

Post processing SW: SEMCAD, V1.8 Build 186

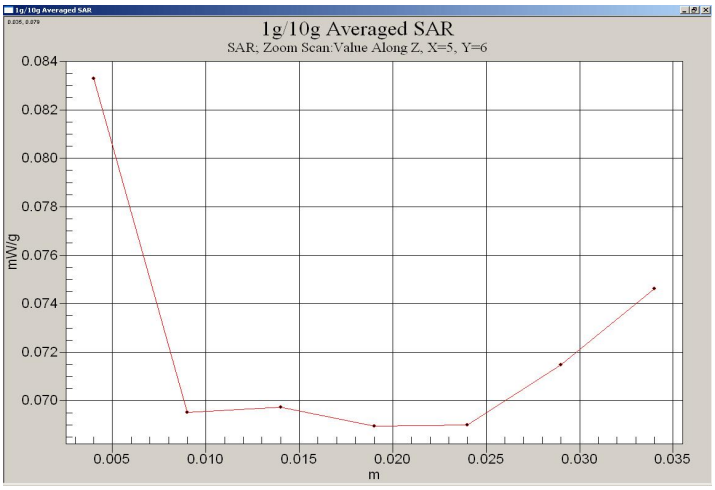
Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Rear_Ch 2_2442MHz_Data 1/Area Scan (13x18x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.081 mW/g

EUT Rear_Ch 2_2442MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.42 V/m; Power Drift = 0.334 dB
Peak SAR (extrapolated) = 0.221 W/kg
SAR(1 g) = 0.082 mW/g; SAR(10 g) = 0.074 mW/g

Maximum value of SAR (measured) = 0.083 mW/g


mW/g
0.083
0.079
0.075
0.071
0.067
0.063


1g/10g Averaged SAR
SAR; Zoom Scan:Value Along Z, X=5, Y=6
mW/g
0.084
0.082
0.080
0.078
0.076
0.074
0.072
0.070
0.005
0.010
0.015
0.020
0.025
0.030
0.035
m

TEST RESULTS

Ambient Temperature:	**24 ± 1^{0}C**
Tissue Temperature:	**24 ± 1^{0}C**
Humidity:	**54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/30/2009 9:51:13 AM

File Name: EUT Lap_Ch 3_2462MHz_11mbps.da4

Program Name: EUT Lap_Ch 3_2462MHz_Data 1.da4

Phantom section: Flat Section

DUT: Notebook

Communication System: 2450 Mhz

Frequency: 2462 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

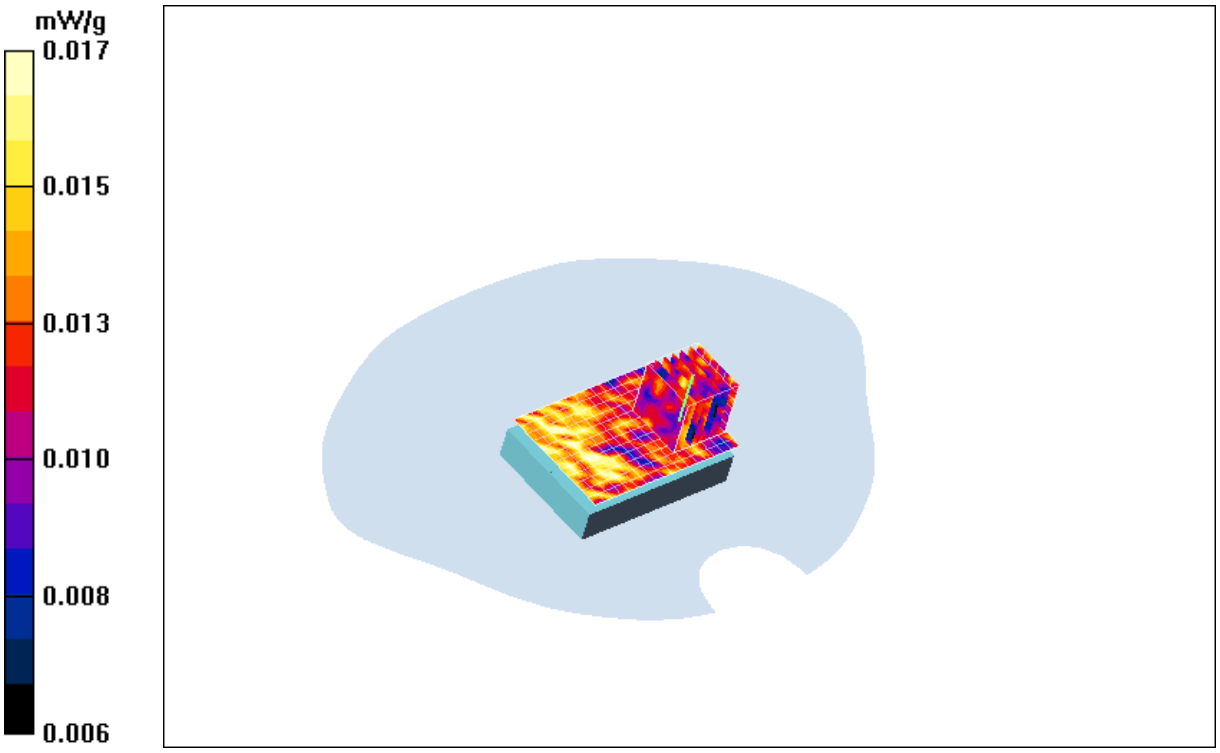
Post processing SW: SEMCAD, V1.8 Build 186

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Rear_Ch 3_2462MHz_Data 1/Area Scan (13x18x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.020 mW/g

EUT Rear_Ch 3_2462MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.85 V/m; Power Drift = -0.719 dB
Peak SAR (extrapolated) = 0.017 W/kg
SAR(1 g) = 0.012 mW/g; SAR(10 g) = 0.011 mW/g

Maximum value of SAR (measured) = 0.017 mW/g



TEST RESULTS

Ambient Temperature:	**24 ± 1^{0}C**
Tissue Temperature:	**24 ± 1^{0}C**
Humidity:	**54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/28/2009 12:02:27 PM

File Name: EUT Closed_Ch 1_2412MHz_11mbps.da4

Program Name: EUT Closed_Ch 1_2412MHz_Data 1.da4

Phantom section: Flat Section

DUT: Notebook

Communication System: 2450 Mhz

Frequency: 2412 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

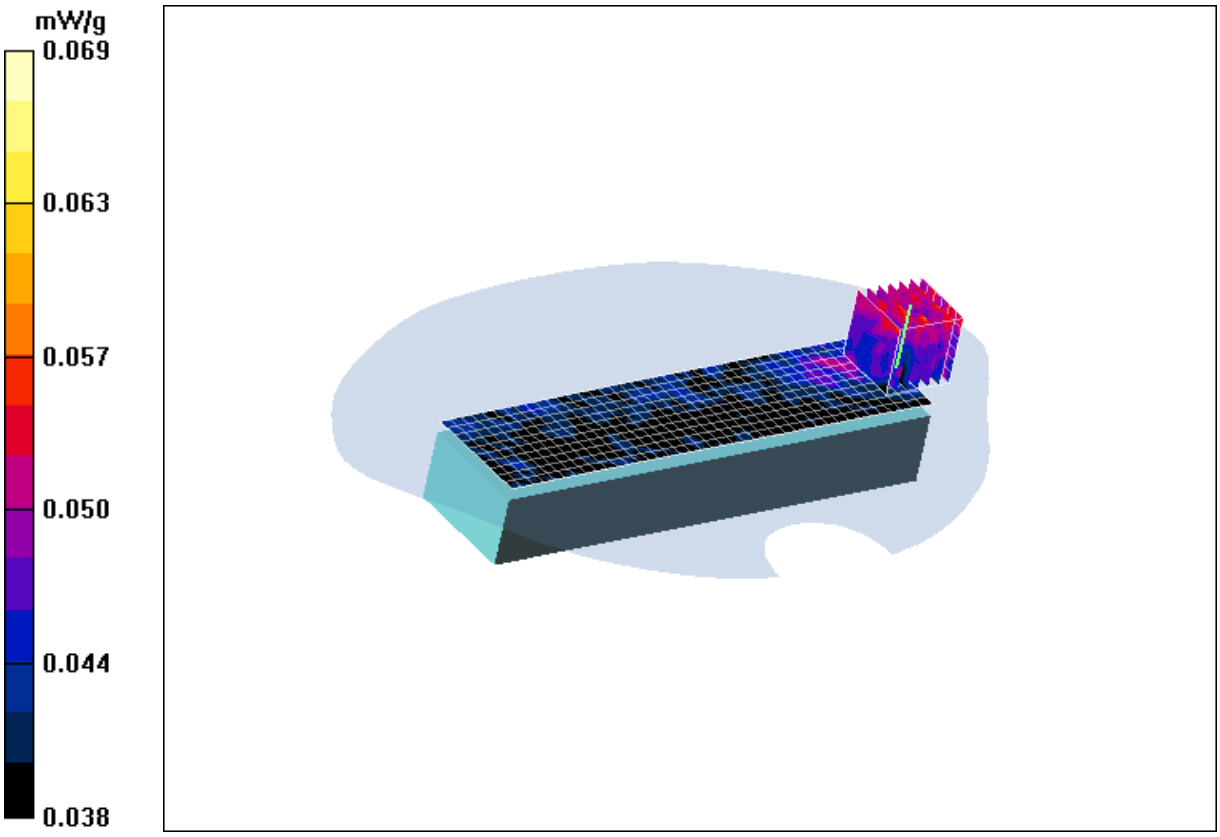
Post processing SW: SEMCAD, V1.8 Build 186

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT Front_Ch 1_2412MHz_Data 1/Area Scan (11x41x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.059 mW/g

EUT Front_Ch 1_2412MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.55 V/m; Power Drift = -0.059 dB
Peak SAR (extrapolated) = 0.221 W/kg
SAR(1 g) = 0.062 mW/g; SAR(10 g) = 0.051 mW/g

Maximum value of SAR (measured) = 0.069 mW/g


mW/g
0.069
0.063
0.057
0.050
0.044
0.038

TEST RESULTS

Ambient Temperature:	**24 ± 1^{0}C**
Tissue Temperature:	**24 ± 1^{0}C**
Humidity:	**54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/30/2009 4:42:23 PM

File Name: EUT Closed_Ch 2_2442MHz_11mbps.da4

Program Name: EUT closed _Ch 2_2442MHz_Data 1.da4

Phantom section: Flat Section

DUT: Notebook

Communication System: 2450 Mhz

Frequency: 2442 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

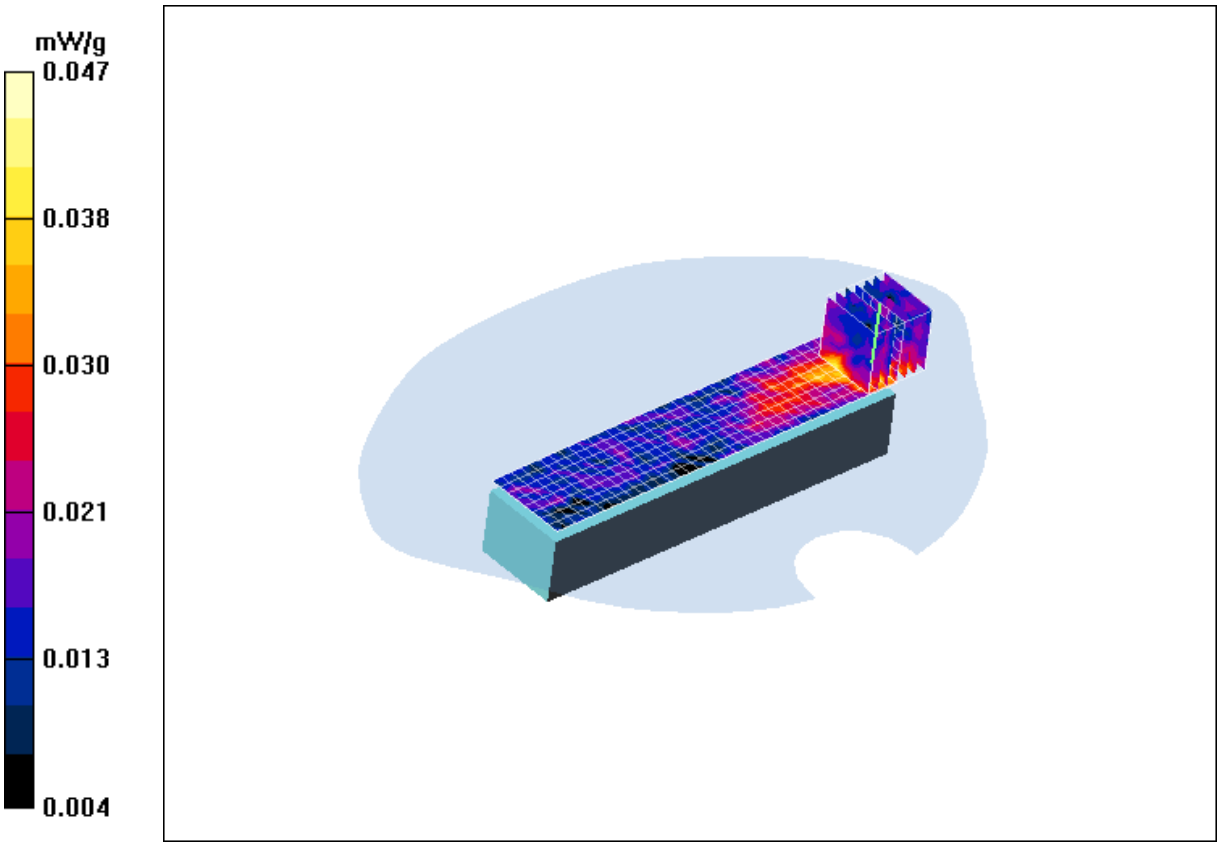
Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

Post processing SW: SEMCAD, V1.8 Build 186

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT closed_Ch 2_2442MHz_Data 1/Area Scan (9x37x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.053 mW/g

EUT closed_Ch 2_2442MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.59 V/m; Power Drift = 2.05 dB
Peak SAR (extrapolated) = 0.138 W/kg
SAR(1 g) = 0.039 mW/g; SAR(10 g) = 0.020 mW/g
Maximum value of SAR (measured) = 0.047 mW/g


mW/g
0.047
0.038
0.030
0.021
0.013
0.004

TEST RESULTS

Ambient Temperature:	**24 ± 1^{0}C**
Tissue Temperature:	**24 ± 1^{0}C**
Humidity:	**54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/30/2009 1:59:22 PM

File Name: EUT Closed_Ch 3_2462MHz_11mbps.da4

Program Name: EUT closed _Ch 3_2462MHz_Data 1.da4

Phantom section: Flat Section

DUT: Notebook

Communication System: 2450 Mhz

Frequency: 2462 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

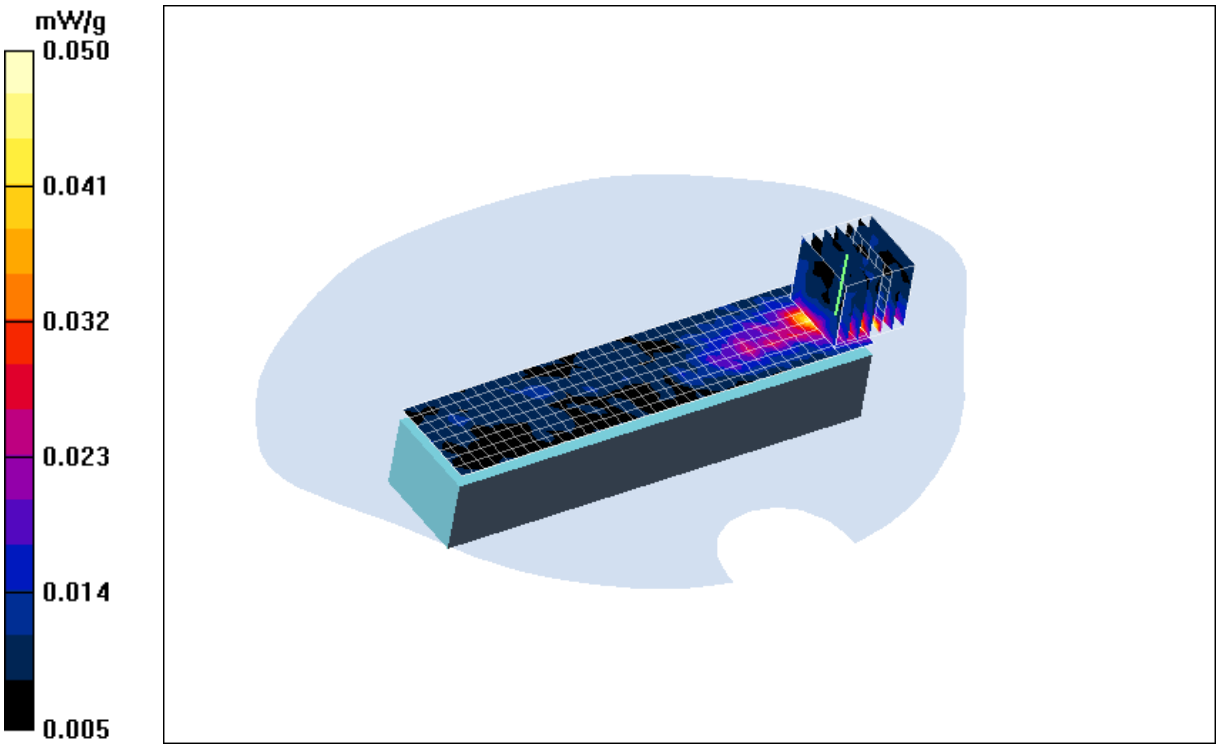
Probe: EX3DV4 - SN3541 ConvF(7.4, 7.4, 7.4) Calibrated: 6/23/2008

Post processing SW: SEMCAD, V1.8 Build 186

Sensor-Surface: 4mm (Mechanical Surface Detection)

EUT closed_Ch 3_2462MHz_Data 1/Area Scan (9x37x1): Measurement grid: dx=5mm, dy=5mm
Maximum value of SAR (measured) = 0.062 mW/g

EUT closed_Ch 3_2462MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.64 V/m; Power Drift = 2.39 dB
Peak SAR (extrapolated) = 0.117 W/kg
SAR(1 g) = 0.046 mW/g; SAR(10 g) = 0.024 mW/g
Maximum value of SAR (measured) = 0.050 mW/g


mW/g
0.050
0.041
0.032
0.023
0.014
0.005

Conducted Peak Output Power Measurement:

Data Rate	Frequency MHz	Conducted Peak Output power dBm
DQPSK 1Mbps	CH1 2412MHz	16.72
	CH2 2442MHz	16.55
	CH3 2462MHz	16.55

Data Rate	Frequency MHz	Conducted Peak Output power dBm
DQPSK 2Mbps	CH1 2412MHz	16.76
	CH2 2442MHz	16.60
	CH3 2462MHz	16.51

Data Rate	Frequency MHz	Conducted Peak Output power dBm
CCK 5.5Mbps	CH1 2412MHz	16.54
	CH2 2442MHz	16.44
	CH3 2462MHz	16.38

Data Rate	Frequency MHz	Conducted Peak Output power dBm
CCK 11Mbps	CH1 2412MHz	16.93
	CH2 2442MHz	16.67
	CH3 2462MHz	16.60

Data Rate	Frequency MHz	Conducted Peak Output power dBm
(802.11g) 6Mbps	CH1 2412MHz	16.94
	CH2 2442MHz	16.86
	CH3 2462MHz	16.62

Data Rate	Frequency MHz	Conducted Peak Output power dBm
(802.11g) 9Mbps	CH1 2412MHz	16.76
	CH2 2442MHz	16.20
	CH3 2462MHz	16.17

Data Rate	Frequency MHz	Conducted Peak Output power dBm
(802.11g) 12Mbps	CH1 2412MHz	16.49
	CH2 2442MHz	16.35
	CH3 2462MHz	16.37

Data Rate	Frequency MHz	Conducted Peak Output power dBm
(802.11g)18Mbps	CH1 2412MHz	16.89
	CH2 2442MHz	16.55
	CH3 2462MHz	16.27

Data Rate	Frequency MHz	Conducted Peak Output power dBm
(802.11g) 24Mbps	CH1 2412MHz	16.39
	CH2 2442MHz	16.26
	CH3 2462MHz	16.43

Data Rate	Frequency MHz	Conducted Peak Output power dBm
(802.11g) 36Mbps	CH1 2412MHz	16.20
	CH2 2442MHz	16.06
	CH3 2462MHz	16.18

Data Rate	Frequency MHz	Conducted Peak Output power dBm
(802.11g) 48Mbps	CH1 2412MHz	16.46
	CH2 2442MHz	16.24
	CH3 2462MHz	16.28

Data Rate	Frequency MHz	Conducted Peak Output power dBm
(802.11g) 54Mbps	CH1 2412MHz	16.33
	CH2 2442MHz	16.16
	CH3 2462MHz	16.29

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2. Unless otherwise requested, a report shall contain only technical results. Analysis and interpretation of the results and professional opinion and recommendations expressed thereupon, if required, shall be clearly indicated and additional fee paid for, by the Client.

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January 2008

ANNEX A

TEST INSTRUMENTATION & GENERAL PROCEDURE

TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

A.1 General Test Procedure

In the SAR measurement, the positioning of the probes must be performed with sufficient accuracy to obtain repeatable measurements in the presence of rapid spatial attenuation phenomena. The accurate positioning of the E-field probe is accomplished by using a high precision robot. The robot can be taught to position the probe sensor following a specific pattern of points. In a first sweep, the sensor is positioned as close as possible to the interface, with the sensor enclosure touching the inside of the fiberglass shell. The SAR is measured on a grid of points, which covers the curved surface of the phantom in an area larger than the size of the EUT. After the initial scan, a high- resolution grid is used to locate the absolute maximum measured energy point. At this location, attenuation versus depth scan will be accomplished by the measurement system to calculate the SAR value.

A.2 SAR Test Instrumentation

SAR Measurement System

- **Positioning Equipment**
  Type: High Precision Industrial Robot, RX90.
  Precision: High precision (repeatability 0.02mm)
  Reliability: High reliability (industrial design)

- **Compaq Computer**
  Type: 2.4GHz Pentium
  Memory: 512MB SDRAM
  Operating System: Windows 2000
  Dell Monitor: 17" LCD

- **Dosimetric E-Field Probe**
  Type: ET3DV6
  Isotropy Error (∅): ±0.25dB
  Dynamic Range: 0.01 – 100 W/kg

- **Phantom & Tissue**
  Phantom: "Phantom SAM 12" and "450MHz Phantom" were manufactured by SPEAG.
  Tissue: Simulated Tissue with electrical characteristics similar to those of the human at normal body temperature (23 ± 1°C)
  Shell: Fiberglass shell phantom with 2mm thickness for "Phantom SAM 12".
  Fiberglass shell phantom with 2mm or 6mm thickness for "450MHz Flat Phantom".

TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

A.3 Test Setup

Phantom

The "Phantom SAM 12", manufactured by SPEAG is a fiberglass shell phantom with 2 mm shell thickness. It has three measurement areas:

- Left hand
- Right hand
- Flat phantom

The "Phantom SAM 12" table comes in the sizes: A 100x50x85 cm (LxWxH).The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. Only one device holder is necessary if two phantoms are used (e.g., for different solutions).

Simulated tissue

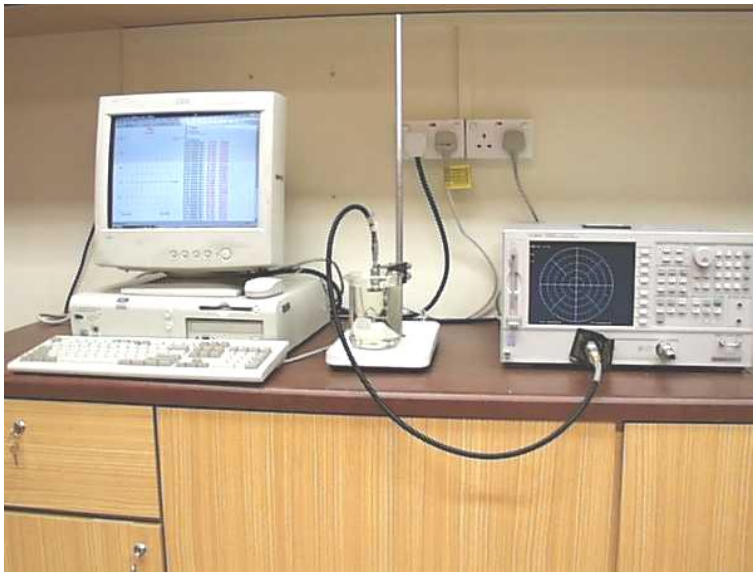
Simulated Tissue: Suggested in a paper by George Hartsgrove and colleagues in University of Ottawa Ref.: Bioelectromagnetics 8:29-36 (1987)

This simulated tissue is mainly composed of water, sugar and salt. At higher frequencies, in order to achieve the proper conductivity, the solution does not contain salt. Also, at these frequencies, D.I. water and alcohol is preferred.
Tissue Density : Approximately 1.25 g/cm^3

- **Preparation**
  The ingredients (i.e. water, sugar, salt, etc) required to prepare the simulated tissue are carefully weighed and poured into a clean container for mixing. A stirring paddle, that is attached to a hand drill is used to stir the solution for a duration of about 30 minutes or more. When the ingredients are completely dissolved, the solution is left in the container for the air bubbles to disappear.
  Measurement of Electrical Characteristics of Simulated Tissue
  1) S-PARAMETER Network Analyzer, Agilent 8753ES (30kHz – 6GHz)
  2) Agilent 85070D Dielectric Probe Kit

TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

ELECTRICAL CHARACTERISTIC MEASUREMENT SETUP



- **Description of the Agilent 85070D Dielectric Probe Kit**

  The 85070D is a dielectric probe that is used to measure the intrinsic electrical properties of materials in the RF and microwave frequency bands. The 85070D software allows you to measure the complex dielectric constant (also called permittivity) of liquids and semi-solids, incuding the dielectric loss factor of loss tangent.

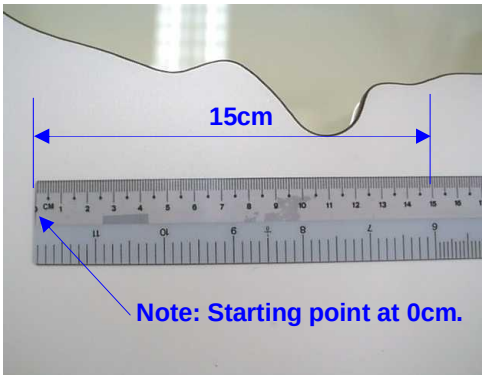
  To obtain data at hundreds of frequencies in seconds, simply immerse the probe into liquids or semi-solids - no special fixtures or containers are required. The 85070D must be used in conjunction with an Agilent network analyzer. The network analyzer provides the high frequency stimulus, and measures the reflected response.

  The probe transmits a signal into the material under test (MUT). The measured reflected response from the materials is then related to its dielectric properties. A computer controls the system, and runs software that guides the user through a measurement sequence. An effort is made to keep the results dielectric constant and conductivity within 5 % of published data.

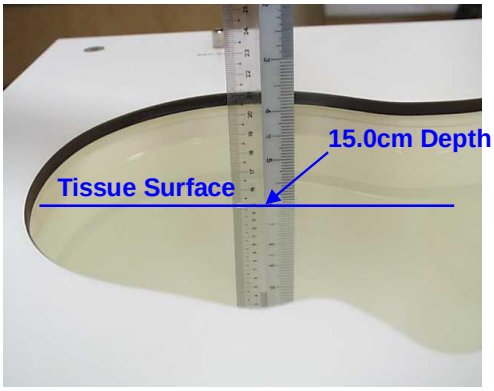
Tissue Depth

The tissue depth at the “Phantom SAM 12”, “450MHz Flat Phantom – 6mm Shell Thickness” & “450MHz Flat Phantom – 2mm Shell Thickness” is approximately 15cm ±0.5cm.

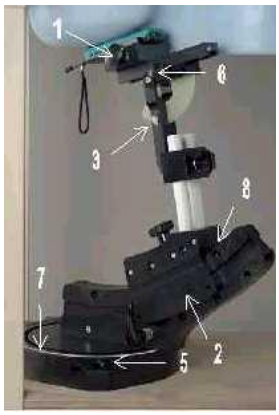
TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A



At "Phantom SAM 12"



Tissue – 15.0cm Depth



The DASY4 holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65º. The intended use position in the CENELEC document is has a rotation angle of 65º and an inclination angle of 80º. The rotation centers for both scales is the ear opening. Thus the device needs no repositioning when changing the angles. The device rotation around the device axis is not changed in the holder. In the CENELEC standard it is always 0º. If the standard changes, a support will be provided with the new angle.

1. **"Cheek/Touch Position"** – the device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom. This test position is established:

i) When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.

ii) (Or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

For existing head phantoms – when the handset loses contact with the phantom at the pivoting point, rotation should continue until the device touches the cheek of the phantom or breaks its last contact from the ear spacer.

2. **"Ear/Tilt Position"** – With the handset aligned in the "Cheek/Touch Position":

TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

i) If the earpiece of the handset is not in full contact with the phantom's ear spacer (in the "Cheek/Touch position") and the peak SAR location for the "Cheek/Touch" position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the "initial ear position" by rotating it away from the mouth until the earpiece is in full contact with the ear spacer.

ii) (Otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both "ear reference points" (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the handset is tilted away from the mouth with respect to the "test device reference point" by 15°. After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both "ear reference points" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

3. **Body Worn Configuration**

All body worn accessories are tested for the FCC RF exposure compliance. The phone is positioned into carrying case (if available) and placed below of the flat phantom. Headset or ear piece (if available) is connected during measurements.

4. **System Checking**

The manufacturer calibrates the probe annually. Dielectric parameters of the tissue stimulants were measured every day using the dielectric probe kit and network analyser 8753ES. Refer to annex C. A system check measurement was made following the determination of the dielectric parameters of the stimulant using the dipole validation system. A power level of 250mW was supplied to the dipole antenna which was placed under the flat section of the twin SAM phantom. The system checking results (dielectric parameters and SAR values) are in Annex D.

TEST INSTRUMENTATION & GENERAL PROCEDURES ANNEX A

Instrument	Model	S/No	Cal Due Date	
Boonton RF Power Meter (Dual Channel)	4532	97701	1 April 2009	√
Boonton Power Sensor	51075	51075	1 April 2009	√
Boonton Power Sensor	51075	32002	1 April 2009	√
S-Parameter Network Analyzer (30kHz – 6GHz)	8753ES	MY40001026	31 Mar 2009	√
Agilent 85070D Dielectric Probe Kit	85075D	21356	-	√
Anritsu RF Signal Generator (10MHz – 20GHz)	68347C	04306	-	√
Amplifier Research Power Amplifier (1MHz – 1000MHz)	25W1000B	27225	-	
Amplifier Research Power Amplifier (800MHz – 4.2GHz)	25S1G4A	29346	-	√
Agilent Dual Directional Coupler (0.1~2.0)GHz	HP778D	18289	-	√
AR Directional Coupler (0.8~4.2)GHz	DC7144	29245	-	
2450MHz System Validation Dipole	D2450V2	752	23 Jun 2009	√
Data Acquisition Electronics (DAE4)	DAE4	627	24 Jun 2009	√
Dosimetric E-field Probe	EX3DV4	3541	23 July 2009	√

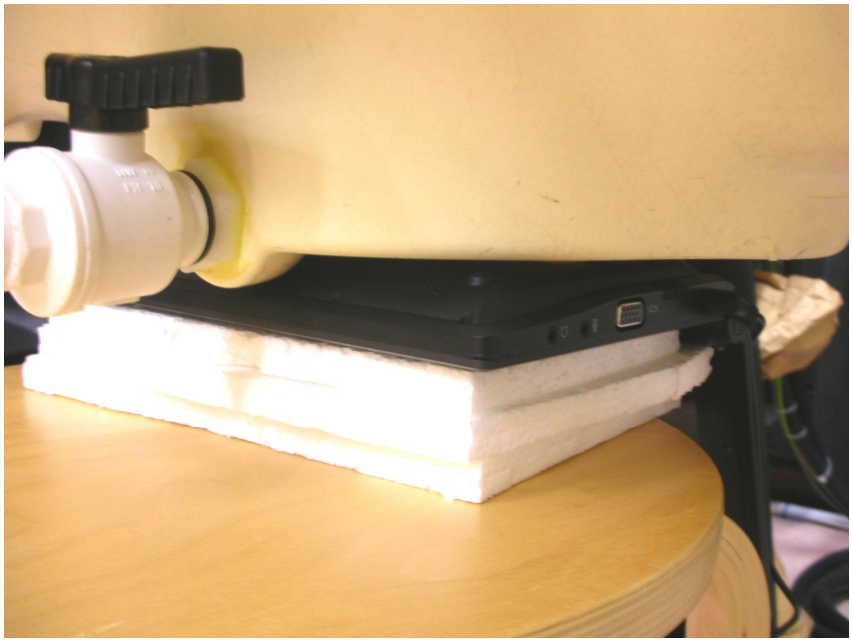
ANNEX B

TEST SETUP PHOTOGRAPHS

TEST SETUP PHOTOGRAPHS ANNEX B

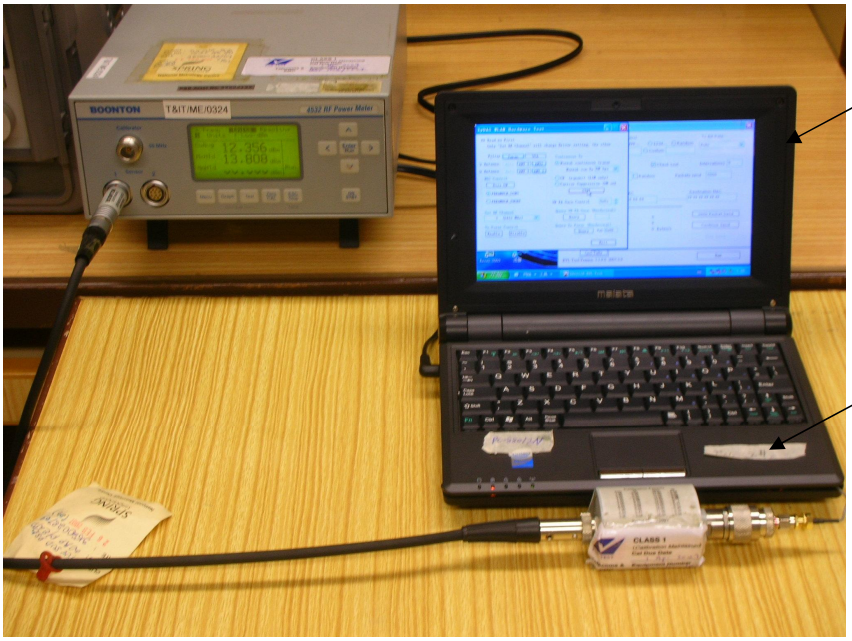
SAR Test Setup Photographs

Below: SAR Test lap Setup At Flat Phantom



Below: SAR Test Close Position Setup At Flat Phantom

TEST SETUP PHOTOGRAPHS ANNEX B



Conducted Power Measurement Test Setup - Closer View
Figure show the location of RF module and antenna

TEST SETUP PHOTOGRAPHS ANNEX B

EUT PHOTOGRAPHS

Front of EUT

Rear of EUT

TEST SETUP PHOTOGRAPHS ANNEX B

EUT PHOTOGRAPHS

EUT with Accessories

ANNEX C

TISSUE SIMULANT DATA SHEETS

Tissue Simulant — ANNEX C

Date :	24-Mar-2009
Type of Tissue	**Body**
Target Frequency (MHz)	2450
Target Dielectric Constant	52.7
Target Conductivity (S/m)	1.9
Composition (by weight)	Water 25500 (72.55%) Glycol 9610 (27.34%) Sugar (0%) Salt 38.4 (0.11%) HEC (0%) Preventol D7 (0%)
Measured Dielectric Constant	52.11
Measured Conductivity (S/m)	1.9704

Probe Name	Dosimetric E-field Probe EX3DV4
Probe Serial Number	3541
Sensor Offset (mm)	1.0
Conversion Factor	7.54 ± 11.8 %
Probe Calibration Due Date (DD/MM/YY)	23/06/09

Tissue Simulant — ANNEX C

Body Tissue at 2450MHz

Frequency	e'	e''	Conductivity
2440000000	52.23	14.51	1.9667
2441000000	52.20	14.49	1.9650
2442000000	52.23	14.48	1.9645
2443000000	52.20	14.50	1.9679
2444000000	52.22	14.48	1.9667
2445000000	52.18	14.49	1.9687
2446000000	52.18	14.48	1.9678
2447000000	52.17	14.48	1.9689
2448000000	52.15	14.49	1.9702
2449000000	52.16	14.50	1.9722
2450000000	**52.11**	**14.48**	**1.9704**
2451000000	52.11	14.48	1.9722
2452000000	52.10	14.50	1.9748
2453000000	52.09	14.51	1.9772
2454000000	52.08	14.50	1.9769
2455000000	52.05	14.50	1.9779
2456000000	52.03	14.51	1.9796
2457000000	52.03	14.51	1.9806
2458000000	52.00	14.53	1.9838
2459000000	52.00	14.53	1.9843
2460000000	51.98	14.53	1.9861
2461000000	51.96	14.55	1.9891
2462000000	51.95	14.55	1.9902
2463000000	51.93	14.57	1.9934
2464000000	51.92	14.55	1.9917
2465000000	51.89	14.59	1.9977
2466000000	51.87	14.59	1.9994
2467000000	51.88	14.60	2.0016
2468000000	51.86	14.62	2.0042
2469000000	51.85	14.61	2.0044
2470000000	51.85	14.64	2.0086
2471000000	51.81	14.64	2.0097
2472000000	51.81	14.66	2.0139
2473000000	51.78	14.68	2.0166
2474000000	51.77	14.68	2.0178
2475000000	51.76	14.70	2.0216
2476000000	51.74	14.71	2.0233
2477000000	51.73	14.73	2.0267
2478000000	51.73	14.74	2.0289
2479000000	51.72	14.75	2.0314
2480000000	51.70	14.77	2.0353

(e' = Dielectric Constant)
(e" = Loss Factor)

Tested by:	SSW
Date :	24-Mar-2009
Frequency:	2450MHz
Mixture:	Body Tissue
Tissue temp:	24°C

Composition		
Tap Water	0.0g	0.00%
Ultra Pure Water	25000.0g	72.15%
Sugar	0.0g	0.00%
Glyco	9610.0g	27.73%
Salt	38.0g	0.10%
Preventol D7	0.0g	0.00%
Total Weight	34648g	100.0%

Result (FCC)	Dielectric Constant	Conductivity
Measured	52.11	1.9704
Target (FCC)	52.7	1.95
Low Limit	50.065	1.8525
High Limit	55.335	2.0475
% Off Target	-1.12	1.05

ANNEX D

SAR VALIDATION RESULTS

SAR VALIDATION RESULTS ANNEX D

SAR Validation – Body Tissue at 2450MHz (Dipole forward power = 250mW)

Ambient Temperature: **24 ± 1^{0}C**
Tissue Temperature: **24 ± 1^{0}C**
Humidity: **54% to 59%**

Test Laboratory: TUV SUD PSB PTE LTD.

Date/Time: 3/23/2009 4:53:30 PM

File Name: 2450MHz_System validation.da4

Program Name: 2450MHz_System validation.da4

Phantom section: Flat Section

DUT: Dipole 2450 MHz

Communication System: CW

Frequency: 2450 MHz

Duty Cycle: 1:1

Medium: Body 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.94 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Electronics: DAE4 Sn627 Calibrated: 6/14/2007

Phantom: SAM 12 Measurement SW: DASY4, V4.7 Build 80

Probe: EX3DV4 - SN3541 ConvF(7.07, 7.07, 7.07) Calibrated: 7/13/2007

Post processing SW: SEMCAD, V1.8 Build 186

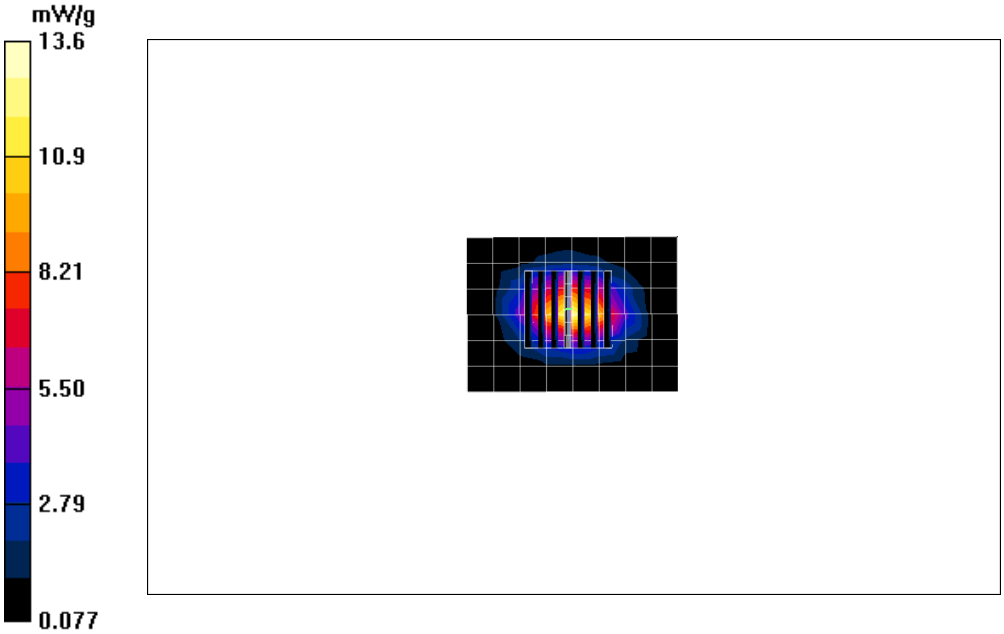
Sensor-Surface: 4mm (Mechanical Surface Detection)

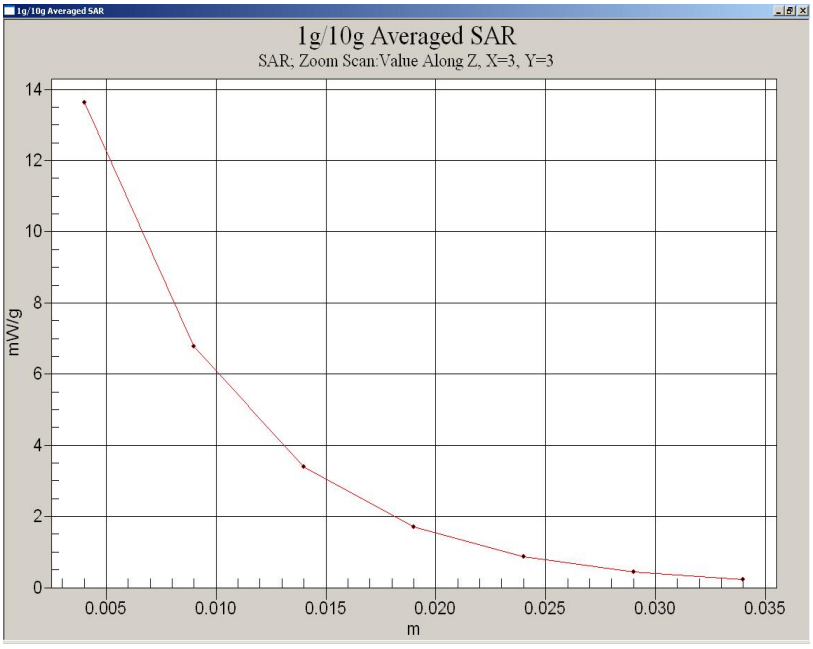
2450MHz_Data 1/Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 12.7 mW/g

2450MHz_Data 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 81.9 V/m; Power Drift = 0.104 dB
Peak SAR (extrapolated) = 24.3 W/kg

SAR VALIDATION RESULTS ANNEX D

SAR(1 g) = 11.9 mW/g; SAR(10 g) = 5.48 mW/g
Maximum value of SAR (measured) = 13.6 mW/g





ANNEX E

MEASUREMENT UNCERTAINTY

ANNEX E

Measurement Uncertainty

All test measurement carried out are traceable to national standards. The uncertainty of measurement at a confidence level of 95%, with a coverage of 2, is **±20.6%.**

Error Description	Uncertainty Value ± %	Probability Distribution	Divisor	ci 1g	Standard Unc.(1g)	Vi or Veff
Measurement System						
Probe Calibration	± 4.8	normal	1	1	± 4.8	∞
Axial isotropy	± 4.7	rectangular	√3	(1-cp)^1/2	± 1.9	∞
Hemispherical Isotropy	± 9.6	rectangular	√3	(cp)^1/2	± 3.9	∞
Spatial resolution	± 0.0	rectangular	√3	1	± 0.0	∞
Boundary effects	± 1.0	rectangular	√3	1	± 0.6	∞
Linearity	± 4.7	rectangular	√3	1	± 2.7	∞
System Detection limit	± 1.0	rectangular	√3	1	± 0.6	∞
Readout electronics	± 1.0	normal	1	1	± 1.0	∞
Response time	± 0.8	rectangular	√3	1	± 0.5	∞
Integration time	± 2.6	rectangular	√3	1	± 1.5	∞
RF ambient conditions	± 3.0	rectangular	√3	1	± 1.7	∞
Probe Positioning Mechanical Tolerance	± 0.4	rectangular	√3	1	± 0.2	∞
Probe Positioning with respect to Phantom Shell	± 2.9	rectangular	√3	1	± 1.7	∞
Extrapolation, Interpolation and Integration Algorithms for Max. SAR Evaluation	± 1.0	rectangular	√3	1	± 0.6	∞
Test Sample Related						
Device positioning	± 2.9	normal	1	1	± 2.9	145
Device holder uncertainty	± 3.6	normal	1	1	± 3.6	5
Power drift	± 5.0	rectangular	√3	1	± 2.9	∞
Phantom and Tissue Parameters						
Phantom uncertainty	± 4.0	rectangular	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	rectangular	√3	0.64	± 1.8	∞
Liquid conductivity (meas)	± 2.5	normal	1	0.64	± 1.6	∞
Liquid permittivity (target)	± 5.0	rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (meas)	± 2.5	normal	1	0.6	± 1.5	∞
Combined Standard Uncertainty					± 10.3	330
Coverage Factor for 95%		**k=2**				
Extended Standard Uncertainty					± 20.6	

ANNEX F

SAR PROBE CALIBRATION CERTIFICATES

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Client TUV SUD PSB **Certificate No:** EX3-3541_Jun08

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3541
Calibration procedure(s)	QA CAL-01.v6 and QA CAL-23.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	June 23, 2008
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 (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 660	3-Sep-07 (No. DAE4-660_Sep07)	Sep-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-07)	In house check: Oct-08

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

Issued: June 25, 2008

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

Calibration Laboratory of
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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

SAR PROBE CALIBRATION CERTIFICATES **ANNEX F**

Probe EX3DV4

SN:3541

Manufactured:	May 3, 2004
Last calibrated:	July 13, 2007
Recalibrated:	June 23, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 **June 23, 2008**

DASY - Parameters of Probe: EX3DV4 SN:3541

Sensitivity in Free Space[A]

NormX	**0.44** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**89** mV
NormY	**0.39** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**89** mV
NormZ	**0.45** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**89** mV

Diode Compression[B]

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	9.6	6.4
SAR_{be} [%]	With Correction Algorithm	0.5	0.3

TSL **1750 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	5.9	3.2
SAR_{be} [%]	With Correction Algorithm	0.6	0.4

Sensor Offset

Probe Tip to Sensor Center	**1.0** mm

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

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

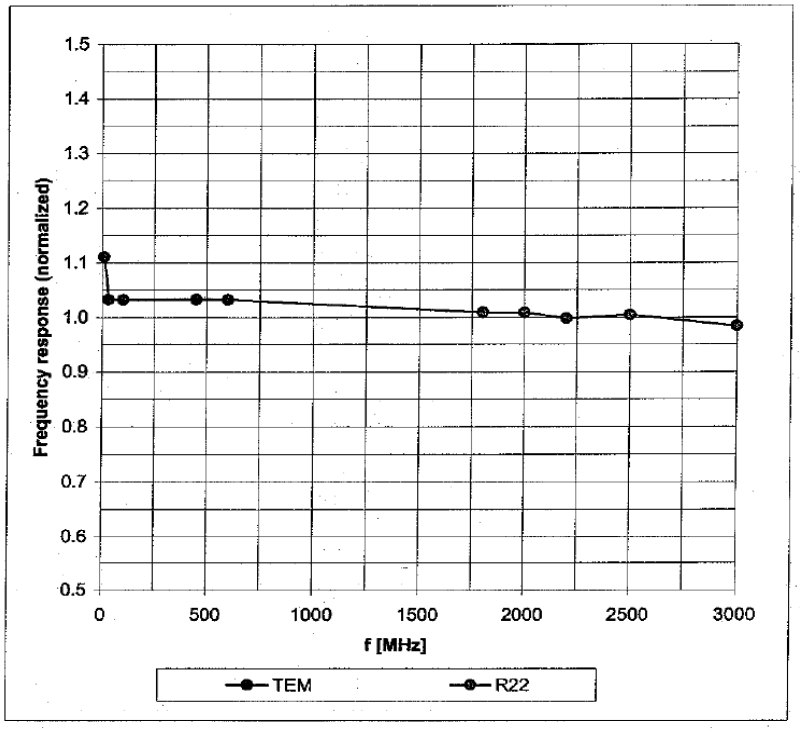
[B] Numerical linearization parameter: uncertainty not required.

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 **June 23, 2008**

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)

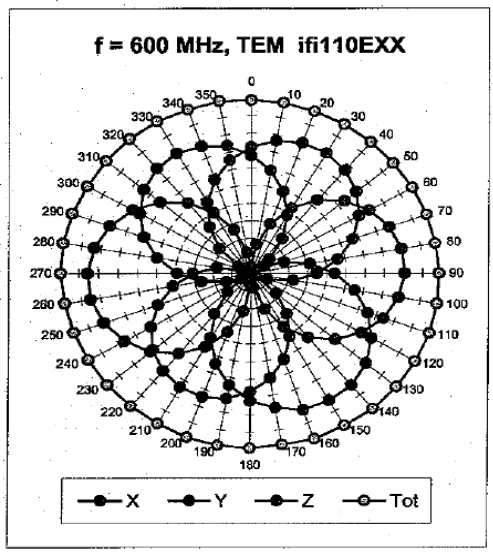


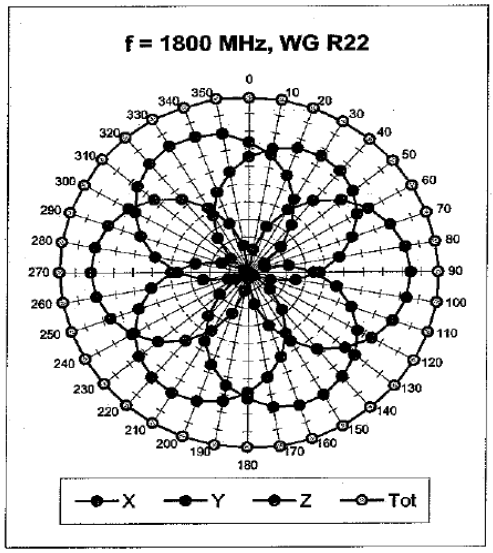
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

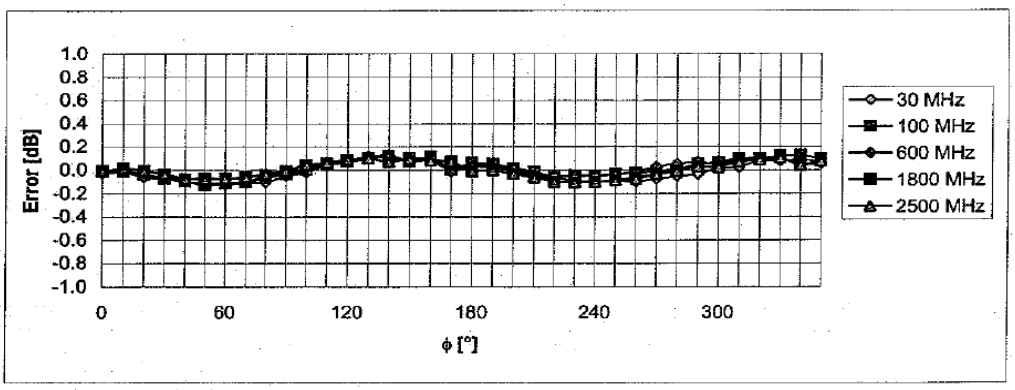
SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 **June 23, 2008**

Receiving Pattern (ϕ), ϑ = 0°







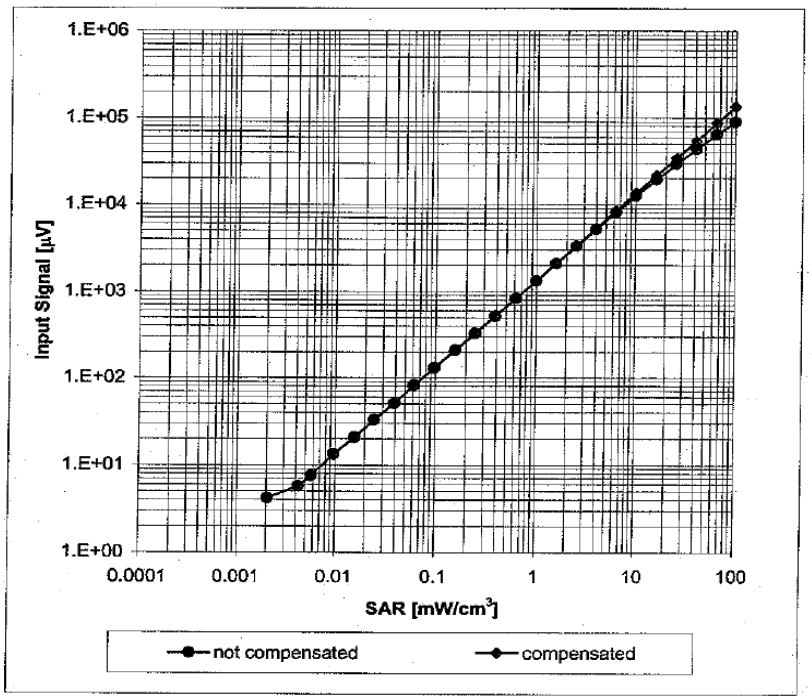
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

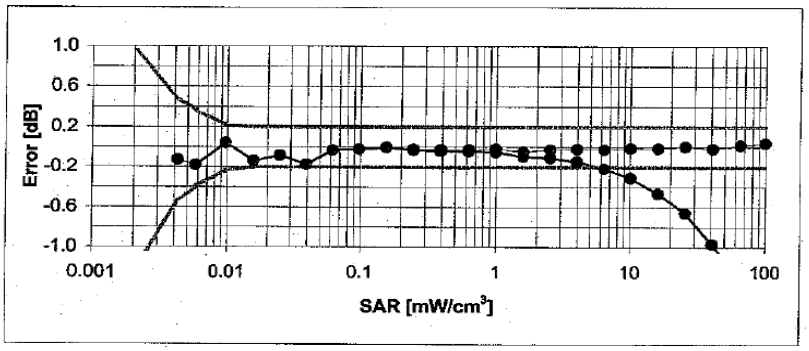
SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 **June 23, 2008**

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)



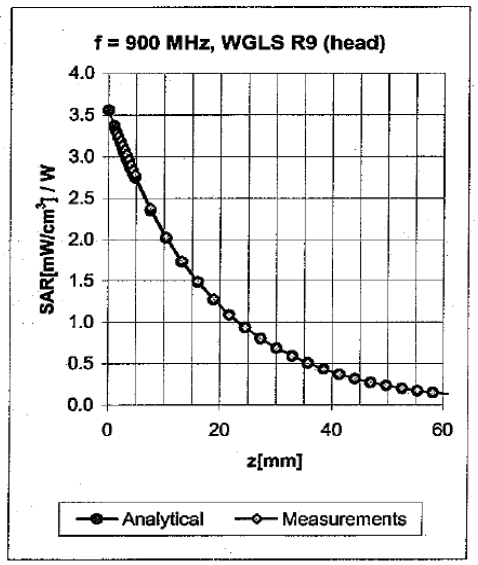


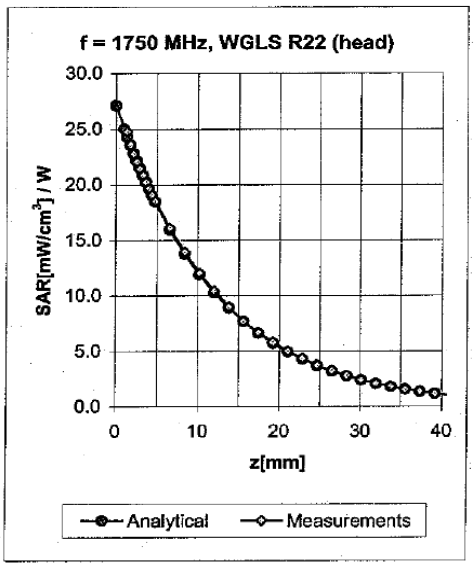
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 **June 23, 2008**

Conversion Factor Assessment





f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.51	0.80	9.45 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.69	0.59	8.53 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.74	0.56	8.27 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.62	0.62	7.55 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.71	0.72	9.47 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.70	0.61	8.23 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.72	0.60	7.85 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.55	0.74	7.40 ± 11.0% (k=2)

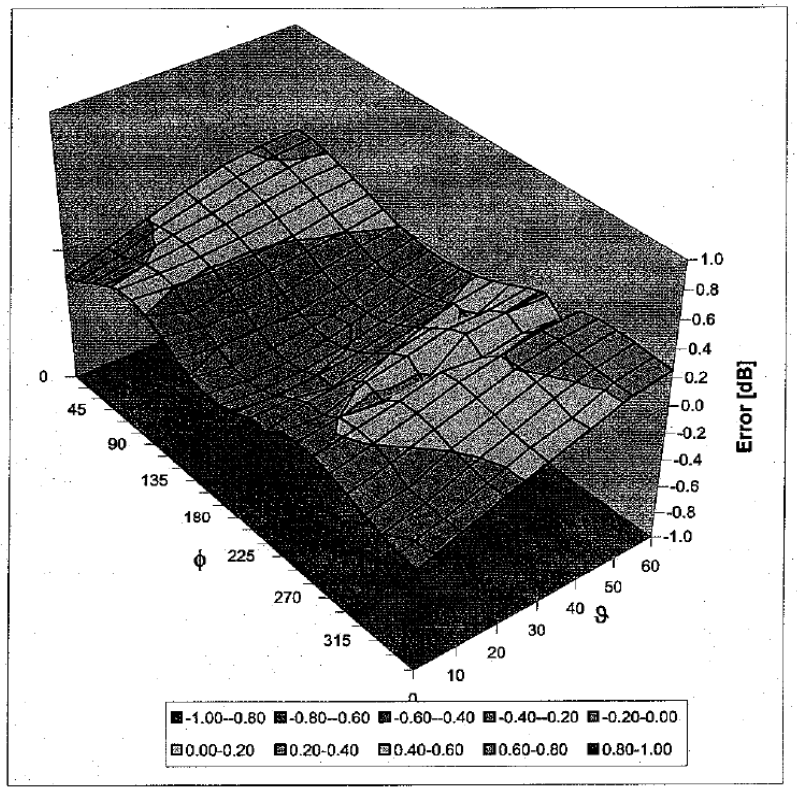
[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

EX3DV4 SN:3541 **June 23, 2008**

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

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Accreditation No.: SCS 108

Client TUV SUD PSB **Certificate No:** DAE4-627_Jun08

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BA - SN: 627
Calibration procedure(s)	QA CAL-06.v12 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	June 24, 2008
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 (Certificate No.)	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	04-Oct-07 (No: 6467)	Oct-08
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-07 (No: 6465)	Oct-08
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	06-Jun-08 (in house check)	In house check: Jun-09

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bomholt	R&D Director	

Issued: June 24, 2008

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

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Accreditation No.: SCS 108

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1μV ,	full range =	-100...+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	405.023 ± 0.1% (k=2)	404.027 ± 0.1% (k=2)	404.480 ± 0.1% (k=2)
Low Range	3.96098 ± 0.7% (k=2)	3.96430 ± 0.7% (k=2)	3.96793 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	204 ° ± 1 °

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

Appendix

1. DC Voltage Linearity

High Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	200000	200000.5	0.00
Channel X	+ Input	20000	20005.24	0.03
Channel X	- Input	20000	-19997.03	-0.01
Channel Y	+ Input	200000	199999.6	0.00
Channel Y	+ Input	20000	20008.45	0.04
Channel Y	- Input	20000	-20004.40	0.02
Channel Z	+ Input	200000	199999.5	0.00
Channel Z	+ Input	20000	20001.90	0.01
Channel Z	- Input	20000	-19999.97	0.00

Low Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	2000	1999.9	0.00
Channel X	+ Input	200	200.05	0.03
Channel X	- Input	200	-200.16	0.08
Channel Y	+ Input	2000	1999.9	0.00
Channel Y	+ Input	200	199.24	-0.38
Channel Y	- Input	200	-200.84	0.42
Channel Z	+ Input	2000	1999.9	0.00
Channel Z	+ Input	200	199.12	-0.44
Channel Z	- Input	200	-200.87	0.44

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	15.03	14.38
	- 200	-13.32	-13.25
Channel Y	200	8.11	7.69
	- 200	-7.94	-8.46
Channel Z	200	7.68	7.22
	- 200	-8.32	-8.92

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	3.80	-0.58
Channel Y	200	0.95	-	4.99
Channel Z	200	-0.43	-0.86	-

SAR PROBE CALIBRATION CERTIFICATES ANNEX F

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15897	16674
Channel Y	16261	16405
Channel Z	15840	16234

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	-0.42	-1.54	0.98	0.37
Channel Y	-1.36	-2.42	0.07	0.41
Channel Z	-0.32	-2.65	2.10	0.38

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2001	199.3
Channel Y	0.2001	199.9
Channel Z	0.2001	200.1

8. Low Battery Alarm Voltage (verified during pre test)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (verified during pre test)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.0	+6	+14
Supply (- Vcc)	–0.01	-8	-9

ANNEX G

REFERENCES

REFERENCES ANNEX G

The methods and procedures used for the measurements contained in this report are details in the following reference standards:

Publications	Year	Title
Supplement C (Edition 01-01) to FCC OET Bulletin 65 (Edition 97-01)	2001	"Evaluating Compliance with FCC Guidelines for Human Exposure to radio Frequency Fields"
IEEE Standard 1528-200X	2000	"Product Performance Standards Relative to the safe Use of Electromagnetic Energy"
ANSI/IEEE C95.3	1992	"Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave"
ANSI/IEEE C95.1	1992	"Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz"
EN62209-1	2006	Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (300MHz – 3GHz)