TEST REPORT

Your Ref:

Date: 28 May 2004

Our Ref: 56S040250/01

DID: +65-6885 1476

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NOTE: This report is issued subject to PSB Corporation's "Terms and Conditions Governing Technical Services". The terms and conditions governing the issue of this report are set out as attached within this report.

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

PDA
[Model: PPT8866-R3BZXXXX]

TEST FACILITY Telecoms & EMC, Testing Group, PSB Corporation
1 Science Park Drive, Singapore 118221

PREPARED FOR Tan Kok Shiung
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JOB NUMBER 56S040250

TEST PERIOD 13 May 2004 and 18 May 2004

PREPARED BY	APPROVED BY
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Your Peace of Mind

ACCREDITED LABORATORY
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LA-2001-0212-A
LA-2001-0213-F
LA-2001-0214-E
LA-2001-0215-B
LA-2001-0216-G
LA-2001-0217-G

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

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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 – Wireless Lan Mode (Device at Flat Phantom)	Pass *
	SAR Measurement – Bluetooth Mode (Device at Flat Phantom)	Pass *

Note:

1. The worst-case SAR value was found to be **0.740W/kg** which is lower than the maximum limit of 1.60 W/kg, over 1g of tissue.

* 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 **PDA**
Device Category	Portable Device
Exposure Environment	General Population/Uncontrolled exposure
Test Device Type	Identical Prototype
Model	PPT8866-R3BZXXXX
Brand Name	Symbol
Serial Numbers	SA01189229
FCC ID	N/A

DEVICE OPERATING CONFIGURATION

Frequency Measured	Wireless Lan Mode 2412Mhz 2442Mhz 2472Mhz	Bluetooth Mode 2402Mhz 2441Mhz 2480Mhz
Operating Temperature Tolerance	10 ~ 35 Degree Celsius	
Operating Voltage Tolerance	3.6 to 4.30V DC	
Continuous Transmission Tolerance	The EUT is able to transmit for about 45 minutes at the maximum power under fully battery charged condition.	
Rated Output Power	Wireless Lan Mode 10dBm Maximum	Bluetooth Mode 4dBm Maximum
Antenna Type	Internal double static c-coupling diversity antenna	
EUT Crest Factor	1.0	
Input Power	7W for the condition where CPU is running full capacity, maximum sound output, maximum backlight brightness, RF communication and scanning application on.	
Accessories	Charger	

MANUFACTURER

Manufacturer Address	Celestica Electronics (S) Pte Ltd Blk 33 #04-05 Marsiling Ind. Est. Road 3 SINGAPORE 739256
DID	68662334
Fax	63682193

DEVICE OPERATING CONDITION

For Wireless Lan Mode, the EUT was put into operation by selecting the self test programme file " T24CE Test", followed by selecting the frequency channel.

For Bluetooth Mode, the EUT was put into operation by selecting the self test programme file " BT Sar Test", followed by selecting the frequency channel.

For every SAR measurement, the EUT was set to maximum output power level using fully charged battery.

TEMPERATURE AND HUMIDITY

Wireless Lan Mode

Ambient Temperature:	23 ± 1^0 C
Tissue Temperature:	23 ± 1^0 C
Humidity:	59% to 62%

Bluetooth mode

Ambient Temperature:	24 ± 1^0 C
Tissue Temperature:	24 ± 1^0 C
Humidity:	57% to 60%

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

Wireless Lan Mode

Table 1 – Body Worn Position SAR Test Results, device without belt clip (15mm spacing).

Phantom Configuration	Device Test Positions	Antenna Position	SAR (W/kg), over 1g Tissue Device Test Channel & Frequency		
			2412MHz	2442MHz	2472MHz
Flat Phantom	EUT **Rear** To Phantom	Fixed	0.038	0.030	0.039
Effective Radiated Power (dBm) Before Test			15.9	15.1	14.8
Effective Radiated Power (dBm) After Test			15.7	15.0	14.5

Wireless Lan Mode

Table 2 – Body Worn Position SAR Test Results, device without belt clip(Touching).

Phantom Configuration	Device Test Positions	Antenna Position	SAR (W/kg), over 1g Tissue Device Test Channel & Frequency		
			2412MHz	2442MHz	2472MHz
Flat Phantom	EUT **Front** Touched Phantom	Fixed	0.740	0.535	0.502
Flat Phantom	EUT **Rear** Touched Phantom	Fixed	0.097	0.073	0.054
Effective Radiated Power (dBm) Before Test			15.9	15.1	14.8
Effective Radiated Power (dBm) After Test			15.7	15.0	14.5

Remarks:

1. All modes of operations were investigated and the worst-case SAR levels are reported.
2. A fully charged Battery was used for each mode of operation.
3. The worst-case SAR value was found to be **0.740W/Kg** (over a 1g tissue) at **2412MHz** which is lower than the maximum limit of 1.60 W/Kg, please refer to the above table.
4. 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

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

Bluetooth Mode

Table 3 – Body Worn Position SAR Test Results, device without belt clip (15mm spacing).

Phantom Configuration	Device Test Positions	Antenna Position	SAR (W/kg), over 1g Tissue Device Test Channel & Frequency		
			Channel: 0 2402MHz	Channel: 39 2441MHz	Channel: 78 2480MHz
Flat Phantom	EUT **Rear** To Phantom	Fixed	0.016	0.016	0.016
Effective Radiated Power (dBm) Before Test			2.6	3.5	3.6
Effective Radiated Power (dBm) After Test			2.5	3.3	3.5

Bluetooth Mode

Table 4 – Body Worn Position SAR Test Results, device without belt clip(Touching).

Phantom Configuration	Device Test Positions	Antenna Position	SAR (W/kg), over 1g Tissue Device Test Channel & Frequency		
			Channel: 0 2402MHz	Channel: 39 2441MHz	Channel: 78 2480MHz
Flat Phantom	EUT **Front** Touched Phantom	Fixed	0.018	0.017	0.016
Flat Phantom	EUT **Rear** Touched Phantom	Fixed	0.016	0.010	0.009
Effective Radiated Power (dBm) Before Test			2.6	3.5	3.6
Effective Radiated Power (dBm) After Test			2.5	3.3	3.5

Remarks:

1. All modes of operations were investigated and the worst-case SAR levels are reported.
2. A fully charged Battery was used for each mode of operation.
3. The worst-case SAR value was found to be **0.018W/Kg** (over a 1g tissue) at **Channel 0** which is lower than the maximum limit of 1.60 W/Kg, please refer to the above table.
4. The SAR limit of 1.60W/Kg (Spatial Peak level for Uncontrolled Exposure / General Population) is based on the Test Standards:
   c) Supplement C (Edition 01-01) to FCC OET Bulletin 65 (Edition 97-01)
   d) ANSI/IEEE Standard C95.1-1993

Ambient Temperature: **23 ± 1^0 C**
Tissue Temperature: **23 ± 1^0 C**
Humidity: **59% to 62%**

Wireless Lan Mode

Figure 1: SAR Test Distribution Plot – device without belt clip (15mm spacing).

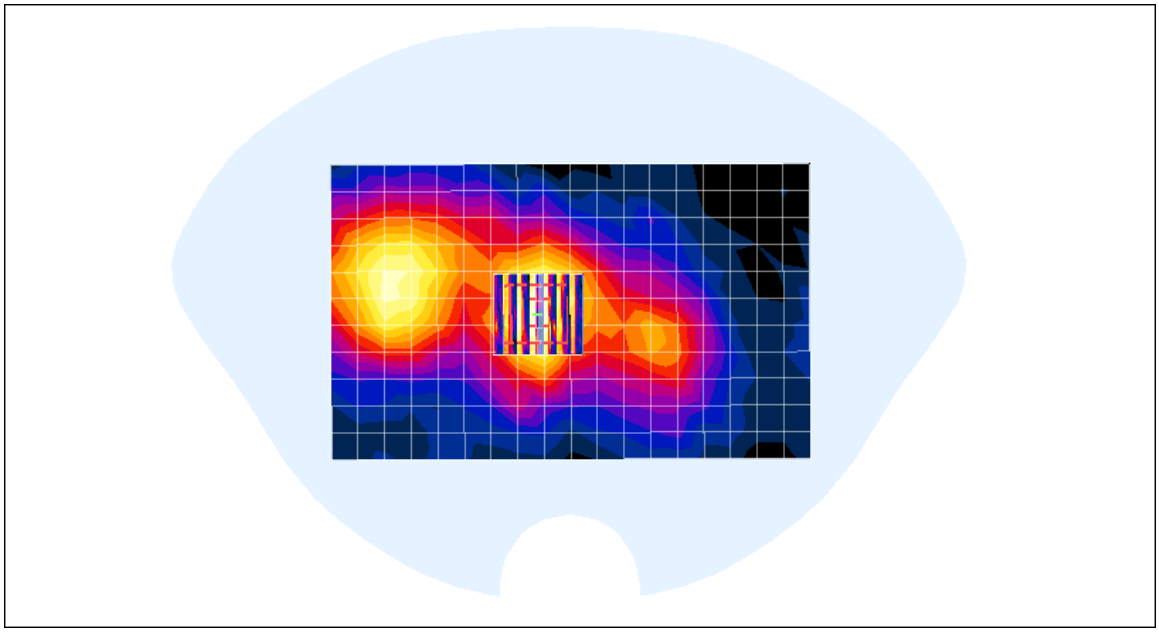
Test Laboratory: Telecom & EMC Testing Group **Date: 05/13/04**
File Name: EUT Rear_15mm Gap_2412MHz_Data 10.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_WiFi Mode
Frequency: 2412 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9786; mho/m, ε_r = 53.3; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Rear_15mm Gap_2412MHz_Data 10/Area Scan (12x19x1):

Measurement grid: dx=10mm, dy=10mm
Reference Value = 4.31 V/m; Power Drift = -0.02 dB
Maximum value of SAR (measured) = 0.040 mW/g

EUT Rear_15mm Gap_2412MHz_Data 10/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.31 V/m; Power Drift = -0.02 dB
Maximum value of SAR (measured) = 0.043 mW/g
Peak SAR (extrapolated) = 0.083 W/kg
SAR(1 g) = 0.038 mW/g; SAR(10 g) = 0.025 mW/g



Ambient Temperature: **23 ± 1^0 C**
Tissue Temperature: **23 ± 1^0 C**
Humidity: **59% to 62%**

Wireless Lan Mode

Figure 2: SAR Test Distribution Plot – device without belt clip (15mm spacing).

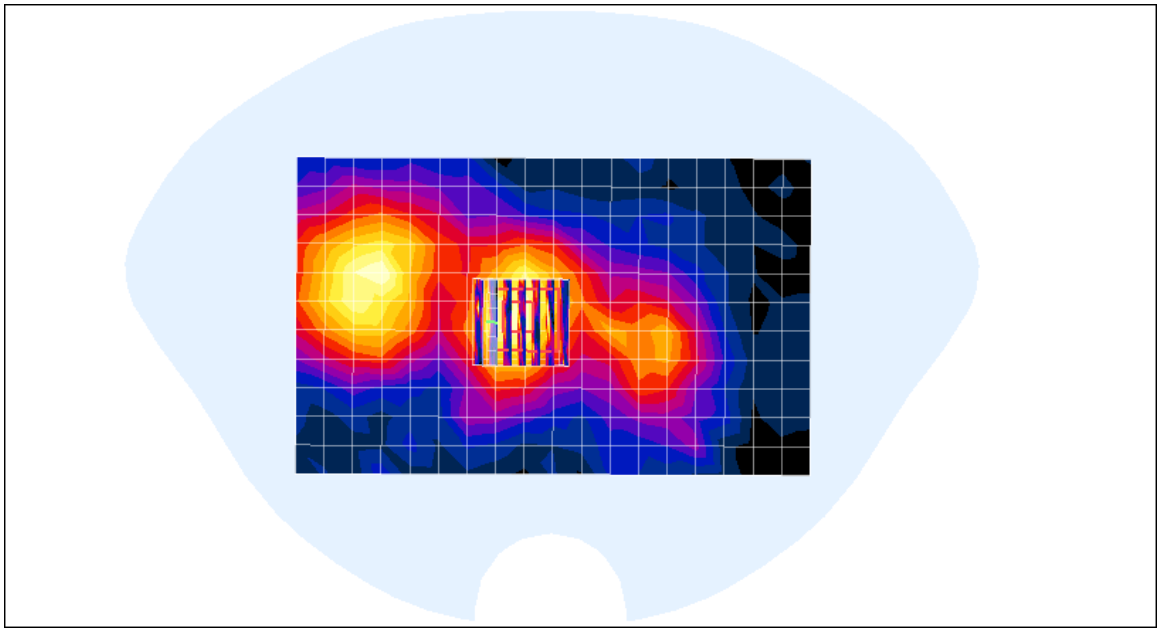
Test Laboratory: Telecom & EMC Testing Group **Date: 05/13/04**
File Name: EUT Rear_15mm Gap_2442MHz_Data 9.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_WiFi Mode
Frequency: 2442 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9786; mho/m, ε_r = 53.3; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Rear_15mm Gap_2442MHz_Data 9/Area Scan (12x19x1):

Measurement grid: dx=10mm, dy=10mm
Reference Value = 3.79 V/m; Power Drift = -0.01 dB
Maximum value of SAR (measured) = 0.032 mW/g

EUT Rear_15mm Gap_2442MHz_Data 9/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.79 V/m; Power Drift = -0.01 dB
Maximum value of SAR (measured) = 0.032 mW/g
Peak SAR (extrapolated) = 0.056 W/kg
SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.021 mW/g



Ambient Temperature: **23 ± 1^0 C**
Tissue Temperature: **23 ± 1^0 C**
Humidity: **59% to 62%**

Wireless Lan Mode

Figure 3: SAR Test Distribution Plot – device without belt clip (15mm spacing).

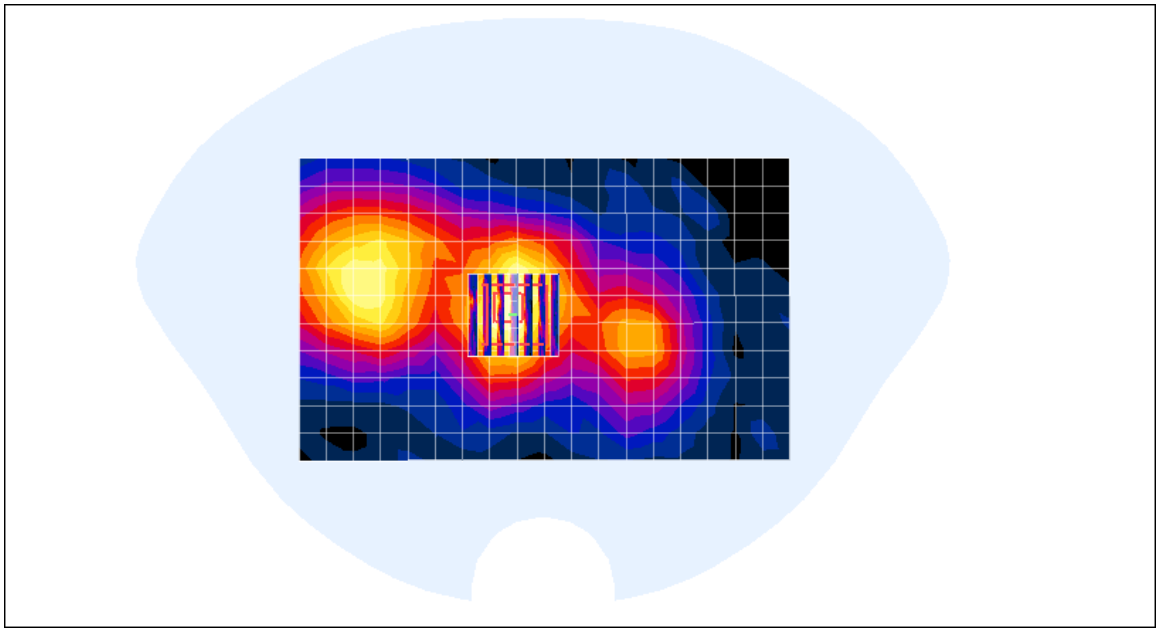
Test Laboratory: Telecom & EMC Testing Group **Date: 05/13/04**
File Name: EUT Rear_15mm Gap_2472MHz_Data 11.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_WiFi Mode
Frequency: 2472 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9786; mho/m, ε_r = 53.3; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Rear_15mm Gap_2472MHz_Data 11/Area Scan (12x19x1):

Measurement grid: dx=10mm, dy=10mm
Reference Value = 4.36 V/m; Power Drift = -0.03 dB
Maximum value of SAR (measured) = 0.040 mW/g

EUT Rear_15mm Gap_2472MHz_Data 11/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.36 V/m; Power Drift = -0.03 dB
Maximum value of SAR (measured) = 0.041 mW/g
Peak SAR (extrapolated) = 0.058 W/kg
SAR(1 g) = 0.039 mW/g; SAR(10 g) = 0.026 mW/g



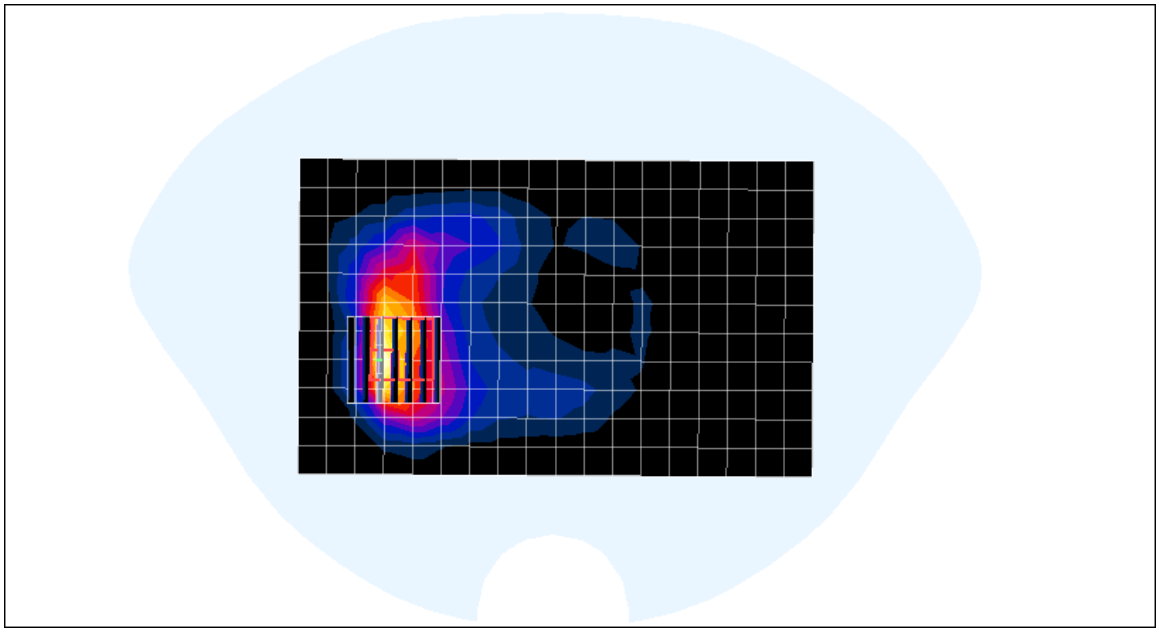
Ambient Temperature: **23 ± 1^0 C**
Tissue Temperature: **23 ± 1^0 C**
Humidity: **59% to 62%**

Wireless Lan Mode
Figure 4: SAR Test Distribution Plot – device without belt clip (EUT Front Touched).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/13/04**
File Name: EUT Front Touched_2412MHz_Data 12_retest.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_WiFi Mode
Frequency: 2412 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9786; mho/m, ε_r = 53.3; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Front Touched_2412MHz_Data 12/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 4.63 V/m; Power Drift = 0.03 dB
Maximum value of SAR (measured) = 0.838 mW/g

EUT Front Touched_2412MHz_Data 12/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.63 V/m; Power Drift = 0.03 dB
Maximum value of SAR (measured) = 0.839 mW/g
Peak SAR (extrapolated) = 2.09 W/kg
SAR(1 g) = 0.740 mW/g; SAR(10 g) = 0.351 mW/g



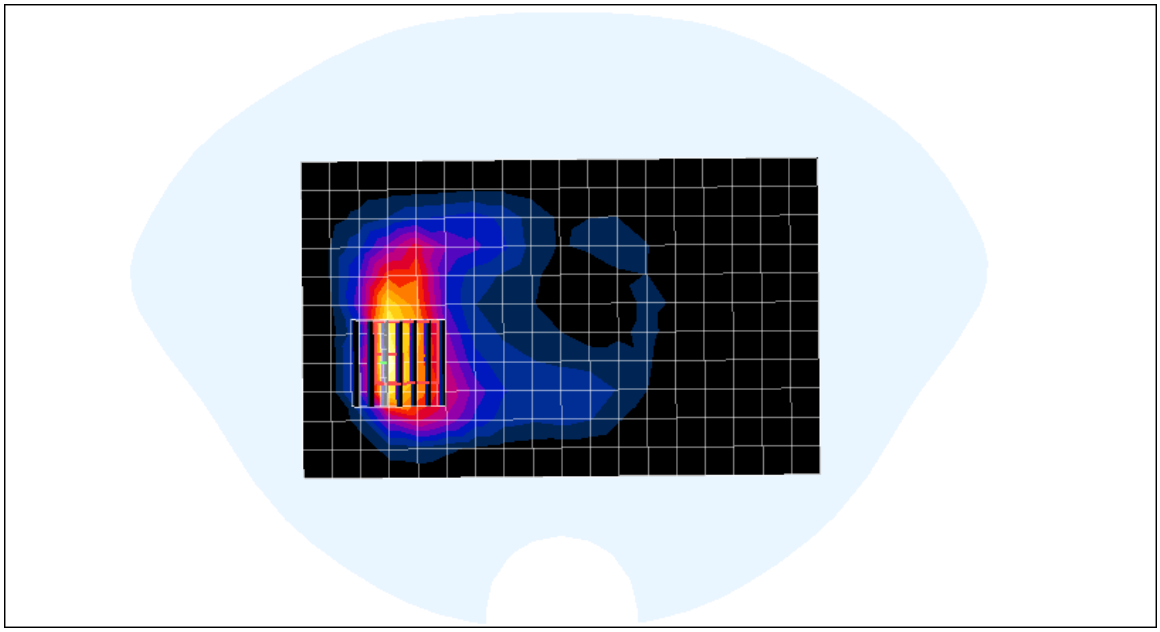
Ambient Temperature: **23 ± 1^0 C**
Tissue Temperature: **23 ± 1^0 C**
Humidity: **59% to 62%**

Wireless Lan Mode
Figure 5: SAR Test Distribution Plot – device without belt clip (EUT Front Touched).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/13/04**
File Name: EUT Front Touched_2442MHz_Data 13_retest.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_WiFi Mode
Frequency: 2442 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9786; mho/m, ε_r = 53.3; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Front Touched_2442MHz_Data 13/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 4.05 V/m; Power Drift = 0.02 dB
Maximum value of SAR (measured) = 0.597 mW/g

EUT Front Touched_2442MHz_Data 13/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.05 V/m; Power Drift = 0.02 dB
Maximum value of SAR (measured) = 0.603 mW/g
Peak SAR (extrapolated) = 1.45 W/kg
SAR(1 g) = 0.535 mW/g; SAR(10 g) = 0.262 mW/g



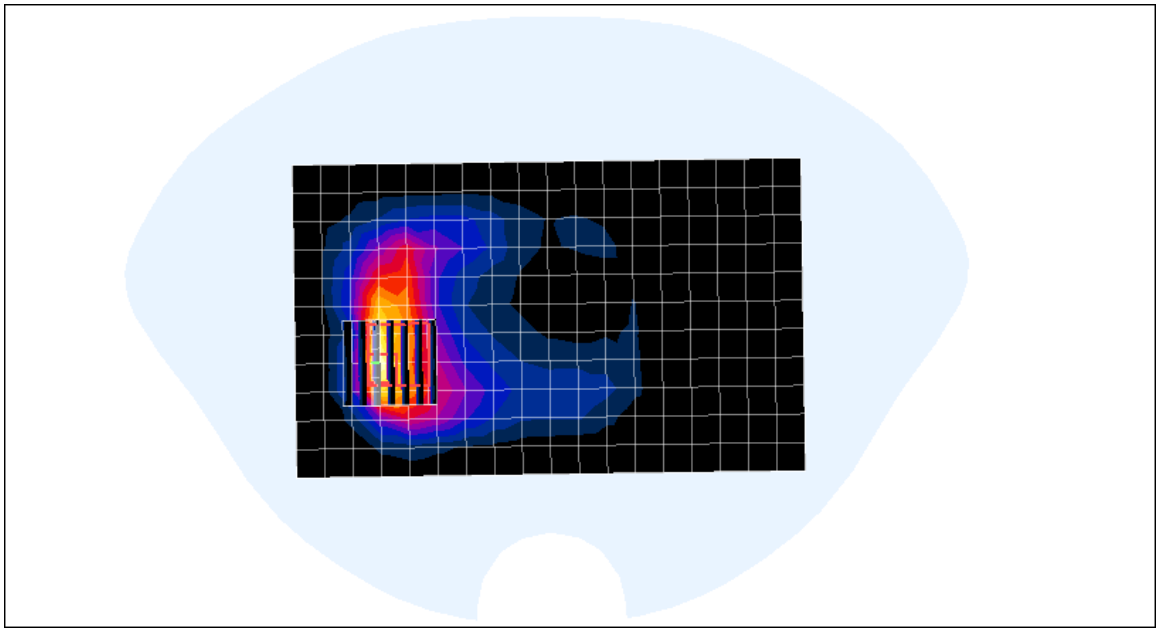
Ambient Temperature: **23 ± 1^0 C**
Tissue Temperature: **23 ± 1^0 C**
Humidity: **59% to 62%**

Wireless Lan Mode
Figure 6: SAR Test Distribution Plot – device without belt clip (EUT Front Touched).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/13/04**
File Name: EUT Front Touched_2472MHz_Data 14_retest.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_WiFi Mode
Frequency: 2472 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9786; mho/m, ε_r = 53.3; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Front Touched_2472MHz_Data 14/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 4.05 V/m; Power Drift = -0.08 dB
Maximum value of SAR (measured) = 0.548 mW/g

EUT Front Touched_2472MHz_Data 14/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.05 V/m; Power Drift = -0.08 dB
Maximum value of SAR (measured) = 0.555 mW/g
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 0.502 mW/g; SAR(10 g) = 0.240 mW/g



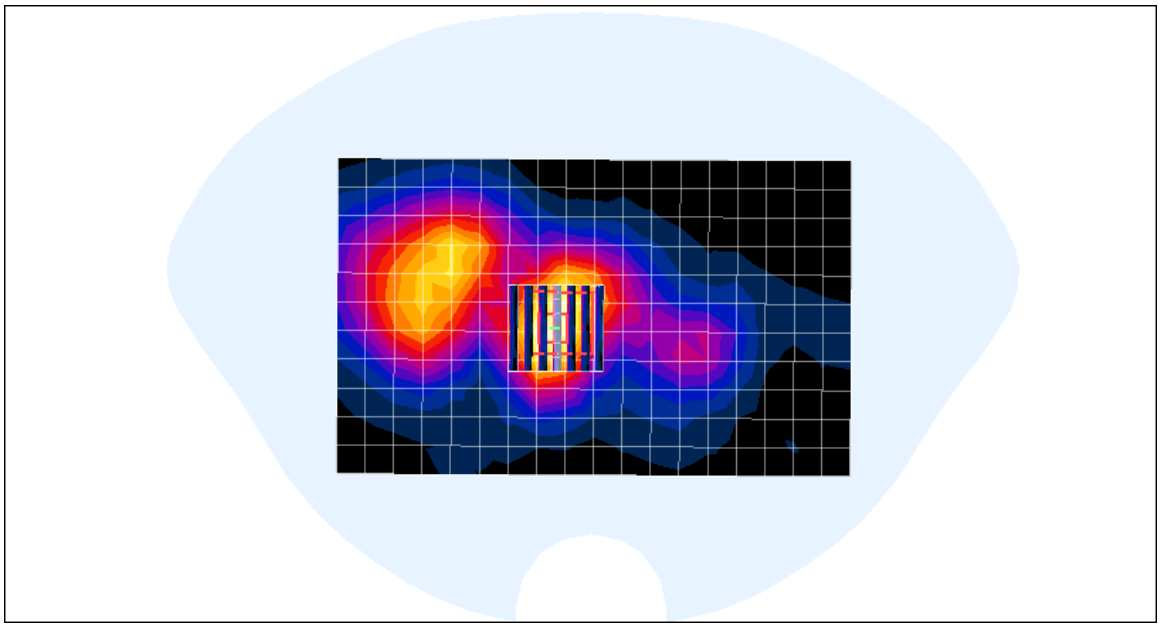
Ambient Temperature: **23 ± 1^0 C**
Tissue Temperature: **23 ± 1^0 C**
Humidity: **59% to 62%**

Wireless Lan Mode
Figure 7: SAR Test Distribution Plot – device without belt clip (EUT Rear Touched).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/13/04**
File Name: EUT Rear Touched_2412MHz_Data 5.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_WiFi Mode
Frequency: 2412 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9786; mho/m, ε_r = 53.3; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Rear Touched_2412MHz_Data 5/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 6.54 V/m; Power Drift = -0.06 dB
Maximum value of SAR (measured) = 0.104 mW/g

EUT Rear Touched_2412MHz_Data 5/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.54 V/m; Power Drift = -0.06 dB
Maximum value of SAR (measured) = 0.105 mW/g
Peak SAR (extrapolated) = 0.174 W/kg
SAR(1 g) = 0.097 mW/g; SAR(10 g) = 0.057 mW/g



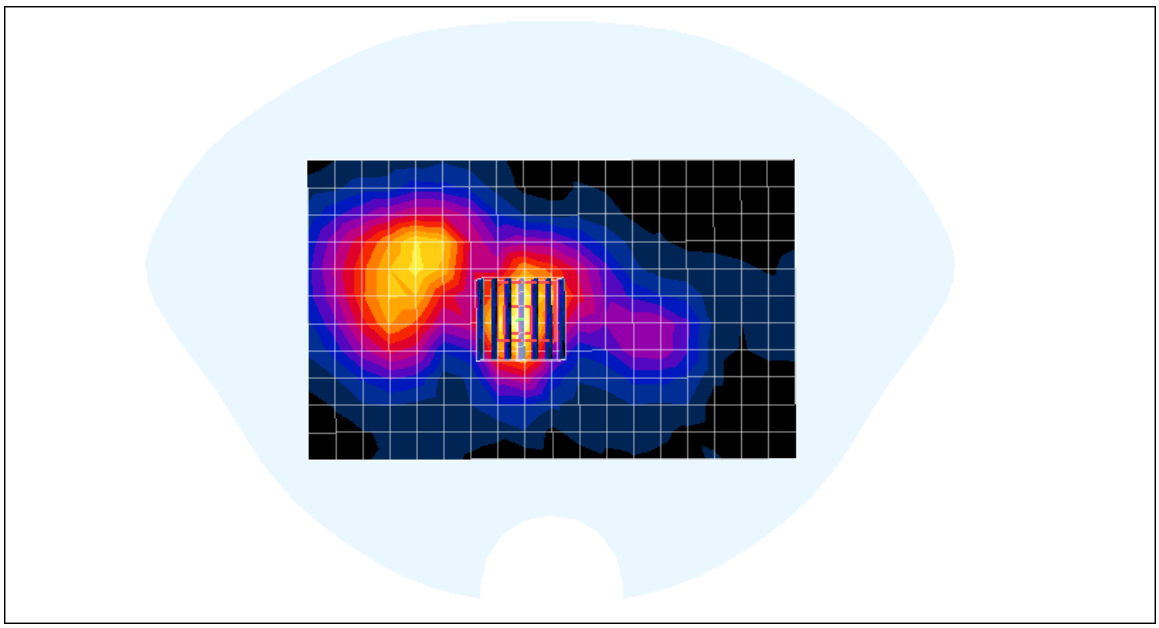
Ambient Temperature: **23 ± 1^0 C**
Tissue Temperature: **23 ± 1^0 C**
Humidity: **59% to 62%**

Wireless Lan Mode
Figure 8: SAR Test Distribution Plot – device without belt clip (EUT Rear Touched).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/13/04**
File Name: EUT Rear Touched_2442MHz_Data 6.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_WiFi Mode
Frequency: 2442 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9786; mho/m, ε_r = 53.3; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Rear Touched_2442MHz_Data 6/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 5.49 V/m; Power Drift = 0.01 dB
Maximum value of SAR (measured) = 0.078 mW/g

EUT Rear Touched_2442MHz_Data 6/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.49 V/m; Power Drift = 0.01 dB
Maximum value of SAR (measured) = 0.080 mW/g
Peak SAR (extrapolated) = 0.145 W/kg
SAR(1 g) = 0.073 mW/g; SAR(10 g) = 0.042 mW/g



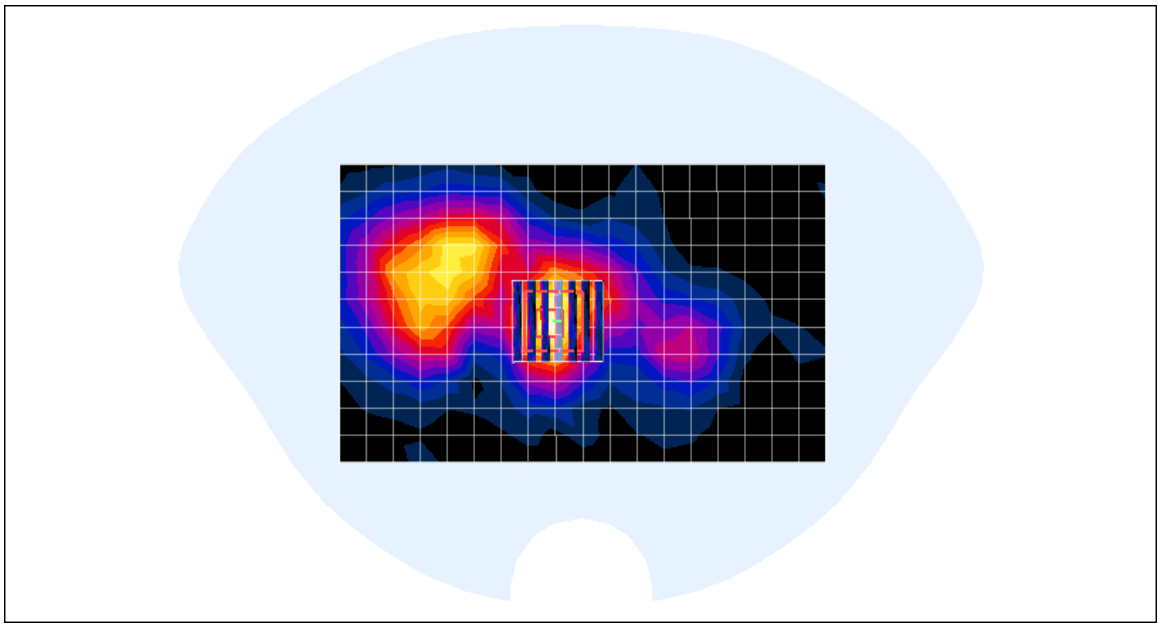
Ambient Temperature: **23 ± 1^0 C**
Tissue Temperature: **23 ± 1^0 C**
Humidity: **59% to 62%**

Wireless Lan Mode
Figure 9: SAR Test Distribution Plot – device without belt clip (EUT Rear Touched).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/13/04**
File Name: EUT Rear Touched_2472MHz_Data 7.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_WiFi Mode
Frequency: 2472 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9786; mho/m, ε_r = 53.3; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Rear Touched_2472MHz_Data 7/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 4.76 V/m; Power Drift = -0.02 dB
Maximum value of SAR (measured) = 0.058 mW/g

EUT Rear Touched_2472MHz_Data 7/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.76 V/m; Power Drift = -0.02 dB
Maximum value of SAR (measured) = 0.058 mW/g
Peak SAR (extrapolated) = 0.113 W/kg
SAR(1 g) = 0.054 mW/g; SAR(10 g) = 0.031 mW/g



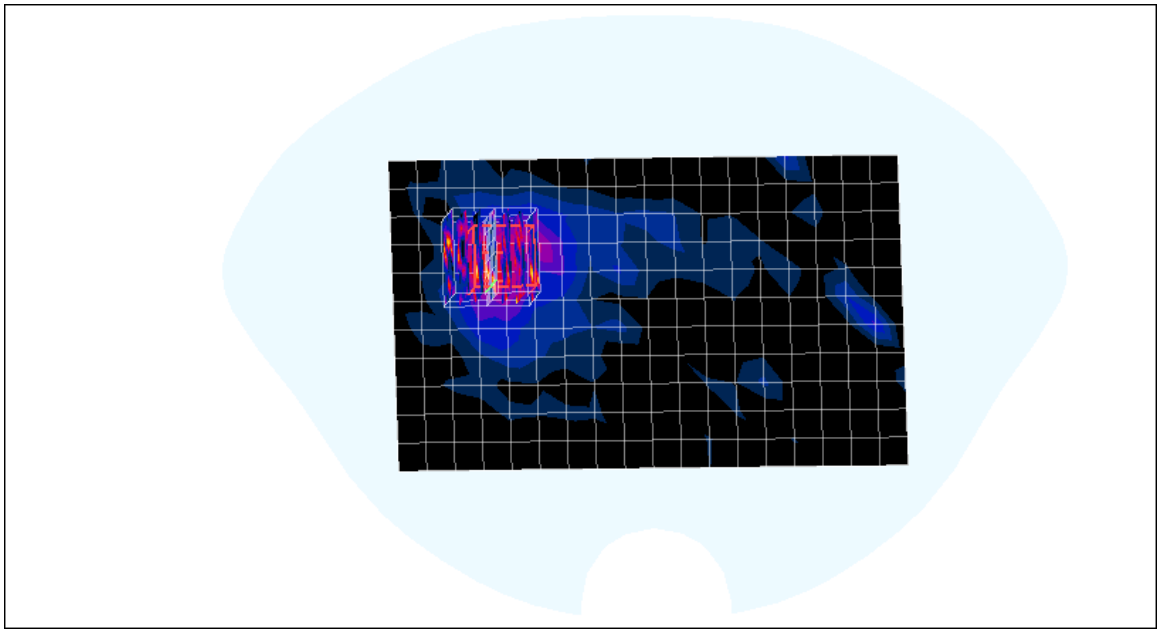
Ambient Temperature: **24 ± 1^0 C**
Tissue Temperature: **24 ± 1^0 C**
Humidity: **57% to 60%**

Bluetooth Mode
Figure 10: SAR Test Distribution Plot – device without belt clip (15mm spacing).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/18/04**
File Name: EUT Rear_15mm Gap_2402MHz_Data 27.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_Bluetooth Mode
Frequency: 2402 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9863; mho/m, ε_r = 52.89; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Rear_15mm Gap_2402MHz_Data 27/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 1.28 V/m; Power Drift = 0.02 dB
Maximum value of SAR (measured) = 0.018 mW/g

EUT Rear_15mm Gap_2402MHz_Data 27/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.28 V/m; Power Drift = 0.02 dB
Maximum value of SAR (measured) = 0.030 mW/g
Peak SAR (extrapolated) = 0.032 W/kg
SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.012 mW/g



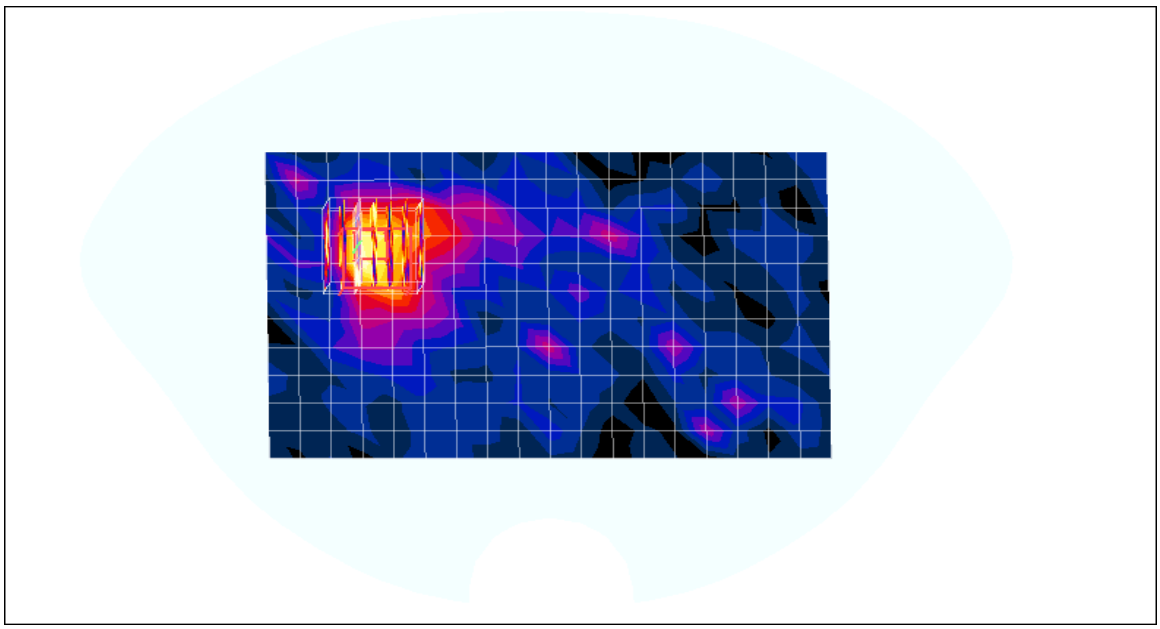
Ambient Temperature: **24 ± 1^0 C**
Tissue Temperature: **24 ± 1^0 C**
Humidity: **57% to 60%**

Bluetooth Mode
Figure 11: SAR Test Distribution Plot – device without belt clip (15mm spacing).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/18/04**
File Name: EUT Rear_15mm Gap_2441MHz_Data 28.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_Bluetooth Mode
Frequency: 2441 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9863; mho/m, ε_r = 52.89; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Rear_15mm Gap_2441MHz_Data 28/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 1.04 V/m; Power Drift = 0.08 dB
Maximum value of SAR (measured) = 0.016 mW/g

EUT Rear_15mm Gap_2441MHz_Data 28/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.04 V/m; Power Drift = 0.08 dB
Maximum value of SAR (measured) = 0.032 mW/g
Peak SAR (extrapolated) = 0.032 W/kg
SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.011 mW/g



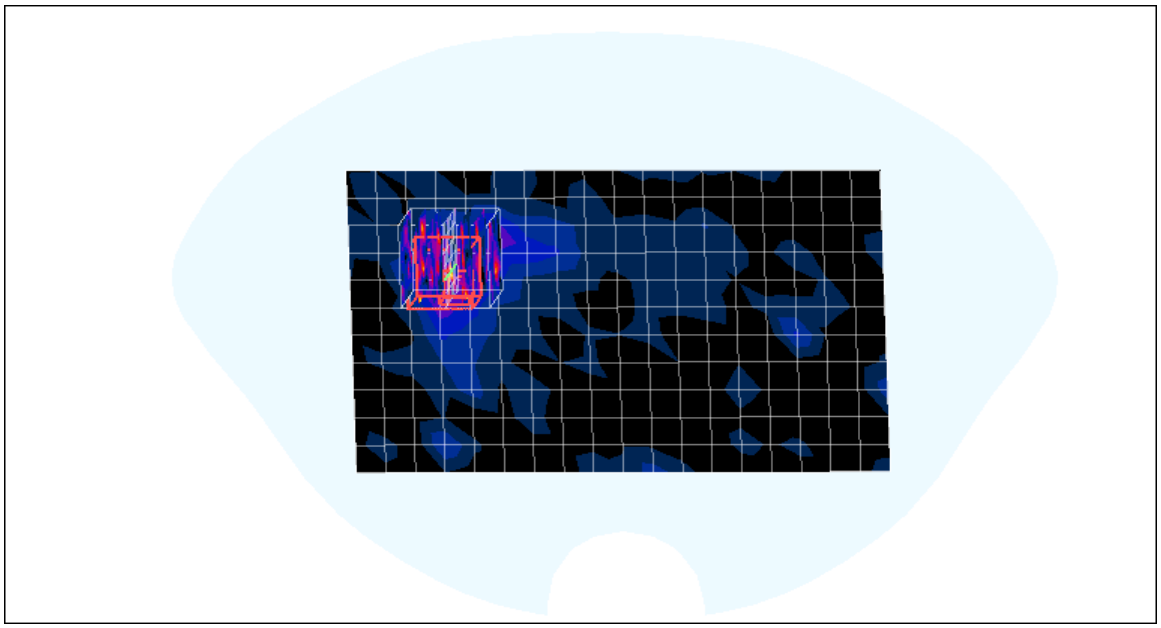
Ambient Temperature: **24 ± 1^0 C**
Tissue Temperature: **24 ± 1^0 C**
Humidity: **57% to 60%**

Bluetooth Mode
Figure 12: SAR Test Distribution Plot – device without belt clip (15mm spacing).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/18/04**
File Name: EUT Rear_15mm Gap_2480MHz_Data 29.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_Bluetooth Mode
Frequency: 2480 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9863; mho/m, ε_r = 52.89; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Rear_15mm Gap_2480MHz_Data 29/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 1.2 V/m; Power Drift = -0.09 dB
Maximum value of SAR (measured) = 0.015 mW/g

EUT Rear_15mm Gap_2480MHz_Data 29/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.2 V/m; Power Drift = -0.09 dB
Maximum value of SAR (measured) = 0.036 mW/g
Peak SAR (extrapolated) = 0.058 W/kg
SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.011 mW/g



Ambient Temperature: **24 ± 1^0 C**
Tissue Temperature: **24 ± 1^0 C**
Humidity: **57% to 60%**

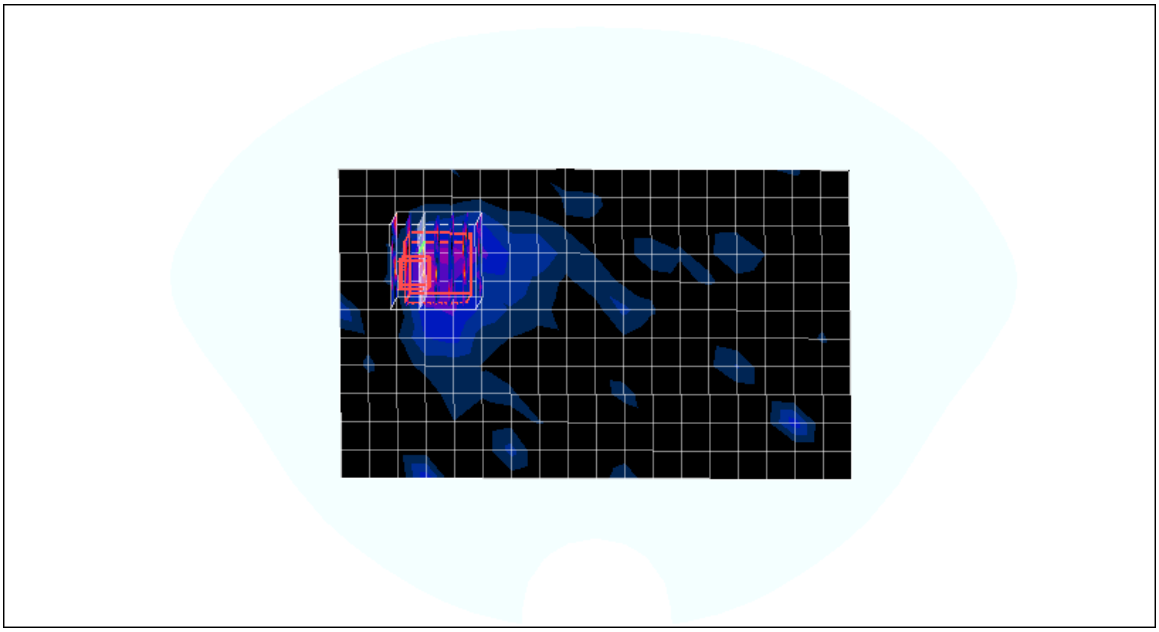
Bluetooth Mode
Figure 13: SAR Test Distribution Plot – device without belt clip (EUT Front Touched).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/18/04**
File Name: EUT Front Touched_2402MHz_Data 15.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_Bluetooth Mode
Frequency: 2402 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9863; mho/m, ε_r = 52.89; ρ = 1000 kg/m^3

DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Front Touched_2402MHz_Data 15/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 1.52 V/m; Power Drift = 0.01 dB
Maximum value of SAR (measured) = 0.017 mW/g

EUT Front Touched_2402MHz_Data 15/Zoom Scan 2 (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.52 V/m; Power Drift = 0.01 dB
Maximum value of SAR (measured) = 0.036 mW/g
Peak SAR (extrapolated) = 0.036 W/kg
SAR(1 g) = 0.018 mW/g; SAR(10 g) = 0.013 mW/g



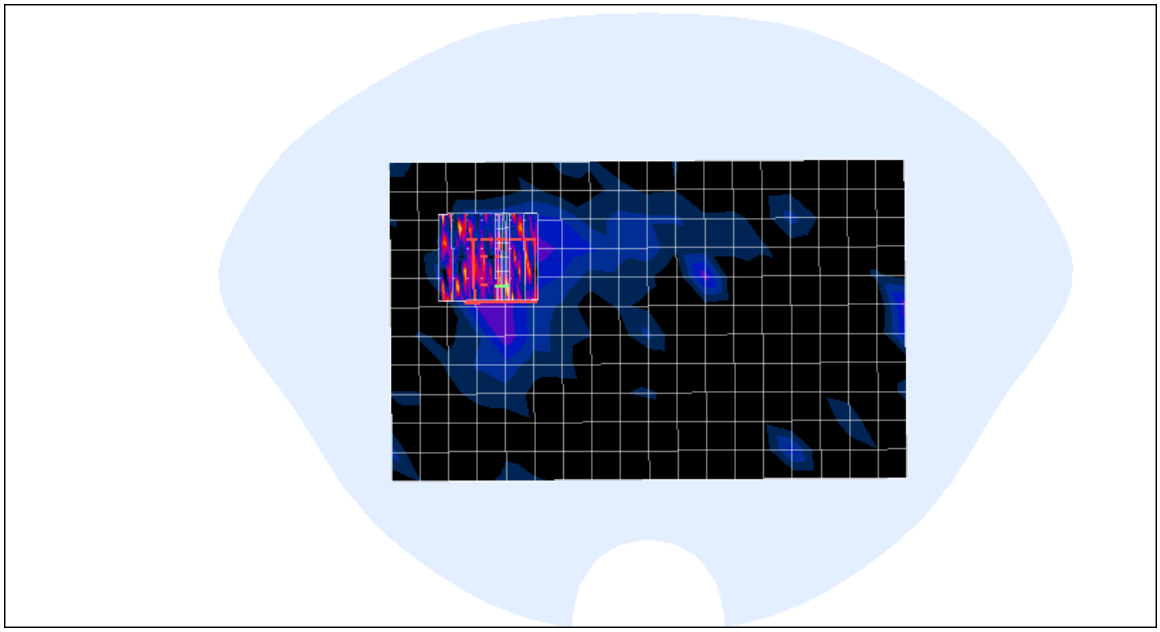
Ambient Temperature: **24 ± 1^0 C**
Tissue Temperature: **24 ± 1^0 C**
Humidity: **57% to 60%**

Bluetooth Mode
Figure 14: SAR Test Distribution Plot – device without belt clip (EUT Front Touched).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/18/04**
File Name: EUT Front Touched_2441MHz_Data 16.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_Bluetooth Mode
Frequency: 2441 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9863; mho/m, ε_r = 52.89; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Front Touched_2441MHz_Data 16/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 1.65 V/m; Power Drift = -0.02 dB
Maximum value of SAR (measured) = 0.016 mW/g

EUT Front Touched_2441MHz_Data 16/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.65 V/m; Power Drift = -0.02 dB
Maximum value of SAR (measured) = 0.031 mW/g
Peak SAR (extrapolated) = 0.031 W/kg
SAR(1 g) = 0.017 mW/g; SAR(10 g) = 0.013 mW/g



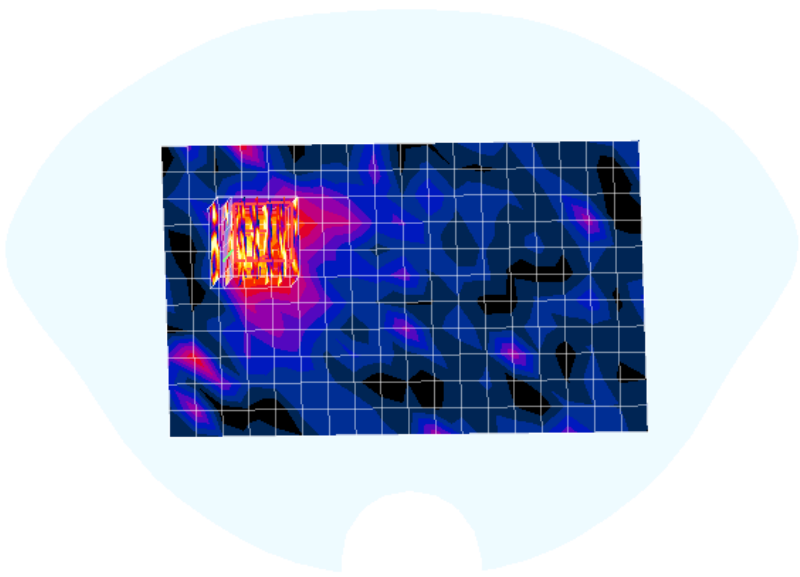
Ambient Temperature: **24 ± 1^0 C**
Tissue Temperature: **24 ± 1^0 C**
Humidity: **57% to 60%**

Bluetooth Mode
Figure 15: SAR Test Distribution Plot – device without belt clip (EUT Front Touched).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/18/04**
File Name: EUT Front Touched_2480MHz_Data 17_retest.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_Bluetooth Mode
Frequency: 2480 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9863; mho/m, ε_r = 52.89; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Front Touched_2480MHz_Data 17/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 1.46 V/m; Power Drift = -0.09 dB
Maximum value of SAR (measured) = 0.018 mW/g

EUT Front Touched_2480MHz_Data 17/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.46 V/m; Power Drift = -0.09 dB
Maximum value of SAR (measured) = 0.031 mW/g
Peak SAR (extrapolated) = 0.031 W/kg
SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.012 mW/g



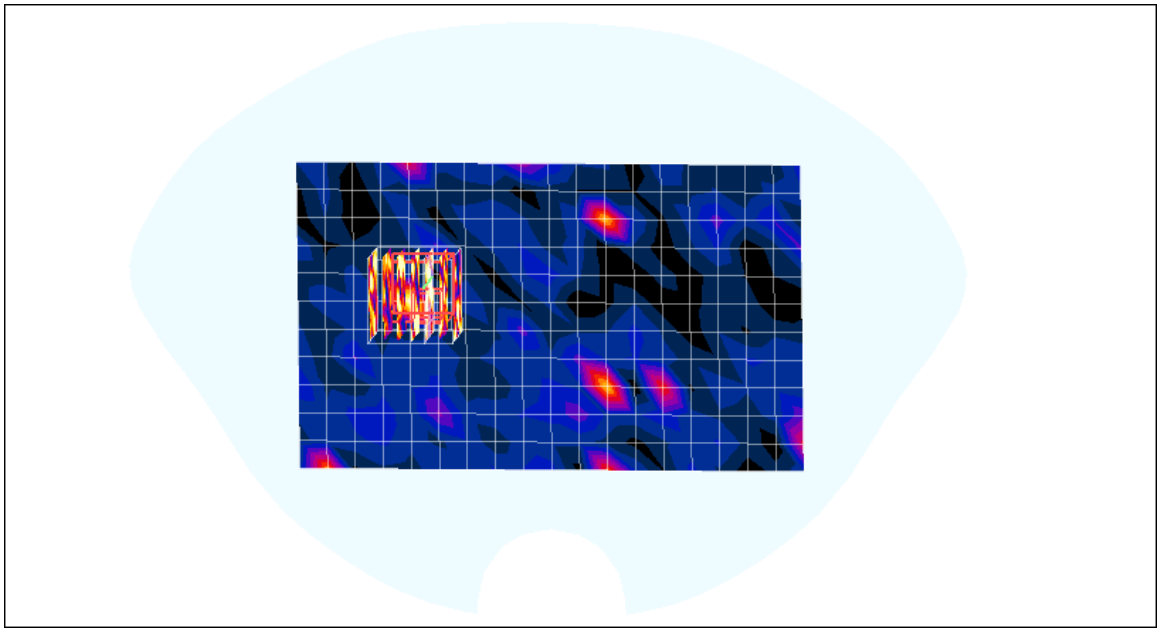
Ambient Temperature: **24 ± 1^0 C**
Tissue Temperature: **24 ± 1^0 C**
Humidity: **57% to 60%**

Bluetooth Mode
Figure 16: SAR Test Distribution Plot – device without belt clip (EUT Rear Touched).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/18/04**
File Name: EUT Rear Touched_2402MHz_Data 18_retest.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_Bluetooth Mode
Frequency: 2402 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9863; mho/m, ε_r = 52.89; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Rear Touched_2402MHz_Data 18/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 0.973 V/m; Power Drift = 0.05 dB
Maximum value of SAR (measured) = 0.014 mW/g

EUT Rear Touched_2402MHz_Data 18/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.973 V/m; Power Drift = 0.05 dB
Maximum value of SAR (measured) = 0.035 mW/g
Peak SAR (extrapolated) = 0.035 W/kg
SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.00982 mW/g



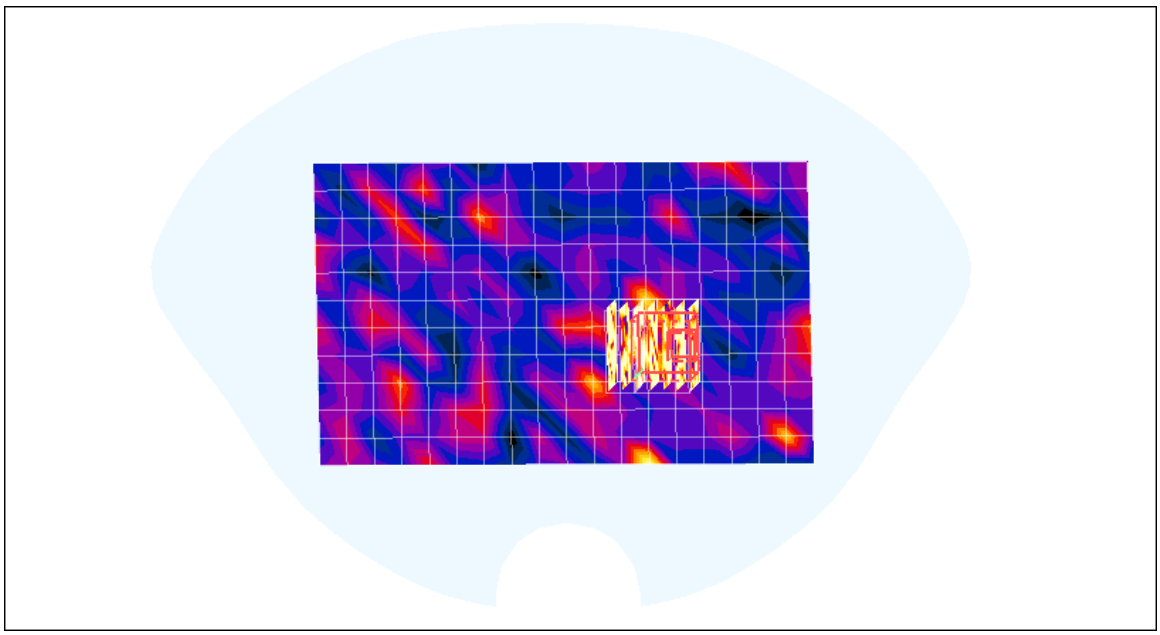
Ambient Temperature: **24 ± 1^0 C**
Tissue Temperature: **24 ± 1^0 C**
Humidity: **57% to 60%**

Bluetooth Mode
Figure 17: SAR Test Distribution Plot – device without belt clip (EUT Rear Touched).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/18/04**
File Name: EUT Rear Touched_2441MHz_Data 19.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_Bluetooth Mode
Frequency: 2441 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9863; mho/m, ε_r = 52.89; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Rear Touched_2441MHz_Data 19/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 1.12 V/m; Power Drift = -0.03 dB
Maximum value of SAR (measured) = 0.00734 mW/g

EUT Rear Touched_2441MHz_Data 19/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.12 V/m; Power Drift = -0.03 dB
Maximum value of SAR (measured) = 0.024 mW/g
Peak SAR (extrapolated) = 0.024 W/kg
SAR(1 g) = 0.010 mW/g; SAR(10 g) = 0.00782 mW/g



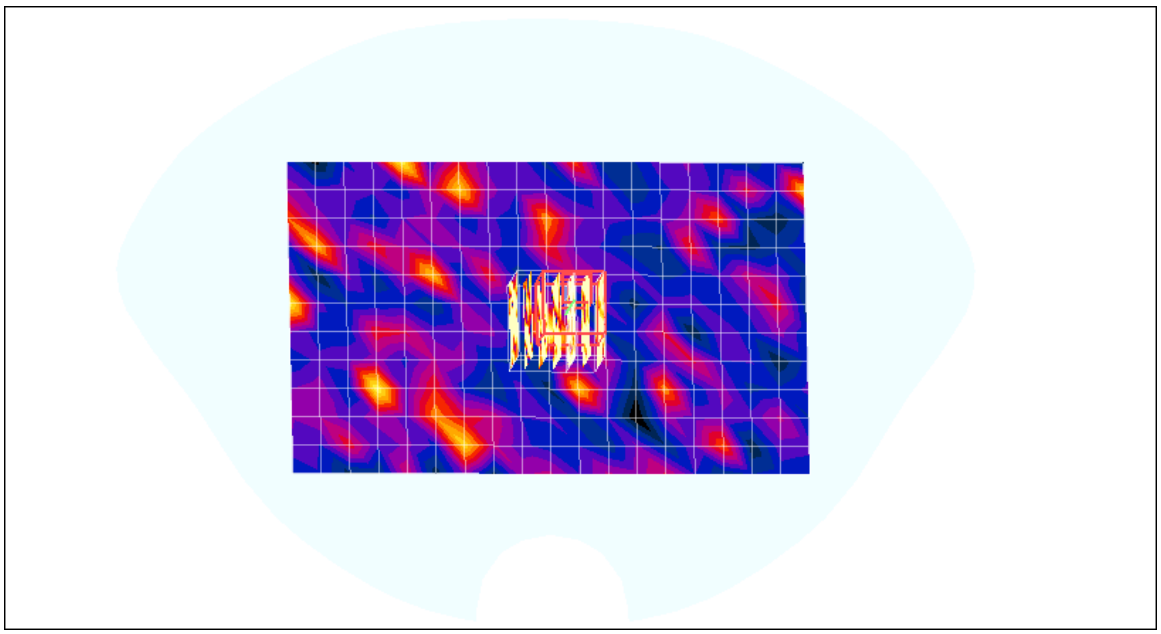
Ambient Temperature: **24 ± 1^0 C**
Tissue Temperature: **24 ± 1^0 C**
Humidity: **57% to 60%**

Bluetooth Mode
Figure 18: SAR Test Distribution Plot – device without belt clip (EUT Rear Touched).

Test Laboratory: Telecom & EMC Testing Group **Date: 05/18/04**
File Name: EUT Rear Touched_2480MHz_Data 20.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Olympus Pocket PC
Communication System: 2450 Mhz_Bluetooth Mode
Frequency: 2480 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9863; mho/m, ε_r = 52.89; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

EUT Rear Touched_2480MHz_Data 20/Area Scan (12x19x1):
Measurement grid: dx=10mm, dy=10mm
Reference Value = 0.972 V/m; Power Drift = 0.08 dB
Maximum value of SAR (measured) = 0.00767 mW/g

EUT Rear Touched_2480MHz_Data 20/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.972 V/m; Power Drift = 0.08 dB
Maximum value of SAR (measured) = 0.027 mW/g
Peak SAR (extrapolated) = 0.027 W/kg
SAR(1 g) = 0.00985 mW/g; SAR(10 g) = 0.00759 mW/g



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August 2003

ANNEX A

TEST INSTRUMENTATION
&
GENERAL PROCEDURE

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”, 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
  Dimension: A100cm x 50cm x 85cm (L x W x H)

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 table comes in the sizes: A 100x50x85 cm (LxWxH) table for use with free standing robots.
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

ELECTRICAL CHARACTERISTIC MEASUREMENT SETUP

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

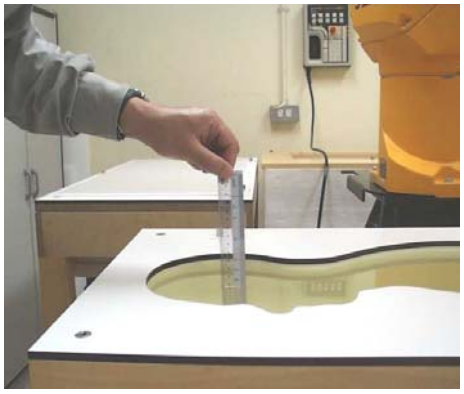
  The 85070D is a dielectric probe that is used to measure the intrinsic electrical properties of materials in the RF and microwave frequency bands. The 85070D software allows you to measure the complex dielectric constant (also called permittivity) of liquids and semi-solids, incuding the dielectric loss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

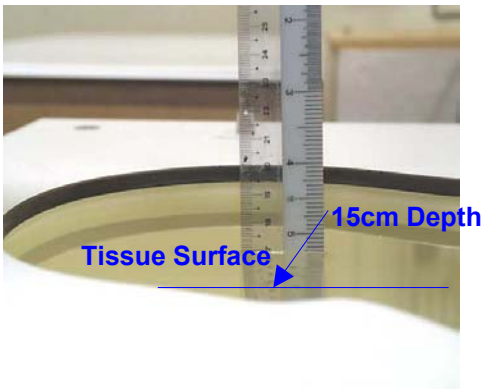
  To obtain data at hundreds of frequencies in seconds, simply immerse the probe into liquids or semi-solids - no special fixtures or containers are required. The 85070D must be used in conjunction with an Agilent network analyzer. The network analyzer provides the high frequency stimulus, and measures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

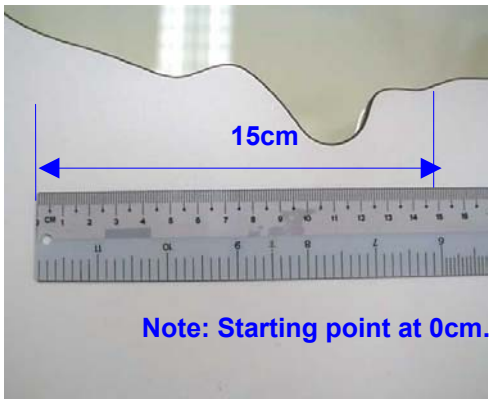
  The probe transmits a signal into the material under test (MUT). The measured reflected response from the materials is then related to its dielectric properties. A computer controls the system, and runs software that guides the user through a measurement sequence. An effort is made to keep the results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

Liquid Depth

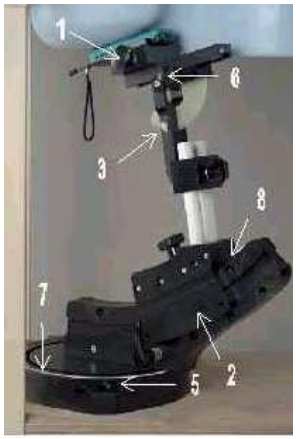
The liquid depth at the head of the Phantom SAM 12 is approximately 15cm+/-0.5cm.







Positioning of EUT



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 pivotingpoint, 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":

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.

Effective Radiated Power (ERP)

Set up as shown in Figure1 with EUT was substituted with a transmit antenna that connected to a signal generator. Set the Signal generator to transmit at lower channel of EUT and arbitrarily set the power level so that the received signal by the receiver is a noise-free signal. Rule of Thumb: 0dBm at 3m distance. Record the power level received after maximization. Compute path loss, L_{path} as follows:

L_{path} = transmitted power - receiver level
= signal generator level - cable loss + antenna gain - receiver level

Replace transmitting antenna with EUT that transmits at low channel. Record the power level received after maximization. Compute the ERP as follows:

ERP = receiver level + pass loss

Repeat the above test procedures when making measurement at EUT middle and high channels.

ERP Measurement Setup

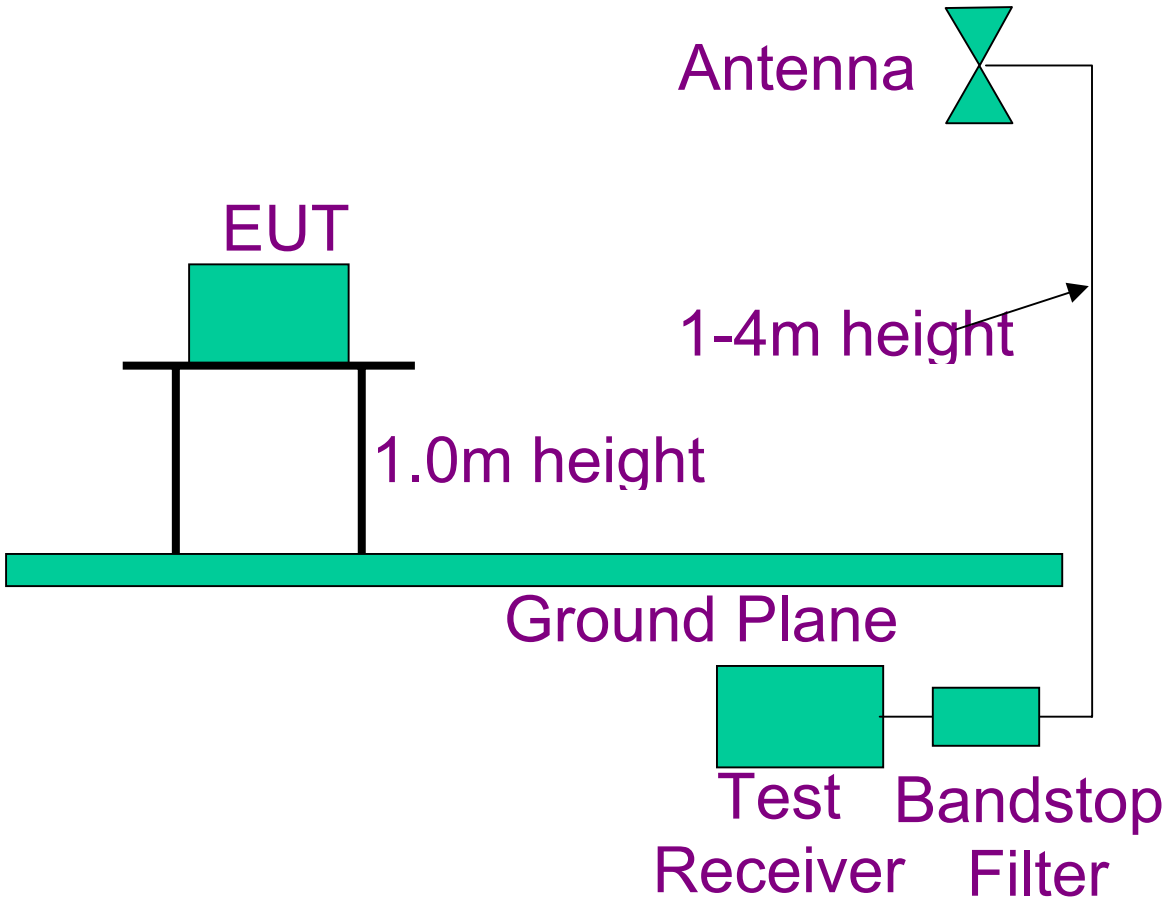


Figure 1

Instrument	Model	S/No	Cal Due Date	
Boonton RF Power Meter (Dual Channel)	4532	97701	25 June 2004	✓
Boonton Peak Power Sensor	56218-S/1	1417	31 Aug 2003	
Boonton Power Sensor (used as reference)	51075	31534	-	✓
Boonton Power Sensor	51075	32002	25 June 2004	✓
HP Spectrum Analyzer	8593E	3831u02087	1 Sept 2004	✓
S-Parameter Network Analyzer (30kHz – 6GHz)	8753ES	MY40001026	3 Oct 2004	✓
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	HP778D	18289	-	✓
Agilent Radio Test Set	8960	089533476	20 Jan 2004	
R&S Universal Radio Communication Tester	CMU-200	837587/068	22 Mar 2005	✓
450MHz System Validation Dipole	D450V2	1004	4 Apr 2003	
835MHz System Validation Dipole	D835V2	447	18 Nov 2004	
900MHz System Validation Dipole	D900V2	134	18 Nov 2004	
1800MHz System Validation Dipole	D1800V2	2d019	12 Nov 2004	
1900MHz System Validation Dipole	D1900V2	546	13 Nov 2004	
2450MHz System Validation Dipole	D2450V2	715	25 Sept 2004	✓
Data Acquisition Electronics (DAE)	DAE3V1	475	13 Nov 2004	✓
Dosimetric E-field Probe	ET3DV6	1645	9 Oct 2004	✓
Dosimetric E-field Probe	ET3DV6	1646	25 Nov 2002	
Dosimetric E-field Probe	ET3DV6	1647	20 Nov 2003	

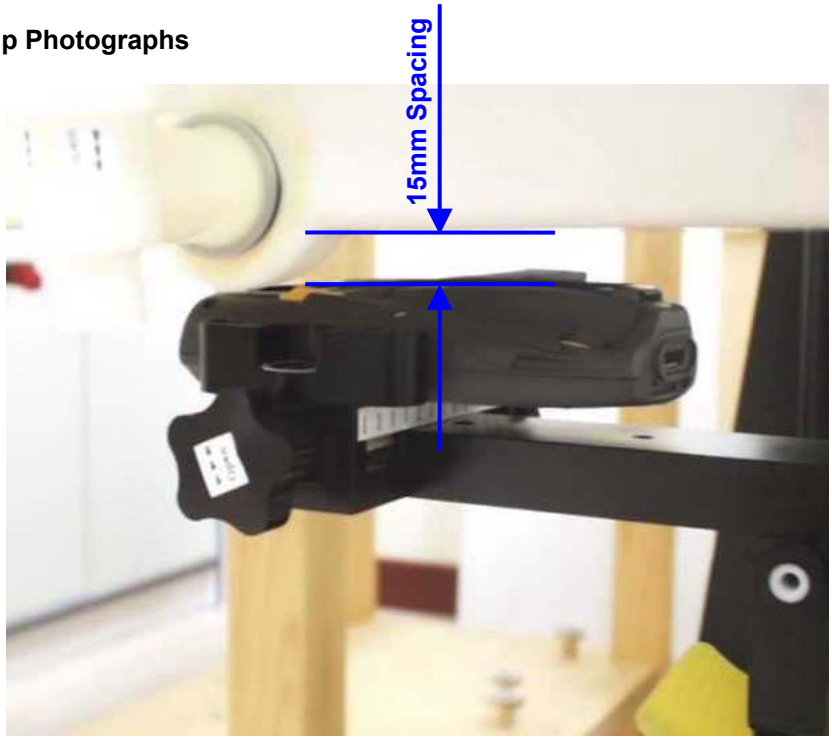
ANNEX B

TEST SETUP PHOTOGRAPHS

SAR Test Setup Photographs

SAR Test Setup (Device at Flat Phantom)

SAR Test Setup Photographs



SAR Test Setup At Flat Phantom – Closer View (EUT **Rear** To Phantom, 15mm spacing)

SAR Test Setup Photographs

SAR Test Setup At Flat Phantom – Closer View (EUT **Front** Touched Phantom)

SAR Test Setup At Flat Phantom – Closer View (EUT **Rear** Touched Phantom)

Effective Radiated Power Test Setup Photographs

Effective Radiated Power Test Setup

EUT PHOTOGRAPHS

Front of EUT

Rear of EUT

ANNEX C

TISSUE SIMULANT DATA SHEETS

Type of Tissue	Body (Wireless Lan Mode)	Body (Bluetooth Mode)
Target Frequency (MHz)	2450	2450
Target Dielectric Constant	52.70	52.70
Target Conductivity (S/m)	1.95	1.95
Composition (by weight)	Ultra Pure Water (72.55%) Glyco (27.34%) Sugar (0%) Salt (0.11%) HEC (0%) Bactericide (0%)	Ultra Pure Water (72.55%) Glyco (27.34%) Sugar (0%) Salt (0.11%) HEC (0%) Bactericide (0%)
Measured Dielectric Constant	53.3	52.89
Measured Conductivity (S/m)	1.9786	1.9863

Probe Name	Dosimetric E-field Probe ET3DV6	Dosimetric E-field Probe ET3DV6
Probe Serial Number	1645	1645
Sensor Offset (mm)	2.7	2.7
Conversion Factor	4.7 ± 9.5%	4.7 ± 9.5%
Probe Calibration Due Date (DD/MM/YY)	9 Oct 2004	9 Oct 2004

Body Tissue at 2450MHz (Wireless Lan Mode)

Frequency	e'	e"	Conductivity
2440000000	53.33	14.47	1.9610
2441000000	53.33	14.49	1.9649
2442000000	53.33	14.48	1.9639
2443000000	53.33	14.48	1.9654
2444000000	53.32	14.51	1.9699
2445000000	53.32	14.49	1.9686
2446000000	53.31	14.50	1.9704
2447000000	53.32	14.52	1.9741
2448000000	53.30	14.51	1.9740
2449000000	53.32	14.54	1.9781
2450000000	**53.30**	**14.54**	**1.9786**
2451000000	53.28	14.55	1.9808
2452000000	53.30	14.54	1.9806
2453000000	53.29	14.56	1.9841
2454000000	53.30	14.55	1.9842
2455000000	53.30	14.57	1.9872
2456000000	53.28	14.57	1.9884
2457000000	53.28	14.59	1.9909
2458000000	53.28	14.59	1.9921
2459000000	53.27	14.60	1.9940
2460000000	53.27	14.60	1.9953
2461000000	53.27	14.61	1.9972
2462000000	53.27	14.62	1.9992
2463000000	53.26	14.62	2.0010
2464000000	53.26	14.64	2.0036
2465000000	53.25	14.62	2.0026
2466000000	53.24	14.64	2.0057
2467000000	53.23	14.65	2.0081
2468000000	53.24	14.64	2.0077
2469000000	53.24	14.67	2.0118
2470000000	53.22	14.67	2.0125
2471000000	53.23	14.67	2.0141
2472000000	53.20	14.67	2.0140
2473000000	53.20	14.68	2.0170
2474000000	53.21	14.67	2.0161
2475000000	53.20	14.69	2.0192
2476000000	53.19	14.68	2.0190
2477000000	53.19	14.68	2.0200
2478000000	53.17	14.69	2.0227
2479000000	53.17	14.68	2.0219
2480000000	53.17	14.69	2.0234

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

Tested by: NAC
Date : 13th May 2004
Frequency: 2450MHz
Mixture: Body Tissue
Tissue temp: 23°C

Composition		
Tap Water	0.0g	0.00%
Ultra Pure Water	25500.0g	72.55%
Sugar	0.0g	0.00%
Glyco	9610.0g	27.34%
Salt	38.4g	0.11%
Preventol D7	0.0g	0.00%
Total Weight	35148.4g	100.0%

Result (FCC)	Dielectric Constant	Conductivity
Measured	53.30	1.9786
Target (FCC)	52.7	1.95
Low Limit	50.065	1.8525
High Limit	55.335	2.0475
% Off Target	1.14	1.47

Body Tissue at 2450MHz (Bluetooth Mode)

Frequency	e'	e''	Conductivity
2440000000	52.92	14.51	1.9669
2441000000	52.90	14.53	1.9711
2442000000	52.92	14.53	1.9708
2443000000	52.90	14.53	1.9724
2444000000	52.89	14.54	1.9746
2445000000	52.91	14.54	1.9756
2446000000	52.89	14.55	1.9772
2447000000	52.90	14.56	1.9796
2448000000	52.90	14.58	1.9827
2449000000	52.89	14.59	1.9844
2450000000	**52.89**	**14.59**	**1.9863**
2451000000	52.86	14.60	1.9880
2452000000	52.88	14.59	1.9880
2453000000	52.88	14.62	1.9927
2454000000	52.87	14.62	1.9931
2455000000	52.89	14.61	1.9926
2456000000	52.86	14.63	1.9965
2457000000	52.87	14.63	1.9976
2458000000	52.88	14.64	1.9993
2459000000	52.85	14.65	2.0019
2460000000	52.85	14.64	2.0007
2461000000	52.85	14.68	2.0067
2462000000	52.84	14.67	2.0064
2463000000	52.84	14.68	2.0085
2464000000	52.82	14.69	2.0112
2465000000	52.84	14.69	2.0112
2466000000	52.84	14.70	2.0143
2467000000	52.81	14.70	2.0145
2468000000	52.82	14.72	2.0180
2469000000	52.81	14.73	2.0198
2470000000	52.81	14.73	2.0211
2471000000	52.81	14.74	2.0228
2472000000	52.79	14.71	2.0207
2473000000	52.79	14.74	2.0252
2474000000	52.78	14.73	2.0251
2475000000	52.77	14.74	2.0264
2476000000	52.77	14.75	2.0284
2477000000	52.76	14.74	2.0287
2478000000	52.75	14.75	2.0303
2479000000	52.75	14.75	2.0310
2480000000	52.74	14.74	2.0306

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

Tested by: NAC
Date : 18th May 2004
Frequency: 2450MHz
Mixture: Body Tissue
Tissue temp: 24°C

Composition		
Tap Water	0.0g	0.00%
Ultra Pure Water	25500.0g	72.55%
Sugar	0.0g	0.00%
Glyco	9610.0g	27.34%
Salt	38.4g	0.11%
Preventol D7	0.0g	0.00%
Total Weight	35148.4g	100.0%

Result (FCC)	Dielectric Constant	Conductivity
Measured	52.89	1.9863
Target (FCC)	52.7	1.95
Low Limit	50.065	1.8525
High Limit	55.335	2.0475
% Off Target	0.35	1.86

ANNEX D

SAR VALIDATION RESULTS

SAR Validation at 2450MHz (Wireless Lan Mode)

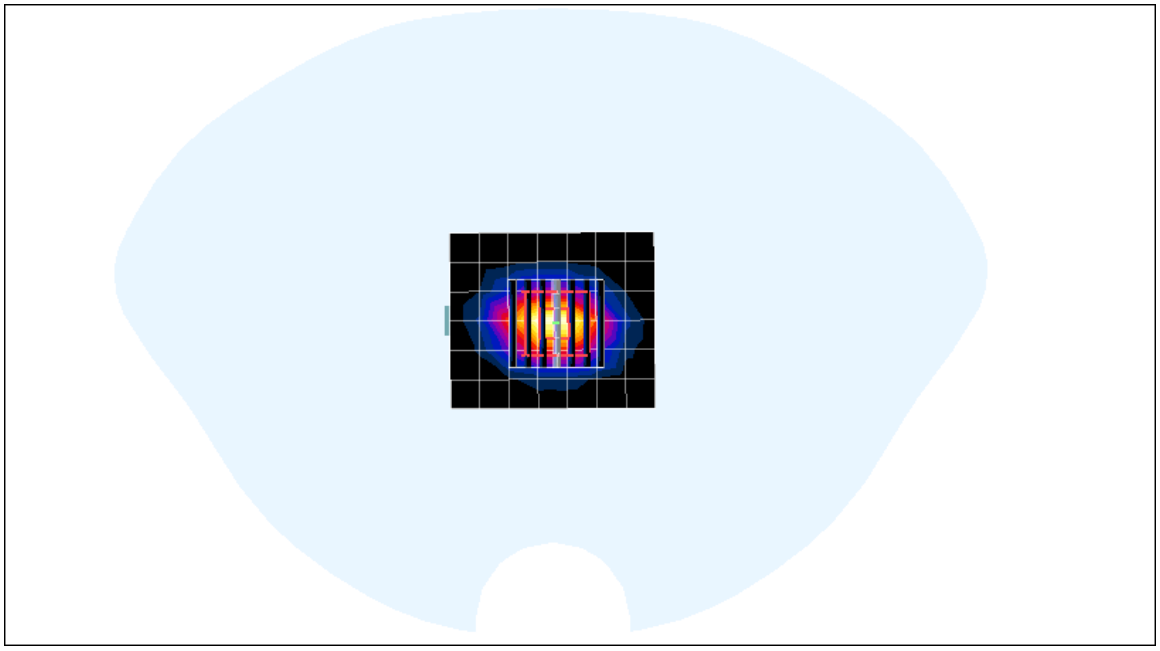
Test Laboratory: Telecom & EMC Testing Group **Date: 05/13/04**
File Name: 2450MHz Body_Dipole Validation.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Dipole 2450MHz
Communication System: CW
Frequency: 2450 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9786; mho/m, ε_r = 53.3; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

2450MHz Body_Dipole Validation/Area Scan (7x8x1):

Measurement grid: dx=10mm, dy=10mm
Reference Value = 93.8 V/m; Power Drift = -0.05 dB
Maximum value of SAR (measured) = 14.4 mW/g

2450MHz Body_Dipole Validation/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.8 V/m; Power Drift = -0.05 dB
Maximum value of SAR (measured) = 15.5 mW/g
Peak SAR (extrapolated) = 29.6 W/kg
SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.31 mW/g

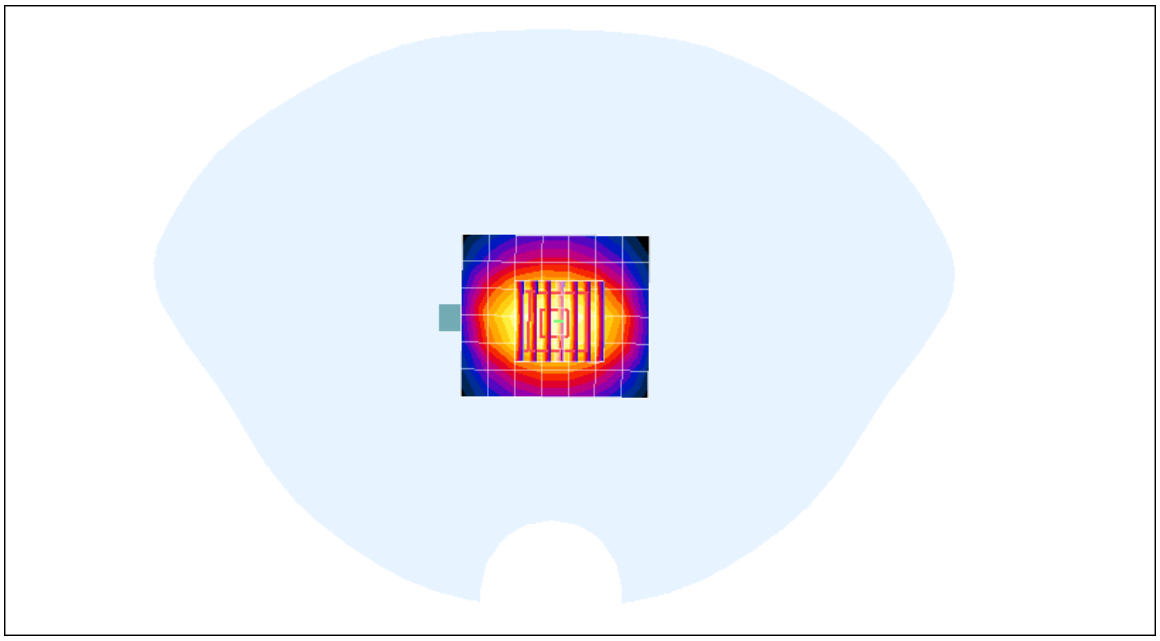


SAR Validation at 2450MHz (Bluetooth Mode)

Test Laboratory: Telecom & EMC Testing Group **Date: 05/18/04**
File Name: 2450MHz Body_for Bluetooth Mode_Dipole Validation.da4
Program Name: Job Nos.: 56S040250
Phantom section: Flat Section
DUT: Dipole 2450MHz
Communication System: CW
Frequency: 2450 MHz
Duty Cycle: 1:1
Medium: Body 2450 MHzMedium parameters used: σ = 1.9863; mho/m, ε_r = 52.89; ρ = 1000 kg/m^3
DASY4 Configuration:
Electronics: DAE3 Sn475 Calibrated: 13/Nov/2003
Phantom: SAM 12 Measurement SW: DASY4, V4.2 Build 37
Probe: ET3DV6 - SN1645 ConvF(4.7, 4.7, 4.7) Calibrated: 09/Oct/2003
Postprocessing SW: SEMCAD, V1.8 Build 109
Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

2450MHz Body_for Bluetooth Mode_Dipole Validation/Area Scan (7x8x1): Measurement grid: dx=10mm, dy=10mm
Reference Value = 91.1 V/m; Power Drift = 0.04 dB
Maximum value of SAR (measured) = 14.3 mW/g

2450MHz Body_for Bluetooth Mode_Dipole Validation/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.1 V/m; Power Drift = 0.04 dB
Maximum value of SAR (measured) = 15.3 mW/g
Peak SAR (extrapolated) = 29.6 W/kg
SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.3 mW/g



ANNEX E

MEASUREMENT UNCERTAINTY

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 ± **20.3%.**

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)	± 1.9	normal	1	0.64	± 1.2	∞
Liquid permittivity (target)	± 5.0	rectangular	√3	0.6	± 1.7	∞
Liquid permittivity (meas)	± 1.1	normal	1	0.6	± 0.7	∞
Combined Standard Uncertainty					± 10.2	330
Coverage Factor for 95%		**k=2**				
Extended Standard Uncertainty					± 20.3	

ANNEX F

SAR PROBE CALIBRATION CERTIFICATES

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

Client **PSB**

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1645
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	October 9, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

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

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

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E4419B	GB41293874	2-Apr-03 (METAS, No 252-0250)	Apr-04
Power sensor E4412A	MY41495277	2-Apr-03 (METAS, No 252-0250)	Apr-04
Reference 20 dB Attenuator	SN: 5086 (20b)	3-Apr-03 (METAS No. 251-0340	Apr-04
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (Agilent, No. 20020918)	In house check: Oct 03
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: October 9, 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.

880-KP0301061-A Page 1 (1)

Schmid & Partner Engineering AG

s p e a g

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

Probe ET3DV6

SN:1645

Manufactured:	November 7, 2001
Last calibration:	November 20, 2002
Recalibrated:	October 9, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1645 October 9, 2003

DASY - Parameters of Probe: ET3DV6 SN:1645

Sensitivity in Free Space

NormX	**1.67**	$\mu V/(V/m)^2$
NormY	**1.79**	$\mu V/(V/m)^2$
NormZ	**1.74**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**95**	mV
DCP Y	**95**	mV
DCP Z	**95**	mV

Sensitivity in Tissue Simulating Liquid

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

Valid for f=800-1000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**6.6**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.6**	± 9.5% (k=2)	Alpha	**0.33**
ConvF Z	**6.6**	± 9.5% (k=2)	Depth	**2.91**

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

Valid for f=1710-1890 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**5.3**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.3**	± 9.5% (k=2)	Alpha	**0.50**
ConvF Z	**5.3**	± 9.5% (k=2)	Depth	**2.73**

Boundary Effect

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

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	10.8	6.5
SAR_{be} [%]	With Correction Algorithm	0.4	0.6

Head 1800 MHz **Typical SAR gradient: 10 % per mm**

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	14.7	10.0
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

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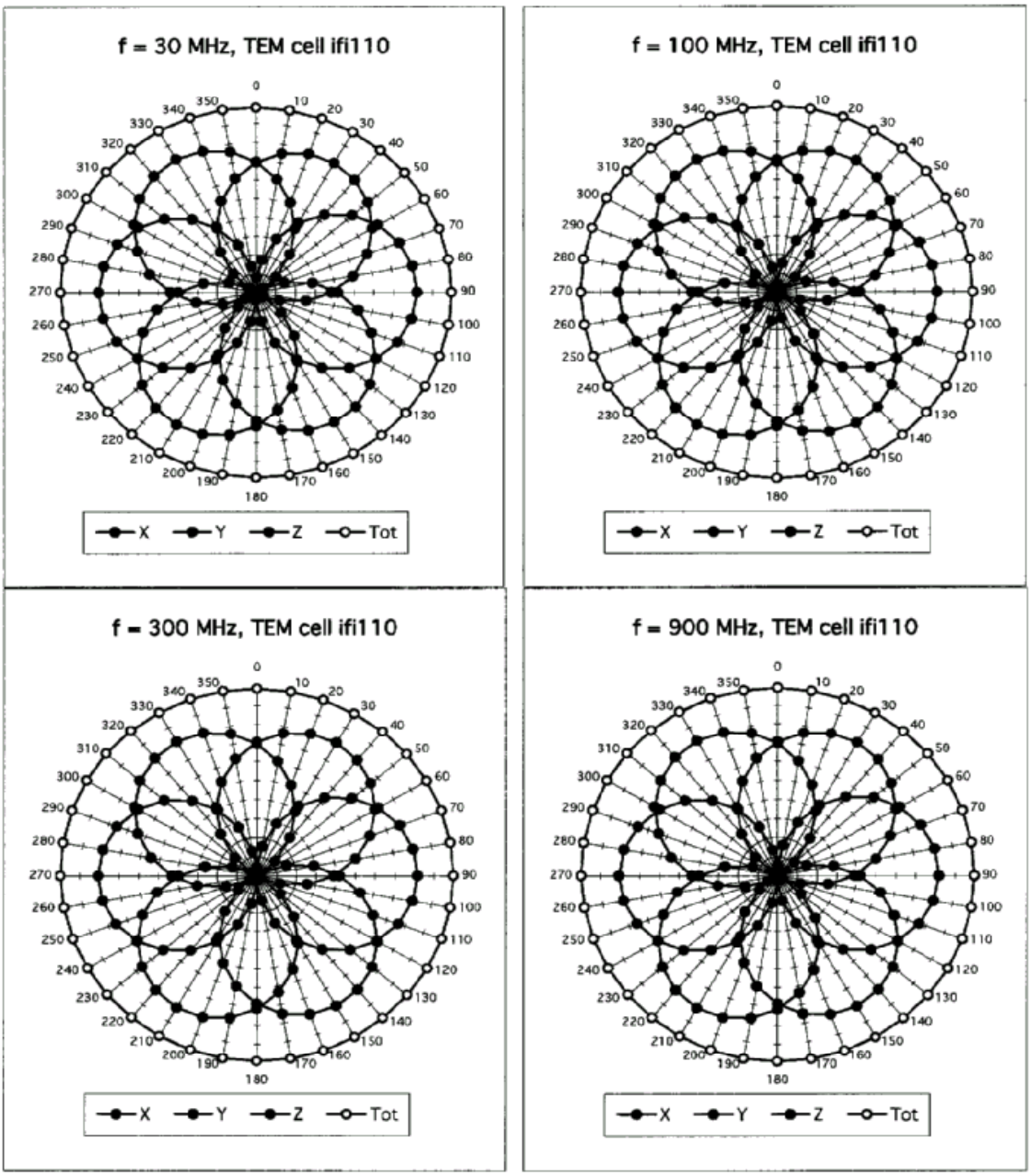
Receiving Pattern (ϕ), θ = 0°



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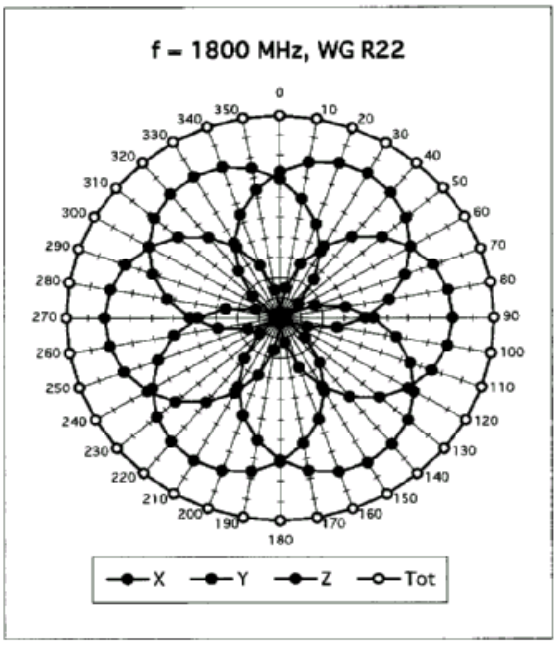
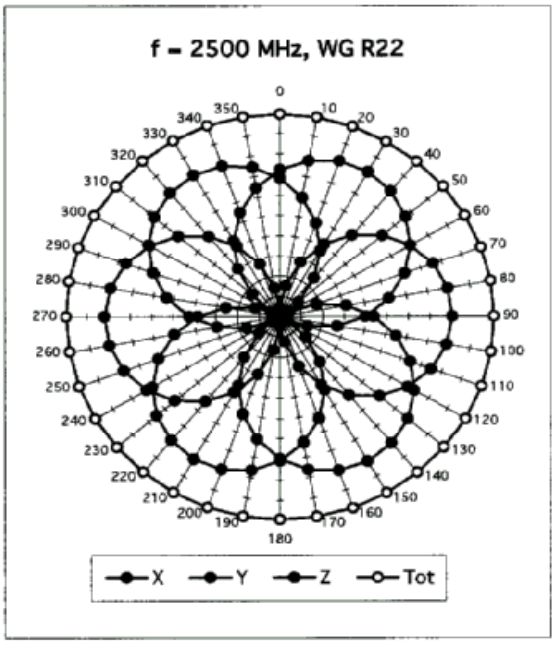
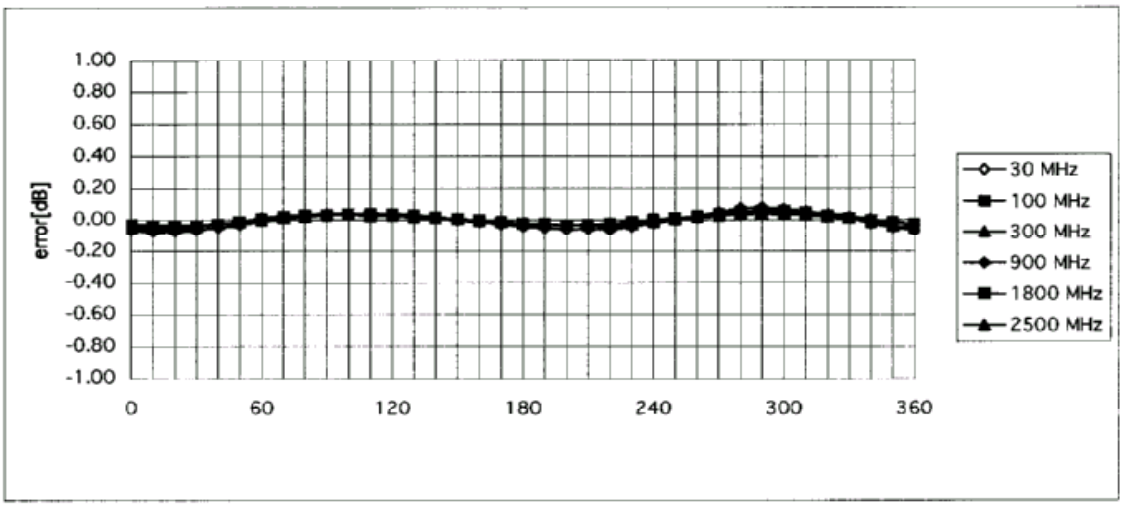




Isotropy Error (ϕ), θ = 0°



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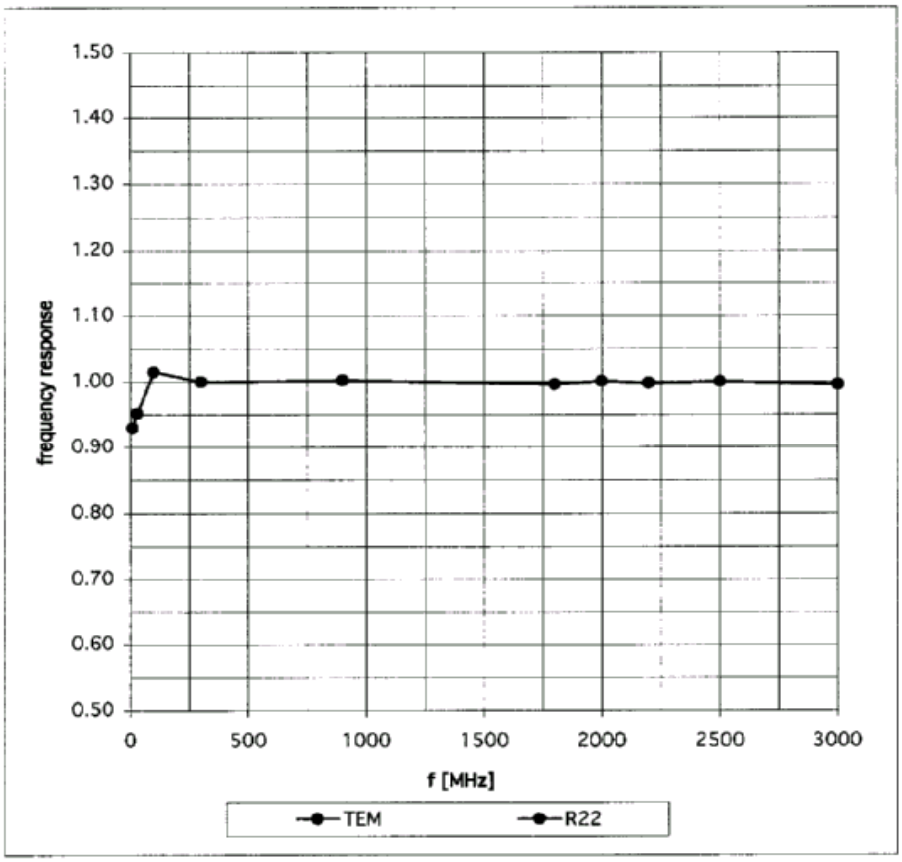
Frequency Response of E-Field

(TEM-Cell:ifi110, Waveguide R22)



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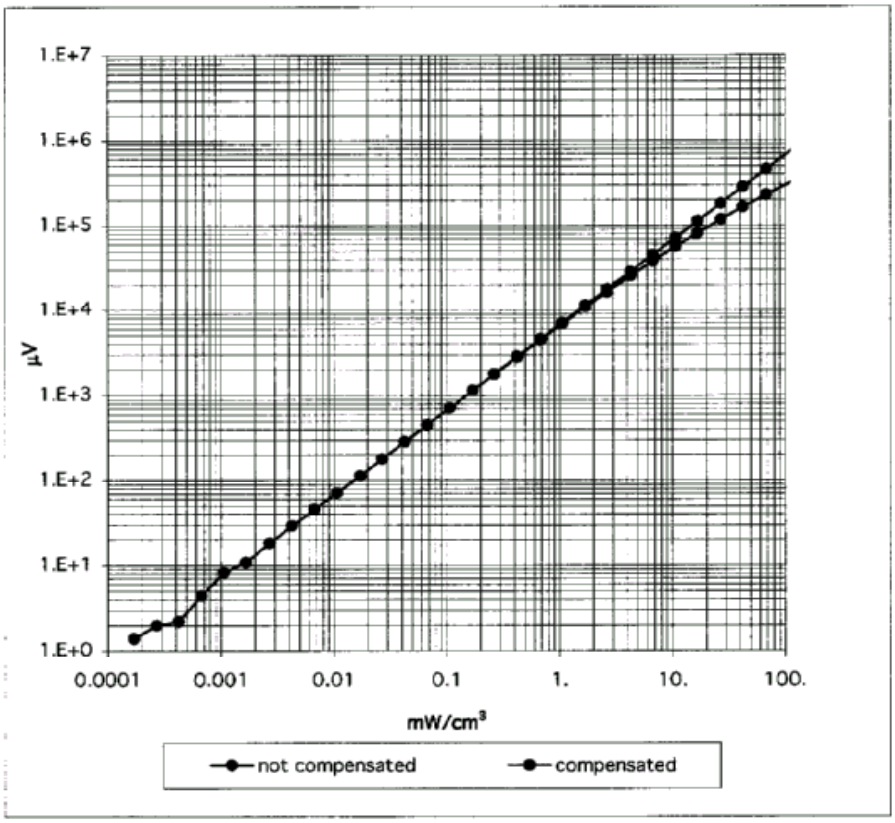
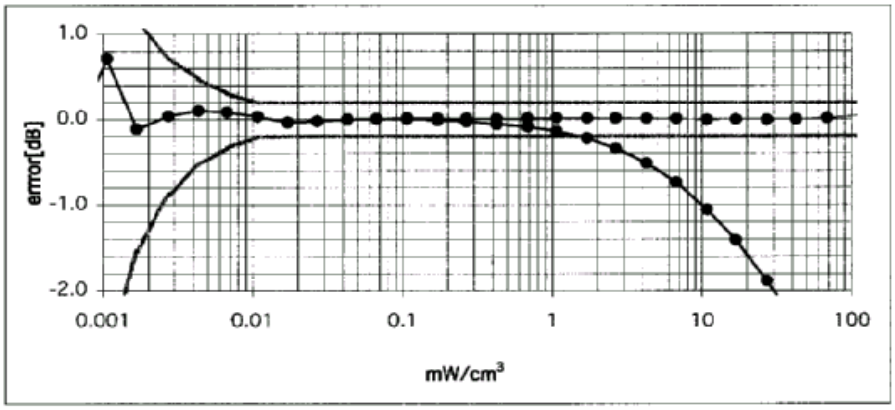
Dynamic Range f(SARhead)

(Waveguide R22)





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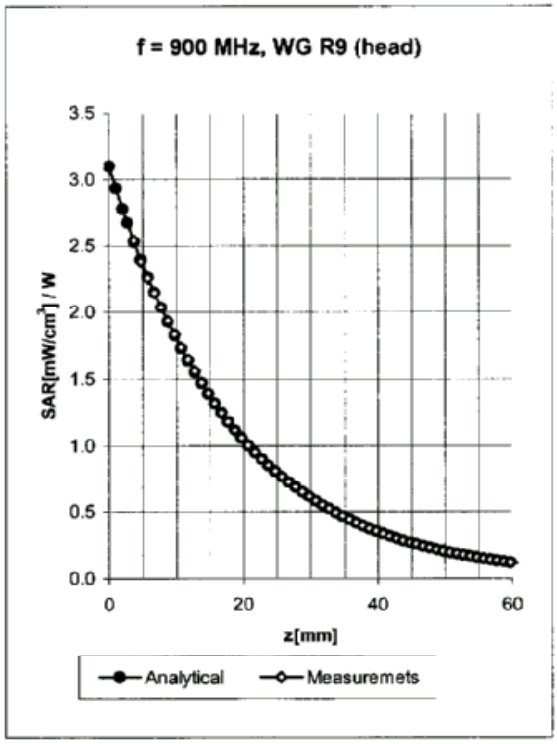
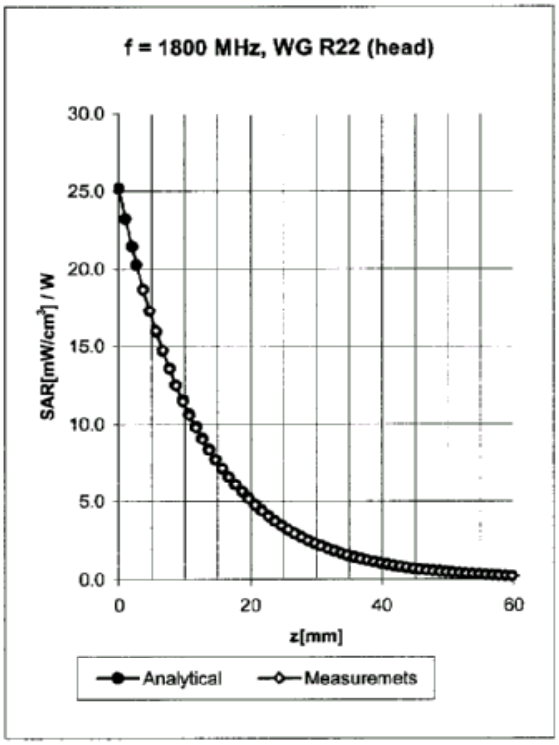
Conversion Factor Assessment





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

Valid for f=800-1000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	6.6 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.6 ± 9.5% (k=2)	Alpha	0.33
ConvF Z	6.6 ± 9.5% (k=2)	Depth	2.91

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

Valid for f=1710-1890 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	5.3 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.3 ± 9.5% (k=2)	Alpha	0.50
ConvF Z	5.3 ± 9.5% (k=2)	Depth	2.73

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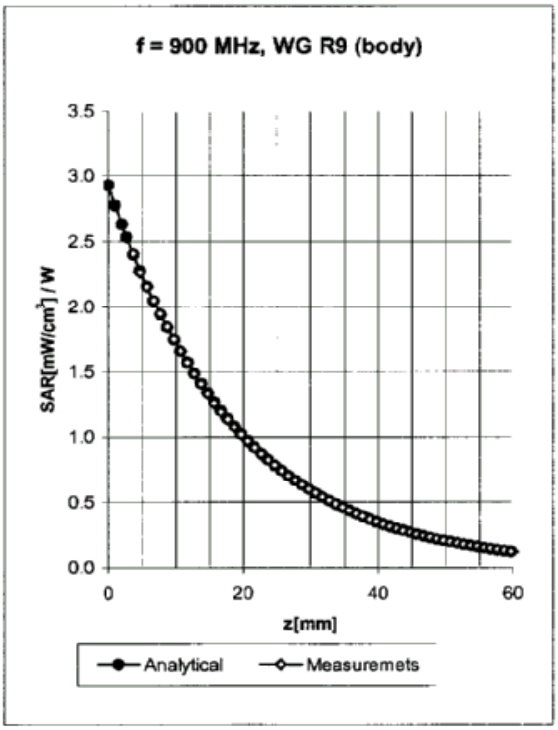
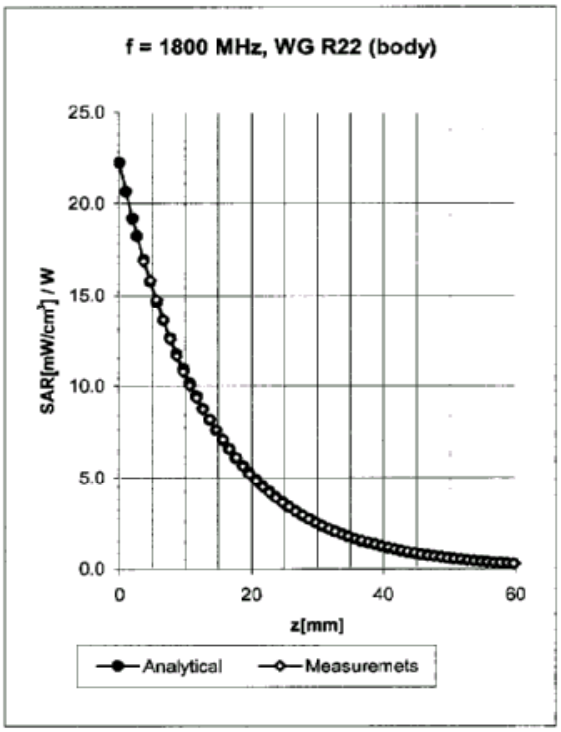
Conversion Factor Assessment





Body 900 MHz ε_r = 55.0 ± 5% σ = 1.05 ± 5% mho/m

Valid for f=800-1000 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	6.4 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.4 ± 9.5% (k=2)	Alpha	**0.42**
ConvF Z	6.4 ± 9.5% (k=2)	Depth	**2.51**

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

Valid for f=1710-1890 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	5.0 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.0 ± 9.5% (k=2)	Alpha	**0.59**
ConvF Z	5.0 ± 9.5% (k=2)	Depth	**2.68**

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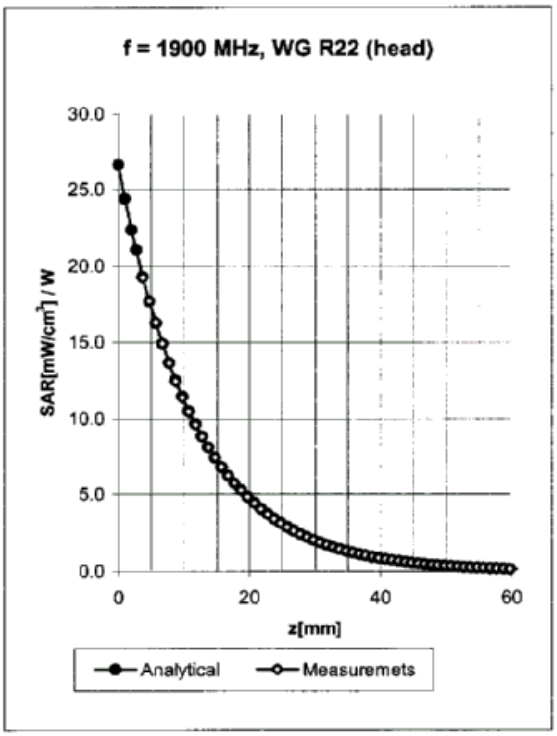
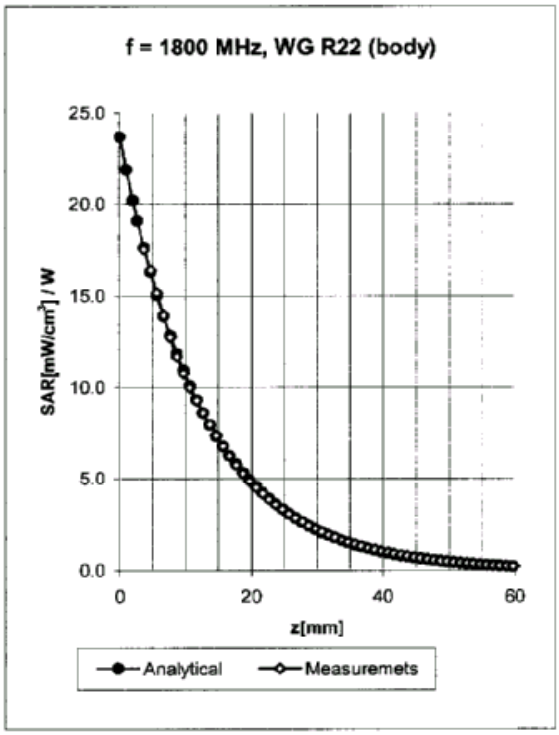
Conversion Factor Assessment





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

Valid for f=1805-1995 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**5.1** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.1** ± 9.5% (k=2)	Alpha	**0.50**
ConvF Z	**5.1** ± 9.5% (k=2)	Depth	**2.88**

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

Valid for f=1805-1995 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**4.8** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.8** ± 9.5% (k=2)	Alpha	**0.66**
ConvF Z	**4.8** ± 9.5% (k=2)	Depth	**2.53**

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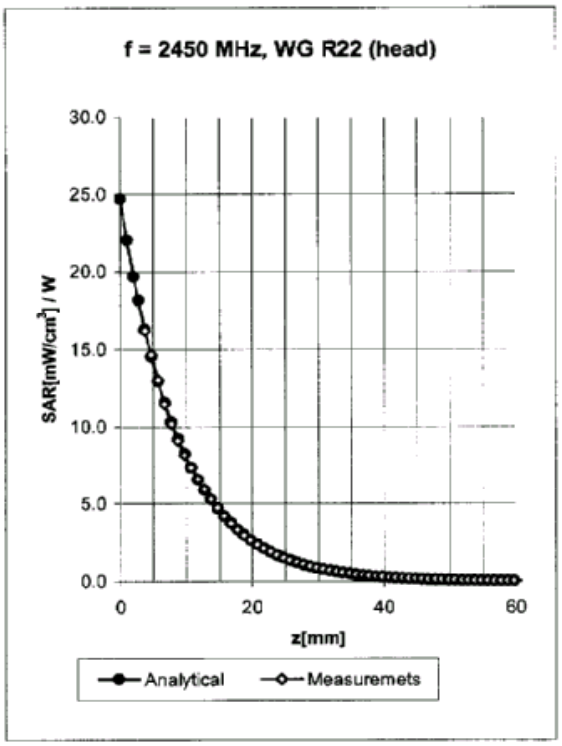
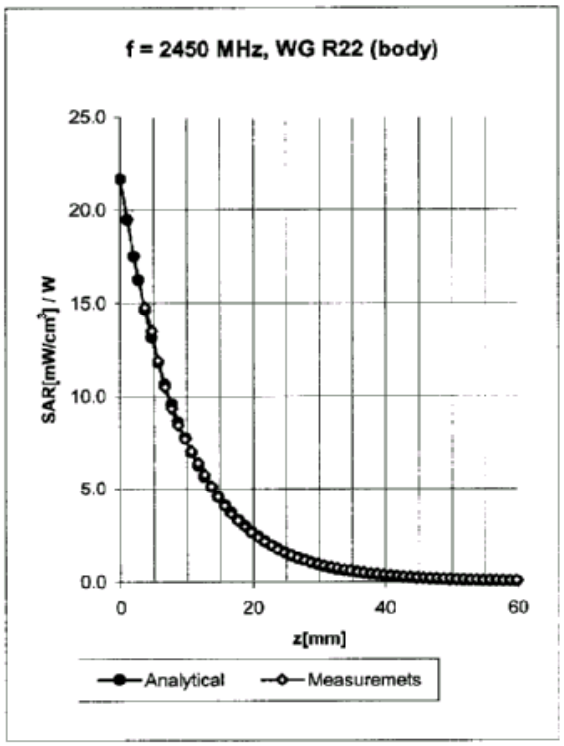
Conversion Factor Assessment





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

Valid for f=2400-2500 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	5.1 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.1 ± 9.5% (k=2)	Alpha	0.97
ConvF Z	5.1 ± 9.5% (k=2)	Depth	1.91

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

Valid for f=2400-2500 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	4.7 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	4.7 ± 9.5% (k=2)	Alpha	1.25
ConvF Z	4.7 ± 9.5% (k=2)	Depth	1.65

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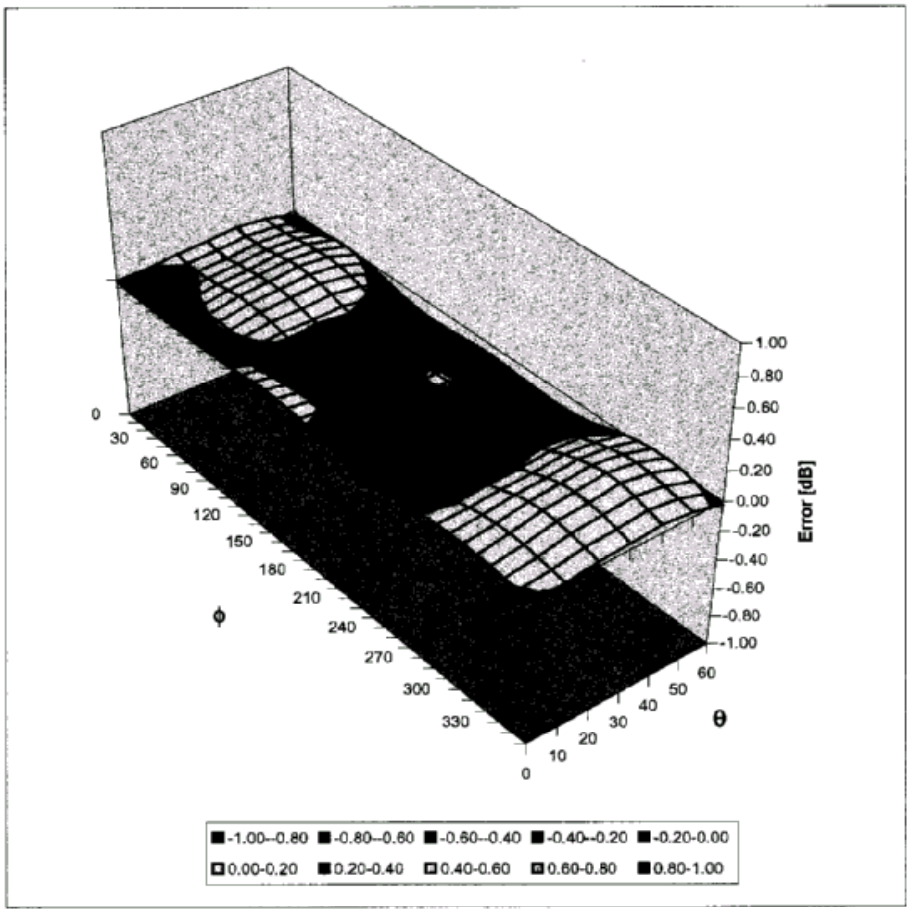
Deviation from Isotropy in HSL

Error (θ,ϕ), f = 900 MHz



ANNEX G

REFERENCES

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"
ACA, Radio Communications (EMR Human Exposure)	2000 (No.2)	“Radiocommunication (Electromagnetic Radiation – Human Exposure)”
EN50360	2001	Product Standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300MHz – 3GHz)
EN50361	2001	Basic Standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phone (300MHz – 3GHz)