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E-mail: info@rim.com

November 19, 2004

Attention: Timothy R. Johnson,
Examining Engineer
American Telecomunications Certification Body Inc.
6731 Whittier Ave
McLean, VA 22101 USA

Subject: Response to the ATCB Comments Reference Number 110704 for clarification on RIM BlackBerry Wireless Handheld FCC ID L6ARAS10WW.

The following addresses your inquiry Reference Number 110704**:**

1. The bandedge radiated emission results are included in the attached file RIM-0111-0409-01a.

2. Please see FCC correspondence dated November 10, 2004 for clarification.

3. Currently we are requesting a verification for this application. For future applications we would like to request certification route as per your suggestion.

4. The TX frequency range of 2402-2483 MHz is incorrect. The correct TX frequency range is 2412-2462 MHz.

5. The handheld was tested with 15mm separation distance to be consistent with the users manual. Below is the test data

f (MHz)	**Limits / Measured**	**SAR (W/kg) 1 g/ 10 g**	**Dielectric Parameters**		**Liquid Temp (°C)**
			ε_r	σ [S/m]	
2450 Muscle	Measured	56.1 / 25.8	50.3	1.97	22.4
	Recommended Limits	53.6 / 25.4	51.5	2.00	N/A

Table 1: System accuracy verification

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Mode	f (MHz)	Cond. Output Power (dBm)	Liquid Temp (°C)	Configuration	SAR, averaged over 1 g (W/kg)
802.11b	2412.00	15.5	22.5	Headset attached	1.15
	2437.00	15.2	22.6	Headset attached	**1.27**
	2462.00	15.0	22.5	Headset attached	1.13

Table 2: Body worn with a distance of 15 mm between the backside of handheld and flat phantom

6. The additional measurements requested are in Table 3 below. In addition to the four holsters that were tested, we are introducing a new Ruggedized Holster with this handheld. Table 3, below shows SAR results for the body worn holsters with low and high channels as well as SAR values for the new Ruggedized holster:

New Holster Type	Model / Part Number	Separation (mm)
Ruggedized	HDW-08617-XXX	18

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Figure 1: Ruggedized holster

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Mode	f (MHz)	Cond. Output Power (dBm)	Liquid Temp (°C)	Holster Type	SAR, averaged over 1 g (W/kg)
802.11b	2412.00	15.5	22.5	Vertical Foam Holster	0.85
	2437.00	15.2	22.6	Vertical Foam Holster	1.03
	2462.00	15.0	22.5	Vertical Foam Holster	0.90
	2412.00	15.5	22.3	Plastic Holster	1.17
	2437.00	15.2	-	Plastic Holster	-
	2462.00	15.0	22.7	Plastic Holster	0.60
	2412.00	15.5	22.5	Leather Holster	0.90
	2437.00	15.2	-	Leather Holster	-
	2462.00	15.0	22.4	Leather Holster	0.67
	*2437.00	15.2	22.0	Ruggedized	0.69

* Supplement C: Middle channel testing is sufficient only if SAR < 3dB below limit see PN 02-1438

Table 3: Body worn SAR values with holsters

7. The highest SAR value tested is highlighted to be 1.27 W/kg with 15 mm separation distance as sown in the Table 2.

8. The photos below are for the 15 mm separation distance configuration:

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Figure 2: Photos with 15 mm separation distance

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9. Re-measured conducted power values are shown in the Table 4, which are in tolerance with the EMC report.

f (MHz)	Cond. Output Power (dBm)
2412.00	15.5
2437.00	15.2
2462.00	15.0

Table 4: Conducted power values

10. We will modify our Safety Information Booklet to the following statement:

"To maintain compliance with FCC and IC RF exposure guidelines when carrying the handheld on your body, use RIM-supplied or approved accessories or accessories that contain no metallic components and provide a separation distance to the body of at least 15 mm. Use of other accessories might violate FCC and IC RF exposure guidelines and might void any warranty applicable to the handheld. For data operation (when you do not use a body-worn accessory and are not holding the handheld at the ear), position the handheld at least 15 mm (0.60 inches) from the body"

11. Please refer to the Appendix B: Calibration Certificate, for the probe tip diameter information.

12. Please refer to the Appendix B: Calibration Certificate, for the probe linearity, axial and special isotropy, boundary effect error and calibration uncertainty information.

13. Please refer to the Appendix B: Calibration Certificate, for probe sensor location and distance. We are using a standard dosimetric SPEAG probe and DASY 4 automated system. It is the same system and probe used to test our previous products that were approved by ATCB and FCC.

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Please do not hesitate to contact the undersigned should you have any questions.

Yours truly,

Masud S. Attayi, P.Eng.
Senior Compliance Engineer
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Appendix A: SAR plots and data

Title

SubTitle

November 10, 2004 04:01 PM

Frequency	e'	e''
2.400000000 GHz	50.5521	14.2543
2.405000000 GHz	50.5368	14.2543
2.410000000 GHz	50.5199	14.2890
2.415000000 GHz	50.4863	14.3004
2.420000000 GHz	50.4676	14.3087
2.425000000 GHz	50.4327	14.3184
2.430000000 GHz	50.4191	14.3425
2.435000000 GHz	50.3872	14.3600
2.440000000 GHz	50.3670	14.3960
2.445000000 GHz	50.3512	14.4233
2.450000000 GHz	50.3318	14.4443
2.455000000 GHz	50.3206	14.4627
2.460000000 GHz	50.2911	14.4927
2.465000000 GHz	50.2834	14.5253
2.470000000 GHz	50.2848	14.5798
2.475000000 GHz	50.2690	14.6081
2.480000000 GHz	50.2686	14.6248
2.485000000 GHz	50.2627	14.6633
2.490000000 GHz	50.2584	14.6851
2.495000000 GHz	50.2207	14.7120
2.500000000 GHz	50.2191	14.7382

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Date/Time: 11/10/04 16:09:18

Test Laboratory: RIM

Dipole validation 2450 muscle tissue; Ambient temp. 24.2 deg. cel.; Liquid temp. 22.5 deg. cel.

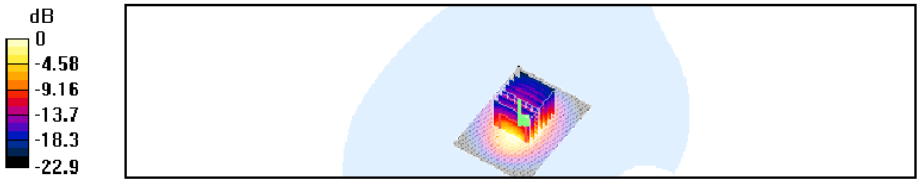
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:xxx

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2450 MHz; σ = 1.97 mho/m; ε_r = 50.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1644; ConvF(4.61, 4.61, 4.61); Calibrated: 21/04/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 27/08/2004
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.3 Build 22; Postprocessing SW: SEMCAD, V1.8 Build 127

Unnamed procedure/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 64.3 mW/g

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 189.8 V/m; Power Drift = -0.008 dB
Peak SAR (extrapolated) = 125.7 W/kg
SAR(1 g) = 56.1 mW/g; SAR(10 g) = 25.8 mW/g
Maximum value of SAR (measured) = 62.4 mW/g



0 dB = 62.4mW/g

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Date/Time: 11/11/04 12:37:17

Test Laboratory: RIM

Body worn with 15 mm distance; Low chan; headset connected; Ambient temp. 25.0 deg. cel.; Liquid temp. 22.5 deg. cel

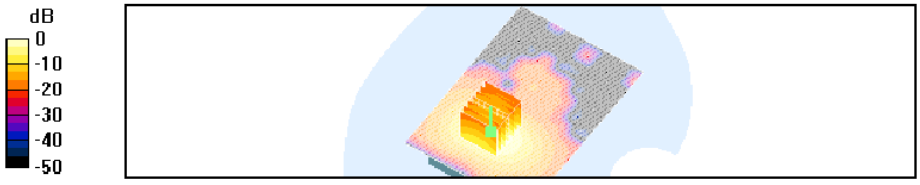
DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: 802.11; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2412 MHz; σ = 1.97 mho/m; ε_r = 50.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1644; ConvF(4.61, 4.61, 4.61); Calibrated: 21/04/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 27/08/2004
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.3 Build 22; Postprocessing SW: SEMCAD, V1.8 Build 127

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.55 V/m; Power Drift = -0.3 dB
Peak SAR (extrapolated) = 2.42 W/kg
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.541 mW/g
Maximum value of SAR (measured) = 1.29 mW/g

Unnamed procedure/Area Scan (101x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.32 mW/g



0 dB = 1.32mW/g

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Date/Time: 11/11/04 13:57:03

Test Laboratory: RIM

Body worn with 15 mm distance; Mid chan; Sanyo GS battery; Ambient temp. 24.9 deg. cel.; Liquid temp. 22.5 deg. cel

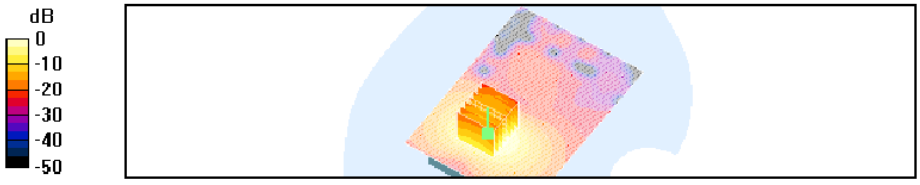
DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: 802.11; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2437 MHz; σ = 1.97 mho/m; ε_r = 50.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1644; ConvF(4.61, 4.61, 4.61); Calibrated: 21/04/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 27/08/2004
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.3 Build 22; Postprocessing SW: SEMCAD, V1.8 Build 127

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.22 V/m; Power Drift = 0.3 dB
Peak SAR (extrapolated) = 2.7 W/kg
SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.591 mW/g
Maximum value of SAR (measured) = 1.43 mW/g

Unnamed procedure/Area Scan (101x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.46 mW/g



0 dB = 1.46mW/g

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Test Laboratory: RIM

Body worn with 15 mm space; High chan; Sanyo GS battery; headset connected; Ambient temp. 25.1 deg. cel.; Liquid temp. 22.5 deg. cel

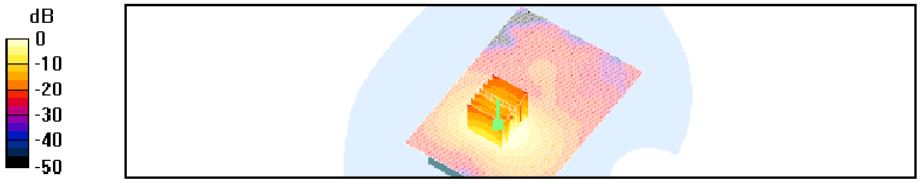
DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: 802.11; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2462 MHz; σ = 1.97 mho/m; ε_r = 50.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1644; ConvF(4.61, 4.61, 4.61); Calibrated: 21/04/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 27/08/2004
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.3 Build 22; Postprocessing SW: SEMCAD, V1.8 Build 127

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.74 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 2.38 W/kg
SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.530 mW/g
Maximum value of SAR (measured) = 1.26 mW/g

Unnamed procedure/Area Scan (101x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.3 mW/g



0 dB = 1.3mW/g

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Date/Time: 11/11/04 10:53:34

Test Laboratory: RIM

Horizontal Foam Holster Body worn; Low chan; Sanyo GS battery; headset connected; Ambient temp. 25.1 deg. cel.; Liquid temp. 22.8 deg. cel

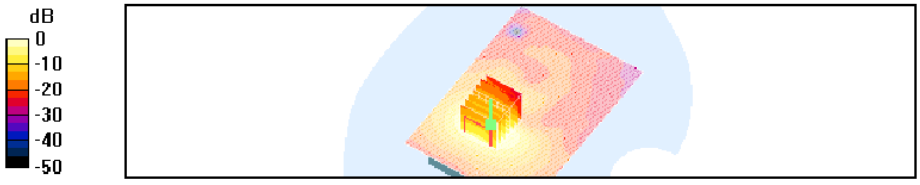
DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: 802.11; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2412 MHz; σ = 1.97 mho/m; ε_r = 50.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1644; ConvF(4.61, 4.61, 4.61); Calibrated: 21/04/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 27/08/2004
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.3 Build 22; Postprocessing SW: SEMCAD, V1.8 Build 127

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.4 V/m; Power Drift = -0.0003 dB
Peak SAR (extrapolated) = 1.78 W/kg
SAR(1 g) = 0.849 mW/g; SAR(10 g) = 0.397 mW/g
Maximum value of SAR (measured) = 0.930 mW/g

Unnamed procedure/Area Scan (101x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.989 mW/g



0 dB = 0.989mW/g

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Test Laboratory: RIM

Horizontal Foam Holster Body worn; Mid chan; Sanyo GS battery; Ambient temp. 24.8 deg. cel.; Liquid temp. 22.7 deg. cel

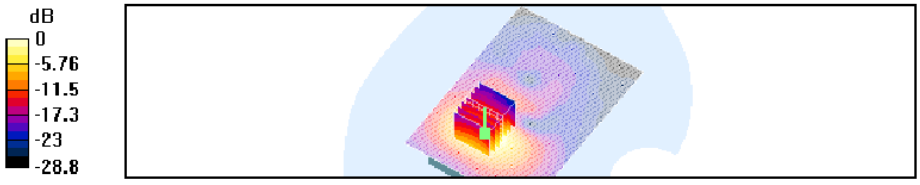
DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: 802.11; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2437 MHz; σ = 1.97 mho/m; ε_r = 50.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1644; ConvF(4.61, 4.61, 4.61); Calibrated: 21/04/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 27/08/2004
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.3 Build 22; Postprocessing SW: SEMCAD, V1.8 Build 127

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.78 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 2.1 W/kg
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.484 mW/g
Maximum value of SAR (measured) = 1.16 mW/g

Unnamed procedure/Area Scan (101x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.26 mW/g



0 dB = 1.26mW/g

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Date/Time: 11/11/04 11:35:05

Test Laboratory: RIM

Horizontal Foam Holster Body worn; High chan; Sanyo GS battery; headset connected; Ambient temp. 25.0 deg. cel.; Liquid temp. 22.6 deg. cel

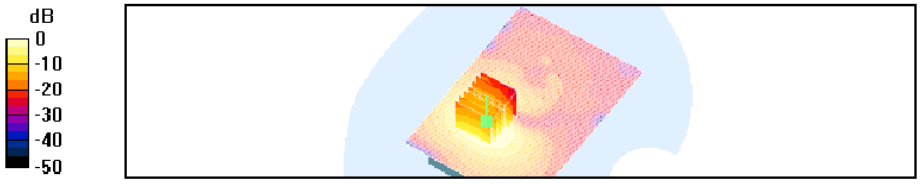
DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: 802.11; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2462 MHz; σ = 1.97 mho/m; ε_r = 50.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1644; ConvF(4.61, 4.61, 4.61); Calibrated: 21/04/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 27/08/2004
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.3 Build 22; Postprocessing SW: SEMCAD, V1.8 Build 127

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.01 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 1.87 W/kg
SAR(1 g) = 0.898 mW/g; SAR(10 g) = 0.420 mW/g
Maximum value of SAR (measured) = 0.992 mW/g

Unnamed procedure/Area Scan (101x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.11 mW/g



0 dB = 1.11mW/g

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Date/Time: 11/11/04 15:55:06

Test Laboratory: RIM

Plastic Holster Body worn; Low chan; Sanyo GS battery; Headset connected; Ambient temp. 24.8 deg. cel.; Liquid temp. 22.3 deg. cel

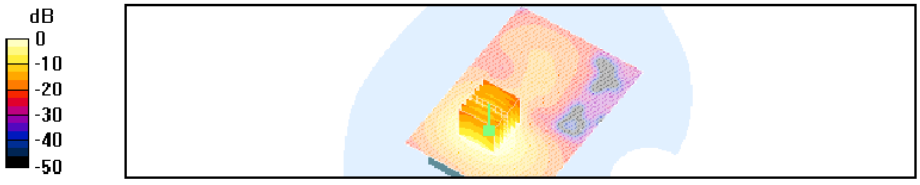
DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: 802.11; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2412 MHz; σ = 1.97 mho/m; ε_r = 50.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1644; ConvF(4.61, 4.61, 4.61); Calibrated: 21/04/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 27/08/2004
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.3 Build 22; Postprocessing SW: SEMCAD, V1.8 Build 127

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.62 V/m; Power Drift = 0.3 dB
Peak SAR (extrapolated) = 2.3 W/kg
SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.586 mW/g
Maximum value of SAR (measured) = 1.32 mW/g

Unnamed procedure/Area Scan (101x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.3 mW/g



0 dB = 1.3mW/g

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Date/Time: 11/12/04 08:18:28

Test Laboratory: RIM

Leather Holster Body worn; Low chan; Sanyo GS battery; Headset connected; Ambient temp. 24.3 deg. cel.; Liquid temp. 22.5 deg. cel

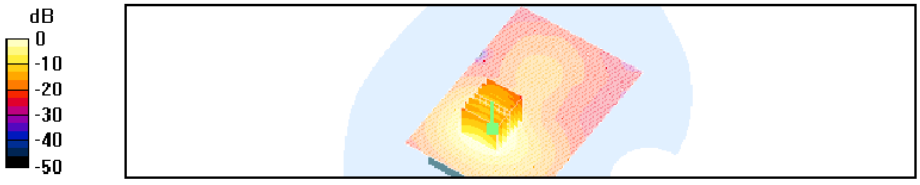
DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: 802.11; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2412 MHz; σ = 1.97 mho/m; ε_r = 50.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1644; ConvF(4.61, 4.61, 4.61); Calibrated: 21/04/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 27/08/2004
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.3 Build 22; Postprocessing SW: SEMCAD, V1.8 Build 127

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.74 V/m; Power Drift = -0.2 dB
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 0.904 mW/g; SAR(10 g) = 0.455 mW/g
Maximum value of SAR (measured) = 1.01 mW/g

Unnamed procedure/Area Scan (101x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.01 mW/g



0 dB = 1.01mW/g

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Date/Time: 11/12/04 13:22:58

Test Laboratory: RIM

Ruggedized Holster Body worn; Mid chan; Sanyo GS battery; Headset connected; Ambient temp. 24.1 deg. cel.; Liquid temp. 22.0 deg. cel

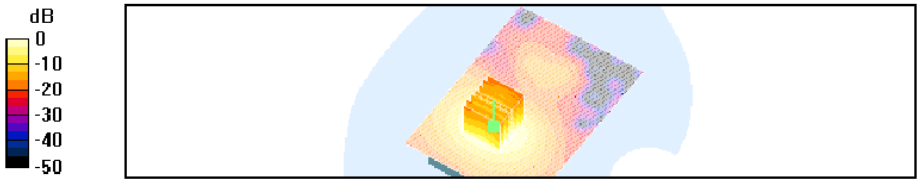
DUT: BlackBerry Wireless Handheld; Type: Sample

Communication System: 802.11; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2437 MHz; σ = 1.97 mho/m; ε_r = 50.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ET3DV6 - SN1644; ConvF(4.61, 4.61, 4.61); Calibrated: 21/04/2004
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 27/08/2004
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.3 Build 22; Postprocessing SW: SEMCAD, V1.8 Build 127

Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.76 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.685 mW/g; SAR(10 g) = 0.349 mW/g
Maximum value of SAR (measured) = 0.753 mW/g

Unnamed procedure/Area Scan (101x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.769 mW/g



0 dB = 0.769mW/g

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Appendix B: Probe calibration certificate

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

Client RIM

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1644
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	November 21, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

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

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

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
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 (SPEAG, in house check Oct-03)	In house check: Oct 05
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 (SPEAG, in house check Oct-03)	In house check: Oct 05

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

Date Issued: November 21, 2003

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

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Schmid & Partner Engineering AG

s p e a g

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Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Probe ET3DV6

SN:1644

Manufactured:	November 7, 2001
Last calibration:	October 21, 2002
Recalibrated:	November 21, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

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DASY - Parameters of Probe: ET3DV6 SN:1644

Sensitivity in Free Space

Diode Compression

NormX	1.71 $\mu V/(V/m)^2$	DCP X	95	mV
NormY	1.86 $\mu V/(V/m)^2$	DCP Y	95	mV
NormZ	1.82 $\mu V/(V/m)^2$	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	6.8 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.8 ± 9.5% (k=2)	Alpha	0.48
ConvF Z	6.8 ± 9.5% (k=2)	Depth	2.08

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

Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	5.4 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.4 ± 9.5% (k=2)	Alpha	0.47
ConvF Z	5.4 ± 9.5% (k=2)	Depth	2.66

Boundary Effect

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

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	9.1	4.9
SAR_{be} [%]	With Correction Algorithm	0.0	0.0

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

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	13.3	8.9
SAR_{be} [%]	With Correction Algorithm	0.1	0.1

Sensor Offset

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

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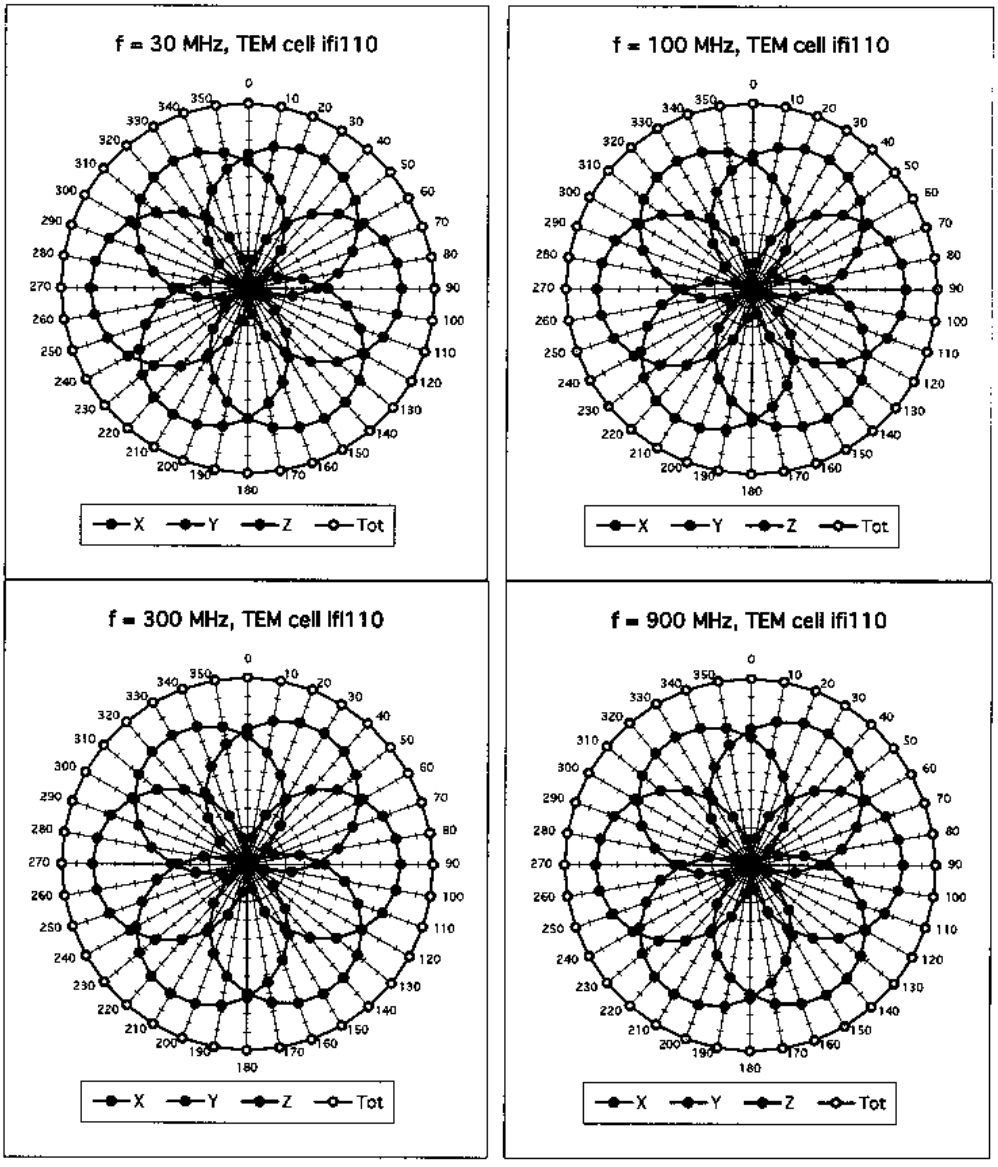
Receiving Pattern (ϕ), θ = 0°



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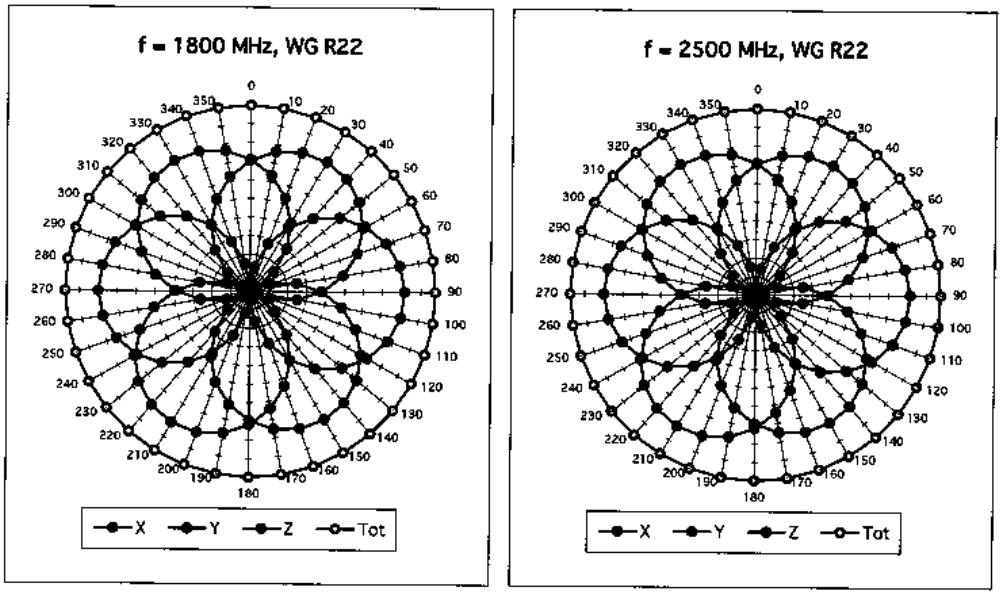
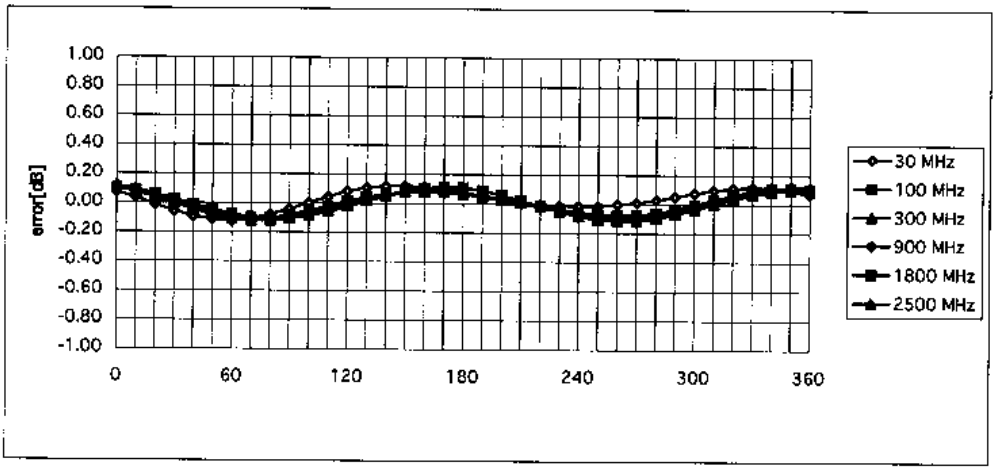


Isotropy Error (ϕ), θ = 0°



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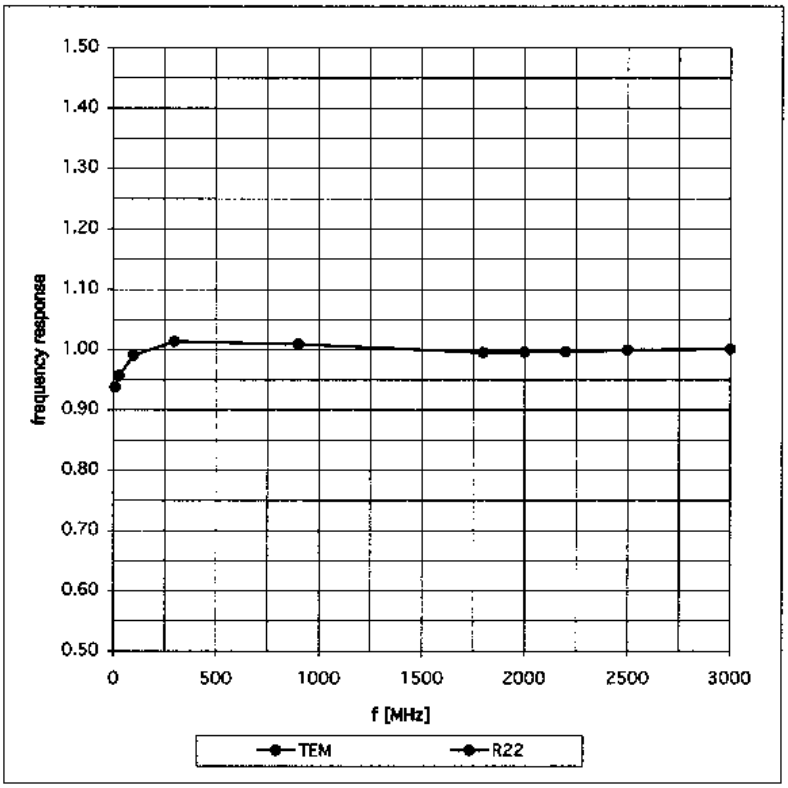
Frequency Response of E-Field

(TEM-Cell:ifi110, Waveguide R22)



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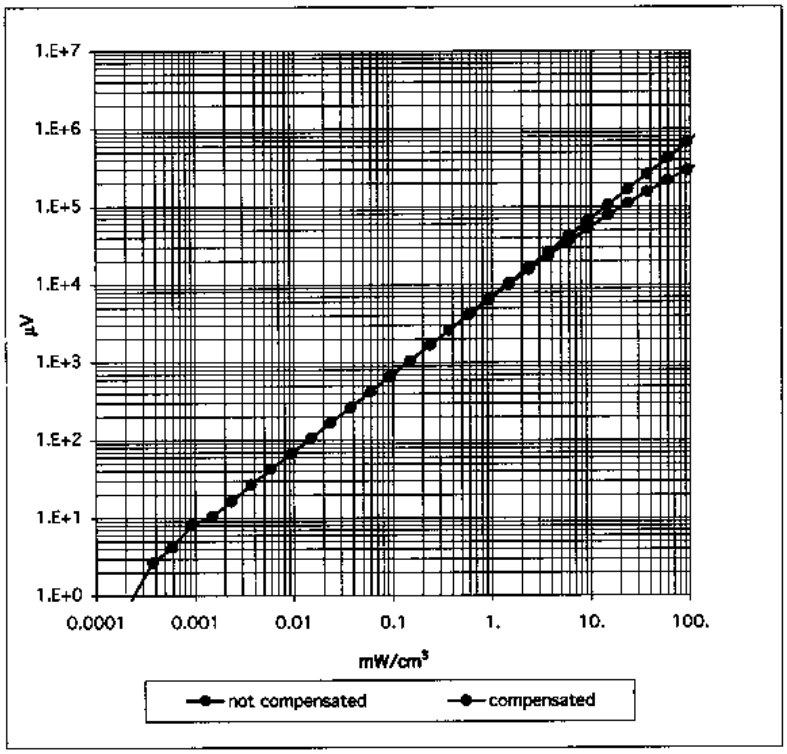
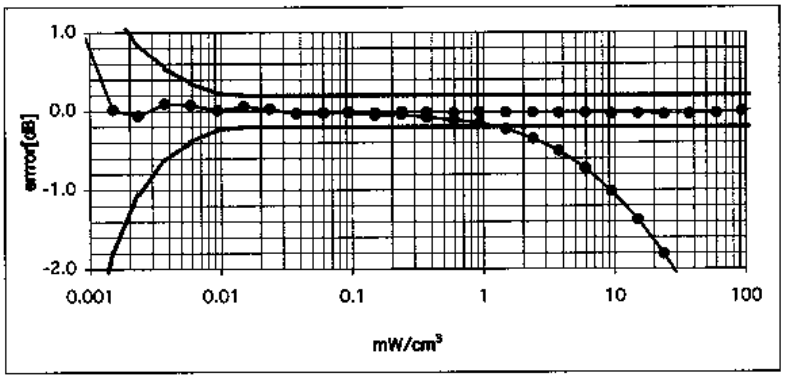
Dynamic Range f(SARhead)

(Waveguide R22)





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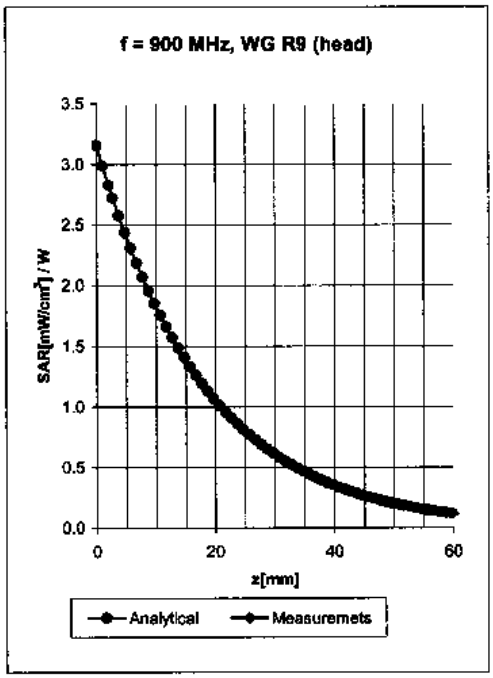
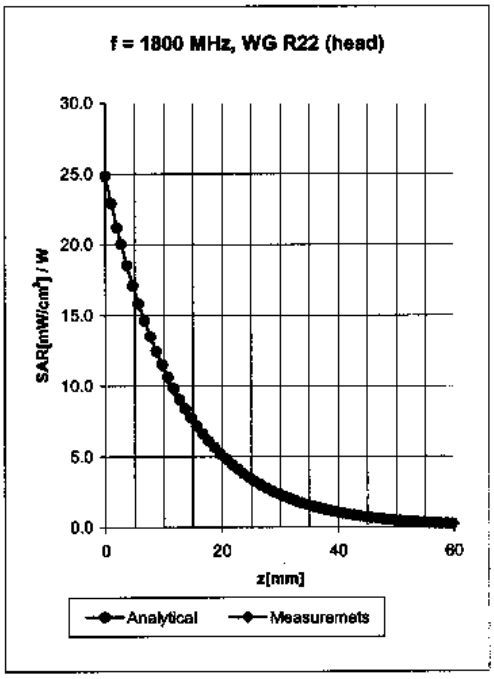
Conversion Factor Assessment





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	6.8 ±9.5% (k=2)	Boundary effect:	
ConvF Y	6.8 ±9.5% (k=2)	Alpha	0.48
ConvF Z	6.8 ±9.5% (k=2)	Depth	2.08

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

Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	5.4 ±9.5% (k=2)	Boundary effect:	
ConvF Y	5.4 ±9.5% (k=2)	Alpha	0.47
ConvF Z	5.4 ±9.5% (k=2)	Depth	2.66

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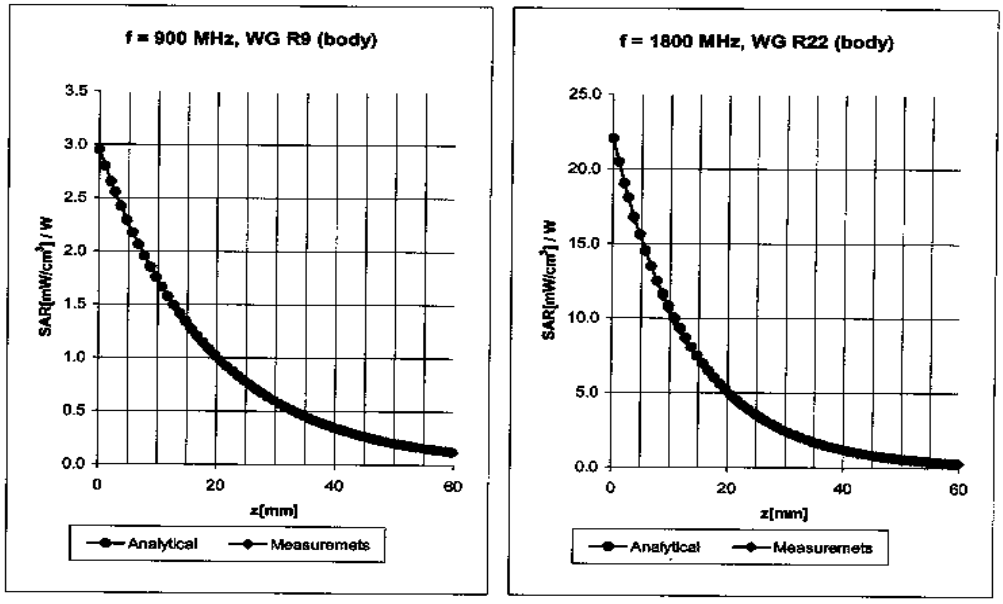
Conversion Factor Assessment



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	0.44
ConvF Z	6.4 ± 9.5% (k=2)	Depth	2.35

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

Valid for f=1710-1910 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	2.61

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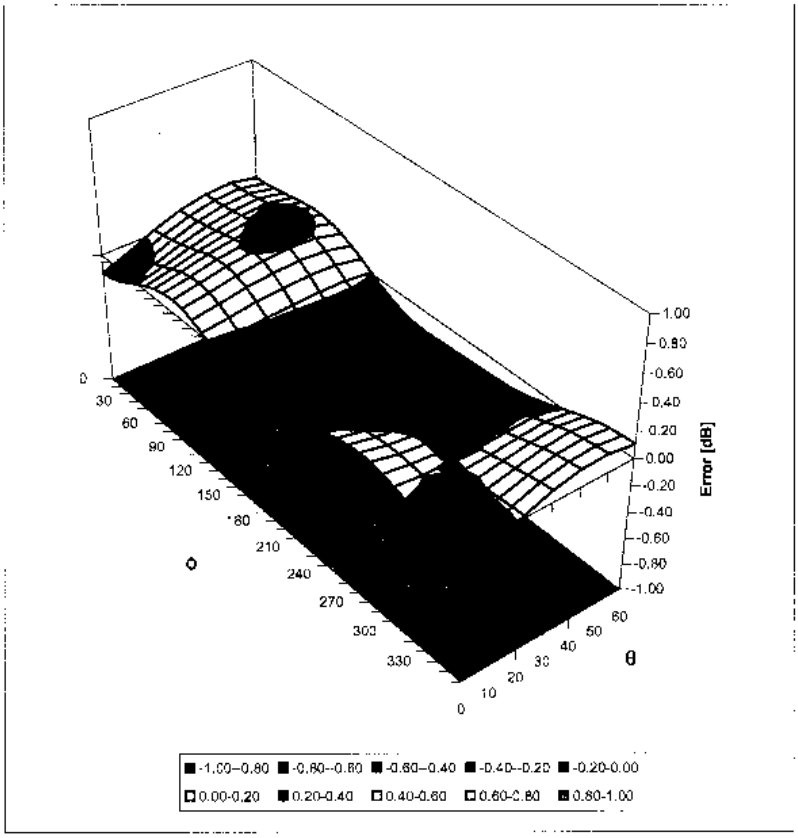
Deviation from Isotropy in HSL

Error (θ,φ), f = 900 MHz



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Applications
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• EASY4
• Probes
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ES3DV3 - Isotropic Dos-Probe
EX3DV4 - Isotropic Dos-Probe
ET1DV3 - D-Probe
ER3DV6 - Isotropic E-Probe
EUV3 - Universal Vector E-Probe
H3DV6 - Isotropic H-Probe
HUV4 - Universal Vector H-Probe
T1V3 - Temp-Probe
DP1 - Dummy-Probe
• Data Acquisition System
• Software
• Phantoms
• Robots
• Validation Kits & Calibration Dipoles
• Hearing Aid Compatibility (HAC) Ext
• Tissue Simulating Liquids
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ET3DV6 / ET3DV6R ISOTROPIC E-FIELD PROBE FOR DOSIME MEASUREMENTS

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system (E Built-in shielding against static charges PEEK enclosure material (resistant to organic solven DGBE)
Calibration	Basic Broad Band Calibration in air: 10-3000 MHz Conversion Factors (CF) for HSL 900 and HSL 1800 Additional CF for other liquids and frequencies upon
Frequency	10 MHz to 3 GHz; Linearity: ± 0.2 dB (30 MHz to 3
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Optical Surface Detection	± 0.2 mm repeatability in air and clear liquids over reflecting surfaces (ET3DV6 only)
Dimensions	Overall length: 330 mm (Tip: 16 mm) Tip diameter: 6.8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.7 mm
Application	General dosimetric measurements up to 2.5GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

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Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland

Client **RIM**

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1644
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	April 20, 2004 (additional conversion factors)
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

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 +/- 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 E442	GB37480704	6-Nov-03 (METAS, No. 252-0254)	Nov-04
Power sensor HP 8481A	US37292783	6-Nov-03 (METAS, No. 252-0254)	Nov-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 (SPEAG, in house check Oct-03)	In house check: Oct 05
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 (SPEAG, in house check Oct-03)	In house check: Oct 05

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

Date Issued: April 20, 2004

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.

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Probe ET3DV6

SN:1644

Manufactured:	November 7, 2001
Last calibrated:	November 21, 2003
Recalibrated:	April 20, 2004

Additional Conversion Factors

(Note: non-compatible with DASY2 system!)

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DASY - Parameters of Probe: ET3DV6 SN:1644

Sensitivity in Free Space

Diode Compression[A]

NormX	**1.71** $\mu V/(V/m)^2$	DCP X	**95**	mV
NormY	**1.86** $\mu V/(V/m)^2$	DCP Y	**95**	mV
NormZ	**1.82** $\mu V/(V/m)^2$	DCP Z	**95**	mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Plese see Page 4.

Sensor Offset

Probe Tip to Sensor Center	**2.7** mm
Optical Surface Detection	**in tolerance**

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] numerical linearization parameter: uncertainty not required

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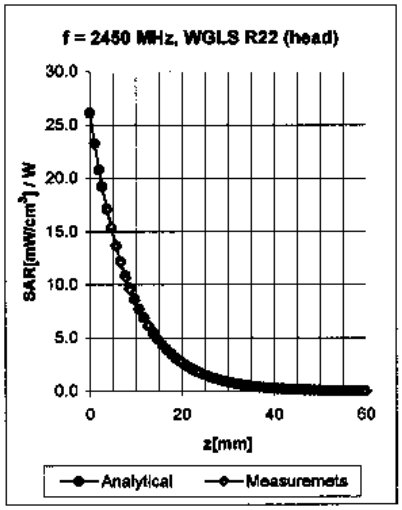
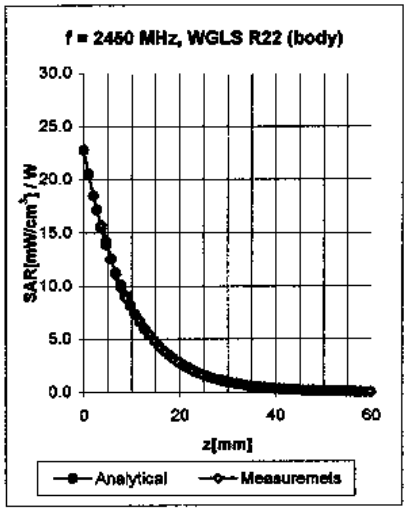
Conversion Factor Assessment





f [MHz]	Validity [MHz][B]	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	1.05	1.87	4.75 ± 9.7% (k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	1.39	1.54	4.61 ± 9.7% (k=2)

[B] The total standard uncertainty is calculated as root-sum-square of standard uncertainty of the Conversion Factor at calibration frequency and the standard uncertainty for the indicated frequency band.

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Deviation from Isotropy in HSL

Error (θ,φ), f = 900 MHz