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	Author Data <b>Daoud Attayi</b>	Dates of Test <b>Nov. 06 - 12, 2003</b>	Test Report No <b>RIM-0060-0311-04</b>

APPENDIX A: SAR DISTRIBUTION COMPARISON FOR THE ACCURACY VERIFICATION

Author Data <b>Daoud Attayi</b>	Dates of Test <b>Nov. 06 - 12, 2003</b>	Test Report No <b>RIM-0060-0311-04</b>	FCC ID <b>L6ARAN21CN</b>
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Date/Time: 11/06/03 14:07:11

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.8 °C Liquid Temperature : 22.7 °C

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1  
 Medium: 835 MHz Head ( $\sigma = 0.89$  mho/m,  $\epsilon_r = 40.67$ ,  $\rho = 1000$  kg/m<sup>3</sup>)

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(6.6, 6.6, 6.6); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (81x151x1):** Measurement grid: dx=10mm, dy=10mm

Reference Value = 113.8 V/m

Power Drift = -0.06 dB

Maximum value of SAR = 10.5 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

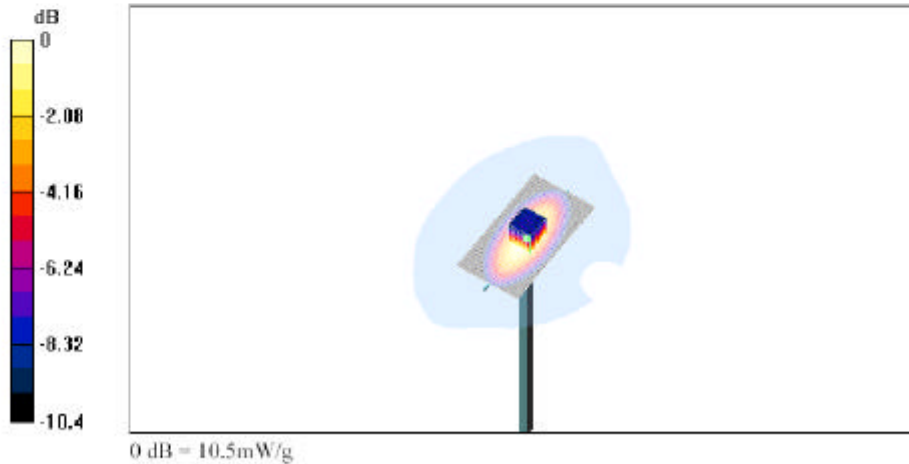
Peak SAR (extrapolated) = 14.1 W/kg

SAR(1 g) = 9.82 mW/g; SAR(10 g) = 6.4 mW/g

Reference Value = 113.8 V/m

Power Drift = -0.06 dB

Maximum value of SAR = 10.5 mW/g



file://C:\Program%20Files\DASY4\Print\_Templates\Dipole%20validation%20for%2083... 21/11/2003

Author Data <b>Daoud Attayi</b>	Dates of Test <b>Nov. 06 - 12, 2003</b>	Test Report No <b>RIM-0060-0311-04</b>	FCC ID <b>L6ARAN21CN</b>
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Date/Time: 11/11/03 13:32:52

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.8 °C Liquid Temperature : 22.9 °C

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:545**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL1900 ( $\sigma = 1.43 \text{ mho/m}$ ,  $\epsilon_r = 40.15$ ,  $\rho = 1000 \text{ kg/m}^3$ )

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(5.4, 5.4, 5.4); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (81x101x1):** Measurement grid: dx=10mm, dy=10mm

Reference Value = 189.8 V/m

Power Drift = -0.004 dB

Maximum value of SAR = 47.1 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

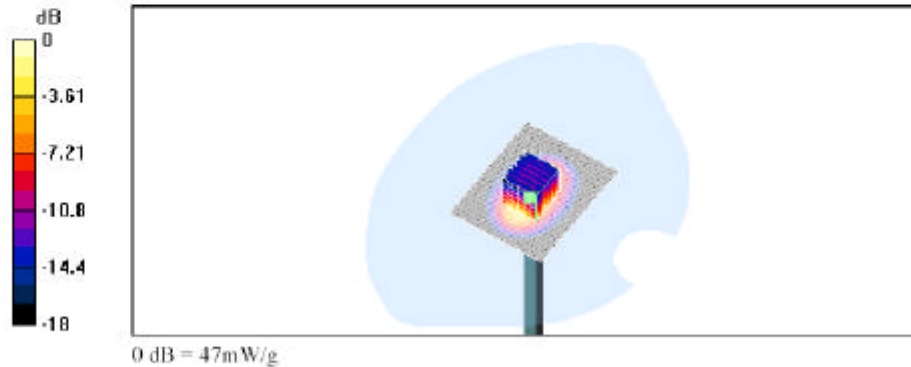
Peak SAR (extrapolated) = 75.5 W/kg

SAR(1 g) = 42 mW/g; SAR(10 g) = 21.5 mW/g


Reference Value = 189.8 V/m

Power Drift = -0.004 dB

Maximum value of SAR = 47 mW/g



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APPENDIX B: SAR DISTRIBUTION PLOTS FOR HEAD CONFIGURATION

Author Data <b>Daoud Attayi</b>	Dates of Test <b>Nov. 06 - 12, 2003</b>	Test Report No <b>RIM-0060-0311-04</b>	FCC ID <b>L6ARAN21CN</b>
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Date/Time: 11/07/03 11:31:47

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.5 °C Liquid Temperature : 22.4 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Touch left side; High Chan; Cellular Band**

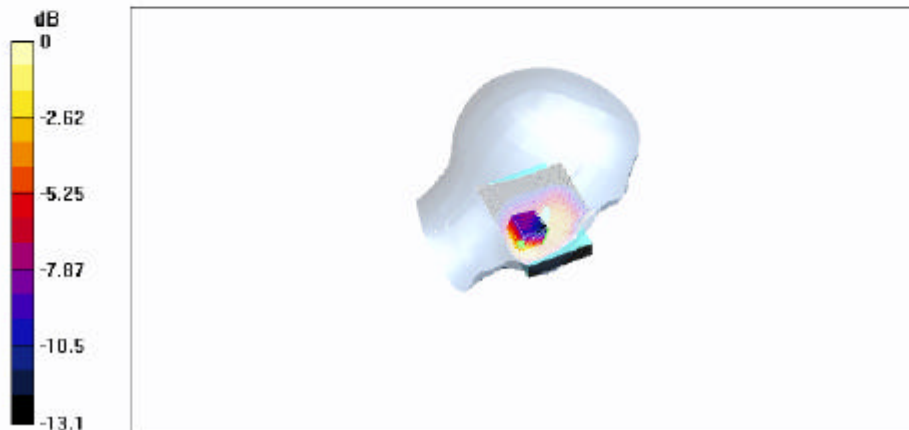
Communication System: Cellular CDMA ; Frequency: 848.31 MHz; Duty Cycle: 1:1  
 Medium: 835 MHz Head ( $\sigma = 0.89$  mho/m,  $\epsilon_r = 40.67$ ,  $\rho = 1000$  kg/m<sup>3</sup>)  
 Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(6.6, 6.6, 6.6); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1):** Measurement grid: dx=10mm, dy=10mm  
 Reference Value = 11.3 V/m  
 Power Drift = -0.1 dB  
 Maximum value of SAR = 1.4 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
 Peak SAR (extrapolated) = 2.05 W/kg  
 SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.749 mW/g  
 Reference Value = 11.3 V/m  
 Power Drift = -0.1 dB  
 Maximum value of SAR = 1.4 mW/g



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Author Data <b>Daoud Attayi</b>	Dates of Test <b>Nov. 06 - 12, 2003</b>	Test Report No <b>RIM-0060-0311-04</b>	FCC ID <b>L6ARAN21CN</b>
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Date/Time: 11/07/03 12:16:47

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.5 °C Liquid Temperature : 22.7 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Tilted left side; Mid.  
 Chan; Cellular Band**

Communication System: Cellular CDMA ; Frequency: 836.52 MHz;Duty Cycle: 1:1  
 Medium: 835 MHz Head ( $\sigma = 0.89$  mho/m,  $\epsilon_r = 40.67$ ,  $\rho = 1000$  kg/m<sup>3</sup>)

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(6.6, 6.6, 6.6); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1);** Measurement grid: dx=10mm, dy=10mm

Reference Value = 12 V/m

Power Drift = -0.3 dB

Maximum value of SAR = 0.498 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0;** Measurement grid: dx=5mm, dy=5mm, dz=5mm

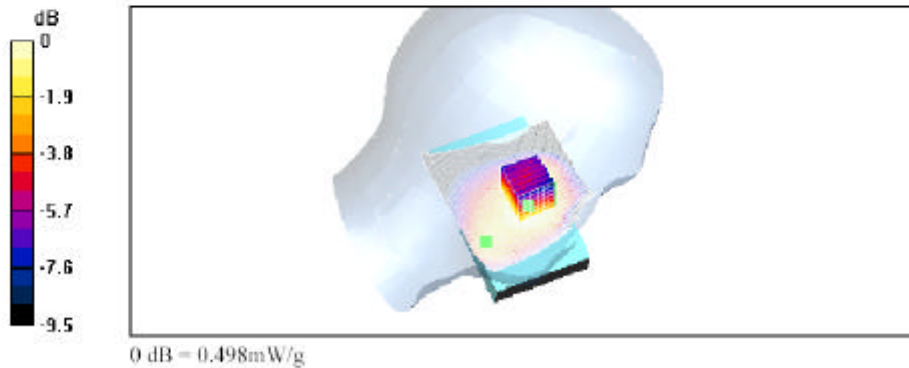
Peak SAR (extrapolated) = 0.614 W/kg

SAR(1 g) = 0.48 mW/g; SAR(10 g) = 0.356 mW/g

Reference Value = 12 V/m

Power Drift = -0.3 dB

Maximum value of SAR = 0.498 mW/g



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Author Data <b>Daoud Attayi</b>	Dates of Test <b>Nov. 06 - 12, 2003</b>	Test Report No <b>RIM-0060-0311-04</b>	FCC ID <b>L6ARAN21CN</b>
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Date/Time: 11/07/03 15:05:18

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.5 °C Liquid Temperature : 22.4 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Touch right; Mid. Chan; Cellular Band**

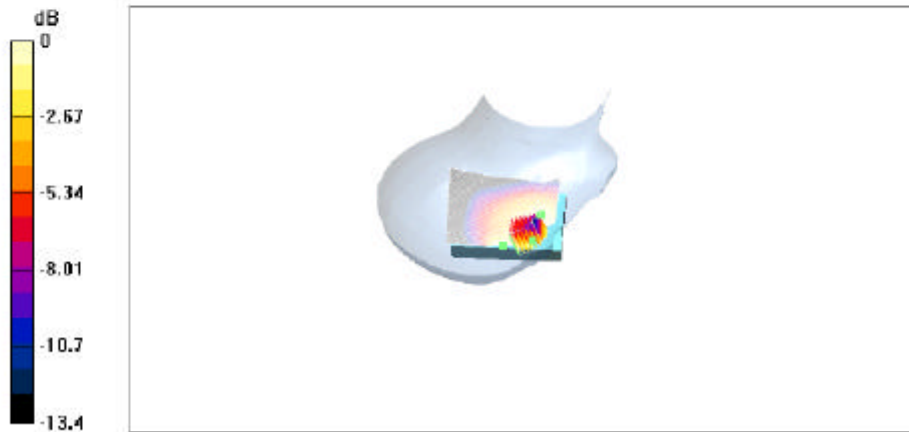
Communication System: Cellular CDMA ; Frequency: 836.52 MHz;Duty Cycle: 1:1  
 Medium: 835 MHz Head ( $\sigma = 0.89$  mho/m,  $\epsilon_r = 40.67$ ,  $\rho = 1000$  kg/m<sup>3</sup>)  
 Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(6.6, 6.6, 6.6); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (91x121x1):** Measurement grid: dx=10mm, dy=10mm  
 Reference Value = 11.9 V/m  
 Power Drift = -0.5 dB  
 Maximum value of SAR = 0.703 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
 Peak SAR (extrapolated) = 0.894 W/kg  
 SAR(1 g) = 0.629 mW/g; SAR(10 g) = 0.432 mW/g  
 Reference Value = 11.9 V/m  
 Power Drift = -0.5 dB  
 Maximum value of SAR = 0.675 mW/g



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Author Data <b>Daoud Attayi</b>	Dates of Test <b>Nov. 06 - 12, 2003</b>	Test Report No <b>RIM-0060-0311-04</b>	FCC ID <b>L6ARAN21CN</b>
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Date/Time: 11/10/03 12:16:46

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.5 °C Liquid Temperature : 22.4 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Tilted right side; Mid.  
 Chan; Cellular Band**

Communication System: Cellular CDMA ; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium: 835 MHz Head ( $\sigma = 0.89$  mho/m,  $\epsilon_r = 40.67$ ,  $\rho = 1000$  kg/m<sup>3</sup>)

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(6.6, 6.6, 6.6); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1);** Measurement grid: dx=10mm, dy=10mm

Reference Value = 14.6 V/m

Power Drift = 0.08 dB

Maximum value of SAR = 0.386 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0;** Measurement grid: dx=5mm, dy=5mm, dz=5mm

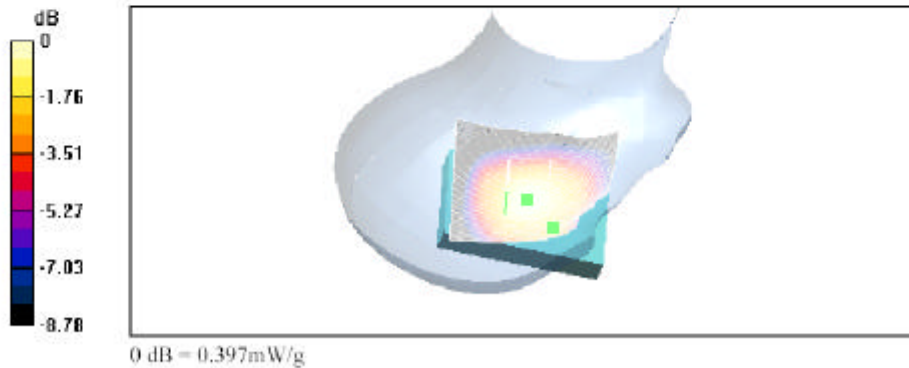
Peak SAR (extrapolated) = 0.499 W/kg

SAR(1 g) = 0.383 mW/g; SAR(10 g) = 0.287 mW/g

Reference Value = 14.6 V/m


Power Drift = 0.08 dB

Maximum value of SAR = 0.397 mW/g



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Date/Time: 11/11/03 15:59:31

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.7 °C Liquid Temperature : 22.6 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Touch left side; High Chan; PCS Band**

Communication System: PCS CDMA 1900; Frequency: 1908.75 MHz; Duty Cycle: 1:1

Medium: HSL1900 ( $\sigma = 1.43$  mho/m,  $\epsilon_r = 40.15$ ,  $\rho = 1000$  kg/m<sup>3</sup>)

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(5.4, 5.4, 5.4); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1):** Measurement grid: dx=10mm, dy=10mm

Reference Value = 16.1 V/m

Power Drift = -0.2 dB

Maximum value of SAR = 1.44 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

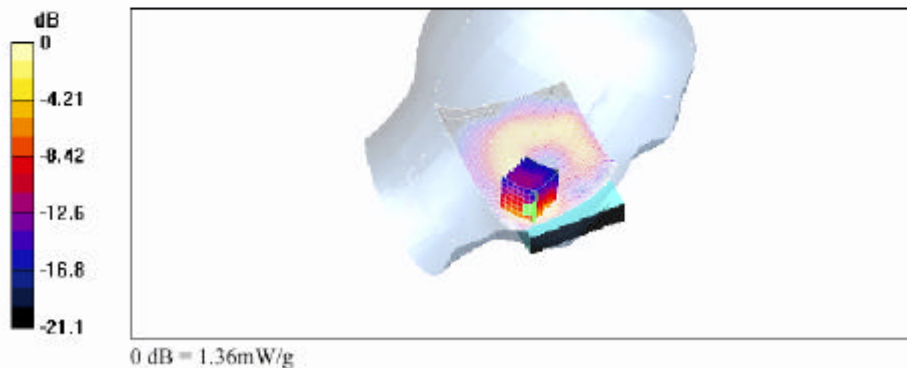
Peak SAR (extrapolated) = 2.37 W/kg

SAR(1 g) = 1.2 mW/g; SAR(10 g) = 0.589 mW/g


Reference Value = 16.1 V/m

Power Drift = -0.2 dB

Maximum value of SAR = 1.36 mW/g



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<b>Daoud Attayi</b>	<b>Nov. 06 - 12, 2003</b>	<b>RIM-0060-0311-04</b>	<b>L6ARAN21CN</b>

Date/Time: 11/11/03 17:15:24

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.7 °C Liquid Temperature : 22.8 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Tilted left side; Mid. Chan; PCS Band**

Communication System: PCS CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
Medium: HSL1900 ( $\sigma = 1.43 \text{ mho/m}$ ,  $\epsilon_r = 40.15$ ,  $\rho = 1000 \text{ kg/m}^3$ )

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(5.4, 5.4, 5.4); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1);** Measurement grid: dx=10mm, dy=10mm

Reference Value = 15.6 V/m

Power Drift = -0.4 dB

Maximum value of SAR = 0.419 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0;** Measurement grid: dx=5mm, dy=5mm, dz=5mm

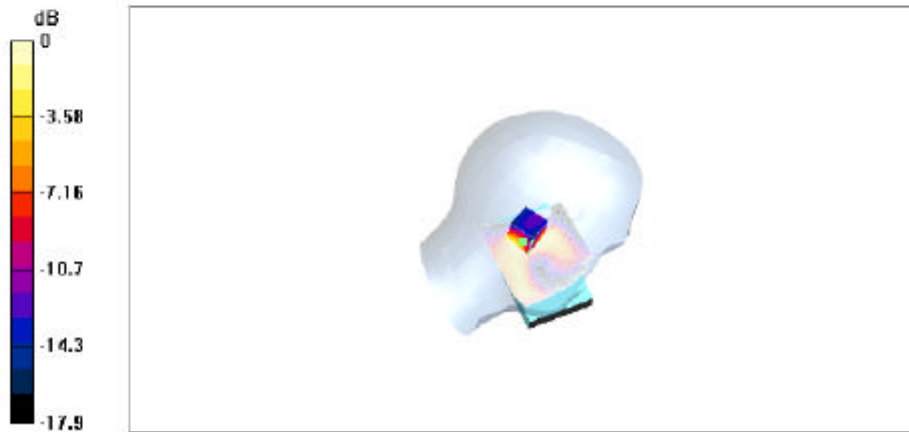
Peak SAR (extrapolated) = 0.729 W/kg

SAR(1 g) = 0.373 mW/g; SAR(10 g) = 0.197 mW/g


Reference Value = 15.6 V/m

Power Drift = -0.4 dB

Maximum value of SAR = 0.404 mW/g



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Daoud Attayi	Nov. 06 - 12, 2003	RIM-0060-0311-04	L6ARAN21CN

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Date/Time: 11/12/03 11:36:04

Ambient Temperature : 24.4 °C Liquid Temperature : 22.5 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Touch right side; Mid. Chan; PCS Band**

Communication System: PCS CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: HSL1900 ( $\sigma = 1.43$  mho/m,  $\epsilon_r = 40.15$ ,  $\rho = 1000$  kg/m<sup>3</sup>)

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(5.4, 5.4, 5.4); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1):** Measurement grid: dx=10mm, dy=10mm

Reference Value = 11.5 V/m

Power Drift = -0.2 dB

Maximum value of SAR = 1 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

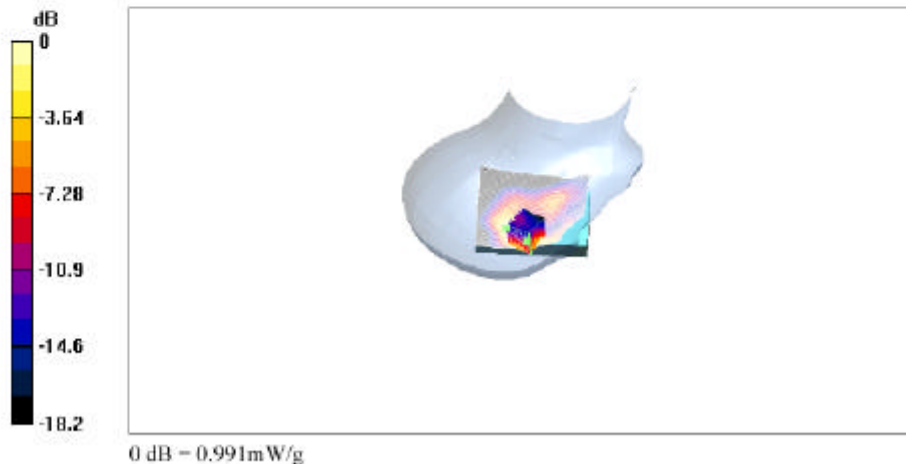
Peak SAR (extrapolated) = 1.8 W/kg

SAR(1 g) = 0.866 mW/g; SAR(10 g) = 0.428 mW/g

Reference Value = 11.5 V/m

Power Drift = -0.2 dB

Maximum value of SAR = 0.991 mW/g



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Author Data <b>Daoud Attayi</b>	Dates of Test <b>Nov. 06 - 12, 2003</b>	Test Report No <b>RIM-0060-0311-04</b>	FCC ID <b>L6ARAN21CN</b>
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Date/Time: 11/12/03 12:12:43

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.4 °C Liquid Temperature : 22.5 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Tilted right side; Mid. Chan; PCS Band**

Communication System: PCS CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
 Medium: HSL1900 ( $\sigma = 1.43 \text{ mho/m}$ ,  $\epsilon_r = 40.15$ ,  $\rho = 1000 \text{ kg/m}^3$ )

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(5.4, 5.4, 5.4); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 1; Type: SAM 4.0; Serial: 1076
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1);** Measurement grid: dx=10mm, dy=10mm

Reference Value = 13.6 V/m

Power Drift = 0.009 dB

Maximum value of SAR = 0.632 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0;** Measurement grid: dx=5mm, dy=5mm, dz=5mm

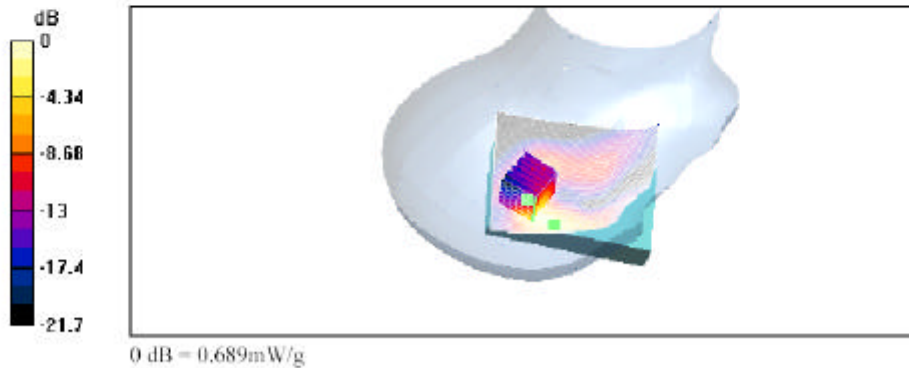
Peak SAR (extrapolated) = 1.55 W/kg

SAR(1 g) = 0.606 mW/g; SAR(10 g) = 0.276 mW/g


Reference Value = 13.6 V/m

Power Drift = 0.009 dB


Maximum value of SAR = 0.689 mW/g



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APPENDIX C: SAR DISTRIBUTION PLOTS FOR BODY-WORN CONFIGURATION

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Date/Time: 11/10/03 14:52:21

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.3 °C Liquid Temperature : 23.0 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Body-worn with holster; Mid. Chan; Cellular Band**

Cycle: 1:1

Medium: M 835 ( $\sigma = 0.96$  mho/m,  $\epsilon_r = 53.3$ ,  $\rho = 1000$  kg/m<sup>3</sup>)

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(6.4, 6.4, 6.4); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1);** Measurement grid: dx=10mm, dy=10mm

Reference Value = 23.5 V/m

Power Drift = 0.1 dB

Maximum value of SAR = 0.601 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0;** Measurement grid: dx=5mm, dy=5mm, dz=5mm

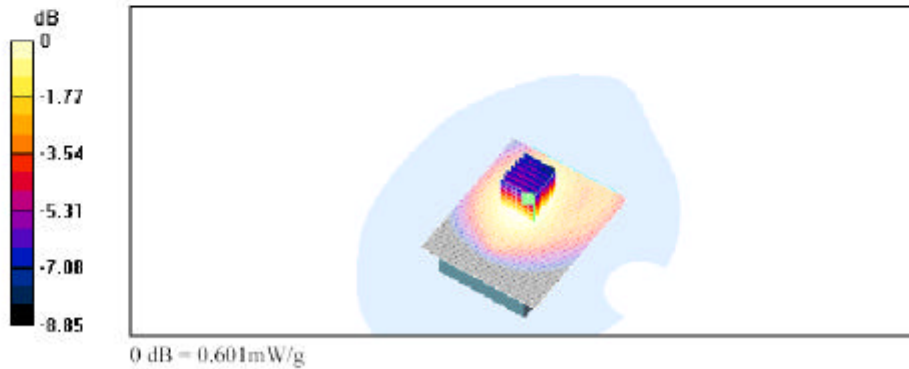
Peak SAR (extrapolated) = 0.711 W/kg

SAR(1 g) = 0.572 mW/g; SAR(10 g) = 0.428 mW/g

Reference Value = 23.5 V/m

Power Drift = 0.1 dB

Maximum value of SAR = 0.601 mW/g



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Author Data <b>Daoud Attayi</b>	Dates of Test <b>Nov. 06 - 12, 2003</b>	Test Report No <b>RIM-0060-0311-04</b>	FCC ID <b>L6ARAN21CN</b>
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Date/Time: 11/10/03 15:24:15

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.4 °C Liquid Temperature : 23.0 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Body-worn with leather  
 holster; Mid. Chan; Cellular Band**

Communication System: Cellular CDMA ; Frequency: 836.52 MHz; Duty Cycle: 1:1  
 Medium: M 835 ( $\sigma = 0.96$  mho/m,  $\epsilon_r = 53.3$ ,  $\rho = 1000$  kg/m<sup>3</sup>)

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(6.4, 6.4, 6.4); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1);** Measurement grid: dx=10mm, dy=10mm

Reference Value = 24.3 V/m

Power Drift = -0.2 dB

Maximum value of SAR = 0.559 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0;** Measurement grid: dx=5mm, dy=5mm, dz=5mm

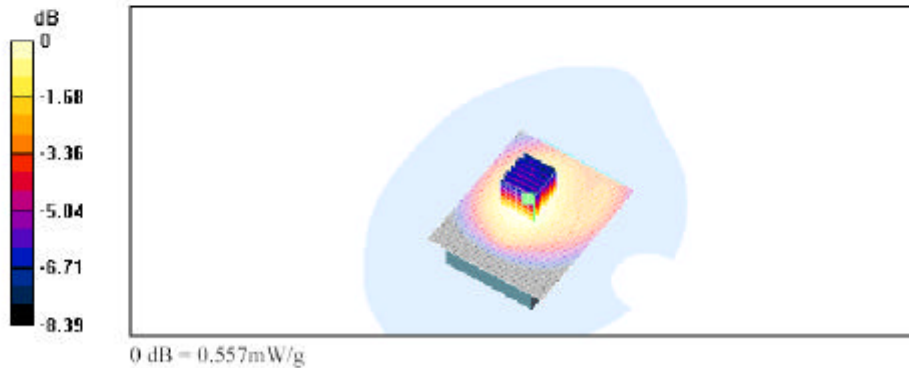
Peak SAR (extrapolated) = 0.656 W/kg

SAR(1 g) = 0.531 mW/g; SAR(10 g) = 0.396 mW/g


Reference Value = 24.3 V/m

Power Drift = -0.2 dB

Maximum value of SAR = 0.557 mW/g



file://C:\Program%20Files\DASY4\Print\_Templates\Body%20worn%20with%20leather... 21/11/2003

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Date/Time: 11/10/03 16:03:39

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.3 °C Liquid Temperature : 23.0 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Body-worn with holster and headset; Mid. Chan: Cellular Band**

Communication System: Cellular CDMA ; Frequency: 836.52 MHz; Duty Cycle: 1:1  
Medium: M 835 ( $\sigma = 0.96 \text{ mho/m}$ ,  $\epsilon_r = 53.3$ ,  $\rho = 1000 \text{ kg/m}^3$ )

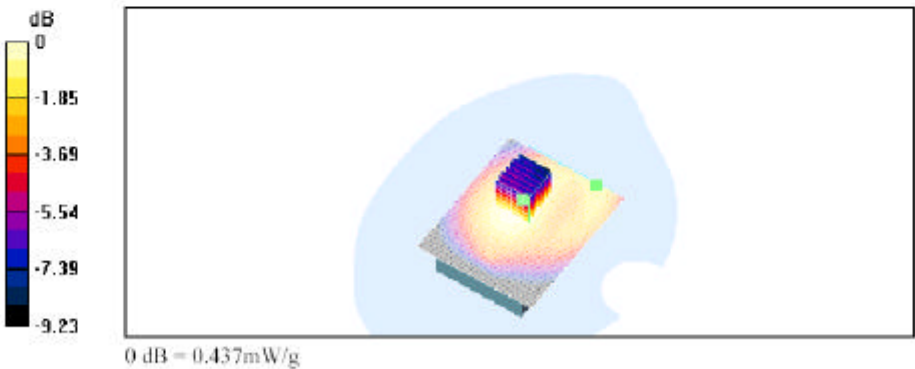
Phantom section: Flat Section

DASY4 Configuration:


- Probe: ET3DV6 - SN1642; ConvF(6.4, 6.4, 6.4); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1);** Measurement grid: dx=10mm, dy=10mm  
Reference Value = 20.6 V/m  
Power Drift = 0.05 dB  
Maximum value of SAR = 0.43 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0;** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Peak SAR (extrapolated) = 0.521 W/kg  
SAR(1 g) = 0.416 mW/g; SAR(10 g) = 0.307 mW/g  
Reference Value = 20.6 V/m  
Power Drift = 0.05 dB  
Maximum value of SAR = 0.437 mW/g





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<b>Daoud Attayi</b>	<b>Nov. 06 - 12, 2003</b>	<b>RIM-0060-0311-04</b>	<b>L6ARAN21CN</b>

Date/Time: 11/12/03 14:34:40

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.7 °C Liquid Temperature : 22.8 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Body-worn with holster; Mid. Chan; PCS Band**

Communication System: PCS CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1  
 Medium: M1900 ( $\sigma = 1.55 \text{ mho/m}$ ,  $\epsilon_r = 51.01$ ,  $\rho = 1000 \text{ kg/m}^3$ )

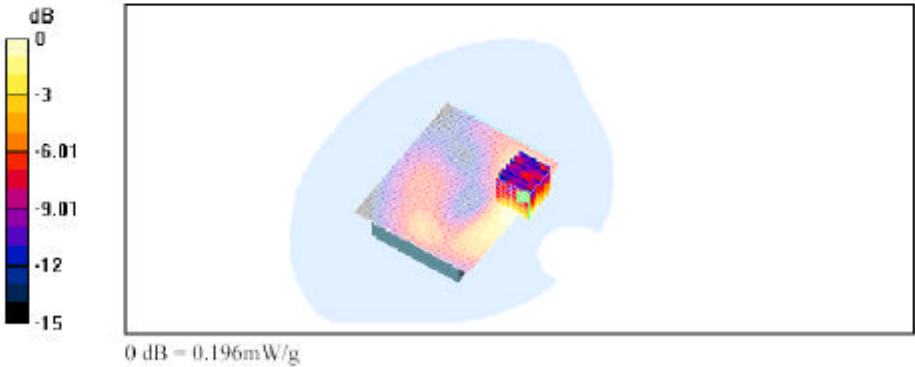
Phantom section: Flat Section

DASY4 Configuration:


- Probe: ET3DV6 - SN1642; ConvF(4.9, 4.9, 4.9); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1);** Measurement grid: dx=10mm, dy=10mm  
 Reference Value = 3.87 V/m  
 Power Drift = -0.2 dB  
 Maximum value of SAR = 0.209 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0;** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
 Peak SAR (extrapolated) = 0.288 W/kg  
 SAR(1 g) = 0.183 mW/g; SAR(10 g) = 0.112 mW/g  
 Reference Value = 3.87 V/m  
 Power Drift = -0.2 dB  
 Maximum value of SAR = 0.196 mW/g



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Date/Time: 11/12/03 15:41:25

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.6 °C Liquid Temperature : 22.7 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Body-worn with leather holster; Mid. Chan; PCS Band**

Medium: M1900 ( $\sigma = 1.55$  mho/m,  $\epsilon_r = 51.01$ ,  $\rho = 1000$  kg/m<sup>3</sup>)

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(4.9, 4.9, 4.9); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1):** Measurement grid: dx=10mm, dy=10mm

Reference Value = 3.6 V/m

Power Drift = -0.2 dB

Maximum value of SAR = 0.21 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

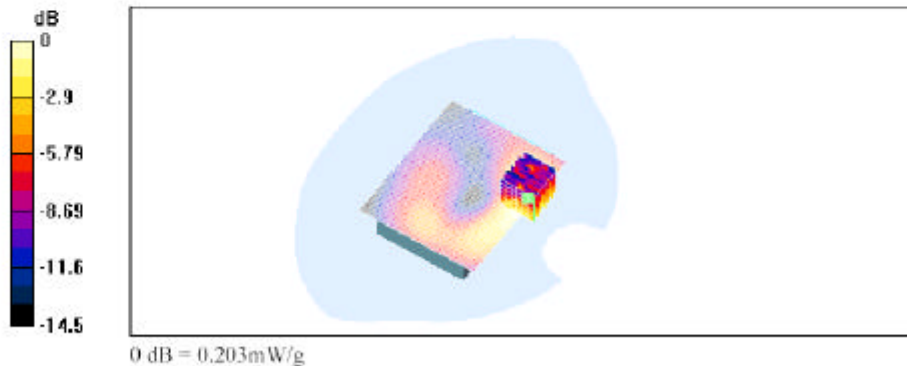
Peak SAR (extrapolated) = 0.32 W/kg

SAR(1 g) = 0.191 mW/g; SAR(10 g) = 0.12 mW/g

Reference Value = 3.6 V/m

Power Drift = -0.2 dB

Maximum value of SAR = 0.203 mW/g



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Author Data <b>Daoud Attayi</b>	Dates of Test <b>Nov. 06 - 12, 2003</b>	Test Report No <b>RIM-0060-0311-04</b>	FCC ID <b>L6ARAN21CN</b>
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Date/Time: 11/12/03 17:06:28

Test Laboratory: Research In Motion Limited

Ambient Temperature : 24.6 °C Liquid Temperature : 22.7 °C

**DUT: BlackBerry Wireless Handheld; Type: Sample ; Serial: E2PRF08; Body-worn with leather holster and headset; Mid. Chan; PCS Band**

Communication System: PCS CDMA 1900; Frequency: 1880 MHz;Duty Cycle: 1:1  
 Medium: M1900 ( $\sigma = 1.55$  mho/m,  $\epsilon_r = 51.01$ ,  $\rho = 1000$  kg/m<sup>3</sup>)

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1642; ConvF(4.9, 4.9, 4.9); Calibrated: 28/08/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn472; Calibrated: 19/08/2003
- Phantom: SAM 2; Type: SAM 4.0; Serial: 1080
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 116

**Unnamed procedure/Area Scan (101x121x1);** Measurement grid: dx=10mm, dy=10mm

Reference Value = 3.25 V/m

Power Drift = -0.09 dB

Maximum value of SAR = 0.217 mW/g

**Unnamed procedure/Zoom Scan (7x7x7)/Cube 0;** Measurement grid: dx=5mm, dy=5mm, dz=5mm

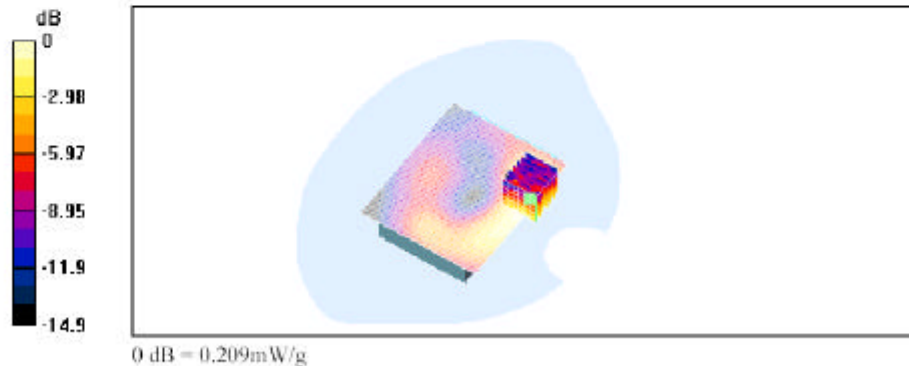
Peak SAR (extrapolated) = 0.306 W/kg

SAR(1 g) = 0.195 mW/g; SAR(10 g) = 0.12 mW/g


Reference Value = 3.25 V/m

Power Drift = -0.09 dB

Maximum value of SAR = 0.209 mW/g



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APPENDIX D: PROBE & DIPOLE CALIBRATION DATA



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Author Data

Daoud Attayi

Dates of Test

Nov. 06 - 12, 2003

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RIM-0060-0311-04


FCC ID

L6ARAN21CN

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

Client **RIM**

CALIBRATION CERTIFICATE			
Object(s)	ET3DV6 - SN:1642		
Calibration procedure(s)	QA-CAL-01.v2 Calibration procedure for dosimetric E-field probes		
Calibration date:	August 28, 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
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Power sensor E4412A	MY41495277	2-Apr-03 (METAS, No 252-0250)	Apr-04
Power sensor HP 8481A	MY41092130	18-Sep-02 (Agilent, No. 20020918)	Sep-03
Power meter EPM E4419B	GB41293874	2-Apr-03 (METAS, No 252-0250)	Apr-04
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 248R1033101)	In house check: Oct 03
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01 (ELCAL, No.2360)	Sep-03
Calibrated by:	Name Nico Vetter	Function Technician	Signature 
Approved by:	Name Katja Pokovic	Function Laboratory Director	Signature 
Date issued: August 28, 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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Daoud Attayi	Nov. 06 - 12, 2003	RIM-0060-0311-04	L6ARAN21CN

Schmid & Partner Engineering AG

**s p e e 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:1642

**Manufactured:** November 7, 2001  
**Last calibration:** July 26, 2002  
**Recalibrated:** August 28, 2003

**Calibrated for DASY Systems**

(Note: non-compatible with DASY2 system!)



Author Data <b>Daoud Attayi</b>	Dates of Test <b>Nov. 06 - 12, 2003</b>	Test Report No <b>RIM-0060-0311-04</b>	FCC ID <b>L6ARAN21CN</b>
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**ET3DV6 SN:1642**

**August 28, 2003**

**DASY - Parameters of Probe: ET3DV6 SN:1642**

**Sensitivity in Free Space**

**Diode Compression**

NormX	<b>1.84</b> $\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	<b>96</b>	mV
NormY	<b>1.86</b> $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	<b>96</b>	mV
NormZ	<b>1.61</b> $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	<b>96</b>	mV

**Sensitivity in Tissue Simulating Liquid**

**Head 900 MHz  $\epsilon_r = 41.5 \pm 5\%$   $\sigma = 0.97 \pm 5\%$  mho/m**

**Valid for f=900-1000 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X**

ConvF X	<b>6.6</b> $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	<b>6.6</b> $\pm 9.5\%$ (k=2)	Alpha	<b>0.27</b>
ConvF Z	<b>6.6</b> $\pm 9.5\%$ (k=2)	Depth	<b>3.41</b>

**Head 1800 MHz  $\epsilon_r = 40.0 \pm 5\%$   $\sigma = 1.40 \pm 5\%$  mho/m**

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

ConvF X	<b>5.4</b> $\pm 9.5\%$ (k=2)	Boundary effect:	
ConvF Y	<b>5.4</b> $\pm 9.5\%$ (k=2)	Alpha	<b>0.48</b>
ConvF Z	<b>5.4</b> $\pm 9.5\%$ (k=2)	Depth	<b>2.57</b>

**Boundary Effect**

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

Probe Tip to Boundary		<b>1 mm</b>	<b>2 mm</b>
SAR <sub>90%</sub> [%]	Without Correction Algorithm	<b>10.8</b>	<b>6.6</b>
SAR <sub>90%</sub> [%]	With Correction Algorithm	<b>0.6</b>	<b>0.6</b>

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

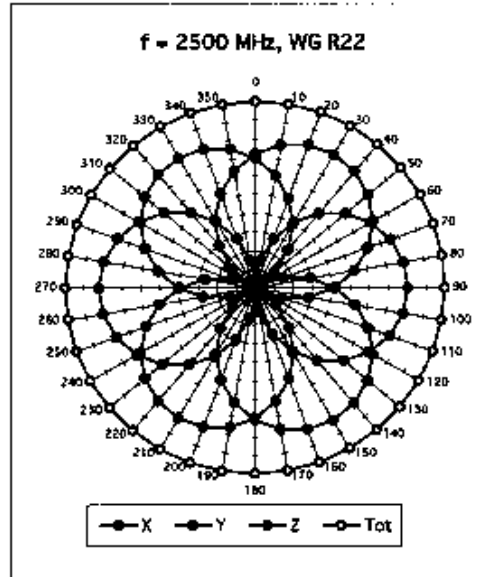
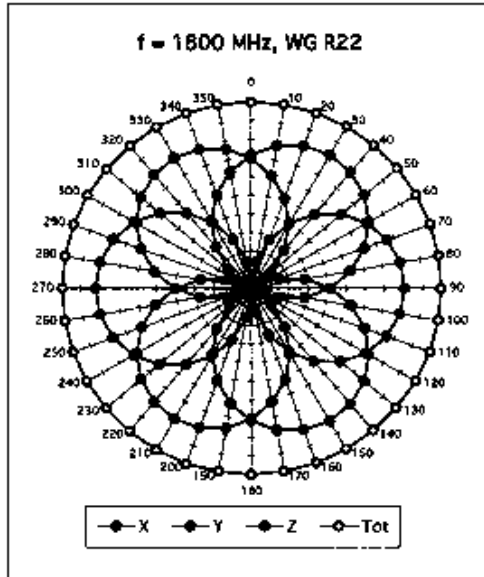
Probe Tip to Boundary		<b>1 mm</b>	<b>2 mm</b>
SAR <sub>90%</sub> [%]	Without Correction Algorithm	<b>12.7</b>	<b>8.5</b>
SAR <sub>90%</sub> [%]	With Correction Algorithm	<b>0.2</b>	<b>0.1</b>

**Sensor Offset**

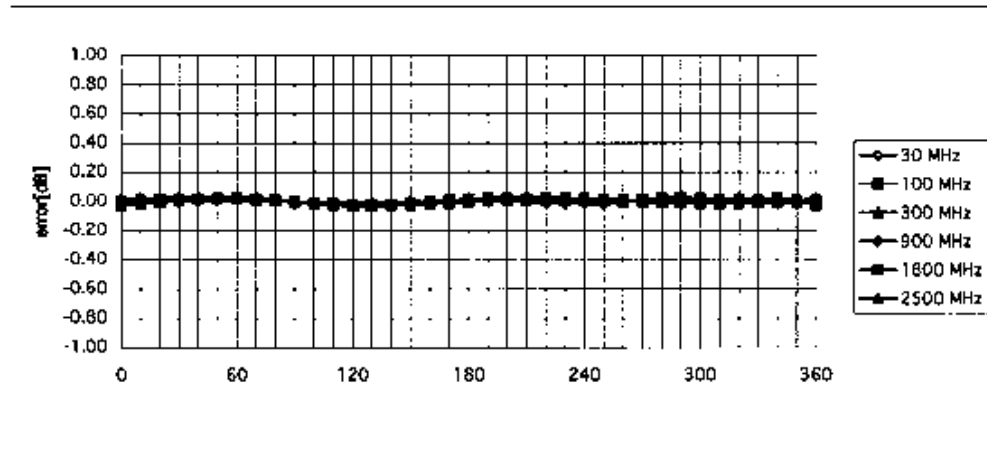
Probe Tip to Sensor Center	<b>2.7</b>	mm
Optical Surface Detection	<b>1.0 <math>\pm</math> 0.2</b>	mm

ET3DV6 SN:1642

August 28, 2003



**Isotropy Error ( $\phi$ ),  $\theta = 0^\circ$**



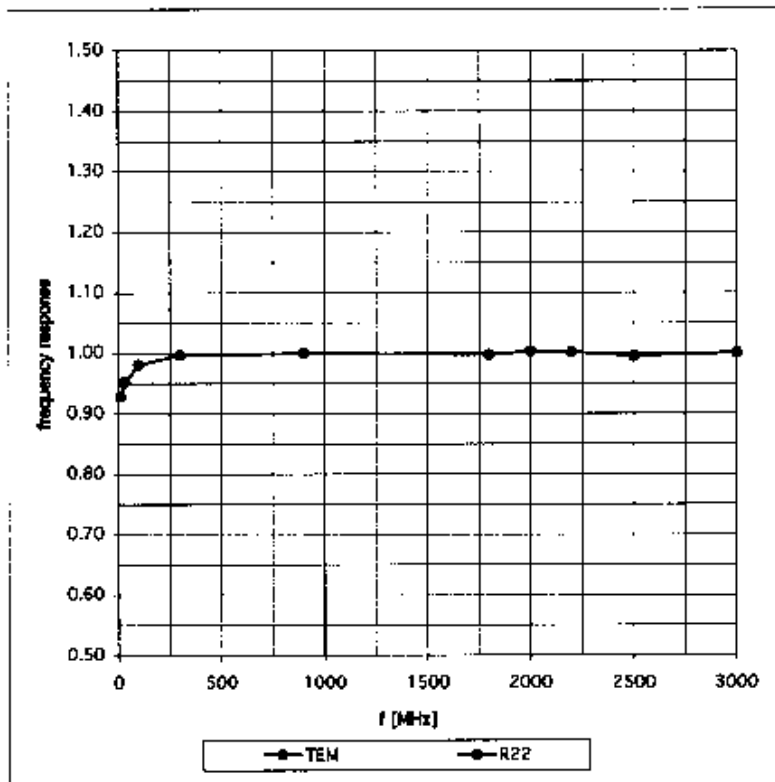


**ETJDV6 9N:1642**

**August 28, 2003**

### Frequency Response of E-Field

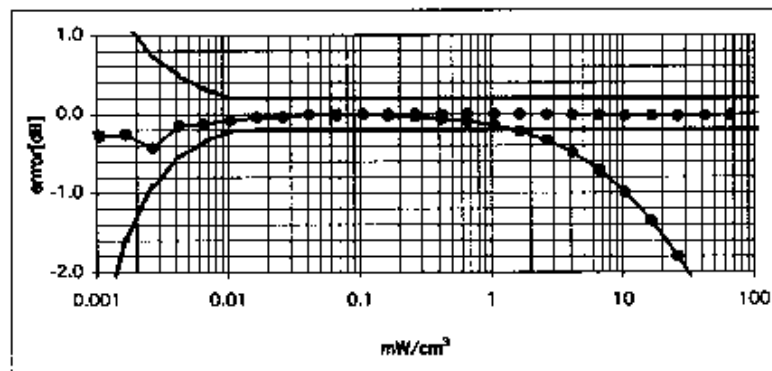
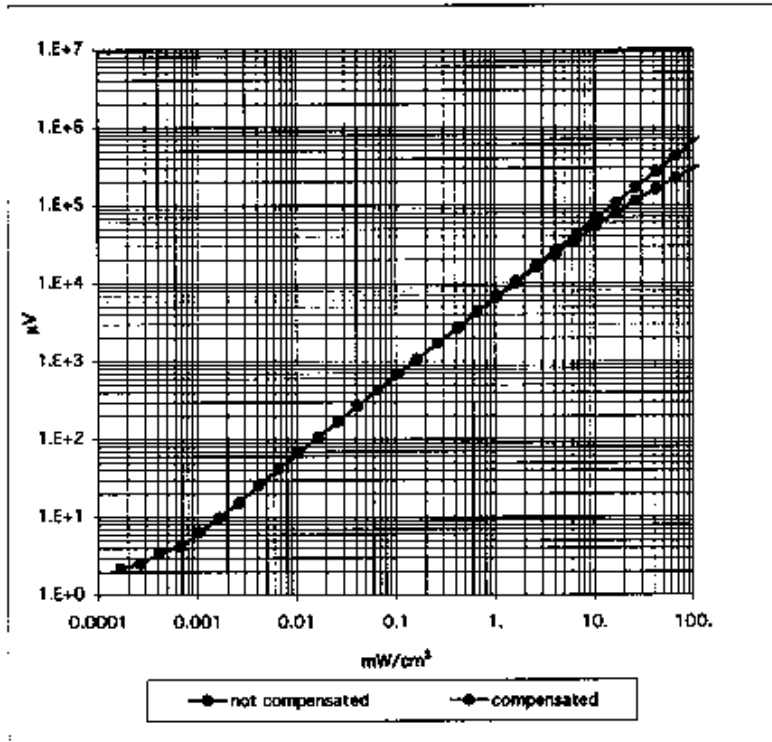
( TEM-Cell:if1110, Waveguide R22)



**ET3DV8 SN:1642**

**August 28, 2003**

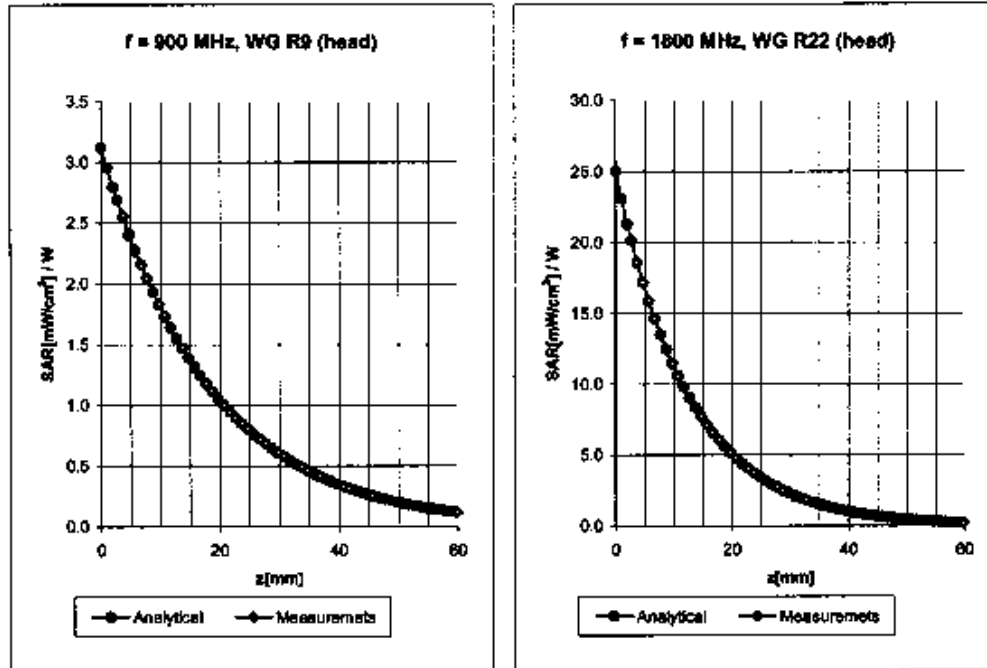
**Dynamic Range f(SARhead)**  
 ( Waveguide R22 )



ET3DV6 SN:1642

August 28, 2003

### Conversion Factor Assessment



Head                      900 MHz                       $\epsilon_r = 41.5 \pm 5\%$                        $\sigma = 0.97 \pm 5\%$  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	0.27
ConvF Z	6.6 ± 9.5% (k=2)	Depth	3.41

Head                      1800 MHz                       $\epsilon_r = 40.0 \pm 5\%$                        $\sigma = 1.40 \pm 5\%$  mho/m

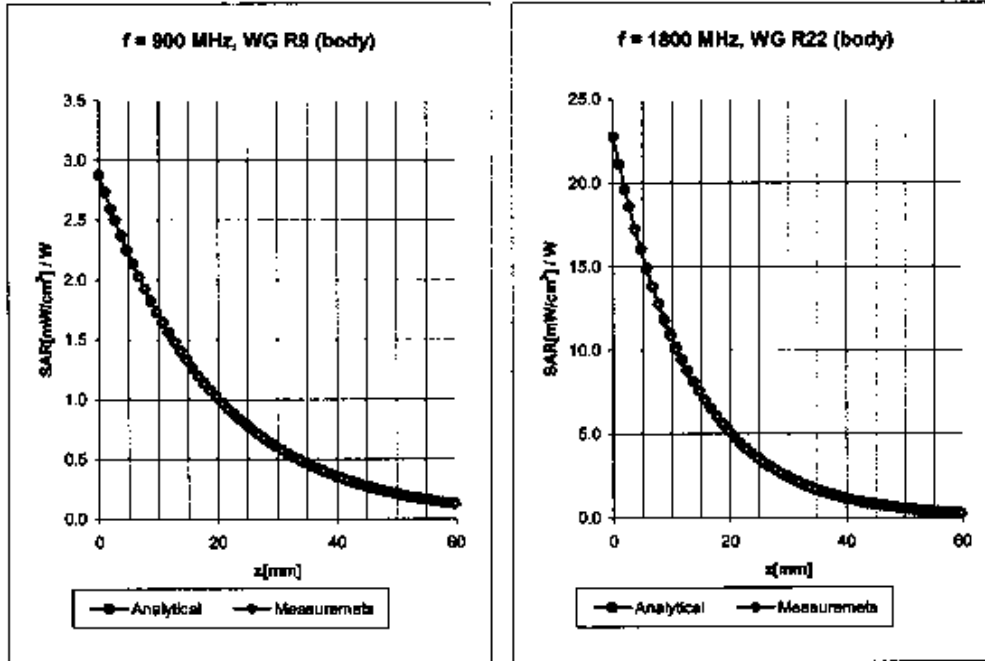
Valid for f=1710-1910 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	5.4 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.4 ± 9.5% (k=2)	Alpha	0.48
ConvF Z	5.4 ± 9.5% (k=2)	Depth	2.57

ET3DV6 SN:1642

August 28, 2003

### Conversion Factor Assessment



Body                      900 MHz                       $\epsilon_r = 55.0 \pm 5\%$                        $\sigma = 1.05 \pm 5\%$  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	0.38
ConvF Z	6.4 ± 9.5% (k=2)	Depth	2.58

Body                      1800 MHz                       $\epsilon_r = 53.3 \pm 5\%$                        $\sigma = 1.52 \pm 5\%$  mho/m

Valid for f=1710-1910 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

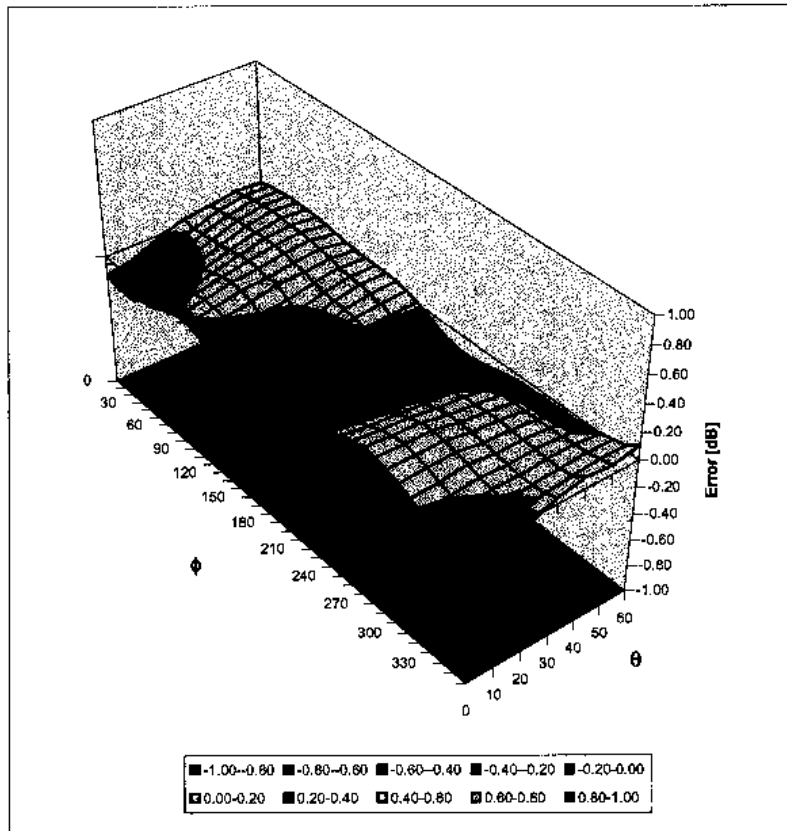
ConvF X	4.9 ± 9.5% (k=2)	Boundary effect:	
ConvF Y	4.9 ± 9.5% (k=2)	Alpha	0.58
ConvF Z	4.9 ± 9.5% (k=2)	Depth	2.60

**ET3DV6 SN:1642**

**August 28, 2003**

### Deviation from Isotropy in HSL

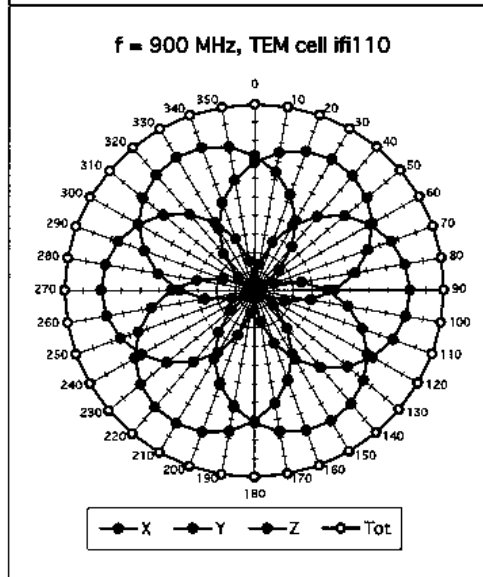
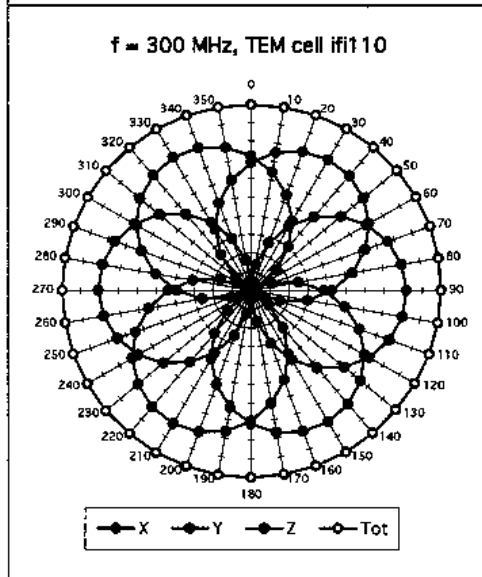
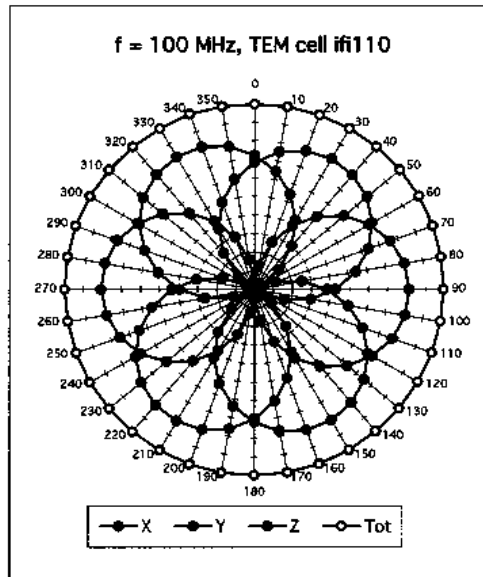
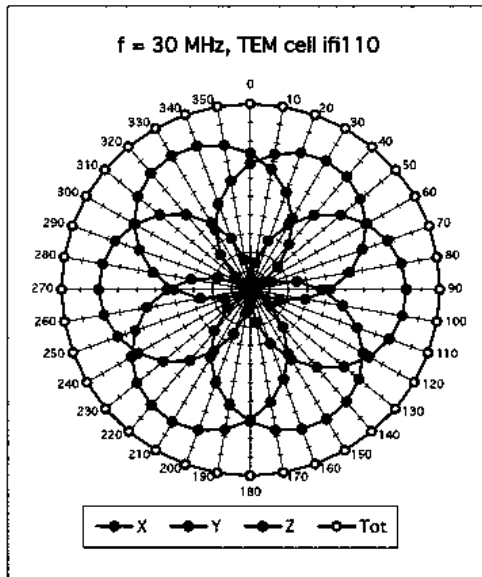
Error ( $\theta, \phi$ ),  $f = 900$  MHz



ET3DV6 SN:1642

August 28, 2003

Receiving Pattern ( $\phi$ ),  $\theta = 0^\circ$





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Daoud Attayi

Dates of Test

Nov. 06 - 12, 2003

Test Report No

RIM-0060-0311-04


FCC ID

L6ARAN21CN

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

Client RIM

CALIBRATION CERTIFICATE			
Object(s)	D835V2 - SN.446		
Calibration procedure(s)	QA CAL-05.v2 Calibration procedure for dipole validation kits		
Calibration date:	August 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
RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check: Mar-05
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
Power sensor HP 8481A	US37292783	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Power meter EPM E442	GB37480704	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03
Calibrated by:	Name Judith Mueller	Function Technician	Signature 
Approved by:	Name Katja Pokovic	Function Laboratory Director	Signature 
Date issued: August 22, 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 e g**

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

# DASY


## Dipole Validation Kit

**Type: D835V2**

**Serial: 446**

**Manufactured: October 24, 2001**  
**Calibrated: August 21, 2003**



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## 1. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with head simulating solution of the following electrical parameters at 835 MHz:

Relative Dielectricity	<b>43.3</b>	$\pm 5\%$
Conductivity	<b>0.91 mho/m</b>	$\pm 5\%$

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.7 at 835 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15mm from dipole center to the solution surface. The included distance spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.

The dipole input power (forward power) was 250 mW  $\pm 3\%$ . The results are normalized to 1W input power.


## 2. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm <sup>3</sup> (1 g) of tissue:	<b>9.60 mW/g</b> $\pm 16.8\%$ (k=2) <sup>1</sup>
averaged over 10 cm <sup>3</sup> (10 g) of tissue:	<b>6.24 mW/g</b> $\pm 16.2\%$ (k=2) <sup>1</sup>

<sup>1</sup> validation uncertainty



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Test Laboratory: SPEAG, Zurich, Switzerland  
File Name: SN446\_SN1507\_HSL835\_210803.da4

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN446**  
**Program: Dipole Calibration**

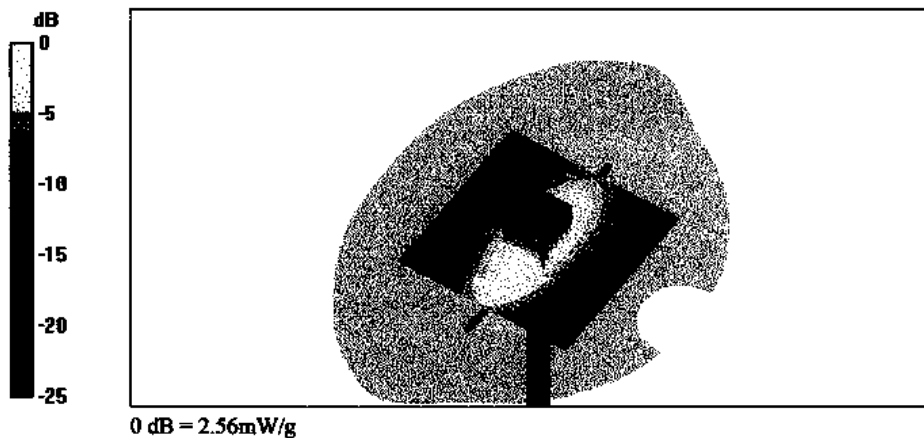
Communication System: CW-835; Frequency: 835 MHz; Duty Cycle: 1:1  
Medium: HSL 835 MHz ( $\sigma = 0.91 \text{ mho/m}$ ,  $\epsilon_r = 43.28$ ,  $\rho = 1000 \text{ kg/m}^3$ )  
Phantom section: Flat Section  
Measurement Standard: DASY4 (High Precision Assessment)

**DASY4 Configuration:**

- Probe: ET3DV6 - SN1507; ConvF(6.7, 6.7, 6.7); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

**P<sub>in</sub> = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm**  
Reference Value = 55.3 V/m  
Power Drift = -0.02 dB  
Maximum value of SAR = 2.55 mW/g

**P<sub>in</sub> = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm**  
Peak SAR (extrapolated) = 3.52 W/kg  
SAR(1 g) = 2.4 mW/g; SAR(10 g) = 1.56 mW/g  
Reference Value = 55.3 V/m  
Power Drift = -0.02 dB  
Maximum value of SAR = 2.56 mW/g





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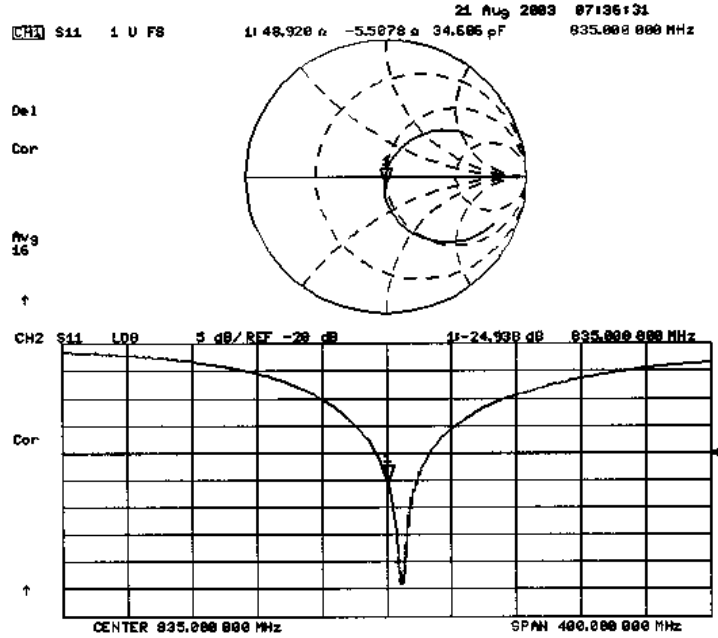
Author Data  
**Daoud Attayi**


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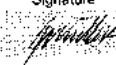
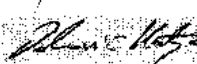
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**Calibration Laboratory of  
 Schmid & Partner  
 Engineering AG**  
 Zeughausstrasse 43, 8004 Zurich, Switzerland

Client **RIM**

CALIBRATION CERTIFICATE																											
Object(s)	D1900V2 - SN:545																										
Calibration procedure(s)	QA CAL-05.v2 Calibration procedure for dipole validation kits																										
Calibration date:	August 22, 2003																										
Condition of the calibrated item	In Tolerance (according to the specific calibration document)																										
<p>This calibration statement documents traceability of M&amp;TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity &lt; 75%.</p> <p>Calibration Equipment used (M&amp;TE critical for calibration)</p> <table border="1"> <thead> <tr> <th>Model Type</th> <th>ID #</th> <th>Cal Date (Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>RF generator R&amp;S SML-03</td> <td>100698</td> <td>27-Mar-2002 (R&amp;S, No. 20-92389)</td> <td>In house check: Mar-05</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>MY41092317</td> <td>18-Oct-02 (Agilent, No. 20021018)</td> <td>Oct-04</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>US37292783</td> <td>30-Oct-02 (METAS, No. 252-0236)</td> <td>Oct-03</td> </tr> <tr> <td>Power meter EPM E442</td> <td>GB37480704</td> <td>30-Oct-02 (METAS, No. 252-0236)</td> <td>Oct-03</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US37390585</td> <td>18-Oct-01 (Agilent, No. 24BR1033101)</td> <td>In house check: Oct 03</td> </tr> </tbody> </table>				Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check: Mar-05	Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04	Power sensor HP 8481A	US37292783	30-Oct-02 (METAS, No. 252-0236)	Oct-03	Power meter EPM E442	GB37480704	30-Oct-02 (METAS, No. 252-0236)	Oct-03	Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03
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Calibrated by:	Name Ulrich Mueller	Function Technician	Signature 																								
Approved by:	Name Kaja Pokovic	Function Laboratory Director	Signature 																								
Date issued: August 24, 2003																											
<p>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 &amp; Partner Engineering AG is completed.</p>																											

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# DASY

## Dipole Validation Kit

**Type: D1900V2**

**Serial: 545**

**Manufactured: November 15, 2001**  
**Calibrated: August 22, 2003**

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## 1. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with head simulating solution of the following electrical parameters at 1900 MHz:

Relative Dielectricity	40.2	± 5%
Conductivity	1.46 mho/m	± 5%

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.2 at 1900 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm from dipole center to the solution surface. The included distance spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.


The dipole input power (forward power) was 250 mW ± 3 %. The results are normalized to 1W input power.

## 2. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm <sup>3</sup> (1 g) of tissue:	41.2 mW/g ± 16.8 % (k=2) <sup>1</sup>
averaged over 10 cm <sup>3</sup> (10 g) of tissue:	21.3 mW/g ± 16.2 % (k=2) <sup>1</sup>

<sup>1</sup> validation uncertainty

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### 3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay: 1.198 ns (one direction)  
Transmission factor: 0.984 (voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance spacer was in place during impedance measurements.

Feedpoint impedance at 1900 MHz:  $Re(Z) = 49.7 \Omega$   
 $Im(Z) = 0.96 \Omega$   
Return Loss at 1900 MHz: -39.9 dB

### 4. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

### 5. Design


The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

Small end caps have been added to the dipole arms in order to improve matching when loaded according to the position as explained in Section 1. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

### 6. Power Test

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



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Test Laboratory: SPEAG, Zurich, Switzerland  
File Name: SNS45\_SN1507\_HSL1900\_220803.da4

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN545**  
**Program: Dipole Calibration**

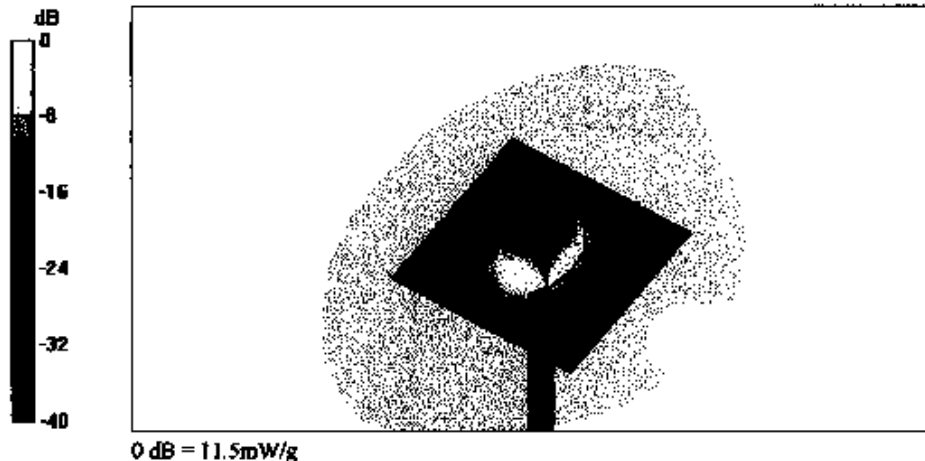
Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1  
Medium: HSL 1900 MHz ( $\sigma = 1.46 \text{ mho/m}$ ,  $\epsilon_r = 40.17$ ,  $\rho = 1000 \text{ kg/m}^3$ )  
Phantom section: Flat Section  
Measurement Standard: DAS4 (High Precision Assessment)

**DAS4 Configuration:**

- Probe: ET3DV6 - SN1507; ConvF(5.2, 5.2, 5.2); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DAS4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

**$P_{in} = 250 \text{ mW}$ ;  $d = 10 \text{ mm}$ /Area Scan (81x81x1): Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$**   
Reference Value = 93.6 V/m  
Power Drift = 0.05 dB  
Maximum value of SAR = 11.5 mW/g

**$P_{in} = 250 \text{ mW}$ ;  $d = 10 \text{ mm}$ /Zoom Scan (7x7x7)/Cube 0: Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$**   
Peak SAR (extrapolated) = 17.7 W/kg  
SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.32 mW/g  
Reference Value = 93.6 V/m  
Power Drift = 0.05 dB  
Maximum value of SAR = 11.5 mW/g





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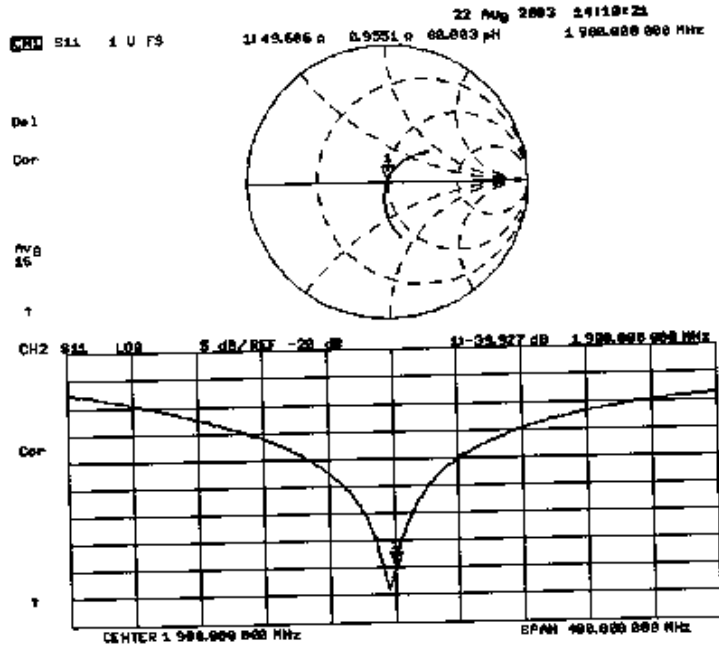
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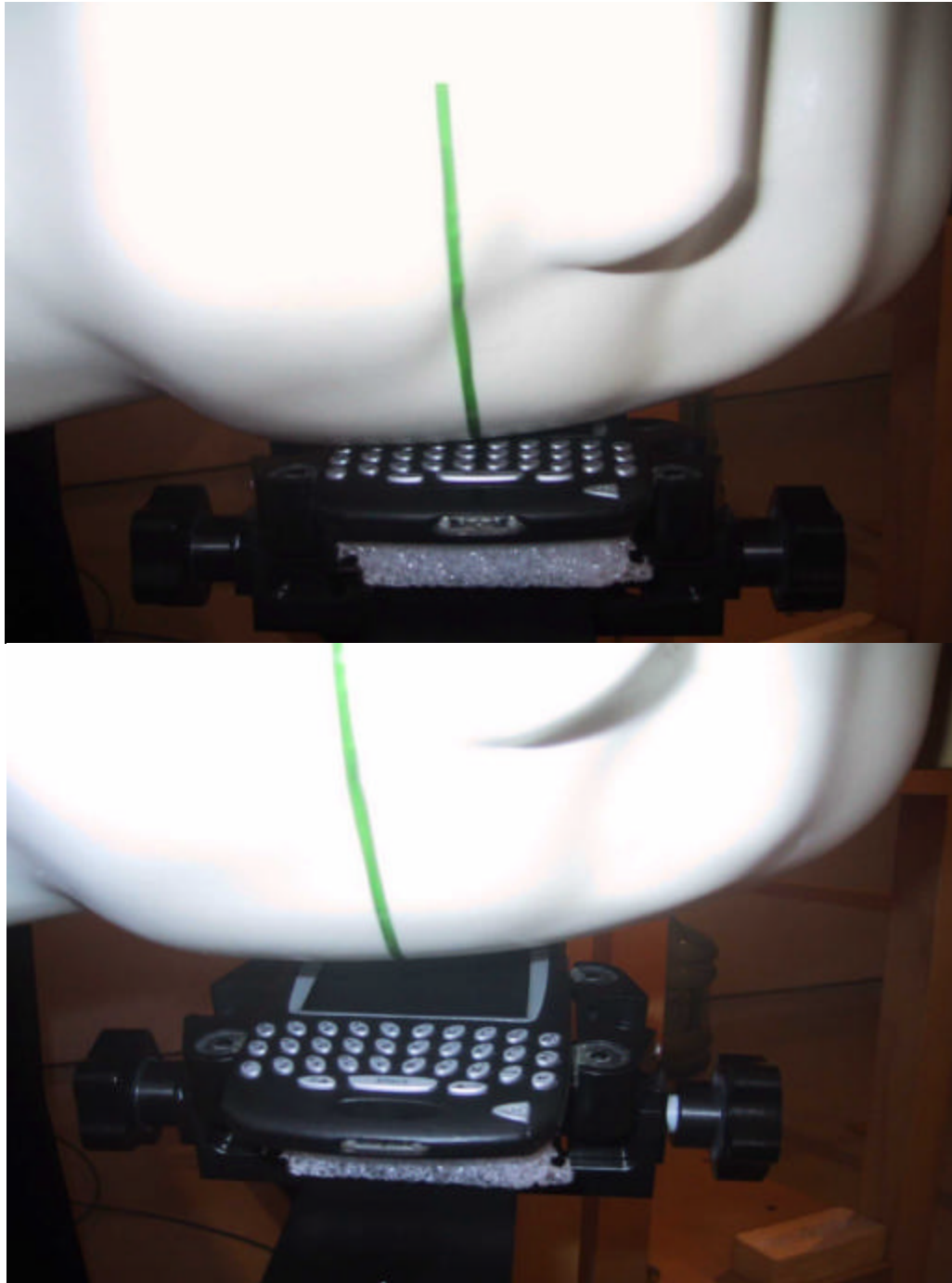
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APPENDIX E: SAR SET UP PHOTOS



**Figure E1. Left ear configuration**



**Figure E2. Right ear configuration**



**Figure E3. Body worn configuration with Plastic Holster ASY-0399-001 and headset**



**Figure E4. Body worn configuration with Leather Swivel Holster HDW-04890-001 and headset**