RESEARCH IN MOTION	 pendices to SAR Compl reless Handheld Model	<b>1</b>	BlackBerry
Author Data	Dates of Test	Test Report No	FCC ID L6ARAN21CN
Daoud Attayi	Nov. 06 - 12, 2003	RIM-0060-0311-04	LUANAINZICIN

APPENDIX A: SAR DISTRIBUTION COMPARISON FOR THE ACCURACY VERIFICATION

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Appendices to SAR Compliance Test Report for BlackBerry

Wireless Handheld Model No. RAN21CN

FCC ID **L6ARAN21CN** 

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2(2)

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,  $\varepsilon_r$  = 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

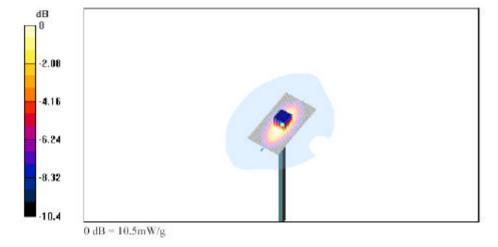
Peak SAR (extrapolated) = 14.1 W/kg

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

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Wireless Handheld Model No. RAN21CN Dates of Test Test Report No

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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: HSL 1900 ( $\sigma = 1.43 \text{ mho/m}$ ,  $\varepsilon_r = 40.15$ ,  $\rho = 1000 \text{ kg/m}^3$ )

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

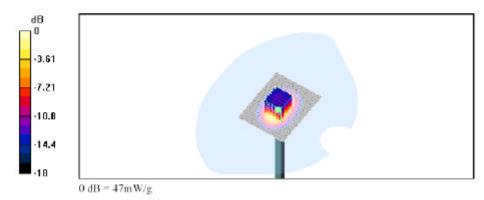
Peak SAR (extrapolated) = 75.5 W/kg

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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Author Data <b>Daoud Attavi</b>	Dates of Test Nov. 06 - 12, 2003	Test Report No <b>RIM-0060-0311-04</b>	FCC ID L6ARAN21CN	

APPENDIX B: SAR DISTRIBUTION PLOTS FOR HEAD CONFIGURATION

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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 ( $\sigma = 0.89 \text{ mho/m}$ ,  $\epsilon_r = 40.67$ ,  $\rho = 1000 \text{ kg/m}^3$ )

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

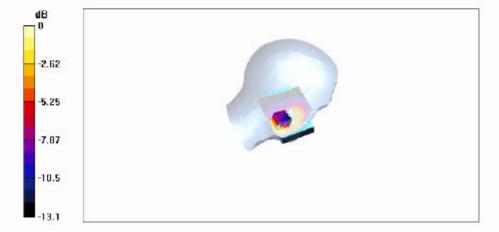
Peak SAR (extrapolated) = 2.05 W/kg

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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6(6)

Date/Time: 11/07/03 12:16:47

Test Laboratory: Research In Motion Limited

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

Dates of Test

Nov. 06 - 12, 2003

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 ( $\sigma = 0.89 \text{ mho/m}$ ,  $\varepsilon_r = 40.67$ ,  $\rho = 1000 \text{ kg/m}^3$ )

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

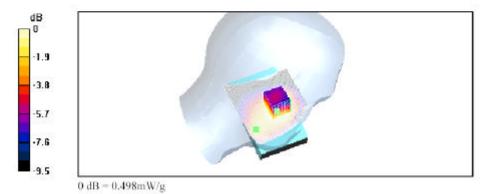
Peak SAR (extrapolated) = 0.614 W/kg

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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7(7)

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 ( $\sigma = 0.89 \text{ mho/m}$ ,  $\varepsilon_r = 40.67$ ,  $\rho = 1000 \text{ kg/m}^3$ )

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

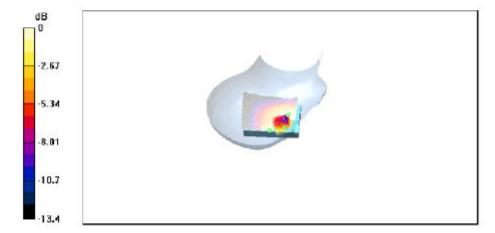
Peak SAR (extrapolated) = 0.894 W/kg

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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8(8)

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 ( $\sigma = 0.89 \text{ mho/m}$ ,  $\varepsilon_r = 40.67$ ,  $\rho = 1000 \text{ kg/m}^3$ )

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

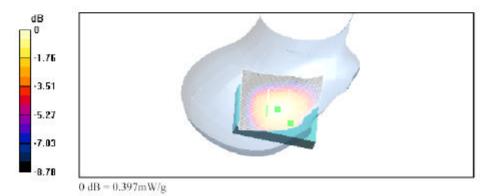
Peak SAR (extrapolated) = 0.499 W/kg

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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9(9)

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: HSL 1900 ( $\sigma = 1.43 \text{ mho/m}$ ,  $\varepsilon_p = 40.15$ ,  $\rho = 1000 \text{ kg/m}^3$ )

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 = 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

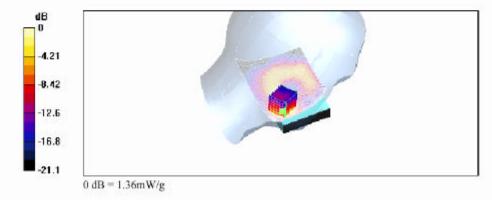
Peak SAR (extrapolated) = 2.37 W/kg

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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10(10)

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

Test Laboratory: Research In Motion Limited

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

Dates of Test

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

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

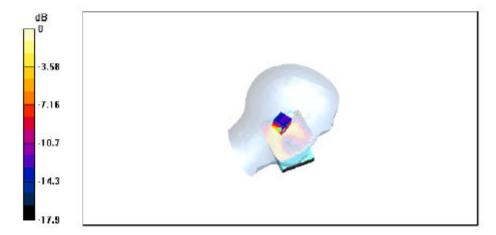
Peak SAR (extrapolated) = 0.729 W/kg

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

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 = 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

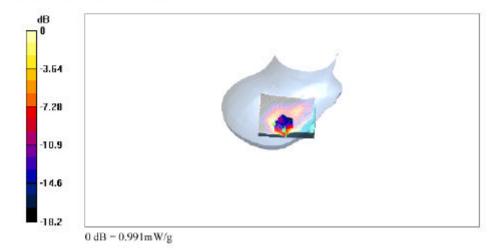
Peak SAR (extrapolated) = 1.8 W/kg

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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12(12)

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

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

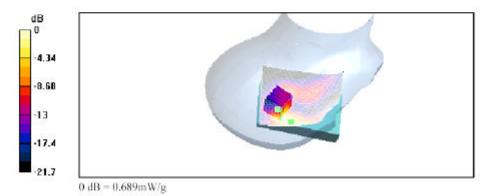
Peak SAR (extrapolated) = 1.55 W/kg

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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Author Data	Date	es of Test	Test Report No	FCC ID	
Daoud Attayi	No	ov. 06 - 12, 2003	RIM-0060-0311-04	L6ARAN21CN	

APPENDIX C: SAR DISTRIBUTION PLOTS FOR BODY-WORN CONFIGURATION

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Author Data Daoud Attayi Dates of Test

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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 ( $\sigma = 0.96 \text{ mho/m}, \epsilon_{\rho} = 53.3, \rho = 1000 \text{ kg/m}^3$ )

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 = 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

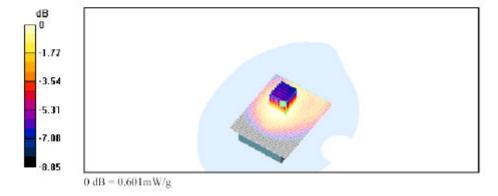
Peak SAR (extrapolated) = 0.711 W/kg

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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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 ( $\sigma = 0.96 \text{ mho/m}, \epsilon_{\rho} = 53.3, \rho = 1000 \text{ kg/m}^3$ )

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 = 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

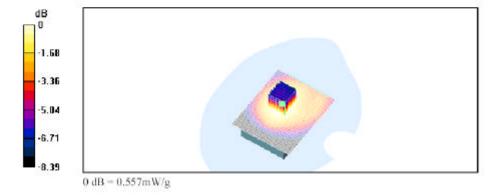
Peak SAR (extrapolated) = 0.656 W/kg

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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Author Data Daoud Attayi Dates of Test Nov. 06 - 12, 2003

RIM-0060-0311-04

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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 ( $\sigma = 0.96 \text{ mho/m}, \epsilon_{\rho} = 53.3, \rho = 1000 \text{ kg/m}^3$ )

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

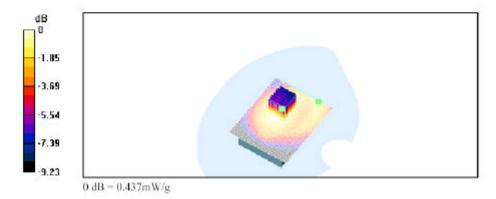
Peak SAR (extrapolated) = 0.521 W/kg

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



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

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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 ( $\sigma = 1.55 \text{ mho/m}$ ,  $\epsilon_{\rho} = 51.01$ ,  $\rho = 1000 \text{ kg/m}^3$ )

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

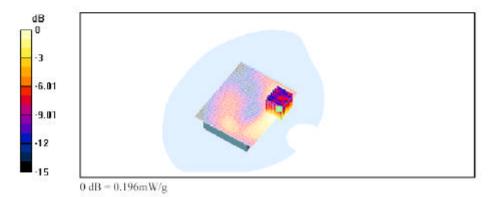
Peak SAR (extrapolated) = 0.288 W/kg

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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Test Report No RIM-0060-0311-04

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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 ( $\sigma = 1.55 \text{ mho/m}$ ,  $\epsilon_{\nu} = 51.01$ ,  $\rho = 1000 \text{ kg/m}^3$ )

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 = 3.6 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

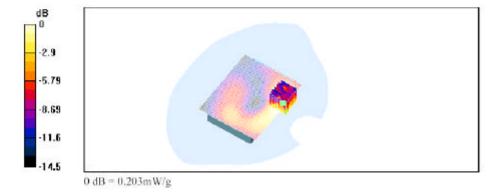
Peak SAR (extrapolated) = 0.32 W/kg

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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## Appendices to SAR Compliance Test Report for BlackBerry

Wireless Handheld Model No. RAN21CN

FCC ID **L6ARAN21CN** 

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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 ( $\sigma = 1.55 \text{ mho/m}$ ,  $\epsilon_{\rho} = 51.01$ ,  $\rho = 1000 \text{ kg/m}^3$ )

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 = 3.25 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

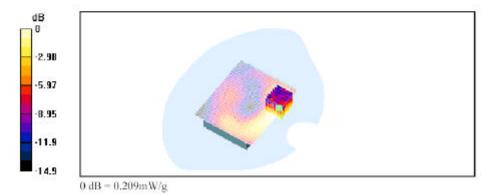
Peak SAR (extrapolated) = 0.306 W/kg

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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RESEARCH IN MOTION Author Data

Appendices to SAR Compliance Test Report for BlackBerry Wireless Handheld Model No. RAN21CN

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Daoud Attayi

Dates of Test Nov. 06 - 12, 2003

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FCC ID

APPENDIX D: PROBE & DIPOLE CALIBRATION DATA



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Author Data

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Dates of Test

Nov. 06 - 12, 2003

Test Report No

RIM-0060-0311-04

L6ARAN21CN

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

Client RIM Company of the Company of

	Company of the Control	<b> </b>	adjulione node o to high soft of higher way local
Object(s)	ET3DV6 - SN		HER HARDVILLE ENDREHAR IN
alibration procedure(s)	QA CAL-01.v2		
	Calibration pro	ocedure for dosimetric E-field probe	
		7 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
alibration date:	August 28, 20		
condition of the callbrated item	In Tolerance (	according to the specific calibration	1 document)
his calibration statement documen 7025 international standard.	its traceability of M&TE	used in the calibration procedures and conformity of	the procedures with the ISO/IEC
Il calibrations have been conducte	d in the closed laborato	ory facility: environment temperature 22 +/- 2 degrees	s Celsius and humidity < 75%.
alibration Equipment used (M&TE	critical for calibration)		
lodet Type	ID#	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
F generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
F generator HP 8684C ower sensor E4412A	US3642U01700 MY41495277	4-Aug-99 (SPEAG, in house check Aug-02) 2-Apr-03 (METAS, No 252-0250)	In house check: Aug-05 Apr-04
F generator HP 8684C ower sensor E4412A ower sensor HP 8481A	U\$3642U01700 MY41495277 MY41092180	4-Aug-99 (SPEAG, in house check Aug-02) 2-Apr-03 (METAS, No 252-0250) 18-Sep-02 (Agilent, No. 20020918)	In house check: Aug-05 Apr-04 Sep-03
F generator HP 8684C ower sensor E4412A ower sensor HP 8481A ower meter EPM E4419B	U\$3642U01700 MY41495277 MY41092180 GB41293974	4-Aug-99 (SPEAG, in house check Aug-02) 2-Apr-03 (METAS, No 252-0250) 18-Sep-02 (Agilent. No. 20020918) 2-Apr-03 (METAS, No 252-0250)	In house check: Aug-05 Apr-04 Sep-03 Apr-04
F generator HP 8684C ower sensor E4412A ower sensor HP 8481A ower meter EPM E4419B letwork Analyzer HP 8753E	US3642U01700 MY41495277 MY41092180 GB41293874 US37390585	4-Aug-99 (SPEAG, in house check Aug-02) 2-Apr-03 (METAS, No 252-0250) 18-Sep-02 (Agilent. No. 20020918) 2-Apr-03 (METAS, No 252-0250) 18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Aug-05 Apr-04 Sep-03 Apr-04 In house check: Oct 03
F generator HP 8684C ower sensor E4412A ower sensor HP 8481A ower meter EPM E4419B letwork Analyzer HP 8753E	US3642U01700 MY41495277 MY41092180 GB41293874 US37390585	4-Aug-99 (SPEAG, in house check Aug-02) 2-Apr-03 (METAS, No 252-0250) 18-Sep-02 (Agilent. No. 20020918) 2-Apr-03 (METAS, No 252-0250)	In house check: Aug-05 Apr-04 Sep-03 Apr-04
IF generator HP 8684C Jower sensor E4412A Jower sensor HP 8481A Jower meter EPM E4419B Jetwork Analyzer HP 8753E	US3642U01700 MY41495277 MY41092180 GB41293874 US37390585 SN: 6295803	4-Aug-99 (SPEAG, in house check Aug-02) 2-Apr-03 (METAS, No 252-0250) 18-Sep-02 (Agilent. No. 20020918) 2-Apr-03 (METAS, No 252-0250) 18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Aug-05 Apr-04 Sep-03 Apr-04 In house check: Oct 03
IF generator HP 8684C ower sensor E4412A ower sensor HP 8481A ower meter EPM E4419B letwork Analyzer HP 8753E luke Process Calibrator Type 702	US3642U01700 MY41495277 MY41092180 GB41293874 US37390585 SN: 6295803	4-Aug-99 (SPEAG, in house check Aug-02) 2-Apr-03 (METAS, No 252-0250) 18-Sep-02 (Agillent, No, 20020918) 2-Apr-03 (METAS, No 252-0250) 18-Oct-01 (Agilent, No, 24BR1033101) 3-Sep-01 (ELCAL, No, 2360)	In house check: Aug-05 Apr-04 Sep-03 Apr-04 In house check: Oct 03 Sep-03
todel Type  IF generator HP 8684C  Gower sensor E4412A  Gower sensor HP 8481A  Gower meter EPM E4419B  Ietwork Analyzer HP 8753E  Iuke Process Calibrator Type 702	US3642U01700 MY41495277 MY41092180 GB41293874 US37390585 SN: 6295803	4-Aug-99 (SPEAG, in house check Aug-02) 2-Apr-03 (METAS, No 252-0250) 18-Sep-02 (Agilent, No. 20020918) 2-Apr-03 (METAS, No 252-0250) 18-Oct-01 (Agilent, No. 24BR1033101) 3-Sep-01 (ELCAL, No.2360)	In house check: Aug-05 Apr-04 Sep-03 Apr-04 In house check: Oct 03 Sep-03
IF generator HP 8684C Power sensor E4412A Power sensor HP 8481A Power meter EPM E4419B Retwork Analyzer HP 8753E Ruke Process Calibrator Type 702	US3642U01700 MY41495277 MY41092180 GB41293874 US37390585 SN: 6295803	4-Aug-99 (SPEAG, in house check Aug-02) 2-Apr-03 (METAS, No 252-0250) 18-Sep-02 (Agilent, No. 20020918) 2-Apr-03 (METAS, No 252-0250) 18-Oct-01 (Agilent, No. 24BR1033101) 3-Sep-01 (ELCAL, No.2360)	In house check: Aug-05 Apr-04 Sep-03 Apr-04 In house check: Oct 03 Sep-03
F generator HP 8684C ower sensor E4412A ower sensor HP 8481A ower meter EPM E4419B letwork Analyzer HP 8753E luke Process Calibrator Type 702	US3642U01700 MY41495277 MY41092180 GB41293874 US37390585 SN: 6295803	4-Aug-99 (SPEAG, in house check Aug-02) 2-Apr-03 (METAS, No 252-0250) 18-Sep-02 (Agilent, No. 20020918) 2-Apr-03 (METAS, No 252-0250) 18-Oct-01 (Agilent, No. 24BR1033101) 3-Sep-01 (ELCAL, No. 2360)	In house check: Aug-05 Apr-04 Sep-03 Apr-04 In house check: Oct 03 Sep-03 Signature
F generator HP 8684C ower sensor E4412A ower sensor HP 8481A ower meter EPM E4419B letwork Analyzer HP 8753E luke Process Calibrator Type 702	US3642U01700 MY41495277 MY41092180 GB41293874 US37390585 SN: 6295803	4-Aug-99 (SPEAG, in house check Aug-02) 2-Apr-03 (METAS, No 252-0250) 18-Sep-02 (Agilent, No. 20020918) 2-Apr-03 (METAS, No 252-0250) 18-Oct-01 (Agilent, No. 24BR1033101) 3-Sep-01 (ELCAL, No. 2360)	In house check: Aug-05 Apr-04 Sep-03 Apr-04 In house check: Oct 03 Sep-03
F generator HP 8684C ower sensor E4412A ower sensor HP 8481A ower meter EPM E4419B letwork Analyzer HP 8753E luke Process Galibrator Type 702 calibrated by:	US3642U01700 MY41495277 MY41092180 GB41293874 US37390585 SN: 6295803	4-Aug-99 (SPEAG, in house check Aug-02) 2-Apr-03 (METAS, No 252-0250) 18-Sep-02 (Agilent, No. 20020918) 2-Apr-03 (METAS, No 252-0250) 18-Oct-01 (Agilent, No. 24BR1033101) 3-Sep-01 (ELCAL, No. 2360)	In house check: Aug-05 Apr-04 Sep-03 Apr-04 In house check: Oct 03 Sep-03 Signature Date issued: August 28, 2003

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Appendices to SAR Compliance Test Report for BlackBerry

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Wireless Handheld Model No. RAN21CN

Dates of Test Author Data **Daoud Attayi** 

Nov. 06 - 12, 2003

RIM-0060-0311-04

L6ARAN21CN

Schmid & Partner Engineering AG

p е a

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

## Probe ET3DV6

SN:1642

Manufactured: Last calibration: Recalibrated:

November 7, 2001 July 26, 2002

August 28, 2003

Calibrated for DASY Systems

(Note: non-competible with DASY2 systemi)

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Author Data Dates of Test Daoud Attayi

Nov. 06 - 12, 2003

Test Report No RIM-0060-0311-04

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August 28, 2003

m٧ mV m۷

ET3DV6 8N:1642

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

Sensitivi	ty in Free	Space		Diode Co	mpressio	n
	NormX	1,0	84 μV/(V/m) <sup>2</sup>		DCP X	96
	NormY	1,3	86 μV/(V/m) <sup>2</sup>		DCP Y	96
	NormZ		61 μV/(V/m)²		DCP Z	96
Sensitivit	y in Tissue	Simulati	ina Liquid			
Head	•	MHz	տց	σ•	0.97 ± 5%	mho/m
Valid for f=80	00-1000 MHz w	ith Head Ties	sue Simulating Liquid accordi	ng to EN 50361	, P1528-200	x
	ConvF X	6	i.6 ±9.5% (k=2)		Boundary of	fect:
	ConvF Y	6	i.6 ±9.5% (k=2)		Alpha	0.27
	ConvF Z	6	.6 ±9.5% (k=2)		Depth	3.41
Head	1800	MHz	e,= 40.0 ± 5%		1.40 ± 5%	mho/m
Valid for f=1	710-1910 <b>MHz</b> 1	with Head To	asue Simulating Liquid eccord	ling to EN 5038	31, P1 52 <b>8-</b> 20	ox
	ConvF X	5	.4 ±9.5% (k=2)		Boundary of	fect:
	ConvF Y	5	.4 ± 9.5% (k=2)		Alpha	0.48
	ConvF Z	5	.4 ± 9.5% (k=2)		Depth	2.57
Boundar	y Effect					
Head	900	MHz	Typical SAR gradient: 5	5 % per mm		
	Probe Tip to B	loundary			1 mm	2 mm
	SAR <sub>M</sub> [%]	Without Co	orrection Algorithm		10.8	6.6
	SAR <sub>ee</sub> [%]	With Corre	ection Algorithm		0.6	0.6
Head	1800	MHz	Typical SAR gradient: 1	10 % per mm		
	Probe Tip to 8	loundary			1 mm	2 mm
	SAR <sub>••</sub> [%]	Without Co	orrection Algorithm		12.7	8.5
	SAR <sub>60</sub> [%]	With Corre	action Algorithm		0.2	0.1
Şensor (	Offset					
	Probe Tip to \$	iensor Centi	er	2.7		mm
	Optical Surfac	e Detection	ı	1.0 ± 0.2		mm

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Wireless Handheld Model No. RAN21CN

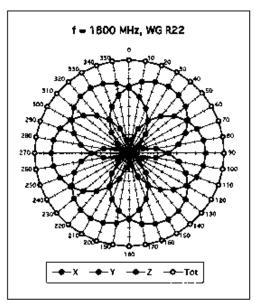
Dates of Test Nov. 06 - 12, 2003

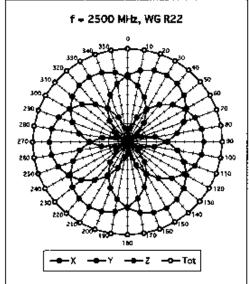
RIM-0060-0311-04

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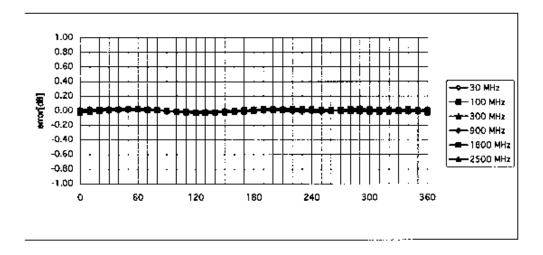
ET3DV6 SN:1642

August 28, 2003





### Isotropy Error ( $\phi$ ), $\theta = 0^{\circ}$



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Author Data Daoud Attayi Dates of Test Nov. 06 - 12, 2003 Test Report No

RIM-0060-0311-04

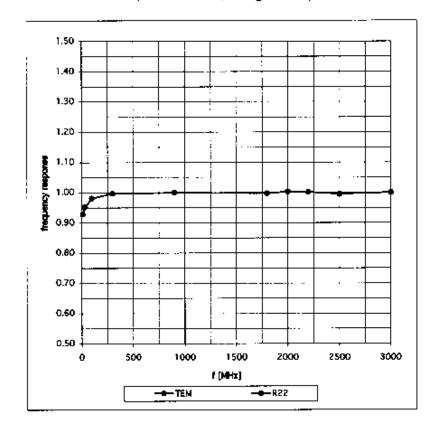
L6ARAN21CN

ET3DV6 SN:1642

August 28, 2003

### Frequency Response of E-Field

(TEM-Cell:#1110, Waveguide R22)



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Author Data

Daoud Attayi

Dates of Test
Nov. 06 - 12, 2003

Test Report No **RIM-0060-0311-04** 

FCC ID

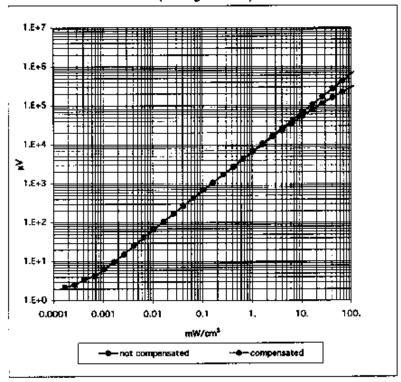
L6ARAN21CN

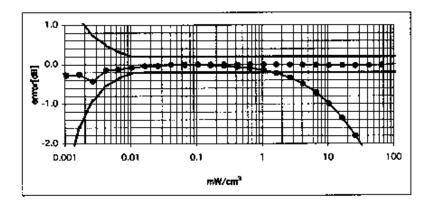
ET3DV6 SN:1642

August 28, 2003

### Dynamic Range f(SARhead)

( Wavegulde R22 )





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Author Data **Daoud Attayi**  Dates of Test Nov. 06 - 12, 2003

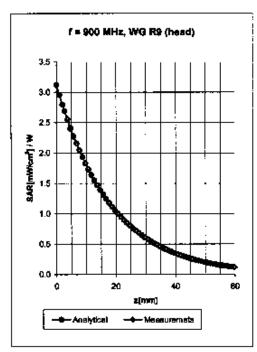
RIM-0060-0311-04

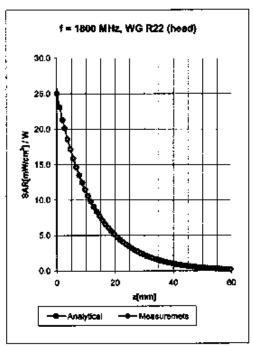
L6ARAN21CN

ET3DV6 SN:1642

August 28, 2003

### Conversion Factor Assessment





Head	900 MH	lz	4= 41.5 ± 5%	o= 0.97 ± 5% n	nho/m
Valid for	f=800-1000 MHz with I	lead Tissue Simuli	sting Liquid according t	o EN 50361, P1528-200	x
	ConvF X	6.6 ±9.59	% (k=2)	Boundary effe	ect:
	ConvF Y	6.6 ± 9.59	% (k=2)	Alpha	0.27
	ConvF Z	6.6 ± 9.59	% (k=2)	Depth	3 <i>.</i> 41
Head	1800 MF	lz.	e,= 40.0 ± 5%	¤ 1,40 ± 5% n	nho/m
Valid for	f=1710-1910 MHz with	Head Tissue Simu	aleting Liquid according	to EN 50361, P1526-20	ОХ
	ConvF X	5.4 ± 9.59	% (k=2)	Boundary effe	ect:
	ConvF Y	5.4 ±9.59	K (k=2)	Aipha	0.48
	ConvF Z	5.4 ±9.59	% (k=2)	Depth	2.57

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Author Data **Daoud Attayi**  Dates of Test Nov. 06 - 12, 2003

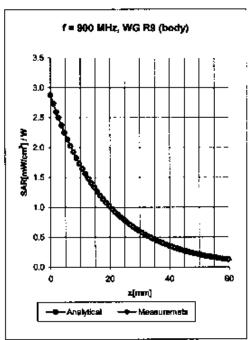
RIM-0060-0311-04

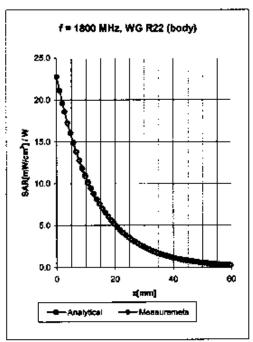
FCC ID L6ARAN21CN

### ET3DV6 SN:1642

August 28, 2003

### **Conversion Factor Assessment**





Body	900 MHz	e,=	55.0 ± 5%	a= 1.05 ± 5% m	ho/m
Valid for fe	800-1000 MHz with Bo	dy Tissue Simulating I	Liquid according to	OET 65 Suppl. C	
	ConvF X	6.4 ±9.6% (k=	2)	Boundary effec	ot:
	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	e,=	53.3 ± 5%	σ= 1.52 ± 5% m	ho/m
Valid for fe	1710-1910 MHz with 9	ody Tissus Simulating	Liquid according	to OET 65 Suppl. C	
	ConvF X	4.9 ±9.6% (k=	2)	Soundary effect	ct:
	ConvF Y	4.9 ±9.6% (k=)	2)	Alpha	0.58
	ConvF Z	4.9 ± 9.5% (k=	2)	Depth	2.60

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Author Data Daoud Attayi Dates of Test Nov. 06 - 12, 2003

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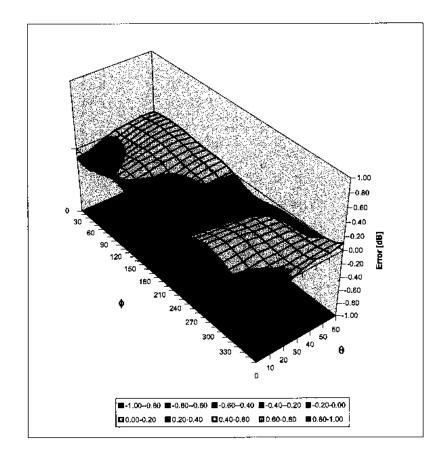
L6ARAN21CN

ET3DV6 \$N:1642

August 28, 2003

### **Deviation from Isotropy in HSL**

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



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Wireless Handheld Model No. RAN21CN

Nov. 06 - 12, 2003

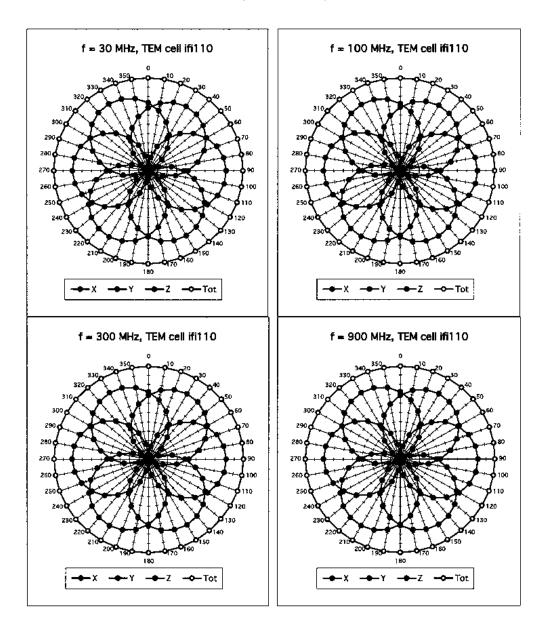
RIM-0060-0311-04

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ET3DV6 SN:1642

August 28, 2003

### Receiving Pattern ( $\phi$ ), $\theta$ = 0°



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

Client

RIM DESCRIPTION OF

Object(s)	D835V2 - SN	446	
Calibration proceduré(s)	QA CAL-05.v Calibration pr	2 ocedure for dipole validation kits	
Calibration date:	August 21, 20		
Condition of the calibrated item	In Tolerance	(according to the specific calibration	on document)
17025 international standard,	led in the closed laborat	E used in the calibration procedures and conformity tory facility: environment temperature 22 +/- 2 degre	·
Model Type RF generator R&S SML-03 Power sensor HP 8481A Power sensor HP 8481A Power meter EPM E442 Network Analyzer HP 8753E	ID # 100698 MY41092317 US37292783 GB37480704 US37390585	Cal Date (Calibrated by, Certificate No.) 27-Mar-2002 (R&S. No. 20-92389) 18-Oct-02 (Agilent, No. 20021018) 30-Oct-02 (METAS, No. 252-0236) 30-Oct-02 (METAS, No. 252-0236) 18-Oct-01 (Agilent, No. 24BR1033101)	Scheduled Calibration In house check: Mar-05 Oct-04 Oct-03 Oct-03 In house check: Oct 03
Calibrated by:	Name Judith <b>M</b> ü <del>ell</del> et	Function Technology	Signature
Approved by:	Katja Pokovic	Lationally Director	flow Ht-
			Date issued: August 22, 2003
This calibration certificate is issued Calibration Laboratory of Schmid		tution until the accreditation process (based on ISO/ AG is completed	IEC 17025 International Standard) for

880-KP0301061-A



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**Daoud Attayi** 

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Schmid & Partner Engineering AG

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

## DASY

## Dipole Validation Kit

Type: D835V2

Serial: 446

October 24, 2001 Manufactured: 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 43.3  $\pm$  5% Conductivity 0.91 mbo/m  $\pm$  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 <u>advanced extrapolation</u> are:

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

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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:

1.395 ns (one direction)

Transmission factor:

0.983

(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 835 MHz:

 $Re{Z} = 48.9 \Omega$ 

 $Im \{Z\} = -5.5 \Omega$ 

Return Loss at 835 MHz

-24.9 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.

### 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.

### Power Test

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.



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Page 1 of 1 Date/Time: 08/21/03 10:03:51

Test Laboratory: SPEAG, Zurich, Switzerland File Name: \$N446\_\$N1507\_HSL835\_210803.da4

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN446

Nov. 06 - 12, 2003

Program: Dipole Calibration

Communication System: CW-835; Frequency: 835 MHz; Duty Cycle: 1:1 Medium: HSL 835 MHz ( $\sigma = 0.91$  mho/m,  $\epsilon_r = 43.28$ ,  $\rho = 1000$  kg/m<sup>3</sup>)

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

### Pin = 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

### Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm,

dz=5mm

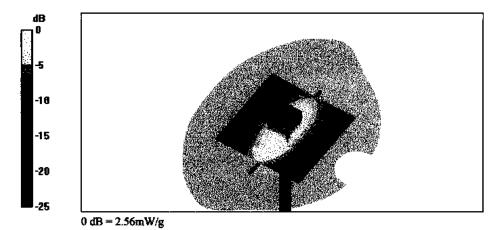
Peak SAR (extrapolated) = 3.52 W/kg

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



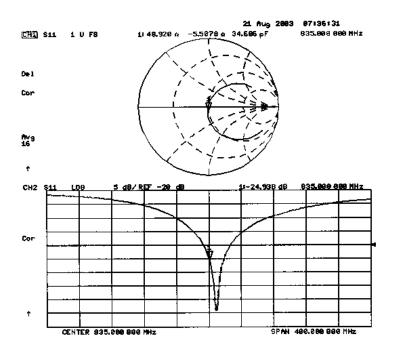


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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland

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Schmid & Partner Engineering AG

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

## DASY

## Dipole Validation Kit

Type: D1900V2

Serial: 545

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



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#### 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.

### 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 cm3 (1 g) of tissue:  $41.2 \text{ mW/g} \pm 16.8 \% (k=2)^{1}$ averaged over 10 cm<sup>3</sup> (10 g) of tissue: 21.3 mW/g  $\pm$  16.2 % (k=2)<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

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.

### 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.

### 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: <u>SN545\_SN1507\_HSL1900\_220803.da4</u>

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 ( $\sigma = 1.46$  mho/m,  $\epsilon_r = 40.17$ ,  $\rho = 1000 \text{ kg/m}^3$ )

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

#### DASY4 Configuration:

Probe; ET3DV6 - \$N1507; ConvF(5.2, 5.2, 5.2); Calibrated: 1/18/2003

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 SN411; Calibrated: I/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

### Pin = 250 mW; d = 10 mm/Area Scan (81x81x1); Measurement grid: dx=15mm, dy=15mm

Reference Value = 93.6 V/m

Power Drift = 0.05 dB

Maximum value of SAR = 11.5 mW/g

#### Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

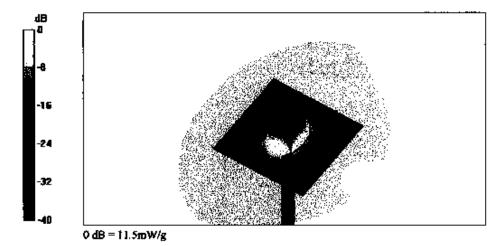
Peak SAR (extrapolated) = 17.7 W/kg

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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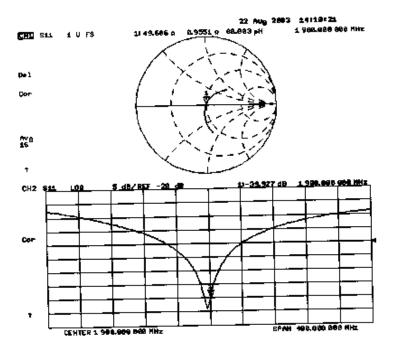
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APPENDIX E: SAR SET UP PHOTOS

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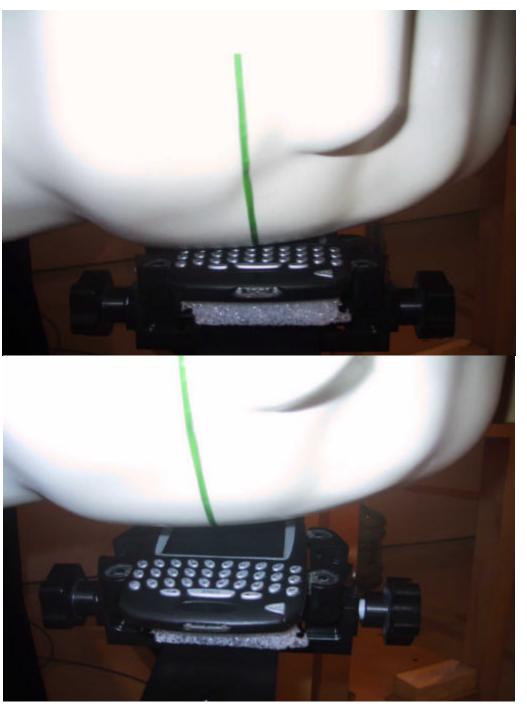


Figure E1. Left ear configuration

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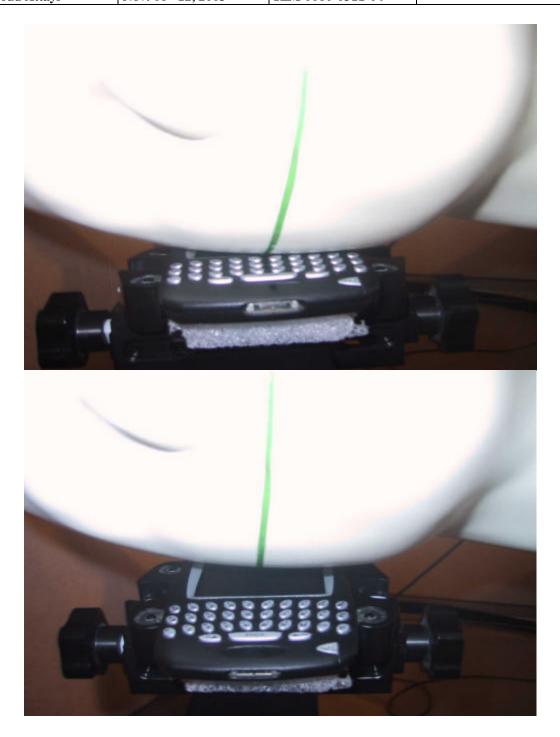


Figure E2. Right ear configuration

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

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