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APPENDIX A: SAR DISTRIBUTION COMPARISON FOR THE ACCURACY VERIFICATION

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05/23/03

Dipole 835

SAM 1; Flat

Probe: ET3DV6 - SN1642; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head 835 MHz: $\sigma = 0.88 \text{ mho/m}$ $\epsilon_r = 40.0$ $\rho = 1.00 \text{ g/cm}^3$

Cube 5x5x7: Peak: 18.5 mW/g, SAR (1g): 11.2 mW/g, SAR (10g): 7.03 mW/g, (Worst-case extrapolation)

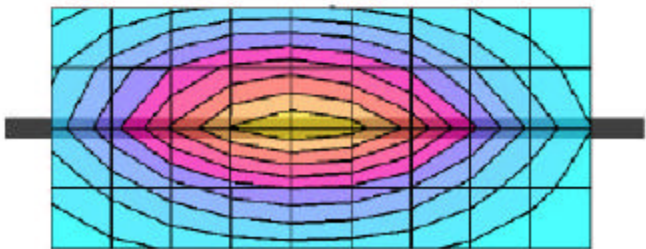
Penetration depth: 11.4 (9.8, 13.6) [mm]

Powerdrift: 0.01 dB

Date tested: May 22, 2003

Ambient temperature: 24.3 (°C)

Liquid temperature: 22.6 (°C)



SAR_{Tot} [mW/g]



Author Data
Daoud Attayi

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May 22 - 27, 2003

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Dipole 1900 MHz

SAM 1; Flat

Probe: ET3DV6 - SN1642; ConvF(5.30,5.30,5.30); Crest factor: 1.0; Head 1900 MHz: $\sigma = 1.52 \text{ mho/m}$ $\epsilon_r = 38.4$ $\rho = 1.00 \text{ g/cm}^3$

Cube 5x5x7: Peak: 86.9 mW/g, SAR (1g): 44.3 mW/g, SAR (10g): 22.3 mW/g, (Worst-case extrapolation)

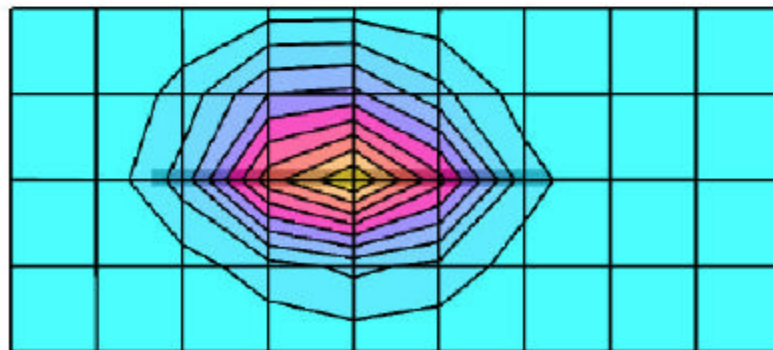
Penetration depth: 7.6 (7.1, 8.8) [mm]

Powerdrift: -0.02 dB

Date tested: May 26, 2003

Ambient temperature: 24.3 (°C)

Liquid temperature: 22.3 (°C)



SAR_{10g} [mW/g]



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APPENDIX B: SAR DISTRIBUTION PLOTS FOR HEAD CONFIGURATION

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SAM 1; Left Hand

Probe: ET3DV6 - SN1642; ConvF(6.50,6.50,6.50); Crest factor: 8.0; Head 835 MHz; $\sigma = 0.88 \text{ mho/m}$ $\epsilon_r = 40.0$ $\rho = 1.00 \text{ g/cm}^3$

Cube 5x5x7; Peak: 0.281 mW/g, SAR (1g): 0.195 mW/g, SAR (10g): 0.140 mW/g, (Worst-case extrapolation)

Penetration depth: 17.3 (14.1, 20.4) [mm]

Powerdrift: -0.20 dB

Date tested: May 22, 2003

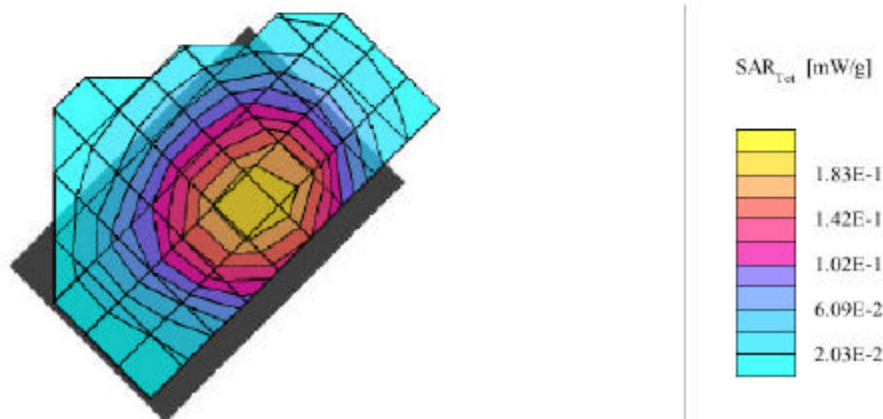
Ambient temperature: 24.3 (°C)

Liquid temperature: 23.5 (°C)

Band: GSM 850

Frequency: 836.8 MHz

Configuration: Left side of head, touch position



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BlackBerry Wireless Handheld Model No. R6230GN

SAM 1; Left Hand

Probe: ET3DV6 - SN1642; ConvF(6.50,6.50,6.50); Crest factor: 8.0; Head 835 MHz: $\sigma = 0.88$ mho/m $\epsilon_r = 40.0$ $\rho = 1.00$ g/cm³

Cube 5x5x7: Peak: 0.187 mW/g, SAR (1g): 0.131 mW/g, SAR (10g): 0.0940 mW/g, (Worst-case extrapolation)

Penetration depth: 17.5 (14.5, 20.4) [mm]

Powerdrift: -0.15 dB

Date tested: May 22, 2003

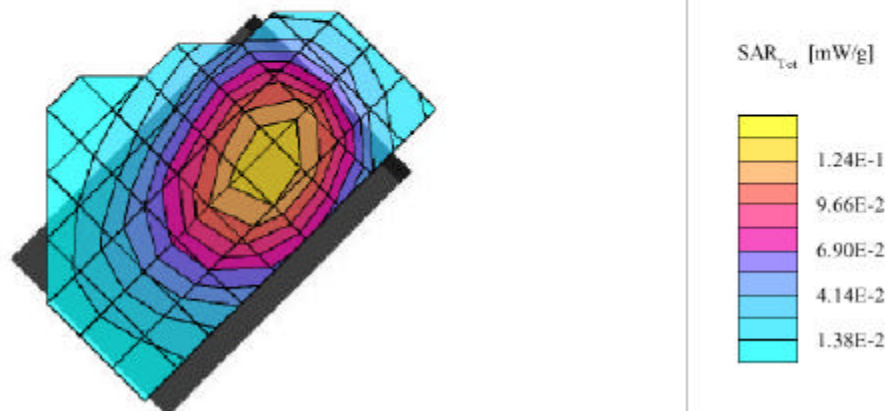
Ambient temperature: 24.3 (°C)

Liquid temperature: 23.5 (°C)

Band: GSM 850

Frequency: 836.8 MHz

Configuration: Left side of head, tilt position



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BlackBerry Wireless Handheld Model No. R6230GN

SAM 1; Right Hand

Probe: ET3DV6 - SN1642; ConvF(6.50,6.50,6.50); Crest factor: 8.0; Head 835 MHz: $\sigma = 0.88 \text{ mho/m}$ $\epsilon_r = 40.0$ $\rho = 1.00 \text{ g/cm}^3$

Cube 5x5x7: Peak: 0.257 mW/g, SAR (1g): 0.173 mW/g, SAR (10g): 0.123 mW/g, (Worst-case extrapolation)

Penetration depth: 17.6 (13.5, 22.1) [mm]

Powerdrift: -0.10 dB

Date tested: May 22, 2003

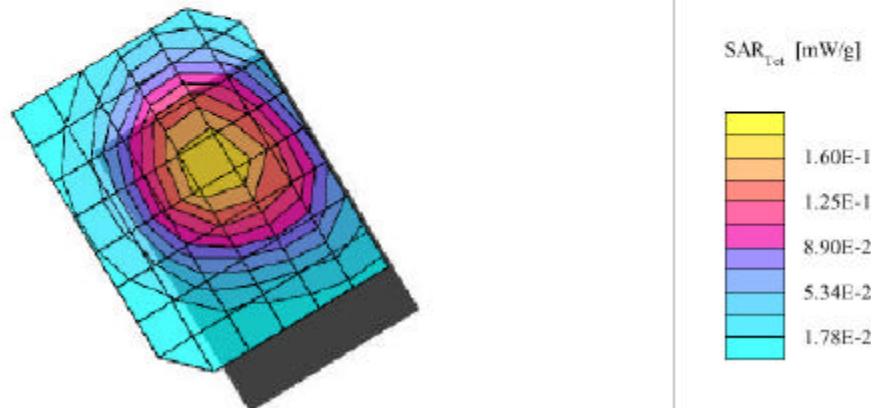
Ambient temperature: 24.3 (°C)

Liquid temperature: 22.6 (°C)

Band: GSM 850

Frequency: 836.8 MHz

Configuration: Right side of head, touch position



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BlackBerry Wireless Handheld Model No. R6230GN

SAM 1; Right Hand

Probe: ET3DV6 - SN1642; ConvF(6.50,6.50,6.50); Crest factor: 8.0; Head 835 MHz: $\sigma = 0.88$ mho/m $\epsilon_r = 40.0$ $\rho = 1.00$ g/cm³

Cube 5x5x7: Peak: 0.215 mW/g, SAR (1g): 0.133 mW/g, SAR (10g): 0.0910 mW/g * Max outside, (Worst-case extrapolation)

Penetration depth: 13.0 (10.7, 15.8) [mm]

Powerdrift: -0.04 dB

Date tested: May 22, 2003

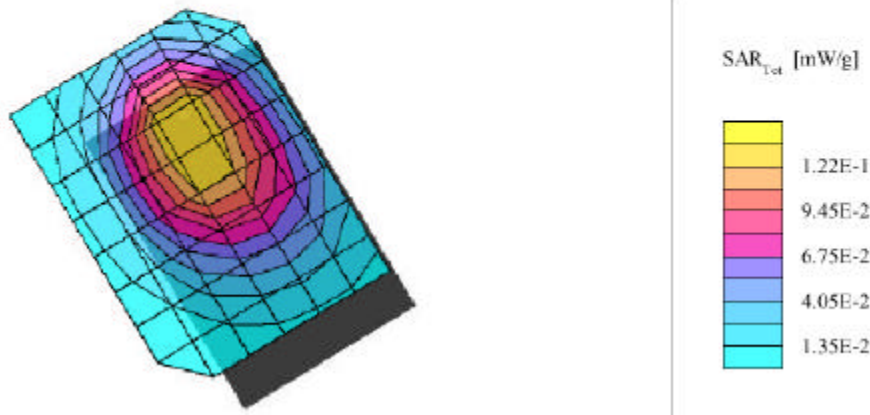
Ambient temperature: 24.3 (°C)

Liquid temperature: 22.6 (°C)

Band: GSM 850

Frequency: 836.8 MHz

Configuration: Right side of head, tilt position



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BlackBerry Wireless Handheld Model No. R6230GN

SAM 1; Left Hand

Probe: ET3DV6 - SN1642; ConvF(5.30,5.30,5.30); Crest factor: 8.0; Head 1900 MHz: $\sigma = 1.52$ mho/m $\epsilon_r = 38.4$ $\rho = 1.00$ g/cm³

Cube 5x5x7: Peak: 0.246 mW/g, SAR (1g): 0.138 mW/g, SAR (10g): 0.0797 mW/g, (Worst-case extrapolation)

Penetration depth: 9.3 (8.2, 11.0) [mm]

Powerdrift: -0.83 dB

Date tested: May 27, 2003

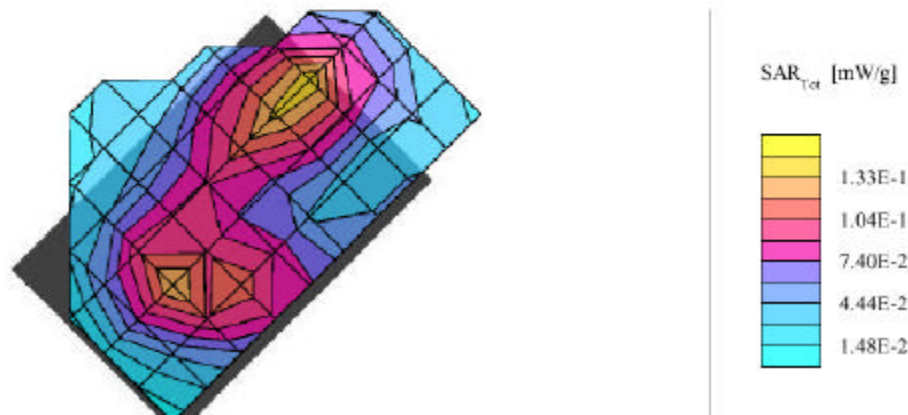
Ambient temperature: 24.4 (°C)

Liquid temperature: 23.3 (°C)

Band: GSM 1900

Frequency: 1880 MHz

Configuration: Left side of head touch position



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BlackBerry Wireless Handheld Model No. R6230GN

SAM 1; Left Hand

Probe: ET3DV6 - SN1642; ConvF(5.30,5.30,5.30); Crest factor: 8.0; Head 1900 MHz: $\sigma = 1.52$ mho/m $\epsilon_r = 38.4$ $\rho = 1.00$ g/cm³

Cube 5x5x7: Peak: 0.330 mW/g, SAR (1g): 0.188 mW/g, SAR (10g): 0.107 mW/g, (Worst-case extrapolation)

Penetration depth: 9.3 (8.4, 10.8) [mm]

Powerdrift: 1.40 dB

Date tested: May 27, 2003

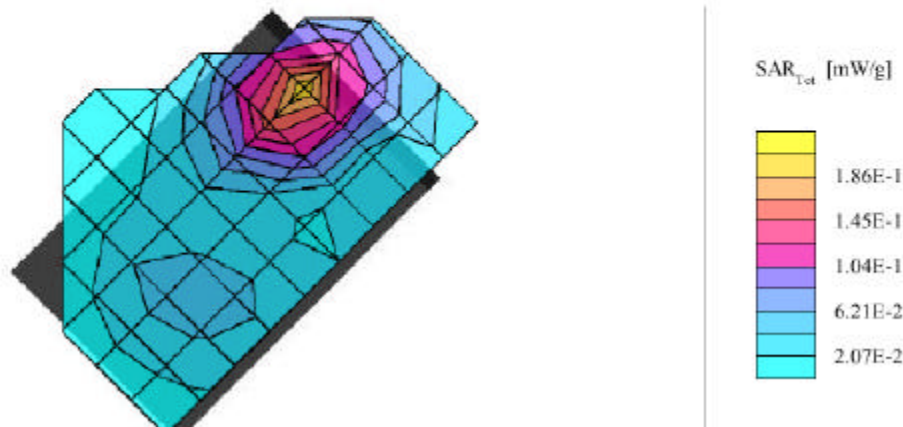
Ambient temperature: 24.4 (°C)

Liquid temperature: 23.3 (°C)

Band: GSM 1900

Frequency: 1880 MHz

Configuration: Left side of head tilt position



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SAM 1; Right Hand

Probe: ET3DV6 - SN1642; ConvF(5.30,5.30,5.30); Crest factor: 8.0; Head 1900 MHz: $\sigma = 1.52$ mho/m $\epsilon_r = 38.4$ $\rho = 1.00$ g/cm³

Cube 5x5x7: Peak: 0.340 mW/g, SAR (1g): 0.193 mW/g, SAR (10g): 0.113 mW/g * Max outside, (Worst-case extrapolation)

Penetration depth: 9.4 (8.3, 11.0) [mm]

Powerdrift: 0.49 dB

Date tested: May 26, 2003

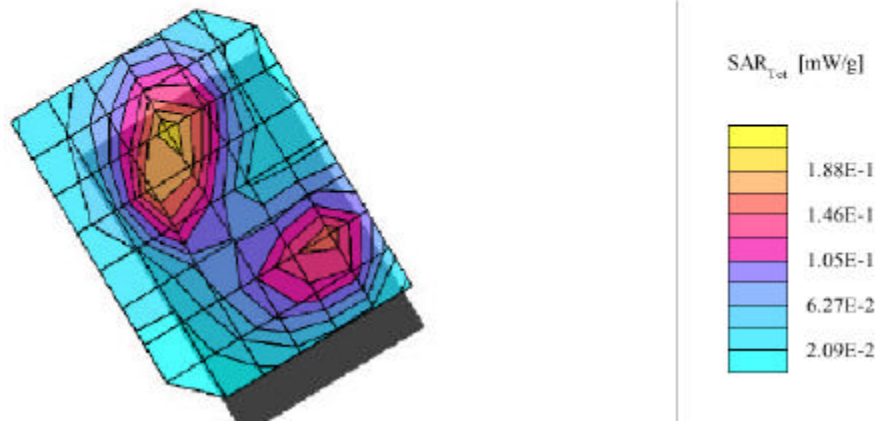
Ambient temperature: 24.5 (°C)

Liquid temperature: 23.4 (°C)

Band: GSM 1900

Frequency: 1880 MHz

Configuration: Right side of head touch position



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BlackBerry Wireless Handheld Model No. R6230GN

SAM 1; Right Hand

Probe: ET3DV6 - SN1642; ConvF(5.30,5.30,5.30); Crest factor: 8.0; Head 1900 MHz: $\sigma = 1.52$ mho/m $\epsilon_r = 38.4$ $\rho = 1.00$ g/cm³

Cube 5x5x7: Peak: 0.418 mW/g, SAR (1g): 0.234 mW/g, SAR (10g): 0.132 mW/g, (Worst-case extrapolation)

Penetration depth: 9.3 (8.4, 10.7) [mm]

Powerdrift: 0.13 dB

Date tested: May 26, 2003

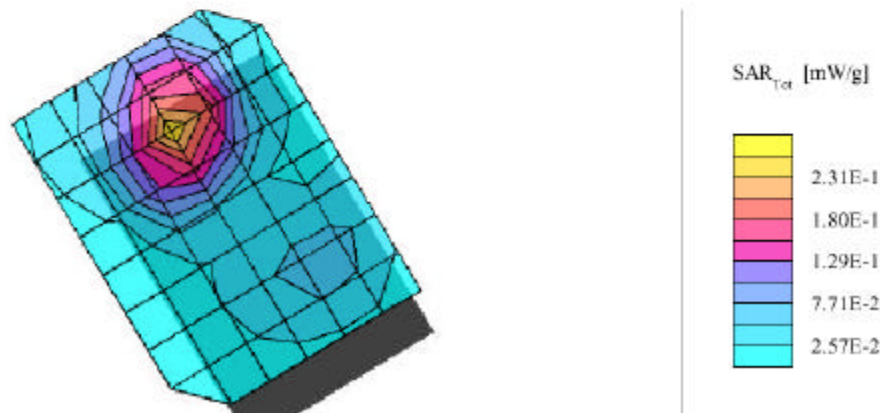
Ambient temperature: 24.5 (°C)

Liquid temperature: 23.4 (°C)

Band: GSM 1900

Frequency: 1880 MHz

Configuration: Right side of head tilt position



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APPENDIX C: SAR DISTRIBUTION PLOTS FOR BODY-WORN CONFIGURATION

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BlackBerry Wireless Handheld Model No. R6230GN

SAM 2; Flat

Probe: ET3DV6 - SN1642; ConvF(6.40,6.40,6.40); Crest factor: 8.0; Muscle 835 MHz: $\sigma = 0.99$ mho/m $\epsilon_r = 54.5$ $\rho = 1.00$ g/cm³

Cube 5x5x7: Peak: 0.173 mW/g, SAR (1g): 0.120 mW/g, SAR (10g): 0.0869 mW/g, (Worst-case extrapolation)

Penetration depth: 16.9 (14.0, 20.3) [mm]

Powerdrift: -0.16 dB

Date tested: May 23, 2003

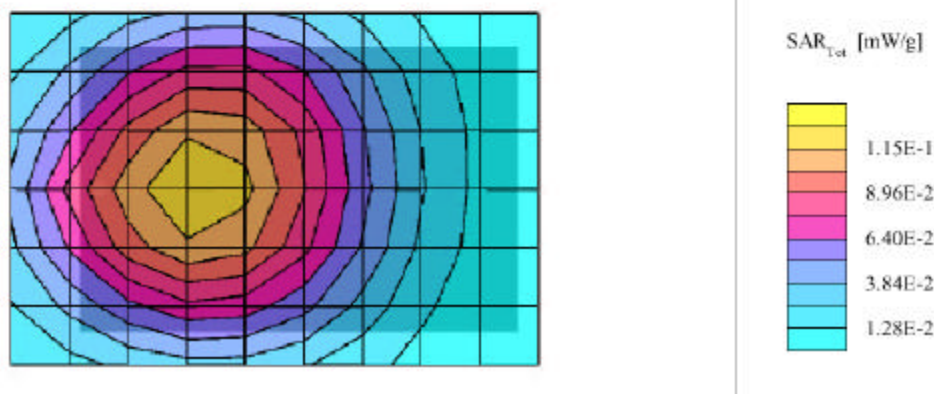
Ambient temperature: 24.2 (°C)

Liquid temperature: 22.2 (°C)

Band: GSM 850

Frequency: 836.8 MHz

Configuration: Body-worn with holster



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BlackBerry Wireless Handheld Model No. R6230GN

SAM 2; Flat

Probe: ET3DV6 - SN1642; ConvF(6.40,6.40,6.40); Crest factor: 8.0; Muscle 835 MHz: $\sigma = 0.99$ mho/m $\epsilon_r = 54.5$ $\rho = 1.00$ g/cm³

Cube 5x5x7: Peak: 0.155 mW/g, SAR (1g): 0.107 mW/g, SAR (10g): 0.0779 mW/g, (Worst-case extrapolation)

Penetration depth: 17.3 (13.9, 21.0) [mm]

Powerdrift: 0.01 dB

Date tested: May 23, 2003

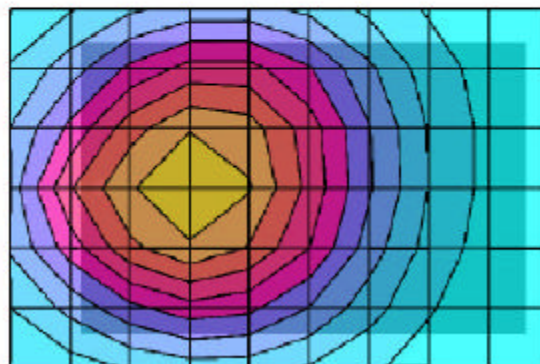
Ambient temperature: 24.3 (°C)

Liquid temperature: 22.1 (°C)

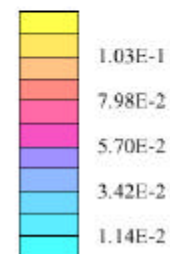
Band: GSM 850

Frequency: 836.8 MHz

Configuration: Body-worn with holster and headset



SAR_{Tot} [mW/g]



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SAM 2; Flat

Probe: ET3DV6 - SN1642; ConvF(6.40,6.40,6.40); Crest factor: 8.0; Muscle 835 MHz: $\sigma = 0.99$ mho/m $\epsilon_r = 54.5$ $\rho = 1.00$ g/cm³

Cube 5x5x7: Peak: 0.183 mW/g, SAR (1g): 0.124 mW/g, SAR (10g): 0.0898 mW/g, (Worst-case extrapolation)

Penetration depth: 17.2 (13.3, 21.4) [mm]

Powerdrift: -0.12 dB

Date tested: May 23, 2003

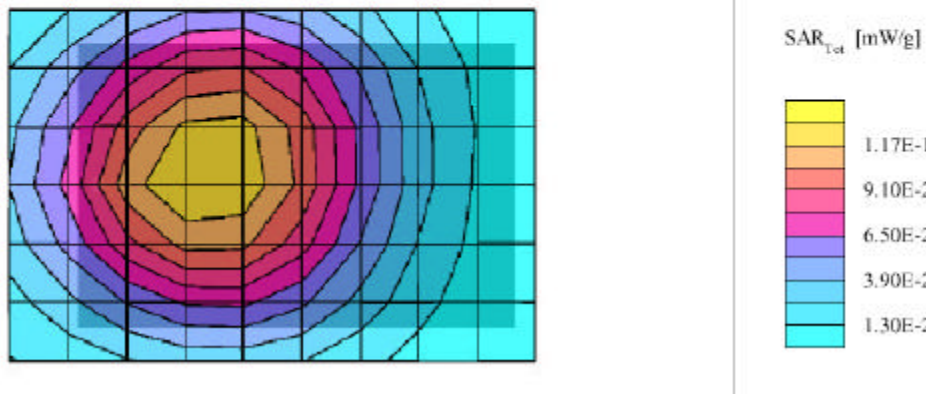
Ambient temperature: 24.3 (°C)

Liquid temperature: 22.2 (°C)

Band: GSM 850

Frequency: 836.8 MHz

Configuration: Body-worn with leather holster



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SAM 2; Flat

Probe: ET3DV6 - SN1642; ConvF(6.40,6.40,6.40); Crest factor: 8.0; Muscle 835 MHz: $\sigma = 0.99$ mho/m $\epsilon_r = 54.5$ $\rho = 1.00$ g/cm³

Cube 5x5x7: Peak: 0.157 mW/g, SAR (1g): 0.108 mW/g, SAR (10g): 0.0785 mW/g, (Worst-case extrapolation)

Penetration depth: 17.3 (14.0, 20.8) [mm]

Powerdrift: -0.02 dB

Date tested: May 23, 2003

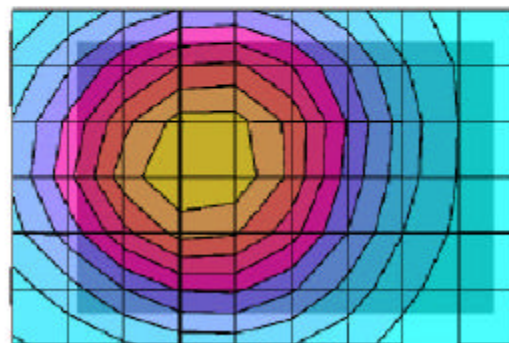
Ambient temperature: 24.4 (°C)

Liquid temperature: 22.3 (°C)

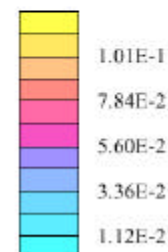
Band: GSM 850

Frequency: 836.8 MHz

Configuration: Body-worn with leather holster and headset



SAR_{Tot} [mW/g]



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SAM 2; Flat

Probe: ET3DV6 - SN1642; ConvF(4.80,4.80,4.80); Crest factor: 8.0; Muscle 1900 MHz: $\sigma = 1.49 \text{ mho/m}$ $\epsilon_r = 52.8$ $\rho = 1.00 \text{ g/cm}^3$

Cube 5x5x7: Peak: 0.189 mW/g, SAR (1g): 0.108 mW/g, SAR (10g): 0.0650 mW/g, (Worst-case extrapolation)

Penetration depth: 10.6 (8.9, 12.9) [mm]

Powerdrift: -0.01 dB

Date tested: May 27, 2003

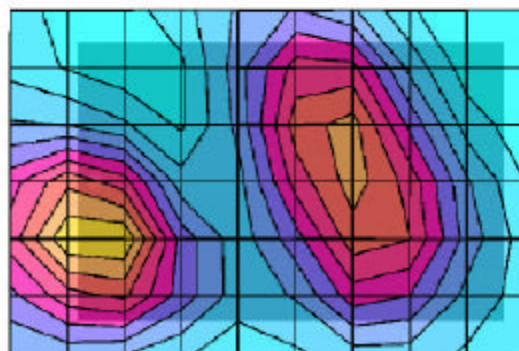
Ambient temperature: 24.4 (°C)

Liquid temperature: 23.3 (°C)

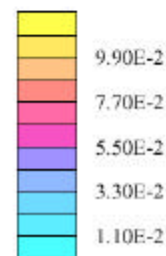
Band: GSM 1900

Frequency: 1880 MHz

Configuration: Body-worn with holster



SAR_{Tot} [mW/g]



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SAM 2; Flat

Probe: ET3DV6 - SN1642; ConvF(4.80,4.80,4.80); Crest factor: 8.0; Muscle 1900 MHz: $\sigma = 1.49 \text{ mho/m}$ $\epsilon_r = 52.8$ $\rho = 1.00 \text{ g/cm}^3$

Cube 5x5x7: Peak: 0.154 mW/g, SAR (1g): 0.0883 mW/g, SAR (10g): 0.0537 mW/g, (Worst-case extrapolation)

Penetration depth: 10.7 (8.8, 13.3) [mm]

Powerdrift: 0.22 dB

Date tested: May 27, 2003

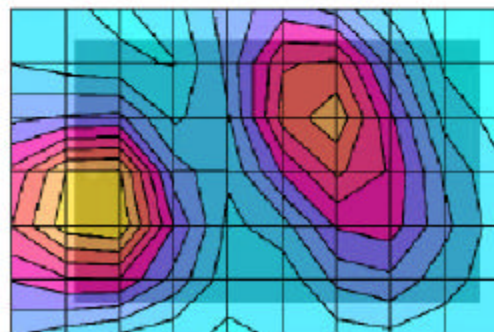
Ambient temperature: 24.4 (°C)

Liquid temperature: 23.3 (°C)

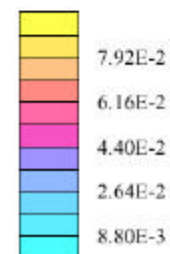
Band: GSM 1900

Frequency: 1880 MHz

Configuration: Body-worn with holster and headset



SAR_{Tot} [mW/g]



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SAM 2; Flat

Probe: ET3DV6 - SN1642; ConvF(4.80,4.80,4.80); Crest factor: 8.0; Muscle 1900 MHz: $\sigma = 1.49 \text{ mho/m}$ $\epsilon_r = 52.8$ $\rho = 1.00 \text{ g/cm}^3$

Cube 5x5x7: Peak: 0.145 mW/g, SAR (1g): 0.0865 mW/g, SAR (10g): 0.0527 mW/g, (Worst-case extrapolation)

Penetration depth: 10.7 (9.6, 12.3) [mm]

Powerdrift: -0.01 dB

Date tested: May 27, 2003

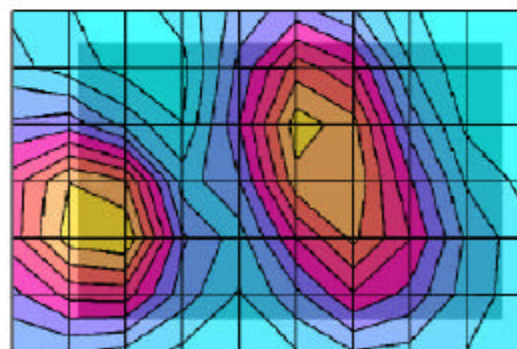
Ambient temperature: 24.4 (°C)

Liquid temperature: 23.2 (°C)

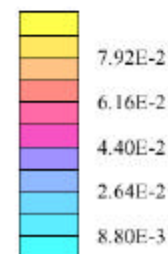
Band: GSM 1900

Frequency: 1880 MHz

Configuration: Body-worn with leather holster



SAR_{Tot} [mW/g]



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BlackBerry Wireless Handheld Model No. R6230GN

SAM 2; Flat

Probe: ET3DV6 - SN1642; ConvF(4.80,4.80,4.80); Crest factor: 8.0; Muscle 1900 MHz: $\sigma = 1.49 \text{ mho/m}$ $\epsilon_r = 52.8$ $\rho = 1.00 \text{ g/cm}^3$

Cube 5x5x7: Peak: 0.119 mW/g, SAR (1g): 0.0718 mW/g, SAR (10g): 0.0447 mW/g, (Worst-case extrapolation)

Penetration depth: 11.3 (9.7, 13.3) [mm]

Powerdrift: 0.06 dB

Date tested: May 27, 2003

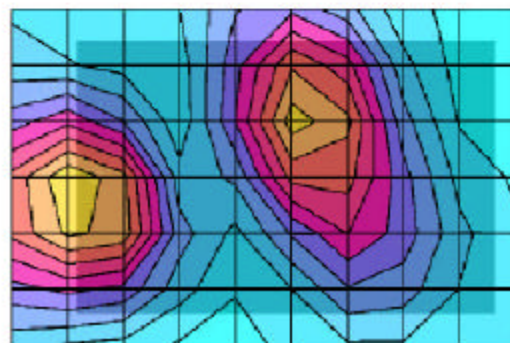
Ambient temperature: 24.5 (°C)

Liquid temperature: 23.2 (°C)

Band: GSM 1900

Frequency: 1880 MHz

Configuration: Body-worn with leather holster and headset



SAR_{Tot} [mW/g]



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APPENDIX D: PROBE & DIPOLE CALIBRATION DATA

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Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Calibration Certificate

Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1642

Place of Calibration:

Zurich

Date of Calibration:

July 26, 2002

Calibration Interval:

12 months

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:

D. Vetter

Approved by:

Daoud Attayi

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**Schmid & Partner
Engineering AG**

Zeughausstrasse 43, 8004 Zurich, Switzerland, Telephone +41 1 245 97 00, Fax +41 1 245 97 79

Probe ET3DV6

SN:1642

Manufactured:	November 7, 2001
Last calibration:	November 26, 2001
Recalibrated:	July 26, 2002

Calibrated for System DASY3

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Author Data	Dates of Test	Test Report No	FCC ID	
Daoud Attayi	May 22 - 27, 2003	RIM-0041-0305-04	L6AR6230GN	

ET3DV6 SN:1642

July 26, 2002

DASY3 - Parameters of Probe: ET3DV6 SN:1642

Sensitivity in Free Space

NormX **1.62** $\mu\text{V}/(\text{V}/\text{m})^2$
 NormY **1.85** $\mu\text{V}/(\text{V}/\text{m})^2$
 NormZ **1.61** $\mu\text{V}/(\text{V}/\text{m})^2$

Diode Compression

DCP X **96** mV
 DCP Y **96** mV
 DCP Z **96** mV

Sensitivity in Tissue Simulating Liquid

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

ConvF X	6.5 $\pm 8.9\%$ (k=2)	Boundary effect:	
ConvF Y	6.5 $\pm 8.9\%$ (k=2)	Alpha	0.34
ConvF Z	6.5 $\pm 8.9\%$ (k=2)	Depth	2.68

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

ConvF X	5.4 $\pm 8.9\%$ (k=2)	Boundary effect:	
ConvF Y	5.4 $\pm 8.9\%$ (k=2)	Alpha	0.53
ConvF Z	5.4 $\pm 8.9\%$ (k=2)	Depth	2.33

Boundary Effect

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

Probe Tip to Boundary		1 mm	2 mm
SAR ₉₀ [%] Without Correction Algorithm		9.9	5.7
SAR ₉₀ [%] With Correction Algorithm		0.4	0.5

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

Probe Tip to Boundary		1 mm	2 mm
SAR ₉₀ [%] Without Correction Algorithm		12.0	7.8
SAR ₉₀ [%] With Correction Algorithm		0.2	0.2

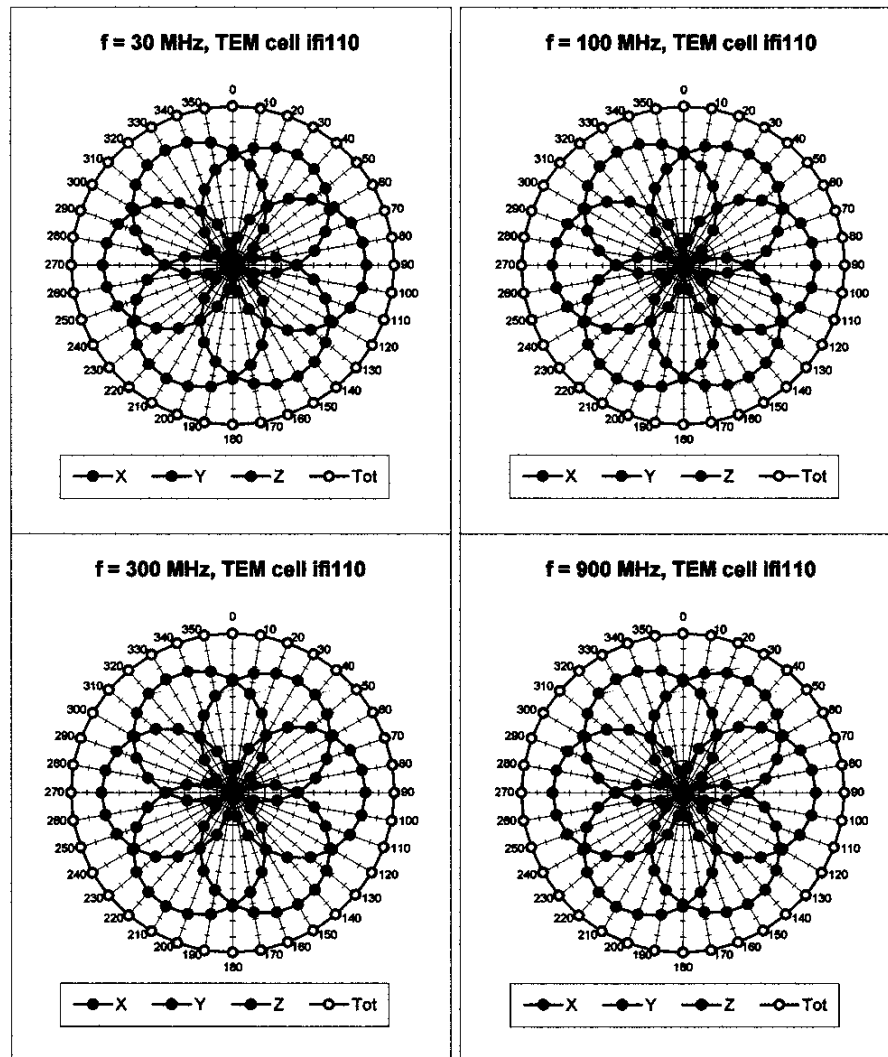
Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.1 $\pm$ 0.2	mm

ET3DV6 SN:1642

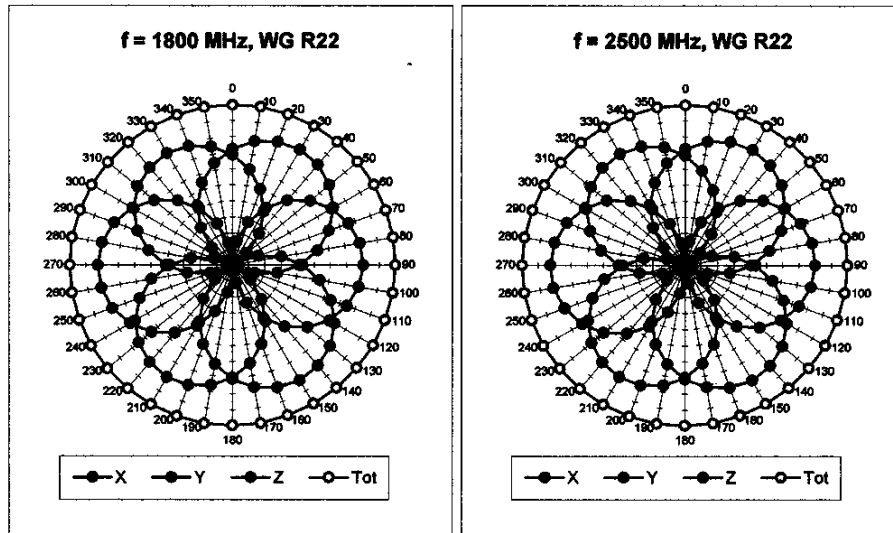
July 26, 2002

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

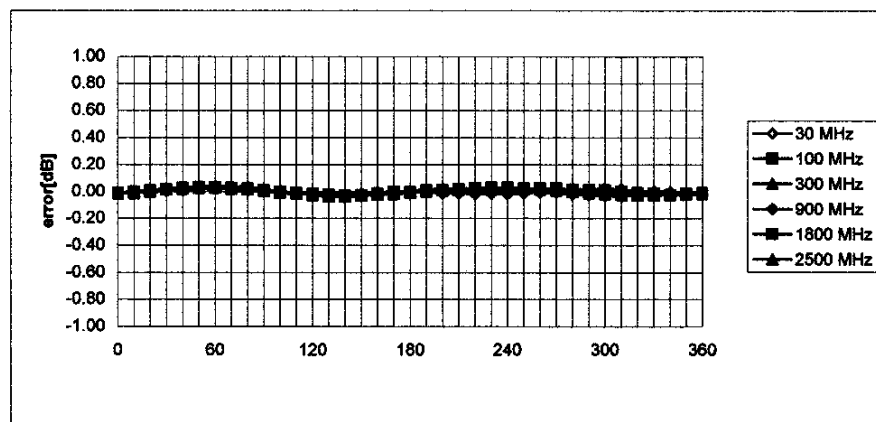


ET3DV6 SN:1642

July 26, 2002



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



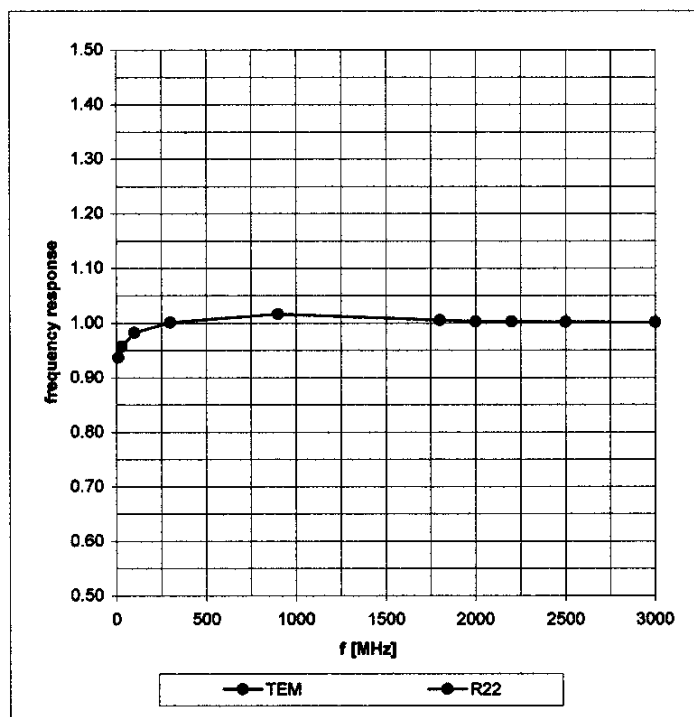
 RESEARCH IN MOTION	Document Appendices for BlackBerry Wireless Handheld Model No. R6230GN SAR Compliance Test Report			Page 28(28)
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ET3DV6 SN:1642

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Frequency Response of E-Field

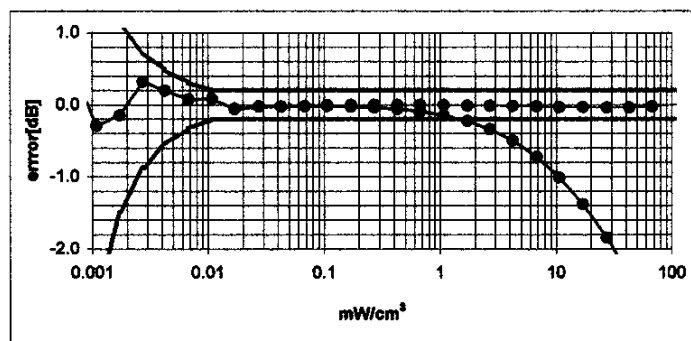
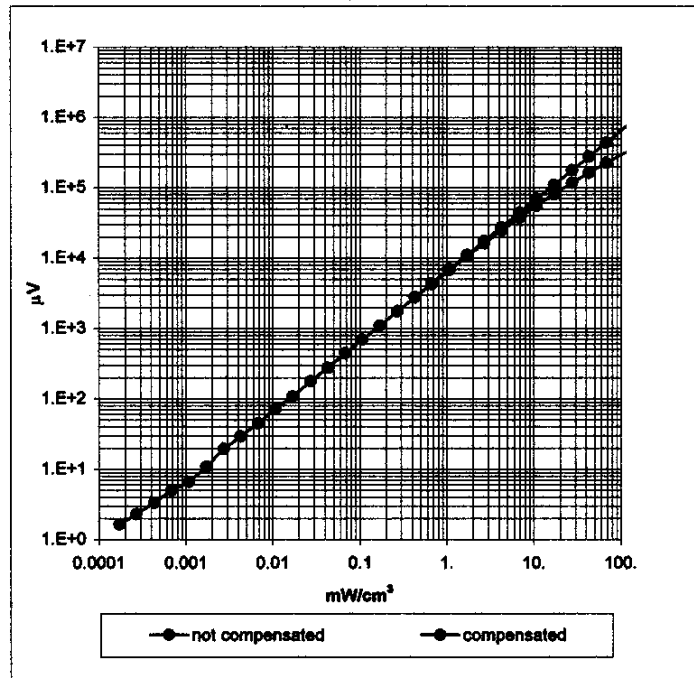
(TEM-Cell:ifi110, Waveguide R22)



ET3DV6 SN:1642

July 26, 2002

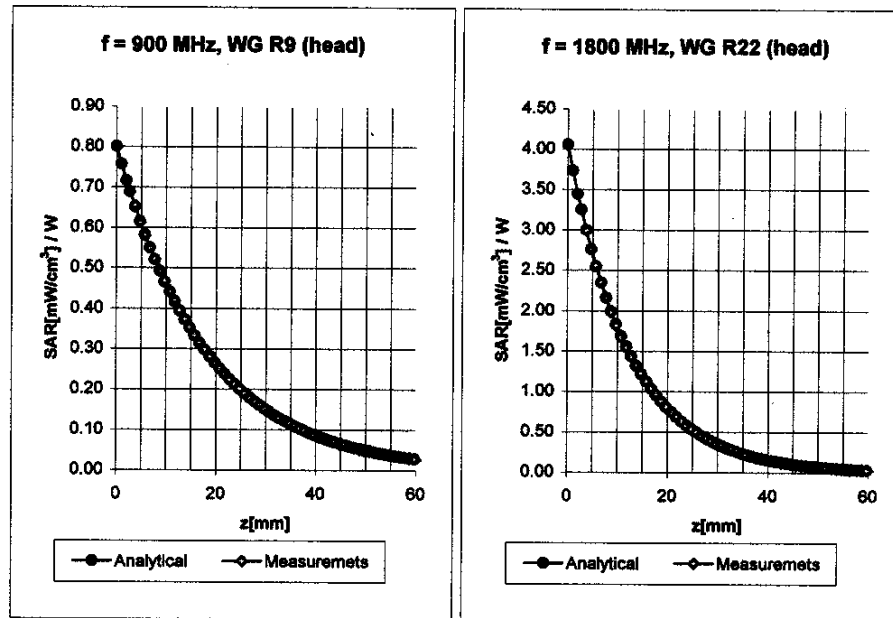
Dynamic Range $f(\text{SAR}_{\text{brain}})$ (Waveguide R22)



ET3DV6 SN:1642

July 26, 2002

Conversion Factor Assessment



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

ConvF X $6.5 \pm 8.9\% (k=2)$
ConvF Y $6.5 \pm 8.9\% (k=2)$
ConvF Z $6.5 \pm 8.9\% (k=2)$

Boundary effect:
Alpha 0.34
Depth 2.68

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

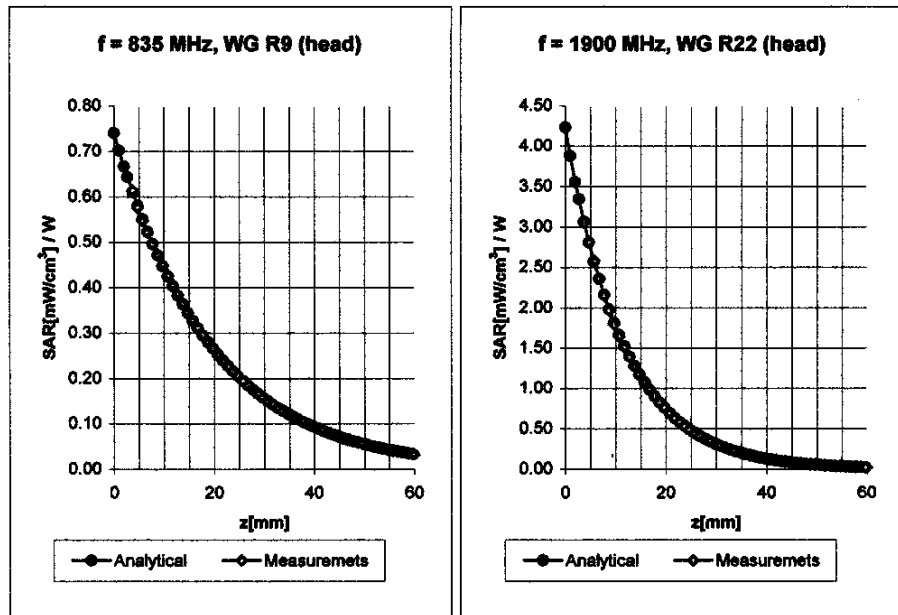
ConvF X $5.4 \pm 8.9\% (k=2)$
ConvF Y $5.4 \pm 8.9\% (k=2)$
ConvF Z $5.4 \pm 8.9\% (k=2)$

Boundary effect:
Alpha 0.53
Depth 2.33

ET3DV6 SN:1642

July 26, 2002

Conversion Factor Assessment

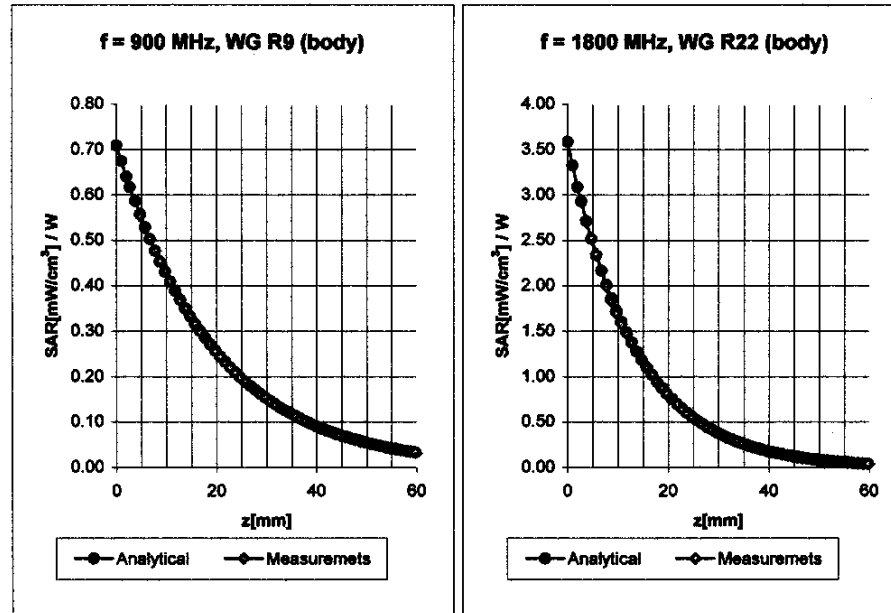


Head	835 MHz	$\epsilon_r = 41.5 \pm 5\%$	$\sigma = 0.90 \pm 5\% \text{ mho/m}$
	ConvF X	$6.5 \pm 8.9\% (k=2)$	Boundary effect:
	ConvF Y	$6.5 \pm 8.9\% (k=2)$	Alpha 0.34
	ConvF Z	$6.5 \pm 8.9\% (k=2)$	Depth 2.65
Head	1900 MHz	$\epsilon_r = 40.0 \pm 5\%$	$\sigma = 1.40 \pm 5\% \text{ mho/m}$
	ConvF X	$5.3 \pm 8.9\% (k=2)$	Boundary effect:
	ConvF Y	$5.3 \pm 8.9\% (k=2)$	Alpha 0.57
	ConvF Z	$5.3 \pm 8.9\% (k=2)$	Depth 2.28

ET3DV6 SN:1642

July 26, 2002

Conversion Factor Assessment

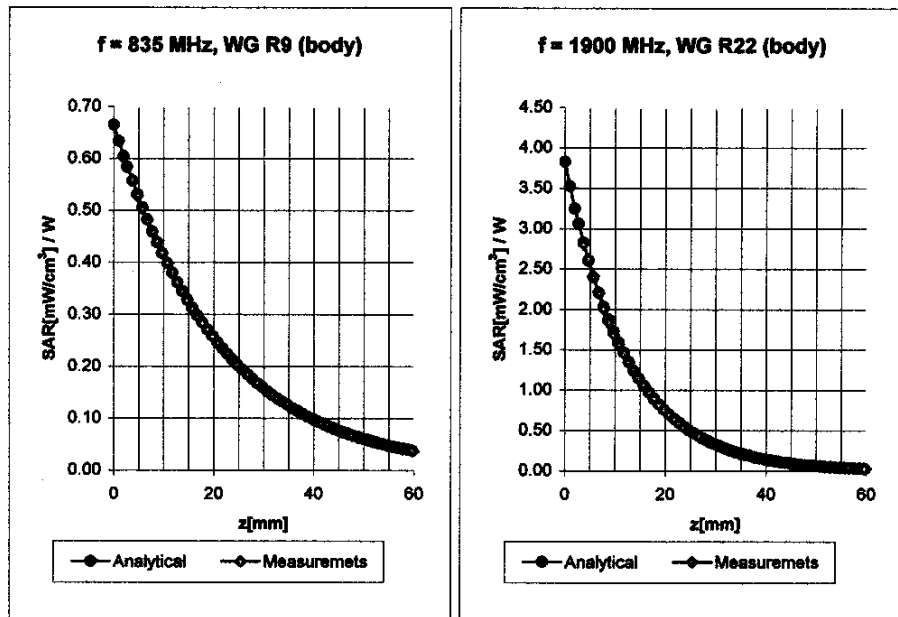


Body	900 MHz	$\epsilon_r = 55.2 \pm 5\%$	$\sigma = 0.97 \pm 5\% \text{ mho/m}$
ConvF X	$6.3 \pm 8.9\% (k=2)$	Boundary effect:	
ConvF Y	$6.3 \pm 8.9\% (k=2)$	Alpha	0.36
ConvF Z	$6.3 \pm 8.9\% (k=2)$	Depth	2.63
Body	1800 MHz	$\epsilon_r = 53.3 \pm 5\%$	$\sigma = 1.52 \pm 5\% \text{ mho/m}$
ConvF X	$5.2 \pm 8.9\% (k=2)$	Boundary effect:	
ConvF Y	$5.2 \pm 8.9\% (k=2)$	Alpha	0.61
ConvF Z	$5.2 \pm 8.9\% (k=2)$	Depth	2.30

ET3DV6 SN:1642

July 26, 2002

Conversion Factor Assessment



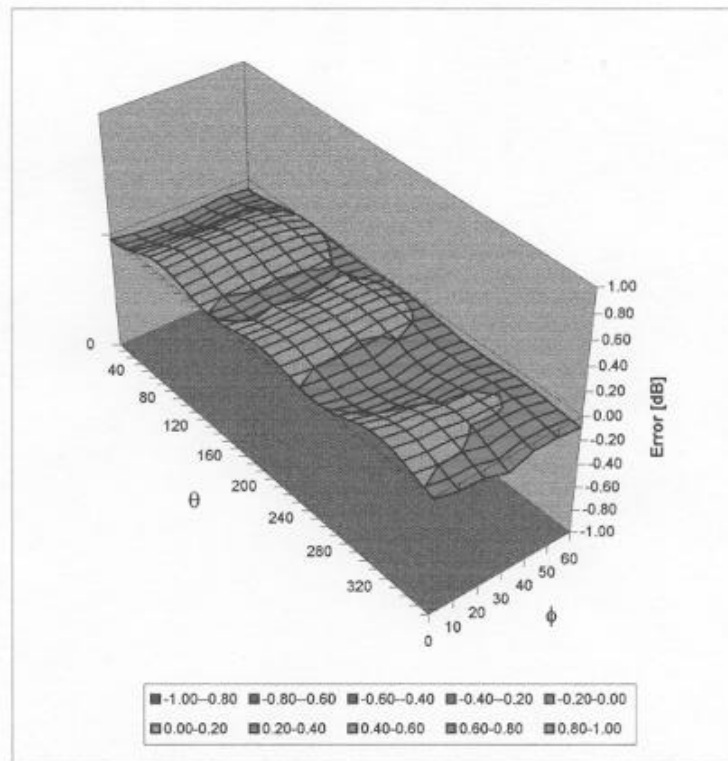
Body	835 MHz	$\epsilon_r = 55.0 \pm 5\%$	$\sigma = 1.05 \pm 5\% \text{ mho/m}$
ConvF X	6.4 $\pm 8.9\%$ (k=2)	Boundary effect:	
ConvF Y	6.4 $\pm 8.9\%$ (k=2)	Alpha	0.36
ConvF Z	6.4 $\pm 8.9\%$ (k=2)	Depth	2.66
Body	1900 MHz	$\epsilon_r = 53.3 \pm 5\%$	$\sigma = 1.52 \pm 5\% \text{ mho/m}$
ConvF X	4.8 $\pm 8.9\%$ (k=2)	Boundary effect:	
ConvF Y	4.8 $\pm 8.9\%$ (k=2)	Alpha	0.74
ConvF Z	4.8 $\pm 8.9\%$ (k=2)	Depth	2.07

ET3DV6 SN:1642

July 26, 2002

Deviation from Isotropy in HSL

Error (θ, ϕ), $f = 900$ MHz



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Schmid & Partner Engineering AG

Zaughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 248 97 00, Fax +41 1 248 97 79

Calibration Certificate

835 MHz System Validation Dipole

Type:

D835V2

Serial Number:

446

Place of Calibration:

Zurich

Date of Calibration:

November 12, 2001

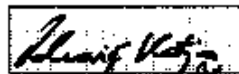
Calibration Interval:

24 months

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:



Approved by:



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**Schmid & Partner
Engineering AG**

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

DASY

Dipole Validation Kit

Type: D835V2

Serial: 446

**Manufactured: October 24, 2001
Calibrated: November 12, 2001**

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1. Measurement Conditions

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

Relative Dielectricity	42.3	± 5%
Conductivity	0.91 mho/m	± 5%

The DASY3 System (Software version 3.1c) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.27 at 900 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 holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 20mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging.

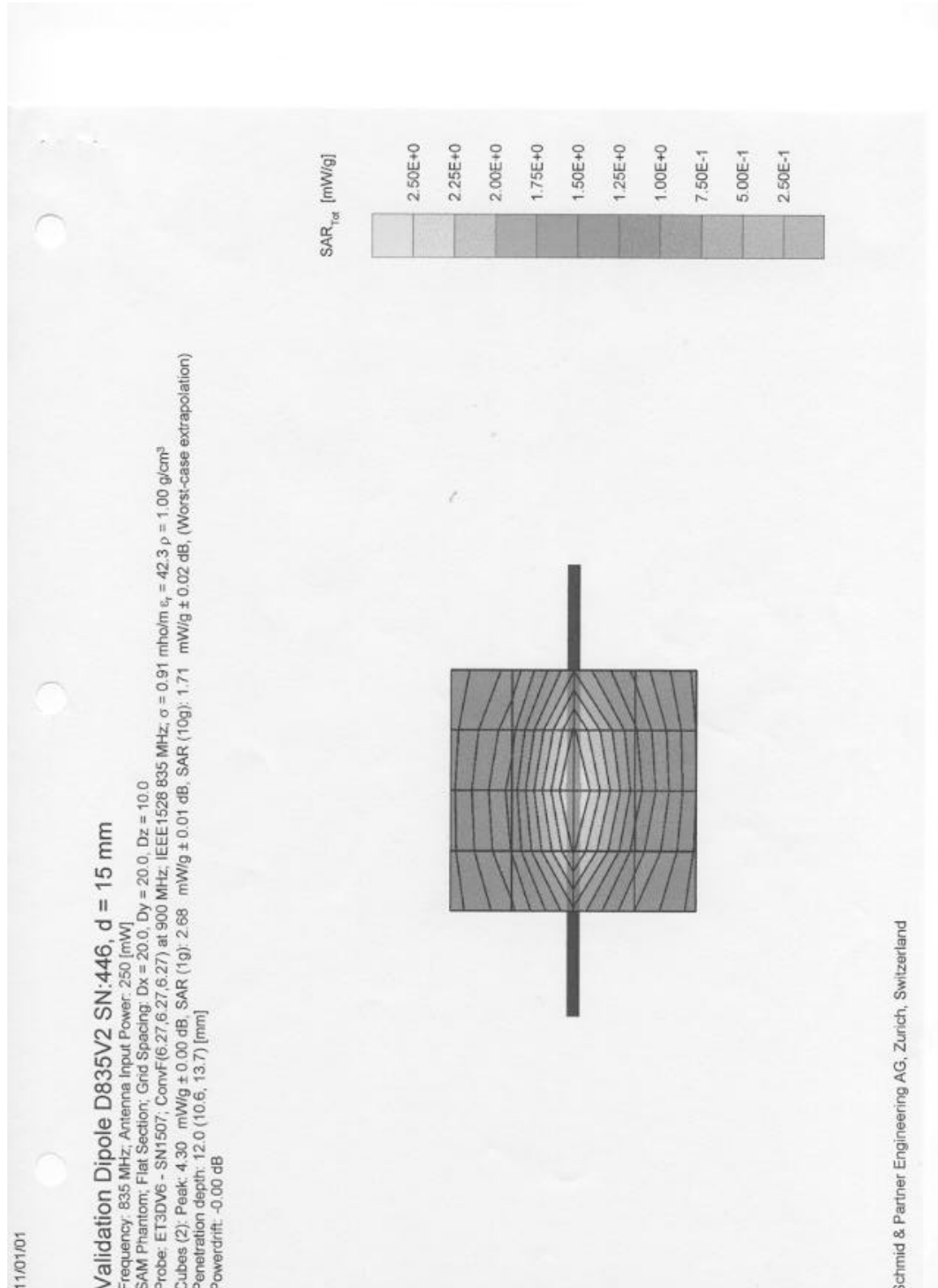
The dipole input power (forward power) was 250mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement

Standard SAR-measurements were performed with the phantom according to the measurement conditions described in section 1. The results have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm ³ (1 g) of tissue:	10.7 mW/g
averaged over 10 cm ³ (10 g) of tissue:	6.84 mW/g

Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well.





Document

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Author Data

Daoud Attayi

Dates of Test

May 22 - 27, 2003

Test Report No

RIM-0041-0305-04

FCC ID

L6AR6230GN

1 Nov 2001 16:49:45
CH1 S11 1 U FS 1: 49.781 ϕ -4.7538 ϕ 48.845 pF 835.000 000 MHz

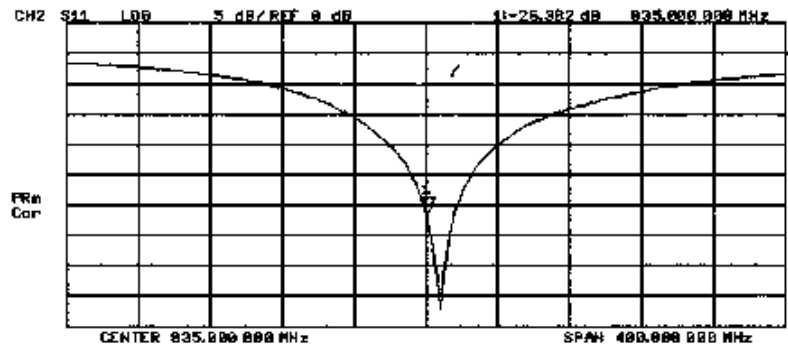
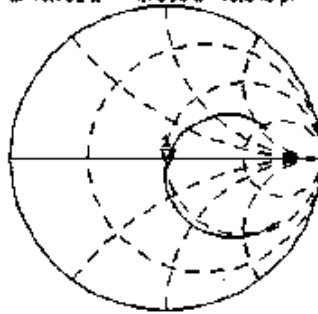
De1

PRM

Cor

Avg

16



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Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Calibration Certificate

1900 MHz System Validation Dipole

Type:

D1900V2

Serial Number:

545

Place of Calibration:

Zurich

Date of Calibration:

November 26, 2001

Calibration Interval:

24 months

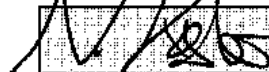
Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:



Approved by:



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**Schmid & Partner
Engineering AG**

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

DASY3

Dipole Validation Kit

Type: D1900V2

Serial: 545

Manufactured: November 15, 2001
Calibrated: November 26, 2001

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1. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with brain simulating sugar solution of the following electrical parameters at 1900 MHz:

Relative permittivity	40.0	$\pm 5\%$
Conductivity	1.45 mho/m	$\pm 10\%$

The DASY3 System (Software version 3.1d) with a dosimetric E-field probe ET3DV6 (SN:1507, conversion factor 5.31 at 1800 MHz) was used for the measurements.

The dipole feedpoint was positioned below the center marking and 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 holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 20mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging.

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

2. SAR Measurement

Standard SAR-measurements were performed with the head phantom according to the measurement conditions described in section 1. The results (see figure) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm ³ (1 g) of tissue:	43.2 mW/g
averaged over 10 cm ³ (10 g) of tissue:	22.0 mW/g

Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well. The estimated sensitivities of SAR-values and penetration depths to the liquid parameters are listed in the DASY Application Note 4: 'SAR Sensitivities'.

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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: **1.216 ns** (one direction)
Transmission factor: **0.992** (voltage transmission, one direction)

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

Feedpoint impedance at 1900 MHz: $\text{Re}\{Z\} = 50.4 \Omega$

$\text{Im}\{Z\} = 1.9 \Omega$

Return Loss at 1900 MHz **- 34.3 dB**

4. Handling

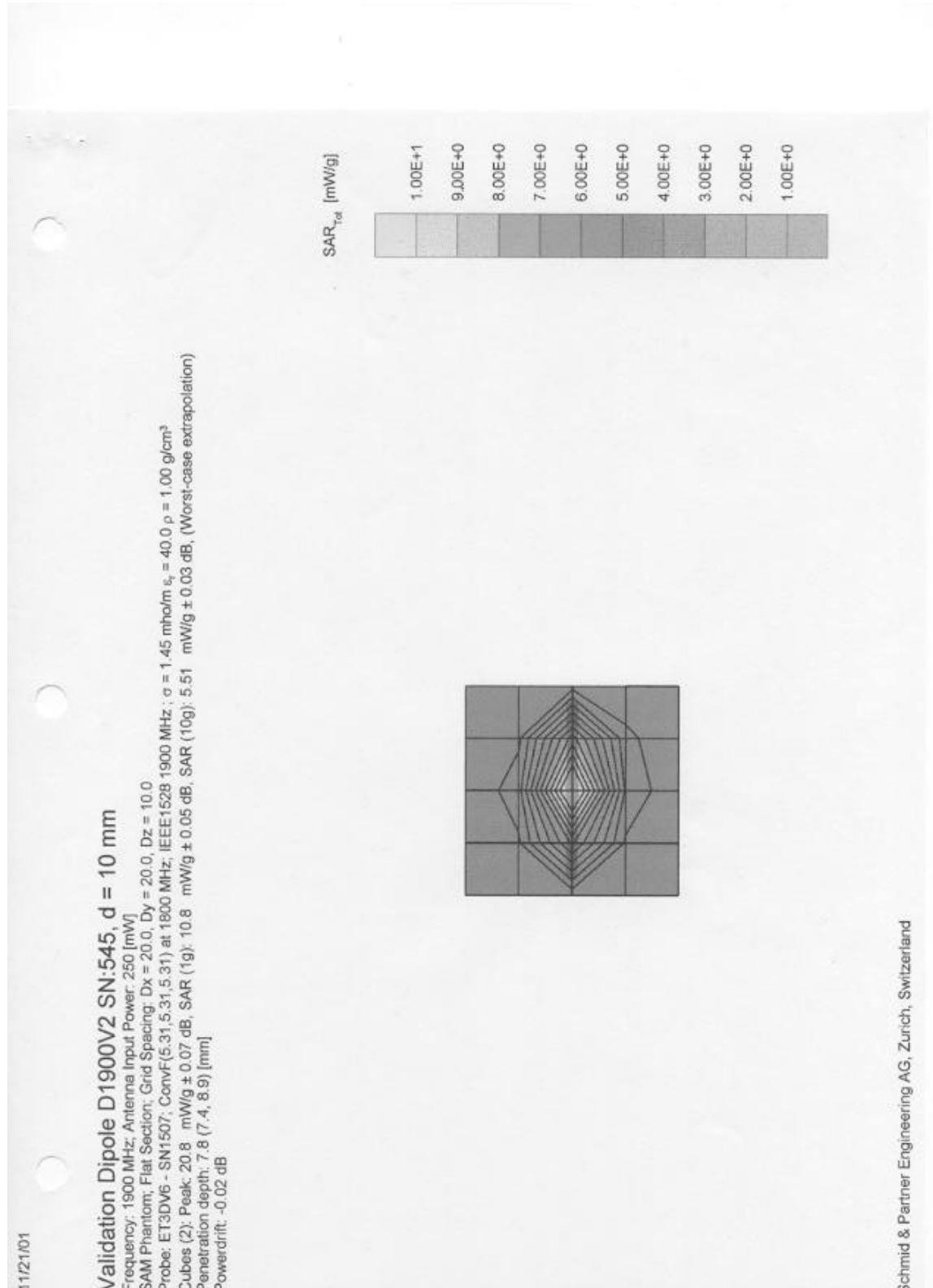
Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

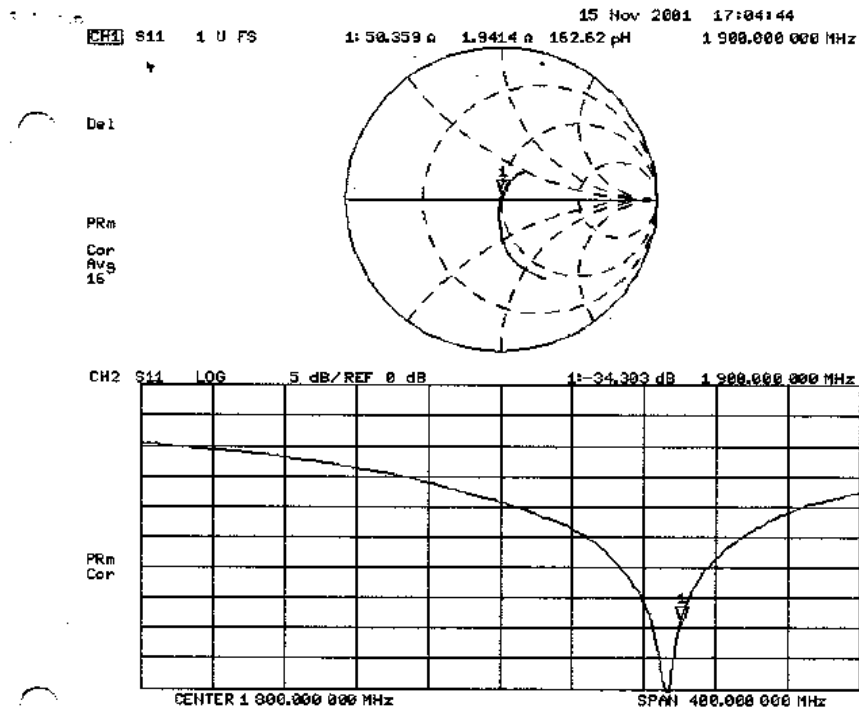
5. Design

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.

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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APPENDIX E: SAR SET UP PHOTOS

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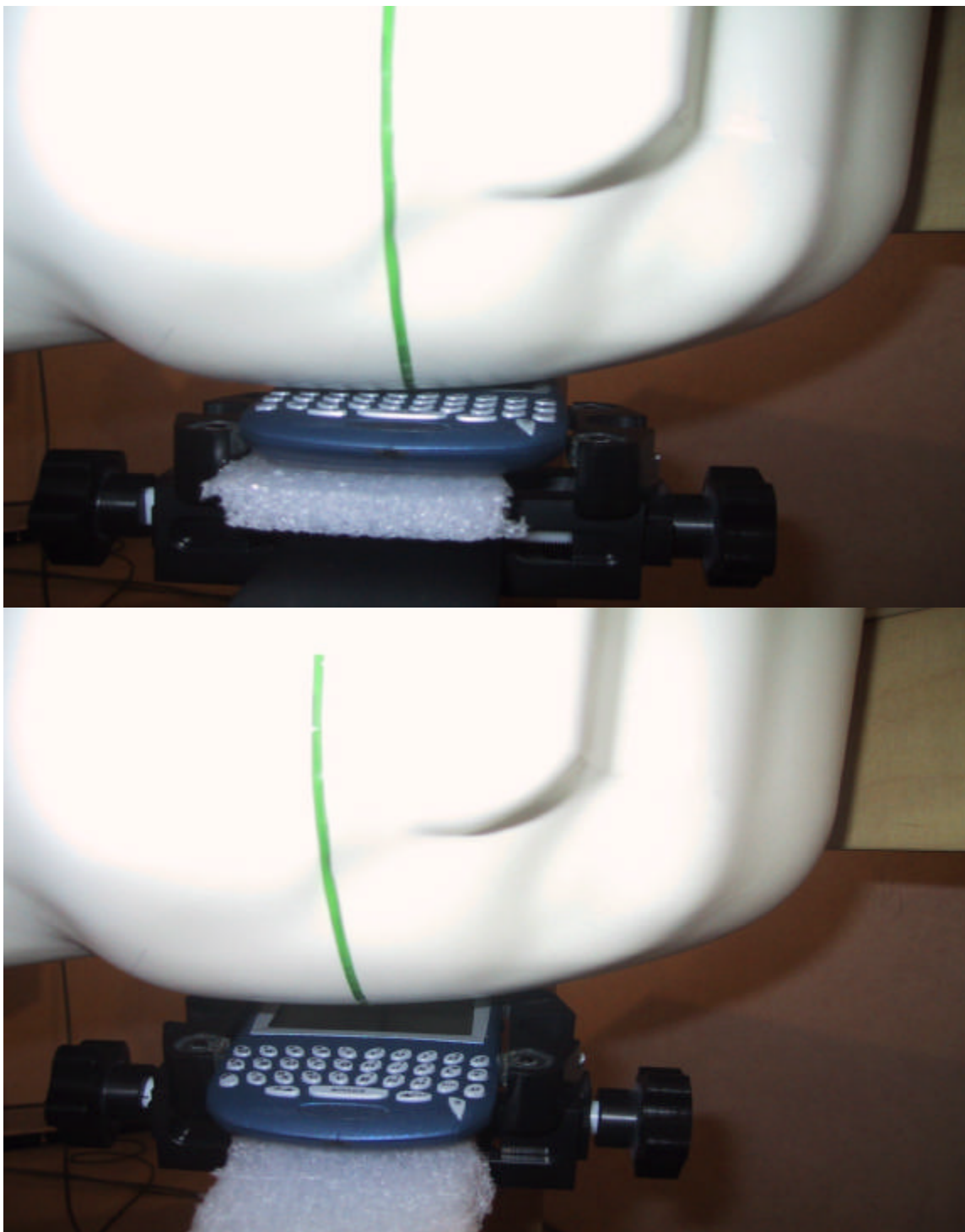


Figure E1. Left ear configuration

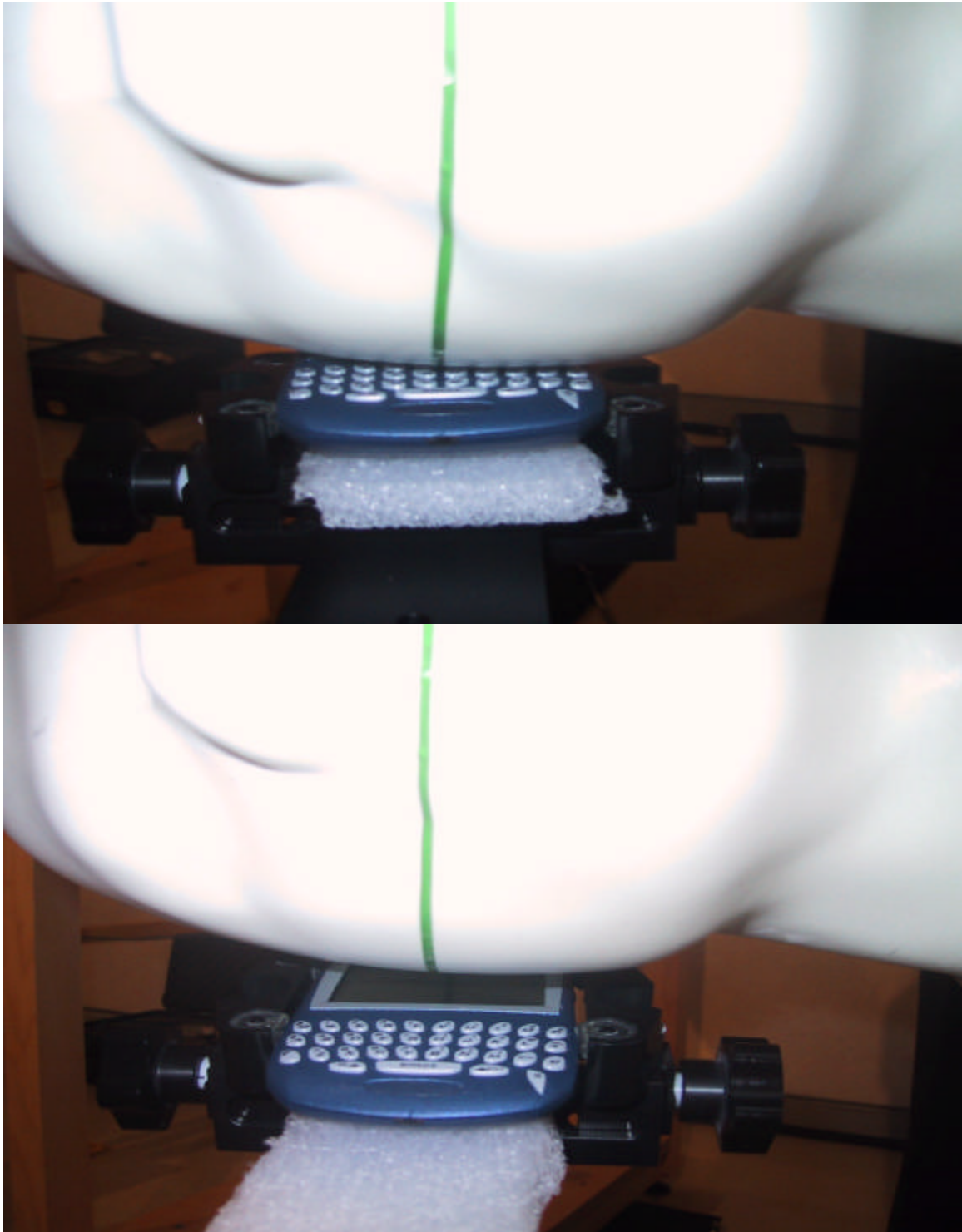


Figure E2. Right ear configuration



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Figure E3. Body worn configuration with Holster and Leather Swivel Headset