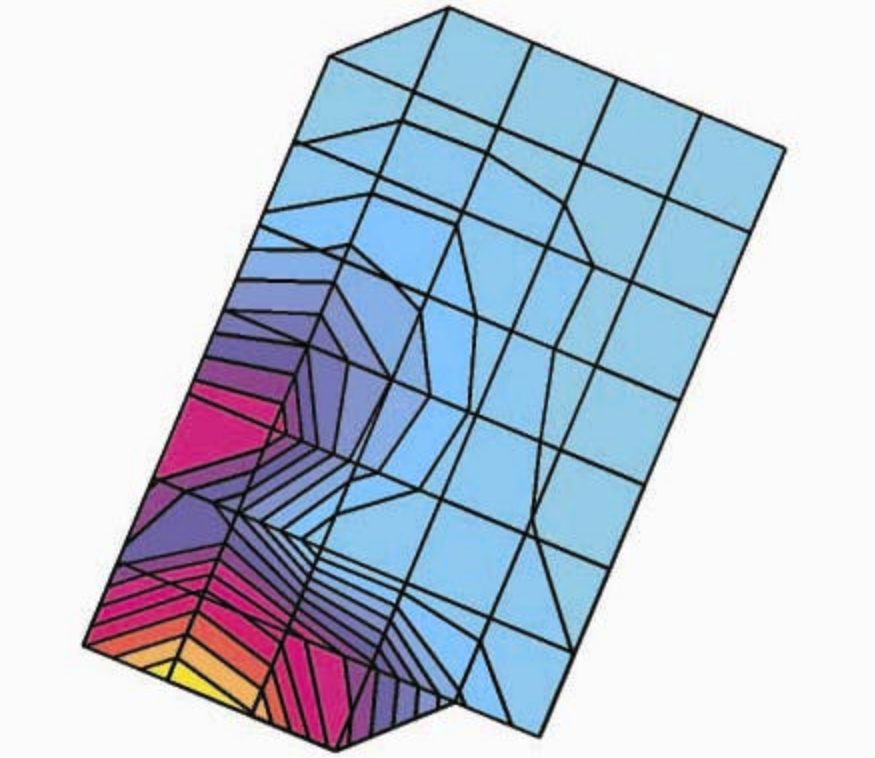
Appendix 2

SAR distribution plots for Phantom Head Adjacent Use

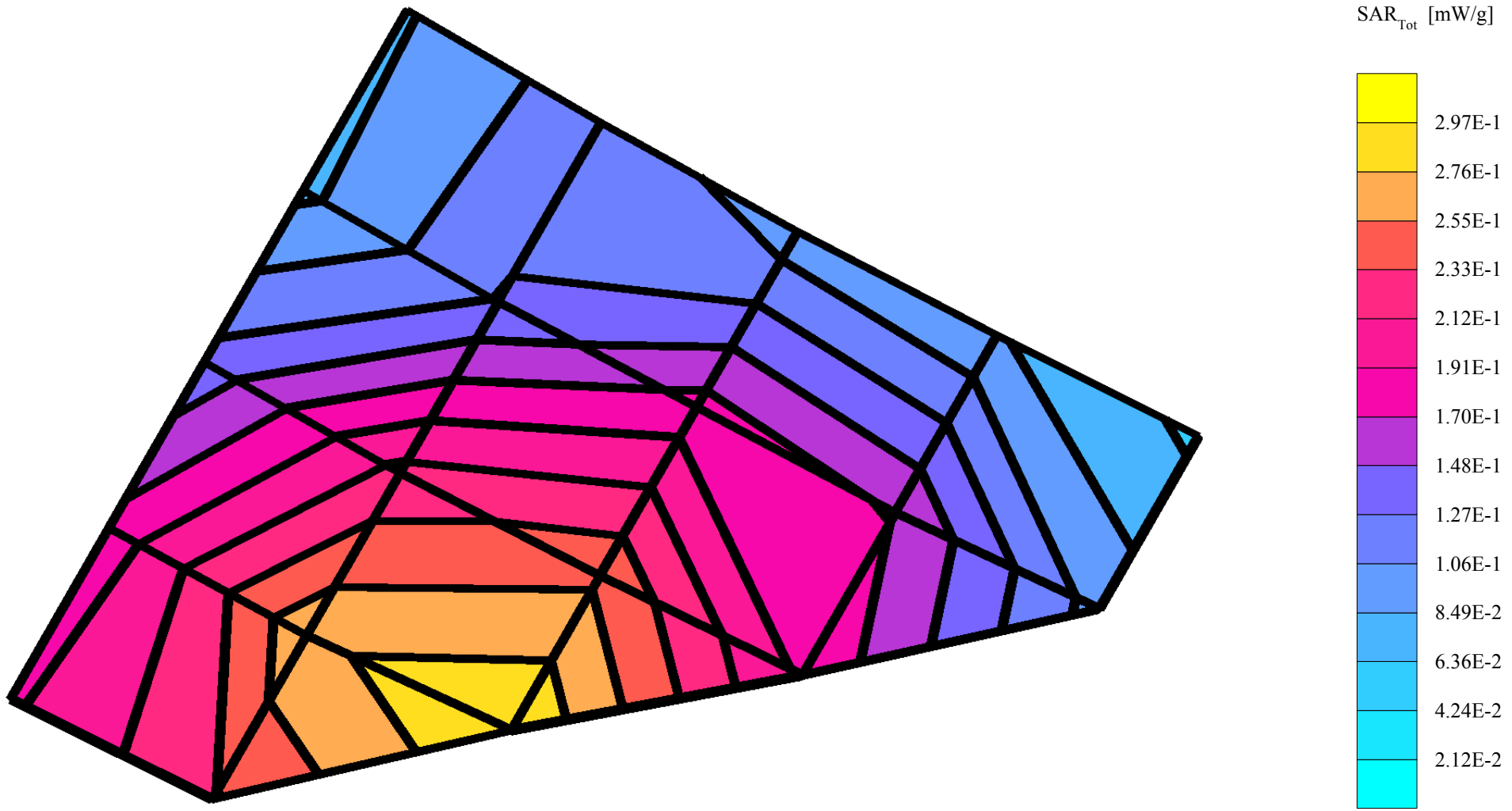
During the Cheek Touch SAR measurements in the 850MHz band and the 1900MHz band it was noted that the location of maximum SAR was near the bottom of the phone, near the mouth & jaw area of the phantom (as can be seen in the contour plot below). In this region, the angle of the probe with respect to the line normal to the surface is relatively large, e.g., greater than 20°. This could increase the boundary effect error to a larger level than accounted for in the uncertainty budget. To compensate for this, scans were performed with the probe tilted 20° back from vertical along the MB line. This orientation results in an angle less than 20° between the closest point on the probe-tip housing to the phantom surface in the area of maximum SAR. This probe alignment is recommended in IEEE 1528 Section 6.5.2 “Zoom Scan Recommendations”. The SAR Plots included in Appendix 2 for the 850MHz and 1900MHz head adjacent cheek touch configurations will utilize a shorter coarse scan centered in the area of the maximum SAR.



08/21/04 05:58

sn: 4400007088915

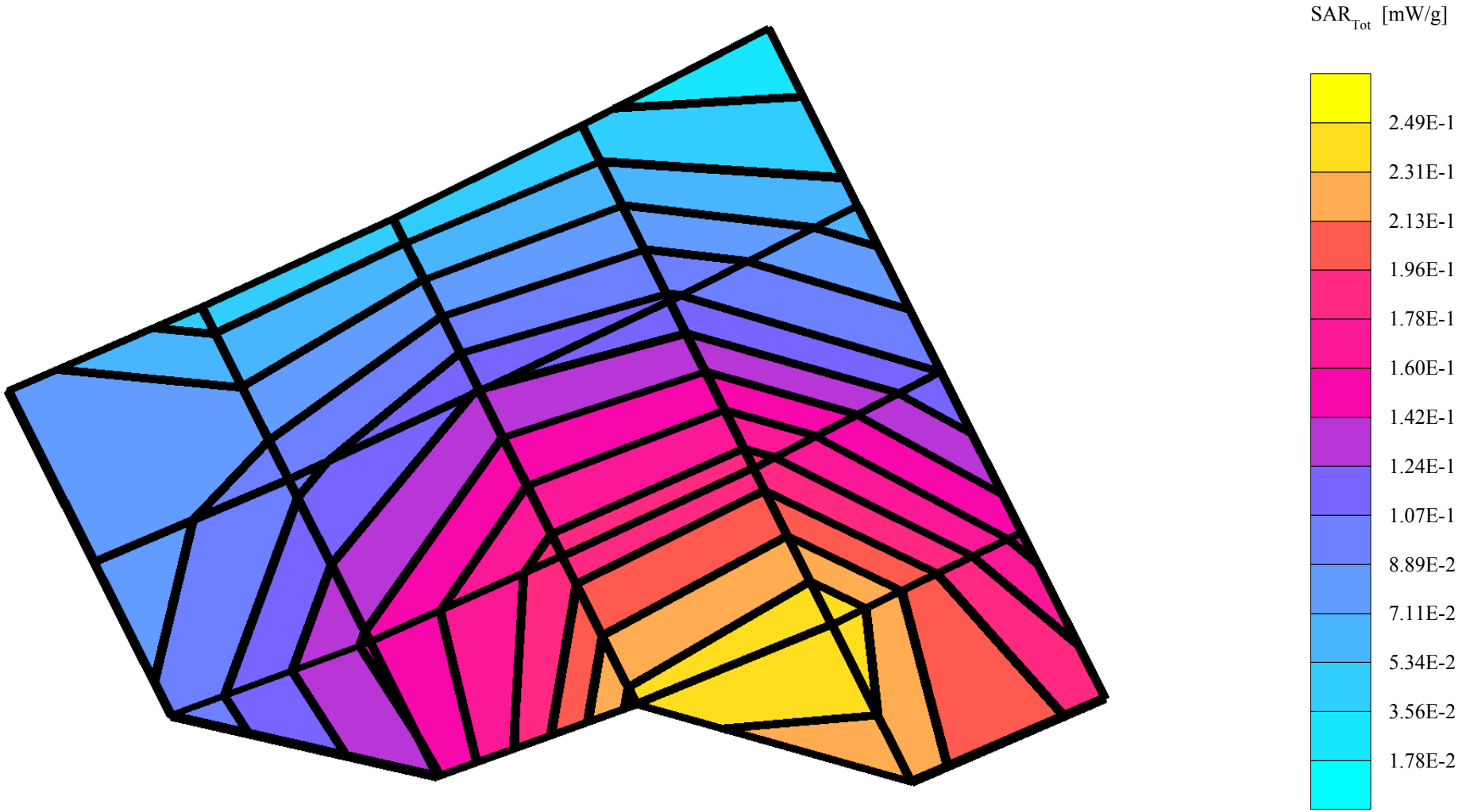
Ch# 190 Pwr Step: 5 ota
Antenna Position: INTERNAL
Type of Modulation: 800 gsm
Battery Model #: SNN5750A
DEVICE POSITION: CHEEK
Accessory Model #: none
R4 TP-1131 SUGAR SAM Expanded (Rev. 2)-9Jan03 Phantom; LH Front Tilt 20 Section; Position: (80°,180°); Frequency: 837 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(6.08,6.08,6.08); Crest factor: 8.0; 835 MHz Head & Body: $\sigma = 0.92$ mho/m $\varepsilon_r = 43.2$ $\rho = 1.00$ g/cm^3
Cube 7x7x7: SAR (1g): 0.305 mW/g, SAR (10g): 0.204 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 12.4 (10.5, 14.9) [mm]
Powerdrift: 0.28 dB



08/21/04 07:16

sn: 4400007088915

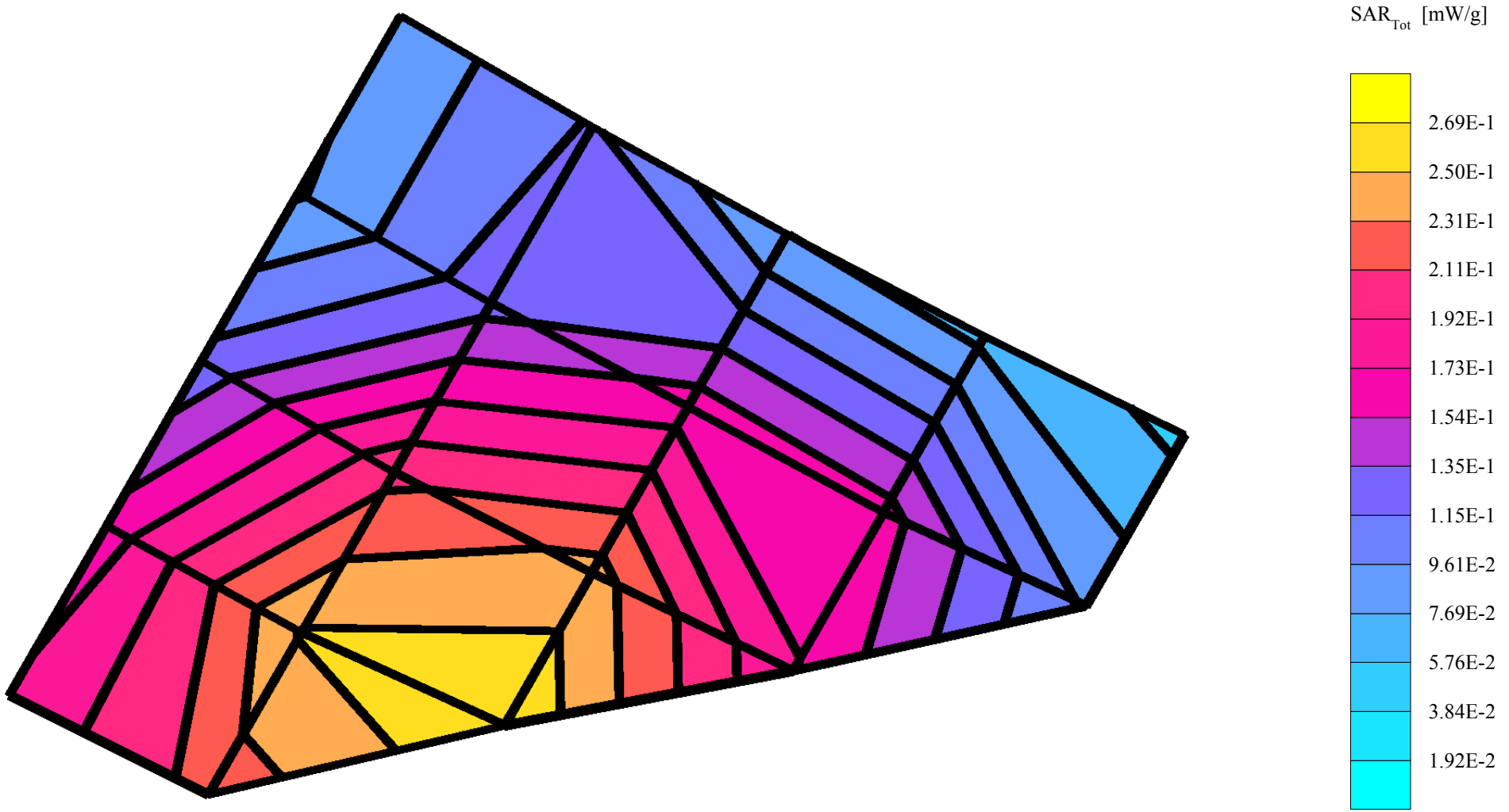
Ch# 190 Pwr Step: 5 ota
Antenna Position: INTERNAL
Type of Modulation: 800 gsm
Battery Model #: SNN5750A
DEVICE POSITION: CHEEK
Accessory Model #: none
R4 TP-1131 SUGAR SAM Expanded (Rev. 2)-9Jan03 Phantom; RH Front Tilt 20 Section; Position: (80°,180°); Frequency: 837 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(6.08,6.08,6.08); Crest factor: 8.0; 835 MHz Head & Body: $\sigma = 0.92$ mho/m $\varepsilon_r = 43.2$ $\rho = 1.00$ g/cm^3
Cube 7x7x7: SAR (1g): 0.264 mW/g, SAR (10g): 0.176 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 13.9 (11.0, 17.8) [mm]
Powerdrift: -0.50 dB



08/24/04 10:28

sn: 4400007088915

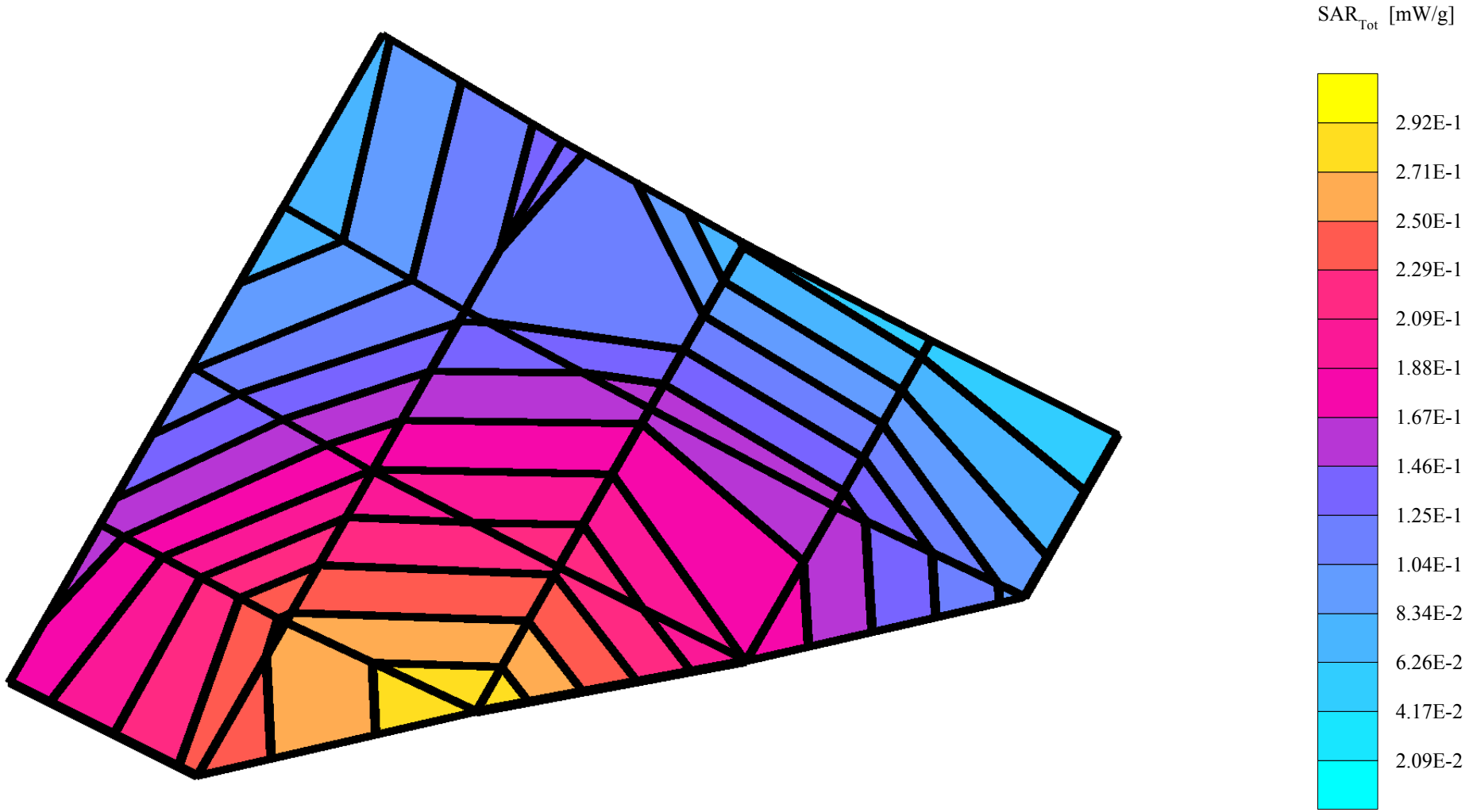
Ch# 190 Pwr Step: 5 ota
Antenna Position: INTERNAL
Type of Modulation: 800 gsm
Battery Model #: SNN5750A
DEVICE POSITION: CHEEK
Accessory Model #: WIFI (continuous mod tx 11mbps/cck)
R4 TP-1131 SUGAR SAM Expanded (Rev. 2)-9Jan03 Phantom; LH Front Tilt 20 Section; Position: (80°,180°); Frequency: 837 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(6.08,6.08,6.08); Crest factor: 8.0; 835 MHz Head & Body: $\sigma = 0.92$ mho/m $\varepsilon_r = 42.8$ $\rho = 1.00$ g/cm^3
Cube 7x7x7: SAR (1g): 0.277 mW/g, SAR (10g): 0.183 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 13.0 (11.0, 15.6) [mm]
Powerdrift: 0.33 dB



08/21/04 07:54

sn: 4400007088915

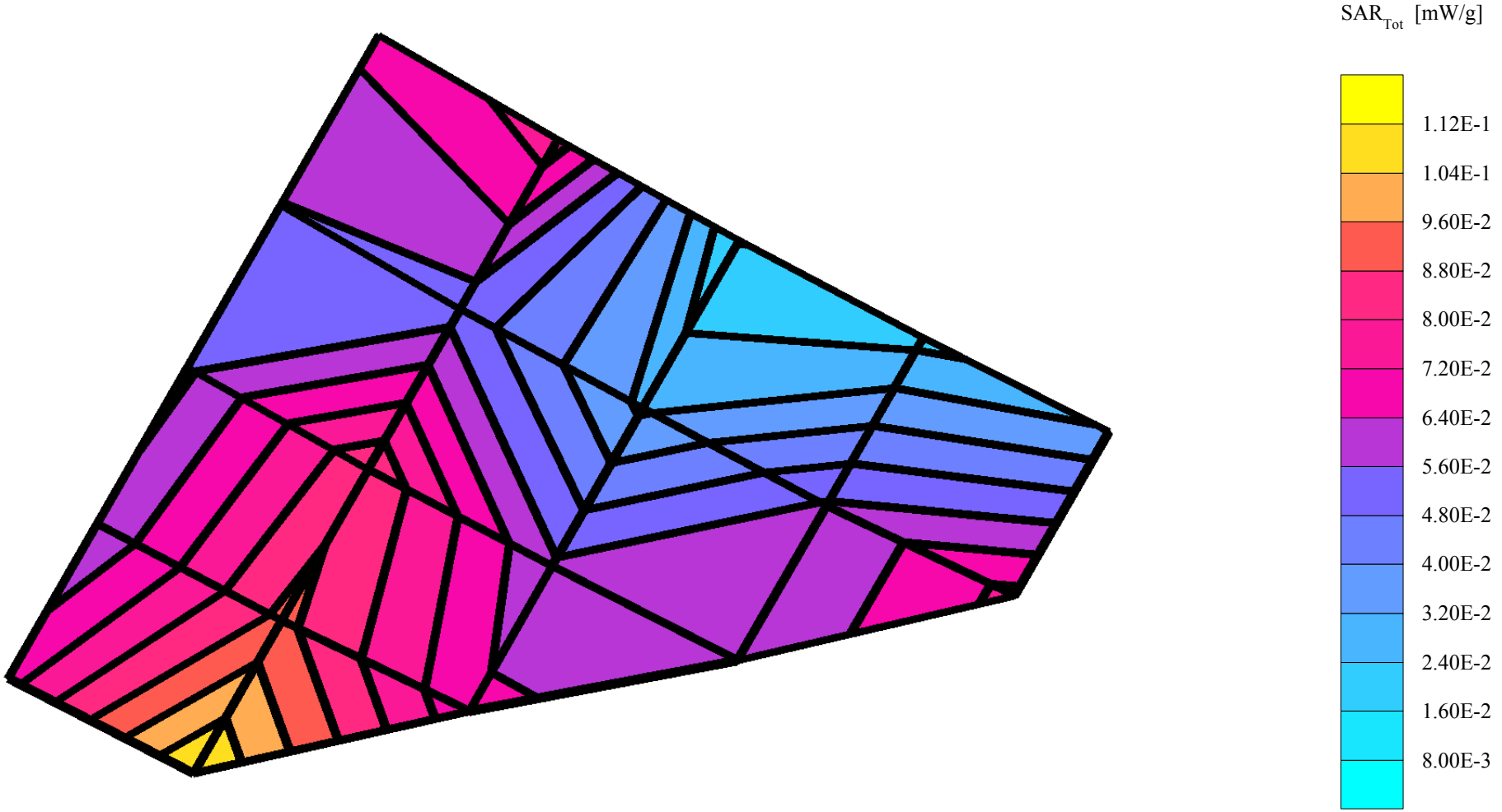
Ch# 190 Pwr Step: 5 ota
Antenna Position: INTERNAL
Type of Modulation: 800 gsm
Battery Model #: SNN5751A
DEVICE POSITION: CHEEK
Accessory Model #: none
R4 TP-1131 SUGAR SAM Expanded (Rev. 2)-9Jan03 Phantom; LH Front Tilt 20 Section; Position: (80°,180°); Frequency: 837 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(6.08,6.08,6.08); Crest factor: 8.0; 835 MHz Head & Body: $\sigma = 0.92$ mho/m $\varepsilon_r = 43.2$ $\rho = 1.00$ g/cm^3
Cube 7x7x7: SAR (1g): 0.293 mW/g, SAR (10g): 0.194 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 12.8 (11.1, 15.0) [mm]
Powerdrift: -0.16 dB



08/20/04 20:34

sn: 4400007088915

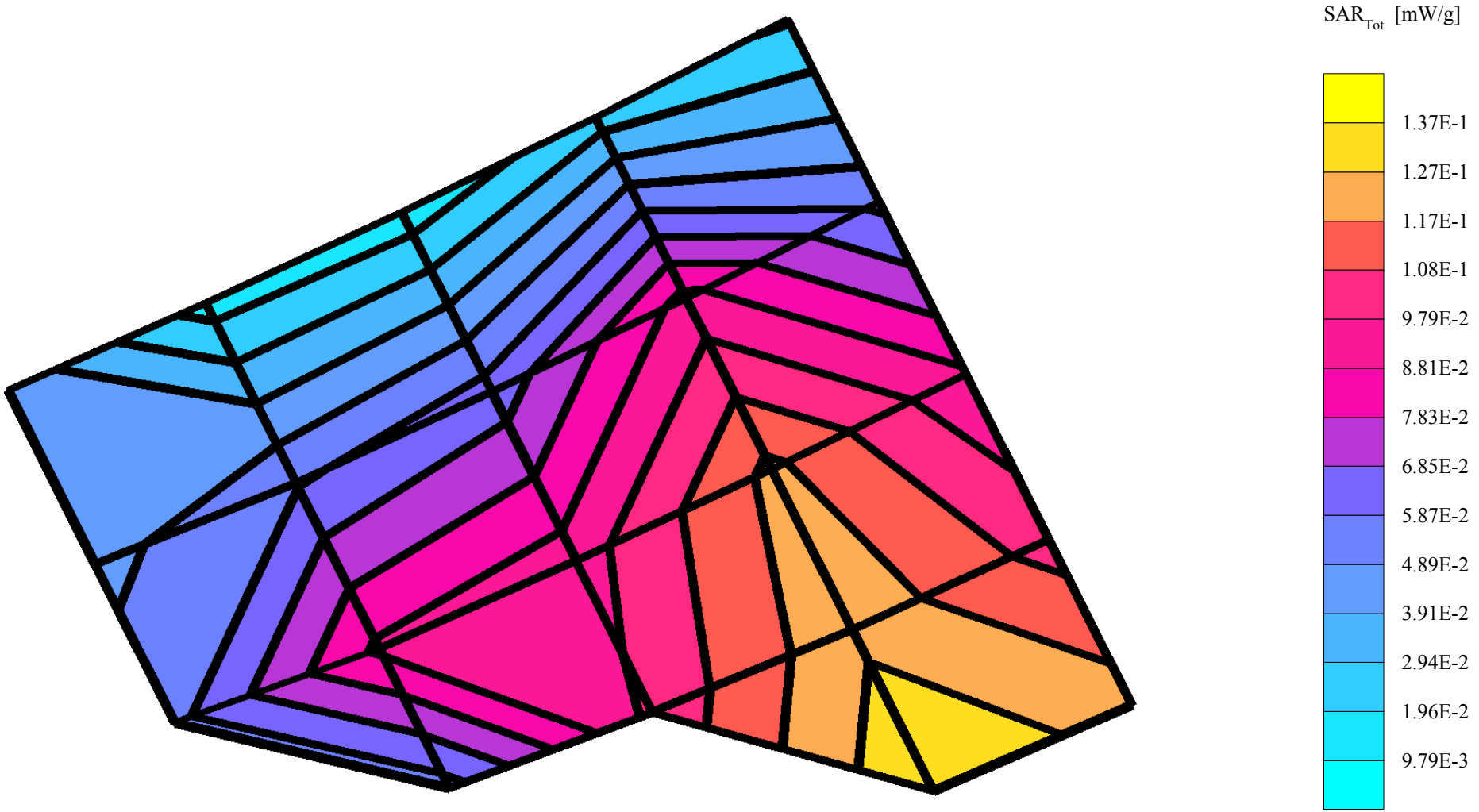
Ch# 661 / Pwr Step: 0 Antenna Position: Internal
Type of Modulation: GSM 1900 Battery Model #: SNN5750A
DEVICE POSITION (cheek or rotated): Cheek
Accessory Model #: N/A
Simulate Temp when Measured: 19.5C Simulate Temp after Test: 19.6C
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; LH Front Tilt 20 Section; Position: (80°,180°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(5.03,5.03,5.03); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.44 mho/m ε_r = 38.5 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.112 mW/g, SAR (10g): 0.0739 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 12.2 (10.4, 15.0) [mm]
Powerdrift: 0.57 dB



08/21/04 21:25

sn: 4400007088915

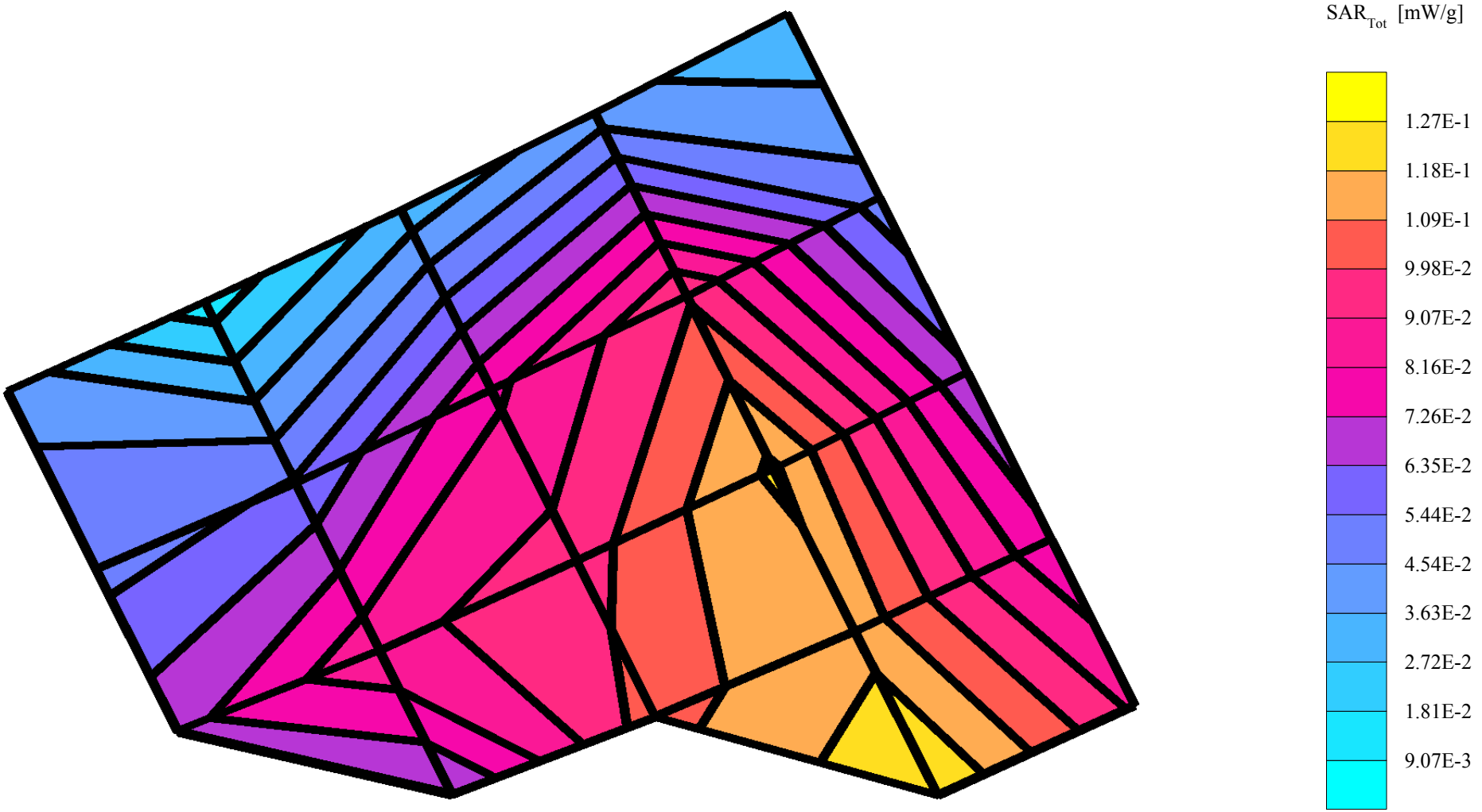
Ch# 661 / Pwr Step: 0 Antenna Position: non
Type of Modulation: gsm Battery Model #: snn5750a
DEVICE POSITION (cheek
tilted probe
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; RH Front Tilt 20 Section; Position: (80°,180°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(5.03,5.03,5.03); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.46 mho/m ε_r = 38.0 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.143 mW/g, SAR (10g): 0.0884 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 11.0 (8.7, 14.8) [mm]
Powerdrift: -0.53 dB



08/25/04 10:03

sn: 4400007088915

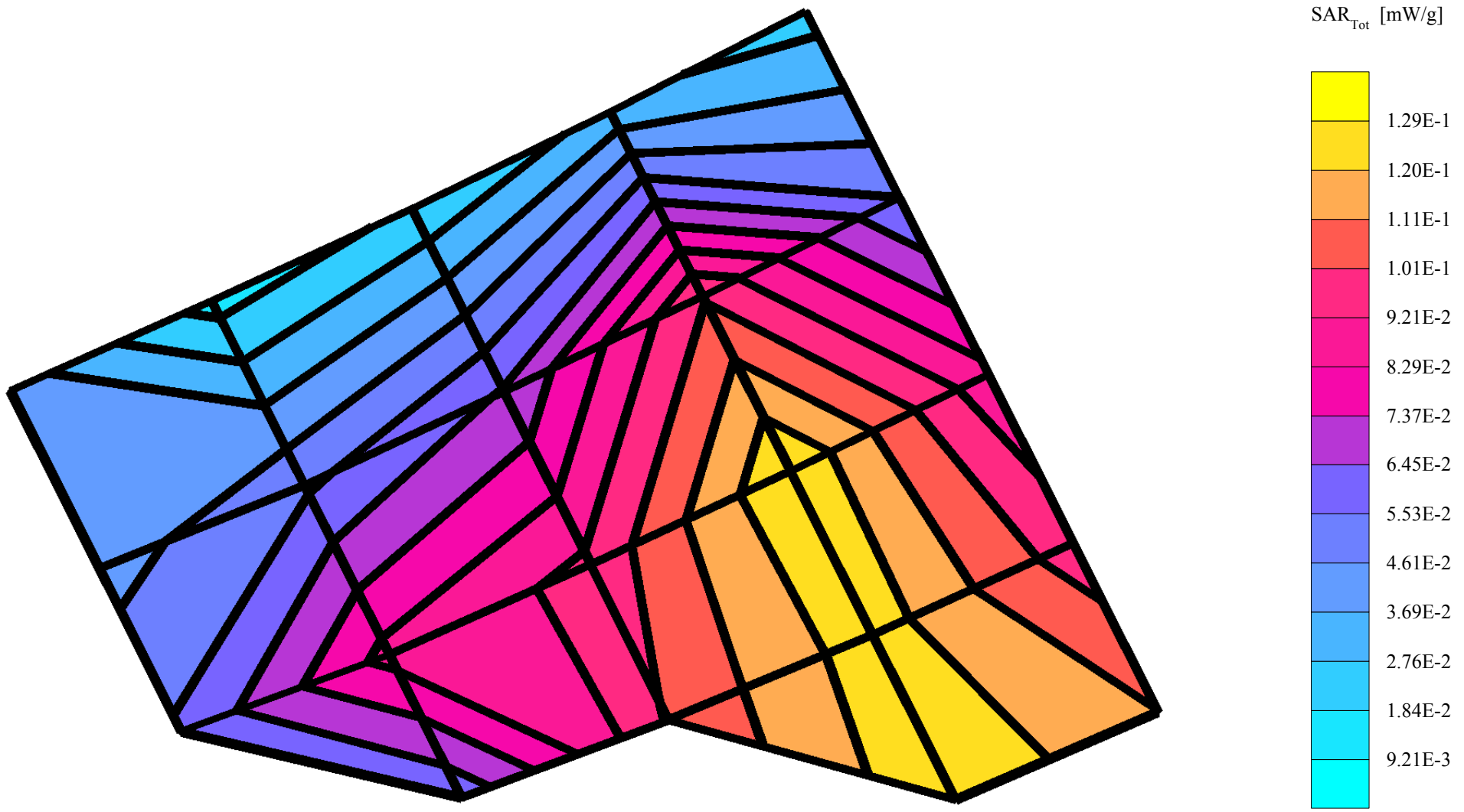
Ch# 661 Pwr Step: 0 ota
Antenna Position: INTERNAL
Type of Modulation: 1900 gsm
Battery Model #: SNN5750A
DEVICE POSITION: CHEEK
Accessory Model #: none
WIFI (cont. mod.tx-ch6-11mbps/cc)
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; RH Front Tilt 20 Section; Position: (80°,180°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(5.03,5.03,5.03); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.45 mho/m ε_r = 38.1 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.130 mW/g, SAR (10g): 0.0807 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 10.3 (8.5, 13.4) [mm]
Powerdrift: 0.39 dB



08/21/04 22:46

sn: 4400007088915

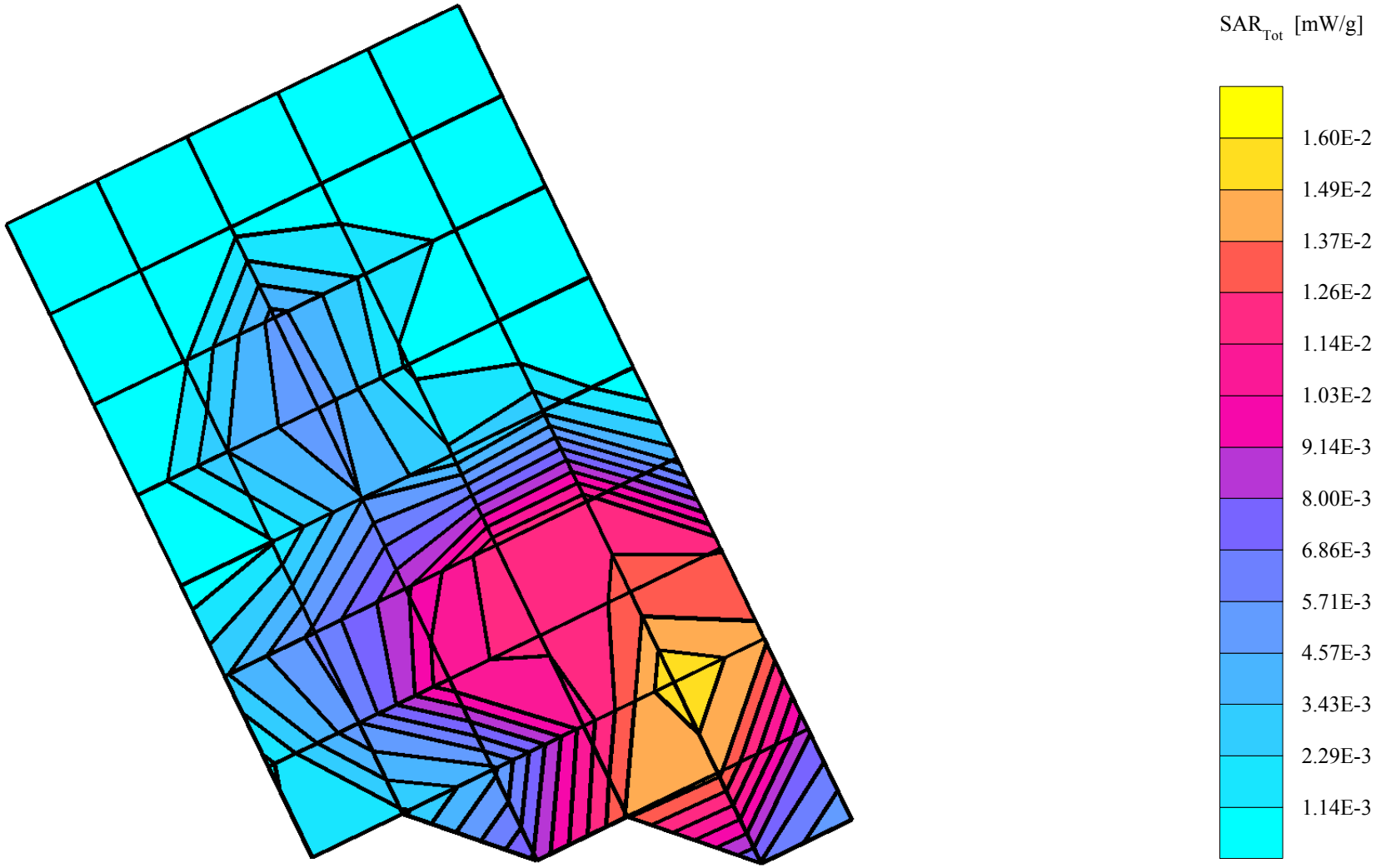
Ch# 661 / Pwr Step: 0 Antenna Position: non
Type of Modulation: gsm Battery Model #: snn5751a extndedbatt
DEVICE POSITION (cheek
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; RH Front Tilt 20 Section; Position: (80°,180°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(5.03,5.03,5.03); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.46 mho/m ε_r = 38.0 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.132 mW/g, SAR (10g): 0.0801 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 10.1 (9.0, 11.8) [mm]
Powerdrift: 0.38 dB



08/23/04 10:53

sn: 4400007088915

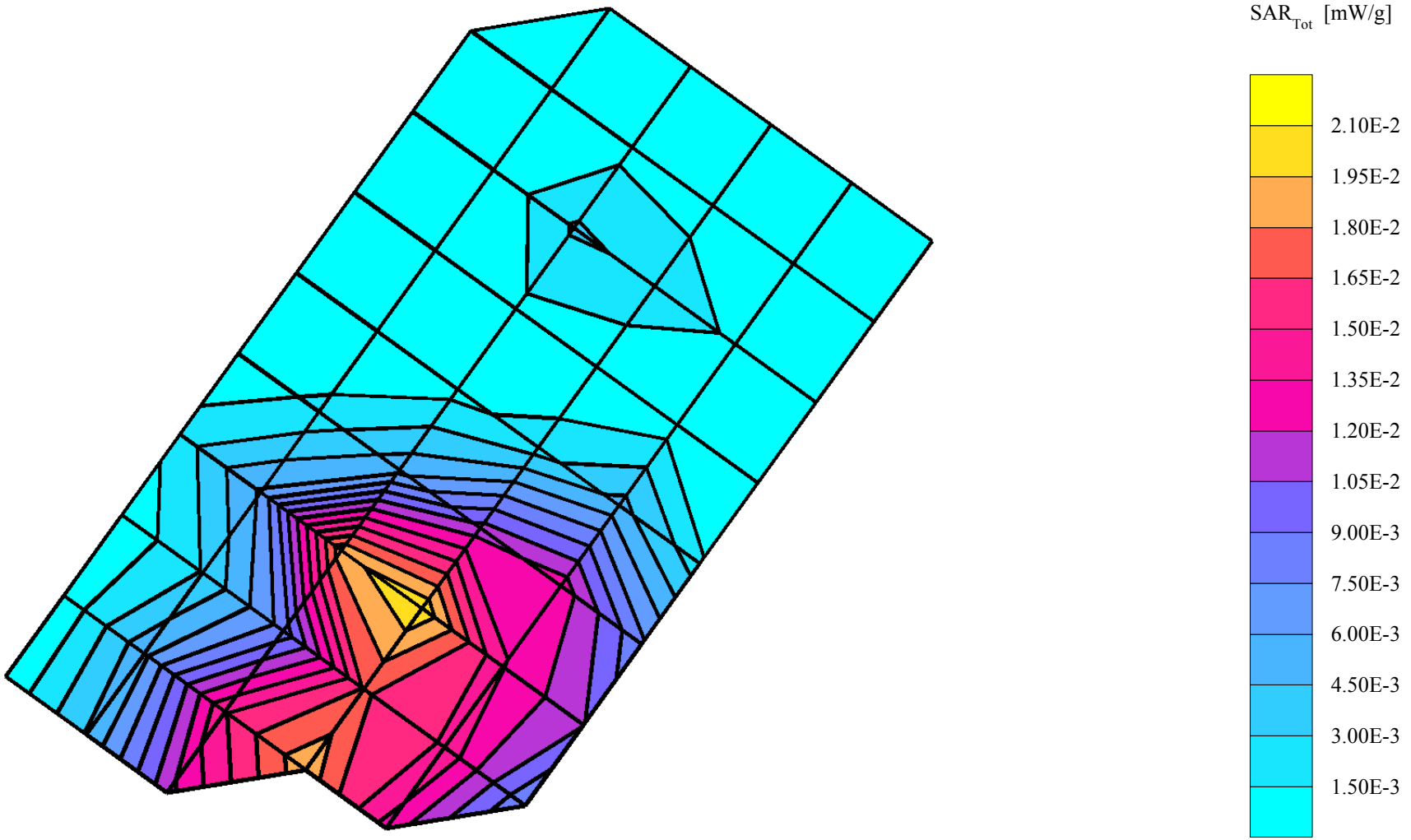
Ch# 6 Pwr Step: continuous mod tx 11mbps/cck Antenna Position: INTERNAL
Type of Modulation: WIFI Battery Model #: SNN5750A
DEVICE POSITION: CHEEK
Accessory Model #: none
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Right Hand Section; Position: (90°,180°); Frequency: 2437 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(4.46,4.46,4.46); Crest factor: 1.0; 2450 MHz Head & Body: σ = 1.88 mho/m ε_r = 37.4 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.0197 mW/g, SAR (10g): 0.0097 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 7.0 (5.6, 10.3) [mm]
Powerdrift: -0.15 dB



08/21/04 10:13

sn: 4400007088915

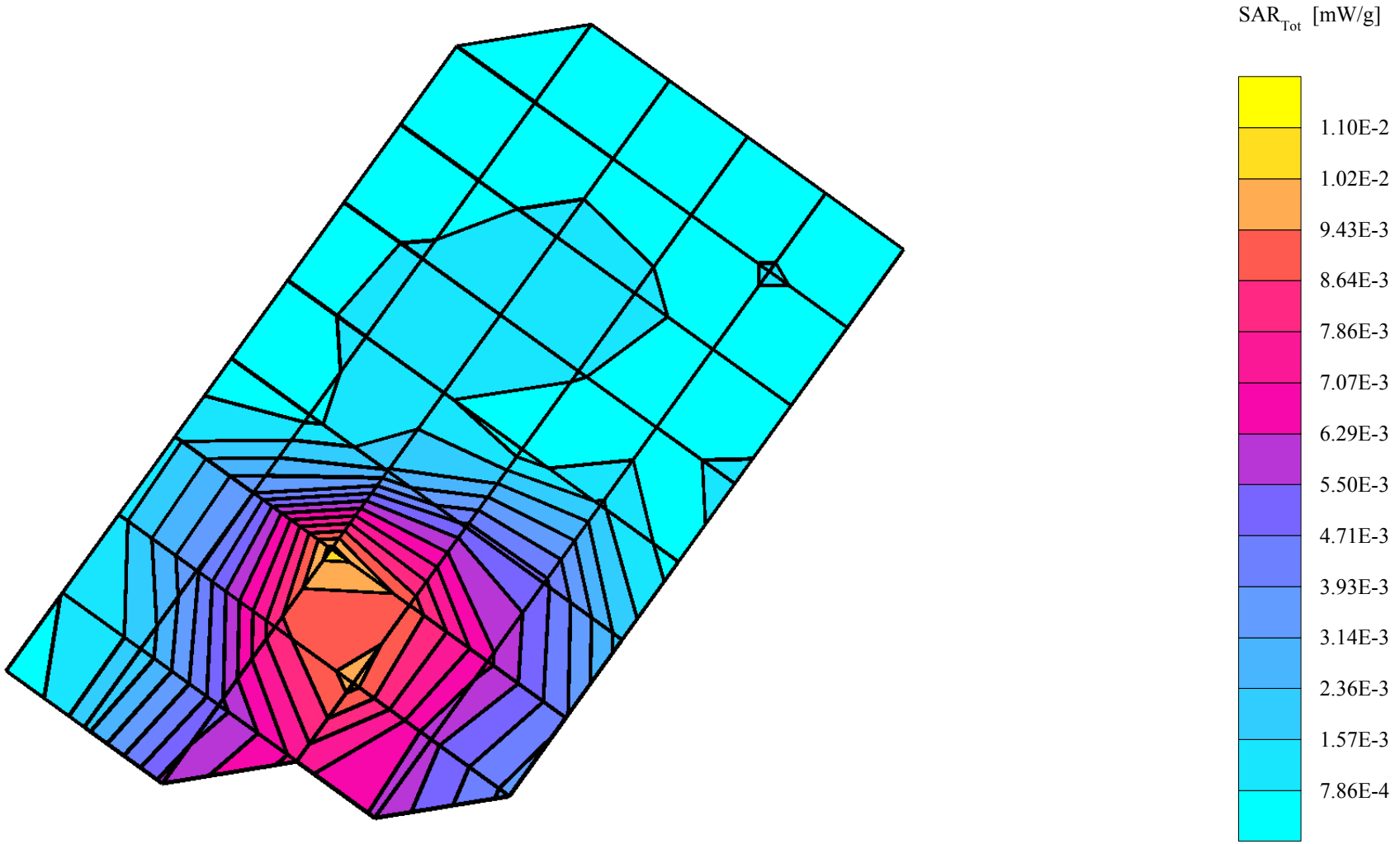
Ch# 6 Pwr Step: continuous mod tx 11mbps/cck Antenna Position: INTERNAL
Type of Modulation: WIFI Battery Model #: SNN5750A
DEVICE POSITION: CHEEK
Accessory Model #: none
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 2437 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(4.46,4.46,4.46); Crest factor: 1.0; 2450 MHz Head & Body: σ = 1.88 mho/m ε_r = 37.6 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.0262 mW/g, SAR (10g): 0.0123 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 8.9 (8.5, 9.4) [mm]
Powerdrift: 0.07 dB



08/23/04 12:09

sn: 4400007088915

Ch# 6 Pwr Step: continuous mod tx 11mbps/cck Antenna Position: INTERNAL
Type of Modulation: WIFI Battery Model #: SNN5751A
DEVICE POSITION: CHEEK
Accessory Model #: none
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 2437 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(4.46,4.46,4.46); Crest factor: 1.0; 2450 MHz Head & Body: σ = 1.88 mho/m ε_r = 37.4 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.0133 mW/g, SAR (10g): 0.0066 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 10.0 (9.6, 10.8) [mm]
Powerdrift: -0.17 dB



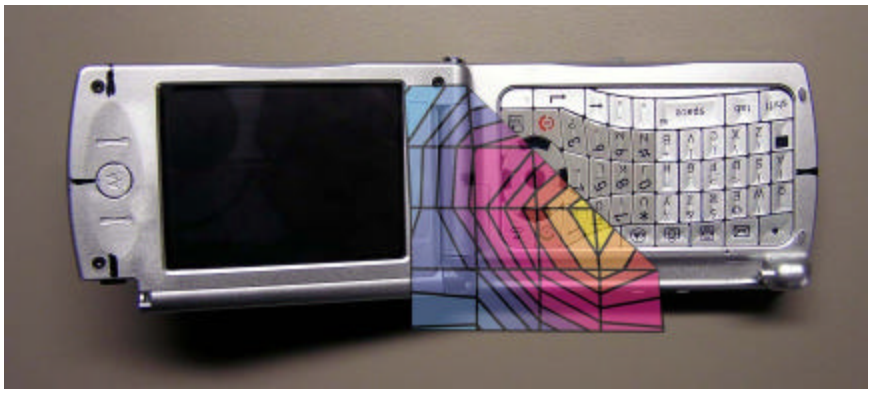


Figure 1.Typical 850MHz Head Adjacent Contour Overlaid on Phone (Cheek Touch)

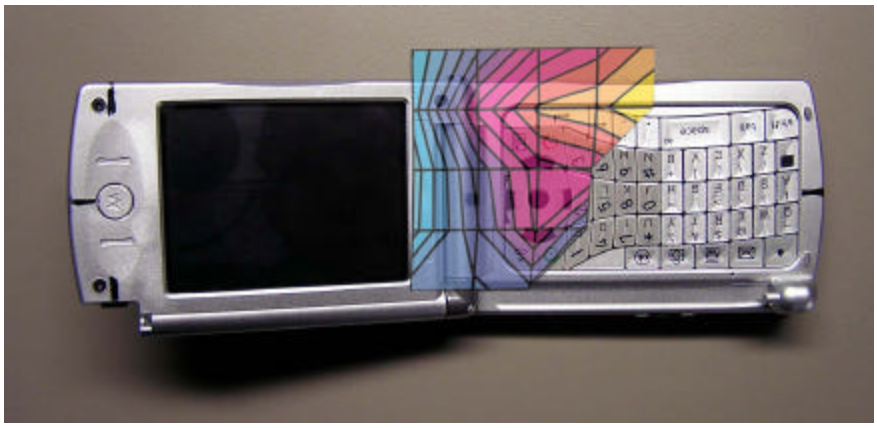


Figure 2.Typical 1900MHz Head Adjacent Contour Overlaid on Phone (Cheek Touch)

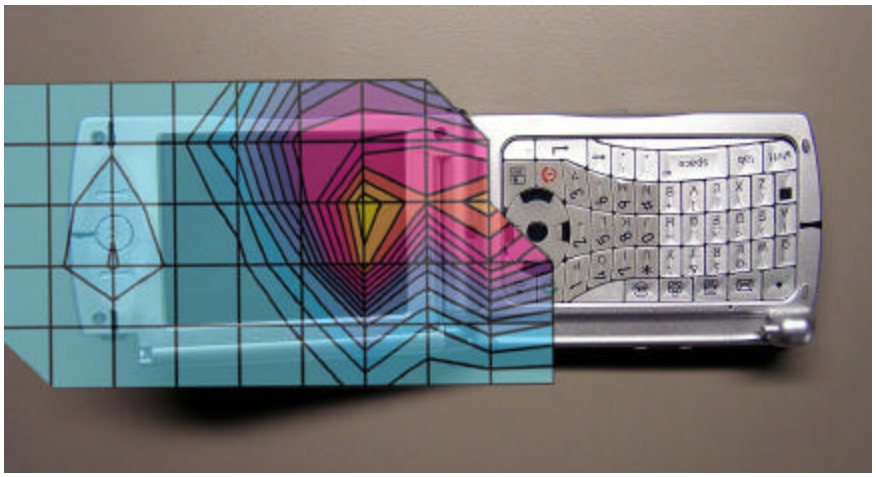
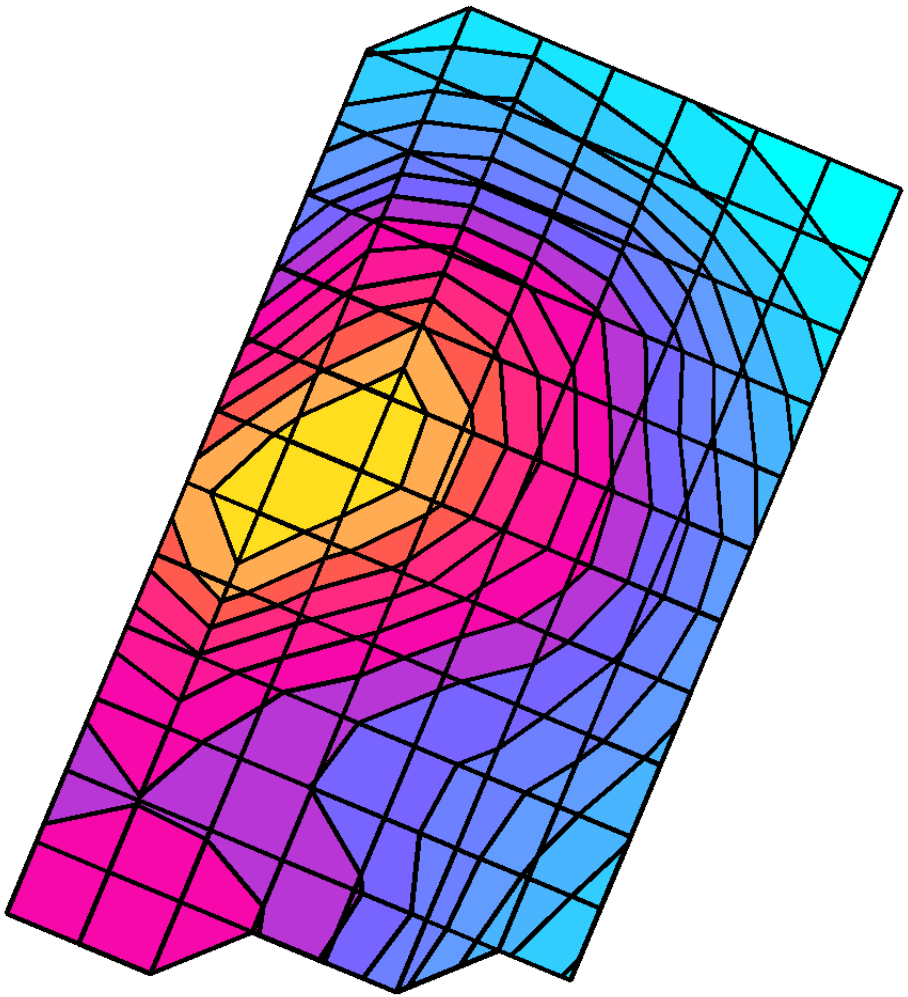


Figure 3.Typical WiFi Head Adjacent Contour Overlaid on Phone (Cheek Touch)

08/19/04 17:24

sn: 4400007088915

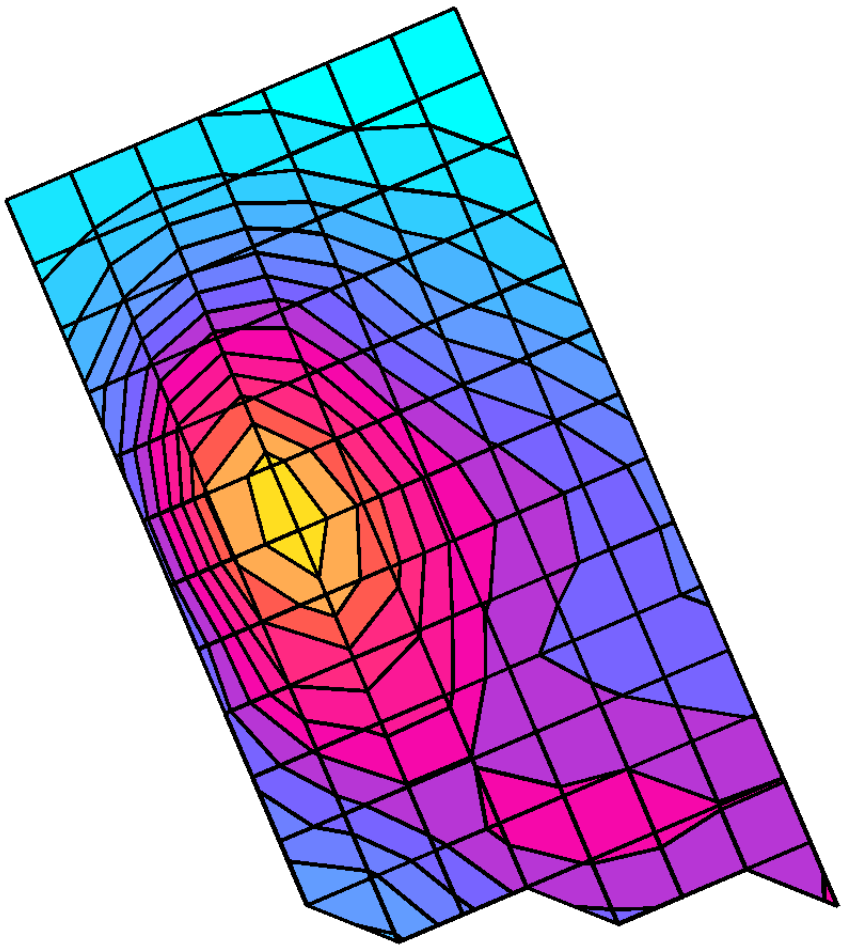
Ch# 190 / Pwr Step: 5 Antenna Position: Internal
Type of Modulation: GSM 850 Battery Model #: SNN5750A
DEVICE POSITION (cheek or rotated): Rotated
Accessory Model #: N/A
Simulate Temp when Measured: 20.0C Simulate Temp after Test: 19.8C
R4 TP-1131 SUGAR SAM Expanded (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 837 MHz
Probe: ET3DV6R - SN1506 - IEEE HEAD.2; ConvF(5.72,5.72,5.72); Crest factor: 8.0; 835 MHz Head & Body: $\sigma = 0.92$ mho/m $\varepsilon_r = 43.3$ $\rho = 1.00$ g/cm^3
Cube 7x7x7: SAR (1g): 0.105 mW/g, SAR (10g): 0.0771 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Penetration depth: 19.2 (17.4, 21.0) [mm]
Powerdrift: -0.01 dB



08/19/04 20:33

sn: 4400007088915

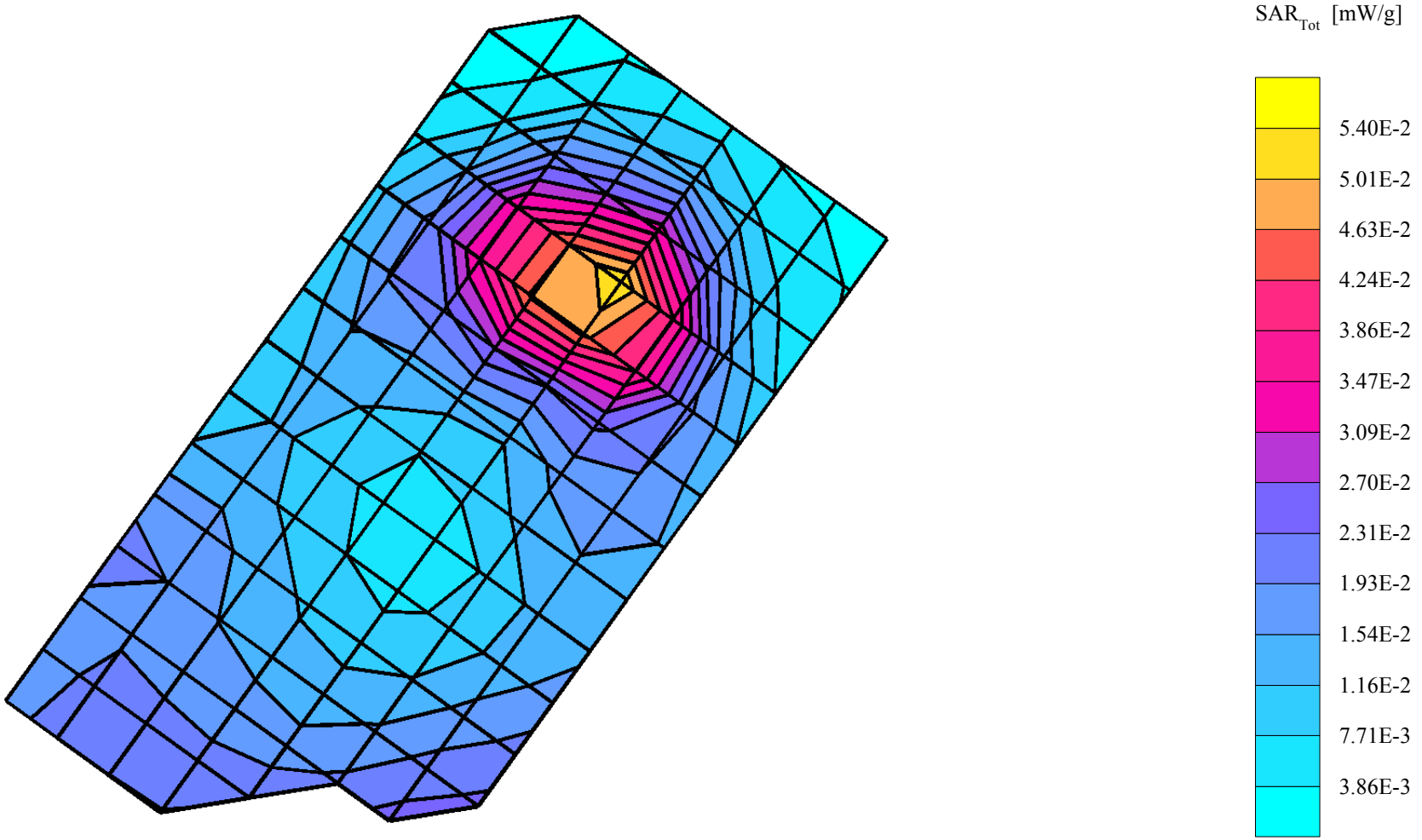
Ch# 190 / Pwr Step: 5 Antenna Position: Internal
Type of Modulation: GSM 850 Battery Model #: SNN5750A
DEVICE POSITION (cheek or rotated): Rotated
Accessory Model #: N/A
Simulate Temp when Measured: 20.0C Simulate Temp after Test: 19.4C
R4 TP-1131 SUGAR SAM Expanded (Rev. 2)-9Jan03 Phantom; Right Hand Section; Position: (90°,180°); Frequency: 837 MHz
Probe: ET3DV6R - SN1506 - IEEE HEAD.2; ConvF(5.72,5.72,5.72); Crest factor: 8.0; 835 MHz Head & Body: $\sigma = 0.92$ mho/m $\varepsilon_r = 43.3$ $\rho = 1.00$ g/cm^3
Cube 7x7x7: SAR (1g): 0.107 mW/g, SAR (10g): 0.0753 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Penetration depth: 16.3 (14.8, 18.1) [mm]
Powerdrift: -0.26 dB



08/20/04 23:29

sn: 4400007088915

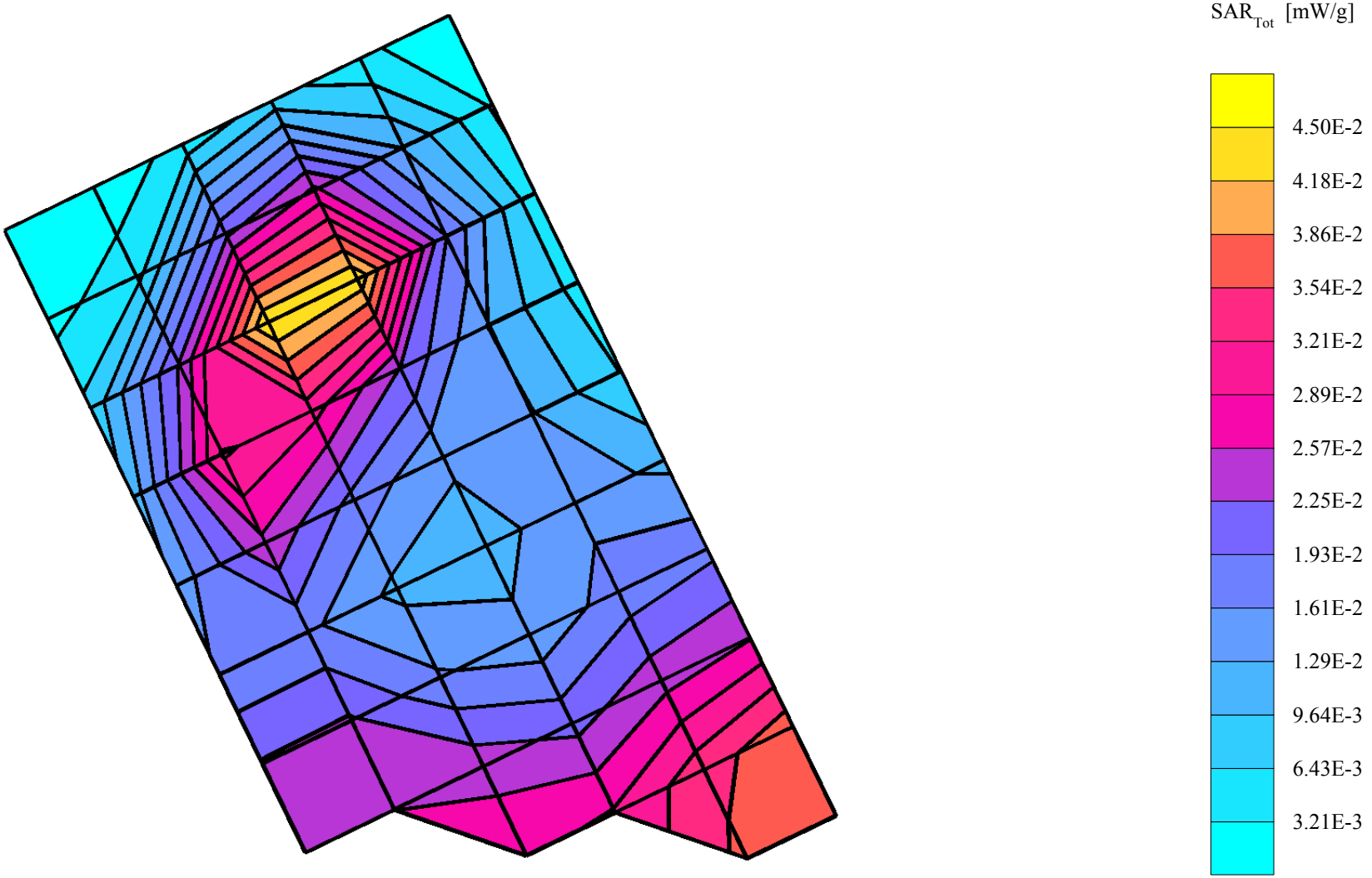
Ch# 661 / Pwr Step: 0 Antenna Position: Internal
Type of Modulation: GSM 1900 Battery Model #: SNN5750A
DEVICE POSITION (cheek or rotated): Rotated
Accessory Model #: N/A
Simulate Temp when Measured: 19.5C Simulate Temp after Test: 19.3C
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(5.03,5.03,5.03); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.44 mho/m ε_r = 38.5 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.0550 mW/g, SAR (10g): 0.0314 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Penetration depth: 11.1 (10.5, 11.8) [mm]
Powerdrift: -0.09 dB



08/21/04 21:56

sn: 4400007088915

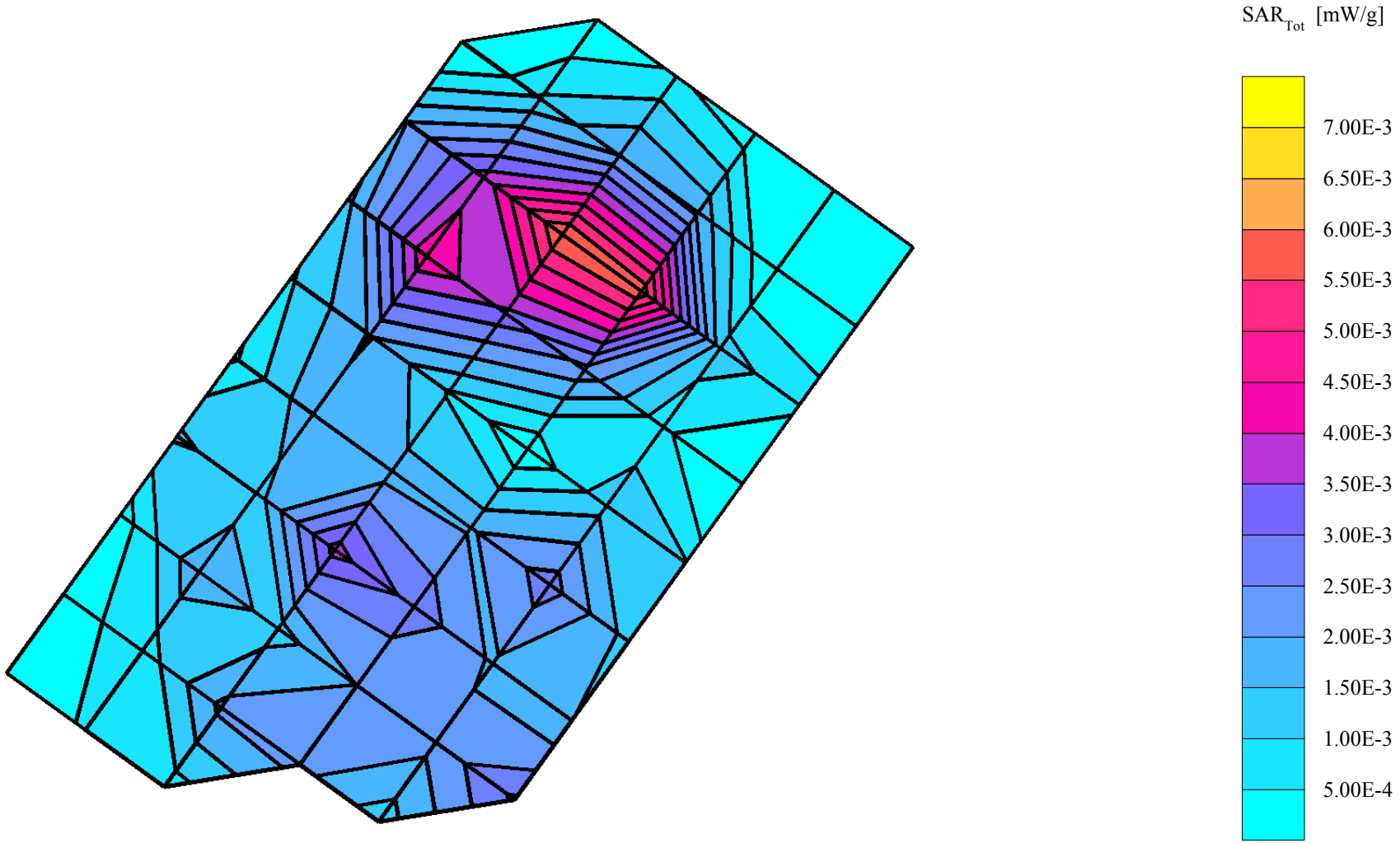
Ch# 661 / Pwr Step: 0 Antenna Position: non
Type of Modulation: gsm Battery Model #: snn5750a
DEVICE POSITION tilt
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Right Hand Section; Position: (90°,180°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(5.03,5.03,5.03); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.46 mho/m ε_r = 38.0 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.0484 mW/g, SAR (10g): 0.0281 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 11.2 (10.6, 11.7) [mm]
Powerdrift: -0.05 dB



08/23/04 10:26

sn: 4400007088915

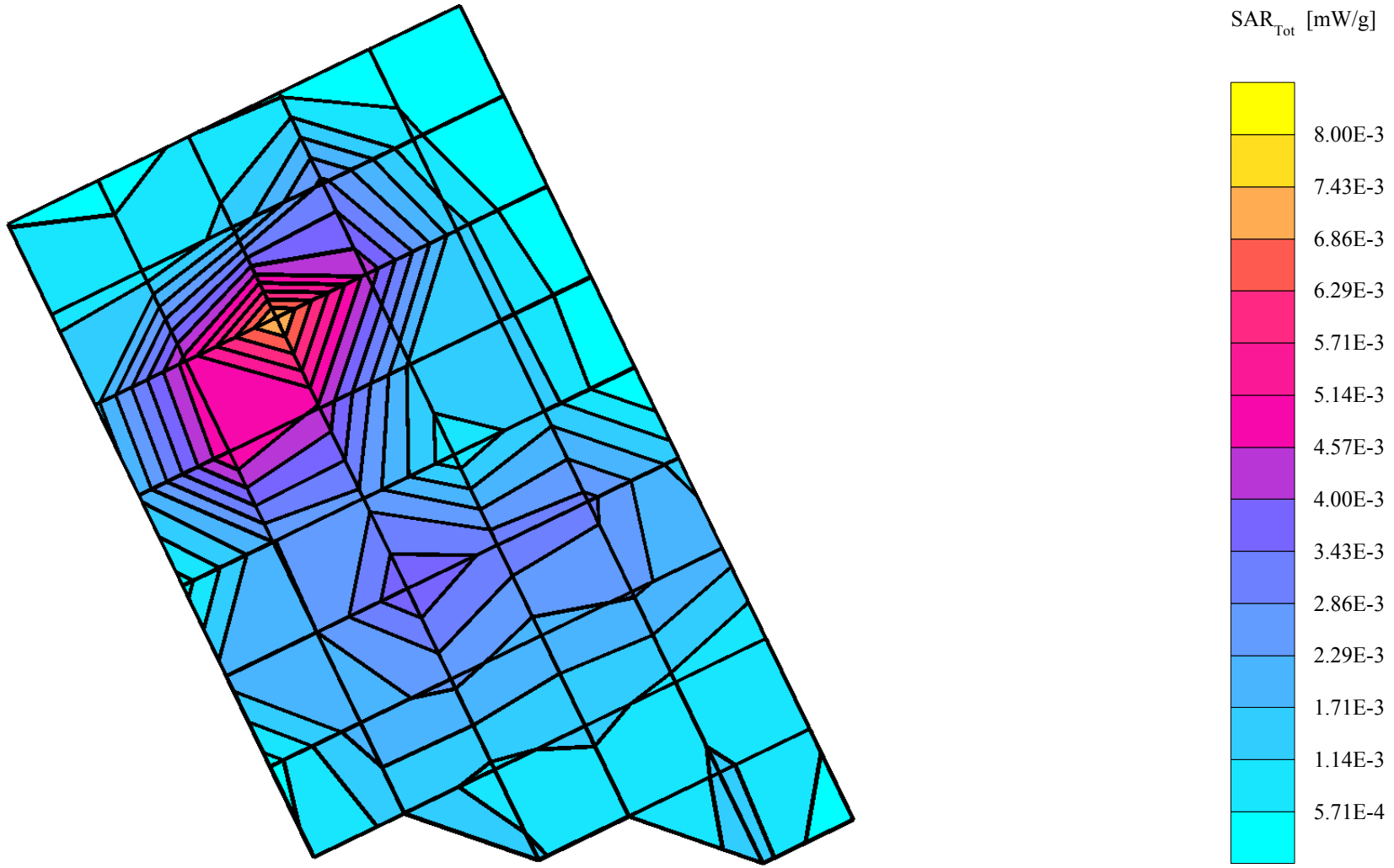
Ch# 6 Pwr Step: continuous mod tx 11mbps/cck Antenna Position: INTERNAL
Type of Modulation: WIFI Battery Model #: SNN5750A
DEVICE POSITION: ROTATED
Accessory Model #: none
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Left Hand Section; Position: (90°,180°); Frequency: 2437 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(4.46,4.46,4.46); Crest factor: 1.0; 2450 MHz Head & Body: σ = 1.88 mho/m ε_r = 37.4 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.0064 mW/g, SAR (10g): 0.0031 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 9.4 (7.4, 13.8) [mm]
Powerdrift: 0.62 dB



08/23/04 11:42

sn: 4400007088915

Ch# 6 Pwr Step: continuous mod tx 11mbps/cck Antenna Position: INTERNAL
Type of Modulation: WIFI Battery Model #: SNN5750A
DEVICE POSITION: ROTATED
Accessory Model #: none
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Right Hand Section; Position: (90°,180°); Frequency: 2437 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(4.46,4.46,4.46); Crest factor: 1.0; 2450 MHz Head & Body: σ = 1.88 mho/m ε_r = 37.4 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.0076 mW/g, SAR (10g): 0.0037 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 5.6 (4.5, 6.8) [mm]
Powerdrift: -0.33 dB



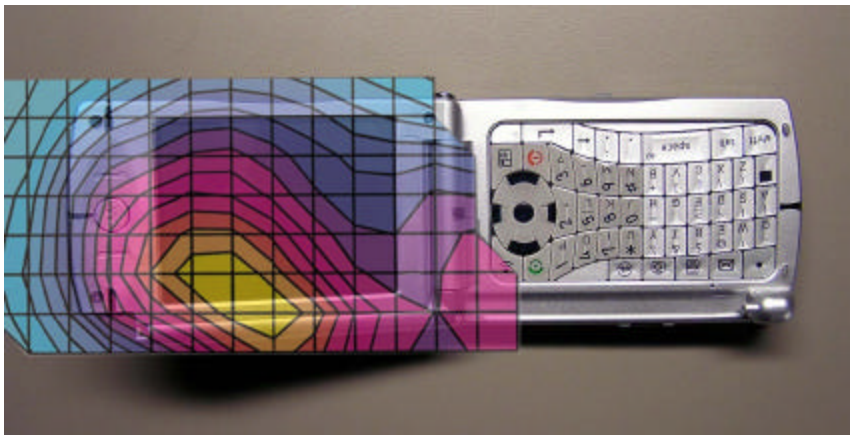


Figure 4.Typical 850MHz Head Adjacent Contour Overlaid on Phone (15 ° Tilt)

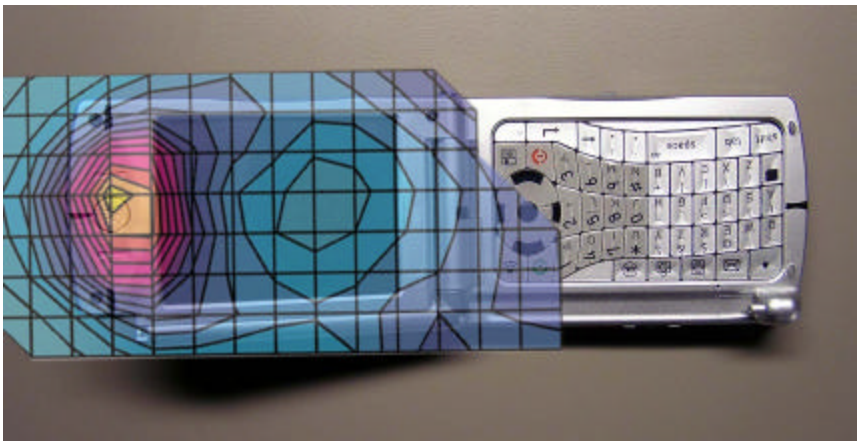


Figure 5.Typical 1900MHz Head Adjacent Contour Overlaid on Phone (15 ° Tilt)

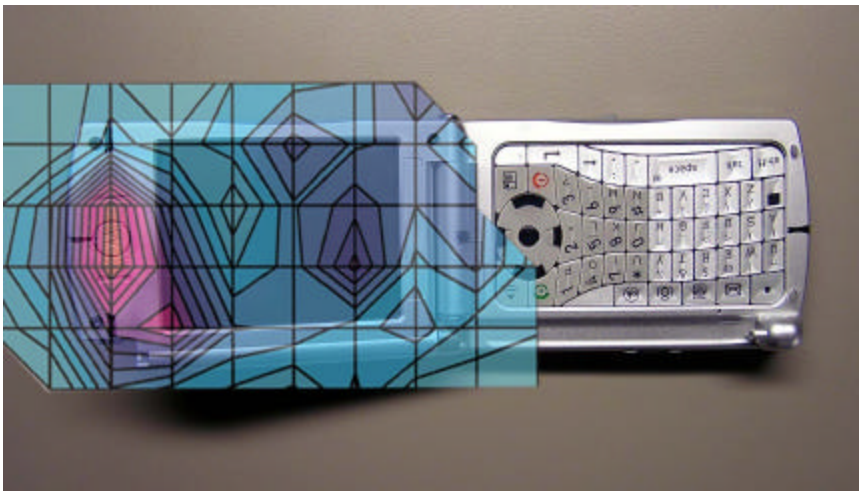


Figure 6.Typical WiFi Head Adjacent Contour Overlaid on Phone (15 ° Tilt)

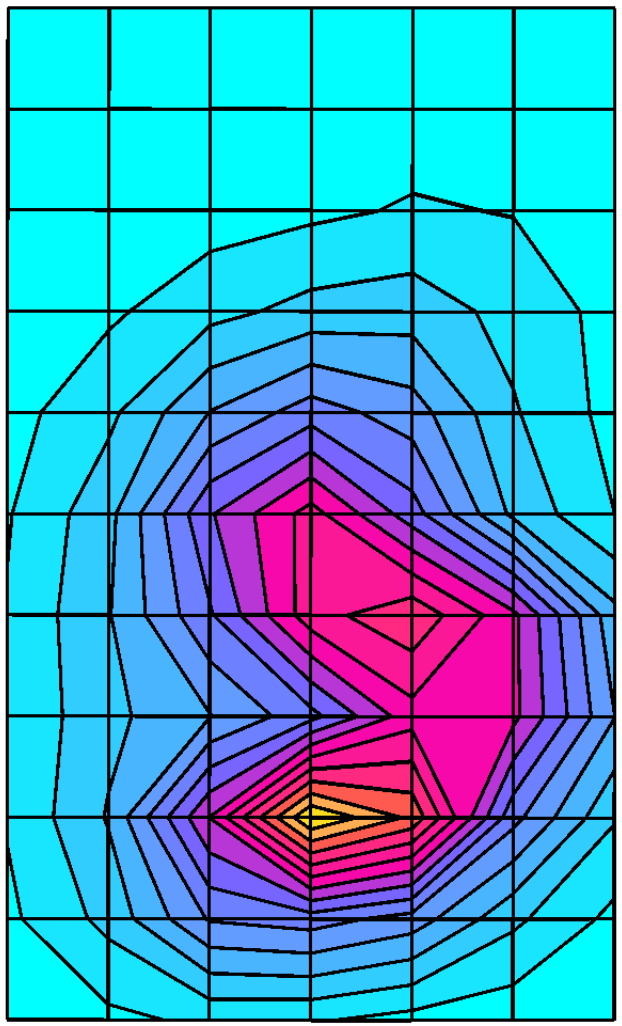
Appendix 3

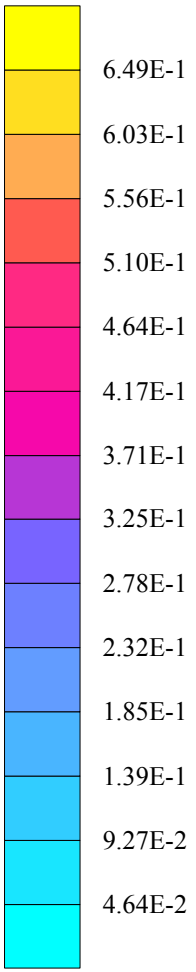
SAR distribution plots for Body Worn Configuration

08/20/04 10:40

sn: 4400007088915

Ch# 190 Pwr Step: 5 ota Antenna Position: INTERNAL
Type of Modulation: 800 gsm Battery Model #: SNN5750A
Accessory Model # = case (SYN1070A)
R4 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 1 Section; Position: (0°,0°); Frequency: 837 MHz
Probe: ET3DV6R - SN1506 FCC Body.2; ConvF(5.53,5.53,5.53); Crest factor: 8.0; 835 MHz Head & Body: $\sigma = 0.98$ mho/m $\varepsilon_r = 53.3$ $\rho = 1.00$ g/cm^3
Cube 7x7x7: SAR (1g): 0.626 mW/g, SAR (10g): 0.349 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 10.1 (9.5, 11.0) [mm]
Powerdrift: -0.11 dB

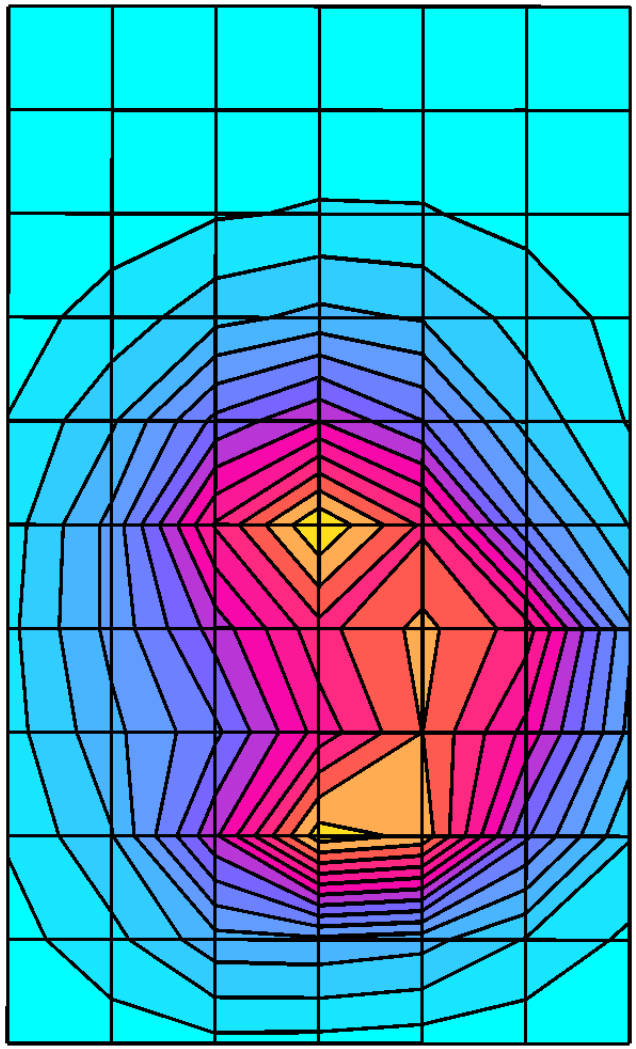


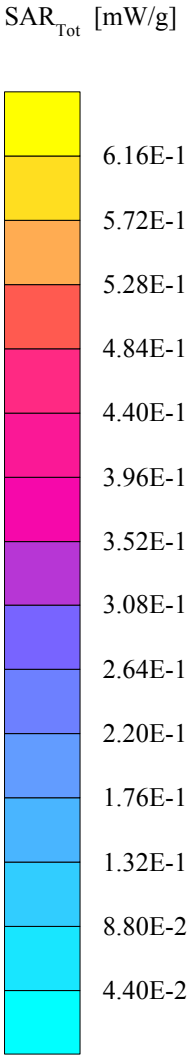


08/21/04 08:25

sn: 4400007088915

Ch# 190 Pwr Step: 5 ota Antenna Position: INTERNAL
Type of Modulation: 800 gsm bluetooth Battery Model #: SNN5750A
Accessory Model # = case (SYN1070A)
R4 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 1 Section; Position: (0°,0°); Frequency: 837 MHz
Probe: ET3DV6 - SN1514-FCC BODY2; ConvF(5.87,5.87,5.87); Crest factor: 8.0; 835 MHz Head & Body: $\sigma = 0.97$ mho/m $\varepsilon_r = 53.3$ $\rho = 1.00$ g/cm^3
Cube 7x7x7: SAR (1g): 0.678 mW/g, SAR (10g): 0.389 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 10.4 (9.8, 11.4) [mm]
Powerdrift: -0.11 dB



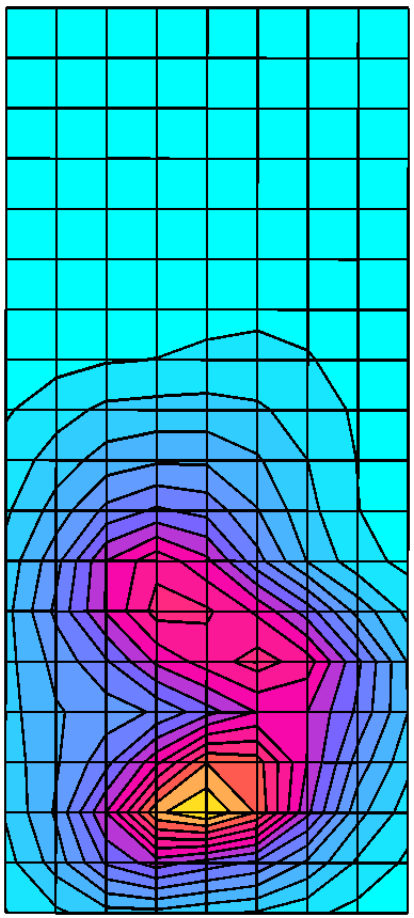


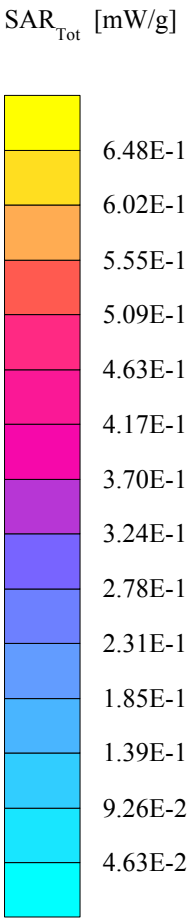
08/24/04 17:22

sn: 4400007088915

Ch# 190 / Pwr Step: 5 Antenna Position: Internal
Type of Modulation: GSM 850 Battery Model #: SNN5750A
Accessory Model #: SYN1070A

Bluetooth Enabled
WiFi (WLAN) (Channel 6) Enabled
Simulate Temp when Measured: 20.5C Simulate Temp after Test: 19.2C
R4 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 1 Section; Position: (0°,0°); Frequency: 837 MHz
Probe: ET3DV6 - SN1514-FCC BODY2; ConvF(5.87,5.87,5.87); Crest factor: 8.0; 835 MHz Head & Body: $\sigma = 0.98$ mho/m $\varepsilon_r = 53.8$ $\rho = 1.00$ g/cm^3
Cube 7x7x7: SAR (1g): 0.646 mW/g, SAR (10g): 0.359 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Penetration depth: 9.7 (9.1, 10.8) [mm]
Powerdrift: -0.22 dB

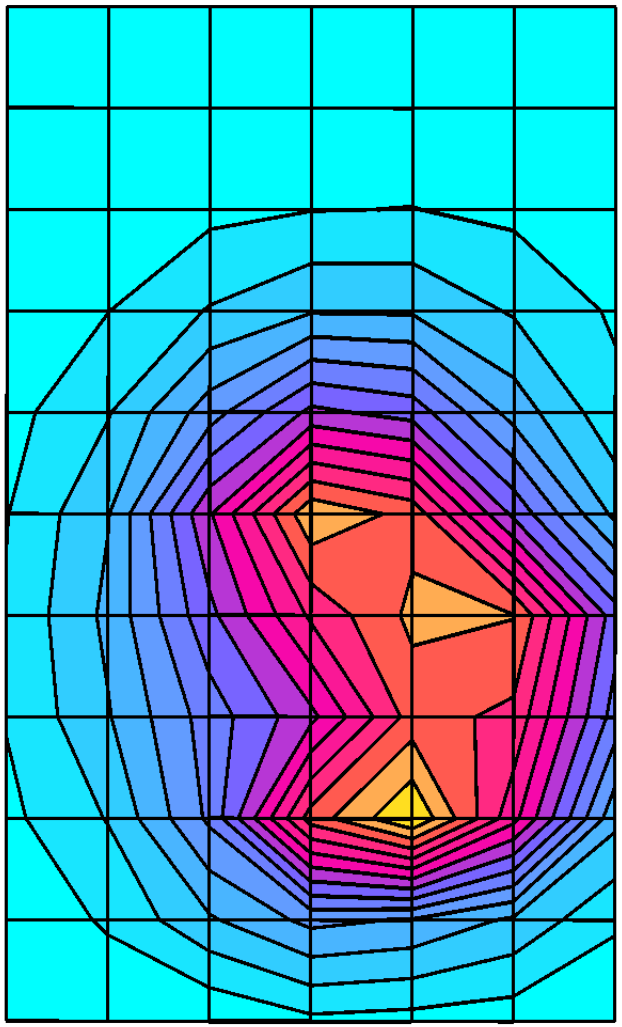


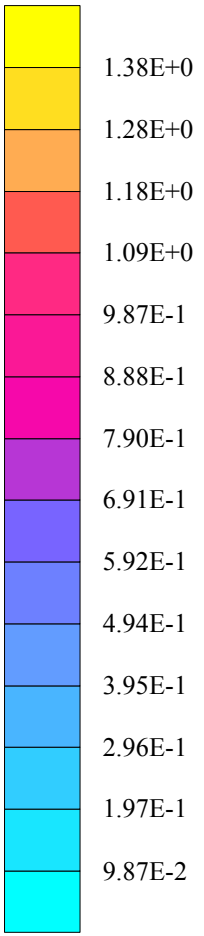


08/31/04 13:34

sn: 4400007088915

Ch# 128 Pwr Step: burst 1 and 2=5 ota Antenna Position: INTERNAL
Type of Modulation: 800 gprs bluetooth program Battery Model #: SNN5750A
Accessory Model # = case (SYN1070A)
R4 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 1 Section; Position: (0°,0°); Frequency: 824 MHz
Probe: ET3DV6 - SN1514-FCC BODY2; ConvF(5.87,5.87,5.87); Crest factor: 4.0; 835 MHz Head & Body: $\sigma = 0.98$ mho/m $\varepsilon_r = 53.4$ $\rho = 1.00$ g/cm^3
Cube 7x7x7: SAR (1g): 1.46 mW/g, SAR (10g): 0.863 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 10.7 (9.9, 11.7) [mm]
Powerdrift: -0.19 dB



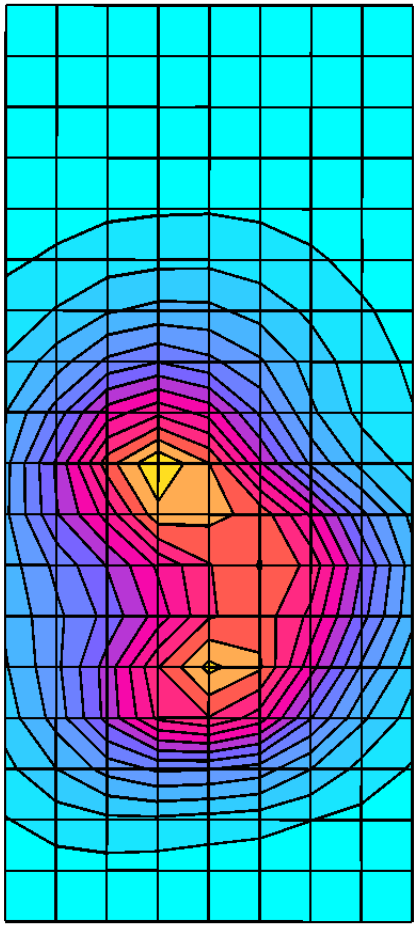


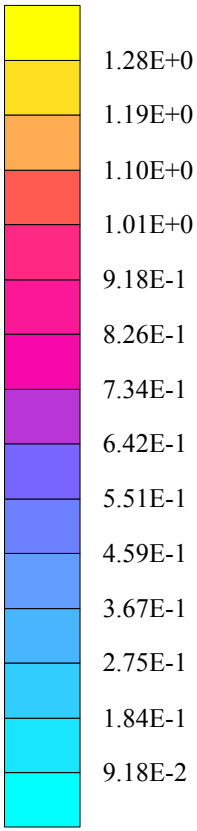
08/24/04 22:54

sn: 4400007088915

Ch# 128 / Pwr Step: 5 Antenna Position: Internal
Type of Modulation: GSM 850 Battery Model #: SNN5751A
Accessory Model #: SYN1070A

Bluetooth Enabled
GPRS Mode
Simulate Temp when Measured: 20.5C Simulate Temp after Test: 19.3C
R4 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 1 Section; Position: (0°,0°); Frequency: 824 MHz
Probe: ET3DV6 - SN1514-FCC BODY2; ConvF(5.87,5.87,5.87); Crest factor: 4.0; 835 MHz Head & Body: $\sigma = 0.98$ mho/m $\varepsilon_r = 53.8$ $\rho = 1.00$ g/cm^3
Cube 7x7x7: SAR (1g): 1.20 mW/g, SAR (10g): 0.808 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Penetration depth: 14.2 (13.6, 15.1) [mm]
Powerdrift: -0.16 dB



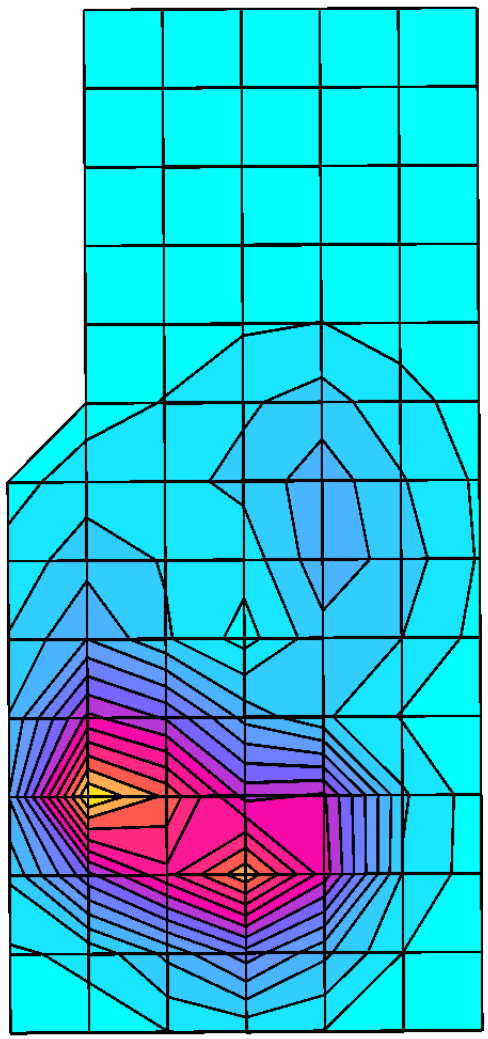


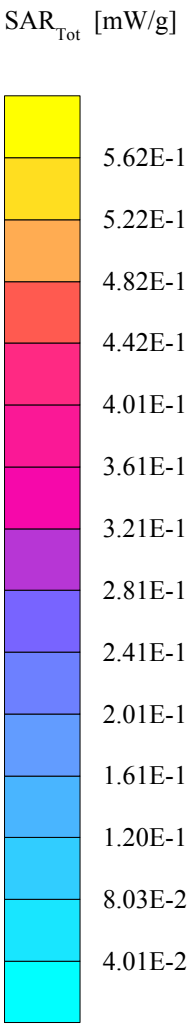
08/22/04 00:29

sn: 4400007088915

Ch# 661 / Pwr Step: 0 Antenna Position: non
Type of Modulation: gsm Battery Model #: snn5750a

acc: syn1070a
R4 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 2 Section; Position: (0°,0°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1514-FCC BODY2; ConvF(4.46,4.46,4.46); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.59 mho/m ε_r = 52.1 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.617 mW/g, SAR (10g): 0.332 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 9.0 (8.1, 10.5) [mm]
Powerdrift: -0.00 dB

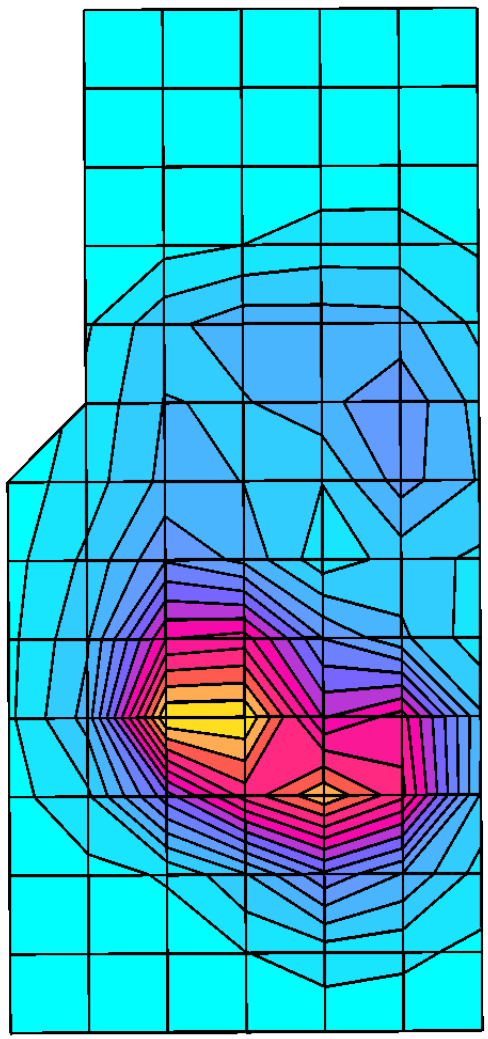


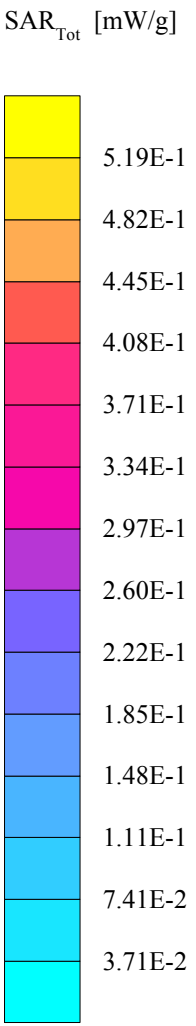


08/23/04 17:44

sn: 4400007088915

Ch# 661 Pwr Step: 0 Antenna Position: non
Type of Modulation: gsm1900- WIFI ch6 continuous mod tx 11mbps/cck
Battery Model #: SNN5751a
Accessory Model # = case (SYN1070A)
R4 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 2 Section; Position: (0°,0°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1514-FCC BODY2; ConvF(4.46,4.46,4.46); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.59 mho/m ε_r = 52.0 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.615 mW/g, SAR (10g): 0.333 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 8.8 (7.9, 10.4) [mm]
Powerdrift: -0.07 dB



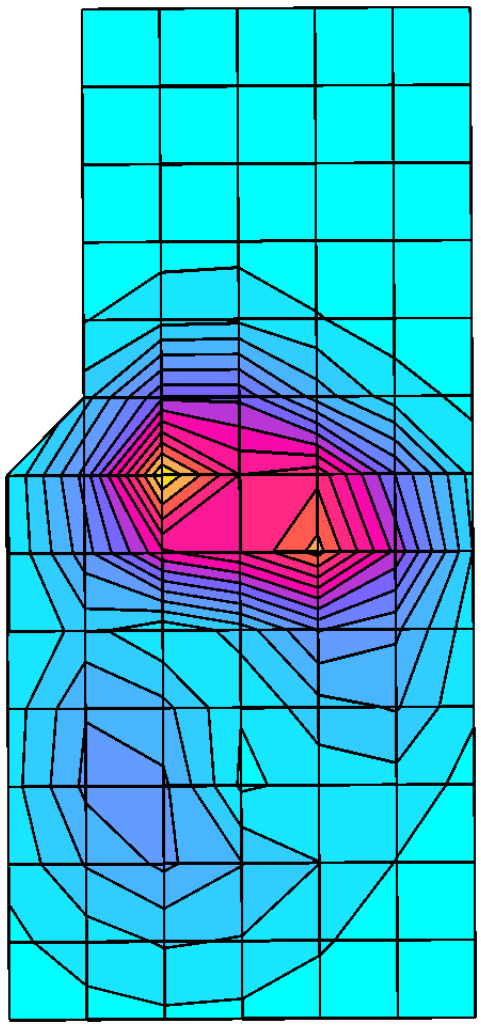


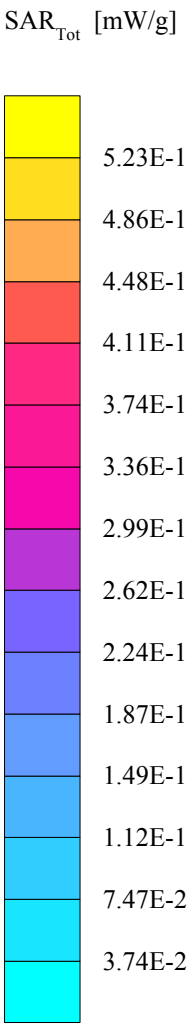
08/22/04 01:13

sn: 4400007088915

Ch# 661 / Pwr Step: 0 Antenna Position: non
Type of Modulation: gsm Battery Model #: snn5750a

acc: syn1070a w/blu2th
R4 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 2 Section; Position: (0°,0°); Frequency: 1880 MHz
Probe: ET3DV6 - SN1514-FCC BODY2; ConvF(4.46,4.46,4.46); Crest factor: 8.0; 1880 MHz Head & Body: σ = 1.59 mho/m ε_r = 52.1 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.513 mW/g, SAR (10g): 0.282 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 10.2 (9.3, 11.5) [mm]
Powerdrift: -0.12 dB

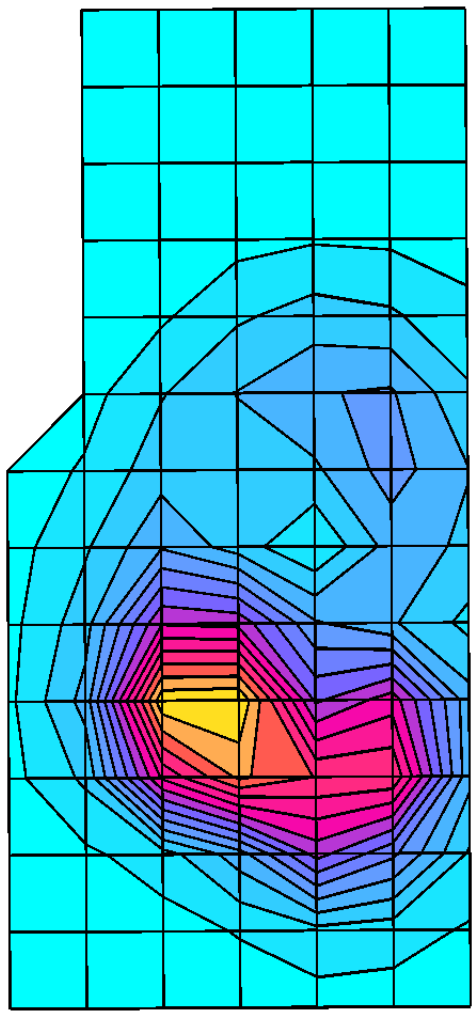


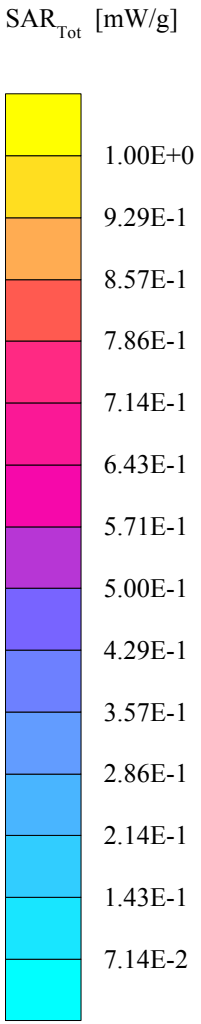


08/23/04 19:29

sn: 4400007088915

Ch# 810 Pwr Step: 0 Antenna Position: non
Type of Modulation: gprs1900- blutooth
Battery Model #: SNN5750a
Accessory Model # = case (SYN1070A)
R4 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 2 Section; Position: (0°,0°); Frequency: 1909 MHz
Probe: ET3DV6 - SN1514-FCC BODY2; ConvF(4.46,4.46,4.46); Crest factor: 4.0; 1880 MHz Head & Body: σ = 1.59 mho/m ε_r = 52.0 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 1.22 mW/g, SAR (10g): 0.655 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 8.8 (7.9, 10.3) [mm]
Powerdrift: -0.03 dB

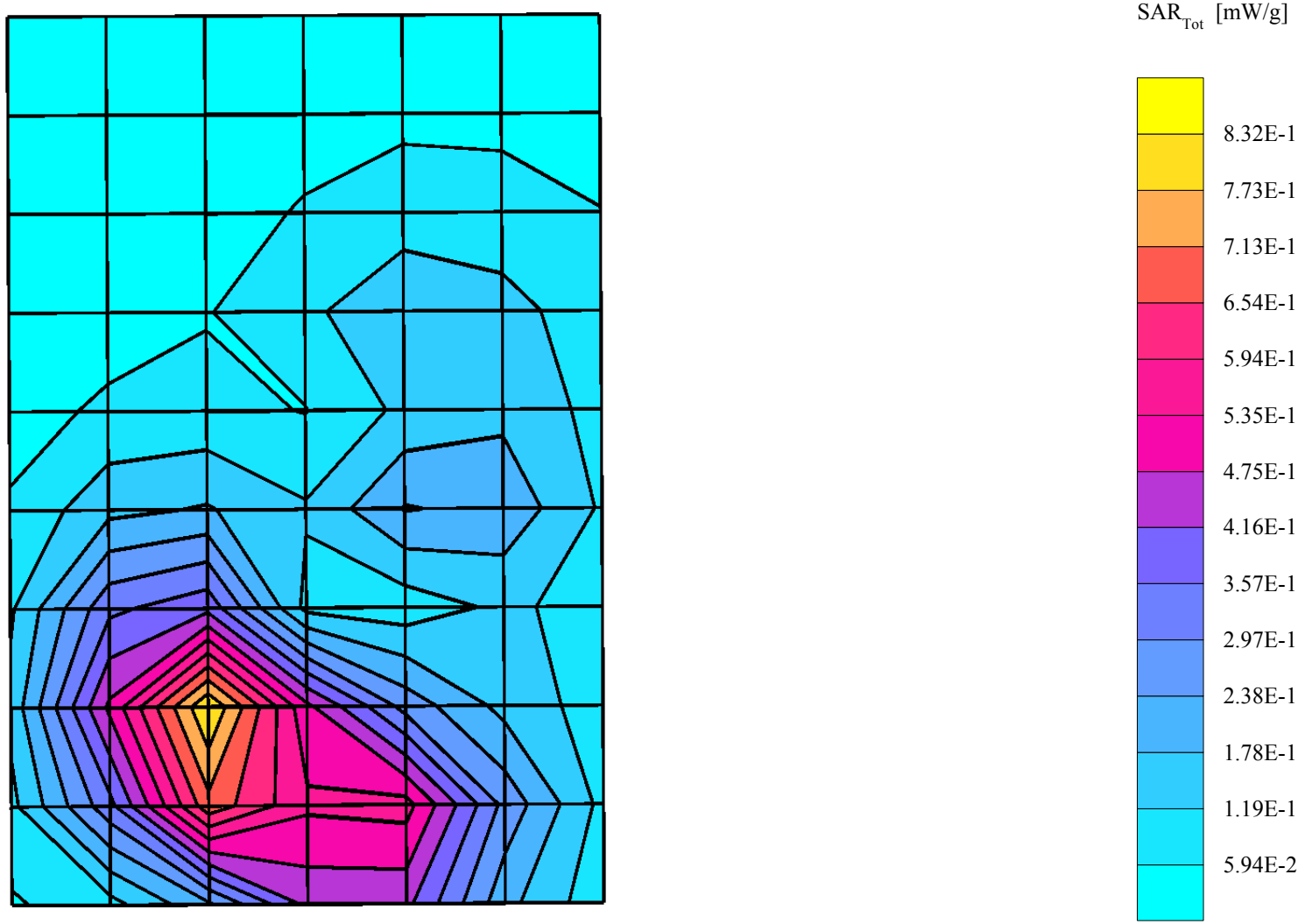




08/25/04 13:26

sn: 4400007088915

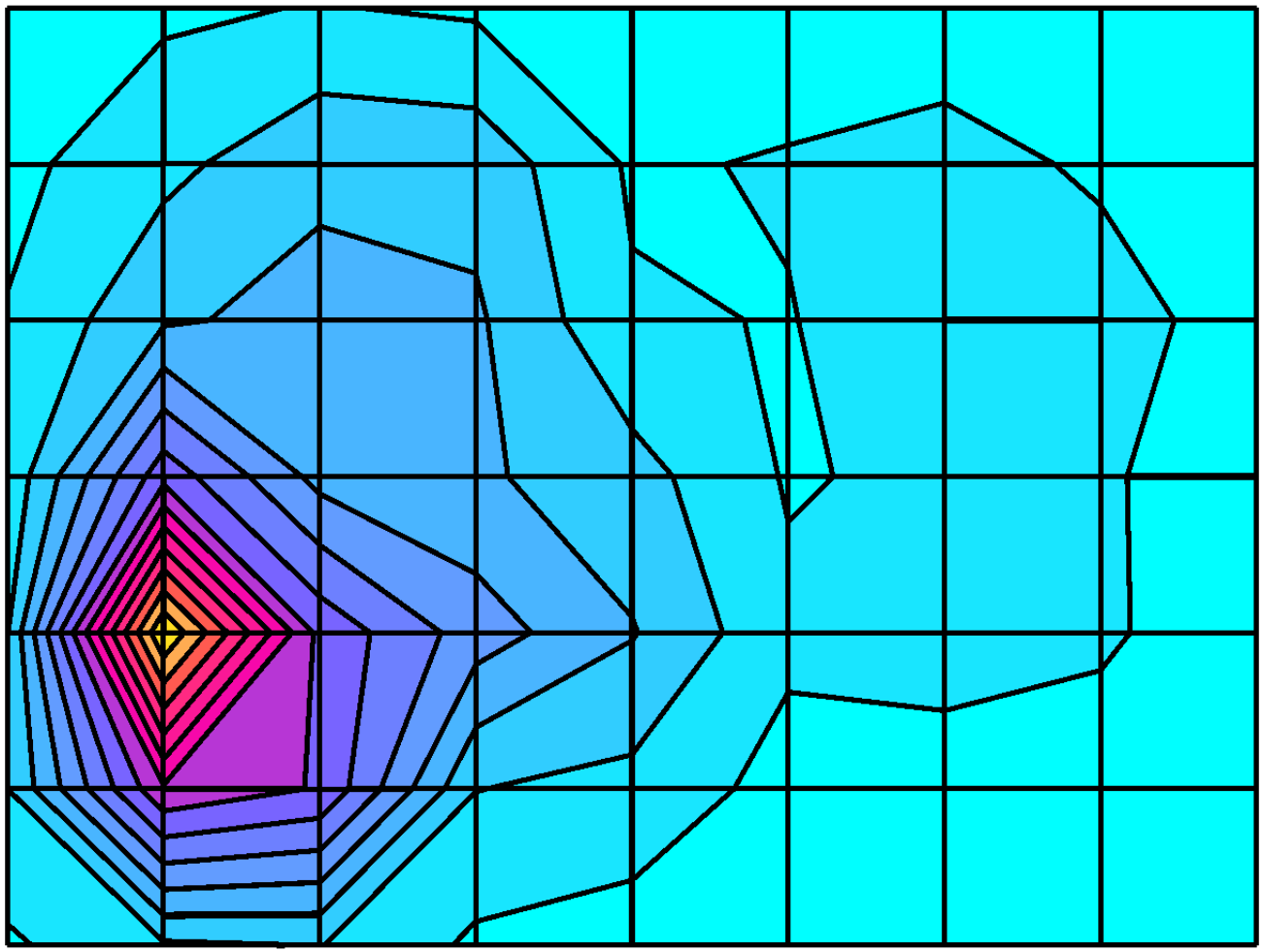
Ch# 810 Pwr Step: burst 1 and 2=0 ota Antenna Position: INTERNAL
Type of Modulation: 1900 gprs bluetooth program Battery Model #: SNN5751A
Accessory Model # = case (SYN1070A)
R4 Amy Twin Phantom Rev.4 (22Aug02) Phantom; section 2 Section; Position: (0°,0°); Frequency: 1910 MHz
Probe: ET3DV6 - SN1514-FCC BODY2; ConvF(4.46,4.46,4.46); Crest factor: 4.0; 1880 MHz Head & Body: σ = 1.59 mho/m ε_r = 51.0 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.858 mW/g, SAR (10g): 0.471 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 8.9 (8.1, 10.3) [mm]
Powerdrift: -0.09 dB



08/23/04 14:23

sn: 4400007088915 Phone 1

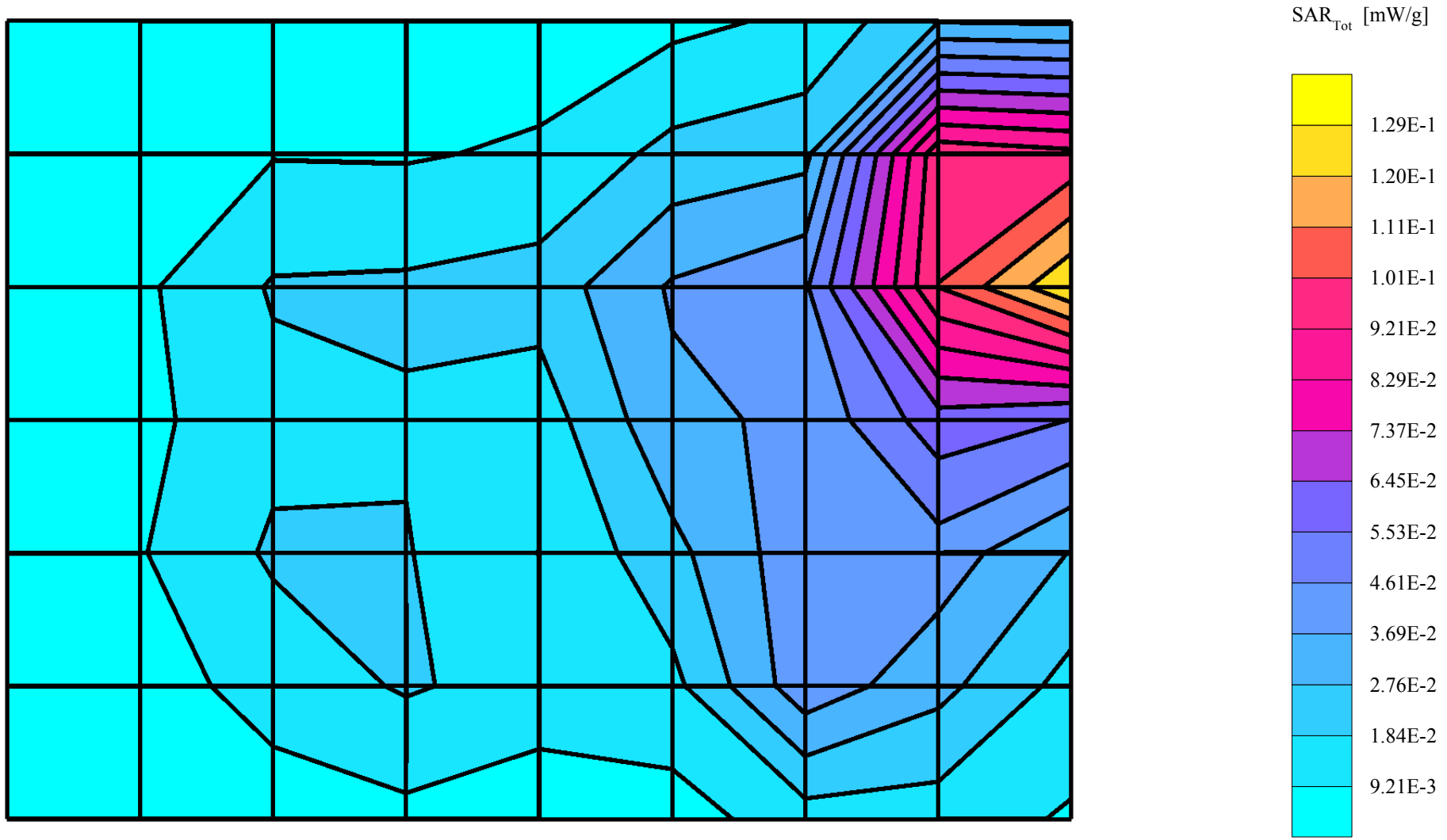
Ch# 6 Pwr Step: continuous mod tx 11mbps/cck Antenna Position: INTERNAL
Type of Modulation: WIFI Battery Model #: SNN5750A
Accessory Model # = case (SYN1070A)
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Flat Section; Position: (0°,0°); Frequency: 2437 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(4.46,4.46,4.46); Crest factor: 1.0; 2450 MHz Head & Body: σ = 1.88 mho/m ε_r = 37.4 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.186 mW/g, SAR (10g): 0.0859 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 6.8 (6.6, 7.2) [mm]
Powerdrift: 0.04 dB



08/23/04 16:58

sn: 4400007088915

Ch# 6 Pwr Step: continuous mod tx 11mbps/cck Antenna Position: non
Type of Modulation: WIFI Battery Model #: SNN5751a
Accessory Model # = case (SYN1070A)
R4 TP-1250 GLYCOL SAM Expanded (Rev. 2)-9Jan03 Phantom; Flat Section; Position: (90°,180°); Frequency: 2437 MHz
Probe: ET3DV6 - SN1514-IEEE Head2; ConvF(4.46,4.46,4.46); Crest factor: 1.0; 2450 MHz Head & Body: σ = 1.88 mho/m ε_r = 37.4 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 0.167 mW/g, SAR (10g): 0.0769 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 6.7 (6.6, 6.9) [mm]
Powerdrift: -0.03 dB



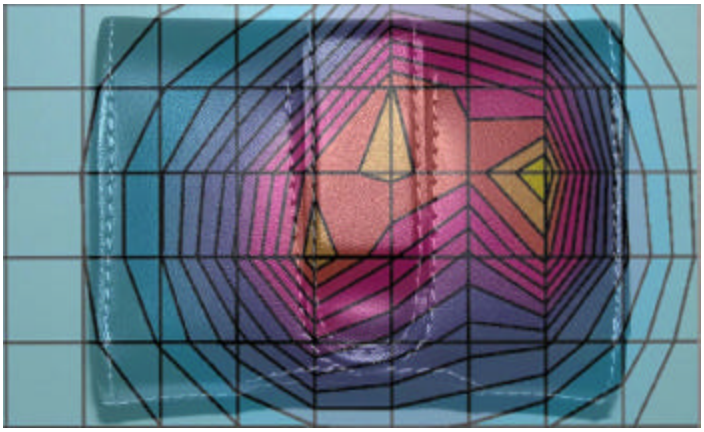


Figure 7.Typical 800 MHz Body-Worn Contour Overlaid on Phone

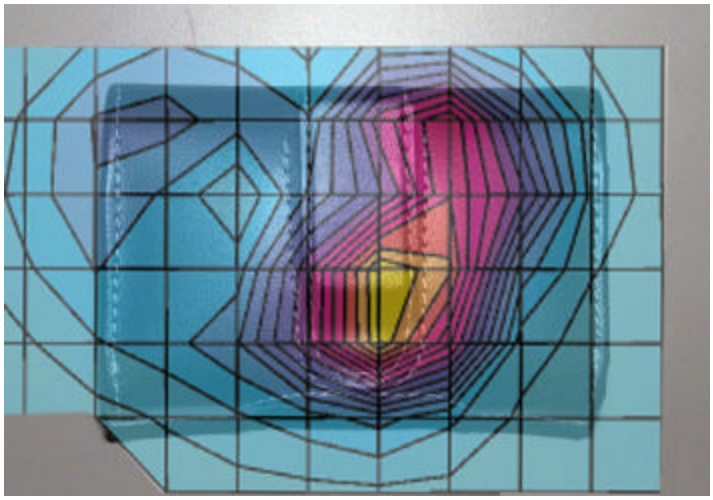


Figure 8.Typical 1900 MHz Body-Worn Contour Overlaid on Phone

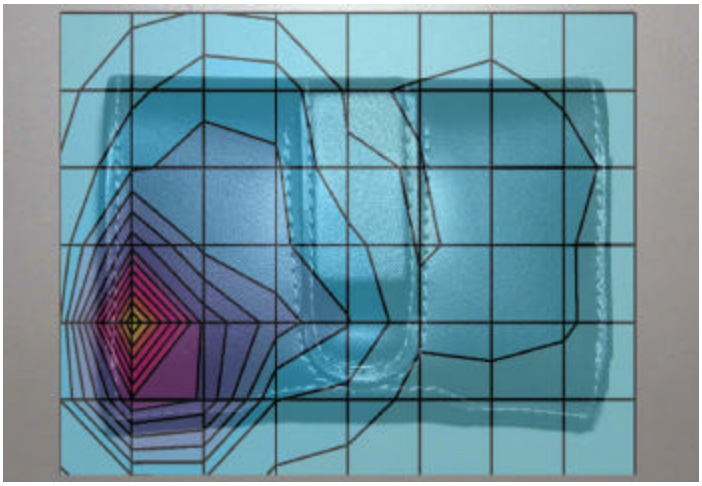


Figure 9.Typical WiFi MHz Body-Worn Contour Overlaid on Phone

Appendix 4

Probe Calibration Certificate

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

Client **Motorola PCS**

CALIBRATION CERTIFICATE

Object(s)	ET3DV6R - SN:1506
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	May 27, 2004
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

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

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E4419B	GB41293874	5-May-04 (METAS, No 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No 251-00388)	May-05
Reference 20 dB Attenuator	SN: 5086 (20b)	3-May-04 (METAS, No 251-00389)	May-05
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-03)	In house check: Oct 05

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

Date issued: May 27, 2004

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

Probe ET3DV6R

SN:1506

Manufactured:	October 24, 1999
Last calibrated:	May 14, 2003
Recalibrated:	May 27, 2004

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6R SN:1506

Sensitivity in Free Space

Diode Compression[A]

NormX	**2.30** $\mu V/(V/m)^2$	DCP X	**96**	mV
NormY	**2.12** $\mu V/(V/m)^2$	DCP Y	**96**	mV
NormZ	**1.25** $\mu V/(V/m)^2$	DCP Z	**96**	mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Plese see Page 7.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	10.5	5.6
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

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

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	14.3	9.2
SAR_{be} [%]	With Correction Algorithm	0.1	0.1

Sensor Offset

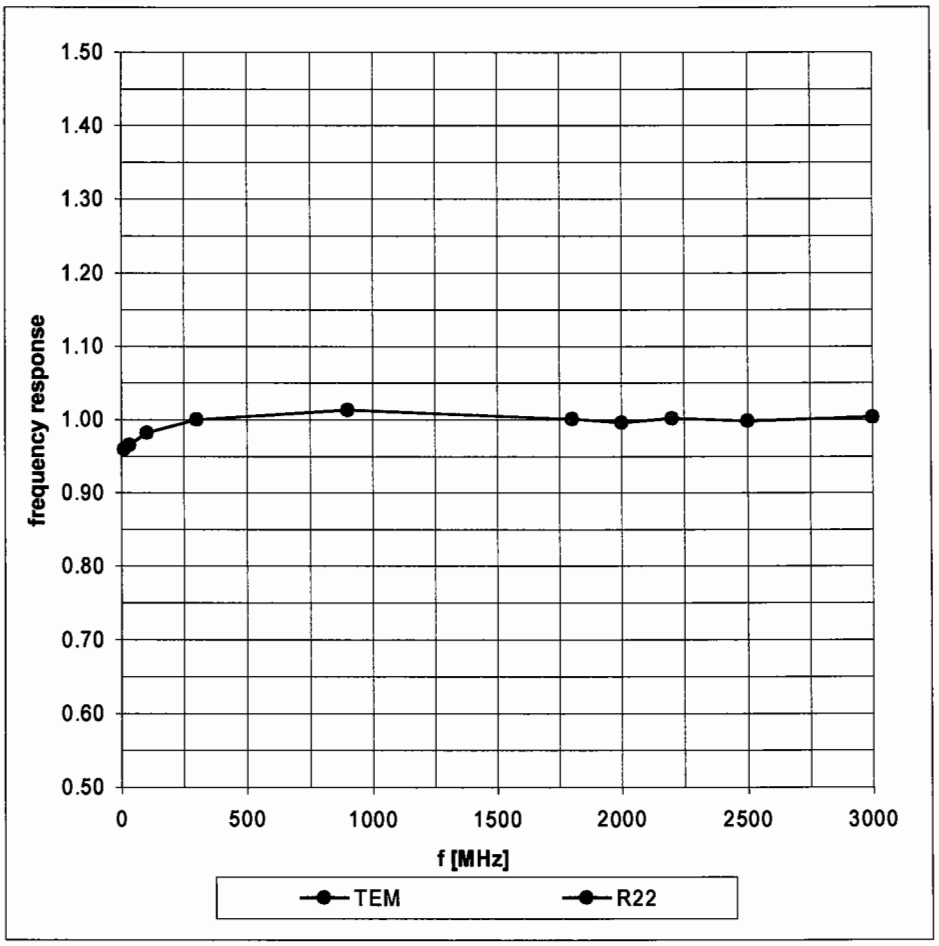
Probe Tip to Sensor Center	**2.7**	mm

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

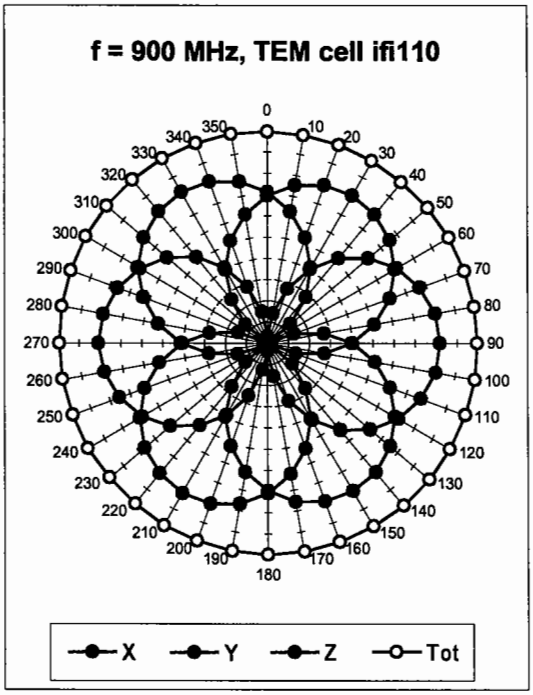
[A] numerical linearization parameter: uncertainty not required

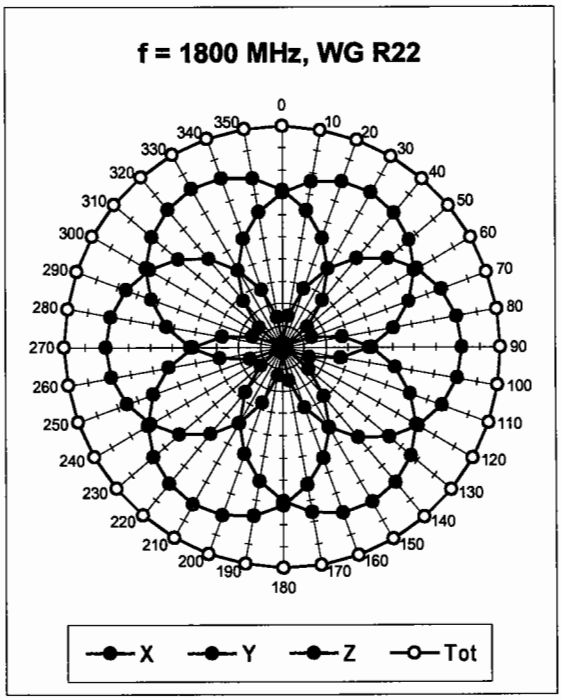
Frequency Response of E-Field

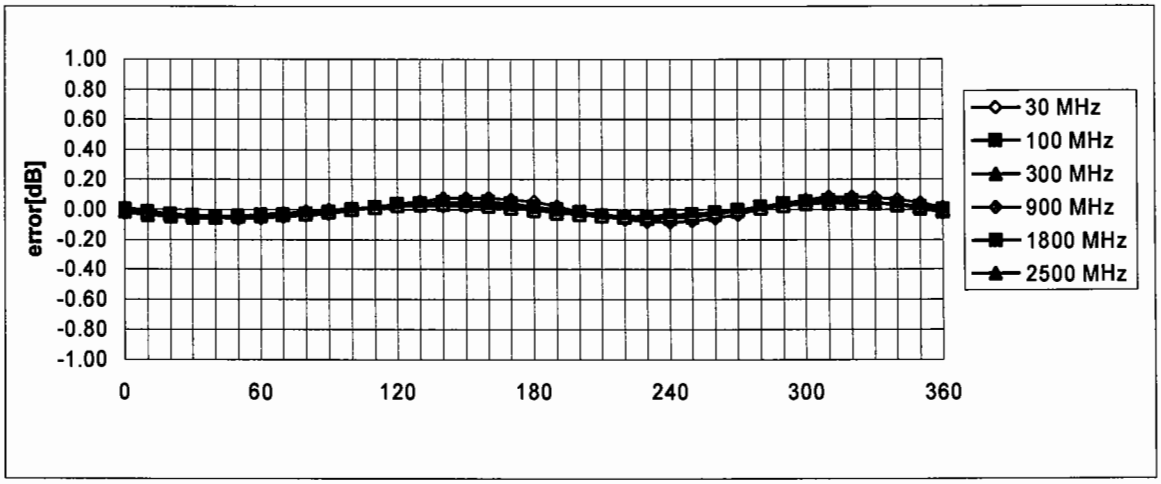
(TEM-Cell:ifi110, Waveguide R22)



Receiving Pattern (ϕ), θ = 0°



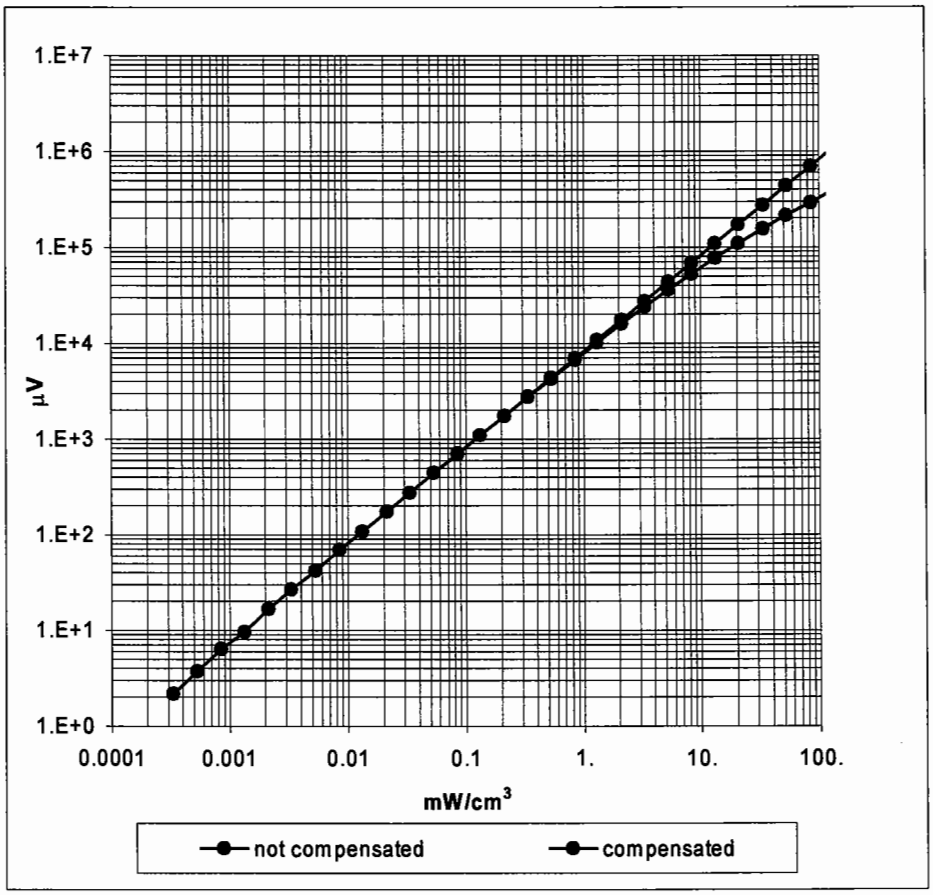


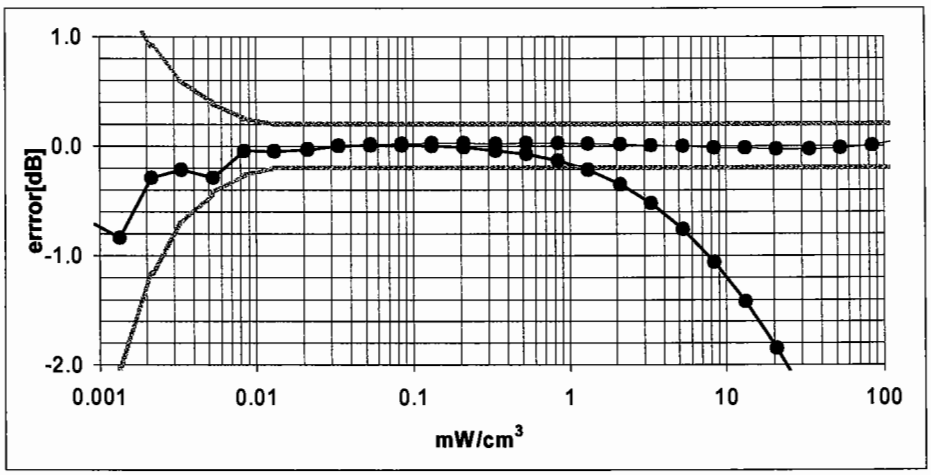


Axial Isotropy Error < ± 0.2 dB

Dynamic Range f(SAR_{head})

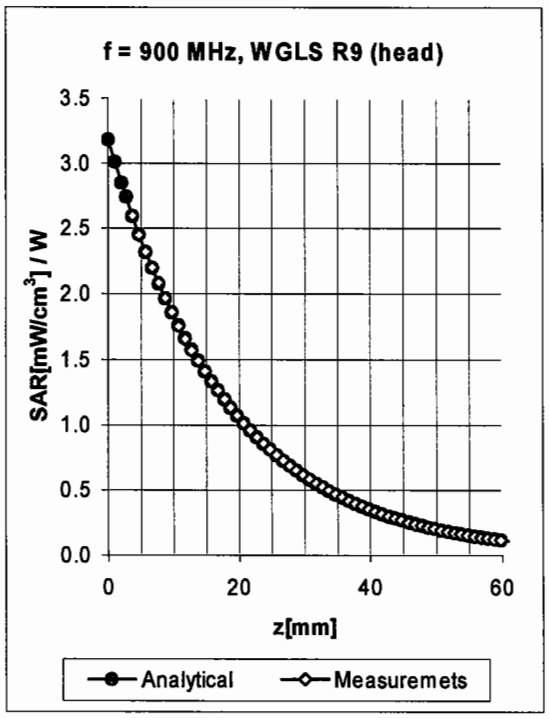
(Waveguide R22)

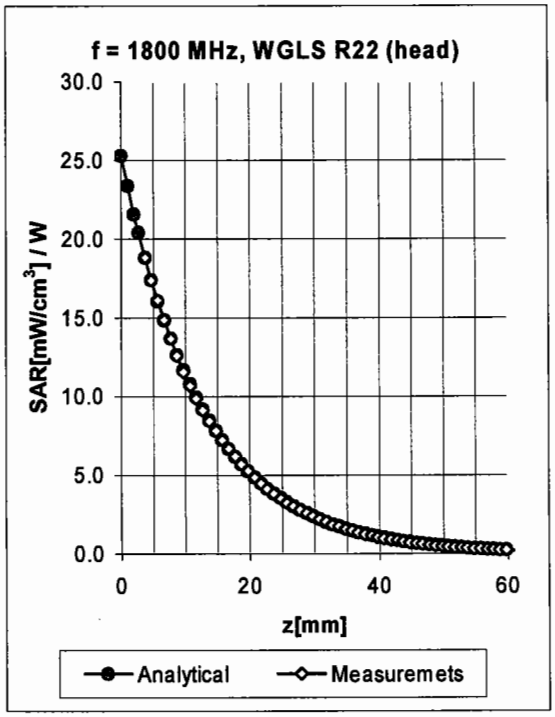




Probe Linearity Error < ± 0.2 dB

Conversion Factor Assessment



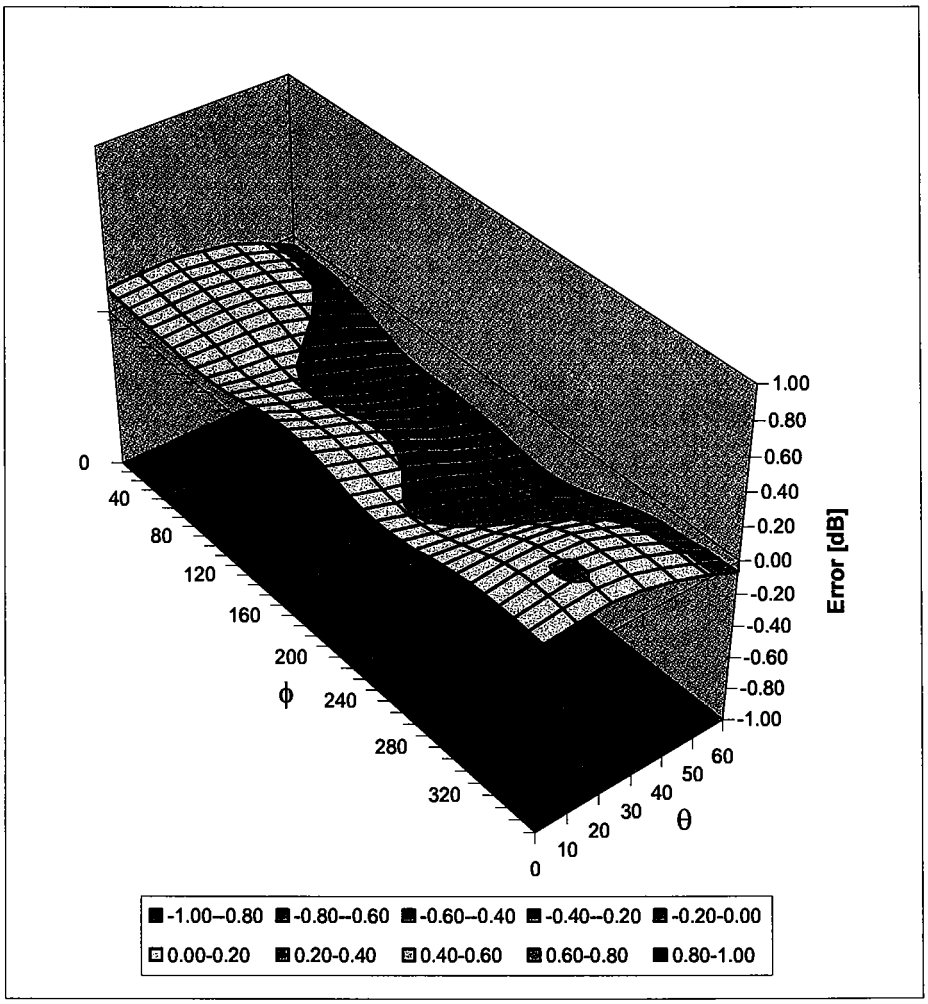


f [MHz]	Validity [MHz][B]	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	800-1000	Head	41.5 ± 5%	0.97 ± 5%	0.70	1.84	5.72 ± 9.5% (k=2)
1800	1710-1910	Head	40.0 ± 5%	1.40 ± 5%	0.54	2.54	4.77 ± 9.5% (k=2)
1950	1900-2000	Head	40.0 ± 5%	1.40 ± 5%	0.62	2.48	4.49 ± 9.5% (k=2)
900	800-1000	Body	55.0 ± 5%	1.05 ± 5%	0.65	1.93	5.53 ± 9.5% (k=2)
1800	1710-1910	Body	53.3 ± 5%	1.52 ± 5%	0.63	2.72	4.18 ± 9.5% (k=2)
1950	1900-2000	Body	53.3 ± 5%	1.52 ± 5%	0.77	2.35	4.15 ± 9.5% (k=2)

[B] The stated uncertainty of calibration in according to P1528.

Deviation from Isotropy in HSL

Error (θ, ϕ), f = 900 MHz



Spherical Isotropy Error < ± 0.4 dB

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

Client **Motorola PCS**

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1514
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	July 22, 2004
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

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

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E4419B	GB41293874	5-May-04 (METAS, No 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No 251-00388)	May-05
Reference 20 dB Attenuator	SN: 5086 (20b)	3-May-04 (METAS, No 251-00389)	May-05
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. S-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct03)	In house check: Oct 05
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug02)	In house check: Aug05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct03)	In house check: Oct 05

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

Date Issued: July 22, 2004

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

Probe ET3DV6

SN:1514

Manufactured:	November 24, 1999
Last calibrated:	July 31, 2003
Recalibrated:	July 22, 2004

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1514

Sensitivity in Free Space

Diode Compression[A]

NormX	1.71 μV/(V/m)^2	DCP X	93	mV
NormY	1.89 μV/(V/m)^2	DCP Y	93	mV
NormZ	1.81 μV/(V/m)^2	DCP Z	93	mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 7.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR_{be} [%]	Without Correction Algorithm	10.2	5.3
SAR_{bc} [%]	With Correction Algorithm	0.1	0.3

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

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR_{be} [%]	Without Correction Algorithm	14.0	9.1
SAR_{bc} [%]	With Correction Algorithm	0.1	0.0

Sensor Offset

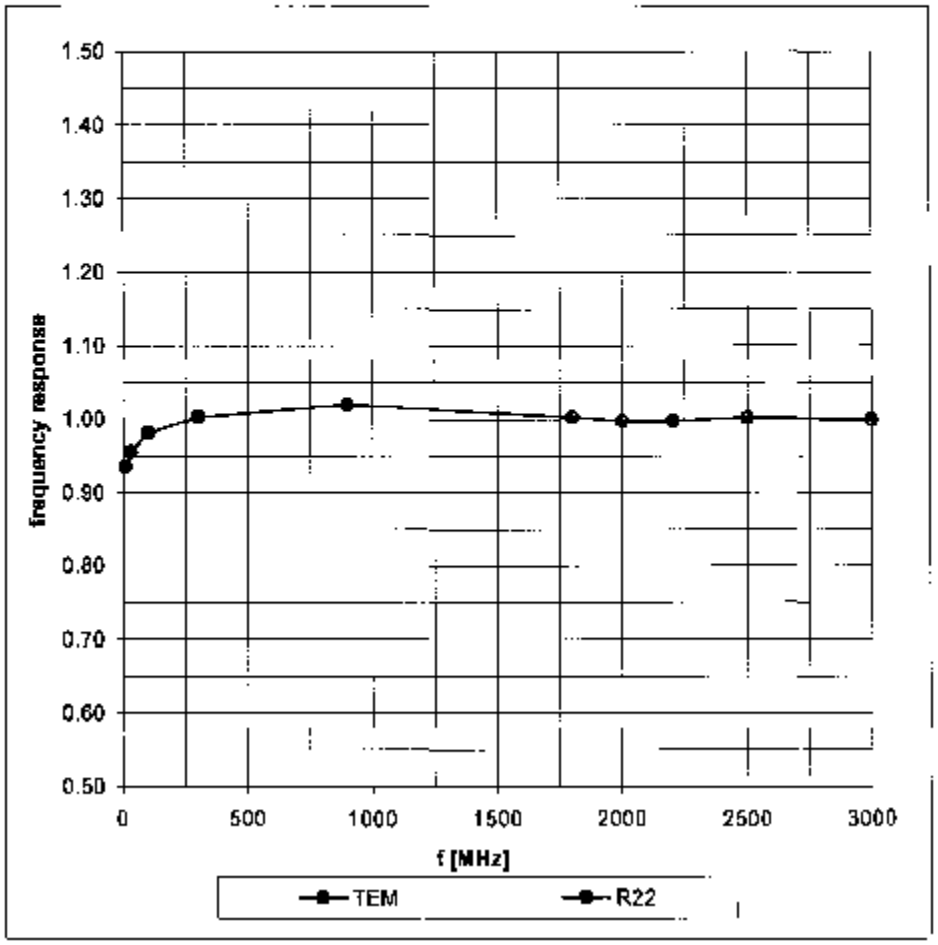
Probe Tip to Sensor Center	2.7	mm

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

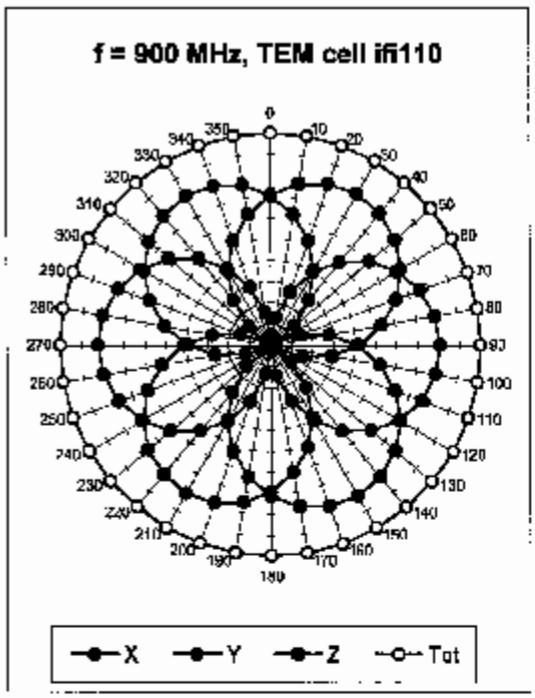
[A] numerical linearization parameter: uncertainty not required

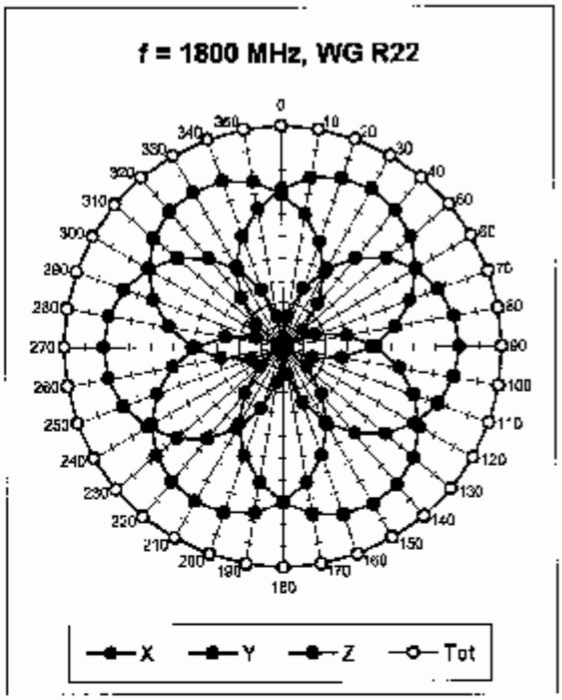
Frequency Response of E-Field

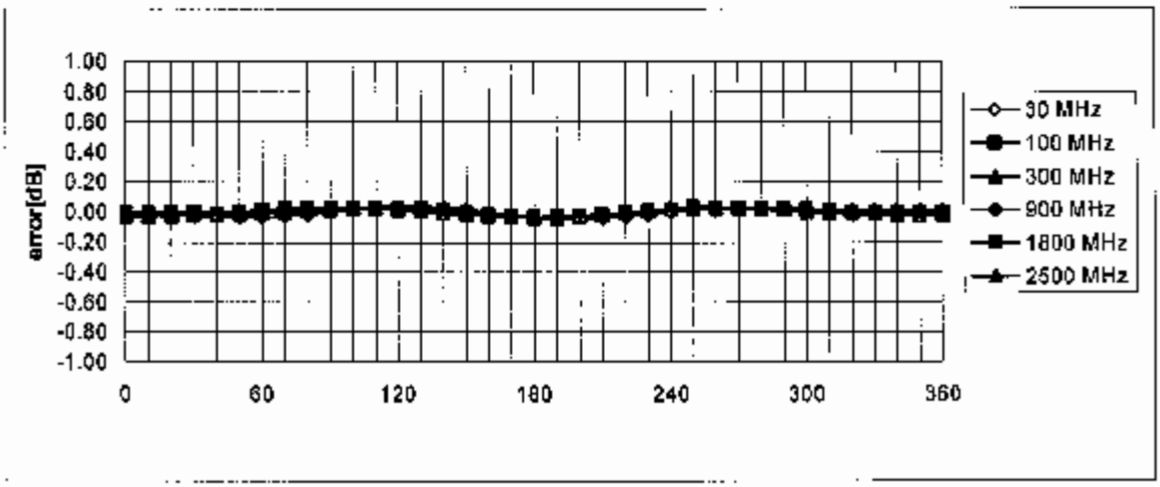
(TEM-Cell:ifi110, Waveguide R22)



Receiving Pattern (ϕ), θ = 0°



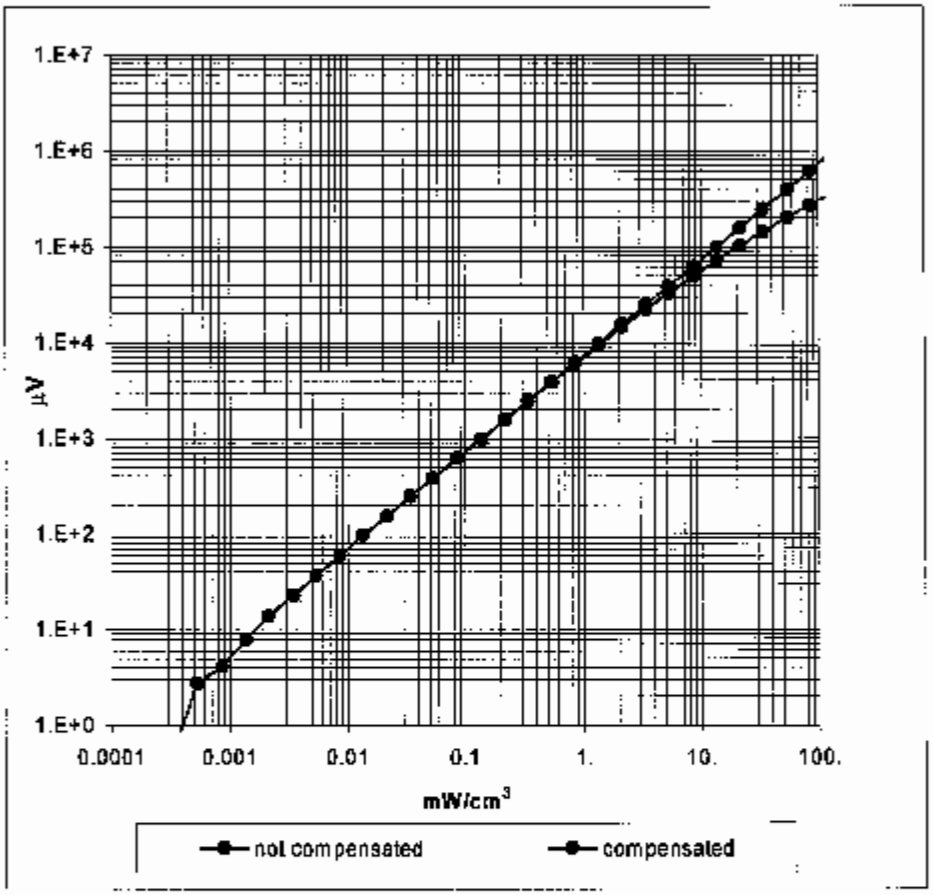


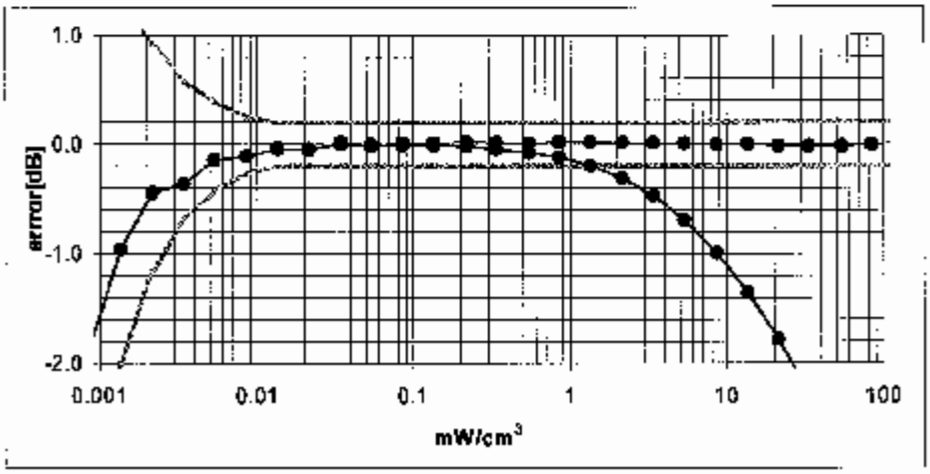


Axial Isotropy Error < ± 0.2 dB

Dynamic Range f(SAR_{head})

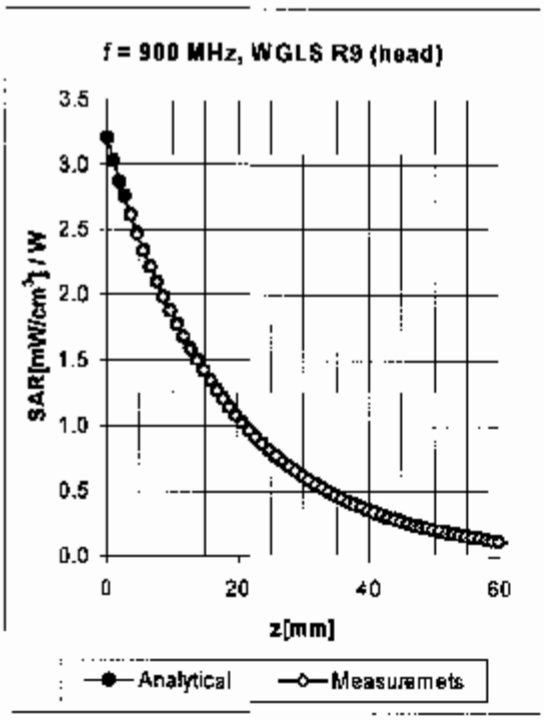
(Waveguide R22)

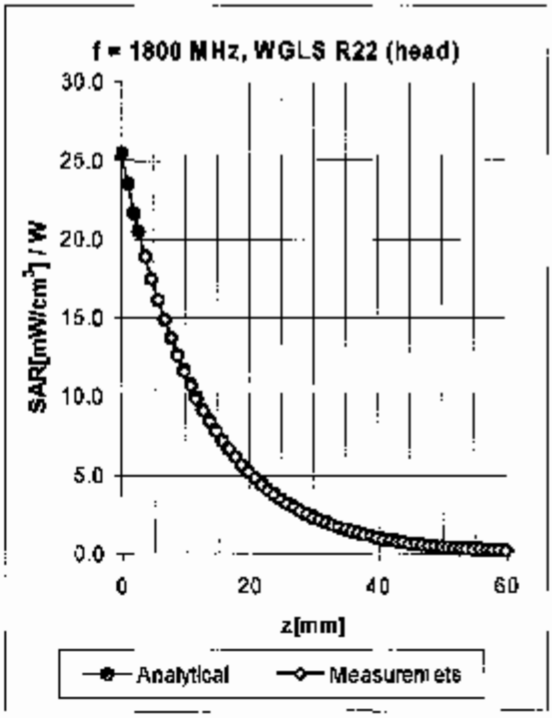




Probe Linearity Error < ± 0.2 dB

Conversion Factor Assessment



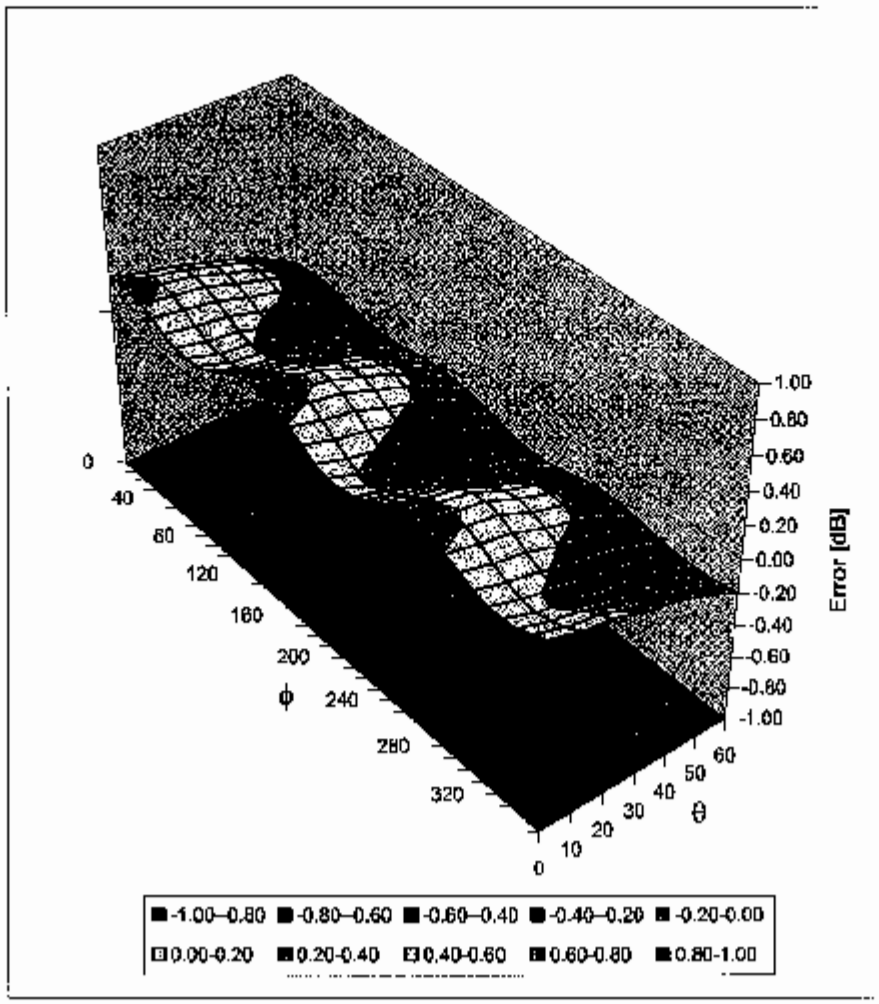


f [MHz]	Validity [MHz][B]	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	800-1000	Head	41.5 ± 5%	0.97 ± 5%	0.72	1.79	6.08 ± 9.5% (k=2)
1800	1710-1910	Head	40.0 ± 5%	1.40 ± 5%	0.53	2.53	5.03 ± 9.5% (k=2)
1950	1900-2000	Head	40.0 ± 5%	1.40 ± 5%	0.60	2.51	4.74 ± 9.5% (k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	1.11	1.81	4.46 ± 9.5% (k=2)
900	800-1000	Body	55.0 ± 5%	1.05 ± 5%	0.58	2.10	5.87 ± 9.5% (k=2)
1800	1710-1910	Body	53.3 ± 5%	1.52 ± 5%	0.61	2.67	4.46 ± 9.5% (k=2)
1950	1900-2000	Body	53.3 ± 5%	1.52 ± 5%	0.72	2.39	4.38 ± 9.5% (k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	1.81	1.30	4.24 ± 9.5% (k=2)

[B] The stated uncertainty of calibration in according to P1528.

Deviation from Isotropy in HSL

Error (θ, φ), f = 900 MHz



Spherical Isotropy Error < ± 0.4 dB

Appendix 5

Dipole Characterization Certificate

Certification of System Performance Check Targets

Based on APP-0396

-Historical Data-

	835MHz	900MHz	1800MHz	1900MHz	
IEEE1528 Target: Advanced Extrapolation	9.5	10.8	38.1	39.7	**(W/kg)**
Measurement Uncertainty (k=1):	9.0%	9.0%	9.0%	9.0%	
Measurement Period:	*1-July-03 to 1-Apr-04*	*1-July-03 to 1-Apr-04*	*1-July-03 to 1-Apr-04*	*1-July-03 to 1-Apr-04*	
# of tests performed:	214	1148	1135	62	
Grand Average: Worst Case Extrapolation	10.0	11.4	40.7	42.0	**(W/kg)**
% Delta (Average - IEEE1528 Target)	5.3%	5.6%	6.8%	5.8%	
Is % Delta <= Measurement Uncertainty?	**Yes**	**Yes**	**Yes**	**Yes**	
Accept/Reject Average as new system performance check target?	**ACCEPT**	**ACCEPT**	**ACCEPT**	**ACCEPT**	
	Applicable 835MHz Dipole Serial Numbers:	**Applicable 900MHz Dipole Serial Numbers:**	**Applicable 1800MHz Dipole Serial Numbers:**	**Applicable 1900Mhz Dipole Serial Numbers:**	
	420(TR), 421(TR)	77, 78	246(TR), 250(TR)	514(TR), 518(TR)	
	422(TR), 423(TR)	79, 80	251(TR), 258(TR)	519(TR), 520(TR)	
	424(TR), 425(TR)	91, 92	259(TR), 262(TR)	523(TR), 524(TR)	
	431(TR), 432(TR)	93, 94	263(TR), 271(TR)	526(TR), 527(TR)	
	433(TR), 434(TR)	95, 96	272(TR), 273(TR)	528(TR), 529(TR)	
	436(TR)	97, 55	276(TR), 277(TR)	530(TR), 533(TR)	
			279(TR), 280(TR)		
			281(TR), 282(TR)		
			283(TR), 284(TR)		

-New System Performance Check Targets- per APP-0396

(based on analysis of historical data)

Frequency	SAR Target (W/kg)	Permittivity	Conductivity (S/m)
835MHz	**10.0**	41.5 ± 5%	0.90 ± 5%
900MHz	**11.4**	41.5 ± 5%	0.97 ± 5%
1800MHz	**40.7**	40.0 ± 5%	1.40 ± 5%
1900MHz	**42.0**	40.0 ± 5%	1.40 ± 5%

-Approvals-

Submitted by: Marge Kaunas Date: 2-Apr-04

Signed: Marge Kaunas

Comments: Spreadsheet detailing all historical measurements available upon request.

Approved by: Mark Douglas **Date:** 2-Apr-04

Signed: Mark Douglas

Comments: Targets and associated simulant properties are derived from the IEEE 1528 standard.

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

Client Motorola MRO

CALIBRATION CERTIFICATE

Object(s) D2450V2 - SN:740

Calibration procedure(s) QA CAL-05.v2
Calibration procedure for dipole validation kits

Calibration date: January 16, 2004

Condition of the calibrated item In Tolerance (according to the specific calibration document)

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

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

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E442	GB37480704	6-Nov-03 (METAS, No. 252-0254)	Nov-04
Power sensor HP 8481A	US37292783	6-Nov-03 (METAS, No. 252-0254)	Nov-04
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check: Mar-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-03)	In house check: Oct 05

	Name	Function	Signature
Calibrated by:	Judith Mueller	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: January 19, 2004

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

Schmid & Partner Engineering AG
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Zeughausstrasse 43, 8004 Zurich, Switzerland
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info@speag.com, http://www.speag.com

DASY

Dipole Validation Kit

Type: D2450V2

Serial: 740

Manufactured: September 18, 2003
Calibrated: January 16, 2004

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 2450 MHz:

Relative Dielectricity	**38.4**	± 5%
Conductivity	**1.86 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe ES3DV2 (SN:3013, Conversion factor 4.8 at 2450 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 250mW ± 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 ES3DV2 SN:3013 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue:	**57.6 mW/g** ± 16.8 % (k=2)[1]
averaged over 10 cm^3 (10 g) of tissue:	**26.0 mW/g** ± 16.2 % (k=2)[1]

[1] validation uncertainty

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:	**1.161 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 spacer was in place during impedance measurements.

Feedpoint impedance at 2450 MHz:	Re{Z} = **52.5 Ω**
	Im {Z} = **4.8 Ω**
Return Loss at 2450 MHz	**-26.6 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.

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN740

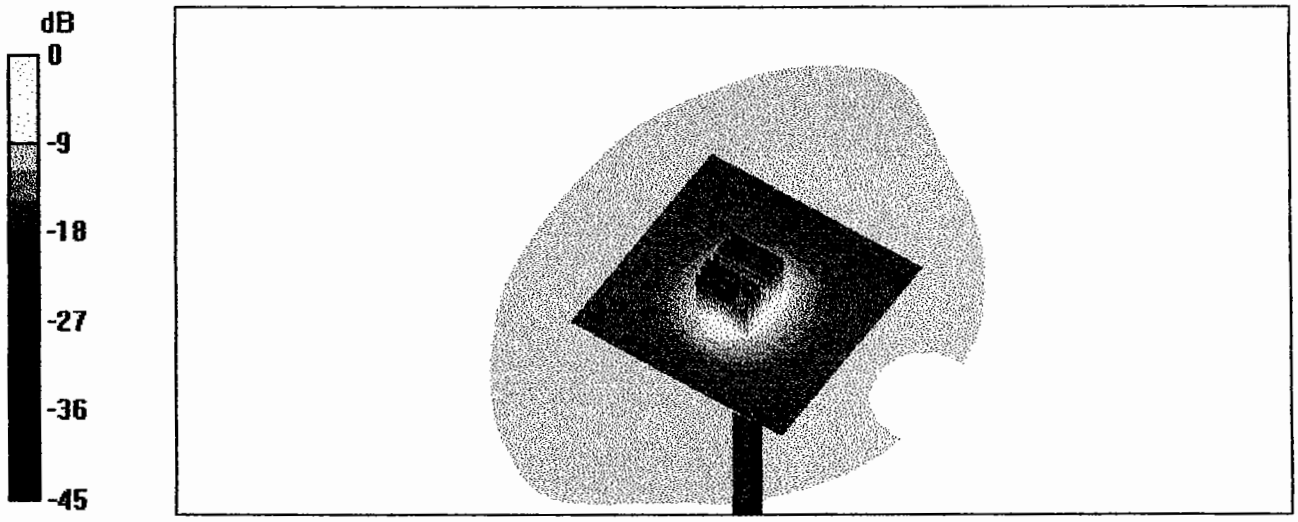
Communication System: CW-2450; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: HSL 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3013; ConvF(4.8, 4.8, 4.8); Calibrated: 1/19/2003
- 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, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 93.1 V/m
Power Drift = -0.005 dB
Maximum value of SAR = 16.6 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 32.2 W/kg
SAR(1 g) = 14.4 mW/g; SAR(10 g) = 6.5 mW/g
Reference Value = 93.1 V/m
Power Drift = -0.005 dB
Maximum value of SAR = 16 mW/g



0 dB = 16mW/g

16 Jan 2004 12:16:53

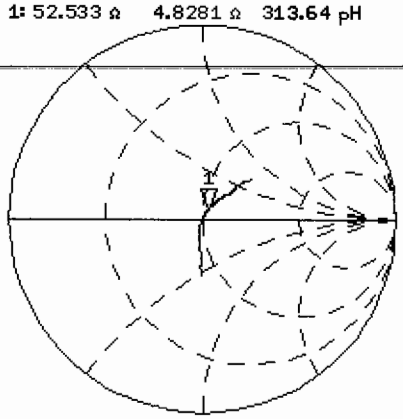
CH1 S11 1 U FS 1: 52.533 Ω 4.8281 Ω 313.64 pH 2 450.000 000 MHz

Del

Cor

Avg
16

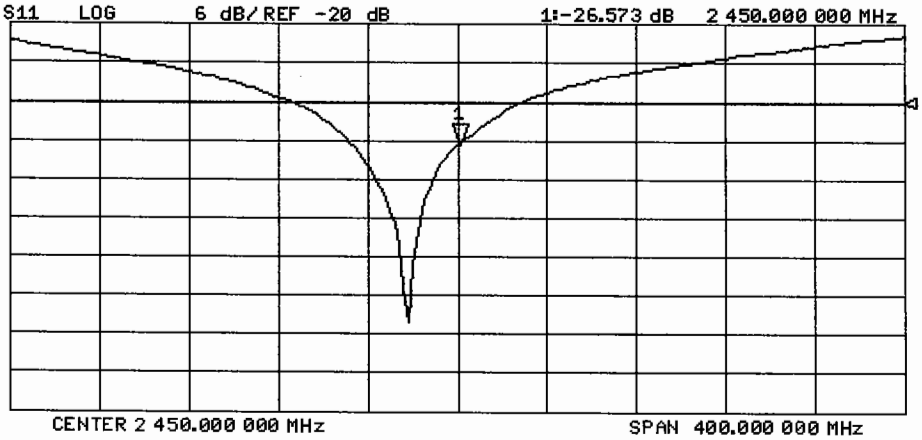
↑



CH2 S11 LOG 6 dB/ REF -20 dB 1:-26.573 dB 2 450.000 000 MHz

Cor

↑



CENTER 2 450.000 000 MHz SPAN 400.000 000 MHz

Appendix 6

Measurement Uncertainty Budget

Uncertainty Budget for Device Under Test

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	**Sec.**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	9.5	N	2.00	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Spherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	5.8	R	1.73	1	1	3.3	3.3	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1.0	N	1.00	1	1	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	1.3	R	1.73	1	1	0.8	0.8	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.3	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	1.1	R	1.73	1	1	0.6	0.6	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	3.9	R	1.73	1	1	2.3	2.3	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.6	N	1.00	1	1	3.6	3.6	29
Device Holder Uncertainty	E.4.1	2.8	N	1.00	1	1	2.8	2.8	8
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	10.0	R	1.73	0.64	0.43	3.7	2.5	∞
Liquid Permittivity - deviation from target values	E.3.2	10.0	R	1.73	0.6	0.49	3.5	2.8	∞
Liquid Permittivity - measurement uncertainty	E.3.3	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Combined Standard Uncertainty			RSS				11.72	11.09	1363
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k* =2				22.98	21.75	

Uncertainty Budget for System Performance Check (dipole & flat phantom)

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	Sec.	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	v_i
Measurement System									
Probe Calibration	E.2.1	9.5	N	2.00	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	1	1	2.7	2.7	∞
Spherical Isotropy	E.2.2	9.6	R	1.73	0	0	0.0	0.0	∞
Boundary Effect	E.2.3	5.8	R	1.73	1	1	3.3	3.3	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1.0	N	1.00	1	1	1.0	1.0	∞
Response Time	E.2.7	0.0	R	1.73	1	1	0.0	0.0	∞
Integration Time	E.2.8	0.0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.3	R	1.73	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	1.1	R	1.73	1	1	0.6	0.6	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E.5	3.9	R	1.73	1	1	2.3	2.3	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.4.2	1.0	R	1.73	1	1	0.6	0.6	∞
Input Power and SAR Drift Measurement	8, 6.6.2	4.7	R	1.73	1	1	2.7	2.7	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	10.0	R	1.73	0.64	0.43	3.7	2.5	∞
Liquid Permittivity - deviation from target values	E.3.2	10.0	R	1.73	0.6	0.49	3.5	2.8	∞
Liquid Permittivity - measurement uncertainty	E.3.3	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Combined Standard Uncertainty			RSS				10.16	9.43	99999
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				19.92	18.48	

Appendix 7

Photographs of the device under test

Figure 10. Front of Phone

Figure 11. Back of Phone

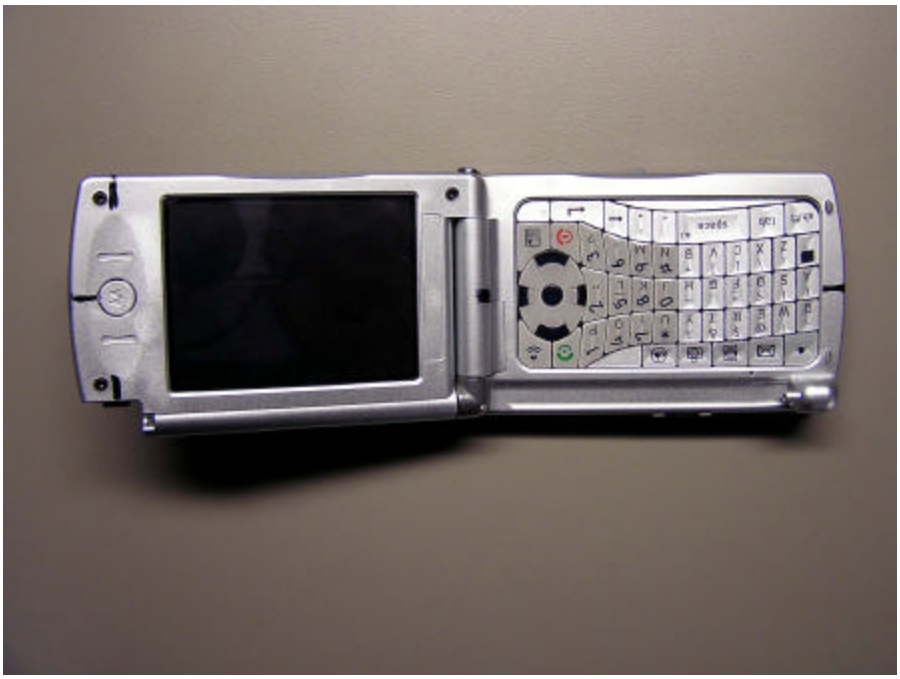


Figure 12. Phone Open; voice flip

Figure 13. Phone Open; data flip

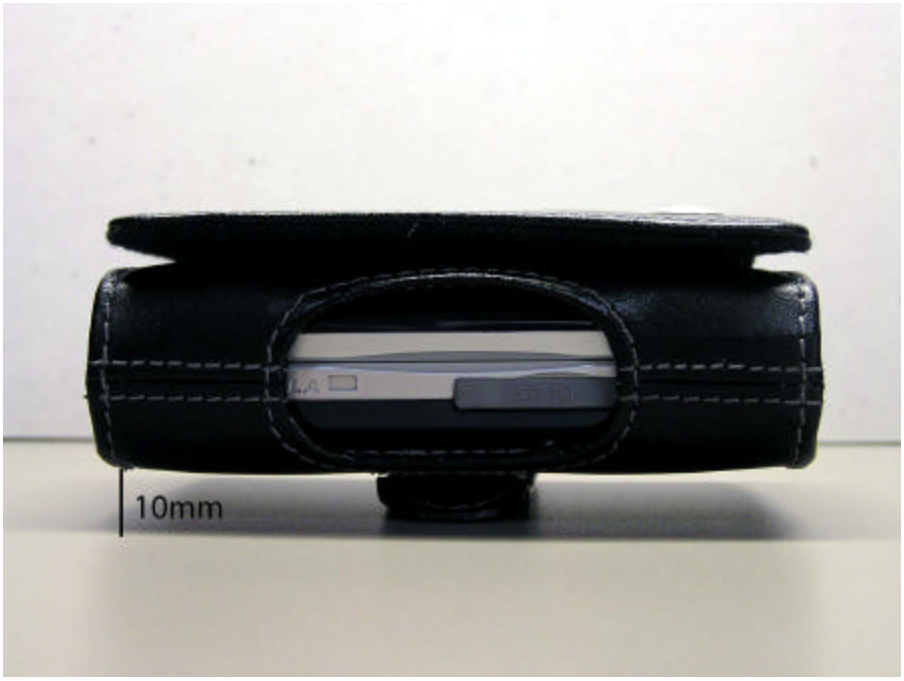


Figure 14. Phone in case; side view

Figure 15. Phone in case; back view

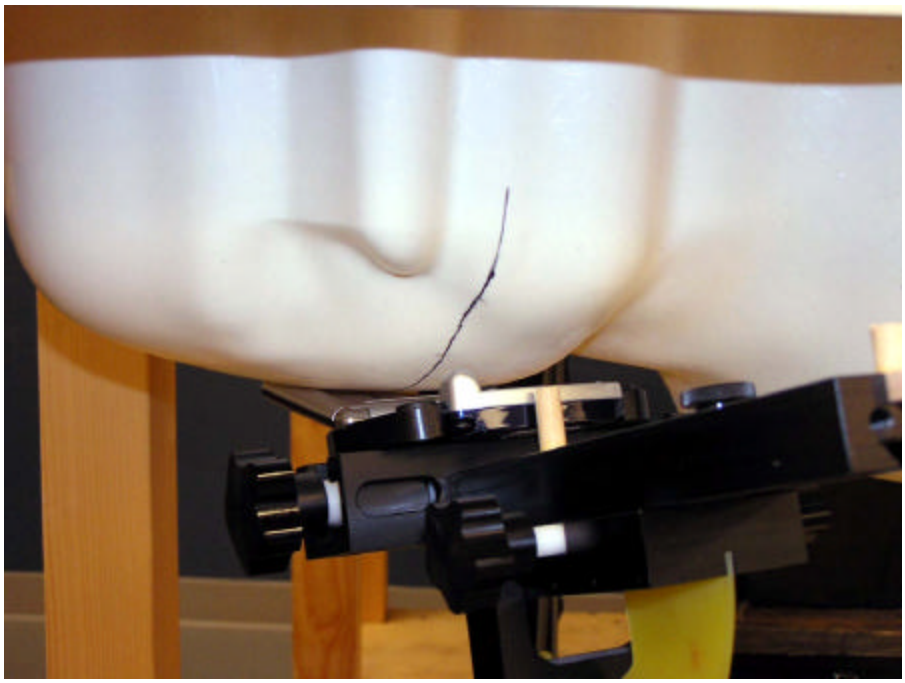


Figure 16. Front View; Cheek/Touch Position

Figure 17. Rear View; Cheek/Touch Position

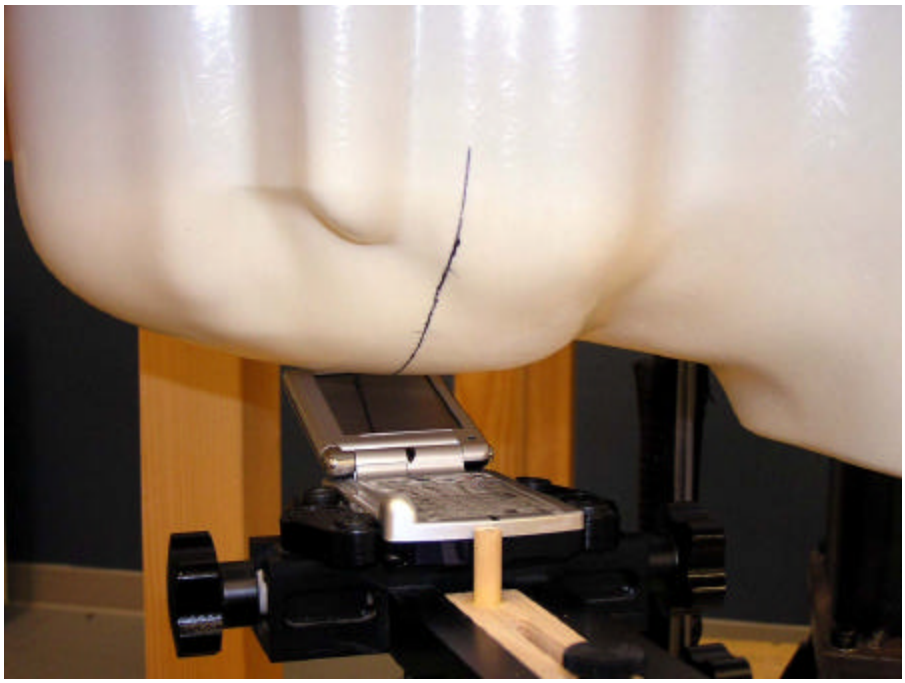


Figure 18. Front View; Tilt Position

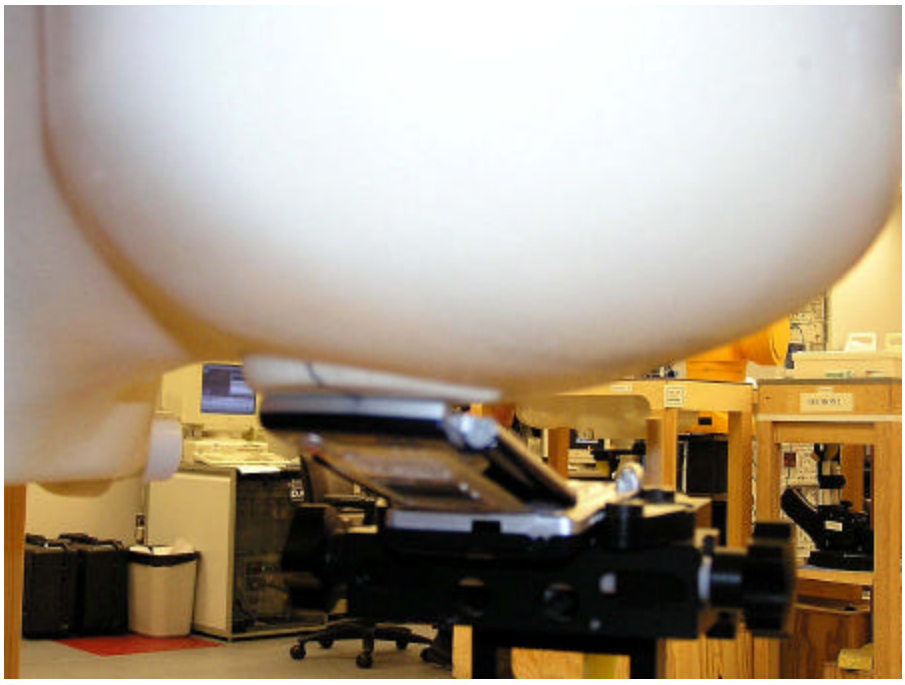


Figure 19. Rear View; Tilt Position

Figure 20. Body Worn Testing