PCTEST ENGINEERING LABORATORY, INC.

DUT: F3133A; Type: GSM Dual Band w/ WLAN & BT; SN: 629SGJ3203; Conducted Power: 16.2dBm

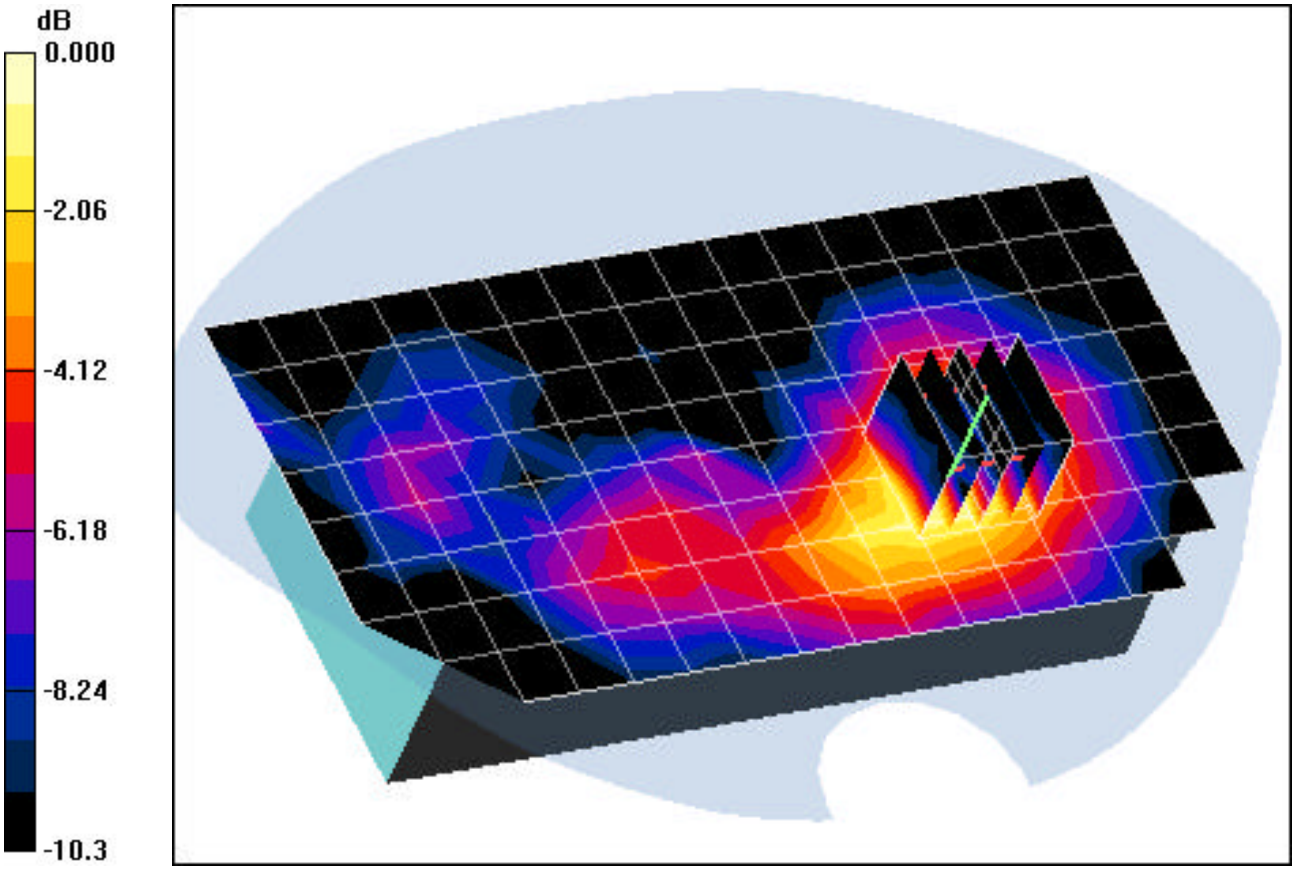
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Muscle (σ = 1.93 mho/m, ε_r = 54.59, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 1.8 cm; Tested with Belt-clip

Test Date: 06-15-2006; Ambient Temp: 23.6°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN3561; ConvF(6.3, 6.3, 6.3); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Mode: IEEE 802.11b, Body w/ Beltclip, Mid.ch,FNN7826A Battery, 11Mbps, Antenna Internal, Front

Area Scan (9x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.91 V/m; Power Drift = 0.154 dB
Peak SAR (extrapolated) = 0.083 W/kg
SAR(1 g) = 0.046 mW/g; SAR(10 g) = 0.026 mW/g



0 dB = 0.056mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: F3133A; Type: GSM Dual Band w/ WLAN & BT; SN: 629SGJ3203; Conducted Power: 16.2dBm

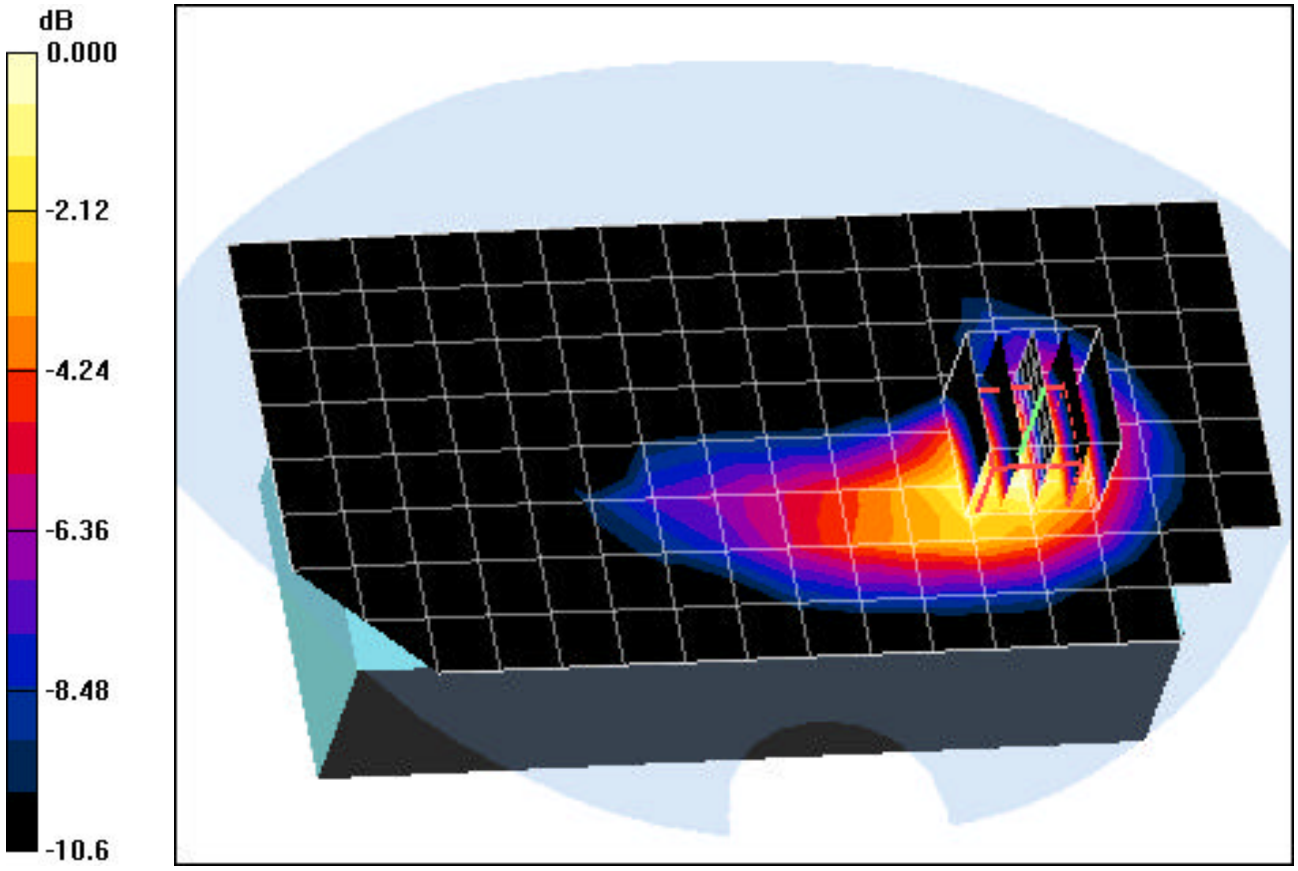
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Brain (σ = 1.79 mho/m, ε_r = 39.84, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 2.5 cm

Test Date: 06-15-2006; Ambient Temp: 23.6°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN3561; ConvF(6.3, 6.3, 6.3); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Mode: IEEE 802.11b, Face, 2.5cm space, Mid.ch, FNN7815A Battery, 11Mbps, Antenna Internal1

Area Scan (9x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.54 V/m; Power Drift = 0.066 dB
Peak SAR (extrapolated) = 0.183 W/kg
SAR(1 g) = 0.096 mW/g; SAR(10 g) = 0.053 mW/g



0 dB = 0.118mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: F3133A; Type: GSM Dual Band w/ WLAN & BT; SN: 629SGJ3203; Conducted Power: 2.8dBm

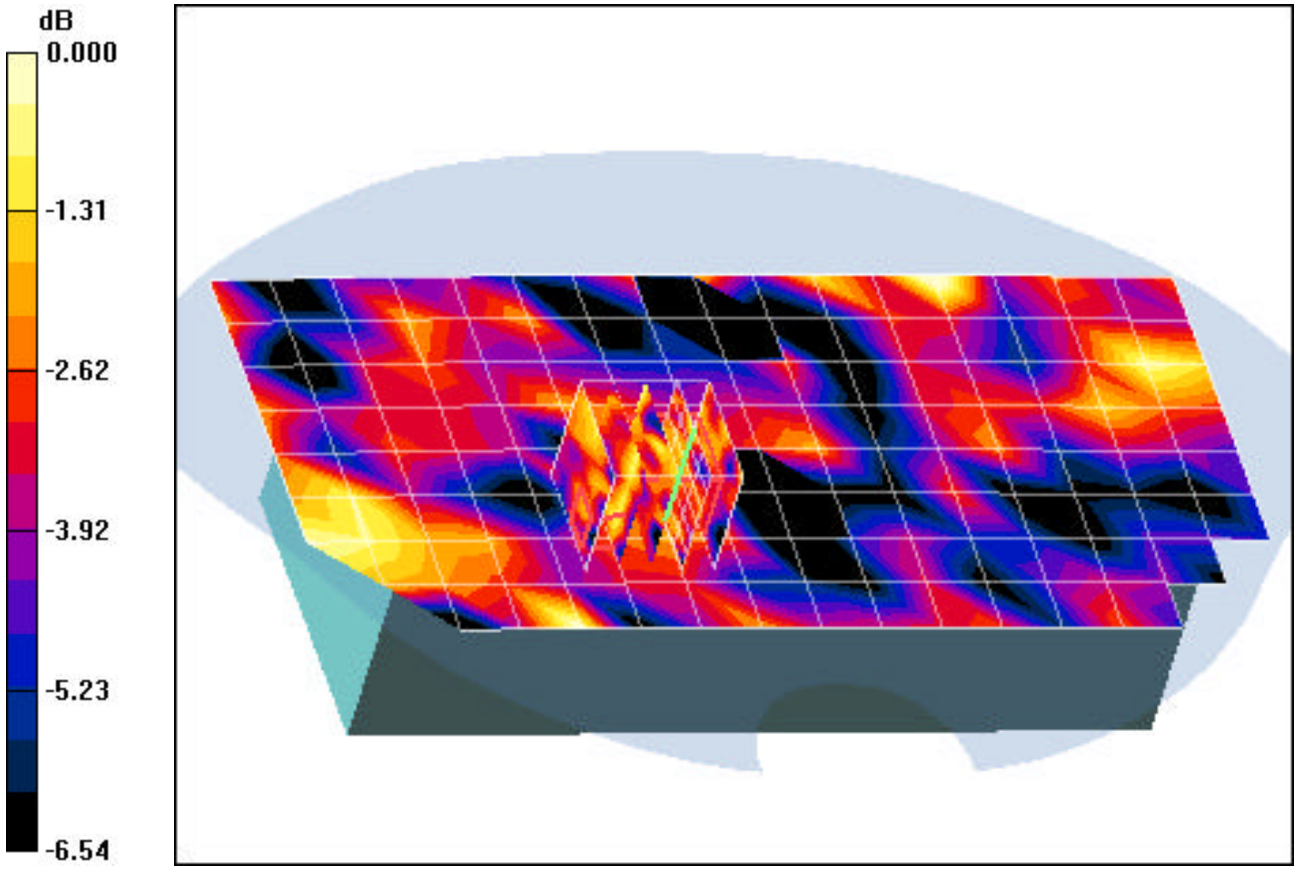
Communication System: Bluetooth; Frequency: 2441 MHz;Duty Cycle: 1:1
Medium: 2450 Muscle (σ = 1.93 mho/m, ε_r = 54.59, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 1.8 cm; Tested with Belt-clip

Test Date: 06-15-2006; Ambient Temp: 23.6°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN3561; ConvF(6.3, 6.3, 6.3); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Mode: Bluetooth, Body w/ Beltclip, Mid.ch, FNN7815A Battery,Front, Antenna Internal

Area Scan (9x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.18 V/m; Power Drift = -0.172 dB
Peak SAR (extrapolated) = 0.006 W/kg
SAR(1 g) = 0.00423 mW/g; SAR(10 g) = 0.00273 mW/g



0 dB = 0.005mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: F3133A; Type: GSM Dual Band w/ WLAN & BT; SN: 629SGJ3203; Conducted Power: 2.8dBm

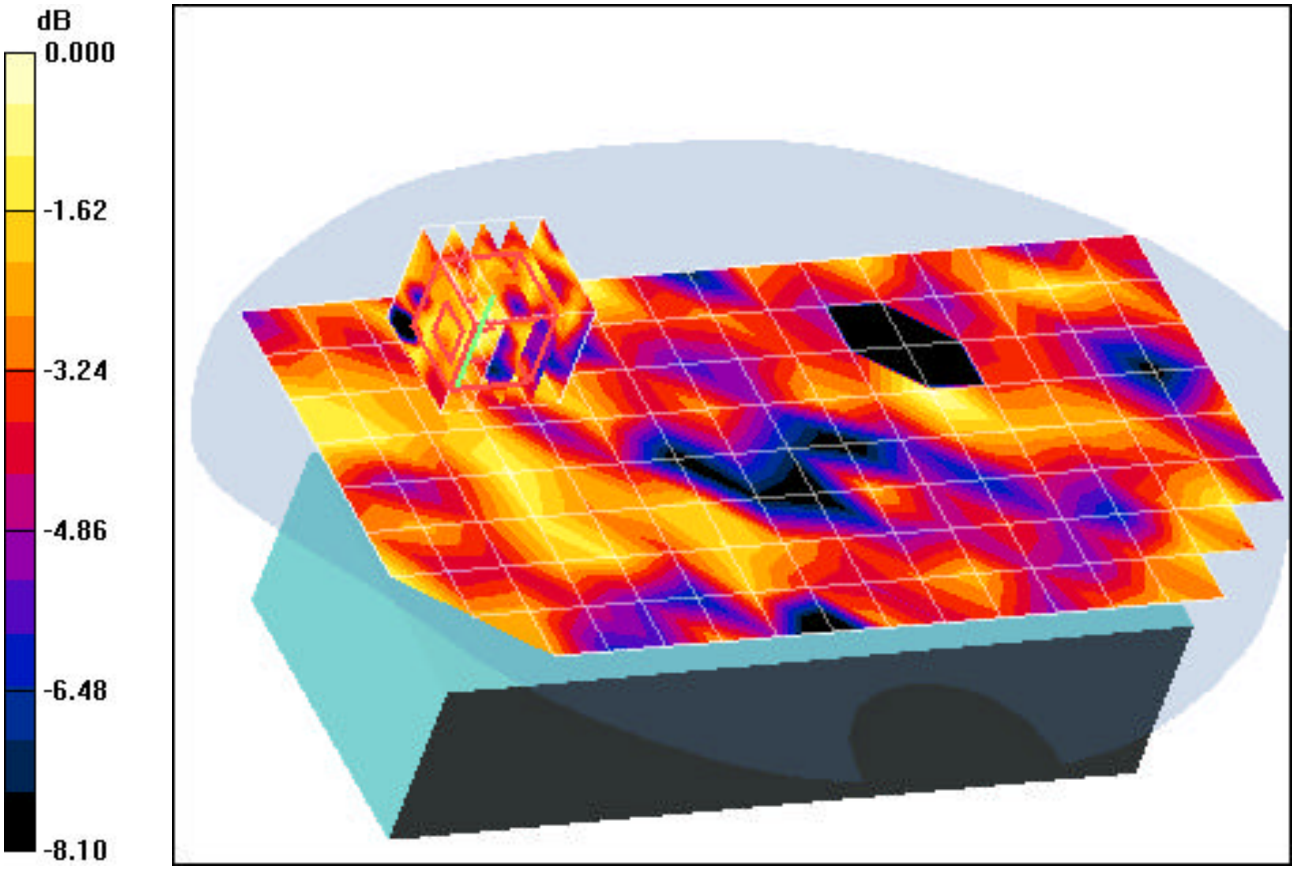
Communication System: Bluetooth; Frequency: 2441 MHz;Duty Cycle: 1:1
Medium: 2450 Brain (σ = 1.79 mho/m, ε_r = 39.84, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 2.5 cm

Test Date: 06-15-2006; Ambient Temp: 23.6°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN3561; ConvF(6.3, 6.3, 6.3); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Mode: Bluetooth, Face, 2.5cm space, Mid.ch, FNN7826A Battery, Antenna Internal

Area Scan (9x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.816 V/m; Power Drift = 0.135 dB
Peak SAR (extrapolated) = 0.009 W/kg
SAR(1 g) = 0.00367 mW/g; SAR(10 g) = 0.00272 mW/g



0 dB = 0.005mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: F3133A; Type: GSM Dual Band w/ WLAN & BT; SN: 629SGJ3203; Conducted Power: 32.2dBm

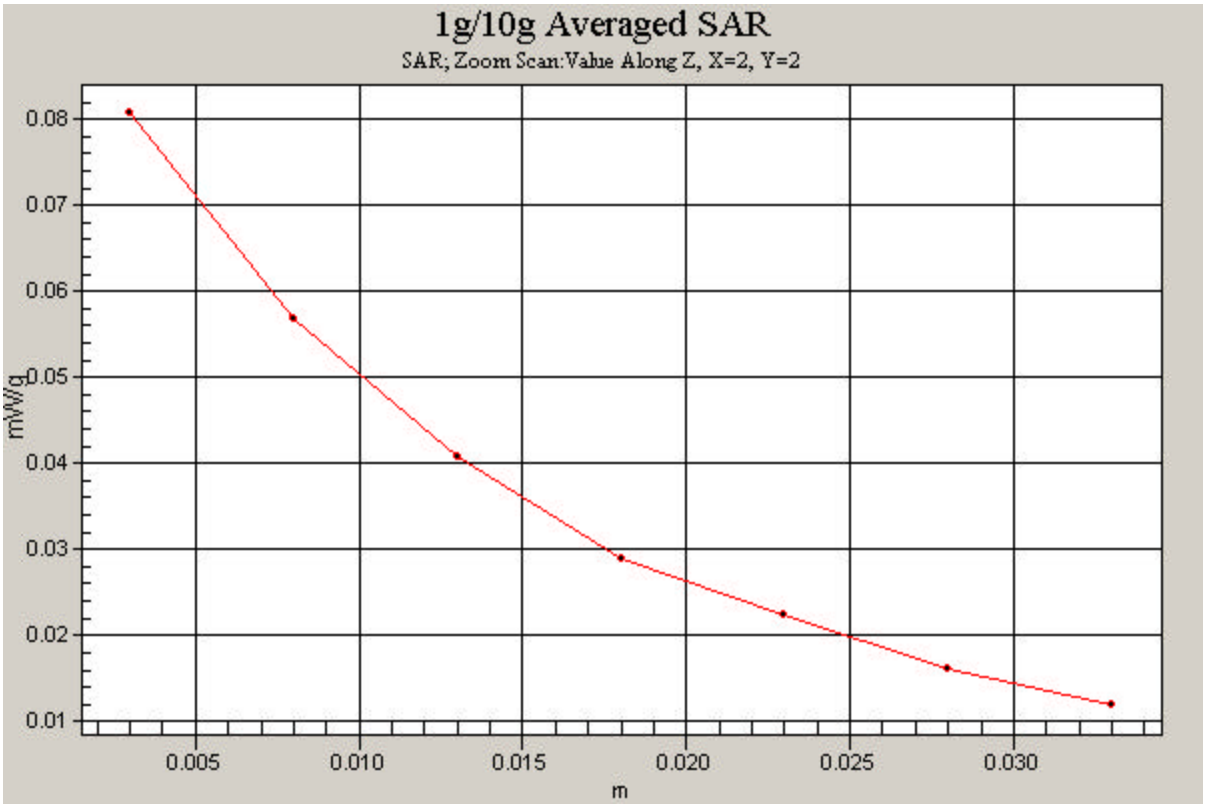
Communication System: GSM850 Motorola; Frequency: 836.6 MHz;Duty Cycle: 1:8
Medium: 835 Brain (σ = 0.88 mho/m, ε_r = 41.67, ρ = 1000 kg/m^3)
Phantom section: Right Section

Test Date: 06-13-2006; Ambient Temp: 23.2°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3561; ConvF(7.91, 7.91, 7.91); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Mode: GSM850, Touch, Mid ch, FNN7815A Battery, Antenna Internal

Area Scan (9x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.21 V/m; Power Drift = 0.220 dB
Peak SAR (extrapolated) = 0.101 W/kg
SAR(1 g) = 0.071 mW/g; SAR(10 g) = 0.049 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: F3133A; Type: GSM Dual Band w/ WLAN & BT; SN: 629SGJ3203; Conducted Power: 29.2dBm

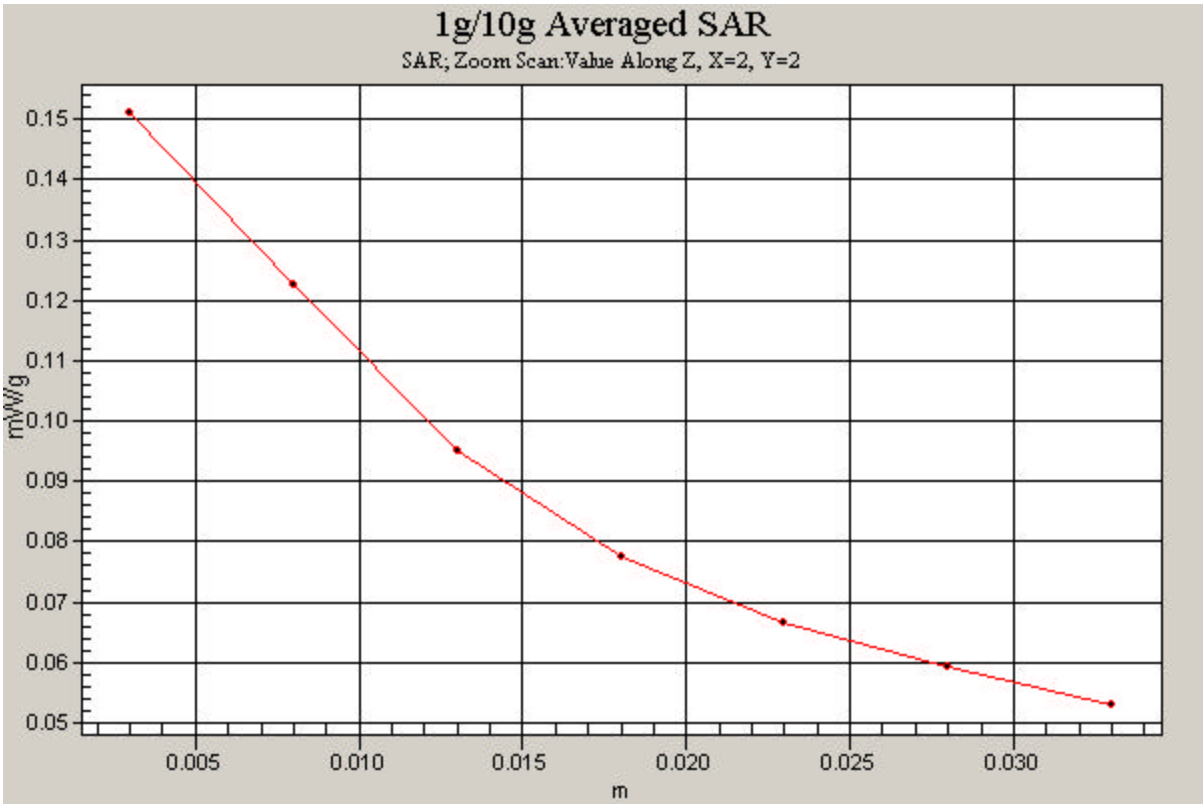
Communication System: GSM1900 Motorola; Frequency: 1880 MHz;Duty Cycle: 1:8
Medium: 1900 Brain (σ = 1.37 mho/m, ε_r = 41.43, ρ = 1000 kg/m^3)
Phantom section: Right Section

Test Date: 06-14-2006; Ambient Temp: 23.5°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN3561; ConvF(7.04, 7.04, 7.04); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Mode: GSM1900, Touch, Mid ch, FNN7826A Battery, Antenna Internal

Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.18 V/m; Power Drift = 0.126 dB
Peak SAR (extrapolated) = 0.166 W/kg
SAR(1 g) = 0.136 mW/g; SAR(10 g) = 0.103 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: F3133A; Type: GSM Dual Band w/ WLAN & BT; SN: 629SGJ3203; Conducted Power: 32.2dBm

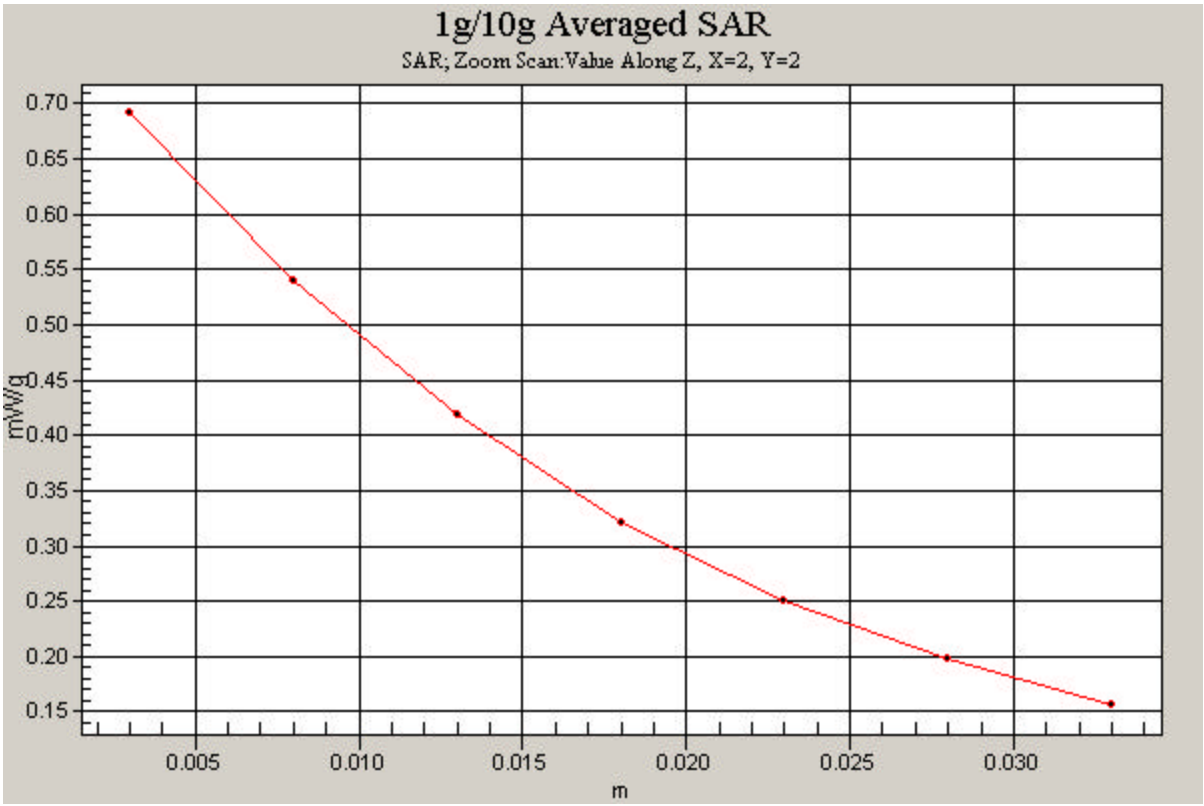
Communication System: GSM850 Motorola; Frequency: 836.6 MHz;Duty Cycle: 1:8
Medium: 835 Muscle (σ = 0.98 mho/m, ε_r = 53.98, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 1.8 cm; Tested with Belt-clip

Test Date: 06-15-2006; Ambient Temp: 23.6°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN3561; ConvF(7.9, 7.9, 7.9); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP:1357
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Mode: GSM850, Body w/ Beltclip, Mid.ch, FNN7815A Battery, Back, Antenna Interna

Area Scan (9x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.5 V/m; Power Drift = 0.138 dB
Peak SAR (extrapolated) = 0.830 W/kg
SAR(1 g) = 0.622 mW/g; SAR(10 g) = 0.439 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: F3133A; Type: GSM Dual Band w/ WLAN & BT; SN: 629SGJ3203; Conducted Power: 29.2dBm

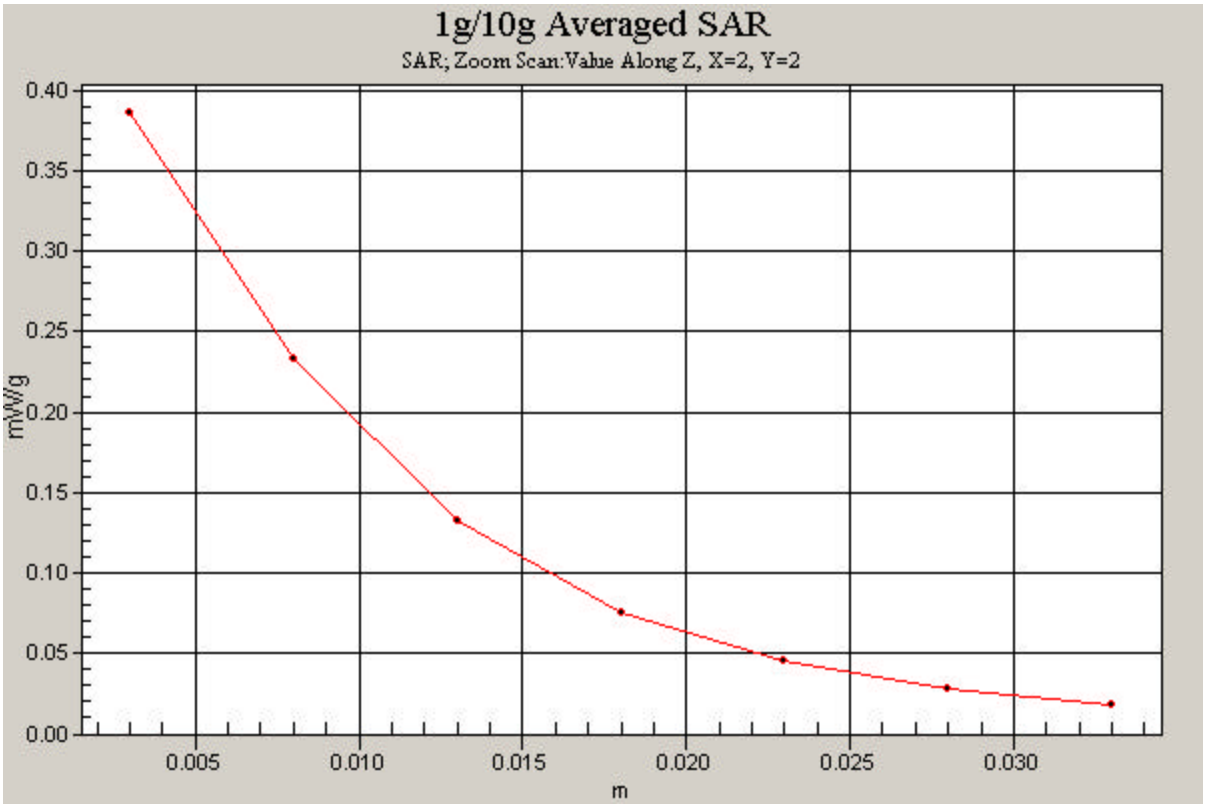
Communication System: GSM1900 Motorola; Frequency: 1880 MHz;Duty Cycle: 1:8
Medium: 1900 Muscle (σ = 1.58 mho/m, ε_r = 52.61, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 1.8 cm; Tested with Belt-clip

Test Date: 06-15-2006; Ambient Temp: 23.6°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN3561; ConvF(6.48, 6.48, 6.48); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP:1357
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Mode: GSM1900, Body w/ Beltclip, Mid.ch, FNN7826A Battery, Back, Antenna Internal

Area Scan (9x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.0 V/m; Power Drift = -0.128 dB
Peak SAR (extrapolated) = 0.551 W/kg
SAR(1 g) = 0.317 mW/g; SAR(10 g) = 0.177 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: F3133A; Type: GSM Dual Band w/ WLAN & BT; SN: 629SGJ3203; Conducted Power: 16.2dBm

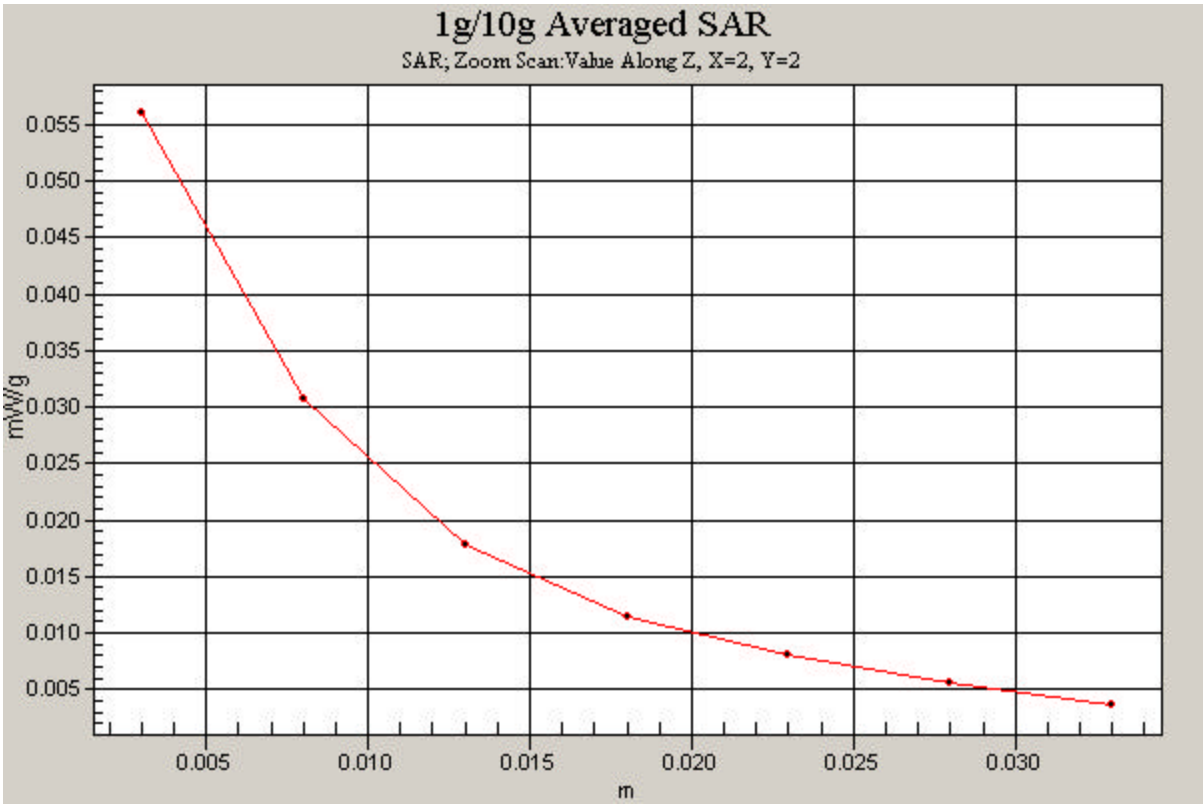
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Muscle (σ = 1.93 mho/m, ε_r = 54.59, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 1.8 cm; Tested with Belt-clip

Test Date: 06-15-2006; Ambient Temp: 23.6°C; Tissue Temp: 21.9°C

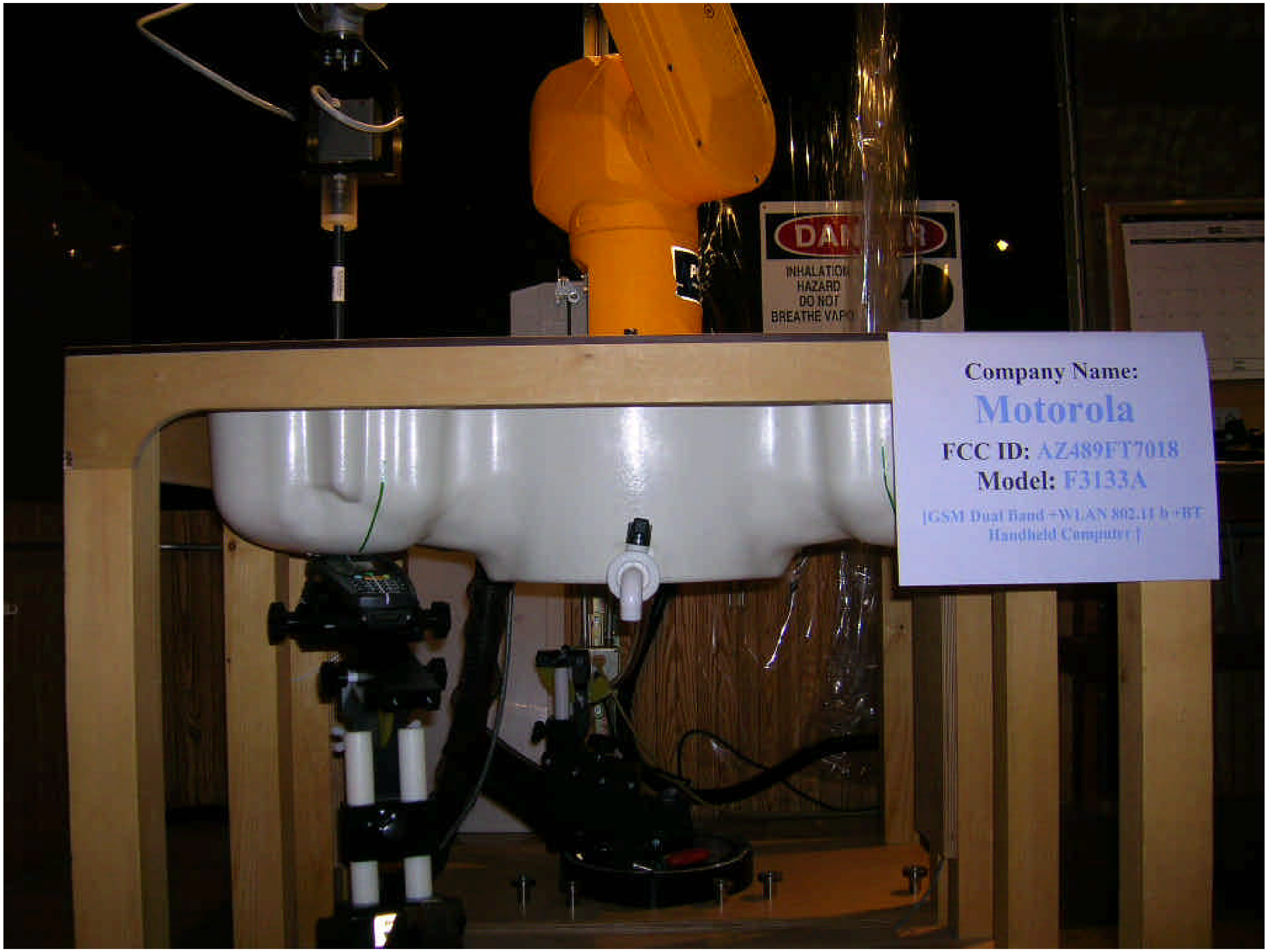
Probe: EX3DV4 - SN3561; ConvF(6.3, 6.3, 6.3); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Mode: IEEE 802.11b, Body w/ Beltclip, Mid.ch,FNN7826A Battery, 11Mbps, Antenna Internal, Front

Area Scan (9x17x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.91 V/m; Power Drift = 0.154 dB
Peak SAR (extrapolated) = 0.083 W/kg
SAR(1 g) = 0.046 mW/g; SAR(10 g) = 0.026 mW/g



APPENDIX B: SAR TEST SETUP PHOTOGRAPHS



PCTEST

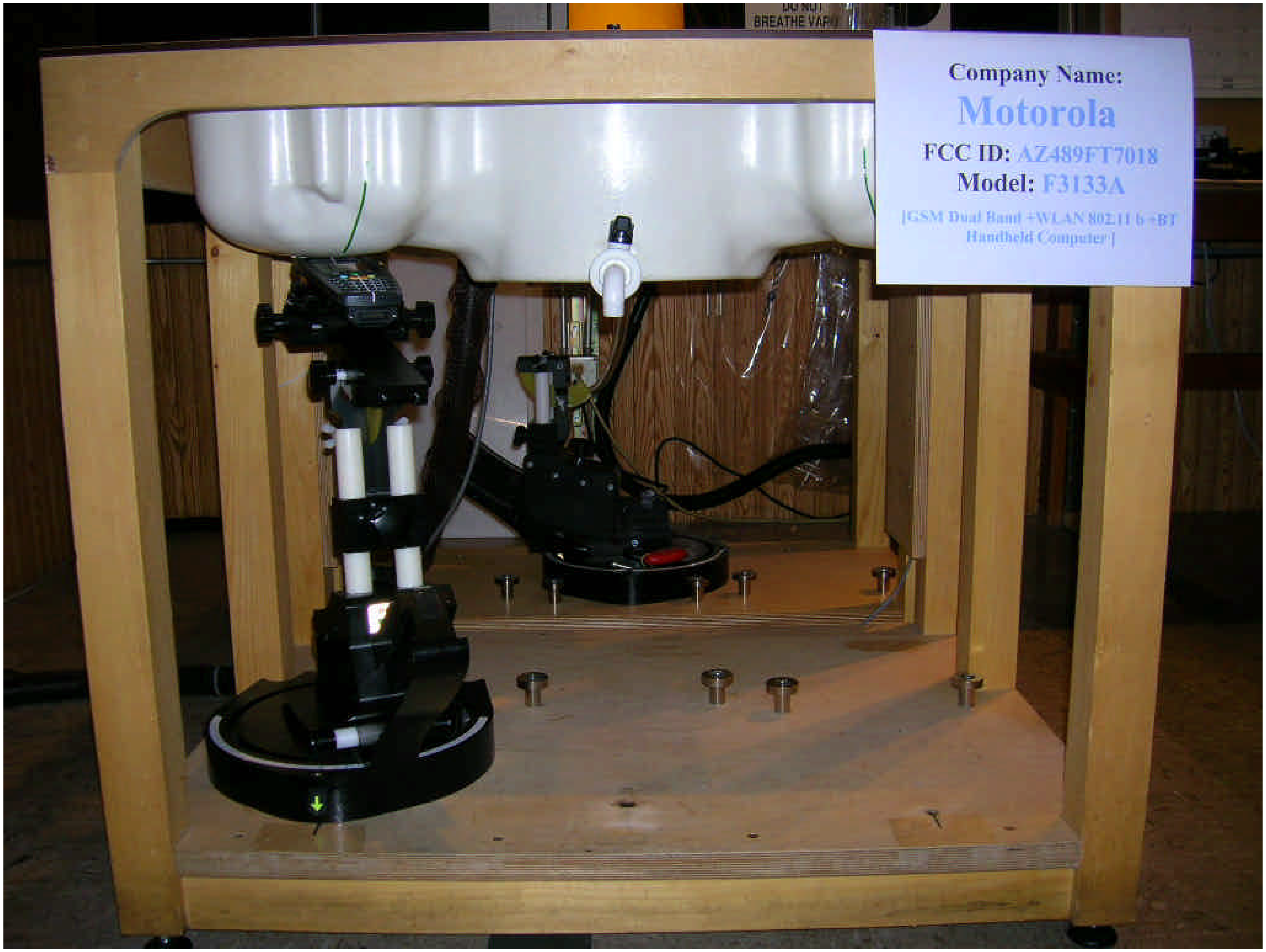
MOTOROLA FCC ID: AZ489FT7018

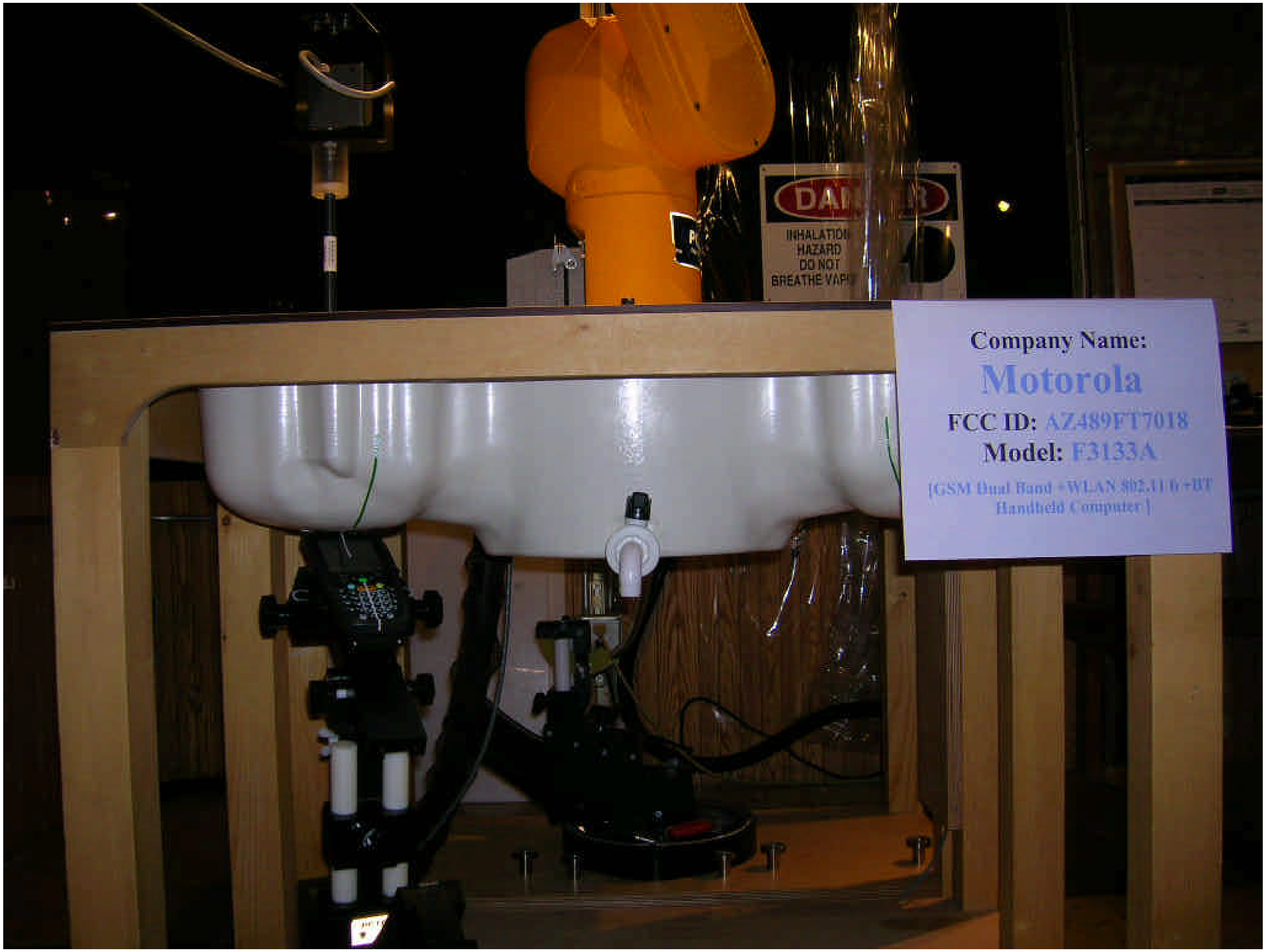
EUT Photographs

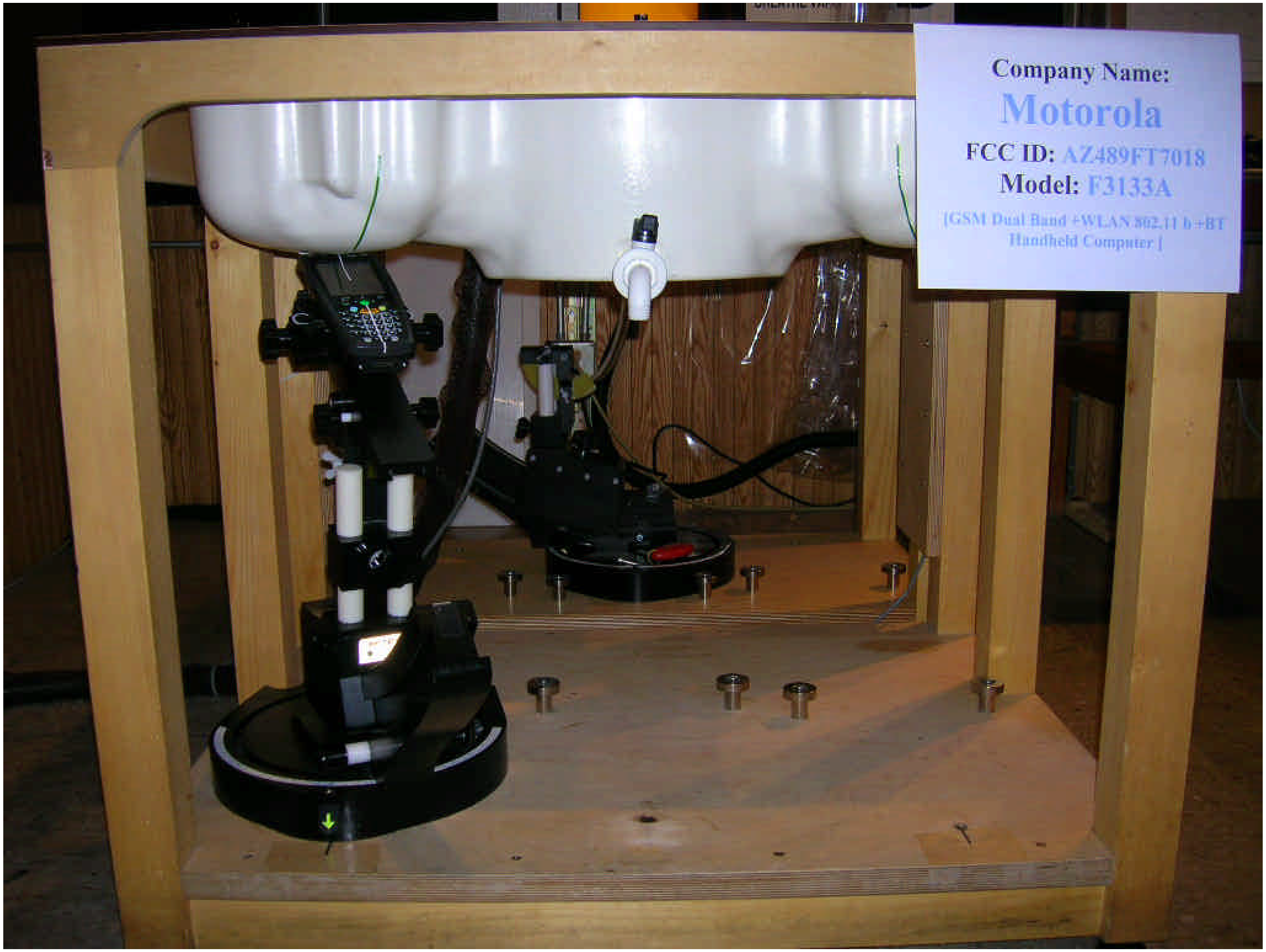
© 2006 PCTEST Lab.

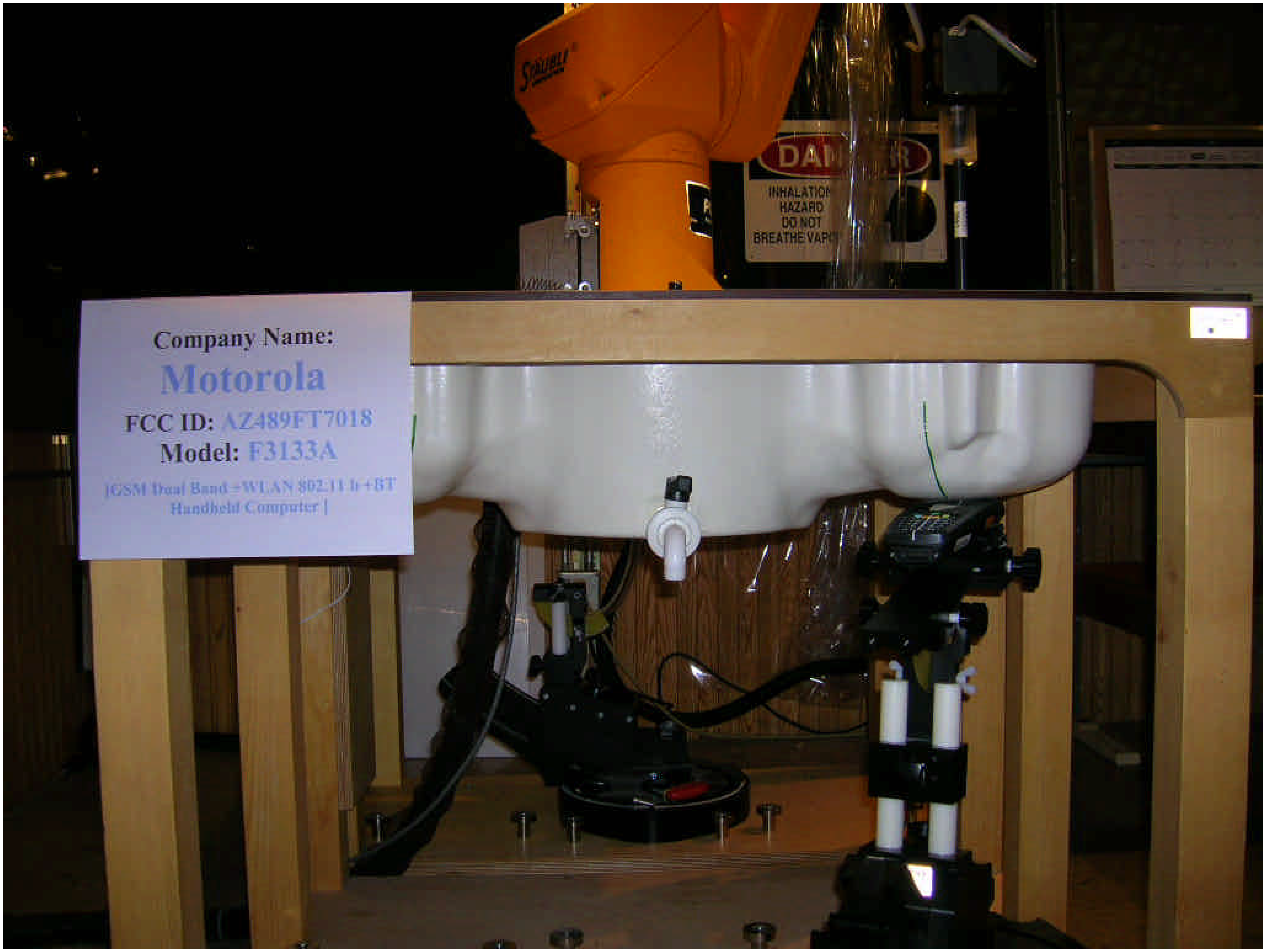
Dual Band GSM Handheld Computer

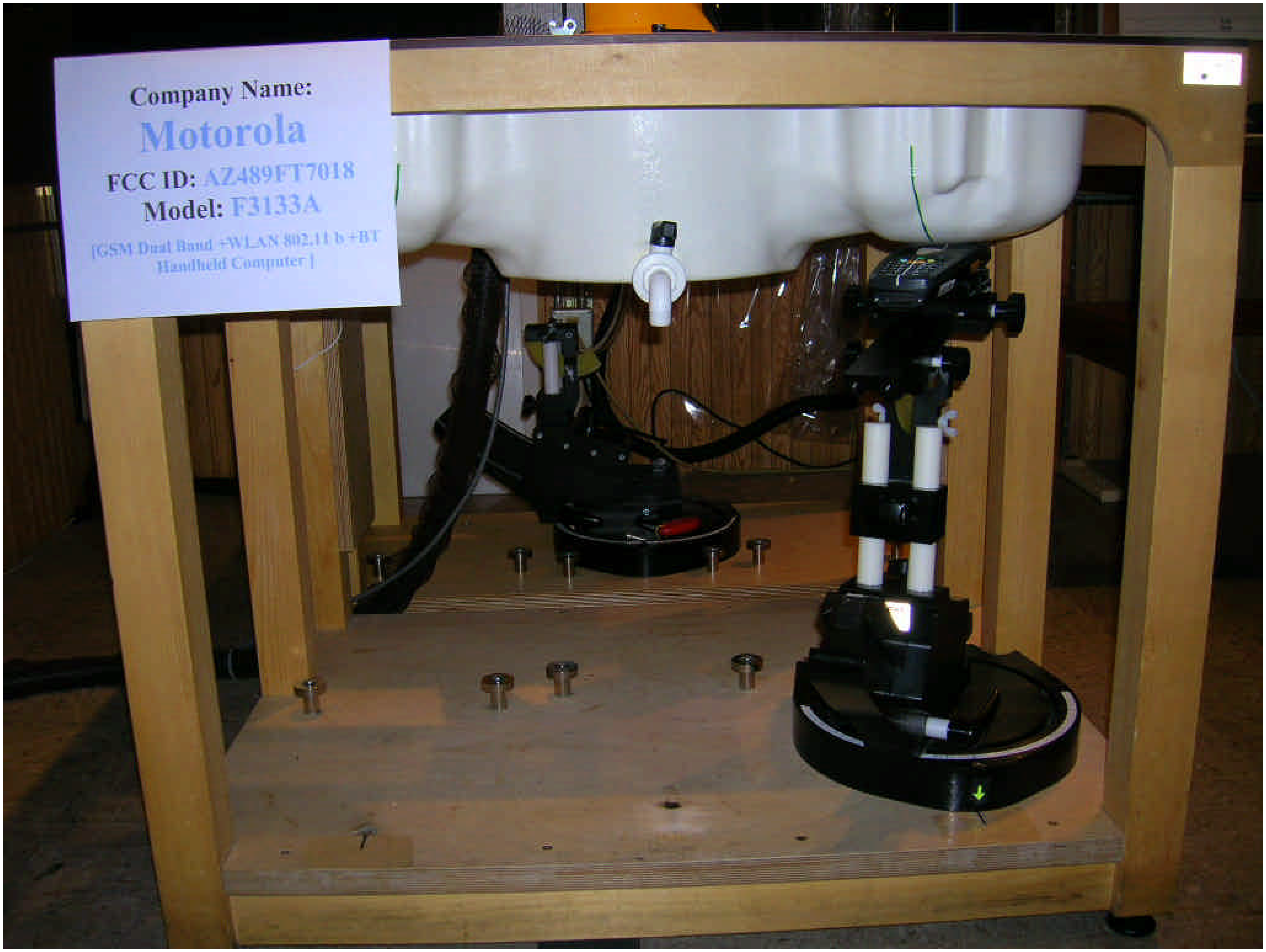
Model: F3133A




Company Name:
Motorola
FCC ID: AZ489FT7018
Model: F3133A
[GSM Dual Band +WLAN 802.11b +BT
Handheld Computer]







EUT Photographs

MOTOROLA FCC ID: AZ489FT7018

Dual Band GSM Handheld Computer

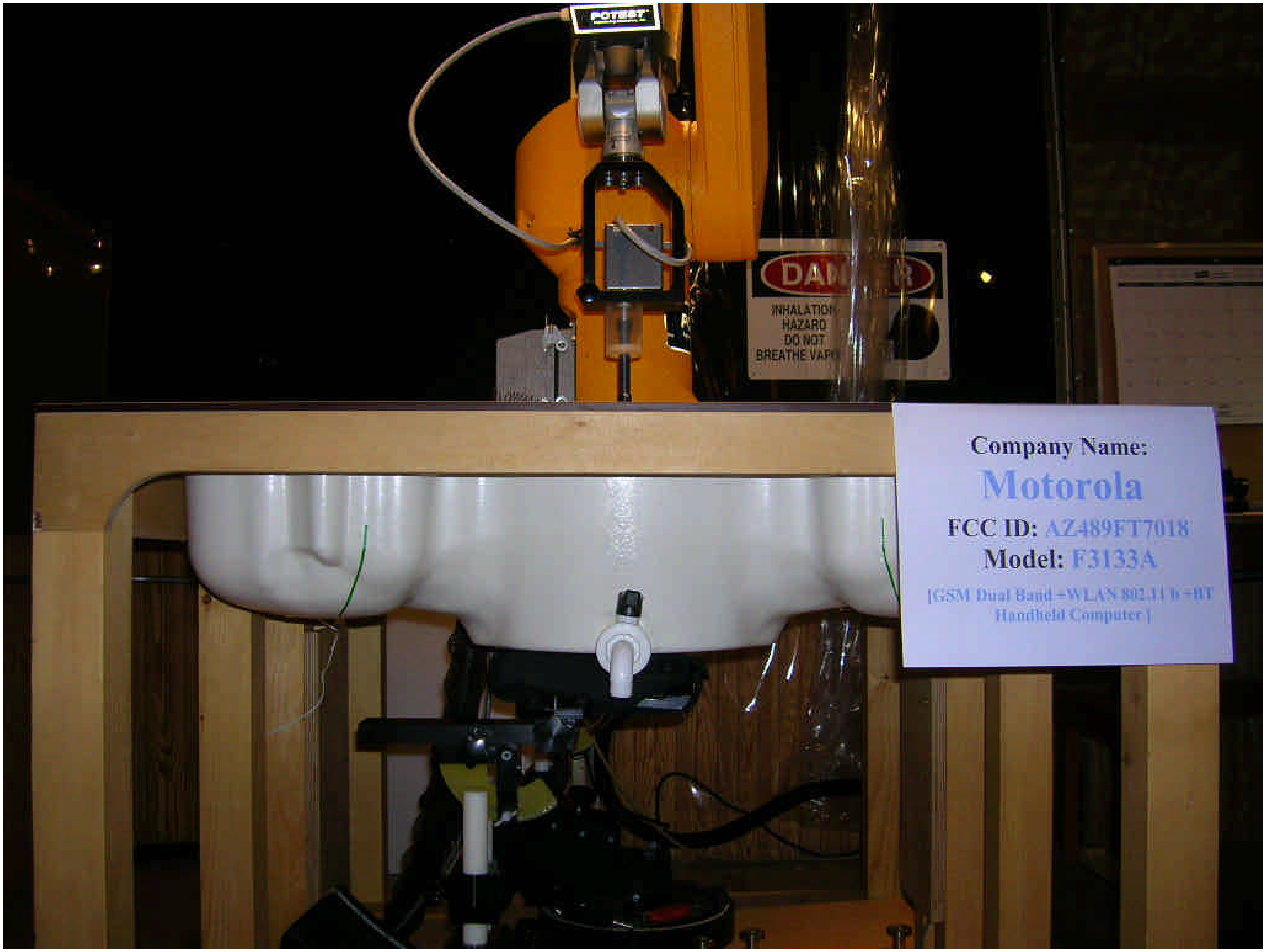
Model: F3133A

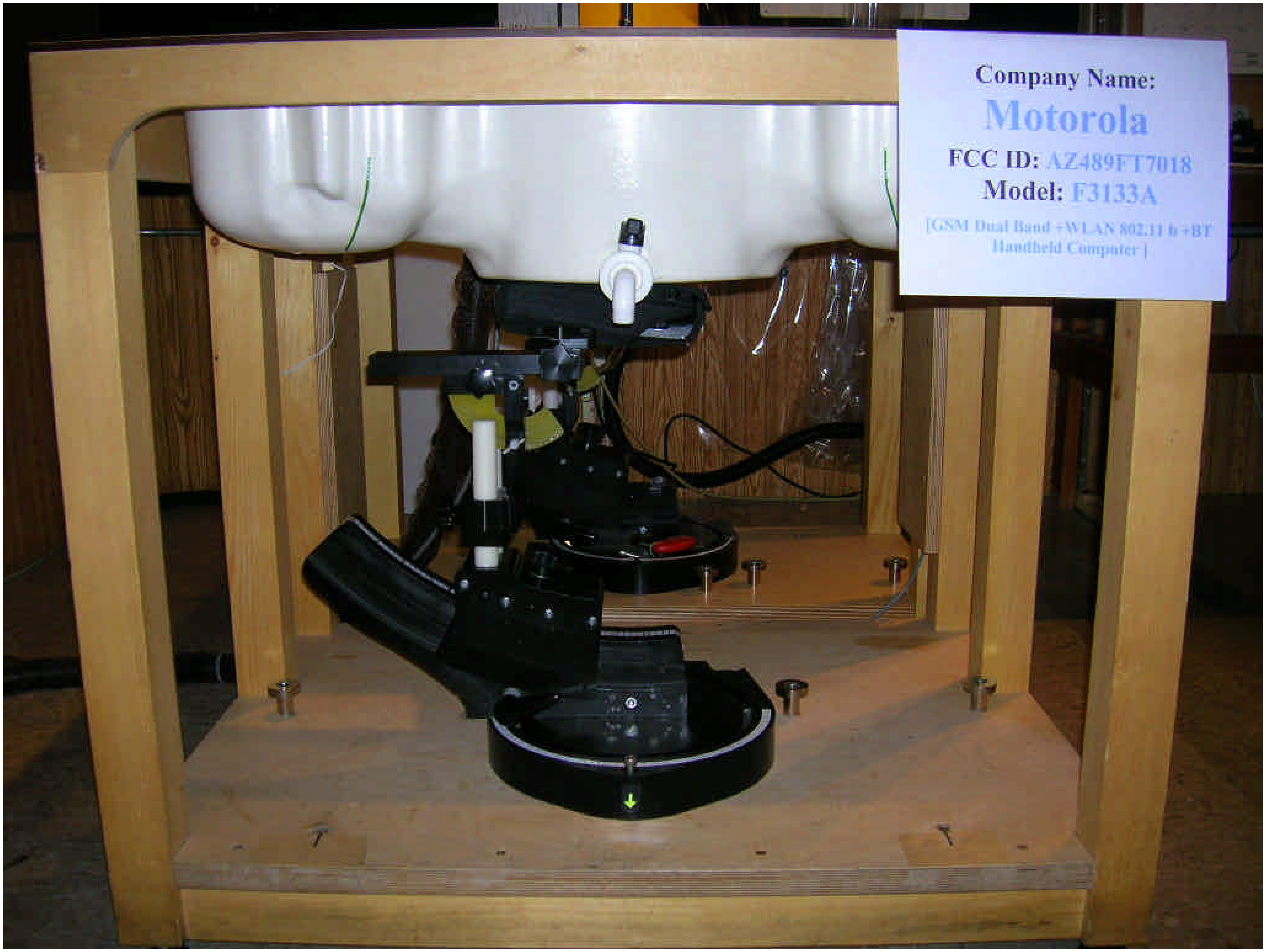
MOTOROLA FCC ID: AZ489FT7018

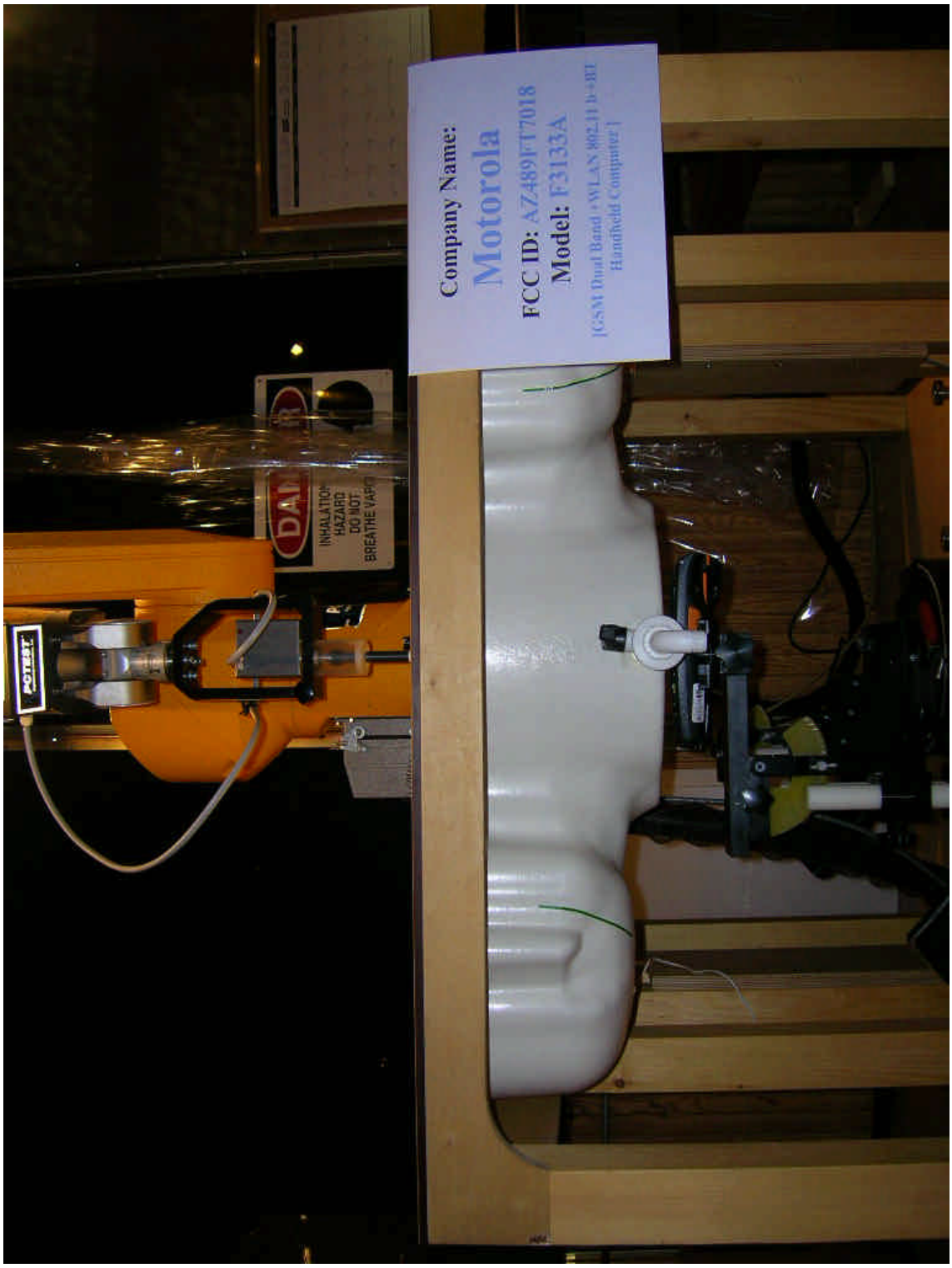
EUT Photographs

Dual Band GSM Handheld Computer

Model: F3133A






Company Name:
Motorola
FCC ID: AZ489FT7018
Model: F3133A
INHALATION HAZARD
DO NOT
BREATHE VAPO


Company Name:
Motorola
FCC ID: AZ489FT7018
Model: F3133A
[GSM Dual Band +WLAN 802.11 b +BT
Handheld Computer]

APPENDIX C: DIPOLE VALIDATION

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d026

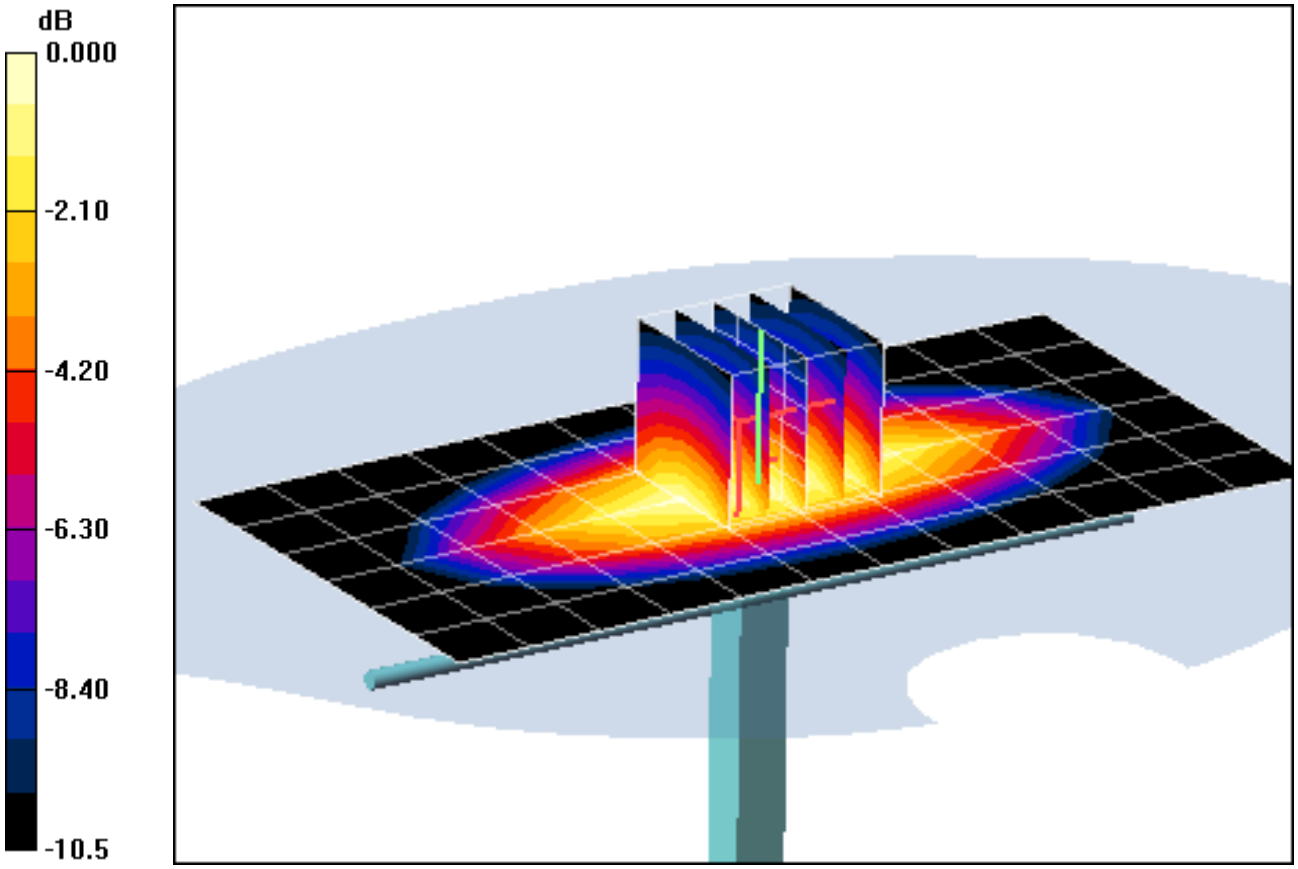
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Brain (σ = 0.88 mho/m, ε_r = 41.67, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-13-2006; Ambient Temp: 23.2°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3561; ConvF(7.91, 7.91, 7.91); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

835MHz Dipole Validation

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 24.0 dBm (250 mW)
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g
Target SAR(1g) = 2.375 mW/g; Deviation = +2.73 %



0 dB = 2.85mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d026

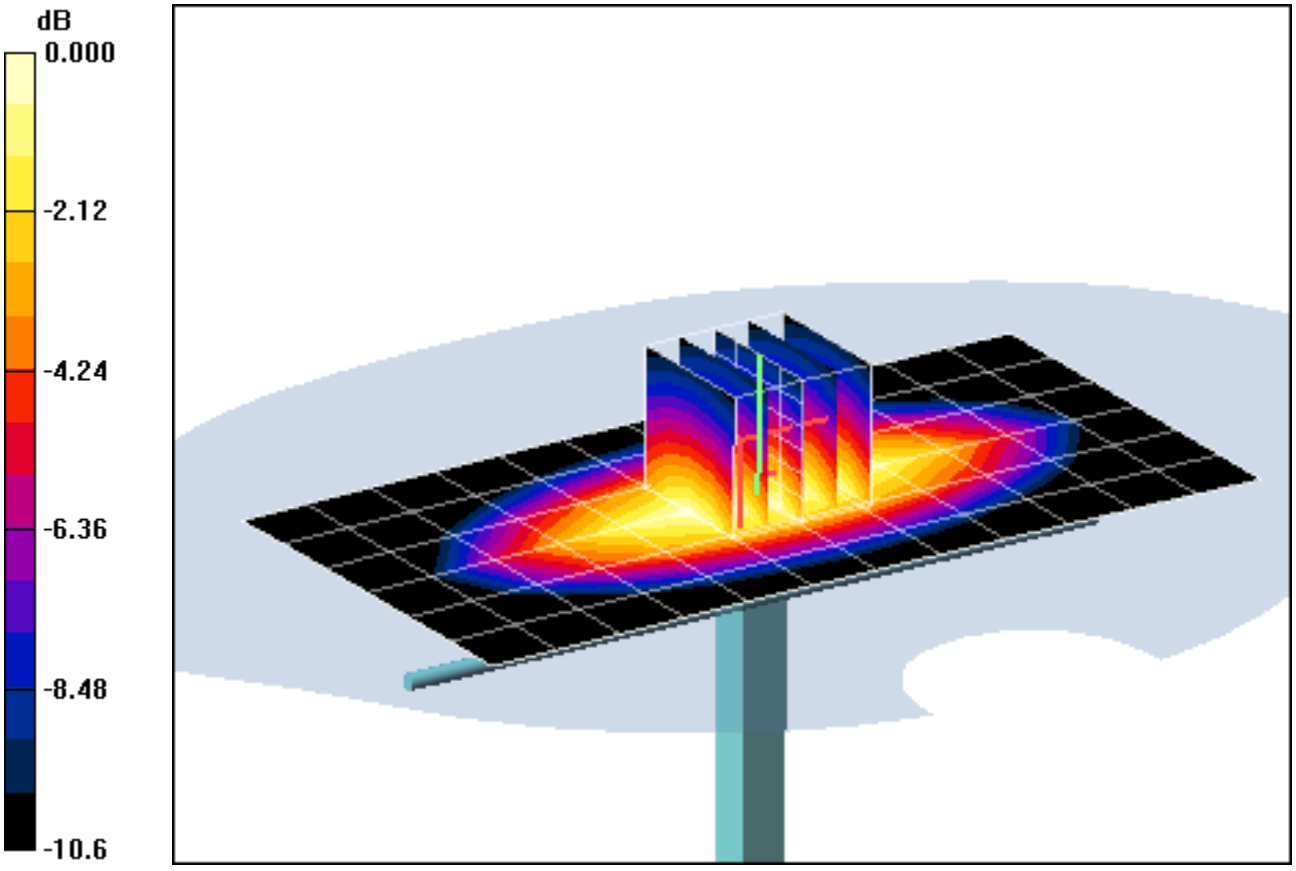
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Brain (σ = 0.88 mho/m, ε_r = 41.67, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-14-2006; Ambient Temp: 23.5°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN3561; ConvF(7.91, 7.91, 7.91); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

835MHz Dipole Validation

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 24.0 dBm (250 mW)
SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.57 mW/g
Target SAR(1g) = 2.375 mW/g; Deviation = +0.63 %



0 dB = 2.79mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d026

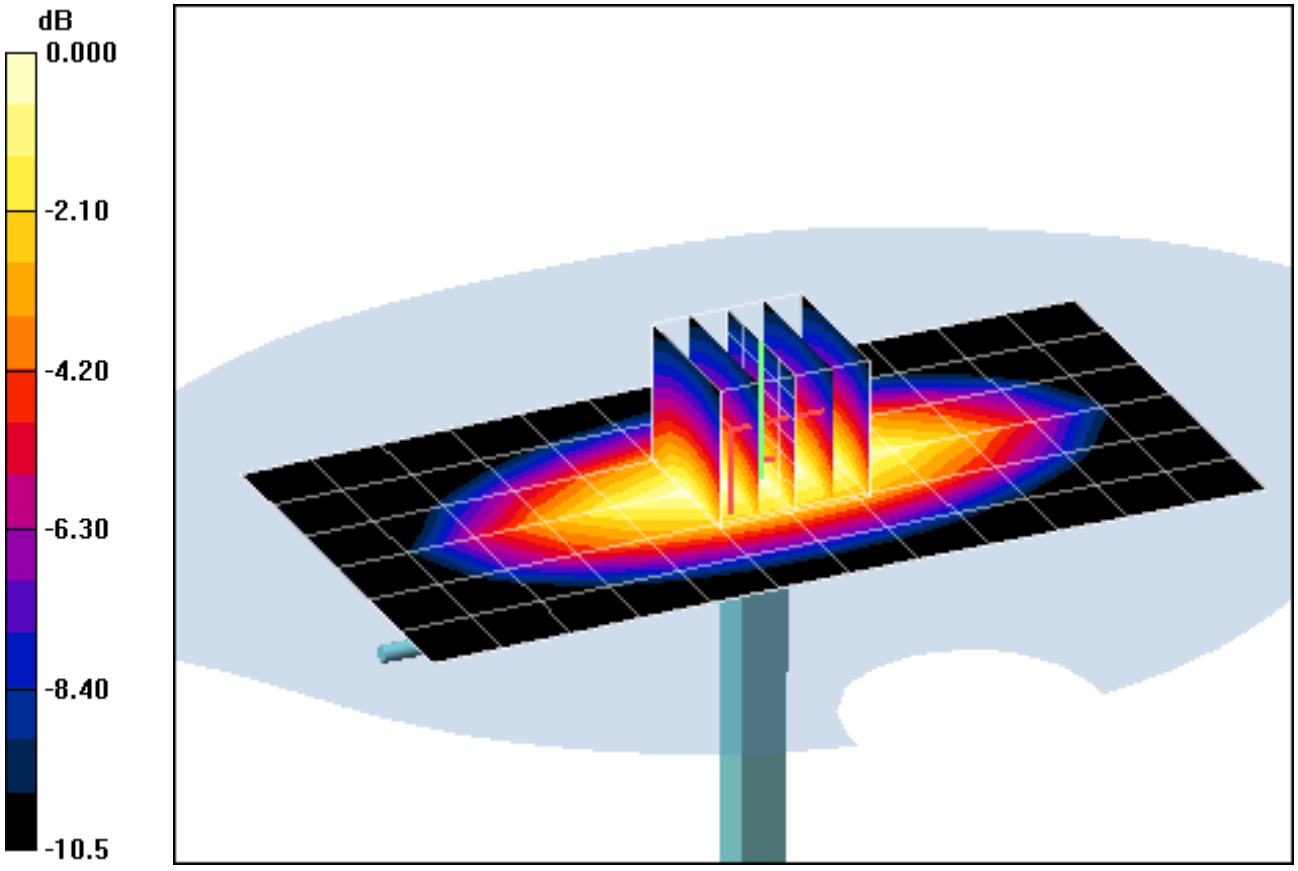
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Brain (σ = 0.88 mho/m, ε_r = 41.67, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-15-2006; Ambient Temp: 23.6°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN3561; ConvF(7.91, 7.91, 7.91); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

835MHz Dipole Validation

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 24.0 dBm (250 mW)
SAR(1 g) = 2.33 mW/g; SAR(10 g) = 1.53 mW/g
Target SAR(1g) = 2.375 mW/g; Deviation = -1.89 %



0 dB = 2.72mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 502

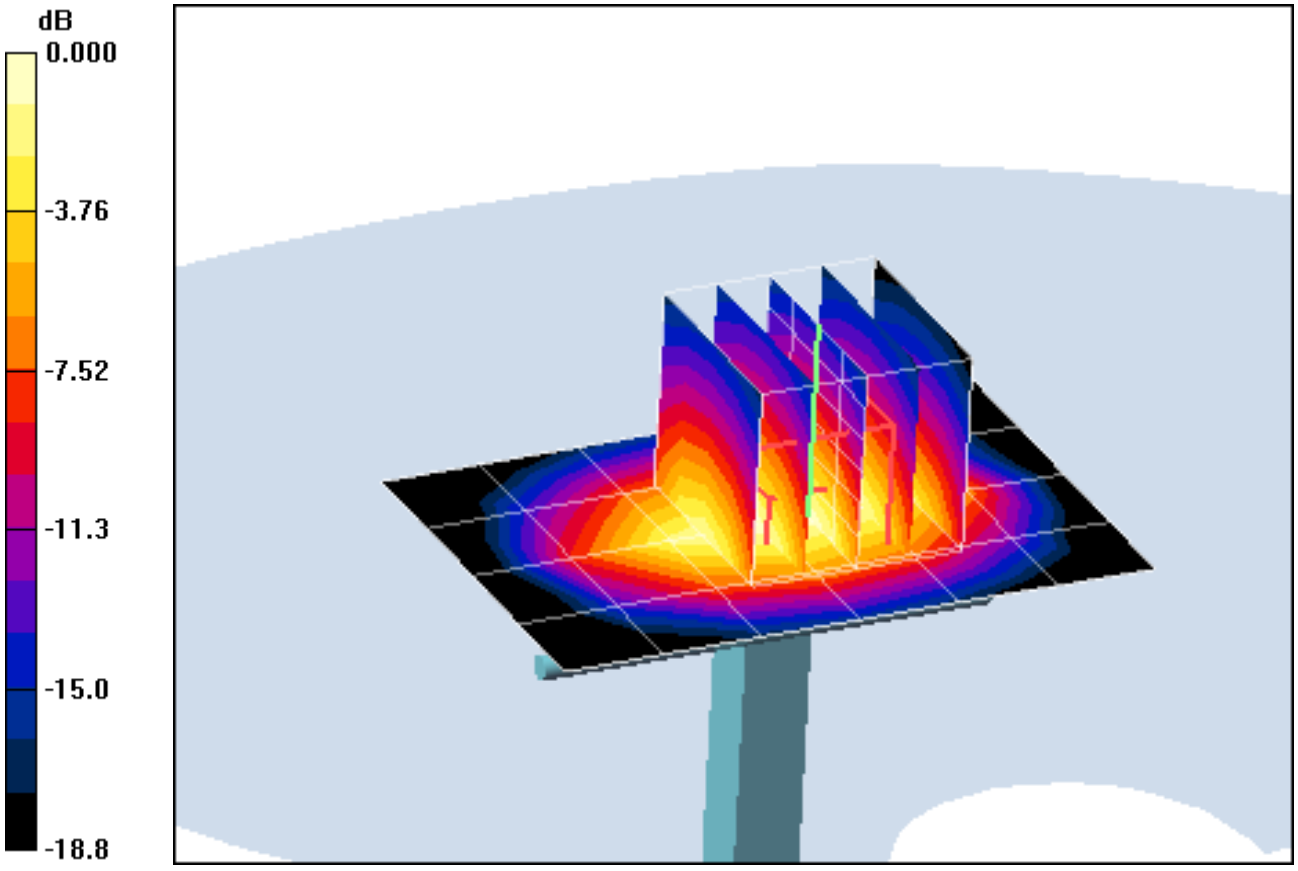
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Brain (σ = 1.37 mho/m, ε_r = 41.43, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-14-2006; Ambient Temp: 23.5°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN3561; ConvF(7.04, 7.04, 7.04); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP:1357
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

1900MHz Dipole Validation

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 3.83 mW/g; SAR(10 g) = 1.97 mW/g
Target SAR(1g) = 3.97 mW/g; Deviation = -3.52 %



0 dB = 4.78mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 502

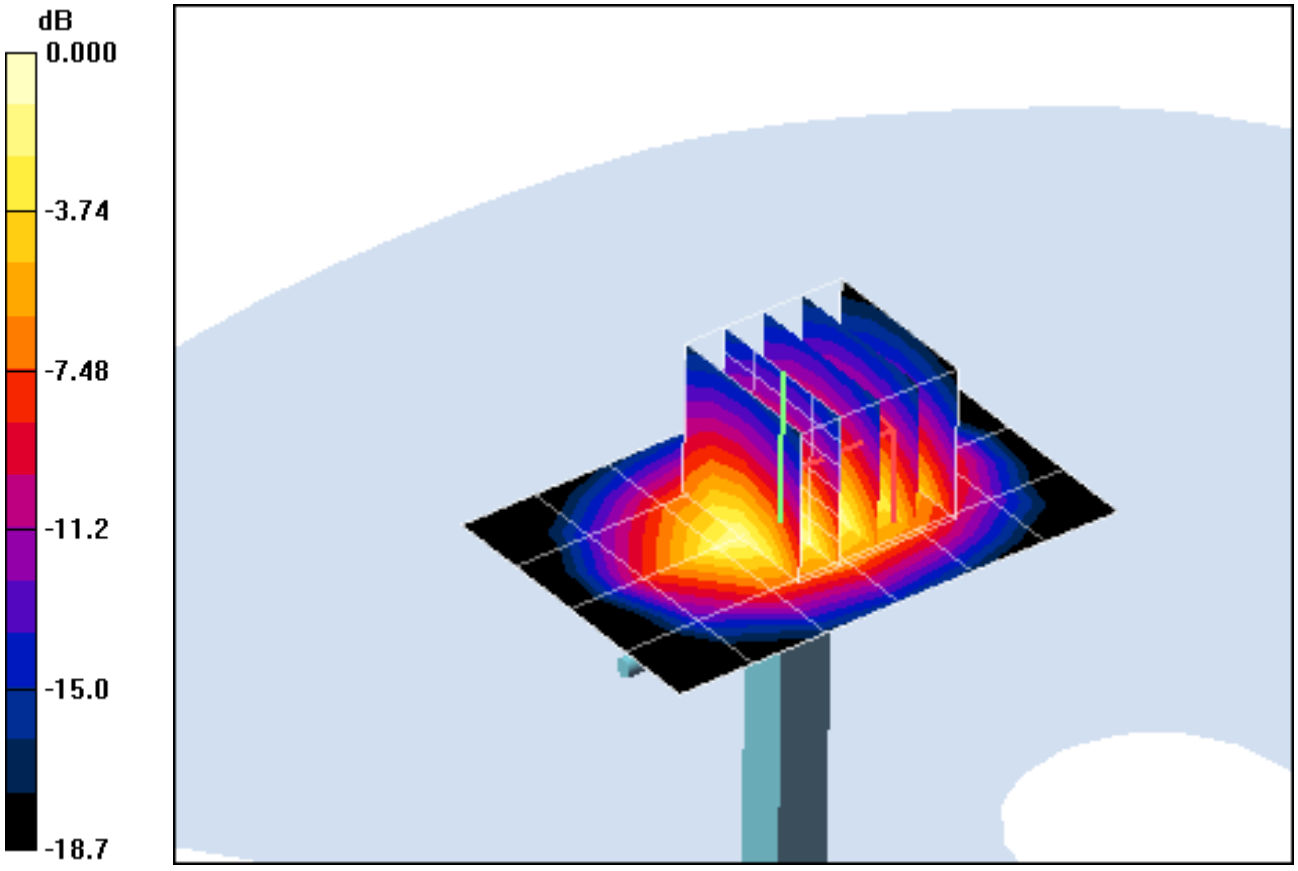
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Brain (σ = 1.37 mho/m, ε_r = 41.43, ρ = 1000 kg/m^3)
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-15-2006; Ambient Temp: 23.6°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN3561; ConvF(7.04, 7.04, 7.04); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP:1357
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

1900MHz Dipole Validation

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 3.73 mW/g; SAR(10 g) = 1.92 mW/g
Target SAR(1g) = 3.97 mW/g; Deviation = -6.04 %



0 dB = 4.64mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:719

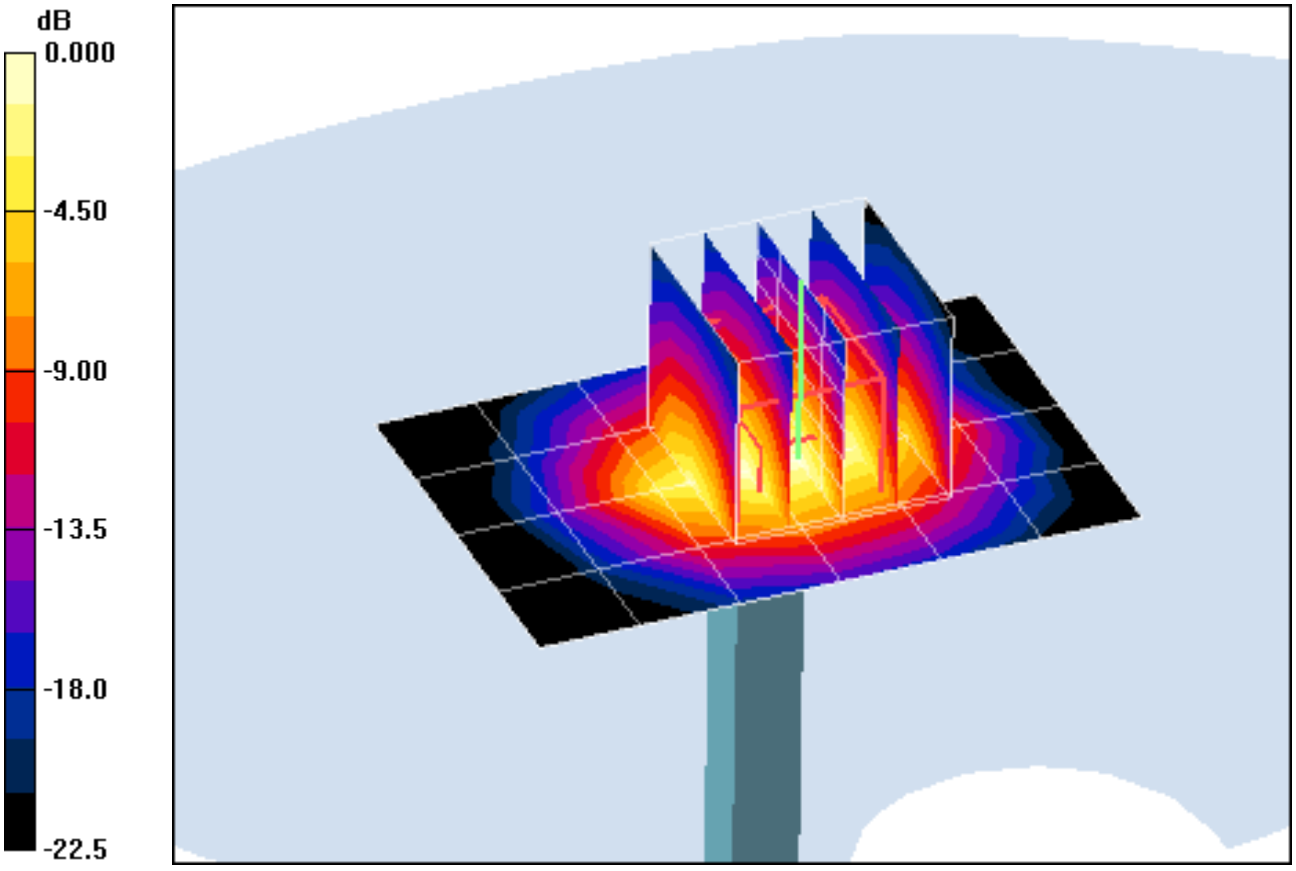
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Brain (σ = 1.79 mho/m, ε_r = 39.84, ρ = 1000 kg/m^3)
Phantom section: Flat Section ; Space 1.0 cm

Test Date: 06-15-2006; Ambient Temp: 23.6°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN3561; ConvF(6.37, 6.37, 6.37); Calibrated: 8/24/2005
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 9/13/2005
Phantom: SAM Main; Type: SAM 4.0; Serial: TP:1197
Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

2450MHz Dipole Validation

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
SAR(1 g) = 4.88 mW/g; SAR(10 g) = 2.25 mW/g
Target SAR(1g) = 5.24 mW/g; Deviation = -6.87 %



0 dB = 6.33mW/g

APPENDIX D: PROBE CALIBRATION

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client PC Test

Certificate No: EX3-3561_Aug05

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3561

Calibration procedure(s): QA CAL-01.v5 and QA CAL-14.v2
Calibration procedure for dosimetric E-field probes

Calibration date: August 24, 2005

Condition of the calibrated item: In Tolerance

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 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	7-Jan-05 (SPEAG, No. ES3-3013_Jan05)	Jan-06
DAE4	SN: 654	29-Nov-04 (SPEAG, No. DAE4-654_Nov04)	Nov-05

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: August 24, 2005

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3561

Manufactured: February 14, 2005
Calibrated: August 24, 2005

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3561

Sensitivity in Free Space[A] Diode Compression[B]

NormX	**0.430** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**90** mV
NormY	**0.470** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**90** mV
NormZ	**0.430** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**90** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	3.8	1.5
SAR_{be} [%]	With Correction Algorithm	0.0	0.0

TSL **1810 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	4.7	2.8
SAR_{be} [%]	With Correction Algorithm	1.1	0.8

Sensor Offset

Probe Tip to Sensor Center	**1.0** mm

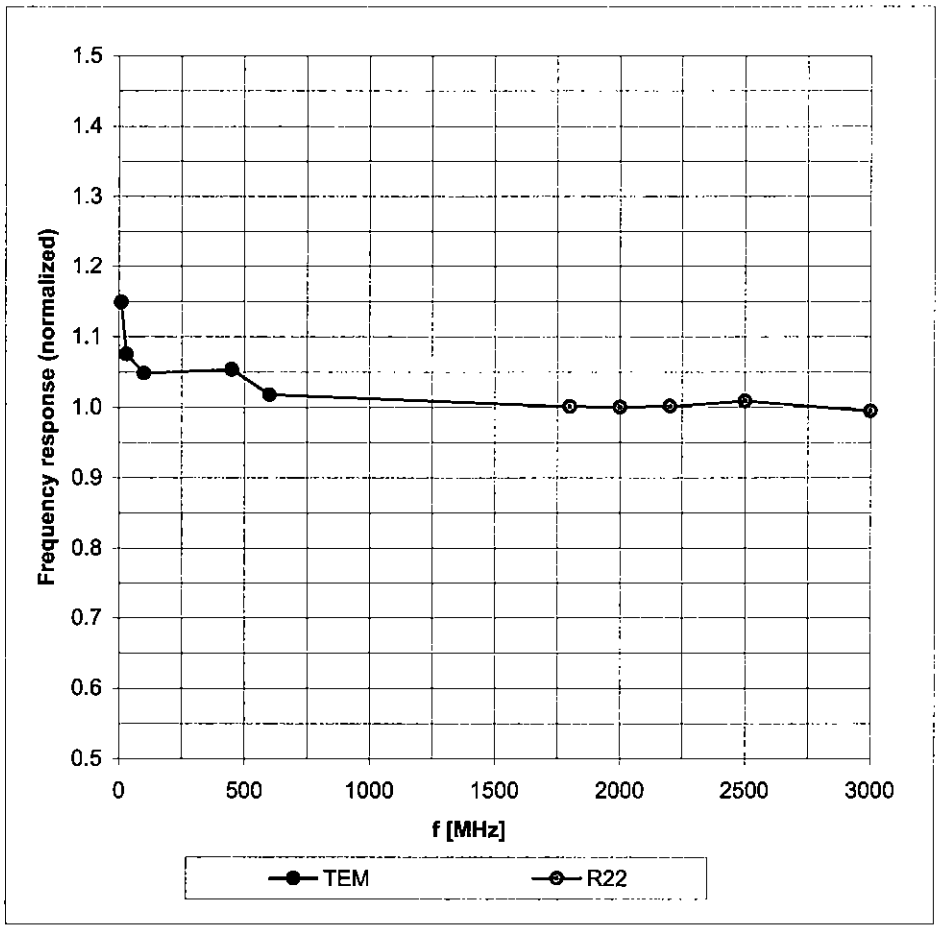
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

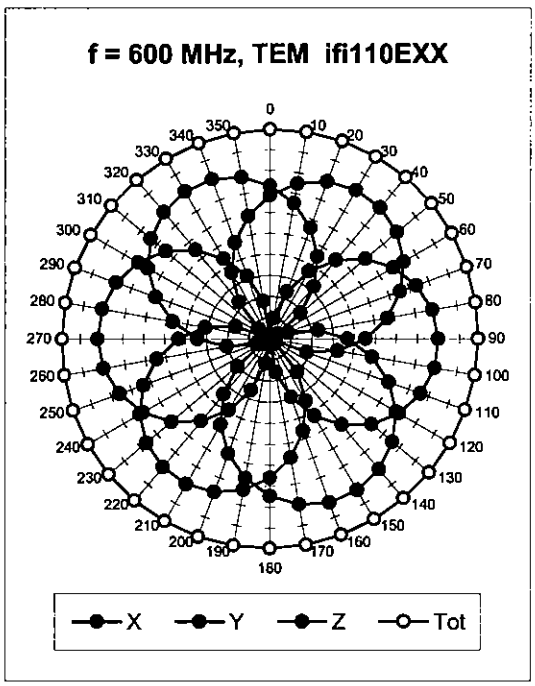
Frequency Response of E-Field

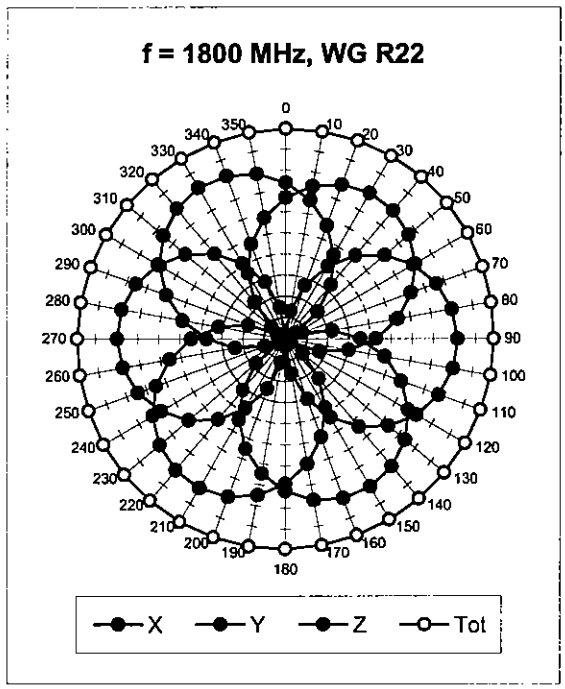
(TEM-Cell:ifi110 EXX, Waveguide: R22)

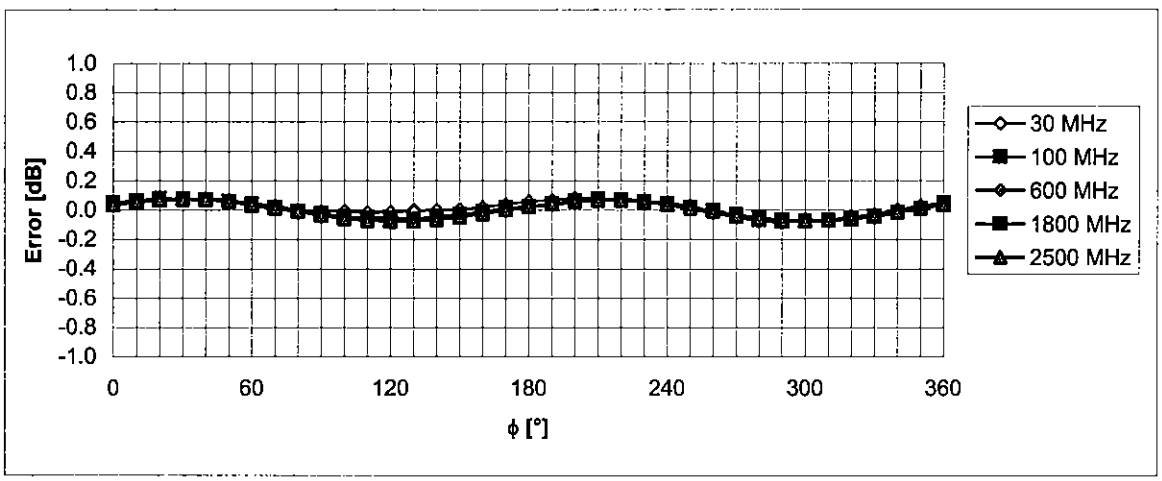


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



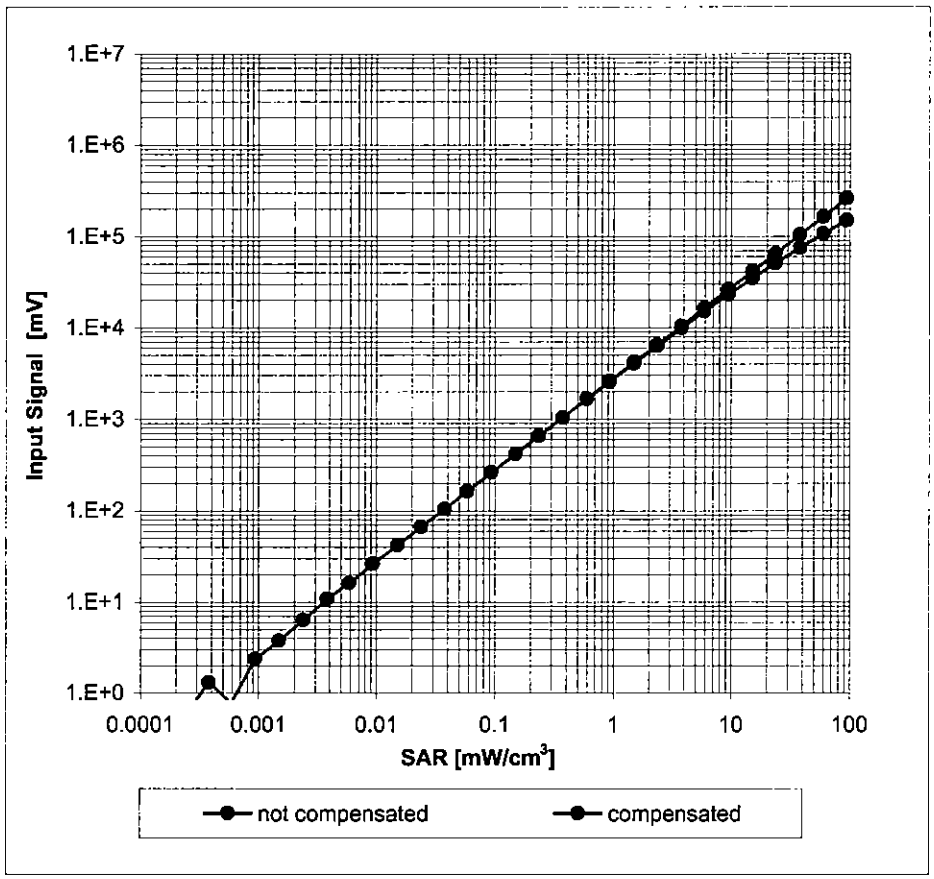


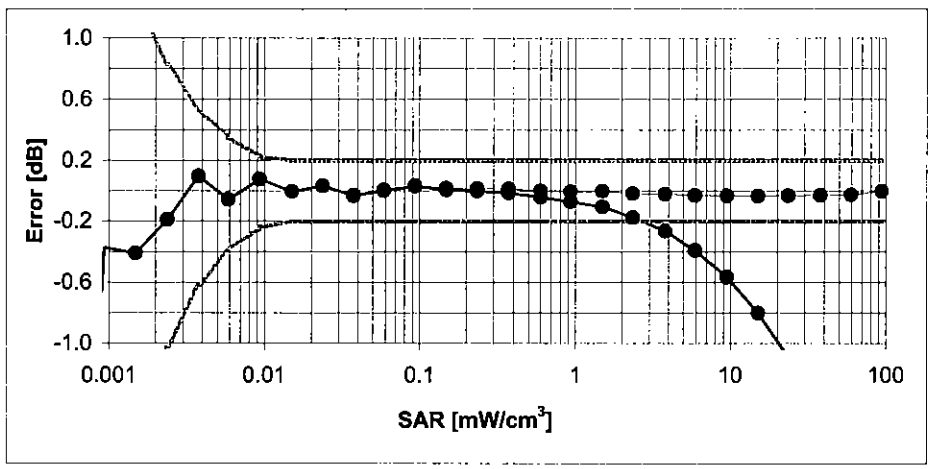


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

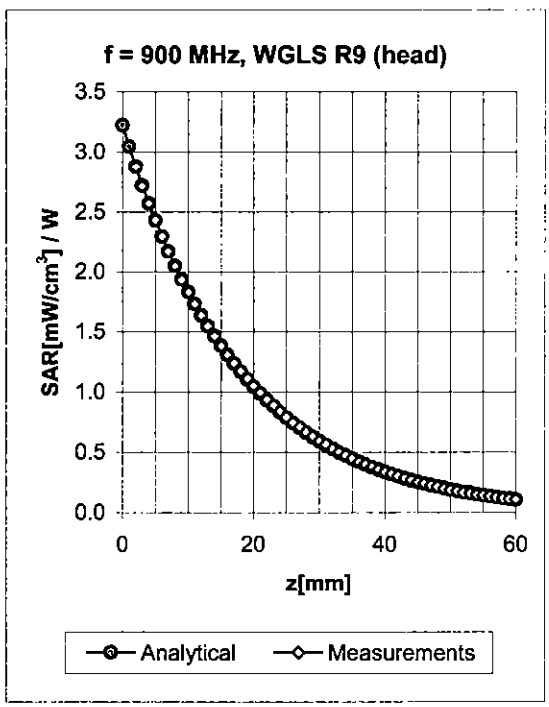
(Waveguide R22, f = 1800 MHz)

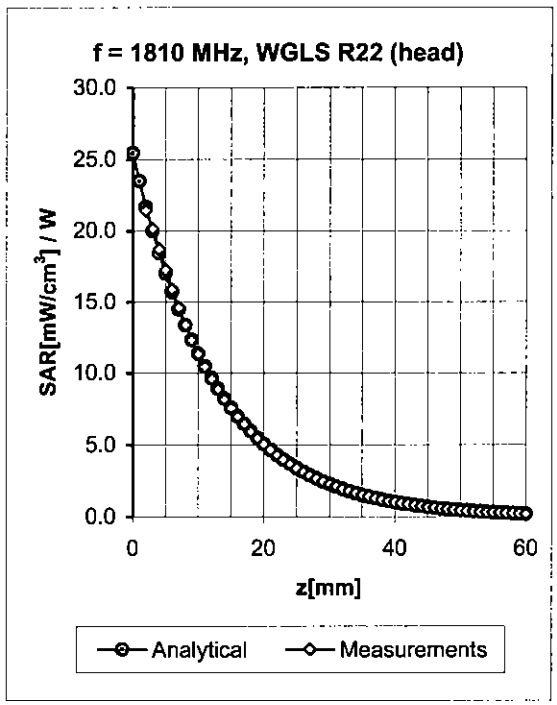




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



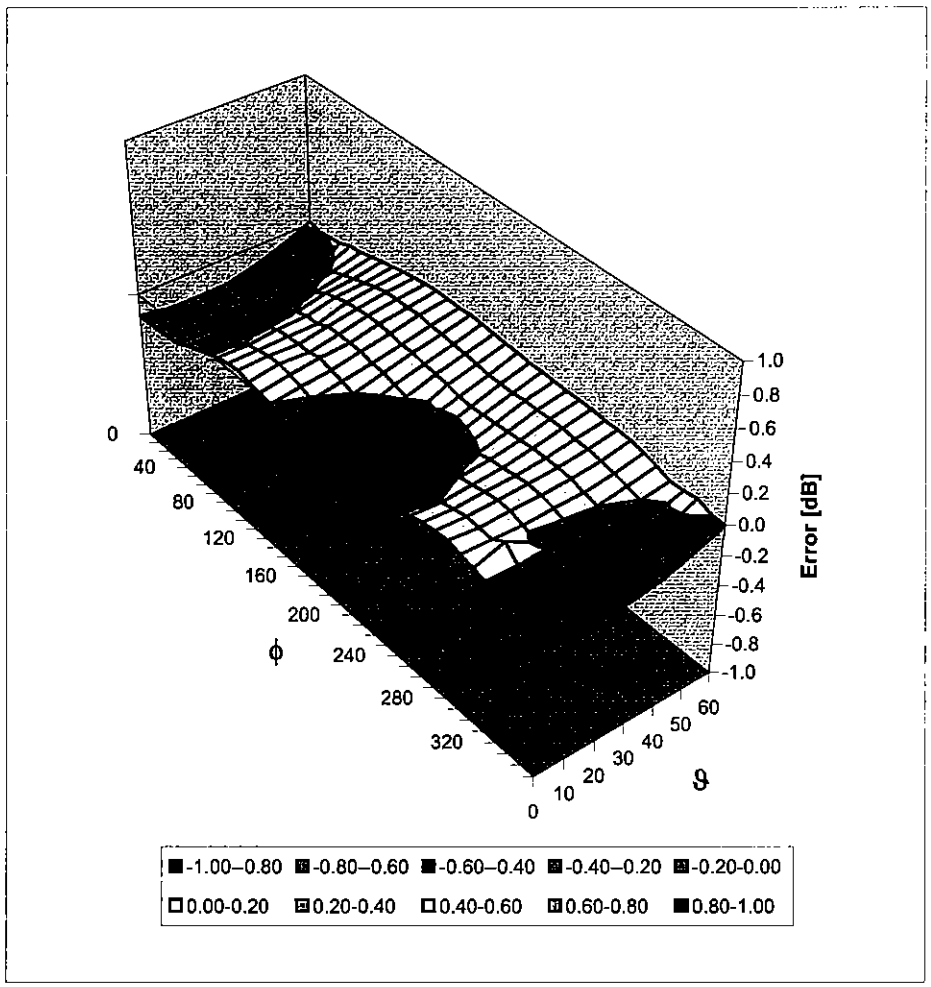


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.21	1.13	7.91 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.47	0.94	7.04 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.61	0.71	6.37 ± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.32	0.93	7.90 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.34	1.60	6.48 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.75	0.62	6.30 ± 11.8% (k=2)

[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

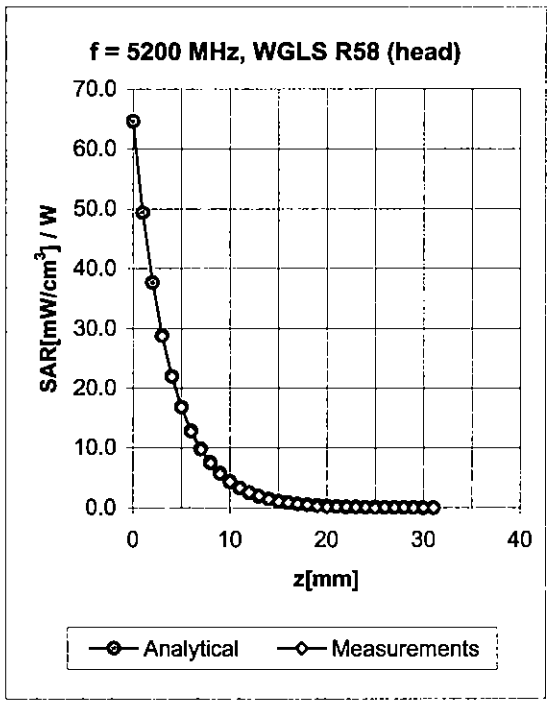
Deviation from Isotropy in HSL

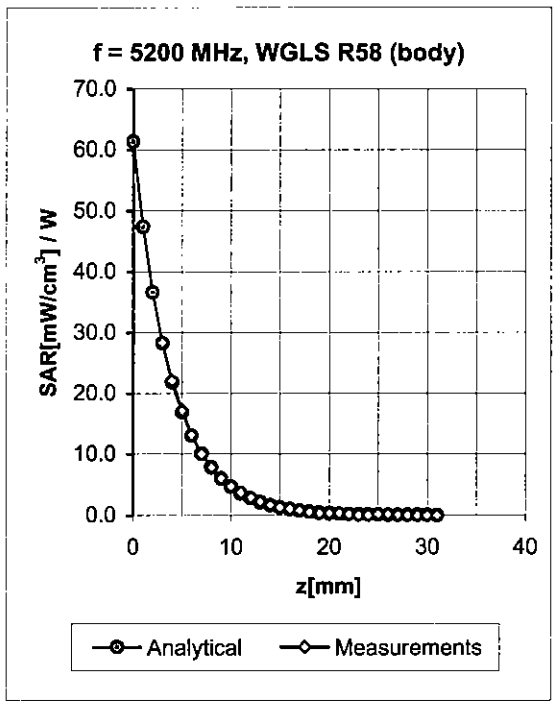
Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Appendix[D]





f [MHz][D]	Validity [MHz]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
5200	± 50	Head	36.0 ± 5%	4.76 ± 5%	0.49	1.36	4.26 ± 13.6% (k=2)
5800	± 50	Head	35.3 ± 5%	5.27 ± 5%	0.52	1.42	3.75 ± 13.6% (k=2)
5200	± 50	Body	49.0 ± 5%	5.30 ± 5%	0.50	1.63	4.10 ± 13.6% (k=2)
5800	± 50	Body	48.2 ± 5%	6.00 ± 5%	0.49	1.70	3.63 ± 13.6% (k=2)

[D] Accreditation for ConvF assessment above 3000 MHz is currently applied for.