

LG Electronics Inc.

**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: GPRS 850; Frequency: 824.20 MHz; Duty Cycle: 1:2.075
Medium: Body 824.20 MHz; ($\sigma = 0.958\text{mho/m}$; $\epsilon_r = 54.1$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

Test Date: 09/14/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ET3DV6 - SN1729; ConvF(5.84, 5.84, 5.84); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn646; Calibrated: 2009-05-25

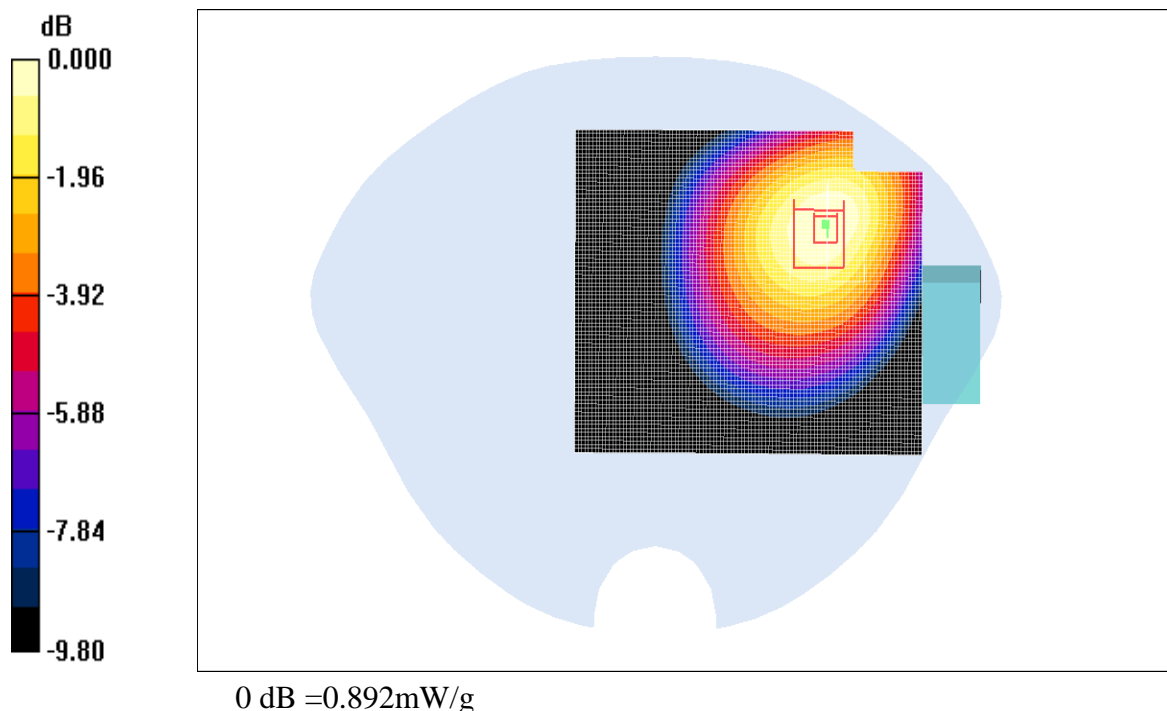
Phantom: SAM 835; Type: SAM 4.0; Serial:TP-1066

Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.128, Rear, Slider Up, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.907mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.64 V/m; Power Drift = 0.032 dB
Peak SAR (extrapolated) = 1.26 W/kg
SAR(1 g) = 0.847mW/g; SAR(10 g) = 0.586mW/g
Maximum value of SAR (measured) = 0.892mW/g



LG Electronics Inc.

**DUT: GW620f;Type: Cellular / PCS GSM /WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: GPRS 850; Frequency: 848.80 MHz; Duty Cycle: 1:2.075
Medium: Body 848.80 MHz;(σ = 0.983mho/m; ε_r = 51.9.8; ρ = 1000 kg/m³)
Phantom section: Flat Section

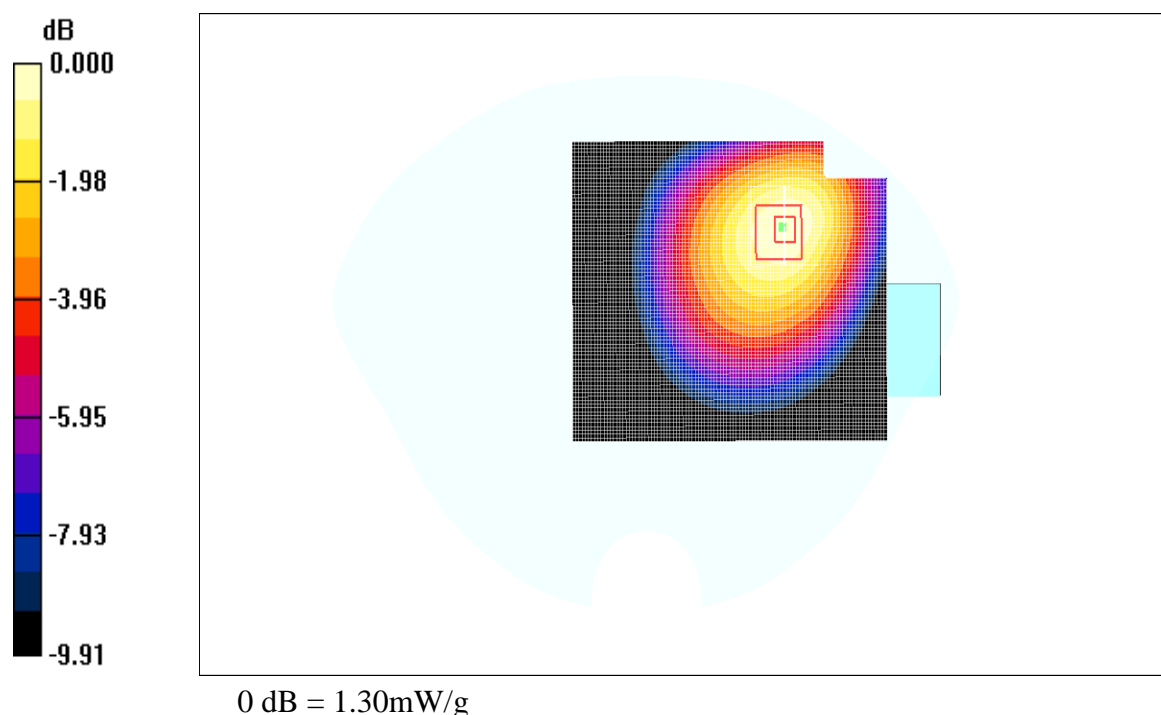
Test Date: 09/14/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ET3DV6 - SN1729; ConvF(5.84, 5.84, 5.84); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 835; Type: SAM 4.0; Serial:TP-1066
Measurement SW: DAS4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.251, Rear, Slider Up, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.31mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.6 V/m; Power Drift = -0.062 dB
Peak SAR (extrapolated) = 1.87W/kg
SAR(1 g) = 1.23mW/g; SAR(10 g) = 0.846mW/g
Maximum value of SAR (measured) = 1.30mW/g



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**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: GPRS 1900; Frequency: 1880.00 MHz; Duty Cycle: 1:2.075
Medium: Body 1880.00 MHz; ($\sigma = 1.48\text{mho/m}$; $\epsilon_r = 51.9$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

Test Date: 09/15/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

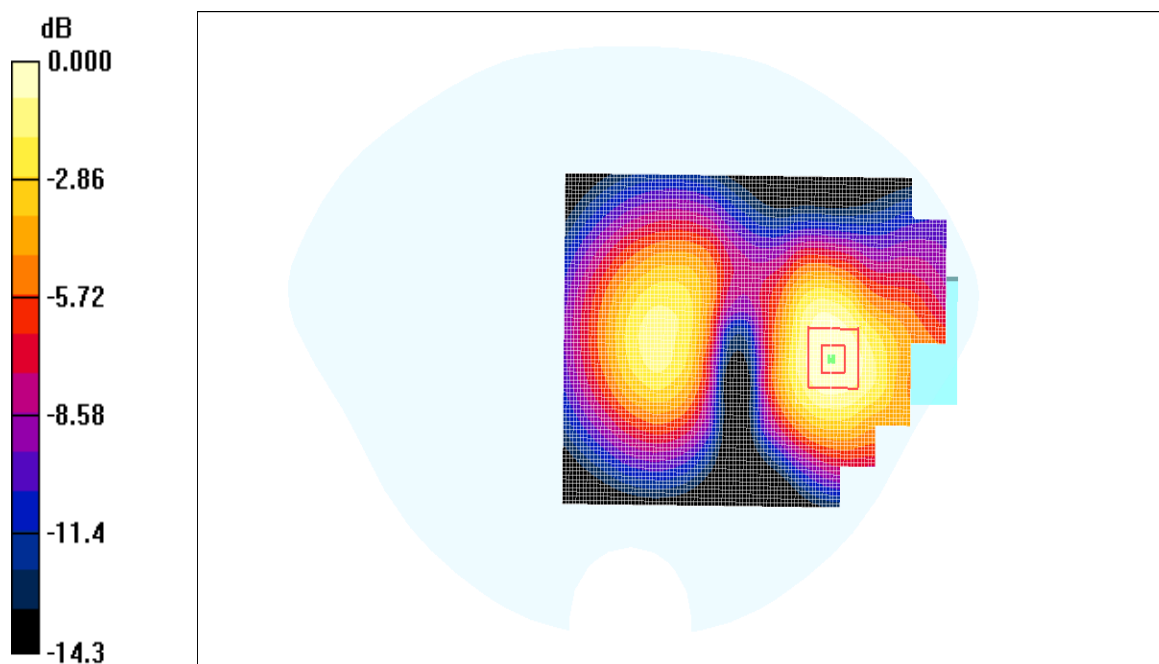
Probe: ET3DV6 - SN1729; ConvF(4.69, 4.69, 4.69); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial: TP-1244

Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.661, Front, Slider Down, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.292mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.6 V/m; Power Drift = -0.084 dB
Peak SAR (extrapolated) = 0.504W/kg
SAR(1 g) = 0.263mW/g; SAR(10 g) = 0.158mW/g
Maximum value of SAR (measured) = 0.280mW/g



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**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: GPRS 1900; Frequency: 1880.00 MHz; Duty Cycle: 1:2.075
Medium: Body 1880.00 MHz; ($\sigma = 1.48\text{mho/m}$; $\epsilon_r = 51.9$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

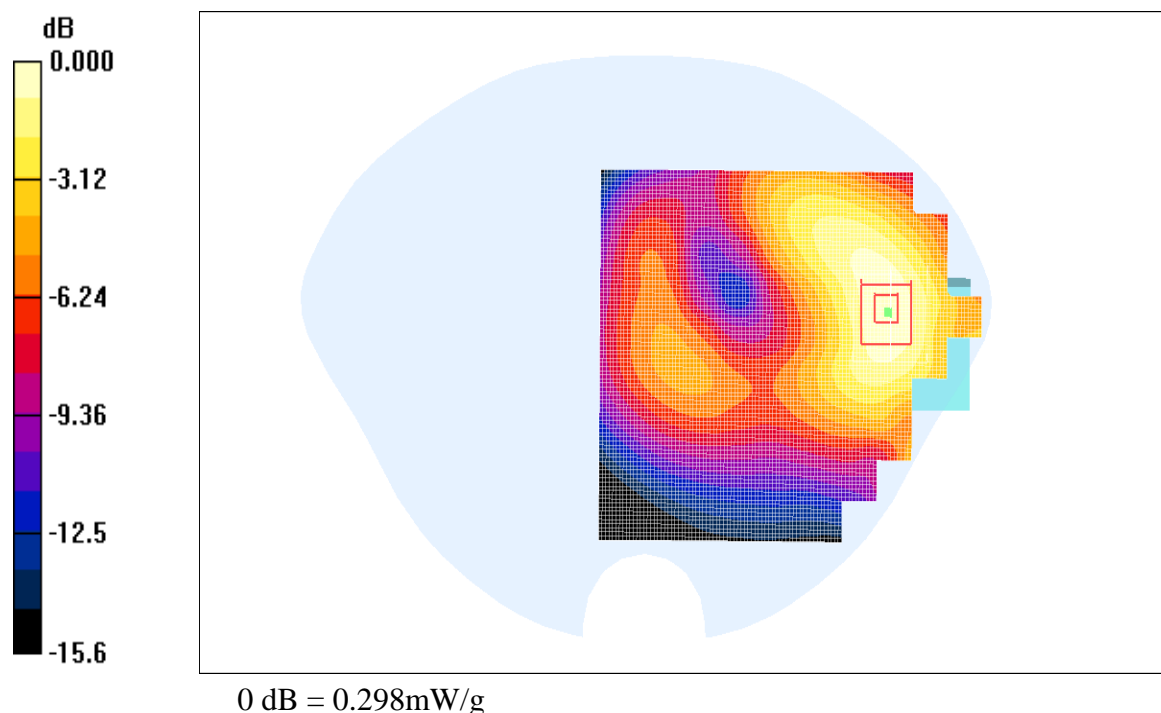
Test Date: 09/15/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ET3DV6 - SN1729; ConvF(4.69, 4.69, 4.69); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial: TP-1244
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.661, Front, Slider Up, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.301mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.66 V/m; Power Drift = -0.004dB
Peak SAR (extrapolated) = 0.551 W/kg
SAR(1 g) = 0.285mW/g; SAR(10 g) = 0.173mW/g
Maximum value of SAR (measured) = 0.298mW/g



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**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: GPRS 1900; Frequency: 1880.00 MHz; Duty Cycle: 1:8.3
Medium: Body 1880.00 MHz; ($\sigma = 1.48\text{mho/m}$; $\epsilon_r = 51.9$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

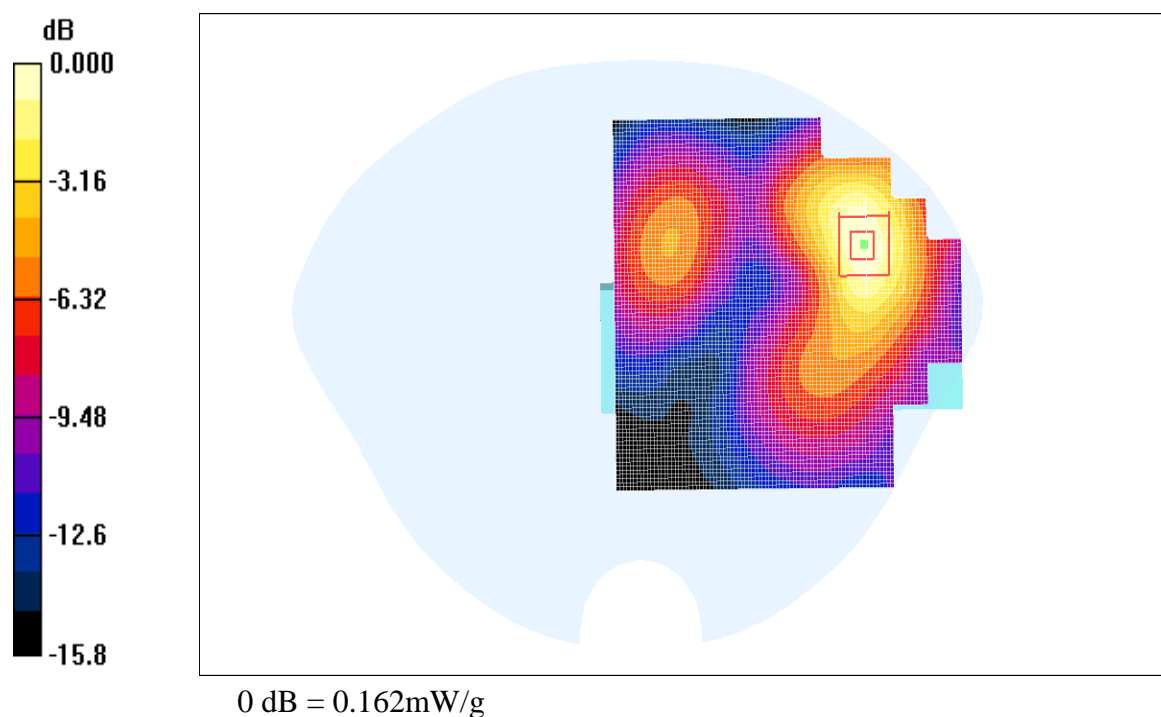
Test Date: 09/15/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ET3DV6 - SN1729; ConvF(4.69, 4.69, 4.69); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial:TP-1244
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.661, Rear, Slider Up, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.165mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.86V/m; Power Drift = 0.080 dB
Peak SAR (extrapolated) = 0.310 W/kg
SAR(1 g) = 0.154mW/g; SAR(10 g) = 0.088mW/g
Maximum value of SAR (measured) = 0.162mW/g



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**DUT: GW620f;Type: Cellular / PCS GSM /WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: GPRS 1900; Frequency: 1880.00 MHz; Duty Cycle: 1:4.15
Medium: Body 1880.00 MHz;($\sigma = 1.48\text{mho/m}$; $\epsilon_r = 51.9$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

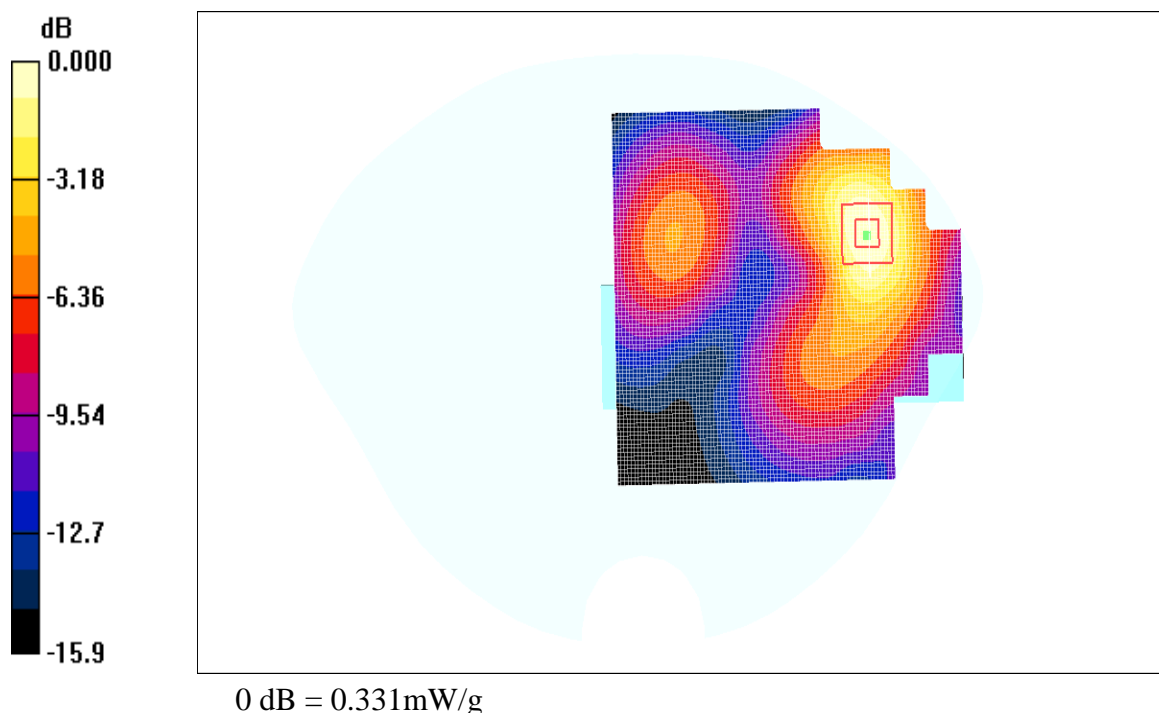
Test Date: 09/15/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ET3DV6 - SN1729; ConvF(4.69, 4.69, 4.69); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial:TP-1244
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.661, Rear, Slider Up, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.342mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.98 V/m; Power Drift = 0.192 dB
Peak SAR (extrapolated) = 0.651 W/kg
SAR(1 g) = 0.310mW/g; SAR(10 g) = 0.178mW/g
Maximum value of SAR (measured) = 0.331mW/g



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Serial:#1**

Communication System: GPRS 1900; Frequency: 1880.00 MHz; Duty Cycle: 1:2.77
Medium: Body 1880.00 MHz; ($\sigma = 1.48\text{mho/m}$; $\epsilon_r = 51.9$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

Test Date: 09/15/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

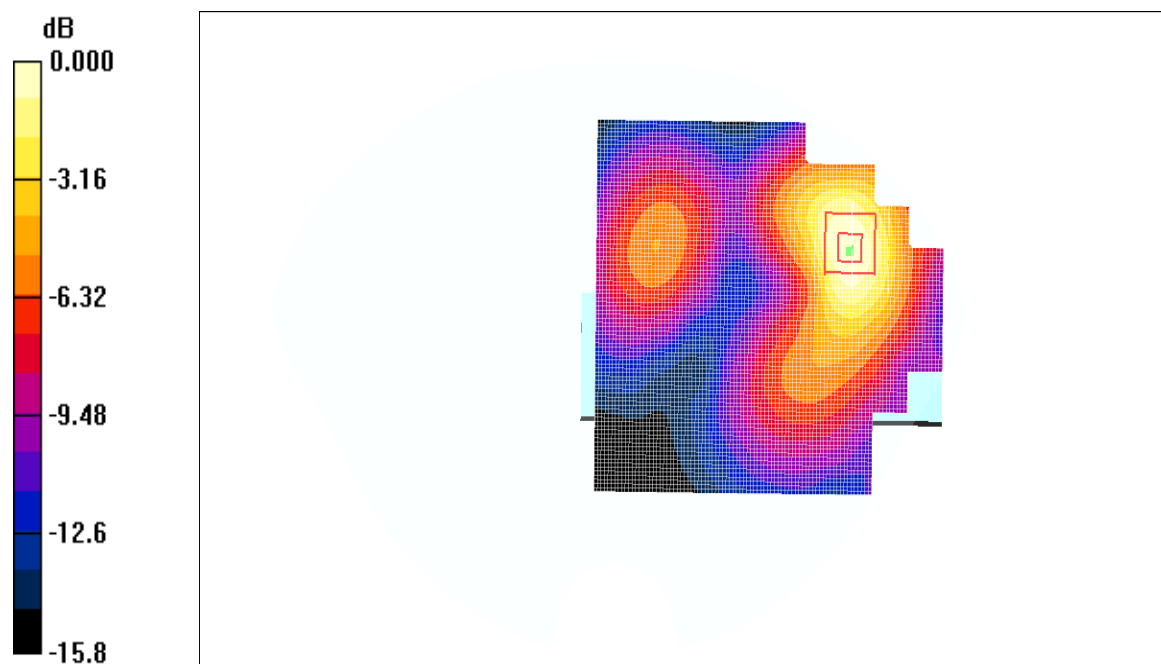
Probe: ET3DV6 - SN1729; ConvF(4.69, 4.69, 4.69); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial: TP-1244

Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.661, Rear, Slider Up, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.510mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.90 V/m; Power Drift = 0.043 dB
Peak SAR (extrapolated) = 0.922 W/kg
SAR(1 g) = 0.463mW/g; SAR(10 g) = 0.266mW/g
Maximum value of SAR (measured) = 0.493mW/g



0 dB = 0.493mW/g

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Serial:#1**

Communication System: GPRS 1900; Frequency: 1880.00 MHz; Duty Cycle: 1:2.075
Medium: Body 1880.00 MHz; ($\sigma = 1.48\text{mho/m}$; $\epsilon_r = 51.9$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

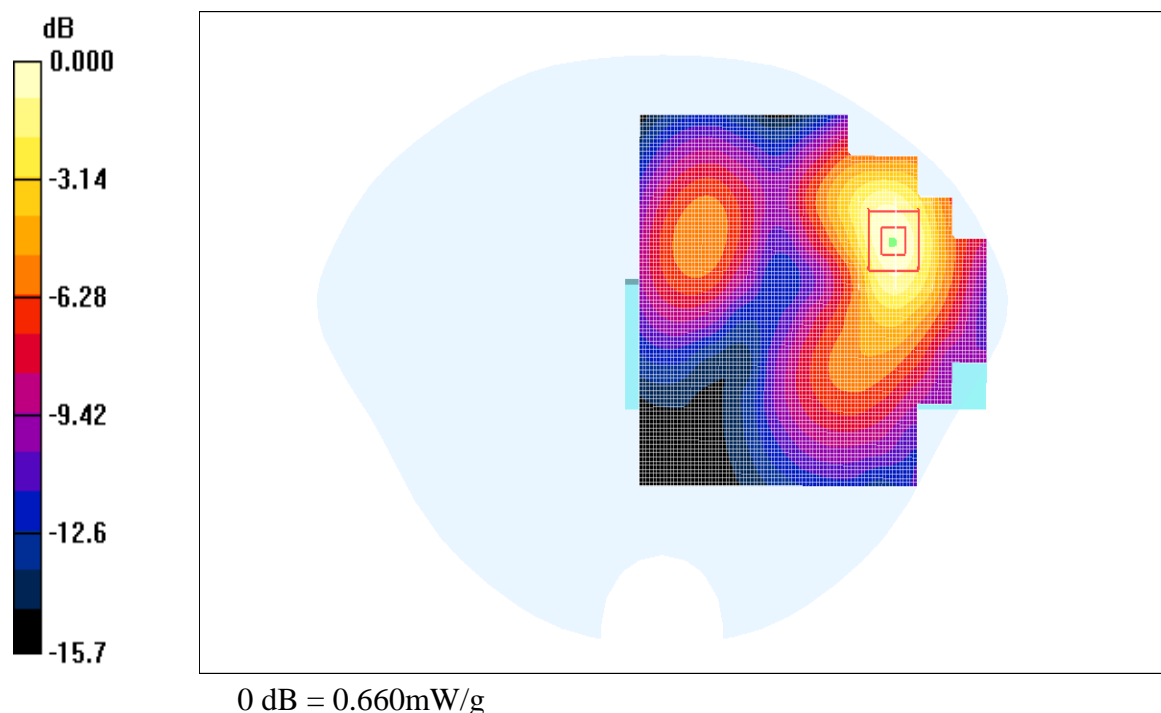
Test Date: 09/15/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ET3DV6 - SN1729; ConvF(4.69, 4.69, 4.69); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial:TP-1244
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.661, Rear, Slider Up, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.674mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.69 V/m; Power Drift = 0.023 dB
Peak SAR (extrapolated) = 1.24 W/kg
SAR(1 g) = 0.620mW/g; SAR(10 g) = 0.356mW/g
Maximum value of SAR (measured) = 0.660mW/g



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**DUT: GW620f;Type: Cellular / PCS GSM /WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: WCDMA; Frequency: 836.40 MHz; Duty Cycle: 1:1
Medium: Body 836.40 MHz;($\sigma = 0.969\text{mho/m}$; $\epsilon_r = 54$; $\rho = 1000 \text{ kg/m}^3$)
Phantom section: Flat Section

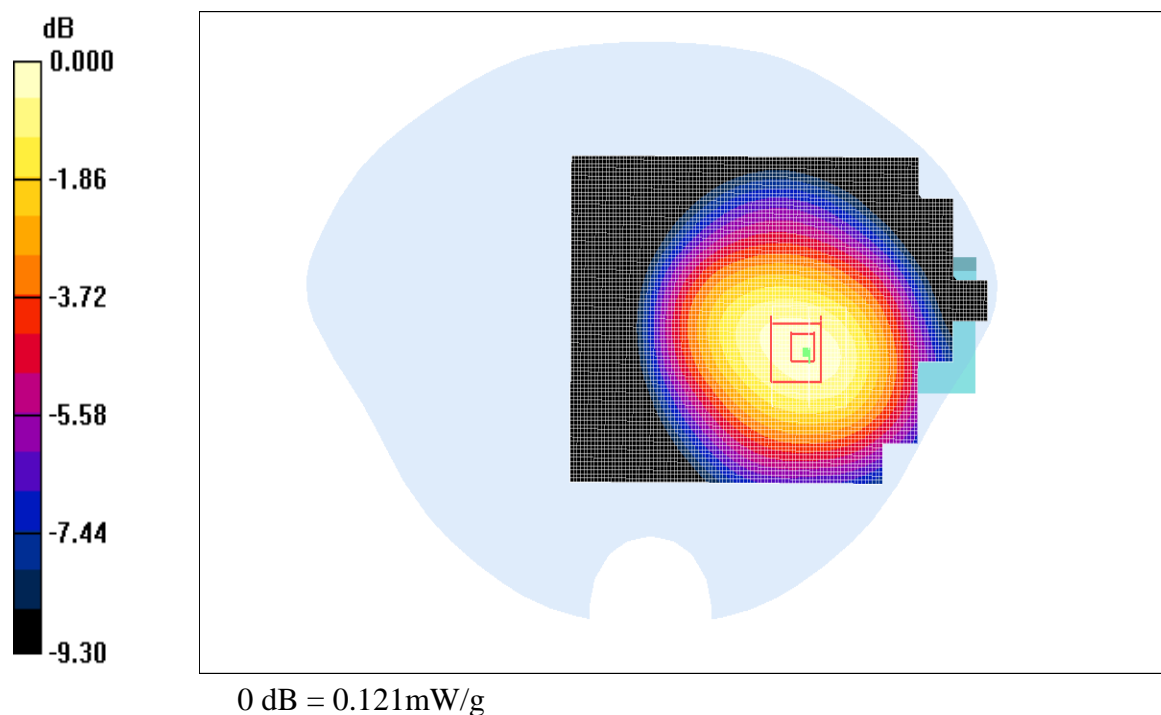
Test Date: 09/14/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ET3DV6 - SN1729; ConvF(5.84, 5.84, 5.84); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 835; Type: SAM 4.0; Serial:TP-1066
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.4182, Front, Slider Down, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.116mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.05 V/m; Power Drift = 0.268dB
Peak SAR (extrapolated) = 0.165 W/kg
SAR(1 g) = 0.115mW/g; SAR(10 g) = 0.084mW/g
Maximum value of SAR (measured) = 0.121mW/g



LG Electronics Inc.

**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: WCDMA; Frequency: 836.40 MHz; Duty Cycle: 1:1
Medium: Body 836.40 MHz; ($\sigma = 0.969\text{mho/m}$; $\epsilon_r = 54$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

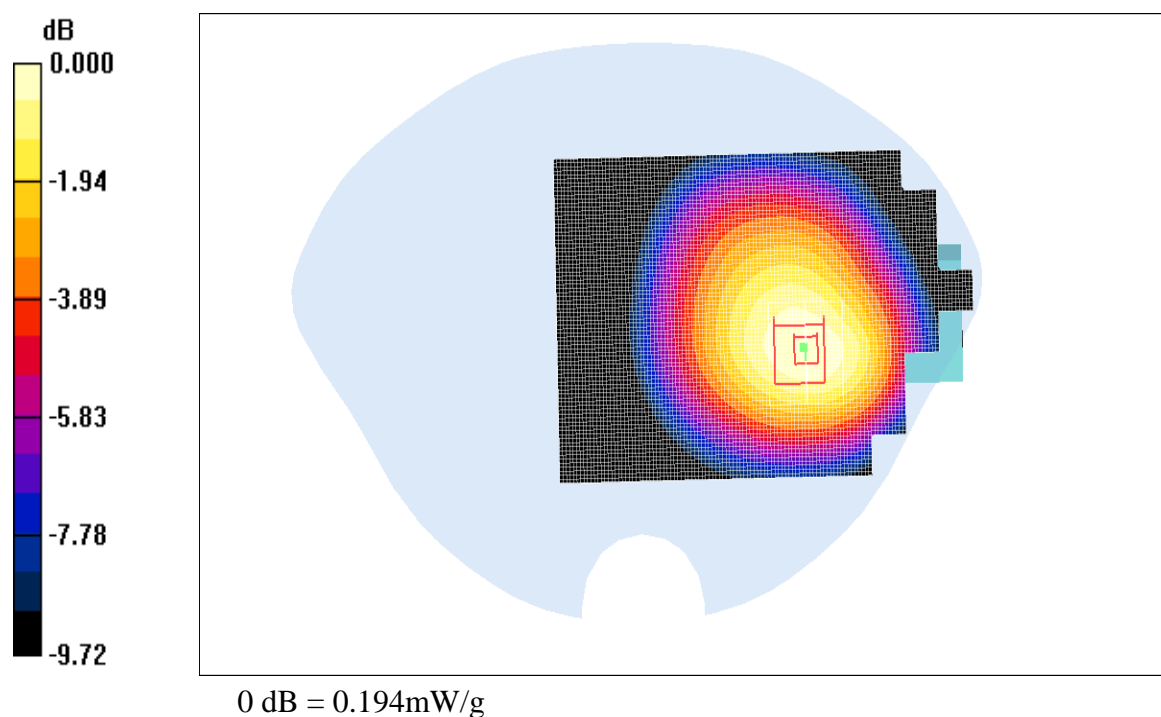
Test Date: 09/14/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ET3DV6 - SN1729; ConvF(5.84, 5.84, 5.84); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 835; Type: SAM 4.0; Serial:TP-1066
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.4182, Front, Slider Up, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.195mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.49 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 0.278 W/kg
SAR(1 g) = 0.185mW/g; SAR(10 g) = 0.130mW/g
Maximum value of SAR (measured) = 0.194mW/g



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Serial:#1**

Communication System: WCDMA; Frequency: 836.40 MHz; Duty Cycle: 1:1
Medium: Body 836.40 MHz; ($\sigma = 0.969\text{mho/m}$; $\epsilon_r = 54$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

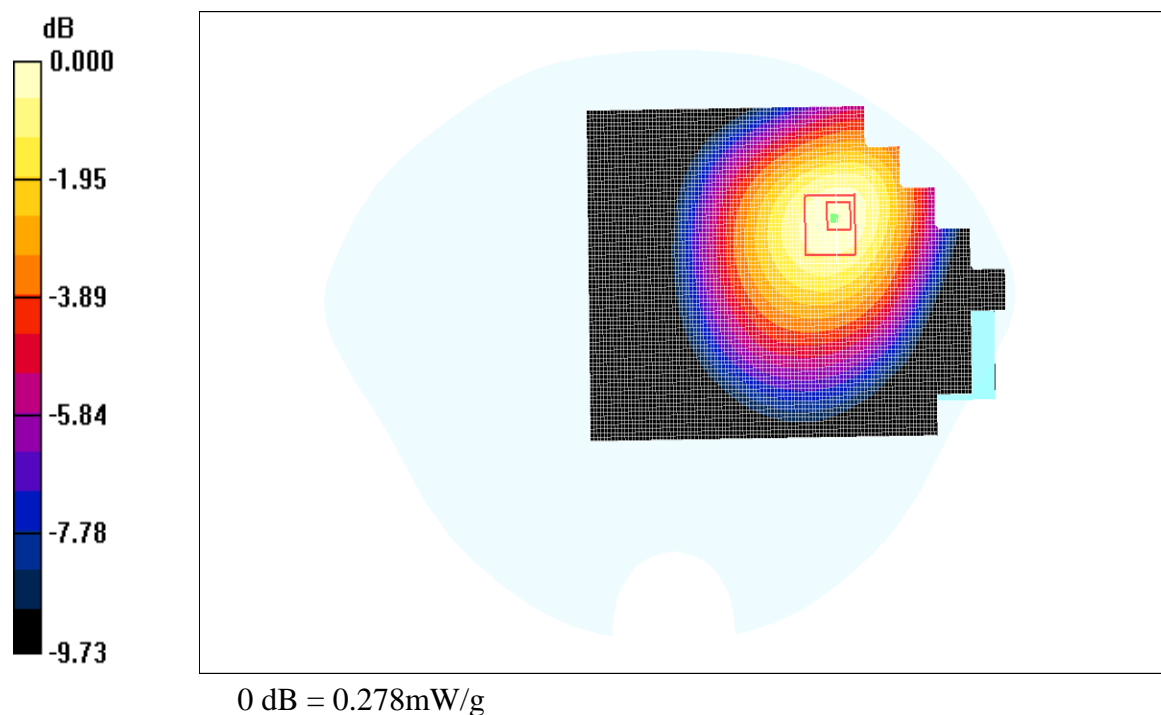
Test Date: 09/14/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ET3DV6 - SN1729; ConvF(5.84, 5.84, 5.84); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 835; Type: SAM 4.0; Serial:TP-1066
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.4182, Rear, Slider Up, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.273mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.97 V/m; Power Drift = 0.000 dB
Peak SAR (extrapolated) = 0.396 W/kg
SAR(1 g) = 0.262mW/g; SAR(10 g) = 0.182mW/g
Maximum value of SAR (measured) = 0.278mW/g



LG Electronics Inc.

**DUT: GW620f;Type: Cellular / PCS GSM /WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: WLAN; Frequency: 2437.00 MHz; Duty Cycle: 1:1
Medium: Muscle 2437.00 MHz;($\sigma = 1.94\text{mho/m}$; $\epsilon_r = 51$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

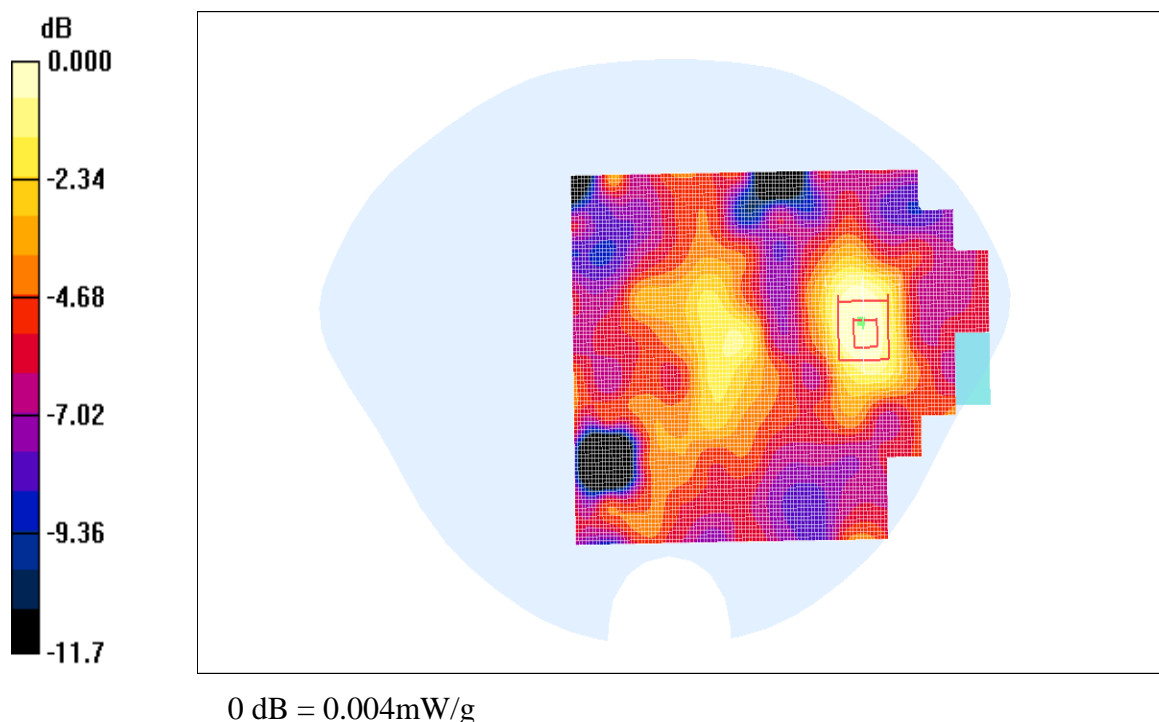
Test Date: 09/16/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3066; ConvF(3.87, 3.87, 3.87); Calibrated: 2009-02-16
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial:TP-1244
Measurement SW: DAS4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.06, Front, Slider Down, 11Mbps, Fixed Ant., Standard Battery

Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.005mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.752 V/m; Power Drift = -0.258 dB
Peak SAR (extrapolated) = 0.009 W/kg
SAR(1 g) = 0.00427mW/g; SAR(10 g) = 0.00272mW/g
Maximum value of SAR (measured) = 0.004mW/g



LG Electronics Inc.

**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: WLAN; Frequency: 2437.00 MHz; Duty Cycle: 1:1
Medium: Muscle 2437.00 MHz; ($\sigma = 1.94\text{mho/m}$; $\epsilon_r = 51$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

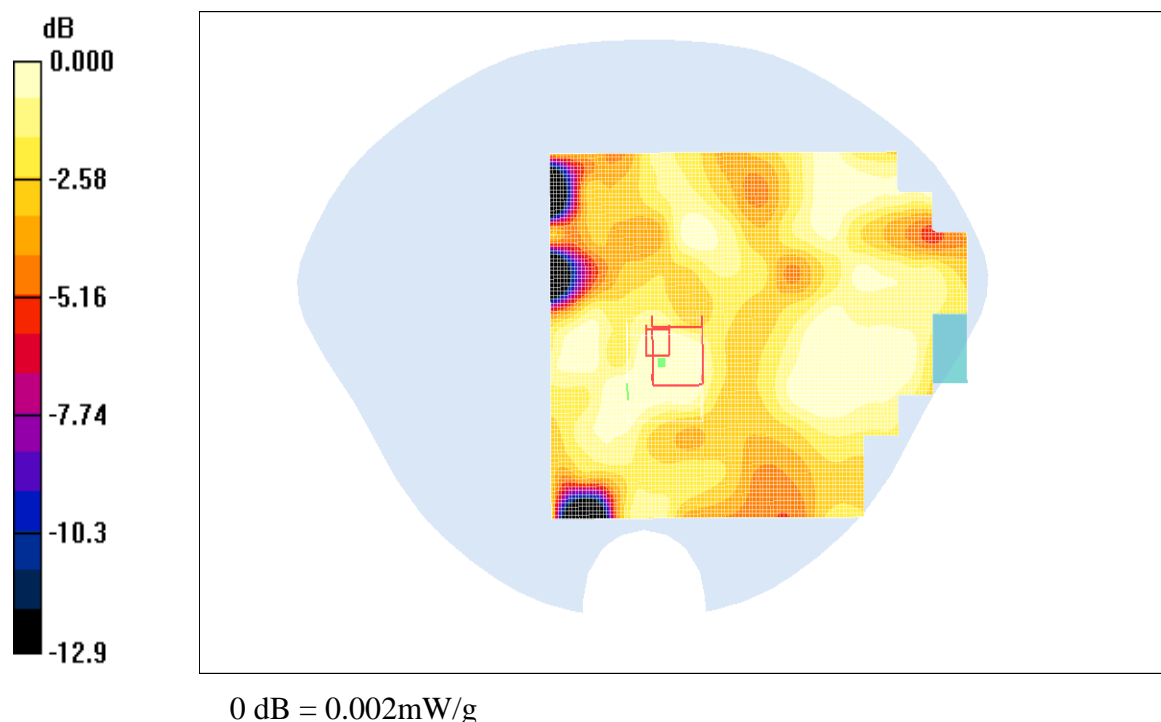
Test Date: 09/16/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3066; ConvF(3.87, 3.87, 3.87); Calibrated: 2009-02-16
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial:TP-1244
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.06, Front, Slider Up, 11Mbps, Fixed Ant., Standard Battery

Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.003mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.861 V/m; Power Drift = -0.356 dB
Peak SAR (extrapolated) = 0.003 W/kg
SAR(1 g) = 0.00209mW/g; SAR(10 g) = 0.00132mW/g
Maximum value of SAR (measured) = 0.002mW/g



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Serial:#1**

Communication System: WLAN; Frequency: 2437.00 MHz; Duty Cycle: 1:1
Medium: Muscle 2437.00 MHz; ($\sigma = 1.94\text{mho/m}$; $\epsilon_r = 51$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

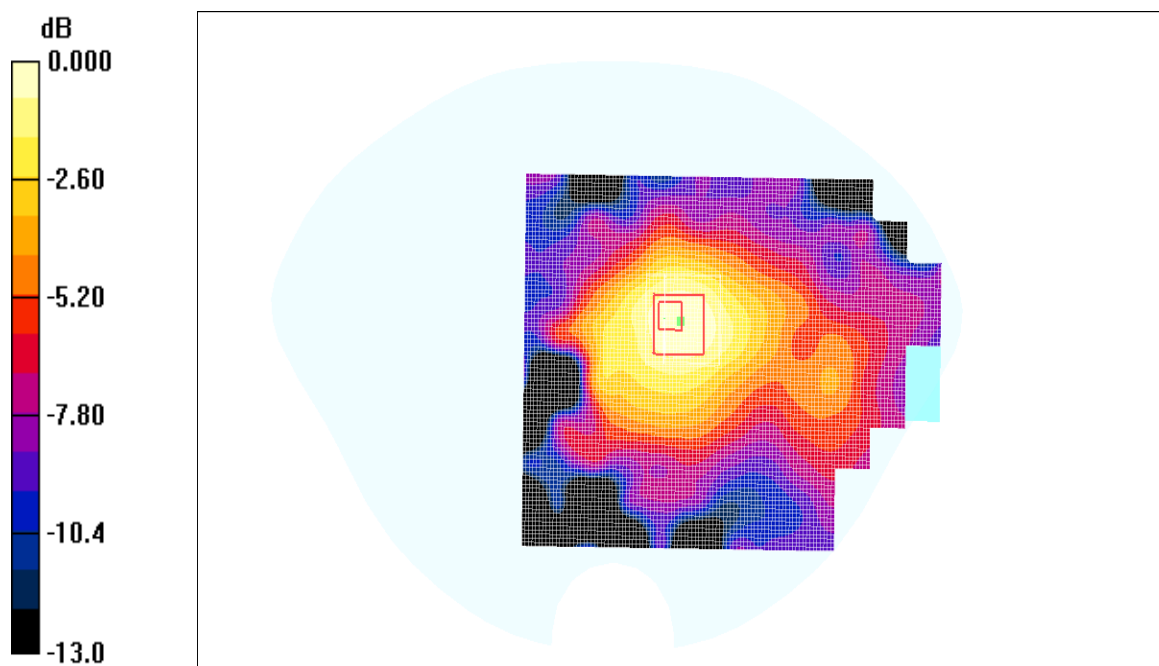
Test Date: 09/16/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3066; ConvF(3.87, 3.87, 3.87); Calibrated: 2009-02-16
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial:TP-1244
Measurement SW: DAS4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.06, Rear, Slider Down, 11Mbps, Fixed Ant., Standard Battery

Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.010mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.70 V/m; Power Drift = 0.398 dB
Peak SAR (extrapolated) = 0.020 W/kg
SAR(1 g) = 0.00972mW/g; SAR(10 g) = 0.00559mW/g
Maximum value of SAR (measured) = 0.011mW/g



0 dB = 0.011mW/g

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**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: WLAN; Frequency: 2437.00 MHz; Duty Cycle: 1:1
Medium: Muscle 2437.00 MHz; ($\sigma = 1.94\text{mho/m}$; $\epsilon_r = 51$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

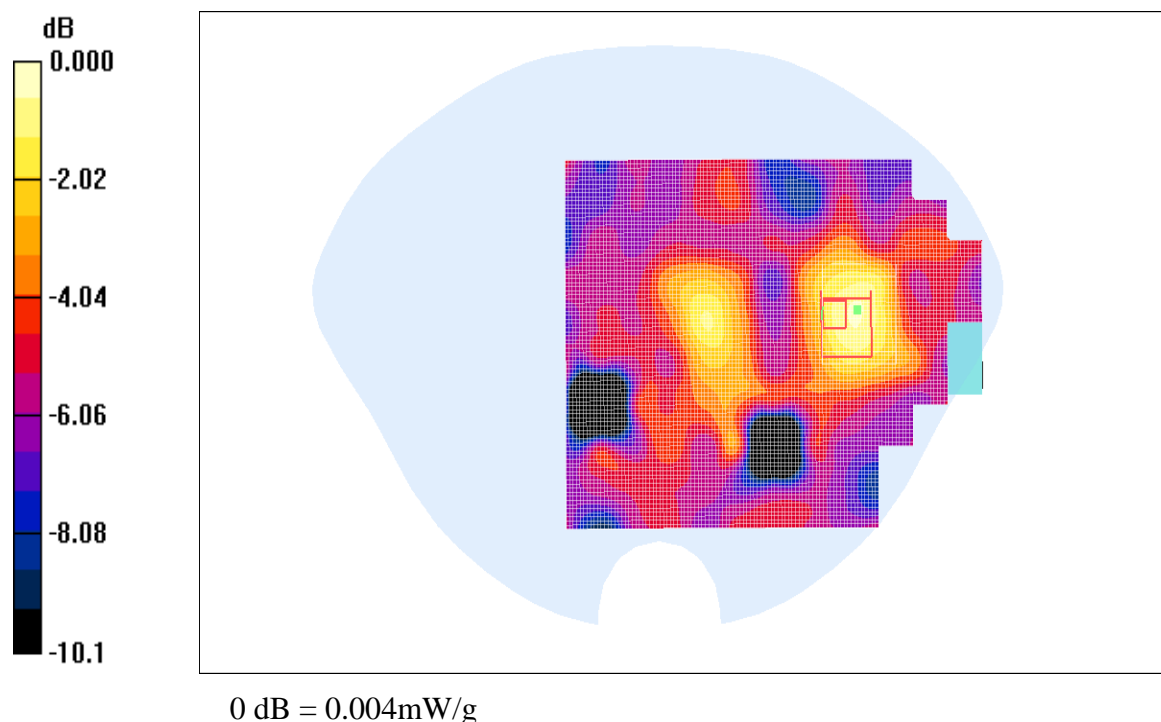
Test Date: 09/16/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3066; ConvF(3.87, 3.87, 3.87); Calibrated: 2009-02-16
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial:TP-1244
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.06, Front, Slider Down, 24Mbps, Fixed Ant., Standard Battery

Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.004mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.768V/m; Power Drift = 0.379 dB
Peak SAR (extrapolated) = 0.009 W/kg
SAR(1 g) = 0.00349mW/g; SAR(10 g) = 0.00219mW/g
Maximum value of SAR (measured) = 0.004mW/g



LG Electronics Inc.

**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: WLAN; Frequency: 2437.00 MHz; Duty Cycle: 1:1
Medium: Muscle 2437.00 MHz; ($\sigma = 1.94\text{mho/m}$; $\epsilon_r = 51$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

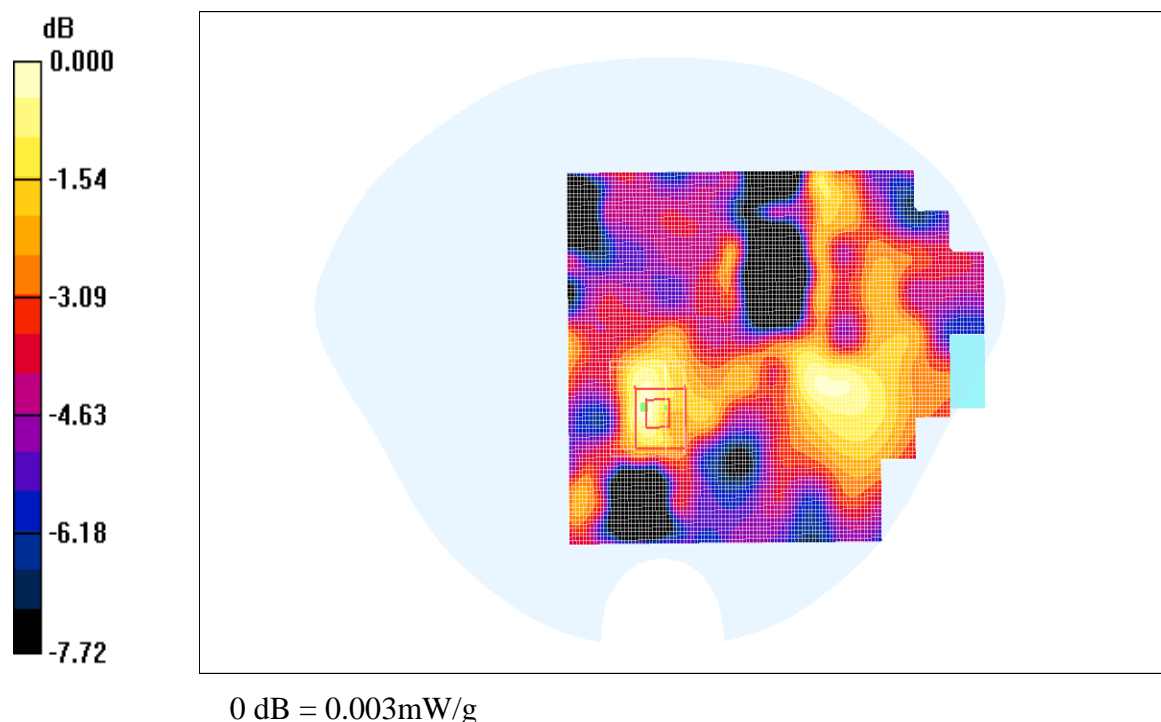
Test Date: 09/16/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3066; ConvF(3.87, 3.87, 3.87); Calibrated: 2009-02-16
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial:TP-1244
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.06, Front, Slider Up, 24Mbps, Fixed Ant., Standard Battery

Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.003mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.878 V/m; Power Drift = 0.165dB
Peak SAR (extrapolated) = 0.004W/kg
SAR(1 g) = 0.00228mW/g; SAR(10 g) = 0.00148mW/g
Maximum value of SAR (measured) = 0.003mW/g



LG Electronics Inc.

**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: WLAN; Frequency: 2437.00 MHz; Duty Cycle: 1:1
Medium: Muscle 2437.00 MHz; ($\sigma = 1.94\text{mho/m}$; $\epsilon_r = 51$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

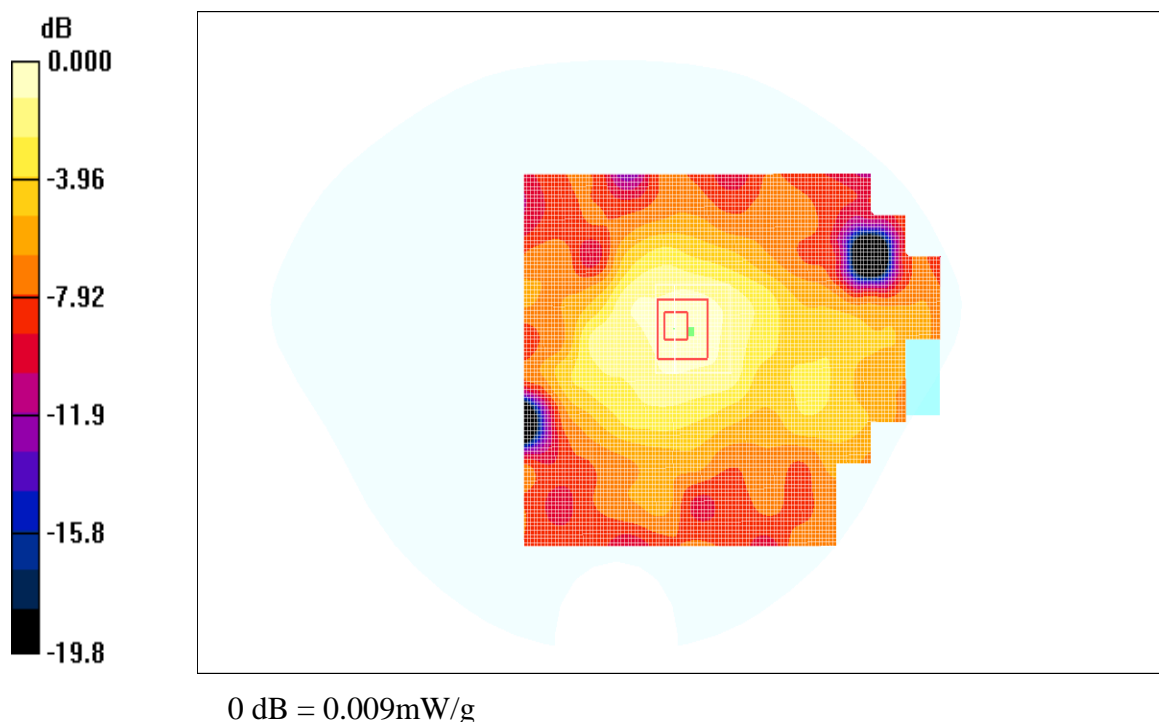
Test Date: 09/16/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3066; ConvF(3.87, 3.87, 3.87); Calibrated: 2009-02-16
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial:TP-1244
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.06, Rear, Slider Down, 24Mbps, Fixed Ant., Standard Battery

Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.007mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.56 V/m; Power Drift = -0.219dB
Peak SAR (extrapolated) = 0.019W/kg
SAR(1 g) = 0.00817mW/g; SAR(10 g) = 0.00467mW/g
Maximum value of SAR (measured) = 0.009mW/g



LG Electronics Inc.

**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: GSM 850; Frequency: 836.60 MHz; Duty Cycle: 1:8.3
Medium: Head 836.60 MHz; ($\sigma = 0.915\text{mho/m}$; $\epsilon_r = 42.7$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Left Section

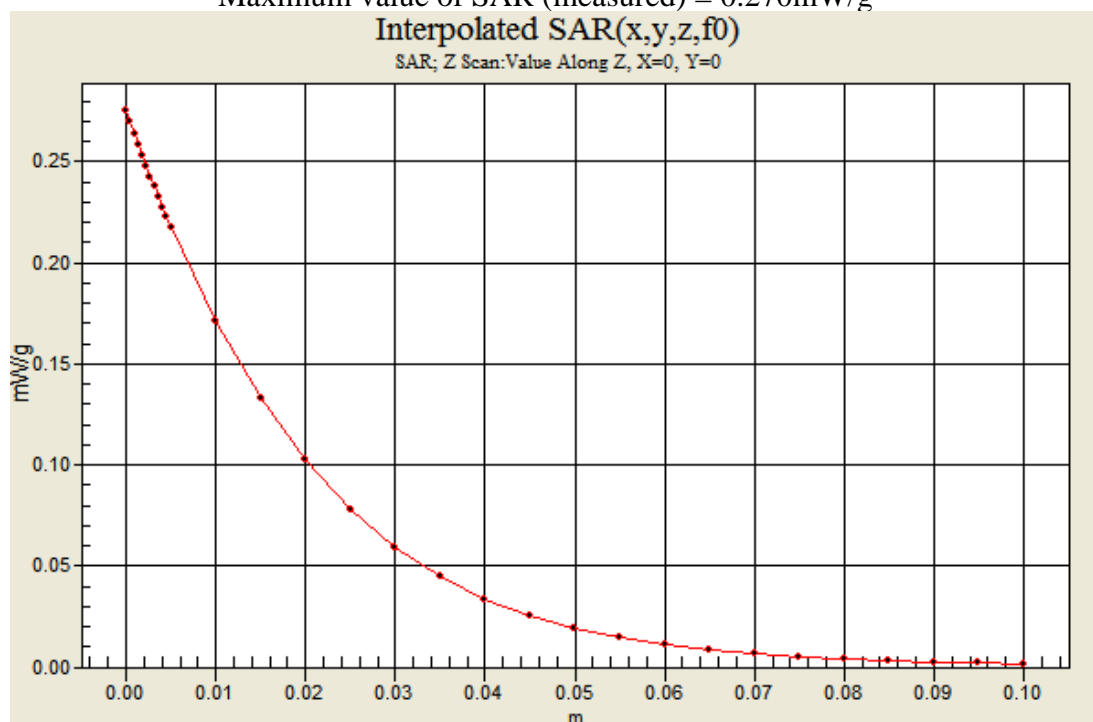
Test Date: 09/14/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ET3DV6 - SN1729; ConvF(6.08, 6.08, 6.08); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 835; Type: SAM 4.0; Serial:TP-1066
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Left Head Touch, Ch.190, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.278mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.50 V/m; Power Drift = -0.114 dB
Peak SAR (extrapolated) = 0.362W/kg
SAR(1 g) = 0.257mW/g; SAR(10 g) = 0.184mW/g
Maximum value of SAR (measured) = 0.270mW/g



0 dB = 0.270mW/g

LG Electronics Inc.

**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: PCS 1900; Frequency: 1880.00 MHz; Duty Cycle: 1:8.3
Medium: Head 1880.00 MHz; ($\sigma = 1.4\text{mho/m}$; $\epsilon_r = 38.7$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Right Section

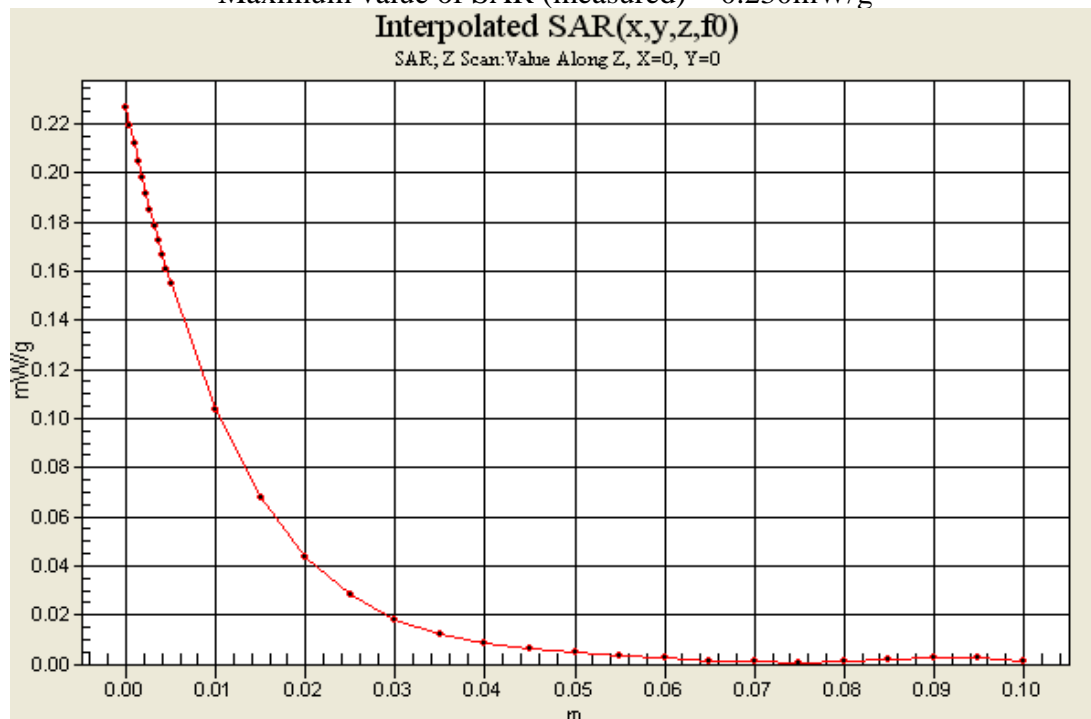
Test Date: 09/15/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ET3DV6 - SN1729; ConvF(4.96, 4.96, 4.96); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial:TP-1244
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Right Head Tilt, Ch.661, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.238mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.9 V/m; Power Drift = 0.053 dB
Peak SAR (extrapolated) = 0.439 W/kg
SAR(1 g) = 0.220mW/g; SAR(10 g) = 0.116mW/g
Maximum value of SAR (measured) = 0.230mW/g



0 dB = 0.230mW/g

LG Electronics Inc.

**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: WCDMA; Frequency: 836.40 MHz; Duty Cycle: 1:1
Medium: Head 836.40 MHz; ($\sigma = 0.914\text{mho/m}$; $\epsilon_r = 42.7$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Left Section

Test Date: 09/14/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

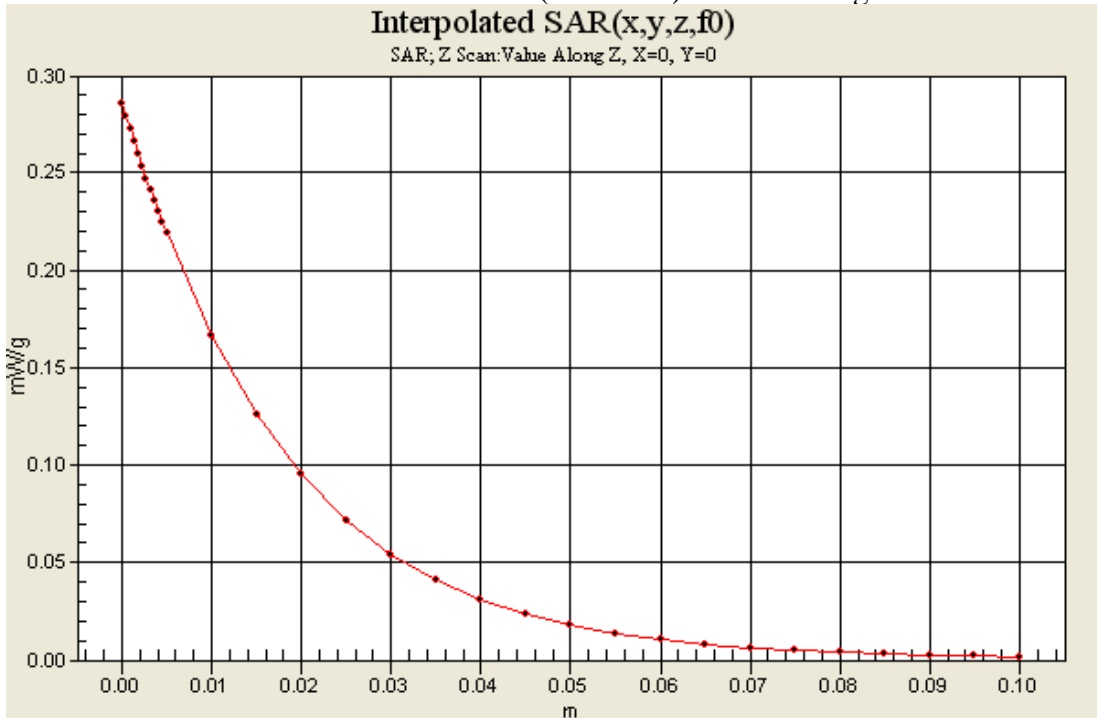
Probe: ET3DV6 - SN1729; ConvF(6.08, 6.08, 6.08); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 835; Type: SAM 4.0; Serial:TP-1066

Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Left Head Touch, Ch.4182, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.306mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.28V/m; Power Drift = 0.211 dB
Peak SAR (extrapolated) = 0.407 W/kg
SAR(1 g) = 0.284mW/g; SAR(10 g) = 0.203mW/g
Maximum value of SAR (measured) = 0.292mW/g



0 dB = 0.292mW/g

LG Electronics Inc.

**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: GPRS 850; Frequency: 848.80 MHz; Duty Cycle: 1:2.075
Medium: Body 848.80 MHz; ($\sigma = 0.983\text{mho/m}$; $\epsilon_r = 51.9.8$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

Test Date: 09/14/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

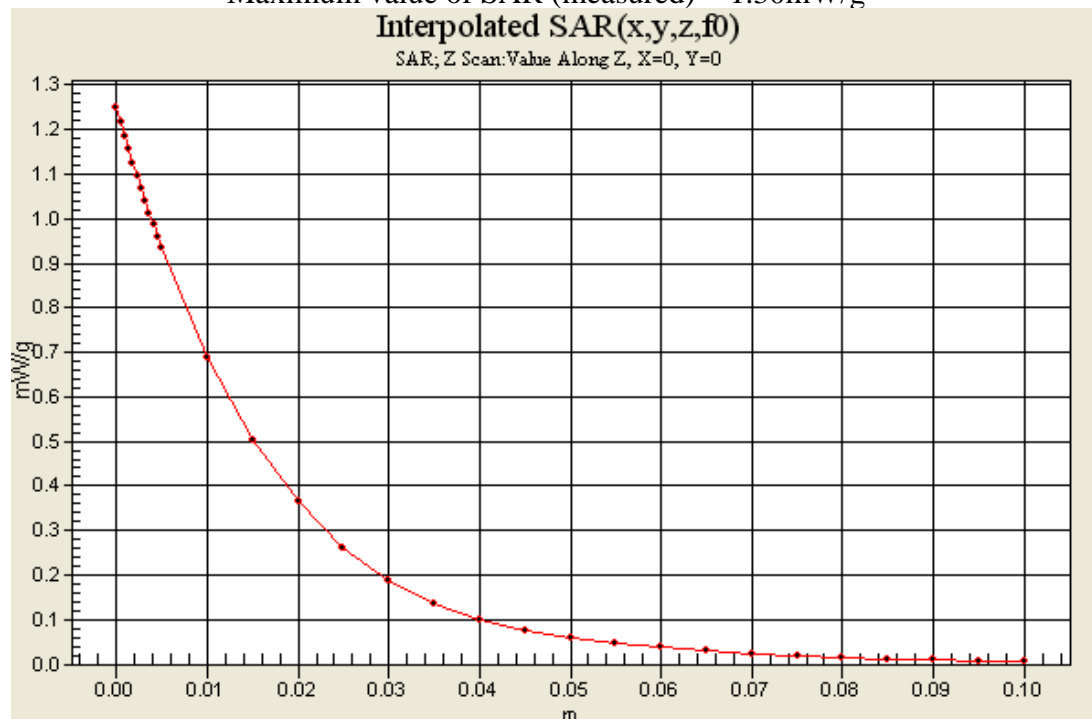
Probe: ET3DV6 - SN1729; ConvF(5.84, 5.84, 5.84); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 835; Type: SAM 4.0; Serial:TP-1066

Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.251, Rear, Slider Up, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.31mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.6 V/m; Power Drift = -0.062 dB
Peak SAR (extrapolated) = 1.87W/kg
SAR(1 g) = 1.23mW/g; SAR(10 g) = 0.846mW/g
Maximum value of SAR (measured) = 1.30mW/g



0 dB = 1.30mW/g

LG Electronics Inc.

**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: GPRS 1900; Frequency: 1880.00 MHz; Duty Cycle: 1:2.075
Medium: Body 1880.00 MHz; ($\sigma = 1.48\text{mho/m}$; $\epsilon_r = 51.9$; $\rho = 1000\text{ kg/m}^3$)
Phantom section: Flat Section

Test Date: 09/15/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

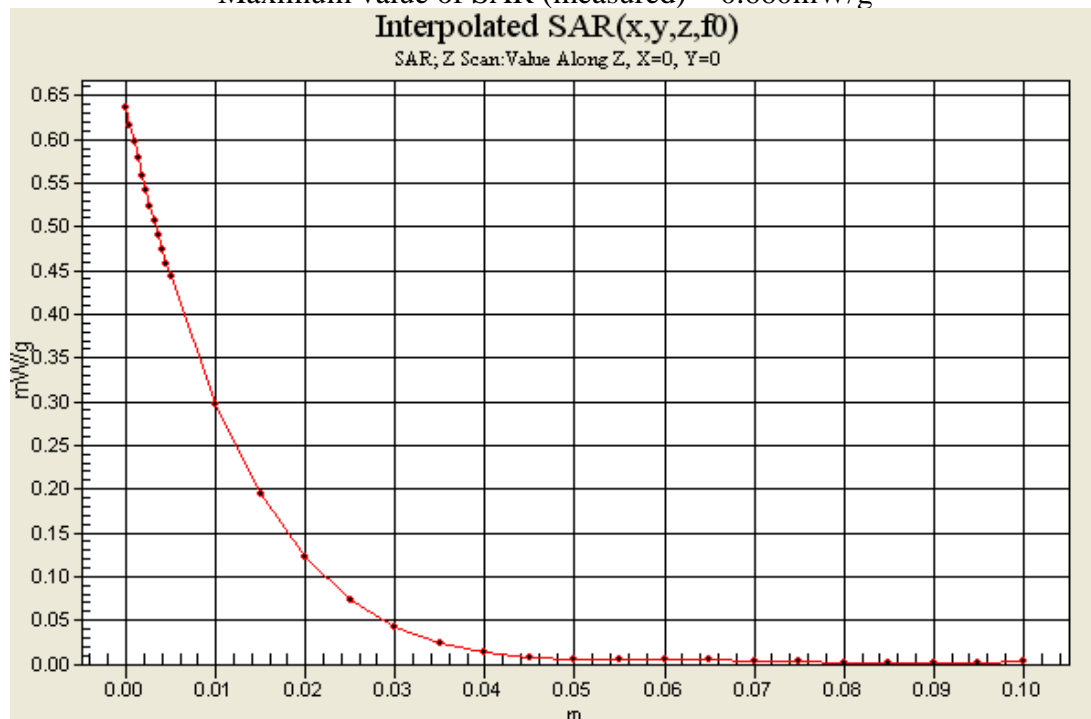
Probe: ET3DV6 - SN1729; ConvF(4.69, 4.69, 4.69); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 1800; Type: SAM 4.0; Serial:TP-1244

Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.661, Rear, Slider Up, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.674mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.69 V/m; Power Drift = 0.023 dB
Peak SAR (extrapolated) = 1.24 W/kg
SAR(1 g) = 0.620mW/g; SAR(10 g) = 0.356mW/g
Maximum value of SAR (measured) = 0.660mW/g



0 dB = 0.660mW/g

LG Electronics Inc.

**DUT: GW620f; Type: Cellular / PCS GSM / WCDMA / EDGE Phone with Bluetooth & WLAN;
Serial:#1**

Communication System: WCDMA; Frequency: 836.40 MHz; Duty Cycle: 1:1
Medium: Body 836.40 MHz; ($\sigma = 0.969 \text{ mho/m}$; $\epsilon_r = 54$; $\rho = 1000 \text{ kg/m}^3$)
Phantom section: Flat Section

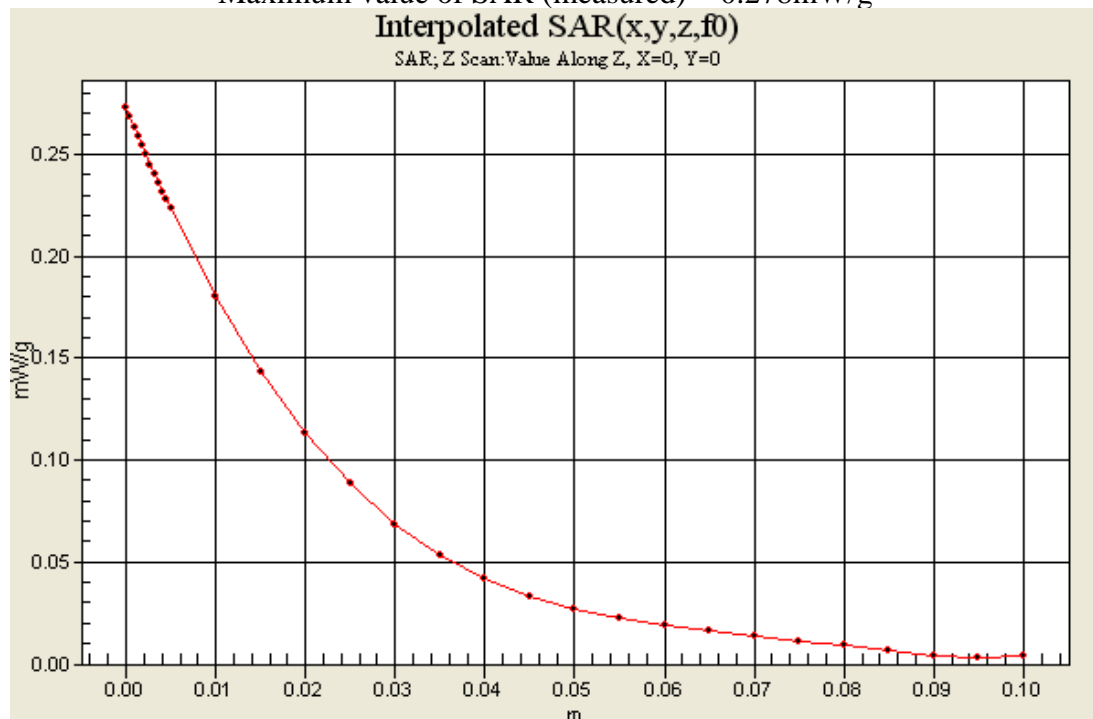
Test Date: 09/14/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ET3DV6 - SN1729; ConvF(5.84, 5.84, 5.84); Calibrated: 2009-01-20
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM 835; Type: SAM 4.0; Serial:TP-1066
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Flat Touch, Ch.4182, Rear, Slider Up, Fixed Ant., Standard Battery

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.273mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.97 V/m; Power Drift = 0.000 dB
Peak SAR (extrapolated) = 0.396 W/kg
SAR(1 g) = 0.262mW/g; SAR(10 g) = 0.182mW/g
Maximum value of SAR (measured) = 0.278mW/g



0 dB = 0.278mW/g

LG Electronics Inc.

DUT: Dipole 2450MHz; Type: D2450V2; Serial: 768

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: Head 2450 MHz; ($\sigma = 1.84$ mho/m; $\epsilon_r = 38.8$; $\rho = 1000$ kg/m³)
Phantom section: Flat Section

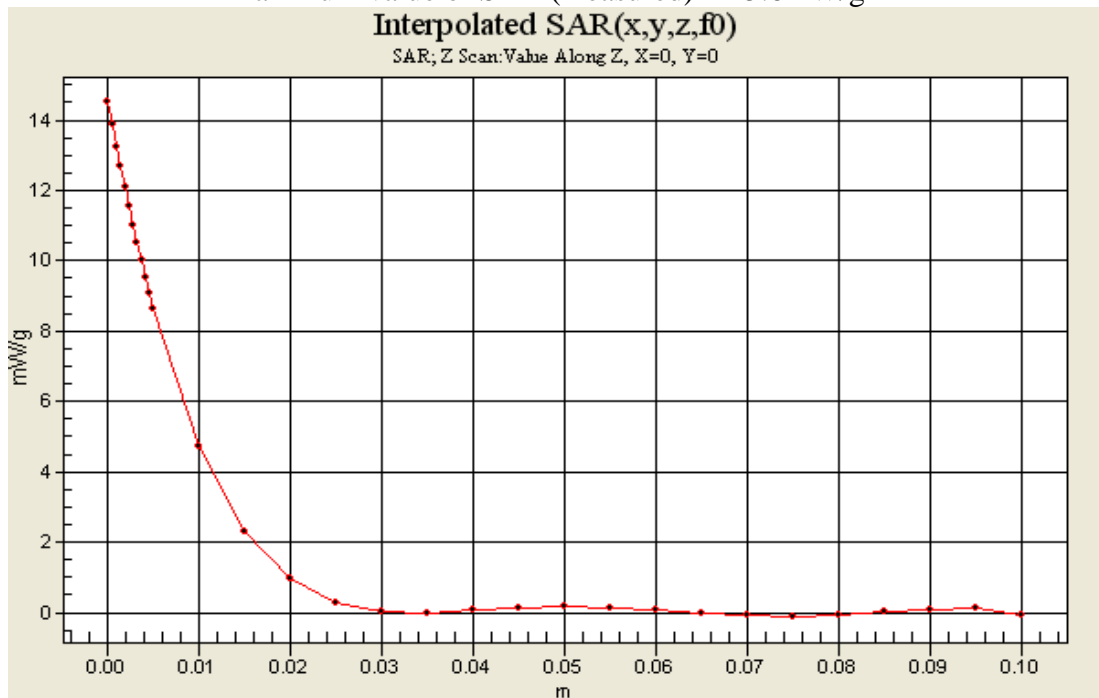
Test Date: 09/16/2009; Ambient Temp: 22.0°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3066; ConvF(4.2, 4.2, 4.2); Calibrated: 2009-02-16
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn646; Calibrated: 2009-05-25
Phantom: SAM with CRP 1800MHz; Type: SAM; Serial: TP-1244
Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

2450 MHz Dipole Validation

Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 16.3mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.6 V/m; Power Drift = -0.049 dB
Peak SAR (extrapolated) = 31.0W/kg
SAR(1 g) = 13.9mW/g; SAR(10 g) = 6.22mW/g
Maximum value of SAR (measured) = 15.6mW/g



0 dB = 15.6mW/g

APPENDIX C: Calibration Certificates

**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 Accreditation Service (SAS)
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: **LG Dymstec**

Certificate No.: **ET3-1729_Jan09**

| CALIBRATION CERTIFICATE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|-----------------------------------|--|-------------------|------|----------------------------|-----------------------|--------------------|------------|--------------------------|--------|---------------------|------------|--------------------------|--------|---------------------|------------|--------------------------|--------|---------------------------|----------------|--------------------------|--------|----------------------------|-----------------|---------------------------|--------|----------------------------|-----------------|--------------------------|--------|------------------------|----------|-------------------------------|--------|------|---------|-------------------------------|--------|---------------------|------|-----------------------|-----------------|-----------------------|--------------|----------------------------------|------------------------|---------------------------|------------|-----------------------------------|------------------------|
| Object | ET3DV6 SN:1729 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibration procedure(s) | QA/CAL-01/v6 and QA/CAL-23/v3 Calibration procedure for dosimetric E-field probes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibration date: | January 20, 2009 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Condition of the calibrated item | In Tolerance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p> <table border="1"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter E4419B</td> <td>GB41293874</td> <td>1-Apr-08 (No. 217-00788)</td> <td>Apr-09</td> </tr> <tr> <td>Power sensor E4412A</td> <td>MY41495277</td> <td>1-Apr-08 (No. 217-00788)</td> <td>Apr-09</td> </tr> <tr> <td>Power sensor E4412A</td> <td>MY41498087</td> <td>1-Apr-08 (No. 217-00788)</td> <td>Apr-09</td> </tr> <tr> <td>Reference 3 dB Attenuator</td> <td>SN: S5054 (3c)</td> <td>1-Jul-08 (No. 217-00865)</td> <td>Jul-09</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: S5086 (20b)</td> <td>31-Mar-08 (No. 217-00787)</td> <td>Apr-09</td> </tr> <tr> <td>Reference 30 dB Attenuator</td> <td>SN: S5129 (30b)</td> <td>1-Jul-08 (No. 217-00866)</td> <td>Jul-09</td> </tr> <tr> <td>Reference Probe ES3DV2</td> <td>SN: 3013</td> <td>2-Jan-09 (No. ES3-3013_Jan09)</td> <td>Jan-10</td> </tr> <tr> <td>DAE4</td> <td>SN: 660</td> <td>9-Sep-08 (No. DAE4-660_Sep08)</td> <td>Sep-09</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Secondary Standards</th> <th>ID #</th> <th>Check Date (in house)</th> <th>Scheduled Check</th> </tr> </thead> <tbody> <tr> <td>RF generator HP 8648C</td> <td>US3642U01700</td> <td>4-Aug-99 (in house check Oct-07)</td> <td>In house check: Oct-09</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US37390585</td> <td>18-Oct-01 (in house check Oct-08)</td> <td>In house check: Oct-09</td> </tr> </tbody> </table> | | | | Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration | Power meter E4419B | GB41293874 | 1-Apr-08 (No. 217-00788) | Apr-09 | Power sensor E4412A | MY41495277 | 1-Apr-08 (No. 217-00788) | Apr-09 | Power sensor E4412A | MY41498087 | 1-Apr-08 (No. 217-00788) | Apr-09 | Reference 3 dB Attenuator | SN: S5054 (3c) | 1-Jul-08 (No. 217-00865) | Jul-09 | Reference 20 dB Attenuator | SN: S5086 (20b) | 31-Mar-08 (No. 217-00787) | Apr-09 | Reference 30 dB Attenuator | SN: S5129 (30b) | 1-Jul-08 (No. 217-00866) | Jul-09 | Reference Probe ES3DV2 | SN: 3013 | 2-Jan-09 (No. ES3-3013_Jan09) | Jan-10 | DAE4 | SN: 660 | 9-Sep-08 (No. DAE4-660_Sep08) | Sep-09 | Secondary Standards | ID # | Check Date (in house) | Scheduled Check | RF generator HP 8648C | US3642U01700 | 4-Aug-99 (in house check Oct-07) | In house check: Oct-09 | Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (in house check Oct-08) | In house check: Oct-09 |
| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power meter E4419B | GB41293874 | 1-Apr-08 (No. 217-00788) | Apr-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power sensor E4412A | MY41495277 | 1-Apr-08 (No. 217-00788) | Apr-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power sensor E4412A | MY41498087 | 1-Apr-08 (No. 217-00788) | Apr-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 1-Jul-08 (No. 217-00865) | Jul-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 31-Mar-08 (No. 217-00787) | Apr-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 1-Jul-08 (No. 217-00866) | Jul-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference Probe ES3DV2 | SN: 3013 | 2-Jan-09 (No. ES3-3013_Jan09) | Jan-10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DAE4 | SN: 660 | 9-Sep-08 (No. DAE4-660_Sep08) | Sep-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Secondary Standards | ID # | Check Date (in house) | Scheduled Check | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RF generator HP 8648C | US3642U01700 | 4-Aug-99 (in house check Oct-07) | In house check: Oct-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (in house check Oct-08) | In house check: Oct-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibrated by: | Name | Function | Signature | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Katja Pokovic | Technical Manager |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Approved by: | Name | Function | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Niels Kusjer | Quality Manager | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Issued: January 20, 2009 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Certificate No: ET3-1729_Jan09

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**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 Accreditation Service (SAS)
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
NORM_{x,y,z} sensitivity in free space
ConvF sensitivity in TSL / NORM_{x,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., $\vartheta = 0$ 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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,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.
- DCP_{x,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 $f \leq 800$ 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 NORM_{x,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.

ET3DV6 SN:1729

January 20, 2009

Probe ET3DV6

SN:1729

| | |
|------------------|-------------------|
| Manufactured: | October 1, 2002 |
| Last calibrated: | February 21, 2007 |
| Recalibrated: | January 20, 2009 |

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: ET3-1729_Jan09

Page 3 of 9

ET3DV6 SN:1729

January 20, 2009

DASY - Parameters of Probe: ET3DV6 SN:1729

Sensitivity in Free Space^A

Diode Compression^B

| | | | | |
|-------|--------------|-----------------|-------|-------|
| NormX | 1.66 ± 10.1% | $\mu V/(V/m)^2$ | DCP X | 93 mV |
| NormY | 1.63 ± 10.1% | $\mu V/(V/m)^2$ | DCP Y | 94 mV |
| NormZ | 1.82 ± 10.1% | $\mu V/(V/m)^2$ | DCP Z | 92 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 | | 3.7 mm | 4.7 mm |
| SAR _{be} [%] | Without Correction Algorithm | 10.3 | 5.9 |
| SAR _{be} [%] | With Correction Algorithm | 0.8 | 0.4 |

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

| | | | |
|---|------------------------------|---------------|---------------|
| Sensor Center to Phantom Surface Distance | | 3.7 mm | 4.7 mm |
| SAR _{be} [%] | Without Correction Algorithm | 12.8 | 8.4 |
| SAR _{be} [%] | With Correction Algorithm | 0.9 | 0.3 |

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%.

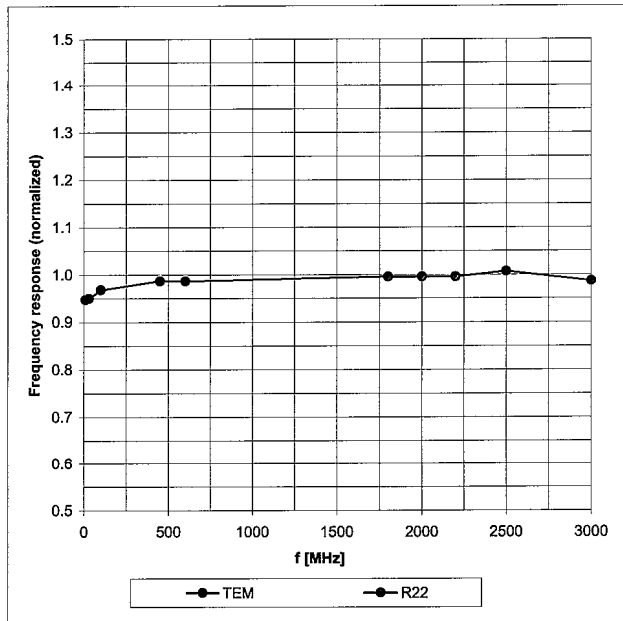
^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).

^B Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1729

January 20, 2009

Frequency Response of E-Field (TEM-Cell:if110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

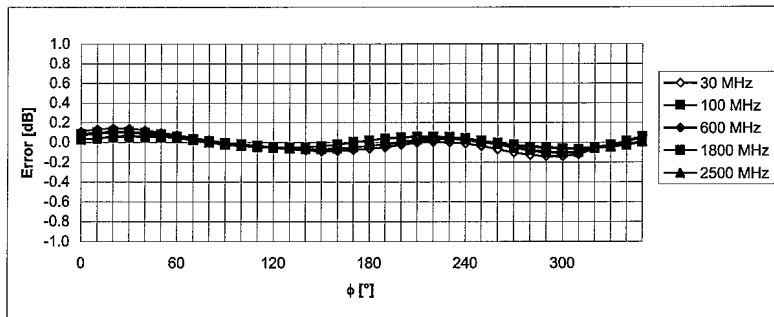
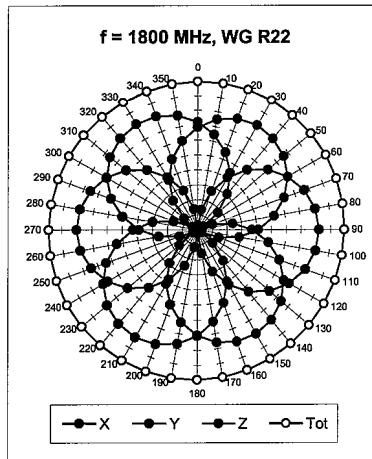
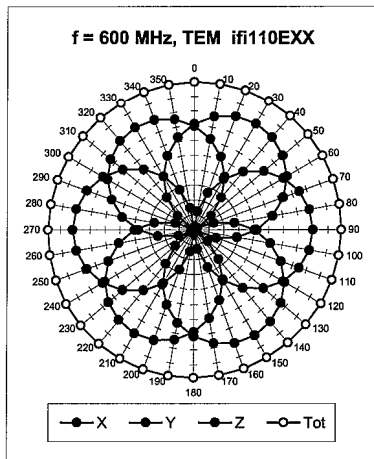
Certificate No: ET3-1729_Jan09

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ET3DV6 SN:1729

January 20, 2009

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



Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

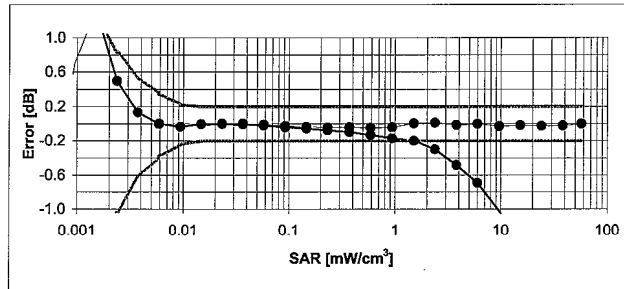
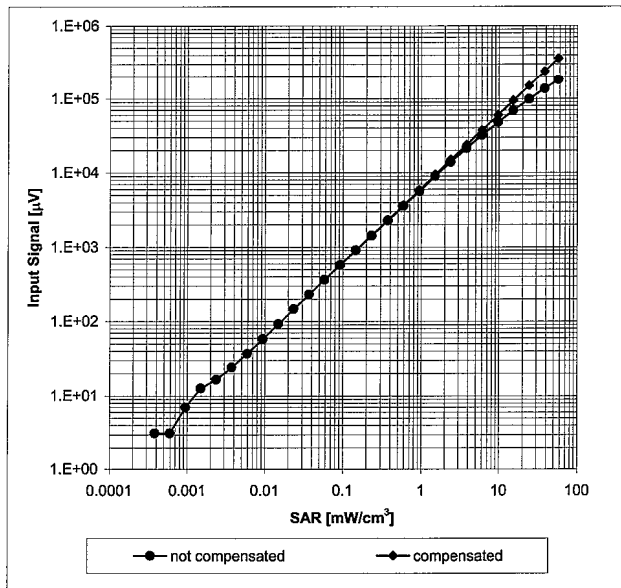
Certificate No: ET3-1729_Jan09

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ET3DV6 SN:1729

January 20, 2009

Dynamic Range f(SAR_{head})
(Waveguide R22, f = 1800 MHz)



Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

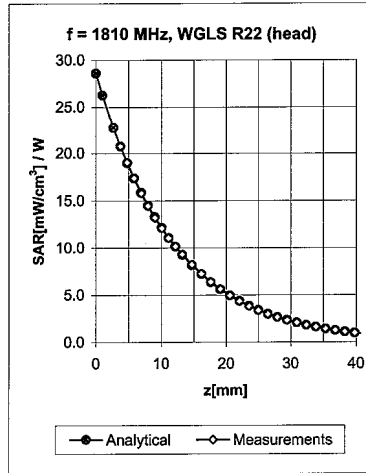
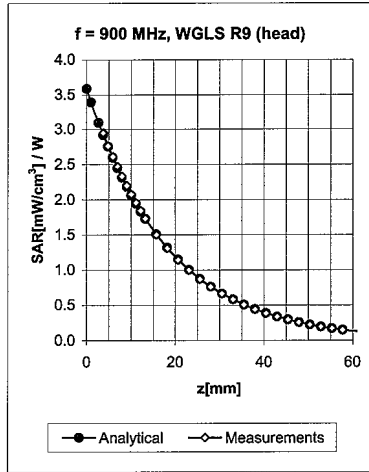
Certificate No: ET3-1729_Jan09

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ET3DV6 SN:1729

January 20, 2009

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% | 0.44 | 2.27 | 5.92 ± 11.0% (k=2) |
| 1810 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.75 | 2.22 | 5.11 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.66 | 2.45 | 4.87 ± 11.0% (k=2) |
| 900 | ± 50 / ± 100 | Body | 55.0 ± 5% | 1.05 ± 5% | 0.39 | 2.60 | 5.82 ± 11.0% (k=2) |
| 1810 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.87 | 2.11 | 4.67 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.99 | 1.87 | 4.65 ± 11.0% (k=2) |

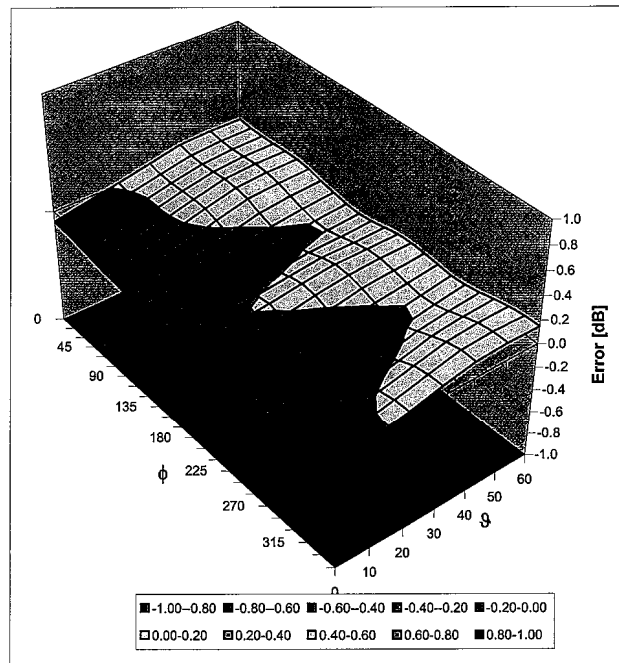
^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ET3DV6 SN:1729

January 20, 2009

Deviation from Isotropy in HSL

Error (ϕ, ϑ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

Certificate No: ET3-1729_Jan09

Page 9 of 9

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s p e a gZeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com**Additional Conversion Factors**
for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1729

Place of Assessment:

Zurich

Date of Assessment:

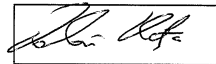
April 27, 2009

Probe Calibration Date:

January 20, 2009

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the recalibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1810 MHz.

Assessed by:



ET3DV6-SN:1729

Page 1 of 2

April 27, 2009

Schmid & Partner Engineering AG

s p e a g

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 Phone +41 44 245 9700, Fax +41 44 245 9779
 info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ET3DV6 - SN:1729

Conversion factor (\pm standard deviation)

| | | | |
|-------------------|-------|---------------|---|
| 835 \pm 50 MHz | ConvF | 6.08 \pm 7% | $\epsilon_r = 41.5 \pm 5\%$ $\sigma = 0.90 \pm 5\%$ mho/m (head tissue) |
| 1900 \pm 50 MHz | ConvF | 4.96 \pm 7% | $\epsilon_r = 40.0 \pm 5\%$ $\sigma = 1.40 \pm 5\%$ mho/m (head tissue) |
| 835 \pm 50 MHz | ConvF | 5.84 \pm 7% | $\epsilon_r = 55.2 \pm 5\%$ $\sigma = 0.97 \pm 5\%$ mho/m (body tissue) |
| 1900 \pm 50 MHz | ConvF | 4.69 \pm 7% | $\epsilon_r = 53.3 \pm 5\%$ $\sigma = 1.52 \pm 5\%$ mho/m (body tissue) |

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also Section 4.7 of the DASY4 Manual.

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Accreditation No.: **SCS 108**

Client **LG (Dymstec)**

Certificate No: **ES3-3066_Feb09**

CALIBRATION CERTIFICATE

Object: **ES3DV3 - SN:3066**

Calibration procedure(s): **QA CAL-01.v6 and QA CAL-23.v3
Calibration procedure for dosimetric E-field probes**

Calibration date: **February 16, 2009**

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 # | Cat Date (Certificate No.) | Scheduled Calibration |
|----------------------------|-----------------|-------------------------------|-----------------------|
| Power meter E4419B | GB41293874 | 1-Apr-08 (No. 217-00788) | Apr-09 |
| Power sensor E4412A | MY41495277 | 1-Apr-08 (No. 217-00788) | Apr-09 |
| Power sensor E4412A | MY41498087 | 1-Apr-08 (No. 217-00788) | Apr-09 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 1-Jul-08 (No. 217-00865) | Jul-09 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 31-Mar-08 (No. 217-00787) | Apr-09 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 1-Jul-08 (No. 217-00866) | Jul-09 |
| Reference Probe ES3DV2 | SN: 3013 | 2-Jan-09 (No. ES3-3013_Jan09) | Jan-10 |
| DAE4 | SN: 660 | 9-Sep-08 (No. DAE4-660_Sep08) | Sep-09 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---------------------------|--------------|-----------------------------------|------------------------|
| RF generator HP 8648C | US3642U01700 | 4-Aug-99 (in house check Oct-07) | In house check: Oct-09 |
| Network Analyzer HP 8753E | US37390585 | 18-Oct-01 (in house check Oct-08) | In house check: Oct-09 |

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

Issued: February 16, 2009

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL tissue simulating liquid
 NORM_{x,y,z} sensitivity in free space
 ConvF sensitivity in TSL / NORM_{x,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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORM_{x,y,z}*: Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)_{x,y,z} = NORM_{x,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*.
- *DCP_{x,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 *NORM_{x,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.

ES3DV3 SN:3066

February 16, 2009

Probe ES3DV3

SN:3066

| | |
|------------------|-------------------|
| Manufactured: | December 14, 2004 |
| Last calibrated: | March 21, 2008 |
| Recalibrated: | February 16, 2009 |

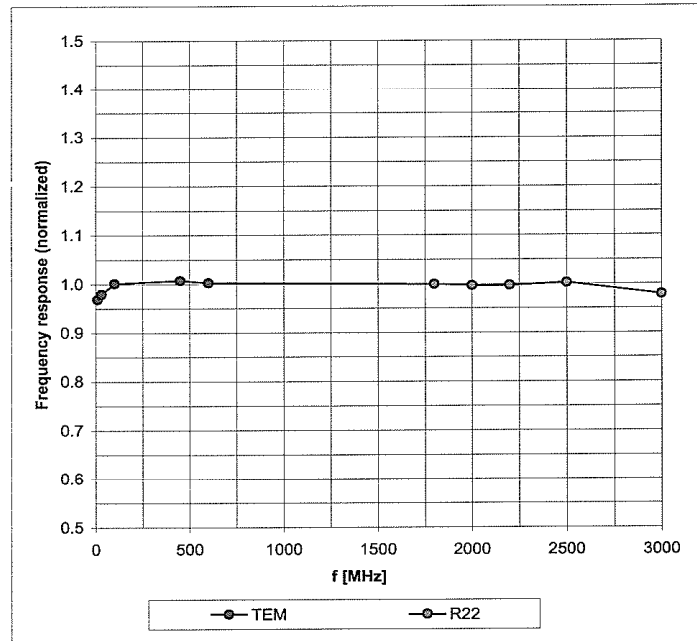
Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ES3DV3 SN:3066

February 16, 2009

Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)

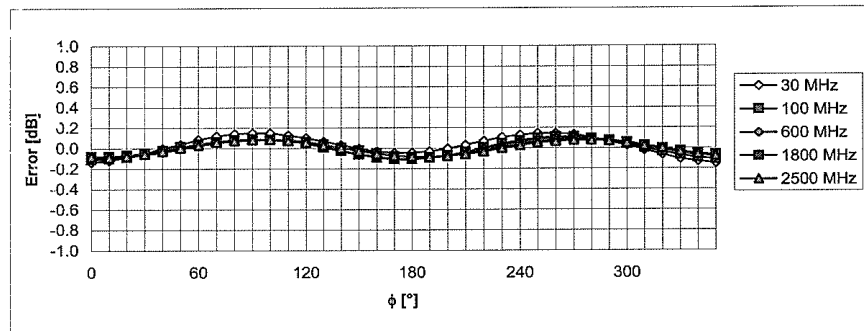
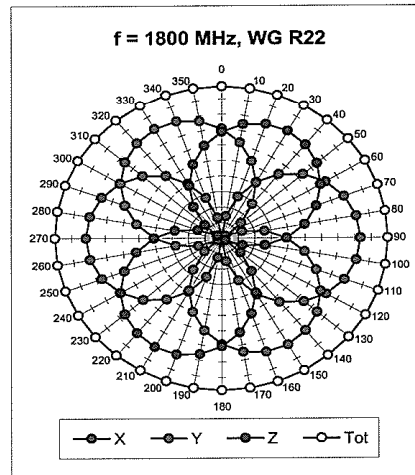
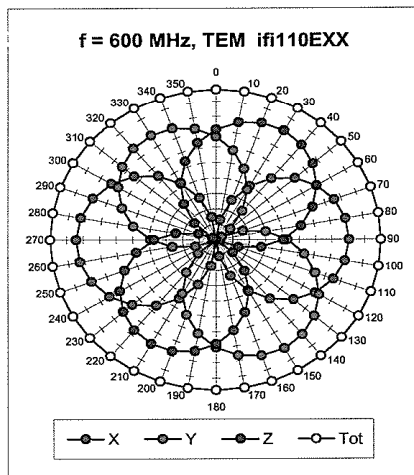


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

ES3DV3 SN:3066

February 16, 2009

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

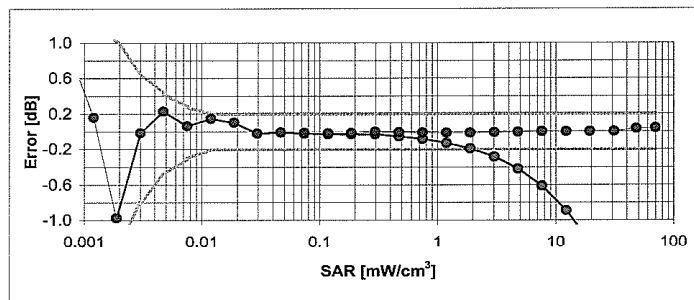
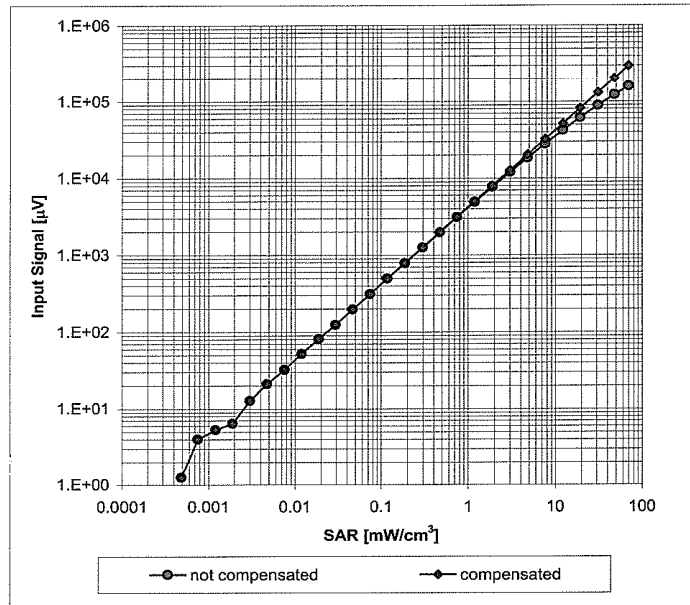


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

ES3DV3 SN:3066

February 16, 2009

Dynamic Range f(SAR_{head})
(Waveguide R22, f = 1800 MHz)



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

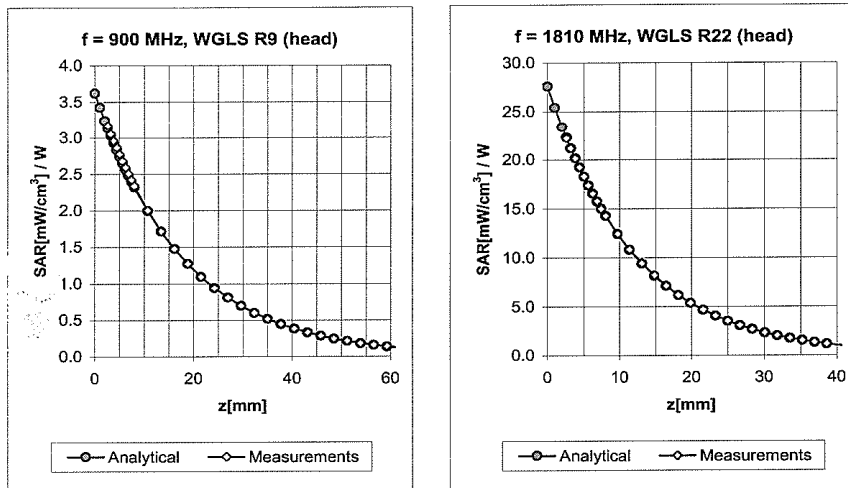
Certificate No: ES3-3066_Feb09

Page 7 of 9

ES3DV3 SN:3066

February 16, 2009

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% | 0.69 | 1.16 | 5.57 ± 11.0% (k=2) |
| 1810 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.51 | 1.53 | 4.72 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Head | 40.0 ± 5% | 1.40 ± 5% | 0.54 | 1.40 | 4.54 ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Head | 39.2 ± 5% | 1.80 ± 5% | 0.42 | 1.71 | 4.20 ± 11.0% (k=2) |
| 900 | ± 50 / ± 100 | Body | 55.0 ± 5% | 1.05 ± 5% | 0.94 | 1.10 | 5.53 ± 11.0% (k=2) |
| 1810 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.42 | 1.67 | 4.53 ± 11.0% (k=2) |
| 1950 | ± 50 / ± 100 | Body | 53.3 ± 5% | 1.52 ± 5% | 0.31 | 1.98 | 4.49 ± 11.0% (k=2) |
| 2450 | ± 50 / ± 100 | Body | 52.7 ± 5% | 1.95 ± 5% | 0.66 | 1.23 | 3.87 ± 11.0% (k=2) |

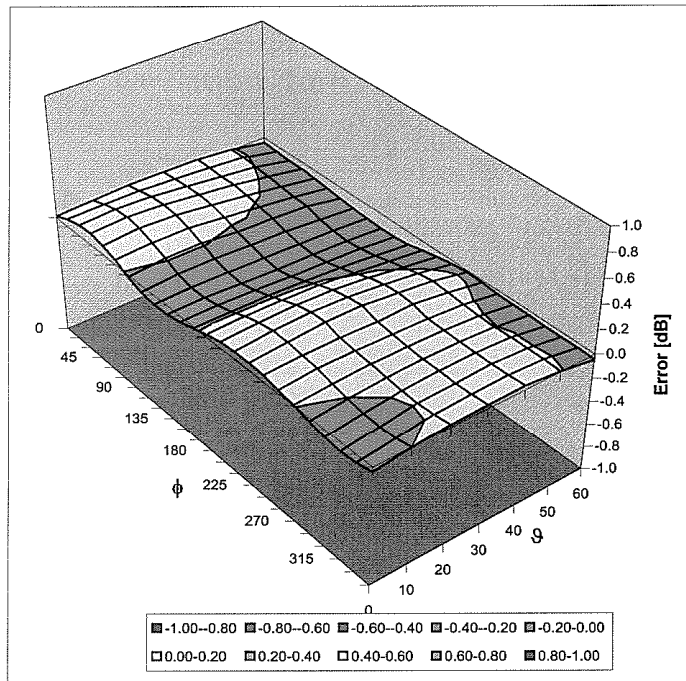
^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ES3DV3 SN:3066

February 16, 2009

Deviation from Isotropy in HSL

Error (ϕ , θ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

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Additional Conversion Factors
 for Dosimetric E-Field Probe

| | |
|-------------------------|--------------------------|
| Type: | ES3DV3 |
| Serial Number: | 3066 |
| Place of Assessment: | Zurich |
| Date of Assessment: | April 27, 2009 |
| Probe Calibration Date: | February 16, 2009 |

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the recalibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1810 MHz.

Assessed by: 

Schmid & Partner Engineering AG

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 Phone +41 44 245 9700, Fax +41 44 245 9779
 info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ES3DV3 - SN:3066

Conversion factor (\pm standard deviation)

| | | | |
|-------------------|--------------|---------------|---|
| 835 \pm 50 MHz | <i>ConvF</i> | 5.72 \pm 7% | $\epsilon_r = 41.5 \pm 5\%$ $\sigma = 0.90 \pm 5\%$ mho/m (head tissue) |
| 1900 \pm 50 MHz | <i>ConvF</i> | 4.58 \pm 7% | $\epsilon_r = 40.0 \pm 5\%$ $\sigma = 1.40 \pm 5\%$ mho/m (head tissue) |
| 835 \pm 50 MHz | <i>ConvF</i> | 5.50 \pm 7% | $\epsilon_r = 55.2 \pm 5\%$ $\sigma = 0.97 \pm 5\%$ mho/m (body tissue) |
| 1900 \pm 50 MHz | <i>ConvF</i> | 4.33 \pm 7% | $\epsilon_r = 53.3 \pm 5\%$ $\sigma = 1.52 \pm 5\%$ mho/m (body tissue) |

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also Section 4.7 of the DASY4 Manual.

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **LG (Dymstec)**

Certificate No: **D835V2-471_Jan09**

CALIBRATION CERTIFICATE

Object: **D835V2 - SN: 471**

Calibration procedure(s): **QA CAL-05.v7
Calibration procedure for dipole validation kits**

Calibration date: **January 19, 2009**

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 (Certificate No.) | Scheduled Calibration |
|-----------------------------|--------------------|--------------------------------|-----------------------|
| Power meter EPM-442A | GB37480704 | 08-Oct-08 (No. 217-00898) | Oct-09 |
| Power sensor HP 8481A | US37292783 | 08-Oct-08 (No. 217-00898) | Oct-09 |
| Reference 20 dB Attenuator | SN: 5086 (20g) | 01-Jul-08 (No. 217-00864) | Jul-09 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 01-Jul-08 (No. 217-00867) | Jul-09 |
| Reference Probe ES3DV2 | SN: 3025 | 28-Apr-08 (No. ES3-3025_Apr08) | Apr-09 |
| DAE4 | SN: 601 | 14-Mar-08 (No. DAE4-601_Mar08) | Mar-09 |


| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---------------------------|------------------|-----------------------------------|------------------------|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-07) | In house check: Oct-09 |
| RF generator R&S SMT-06 | 100005 | 4-Aug-99 (in house check Oct-07) | In house check: Oct-09 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-08) | In house check: Oct-09 |


| | Name | Function | Signature |
|----------------|----------------|-----------------------|---|
| Calibrated by: | Jeton Kastrati | Laboratory Technician |  |
| Approved by: | Katja Pokovic | Technical Manager |  |

Issued: January 20, 2009

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Accreditation No.: **SCS 108**

Glossary:

| | |
|-------|---------------------------------|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Certificate No: D835V2-471_Jan09

Page 2 of 6

Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|-------------------------------------|---------------------------|-------------|
| DASY Version | DASY5 | V5.0 |
| Extrapolation | Advanced Extrapolation | |
| Phantom | Modular Flat Phantom V4.9 | |
| Distance Dipole Center - TSL | 15 mm | with Spacer |
| Zoom Scan Resolution | dx, dy, dz = 5 mm | |
| Frequency | 835 MHz ± 1 MHz | |

Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 41.5 | 0.90 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 41.3 ± 6 % | 0.91 mho/m ± 6 % |
| Head TSL temperature during test | (21.5 ± 0.2) °C | ---- | ---- |

SAR result with Head TSL

| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
|---|--------------------|-----------------------------------|
| SAR measured | 250 mW input power | 2.44 mW / g |
| SAR normalized | normalized to 1W | 9.76 mW / g |
| SAR for nominal Head TSL parameters ¹ | normalized to 1W | 9.66 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm ³ (10 g) of Head TSL | condition | |
|---|--------------------|-----------------------------------|
| SAR measured | 250 mW input power | 1.61 mW / g |
| SAR normalized | normalized to 1W | 6.44 mW / g |
| SAR for nominal Head TSL parameters ¹ | normalized to 1W | 6.39 mW / g ± 16.5 % (k=2) |

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

| | |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.7 Ω - 1.7 j Ω |
| Return Loss | - 32.5 dB |

General Antenna Parameters and Design

| | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.386 ns |
|----------------------------------|----------|

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

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.
 No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

| | |
|-----------------|-------------------|
| Manufactured by | SPEAG |
| Manufactured on | November 15, 2002 |

DASY5 Validation Report for Head TSL

Date/Time: 19.01.2009 11:07:17

Test Laboratory: SPEAG, Zurich, Switzerland

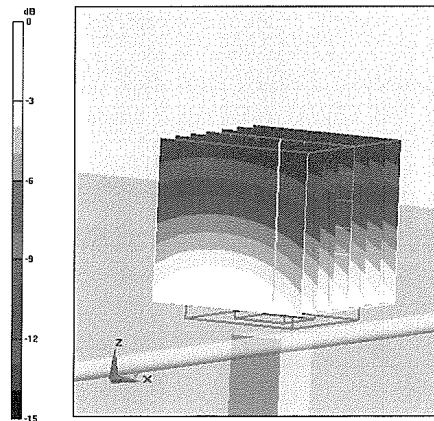
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:471

Communication System: CW-835; Frequency: 835 MHz; Duty Cycle: 1:1
 Medium: HSL 900 MHz
 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 41.1$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC)

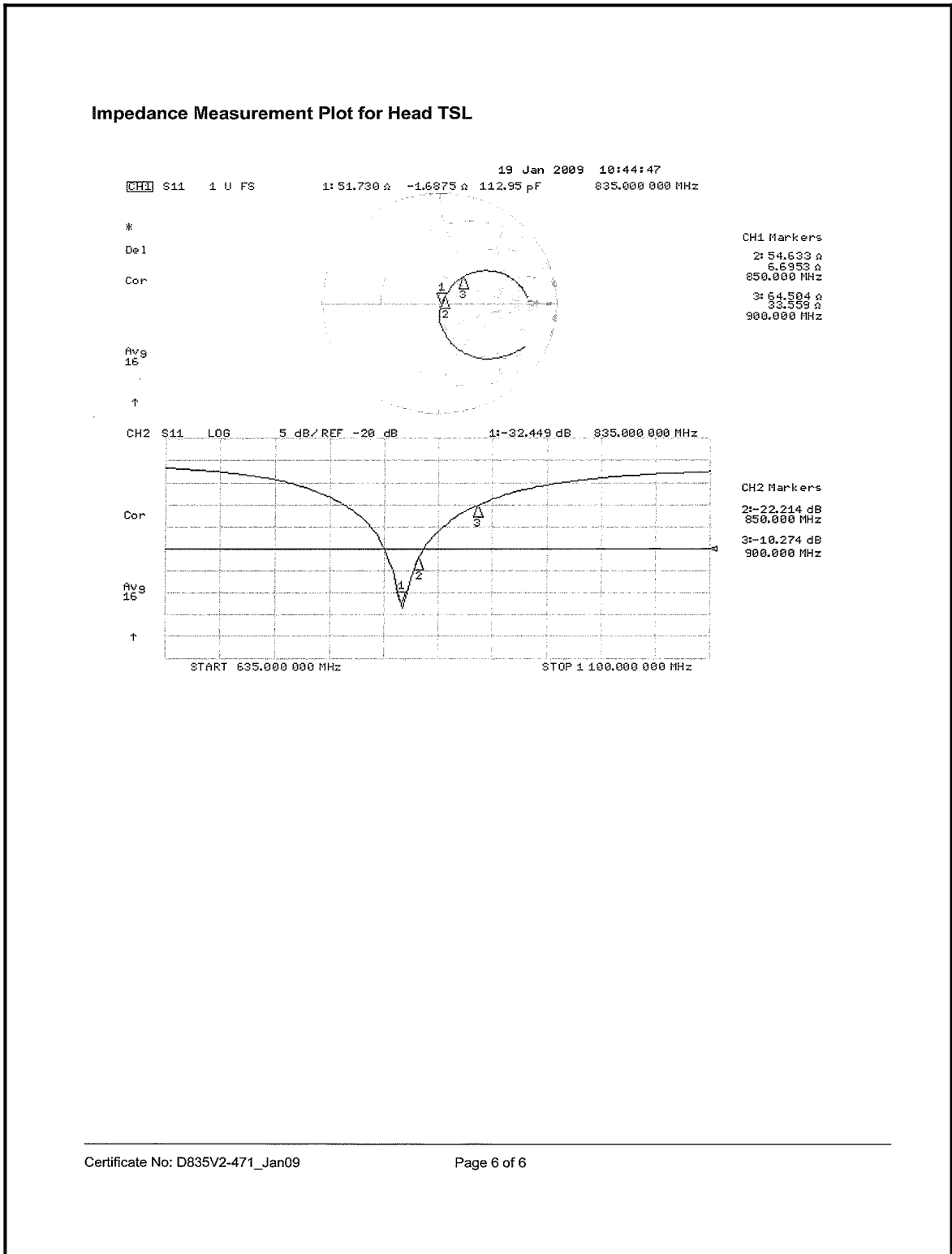
DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(5.97, 5.97, 5.97); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45


Pin=250mW; dip=15mm; dist=3.4mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 56.2 V/m; Power Drift = 0.026 dB
 Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.61 mW/g
 Maximum value of SAR (measured) = 2.75 mW/g




0 dB = 2.75mW/g



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Accreditation No.: **SCS 108**

Client **LG (Dymstec)**

Certificate No: **D1900V2-5d057_Apr08**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d057**

Calibration procedure(s) **QA CAL-05.v7
Calibration procedure for dipole validation kits**

Calibration date: **April 22, 2008**

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%.

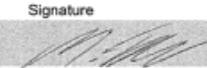
Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
|-----------------------------|--------------------|---|-----------------------|
| Power meter EPM-442A | GB37480704 | 04-Oct-07 (No. 217-00736) | Oct-08 |
| Power sensor HP 8481A | US37292783 | 04-Oct-07 (No. 217-00736) | Oct-08 |
| Reference 20 dB Attenuator | SN: 5086 (20g) | 07-Aug-07 (No. 217-00718) | Aug-08 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 08-Aug-07 (No. 217-00721) | Aug-08 |
| Reference Probe ES3DV2 | SN: 3025 | 01-Mar-08 (No. ES3-3025_Mar08) | Mar-09 |
| DAE4 | SN: 601 | 14-Mar-08 (No. DAE4-601_Mar08) | Mar-09 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---------------------------|------------------|-----------------------------------|------------------------|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-07) | In house check: Oct-08 |
| RF generator R&S SMT-06 | 100005 | 4-Aug-99 (in house check Oct-07) | In house check: Oct-09 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-07) | In house check: Oct-08 |

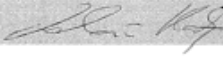
Calibrated by:

Name: **Marcel Fehr**
Function: **Laboratory Technician**

Signature: 

Approved by:

Name: **Katja Pokovic**
Function: **Technical Manager**

Signature: 


Issued: April 23, 2008


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Certificate No: D1900V2-5d057_Apr08

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

| | |
|-------|---------------------------------|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

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
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Certificate No: D1900V2-5d057_Apr08 Page 2 of 6

Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|-------------------------------------|---------------------------|-------------|
| DASY Version | DASY4 | V4.7 |
| Extrapolation | Advanced Extrapolation | |
| Phantom | Modular Flat Phantom V5.0 | |
| Distance Dipole Center - TSL | 10 mm | with Spacer |
| Zoom Scan Resolution | dx, dy, dz = 5 mm | |
| Frequency | 1900 MHz ± 1 MHz | |

Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 40.0 | 1.40 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 40.1 ± 6 % | 1.47 mho/m ± 6 % |
| Head TSL temperature during test | (21.2 ± 0.2) °C | ---- | ---- |

SAR result with Head TSL

| SAR averaged over 1 cm³ (1 g) of Head TSL | condition | |
|---|--------------------|-----------------------------------|
| SAR measured | 250 mW input power | 10.1 mW / g |
| SAR normalized | normalized to 1W | 40.4 mW / g |
| SAR for nominal Head TSL parameters ¹ | normalized to 1W | 39.5 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm³ (10 g) of Head TSL | Condition | |
|---|--------------------|-----------------------------------|
| SAR measured | 250 mW input power | 5.19 mW / g |
| SAR normalized | normalized to 1W | 20.8 mW / g |
| SAR for nominal Head TSL parameters ¹ | normalized to 1W | 20.6 mW / g ± 16.5 % (k=2) |

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

| | |
|---|-------------------------------|
| Appendix | |
| Antenna Parameters with Head TSL | |
| Impedance, transformed to feed point | 53.1 Ω + 4.8 $j\Omega$ |
| Return Loss | - 25.2 dB |
| General Antenna Parameters and Design | |
| Electrical Delay (one direction) | 1.199 ns |
| <p>After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.</p> <p>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.</p> <p>No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.</p> | |
| Additional EUT Data | |
| Manufactured by | SPEAG |
| Manufactured on | March 19, 2004 |
| <hr/> <p>Certificate No: D1900V2-5d057_Apr08 Page 4 of 6</p> | |

DASY4 Validation Report for Head TSL

Date/Time: 22.04.2008 14:09:52

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d057

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

Medium: HSL U10 BB;

Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.47 \text{ mho/m}$; $\epsilon_r = 40.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.9, 4.9, 4.9); Calibrated: 01.03.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

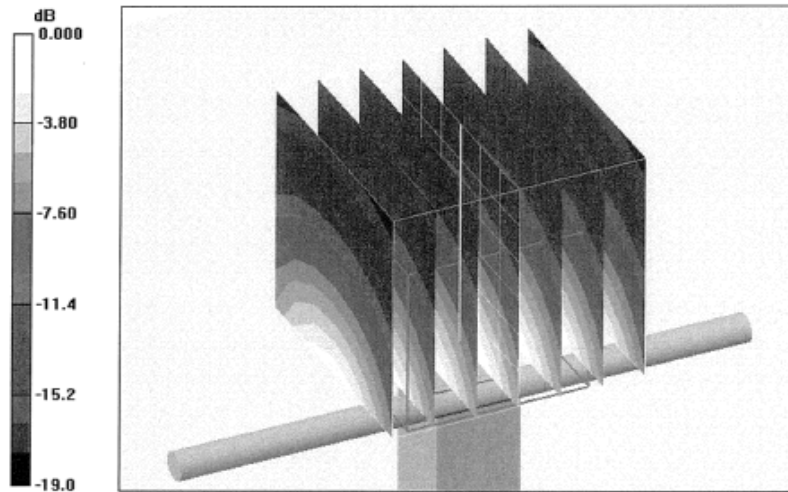
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 93.1 V/m; Power Drift = 0.035 dB

Peak SAR (extrapolated) = 18.8 W/kg

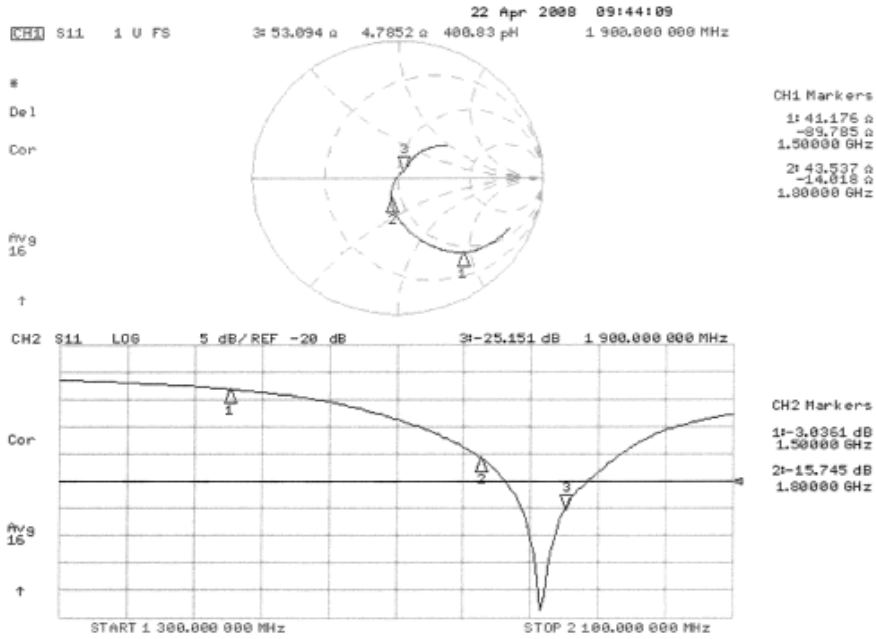
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.19 mW/g

Maximum value of SAR (measured) = 12.1 mW/g



0 dB = 12.1mW/g

Impedance Measurement Plot for Head TSL



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Accreditation No.: **SCS 108**

Client **LG (Dymstec)**

Certificate No: **D2450V2-768_Apr08**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 768**

Calibration procedure(s) **QA CAL-05.v7
Calibration procedure for dipole validation kits**

Calibration date: **April 22, 2008**

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 (Certificate No.) | Scheduled Calibration |
|-----------------------------|--------------------|--------------------------------|-----------------------|
| Power meter EPM-442A | GB37480704 | 04-Oct-07 (No. 217-00736) | Oct-08 |
| Power sensor HP 8481A | US37292783 | 04-Oct-07 (No. 217-00736) | Oct-08 |
| Reference 20 dB Attenuator | SN: 5086 (20g) | 07-Aug-07 (No 217-00718) | Aug-08 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 08-Aug-07 (No. 217-00721) | Aug-08 |
| Reference Probe ES3DV2 | SN: 3025 | 01-Mar-08 (No. ES3-3025_Mar08) | Mar-09 |
| DAE4 | SN: 601 | 14-Mar-08 (No. DAE4-601_Mar08) | Mar-09 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---------------------------|------------------|-----------------------------------|------------------------|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-07) | In house check: Oct-09 |
| RF generator R&S SMT-06 | 100005 | 4-Aug-99 (in house check Oct-07) | In house check: Oct-09 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-07) | In house check: Oct-08 |

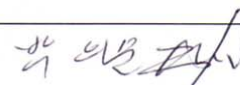
| | Name | Function | Signature |
|----------------|---------------|-----------------------|---|
| Calibrated by: | Marcel Fehr | Laboratory Technician |  |
| Approved by: | Katja Pokovic | Technical Manager |  |

Issued: April 23, 2008

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Certificate No: D2450V2-768_Apr08

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL tissue simulating liquid
ConvF sensitivity in TSL / NORM x,y,z
N/A not applicable or not measured

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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

| | | |
|-------------------------------------|---------------------------|-------------|
| DASY Version | DASY4 | V4.7 |
| Extrapolation | Advanced Extrapolation | |
| Phantom | Modular Flat Phantom V5.0 | |
| Distance Dipole Center - TSL | 10 mm | with Spacer |
| Zoom Scan Resolution | dx, dy, dz = 5 mm | |
| Frequency | 2450 MHz ± 1 MHz | |

Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 39.2 | 1.80 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 39.4 ± 6 % | 1.84 mho/m ± 6 % |
| Head TSL temperature during test | (21.1 ± 0.2) °C | --- | --- |

SAR result with Head TSL

| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
|---|--------------------|-----------------------------------|
| SAR measured | 250 mW input power | 13.7 mW / g |
| SAR normalized | normalized to 1W | 54.8 mW / g |
| SAR for nominal Head TSL parameters ¹ | normalized to 1W | 54.5 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm ³ (10 g) of Head TSL | condition | |
|---|--------------------|-----------------------------------|
| SAR measured | 250 mW input power | 6.35 mW / g |
| SAR normalized | normalized to 1W | 25.4 mW / g |
| SAR for nominal Head TSL parameters ¹ | normalized to 1W | 25.4 mW / g ± 16.5 % (k=2) |

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

| | |
|--------------------------------------|-------------------------------|
| Impedance, transformed to feed point | 53.4 Ω + 4.8 $j\Omega$ |
| Return Loss | - 24.9 dB |

General Antenna Parameters and Design

| | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.151 ns |
|----------------------------------|----------|

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

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.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

| | |
|-----------------|-----------------|
| Manufactured by | SPEAG |
| Manufactured on | August 10, 2004 |

DASY4 Validation Report for Head TSL

Date/Time: 22.04.2008 15:40:12

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN768

Communication System: CW-2450; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB;

Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.83 \text{ mho/m}$; $\epsilon_r = 39.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.4, 4.4, 4.4); Calibrated: 01.03.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

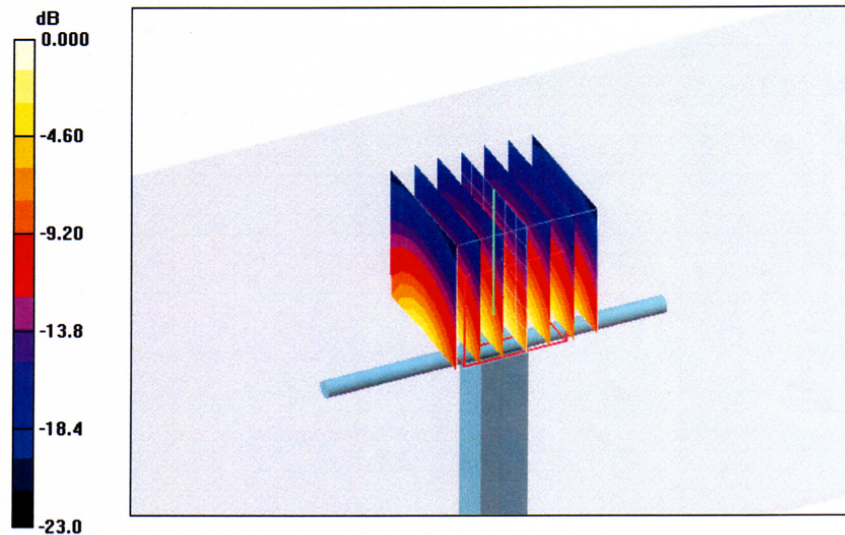
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 98.5 V/m; Power Drift = 0.016 dB

Peak SAR (extrapolated) = 28.2 W/kg

SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.35 mW/g

Maximum value of SAR (measured) = 16.9 mW/g



0 dB = 16.9mW/g

Impedance Measurement Plot for Head TSL

22 Apr 2008 14:31:04
[CH1] S11 1 U FS 1: 53.443 Ω 4.7734 Ω 310.09 pF 2 450.000 000 MHz

*
Del
Cor
Avg
16

CH2 S11 LOG 5 dB/REF -20 dB 1:-24.903 dB 2 450.000 000 MHz

Cor
Avg
16

CENTER 2 450.000 000 MHz SPAN 400.000 000 MHz