

WCDMA FDD V Head SAR Test

Date: 2013-02-07

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WCDMA V_Right Touch_CH4182.dsf](#)

Ambient Temp : 23.8 °C Tissue Temp : 22.9 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262
Program Name: WCDMA V_Right Touch

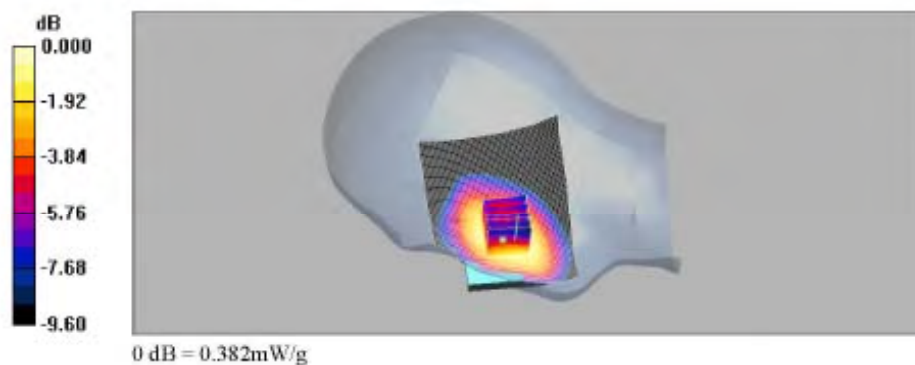
Communication System: WCDMA V; Frequency: 836.4 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 836.4 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 43.1$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM MIC #2000-93 with CRP Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA V_Right Touch_CH4182/Area Scan (71x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
 Maximum value of SAR (interpolated) = 0.392 mW/g

WCDMA V_Right Touch_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 6.90 V/m; Power Drift = -0.045 dB
 Peak SAR (extrapolated) = 0.465 W/kg
SAR(1 g) = 0.365 mW/g; SAR(10 g) = 0.275 mW/g
 Maximum value of SAR (measured) = 0.382 mW/g



Date: 2013-02-07

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: [WCDMA V_Right Tilt_CH4182.da4](#)

Ambient Temp : 23.8 °C Tissue Temp : 22.9 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WCDMA V_Right Tilt

Communication System: WCDMA V; Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 836.4 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 43.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM MIC #2000-93 with CRP_Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA V_Right Tilt_CH4182/Area Scan (71x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.296 mW/g

WCDMA V_Right Tilt_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

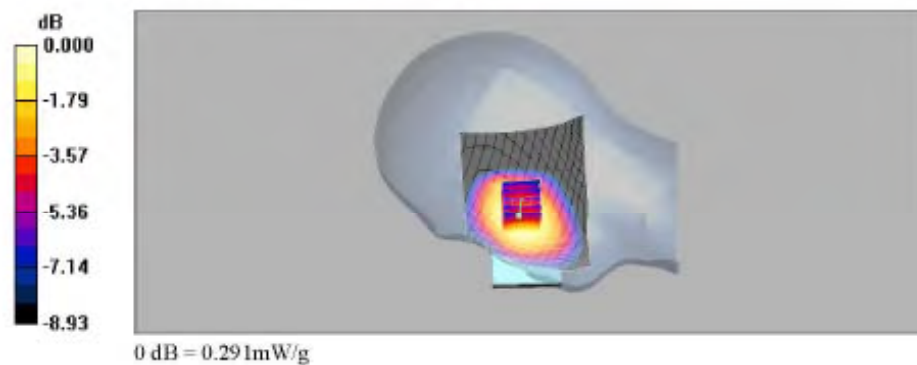
dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.1 V/m; Power Drift = -0.017 dB

Peak SAR (extrapolated) = 0.324 W/kg

SAR(1 g) = 0.278 mW/g; SAR(10 g) = 0.215 mW/g

Maximum value of SAR (measured) = 0.291 mW/g



Date: 2013-02-07

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WCDMA V_Left Touch_CH4182.da4](#)

Ambient Temp : 23.8 °C Tissue Temp : 22.9 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WCDMA V_Left Touch

Communication System: WCDMA V; Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 836.4 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 43.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM MIC #2000-93 with CRP Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA V_Left Touch_CH4182/Area Scan (71x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.411 mW/g

WCDMA V_Left Touch_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

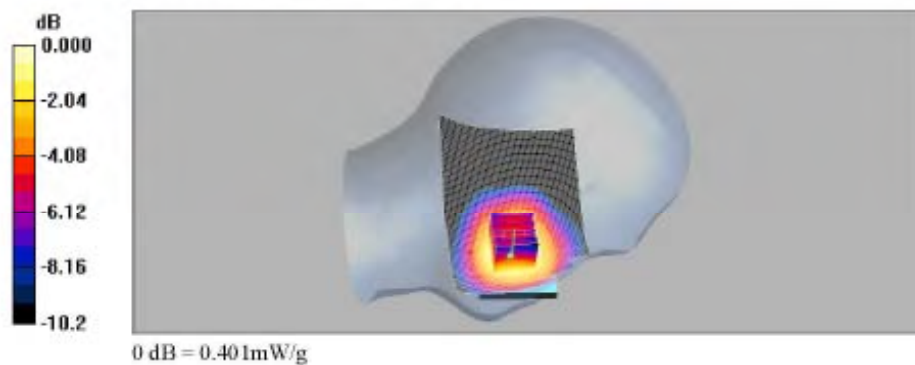
dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.95 V/m; Power Drift = -0.191 dB

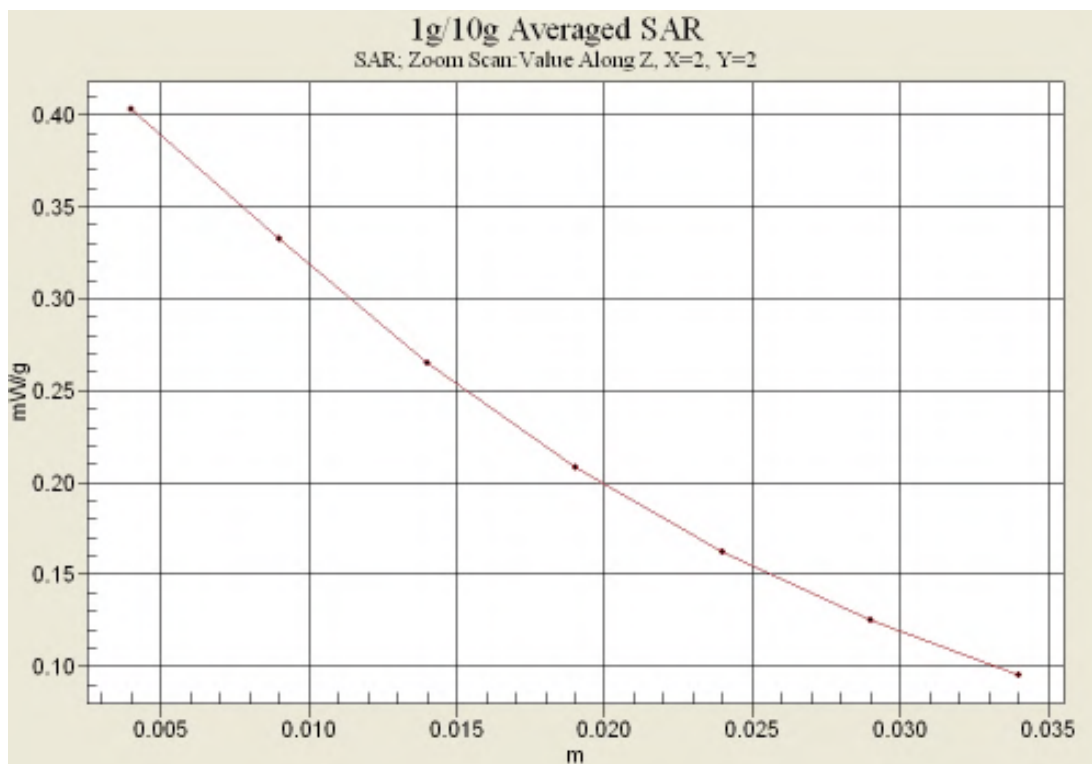
Peak SAR (extrapolated) = 0.463 W/kg

SAR(1 g) = 0.385 mW/g; SAR(10 g) = 0.291 mW/g

Maximum value of SAR (measured) = 0.401 mW/g



Z-Scan



Date: 2013-02-07

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WCDMA V_Left Tilt_CH4182.da4](#)

Ambient Temp : 23.8 °C Tissue Temp : 22.9 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WCDMA V_Left Tilt

Communication System: WCDMA V; Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 836.4 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 43.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.4, 6.4, 6.4); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM MIC #2000-93 with CRP Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA V_Left Tilt_CH4182/Area Scan (71x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.234 mW/g

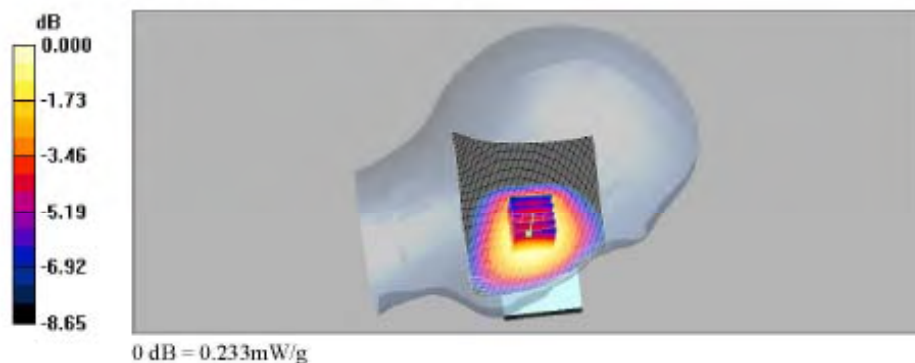
WCDMA V_Left Tilt_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.20 V/m; Power Drift = -0.020 dB

Peak SAR (extrapolated) = 0.260 W/kg

SAR(1 g) = 0.222 mW/g; SAR(10 g) = 0.172 mW/g

Maximum value of SAR (measured) = 0.233 mW/g



WCDMA FDD V Body SAR Test

Date: 2013-02-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WCDMA V_Front_CH4182.da4](#)

Ambient Temp : 23.3 °C Tissue Temp : 22.5 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262
Program Name: WCDMA V_Body

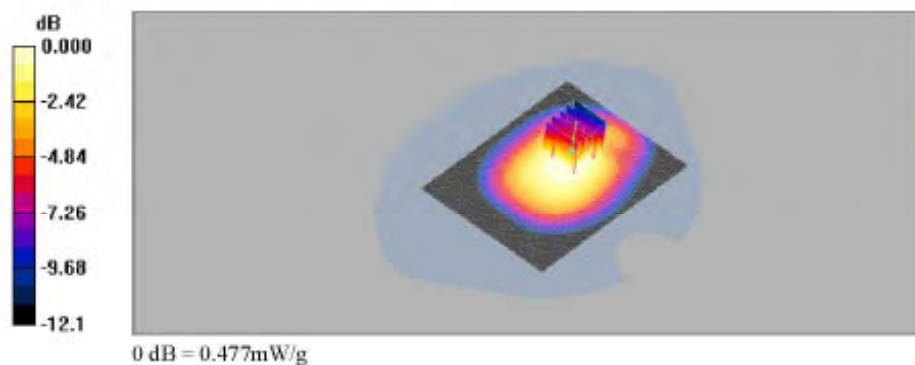
Communication System: WCDMA V; Frequency: 836.4 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 836.4 \text{ MHz}$; $\sigma = 0.94 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA V_Front_CH4182/Area Scan (81x111x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
 Maximum value of SAR (interpolated) = 0.489 mW/g

WCDMA V_Front_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 20.6 V/m; Power Drift = -0.026 dB
 Peak SAR (extrapolated) = 0.635 W/kg
SAR(1 g) = 0.454 mW/g; SAR(10 g) = 0.331 mW/g
 Maximum value of SAR (measured) = 0.477 mW/g



Date: 2013-02-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: WCDMA_V_Rear_CH4182.da4

Ambient Temp : 23.3 °C Tissue Temp : 22.5 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WCDMA_V_Body

Communication System: WCDMA V; Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 836.4$ MHz; $\sigma = 0.94$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

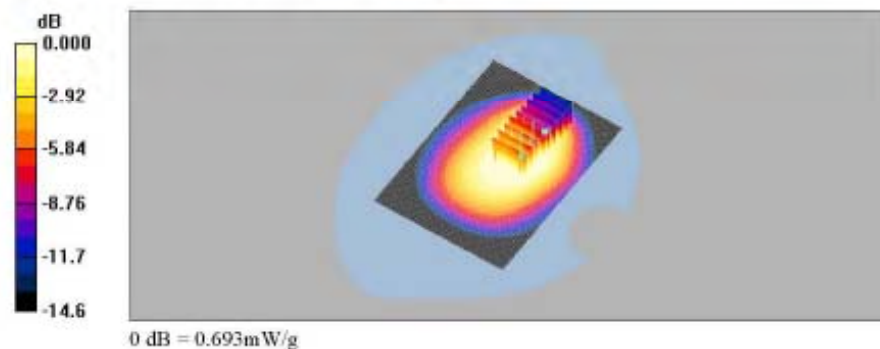
DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA_V_Rear_CH4182/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.873 mW/g

WCDMA_V_Rear_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 27.5 V/m; Power Drift = -0.035 dB
 Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.816 mW/g; SAR(10 g) = 0.598 mW/g
 Maximum value of SAR (measured) = 0.861 mW/g

WCDMA_V_Rear_CH4182/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 27.5 V/m; Power Drift = -0.035 dB
 Peak SAR (extrapolated) = 0.934 W/kg
SAR(1 g) = 0.577 mW/g; SAR(10 g) = 0.372 mW/g
 Maximum value of SAR (measured) = 0.693 mW/g



Date: 2013-02-08

Test Laboratory: SGS Korea (Gunpo Laboratory)

File Name: WCDMA_V_Rear_CH4132.da4

Ambient Temp : 23.3 °C Tissue Temp : 22.5 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WCDMA_V_Body

Communication System: WCDMA V; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 826.4$ MHz; $\sigma = 0.93$ mho/m; $\epsilon_r = 52.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA_V_Rear_CH4132/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.821 mW/g

WCDMA_V_Rear_CH4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 26.5 V/m; Power Drift = -0.021 dB

Peak SAR (extrapolated) = 0.990 W/kg

SAR(1 g) = 0.773 mW/g; SAR(10 g) = 0.564 mW/g

Maximum value of SAR (measured) = 0.820 mW/g

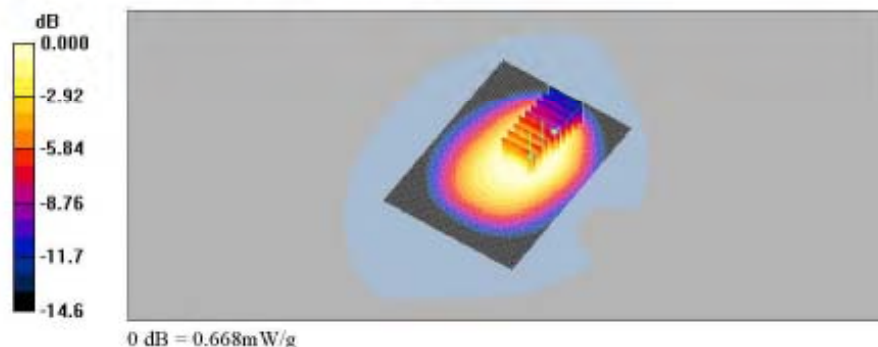
WCDMA_V_Rear_CH4132/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 26.5 V/m; Power Drift = -0.021 dB

Peak SAR (extrapolated) = 0.900 W/kg

SAR(1 g) = 0.554 mW/g; SAR(10 g) = 0.357 mW/g

Maximum value of SAR (measured) = 0.668 mW/g



Date: 2013-02-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: WCDMA_V_Rear_CH4233.da4

Ambient Temp : 23.3 °C Tissue Temp : 22.5 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WCDMA_V_Body

Communication System: WCDMA V; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 846.6$ MHz; $\sigma = 0.95$ mho/m; $\epsilon_r = 52.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA_V_Rear_CH4233/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.891 mW/g

WCDMA_V_Rear_CH4233/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 28.0 V/m; Power Drift = -0.033 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.835 mW/g; SAR(10 g) = 0.611 mW/g

Maximum value of SAR (measured) = 0.884 mW/g

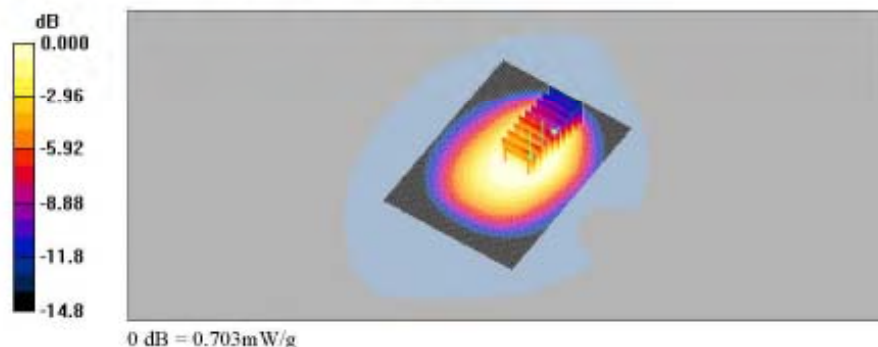
WCDMA_V_Rear_CH4233/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 28.0 V/m; Power Drift = -0.033 dB

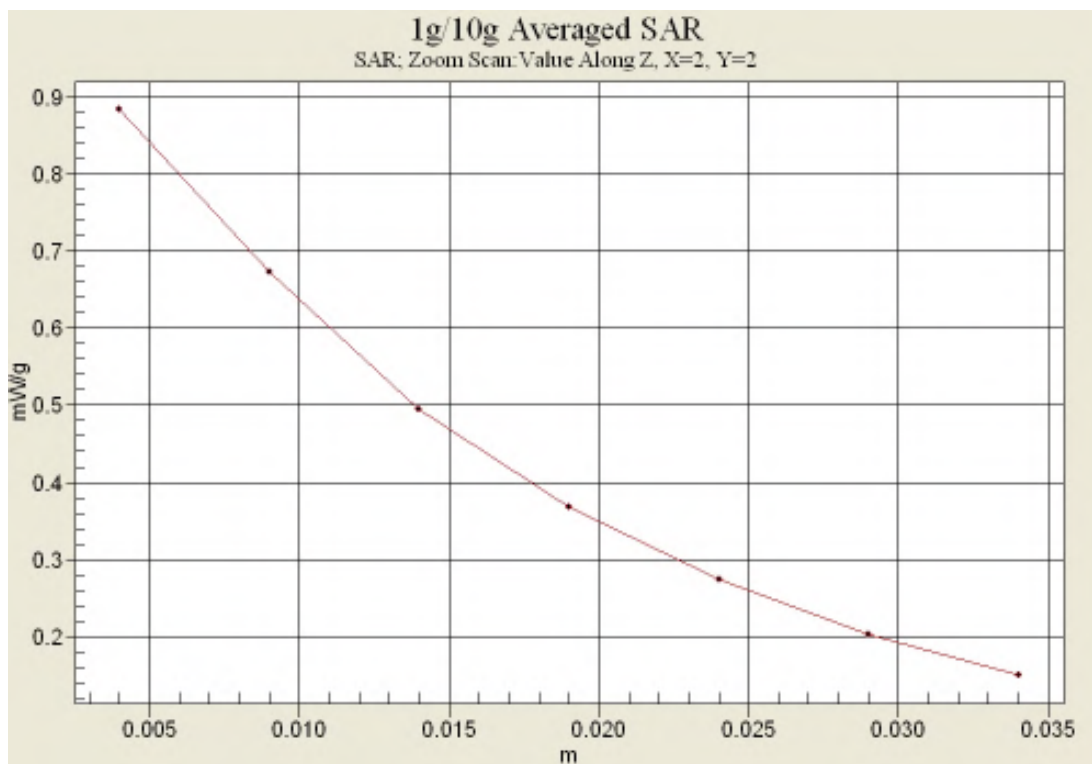
Peak SAR (extrapolated) = 0.925 W/kg

SAR(1 g) = 0.576 mW/g; SAR(10 g) = 0.371 mW/g

Maximum value of SAR (measured) = 0.703 mW/g



Z-Scan



Date: 2013-02-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: [WCDMA V_Left Edge_CH4182.da4](#)

Ambient Temp : 23.3 °C Tissue Temp : 22.5 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WCDMA V_Body

Communication System: WCDMA V; Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 836.4 \text{ MHz}$; $\sigma = 0.94 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA V_Left Edge_CH4182/Area Scan (71x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.547 mW/g

WCDMA V_Left Edge_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

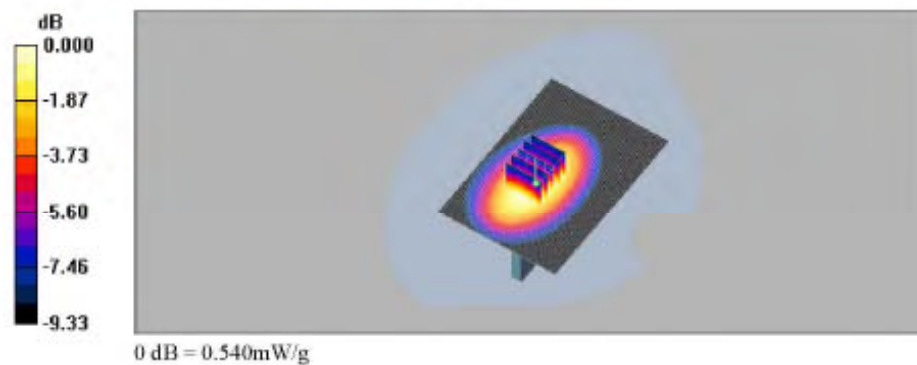
dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.8 V/m; Power Drift = -0.040 dB

Peak SAR (extrapolated) = 0.714 W/kg

SAR(1 g) = 0.508 mW/g; SAR(10 g) = 0.351 mW/g

Maximum value of SAR (measured) = 0.540 mW/g



Date: 2013-02-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: [WCDMA V_Right Edge_CH4182.da4](#)

Ambient Temp : 23.3 °C Tissue Temp : 22.5 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WCDMA V_Body

Communication System: WCDMA V; Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 836.4 \text{ MHz}$; $\sigma = 0.94 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA V_Right Edge_CH4182/Area Scan (71x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.507 mW/g

WCDMA V_Right Edge_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

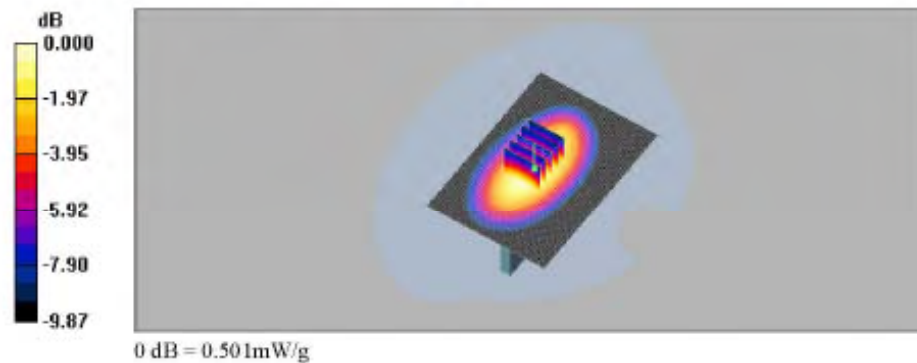
$dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 23.7 V/m; Power Drift = -0.006 dB

Peak SAR (extrapolated) = 0.676 W/kg

SAR(1 g) = 0.470 mW/g; SAR(10 g) = 0.318 mW/g

Maximum value of SAR (measured) = 0.501 mW/g



Date: 2013-02-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WCDMA V_Bottom_CH4182.da4](#)

Ambient Temp : 23.3 °C Tissue Temp : 22.5 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WCDMA V_Body

Communication System: WCDMA V; Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 836.4 \text{ MHz}$; $\sigma = 0.94 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA V_Bottom_CH4182/Area Scan (71x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.104 mW/g

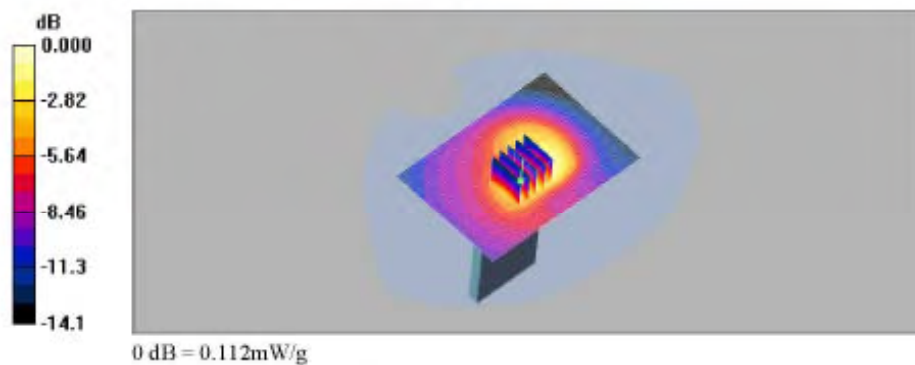
WCDMA V_Bottom_CH4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.11 V/m; Power Drift = -0.070 dB

Peak SAR (extrapolated) = 0.211 W/kg

SAR(1 g) = 0.102 mW/g; SAR(10 g) = 0.056 mW/g

Maximum value of SAR (measured) = 0.112 mW/g



WLAN Head SAR Test

Date: 2013-02-10

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: WLAN_11b_Right Touch_1Mbps_CH11.da4

Ambient Temp : 23.1 °C Tissue Temp : 21.6 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262
Program Name: WLAN 11b_Head

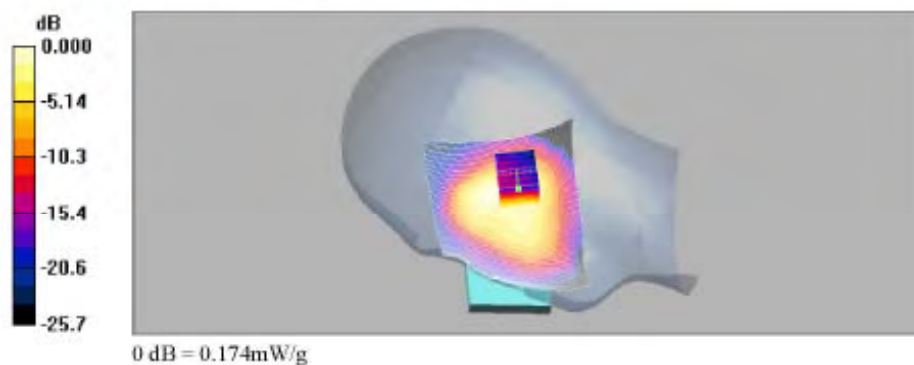
Communication System: WLAN; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 1.81 \text{ mho/m}$; $\epsilon_r = 38.7$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(4.48, 4.48, 4.48); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM MIC #2000-93 with CRP Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN 11b_Right Touch_1Mbps_CH11/Area Scan (111x151x1): Measurement grid:
 $dx=10\text{mm}$, $dy=10\text{mm}$
Maximum value of SAR (interpolated) = 0.179 mW/g

WLAN 11b_Right Touch_1Mbps_CH11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
Reference Value = 9.81 V/m; Power Drift = -0.086 dB
Peak SAR (extrapolated) = 0.336 W/kg
SAR(1 g) = 0.161 mW/g; SAR(10 g) = 0.084 mW/g
Maximum value of SAR (measured) = 0.174 mW/g



Date: 2013-02-10

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: [WLAN_11b_Right Tilt_1Mbps_CH11.da4](#)

Ambient Temp : 23.1 °C Tissue Temp : 21.6 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WLAN 11b_Head

Communication System: WLAN; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462$ MHz; $\sigma = 1.81$ mho/m; $\epsilon_r = 38.7$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(4.48, 4.48, 4.48); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM MIC #2000-93 with CRP Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN 11b_Right Tilt_1Mbps_CH11/Area Scan (111x151x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.140 mW/g

WLAN 11b_Right Tilt_1Mbps_CH11/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

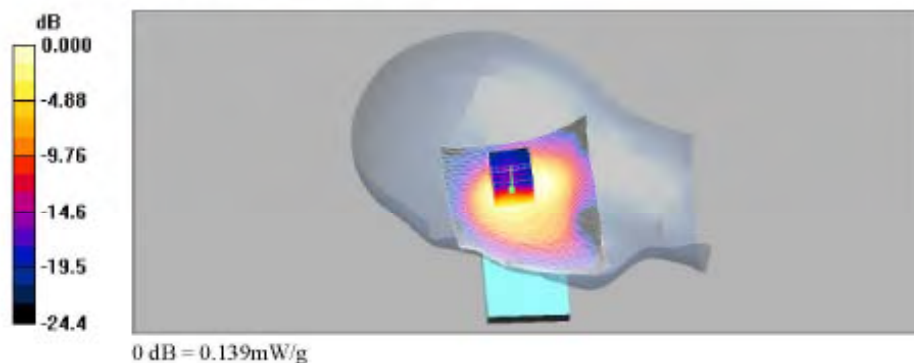
dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.98 V/m; Power Drift = -0.041 dB

Peak SAR (extrapolated) = 0.253 W/kg

SAR(1 g) = 0.127 mW/g; SAR(10 g) = 0.066 mW/g

Maximum value of SAR (measured) = 0.139 mW/g



Date: 2013-02-10

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: [WLAN_11b_Left Touch_1Mbps_CH11.da4](#)

Ambient Temp : 23.1 °C Tissue Temp : 21.6 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WLAN 11b_Head

Communication System: WLAN; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 1.81 \text{ mho/m}$; $\epsilon_r = 38.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(4.48, 4.48, 4.48); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM MIC #2000-93 with CRP Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN 11b_Left Touch_1Mbps_CH11/Area Scan (111x151x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.333 mW/g

WLAN 11b_Left Touch_1Mbps_CH11/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

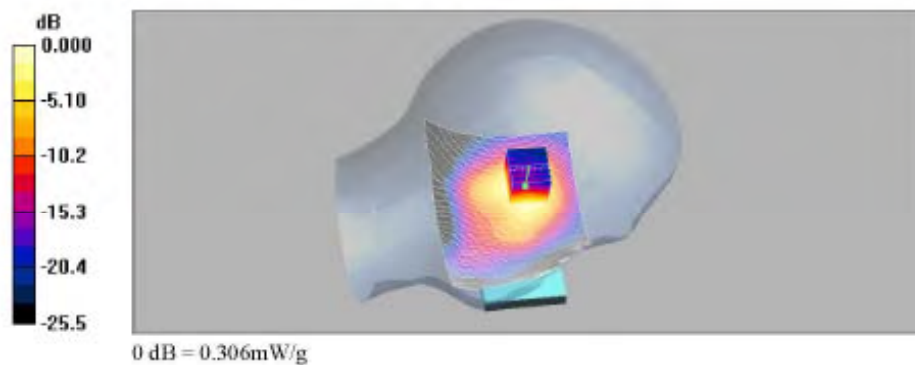
dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.87 V/m; Power Drift = -0.152 dB

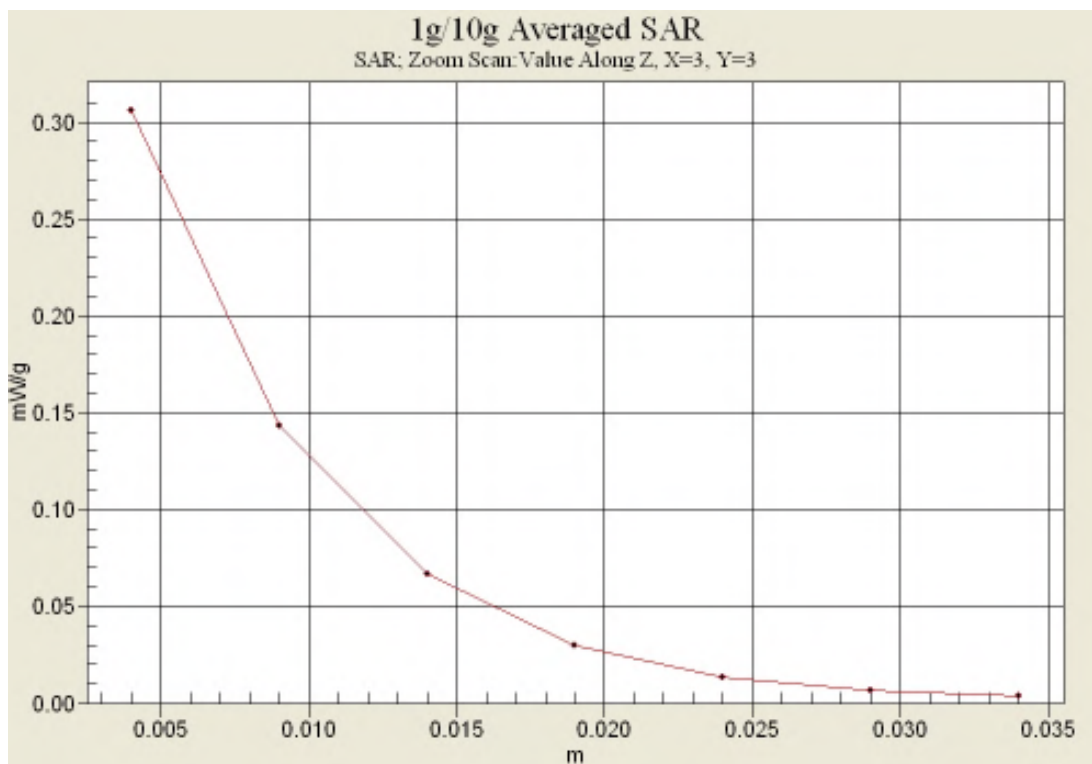
Peak SAR (extrapolated) = 0.672 W/kg

SAR(1 g) = 0.281 mW/g; SAR(10 g) = 0.134 mW/g

Maximum value of SAR (measured) = 0.306 mW/g



Z-Scan



Date: 2013-02-10

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WLAN_11b_Left Tilt_1Mbps_CH11.da4](#)

Ambient Temp : 23.1 °C Tissue Temp : 21.6 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WLAN 11b_Head

Communication System: WLAN; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 1.81 \text{ mho/m}$; $\epsilon_r = 38.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(4.48, 4.48, 4.48); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM MIC #2000-93 with CRP Right; Type: SAM MIC #2000-93; Serial: TP-1300
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN 11b_Left Tilt_1Mbps_CH11/Area Scan (111x151x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.224 mW/g

WLAN 11b_Left Tilt_1Mbps_CH11/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

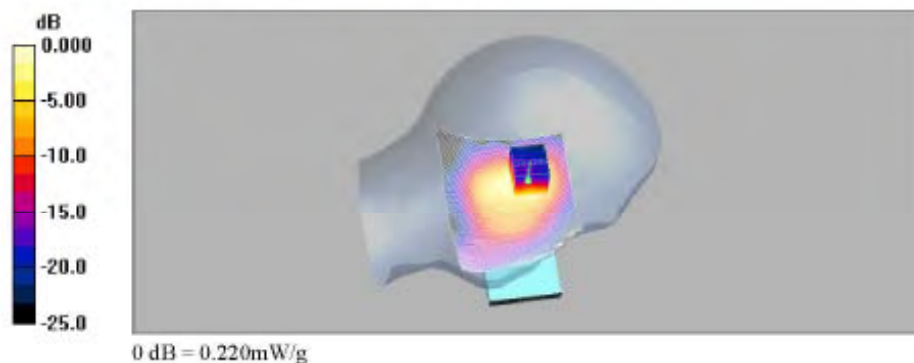
dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.98 V/m; Power Drift = -0.020 dB

Peak SAR (extrapolated) = 0.495 W/kg

SAR(1 g) = 0.199 mW/g; SAR(10 g) = 0.092 mW/g

Maximum value of SAR (measured) = 0.220 mW/g



WLAN Body SAR Test

Date: 2013-02-10

Test Laboratory: SGS Korea (Gunpo Laboratory)
File Name: [WLAN_11b_1Mbps_Front_CH11.da4](#)

Ambient Temp : 23.1 °C Tissue Temp : 21.6 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262
Program Name: WLAN_Body

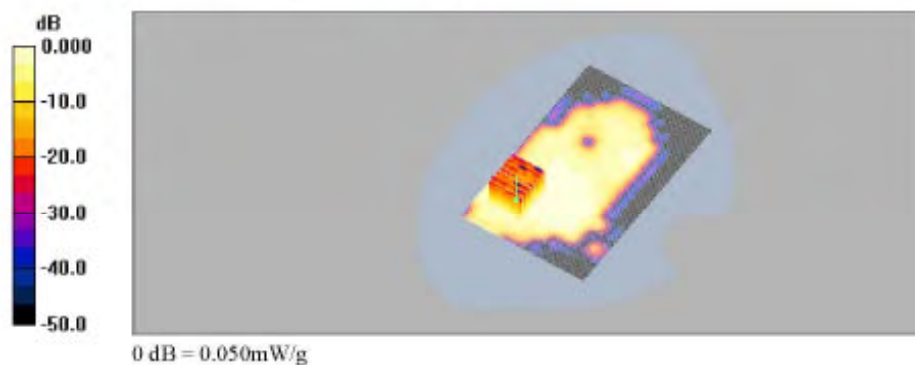
Communication System: WLAN; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 2 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(4.11, 4.11, 4.11); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_11b_Front_CH11/Area Scan (111x171x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.047 mW/g

WLAN_11b_Front_CH11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.88 V/m; Power Drift = -0.089 dB
Peak SAR (extrapolated) = 0.098 W/kg
SAR(1 g) = 0.044 mW/g; SAR(10 g) = 0.022 mW/g
Maximum value of SAR (measured) = 0.050 mW/g



Date: 2013-02-10

Test Laboratory: SGS Korea (Gunpo Laboratory)

File Name: [WLAN_11b_1Mbps_Rear_CH11.da4](#)

Ambient Temp : 23.1 °C Tissue Temp : 21.6 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WLAN_Body

Communication System: WLAN; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462$ MHz; $\sigma = 2$ mho/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(4.11, 4.11, 4.11); Calibrated: 2012-04-27

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn567; Calibrated: 2013-01-25

- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645

- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_11b_Rear_CH11/Area Scan (111x171x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.118 mW/g

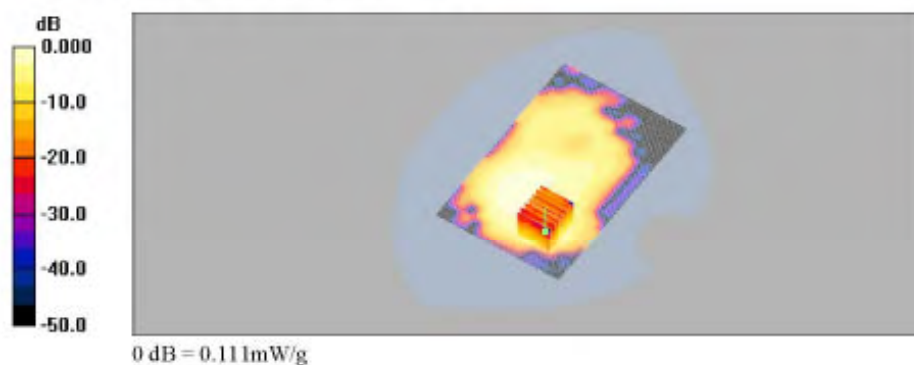
WLAN_11b_Rear_CH11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.41 V/m; Power Drift = -0.031 dB

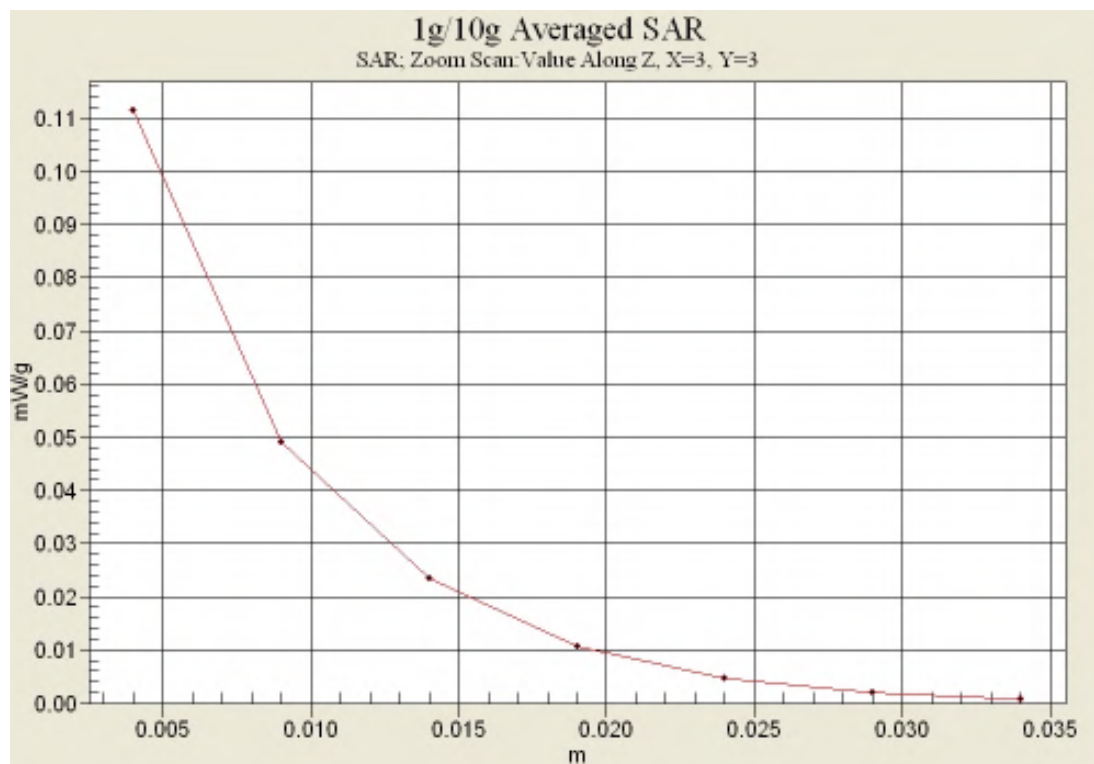
Peak SAR (extrapolated) = 0.240 W/kg

SAR(1 g) = 0.102 mW/g; SAR(10 g) = 0.048 mW/g

Maximum value of SAR (measured) = 0.111 mW/g



Z-Scan



Date: 2013-02-10

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [WLAN_11b_1Mbps_Right_Edge_CH11.da4](#)

Ambient Temp : 23.1 °C Tissue Temp : 21.6 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262

Program Name: WLAN_Body

Communication System: WLAN; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 2 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(4.11, 4.11, 4.11); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_11b_Right_Edge_CH11/Area Scan (81x161x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.061 mW/g

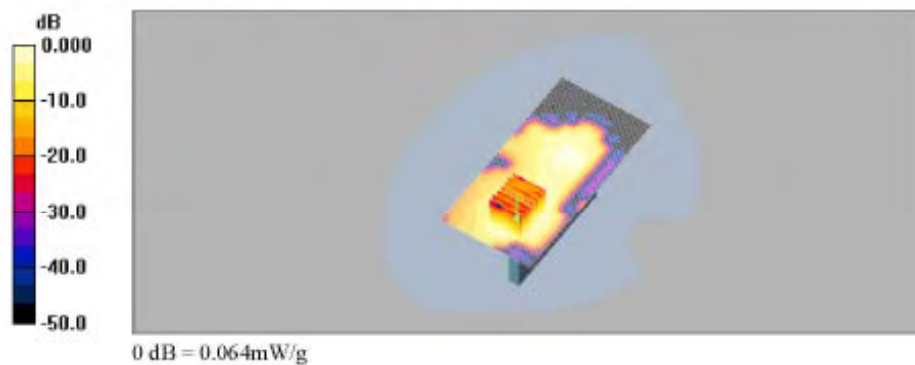
WLAN_11b_Right_Edge_CH11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.17 V/m; Power Drift = -0.021 dB

Peak SAR (extrapolated) = 0.127 W/kg

SAR(1 g) = 0.058 mW/g; SAR(10 g) = 0.030 mW/g

Maximum value of SAR (measured) = 0.064 mW/g



Date: 2013-02-10

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: WLAN_11b_1Mbps_Top_CH11.da4

Ambient Temp : 23.1 °C Tissue Temp : 21.6 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262
Program Name: WLAN_Body

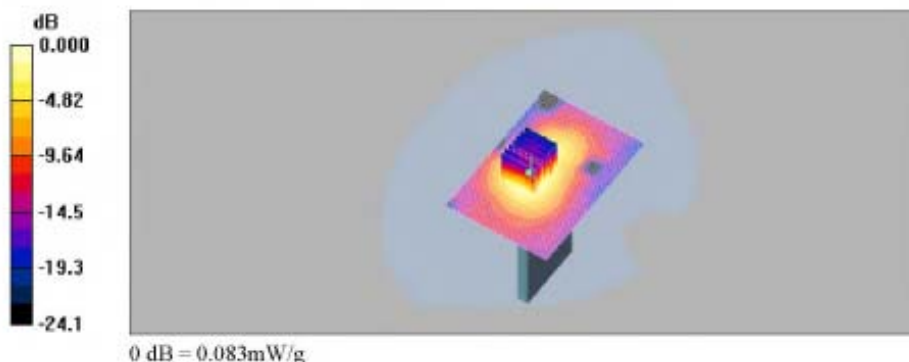
Communication System: WLAN; Frequency: 2462 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 2 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(4.11, 4.11, 4.11); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WLAN_11b_Top_CH11/Area Scan (91x131x1): Measurement grid: dx=10mm, dy=10mm
 Maximum value of SAR (interpolated) = 0.081 mW/g

WLAN_11b_Top_CH11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 5.68 V/m; Power Drift = 0.082 dB
 Peak SAR (extrapolated) = 0.164 W/kg
SAR(1 g) = 0.075 mW/g; SAR(10 g) = 0.038 mW/g
 Maximum value of SAR (measured) = 0.083 mW/g



Repeated SAR Test

Date: 2013-02-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: [GPRS850_Rear_CH190_4TX_Repeated Test.da4](#)

Ambient Temp : 23.3 °C Tissue Temp : 22.5 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262
Program Name: GPRS850_Body

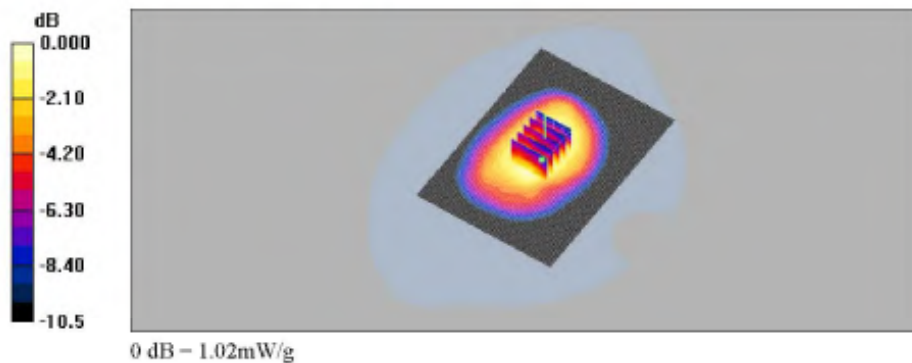
Communication System: GPRS850; Frequency: 836.6 MHz; Duty Cycle: 1:2.075
 Medium parameters used: $f = 836.6 \text{ MHz}$; $\sigma = 0.94 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

GPRS850_Rear_CH190_4TX_Repeated Test/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 1.00 mW/g

GPRS850_Rear_CH190_4TX_Repeated Test/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 31.0 V/m; Power Drift = 0.085 dB
 Peak SAR (extrapolated) = 2.38 W/kg
SAR(1 g) = 0.946 mW/g; SAR(10 g) = 0.688 mW/g
 Maximum value of SAR (measured) = 1.02 mW/g



Date: 2013-02-08

Test Laboratory: SGS Korea (Gunpo Laboratory)
 File Name: WCDMA V_Rear_CH4233_Repeated Test.da4

Ambient Temp : 23.3 °C Tissue Temp : 21.5 °C

DUT: LG-E455f; Type: GSM & WCDMA Phone with Bluetooth and WLAN; Serial: 204KPRW100262
Program Name: WCDMA V_Body

Communication System: WCDMA V; Frequency: 846.6 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 846.6 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 52.7$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section

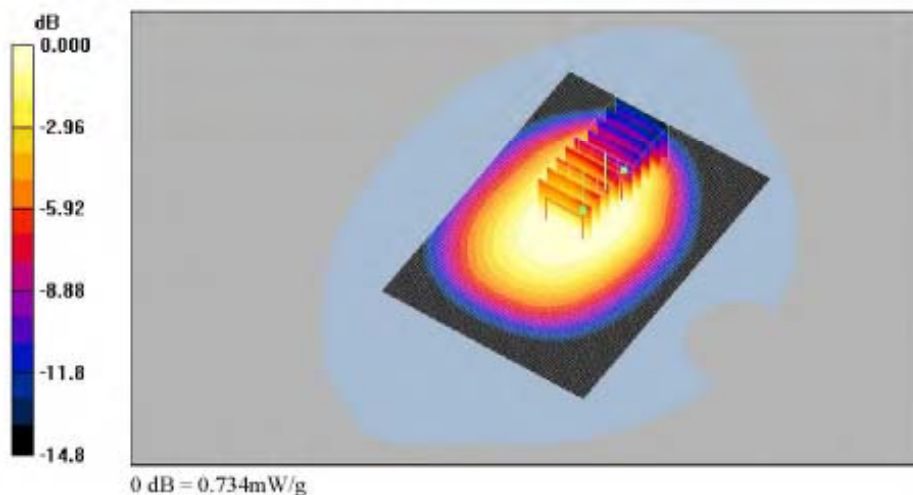
DASY4 Configuration:

- Probe: ET3DV6 - SN1782; ConvF(6.22, 6.22, 6.22); Calibrated: 2012-04-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn567; Calibrated: 2013-01-25
- Phantom: SAM with CRP_2011(left); Type: SAM; Serial: TP-1645
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA V_Rear_CH4233_Repeated Test/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (interpolated) = 0.969 mW/g

WCDMA V_Rear_CH4233_Repeated Test/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 29.4 V/m; Power Drift = -0.005 dB
 Peak SAR (extrapolated) = 1.17 W/kg
SAR(1 g) = 0.910 mW/g; SAR(10 g) = 0.668 mW/g
 Maximum value of SAR (measured) = 0.955 mW/g

WCDMA V_Rear_CH4233_Repeated Test/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
 Reference Value = 29.4 V/m; Power Drift = -0.005 dB
 Peak SAR (extrapolated) = 1.15 W/kg
SAR(1 g) = 0.628 mW/g; SAR(10 g) = 0.405 mW/g
 Maximum value of SAR (measured) = 0.734 mW/g



Appendix B

Uncertainty Analysis

Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

a	b	c	d	e = f(d,k)	g	i = cxg/e	k
Uncertainty Component	Section in P1528	Tol (%)	Prob . Dist.	Div.	Ci (1g)	1g ui (%)	Vi (Veff)
Probe calibration	E.2.1	6.0	N	1	1	6.00	∞
Axial isotropy	E.2.2	0.25	R	1.73	1	0.14	∞
hemispherical isotropy	E.2.2	1.3	R	1.73	1	0.75	∞
Boundary effect	E.2.3	0.4	R	1.73	1	0.23	∞
Linearity	E.2.4	0.3	R	1.73	1	0.17	∞
System detection limit	E.2.5	0.25	R	1.73	1	0.14	∞
Readout electronics	E.2.6	0.3	N	1	1	0.30	∞
Response time	E.2.7	0.8	R	1.73	1	0.46	∞
Integration time	E.2.8	2.6	R	1.73	1	1.50	∞
RF ambient Condition -Noise	E.6.1	3.0	R	1.73	1	1.73	∞
RF ambient Condition - reflections	E.6.1	3.0	R	1.73	1	1.73	∞
Probe positioning- mechanical tolerance	E.6.2	1.5	R	1.73	1	0.87	∞
Probe positioning- with respect to phantom	E.6.3	2.9	R	1.73	1	1.67	∞
Max. SAR evaluation	E.5.2	1.0	R	1.73	1	0.58	∞
Test sample positioning	E.4.2	5.84	N	1	1	5.84	9
Device holder uncertainty	E.4.1	3.6	N	1	1	3.60	∞
Output power variation -SAR drift measurement	6.62	5.0	R	1.73	1	2.89	∞
Phantom uncertainty (shape and thickness tolerances)	E.3.1	6.6	R	1.73	1	3.81	∞
Liquid conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	1.85	∞
Liquid conductivity - measurement uncertainty	E.3.2	0.70	N	1	0.64	0.45	5
Liquid permittivity - deviation from target values	E.3.3	5.0	R	1.73	0.6	1.73	∞
Liquid permittivity - measurement uncertainty	E.3.3	0.56	N	1	0.6	0.34	5
Combined standard uncertainty				RSS		11.22	123
Expanded uncertainty (95% CONFIDENCE INTERVAL)				K=2		22.44	

Appendix C

Calibration Certificate

- PROBE

- DAE

- 835 MHz, 1900 MHz, 2450 MHz DIPOLE

- PROBE Calibration Certificate

**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 **SGS (Dymstec)**

Certificate No: **ET3-1782_Apr12**

CALIBRATION CERTIFICATE

Object **ET3DV6 - SN:1782**

Calibration procedure(s) **QA CAL-01 v8, QA CAL-12 v7, QA CAL-23 v4, QA CAL-25 v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **April 27, 2012**

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&E critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293674	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S6086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	10-Jan-12 (No. DAE4-660_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642UB1700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390595	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Jeton Kastali	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

Issued: April 27, 2012

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
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
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., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- 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
- 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 $\theta = 0$ ($f \leq 900$ 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 affect the E^2 -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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- 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:1782

April 27, 2012

Probe ET3DV6

SN:1782

Manufactured: April 15, 2003
Calibrated: April 27, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

ET3DV6- SN:1782

April 27, 2012

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1782

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$) ^A	2.01	1.66	1.88	± 10.1 %
DCP (mV) ^B	96.2	96.7	96.7	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^C (k=2)
0	CW	0.00	X	0.00	0.00	1.00	154.8	±1.9 %
			Y	0.00	0.00	1.00	185.8	
			Z	0.00	0.00	1.00	151.1	

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 Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^C Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^e	Conductivity (S/m) ^e	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	7.17	7.17	7.17	0.23	2.35	± 13.4 %
835	41.5	0.90	6.40	6.40	6.40	0.32	3.00	± 12.0 %
1750	40.1	1.37	5.39	5.39	5.39	0.80	1.66	± 12.0 %
1900	40.0	1.40	5.12	5.12	5.12	0.80	1.98	± 12.0 %
2450	39.2	1.80	4.48	4.48	4.48	0.80	1.97	± 12.0 %

^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^e At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.57	7.57	7.57	0.16	2.29	± 13.4 %
835	55.2	0.97	6.22	6.22	6.22	0.24	3.00	± 12.0 %
1750	53.4	1.49	4.79	4.79	4.79	0.76	2.24	± 12.0 %
1900	53.3	1.52	4.59	4.59	4.59	0.75	2.18	± 12.0 %
2450	52.7	1.95	4.11	4.11	4.11	0.76	2.25	± 12.0 %

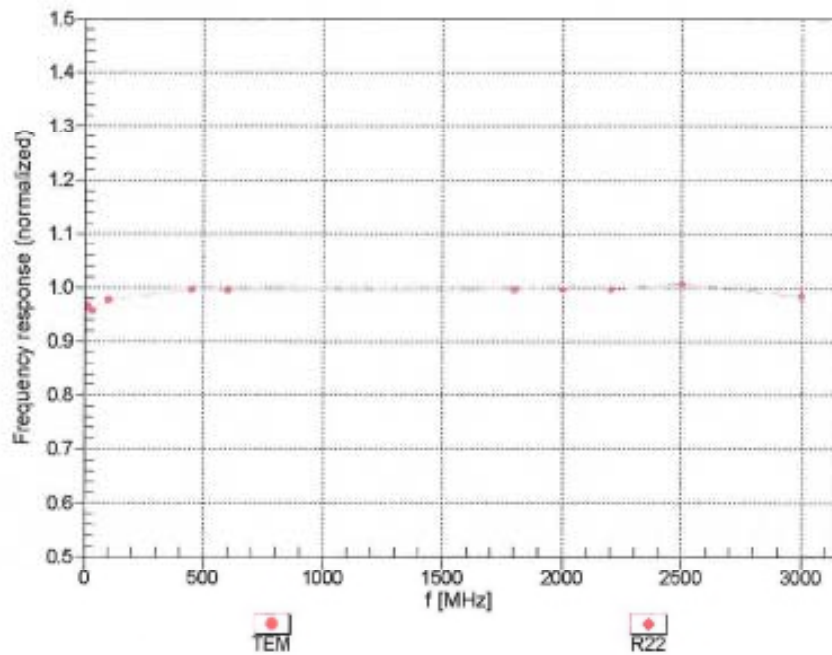
^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^f At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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



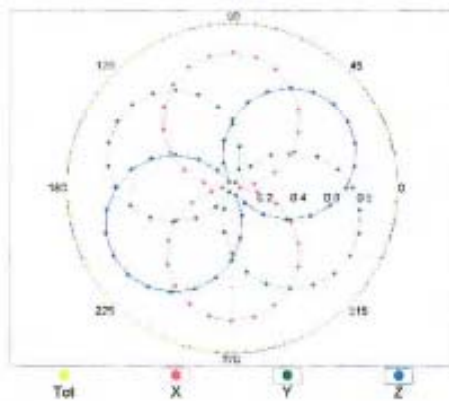
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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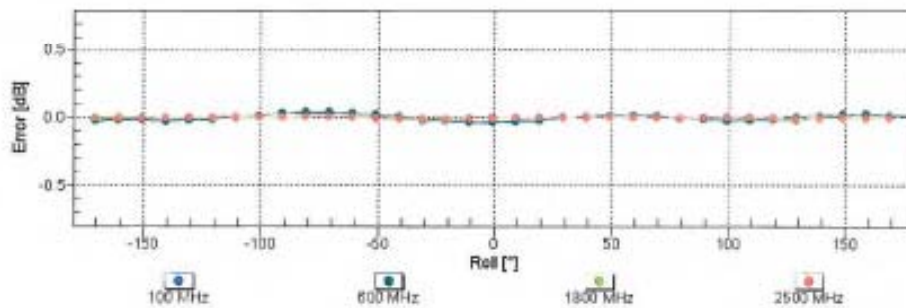
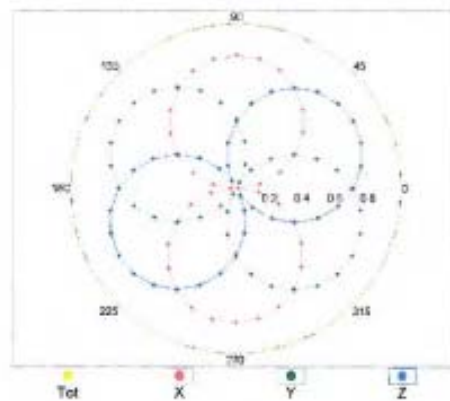
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Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz, TEM



f=1800 MHz, R22

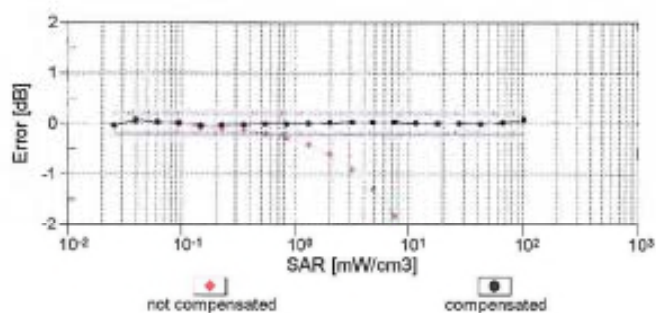
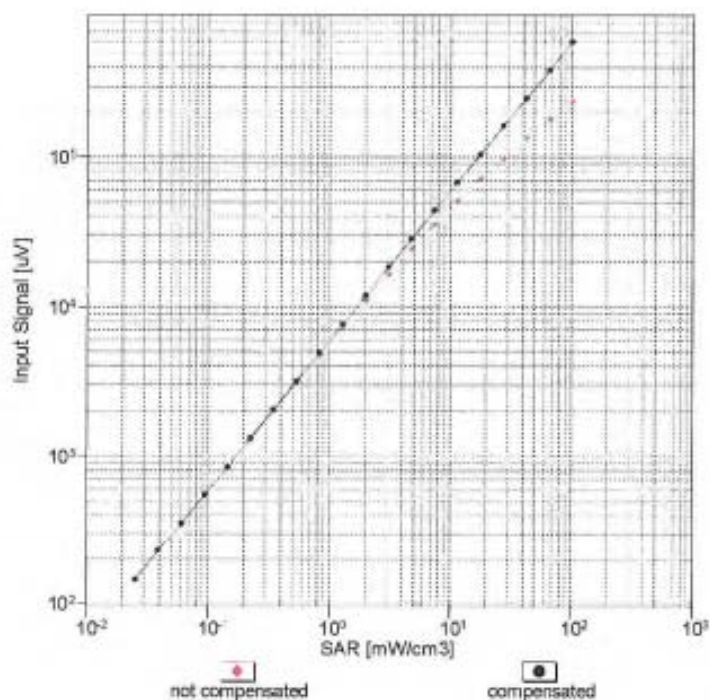


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f = 900 \text{ MHz}$)

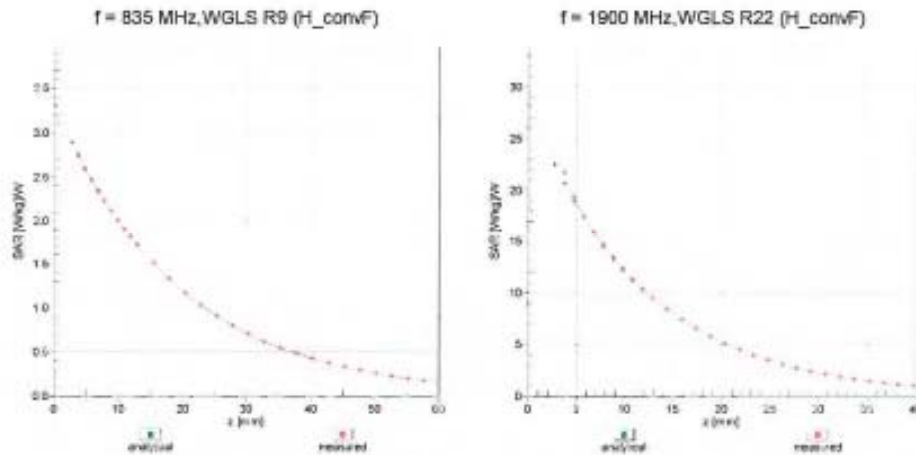


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

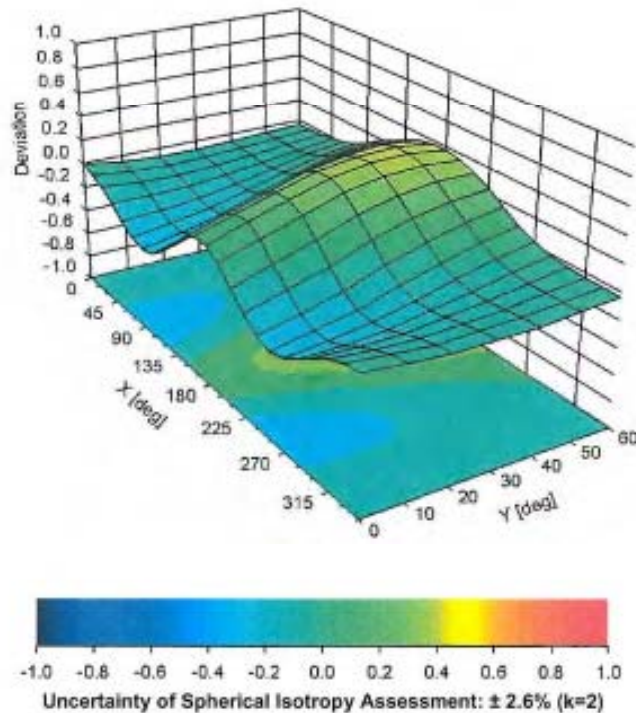
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Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ , θ), $f = 900$ MHz



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DASY/EASY - Parameters of Probe: ET3DV6 - SN:1782

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	49.1
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

- DAE3 Calibration Certificate

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 **SGS (Dymstec)**

Certificate No: DAE3-567_Jan13

CALIBRATION CERTIFICATE

Object **DAE3 - SD 000 D03 AA - SN: 567**

Calibration procedure(s) **QA CAL-06.v25
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **January 25, 2013**

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
Keithley Multimeter Type 2001	SN: 0810278	02-Oct-12 (No:12728)	Oct-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Auto DAE Calibration Unit Calibrator Box V2.1	SE UWS 053 AA 1001	07-Jan-13 (in house check)	In house check: Jan-14
	SE UMS 006 AA 1002	07-Jan-13 (in house check)	In house check: Jan-14

Calibrated by:	Name R. Mayoraz	Function Technician	Signature 
Approved by:	Fin Bornholt	Deputy Technical Manager	

Issued: January 25, 2013

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

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**

Glossary

DAE data acquisition electronics
Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- **DC Voltage Measurement:** Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- **Connector angle:** The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
 - **DC Voltage Measurement Linearity:** Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
 - **Common mode sensitivity:** Influence of a positive or negative common mode voltage on the differential measurement.
 - **Channel separation:** Influence of a voltage on the neighbor channels not subject to an input voltage.
 - **AD Converter Values with inputs shorted:** Values on the internal AD converter corresponding to zero input voltage
 - **Input Offset Measurement:** Output voltage and statistical results over a large number of zero voltage measurements.
 - **Input Offset Current:** Typical value for information; Maximum channel input offset current, not considering the input resistance.
 - **Input resistance:** Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
 - **Low Battery Alarm Voltage:** Typical value for information. Below this voltage, a battery alarm signal is generated.
 - **Power consumption:** Typical value for information. Supply currents in various operating modes.