Attachment 1 – System Validation Plots

JQA

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

System Validation (Head 1900 MHz)

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d112

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL1900 Medium parameters used: f = 1900 MHz; σ = 1.41 mho/m; ε_r = 40.9; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Antenna Input Power 250 mW/Area Scan (5x5x1): Measurement grid: dx=20mm, dy=20mm
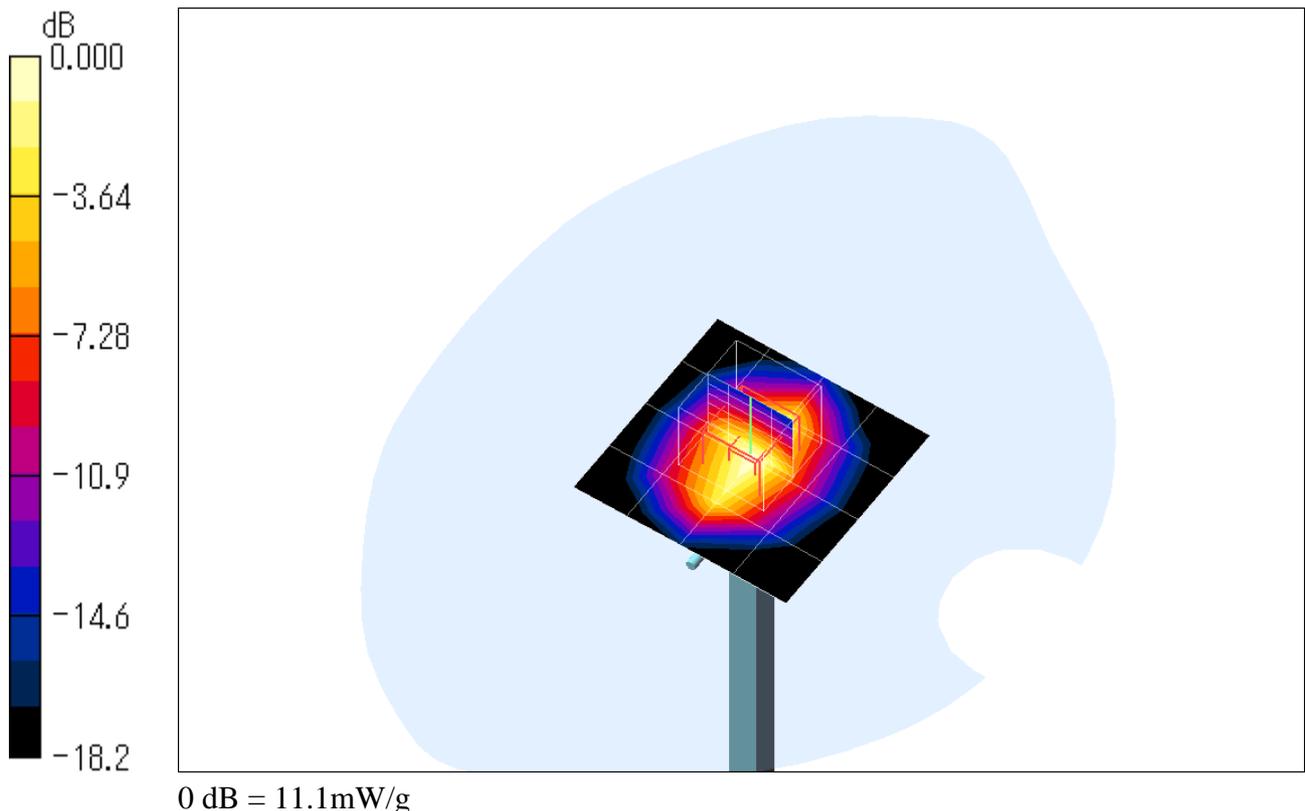Maximum value of SAR (measured) = 11.1 mW/g

Antenna Input Power 250 mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 94.2 V/m; Power Drift = 0.011 dB
Peak SAR (extrapolated) = 17.1 W/kg
SAR(1 g) = 9.86 mW/g; SAR(10 g) = 5.2 mW/g
Maximum value of SAR (measured) = 11.1 mW/g

dB
0.000
-3.64
-7.28
-10.9
-14.6
-18.2

0 dB = 11.1mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

System Validation (Body 1900 MHz)

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d112

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

Medium: MSL1900 Medium parameters used: f = 1900 MHz; σ = 1.56 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.43, 4.43, 4.43); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Antenna Input Power 250 mW/Area Scan (5x5x1): Measurement grid: dx=20mm, dy=20mm
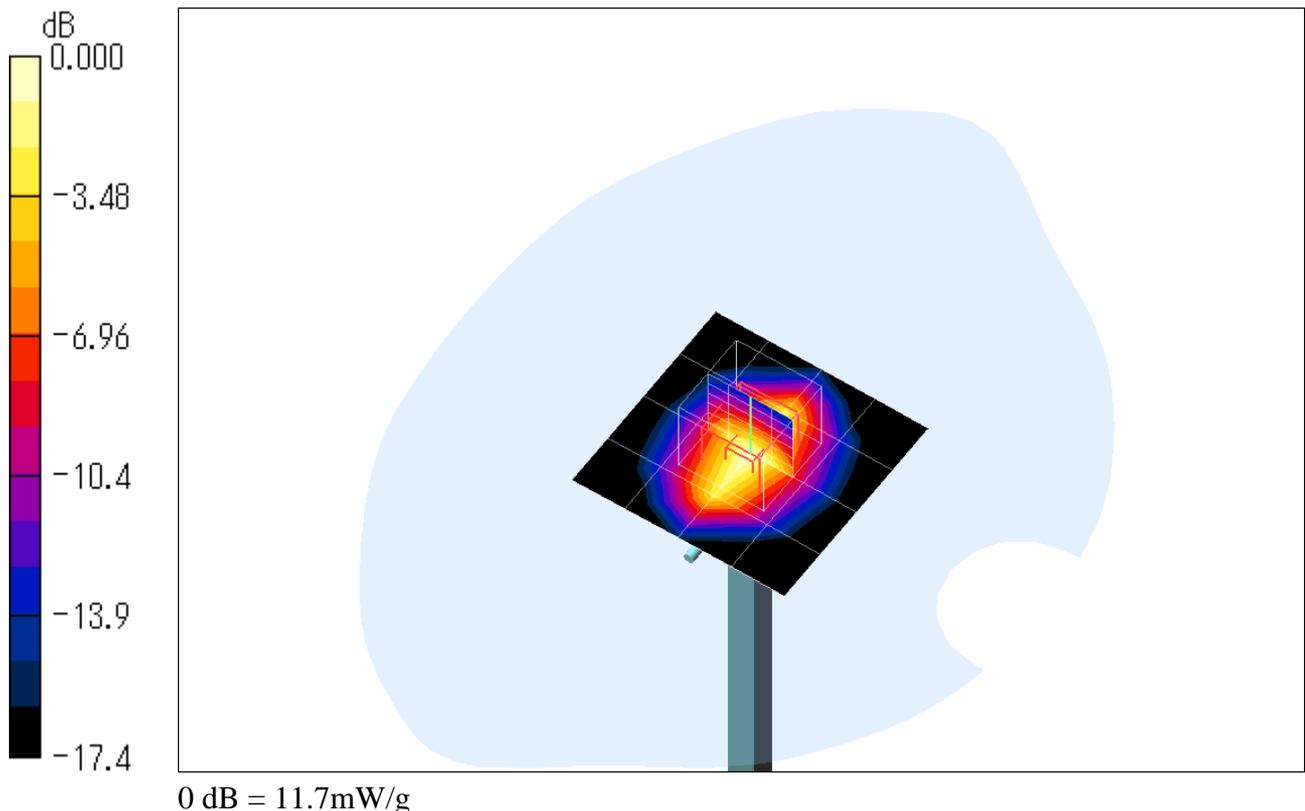Maximum value of SAR (measured) = 11.8 mW/g

Antenna Input Power 250 mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 93.3 V/m; Power Drift = -0.018 dB
Peak SAR (extrapolated) = 17.8 W/kg
SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.47 mW/g
Maximum value of SAR (measured) = 11.7 mW/g

0 dB = 11.7mW/g

Attachment 2 – SAR Test Plots

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Left Head 661ch / PCS 1900

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3

Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 40.9; ρ = 1000 kg/m^3

Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch Position/Area Scan (11x6x1): Measurement grid: dx=15mm, dy=15mm
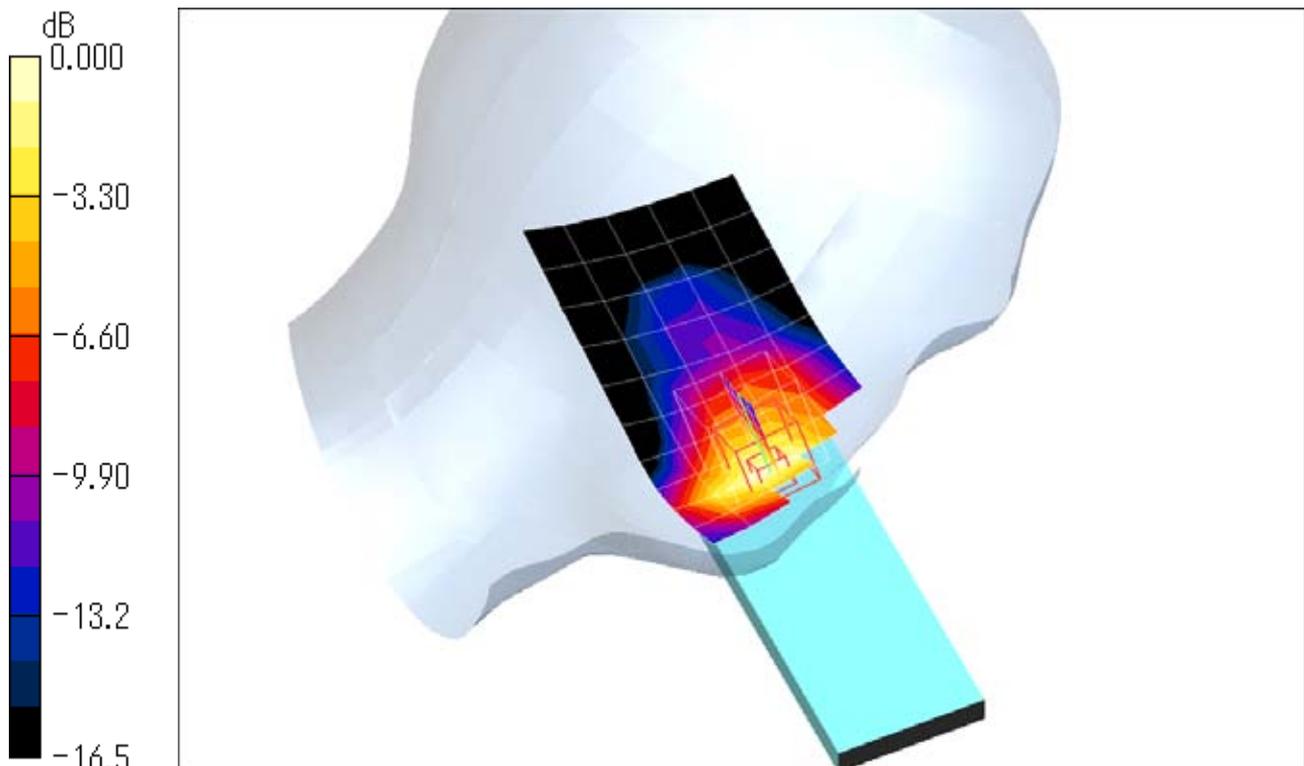Maximum value of SAR (measured) = 0.306 mW/g

Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.66 V/m; Power Drift = -0.146 dB
Peak SAR (extrapolated) = 0.434 W/kg
SAR(1 g) = 0.287 mW/g; SAR(10 g) = 0.174 mW/g
Maximum value of SAR (measured) = 0.313 mW/g

0 dB = 0.313mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Left Head 661ch / PCS 1900

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3

Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 40.9; ρ = 1000 kg/m^3

Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Ear/Tilt Position/Area Scan (11x6x1): Measurement grid: dx=15mm, dy=15mm
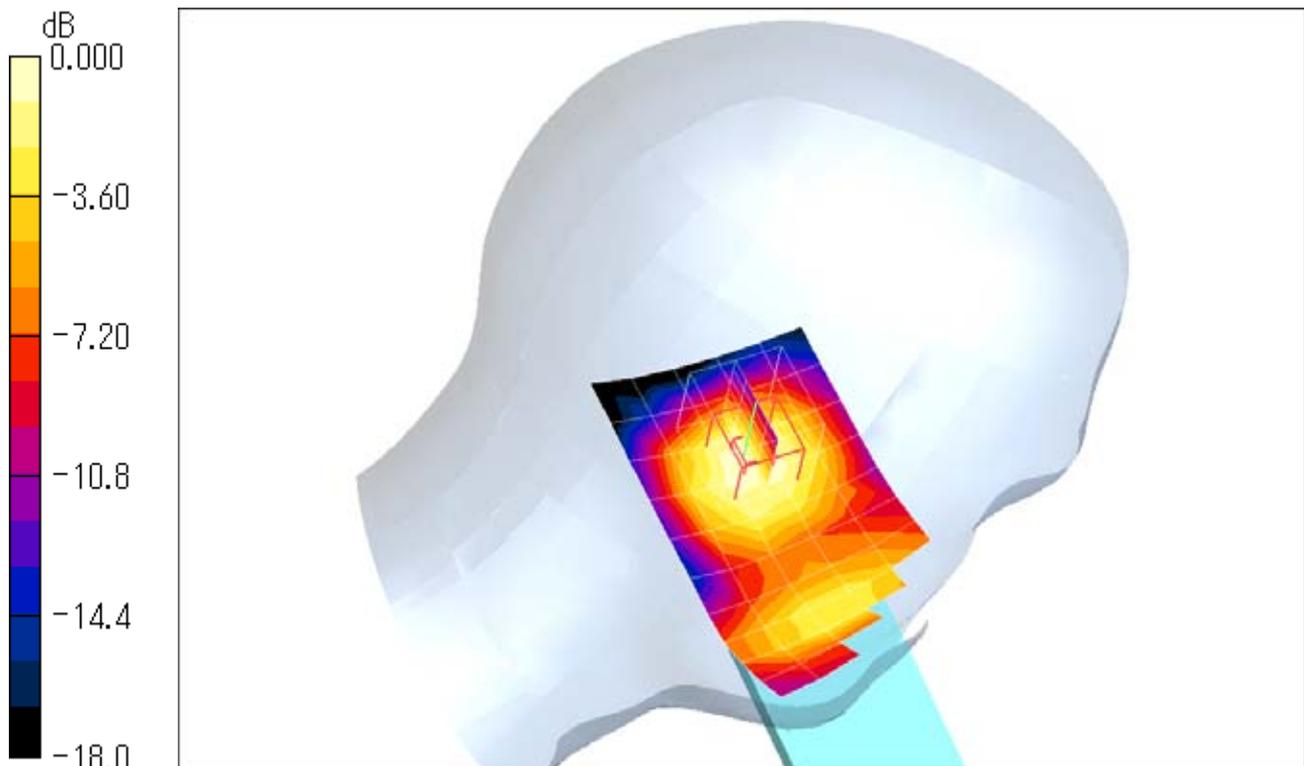Maximum value of SAR (measured) = 0.056 mW/g

Ear/Tilt Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.55 V/m; Power Drift = 0.015 dB
Peak SAR (extrapolated) = 0.081 W/kg
SAR(1 g) = 0.056 mW/g; SAR(10 g) = 0.035 mW/g
Maximum value of SAR (measured) = 0.060 mW/g

0 dB = 0.060mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Right Head 512ch / PCS 1900

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: HSL1900 Medium parameters used: f = 1850.2 MHz; σ = 1.36 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3

Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch Position/Area Scan (11x6x1): Measurement grid: dx=15mm, dy=15mm
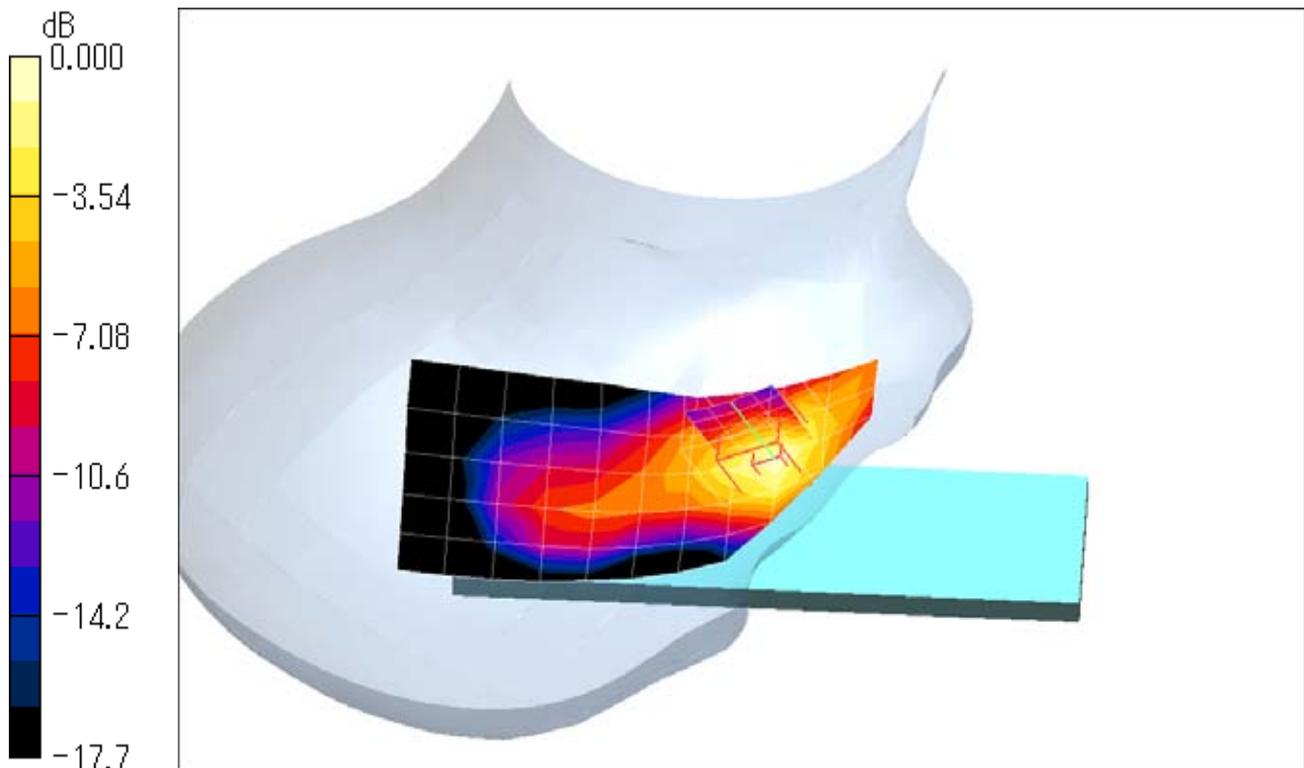Maximum value of SAR (measured) = 0.301 mW/g

Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.17 V/m; Power Drift = 0.042 dB
Peak SAR (extrapolated) = 0.398 W/kg
SAR(1 g) = 0.272 mW/g; SAR(10 g) = 0.162 mW/g
Maximum value of SAR (measured) = 0.303 mW/g

0 dB = 0.303mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Right Head 661ch / PCS 1900

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3

Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 40.9; ρ = 1000 kg/m^3

Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch Position/Area Scan (11x6x1): Measurement grid: dx=15mm, dy=15mm
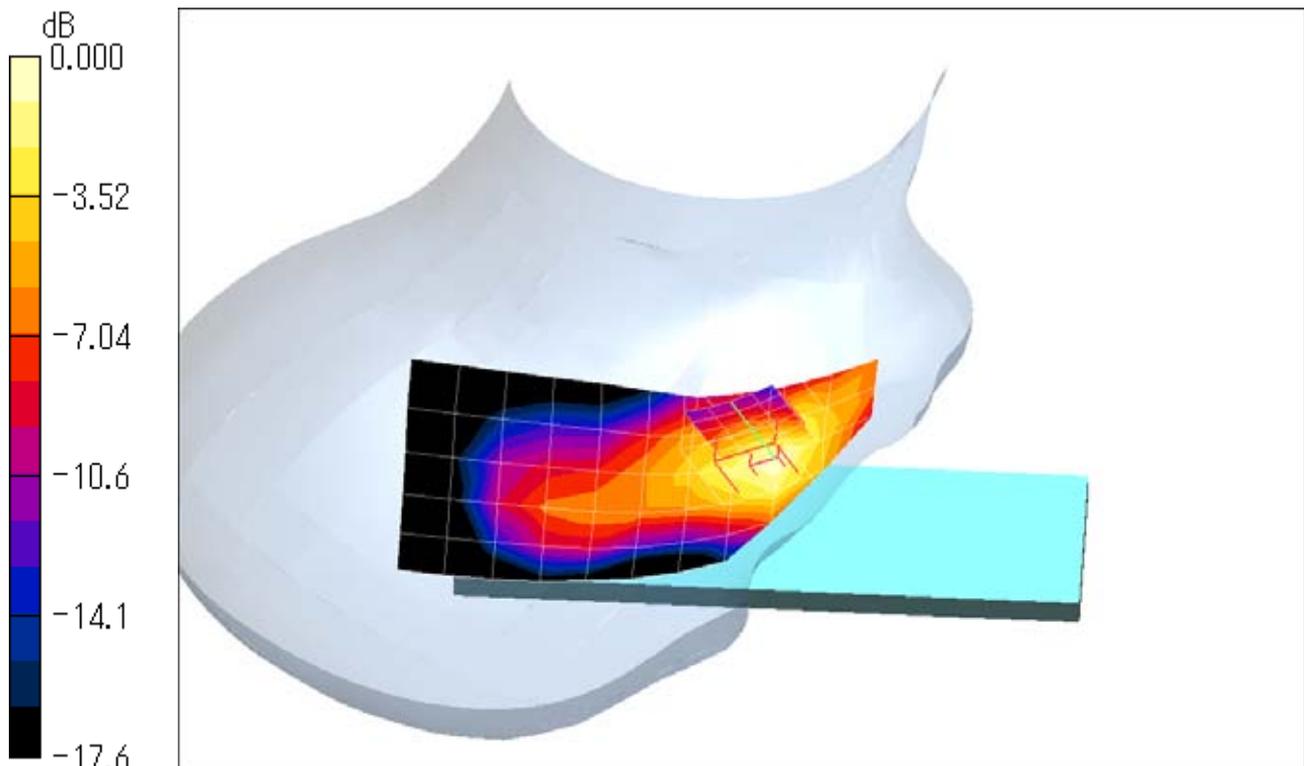Maximum value of SAR (measured) = 0.333 mW/g

Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.19 V/m; Power Drift = 0.016 dB
Peak SAR (extrapolated) = 0.428 W/kg
SAR(1 g) = 0.292 mW/g; SAR(10 g) = 0.176 mW/g
Maximum value of SAR (measured) = 0.321 mW/g

0 dB = 0.321mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Right Head 810ch / PCS 1900

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

Communication System: GSM 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3

Medium: HSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.42 mho/m; ε_r = 40.8; ρ = 1000 kg/m^3

Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch Position/Area Scan (11x6x1): Measurement grid: dx=15mm, dy=15mm
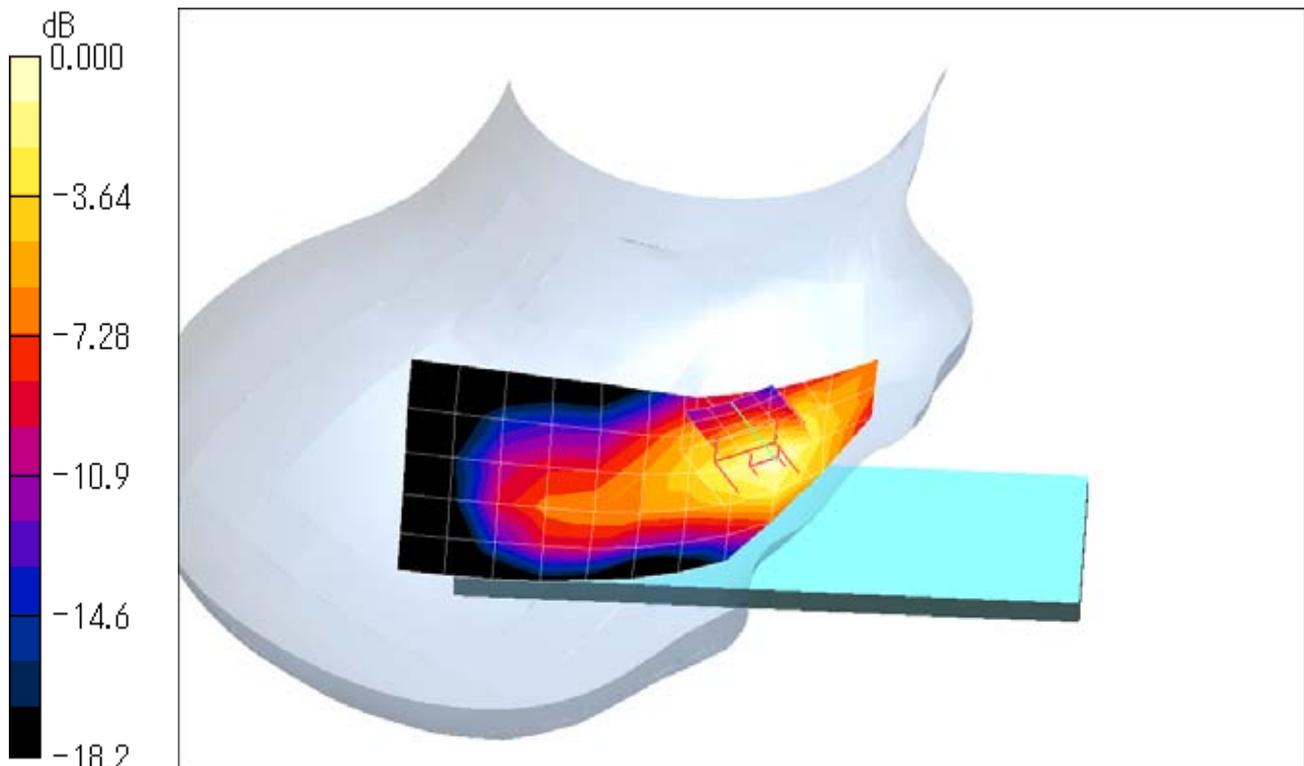Maximum value of SAR (measured) = 0.389 mW/g

Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.10 V/m; Power Drift = -0.045 dB
Peak SAR (extrapolated) = 0.533 W/kg
SAR(1 g) = 0.358 mW/g; SAR(10 g) = 0.214 mW/g
Maximum value of SAR (measured) = 0.396 mW/g

0 dB = 0.396mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Right Head 810ch / PCS 1900

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

Communication System: GSM 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3

Medium: HSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.42 mho/m; ε_r = 40.8; ρ = 1000 kg/m^3

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch Position/Z Scan (1x1x45): Measurement grid: dx=20mm, dy=20mm, dz=2.5mm

Maximum value of SAR (measured) = 0.373 mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Right Head 661ch / PCS 1900

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

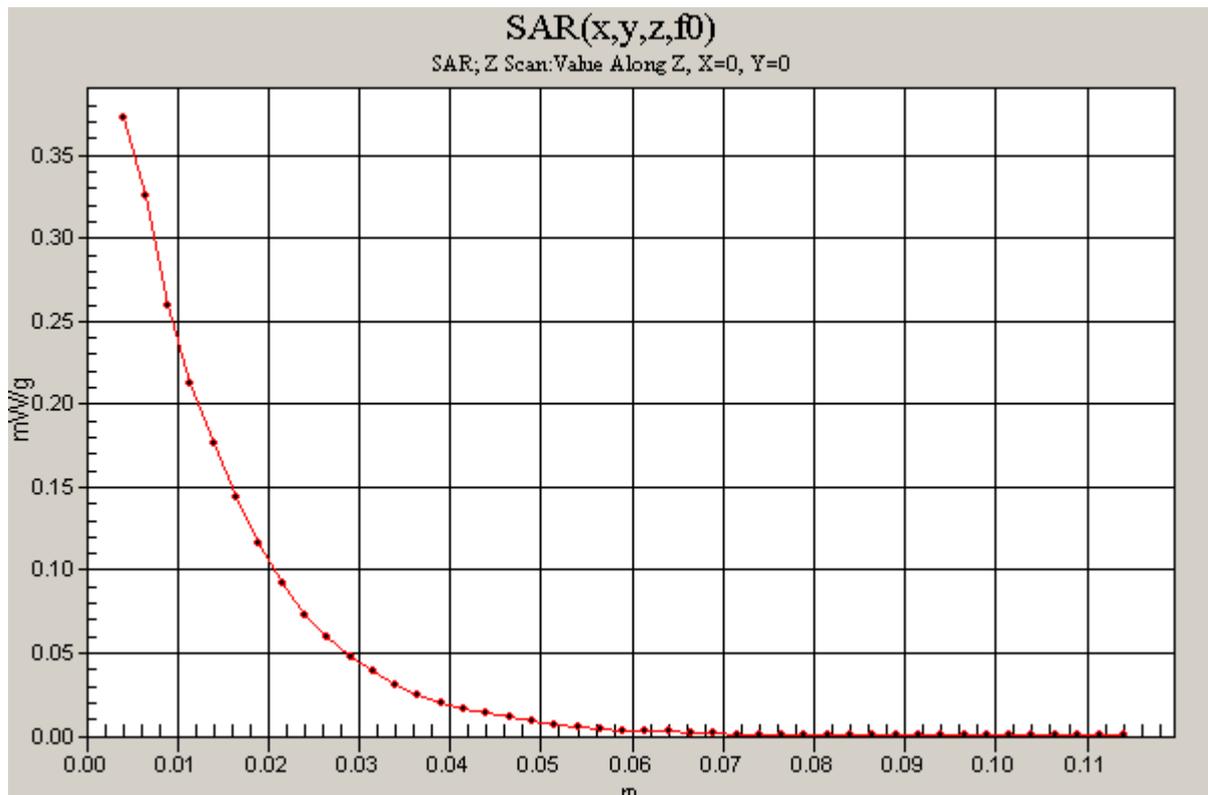Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3

Medium: HSL1900 Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 40.9; ρ = 1000 kg/m^3

Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Ear/Tilt Position/Area Scan (11x6x1): Measurement grid: dx=15mm, dy=15mm
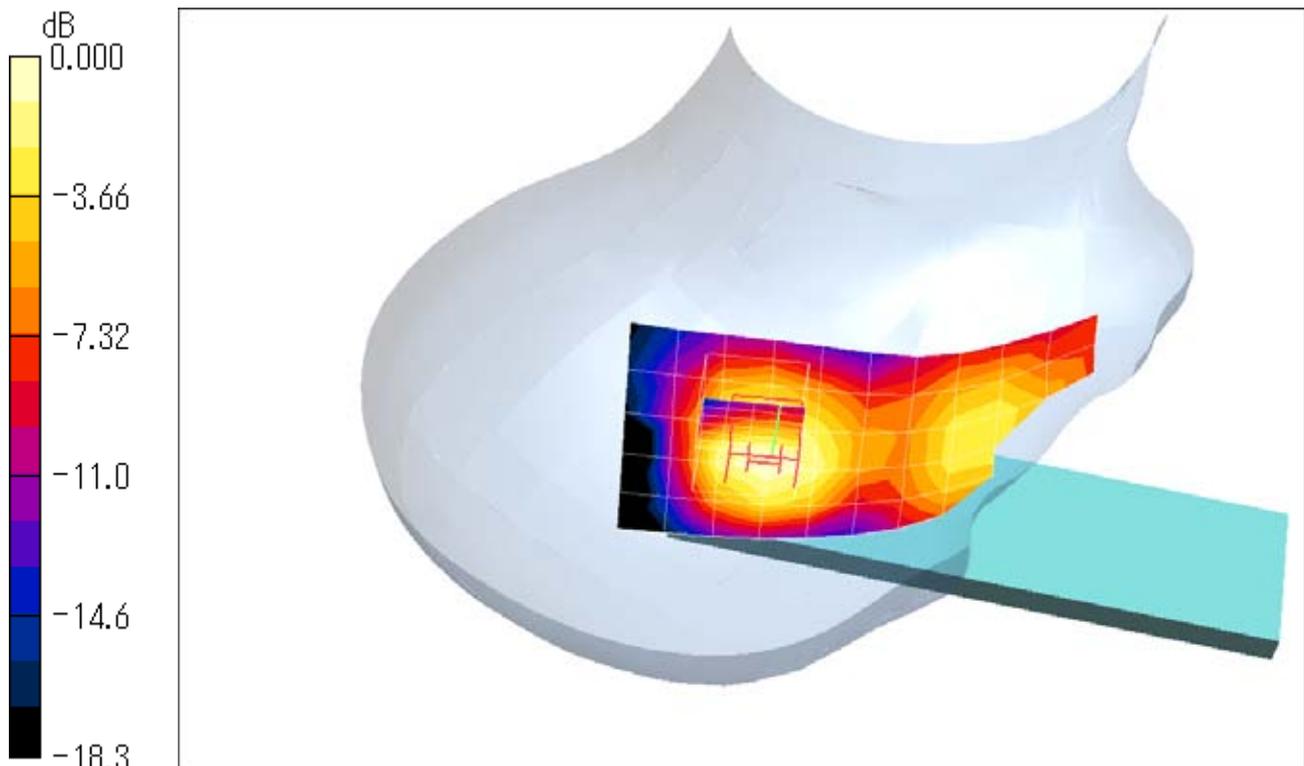Maximum value of SAR (measured) = 0.069 mW/g

Ear/Tilt Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.26 V/m; Power Drift = -0.043 dB
Peak SAR (extrapolated) = 0.095 W/kg
SAR(1 g) = 0.065 mW/g; SAR(10 g) = 0.040 mW/g
Maximum value of SAR (measured) = 0.070 mW/g

0 dB = 0.070mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body 661ch / PCS 1900 - GPRS 2slot

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium: MSL1900 Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.43, 4.43, 4.43); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Front Side/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
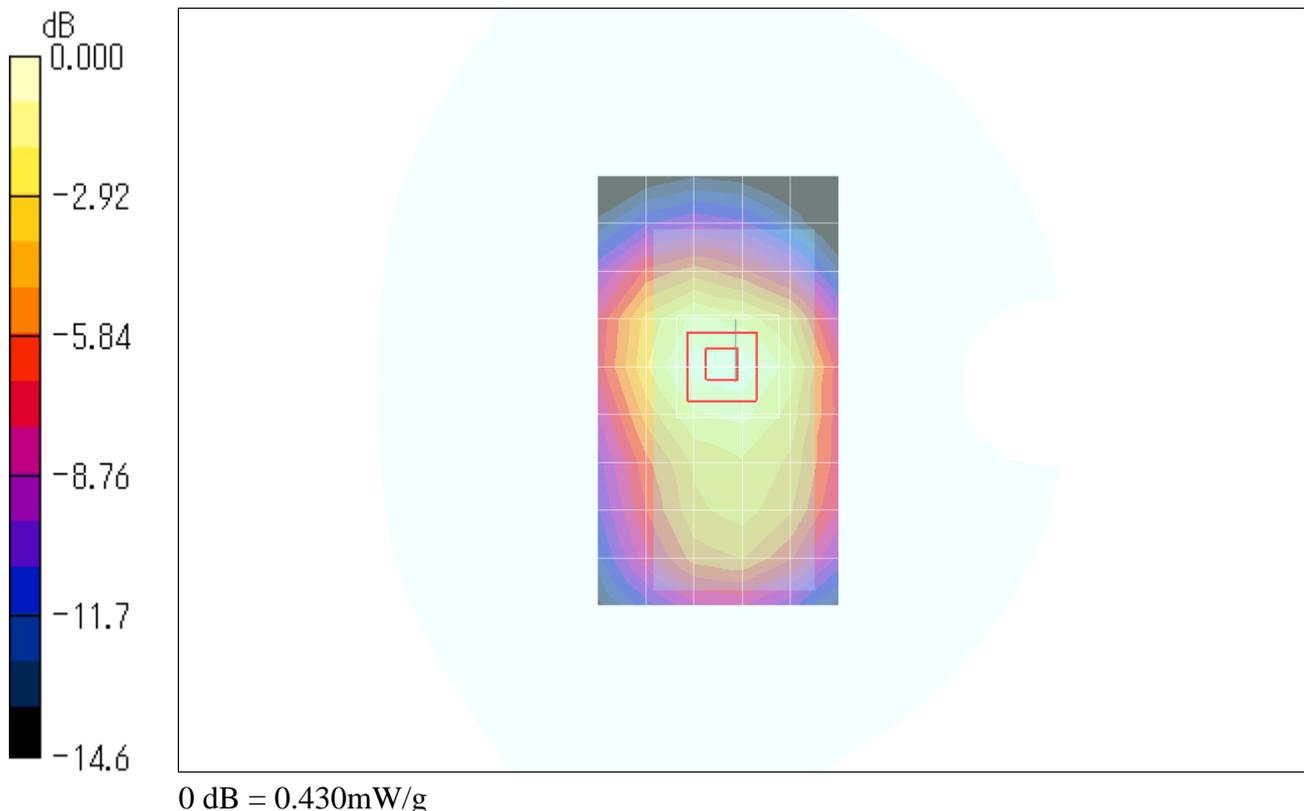Maximum value of SAR (measured) = 0.416 mW/g

Front Side/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.3 V/m; Power Drift = -0.067 dB
Peak SAR (extrapolated) = 0.611 W/kg
SAR(1 g) = 0.397 mW/g; SAR(10 g) = 0.246 mW/g
Maximum value of SAR (measured) = 0.430 mW/g

0 dB = 0.430mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body 512ch / PCS 1900 - GPRS 2slot

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

Communication System: GSM 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4.15
Medium: MSL1900 Medium parameters used: f = 1850.2 MHz; σ = 1.5 mho/m; ε_r = 53; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.43, 4.43, 4.43); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Rear Side/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.443 mW/g

Rear Side/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.0 V/m; Power Drift = -0.036 dB
Peak SAR (extrapolated) = 0.703 W/kg
SAR(1 g) = 0.450 mW/g; SAR(10 g) = 0.276 mW/g
Maximum value of SAR (measured) = 0.489 mW/g

0 dB = 0.489mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body 661ch / PCS 1900 - GPRS 2slot

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium: MSL1900 Medium parameters used: f = 1880 MHz; σ = 1.54 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.43, 4.43, 4.43); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Rear Side/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
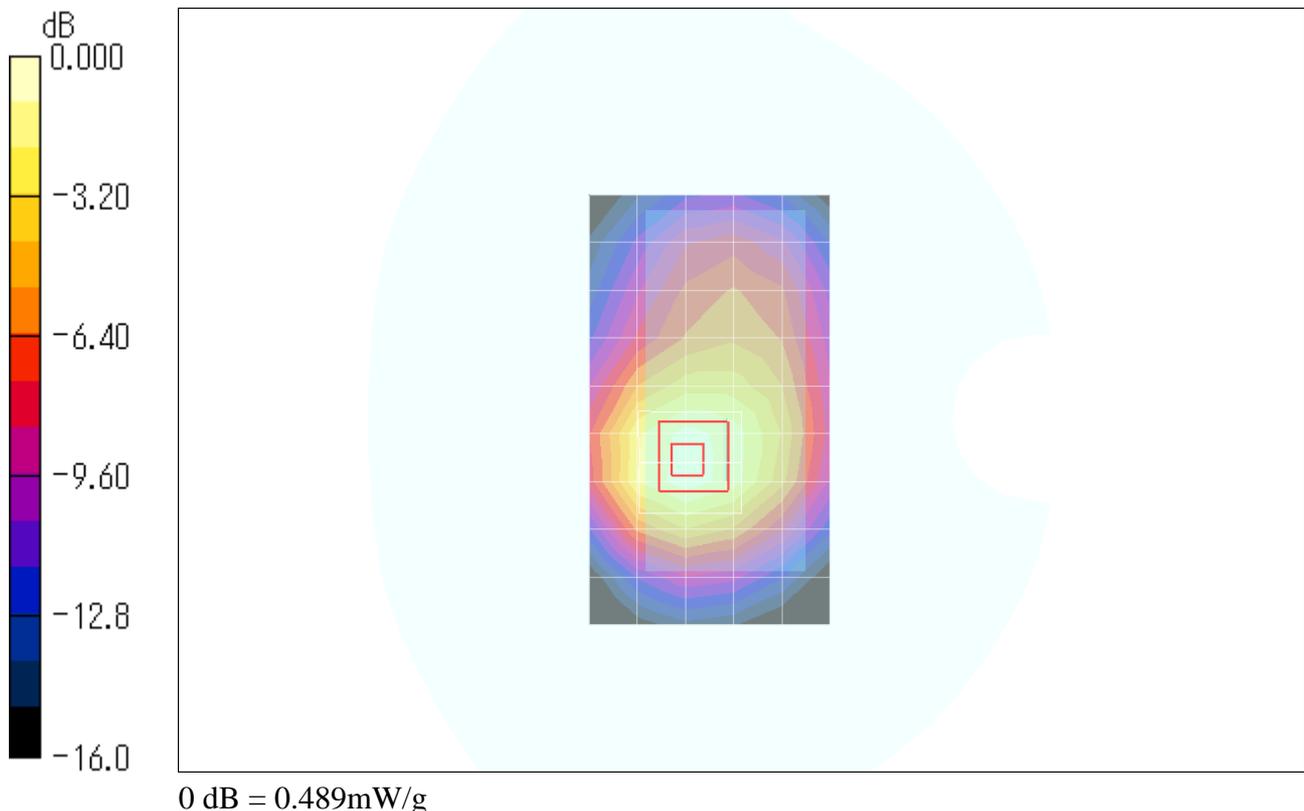Maximum value of SAR (measured) = 0.405 mW/g

Rear Side/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.6 V/m; Power Drift = -0.017 dB
Peak SAR (extrapolated) = 0.698 W/kg
SAR(1 g) = 0.427 mW/g; SAR(10 g) = 0.257 mW/g
Maximum value of SAR (measured) = 0.462 mW/g

0 dB = 0.462mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body 810ch / PCS 1900 - GPRS 2slot

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

Communication System: GSM 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:4.15

Medium: MSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.57 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.43, 4.43, 4.43); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Rear Side/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
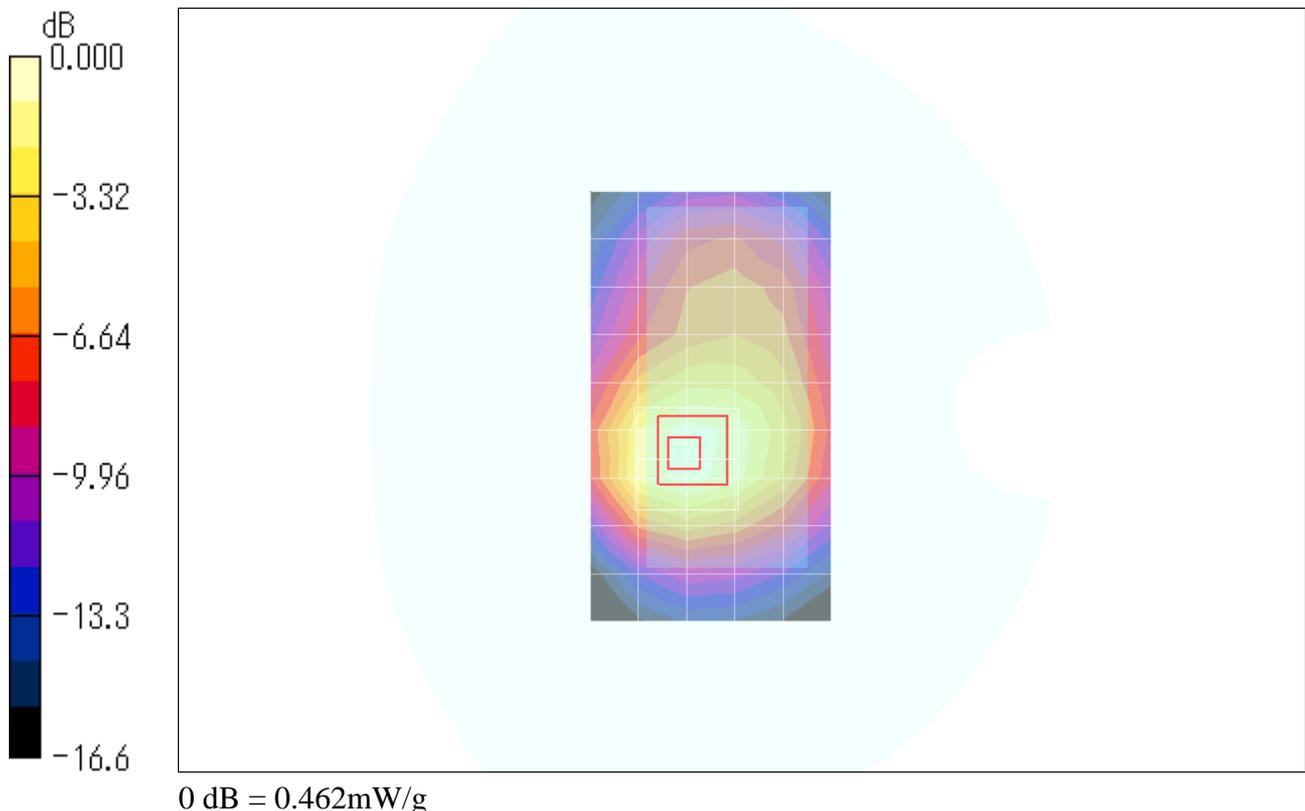Maximum value of SAR (measured) = 0.458 mW/g

Rear Side/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.5 V/m; Power Drift = -0.033 dB
Peak SAR (extrapolated) = 0.801 W/kg
SAR(1 g) = 0.488 mW/g; SAR(10 g) = 0.290 mW/g
Maximum value of SAR (measured) = 0.518 mW/g

0 dB = 0.518mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body 810ch / PCS 1900 - GPRS 2slot

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

Communication System: GSM 1900; Frequency: 1909.8 MHz; Duty Cycle: 1:4.15

Medium: MSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.57 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.43, 4.43, 4.43); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Rear Side w/headset/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.489 mW/g

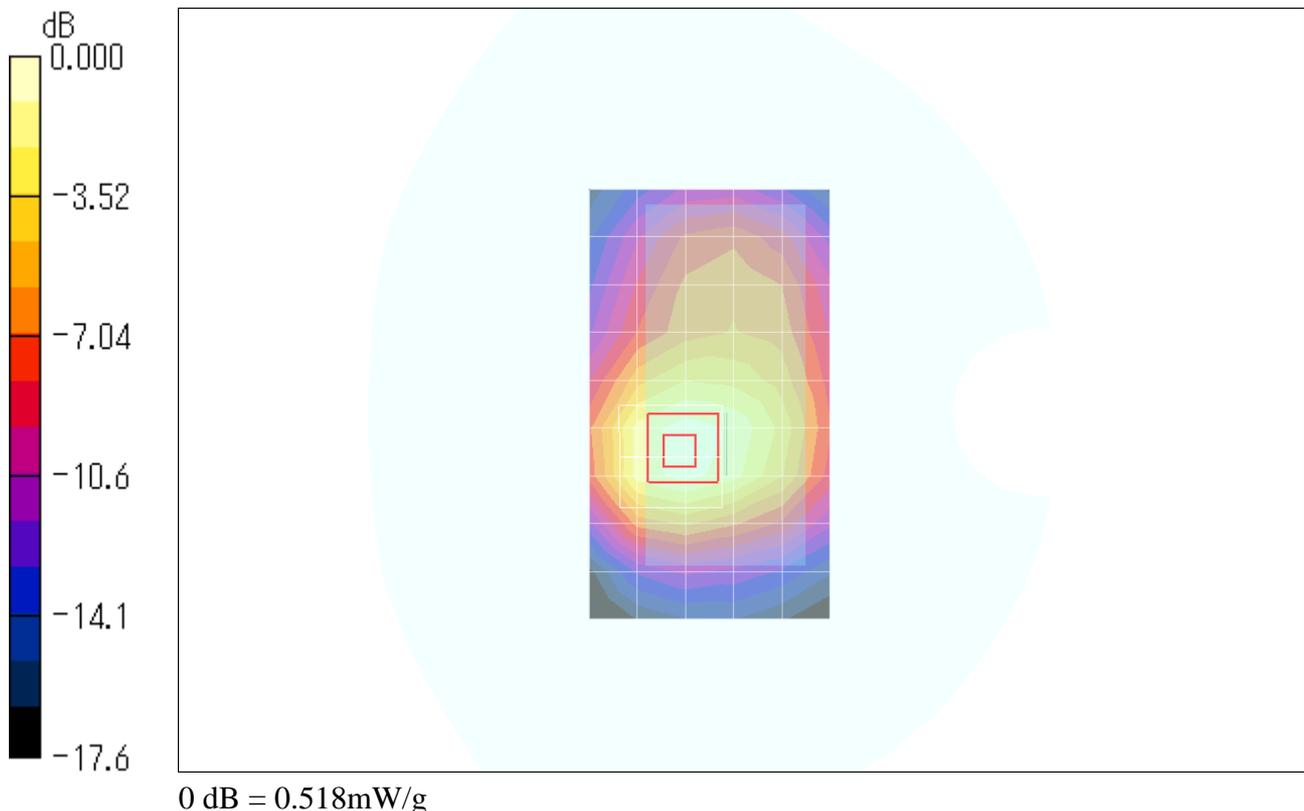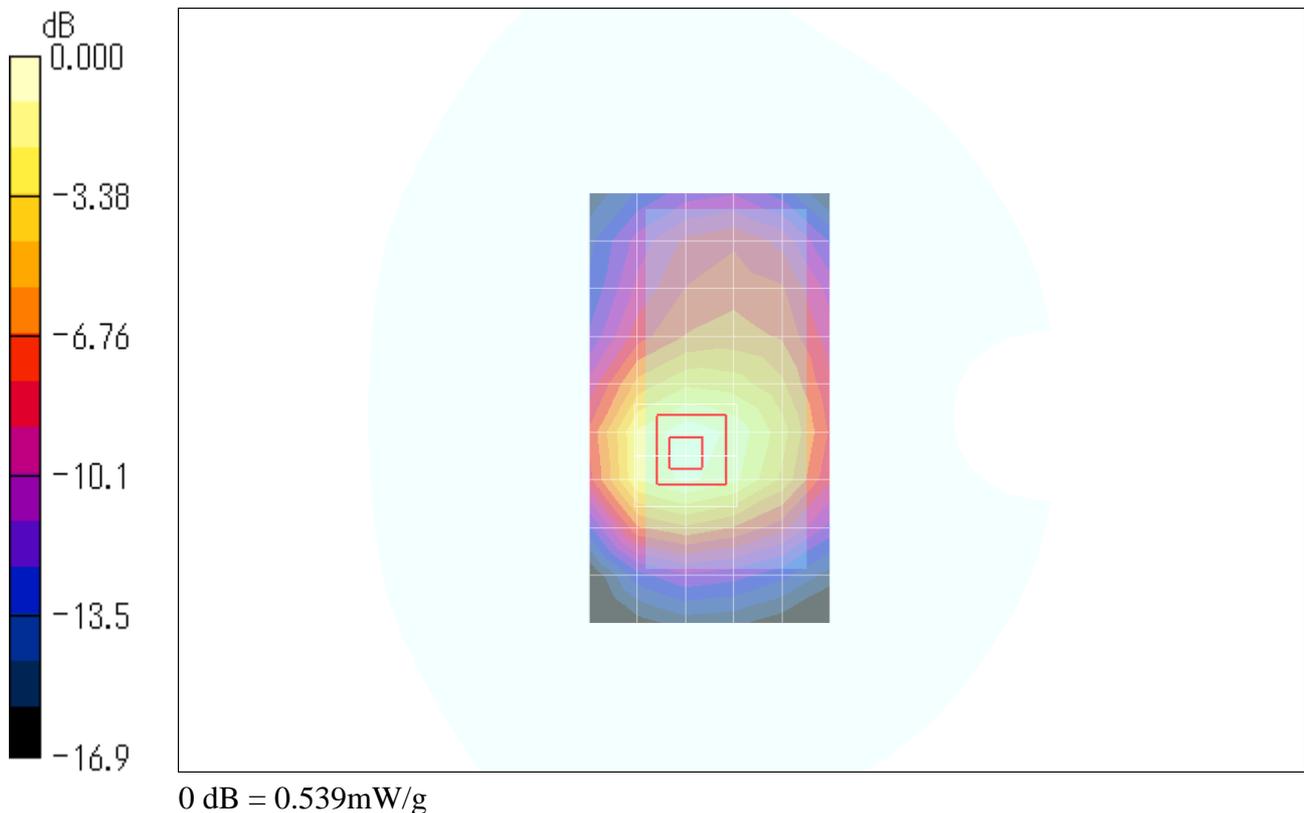**Rear Side w/headset/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.9 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 0.812 W/kg
SAR(1 g) = 0.496 mW/g; SAR(10 g) = 0.296 mW/g
Maximum value of SAR (measured) = 0.539 mW/g

0 dB = 0.539mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body 810ch / PCS 1900 - GPRS 2slot

DUT: Cellular Phone; Type: 105SH; Serial: 004401/11/375540/5

Communication System: GSM 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:4.15

Medium: MSL1900 Medium parameters used: f = 1909.8 MHz; σ = 1.57 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.43, 4.43, 4.43); Calibrated: 2011/08/18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn508; Calibrated: 2011/11/14
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Rear Side w/headset/Z Scan (1x1x45): Measurement grid: dx=20mm, dy=20mm, dz=2.5mm
Maximum value of SAR (measured) = 0.527 mW/g

![JQA]
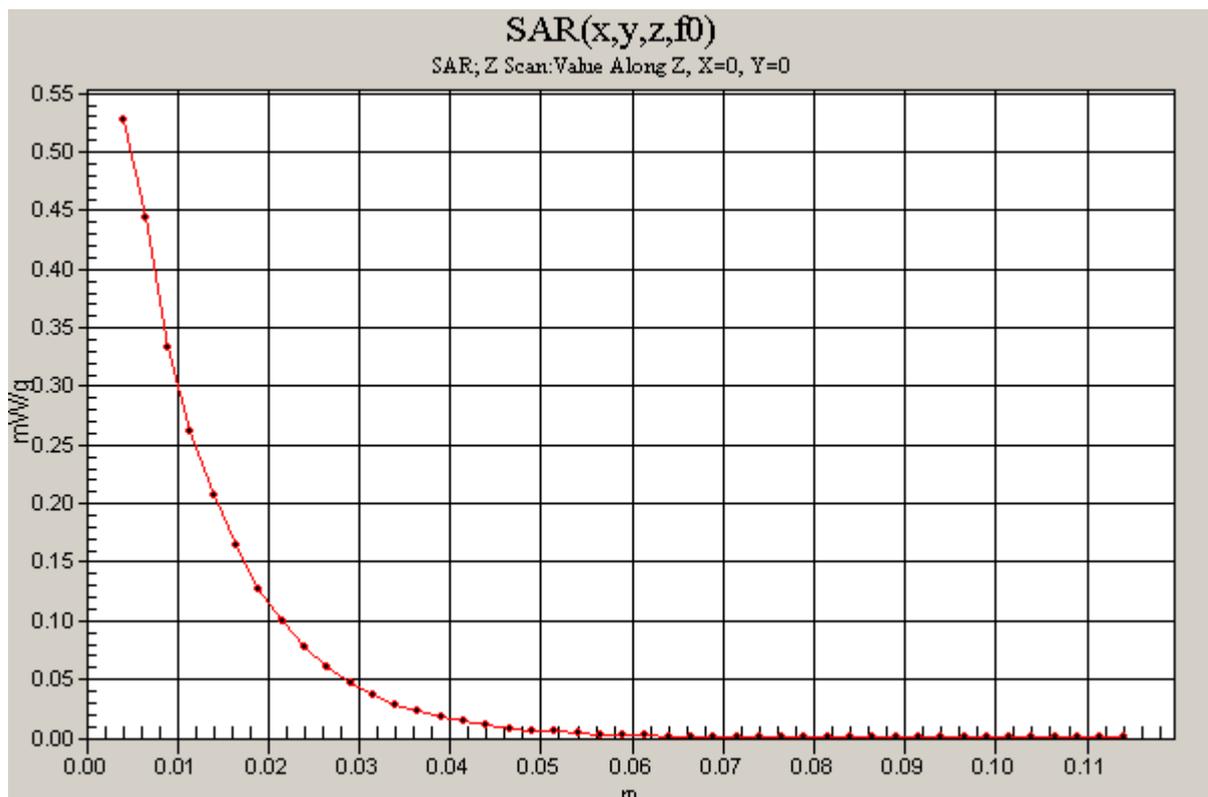
Attachment 3 – Dosimetric E-Field Probe – ET3DV6, S/N: 1679 Calibration Data

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

ilac-MRA

SWISS CALIBRATION

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

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Accreditation No.: **SCS 108**

Client **JQA (PTT)**

Certificate No: **ET3-1679_Aug11**

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1679
Calibration procedure(s)	QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	August 18, 2011

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 E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: August 18, 2011

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,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., 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:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).

- *NORM(f)x,y,z* = NORMx,y,z * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF.*

- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep 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

- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,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 ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.

- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.

- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1679

Manufactured: May 7, 2002
Calibrated: August 18, 2011

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

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1679

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^A$	1.95	1.93	1.95	± 10.1 %
DCP $(mV)^B$	96.5	98.4	96.9	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	113.4	±2.5 %
			Y	0.00	0.00	1.00	109.1	
			Z	0.00	0.00	1.00	116.2	

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

^{A} The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
^{B} Numerical linearization parameter: uncertainty not required.
^{E} Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1679

Calibration Parameter Determined in Head 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)
835	41.5	0.90	6.24	6.24	6.24	0.53	2.44	± 12.0 %
900	41.5	0.97	6.14	6.14	6.14	0.52	2.48	± 12.0 %
1450	40.5	1.20	5.20	5.20	5.20	0.52	3.00	± 12.0 %
1750	40.1	1.37	5.15	5.15	5.15	0.54	2.61	± 12.0 %
1900	40.0	1.40	4.93	4.93	4.93	0.57	2.42	± 12.0 %
1950	40.0	1.40	4.77	4.77	4.77	0.58	2.43	± 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.

DASY/EASY - Parameters of Probe: ET3DV6- SN:1679

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)
835	55.2	0.97	6.18	6.18	6.18	0.59	2.25	± 12.0 %
900	55.0	1.05	6.11	6.11	6.11	0.63	2.12	± 12.0 %
1450	54.0	1.30	5.19	5.19	5.19	0.60	2.32	± 12.0 %
1750	53.4	1.49	4.64	4.64	4.64	0.60	2.73	± 12.0 %
1900	53.3	1.52	4.43	4.43	4.43	0.63	2.50	± 12.0 %
1950	53.3	1.52	4.56	4.56	4.56	0.61	2.58	± 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.

Frequency Response of E-Field
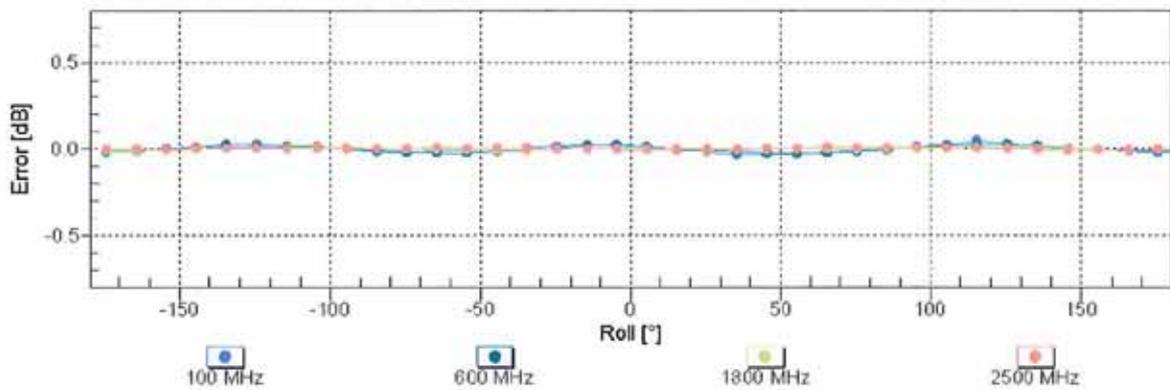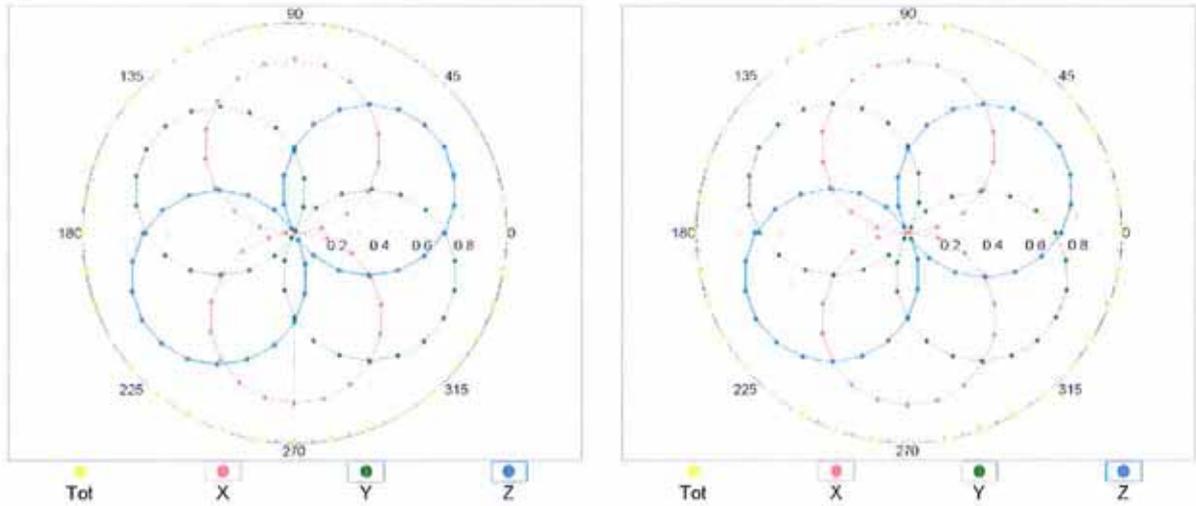## (TEM-Cell:ifi110 EXX, Waveguide: R22)
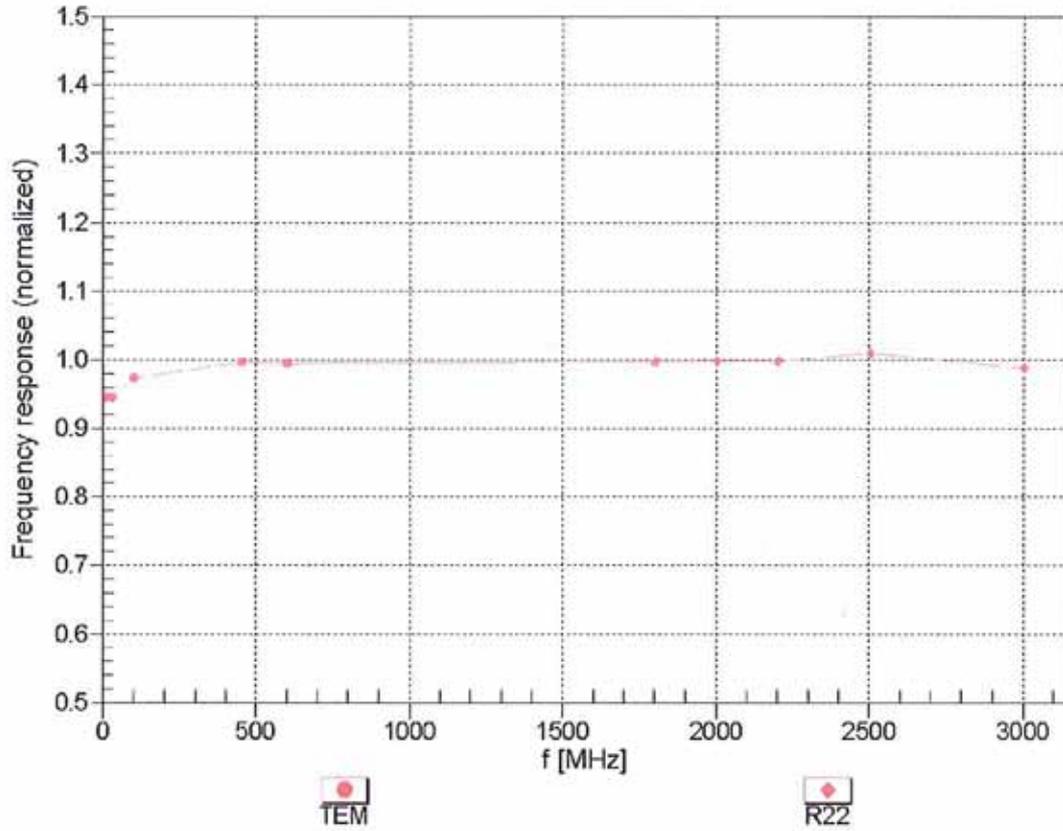
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)
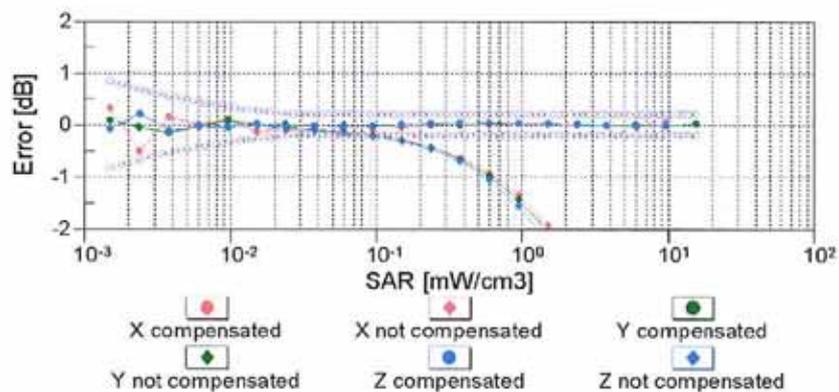
Receiving Pattern (φ), ϑ = 0°

f=600 MHz,TEM

| Tot | X | Y | Z |

f=1800 MHz,R22

| Tot | X | Y | Z |

| 100 MHz | 600 MHz | 1800 MHz | 2500 MHz |

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

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

| X compensated | X not compensated | Y compensated |
| Y not compensated | Z compensated | Z not compensated |

| X compensated | X not compensated | Y compensated |
| Y not compensated | Z compensated | Z not compensated |
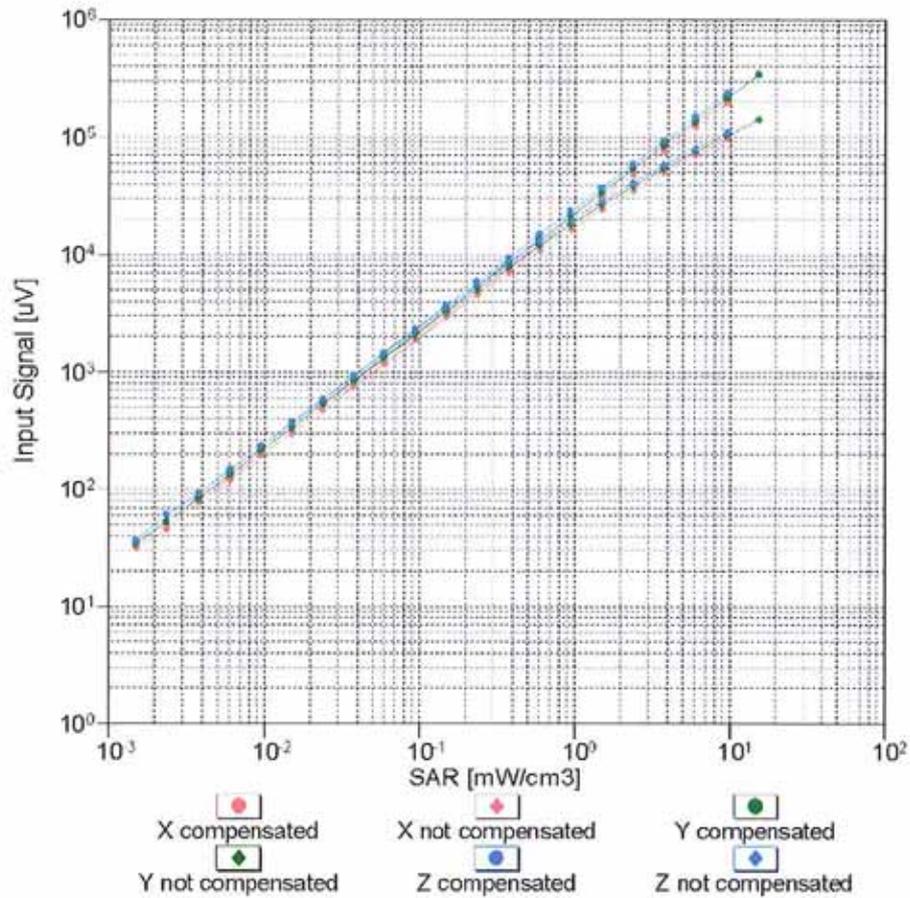
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)   f = 1750 MHz,WGLS R22 (H_convF)
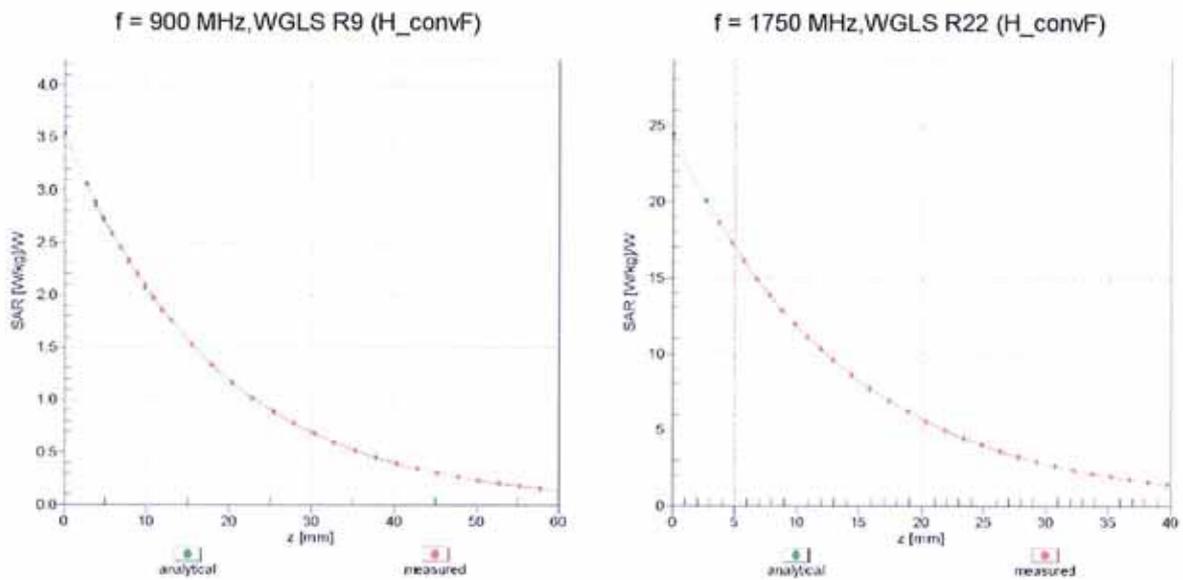
Deviation from Isotropy in Liquid
Error (φ, ϑ), f = 900 MHz

Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)
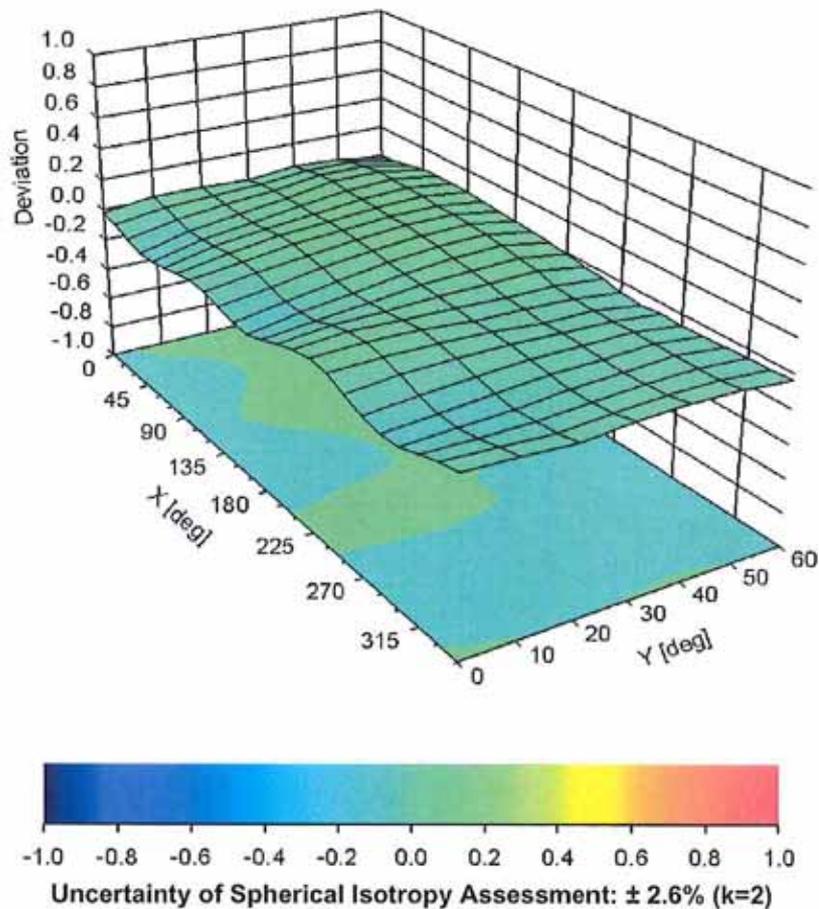
DASY/EASY - Parameters of Probe: ET3DV6 - SN:1679

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
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

Attachment 4 – System Validation Dipole – D1900V2, S/N: 5d112 Calibration Data

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

ilac-MRA

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Accreditation No.: **SCS 108**

Client   **JQA (PTT)**

Certificate No: **D1900V2-5d112_Aug11**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d112
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 17, 2011

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 17, 2011

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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	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	39.5 ± 6 %	1.42 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**40.3 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.31 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**21.1 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.9 ± 6 %	1.57 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.5 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**41.3 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.49 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.8 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.0 Ω + 7.3 jΩ
Return Loss	- 22.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω + 7.3 jΩ
Return Loss	- 21.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.206 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	March 28, 2008

Date: 16.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d112

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.42 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 29.04.2011

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 04.07.2011

- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001

- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
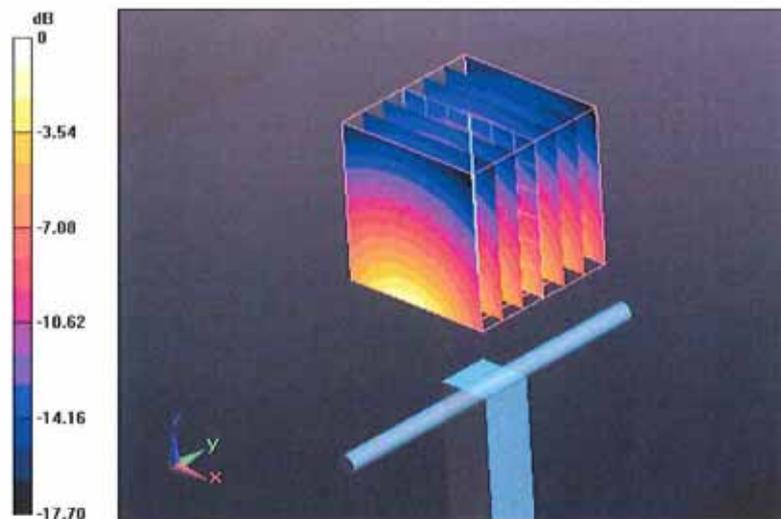Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.554 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 18.533 W/kg
SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.31 mW/g
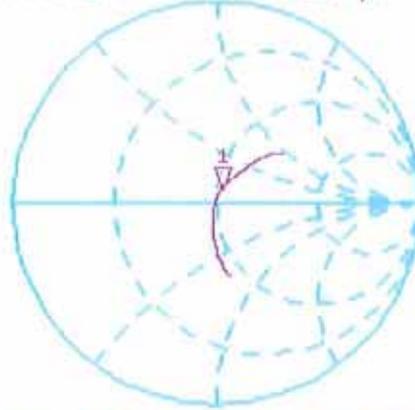Maximum value of SAR (measured) = 12.515 mW/g

0 dB = 12.520mW/g

Impedance Measurement Plot for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d112

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 53.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 29.04.2011

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 04.07.2011

- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002

- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

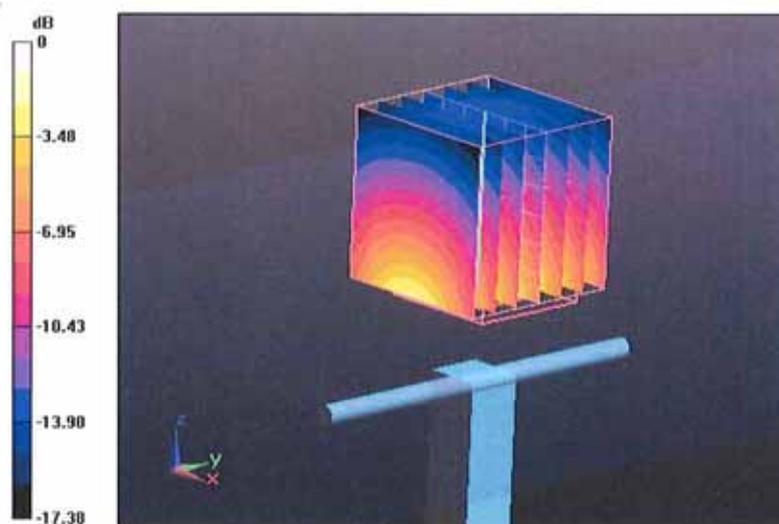## Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.179 V/m; Power Drift = 0.0043 dB
Peak SAR (extrapolated) = 18.621 W/kg
SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.49 mW/g
Maximum value of SAR (measured) = 13.313 mW/g

0 dB = 13.310mW/g

Impedance Measurement Plot for Body TSL