



Attachment 1 – System Validation Plots

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; $\sigma = 1.43$ mho/m; $\epsilon_r = 39.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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) = 11.9 mW/g

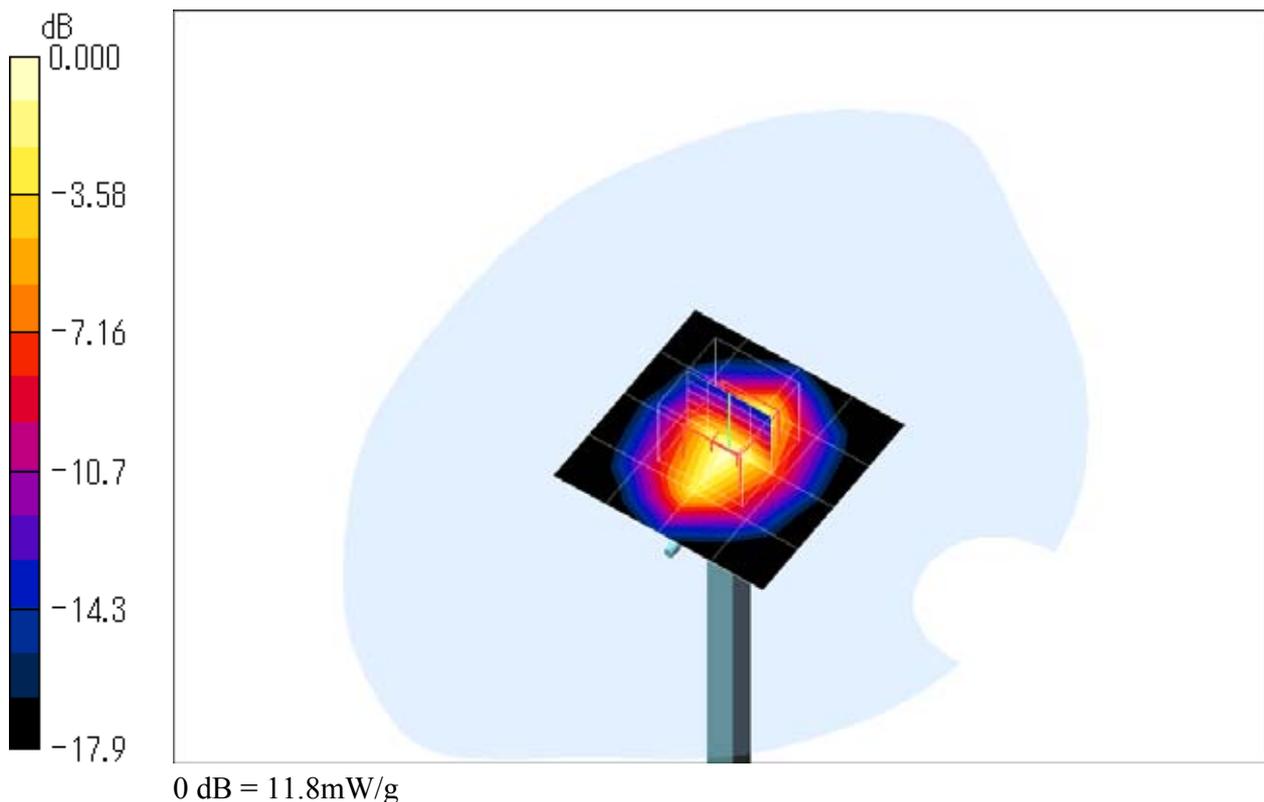
Antenna Input Power 250 mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 96.4 V/m; Power Drift = -0.006 dB

Peak SAR (extrapolated) = 18.2 W/kg

SAR(1 g) = 10.5 mW/g; SAR(10 g) = 5.5 mW/g

Maximum value of SAR (measured) = 11.8 mW/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: M1900 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.55$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.56, 4.56, 4.56); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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

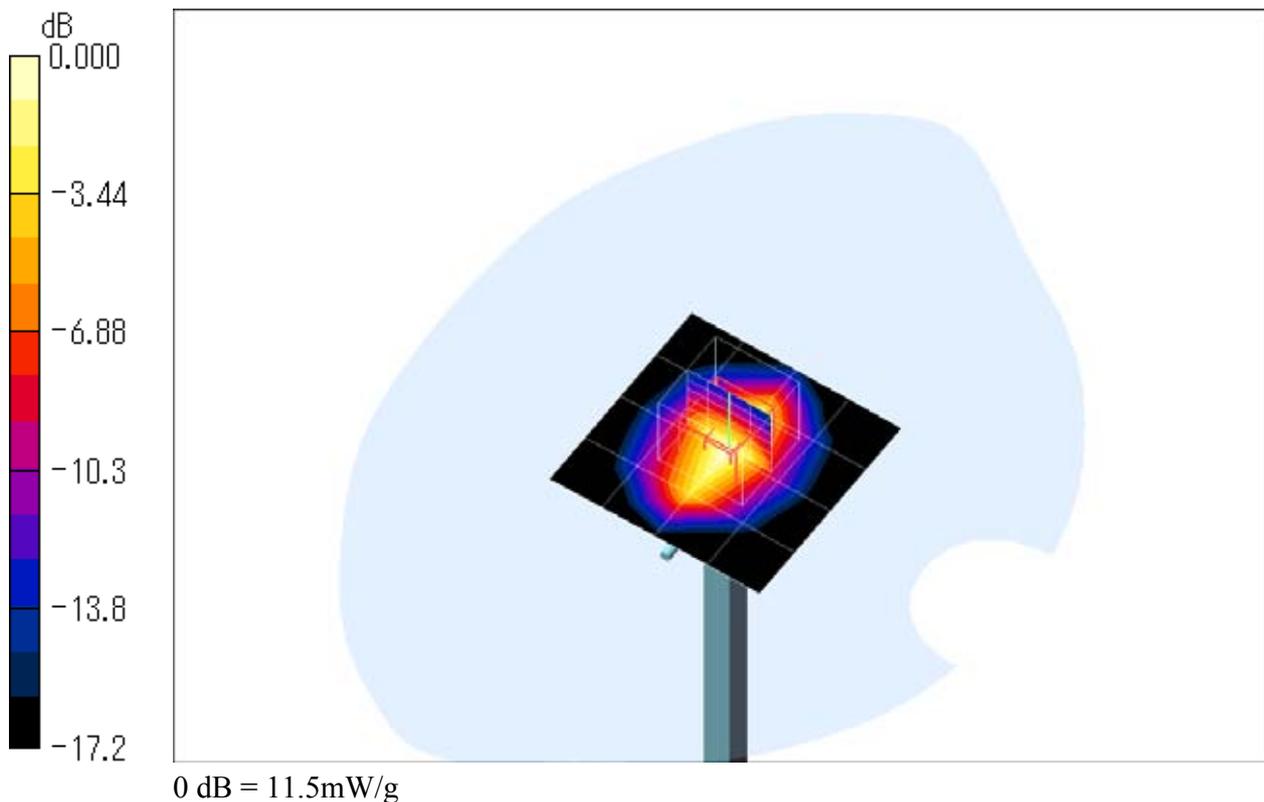
Maximum value of SAR (measured) = 11.5 mW/g

Antenna Input Power 250 mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 94.1 V/m; Power Drift = -0.022 dB

Peak SAR (extrapolated) = 16.1 W/kg

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.37 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

System Validation (Head 2450 MHz)

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 765

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

Medium: HSL2450 Medium parameters used: $f = 2450$ MHz; $\sigma = 1.82$ mho/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.26, 4.26, 4.26); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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

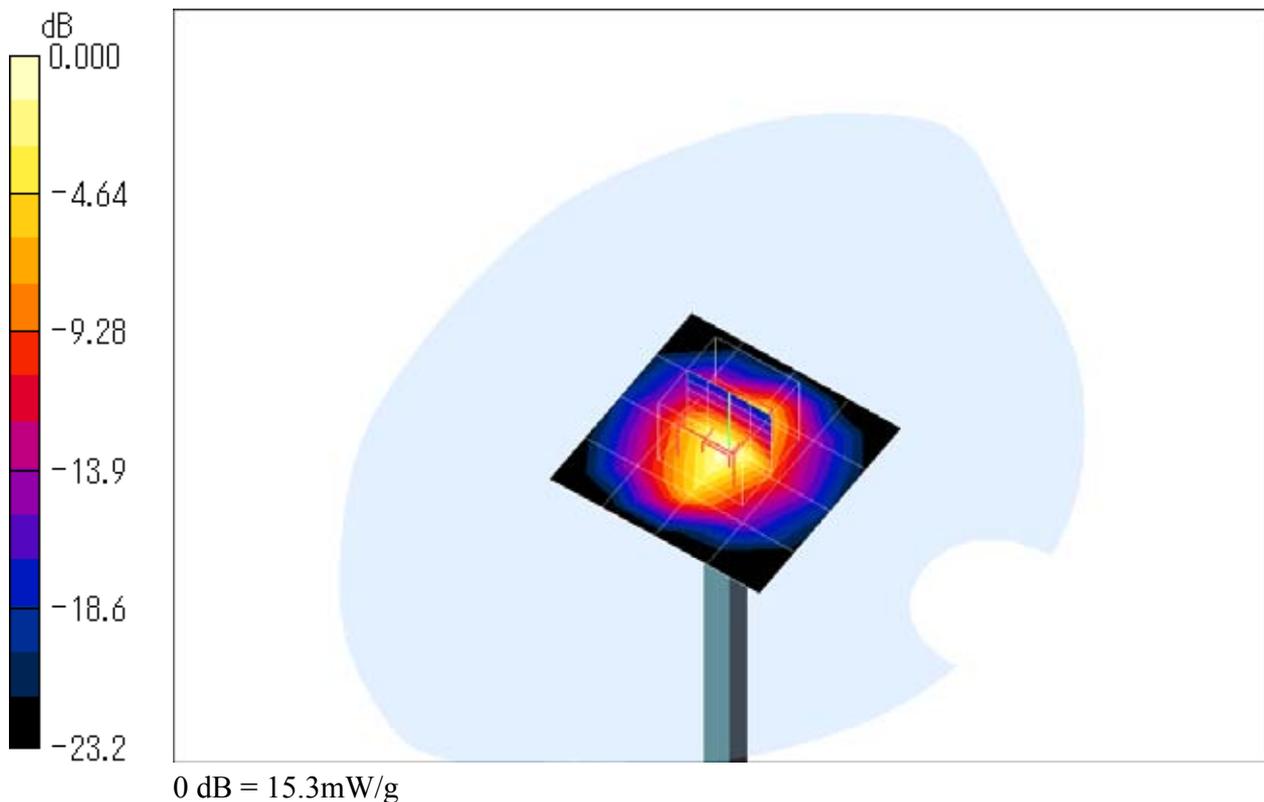
Maximum value of SAR (measured) = 15.3 mW/g

Antenna Input Power 250 mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 97.2 V/m; Power Drift = -0.009 dB

Peak SAR (extrapolated) = 30.7 W/kg

SAR(1 g) = 13.8 mW/g; SAR(10 g) = 6.26 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

System Validation (Body 2450 MHz)

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 765

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

Medium: M2450 Medium parameters used: $f = 2450$ MHz; $\sigma = 1.97$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.1, 4.1, 4.1); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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) = 15.1 mW/g

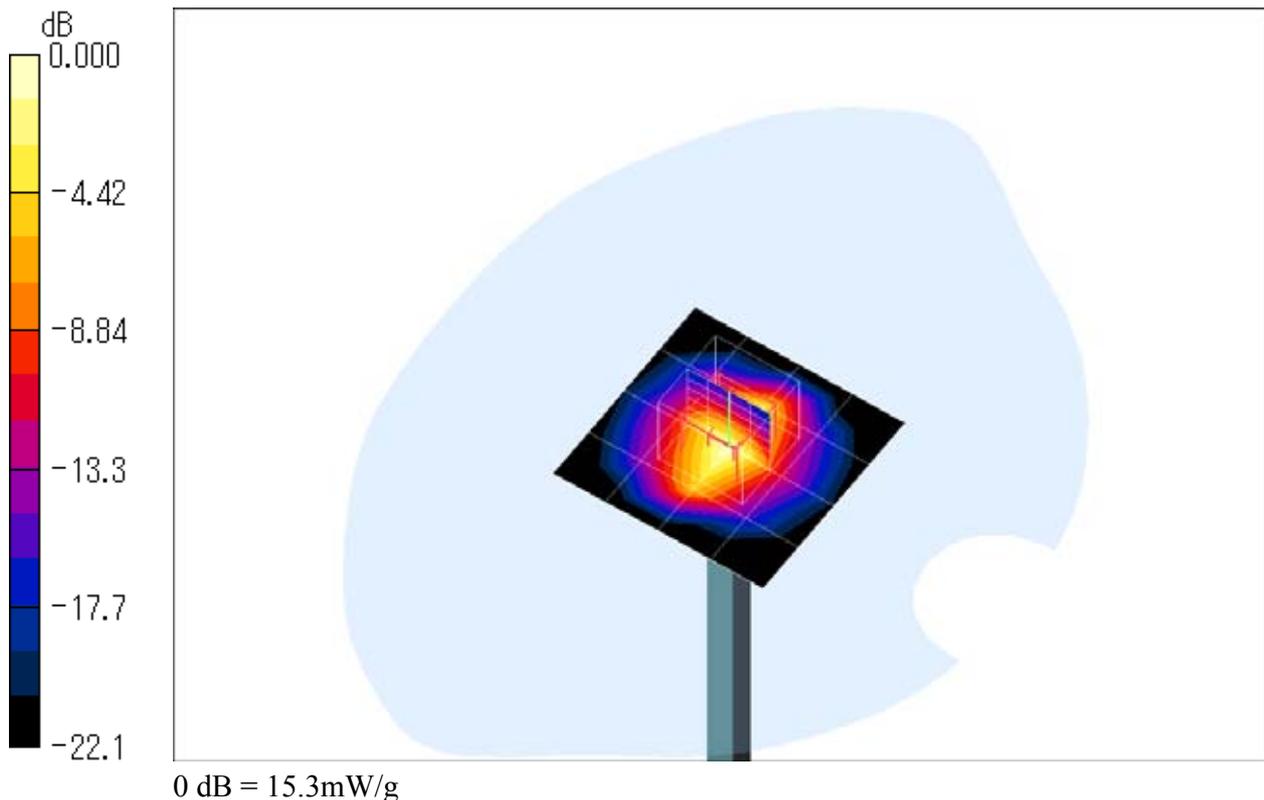
Antenna Input Power 250 mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 92.9 V/m; Power Drift = 0.016 dB

Peak SAR (extrapolated) = 31.3 W/kg

SAR(1 g) = 13.8 mW/g; SAR(10 g) = 6.34 mW/g

Maximum value of SAR (measured) = 15.3 mW/g





Attachment 2 – SAR Test Plots



Attachment 2-1 – SAR Test Plots (PCS1900)

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Left Head, Cheek/Touch 512ch (1850.2MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: HSL1900 Medium parameters used: $f = 1850.2 \text{ MHz}$; $\sigma = 1.38 \text{ mho/m}$; $\epsilon_r = 40.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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 (12x6x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.349 mW/g

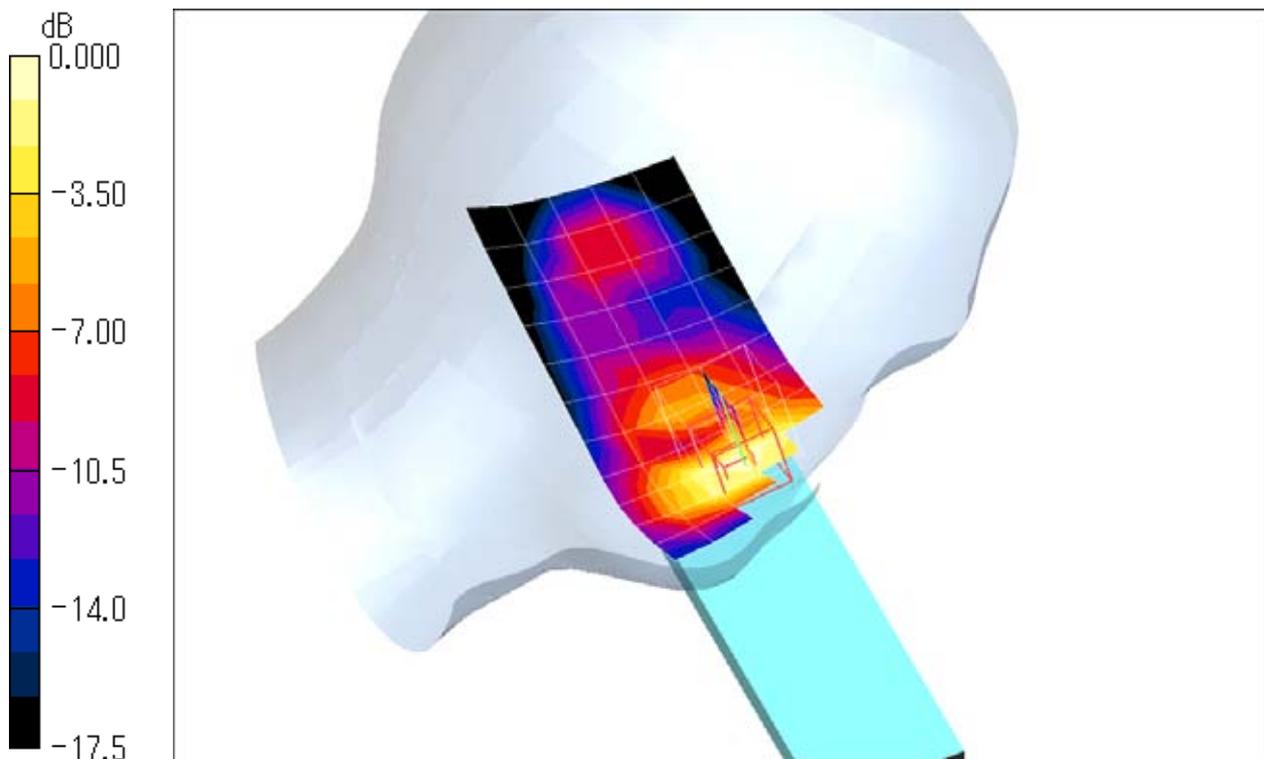
Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 8.52 V/m; Power Drift = 0.079 dB

Peak SAR (extrapolated) = 0.499 W/kg

SAR(1 g) = 0.332 mW/g; SAR(10 g) = 0.202 mW/g

Maximum value of SAR (measured) = 0.354 mW/g



0 dB = 0.354mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Left Head, Cheek/Touch 661ch (1880.0MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: HSL1900 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASYS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASYS4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch Position/Area Scan (12x6x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.324 mW/g

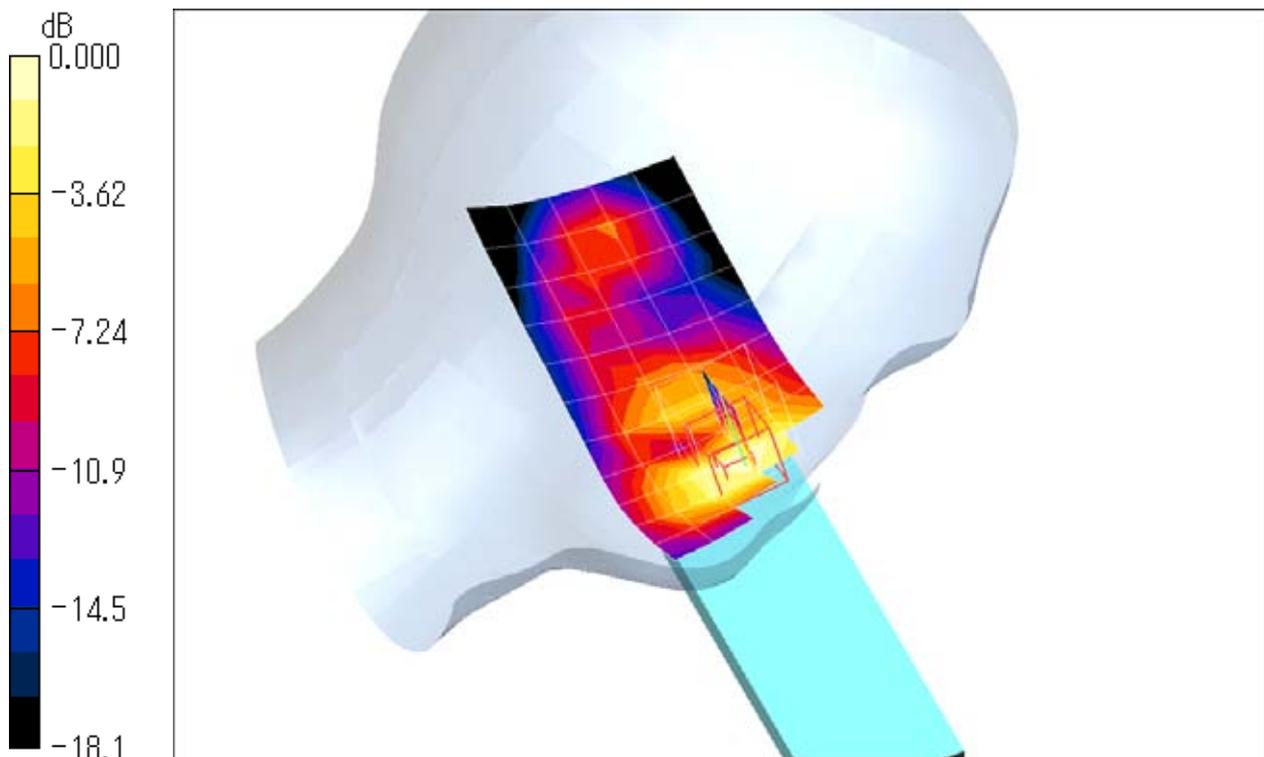
Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.27 V/m; Power Drift = 0.045 dB

Peak SAR (extrapolated) = 0.469 W/kg

SAR(1 g) = 0.307 mW/g; SAR(10 g) = 0.186 mW/g

Maximum value of SAR (measured) = 0.325 mW/g



0 dB = 0.325mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Left Head, Cheek/Touch 810ch (1909.8MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: HSL1900 Medium parameters used: $f = 1909.8$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 39.8$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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 (12x6x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.384 mW/g

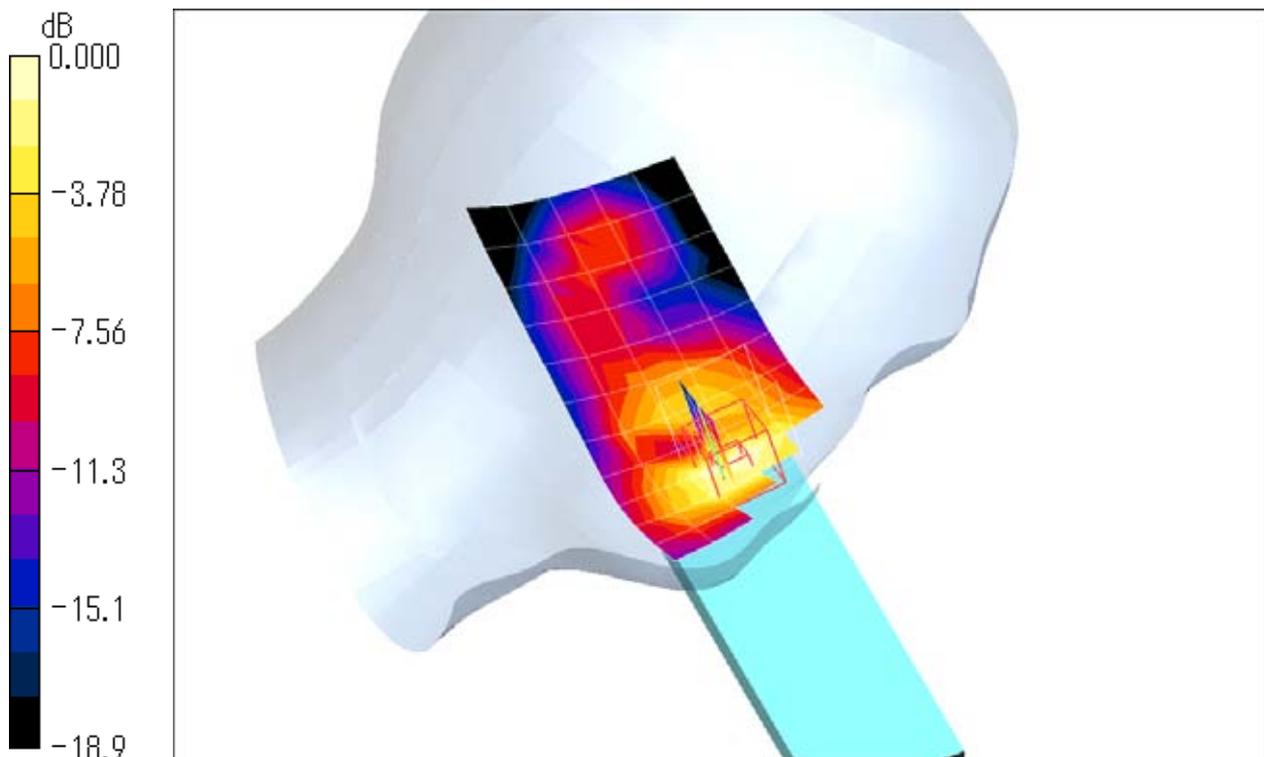
Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.1 V/m; Power Drift = 0.050 dB

Peak SAR (extrapolated) = 0.572 W/kg

SAR(1 g) = 0.364 mW/g; SAR(10 g) = 0.213 mW/g

Maximum value of SAR (measured) = 0.385 mW/g



0 dB = 0.385mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Left Head, Cheek/Touch 810ch (1909.8MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: HSL1900 Medium parameters used: $f = 1909.8 \text{ MHz}$; $\sigma = 1.44 \text{ mho/m}$; $\epsilon_r = 39.8$; $\rho = 1000 \text{ kg/m}^3$

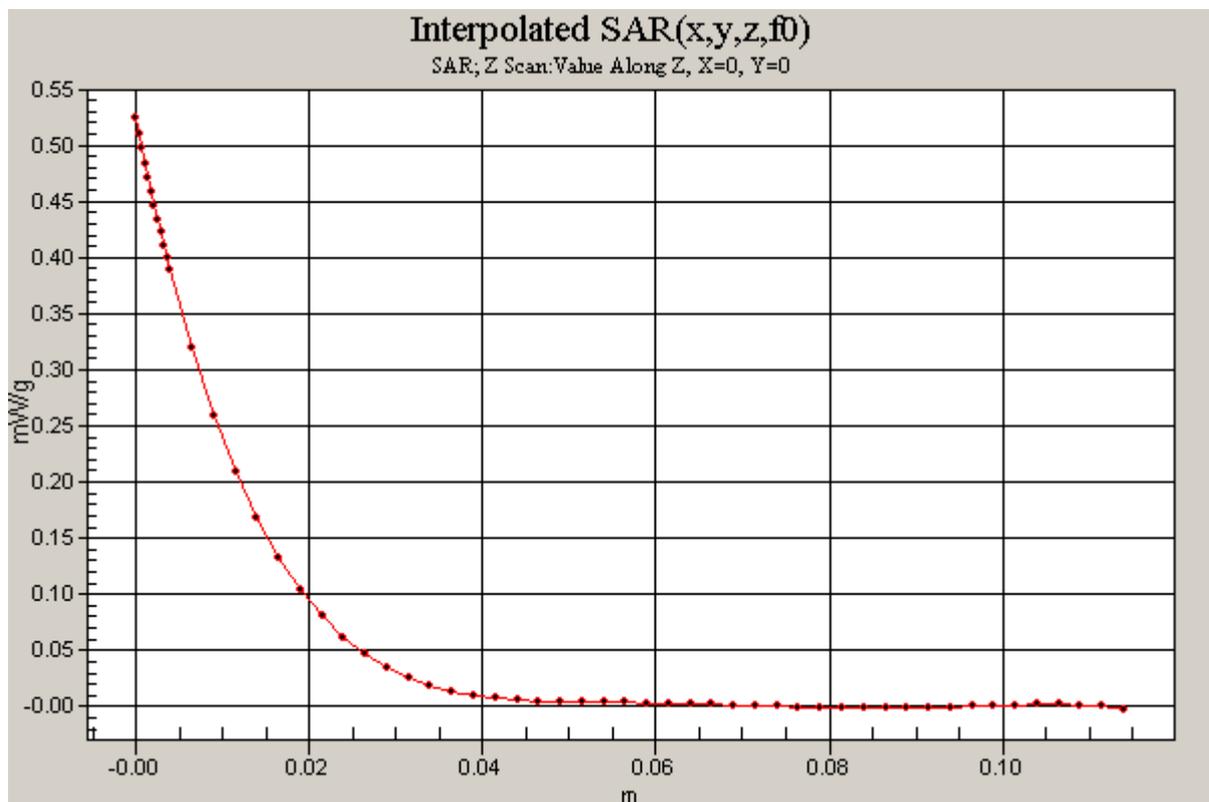
Phantom section: Left Section

Measurement Standard: DAS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DAS4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch Position/Z Scan (1x1x56): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$, $dz=2.5\text{mm}$
 Maximum value of SAR (interpolated) = 0.524 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Left Head, Ear/Tilt 661ch (1880.0MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: HSL1900 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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 (12x6x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.110 mW/g

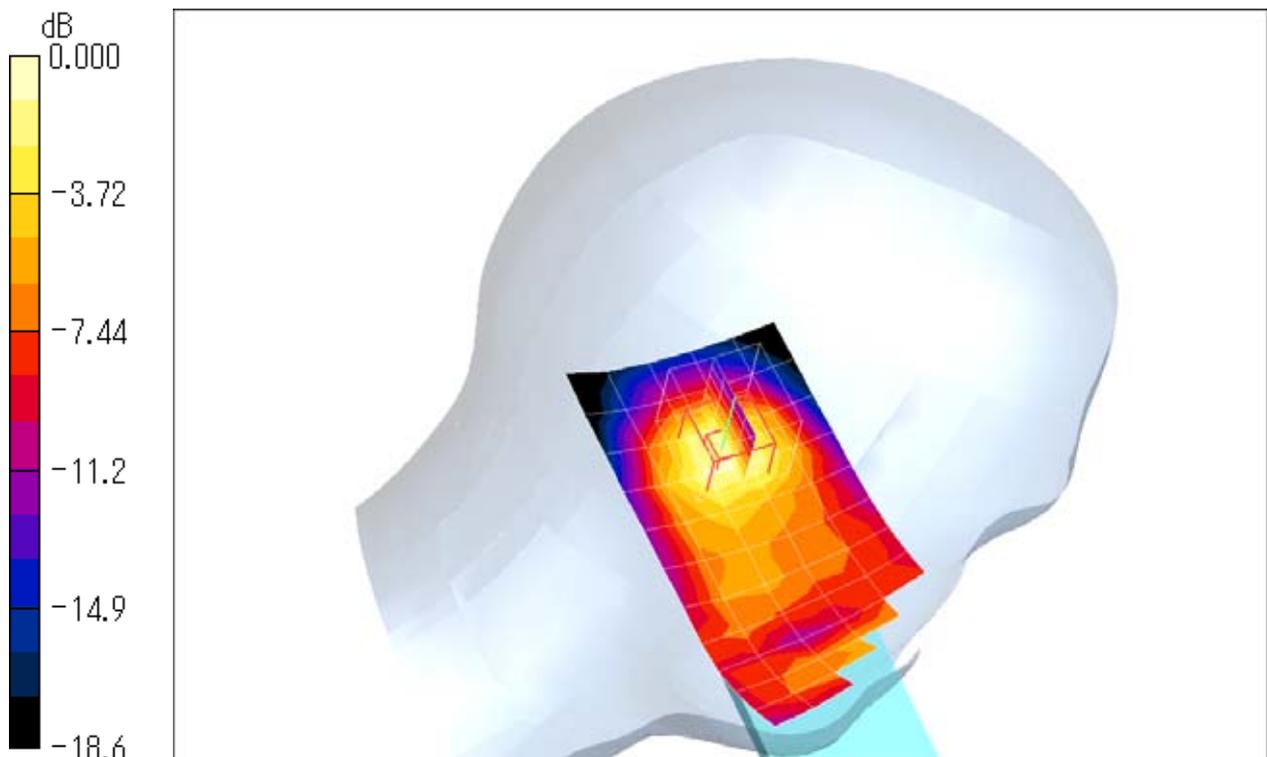
ear/Tilt Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.87 V/m; Power Drift = -0.009 dB

Peak SAR (extrapolated) = 0.190 W/kg

SAR(1 g) = 0.122 mW/g; SAR(10 g) = 0.070 mW/g

Maximum value of SAR (measured) = 0.134 mW/g



0 dB = 0.134mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Right Head, Cheek/Touch 661ch (1880.0MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: HSL1900 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.41$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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 (12x6x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.248 mW/g

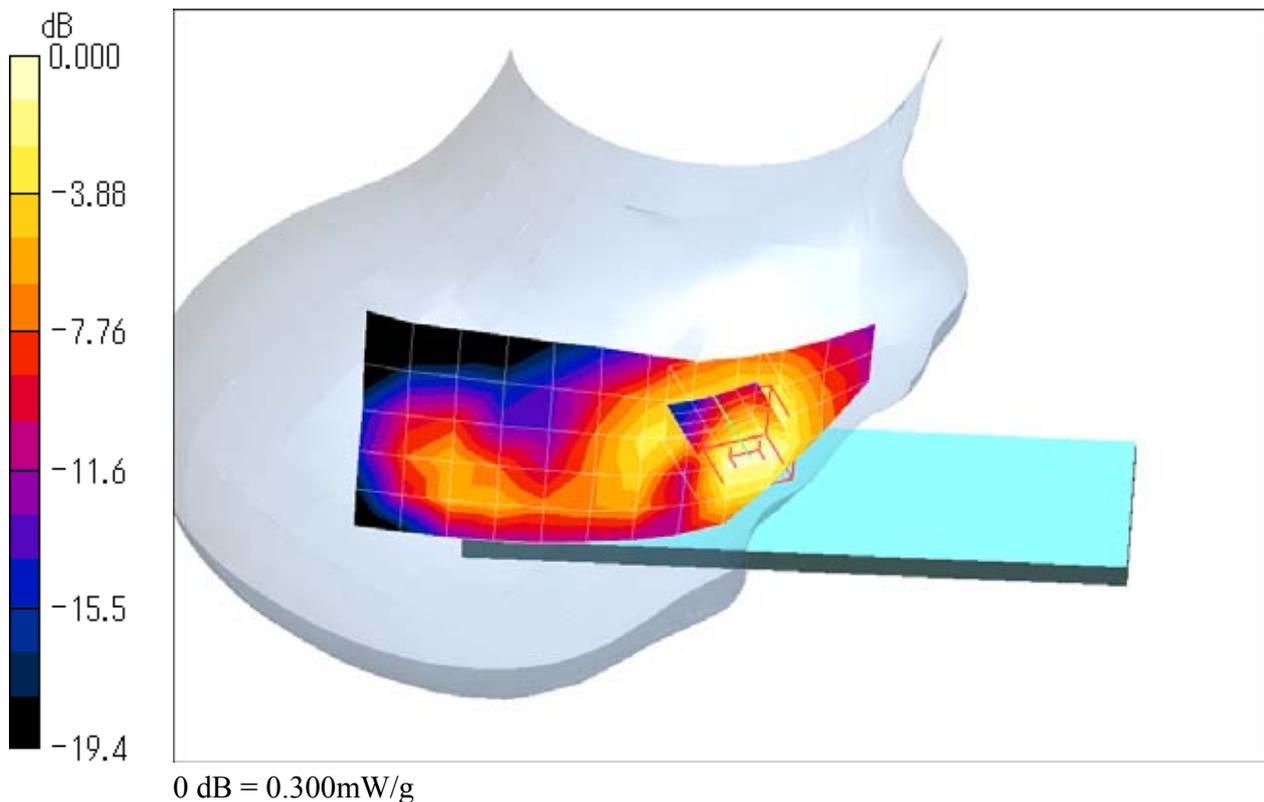
Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.12 V/m; Power Drift = 0.065 dB

Peak SAR (extrapolated) = 0.415 W/kg

SAR(1 g) = 0.278 mW/g; SAR(10 g) = 0.170 mW/g

Maximum value of SAR (measured) = 0.300 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Right Head, Ear/Tilt 661ch (1880.0MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: HSL1900 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.41 \text{ mho/m}$; $\epsilon_r = 40$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.93, 4.93, 4.93); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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 (12x6x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.129 mW/g

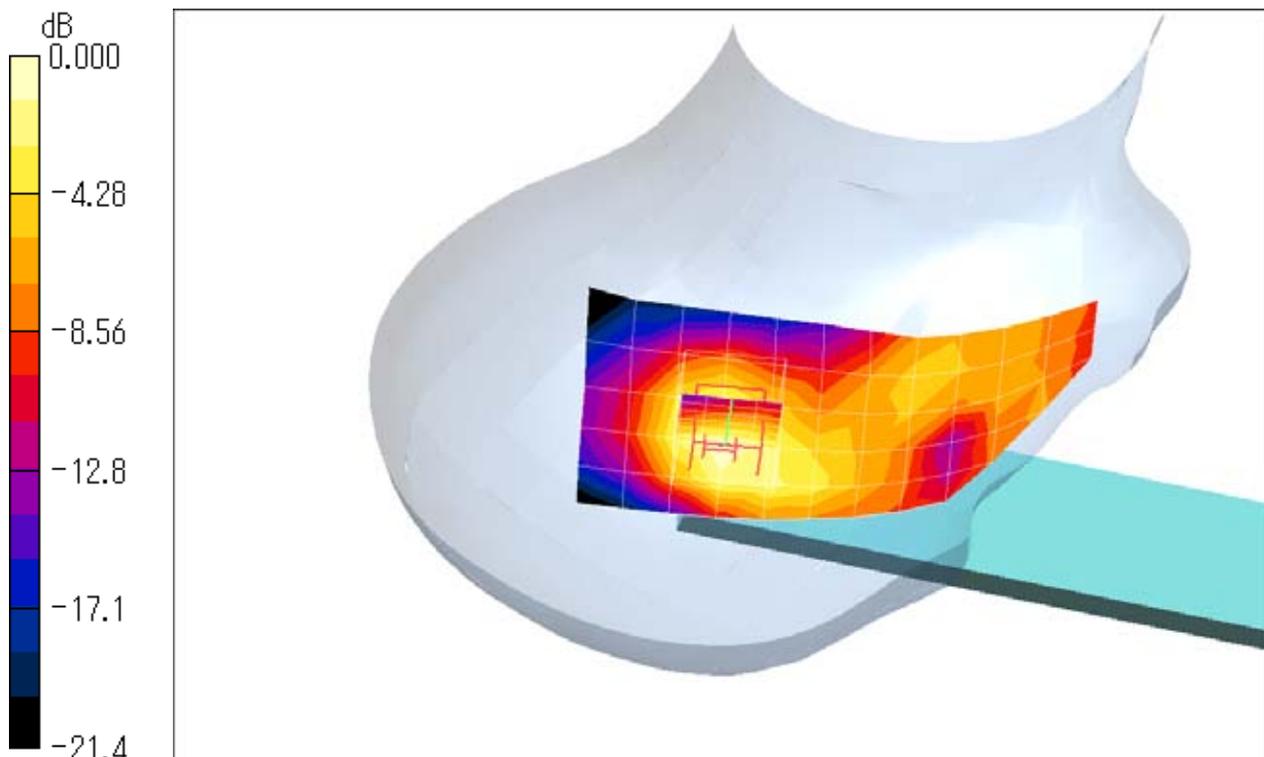
ear/Tilt Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 4.79 V/m; Power Drift = -0.031 dB

Peak SAR (extrapolated) = 0.185 W/kg

SAR(1 g) = 0.118 mW/g; SAR(10 g) = 0.069 mW/g

Maximum value of SAR (measured) = 0.128 mW/g



0 dB = 0.128mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body-worn, Rear 661ch (1880.0MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: M1900 Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.53 \text{ mho/m}$; $\epsilon_r = 52.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.56, 4.56, 4.56); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body-worn/Area Scan (6x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.350 mW/g

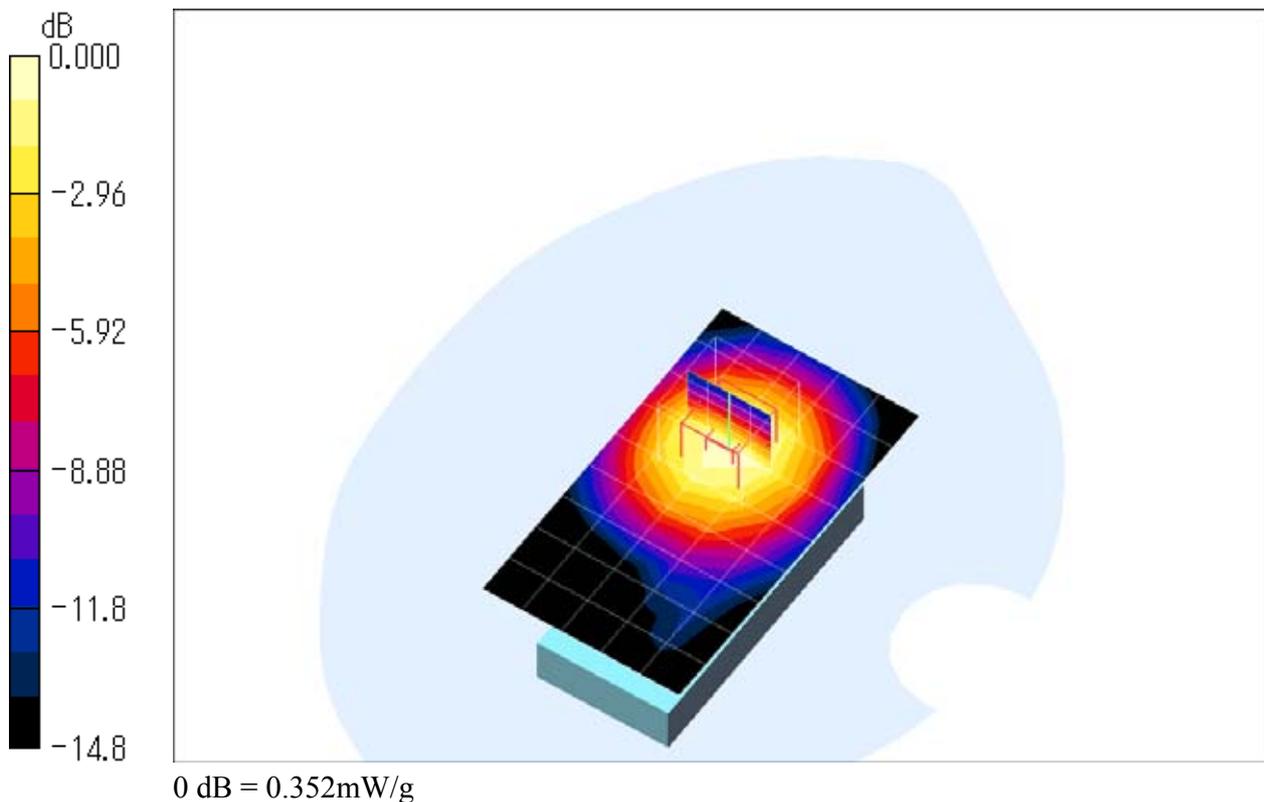
Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.5 V/m; Power Drift = -0.024 dB

Peak SAR (extrapolated) = 0.476 W/kg

SAR(1 g) = 0.325 mW/g; SAR(10 g) = 0.203 mW/g

Maximum value of SAR (measured) = 0.352 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body-worn, Rear 661ch (1880.0MHz) : GPRS Class 10 (1slot)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: M1900 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.56, 4.56, 4.56); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body-worn/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.337 mW/g

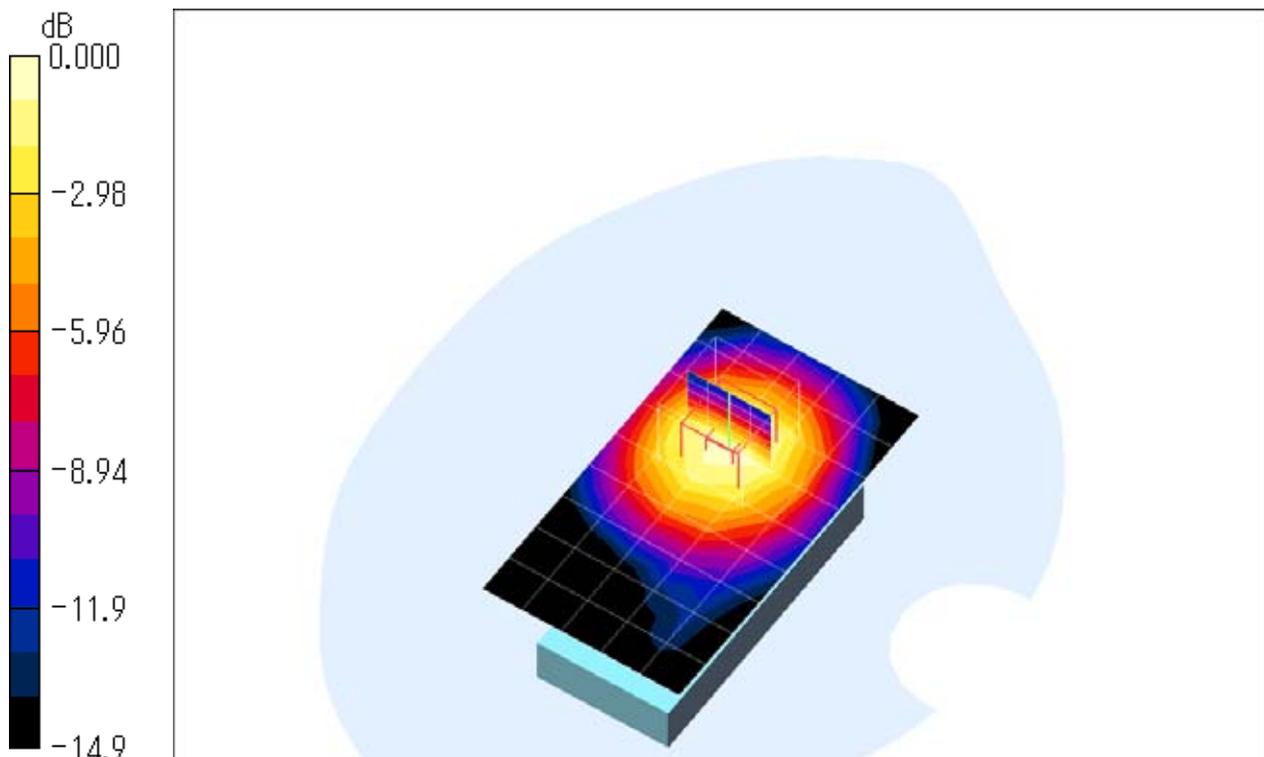
Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.1 V/m; Power Drift = -0.004 dB

Peak SAR (extrapolated) = 0.457 W/kg

SAR(1 g) = 0.313 mW/g; SAR(10 g) = 0.195 mW/g

Maximum value of SAR (measured) = 0.340 mW/g



0 dB = 0.340mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body-worn, Rear 512ch (1850.2MHz) : GPRS Class 10 (2slots)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:4.15

Medium: M1900 Medium parameters used: $f = 1850.2 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.56, 4.56, 4.56); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body-worn/Area Scan (6x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.809 mW/g

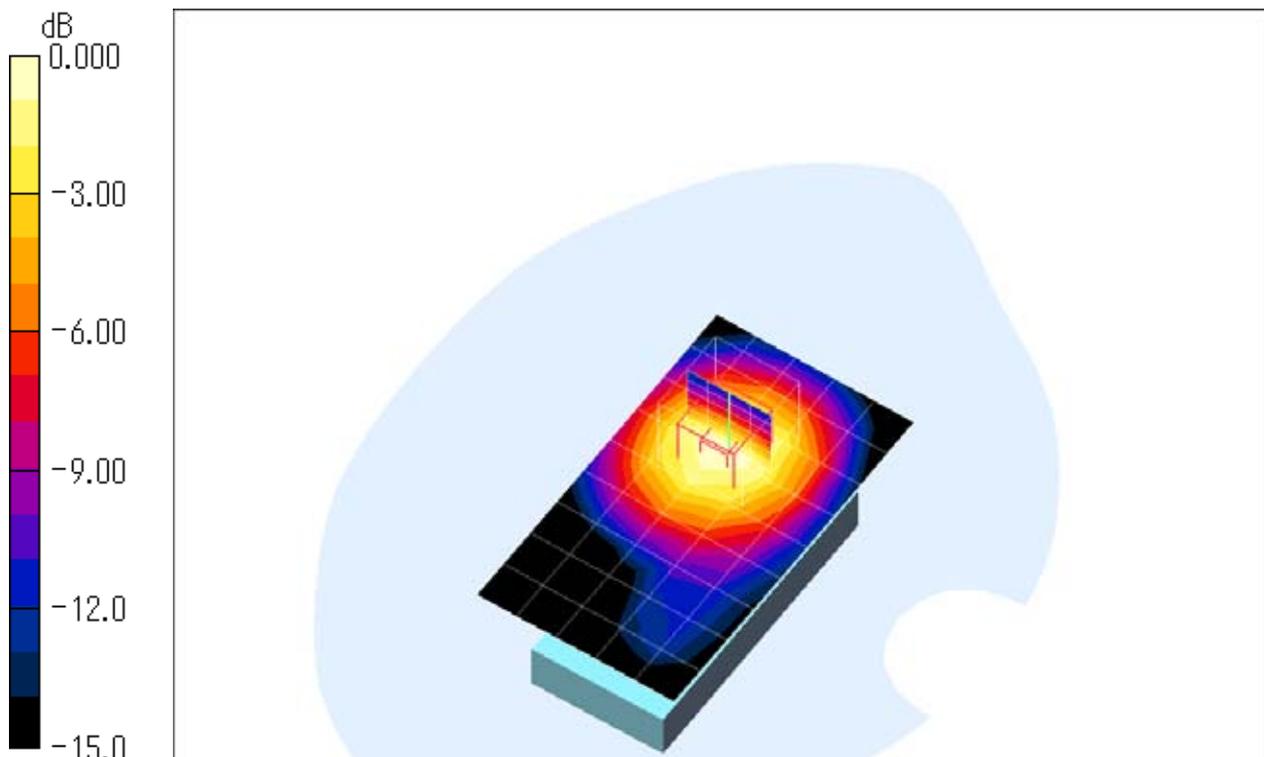
Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.3 V/m; Power Drift = -0.003 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.742 mW/g; SAR(10 g) = 0.464 mW/g

Maximum value of SAR (measured) = 0.798 mW/g



0 dB = 0.798mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body-worn, Rear 512ch (1850.2MHz) : GPRS Class 10 (2slots)**DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1**

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:4.15

Medium: M1900 Medium parameters used: $f = 1850.2$ MHz; $\sigma = 1.5$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

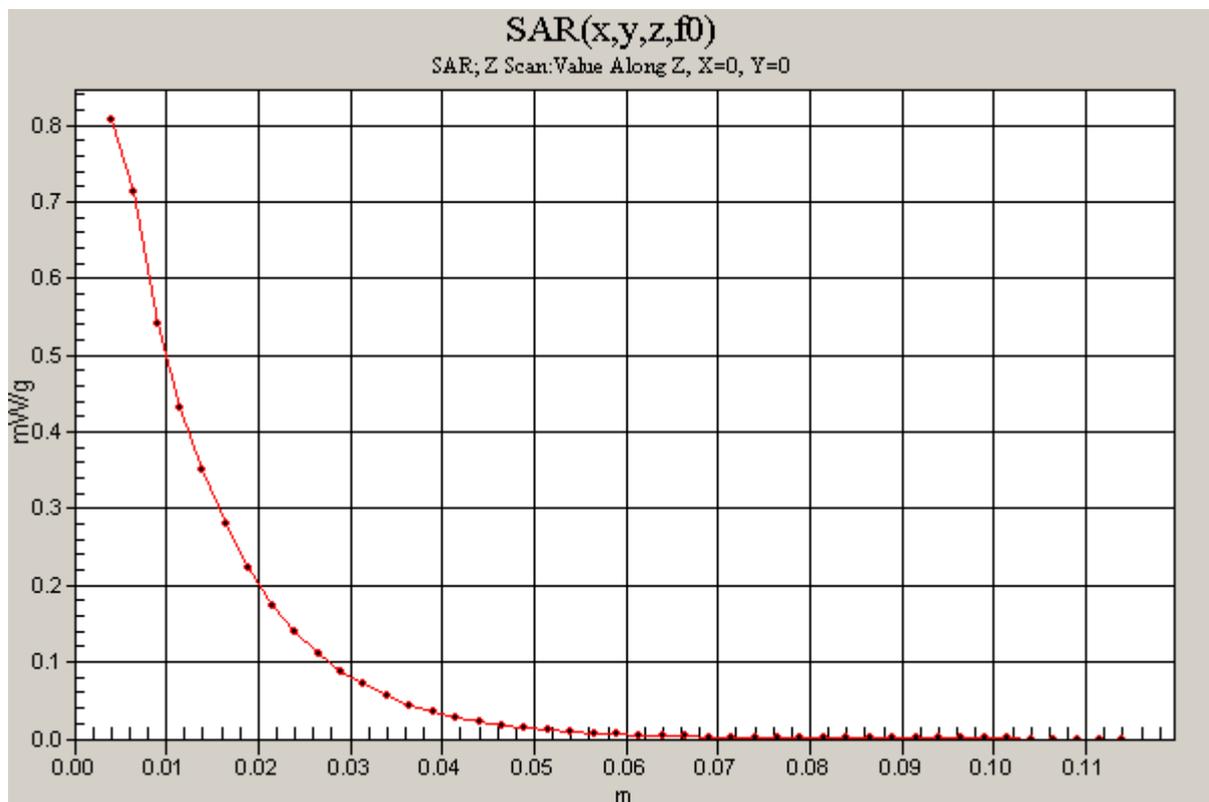
Measurement Standard: DAS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.56, 4.56, 4.56); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DAS4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body-worn/Z Scan (1x1x45): Measurement grid: dx=20mm, dy=20mm, dz=2.5mm

Maximum value of SAR (measured) = 0.807 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body-worn, Rear 661ch (1880.0MHz) : GPRS Class 10 (2slots)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium: M1900 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.56, 4.56, 4.56); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASYS4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body-worn/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.649 mW/g

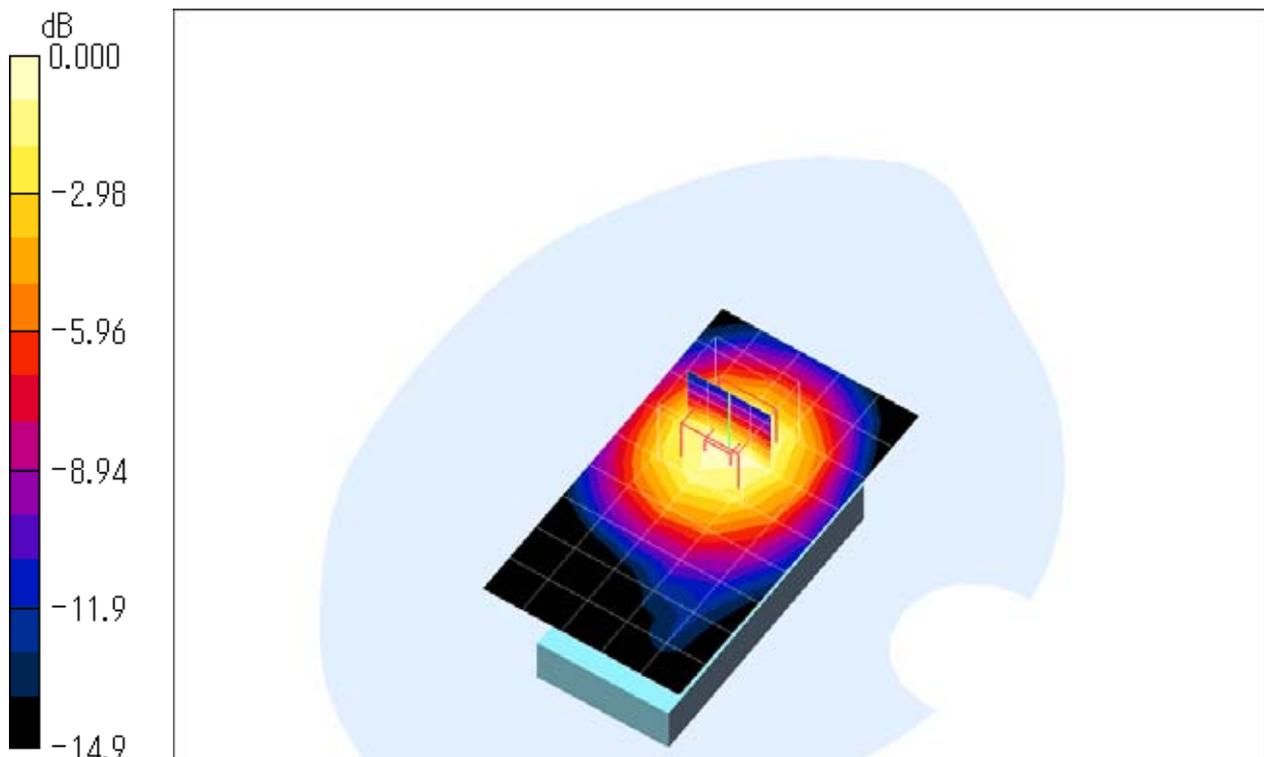
Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.1 V/m; Power Drift = -0.034 dB

Peak SAR (extrapolated) = 0.866 W/kg

SAR(1 g) = 0.595 mW/g; SAR(10 g) = 0.373 mW/g

Maximum value of SAR (measured) = 0.644 mW/g



0 dB = 0.644mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body-worn, Rear 810ch (1909.8MHz) : GPRS Class 10 (2slots)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: M1900 Medium parameters used: $f = 1909.8 \text{ MHz}$; $\sigma = 1.56 \text{ mho/m}$; $\epsilon_r = 52.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.56, 4.56, 4.56); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body-worn/Area Scan (6x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.572 mW/g

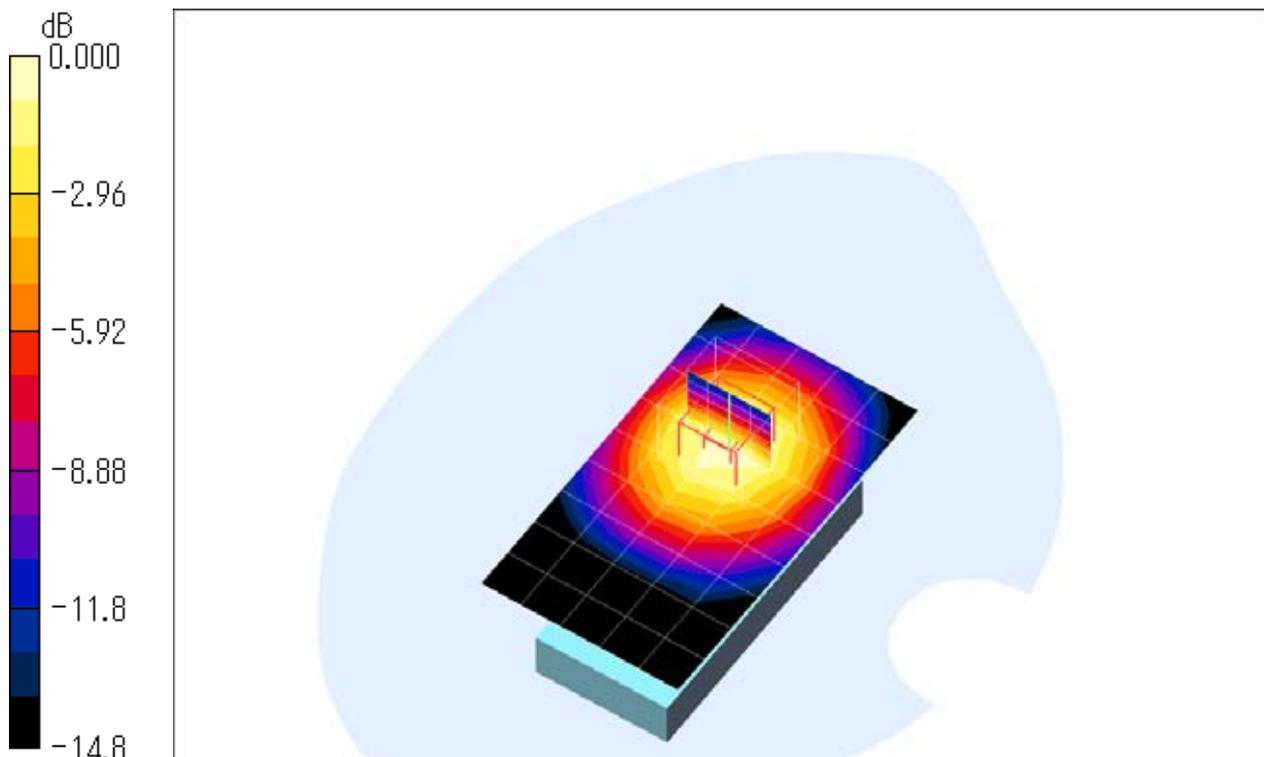
Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 16.8 V/m; Power Drift = -0.025 dB

Peak SAR (extrapolated) = 0.801 W/kg

SAR(1 g) = 0.540 mW/g; SAR(10 g) = 0.337 mW/g

Maximum value of SAR (measured) = 0.583 mW/g



0 dB = 0.583mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body-worn, Front 661ch (1880.0MHz) : GPRS Class 10 (2slots)**DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1**

Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium: M1900 Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.56, 4.56, 4.56); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASYS4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body-worn/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.183 mW/g

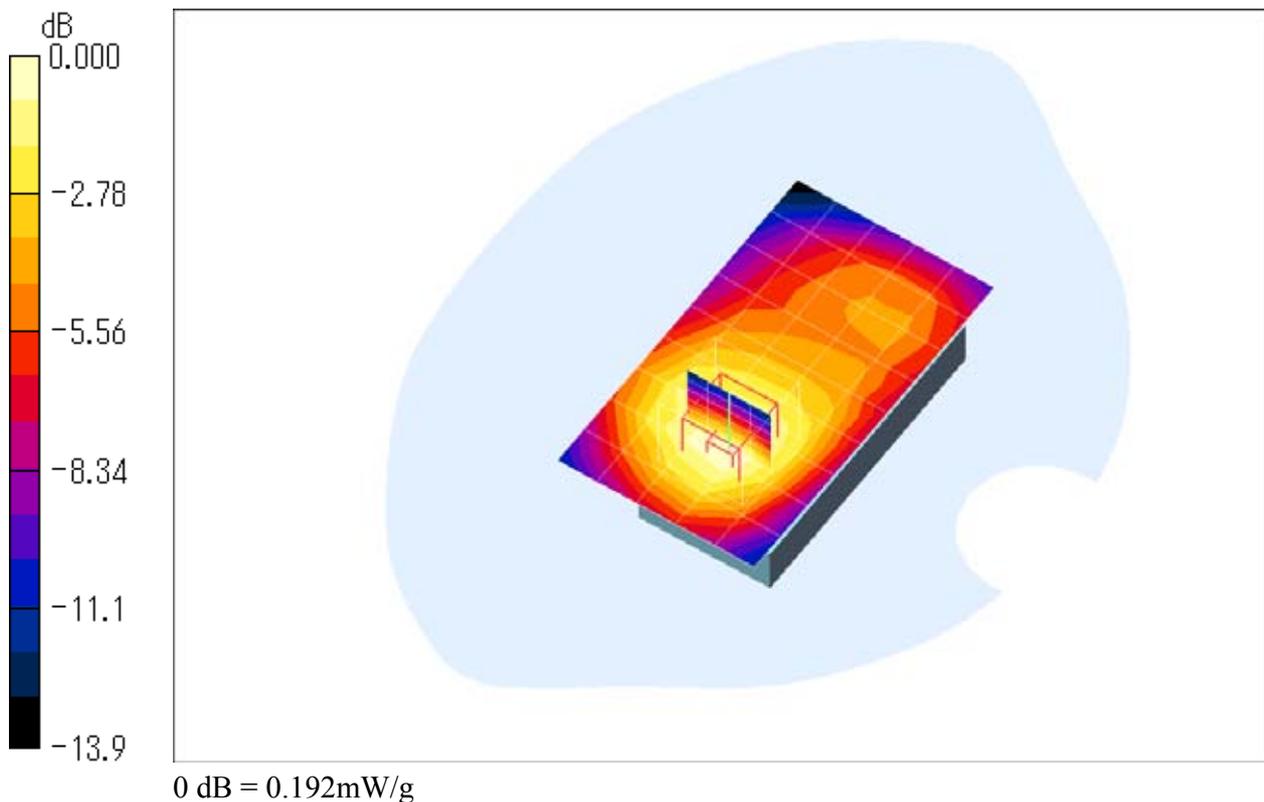
Body-worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.10 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 0.246 W/kg

SAR(1 g) = 0.176 mW/g; SAR(10 g) = 0.113 mW/g

Maximum value of SAR (measured) = 0.192 mW/g



Attachment 2-2 – SAR Test Plots (WLAN)

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Left Head, Cheek/Touch 11ch (2462MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: HSL2450 Medium parameters used: $f = 2462$ MHz; $\sigma = 1.83$ mho/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.26, 4.26, 4.26); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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) = 0.024 mW/g

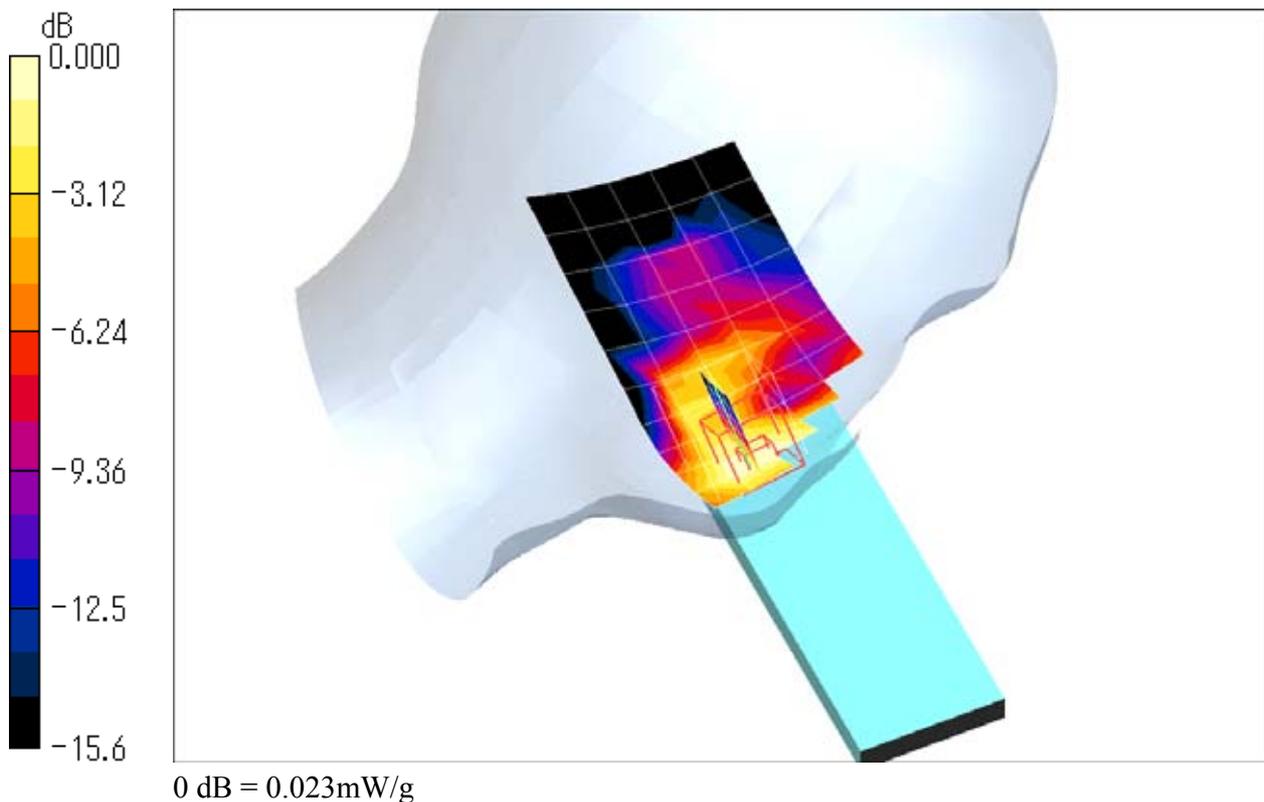
Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.62 V/m; Power Drift = -0.018 dB

Peak SAR (extrapolated) = 0.042 W/kg

SAR(1 g) = 0.022 mW/g; SAR(10 g) = 0.012 mW/g

Maximum value of SAR (measured) = 0.023 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Left Head, Ear/Tilt 11ch (2462MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: HSL2450 Medium parameters used: $f = 2462$ MHz; $\sigma = 1.83$ mho/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.26, 4.26, 4.26); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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) = 0.018 mW/g

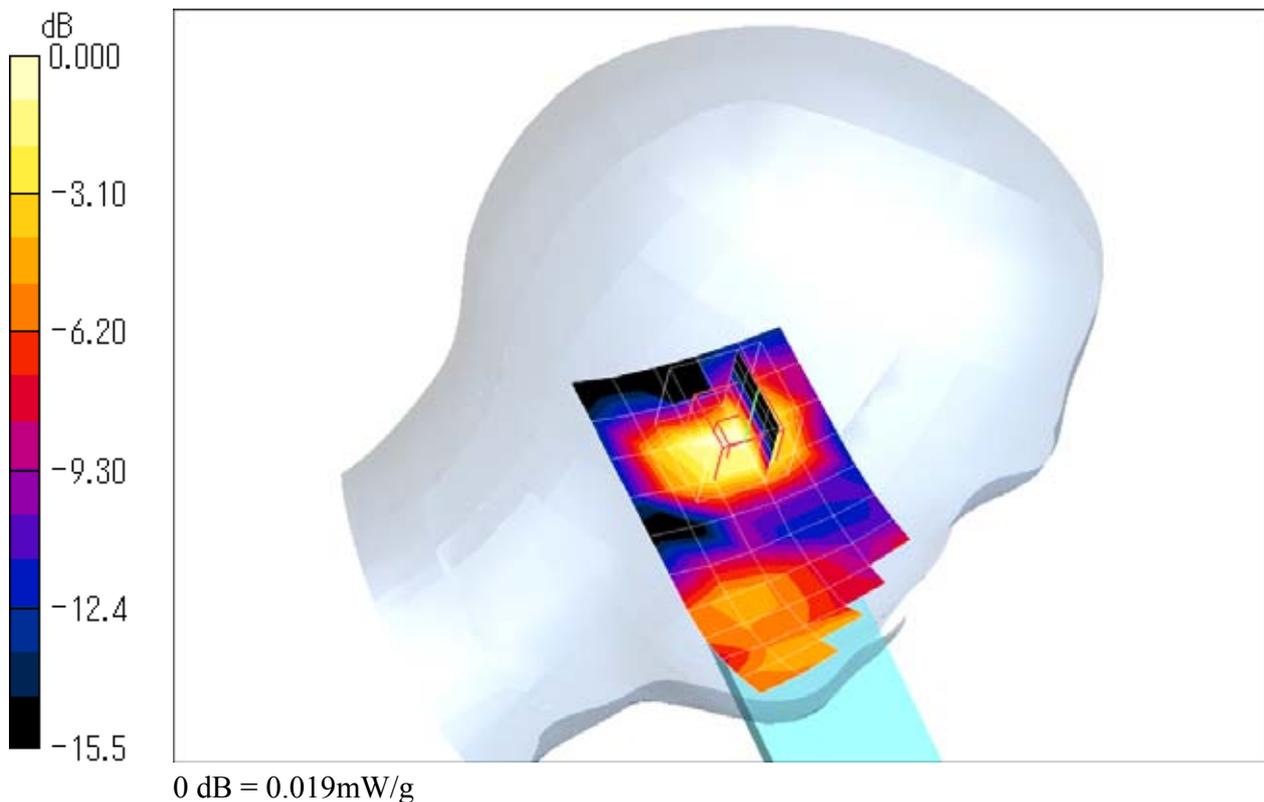
Ear/Tilt Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.72 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 0.029 W/kg

SAR(1 g) = 0.017 mW/g; SAR(10 g) = 0.00897 mW/g

Maximum value of SAR (measured) = 0.019 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Right Head, Cheek/Touch 11ch (2462MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: HSL2450 Medium parameters used: $f = 2462$ MHz; $\sigma = 1.83$ mho/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.26, 4.26, 4.26); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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) = 0.031 mW/g

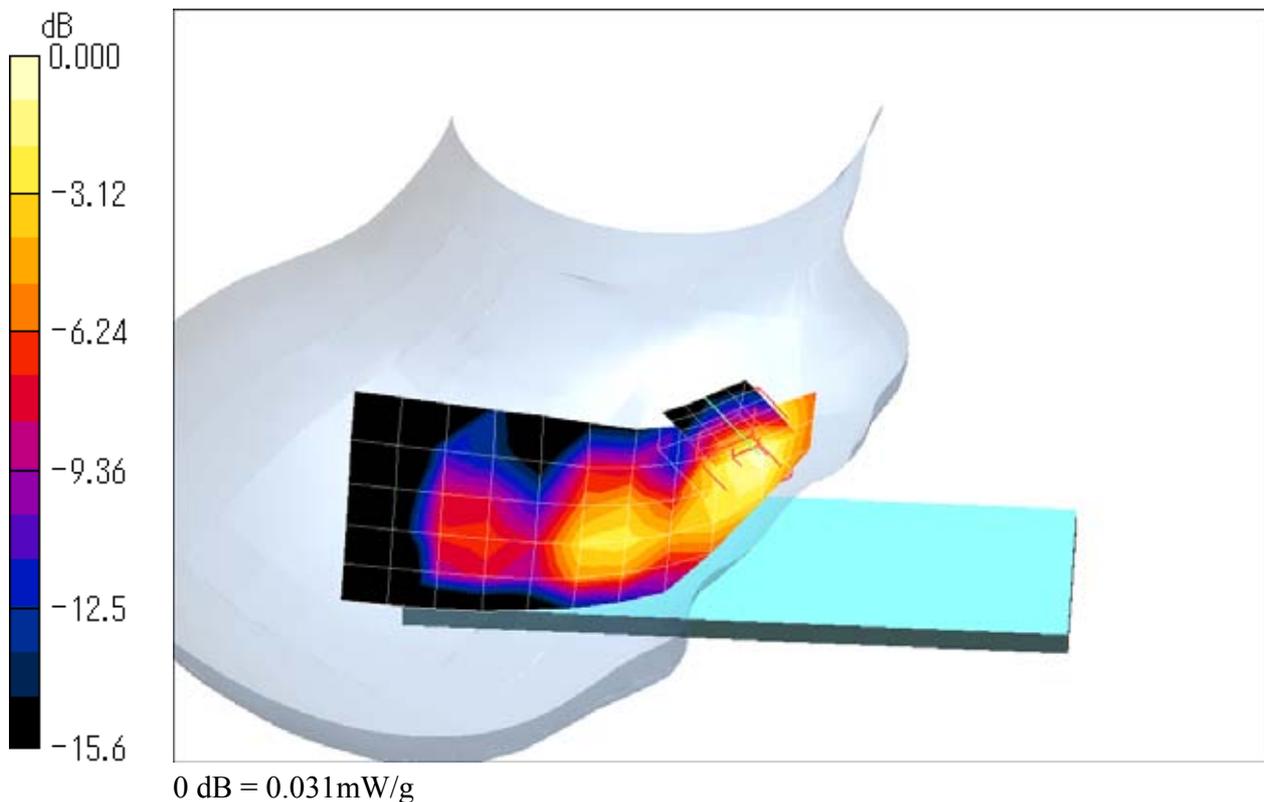
Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.13 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 0.054 W/kg

SAR(1 g) = 0.029 mW/g; SAR(10 g) = 0.016 mW/g

Maximum value of SAR (measured) = 0.031 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Right Head, Cheek/Touch 11ch (2462MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: HSL2450 Medium parameters used: $f = 2462 \text{ MHz}$; $\sigma = 1.83 \text{ mho/m}$; $\epsilon_r = 38.9$; $\rho = 1000 \text{ kg/m}^3$

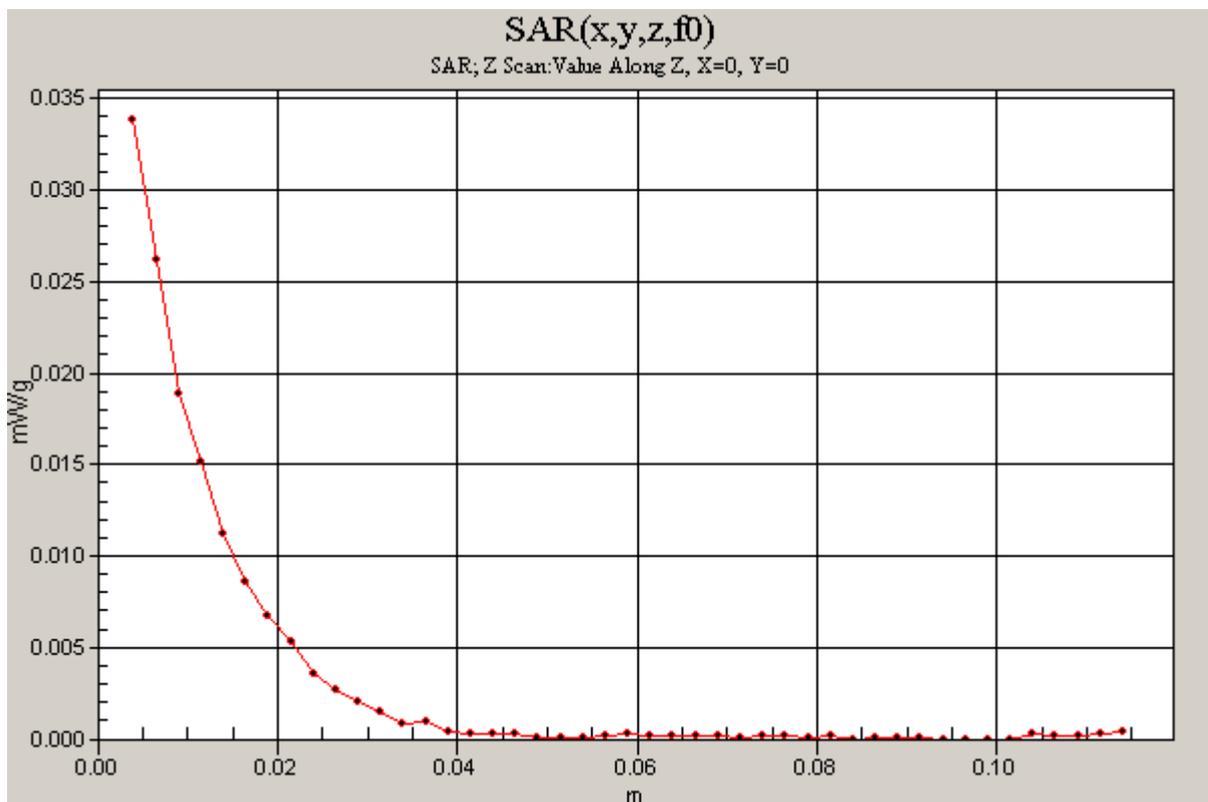
Phantom section: Right Section

Measurement Standard: DAS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.26, 4.26, 4.26); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DAS4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Cheek/Touch Position/Z Scan (1x1x45): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$, $dz=2.5\text{mm}$
 Maximum value of SAR (measured) = 0.034 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Right Head, Ear/Tilt 11ch (2462MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: HSL2450 Medium parameters used: $f = 2462$ MHz; $\sigma = 1.83$ mho/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.26, 4.26, 4.26); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- 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) = 0.021 mW/g

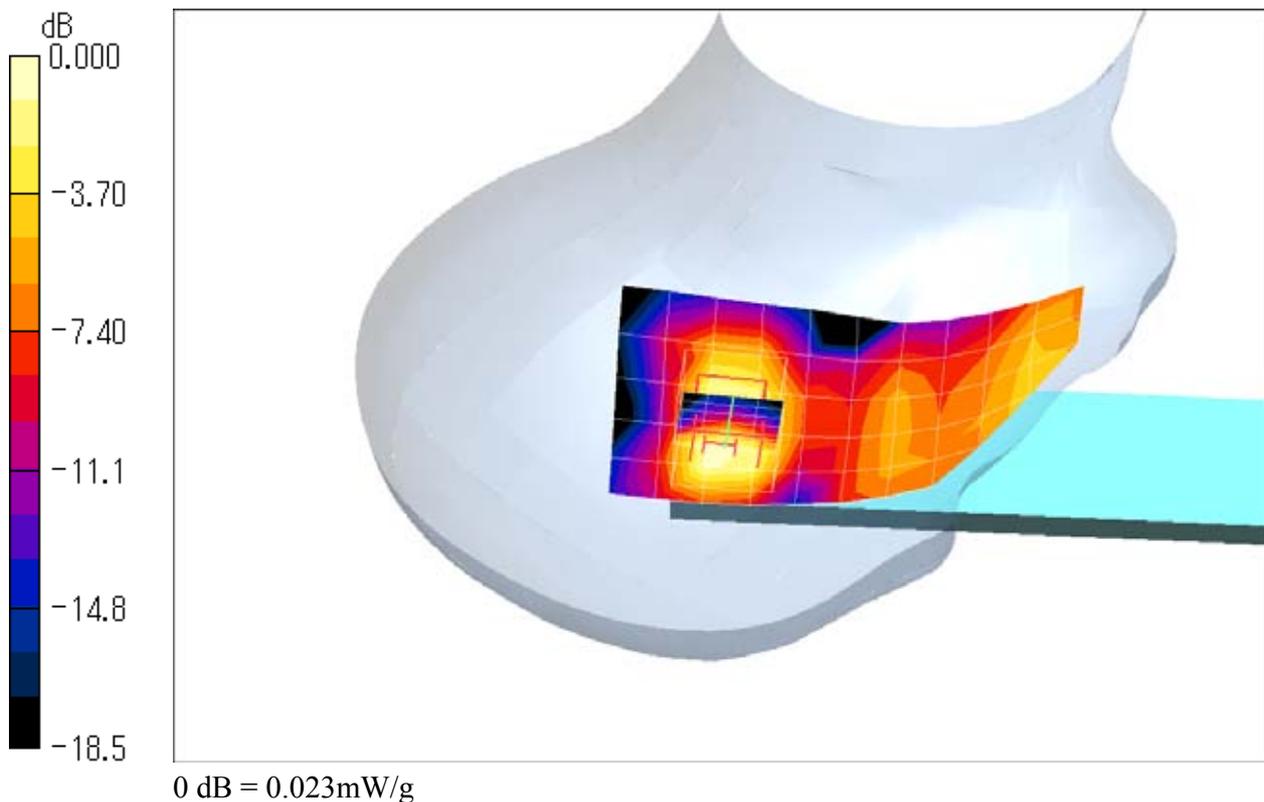
Ear/Tilt Position/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.94 V/m; Power Drift = -0.010 dB

Peak SAR (extrapolated) = 0.043 W/kg

SAR(1 g) = 0.022 mW/g; SAR(10 g) = 0.012 mW/g

Maximum value of SAR (measured) = 0.023 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body-worn, Rear 11ch (2462MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: M2450 Medium parameters used: $f = 2462$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.1, 4.1, 4.1); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASYS4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body-worn/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.050 mW/g

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

Reference Value = 4.76 V/m; Power Drift = -0.040 dB

Peak SAR (extrapolated) = 0.091 W/kg

SAR(1 g) = 0.048 mW/g; SAR(10 g) = 0.028 mW/g

Maximum value of SAR (measured) = 0.049 mW/g

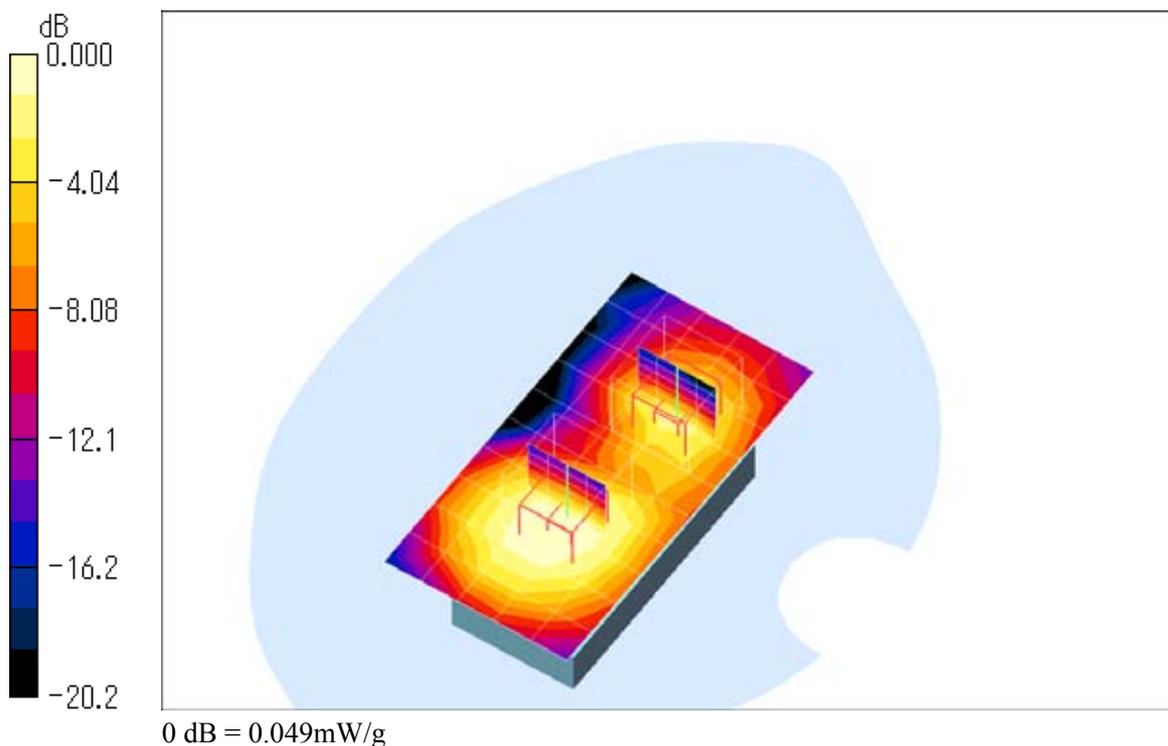
Body-worn/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.76 V/m; Power Drift = -0.040 dB

Peak SAR (extrapolated) = 0.059 W/kg

SAR(1 g) = 0.031 mW/g; SAR(10 g) = 0.017 mW/g

Maximum value of SAR (measured) = 0.034 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body-worn, Rear 11ch (2462MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: M2450 Medium parameters used: $f = 2462$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

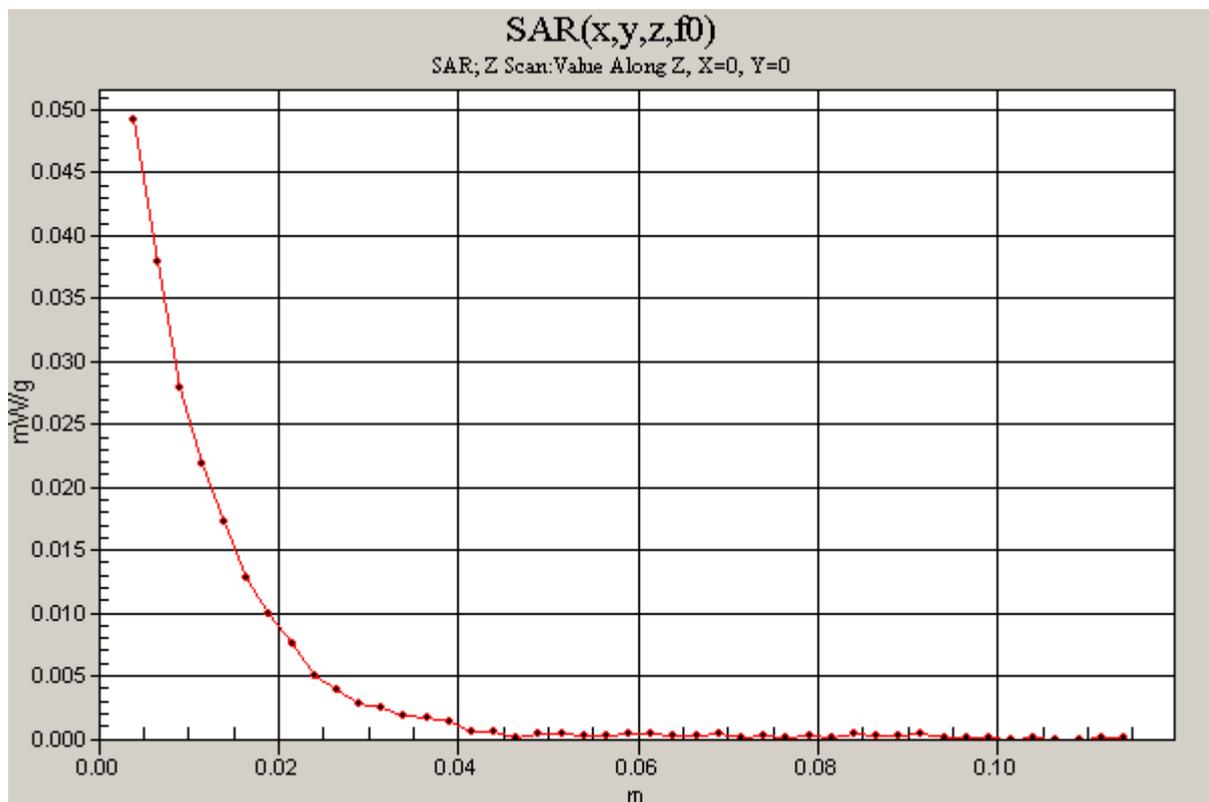
Measurement Standard: DAS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.1, 4.1, 4.1); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DAS4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body-worn/Z Scan (1x1x45): Measurement grid: dx=20mm, dy=20mm, dz=2.5mm

Maximum value of SAR (measured) = 0.049 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

Body-worn, Front 11ch (2462MHz)

DUT: Cellular Phone; Type: 004SH; Serial: 004401/11/303507/1

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

Medium: M2450 Medium parameters used: $f = 2462$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.1, 4.1, 4.1); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn516; Calibrated: 2010/04/15
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASYS4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

Body-worn/Area Scan (6x12x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.009 mW/g

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

Reference Value = 1.62 V/m; Power Drift = -0.007 dB

Peak SAR (extrapolated) = 0.015 W/kg

SAR(1 g) = 0.00843 mW/g; SAR(10 g) = 0.00414 mW/g

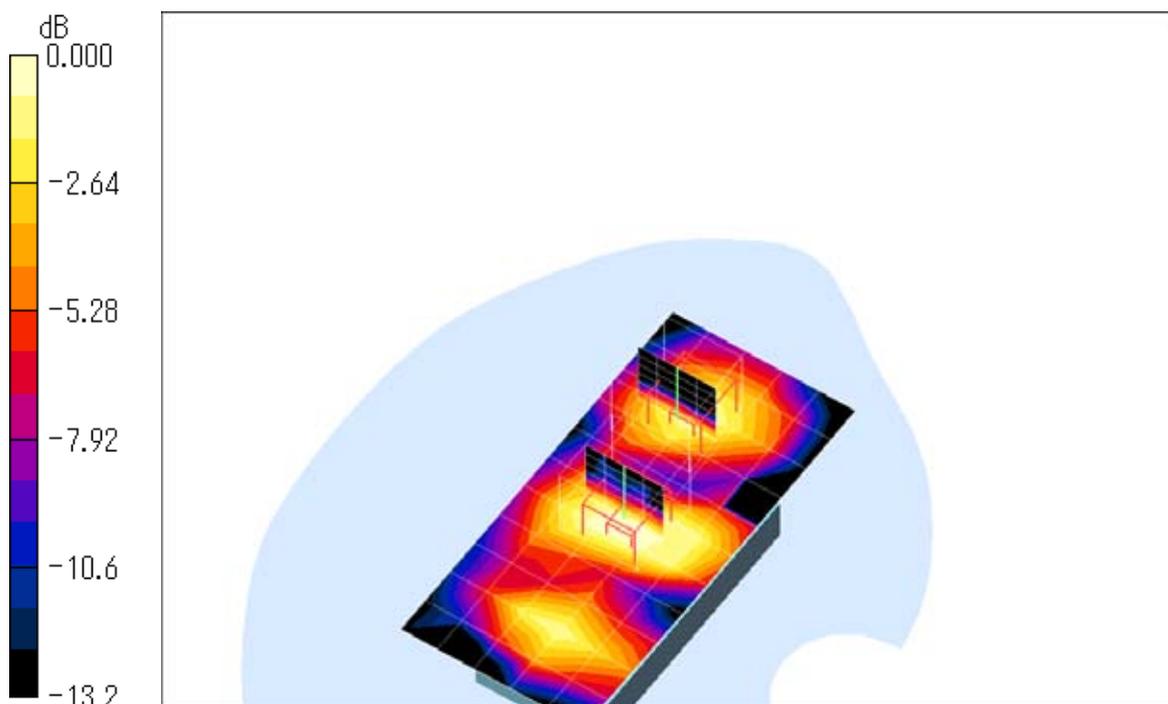
Body-worn/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.62 V/m; Power Drift = -0.007 dB

Peak SAR (extrapolated) = 0.017 W/kg

SAR(1 g) = 0.00762 mW/g; SAR(10 g) = 0.00356 mW/g

Maximum value of SAR (measured) = 0.008 mW/g



0 dB = 0.009mW/g



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



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 JQA (PTT)

Certificate No: ET3-1679_Aug10

CALIBRATION CERTIFICATE

Object ET3DV6 - SN:1679

Calibration procedure(s) QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2
Calibration procedure for dosimetric E-field probes

Calibration date: August 20, 2010

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 $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration |
|----------------------------|-----------------|-----------------------------------|------------------------|
| Power meter E4419B | GB41293874 | 1-Apr-10 (No. 217-01136) | Apr-11 |
| Power sensor E4412A | MY41495277 | 1-Apr-10 (No. 217-01136) | Apr-11 |
| Power sensor E4412A | MY41498087 | 1-Apr-10 (No. 217-01136) | Apr-11 |
| Reference 3 dB Attenuator | SN: S5054 (3c) | 30-Mar-10 (No. 217-01159) | Mar-11 |
| Reference 20 dB Attenuator | SN: S5086 (20b) | 30-Mar-10 (No. 217-01161) | Mar-11 |
| Reference 30 dB Attenuator | SN: S5129 (30b) | 30-Mar-10 (No. 217-01160) | Mar-11 |
| Reference Probe ES3DV2 | SN: 3013 | 30-Dec-09 (No. ES3-3013_Dec09) | Dec-10 |
| DAE4 | SN: 660 | 20-Apr-10 (No. DAE4-660_Apr10) | Apr-11 |
| 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-09) | In house check: Oct10 |

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

Issued: August 20, 2010

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



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., $\vartheta = 0$ 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 $\vartheta = 0$ ($f \leq 900$ 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 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.
- 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.

Probe ET3DV6

SN:1679

| | |
|------------------|-------------------|
| Manufactured: | May 7, 2002 |
| Last calibrated: | December 14, 2009 |
| Repaired: | August 17, 2010 |
| Recalibrated: | August 20, 2010 |

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 ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A | 1.97 | 1.98 | 1.96 | $\pm 10.1\%$ |
| DCP (mV) ^B | 93.0 | 91.2 | 94.5 | |

Modulation Calibration Parameters

| UID | Communication System Name | PAR | | A dB | B dBuV | C | VR mV | Unc ^E (k=2) |
|-------|---------------------------|------|---|---------|-----------|------|----------|---------------------------|
| 10000 | CW | 0.00 | X | 0.00 | 0.00 | 1.00 | 300.0 | $\pm 1.5\%$ |
| | | | Y | 0.00 | 0.00 | 1.00 | 300.0 | |
| | | | Z | 0.00 | 0.00 | 1.00 | 300.0 | |

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 maximum 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] | Validity [MHz] ^c | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---------|-----------------------------|--------------|--------------|---------|---------|---------|-------|-----------------|
| 835 | ± 50 / ± 100 | 41.5 ± 5% | 0.90 ± 5% | 6.20 | 6.20 | 6.20 | 0.42 | 2.22 ± 11.0% |
| 900 | ± 50 / ± 100 | 41.5 ± 5% | 0.97 ± 5% | 6.05 | 6.05 | 6.05 | 0.35 | 2.54 ± 11.0% |
| 1450 | ± 50 / ± 100 | 40.5 ± 5% | 1.20 ± 5% | 5.46 | 5.46 | 5.46 | 0.38 | 3.22 ± 11.0% |
| 1750 | ± 50 / ± 100 | 40.1 ± 5% | 1.37 ± 5% | 5.18 | 5.18 | 5.18 | 0.49 | 2.77 ± 11.0% |
| 1900 | ± 50 / ± 100 | 40.0 ± 5% | 1.40 ± 5% | 4.93 | 4.93 | 4.93 | 0.63 | 2.30 ± 11.0% |
| 1950 | ± 50 / ± 100 | 40.0 ± 5% | 1.40 ± 5% | 4.76 | 4.76 | 4.76 | 0.71 | 2.14 ± 11.0% |
| 2450 | ± 50 / ± 100 | 39.2 ± 5% | 1.80 ± 5% | 4.26 | 4.26 | 4.26 | 0.99 | 1.77 ± 11.0% |

^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.

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

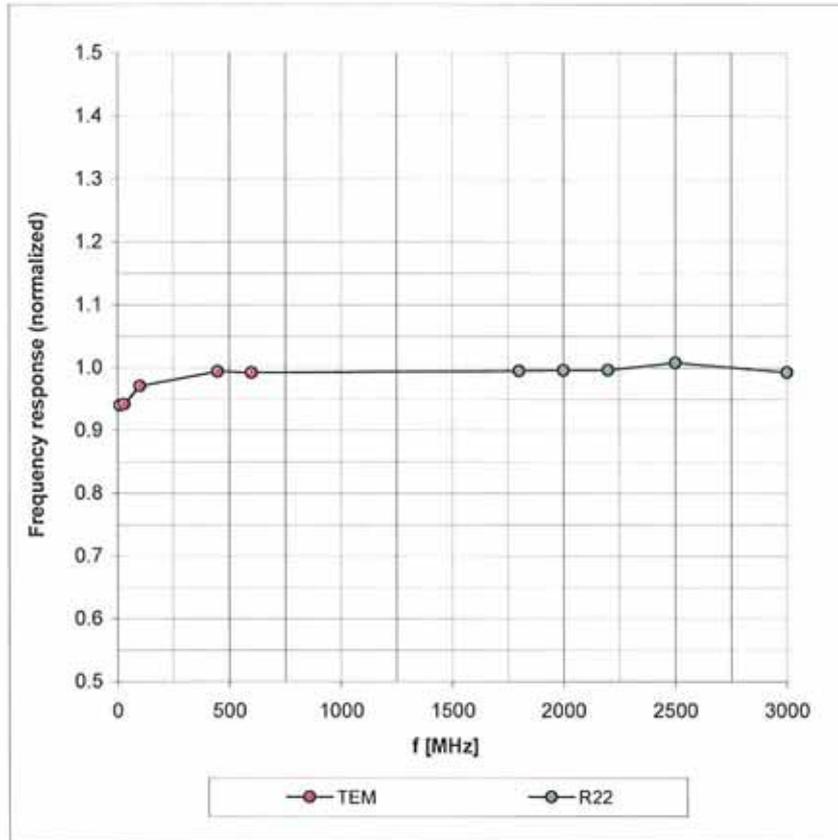
Calibration Parameter Determined in Body Tissue Simulating Media

| f [MHz] | Validity [MHz] ^c | Permittivity | Conductivity | ConvF X | ConvF Y | ConvF Z | Alpha | Depth Unc (k=2) |
|---------|-----------------------------|--------------|--------------|---------|---------|---------|-------|-----------------|
| 835 | ± 50 / ± 100 | 55.2 ± 5% | 0.97 ± 5% | 6.09 | 6.09 | 6.09 | 0.35 | 2.57 ± 11.0% |
| 900 | ± 50 / ± 100 | 55.0 ± 5% | 1.05 ± 5% | 5.99 | 5.99 | 5.99 | 0.33 | 2.84 ± 11.0% |
| 1450 | ± 50 / ± 100 | 54.0 ± 5% | 1.30 ± 5% | 5.30 | 5.30 | 5.30 | 0.45 | 2.79 ± 11.0% |
| 1750 | ± 50 / ± 100 | 53.4 ± 5% | 1.49 ± 5% | 4.80 | 4.80 | 4.80 | 0.58 | 3.18 ± 11.0% |
| 1900 | ± 50 / ± 100 | 53.3 ± 5% | 1.52 ± 5% | 4.56 | 4.56 | 4.56 | 0.75 | 2.67 ± 11.0% |
| 1950 | ± 50 / ± 100 | 53.3 ± 5% | 1.52 ± 5% | 4.67 | 4.67 | 4.67 | 0.87 | 2.41 ± 11.0% |
| 2450 | ± 50 / ± 100 | 52.7 ± 5% | 1.95 ± 5% | 4.10 | 4.10 | 4.10 | 0.99 | 1.77 ± 11.0% |

^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.

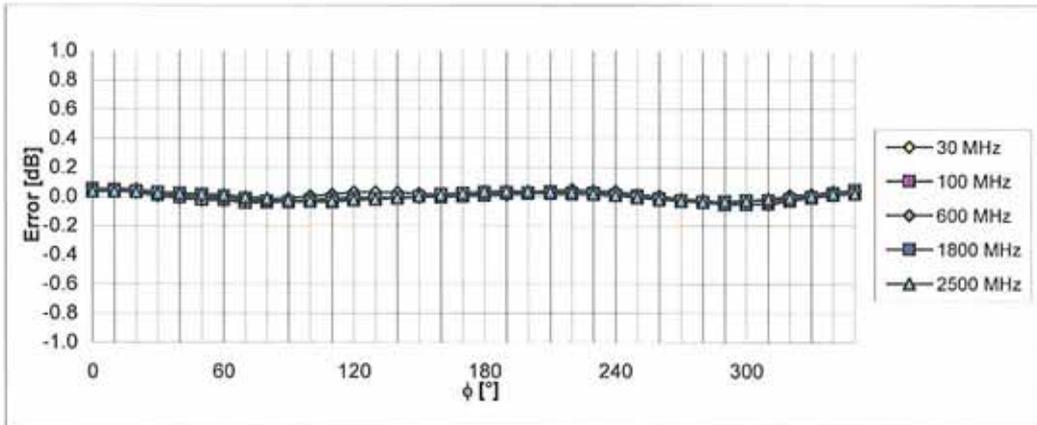
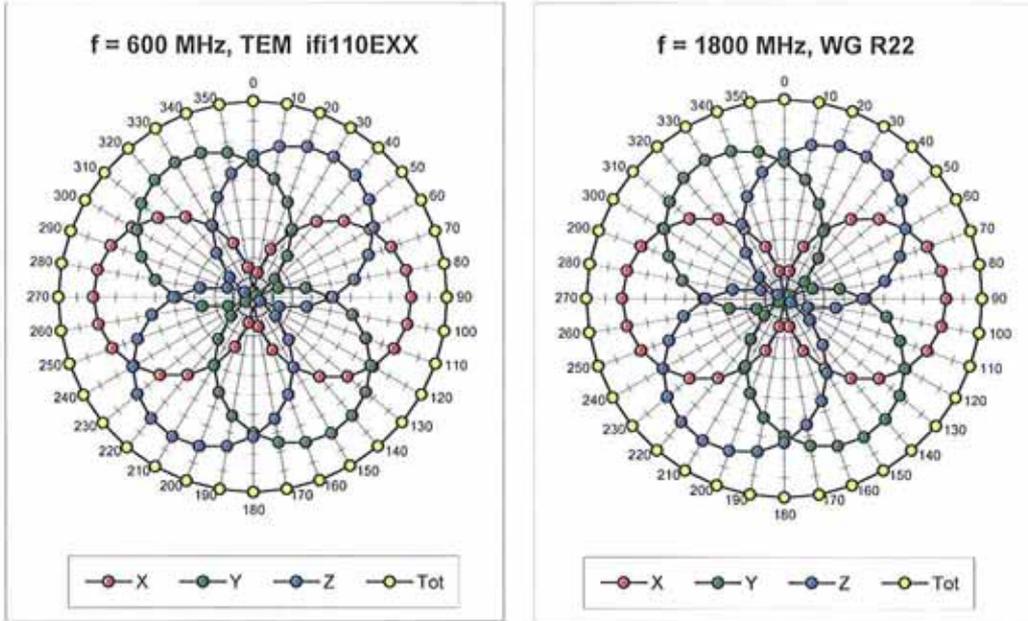
Frequency Response of E-Field

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



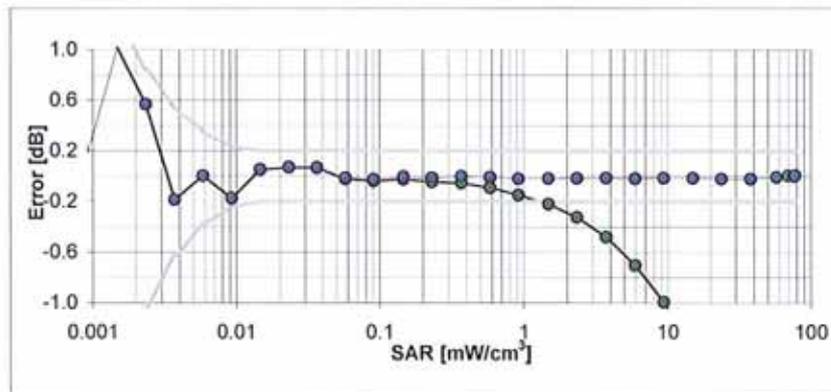
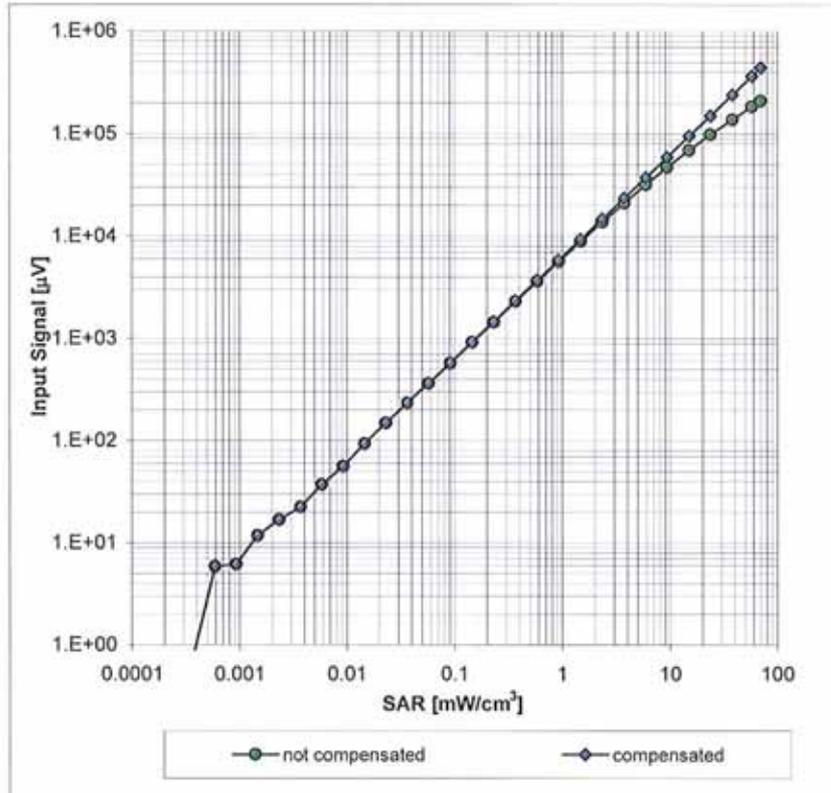
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

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



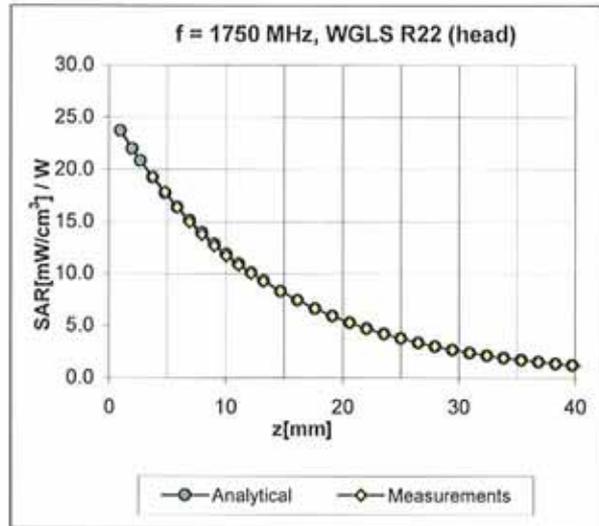
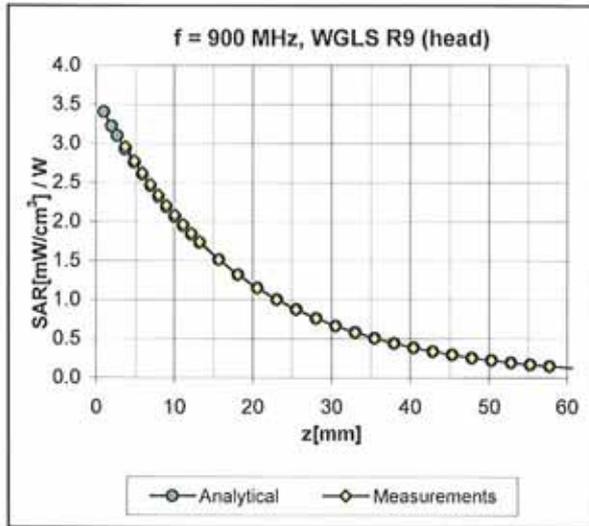
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

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



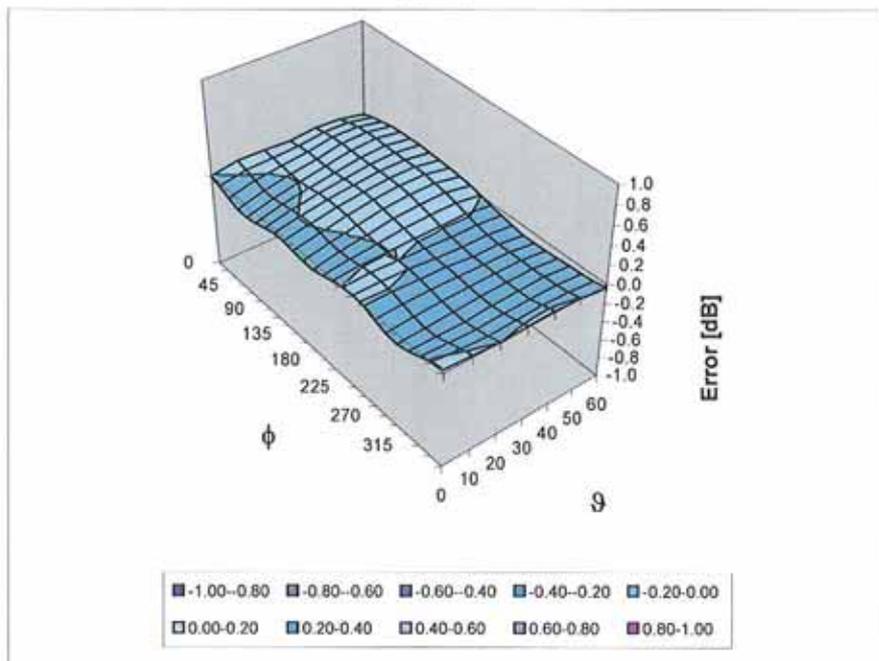
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in HSL

Error (ϕ , θ), f = 900 MHz



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

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



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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 **JQA (PTT)**

Certificate No: **D1900V2-5d112_Aug10**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d112**

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

Calibration date: **August 17, 2010**

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-09 (No. 217-01086) | Oct-10 |
| Power sensor HP 8481A | US37292783 | 06-Oct-09 (No. 217-01086) | Oct-10 |
| Reference 20 dB Attenuator | SN: 5086 (20g) | 30-Mar-10 (No. 217-01158) | Mar-11 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 30-Mar-10 (No. 217-01162) | Mar-11 |
| Reference Probe ES3DV3 | SN: 3205 | 30-Apr-10 (No. ES3-3205_Apr10) | Apr-11 |
| DAE4 | SN: 601 | 10-Jun-10 (No. DAE4-601_Jun10) | Jun-11 |
| 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 | 4-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-09) | In house check: Oct-10 |

Calibrated by: **Dimce Iliev** Name: **Dimce Iliev** Function: **Laboratory Technician**

Signature:

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

Signature:

Issued: August 18, 2010

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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:

- 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
- 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:

- 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 | V52.2 |
| 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 \pm 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 \pm 0.2) °C | 40.3 \pm 6 % | 1.43 mho/m \pm 6 % |
| Head TSL temperature during test | (21.9 \pm 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 | 10.2 mW / g |
| SAR normalized | normalized to 1W | 40.8 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | 40.4 mW / g \pm 17.0 % (k=2) |

| SAR averaged over 10 cm ³ (10 g) of Head TSL | condition | |
|---|--------------------|--|
| SAR measured | 250 mW input power | 5.33 mW / g |
| SAR normalized | normalized to 1W | 21.3 mW / g |
| SAR for nominal Head TSL parameters | normalized to 1W | 21.2 mW / g \pm 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 | 52.9 ± 6 % | 1.53 mho/m ± 6 % |
| Body TSL temperature during test | (21.9 ± 0.2) °C | ---- | ---- |

SAR result with Body TSL

| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | |
|---|--------------------|-----------------------------------|
| SAR measured | 250 mW input power | 10.6 mW / g |
| SAR normalized | normalized to 1W | 42.4 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | 42.2 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm ³ (10 g) of Body TSL | condition | |
|---|--------------------|-----------------------------------|
| SAR measured | 250 mW input power | 5.74 mW / g |
| SAR normalized | normalized to 1W | 23.0 mW / g |
| SAR for nominal Body TSL parameters | normalized to 1W | 22.9 mW / g ± 16.5 % (k=2) |

Appendix

Antenna Parameters with Head TSL

| | |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 51.5 Ω + 7.6 j Ω |
| Return Loss | - 22.3 dB |

Antenna Parameters with Body TSL

| | |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 47.8 Ω + 7.5 j Ω |
| Return Loss | - 22.0 dB |

General Antenna Parameters and Design

| | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.179 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 |

DASY5 Validation Report for Head TSL

Date/Time: 10.08.2010 14:23:02

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium: HSL U12 BB

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

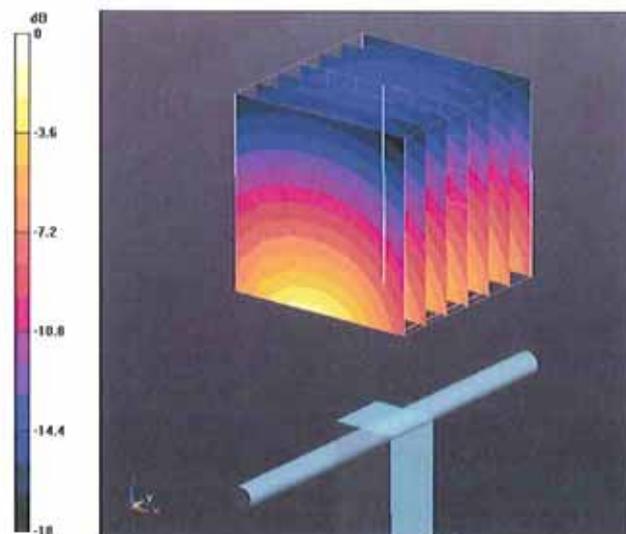
Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.8 V/m; Power Drift = 0.032 dB

Peak SAR (extrapolated) = 18.7 W/kg

SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.33 mW/g

Maximum value of SAR (measured) = 12.7 mW/g

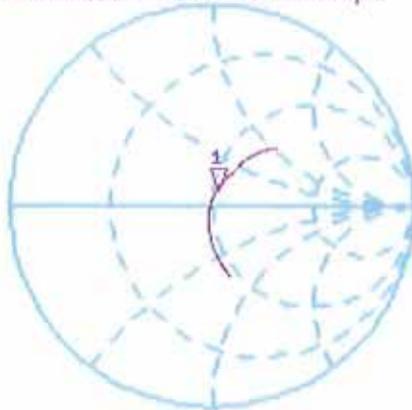


0 dB = 12.7mW/g

Impedance Measurement Plot for Head TSL

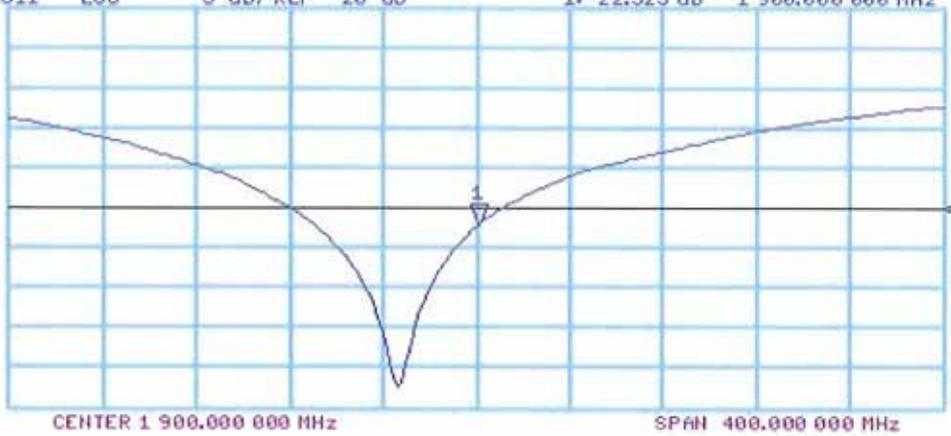
10 Aug 2010 10:53:49
 [CH1] S11 1 U FS 1: 51.539 Ω 7.6348 Ω 639.53 μ H 1 900.000 000 MHz

*
 De l
 CA
 Avg
 16
 †



CH2 S11 LOG 5 dB/REF -20 dB 1:-22.323 dB 1 900.000 000 MHz

CA
 Avg
 16
 †



DASY5 Validation Report for Body

Date/Time: 17.08.2010 17:07:36

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium: MSL U11 BB

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

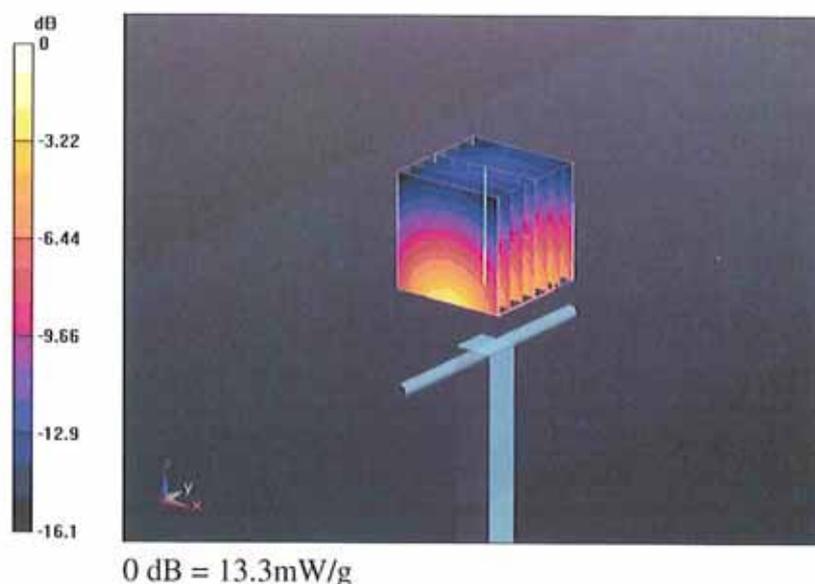
Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.5 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 17.5 W/kg

SAR(1 g) = 10.6 mW/g; SAR(10 g) = 5.74 mW/g

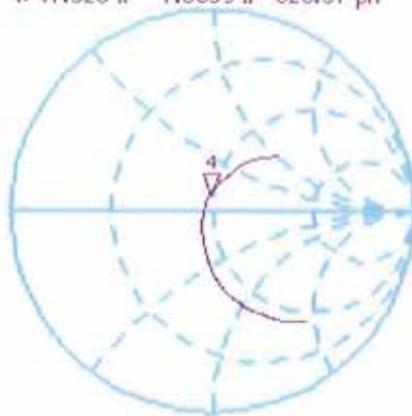
Maximum value of SAR (measured) = 13.3 mW/g



Impedance Measurement Plot for Body TSL

17 Aug 2010 09:54:02
[CH1] S11 1 U FS 4: 47.828 \hat{u} 7.5039 \hat{u} 628.57 pH 1 900.000 000 MHz

*
De1
CA
Avg
16



CH2 S11 LOG 5 dB/REF -20 dB 4: -21.981 dB 1 900.000 000 MHz

CA
Avg
16



START 1 500.000 000 MHz

STOP 2 100.000 000 MHz



Attachment 4 – System Validation Dipole – D2450V2, S/N: 765 Calibration Data



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PTT**

Certificate No: **D2450V2-765_Jan09**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 765**

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

Calibration date: **January 08, 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: S5086 (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 12, 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:

- 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
- 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:

- 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 | V5.0 |
| 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 \pm 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 \pm 0.2) °C | 38.3 \pm 6 % | 1.83 mho/m \pm 6 % |
| Head TSL temperature during test | (21.5 \pm 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 | 13.3 mW / g |
| SAR normalized | normalized to 1W | 53.3 mW / g |
| SAR for nominal Head TSL parameters ¹ | normalized to 1W | 52.6 mW / g \pm 17.0 % (k=2) |

| SAR averaged over 10 cm ³ (10 g) of Head TSL | condition | |
|---|--------------------|--|
| SAR measured | 250 mW input power | 6.19 mW / g |
| SAR normalized | normalized to 1W | 24.8 mW / g |
| SAR for nominal Head TSL parameters ¹ | normalized to 1W | 24.6 mW / g \pm 16.5 % (k=2) |

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

Body TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|----------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 °C | 52.7 | 1.95 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 53.8 ± 6 % | 2.01 mho/m ± 6 % |
| Body TSL temperature during test | (21.0 ± 0.2) °C | --- | --- |

SAR result with Body TSL

| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | |
|---|--------------------|-----------------------------------|
| SAR measured | 250 mW input power | 13.4 mW / g |
| SAR normalized | normalized to 1W | 53.6 mW / g |
| SAR for nominal Body TSL parameters ² | normalized to 1W | 53.0 mW / g ± 17.0 % (k=2) |

| SAR averaged over 10 cm ³ (10 g) of Body TSL | condition | |
|---|--------------------|-----------------------------------|
| SAR measured | 250 mW input power | 6.29 mW / g |
| SAR normalized | normalized to 1W | 25.2 mW / g |
| SAR for nominal Body TSL parameters ² | normalized to 1W | 25.1 mW / g ± 16.5 % (k=2) |

² Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

| | |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $55.6 \Omega + 2.7 j\Omega$ |
| Return Loss | - 24.6 dB |

Antenna Parameters with Body TSL

| | |
|--------------------------------------|-----------------------------|
| Impedance, transformed to feed point | $49.8 \Omega + 4.9 j\Omega$ |
| Return Loss | - 26.1 dB |

General Antenna Parameters and Design

| | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.155 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 |

DASY5 Validation Report for Head TSL

Date/Time: 08.01.2009 10:48:21

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN765

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

Medium: HSL U10 BB

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.83$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.4, 4.4, 4.4); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

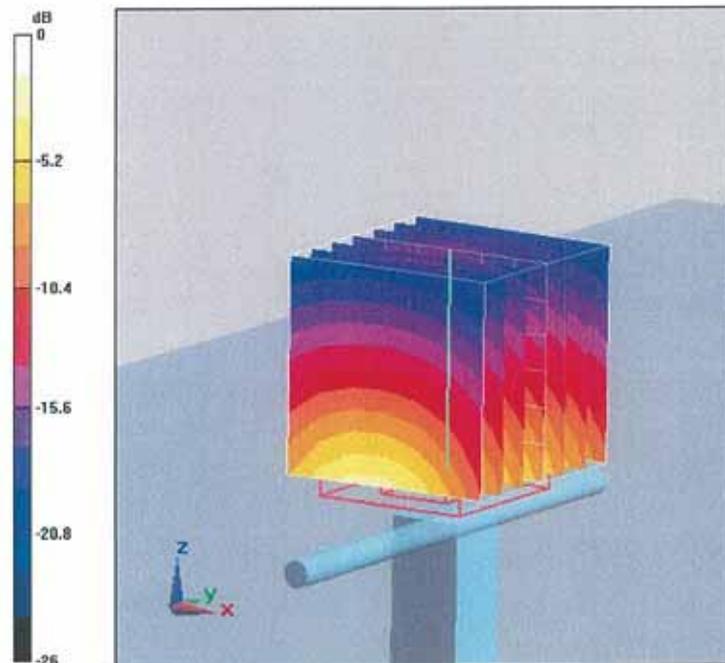
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.2 V/m; Power Drift = 0.017 dB

Peak SAR (extrapolated) = 28 W/kg

SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.19 mW/g

Maximum value of SAR (measured) = 16.1 mW/g



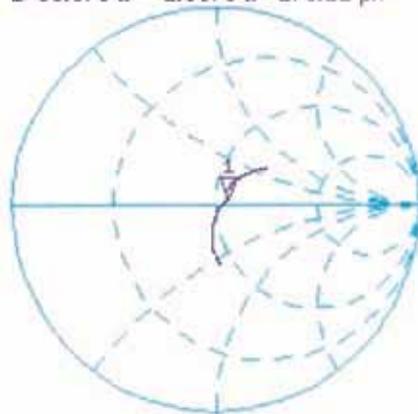
0 dB = 16.1mW/g

Impedance Measurement Plot for Head TSL

8 Jan 2009 09:29:58

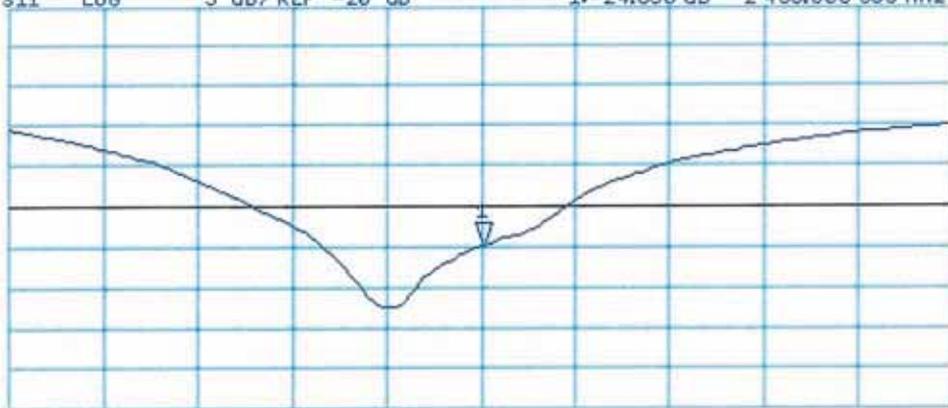
CH1 S11 1 U FS 1: 55.576 Ω 2.6973 Ω 175.22 pH 2 450.000 000 MHz

*
De1
Cor
Avg
16



CH2 S11 LOG 5 dB/REF -20 dB 1:-24.630 dB 2 450.000 000 MHz

Cor
Avg
16



START 2 250.000 000 MHz

STOP 2 650.000 000 MHz

DASY5 Validation Report for Body TSL

Date/Time: 08.01.2009 13:06:44

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:765

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

Medium: MSL U10 BB

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.02$ mho/m; $\epsilon_r = 53.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.07, 4.07, 4.07); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

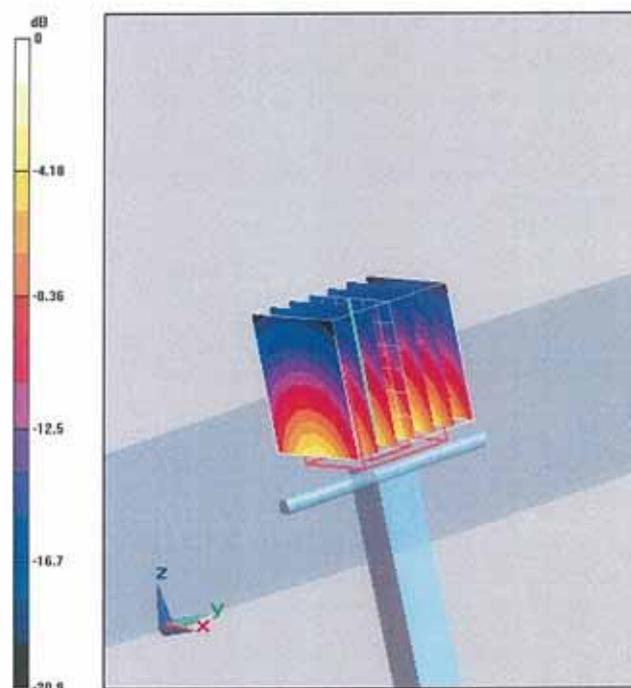
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.6 V/m; Power Drift = 0.014 dB

Peak SAR (extrapolated) = 27 W/kg

SAR(1 g) = 13.4 mW/g; SAR(10 g) = 6.29 mW/g

Maximum value of SAR (measured) = 16.7 mW/g



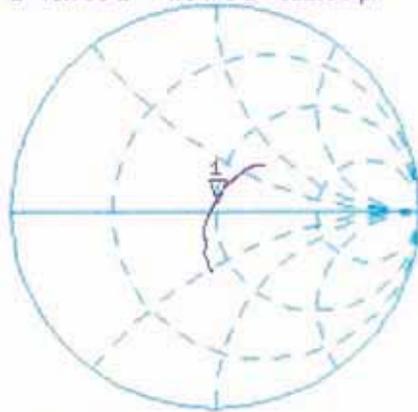
0 dB = 16.7mW/g

Impedance Measurement Plot for Body TSL

8 Jan 2009 09:38:48

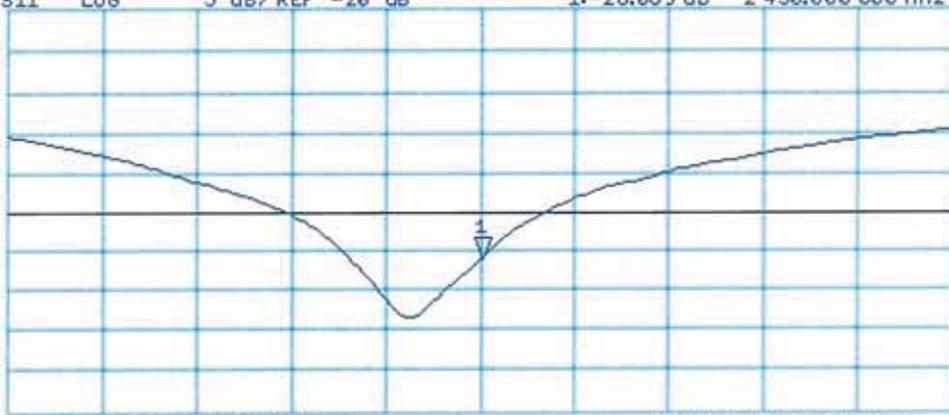
CH1 S11 1 U FS 1: 49.768 Ω 4.9473 Ω 321.38 pF 2 450.000 000 MHz

*
De1
Cor
Avg
16
↑



CH2 S11 LOG 5 dB/REF -20 dB 1: -26.089 dB 2 450.000 000 MHz

Cor
Avg
16
↑



START 2 250.000 000 MHz

STOP 2 650.000 000 MHz