



**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;  $\sigma = 1.41$  mho/m;  $\epsilon_r = 39.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 Sn508; Calibrated: 2010/11/11
- 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) = 11.7 mW/g

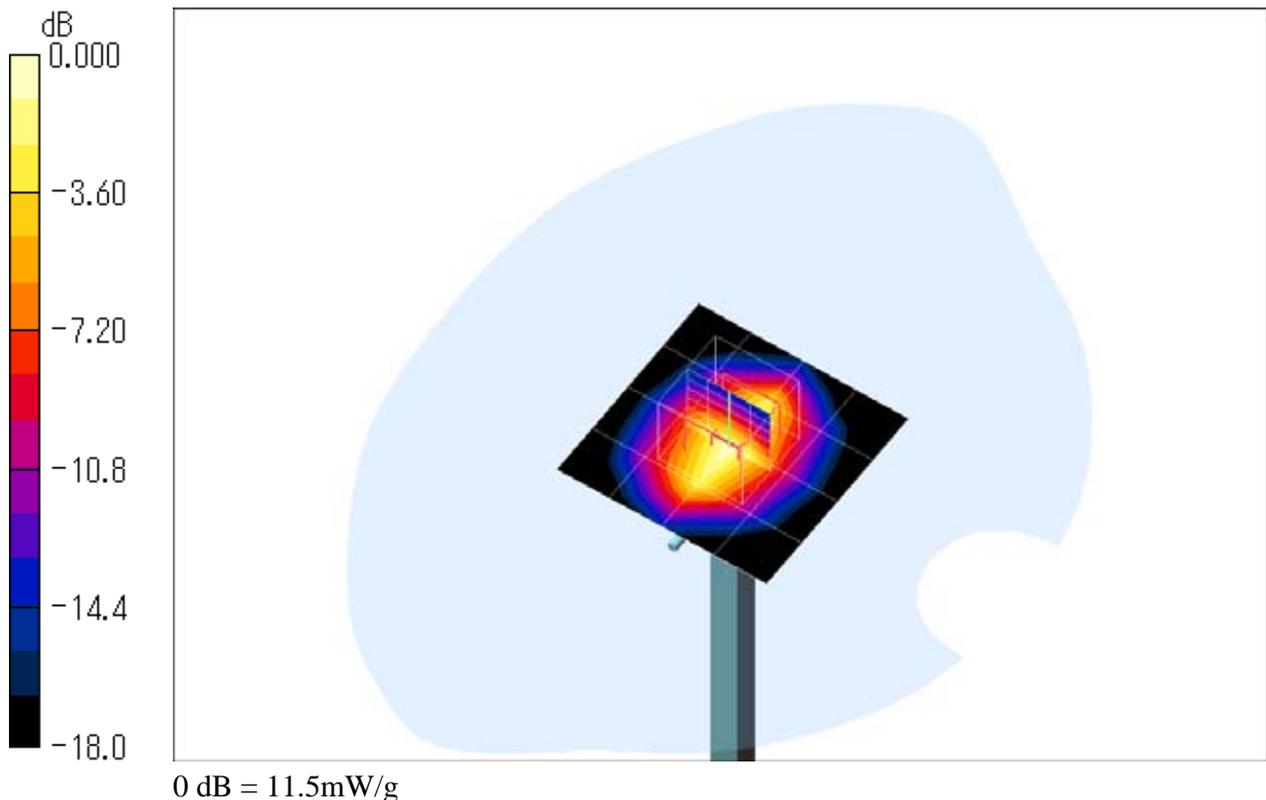
**Antenna Input Power 250 mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 96.5 V/m; Power Drift = -0.008 dB

Peak SAR (extrapolated) = 17.7 W/kg

**SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.36 mW/g**

Maximum value of SAR (measured) = 11.5 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;  $\sigma = 1.57$  mho/m;  $\epsilon_r = 52.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 Sn508; Calibrated: 2010/11/11
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASYS4, 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

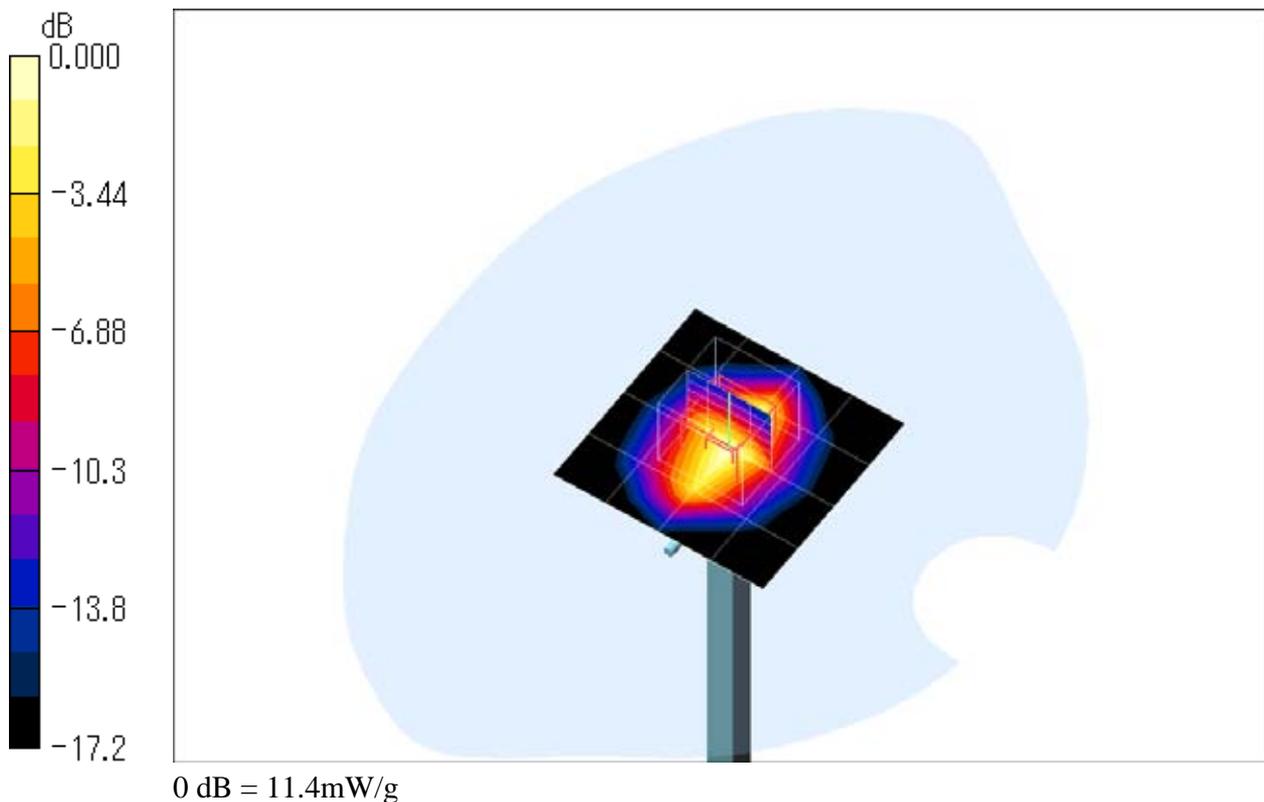
Maximum value of SAR (measured) = 11.4 mW/g

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

Reference Value = 93.1 V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 15.8 W/kg

**SAR(1 g) = 9.95 mW/g; SAR(10 g) = 5.29 mW/g**



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## System Validation (Head 2450 MHz)

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 714**

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

Medium: HSL2450 Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.86$  mho/m;  $\epsilon_r = 38.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 Sn508; Calibrated: 2010/11/11
- 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) = 16.3 mW/g

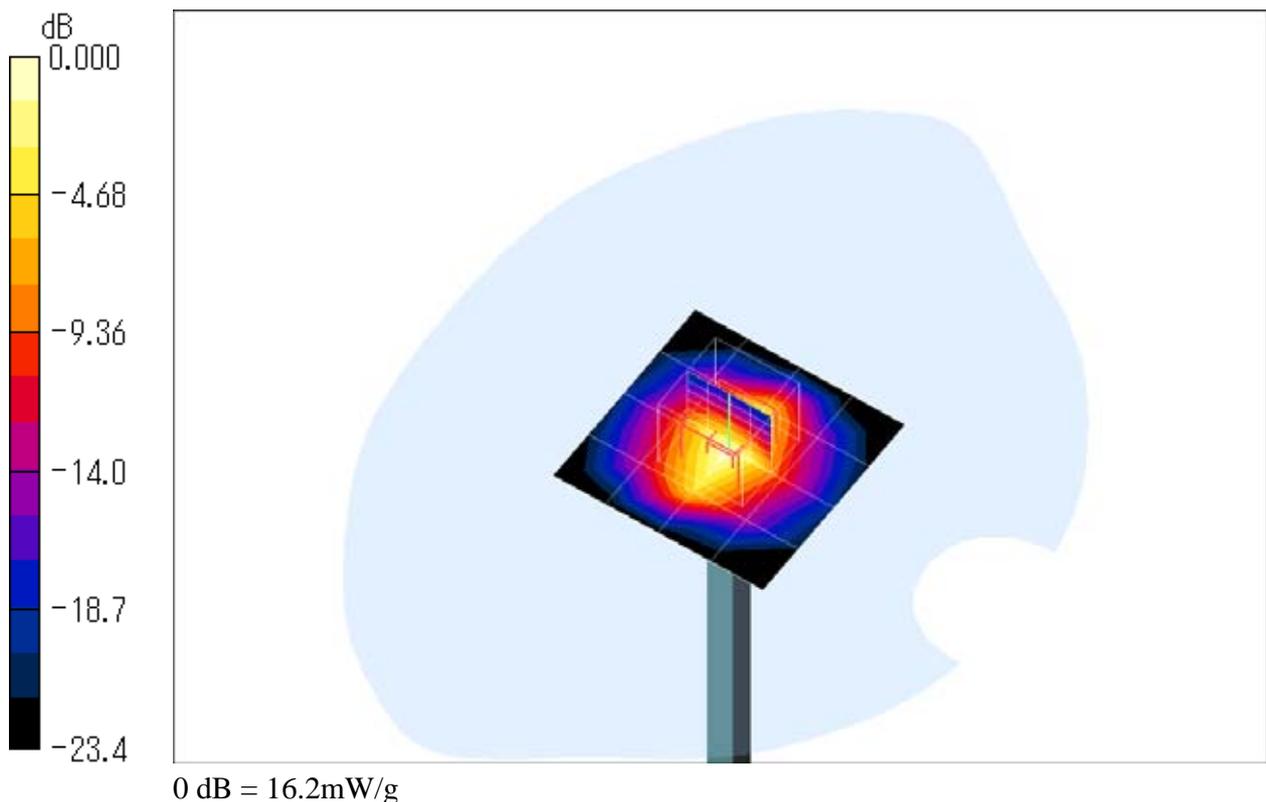
**Antenna Input Power 250 mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 99.2 V/m; Power Drift = -0.072 dB

Peak SAR (extrapolated) = 32.2 W/kg

**SAR(1 g) = 14.4 mW/g; SAR(10 g) = 6.53 mW/g**

Maximum value of SAR (measured) = 16.2 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## System Validation (Body 2450 MHz)

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 714**

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

Medium: M2450 Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2$  mho/m;  $\epsilon_r = 52.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 Sn508; Calibrated: 2010/11/11
- 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) = 15.4 mW/g

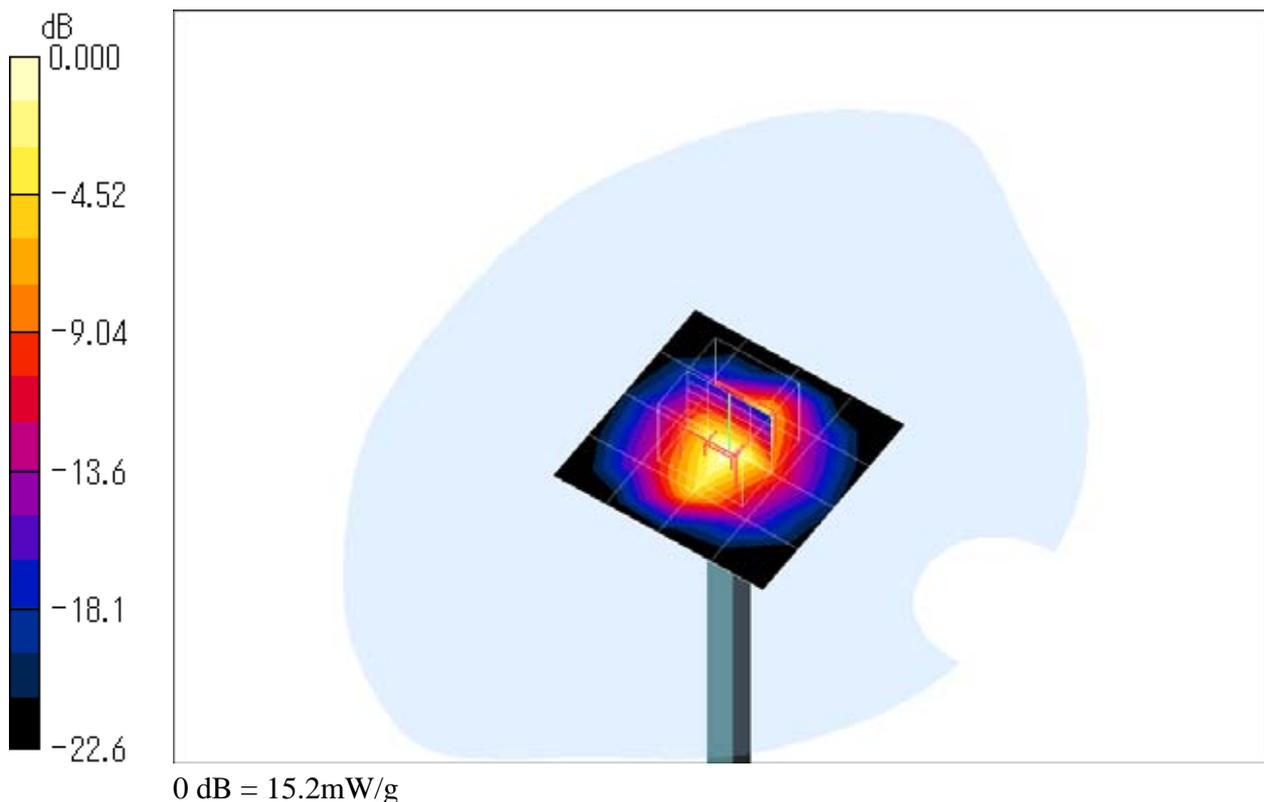
**Antenna Input Power 250 mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 93.6 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 31.0 W/kg

**SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.24 mW/g**

Maximum value of SAR (measured) = 15.2 mW/g





**Attachment 2 – SAR Test Plots**



**Attachment 2-1 – SAR Test Plots (PCS1900)**

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

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

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: HSL1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 39.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 Sn508; Calibrated: 2010/11/11
- 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 (11x7x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.258 mW/g

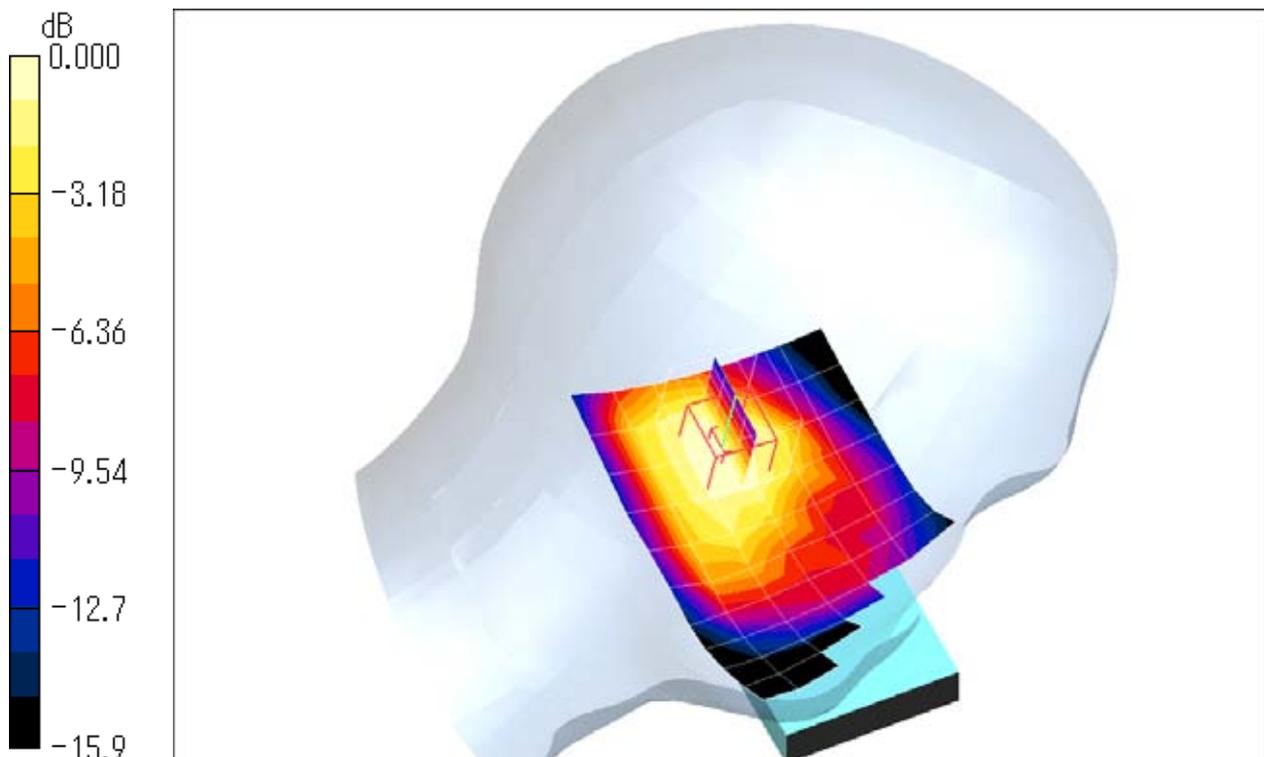
**Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.46 V/m; Power Drift = -0.110 dB

Peak SAR (extrapolated) = 0.356 W/kg

**SAR(1 g) = 0.237 mW/g; SAR(10 g) = 0.151 mW/g**

Maximum value of SAR (measured) = 0.251 mW/g



0 dB = 0.251mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## Left Head, Ear/Tilt 512ch (1850.2MHz)

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: HSL1900 Medium parameters used:  $f = 1850.2 \text{ MHz}$ ;  $\sigma = 1.36 \text{ mho/m}$ ;  $\epsilon_r = 39.4$ ;  $\rho = 1000 \text{ kg/m}^3$

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 Sn508; Calibrated: 2010/11/11
- 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 (11x7x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.218 mW/g

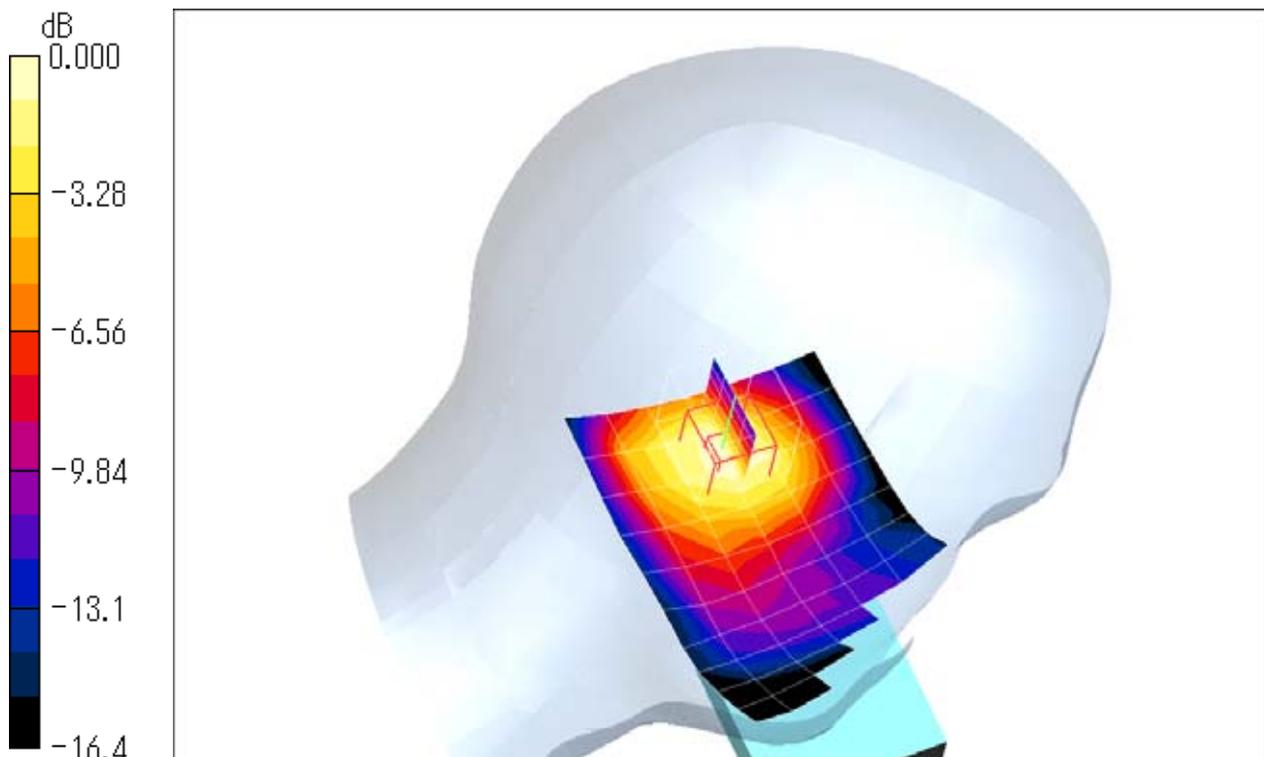
**Ear/Tilt Position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 14.0 V/m; Power Drift = -0.060 dB

Peak SAR (extrapolated) = 0.324 W/kg

**SAR(1 g) = 0.219 mW/g; SAR(10 g) = 0.133 mW/g**

Maximum value of SAR (measured) = 0.239 mW/g



0 dB = 0.239mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

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

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: HSL1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 39.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 Sn508; Calibrated: 2010/11/11
- 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 (11x7x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.288 mW/g

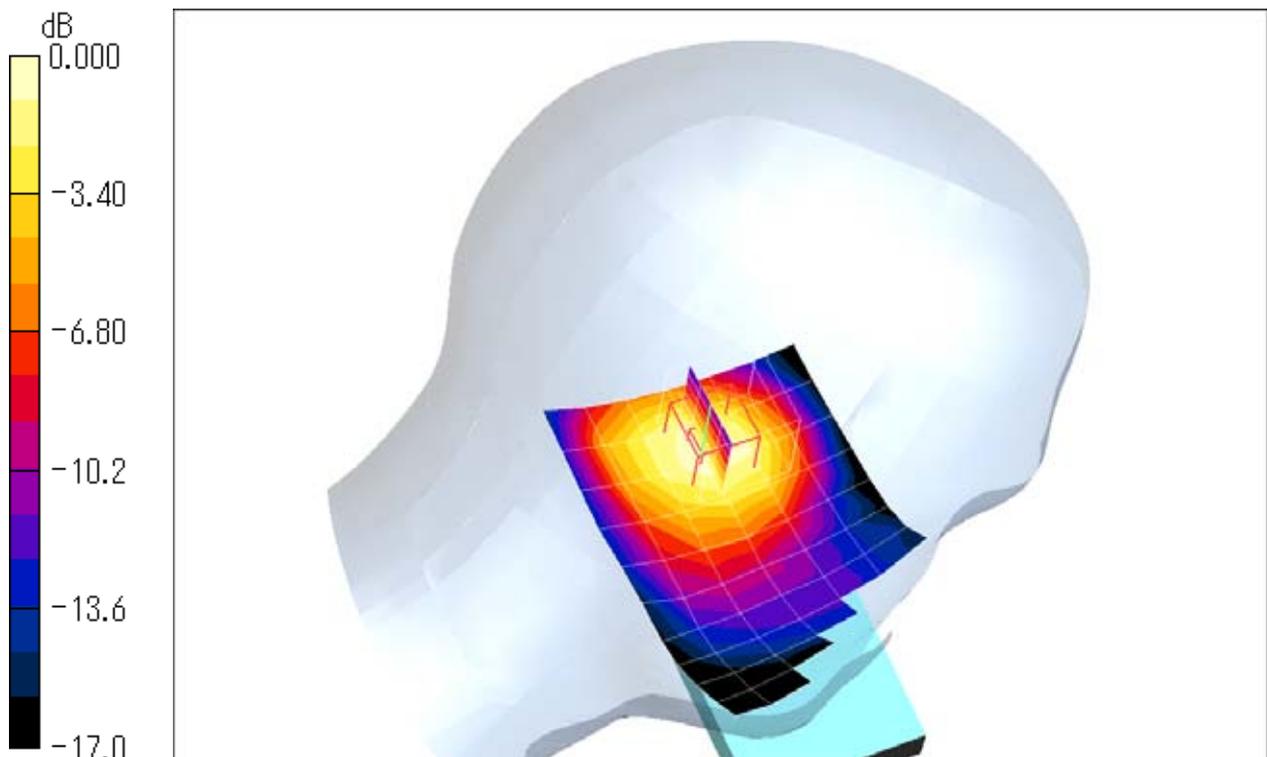
**Ear/Tilt Position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.19 V/m; Power Drift = 0.121 dB

Peak SAR (extrapolated) = 0.408 W/kg

**SAR(1 g) = 0.280 mW/g; SAR(10 g) = 0.172 mW/g**

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



0 dB = 0.296mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## Left Head, Ear/Tilt 810ch (1909.8MHz)

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: HSL1900 Medium parameters used:  $f = 1909.8 \text{ MHz}$ ;  $\sigma = 1.43 \text{ mho/m}$ ;  $\epsilon_r = 39.3$ ;  $\rho = 1000 \text{ kg/m}^3$

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 Sn508; Calibrated: 2010/11/11
- 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 (11x7x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.292 mW/g

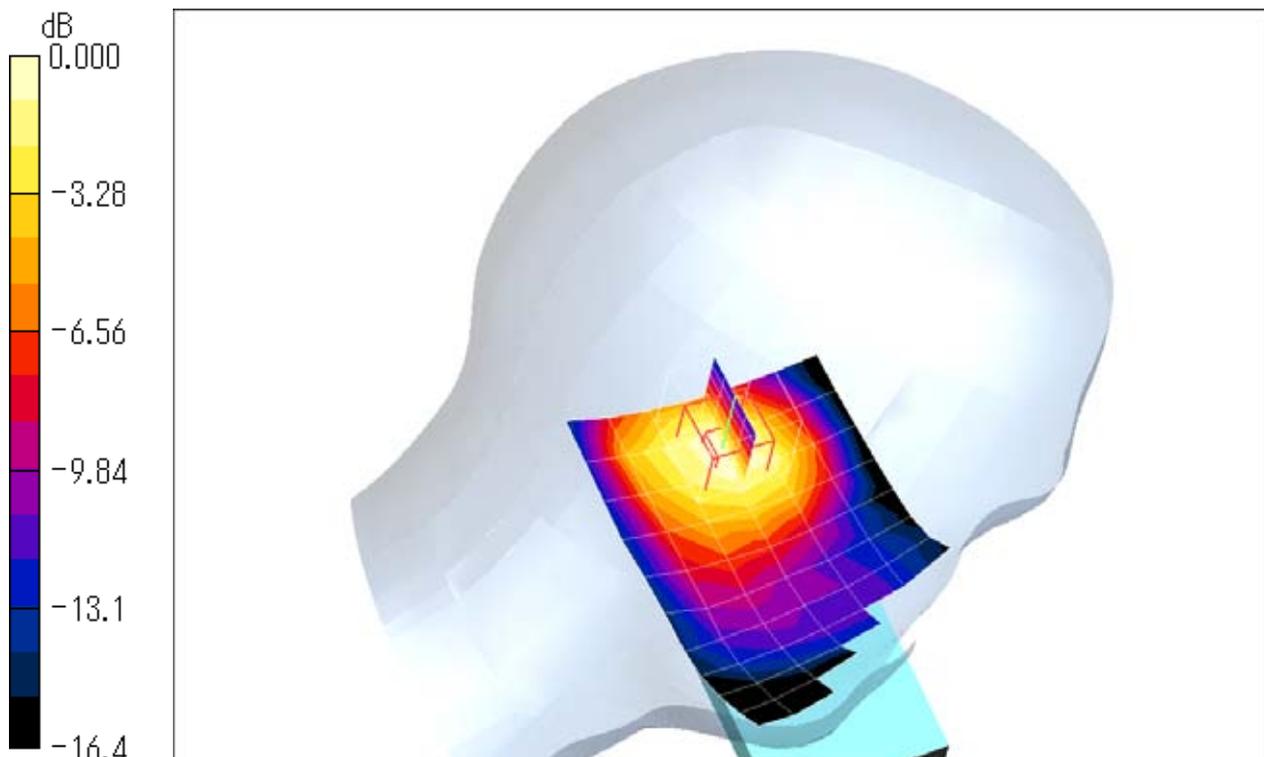
**Ear/Tilt Position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 16.3 V/m; Power Drift = -0.120 dB

Peak SAR (extrapolated) = 0.424 W/kg

**SAR(1 g) = 0.284 mW/g; SAR(10 g) = 0.173 mW/g**

Maximum value of SAR (measured) = 0.312 mW/g



0 dB = 0.312mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## Left Head, Ear/Tilt 810ch (1909.8MHz)

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: HSL1900 Medium parameters used:  $f = 1909.8 \text{ MHz}$ ;  $\sigma = 1.43 \text{ mho/m}$ ;  $\epsilon_r = 39.3$ ;  $\rho = 1000 \text{ kg/m}^3$

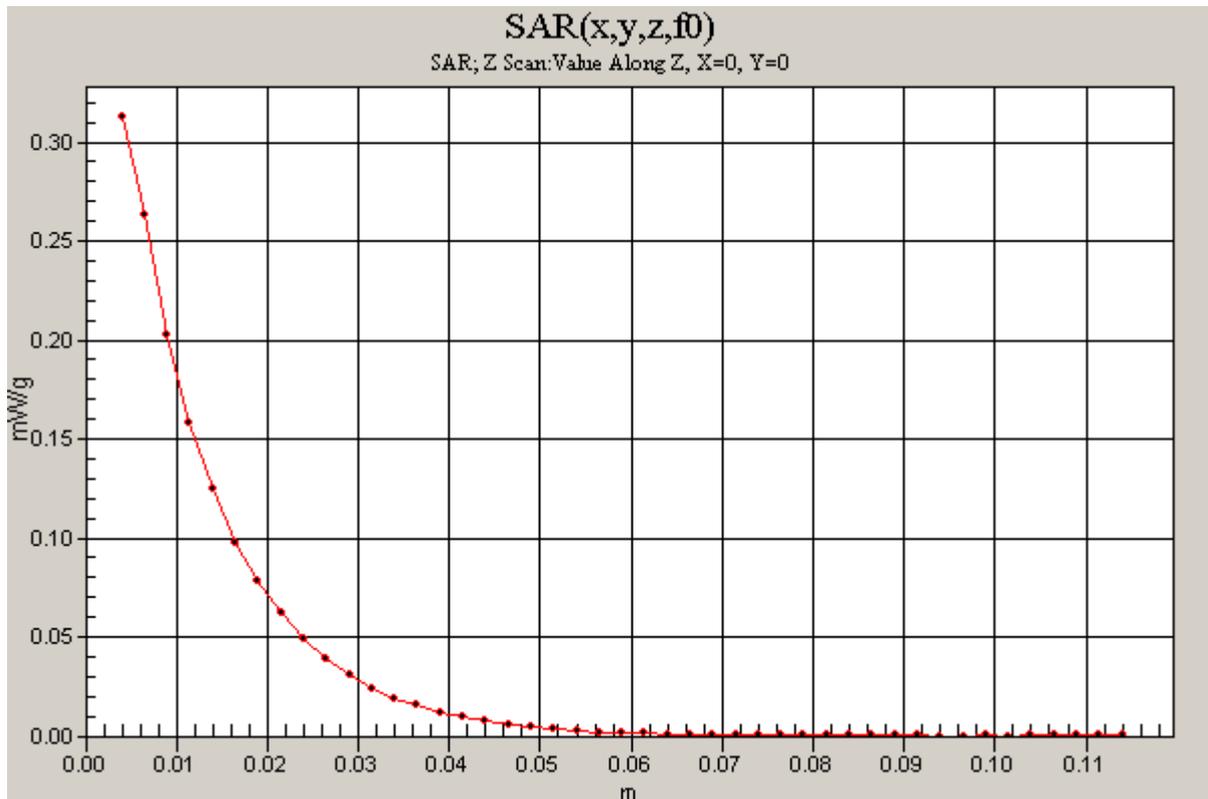
Phantom section: Left Section

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 Sn508; Calibrated: 2010/11/11
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DAS4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**Ear/Tilt Position/Z Scan (1x1x45):** Measurement grid:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$ ,  $dz=2.5\text{mm}$   
Maximum value of SAR (measured) = 0.313 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

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

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: HSL1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 39.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 Sn508; Calibrated: 2010/11/11
- 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 (11x7x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.270 mW/g

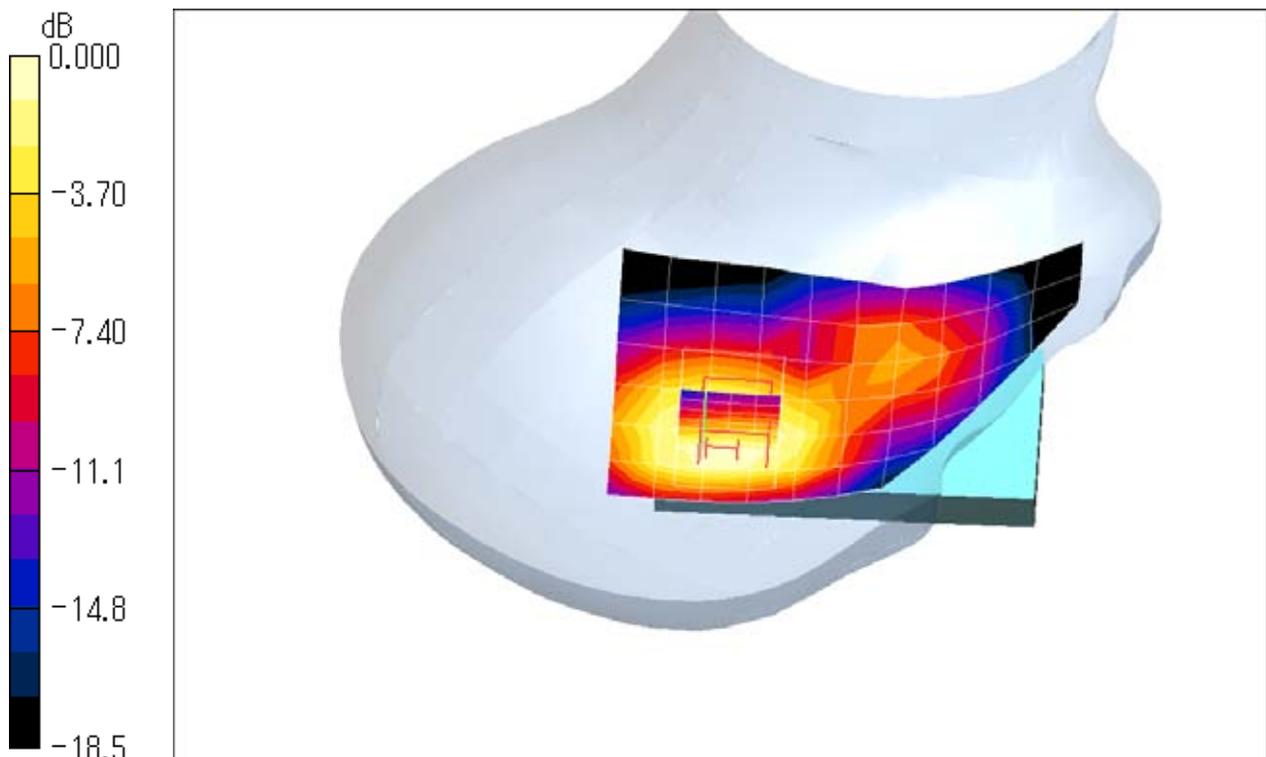
**Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.90 V/m; Power Drift = 0.083 dB

Peak SAR (extrapolated) = 0.432 W/kg

**SAR(1 g) = 0.264 mW/g; SAR(10 g) = 0.168 mW/g**

Maximum value of SAR (measured) = 0.284 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

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

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: HSL1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 39.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right 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 Sn508; Calibrated: 2010/11/11
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DASYS4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**Ear/Tilt Position/Area Scan (11x7x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.206 mW/g

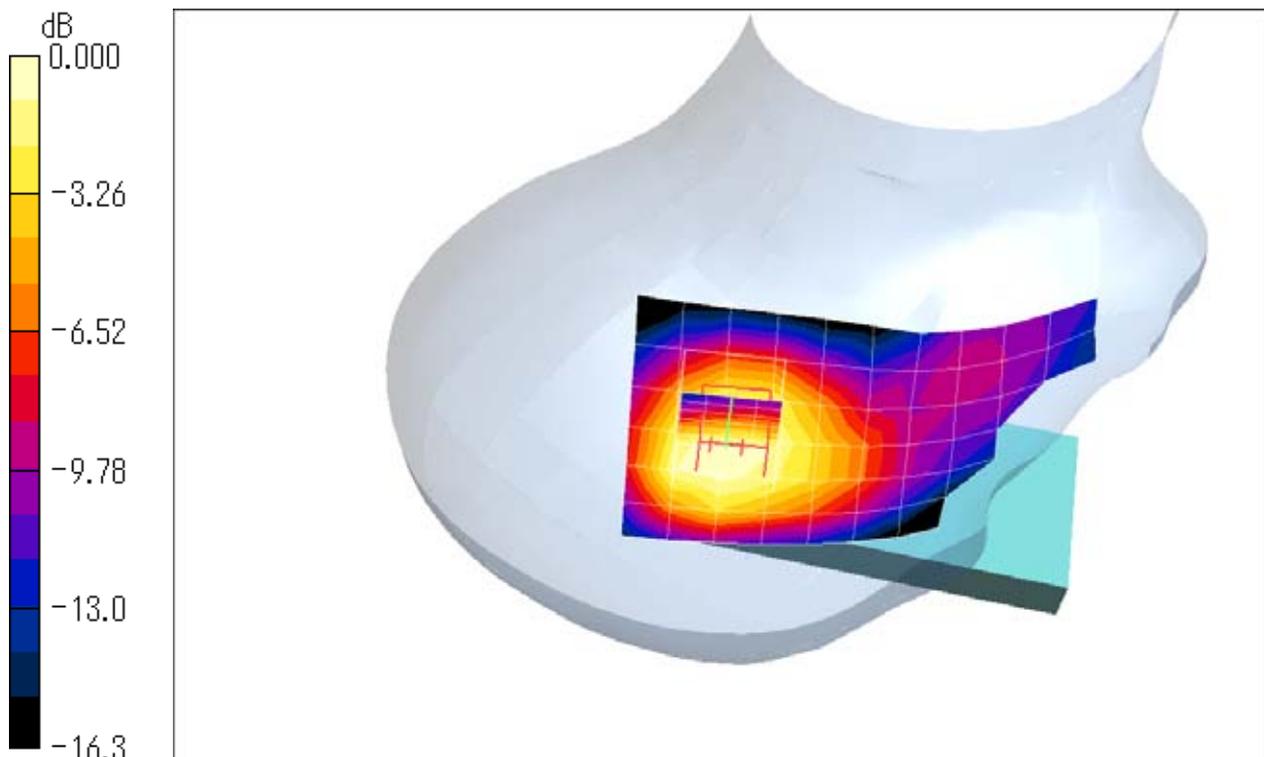
**Ear/Tilt Position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.8 V/m; Power Drift = -0.098 dB

Peak SAR (extrapolated) = 0.328 W/kg

**SAR(1 g) = 0.190 mW/g; SAR(10 g) = 0.121 mW/g**

Maximum value of SAR (measured) = 0.204 mW/g



0 dB = 0.204mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## Body-worn, Rear 661ch (1880.0MHz)

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: M1900 Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.55 \text{ mho/m}$ ;  $\epsilon_r = 52.2$ ;  $\rho = 1000 \text{ kg/m}^3$

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 Sn508; Calibrated: 2010/11/11
- 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 (7x11x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.213 mW/g

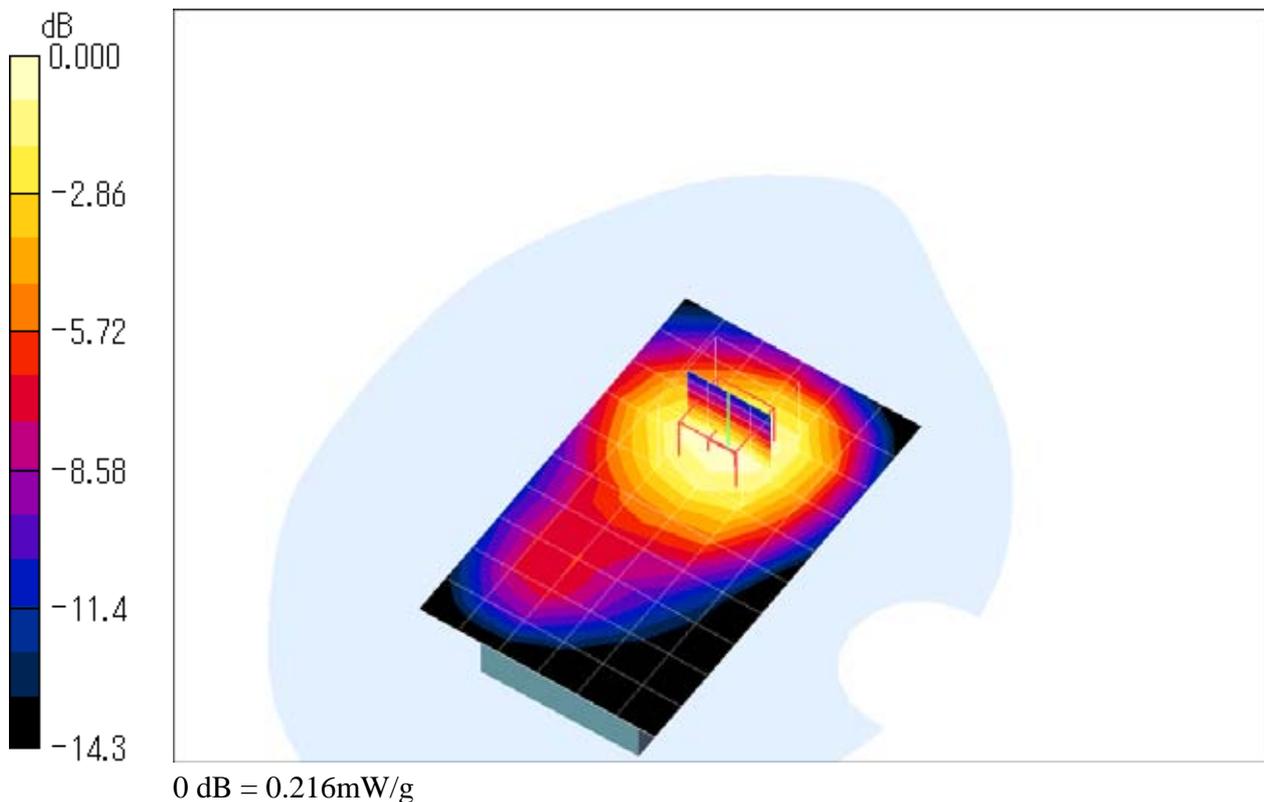
**Body-worn/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 7.18 V/m; Power Drift = -0.135 dB

Peak SAR (extrapolated) = 0.281 W/kg

**SAR(1 g) = 0.200 mW/g; SAR(10 g) = 0.129 mW/g**

Maximum value of SAR (measured) = 0.216 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

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

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: M1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 Sn508; Calibrated: 2010/11/11
- 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 (7x11x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.193 mW/g

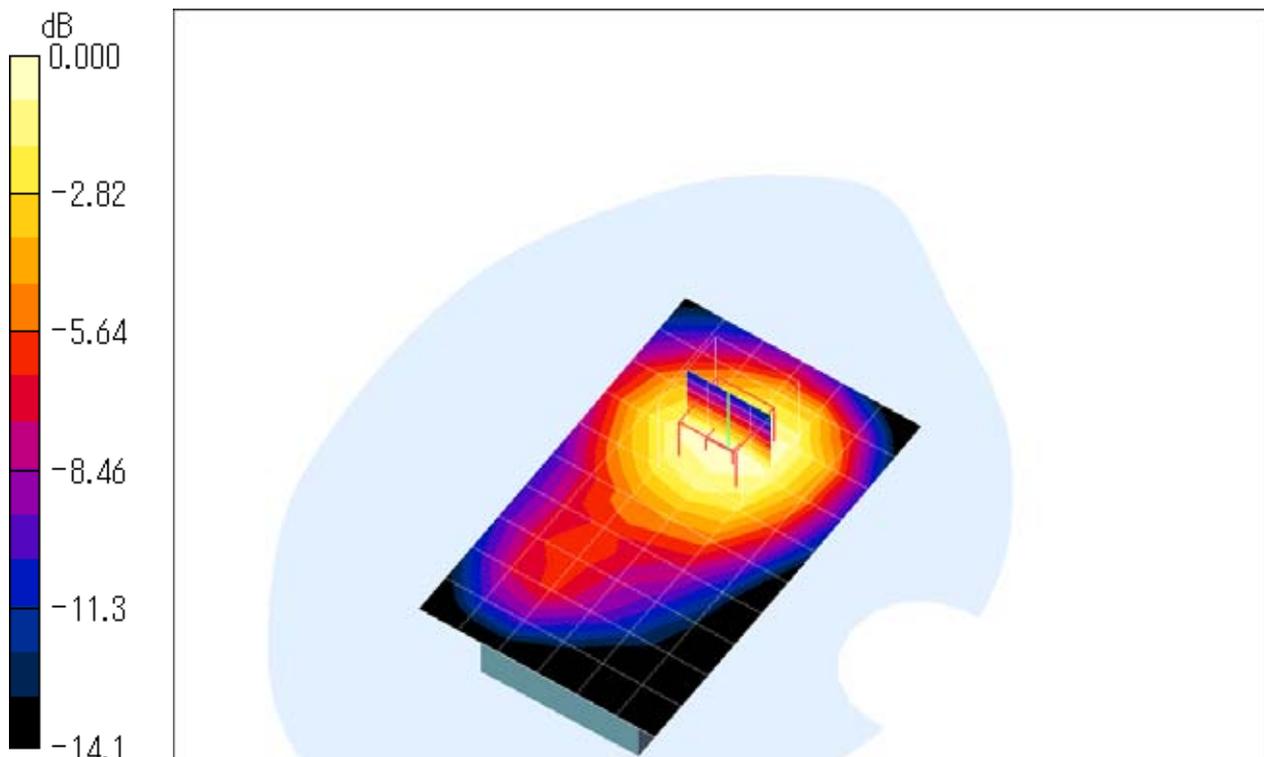
**Body-worn/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.07 V/m; Power Drift = -0.064 dB

Peak SAR (extrapolated) = 0.257 W/kg

**SAR(1 g) = 0.183 mW/g; SAR(10 g) = 0.119 mW/g**

Maximum value of SAR (measured) = 0.198 mW/g



0 dB = 0.198mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

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

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: M1900 Medium parameters used:  $f = 1850.2 \text{ MHz}$ ;  $\sigma = 1.51 \text{ mho/m}$ ;  $\epsilon_r = 52.3$ ;  $\rho = 1000 \text{ kg/m}^3$

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 Sn508; Calibrated: 2010/11/11
- 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 (7x11x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.355 mW/g

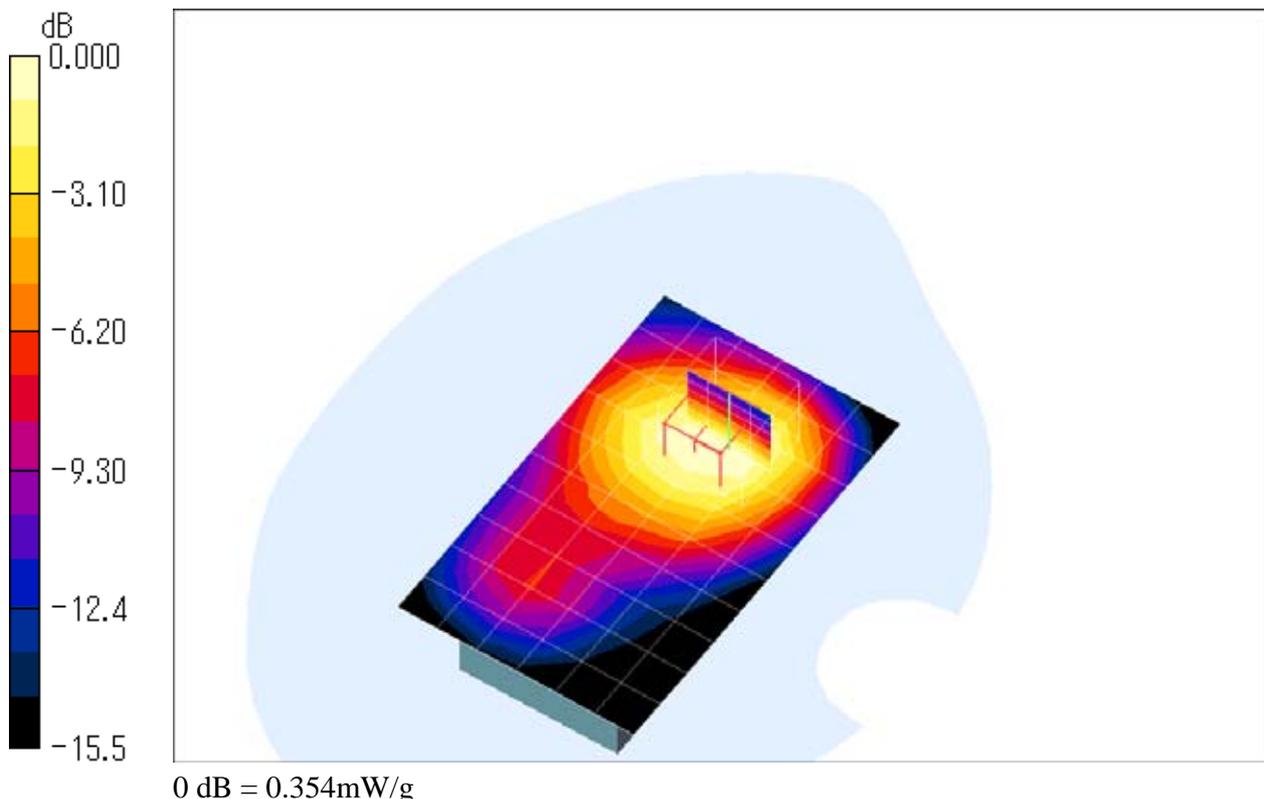
**Body-worn/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 9.18 V/m; Power Drift = -0.133 dB

Peak SAR (extrapolated) = 0.458 W/kg

**SAR(1 g) = 0.328 mW/g; SAR(10 g) = 0.212 mW/g**

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



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

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

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: M1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 Sn508; Calibrated: 2010/11/11
- 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 (7x11x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.361 mW/g

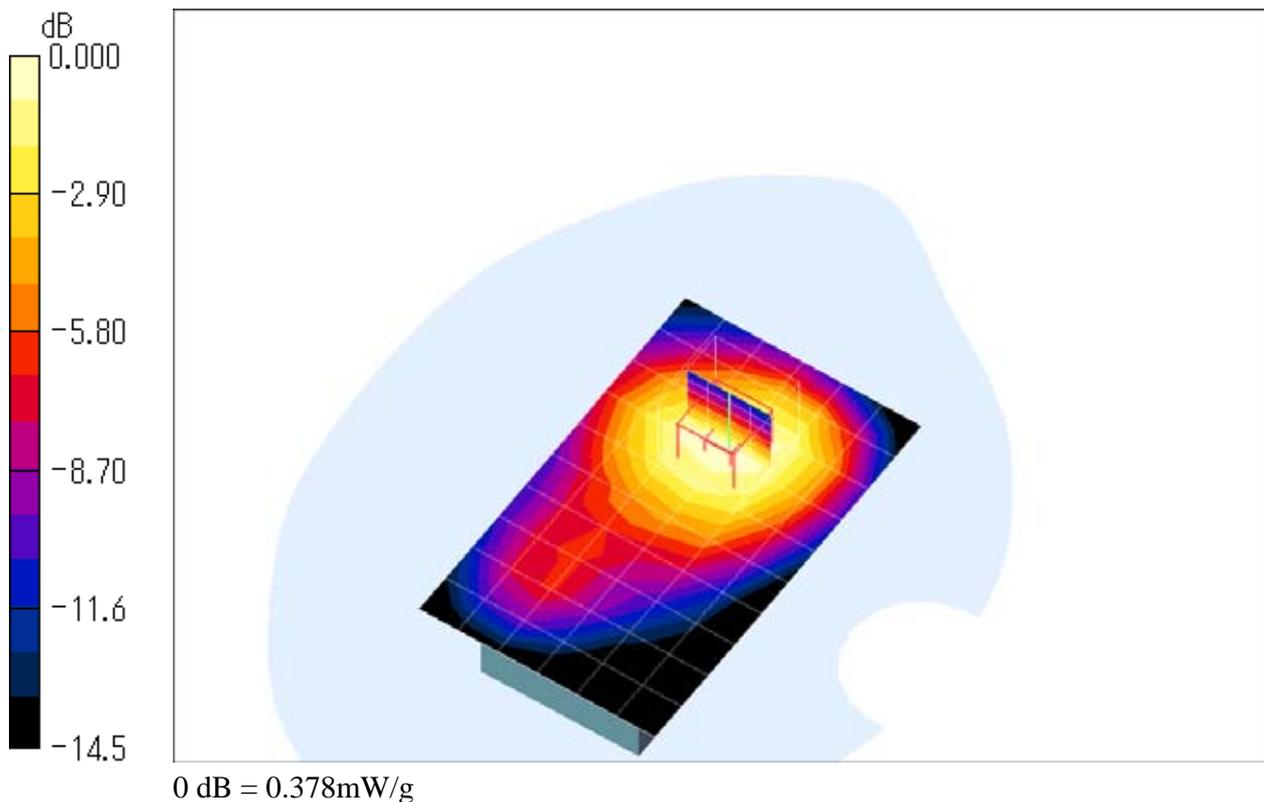
**Body-worn/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.91 V/m; Power Drift = -0.166 dB

Peak SAR (extrapolated) = 0.494 W/kg

**SAR(1 g) = 0.349 mW/g; SAR(10 g) = 0.226 mW/g**

Maximum value of SAR (measured) = 0.378 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

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

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: M1900 Medium parameters used:  $f = 1909.8 \text{ MHz}$ ;  $\sigma = 1.59 \text{ mho/m}$ ;  $\epsilon_r = 52.1$ ;  $\rho = 1000 \text{ kg/m}^3$

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 Sn508; Calibrated: 2010/11/11
- 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 (7x11x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.386 mW/g

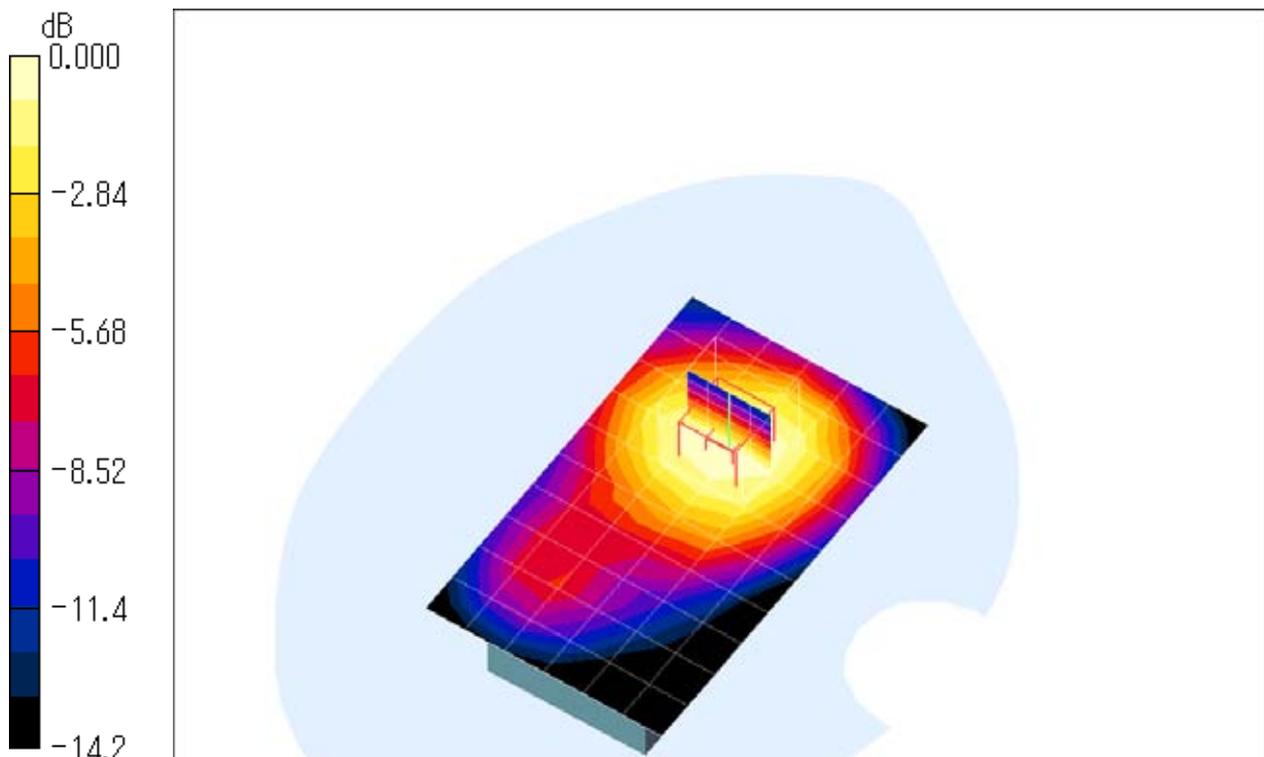
**Body-worn/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 10.2 V/m; Power Drift = -0.127 dB

Peak SAR (extrapolated) = 0.495 W/kg

**SAR(1 g) = 0.350 mW/g; SAR(10 g) = 0.229 mW/g**

Maximum value of SAR (measured) = 0.375 mW/g



0 dB = 0.375mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

**Body-worn, Rear 810ch (1909.8MHz) : GPRS Class 10 (2slots)****DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: M1900 Medium parameters used:  $f = 1909.8$  MHz;  $\sigma = 1.59$  mho/m;  $\epsilon_r = 52.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

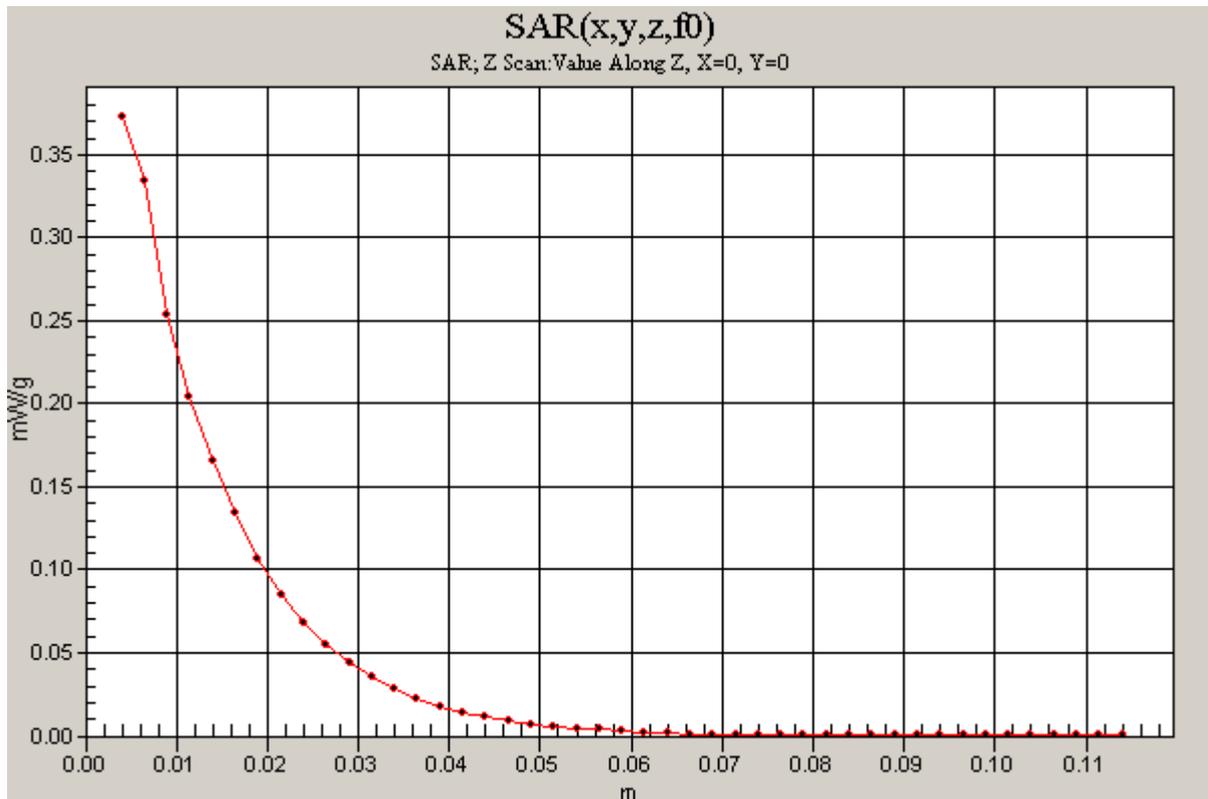
Measurement Standard: DAS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.56, 4.56, 4.56); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2010/11/11
- 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) = 0.373 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

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

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

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

Medium: M1900 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.55$  mho/m;  $\epsilon_r = 52.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 Sn508; Calibrated: 2010/11/11
- 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/Area Scan (7x11x1):** Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 4.28 V/m; Power Drift = 0.137 dB

Peak SAR (extrapolated) = 0.184 W/kg

**SAR(1 g) = 0.138 mW/g; SAR(10 g) = 0.092 mW/g**

Maximum value of SAR (measured) = 0.151 mW/g

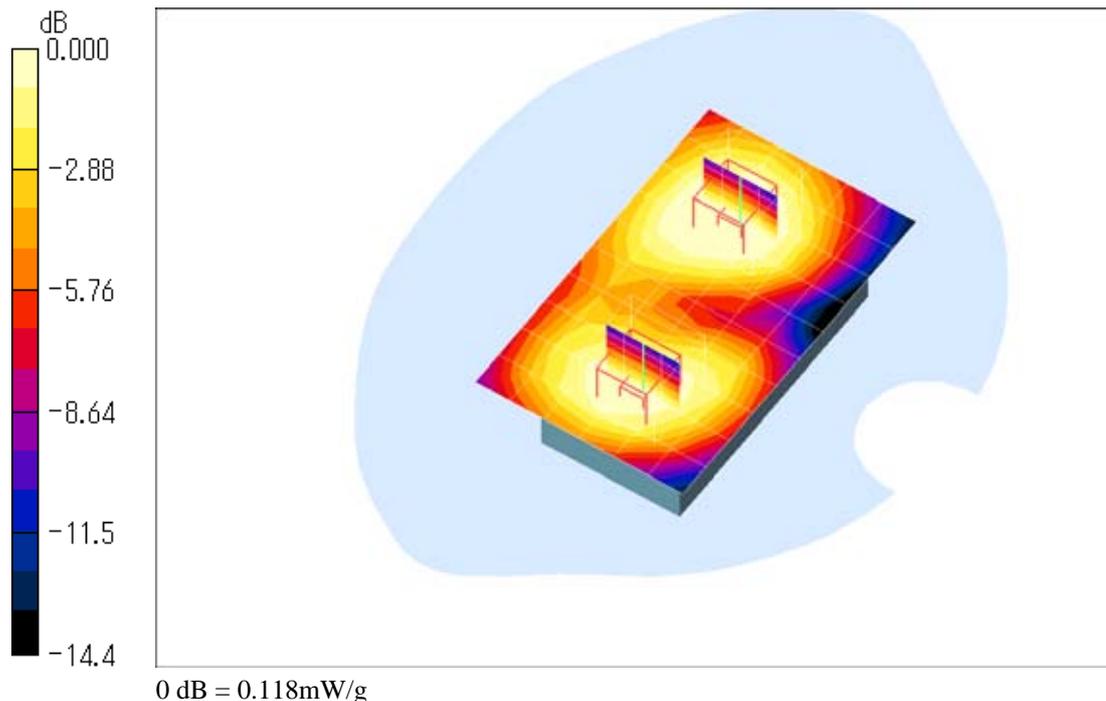
**Body-worn/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.28 V/m; Power Drift = 0.137 dB

Peak SAR (extrapolated) = 0.147 W/kg

**SAR(1 g) = 0.111 mW/g; SAR(10 g) = 0.075 mW/g**

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



**Attachment 2-2 – SAR Test Plots (WLAN)**

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## Left Head, Cheek/Touch 1ch (2412MHz)

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

Communication System: WLAN; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: HSL2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.82 \text{ mho/m}$ ;  $\epsilon_r = 39$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left 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 Sn508; Calibrated: 2010/11/11
- 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/Area Scan (11x7x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.030 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 = 2.60 V/m; Power Drift = -0.073 dB

Peak SAR (extrapolated) = 0.063 W/kg

**SAR(1 g) = 0.033 mW/g; SAR(10 g) = 0.017 mW/g**

Maximum value of SAR (measured) = 0.036 mW/g

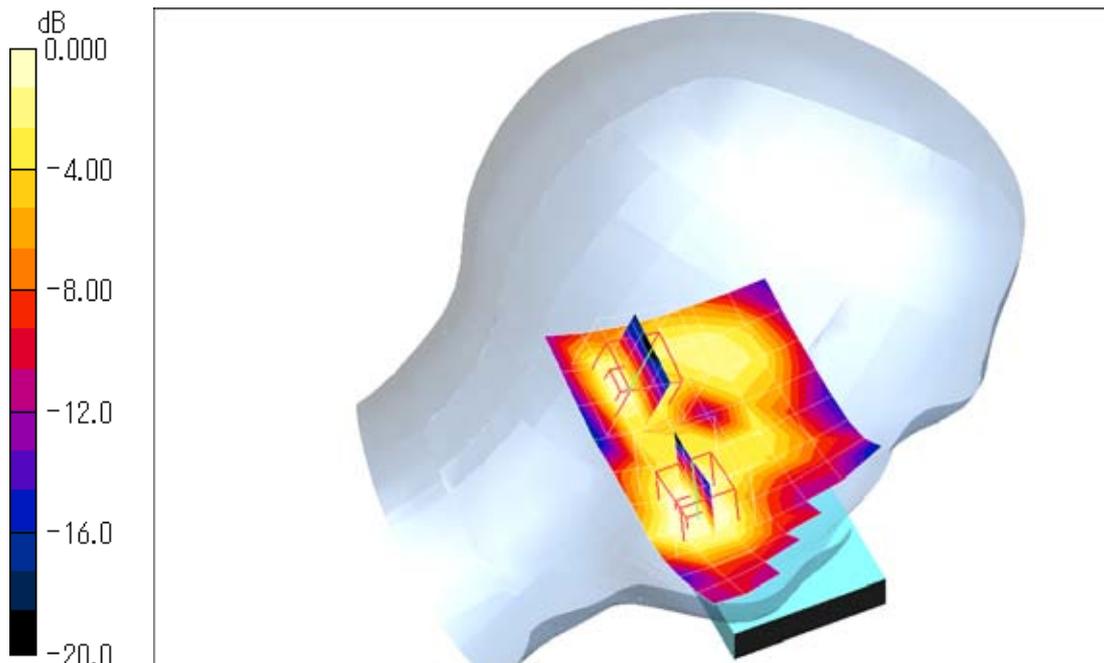
**Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 1:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 2.60 V/m; Power Drift = -0.073 dB

Peak SAR (extrapolated) = 0.051 W/kg

**SAR(1 g) = 0.023 mW/g; SAR(10 g) = 0.011 mW/g**

Maximum value of SAR (measured) = 0.025 mW/g



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## Left Head, Ear/Tilt 1ch (2412MHz)

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

Communication System: WLAN; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: HSL2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.82 \text{ mho/m}$ ;  $\epsilon_r = 39$ ;  $\rho = 1000 \text{ kg/m}^3$

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 Sn508; Calibrated: 2010/11/11
- 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 (11x7x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.027 mW/g

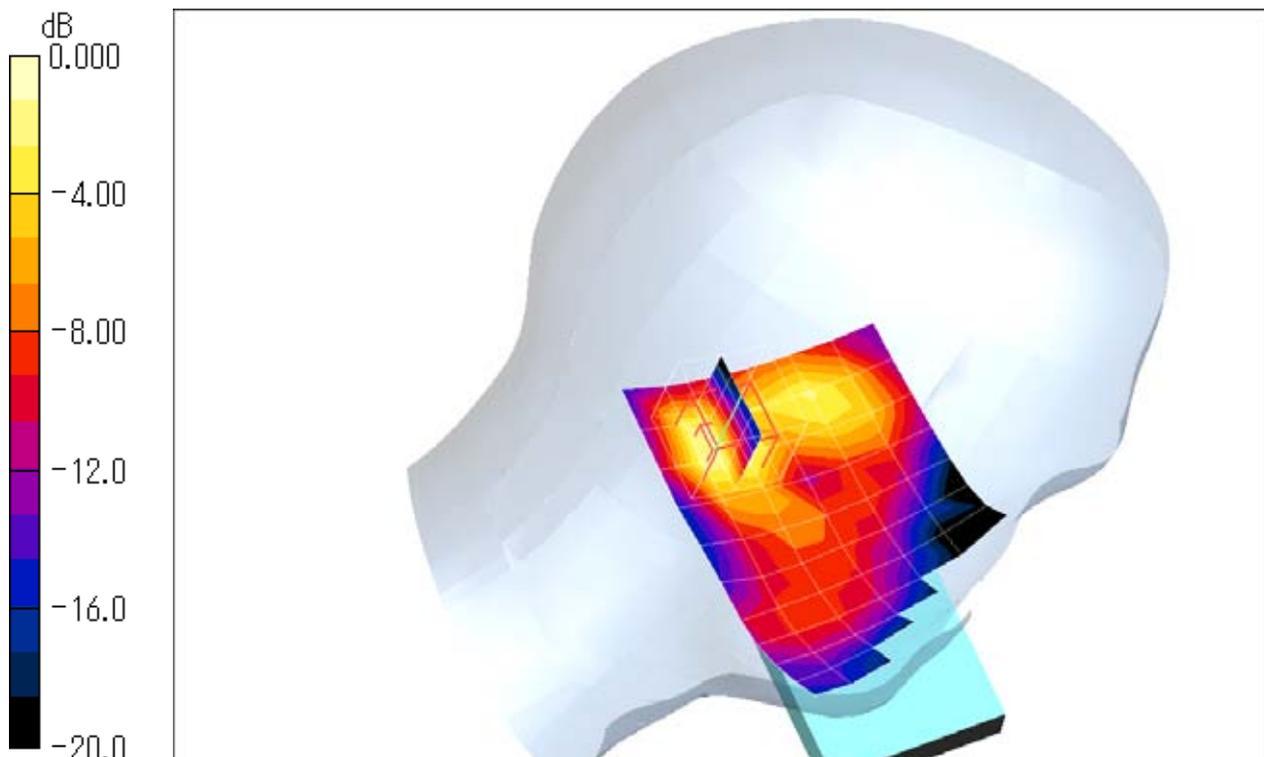
**Ear/Tilt Position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 1.72 V/m; Power Drift = -0.085 dB

Peak SAR (extrapolated) = 0.067 W/kg

**SAR(1 g) = 0.031 mW/g; SAR(10 g) = 0.014 mW/g**

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



0 dB = 0.034mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## Right Head, Cheek/Touch 1ch (2412MHz)

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

Communication System: WLAN; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: HSL2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.82 \text{ mho/m}$ ;  $\epsilon_r = 39$ ;  $\rho = 1000 \text{ kg/m}^3$

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 Sn508; Calibrated: 2010/11/11
- 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 (11x7x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.032 mW/g

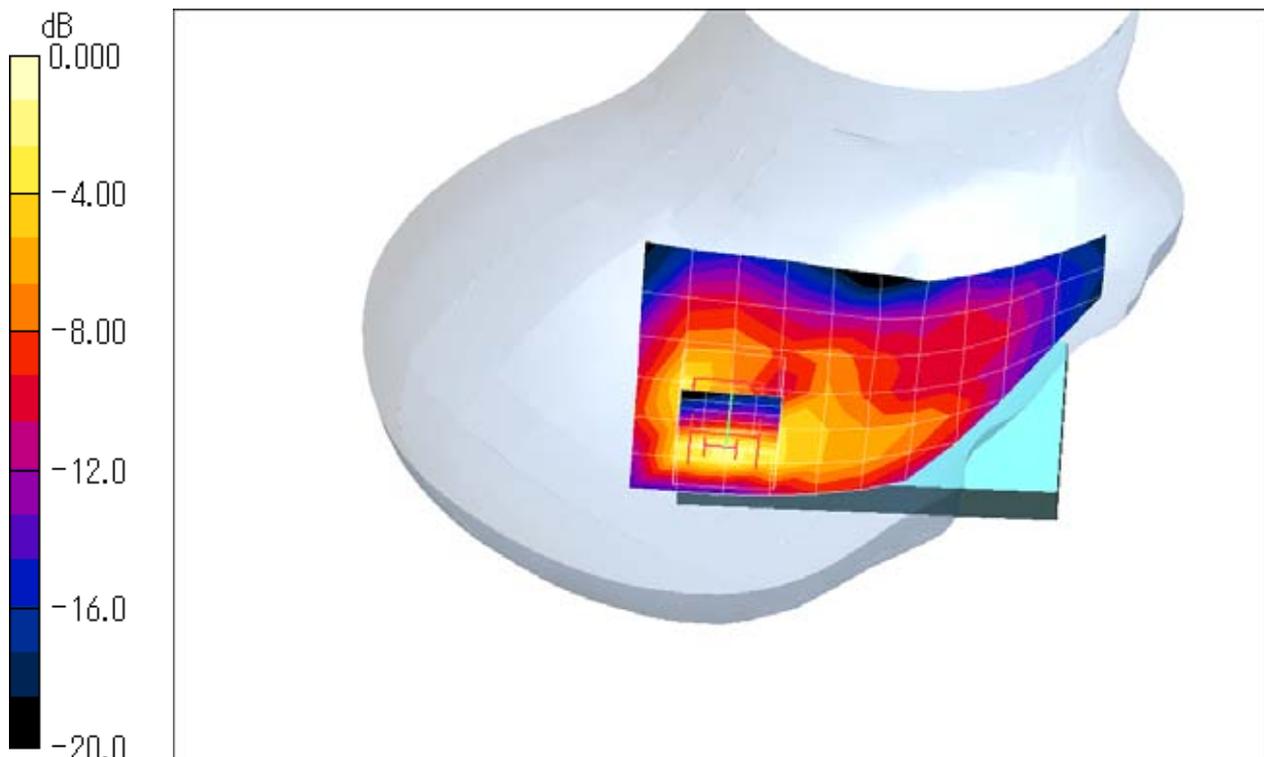
**Cheek/Touch Position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 2.14 V/m; Power Drift = -0.057 dB

Peak SAR (extrapolated) = 0.103 W/kg

**SAR(1 g) = 0.044 mW/g; SAR(10 g) = 0.018 mW/g**

Maximum value of SAR (measured) = 0.052 mW/g



0 dB = 0.052mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## Right Head, Ear/Tilt 1ch (2412MHz)

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

Communication System: WLAN; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: HSL2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.82 \text{ mho/m}$ ;  $\epsilon_r = 39$ ;  $\rho = 1000 \text{ kg/m}^3$

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 Sn508; Calibrated: 2010/11/11
- 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 (11x7x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.042 mW/g

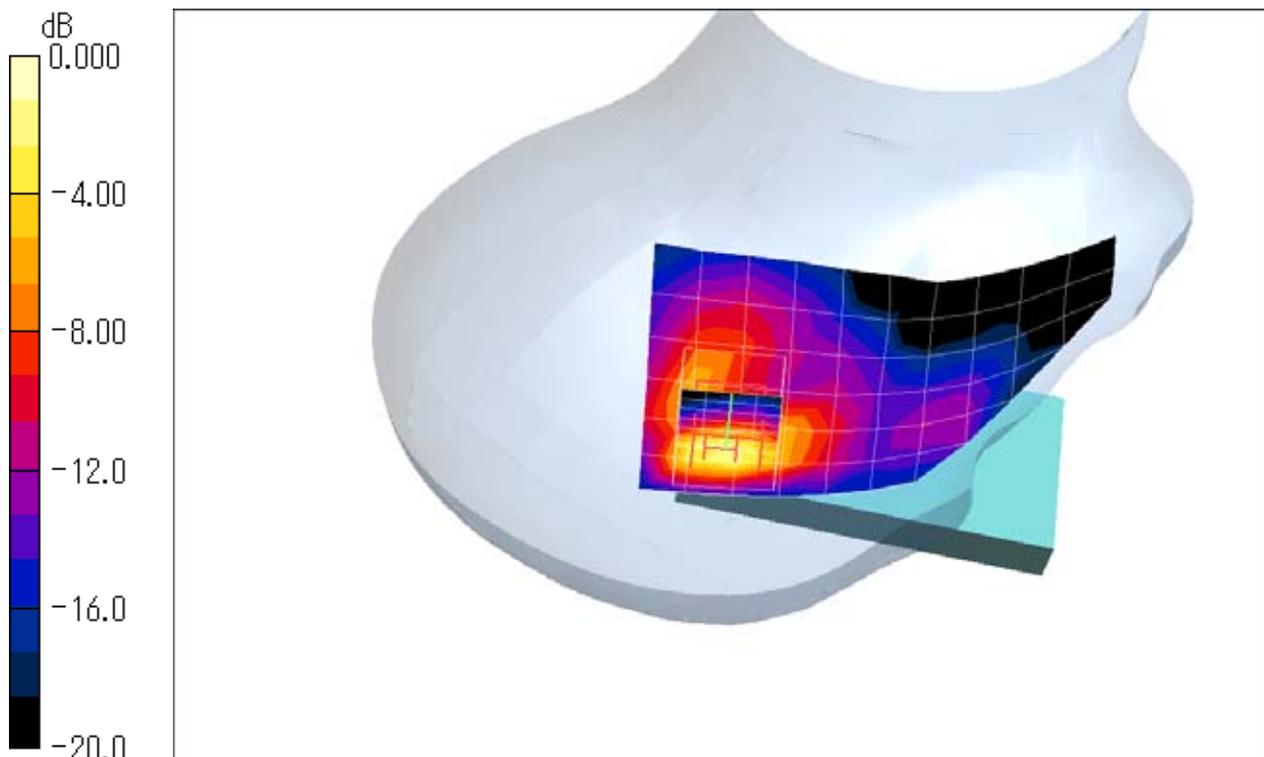
**Ear/Tilt Position/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 1.40 V/m; Power Drift = -0.130 dB

Peak SAR (extrapolated) = 0.139 W/kg

**SAR(1 g) = 0.057 mW/g; SAR(10 g) = 0.023 mW/g**

Maximum value of SAR (measured) = 0.068 mW/g



0 dB = 0.068mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

**Right Head, Ear/Tilt 1ch (2412MHz)****DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

Communication System: WLAN; Frequency: 2412 MHz; Duty Cycle: 1:1

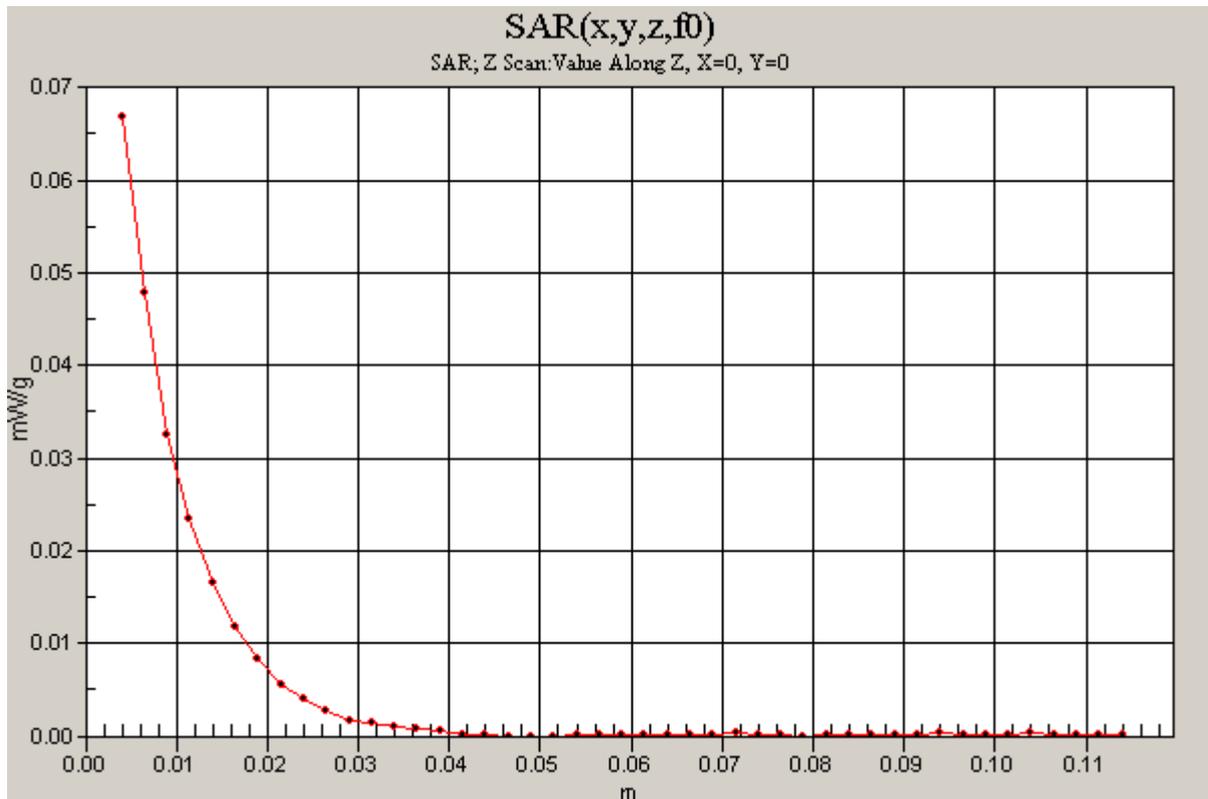
Medium: HSL2450 Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.82$  mho/m;  $\epsilon_r = 39$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 Sn508; Calibrated: 2010/11/11
- Phantom: SAM 1200; Type: QD 000 P40 CA; Serial: 1200
- Measurement SW: DAS4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 184

**Ear/Tilt Position/Z Scan (1x1x45):** Measurement grid: dx=20mm, dy=20mm, dz=2.5mm  
Maximum value of SAR (measured) = 0.067 mW/g

Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## Body-worn, Rear 1ch (2412MHz)

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

Communication System: WLAN; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used:  $f = 2412$  MHz;  $\sigma = 1.95$  mho/m;  $\epsilon_r = 52.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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 Sn508; Calibrated: 2010/11/11
- 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 (6x11x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.025 mW/g

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

Reference Value = 2.94 V/m; Power Drift = 0.054 dB

Peak SAR (extrapolated) = 0.043 W/kg

**SAR(1 g) = 0.023 mW/g; SAR(10 g) = 0.013 mW/g**

Maximum value of SAR (measured) = 0.024 mW/g

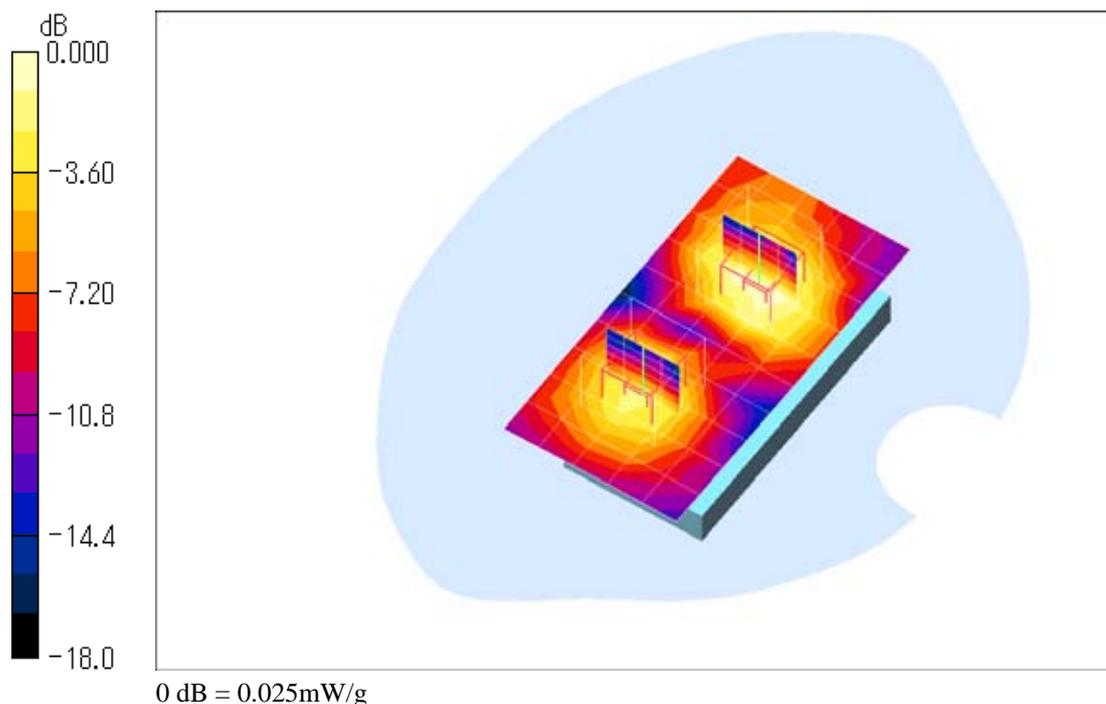
**Body-worn/Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.94 V/m; Power Drift = 0.054 dB

Peak SAR (extrapolated) = 0.032 W/kg

**SAR(1 g) = 0.017 mW/g; SAR(10 g) = 0.00969 mW/g**

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



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## Body-worn, Rear 1ch (2412MHz)

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

Communication System: WLAN; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 52.8$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

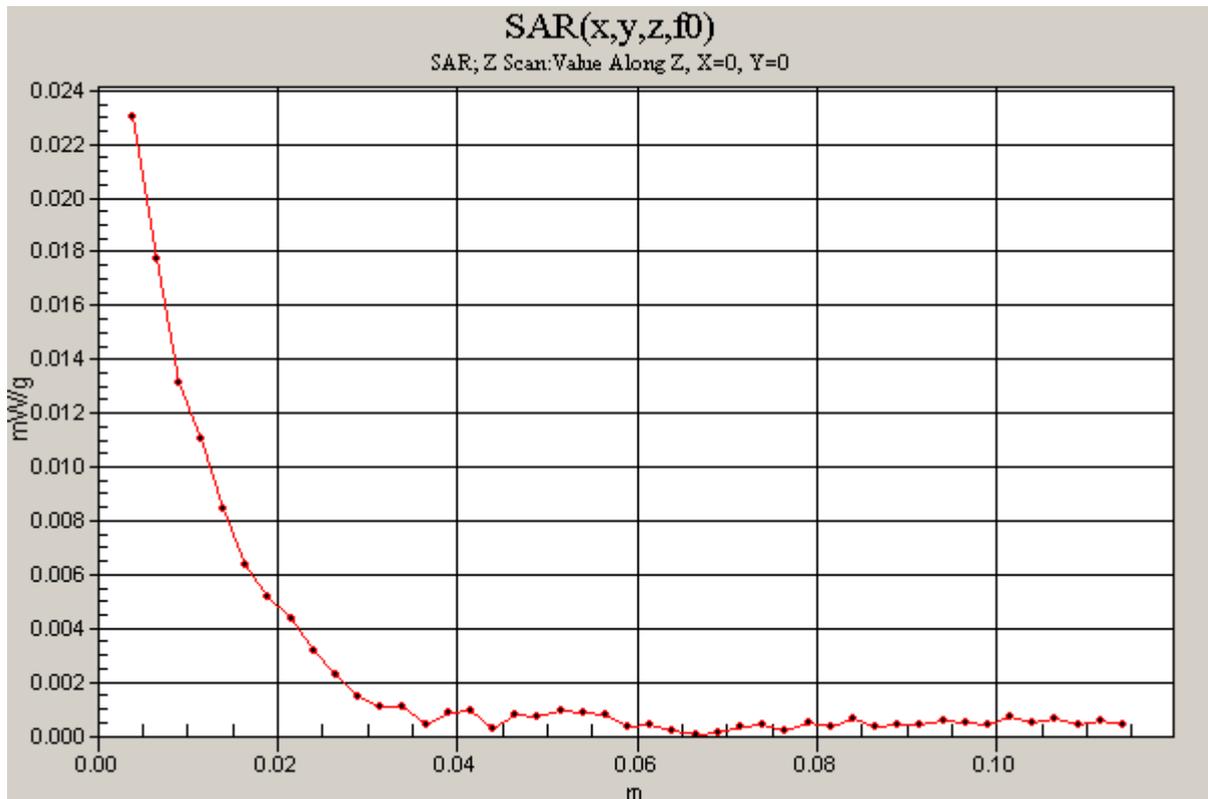
Measurement Standard: DAS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1679; ConvF(4.1, 4.1, 4.1); Calibrated: 2010/08/20
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn508; Calibrated: 2010/11/11
- 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:  $dx=20\text{mm}$ ,  $dy=20\text{mm}$ ,  $dz=2.5\text{mm}$

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



Test Laboratory: JAPAN QUALITY ASSURANCE ORGANIZATION

## Body-worn, Front 1ch (2412MHz)

**DUT: Cellular Phone; Type: 005SH; Serial: 004401/11/310184/0**

Communication System: WLAN; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: M2450 Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.95 \text{ mho/m}$ ;  $\epsilon_r = 52.8$ ;  $\rho = 1000 \text{ kg/m}^3$

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 Sn508; Calibrated: 2010/11/11
- 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/Area Scan (7x11x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$

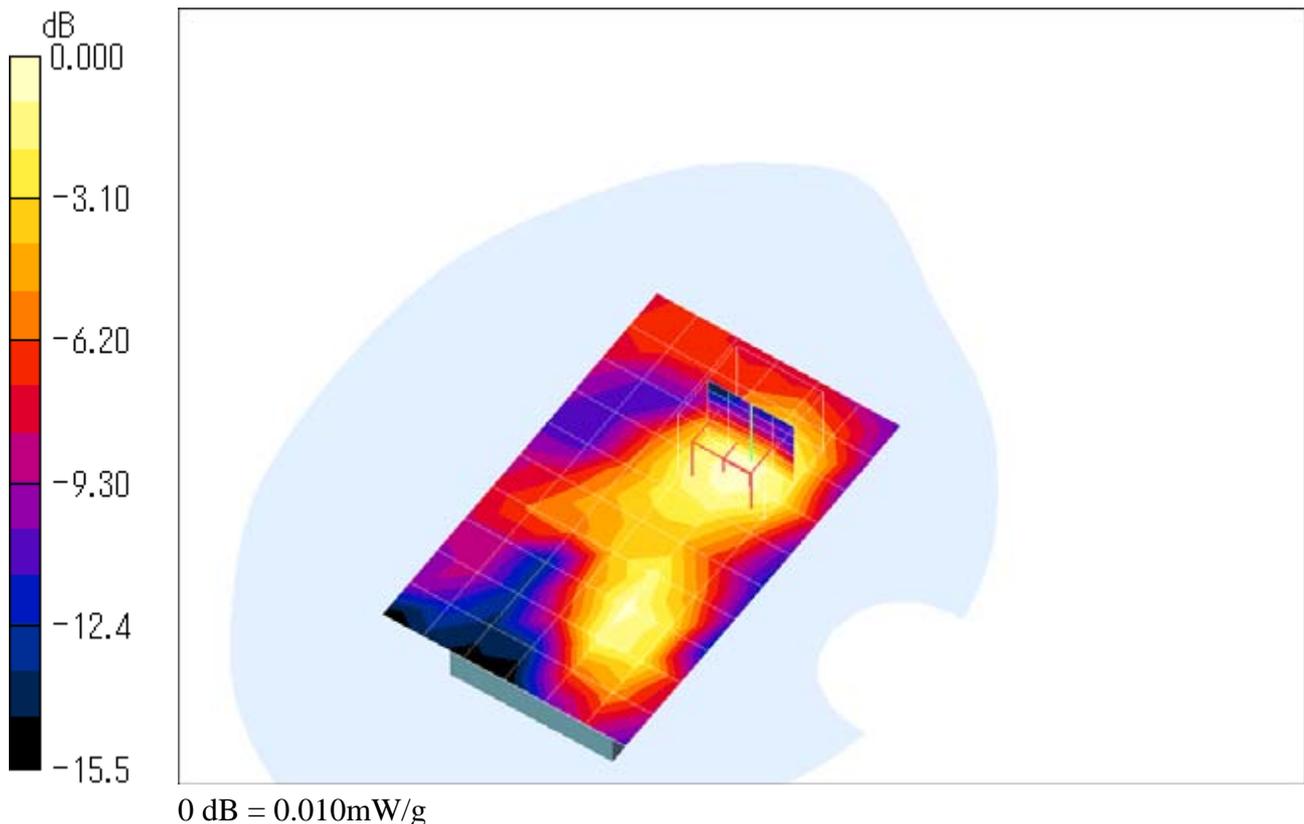
Maximum value of SAR (measured) = 0.010 mW/g

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

Reference Value = 0.634 V/m; Power Drift = 0.050 dB

Peak SAR (extrapolated) = 0.019 W/kg

**SAR(1 g) = 0.00931 mW/g; SAR(10 g) = 0.00537 mW/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 ( $22 \pm 3$ )°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

Calibrated by: Jeton Kastrati Laboratory Technician

Signature

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 <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

**Calibration is Performed According to the Following Standards:**

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

**Methods Applied and Interpretation of Parameters:**

- **NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not effect the  $E^2$ -field uncertainty inside TSL (see below *ConvF*).
- **NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* *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<sub>x,y,z</sub>**: 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<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: 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<sub>x,y,z</sub> \* 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  $\pm 50$  MHz to  $\pm 100$  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 ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	1.97	1.98	1.96	$\pm 10.1\%$
DCP (mV) <sup>B</sup>	93.0	91.2	94.5	

**Modulation Calibration Parameters**

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc <sup>E</sup> (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%.

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the  $E^2$ -field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> 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] <sup>c</sup>	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%

<sup>c</sup> 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

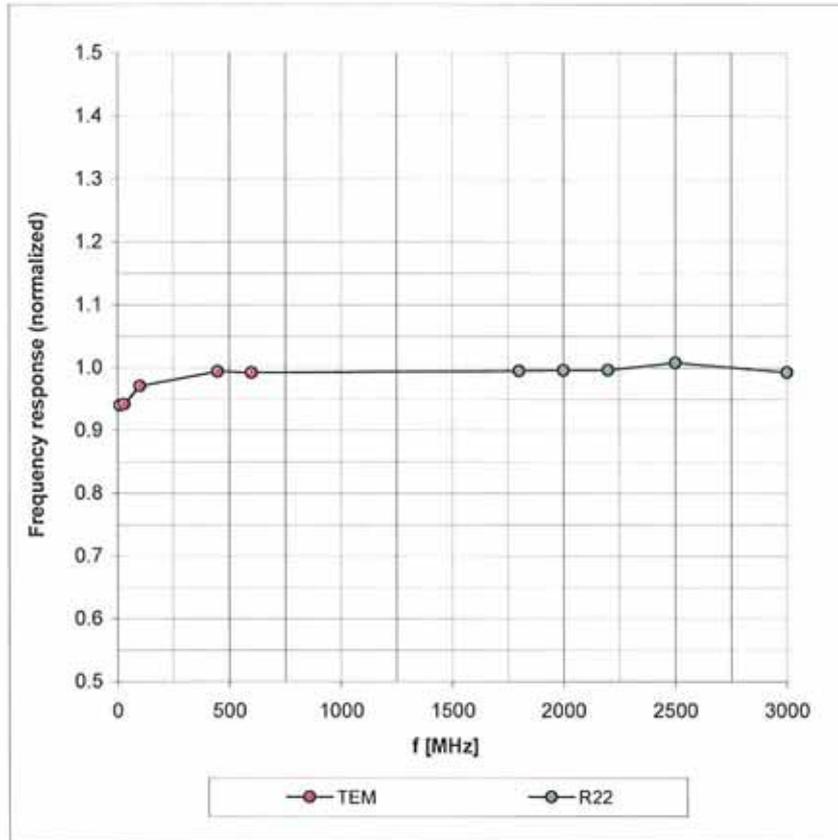
### Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] <sup>c</sup>	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%

<sup>c</sup> 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.

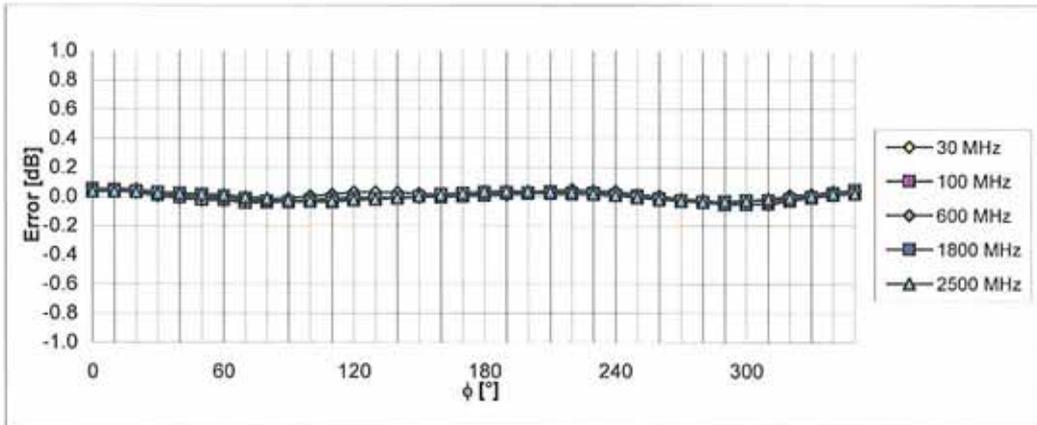
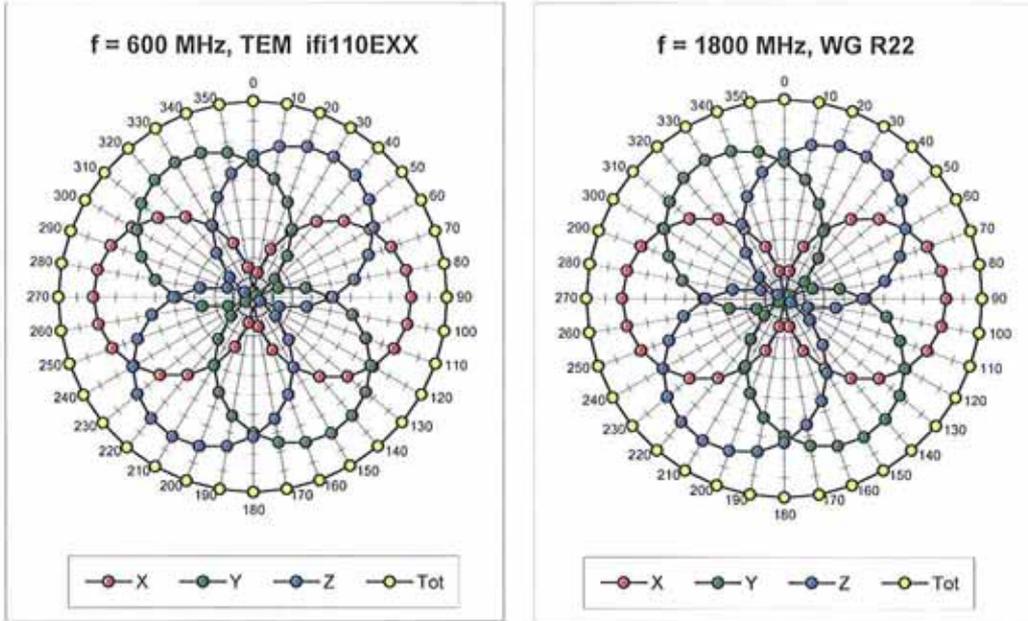
### Frequency Response of E-Field

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



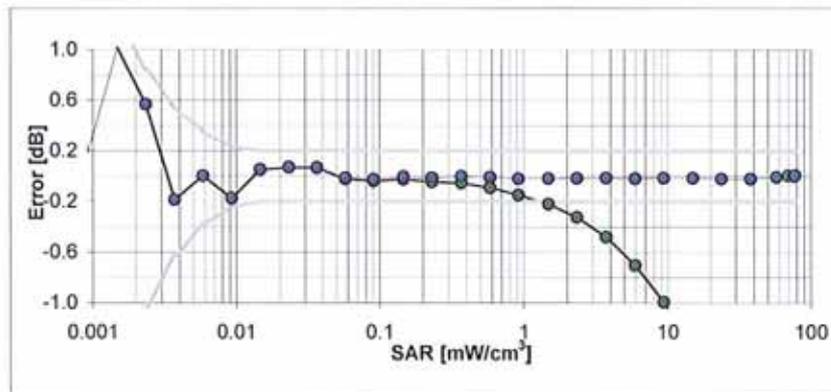
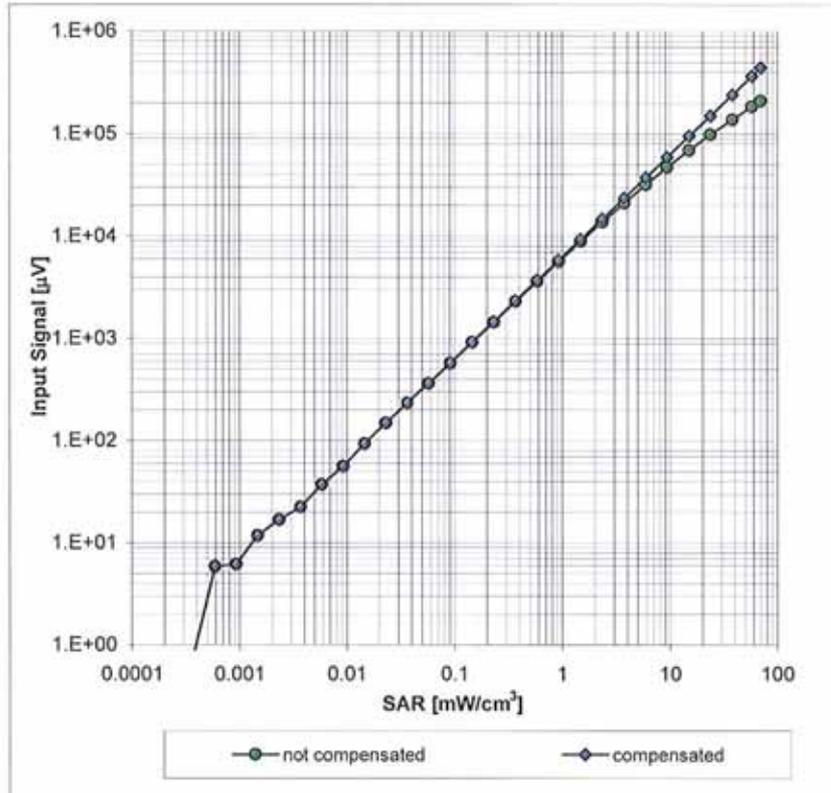
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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



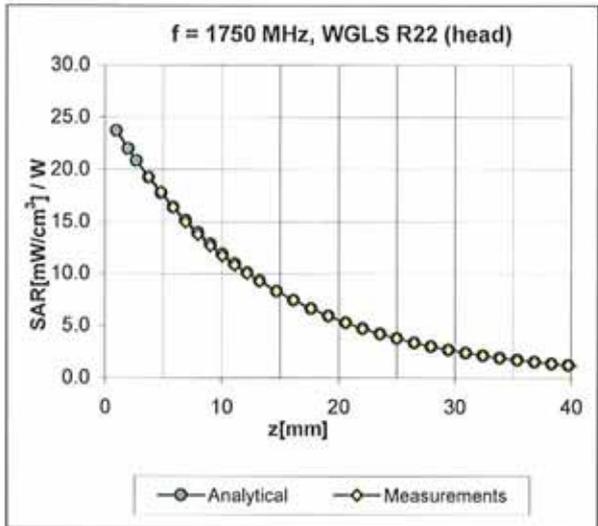
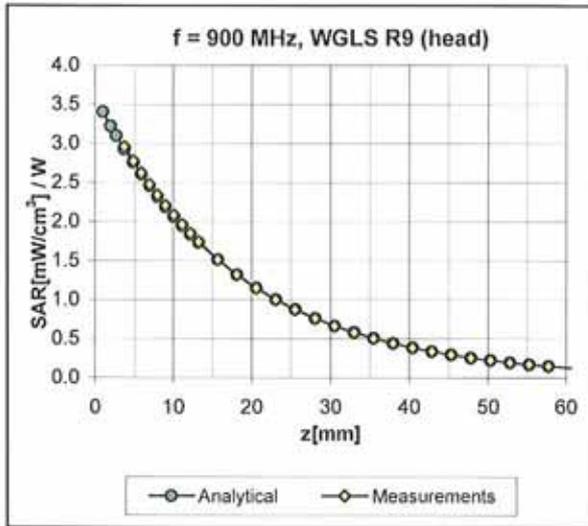
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)

### Dynamic Range f(SAR<sub>head</sub>) (Waveguide R22, f = 1800 MHz)



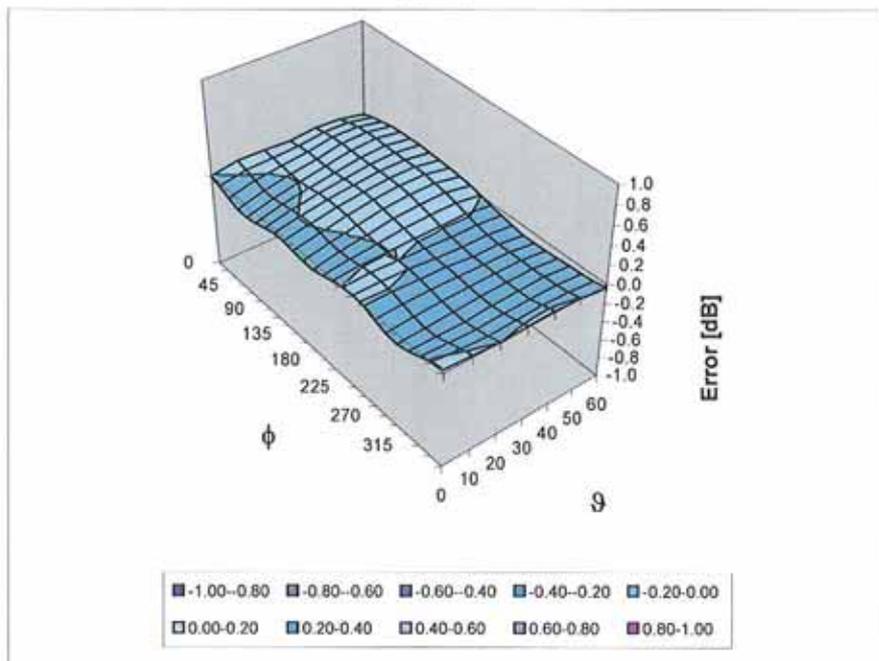
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

### Conversion Factor Assessment



### Deviation from Isotropy in HSL

Error ( $\phi$ ,  $\theta$ ), 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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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 <sup>3</sup> (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	<b>40.4 mW / g <math>\pm</math> 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (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	<b>21.2 mW / g <math>\pm</math> 16.5 % (k=2)</b>

## 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 <sup>3</sup> (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	<b>42.2 mW / g ± 17.0 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (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	<b>22.9 mW / g ± 16.5 % (k=2)</b>

## Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.5 $\Omega$ + 7.6 j $\Omega$
Return Loss	- 22.3 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.8 $\Omega$ + 7.5 j $\Omega$
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/m<sup>3</sup>

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)

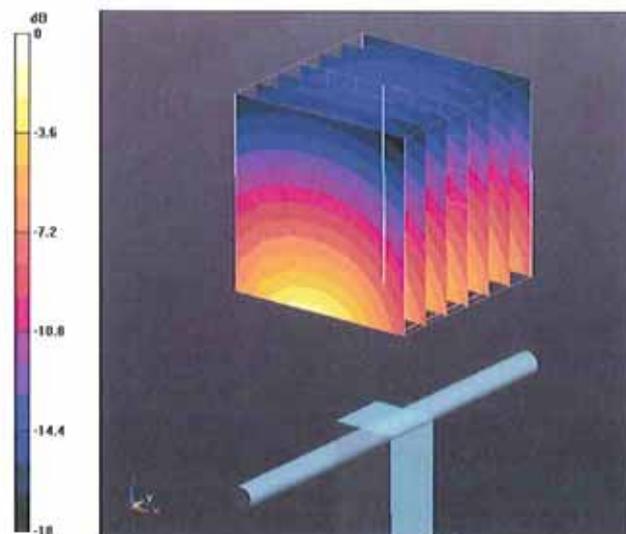
**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

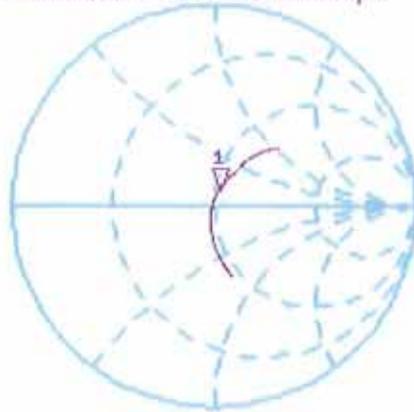


0 dB = 12.7mW/g

# Impedance Measurement Plot for Head TSL

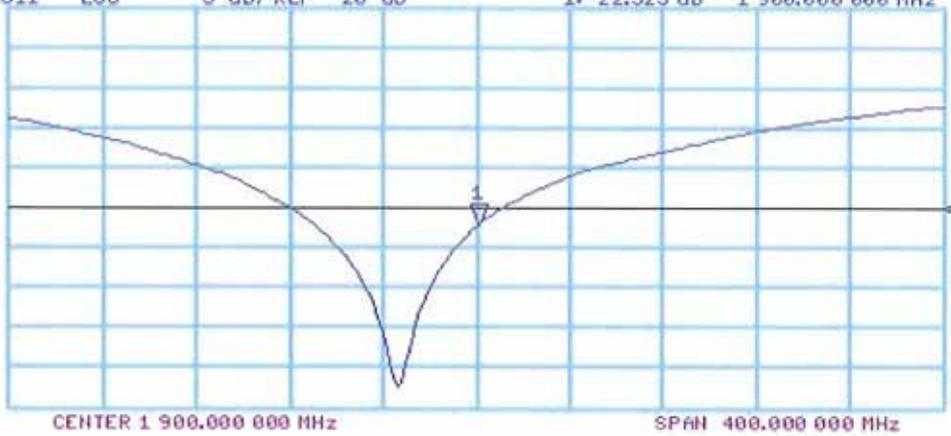
10 Aug 2010 10:53:49  
 [CH1] S11 1 U FS 1: 51.539  $\Omega$  7.6348  $\Omega$  639.53  $\mu$ H 1 900.000 000 MHz

\*  
 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/m<sup>3</sup>

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)

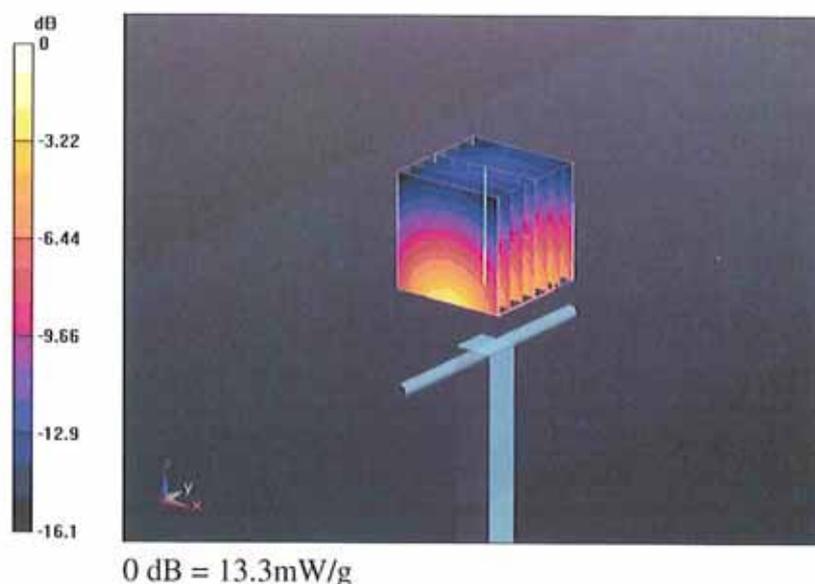
**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement**  
grid: dx=5mm, dy=5mm, dz=5mm

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**

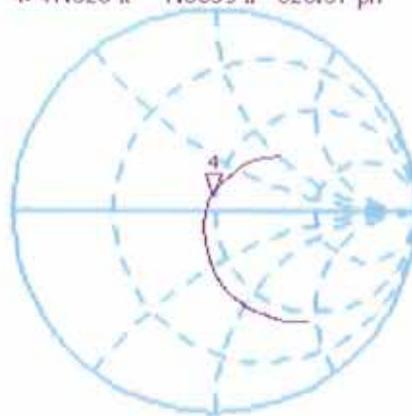
Maximum value of SAR (measured) = 13.3 mW/g



# 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





**Attachment 4 – System Validation Dipole – D2450V2, S/N: 714 Calibration Data**



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **JQA (Auden)**

Certificate No: **D2450V2-714\_Nov10**

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 714**

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

Calibration date: **November 11, 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-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
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-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	

Approved by:	Katja Pokovic	Technical Manager	
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Issued: November 12, 2010

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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.

<b>DASY Version</b>	DASY5	V52.2
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom V5.0	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	2450 MHz $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	39.2	1.80 mho/m
<b>Measured Head TSL parameters</b>	(22.0 $\pm$ 0.2) °C	38.8 $\pm$ 6 %	1.72 mho/m $\pm$ 6 %
<b>Head TSL temperature during test</b>	(22.5 $\pm$ 0.2) °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	13.2 mW / g
SAR normalized	normalized to 1W	52.8 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>53.8 mW /g <math>\pm</math> 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	6.18 mW / g
SAR normalized	normalized to 1W	24.7 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>24.9 mW /g <math>\pm</math> 16.5 % (k=2)</b>

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	52.7	1.95 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	52.3 ± 6 %	1.92 mho/m ± 6 %
<b>Body TSL temperature during test</b>	(22.0 ± 0.2) °C	----	----

## SAR result with Body TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b>	Condition	
SAR measured	250 mW input power	12.6 mW / g
SAR normalized	normalized to 1W	50.4 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>50.7 mW / g ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	5.85 mW / g
SAR normalized	normalized to 1W	23.4 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	<b>23.4 mW / g ± 16.5 % (k=2)</b>

## Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	$52.9 \Omega + 1.8 j\Omega$
Return Loss	- 29.6 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	$48.4 \Omega + 4.1 j\Omega$
Return Loss	- 27.0 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.163 ns
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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	July 05, 2002

## DASY5 Validation Report for Head TSL

Date/Time: 11.11.2010 10:49:33

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:714**

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

Medium: HSL U12 BB

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.72$  mho/m;  $\epsilon_r = 38.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

### DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); 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)

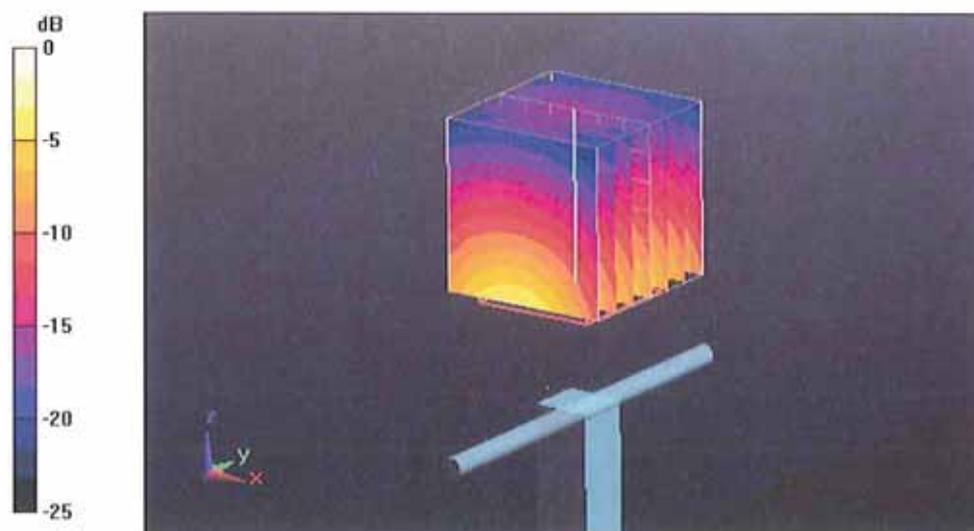
**Pin=250 mW/d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm**

Reference Value = 102.6 V/m; Power Drift = 0.054 dB

Peak SAR (extrapolated) = 27.1 W/kg

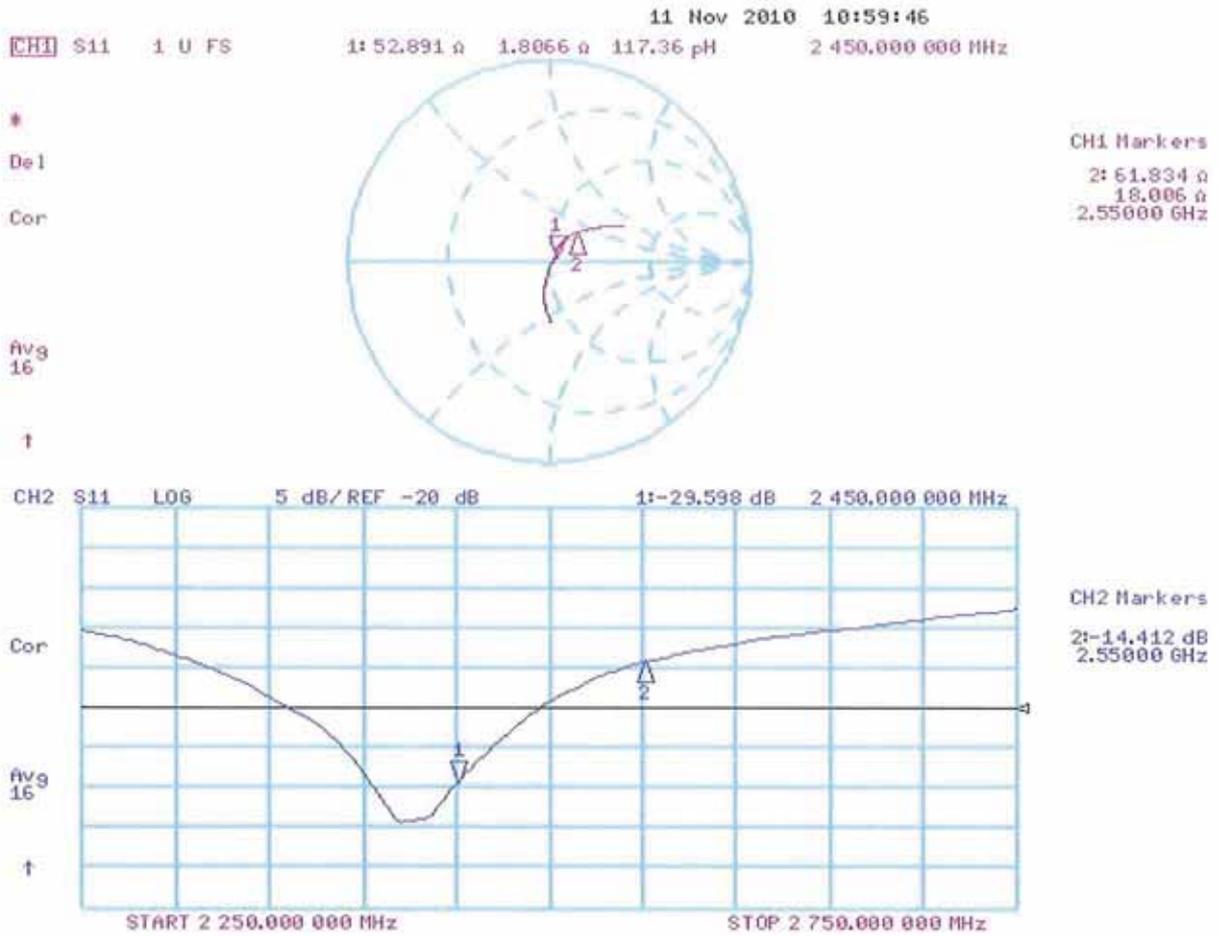
**SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.18 mW/g**

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



0 dB = 16.9mW/g

# Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body

Date/Time: 11.11.2010 13:18:12

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:714**

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

Medium: MSL U12 BB

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.92$  mho/m;  $\epsilon_r = 52.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.31, 4.31, 4.31); 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)

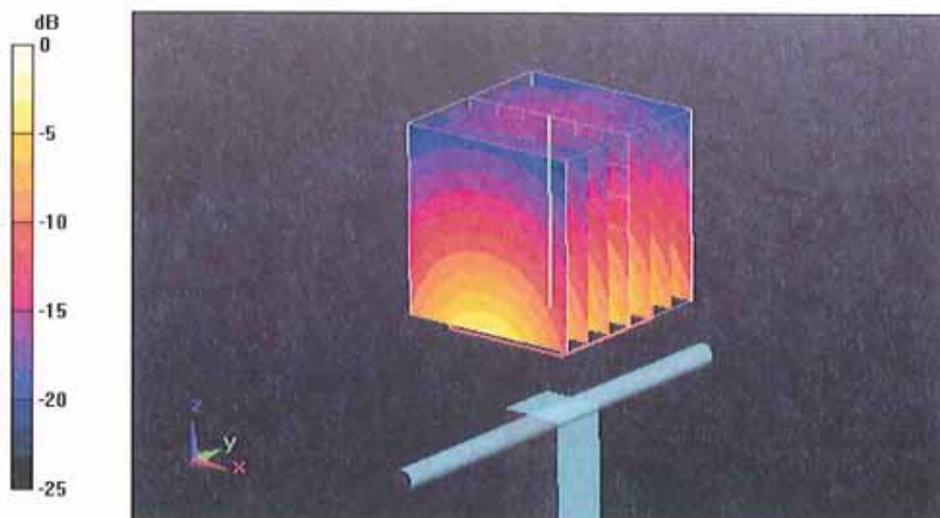
**Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement**  
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.2 V/m; Power Drift = 0.026 dB

Peak SAR (extrapolated) = 26.5 W/kg

**SAR(1 g) = 12.6 mW/g; SAR(10 g) = 5.85 mW/g**

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



0 dB = 16.7mW/g

# Impedance Measurement Plot for Body TSL

