

APPENDIX A

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (p). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. A.1) .

$$SAR = \frac{d}{dt} \left(\frac{dU}{dm} \right) = \frac{d}{dt} \left(\frac{dU}{p dv} \right)$$

Figure A.1 SAR Mathematical Equation

SAR is expressed in units of Watts per Kilogram (W/kg).

$$SAR = \sigma E^2 / p$$

Where :

- σ = conductivity of the tissue-simulant material (S/m)
- p = mass density of the tissue-simulant material (kg/m³)
- E = Total RMS electric field strength (V/m)

Note: The primary factors that control rate or energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.

APPENDIX B

Probe Calibration Process

Dosimetric Assessment Procedure

Each probe is calibrated according to a dosimetric assessment procedure described in **K. Pokovic, T.Schmid, N. Kuster, *Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies*, ICECOM97, Oct. 1997, pp. 120-124** with an accuracy better than +/-10%. The spherical isotropy was evaluated with the procedure described in **K. Pokovic, T.Schmid, N. Kuster, *E-field Probe with improved isotropy in brain simulating liquids*, Proceedings of the ELMAR, Zadar, June 23-25, 1996, pp. 172-175** and found to be better than +/-0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe is tested.

Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies below 1 GHz (see Fig. B.1), and in a waveguide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

Temperature Assessment

E-field temperature correlation calibration is performed in a flat phantom flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe (see Fig. B.2).

$$SAR = C \frac{\Delta T}{\Delta t}$$

$$SAR = \frac{|E|^2 \cdot \sigma}{p}$$

where:

Δt = exposure time (30 seconds)

C = heat capacity of tissue (brain or muscle).

ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T / \Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E-field;

where:

σ = simulated tissue conductivity

p = Tissue density (1.25 g/cm³ for brain tissue)

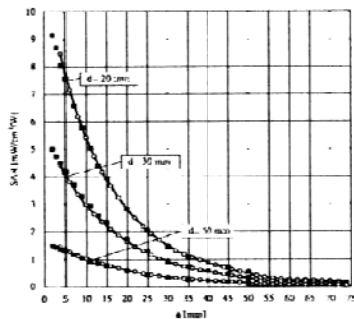


Figure B.1. E-Field and Temperature measurements at 900MHz

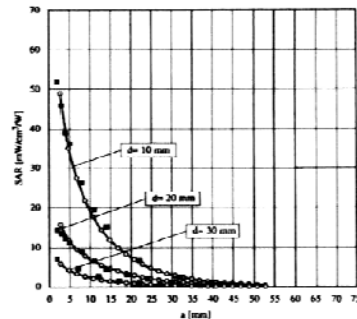


Figure B.2. E-Field and temperature measurements at 1.9GHz

APPENDIX C

ANSI/IEEE C95.1 – 2005 RF EXPOSURE LIMITS

Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is the exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Table C.1 Safety Limits for Partial Body Exposure

	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)
SPATIAL PEAK SAR ¹ Brain	1.60	8.00
SPATIAL PEAK SAR ² Whole Body	0.08	0.40
SPATIAL PEAK SAR ³ Hands, Feet, Ankles, Wrists	4.00	20.00

¹ The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as tissue volume in the shape of a cube) and over the appropriate averaging time.

² The Spatial Average value of the SAR averaged over the whole body.

³ The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

APPENDIX D

The Validation Measurements

DUT: Dipole 835 MHz; Serial: 4d111

Program Name: 835MHz Dipole Validation 2012.05.18

Procedure Name: 835MHz @ 100mW, Head 2

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-18/May/2012

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.89 \text{ mho/m}$; $\epsilon_r = 40.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.36, 9.36, 9.36); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1364
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

835MHz @ 100mW, Head 2/Area Scan (51x51x1): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.987 mW/g

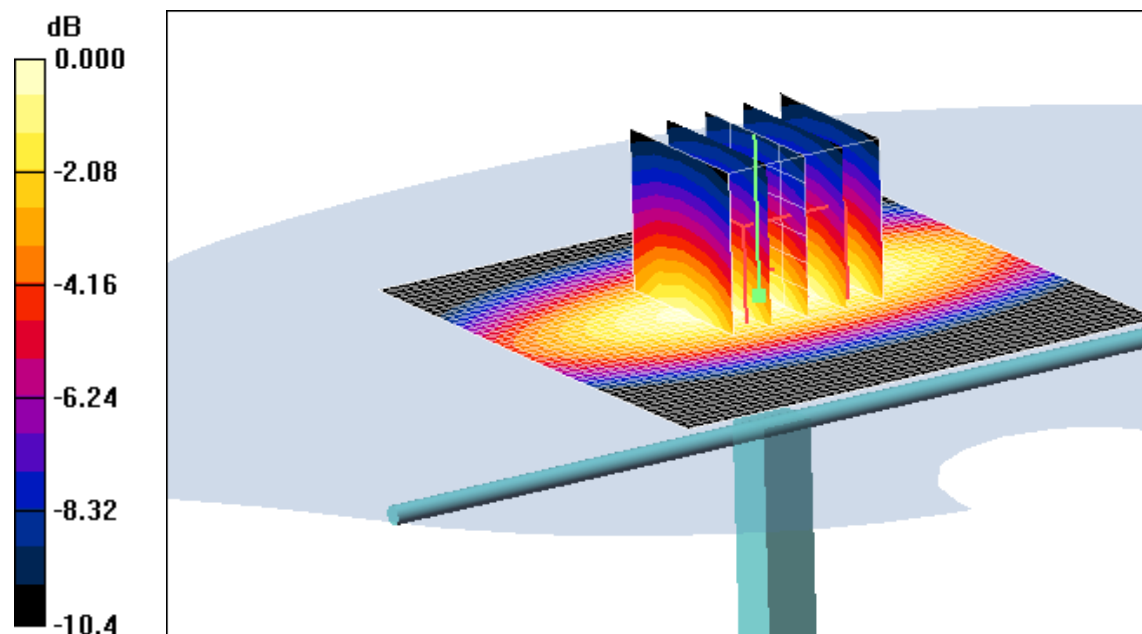
835MHz @ 100mW, Head 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 32.3 V/m; Power Drift = -0.117 dB

Peak SAR (extrapolated) = 1.34 W/kg

SAR(1 g) = 0.911 mW/g; SAR(10 g) = 0.601 mW/g

Maximum value of SAR (measured) = 0.981 mW/g



0 dB = 0.981mW/g

DUT: Dipole 835 MHz; Serial: 4d111

Program Name: 835MHz Dipole Validation 2012.05.18

Procedure Name: 835MHz @ 100mW, Body

Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-18/May/2012

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.97 \text{ mho/m}$; $\epsilon_r = 54.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.23, 9.23, 9.23); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

835MHz @ 100mW, Body/Area Scan (51x51x1): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$
Maximum value of SAR (interpolated) = 1.05 mW/g

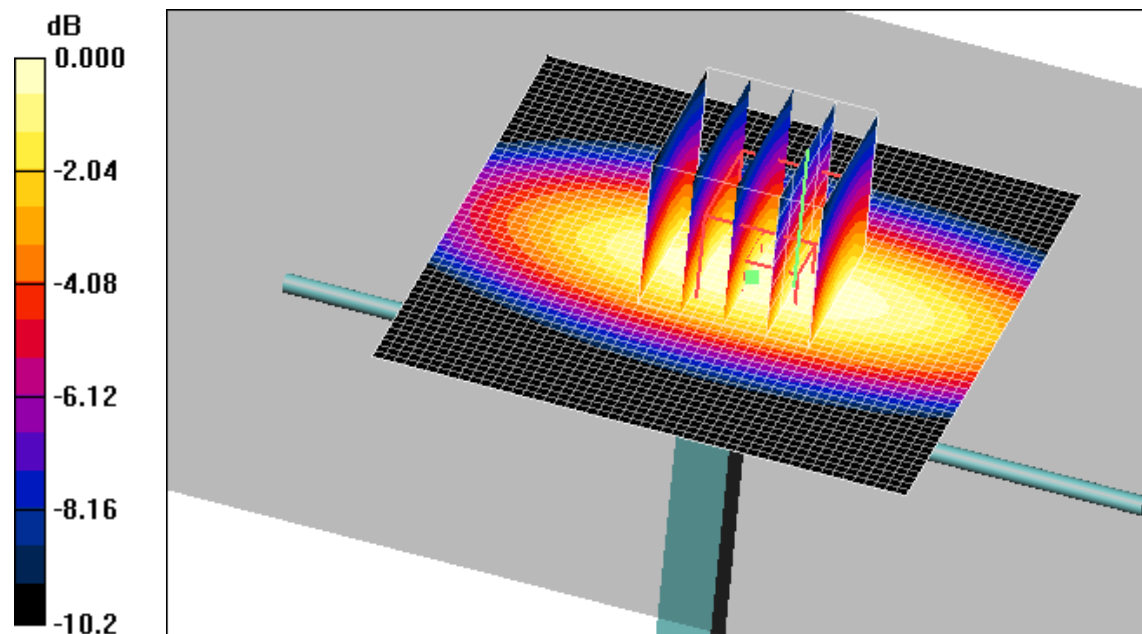
835MHz @ 100mW, Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$,
 $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 32.4 V/m ; Power Drift = -0.043 dB

Peak SAR (extrapolated) = 1.39 W/kg

SAR(1 g) = 0.966 mW/g ; SAR(10 g) = 0.641 mW/g

Maximum value of SAR (measured) = 1.04 mW/g



0 dB = 1.04mW/g

DUT: Dipole 1900 MHz; Serial: 5d023

Program Name: 1900MHz Dipole Validation 2012.05.14

Procedure Name: 1900MHz @ 100mW 2

Meas. Ambient Temp(celsius)-22.6;Tissue Temp(celsius)-22.1;Test Date-14/May/2012

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.75, 7.75, 7.75); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1604
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz @ 100mW 2/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 5.68 mW/g

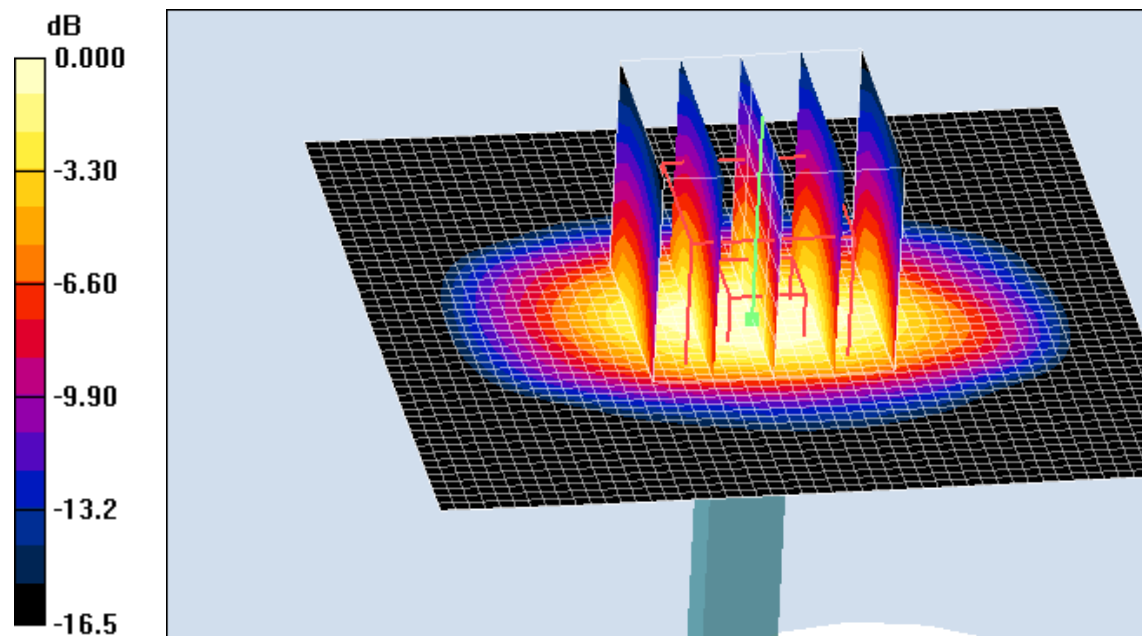
1900MHz @ 100mW 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 55.0 V/m; Power Drift = 0.028 dB

Peak SAR (extrapolated) = 6.80 W/kg

SAR(1 g) = 3.84 mW/g; SAR(10 g) = 2.05 mW/g

Maximum value of SAR (measured) = 4.31 mW/g



0 dB = 4.31mW/g

DUT: Dipole 1900 MHz; Serial: 5d023

Program Name: 1900MHz Dipole Validation 2012.05.14

Procedure Name: 1900MHz @ 100mW 2 2

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-14/May/2012

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 51.7$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.38, 7.38, 7.38); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

1900MHz @ 100mW 2 2/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 4.92 mW/g

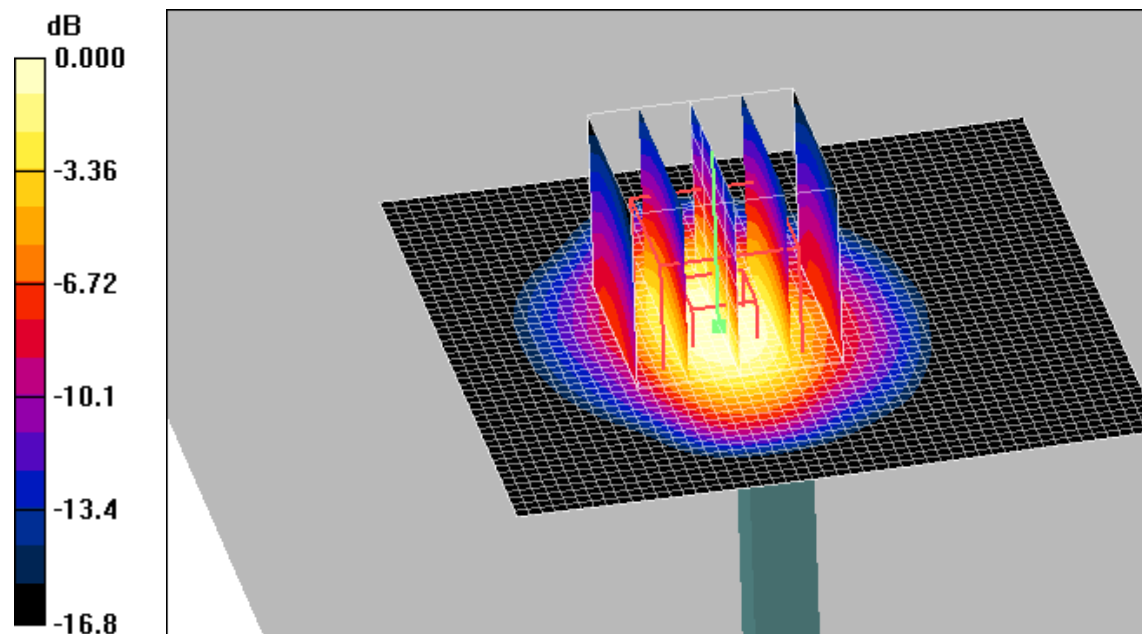
1900MHz @ 100mW 2 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 43.7 V/m; Power Drift = -0.024 dB

Peak SAR (extrapolated) = 6.69 W/kg

SAR(1 g) = 3.75 mW/g; SAR(10 g) = 1.97 mW/g

Maximum value of SAR (measured) = 4.21 mW/g



0 dB = 4.21mW/g

DUT: Dipole 2450 MHz; Serial: D2450V2 - SN:807

Program Name: 2450MHz Dipole Validation 2012.05.15

Procedure Name: 2450MHz @ 100mW, Head 2 2

Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-21.9;Test Date-15/May/2012

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

Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.85 \text{ mho/m}$; $\epsilon_r = 39.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(6.93, 6.93, 6.93); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1604
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

2450MHz @ 100mW, Head 2 2/Area Scan (51x51x1): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 7.13 mW/g

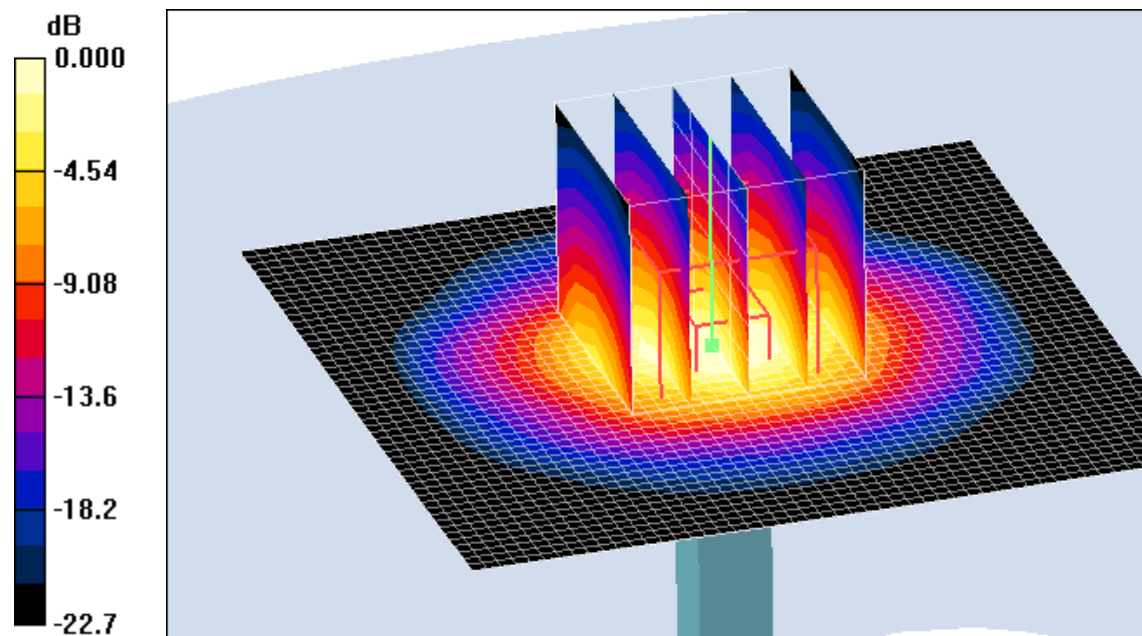
2450MHz @ 100mW, Head 2 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.5 V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 11.1 W/kg

SAR(1 g) = 5.23 mW/g; SAR(10 g) = 2.4 mW/g

Maximum value of SAR (measured) = 5.90 mW/g



0 dB = 5.90mW/g

DUT: Dipole 2450 MHz; Serial: D2450V2 - SN:807

Program Name: 2450MHz Dipole Validation 2012.05.15

Procedure Name: 2450MHz @ 100mW, Body

Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-21.8;Test Date-15/May/2012

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

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.95$ mho/m; $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

2450MHz @ 100mW, Body/Area Scan (51x51x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 6.51 mW/g

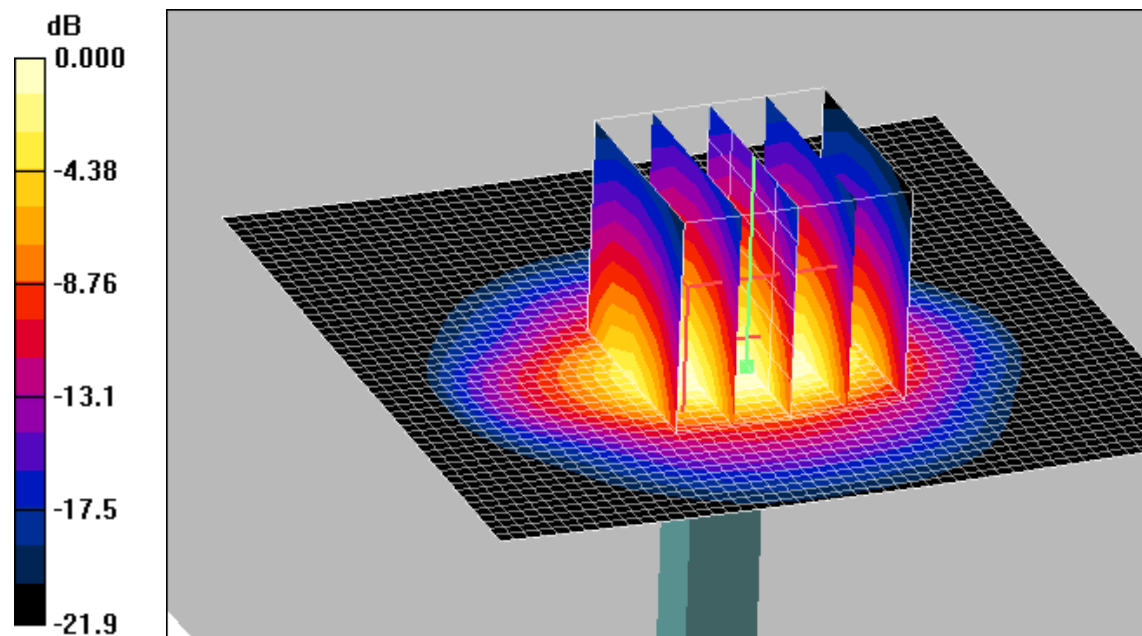
2450MHz @ 100mW, Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 39.6 V/m; Power Drift = -0.071 dB

Peak SAR (extrapolated) = 10.1 W/kg

SAR(1 g) = 5.1 mW/g; SAR(10 g) = 2.39 mW/g

Maximum value of SAR (measured) = 5.74 mW/g



0 dB = 5.74mW/g

APPENDIX E

Plots of The SAR Measurements

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GSM850 Right (Job No. : FJ-127)

Procedure Name: Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-18/May/2012

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3

Medium parameters used: $f = 836.6$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.36, 9.36, 9.36); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1364
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.327 mW/g

Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0:

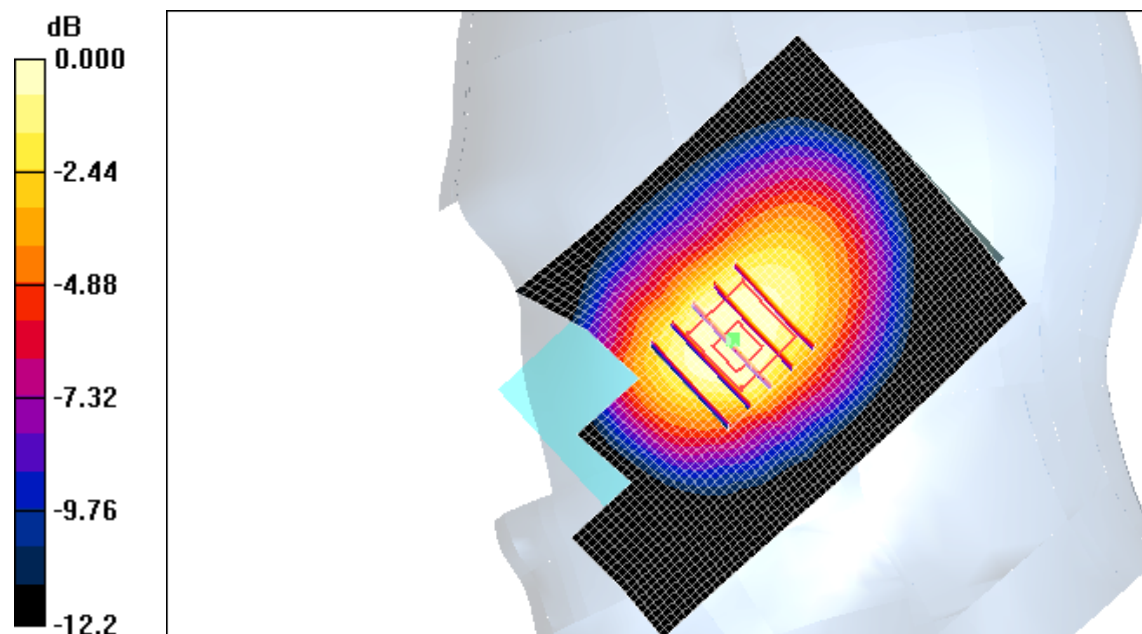
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.2 V/m; Power Drift = -0.018 dB

Peak SAR (extrapolated) = 0.355 W/kg

SAR(1 g) = 0.251 mW/g; SAR(10 g) = 0.172 mW/g

Maximum value of SAR (measured) = 0.283 mW/g



0 dB = 0.283mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GSM850 Right (Job No. : FJ-127)

Procedure Name: Ear/Tilt, Ch.190, Ant.Intenna, Bat.Standard

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-18/May/2012

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3

Medium parameters used: $f = 836.6$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.36, 9.36, 9.36); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1364
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ear/Tilt, Ch.190, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.117 mW/g

Ear/Tilt, Ch.190, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement

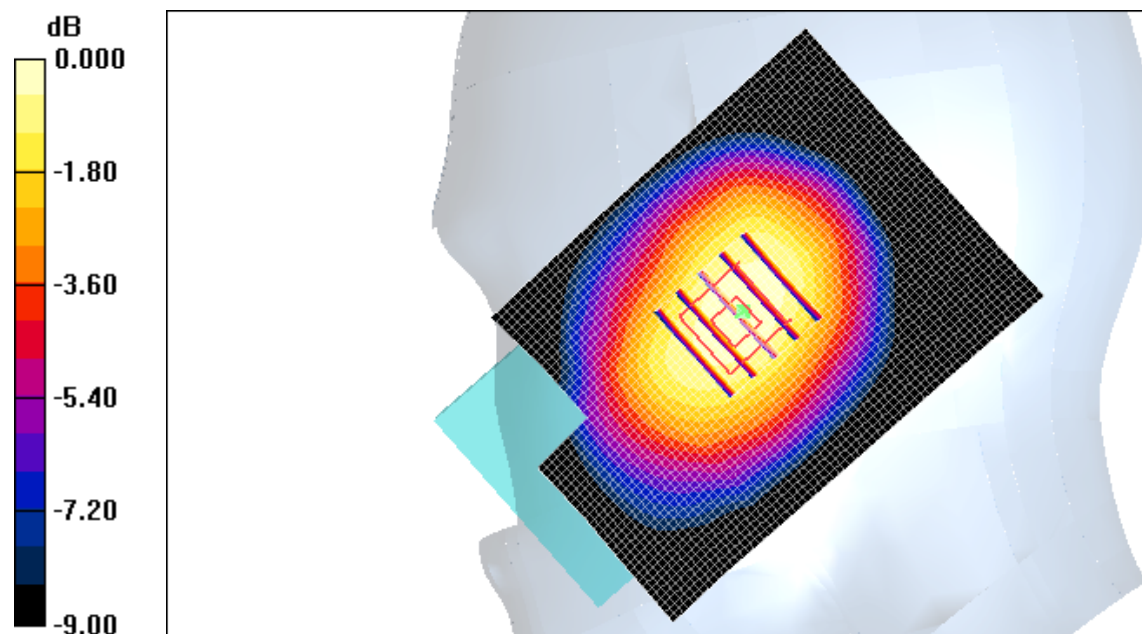
grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.98 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 0.129 W/kg

SAR(1 g) = 0.107 mW/g; SAR(10 g) = 0.080 mW/g

Maximum value of SAR (measured) = 0.117 mW/g



0 dB = 0.117mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GSM850 Left (Job No. : FJ-127)

Procedure Name: Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-18/May/2012

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3

Medium parameters used: $f = 836.6$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.36, 9.36, 9.36); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1364
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.403 mW/g

Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0:

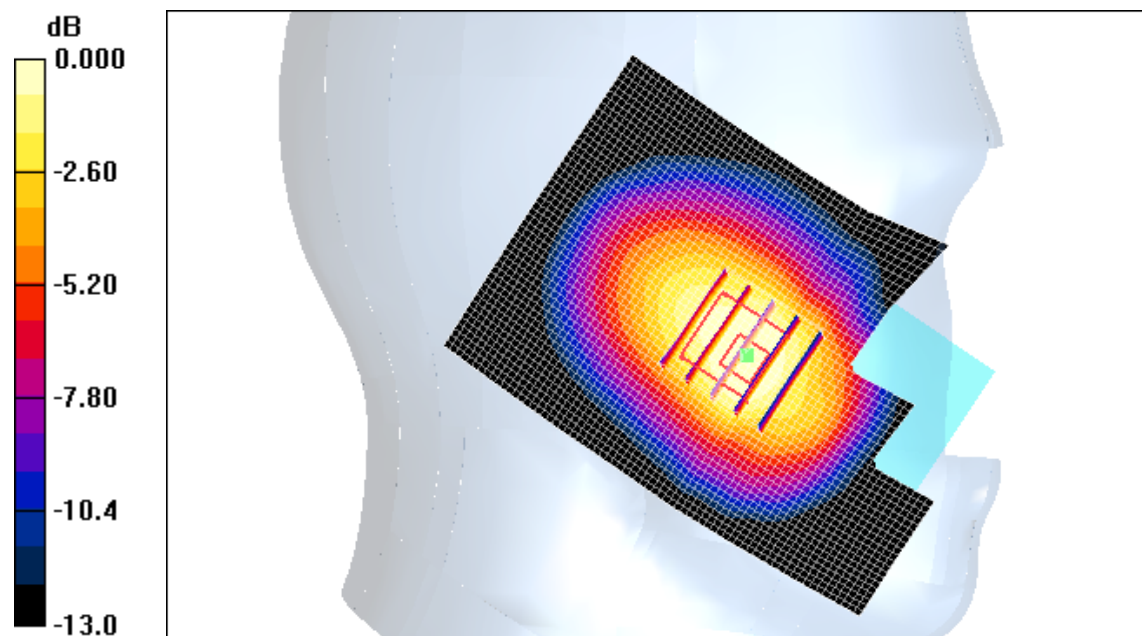
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.9 V/m; Power Drift = 0.027 dB

Peak SAR (extrapolated) = 0.454 W/kg

SAR(1 g) = 0.307 mW/g; SAR(10 g) = 0.207 mW/g

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



0 dB = 0.350mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GSM850 Left (Job No. : FJ-127)

Procedure Name: Ear/Tilt, Ch.190, Ant.Intenna, Bat.Standard

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-18/May/2012

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3

Medium parameters used: $f = 836.6$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.36, 9.36, 9.36); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1364
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Ear/Tilt, Ch.190, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.121 mW/g

Ear/Tilt, Ch.190, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement

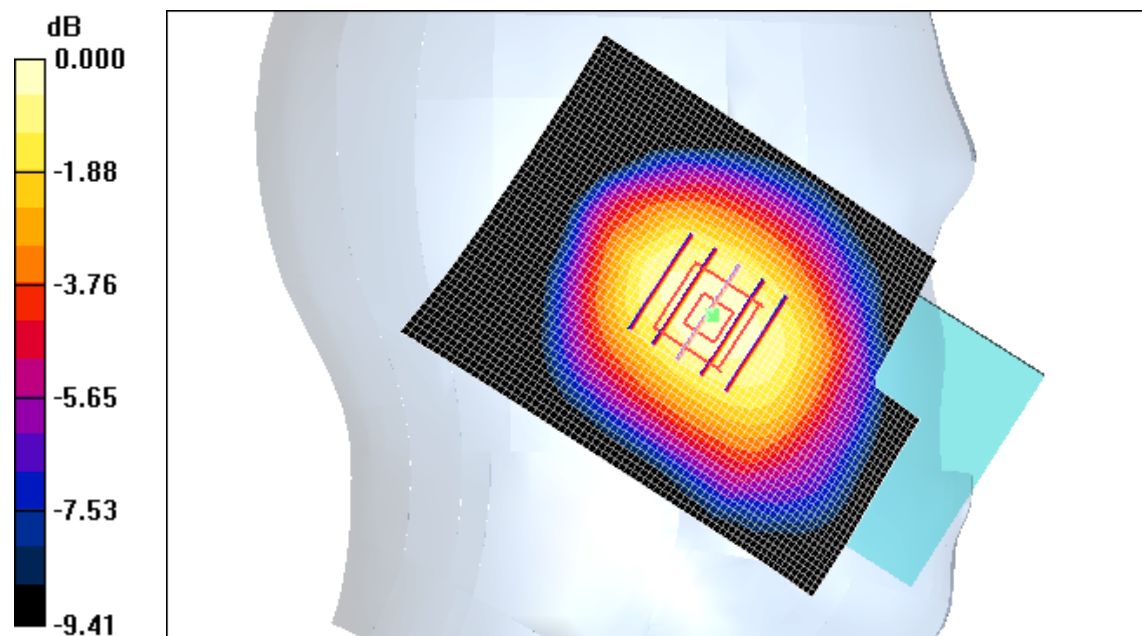
grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.78 V/m; Power Drift = 0.183 dB

Peak SAR (extrapolated) = 0.138 W/kg

SAR(1 g) = 0.111 mW/g; SAR(10 g) = 0.082 mW/g

Maximum value of SAR (measured) = 0.123 mW/g



0 dB = 0.123mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GSM850 Left (Job No. : FJ-127)

Procedure Name: Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-18/May/2012

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3

Medium parameters used: $f = 836.6$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.36, 9.36, 9.36); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #1; Type: SAM; Serial: TP-1364
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.403 mW/g

Cheek/Touch, Ch.190, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0:

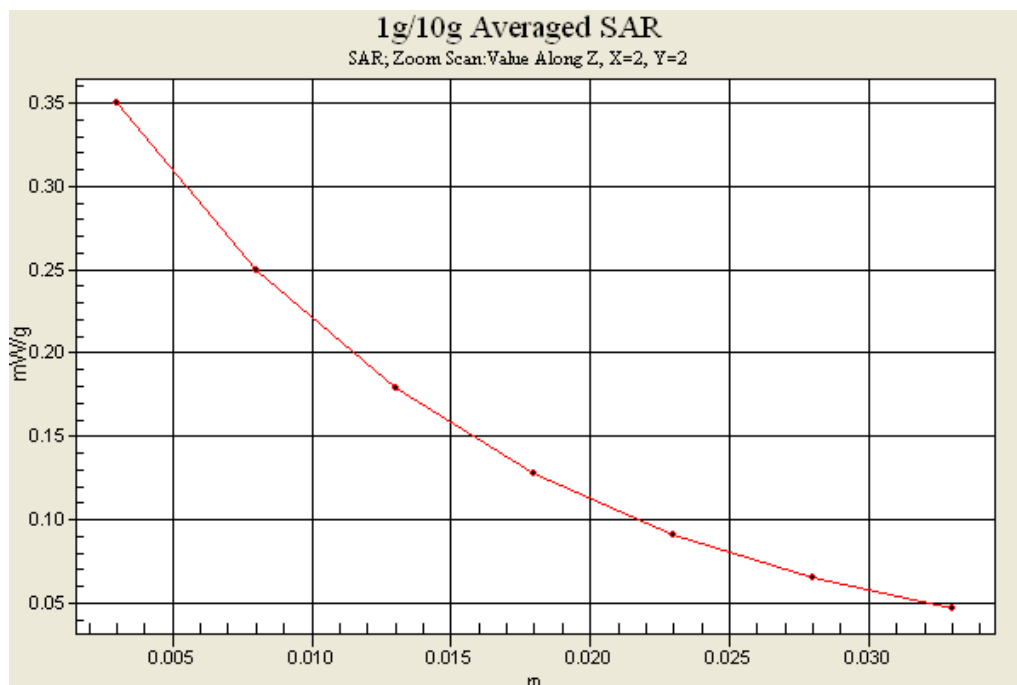
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.9 V/m; Power Drift = 0.027 dB

Peak SAR (extrapolated) = 0.454 W/kg

SAR(1 g) = 0.307 mW/g; SAR(10 g) = 0.207 mW/g

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



DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS850 Body (Job No. : FJ-127)

Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Back, 10mm

Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-18/May/2012

Communication System: GPRS 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15

Medium parameters used: $f = 836.6$ MHz; $\sigma = 0.97$ mho/m; $\epsilon_r = 54.5$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.23, 9.23, 9.23); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Back, 10mm/Area Scan (51x71x1):

Measurement grid: $dx=20$ mm, $dy=20$ mm

Maximum value of SAR (interpolated) = 0.688 mW/g

Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Back, 10mm/Zoom Scan 2 (5x5x7)/Cube

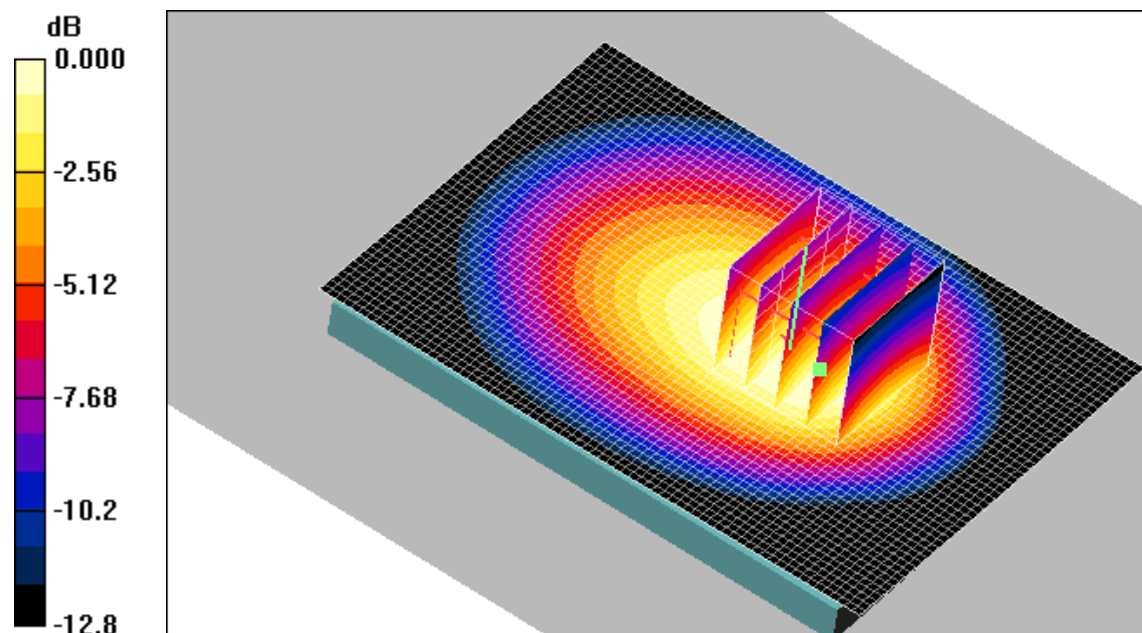
0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 24.4 V/m; Power Drift = -0.111 dB

Peak SAR (extrapolated) = 0.720 W/kg

SAR(1 g) = 0.530 mW/g; SAR(10 g) = 0.368 mW/g

Maximum value of SAR (measured) = 0.594 mW/g



0 dB = 0.594mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS850 Body (Job No. : FJ-127)

Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard, 3Tx, Back, 10mm

Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-18/May/2012

Communication System: GPRS 850; Frequency: 836.6 MHz:Duty Cycle: 1:2.767

Medium parameters used: $f = 836.6$ MHz; $\sigma = 0.97$ mho/m; $\epsilon_r = 54.5$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.23, 9.23, 9.23); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch. 190, Ant. Intenna, Bat. Standard, 3Tx, Back, 10mm/Area Scan (51x71x1):

Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.495 mW/g

Body, Ch. 190, Ant. Intenna, Bat. Standard, 3Tx, Back, 10mm/Zoom Scan 2 (5x5x7)/Cube

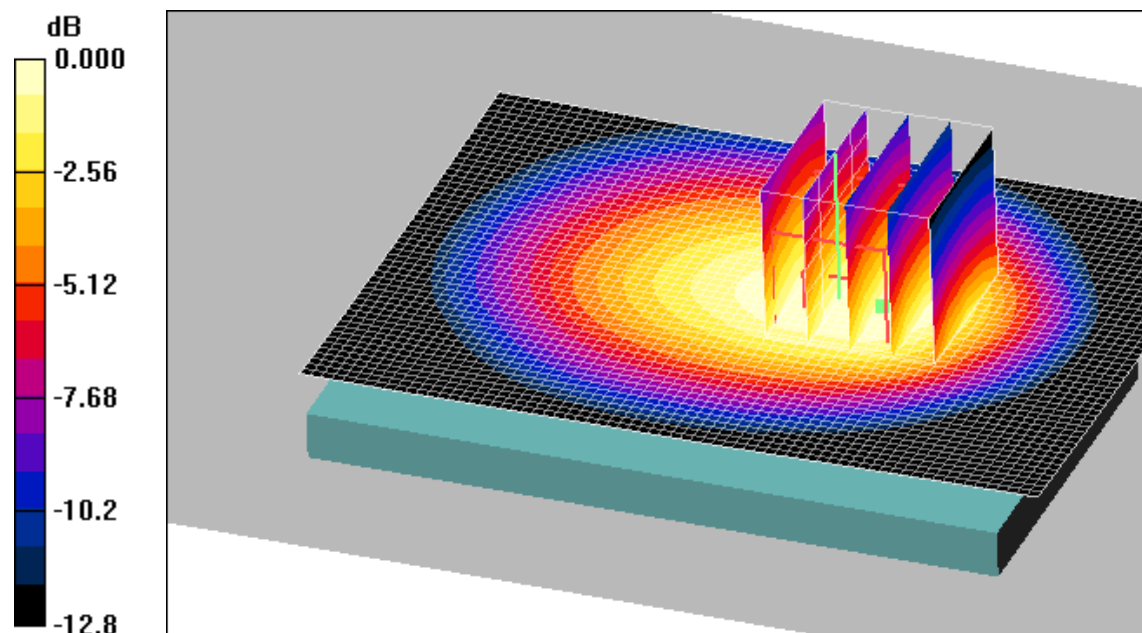
0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.5 V/m; Power Drift = 0.033 dB

Peak SAR (extrapolated) = 0.538 W/kg

SAR(1 g) = 0.397 mW/g; SAR(10 g) = 0.274 mW/g

Maximum value of SAR (measured) = 0.448 mW/g



0 dB = 0.448mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS850 Body (Job No. : FJ-127)

Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard, 4Tx, Back, 10mm

Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-18/May/2012

Communication System: GPRS 850; Frequency: 836.6 MHz:Duty Cycle: 1:2.075

Medium parameters used: $f = 836.6$ MHz; $\sigma = 0.97$ mho/m; $\epsilon_r = 54.5$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.23, 9.23, 9.23); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch. 190, Ant. Intenna, Bat. Standard, 4Tx, Back, 10mm/Area Scan (51x71x1):

Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.321 mW/g

Body, Ch. 190, Ant. Intenna, Bat. Standard, 4Tx, Back, 10mm/Zoom Scan (5x5x7)/Cube 0:

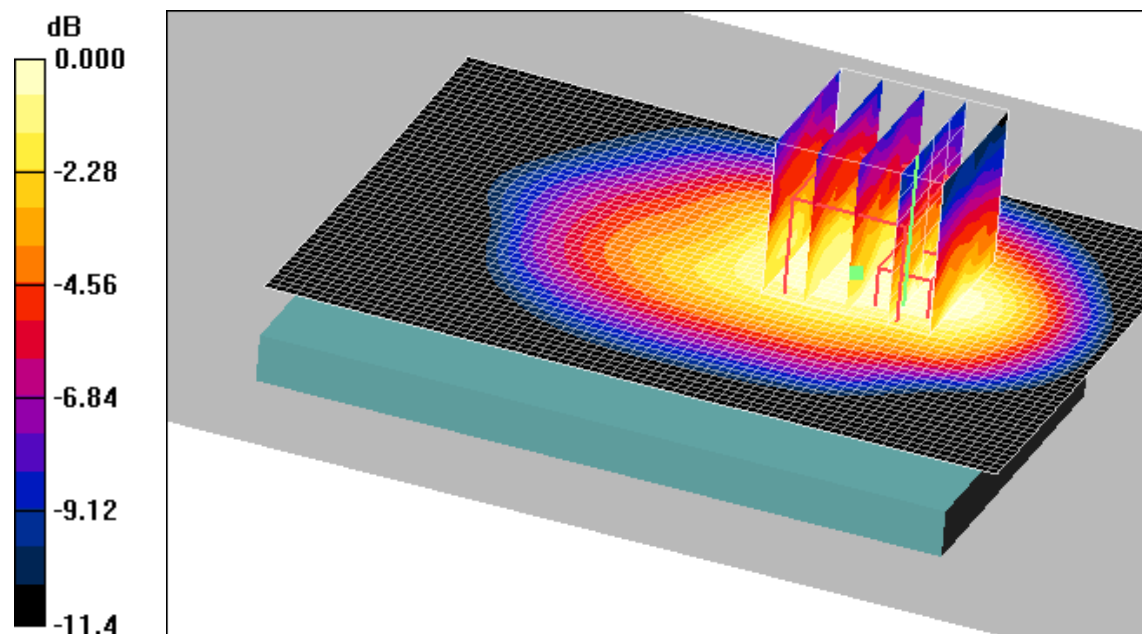
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.9 V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 0.487 W/kg

SAR(1 g) = 0.255 mW/g; SAR(10 g) = 0.187 mW/g

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



0 dB = 0.312mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS850 Body (Job No. : FJ-127)

Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Front, 10mm

Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-18/May/2012

Communication System: GPRS 850; Frequency: 836.6 MHz:Duty Cycle: 1:4.15

Medium parameters used: $f = 836.6$ MHz; $\sigma = 0.97$ mho/m; $\epsilon_r = 54.5$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.23, 9.23, 9.23); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Front, 10mm/Area Scan (51x71x1):

Measurement grid: dx=20mm, dy=20mm

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

Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Front, 10mm/Zoom Scan (5x5x7)/Cube 0:

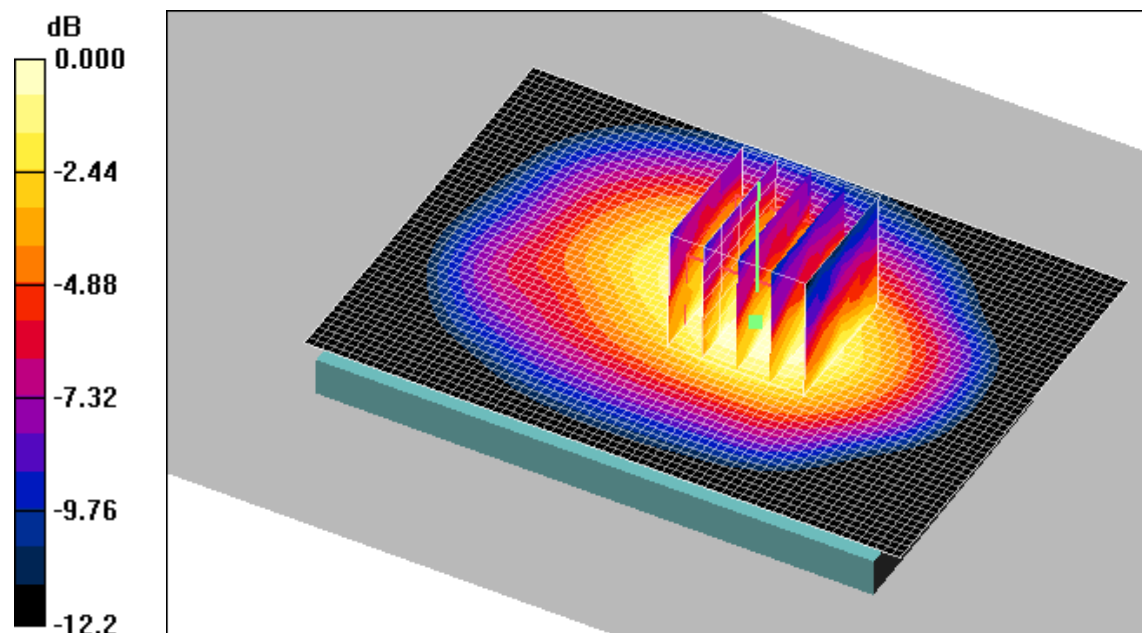
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.3 V/m; Power Drift = -0.141 dB

Peak SAR (extrapolated) = 0.653 W/kg

SAR(1 g) = 0.445 mW/g; SAR(10 g) = 0.319 mW/g

Maximum value of SAR (measured) = 0.520 mW/g



0 dB = 0.520mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS850 Body (Job No. : FJ-127)

Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Right, 10mm

Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-18/May/2012

Communication System: GPRS 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15

Medium parameters used: $f = 836.6$ MHz; $\sigma = 0.97$ mho/m; $\epsilon_r = 54.5$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.23, 9.23, 9.23); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Right, 10mm/Area Scan (41x71x1):

Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.157 mW/g

Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Right, 10mm/Zoom Scan (5x5x7)/Cube 0:

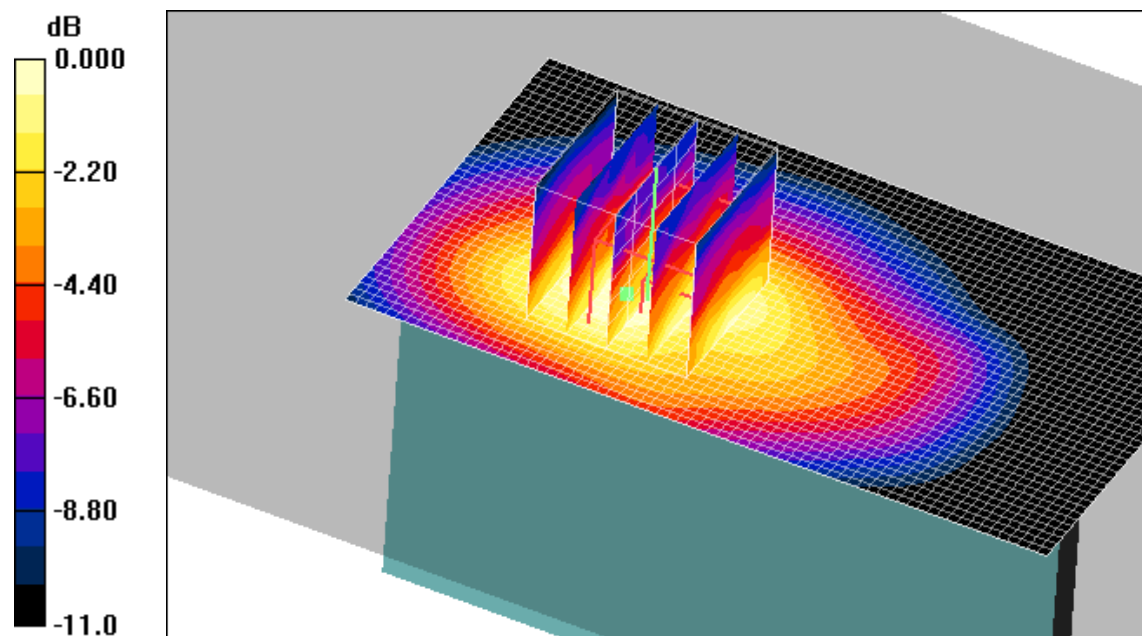
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.8 V/m; Power Drift = -0.019 dB

Peak SAR (extrapolated) = 0.227 W/kg

SAR(1 g) = 0.134 mW/g; SAR(10 g) = 0.093 mW/g

Maximum value of SAR (measured) = 0.161 mW/g



0 dB = 0.161mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS850 Body (Job No. : FJ-127)

Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Left, 10mm

Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-18/May/2012

Communication System: GPRS 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15

Medium parameters used: $f = 836.6 \text{ MHz}$; $\sigma = 0.97 \text{ mho/m}$; $\epsilon_r = 54.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.23, 9.23, 9.23); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Left, 10mm/Area Scan (41x71x1):

Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

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

Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Left, 10mm/Zoom Scan (5x5x7)/Cube 0:

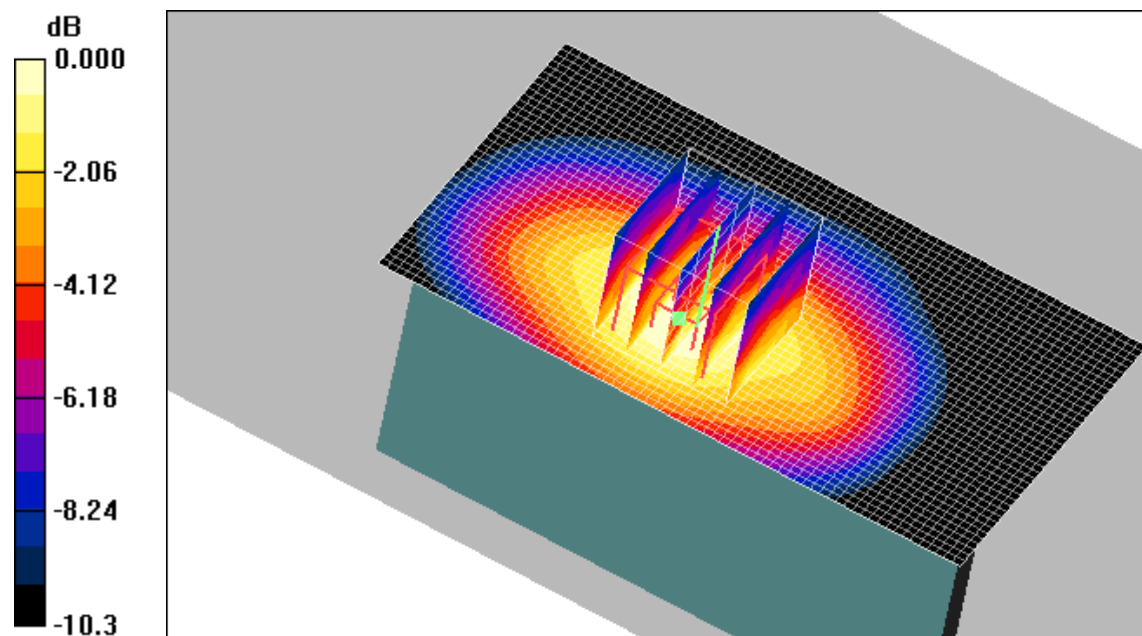
Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.8 V/m; Power Drift = -0.002 dB

Peak SAR (extrapolated) = 0.434 W/kg

SAR(1 g) = 0.202 mW/g; SAR(10 g) = 0.137 mW/g

Maximum value of SAR (measured) = 0.232 mW/g



0 dB = 0.232mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS850 Body (Job No. : FJ-127)

Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Bottom, 10mm

Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-18/May/2012

Communication System: GPRS 850; Frequency: 836.6 MHz:Duty Cycle: 1:4.15

Medium parameters used: $f = 836.6$ MHz; $\sigma = 0.97$ mho/m; $\epsilon_r = 54.5$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.23, 9.23, 9.23); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Bottom, 10mm/Area Scan (41x41x1):

Measurement grid: $dx=20$ mm, $dy=20$ mm

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

Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Bottom, 10mm/Zoom Scan (5x5x7)/Cube

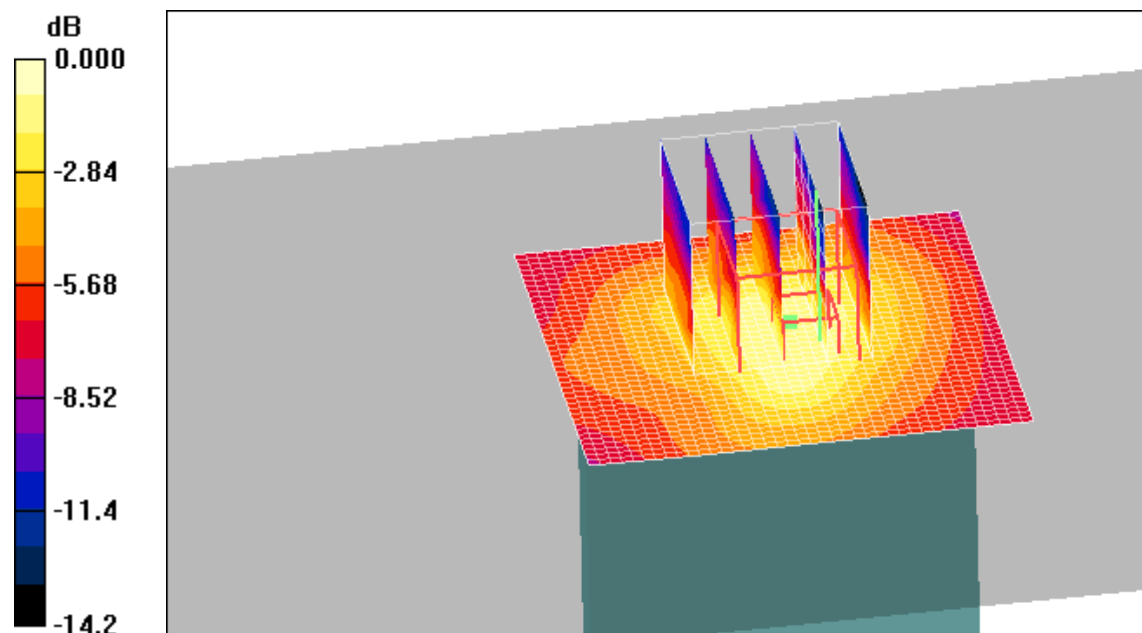
0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 7.96 V/m; Power Drift = -0.007 dB

Peak SAR (extrapolated) = 0.095 W/kg

SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.030 mW/g

Maximum value of SAR (measured) = 0.065 mW/g



0 dB = 0.065mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS850 Body (Job No. : FJ-127)

Procedure Name: Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Back, 10mm

Meas. Ambient Temp(celsius)-22.3,Tissue Temp(celsius)-21.8;Test Date-18/May/2012

Communication System: GPRS 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15

Medium parameters used: $f = 836.6$ MHz; $\sigma = 0.97$ mho/m; $\epsilon_r = 54.5$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(9.23, 9.23, 9.23); Calibrated: 2012-01-27
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Back, 10mm/Area Scan (51x71x1):

Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.688 mW/g

Body, Ch. 190, Ant. Intenna, Bat. Standard, 2Tx, Back, 10mm/Zoom Scan 2 (5x5x7)/Cube

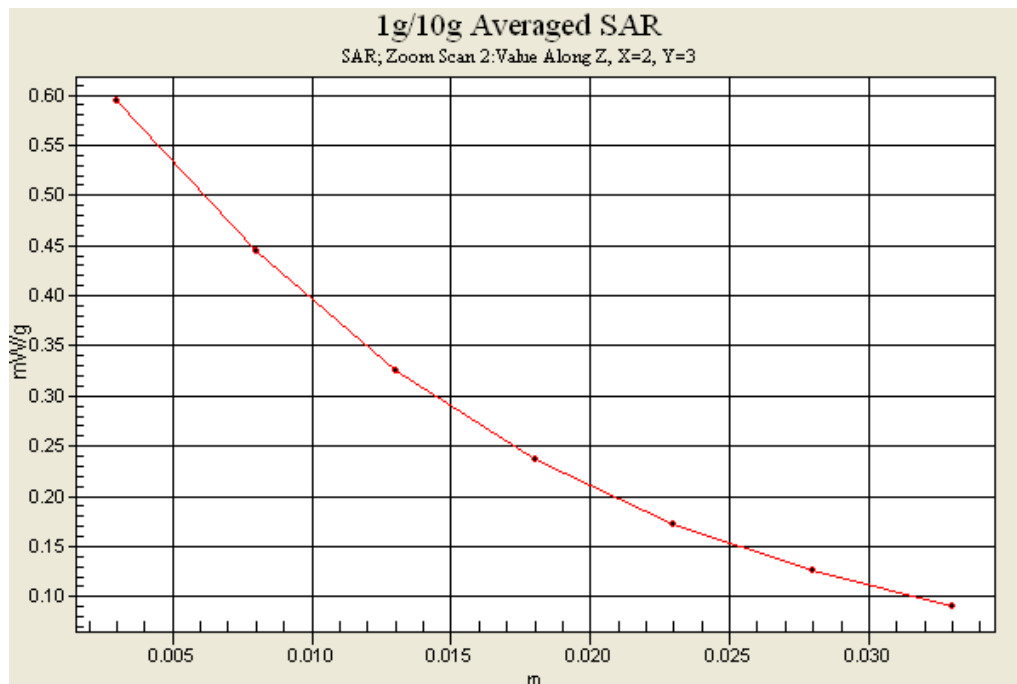
0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 24.4 V/m; Power Drift = -0.111 dB

Peak SAR (extrapolated) = 0.720 W/kg

SAR(1 g) = 0.530 mW/g; SAR(10 g) = 0.368 mW/g

Maximum value of SAR (measured) = 0.594 mW/g



DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GSM1900 Right (Job No. : FJ-127)

Procedure Name: Cheek, Ch.661, Ant.Intenna, Bat.Standard

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.1;Test Date-14/May/2012

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.75, 7.75, 7.75); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1604
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek, Ch.661, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.508 mW/g

Cheek, Ch.661, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

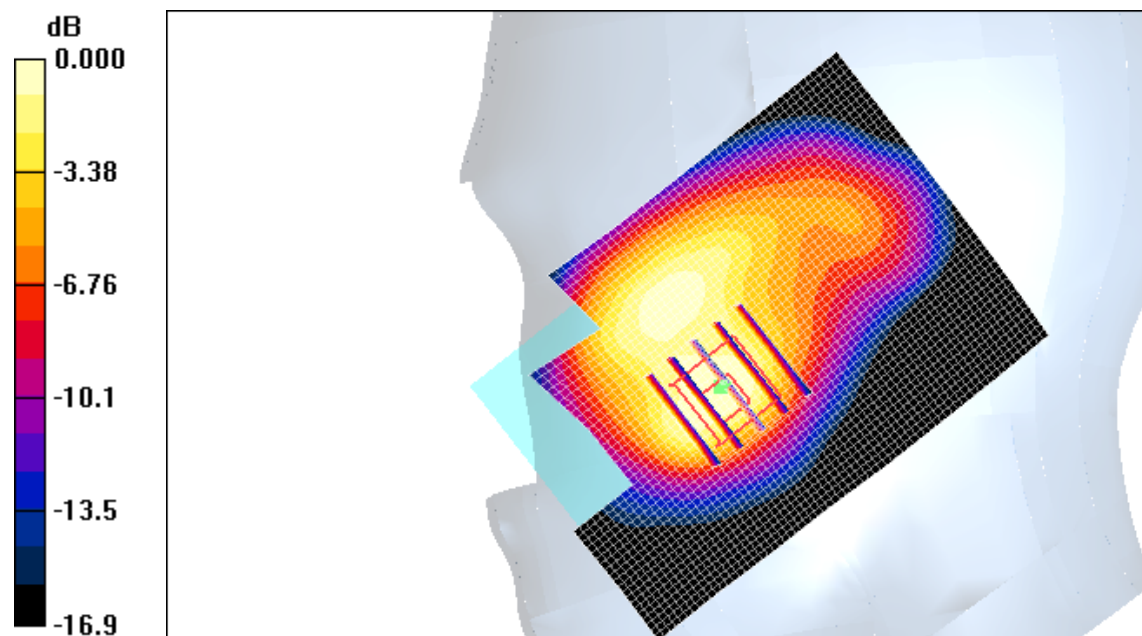
dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.9 V/m; Power Drift = -0.135 dB

Peak SAR (extrapolated) = 0.605 W/kg

SAR(1 g) = 0.354 mW/g; SAR(10 g) = 0.189 mW/g

Maximum value of SAR (measured) = 0.463 mW/g



0 dB = 0.463mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GSM1900 Right (Job No. : FJ-127)

Procedure Name: Tilt, Ch.661, Ant.Intenna, Bat.Standard

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.1;Test Date-14/May/2012

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.75, 7.75, 7.75); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1604
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt, Ch.661, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.158 mW/g

Tilt, Ch.661, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

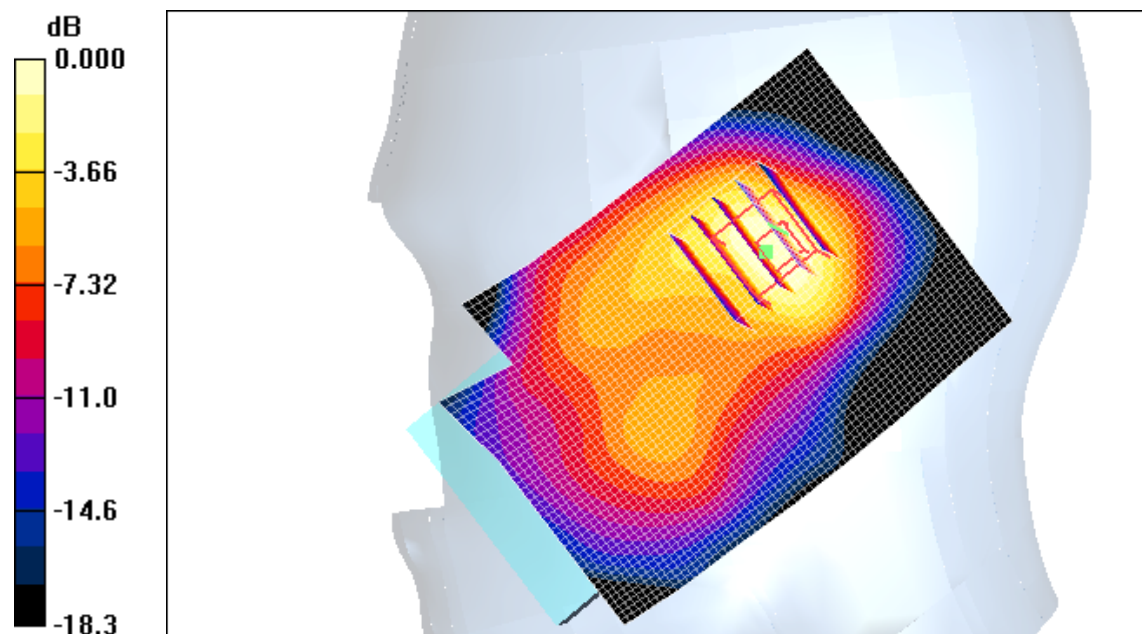
dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.83 V/m; Power Drift = 0.198 dB

Peak SAR (extrapolated) = 0.187 W/kg

SAR(1 g) = 0.112 mW/g; SAR(10 g) = 0.063 mW/g

Maximum value of SAR (measured) = 0.145 mW/g



0 dB = 0.145mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GSM1900 Left (Job No. : FJ-127)

Procedure Name: Cheek, Ch.661, Ant.Intenna, Bat.Standard

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.1;Test Date-14/May/2012

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.75, 7.75, 7.75); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1604
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek, Ch.661, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.747 mW/g

Cheek, Ch.661, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

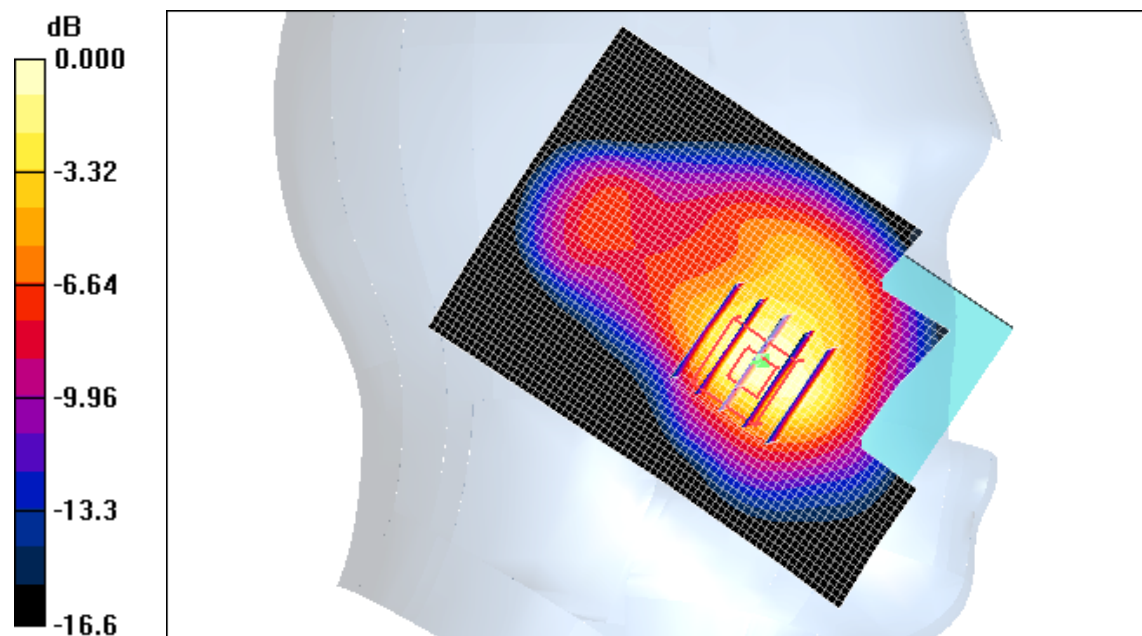
dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.3 V/m; Power Drift = -0.004 dB

Peak SAR (extrapolated) = 0.914 W/kg

SAR(1 g) = 0.544 mW/g; SAR(10 g) = 0.286 mW/g

Maximum value of SAR (measured) = 0.688 mW/g



0 dB = 0.688mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GSM1900 Left (Job No. : FJ-127)

Procedure Name: Tilt, Ch.661, Ant.Intenna, Bat.Standard

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.1;Test Date-14/May/2012

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.75, 7.75, 7.75); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1604
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt, Ch.661, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.152 mW/g

Tilt, Ch.661, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

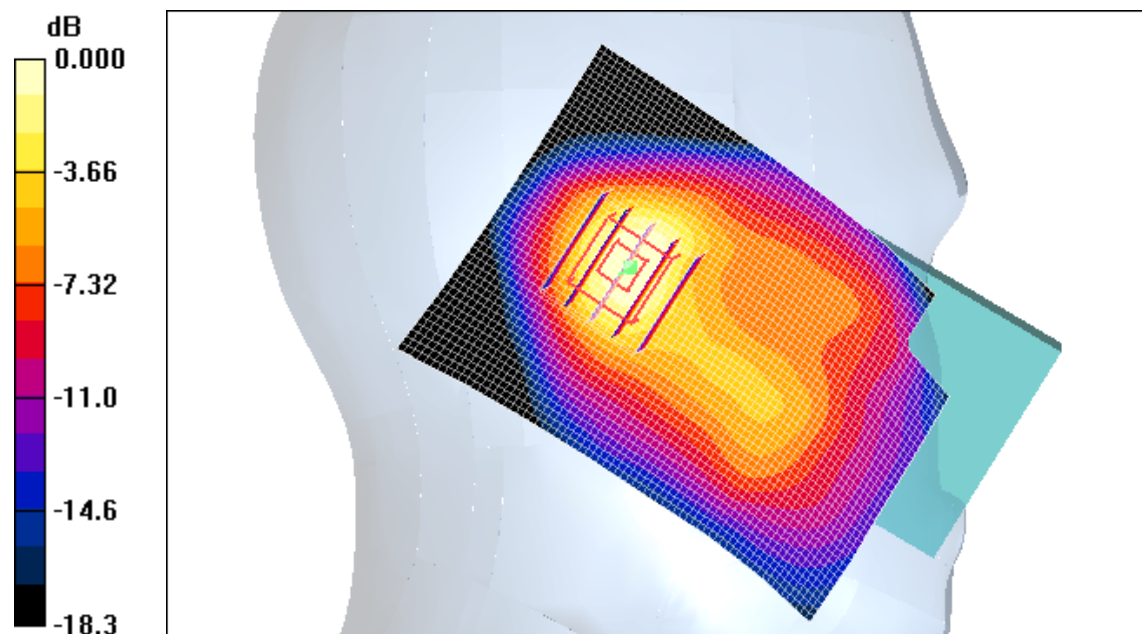
dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.18 V/m; Power Drift = 0.140 dB

Peak SAR (extrapolated) = 0.186 W/kg

SAR(1 g) = 0.112 mW/g; SAR(10 g) = 0.063 mW/g

Maximum value of SAR (measured) = 0.148 mW/g



0 dB = 0.148mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GSM1900 Left (Job No. : FJ-127)

Procedure Name: Cheek, Ch.661, Ant.Intenna, Bat.Standard

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.1;Test Date-14/May/2012

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

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.75, 7.75, 7.75); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1604
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek, Ch.661, Ant.Intenna, Bat.Standard/Area Scan (51x71x1): Measurement grid:

dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.747 mW/g

Cheek, Ch.661, Ant.Intenna, Bat.Standard/Zoom Scan (5x5x7)/Cube 0: Measurement grid:

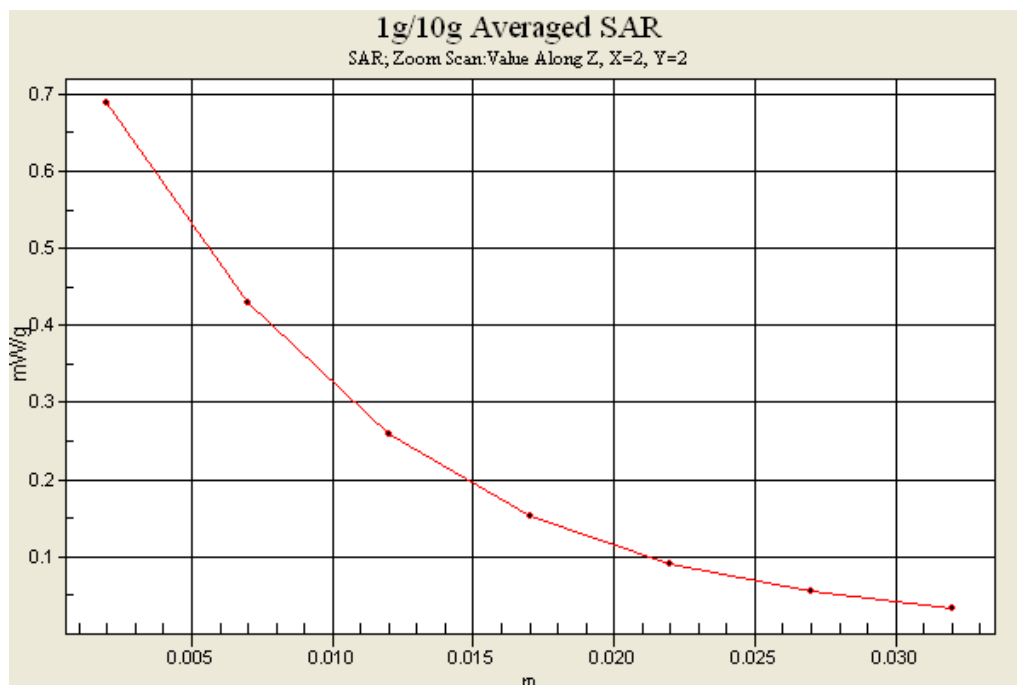
dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.3 V/m; Power Drift = -0.004 dB

Peak SAR (extrapolated) = 0.914 W/kg

SAR(1 g) = 0.544 mW/g; SAR(10 g) = 0.286 mW/g

Maximum value of SAR (measured) = 0.688 mW/g



DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS1900 Body (Job No. : FJ-127)

Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Back, 10mm

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-14/May/2012

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 51.7$; $\rho = 1000$ kg/m³
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.38, 7.38, 7.38); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Back, 10mm/Area Scan (51x71x1):

Measurement grid: $dx=20$ mm, $dy=20$ mm

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

Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Back, 10mm/Zoom Scan (5x5x7)/Cube 0:

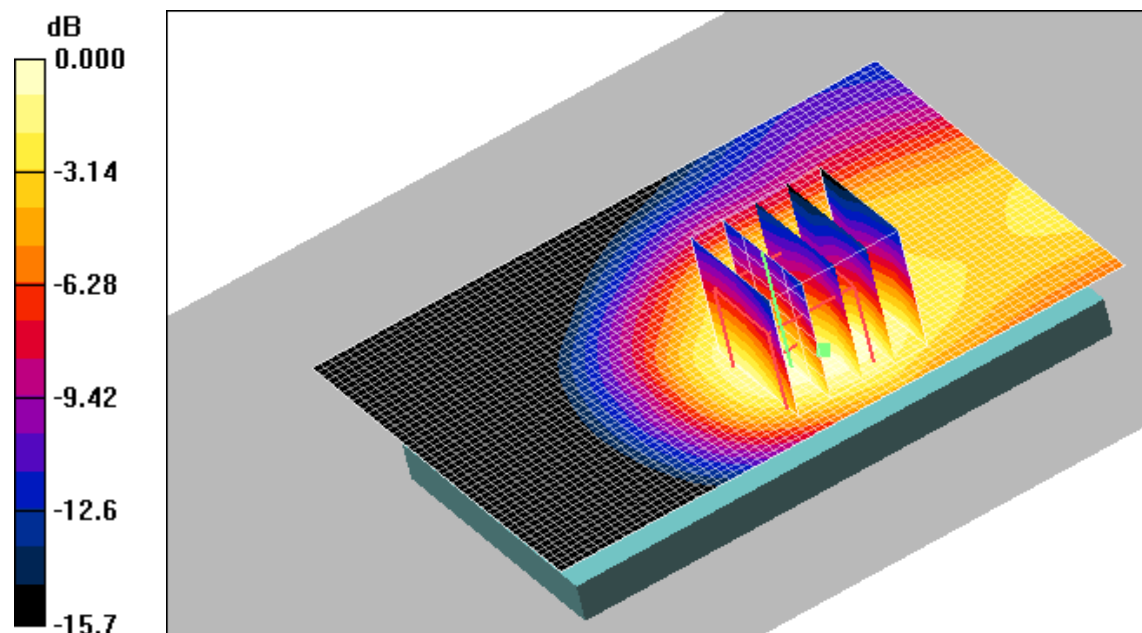
Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 13.2 V/m; Power Drift = -0.009 dB

Peak SAR (extrapolated) = 0.437 W/kg

SAR(1 g) = 0.281 mW/g; SAR(10 g) = 0.168 mW/g

Maximum value of SAR (measured) = 0.371 mW/g



0 dB = 0.371mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS1900 Body (Job No. : FJ-127)

Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard, 3Tx, Back, 10mm

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-14/May/2012

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:2.767
Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.51 \text{ mho/m}$; $\epsilon_r = 51.7$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.38, 7.38, 7.38); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.661, Ant.Intenna, Bat.Standard, 3Tx, Back, 10mm/Area Scan (51x71x1):

Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.278 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard, 3Tx, Back, 10mm/Zoom Scan (5x5x7)/Cube 0:

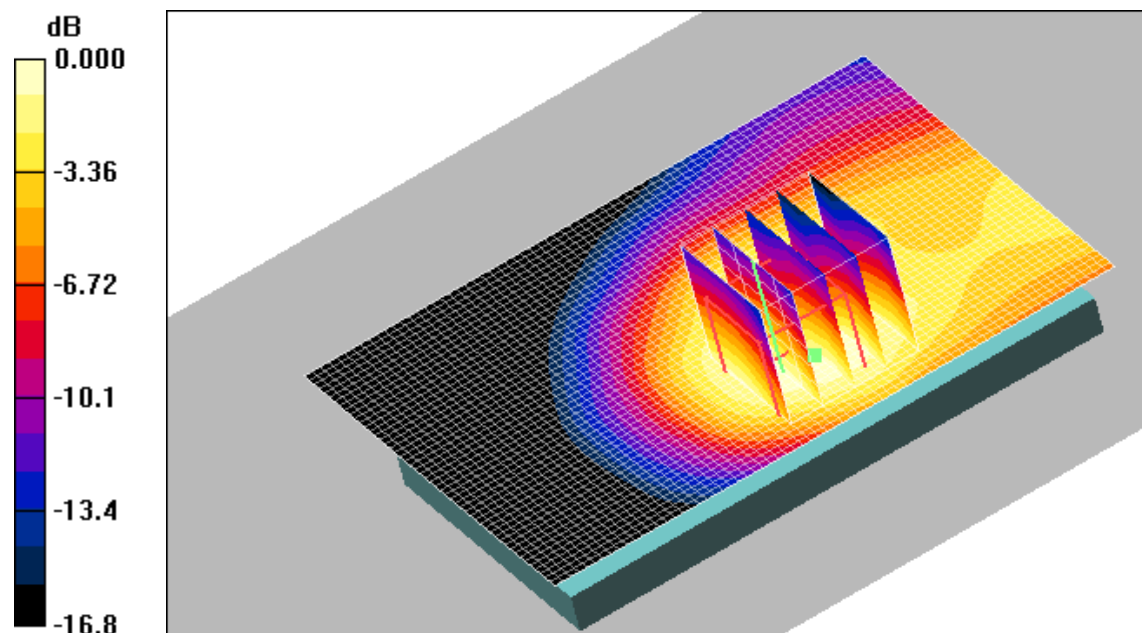
Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 11.2 V/m; Power Drift = -0.031 dB

Peak SAR (extrapolated) = 0.322 W/kg

SAR(1 g) = 0.207 mW/g; SAR(10 g) = 0.123 mW/g

Maximum value of SAR (measured) = 0.273 mW/g



0 dB = 0.273mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS1900 Body (Job No. : FJ-127)

Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard, 4Tx, Back, 10mm

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-14/May/2012

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.51 \text{ mho/m}$; $\epsilon_r = 51.7$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.38, 7.38, 7.38); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.661, Ant.Intenna, Bat.Standard, 4Tx, Back, 10mm/Area Scan (51x71x1):

Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.236 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard, 4Tx, Back, 10mm/Zoom Scan (5x5x7)/Cube 0:

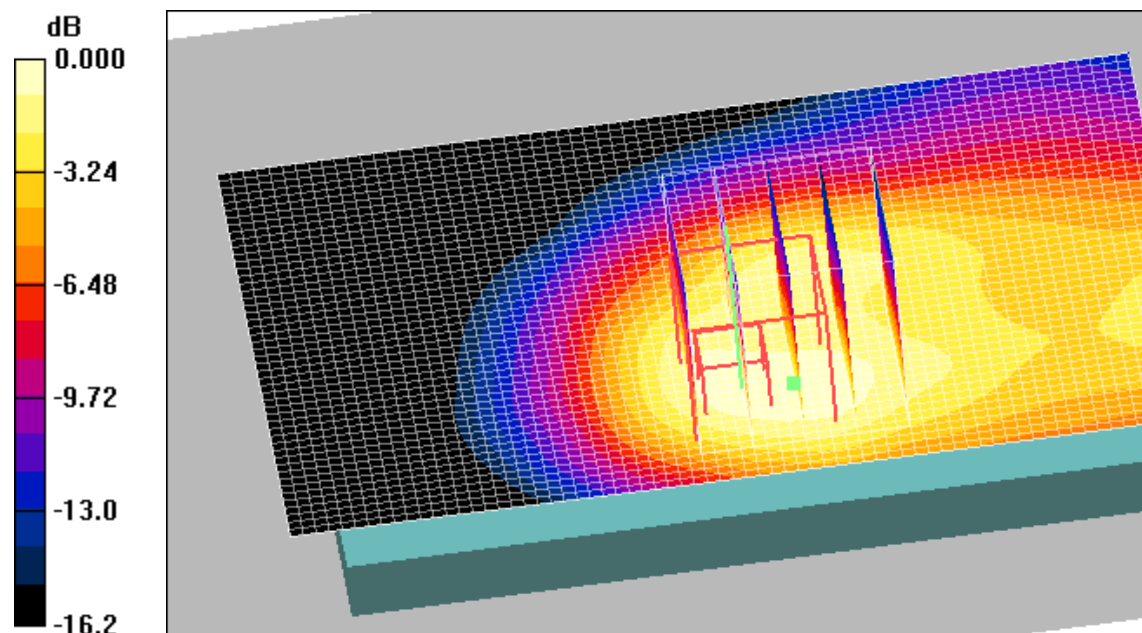
Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 10.4 V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 0.274 W/kg

SAR(1 g) = 0.175 mW/g; SAR(10 g) = 0.105 mW/g

Maximum value of SAR (measured) = 0.231 mW/g



0 dB = 0.231mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS1900 Body (Job No. : FJ-127)

Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Front, 10mm

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-14/May/2012

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 51.7$; $\rho = 1000$ kg/m³
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.38, 7.38, 7.38); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Front, 10mm/Area Scan (51x71x1):

Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.465 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Front, 10mm/Zoom Scan (5x5x7)/Cube 0:

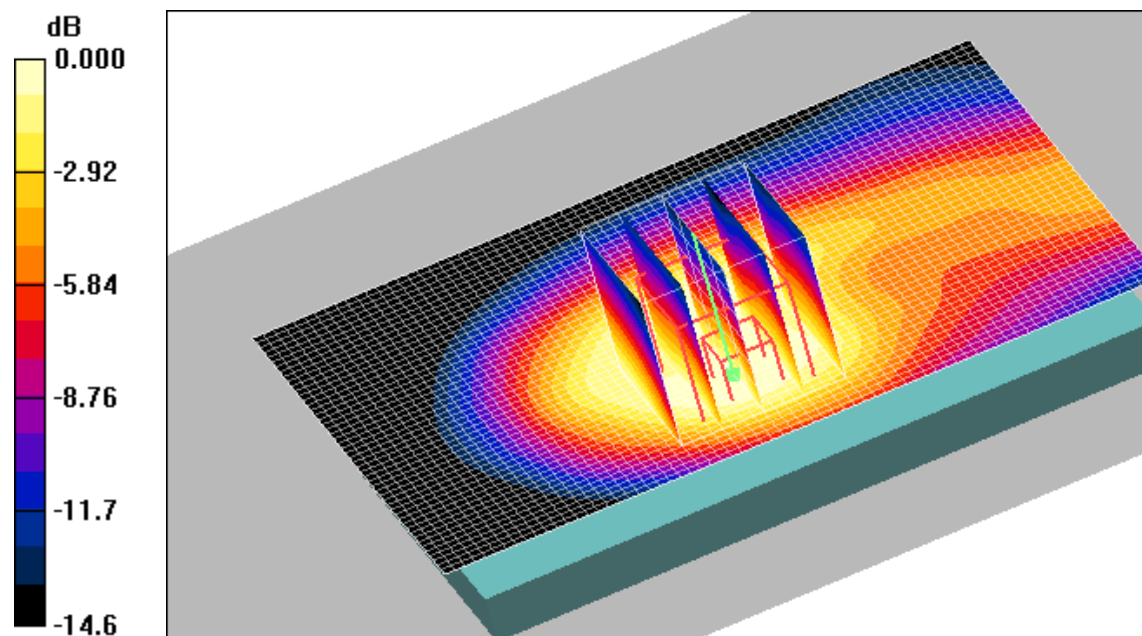
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.3 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 0.501 W/kg

SAR(1 g) = 0.317 mW/g; SAR(10 g) = 0.190 mW/g

Maximum value of SAR (measured) = 0.412 mW/g



0 dB = 0.412mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS1900 Body (Job No. : FJ-127)

Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Right, 10mm

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-14/May/2012

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.51 \text{ mho/m}$; $\epsilon_r = 51.7$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.38, 7.38, 7.38); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Right, 10mm/Area Scan (41x71x1):

Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.157 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Right, 10mm/Zoom Scan (5x5x7)/Cube 0:

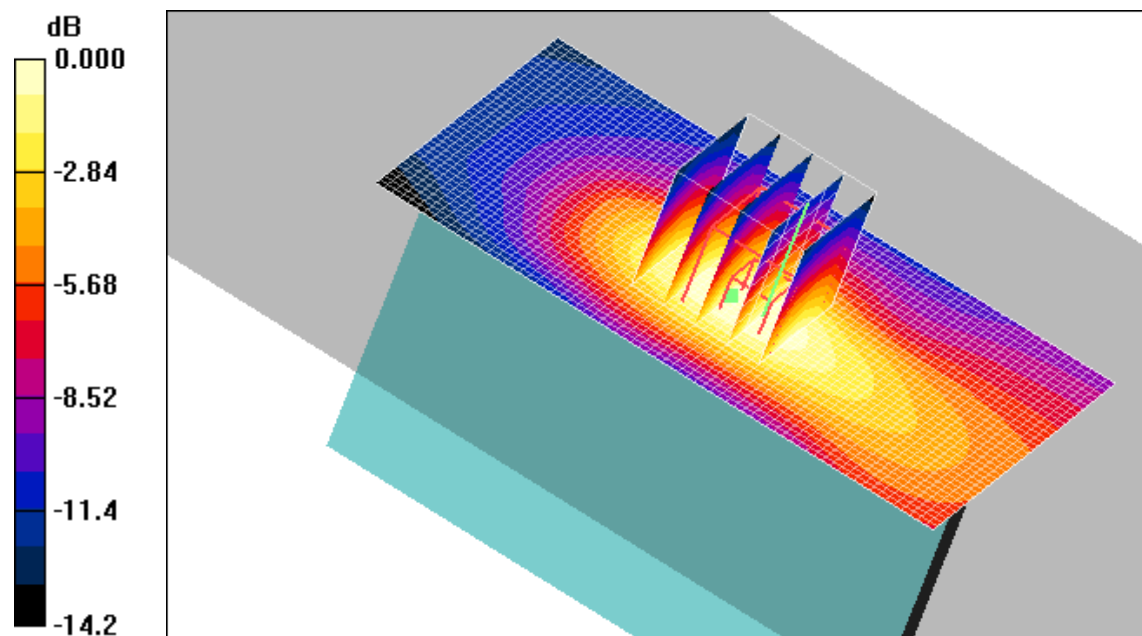
Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 9.54 V/m; Power Drift = 0.024 dB

Peak SAR (extrapolated) = 0.180 W/kg

SAR(1 g) = 0.118 mW/g; SAR(10 g) = 0.073 mW/g

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



0 dB = 0.151mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS1900 Body (Job No. : FJ-127)

Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Left, 10mm

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-14/May/2012

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.51 \text{ mho/m}$; $\epsilon_r = 51.7$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.38, 7.38, 7.38); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Left, 10mm/Area Scan (41x71x1):

Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.191 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Left, 10mm/Zoom Scan (5x5x7)/Cube 0:

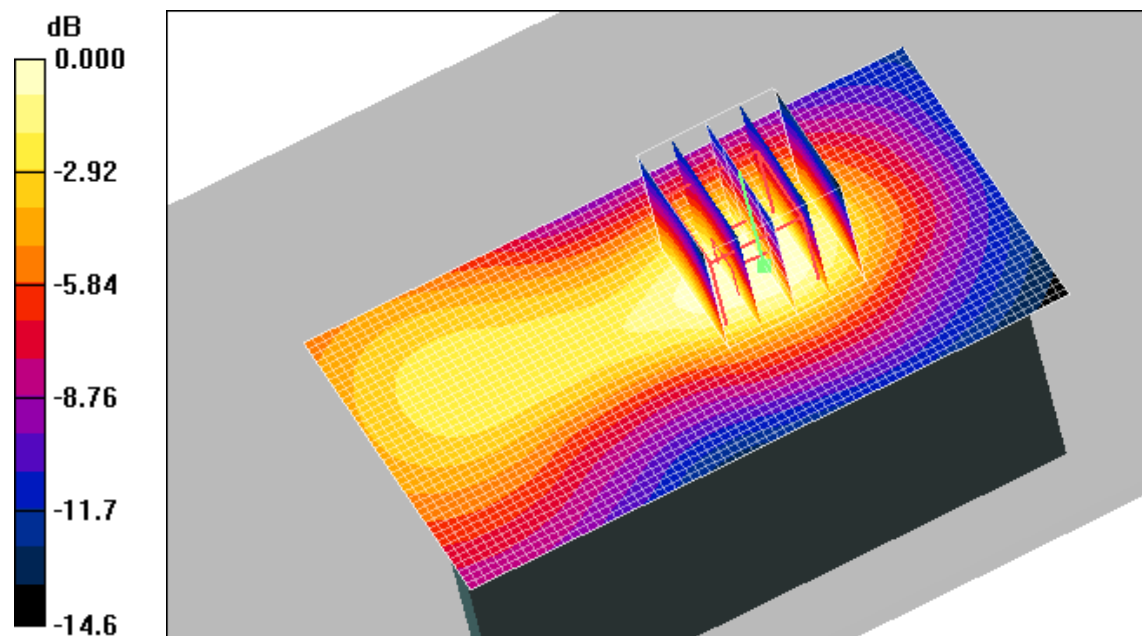
Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 9.65 V/m; Power Drift = -0.041 dB

Peak SAR (extrapolated) = 0.214 W/kg

SAR(1 g) = 0.140 mW/g; SAR(10 g) = 0.086 mW/g

Maximum value of SAR (measured) = 0.179 mW/g



0 dB = 0.179mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS1900 Body (Job No. : FJ-127)

Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Bottom, 10mm

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-14/May/2012

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 51.7$; $\rho = 1000$ kg/m³
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.38, 7.38, 7.38); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Bottom, 10mm/Area Scan (61x51x1):

Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.503 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Bottom, 10mm/Zoom Scan (5x5x7)/Cube 0:

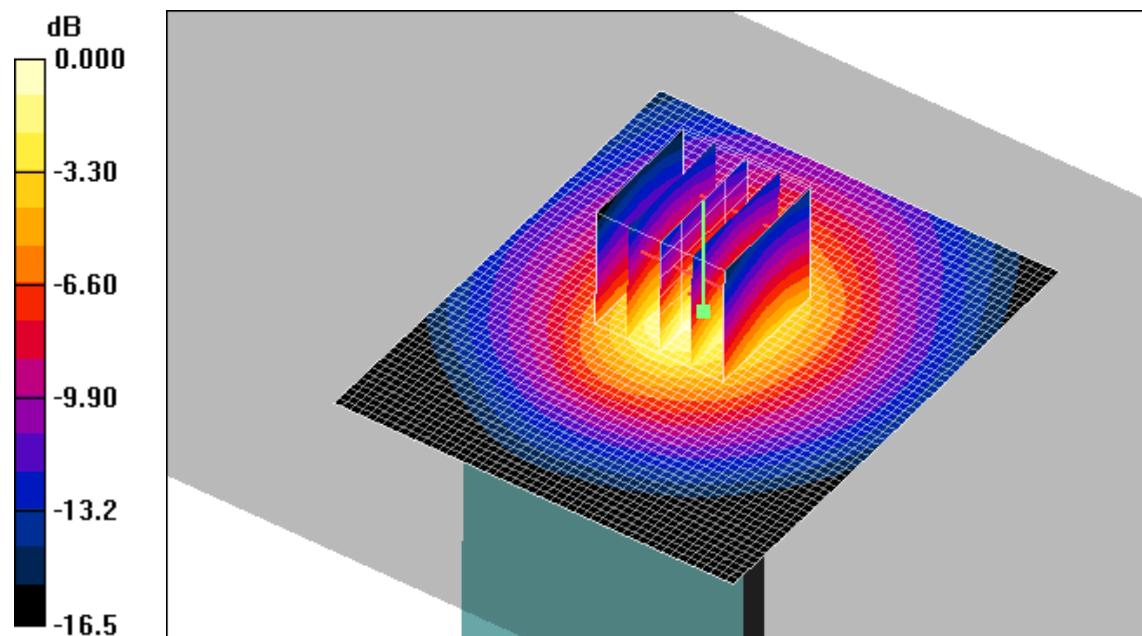
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.2 V/m; Power Drift = 0.009 dB

Peak SAR (extrapolated) = 0.724 W/kg

SAR(1 g) = 0.449 mW/g; SAR(10 g) = 0.252 mW/g

Maximum value of SAR (measured) = 0.595 mW/g



0 dB = 0.595mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 GPRS1900 Body (Job No. : FJ-127)

Procedure Name: Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Bottom, 10mm

Meas. Ambient Temp(celsius)-22.6,Tissue Temp(celsius)-22.3;Test Date-14/May/2012

Communication System: Body GPRS ; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: $f = 1880$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 51.7$; $\rho = 1000$ kg/m³
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(7.38, 7.38, 7.38); Calibrated: 2012-01-27
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Bottom, 10mm/Area Scan (61x51x1):

Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.503 mW/g

Body, Ch.661, Ant.Intenna, Bat.Standard, 2Tx, Bottom, 10mm/Zoom Scan (5x5x7)/Cube 0:

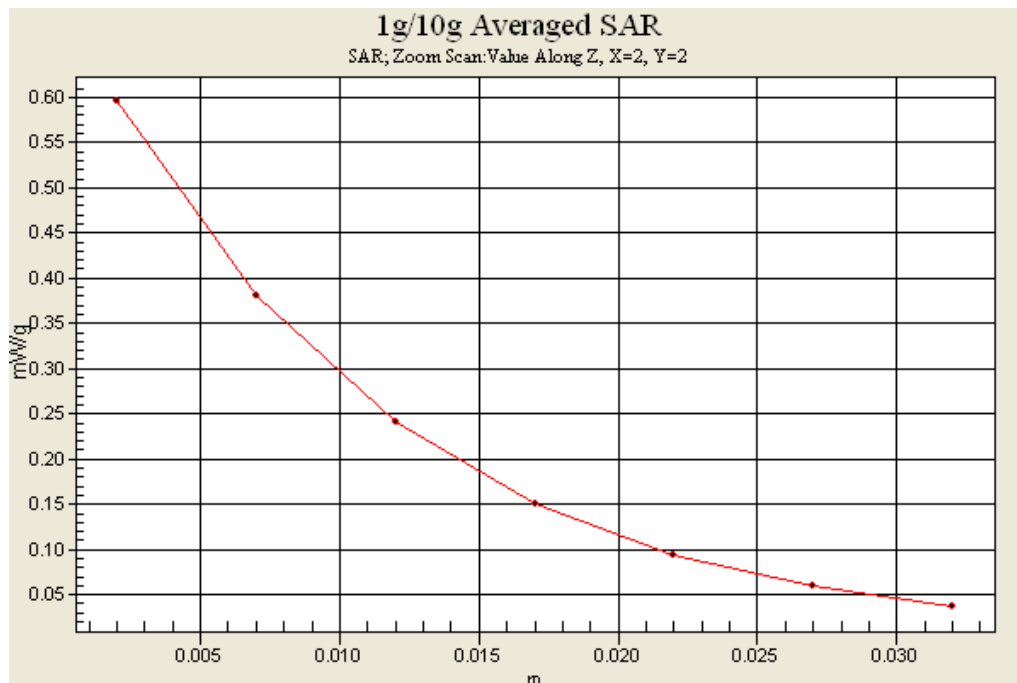
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.2 V/m; Power Drift = 0.009 dB

Peak SAR (extrapolated) = 0.724 W/kg

SAR(1 g) = 0.449 mW/g; SAR(10 g) = 0.252 mW/g

Maximum value of SAR (measured) = 0.595 mW/g



DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 WLAN Right(Job No. : FJ-127)

Procedure Name: Cheek, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps

Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-21.9;Test Date-15/May/2012

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

Medium parameters used: $f = 2412$ MHz; $\sigma = 1.85$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(6.93, 6.93, 6.93); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1604
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps/Area Scan (51x71x1): Measurement grid:
dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.135 mW/g

Cheek, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps/Zoom Scan 2 (5x5x7)/Cube 0:

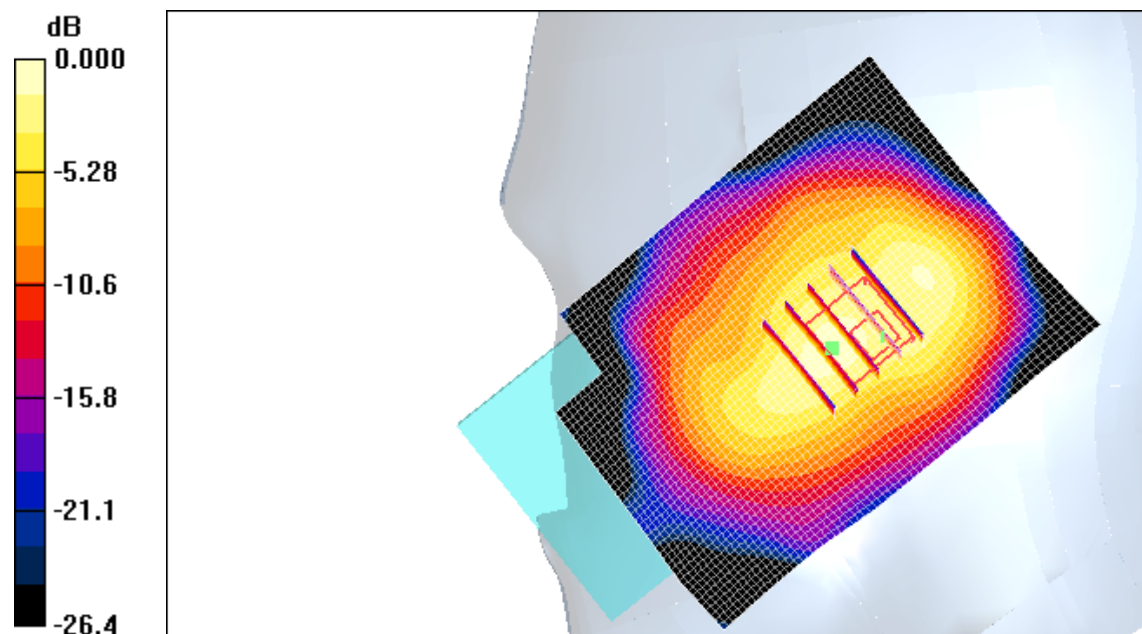
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.00 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 0.277 W/kg

SAR(1 g) = 0.143 mW/g; SAR(10 g) = 0.073 mW/g

Maximum value of SAR (measured) = 0.160 mW/g



0 dB = 0.160mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 WLAN Right(Job No. : FJ-127)

Procedure Name: Tilted, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps

Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-21.9;Test Date-15/May/2012

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

Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.85 \text{ mho/m}$; $\epsilon_r = 39.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(6.93, 6.93, 6.93); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1604
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilted, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps/Area Scan (51x71x1): Measurement grid:
 $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.083 mW/g

Tilted, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps/Zoom Scan (5x5x7)/Cube 0:

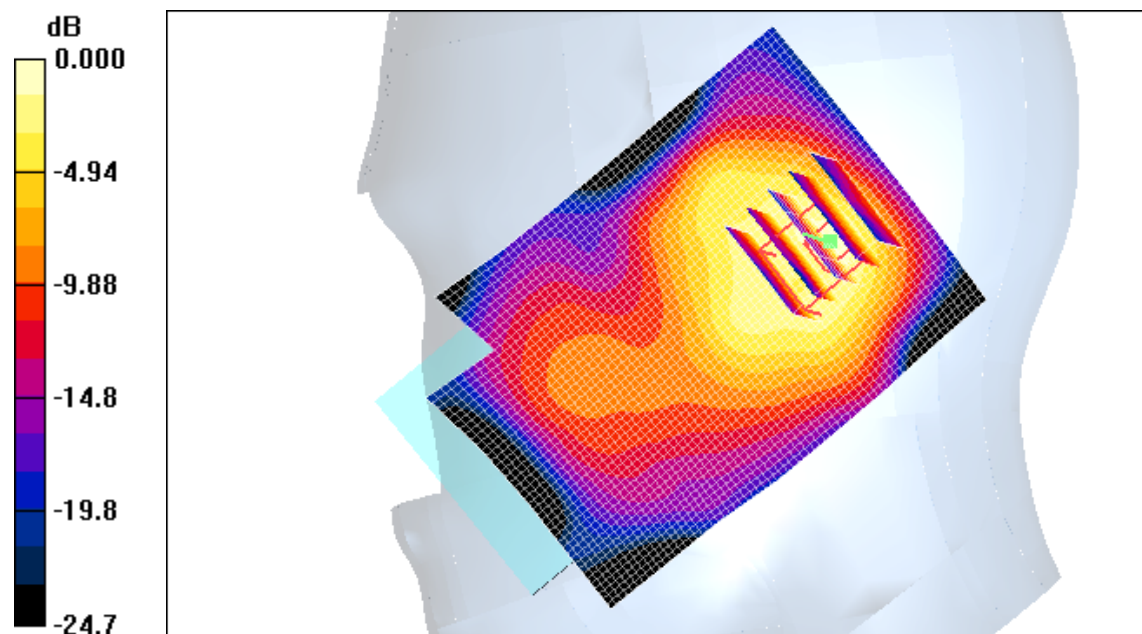
Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 6.14 V/m; Power Drift = 0.161 dB

Peak SAR (extrapolated) = 0.180 W/kg

SAR(1 g) = 0.080 mW/g; SAR(10 g) = 0.039 mW/g

Maximum value of SAR (measured) = 0.095 mW/g



0 dB = 0.095mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 WLAN Left(Job No. : FJ-127)

Procedure Name: Cheek, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps

Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-21.9;Test Date-15/May/2012

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

Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.85 \text{ mho/m}$; $\epsilon_r = 39.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(6.93, 6.93, 6.93); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1604
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps/Area Scan (51x71x1): Measurement grid:
 $dx=20\text{mm}$, $dy=20\text{mm}$

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

Cheek, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps/Zoom Scan (5x5x7)/Cube 0:

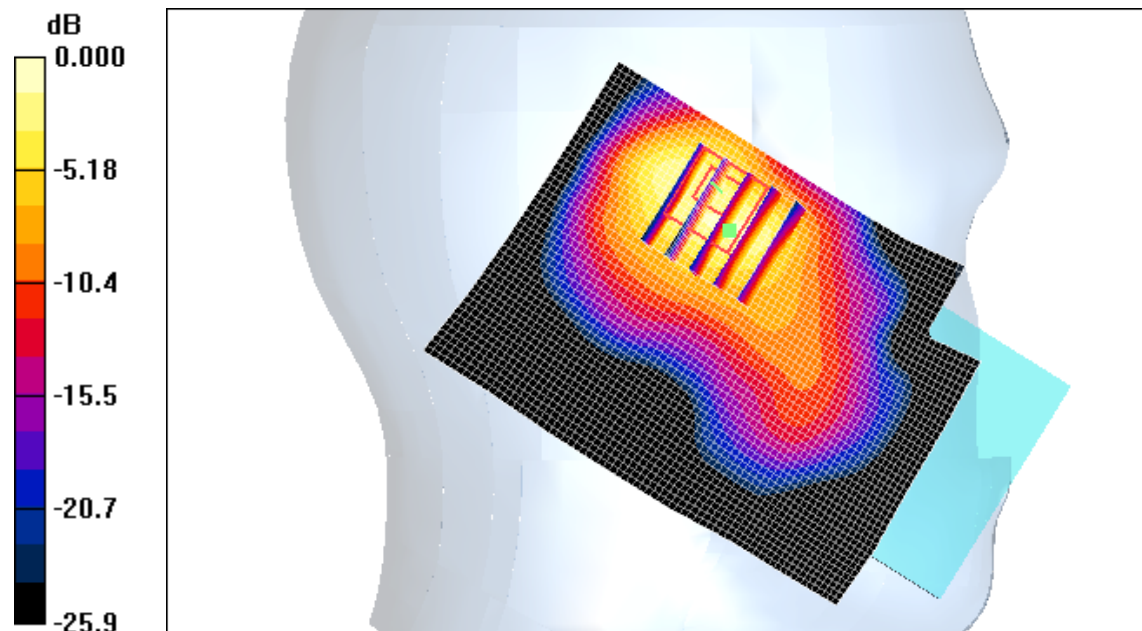
Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 6.45 V/m; Power Drift = 0.112 dB

Peak SAR (extrapolated) = 0.786 W/kg

SAR(1 g) = 0.334 mW/g; SAR(10 g) = 0.150 mW/g

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



0 dB = 0.401mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 WLAN Left(Job No. : FJ-127)

Procedure Name: Tilted, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps

Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-21.9;Test Date-15/May/2012

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

Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.85 \text{ mho/m}$; $\epsilon_r = 39.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(6.93, 6.93, 6.93); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1604
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilted, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps/Area Scan (51x71x1): Measurement grid:
 $dx=20\text{mm}$, $dy=20\text{mm}$

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

Tilted, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps/Zoom Scan (5x5x7)/Cube 0:

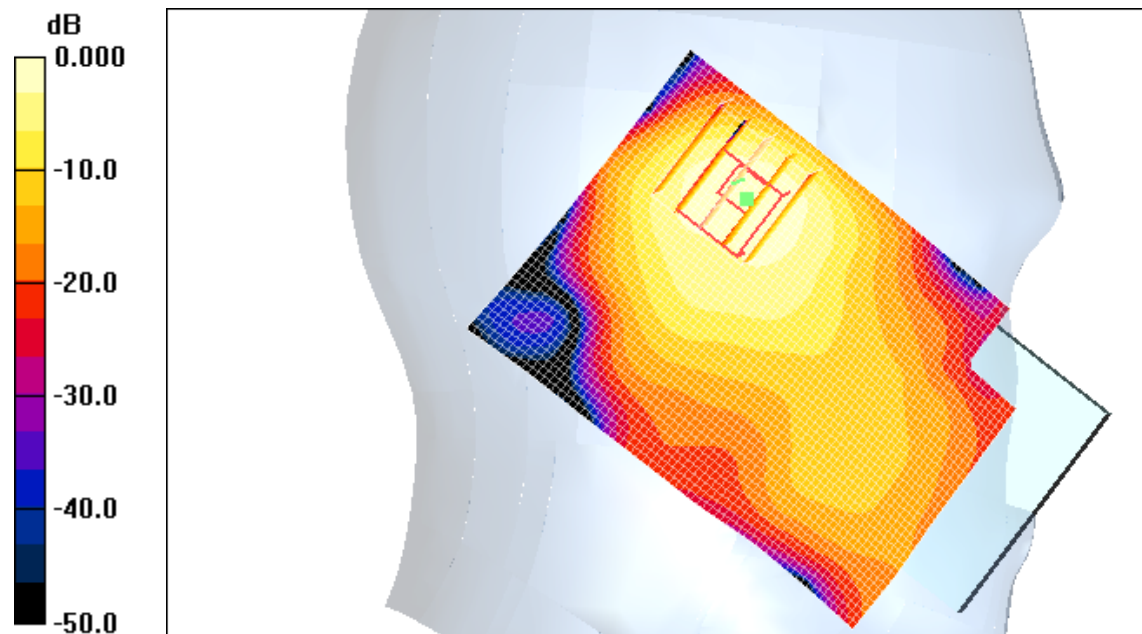
Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 8.60 V/m; Power Drift = 0.070 dB

Peak SAR (extrapolated) = 0.441 W/kg

SAR(1 g) = 0.182 mW/g; SAR(10 g) = 0.088 mW/g

Maximum value of SAR (measured) = 0.210 mW/g



0 dB = 0.210mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5302 WLAN Left(Job No. : FJ-127)

Procedure Name: Cheek, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps

Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-21.9;Test Date-15/May/2012

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

Medium parameters used: $f = 2412$ MHz; $\sigma = 1.85$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(6.93, 6.93, 6.93); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: PHANTOM #2; Type: SAM; Serial: TP-1604
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps/Area Scan (51x71x1): Measurement grid:
dx=20mm, dy=20mm

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

Cheek, Ch.01, Ant.Intenna, Bat.Standard, 1Mbps/Zoom Scan (5x5x7)/Cube 0:

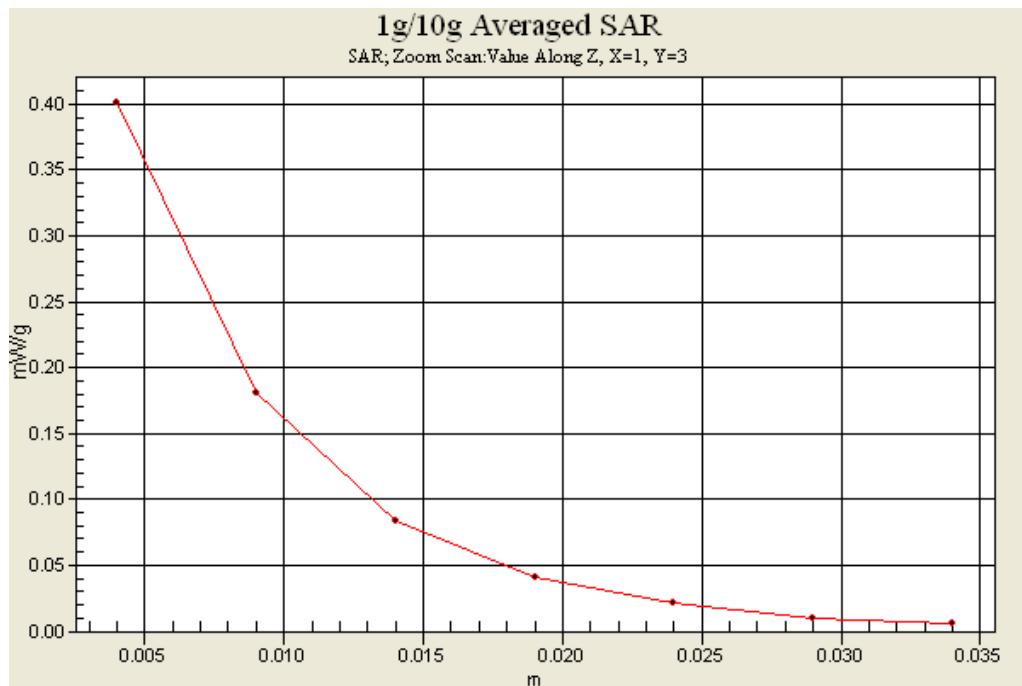
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.45 V/m; Power Drift = 0.112 dB

Peak SAR (extrapolated) = 0.786 W/kg

SAR(1 g) = 0.334 mW/g; SAR(10 g) = 0.150 mW/g

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



DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5320 WLAN Body (Job No. : FJ-127)

Procedure Name: Body, Ch.01, Ant.Intenna, Bat.Standard Back 1Mbps,10mm

Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-21.8;Test Date-15/May/2012

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

Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.95 \text{ mho/m}$; $\epsilon_r = 51.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.01, Ant.Intenna, Bat.Standard Back 1Mbps/Area Scan (51x71x1): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

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

Body, Ch.01, Ant.Intenna, Bat.Standard Back 1Mbps/Zoom Scan (5x5x7)/Cube 0:

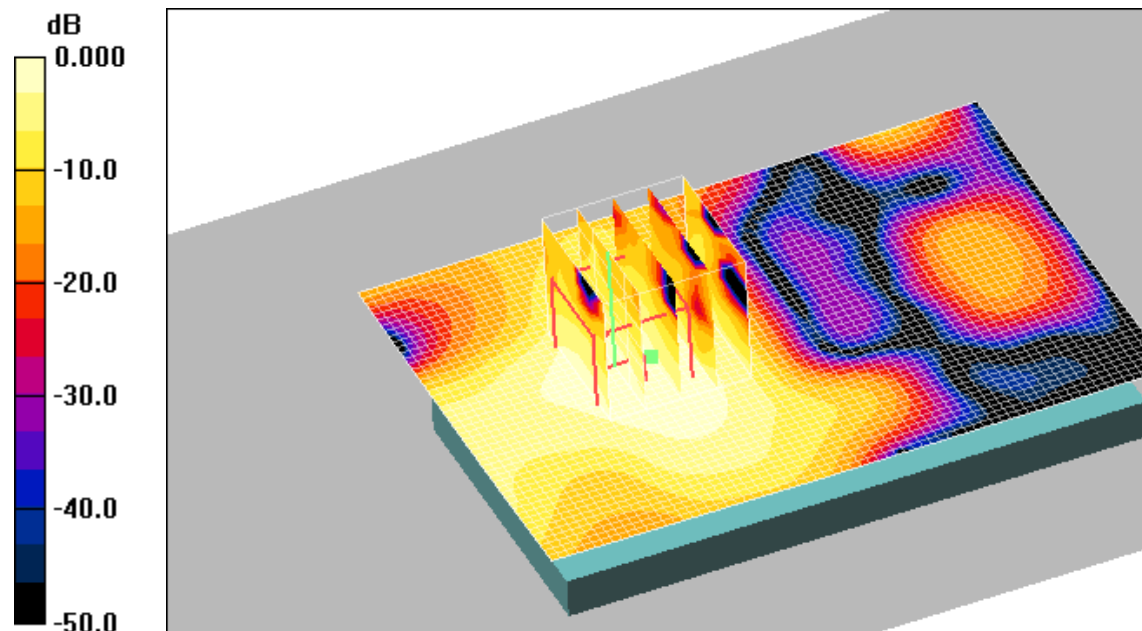
Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 1.82 V/m; Power Drift = -0.023 dB

Peak SAR (extrapolated) = 0.078 W/kg

SAR(1 g) = 0.025 mW/g; SAR(10 g) = 0.013 mW/g

Maximum value of SAR (measured) = 0.028 mW/g



0 dB = 0.028mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5320 WLAN Body (Job No. : FJ-127)

Procedure Name: Body, Ch.01, Ant.Intenna, Bat.Standard Front 1Mbps,10mm

Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-21.8;Test Date-15/May/2012

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

Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.95 \text{ mho/m}$; $\epsilon_r = 51.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.01, Ant.Intenna, Bat.Standard Front 1Mbps/Area Scan (51x71x1): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

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

Body, Ch.01, Ant.Intenna, Bat.Standard Front 1Mbps/Zoom Scan (5x5x7)/Cube 0:

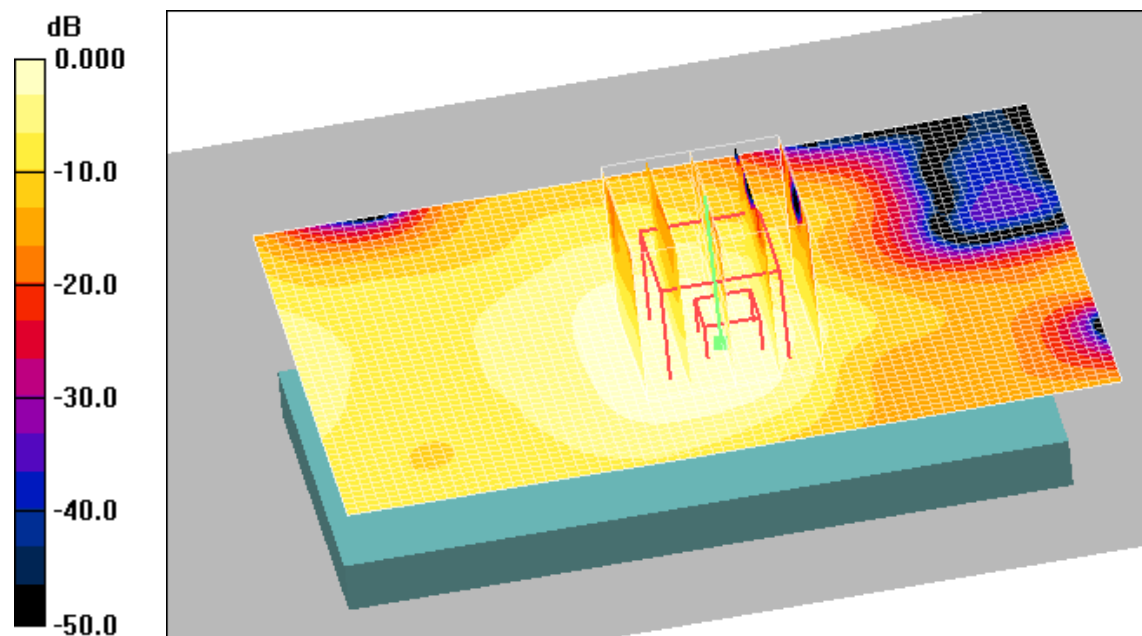
Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 4.86 V/m; Power Drift = -0.183 dB

Peak SAR (extrapolated) = 0.085 W/kg

SAR(1 g) = 0.040 mW/g; SAR(10 g) = 0.020 mW/g

Maximum value of SAR (measured) = 0.046 mW/g



0 dB = 0.046mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5320 WLAN Body (Job No. : FJ-127)

Procedure Name: Body, Ch.01, Ant.Intenna, Bat.Standard Right 1Mbps,10mm

Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-21.8;Test Date-15/May/2012

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

Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.95 \text{ mho/m}$; $\epsilon_r = 51.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.01, Ant.Intenna, Bat.Standard Right 1Mbps/Area Scan (51x71x1): Measurement grid: $dx=20\text{mm}$, $dy=20\text{mm}$

Maximum value of SAR (interpolated) = 0.063 mW/g

Body, Ch.01, Ant.Intenna, Bat.Standard Right 1Mbps/Zoom Scan (5x5x7)/Cube 0:

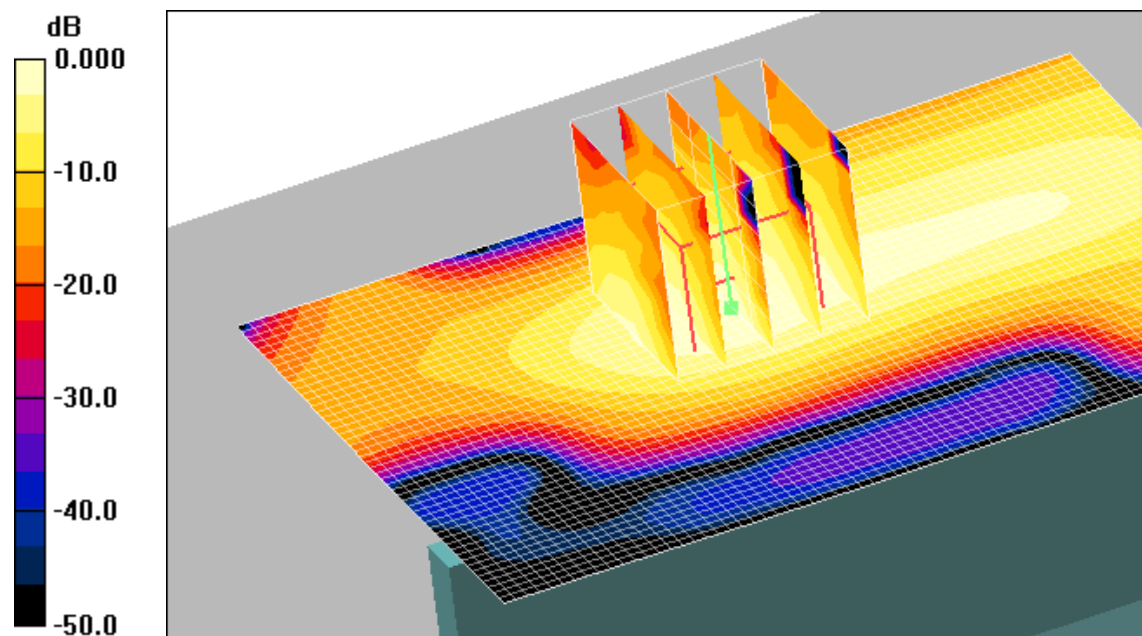
Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 3.22 V/m ; Power Drift = 0.076 dB

Peak SAR (extrapolated) = 0.106 W/kg

SAR(1 g) = 0.058 mW/g ; SAR(10 g) = 0.028 mW/g

Maximum value of SAR (measured) = 0.065 mW/g



0 dB = 0.065 mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5320 WLAN Body (Job No. : FJ-127)

Procedure Name: Body, Ch.01, Ant.Intenna, Bat.Standard Top 1Mbps,10mm

Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-21.8;Test Date-15/May/2012

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

Medium parameters used: $f = 2412$ MHz; $\sigma = 1.95$ mho/m; $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.01, Ant.Intenna, Bat.Standard Top 1Mbps/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.021 mW/g

Body, Ch.01, Ant.Intenna, Bat.Standard Top 1Mbps/Zoom Scan (5x5x7)/Cube 0:

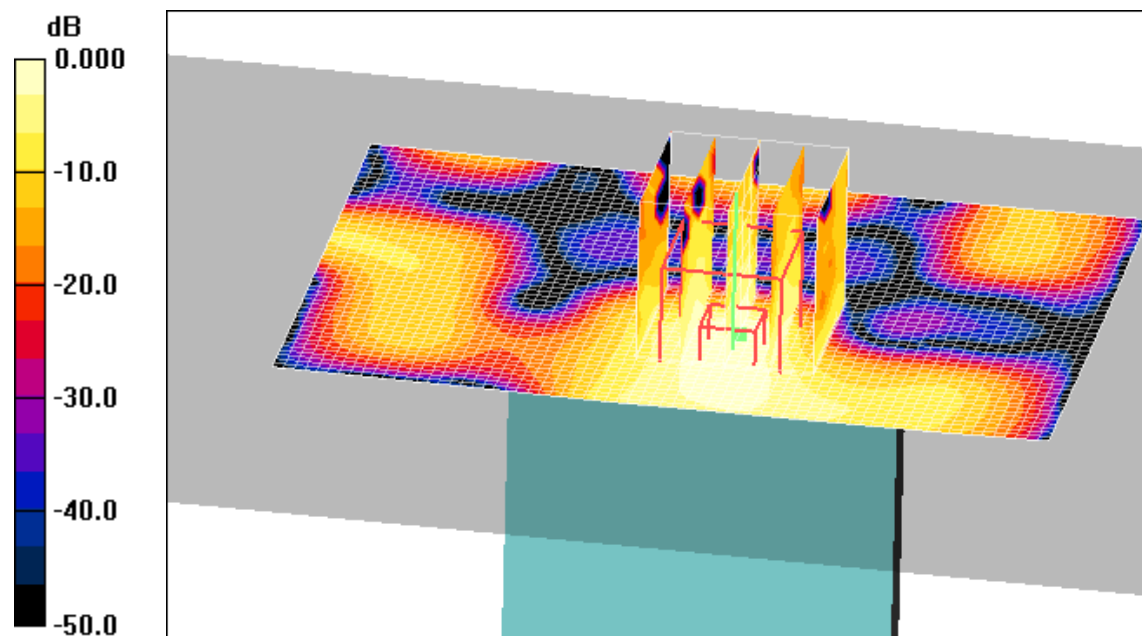
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.50 V/m; Power Drift = 0.078 dB

Peak SAR (extrapolated) = 0.022 W/kg

SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.00713 mW/g

Maximum value of SAR (measured) = 0.016 mW/g



0 dB = 0.016mW/g

DUT: GT-S5302; Serial: FJ-127-B

Program Name: GT-S5320 WLAN Body (Job No. : FJ-127)

Procedure Name: Body, Ch.01, Ant.Intenna, Bat.Standard Right 1Mbps,10mm

Meas. Ambient Temp(celsius)-22.4,Tissue Temp(celsius)-21.8;Test Date-15/May/2012

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

Medium parameters used: $f = 2412$ MHz; $\sigma = 1.95$ mho/m; $\epsilon_r = 51.2$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3752; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn486; Calibrated: 2012-01-19
- Phantom: Triple Flat Phantom 5.1; Type: Triple Flat Phantom 5.1; Serial: MP-1010
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body, Ch.01, Ant.Intenna, Bat.Standard Right 1Mbps/Area Scan (51x71x1): Measurement grid: dx=20mm, dy=20mm

Maximum value of SAR (interpolated) = 0.063 mW/g

Body, Ch.01, Ant.Intenna, Bat.Standard Right 1Mbps/Zoom Scan (5x5x7)/Cube 0:

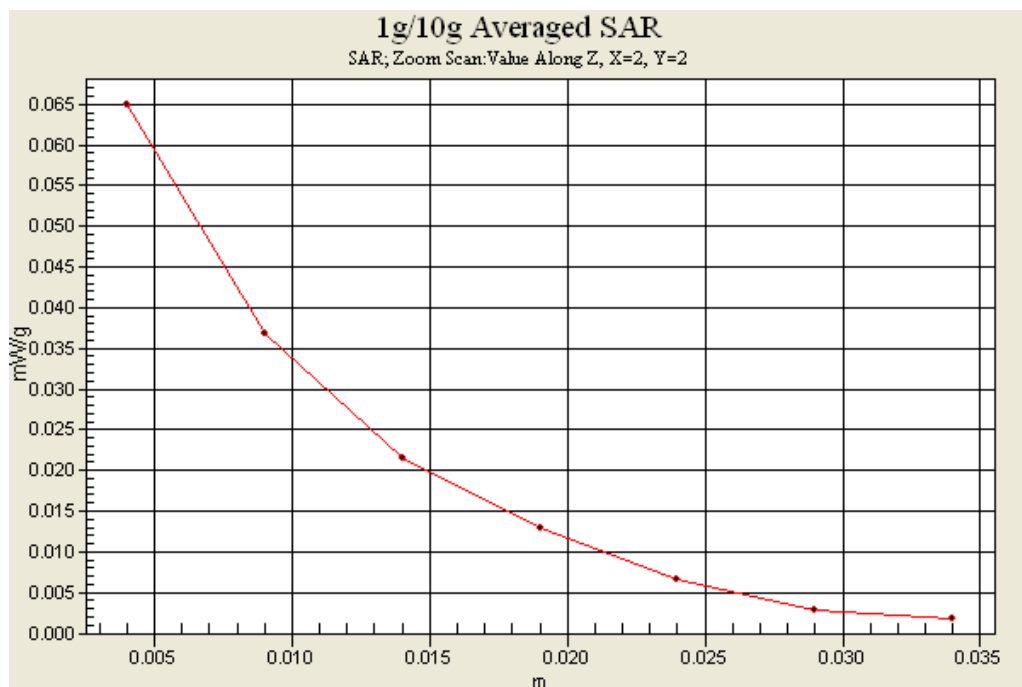
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.22 V/m; Power Drift = 0.076 dB

Peak SAR (extrapolated) = 0.106 W/kg

SAR(1 g) = 0.058 mW/g; SAR(10 g) = 0.028 mW/g

Maximum value of SAR (measured) = 0.065 mW/g



APPENDIX F

Probe Calibration



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 **Samsung (Dymstec)**

Certificate No: **EX3-3752_Jan12**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3752**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-14 v3, QA CAL-23 v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **January 27, 2012**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			
Issued: January 27, 2012			



Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}:** Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}:** DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR:** PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}:** A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters:** Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy):** in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset:** The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3752

Manufactured: March 16, 2010
Calibrated: January 27, 2012

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3752

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V/m})^2$) ^A	0.46	0.53	0.52	$\pm 10.1 \%$
DCP (mV) ^B	100.4	102.5	97.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^C (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	109.4	$\pm 3.0 \%$
			Y	0.00	0.00	1.00	90.2	
			Z	0.00	0.00	1.00	114.6	

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.

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3752

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.36	9.36	9.36	0.44	0.85	± 12.0 %
850	41.5	0.92	8.98	8.98	8.98	0.26	1.14	± 12.0 %
1750	40.1	1.37	7.96	7.96	7.96	0.76	0.56	± 12.0 %
1900	40.0	1.40	7.75	7.75	7.75	0.58	0.67	± 12.0 %
2000	40.0	1.40	7.63	7.63	7.63	0.69	0.61	± 12.0 %
2450	39.2	1.80	6.93	6.93	6.93	0.34	0.89	± 12.0 %
2600	39.0	1.96	6.78	6.78	6.78	0.41	0.83	± 12.0 %
3500	37.9	2.91	6.60	6.60	6.60	0.20	1.83	± 13.1 %

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

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3752

Calibration Parameter Determined in Body Tissue Simulating Media

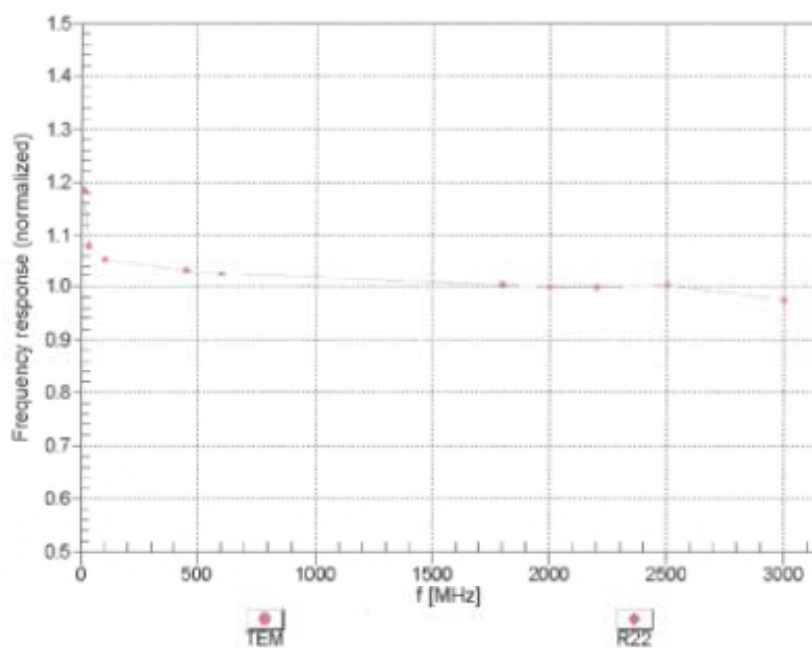
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.23	9.23	9.23	0.48	0.79	± 12.0 %
850	55.2	0.99	8.97	8.97	8.97	0.20	1.46	± 12.0 %
1750	53.4	1.49	7.79	7.79	7.79	0.45	0.85	± 12.0 %
1900	53.3	1.52	7.38	7.38	7.38	0.31	1.01	± 12.0 %
2450	52.7	1.95	6.98	6.98	6.98	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.73	6.73	6.73	0.80	0.50	± 12.0 %
3500	51.3	3.31	5.99	5.99	5.99	0.34	1.24	± 13.1 %

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

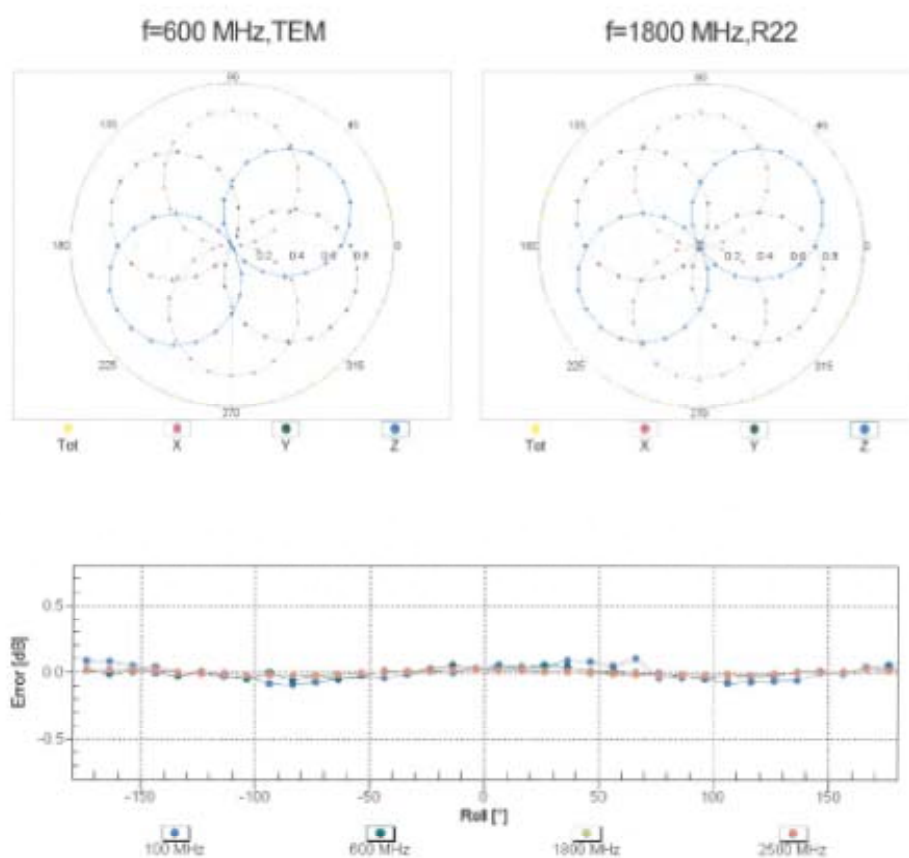
^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty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

Frequency Response of E-Field

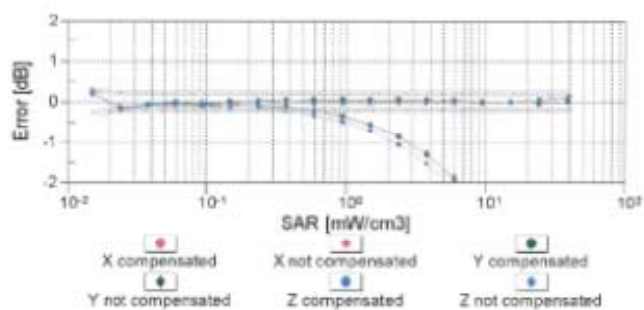
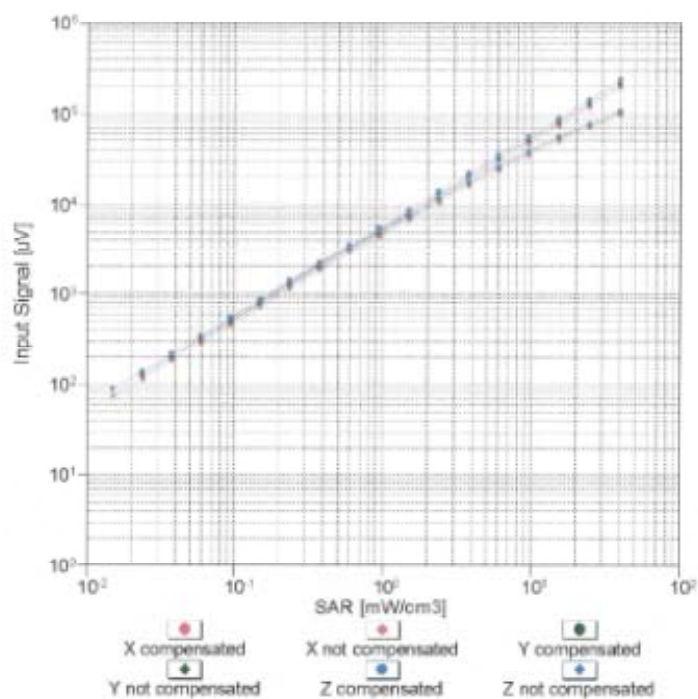
(TEM-Cell:ifi110 EXX, Waveguide: R22)



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

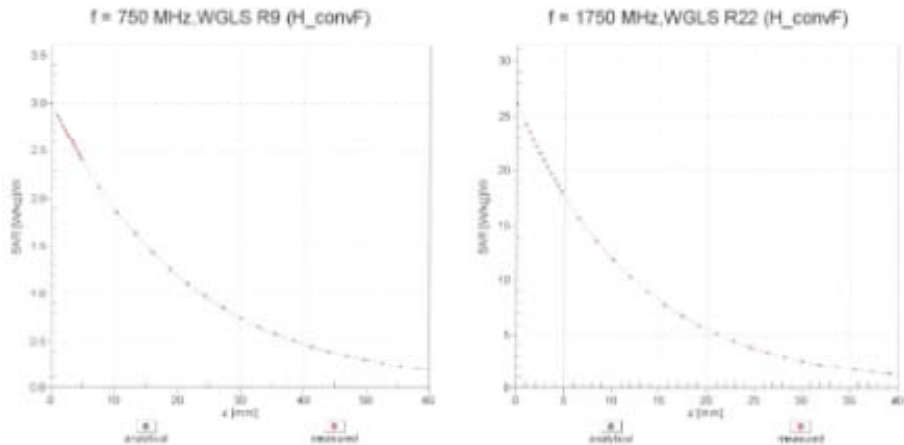
Receiving Pattern (ϕ), $\theta = 0^\circ$ **Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)**

Dynamic Range f(SAR_{head}) (TEM cell , f = 900 MHz)

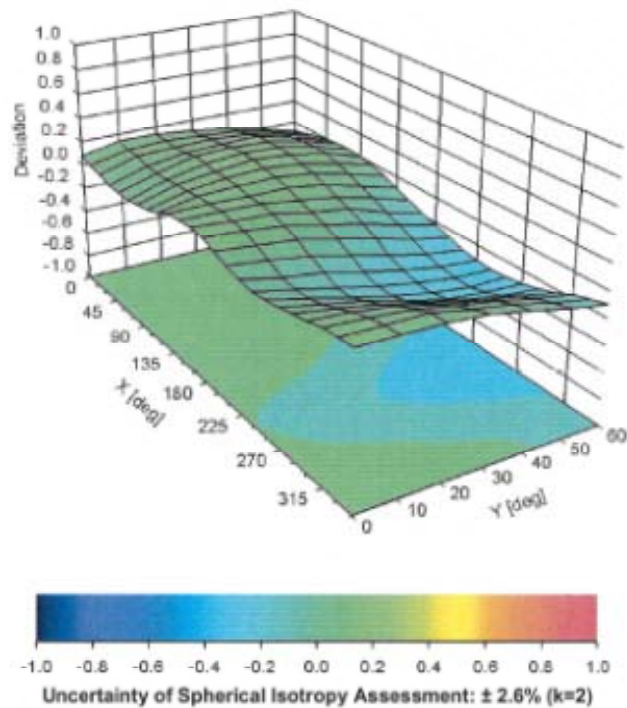


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



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



DASY/EASY - Parameters of Probe: EX3DV4 - SN:3752**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	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

APPENDIX G

Calibration of The Validation Dipole



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 **Samsung (Dymstec)**

Certificate No: **D835V2-4d111_Nov11**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d111**

Calibration procedure(s) **QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **November 18, 2011**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES2DV2	SN: 2206	29-Apr-11 (No. ES2-2206_Apr11)	Apr 12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	in house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	in house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	in house check: Oct-12

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 18, 2011

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: SCS 108

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

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	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.4 $\pm$ 6 %	0.90 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.36 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.43 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	1.55 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.20 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	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.3 $\pm$ 6 %	0.99 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.44 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.54 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.29 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.2 Ω - 3.1 j Ω
Return Loss	- 28.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1 Ω - 4.7 j Ω
Return Loss	- 25.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.399 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	May 26, 2010

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d111

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.9$ mho/m; $\epsilon_r = 41.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Head Tissue/ $P_{in}=250$ mW, $d=15$ mm/Zoom Scan (7x7x7)/Cube 0:

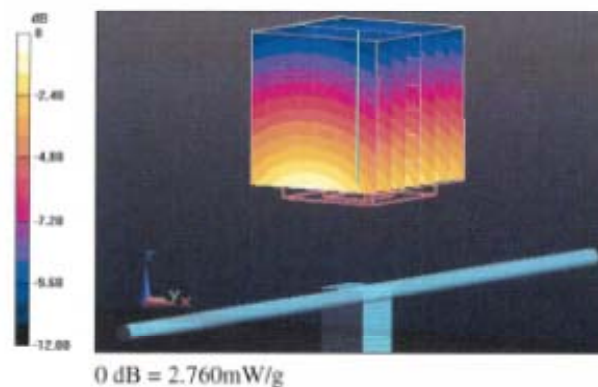
Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 57.200 V/m; Power Drift = 0.0057 dB

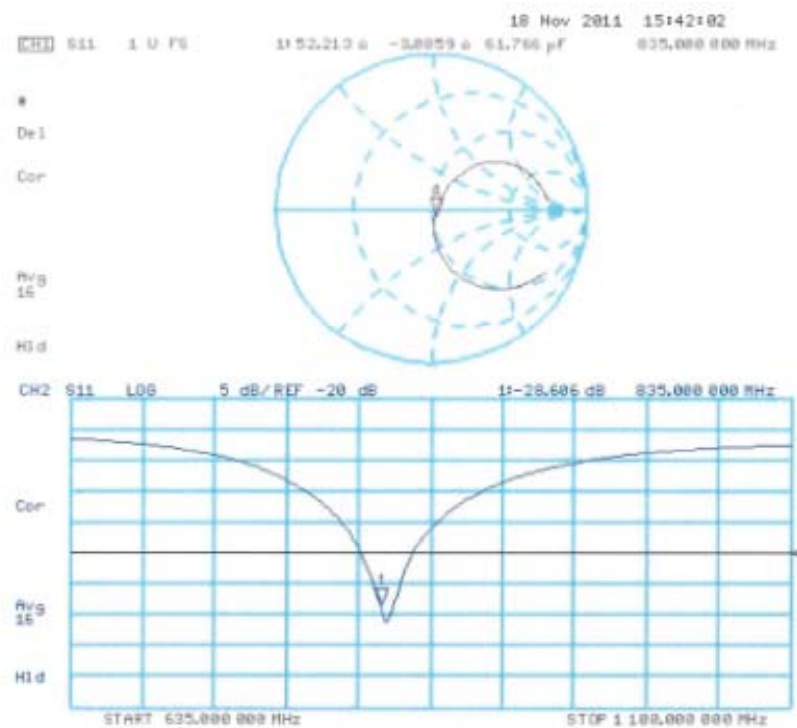
Peak SAR (extrapolated) = 3.474 W/kg

SAR(1 g) = 2.36 mW/g; SAR(10 g) = 1.55 mW/g

Maximum value of SAR (measured) = 2.755 mW/g



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 18.11.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d111

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.99$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Body Tissue/ $P_{in}=250$ mW, $d=15$ mm/Zoom Scan (7x7x7)/Cube 0:

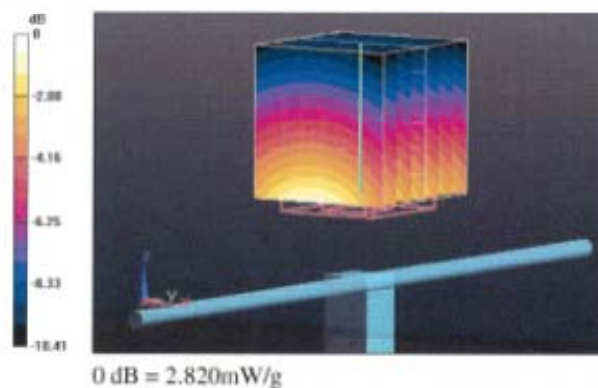
Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 55.351 V/m; Power Drift = 0.009 dB

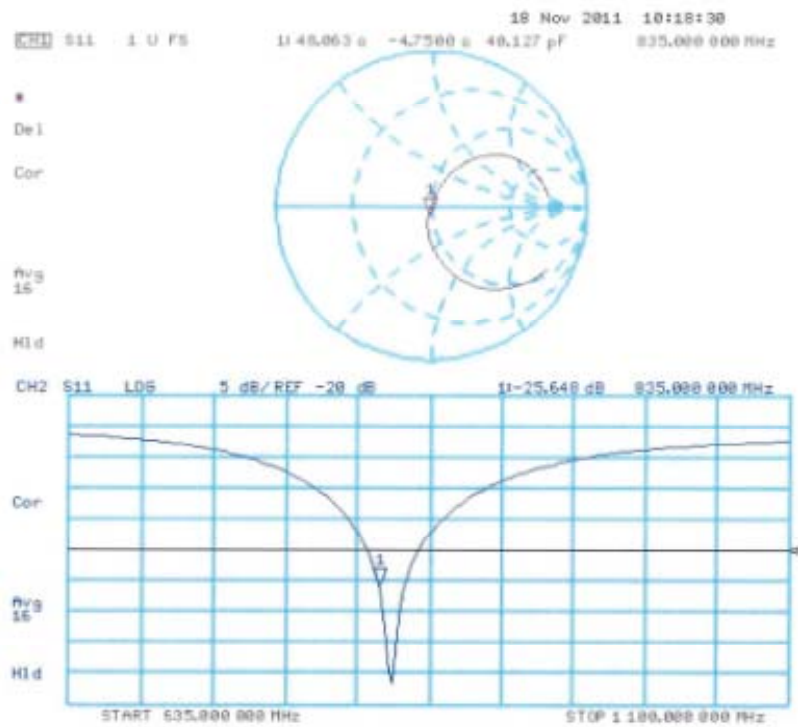
Peak SAR (extrapolated) = 3.538 W/kg

SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g

Maximum value of SAR (measured) = 2.821 mW/g



Impedance Measurement Plot for Body TSL





Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Client **Samsung (Dymstec)**

Certificate No: **D1900V2-5d023_Jan12**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d023**

Calibration procedure(s) **QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **January 26, 2012**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by: **Name: Dimce Iliev Function: Laboratory Technician Signature: [Signature]**

Approved by: **Katja Pokovic Technical Manager [Signature]**

Issued: January 26, 2012

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: SCS 108

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

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	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 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	40.8 $\pm$ 6 %	1.39 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.66 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	39.0 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	5.07 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.4 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 $\pm$ 0.2) °C	52.9 $\pm$ 6 %	1.52 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.72 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	38.8 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.10 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.4 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$48.9 \Omega + 8.1 j\Omega$
Return Loss	- 21.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$45.3 \Omega + 8.2 j\Omega$
Return Loss	- 20.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.203 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d023

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 40.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

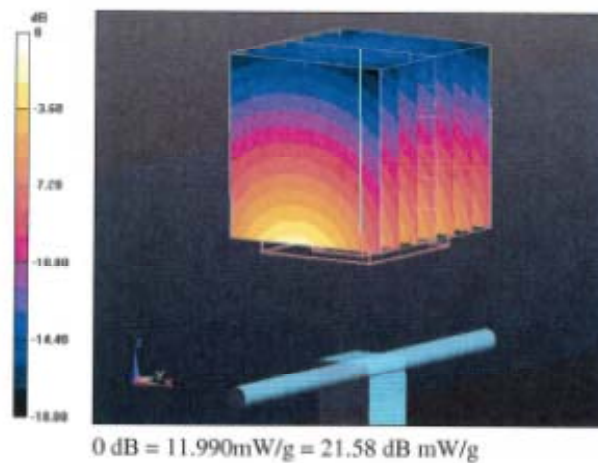
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.841 V/m; Power Drift = 0.03 dB

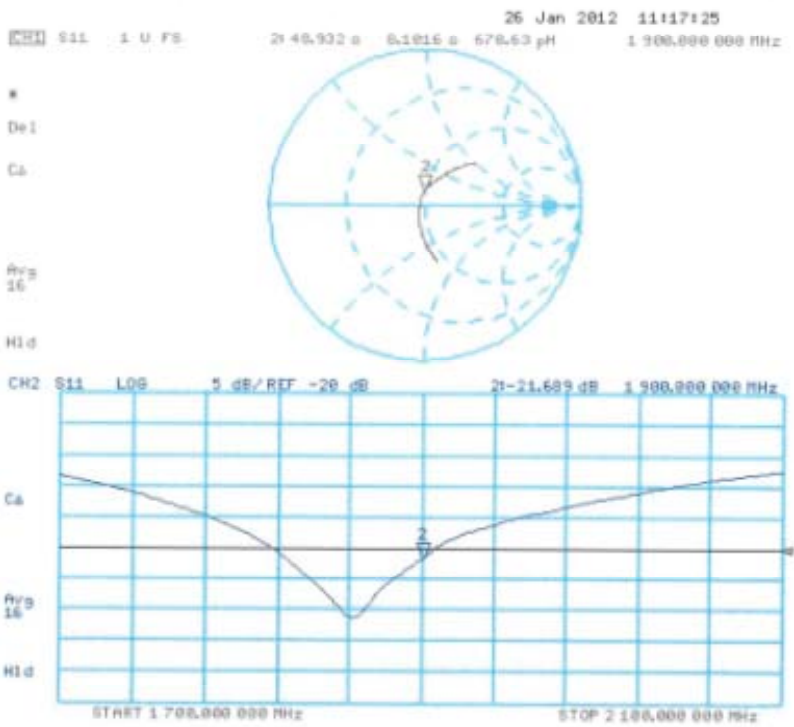
Peak SAR (extrapolated) = 17.2900

SAR(1 g) = 9.66 mW/g; SAR(10 g) = 5.07 mW/g

Maximum value of SAR (measured) = 11.991 mW/g



Impedance Measurement Plot for Head TSL



Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d023

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 52.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

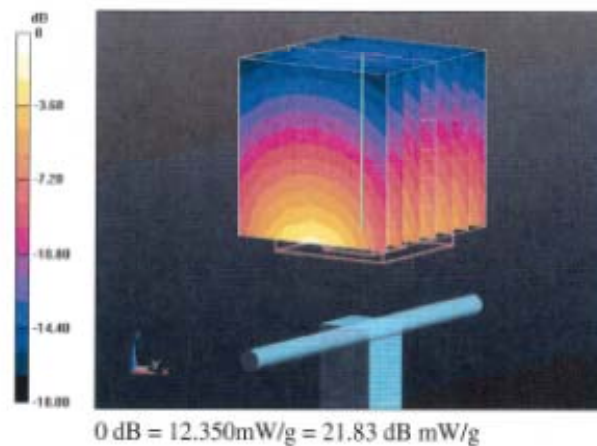
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.052 V/m; Power Drift = -6.9e-005 dB

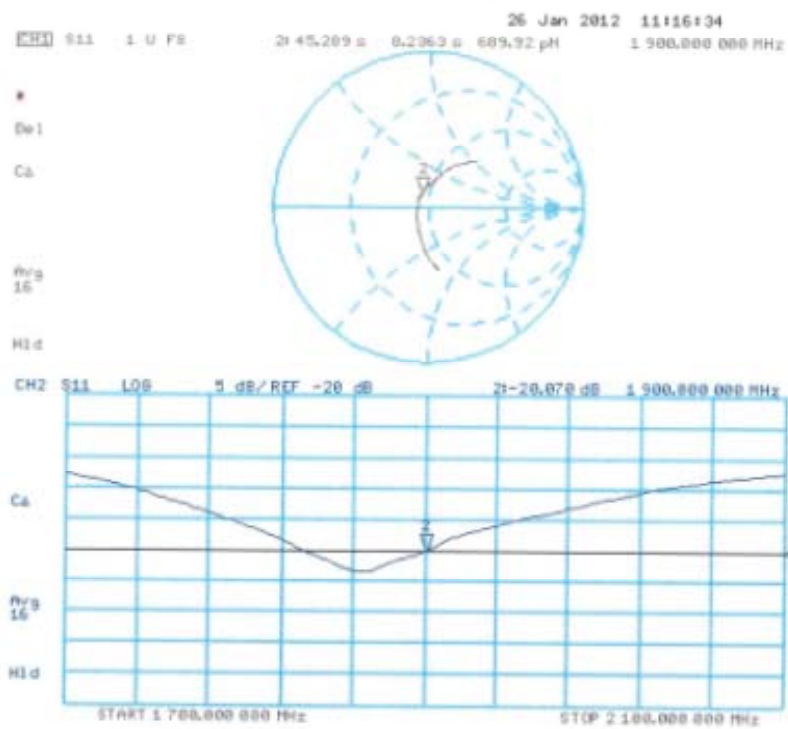
Peak SAR (extrapolated) = 17.0640

SAR(1 g) = 9.72 mW/g; SAR(10 g) = 5.1 mW/g

Maximum value of SAR (measured) = 12.349 mW/g



Impedance Measurement Plot for Body TSL





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 **Samsung (Dymstec)**

Certificate No: **D2450V2-807_Feb12**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 807**

Calibration procedure(s) **QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **February 23, 2012**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe FS3DV3	SN: 3205	30-Dec-11 (No. FS3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israa El-Nabouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 23, 2012

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
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	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	38.9 $\pm$ 6 %	1.86 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.6 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	53.5 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	6.25 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	24.8 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	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.3 $\pm$ 6 %	2.02 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.8 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	50.3 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.95 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	23.6 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$53.3 \Omega + 1.1 j\Omega$
Return Loss	- 29.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$49.6 \Omega + 2.6 j\Omega$
Return Loss	- 31.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.160 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 02, 2006

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 807

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.86$ mho/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

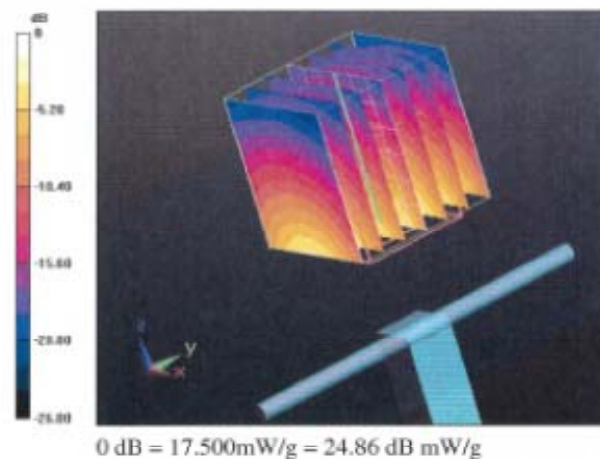
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 100.1 V/m; Power Drift = 0.07 dB

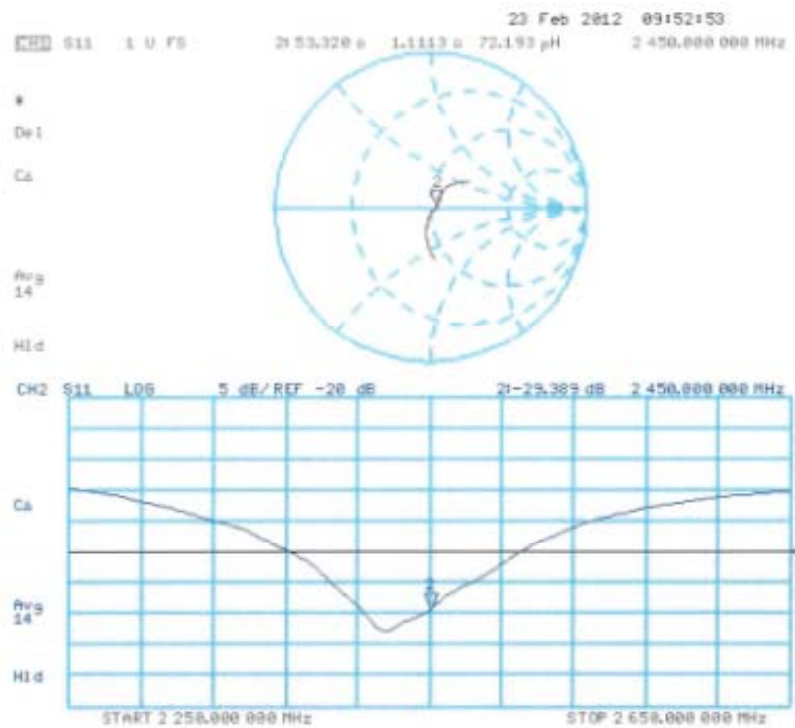
Peak SAR (extrapolated) = 28.6750

SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.25 mW/g

Maximum value of SAR (measured) = 17.500 mW/g



Impedance Measurement Plot for Head TSL



Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 807

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.02$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

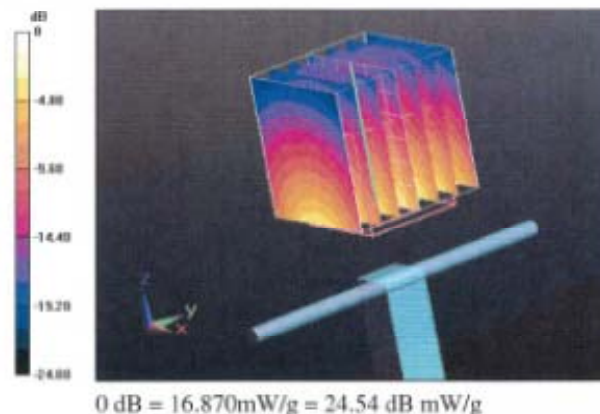
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.815 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 26.1870

SAR(1 g) = 12.8 mW/g; SAR(10 g) = 5.95 mW/g

Maximum value of SAR (measured) = 16.868 mW/g



Impedance Measurement Plot for Body TSL

