

#25_LTE Band 7_20M_QPSK(1,0)_Bottom Side 1cm_Ch21350

Communication System: FDD_LTE (0); Frequency: 2560 MHz; Duty Cycle: 1:1

Medium: MSL_2600_150328 Medium parameters used: $f = 2560$ MHz; $\sigma = 2.149$ mho/m; $\epsilon_r =$

52.782; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(6.82, 6.82, 6.82); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch21350/Area Scan (51x91x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 2.076 mW/g

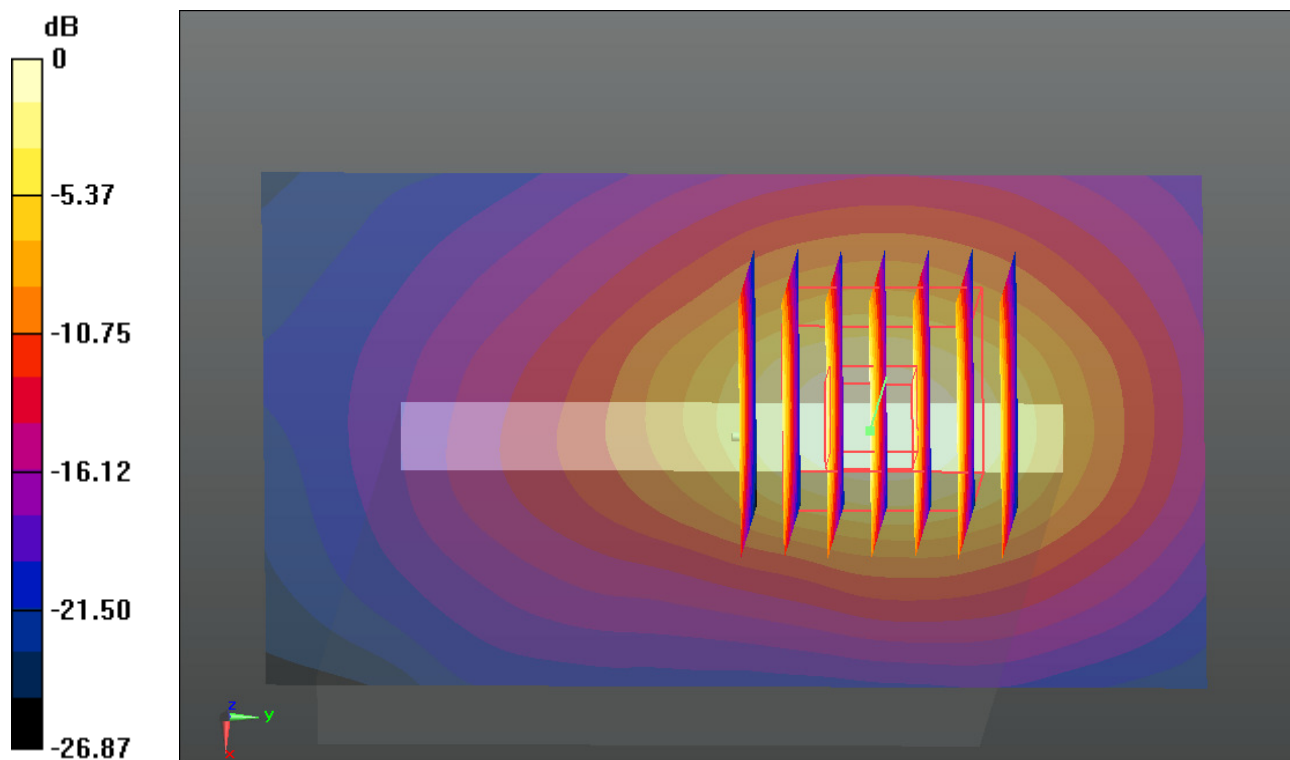
Ch21350/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.762 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 2.746 W/kg

SAR(1 g) = 1.290 mW/g; SAR(10 g) = 0.570 mW/g

Maximum value of SAR (measured) = 2.005 mW/g



#26_WLAN 2.4GHz_802.11b_1Mbps_Back 1cm_Ch11

Communication System: WIFI (0); Frequency: 2462 MHz; Duty Cycle: 1:1.024

Medium: MSL_2450_150404 Medium parameters used: $f = 2462$ MHz; $\sigma = 1.959$ mho/m; $\epsilon_r =$

50.912; $\rho = 1000$ kg/m³

Ambient Temperature : 23.9 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.14, 7.14, 7.14); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch11/Area Scan (81x151x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.776 mW/g

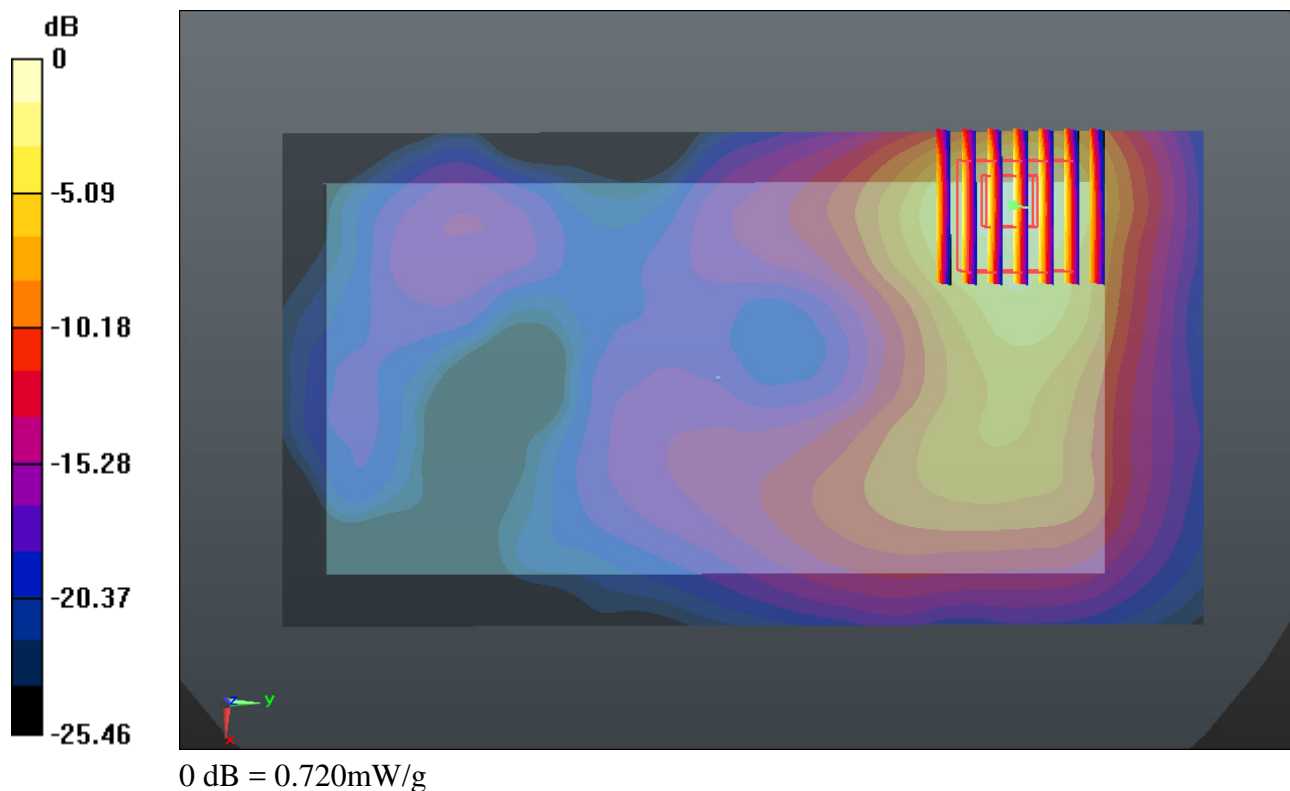
Ch11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.317 V/m; Power Drift = 0.039 dB

Peak SAR (extrapolated) = 1.021 W/kg

SAR(1 g) = 0.457 mW/g; SAR(10 g) = 0.205 mW/g

Maximum value of SAR (measured) = 0.724 mW/g



#27_WLAN 5.8GHz_802.11a_6Mbps_Right Side 1cm_Ch157

Communication System: WIFI (0); Frequency: 5785 MHz; Duty Cycle: 1:1.146

Medium: MSL_5000_150413 Medium parameters used: $f = 5785$ MHz; $\sigma = 6.214$ mho/m; $\epsilon_r =$

47.373; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(4.21, 4.21, 4.21); Calibrated: 2014.05.23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch157/Area Scan (41x181x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.475 mW/g

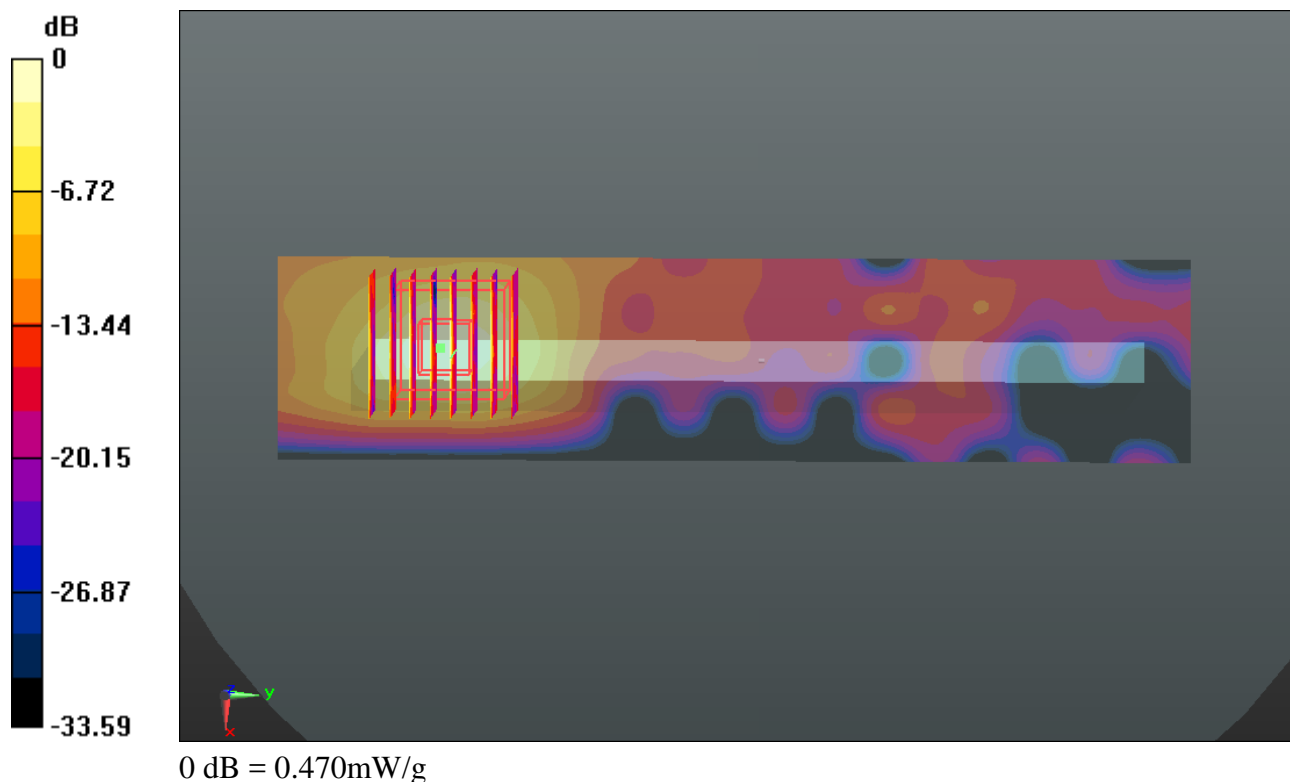
Ch157/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 1.787 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.867 W/kg

SAR(1 g) = 0.198 mW/g; SAR(10 g) = 0.062 mW/g

Maximum value of SAR (measured) = 0.474 mW/g



#28_LTE Band 2_20M_QPSK(1,0)_Back 0cm_Ch18700

Communication System: FDD_LTE (0); Frequency: 1860 MHz; Duty Cycle: 1:1

Medium: MSL_1900_150325 Medium parameters used: $f = 1860$ MHz; $\sigma = 1.495$ mho/m; $\epsilon_r =$

53.328; $\rho = 1000$ kg/m³

Ambient Temperature : 23.0 °C ; Liquid Temperature : 22.0 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.56, 7.56, 7.56); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch18700/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 7.045 mW/g

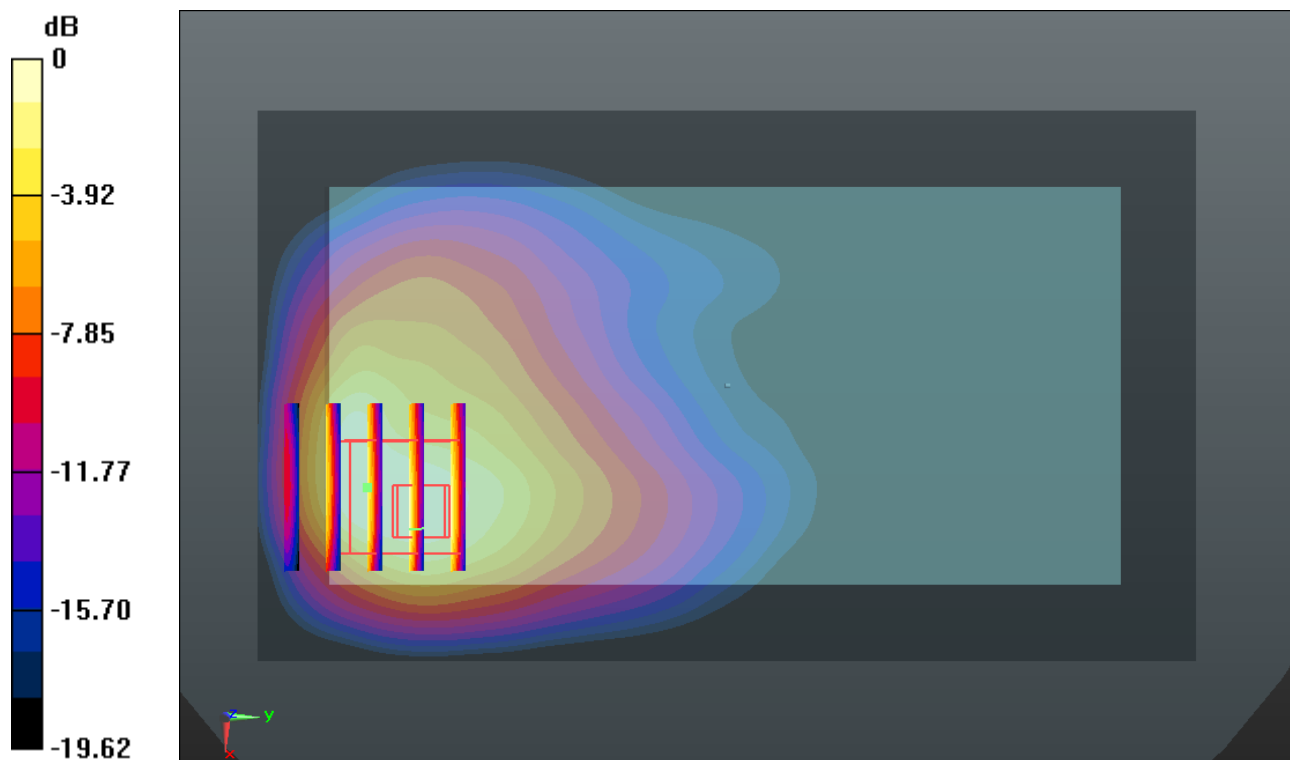
Ch18700/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.822 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 7.951 W/kg

SAR(1 g) = 4.24 mW/g; SAR(10 g) = 2.220 mW/g

Maximum value of SAR (measured) = 5.830 mW/g



0 dB = 5.830mW/g

#29_LTE Band 7_20M_QPSK(1,0)_Bottom Side 0cm_Ch21350

Communication System: FDD_LTE (0); Frequency: 2560 MHz; Duty Cycle: 1:1

Medium: MSL_2600_150328 Medium parameters used: $f = 2560$ MHz; $\sigma = 2.149$ mho/m; $\epsilon_r =$

52.782; $\rho = 1000$ kg/m³

Ambient Temperature : 23.0 °C; Liquid Temperature : 22.0 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(6.82, 6.82, 6.82); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch21350/Area Scan (41x101x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 17.094 mW/g

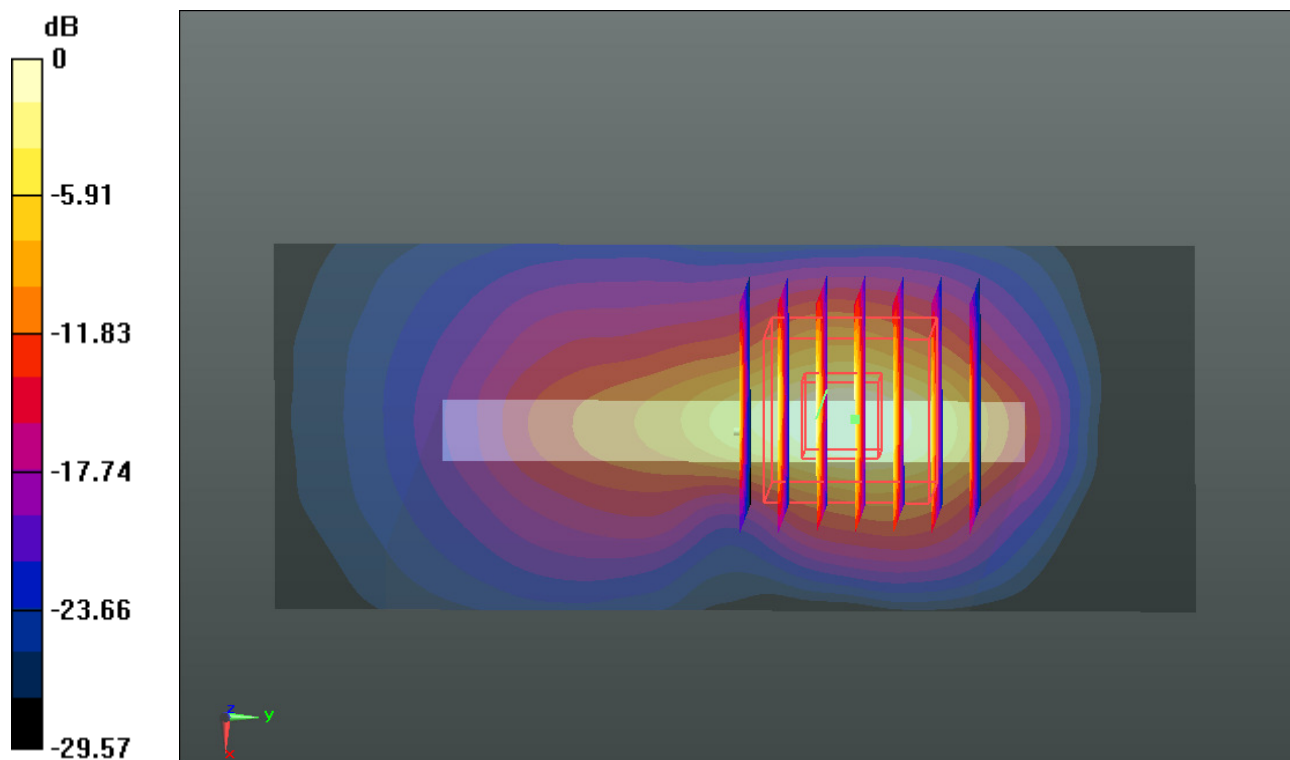
Ch21350/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 42.436 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 24.862 W/kg

SAR(1 g) = 9.62 mW/g; SAR(10 g) = 3.430 mW/g

Maximum value of SAR (measured) = 16.586 mW/g



0 dB = 16.590mW/g

#30_GSM850_GPRS (4 Tx slots)_Back 1cm_Ch251

Communication System: GPRS/EDGE (4 Tx slots) (0); Frequency: 848.8 MHz; Duty Cycle: 1:2.08
Medium: MSL_835_150325 Medium parameters used: $f = 849$ MHz; $\sigma = 0.994$ mho/m; $\epsilon_r = 54.329$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(9.31, 9.31, 9.31); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch251/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.709 mW/g

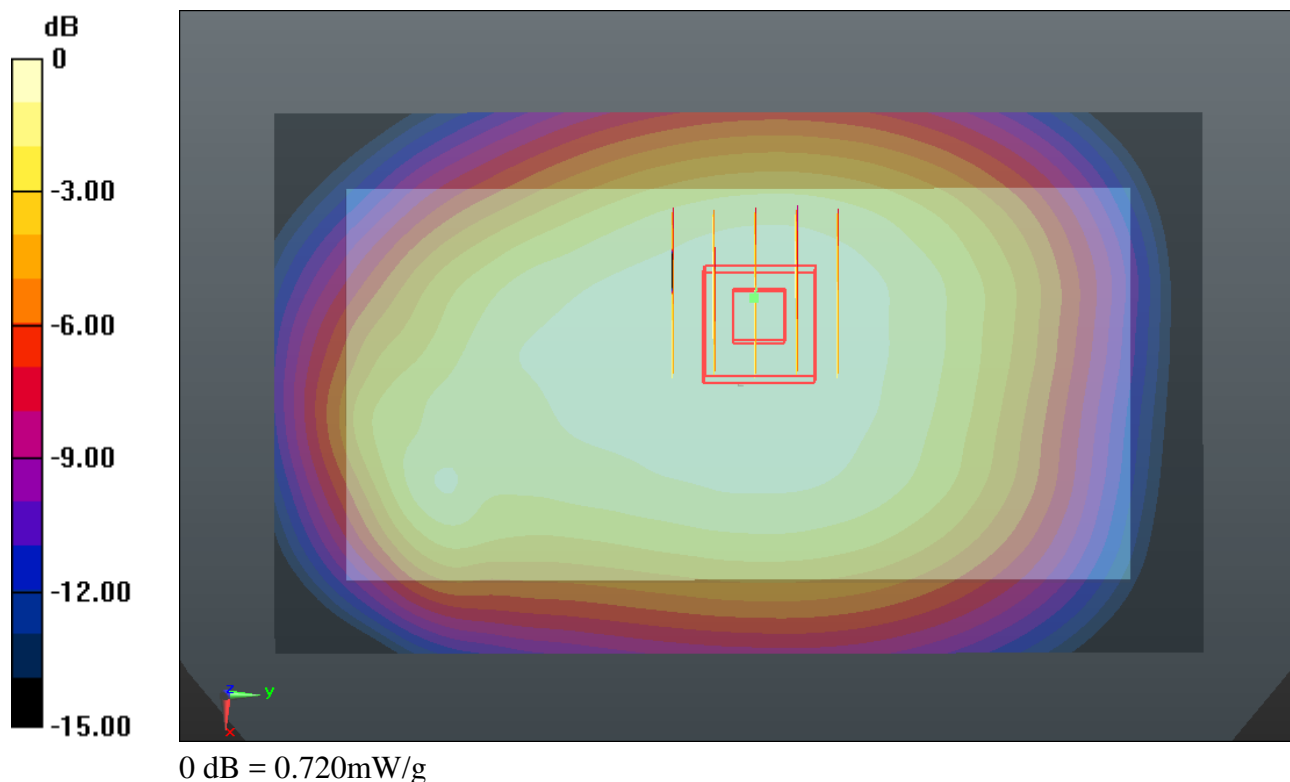
Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 24.928 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 1.100 W/kg

SAR(1 g) = 0.622 mW/g; SAR(10 g) = 0.476 mW/g

Maximum value of SAR (measured) = 0.717 mW/g



#31_GSM1900_GPRS (4 Tx slots)_Back 1cm_Ch810

Communication System: GPRS/EDGE (4 Tx slots) (0); Frequency: 1909.8 MHz; Duty Cycle: 1:2.08
Medium: MSL_1900_150321 Medium parameters used: $f = 1909.8$ MHz; $\sigma = 1.555$ mho/m; $\epsilon_r =$

53.206; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.56, 7.56, 7.56); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch810/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.130 mW/g

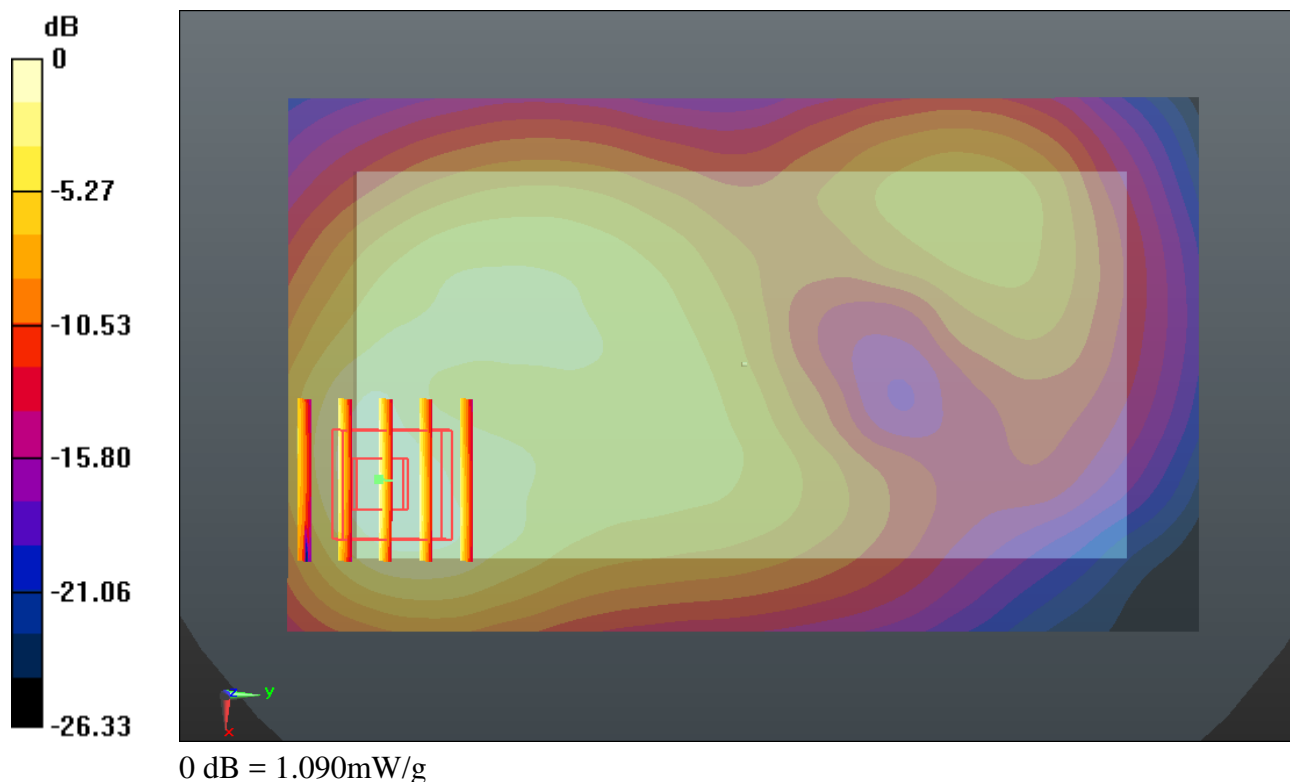
Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.536 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.317 W/kg

SAR(1 g) = 0.804 mW/g; SAR(10 g) = 0.465 mW/g

Maximum value of SAR (measured) = 1.086 mW/g



#32_WCDMA Band V_RMC12.2Kbps_Back 1cm_Ch4132

Communication System: UMTS (0); Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: MSL_835_150325 Medium parameters used: $f = 826.4$ MHz; $\sigma = 0.971$ mho/m; $\epsilon_r =$

54.557; $\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(9.31, 9.31, 9.31); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch4132/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.538 mW/g

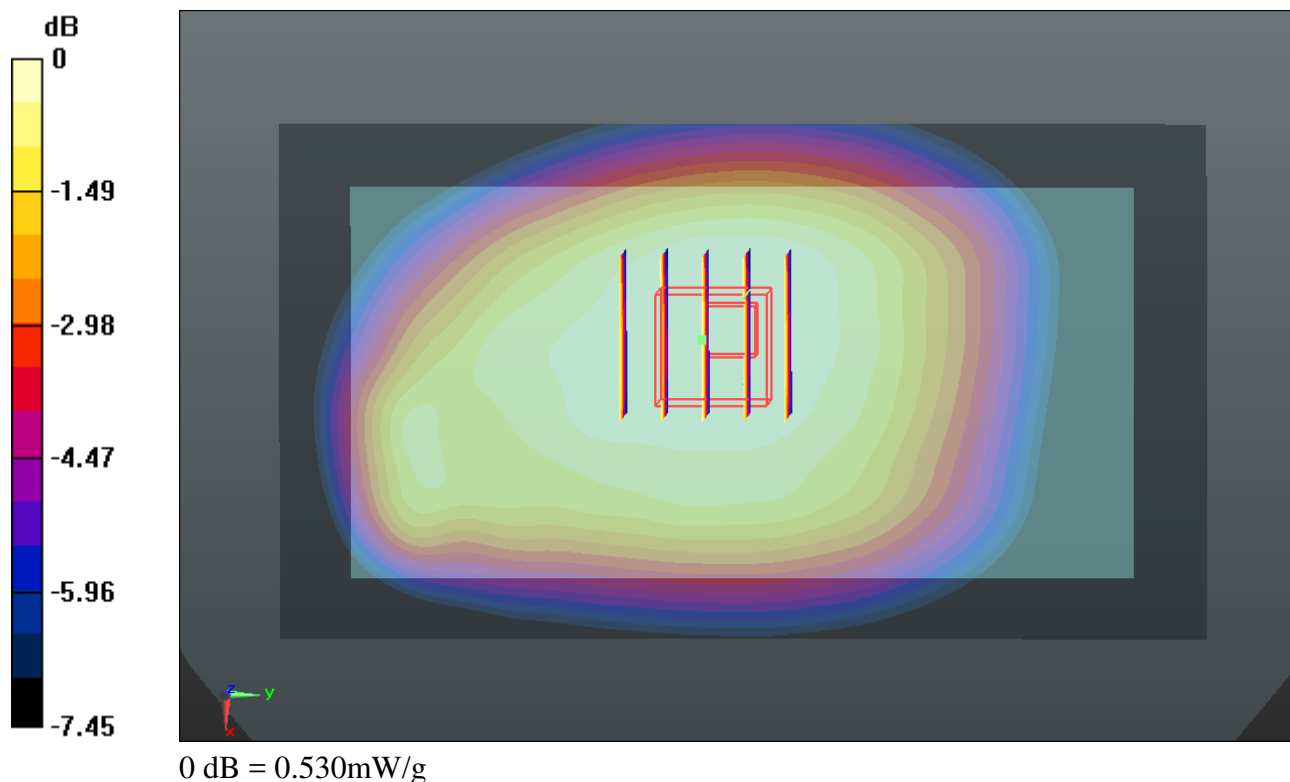
Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.225 V/m; Power Drift = -0.0085 dB

Peak SAR (extrapolated) = 0.589 W/kg

SAR(1 g) = 0.469 mW/g; SAR(10 g) = 0.367 mW/g

Maximum value of SAR (measured) = 0.535 mW/g



#33_WCDMA Band IV_RMC12.2Kbps_Back 1cm_Ch1513

Communication System: UMTS (0); Frequency: 1752.6 MHz; Duty Cycle: 1:1

Medium: MSL_1750_150325 Medium parameters used: $f = 1752.6$ MHz; $\sigma = 1.525$ mho/m; $\epsilon_r =$

54.433; $\rho = 1000$ kg/m³

Ambient Temperature : 23.9 °C; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.89, 7.89, 7.89); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch1513/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.104 mW/g

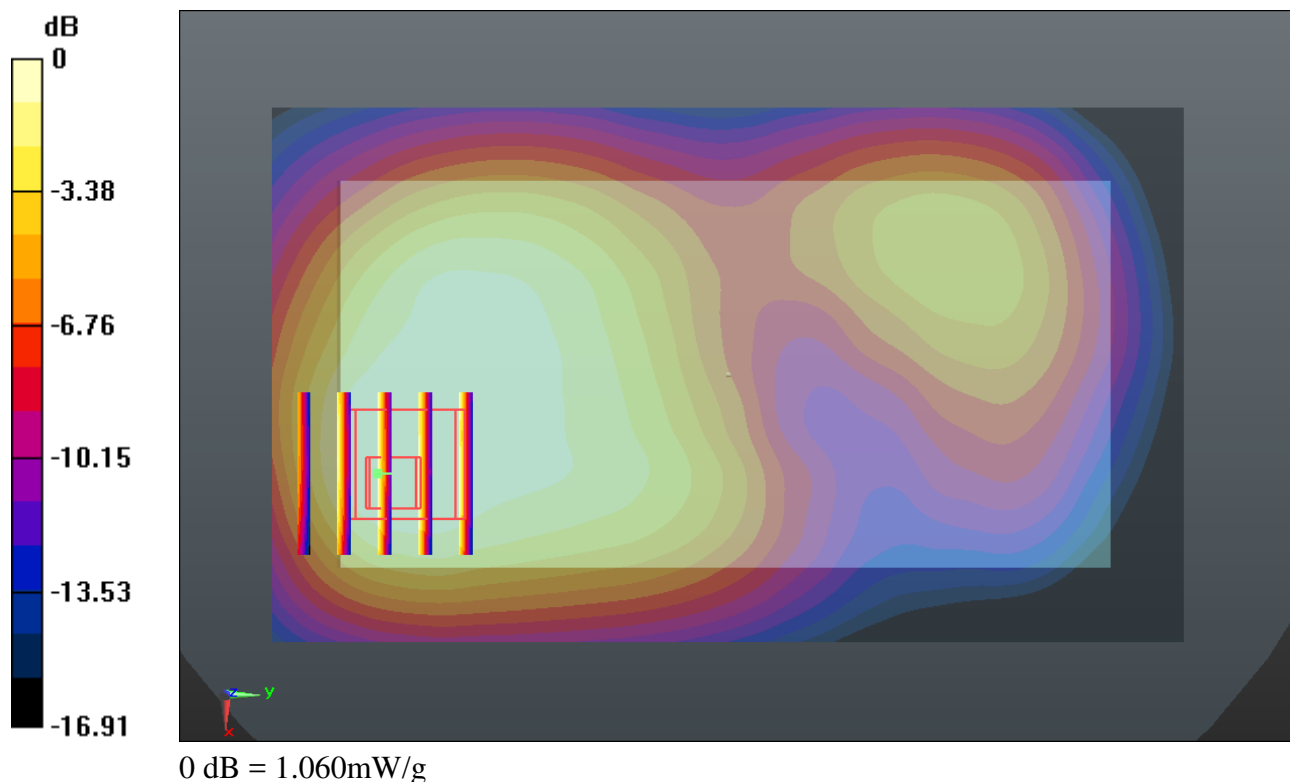
Ch1513/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.539 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 1.321 W/kg

SAR(1 g) = 0.803 mW/g; SAR(10 g) = 0.493 mW/g

Maximum value of SAR (measured) = 1.055 mW/g



#34_WCDMA Band II_RMC12.2Kbps_Back 1cm_Ch9358

Communication System: UMTS (0); Frequency: 1907.6 MHz; Duty Cycle: 1:1

Medium: MSL_1900_150321 Medium parameters used: $f = 1907.6$ MHz; $\sigma = 1.553$ mho/m; $\epsilon_r =$

53.214; $\rho = 1000$ kg/m³

Ambient Temperature : 23.0 °C; Liquid Temperature : 22.0 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.56, 7.56, 7.56); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch9538/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.443 mW/g

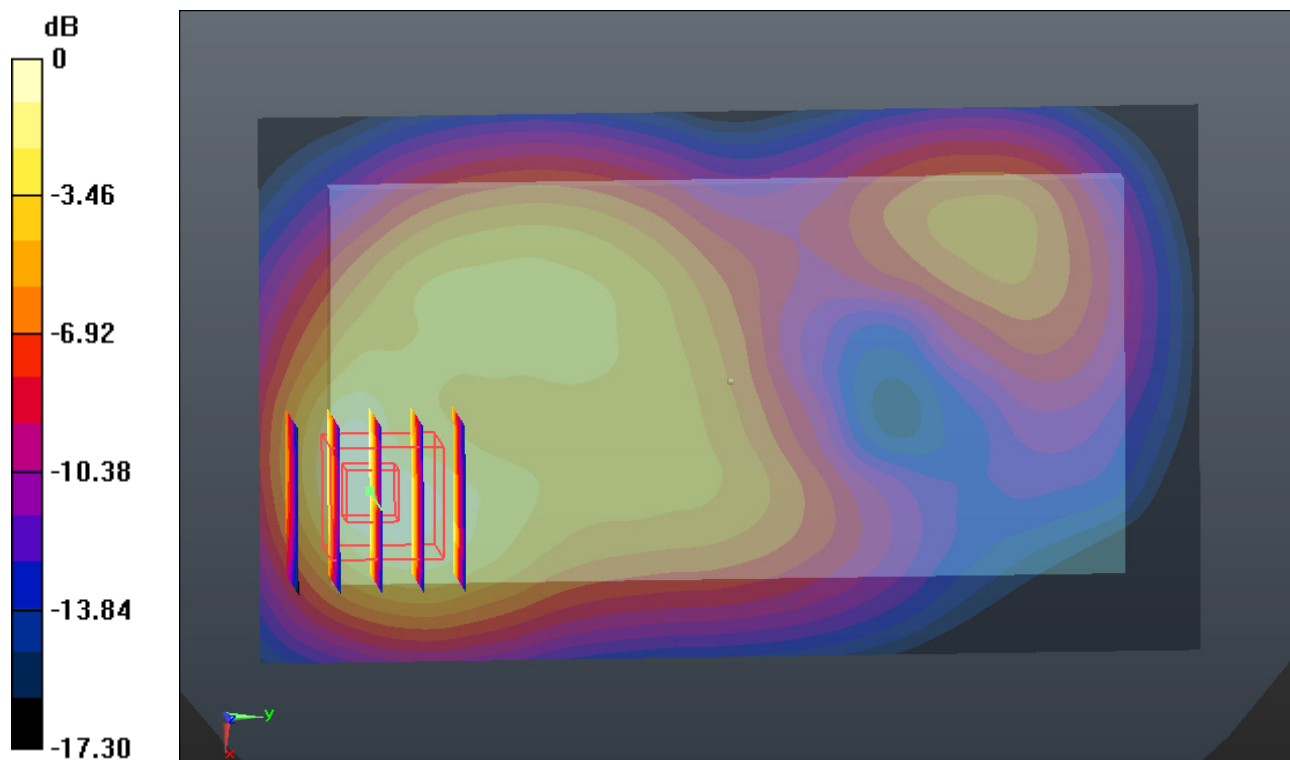
Ch9538/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.116 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 1.793 W/kg

SAR(1 g) = 1.080 mW/g; SAR(10 g) = 0.619 mW/g

Maximum value of SAR (measured) = 1.472 mW/g



0 dB = 1.470mW/g

#35_LTE Band 12_10M_QPSK(1,0)_Back 1cm_Ch23130

Communication System: FDD_LTE (0); Frequency: 711 MHz; Duty Cycle: 1:1

Medium: MSL_750_150325 Medium parameters used: $f = 711$ MHz; $\sigma = 0.934$ mho/m; $\epsilon_r = 54.838$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(9.46, 9.46, 9.46); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch23130/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.189 mW/g

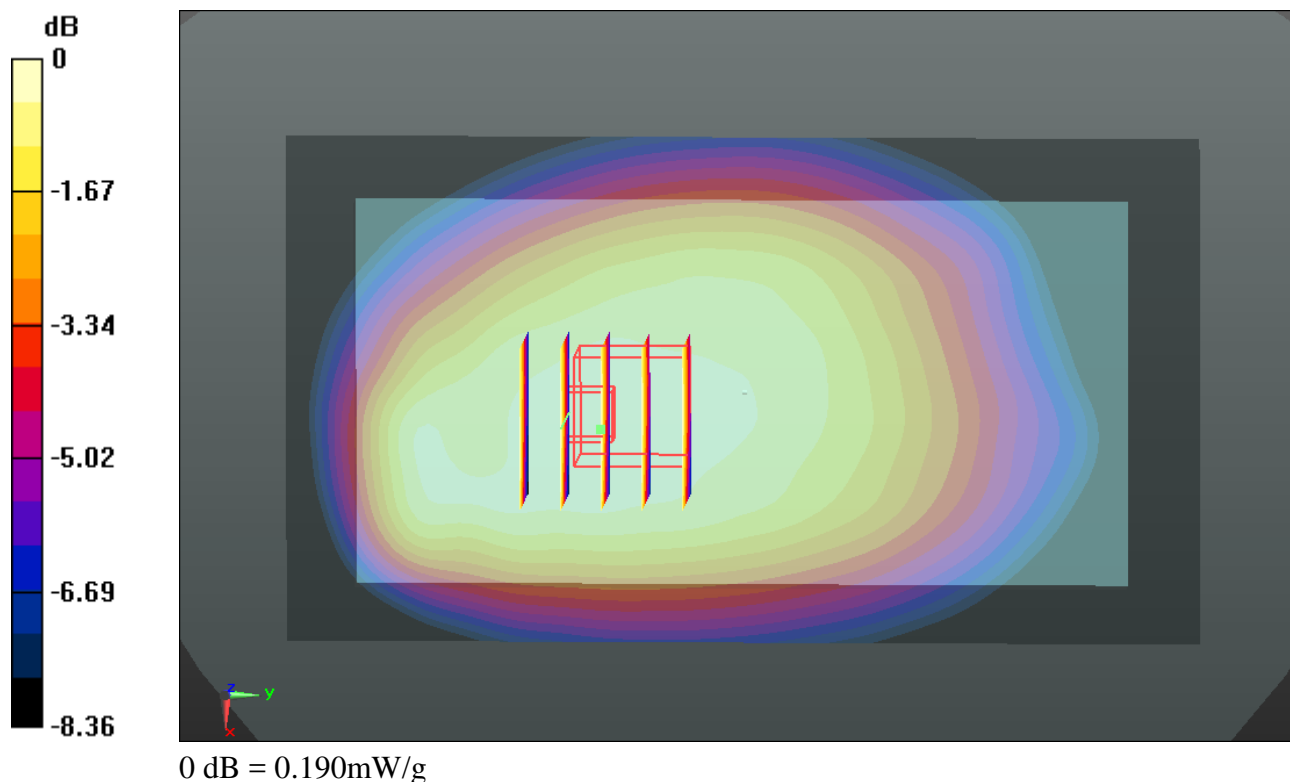
Ch23130/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.164 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.211 W/kg

SAR(1 g) = 0.168 mW/g; SAR(10 g) = 0.133 mW/g

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



#36_LTE Band 17_10M_QPSK(1,0)_Back 1cm_Ch23790

Communication System: FDD_LTE (0); Frequency: 710 MHz; Duty Cycle: 1:1

Medium: MSL_750_150325 Medium parameters used: $f = 710$ MHz; $\sigma = 0.933$ mho/m; $\epsilon_r = 54.842$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(9.46, 9.46, 9.46); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch23790/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm

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

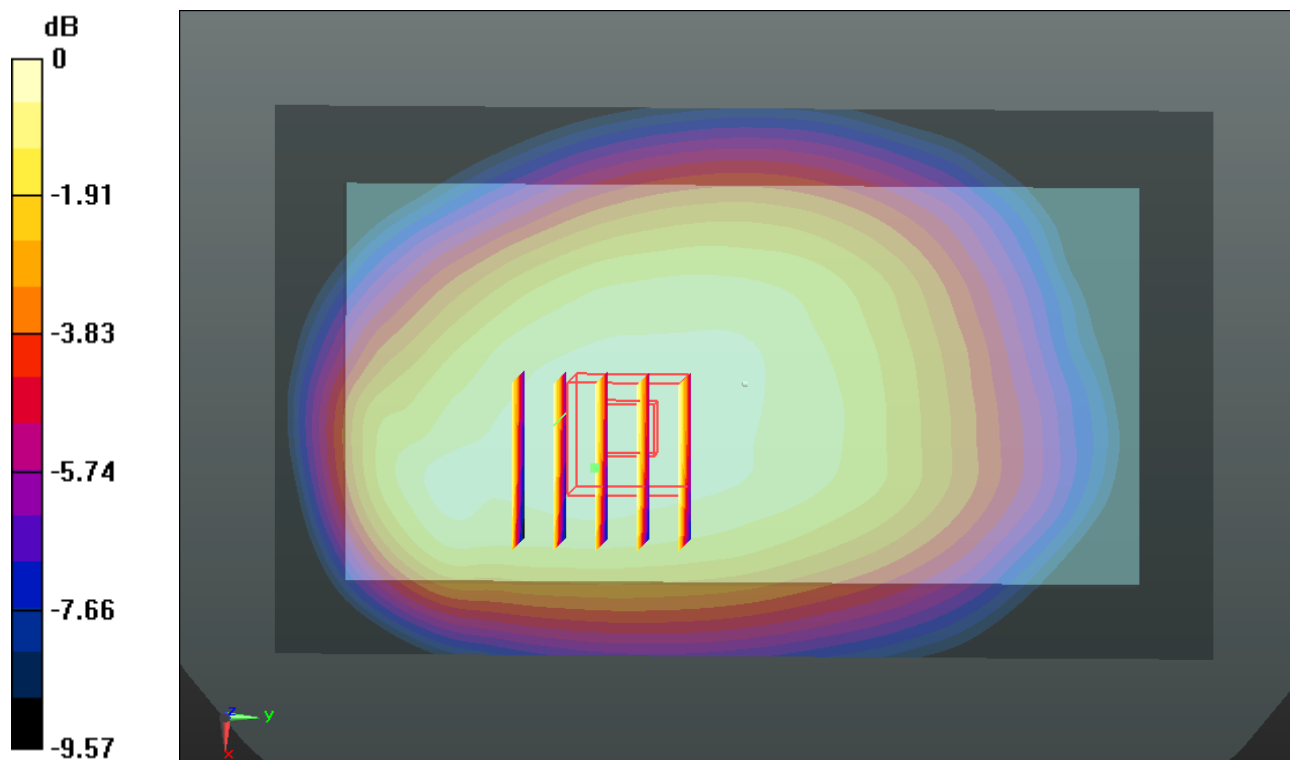
Ch23790/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.945 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.238 W/kg

SAR(1 g) = 0.190 mW/g; SAR(10 g) = 0.150 mW/g

Maximum value of SAR (measured) = 0.217 mW/g



0 dB = 0.220mW/g

#37_LTE Band 5_10M_QPSK(1,24)_Back 1cm_Ch20450

Communication System: FDD_LTE (0); Frequency: 829 MHz; Duty Cycle: 1:1

Medium: MSL_835_150325 Medium parameters used: $f = 829$ MHz; $\sigma = 0.974$ mho/m; $\epsilon_r = 54.536$;

$\rho = 1000$ kg/m³

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(9.31, 9.31, 9.31); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch20450/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.570 mW/g

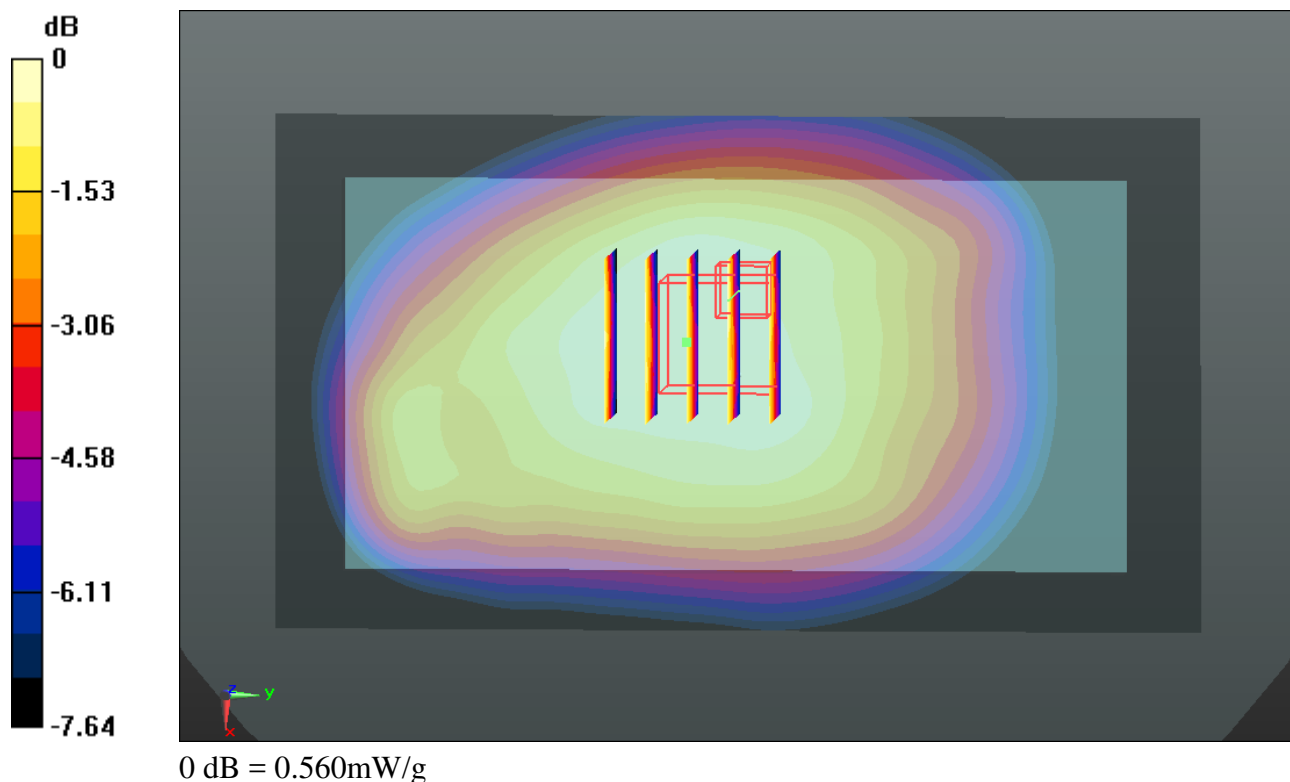
Ch20450/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.163 V/m; Power Drift = 0.031 dB

Peak SAR (extrapolated) = 0.622 W/kg

SAR(1 g) = 0.485 mW/g; SAR(10 g) = 0.364 mW/g

Maximum value of SAR (measured) = 0.564 mW/g



#38_LTE Band 4_20M_QPSK(1,0)_Front 1cm_Ch20300

Communication System: FDD_LTE (0); Frequency: 1745 MHz; Duty Cycle: 1:1

Medium: MSL_1750_150325 Medium parameters used: $f = 1745$ MHz; $\sigma = 1.516$ mho/m; $\epsilon_r =$

54.446; $\rho = 1000$ kg/m³

Ambient Temperature : 23.9 °C; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.89, 7.89, 7.89); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch20300/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.168 mW/g

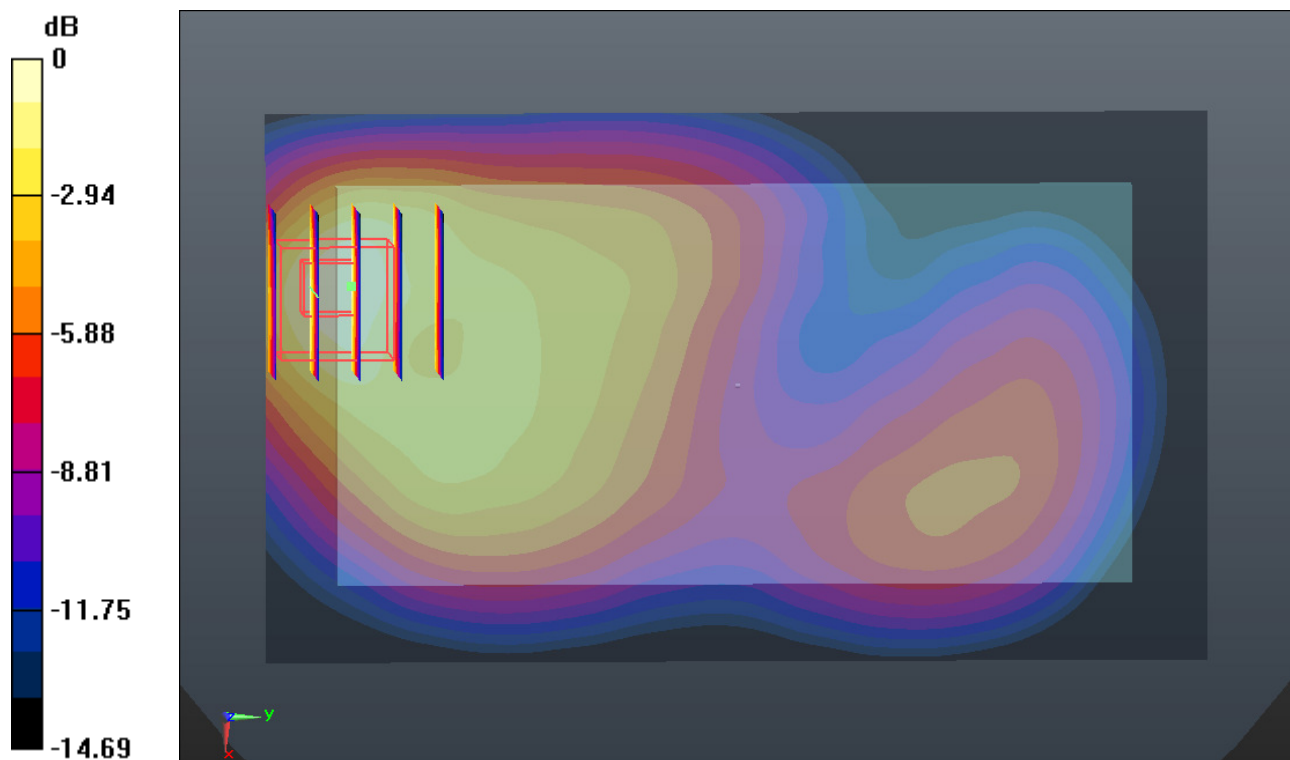
Ch20300/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.207 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 1.430 W/kg

SAR(1 g) = 0.872 mW/g; SAR(10 g) = 0.494 mW/g

Maximum value of SAR (measured) = 1.110 mW/g



#39_LTE Band 2_20M_QPSK(1,0)_Back 1cm_Ch19100_Headset 1

Communication System: FDD_LTE (0); Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: MSL_1900_150325 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.544$ mho/m; $\epsilon_r =$

53.236; $\rho = 1000$ kg/m³

Ambient Temperature : 23.8 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.56, 7.56, 7.56); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch19100/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.578 mW/g

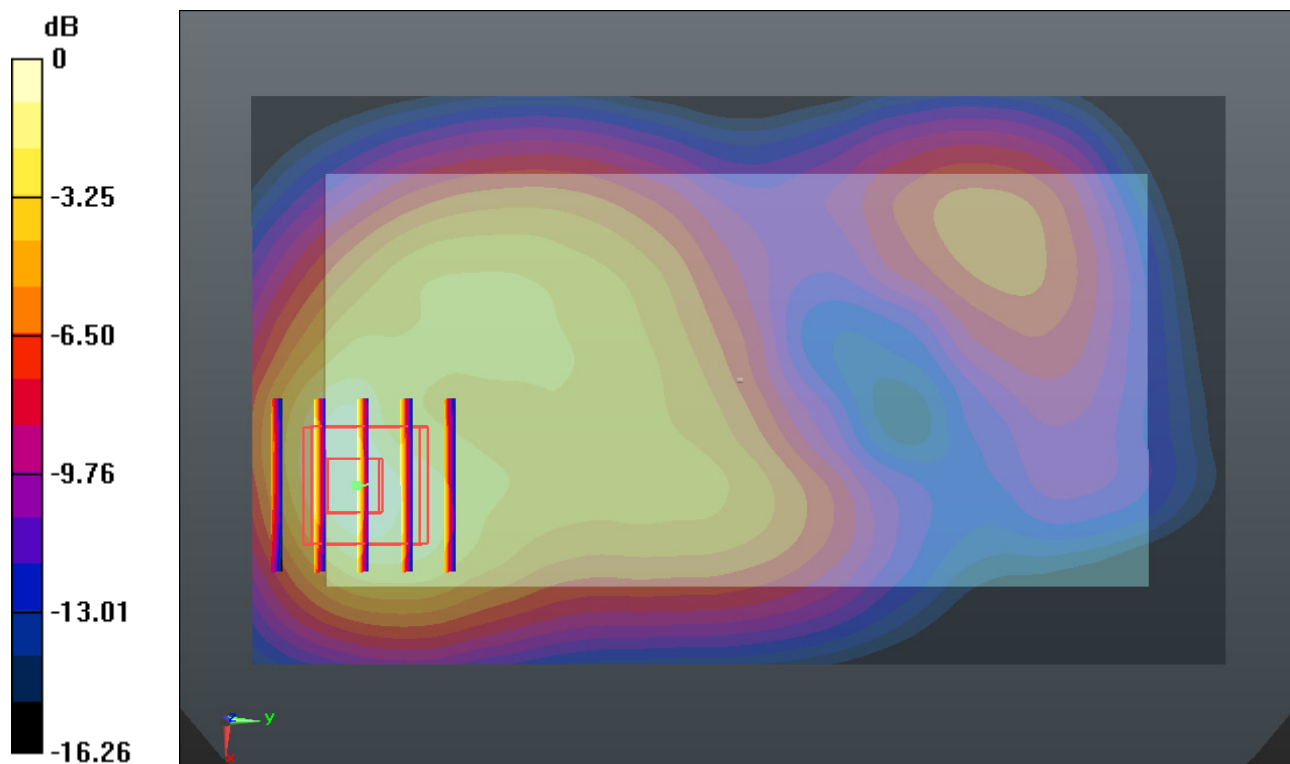
Ch19100/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.962 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 1.881 W/kg

SAR(1 g) = 1.160 mW/g; SAR(10 g) = 0.685 mW/g

Maximum value of SAR (measured) = 1.562 mW/g



0 dB = 1.560mW/g

#40_LTE Band 7_20M_QPSK(1,0)_Back 1cm_Ch21350

Communication System: FDD_LTE (0); Frequency: 2560 MHz; Duty Cycle: 1:1

Medium: MSL_2600_150328 Medium parameters used: $f = 2560$ MHz; $\sigma = 2.149$ mho/m; $\epsilon_r =$

52.782; $\rho = 1000$ kg/m³

Ambient Temperature : 23.0 °C ; Liquid Temperature : 22.0 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(6.82, 6.82, 6.82); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch21350/Area Scan (81x151x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 2.148 mW/g

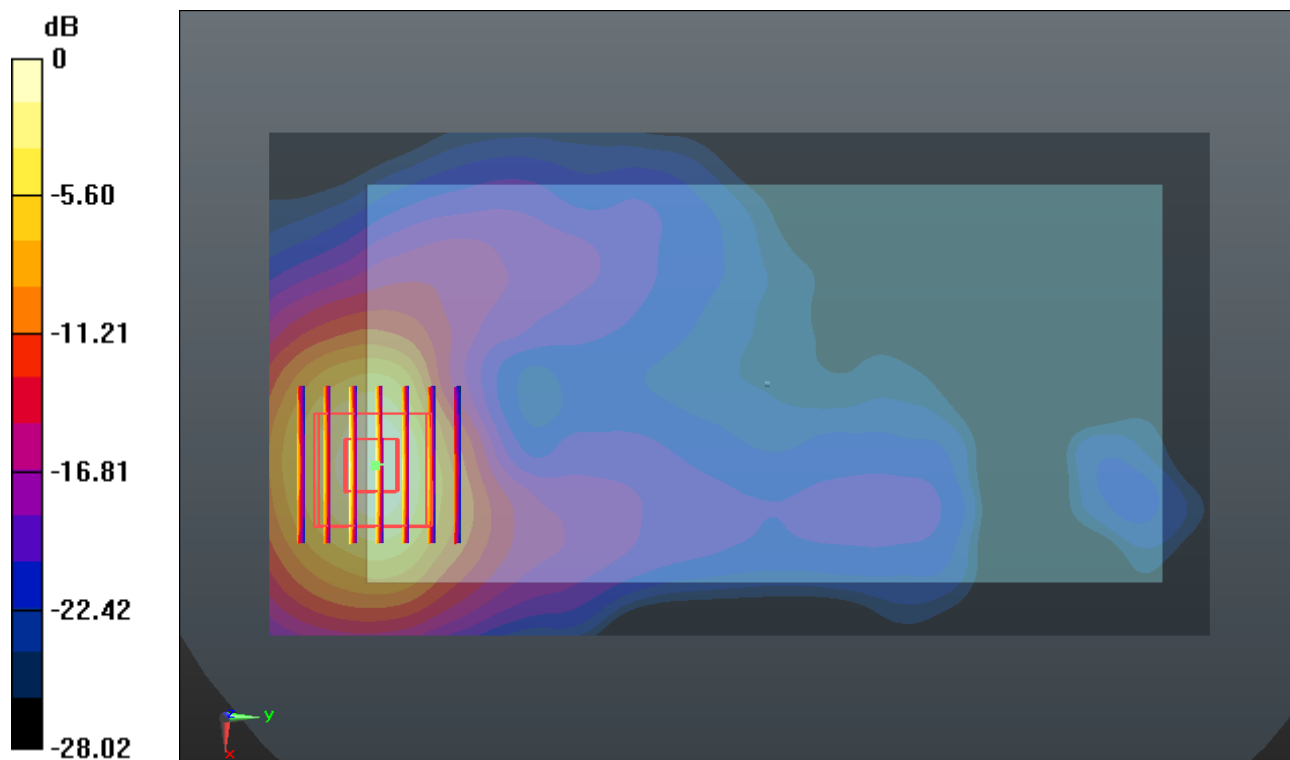
Ch21350/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.642 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 2.742 W/kg

SAR(1 g) = 1.270 mW/g; SAR(10 g) = 0.551 mW/g

Maximum value of SAR (measured) = 2.009 mW/g



0 dB = 2.010mW/g

#41_WLAN 2.4GHz_802.11b_1Mbps_Back 1cm_Ch11

Communication System: WIFI (0); Frequency: 2462 MHz; Duty Cycle: 1:1.024

Medium: MSL_2450_150404 Medium parameters used: $f = 2462$ MHz; $\sigma = 1.959$ mho/m; $\epsilon_r =$

50.912; $\rho = 1000$ kg/m³

Ambient Temperature : 23.9 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.14, 7.14, 7.14); Calibrated: 2014.05.23
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch11/Area Scan (81x151x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 0.776 mW/g

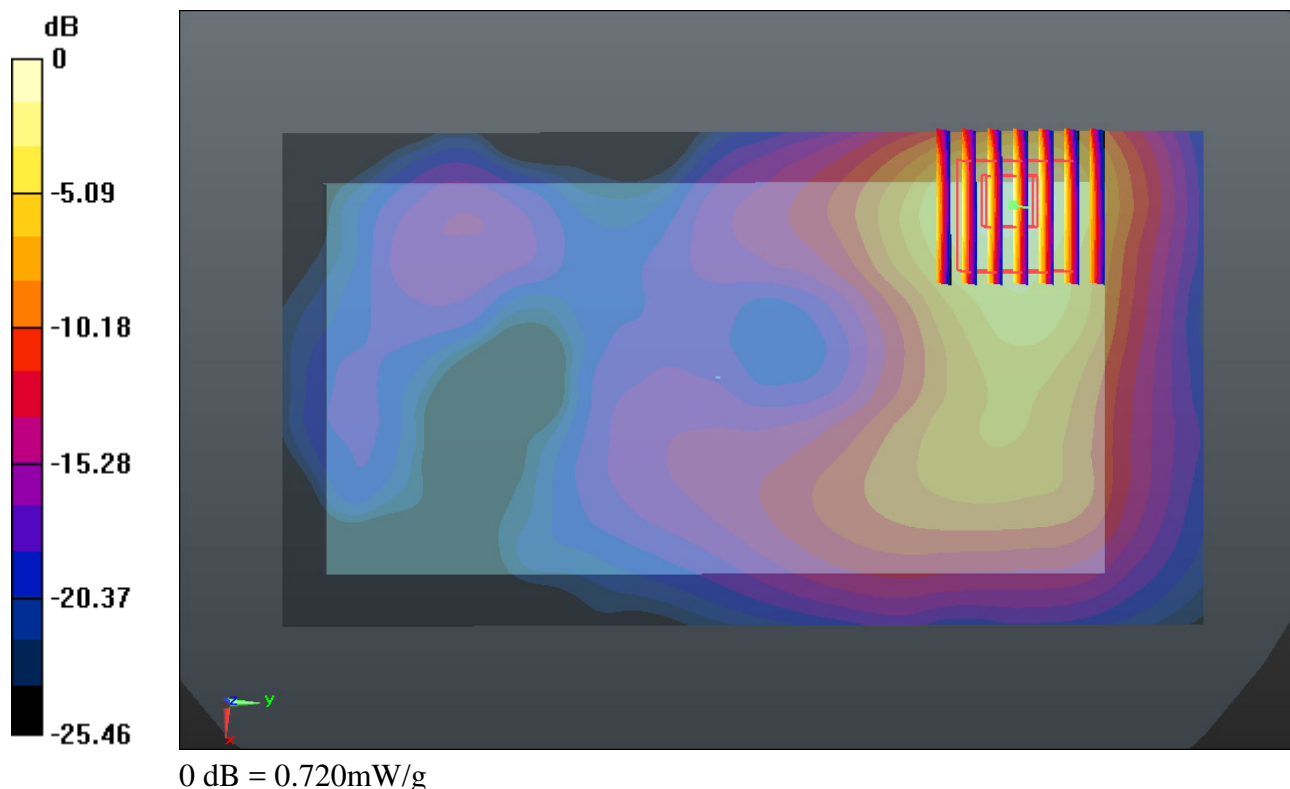
Ch11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.317 V/m; Power Drift = 0.039 dB

Peak SAR (extrapolated) = 1.021 W/kg

SAR(1 g) = 0.457 mW/g; SAR(10 g) = 0.205 mW/g

Maximum value of SAR (measured) = 0.724 mW/g



#42_WLAN 5.2GHz_802.11a_6Mbps_Back 1cm_Ch48

Communication System: WIFI (0); Frequency: 5240 MHz; Duty Cycle: 1:1.146

Medium: MSL_5000_150413 Medium parameters used: $f = 5240$ MHz; $\sigma = 5.414$ mho/m; $\epsilon_r =$

48.588; $\rho = 1000$ kg/m³

Ambient Temperature : 23.0 °C; Liquid Temperature : 22.0 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(4.54, 4.54, 4.54); Calibrated: 2014.05.23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch48/Area Scan (101x191x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.107 mW/g

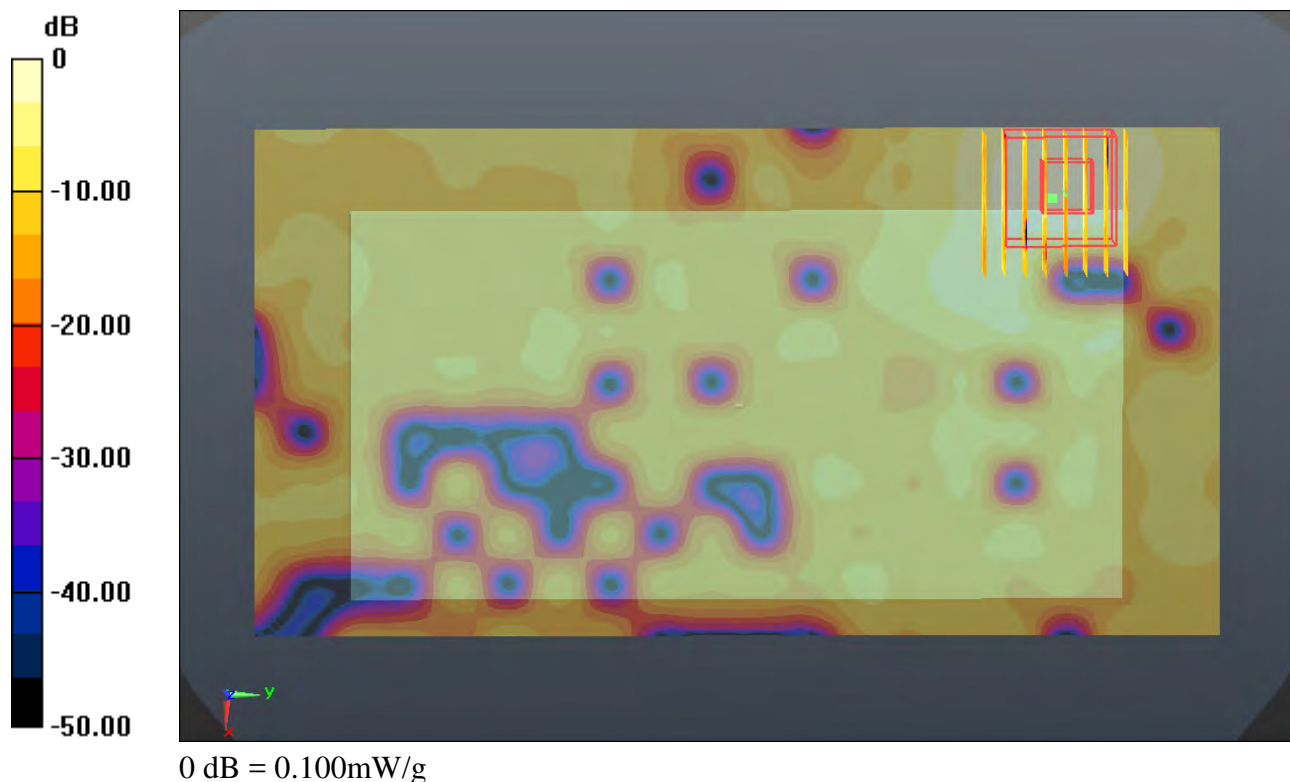
Ch48/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 1.198 V/m; Power Drift = -0.042 dB

Peak SAR (extrapolated) = 0.155 W/kg

SAR(1 g) = 0.040 mW/g; SAR(10 g) = 0.015 mW/g

Maximum value of SAR (measured) = 0.100 mW/g



#43_WLAN 5.8GHz_802.11a_6Mbps_Back 1cm_Ch157

Communication System: WIFI (0); Frequency: 5785 MHz; Duty Cycle: 1:1.146

Medium: MSL_5000_150413 Medium parameters used: $f = 5785$ MHz; $\sigma = 6.214$ mho/m; $\epsilon_r =$

47.373; $\rho = 1000$ kg/m³

Ambient Temperature : 23.0 °C; Liquid Temperature : 22.0 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(4.21, 4.21, 4.21); Calibrated: 2014.05.23
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2014.05.19
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.4.5 (3634)

Ch157/Area Scan (101x191x1): Measurement grid: dx=10mm, dy=10mm

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

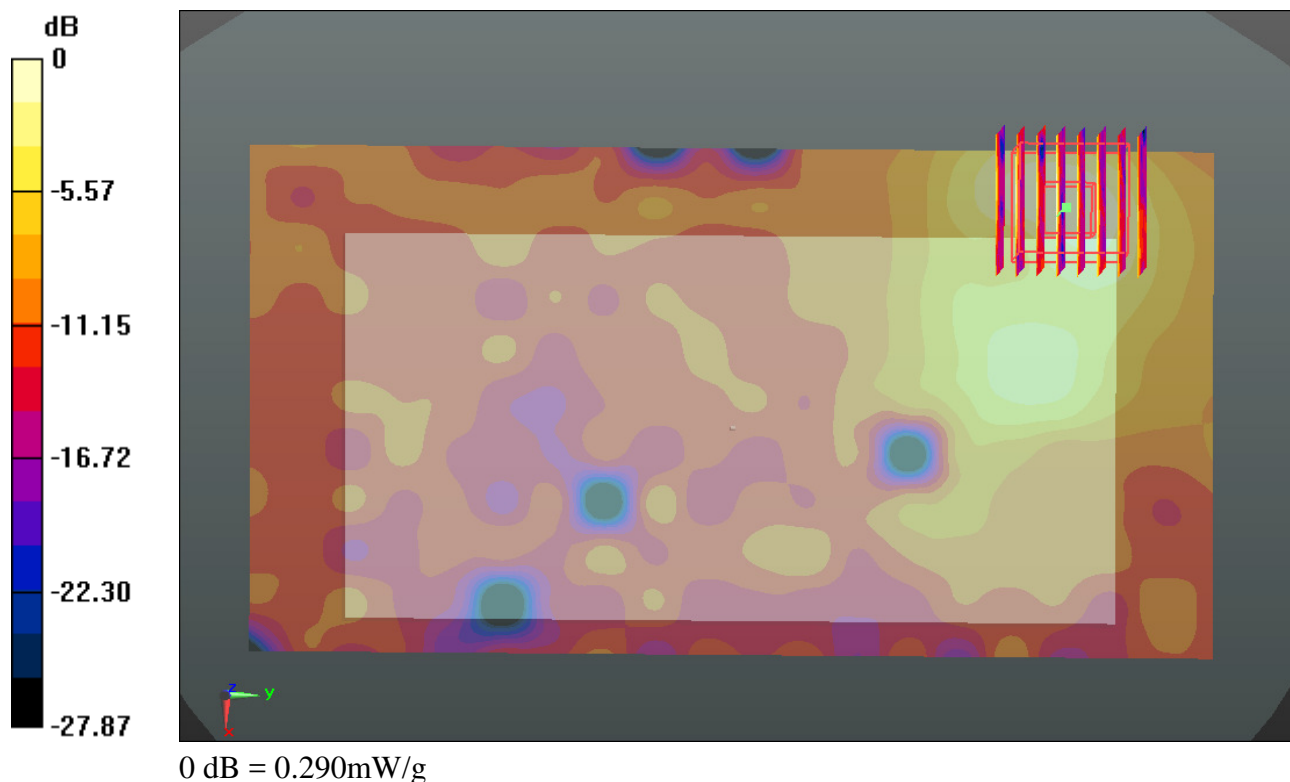
Ch157/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 1.601 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.424 W/kg

SAR(1 g) = 0.109 mW/g; SAR(10 g) = 0.041 mW/g

Maximum value of SAR (measured) = 0.286 mW/g



1-1_GSM850_GPRS 4 Tx slots_Left Cheek_0mm_Ch251

Communication System: UID 0, GPRS/EDGE (4 Tx slots) (0); Frequency: 848.8 MHz; Duty Cycle: 1:2.08

Medium: HSL_835_160226 Medium parameters used: $f = 848.8$ MHz; $\sigma = 0.897$ S/m; $\epsilon_r = 40.856$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C ; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(10.1, 10.1, 10.1); Calibrated: 2015.11.27;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2015.7.21
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch251/Area Scan (81x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.404 W/kg

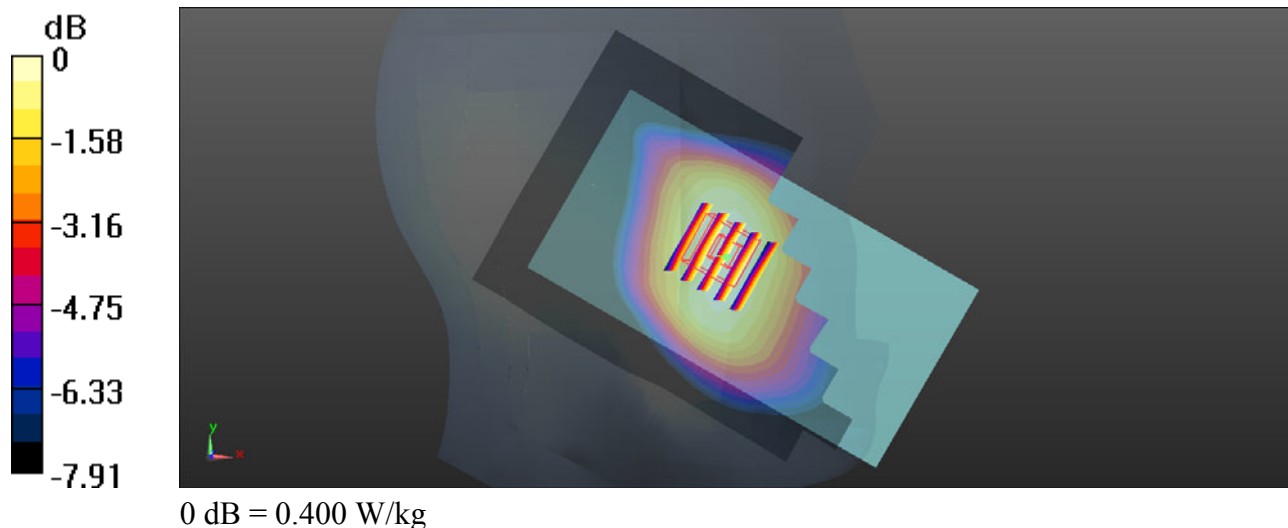
Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.577 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 0.427 W/kg

SAR(1 g) = 0.357 W/kg; SAR(10 g) = 0.282 W/kg

Maximum value of SAR (measured) = 0.400 W/kg



2-1_WLAN2.4GHz_802.11b 1Mbps_Left Cheek_0mm_Ch6

Communication System: UID 0, WIFI (0); Frequency: 2437 MHz; Duty Cycle: 1:1.024

Medium: HSL_2450_160225 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.805$ S/m; $\epsilon_r = 39.8$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C ; Liquid Temperature : 22.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.08, 7.08, 7.08); Calibrated: 2015.5.28;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2015.5.21
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch6/Area Scan (81x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 1.98 W/kg

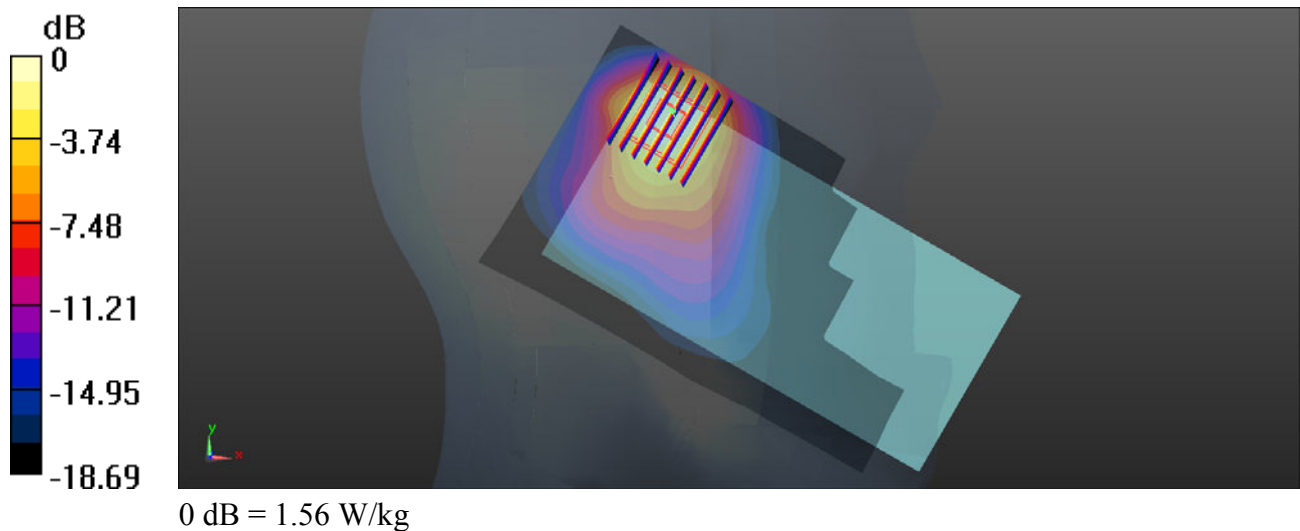
Ch6/Zoom Scan (8x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.67 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 2.31 W/kg

SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.517 W/kg

Maximum value of SAR (measured) = 1.56 W/kg



3-1_LTE Band 7_20M_QPSK_1RB_Offset_Bottom_10mm_Ch21350

Communication System: UID 0, FDD_LTE (0); Frequency: 2560 MHz; Duty Cycle: 1:1
Medium: MSL_2600_160226 Medium parameters used: $f = 2560$ MHz; $\sigma = 2.092$ S/m; $\epsilon_r = 53.05$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.5 °C; Liquid Temperature : 22.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.17, 7.17, 7.17); Calibrated: 2015.5.28;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2015.5.21
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch21350/Area Scan (41x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 1.29 W/kg

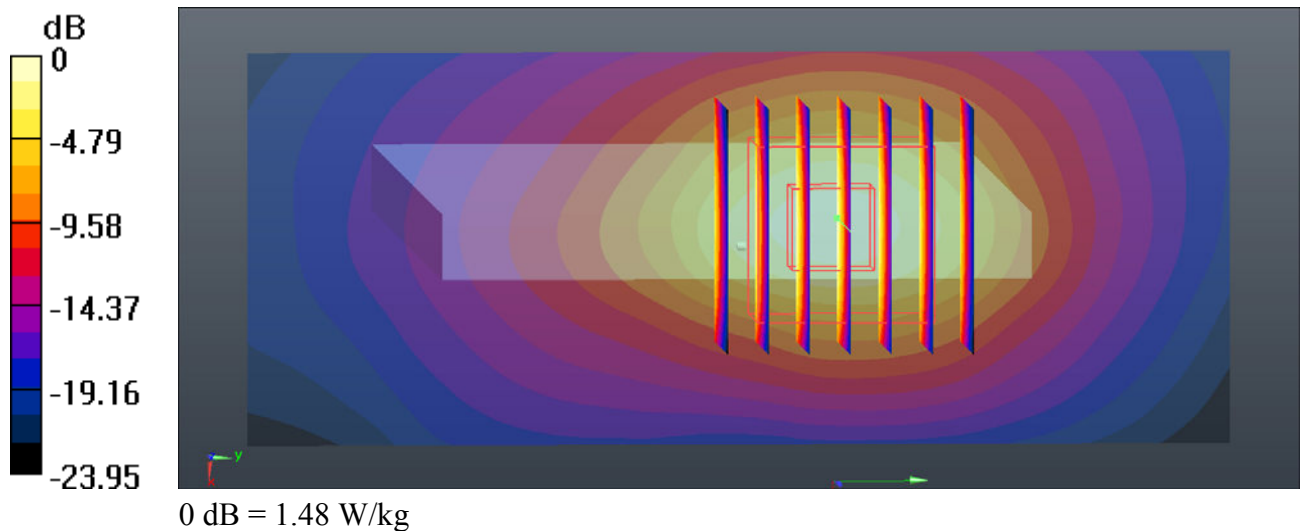
Ch21350/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.52 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 2.01 W/kg

SAR(1 g) = 0.976 W/kg; SAR(10 g) = 0.441 W/kg

Maximum value of SAR (measured) = 1.48 W/kg



4-1_WLAN2.4GHz_802.11b 1Mbps_Back_10mm_Ch11

Communication System: UID 0, FDD_LTE (0); Frequency: 2510 MHz; Duty Cycle: 1:1.024

Medium: MSL_2450_160226 Medium parameters used: $f = 2510$ MHz; $\sigma = 2.078$ S/m; $\epsilon_r = 51.172$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.5 °C; Liquid Temperature : 22.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.17, 7.17, 7.17); Calibrated: 2015.5.28;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2015.5.21
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch20850/Area Scan (81x141x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.386 W/kg

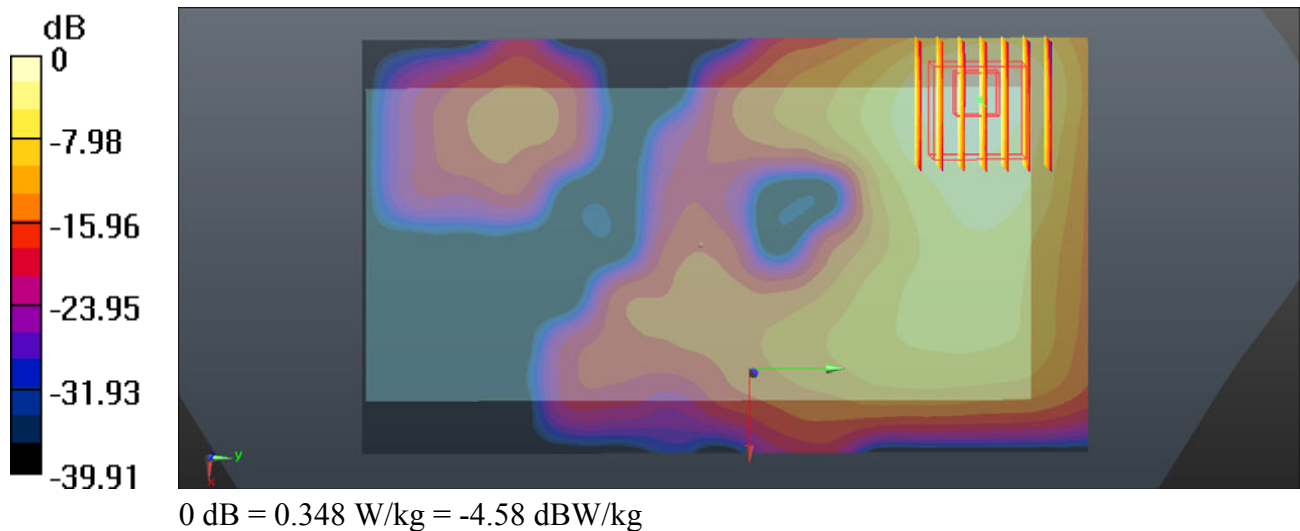
Ch20850/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.396 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.507 W/kg

SAR(1 g) = 0.229 W/kg; SAR(10 g) = 0.105 W/kg

Maximum value of SAR (measured) = 0.348 W/kg



5-1_LTE Band 7_20M_QPSK_1RB_Offset_Back_10mm_Ch21350

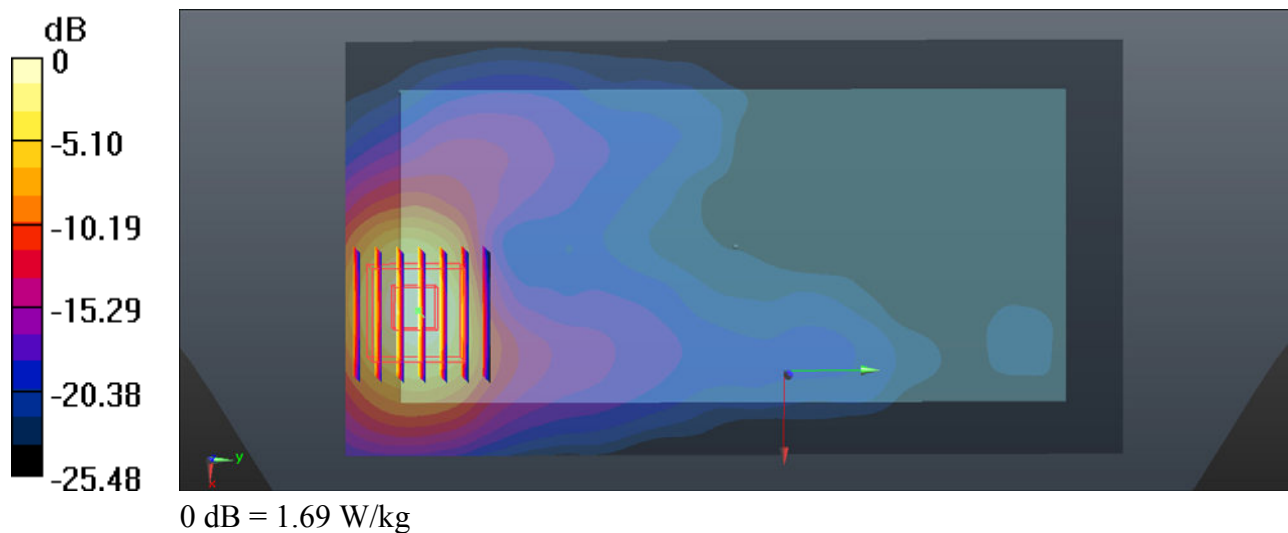
Communication System: UID 0, FDD_LTE (0); Frequency: 2560 MHz; Duty Cycle: 1:1
Medium: MSL_2600_160226 Medium parameters used: $f = 2560$ MHz; $\sigma = 2.092$ S/m; $\epsilon_r = 53.05$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.5 °C; Liquid Temperature : 22.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.17, 7.17, 7.17); Calibrated: 2015.5.28;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2015.5.21
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch21350/Area Scan (81x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.70 W/kg

Ch21350/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.621 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.30 W/kg
SAR(1 g) = 1.08 W/kg; SAR(10 g) = 0.476 W/kg
Maximum value of SAR (measured) = 1.69 W/kg



6-1_LTE Band 7_20M_QPSK_1RB_Offset_Bottom Side_0mm_Ch21350

Communication System: UID 0, FDD_LTE (0); Frequency: 2560 MHz; Duty Cycle: 1:1
Medium: MSL_2600_160226 Medium parameters used: $f = 2560$ MHz; $\sigma = 2.092$ S/m; $\epsilon_r = 53.05$; $\rho = 1000$ kg/m³
Ambient Temperature : 23.5 °C ; Liquid Temperature : 22.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.17, 7.17, 7.17); Calibrated: 2015.5.28;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1210; Calibrated: 2015.5.21
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch21350/Area Scan (41x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 15.5 W/kg

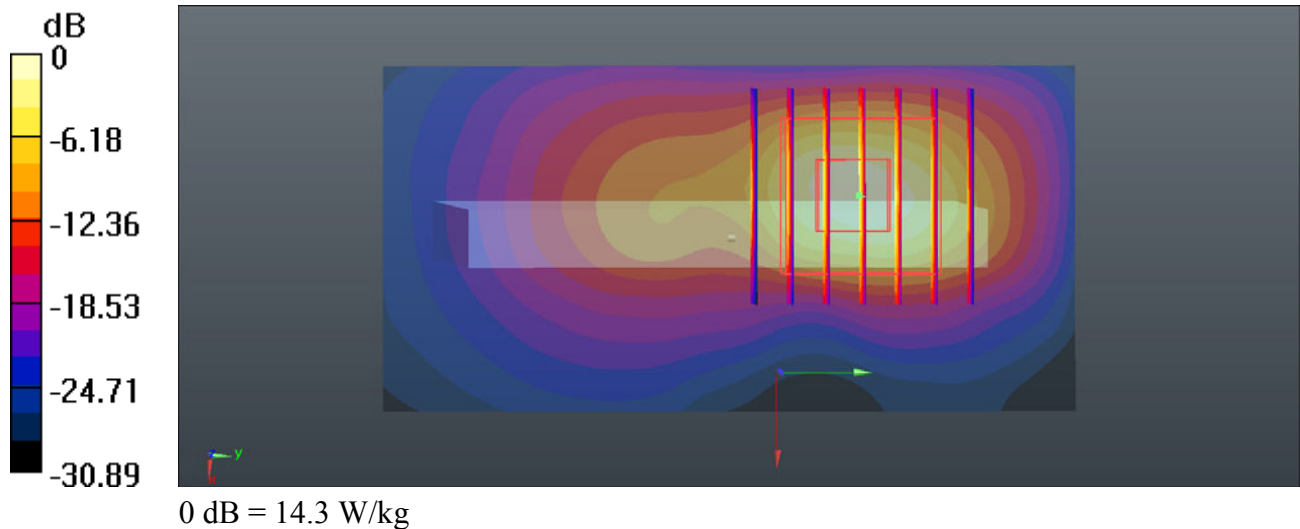
Ch21350/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.50 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 20.8 W/kg

SAR(1 g) = 8.07 W/kg; SAR(10 g) = 2.84 W/kg

Maximum value of SAR (measured) = 14.3 W/kg





Appendix C. DASY Calibration Certificate

The DASY calibration certificates are shown as follows.



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 **Sporton-CN (Auden)**

Certificate No: **D750V3-1065_Nov14**

CALIBRATION CERTIFICATE

Object **D750V3 - SN: 1065**

Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **November 19, 2014**

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 EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by: Name **Michael Weber** Function **Laboratory Technician** Signature 

Approved by: **Katja Pokovic** Technical Manager



Issued: November 20, 2014

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:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

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%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.4 $\pm$ 6 %	0.89 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	2.04 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.14 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.35 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	54.7 $\pm$ 6 %	0.98 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	2.20 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.64 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.71 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.5 Ω - 0.4 j Ω
Return Loss	- 27.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.0 Ω - 3.0 j Ω
Return Loss	- 29.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.032 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	May 10, 2012

DASY5 Validation Report for Head TSL

Date: 19.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1065

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.89 \text{ S/m}$; $\epsilon_r = 41.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.37, 6.37, 6.37); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

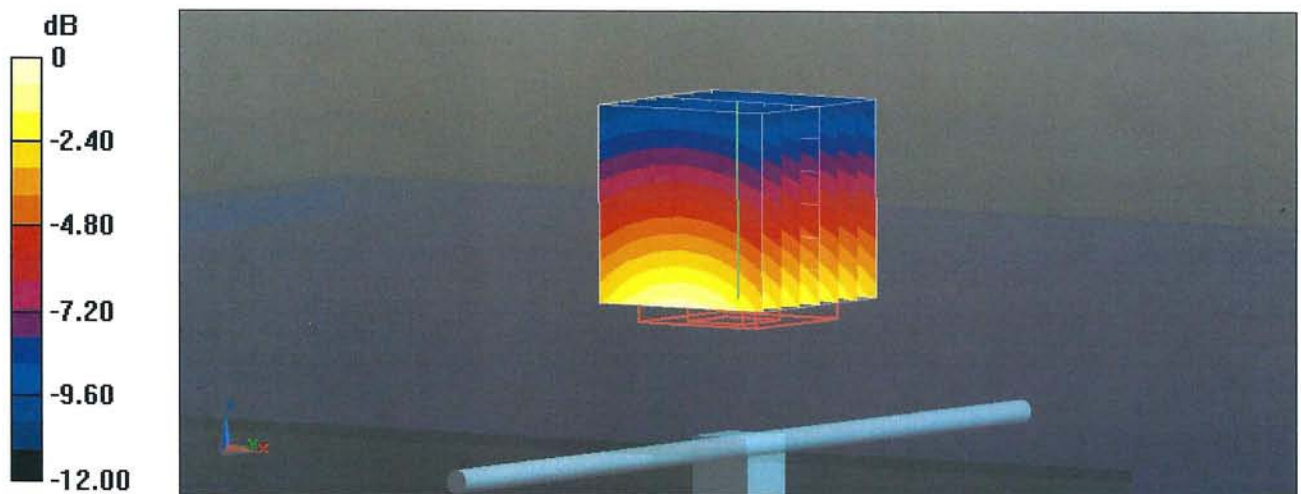
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 53.42 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.04 W/kg

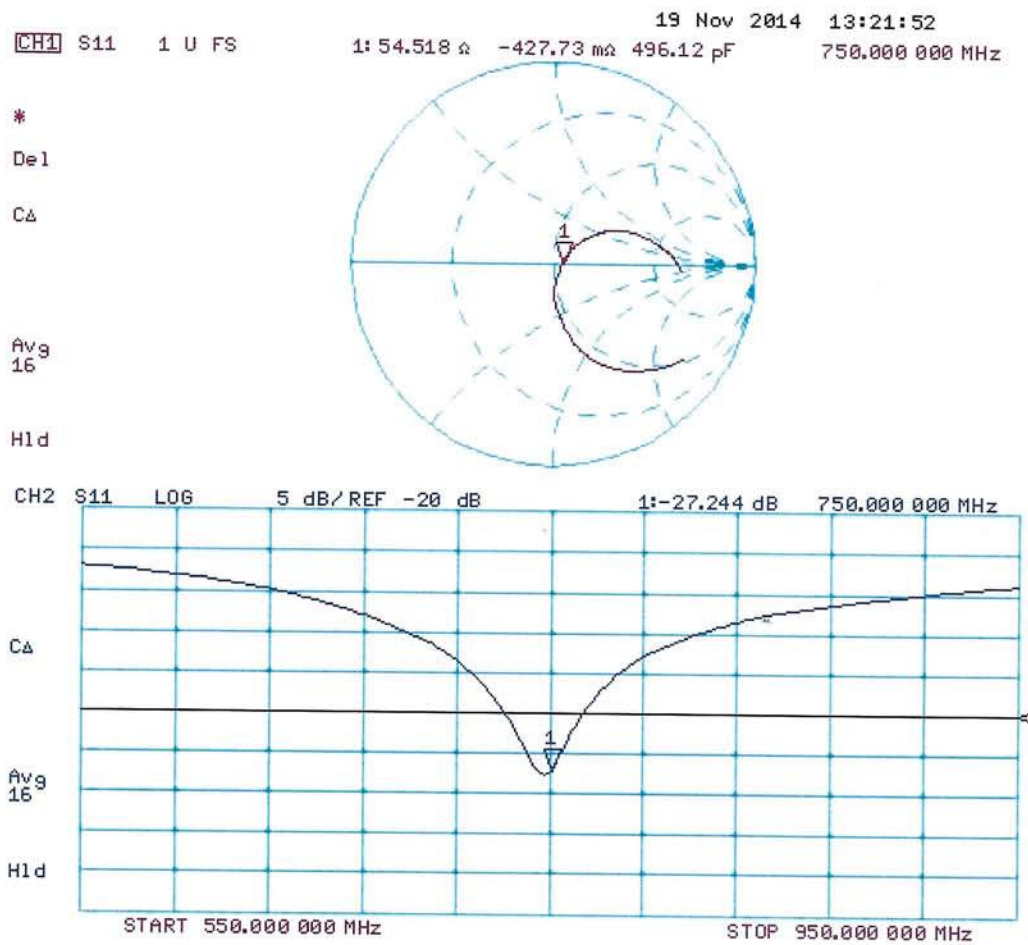
SAR(1 g) = 2.04 W/kg; SAR(10 g) = 1.34 W/kg

Maximum value of SAR (measured) = 2.40 W/kg



0 dB = 2.40 W/kg = 3.80 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 18.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1065

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: $f = 750$ MHz; $\sigma = 0.98$ S/m; $\epsilon_r = 54.7$; $\rho = 1000$ kg/m³

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.13, 6.13, 6.13); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

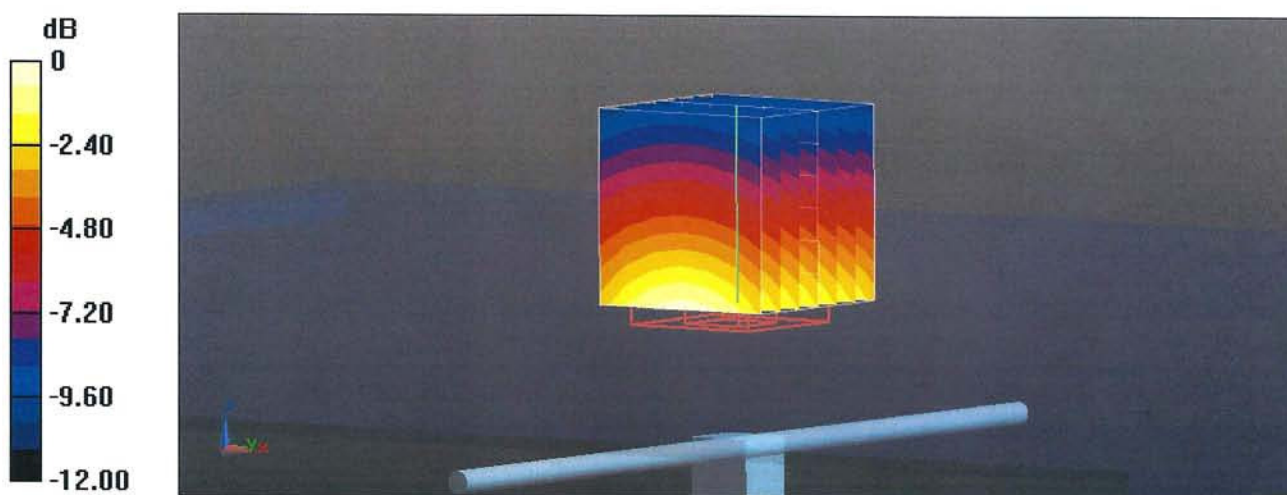
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.96 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.22 W/kg

SAR(1 g) = 2.2 W/kg; SAR(10 g) = 1.45 W/kg

Maximum value of SAR (measured) = 2.57 W/kg



Impedance Measurement Plot for Body TSL

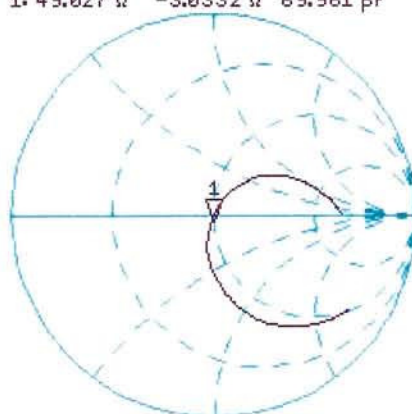
CH1 S11 1 U FS 1: 49.027 Δ -3.0332 Δ 69.961 pF 18 Nov 2014 16:09:59 750.000 000 MHz

De 1

 C_{Δ}

Av 9
16

H1d

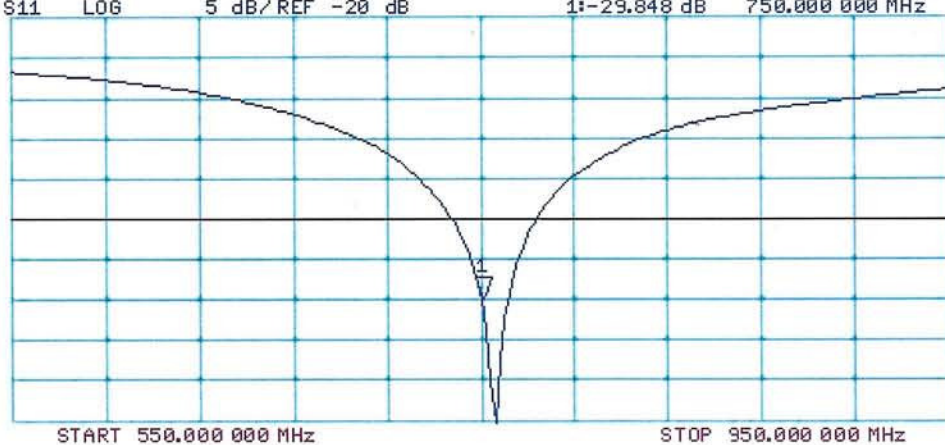


CH2 S11 LOG 5 dB/REF -20 dB 1:-29.848 dB 750.000 000 MHz

 C_{Δ}

Av 9
16

H1d





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 **Sporton-CN (Auden)**

Certificate No: **D835V2-4d091_Nov14**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d091**

Calibration procedure(s) **QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **November 21, 2014**

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 EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by: **Michael Weber** **Laboratory Technician** **Signature** *M. Weber*

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

Katja Pokovic

Issued: November 21, 2014

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



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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 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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.

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%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
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	41.2 $\pm$ 6 %	0.91 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	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.11 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.50 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.95 W/kg $\pm$ 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	54.5 $\pm$ 6 %	1.01 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	2.48 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.60 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.62 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.31 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.7 Ω - 1.8 j Ω
Return Loss	- 32.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.7 Ω - 4.2 j Ω
Return Loss	- 25.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.394 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	September 15, 2009

DASY5 Validation Report for Head TSL

Date: 19.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d091

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.91$ S/m; $\epsilon_r = 41.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.22, 6.22, 6.22); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

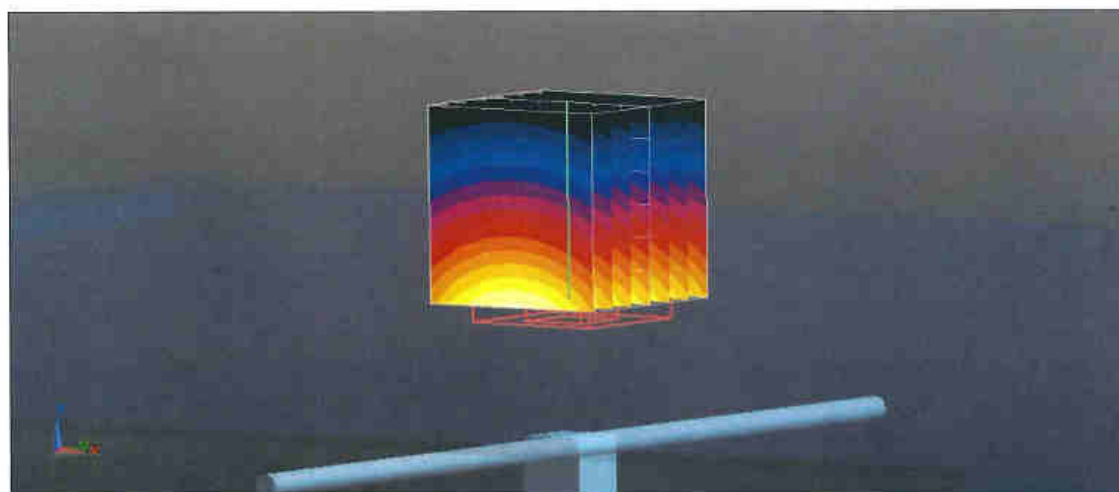
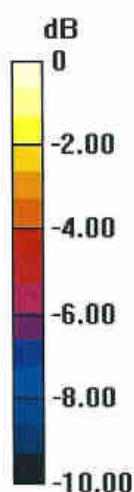
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.46 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 3.43 W/kg

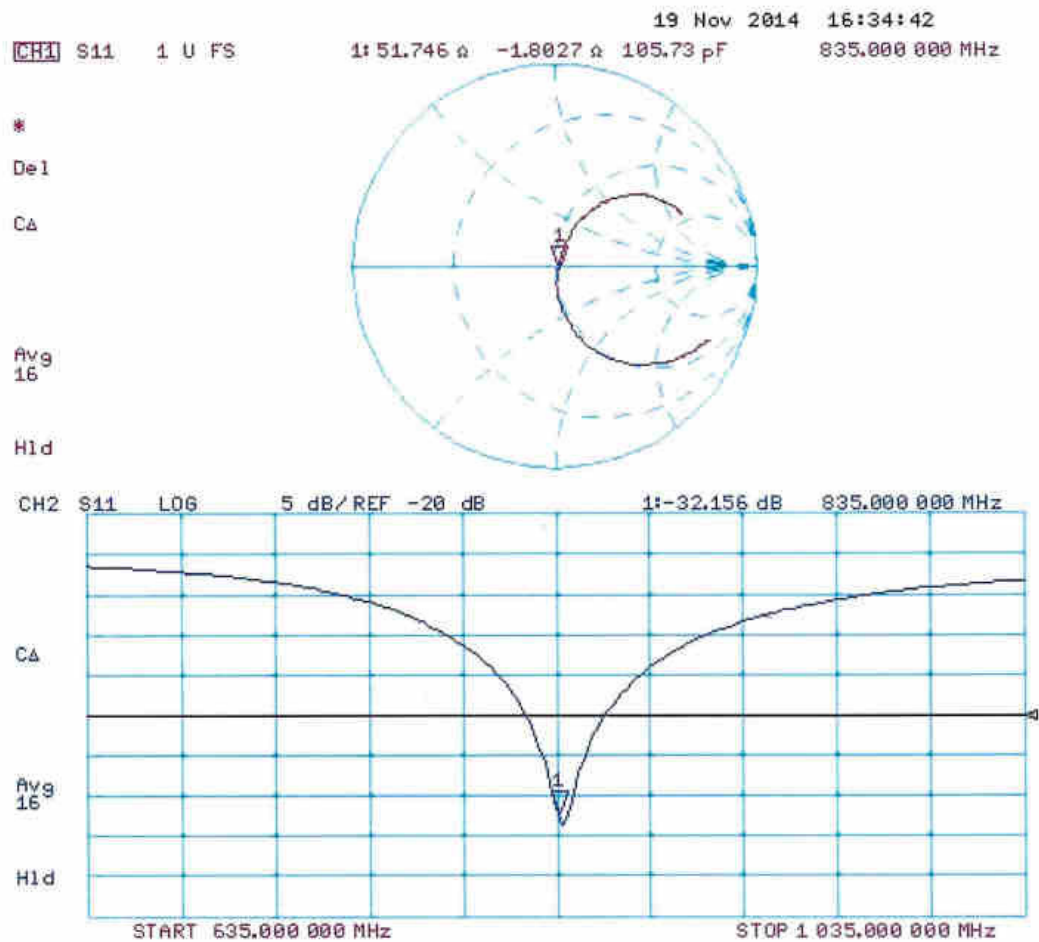
SAR(1 g) = 2.3 W/kg; SAR(10 g) = 1.5 W/kg

Maximum value of SAR (measured) = 2.69 W/kg



0 dB = 2.69 W/kg = 4.30 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 21.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d091

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1.01 \text{ S/m}$; $\epsilon_r = 54.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.09, 6.09, 6.09); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

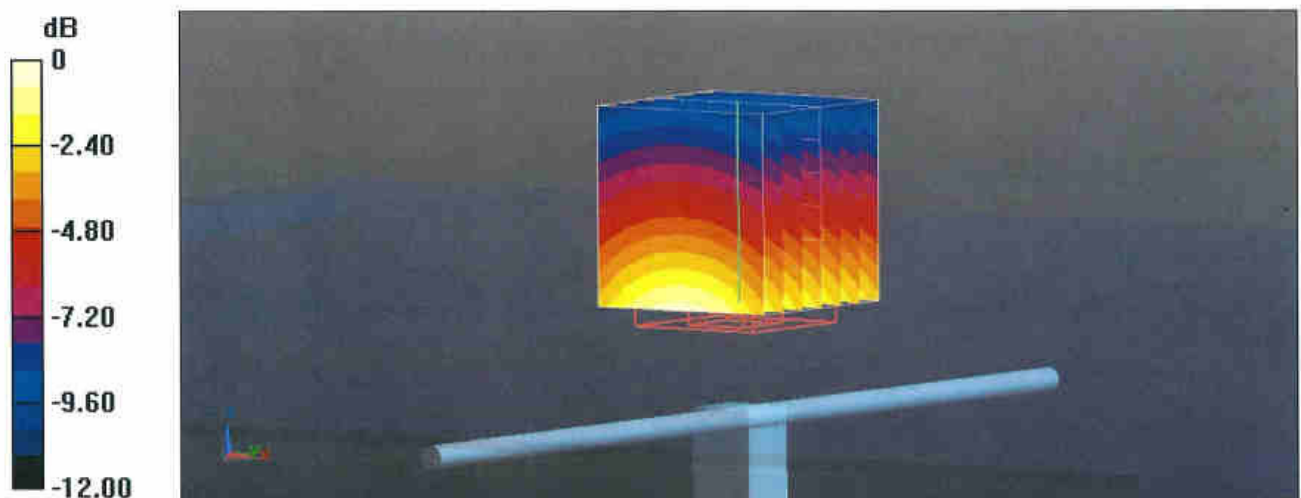
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 55.36 V/m; Power Drift = 0.00 dB

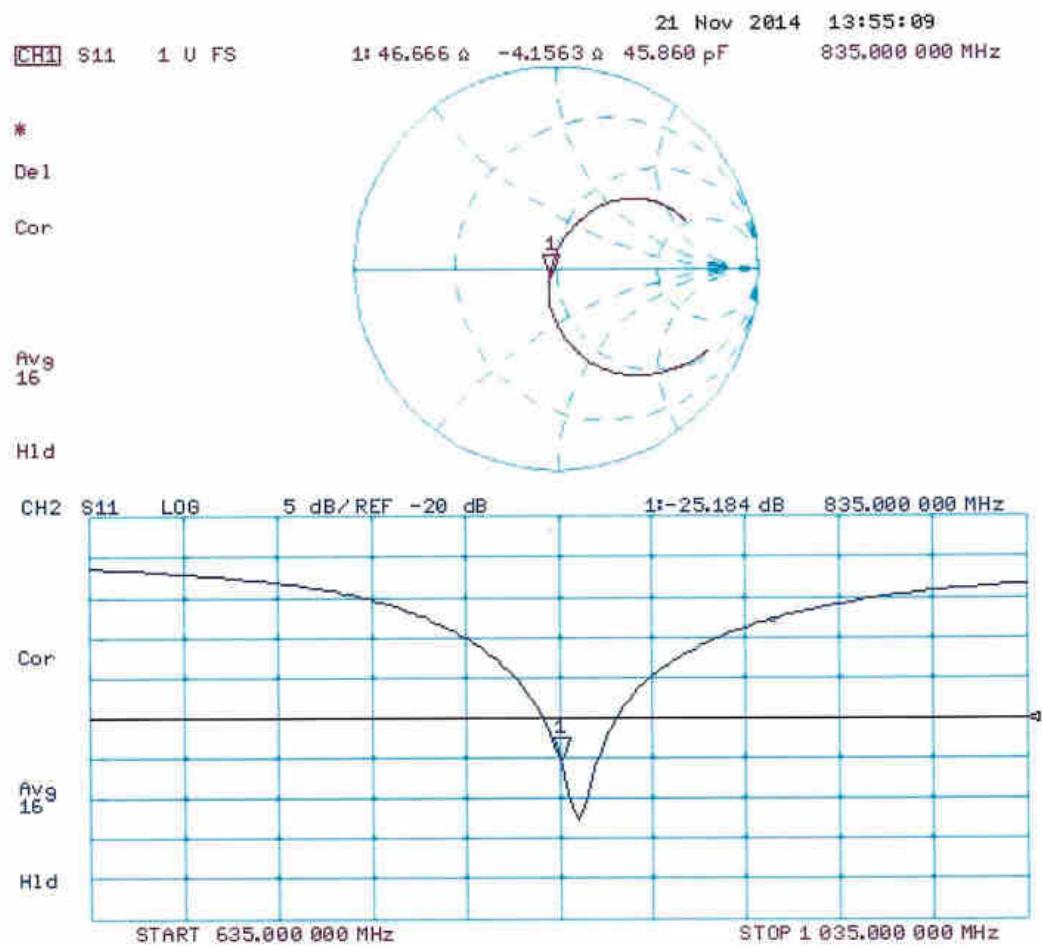
Peak SAR (extrapolated) = 3.64 W/kg

SAR(1 g) = 2.48 W/kg; SAR(10 g) = 1.62 W/kg

Maximum value of SAR (measured) = 2.89 W/kg



Impedance Measurement Plot for Body TSL





Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

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Multilateral Agreement for the recognition of calibration certificates

Client **Sporton-KS (Auden)**

Certificate No: **D835V2-4d091_Nov15**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d091**

Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **November 24, 2015**

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	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	US37292783	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	MY41092317	07-Oct-15 (No. 217-02223)	Oct-16
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe EX3DV4	SN: 7349	30-Dec-14 (No. EX3-7349_Dec14)	Dec-15
DAE4	SN: 601	17-Aug-15 (No. DAE4-601_Aug15)	Aug-16
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100972	15-Jun-15 (in house check Jun-15)	In house check: Jun-18
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Signature

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

Issued: November 24, 2015

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 0108**

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 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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.

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%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
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	42.6 $\pm$ 6 %	0.92 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	2.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.14 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.50 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.94 W/kg $\pm$ 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	55.6 $\pm$ 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	2.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.55 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.29 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.3 Ω - 4.3 j Ω
Return Loss	- 27.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.3 Ω - 6.3 j Ω
Return Loss	- 23.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.395 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is, therefore short-circuited for DC-signals. 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	September 15, 2009

DASY5 Validation Report for Head TSL

Date: 24.11.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d091

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.92 \text{ S/m}$; $\epsilon_r = 42.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.77, 9.77, 9.77); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

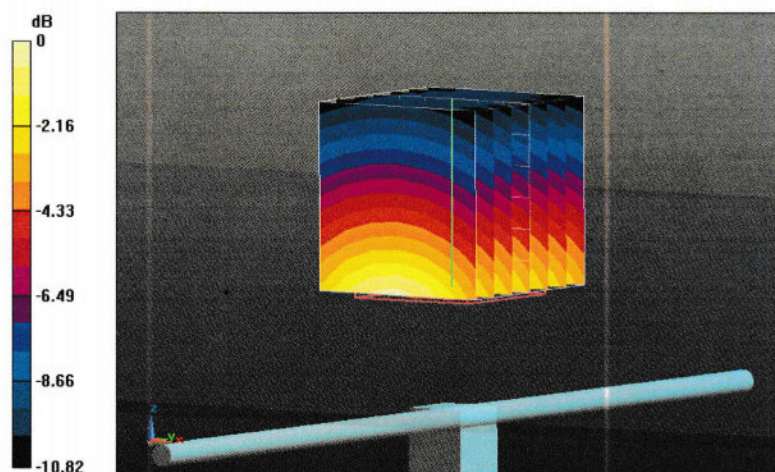
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 60.87 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 3.43 W/kg

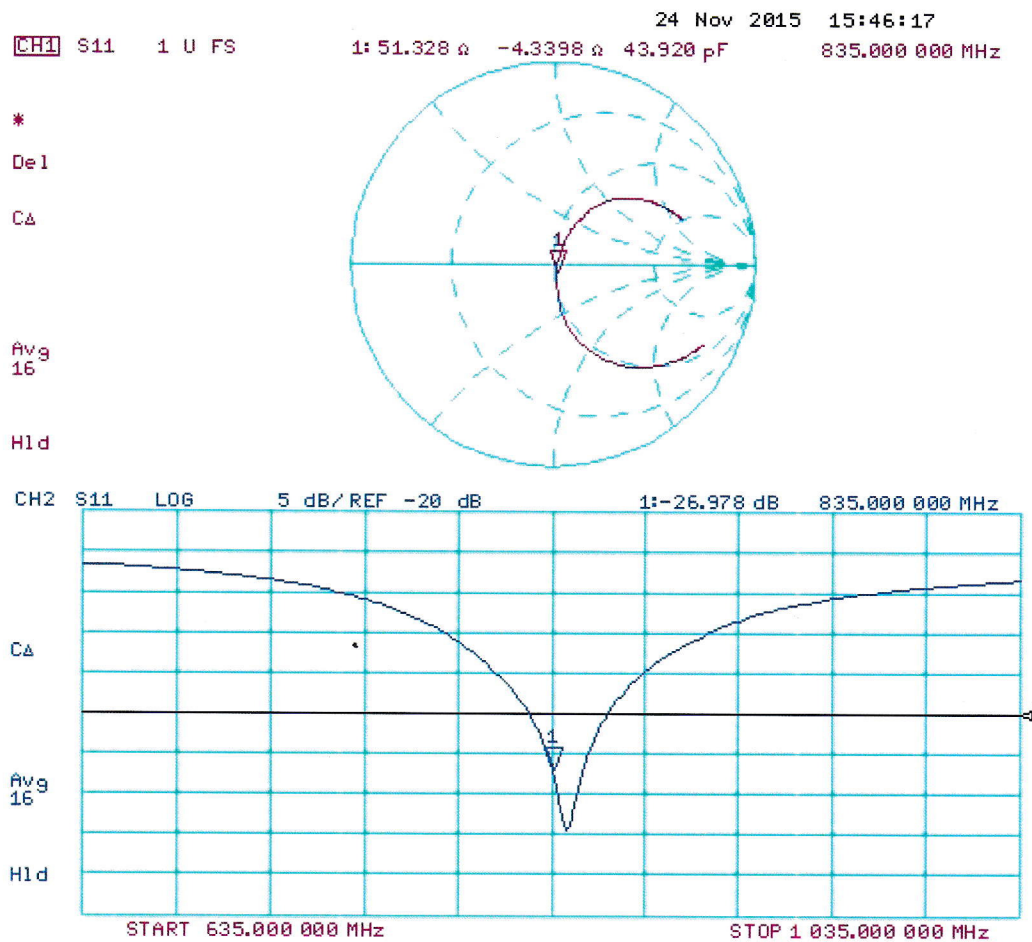
SAR(1 g) = 2.31 W/kg; SAR(10 g) = 1.5 W/kg

Maximum value of SAR (measured) = 3.05 W/kg



0 dB = 3.05 W/kg = 4.84 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 24.11.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d091

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.99$ S/m; $\epsilon_r = 55.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.72, 9.72, 9.72); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

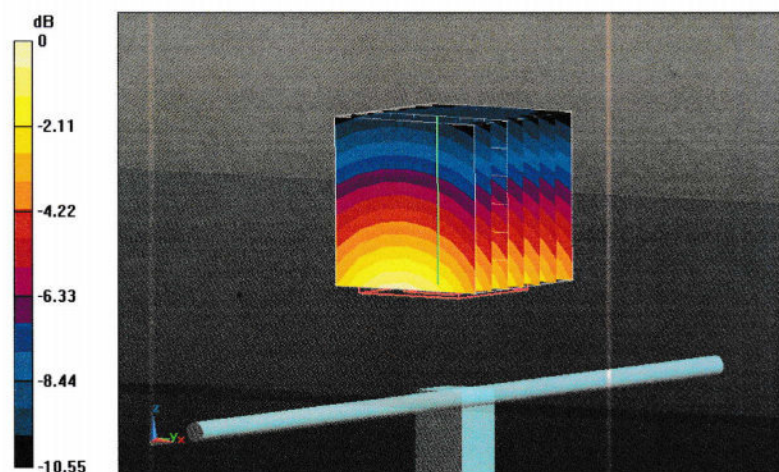
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.69 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.58 W/kg

SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.59 W/kg

Maximum value of SAR (measured) = 3.19 W/kg



0 dB = 3.19 W/kg = 5.04 dBW/kg

Impedance Measurement Plot for Body TSL

