

**50\_WLAN5.2GHz\_802.11n-HT20 MCS0\_Back\_15mm\_Ant 1+2\_Ch48**

Communication System: UID 0, WIFI (0); Frequency: 5240 MHz; Duty Cycle: 1:1.058  
Medium: MSL\_5000\_160423 Medium parameters used:  $f = 5240 \text{ MHz}$ ;  $\sigma = 5.363 \text{ S/m}$ ;  $\epsilon_r = 49.129$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

## DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(4.25, 4.25, 4.25); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

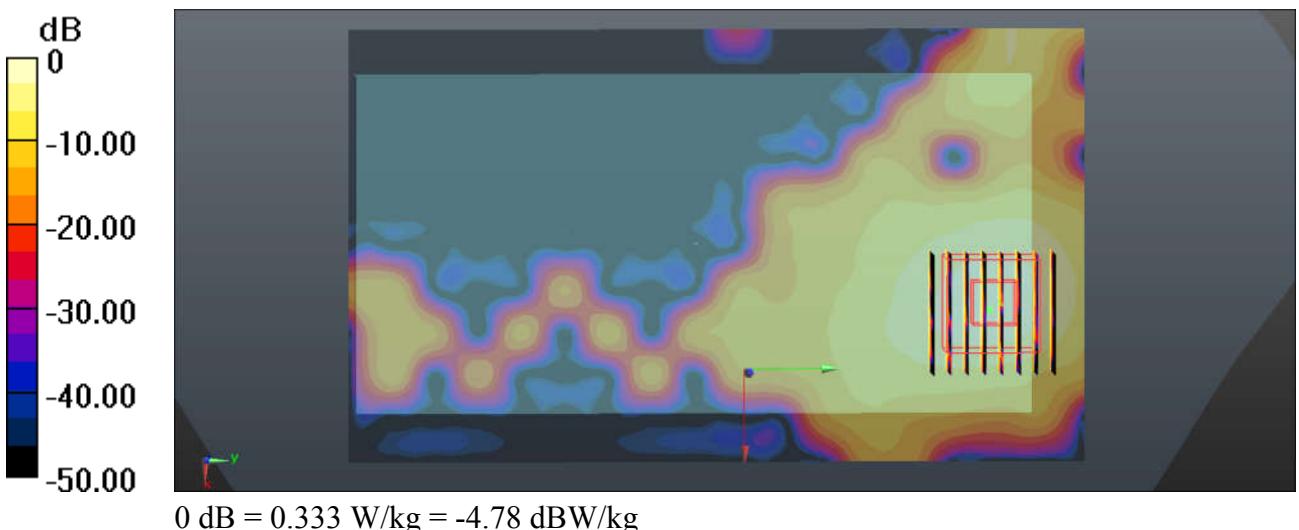
**Ch48/Area Scan (101x171x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 0.286 W/kg

**Ch48/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 0.6780 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.512 W/kg

**SAR(1 g) = 0.150 W/kg; SAR(10 g) = 0.053 W/kg**

Maximum value of SAR (measured) = 0.333 W/kg



**51\_WLAN5.5GHz\_802.11a 6Mbps\_Back\_15mm\_Ant 1\_Ch100**

Communication System: UID 0, WIFI (0); Frequency: 5500 MHz; Duty Cycle: 1:1.049  
Medium: MSL\_5000\_160419 Medium parameters used:  $f = 5500 \text{ MHz}$ ;  $\sigma = 5.738 \text{ S/m}$ ;  $\epsilon_r = 48.597$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(3.65, 3.65, 3.65); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

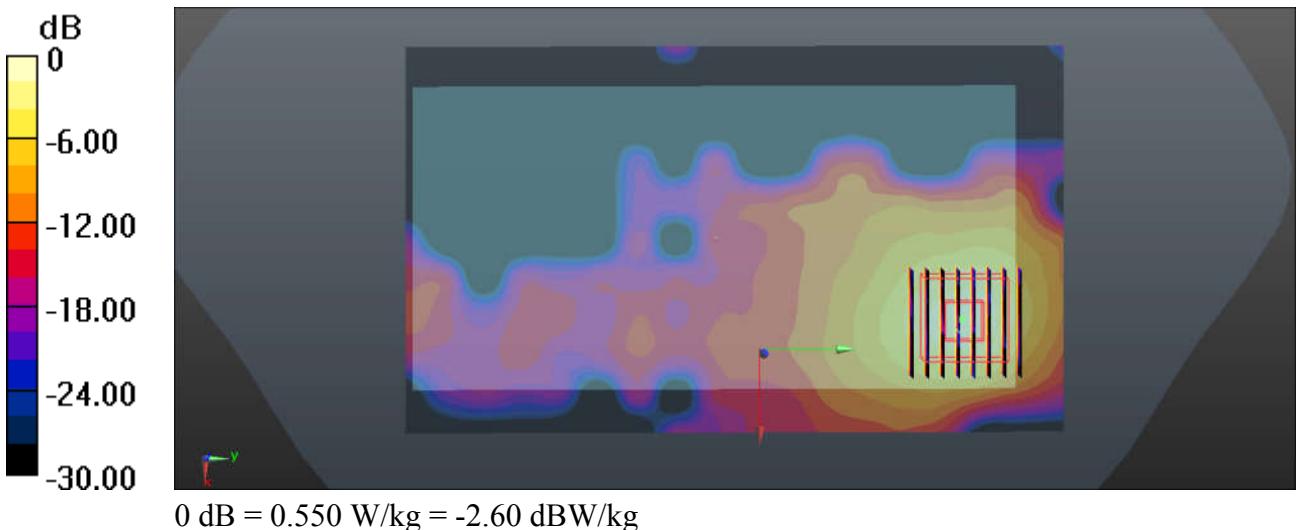
**Ch100/Area Scan (101x171x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 0.481 W/kg

**Ch100/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 1.217 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.846 W/kg

**SAR(1 g) = 0.249 W/kg; SAR(10 g) = 0.091 W/kg**

Maximum value of SAR (measured) = 0.550 W/kg



**52\_WLAN5.5GHz\_802.11a 6Mbps\_Back\_15mm\_Ant 2\_Ch140**

Communication System: UID 0, WIFI (0); Frequency: 5700 MHz; Duty Cycle: 1:1.05  
Medium: MSL\_5000\_160418 Medium parameters used:  $f = 5700 \text{ MHz}$ ;  $\sigma = 6.022 \text{ S/m}$ ;  $\epsilon_r = 48.097$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(3.65, 3.65, 3.65); Calibrated: 2015.11.27;
- Sensor-Surface: 2mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

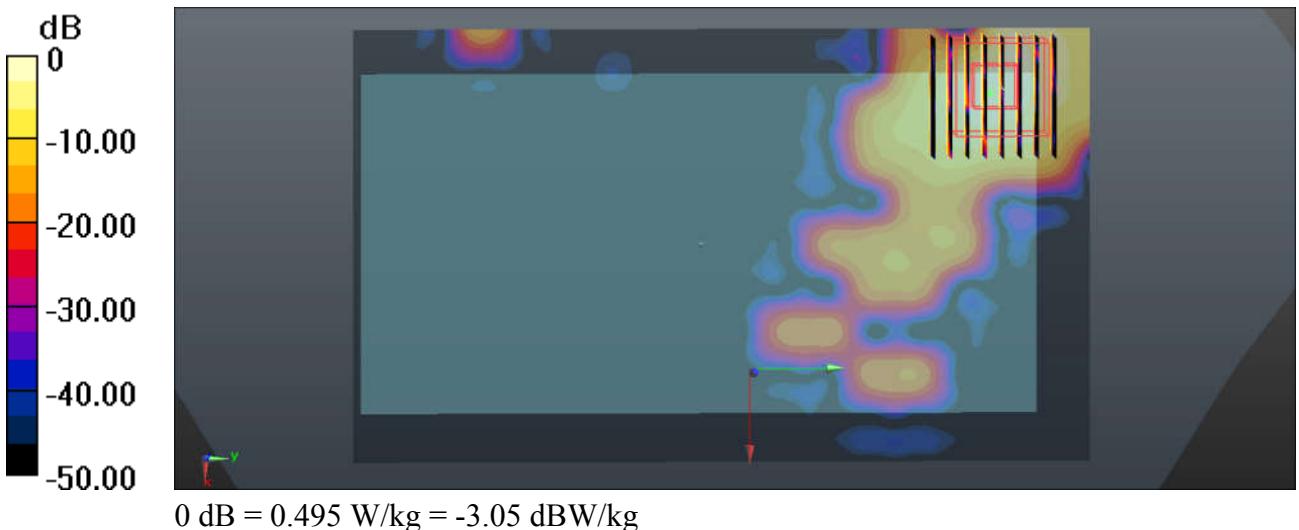
**Ch140/Area Scan (101x171x1):** Interpolated grid:  $dx=1.000 \text{ mm}$ ,  $dy=1.000 \text{ mm}$   
Maximum value of SAR (interpolated) = 0.390 W/kg

**Ch140/Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$   
Reference Value = 0 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.862 W/kg

**SAR(1 g) = 0.200 W/kg; SAR(10 g) = 0.063 W/kg**

Maximum value of SAR (measured) = 0.495 W/kg



**53\_WLAN5.5GHz\_802.11a 6Mbps\_Back\_15mm\_Ant 1+2\_Ch140**

Communication System: UID 0, WIFI (0); Frequency: 5700 MHz; Duty Cycle: 1:1.058  
Medium: MSL\_5000\_160418 Medium parameters used:  $f = 5700 \text{ MHz}$ ;  $\sigma = 6.022 \text{ S/m}$ ;  $\epsilon_r = 48.097$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(3.65, 3.65, 3.65); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

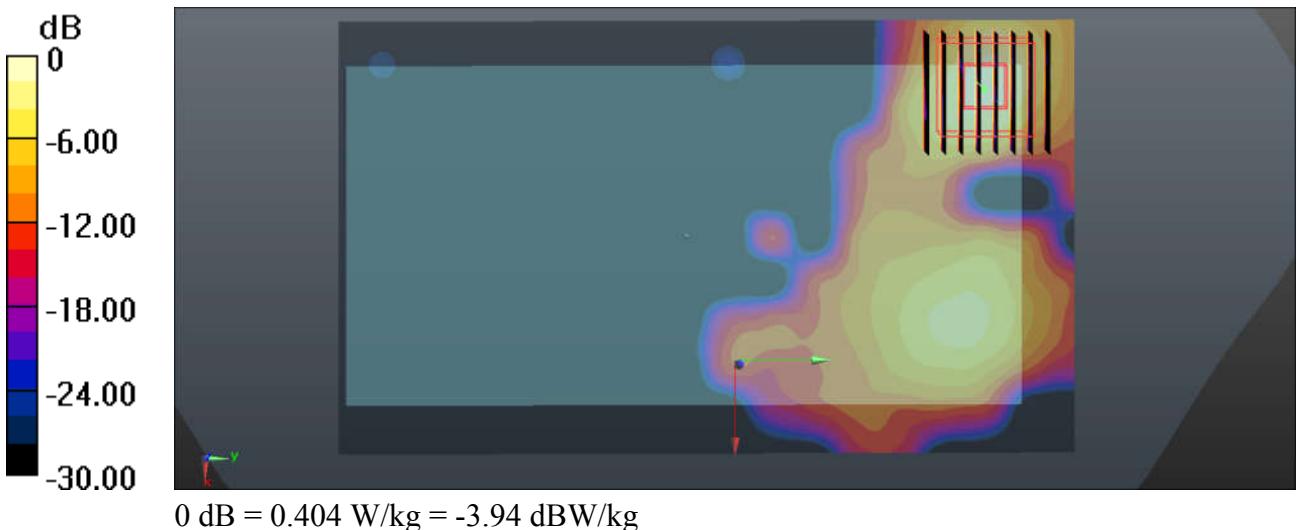
**Ch140/Area Scan (101x171x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 0.332 W/kg

**Ch140/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 0 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.04 W/kg

**SAR(1 g) = 0.163 W/kg; SAR(10 g) = 0.052 W/kg**

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



**54\_WLAN5.8GHz\_802.11a 6Mbps\_Back\_15mm\_Ant 1\_Ch157**

Communication System: UID 0, WIFI (0); Frequency: 5785 MHz; Duty Cycle: 1:1.049  
Medium: MSL\_5000\_160418 Medium parameters used:  $f = 5785 \text{ MHz}$ ;  $\sigma = 6.11 \text{ S/m}$ ;  $\epsilon_r = 47.844$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(3.77, 3.77, 3.77); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

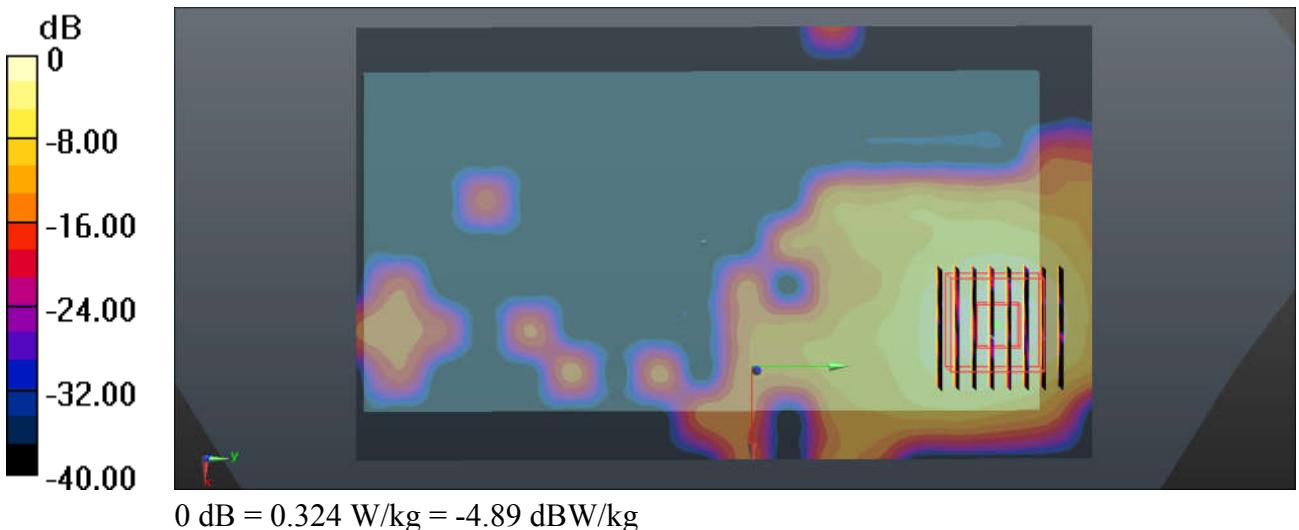
**Ch157/Area Scan (101x171x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 0.284 W/kg

**Ch157/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 0.7030 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.519 W/kg

**SAR(1 g) = 0.138 W/kg; SAR(10 g) = 0.049 W/kg**

Maximum value of SAR (measured) = 0.324 W/kg



**55\_WLAN5.8GHz\_802.11a 6Mbps\_Back\_15mm\_Ant 1\_Ch157**

Communication System: UID 0, WIFI (0); Frequency: 5785 MHz; Duty Cycle: 1:1.050  
Medium: MSL\_5000\_160418 Medium parameters used:  $f = 5785 \text{ MHz}$ ;  $\sigma = 6.11 \text{ S/m}$ ;  $\epsilon_r = 47.844$ ;  $\rho = 1000 \text{ kg/m}^3$   
Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

## DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(3.77, 3.77, 3.77); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch157/Area Scan (101x171x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 0.466 W/kg

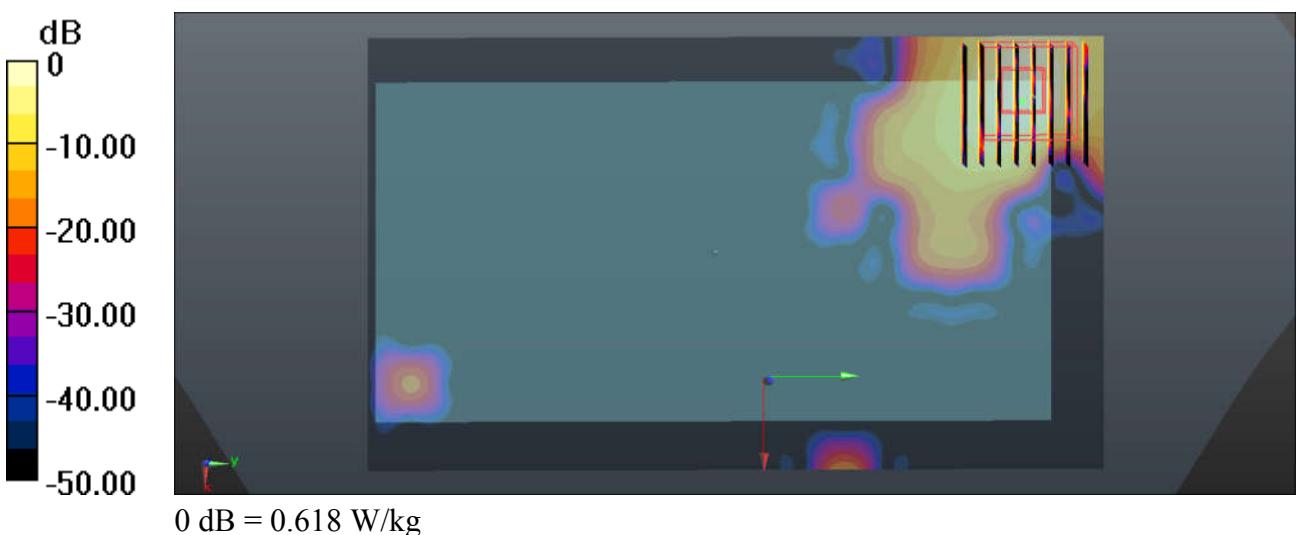
**Ch157/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 0 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.979 W/kg

**SAR(1 g) = 0.253 W/kg; SAR(10 g) = 0.079 W/kg**

Maximum value of SAR (measured) = 0.618 W/kg



**56\_WLAN5.8GHz\_802.11a 6Mbps\_Back\_15mm\_Ant 1\_Ch157**

Communication System: UID 0, WIFI (0); Frequency: 5785 MHz; Duty Cycle: 1:1.058  
Medium: MSL\_5000\_160418 Medium parameters used:  $f = 5785 \text{ MHz}$ ;  $\sigma = 6.11 \text{ S/m}$ ;  $\epsilon_r = 47.844$ ;  $\rho = 1000 \text{ kg/m}^3$   
Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(3.77, 3.77, 3.77); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

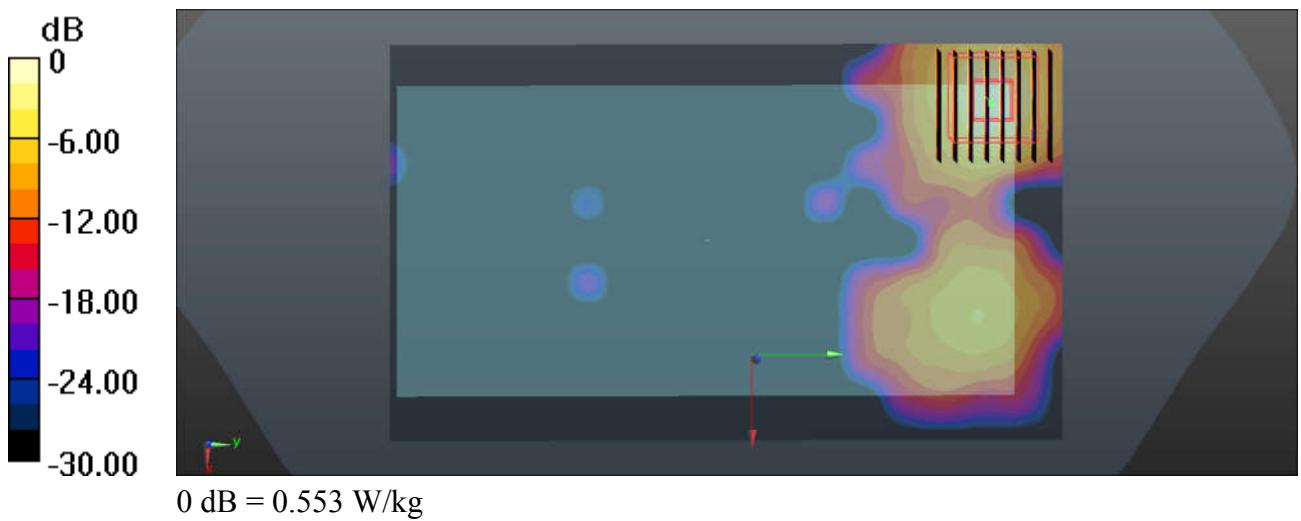
**Ch157/Area Scan (101x171x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 0.453 W/kg

**Ch157/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 0 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.888 W/kg

**SAR(1 g) = 0.227 W/kg; SAR(10 g) = 0.071 W/kg**

Maximum value of SAR (measured) = 0.553 W/kg



**57\_BBluetooth\_1Mbps\_Front\_15mm\_Ant 1\_Ch39**

Communication System: UID 0, Bluetooth (0); Frequency: 2441 MHz; Duty Cycle: 1:1.2  
Medium: MSL\_2450\_160423 Medium parameters used:  $f = 2441$  MHz;  $\sigma = 1.97$  S/m;  $\epsilon_r = 51.455$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.29, 7.29, 7.29); 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)

**Ch39/Area Scan (91x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm  
Maximum value of SAR (interpolated) = 0.0248 W/kg

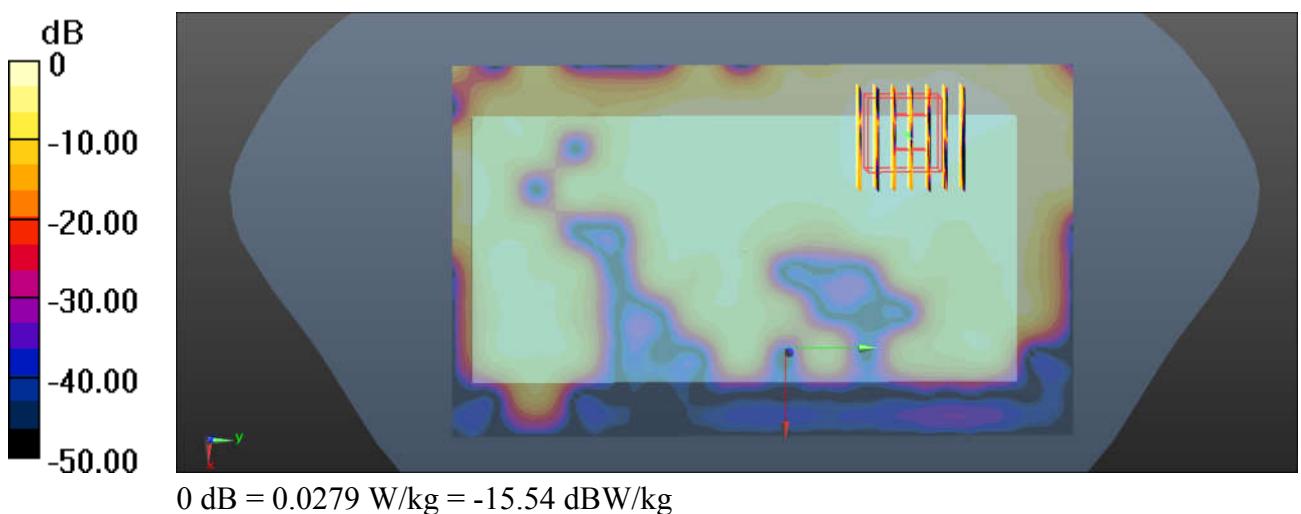
**Ch39/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.812 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.0370 W/kg

**SAR(1 g) = 0.019 W/kg; SAR(10 g) = 0.00877 W/kg**

Maximum value of SAR (measured) = 0.0279 W/kg



**58\_GSM1900\_GPRS 4 Tx slots\_Bottom Side\_0mm\_Ch512**

Communication System: UID 0, GPRS/EDGE (4 Tx slots) (0); Frequency: 1850.2 MHz; Duty Cycle: 1:2.08

Medium: MSL\_1900\_160422 Medium parameters used (interpolated):  $f = 1850.2 \text{ MHz}$ ;  $\sigma = 1.503 \text{ S/m}$ ;  $\epsilon_r = 52.928$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.54, 7.54, 7.54); 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)

**Ch512/Area Scan (41x71x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 6.53 W/kg

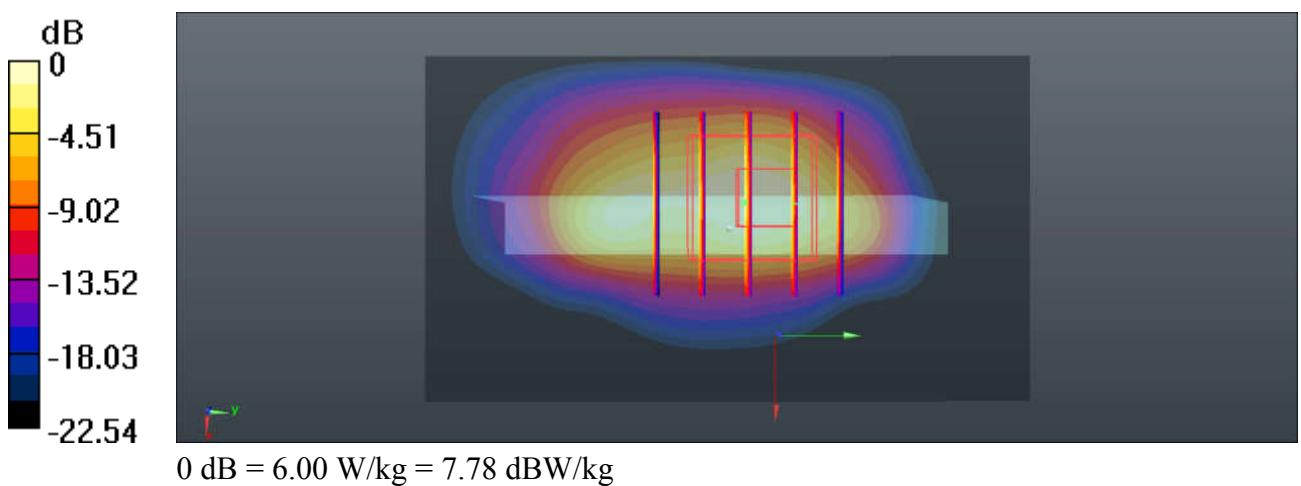
**Ch512/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 52.06 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 8.13 W/kg

**SAR(1 g) = 3.92 W/kg; SAR(10 g) = 1.83 W/kg**

Maximum value of SAR (measured) = 6.00 W/kg



**59\_WCDMA Band IV\_RMC12.2Kbps\_Bottom Side\_0mm\_Ch1312**

Communication System: UID 0, UMTS (0); Frequency: 1712.4 MHz; Duty Cycle: 1:1  
Medium: MSL\_1750\_160422 Medium parameters used (interpolated):  $f = 1712.4$  MHz;  $\sigma = 1.501$  S/m;  $\epsilon_r = 53.404$ ;  $\rho = 1000$  kg/m<sup>3</sup>

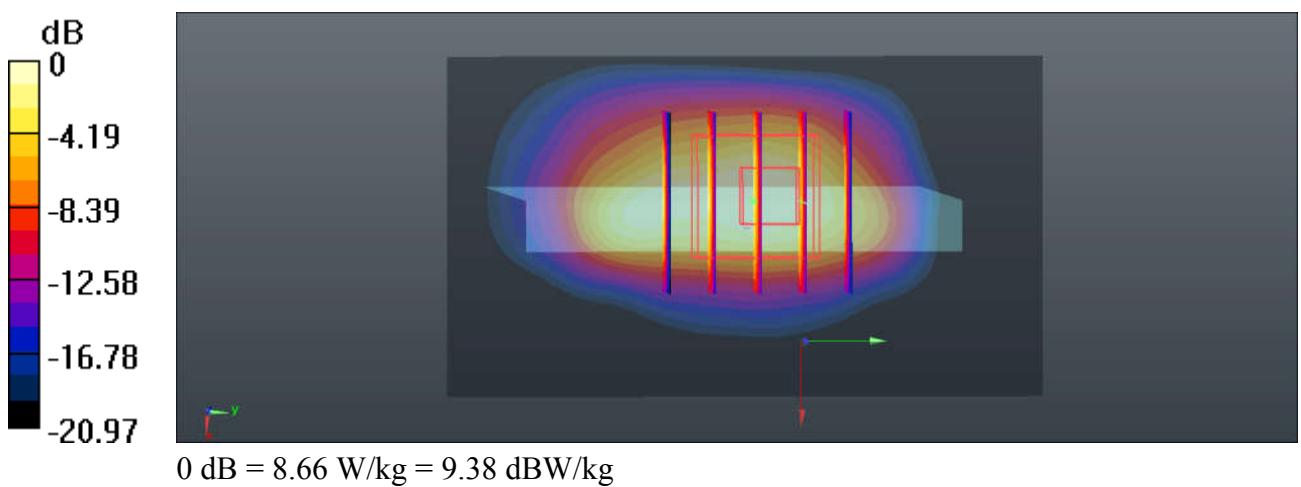
Ambient Temperature : 23.3 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.77, 7.77, 7.77); 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)

**Ch1312/Area Scan (41x71x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 10.1 W/kg

**Ch1312/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 65.76 V/m; Power Drift = 0.06 dB  
Peak SAR (extrapolated) = 11.5 W/kg  
**SAR(1 g) = 5.78 W/kg; SAR(10 g) = 2.84 W/kg**  
Maximum value of SAR (measured) = 8.66 W/kg



**60\_WCDMA Band II\_RMC12.2Kbps\_Bottom Side\_0mm\_Ch9262**

Communication System: UID 0, UMTS (0); Frequency: 1852.4 MHz; Duty Cycle: 1:1  
Medium: MSL\_1900\_160422 Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.506$  S/m;  $\epsilon_r = 52.922$ ;  $\rho = 1000$  kg/m<sup>3</sup>

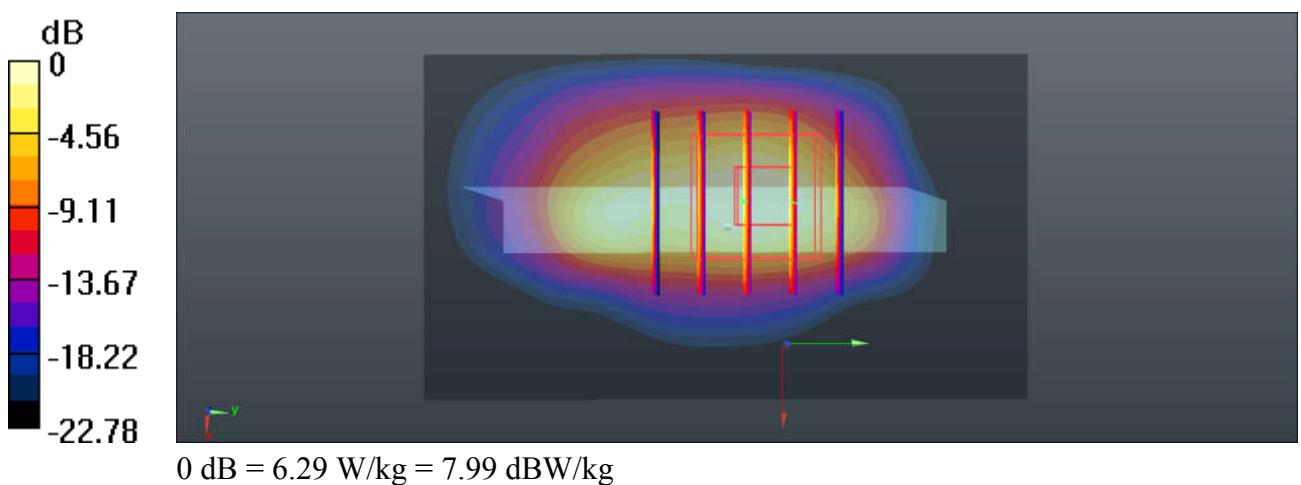
Ambient Temperature : 23.3 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.54, 7.54, 7.54); 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)

**Ch9262/Area Scan (41x71x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 6.97 W/kg

**Ch9262/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 52.69 V/m; Power Drift = 0.06 dB  
Peak SAR (extrapolated) = 8.52 W/kg  
**SAR(1 g) = 4.08 W/kg; SAR(10 g) = 1.89 W/kg**  
Maximum value of SAR (measured) = 6.29 W/kg



**61\_LTE Band 4\_20M\_QPSK\_1RB\_49Offset\_Front\_0mm\_Ch20175**

Communication System: UID 0, FDD\_LTE (0); Frequency: 1732.5 MHz; Duty Cycle: 1:1  
Medium: MSL\_1750\_160318 Medium parameters used:  $f = 1732.5$  MHz;  $\sigma = 1.525$  S/m;  $\epsilon_r = 53.365$ ;

$$\rho = 1000 \text{ kg/m}^3$$

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.77, 7.77, 7.77); 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)

**Ch20175/Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 7.69 W/kg

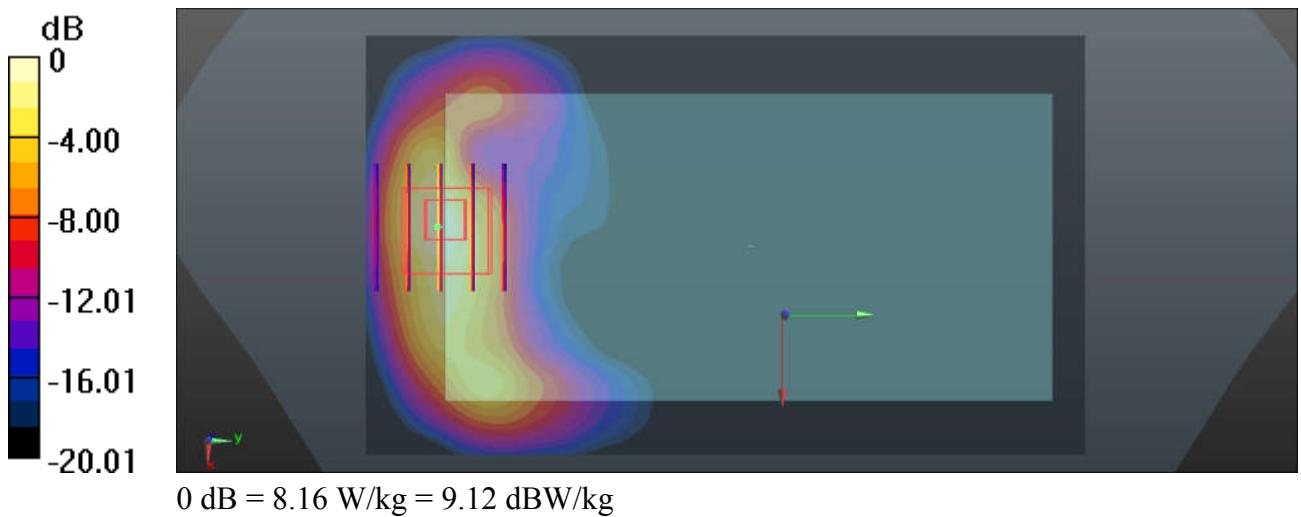
**Ch20175/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.913 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 11.5 W/kg

**SAR(1 g) = 5.61 W/kg; SAR(10 g) = 2.7 W/kg**

Maximum value of SAR (measured) = 8.16 W/kg



**62\_LTE Band 2\_20M\_QPSK\_1RB\_99Offset\_Bottom Side\_0mm\_Ch18700**

Communication System: UID 0, FDD\_LTE (0); Frequency: 1860 MHz; Duty Cycle: 1:1  
 Medium: MSL\_1900\_160422 Medium parameters used:  $f = 1860 \text{ MHz}$ ;  $\sigma = 1.514 \text{ S/m}$ ;  $\epsilon_r = 52.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.6 °C

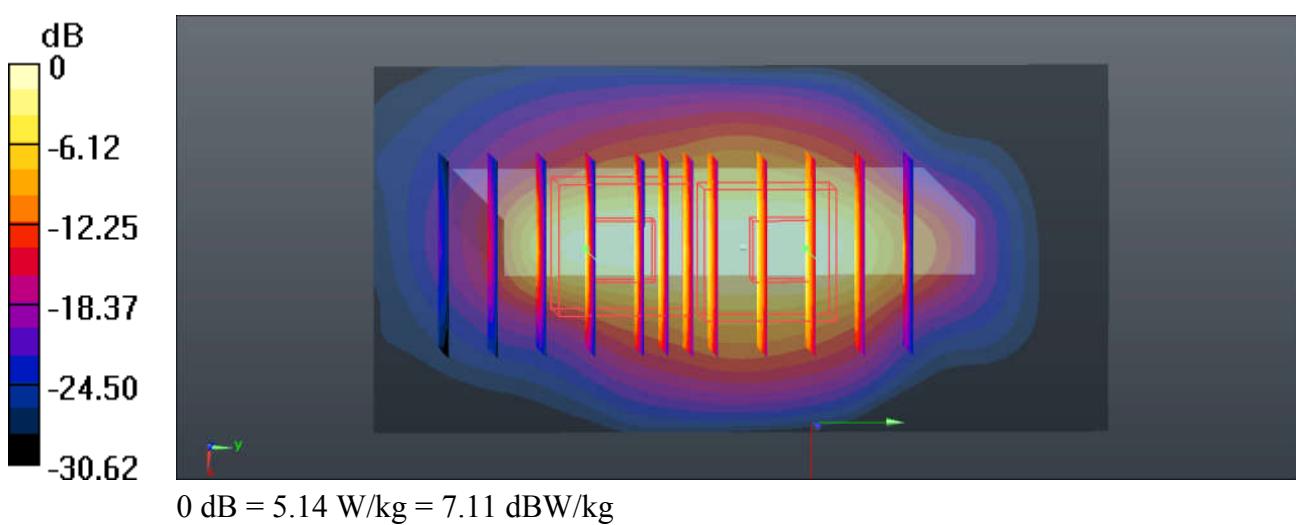
DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.54, 7.54, 7.54); 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)

**Ch18700/Area Scan (41x81x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$   
 Maximum value of SAR (interpolated) = 4.99 W/kg

**Ch18700/Zoom Scan (5x6x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
 Reference Value = 50.65 V/m; Power Drift = 0.03 dB  
 Peak SAR (extrapolated) = 6.27 W/kg  
**SAR(1 g) = 2.91 W/kg; SAR(10 g) = 1.35 W/kg**  
 Maximum value of SAR (measured) = 4.51 W/kg

**Ch18700/Zoom Scan (5x6x7)/Cube 1:** Measurement grid:  $dx=8\text{mm}$ ,  
 $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
 Reference Value = 50.65 V/m; Power Drift = 0.03 dB  
 Peak SAR (extrapolated) = 8.32 W/kg  
**SAR(1 g) = 2.61 W/kg; SAR(10 g) = 0.937 W/kg**  
 Maximum value of SAR (measured) = 5.14 W/kg



**63\_LTE Band 7\_20M\_QPSK\_1RB\_0Offset\_Bottom Side\_0mm\_Ch20850**

Communication System: UID 0, FDD\_LTE (0); Frequency: 2510 MHz; Duty Cycle: 1:1  
 Medium: MSL\_2600\_160421 Medium parameters used:  $f = 2510$  MHz;  $\sigma = 2.038$  S/m;  $\epsilon_r = 53.124$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.7 °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)

**Ch20850/Area Scan (51x91x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm  
 Maximum value of SAR (interpolated) = 7.54 W/kg

**Ch20850/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
 Reference Value = 45.82 V/m; Power Drift = 0.15 dB  
 Peak SAR (extrapolated) = 14.7 W/kg  
**SAR(1 g) = 4.93 W/kg; SAR(10 g) = 1.75 W/kg**  
 Maximum value of SAR (measured) = 9.08 W/kg

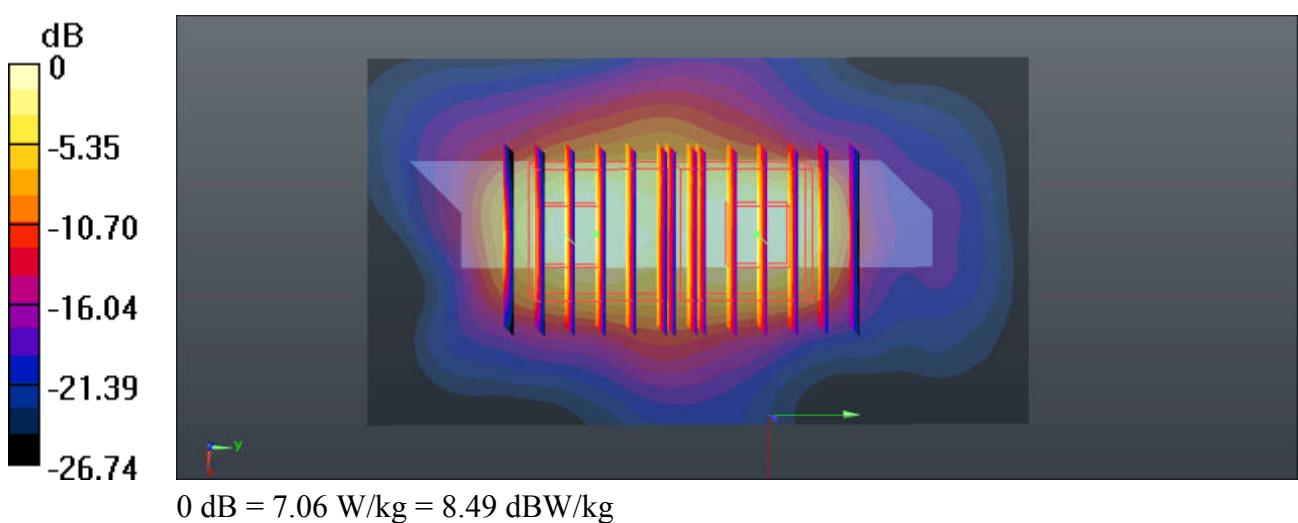
**Ch20850/Zoom Scan (7x7x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 45.82 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 10.2 W/kg

**SAR(1 g) = 4.22 W/kg; SAR(10 g) = 1.73 W/kg**

Maximum value of SAR (measured) = 7.06 W/kg



**64\_WLAN2.4GHz\_802.11n-HT20 MCS0\_Front\_0mm\_Ant 1+2\_Ch6**

Communication System: UID 0, WIFI (0); Frequency: 2437 MHz; Duty Cycle: 1:1.063  
Medium: MSL\_2450\_160423 Medium parameters used:  $f = 2437 \text{ MHz}$ ;  $\sigma = 1.964 \text{ S/m}$ ;  $\epsilon_r = 51.468$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3857; ConvF(7.29, 7.29, 7.29); 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)

**Ch6/Area Scan (91x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm  
Maximum value of SAR (interpolated) = 1.73 W/kg

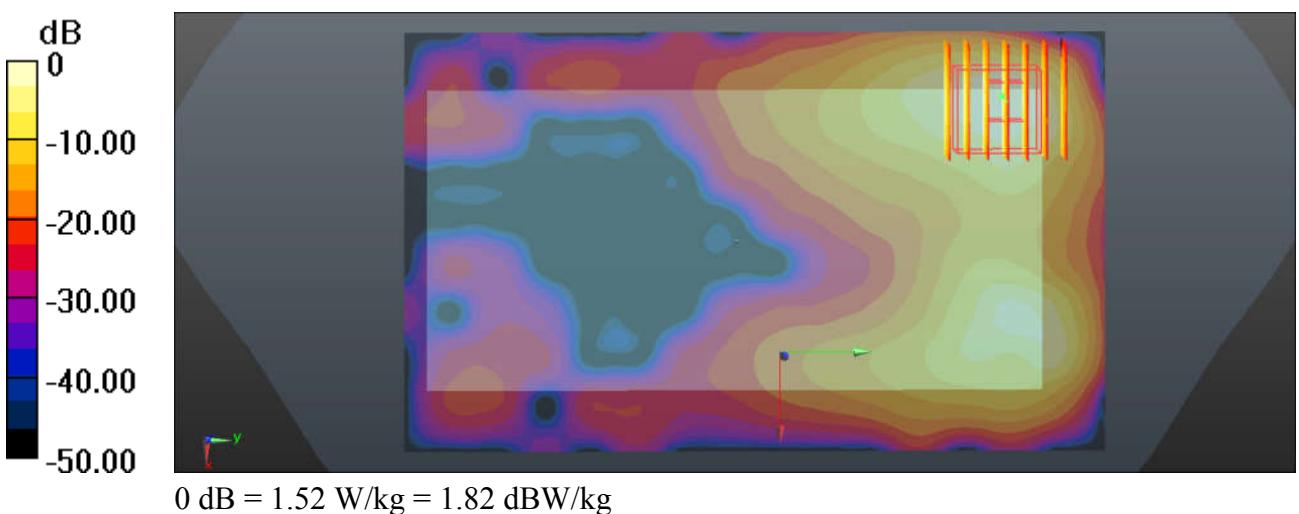
**Ch6/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 2.45 W/kg

**SAR(1 g) = 0.848 W/kg; SAR(10 g) = 0.358 W/kg**

Maximum value of SAR (measured) = 1.52 W/kg



**65\_WLAN5.3GHz\_802.11a 6Mbps\_Back\_0mm\_Ant 1\_Ch56**

Communication System: UID 0, WIFI (0); Frequency: 5280 MHz; Duty Cycle: 1:1.049  
Medium: MSL\_5000\_160423 Medium parameters used:  $f = 5280 \text{ MHz}$ ;  $\sigma = 5.415 \text{ S/m}$ ;  $\epsilon_r = 49.041$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(4.25, 4.25, 4.25); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch56/Area Scan (101x171x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 3.69 W/kg

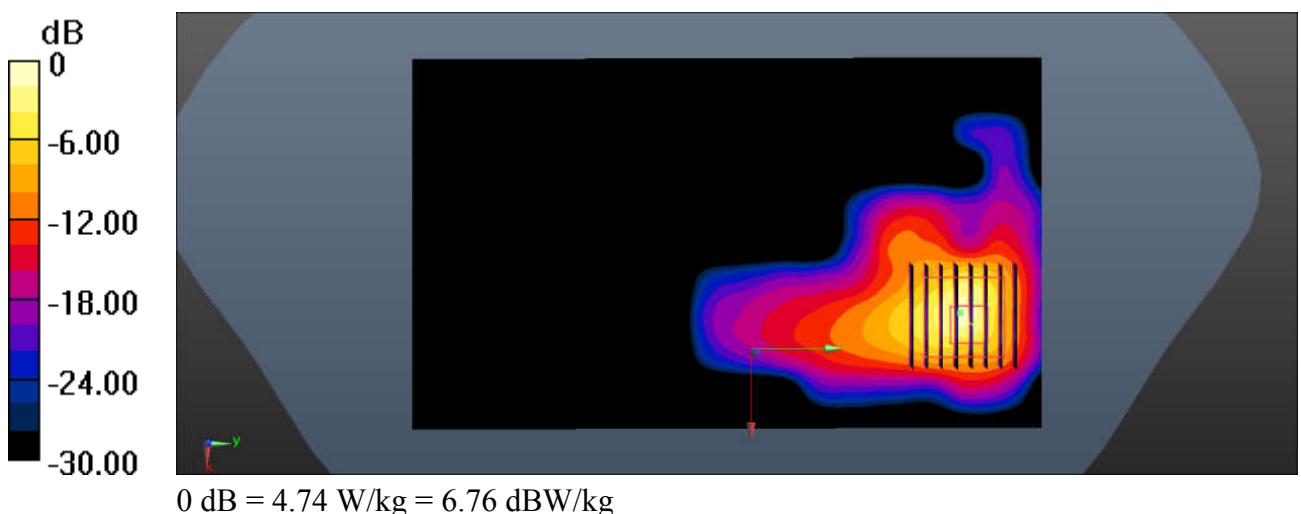
**Ch56/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 0 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 8.22 W/kg

**SAR(1 g) = 1.85 W/kg; SAR(10 g) = 0.547 W/kg**

Maximum value of SAR (measured) = 4.74 W/kg



**66\_WLAN5.2GHz\_802.11a 6Mbps\_Back\_0mm\_Ant 2\_Ch48**

Communication System: UID 0, WIFI (0); Frequency: 5240 MHz; Duty Cycle: 1:1.050  
Medium: MSL\_5000\_160423 Medium parameters used:  $f = 5240 \text{ MHz}$ ;  $\sigma = 5.363 \text{ S/m}$ ;  $\epsilon_r = 49.129$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(4.25, 4.25, 4.25); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch48/Area Scan (101x171x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 2.34 W/kg

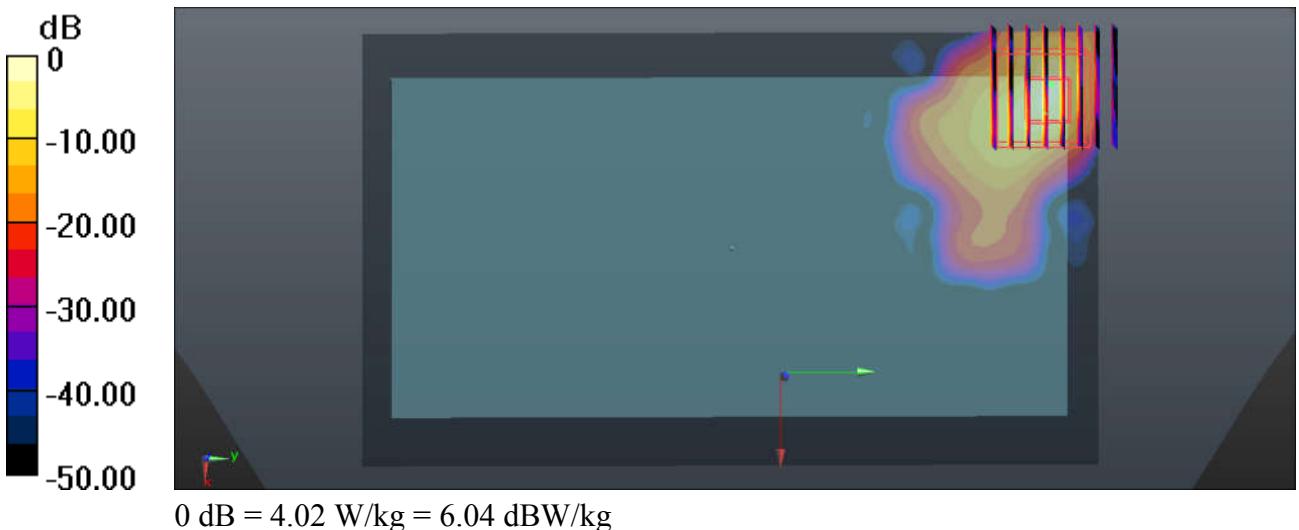
**Ch48/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 0 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 8.76 W/kg

**SAR(1 g) = 1.17 W/kg; SAR(10 g) = 0.226 W/kg**

Maximum value of SAR (measured) = 4.02 W/kg



**67\_WLAN5.2GHz\_802.11n-HT20 MCS0\_0mm\_Ant 1+2\_Ch40**

Communication System: UID 0, WIFI (0); Frequency: 5200 MHz; Duty Cycle: 1:1.058  
 Medium: MSL\_5000\_160423 Medium parameters used:  $f = 5200 \text{ MHz}$ ;  $\sigma = 5.297 \text{ S/m}$ ;  $\epsilon_r = 49.185$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(4.25, 4.25, 4.25); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch40/Area Scan (101x171x1):** Interpolated grid:  $dx=1.000 \text{ mm}$ ,  $dy=1.000 \text{ mm}$   
 Maximum value of SAR (interpolated) = 3.00 W/kg

**Ch40/Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$

Reference Value = 0 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 6.76 W/kg

**SAR(1 g) = 1.51 W/kg; SAR(10 g) = 0.448 W/kg**

Maximum value of SAR (measured) = 3.76 W/kg

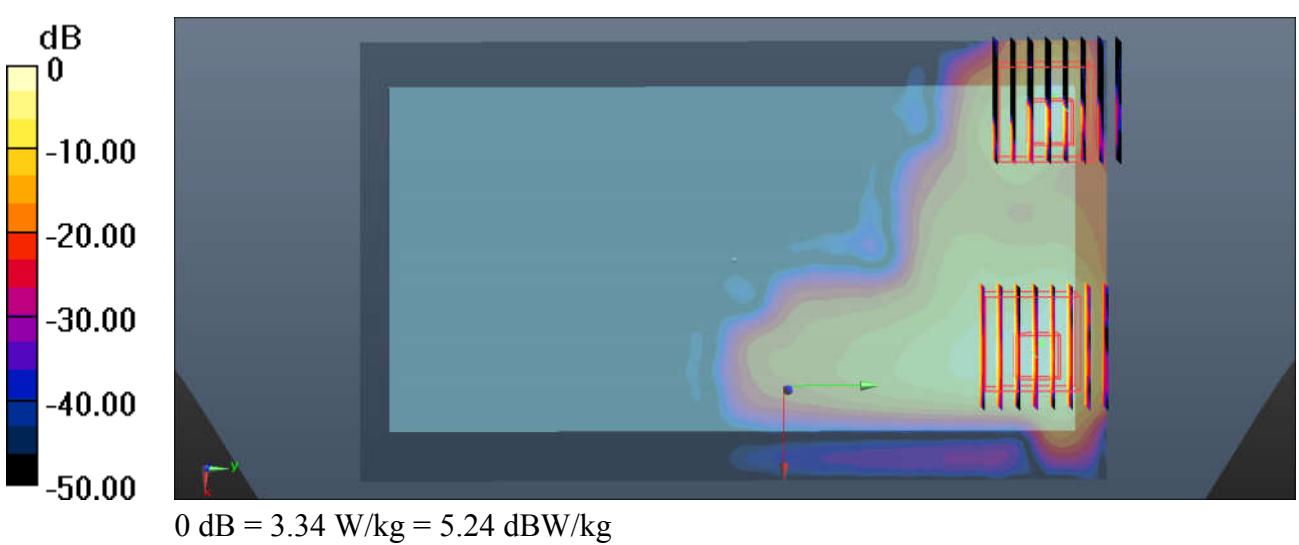
**Ch40/Zoom Scan (8x8x7)/Cube 1:** Measurement grid:  $dx=4\text{mm}$ ,  $dy=4\text{mm}$ ,  $dz=1.4\text{mm}$

Reference Value = 0 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 15.6 W/kg

**SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.148 W/kg**

Maximum value of SAR (measured) = 3.34 W/kg



**68\_WLAN5.5GHz\_802.11a 6Mbps\_Back\_0mm\_Ant 1\_Ch100**

Communication System: UID 0, WIFI (0); Frequency: 5500 MHz; Duty Cycle: 1:1.049  
Medium: MSL\_5000\_160419 Medium parameters used:  $f = 5500 \text{ MHz}$ ;  $\sigma = 5.738 \text{ S/m}$ ;  $\epsilon_r = 48.597$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(3.65, 3.65, 3.65); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

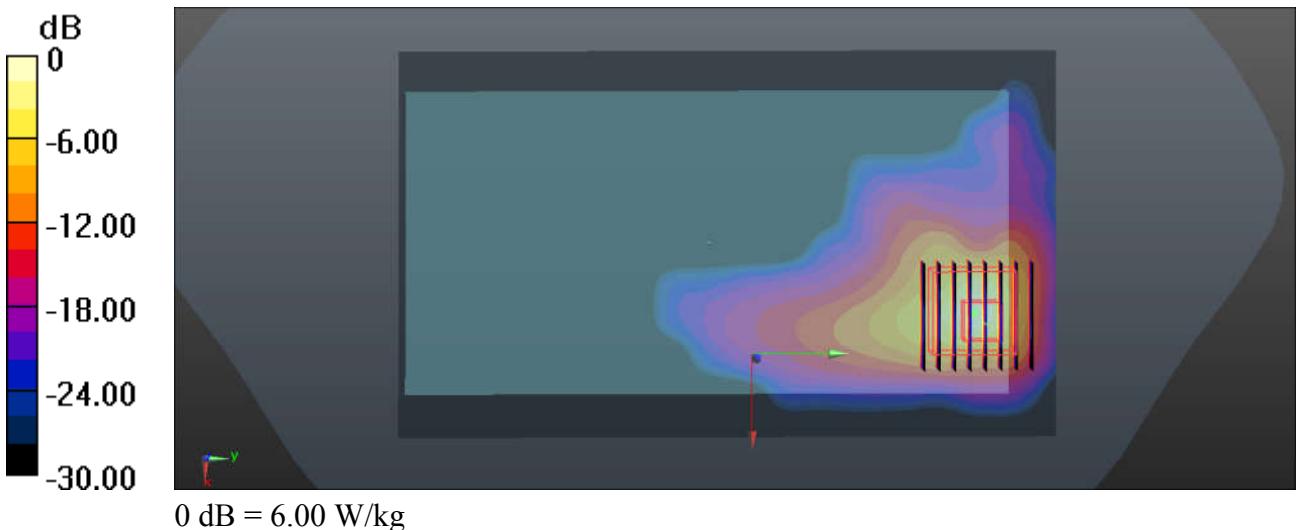
**Ch100/Area Scan (101x171x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 5.55 W/kg

**Ch100/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 0 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 9.59 W/kg

**SAR(1 g) = 2.22 W/kg; SAR(10 g) = 0.662 W/kg**

Maximum value of SAR (measured) = 6.00 W/kg



**69\_WLAN5.5GHz\_802.11a 6Mbps\_Back\_0mm\_Ant 2\_Ch140**

Communication System: UID 0, WIFI (0); Frequency: 5700 MHz; Duty Cycle: 1:1050  
Medium: MSL\_5000\_160418 Medium parameters used:  $f = 5700 \text{ MHz}$ ;  $\sigma = 6.022 \text{ S/m}$ ;  $\epsilon_r = 48.097$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(3.65, 3.65, 3.65); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

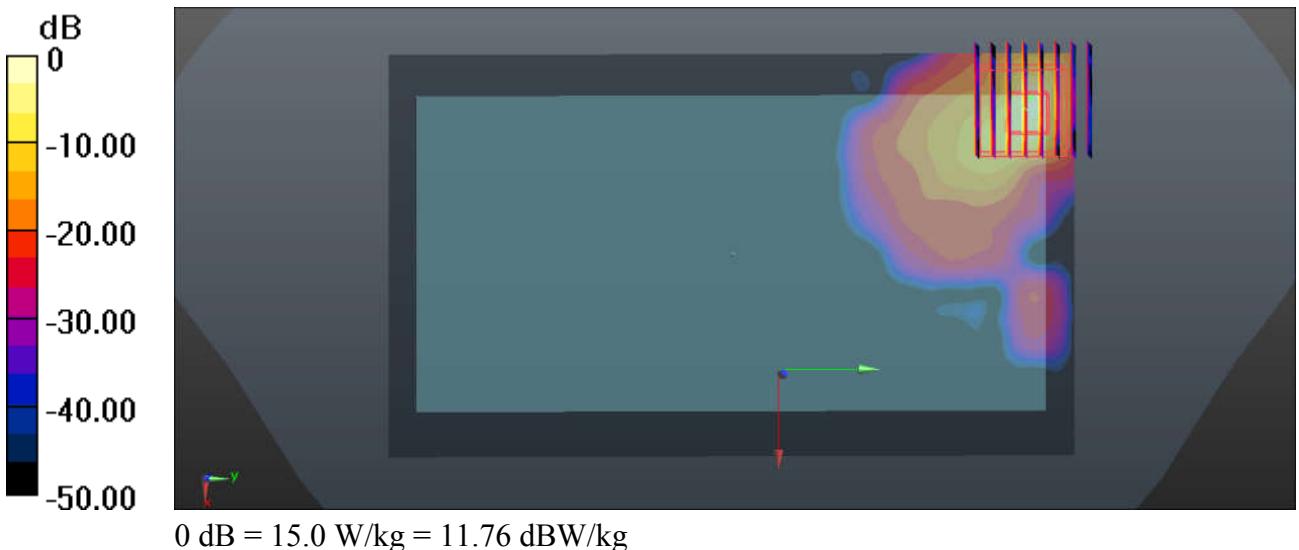
**Ch140/Area Scan (101x171x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 10.8 W/kg

**Ch140/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 0.1990 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 36.1 W/kg

**SAR(1 g) = 4.24 W/kg; SAR(10 g) = 0.799 W/kg**

Maximum value of SAR (measured) = 15.0 W/kg



**70\_WLAN5.5GHz\_802.11n-HT20 MCS0\_Back\_0mm\_Ant 1+2\_Ch140**

Communication System: UID 0, WIFI (0); Frequency: 5700 MHz; Duty Cycle: 1:1.058  
Medium: MSL\_5000\_160418 Medium parameters used:  $f = 5700 \text{ MHz}$ ;  $\sigma = 6.022 \text{ S/m}$ ;  $\epsilon_r = 48.097$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(3.65, 3.65, 3.65); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

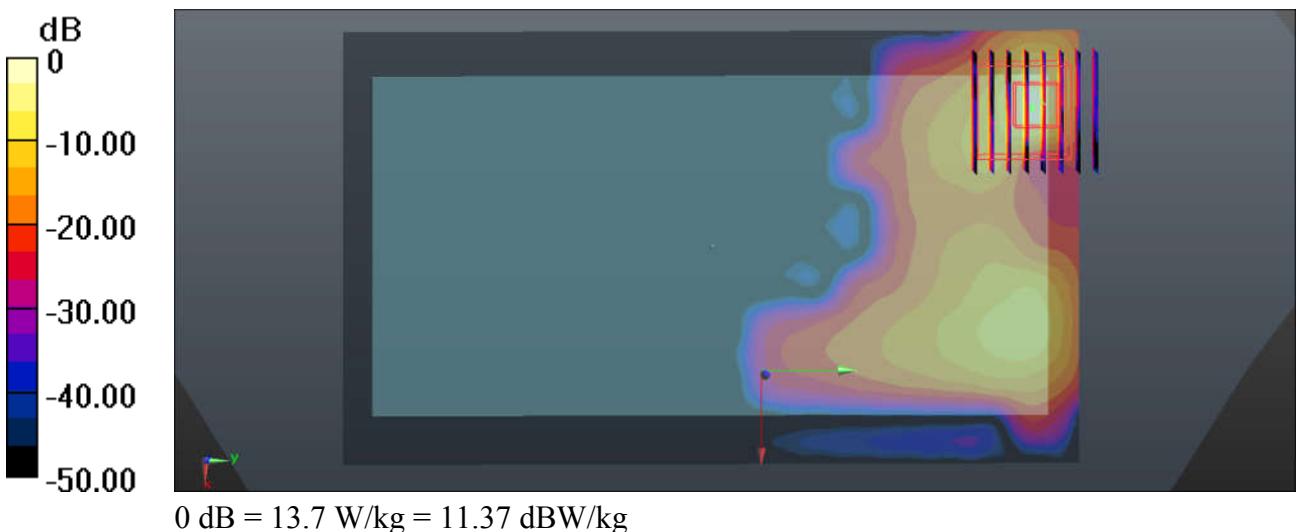
**Ch140/Area Scan (101x171x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 9.69 W/kg

**Ch140/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 0.5110 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 25.5 W/kg

**SAR(1 g) = 3.46 W/kg; SAR(10 g) = 0.657 W/kg**

Maximum value of SAR (measured) = 13.7 W/kg



**71\_WLAN5.8GHz\_802.11a 6Mbps\_Back\_0mm\_Ant 1\_Ch165**

Communication System: UID 0, WIFI (0); Frequency: 5825 MHz; Duty Cycle: 1:1.049  
Medium: MSL\_5000\_160418 Medium parameters used:  $f = 5825 \text{ MHz}$ ;  $\sigma = 6.166 \text{ S/m}$ ;  $\epsilon_r = 47.679$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(3.77, 3.77, 3.77); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch165/Area Scan (101x181x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 4.30 W/kg

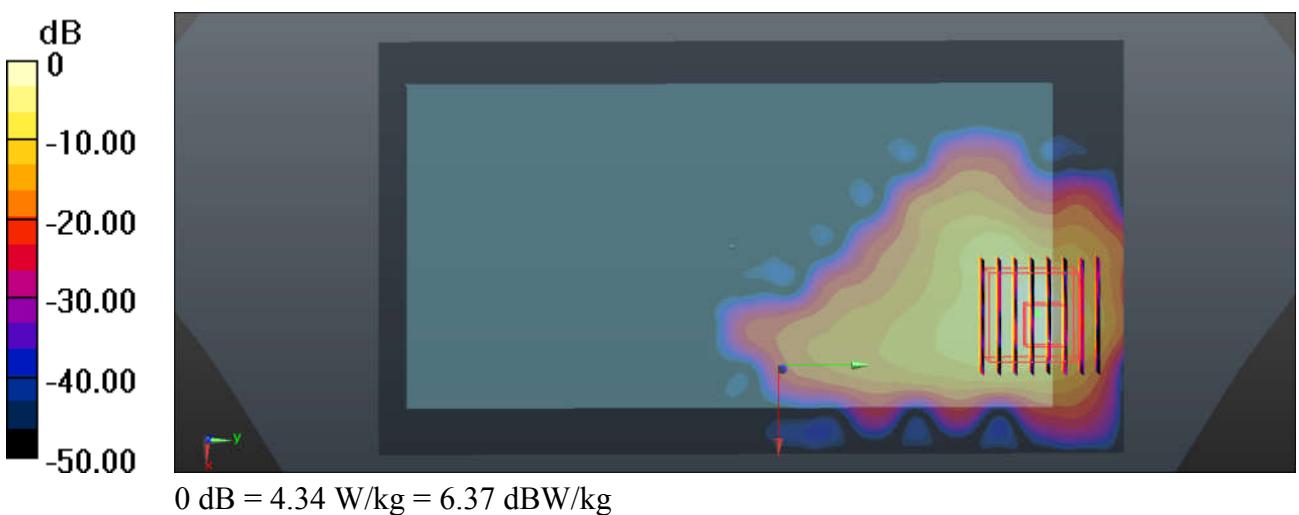
**Ch165/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 0 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 7.46 W/kg

**SAR(1 g) = 1.55 W/kg; SAR(10 g) = 0.462 W/kg**

Maximum value of SAR (measured) = 4.34 W/kg



**72\_WLAN5.8GHz\_802.11a 6Mbps\_Back\_0mm\_Ant 2\_Ch157**

Communication System: UID 0, WIFI (0); Frequency: 5785 MHz; Duty Cycle: 1:1.05  
Medium: MSL\_5000\_160418 Medium parameters used:  $f = 5785 \text{ MHz}$ ;  $\sigma = 6.11 \text{ S/m}$ ;  $\epsilon_r = 47.844$ ;  $\rho = 1000 \text{ kg/m}^3$   
Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

## DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(3.77, 3.77, 3.77); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch157/Area Scan (101x181x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 11.8 W/kg

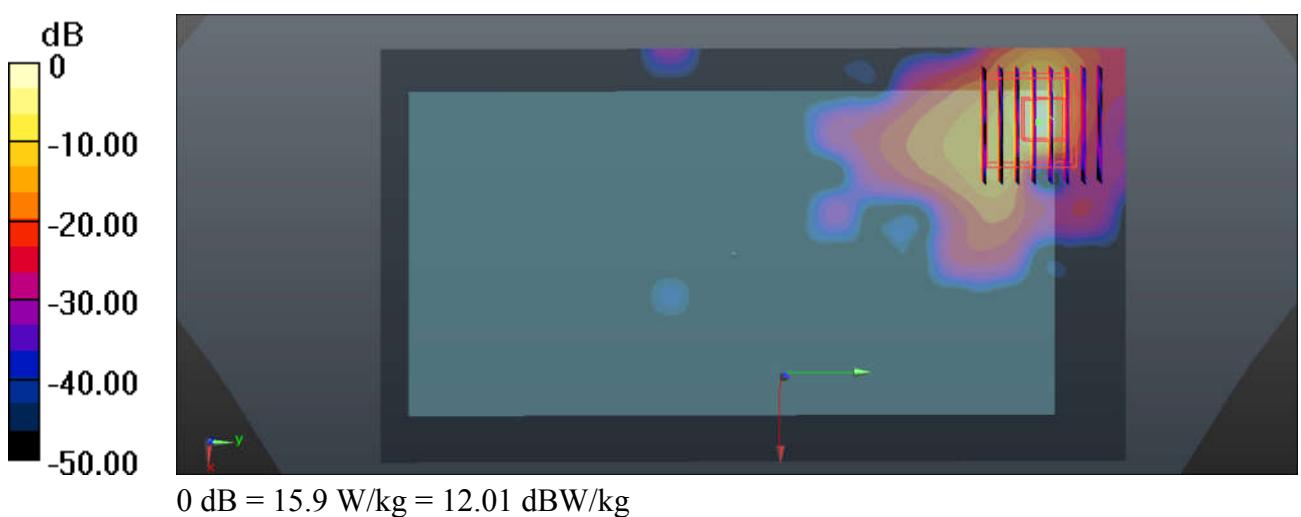
**Ch157/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 0 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 32.4 W/kg

**SAR(1 g) = 4.02 W/kg; SAR(10 g) = 0.730 W/kg**

Maximum value of SAR (measured) = 15.9 W/kg



**73\_WLAN5.8GHz\_802.11n-HT20 MCS0\_Back\_0mm\_Ant 1+2\_Ch165**

Communication System: UID 0, WIFI (0); Frequency: 5825 MHz; Duty Cycle: 1:1.058  
Medium: MSL\_5000\_160418 Medium parameters used:  $f = 5825 \text{ MHz}$ ;  $\sigma = 6.166 \text{ S/m}$ ;  $\epsilon_r = 47.679$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : 23.7 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3954; ConvF(3.77, 3.77, 3.77); Calibrated: 2015.11.27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 2015.7.16
- Phantom: SAM1; Type: SAM; Serial: TP-1644
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Ch165/Area Scan (101x181x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 3.51 W/kg

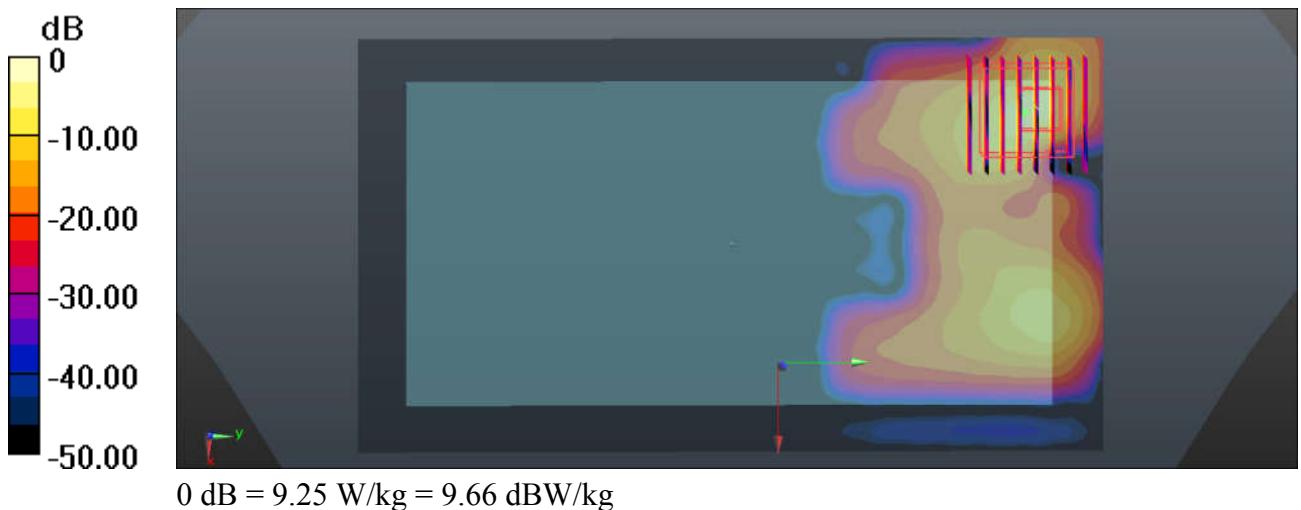
**Ch165/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 0 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 21.7 W/kg

**SAR(1 g) = 2.8 W/kg; SAR(10 g) = 0.567 W/kg**

Maximum value of SAR (measured) = 9.25 W/kg





## Appendix C. DASY Calibration Certificate

The DASY calibration certificates are shown as follows.

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



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

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 0108**

Client **Sporton-KS (Auden)**

Certificate No: **D750V3-1065\_Nov15**

## 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 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 ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter 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: Name **Claudio Leubler** Function **Laboratory Technician**

Signature

Approved by: Name **Katja Pokovic** Function **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)

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

Accreditation No.: SCS 0108

#### 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) 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
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

- e) 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.

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

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	41.9	0.89 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	42.8 ± 6 %	0.90 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	---	---

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	2.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.25 W/kg ± 17.0 % (k=2)

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	1.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.38 W/kg ± 16.5 % (k=2)

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	55.5	0.96 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	55.9 ± 6 %	0.97 mho/m ± 6 %
<b>Body TSL temperature change during test</b>	< 0.5 °C	---	---

## SAR result with Body TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b>	Condition	
SAR measured	250 mW input power	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.86 W/kg ± 17.0 % (k=2)

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	1.48 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.89 W/kg ± 16.5 % (k=2)

## **Appendix (Additional assessments outside the scope of SCS 0108)**

### **Antenna Parameters with Head TSL**

Impedance, transformed to feed point	53.4 $\Omega$ - 2.1 $j\Omega$
Return Loss	- 28.3 dB

### **Antenna Parameters with Body TSL**

Impedance, transformed to feed point	49.1 $\Omega$ - 3.9 $j\Omega$
Return Loss	- 27.8 dB

### **General Antenna Parameters and Design**

Electrical Delay (one direction)	1.032 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	May 10, 2012

# DASY5 Validation Report for Head TSL

Date: 24.11.2015

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:  $f = 750 \text{ MHz}$ ;  $\sigma = 0.9 \text{ S/m}$ ;  $\epsilon_r = 42.8$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.1, 10.1, 10.1); 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:

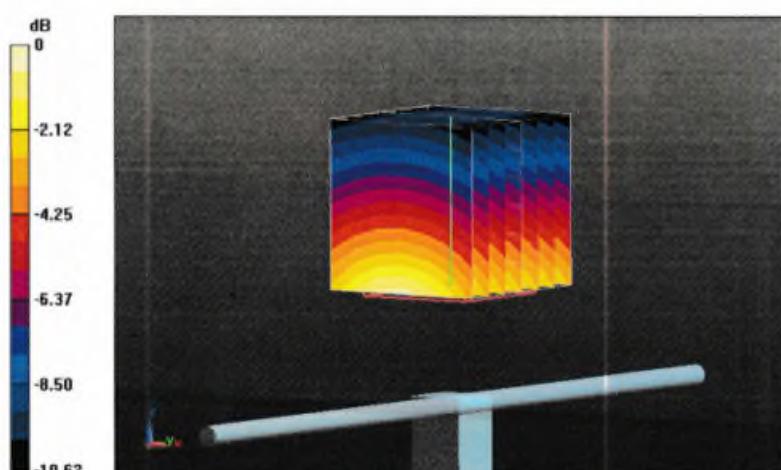
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 58.14 V/m; Power Drift = 0.05 dB

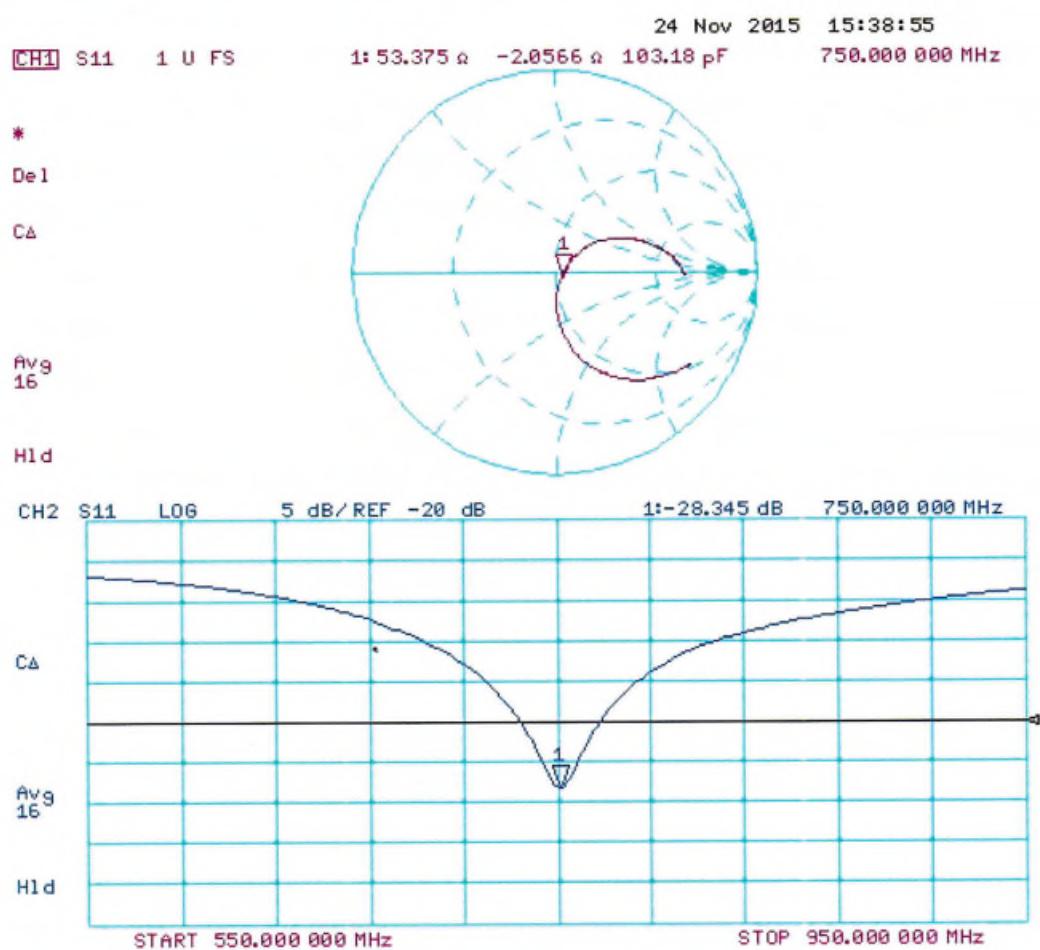
Peak SAR (extrapolated) = 3.09 W/kg

**SAR(1 g) = 2.07 W/kg; SAR(10 g) = 1.35 W/kg**

Maximum value of SAR (measured) = 2.74 W/kg



## Impedance Measurement Plot for Head TSL



# DASY5 Validation Report for Body TSL

Date: 24.11.2015

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:  $f = 750 \text{ MHz}$ ;  $\sigma = 0.97 \text{ S/m}$ ;  $\epsilon_r = 55.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.61, 9.61, 9.61); 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:

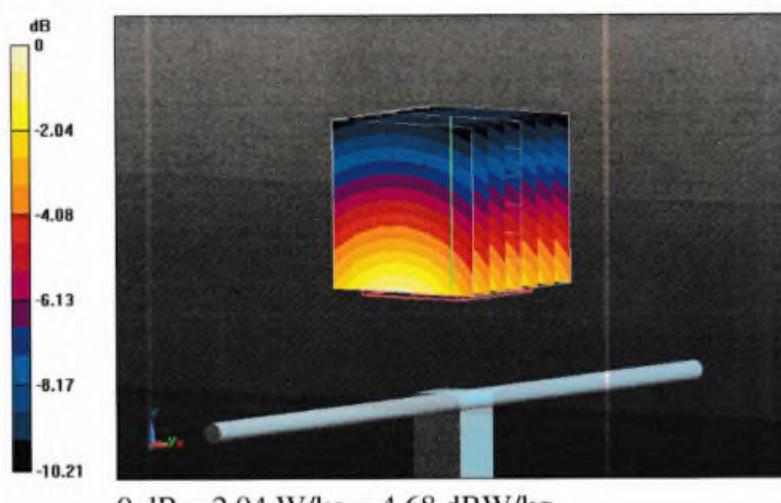
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 58.13 V/m; Power Drift = -0.00 dB

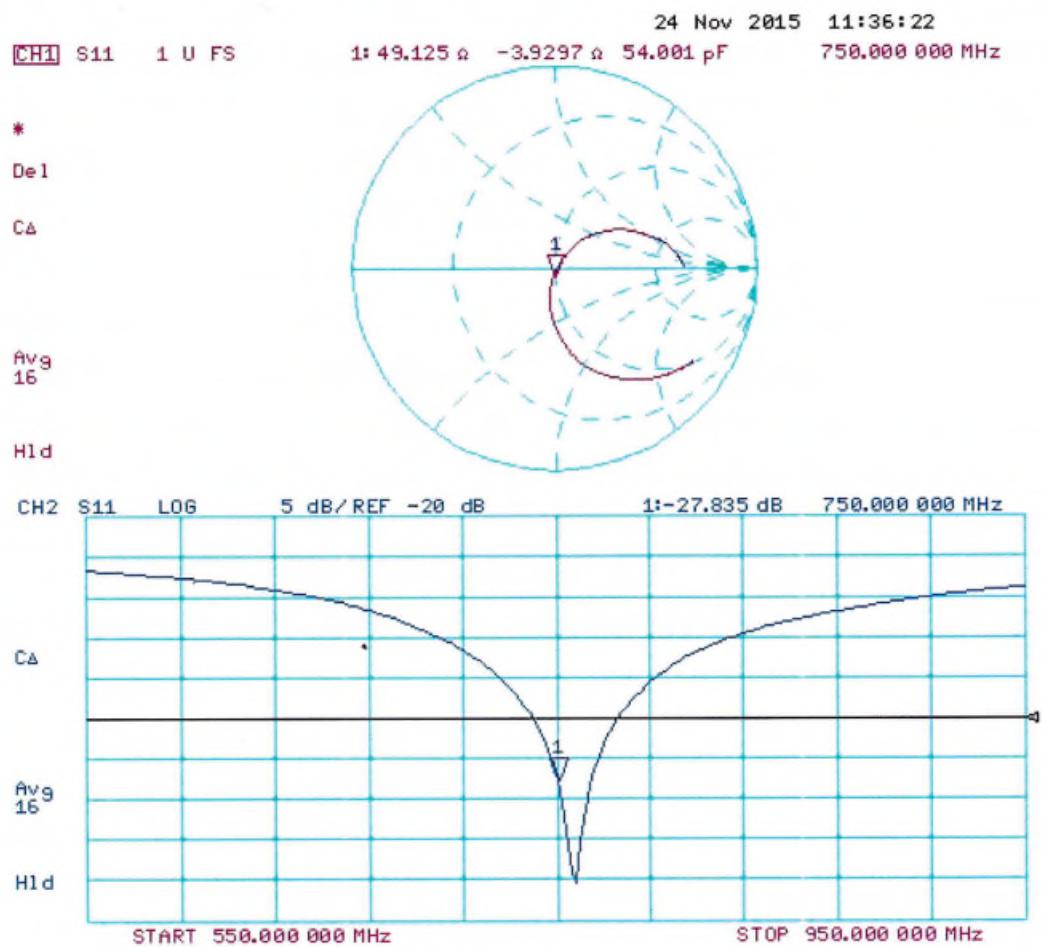
Peak SAR (extrapolated) = 3.29 W/kg

**SAR(1 g) = 2.23 W/kg; SAR(10 g) = 1.48 W/kg**

Maximum value of SAR (measured) = 2.94 W/kg



## Impedance Measurement Plot for Body TSL





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

Accreditation No.: **SCS 0108**

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 ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter 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: Name **Claudio Leubler** Function **Laboratory Technician**

Signature

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

- 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) 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
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

- e) 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 ± 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 ± 0.2) °C	42.6 ± 6 %	0.92 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

## SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.14 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (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 ± 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 ± 0.2) °C	55.6 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

## SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.55 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (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 ± 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 $\Omega$ - 4.3 $j\Omega$
Return Loss	- 27.0 dB

### **Antenna Parameters with Body TSL**

Impedance, transformed to feed point	47.3 $\Omega$ - 6.3 $j\Omega$
Return Loss	- 23.0 dB

### **General Antenna Parameters and Design**

Electrical Delay (one direction)	1.395 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: 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:

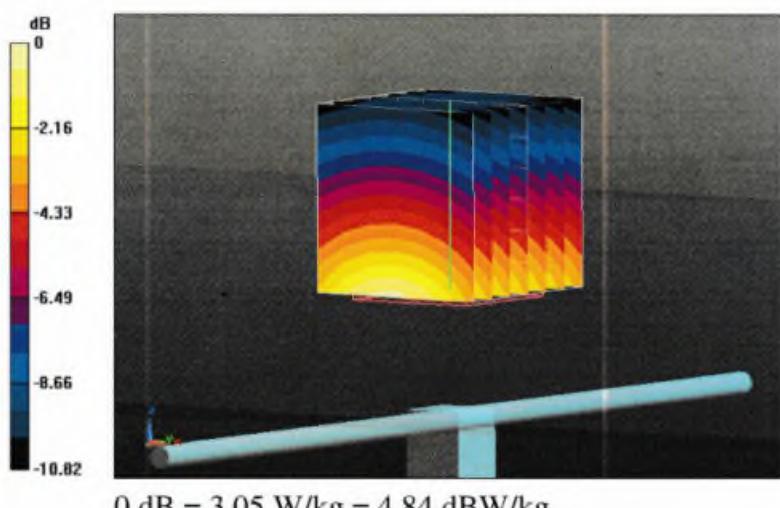
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

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

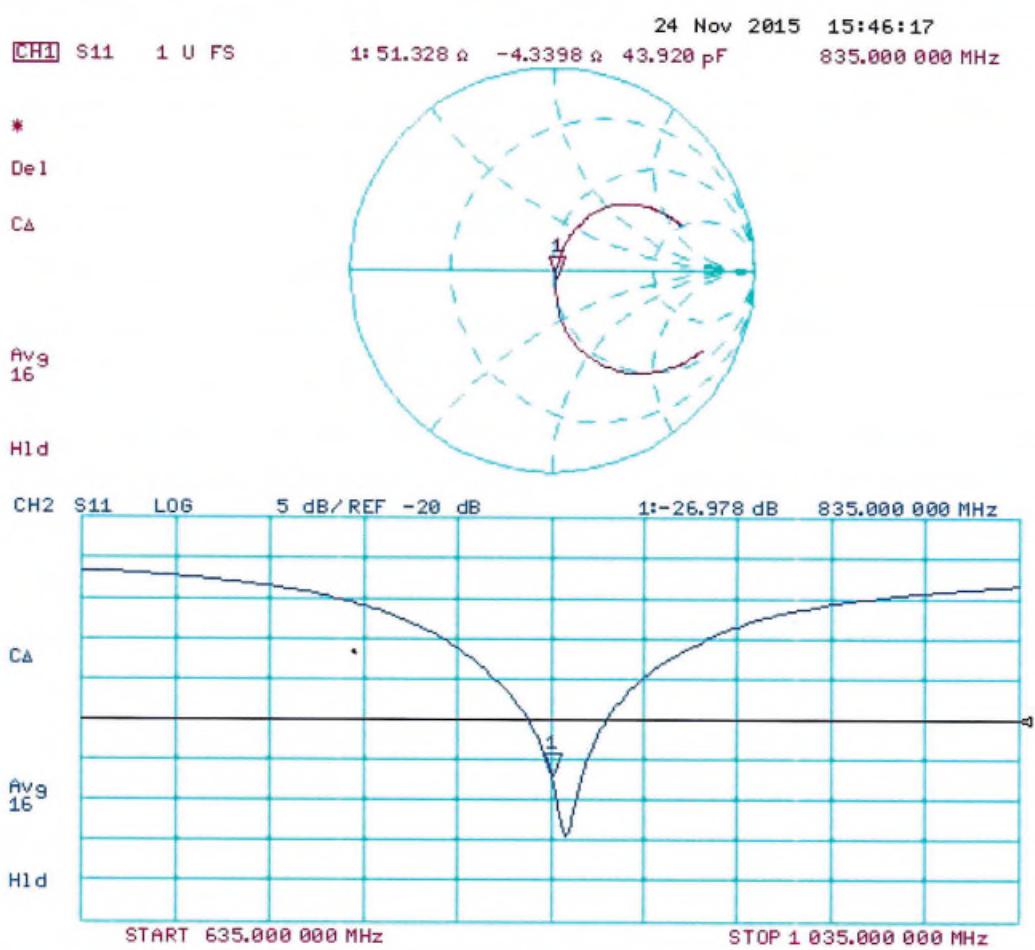
Peak SAR (extrapolated) = 3.43 W/kg

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

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



## 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:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.99 \text{ S/m}$ ;  $\epsilon_r = 55.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.72, 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:

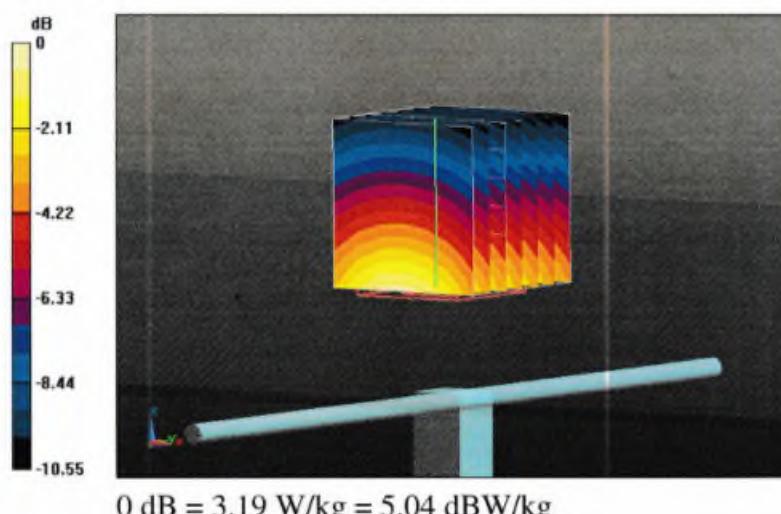
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

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

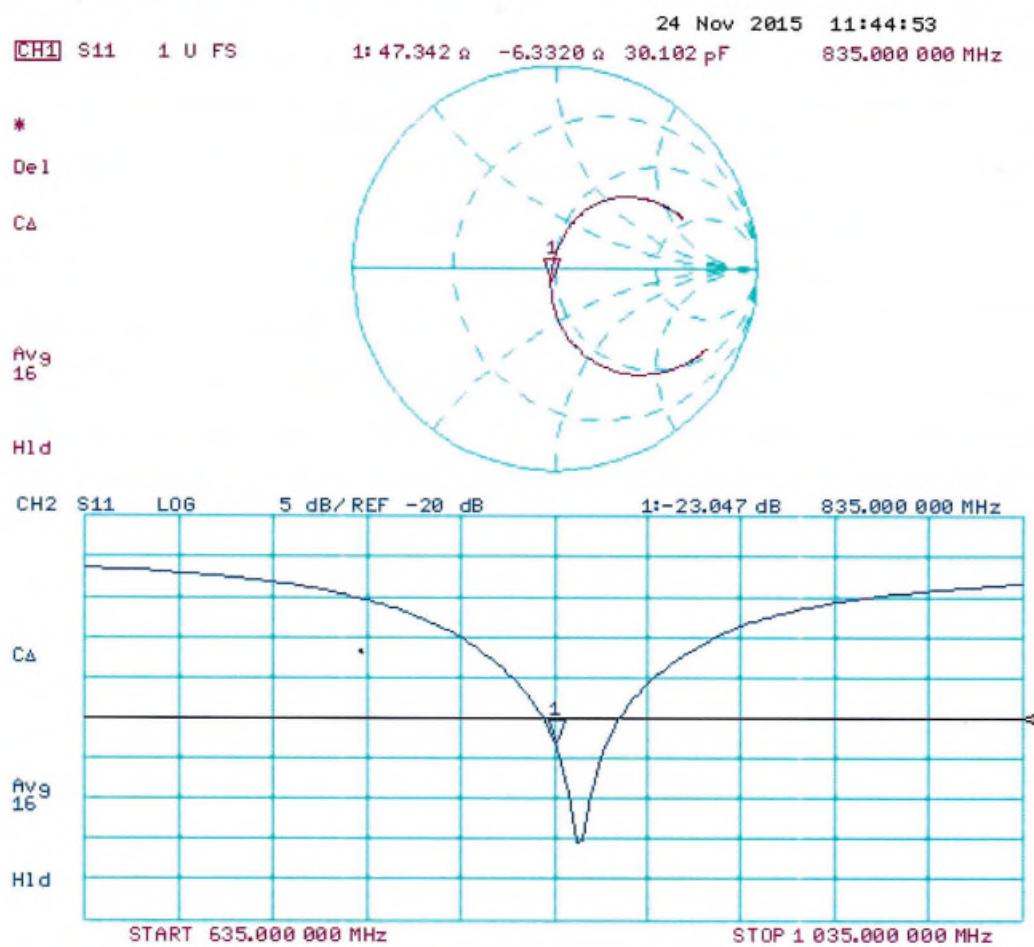
Peak SAR (extrapolated) = 3.58 W/kg

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

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



## Impedance Measurement Plot for Body TSL





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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **Sporton-KS (Auden)**

Certificate No: **D1750V2-1069\_Nov15**

## **CALIBRATION CERTIFICATE**

Object **D1750V2 - SN: 1069**

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

Calibration date: **November 23, 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 ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter 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: Name **Michael Weber** Function **Laboratory Technician**

Signature

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

- 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) 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
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- e) 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.

<b>DASY Version</b>	DASY5	V52.8.8
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	$dx, dy, dz = 5 \text{ mm}$	
<b>Frequency</b>	$1750 \text{ MHz} \pm 1 \text{ MHz}$	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	40.1	1.37 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	40.8 ± 6 %	1.35 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	9.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	37.0 W/kg ± 17.0 % (k=2)

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	4.83 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.5 W/kg ± 16.5 % (k=2)

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	53.4	1.49 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	54.2 ± 6 %	1.48 mho/m ± 6 %
<b>Body TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Body TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b>	Condition	
SAR measured	250 mW input power	8.92 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	35.9 W/kg ± 17.0 % (k=2)

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	4.76 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	19.1 W/kg ± 16.5 % (k=2)

## **Appendix (Additional assessments outside the scope of SCS 0108)**

### **Antenna Parameters with Head TSL**

Impedance, transformed to feed point	49.5 $\Omega$ - 0.4 $j\Omega$
Return Loss	- 44.1 dB

### **Antenna Parameters with Body TSL**

Impedance, transformed to feed point	46.6 $\Omega$ - 0.4 $j\Omega$
Return Loss	- 29.1 dB

### **General Antenna Parameters and Design**

Electrical Delay (one direction)	1.218 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	June 15, 2010

# DASY5 Validation Report for Head TSL

Date: 23.11.2015

Test Laboratory: SPEAG, Zurich, Switzerland

## DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1069

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used:  $f = 1750 \text{ MHz}$ ;  $\sigma = 1.35 \text{ S/m}$ ;  $\epsilon_r = 40.8$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.38, 8.38, 8.38); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

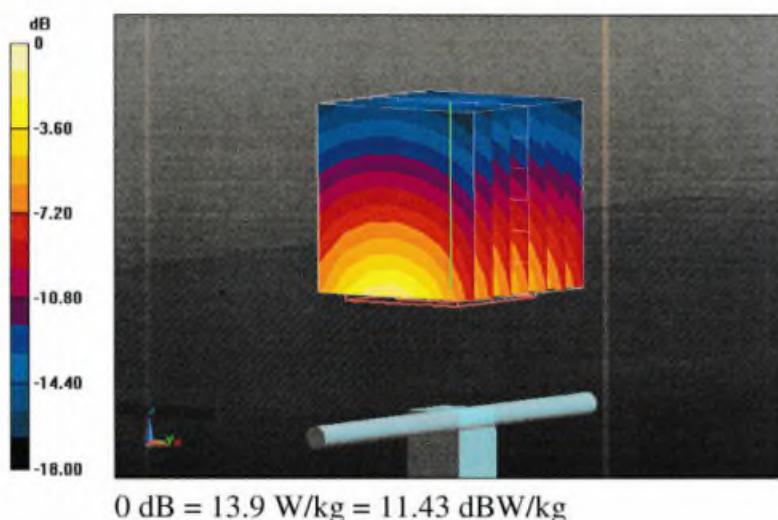
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 105.2 V/m; Power Drift = 0.03 dB

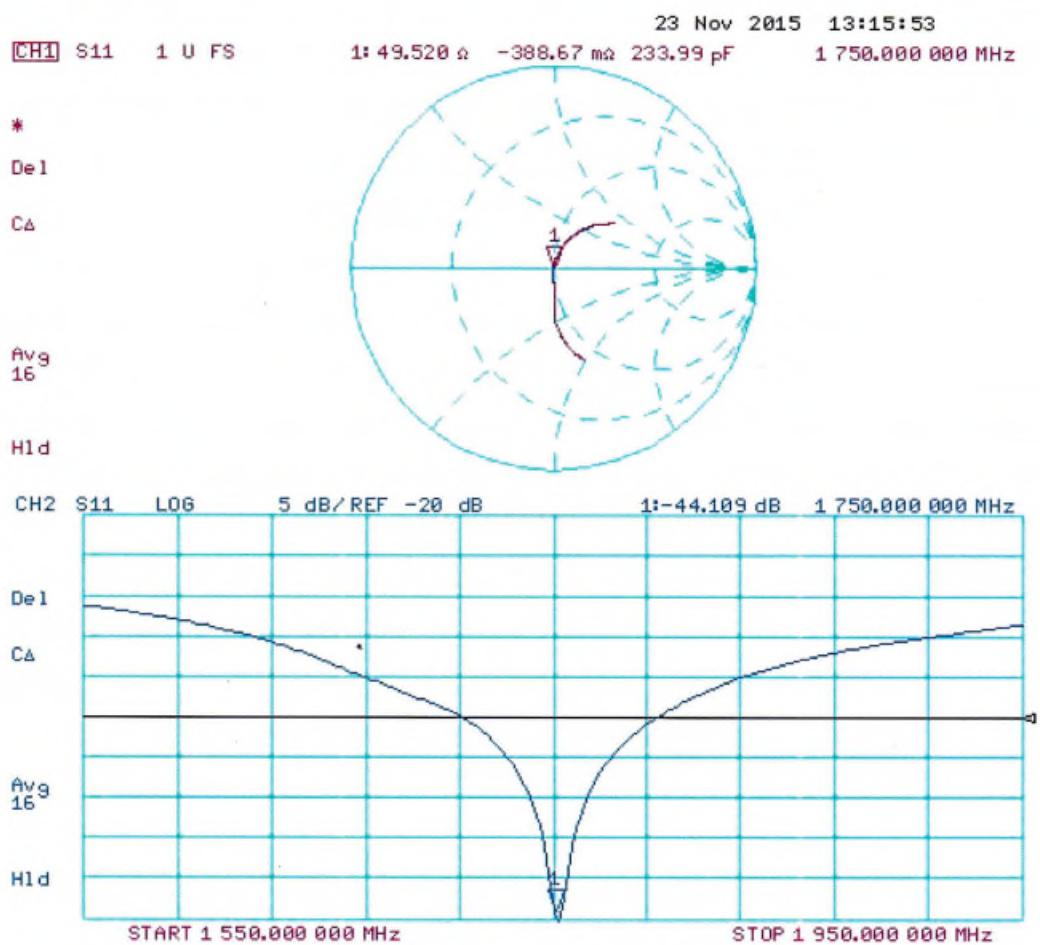
Peak SAR (extrapolated) = 16.9 W/kg

**SAR(1 g) = 9.12 W/kg; SAR(10 g) = 4.83 W/kg**

Maximum value of SAR (measured) = 13.9 W/kg



## Impedance Measurement Plot for Head TSL



# DASY5 Validation Report for Body TSL

Date: 23.11.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1069**

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used:  $f = 1750 \text{ MHz}$ ;  $\sigma = 1.48 \text{ S/m}$ ;  $\epsilon_r = 54.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.25, 8.25, 8.25); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

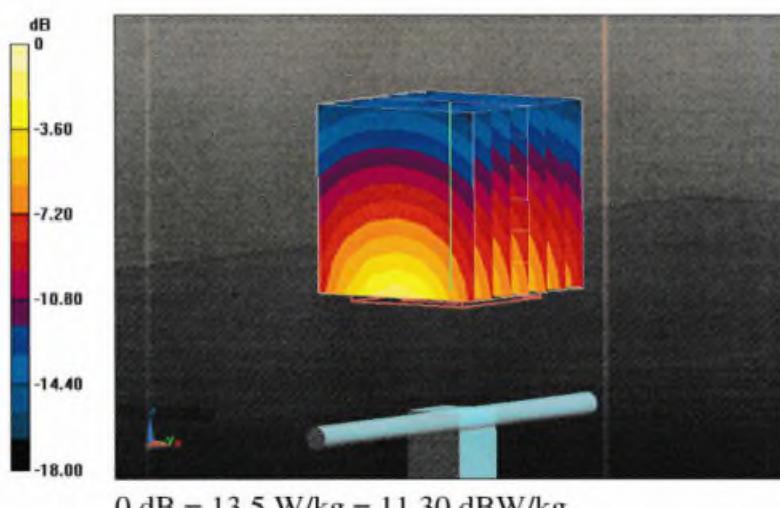
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 99.44 V/m; Power Drift = 0.01 dB

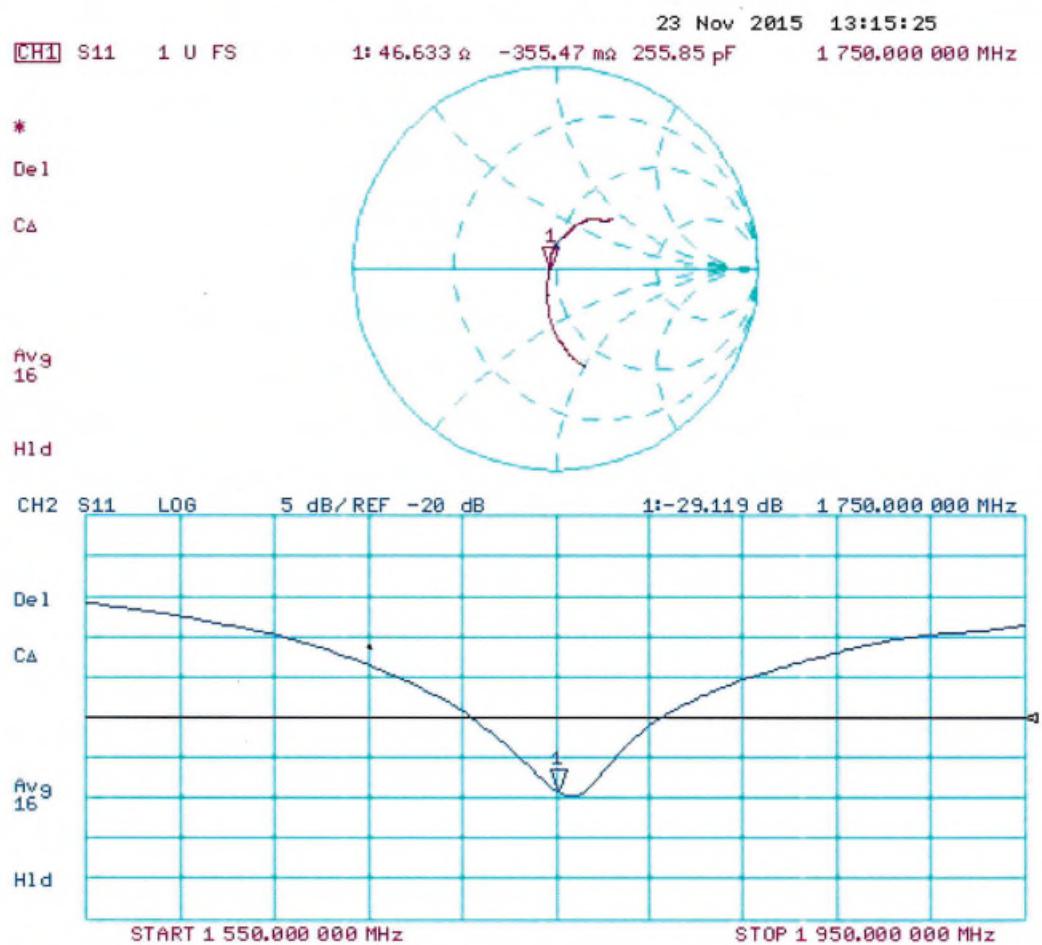
Peak SAR (extrapolated) = 15.8 W/kg

**SAR(1 g) = 8.92 W/kg; SAR(10 g) = 4.76 W/kg**

Maximum value of SAR (measured) = 13.5 W/kg



## 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 0108**

Client **Sporton-KS (Auden)**

Certificate No: **D1900V2-5d118\_Nov15**

## CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d118**

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

Calibration date: **November 23, 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 ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter 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: Name **Michael Weber** Function **Laboratory Technician**

Signature

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

Issued: November 26, 2015

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 0108

#### 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) 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
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

- e) 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.

<b>DASY Version</b>	DASY5	V52.8.8
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy, dz = 5 mm	
<b>Frequency</b>	1900 MHz ± 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	40.0	1.40 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	39.4 ± 6 %	1.39 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	9.85 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.4 W/kg ± 17.0 % (k=2)

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	5.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.6 W/kg ± 16.5 % (k=2)

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	53.3	1.52 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	52.2 ± 6 %	1.52 mho/m ± 6 %
<b>Body TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Body TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b>	Condition	
SAR measured	250 mW input power	10.2 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	40.6 W/kg ± 17.0 % (k=2)

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	5.36 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.4 W/kg ± 16.5 % (k=2)

## **Appendix (Additional assessments outside the scope of SCS 0108)**

### **Antenna Parameters with Head TSL**

Impedance, transformed to feed point	$51.8 \Omega + 7.2 j\Omega$
Return Loss	- 22.8 dB

### **Antenna Parameters with Body TSL**

Impedance, transformed to feed point	$47.8 \Omega + 7.7 j\Omega$
Return Loss	- 21.8 dB

### **General Antenna Parameters and Design**

Electrical Delay (one direction)	1.200 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	August 21, 2009

# DASY5 Validation Report for Head TSL

Date: 23.11.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d118**

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.39 \text{ S/m}$ ;  $\epsilon_r = 39.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.14, 8.14, 8.14); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

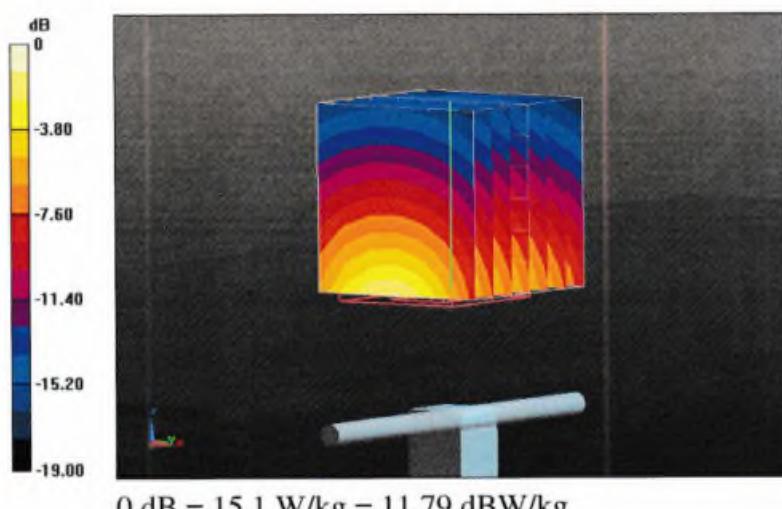
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 107.5 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 18.5 W/kg

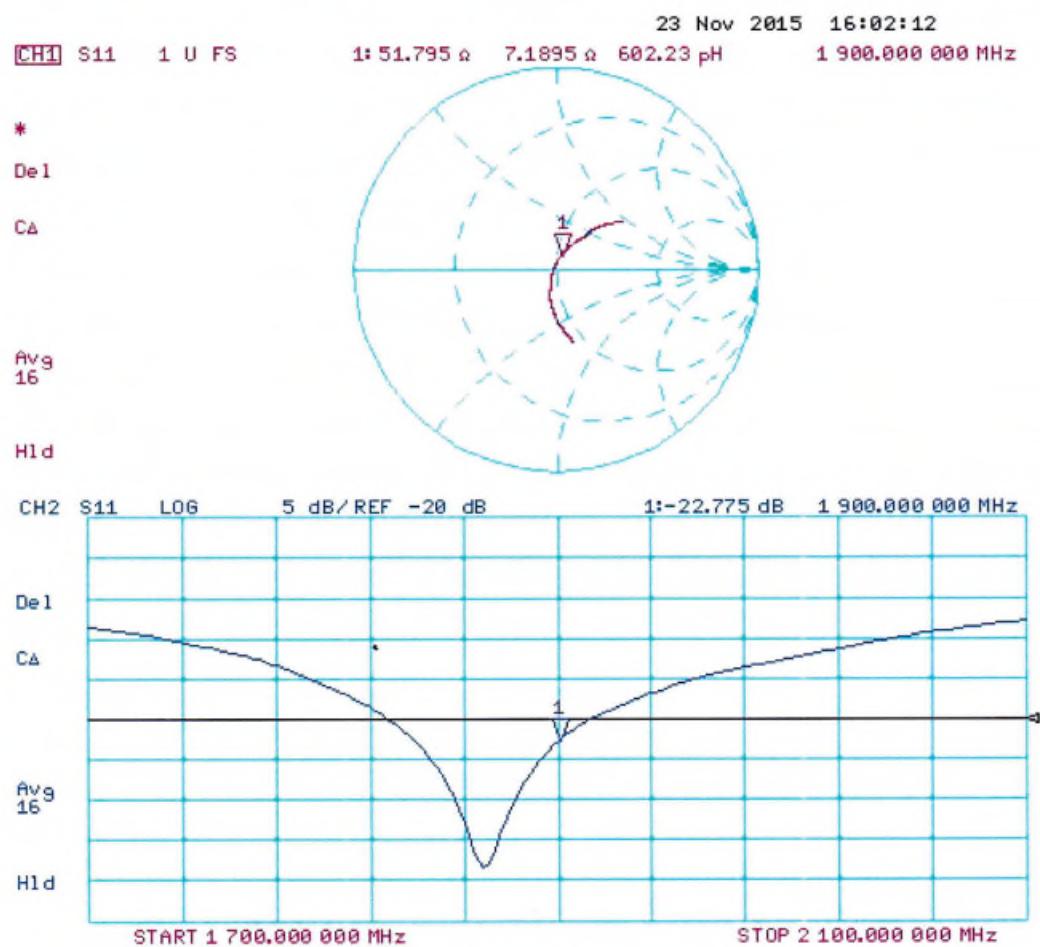
**SAR(1 g) = 9.85 W/kg; SAR(10 g) = 5.15 W/kg**

Maximum value of SAR (measured) = 15.1 W/kg



$$0 \text{ dB} = 15.1 \text{ W/kg} = 11.79 \text{ dBW/kg}$$

## Impedance Measurement Plot for Head TSL



# DASY5 Validation Report for Body TSL

Date: 23.11.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d118**

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.52 \text{ S/m}$ ;  $\epsilon_r = 52.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.9, 7.9, 7.9); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

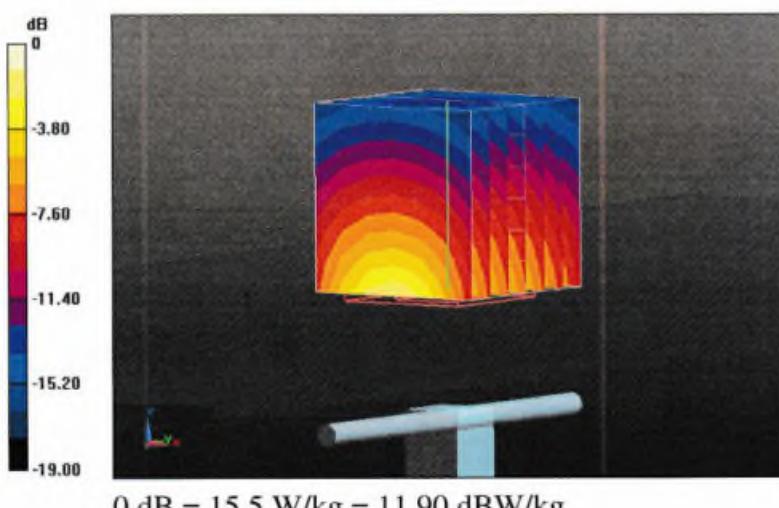
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 105.1 V/m; Power Drift = 0.04 dB

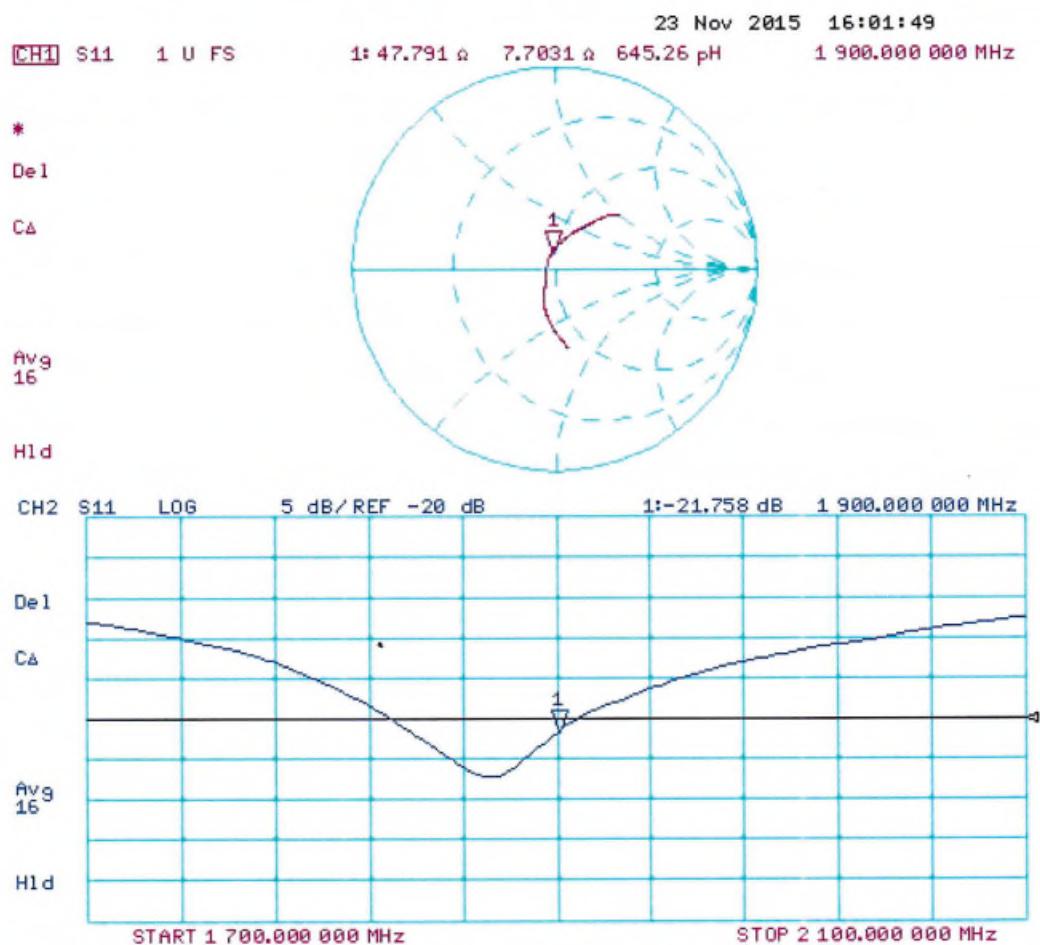
Peak SAR (extrapolated) = 18.3 W/kg

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

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



## Impedance Measurement Plot for Body TSL





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Accreditation No.: **SCS 0108**

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 Multilateral Agreement for the recognition of calibration certificates

Client **Sporton-KS (Auden)**

Certificate No: **D2450V2-840\_Nov15**

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 840**

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

Calibration date: **November 25, 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 ( $22 \pm 3$ )°C and humidity < 70%.

### Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter 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: Name **Michael Weber** Function **Laboratory Technician**

Signature

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

Issued: November 25, 2015

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

**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) 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
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- e) 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.

<b>DASY Version</b>	DASY5	V52.8.8
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	$dx, dy, dz = 5 \text{ mm}$	
<b>Frequency</b>	$2450 \text{ MHz} \pm 1 \text{ MHz}$	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	39.2	1.80 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	38.2 ± 6 %	1.87 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	---	---

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	250 mW input power	12.9 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	50.4 W/kg ± 17.0 % (k=2)
<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	5.98 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.6 W/kg ± 16.5 % (k=2)

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	52.7	1.95 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	52.7 ± 6 %	2.02 mho/m ± 6 %
<b>Body TSL temperature change during test</b>	< 0.5 °C	---	---

## SAR result with Body TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Body TSL</b>	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	51.1 W/kg ± 17.0 % (k=2)
<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	6.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	24.1 W/kg ± 16.5 % (k=2)

## **Appendix (Additional assessments outside the scope of SCS 0108)**

### **Antenna Parameters with Head TSL**

Impedance, transformed to feed point	$55.5 \Omega + 4.4 j\Omega$
Return Loss	- 23.5 dB

### **Antenna Parameters with Body TSL**

Impedance, transformed to feed point	$50.5 \Omega + 6.7 j\Omega$
Return Loss	- 23.6 dB

### **General Antenna Parameters and Design**

Electrical Delay (one direction)	1.161 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	July 20, 2009