

### System Check\_B835\_160331

**DUT: Dipole 835 MHz; Type: D835V2; SN: 4d121**

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

Medium: B07T10N3\_0331 Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.999 \text{ S/m}$ ;  $\epsilon_r = 54.455$ ;  $\rho = 1000 \text{ kg/m}^3$

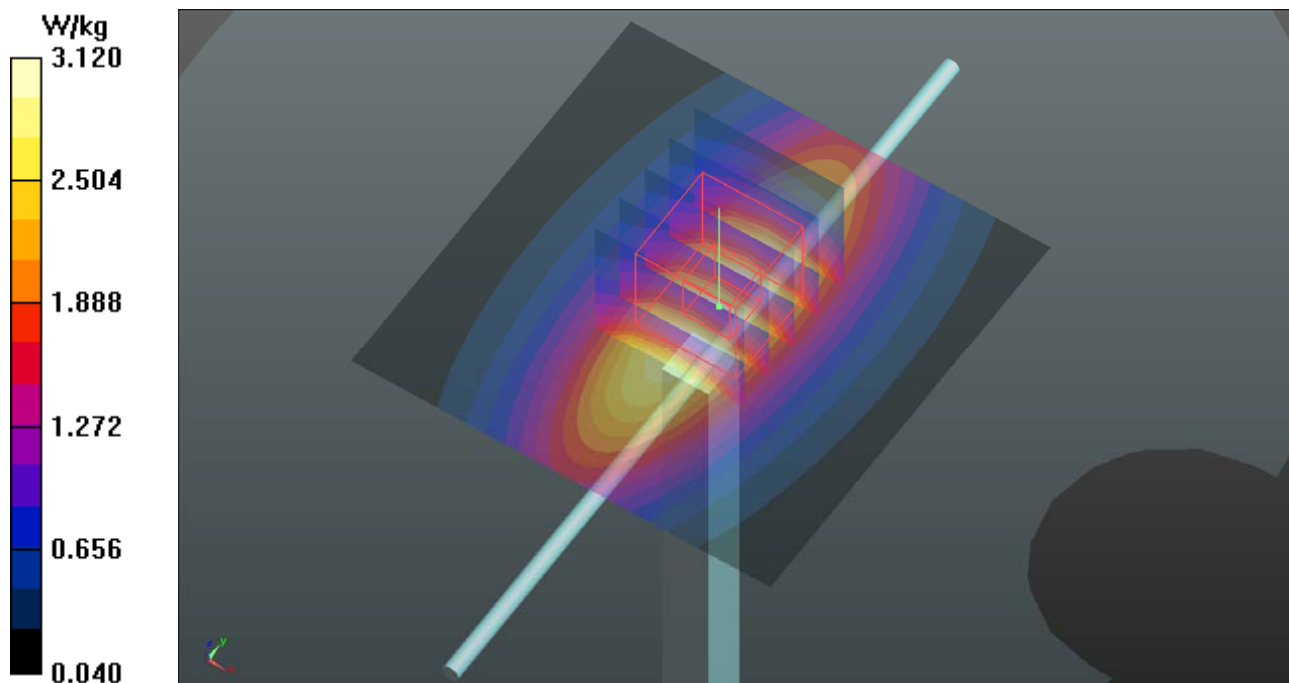
Ambient Temperature :  $23.8 \text{ }^\circ\text{C}$  ; Liquid Temperature :  $23.2 \text{ }^\circ\text{C}$

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$   
Maximum value of SAR (interpolated) =  $3.12 \text{ W/kg}$

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$   
Reference Value =  $51.99 \text{ V/m}$ ; Power Drift =  $-0.13 \text{ dB}$   
Peak SAR (extrapolated) =  $3.54 \text{ W/kg}$   
**SAR(1 g) =  $2.34 \text{ W/kg}$ ; SAR(10 g) =  $1.54 \text{ W/kg}$**   
Maximum value of SAR (measured) =  $3.14 \text{ W/kg}$



### System Check\_B1750\_160331

**DUT: Dipole 1750 MHz; Type: D1750V2; SN: 1055**

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: B16T20N2\_0331 Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.446$  S/m;  $\epsilon_r = 51.969$ ;  $\rho = 1000$  kg/m<sup>3</sup>

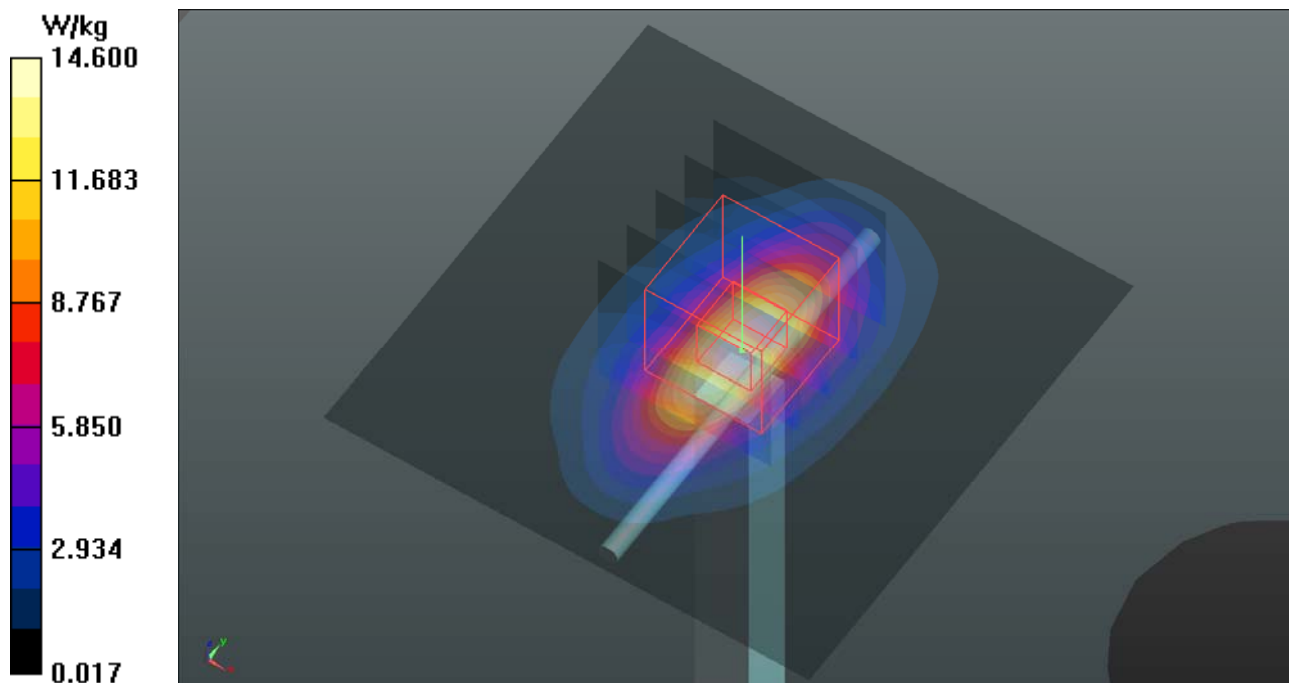
Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(8.13, 8.13, 8.13); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 14.6 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 104.0 V/m; Power Drift = -0.18 dB  
Peak SAR (extrapolated) = 17.0 W/kg  
**SAR(1 g) = 9.7 W/kg; SAR(10 g) = 5.21 W/kg**  
Maximum value of SAR (measured) = 14.6 W/kg



### System Check\_B1900\_160403

**DUT: Dipole 1900 MHz; Type: D1900V2; SN: 5d036**

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

Medium: B16T20N2\_0403 Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.574$  S/m;  $\epsilon_r = 51.229$ ;  $\rho = 1000$  kg/m<sup>3</sup>

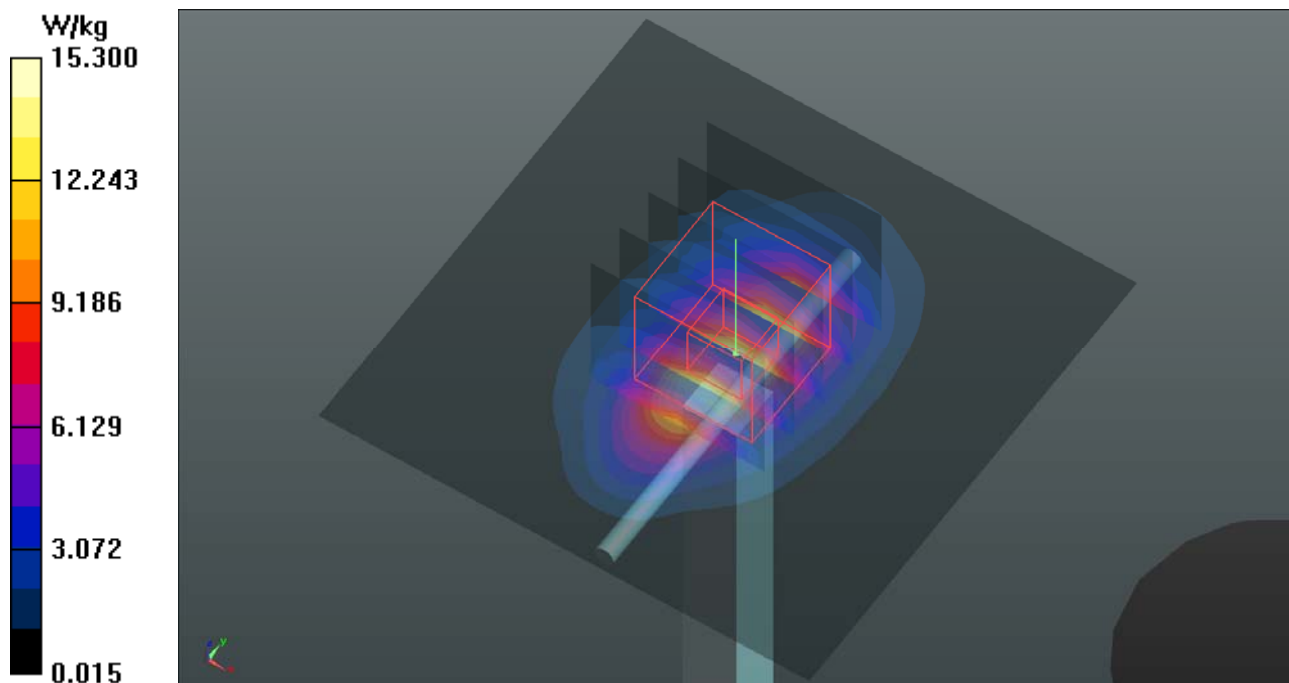
Ambient Temperature : 23.9 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 15.3 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 100.6 V/m; Power Drift = -0.15 dB  
Peak SAR (extrapolated) = 18.2 W/kg  
**SAR(1 g) = 9.87 W/kg; SAR(10 g) = 5.12 W/kg**  
Maximum value of SAR (measured) = 15.3 W/kg



### System Check\_B2450\_160403

**DUT: Dipole 2450 MHz; Type: D2450V2; SN: 737**

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

Medium: B19T27N1\_0403 Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2.033$  S/m;  $\epsilon_r = 51.139$ ;  $\rho = 1000$  kg/m<sup>3</sup>

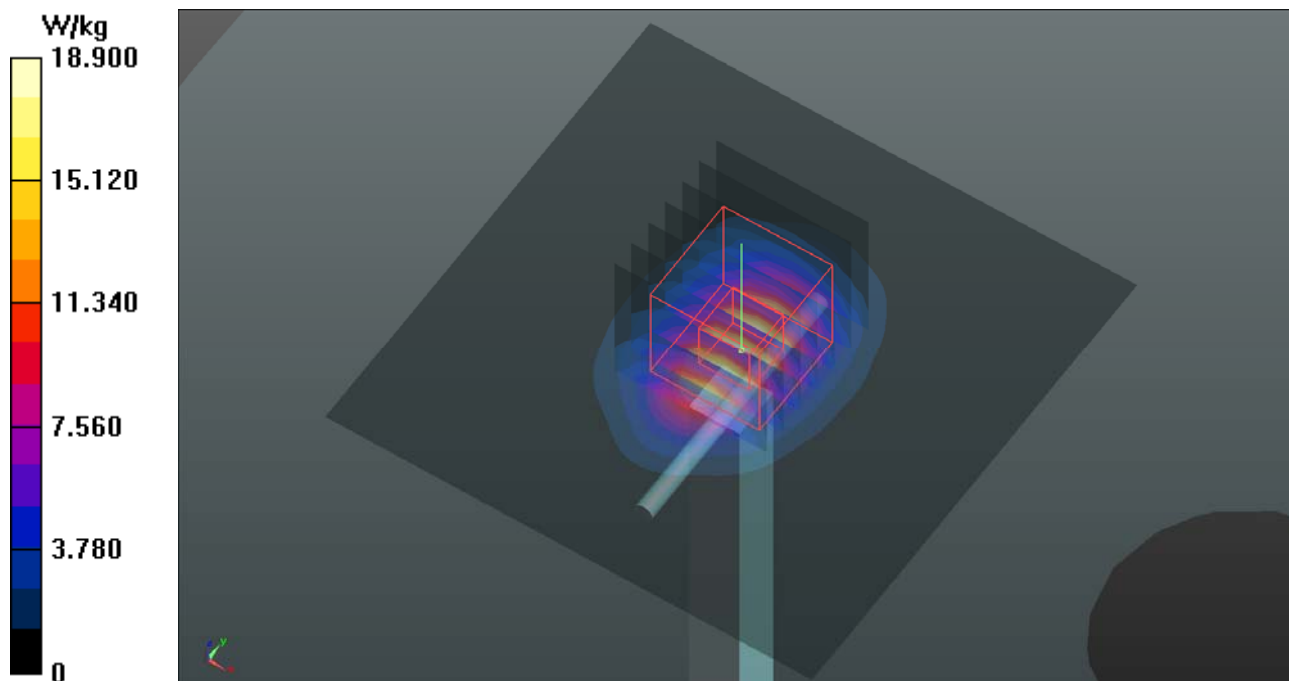
Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.3, 7.3, 7.3); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1652; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (81x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm  
Maximum value of SAR (interpolated) = 18.9 W/kg

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm  
Reference Value = 97.99 V/m; Power Drift = -0.11 dB  
Peak SAR (extrapolated) = 25.3 W/kg  
**SAR(1 g) = 12.3 W/kg; SAR(10 g) = 5.69 W/kg**  
Maximum value of SAR (measured) = 18.9 W/kg



## System Check\_B2600\_160416

**DUT: Dipole 2600 MHz; Type: D2600V2; SN: 1020**

Communication System: CW; Frequency: 2600 MHz; Duty Cycle: 1:1

Medium: B19T27N3\_0416 Medium parameters used:  $f = 2600$  MHz;  $\sigma = 2.154$  S/m;  $\epsilon_r = 50.419$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.19, 7.19, 7.19); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=250mW/Area Scan (81x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 23.4 W/kg

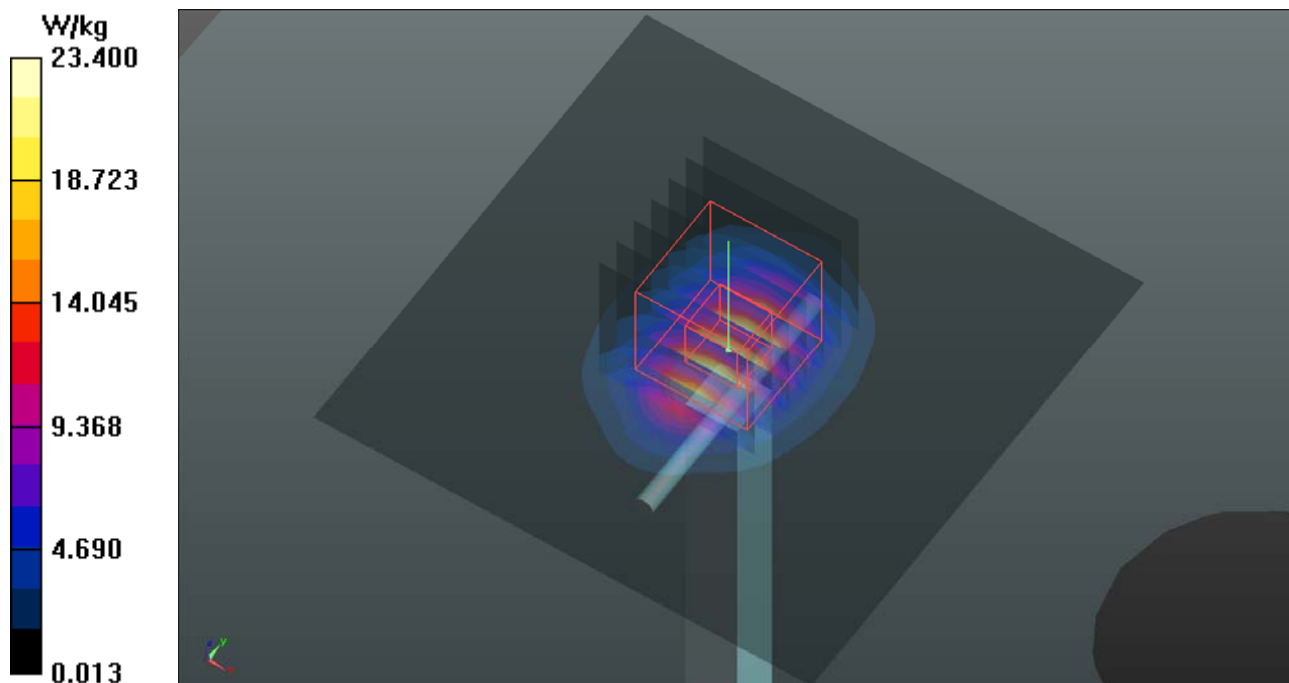
**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 107.7 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 29.1 W/kg

**SAR(1 g) = 13.5 W/kg; SAR(10 g) = 5.98 W/kg**

Maximum value of SAR (measured) = 23.2 W/kg



## System Check\_B5300\_160411

**DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019**

Communication System: CW; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: B34T60N3\_0411 Medium parameters used:  $f = 5300$  MHz;  $\sigma = 5.461$  S/m;  $\epsilon_r = 48.242$ ;  $\rho = 1000$  kg/m<sup>3</sup>

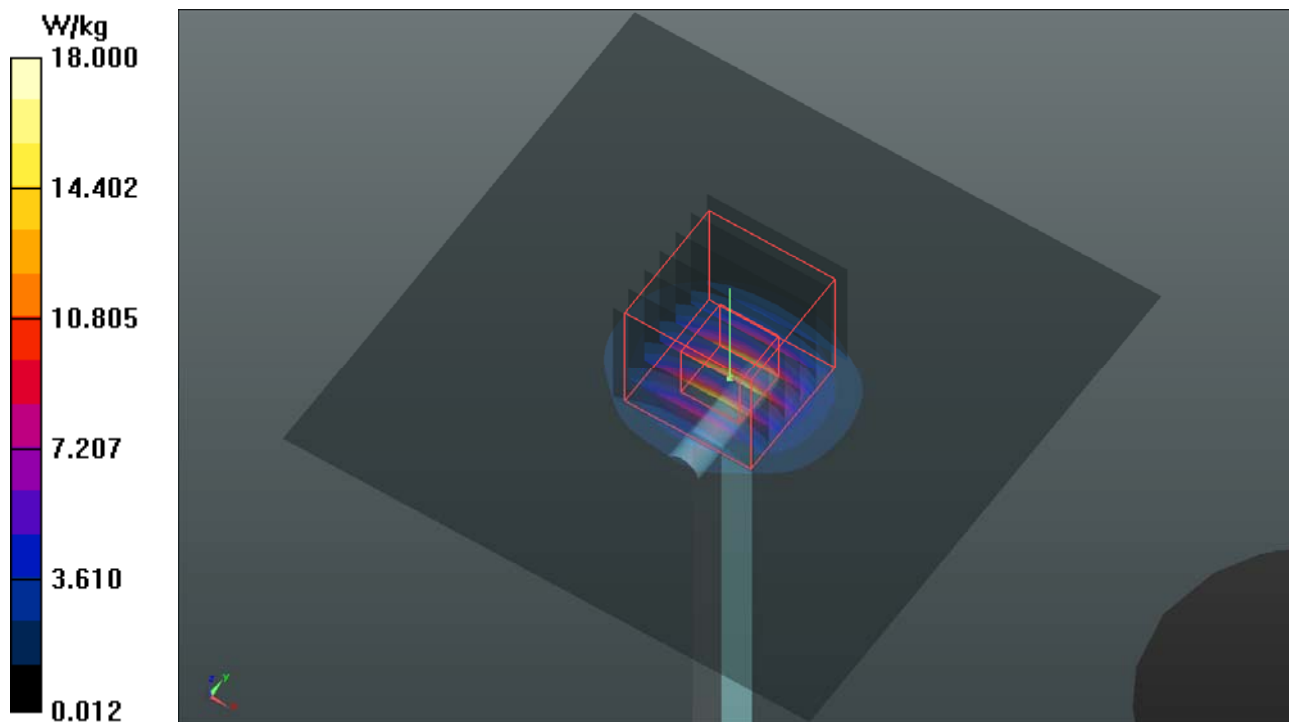
Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7346; ConvF(4.42, 4.42, 4.42); Calibrated: 2015/09/02;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn916; Calibrated: 2015/12/16
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=100mW/Area Scan (91x91x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 18.0 W/kg

**Pin=100mW/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm  
Reference Value = 57.95 V/m; Power Drift = -0.09 dB  
Peak SAR (extrapolated) = 30.5 W/kg  
**SAR(1 g) = 7.67 W/kg; SAR(10 g) = 2.21 W/kg**  
Maximum value of SAR (measured) = 19.0 W/kg



## System Check\_B5600\_160411

**DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019**

Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: B34T60N3\_0411 Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.857$  S/m;  $\epsilon_r = 47.856$ ;  $\rho = 1000$  kg/m<sup>3</sup>

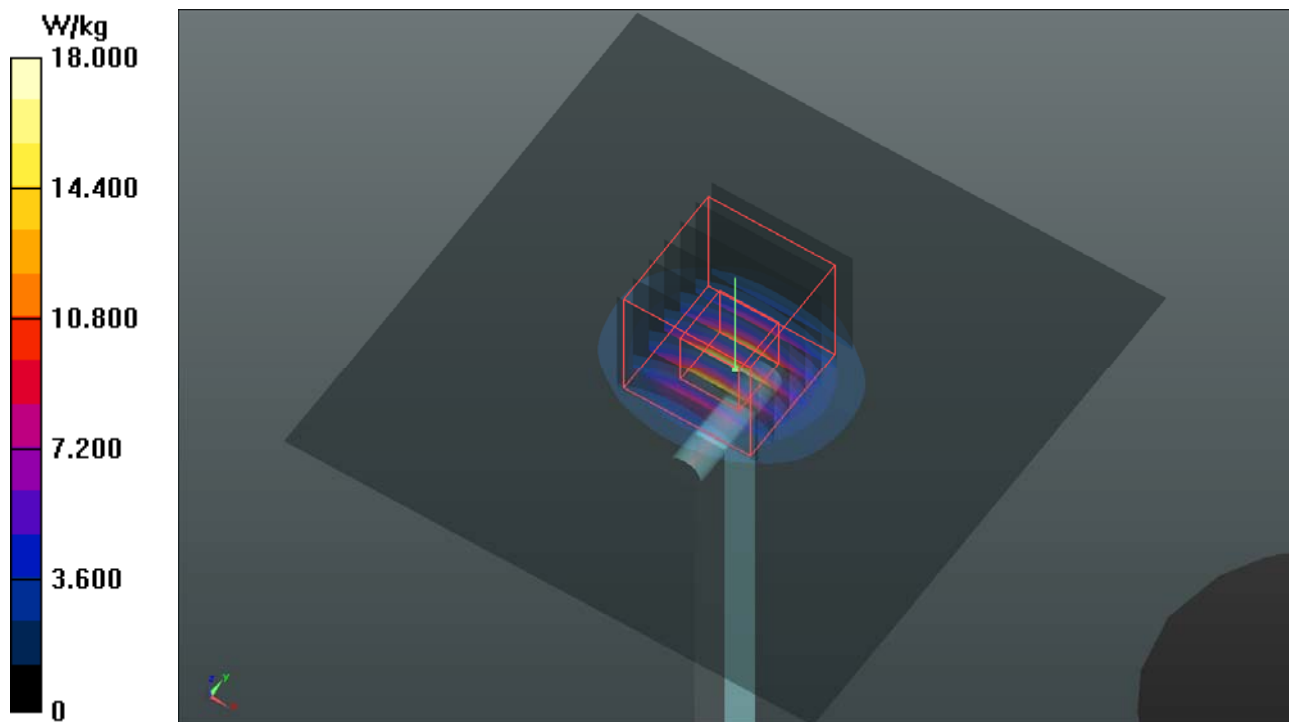
Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7346; ConvF(3.9, 3.9, 3.9); Calibrated: 2015/09/02;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn916; Calibrated: 2015/12/16
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=100mW/Area Scan (91x91x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 18.0 W/kg

**Pin=100mW/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm  
Reference Value = 64.55 V/m; Power Drift = 0.02 dB  
Peak SAR (extrapolated) = 33.7 W/kg  
**SAR(1 g) = 7.68 W/kg; SAR(10 g) = 2.18 W/kg**  
Maximum value of SAR (measured) = 19.6 W/kg



## System Check\_B5800\_160411

**DUT: Dipole 5 GHz; Type: D5GHzV2; SN: 1019**

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: B34T60N3\_0411 Medium parameters used:  $f = 5800$  MHz;  $\sigma = 6.141$  S/m;  $\epsilon_r = 47.513$ ;  $\rho = 1000$  kg/m<sup>3</sup>

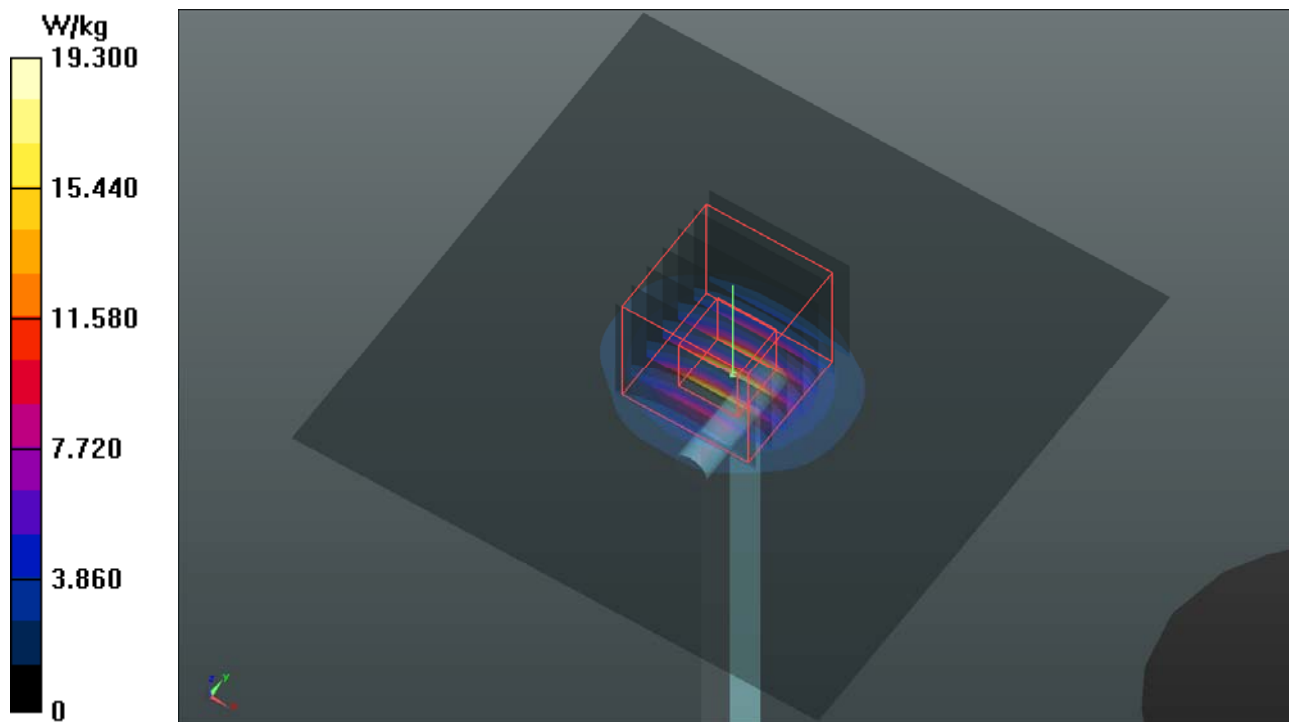
Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7346; ConvF(4.08, 4.08, 4.08); Calibrated: 2015/09/02;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn916; Calibrated: 2015/12/16
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Pin=100mW/Area Scan (91x91x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 19.3 W/kg

**Pin=100mW/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm  
Reference Value = 56.30 V/m; Power Drift = 0.14 dB  
Peak SAR (extrapolated) = 39.4 W/kg  
**SAR(1 g) = 8.13 W/kg; SAR(10 g) = 2.28 W/kg**  
Maximum value of SAR (measured) = 21.6 W/kg







## **Appendix B. SAR Plots of SAR Measurement**

The SAR plots for highest measured SAR in each exposure configuration, wireless mode and frequency band combination, and measured SAR > 1.5 W/kg are shown as follows.

### P01 GSM850\_GSM\_Right Cheek\_Ch251

**DUT: 160316C04**

Communication System: GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium: H07T10N1\_0330 Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.943$  S/m;  $\epsilon_r = 41.722$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 24.0 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.9, 9.9, 9.9); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.225 W/kg

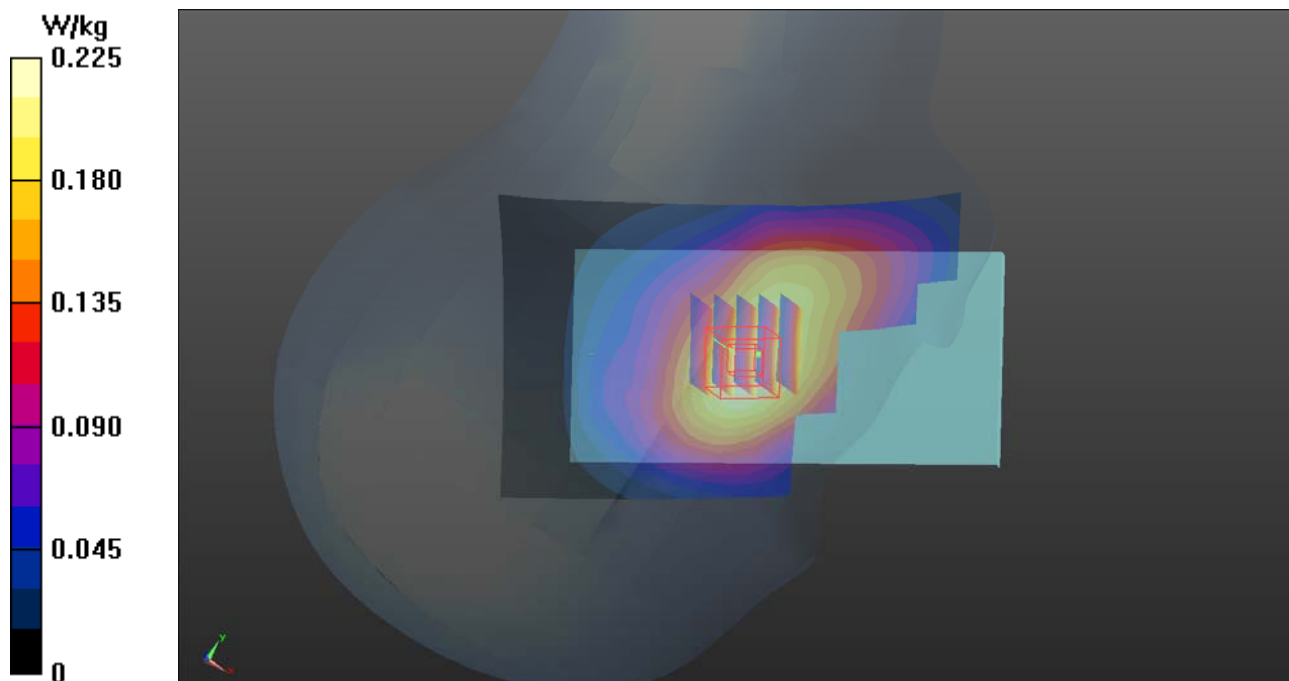
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.716 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.249 W/kg

**SAR(1 g) = 0.188 W/kg; SAR(10 g) = 0.143 W/kg**

Maximum value of SAR (measured) = 0.224 W/kg



## P02 GSM1900\_GSM\_Right Cheek\_Ch661

**DUT: 160316C04**

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

Medium: H16T20N1\_0330 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.436$  S/m;  $\epsilon_r = 38.496$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(8.21, 8.21, 8.21); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.0753 W/kg

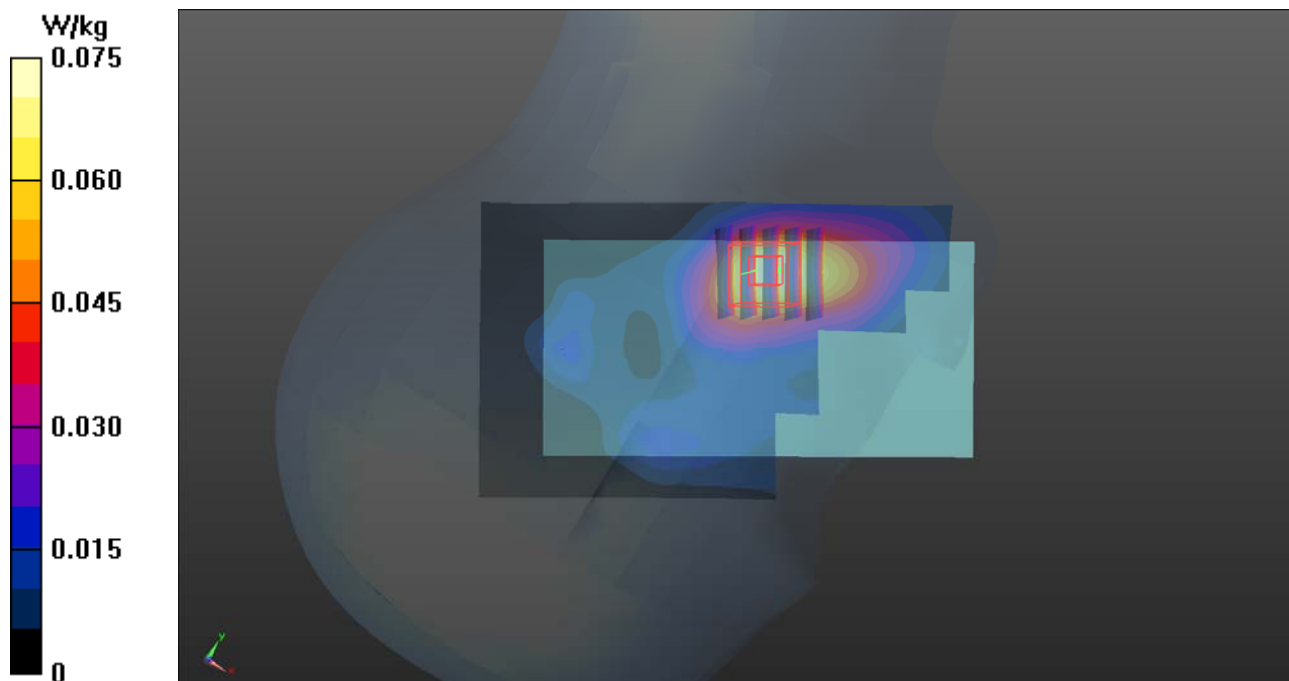
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.548 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 0.0880 W/kg

**SAR(1 g) = 0.058 W/kg; SAR(10 g) = 0.036 W/kg**

Maximum value of SAR (measured) = 0.0762 W/kg



### P03 WCDMA II\_RMC12.2K\_Right Cheek\_Ch9262

**DUT: 160316C04**

Communication System: WCDMA; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium: H16T20N1\_0402 Medium parameters used:  $f = 1852.4$  MHz;  $\sigma = 1.414$  S/m;  $\epsilon_r = 38.536$ ;  $\rho$

$= 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.3 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(8.21, 8.21, 8.21); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.374 W/kg

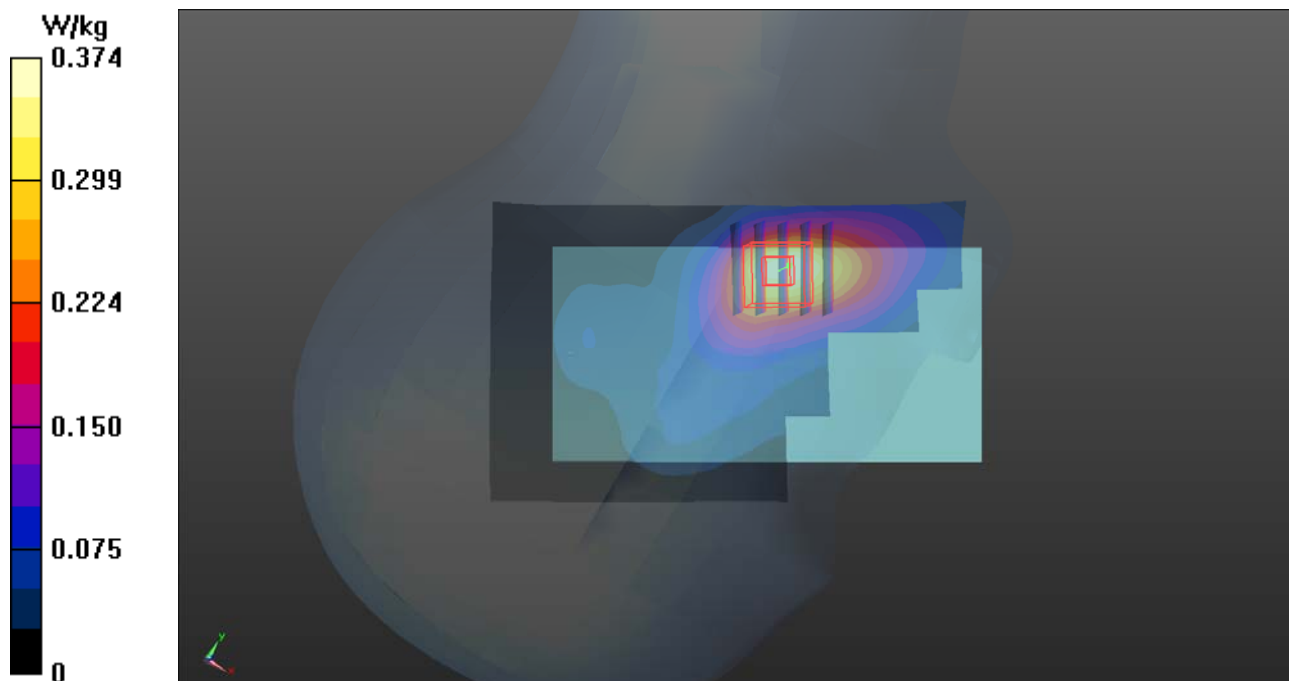
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.238 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.410 W/kg

**SAR(1 g) = 0.266 W/kg; SAR(10 g) = 0.167 W/kg**

Maximum value of SAR (measured) = 0.358 W/kg



## P04 WCDMA V\_RMC12.2K\_Left Cheek\_Ch4132

**DUT: 160316C04**

Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: H07T10N1\_0330 Medium parameters used:  $f = 826.4 \text{ MHz}$ ;  $\sigma = 0.923 \text{ S/m}$ ;  $\epsilon_r = 41.999$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature :  $24.0 \text{ }^\circ\text{C}$  ; Liquid Temperature :  $23.6 \text{ }^\circ\text{C}$

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.9, 9.9, 9.9); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) =  $0.233 \text{ W/kg}$

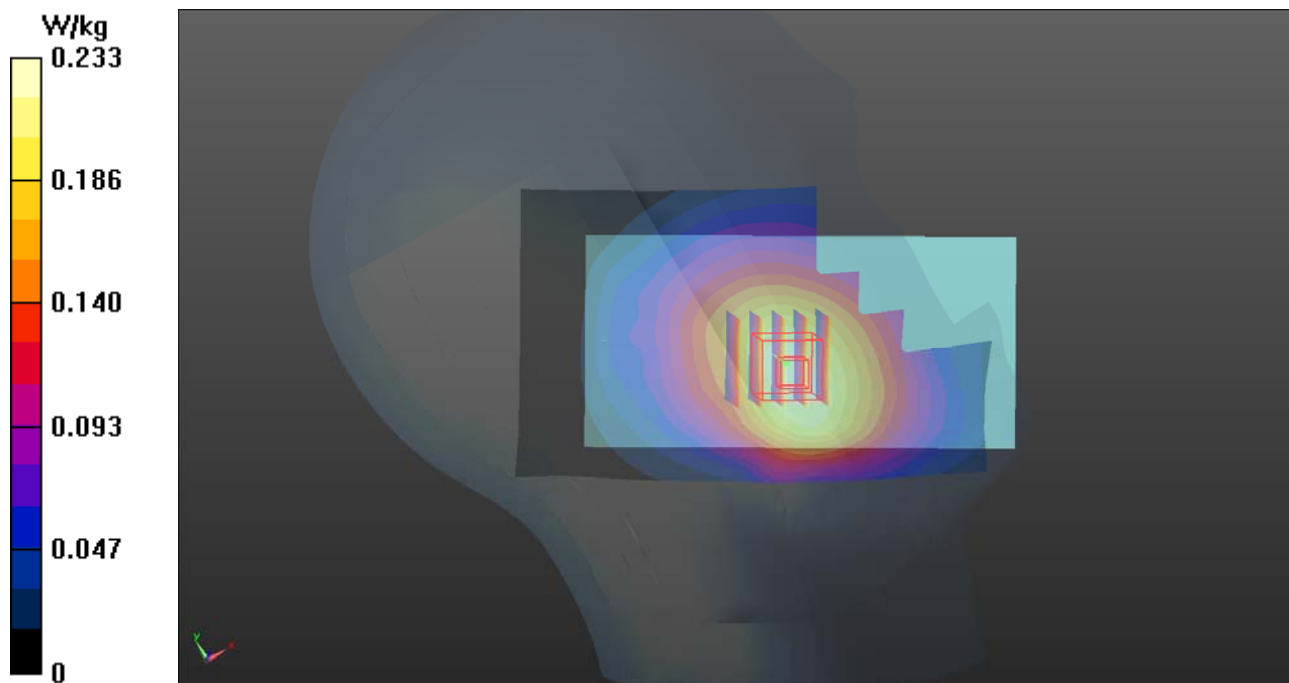
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $7.199 \text{ V/m}$ ; Power Drift =  $0.03 \text{ dB}$

Peak SAR (extrapolated) =  $0.255 \text{ W/kg}$

**SAR(1 g) =  $0.200 \text{ W/kg}$ ; SAR(10 g) =  $0.155 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.235 \text{ W/kg}$



### P05 LTE 2\_QPSK20M\_Right Cheek\_Ch18700\_1RB\_OS50

**DUT: 160316C04**

Communication System: LTE; Frequency: 1860 MHz; Duty Cycle: 1:1

Medium: H16T20N1\_0330 Medium parameters used:  $f = 1860$  MHz;  $\sigma = 1.419$  S/m;  $\epsilon_r = 38.557$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(8.21, 8.21, 8.21); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.235 W/kg

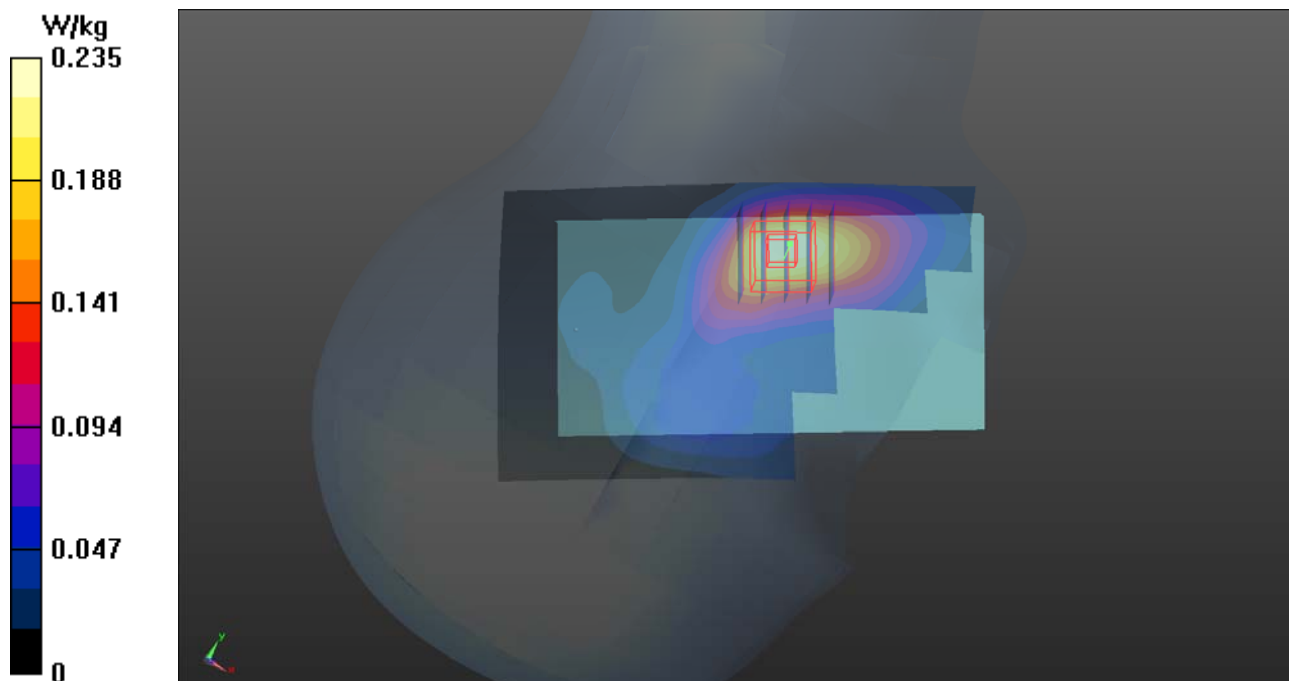
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.790 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 0.276 W/kg

**SAR(1 g) = 0.179 W/kg; SAR(10 g) = 0.112 W/kg**

Maximum value of SAR (measured) = 0.243 W/kg



### P06 LTE 4\_QPSK20M\_Right Cheek\_Ch20300\_1RB\_OS50

**DUT: 160316C04**

Communication System: LTE; Frequency: 1745 MHz; Duty Cycle: 1:1

Medium: H16T20N2\_0331 Medium parameters used:  $f = 1745$  MHz;  $\sigma = 1.314$  S/m;  $\epsilon_r = 39.144$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(8.49, 8.49, 8.49); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1652; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.557 W/kg

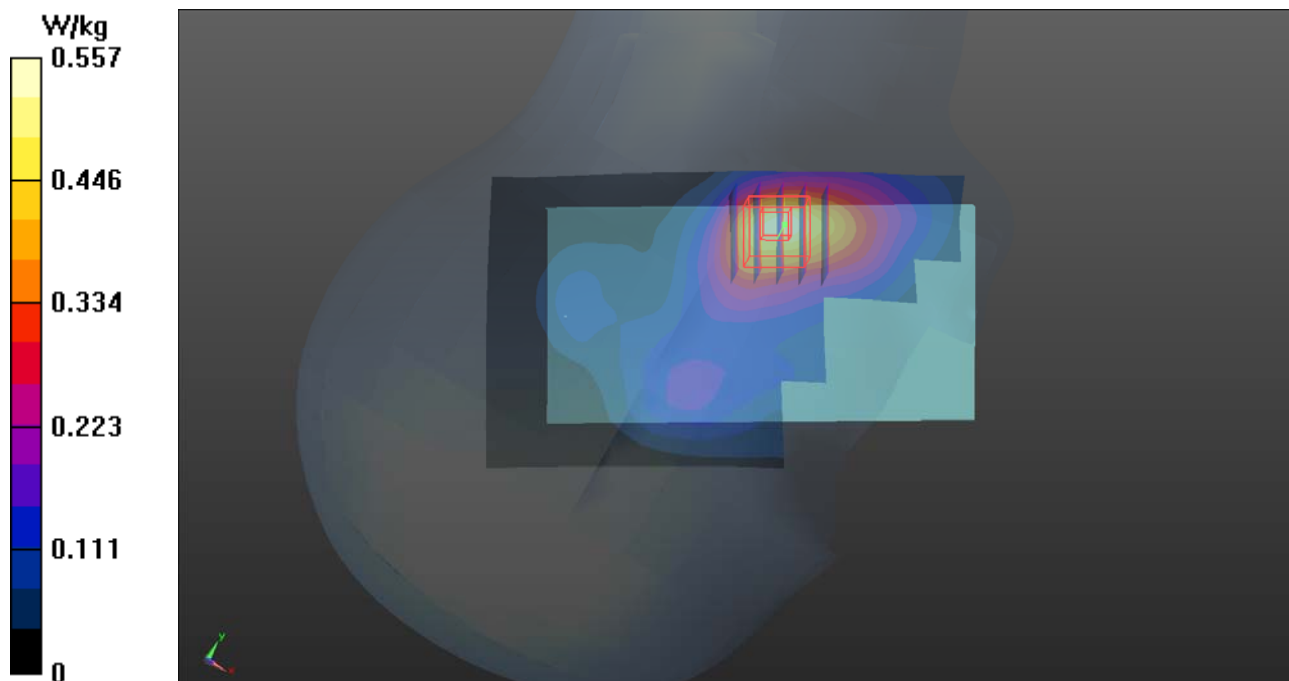
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.191 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.607 W/kg

**SAR(1 g) = 0.414 W/kg; SAR(10 g) = 0.264 W/kg**

Maximum value of SAR (measured) = 0.531 W/kg



### P07 LTE 5\_QPSK10M\_Left Cheek\_Ch20450\_1RB\_OS24

**DUT: 160316C04**

Communication System: LTE; Frequency: 829 MHz; Duty Cycle: 1:1

Medium: H07T10N1\_0330 Medium parameters used:  $f = 829$  MHz;  $\sigma = 0.926$  S/m;  $\epsilon_r = 41.96$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 24.0 °C ; Liquid Temperature : 23.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.9, 9.9, 9.9); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.236 W/kg

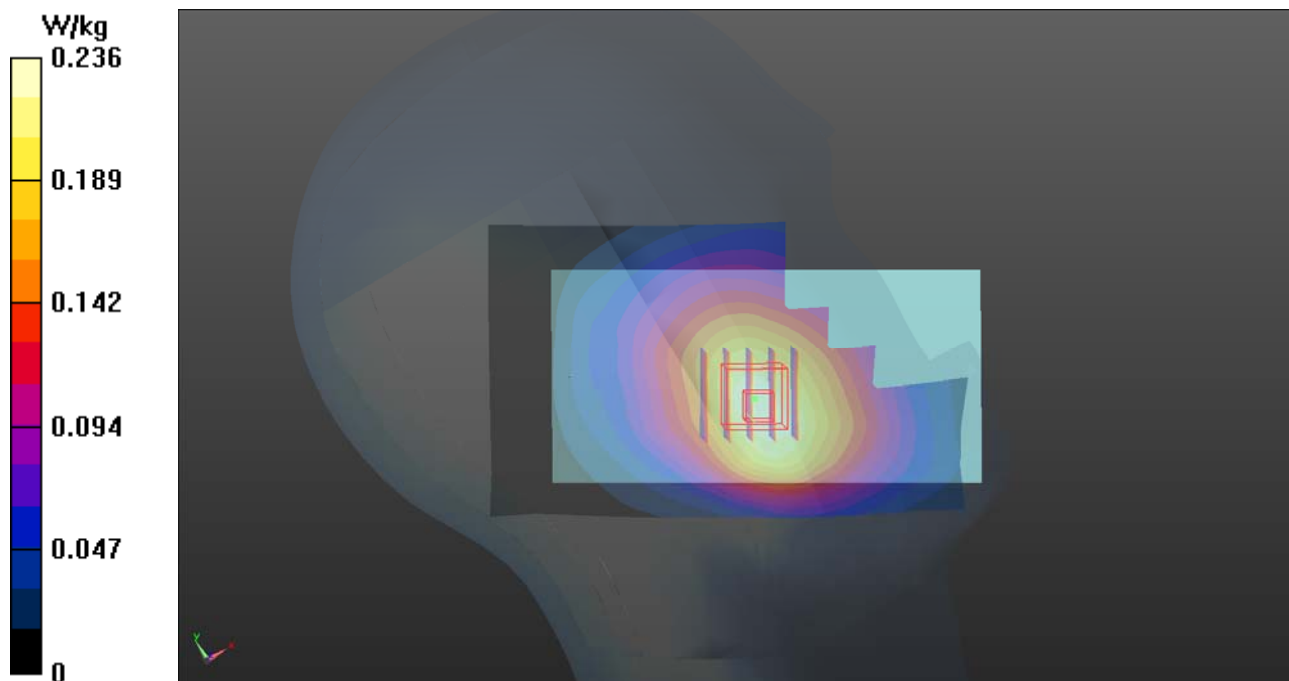
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.814 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.257 W/kg

**SAR(1 g) = 0.202 W/kg; SAR(10 g) = 0.155 W/kg**

Maximum value of SAR (measured) = 0.238 W/kg





### P08 LTE 7\_QPSK20M\_Right Cheek\_Ch21100\_1RB\_OS0

**DUT: 160316C04**

Communication System: LTE; Frequency: 2535 MHz; Duty Cycle: 1:1

Medium: H19T27N3\_0416 Medium parameters used:  $f = 2535$  MHz;  $\sigma = 1.924$  S/m;  $\epsilon_r = 38.32$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.7 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.26, 7.26, 7.26); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1652; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (81x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.173 W/kg

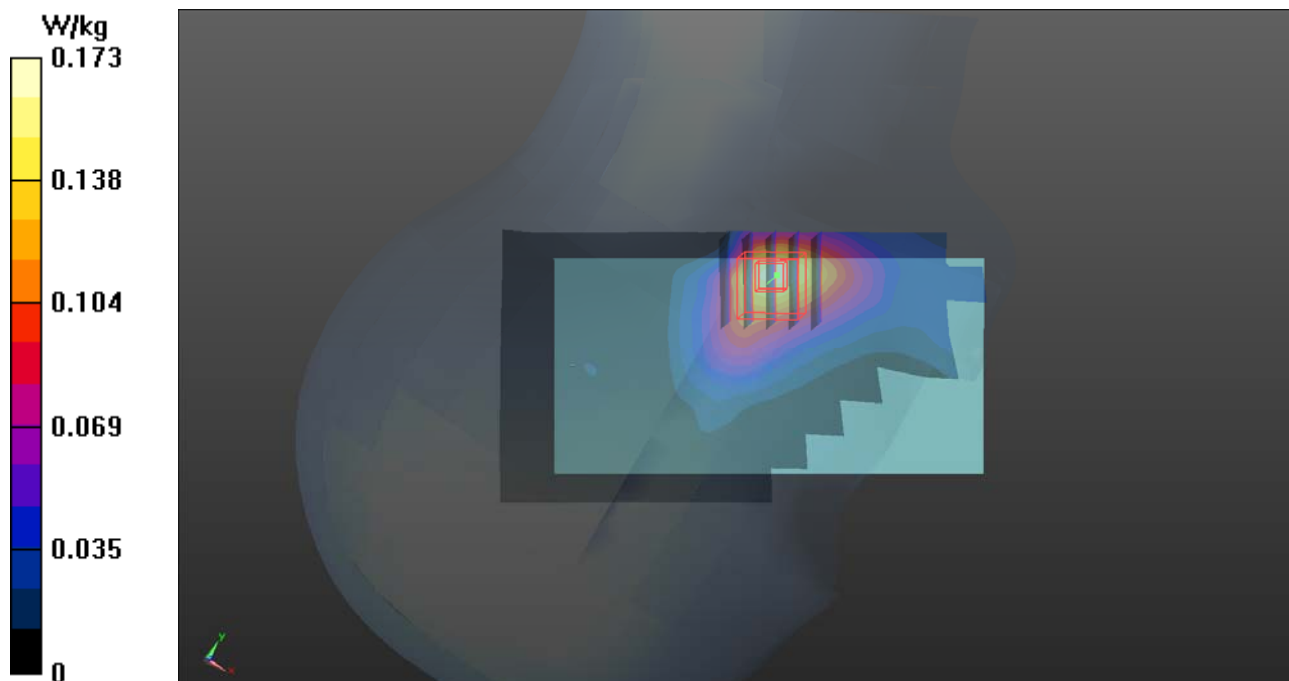
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.117 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.192 W/kg

**SAR(1 g) = 0.111 W/kg; SAR(10 g) = 0.060 W/kg**

Maximum value of SAR (measured) = 0.161 W/kg



## P09 2.4G WLAN\_802.11b\_Right Cheek\_Ch6

**DUT: 160316C04**

Communication System: WLAN\_2.4G; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: H19T27N1\_0403 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.862$  S/m;  $\epsilon_r = 39.201$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.35, 7.35, 7.35); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (81x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.988 W/kg

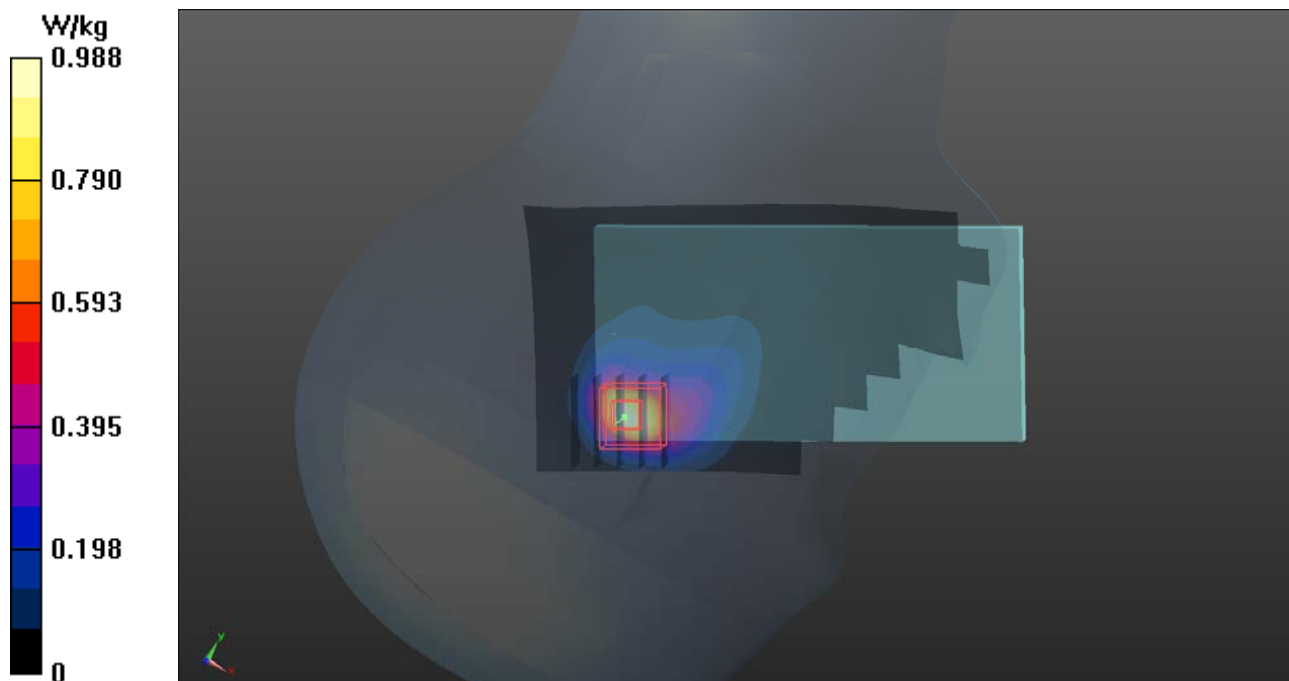
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.089 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.26 W/kg

**SAR(1 g) = 0.581 W/kg; SAR(10 g) = 0.265 W/kg**

Maximum value of SAR (measured) = 0.999 W/kg



### P10 5.3G WLAN\_802.11n HT40\_Right Cheek\_Ch62

**DUT: 160316C04**

Communication System: WLAN\_5G; Frequency: 5310 MHz; Duty Cycle: 1:1.4

Medium: H34T60N1\_0410 Medium parameters used:  $f = 5310$  MHz;  $\sigma = 4.849$  S/m;  $\epsilon_r = 34.793$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.9 °C ; Liquid Temperature : 23.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(5.18, 5.18, 5.18); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1277; Calibrated: 2015/07/22
- Phantom: Twin SAM Phantom\_1654; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**- Area Scan (101x181x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.420 W/kg

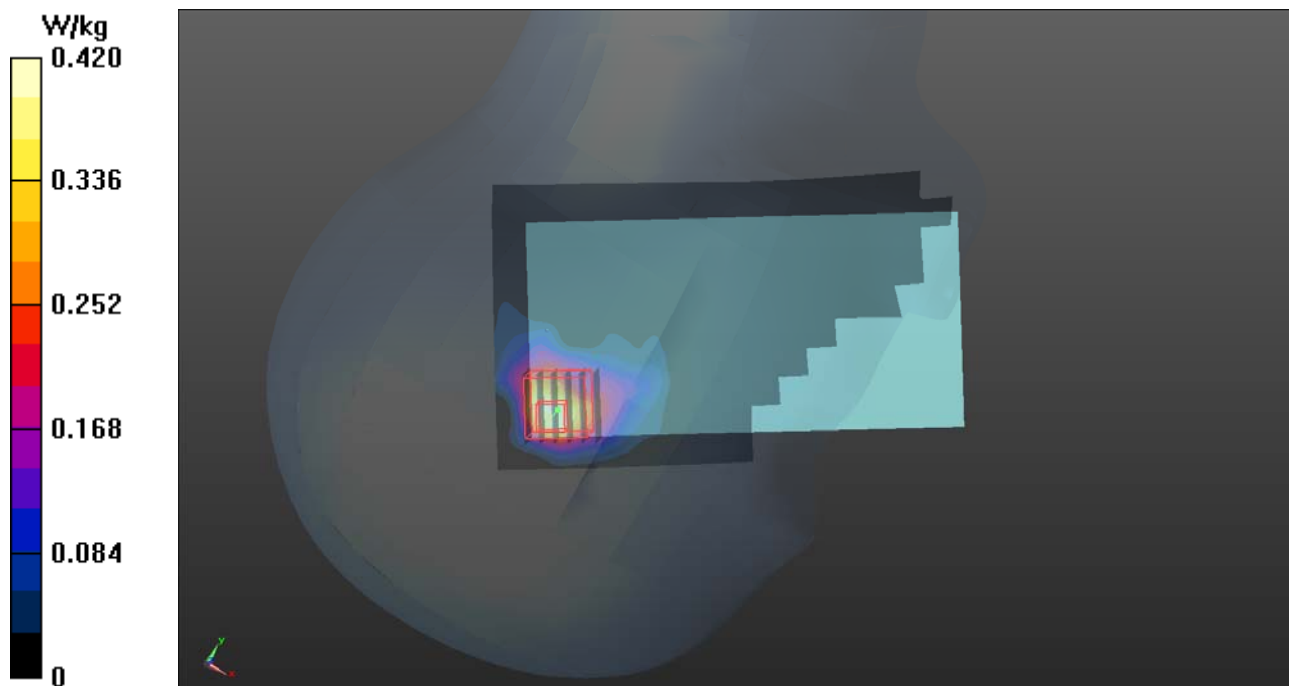
**- Zoom Scan (6x6x12)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 2.957 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.784 W/kg

**SAR(1 g) = 0.185 W/kg; SAR(10 g) = 0.068 W/kg**

Maximum value of SAR (measured) = 0.429 W/kg



## P11 5.6G WLAN\_802.11n HT40\_Right Cheek\_Ch134

**DUT: 160316C04**

Communication System: WLAN\_5G; Frequency: 5670 MHz; Duty Cycle: 1:1.4

Medium: H34T60N1\_0410 Medium parameters used:  $f = 5670$  MHz;  $\sigma = 5.189$  S/m;  $\epsilon_r = 34.259$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.9 °C ; Liquid Temperature : 23.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(4.74, 4.74, 4.74); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1277; Calibrated: 2015/07/22
- Phantom: Twin SAM Phantom\_1654; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (101x181x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.267 W/kg

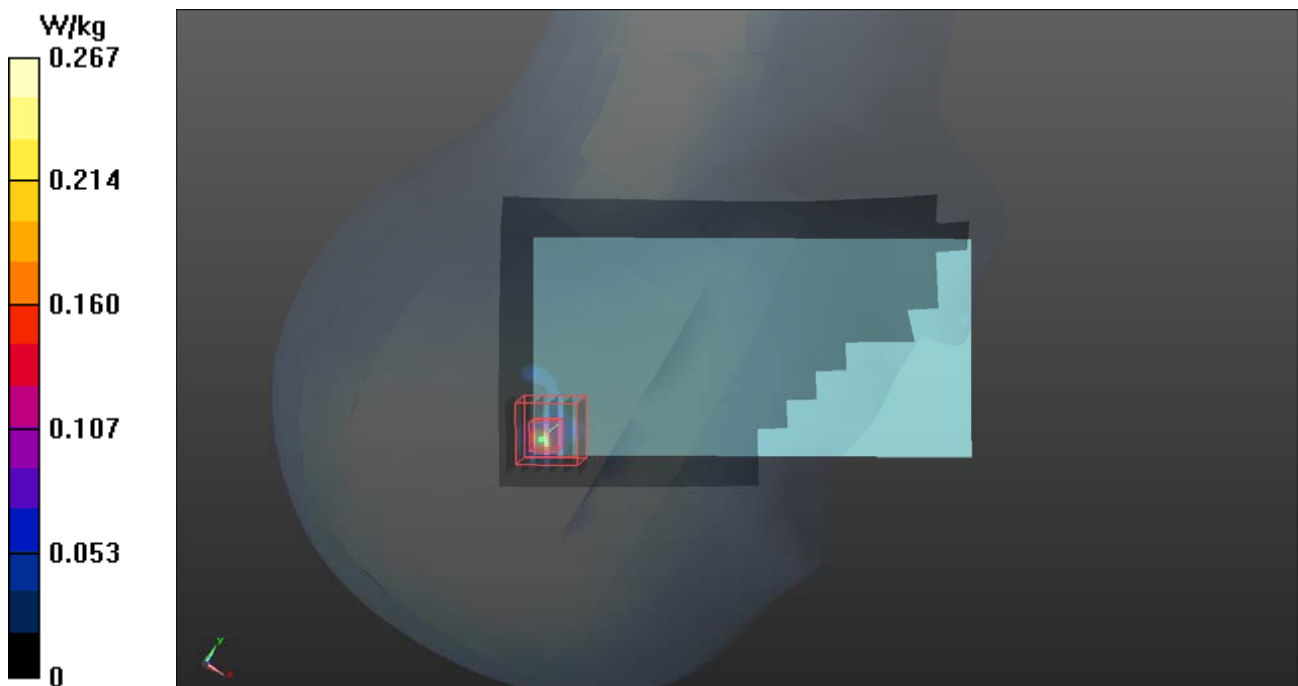
- **Zoom Scan (6x6x12)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 0 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.247 W/kg

**SAR(1 g) = 0.042 W/kg; SAR(10 g) = 0.00952 W/kg**

Maximum value of SAR (measured) = 0.150 W/kg



## P12 5.8G WLAN\_802.11n HT40\_Right Cheek\_Ch151

**DUT: 160316C04**

Communication System: WLAN\_5G; Frequency: 5755 MHz; Duty Cycle: 1:1.4

Medium: H34T60N1\_0410 Medium parameters used:  $f = 5755$  MHz;  $\sigma = 5.27$  S/m;  $\epsilon_r = 34.156$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.9 °C ; Liquid Temperature : 23.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(4.87, 4.87, 4.87); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1277; Calibrated: 2015/07/22
- Phantom: Twin SAM Phantom\_1654; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (101x181x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.147 W/kg

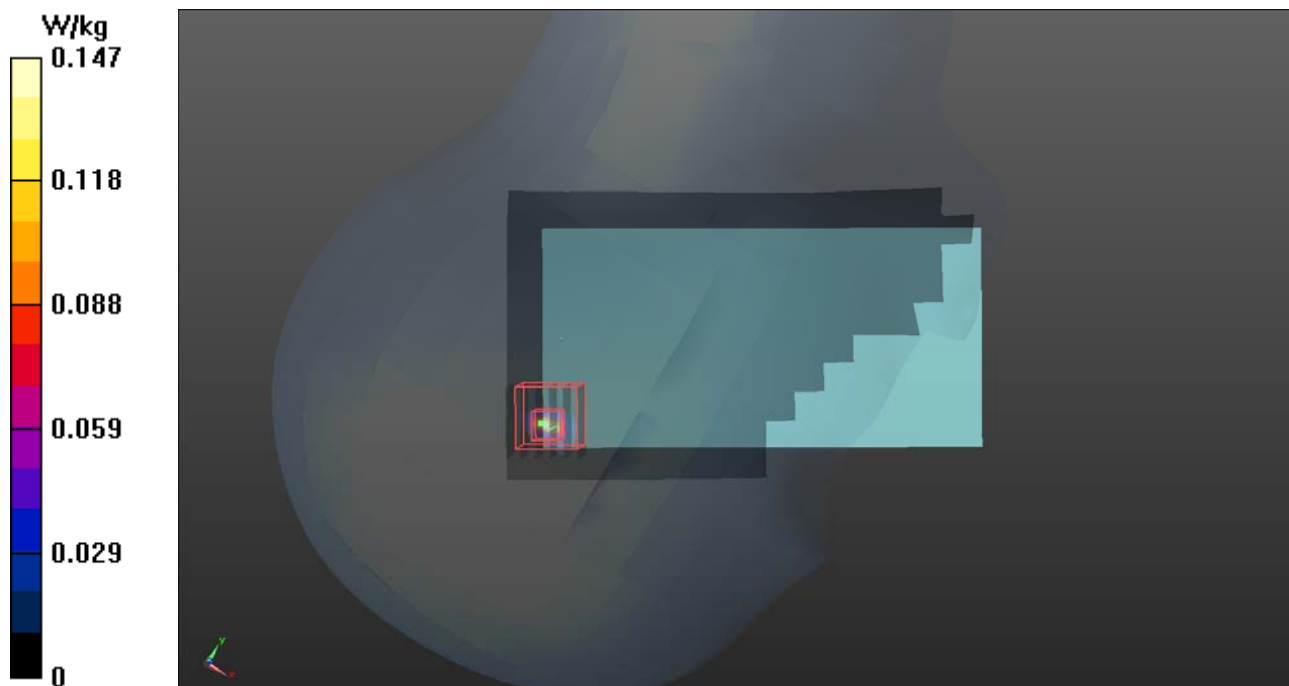
- **Zoom Scan (6x6x12)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 0 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.352 W/kg

**SAR(1 g) = 0.043 W/kg; SAR(10 g) = 0.00827 W/kg**

Maximum value of SAR (measured) = 0.165 W/kg



### P13 GSM850\_GPRS11\_Rear Face\_1cm\_Ch251

**DUT: 160316C04**

Communication System: GPRS11; Frequency: 848.8 MHz; Duty Cycle: 1:2.67

Medium: B07T10N3\_0331 Medium parameters used:  $f = 849$  MHz;  $\sigma = 1.012$  S/m;  $\epsilon_r = 54.309$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.9 °C ; Liquid Temperature : 23.3 °C

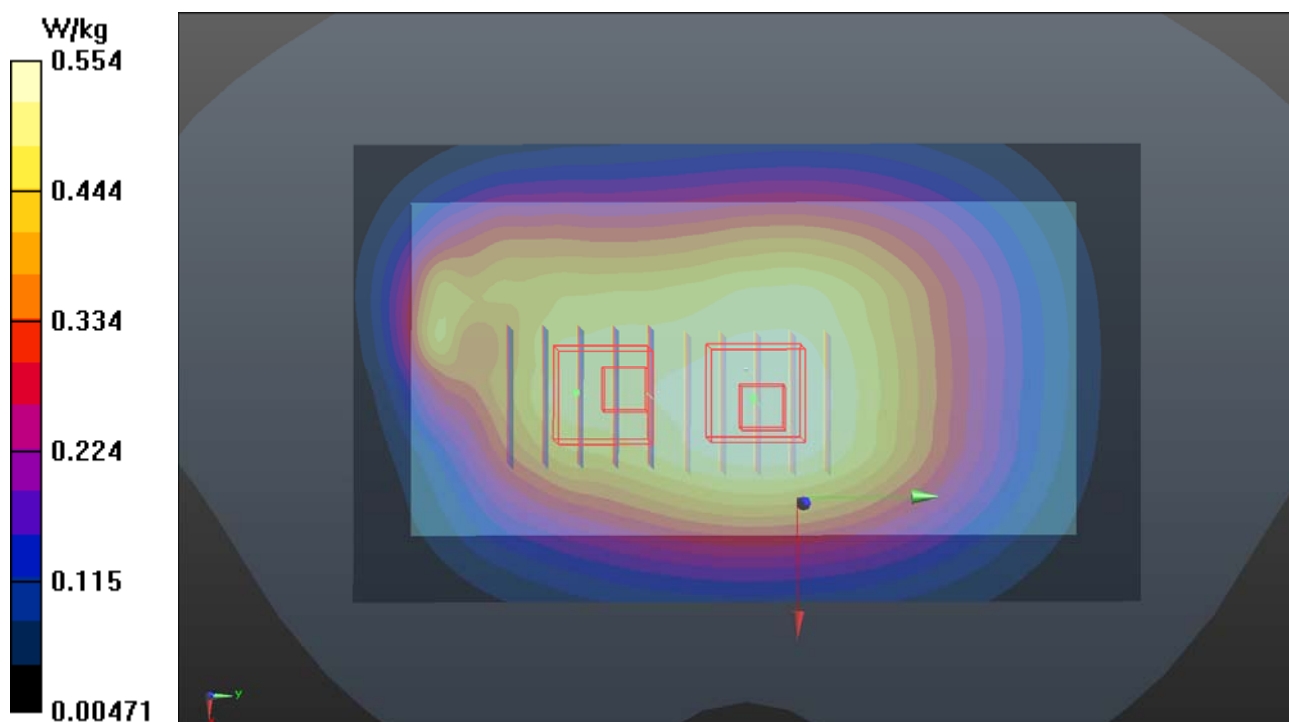
DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.554 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 24.09 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 0.608 W/kg  
**SAR(1 g) = 0.461 W/kg; SAR(10 g) = 0.354 W/kg**  
Maximum value of SAR (measured) = 0.556 W/kg

- **Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 24.09 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 0.556 W/kg  
**SAR(1 g) = 0.431 W/kg; SAR(10 g) = 0.325 W/kg**  
Maximum value of SAR (measured) = 0.510 W/kg



### P14 GSM1900\_GPRS11\_Front Face\_1cm\_Ch661

**DUT: 160316C04**

Communication System: GPRS11; Frequency: 1880 MHz; Duty Cycle: 1:2.67

Medium: B16T20N2\_0402 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.549$  S/m;  $\epsilon_r = 51.056$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1652; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.305 W/kg

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

Reference Value = 5.958 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 0.368 W/kg

**SAR(1 g) = 0.211 W/kg; SAR(10 g) = 0.118 W/kg**

Maximum value of SAR (measured) = 0.305 W/kg

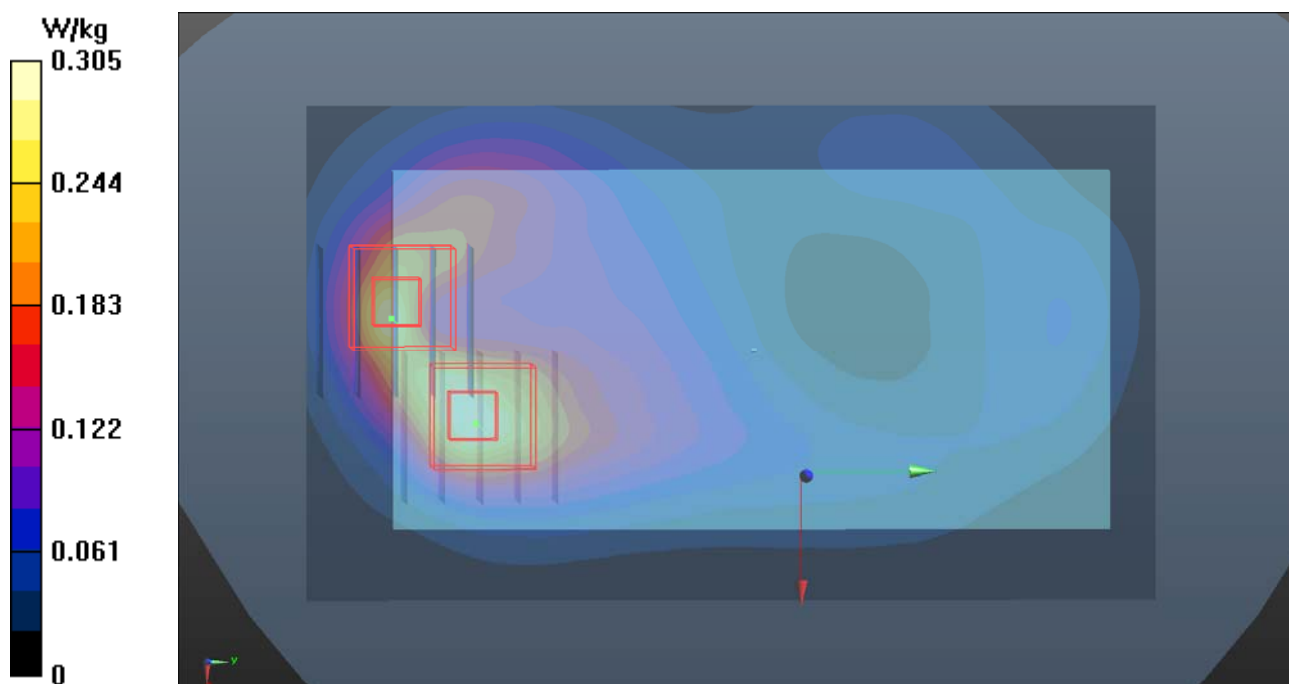
- **Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.958 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 0.388 W/kg

**SAR(1 g) = 0.204 W/kg; SAR(10 g) = 0.107 W/kg**

Maximum value of SAR (measured) = 0.306 W/kg



### P15 WCDMA II\_RMC12.2K\_Front Face\_1cm\_Ch9262

**DUT: 160316C04**

Communication System: WCDMA; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium: B16T20N2\_0402 Medium parameters used:  $f = 1852.4$  MHz;  $\sigma = 1.526$  S/m;  $\epsilon_r = 51.11$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

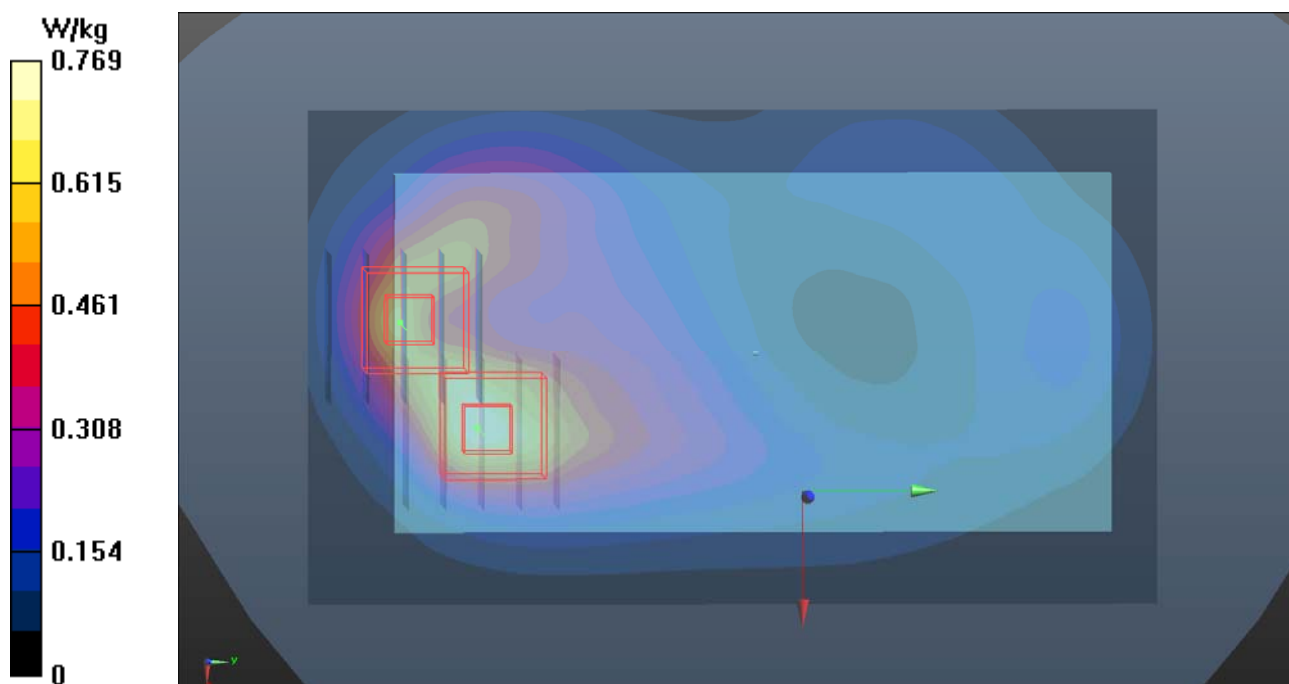
DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1652; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.769 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 9.623 V/m; Power Drift = -0.17 dB  
Peak SAR (extrapolated) = 0.946 W/kg  
**SAR(1 g) = 0.536 W/kg; SAR(10 g) = 0.300 W/kg**  
Maximum value of SAR (measured) = 0.796 W/kg

- **Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 9.623 V/m; Power Drift = -0.17 dB  
Peak SAR (extrapolated) = 0.875 W/kg  
**SAR(1 g) = 0.502 W/kg; SAR(10 g) = 0.276 W/kg**  
Maximum value of SAR (measured) = 0.738 W/kg





### P16 WCDMA V\_RMC12.2K\_Rear Face\_1cm\_Ch4132

**DUT: 160316C04**

Communication System: WCDMA; Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: B07T10N3\_0331 Medium parameters used:  $f = 826.4$  MHz;  $\sigma = 0.992$  S/m;  $\epsilon_r = 54.53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

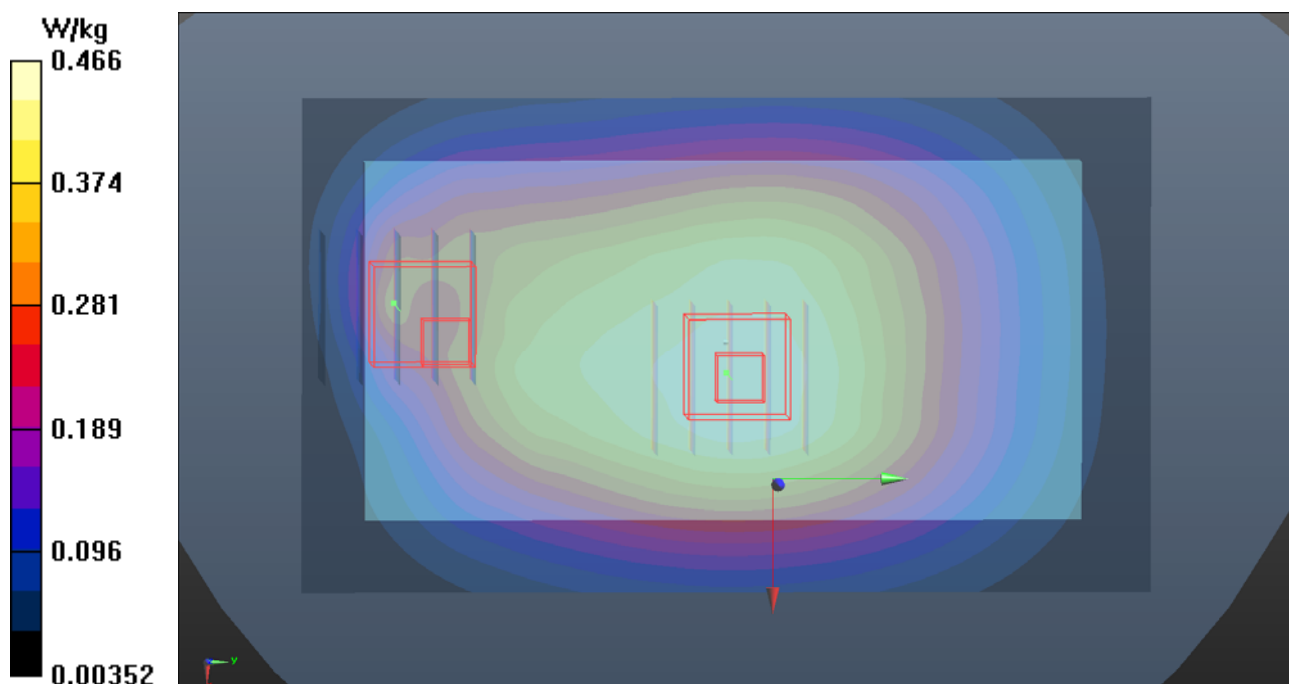
DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm  
Maximum value of SAR (interpolated) = 0.466 W/kg

- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 22.45 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 0.508 W/kg  
**SAR(1 g) = 0.392 W/kg; SAR(10 g) = 0.303 W/kg**  
Maximum value of SAR (measured) = 0.468 W/kg

- **Zoom Scan (5x5x7)/Cube 1:** Measurement grid: dx=8mm, dy=8mm, dz=5mm  
Reference Value = 22.45 V/m; Power Drift = -0.02 dB  
Peak SAR (extrapolated) = 0.395 W/kg  
**SAR(1 g) = 0.222 W/kg; SAR(10 g) = 0.141 W/kg**  
Maximum value of SAR (measured) = 0.320 W/kg



### P17 LTE 2\_QPSK20M\_Rear Face\_1cm\_Ch18700\_1RB\_OS50

**DUT: 160316C04**

Communication System: LTE; Frequency: 1860 MHz; Duty Cycle: 1:1

Medium: B16T20N2\_0403 Medium parameters used:  $f = 1860$  MHz;  $\sigma = 1.541$  S/m;  $\epsilon_r = 51.282$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.637 W/kg

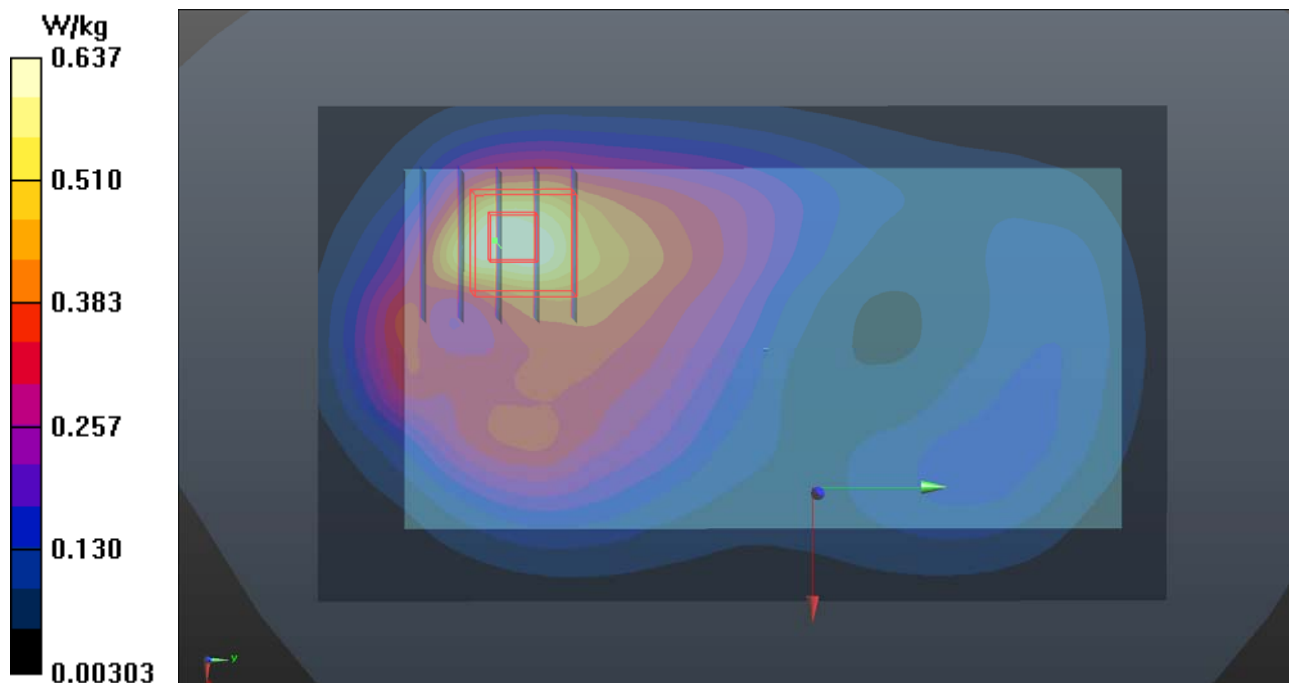
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.644 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.795 W/kg

**SAR(1 g) = 0.457 W/kg; SAR(10 g) = 0.263 W/kg**

Maximum value of SAR (measured) = 0.666 W/kg



### P18 LTE 4\_QPSK20M\_Rear Face\_1cm\_Ch20175\_1RB\_OS50

**DUT: 160316C04**

Communication System: LTE; Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: B16T20N2\_0331 Medium parameters used:  $f = 1732.5$  MHz;  $\sigma = 1.431$  S/m;  $\epsilon_r = 51.968$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(8.13, 8.13, 8.13); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.15 W/kg

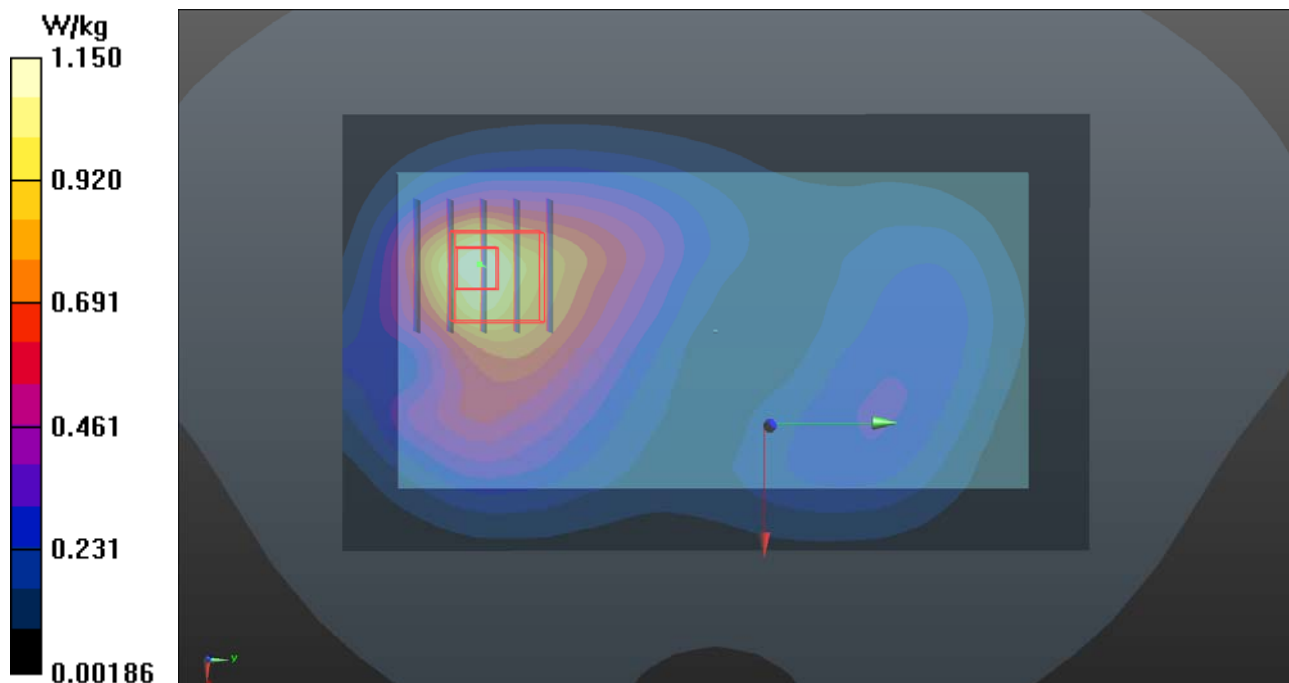
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.514 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.34 W/kg

**SAR(1 g) = 0.838 W/kg; SAR(10 g) = 0.506 W/kg**

Maximum value of SAR (measured) = 1.15 W/kg



### P19 LTE 5\_QPSK10M\_Rear Face\_1cm\_Ch20450\_1RB\_OS24

**DUT: 160316C04**

Communication System: LTE; Frequency: 829 MHz; Duty Cycle: 1:1

Medium: B07T10N3\_0331 Medium parameters used:  $f = 829 \text{ MHz}$ ;  $\sigma = 0.994 \text{ S/m}$ ;  $\epsilon_r = 54.515$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature :  $23.8 \text{ }^\circ\text{C}$  ; Liquid Temperature :  $23.2 \text{ }^\circ\text{C}$

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(9.83, 9.83, 9.83); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (71x121x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) =  $0.403 \text{ W/kg}$

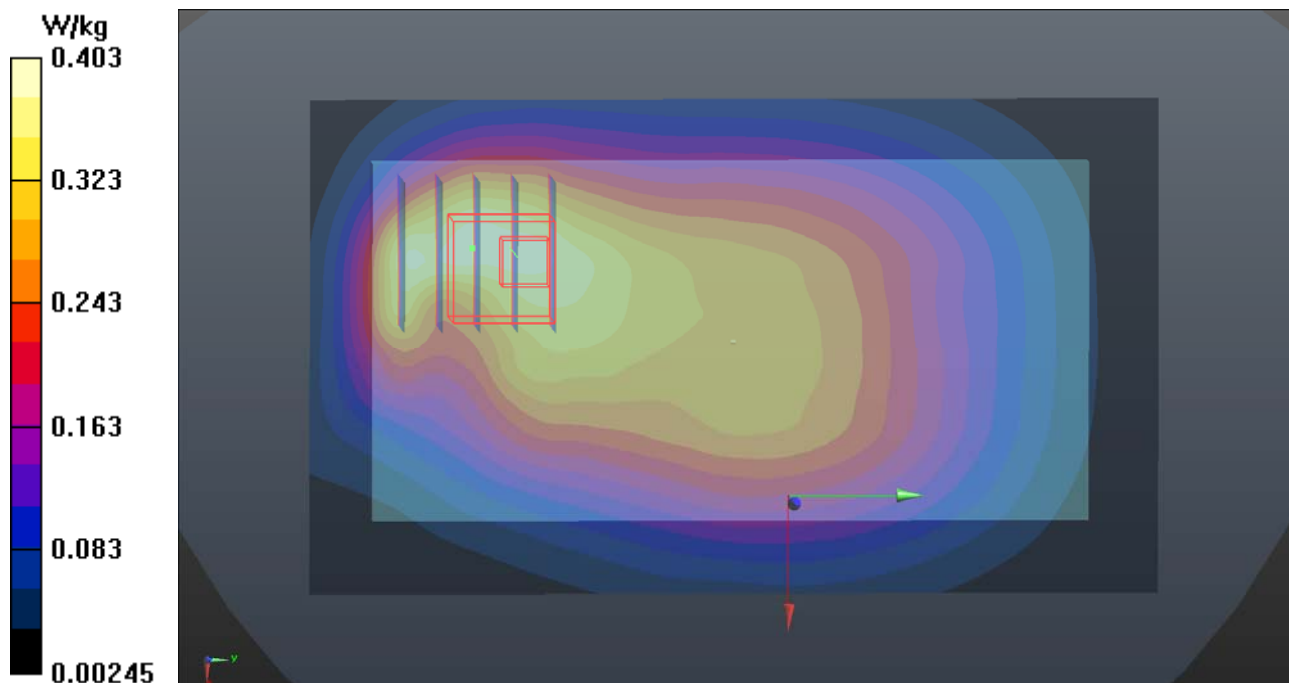
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $17.90 \text{ V/m}$ ; Power Drift =  $-0.10 \text{ dB}$

Peak SAR (extrapolated) =  $0.459 \text{ W/kg}$

**SAR(1 g) =  $0.294 \text{ W/kg}$ ; SAR(10 g) =  $0.193 \text{ W/kg}$**

Maximum value of SAR (measured) =  $0.392 \text{ W/kg}$



## P20 LTE 7\_QPSK20M\_Rear Face\_1cm\_Ch21100\_1RB\_OS0

**DUT: 160316C04**

Communication System: LTE; Frequency: 2535 MHz; Duty Cycle: 1:1

Medium: B19T27N3\_0416 Medium parameters used:  $f = 2535$  MHz;  $\sigma = 2.08$  S/m;  $\epsilon_r = 50.614$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.19, 7.19, 7.19); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (81x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 1.19 W/kg

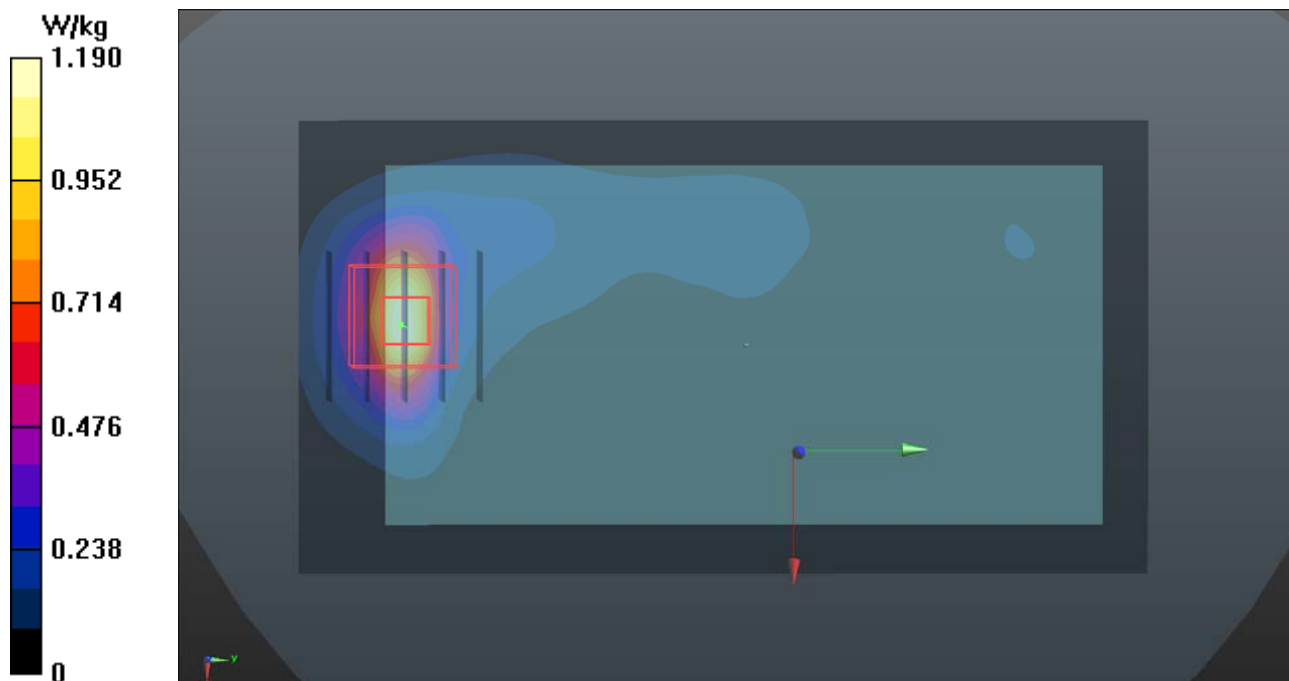
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.539 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.44 W/kg

**SAR(1 g) = 0.719 W/kg; SAR(10 g) = 0.335 W/kg**

Maximum value of SAR (measured) = 1.14 W/kg



## P21 2.4G WLAN\_802.11b\_Rear Face\_1cm\_Ch6

**DUT: 160316C04**

Communication System: WLAN\_2.4G; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: B19T27N1\_0403 Medium parameters used:  $f = 2437$  MHz;  $\sigma = 2.018$  S/m;  $\epsilon_r = 51.176$ ;  $\rho =$

$1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.3, 7.3, 7.3); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1652; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (81x151x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.211 W/kg

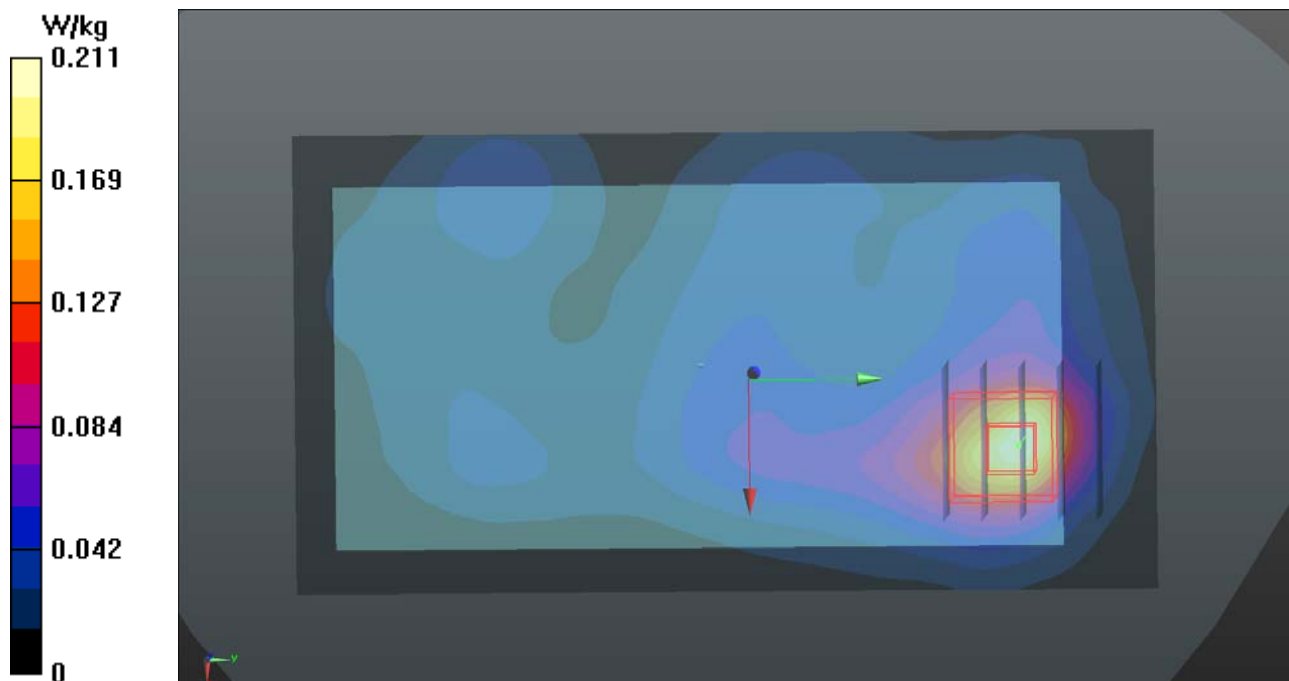
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.771 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 0.259 W/kg

**SAR(1 g) = 0.130 W/kg; SAR(10 g) = 0.064 W/kg**

Maximum value of SAR (measured) = 0.211 W/kg



## P22 5.3G WLAN\_802.11n HT40\_Rear Face\_1cm\_Ch62

**DUT: 160316C04**

Communication System: WLAN\_5G; Frequency: 5310 MHz; Duty Cycle: 1:1.4

Medium: B34T60N3\_0411 Medium parameters used:  $f = 5310$  MHz;  $\sigma = 5.48$  S/m;  $\epsilon_r = 48.221$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7346; ConvF(4.42, 4.42, 4.42); Calibrated: 2015/09/02;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn916; Calibrated: 2015/12/16
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (101x181x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.0981 W/kg

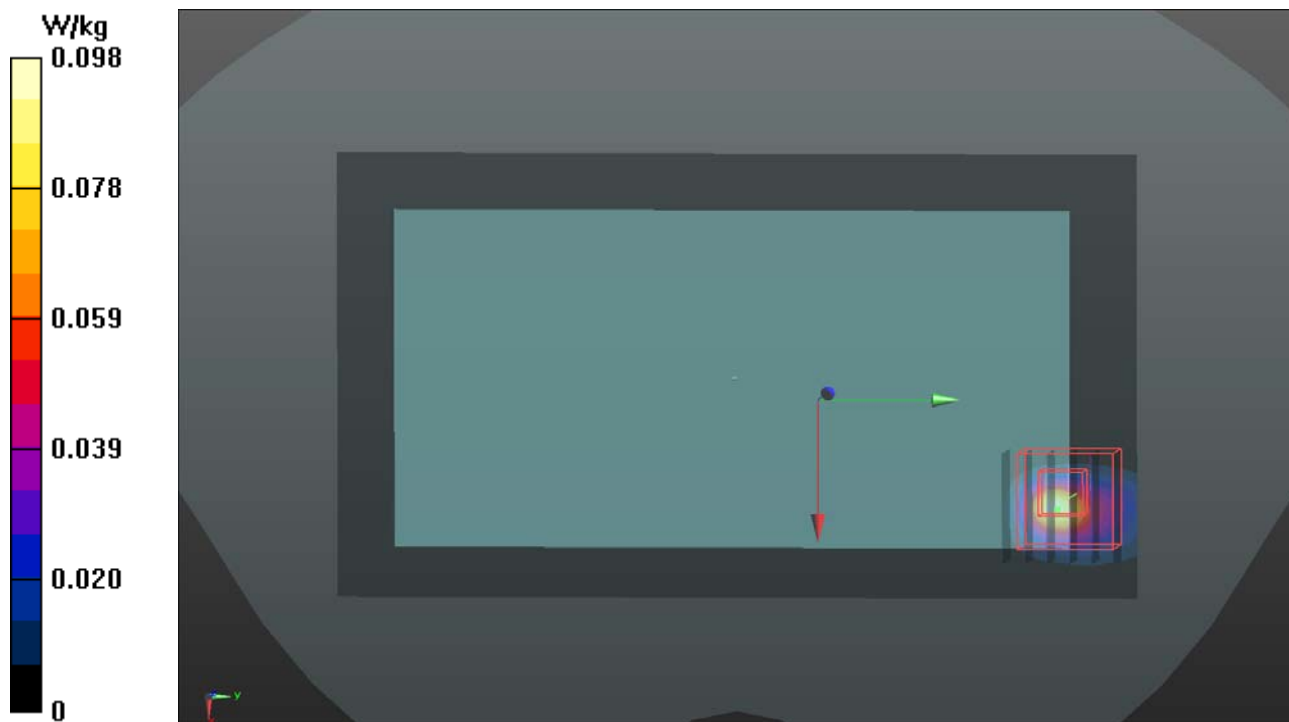
- **Zoom Scan (6x6x12)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 0.3520 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.186 W/kg

**SAR(1 g) = 0.041 W/kg; SAR(10 g) = 0.011 W/kg**

Maximum value of SAR (measured) = 0.116 W/kg



## P23 Bluetooth\_Rear Face\_1cm\_Ch39

**DUT: 160316C04**

Communication System: BT; Frequency: 2441 MHz; Duty Cycle: 1:2.95

Medium: B19T27N1\_0411 Medium parameters used:  $f = 2441$  MHz;  $\sigma = 2.001$  S/m;  $\epsilon_r = 51.534$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.9 °C ; Liquid Temperature : 23.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3650; ConvF(7.03, 7.03, 7.03); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1277; Calibrated: 2015/07/22
- Phantom: Twin SAM Phantom\_1654; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (101x191x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.0481 W/kg

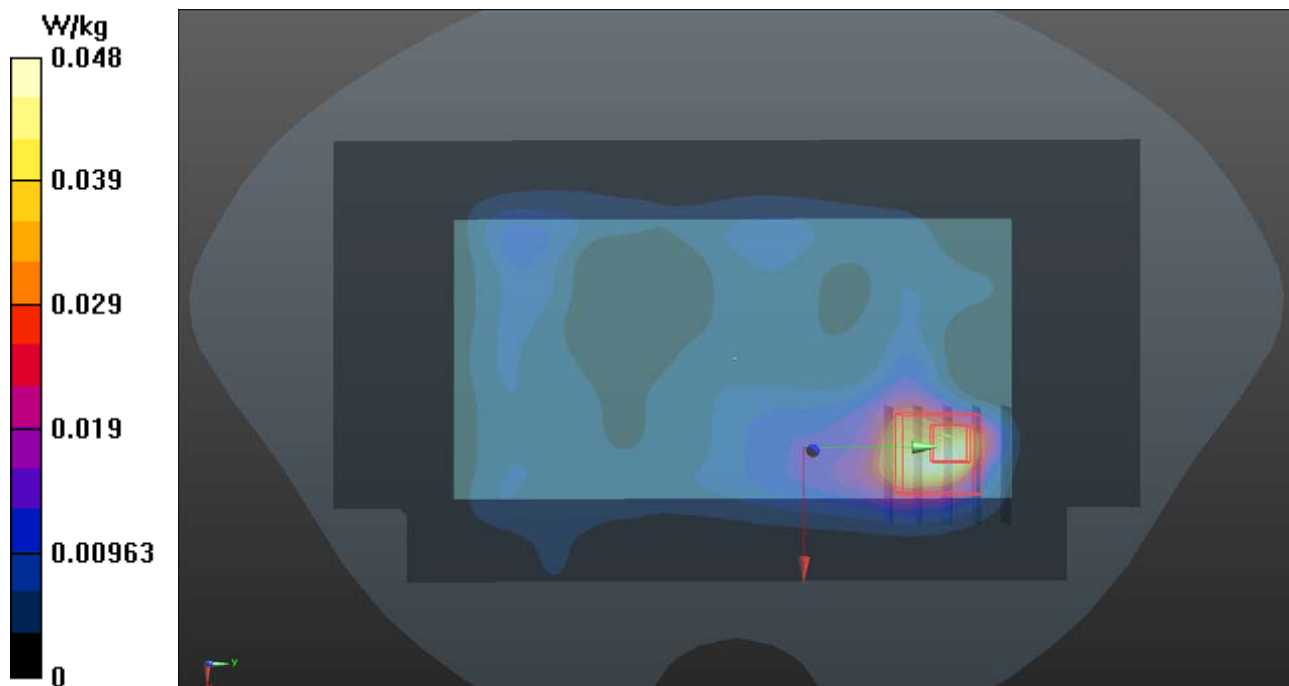
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.030 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.0720 W/kg

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

Maximum value of SAR (measured) = 0.0483 W/kg





### P24 GSM1900\_GPRS11\_Bottom Side\_1cm\_Ch661

**DUT: 160316C04**

Communication System: GPRS11; Frequency: 1880 MHz; Duty Cycle: 1:2.67

Medium: B16T20N2\_0402 Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.549$  S/m;  $\epsilon_r = 51.056$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1652; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (41x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.377 W/kg

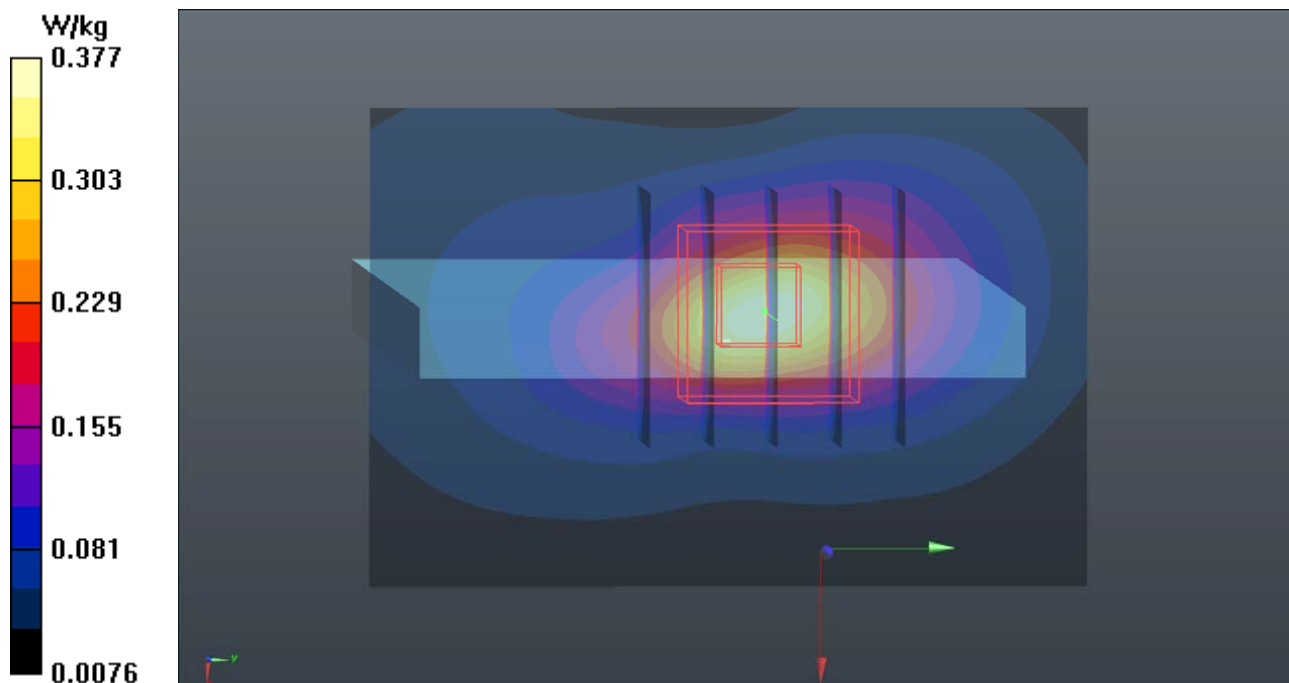
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.02 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.484 W/kg

**SAR(1 g) = 0.272 W/kg; SAR(10 g) = 0.138 W/kg**

Maximum value of SAR (measured) = 0.411 W/kg



## P25 WCDMA II\_RMC12.2K\_Bottom Side\_1cm\_Ch9262

**DUT: 160316C04**

Communication System: WCDMA; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium: B16T20N2\_0402 Medium parameters used:  $f = 1852.4$  MHz;  $\sigma = 1.526$  S/m;  $\epsilon_r = 51.11$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1652; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (41x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.812 W/kg

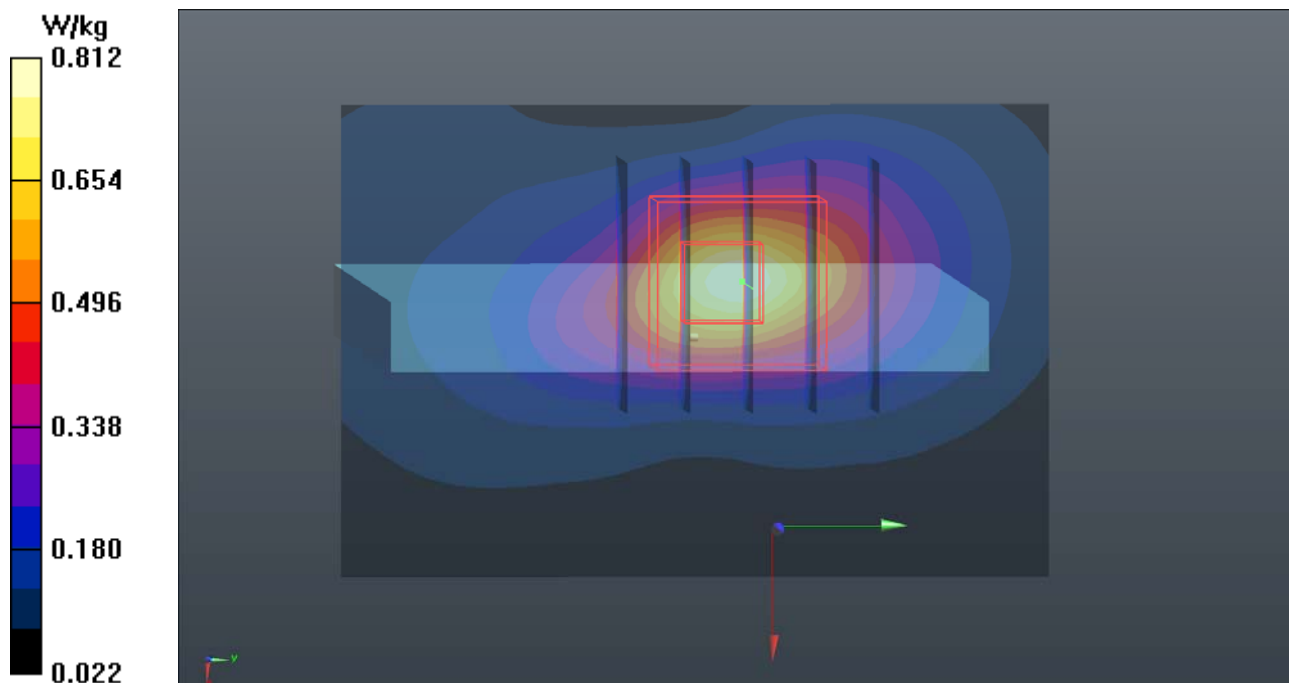
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.25 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 1.01 W/kg

**SAR(1 g) = 0.570 W/kg; SAR(10 g) = 0.291 W/kg**

Maximum value of SAR (measured) = 0.848 W/kg



## P26 LTE 2\_QPSK20M\_Bottom Side\_1cm\_Ch18700\_1RB\_OS50

**DUT: 160316C04**

Communication System: LTE; Frequency: 1860 MHz; Duty Cycle: 1:1

Medium: B16T20N2\_0403 Medium parameters used:  $f = 1860$  MHz;  $\sigma = 1.541$  S/m;  $\epsilon_r = 51.282$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.2 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.88, 7.88, 7.88); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (41x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.818 W/kg

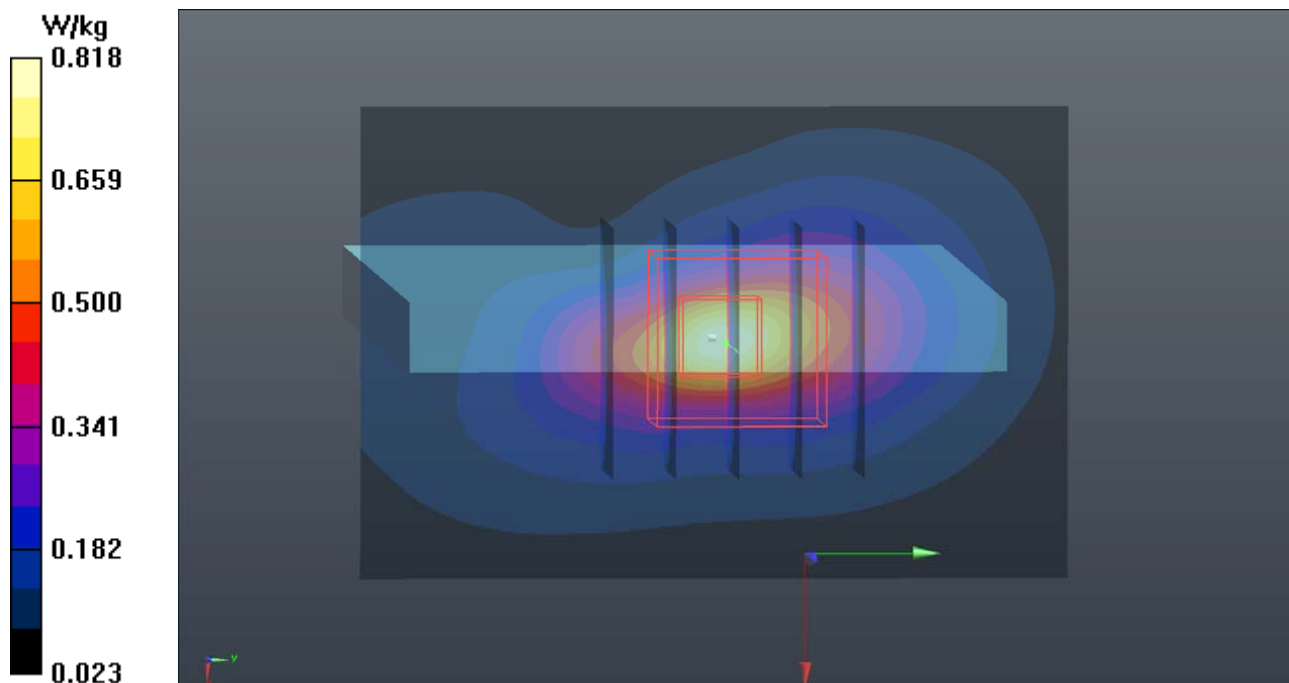
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.29 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.923 W/kg

**SAR(1 g) = 0.518 W/kg; SAR(10 g) = 0.262 W/kg**

Maximum value of SAR (measured) = 0.792 W/kg



### P27 LTE 7\_QPSK20M\_Bottom Side\_1cm\_Ch21100\_1RB\_OS0

**DUT: 160316C04**

Communication System: LTE; Frequency: 2535 MHz; Duty Cycle: 1:1

Medium: B19T27N3\_0416 Medium parameters used:  $f = 2535$  MHz;  $\sigma = 2.08$  S/m;  $\epsilon_r = 50.614$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.8 °C ; Liquid Temperature : 23.4 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN3864; ConvF(7.19, 7.19, 7.19); Calibrated: 2015/07/23;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn861; Calibrated: 2015/04/28
- Phantom: Twin SAM Phantom\_1823; Type: QD000P40CD;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (51x101x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 1.87 W/kg

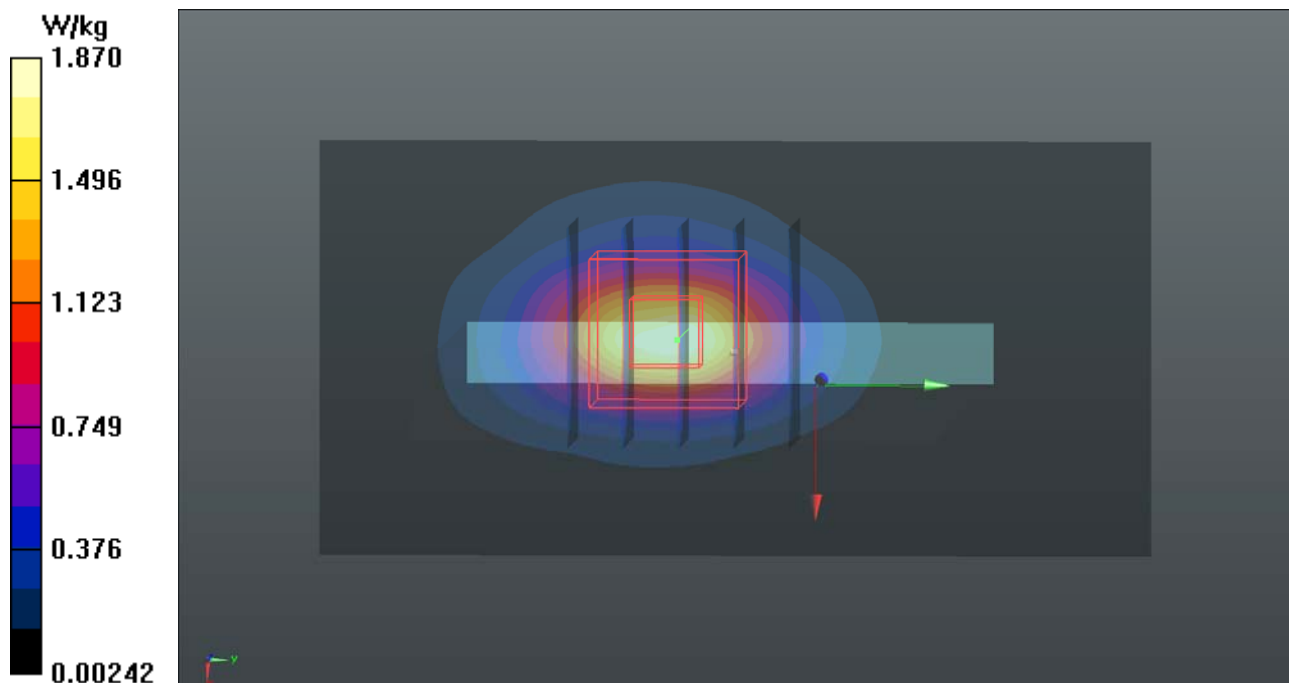
- **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.60 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 2.15 W/kg

**SAR(1 g) = 1.06 W/kg; SAR(10 g) = 0.498 W/kg**

Maximum value of SAR (measured) = 1.73 W/kg



### P28 5.6G WLAN\_802.11n HT40\_Top Side\_1cm\_Ch134

**DUT: 160316C04**

Communication System: WLAN\_5G; Frequency: 5670 MHz; Duty Cycle: 1:1.4

Medium: B34T60N3\_0411 Medium parameters used:  $f = 5670$  MHz;  $\sigma = 5.957$  S/m;  $\epsilon_r = 47.674$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7346; ConvF(3.9, 3.9, 3.9); Calibrated: 2015/09/02;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn916; Calibrated: 2015/12/16
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (61x121x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.0168 W/kg

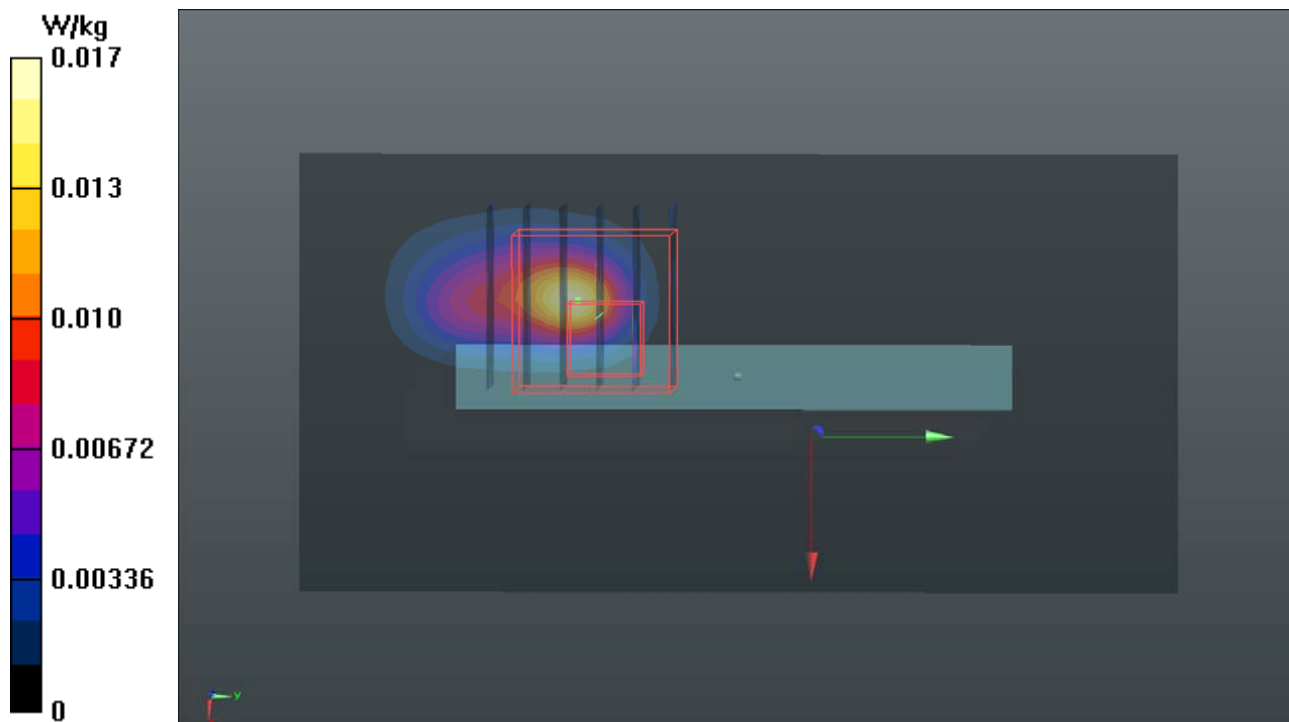
- **Zoom Scan (6x6x12)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=2mm

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

Peak SAR (extrapolated) = 0.0430 W/kg

**SAR(1 g) = 0.00185 W/kg; SAR(10 g) = 0.000207 W/kg**

Maximum value of SAR (measured) = 0.0187 W/kg



## P29 5.8G WLAN\_802.11n HT40\_Left Side\_1cm\_Ch151

**DUT: 160316C04**

Communication System: WLAN\_5G; Frequency: 5755 MHz; Duty Cycle: 1:1.4

Medium: B34T60N3\_0411 Medium parameters used:  $f = 5755$  MHz;  $\sigma = 6.053$  S/m;  $\epsilon_r = 47.559$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature : 23.6 °C ; Liquid Temperature : 23.5 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7346; ConvF(4.08, 4.08, 4.08); Calibrated: 2015/09/02;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn916; Calibrated: 2015/12/16
- Phantom: Twin SAM Phantom\_1653; Type: QD000P40;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

- **Area Scan (61x181x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.00848 W/kg

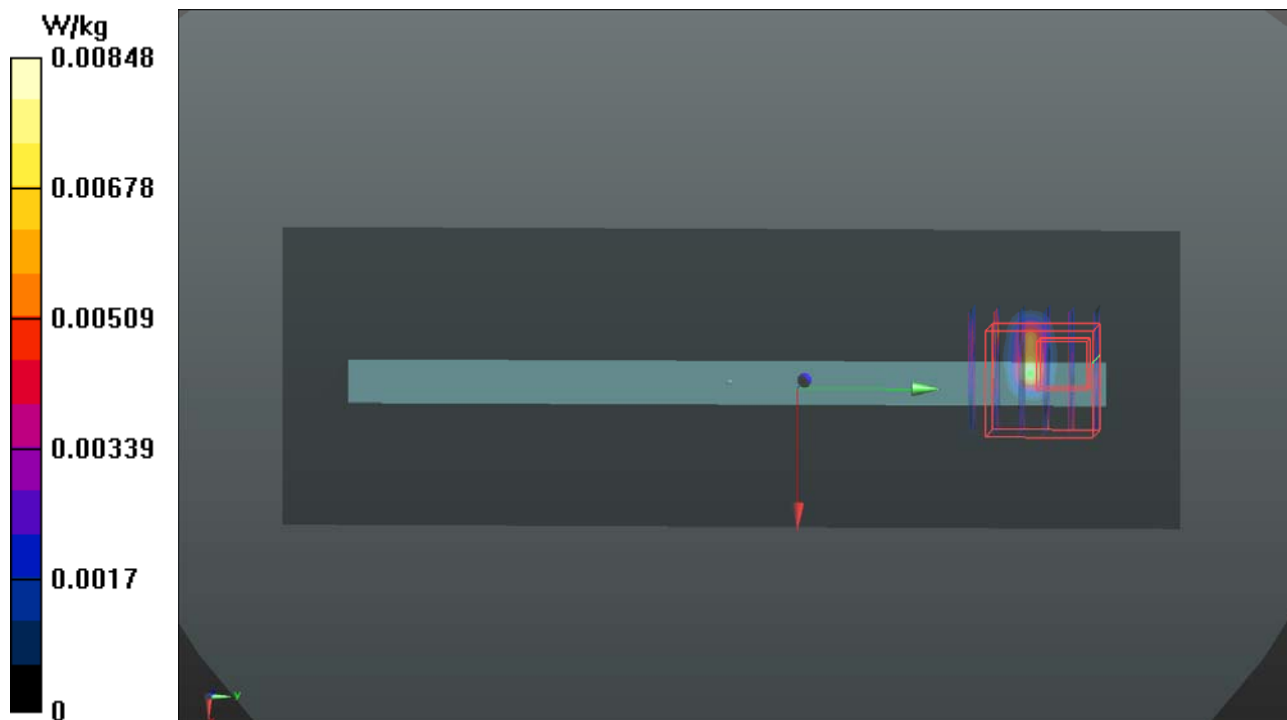
- **Zoom Scan (6x6x12)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=2mm

Reference Value = 0.6200 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.0280 W/kg

**SAR(1 g) = 0.00205 W/kg; SAR(10 g) = 0.000509 W/kg**

Maximum value of SAR (measured) = 0.0105 W/kg





## **Appendix C. Calibration Certificate for Probe and Dipole**

The SPEAG 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 0108**

Client **B.V. ADT (Auden)**

Certificate No: **D835V2-4d121\_Aug15**

## CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d121**

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

Calibration date: **August 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-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)	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 ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_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	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 <b>Michael Weber</b>	Function <b>Laboratory Technician</b>	Signature 
Approved by:	<b>Katja Pokovic</b>	<b>Technical Manager</b>	

Issued: August 25, 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:

- 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.

<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 mm	
<b>Frequency</b>	835 MHz $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	41.5	0.90 mho/m
<b>Measured Head TSL parameters</b>	(22.0 $\pm$ 0.2) °C	41.9 $\pm$ 6 %	0.93 mho/m $\pm$ 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	2.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>9.11 W/kg <math>\pm</math> 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	1.52 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>5.97 W/kg <math>\pm</math> 16.5 % (k=2)</b>

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	55.2	0.97 mho/m
<b>Measured Body TSL parameters</b>	(22.0 $\pm$ 0.2) °C	56.1 $\pm$ 6 %	1.02 mho/m $\pm$ 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	2.38 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>9.20 W/kg <math>\pm</math> 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	1.56 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>6.07 W/kg <math>\pm</math> 16.5 % (k=2)</b>

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

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 $\Omega$ - 2.1 j $\Omega$
Return Loss	- 31.4 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1 $\Omega$ - 3.2 j $\Omega$
Return Loss	- 28.5 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	June 29, 2010

# DASY5 Validation Report for Head TSL

Date: 21.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d121**

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

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.93 \text{ S/m}$ ;  $\epsilon_r = 41.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.2, 6.2, 6.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (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=5mm, dy=5mm, dz=5mm

Reference Value = 56.08 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 3.45 W/kg

**SAR(1 g) = 2.33 W/kg; SAR(10 g) = 1.52 W/kg**

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

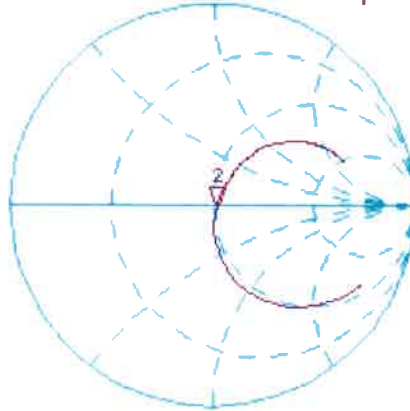


0 dB = 2.74 W/kg = 4.38 dBW/kg

# Impedance Measurement Plot for Head TSL

21 Aug 2015 13:23:47  
[CH1] S11 1 U FS 2: 51.779  $\Omega$  -2.0625  $\Omega$  92.414 pF 835.000 000 MHz

\*  
De l  
CA



Avg  
16

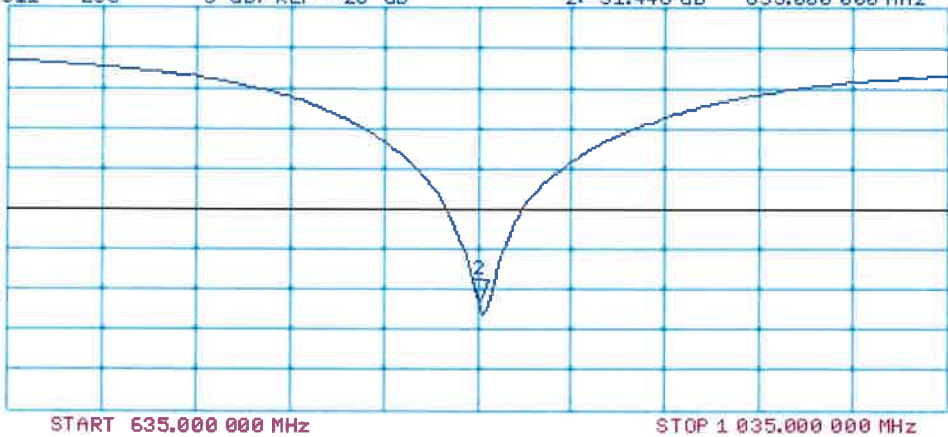
H1d

CH2 S11 LOG 5 dB/ REF -20 dB 2: -31.446 dB 835.000 000 MHz

CA

Avg  
16

H1d



## DASY5 Validation Report for Body TSL

Date: 24.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d121**

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

Medium parameters used:  $f = 835$  MHz;  $\sigma = 1.02$  S/m;  $\epsilon_r = 56.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.17, 6.17, 6.17); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (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:

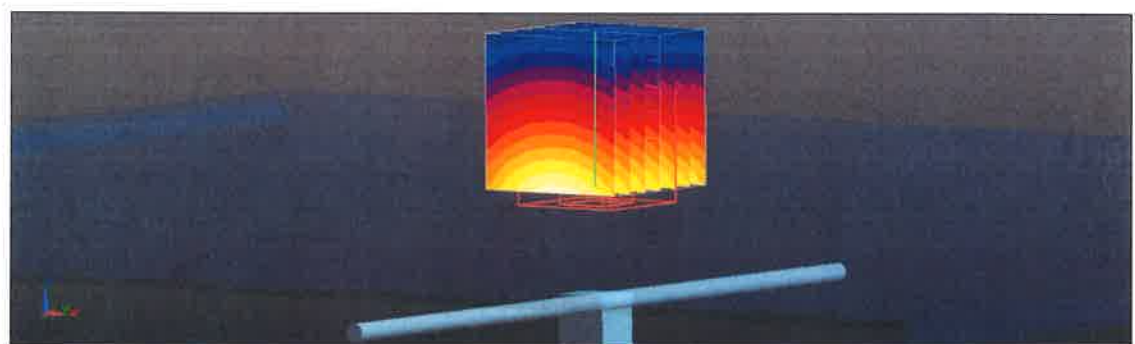
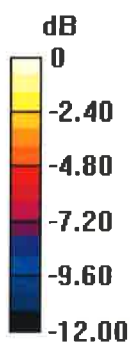
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.32 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 3.49 W/kg

**SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.56 W/kg**

Maximum value of SAR (measured) = 2.77 W/kg



0 dB = 2.77 W/kg = 4.42 dBW/kg

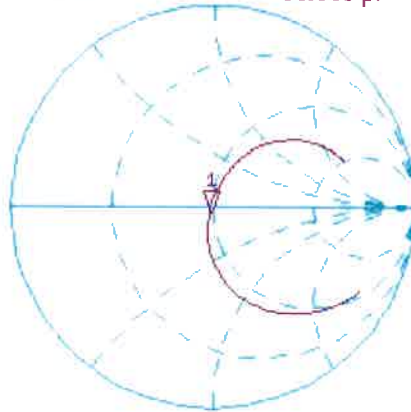
# Impedance Measurement Plot for Body TSL

24 Aug 2015 12:28:02

CH1 S11 1 U FS

1: 48.137  $\Omega$  -3.1738  $\Omega$  60.055 pF 835.000 000 MHz

\*  
De1  
CA



Avg  
16

H1d

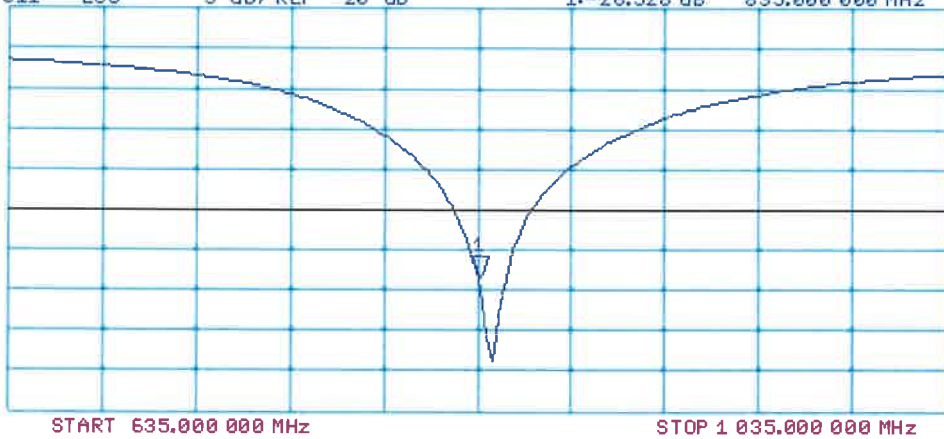
CH2 S11 LOG 5 dB/REF -20 dB 1:-28.528 dB 835.000 000 MHz

De1

CA

Avg  
16

H1d





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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 **B.V. ADT (Auden)**

Certificate No: **D1750V2-1055\_Aug15**

## CALIBRATION CERTIFICATE

Object **D1750V2 - SN: 1055**

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

Calibration date: **August 20, 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-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)	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 ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_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	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 <b>Michael Weber</b>	Function <b>Laboratory Technician</b>	Signature 
Approved by:	<b>Katja Pokovic</b>	<b>Technical Manager</b>	

Issued: August 21, 2015

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





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Accreditation No.: **SCS 0108**

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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.

<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>	1750 MHz $\pm$ 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	40.1	1.37 mho/m
<b>Measured Head TSL parameters</b>	(22.0 $\pm$ 0.2) °C	39.8 $\pm$ 6 %	1.36 mho/m $\pm$ 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	9.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>37.0 W/kg <math>\pm</math> 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	4.92 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>19.7 W/kg <math>\pm</math> 16.5 % (k=2)</b>

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	53.4	1.49 mho/m
<b>Measured Body TSL parameters</b>	(22.0 $\pm$ 0.2) °C	52.1 $\pm$ 6 %	1.48 mho/m $\pm$ 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	9.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>37.6 W/kg <math>\pm</math> 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	5.08 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>20.3 W/kg <math>\pm</math> 16.5 % (k=2)</b>

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

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.5 $\Omega$ + 1.6 j $\Omega$
Return Loss	- 35.4 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.7 $\Omega$ + 1.6 j $\Omega$
Return Loss	- 28.5 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.222 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	February 19, 2010

## DASY5 Validation Report for Head TSL

Date: 20.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1055**

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

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.36$  S/m;  $\epsilon_r = 39.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.2, 5.2, 5.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (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:

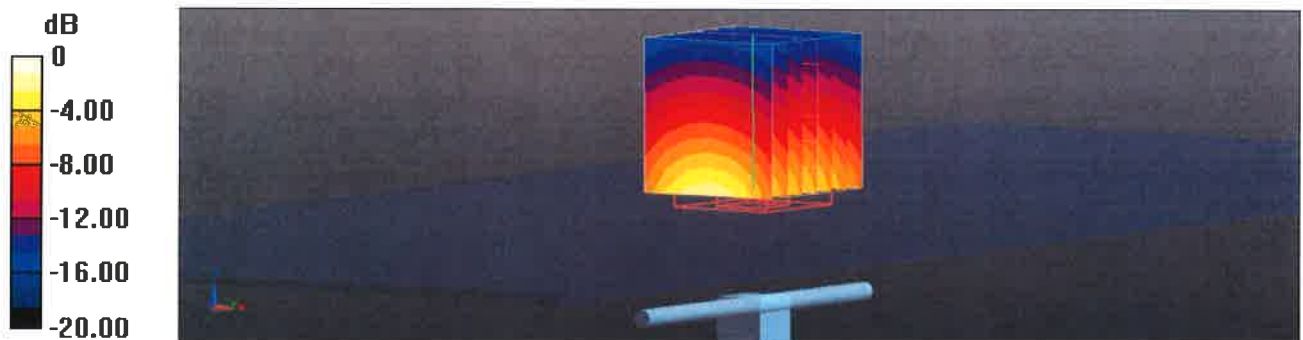
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.73 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 16.4 W/kg

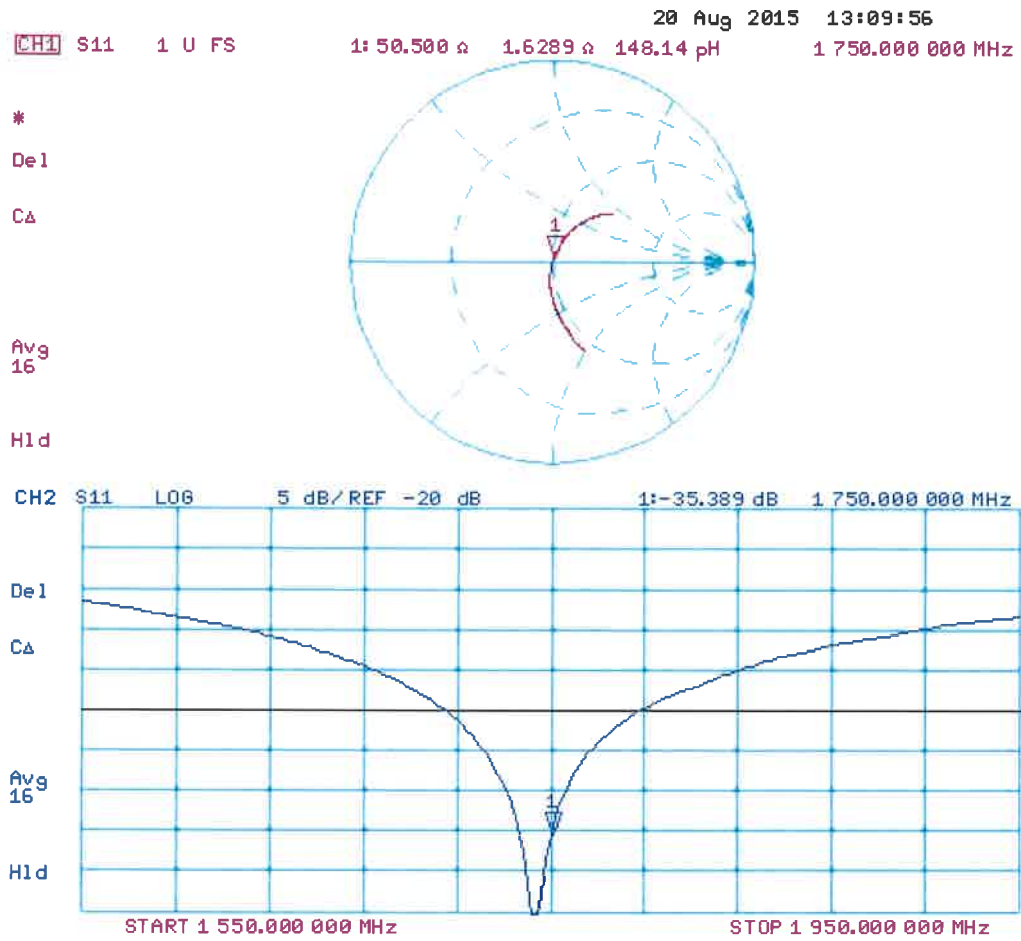
**SAR(1 g) = 9.22 W/kg; SAR(10 g) = 4.92 W/kg**

Maximum value of SAR (measured) = 11.7 W/kg



0 dB = 11.7 W/kg = 10.68 dBW/kg

# Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 20.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1055**

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

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.48$  S/m;  $\epsilon_r = 52.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.88, 4.88, 4.88); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (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:**

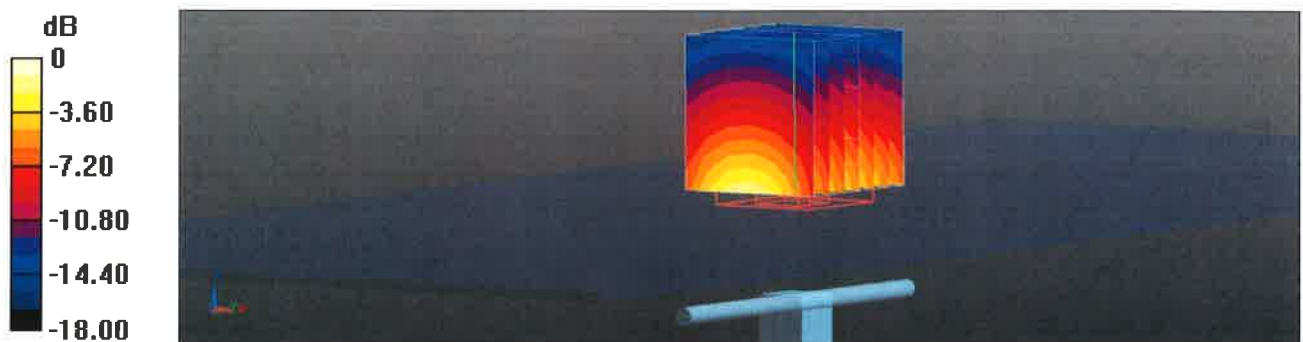
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.55 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.1 W/kg

**SAR(1 g) = 9.42 W/kg; SAR(10 g) = 5.08 W/kg**

Maximum value of SAR (measured) = 11.9 W/kg

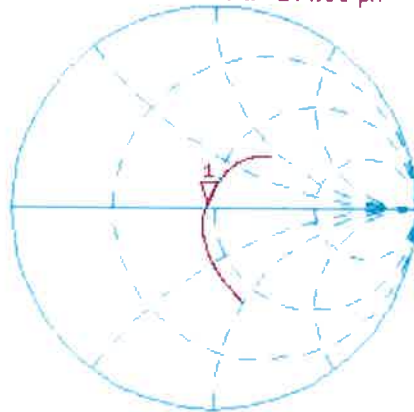


0 dB = 11.9 W/kg = 10.76 dBW/kg

# Impedance Measurement Plot for Body TSL

20 Aug 2015 13:09:34  
[CH1] S11 1 U FS 1: 46.732  $\Omega$  1.5898  $\Omega$  144.59  $\mu\text{H}$  1 750.000 000 MHz

\*  
De1  
CA

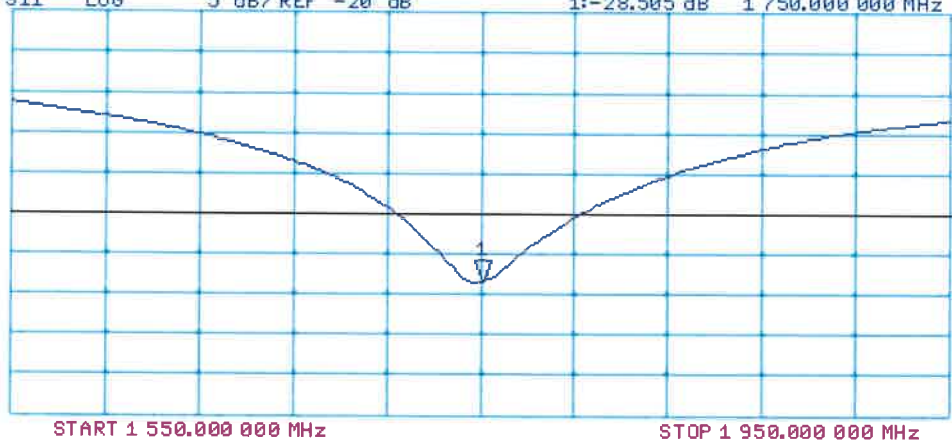


Avg  
16  
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-28.505 dB 1 750.000 000 MHz

De1  
CA

Avg  
16  
H1d





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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **B.V. ADT (Auden)**

Certificate No: **D1900V2-5d036\_Jan16**

## CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d036**

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

Calibration date: **January 22, 2016**

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	31-Dec-15 (No. EX3-7349_Dec15)	Dec-16
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-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: **Michael Weber**      **Laboratory Technician**

Signature

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

Issued: January 25, 2016

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





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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:

- 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.

<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	39.3 ± 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	9.73 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>38.9 W/kg ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	5.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>20.4 W/kg ± 16.5 % (k=2)</b>

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	53.3	1.52 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	52.7 ± 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	<b>40.7 W/kg ± 17.0 % (k=2)</b>

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

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

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.1 $\Omega$ + 5.3 j $\Omega$
Return Loss	- 25.0 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.7 $\Omega$ + 6.9 j $\Omega$
Return Loss	- 22.6 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.195 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 08, 2003

## DASY5 Validation Report for Head TSL

Date: 22.01.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d036**

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.39$  S/m;  $\epsilon_r = 39.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.2, 8.2, 8.2); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

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

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

Reference Value = 107.9 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.8 W/kg

**SAR(1 g) = 9.73 W/kg; SAR(10 g) = 5.1 W/kg**

Maximum value of SAR (measured) = 14.8 W/kg



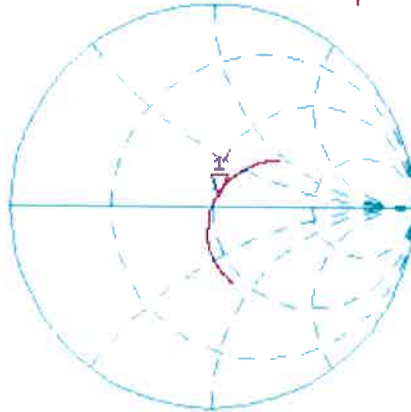
0 dB = 14.8 W/kg = 11.70 dBW/kg

# Impedance Measurement Plot for Head TSL

22 Jan 2016 12:07:49

CH1 S11 1 U FS 1: 52.143  $\Omega$  5.3047  $\Omega$  444.35  $\mu\text{H}$  1 900.000 000 MHz

\*  
De1  
CA



Avg  
16

H1d

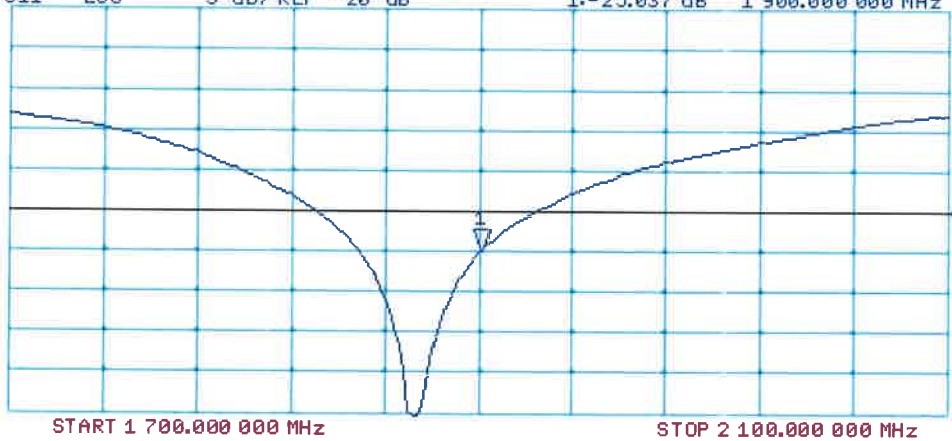
CH2 S11 LOG 5 dB/REF -20 dB 1:-25.037 dB 1 900.000 000 MHz

De1

CA

Avg  
16

H1d



## DASY5 Validation Report for Body TSL

Date: 20.01.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d036**

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

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.52$  S/m;  $\epsilon_r = 52.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.03, 8.03, 8.03); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

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

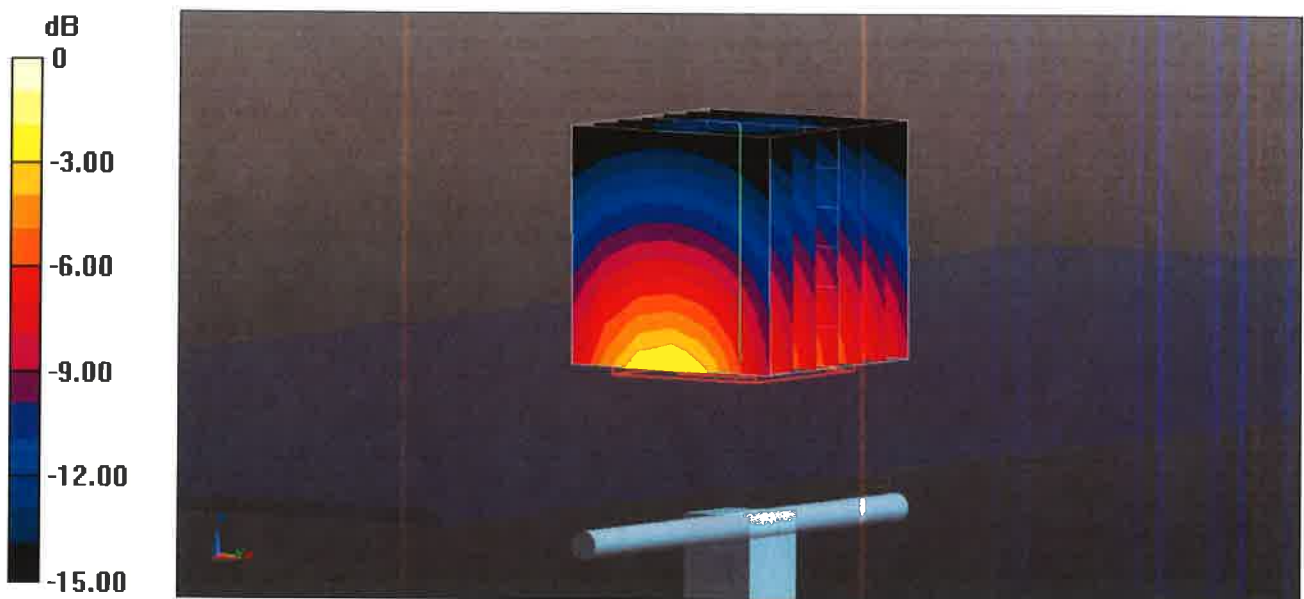
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 105.0 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 18.0 W/kg

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

Maximum value of SAR (measured) = 15.3 W/kg

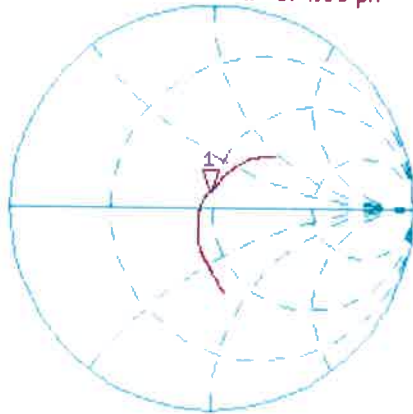


0 dB = 15.3 W/kg = 11.85 dBW/kg

# Impedance Measurement Plot for Body TSL

20 Jan 2016 16:37:34  
CH1 S11 1 U FS 1: 47.711  $\Omega$  6.8535  $\Omega$  574.09  $\mu$ H 1 900.000 000 MHz

\*  
De1  
Cor



Avg  
16

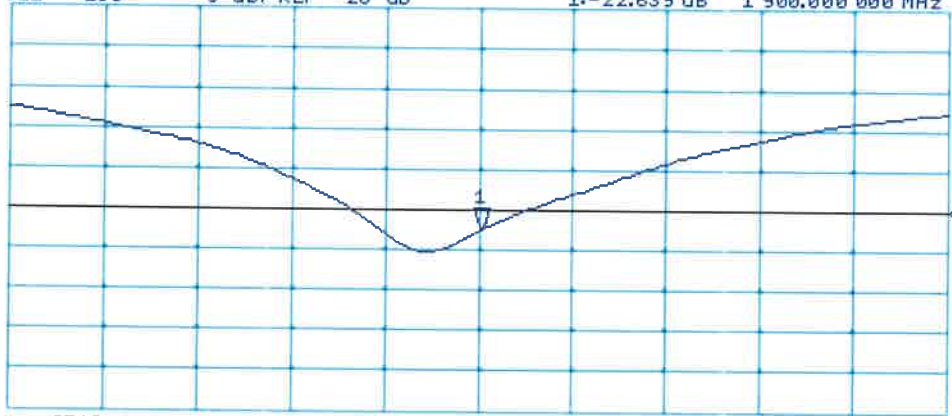
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-22.639 dB 1 900.000 000 MHz

Cor

Avg  
16

H1d



START 1 700.000 000 MHz

STOP 2 100.000 000 MHz





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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 **B.V. ADT (Auden)**

Certificate No: **D2450V2-737\_Aug15**

## CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 737**

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

Calibration date: **August 20, 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-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)	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 ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_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	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 <b>Michael Weber</b>	Function <b>Laboratory Technician</b>	Signature 
Approved by:	<b>Katja Pokovic</b>	<b>Technical Manager</b>	

Issued: August 21, 2015

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





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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:

- 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.

<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>	2450 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	39.2	1.80 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	39.2 ± 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	13.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>53.0 W/kg ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	250 mW input power	6.32 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>25.0 W/kg ± 16.5 % (k=2)</b>

## Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Body TSL parameters</b>	22.0 °C	52.7	1.95 mho/m
<b>Measured Body TSL parameters</b>	(22.0 ± 0.2) °C	53.2 ± 6 %	2.00 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	12.9 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>51.1 W/kg ± 17.0 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Body TSL</b>	condition	
SAR measured	250 mW input power	6.02 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>24.0 W/kg ± 16.5 % (k=2)</b>

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

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.5 $\Omega$ + 3.5 j $\Omega$
Return Loss	- 26.3 dB

### Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.8 $\Omega$ + 4.8 j $\Omega$
Return Loss	- 26.3 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.161 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 26, 2003

# DASY5 Validation Report for Head TSL

Date: 20.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 737**

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.87$  S/m;  $\epsilon_r = 39.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.54, 4.54, 4.54); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (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:

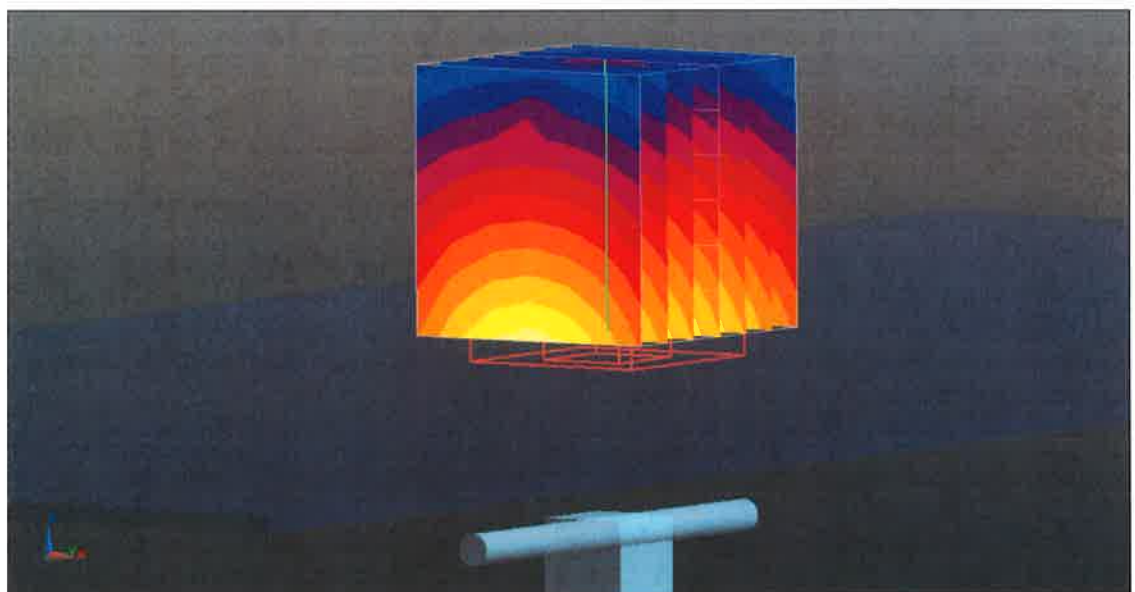
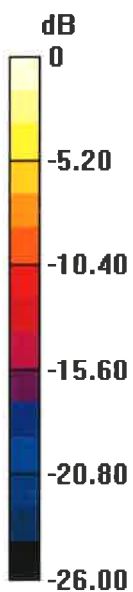
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.6 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 27.8 W/kg

**SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.32 W/kg**

Maximum value of SAR (measured) = 18.0 W/kg



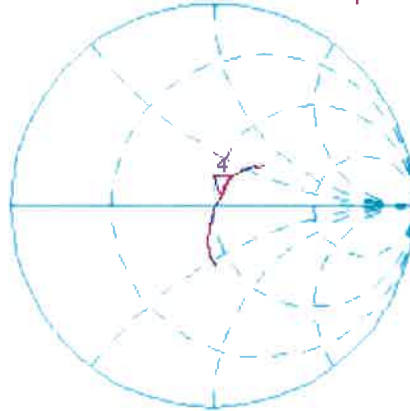
0 dB = 18.0 W/kg = 12.55 dBW/kg

# Impedance Measurement Plot for Head TSL

19 Aug 2015 12:42:13

CH1 S11 1 U FS 4: 53.531  $\Omega$  3.5332  $\Omega$  229.52 pF 2 450.000 000 MHz

\*  
De l  
CA



Av 9  
16

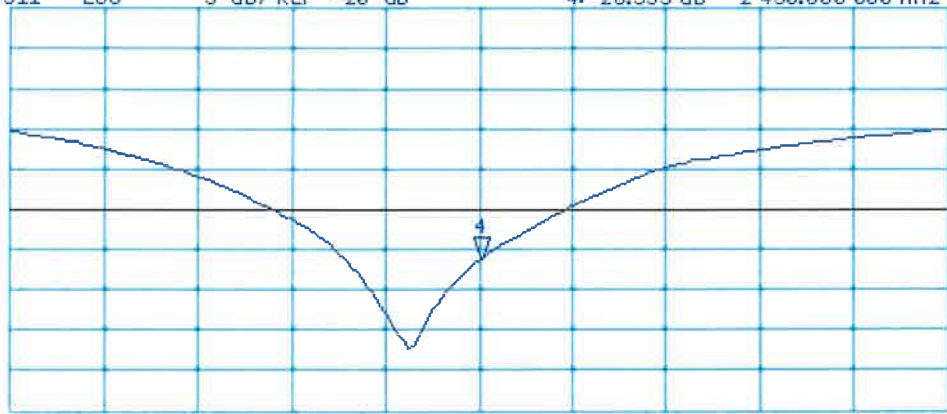
H1 d

CH2 S11 LOG 5 dB/ REF -20 dB 4: -26.333 dB 2 450.000 000 MHz

CA

Av 9  
16

H1 d



START 2 250.000 000 MHz

STOP 2 650.000 000 MHz

## DASY5 Validation Report for Body TSL

Date: 19.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 737**

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 2$  S/m;  $\epsilon_r = 53.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.32, 4.32, 4.32); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (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=5mm, dy=5mm, dz=5mm

Reference Value = 95.46 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 26.6 W/kg

**SAR(1 g) = 12.9 W/kg; SAR(10 g) = 6.02 W/kg**

Maximum value of SAR (measured) = 17.1 W/kg



0 dB = 17.1 W/kg = 12.33 dBW/kg

# Impedance Measurement Plot for Body TSL

19 Aug 2015 12:40:41

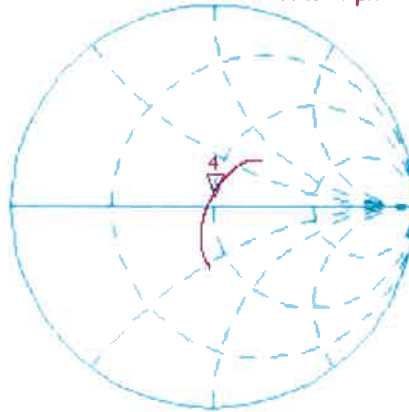
CH1 S11 1 U FS 4: 49.811  $\Omega$  4.8281  $\Omega$  313.64 pF 2 450.000 000 MHz

\*  
Del

CA

Avg  
16

H1d



CH2 S11 LOG 5 dB/REF -20 dB 4:-26.305 dB 2 450.000 000 MHz

CA

Avg  
16

H1d

