# Appendix A. SAR Plots of System Verification

The plots for system verification with largest deviation for each SAR system combination are shown as follows.

# System Check_B750_180820

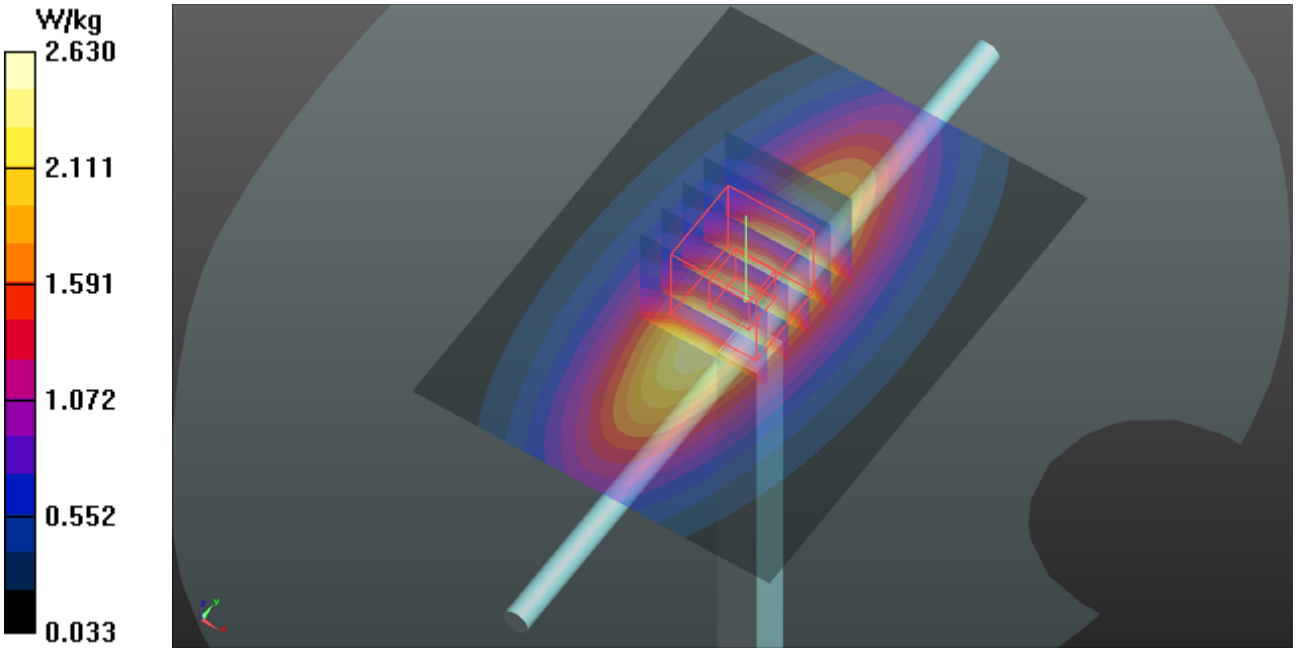
## DUT: Dipole 750 MHz; Type: D750V3; SN: 1132

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: B06T09N1_0820 Medium parameters used: f = 750 MHz; $\sigma$ = 0.961 S/m; $\varepsilon_r$ = 54.281; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.91, 9.91, 9.91); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Pin=250mW/Area Scan (61x81x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.63 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 53.68 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 3.16 W/kg
**SAR(1 g) = 2.07 W/kg; SAR(10 g) = 1.34 W/kg**
Maximum value of SAR (measured) = 2.65 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2018/08/20

# System Check_B835_180820

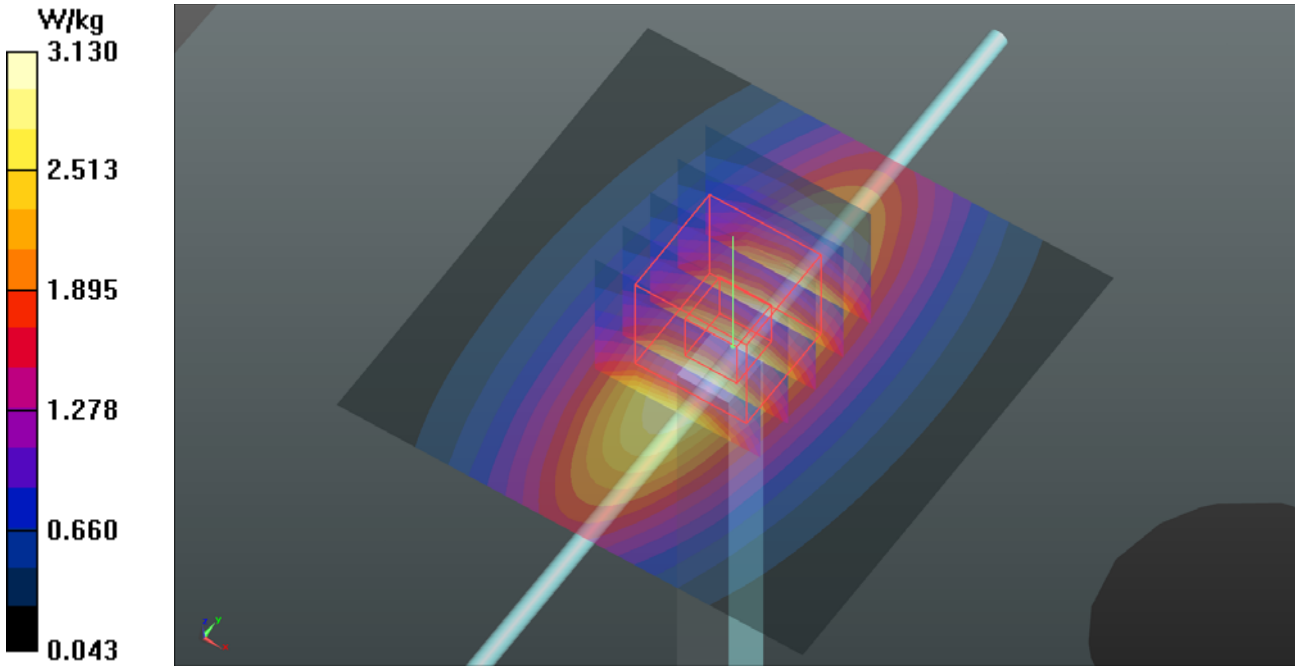
## DUT: Dipole 835 MHz; Type: D835V2; SN: 4d120

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: B07T10N2_0820 Medium parameters used: f = 835 MHz; $\sigma$ = 1.016 S/m; $\varepsilon_r$ = 55.341; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.74, 9.74, 9.74); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.13 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.96 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 3.50 W/kg
**SAR(1 g) = 2.35 W/kg; SAR(10 g) = 1.55 W/kg**
Maximum value of SAR (measured) = 3.12 W/kg



# System Check_B1750_180820

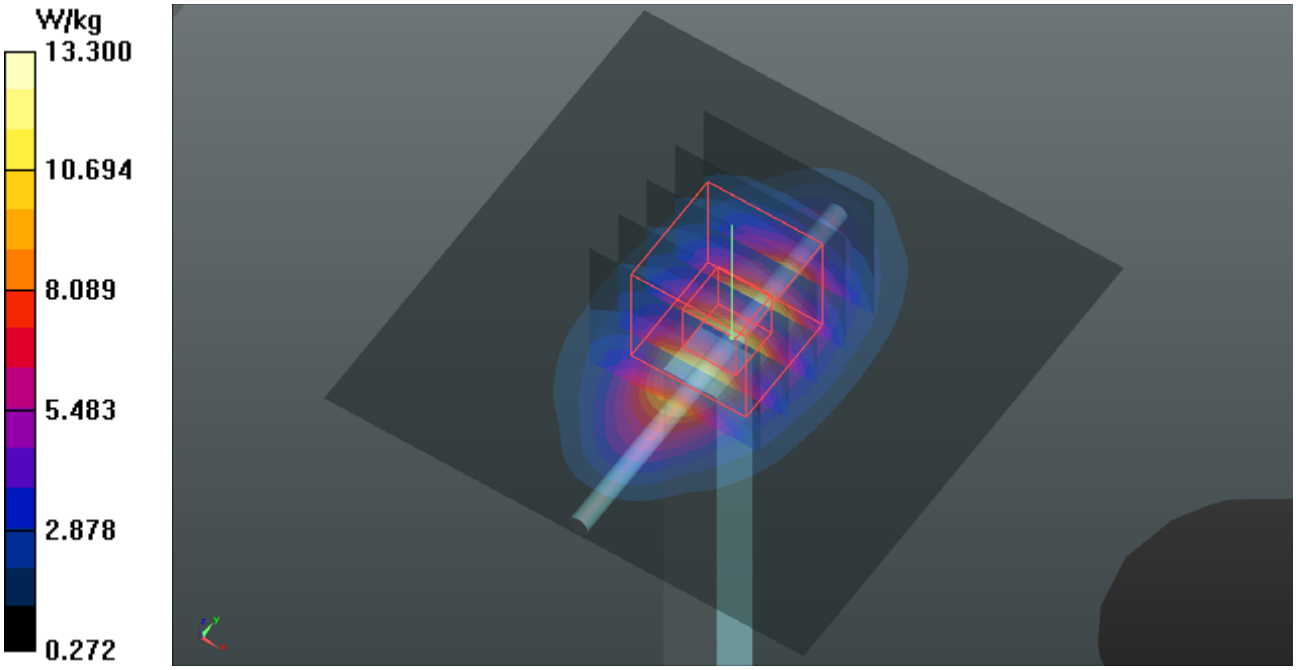
## DUT: Dipole 1750 MHz; Type: D1750V2; SN: 1023

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0820 Medium parameters used: f = 1750 MHz; $\sigma$ = 1.441 S/m; $\varepsilon_r$ = 52.489; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(8.2, 8.2, 8.2); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 13.4 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 99.88 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 15.6 W/kg
**SAR(1 g) = 8.76 W/kg; SAR(10 g) = 4.67 W/kg**
Maximum value of SAR (measured) = 13.3 W/kg



# System Check_B1900_180820

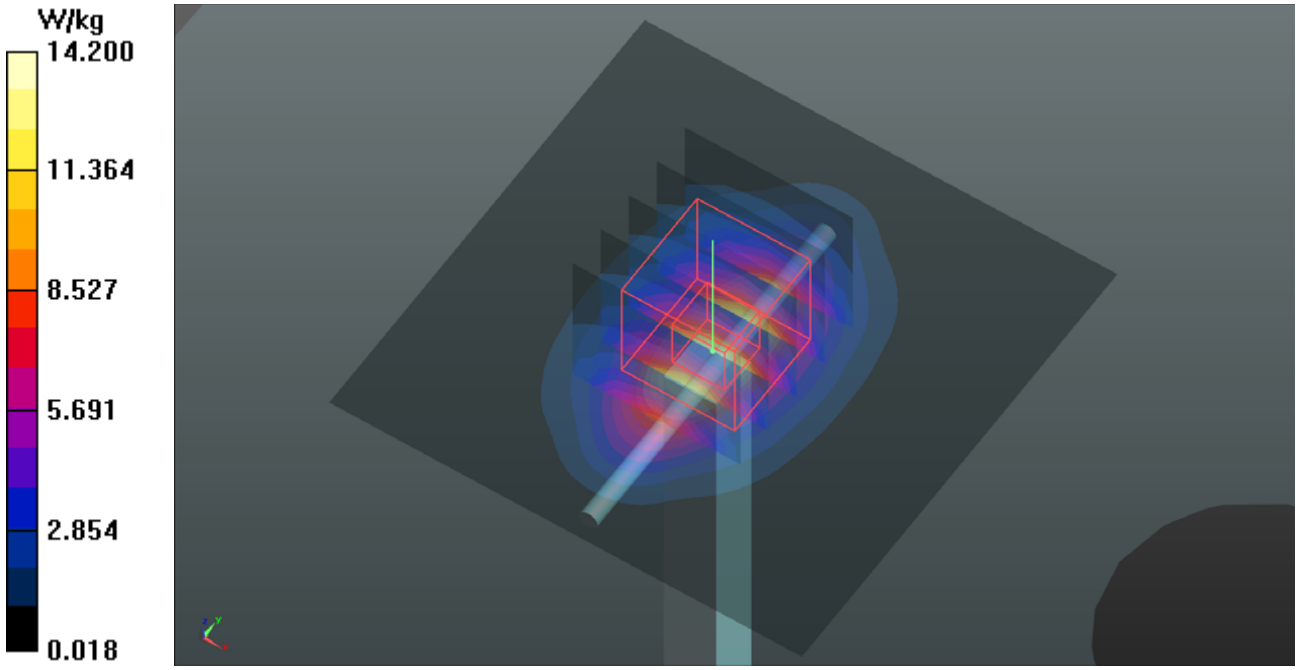
## DUT: Dipole 1900 MHz; Type: D1900V2; SN: 5d036

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0820 Medium parameters used: f = 1900 MHz; $\sigma$ = 1.584 S/m; $\varepsilon_r$ = 52.168; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.89, 7.89, 7.89); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.2 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 95.69 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 17.5 W/kg
**SAR(1 g) = 9.87 W/kg; SAR(10 g) = 5.21 W/kg**
Maximum value of SAR (measured) = 14.0 W/kg



# System Check_B2450_180820

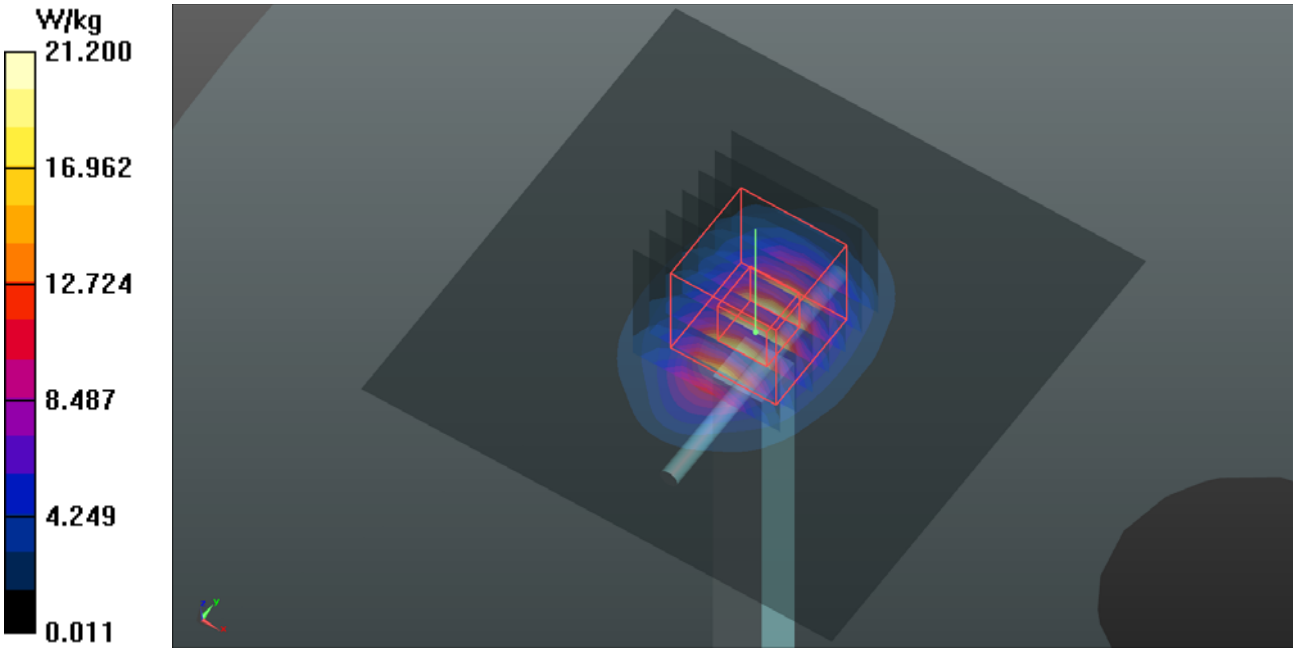
## DUT: Dipole 2450 MHz; Type: D2450V2; SN: 869

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: B19T27N1_0820 Medium parameters used: f = 2450 MHz; $\sigma$ = 1.996 S/m; $\varepsilon_r$ = 51.523; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.8 ℃ ； Liquid Temperature：23.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.61, 7.61, 7.61); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Pin=250mW/Area Scan (81x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 21.2 W/kg

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.2 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 26.6 W/kg
**SAR(1 g) = 12.6 W/kg; SAR(10 g) = 5.76 W/kg**
Maximum value of SAR (measured) = 21.4 W/kg



# System Check_B750_180820

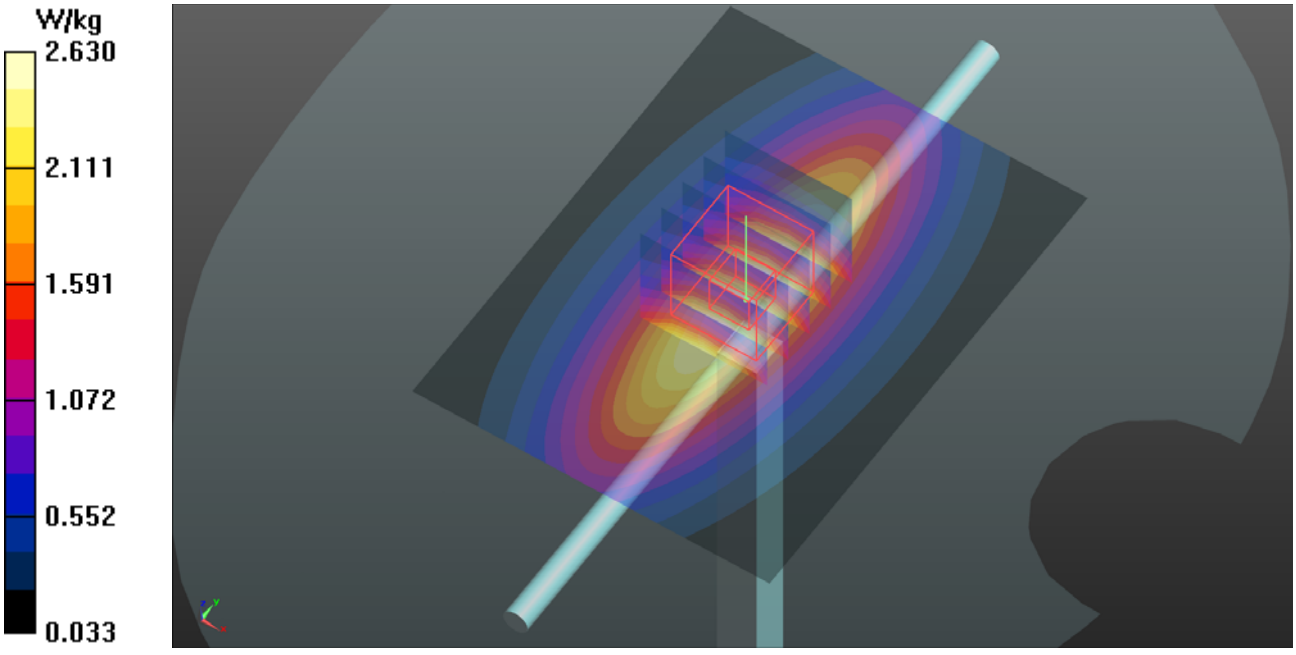
## DUT: Dipole 750 MHz; Type: D750V3; SN: 1132

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: B06T09N1_0820 Medium parameters used: f = 750 MHz; $\sigma$ = 0.961 S/m; $\varepsilon_r$ = 54.281; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.91, 9.91, 9.91); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Pin=250mW/Area Scan (61x81x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.63 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 53.68 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 3.16 W/kg
**SAR(1 g) = 2.07 W/kg; SAR(10 g) = 1.34 W/kg**
Maximum value of SAR (measured) = 2.65 W/kg



Test Laboratory: Bureau Veritas ADT SAR/HAC Testing Lab Date: 2018/08/20

# System Check_B835_180820

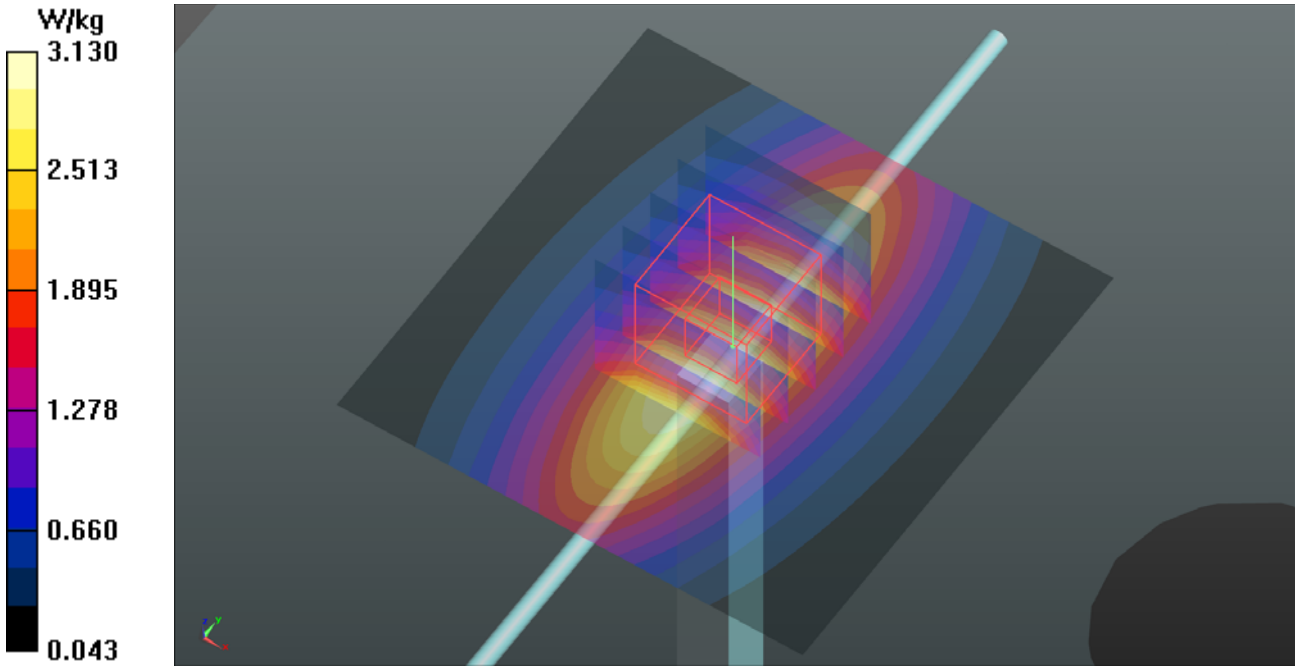
## DUT: Dipole 835 MHz; Type: D835V2; SN: 4d120

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: B07T10N2_0820 Medium parameters used: f = 835 MHz; $\sigma$ = 1.016 S/m; $\varepsilon_r$ = 55.341; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.74, 9.74, 9.74); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.13 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.96 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 3.50 W/kg
**SAR(1 g) = 2.35 W/kg; SAR(10 g) = 1.55 W/kg**
Maximum value of SAR (measured) = 3.12 W/kg



# System Check_B1750_180820

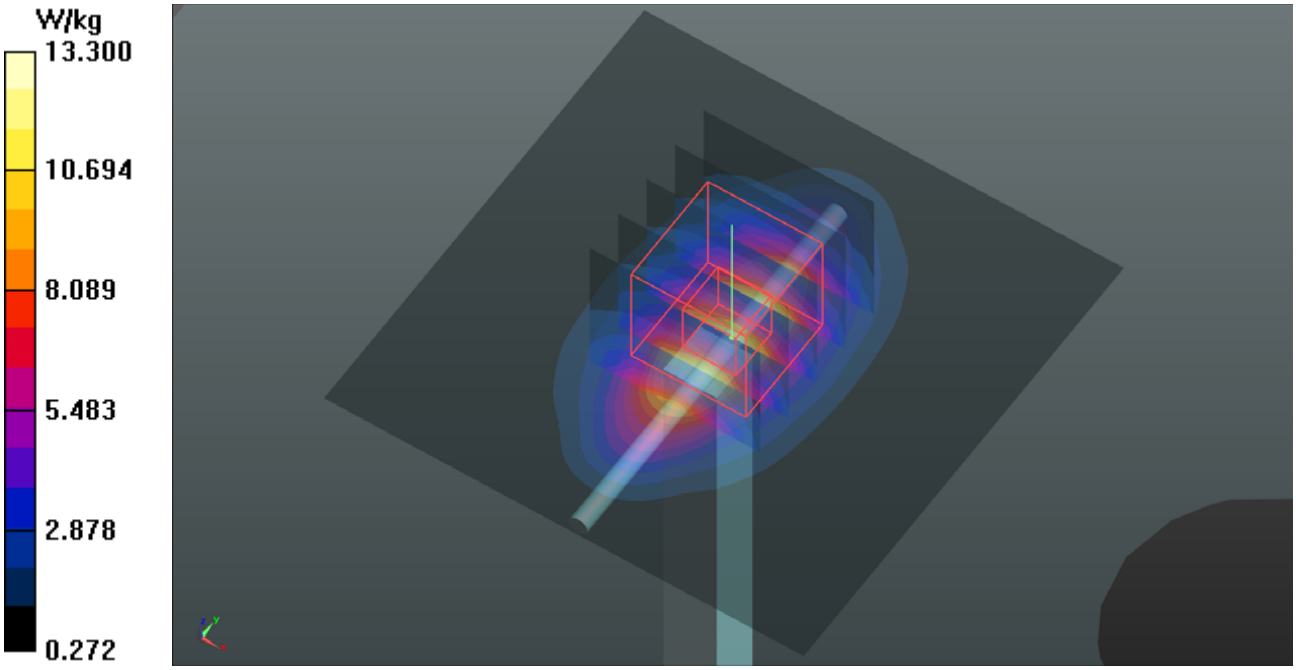
## DUT: Dipole 1750 MHz; Type: D1750V2; SN: 1023

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0820 Medium parameters used: f = 1750 MHz; $\sigma$ = 1.441 S/m; $\varepsilon_r$ = 52.489; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(8.2, 8.2, 8.2); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 13.4 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 99.88 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 15.6 W/kg
**SAR(1 g) = 8.76 W/kg; SAR(10 g) = 4.67 W/kg**
Maximum value of SAR (measured) = 13.3 W/kg



# System Check_B1900_180820

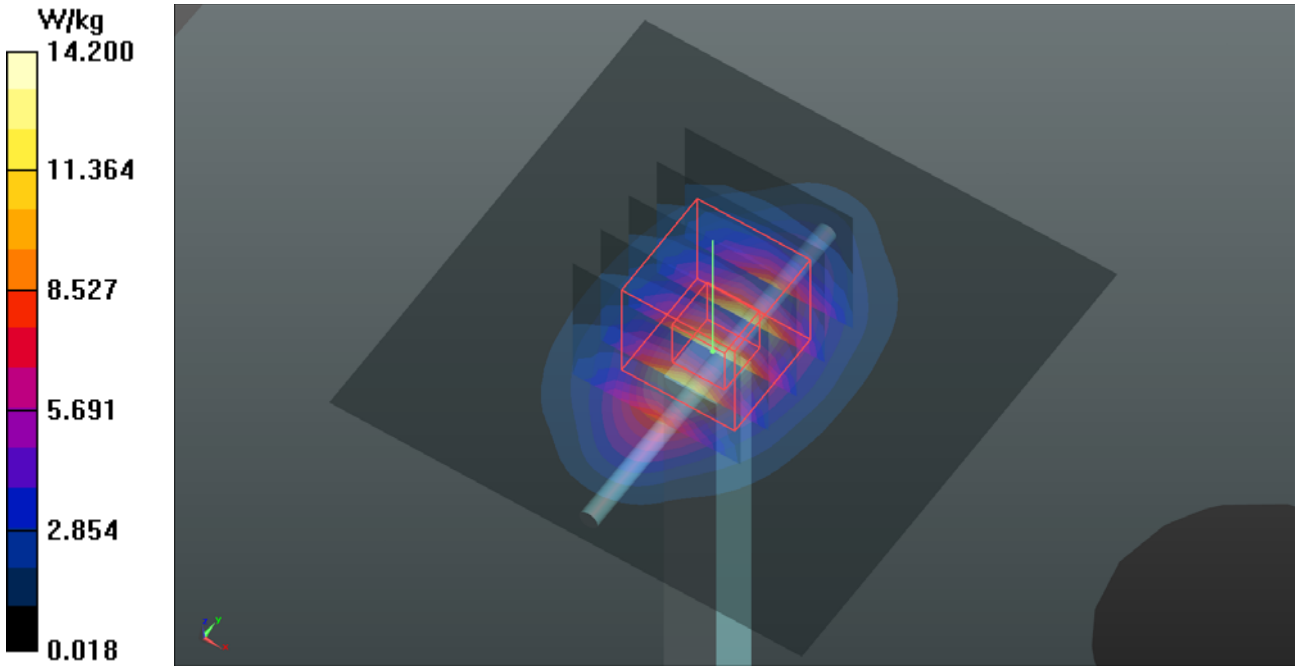
## DUT: Dipole 1900 MHz; Type: D1900V2; SN: 5d036

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0820 Medium parameters used: f = 1900 MHz; $\sigma$ = 1.584 S/m; $\varepsilon_r$ = 52.168; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.89, 7.89, 7.89); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.2 W/kg

**Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 95.69 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 17.5 W/kg
**SAR(1 g) = 9.87 W/kg; SAR(10 g) = 5.21 W/kg**
Maximum value of SAR (measured) = 14.0 W/kg



# System Check_B2450_180820

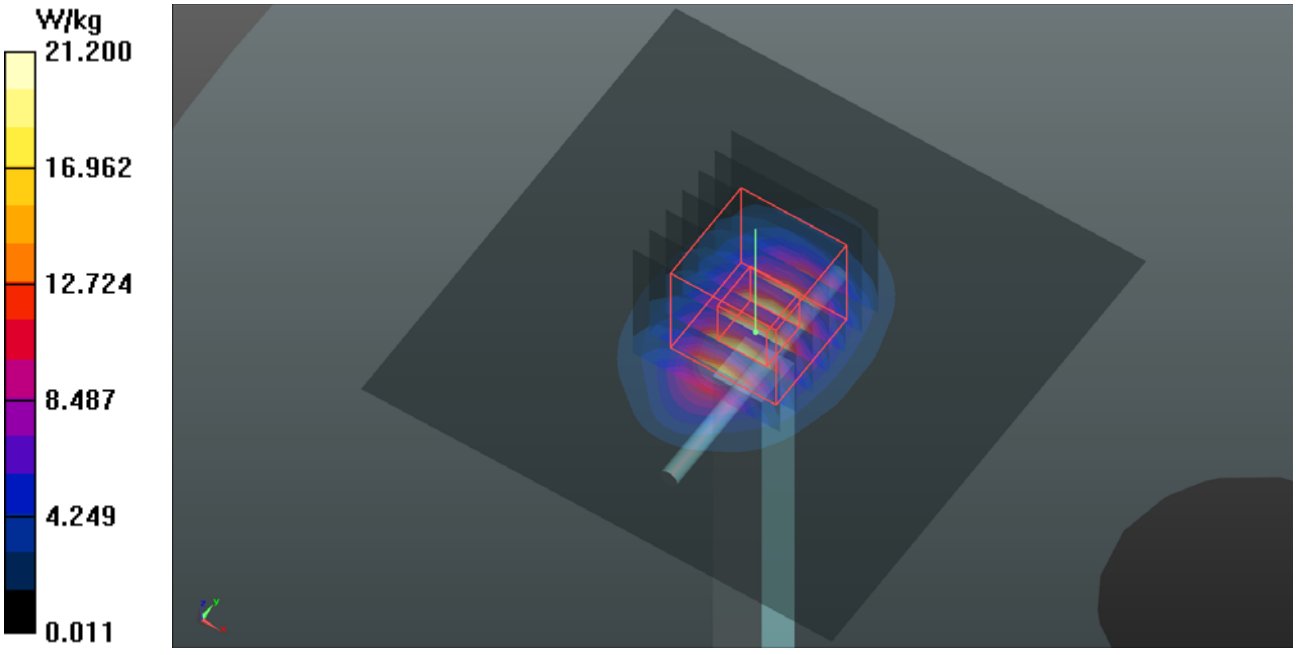
## DUT: Dipole 2450 MHz; Type: D2450V2; SN: 869

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: B19T27N1_0820 Medium parameters used: f = 2450 MHz; $\sigma$ = 1.996 S/m; $\varepsilon_r$ = 51.523; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.8 ℃ ； Liquid Temperature：23.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.61, 7.61, 7.61); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Pin=250mW/Area Scan (81x81x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 21.2 W/kg

**Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.2 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 26.6 W/kg
**SAR(1 g) = 12.6 W/kg; SAR(10 g) = 5.76 W/kg**
Maximum value of SAR (measured) = 21.4 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 WCDMA II_RMC12.2K_Rear Face_15mm_Ch9262

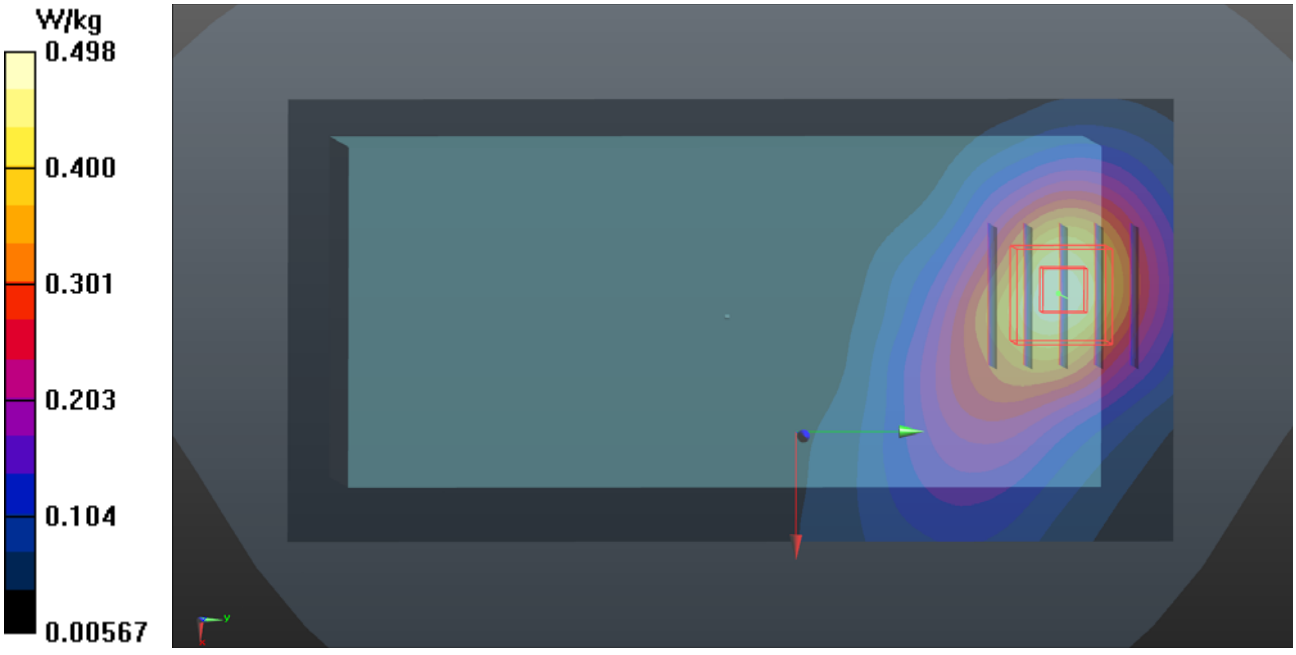
**DUT: 180802C04**

Communication System: WCDMA; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0820 Medium parameters used: f = 1852.4 MHz; $\sigma$ = 1.538 S/m; $\varepsilon_r$ = 52.275; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.89, 7.89, 7.89); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.498 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.56 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.543 W/kg
**SAR(1 g) = 0.335 W/kg; SAR(10 g) = 0.205 W/kg**
Maximum value of SAR (measured) = 0.468 W/kg



# P02 WCDMA V_RMC12.2K_Rear Face_15mm_Ch4132

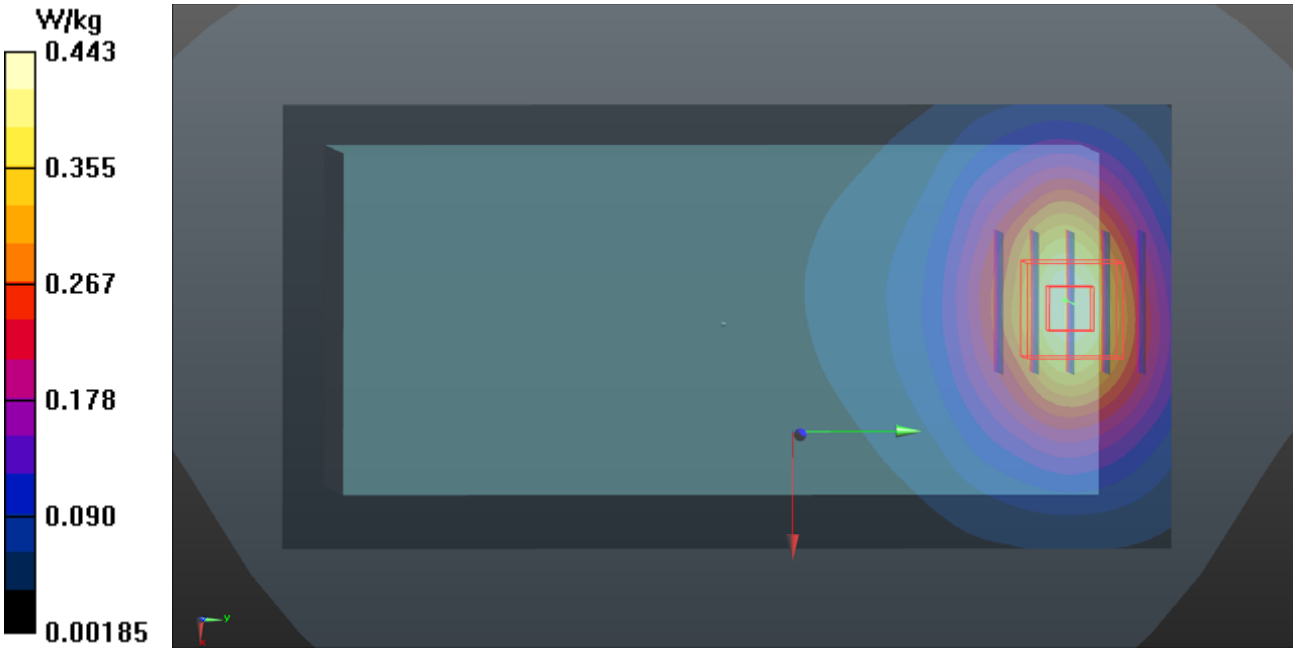
**DUT: 180802C04**

Communication System: WCDMA; Frequency: 826.4 MHz;Duty Cycle: 1:1
Medium: B07T10N2_0820 Medium parameters used: f = 826.4 MHz; $\sigma$ = 1.008 S/m; $\varepsilon_r$ = 55.402; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.74, 9.74, 9.74); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.443 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.95 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.485 W/kg
**SAR(1 g) = 0.326 W/kg; SAR(10 g) = 0.217 W/kg**
Maximum value of SAR (measured) = 0.430 W/kg



# P03 LTE 2_QPSK20M_Rear Face_15mm_Ch18700_1RB_OS0

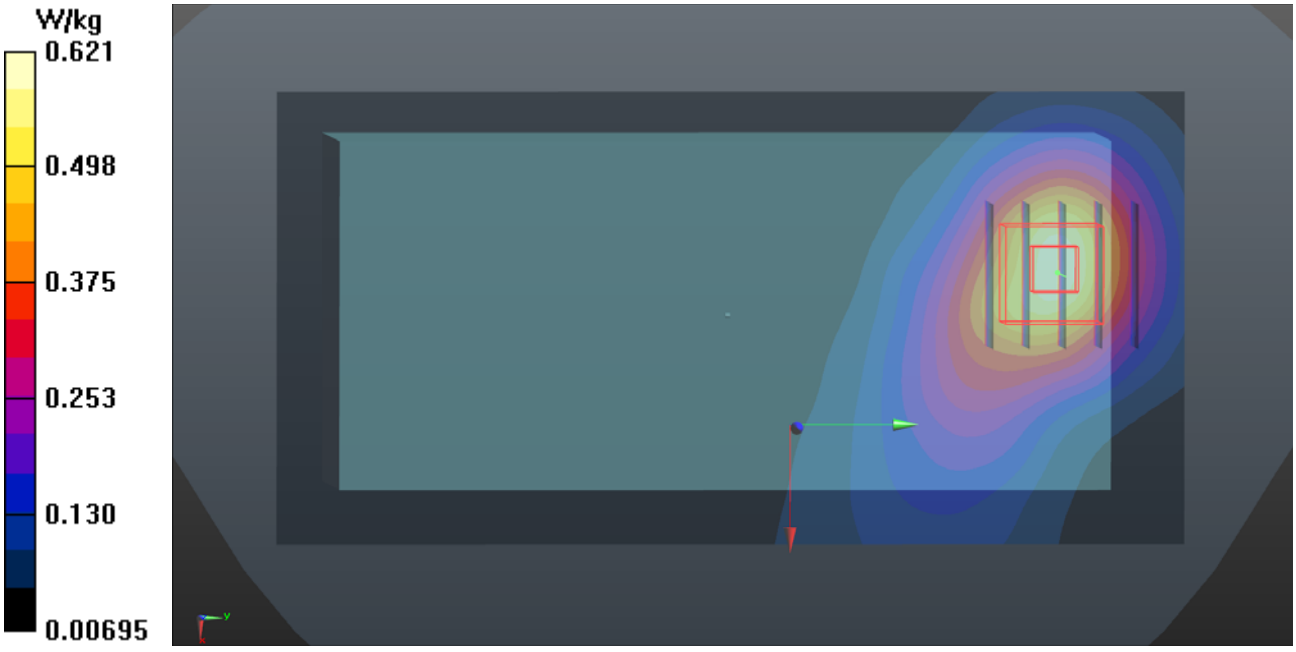
**DUT: 180802C04**

Communication System: LTE; Frequency: 1860 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0820 Medium parameters used: f = 1860 MHz; $\sigma$ = 1.545 S/m; $\varepsilon_r$ = 52.262; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.89, 7.89, 7.89); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.621 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.73 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.690 W/kg
**SAR(1 g) = 0.423 W/kg; SAR(10 g) = 0.255 W/kg**
Maximum value of SAR (measured) = 0.596 W/kg



# P04 LTE 4_QPSK20M_Rear Face_15mm_Ch20050_1RB_OS0

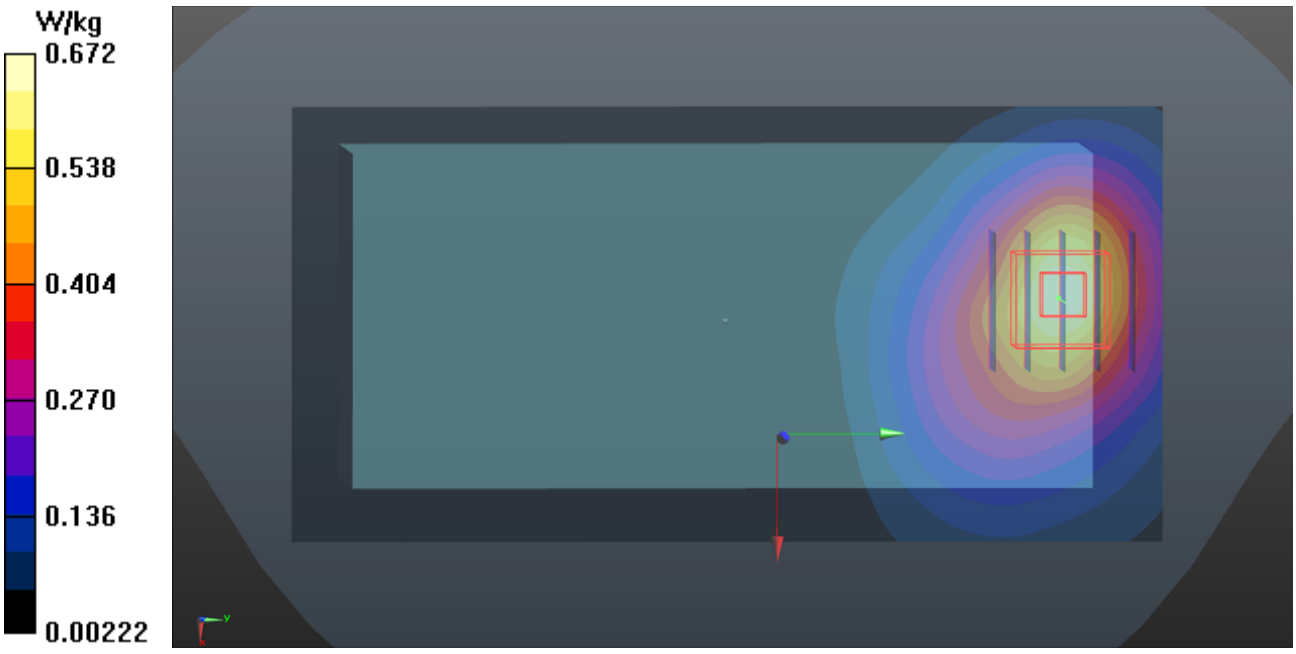
**DUT: 180802C04**

Communication System: LTE; Frequency: 1720 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0820 Medium parameters used: f = 1720 MHz; $\sigma$ = 1.414 S/m; $\varepsilon_r$ = 52.529; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(8.2, 8.2, 8.2); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.672 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.33 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.762 W/kg
**SAR(1 g) = 0.483 W/kg; SAR(10 g) = 0.301 W/kg**
Maximum value of SAR (measured) = 0.665 W/kg



# P05 LTE 5_QPSK10M_Rear Face_15mm_Ch20450_1RB_OS0

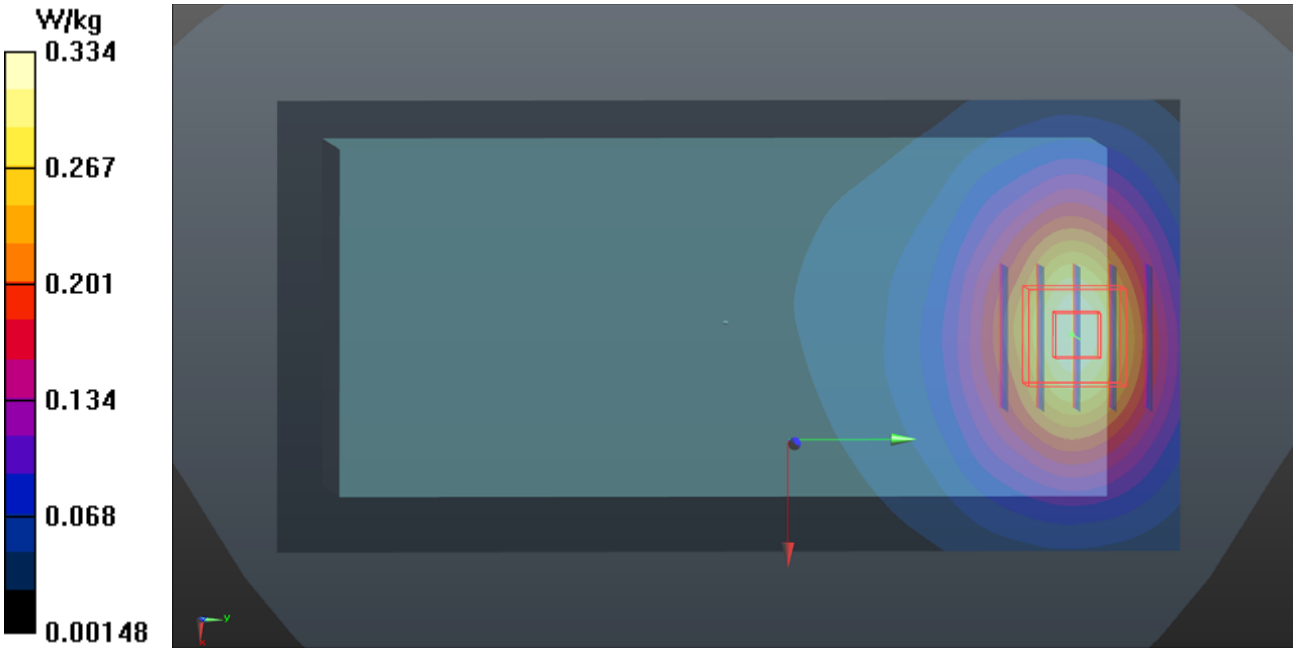
**DUT: 180802C04**

Communication System: LTE; Frequency: 829 MHz;Duty Cycle: 1:1
Medium: B07T10N2_0820 Medium parameters used: f = 829 MHz; $\sigma$ = 1.01 S/m; $\varepsilon_r$ = 55.384; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.74, 9.74, 9.74); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.334 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.09 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.371 W/kg
**SAR(1 g) = 0.250 W/kg; SAR(10 g) = 0.168 W/kg**
Maximum value of SAR (measured) = 0.330 W/kg



# P06 LTE 12_QPSK10M_Rear Face_15mm_Ch23130_1RB_OS0

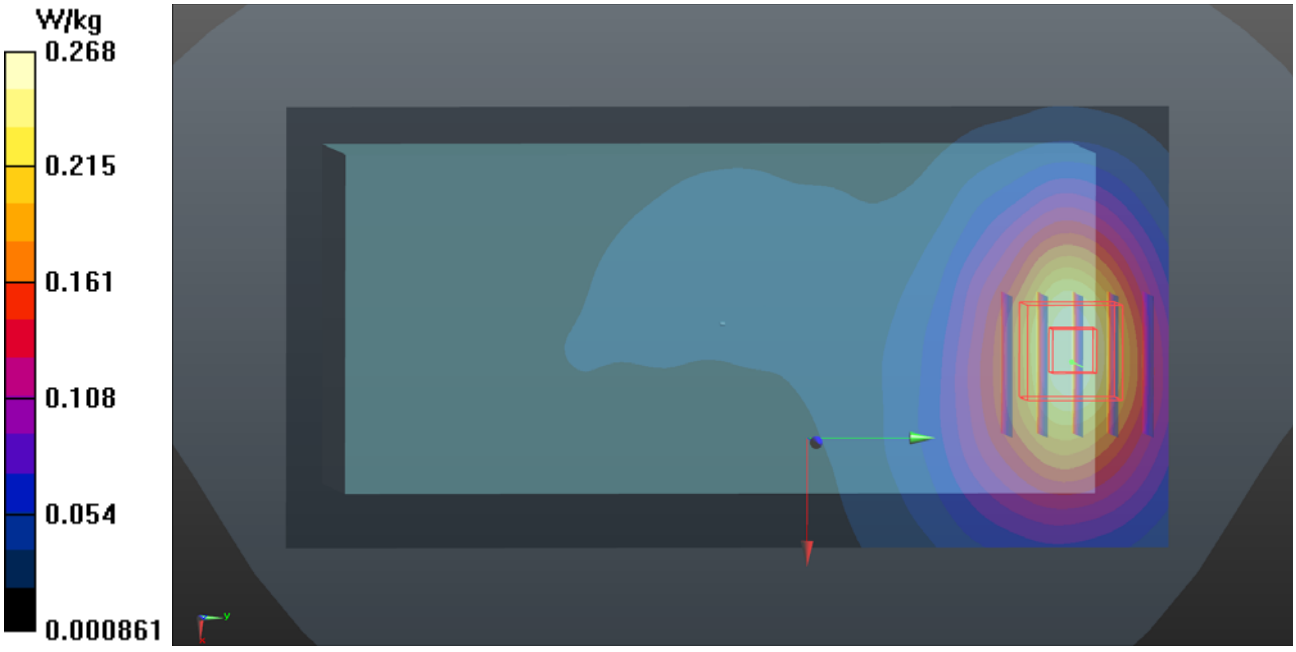
**DUT: 180802C04**

Communication System: LTE; Frequency: 711 MHz;Duty Cycle: 1:1
Medium: B06T09N1_0820 Medium parameters used: f = 711 MHz; $\sigma$ = 0.925 S/m; $\varepsilon_r$ = 54.685; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.91, 9.91, 9.91); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.268 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.62 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.327 W/kg
**SAR(1 g) = 0.225 W/kg; SAR(10 g) = 0.153 W/kg**
Maximum value of SAR (measured) = 0.290 W/kg



# P07 LTE 13_QPSK10M_Rear Face_15mm_Ch23230_1RB_OS0

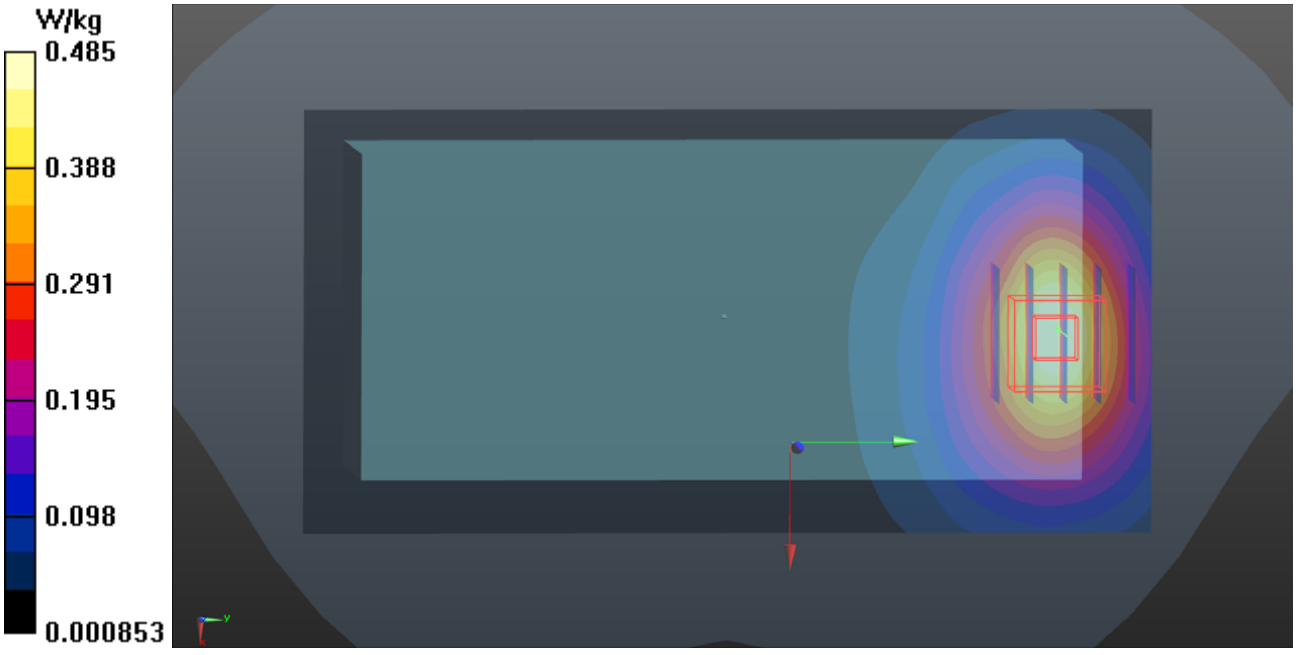
**DUT: 180802C04**

Communication System: LTE; Frequency: 782 MHz;Duty Cycle: 1:1
Medium: B06T09N1_0820 Medium parameters used: f = 782 MHz; $\sigma$ = 0.991 S/m; $\varepsilon_r$ = 53.947; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.91, 9.91, 9.91); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.485 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.45 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.543 W/kg
**SAR(1 g) = 0.369 W/kg; SAR(10 g) = 0.249 W/kg**
Maximum value of SAR (measured) = 0.481 W/kg



# P08 WLAN2.4_802.11b_Rear Face_15mm_Ch11

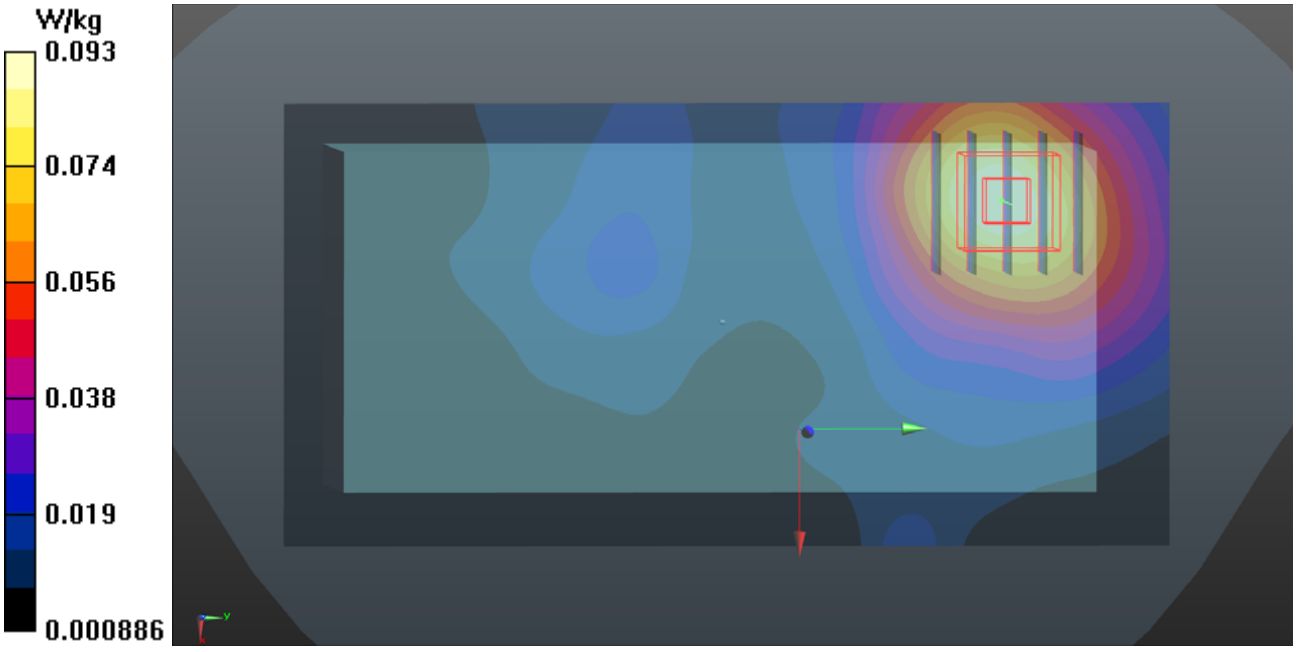
## DUT: 180802C04

Communication System: WLAN_2.4G; Frequency: 2462 MHz;Duty Cycle: 1:1.02
Medium: B19T27N1_0820 Medium parameters used: f = 2462 MHz; $\sigma$ = 2.01 S/m; $\varepsilon_r$ = 51.492; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.8 ℃ ； Liquid Temperature：23.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.61, 7.61, 7.61); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (91x171x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.0925 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.056 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.112 W/kg
**SAR(1 g) = 0.063 W/kg; SAR(10 g) = 0.038 W/kg**
Maximum value of SAR (measured) = 0.0923 W/kg



# P09 BT_BR_EDR_Rear Face_15mm_Ch39

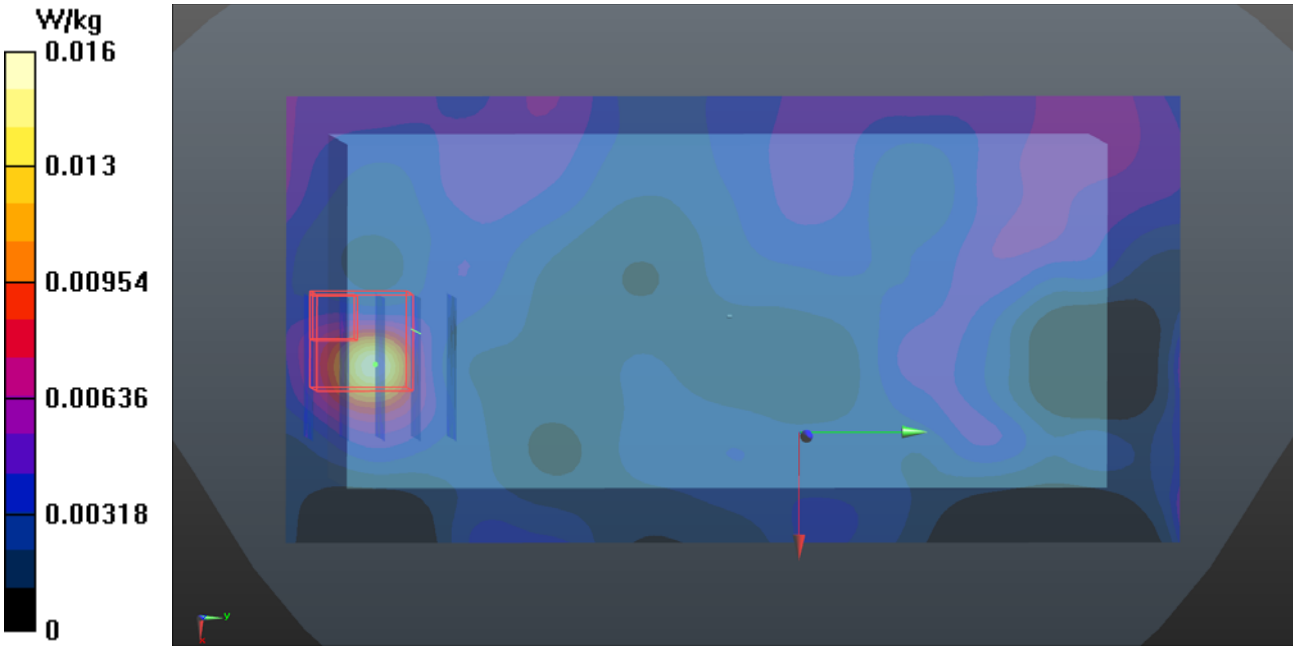
**DUT: 180802C04**

Communication System: BT; Frequency: 2441 MHz;Duty Cycle: 1:1.4
Medium: B19T27N1_0820 Medium parameters used: f = 2441 MHz; $\sigma$ = 1.987 S/m; $\varepsilon_r$ = 51.54; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.8 ℃ ； Liquid Temperature：23.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.61, 7.61, 7.61); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (91x171x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.0159 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.322 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.00513 W/kg
**SAR(1 g) = 0.00407 W/kg; SAR(10 g) = 0.00334 W/kg**
Maximum value of SAR (measured) = 0.00498 W/kg



# P10 WCDMA II_RMC12.2K_Left Side_0mm_Ch9538

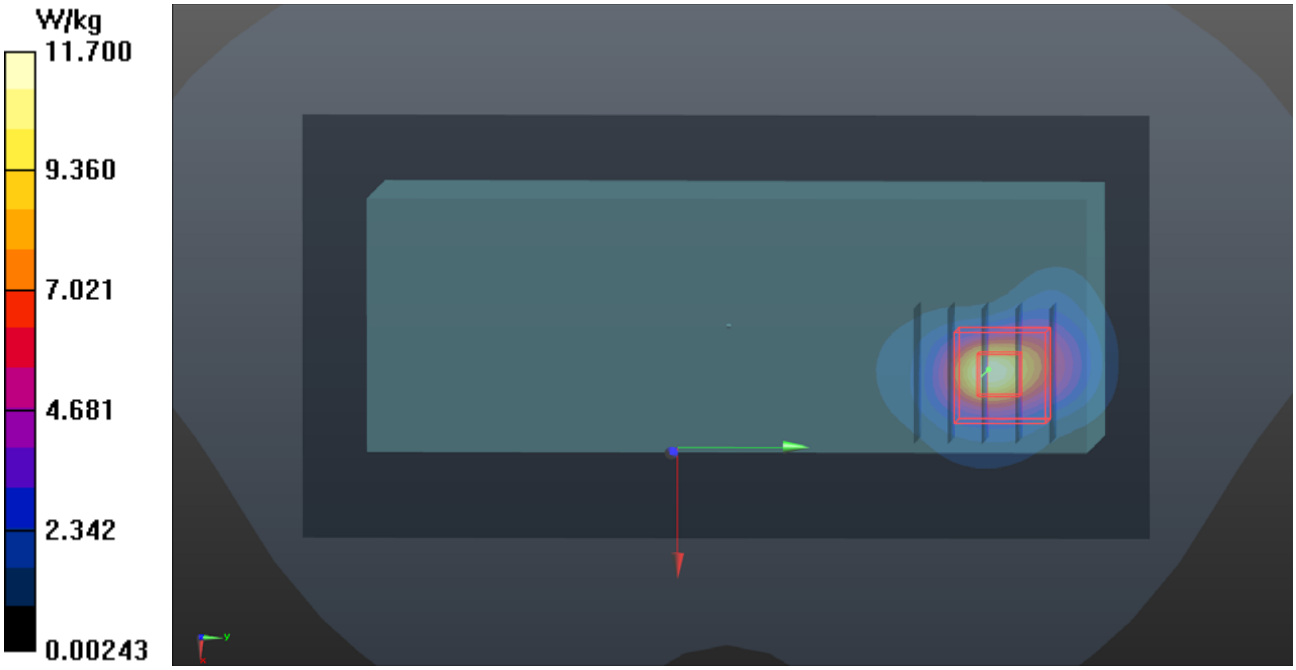
**DUT: 180802C04**

Communication System: WCDMA; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0820 Medium parameters used: f = 1908 MHz; $\sigma$ = 1.593 S/m; $\varepsilon_r$ = 52.141; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.89, 7.89, 7.89); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 11.7 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 86.89 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 15.2 W/kg
**SAR(1 g) = 7.21 W/kg; SAR(10 g) = 3.34 W/kg**
Maximum value of SAR (measured) = 11.6 W/kg



# P11 WCDMA V_RMC12.2K_Rear Face_0mm_Ch4132

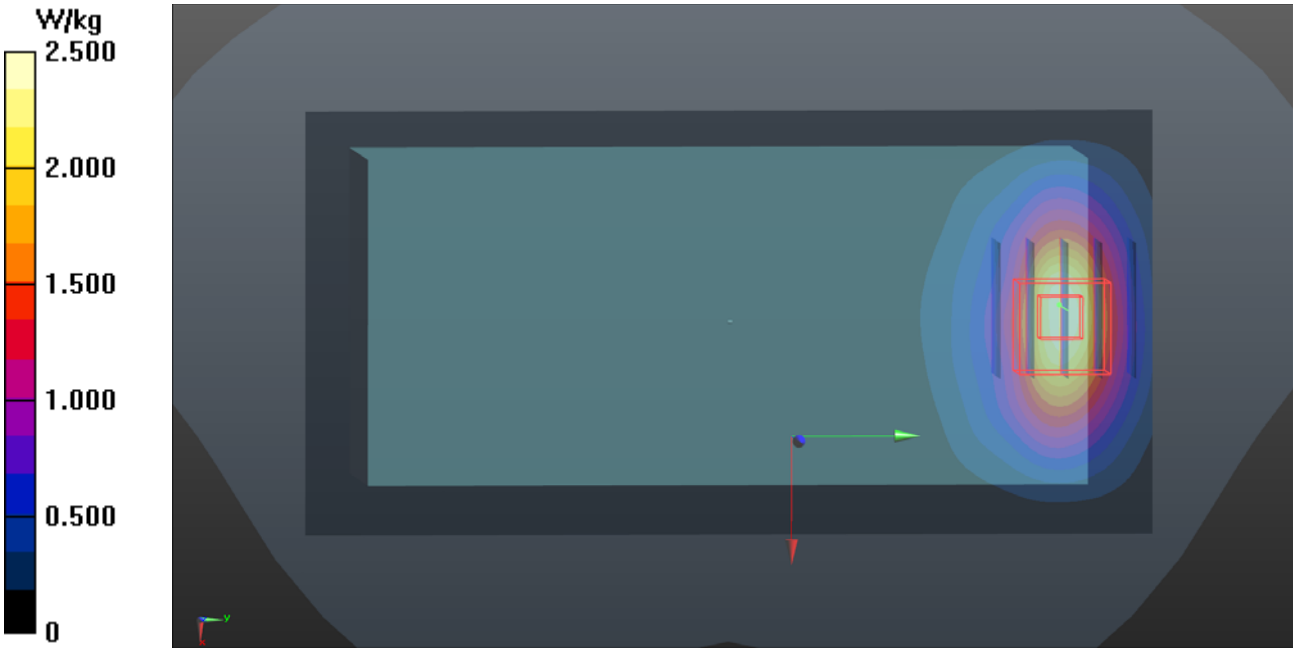
**DUT: 180802C04**

Communication System: WCDMA; Frequency: 826.4 MHz;Duty Cycle: 1:1
Medium: B07T10N2_0820 Medium parameters used: f = 826.4 MHz; $\sigma$ = 1.008 S/m; $\varepsilon_r$ = 55.402; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.74, 9.74, 9.74); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.50 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 49.54 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 3.07 W/kg
**SAR(1 g) = 1.63 W/kg; SAR(10 g) = 0.918 W/kg**
Maximum value of SAR (measured) = 2.54 W/kg



# P12 LTE 2_QPSK20M_Left Side_0mm_Ch19100_1RB_OS0

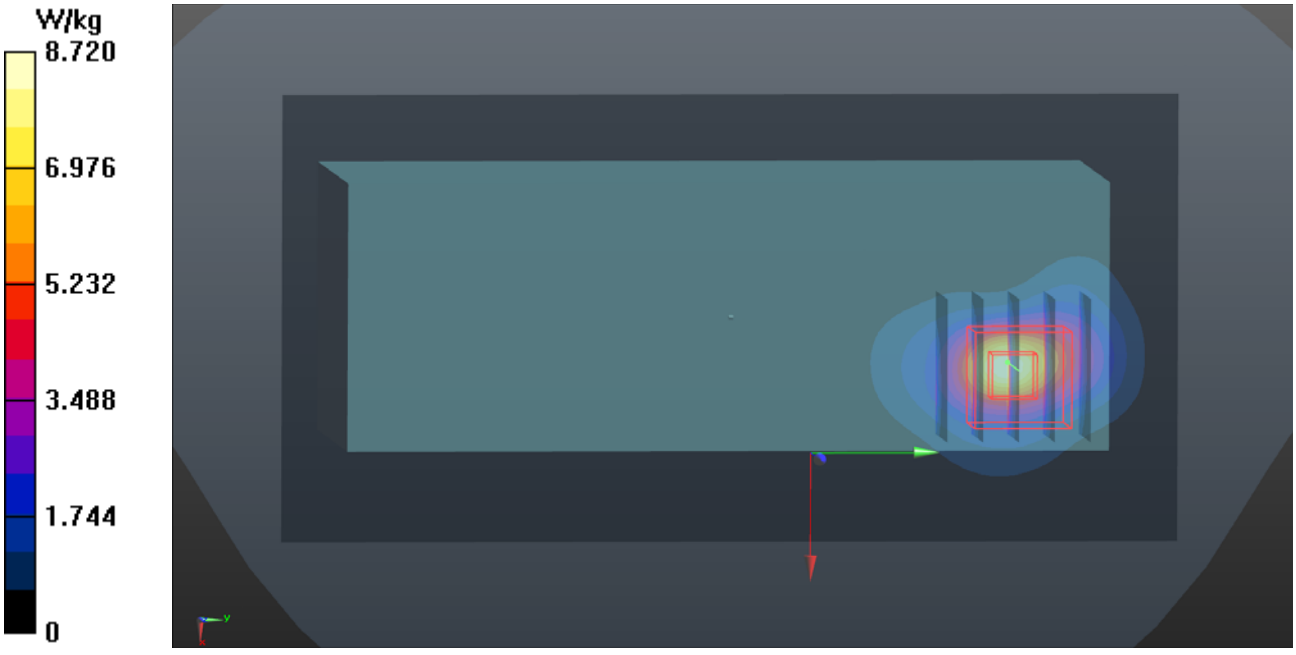
**DUT: 180802C04**

Communication System: LTE; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0820 Medium parameters used: f = 1900 MHz; $\sigma$ = 1.584 S/m; $\varepsilon_r$ = 52.168; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.89, 7.89, 7.89); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 8.72 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 75.98 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 11.5 W/kg
**SAR(1 g) = 5.65 W/kg; SAR(10 g) = 2.65 W/kg**
Maximum value of SAR (measured) = 8.69 W/kg



# P13 LTE 4_QPSK20M_Left Side_0mm_Ch20050_1RB_OS0

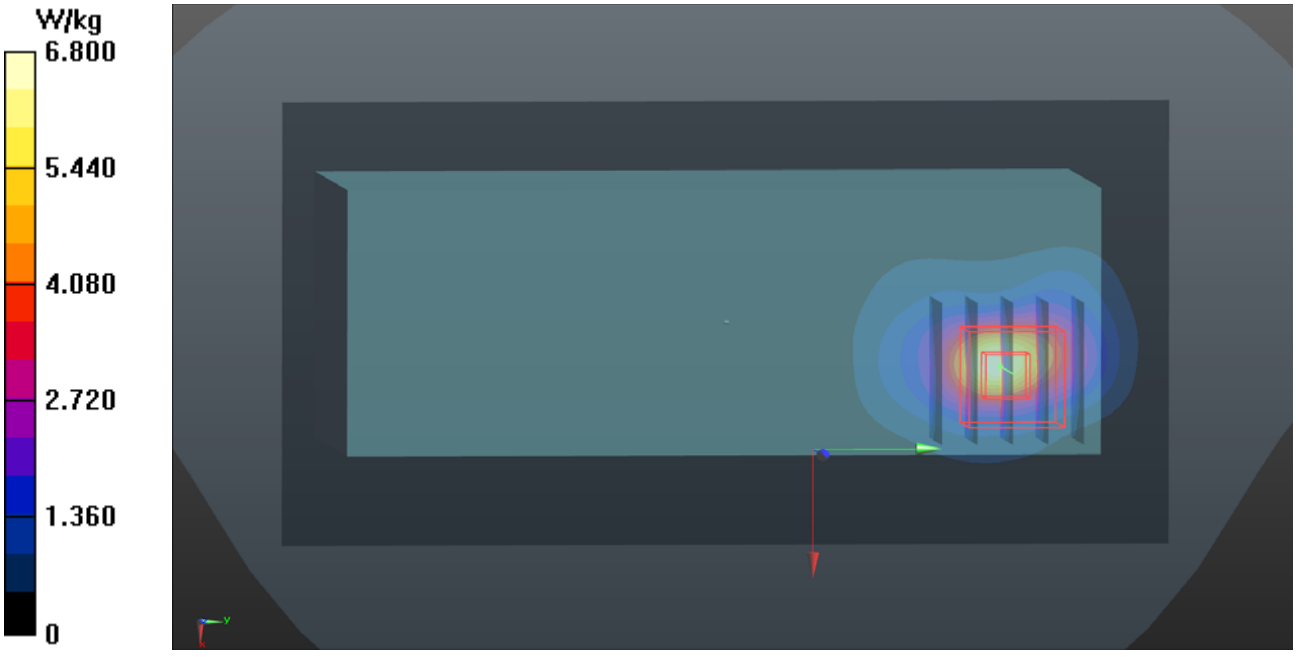
**DUT: 180802C04**

Communication System: LTE; Frequency: 1720 MHz;Duty Cycle: 1:1
Medium: B16T20N1_0820 Medium parameters used: f = 1720 MHz; $\sigma$ = 1.414 S/m; $\varepsilon_r$ = 52.529; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(8.2, 8.2, 8.2); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 6.80 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 71.49 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 8.36 W/kg
**SAR(1 g) = 4.32 W/kg; SAR(10 g) = 2.05 W/kg**
Maximum value of SAR (measured) = 6.79 W/kg



# P14 LTE 5_QPSK10M_Rear Face_0mm_Ch20450_1RB_OS0

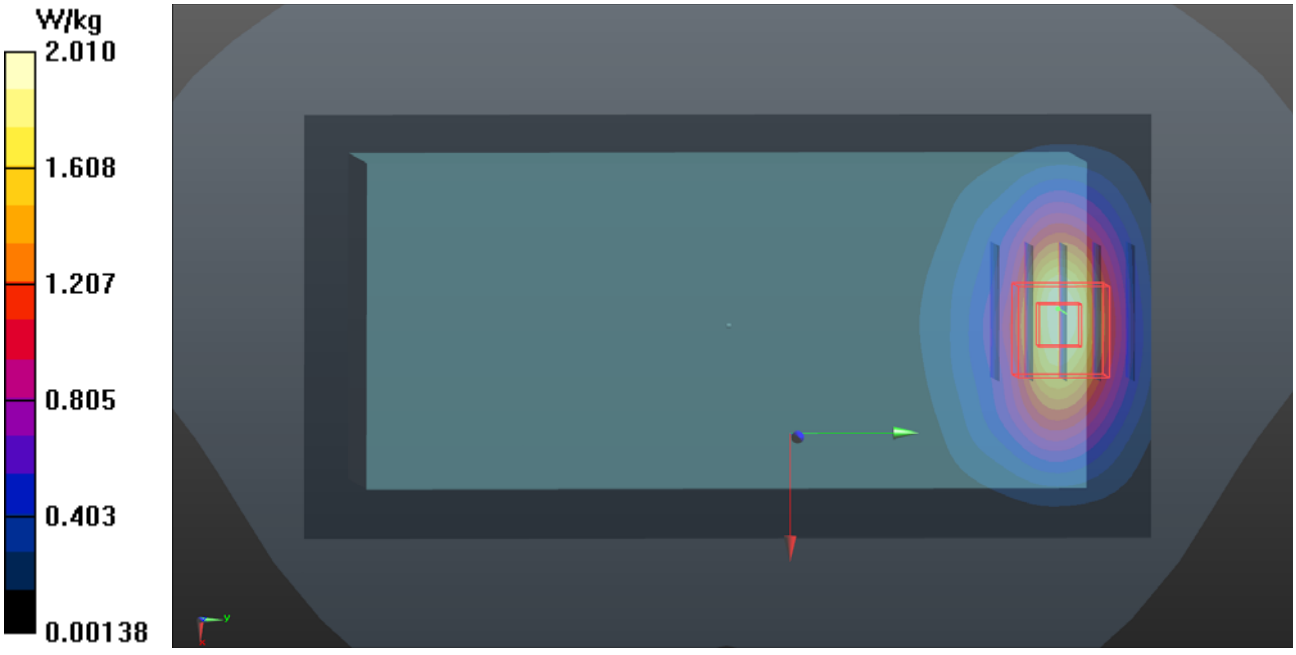
**DUT: 180802C04**

Communication System: LTE; Frequency: 829 MHz;Duty Cycle: 1:1
Medium: B07T10N2_0820 Medium parameters used: f = 829 MHz; $\sigma$ = 1.01 S/m; $\varepsilon_r$ = 55.384; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.74, 9.74, 9.74); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.01 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 44.06 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 2.41 W/kg
**SAR(1 g) = 1.29 W/kg; SAR(10 g) = 0.733 W/kg**
Maximum value of SAR (measured) = 2.01 W/kg



# P15 LTE 12_QPSK10M_Rear Face_0mm_Ch23130_1RB_OS0

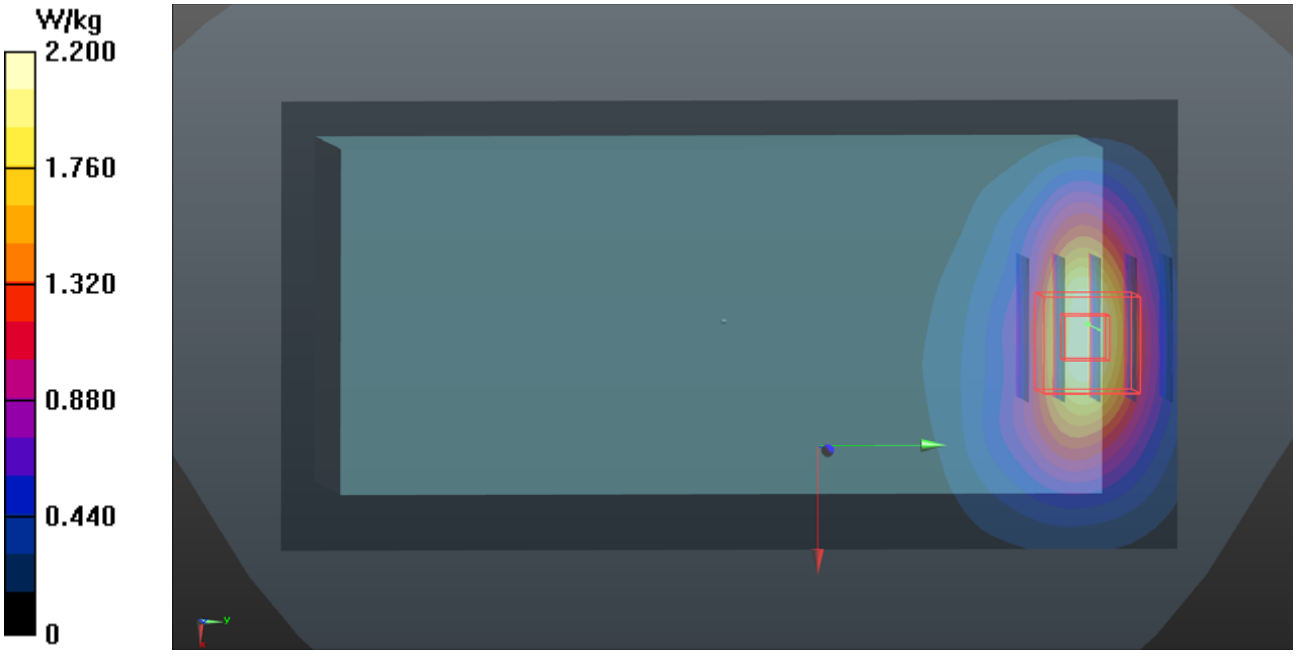
**DUT: 180802C04**

Communication System: LTE; Frequency: 711 MHz;Duty Cycle: 1:1
Medium: B06T09N1_0820 Medium parameters used: f = 711 MHz; $\sigma$ = 0.925 S/m; $\varepsilon_r$ = 54.685; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.91, 9.91, 9.91); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.20 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.31 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 2.79 W/kg
**SAR(1 g) = 1.53 W/kg; SAR(10 g) = 0.883 W/kg**
Maximum value of SAR (measured) = 2.31 W/kg



# P16 LTE 13_QPSK10M_Rear Face_0mm_Ch23230_1RB_OS0

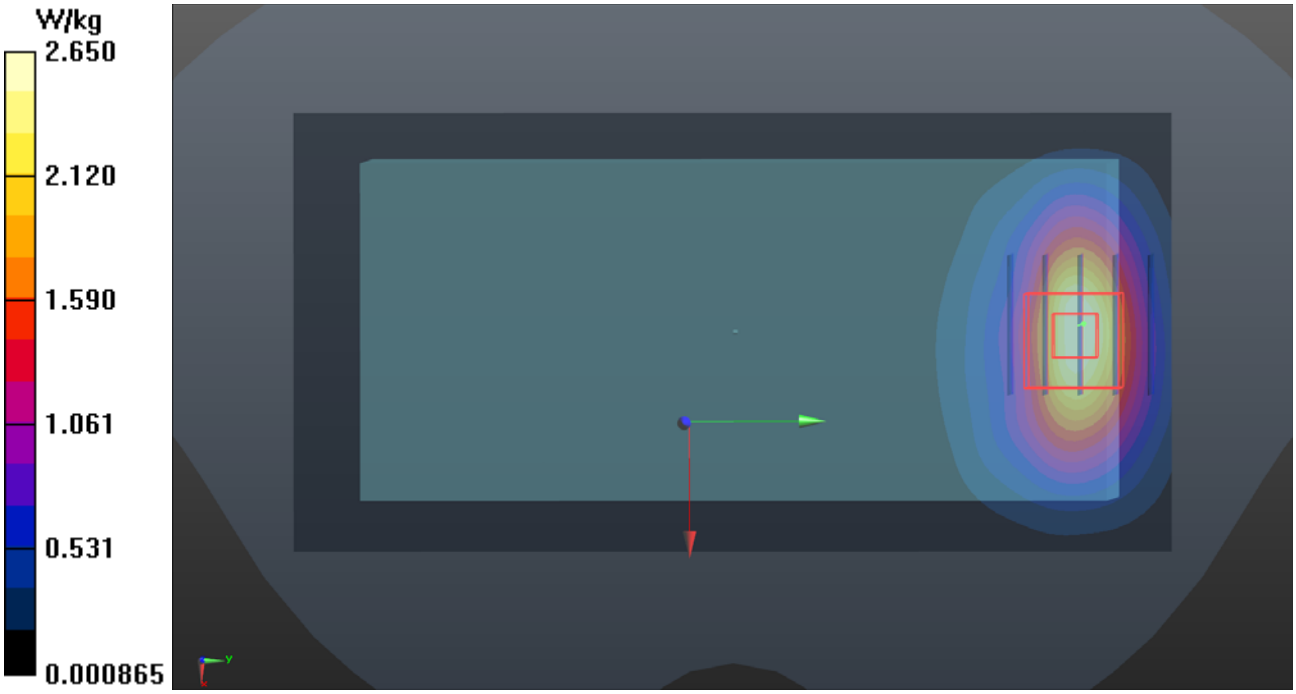
**DUT: 180802C04**

Communication System: LTE; Frequency: 782 MHz;Duty Cycle: 1:1
Medium: B06T09N1_0820 Medium parameters used: f = 782 MHz; $\sigma$ = 0.991 S/m; $\varepsilon_r$ = 53.947; $\rho$ = 1000 kg/$m^3$
Ambient Temperature：23.7 ℃ ； Liquid Temperature：23.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(9.91, 9.91, 9.91); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.65 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 51.12 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 3.23 W/kg
**SAR(1 g) = 1.76 W/kg; SAR(10 g) = 1.01 W/kg**
Maximum value of SAR (measured) = 2.66 W/kg



# P17 WLAN2.4G_802.11b_Right Side_0mm_Ch11

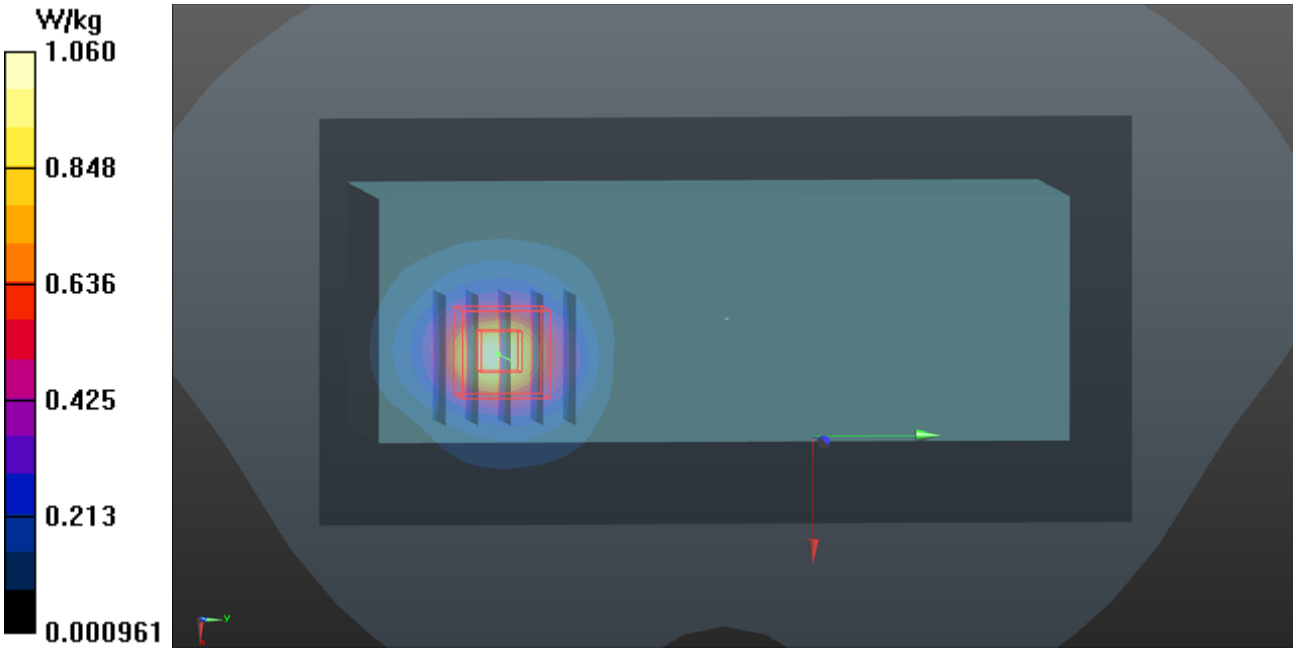
**DUT: 180802C04**

Communication System: WLAN_2.4G; Frequency: 2462 MHz;Duty Cycle: 1:1.02
Medium: B19T27N1_0820 Medium parameters used: f = 2462 MHz; $\sigma$ = 2.01 S/m; $\varepsilon_r$ = 51.492; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.8 ℃ ； Liquid Temperature：23.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.61, 7.61, 7.61); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (91x171x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.06 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.95 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.30 W/kg
**SAR(1 g) = 0.644 W/kg; SAR(10 g) = 0.314 W/kg**
Maximum value of SAR (measured) = 1.06 W/kg



# P18 BT_BR_EDR_Right Side_0mm_Ch39

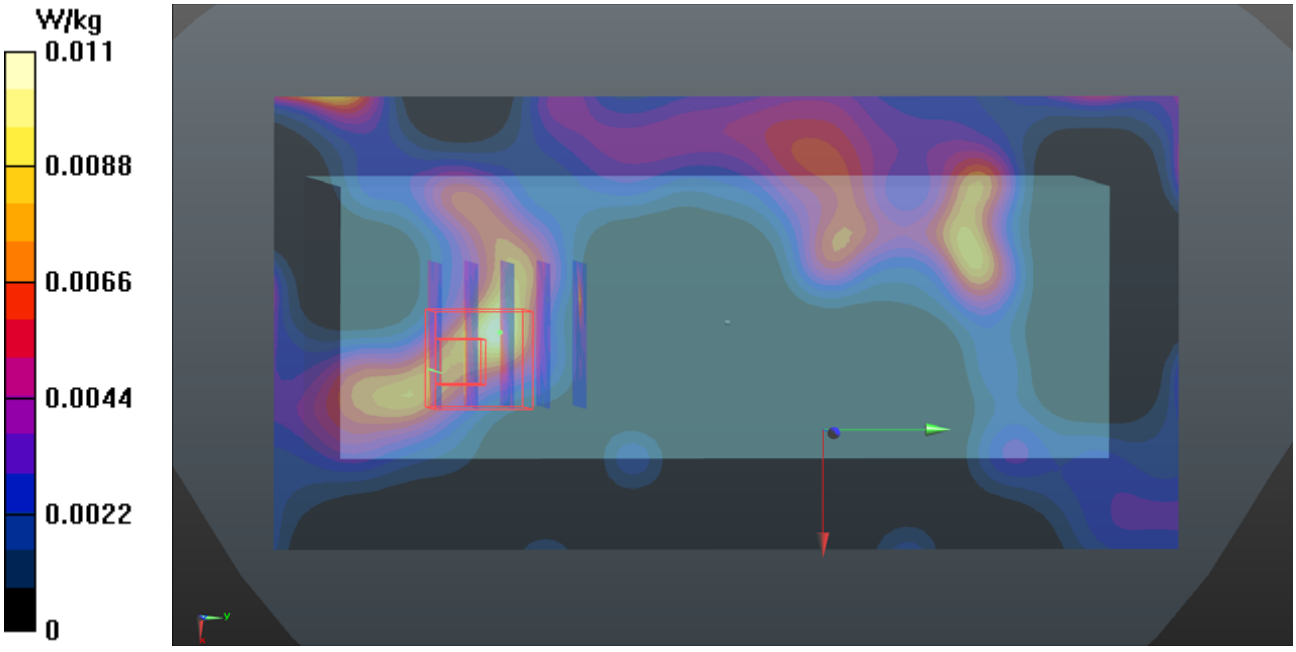
## DUT: 180802C04

Communication System: BT; Frequency: 2441 MHz;Duty Cycle: 1:1.4
Medium: B19T27N1_0820 Medium parameters used: f = 2441 MHz; $\sigma$ = 1.987 S/m; $\varepsilon_r$ = 51.54; $\rho$ = 1000 kg/m$^3$
Ambient Temperature：23.8 ℃ ； Liquid Temperature：23.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3650; ConvF(7.61, 7.61, 7.61); Calibrated: 2018/07/27
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1232; Calibrated: 2018/05/22
- Phantom: Twin SAM Phantom_1496; Type: QD000P40CA;
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**- Area Scan (71x141x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.0110 W/kg

**- Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.457 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.0110 W/kg
**SAR(1 g) = 0.00674 W/kg; SAR(10 g) = 0.00454 W/kg**
Maximum value of SAR (measured) = 0.00934 W/kg



# Appendix C. Calibration Certificate for Probe and Dipole

The SPEAG calibration certificates are shown as follows.

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

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

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**Accreditation No.: SCS 0108**

**Client** **Auden**

**Certificate No: D750V3-1132_Dec17**

# CALIBRATION CERTIFICATE

Object: D750V3 - SN:1132

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

Calibration date: December 18, 2017

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 NRP | SN: 104778 | 04-Apr-17 (No. 217-02521/02522) | Apr-18 |
| Power sensor NRP-Z91 | SN: 103244 | 04-Apr-17 (No. 217-02521) | Apr-18 |
| Power sensor NRP-Z91 | SN: 103245 | 04-Apr-17 (No. 217-02522) | Apr-18 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 07-Apr-17 (No. 217-02528) | Apr-18 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 07-Apr-17 (No. 217-02529) | Apr-18 |
| Reference Probe EX3DV4 | SN: 7349 | 31-May-17 (No. EX3-7349_May17) | May-18 |
| DAE4 | SN: 601 | 26-Oct-17 (No. DAE4-601_Oct17) | Oct-18 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Oct-16) | In house check: Oct-18 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-17) | In house check: Oct-18 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Michael Weber | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: December 18, 2017

## Glossary:

| | |
|---|---|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A | not applicable or not measured |

## Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

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

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

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

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.10.0 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 15 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 750 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 41.9 | 0.89 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 41.2 ± 6 % | 0.89 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm³ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.11 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **8.41 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.37 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **5.47 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | **Temperature** | **Permittivity** | **Conductivity** |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 55.5 | 0.96 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 54.2 ± 6 % | 0.98 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm³ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.23 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **8.74 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.46 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **5.75 W/kg ± 16.5 % (k=2)** |

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

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 55.0 Ω - 0.4 jΩ |
| Return Loss | - 26.5 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 51.3 Ω - 2.2 jΩ |
| Return Loss | - 32.1 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.035 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 | October 20, 2014 |

## DASY5 Validation Report for Head TSL

Date: 18.12.2017

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1132**

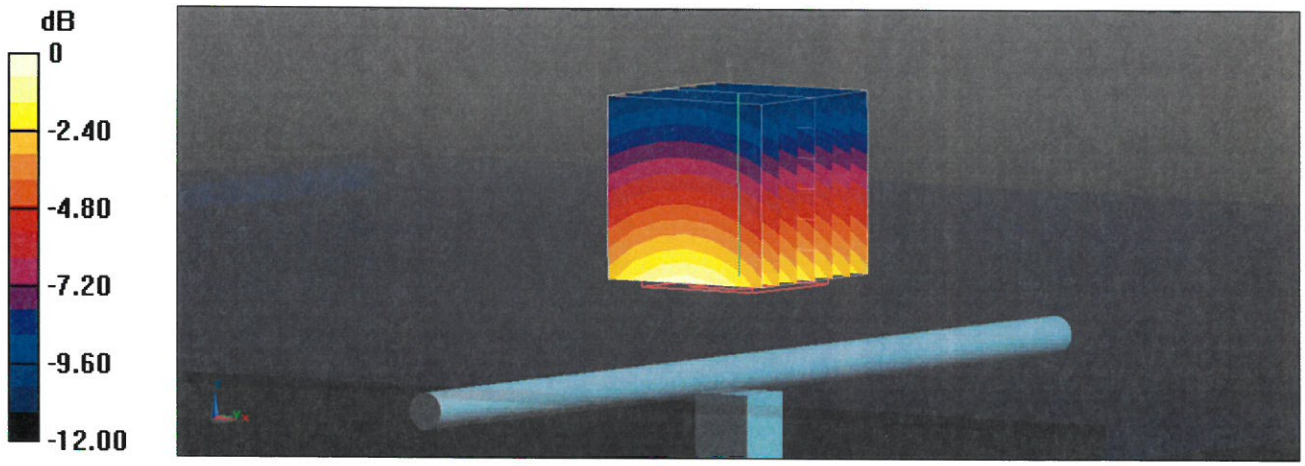
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma$ = 0.89 S/m; $\varepsilon_r$ = 41.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.49, 10.49, 10.49); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

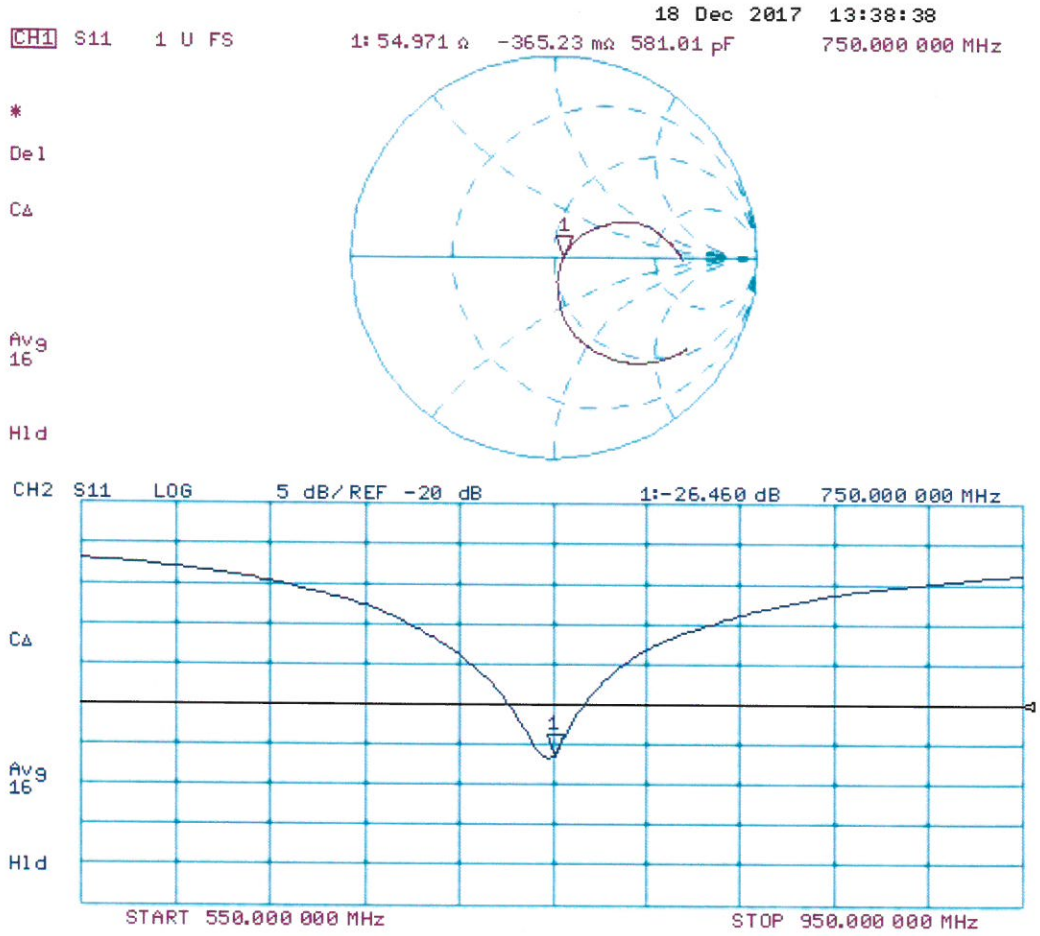
### Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.63 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.31 W/kg
**SAR(1 g) = 2.11 W/kg; SAR(10 g) = 1.37 W/kg**
Maximum value of SAR (measured) = 2.89 W/kg




0 dB = 2.89 W/kg = 4.61 dBW/kg

## Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 18.12.2017

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1132**

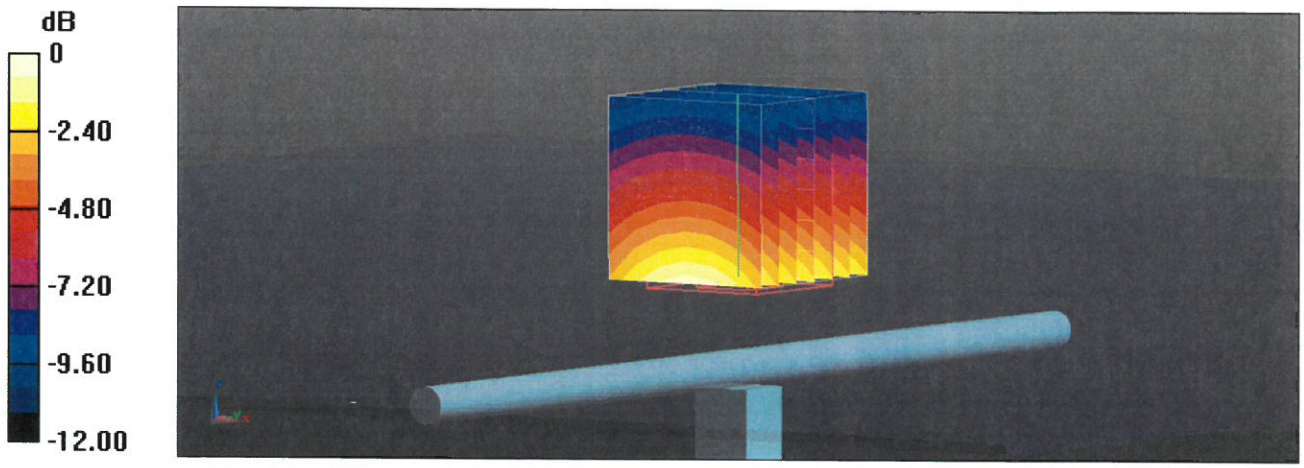
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma$ = 0.98 S/m; $\varepsilon_r$ = 54.2; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.35, 10.35, 10.35); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

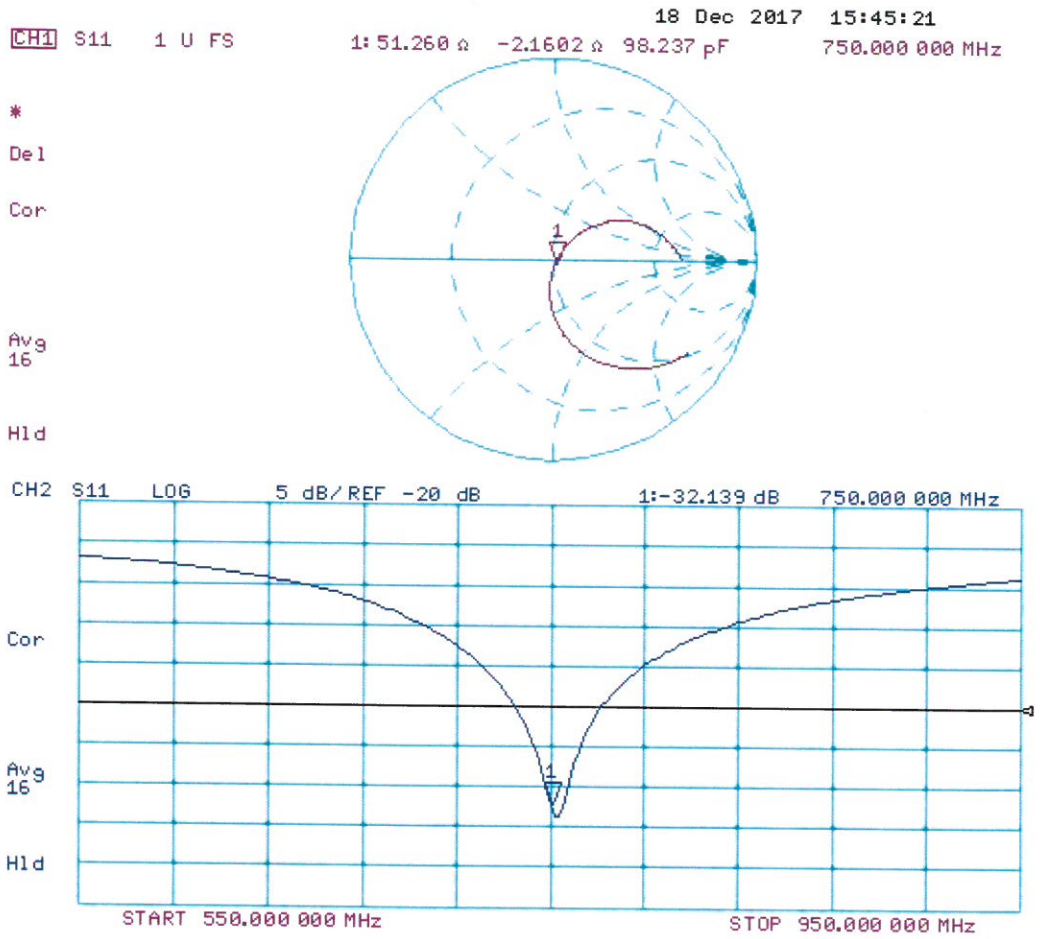
### Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.19 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.40 W/kg
**SAR(1 g) = 2.23 W/kg; SAR(10 g) = 1.46 W/kg**
Maximum value of SAR (measured) = 2.99 W/kg




0 dB = 2.99 W/kg = 4.76 dBW/kg

## Impedance Measurement Plot for Body TSL



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**Accreditation No.: SCS 0108**

**Client** **Auden**

**Certificate No: D835V2-4d120_Jun18**

# CALIBRATION CERTIFICATE

Object: D835V2 - SN:4d120

Calibration procedure(s): QA CAL-05.v10
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: June 20, 2018

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 NRP | SN: 104778 | 04-Apr-18 (No. 217-02672/02673) | Apr-19 |
| Power sensor NRP-Z91 | SN: 103244 | 04-Apr-18 (No. 217-02672) | Apr-19 |
| Power sensor NRP-Z91 | SN: 103245 | 04-Apr-18 (No. 217-02673) | Apr-19 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 04-Apr-18 (No. 217-02682) | Apr-19 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 04-Apr-18 (No. 217-02683) | Apr-19 |
| Reference Probe EX3DV4 | SN: 7349 | 30-Dec-17 (No. EX3-7349_Dec17) | Dec-18 |
| DAE4 | SN: 601 | 26-Oct-17 (No. DAE4-601_Oct17) | Oct-18 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power meter EPM-442A | SN: GB37480704 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (in house check Oct-16) | In house check: Oct-18 |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Oct-16) | In house check: Oct-18 |
| Network Analyzer HP 8753E | SN: US37390585 | 18-Oct-01 (in house check Oct-17) | In house check: Oct-18 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Claudio Leubler | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: June 21, 2018