

## **APPENDIX A. SAR System Verification Data**

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

Date/Time: 07/11/2018

Test Laboratory: Cerpass Lab

Dipole Calibration for Body Tissue Pin=250mW, dist=10mm, f=2450 MHz

**DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2**

Communication System: CW; Frequency: 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.95$  S/m;  $\epsilon_r = 52.63$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section; Meas. Ambient Temp (celsius) -22°C; Input power-250mW

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

DASY Configuration:

- Probe: EX3DV4 - SN3927; ConvF(7.61, 7.61, 7.61); Calibrated: 2018/8/25;
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1379; Calibrated: 2018/06/22
- Phantom: ELI v5.0; Type: QDOVA002AA
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

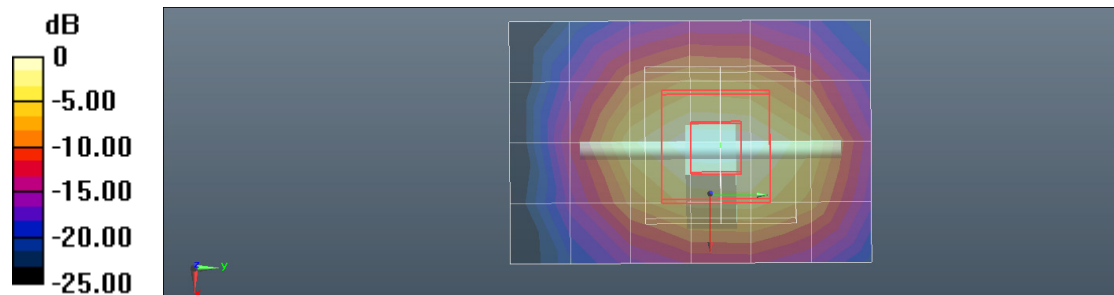
**Configuration/SystemPerformanceCheck-D2450 Body/Area Scan (7x7x1):**

Measurement grid:  $dx=12$ mm,  $dy=12$ mm, Maximum value of SAR (measured) = 14.7 W/kg

**Configuration/SystemPerformanceCheck-D2450 Body/Zoom Scan (9x9x7)/Cube 0:**

Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm, Reference Value = 104.45 V/m; Power Drift = 0.01 dB, Peak SAR (extrapolated) = 25.8 W/kg

**SAR(1 g) = 12.9 W/kg; SAR(10 g) = 5.6W/kg** Maximum value of SAR (measured) = 16.1 W/kg



0 dB = 16.1 W/kg = 12.07 dBW/kg

Date/Time: 07/11/2018

Test Laboratory: Cerpass Lab

Dipole Calibration for Body Tissue Pin=100mW, dist=10mm, f=5250 MHz

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2**

Communication System: CW; Frequency: 5250 MHz

Medium parameters used:  $f = 5250$  MHz;  $\sigma = 5.46$  S/m;  $\epsilon_r = 48.95$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section; Meas. Ambient Temp (celsius) -22°C; Input power-100mW

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

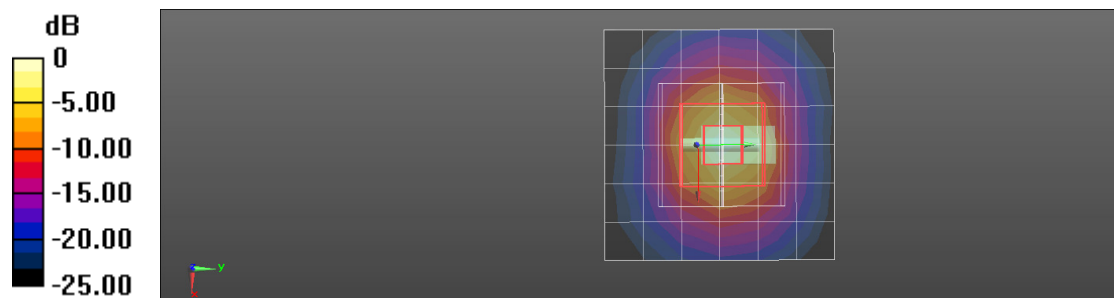
DASY Configuration:

- Probe: EX3DV4 - SN3927; ConvF(544, 5.44, 5.44); Calibrated: 2018/8/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1379; Calibrated: 2018/06/22
- Phantom: ELI v5.0; Type: QDOVA002AA
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm, Maximum value of SAR (measured) = 16.1 W/kg

**Configuration/Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan (9x9x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm, Reference Value = 55.85 V/m; Power Drift = 0.04 dB, Peak SAR (extrapolated) = 33.3 W/kg

**SAR(1 g) = 7.98 W/kg; SAR(10 g) = 2.27 W/kg** Maximum value of SAR (measured) = 16.8 W/kg



0 dB = 16.8 W/kg = 12.25 dBW/kg

Date/Time: 07/11/2018

Test Laboratory: Cerpass Lab

Dipole Calibration for Body Tissue Pin=100mW, dist=10mm, f=5750 MHz

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2**

Communication System: CW; Frequency: 5750 MHz

Medium parameters used:  $f = 5750$  MHz;  $\sigma = 5.90$  S/m;  $\epsilon_r = 48.35$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section; Meas. Ambient Temp (celsius) -22°C; Input power-100mW

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

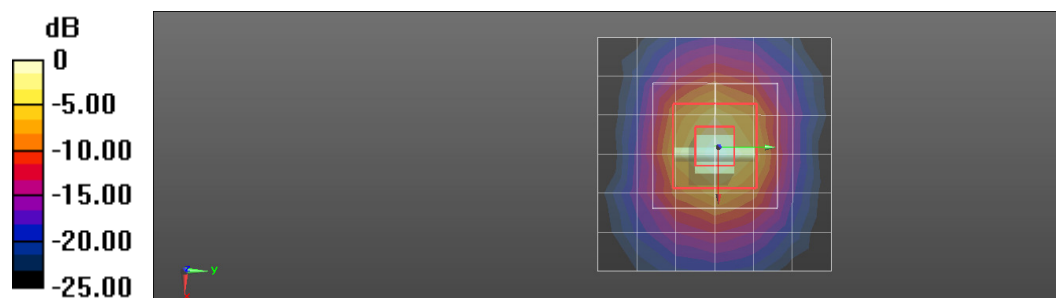
DASY Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.55, 4.55, 4.55); Calibrated: 2018/8/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1379; Calibrated: 2018/06/22
- Phantom: ELI v5.0; Type: QDOVA002AA
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Configuration/Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Area Scan (7x7x1):** Measurement grid: dx=10mm, dy=10mm, Maximum value of SAR (measured) = 16.9 W/kg

**Configuration/Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan (9x9x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm, Reference Value = 66.49 V/m; Power Drift = 0.02 dB, Peak SAR (extrapolated) = 32.3 W/kg

**SAR(1 g) = 8.08 W/kg; SAR(10 g) = 2.36 W/kg** Maximum value of SAR (measured) = 17.5 W/kg



0 dB = 17.5 W/kg = 12.43 dBW/kg

## **APPENDIX B. SAR measurement Data**

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.

Date/Time: 14/11/2018

Test Laboratory: Cerpass Lab

**DUT: BenQ Wireless Dongle; Type: WDR02U**

**Procedure Name: 802.11g 2412MHz Horizontal-Up(Ant 1)**

Communication System: UID 0, 2.4GHz Wi-Fi (0); Frequency: 2412MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.89 \text{ S/m}$ ;  $\epsilon_r = 52.67$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Tissue Temp(celsius) -  $21^\circ\text{C}$

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(7.6, 7.6, 7.6); Calibrated: 2018/6/22;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2018/6/6
- Phantom: ELI v5.0 (20deg probe tilt); Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/802.11g 2412MHz Horizontal-Up(Ant 1)/Area Scan (11x5x1):**

Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

Maximum value of SAR (measured) =  $1.01 \text{ W/kg}$

**Configuration/802.11g 2412MHz Horizontal-Up(Ant 1)/Zoom Scan (7x7x7)/Cube 0:**

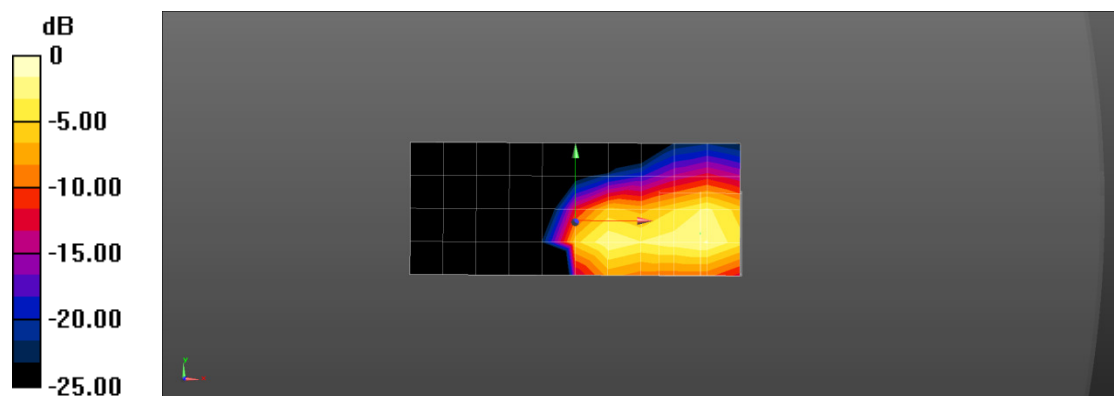
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $7.181 \text{ V/m}$ ; Power Drift =  $-2.33 \text{ dB}$

Peak SAR (extrapolated) =  $2.97 \text{ W/kg}$

**SAR(1 g) =  $1.23 \text{ W/kg}$ ; SAR(10 g) =  $0.566 \text{ W/kg}$**

Maximum value of SAR (measured) =  $1.45 \text{ W/kg}$



0 dB =  $1.45 \text{ W/kg}$  =  $1.61\text{dBW/kg}$

Date/Time: 14/11/2018

Test Laboratory: Cerpass Lab

**DUT: BenQ Wireless Dongle; Type: WDR02U**

**Procedure Name: 802.11g 2462MHz Horizontal-Up(Ant 1)**

Communication System: UID 0, 2.4GHz Wi-Fi (0); Frequency: 2462MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 2462 \text{ MHz}$ ;  $\sigma = 1.97 \text{ S/m}$ ;  $\epsilon_r = 52.59$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Tissue Temp(celsius) -  $21^\circ\text{C}$

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(7.6, 7.6, 7.6); Calibrated: 2018/6/22;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2018/6/6
- Phantom: ELI v5.0 (20deg probe tilt); Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/802.11g 2462MHz Horizontal-Up(Ant 1)/Area Scan (11x5x1):**

Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

Maximum value of SAR (measured) =  $1.11 \text{ W/kg}$

**Configuration/802.11g 2462MHz Horizontal-Up(Ant 1)/Zoom Scan (7x7x7)/Cube 0:**

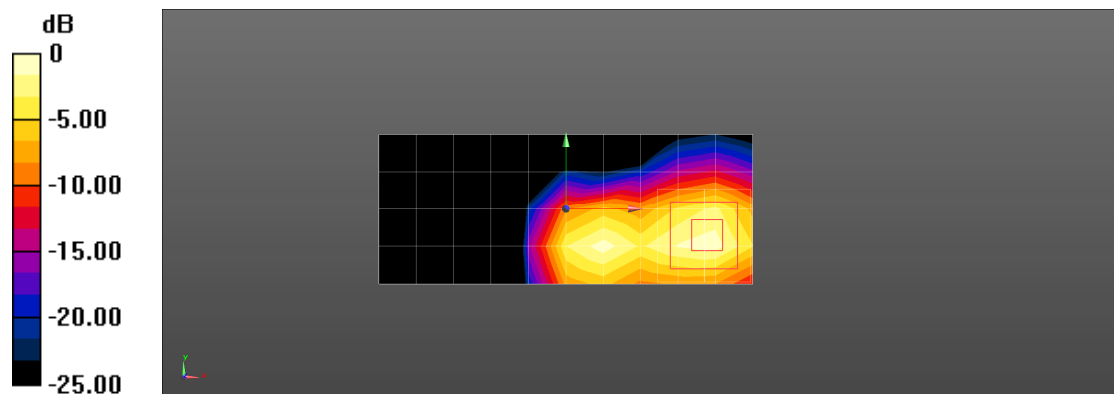
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $11.54 \text{ V/m}$ ; Power Drift =  $-0.03 \text{ dB}$

Peak SAR (extrapolated) =  $2.86 \text{ W/kg}$

**SAR(1 g) =  $1.18 \text{ W/kg}$ ; SAR(10 g) =  $0.680 \text{ W/kg}$**

Maximum value of SAR (measured) =  $1.73 \text{ W/kg}$



$0 \text{ dB} = 1.73 \text{ W/kg} = 2.38 \text{ dBW/kg}$

Date/Time: 14/11/2018

Test Laboratory: Cerpass Lab

**DUT: BenQ Wireless Dongle; Type: WDR02U**

**Procedure Name: 802.11g 2437MHz Horizontal-Up(Ant 2)**

Communication System: UID 0, 2.4GHz Wi-Fi (0); Frequency: 2437MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 2437 \text{ MHz}$ ;  $\sigma = 1.92 \text{ S/m}$ ;  $\epsilon_r = 52.64$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Tissue Temp(celsius) - 21 °C

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(7.6, 7.6, 7.6); Calibrated: 2018/6/22;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2018/6/6
- Phantom: ELI v5.0 (20deg probe tilt); Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/802.11g 2437MHz Horizontal-Up(Ant 2)/Area Scan (11x5x1):**

Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

Maximum value of SAR (measured) = 0.929 W/kg

**Configuration/802.11g 2437MHz Horizontal-Up(Ant 2)/Zoom Scan (7x7x7)/Cube 0:**

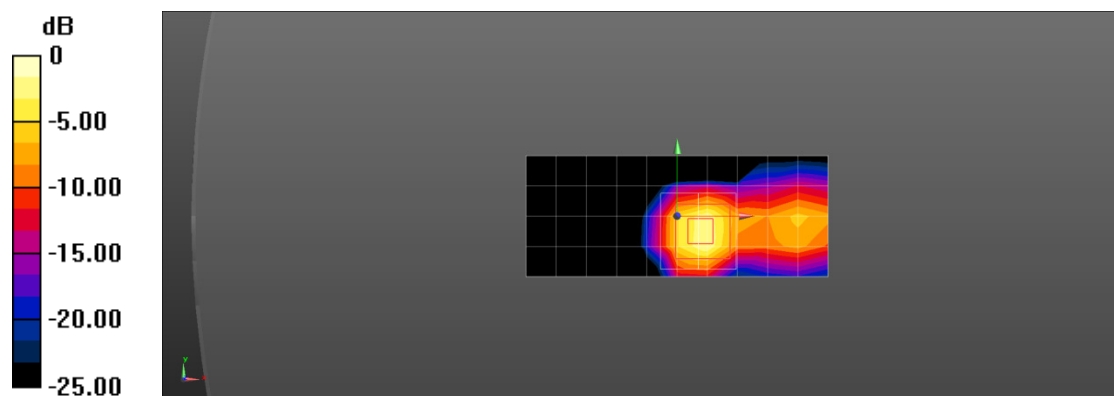
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 15.28 V/m; Power Drift = -0.28 dB

Peak SAR (extrapolated) = 2.94W/kg

**SAR(1 g) = 1.1W/kg; SAR(10 g) = 0.402W/kg**

Maximum value of SAR (measured) = 1.35 W/kg



0 dB = 1.45 W/kg = 1.30dBW/kg



Date/Time: 16/11/2018

Test Laboratory: Cerpass Lab

**DUT: BenQ Wireless Dongle; Type: WDR02U**

**Procedure Name: 802.11a 5180MHz Horizontal-Up(Ant 1)**

Communication System: UID 0, 5GHz Wi-Fi (0); Frequency: 5180MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 5180 \text{ MHz}$ ;  $\sigma = 5.26 \text{ S/m}$ ;  $\epsilon_r = 49.11$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Tissue Temp(celsius) -  $21^\circ\text{C}$

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(5.41, 5.41, 5.41); Calibrated: 2018/6/22;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2018/6/6
- Phantom: ELI v5.0 (20deg probe tilt); Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/802.11a 5180MHz Horizontal-Up(Ant 1)/Area Scan (11x11x1):**

Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

Maximum value of SAR (measured) =  $1.04\text{W/kg}$

**Configuration/802.11a 5180MHz Horizontal-Up(Ant 1)/Zoom Scan (7x7x7)/Cube 0:**

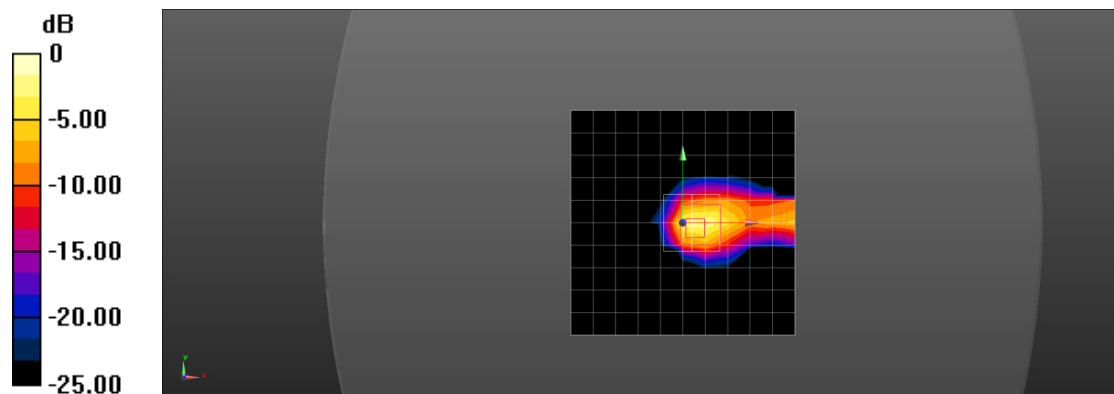
Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $14.96 \text{ V/m}$ ; Power Drift =  $-0.42 \text{ dB}$

Peak SAR (extrapolated) =  $10.9\text{W/kg}$

**SAR(1 g) =  $1.52\text{W/kg}$ ; SAR(10 g) =  $0.391\text{W/kg}$**

Maximum value of SAR (measured) =  $1.47 \text{ W/kg}$



0 dB =  $1.47 \text{ W/kg}$  =  $1.67\text{dBW/kg}$

Date/Time: 16/11/2018

Test Laboratory: Cerpass Lab

**DUT: BenQ Wireless Dongle; Type: WDR02U**

**Procedure Name: 802.11a 5240MHz Horizontal-Up(Ant 1)**

Communication System: UID 0, 5GHz Wi-Fi (0); Frequency: 5180MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 5240$  MHz;  $\sigma = 5.45$  S/m;  $\epsilon_r = 48.99$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section; Tissue Temp(celsius) - 21 °C

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(5.41, 5.41, 5.41); Calibrated: 2018/6/22;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2018/6/6
- Phantom: ELI v5.0 (20deg probe tilt); Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/802.11a 5240MHz Horizontal-Up(Ant 1)/Area Scan (11x11x1):**

Measurement grid: dx=12mm, dy=12mm

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

**Configuration/802.11a 5240MHz Horizontal-Up(Ant 1)/Zoom Scan (7x7x7)/Cube 0:**

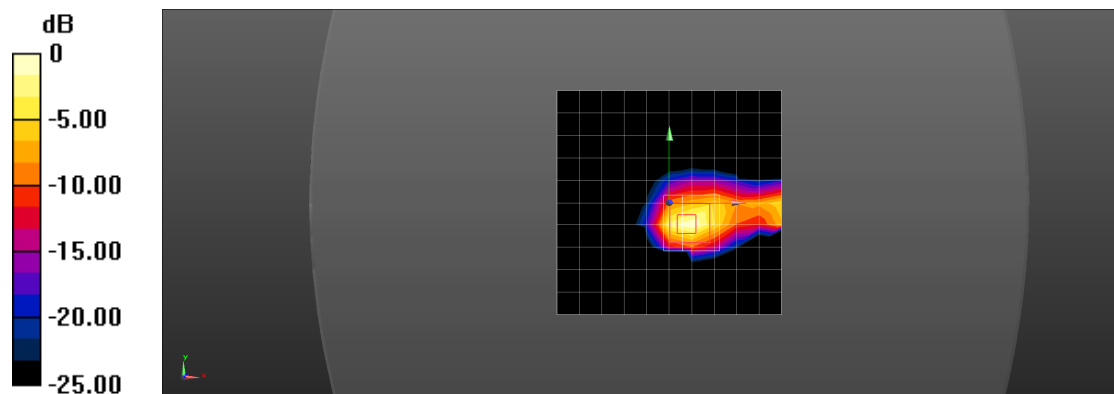
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.74 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 7.47W/kg

**SAR(1 g) = 1.21W/kg; SAR(10 g) = 0.326W/kg**

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



0 dB = 1.15 W/kg = 0.61dBW/kg

Date/Time: 17/11/2018

Test Laboratory: Cerpass Lab

**DUT: BenQ Wireless Dongle; Type: WDR02U**

**Procedure Name: 802.11ac-VHT20 5825MHz Horizontal-Down(Ant 1)**

Communication System: UID 0, 5GHz Wi-Fi (0); Frequency: 5825MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 5825 \text{ MHz}$ ;  $\sigma = 6.03 \text{ S/m}$ ;  $\epsilon_r = 47.94$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Tissue Temp(celsius) -  $21^\circ\text{C}$

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.99, 4.99, 4.99); Calibrated: 2018/6/22;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2018/6/6
- Phantom: ELI v5.0 (20deg probe tilt); Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/802.11ac-VHT20 5825MHz Horizontal-Down(Ant 1)/Area Scan**

**(11x11x1):** Measurement grid:  $dx=12\text{mm}$ ,  $dy=12\text{mm}$

Maximum value of SAR (measured) =  $1.62\text{W/kg}$

**Configuration/802.11ac-VHT20 5825MHz Horizontal-Down(Ant 1)/Zoom Scan**

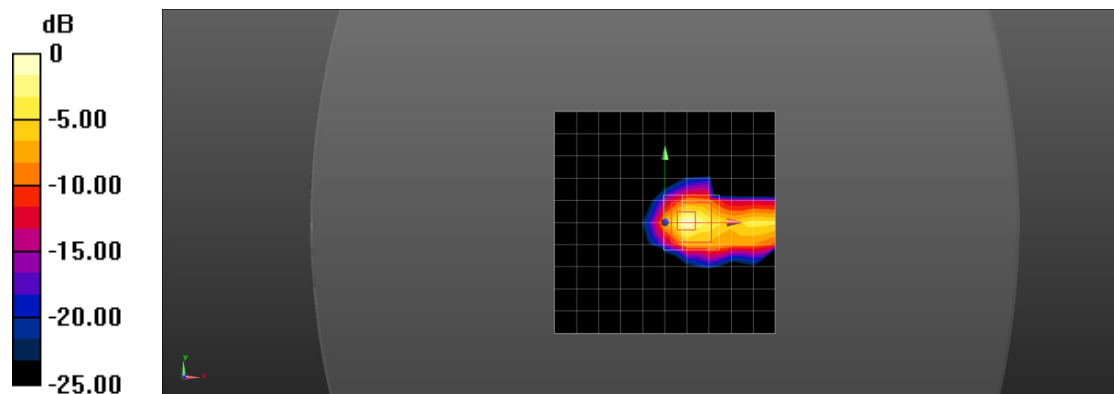
**(7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $7.942 \text{ V/m}$ ; Power Drift =  $-0.53 \text{ dB}$

Peak SAR (extrapolated) =  $8.50\text{W/kg}$

**SAR(1 g) =  $1.45\text{W/kg}$ ; SAR(10 g) =  $0.374\text{W/kg}$**

Maximum value of SAR (measured) =  $1.55 \text{ W/kg}$



0 dB =  $1.55 \text{ W/kg}$  =  $1.90\text{dBW/kg}$

Date/Time: 17/11/2018

Test Laboratory: Cerpass Lab

**DUT: BenQ Wireless Dongle; Type: WDR02U**

**Procedure Name: 802.11ac-VHT20 5825MHz Vertical-Back(Ant 1)**

Communication System: UID 0, 5GHz Wi-Fi (0); Frequency: 5825MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 5825 \text{ MHz}$ ;  $\sigma = 6.03 \text{ S/m}$ ;  $\epsilon_r = 47.94$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Tissue Temp(celsius) - 21 °C

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3927; ConvF(4.99, 4.99, 4.99); Calibrated: 2018/6/22;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1379; Calibrated: 2018/6/6
- Phantom: ELI v5.0 (20deg probe tilt); Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Configuration/802.11ac-VHT20 5825MHz Vertical-Back(Ant 1)/Area Scan (11x11x1):**

Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 1.36W/kg

**Configuration/802.11ac-VHT20 5825MHz Vertical-Back(Ant 1)/Zoom Scan**

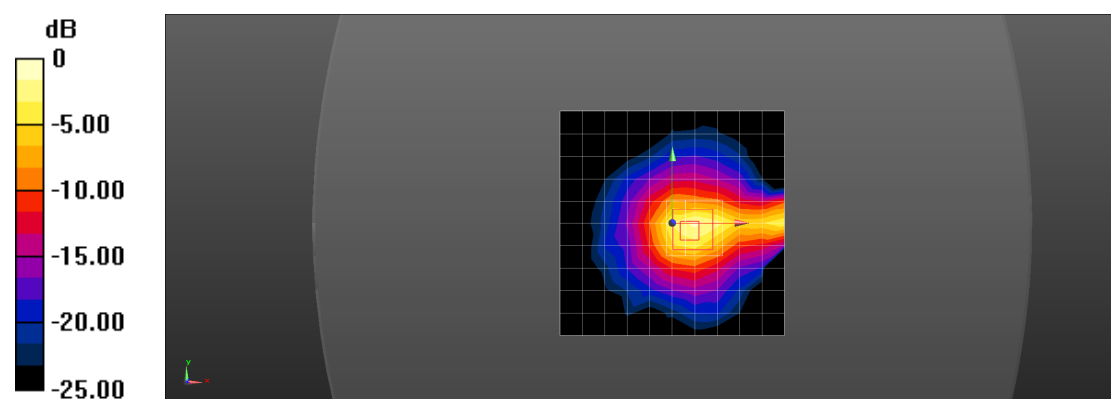
**(7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.49V/m; Power Drift = -0.29 dB

Peak SAR (extrapolated) = 5.41W/kg

**SAR(1 g) = 1.45W/kg; SAR(10 g) = 0.480W/kg**

Maximum value of SAR (measured) = 1.85 W/kg



0 dB = 1.85 W/kg = 2.67dBW/kg

## **APPENDIX C. Calibration Data for Probe, Dipole and DAE**

Please refer to attached files.

## **APPENDIX D. Photographs of EUT and Setup**

Please refer to attached files.