

# Appendix A

## Detailed System Validation Results

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Date: 2019-06-24

Test Laboratory: Compliance Certification Services Inc.

## System Performance Check-Head 835MHz

**DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: 4d166**

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.887$  S/m;  $\epsilon_r = 40.842$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3798; ConvF(9.46, 9.46, 9.46); Calibrated: 2019-05-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1245; Calibrated: 2019-05-21
- Phantom: Twin SAM Phantom; Type: QD 000 P40 CD; Serial: 1609
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### **Body/Pin=250 mW, dist=15 mm (EX-Probe)/Area Scan (7x12x1):**

Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
Maximum value of SAR (measured) = 2.87 W/kg

### **Body/Pin=250 mW, dist=15 mm (EX-Probe)/Zoom Scan (7x7x7)**

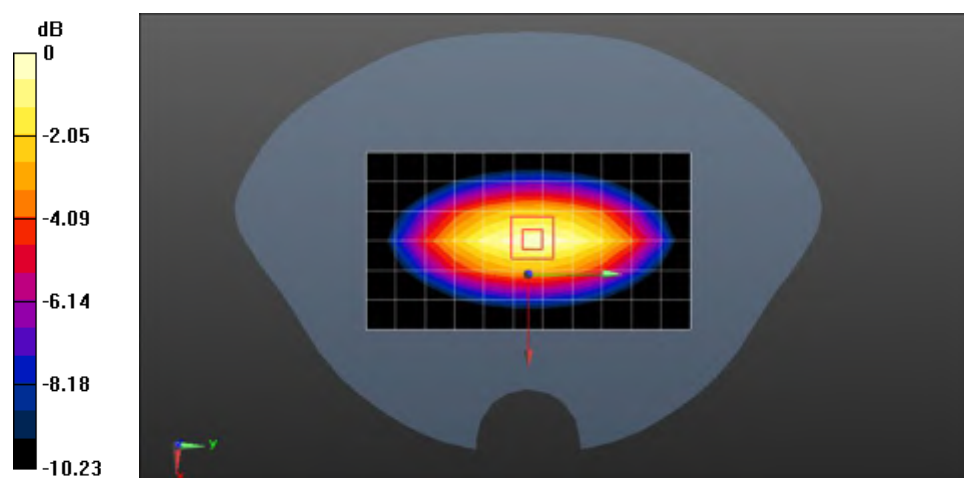
**(7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 58.61 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 3.46 W/kg

**SAR(1 g) = 2.35 W/kg; SAR(10 g) = 1.55 W/kg**

Maximum value of SAR (measured) = 2.95 W/kg



0 dB = 2.95 W/kg = 4.70 dBW/kg

Date: 2019-06-24

Test Laboratory: Compliance Certification Services Inc.

## System Performance Check-Body 835MHz

**DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: 4d166**

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 835$  MHz;  $\sigma = 1.012$  S/m;  $\epsilon_r = 54.425$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3798; ConvF(9.33, 9.33, 9.33); Calibrated: 2019-05-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1245; Calibrated: 2019-05-21
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### Body/dist=15mm, Pin=250 mW(EX-Probe)/Area Scan (7x12x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm

Maximum value of SAR (measured) = 3.54 W/kg

### Body/dist=15mm, Pin=250 mW(EX-Probe)/Zoom Scan (7x7x7)

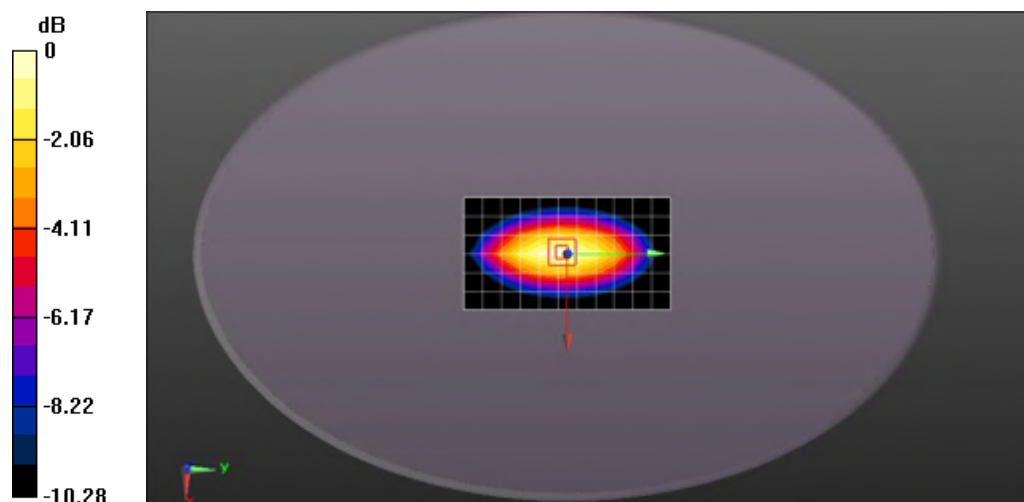
**(7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 60.91 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 4.20 W/kg

**SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.64 W/kg**

Maximum value of SAR (measured) = 3.56 W/kg



0 dB = 3.56 W/kg = 5.51 dBW/kg

Date: 2019-06-25

Test Laboratory: Compliance Certification Services Inc.

## System Performance Check-Head 1800MHz

**DUT: Dipole 1800 MHz D1800V2; Type: D1800V2; Serial: D1800V2 - SN:2d052**

Communication System: UID 10000, CW; Frequency: 1800 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.367$  S/m;  $\epsilon_r = 40.307$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3798; ConvF(8, 8, 8); Calibrated: 2019-05-24;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1245; Calibrated: 2019-05-21
- Phantom: Twin SAM Phantom; Type: QD 000 P40 CD; Serial: 1609
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### Body/d=10mm, Pin=250 mW,(EX-Probe)/Area Scan (7x7x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm

Maximum value of SAR (measured) = 9.09 W/kg

### Body/d=10mm, Pin=250 mW,(EX-Probe)/Zoom Scan (7x7x7)

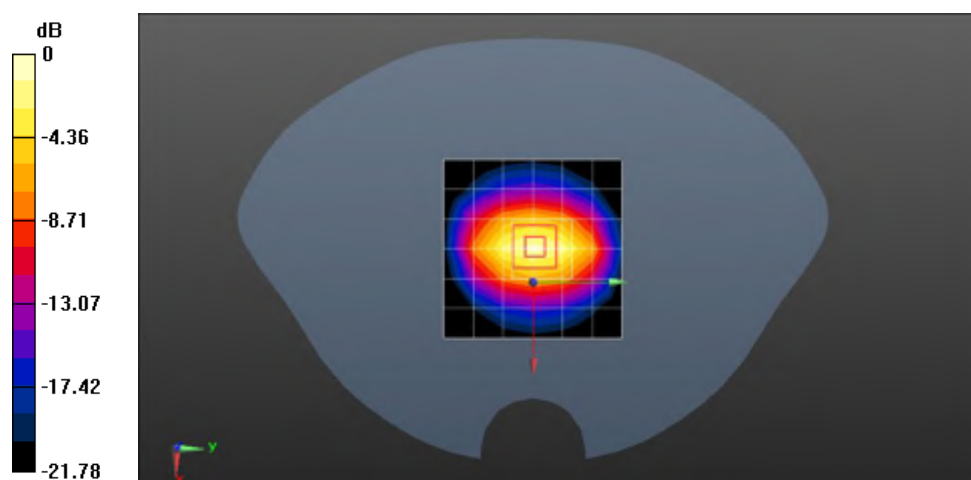
**(7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 81.94 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 17.4 W/kg

**SAR(1 g) = 8.99 W/kg; SAR(10 g) = 4.91 W/kg**

Maximum value of SAR (measured) = 10.6 W/kg



0 dB = 10.6 W/kg = 10.25 dBW/kg

Date: 2019-06-23

Test Laboratory: Compliance Certification Services Inc.

## System Performance Check-Body 1800MHz

**DUT: Dipole 1800 MHz D1800V2; Type: D1800V2; Serial: D1800V2 - SN:2d052**

Communication System: UID 10000, CW; Frequency: 1800 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.481$  S/m;  $\epsilon_r = 51.142$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.81, 7.81, 7.81); Calibrated: 2019-05-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1245; Calibrated: 2019-05-21
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Body/d=10mm, Pin=250 mW, dist=2.0mm (EX-Probe) (23.6 dBm)/Area**

**Scan (7x7x1):** Measurement grid:  $dx=15$ mm,  $dy=15$ mm

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

**Body/d=10mm, Pin=250 mW, dist=2.0mm (EX-Probe) (23.6 dBm)/Zoom**

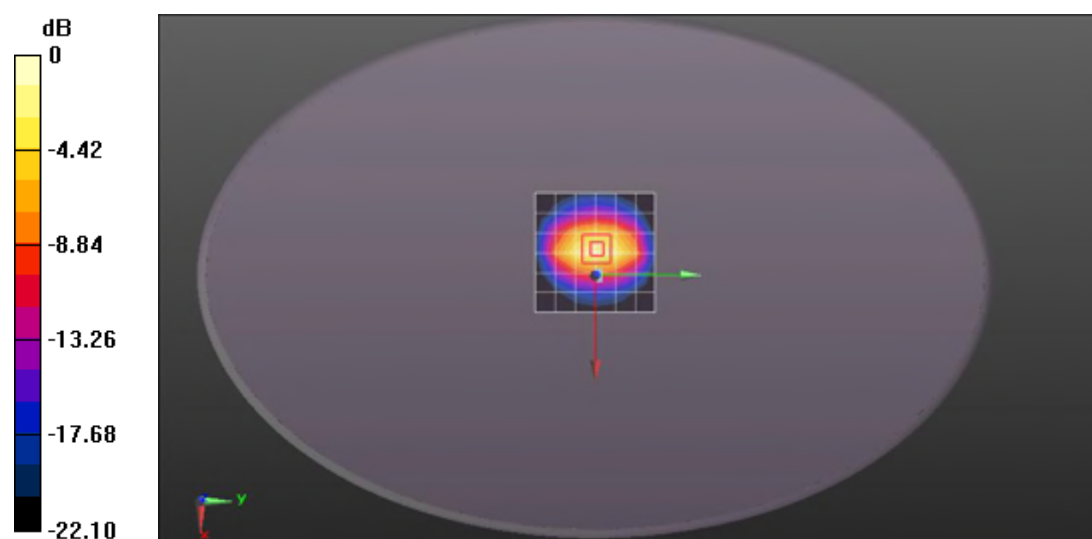
**Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 108.7 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 21.4 W/kg

**SAR(1 g) = 9.97 W/kg; SAR(10 g) = 4.8 W/kg**

Maximum value of SAR (measured) = 16.9 W/kg



0 dB = 16.9 W/kg = 12.28 dBW/kg

Test Laboratory: Compliance Certification Services Inc.

## System Performance Check-Head 1900MHz

**DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: 5d018**

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.372$  S/m;  $\epsilon_r = 40.64$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.9, 7.9, 7.9); Calibrated: 2019-05-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1245; Calibrated: 2019-05-21
- Phantom: Twin SAM Phantom; Type: QD 000 P40 CD; Serial: 1609
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### Body/Pin=250 mW, dist=10mm (EX-Probe)/Area Scan (7x8x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm

Maximum value of SAR (measured) = 16.1 W/kg

### Body/Pin=250 mW, dist=10mm (EX-Probe)/Zoom Scan (7x7x7)

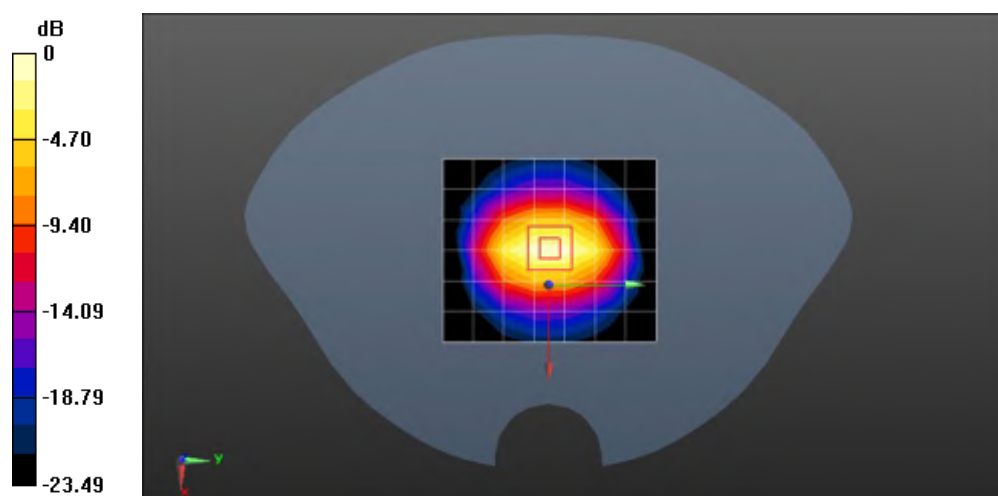
**(7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 115.3 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 25.3 W/kg

**SAR(1 g) = 10.8 W/kg; SAR(10 g) = 5.22 W/kg**

Maximum value of SAR (measured) = 17.7 W/kg



0 dB = 17.7 W/kg = 12.48 dBW/kg

Date: 2019-06-23

Test Laboratory: Compliance Certification Services Inc.

## System Performance Check-Body 1900MHz

**DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: 5d018**

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.513$  S/m;  $\epsilon_r = 53.826$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.66, 7.66, 7.66); Calibrated: 2019-05-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1245; Calibrated: 2019-05-21
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### Body/Pin=250 mW, dist=10mm (EX-Probe)/Area Scan (7x8x1):

Measurement grid:  $dx=15$ mm,  $dy=15$ mm

Maximum value of SAR (measured) = 12.8 W/kg

### Body/Pin=250 mW, dist=10mm (EX-Probe)/Zoom Scan (7x7x7)

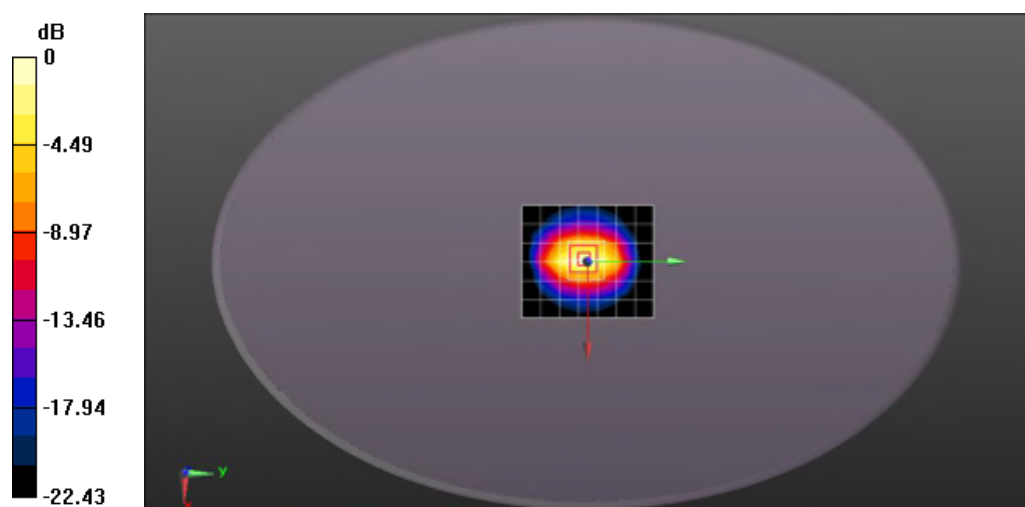
**(7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 94.53 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 19.0 W/kg

**SAR(1 g) = 9.76 W/kg; SAR(10 g) = 5.14 W/kg**

Maximum value of SAR (measured) = 13.6 W/kg



0 dB = 13.6 W/kg = 11.34 dBW/kg

Test Laboratory: Compliance Certification Services Inc.

## System Performance Check-Head 2300MHz

**DUT: Dipole 2300 MHz D2300V2; Type: D2300V2; Serial: 1096**

Communication System: UID 0, CW (0); Frequency: 2300 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2300$  MHz;  $\sigma = 1.645$  S/m;  $\epsilon_r = 40.475$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.61, 7.61, 7.61); Calibrated: 2019-05-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1245; Calibrated: 2019-05-21
- Phantom: Twin SAM Phantom; Type: QD 000 P40 CD; Serial: 1609
- DASYS 52.8.8(1222); SEMCAD X 14.6.10(7331)

### Body/Pin=250 mW, dist=10mm (EX-Probe)/Area Scan (9x10x1):

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

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

### Body/Pin=250 mW, dist=10mm (EX-Probe)/Zoom Scan (7x7x7)

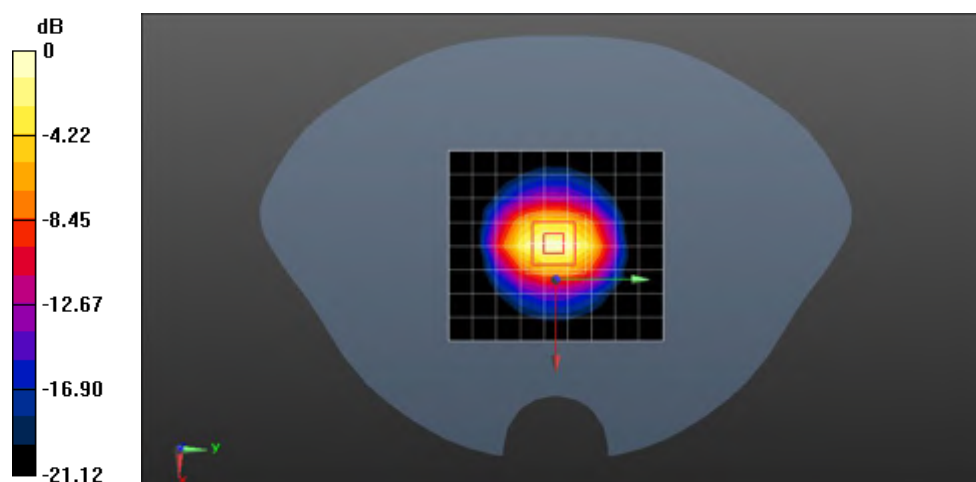
**(7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 100.5 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 22.0 W/kg

**SAR(1 g) = 10.8 W/kg; SAR(10 g) = 5.16 W/kg**

Maximum value of SAR (measured) = 16.4 W/kg



0 dB = 16.4 W/kg = 12.15 dBW/kg

Date: 2019-06-22

Test Laboratory: Compliance Certification Services Inc.

## System Performance Check-Body 2300MHz

**DUT: Dipole 2300 MHz D2300V2; Type: D2300V2; Serial: 1096**

Communication System: UID 0, CW (0); Frequency: 2300 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2300$  MHz;  $\sigma = 1.776$  S/m;  $\epsilon_r = 53.158$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.49, 7.49, 7.49); Calibrated: 2019-05-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1245; Calibrated: 2019-05-21
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### Body/d=10mm, Pin=250 mW, dist=2.0mm (EX-Probe)/Area Scan

**(8x9x1):** Measurement grid:  $dx=12$ mm,  $dy=12$ mm

Maximum value of SAR (measured) = 11.3 W/kg

### Body/d=10mm, Pin=250 mW, dist=2.0mm (EX-Probe)/Zoom Scan

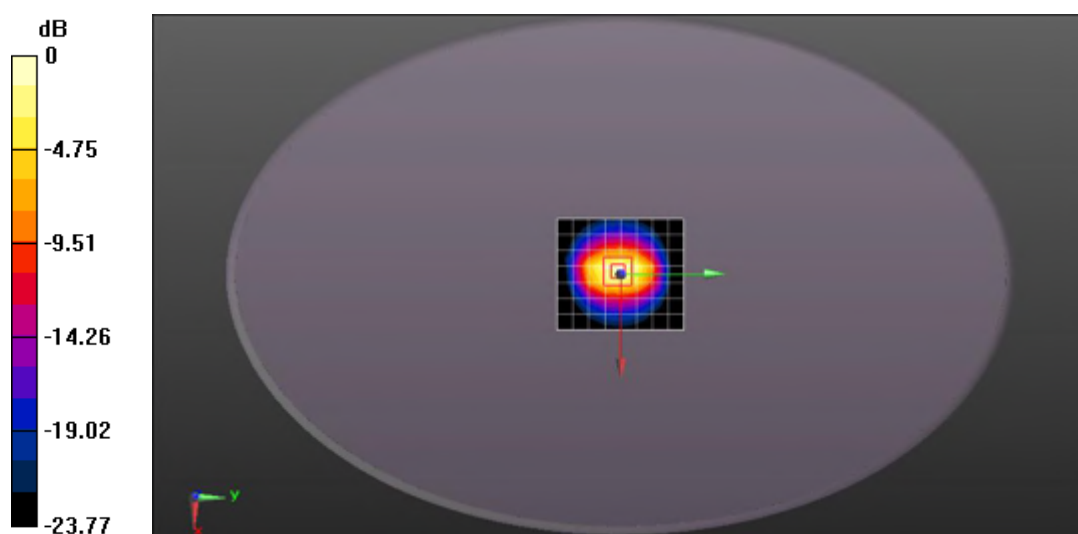
**(7x7x7) (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 85.30 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 17.8 W/kg

**SAR(1 g) = 10.9 W/kg; SAR(10 g) = 5.4 W/kg**

Maximum value of SAR (measured) = 13.0 W/kg



0 dB = 13.0 W/kg = 11.14 dBW/kg

Date: 2019-06-21

Test Laboratory: Compliance Certification Services Inc.

## System Performance Check-Head 2450MHz

**DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: 903**

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.826$  S/m;  $\epsilon_r = 39.901$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.24, 7.24, 7.24); Calibrated: 2019-05-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1245; Calibrated: 2019-05-21
- Phantom: Twin SAM Phantom; Type: QD 000 P40 CD; Serial: 1609
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### Body/Pin=250 mW, dist=10mm (EX-Probe)/Area Scan (9x10x1):

Measurement grid:  $dx=12$ mm,  $dy=12$ mm  
Maximum value of SAR (measured) = 17.8 W/kg

### Body/Pin=250 mW, dist=10mm (EX-Probe)/Zoom Scan (7x7x7)

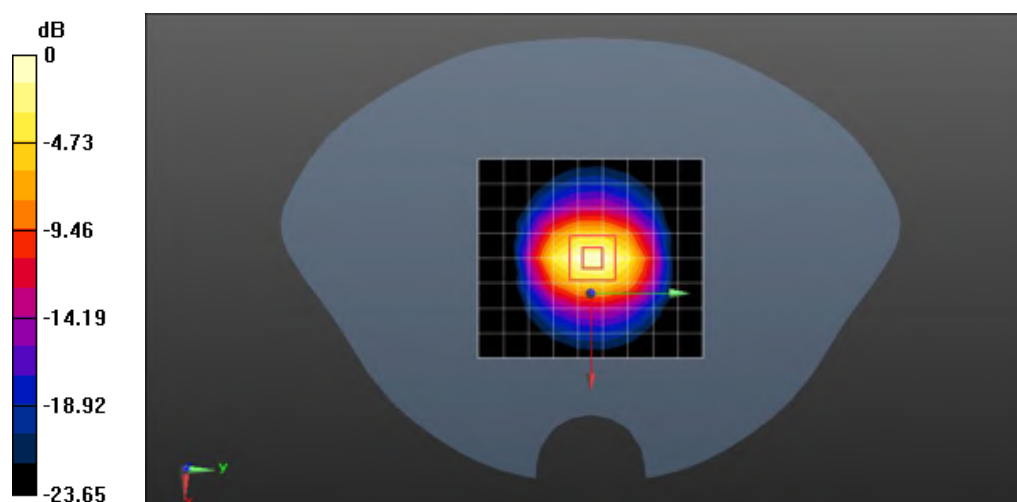
**(7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 104.8 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 26.7 W/kg

**SAR(1 g) = 12.3 W/kg; SAR(10 g) = 5.53 W/kg**

Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 19.3 W/kg = 12.86 dBW/kg

Test Laboratory: Compliance Certification Services Inc.

## System Performance Check-Body 2450MHz

**DUT: Dipole 2450 MHz D2450V2; Type: D24500V2; Serial: 903**

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.97$  S/m;  $\epsilon_r = 52.693$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.37, 7.37, 7.37); Calibrated: 2019-05-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1245; Calibrated: 2019-05-21
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### Body/Pin=250 mW, dist=10mm (EX-Probe)/Area Scan (9x10x1):

Measurement grid:  $dx=12$ mm,  $dy=12$ mm  
Maximum value of SAR (measured) = 18.5 W/kg

### Body/Pin=250 mW, dist=10mm (EX-Probe)/Zoom Scan (7x7x7)

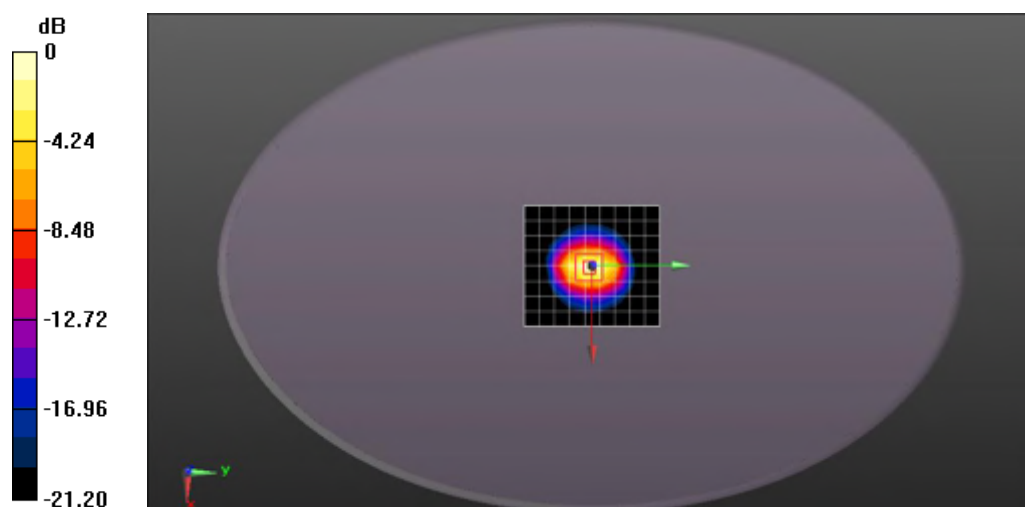
**(7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 101.2 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 26.1 W/kg

**SAR(1 g) = 13 W/kg; SAR(10 g) = 6.06 W/kg**

Maximum value of SAR (measured) = 19.7 W/kg



0 dB = 19.7 W/kg = 12.94 dBW/kg

Date: 2019-06-21

Test Laboratory: Compliance Certification Services Inc.

## System Performance Check-Head 2600MHz

**DUT: Dipole 2600 MHz D2600V2; Type: D2600V2; Serial: 1158**

Communication System: UID 0, CW (0); Frequency: 2600 MHz; Duty Cycle: 1:1  
Medium parameters used:  $f = 2600$  MHz;  $\sigma = 2$  S/m;  $\epsilon_r = 39.388$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.11, 7.11, 7.11); Calibrated: 2019-05-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1245; Calibrated: 2019-05-21
- Phantom: Twin SAM Phantom; Type: QD 000 P40 CD; Serial: 1609
- DASYS 52.8.8(1222); SEMCAD X 14.6.10(7331)

### Body/Pin=250 mW, dist=10mm (EX-Probe)/Area Scan (9x10x1):

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

Maximum value of SAR (measured) = 19.6 W/kg

### Body/Pin=250 mW, dist=10mm (EX-Probe)/Zoom Scan (7x7x7)

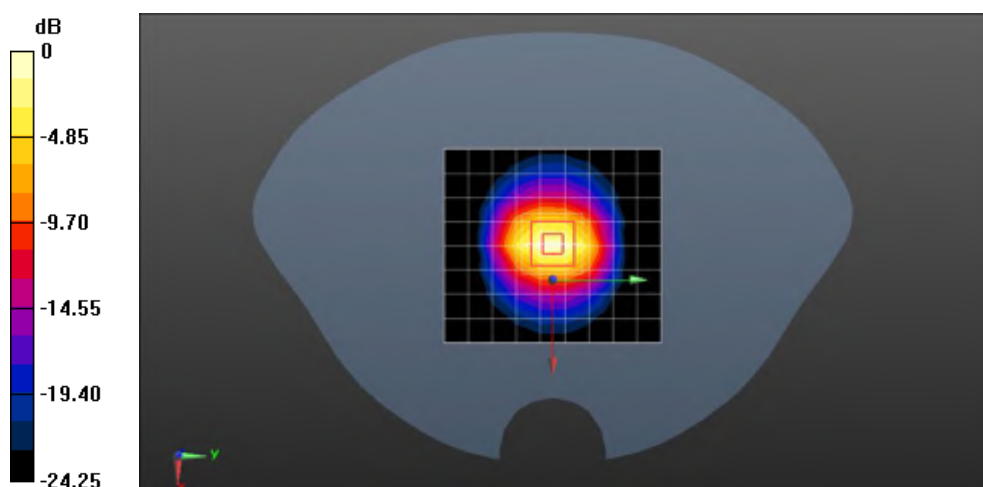
(7x7x7)/Cube 0: Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 105.6 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 30.4 W/kg

**SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.06 W/kg**

Maximum value of SAR (measured) = 21.8 W/kg



0 dB = 21.8 W/kg = 13.38 dBW/kg

Date: 2019-06-22

Test Laboratory: Compliance Certification Services Inc.

## System Performance Check-Body 2600MHz

**DUT: Dipole 2600 MHz D2600V2; Type: D2600V2; Serial: 1158**

Communication System: UID 0, CW (0); Frequency: 2600 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2600$  MHz;  $\sigma = 2.162$  S/m;  $\epsilon_r = 52.234$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3798; ConvF(7.09, 7.09, 7.09); Calibrated: 2019-05-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1245; Calibrated: 2019-05-21
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1102
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

**Body/d=10mm, Pin=250 mW, dist=2.0mm (EX-Probe)/Area Scan**

**(8x9x1):** Measurement grid:  $dx=12$ mm,  $dy=12$ mm

Maximum value of SAR (measured) = 17.3 W/kg

**Body/d=10mm, Pin=250 mW, dist=2.0mm (EX-Probe)/Zoom Scan**

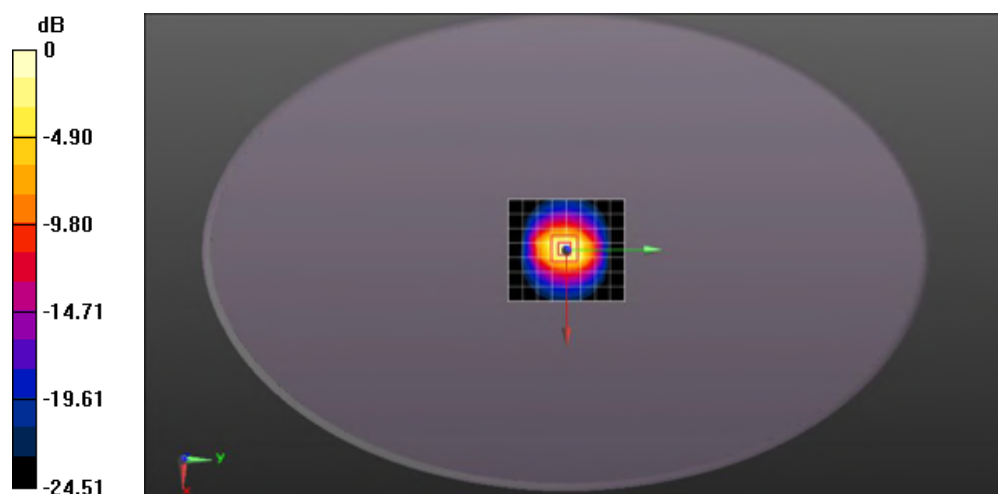
**(7x7x7) (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 102.4 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 30.3 W/kg

**SAR(1 g) = 14 W/kg; SAR(10 g) = 6.15 W/kg**

Maximum value of SAR (measured) = 21.7 W/kg



0 dB = 21.7 W/kg = 13.36 dBW/kg