

### Validation Report for Head TSL of 5.2GHz

Test Laboratory: BTL Inc. Date: 2018/12/25<sup>+</sup>

**System Check\_H5200\_7396<sup>+</sup>**

**DUT: Dipole D5GHzV2;SN;1160;<sup>+</sup>**

Communication System: UID 0, CW (0); Frequency: 5200 MHz; Duty Cycle: 1:1  
 Medium parameters used: f = 5200 MHz;  $\sigma = 4.766$  S/m;  $\epsilon_r = 35.64$ ;  $\rho = 996$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.2 °C; Liquid Temperature : 22.5 °C<sup>+</sup>

DASY Configuration:<sup>+</sup>

- Probe: EX3DV4 - SN7396; ConvE(5.7, 5.7, 5.7) @ 5200 MHz; Calibrated: 2018/5/29<sup>+</sup>
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0<sup>+</sup>
- Electronics: DAE4 Sn1390; Calibrated: 2018/5/11<sup>+</sup>
- Phantom: SAM Right; Type: Twin SAM; Serial: 1896<sup>+</sup>
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)<sup>+</sup>

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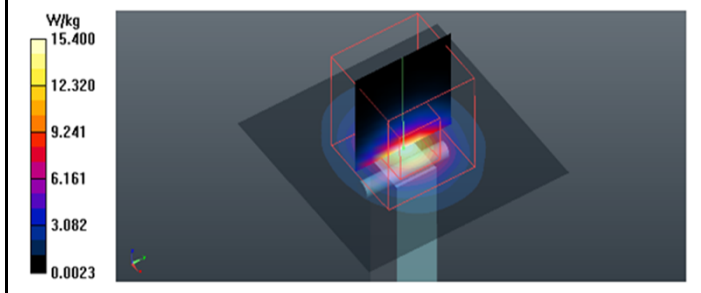
**Area Scan (6x6x1):** Interpolated grid: dx=10 mm, dy=10 mm  
 Maximum value of SAR (interpolated) = 15.4 W/kg<sup>+</sup>

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**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm  
 Reference Value = 41.93 V/m; Power Drift = -0.11 dB  
 Peak SAR (extrapolated) = 30.7 W/kg<sup>+</sup>

**SAR(1 g) = 7.27 W/kg; SAR(10 g) = 2.07 W/kg<sup>+</sup>**

Maximum value of SAR (measured) = 15.4 W/kg



### Validation Report for Head TSL of 5.3GHz

Test Laboratory: BTL Inc. Date: 2018/12/25<sup>+</sup>

**System Check\_H5300\_7396<sup>+</sup>**

**DUT: Dipole D5GHzV2;SN;1160;<sup>+</sup>**

Communication System: UID 0, CW (0); Frequency: 5300 MHz; Duty Cycle: 1:1  
 Medium parameters used (interpolated): f = 5300 MHz;  $\sigma = 4.882$  S/m;  $\epsilon_r = 35.392$ ;  $\rho = 996$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.2 °C; Liquid Temperature : 22.5 °C<sup>+</sup>

DASY Configuration:<sup>+</sup>

- Probe: EX3DV4 - SN7396; ConvE(5.35, 5.35, 5.35) @ 5300 MHz; Calibrated: 2018/5/29<sup>+</sup>
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0<sup>+</sup>
- Electronics: DAE4 Sn1390; Calibrated: 2018/5/11<sup>+</sup>
- Phantom: SAM Right; Type: Twin SAM; Serial: 1896<sup>+</sup>
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)<sup>+</sup>

↓

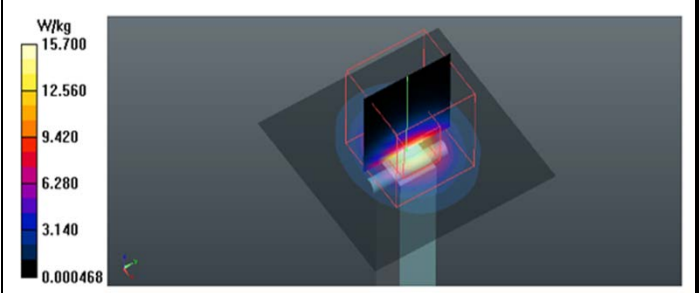
**Area Scan (6x6x1):** Interpolated grid: dx=10 mm, dy=10 mm  
 Maximum value of SAR (interpolated) = 16.5 W/kg<sup>+</sup>

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**Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm  
 Reference Value = 41.02 V/m; Power Drift = -0.06 dB  
 Peak SAR (extrapolated) = 31.4 W/kg<sup>+</sup>

**SAR(1 g) = 7.34 W/kg; SAR(10 g) = 2.07 W/kg<sup>+</sup>**

Maximum value of SAR (measured) = 15.7 W/kg



Validation Report for Head TSL of 5.5GHz

Validation Report for Head TSL of 5.6GHz

Test Laboratory: BTL Inc. Date: 2018/12/25

Test Laboratory: BTL Inc. Date: 2018/12/25

System Check\_H5500\_7396

System Check\_H5600\_7396

DUT: Dipole D5GHzV2;SN:1160

DUT: Dipole D5GHzV2;SN:1160

Communication System: UID 0, CW (0); Frequency: 5500 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 5500$  MHz;  $\sigma = 5.112$  S/m;  $\epsilon_r = 34.912$ ;  $\rho = 996$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.2 °C; Liquid Temperature : 22.5 °C

Communication System: UID 0, CW (0); Frequency: 5600 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.235$  S/m;  $\epsilon_r = 34.669$ ;  $\rho = 996$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.2 °C; Liquid Temperature : 22.5 °C

DASY Configuration

DASY Configuration

- Probe: EX3DV4 - SN7396; ConnE(4.94, 4.94, 4.94) @ 5500 MHz; Calibrated: 2018/5/29
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0
- Electronics: DAE4 Sn1390; Calibrated: 2018/5/11
- Phantom: SAM Right; Type: Twin SAM; Serial: 1896
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

- Probe: EX3DV4 - SN7396; ConnE(4.94, 4.94, 4.94) @ 5600 MHz; Calibrated: 2018/5/29
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0
- Electronics: DAE4 Sn1390; Calibrated: 2018/5/11
- Phantom: SAM Right; Type: Twin SAM; Serial: 1896
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Area Scan (6x6x1): Interpolated grid: dx=10 mm, dy=10 mm  
 Maximum value of SAR (interpolated) = 18.5 W/kg

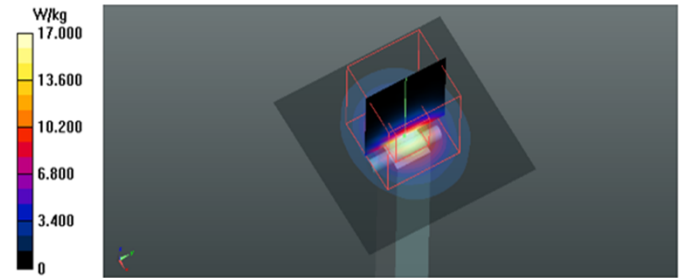
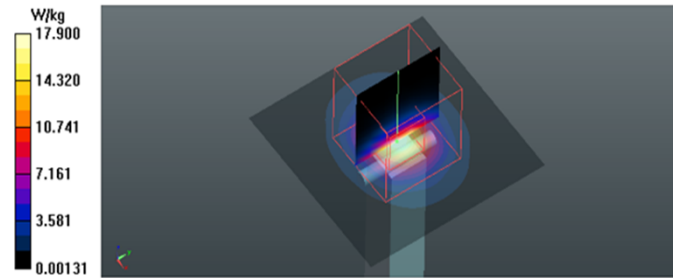
Area Scan (6x6x1): Interpolated grid: dx=10 mm, dy=10 mm  
 Maximum value of SAR (interpolated) = 17.4 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm  
 Reference Value = 42.15 V/m; Power Drift = -0.07 dB  
 Peak SAR (extrapolated) = 38.9 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm  
 Reference Value = 40.04 V/m; Power Drift = -0.09 dB  
 Peak SAR (extrapolated) = 37.1 W/kg

SAR(1 g) = 8.32 W/kg; SAR(10 g) = 2.33 W/kg  
 Maximum value of SAR (measured) = 17.9 W/kg

SAR(1 g) = 7.84 W/kg; SAR(10 g) = 2.2 W/kg  
 Maximum value of SAR (measured) = 17.0 W/kg



Validation Report for Head TSL of 5.8GHz

Validation Report for Body TSL of 5.2GHz

Test Laboratory: BTL Inc. Date: 2018/12/25

Test Laboratory: BTL Inc. Date: 2018/12/25

System Check\_H5800\_7396

System Check\_B5200\_7396

DUT: Dipole D5GHzV2;SN:1160

DUT: Dipole D5GHzV2;SN:1160

Communication System: UID 0, CW (0); Frequency: 5800 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.479$  S/m;  $\epsilon_r = 34.208$ ;  $\rho = 996$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.2 °C; Liquid Temperature : 22.5 °C

Communication System: UID 0, CW (0); Frequency: 5200 MHz; Duty Cycle: 1:1  
 Medium parameters used:  $f = 5200$  MHz;  $\sigma = 5.372$  S/m;  $\epsilon_r = 47.807$ ;  $\rho = 996$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.2 °C; Liquid Temperature : 22.5 °C

DASY Configuration

DASY Configuration

- Probe: EX3DV4 - SN7396; ConvF(5.05, 5.05, 5.05) @ 5800 MHz; Calibrated: 2018/5/29
- Sensor-Surface: 2mm (Mechanical Surface Detection),  $z = 1.0, 23.0$
- Electronics: DAE4 Sn1390; Calibrated: 2018/5/11
- Phantom: SAM Right; Type: Twin SAM; Serial: 1896
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

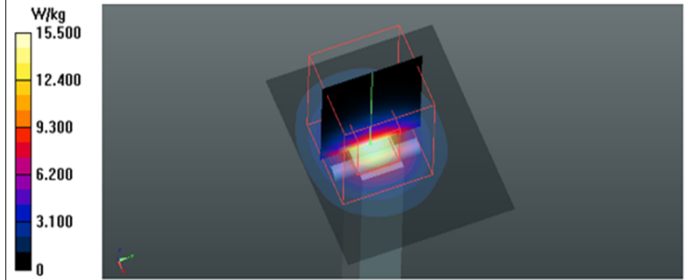
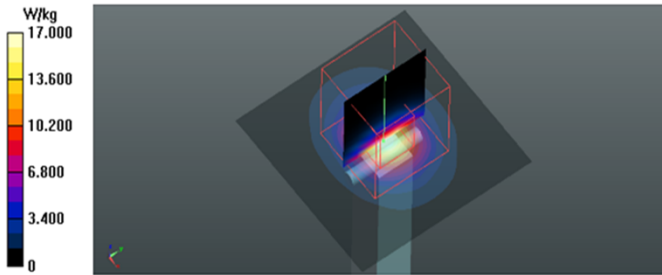
- Probe: EX3DV4 - SN7396; ConvF(5.3, 5.3, 5.3) @ 5200 MHz; Calibrated: 2018/5/29
- Sensor-Surface: 2mm (Mechanical Surface Detection),  $z = 1.0, 23.0$
- Electronics: DAE4 Sn1390; Calibrated: 2018/5/11
- Phantom: SAM Right; Type: Twin SAM; Serial: 1896
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Area Scan (6x6x1): Interpolated grid:  $dx=10$  mm,  $dy=10$  mm  
 Maximum value of SAR (interpolated) = 17.5 W/kg

Area Scan (6x5x1): Interpolated grid:  $dx=10$  mm,  $dy=10$  mm  
 Maximum value of SAR (interpolated) = 15.9 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid:  $dx=4$  mm,  $dy=4$  mm,  $dz=2$  mm  
 Reference Value = 39.17 V/m; Power Drift = -0.06 dB  
 Peak SAR (extrapolated) = 37.5 W/kg  
**SAR(1 g) = 7.89 W/kg; SAR(10 g) = 2.21 W/kg**  
 Maximum value of SAR (measured) = 17.0 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid:  $dx=4$  mm,  $dy=4$  mm,  $dz=2$  mm  
 Reference Value = 35.81 V/m; Power Drift = 0.06 dB  
 Peak SAR (extrapolated) = 31.3 W/kg  
**SAR(1 g) = 7.28 W/kg; SAR(10 g) = 2.06 W/kg**  
 Maximum value of SAR (measured) = 15.5 W/kg



Validation Report for Body TSL of 5.3GHz

Validation Report for Body TSL of 5.5GHz

Test Laboratory: BTL Inc. Date: 2018/12/25

Test Laboratory: BTL Inc. Date: 2018/12/25

System Check\_B5300\_7396

System Check\_B5500\_7396

DUT: Dipole D5GHzV2;SN:1160

DUT: Dipole D5GHzV2;SN:1160

Communication System: UID 0, CW (0); Frequency: 5300 MHz; Duty Cycle: 1:1  
 Medium parameters used: f = 5300 MHz;  $\sigma = 5.507$  S/m;  $\epsilon_r = 47.625$ ;  $\rho = 996$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.2 °C; Liquid Temperature : 22.5 °C

Communication System: UID 0, CW (0); Frequency: 5500 MHz; Duty Cycle: 1:1  
 Medium parameters used: f = 5500 MHz;  $\sigma = 5.797$  S/m;  $\epsilon_r = 47.264$ ;  $\rho = 996$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.2 °C; Liquid Temperature : 22.5 °C

DASY Configuration:

DASY Configuration:

- Probe: EX3DV4 - SN7396; ConvF(5.05, 5.05, 5.05) @ 5300 MHz; Calibrated: 2018/5/29
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0
- Electronics: DAE4 Sn1390; Calibrated: 2018/5/11
- Phantom: SAM Right; Type: Twin SAM; Serial: 1896
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

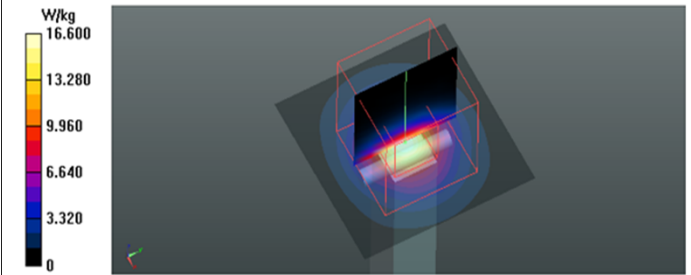
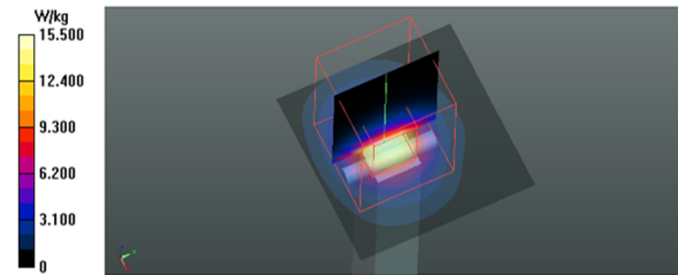
- Probe: EX3DV4 - SN7396; ConvF(4.38, 4.38, 4.38) @ 5500 MHz; Calibrated: 2018/5/29
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0
- Electronics: DAE4 Sn1390; Calibrated: 2018/5/11
- Phantom: SAM Right; Type: Twin SAM; Serial: 1896
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Area Scan (5x5x1): Interpolated grid: dx=10 mm, dy=10 mm  
 Maximum value of SAR (interpolated) = 14.7 W/kg

Area Scan (5x5x1): Interpolated grid: dx=10 mm, dy=10 mm  
 Maximum value of SAR (interpolated) = 16.4 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm  
 Reference Value = 34.45 V/m; Power Drift = 0.06 dB  
 Peak SAR (extrapolated) = 30.9 W/kg  
 SAR(1 g) = 7.16 W/kg; SAR(10 g) = 2 W/kg  
 Maximum value of SAR (measured) = 15.5 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm  
 Reference Value = 38.51 V/m; Power Drift = -0.17 dB  
 Peak SAR (extrapolated) = 33.9 W/kg  
 SAR(1 g) = 7.72 W/kg; SAR(10 g) = 2.16 W/kg  
 Maximum value of SAR (measured) = 16.6 W/kg



Validation Report for Body TSL of 5.6GHz

Validation Report for Body TSL of 5.8GHz

Test Laboratory: BTL Inc. Date: 2018/12/25

Test Laboratory: BTL Inc. Date: 2018/12/25

System Check\_B5600\_7396

System Check\_B5800\_7396

DUT: Dipole D5GHzV2;SN:1160

DUT: Dipole D5GHzV2;SN:1160

Communication System: UID 0, CW (0); Frequency: 5600 MHz; Duty Cycle: 1:1  
 Medium parameters used: f = 5600 MHz;  $\sigma = 5.947 \text{ S/m}$ ;  $\epsilon_r = 47.073$ ;  $\rho = 996 \text{ kg/m}^3$   
 Ambient Temperature : 23.2 °C; Liquid Temperature : 22.5 °C

Communication System: UID 0, CW (0); Frequency: 5800 MHz; Duty Cycle: 1:1  
 Medium parameters used: f = 5800 MHz;  $\sigma = 6.239 \text{ S/m}$ ;  $\epsilon_r = 46.673$ ;  $\rho = 996 \text{ kg/m}^3$   
 Ambient Temperature : 23.2 °C; Liquid Temperature : 22.5 °C

DASY Configuration:

DASY Configuration:

- Probe: EX3DV4 - SN7396; ConyE(4.38, 4.38, 4.38) @ 5600 MHz; Calibrated: 2018/5/29
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0
- Electronics: DAE4 Sn1390; Calibrated: 2018/5/11
- Phantom: SAM Right; Type: Twin SAM; Serial: 1896
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

- Probe: EX3DV4 - SN7396; ConyE(4.5, 4.5, 4.5) @ 5800 MHz; Calibrated: 2018/5/29
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0
- Electronics: DAE4 Sn1390; Calibrated: 2018/5/11
- Phantom: SAM Right; Type: Twin SAM; Serial: 1896
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Area Scan (6x6x1): Interpolated grid: dx=10 mm, dy=10 mm  
 Maximum value of SAR (interpolated) = 16.5 W/kg

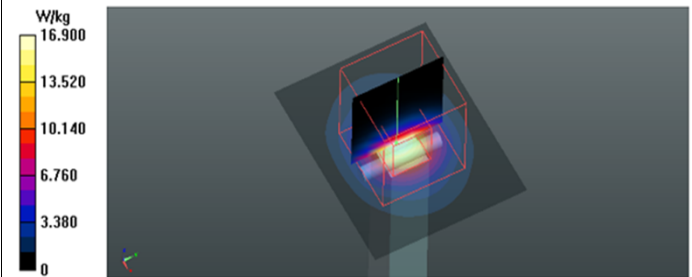
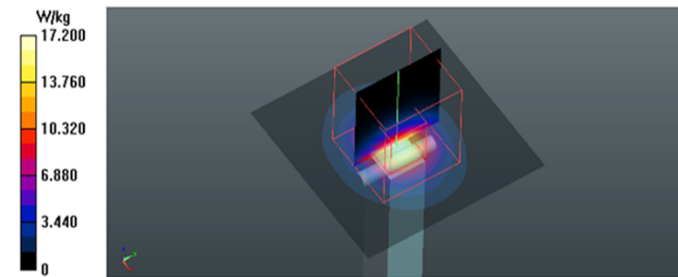
Area Scan (6x5x1): Interpolated grid: dx=10 mm, dy=10 mm  
 Maximum value of SAR (interpolated) = 16.6 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm  
 Reference Value = 38.11 V/m; Power Drift = -0.17 dB

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm  
 Reference Value = 37.07 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 35.4 W/kg  
 SAR(1 g) = 7.92 W/kg; SAR(10 g) = 2.2 W/kg  
 Maximum value of SAR (measured) = 17.2 W/kg

Peak SAR (extrapolated) = 35.6 W/kg  
 SAR(1 g) = 7.79 W/kg; SAR(10 g) = 2.16 W/kg  
 Maximum value of SAR (measured) = 16.9 W/kg



Calibrator: *Rot - Liang*

Approver: *Herbert Liu*



## Dipole Internal Calibration Record

Asset No. :	E-434	Model No. :	D2450V2	Serial No. :	919
Environmental	23.1°C, 51 %	Original Cal. Date :	June 11, 2018	Next Cal. Date :	June 11, 2021

### Standard List

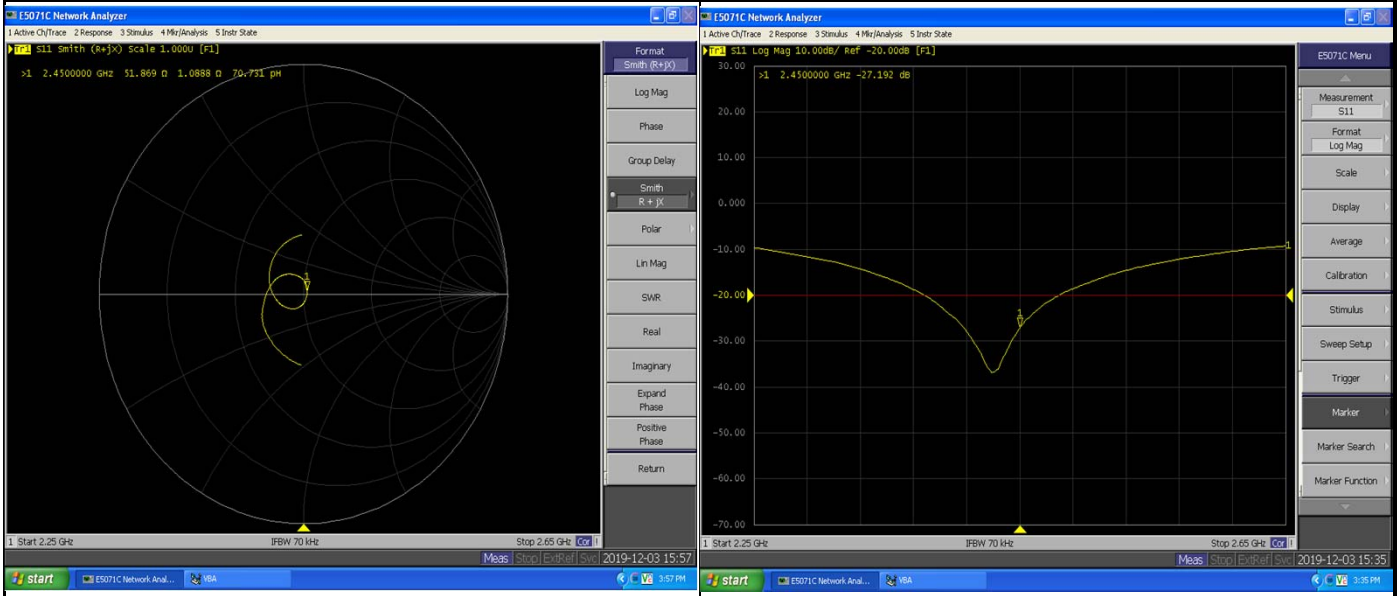
1	IEEE Std 1528-2013	IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate(SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques, June 2013
2	IEC 62209-2	Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body(frequency range of 30 MHz to 6 GHz), March 2010
3	KDB865664	SAR Measurement Requirements for 100 MHz to 6 GHz

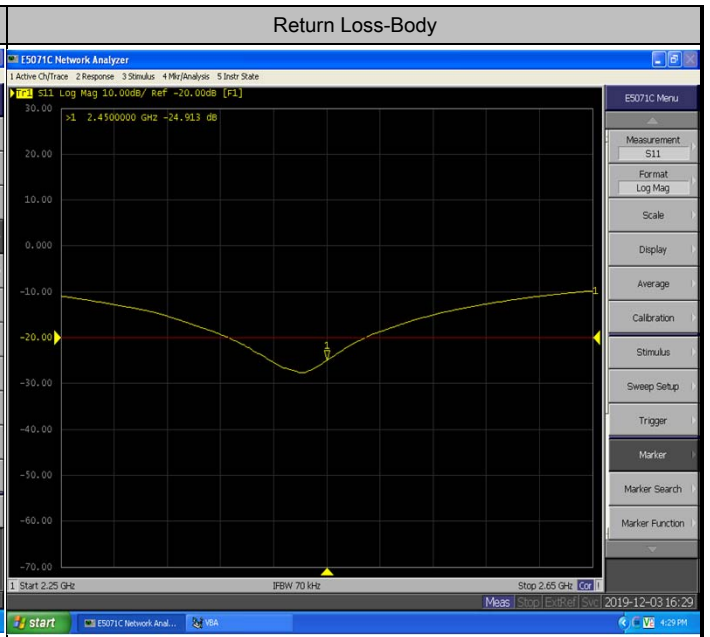
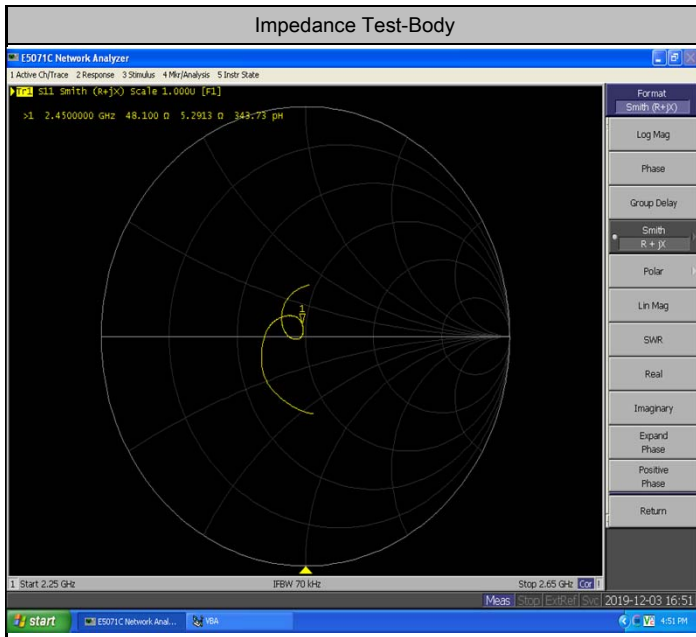
### Equipment Information

Equipment :	Manufacturer :	Model No. :	Serial No. :	Cal.Organization :	Cal. Date :
Power Amplifier	Mini-Circuits	ZHL-42W+	QA1333003	NA	February 25, 2019
DC Source	Iteck	OT6154	M00157	NA	August 3, 2019
P-series power meter	Agilent	N1911A	MY45100473	NA	September 23, 2019
wideband power sensor	Agilent	N1921A	MY51100041	NA	September 23, 2019
Smart Power Sensor	R&S	NRP-Z21	102209	NA	March 1, 2019
Dual directional coupler	Woken	TS-PCC0M-05	107090019	NA	March 10, 2019
Signal Generator	Agilent	E4438C	MY4907131	NA	Mar. 10, 2019
ENA Network Analyzer	Agilent	E5071C	MY46102965	NA	March 10, 2019

Model No	For Head Tissue					
	Item	Original Cal. Result	Verified on 2019/12/3	Deviation	Result	
D2450V2	Impedance, transformed to feed point	53Ω+2.85jΩ	51.869Ω+1.09jΩ	<5Ω	Pass	
	Return Loss(dB)	-27.9	-27.192	-2.5%	Pass	
	SAR Value for 1g(mW/g)	13.1	12.4	-5.3%	Pass	
	SAR Value for 10g(mW/g)	6.17	6.2	0.5%	Pass	
	For Body Tissue					
		Item	Original Cal. Result	Verified on 2019/12/3	Deviation	Result
		Impedance, transformed to feed point	49.9Ω+4.74jΩ	48.100Ω+5.29jΩ	<5Ω	Pass
		Return Loss(dB)	-26.5	-24.913	-6.0%	Pass
		SAR Value for 1g(mW/g)	12.7	13.1	3.1%	Pass
		SAR Value for 10g(mW/g)	5.93	6.12	3.2%	Pass

Impedance Test-Head	Return Loss-Head
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### Validation Report for Head TSL

Test Laboratory: BTL Inc.    Date: 2019/12/03

**System Check\_H2450\_1203**

DUT: Dipole 2450 MHz D2450V2;SN:919;

Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1  
 Medium parameters used (interpolated):  $f = 2450$  MHz;  $\sigma = 1.874$  S/m;  $\epsilon_r = 38.311$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.1 °C; Liquid Temperature : 22.4 °C

DASY Configuration:

- Probe: EX3DV4 - SN7544; ConvF(7.58, 7.58, 7.58) @ 2450 MHz; Calibrated: 2019/9/9
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1390; Calibrated: 2019/10/29
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1222
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

**Area Scan (7x7x1):** Interpolated grid:  $dx=12$  mm,  $dy=12$  mm  
 Maximum value of SAR (interpolated) = 21.3 W/kg

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm  
 Reference Value = 106.2 V/m; Power Drift = 0.00 dB  
 Peak SAR (extrapolated) = 23.5 W/kg  
**SAR(1 g) = 12.4 W/kg; SAR(10 g) = 6.2 W/kg**  
 Maximum value of SAR (measured) = 19.5 W/kg

### Validation Report for Body TSL

Test Laboratory: BTL Inc.    Date: 2019/12/03

**System Check\_B2450\_1203**

DUT: Dipole 2450 MHz D2450V2;SN:919;

Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1  
 Medium parameters used (interpolated):  $f = 2450$  MHz;  $\sigma = 2.036$  S/m;  $\epsilon_r = 52.015$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.1 °C; Liquid Temperature : 22.4 °C

DASY Configuration:

- Probe: EX3DV4 - SN7544; ConvF(7.57, 7.57, 7.57) @ 2450 MHz; Calibrated: 2019/9/9
- Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 Sn1390; Calibrated: 2019/10/29
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1222
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

**Area Scan (7x7x1):** Interpolated grid:  $dx=12$  mm,  $dy=12$  mm  
 Maximum value of SAR (interpolated) = 22.9 W/kg

**Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm  
 Reference Value = 106.3 V/m; Power Drift = 0.00 dB  
 Peak SAR (extrapolated) = 25.2 W/kg  
**SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.12 W/kg**  
 Maximum value of SAR (measured) = 21.0 W/kg

Calibrator: *Rot - Liang*

Approver: *Herbert Liu*



### Dipole Internal Calibration Record

Asset No. :	E-436	Model No. :	D5GHzV2	Serial No. :	1160
Environmental	23.2°C, 49 %	Original Cal. Date :	June 20, 2018	Next Cal. Date :	June 20, 2021

#### Standard List

1	IEEE Std 1528-2013	IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate(SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques, June 2013
2	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
3	KDB865664	SAR Measurement Requirements for 100 MHz to 6 GHz

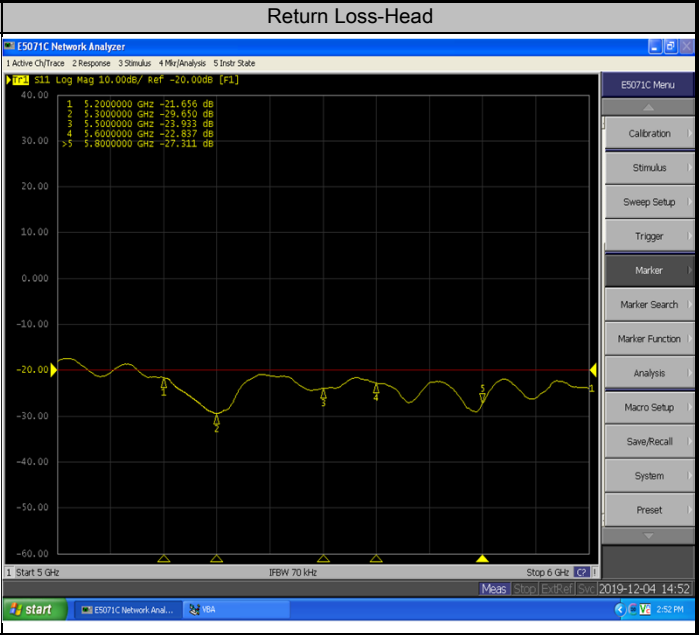
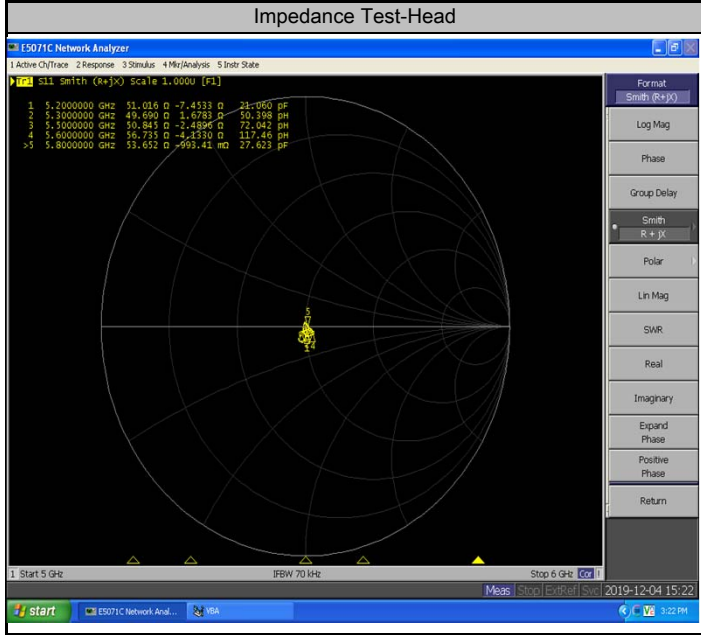
#### Equipment Information

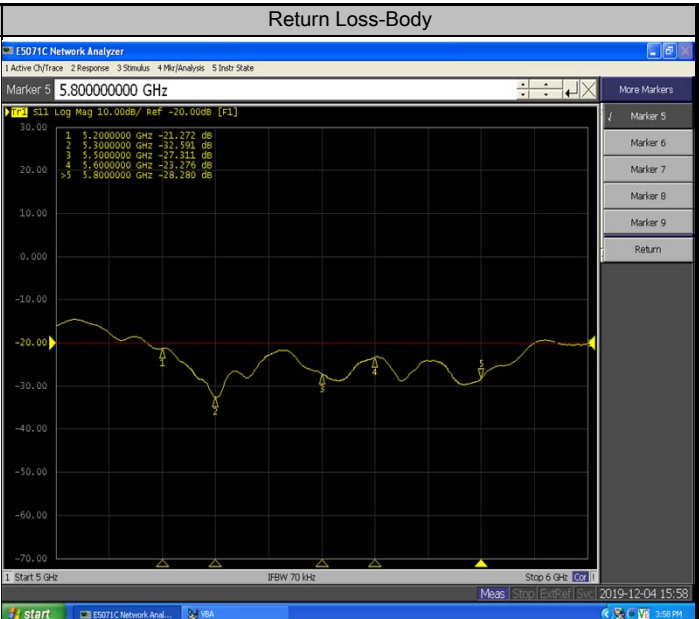
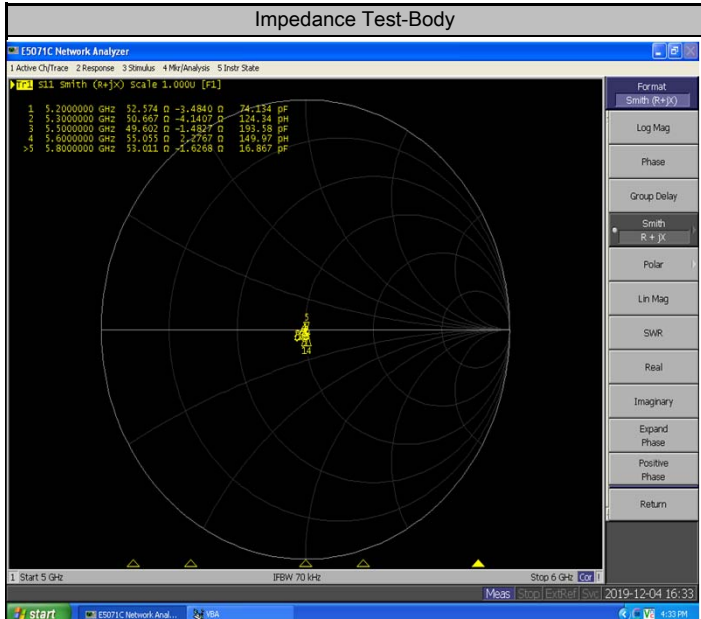
Equipment :	Manufacturer :	Model No. :	Serial No. :	Cal.Organization :	Cal. Date :
Power Amplifier	Mini-Circuits	ZVE-8G+	520701341	NA	February 25, 2019
DC Source	Iteck	OT6154	M00157	NA	August 3, 2019
P-series power meter	Agilent	N1911A	MY45100473	NA	September 23, 2019
wideband power sensor	Agilent	N1921A	MY51100041	NA	September 23, 2019
Smart Power Sensor	R&S	NRP-Z21	102209	NA	March 1, 2019
Dual directional coupler	Woken	TS-PCC0M-05	107090019	NA	March 10, 2019
Signal Generator	Agilent	E4438C	MY4907131	NA	Mar. 10, 2019
ENA Network Analyzer	Agilent	E5071C	MY46102965	NA	March 10, 2019

Model No	For Head Tissue				
	Item	Originak Cal. Result	Verified on 2019/12/4	Deviation	Result
D5GHzV2(5.2GHz)	Impedance, transformed to feed point	53.5Ω-8.96jΩ	51.016Ω-7.45jΩ	<5Ω	Pass
	Return Loss(dB)	-20.7	-21.656	4.6%	Pass
	SAR Value for 1g(mW/g)	7.5	7.84	4.5%	Pass
	SAR Value for 10g(mW/g)	2.16	2.24	3.7%	Pass
D5GHzV2(5.3GHz)	Impedance, transformed to feed point	50.1Ω-3jΩ	49.690Ω-1.68jΩ	<5Ω	Pass
	Return Loss(dB)	-30.5	-29.65	-2.8%	Pass
	SAR Value for 1g(mW/g)	7.66	7.72	0.8%	Pass
	SAR Value for 10g(mW/g)	2.2	2.2	0.0%	Pass
D5GHzV2(5.5GHz)	Impedance, transformed to feed point	51.4Ω-5.39jΩ	50.8452Ω-2.49jΩ	<5Ω	Pass
	Return Loss(dB)	-25.2	-23.933	-5.0%	Pass
	SAR Value for 1g(mW/g)	8.08	7.79	-3.6%	Pass
	SAR Value for 10g(mW/g)	2.3	2.21	-3.9%	Pass
D5GHzV2(5.6GHz)	Impedance, transformed to feed point	57.5Ω-2.95jΩ	56.735Ω-4.13jΩ	<5Ω	Pass
	Return Loss(dB)	-22.5	-22.837	1.5%	Pass
	SAR Value for 1g(mW/g)	7.85	7.82	-0.4%	Pass
	SAR Value for 10g(mW/g)	2.25	2.19	-2.7%	Pass
D5GHzV2(5.8GHz)	Impedance, transformed to feed point	54.5Ω-1.38jΩ	53.652Ω-0.993jΩ	<5Ω	Pass
	Return Loss(dB)	-26.9	-27.311	1.5%	Pass
	SAR Value for 1g(mW/g)	7.78	7.83	0.6%	Pass
	SAR Value for 10g(mW/g)	2.21	2.19	-0.9%	Pass



Model No	For Body Tissue				
	Item	Originak Cal. Result	Verified on 2019/12/4	Deviation	Result
D5GHzV2(5.2GHz)	Impedance, transformed to feed point	53.1Ω-7.52jΩ	52.574Ω-3.48jΩ	<5Ω	Pass
	Return Loss(dB)	-22.1	-21.272	-3.7%	Pass
	SAR Value for 1g(mW/g)	6.99	7.02	0.4%	Pass
	SAR Value for 10g(mW/g)	1.92	2.01	4.7%	Pass
D5GHzV2(5.3GHz)	Impedance, transformed to feed point	49.3Ω-2.06jΩ	50.667Ω-4.14jΩ	<5Ω	Pass
	Return Loss(dB)	-33.1	-32.591	-1.5%	Pass
	SAR Value for 1g(mW/g)	7.25	7.48	3.2%	Pass
	SAR Value for 10g(mW/g)	2.04	2.13	4.4%	Pass
D5GHzV2(5.5GHz)	Impedance, transformed to feed point	50.9Ω-4.94jΩ	49.602Ω-1.48jΩ	<5Ω	Pass
	Return Loss(dB)	-26.1	-27.311	4.6%	Pass
	SAR Value for 1g(mW/g)	7.63	7.74	1.4%	Pass
	SAR Value for 10g(mW/g)	2.13	2.21	3.8%	Pass
D5GHzV2(5.6GHz)	Impedance, transformed to feed point	58.5Ω-0.79jΩ	55.055Ω+2.28jΩ	<5Ω	Pass
	Return Loss(dB)	-22.1	-23.276	5.3%	Pass
	SAR Value for 1g(mW/g)	7.78	8.01	3.0%	Pass
	SAR Value for 10g(mW/g)	2.14	2.23	4.2%	Pass
D5GHzV2(5.8GHz)	Impedance, transformed to feed point	54.3Ω+0.12jΩ	53.011Ω-1.63jΩ	<5Ω	Pass
	Return Loss(dB)	-27.6	-28.28	2.5%	Pass
	SAR Value for 1g(mW/g)	7.66	7.73	0.9%	Pass
	SAR Value for 10g(mW/g)	2.15	2.17	0.9%	Pass





### Validation Report for Head TSL of 5.2GHz

Test Laboratory: BTL Inc.      Date: 2019/12/04

**System Check\_H5200\_1204**

DUT: Dipole D5GHzV2;SN;1160;

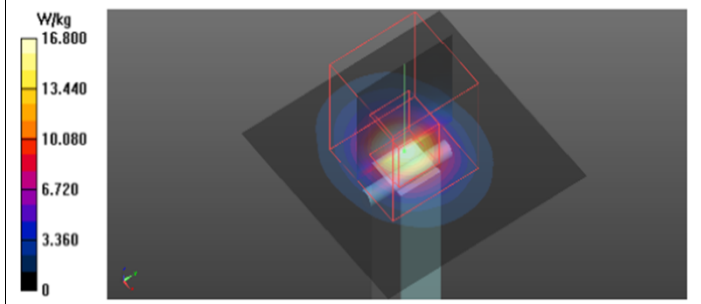
Communication System: UID 0, CW (0); Frequency: 5200 MHz; Duty Cycle: 1:1  
 Medium parameters used: f = 5200 MHz;  $\sigma = 4.756$  S/m;  $\epsilon_r = 35.67$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.2 °C; Liquid Temperature : 22.3 °C

DASY Configuration:

- Probe: EX3DV4 - SN7544; ConvF(5.54, 5.54, 5.54) @ 5200 MHz; Calibrated: 2019/9/9
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0
- Electronics: DAE4 Sn1390; Calibrated: 2019/10/29
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1222
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Area Scan (6x6x1): Interpolated grid: dx=10 mm, dy=10 mm  
 Maximum value of SAR (interpolated) = 16.8 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm  
 Reference Value = 60.39 V/m; Power Drift = 0.12 dB  
 Peak SAR (extrapolated) = 34.2 W/kg  
**SAR(1 g) = 7.84 W/kg; SAR(10 g) = 2.24 W/kg**  
 Maximum value of SAR (measured) = 16.8 W/kg



### Validation Report for Head TSL of 5.3GHz

Test Laboratory: BTL Inc.      Date: 2019/12/04

**System Check\_H5300\_1204**

DUT: Dipole D5GHzV2;SN;1160;

Communication System: UID 0, CW (0); Frequency: 5300 MHz; Duty Cycle: 1:1  
 Medium parameters used (interpolated): f = 5300 MHz;  $\sigma = 4.869$  S/m;  $\epsilon_r = 35.413$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Ambient Temperature : 23.2 °C; Liquid Temperature : 22.3 °C

DASY Configuration:

- Probe: EX3DV4 - SN7544; ConvF(5.21, 5.21, 5.21) @ 5300 MHz; Calibrated: 2019/9/9
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 23.0
- Electronics: DAE4 Sn1390; Calibrated: 2019/10/29
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1222
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Area Scan (6x6x1): Interpolated grid: dx=10 mm, dy=10 mm  
 Maximum value of SAR (interpolated) = 16.8 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm  
 Reference Value = 59.72 V/m; Power Drift = 0.10 dB  
 Peak SAR (extrapolated) = 34.9 W/kg  
**SAR(1 g) = 7.72 W/kg; SAR(10 g) = 2.2 W/kg**  
 Maximum value of SAR (measured) = 16.6 W/kg

