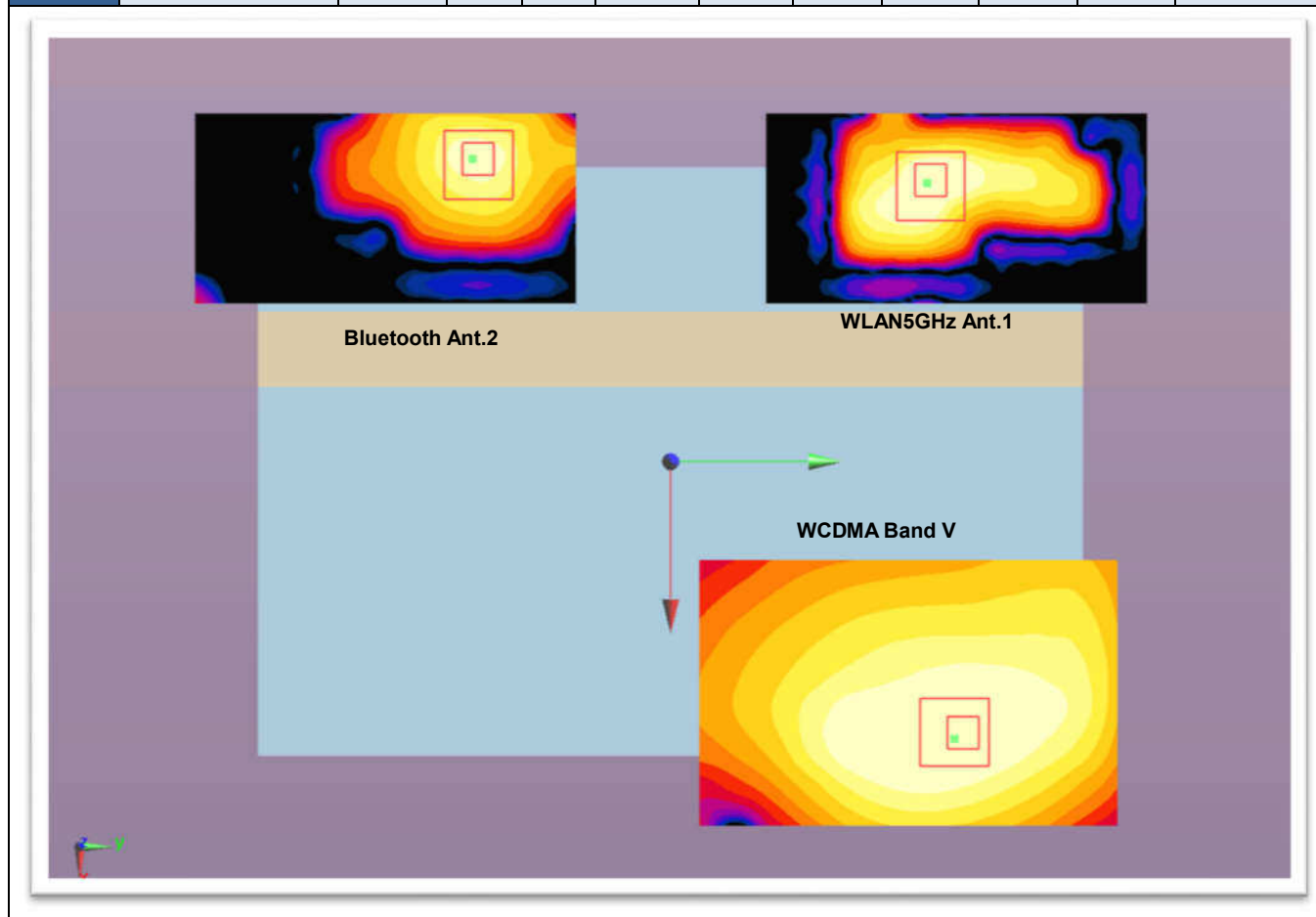
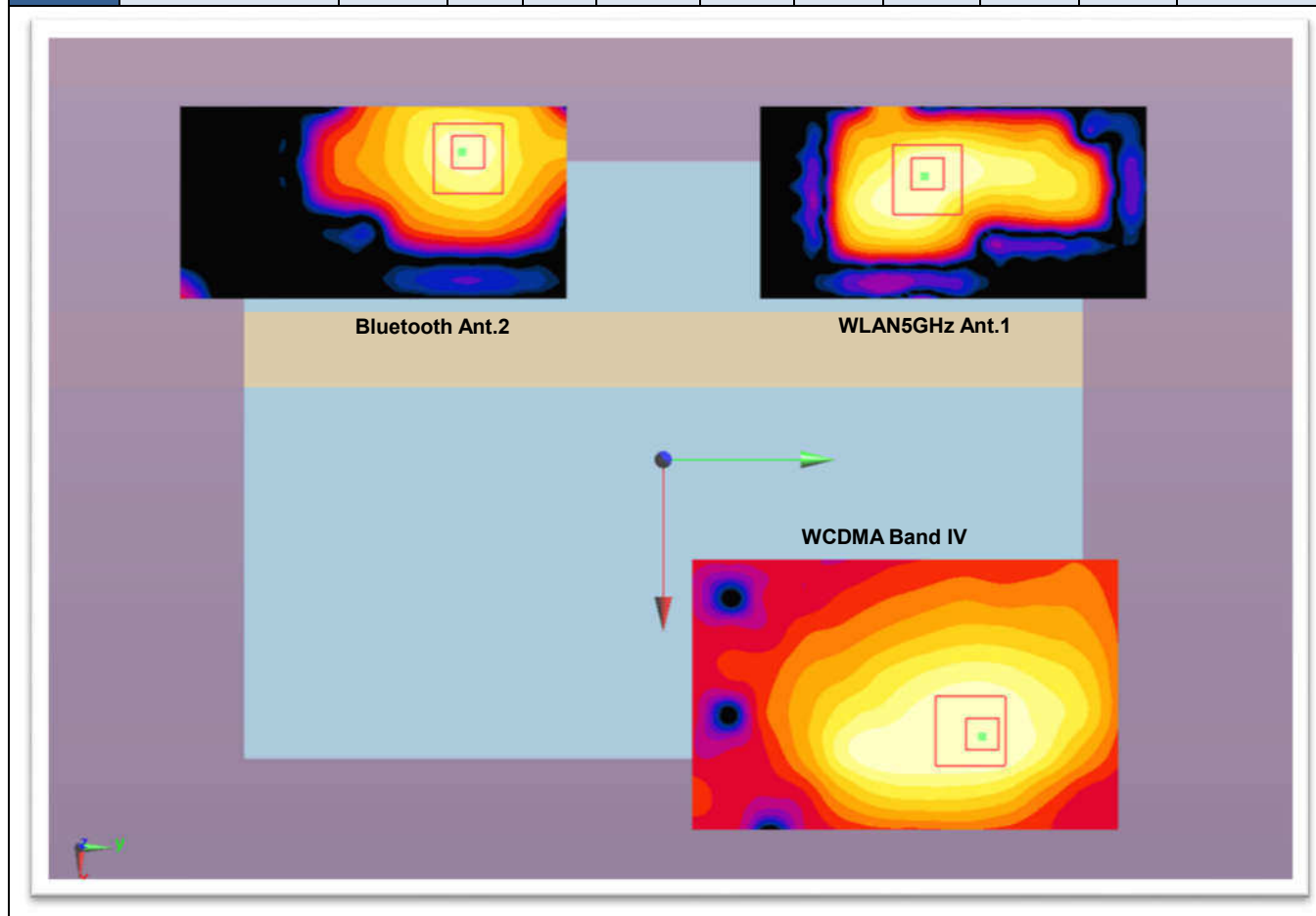


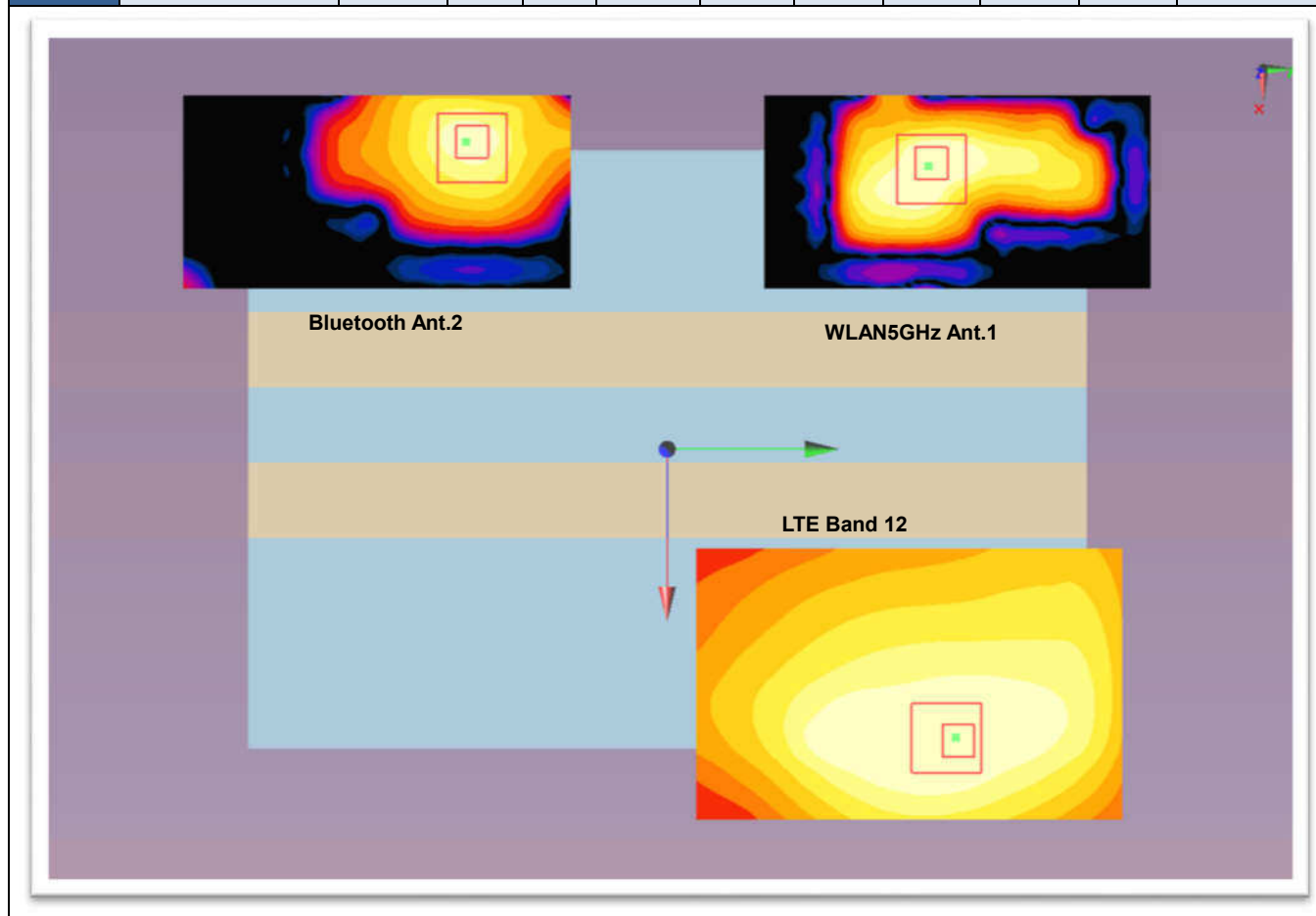
	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
Case #29	WCDMA Band V	Bottom	1.003	0	8.48	9.42	0	173.30	1.63	0.01	Not required
	WLAN5G Ant.1		0.630	0	-8.8	8.1	0.07	240.96	1.35	0.01	Not required
	WCDMA Band V		1.003	0	8.48	9.42	0				
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02	145.65	0.98	0.01	Not required
	WLAN5G Ant. 1		0.630	0	-8.8	8.1	0.07				
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02				



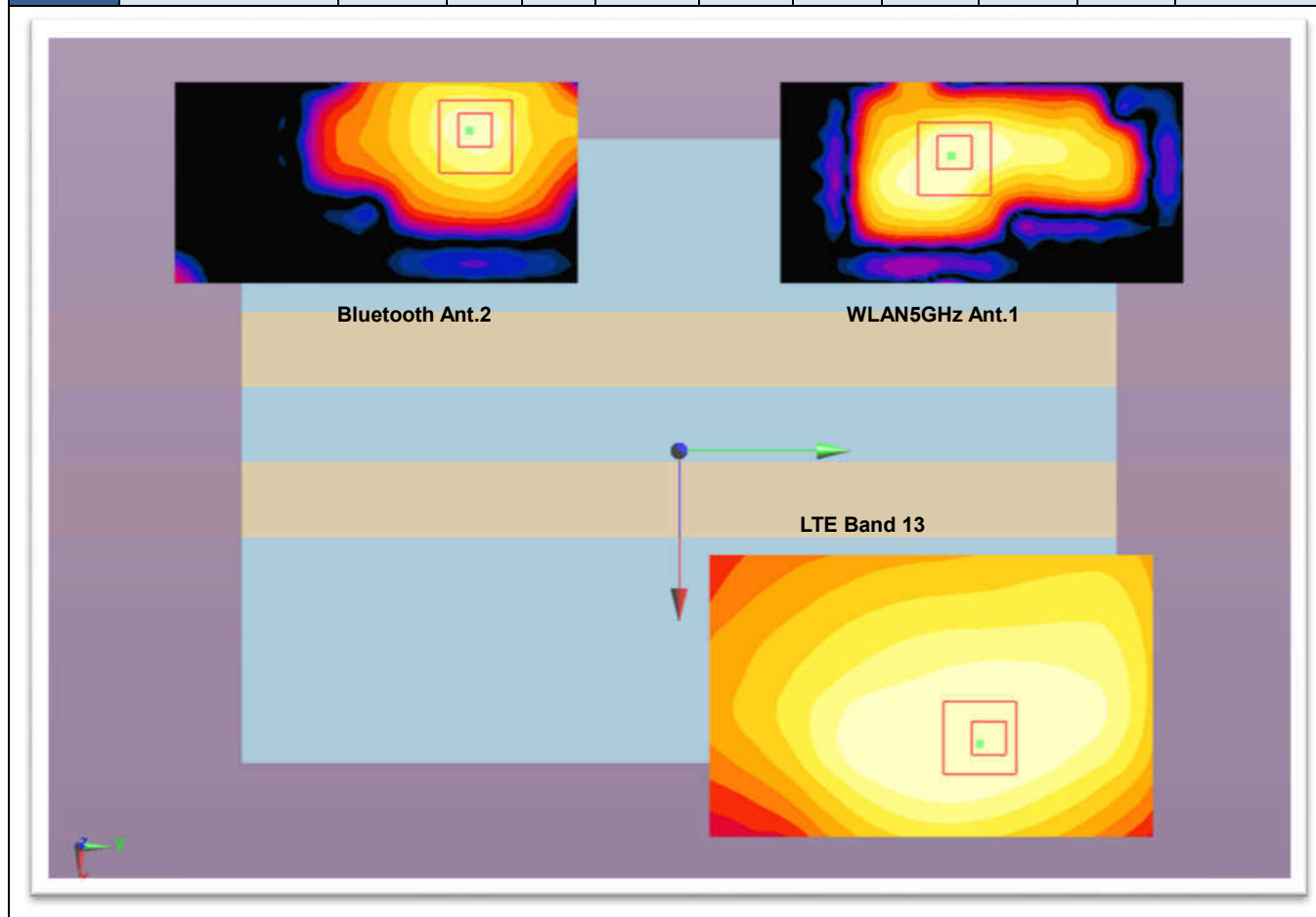
	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
Case #30	WCDMA Band IV	Bottom	1.039	0	8.52	10	0.13	174.24	1.67	0.01	Not required
	WLAN5G Ant.1		0.630	0	-8.8	8.1	0.07	245.11	1.39	0.01	Not required
	WCDMA Band IV		1.039	0	8.52	10	0.13				
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02	145.65	0.98	0.01	Not required
	WLAN5G Ant.1		0.630	0	-8.8	8.1	0.07				
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02				



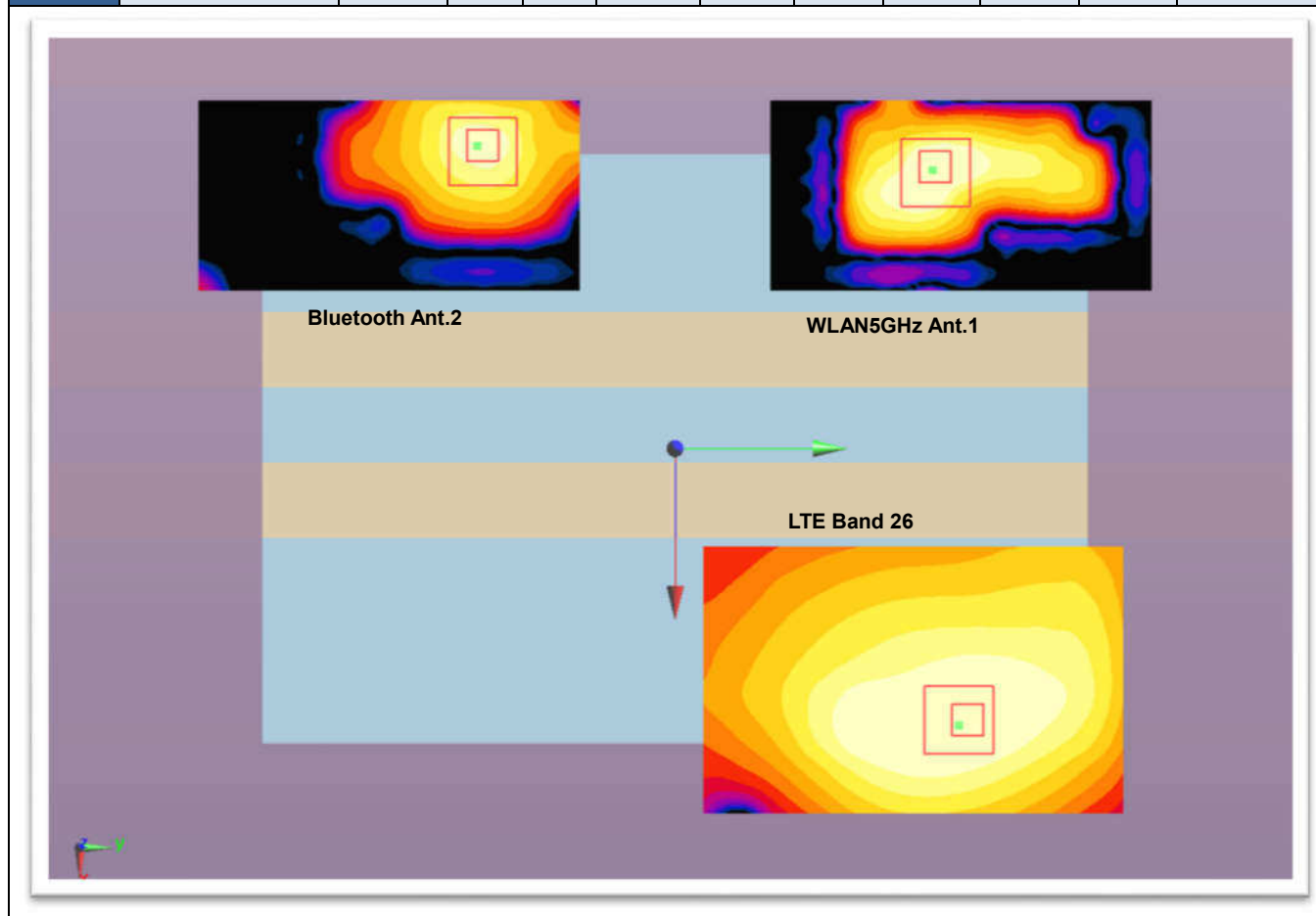
	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
Case #31	LTE Band 12	Bottom	0.867	0	8.98	9.24	0.15	178.17	1.50	0.01	Not required
	WLAN5G Ant.1		0.630	0	-8.8	8.1	0.07	243.58	1.22	0.01	Not required
	LTE Band 12		0.867	0	8.98	9.24	0.15				
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02	145.65	0.98	0.01	Not required
	WLAN5G Ant. 1		0.630	0	-8.8	8.1	0.07				
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02				



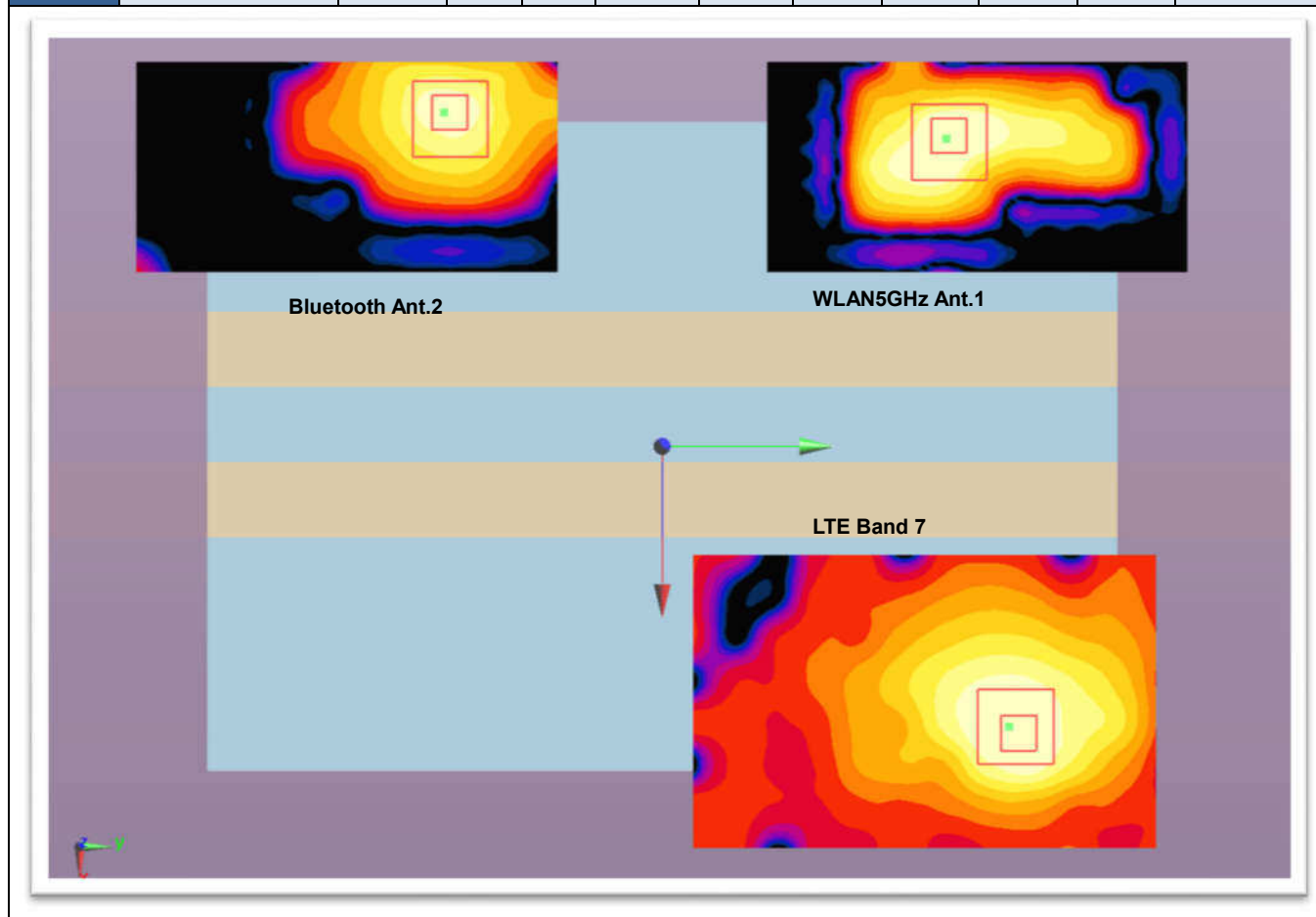
	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
Case #32	LTE Band 13	Bottom	1.067	0	8.42	0.42	0	188.55	1.70	0.01	Not required
	WLAN5G Ant.1		0.630	0	-8.8	8.1	0.07				
	LTE Band 13		1.067	0	8.42	0.42	0	193.38	1.42	0.01	Not required
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02				
	WLAN5G Ant.1		0.630	0	-8.8	8.1	0.07	145.65	0.98	0.01	Not required
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02				



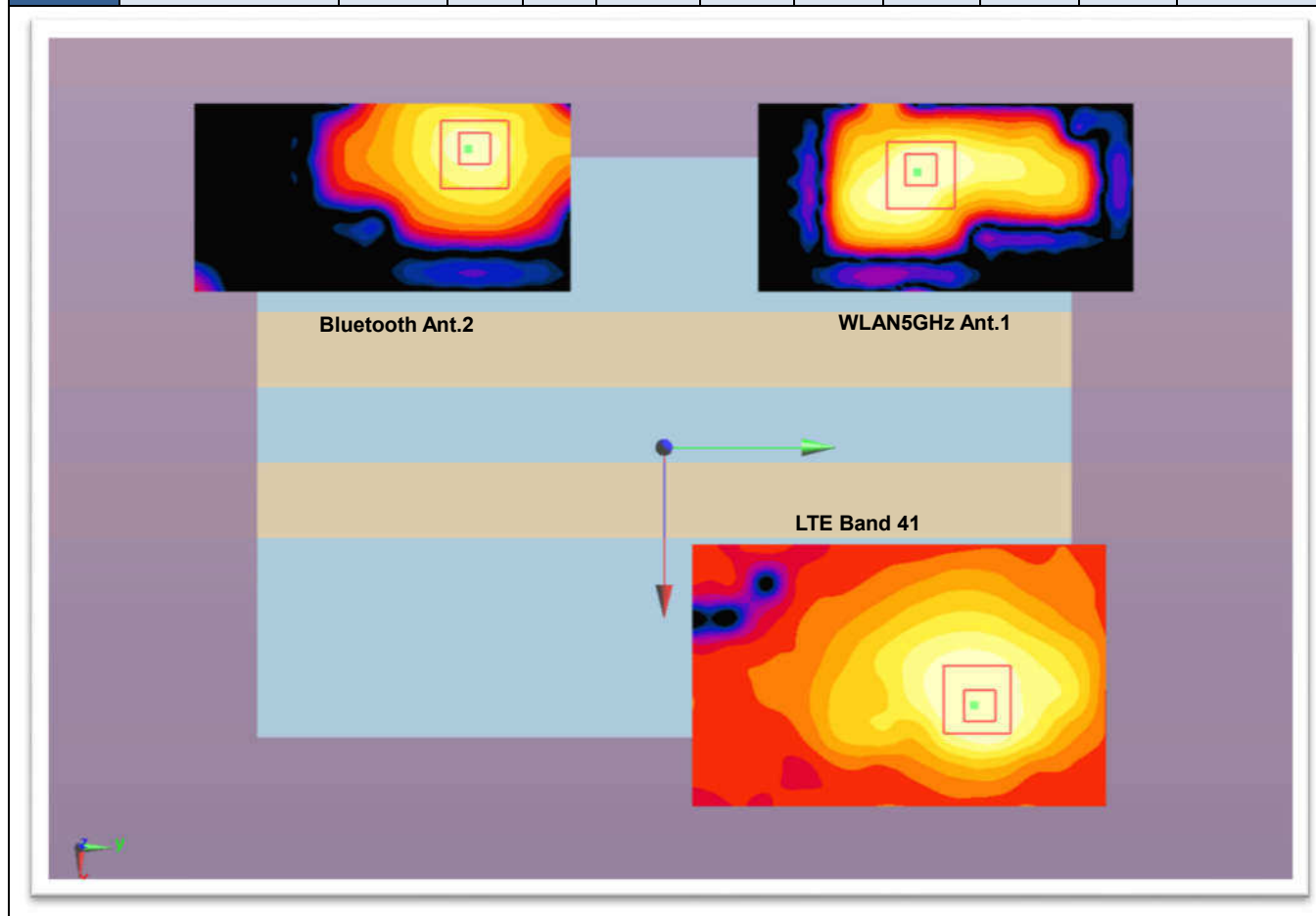
	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
Case #33	LTE Band 26	Bottom	0.916	0	8.42	9.42	0	172.71	1.55	0.01	Not required
	WLAN5G Ant.1		0.630	0	-8.8	8.1	0.07	240.50	1.27	0.01	Not required
	LTE Band 26		0.916	0	8.42	9.42	0				
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02	145.65	0.98	0.01	Not required
	WLAN5G Ant.1		0.630	0	-8.8	8.1	0.07				
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02				



	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
Case #34	LTE Band 7	Bottom	0.988	0	8.32	10.1	0	172.37	1.62	0.01	Not required
	WLAN5G Ant.1		0.630	0	-8.8	8.1	0.07	244.31	1.34	0.01	Not required
	LTE Band 7		0.988	0	8.32	10.1	0				
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02	145.65	0.98	0.01	Not required
	WLAN5G Ant. 1		0.630	0	-8.8	8.1	0.07				
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02				



	Band	Position	SAR (W/kg)	Gap (mm)	SAR peak location (cm)			3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z				
Case #35	LTE Band 41	Bottom	1.054	0	8.36	10.1	0.01	172.76	1.68	0.01	Not required
	WLAN5G Ant.1		0.630	0	-8.8	8.1	0.07				
	LTE Band 41		1.054	0	8.36	10.1	0.01	244.60	1.40	0.01	Not required
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02				
	WLAN5G Ant. 1		0.630	0	-8.8	8.1	0.07	145.65	0.98	0.01	Not required
	Bluetooth Ant.2		0.350	0	-9.66	-6.44	0.02				



Test Engineer : Nick Hu



17. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg. The expanded SAR measurement uncertainty must be $\leq 30\%$, for a confidence interval of $k = 2$. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg. Therefore, the measurement uncertainty table is not required in this report.

18. References

- [1] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"
- [2] ANSI/IEEE Std. C95.1-1992, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", September 1992
- [3] IEEE Std. 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", Sep 2013
- [4] SPEAG DASY System Handbook
- [5] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [6] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015
- [7] FCC KDB 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015
- [8] FCC KDB 248227 D01 v02r02, "SAR Guidance for IEEE 802.11 (WiFi) Transmitters", Oct 2015.
- [9] FCC KDB 616217 D04 v01r02, "SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers", Oct 2015
- [10] FCC KDB 941225 D01 v03r01, "3G SAR MEAUREMENT PROCEDURES", Oct 2015
- [11] FCC KDB 941225 D05 v02r05, "SAR Evaluation Considerations for LTE Devices", Dec 2015
- [12] FCC KDB 941225 D05A v01r02, "Rel. 10 LTE SAR Test Guidance and KDB Inquiries", Oct 2015



Appendix A. Plots of System Performance Check

The plots are shown as follows.

System Check_Body_750MHz**DUT: D750V3 - SN:1065**

Communication System: UID 0, CW (0); Frequency: 750 MHz; Duty Cycle: 1:1

Medium: MSL_750 Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.968 \text{ S/m}$; $\epsilon_r = 56.659$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature : $23.2 \text{ }^\circ\text{C}$; Liquid Temperature : $22.6 \text{ }^\circ\text{C}$

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(10.49, 10.49, 10.49); Calibrated: 2017.12.18;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 3.71 W/kg

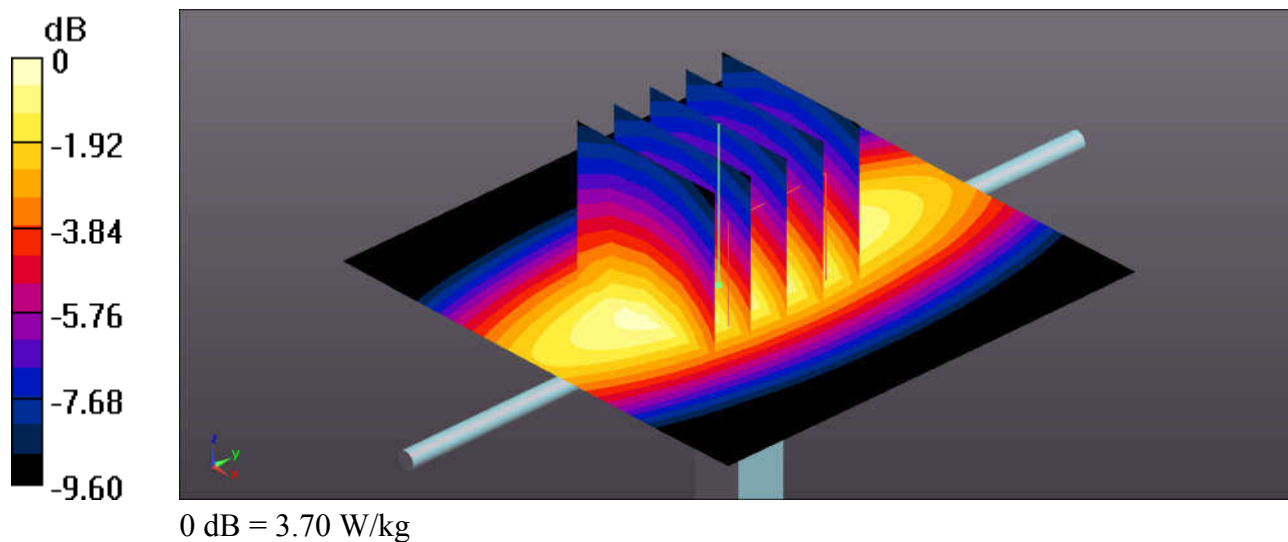
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 48.92 V/m ; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 3.94 W/kg

SAR(1 g) = 2.21 W/kg ; SAR(10 g) = 1.51 W/kg

Maximum value of SAR (measured) = 3.70 W/kg



System Check_Body_835MHz**DUT: D835V2 - SN:4d091**

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

Medium: MSL_835 Medium parameters used: $f = 835$ MHz; $\sigma = 0.982$ S/m; $\epsilon_r = 54.617$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.2 °C ; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(10.14, 10.14, 10.14); Calibrated: 2017.12.18;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 3.84 W/kg

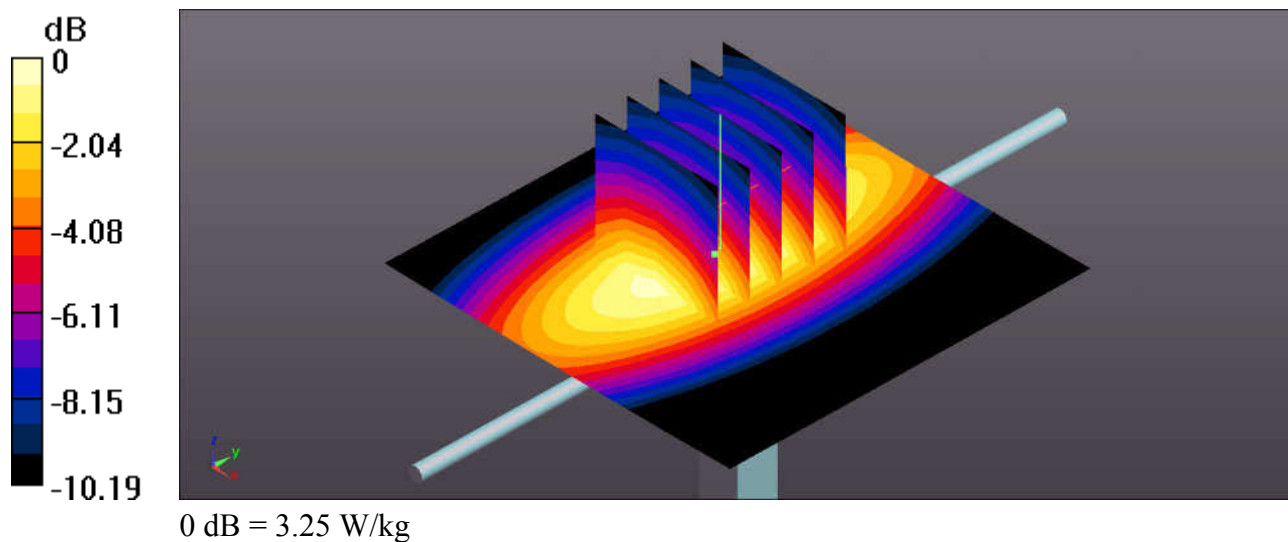
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 38.16 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 2.14 W/kg

SAR(1 g) = 2.23 W/kg; SAR(10 g) = 1.48 W/kg

Maximum value of SAR (measured) = 3.25 W/kg



System Check_Body_1750MHz**DUT: D1750V2 - SN:1069**

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: MSL_1750 Medium parameters used: $f = 1750$ MHz; $\sigma = 1.478$ S/m; $\epsilon_r = 54.616$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.2 °C ; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(8.99, 8.99, 8.99); Calibrated: 2017.12.18;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 19.4 W/kg

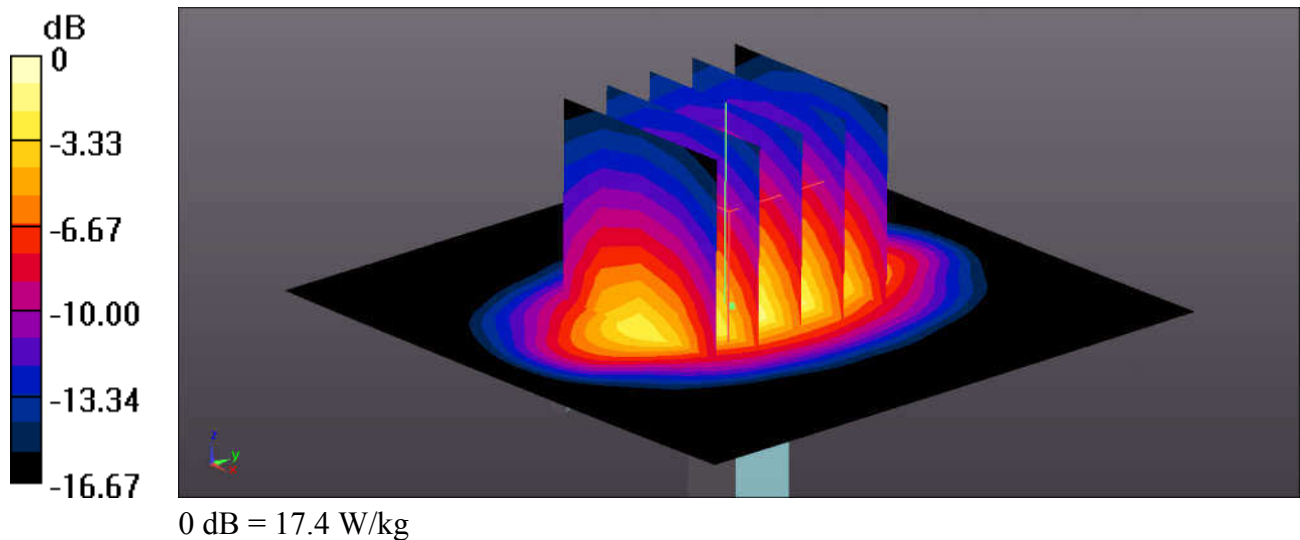
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 75.40 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 9.25 W/kg; SAR(10 g) = 4.94 W/kg

Maximum value of SAR (measured) = 17.4 W/kg



System Check_Body_1900MHz**DUT: D1900V2 - SN:5d118**

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: MSL_1900 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.524$ S/m; $\epsilon_r = 51.744$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.2 °C ; Liquid Temperature : 22.9 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(8.44, 8.44, 8.44); Calibrated: 2017.12.18;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 18.1 W/kg

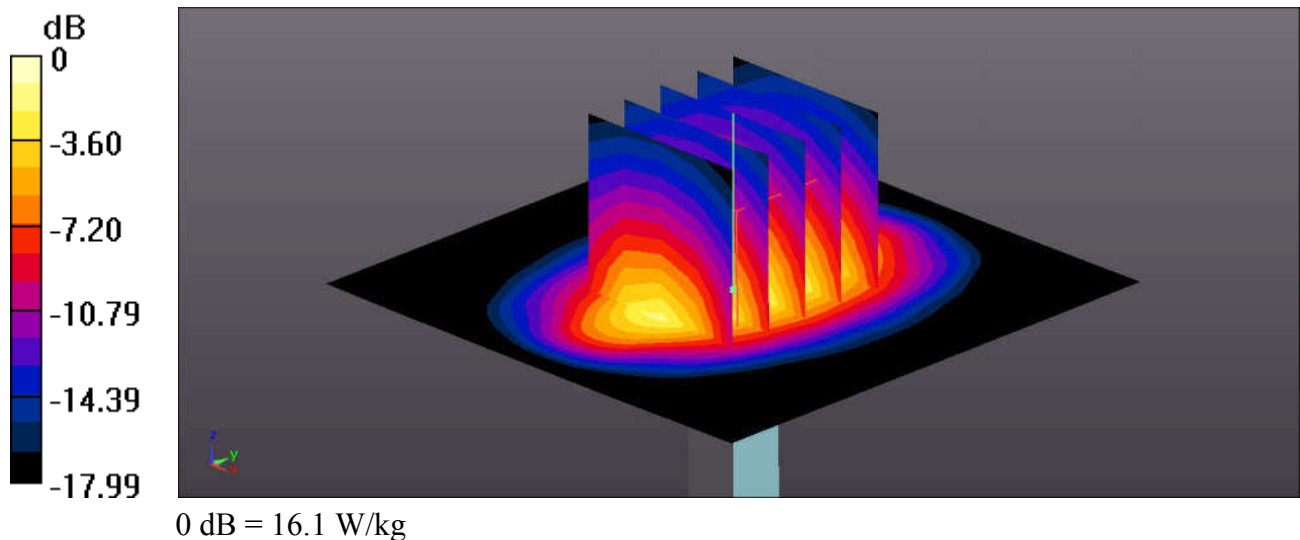
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 76.11 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 9.38 W/kg; SAR(10 g) = 4.96 W/kg

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



System Check_Body_2300MHz**DUT: D2450V2 - SN:1055**

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

Medium: MSL_2300 Medium parameters used: $f = 2300$ MHz; $\sigma = 1.763$ S/m; $\epsilon_r = 52.894$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C ; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(7.93, 7.93, 7.93); Calibrated: 2017.12.18;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Maximum value of SAR (interpolated) = 23.3 W/kg

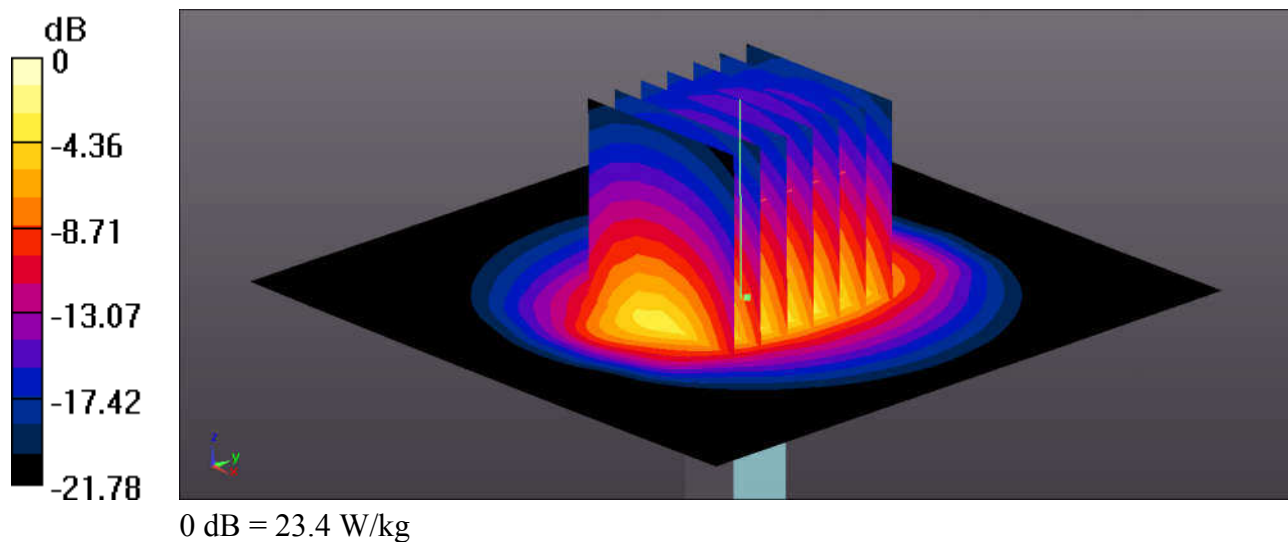
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 76.49 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 17.7 W/kg

SAR(1 g) = 11.45 W/kg; SAR(10 g) = 5.32 W/kg

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



System Check_Body_2450MHz**DUT: D2450V2 - SN:840**

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: MSL_2450 Medium parameters used: $f = 2450$ MHz; $\sigma = 1.957$ S/m; $\epsilon_r = 52.432$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C ; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(7.83, 7.83, 7.83); Calibrated: 2017.12.18;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Maximum value of SAR (interpolated) = 24.9 W/kg

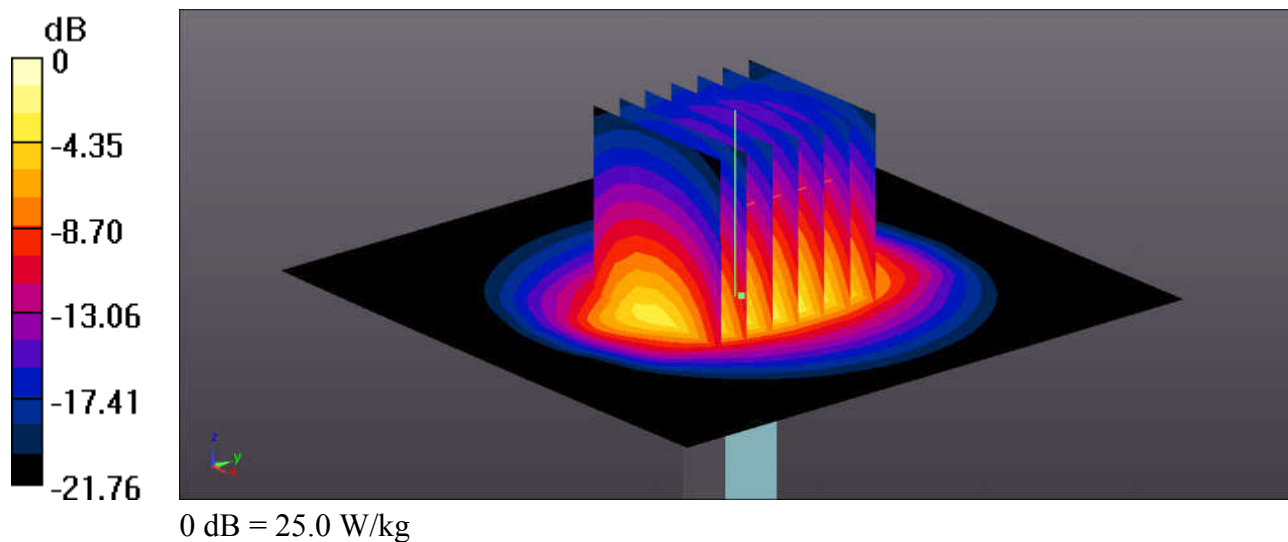
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 76.98 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 19.8 W/kg

SAR(1 g) = 12.03 W/kg; SAR(10 g) = 5.68 W/kg

Maximum value of SAR (measured) = 25.0 W/kg



System Check_Body_2600MHz**DUT: D2600V2 - SN:1061**

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

Medium: MSL_2600 Medium parameters used: $f = 2600$ MHz; $\sigma = 2.172$ S/m; $\epsilon_r = 51.861$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C ; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(7.43, 7.43, 7.43); Calibrated: 2017.12.18;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Maximum value of SAR (interpolated) = 27.6 W/kg

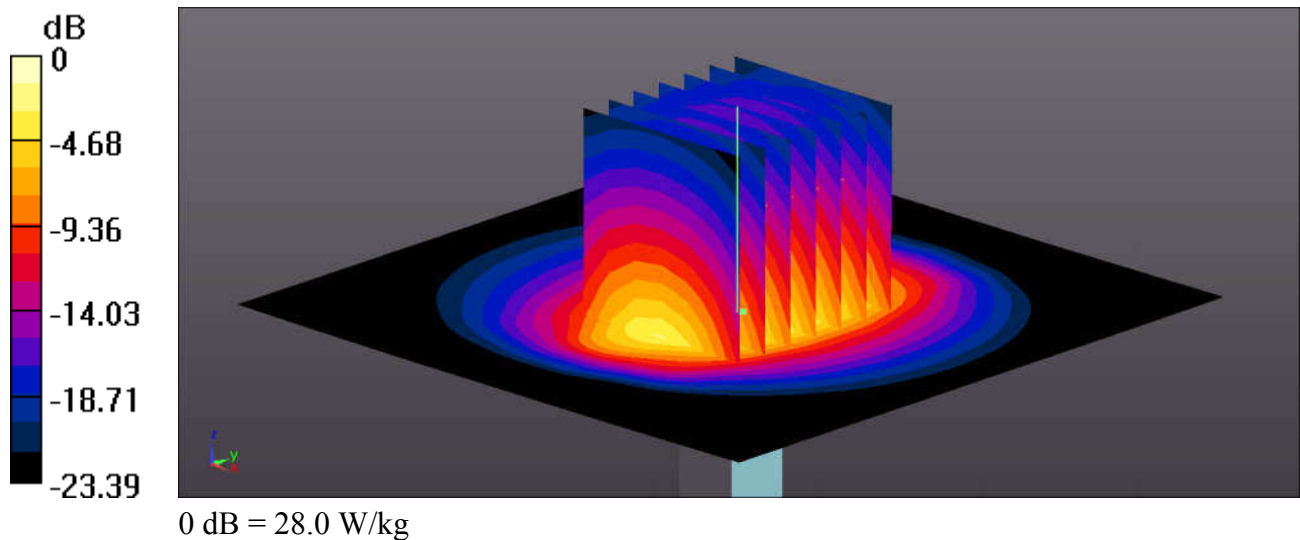
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.98 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 24.3 W/kg

SAR(1 g) = 13.23 W/kg; SAR(10 g) = 6.32 W/kg

Maximum value of SAR (measured) = 28.0 W/kg



System Check_Body_5250MHz**DUT: D5GHzV2-SN:1006**

Communication System: UID 0, CW (0); Frequency: 5250 MHz; Duty Cycle: 1:1

Medium: MSL_5000 Medium parameters used: $f = 5250$ MHz; $\sigma = 5.548$ S/m; $\epsilon_r = 47.011$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C ; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.84, 4.84, 4.84); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 13.2 W/kg

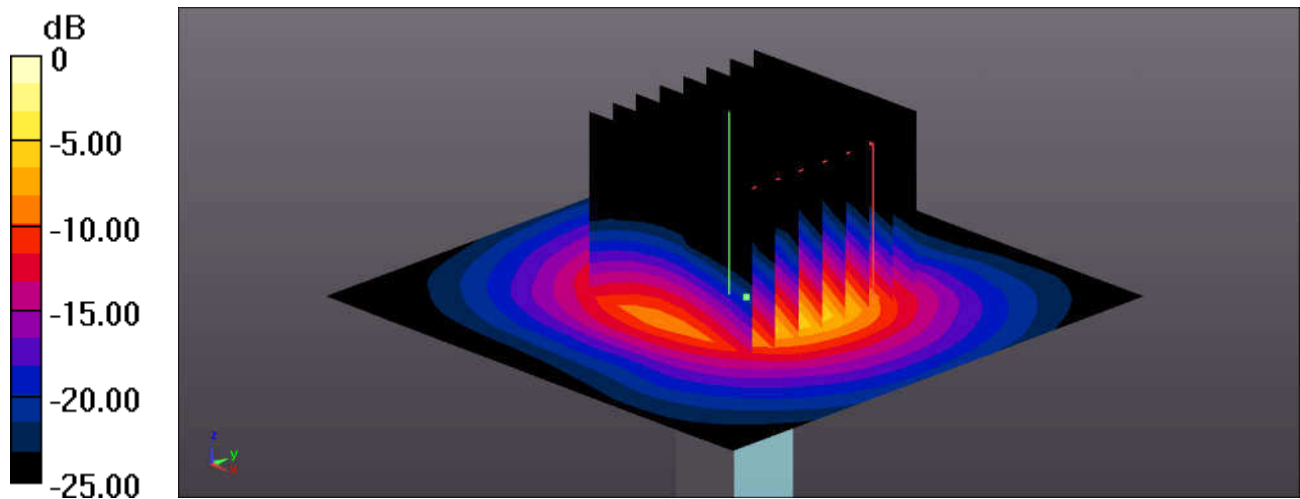
Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 30.27 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 17.3 W/kg

SAR(1 g) = 7.8 W/kg; SAR(10 g) = 2.23 W/kg

Maximum value of SAR (measured) = 15.1 W/kg



0 dB = 15.1 W/kg

System Check_Body_5600MHz**DUT: D5GHzV2-SN:1006**

Communication System: UID 0, CW (0); Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: MSL_5000 Medium parameters used: $f = 5600$ MHz; $\sigma = 6.014$ S/m; $\epsilon_r = 46.383$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C ; Liquid Temperature : 22.9 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.1, 4.1, 4.1); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 13.4 W/kg

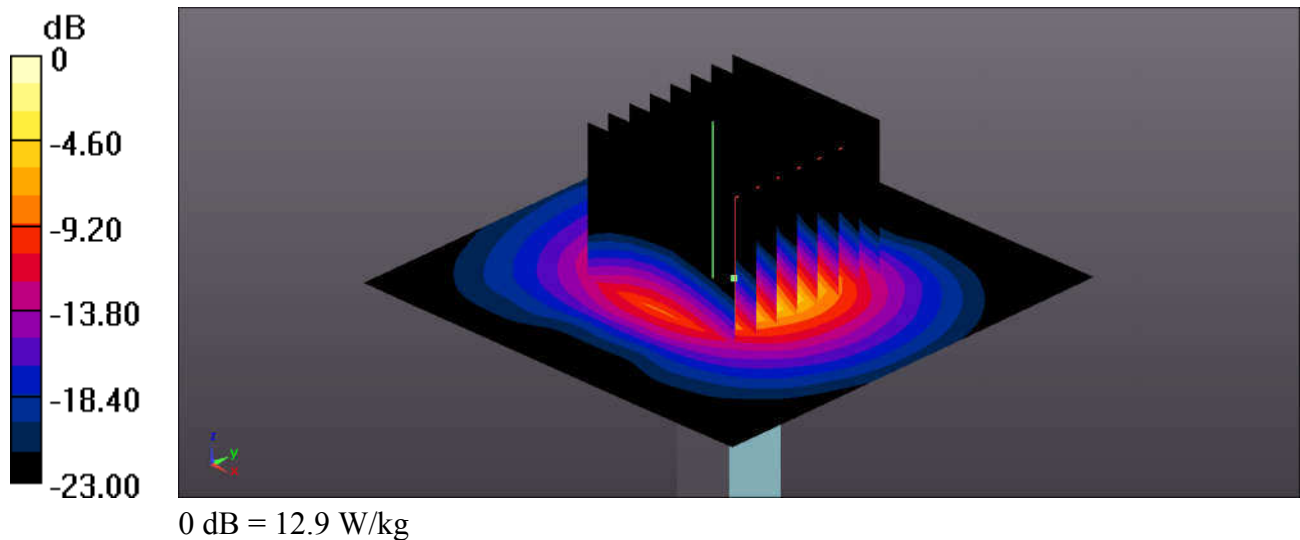
Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 32.67 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 23.4 W/kg

SAR(1 g) = 7.54 W/kg; SAR(10 g) = 2.32 W/kg

Maximum value of SAR (measured) = 12.9 W/kg



System Check_Body_5750MHz**DUT: D5GHzV2-SN:1006**

Communication System: UID 0, CW (0); Frequency: 5750 MHz; Duty Cycle: 1:1

Medium: MSL_5000 Medium parameters used: $f = 5750$ MHz; $\sigma = 6.226$ S/m; $\epsilon_r = 46.149$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.4 °C ; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.41, 4.41, 4.41); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 14.0 W/kg

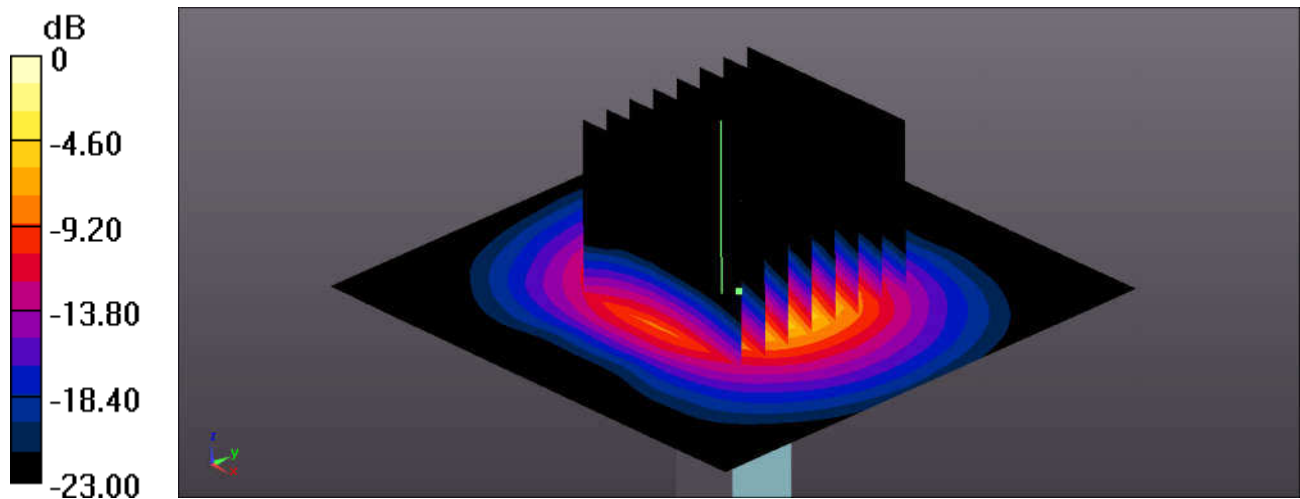
Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 27.91 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 21.5 W/kg

SAR(1 g) = 7.42 W/kg; SAR(10 g) = 2.26 W/kg

Maximum value of SAR (measured) = 16.2 W/kg



0 dB = 16.2 W/kg



Appendix B. Plots of High SAR Measurement

The plots are shown as follows.

01_WCDMA V_RMC 12.2Kbps_Bottom_0mm_On_Ch4182

Communication System: UID 0, UMTS (0); Frequency: 836.4 MHz; Duty Cycle: 1:1

Medium: MSL_835 Medium parameters used: $f = 836.4$ MHz; $\sigma = 0.984$ S/m; $\epsilon_r = 54.593$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.2 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(10.14, 10.14, 10.14); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

Ch4182/Area Scan (71x111x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 1.27 W/kg

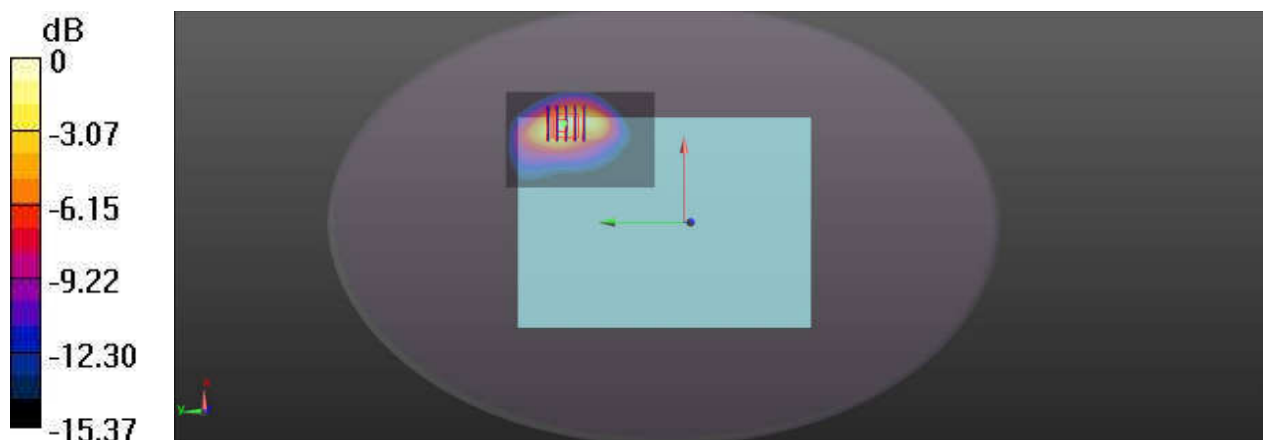
Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

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

Peak SAR (extrapolated) = 1.82 W/kg

SAR(1 g) = 0.878 W/kg; SAR(10 g) = 0.465 W/kg

Maximum value of SAR (measured) = 1.31 W/kg



0 dB = 1.31 W/kg

02_WCDMA IV_RMC 12.2Kbps_Bottom_0mm_On_Ch1312

Communication System: UID 0, UMTS (0); Frequency: 1712.4 MHz; Duty Cycle: 1:1

Medium: MSL_1750 Medium parameters used: $f = 1712.4$ MHz; $\sigma = 1.439$ S/m; $\epsilon_r = 54.759$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.2 °C; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(8.99, 8.99, 8.99); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

Ch1312/Area Scan (71x111x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 1.17 W/kg

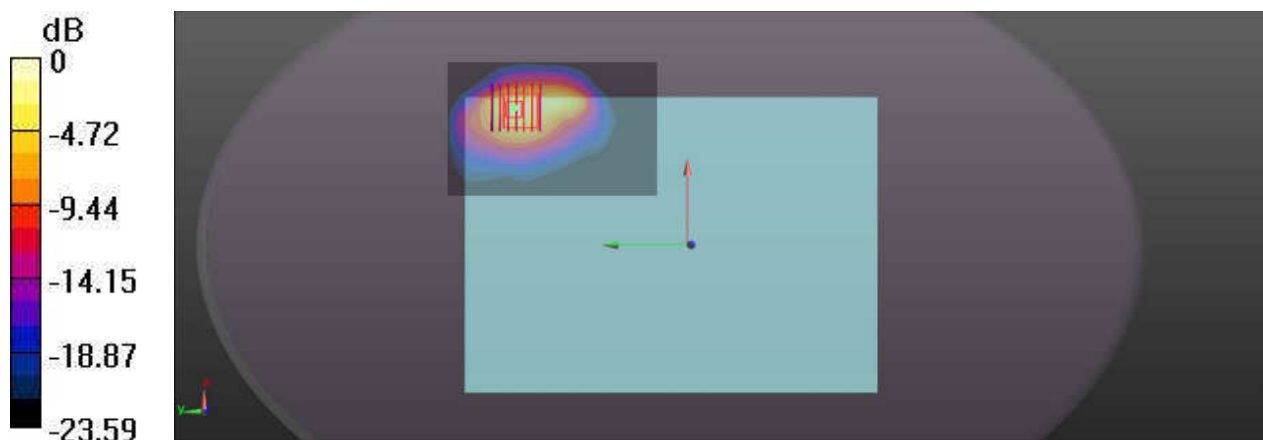
Ch1312/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 0.9130 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.78 W/kg

SAR(1 g) = 0.810 W/kg; SAR(10 g) = 0.382 W/kg

Maximum value of SAR (measured) = 1.29 W/kg



0 dB = 1.29 W/kg

03_WCDMA II_RMC 12.2Kbps_Bottom Face_0mm_On_Ch9538

Communication System: UID 0, UMTS (0); Frequency: 1907.6 MHz; Duty Cycle: 1:1

Medium: MSL_1900 Medium parameters used: $f = 1907.6$ MHz; $\sigma = 1.535$ S/m; $\epsilon_r = 51.718$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.2 °C; Liquid Temperature : 22.9 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(8.44, 8.44, 8.44); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch9538/Area Scan (61x81x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 1.41 W/kg

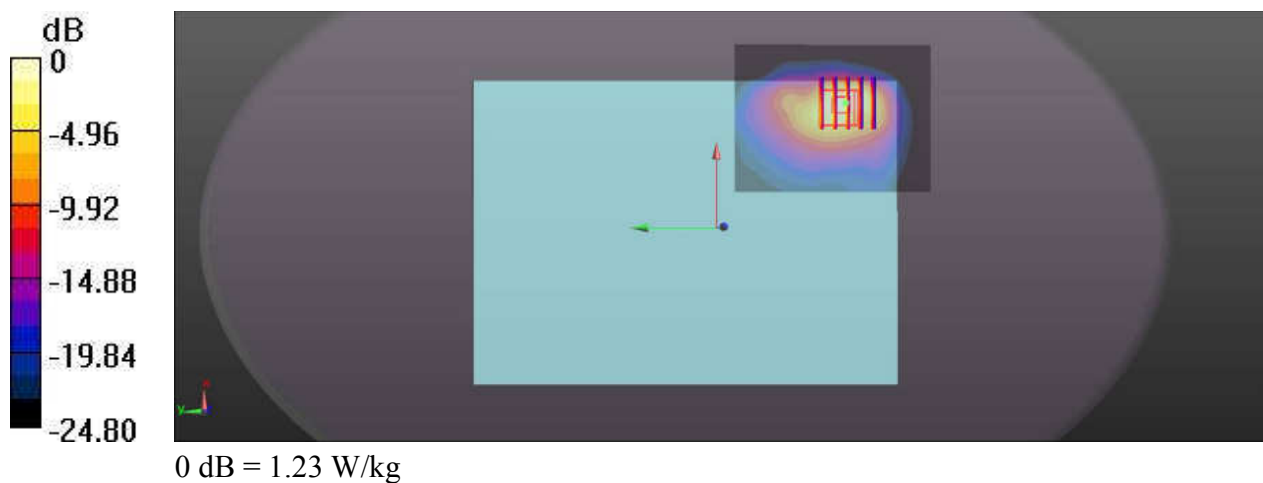
Ch9538/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 1.029 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.85 W/kg

SAR(1 g) = 0.796 W/kg; SAR(10 g) = 0.348 W/kg

Maximum value of SAR (measured) = 1.23 W/kg



04_LTE Band 12_10M_QPSK_1RB_0Offset_Bottom_0mm_On_Ch23095

Communication System: UID 0, FDD_LTE (0); Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: MSL_750 Medium parameters used: $f = 707.5$ MHz; $\sigma = 0.927$ S/m; $\epsilon_r = 57.031$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.2 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(10.49, 10.49, 10.49); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

23095/Area Scan (71x111x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 1.16 W/kg

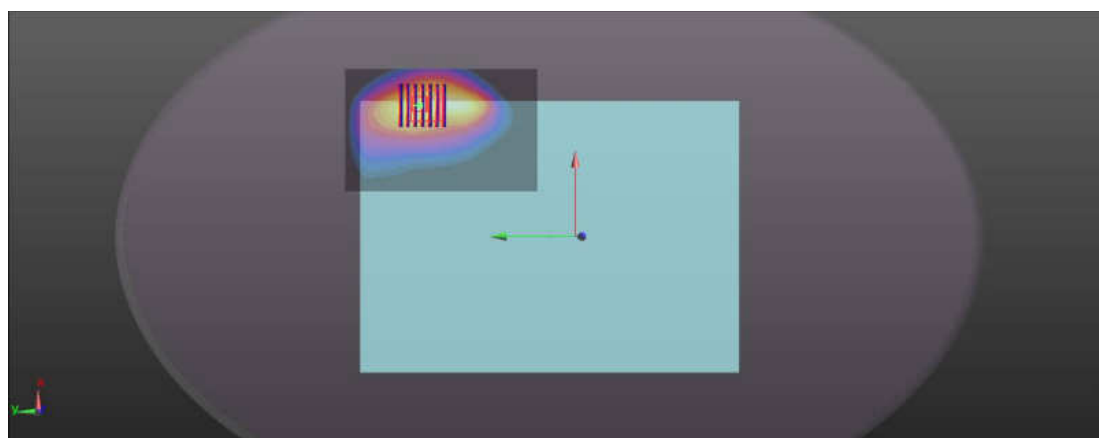
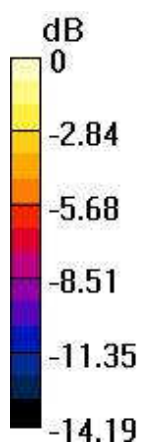
23095/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0.9770 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 1.55 W/kg

SAR(1 g) = 0.736 W/kg; SAR(10 g) = 0.396 W/kg

Maximum value of SAR (measured) = 1.10 W/kg



0 dB = 1.10 W/kg

05_LTE Band 13_10M_QPSK_1RB_0Offset_Bottom_0mm_Ch23230

Communication System: UID 0, FDD_LTE (0); Frequency: 782 MHz; Duty Cycle: 1:1

Medium: MSL_750 Medium parameters used: $f = 782$ MHz; $\sigma = 1$ S/m; $\epsilon_r = 56.35$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.2 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(10.49, 10.49, 10.49); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.1.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch23230/Area Scan (71x111x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 1.32 W/kg

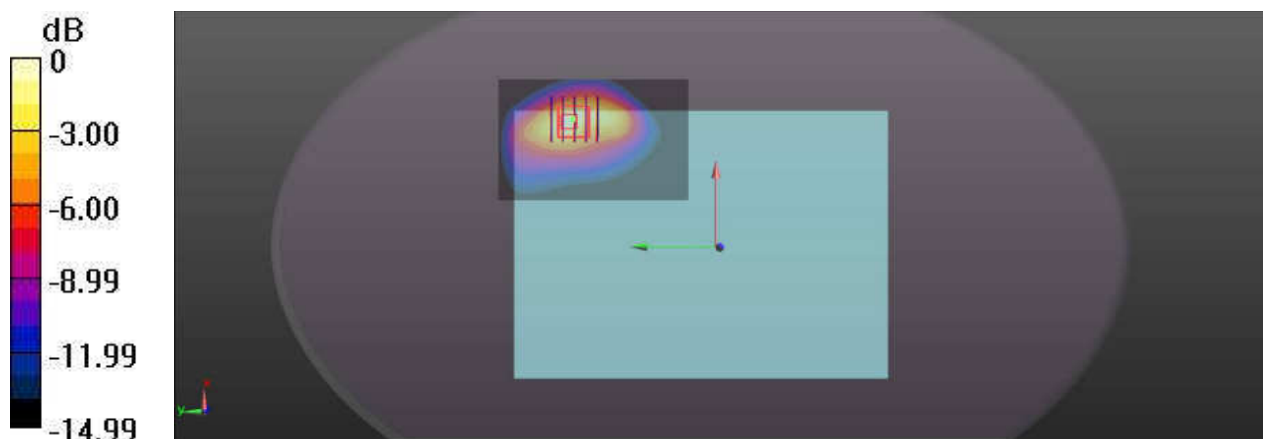
Ch23230/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 0 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.87 W/kg

SAR(1 g) = 0.865 W/kg; SAR(10 g) = 0.428 W/kg

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



0 dB = 1.36 W/kg

06_LTE Band 26_15M_QPSK_1RB_0Offset_Bottom_0mm_Ch26865

Communication System: UID 0, FDD_LTE (0); Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: MSL_835 Medium parameters used: $f = 831.5$ MHz; $\sigma = 0.979$ S/m; $\epsilon_r = 54.646$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.2 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(10.14, 10.14, 10.14); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch26865/Area Scan (71x111x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 1.10 W/kg

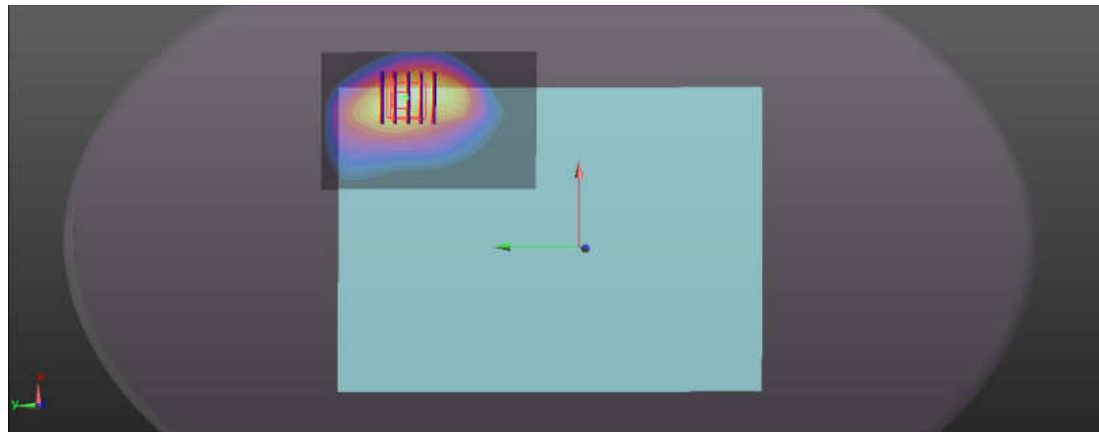
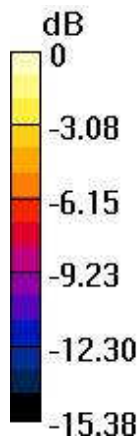
Ch26865/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

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

Peak SAR (extrapolated) = 1.58 W/kg

SAR(1 g) = 0.765 W/kg; SAR(10 g) = 0.405 W/kg

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



0 dB = 1.14 W/kg

07_LTE Band 66_20M_QPSK_1RB_0Offset_Edge 1_18mm_Off_Ch132322

Communication System: UID 0, FDD_LTE (0); Frequency: 1745 MHz; Duty Cycle: 1:1
Medium: MSL_1750 Medium parameters used: $f = 1745$ MHz; $\sigma = 1.473$ S/m; $\epsilon_r = 54.63$; $\rho = 1000$

kg/m³

Ambient Temperature : 23.2 °C; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(8.99, 8.99, 8.99); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch132322/Area Scan (41x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.922 W/kg

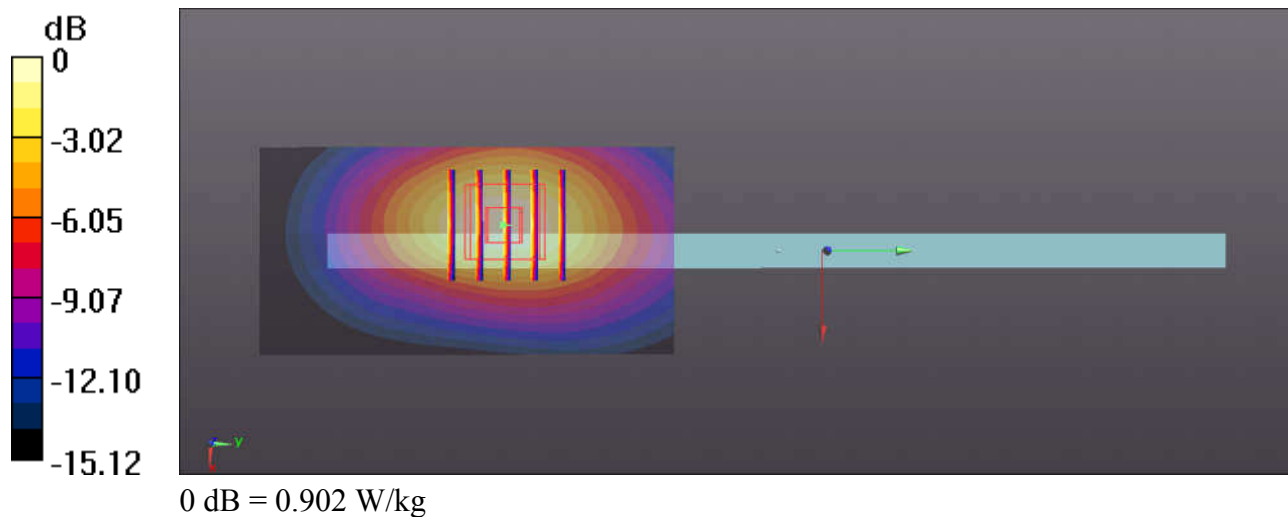
Ch132322/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.187 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.06 W/kg

SAR(1 g) = 0.695 W/kg; SAR(10 g) = 0.419 W/kg

Maximum value of SAR (measured) = 0.902 W/kg



08_LTE Band 2_20M_QPSK_1RB_0Offset_Bottom Face_0mm_On_Ch19100

Communication System: UID 0, FDD_LTE (0); Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: MSL_1900 Medium parameters used: $f = 1900$ MHz; $\sigma = 1.524$ S/m; $\epsilon_r = 51.744$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.2 °C; Liquid Temperature : 22.9 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(8.44, 8.44, 8.44); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

Ch19100/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.51 W/kg

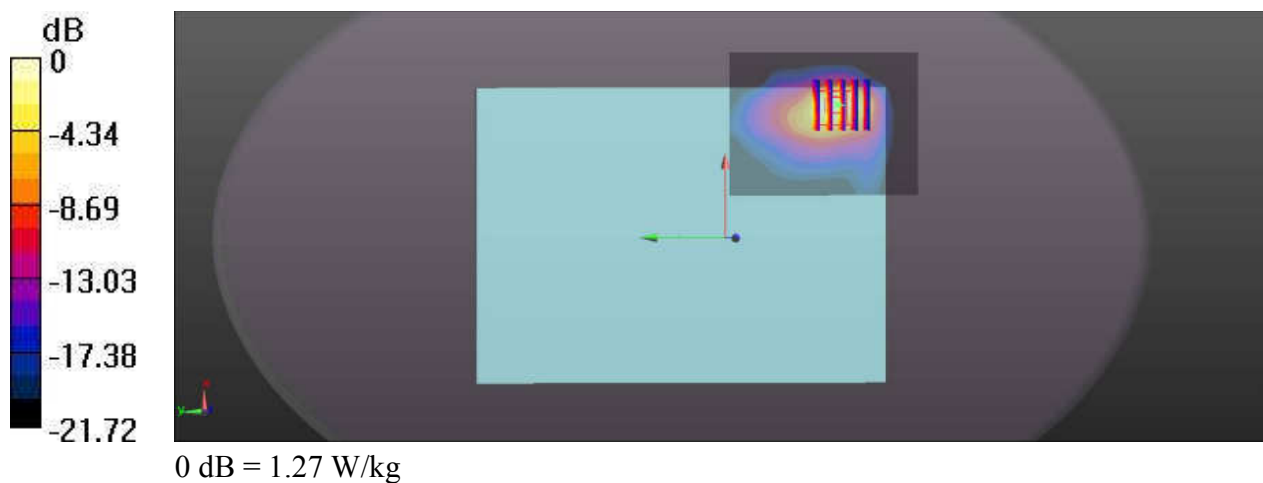
Ch19100/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.025 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 1.90 W/kg

SAR(1 g) = 0.848 W/kg; SAR(10 g) = 0.374 W/kg

Maximum value of SAR (measured) = 1.27 W/kg



09_LTE Band 30_10M_QPSK_1RB_0Offset_Bottom Face_0mm_On_Ch27710

Communication System: UID 0, FDD_LTE (0); Frequency: 2310 MHz; Duty Cycle: 1:1

Medium: MSL_2300 Medium parameters used: $f = 2310$ MHz; $\sigma = 1.775$ S/m; $\epsilon_r = 52.846$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(7.93, 7.93, 7.93); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch27710/Area Scan (71x111x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

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

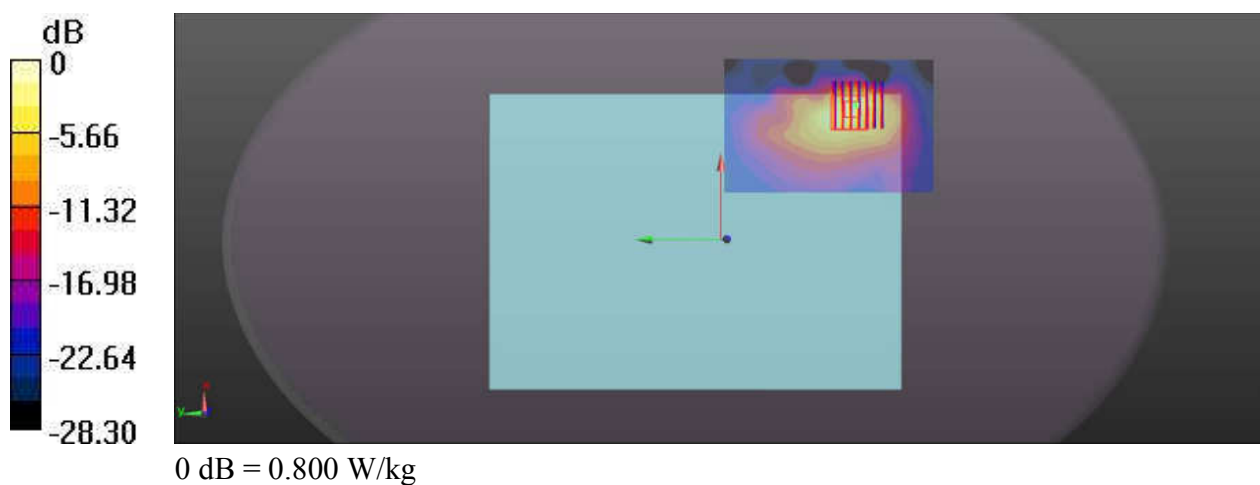
Ch27710/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 0.9330 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.20 W/kg

SAR(1 g) = 0.476 W/kg; SAR(10 g) = 0.201 W/kg

Maximum value of SAR (measured) = 0.800 W/kg



10_LTE Band 7_20M_QPSK_1RB_0Offset_Bottom_0mm_Ch21100

Communication System: UID 0, FDD_LTE (0); Frequency: 2535 MHz; Duty Cycle: 1:1

Medium: MSL_2600 Medium parameters used: $f = 2535$ MHz; $\sigma = 2.079$ S/m; $\epsilon_r = 52.125$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(7.43, 7.43, 7.43); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch21100/Area Scan (71x111x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 1.16 W/kg

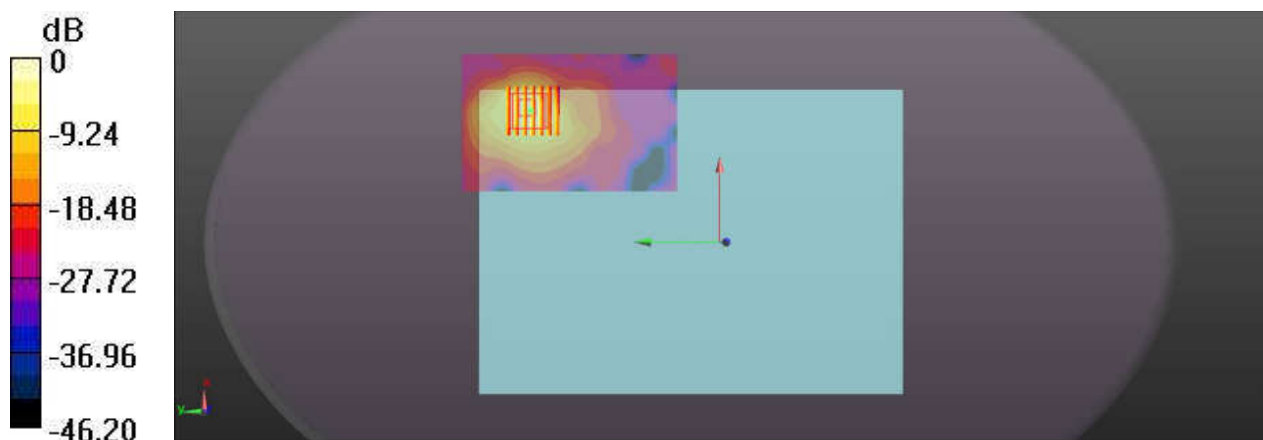
Ch21100/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0.8210 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.79 W/kg

SAR(1 g) = 0.704 W/kg; SAR(10 g) = 0.284 W/kg

Maximum value of SAR (measured) = 1.13 W/kg



0 dB = 1.13 W/kg

11_LTE Band 41_20M_QPSK_1RB_0Offset_Bottom_0mm_Ch41490

Communication System: UID 0, TDD_LTE (0); Frequency: 2680 MHz; Duty Cycle: 1:1.59

Medium: MSL_2600 Medium parameters used: $f = 2680$ MHz; $\sigma = 2.281$ S/m; $\epsilon_r = 51.55$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(7.43, 7.43, 7.43); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch41490/Area Scan (71x111x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 1.37 W/kg

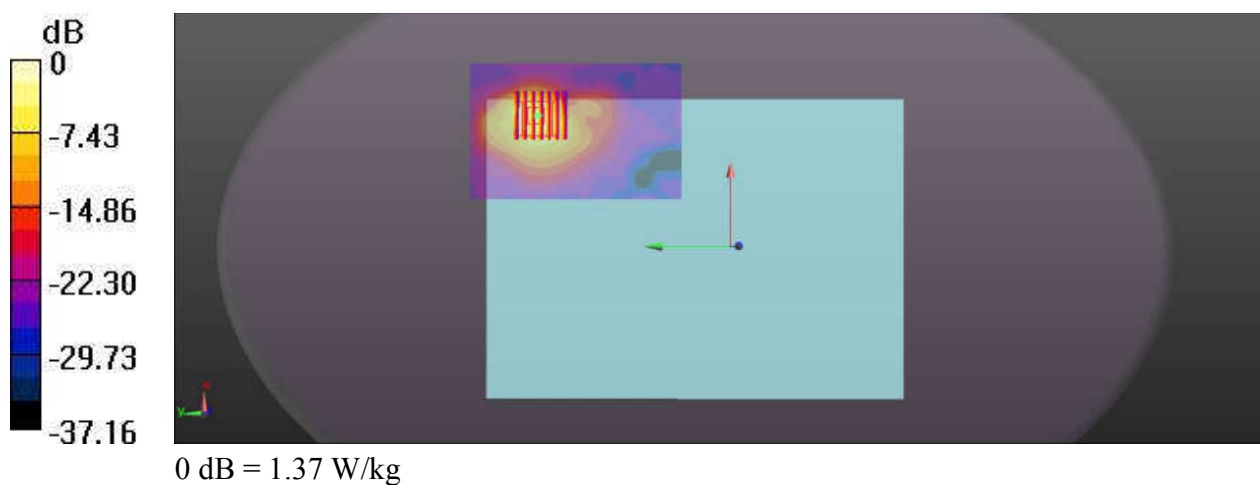
Ch41490/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0.8530 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 2.13 W/kg

SAR(1 g) = 0.815 W/kg; SAR(10 g) = 0.320 W/kg

Maximum value of SAR (measured) = 1.37 W/kg



12_WLAN 2.4GHz_802.11b 1Mbps_Bottom_0mm_Ant1_Ch6

Communication System: UID 0, WIFI (0); Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: MSL_2450 Medium parameters used: $f = 2437$ MHz; $\sigma = 1.939$ S/m; $\epsilon_r = 52.478$; $\rho = 1000$

kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(7.83, 7.83, 7.83); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch6/Area Scan (51x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

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

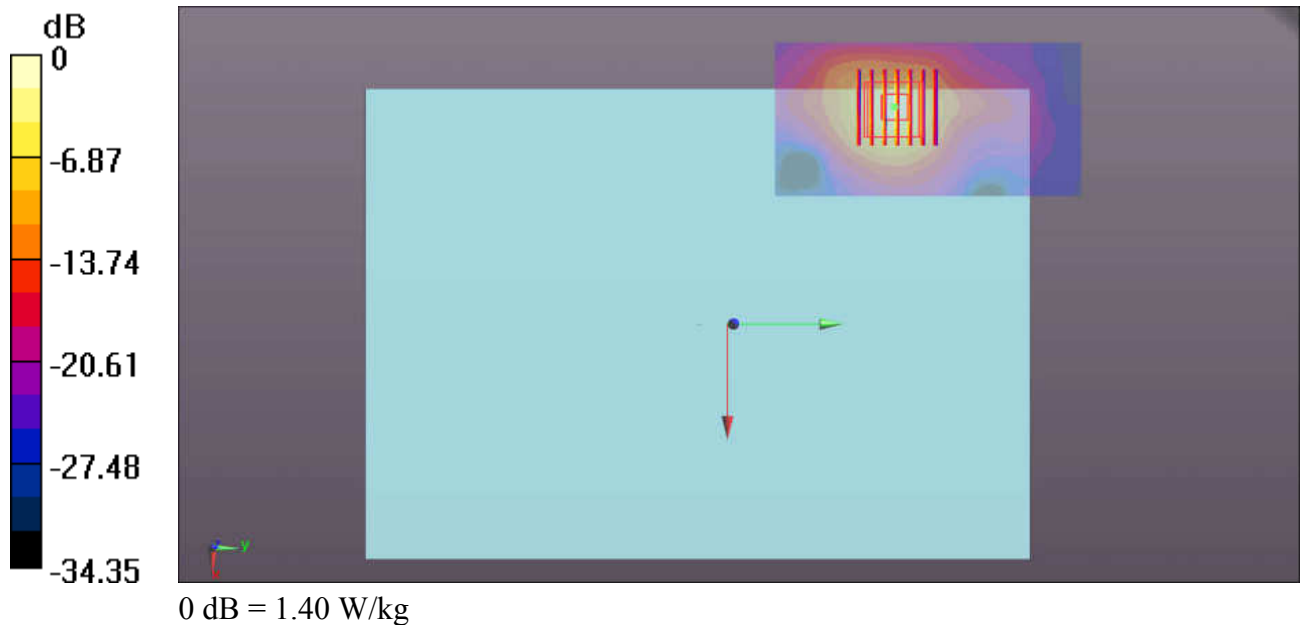
Ch6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0.9000 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 2.65 W/kg

SAR(1 g) = 0.847 W/kg; SAR(10 g) = 0.298 W/kg

Maximum value of SAR (measured) = 1.40 W/kg



13_WLAN2.4GHz_802.11b 1Mbps_Bottom_0mm_Ant 2_Ch1

Communication System: UID 0, WIFI (0); Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: MSL_2450 Medium parameters used: $f = 2412$ MHz; $\sigma = 1.905$ S/m; $\epsilon_r = 52.557$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(7.83, 7.83, 7.83); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch1/Area Scan (51x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 1.07 W/kg

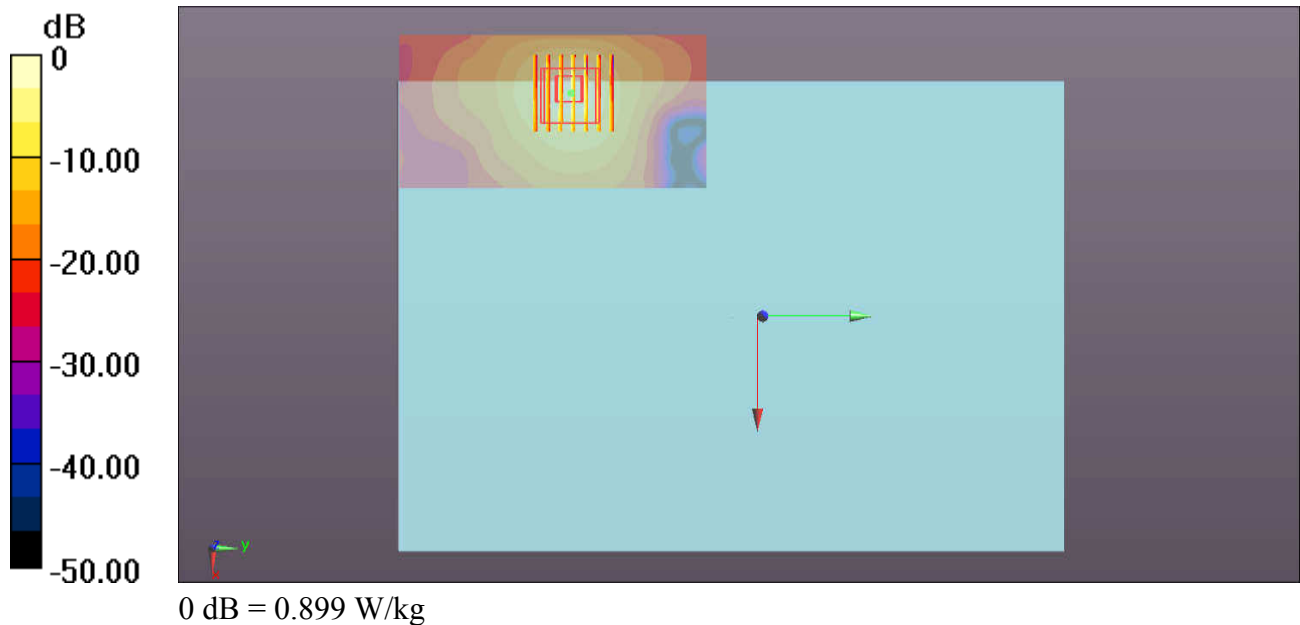
Ch1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.021 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 1.37 W/kg

SAR(1 g) = 0.709 W/kg; SAR(10 g) = 0.259 W/kg

Maximum value of SAR (measured) = 0.899 W/kg



14_ Bluetooth_1Mbps_Bottom_0mm_Ant 2_Off_Ch39

Communication System: UID 0, Bluetooth (0); Frequency: 2441 MHz; Duty Cycle: 1:1.305

Medium: MSL_2450 Medium parameters used: $f = 2441$ MHz; $\sigma = 1.945$ S/m; $\epsilon_r = 52.469$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.7 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(7.83, 7.83, 7.83); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch39/Area Scan (51x101x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.432 W/kg

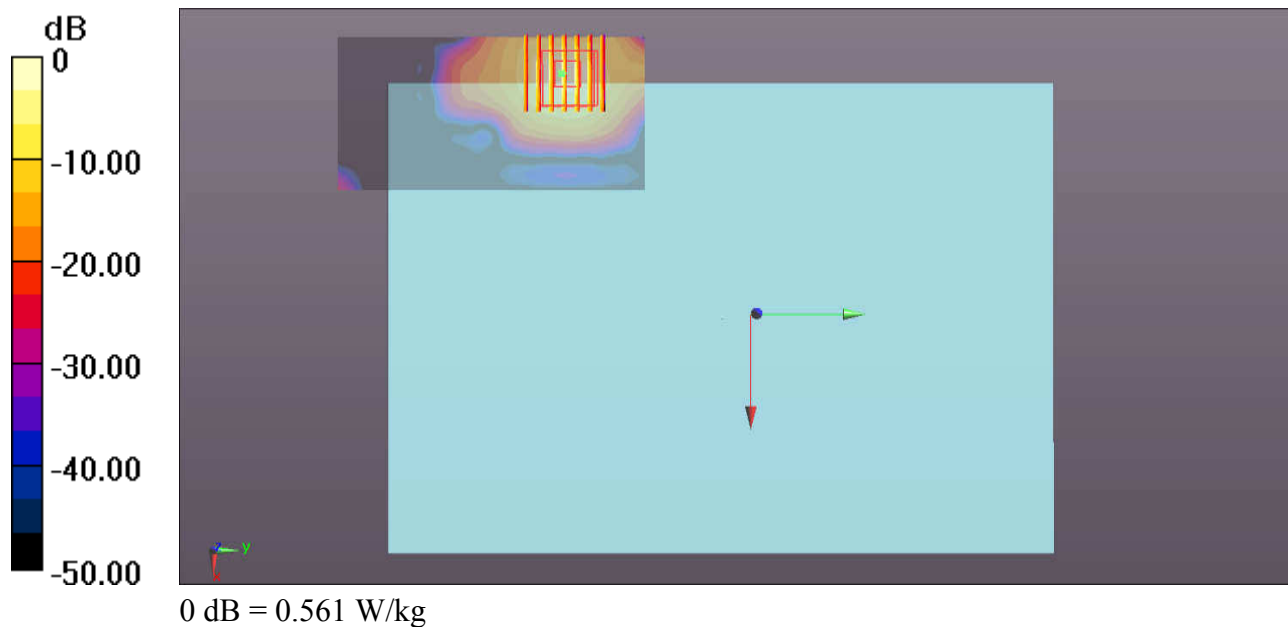
Ch39/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 0.828 W/kg

SAR(1 g) = 0.302 W/kg; SAR(10 g) = 0.114 W/kg

Maximum value of SAR (measured) = 0.561 W/kg



15_WLAN5.3GHz_802.11a 6Mbps_Curved surface of Edge3_0mm_Ant1_On_Ch52

Communication System: UID 0, WIFI (0); Frequency: 5260 MHz; Duty Cycle: 1:1.057

Medium: MSL_5000 Medium parameters used: $f = 5260$ MHz; $\sigma = 5.517$ S/m; $\epsilon_r = 46.495$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.84, 4.84, 4.84); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch52/Area Scan (61x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.96 W/kg

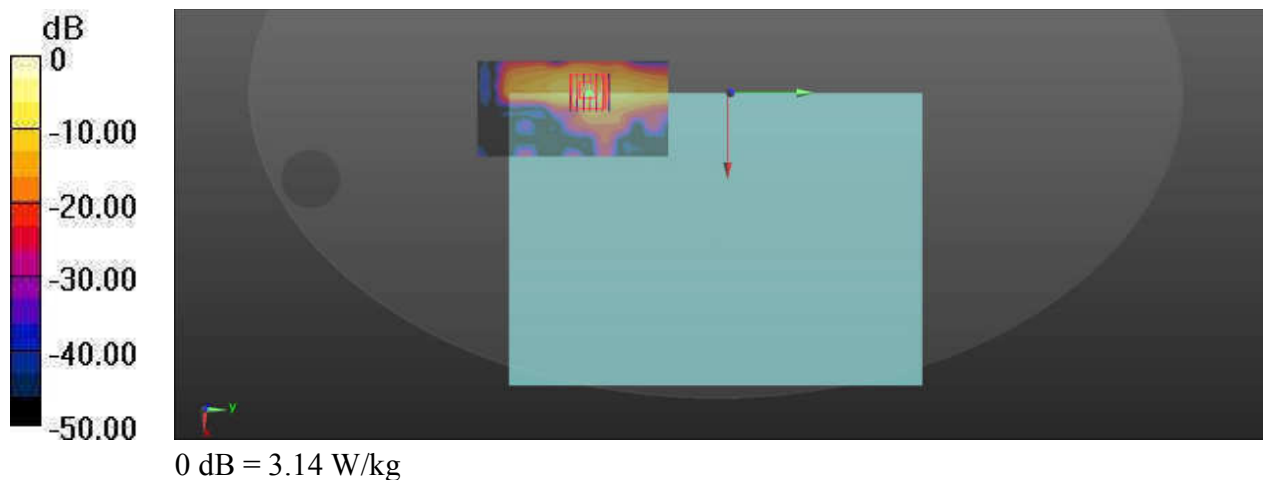
Ch52/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 1.579 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 9.18 W/kg

SAR(1 g) = 1.01 W/kg; SAR(10 g) = 0.195 W/kg

Maximum value of SAR (measured) = 3.14 W/kg



16_WLAN5.3GHz_802.11a 6Mbps_Curved surface of Edge3_0mm_Ant 2_On_Ch52

Communication System: UID 0, 802.11a (0); Frequency: 5260 MHz; Duty Cycle: 1:1.058

Medium: MSL_5000 Medium parameters used: $f = 5260$ MHz; $\sigma = 5.517$ S/m; $\epsilon_r = 49.495$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.8 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.84, 4.84, 4.84); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch52/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.47 W/kg

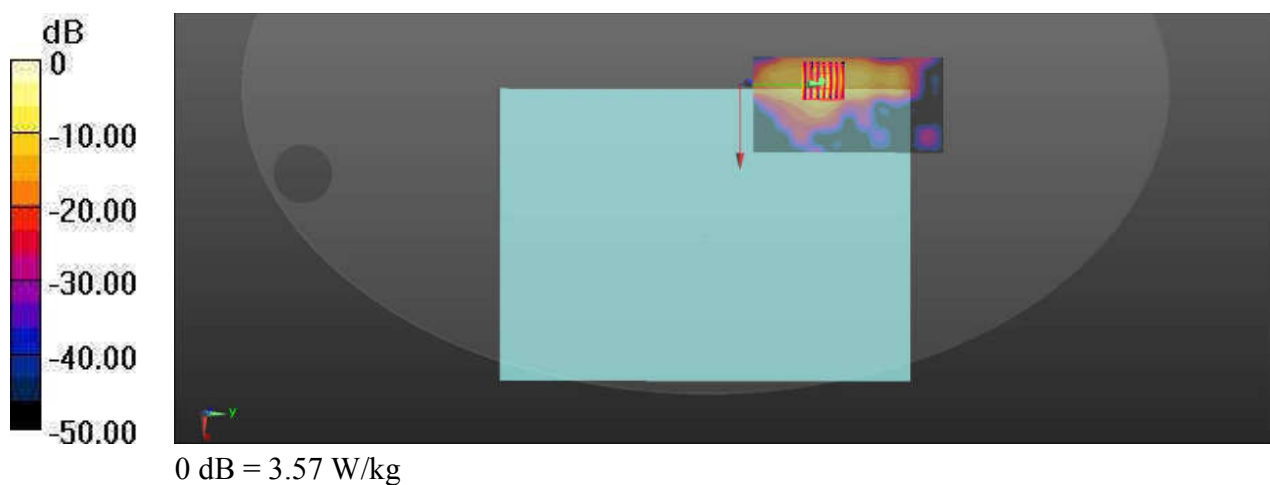
Ch52/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 1.166 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 8.49 W/kg

SAR(1 g) = 0.982 W/kg; SAR(10 g) = 0.213 W/kg

Maximum value of SAR (measured) = 3.57 W/kg



17_WLAN5.5GHz_802.11a 6Mbps_Bottom_0mm_Ant 1_Ch100

Communication System: UID 0, WIFI (0); Frequency: 5500 MHz; Duty Cycle: 1:1.057

Medium: MSL_5000 Medium parameters used: $f = 5500$ MHz; $\sigma = 5.838$ S/m; $\epsilon_r = 49.116$; $\rho = 1000$

kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.9 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.22, 4.22, 4.22); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch100/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.69 W/kg

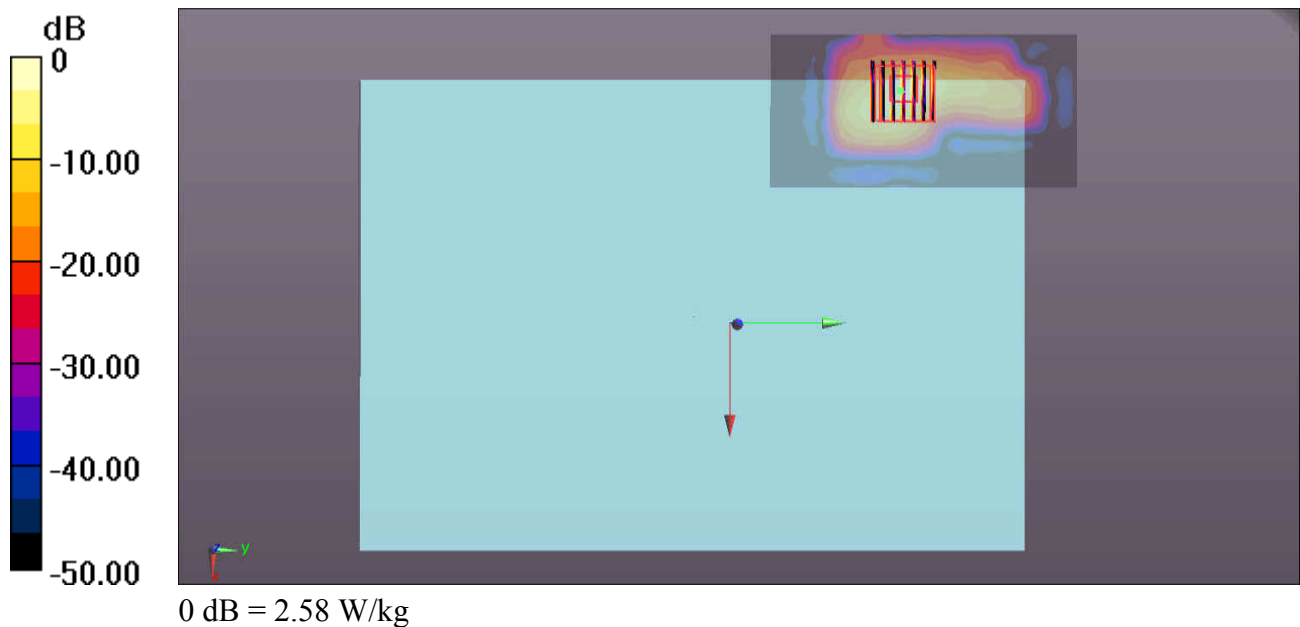
Ch100/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 0 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 4.24 W/kg

SAR(1 g) = 0.550 W/kg; SAR(10 g) = 0.129 W/kg

Maximum value of SAR (measured) = 2.58 W/kg



18_WLAN5.5GHz_802.11a 6Mbps_Bottom Face_0mm_Ant 2_On_Ch100

Communication System: UID 0, WIFI (0); Frequency: 5500 MHz; Duty Cycle: 1:1.058

Medium: MSL_5000 Medium parameters used: $f = 5500$ MHz; $\sigma = 5.838$ S/m; $\epsilon_r = 49.116$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.3 °C; Liquid Temperature : 22.9 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.22, 4.22, 4.22); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch100/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 2.49 W/kg

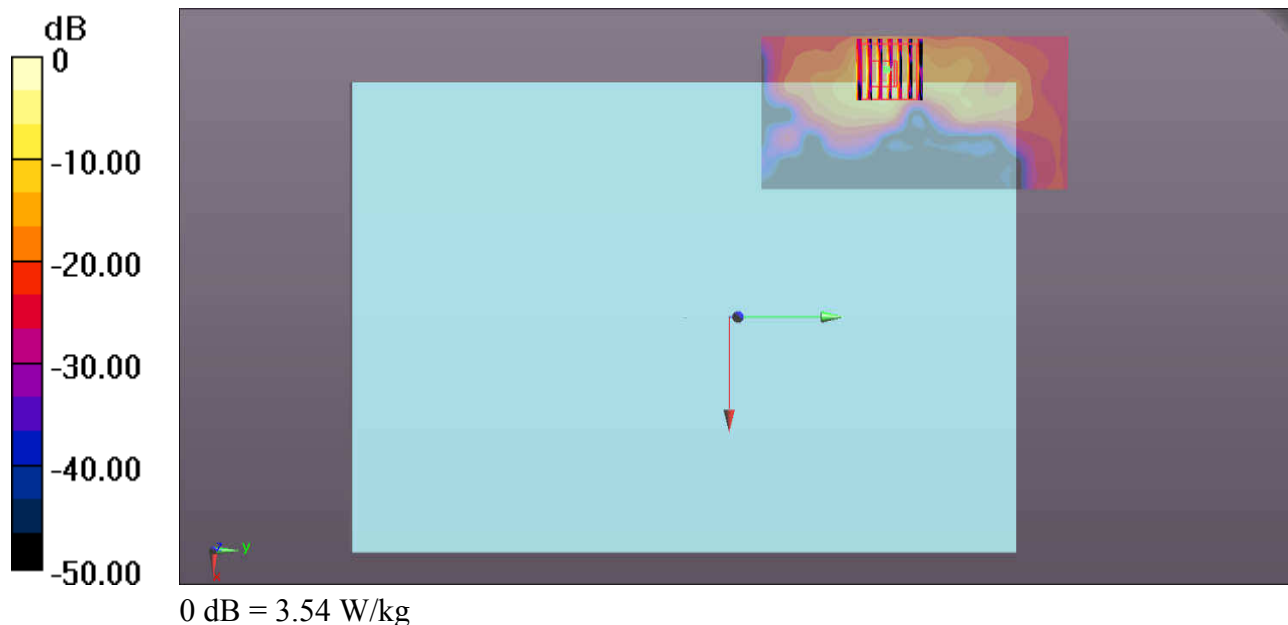
Ch100/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 0.5010 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 8.80 W/kg

SAR(1 g) = 0.935 W/kg; SAR(10 g) = 0.188 W/kg

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



19_WLAN5.8GHz_802.11a 6Mbps_Curved surface of Edge3_0mm_Ant 1_On_Ch165

Communication System: UID 0, 802.11a (0); Frequency: 5825 MHz; Duty Cycle: 1:1.057

Medium: MSL_5000 Medium parameters used: $f = 5825$ MHz; $\sigma = 6.297$ S/m; $\epsilon_r = 48.603$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.4 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.41, 4.41, 4.41); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch165/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

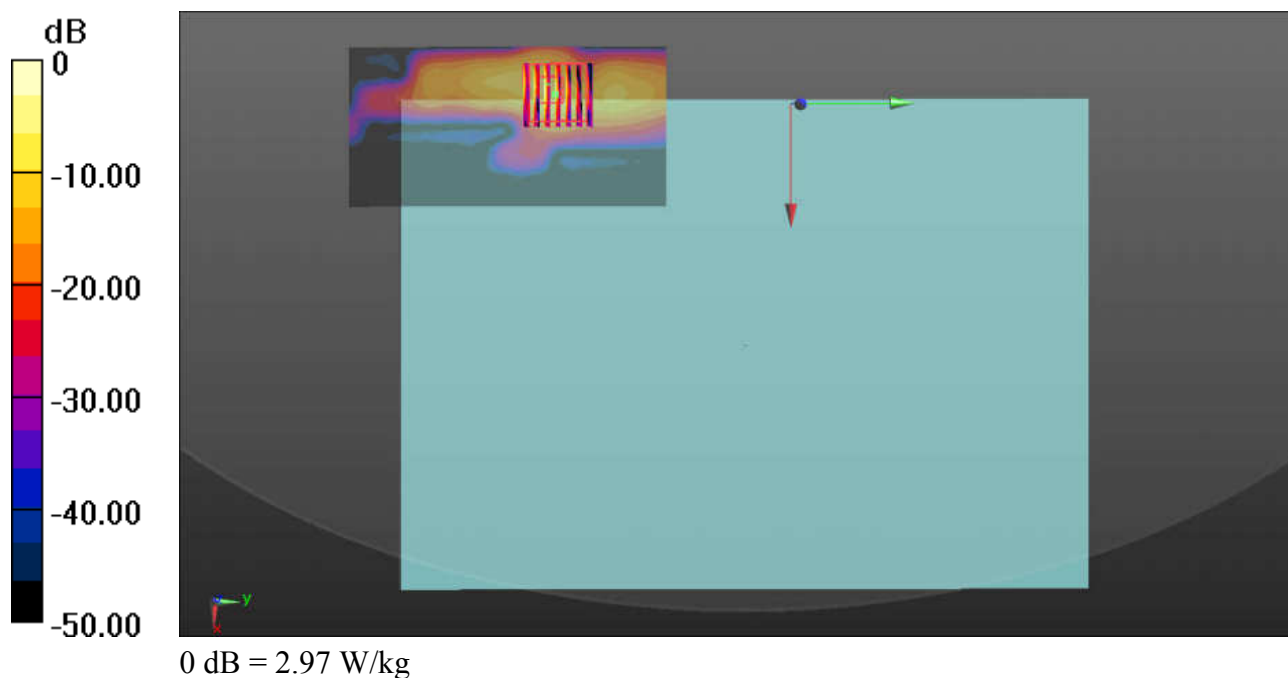
Ch165/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 1.760 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 8.89 W/kg

SAR(1 g) = 0.909 W/kg; SAR(10 g) = 0.151 W/kg

Maximum value of SAR (measured) = 2.97 W/kg



20_WLAN5.8GHz_802.11a 6Mbps_Curved surface of Edge3_0mm_Ant 2_On_Ch165

Communication System: UID 0, 802.11a (0); Frequency: 5825 MHz; Duty Cycle: 1:1.058

Medium: MSL_5000 Medium parameters used: $f = 5825$ MHz; $\sigma = 6.297$ S/m; $\epsilon_r = 48.603$; $\rho = 1000$ kg/m³

Ambient Temperature : 23.4 °C; Liquid Temperature : 22.6 °C

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.41, 4.41, 4.41); Calibrated: 2017.12.18;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn910; Calibrated: 2017.7.13
- Phantom: SAM4; Type: SAM; Serial: TP-1127
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch165/Area Scan (61x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.43 W/kg

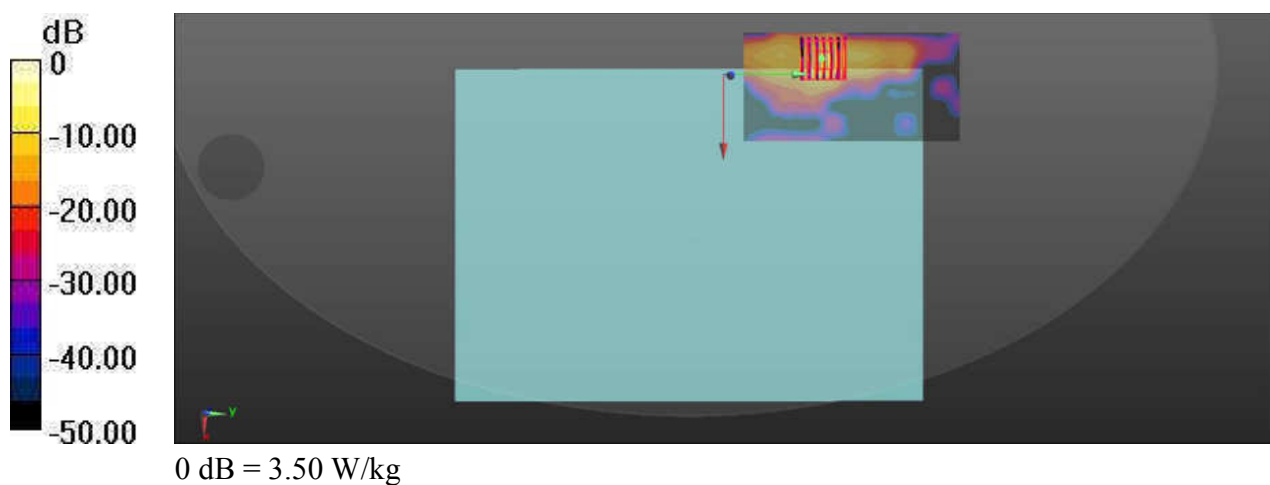
Ch165/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 0.7810 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 8.83 W/kg

SAR(1 g) = 0.894 W/kg; SAR(10 g) = 0.172 W/kg

Maximum value of SAR (measured) = 3.50 W/kg





Appendix C. DASY Calibration Certificate

The DASY calibration certificates are shown as follows.



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Client

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Certificate No: **Z17-97258**

CALIBRATION CERTIFICATE

Object **D750V3 - SN: 1065**

Calibration Procedure(s) **FF-Z11-003-01**
Calibration Procedures for dipole validation kits

Calibration date: **December 4, 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(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102196	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Power sensor NRV-Z5	100596	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Reference Probe EX3DV4	SN 3617	23-Jan-17(SPEAG,No.EX3-3617_Jan17)	Jan-18
DAE3	SN 536	09-Oct-17(CTTL-SPEAG,No.Z17-97198)	Oct-18
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-17 (CTTL, No.J17X00286)	Jan-18
Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL, No.J17X00285)	Jan-18

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: December 8, 2017

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



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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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



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Measurement Conditions

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

DASY Version	DASY52	52.10.0.1446
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 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 $\pm$ 0.2) °C	41.4 $\pm$ 6 %	0.90 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.10 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	8.33 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.39 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	5.53 mW / g $\pm$ 18.7 % (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 $\pm$ 0.2) °C	55.2 $\pm$ 6 %	0.94 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.14 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	8.72 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.42 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	5.76 mW / g $\pm$ 18.7 % (k=2)



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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.9Ω- 3.76jΩ
Return Loss	- 28.3dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.8Ω- 2.81jΩ
Return Loss	- 30.2dB

General Antenna Parameters and Design

Electrical Delay (one direction)	0.896 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
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DASY5 Validation Report for Head TSL

Date: 12.04.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1065

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.896 \text{ S/m}$; $\epsilon_r = 41.36$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(10.05, 10.05, 10.05); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 10/9/2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/I
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

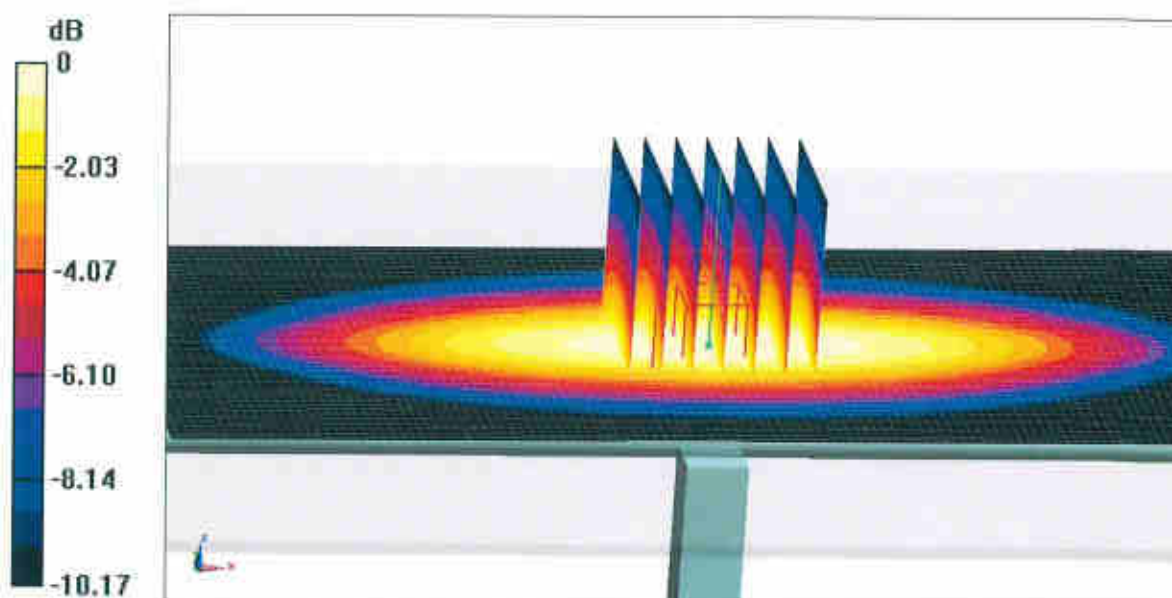
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 55.21 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.20 W/kg

SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.39 W/kg

Maximum value of SAR (measured) = 2.82 W/kg



0 dB = 2.82 W/kg = 4.50 dBW/kg



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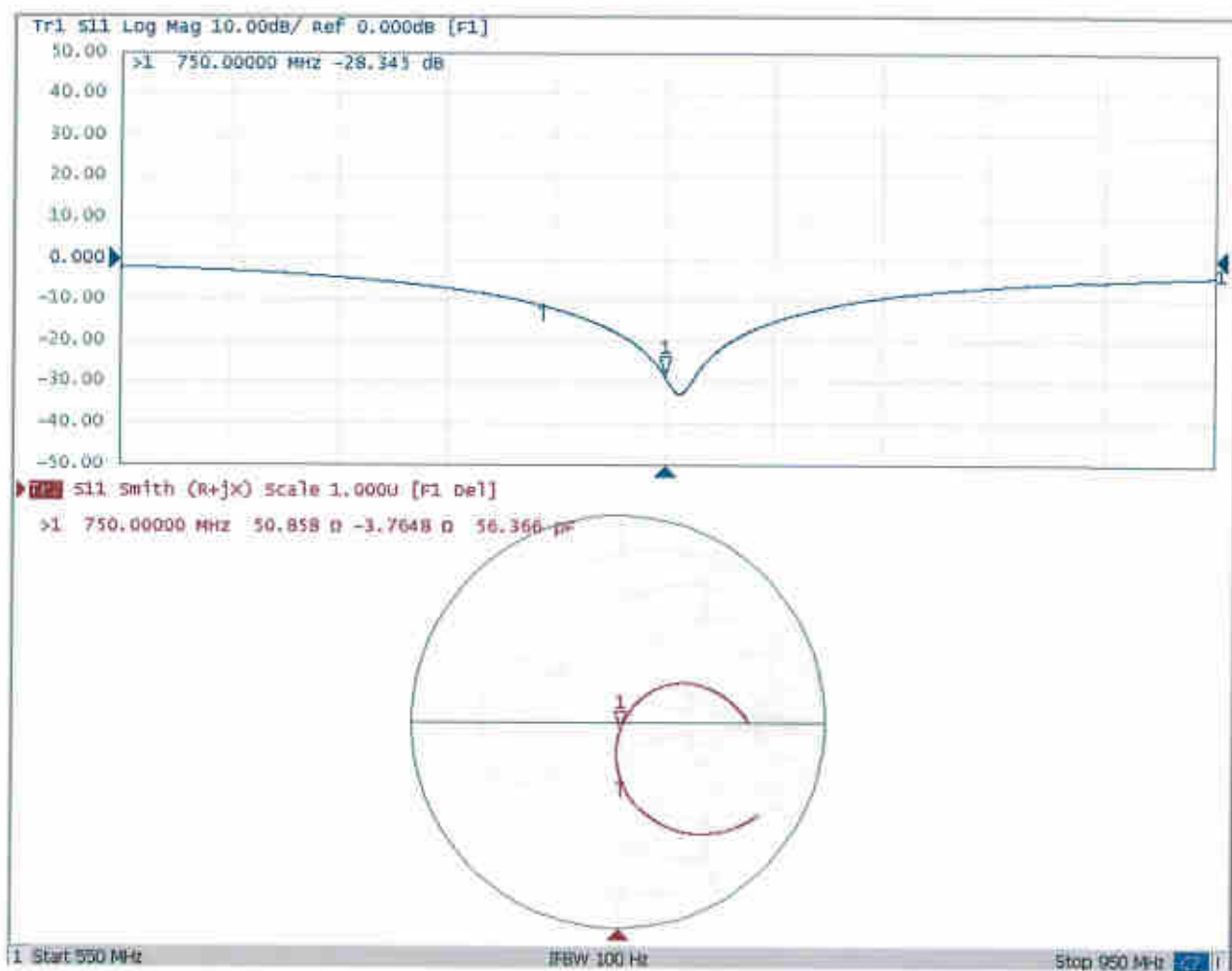
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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 12.04.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1065

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 750$ MHz; $\sigma = 0.936$ S/m; $\epsilon_r = 55.23$; $\rho = 1000$ kg/m³

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.8, 9.8, 9.8); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 10/9/2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/I
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

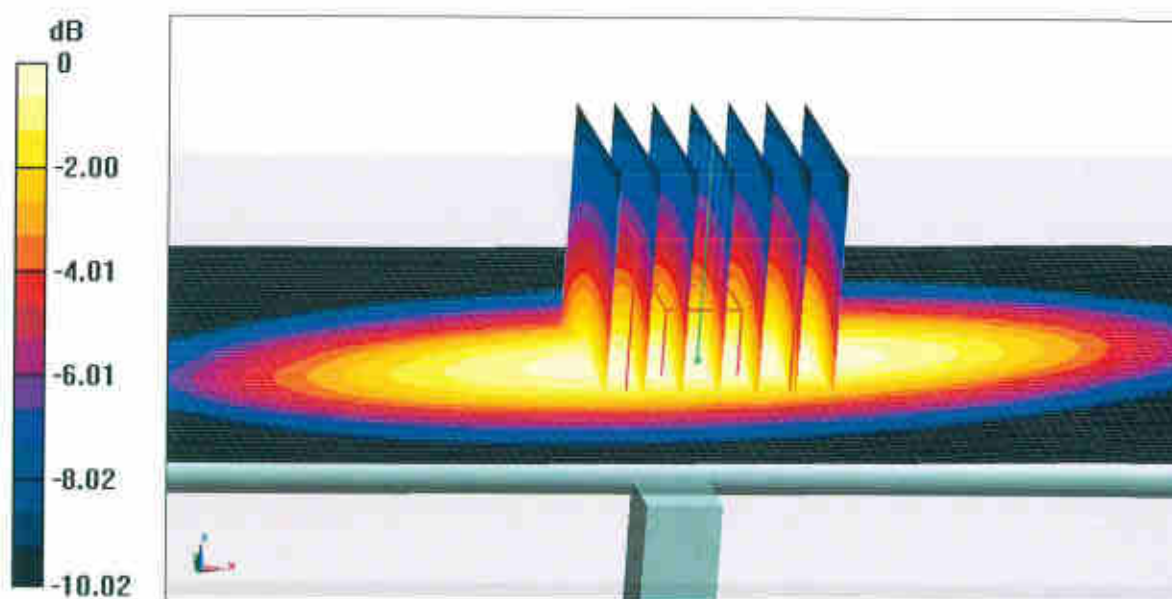
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.07 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 3.18 W/kg

SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.42 W/kg

Maximum value of SAR (measured) = 2.83 W/kg



0 dB = 2.83 W/kg = 4.52 dBW/kg



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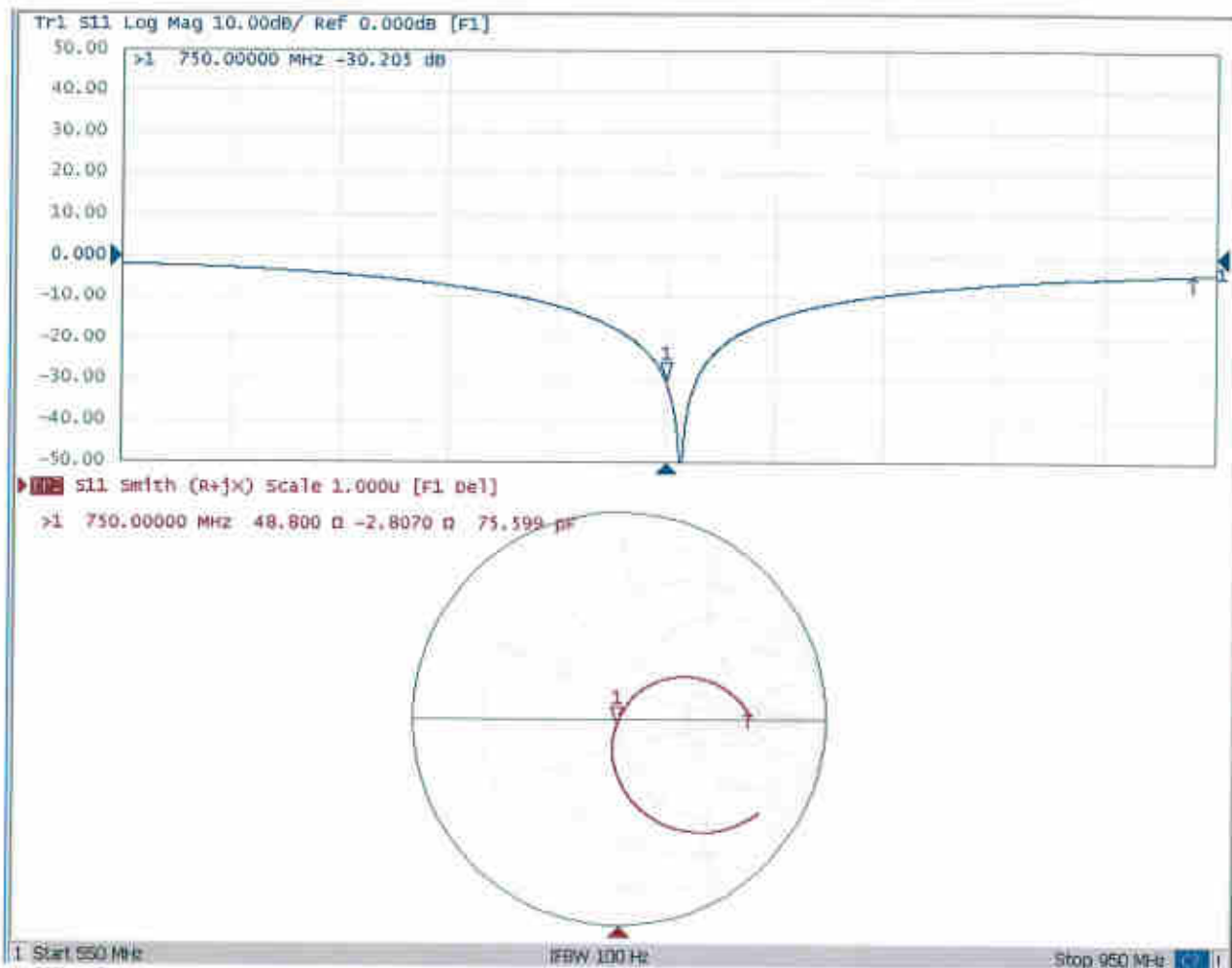
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Impedance Measurement Plot for Body TSL





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Client

Sporton

Certificate No: **Z17-97259**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d091**

Calibration Procedure(s) **FF-Z11-003-01**
Calibration Procedures for dipole validation kits

Calibration date: **December 5, 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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102196	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Power sensor NRV-Z5	100596	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Reference Probe EX3DV4	SN 3617	23-Jan-17(SPEAG,No.EX3-3617_Jan17)	Jan-18
DAE3	SN 536	09-Oct-17(CTTL-SPEAG,No.Z17-97198)	Oct-18
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-17 (CTTL, No.J17X00286)	Jan-18
Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL, No.J17X00285)	Jan-18

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: December 9, 2017

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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



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Measurement Conditions

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

DASY Version	DASY52	52.10.0.1446
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.7 $\pm$ 6 %	0.88 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.32 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.48 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.53 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.22 mW / g $\pm$ 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	54.7 $\pm$ 6 %	0.96 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.42 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.72 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.42 mW / g $\pm$ 18.7 % (k=2)



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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.7Ω- 3.69jΩ
Return Loss	- 28.1dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6Ω- 4.62jΩ
Return Loss	- 24.5dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.258 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

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DASY5 Validation Report for Head TSL

Date: 12.04.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d091

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

Medium parameters used: $f = 835$ MHz; $\sigma = 0.876$ S/m; $\epsilon_r = 41.67$; $\rho = 1000$ kg/m³

Phantom section: Center Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.73, 9.73, 9.73); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 10/9/2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

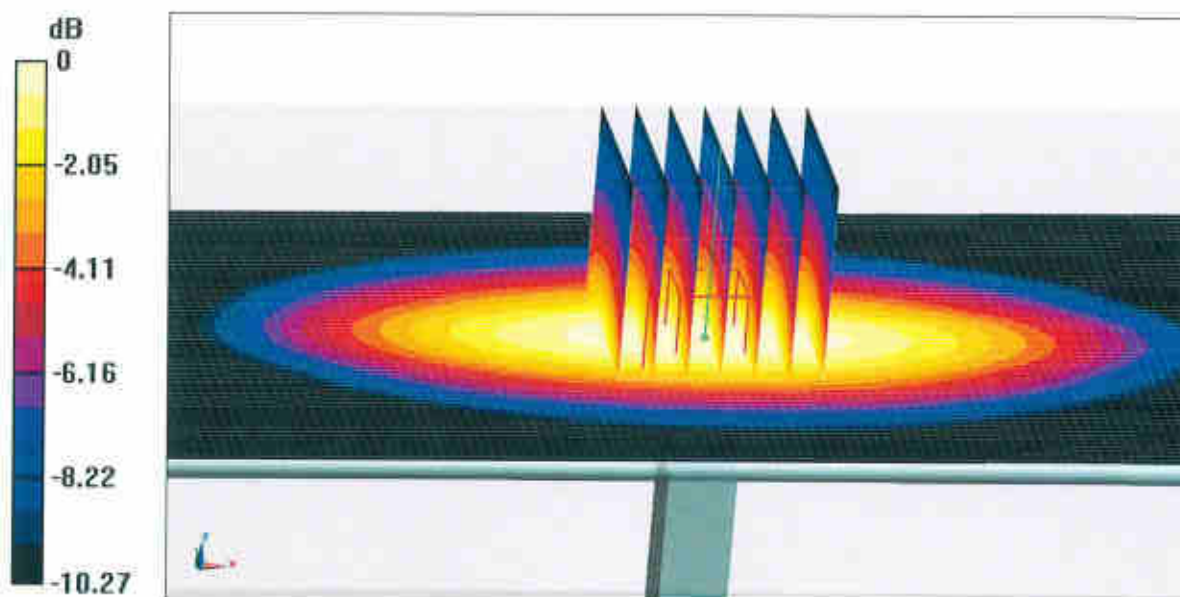
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 58.89V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 3.48 W/kg

SAR(1 g) = 2.32 W/kg; SAR(10 g) = 1.53 W/kg

Maximum value of SAR (measured) = 3.10 W/kg

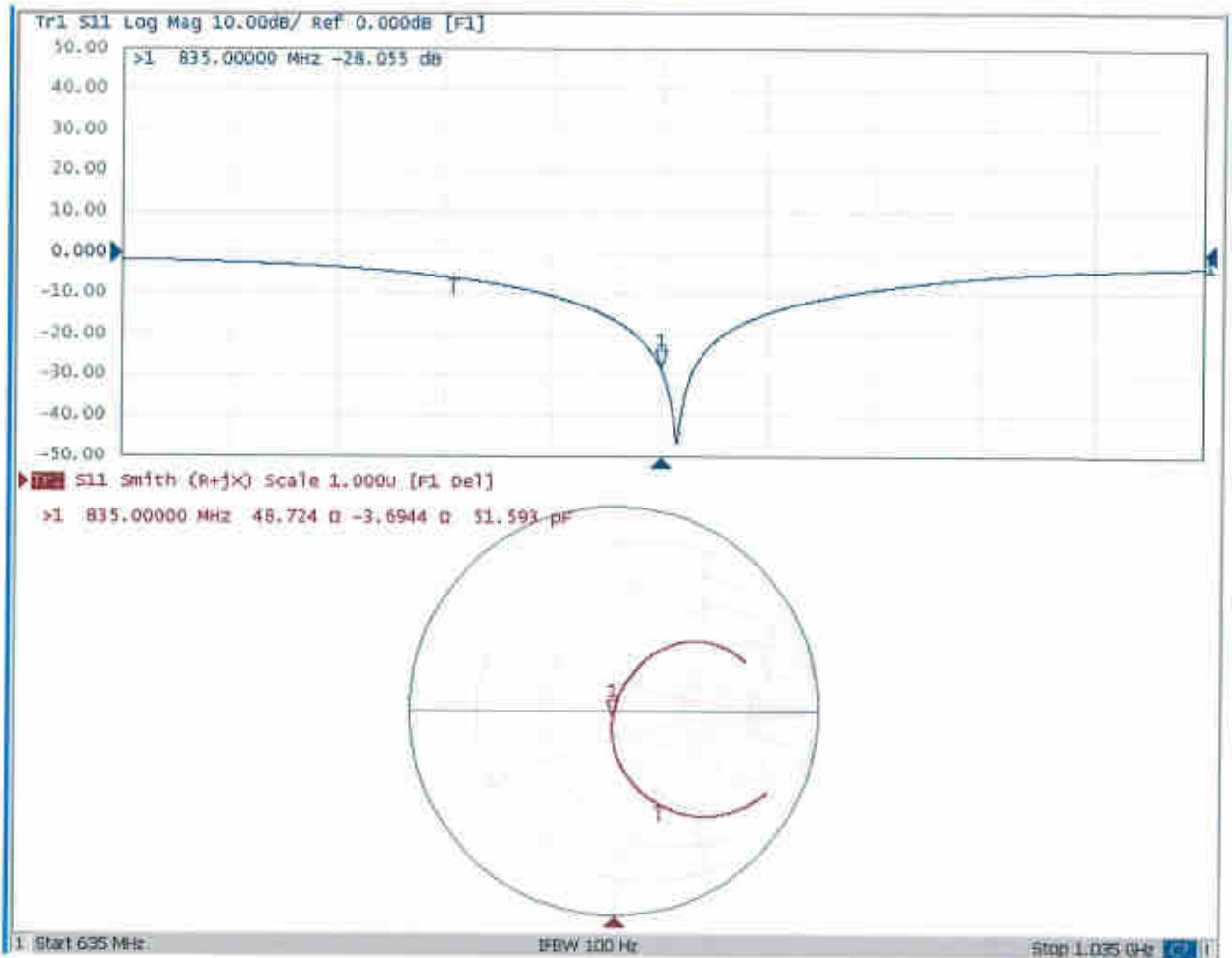


0 dB = 3.10 W/kg = 4.91 dBW/kg



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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 12.05.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d091

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

Medium parameters used: $f = 835$ MHz; $\sigma = 0.962$ S/m; $\epsilon_r = 54.65$; $\rho = 1000$ kg/m³

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.64, 9.64, 9.64); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 10/9/2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

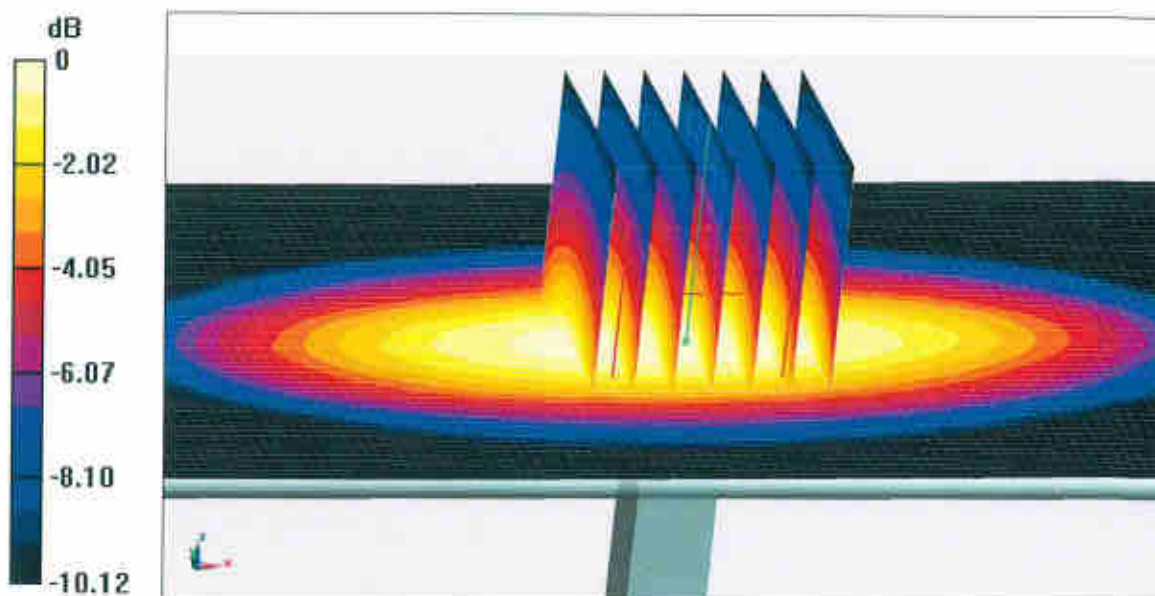
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.88 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.59 W/kg

SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.6 W/kg

Maximum value of SAR (measured) = 3.20 W/kg

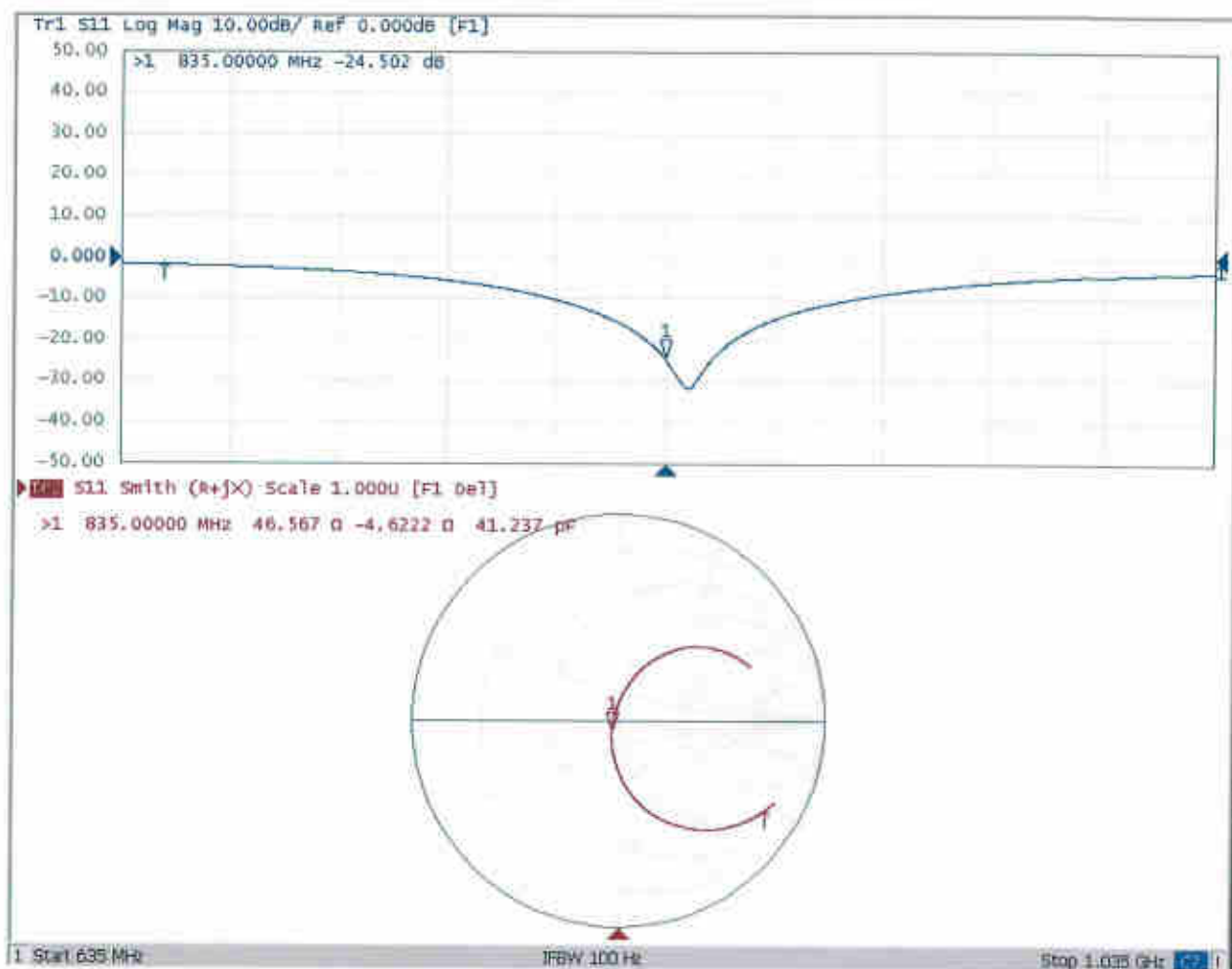


0 dB = 3.20 W/kg = 5.05 dBW/kg



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Impedance Measurement Plot for Body TSL





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Certificate No: **Z17-97260**

CALIBRATION CERTIFICATE

Object **D1750V2 - SN: 1069**

Calibration Procedure(s) **FF-Z11-003-01**
Calibration Procedures for dipole validation kits

Calibration date: **December 5, 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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102196	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Power sensor NRV-Z5	100596	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Reference Probe EX3DV4	SN 3617	23-Jan-17(SPEAG,No.EX3-3617_Jan17)	Jan-18
DAE3	SN 536	09-Oct-17(CTTL-SPEAG,No.Z17-97198)	Oct-18
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-17 (CTTL, No.J17X00286)	Jan-18
Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL, No.J17X00285)	Jan-18

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: December 9, 2017

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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



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Measurement Conditions

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

DASY Version	DASY52	52.10.0.1446
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.5 $\pm$ 6 %	1.38 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.31 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	37.0 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.96 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	19.8 mW / g $\pm$ 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.8 $\pm$ 6 %	1.47 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.40 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	38.0 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.03 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.3 mW / g $\pm$ 18.7 % (k=2)



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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.3Ω+ 1.19 jΩ
Return Loss	- 37.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.3Ω+ 0.51 jΩ
Return Loss	- 26.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.084 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

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DASY5 Validation Report for Head TSL

Date: 12.05.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1069

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.378$ S/m; $\epsilon_r = 39.46$; $\rho = 1000$ kg/m³

Phantom section: Center Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.49, 8.49, 8.49); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 10/9/2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

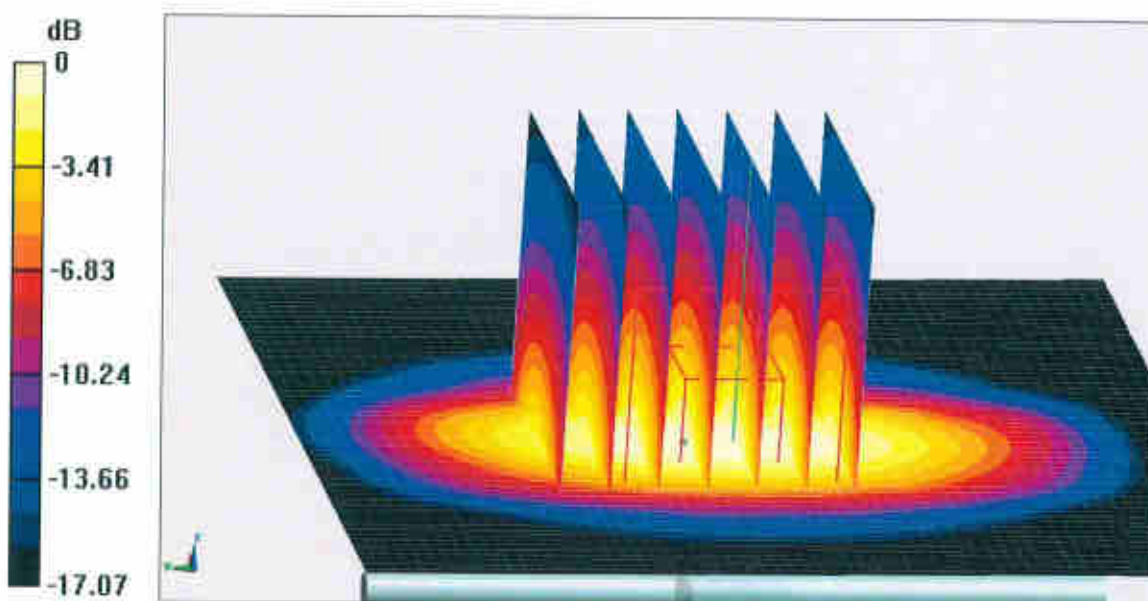
dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.28 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 17.2 W/kg

SAR(1 g) = 9.31 W/kg; SAR(10 g) = 4.96 W/kg

Maximum value of SAR (measured) = 14.3 W/kg

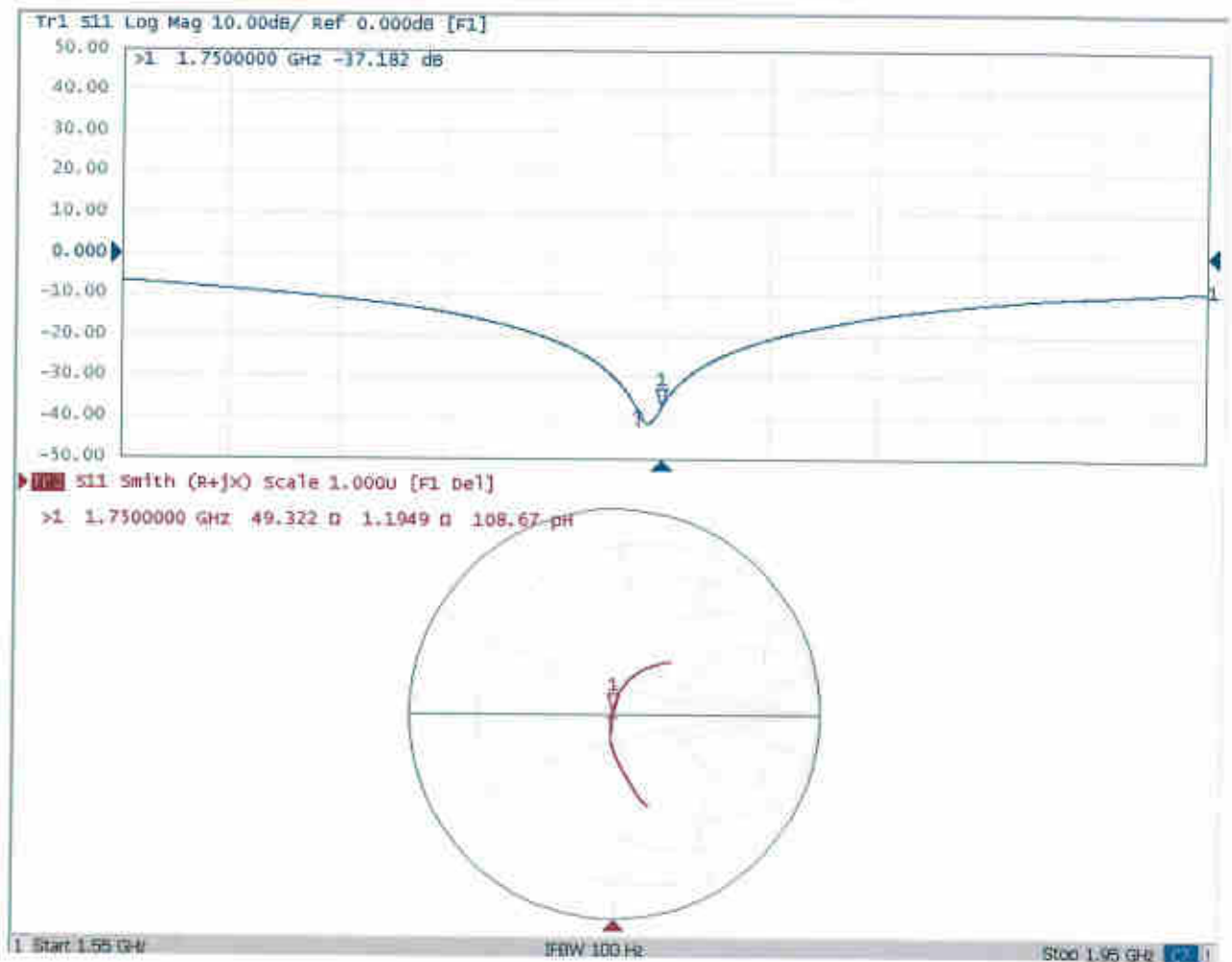


0 dB = 14.3 W/kg = 11.55 dBW/kg



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Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 12.05.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1069

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.469$ S/m; $\epsilon_r = 53.75$; $\rho = 1000$ kg/m³

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.21, 8.21, 8.21); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 10/9/2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

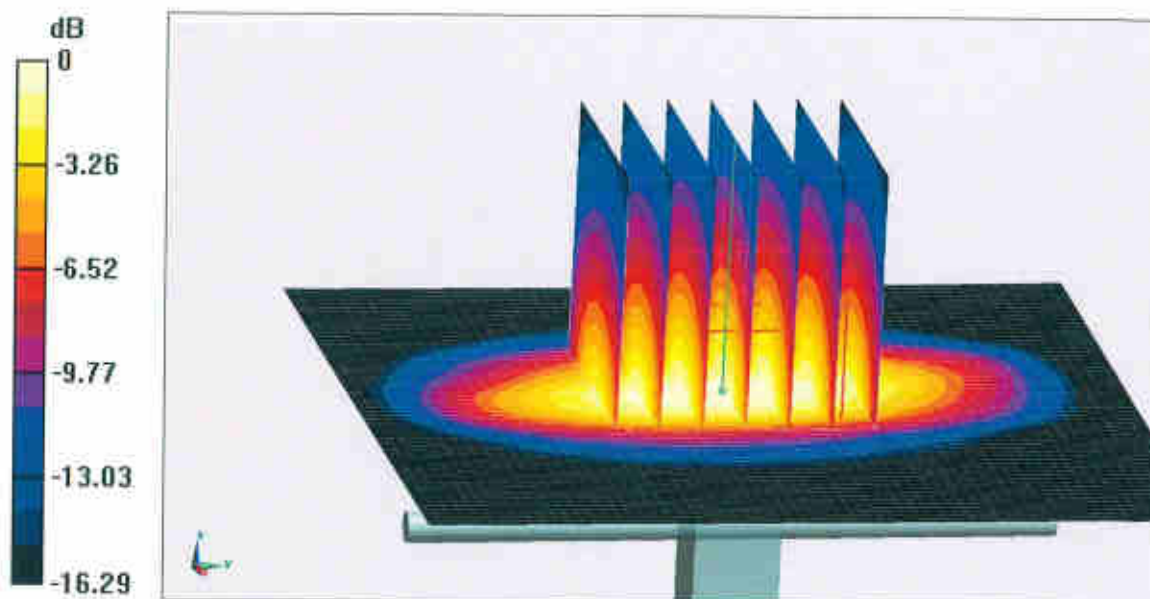
dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.22 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 9.4 W/kg; SAR(10 g) = 5.03 W/kg

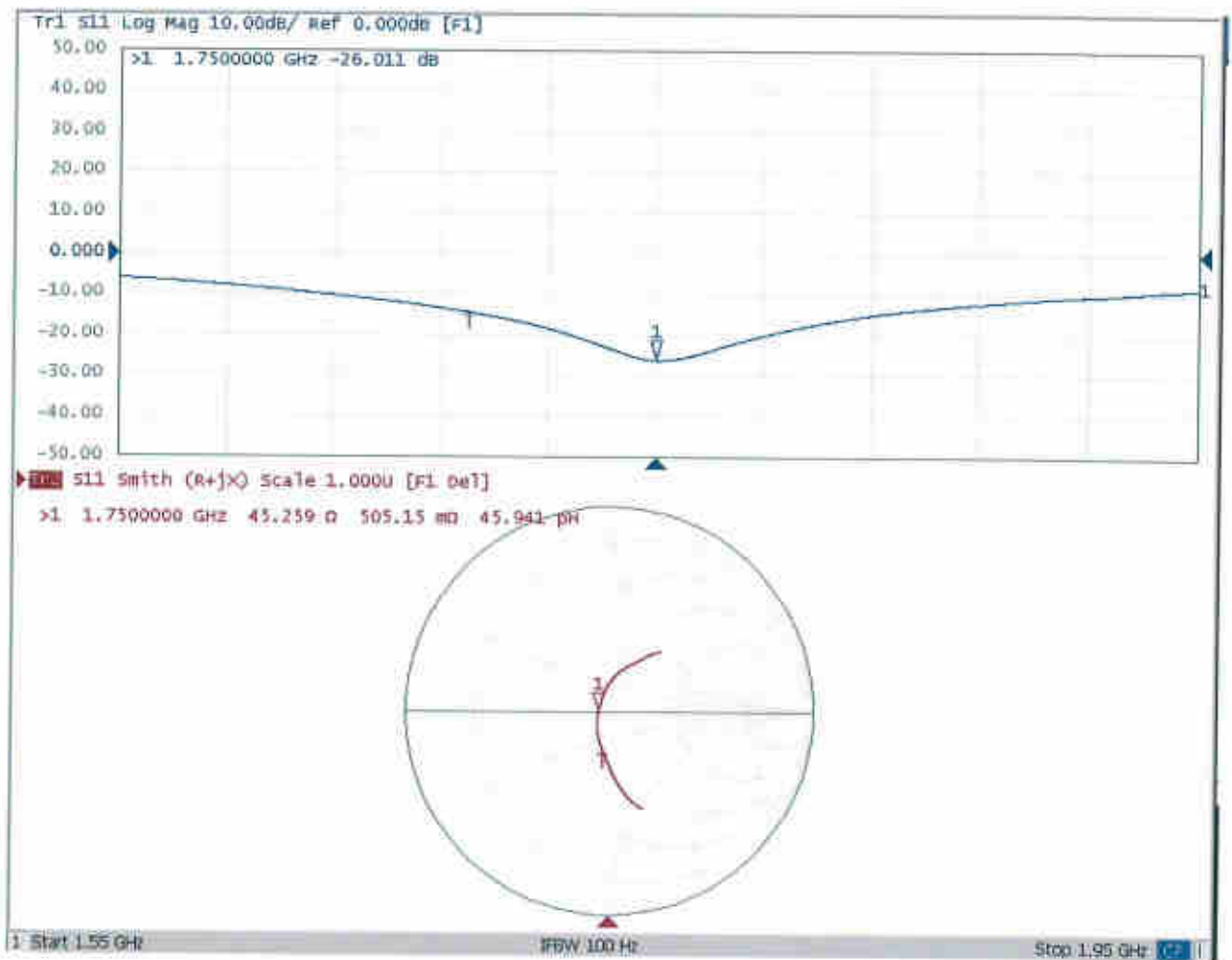
Maximum value of SAR (measured) = 14.3 W/kg


0 dB = 14.3 W/kg = 11.55 dBW/kg



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Impedance Measurement Plot for Body TSL





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Client

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Certificate No: **Z17-97262**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d118**

Calibration Procedure(s) **FF-Z11-003-01**
Calibration Procedures for dipole validation kits

Calibration date: **December 6, 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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102196	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Power sensor NRV-Z5	100596	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Reference Probe EX3DV4	SN 3617	23-Jan-17(SPEAG,No.EX3-3617_Jan17)	Jan-18
DAE3	SN 536	09-Oct-17(CTTL-SPEAG,No.Z17-97198)	Oct-18
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-17 (CTTL, No.J17X00286)	Jan-18
Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL, No.J17X00285)	Jan-18

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: December 10, 2017

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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 assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- d) KDB865664, 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%.



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Measurement Conditions

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

DASY Version	DASY52	52.10.0.1446
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.4 $\pm$ 6 %	1.41 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	39.7 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.19 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.7 mW / g $\pm$ 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.9 $\pm$ 6 %	1.54 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	40.4 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.30 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.1 mW / g $\pm$ 18.7 % (k=2)



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Appendix (Additional assessments outside the scope of CNAS L0570)**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	$50.0\Omega + 6.60j\Omega$
Return Loss	- 23.6dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$46.6\Omega + 6.11j\Omega$
Return Loss	- 22.8dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.067 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

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DASY5 Validation Report for Head TSL

Date: 12.06.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d118

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.409$ S/m; $\epsilon_r = 39.36$; $\rho = 1000$ kg/m³

Phantom section: Center Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.26, 8.26, 8.26); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 10/9/2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

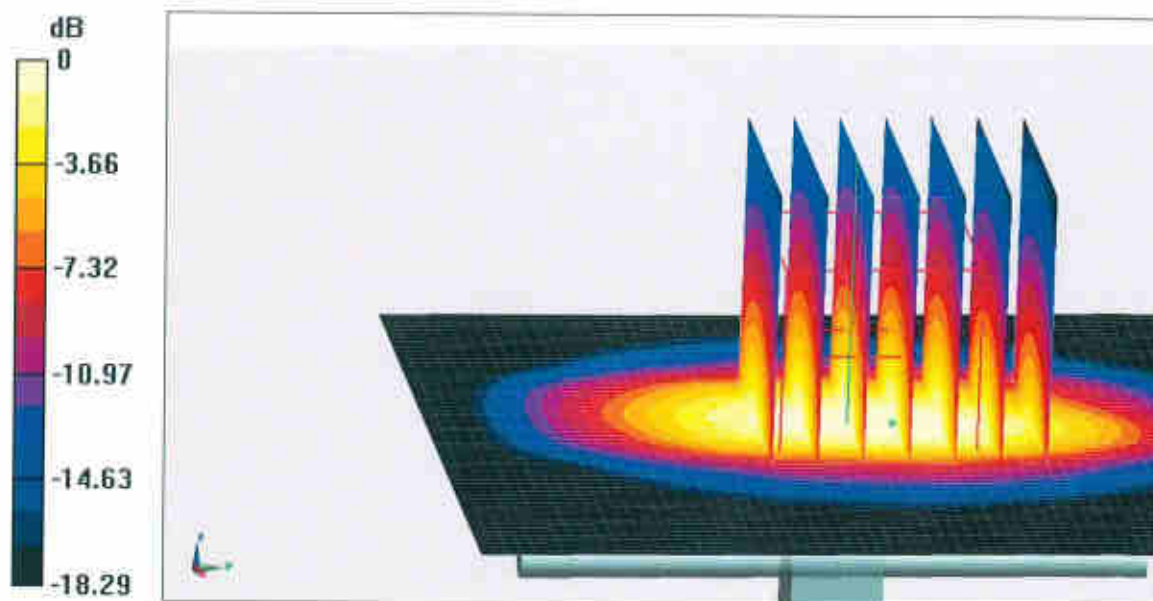
$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 101.5 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 19.1 W/kg

SAR(1 g) = 10 W/kg; SAR(10 g) = 5.19 W/kg

Maximum value of SAR (measured) = 15.6 W/kg



0 dB = 15.6 W/kg = 11.93 dBW/kg



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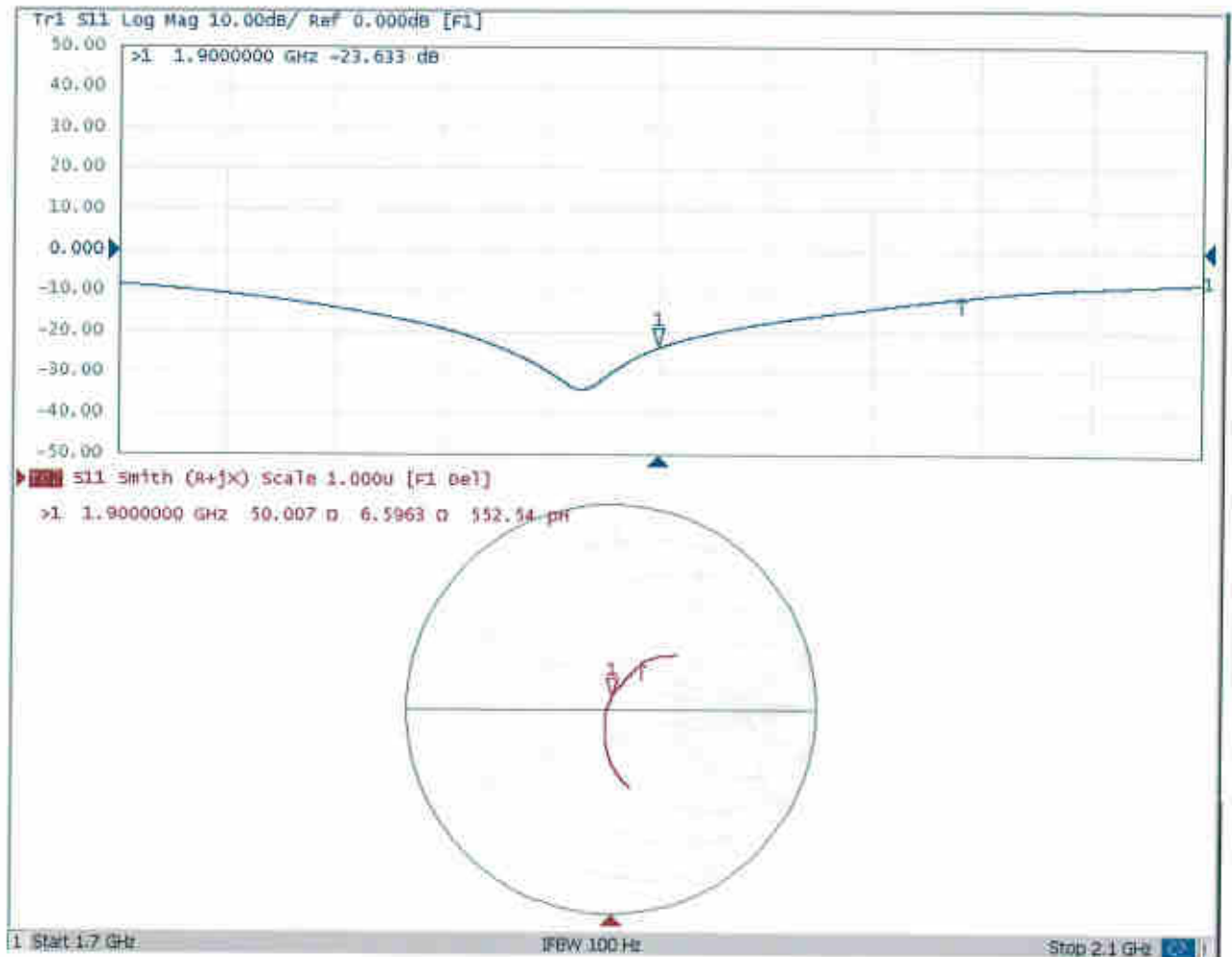
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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 12.06.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d118

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.542$ S/m; $\epsilon_r = 52.89$; $\rho = 1000$ kg/m³

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.95, 7.95, 7.95); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 10/9/2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

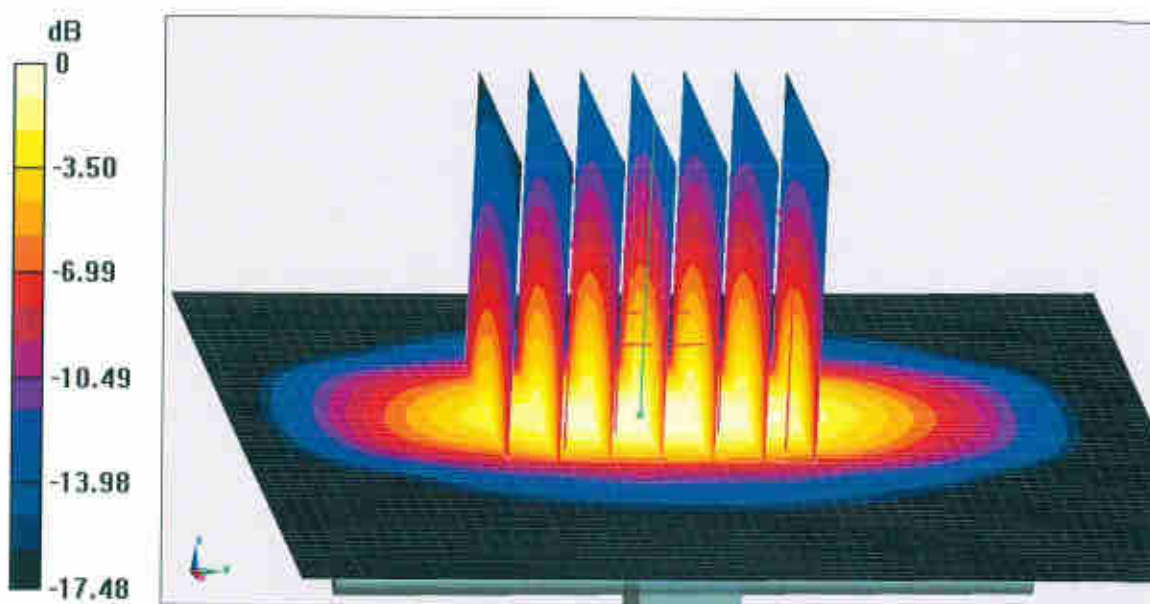
$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 96.27 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 18.5 W/kg

SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.3 W/kg

Maximum value of SAR (measured) = 15.5 W/kg



0 dB = 15.5 W/kg = 11.90 dBW/kg



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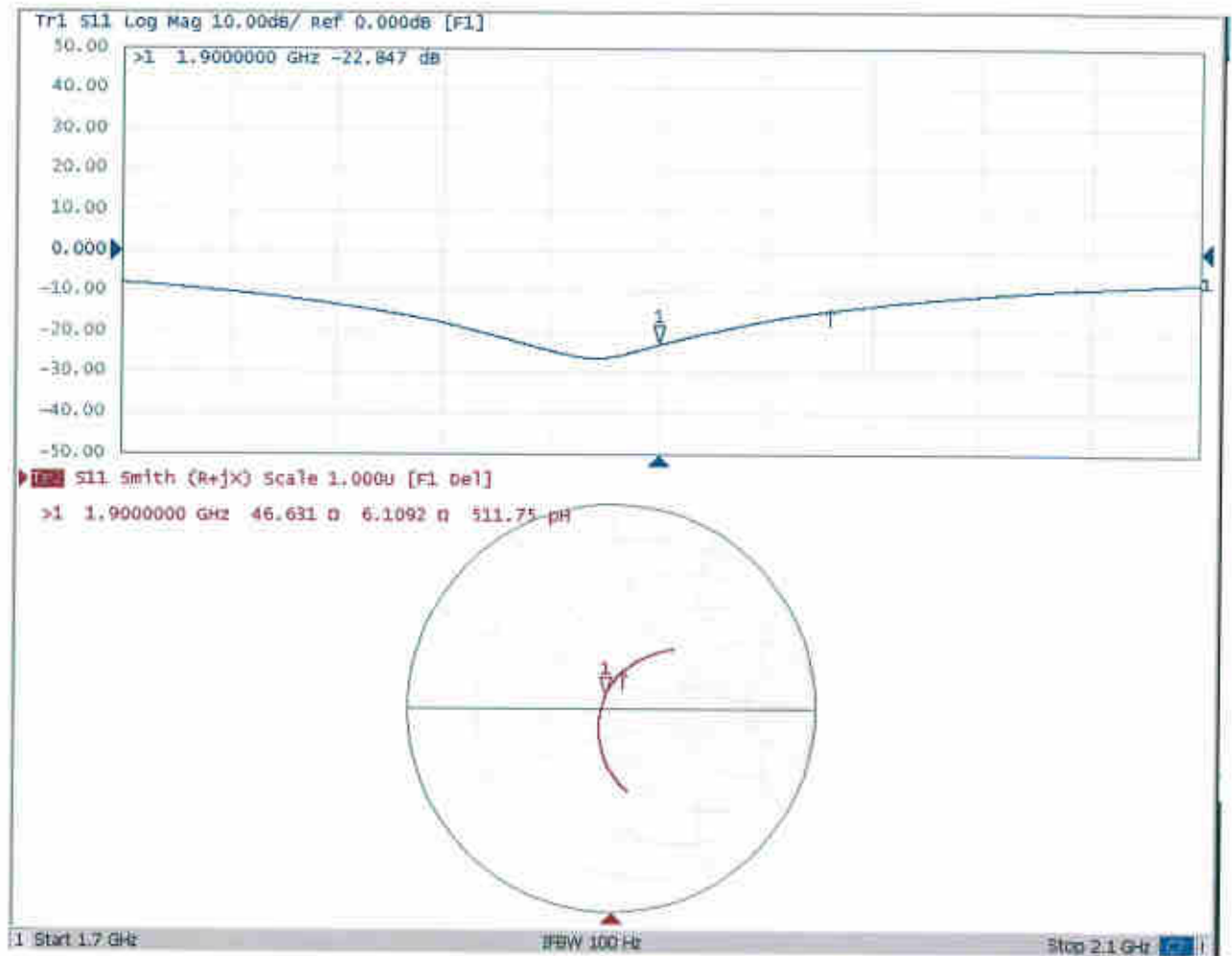
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Impedance Measurement Plot for Body TSL





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Client

Sporton International INC

Certificate No: **Z17-97126**

CALIBRATION CERTIFICATE

Object **D2300V2 - SN: 1055**

Calibration Procedure(s) **FF-Z11-003-01**
Calibration Procedures for dipole validation kits

Calibration date: **August 30, 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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102083	22-Sep-16 (CTTL, No.J16X06809)	Sep-17
Power sensor NRV-Z5	100595	22-Sep-16 (CTTL, No.J16X06809)	Sep-17
Reference Probe EX3DV4	SN 3617	23-Jan-17(SPEAG,No.EX3-3617_Jan17)	Jan-18
DAE4	SN 1331	19-Jan-17(CTTL-SPEAG,No.Z17-97015)	Jan-18
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-17 (CTTL, No.J17X00286)	Jan-18
Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL, No.J17X00285)	Jan-18

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Yu Zongying	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: September 2, 2017

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



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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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



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Measurement Conditions

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

DASY Version	DASY52	52.10.0.1446
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2300 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.5	1.67 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.3 $\pm$ 6 %	1.69 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	12.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	49.3 mW /g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.91 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	23.6 mW /g $\pm$ 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.9	1.81 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.5 $\pm$ 6 %	1.80 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	48.9 mW /g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.82 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	23.3 mW /g $\pm$ 18.7 % (k=2)



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Appendix(Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.6Ω- 3.86jΩ
Return Loss	- 27.6dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.9Ω- 3.37jΩ
Return Loss	- 25.2dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.275 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

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DASY5 Validation Report for Head TSL

Date: 08.30.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2300 MHz; Type: D2300V2; Serial: D2300V2 - SN: 1055

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

Medium parameters used: $f = 2300$ MHz; $\sigma = 1.688$ S/m; $\epsilon_r = 39.32$; $\rho = 1000$ kg/m³

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.87, 7.87, 7.87); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 1/19/2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

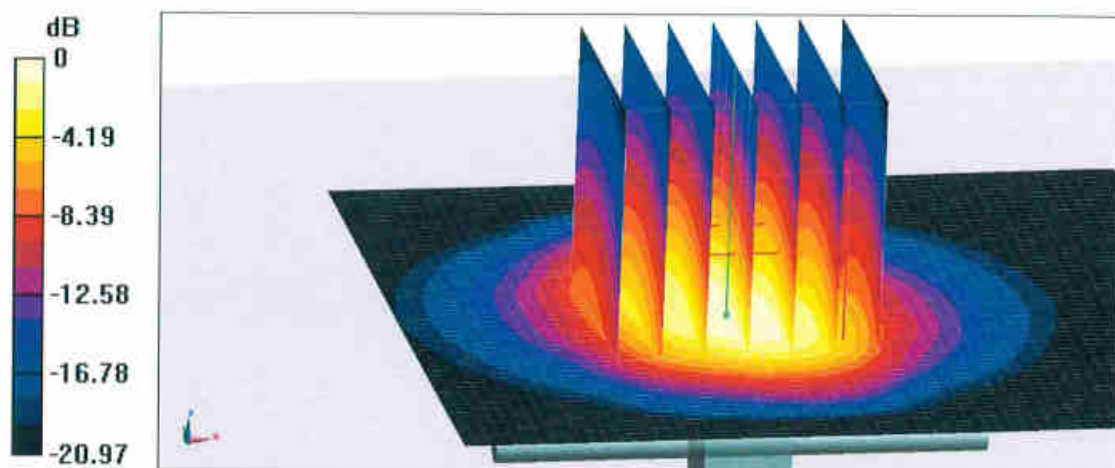
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 105.2 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 24.9 W/kg

SAR(1 g) = 12.4 W/kg; SAR(10 g) = 5.91 W/kg

Maximum value of SAR (measured) = 20.3 W/kg



0 dB = 20.3 W/kg = 13.07 dBW/kg

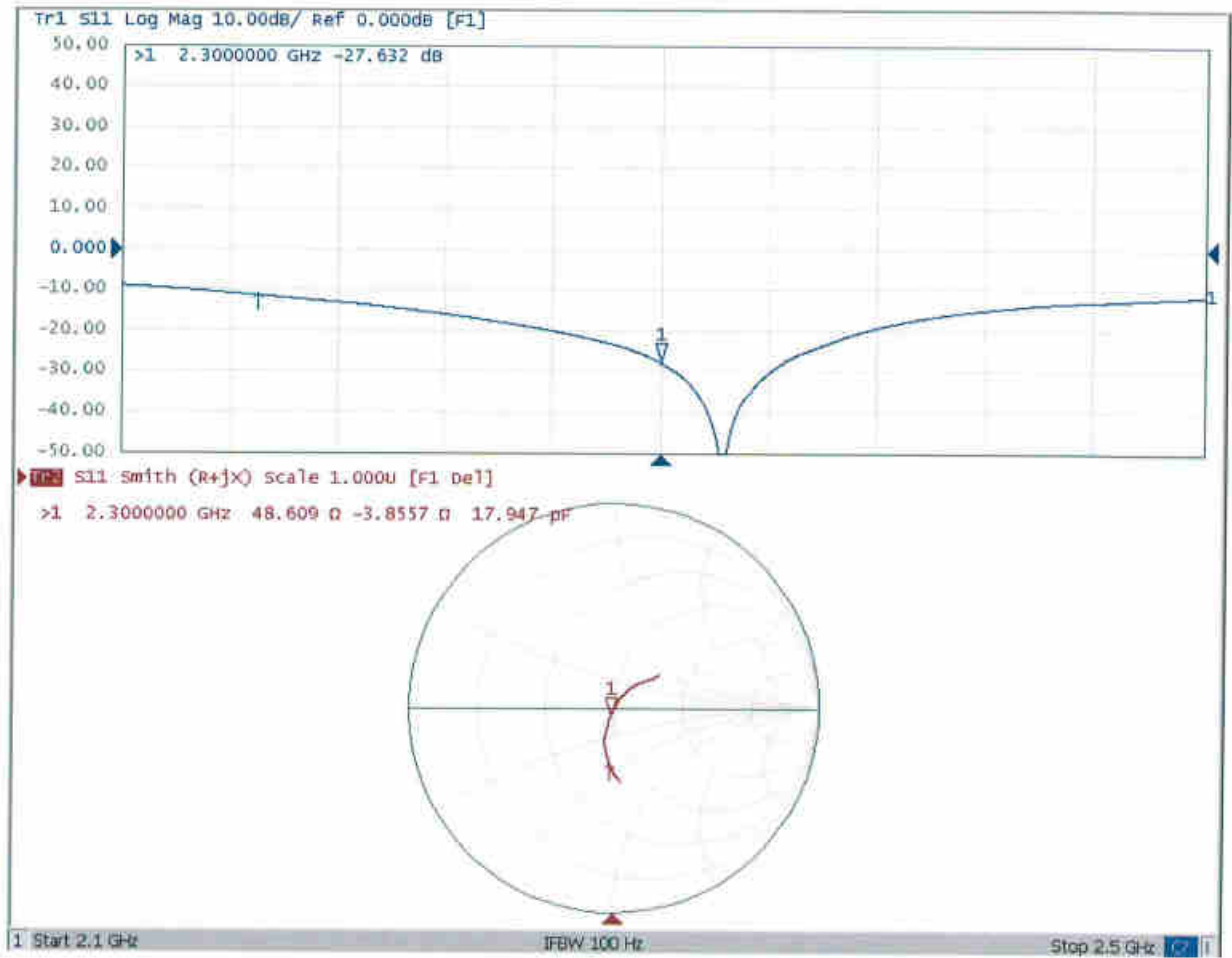


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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 08.30.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2300 MHz; Type: D2300V2; Serial: D2300V2 - SN: 1055

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

Medium parameters used: $f = 2300$ MHz; $\sigma = 1.8$ S/m; $\epsilon_r = 52.46$; $\rho = 1000$ kg/m³

Phantom section: Right Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.87, 7.87, 7.87); Calibrated: 1/23/2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 1/19/2017
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)

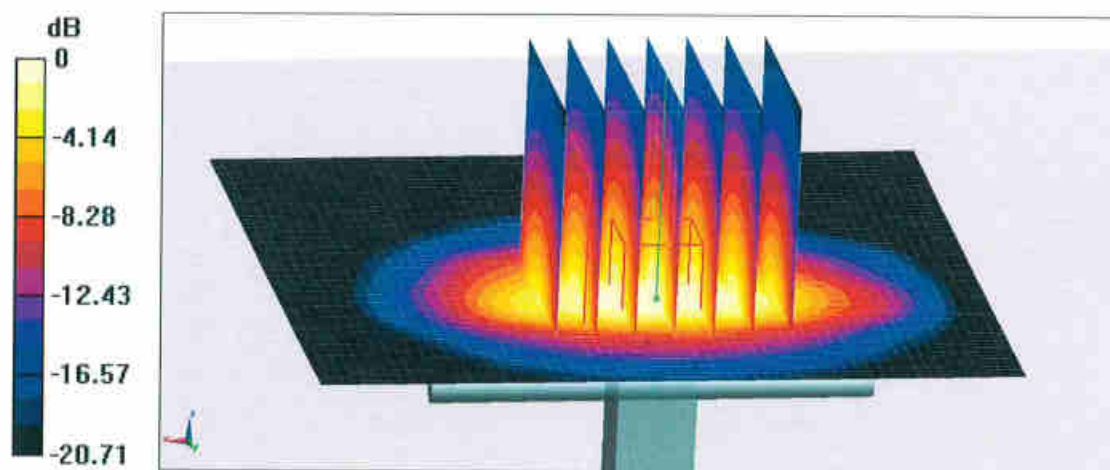
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 60.83 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 24.2 W/kg

SAR(1 g) = 12.2 W/kg; SAR(10 g) = 5.82 W/kg

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



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