Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

General Antenna Parameters and Design

Electrical Delay (one direction)	1.069 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: 11.05.2018

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1176

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz,

Medium parameters used: f = 5250 MHz; σ = 4.848 S/m; εr = 34.85; ρ = 1000 kg/m3, Medium parameters used: f = 5600 MHz; σ = 4.921 S/m; εr = 34.47; ρ = 1000 kg/m3, Medium parameters used: f = 5750 MHz; σ = 5.067 S/m; εr = 34.42; ρ = 1000 kg/m3,

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(5.02, 5.02, 5.02) @ 5250 MHz; Calibrated: 8/27/2018, ConvF(4.41, 4.41, 4.41) @ 5600 MHz; Calibrated: 8/27/2018, ConvF(4.47, 4.47, 4.47) @ 5750 MHz; Calibrated: 8/27/2018,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/20/2018
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.52 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 32.2 W/kg
SAR(1 g) = 7.93 W/kg; SAR(10 g) = 2.26 W/kg
Maximum value of SAR (measured) = 18.5 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.65 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 36.4 W/kg
SAR(1 g) = 8.15 W/kg; SAR(10 g) = 2.33 W/kg
Maximum value of SAR (measured) = 19.3 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.99 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 37.6 W/kg
SAR(1 g) = 8.05 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 20.1 W/kg

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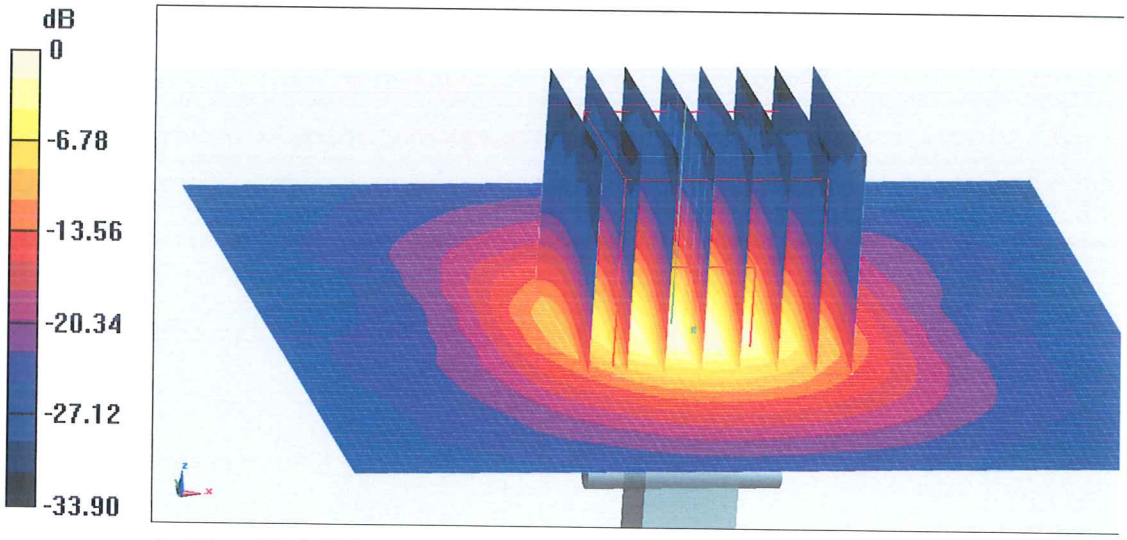

0 dB = 20.1 W/kg = 13.03 dBW/kg

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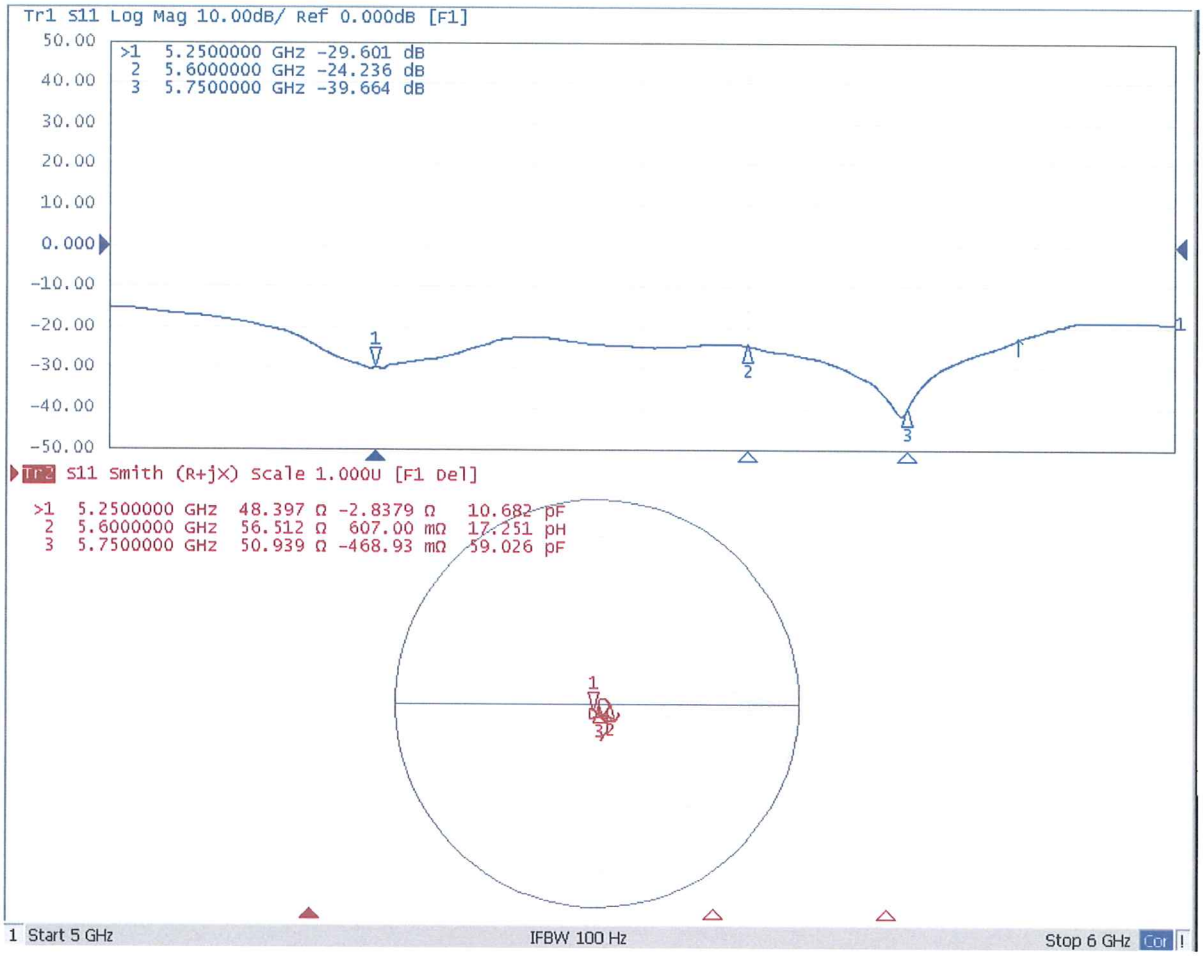
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 11.06.2018

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1176

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz,

Medium parameters used: f = 5250 MHz; σ = 5.269 S/m; ε_r = 47.53; ρ = 1000 kg/m3, Medium parameters used: f = 5600 MHz; σ = 5.791 S/m; ε_r = 47.12; ρ = 1000 kg/m3, Medium parameters used: f = 5750 MHz; σ = 6.018 S/m; ε_r = 46.88; ρ = 1000 kg/m3,

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7514; ConvF(4.54, 4.54, 4.54) @ 5250 MHz; Calibrated: 8/27/2018, ConvF(4, 4, 4) @ 5600 MHz; Calibrated: 8/27/2018, ConvF(3.98, 3.98, 3.98) @ 5750 MHz; Calibrated: 8/27/2018,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/20/2018
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.47 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 29.0 W/kg
SAR(1 g) = 7.32 W/kg; SAR(10 g) = 2.08 W/kg
Maximum value of SAR (measured) = 16.9 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.94 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 34.6 W/kg
SAR(1 g) = 7.77 W/kg; SAR(10 g) = 2.2 W/kg
Maximum value of SAR (measured) = 19.1 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 61.33 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 35.8 W/kg
SAR(1 g) = 7.57 W/kg; SAR(10 g) = 2.12 W/kg
Maximum value of SAR (measured) = 19.2 W/kg

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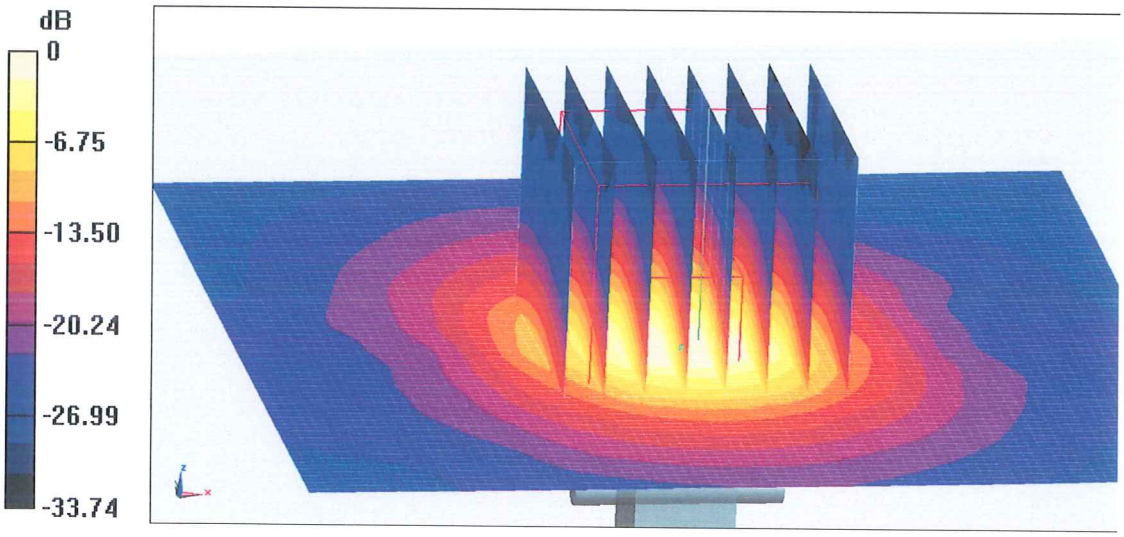

0 dB = 19.2 W/kg = 12.83 dBW/kg

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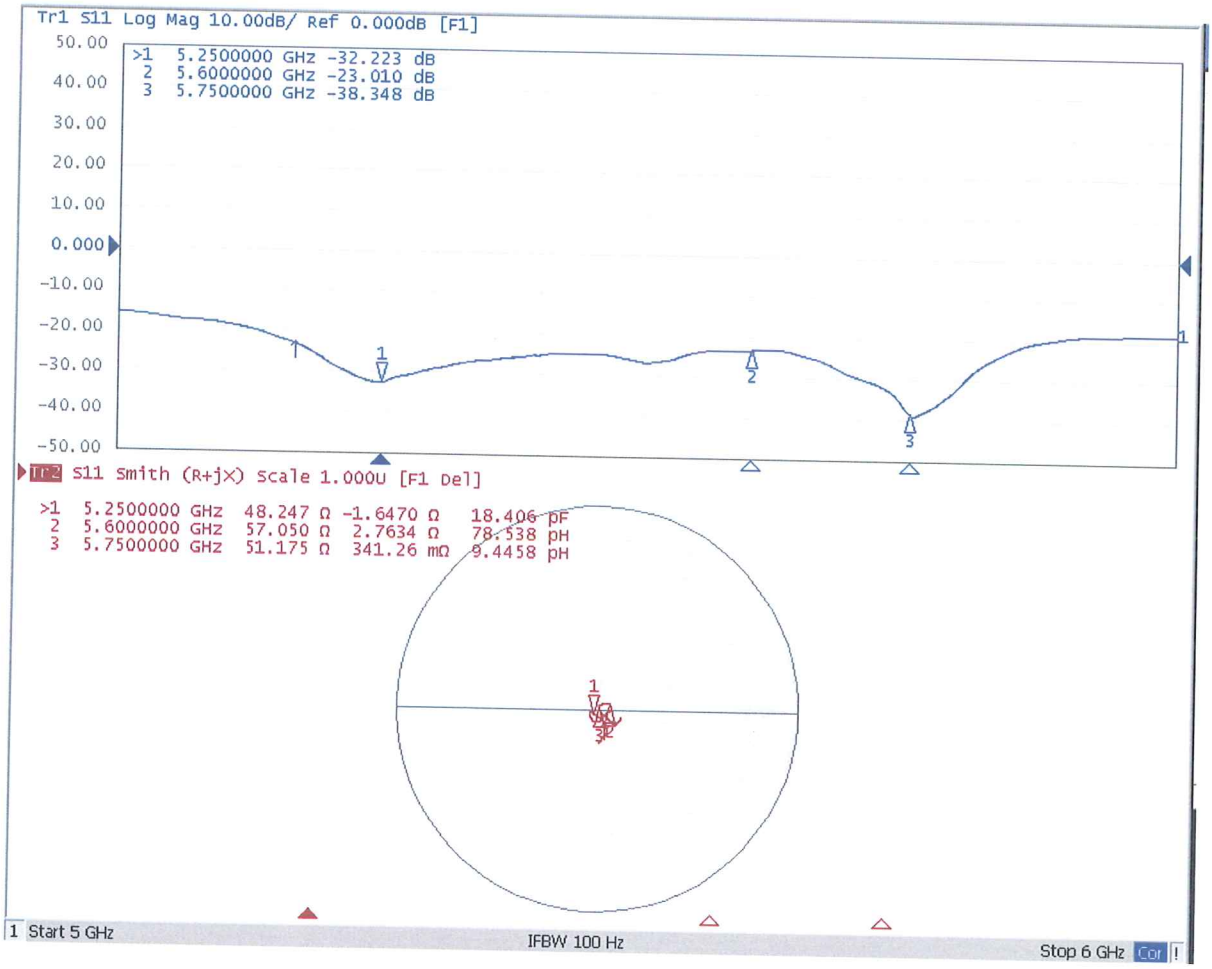
Impedance Measurement Plot for Body TSL



Appendix Annual validation for Test Lab.

General calibration information

Date	2019.10.09
Test Laboratory	ShenZhen Morlab Communications Technology Co., Ltd.
Antenna serial No.	D1750V2-SN:1160

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	51.35Ω+3.85jΩ
Return Loss	-27.9dB

Antenna Parameters Head TSL at 5600 MHz

Impedance, transformed to feed point	44.7Ω+2.96jΩ
Return Loss	-23.87dB

Antenna Parameters Head TSL at 5750 MHz

Impedance, transformed to feed point	46.84Ω+0.95jΩ
Return Loss	-29.36dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.276 ns

After long term use with 100W radiated power，only a slight warming of the dipole near the feed point 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 arm，because they might bend or the soldered connections near the feed point may be damaged.

Test Laboratory: SAR Lab. of Shenzhen Morlab Communications Technology Co., Ltd. Date: 2019.10.09

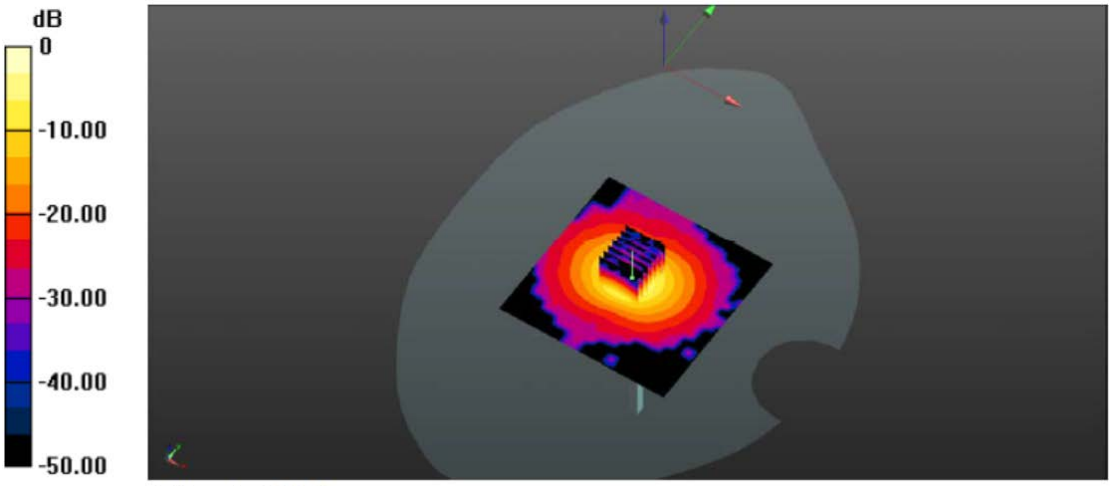
System Check_5250MHz_Head

Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium: HSL_5250 Medium parameters used: f = 5250 MHz; σ = 4.699 S/m; ε_r = 36.146; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3823; ConvF(4.6, 4.6, 4.6); Calibrated: 2018.11.12;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn480; Calibrated: 2019.04.11
- Phantom: SAM 1; Type: QD000P40CC; Serial: TP:1471
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW 5250/Area Scan (201x201x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 8.65 W/kg

CW 5250/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 35.37 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 46.7 W/kg
SAR(1 g) = 7.67 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (measured) = 8.24 W/kg



0 dB = 8.65 W/kg

Test Laboratory: SAR Lab. of Shenzhen Morlab Communications Technology Co., Ltd. Date: 2019.10.09

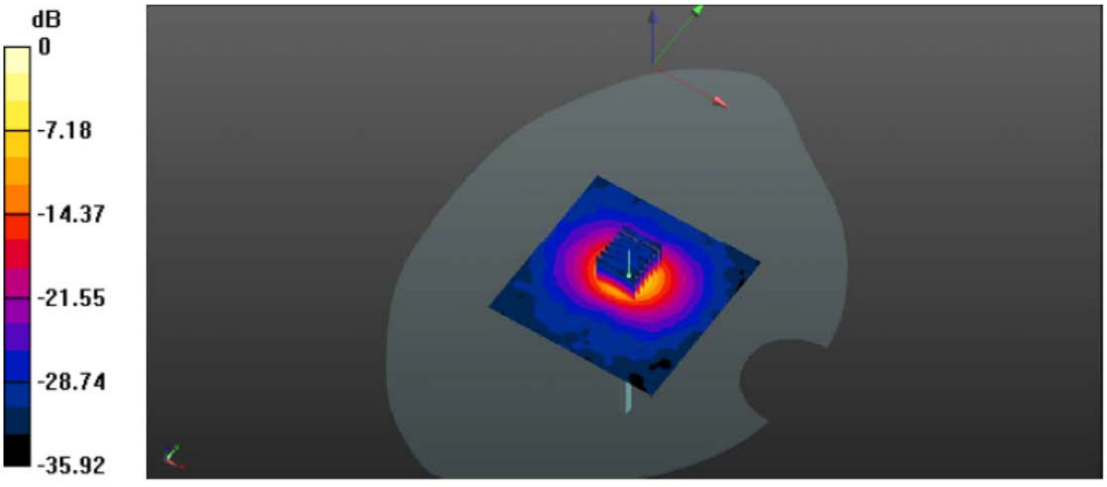
System Check_5600MHz_Head

Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: HSL_5600 Medium parameters used: f = 5600 MHz; σ = 5.125 S/m; ε_r = 35.435; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3823; ConvF(4.5, 4.5, 4.5); Calibrated: 2018.11.12;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn480; Calibrated: 2019.04.11
- Phantom: SAM 1; Type: QD000P40CC; Serial: TP:1471
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW 5600/Area Scan (201x201x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 8.96 W/kg

CW 5600/Zoom Scan (7x7x13)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 33.62 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 40.3 W/kg
SAR(1 g) = 8.31 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 17.9 W/kg



0 dB = 17.9 W/kg

Test Laboratory: SAR Lab. of Shenzhen Morlab Communications Technology Co., Ltd. Date: 2019.10.09

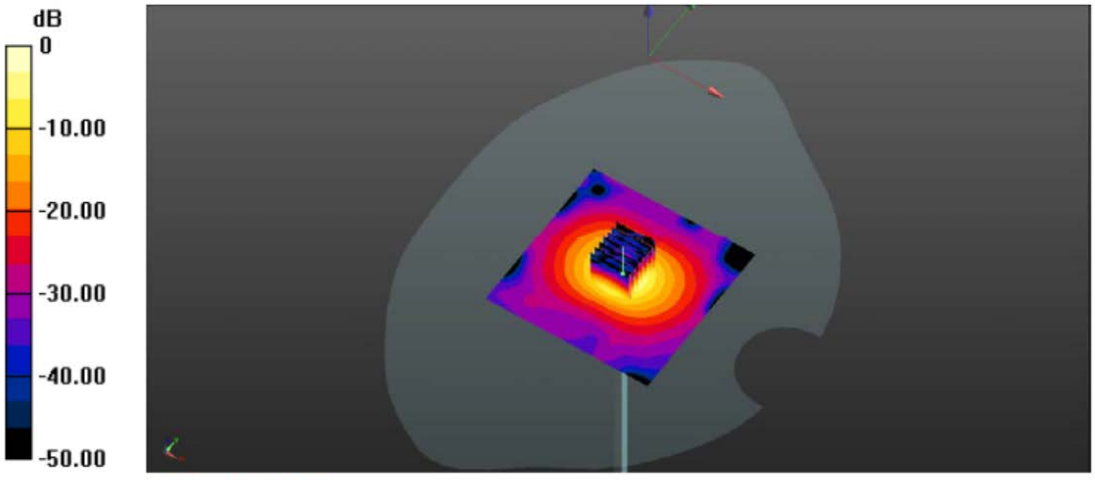
System Check_5750MHz_Head

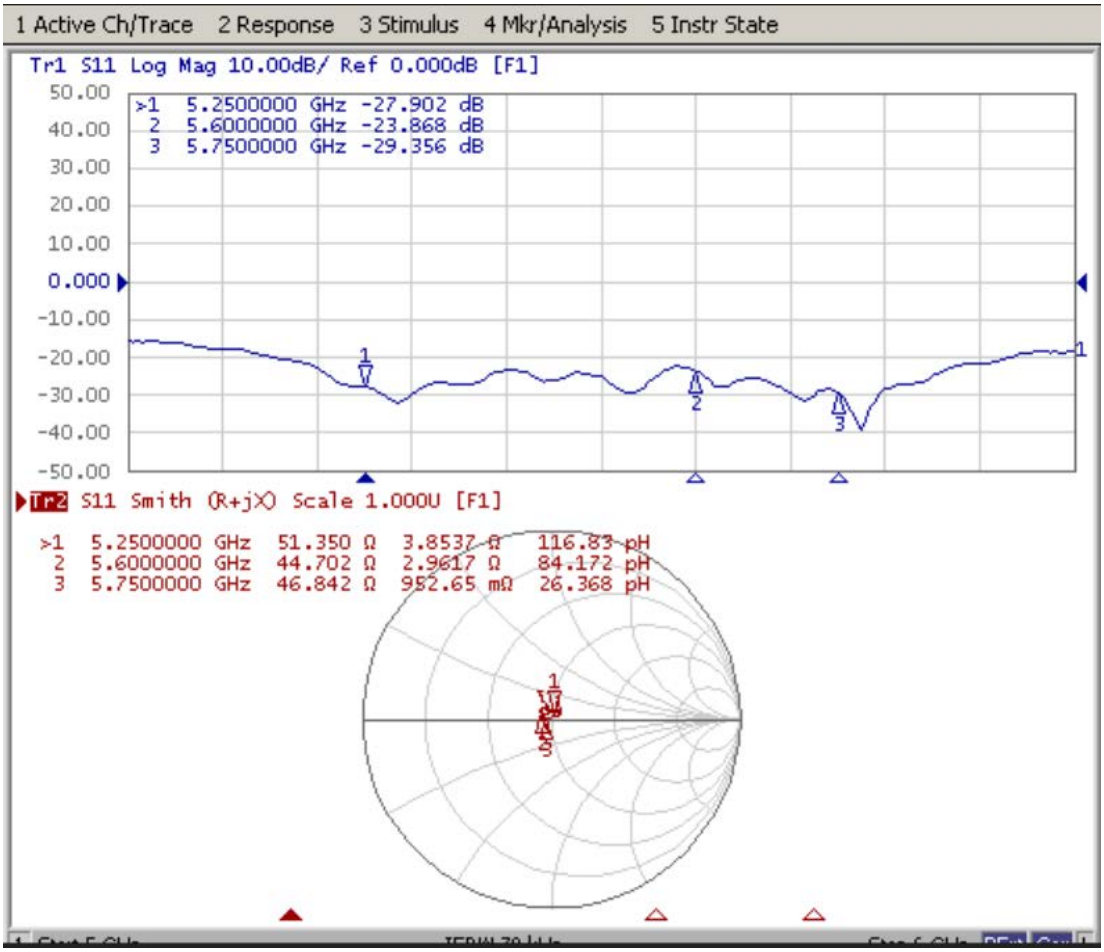
Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium: HSL_5750 Medium parameters used: f = 5750 MHz; σ = 5.298 S/m; ε_r = 35.158; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3823; ConvF(4.6, 4.6, 4.6); Calibrated: 2018.11.12;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn480; Calibrated: 2019.04.11
- Phantom: SAM 1; Type: QD000P40CC; Serial: TP:1471
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

CW5750/Area Scan (101x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 16.4 W/kg

CW5750/Zoom Scan (7x7x13)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 37.87 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 39.3 W/kg
SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.31 W/kg
Maximum value of SAR (measured) = 16.4 W/kg



0 dB = 16.4 W/kg

Appendix Impedance Measurement Plot for Head TSL