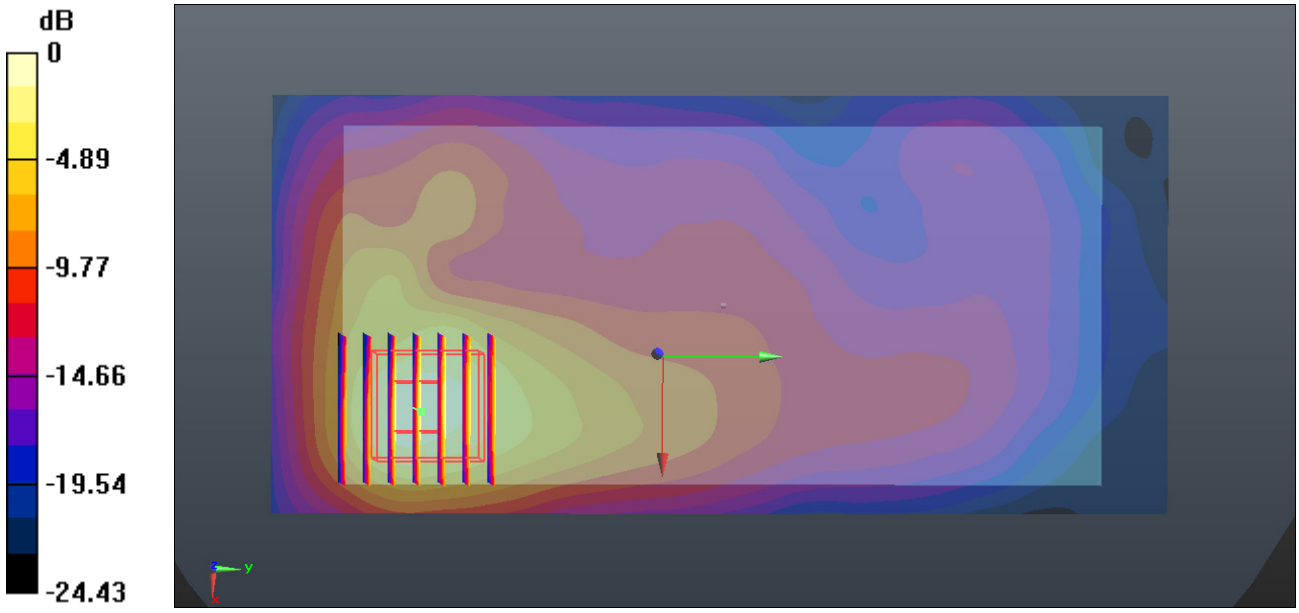
15_LTE Band 7_20M_QPSK_1RB_0Offset_Front_5mm_Ch20850

Communication System: UID 0, FDD_LTE (0); Frequency: 2510 MHz;Duty Cycle: 1:1
Medium: MSL_2600 Medium parameters used: f = 2510 MHz; σ = 2.102 S/m; ε_r = 53.321;
ρ = 1000kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3753; ConvF(7.14, 7.14, 7.14); Calibrated: 2017.5.5;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2018.1.3
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

Ch20850/Area Scan (71x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.10 W/kg

Ch20850/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.840 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.95 W/kg
SAR(1 g) = 0.939 W/kg; SAR(10 g) = 0.430 W/kg
Maximum value of SAR (measured) = 1.22 W/kg



0 dB = 1.22 W/kg = 0.86 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2018.2.8

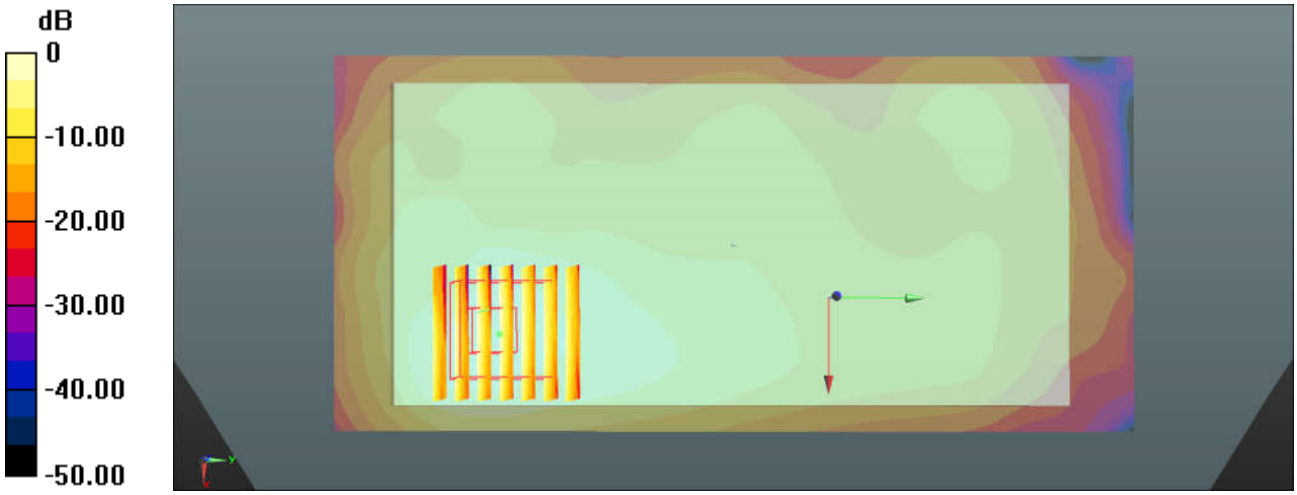
16_LTE Band 38_20M_QPSK_1RB_0Offset_Front_5mm_Ch38000

Communication System: UID 0, TDD_LTE (0); Frequency: 2595 MHz;Duty Cycle: 1:1.59
Medium: MSL_2600 Medium parameters used: f = 2595 MHz; σ = 2.217 S/m; ε_r = 52.986;
$\rho = 1000 kg/m^3$
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3753; ConvF(7.14, 7.14, 7.14); Calibrated: 2017.5.5;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2018.1.3
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch38000/Area Scan (71x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.36 W/kg

Ch38000/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.776 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.95 W/kg
SAR(1 g) = 0.985 W/kg; SAR(10 g) = 0.485 W/kg
Maximum value of SAR (measured) = 1.23 W/kg



0 dB = 1.36 W/kg = 1.34 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2018.1.14

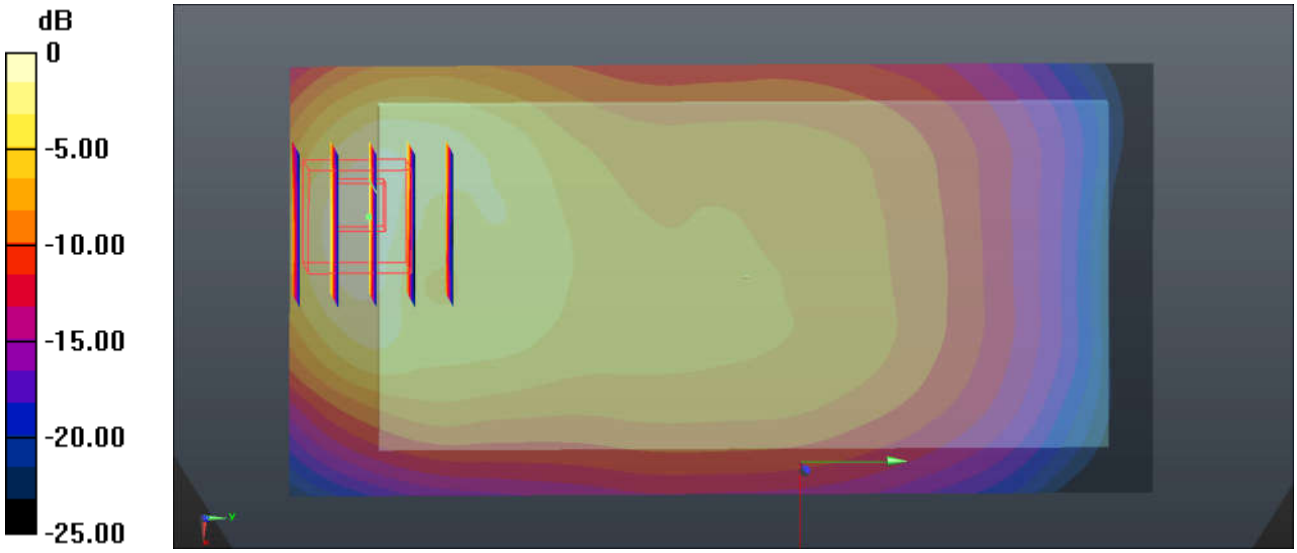
17_GSM850_GPRS 2 Tx slots_Front_5mm_Ch128

Communication System: UID 0, GPRS/EDGE (2 Tx slots) (0); Frequency: 824.2 MHz;Duty Cycle:1:4.15
Medium: MSL_850 Medium parameters used: f = 824.2 MHz; σ = 0.984 S/m; ε_r = 54.735;
$\rho = 1000_{kg/m^3}$
Ambient Temperature：23.5 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(6.19, 6.19, 6.19); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch128/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.45 W/kg

Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.94 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.16 W/kg
SAR(1 g) = 1.080 W/kg; SAR(10 g) = 0.566 W/kg
Maximum value of SAR (measured) = 1.36 W/kg



0 dB = 1.45 W/kg = 1.61 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2018.1.14

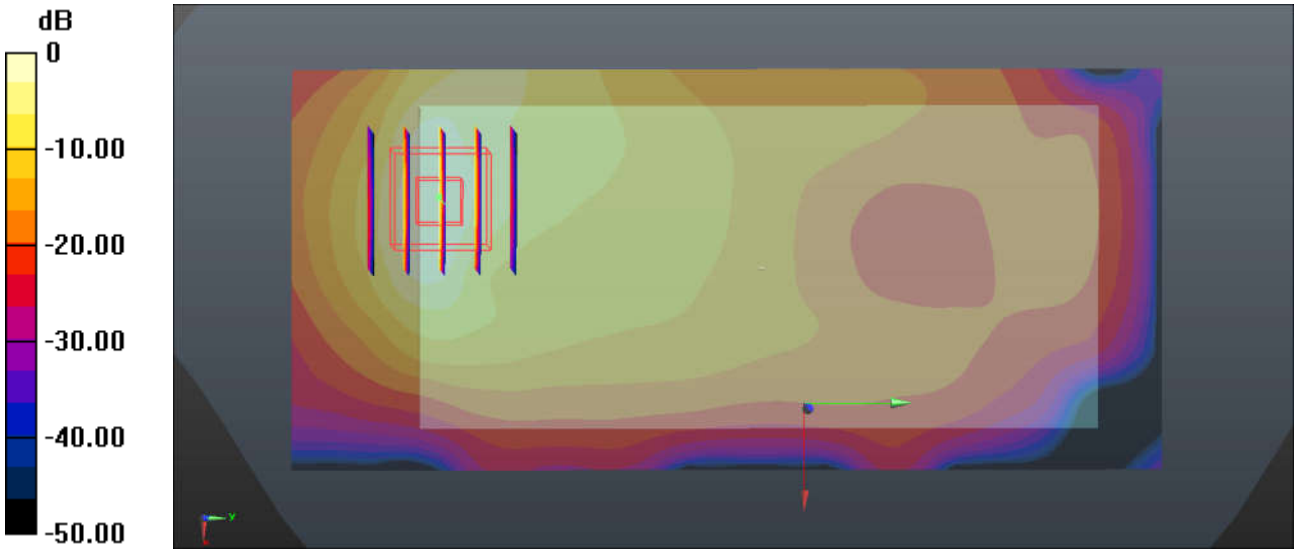
18_GSM1900_GPRS 2 Tx slots_Front_5mm_Ch512

Communication System: UID 0, GPRS/EDGE (2 Tx slots) (0); Frequency: 1850.2 MHz;Duty Cycle:1:4.15
Medium: MSL_1900 Medium parameters used: f = 1850.2 MHz; σ = 1.471 S/m; ε_r = 51.941;
$\rho = 1000_{kg/m^3}$
Ambient Temperature：23.4 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(4.86, 4.86, 4.86); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch512/Area Scan (61x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.32 W/kg

Ch512/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.243 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 2.16 W/kg
SAR(1 g) = 0.788 W/kg; SAR(10 g) = 0.363 W/kg
Maximum value of SAR (measured) = 1.46 W/kg



0 dB = 1.32 W/kg = 1.21 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2018.1.14

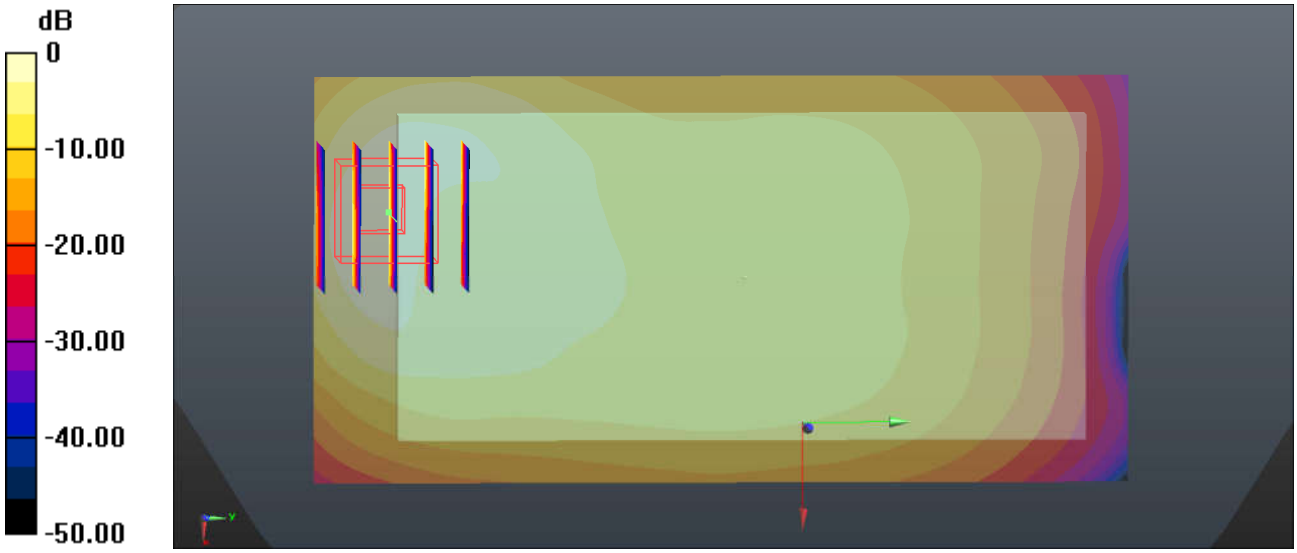
19_WCDMA Band V_RMC 12.2Kbps_Front_5mm_Ch4233

Communication System: UID 0, UMTS (0); Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 846.6 MHz; σ = 1.007 S/m; ε_r = 54.512; ρ =1000kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(6.19, 6.19, 6.19); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch4233/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.12 W/kg

Ch4233/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.73 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.66 W/kg
SAR(1 g) = 0.853 W/kg; SAR(10 g) = 0.446 W/kg
Maximum value of SAR (measured) = 1.10 W/kg



0 dB = 1.12 W/kg = 0.49 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2018.1.14

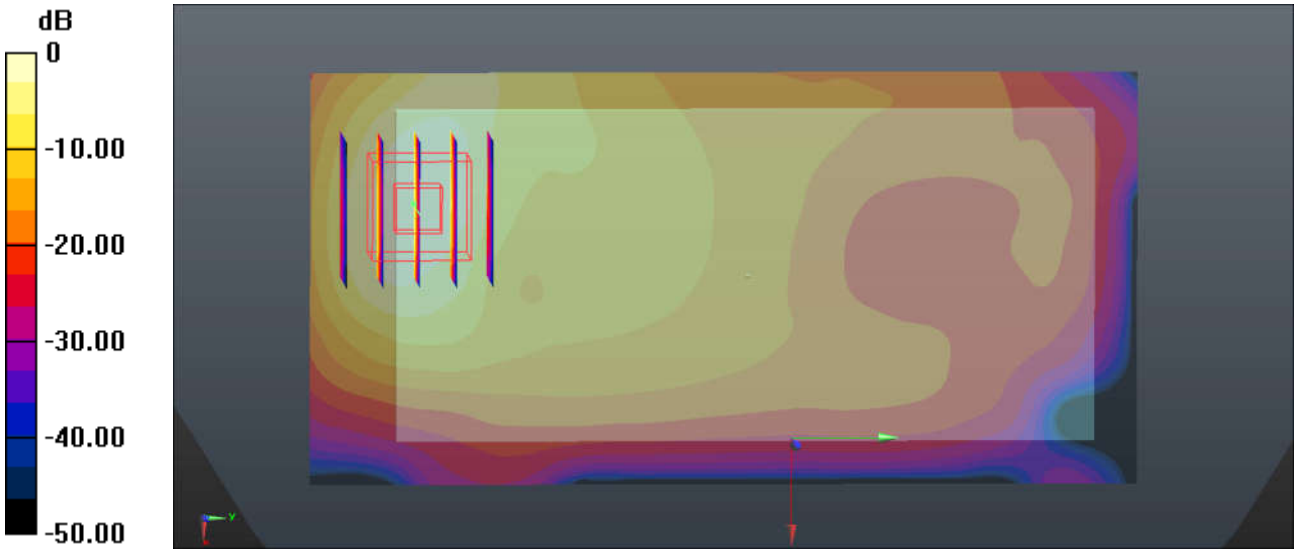
20_WCDMA Band II_RMC 12.2Kbps_Front_5mm_Ch9400

Communication System: UID 0, UMTS (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: MSL_1900 Medium parameters used: f = 1880 MHz; σ = 1.502 S/m; ε_r = 51.824;
$\rho = 1000 kg/m^3$
Ambient Temperature：23.4 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(4.86, 4.86, 4.86); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch9400/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.24 W/kg

Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.160 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.411 W/kg; SAR(10 g) = 0.246 W/kg
Maximum value of SAR (measured) = 1.38 W/kg



0 dB = 1.24 W/kg = 0.93 dBW/kg

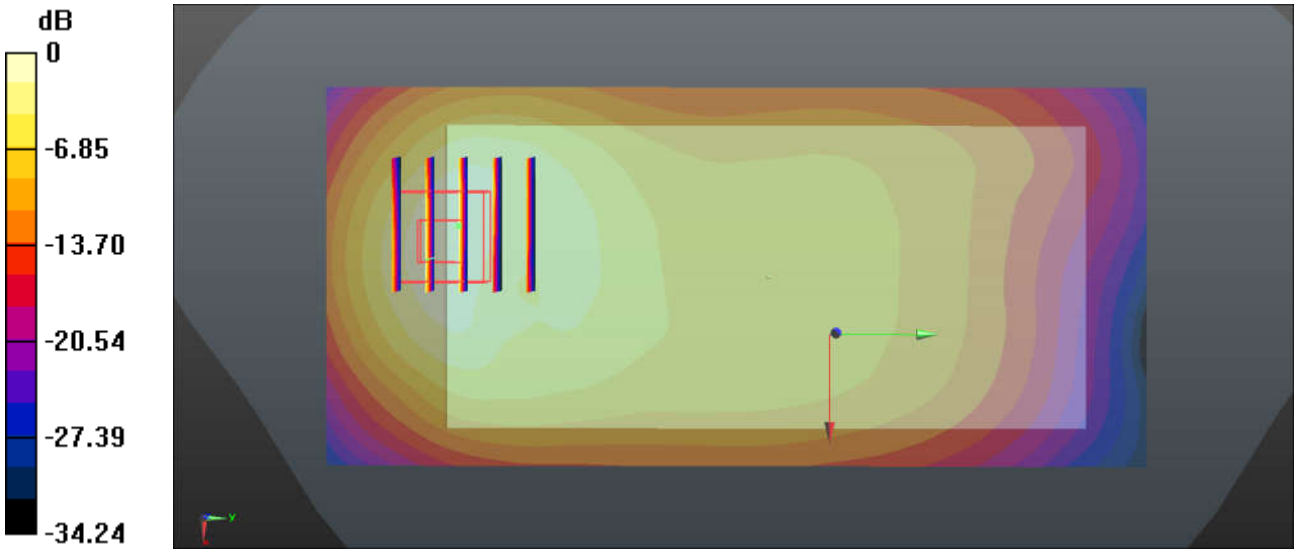
21_LTE Band 26_15M_QPSK_1RB_74Offset_Front_5mm_Ch26865

Communication System: UID 0, FDD_LTE (0); Frequency: 831.5 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 831.5 MHz; σ = 0.991 S/m; ε_r =54.669;
ρ =1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(6.19, 6.19, 6.19); Calibrated: 2017.9.25;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch26865/Area Scan (61x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.07 W/kg

Ch26865/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.75 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 1.61 W/kg
SAR(1 g) = 0.816 W/kg; SAR(10 g) = 0.430 W/kg
Maximum value of SAR (measured) = 0.973 W/kg



0 dB = 1.07 W/kg = 0.29 dBW/kg

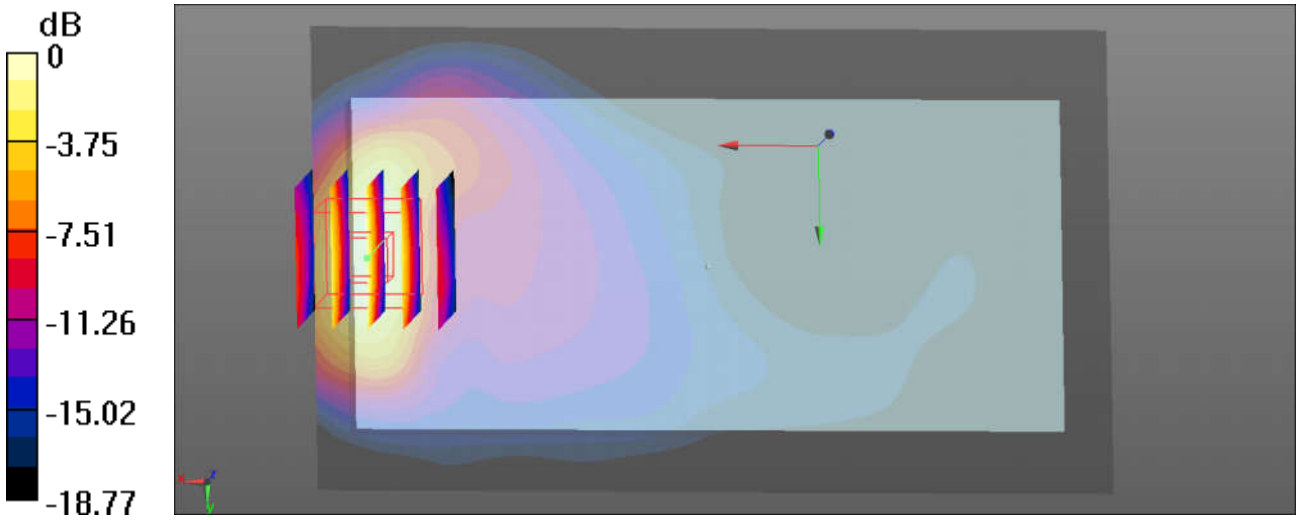
22_LTE Band 2_20M_QPSK_1RB_0Offset_Front_5mm_Ch18900

Communication System: UID 0, FDD_LTE (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: MSL_1900 Medium parameters used: f = 1880 MHz; σ = 1.502 S/m; ε_r = 51.824;
$\rho = 1000_{kg/m^3}$
Ambient Temperature：23.4 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(4.86, 4.86, 4.86); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch18900/Area Scan (121x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.700 W/kg

Ch18900/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.995 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.878 W/kg
SAR(1 g) = 0.495 W/kg; SAR(10 g) = 0.254 W/kg
Maximum value of SAR (measured) = 0.703 W/kg



0 dB = 0.703 W/kg = -1.53 dBW/kg

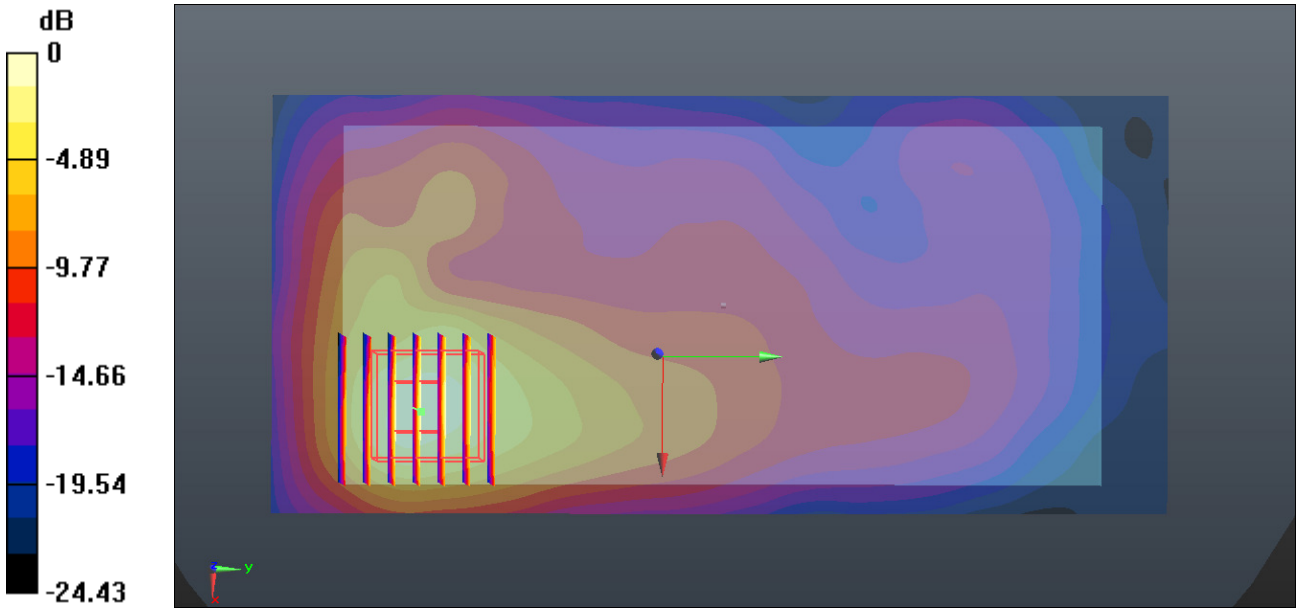
23_LTE Band 7_20M_QPSK_1RB_0Offset_Front_5mm_Ch20850

Communication System: UID 0, FDD_LTE (0); Frequency: 2510 MHz;Duty Cycle: 1:1
Medium: MSL_2600 Medium parameters used: f = 2510 MHz; σ = 2.102 S/m; ε_r = 53.321;
ρ = 1000kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3753; ConvF(7.14, 7.14, 7.14); Calibrated: 2017.5.5;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2018.1.3
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch20850/Area Scan (71x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.10 W/kg

Ch20850/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.840 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.95 W/kg
SAR(1 g) = 0.939 W/kg; SAR(10 g) = 0.430 W/kg
Maximum value of SAR (measured) = 1.22 W/kg



0 dB = 1.22 W/kg = 0.86 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2018.2.8

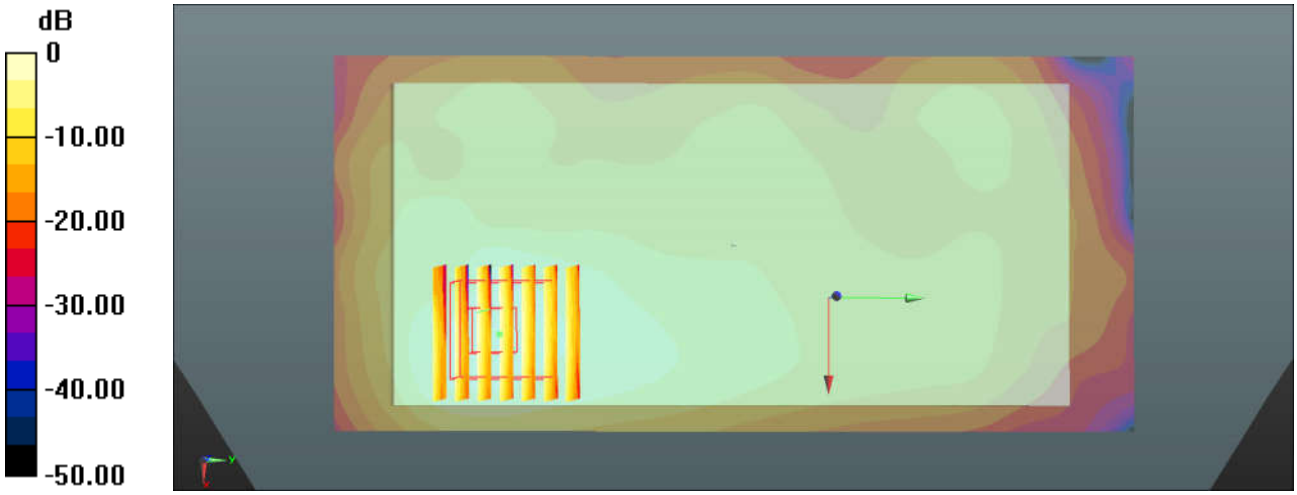
24_LTE Band 38_20M_QPSK_1RB_0Offset_Front_5mm_Ch38000

Communication System: UID 0, TDD_LTE (0); Frequency: 2595 MHz;Duty Cycle: 1:1.59
Medium: MSL_2600 Medium parameters used: f = 2595 MHz; σ = 2.217 S/m; ε_r = 52.986;
$\rho = 1000 kg/m^3$
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3753; ConvF(7.14, 7.14, 7.14); Calibrated: 2017.5.5;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2018.1.3
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch38000/Area Scan (71x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.36 W/kg

Ch38000/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.776 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.95 W/kg
SAR(1 g) = 0.985 W/kg; SAR(10 g) = 0.485 W/kg
Maximum value of SAR (measured) = 1.23 W/kg



0 dB = 1.36 W/kg = 1.34 dBW/kg

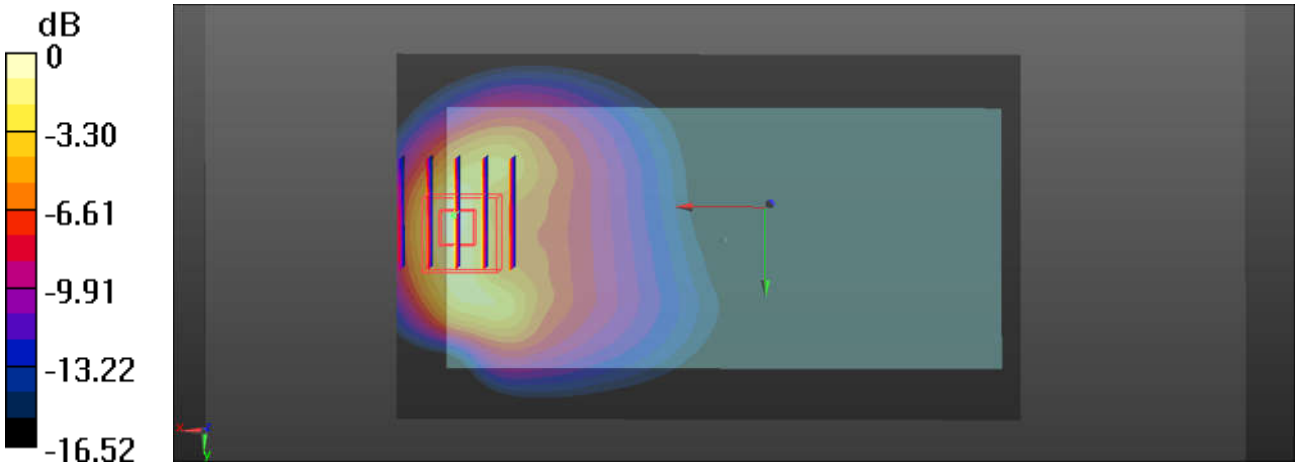
25_GSM850_GPRS 2 Tx slots_Front_0mm_Ch189

Communication System: UID 0, GPRS/EDGE (2 Tx slots) (0); Frequency: 836.4 MHz;Duty Cycle:1:4.15
Medium: MSL_850 Medium parameters used: f = 836.4 MHz; σ = 0.997 S/m; ε_r = 54.617;
$\rho = 1000_{kg/m^3}$
Ambient Temperature：23.5 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(6.19, 6.19, 6.19); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch189/Area Scan (121x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.44 W/kg

Ch189/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.781 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 5.26 W/kg
SAR(1 g) = 2.51 W/kg; SAR(10 g) = 1.310 W/kg
Maximum value of SAR (measured) = 3.85 W/kg



0 dB = 3.85 W/kg

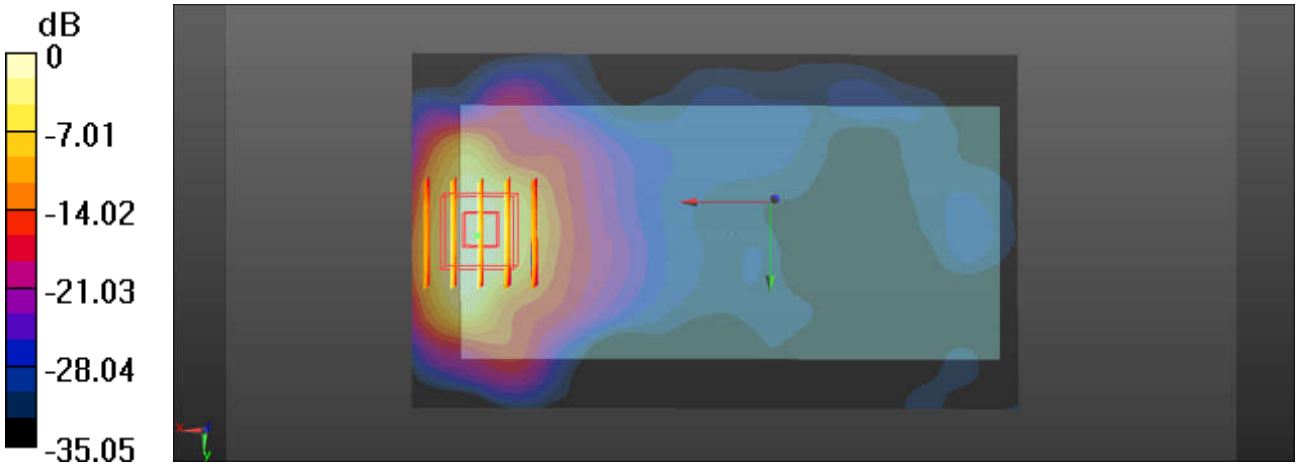
26_GSM1900_GPRS 2 Tx slots_Front_0mm_Ch512

Communication System: UID 0, GPRS/EDGE (2 Tx slots) (0); Frequency: 1909.8 MHz;Duty Cycle:1:4.15
Medium: MSL_1900 Medium parameters used: f = 1909.8 MHz; σ = 1.538 S/m; ε_r = 51.693;
ρ =1000kg/m^3
Ambient Temperature：23.4 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(4.86, 4.86, 4.86); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch512/Area Scan (121x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 10.2 W/kg

Ch512/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.195 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 11.2 W/kg
SAR(1 g) = 5.76 W/kg; SAR(10 g) = 2.900 W/kg
Maximum value of SAR (measured) = 8.34 W/kg



0 dB = 8.34 W/kg

27_WCDMA Band V_RMC 12.2Kbps_Front_0mm_Ch4132

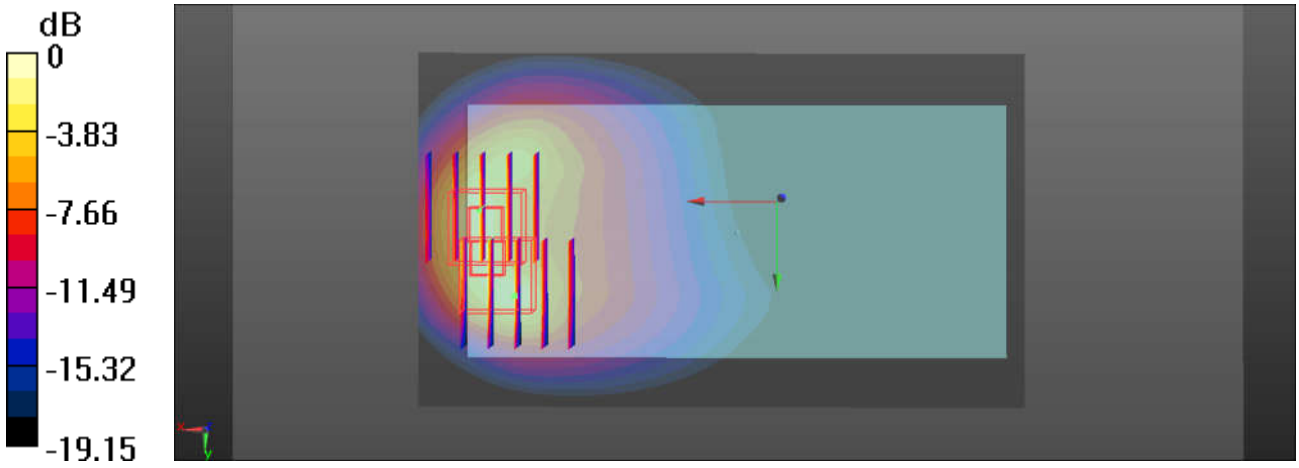
Communication System: UID 0, UMTS (0); Frequency: 826.4 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 826.4 MHz; σ = 0.986 S/m; ε_r = 54.724;
$\rho = 1000_{kg/m^3}$
Ambient Temperature：23.5 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(6.19, 6.19, 6.19); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch4132/Area Scan (121x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.40 W/kg

Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.086 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 5.92 W/kg
SAR(1 g) = 2.69 W/kg; SAR(10 g) = 1.400 W/kg
Maximum value of SAR (measured) = 4.24 W/kg

Ch4132/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.086 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 7.22 W/kg
SAR(1 g) = 2.65 W/kg; SAR(10 g) = 1.310 W/kg
Maximum value of SAR (measured) = 4.61 W/kg



0 dB = 4.61 W/kg

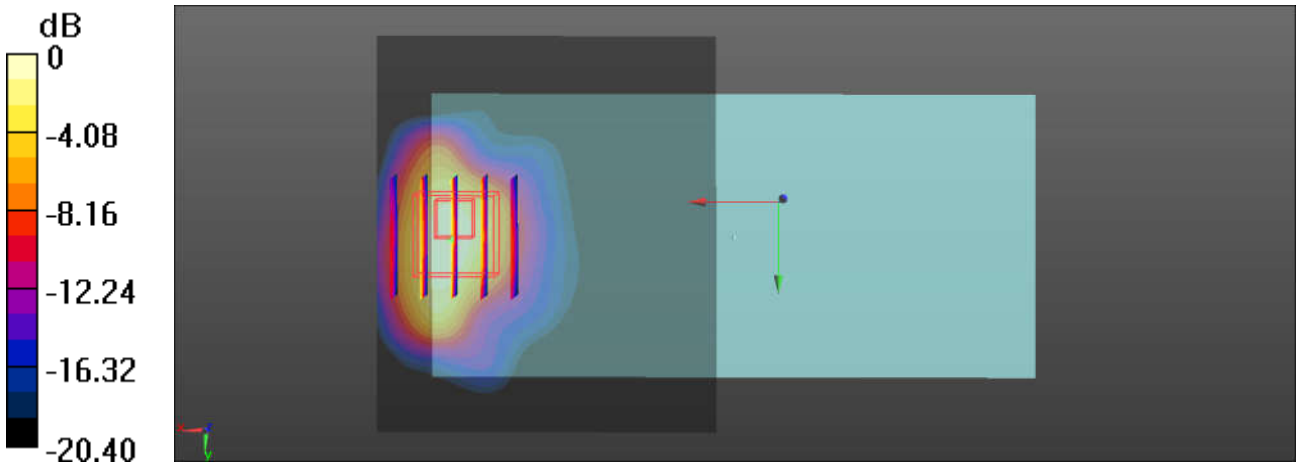
28_WCDMA Band II_RMC 12.2Kbps_Front_0mm_Ch9262

Communication System: UID 0, UMTS (0); Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium: MSL_1900 Medium parameters used: f = 1852.4 MHz; σ = 1.474 S/m; ε_r = 51.935;
ρ =1000 kg/m^3
Ambient Temperature：23.4 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(4.86, 4.86, 4.86); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch9262/Area Scan (61x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 7.20 W/kg

Ch9262/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.641 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 8.32 W/kg
SAR(1 g) = 3.92 W/kg; SAR(10 g) = 1.980 W/kg
Maximum value of SAR (measured) = 6.09 W/kg



0 dB = 6.09 W/kg

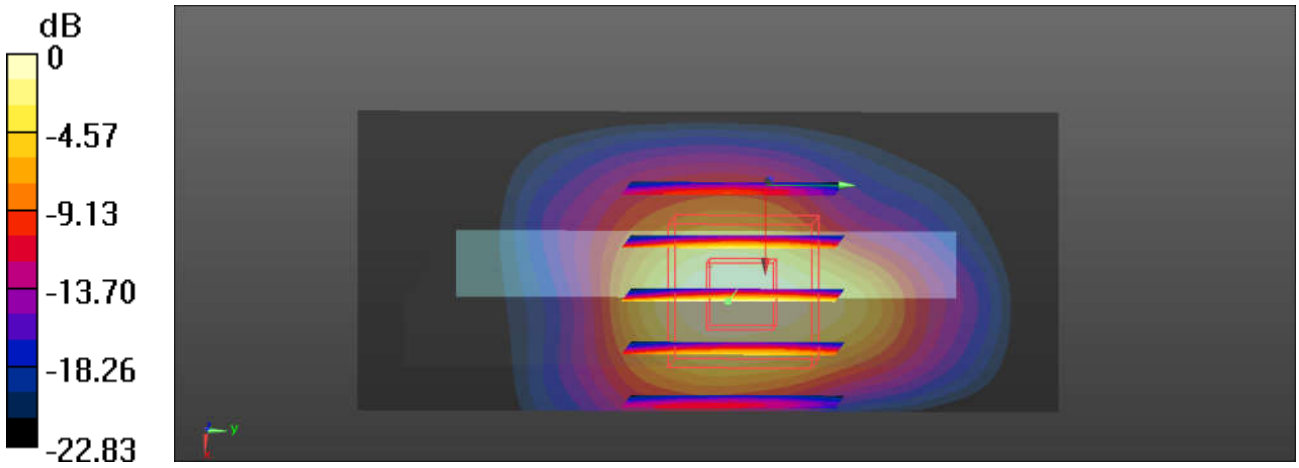
29_LTE Band 2_20M_QPSK_1RB_0Offset_Bottom Side_0mm_Ch18900

Communication System: UID 0, FDD_LTE (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: MSL_1900 Medium parameters used: f = 1880 MHz; σ = 1.502 S/m; ε_r = 51.824;
$\rho = 1000_{kg/m^3}$
Ambient Temperature：23.4 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3293; ConvF(4.86, 4.86, 4.86); Calibrated: 2017.9.25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1326; Calibrated: 2017.9.15
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch18900/Area Scan (31x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 4.45 W/kg

Ch18900/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 45.25 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 5.91 W/kg
SAR(1 g) = 2.88 W/kg; SAR(10 g) = 1.270 W/kg
Maximum value of SAR (measured) = 4.40 W/kg



0 dB = 4.40 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2018.2.8

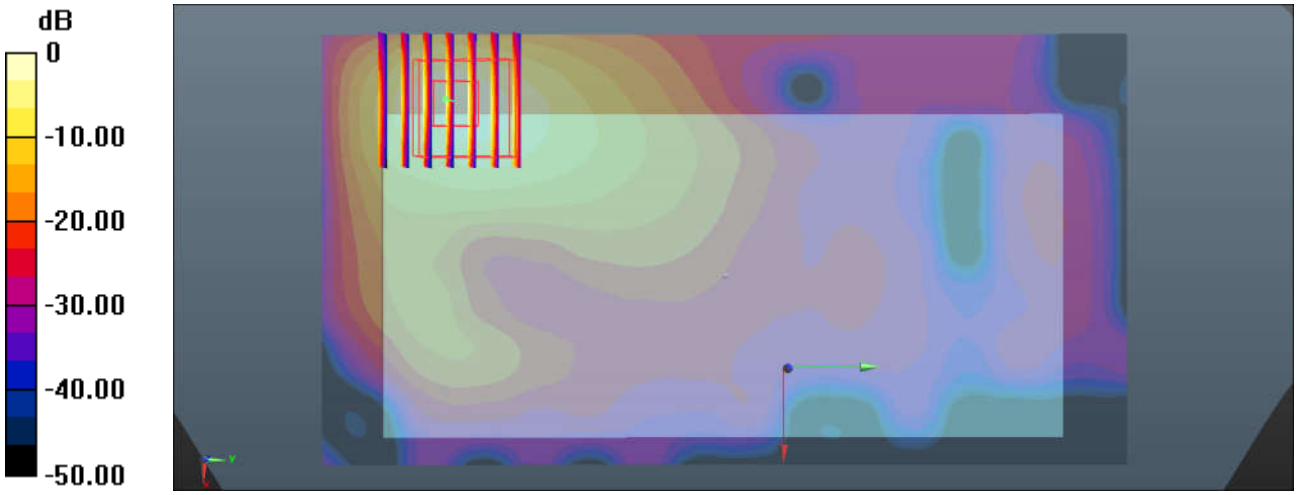
30_LTE Band 7_20M_QPSK_1RB_0Offset_Front_0mm_Ch21100

Communication System: UID 0, FDD_LTE (0); Frequency: 2535 MHz;Duty Cycle: 1:1
Medium: MSL_2600 Medium parameters used: f = 2535 MHz; σ = 2.136 S/m; ε_r = 53.218;
$\rho = 1000 kg/m^3$
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3753; ConvF(7.14, 7.14, 7.14); Calibrated: 2017.5.5;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2018.1.3
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch21100/Area Scan (81x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 9.45 W/kg

Ch21100/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.617 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 16.8 W/kg
SAR(1 g) = 6.23 W/kg; SAR(10 g) = 2.430 W/kg
Maximum value of SAR (measured) = 9.17 W/kg



0 dB = 9.45 W/kg = 9.75 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2018.2.8

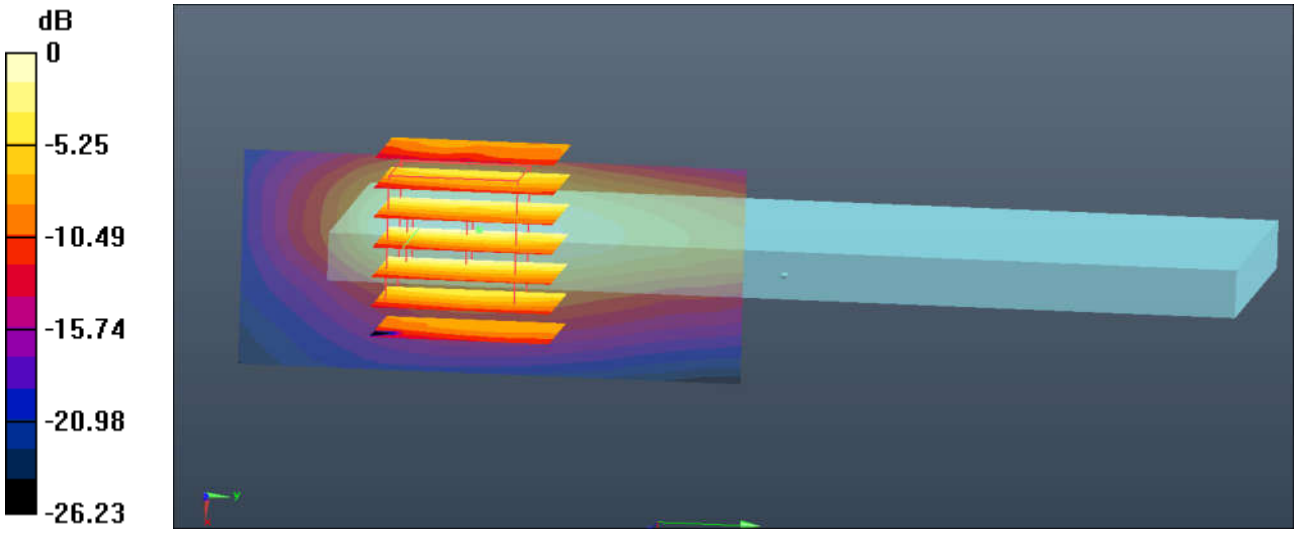
31_LTE Band 38_20M_QPSK_1RB_0Offset_Left Side_0mm_Ch38000

Communication System: UID 0, TDD_LTE (0); Frequency: 2595 MHz;Duty Cycle: 1:1.59
Medium: MSL_2600 Medium parameters used: f = 2595 MHz; σ = 2.217 S/m; ε_r = 52.986;
$\rho = 1000 kg/m^3$
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3753; ConvF(7.14, 7.14, 7.14); Calibrated: 2017.5.5;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1279; Calibrated: 2018.1.3
- Phantom: SAM3; Type: SAM; Serial: TP-1839
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch38000/Area Scan (31x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 10.0 W/kg

Ch38000/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 25.30 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 23.1 W/kg
SAR(1 g) = 7.65 W/kg; SAR(10 g) = 2.800 W/kg
Maximum value of SAR (measured) = 11.1 W/kg



0 dB = 10.0 W/kg = 10.00 dBW/kg

Appendix C. Supplemental Tuner Head & Body SAR Results

The results are shown as follows

Head

Average Value of Time Sweep (W/kg)

Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Auto-Tune (State)	0	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324	330	336	342	348	354	360
GSM850	GPRS(2Tx slots)	836.4	189	N/A	N/A	Right Cheek	0 mm	0.516	0.11	0.128	0.122	0.079	0.255	0.353	0.059	0.058	0.318	0.357	0.078	0.08	0.322	0.252	0.066	0.055	0.22	0.046	0.048	0.102	0.288	0.064	0.067	0.378	0.302	0.099	0.13	0.142	0.234	0.123	0.256	0.354	0.328	0.257	0.334	0.487	0.104	0.487	0.019	0.234	0.324	0.502	0.268	0.347	0.33	0.378	0.502	0.124	0.234	0.254	0.364	0.222	0.225	0.236	0.458	0.356	0.22	0.387	0.317	0.268	0.249

Average Value of Time Sweep (W/kg)

Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Auto-Tune (State)	1	7	13	19	25	31	37	43	49	55	61	67	73	79	85	91	97	103	109	115	121	127	133	139	145	151	157	163	169	175	181	187	193	199	205	211	217	223	229	235	241	247	253	259	265	271	277	283	289	295	301	307	313	319	325	331	337	343	349	355	361
GSM1900	GPRS(2Tx slots)	1909.8	810	N/A	N/A	Right Cheek	0 mm	0.114	0.09	0.075	0.01	0.082	0.066	0.057	0.059	0.056	0.074	0.067	0.063	0.05	0.059	0.05	0.07	0.055	0.053	0.053	0.07	0.054	0.051	0.059	0.048	0.073	0.062	0.077	0.094	0.088	0.058	0.036	0.085	0.105	0.047	0.025	0.077	0.089	0.025	0.021	0.035	0.077	0.098	0.032	0.058	0.097	0.092	0.082	0.027	0.056	0.039	0.058	0.074	0.069	0.025	0.047	0.028	0.099	0.036	0.058	0.047	0.044	0.058

Average Value of Time Sweep (W/kg)

Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Auto-Tune (State)	2	8	14	20	26	32	38	44	50	56	62	68	74	80	86	92	98	104	110	116	122	128	134	140	146	152	158	164	170	176	182	188	194	200	206	212	218	224	230	236	242	248	254	260	266	272	278	284	290	296	302	308	314	320	326	332	338	344	350	356	362
WCDMA Band V	RMC12.2Kbps	826.4	4132	N/A	N/A	Right Cheek	0 mm	0.360	0.08	0.129	0.134	0.128	0.186	0.237	0.246	0.104	0.203	0.231	0.135	0.127	0.222	0.226	0.132	0.182	0.175	0.078	0.067	0.07	0.196	0.121	0.129	0.245	0.268	0.151	0.09	0.129	0.128	0.254	0.305	0.287	0.158	0.147	0.257	0.309	0.225	0.235	0.247	0.289	0.256	0.247	0.214	0.314	0.098	0.147	0.159	0.123	0.157	0.247	0.247	0.159	0.324	0.098	0.174	0.158	0.297	0.234	0.153	0.333	0.321

Average Value of Time Sweep (W/kg)

Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Auto-Tune (State)	3	9	15	21	27	33	39	45	51	57	63	69	75	81	87	93	99	105	111	117	123	129	135	141	147	153	159	165	171	177	183	189	195	201	207	213	219	225	231	237	243	249	255	261	267	273	279	285	291	297	303	309	315	321	327	333	339	345	351	357	363
WCDMA Band II	RMC12.2Kbps	1880	9400	N/A	N/A	Left Cheek	0 mm	0.216	0.178	0.159	0.086	0.151	0.163	0.128	0.138	0.127	0.168	0.145	0.141	0.162	0.14	0.074	0.13	0.116	0.098	0.105	0.16	0.133	0.109	0.127	0.187	0.168	0.17	0.154	0.193	0.195	0.15	0.132	0.095	0.085	0.202	0.174	0.136	0.128	0.122	0.016	0.147	0.134	0.112	0.201	0.087	0.095	0.149	0.132	0.165	0.198	0.187	0.154	0.112	0.117	0.118	0.21	0.136	0.126	0.125	0.124	0.169	0.154	0.174

Average Value of Time Sweep (W/kg)

Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Auto-Tune (State)	4	10	16	22	28	34	40	46	52	58	64	70	76	82	88	94	100	106	112	118	124	130	136	142	148	154	160	166	172	178	184	190	196	202	208	214	220	226	232	238	244	250	256	262	268	274	280	286	292	298	304	310	316	322	328	334	340	346	352	358	364
LTE B26	15M_QPSK	831.5	26865	1	74	Right Cheek	0 mm	0.221	0.123	0.135	0.094	0.11	0.207	0.078	0.076	0.164	0.217	0.095	0.081	0.182	0.127	0.08	0.049	0.179	0.205	0.069	0.078	0.208	0.09	0.091	0.214	0.124	0.124	0.107	0.114	0.201	0.18	0.174	0.134	0.117	0.204	0.212	0.174	0.166	0.162	0.054	0.187	0.123	0.15	0.209	0.125	0.103	0.18	0.174	0.203	0.133	0.214	0.193	0.154	0.154	0.114	0.108	0.124	0.168	0.164	0.149	0.183	0.19	0.214

Average Value of Time Sweep (W/kg)

Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Auto-Tune (State)	5	11	17	23	29	35	41	47	53	59	65	71	77	83	89	95	101	107	113	119	125	131	137	143	149	155	161	167	173	179	185	191	197	203	209	215	221	227	233	239	245	251	257	263	269	275	281	287	293	299	305	311	317	323	329	335	341	347	353	359	365
LTE B2	20M_QPSK	1880	26340	1	0	Right Cheek	0 mm	0.127	0.02	0.03	0.04	0.05	0.07	0.06	0.02	0.087	0.054	0.01	0.098	0.102	0.105	0.115	0.117	0.02	0.05	0.098	0.087	0.054	0.087	0.054	0.023	0.118	0.118	0.119	0.019	0.038	0.037	0.028	0.029	0.058	0.098	0.085	0.047	0.025	0.036	0.054	0.087	0.012	0.085	0.098	0.057	0.017	0.106	0.107	0.109	0.105	0.115	0.116	0.112	0.109	0.068	0.097	0.058	0.025	0.014	0.078	0.065	0.019	0.054

Body

Average Value of Time Sweep (W/kg)

Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Auto-Tune (State)	0	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324	330	336	342	348	354	360
GSM850	GPRS(2Tx slots)	824.2	128	N/A	N/A	Front	5 mm	1.080	0.283	0.288	0.134	0.211	0.736	0.39	0.135	0.138	0.95	0.83	0.19	0.177	0.439	0.515	0.152	0.208	0.905	0.112	0.118	0.514	0.98	0.166	0.148	0.91	0.7	0.229	0.378	0.385	0.587	0.247	0.598	0.258	0.369	0.147	0.598	0.547	0.998	0.587	0.257	0.369	0.247	0.258	0.654	0.698	0.147	0.258	0.951	0.756	0.147	0.65	0.523	0.781	0.159	0.552	0.663	0.471	0.324	0.174	0.589	0.951	0.258

Average Value of Time Sweep (W/kg)

Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Auto-Tune (State)	1	7	13	19	25	31	37	43	49	55	61	67	73	79	85	91	97	103	109	115	121	127	133	139	145	151	157	163	169	175	181	187	193	199	205	211	217	223	229	235	241	247	253	259	265	271	277	283	289	295	301	307	313	319	325	331	337	343	349	355	361
GSM1900	GPRS(2Tx slots)	1880	661	N/A	N/A	Bottom Side	5 mm	1.080	0.93	0.91	0.57	0.91	0.958	0.777	0.844	0.859	0.89	0.973	0.979	0.91	0.983	0.78	0.93	0.789	0.58	0.788	0.663	0.757	0.779	0.787	0.765	0.97	0.91	0.95	0.92	0.91	0.487	0.148	0.523	0.228	0.271	0.049	0.512	0.449	0.9	0.478	0.159	0.271	0.147	0.16	0.556	0.236	0.049	0.16	0.147	0.326	0.147	0.552	0.425	0.369	0.147	0.852	0.964	0.373	0.226	0.327	0.491	0.853	0.247

Average Value of Time Sweep (W/kg)

Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Auto-Tune (State)	2	8	14	20	26	32	38	44	50	56	62	68	74	80	86	92	98	104	110	116	122	128	134	140	146	152	158	164	170	176	182	188	194	200	206	212	218	224	230	236	242	248	254	260	266	272	278	284	290	296	302	308	314	320	326	332	338	344	350	356	362
WCDMA Band V	RMC12.2Kbps	846.6	4233	N/A	N/A	Front	5 mm	0.853	0.562	0.651	0.135	0.18	0.385	0.31	0.289	0.56	0.588	0.561	0.461	0.458	0.645	0.345	0.515	0.364	0.622	0.652	0.625	0.462	0.651	0.641	0.423	0.358	0.286	0.41	0.328	0.28	0.29	0.14	0.567	0.657	0.235	0.541	0.654	0.178	0.741	0.756	0.723	0.354	0.654	0.128	0.459	0.369	0.587	0.54	0.68	0.74	0.746	0.36	0.567	0.26	0.54	0.8	0.18	0.198	0.223	0.336	0.554	0.128	0.654

Average Value of Time Sweep (W/kg)

Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Auto-Tune (State)	3	9	15	21	27	33	39	45	51	57	63	69	75	81	87	93	99	105	111	117	123	129	135	141	147	153	159	165	171	177	183	189	195	201	207	213	219	225	231	237	243	249	255	261	267	273	279	285	291	297	303	309	315	321	327	333	339	345	351	357	363
WCDMA Band II	RMC12.2Kbps	1880	9400	N/A	N/A	Bottom Side	5 mm	0.710	0.473	0.467	0.119	0.383	0.293	0.125	0.199	0.178	0.438	0.385	0.392	0.368	0.251	0.174	0.258	0.273	0.069	0.168	0.158	0.173	0.155	0.2	0.488	0.385	0.325	0.267	0.499	0.489	0.238	0.125	0.654	0.687	0.128	0.325	0.605	0.306	0.307	0.523	0.564	0.578	0.598	0.514	0.523	0.514	0.236	0.314	0.357	0.369	0.358	0.357	0.652	0.471	0.521	0.547	0.598	0.526	0.569	0.581	0.515	0.112	0.228

Average Value of Time Sweep (W/kg)

Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Auto-Tune (State)	4	10	16	22	28	34	40	46	52	58	64	70	76	82	88	94	100	106	112	118	124	130	136	142	148	154	160	166	172	178	184	190	196	202	208	214	220	226	232	238	244	250	256	262	268	274	280	286	292	298	304	310	316	322	328	334	340	346	352	358	364
LTE B26	15M_QPSK	831.5	26865	1	74	Front	5 mm	0.816	0.574	0.519	0.389	0.492	0.599	0.29	0.267	0.661	0.683	0.284	0.313	0.223	0.781	0.321	0.16	0.642	0.334	0.212	0.344	0.658	0.289	0.297	0.146	0.598	0.452	0.446	0.546	0.587	0.654	0.324	0.258	0.214	0.65	0.32	0.65	0.214	0.568	0.598	0.587	0.698	0.674	0.365	0.324	0.329	0.328	0.128	0.547	0.4569	0.587	0.569	0.521	0.236	0.327	0.359	0.569	0.556	0.236	0.247	0.658	0.324	0.385

Average Value of Time Sweep (W/kg)

Mode	Service/ Modulation	Frequency (MHz)	Channel	RB Size	RB Offset	Test Position	Spacing	Auto-Tune (State)	5	11	17	23	29	35	41	47	53	59	65	71	77	83	89	95	101	107	113	119	125	131	137	143	149	155	161	167	173	179	185	191	197	203	209	215	221	227	233	239	245	251	257	263	269	275	281	287	293	299	305	311	317	323	329	335	341	347	353	359	365
LTE B2	20M_QPSK	1880	18900	1	0	Bottom Side	5 mm	0.791	0.43	0.3	0.361	0.212	0.188	0.22	0.145	0.354	0.366	0.15	0.34	0.261	0.42	0.221	0.28	0.315	0.161	0.42	0.255	0.186	0.268	0.116	0.316	0.694	0.229	0.17	0.41	0.654	0.239	0.65	0.547	0.269	0.558	0.57	0.68	0.125	0.326	0.365	0.564	0.325	0.687	0.298	0.378	0.354	0.621	0.158	0.247	0.336	0.558	0.479	0.369	0.528	0.602	0.306	0.208	0.367	0.478	0.456	0.339	0.228	0.459

Appendix D. DASY Calibration Certificate

The DASY calibration certificates are shown as follows.

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

中国认可
国际互认
校准
CALIBRATION
CNAS L0570

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

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 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 ± 0.2) °C	41.7 ± 6 %	0.88 mho/m ± 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 ± 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 ± 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 ± 0.2) °C	54.7 ± 6 %	0.96 mho/m ± 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 ± 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 ± 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

Manufactured by	SPEAG

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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; σ = 0.876 S/m; ε_r = 41.67; ρ = 1000 kg/m^3

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)

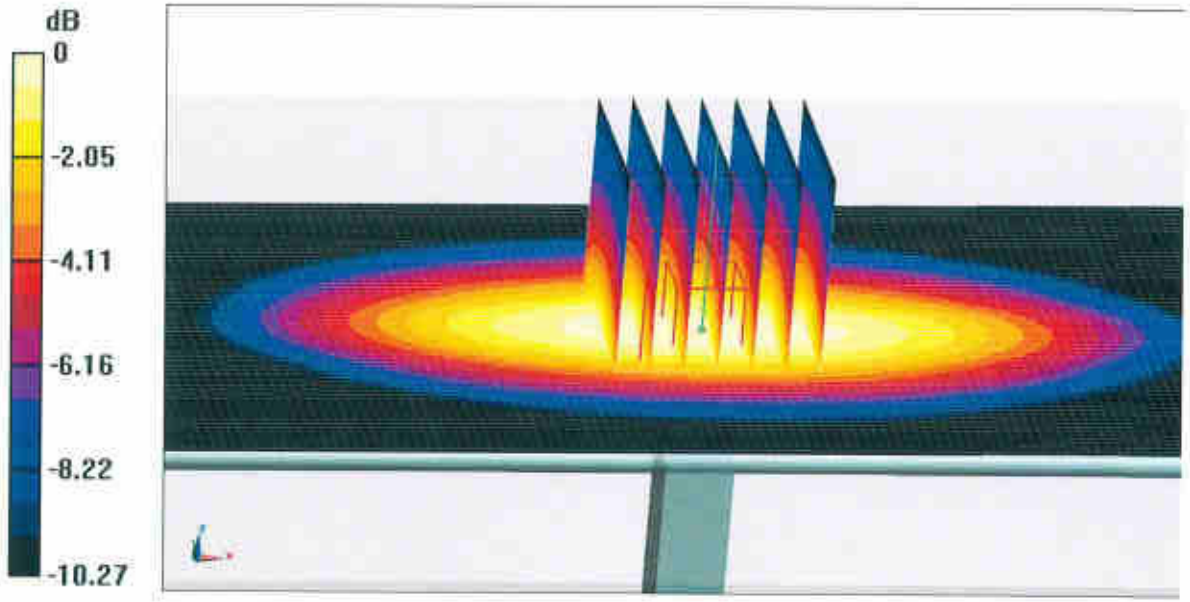
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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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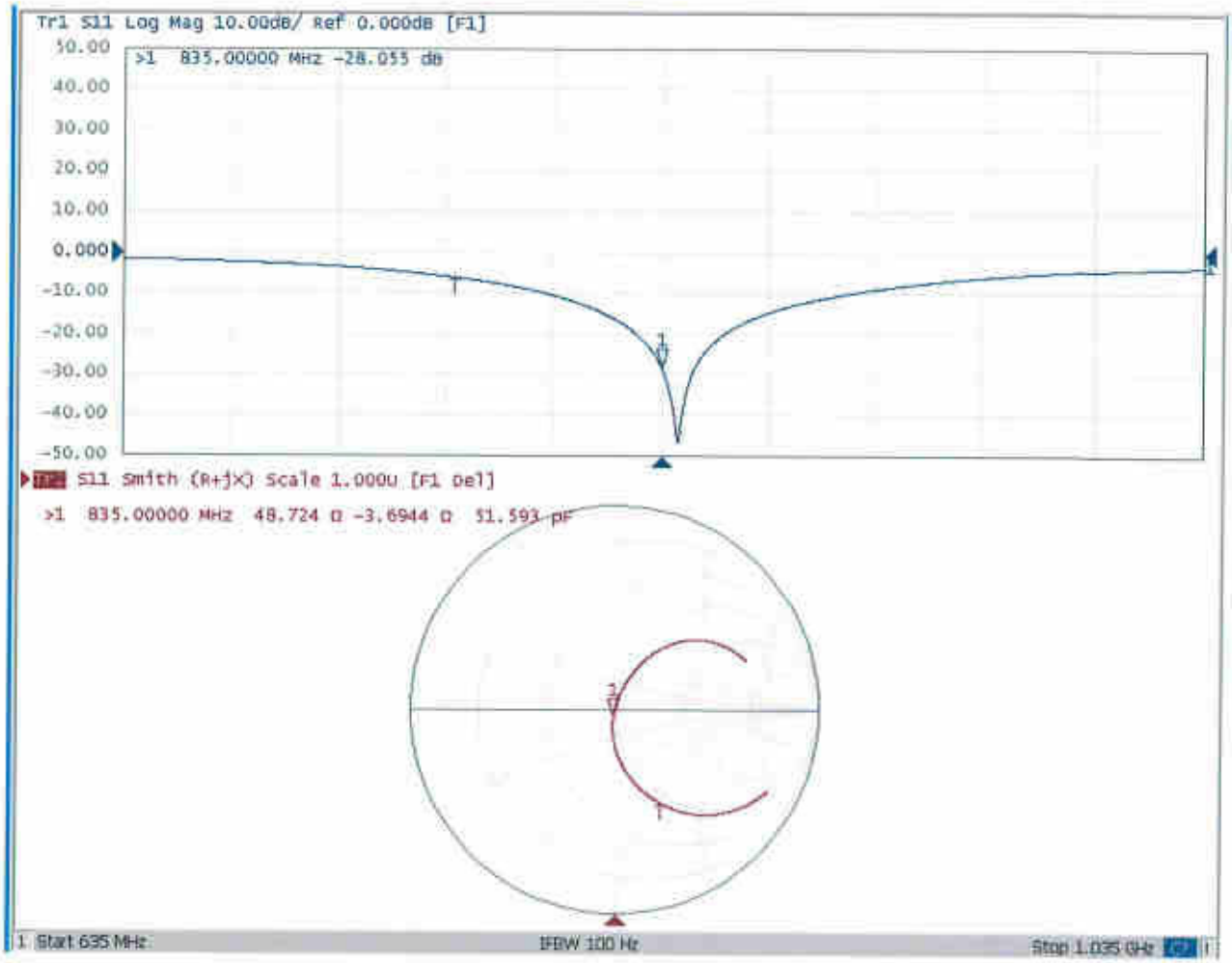
Impedance Measurement Plot for Head TSL



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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; σ = 0.962 S/m; ε_r = 54.65; ρ = 1000 kg/m^3

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)

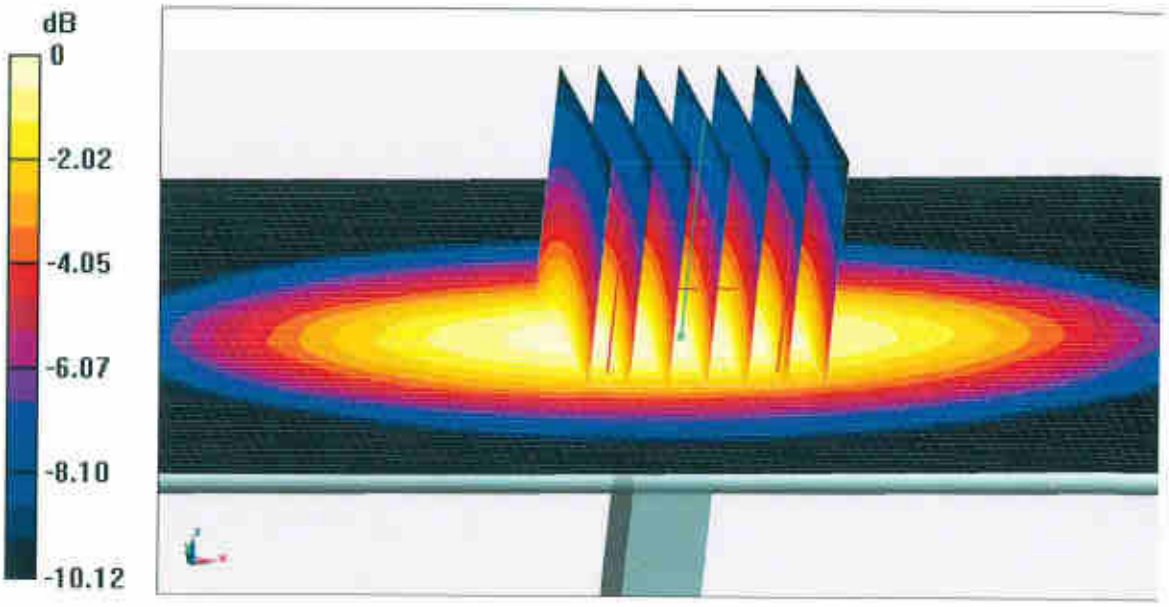
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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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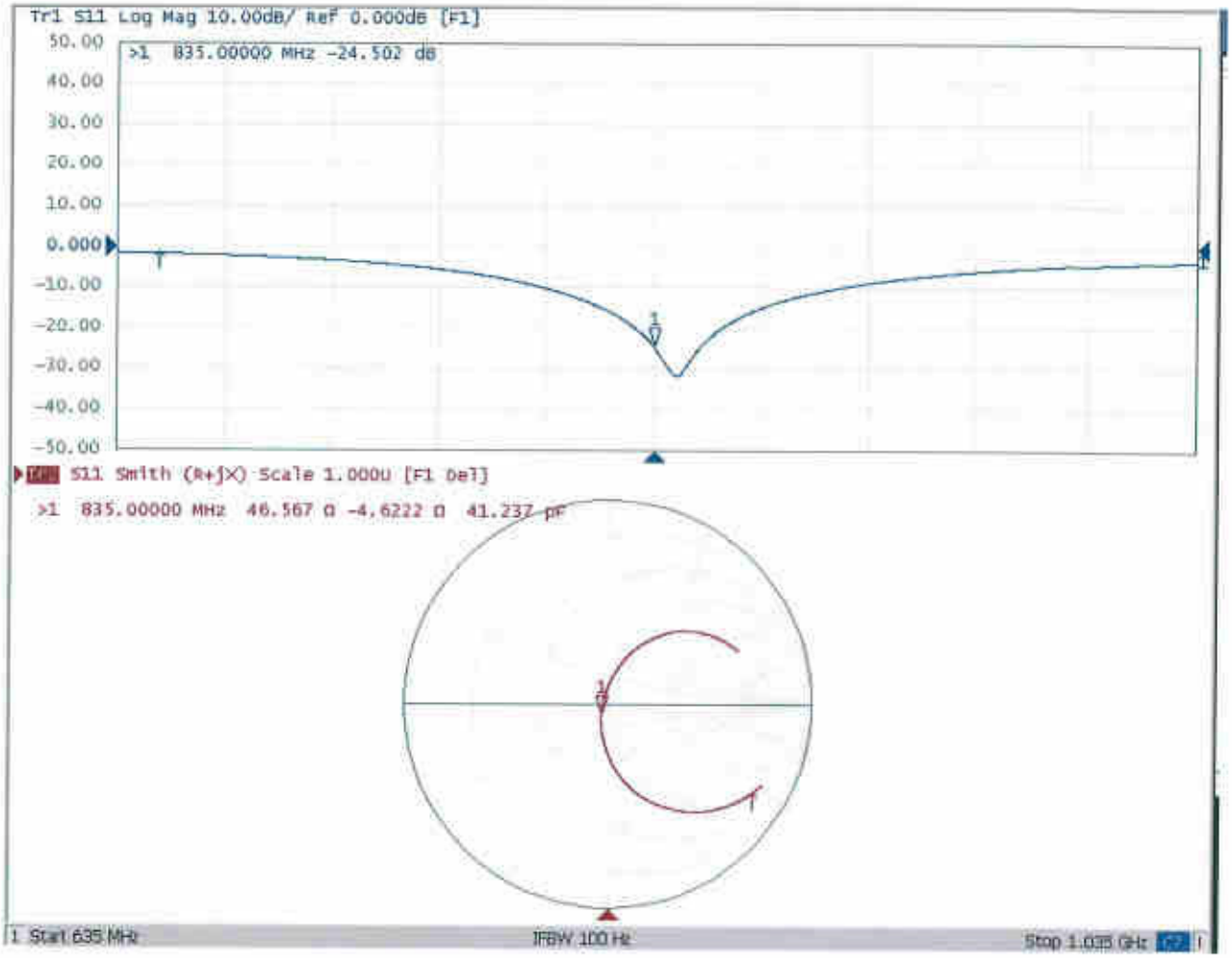
Impedance Measurement Plot for Body TSL



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CNAS L0570

Client **Sporton** **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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lossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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 ± 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 ± 0.2) °C	39.4 ± 6 %	1.41 mho/m ± 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 ± 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 ± 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 ± 0.2) °C	52.9 ± 6 %	1.54 mho/m ± 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 ± 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 ± 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	50.0Ω+ 6.60jΩ
Return Loss	- 23.6dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6Ω+ 6.11jΩ
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

Manufactured by	SPEAG

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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; σ = 1.409 S/m; εr = 39.36; ρ = 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)

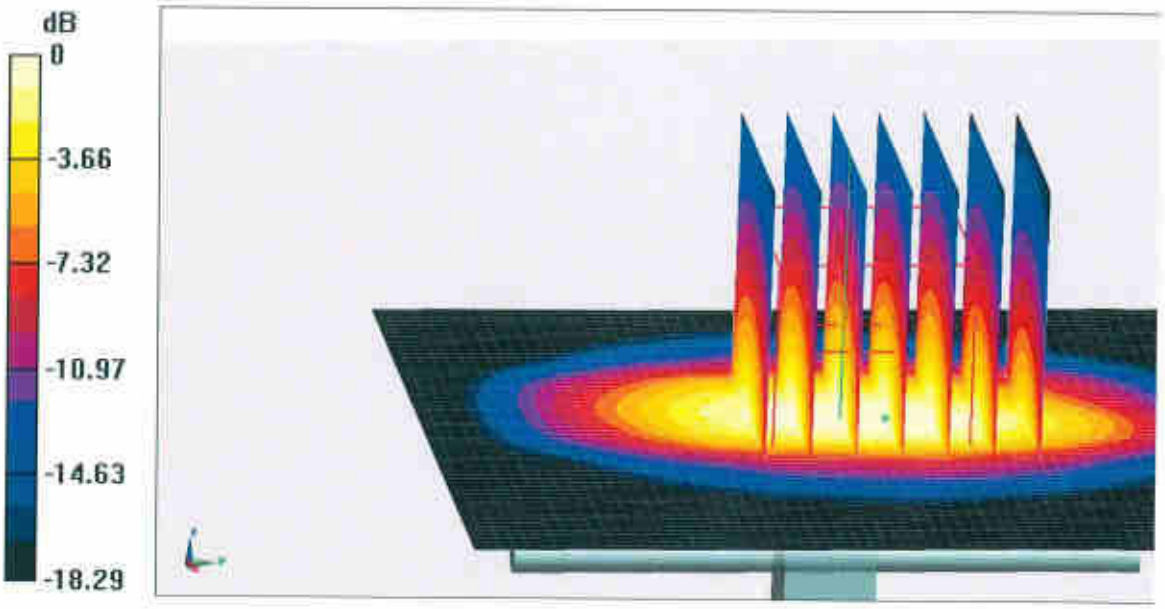
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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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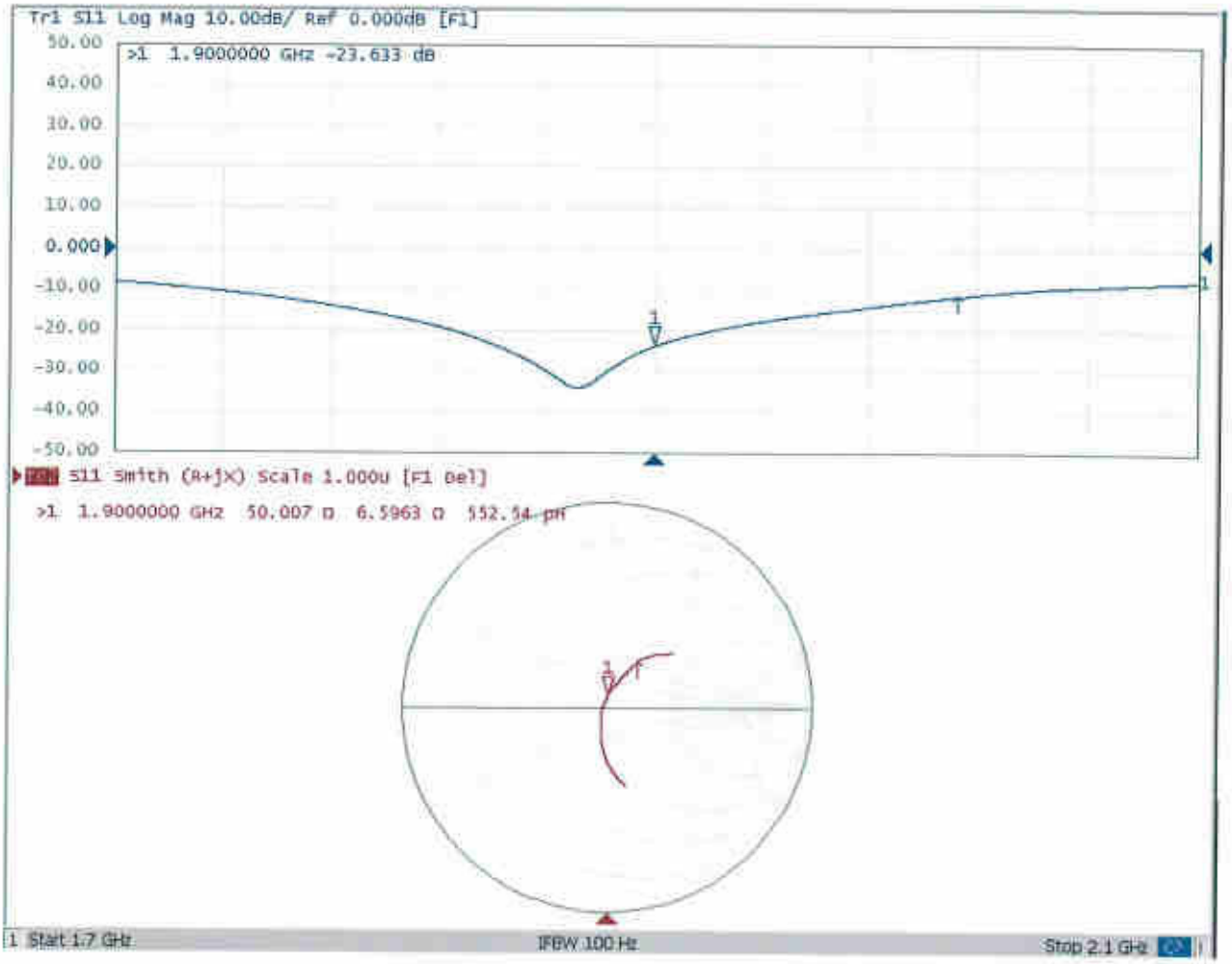
Impedance Measurement Plot for Head TSL



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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; σ = 1.542 S/m; ε_r = 52.89; ρ = 1000 kg/m^3

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)

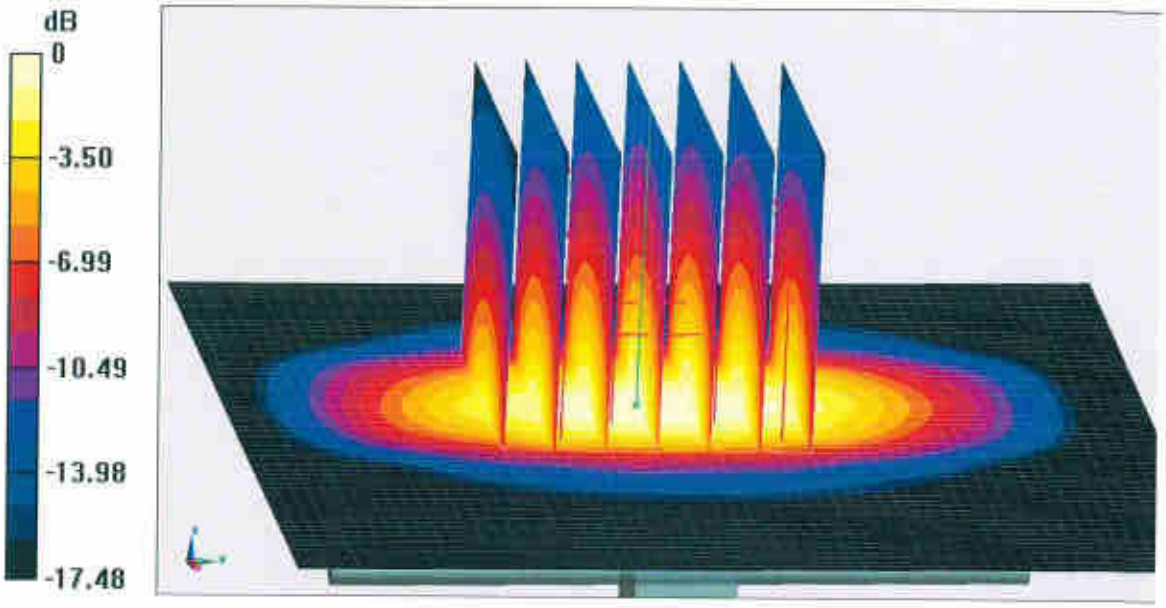
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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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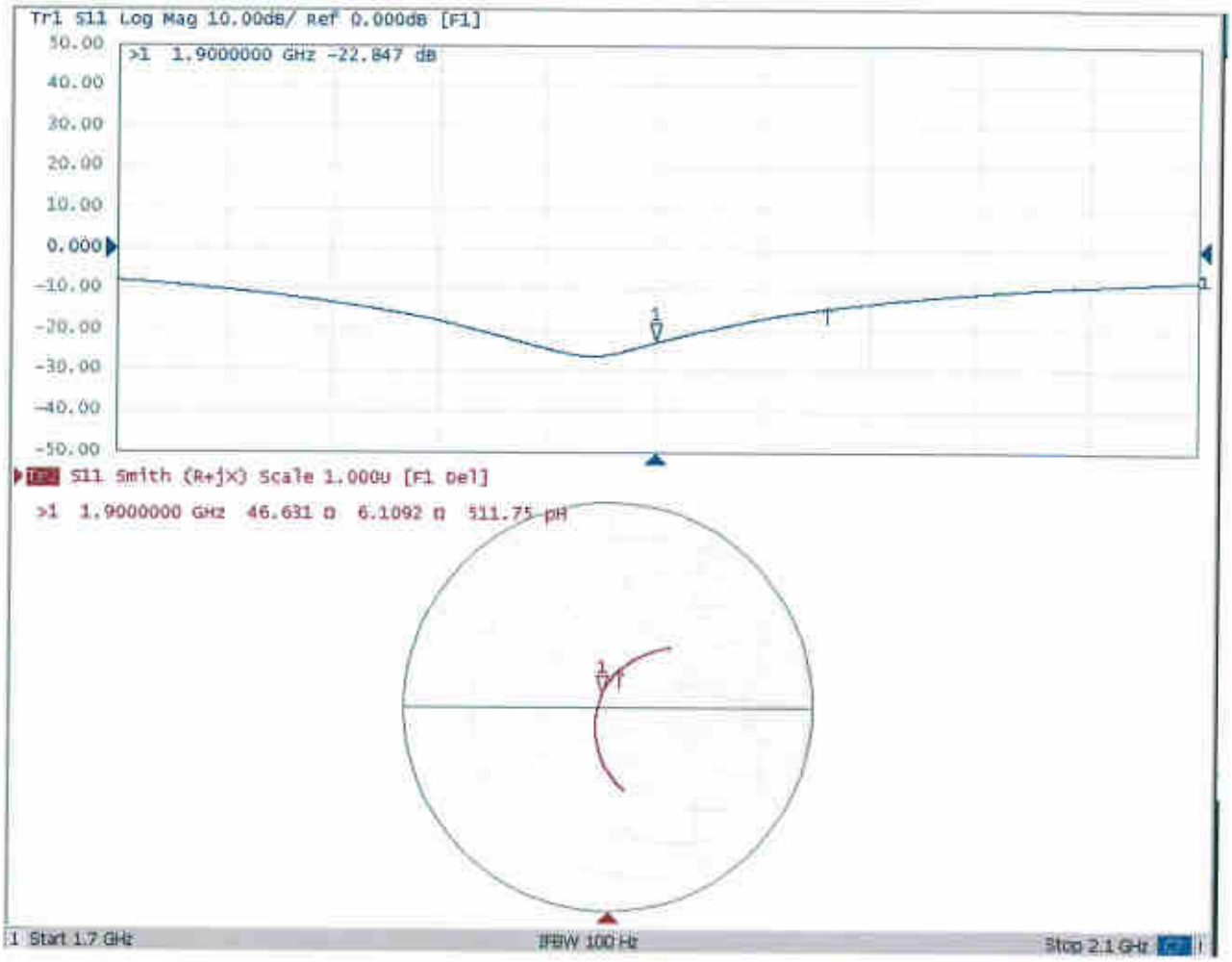
Impedance Measurement Plot for Body TSL



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CNAS L0570

Client **Sporton** **Certificate No: Z17-97255**

CALIBRATION CERTIFICATE

Object D2600V2 - SN: 1061

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

Calibration date: December 7, 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

In Collaboration with
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CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.4 ± 6 %	1.99 mho/m ± 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	14.6 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**58.2 mW /g ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.50 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**26.0 mW /g ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.6 ± 6 %	2.13 mho/m ± 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	14.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**56.4 mW /g ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	6.23 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**25.0 mW /g ± 18.7 % (k=2)**

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E-mail: cttl@chinattl.com http://www.chinattl.cn

Appendix(Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.4Ω- 6.08jΩ
Return Loss	- 24.3dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.2Ω- 5.19jΩ
Return Loss	- 23.5dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.013 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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Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
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DASY5 Validation Report for Head TSL Date: 12.07.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1061

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

Medium parameters used: f = 2600 MHz; σ = 1.985 S/m; εr = 39.42; ρ = 1000 kg/m3

Phantom section: Center Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.3, 7.3, 7.3); 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)

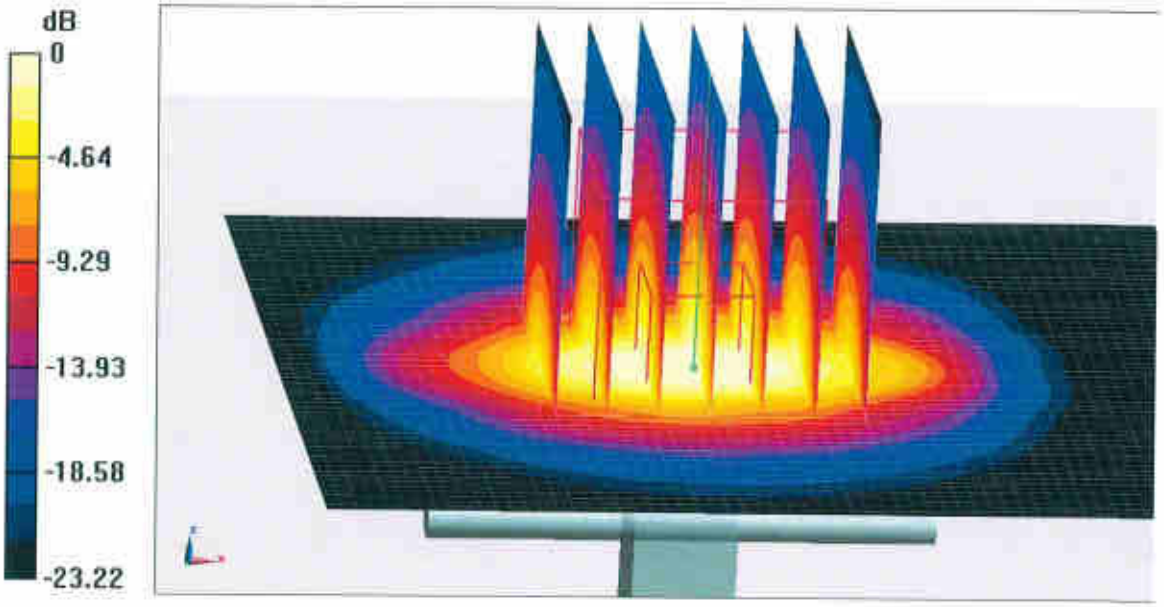
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 107.7 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 31.5 W/kg

SAR(1 g) = 14.6 W/kg; SAR(10 g) = 6.5 W/kg

Maximum value of SAR (measured) = 25.1 W/kg



0 dB = 25.1 W/kg = 14.00 dBW/kg

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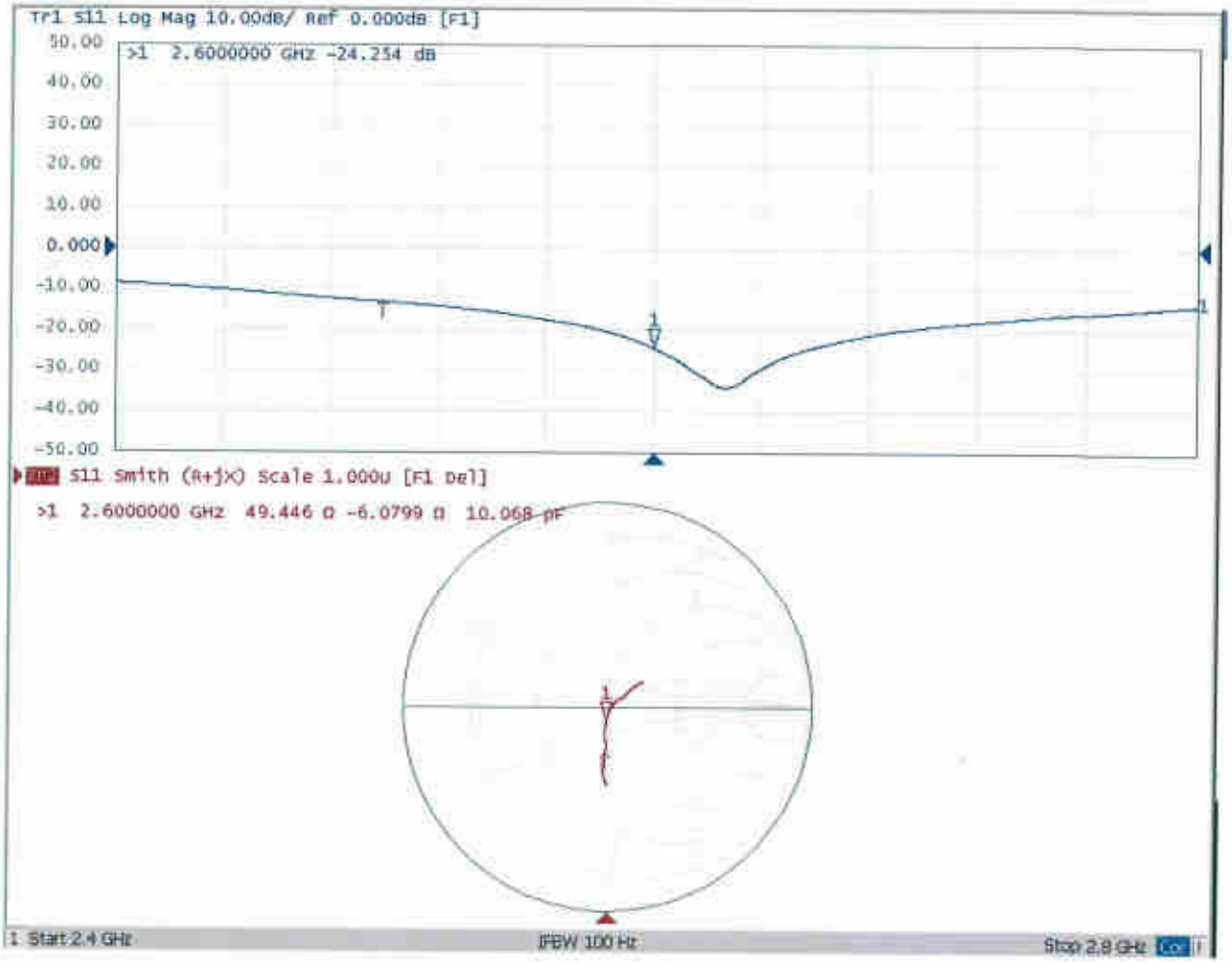
Impedance Measurement Plot for Head TSL



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Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Body TSL Date: 12.07.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1061

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

Medium parameters used: f = 2600 MHz; σ = 2.127 S/m; ε_r = 52.63; ρ = 1000 kg/m^3

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.48, 7.48, 7.48); 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)

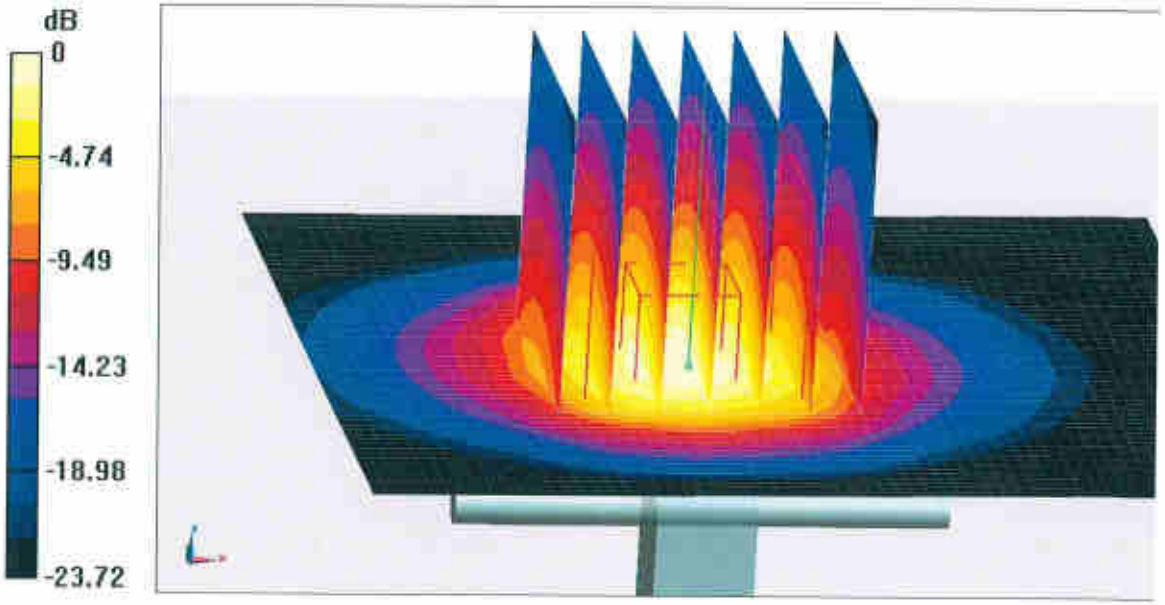
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.43 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 30.0 W/kg

SAR(1 g) = 14 W/kg; SAR(10 g) = 6.23 W/kg

Maximum value of SAR (measured) = 23.8 W/kg



0 dB = 23.8 W/kg = 13.77 dBW/kg

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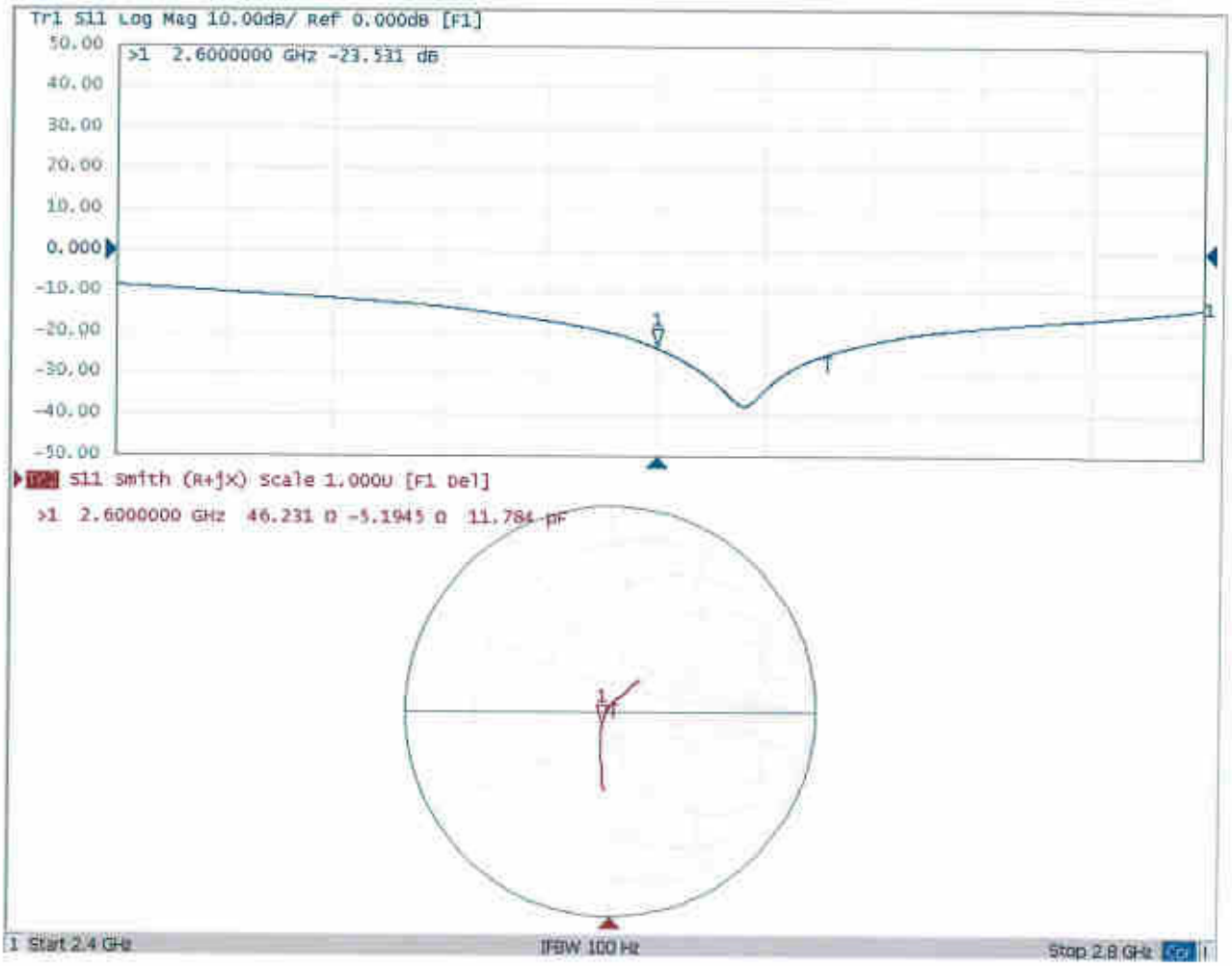
Impedance Measurement Plot for Body TSL



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Client : **Sporton International INC** **Certificate No: Z17-97245**

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 1338
Calibration Procedure(s)	FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	December 04, 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
Process Calibrator 753	1971018	27-Jun-17 (CTTL, No.J17X05859)	June-18

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

Issued: December 05, 2017

In Collaboration with
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CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Glossary:

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters:

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.

- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.

- The report provide only calibration results for DAE, it does not contain other performance test results.

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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV
Low Range: 1LSB = 61nV , full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	403.689 ± 0.15% (k=2)	404.263 ± 0.15% (k=2)	404.219 ± 0.15% (k=2)
Low Range	3.97174 ± 0.7% (k=2)	3.97734 ± 0.7% (k=2)	3.97338 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	64° ± 1 °

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CNAS L0570

Client : **Sporton International INC** **Certificate No: Z17-97153**

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 1326
Calibration Procedure(s)	FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	September 15, 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
Process Calibrator 753	1971018	27-Jun-17 (CTTL, No.J17X05859)	June-18

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

Issued: September 18, 2017

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CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Glossary:

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters:

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.

- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.

- The report provide only calibration results for DAE, it does not contain other performance test results.

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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
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DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV
Low Range: 1LSB = 61nV , full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.898 ± 0.15% (k=2)	405.241 ± 0.15% (k=2)	404.618 ± 0.15% (k=2)
Low Range	3.98840 ± 0.7% (k=2)	3.99650 ± 0.7% (k=2)	3.99854 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	41.5° ± 1 °

Schmid & Partner Engineering AG

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Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

IMPORTANT NOTICE

USAGE OF THE DAE 4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:
Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:
Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:
To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client Sporton (Auden)

Certificate No: DAE4-1279_Jan18

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BM - SN: 1279
Calibration procedure(s)	QA CAL-06.v29 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	January 03, 2018

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 (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	31-Aug-17 (No:21092)	Aug-18
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	05-Jan-17 (in house check)	In house check: Jan-18
Calibrator Box V2.1	SE UMS 006 AA 1002	05-Jan-17 (in house check)	In house check: Jan-18

	Name	Function	Signature
Calibrated by:	Adrian Gehring	Laboratory Technician	
Approved by:	Sven Kühn	Deputy Manager	

Issued: January 3, 2018

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1μV ,	full range =	-100...+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	403.936 ± 0.02% (k=2)	403.884 ± 0.02% (k=2)	404.618 ± 0.02% (k=2)
Low Range	3.94927 ± 1.50% (k=2)	3.99010 ± 1.50% (k=2)	3.98938 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	354.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199997.64	1.92	0.00
Channel X	+ Input	20004.80	2.86	0.01
Channel X	- Input	-19998.76	2.17	-0.01
Channel Y	+ Input	199997.83	1.78	0.00
Channel Y	+ Input	20003.36	1.57	0.01
Channel Y	- Input	-20002.72	-1.82	0.01
Channel Z	+ Input	199997.69	1.96	0.00
Channel Z	+ Input	20001.39	-0.37	-0.00
Channel Z	- Input	-20003.42	-2.35	0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2002.48	0.98	0.05
Channel X	+ Input	202.86	1.08	0.53
Channel X	- Input	-196.92	1.17	-0.59
Channel Y	+ Input	2001.79	0.30	0.02
Channel Y	+ Input	201.96	0.09	0.04
Channel Y	- Input	-198.07	0.01	-0.00
Channel Z	+ Input	2002.13	0.68	0.03
Channel Z	+ Input	201.17	-0.61	-0.30
Channel Z	- Input	-199.15	-0.81	0.41

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-18.51	-19.43
	- 200	22.51	20.73
Channel Y	200	5.49	5.17
	- 200	-5.84	-6.15
Channel Z	200	6.57	6.24
	- 200	-7.96	-7.86

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	3.48	-3.85
Channel Y	200	8.57	-	4.96
Channel Z	200	10.34	5.90	-