

Test Laboratory: SGS-SAR Lab

System Performance Check D5.75GHz Head

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1165

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

Medium: HSL5G; Medium parameters used: $f = 5750$ MHz; $\sigma = 5.329$ S/m; $\epsilon_r = 34.695$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(5.05, 5.05, 5.05); Calibrated: 2018-01-11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 23.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 1; Type: SAM; Serial: 1912
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=10mm, Pin=100mW, f=5750 MHz/Area Scan (10x10x1): Measurement grid:

$dx=10$ mm, $dy=10$ mm

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

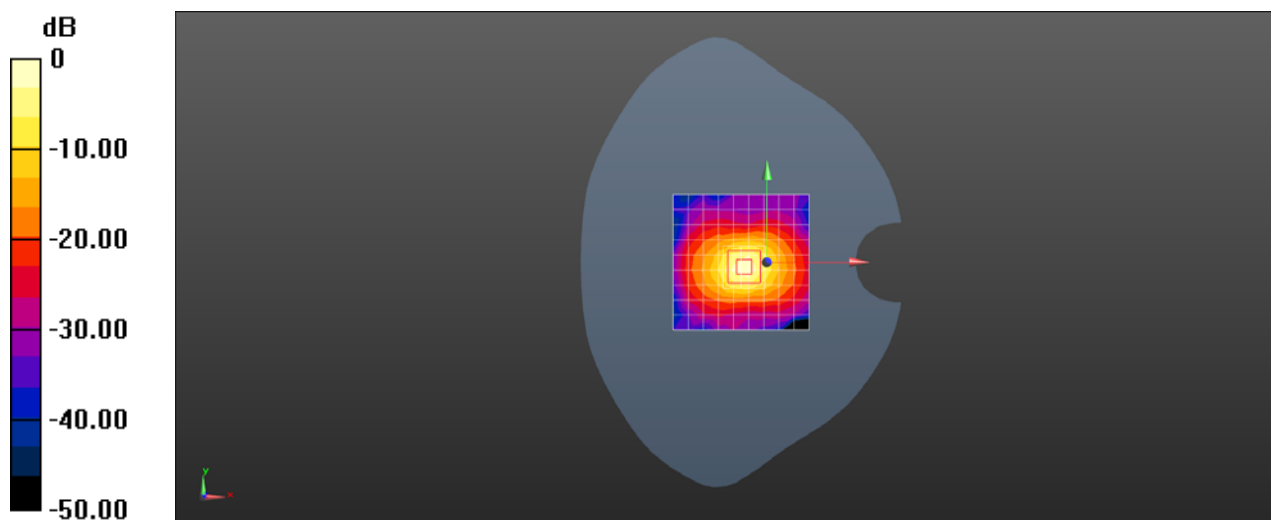
Body/d=10mm, Pin=100mW, f=5750 MHz/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 64.31 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 38.9 W/kg

SAR(1 g) = 8.46 W/kg; SAR(10 g) = 2.41 W/kg

Maximum value of SAR (measured) = 20.8 W/kg



0 dB = 20.8 W/kg = 13.18 dBW/kg

Test Laboratory: SGS-SAR Lab

System Performance Check D5.75GHz Body

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1165

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

Medium: MSL5G; Medium parameters used: $f = 5750$ MHz; $\sigma = 5.969$ S/m; $\epsilon_r = 47.096$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(4.59, 4.59, 4.59); Calibrated: 2018-01-11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 23.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 2; Type: SAM V4.0; Serial: 1640
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/d=10mm, Pin=100mW, f=5750 MHz/Area Scan (10x10x1): Measurement grid:

$dx=10$ mm, $dy=10$ mm

Maximum value of SAR (measured) = 16.7 W/kg

Body/d=10mm, Pin=100mW, f=5750 MHz/Zoom Scan (4x4x1.4mm, graded),

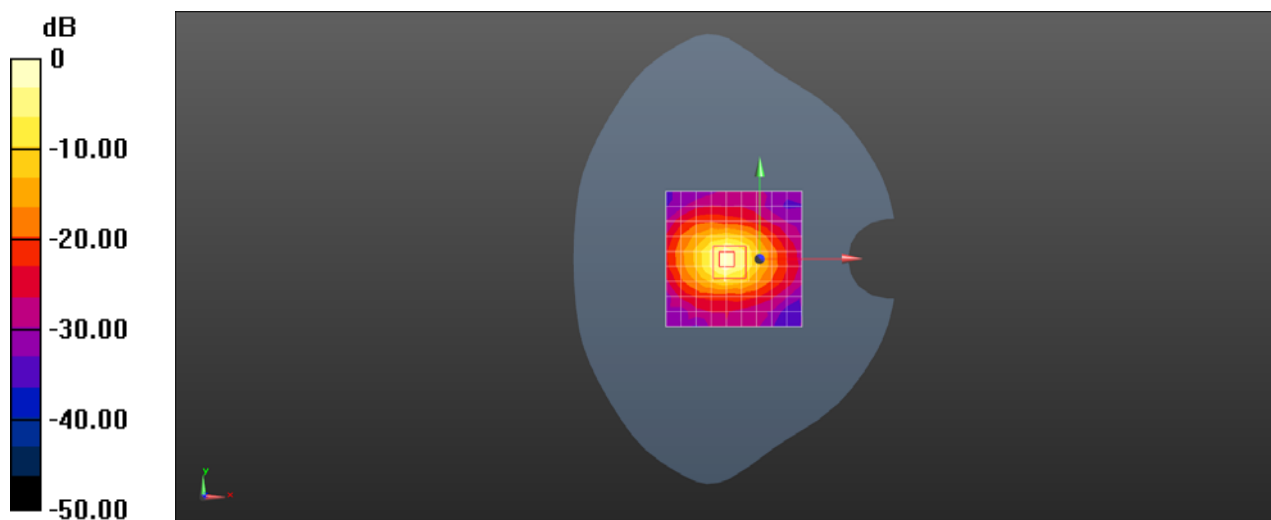
dist=1.4mm (7x7x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 60.28 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 37.7 W/kg

SAR(1 g) = 8.03 W/kg; SAR(10 g) = 2.19 W/kg

Maximum value of SAR (measured) = 20.5 W/kg



0 dB = 20.5 W/kg = 13.12 dBW/kg



Appendix B

Detailed Test Results

1. GSM
GSM850 for Head & Body
GSM1900 for Head & Body
2. WCDMA
WCDMA Band II for Head & Body
WCDMA Band V for Head & Body
3.LTE
LTE Band 2 for Head & Body
LTE Band 5 for Head & Body
LTE Band 7 for Head & Body
4.WIFI
WIFI 2.4G for Head & Body
WIFI 5G for Head & Body

Test Laboratory: SGS-SAR Lab

SONY I4312 GSM850 251CH Right cheek

DUT: I4312; Type: mobile phone; Serial: HQ689S1683

Communication System: UID 0, GSM Only Communication System (0); Frequency: 848.6 MHz; Duty Cycle: 1:8.30042

Medium: HSL835; Medium parameters used: $f = 849$ MHz; $\sigma = 0.895$ S/m; $\epsilon_r = 40.76$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.66, 8.66, 8.66); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.232 W/kg

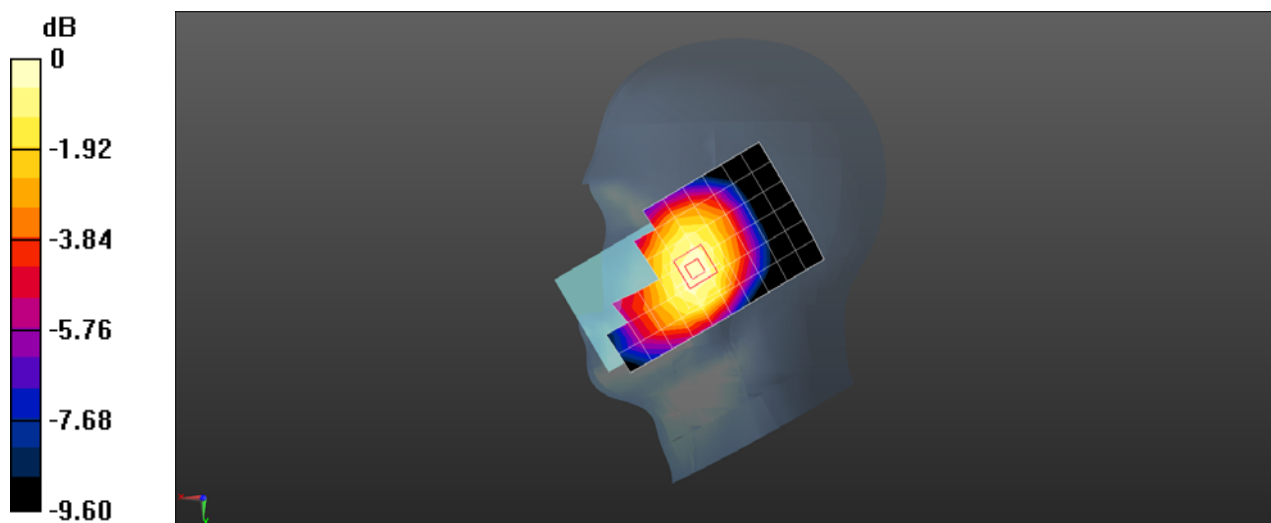
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 4.328 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 0.270 W/kg

SAR(1 g) = 0.210 W/kg; SAR(10 g) = 0.162 W/kg

Maximum value of SAR (measured) = 0.242 W/kg



0 dB = 0.242 W/kg = -6.16 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 GSM850 GSM 128CH Back side 15mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0774

Communication System: UID 0, GSM Only Communication System (0); Frequency: 824.2 MHz; Duty Cycle: 1:8.30042

Medium: MSL835; Medium parameters used: $f = 824.2$ MHz; $\sigma = 1.001$ S/m; $\epsilon_r = 54.584$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.84, 8.84, 8.84); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.310 W/kg

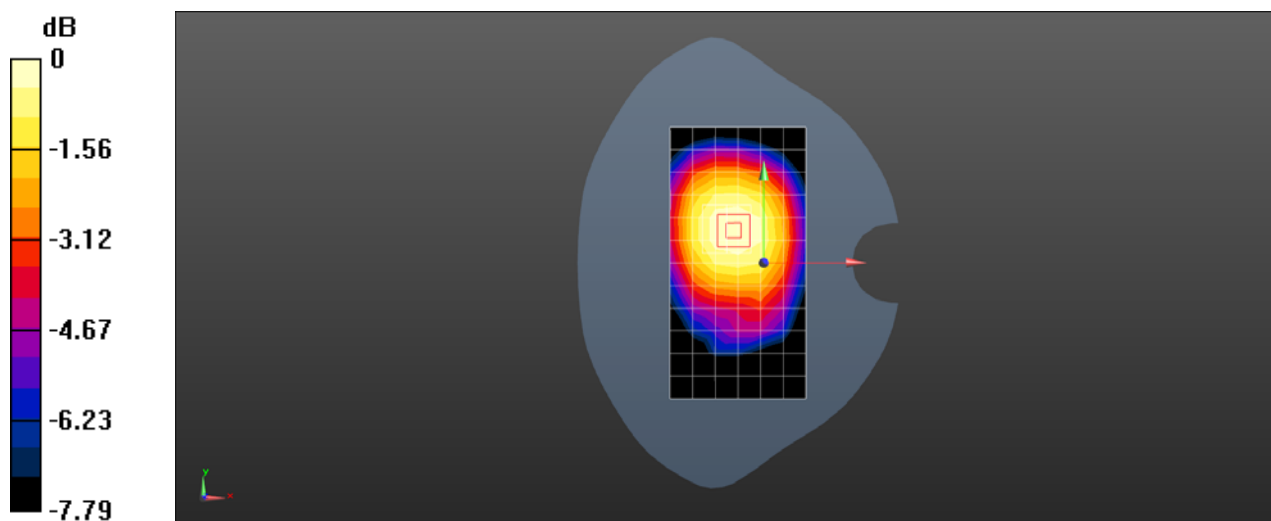
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 15.68 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.350 W/kg

SAR(1 g) = 0.279 W/kg; SAR(10 g) = 0.215 W/kg

Maximum value of SAR (measured) = 0.319 W/kg



0 dB = 0.319 W/kg = -4.96 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 GSM850 GPRS 4TS 190CH Back side 10mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0774

Communication System: UID 0, GPRS/EGPRS Mode(4up) Communication System (0); Frequency: 836.6 MHz; Duty Cycle: 1:2.0797

Medium: MSL835; Medium parameters used: $f = 837$ MHz; $\sigma = 1.01$ S/m; $\epsilon_r = 54.523$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.84, 8.84, 8.84); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.621 W/kg

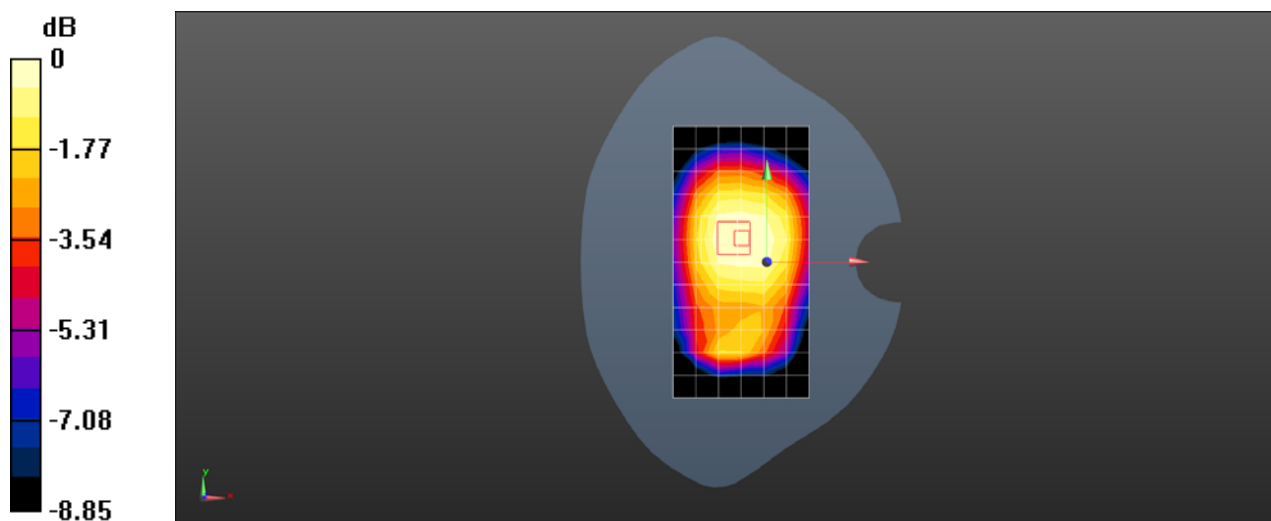
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 22.86 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.690 W/kg

SAR(1 g) = 0.542 W/kg; SAR(10 g) = 0.417 W/kg

Maximum value of SAR (measured) = 0.620 W/kg



Test Laboratory: SGS-SAR Lab

SONY I4312 GSM1900 810CH Right cheek

DUT: I4312; Type: mobile phone; Serial: HQ689S1683

Communication System: UID 0, GSM Only Communication System (0); Frequency: 1909.8 MHz; Duty Cycle: 1:8.30042

Medium: HSL1900; Medium parameters used: $f = 1910$ MHz; $\sigma = 1.401$ S/m; $\epsilon_r = 40.224$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(7.35, 7.35, 7.35); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.132 W/kg

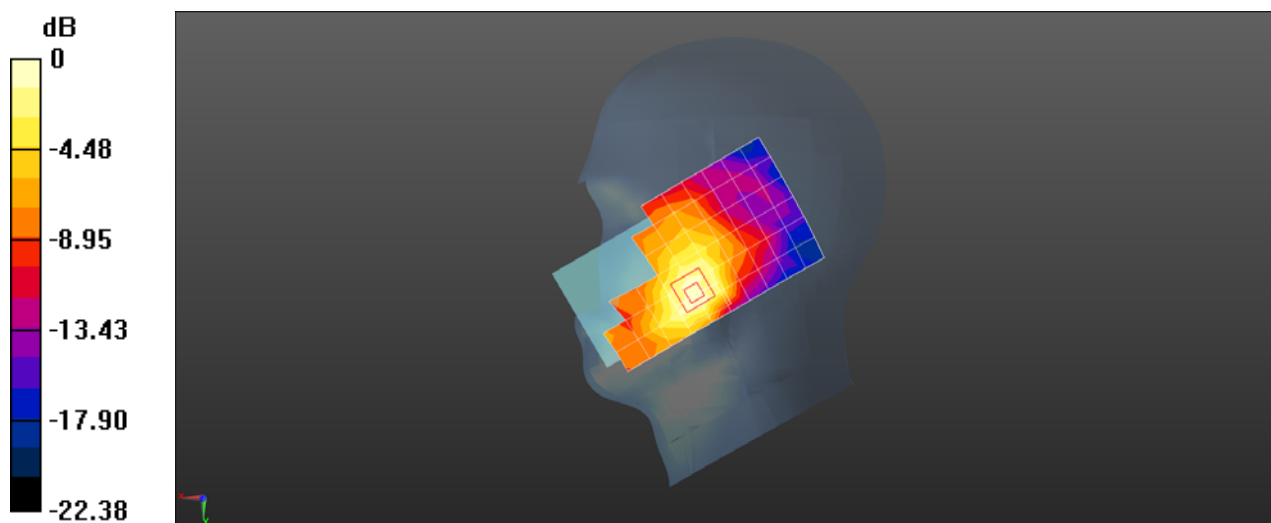
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 2.177 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.167 W/kg

SAR(1 g) = 0.113 W/kg; SAR(10 g) = 0.070 W/kg

Maximum value of SAR (measured) = 0.142 W/kg



0 dB = 0.142 W/kg = -8.48 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 GSM1900 GSM 810CH Back side 15mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0753

Communication System: UID 0, GSM Only Communication System (0); Frequency: 1909.8 MHz; Duty Cycle: 1:8.30042

Medium: MSL1900; Medium parameters used: $f = 1910$ MHz; $\sigma = 1.517$ S/m; $\epsilon_r = 53.098$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.09, 8.09, 8.09); Calibrated: 2018-01-11;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 2; Type: SAM V4.0; Serial: 1640
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.212 W/kg

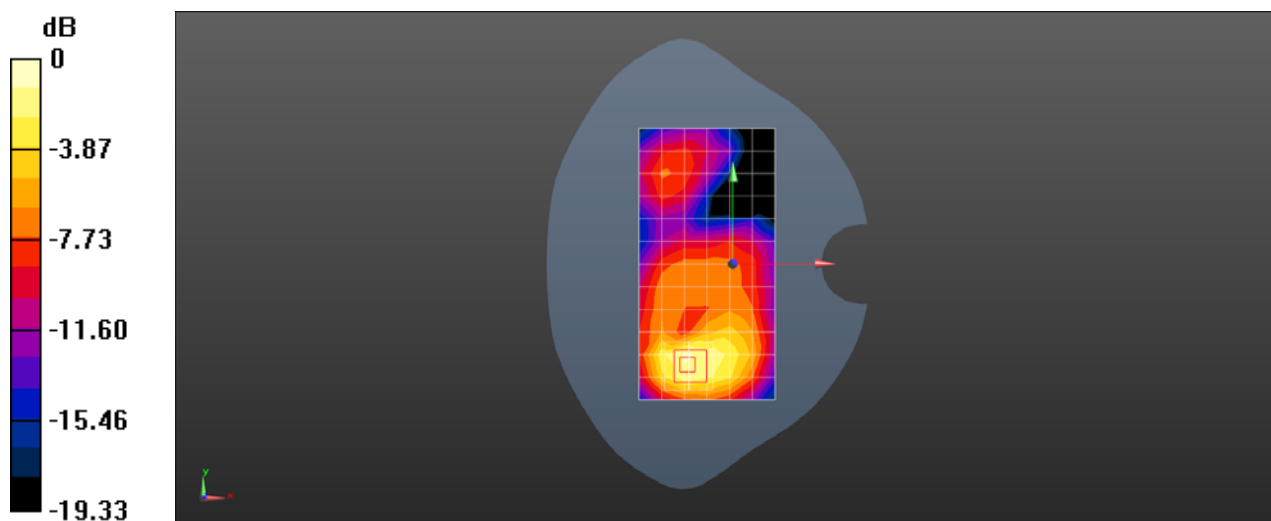
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 5.324 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.327 W/kg

SAR(1 g) = 0.204 W/kg; SAR(10 g) = 0.116 W/kg

Maximum value of SAR (measured) = 0.270 W/kg



Test Laboratory: SGS-SAR Lab

SONY I4312 GSM1900 GPRS 4TS 661CH Back side 10mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0753

Communication System: UID 0, GPRS/EGPRS Mode(4up) Communication System (0); Frequency: 1880 MHz; Duty Cycle: 1:2.0797

Medium: MSL1900; Medium parameters used: $f = 1880$ MHz; $\sigma = 1.503$ S/m; $\epsilon_r = 53.465$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.09, 8.09, 8.09); Calibrated: 2018-01-11;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 2; Type: SAM V4.0; Serial: 1640
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.963 W/kg

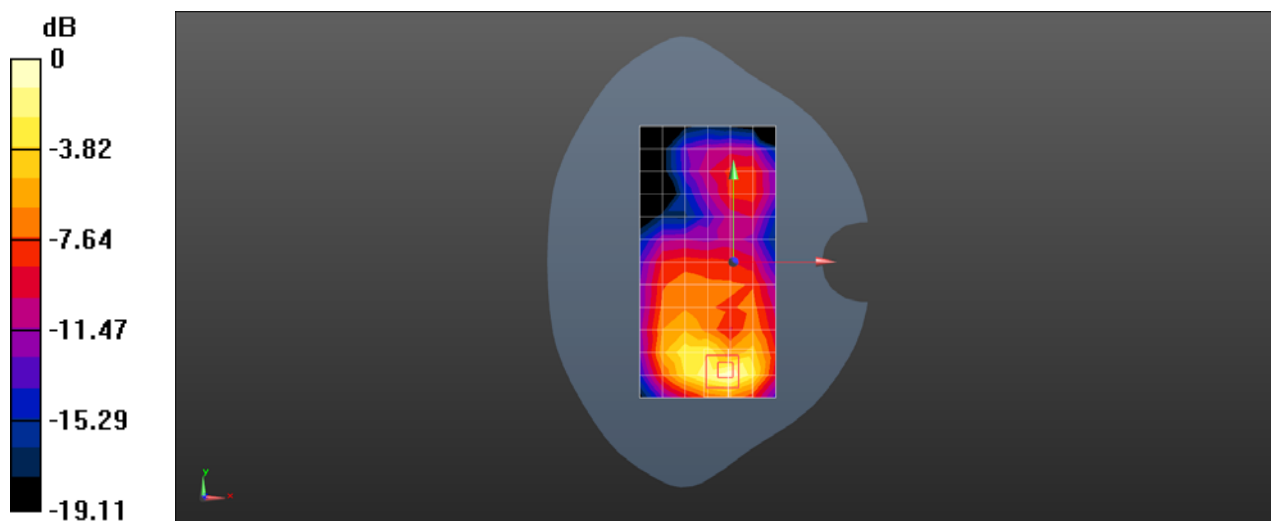
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 5.911 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 1.19 W/kg

SAR(1 g) = 0.706 W/kg; SAR(10 g) = 0.364 W/kg

Maximum value of SAR (measured) = 0.952 W/kg



Test Laboratory: SGS-SAR Lab

SONY I4312 WCDMA Band II 9538CH Right cheek

DUT: I4312; Type: mobile phone; Serial: HQ689S1683

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

Medium: HSL1900; Medium parameters used: $f = 1908$ MHz; $\sigma = 1.4$ S/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(7.35, 7.35, 7.35); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.167 W/kg

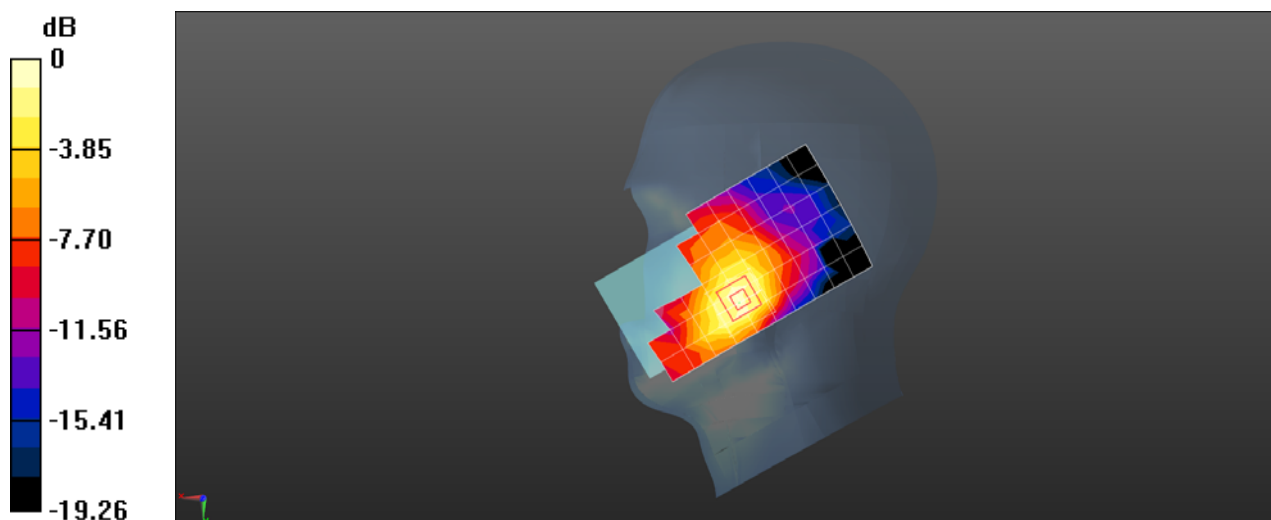
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 2.486 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.224 W/kg

SAR(1 g) = 0.147 W/kg; SAR(10 g) = 0.091 W/kg

Maximum value of SAR (measured) = 0.188 W/kg



0 dB = 0.188 W/kg = -7.26 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 WCDMA Band II 9400CH Back side 15mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0747

Communication System: UID 0, WCDMA (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: MSL1900; Medium parameters used: $f = 1880$ MHz; $\sigma = 1.503$ S/m; $\epsilon_r = 53.465$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.09, 8.09, 8.09); Calibrated: 2018-01-11;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 2; Type: SAM V4.0; Serial: 1640
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.391 W/kg

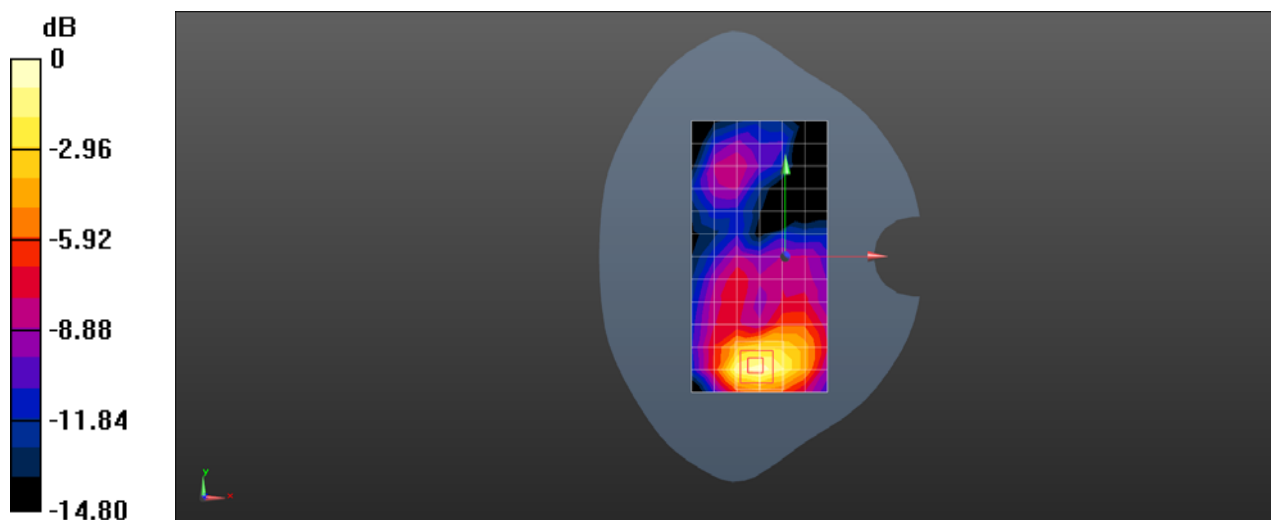
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 5.060 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.518 W/kg

SAR(1 g) = 0.331 W/kg; SAR(10 g) = 0.193 W/kg

Maximum value of SAR (measured) = 0.423 W/kg



0 dB = 0.423 W/kg = -3.74 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 WCDMA Band II 9262CH Back side 10mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0747

Communication System: UID 0, WCDMA (0); Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium: MSL1900; Medium parameters used: $f = 1852.4$ MHz; $\sigma = 1.486$ S/m; $\epsilon_r = 53.679$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.09, 8.09, 8.09); Calibrated: 2018-01-11;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 2; Type: SAM V4.0; Serial: 1640
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.795 W/kg

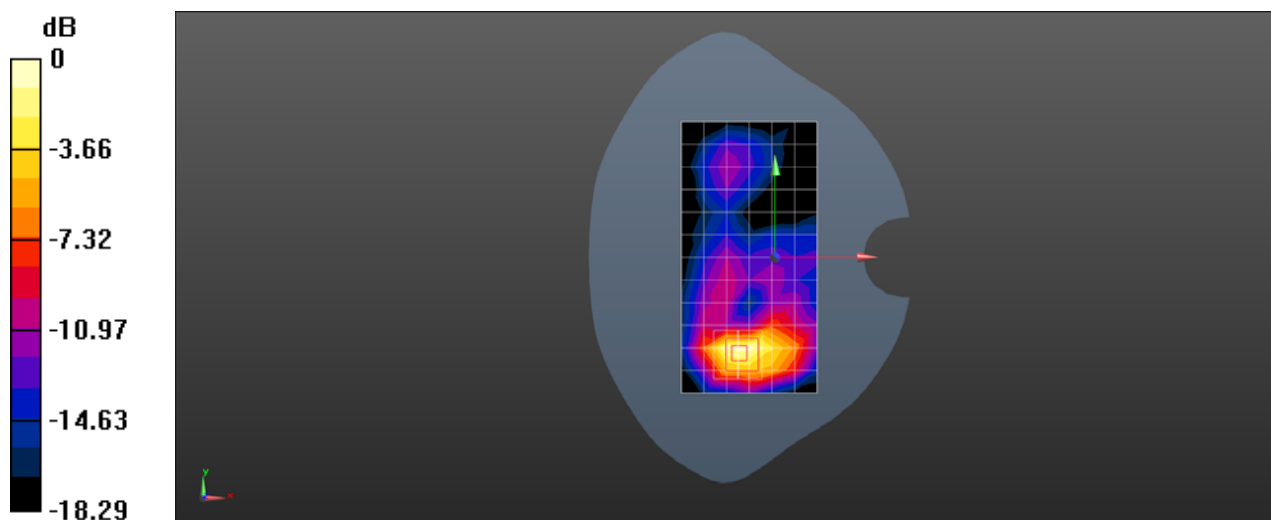
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 5.450 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.12 W/kg

SAR(1 g) = 0.671 W/kg; SAR(10 g) = 0.352 W/kg

Maximum value of SAR (measured) = 0.904 W/kg



0 dB = 0.904 W/kg = -0.44 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 WCDMA Band V 4182CH Right cheek

DUT: I4312; Type: mobile phone; Serial: HQ689S0747

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

Medium: HSL835; Medium parameters used: $f = 836.4$ MHz; $\sigma = 0.887$ S/m; $\epsilon_r = 40.84$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.66, 8.66, 8.66); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

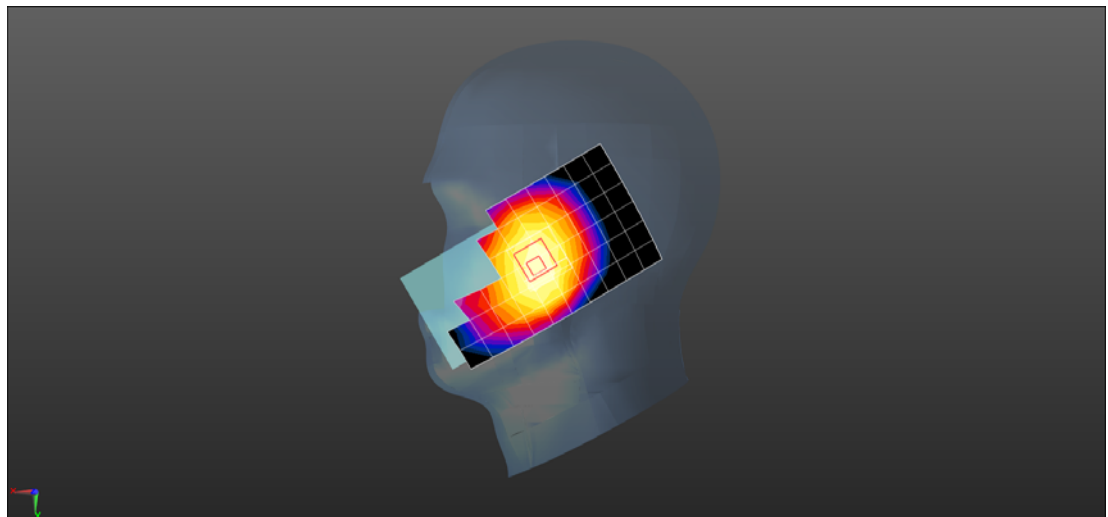
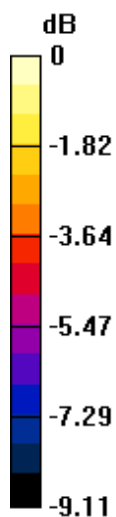
Configuration/Head/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.215 W/kg

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

Reference Value = 4.886 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.241 W/kg

SAR(1 g) = 0.189 W/kg; SAR(10 g) = 0.146 W/kg



0 dB = 0.215 W/kg = -6.68 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 WCDMA Band V 4182CH Back side 15mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0774

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

Medium: MSL835; Medium parameters used: $f = 836.4$ MHz; $\sigma = 1.009$ S/m; $\epsilon_r = 54.525$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.84, 8.84, 8.84); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Maximum value of SAR (measured) = 0.304 W/kg

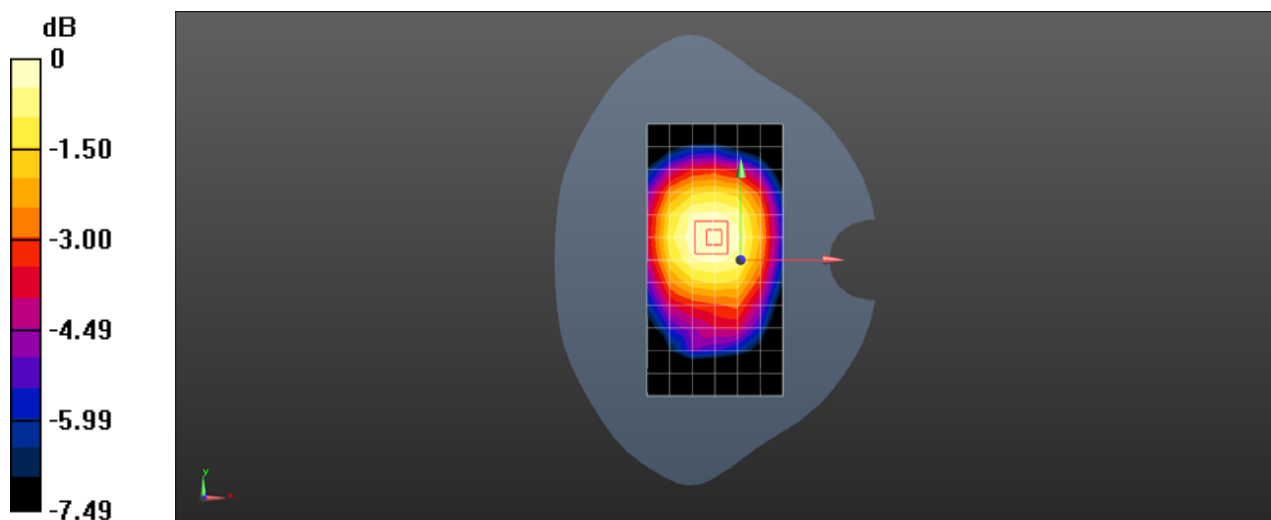
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 15.97 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.337 W/kg

SAR(1 g) = 0.265 W/kg; SAR(10 g) = 0.205 W/kg

Maximum value of SAR (measured) = 0.305 W/kg



Test Laboratory: SGS-SAR Lab

SONY I4312 WCDMA Band V 4182CH Back side 10mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0774

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

Medium: MSL835; Medium parameters used: $f = 836.4$ MHz; $\sigma = 1.009$ S/m; $\epsilon_r = 54.525$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.84, 8.84, 8.84); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.367 W/kg

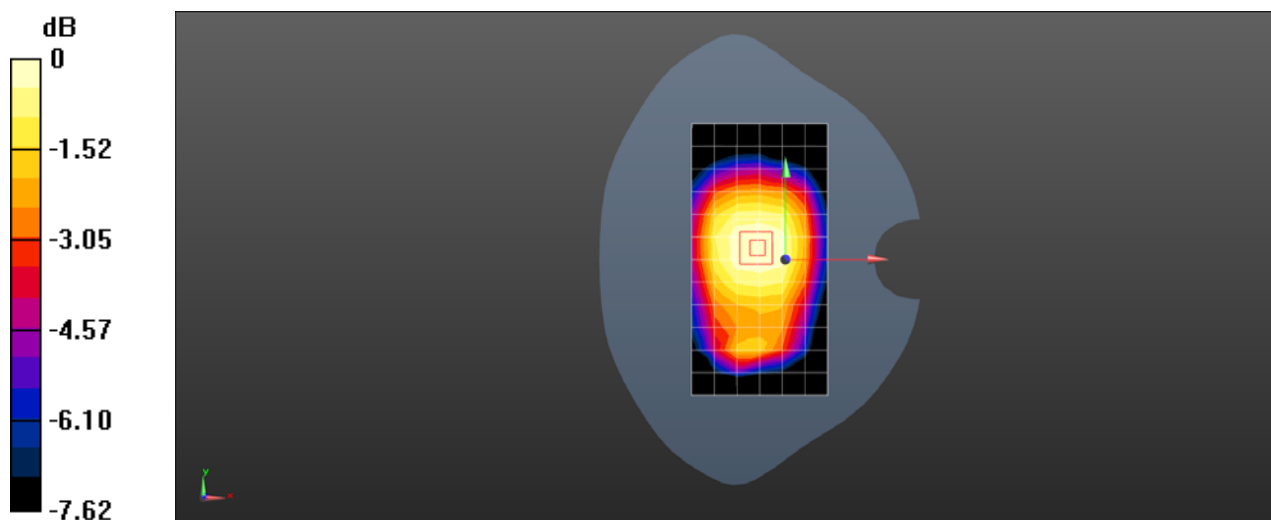
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 18.24 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.411 W/kg

SAR(1 g) = 0.325 W/kg; SAR(10 g) = 0.253 W/kg

Maximum value of SAR (measured) = 0.371 W/kg



0 dB = 0.371 W/kg = -4.31 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 LTE Band 2 20M QPSK 1RB50 19100CH Right cheek

DUT: I4312; Type: mobile phone; Serial: HQ689S1683

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL1900; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.389$ S/m; $\epsilon_r = 40.284$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(7.35, 7.35, 7.35); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Maximum value of SAR (measured) = 0.186 W/kg

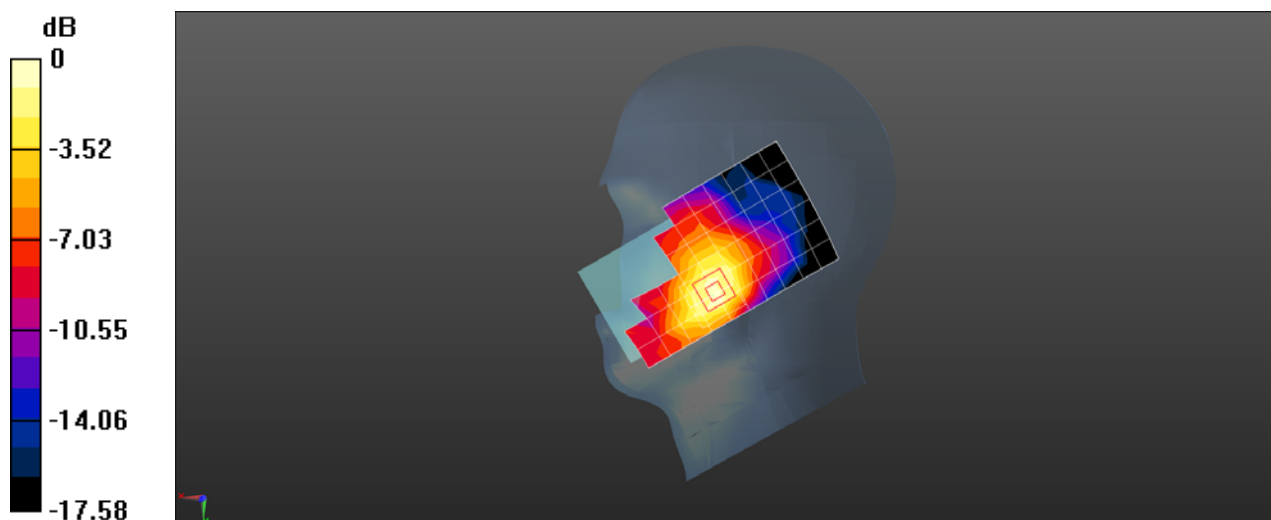
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 2.998 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.255 W/kg

SAR(1 g) = 0.171 W/kg; SAR(10 g) = 0.106 W/kg

Maximum value of SAR (measured) = 0.214 W/kg



0 dB = 0.214 W/kg = -6.70 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 LTE Band 2 20M QPSK 1RB50 19100CH Back side 15mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0747

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: MSL1900; Medium parameters used: $f = 1900$ MHz; $\sigma = 1.513$ S/m; $\epsilon_r = 53.19$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.09, 8.09, 8.09); Calibrated: 2018-01-11;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 2; Type: SAM V4.0; Serial: 1640
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.457 W/kg

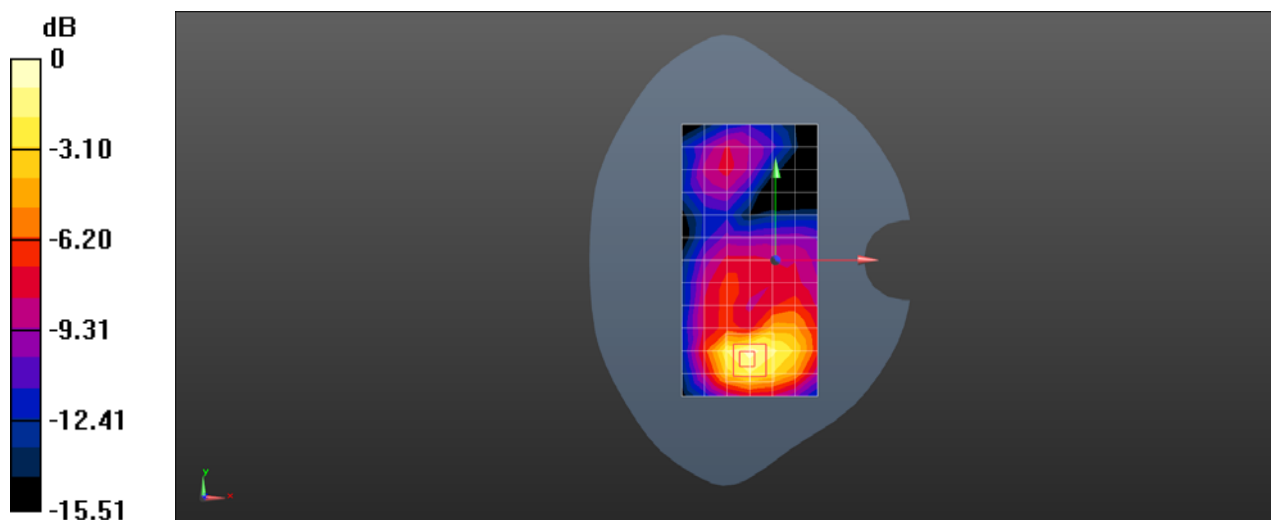
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 7.177 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.613 W/kg

SAR(1 g) = 0.392 W/kg; SAR(10 g) = 0.227 W/kg

Maximum value of SAR (measured) = 0.515 W/kg



Test Laboratory: SGS-SAR Lab

SONY I4312 LTE Band 2 20M QPSK 1RB50 18700CH Back side 10mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0747

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1860 MHz; Duty Cycle: 1:1

Medium: MSL1900; Medium parameters used: $f = 1860$ MHz; $\sigma = 1.503$ S/m; $\epsilon_r = 53.676$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(8.09, 8.09, 8.09); Calibrated: 2018-01-11;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 2; Type: SAM V4.0; Serial: 1640
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Maximum value of SAR (measured) = 0.979 W/kg

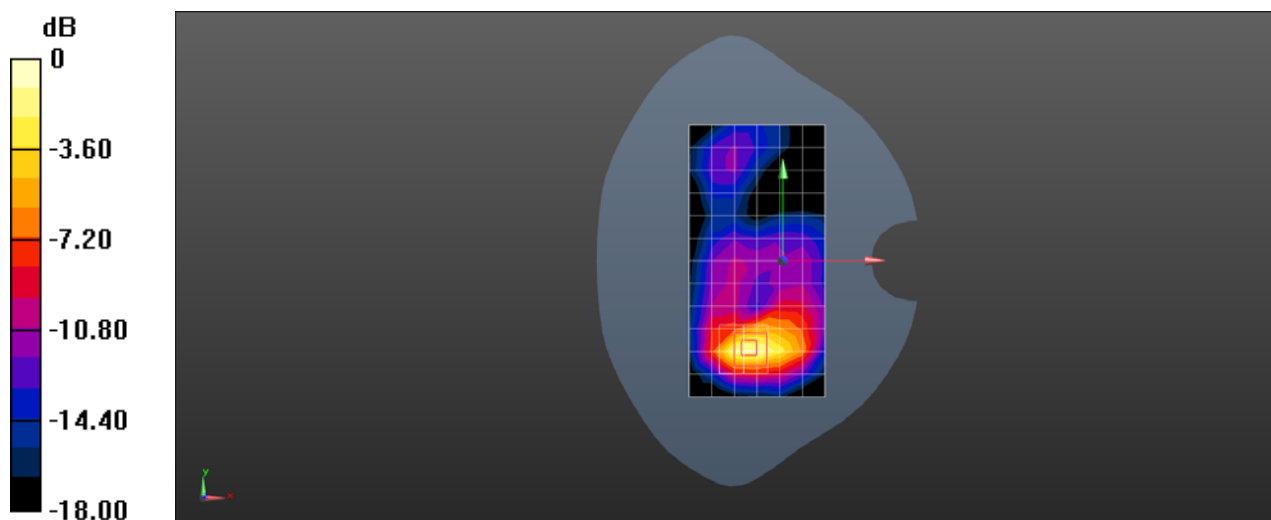
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 7.352 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 0.861 W/kg; SAR(10 g) = 0.448 W/kg

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



Test Laboratory: SGS-SAR Lab

SONY I4312 LTE Band 5 10M QPSK 1RB25 20600CH Right cheek

DUT: I4312; Type: mobile phone; Serial: HQ689S1683

Communication System: UID 0, LTE-FDD BW 10MHZ (0); Frequency: 844 MHz; Duty Cycle: 1:1

Medium: HSL835; Medium parameters used: $f = 844 \text{ MHz}$; $\sigma = 0.891 \text{ S/m}$; $\epsilon_r = 40.790$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.66, 8.66, 8.66); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (7x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (measured) = 0.207 W/kg

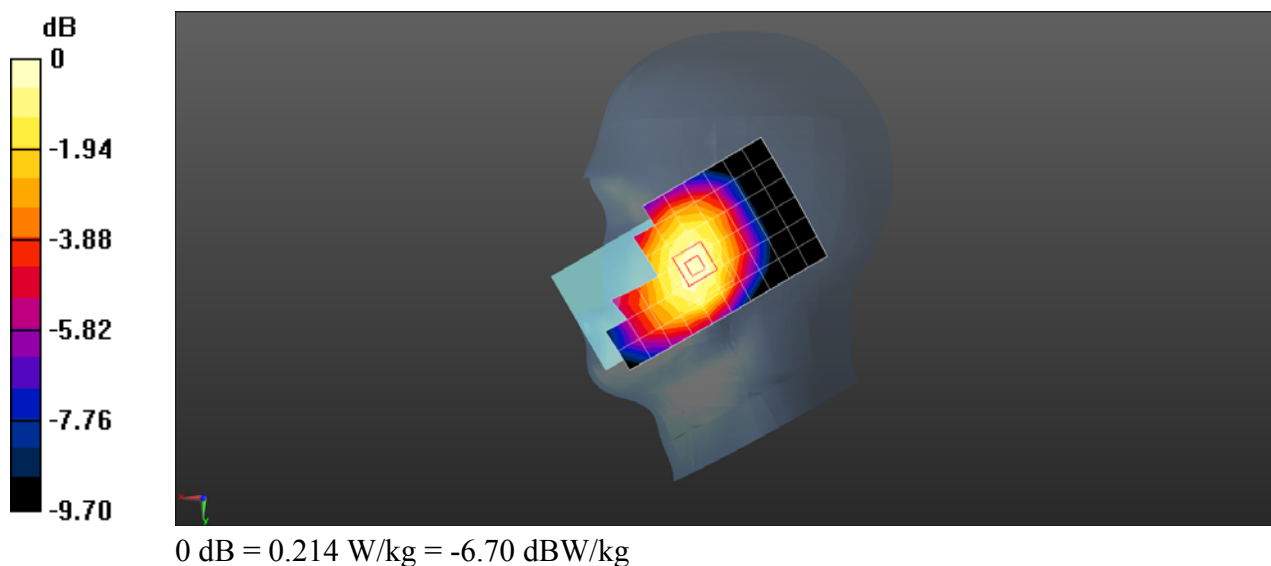
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 4.294 V/m ; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.239 W/kg

SAR(1 g) = 0.187 W/kg ; SAR(10 g) = 0.143 W/kg

Maximum value of SAR (measured) = 0.214 W/kg



Test Laboratory: SGS-SAR Lab

SONY I4312 LTE Band 5 10M QPSK 1RB25 20600CH Back side 15mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0774

Communication System: UID 0, LTE-FDD BW 10MHZ (0); Frequency: 844 MHz; Duty Cycle: 1:1

Medium: MSL835; Medium parameters used: $f = 844$ MHz; $\sigma = 1.014$ S/m; $\epsilon_r = 54.493$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.84, 8.84, 8.84); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm
Maximum value of SAR (measured) = 0.327 W/kg

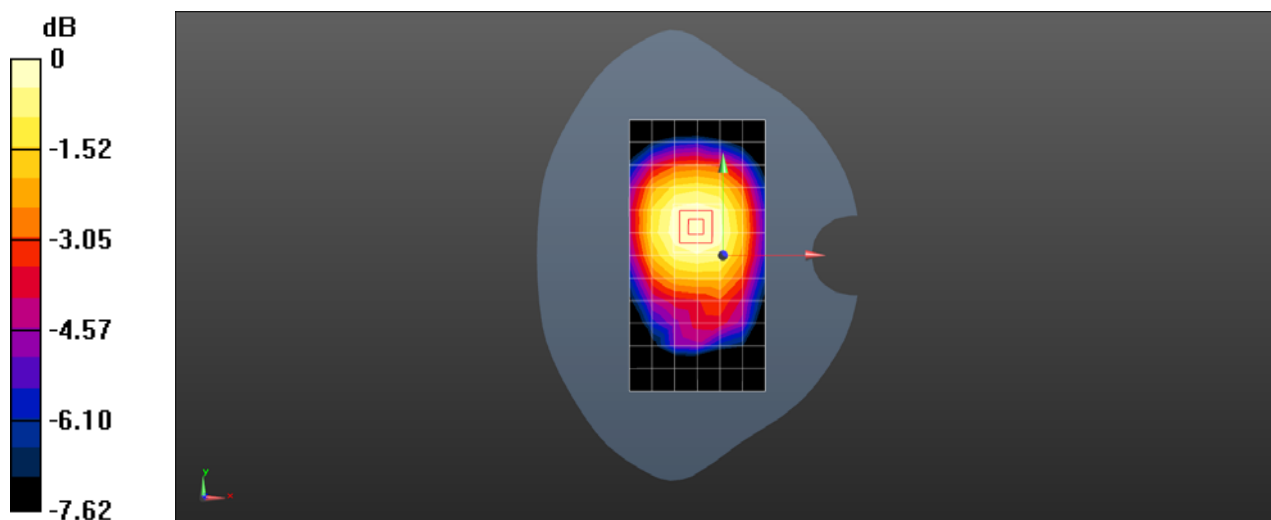
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 16.09 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.359 W/kg

SAR(1 g) = 0.284 W/kg; SAR(10 g) = 0.219 W/kg

Maximum value of SAR (measured) = 0.326 W/kg



0 dB = 0.326 W/kg = -4.87 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 LTE Band 5 10M QPSK 1RB25 20600CH Back side 10mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0774

Communication System: UID 0, LTE-FDD BW 10MHZ (0); Frequency: 844 MHz; Duty Cycle: 1:1

Medium: MSL835; Medium parameters used: $f = 844$ MHz; $\sigma = 1.014$ S/m; $\epsilon_r = 54.493$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(8.84, 8.84, 8.84); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (7x13x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Maximum value of SAR (measured) = 0.395 W/kg

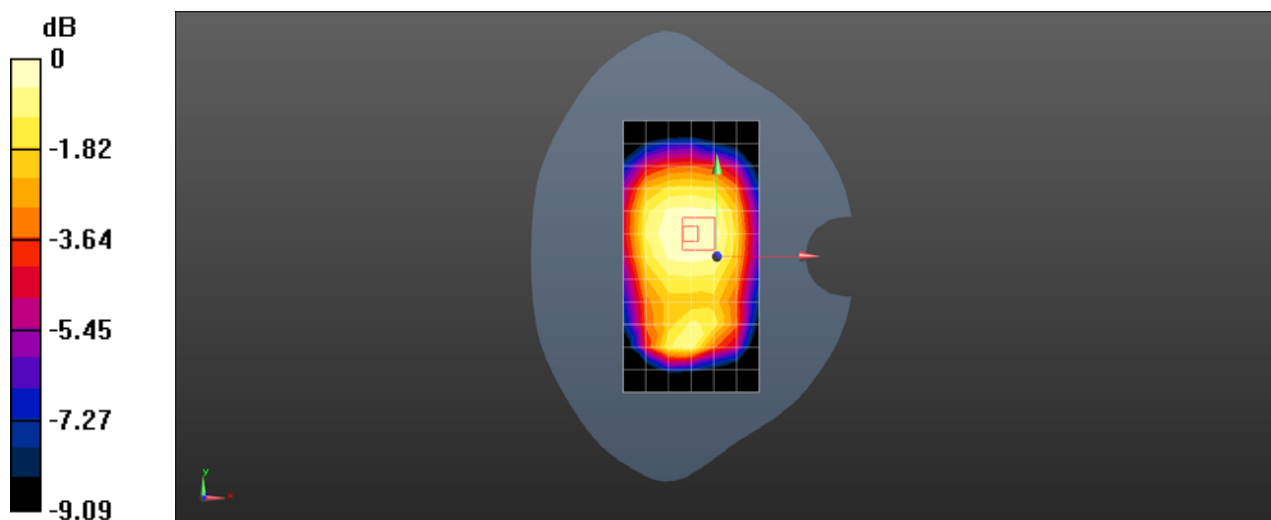
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 18.20 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.439 W/kg

SAR(1 g) = 0.349 W/kg; SAR(10 g) = 0.267 W/kg

Maximum value of SAR (measured) = 0.399 W/kg



0 dB = 0.399 W/kg = -3.99 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 LTE Band 7 20M QPSK 1RB50 21350CH Left cheek

DUT: I4312; Type: mobile phone; Serial: HQ689S0747

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 2560 MHz; Duty Cycle: 1:1

Medium: HSL2600; Medium parameters used: $f = 2560$ MHz; $\sigma = 1.943$ S/m; $\epsilon_r = 38.776$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(7.52, 7.52, 7.52); Calibrated: 2018-01-11;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 1; Type: SAM; Serial: 1912
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (9x16x1): Measurement grid: $dx=12$ mm, $dy=12$ mm
Maximum value of SAR (measured) = 0.385 W/kg

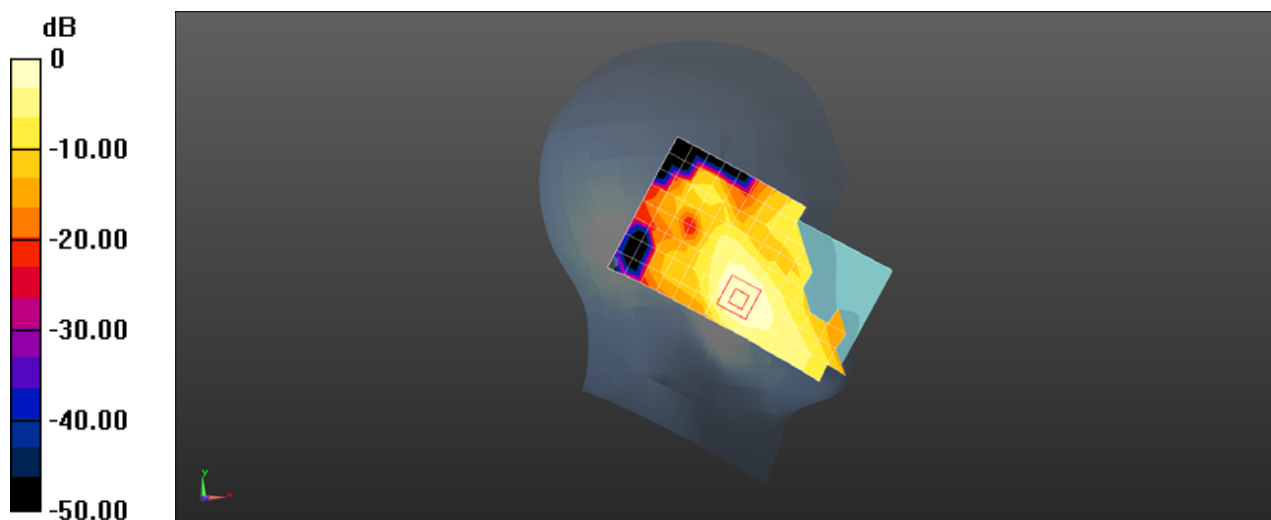
Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 2.904 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.520 W/kg

SAR(1 g) = 0.302 W/kg; SAR(10 g) = 0.164 W/kg

Maximum value of SAR (measured) = 0.409 W/kg



0 dB = 0.409 W/kg = -3.88 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 LTE Band 7 20M QPSK 1RB50 21350CH Back side 15mm

DUT: I4312; Type: mobile phone; Serial: HQ689S0774

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 2560 MHz; Duty Cycle: 1:1

Medium: MSL2600; Medium parameters used: $f = 2560$ MHz; $\sigma = 2.093$ S/m; $\epsilon_r = 53.007$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(6.96, 6.96, 6.96); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: $dx=12$ mm, $dy=12$ mm
Maximum value of SAR (measured) = 0.709 W/kg

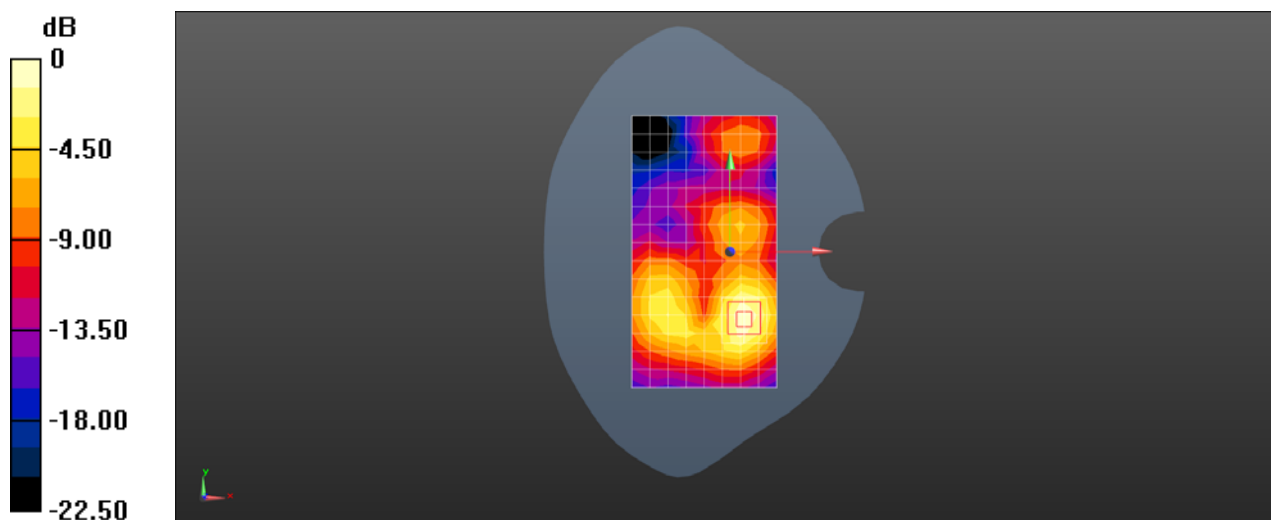
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 4.723 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 0.935 W/kg

SAR(1 g) = 0.522 W/kg; SAR(10 g) = 0.274 W/kg

Maximum value of SAR (measured) = 0.733 W/kg



0 dB = 0.733 W/kg = -1.35 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 LTE Band 7 20M QPSK 1RB50 21100CH Back side 10mm

DUT: I4312; Type: mobile phone; Serial: HQ689S1683

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 2535 MHz; Duty Cycle: 1:1

Medium: MSL2600; Medium parameters used: $f = 2535$ MHz; $\sigma = 2.061$ S/m; $\epsilon_r = 53.081$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(7.15, 7.15, 7.15); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: $dx=12$ mm, $dy=12$ mm
Maximum value of SAR (measured) = 1.49 W/kg

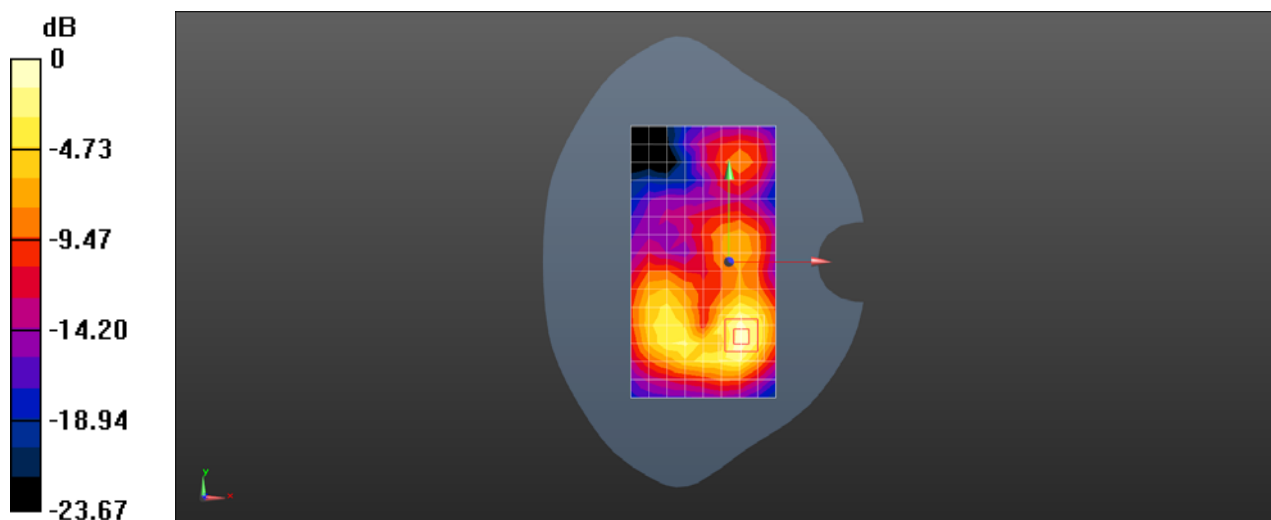
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 6.407 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 2.01 W/kg

SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.536 W/kg

Maximum value of SAR (measured) = 1.57 W/kg



0 dB = 1.57 W/kg = 1.96 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 WIFI 2.4G 802.11b 11CH Left tilted

DUT: I4312; Type: mobile phone; Serial: HQ68AQ1472

Communication System: UID 0, WI-FI(2.4GHz) (0); Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: HSL2450; Medium parameters used: $f = 2462$ MHz; $\sigma = 1.83$ S/m; $\epsilon_r = 39.084$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(7.01, 7.01, 7.01); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM2; Type: SAM; Serial: 1913
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (9x16x1): Measurement grid: $dx=12$ mm, $dy=12$ mm
Maximum value of SAR (measured) = 1.60 W/kg

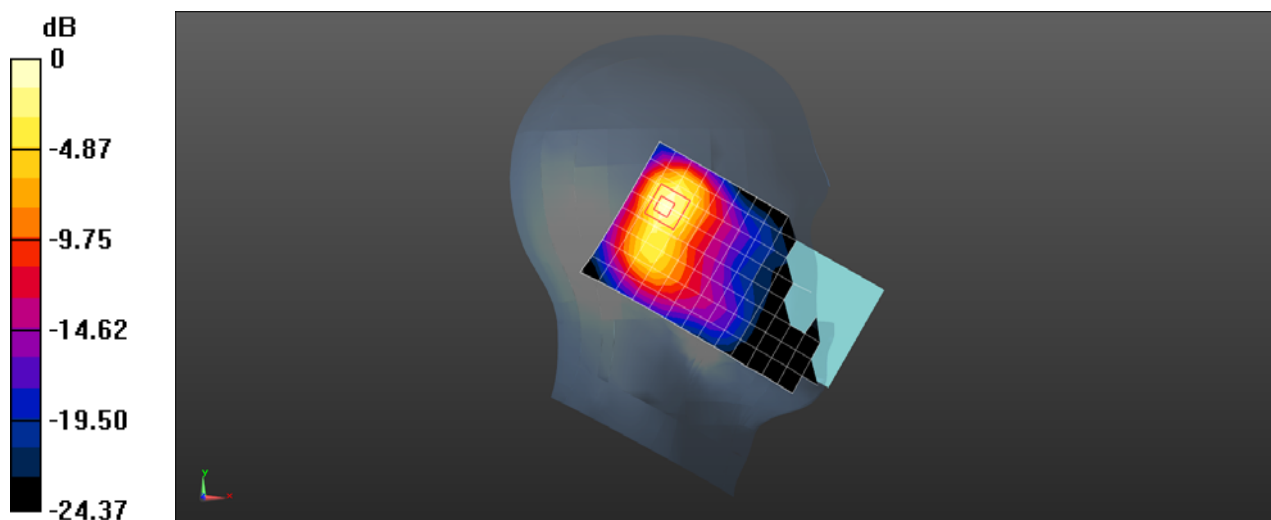
Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 19.11 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 2.36 W/kg

SAR(1 g) = 0.973 W/kg; SAR(10 g) = 0.432 W/kg

Maximum value of SAR (measured) = 1.54 W/kg



0 dB = 1.54 W/kg = 1.88 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 WIFI 2.4G 802.11b 1CH Back side 15mm

DUT: I4312; Type: mobile phone; Serial: HQ68AQ1472

Communication System: UID 0, WI-FI(2.4GHz) (0); Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: MSL2450; Medium parameters used: $f = 2412$ MHz; $\sigma = 1.917$ S/m; $\epsilon_r = 53.484$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(7.15, 7.15, 7.15); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: $dx=12$ mm, $dy=12$ mm
Maximum value of SAR (measured) = 0.239 W/kg

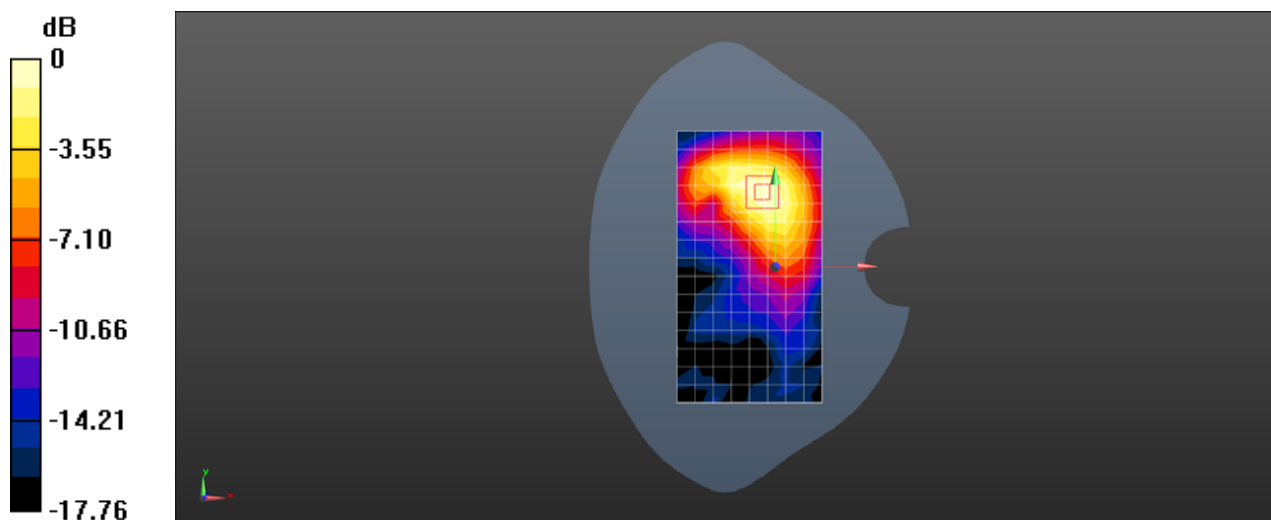
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 2.884 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.304 W/kg

SAR(1 g) = 0.184 W/kg; SAR(10 g) = 0.109 W/kg

Maximum value of SAR (measured) = 0.244 W/kg



0 dB = 0.244 W/kg = -6.13 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 WIFI 2.4G 802.11b 1CH Back side 10mm

DUT: I4312; Type: mobile phone; Serial: HQ68AQ1472

Communication System: UID 0, WI-FI(2.4GHz) (0); Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: MSL2450; Medium parameters used: $f = 2412$ MHz; $\sigma = 1.917$ S/m; $\epsilon_r = 53.484$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3789; ConvF(7.15, 7.15, 7.15); Calibrated: 2018-02-08;
- Sensor-Surface: 2mm (Mechanical Surface Detection), $z = -2.0, 31.0$
- Electronics: DAE4 Sn1267; Calibrated: 2017-11-28
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: $dx=12$ mm, $dy=12$ mm
Maximum value of SAR (measured) = 0.436 W/kg

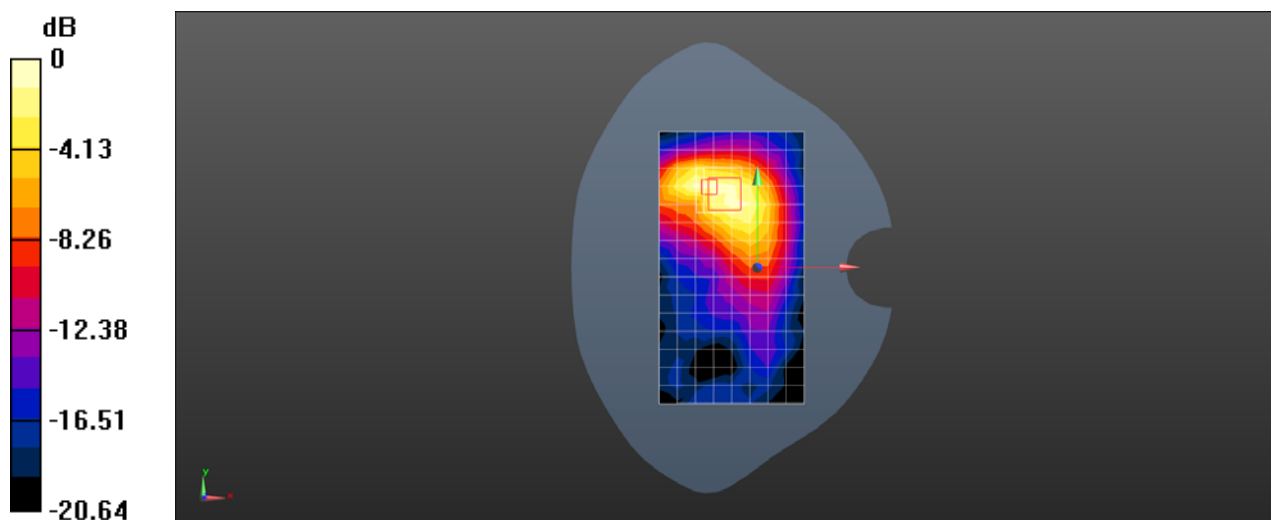
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 4.437 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.618 W/kg

SAR(1 g) = 0.330 W/kg; SAR(10 g) = 0.184 W/kg

Maximum value of SAR (measured) = 0.469 W/kg



Test Laboratory: SGS-SAR Lab

SONY I4312 802.11a 165CH Left cheek

DUT: I4312; Type: mobile phone; Serial: HQ68AQ1472

Communication System: UID 0, WI-FI(5GHz) (0); Frequency: 5825 MHz; Duty Cycle: 1:1

Medium: HSL5G; Medium parameters used: $f = 5825$ MHz; $\sigma = 5.42$ S/m; $\epsilon_r = 34.46$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(5.05, 5.05, 5.05); Calibrated: 2018-01-11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 23.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 1; Type: SAM; Serial: 1912
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (10x19x1): Measurement grid: $dx=10$ mm, $dy=10$ mm
Maximum value of SAR (measured) = 2.21 W/kg

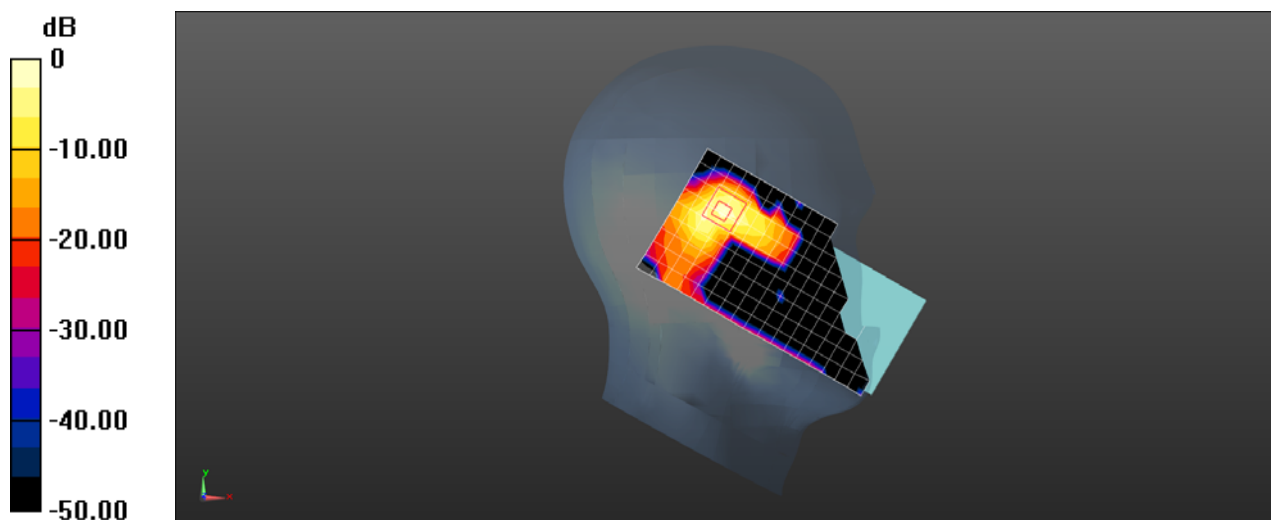
Configuration/Head/Zoom Scan (7x7x12)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=2$ mm

Reference Value = 7.002 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 4.04 W/kg

SAR(1 g) = 0.812 W/kg; SAR(10 g) = 0.226 W/kg

Maximum value of SAR (measured) = 2.31 W/kg



Test Laboratory: SGS-SAR Lab

SONY I4312 802.11a 165CH Front side 15mm

DUT: I4312; Type: mobile phone; Serial: HQ68AQ0298

Communication System: UID 0, WI-FI(5GHz) (0); Frequency: 5825 MHz; Duty Cycle: 1:1

Medium: MSL5G; Medium parameters used: $f = 5825$ MHz; $\sigma = 6.043$ S/m; $\epsilon_r = 46.769$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(4.59, 4.59, 4.59); Calibrated: 2018-01-11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 23.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 2; Type: SAM V4.0; Serial: 1640
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (10x19x1): Measurement grid: $dx=10$ mm, $dy=10$ mm
Maximum value of SAR (measured) = 0.132 W/kg

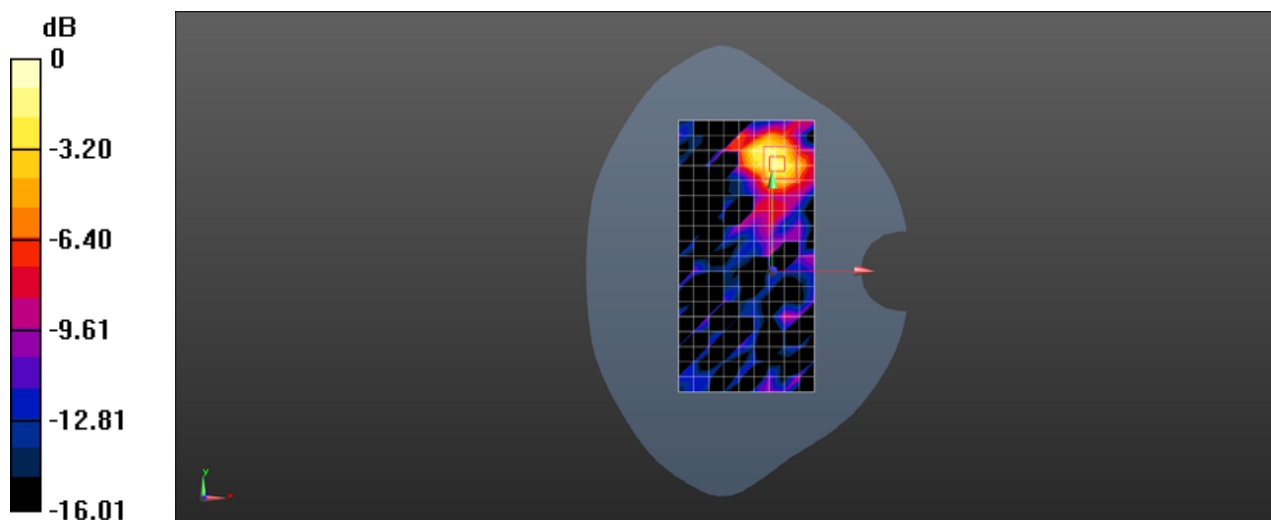
Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=2$ mm

Reference Value = 1.522 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.280 W/kg

SAR(1 g) = 0.073 W/kg; SAR(10 g) = 0.032 W/kg

Maximum value of SAR (measured) = 0.176 W/kg



Test Laboratory: SGS-SAR Lab

SONY I4312 802.11a 157CH Front side 10mm

DUT: I4312; Type: mobile phone; Serial: HQ68AQ1472

Communication System: UID 0, WI-FI(5GHz) (0); Frequency: 5785 MHz;Duty Cycle: 1:1

Medium: MSL5G;Medium parameters used: $f = 5785$ MHz; $\sigma = 5.989$ S/m; $\epsilon_r = 46.916$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(4.59, 4.59, 4.59); Calibrated: 2018-01-11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 23.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 2; Type: SAM V4.0; Serial: 1640
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (10x19x1): Measurement grid: $dx=10$ mm, $dy=10$ mm
Maximum value of SAR (measured) = 0.283 W/kg

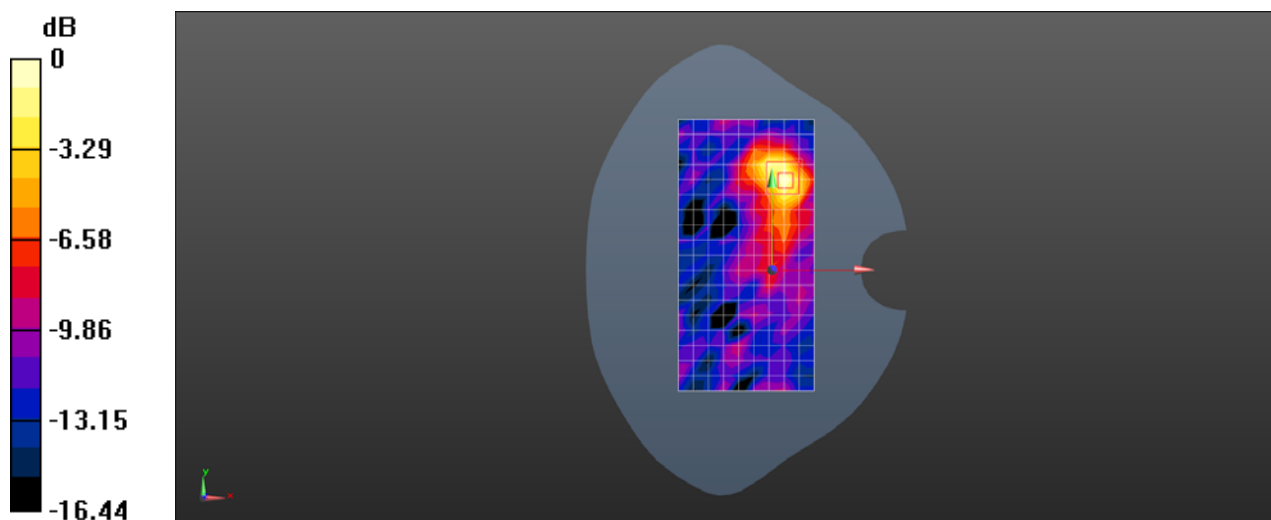
Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=2$ mm

Reference Value = 1.801 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.384 W/kg

SAR(1 g) = 0.110 W/kg; SAR(10 g) = 0.046 W/kg

Maximum value of SAR (measured) = 0.242 W/kg



0 dB = 0.242 W/kg = -6.16 dBW/kg

Test Laboratory: SGS-SAR Lab

SONY I4312 802.11a 140CH Front side 0mm

DUT: I4312; Type: mobile phone; Serial: HQ68AQ1472

Communication System: UID 0, WI-FI(5GHz) (0); Frequency: 5700 MHz;Duty Cycle: 1:1

Medium: MSL5G;Medium parameters used: $f = 5700$ MHz; $\sigma = 5.916$ S/m; $\epsilon_r = 47.339$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3962; ConvF(4.45, 4.45, 4.45); Calibrated: 2018-01-11;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -2.0, 23.0$
- Electronics: DAE4 Sn1428; Calibrated: 2018-01-17
- Phantom: SAM 2; Type: SAM V4.0; Serial: 1640
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (10x19x1): Measurement grid: $dx=10$ mm, $dy=10$ mm

Maximum value of SAR (measured) = 2.27 W/kg

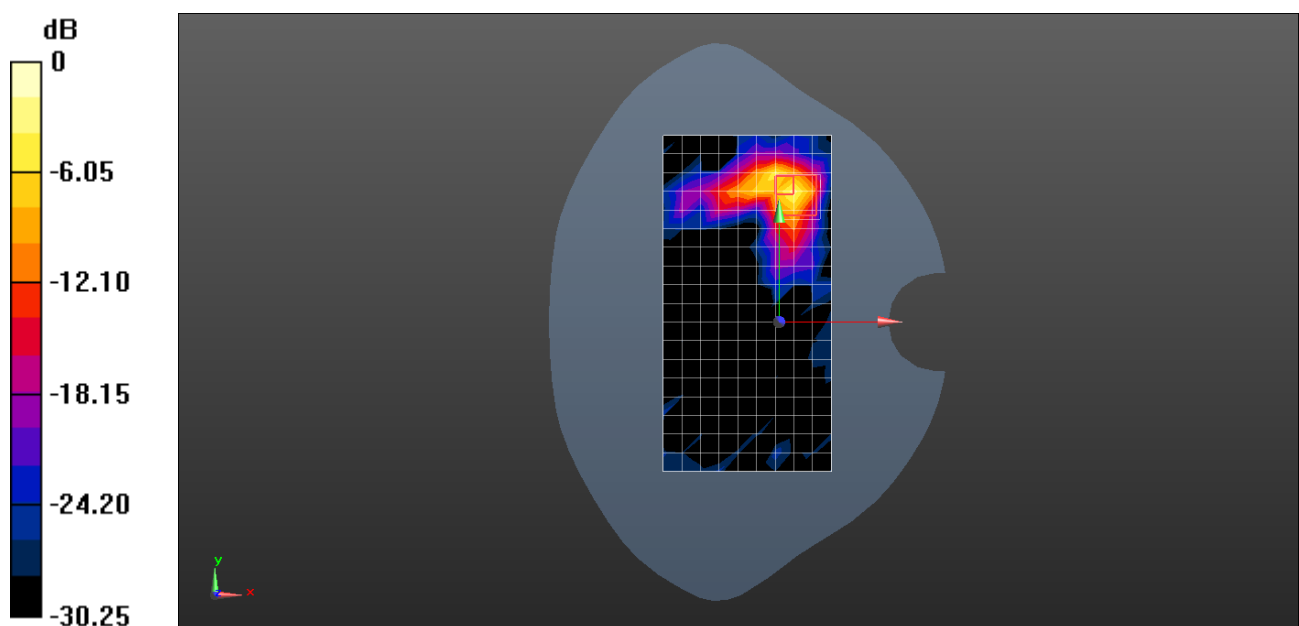
Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=2$ mm

Reference Value = 1.307 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 7.66 W/kg

SAR(1 g) = 1.04 W/kg; SAR(10 g) = 0.277 W/kg

Maximum value of SAR (measured) = 4.33 W/kg



0 dB = 4.33 W/kg = 6.36 dBW/kg



Appendix C

Calibration certificate

1. Dipole
D835V2 - SN 4d105(2016-12-08)
D1750V2 - SN 1149(2016-06-23)
D1900V2 - SN 5d028(2016-12-07)
D2450V2 - SN 733(2016-12-07)
D2600V2 - SN 1125(2016-06-22)
D5GHzV2 - SN 1165(2016-12-13)
2. DAE
DAE4 - SN 1267(2017-11-28)
DAE4 - SN 1428(2018-1-17)
3. Probe
EX3DV4 - SN 3962(2018-01-11)
EX3DV4 - SN 3789(2018-02-08)



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Client

SGS(Boce)

Certificate No: **Z16-97239**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d105**

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

Calibration date: **December 8, 2016**

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) $^{\circ}\text{C}$ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Power sensor NRP-Z91	101547	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Reference Probe EX3DV4	SN 7433	26-Sep-16(SPEAG,No.EX3-7433_Sep16)	Sep-17
DAE4	SN 771	02-Feb-16(CTTL-SPEAG,No.Z16-97011)	Feb-17
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-16 (CTTL, No.J16X00893)	Jan-17
Network Analyzer E5071C	MY46110673	26-Jan-16 (CTTL, No.J16X00894)	Jan-17

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: December 11, 2016

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, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- 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	52.8.8.1258
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	40.8 $\pm$ 6 %	0.91 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	2.43 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.59 mW /g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.59 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.29 mW /g $\pm$ 20.4 % (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 %	0.98 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	2.44 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.65 mW /g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.63 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.46 mW /g $\pm$ 20.4 % (k=2)



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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.2Ω- 3.41jΩ
Return Loss	- 29.1dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.8Ω- 3.25jΩ
Return Loss	- 25.1dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.500 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: 12.08.2016

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d105

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

Medium parameters used: $f = 835$ MHz; $\sigma = 0.912$ S/m; $\epsilon_r = 40.78$; $\rho = 1000$ kg/m³

Phantom section: Center Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(9.82, 9.82, 9.82); Calibrated: 9/26/2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

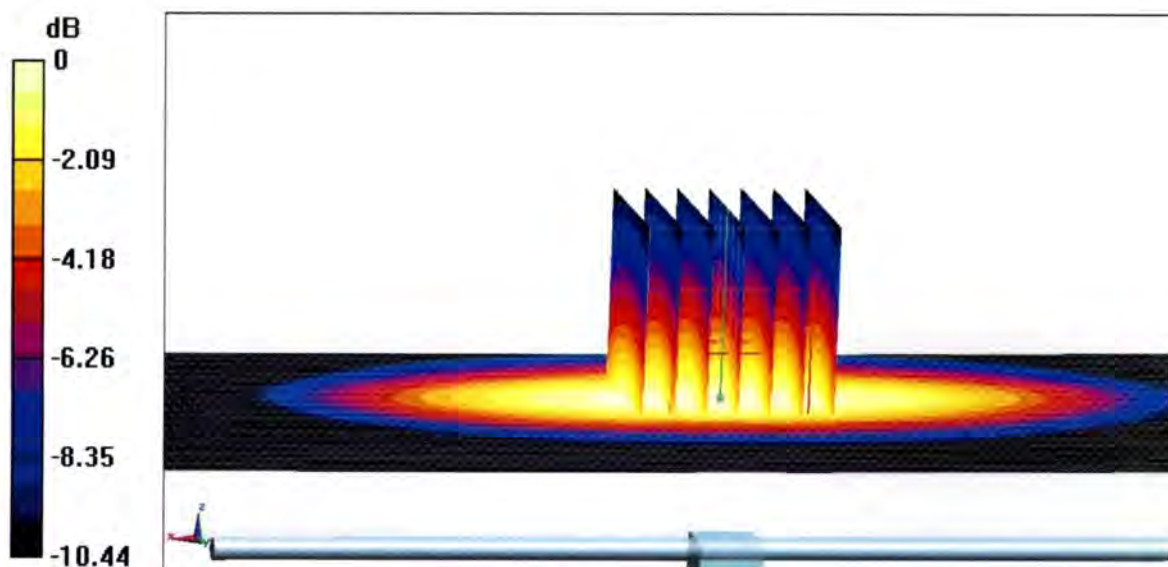
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 49.08V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 3.62 W/kg

SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.59 W/kg

Maximum value of SAR (measured) = 3.08 W/kg

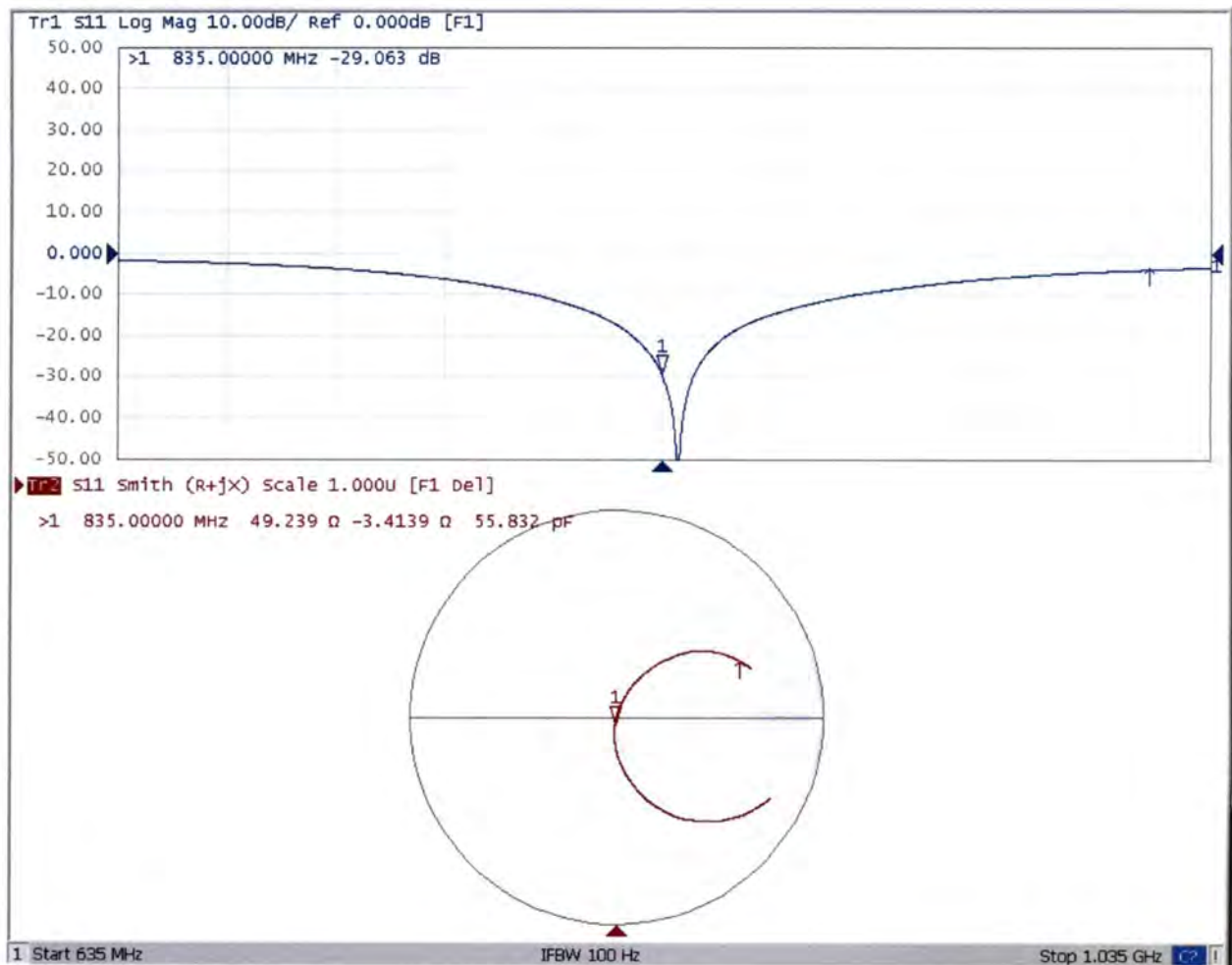


0 dB = 3.08 W/kg = 4.89 dBW/kg



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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 12.08.2016

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d105

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

Medium parameters used: $f = 835$ MHz; $\sigma = 0.983$ S/m; $\epsilon_r = 54.74$; $\rho = 1000$ kg/m³

Phantom section: Right Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(9.5,9.5, 9.5); Calibrated: 9/26/2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

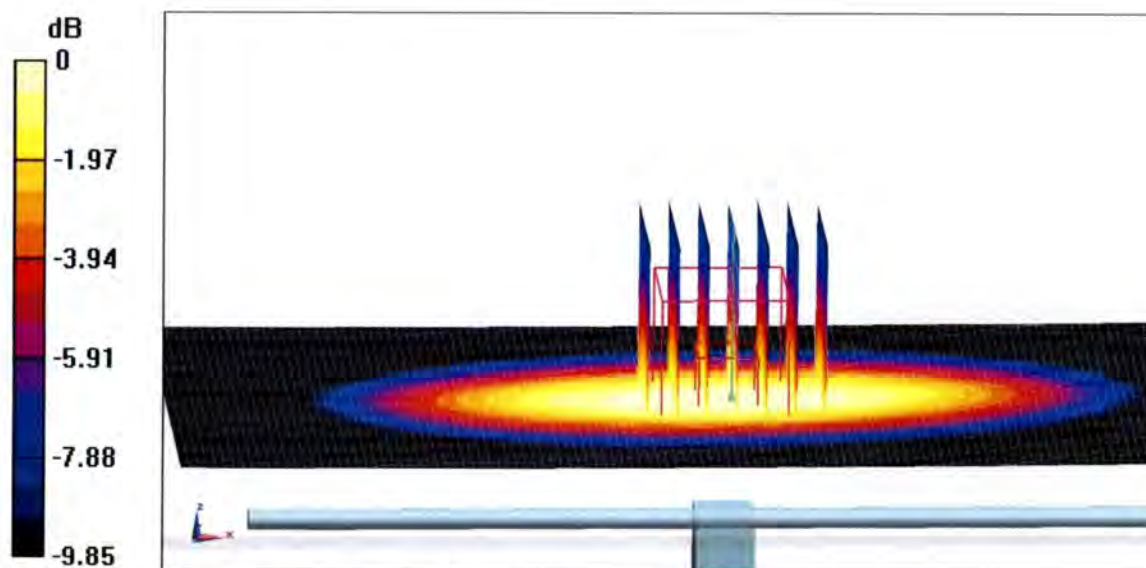
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.10 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.54 W/kg

SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.63 W/kg

Maximum value of SAR (measured) = 3.06 W/kg

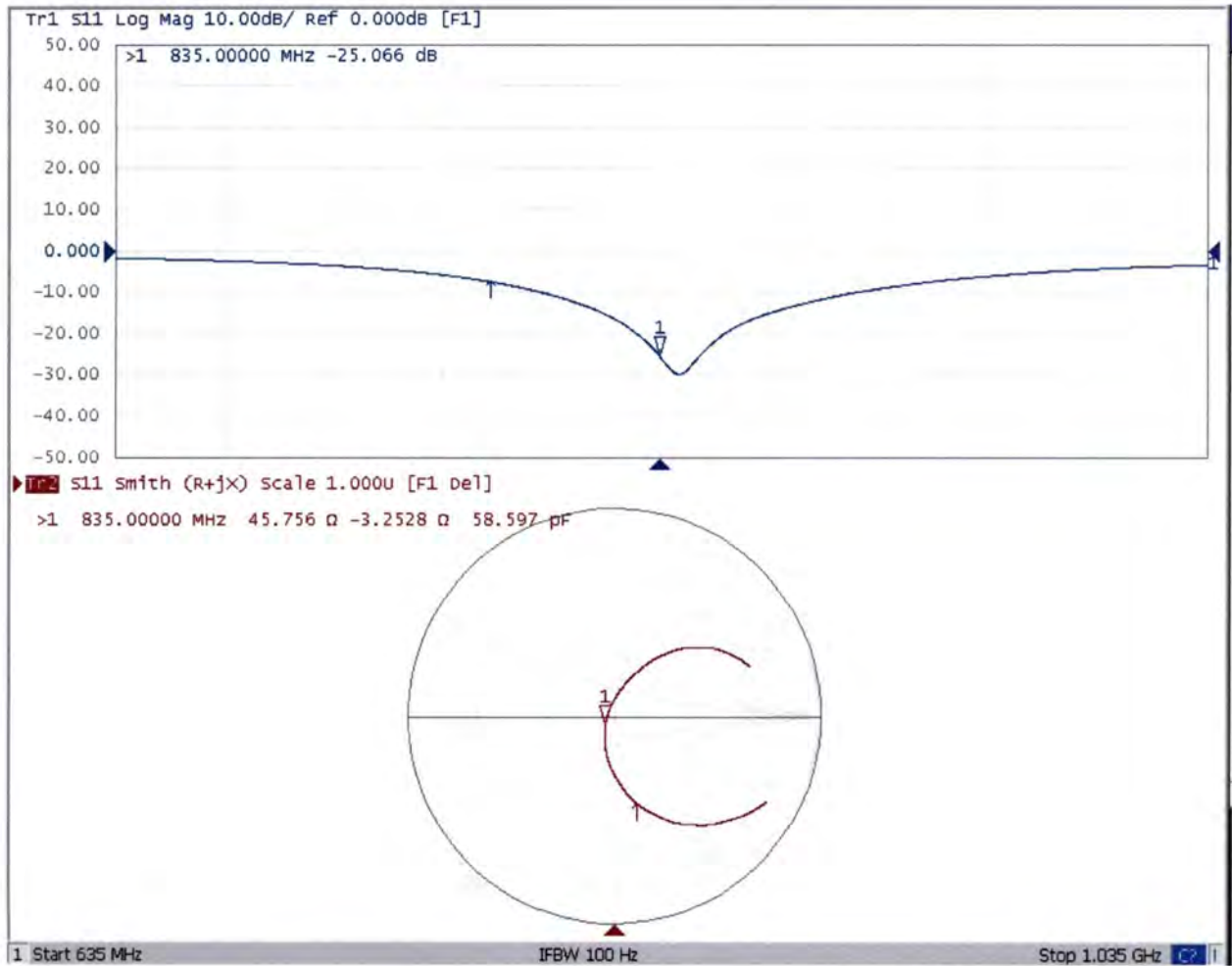


0 dB = 3.06 W/kg = 4.86 dBW/kg



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Impedance Measurement Plot for Body TSL





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Accreditation No.: **SCS 0108**

Client **SGS-SZ (Auden)**

Certificate No: **D1750V2-1149_Jun16**

CALIBRATION CERTIFICATE

Object **D1750V2 - SN:1149**

Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **June 23, 2016**

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	15-Jun-16 (No. EX3-7349_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

Calibrated by: **Michael Weber** Function **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** Technical Manager

Issued: June 28, 2016

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Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

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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, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	39.8 $\pm$ 6 %	1.36 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.16 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.7 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.87 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.5 W/kg $\pm$ 16.5 % (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 %	1.50 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.27 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	37.0 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.93 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	19.7 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.0 Ω - 0.5 j Ω
Return Loss	- 38.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.6 Ω + 0.0 j Ω
Return Loss	- 23.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.213 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
Manufactured on	April 10, 2015

DASY5 Validation Report for Head TSL

Date: 23.06.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1149

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.36$ S/m; $\epsilon_r = 39.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.46, 8.46, 8.46); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

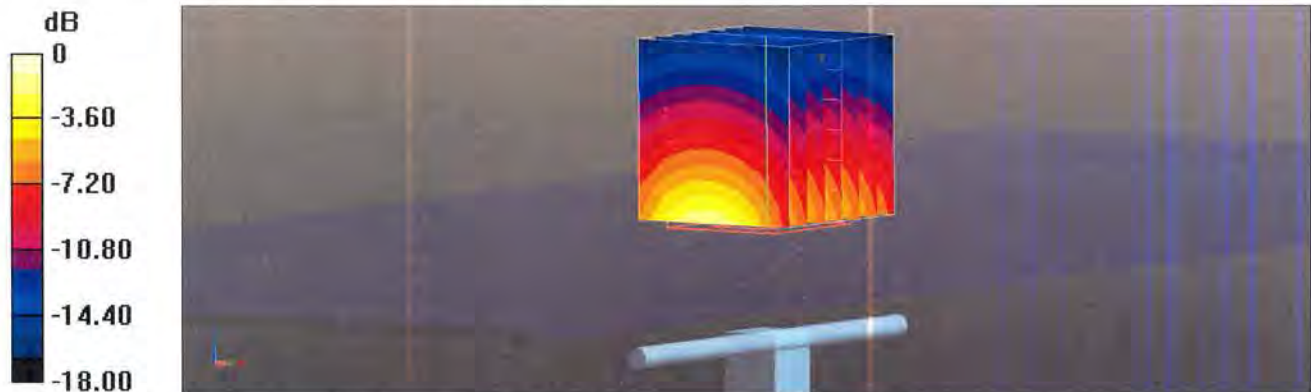
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 105.0 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 16.7 W/kg

SAR(1 g) = 9.16 W/kg; SAR(10 g) = 4.87 W/kg

Maximum value of SAR (measured) = 13.9 W/kg



0 dB = 13.9 W/kg = 11.43 dBW/kg

Impedance Measurement Plot for Head TSL

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1: 48.973 Ω -511.72 m Ω 177.73 pF 1 750.000 000 MHz

*

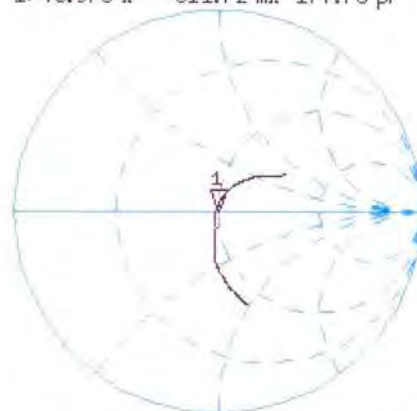
De1

CΔ

Avg

16

H1d



CH2 S11 LOG 5 dB/REF -20 dB 1: -38.724 dB 1 750.000 000 MHz

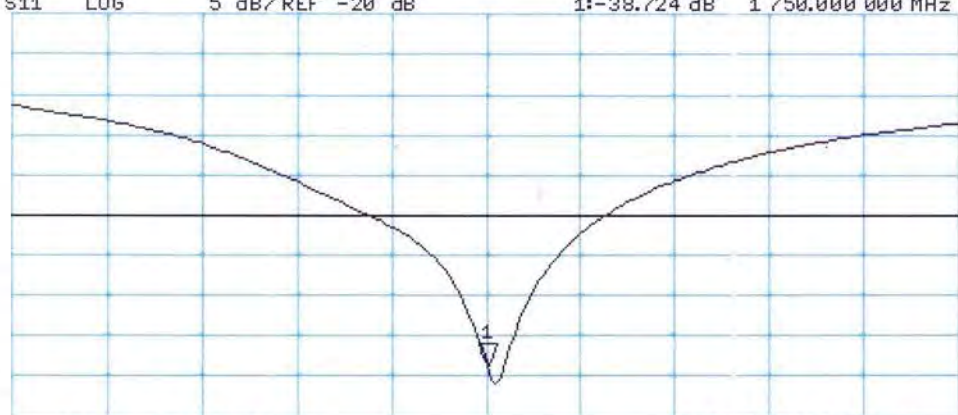
De1

CΔ

Avg

16

H1d



START 1 550.000 000 MHz

STOP 1 950.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 23.06.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1149

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.5$ S/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.25, 8.25, 8.25); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

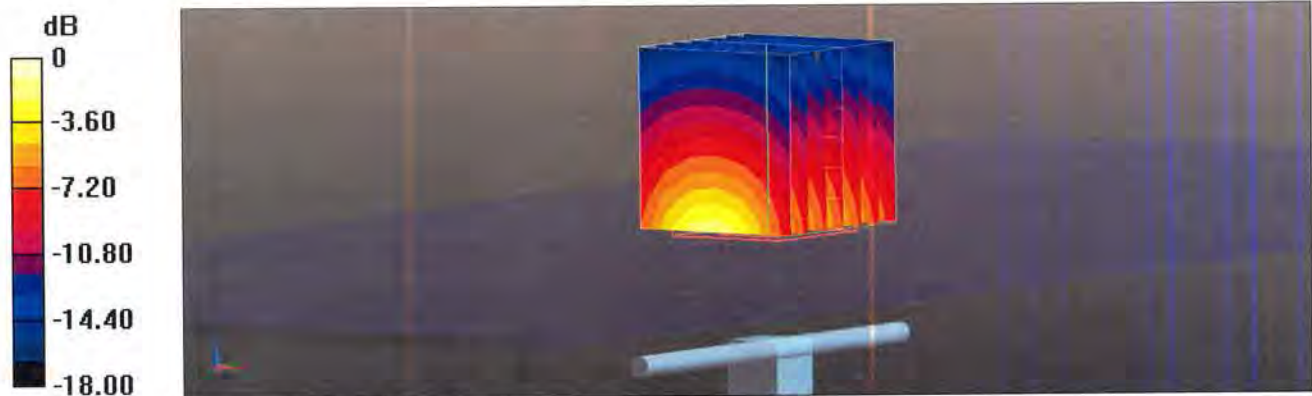
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 100.6 V/m; Power Drift = 0.01 dB

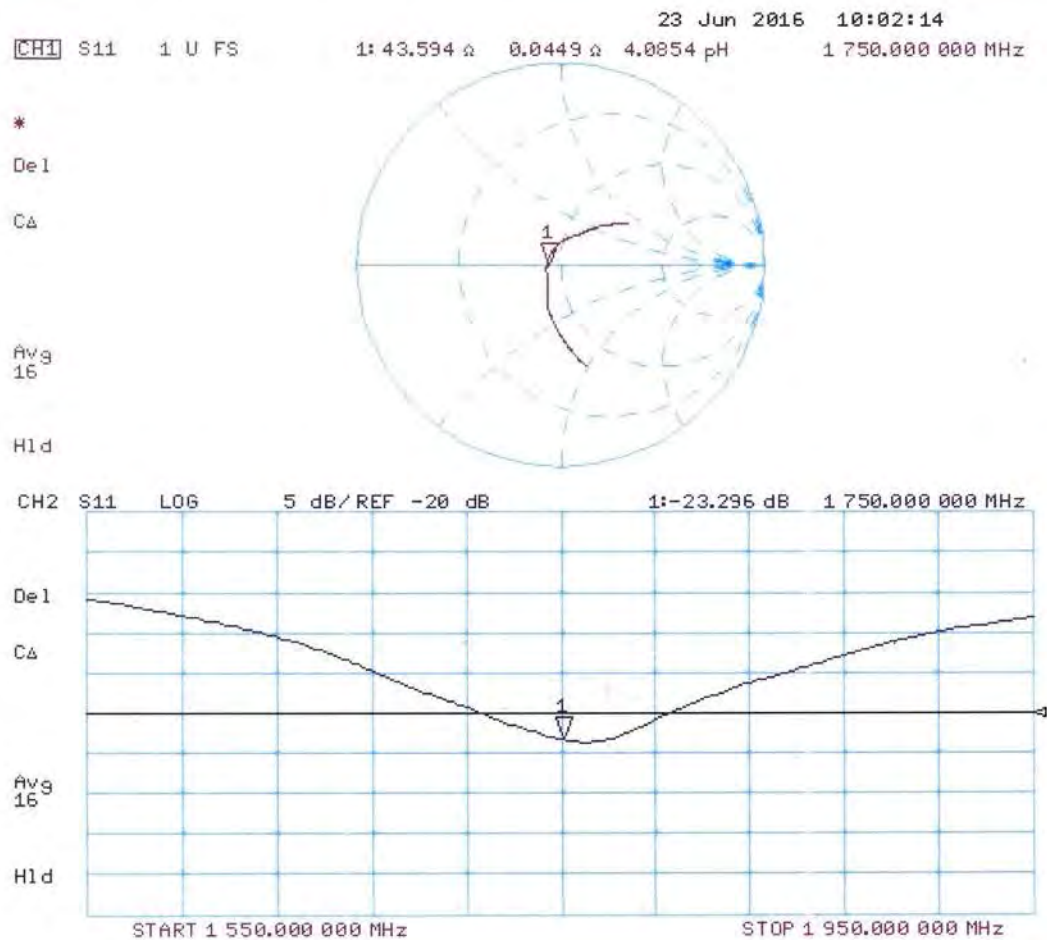
Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 9.27 W/kg; SAR(10 g) = 4.93 W/kg

Maximum value of SAR (measured) = 13.9 W/kg



Impedance Measurement Plot for Body TSL





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Client

SGS(Boce)

Certificate No: **Z16-97240**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d028**

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

Calibration date: **December 7, 2016**

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 NRP2	101919	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Power sensor NRP-Z91	101547	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Reference Probe EX3DV4	SN 7433	26-Sep-16(SPEAG,No.EX3-7433_Sep16)	Sep-17
DAE4	SN 771	02-Feb-16(CTTL-SPEAG,No.Z16-97011)	Feb-17
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-16 (CTTL, No.J16X00893)	Jan-17
Network Analyzer E5071C	MY46110673	26-Jan-16 (CTTL, No.J16X00894)	Jan-17

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: December 11, 2016

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, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- 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	52.8.8.1258
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	40.2 $\pm$ 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 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	40.7 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.24 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	21.1 mW / g $\pm$ 20.4 % (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	54.3 $\pm$ 6 %	1.51 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	10.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	41.6 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.32 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.4 mW / g $\pm$ 20.4 % (k=2)



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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8Ω+ 5.90jΩ
Return Loss	- 24.4dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1Ω+ 5.82jΩ
Return Loss	- 24.1dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.306 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: 12.07.2016

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d028

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.383$ S/m; $\epsilon_r = 40.16$; $\rho = 1000$ kg/m³

Phantom section: Center Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(7.98, 7.98, 7.98); Calibrated: 9/26/2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

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

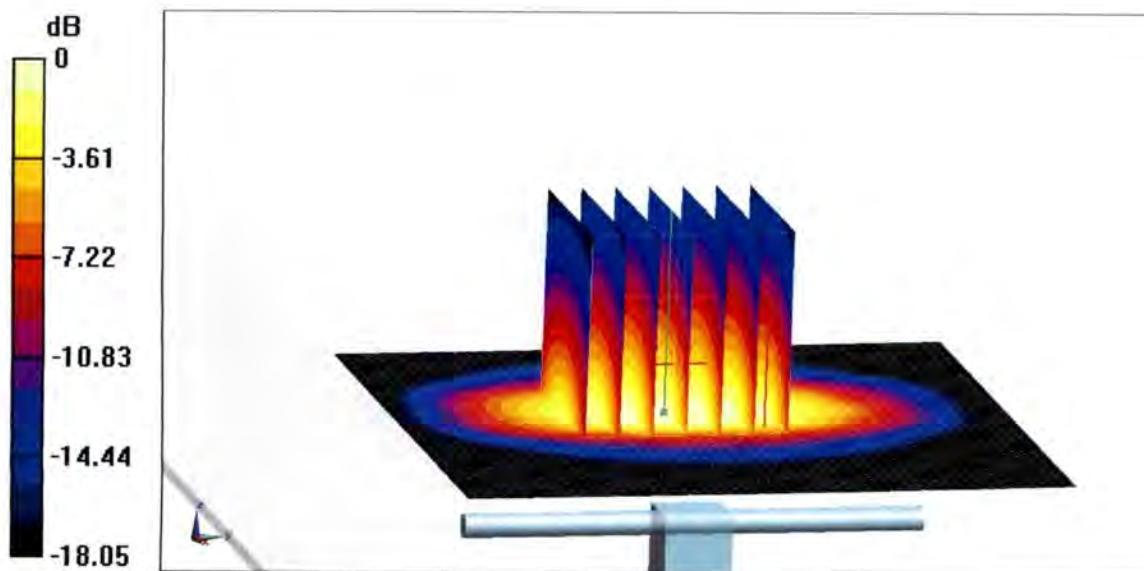
$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 102.5 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 18.7 W/kg

SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.24 W/kg

Maximum value of SAR (measured) = 14.4 W/kg

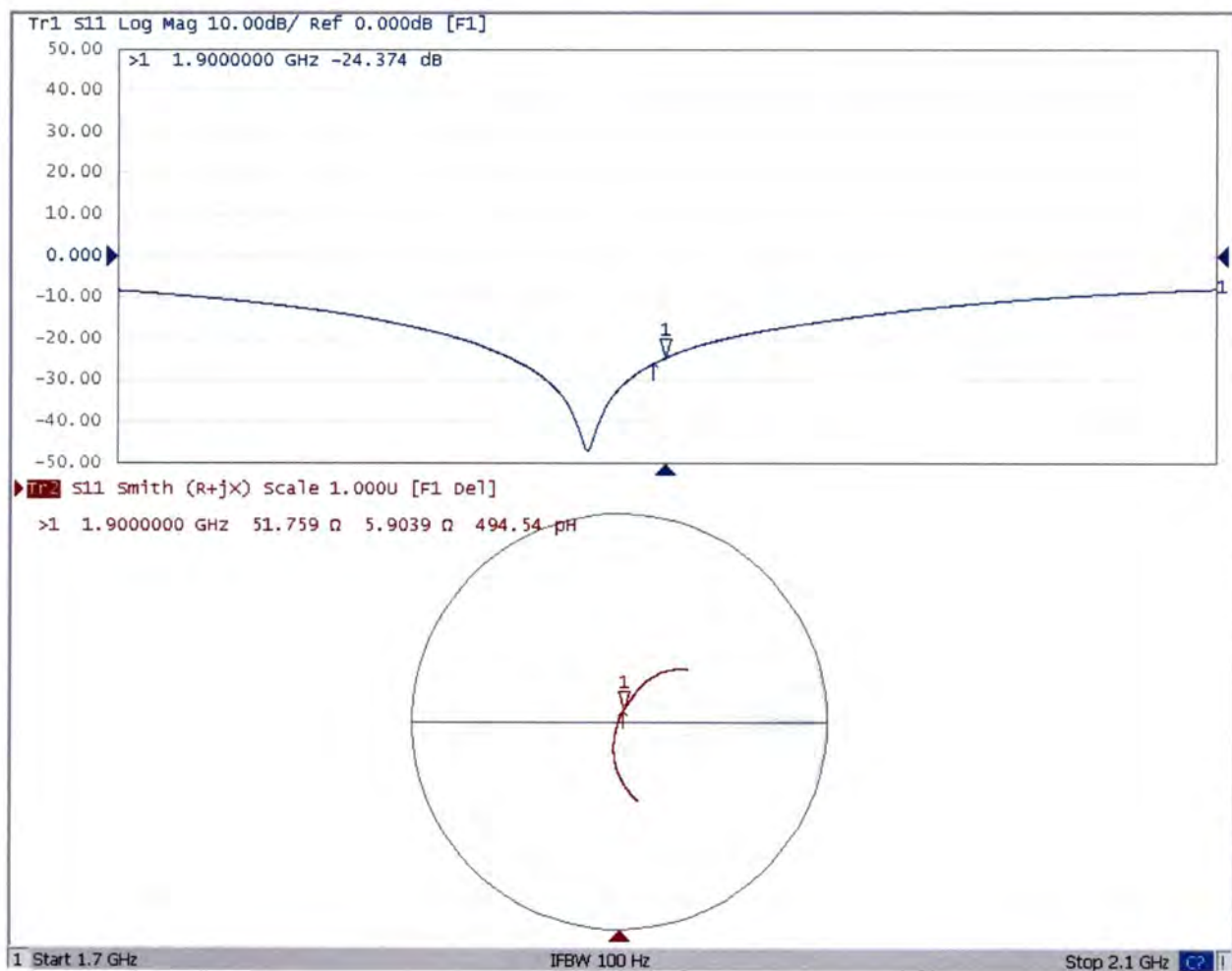


0 dB = 14.4 W/kg = 11.58 dBW/kg



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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 12.07.2016

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d028

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

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.506$ S/m; $\epsilon_r = 54.26$; $\rho = 1000$ kg/m³

Phantom section: Right Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(7.7, 7.7, 7.7); Calibrated: 9/26/2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

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

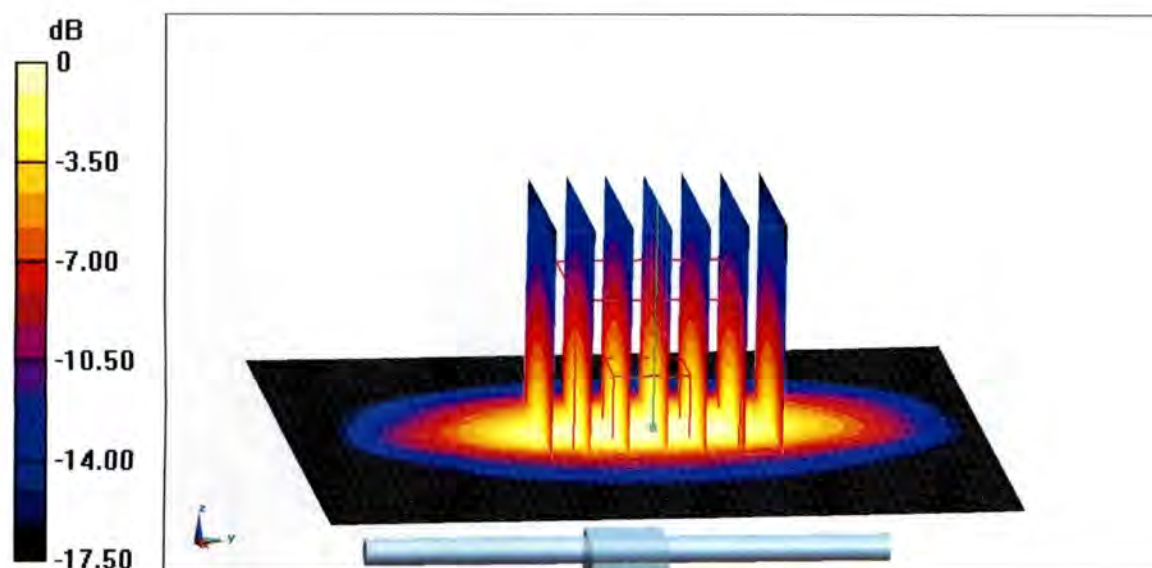
$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 99.69 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 18.8 W/kg

SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.32 W/kg

Maximum value of SAR (measured) = 14.8 W/kg



0 dB = 14.8 W/kg = 11.70 dBW/kg



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Impedance Measurement Plot for Body TSL

