

APPENDIX A: SAR TEST DATA

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR033P7GG

Communication System: UID 0, GSM GPRS; 2 Tx slots; Frequency: 824.2 MHz; Duty Cycle: 1:4.15

Medium: 835 MHz Body Medium parameters used (interpolated):

$f = 824.2 \text{ MHz}$; $\sigma = 0.996 \text{ S/m}$; $\epsilon_r = 56.233$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-09-2020; Ambient Temp: 22.0°C; Tissue Temp: 19.8°C

Probe: EX3DV4 - SN7416; ConvF(9.71, 9.71, 9.71) @ 824.2 MHz; Calibrated: 6/19/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn701; Calibrated: 6/14/2019

Phantom: Twin-SAM V8.0_Left; Type: QD 000 P41 AA; Serial: 1935

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

Mode: GPRS 850 Antenna 1, Body SAR, Left Edge, Low.ch, 2 Tx Slots

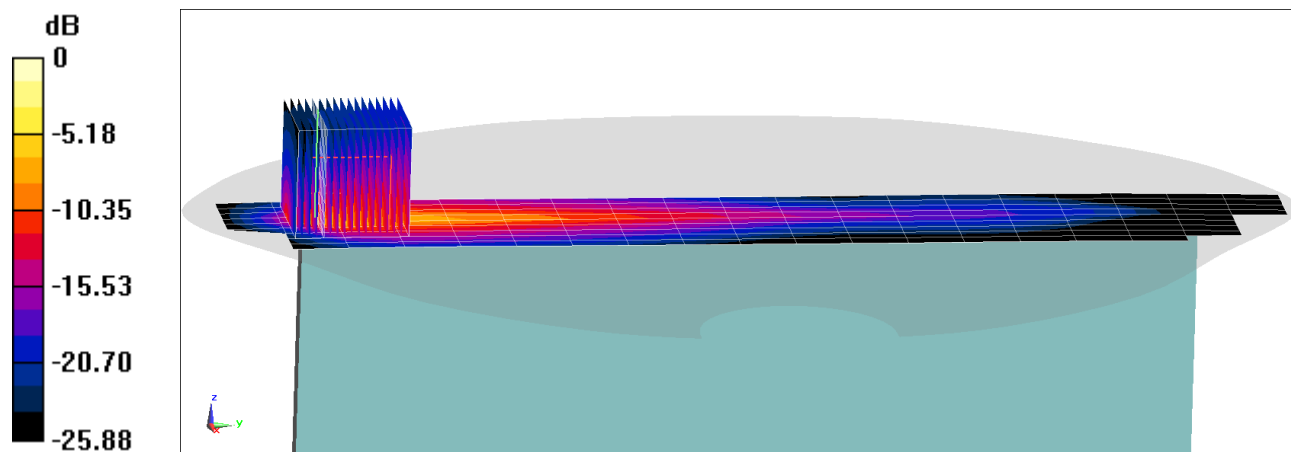
Area Scan (10x20x1): Measurement grid: dx=5mm, dy=15mm

Zoom Scan (17x17x8)/Cube 0: Measurement grid: dx=1.9mm, dy=1.9mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 24.37 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 22.7 W/kg

SAR(1 g) = 0.989 W/kg; SAR(10 g) = 0.285 W/kg



0 dB = 3.78 W/kg = 5.77 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR033P7GG

Communication System: UID 0, GSM GPRS; 2 Tx slots; Frequency: 1909.8 MHz; Duty Cycle: 1:4.15

Medium: 1900 MHz Body Medium parameters used:

$f = 1910 \text{ MHz}$; $\sigma = 1.585 \text{ S/m}$; $\epsilon_r = 52.949$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-13-2020; Ambient Temp: 21.1°C; Tissue Temp: 19.7°C

Probe: EX3DV4 - SN7421; ConvF(7.6, 7.6, 7.6) @ 1909.8 MHz; Calibrated: 3/18/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn604; Calibrated: 3/13/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CD; Serial: 1736

Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

Mode: GPRS 1900 Antenna 4a, Body SAR, Back side, High ch, 2 Tx Slots

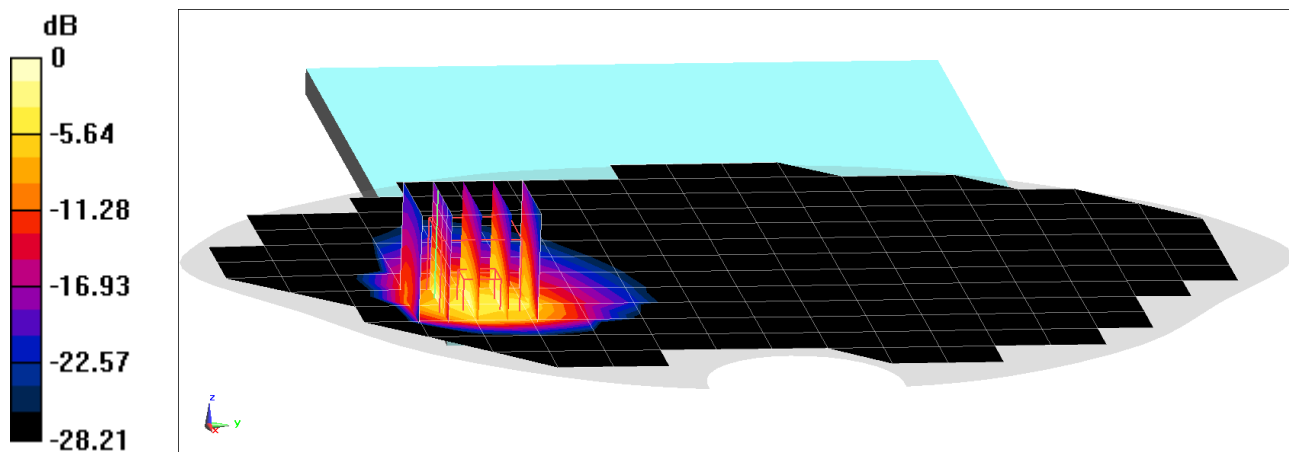
Area Scan (15x19x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 25.29 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 2.99 W/kg

SAR(1 g) = 0.998 W/kg; SAR(10 g) = 0.477 W/kg



0 dB = 1.87 W/kg = 2.72 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR033P7GG

Communication System: UID 0, UMTS, Frequency: 826.4 MHz; Duty Cycle: 1:1

Medium: 835 MHz Body Medium parameters used (interpolated):

$f = 826.4 \text{ MHz}$; $\sigma = 0.997 \text{ S/m}$; $\epsilon_r = 56.19$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-09-2020; Ambient Temp: 22.0°C; Tissue Temp: 19.8°C

Probe: EX3DV4 - SN7416; ConvF(9.71, 9.71, 9.71) @ 826.4 MHz; Calibrated: 6/19/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn701; Calibrated: 6/14/2019

Phantom: Twin-SAM V8.0_Left; Type: QD 000 P41 AA; Serial: 1935

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

Mode: UMTS 850 Antenna 1, Body SAR, Left Edge, Low.ch

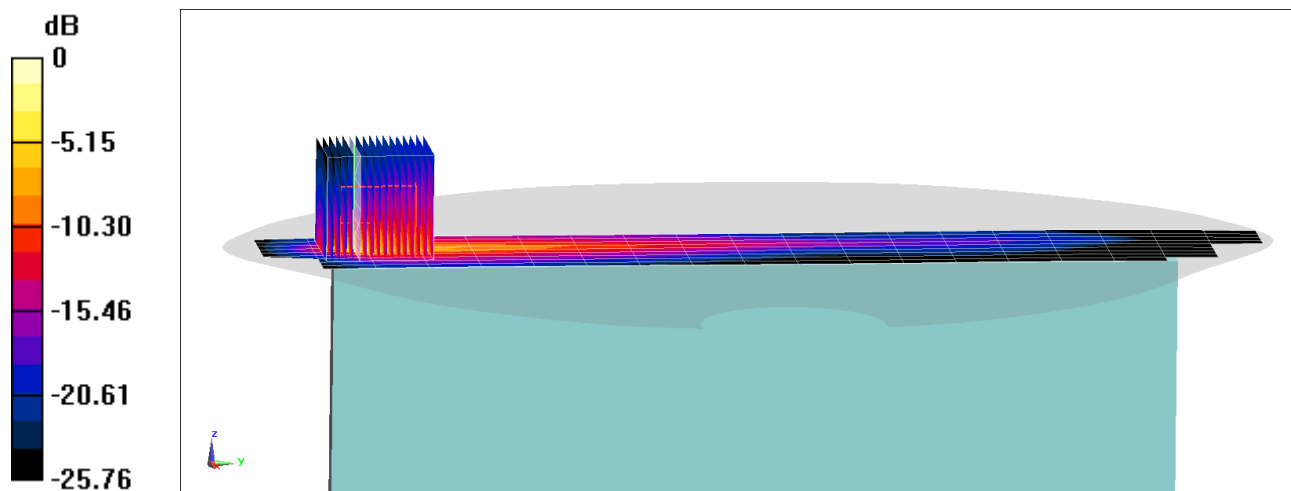
Area Scan (10x20x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

Zoom Scan (17x17x8)/Cube 0: Measurement grid: $dx=1.9\text{mm}$, $dy=1.9\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Reference Value = 26.40 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 24.3 W/kg

SAR(1 g) = 1.1 W/kg; SAR(10 g) = 0.324 W/kg



0 dB = 4.44 W/kg = 6.47 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR033P7GG

Communication System: UID 0, _UMTS , Frequency: 1752.6 MHz; Duty Cycle: 1:1

Medium: 1750 MHz Body Medium parameters used (interpolated):

$f = 1752.6$ MHz; $\sigma = 1.528$ S/m; $\epsilon_r = 52.671$; $\rho = 1000$ kg/m³

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-30-2019; Ambient Temp: 21.4°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN3837; ConvF(7.72, 7.72, 7.72) @ 1752.6 MHz; Calibrated: 1/28/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn793; Calibrated: 1/15/2019

Phantom: Twin-SAM V4.0 (20deg probe tilt) SUB use; Type: QD 000 P40 CC; Serial: 1403

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

Mode: UMTS 1750 Antenna 2b, Body SAR, Back side, High.ch

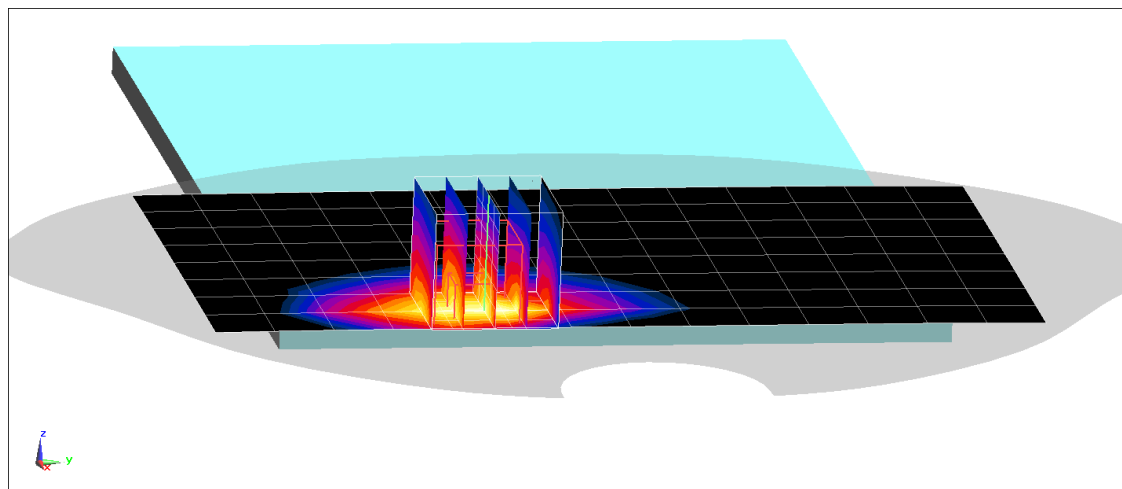
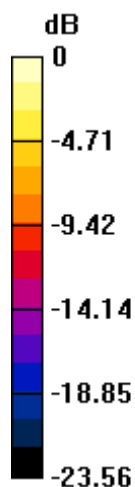
Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (9x9x8)/Cube 0: Measurement grid: dx=3.8mm, dy=3.8mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 26.19 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 4.38 W/kg

SAR(1 g) = 0.988 W/kg; SAR(10 g) = 0.424 W/kg



0 dB = 2.09 W/kg = 3.20 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR033P7GG

Communication System: UID 0, UMTS, Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium: 1900 MHz Body Medium parameters used (interpolated):

$f = 1852.4 \text{ MHz}$; $\sigma = 1.516 \text{ S/m}$; $\epsilon_r = 52.158$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-09-2020; Ambient Temp: 22.7°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7491; ConvF(8.04, 8.04, 8.04) @ 1852.4 MHz; Calibrated: 7/16/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1402; Calibrated: 7/10/2019

Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1936

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

Mode: UMTS 1900 Antenna 2b, Body SAR, Back side, Low.ch

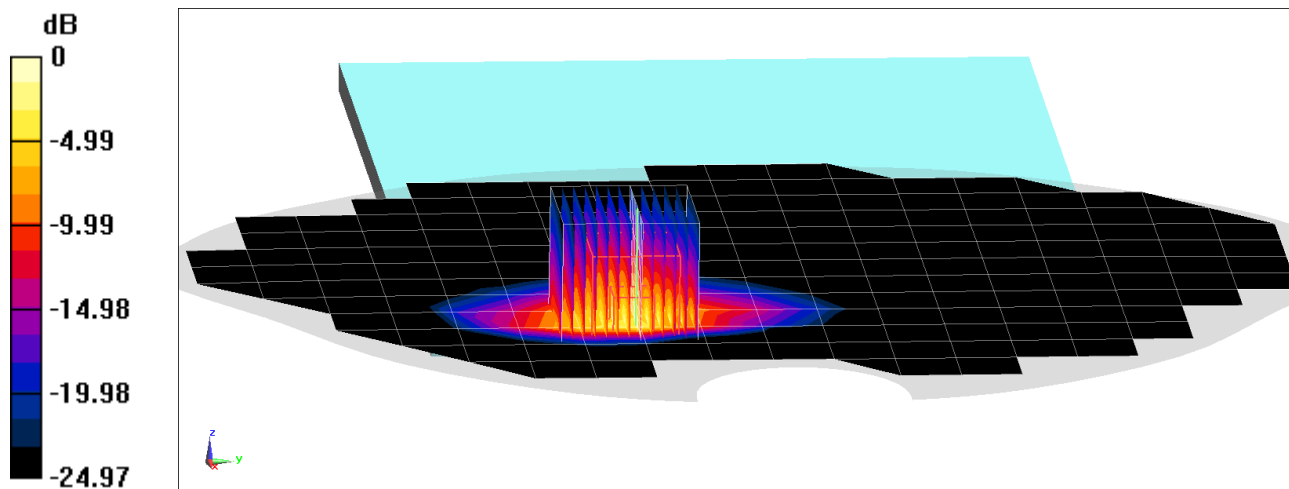
Area Scan (15x19x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (13x13x8)/Cube 0: Measurement grid: $dx=2.8\text{mm}$, $dy=2.8\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Reference Value = 25.85 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 5.09 W/kg

SAR(1 g) = 0.945 W/kg; SAR(10 g) = 0.383 W/kg



0 dB = 2.24 W/kg = 3.50 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR031P7GG

Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1

Medium: 750 MHz Body Medium parameters used (interpolated):

$f = 707.5 \text{ MHz}$; $\sigma = 0.931 \text{ S/m}$; $\epsilon_r = 55.604$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-07-2020; Ambient Temp: 20.5°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7421; ConvF(9.66, 9.66, 9.66) @ 707.5 MHz; Calibrated: 3/18/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn604; Calibrated: 3/13/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CD; Serial: 1736

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: LTE Band 12 Antenna 1, Body SAR, Left Edge, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

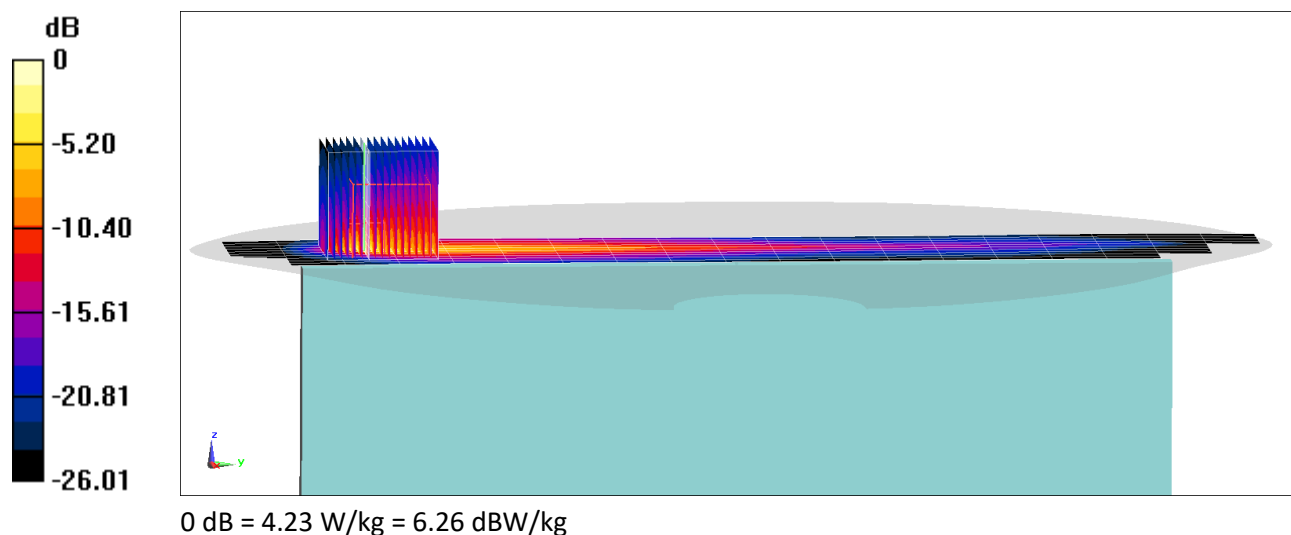
Area Scan (11x20x1): Measurement grid: dx=5mm, dy=15mm

Zoom Scan (17x20x8)/Cube 0: Measurement grid: dx=1.9mm, dy=1.9mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 30.48 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 24.7 W/kg

SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.270 W/kg



PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR033P7GG

Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 MHz Body Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 1.006 \text{ S/m}$; $\epsilon_r = 54.77$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-07-2020; Ambient Temp: 20.5°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7421; ConvF(9.66, 9.66, 9.66) @ 782 MHz; Calibrated: 3/18/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn604; Calibrated: 3/13/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CD; Serial: 1736

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: LTE Band 13 Antenna 1, Body SAR, Left Edge, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

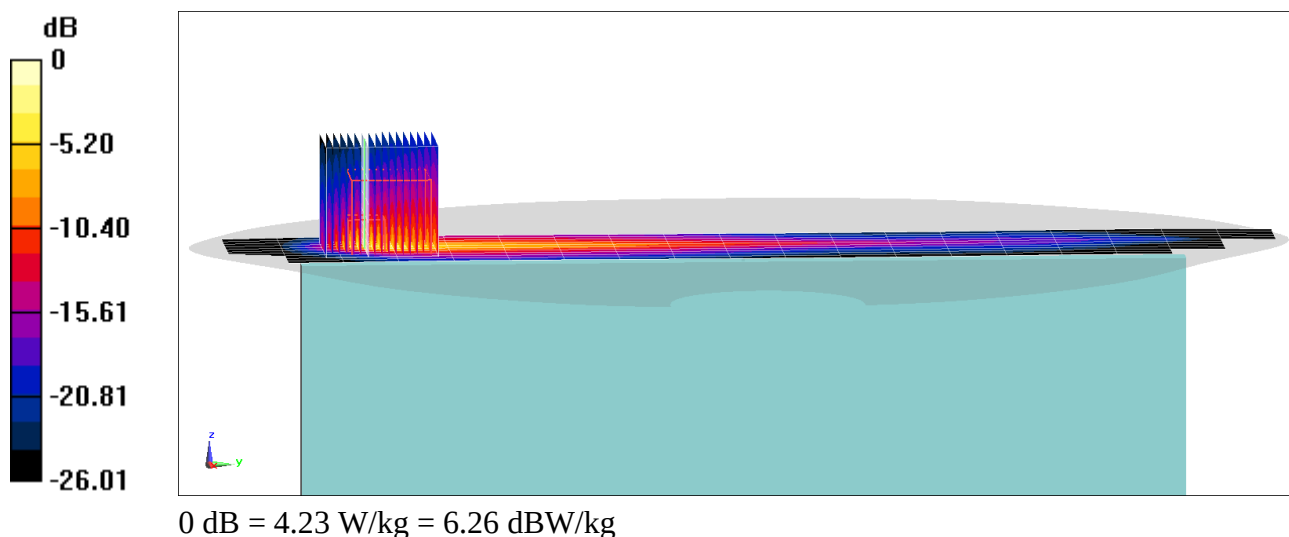
Area Scan (11x20x1): Measurement grid: dx=5mm, dy=15mm

Zoom Scan (17x17x8)/Cube 0: Measurement grid: dx=1.9mm, dy=1.9mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 28.49 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 19.1 W/kg

SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.330 W/kg



PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR01LP7GG

Communication System: UID 0, _LTE Band 26; Frequency: 819 MHz; Duty Cycle: 1:1

Medium: 835 MHz Body Medium parameters used (interpolated):

$f = 819 \text{ MHz}$; $\sigma = 0.992 \text{ S/m}$; $\epsilon_r = 56.32$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-09-2020; Ambient Temp: 22.0°C; Tissue Temp: 19.8°C

Probe: EX3DV4 - SN7416; ConvF(9.71, 9.71, 9.71) @ 819 MHz; Calibrated: 6/19/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn701; Calibrated: 6/14/2019

Phantom: Twin-SAM V8.0_Left; Type: QD 000 P41 AA; Serial: 1935

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: LTE Band 26 (Cell.) Antenna 1, Body SAR, Left Edge, Low.ch,
10 MHz Bandwidth, QPSK, 25 RB, 12 RB Offset**

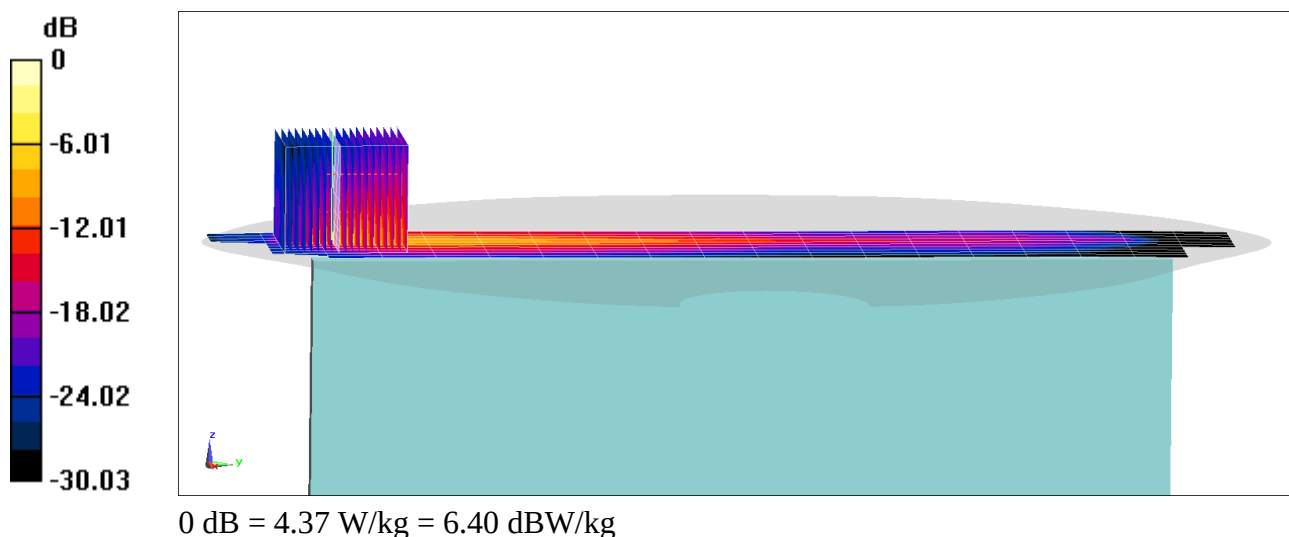
Area Scan (11x20x1): Measurement grid: dx=5mm, dy=15mm

Zoom Scan (20x19x8)/Cube 0: Measurement grid: dx=1.9mm, dy=1.9mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 34.08 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 24.0 W/kg

SAR(1 g) = 1.1 W/kg; SAR(10 g) = 0.318 W/kg



PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR008P7H9

Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1

Medium: 835 MHz Body Medium parameters used (interpolated):

$f = 836.5 \text{ MHz}$; $\sigma = 1.002 \text{ S/m}$; $\epsilon_r = 56$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-09-2020; Ambient Temp: 22.0°C; Tissue Temp: 19.8°C

Probe: EX3DV4 - SN7416; ConvF(9.71, 9.71, 9.71) @ 836.5 MHz; Calibrated: 6/19/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn701; Calibrated: 6/14/2019

Phantom: Twin-SAM V8.0_Left; Type: QD 000 P41 AA; Serial: 1935

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: LTE Band 5 (Cell.) Antenna 1, Body SAR, Left Edge, Mid.ch,
10 MHz Bandwidth, QPSK, 50 RB, 0 RB Offset**

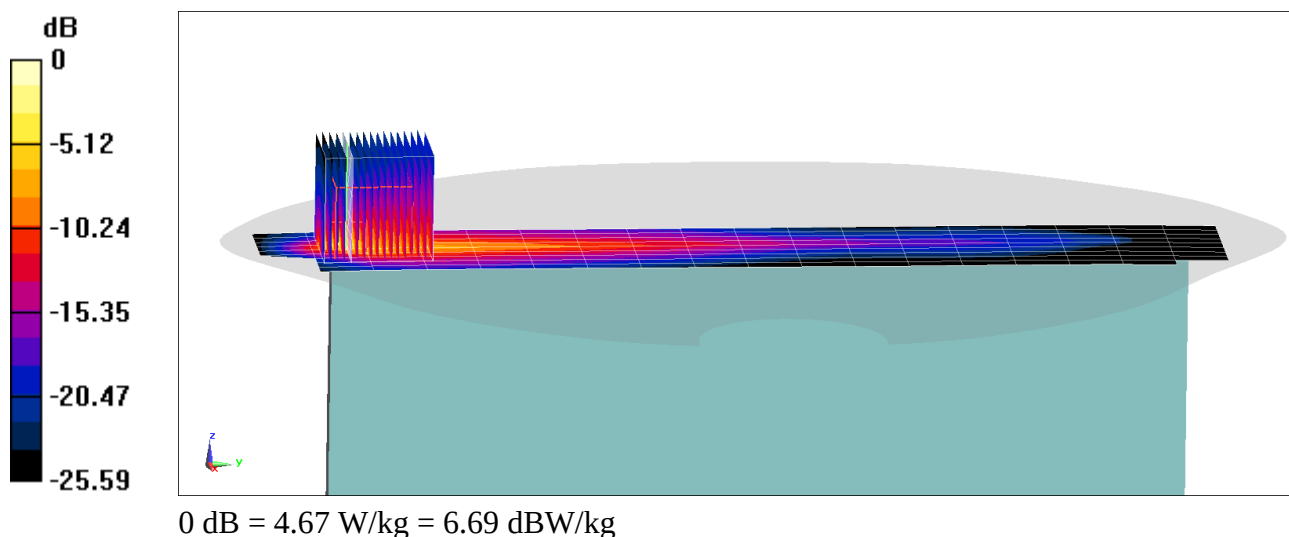
Area Scan (10x19x1): Measurement grid: dx=5mm, dy=15mm

Zoom Scan (17x17x7)/Cube 0: Measurement grid: dx=1.9mm, dy=1.9mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 25.63 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 26.1 W/kg

SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.333 W/kg



PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR026P7GG

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: 1750 MHz Body Medium parameters used (interpolated):

$f = 1732.5 \text{ MHz}$; $\sigma = 1.494 \text{ S/m}$; $\epsilon_r = 52.164$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-04-2020; Ambient Temp: 19.8°C; Tissue Temp: 19.6°C

Probe: EX3DV4 – SN7416; ConvF(7.89, 7.89, 7.89) @ 1732.5 MHz; Calibrated: 6/19/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn701; Calibrated: 6/14/2019

Phantom: Twin-SAM V8.0_Left; Type: QD 000 P41 AA; Serial: 1935

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: LTE Band 4 (AWS) Antenna 2a, Body SAR, Back side, Mid.ch,
20 MHz Bandwidth, QPSK, 50 RB, 0 RB Offset**

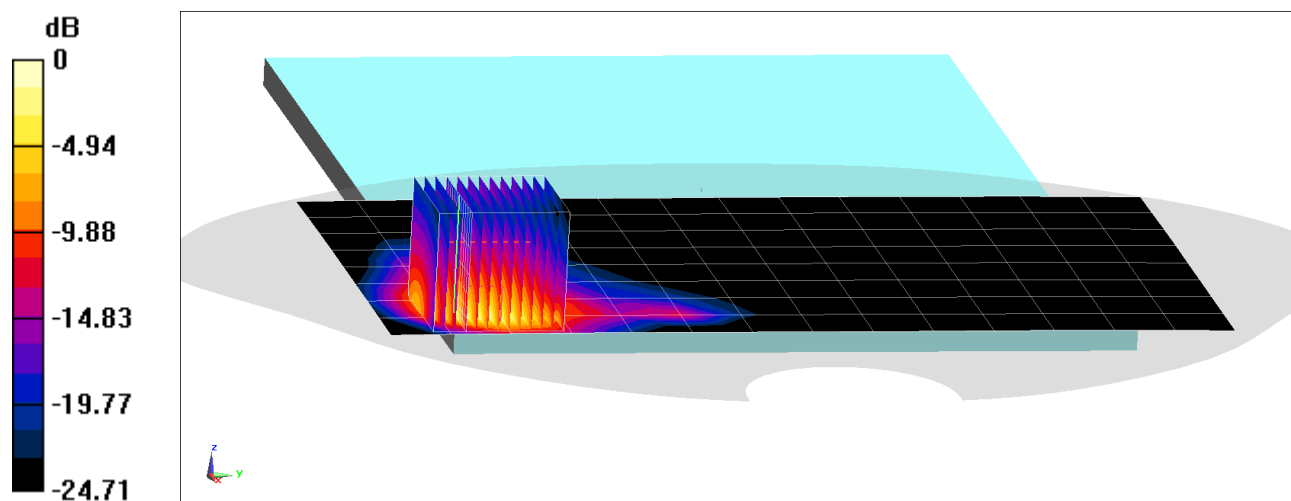
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (13x13x8)/Cube 0: Measurement grid: dx=2.7mm, dy=2.7mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 26.81 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 5.75 W/kg

SAR(1 g) = 1.02 W/kg; SAR(10 g) = 0.481 W/kg



0 dB = 2.44 W/kg = 3.87 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR02YP7GG

Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1720 MHz; Duty Cycle: 1:1

Medium: 1750 MHz Body Medium parameters used (interpolated):

$f = 1720 \text{ MHz}$; $\sigma = 1.481 \text{ S/m}$; $\epsilon_r = 52.193$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-04-2020; Ambient Temp: 19.8°C; Tissue Temp: 19.6°C

Probe: EX3DV4 - SN7416; ConvF(7.89, 7.89, 7.89) @ 1720 MHz; Calibrated: 6/19/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn701; Calibrated: 6/14/2019

Phantom: Twin-SAM V8.0_Left; Type: QD 000 P41 AA; Serial: 1935

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: LTE Band 66 (AWS) Antenna 2a, Body SAR, Back side, Low.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

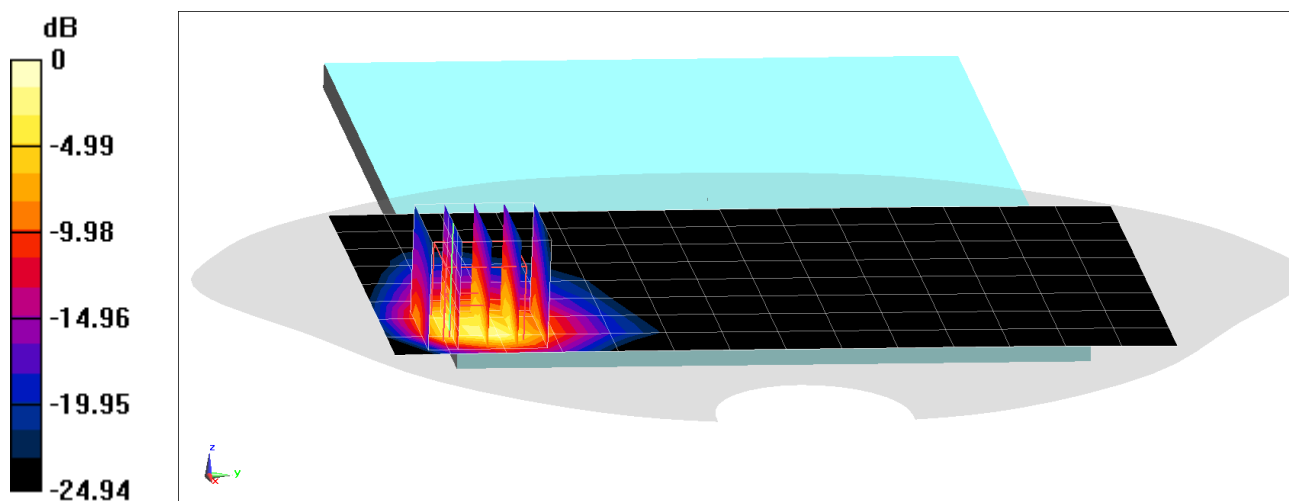
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 26.17 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 3.54 W/kg

SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.486 W/kg



0 dB = 2.48 W/kg = 3.94 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR033P7GG

Communication System: UID 0, LTE Band 2 (PCS), Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 MHz Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.491 \text{ S/m}$; $\epsilon_r = 51.205$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-30-2019; Ambient Temp: 21.7°C; Tissue Temp: 19.0°C

Probe: EX3DV4 - SN7491; ConvF(8.04, 8.04, 8.04) @ 1900 MHz; Calibrated: 7/16/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1402; Calibrated: 7/10/2019

Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1936

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: LTE Band 2 (PCS) Antenna 4a, Body SAR, Back side, High.ch,
20 MHz Bandwidth, QPSK, 100 RB, 0 RB Offset**

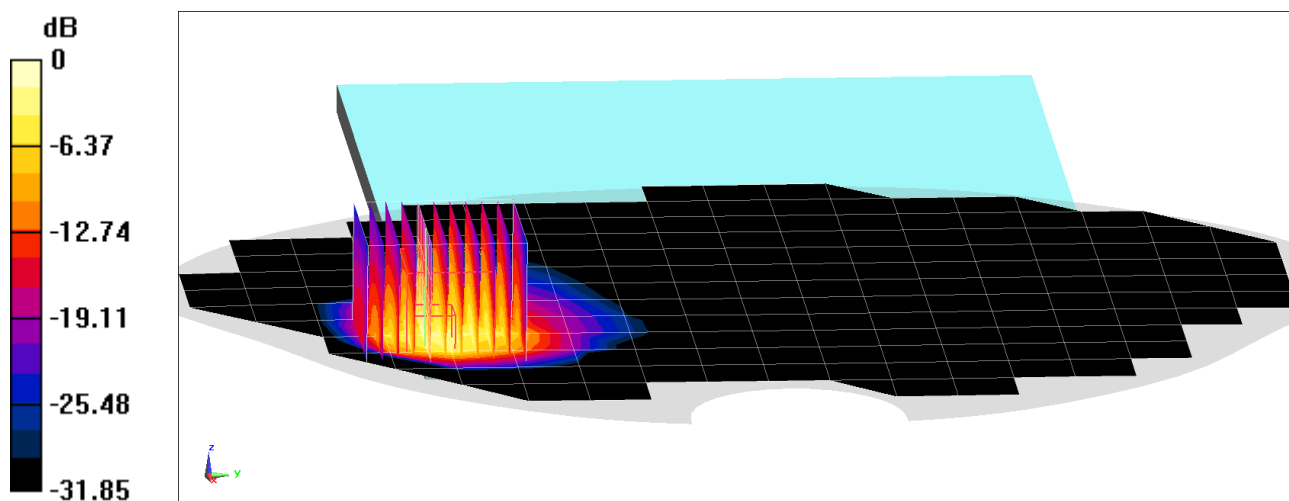
Area Scan (15x19x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (11x11x8)/Cube 0: Measurement grid: dx=3.9mm, dy=3.9mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 25.16 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 4.83 W/kg

SAR(1 g) = 1.04 W/kg; SAR(10 g) = 0.518 W/kg



0 dB = 2.38 W/kg = 3.77 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR026P7GG

Communication System: UID 0, LTE Band 25 (PCS), Frequency: 1905 MHz; Duty Cycle: 1:1

Medium: 1900 MHz Body Medium parameters used (interpolated):

$f = 1905 \text{ MHz}$; $\sigma = 1.497 \text{ S/m}$; $\epsilon_r = 51.177$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-30-2019; Ambient Temp: 21.7°C; Tissue Temp: 19.0°C

Probe: EX3DV4 - SN7491; ConvF(8.04, 8.04, 8.04) @ 1905 MHz; Calibrated: 7/16/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1402; Calibrated: 7/10/2019

Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1936

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: LTE Band 25 (PCS) Antenna 2b, Body SAR, Back side, High.ch,
20 MHz Bandwidth, QPSK, 100 RB, 0 RB Offset**

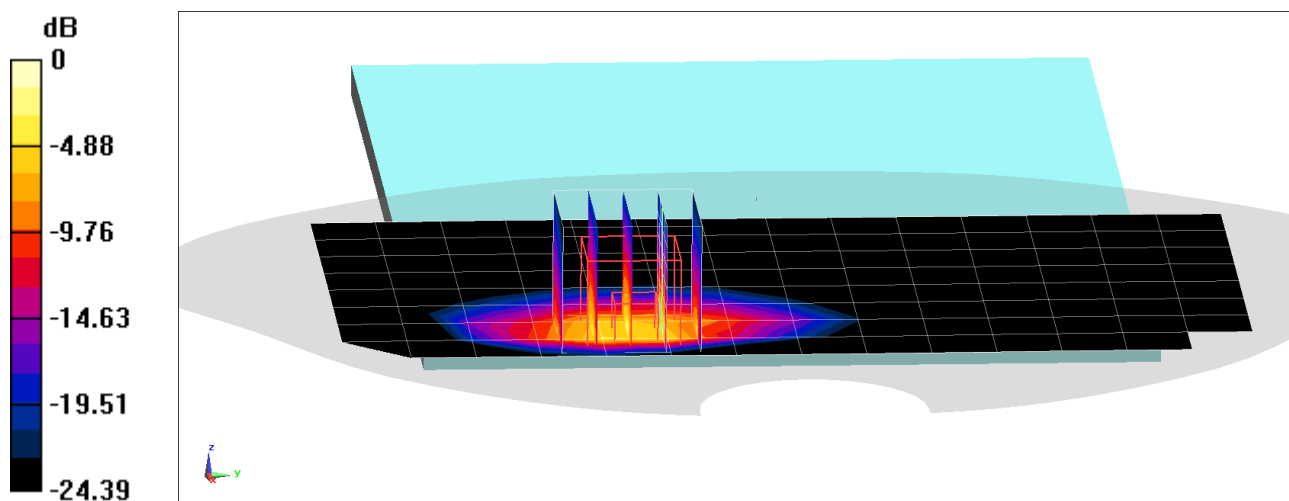
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 28.00 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 3.44 W/kg

SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.435 W/kg



0 dB = 2.44 W/kg = 3.87 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR007P7H9

Communication System: UID 0, LTE Band 30; Frequency: 2310 MHz; Duty Cycle: 1:1

Medium: 2450 MHz Body Medium parameters used:

$f = 2310$ MHz; $\sigma = 1.845$ S/m; $\epsilon_r = 52.193$; $\rho = 1000$ kg/m³

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-12-2020; Ambient Temp: 22.1°C; Tissue Temp: 20.1°C

Probe: EX3DV4 - SN7532; ConvF(7.93, 7.93, 7.93) @ 2310 MHz; Calibrated: 4/12/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn501; Calibrated: 4/17/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1179

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: LTE Band 30 Antenna 4b, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 50 RB, 0 RB Offset**

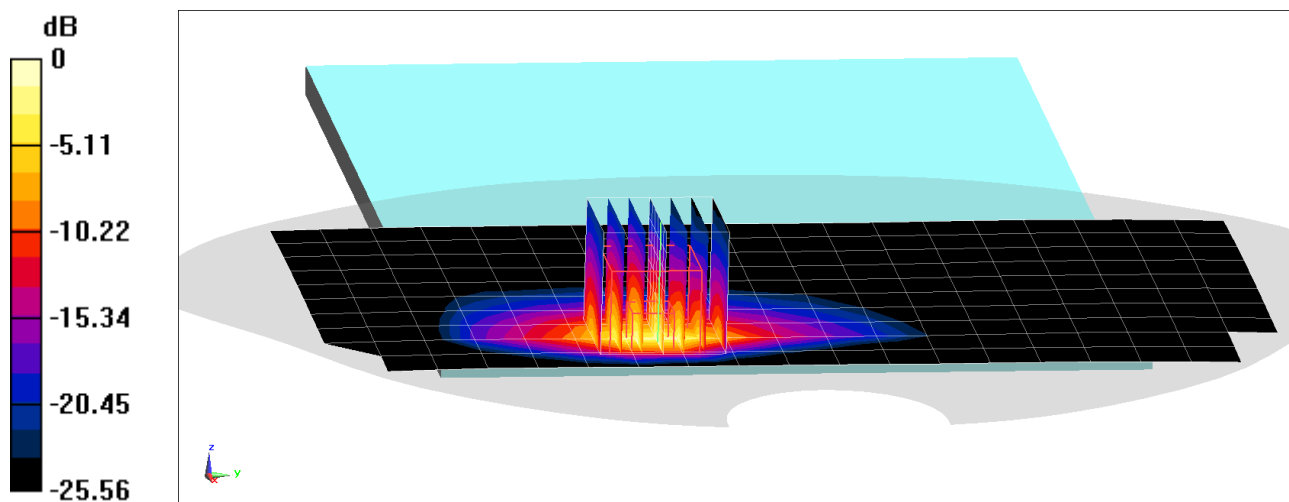
Area Scan (11x20x1): Measurement grid: dx=12mm, dy=12mm

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

Reference Value = 22.23 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 3.44 W/kg

SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.405 W/kg



PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR02YP7GG

Communication System: UID 0, LTE Band 7; Frequency: 2510 MHz; Duty Cycle: 1:1

Medium: 2450 MHz Body Medium parameters used (interpolated):

$f = 2510 \text{ MHz}$; $\sigma = 2.066 \text{ S/m}$; $\epsilon_r = 50.841$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-13-2020; Ambient Temp: 23.4°C; Tissue Temp: 19.5°C

Probe: EX3DV4 - SN7491; ConvF(7.57, 7.57, 7.57) @ 2510 MHz; Calibrated: 7/16/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1402; Calibrated: 7/10/2019

Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1936

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

Mode: LTE Intra-Band ULCA Band 7 Antenna 4b, Body SAR, Back side,

PCC: 20 MHz Bandwidth, QPSK, Ch.20850, 50 RB, 50 RB Offset

SCC: 20 MHz Bandwidth, QPSK, Ch.21048, 50 RB, 0 RB Offset

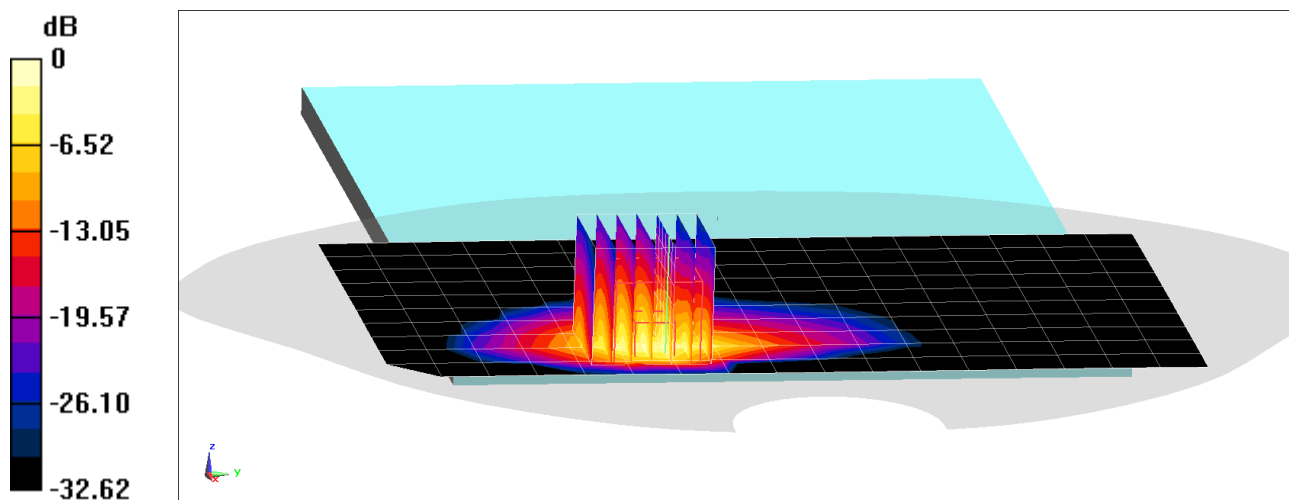
Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm

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

Reference Value = 23.52 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.41 W/kg

SAR(1 g) = 1.1 W/kg; SAR(10 g) = 0.405 W/kg



0 dB = 2.37 W/kg = 3.75 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR031P7GG

Communication System: UID 0, LTE Band 41 (Class 3); Frequency: 2593 MHz; Duty Cycle: 1:1.58

Medium: 2450 MHz Body Medium parameters used (interpolated):

$f = 2593 \text{ MHz}$; $\sigma = 2.252 \text{ S/m}$; $\epsilon_r = 52.442$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-01-2020; Ambient Temp: 21.6°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7532; ConvF(7.47, 7.47, 7.47) @ 2593 MHz; Calibrated: 4/12/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn501; Calibrated: 4/17/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1179

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: LTE Band 41 Antenna 4b, Body SAR, Back side, Mid.ch,
20 MHz Bandwidth, QPSK, 50 RB, 25 RB Offset**

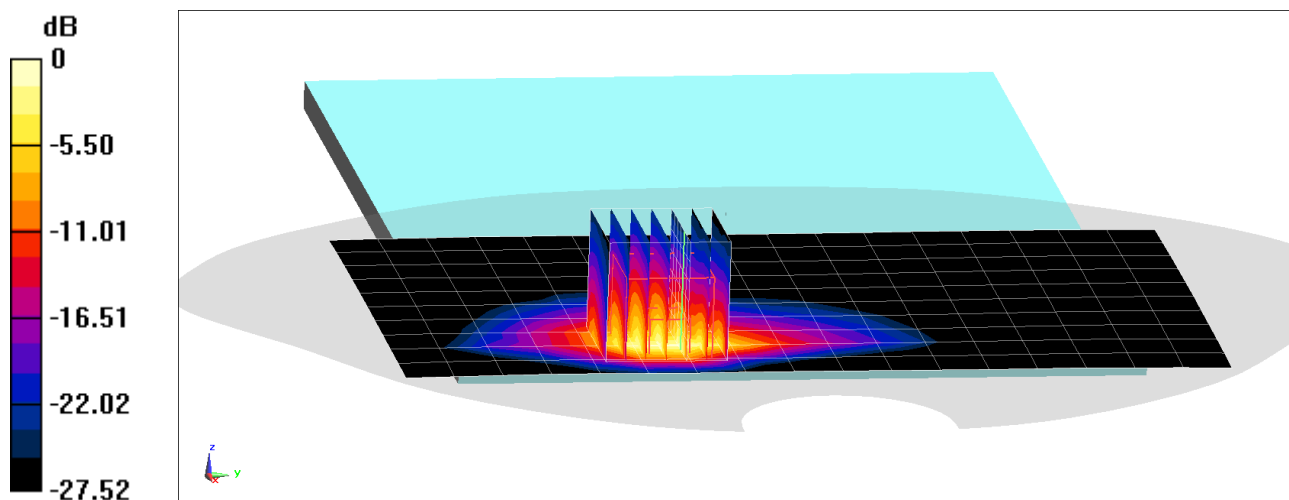
Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm

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

Reference Value = 23.11 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 4.03 W/kg

SAR(1 g) = 1.17 W/kg; SAR(10 g) = 0.403 W/kg



0 dB = 2.58 W/kg = 4.12 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR033P7GG

Communication System: UID 0, LTE Band 48; Frequency: 3560 MHz; Duty Cycle: 1:1.58

Medium: 3500 MHz Body Medium parameters used (interpolated):

$f = 3560 \text{ MHz}$; $\sigma = 3.488 \text{ S/m}$; $\epsilon_r = 49.496$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-04-2020; Ambient Temp: 23.1°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3949; ConvF(6.88, 6.88, 6.88) @ 3560 MHz; Calibrated: 8/29/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 8/12/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1596

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: LTE Band 48 Antenna 2b, Body SAR, Back side, Low.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

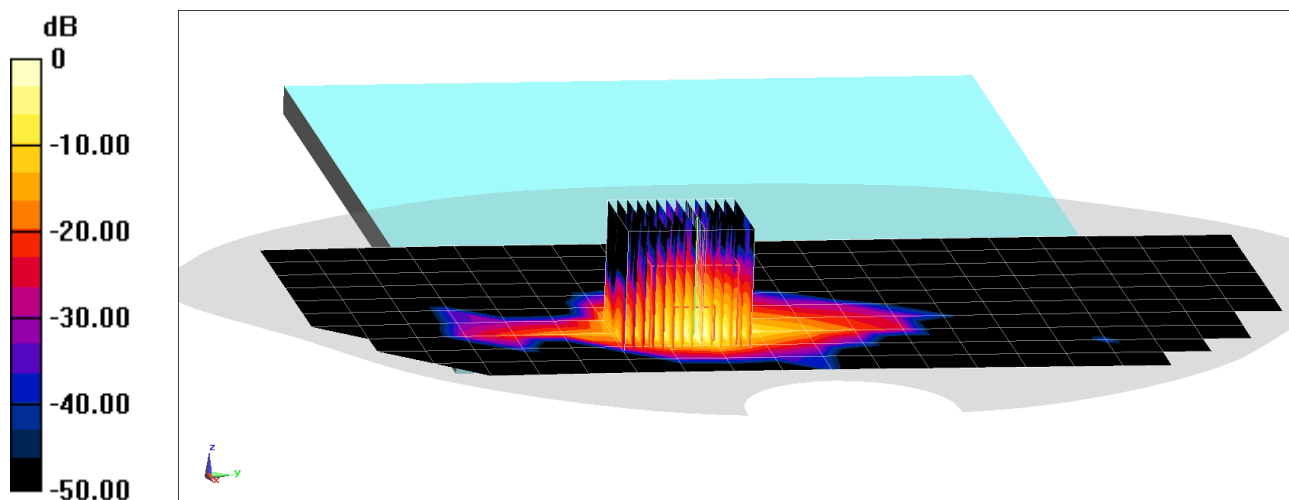
Area Scan (11x21x1): Measurement grid: dx=12mm, dy=12mm

Zoom Scan (13x14x8)/Cube 0: Measurement grid: dx=2.4mm, dy=2.4mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 18.04 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 4.93 W/kg

SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.321 W/kg



0 dB = 3.01 W/kg = 4.79 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR01PP7GG

Communication System: UID 0, _IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: 2450 MHz Body Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 2.007 \text{ S/m}$; $\epsilon_r = 50.72$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-18-2019; Ambient Temp: 20.6°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN7532; ConvF(7.66, 7.66, 7.66) @ 2437 MHz; Calibrated: 4/12/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn501; Calibrated: 4/17/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1179

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: IEEE 802.11b Antenna 4a Variant 2,
22 MHz Bandwidth, Body SAR, Ch 6, 1 Mbps, Back Side**

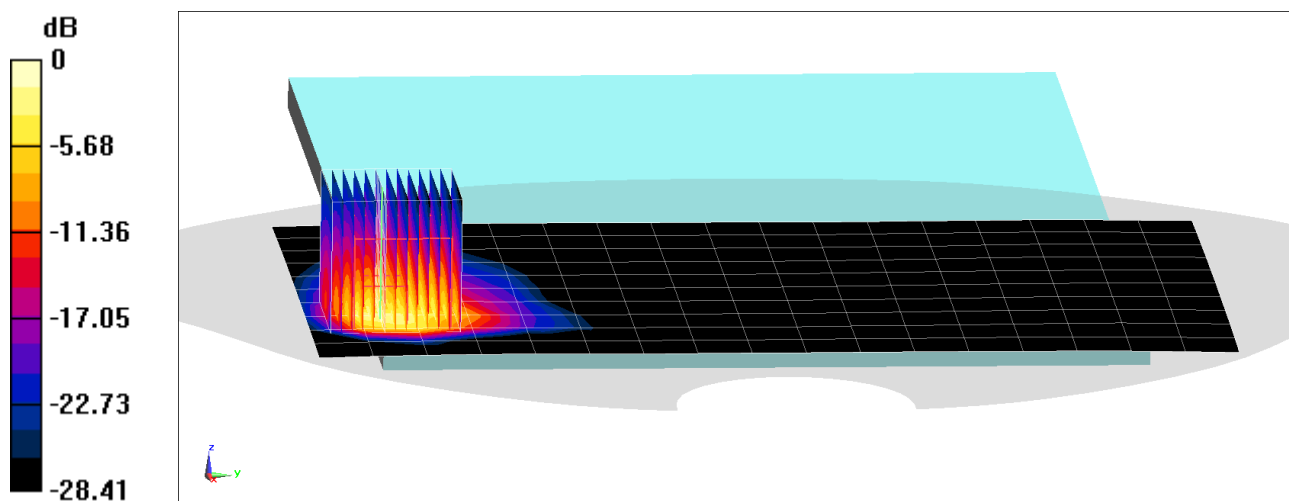
Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm

Zoom Scan (13x13x8)/Cube 0: Measurement grid: dx=2.4mm, dy=2.4mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 17.28 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 4.30 W/kg

SAR(1 g) = 0.849 W/kg; SAR(10 g) = 0.346 W/kg



0 dB = 2.35 W/kg = 3.71 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZR01PP7GG

Communication System: UID 0, _IEEE 802.11ac; Frequency: 5690 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5690 \text{ MHz}$; $\sigma = 5.793 \text{ S/m}$; $\epsilon_r = 47.691$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 12-16-2019; Ambient Temp: 22.7°C; Tissue Temp: 19.0°C

Probe: EX3DV4 - SN7491; ConvF(4.32, 4.32, 4.32) @ 5690 MHz; Calibrated: 7/16/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1402; Calibrated: 7/10/2019

Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1936

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

**Mode: IEEE 802.11ac 5GHz ANTlower Variant 2 , U-NII-2C,
80 MHz Bandwidth, Body SAR, Ch 138, 29.3 Mbps, Right Edge**

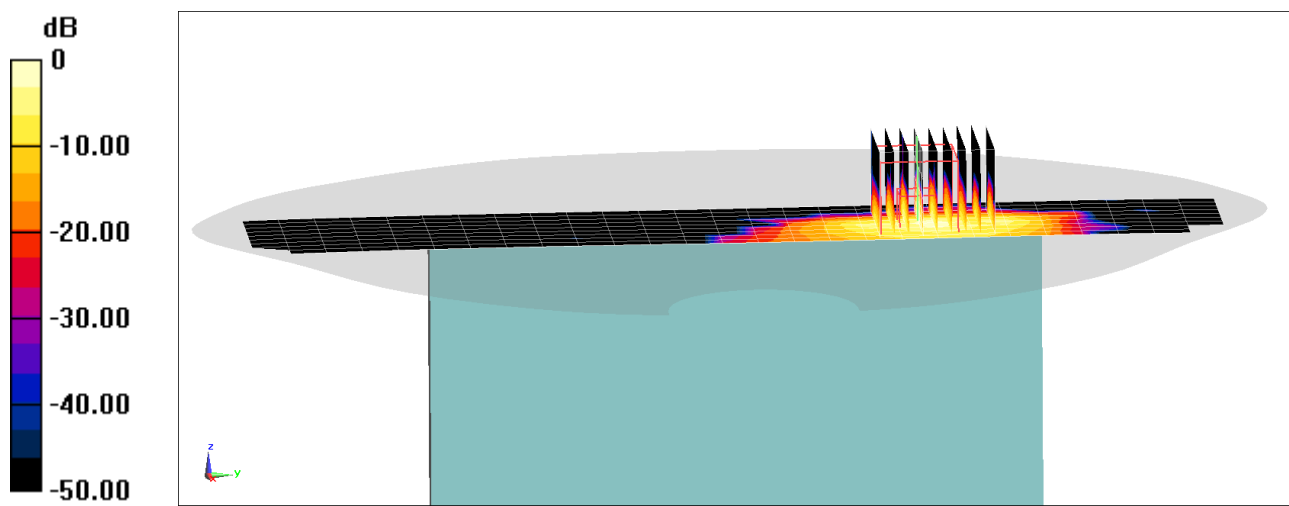
Area Scan (10x28x1): Measurement grid: dx=5mm, dy=10mm

Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 11.07 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 5.00 W/kg

SAR(1 g) = 0.910 W/kg; SAR(10 g) = 0.233 W/kg



0 dB = 2.73 W/kg = 4.36 dBW/kg

PCTEST

DUT: BCGA2230; Type: Tablet Device; Serial: DLXZN001P7GH

Communication System: UID 0, Bluetooth; Frequency: 2480 MHz; Duty Cycle: 1:1.302

Medium: 2450 MHz Body Medium parameters used (interpolated):

$f = 2480 \text{ MHz}$; $\sigma = 1.992 \text{ S/m}$; $\epsilon_r = 50.709$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-14-2020; Ambient Temp: 22.1°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7532; ConvF(7.66, 7.66, 7.66) @ 2480 MHz; Calibrated: 4/12/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn501; Calibrated: 4/17/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1179

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

Mode: Bluetooth Antenna 2a Variant 1, Body SAR, Ch 78, 1 Mbps, Back Side

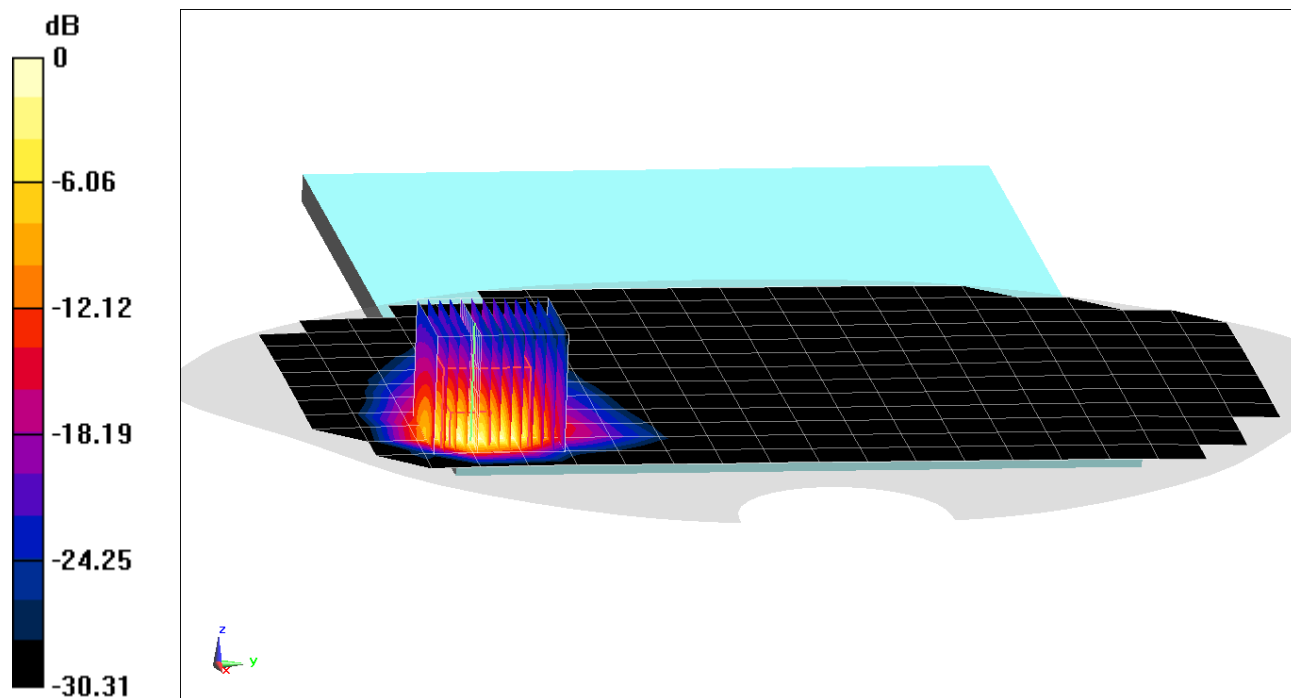
Area Scan (14x21x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Zoom Scan (13x13x8)/Cube 0: Measurement grid: $dx=2.7\text{mm}$, $dy=2.7\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Reference Value = 20.11 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 4.68 W/kg

SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.442 W/kg



APPENDIX B: SYSTEM VERIFICATION

PCTEST

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1097

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

Medium: 750 MHz Body Medium parameters used (interpolated):

$f = 750 \text{ MHz}$; $\sigma = 0.976 \text{ S/m}$; $\epsilon_r = 54.862$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-07-2020; Ambient Temp: 20.5°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7421; ConvF(9.66, 9.66, 9.66) @ 750 MHz; Calibrated: 3/18/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn604; Calibrated: 3/13/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CD; Serial: 1736

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

750 MHz System Verification at 23.0 dBm (200 mW)

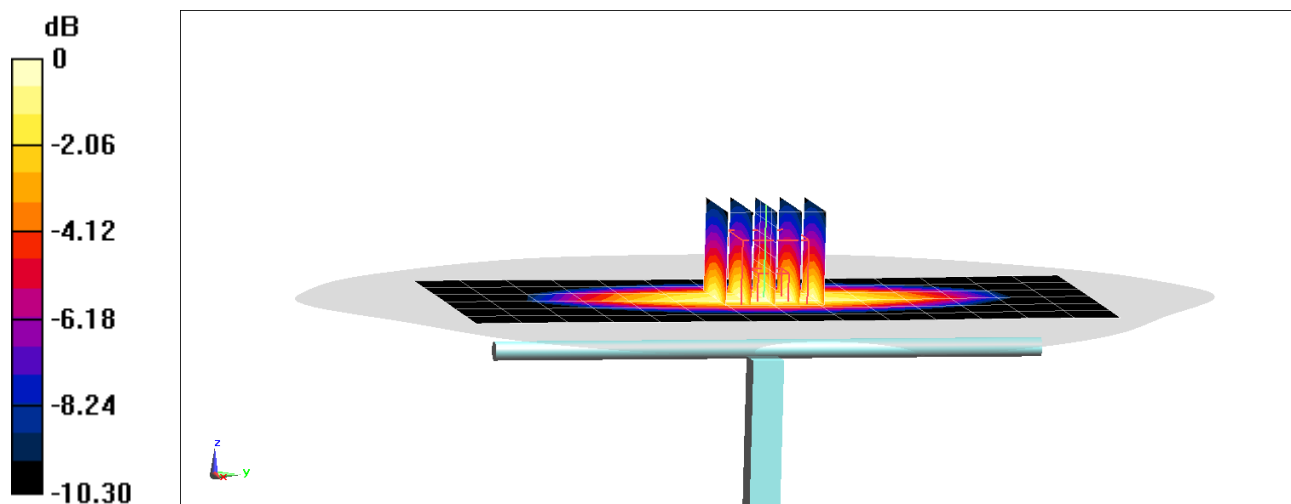
Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Peak SAR (extrapolated) = 2.65 W/kg

SAR(1 g) = 1.76 W/kg; SAR(10 g) = 1.16 W/kg

Deviation(1 g) = 2.80%



0 dB = 2.34 W/kg = 3.69 dBW/kg

PCTEST

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d040

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

Medium: 835 MHz Body Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 1.001 \text{ S/m}$; $\epsilon_r = 56.021$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-09-2020; Ambient Temp: 22.0°C; Tissue Temp: 19.8°C

Probe: EX3DV4 - SN7416; ConvF(9.71, 9.71, 9.71) @ 835 MHz; Calibrated: 6/19/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn701; Calibrated: 6/14/2019

Phantom: Twin-SAM V8.0_Left; Type: QD 000 P41 AA; Serial: 1935

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

835 MHz System Verification at 23.0 dBm (200 mW)

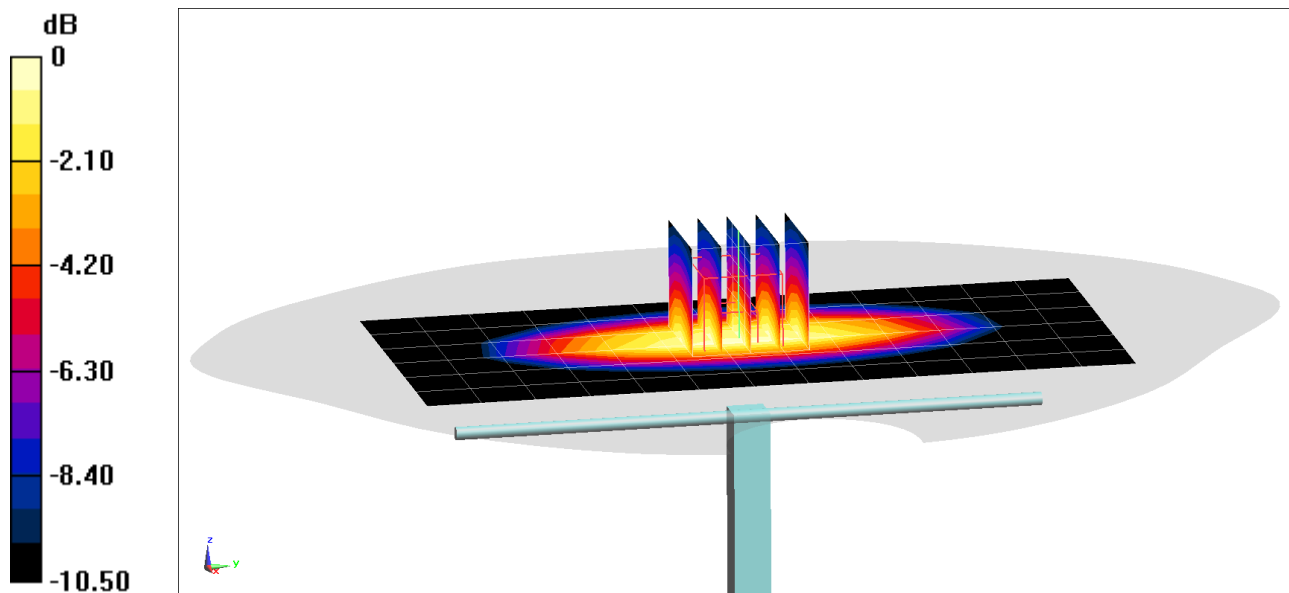
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Peak SAR (extrapolated) = 2.85 W/kg

SAR(1 g) = 1.89 W/kg; SAR(10 g) = 1.24 W/kg

Deviation(1 g) = -0.84%



0 dB = 2.52 W/kg = 4.01 dBW/kg

PCTEST

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1092

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

Medium: 1750 MHz Body Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.525 \text{ S/m}$; $\epsilon_r = 52.685$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-30-2019; Ambient Temp: 21.4°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN3837; ConvF(7.72, 7.72, 7.72) @ 1750 MHz; Calibrated: 1/28/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn793; Calibrated: 1/15/2019

Phantom: Twin-SAM V4.0 (20deg probe tilt) SUB use; Type: QD 000 P40 CC; Serial: 1403

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

1750 MHz System Verification at 20.0 dBm (100 mW)

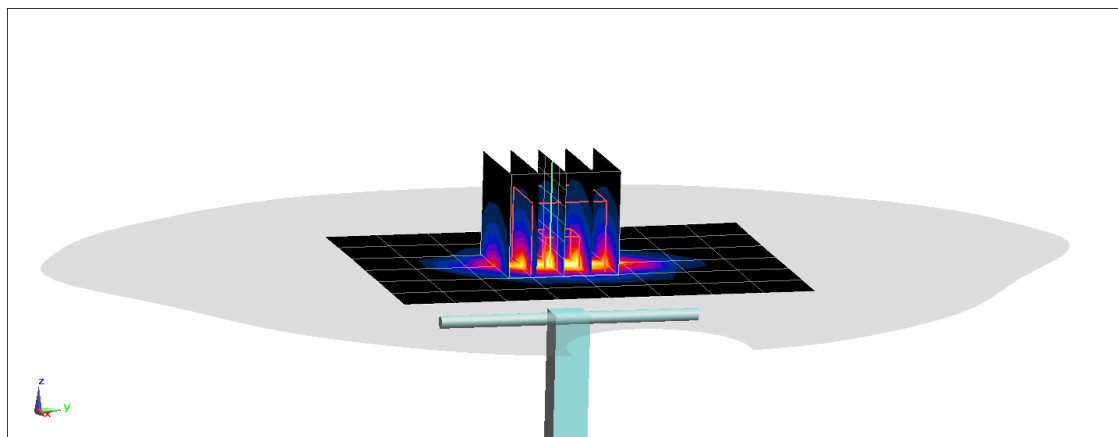
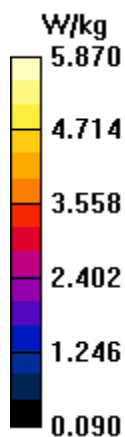
Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

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

Peak SAR (extrapolated) = 7.08 W/kg

SAR(1 g) = 3.91 W/kg; SAR(10 g) = 2.04 W/kg

Deviation(1 g) = 7.42%



PCTEST

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1083

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

Medium: 1750 MHz Body Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.513 \text{ S/m}$; $\epsilon_r = 52.124$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-04-2020; Ambient Temp: 19.8°C; Tissue Temp: 19.6°C

Probe: EX3DV4 - SN7416; ConvF(7.89, 7.89, 7.89) @ 1750 MHz; Calibrated: 6/19/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn701; Calibrated: 6/14/2019

Phantom: Twin-SAM V8.0_Left; Type: QD 000 P41 AA; Serial: 1935

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

1750 MHz System Verification at 20.0 dBm (100 mW)

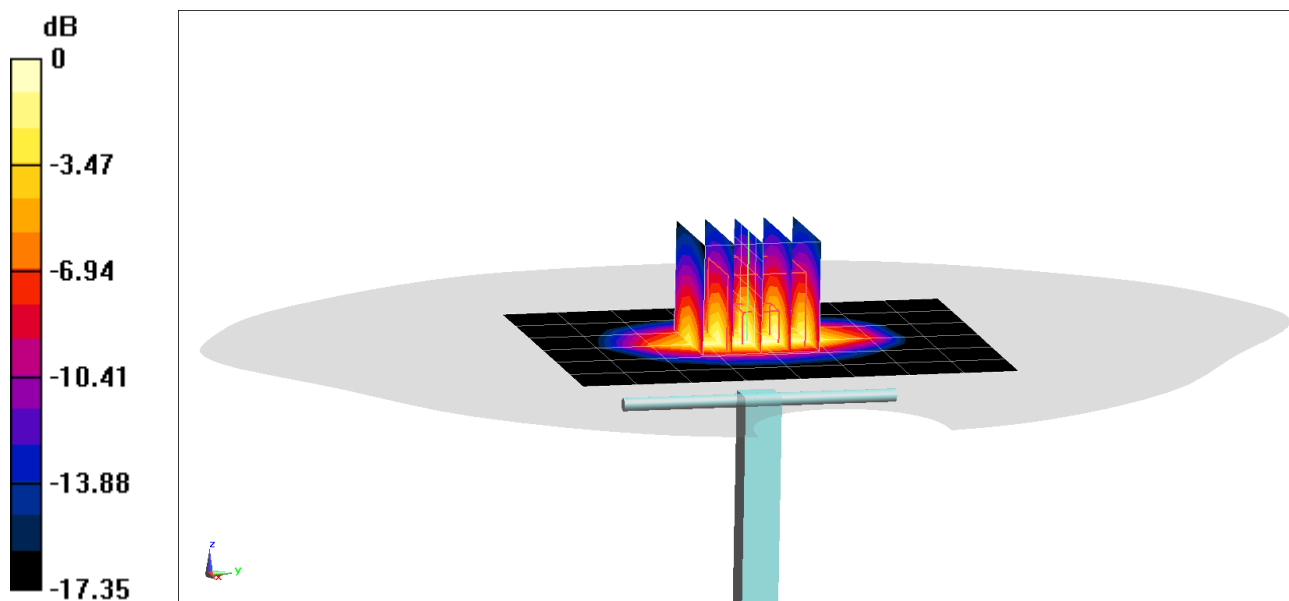
Area Scan (7x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Peak SAR (extrapolated) = 7.12 W/kg

SAR(1 g) = 3.97 W/kg; SAR(10 g) = 2.11 W/kg

Deviation(1 g) = 7.01%



0 dB = 5.98 W/kg = 7.77 dBW/kg

PCTEST

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d026

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

Medium: 1900 MHz Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.491 \text{ S/m}$; $\epsilon_r = 51.205$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-30-2019; Ambient Temp: 21.7°C; Tissue Temp: 19.0°C

Probe: EX3DV4 - SN7491; ConvF(8.04, 8.04, 8.04) @ 1900 MHz; Calibrated: 7/16/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1402; Calibrated: 7/10/2019

Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1936

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

1900 MHz System Verification at 20.0 dBm (100 mW)

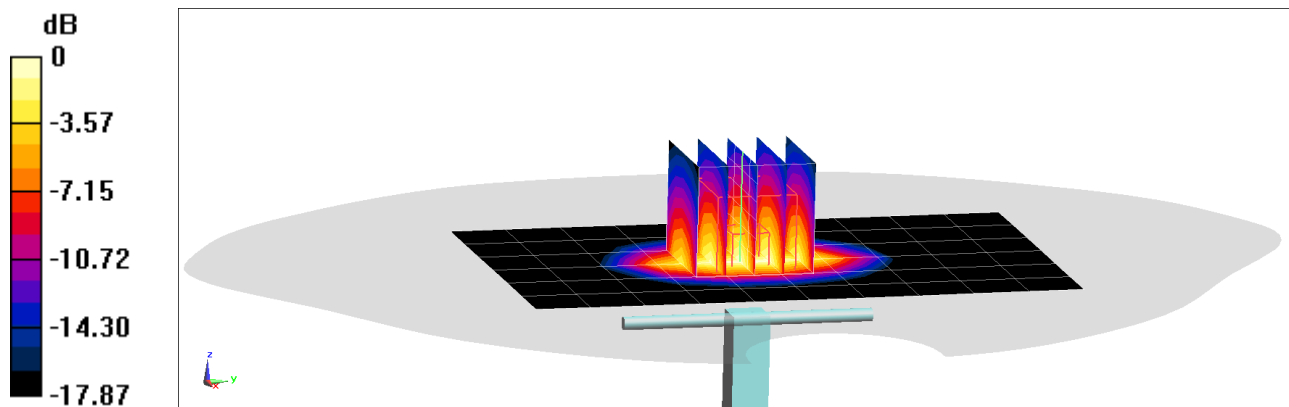
Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Peak SAR (extrapolated) = 7.60 W/kg

SAR(1 g) = 4.18 W/kg; SAR(10 g) = 2.17 W/kg

Deviation(1 g) = 4.76%



0 dB = 6.39 W/kg = 8.06 dBW/kg

PCTEST

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d181

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

Medium: 1900 MHz Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.574 \text{ S/m}$; $\epsilon_r = 51.734$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-09-2020; Ambient Temp: 22.7°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7491; ConvF(8.04, 8.04, 8.04) @ 1900 MHz; Calibrated: 7/16/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1402; Calibrated: 7/10/2019

Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1936

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

1900 MHz System Verification at 20.0 dBm (100 mW)

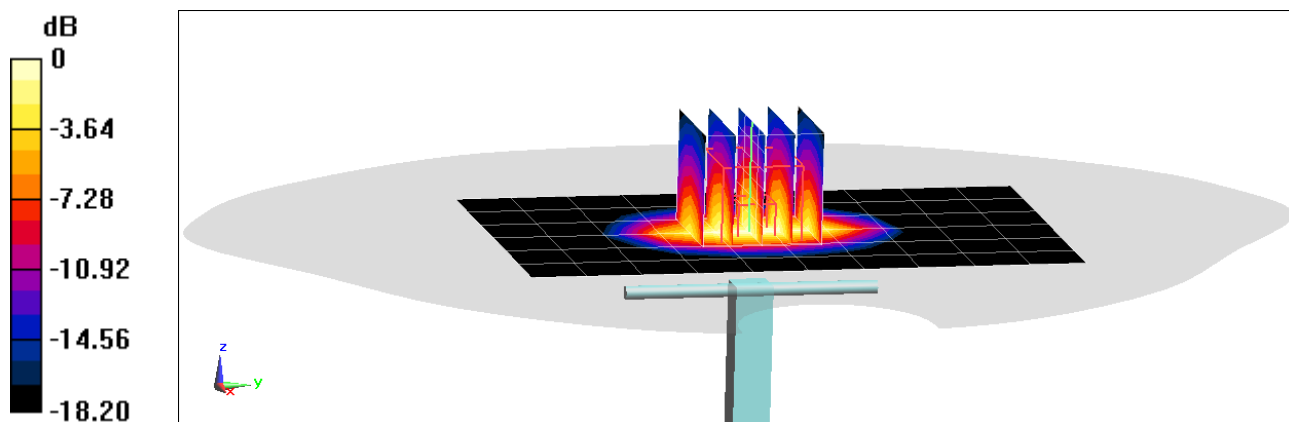
Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Peak SAR (extrapolated) = 7.45 W/kg

SAR(1 g) = 3.96 W/kg; SAR(10 g) = 2.04 W/kg

Deviation(1 g) = 0.25%



0 dB = 6.20 W/kg = 7.92 dBW/kg

PCTEST

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d026

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

Medium: 1900 MHz Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.575 \text{ S/m}$; $\epsilon_r = 52.977$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-13-2020; Ambient Temp: 21.1°C; Tissue Temp: 19.7°C

Probe: EX3DV4 - SN7421; ConvF(7.6, 7.6, 7.6) @ 1900 MHz; Calibrated: 3/18/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn604; Calibrated: 3/13/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CD; Serial: 1736

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

1900 MHz System Verification at 20.0 dBm (100 mW)

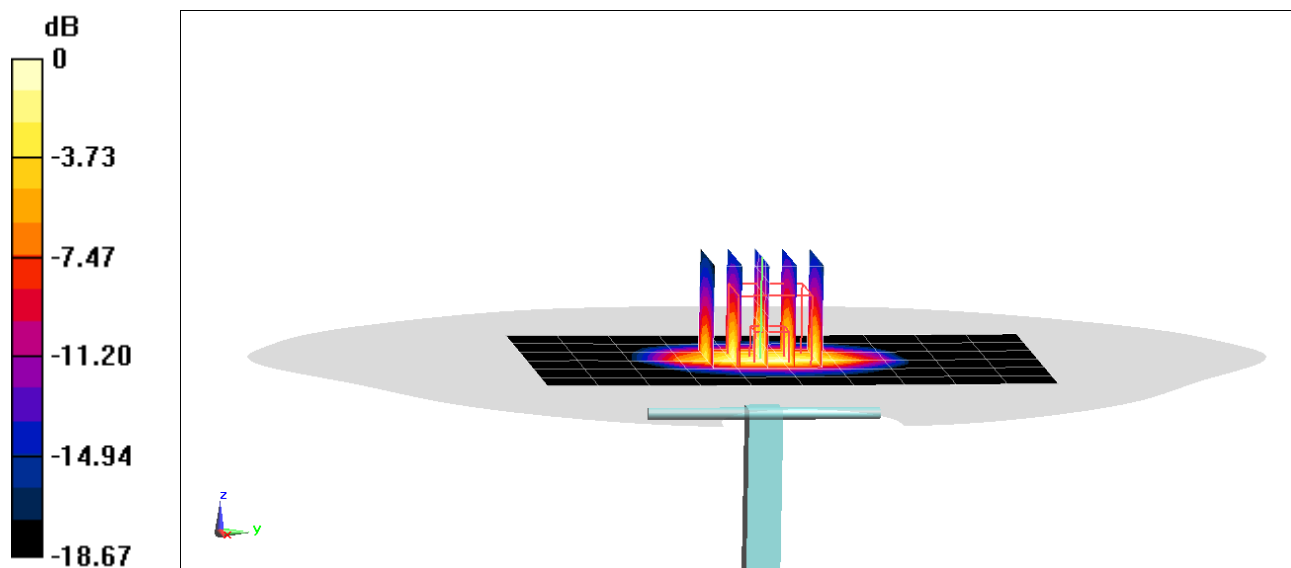
Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

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

Peak SAR (extrapolated) = 7.51 W/kg

SAR(1 g) = 4.08 W/kg; SAR(10 g) = 2.11 W/kg

Deviation(1 g) = 2.26%



0 dB = 6.29 W/kg = 7.99 dBW/kg

PCTEST

DUT: Dipole 2300 MHz; Type: D2300V3; Serial: 1038

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

Medium: 2300 MHz Body Medium parameters used:

$f = 2300 \text{ MHz}$; $\sigma = 1.833 \text{ S/m}$; $\epsilon_r = 52.242$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-12-2020; Ambient Temp: 22.1°C; Tissue Temp: 20.1°C

Probe: EX3DV4 - SN7532; ConvF(7.93, 7.93, 7.93) @ 2300 MHz; Calibrated: 4/12/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn501; Calibrated: 4/17/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1179

Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

2300 MHz System Verification at 20.0 dBm (100 mW)

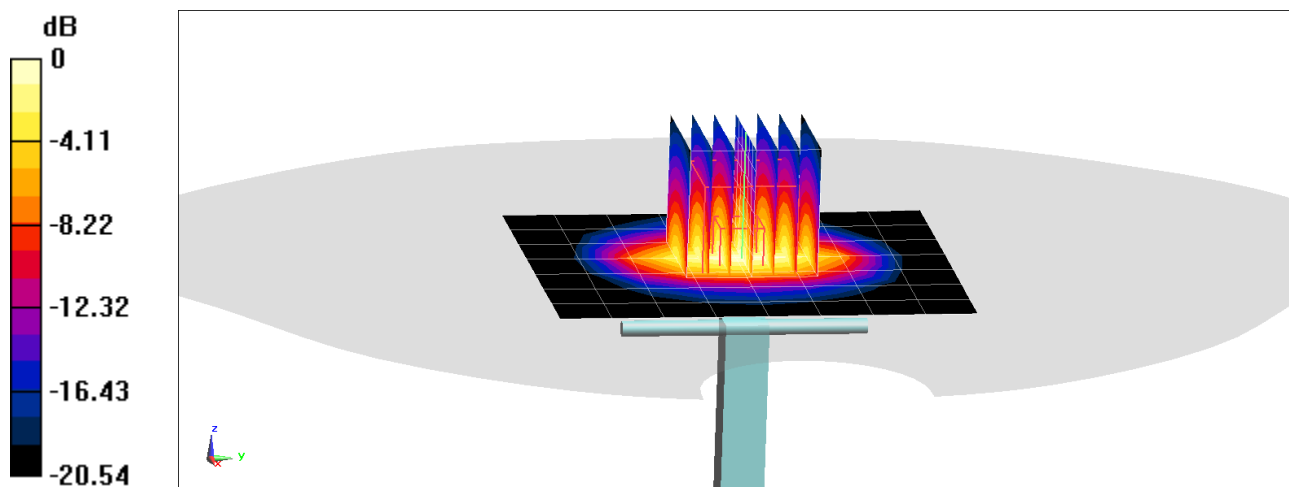
Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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

Peak SAR (extrapolated) = 8.90 W/kg

SAR(1 g) = 4.47 W/kg; SAR(10 g) = 2.12 W/kg

Deviation(1 g) = -4.28%



0 dB = 7.30 W/kg = 8.63 dBW/kg

PCTEST

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921

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

Medium: 2450 MHz Body Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 2.022 \text{ S/m}$; $\epsilon_r = 50.678$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-18-2019; Ambient Temp: 20.6°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN7532; ConvF(7.66, 7.66, 7.66) @ 2450 MHz; Calibrated: 4/12/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn501; Calibrated: 4/17/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1179

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

2450 MHz System Verification at 20.0 dBm (100 mW)

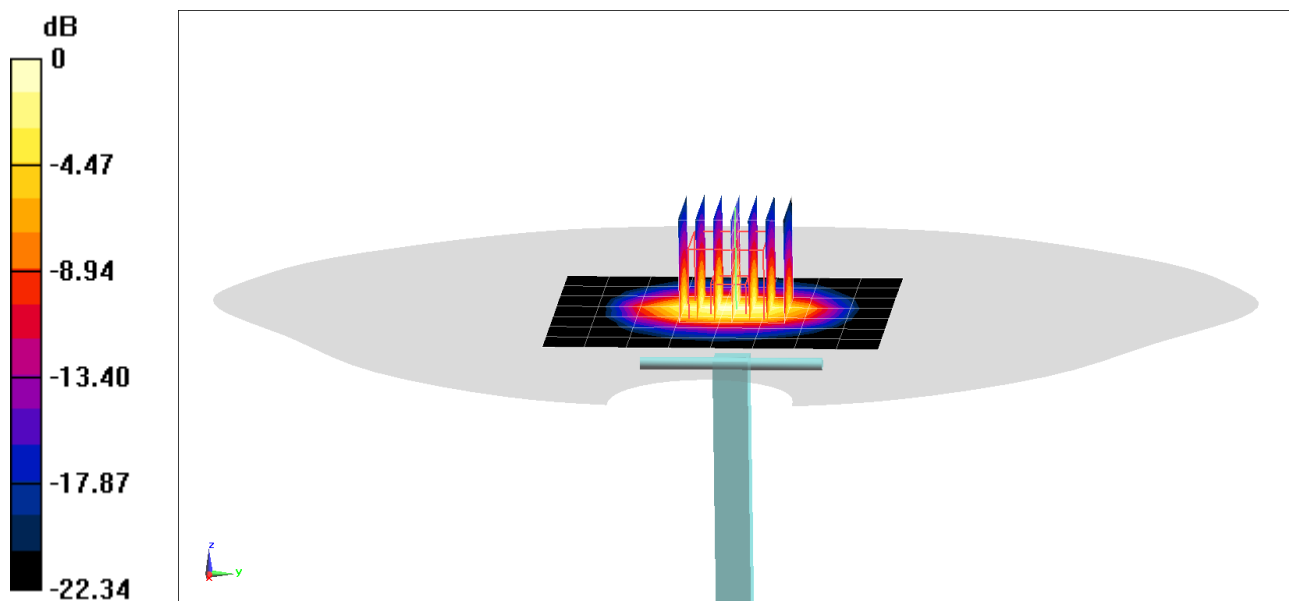
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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

Peak SAR (extrapolated) = 10.9 W/kg

SAR(1 g) = 5.32 W/kg; SAR(10 g) = 2.45 W/kg

Deviation(1 g) = 4.72%



0 dB = 8.82 W/kg = 9.45 dBW/kg

PCTEST

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 945

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

Medium: 2450 MHz Body Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 2.045 \text{ S/m}$; $\epsilon_r = 53.045$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-01-2020; Ambient Temp: 21.6°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7532; ConvF(7.66, 7.66, 7.66) @ 2450 MHz; Calibrated: 4/12/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn501; Calibrated: 4/17/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1179

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

2450 MHz System Verification at 20.0 dBm (100 mW)

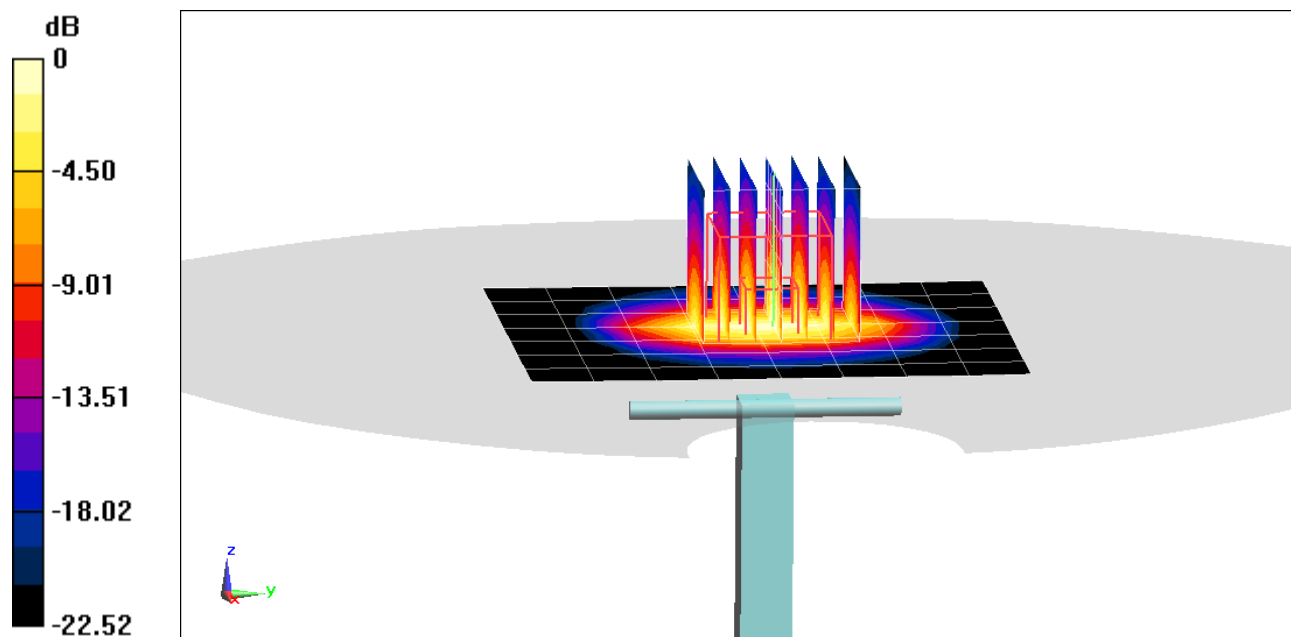
Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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

Peak SAR (extrapolated) = 11.0 W/kg

SAR(1 g) = 5.26 W/kg; SAR(10 g) = 2.4 W/kg

Deviation(1 g) = 6.48%



0 dB = 8.80 W/kg = 9.44 dBW/kg

PCTEST

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921

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

Medium: 2450 MHz Body Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 2.01 \text{ S/m}$; $\epsilon_r = 50.958$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-13-2020; Ambient Temp: 23.4°C; Tissue Temp: 19.5°C

Probe: EX3DV4 - SN7491; ConvF(7.57, 7.57, 7.57) @ 2450 MHz; Calibrated: 7/16/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1402; Calibrated: 7/10/2019

Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1936

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

2450 MHz System Verification at 20.0 dBm (100 mW)

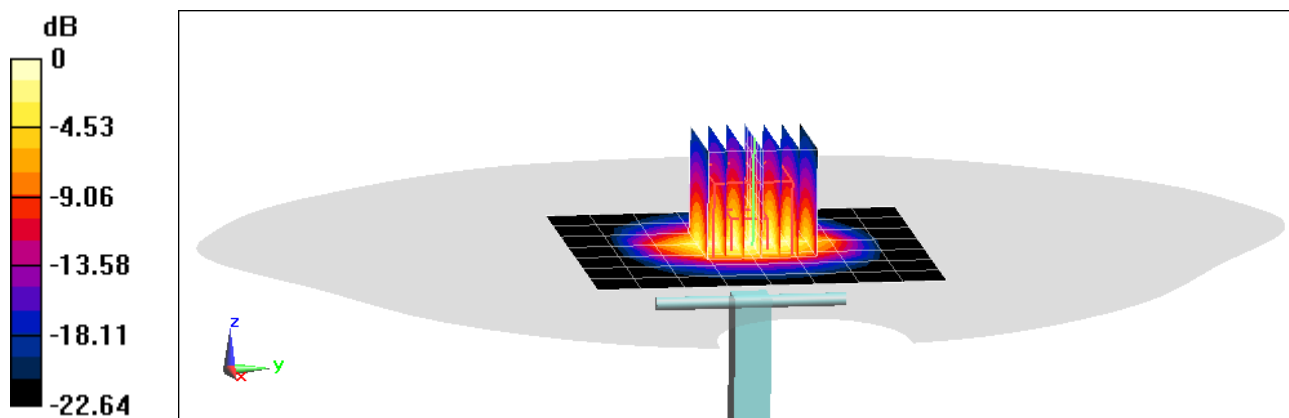
Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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

Peak SAR (extrapolated) = 10.7 W/kg

SAR(1 g) = 5.16 W/kg; SAR(10 g) = 2.37 W/kg

Deviation(1 g) = 1.57%



0 dB = 8.61 W/kg = 9.35 dBW/kg

PCTEST

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921

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

Medium: 2450 MHz Body Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 1.948 \text{ S/m}$; $\epsilon_r = 50.877$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-14-2020; Ambient Temp: 22.1°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7532; ConvF(7.66, 7.66, 7.66) @ 2450 MHz; Calibrated: 4/12/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn501; Calibrated: 4/17/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1179

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

2450 MHz System Verification at 20.0 dBm (100 mW)

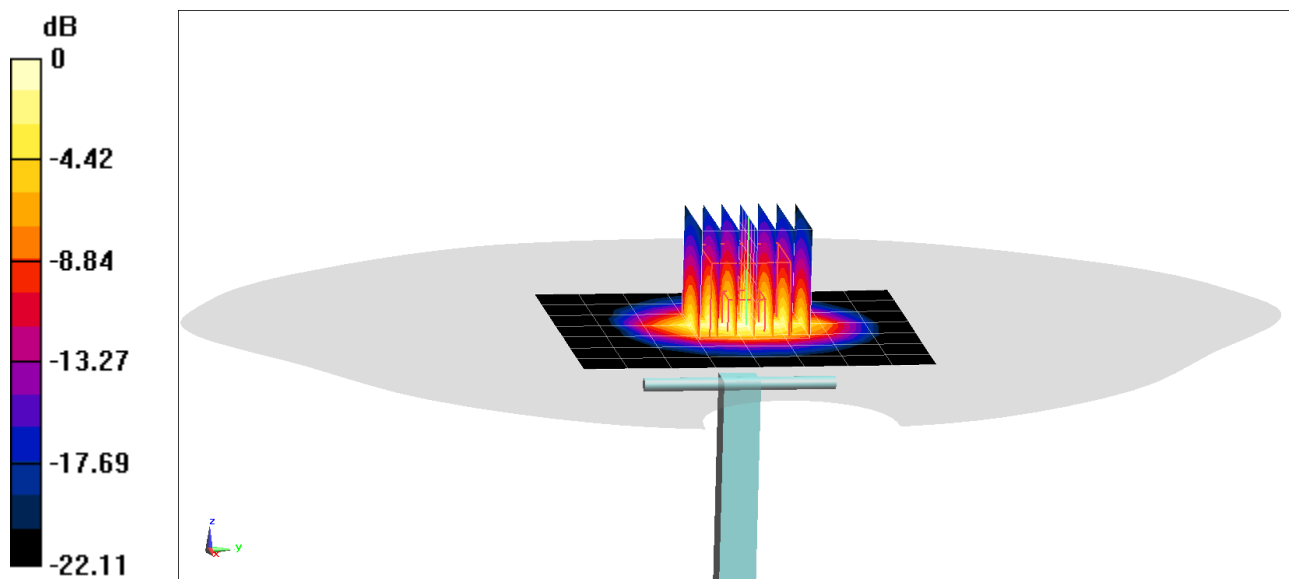
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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

Peak SAR (extrapolated) = 10.5 W/kg

SAR(1 g) = 5.12 W/kg; SAR(10 g) = 2.36 W/kg

Deviation(1 g) = 0.79%



PCTEST

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1009

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

Medium: 2450 MHz Body Medium parameters used:

$f = 2600$ MHz; $\sigma = 2.263$ S/m; $\epsilon_r = 52.409$; $\rho = 1000$ kg/m³

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-01-2020; Ambient Temp: 21.6°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7532; ConvF(7.47, 7.47, 7.47) @ 2600 MHz; Calibrated: 4/12/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn501; Calibrated: 4/17/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1179

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

2600 MHz System Verification at 20.0 dBm (100 mW)

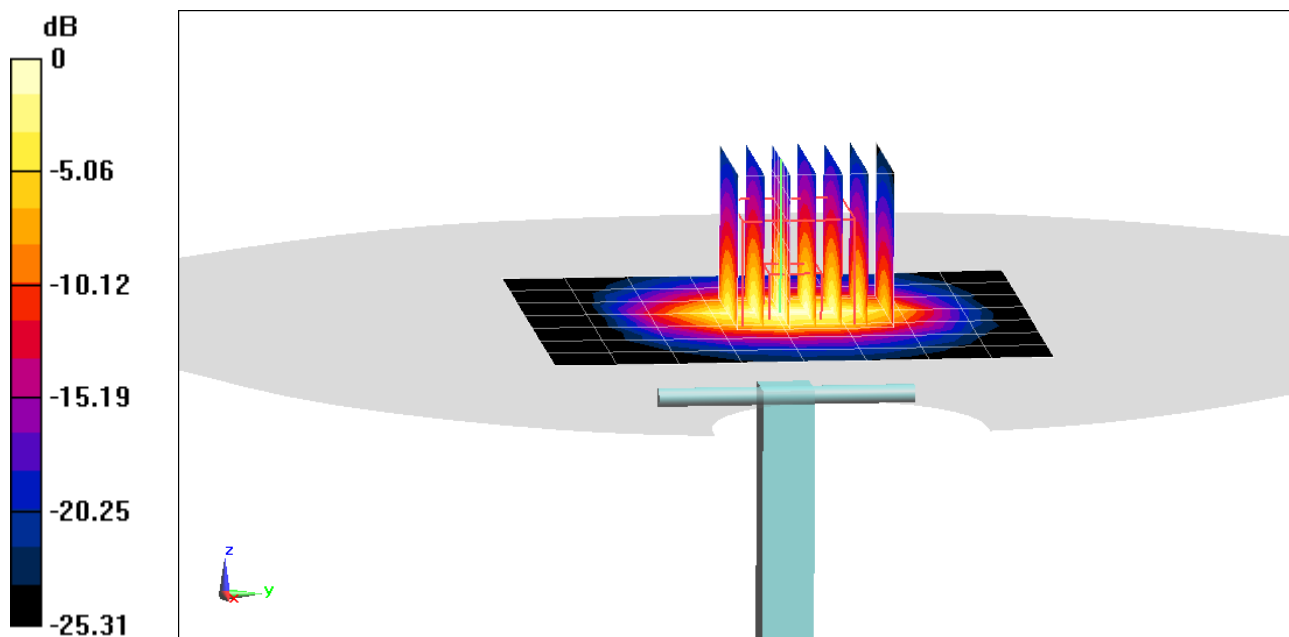
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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

Peak SAR (extrapolated) = 12.6 W/kg

SAR(1 g) = 5.53 W/kg; SAR(10 g) = 2.38 W/kg

Deviation(1 g) = -0.36%



0 dB = 9.65 W/kg = 9.85 dBW/kg

PCTEST

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1069

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

Medium: 2450 MHz Body Medium parameters used:

$f = 2600 \text{ MHz}$; $\sigma = 2.151 \text{ S/m}$; $\epsilon_r = 50.698$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-13-2020; Ambient Temp: 23.4°C; Tissue Temp: 19.5°C

Probe: EX3DV4 - SN7491; ConvF(7.45, 7.45, 7.45) @ 2600 MHz; Calibrated: 7/16/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1402; Calibrated: 7/10/2019

Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1936

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

2600 MHz System Verification at 20.0 dBm (100 mW)

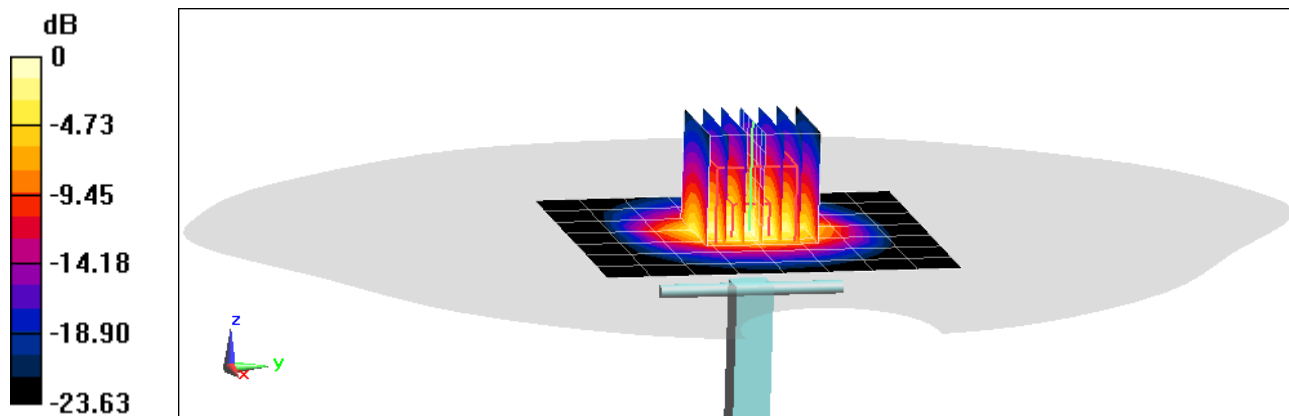
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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

Peak SAR (extrapolated) = 11.9 W/kg

SAR(1 g) = 5.44 W/kg; SAR(10 g) = 2.4 W/kg

Deviation(1 g) = -1.63%



0 dB = 9.44 W/kg = 9.75 dBW/kg

PCTEST

DUT: Dipole 3500 MHz; Type: D3500V2; Serial: 1068

Communication System: UID 0, CW; Frequency: 3500 MHz; Duty Cycle: 1:1

Medium: 3500 MHz Body Medium parameters used:

$f = 3500 \text{ MHz}$; $\sigma = 3.403 \text{ S/m}$; $\epsilon_r = 49.675$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-04-2020; Ambient Temp: 23.1°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3949; ConvF(6.88, 6.88, 6.88) @ 3500 MHz; Calibrated: 8/29/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 8/12/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1596

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

3500 MHz System Verification at 20.0 dBm (100 mW)

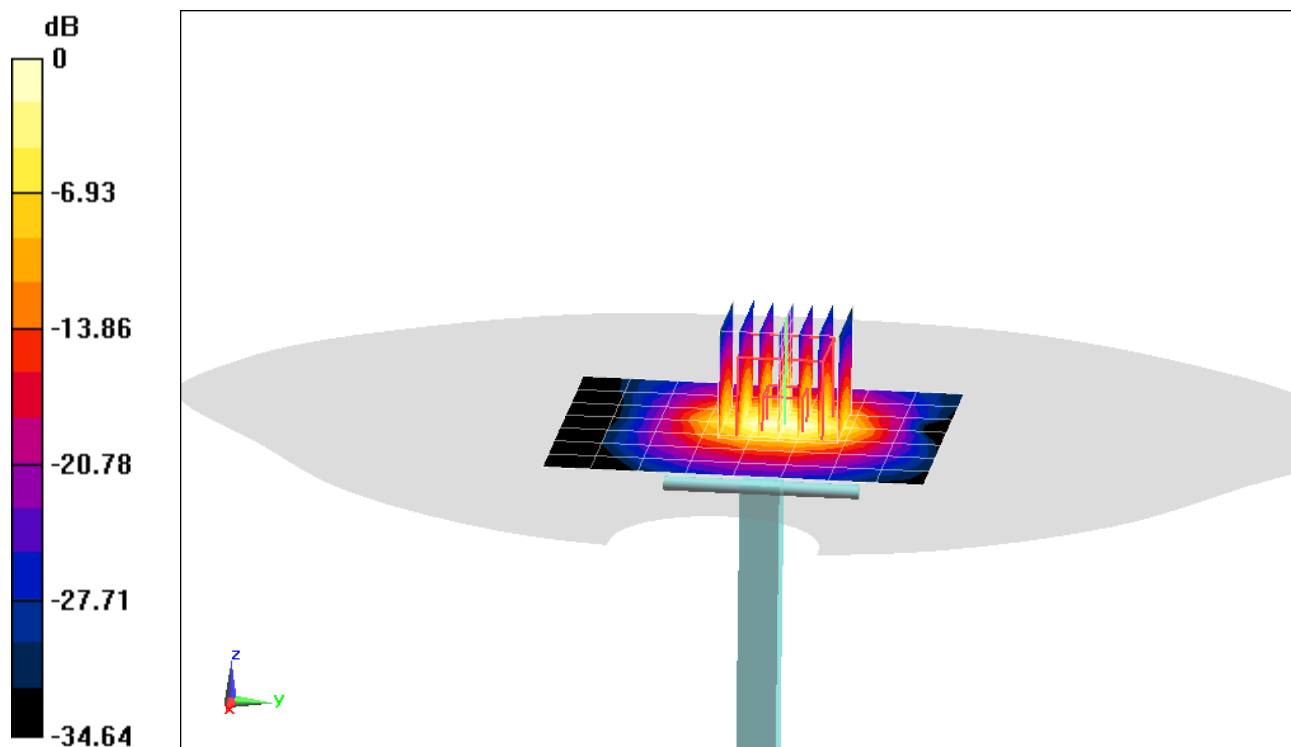
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm

Peak SAR (extrapolated) = 16.7 W/kg

SAR(1 g) = 6.44 W/kg; SAR(10 g) = 2.4 W/kg

Deviation(1 g) = -1.38%



PCTEST

DUT: Dipole 3700 MHz; Type: D3700V2; Serial: 1029

Communication System: UID 0, CW; Frequency: 3700 MHz; Duty Cycle: 1:1

Medium: 3500 MHz Body Medium parameters used (interpolated):

$f = 3700 \text{ MHz}$; $\sigma = 3.677 \text{ S/m}$; $\epsilon_r = 49.104$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-04-2020; Ambient Temp: 23.1°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3949; ConvF(6.78, 6.78, 6.78) @ 3700 MHz; Calibrated: 8/29/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 8/12/2019

Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1596

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

3700 MHz System Verification at 20.0 dBm (100 mW)

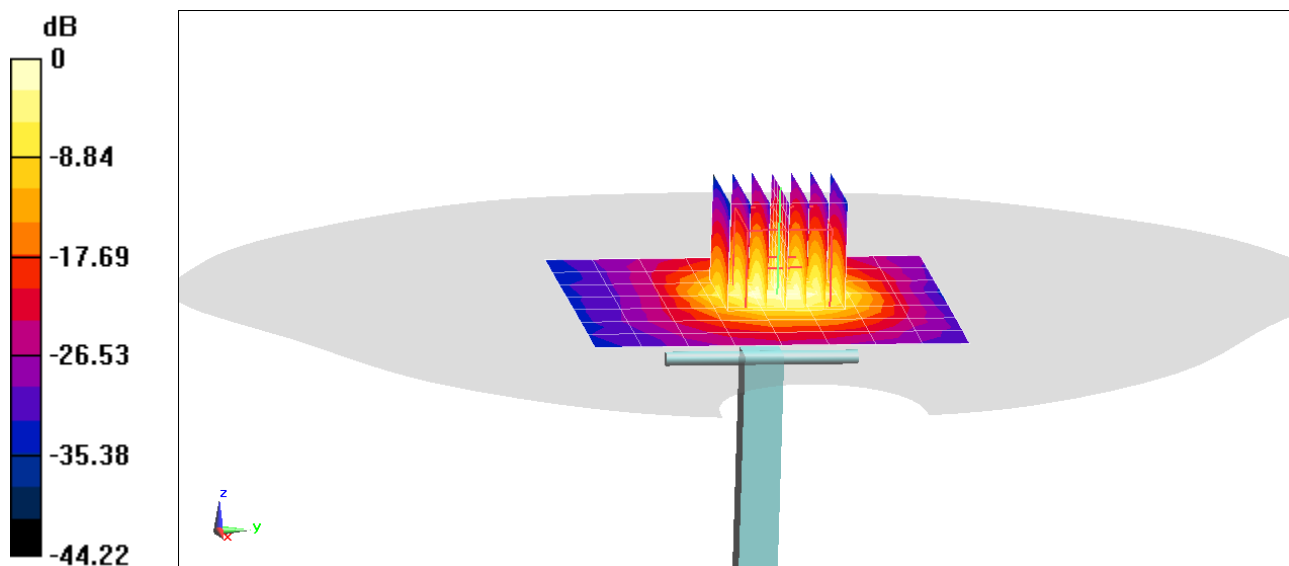
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm

Peak SAR (extrapolated) = 17.0 W/kg

SAR(1 g) = 6.23 W/kg; SAR(10 g) = 2.23 W/kg

Deviation(1 g) = -4.01%



PCTEST

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1123

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

Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5250 \text{ MHz}$; $\sigma = 5.165 \text{ S/m}$; $\epsilon_r = 48.505$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-16-2019; Ambient Temp: 22.7°C; Tissue Temp: 19.0°C

Probe: EX3DV4 - SN7491; ConvF(4.87, 4.87, 4.87) @ 5250 MHz; Calibrated: 7/16/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1402; Calibrated: 7/10/2019

Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1936

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

5250 MHz System Verification at 17.0 dBm (50 mW)

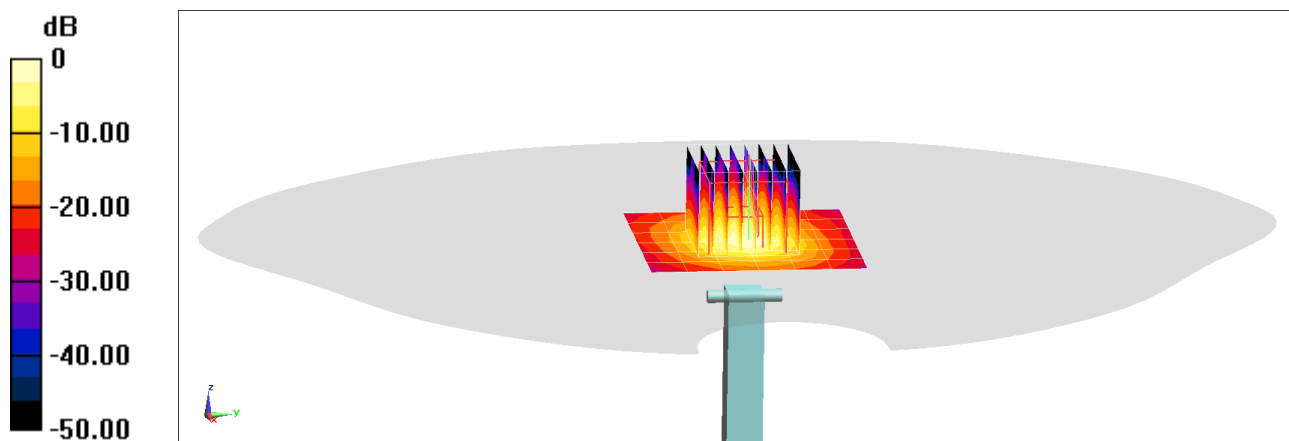
Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Peak SAR (extrapolated) = 13.9 W/kg

SAR(1 g) = 3.6 W/kg; SAR(10 g) = 0.996 W/kg

Deviation(1 g) = -2.70%



0 dB = 8.30 W/kg = 9.19 dBW/kg

PCTEST

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1123

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

Medium: 5 GHz Body Medium parameters used:

$f = 5600 \text{ MHz}$; $\sigma = 5.653 \text{ S/m}$; $\epsilon_r = 47.862$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 12-16-2019; Ambient Temp: 22.7°C; Tissue Temp: 19.0°C

Probe: EX3DV4 - SN7491; ConvF(4.23, 4.23, 4.23) @ 5600 MHz; Calibrated: 7/16/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1402; Calibrated: 7/10/2019

Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1936

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

5600 MHz System Verification at 17.0 dBm (50 mW)

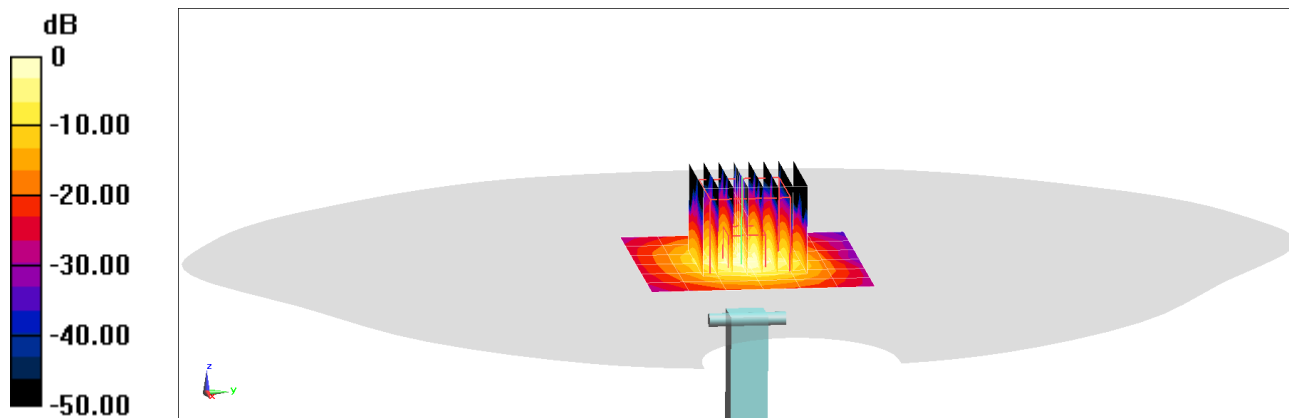
Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Peak SAR (extrapolated) = 16.3 W/kg

SAR(1 g) = 3.83 W/kg; SAR(10 g) = 1.05 W/kg

Deviation(1 g) = -1.29%



0 dB = 9.28 W/kg = 9.68 dBW/kg

PCTEST

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1123

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

Medium: 5 GHz Body Medium parameters used (interpolated):

$f = 5750 \text{ MHz}$; $\sigma = 5.89 \text{ S/m}$; $\epsilon_r = 47.568$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0cm

Test Date: 12-16-2019; Ambient Temp: 22.7°C; Tissue Temp: 19.0°C

Probe: EX3DV4 - SN7491; ConvF(4.32, 4.32, 4.32) @ 5750 MHz; Calibrated: 7/16/2019

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1402; Calibrated: 7/10/2019

Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1936

Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

5750 MHz System Verification at 17.0 dBm (50 mW)

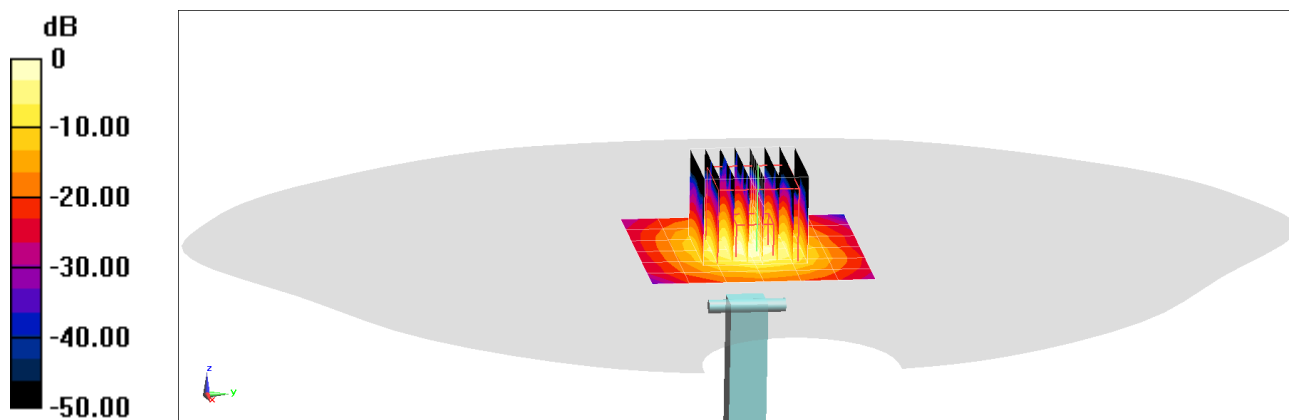
Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Peak SAR (extrapolated) = 15.9 W/kg

SAR(1 g) = 3.59 W/kg; SAR(10 g) = 0.995 W/kg

Deviation(1 g) = -3.88%



APPENDIX C: SAR TISSUE SPECIFICATIONS

FCC ID: BCGA2230	 PCTEST	SAR EVALUATION REPORT	Approved by: Quality Manager
Test Dates: 12/16/2019 – 01/14/2020	DUT Type: Tablet Device		Appendix C: Page 1 of 3

Measurement Procedure for Tissue verification:

- 1) The network analyzer and probe system was configured and calibrated.
- 2) The probe was immersed in the tissue. The tissue was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
- 3) The complex admittance with respect to the probe aperture was measured
- 4) The complex relative permittivity ϵ' can be calculated from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\epsilon_r\epsilon_0}{[\ln(b/a)]^2} \int_a^b \int_a^b \int_0^\pi \cos\phi' \frac{\exp[-j\omega r(\mu_0\epsilon_r'\epsilon_0)^{1/2}]}{r} d\phi' d\rho' d\rho$$

where Y is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively, $r^2 = \rho^2 + \rho'^2 - 2\rho\rho' \cos\phi'$, ω is the angular frequency, and $j = \sqrt{-1}$.

3 Composition / Information on ingredients

3.2 Mixtures

Description: Aqueous solution with surfactants and inhibitors

Declarable, or hazardous components:

CAS: 107-21-1 EINECS: 203-473-3 Reg.nr.: 01-2119456816-28-0000	Ethanedial STOT RE 2, H373; Acute Tox. 4, H302	>1.0-4.9%
CAS: 68608-26-4 EINECS: 271-781-5 Reg.nr.: 01-2119527859-22-0000	Sodium petroleum sulfonate Eye Irrit. 2, H319	< 2.9%
CAS: 107-41-5 EINECS: 203-489-0 Reg.nr.: 01-2119539582-35-0000	Hexylene Glycol / 2-Methyl-pentane-2,4-diol Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.9%
CAS: 68920-66-1 NLP: 500-236-9 Reg.nr.: 01-2119489407-26-0000	Alkoxyated alcohol, > C₁₆ Aquatic Chronic 2, H411; Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.0%

Additional information:

For the wording of the listed risk phrases refer to section 16.

Not mentioned CAS-, EINECS- or registration numbers are to be regarded as Proprietary/Confidential.

The specific chemical identity and/or exact percentage concentration of proprietary components is withheld as a trade secret.

Figure C-1

Note: Liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

FCC ID: BCGA2230	 PCTEST	SAR EVALUATION REPORT	Approved by: Quality Manager
Test Dates: 12/16/2019 – 01/14/2020	DUT Type: Tablet Device		Appendix C: Page 2 of 3

Measurement Certificate / Material Test

Item Name **Body Tissue Simulating Liquid (MBBL600-6000V6)**
 Product No. **SL AAM U16 BC (Batch: 181029-1)**
 Manufacturer **SPEAG**

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters

Target parameters as defined in the KDB 865864 compliance standard.

Test Condition

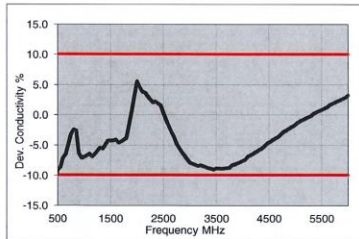
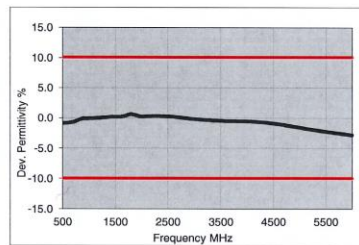
Ambient Condition **22°C ; 30% humidity**
 TSL Temperature **22°C**
 Test Date **30-Oct-18**
 Operator **CL**

Additional Information

TSL Density
 TSL Heat-capacity

Results

f [MHz]	Measured			Target		Diff.to Target [%]	
	e'	e''	sigma	eps	sigma	Δ-eps	Δ-sigma
800	55.1	21.3	0.95	55.3	0.97	-0.4	-2.1
825	55.1	20.8	0.96	55.2	0.98	-0.3	-2.0
835	55.1	20.6	0.96	55.1	0.99	0.0	-2.5
850	55.1	20.4	0.96	55.2	0.99	-0.1	-3.0
900	55.0	19.7	0.98	55.0	1.05	0.0	-6.7
1400	54.2	15.6	1.22	54.1	1.28	0.2	-4.7
1450	54.1	15.4	1.24	54.0	1.30	0.2	-4.6
1500	54.1	15.3	1.27	53.9	1.33	0.3	-4.5
1550	54.0	15.1	1.30	53.9	1.36	0.2	-4.4
1600	53.9	15.0	1.33	53.8	1.39	0.2	-4.3
1625	53.9	14.9	1.35	53.8	1.41	0.3	-4.3
1640	53.9	14.9	1.36	53.7	1.42	0.3	-4.2
1650	53.8	14.9	1.36	53.7	1.43	0.2	-4.9
1700	53.8	14.8	1.40	53.6	1.46	0.4	-4.1
1750	53.7	14.7	1.43	53.4	1.49	0.5	-4.0
1800	53.7	14.6	1.46	53.3	1.52	0.8	-3.9
1810	53.7	14.6	1.47	53.3	1.52	0.8	-3.3
1825	53.7	14.6	1.48	53.3	1.52	0.8	-2.6
1850	53.6	14.5	1.50	53.3	1.52	0.6	-1.3
1900	53.5	14.5	1.53	53.3	1.52	0.4	0.7
1950	53.5	14.5	1.57	53.3	1.52	0.4	3.3
2000	53.4	14.4	1.60	53.3	1.52	0.2	5.3
2050	53.4	14.4	1.64	53.2	1.57	0.3	4.5
2100	53.3	14.4	1.68	53.2	1.62	0.2	3.7
2150	53.3	14.4	1.72	53.1	1.66	0.4	3.6
2200	53.2	14.4	1.76	53.0	1.71	0.3	2.9
2250	53.1	14.4	1.81	53.0	1.76	0.2	2.8
2300	53.1	14.4	1.85	52.9	1.81	0.4	2.2
2350	53.0	14.5	1.89	52.8	1.85	0.3	2.2
2400	52.9	14.5	1.94	52.8	1.90	0.2	2.1
2450	52.9	14.5	1.98	52.7	1.95	0.4	1.5
2500	52.8	14.6	2.03	52.6	2.02	0.3	0.5
2550	52.7	14.6	2.07	52.6	2.09	0.2	-1.0
2600	52.6	14.7	2.12	52.5	2.16	0.2	-1.9



3500	51.1	15.5	3.02	51.3	3.31	-0.4	-8.8
3700	50.8	15.7	3.24	51.1	3.55	-0.5	-8.8
5200	48.1	18.2	5.27	49.0	5.30	-1.8	-0.6
5250	48.0	18.3	5.34	49.0	5.36	-1.9	-0.4
5300	47.9	18.4	5.41	48.9	5.42	-2.0	-0.2
5500	47.5	18.6	5.70	48.6	5.65	-2.2	0.8
5600	47.3	18.8	5.84	48.5	5.77	-2.3	1.3
5700	47.1	18.9	5.99	48.3	5.88	-2.5	1.8
5800	47.0	19.0	6.14	48.2	6.00	-2.6	2.3

TSL Dielectric Parameters

1

Figure C-2
 600 – 5800 MHz Body Tissue Equivalent Matter

FCC ID: BCGA2230		SAR EVALUATION REPORT	Approved by: Quality Manager
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APPENDIX D: SAR SYSTEM VALIDATION

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Per FCC KDB Publication 865664 D02v01r02, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

Table D-1
SAR System Validation Summary – 1g

SAR SYSTEM #	FREQ. [MHz]	DATE	PROBE SN	PROBE CAL. POINT		COND.	PERM.	CW VALIDATION			MOD. VALIDATION		
						(σ)	(ϵ_r)	SENSITIVITY	PROBE LINEARITY	PROBE ISOTROPY	MOD. TYPE	DUTY FACTOR	PAR
AM1	750	7/15/2019	7421	750	Body	0.93	53.942	PASS	PASS	PASS	N/A	N/A	N/A
AM8	835	8/2/2019	7416	835	Body	0.994	53.524	PASS	PASS	PASS	GMSK	PASS	N/A
AM7	1750	2/21/2019	3837	1750	Body	1.49	52.305	PASS	PASS	PASS	N/A	N/A	N/A
AM8	1750	8/5/2019	7416	1750	Body	1.495	52.93	PASS	PASS	PASS	N/A	N/A	N/A
AM5	1900	8/13/2019	7491	1900	Body	1.525	52.611	PASS	PASS	PASS	GMSK	PASS	N/A
AM1	1900	7/15/2019	7421	1900	Body	1.548	51.802	PASS	PASS	PASS	GMSK	PASS	N/A
AM4	2300	4/23/2019	7532	2300	Body	1.897	50.974	PASS	PASS	PASS	N/A	N/A	N/A
AM4	2450	4/23/2019	7532	2450	Body	2.027	50.762	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
AM5	2450	8/14/2019	7491	2450	Body	1.972	51.904	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
AM4	2600	4/23/2019	7532	2600	Body	2.167	50.527	PASS	PASS	PASS	TDD	PASS	N/A
AM5	2600	8/13/2019	7491	2600	Body	2.11	51.64	PASS	PASS	PASS	TDD	PASS	N/A
AM3	3500	12/11/2019	3949	3500	Body	3.448	50.786	PASS	PASS	PASS	TDD	PASS	N/A
AM3	3700	12/11/2019	3949	3700	Body	3.67	50.471	PASS	PASS	PASS	TDD	PASS	N/A
AM5	5250	8/27/2019	7491	5250	Body	5.352	47.481	PASS	PASS	PASS	OFDM	N/A	PASS
AM5	5600	8/14/2019	7491	5600	Body	5.897	46.808	PASS	PASS	PASS	OFDM	N/A	PASS
AM5	5750	8/14/2019	7491	5750	Body	6.122	46.512	PASS	PASS	PASS	OFDM	N/A	PASS

NOTE: While the probes have been calibrated for both CW and modulated signals, all measurements were performed using communication systems calibrated for CW signals only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r04 for scenarios when CW probe calibrations are used with other signal types. SAR systems were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to FCC KDB Publication 865664 D01v01r04.

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APPENDIX F: DOWNLINK LTE CA RF CONDUCTED POWERS

1.1 LTE Downlink Only Carrier Aggregation Test Reduction Methodology

SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number of component carriers (CCs) supported by the product implementation. Per April 2018 TCBC Workshop Notes, the following test reduction methodology was applied to determine the combinations required for conducted power measurements.

LTE DLCA Test Reduction Methodology:

- The supported combinations were arranged by the number of component carriers in columns.
- Any limitations on the PCC or SCC for each combination were identified alongside the combination (e.g. CA_2A-2A-4A-12A, but B12 can only be configured as a SCC).
- Power measurements were performed for "supersets" (LTE CA combinations with multiple components carriers) and any "subsets" (LTE CA combinations with fewer component carriers) that were not completely covered by the supersets.
- Only subsets that have the exact same components as a superset were excluded for measurement.
- When there were certain restrictions on component carriers that existed in the superset that were not applied for the subset, the subset configuration was additionally evaluated.
- Both inter-band and intra-band downlink carrier aggregation scenarios were considered.
- Downlink CA combinations for SISO and 4x4 Downlink MIMO operations were measured independently, per May 2017 TCBC Workshop notes.
- The antenna with highest maximum output power for each LTE Band was selected for the PCC configurations of DLCA power measurements.

Table 1 – Example of Exclusion Table for SISO Configurations

Index		ZIC	Aggregated Character Description (ZIC)	Restriction	Completely Covered by Measurement Support?	Index		ZIC	Aggregated Character Description (ZIC)	Restriction	Completely Covered by Measurement Support?	Index		ZIC	Aggregated Character Description (ZIC)	Restriction	Completely Covered by Measurement Support?	
CC-01	CA-20	1.10.10.20	1.10.10.20	CC-01	CC-01	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-01	CC-01	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-01	CC-01	CA-20-20-00A
CC-02	CA-20-00A	1.10.10.20	1.10.10.20	CC-02	CC-02	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-02	CC-02	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-02	CC-02	CA-20-20-00A
CC-03	CA-20-00A	1.10.10.20	1.10.10.20	CC-03	CC-03	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-03	CC-03	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-03	CC-03	CA-20-20-00A
CC-04	CA-20-00A	1.10.10.20	1.10.10.20	CC-04	CC-04	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-04	CC-04	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-04	CC-04	CA-20-20-00A
CC-05	CA-20-00A	1.10.10.20	1.10.10.20	CC-05	CC-05	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-05	CC-05	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-05	CC-05	CA-20-20-00A
CC-06	CA-20-00A	1.10.10.20	1.10.10.20	CC-06	CC-06	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-06	CC-06	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-06	CC-06	CA-20-20-00A
CC-07	CA-20-00A	1.10.10.20	1.10.10.20	CC-07	CC-07	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-07	CC-07	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-07	CC-07	CA-20-20-00A
CC-08	CA-20-00A	1.10.10.20	1.10.10.20	CC-08	CC-08	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-08	CC-08	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-08	CC-08	CA-20-20-00A
CC-09	CA-20-00A	1.10.10.20	1.10.10.20	CC-09	CC-09	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-09	CC-09	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-09	CC-09	CA-20-20-00A
CC-10	CA-20-00A	1.10.10.20	1.10.10.20	CC-10	CC-10	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-10	CC-10	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-10	CC-10	CA-20-20-00A
CC-11	CA-20-00A	1.10.10.20	1.10.10.20	CC-11	CC-11	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-11	CC-11	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-11	CC-11	CA-20-20-00A
CC-12	CA-20-00A	1.10.10.20	1.10.10.20	CC-12	CC-12	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-12	CC-12	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-12	CC-12	CA-20-20-00A
CC-13	CA-20-00A	1.10.10.20	1.10.10.20	CC-13	CC-13	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-13	CC-13	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-13	CC-13	CA-20-20-00A
CC-14	CA-20-00A	1.10.10.20	1.10.10.20	CC-14	CC-14	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-14	CC-14	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-14	CC-14	CA-20-20-00A
CC-15	CA-20-00A	1.10.10.20	1.10.10.20	CC-15	CC-15	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-15	CC-15	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-15	CC-15	CA-20-20-00A
CC-16	CA-20-00A	1.10.10.20	1.10.10.20	CC-16	CC-16	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-16	CC-16	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-16	CC-16	CA-20-20-00A
CC-17	CA-20-00A	1.10.10.20	1.10.10.20	CC-17	CC-17	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-17	CC-17	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-17	CC-17	CA-20-20-00A
CC-18	CA-20-00A	1.10.10.20	1.10.10.20	CC-18	CC-18	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-18	CC-18	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-18	CC-18	CA-20-20-00A
CC-19	CA-20-00A	1.10.10.20	1.10.10.20	CC-19	CC-19	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-19	CC-19	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-19	CC-19	CA-20-20-00A
CC-20	CA-20-00A	1.10.10.20	1.10.10.20	CC-20	CC-20	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-20	CC-20	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-20	CC-20	CA-20-20-00A
CC-21	CA-20-00A	1.10.10.20	1.10.10.20	CC-21	CC-21	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-21	CC-21	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-21	CC-21	CA-20-20-00A
CC-22	CA-20-00A	1.10.10.20	1.10.10.20	CC-22	CC-22	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-22	CC-22	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-22	CC-22	CA-20-20-00A
CC-23	CA-20-00A	1.10.10.20	1.10.10.20	CC-23	CC-23	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-23	CC-23	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-23	CC-23	CA-20-20-00A
CC-24	CA-20-00A	1.10.10.20	1.10.10.20	CC-24	CC-24	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-24	CC-24	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-24	CC-24	CA-20-20-00A
CC-25	CA-20-00A	1.10.10.20	1.10.10.20	CC-25	CC-25	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-25	CC-25	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-25	CC-25	CA-20-20-00A
CC-26	CA-20-00A	1.10.10.20	1.10.10.20	CC-26	CC-26	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-26	CC-26	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-26	CC-26	CA-20-20-00A
CC-27	CA-20-00A	1.10.10.20	1.10.10.20	CC-27	CC-27	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-27	CC-27	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-27	CC-27	CA-20-20-00A
CC-28	CA-20-00A	1.10.10.20	1.10.10.20	CC-28	CC-28	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-28	CC-28	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-28	CC-28	CA-20-20-00A
CC-29	CA-20-00A	1.10.10.20	1.10.10.20	CC-29	CC-29	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-29	CC-29	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-29	CC-29	CA-20-20-00A
CC-30	CA-20-00A	1.10.10.20	1.10.10.20	CC-30	CC-30	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-30	CC-30	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-30	CC-30	CA-20-20-00A
CC-31	CA-20-00A	1.10.10.20	1.10.10.20	CC-31	CC-31	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-31	CC-31	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-31	CC-31	CA-20-20-00A
CC-32	CA-20-00A	1.10.10.20	1.10.10.20	CC-32	CC-32	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-32	CC-32	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-32	CC-32	CA-20-20-00A
CC-33	CA-20-00A	1.10.10.20	1.10.10.20	CC-33	CC-33	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-33	CC-33	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-33	CC-33	CA-20-20-00A
CC-34	CA-20-00A	1.10.10.20	1.10.10.20	CC-34	CC-34	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-34	CC-34	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-34	CC-34	CA-20-20-00A
CC-35	CA-20-00A	1.10.10.20	1.10.10.20	CC-35	CC-35	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-35	CC-35	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-35	CC-35	CA-20-20-00A
CC-36	CA-20-00A	1.10.10.20	1.10.10.20	CC-36	CC-36	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-36	CC-36	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-36	CC-36	CA-20-20-00A
CC-37	CA-20-00A	1.10.10.20	1.10.10.20	CC-37	CC-37	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-37	CC-37	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-37	CC-37	CA-20-20-00A
CC-38	CA-20-00A	1.10.10.20	1.10.10.20	CC-38	CC-38	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-38	CC-38	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-38	CC-38	CA-20-20-00A
CC-39	CA-20-00A	1.10.10.20	1.10.10.20	CC-39	CC-39	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-39	CC-39	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-39	CC-39	CA-20-20-00A
CC-40	CA-20-00A	1.10.10.20	1.10.10.20	CC-40	CC-40	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-40	CC-40	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-40	CC-40	CA-20-20-00A
CC-41	CA-20-00A	1.10.10.20	1.10.10.20	CC-41	CC-41	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-41	CC-41	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-41	CC-41	CA-20-20-00A
CC-42	CA-20-00A	1.10.10.20	1.10.10.20	CC-42	CC-42	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-42	CC-42	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-42	CC-42	CA-20-20-00A
CC-43	CA-20-00A	1.10.10.20	1.10.10.20	CC-43	CC-43	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-43	CC-43	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-43	CC-43	CA-20-20-00A
CC-44	CA-20-00A	1.10.10.20	1.10.10.20	CC-44	CC-44	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-44	CC-44	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-44	CC-44	CA-20-20-00A
CC-45	CA-20-00A	1.10.10.20	1.10.10.20	CC-45	CC-45	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-45	CC-45	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-45	CC-45	CA-20-20-00A
CC-46	CA-20-00A	1.10.10.20	1.10.10.20	CC-46	CC-46	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-46	CC-46	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-46	CC-46	CA-20-20-00A
CC-47	CA-20-00A	1.10.10.20	1.10.10.20	CC-47	CC-47	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-47	CC-47	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-47	CC-47	CA-20-20-00A
CC-48	CA-20-00A	1.10.10.20	1.10.10.20	CC-48	CC-48	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-48	CC-48	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-48	CC-48	CA-20-20-00A
CC-49	CA-20-00A	1.10.10.20	1.10.10.20	CC-49	CC-49	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-49	CC-49	CA-20-20-00A	1.10.10.20	1.10.10.20	1.10.10.20	CC-49	CC-49	CA-20-20-00A
CC-50	CA-20-0																	

Table 2 – Example of Exclusion Table for 4x4 Downlink MIMO Configurations

[illegible]

Note: [CC] indicates component carrier with 4x4 DL MIMO antenna configuration

FCC ID: BCGA2230	 PCTEST Proud to be part of 	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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1.2 LTE Downlink Only Carrier Aggregation Test Selection and Setup

SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number component carriers (CCs) supported by the product implementation. For those configurations required by April 2018 TCBC Workshop Notes, conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in accordance to KDB Publication 941225 D05Av01r02. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. Additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band.

This device supports LAA with downlink carrier aggregation only. It uses carrier aggregation in the downlink to combine LTE in the unlicensed spectrum (i.e. LTE Band 46) with LTE in the licensed band (served as PCC). All uplink communications and acknowledgements on the PCC remain identical to specifications when downlink carrier aggregation is inactive.

Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for carrier aggregation configurations when the maximum average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive. All bands required for SAR testing per FCC KDB procedures were considered. Based on the measured maximum powers below, no additional SAR tests were required for DLCA SAR configurations.

General PCC and SCC configuration selection procedure

- PCC uplink channel, channel bandwidth, modulation and RB configurations were selected based on section C)3)b)ii) of KDB 941225 D05 V01r02. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation.
- To maximize aggregated bandwidth, highest channel bandwidth available for that CA combination was selected for SCC. For inter-band CA, the SCC downlink channels were selected near the middle of their transmission bands. For contiguous intra-band CA, the downlink channel spacing between the component carriers was set to multiple of 300 kHz less than the nominal channel spacing defined in section 5.4.1A of 3GPP TS 36.521. For non-contiguous intra-band CA, the downlink channel spacing between the component carriers was set to be larger than the nominal channel spacing and provided maximum separation between the component carriers.
- All selected PCC and SCC(s) remained fully within the uplink/downlink transmission band of the respective component carrier.

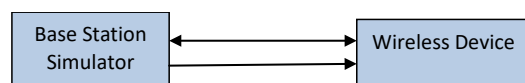


Figure 1
DL CA Power Measurement Setup

FCC ID: BCGA2230	 SAR EVALUATION REPORT	Reviewed by: Quality Manager
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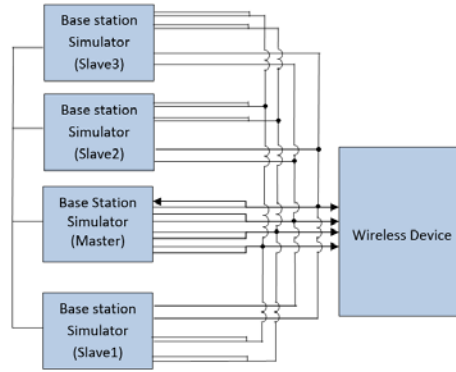


Figure 2
DL CA with DL 4x4 MIMO Power Measurement Setup

1.3 Downlink Carrier Aggregation RF Conducted Powers

1.3.1 LTE Band 12 as PCC

Table 1
Output Powers – Ant 1

Combination	PCC Band	PCC BW [MHz]	PCC (UL) Ch. Freq. [MHz]	PCC				SCC 1				SCC 2				SCC 3				SCC 4				Power			
				PCC (UL) RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	LTE Tx Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)		
CA 2A-12A (1)	LTE B12	5	23025	700.5	64QAM	1	7	6035	730.5	LTE B2	20	900	1960	-	-	-	-	-	-	-	-	-	-	21.46	21.44		
CA 4A-12A (1)	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	-	21.48	21.44		
CA 4A-12A (2)	LTE B12	5	23025	700.5	16QAM	1	7	6035	730.5	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	-	21.49	21.49		
CA 12A-12A	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B12	20	900	1960	-	-	-	-	-	-	-	-	-	-	21.44	21.44		
CA 12A-66A	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B66	20	66786	5037.5	-	-	-	-	-	-	-	-	-	-	21.44	21.44		
CA 12A-66A (1)	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B66	20	66786	2145	-	-	-	-	-	-	-	-	-	-	21.48	21.44		
CA 12A-66A (2)	LTE B12	5	23025	700.5	16QAM	1	7	6035	730.5	LTE B66	20	66786	2145	-	-	-	-	-	-	-	-	-	-	21.49	21.48		
CA 2C-12A	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B2	20	900	1960	LTE B2	20	700	1940	-	-	-	-	-	-	21.39	21.44		
CA 2A-2A-12B	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B12	10	5107	738.7	LTE B2	20	900	1960	LTE B2	20	700	1940	-	-	-	21.27	21.44	
CA 4A-4A-12B	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B12	10	5107	738.7	LTE B4	20	2175	2132.5	LTE B4	20	2175	2132.5	-	-	-	21.16	21.44	
CA 2A-2A-4A-12A	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B2	20	900	1960	LTE B2	20	700	1940	LTE B4	20	2175	2132.5	-	-	-	21.24	21.44	
CA 2A-2A-4A-12A	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	LTE B4	20	2175	2132.5	-	-	-	21.24	21.44	
CA 2A-4A-12B	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B12	10	5107	738.7	LTE B4	20	900	1960	LTE B4	20	2175	2132.5	-	-	-	21.23	21.44	
CA 2A-12A-66C	LTE B12	5	23025	700.5	16QAM	5	24	6035	731.5	LTE B2	20	900	1960	LTE B66	20	66786	2145	LTE B66	20	66786	2145	-	-	-	21.27	21.44	
CA 4A-4A-12A-30A	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B4	20	2175	2132.5	LTE B4	20	2175	2132.5	LTE B4	20	2175	2132.5	-	-	-	21.26	21.44	
CA 2A-4A-7A-12A	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	LTE B7	20	5000	2865	-	-	-	21.27	21.44	
CA 2A-4A-12A-30A	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	LTE B30	10	9620	2395	-	-	-	21.21	21.44	
CA 2A-7A-12A-66A	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B2	20	900	1960	LTE B7	20	5000	2865	LTE B66	20	66786	2145	-	-	-	21.18	21.44	
CA 2A-2A-12A-66A-66A	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B2	20	900	1960	LTE B2	20	700	1940	LTE B66	20	66786	2145	-	-	-	21.28	21.44	
CA 2A-2A-12A-30A-66A	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B2	20	900	1960	LTE B2	20	700	1940	LTE B30	10	9620	2355	LTE B66	20	66786	2145	21.27	21.44
CA 2A-12A-30A-66A-66A	LTE B12	5	23025	700.5	16QAM	1	24	6035	731.5	LTE B2	20	900	1960	LTE B30	10	9620	2355	LTE B66	20	66786	2145	-	-	-	21.26	21.44	

1.3.2 LTE Band 13 as PCC

Table 2
Output Powers – Ant 1

Combination	PCC Band	PCC BW [MHz]	PCC (UL) Ch. Freq. [MHz]	PCC				PCC (DL) Channel	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC 1				SCC 2				SCC 3				SCC 4				Power		
				Mod.	PCC UL RB	PCC UL RB Offset	SCC (DL) Channel					SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	LTE Tx Power with DL CA	LTE Single Carrier Tx Power (dBm)
CA 4A-4A-13A	LTE B13	10	23230	782	QPSK	1	0	5230	782	LTE B4	20	2175	2132.5	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	-	21.07	21.14	
CA 2A-4A-13A	LTE B13	10	23230	782	QPSK	1	0	5230	782	LTE B2	20	900	1980	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	-	21.11	21.14	
CA 2A-13A-46A	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B2	20	900	1980	LTE B46	20	50665	5537.5	-	-	-	-	-	-	-	-	-	-	20.86	21.16	
CA 13A-46A-66A	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B46	20	50665	5537.5	LTE B46	20	50665	5537.5	-	-	-	-	-	-	-	-	-	-	20.90	21.16	
CA 13A-46A-66A	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B46	20	50665	5537.5	LTE B46	20	50665	5537.5	-	-	-	-	-	-	-	-	-	-	21.00	21.16	
CA 13A-66A-66B	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B66	20	66786	2145	LTE B66	5	67188	2183.2	LTE B66	15	67231	2182.5	-	-	-	-	-	-	-	20.94	21.16
CA 13A-66A-66C	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B66	20	66786	2145	LTE B66	20	66786	2145	LTE B66	20	66786	2145	-	-	-	-	-	-	-	20.84	21.16
CA 2A-2A-13A-66A	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B2	20	900	1980	LTE B2	20	700	1940	LTE B66	20	66786	2145	-	-	-	-	-	-	-	20.93	21.16
CA 2A-13A-46C	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B2	20	900	1980	LTE B46	20	50665	5537.5	LTE B46	20	50665	5537.5	-	-	-	-	-	-	-	20.93	21.16
CA 2A-13A-66A-66A	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B2	20	900	1980	LTE B66	20	66786	2145	LTE B66	20	66786	2145	-	-	-	-	-	-	-	20.91	21.16
CA 2A-13A-66B	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B2	20	900	1980	LTE B66	20	66786	2145	LTE B66	5	66879	2184.8	-	-	-	-	-	-	-	20.88	21.16
CA 2A-13A-66C	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B2	20	900	1980	LTE B66	20	66786	2145	LTE B66	20	66884	2164.8	-	-	-	-	-	-	-	20.97	21.16
CA 13A-46C-66A	LTE B13	5	23230	782	16QAM	5	24	5230	782	LTE B46	20	50665	5537.5	LTE B46	20	50665	5537.5	LTE B66	20	66786	2145	-	-	-	-	-	-	-	20.93	21.16
CA 13A-46C-66A	LTE B13	5	23230	782	16QAM	5	24	5230	782	LTE B46	20	50665	5537.5	LTE B46	20	50665	5537.5	LTE B66	20	66786	2145	-	-	-	-	-	-	-	21.23	21.16
CA 13A-46C	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B46	20	50665	5537.5	LTE B46	20	50665	5537.5	LTE B46	20	50683	5557.3	LTE B46	20	50683	5557.3	-	-	-	20.93	21.16
CA 2A-12A-46D	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B2	20	900	1980	LTE B46	20	50665	5537.5	LTE B46	20	50647	5517.7	LTE B46	20	50647	5517.7	-	-	-	21.02	21.16
CA 13A-46D-66A	LTE B13	5	23230	782	16QAM	1	24	5230	782	LTE B46	20	50665	5537.5	LTE B46	20	50665	5537.5	LTE B66	20	66786	2145	-	-	-	-	-	-	-	20.96	21.16

FCC ID: BCGA2230	 PCTEST Ready to test in a second	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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1.3.3

LTE Band 5 as PCC

Table 3
Output Powers – Ant 1

Combination	PCC Band	PCC BW [MHz]	PCC (UL) Ch.	PCC				PCC UL RB	PCC UL RB Offset	PCC (DL) Channel	SCC 1				SCC 2				SCC 3				SCC 4				Power	
				Mod.	SCC Band	SCC BW [MHz]	SCC (UL) Channel				SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (UL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (UL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (UL) Channel	SCC (DL) Freq. [MHz]	LTE Tx Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)			
CA 5A-7A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B7	20	3100	2655	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60
CA 5A-25A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B25	20	8365	1962.5	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60
CA 5A-41A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B41	20	40620	2593	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60
CA 5A-46A (1)	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B46	20	50665	5537.5	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60
CA 5A-46A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B46	20	50660	5537.5	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60
CA 2C-5A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B2	20	900	1960	LTE B2	20	792	1940.2	-	-	-	-	-	-	-	-	20.35	20.60
CA 4A-5B (1)	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B5	5	2577	886.7	LTE B4	20	2175	2132.5	LTE B4	10	2350	2150	-	-	-	-	20.39	20.60
CA 5A-7A-7A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B7	20	3100	2655	LTE B7	20	2850	2630	-	-	-	-	-	-	-	-	20.41	20.60
CA 5A-7C	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B7	20	3100	2655	LTE B7	20	2902	2635.2	-	-	-	-	-	-	-	-	20.37	20.60
CA 5A-40C (1)	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B40	20	50665	5537.5	LTE B40	20	50467	5517.7	LTE B40	20	66887	2145	-	-	-	-	20.42	20.60
CA 2A-5A-46A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B2	20	900	1960	LTE B46	20	50665	5537.5	-	-	-	-	-	-	-	-	20.39	20.60
CA 5A-46A-66A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B46	20	50665	5537.5	LTE B46	20	66786	2145	-	-	-	-	-	-	-	-	20.34	20.60
CA 4A-5B	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B5	10	2553	884.3	LTE B4	20	2175	2132.5	LTE B4	10	2350	2150	-	-	-	-	20.47	20.60
CA 5A-46D (1)	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B46	20	50665	5537.5	LTE B46	20	50467	5517.7	LTE B46	20	66962	2145	-	-	-	-	20.43	20.60
CA 5A-66A-66B	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B66	20	66786	2145	LTE B66	5	67169	2183.2	LTE B66	15	67261	2192.9	-	-	-	-	20.35	20.60
CA 5A-66A-66C	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B66	20	66786	2145	LTE B66	20	67038	2170.2	LTE B66	20	67236	2190	-	-	-	-	20.46	20.60
CA 2A-2A-4A-5A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B2	20	900	1960	LTE B2	20	792	1940	LTE B4	20	2175	2132.5	-	-	-	-	20.31	20.60
CA 2A-4A-5A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	LTE B4	20	2350	2150	-	-	-	-	20.48	20.60
CA 2A-5A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B5	10	2553	884.3	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	-	-	-	-	20.45	20.60
CA 2A-5B-66C	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B6	20	900	1960	LTE B46	20	50665	5537.5	LTE B46	20	50467	5517.7	-	-	-	-	20.37	20.60
CA 4A-4A-5A-30A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B4	20	2175	2132.5	LTE B4	20	2350	2150	LTE B30	10	9820	2395	-	-	-	-	20.36	20.60
CA 5A-46C-66A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B46	20	50665	5537.5	LTE B46	20	50467	5517.7	LTE B46	20	66786	2145	-	-	-	-	20.49	20.60
CA 2A-4A-5A-30A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	LTE B30	10	9820	2395	-	-	-	-	20.27	20.60
CA 2A-2A-5A-66A-66A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B2	20	900	1960	LTE B2	20	792	1940	LTE B66	20	66786	2145	LTE B66	20	67236	2190	20.43	20.60
CA 2A-2A-5A-66B	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B2	20	900	1960	LTE B2	20	792	1940	LTE B66	15	66786	2145	LTE B66	5	66879	2154.3	20.51	20.60
CA 2A-2A-5A-66C	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B2	20	900	1960	LTE B2	20	792	1940	LTE B66	20	66786	2145	LTE B66	20	66964	2145.4	20.34	20.60
CA 2A-5A-46D	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B2	20	900	1960	LTE B46	20	50665	5537.5	LTE B46	20	50467	5517.7	LTE B46	20	50663	5537.3	20.43	20.60
CA 2A-5B-66B	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B5	10	2553	884.3	LTE B2	20	900	1960	LTE B66	15	66786	2145	LTE B66	5	66879	2154.3	20.50	20.60
CA 2A-5B-66C	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B5	10	2553	884.3	LTE B2	20	900	1960	LTE B66	20	66786	2145	LTE B66	20	66964	2145.4	20.38	20.60
CA 5A-5B-66A-66A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B5	10	2553	884.3	LTE B2	20	900	1960	LTE B66	20	66786	2145	LTE B66	20	67236	2190	20.39	20.60
CA 5A-46D-66A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B46	20	50665	5537.5	LTE B46	20	50467	5517.7	LTE B46	20	50663	5537.3	LTE B66	20	66786	2145	20.49	20.60
CA 5B-30A-66A-66A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B5	10	2553	884.3	LTE B30	10	9820	2395	LTE B66	20	66786	2145	LTE B66	20	67236	2190	20.36	20.60
CA 2A-2A-5A-30A-66A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B2	20	900	1960	LTE B2	20	792	1940	LTE B30	10	9820	2395	LTE B66	20	66786	2145	20.47	20.60
CA 2A-5B-30A-66A-66A	LTE B5	5	26025	B46.5	16QAM	1	0	2625		891.5	LTE B2	20	900	1960	LTE B30	10	9820	2395	LTE B66	20	66786	2145	LTE B66	20	67236	2190	20.42	20.60

1.3.4

LTE Band 26 as PCC

Table 4
Output Powers – Ant 1

Combination	PCC										SCC 1				SCC 2				Power	
	PCC Band	PCC BW [MHz]	PCC (UL) Ch.	PCC (UL) Freq. [MHz]	Mod.	PCC UL# RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	LTE Tx Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)	
CA 7A-26A	LTE B26	10	26990	844	QPSK	25	25	8990	889	LTE B7	20	3100	2655	-	-	-	-	20.59	20.60	
CA 25A-26A	LTE B26	10	26990	844	QPSK	25	25	8990	889	LTE B25	20	8365	1962.5	-	-	-	-	20.52	20.60	
CA 26A-41A	LTE B26	10	26990	844	QPSK	25	25	8990	889	LTE B41	20	40620	2593	-	-	-	-	20.60	20.60	
CA 7A-7A-26A	LTE B26	10	26990	844	QPSK	25	25	8990	889	LTE B7	20	3100	2655	LTE B7	20	2850	2630	20.58	20.60	
CA 25A-25A-26A	LTE B26	5	26715	816.5	16QAM	1	0	8715	861.5	LTE B25	20	8365	1962.5	LTE B25	20	8590	1985	20.55	20.60	
CA 26A-41C	LTE B26	10	26990	844	QPSK	25	25	8990	889	LTE B41	20	40620	2593	LTE B41	20	40422	2573.2	20.60	20.60	

FCC ID: BCGA2230



SAR EVALUATION REPORT

Reviewed by:
Quality ManagerTest Dates:
12/16/2019-1/14/2020DUT Type:
Tablet DeviceAPPENDIX F:
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Table 5
Output Powers – Ant 2B

FCC ID: BCGA2230	 PCTEST Passing the point to the customer	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 12/16/2019-1/14/2020	DUT Type: Tablet Device	APPENDIX F: Page 5 of 16	

1.3.6

LTE Band 25 as PCC

Table 6
Output Powers – Ant 2A

Combination	PCC										SCC 1				SCC 2				SCC 3				SCC 4				Power		
	PCC Band	PCC BW [MHz]	PCC [UL] Ch.	PCC [UL] Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC [DL] Channel	PCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	LTE Tx Power with DL CA Carrier Tx Power (dBm)	LTE Single Carrier Tx Power (dBm)		
CA 5A-25A	LTE B25	20	26590	1905	16QAM	1	99	8590	1985	LTE B5	10	2525	881.5	-	-	-	-	-	-	-	-	-	-	-	-	-	15.10	15.10	
CA 12A-25A	LTE B7	20	26590	1905	16QAM	1	99	8590	1985	LTE B2	10	5095	737.5	-	-	-	-	-	-	-	-	-	-	-	-	-	15.10	15.10	
CA 25A-26A	LTE B25	20	26590	1905	16QAM	1	99	8590	1985	LTE B25	10	8865	876.5	-	-	-	-	-	-	-	-	-	-	-	-	-	15.10	15.10	
CA 25A-46A	LTE B25	20	26590	1905	16QAM	1	99	8590	1985	LTE B46	20	50065	5037.5	-	-	-	-	-	-	-	-	-	-	-	-	-	15.10	15.10	
CA 25A-25A-25A	LTE B25	20	26590	1905	16QAM	1	99	8590	1985	LTE B25	20	8140	1940	LTE B26	5	8865	876.5	-	-	-	-	-	-	-	-	-	-	14.84	15.10
CA 25A-25A-41A	LTE B25	20	26590	1905	16QAM	1	99	8590	1985	LTE B25	20	8140	1940	LTE B41	20	40020	2093	-	-	-	-	-	-	-	-	-	-	14.94	15.10
CA 25A-41C	LTE B25	20	26590	1905	16QAM	1	99	8590	1985	LTE B41	20	40020	2093	LTE B41	20	40020	2093	-	-	-	-	-	-	-	-	-	-	14.88	15.10
CA 25A-46C	LTE B25	20	26590	1905	16QAM	1	99	8590	1985	LTE B46	20	50065	5037.5	LTE B46	20	50067	5017.7	-	-	-	-	-	-	-	-	-	-	14.91	15.10
CA 25A-25A-41C	LTE B25	20	26590	1905	16QAM	1	99	8590	1985	LTE B25	20	8140	1940	LTE B41	20	40020	2093	LTE B41	20	40020	2093	LTE B41	20	40020	2093	-	-	14.71	15.10
CA 25A-46C	LTE B25	20	26590	1905	16QAM	1	99	8590	1985	LTE B46	20	50065	5037.5	LTE B46	20	50067	5017.7	LTE B46	20	50065	5037.5	-	-	-	-	-	-	14.91	15.10
CA 25A-25A-41D	LTE B25	20	26590	1905	16QAM	1	99	8590	1985	LTE B25	20	8140	1940	LTE B41	20	40020	2093	LTE B41	20	40018	2012.8	LTE B41	20	40018	2012.8	-	-	13.08	15.10

1.3.7

LTE Band 30 as PCC

Table 7
Output Powers – Ant 4B

Combination	PCC										SCC 1				SCC 2				SCC 3				SCC 4				Power		
	PCC Band	PCC BW [MHz]	PCC [UL] Ch.	PCC [UL] Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC [DL] Channel	PCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	LTE Tx Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)		
CA 2C-30A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B2	10	900	1980	LTE B2	10	900	1940.2	-	-	-	-	-	-	-	-	-	13.98	13.98	
CA 2A-2A-30A-30A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B2	10	900	1980	LTE B2	10	900	1940	LTE B29	10	9715	722.5	-	-	-	-	-	-	13.50	13.50
CA 4A-4A-30A-30A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B4	20	2175	2132.5	LTE B4	10	2050	2100	LTE B5	10	2525	881.5	-	-	-	-	-	-	13.48	13.50
CA 4A-4A-12A-30A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B4	20	2175	2132.5	LTE B4	10	2050	2100	LTE B12	10	5095	737.5	-	-	-	-	-	-	13.48	13.50
CA 2A-4A-30A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B2	10	900	1980	LTE B4	20	2175	2132.5	LTE B5	10	2525	881.5	-	-	-	-	-	-	13.48	13.50
CA 2A-4A-12A-30A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B2	10	900	1980	LTE B4	20	2175	2132.5	LTE B12	10	5095	737.5	-	-	-	-	-	-	13.48	13.50
CA 2A-4A-30A-66A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B2	10	900	1980	LTE B6	10	2525	881.5	LTE B29	10	9715	722.5	-	-	-	-	-	-	13.47	13.50
CA 2A-2A-30A-66A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B2	10	900	1980	LTE B2	10	900	1940	LTE B66	20	66786	2145	-	-	-	-	-	-	13.49	13.50
CA 5B-30A-66A-66A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B5	10	2525	881.5	LTE B5	5	2403	874.3	LTE B66	20	66786	2145	LTE B66	20	67236	2190	-	-	13.48	13.50
CA 2A-2A-3A-30A-66A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B2	10	900	1980	LTE B12	10	5095	737.5	LTE B66	20	66786	2145	LTE B66	20	67236	2190	-	-	13.48	13.50
CA 2A-2A-12A-30A-66A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B2	10	900	1980	LTE B5	10	2525	881.5	LTE B66	20	66786	2145	LTE B66	20	67236	2190	-	-	13.50	13.50
CA 2A-8B-30A-66A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B2	10	900	1980	LTE B6	10	2525	881.5	LTE B66	20	66786	2145	LTE B66	20	67236	2190	-	-	13.48	13.50
CA 1A-12A-30A-66A-66A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B2	10	900	1980	LTE B12	10	5095	737.5	LTE B66	20	66786	2145	LTE B66	20	67236	2190	-	-	13.47	13.50

1.3.8

LTE Band 7 as PCC

Table 8
Output Powers – Ant 4B

Combination	PCC Band	PCC										SCC 1				SCC 2				SCC 3				SCC 4				Power		
		PCC BW [MHz]	PCC [UL] Ch	PCC [UL] Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC [DL] Channel	PCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	LTE Tx Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)			
CA 7B	LTE B7	15	21100	2535	QPSK	1	74	3100	2655	LTE B7	5	3007	2646.7	-	-	-	-	-	-	-	-	-	-	-	-	-	13.07	13.13		
CA 5A-7A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B5	10	2525	881.5	-	-	-	-	-	-	-	-	-	-	-	-	-	13.19	13.24		
CA 7A-26A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B26	10	8865	876.5	-	-	-	-	-	-	-	-	-	-	-	-	-	13.22	13.24		
CA 7A-46A (1)	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B46	20	50065	5037.5	-	-	-	-	-	-	-	-	-	-	-	-	-	13.26	13.24		
CA 4A-4A-7A (1)	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B4	20	2175	2132.5	LTE B4	10	2050	2100	-	-	-	-	-	-	-	-	-	-	13.16	13.24	
CA 5A-7A-7A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2850	2630	LTE B5	10	2525	881.5	-	-	-	-	-	-	-	-	-	-	13.20	13.24	
CA 5A-7C	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2850	2630	LTE B26	10	2525	881.5	-	-	-	-	-	-	-	-	-	-	13.26	13.24	
CA 7A-7A-26A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2850	2630	LTE B46	20	50065	5037.5	-	-	-	-	-	-	-	-	-	-	13.25	13.24	
CA 7A-46C (1)	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B46	20	50065	5037.5	LTE B46	20	50067	5017.7	-	-	-	-	-	-	-	-	-	-	13.26	13.24	
CA 7C-46A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2850	2630	LTE B46	20	50065	5037.5	-	-	-	-	-	-	-	-	-	-	13.20	13.24	
CA 7A-46D (1)	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B46	20	50065	5037.5	LTE B46	20	50067	5017.7	LTE B46	20	50063	5007.3	-	-	-	-	-	-	13.23	13.24	
CA 7C-46C	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2850	2630	LTE B46	20	50065	5037.5	LTE B46	20	50067	5017.7	-	-	-	-	-	-	13.21	13.24	
CA 2A-4A-7A-7A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2850	2630	LTE B2	10	900	1960	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	13.17	13.24
CA 2A-4A-7C	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2850	2630	LTE B2	10	900	1960	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	13.18	13.24
CA 2A-4A-7A-12A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B2	10	900	1960	LTE B4	20	2175	2132.5	LTE B12	10	5095	737.5	-	-	-	-	-	-	-	13.16	13.24
CA 2A-7A-7A-66A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2850	2630	LTE B2	10	900	1960	LTE B66	20	66786	2146	-	-	-	-	-	-	-	13.17	13.24
CA 2A-7A-12A-66A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B2	10	900	1960	LTE B12	10	5095	737.5	LTE B66	20	66786	2146	-	-	-	-	-	-	-	13.20	13.24
CA 7C-46D	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2850	2630	LTE B46	20	50065	5037.5	LTE B46	20	50067	5017.7	LTE B46	20	50063	5007.3	-	-	13.17	13.24	

FCC ID: BCGA2230	 PCT
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1.3.9

LTE Band 41 as PCC

Table 9
Output Powers – Ant 4B

Combination	PCC Band	PCC BW [MHz]	PCC [U] Ch.	PCC				PCC [U] Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC [D] Channel	PCC [D] Freq. [MHz]	SCC 1		SCC 2		SCC 3		SCC 4		Power										
				PCC [U] Freq. [MHz]	PCC UL RB	PCC UL RB Offset	PCC [D] Channel							SCC Band	SCC BW [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]	LTE Tx Power with CA Carrier Tx Power (dBm)	LTE Single Carrier Tx Power (dBm)					
CA 41A-41A (I)	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	41490	2080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.89	15.90	
CA 5A-41A	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B5	10	2520	881.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.89	13.90	
CA 26A-41A	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B35	10	8865	876.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.89	13.90	
CA 41A-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	41502	2060.2	LTE B41	20	41490	2080	-	-	-	-	-	-	-	-	-	-	-	-	13.87	13.90	
CA 41C-41A	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40818	2612.8	LTE B41	20	41490	2080	-	-	-	-	-	-	-	-	-	-	-	-	13.88	13.90	
CA 26A-26A-41A	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B25	20	8865	1862.5	LTE B25	20	8865	1865	-	-	-	-	-	-	-	-	-	-	-	-	13.88	13.90	
CA 26A-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40818	2612.8	LTE B25	20	8865	1862.5	-	-	-	-	-	-	-	-	-	-	-	-	13.89	13.90	
CA 26A-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40818	2612.8	LTE B25	20	8865	875.5	-	-	-	-	-	-	-	-	-	-	-	-	13.89	13.90	
CA 41E	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	40818	2612.8	LTE B41	20	42056	2632.6	-	-	-	-	-	-	-	-	-	13.89	13.90
CA 41A-41D	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	41094	2640.4	LTE B41	20	41502	2060.2	LTE B41	20	41490	2080	-	-	-	-	-	-	-	-	-	13.88	13.90
CA 41D-41A	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	40818	2612.8	LTE B41	20	41490	2080	-	-	-	-	-	-	-	-	-	13.89	13.90
CA 41C-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	41502	2060.2	LTE B41	20	41490	2080	-	-	-	-	-	-	-	-	-	13.88	13.90
CA 26A-26A-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B25	20	8865	1862.5	LTE B25	20	8865	1865	-	-	-	-	-	-	-	-	-	13.89	13.90
CA 41C-41D	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	41094	2640.4	LTE B41	20	41502	2060.2	LTE B41	20	41490	2080	-	-	-	-	-	13.89	13.90
CA 41D-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	40818	2612.8	LTE B41	20	41502	2060.2	LTE B41	20	41490	2080	-	-	-	-	-	13.89	13.90
CA 26A-26A-41D	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	40818	2612.8	LTE B25	20	8865	1862.5	LTE B25	20	8865	1865	-	-	-	-	-	13.89	13.90

1.3.10

LTE Band 41 PC2 as PCC

Table 10
Output Powers – Ant 4B

Combination	PCC Band	PCC BW [MHz]	PCC [U] Ch.	PCC				PCC [U] Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC [D] Channel	PCC [D] Freq. [MHz]	SCC 1		SCC 2		SCC 3		SCC 4		Power								
				SCC [U] Freq. [MHz]	SCC [U] RB	SCC [U] RB Offset	SCC [D] Channel							SCC [D] Freq. [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]	LTE Tx Power with CA Carrier Power (dBm)	LTE Single Carrier Tx Power (dBm)				
CA 41A-41A (I)	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	41490	2080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.90	15.90
CA 5A-41A	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B5	10	2520	881.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.90	15.90
CA 26A-41A	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B35	10	8865	876.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.90	15.90
CA 41A-41C	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	41502	2060.2	LTE B41 PC2	20	41490	2080	-	-	-	-	-	-	-	-	-	-	-	15.89	15.90
CA 41C-41A	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40818	2612.8	LTE B41 PC2	20	41490	2080	-	-	-	-	-	-	-	-	-	-	-	15.88	15.90
CA 26A-26A-41A	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B25	20	8865	1862.5	LTE B25	20	8865	1865	-	-	-	-	-	-	-	-	-	-	-	15.89	15.90
CA 26A-41C	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40818	2612.8	LTE B25	20	8865	1862.5	-	-	-	-	-	-	-	-	-	-	-	15.89	15.90
CA 26A-41C	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40818	2612.8	LTE B25	20	8865	1875.5	-	-	-	-	-	-	-	-	-	-	-	15.89	15.90
CA 41E	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40422	2573.2	LTE B41 PC2	20	40818	2612.8	LTE B41 PC2	20	42056	2632.6	-	-	-	-	-	-	-	15.89	15.90
CA 41A-41D	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	41094	2640.4	LTE B41 PC2	20	41502	2060.2	LTE B41 PC2	20	41490	2080	-	-	-	-	-	-	-	15.88	15.90
CA 41D-41A	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40422	2573.2	LTE B41 PC2	20	40818	2612.8	LTE B41 PC2	20	41490	2080	-	-	-	-	-	-	-	15.89	15.90
CA 41C-41C	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40422	2573.2	LTE B41 PC2	20	41502	2060.2	LTE B41 PC2	20	41490	2080	-	-	-	-	-	-	-	15.88	15.90
CA 26A-26A-41C	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40422	2573.2	LTE B25	20	8865	1862.5	LTE B25	20	8865	1865	-	-	-	-	-	-	-	15.89	15.90
CA 41C-41D	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40422	2573.2	LTE B41 PC2	20	41094	2640.4	LTE B41 PC2	20	41502	2060.2	LTE B41 PC2	20	41490	2080	-	-	-	15.89	15.90
CA 41D-41C	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40422	2573.2	LTE B41 PC2	20	40818	2612.8	LTE B41 PC2	20	41502	2060.2	LTE B41 PC2	20	41490	2080	-	-	-	15.89	15.90
CA 26A-26A-41D	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40422	2573.2	LTE B41 PC2	20	40818	2612.8	LTE B25	20	8865	1862.5	LTE B25	20	8865	1865	-	-	-	15.89	15.90

1.3.11

LTE Band 48 as PCC

Table 11
Output Powers – Ant 3

Combination	PCC Band	PCC BW [MHz]	PCC										SCC Band	SCC 1			SCC 2			SCC 3			SCC 4			SCC 5			LTE Tx Power with CA Carrier Power (dBm)	LTE Single Carrier Tx Power (dBm)					
			PCC [U] Ch.	PCC [U] Freq. [MHz]	PCC [U] RB	PCC [U] RB Offset	PCC [D] Channel	PCC [D] Freq. [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]		SCC [D] Channel	SCC [D] Freq. [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]	SCC [D] Channel	SCC [D] Freq. [MHz]								
CA 3A-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50		
CA 2A-48A-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B2	20	900	1860	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 13A-48A-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B13	10	5230	751	LTE B56	20	66766	2145	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.48	16.50	
CA 48A-48A-48A-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	67226	2100	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 48A-48C-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 48C-48A-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 48C-48C-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 13A-48A-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B13	10	5230	751	LTE B56	20	66766	2145	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.48	16.50	
CA 2A-48A-48A-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	67226	2100	-	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50
CA 2A-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B2	20	900	1860	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B2	20	900	1860	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 13A-48C-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B13	10	5230	751	LTE B56	20	66766	2145	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.48	16.50	
CA 2A-48A-48C-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48A-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48C-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16.49	16.50	
CA 2A-48A-48C-48C	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B48	20	56207	3646.7	LTE B48	20	56207	3646.7	LTE B56	20	66766	2145	-	-	-	-	-	-	-	-	-	-	-	16		

1.4 DL CA with DL 4x4 MIMO RF Conduction Powers

This device supports downlink 4x4 MIMO operations for some LTE bands. Uplink transmission is limited to a single output stream. When carrier aggregation was applicable, the general test selection and setup procedures described in Section 1.2 were applied.

Per May 2017 TCB Workshop Notes, SAR for 4x4 DL MIMO was not needed since the maximum average output power in 4x4 DL MIMO mode was not more than 0.25 dB higher than the maximum output power with 4x4 DL MIMO inactive. Additionally, SAR for 4x4 MIMO Downlink Carrier Aggregation was not needed since the maximum average output power in 4x4 MIMO Downlink Carrier Aggregation mode was not more than 0.25 dB higher than the maximum output power with 4x4 MIMO Downlink and downlink carrier aggregation inactive.

1.4.1 LTE 4x4 MIMO DL Standalone Powers

Table 12
Output Powers – Ant 3

LTE Band	Bandwidth [MHz]	Channel	Frequency [MHz]	Modulation	RB Size	RB Offset	4x4 DL MIMO Tx. Power [dBm]	Single Antenna Tx. Power [dBm]	Maximum Allowed Power [dBm]
48	20	56207	3646.7	64QAM	1	99	16.50	16.50	16.50

Table 13
Output Powers – Ant 2A

LTE Band	Bandwidth [MHz]	Channel	Frequency [MHz]	Modulation	RB Size	RB Offset	4x4 DL MIMO Tx. Power [dBm]	Single Antenna Tx. Power [dBm]	Maximum Allowed Power [dBm]
25	20	26590	1905	16QAM	1	99	14.98	15.10	15.10

Table 14
Output Powers – Ant 2B

LTE Band	Bandwidth [MHz]	Channel	Frequency [MHz]	Modulation	RB Size	RB Offset	4x4 DL MIMO Tx. Power [dBm]	Single Antenna Tx. Power [dBm]	Maximum Allowed Power [dBm]
66	20	132072	1720	16QAM	1	50	14.54	14.60	14.90

FCC ID: BCGA2230	 SAR EVALUATION REPORT	Reviewed by: Quality Manager
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Table 15
Output Powers – Ant 4B

LTE Band	Bandwidth [MHz]	Channel	Frequency [MHz]	Modulation	RB Size	RB Offset	4x4 DL MIMO Tx. Power [dBm]	Single Antenna Tx. Power [dBm]	Maximum Power [dBm]
7	20	21100	2535	QPSK	50	0	13.26	13.24	13.30
30	10	27710	2310	16QAM	1	25	13.47	13.50	13.70
41	20	40620	2593	16QAM	1	0	15.81	15.90	15.90
41 PC2	20	40620	2593	64QAM	1	0	15.78	15.90	15.90

FCC ID: BCGA2230	 PCTEST Providing the best test solutions	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 12/16/2019-1/14/2020	DUT Type: Tablet Device		APPENDIX F: Page 9 of 16

LTE Band 12 as PCC

Table 16
Output Powers – Ant 1

Combination	PCC Band	PCC										SSC 1				SSC 2				SSC 3				SSC 4				Power									
		PCC BW [MHz]	PCC [UL] Freq. [MHz]	PCC [DL] Freq. [MHz]	PCC Mod.	PCC UL RB	PCC DL RB	PCC UL Offset	PCC [UL] Freq. [MHz]	Dl Ant. Config.	SSC Band	SSC BW [MHz]	SSC [UL] Freq. [MHz]	SSC [DL] Ch.	SSC [UL] Freq. [MHz]	Dl Ant. Config.	SSC Band	SSC BW [MHz]	SSC [UL] Freq. [MHz]	SSC [DL] Ch.	Dl Ant. Config.	SSC Band	SSC BW [MHz]	SSC [UL] Freq. [MHz]	SSC [DL] Ch.	Dl Ant. Config.	SSC Band	SSC BW [MHz]	SSC [UL] Freq. [MHz]	SSC [DL] Ch.	Dl Ant. Config.	LTE Tx Power [dBm]	LTE Single Carrier Power [dBm]				
CA (FDD) CA-1	LTE B12	3	20305	709.5	4G-LTE	1	28	5025	790.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.49	21.49
CA (FDD) CA-2	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B4	20	2175	2122.5	4x4	LTE B2	20	900	1960	4x4	LTE B4	20	2175	2122.5	4x4	LTE B4	20	2175	2122.5	4x4	LTE B4	20	2175	2122.5	4x4	21.08	21.48
CA (FDD) CA-3	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-1	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-2	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-3	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-4	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-5	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-6	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-7	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-8	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-9	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-10	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-11	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-12	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-13	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-14	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-15	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-16	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-17	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-18	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-19	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-20	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-21	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-22	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-23	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-24	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-25	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-26	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-27	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-28	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-29	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-30	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-31	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-32	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-33	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-34	LTE B12	5	20305	709.5	1G-GSM	1	24	5035	735.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	21.08	21.48
CA (TDD) CA-35	LTE B12	5																																			

LTE Band 13 as PCC

Table 17
Output Powers – Ant 1

Combination	PCC Band	PCC BW [MHz]	PCC (UL) Freq. [MHz]	Mod.		PCC (DL) Freq. [MHz]	DL Ant. Config.	SCC 1		DL Ant. Config.	SCC 2		DL Ant. Config.	SCC 3		DL Ant. Config.	SCC 4		DL Ant. Config.	Power		
				PCC UL RB	PCC UL RB Offset			SCC Band	SCC BW [MHz]		SCC (DL) Freq. [MHz]	SCC Band		SCC BW [MHz]	SCC (DL) Freq. [MHz]		SCC Band	SCC BW [MHz]		SCC (DL) Freq. [MHz]	LTE Tx Power with DC CA Enabled (dBm)	LTE Single Tx Power (dBm)
CA 14A-44A-13A	LTE-B13	10	21320	782	0PSK	1	2A	5230	751	242	LTE-B4	20	21175	21125	44A	LTE-B4	20	21310	21350	44A	-	-
CA 12A-14A-13A	LTE-B13	10	21320	782	0PSK	1	0	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B4	20	21175	21325	44A	21.13	21.14
CA 12A-14A-13A	LTE-B13	10	21320	782	0PSK	1	2A	5230	751	242	LTE-B4	20	21175	21125	44A	LTE-B4	20	21310	21350	44A	21.13	21.14
CA 13A-44A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B4	20	21175	21125	44A	LTE-B4	20	21310	21350	44A	21.15	21.16
CA 13A-44A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B4	20	21175	21125	44A	LTE-B4	20	21310	21350	44A	21.15	21.16
CA 13A-44A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B4	20	21175	21125	44A	LTE-B4	20	21310	21350	44A	21.15	21.16
CA 13A-44A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B4	20	21175	21125	44A	LTE-B4	20	21310	21350	44A	21.15	21.16
CA 13A-44A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B4	20	21175	21125	44A	LTE-B4	20	21310	21350	44A	21.15	21.16
CA 13A-44A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B4	20	21175	21125	44A	LTE-B4	20	21310	21350	44A	21.15	21.16
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	5230	751	242	LTE-B2	20	900	1560	44A	LTE-B2	20	900	1560	44A	21.16	21.17
CA 12A-12A-13A-16A	LTE-B13	5	21330	783	1GQAM	1	2A	52														

FCC ID: BCGA2230	 SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 12/16/2019-1/14/2020	DUT Type: Tablet Device	APPENDIX F: Page 10 of 16

LTE Band 5 as PCC

Table 18
Output Powers – Ant 1

Combination	PCB Band	PCB BW [MHz]	PCC [UL] Ch	PCC [UL] Freq. [MHz]	PCC				DL Ant. Config.	SCC 1				DL Ant. Config.	SCC 2				DL Ant. Config.	SCC 3				DL Ant. Config.	SCC 4				DL Ant. Config.	Power		
					Mod.	RB	PCUL Int Offset	PCUL Ch		PCC [DL] Ch	PCC [DL] Freq. [MHz]	SCC [DL] Ch	SCC [DL] Freq. [MHz]		SCC Band	SCC BW [MHz]	SCC [DL] Ch	SCC [DL] Freq. [MHz]		SCC Band	SCC BW [MHz]	SCC [DL] Ch	SCC [DL] Freq. [MHz]		SCC Band	SCC BW [MHz]	SCC [DL] Ch	SCC [DL] Freq. [MHz]		SCC Band	SCC BW [MHz]	SCC [DL] Ch
CA 2A(1)	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B7	20	1100	2695	4x4	LTE B7	20	1100	2695	4x4	LTE B7	20	1100	2695	4x4	LTE B7	20	1100	2695	4x4	20.18	20.60
CA 2A(2)	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B7	20	1100	2695	4x4	LTE B7	20	1100	2695	4x4	LTE B7	20	1100	2695	4x4	LTE B7	20	1100	2695	4x4	20.18	20.60
CA 2A(3A)	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B4	20	8020	3390	4x4	LTE B4	20	8020	3390	4x4	LTE B4	20	8020	3390	4x4	LTE B4	20	8020	3390	4x4	20.43	20.85
CA 2A(4)	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B4	20	8020	3390	4x4	LTE B4	20	8020	3390	4x4	LTE B4	20	8020	3390	4x4	LTE B4	20	8020	3390	4x4	20.43	20.85
CA 2D(1,5)	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	LTE B2	20	900	1960	4x4	20.51	20.93
CA 1A(1) SB (1)	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B5	5	2577	886.7	2x2	LTE B4	20	2175	2125.5	4x4	LTE B4	20	2175	2125.5	4x4	LTE B4	20	2175	2125.5	4x4	20.39	20.60
CA 5A(17A) 7A	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B7	20	3100	2655	4x4	LTE B7	20	2850	2630	4x4	-	-	-	-	-	-	-	-	-	-	20.43	20.60
CA 5A(17B) 7B	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B7	20	3100	2655	4x4	LTE B7	20	2850	2630	4x4	-	-	-	-	-	-	-	-	-	-	20.38	20.60
CA 2A(1A)-66A	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B7	20	900	1960	4x4	LTE B4	20	50665	5537.5	2x2	LTE B4	20	50665	5537.5	2x2	LTE B4	20	50665	5537.5	2x2	20.26	20.60
CA 5A-5A(66A)	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B4	20	50665	5537.5	2x2	LTE B6	20	66786	2145	4x4	LTE B6	20	66786	2145	4x4	LTE B6	20	66786	2145	4x4	20.40	20.60
CA 1A(1A)-66B	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B5	5	2577	886.7	2x2	LTE B4	20	2175	2125.5	4x4	LTE B4	20	2175	2125.5	4x4	LTE B4	20	2175	2125.5	4x4	20.25	20.60
CA 2A(2A)-66B	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B5	5	2577	886.7	2x2	LTE B4	20	2175	2125.5	4x4	LTE B4	20	2175	2125.5	4x4	LTE B4	20	2175	2125.5	4x4	20.25	20.60
CA 5A(66A)-66C	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	66786	2145	4x4	LTE B6	20	67038	2102.7	4x4	LTE B6	20	67236	2100	4x4	LTE B6	20	67236	2100	4x4	20.37	20.60
CA 2A(2A)-66C	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66D	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66E	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66F	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66G	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66H	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66I	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66J	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66K	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66L	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66M	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66N	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66O	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66P	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66Q	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66R	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66S	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66T	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66U	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66V	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66W	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66X	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66Y	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66Z	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66AA	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66AB	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66AC	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66AD	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66AE	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	900	1960	4x4	LTE B2	20	100	1840	4x4	LTE B4	20	2175	2135	4x4	LTE B4	20	2175	2135	4x4	20.12	20.60
CA 2A(2A)-66AF	LTE BB	5	2625	846.5	16QAM	1	0	262																								

LTE Band 26 as PCC

Table 19
Output Powers – Ant 1

Combination	PCC Band	PCC										SCC 1				SCC 2				Power		
		PCC BW [MHz]	PCC [UL] Ch.	PCC [UL] Freq. [MHz]	Mod.	PCC UL#1 RB	PCC UL RB Offset	PCC [DL] Ch.	PCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Power (TxPower) (dBm)
CA [7A]-26A	LTE B26	10	26990	844	QPSK	25	25	8990	889	2x2	LTE B7	20	3100	2655	4x4	-	-	-	-	-	20.57	20.60
CA [25A]-26A	LTE B26	10	26990	844	QPSK	25	25	8990	889	2x2	LTE B25	20	8365	1962.5	4x4	-	-	-	-	-	20.55	20.60
CA 26A-[41A]	LTE B26	10	26990	844	QPSK	25	25	8990	889	2x2	LTE B41	20	40620	2593	4x4	-	-	-	-	-	20.60	20.60
CA [7A]-[7A]-26A	LTE B26	10	26990	844	QPSK	25	25	8990	889	2x2	LTE B7	20	3100	2655	4x4	LTE B7	20	2850	2630	4x4	20.58	20.60
CA [25A]-[25A]-26A	LTE B26	5	26715	816.5	16QAM	1	0	8715	861.5	2x2	LTE B25	20	8365	1962.5	4x4	LTE B25	20	8590	1985	4x4	20.27	20.60
CA 26A-[41A]	LTE B26	10	26990	844	QPSK	25	25	8990	889	2x2	LTE B41	20	40620	2593	4x4	LTE B41	20	40422	2573.2	4x4	20.58	20.60

FCC ID: BCGA2230	 SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 12/16/2019-1/14/2020	DUT Type: Tablet Device	APPENDIX F: Page 11 of 16

LTE Band 66 as PCC

Table 20
Output Powers – Ant 2B

Combination		PCC										SCC-1										SCC-2										SCC-3										SCC-4										SCC-5										SCC-6										SCC-7										SCC-8										SCC-9										SCC-10										SCC-11										SCC-12										SCC-13										SCC-14										SCC-15										SCC-16										SCC-17										SCC-18										SCC-19										SCC-20										SCC-21										SCC-22										SCC-23										SCC-24										SCC-25										SCC-26										SCC-27										SCC-28										SCC-29										SCC-30										SCC-31										SCC-32										SCC-33										SCC-34										SCC-35										SCC-36										SCC-37										SCC-38										SCC-39										SCC-40										SCC-41										SCC-42										SCC-43										SCC-44										SCC-45										SCC-46										SCC-47										SCC-48										SCC-49										SCC-50										SCC-51										SCC-52										SCC-53										SCC-54										SCC-55										SCC-56										SCC-57										SCC-58										SCC-59										SCC-60										SCC-61										SCC-62										SCC-63										SCC-64										SCC-65										SCC-66										SCC-67										SCC-68										SCC-69										SCC-70										SCC-71										SCC-72										SCC-73										SCC-74										SCC-75										SCC-76										SCC-77										SCC-78										SCC-79										SCC-80										SCC-81										SCC-82										SCC-83										SCC-84										SCC-85										SCC-86										SCC-87										SCC-88										SCC-89										SCC-90										SCC-91										SCC-92										SCC-93										SCC-94										SCC-95										SCC-96										SCC-97										SCC-98										SCC-99										SCC-100										SCC-101										SCC-102										SCC-103										SCC-104										SCC-105										SCC-106										SCC-107										SCC-108										SCC-109										SCC-110										SCC-111										SCC-112										SCC-113										SCC-114										SCC-115										SCC-116										SCC-117										SCC-118										SCC-119										SCC-120										SCC-121										SCC-122										SCC-123										SCC-124										SCC-125										SCC-126										SCC-127										SCC-128										SCC-129										SCC-130										SCC-131										SCC-132										SCC-133										SCC-134										SCC-135										SCC-136										SCC-137										SCC-138										SCC-139										SCC-140										SCC-141										SCC-142										SCC-143										SCC-144										SCC-145										SCC-146										SCC-147										SCC-148										SCC-149										SCC-150										SCC-151										SCC-152										SCC-153										SCC-154										SCC-155										SCC-156										SCC-157										SCC-158										SCC-159										SCC-160										SCC-161										SCC-162										SCC-163										SCC-164										SCC-165										SCC-166										SCC-167										SCC-168										SCC-169										SCC-170										SCC-171										SCC-172										SCC-173										SCC-174										SCC-175										SCC-176										SCC-177										SCC-178										SCC-179										SCC-180										SCC-181										SCC-182										SCC-183										SCC-184										SCC-185										SCC-186										SCC-187										SCC-188										SCC-189										SCC-190										SCC-191										SCC-192										SCC-193										SCC-194										SCC-195										SCC-196										SCC-197										SCC-198										SCC-199										SCC-200										SCC-201										SCC-202										SCC-203										SCC-204										SCC-205										SCC-206										SCC-207										SCC-208										SCC-209										SCC-210										SCC-211										SCC-212										SCC-213										SCC-214										SCC-215										SCC-216										SCC-217										SCC-218										SCC-219										SCC-220										SCC-221										SCC-222										SCC-223										SCC-224										SCC-225										SCC-226										SCC-227										SCC-228										SCC-229										SCC-230										SCC-231										SCC-232										SCC-233										SCC-234										SCC-235										SCC-236										SCC-237										SCC-238										SCC-239										SCC-240										SCC-241										SCC-242										SCC-243										SCC-244										SCC-245										SCC-246										SCC-247										SCC-248										SCC-249										SCC-250										SCC-251										SCC-252										SCC-253										SCC-254										SCC-255										SCC-256										SCC-257										SCC-258										SCC-259										SCC-260										SCC-261										SCC-262										SCC-263										SCC-264										SCC-265										SCC-266										SCC-267										SCC-268										SCC-269										SCC-270										SCC-271										SCC-272										SCC-273										SCC-274										SCC-275										SCC-276										SCC-277										SCC-278										SCC-279										SCC-280										SCC-281										SCC-282										SCC-283										SCC-284										SCC-285										SCC-286										SCC-287										SCC-288										SCC-289										SCC-290										SCC-291										SCC-292										SCC-293										SCC-294										SCC-295										SCC-296										SCC-297										SCC-298										SCC-299									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LTE Band 25 as PCC

Table 21
Output Powers – Ant 2A

[illegible]

LTE Band 30 as PCC

Table 22
Output Powers – Ant 4B

[illegible]

LTE Band 7 as PCC

Table 23
Output Powers – Ant 4B

Combination	PCB Band	PCC										SC1		SC2		SC3		SC4		Power												
		PCC BW [MHz]	PCC [UL] Ch.	PCC [UL] Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC [DL] Ch.	PCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	LTE Tx Power with CLC Enabled [dBm]	LTE Single Carrier Tx Power [dBm]					
CA [T8]	LTE BT	15	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	5	2007	2685	4x4											13.21	13.24					
CA SA [T4]	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	10	2125	881.5	2x2											13.18	13.24					
CA [T4]-26A	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B26	10	8905	876.5	2x2											13.18	13.24					
CA [T4]-26A [1]	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B46	20	50665	5537.5	2x2											13.23	13.24					
CA [T4]-[T4]-26A	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B12	20	900	1960	4x4	LTE B2	20	900	1960	4x4						13.13	13.18					
CA [4A]-[4A]-[T4]	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B4	20	2175	2122.5	4x4	LTE B4	10	2130	2150	2x2						13.16	13.24					
CA SA [T4]-26A	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2830	4x4	LTE B5	10	2525	881.5	2x2						13.16	13.24					
CA [T4]-[T4]-26A	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2832	4x4	LTE B5	10	2525	881.5	2x2						13.16	13.24					
CA [T4]-[T4]-26A	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2830	4x4	LTE B26	10	8905	876.5	2x2						13.18	13.24					
CA [T4]-46C [1]	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B46	20	50665	5537.5	2x2	LTE B46	20	50667	5537.7	2x2						13.23	13.24					
CA [T4]-46C [2]	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2832	4x4	LTE B46	20	50665	5537.5	2x2						13.23	13.24					
CA [T4]-[T4]-26A	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B46	20	50667	5537.7	2x2	LTE B46	20	50667	5537.7	2x2						13.23	13.24					
CA [T4]-46D [1]	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B46	20	50665	5537.5	2x2	LTE B46	20	50667	5537.7	2x2						13.23	13.24					
CA [T4]-46D [2]	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2832	4x4	LTE B46	20	50665	5537.5	2x2						13.13	13.24					
CA [T4]-[T4]-26A	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2830	4x4	LTE B2	20	900	1960	4x4	LTE B4	20	2175	2122.5	4x4	13.13	13.18					
CA [2A]-[4A]-[T4]	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2832	4x4	LTE B2	20	900	1960	4x4	LTE B4	20	2175	2122.5	4x4	13.13	13.18					
CA [2A]-[4A]-[T4]-26A	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2832	4x4	LTE B2	20	900	1960	4x4	LTE B4	20	2175	2122.5	4x4	13.13	13.18					
CA [2A]-[4A]-[T4]-26A	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2830	4x4	LTE B2	20	900	1960	4x4	LTE B12	10	5095	77.5	2x2		13.18	13.24				
CA [T4]-[T4]-26A	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2840	4x4	LTE B2	20	900	1960	2x2	LTE B26	10	89786	2485	4x4		13.20	13.24				
CA [T4]-[T4]-26A	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2840	4x4	LTE B12	10	5095	77.5	2x2	LTE B26	10	89786	2485	4x4		13.20	13.24				
CA [T4]-46A	LTE BT	20	21100	2535	QPSK	50	0	1100	2656	4x4	LTE BT	20	2902	2682.2	4x4	LTE B46	20	50605	5537.5	2x2	LTE B46	20	50607	5537.7	2x2	LTE B46	20	50603	5567.3	2x2	13.17	13.24

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LTE Band 41 as PCC

Table 24
Output Powers – Ant 4B

[illegible]

1.4.11

LTE Band 41 PC2 as PCC

Table 25
Output Powers – Ant 4B

Combination	PCC										SCS 1				SCS 2				SCS 3				SCS 4				Power							
	PCC Band	PCC BW [MHz]	PCC [CA]	PCC [Freq. [MHz]]	Mod.	PCC UL PR	PCC UL RB	PCC UL NB Offset	PCC [CA]	PCC [Freq. [MHz]]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [CA]	SCC [Freq. [MHz]]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [CA]	SCC [Freq. [MHz]]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [CA]	SCC [Freq. [MHz]]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [CA]	SCC [Freq. [MHz]]	DL Ant. Config.	Tx Power with CA [dBm]	LTE Single Carrier Tx Power [dBm]	
CA (41A)(41A) (41)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.87	18.87
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B7B	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	18.88	18.88
CA (41A)(41A)	LTE B4 PC2	20	4G-LTE	2353	QAM64	0	4G-LTE	2353	4A4	LTE B4 PC2	20	41207	2460.2	4A4		LTE B5	10	2375	1815	2A2		4G-LTE B4 PC2	20	41A00	2480	4A4		4G-LTE B4 PC2	20	41A00	2480	4A4	1	

1.4.12

LTE Band 48 as PCC

Table 26
Output Powers – Ant 3

[illegible]

FCC ID: BCGA2230	 SAR EVALUATION REPORT	Reviewed by: Quality Manager
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1.5.2.2 LTE Band 41 PC2

Table 30
Output Powers – Ant 4B

[illegible]

1.5.2.3 LTE Band 7

Table 31
Output Powers – Ant 4B

	PCC										SCC 1										Power		
Combination	PCC Band	PCC BW [MHz]	PCC UL Ch.	PCC (UL) Freq. [MHz]	Mod.	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC UL Ch.	SCC (UL) Freq. [MHz]	Mod	SCC UL # RB	SCC UL RB Offset	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	DL Ant. Config.	ULCA Tx Power with add'l CA config. active on DL (dBm)	ULCA Tx Power (dBm)	
CA [7C]	LTE B7	20	20850	2510	QPSK	50	50	2850	2630	4x4	LTE B7	20	21048	2529.8	QPSK	50	0	3048	2649.8	4x4	13.09	13.12	

FCC ID: BCGA2230	 SAR EVALUATION REPORT	Reviewed by: Quality Manager
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APPENDIX G: POWER REDUCTION VERIFICATION

FCC ID BCGA2230	 PCTEST	SAR EVALUATION REPORT	Approved by: Quality Manager
Test Dates: 12/16/2019 – 01/14/2020	DUT Type: Tablet Device		APPENDIX G Page 1 of 2

The device supports manufacturer's proprietary power reduction mechanism called "Detect Mode" for the Main Cellular Antenna. Details of this mechanism can be found in the Operational Description. When the device is being used "on-body" or "held in hand" by the user, the device will detect motion and reduce the power of the main antenna. Per the manufacturer, the mechanism is agnostic to different cellular air interfaces. Detect Mode operation was verified for two test cases, on-body and held in hand, for each supported cellular band. The power reduction verification results are below.

1.1 Main Antenna Power Reduction Verification Summary

Table G-1
Main Antenna Power Reduction Verification

Mode/Band	Antenna	Maximum Scenario Maximum Allowed Target Power [dBm]	Reduced Scenario Maximum Allowed Target Power [dBm]	Conducted Power [dBm]			Verdict
				Maximum	Test Case 1	Test Case 2	
GPRS 850 (2 Tx)	1	30.00 (± 0.75)	26.05 (± 0.75)	29.89	25.73	25.70	PASS
	3	31.50 (± 0.75)	26.55 (± 0.75)	31.62	25.84	25.91	PASS
	2a	26.50 (± 0.75)	21.05 (± 0.75)	26.71	20.45	20.44	PASS
GPRS 1900 (2 Tx)	2b	26.50 (± 0.75)	19.75 (± 0.75)	27.25	20.19	20.20	PASS
	4a	26.50 (± 0.75)	20.15 (± 0.75)	26.85	19.40	19.40	PASS
	4b	29.00 (± 0.75)	20.25 (± 0.75)	29.33	19.51	19.50	PASS
WCDMA B5	1	24.00 (± 0.5)	20.10 (± 0.5)	24.50	20.59	20.60	PASS
	3	25.20 (± 0.5)	19.80 (± 0.5)	25.33	19.95	19.98	PASS
	2a	22.50 (± 0.5)	13.75 (± 1)	22.70	14.28	14.29	PASS
WCDMA B4	2b	22.75 (± 0.5)	13.90 (± 1)	23.25	14.31	14.32	PASS
	4a	24.50 (± 0.5)	13.50 (± 1)	24.52	14.20	14.19	PASS
	4b	25.20 (± 0.5)	13.50 (± 1)	25.40	14.00	13.99	PASS
WCDMA B2	2a	22.50 (± 0.5)	14.10 (± 1)	22.70	14.80	14.79	PASS
	2b	22.75 (± 0.5)	13.10 (± 1)	23.25	14.10	14.10	PASS
	4a	24.50 (± 0.5)	13.90 (± 1)	24.65	14.55	14.50	PASS
LTE Band 12	4b	25.20 (± 0.5)	13.70 (± 1)	25.40	14.01	14.04	PASS
	1	24.00 (± 0.5)	21.00 (± 0.5)	24.50	21.41	21.50	PASS
	3	25.20 (± 0.5)	19.50 (± 0.5)	25.51	19.53	19.50	PASS
LTE Band 17	1	24.00 (± 0.5)	21.00 (± 0.5)	24.25	21.30	21.27	PASS
	3	25.20 (± 0.5)	19.50 (± 0.5)	25.40	19.80	19.50	PASS
LTE Band 13	1	24.00 (± 0.5)	21.00 (± 0.5)	24.48	21.35	21.33	PASS
	3	25.20 (± 0.5)	19.80 (± 0.5)	25.68	20.20	20.19	PASS
	1	24.00 (± 0.5)	20.10 (± 0.5)	24.08	20.16	20.09	PASS
LTE Band 5	3	25.20 (± 0.5)	19.80 (± 0.5)	25.11	19.77	19.79	PASS
	1	24.00 (± 0.5)	20.10 (± 0.5)	24.13	20.15	20.14	PASS
	3	25.20 (± 0.5)	19.80 (± 0.5)	25.28	19.98	19.96	PASS
LTE Band 26	2a	22.50 (± 0.5)	13.75 (± 1)	22.57	14.04	14.10	PASS
	2b	23.00 (± 0.5)	13.90 (± 1)	23.20	14.45	14.49	PASS
	4a	24.50 (± 0.5)	13.50 (± 1)	24.57	13.71	13.69	PASS
LTE Band 4	4b	25.20 (± 0.5)	13.50 (± 1)	25.23	13.90	13.89	PASS
	2a	22.50 (± 0.5)	13.75 (± 1)	22.22	13.81	13.83	PASS
	2b	23.00 (± 0.5)	13.90 (± 1)	23.19	14.46	14.41	PASS
LTE Band 66	4a	24.50 (± 0.5)	13.50 (± 1)	24.39	13.77	13.75	PASS
	4b	25.20 (± 0.5)	13.50 (± 1)	25.36	13.98	14.00	PASS
	2a	22.50 (± 0.5)	14.10 (± 1)	22.64	14.61	14.72	PASS
LTE Band 2	2b	23.00 (± 0.5)	13.10 (± 1)	23.50	14.06	14.10	PASS
	4a	24.50 (± 0.5)	13.90 (± 1)	24.43	13.91	13.90	PASS
	4b	25.20 (± 0.5)	13.70 (± 1)	25.38	13.92	13.91	PASS
LTE Band 25	2a	22.50 (± 0.5)	14.10 (± 1)	22.70	14.68	14.70	PASS
	2b	23.00 (± 0.5)	13.10 (± 1)	23.50	14.10	14.10	PASS
	4a	24.50 (± 0.5)	13.90 (± 1)	24.55	13.92	13.90	PASS
LTE Band 30	4b	25.20 (± 0.5)	13.70 (± 1)	25.37	13.94	13.93	PASS
	2a	22.00 (± 0.5)	12.00 (± 1)	22.01	12.01	12.00	PASS
	2b	22.75 (± 0.5)	12.40 (± 1)	23.25	12.70	12.67	PASS
LTE Band 7	4a	23.00 (± 0.5)	12.20 (± 1)	22.93	12.21	12.20	PASS
	4b	23.50 (± 0.5)	12.70 (± 1)	23.59	13.20	13.30	PASS
	2a	22.50 (± 0.5)	11.70 (± 1)	22.47	11.70	11.71	PASS
LTE Band 41 (PC3)	2b	22.50 (± 0.5)	11.30 (± 1)	22.70	11.92	11.95	PASS
	4a	24.50 (± 0.5)	11.50 (± 1)	24.18	11.58	11.60	PASS
	4b	25.20 (± 0.5)	12.30 (± 1)	25.25	12.95	12.94	PASS
LTE Band 41 (PC2)	2a	22.00 (± 0.5)	13.70 (± 1)	22.20	14.02	14.01	PASS
	2b	22.50 (± 0.5)	13.20 (± 1)	22.97	14.12	14.14	PASS
	4a	25.00 (± 0.5)	13.20 (± 1)	25.31	13.81	13.83	PASS
LTE Band 48	4b	25.20 (± 0.5)	15.40 (± 0.5)	25.40	15.60	15.57	PASS
	2a	25.00 (± 0.5)	13.70 (± 1)	25.20	14.08	14.05	PASS
	2b	24.50 (± 0.5)	13.20 (± 1)	24.70	13.90	13.89	PASS
LTE B5 Intra-Band ULCA	4a	27.50 (± 0.5)	13.20 (± 1)	27.01	13.71	13.73	PASS
	4b	28.20 (± 0.5)	15.40 (± 0.5)	28.33	15.60	15.59	PASS
	1	21.50 (± 0.5)	14.30 (± 1)	22.00	15.30	15.30	PASS
LTE B7 Intra-Band ULCA	3	24.50 (± 0.5)	16.00 (± 0.5)	24.34	15.53	15.51	PASS
	2b	21.50 (± 0.5)	14.30 (± 1)	21.68	14.97	14.95	PASS
	4b	25.20 (± 0.5)	15.80 (± 0.5)	25.00	16.30	16.30	PASS
LTE B41 (PC3) Intra-Band ULCA	1	22.50 (± 1)	19.60 (± 1)	22.91	19.73	19.68	PASS
	3	24.00 (± 1)	19.30 (± 1)	24.42	18.30	18.32	PASS
	2a	21.00 (± 1)	11.70 (± 1)	21.43	10.82	10.85	PASS
LTE B41 (PC2) Intra-Band ULCA	2b	20.50 (± 1)	11.30 (± 1)	20.93	10.85	10.88	PASS
	4a	23.50 (± 1)	11.50 (± 1)	22.81	10.80	10.82	PASS
	4b	24.00 (± 1)	12.30 (± 1)	23.05	12.20	12.17	PASS
LTE B41 (PC3) Intra-Band ULCA	2a	20.00 (± 1)	13.70 (± 1)	20.04	12.82	12.85	PASS
	2b	20.50 (± 1)	13.20 (± 1)	20.88	13.26	13.21	PASS
	4a	23.50 (± 1)	13.20 (± 1)	22.51	12.80	12.78	PASS
LTE B41 (PC2) Intra-Band ULCA	4b	24.00 (± 1)	14.90 (± 1)	24.53	13.91	13.93	PASS
	2a	21.50 (± 1)	13.70 (± 1)	22.01	13.57	13.55	PASS
	2b	22.50 (± 1)	13.20 (± 1)	22.68	13.34	13.37	PASS
	4a	25.50 (± 1)	13.20 (± 1)	24.50	12.85	12.81	PASS
	4b	26.00 (± 1)	14.90 (± 1)	25.00	14.24	14.26	PASS

Test Case 1: Device Held in Hand

Test Case 2: Device Resting on Lap

Test Cases represent typical scenarios in which the device power would be reduced. In these scenarios detect mode has been verified to identify typical on-body use-cases including when thin objects, such as a magazine or newspaper, are placed between the body and the device. In the absence of detect mode output, the device defaults to the most conservative power.

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APPENDIX H: IEEE 802.11AX RU SAR EXCLUSION

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1.1 IEEE 802.11ax RU SAR Exclusion

To make the most efficient use of the additional available subcarriers (data tones), IEEE 802.11ax can utilize Orthogonal Frequency-Division Multiple Access (OFDMA) which divides the existing 802.11 channels into smaller subchannels called Resource Units (RUs). Possible RU sizes are: 26T, 52T, 106T, 242T, 484T, 996T.

Per FCC Guidance, 802.11ax was considered a higher order 802.11 mode when compared to a/b/g/n/ac to apply KDB Publication 248227 D01v02r02 for OFDM mode selection. Therefore, SAR tests were not required for 802.11ax based on the maximum allowed output powers of OFDM modes and the reported SAR values. Per FCC Guidance, maximum conducted powers were performed for each RU size to demonstrate that the output powers would not be higher than the other OFDM 802.11 modes.

1.2 IEEE 802.11ax RU Target Powers

1.2.1 Maximum 802.11ax RU WLAN Output Power

A. Antenna 2A

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 2A	20 MHz Bandwidth	1	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		2	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		3	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		4	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		5	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		6	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		7	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		8	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		9	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		10	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		11	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		12	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 2A	20 MHz Bandwidth	1	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50
		2	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		3	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		4	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		5	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		6	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		7	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		8	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		9	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		10	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		11	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		12	8.00	6.50	8.00	6.50	8.00	6.50	8.00	6.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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B. Antenna 4A

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 4A	20 MHz Bandwidth	1	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		2	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		3	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		4	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		5	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		6	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		7	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		8	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		9	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		10	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		11	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		12	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 4A	20 MHz Bandwidth	1	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		2	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		3	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		4	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		5	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		6	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		7	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		8	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		9	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		10	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		11	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		12	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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C. 5GHz ANTlower

Mode/ Band		Tones		26T		52T		106T		242T		484T		996T			
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal			
Modulated Average - Single Tx Chain (dBm) - 5GHz ANTower	20 MHz Bandwidth	36	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50	15.00	13.50					
		40	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50							
		44	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50							
		48	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50							
		52	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		56	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		60	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		64	11.00	9.50	14.00	12.50	14.50	13.00	14.50	13.00							
		100	11.00	9.50	14.00	12.50	14.00	12.50	14.00	12.50							
		104	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		108	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		112	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		116	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		120	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		124	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		128	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		132	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		136	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		140	11.00	9.50	13.50	12.00	13.50	12.00	13.50	12.00							
		144	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00							
		149	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00							
		153	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00							
		157	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00							
		161	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00							
		165	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00							
	40 MHz Bandwidth	38	11.00	9.50	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50			
		46	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50	16.00	14.50					
		54	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00	16.50	15.00					
		62	11.00	9.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00					
		102	11.00	9.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00					
		110	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00	16.50	15.00					
		118	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00	16.50	15.00					
		126	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00	16.50	15.00					
		134	11.00	9.50	14.00	12.50	14.50	13.00	14.50	13.00	14.50	13.00					
		142	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00	16.50	15.00					
		151	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		159	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		80 MHz Bandwidth	42	11.00	9.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
			58	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
	106		10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	
	122		11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00	16.50	15.00	16.50	15.00	16.50	15.00	
	138		11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00	16.50	15.00	16.50	15.00	16.50	15.00	
	155		15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	

Mode/ Band		Tones		26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	
Modulated Average - 2 Tx Chain (dBm) CDD - 5GHz ANTlower	20 MHz Bandwidth	36	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		40	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50					
		44	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50					
		48	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50					
		52	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		56	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		60	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		64	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		100	7.75	6.25	10.75	9.25	13.50	12.00	13.50	12.00					
		104	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		108	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		112	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		116	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		120	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		124	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		128	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		132	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		136	7.75	6.25	10.75	9.25	13.50	12.00	13.50	12.00					
		140	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50					
		144	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		149	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		153	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		157	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		161	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		165	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
	40 MHz Bandwidth	38	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50			
		46	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50			
		54	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00			
		62	8.00	6.50	10.50	9.00	10.50	9.00	10.00	8.50	10.50	9.00			
		102	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50			
		110	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00	16.50	15.00			
		118	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00	16.50	15.00			
		126	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00	16.50	15.00			
		134	7.75	6.25	10.75	9.25	13.00	11.50	13.00	11.50	13.00	11.50			
		142	7.75	6.25	10.75	9.25	13.75	12.25	10.00	8.50	16.50	15.00			
		151	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00			
		159	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00			
		80 MHz Bandwidth	42	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
			58	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
	106		7.75	6.25	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	
	122		7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00	16.50	15.00	16.50	15.00	
	138		7.75	6.25	10.75	9.25	13.75	12.25	10.00	8.50	13.00	11.50	16.50	15.00	
	155	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00		

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Mode/ Band		Tones		26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	
Modulated Average - 2 Tx Chain (dBm) SDM - 5GHz ANTlower	20 MHz Bandwidth	36	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		40	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50					
		44	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50					
		48	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50					
		52	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		56	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		60	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		64	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		100	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		104	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		108	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		112	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		116	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		120	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		124	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		128	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		132	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		136	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		140	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50					
		144	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		149	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		153	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		157	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		161	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		165	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
	40 MHz Bandwidth	38	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50	
		46	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50			
		54	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00			
		62	8.00	6.50	10.50	9.00	10.50	9.00	10.00	8.50	10.50	9.00			
		102	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50			
		110	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00			
		118	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00			
		126	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00			
		134	8.00	6.50	11.00	9.50	13.00	11.50	13.00	11.50	13.00	11.50			
		142	8.00	6.50	11.00	9.50	14.00	12.50	10.00	8.50	16.50	15.00			
		151	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00			
		159	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00			
	80 MHz Bandwidth	42	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	
		58	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	
		106	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	
		122	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00	16.50	15.00	
		138	8.00	6.50	11.00	9.50	14.00	12.50	10.00	8.50	13.00	11.50	16.50	15.00	
		155	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	

D. 5GHz ANTupper

Mode/ Band		Tones		26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	
Modulated Average - Single Tx Chain (dBm) - 5GHz ANTupper	20 MHz Bandwidth	36	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50					
		40	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50					
		44	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50					
		48	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50					
		52	11.00	9.50	14.00	12.50	16.25	14.75	16.25	14.75					
		56	11.00	9.50	14.00	12.50	16.25	14.75	16.25	14.75					
		60	11.00	9.50	14.00	12.50	16.25	14.75	16.25	14.75					
		64	11.00	9.50	14.00	12.50	14.50	13.00	14.50	13.00					
		100	11.00	9.50	14.00	12.50	14.00	12.50	14.00	12.50					
		104	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50					
		108	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50					
		112	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50					
		116	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50					
		120	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50					
		124	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50					
		128	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50					
		132	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50					
		136	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50					
		140	11.00	9.50	13.50	12.00	13.50	12.00	13.50	12.00					
		144	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50					
		149	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		153	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		157	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		161	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		165	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
	40 MHz Bandwidth	38	11.00	9.50	12.00	10.50	12.00	10.50	12.00	10.50		12.00	10.50		
		46	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50		16.00	14.50		
		54	11.00	9.50	14.00	12.50	16.25	14.75	16.25	14.75		16.25	14.75		
		62	11.00	9.50	11.50	10.00	11.50	10.00	11.50	10.00		11.50	10.00		
		102	11.00	9.50	11.50	10.00	11.50	10.00	11.50	10.00		11.50	10.00		
		110	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50		15.00	13.50		
		118	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50		15.00	13.50		
		126	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50		15.00	13.50		
		134	11.00	9.50	14.00	12.50	14.50	13.00	14.50	13.00		14.50	13.00		
		142	11.00	9.50	14.00	12.50	15.00	13.50	13.50	12.00		15.00	13.50		
		151	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00		15.50	14.00		
		159	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00		15.50	14.00		
	80 MHz Bandwidth	42	11.00	9.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00		10.50	9.00
		58	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	
		106	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	
		122	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50	15.00	13.50	15.00	13.50	15.00
		138	11.00	9.50	14.00	12.50	15.00	13.50	13.50	12.00	14.50	13.00	15.00	13.50	15.00
		155	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50

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Mode/ Band		Tones		26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	
Modulated Average - 2 Tx Chain (dBm) CDD - 5GHz ANTupper	20 MHz Bandwidth	36	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		40	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50					
		44	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50					
		48	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50					
		52	8.00	6.50	11.00	9.50	14.00	12.50	16.25	14.75					
		56	8.00	6.50	11.00	9.50	14.00	12.50	16.25	14.75					
		60	8.00	6.50	11.00	9.50	14.00	12.50	16.25	14.75					
		64	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		100	7.75	6.25	10.75	9.25	13.50	12.00	13.50	12.00					
		104	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50					
		108	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50					
		112	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50					
		116	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50					
		120	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50					
		124	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50					
		128	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50					
		132	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50					
		136	7.75	6.25	10.75	9.25	13.50	12.00	13.50	12.00					
		140	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50					
		144	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50					
		149	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		153	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		157	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		161	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		165	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
	40 MHz Bandwidth	38	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50			
		46	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50			
		54	8.00	6.50	11.00	9.50	14.00	12.50	16.25	14.75	16.25	14.75			
		62	8.00	6.50	10.50	9.00	10.50	9.00	10.00	8.50	10.50	9.00			
		102	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50			
		110	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50	15.00	13.50			
		118	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50	15.00	13.50			
		126	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50	15.00	13.50			
		134	7.75	6.25	10.75	9.25	13.00	11.50	13.00	11.50	13.00	11.50			
		142	7.75	6.25	10.75	9.25	13.75	12.25	10.00	8.50	15.00	13.50			
		151	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00			
		159	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00			
	80 MHz Bandwidth	42	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	
		58	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	
		106	7.75	6.25	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	
		122	7.75	6.25	10.75	9.25	13.75	12.25	15.00	13.50	15.00	13.50	15.00	13.50	
		138	7.75	6.25	10.75	9.25	13.75	12.25	10.00	8.50	13.00	11.50	15.00	13.50	
		155	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	

Mode/ Band		Tones		26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	
Modulated Average - 2 Tx Chain (dBm) SDM - 5GHz ANTupper	20 MHz Bandwidth	36	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		40	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50					
		44	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50					
		48	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50					
		52	8.00	6.50	11.00	9.50	14.00	12.50	16.25	14.75					
		56	8.00	6.50	11.00	9.50	14.00	12.50	16.25	14.75					
		60	8.00	6.50	11.00	9.50	14.00	12.50	16.25	14.75					
		64	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		100	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		104	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50					
		108	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50					
		112	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50					
		116	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50					
		120	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50					
		124	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50					
		128	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50					
		132	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50					
		136	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		140	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50					
		144	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50					
		149	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		153	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		157	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		161	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		165	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
	40 MHz Bandwidth	38	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50			
		46	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50			
		54	8.00	6.50	11.00	9.50	14.00	12.50	16.25	14.75	16.25	14.75			
		62	8.00	6.50	10.50	9.00	10.50	9.00	10.00	8.50	10.50	9.00			
		102	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50			
		110	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50			
		118	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50			
		126	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50			
		134	8.00	6.50	11.00	9.50	13.00	11.50	13.00	11.50	13.00	11.50			
		142	8.00	6.50	11.00	9.50	14.00	12.50	10.00	8.50	15.00	13.50			
		151	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00			
		159	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00			
	80 MHz Bandwidth	42	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	
		58	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	
		106	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	
		122	8.00	6.50	11.00	9.50	14.00	12.50	15.00	13.50	15.00	13.50	15.00	13.50	
		138	8.00	6.50	11.00	9.50	14.00	12.50	10.00	8.50	13.00	11.50	15.00	13.50	
		155	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	

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1.2.2 Reduced 802.11ax RU WLAN Output Power

E. Ant 2a

Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 2A/2B
- Simultaneous conditions with LTE Inter-band ULCA

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 2A	20 MHz Bandwidth	1	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		2	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		3	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		4	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		5	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		6	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		7	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		8	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		9	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		10	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		11	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		12	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 2A/2B
- Simultaneous conditions with LTE Inter-band ULCA

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 2A	20 MHz Bandwidth	1	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		2	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		3	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		4	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		5	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		6	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		7	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		8	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		9	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		10	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		11	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		12	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

F. Ant 4a

Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 4A/4B
- Simultaneous conditions with LTE Inter-band ULCA

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 4A	20 MHz Bandwidth	1	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		2	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		3	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		4	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		5	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		6	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		7	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		8	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		9	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		10	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		11	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		12	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 4A/4B
- Simultaneous conditions with LTE Inter-band ULCA

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 4A	20 MHz Bandwidth	1	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		2	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		3	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		4	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		5	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		6	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		7	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		8	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		9	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		10	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		11	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		12	6.00	4.50	6.00	4.50	6.00	4.50	6.00	4.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

G. 5GHz ANTlower

Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 2A
- Simultaneous conditions with LTE Inter-band ULCA

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - 5GHz ANTlower	20 MHz Bandwidth	36	11.00	9.50	12.00	10.50	12.00	10.50	12.00	10.50				
		40	11.00	9.50	12.00	10.50	12.00	10.50	12.00	10.50				
		44	11.00	9.50	12.00	10.50	12.00	10.50	12.00	10.50				
		48	11.00	9.50	12.00	10.50	12.00	10.50	12.00	10.50				
		52	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		56	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		60	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		64	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		100	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		104	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		108	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		112	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		116	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		120	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		124	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		128	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		132	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		136	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		140	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
		144	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00				
	40 MHz Bandwidth	149	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		153	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		157	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		161	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		165	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		38	11.00	9.50	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50		
		46	11.00	9.50	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50		
		54	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00		
		62	11.00	9.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		102	11.00	9.50	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		110	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00		
		118	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00		
	80 MHz Bandwidth	126	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00		
		134	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00		
		142	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00		
		151	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		159	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		42	11.00	9.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		58	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		106	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		122	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00
		138	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00
		155	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00

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Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 2A
- Simultaneous conditions with LTE Inter-band ULCA

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) CDD - 5GHz ANTower	20 MHz Bandwidth	36	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		40	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		44	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		48	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		52	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		56	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		60	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		64	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		100	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00				
		104	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00				
		108	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00				
		112	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00				
		116	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00				
		120	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00				
		124	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00				
		128	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00				
		132	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00				
		136	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00				
		140	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		144	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00				
		149	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		153	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		157	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		161	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		165	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
	40 MHz Bandwidth	38	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50		
		46	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50	12.00	10.50		
		54	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00		
		62	8.00	6.50	10.50	9.00	10.50	9.00	10.00	8.50	10.50	9.00		
		102	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		110	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00	12.50	11.00		
		118	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00	12.50	11.00		
		126	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00	12.50	11.00		
		134	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00	12.50	11.00		
		142	7.75	6.25	10.75	9.25	12.50	11.00	10.00	8.50	12.50	11.00		
		151	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		159	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
	80 MHz Bandwidth	42	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		58	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		106	7.75	6.25	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		122	7.75	6.25	10.75	9.25	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00
		138	7.75	6.25	10.75	9.25	12.50	11.00	10.00	8.50	12.50	11.00	12.50	11.00
		155	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00

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Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 2A
- Simultaneous conditions with LTE Inter-band ULCA

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) SDM - 5GHz ANTower	20 MHz Bandwidth	36	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		40	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		44	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		48	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		52	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		56	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		60	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		64	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		100	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		104	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		108	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		112	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		116	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		120	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		124	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		128	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		132	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		136	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		140	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		144	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00				
		149	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		153	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		157	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		161	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
		165	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00				
	40 MHz Bandwidth	38	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50		
		46	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50	12.00	10.50		
		54	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00		
		62	8.00	6.50	10.50	9.00	10.50	9.00	10.00	8.50	10.50	9.00		
		102	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		110	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00		
		118	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00		
		126	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00		
		134	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00		
		142	8.00	6.50	11.00	9.50	12.50	11.00	10.00	8.50	12.50	11.00		
		151	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
		159	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00		
	80 MHz Bandwidth	42	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		58	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		106	8.00	6.50	8.50	7.00	8.50	7.00	9.00	7.50	9.00	7.50	9.00	7.50
		122	8.00	6.50	11.00	9.50	12.50	11.00	12.50	11.00	12.50	11.00	12.50	11.00
		138	8.00	6.50	11.00	9.50	12.50	11.00	10.00	8.50	12.50	11.00	12.50	11.00
		155	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00

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H. 5GHz ANTupper

Below table is applicable in the following conditions:

-Simultaneous conditions with Licensed Bands Antenna 3

-Simultaneous conditions with LTE Inter-band ULCA

Mode/ Band		Tones		26T		52T		106T		242T		484T		996T			
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal			
Modulated Average - Single Tx Chain (dBm) - 5GHz ANTupper	20 MHz Bandwidth	36	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50					
		40	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50					
		44	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50					
		48	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50					
		52	11.00	9.50	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75					
		56	11.00	9.50	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75					
		60	11.00	9.50	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75					
		64	11.00	9.50	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75					
		100	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50					
		104	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50					
		108	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50					
		112	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50					
		116	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50					
		120	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50					
		124	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50					
		128	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50					
		132	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50					
		136	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50					
		140	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50					
		144	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50					
		149	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00					
		153	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00					
		157	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00					
		161	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00					
		165	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00					
	40 MHz Bandwidth	38	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50			
		46	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50			
		54	11.00	9.50	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75			
		62	11.00	9.50	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75	11.25	9.75			
		102	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50			
		110	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50			
		118	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50			
		126	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50			
		134	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50			
		142	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50			
		151	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00			
		159	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00			
		80 MHz Bandwidth	42	11.00	9.50	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
			58	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
			106	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50
	122		10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	
	138		10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	
		155	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	

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Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 3
- Simultaneous conditions with LTE Inter-band ULCA

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) CDD - 5GHz ANTupper	20 MHz Bandwidth	36	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50				
		40	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50				
		44	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50				
		48	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50				
		52	8.00	6.50	11.00	9.50	11.25	9.75	11.25	9.75				
		56	8.00	6.50	11.00	9.50	11.25	9.75	11.25	9.75				
		60	8.00	6.50	11.00	9.50	11.25	9.75	11.25	9.75				
		64	8.00	6.50	11.00	9.50	11.25	9.75	11.25	9.75				
		100	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		104	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		108	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		112	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		116	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		120	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		124	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		128	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		132	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		136	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		140	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		144	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50				
		149	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
		153	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
		157	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
		161	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
		165	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
	40 MHz Bandwidth	38	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50		
		46	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50		
		54	8.00	6.50	11.00	9.50	11.25	9.75	11.25	9.75	11.25	9.75		
		62	8.00	6.50	10.50	9.00	10.50	9.00	10.00	8.50	10.50	9.00		
		102	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		110	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		118	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		126	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		134	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		142	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		151	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00		
		159	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00		
	80 MHz Bandwidth	42	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		58	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		106	7.75	6.25	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		122	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50
		138	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50
		155	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00

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Below table is applicable in the following conditions:

- Simultaneous conditions with Licensed Bands Antenna 3
- Simultaneous conditions with LTE Inter-band ULCA

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) SDM - 5GHz ANTupper	20 MHz Bandwidth	36	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50				
		40	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50				
		44	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50				
		48	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50				
		52	8.00	6.50	11.00	9.50	11.25	9.75	11.25	9.75				
		56	8.00	6.50	11.00	9.50	11.25	9.75	11.25	9.75				
		60	8.00	6.50	11.00	9.50	11.25	9.75	11.25	9.75				
		64	8.00	6.50	11.00	9.50	11.25	9.75	11.25	9.75				
		100	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		104	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		108	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		112	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		116	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		120	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		124	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		128	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		132	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		136	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		140	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		144	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50				
		149	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
		153	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
		157	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
		161	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
		165	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00				
	40 MHz Bandwidth	38	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50		
		46	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50		
		54	8.00	6.50	11.00	9.50	11.25	9.75	11.25	9.75	11.25	9.75		
		62	8.00	6.50	10.50	9.00	10.50	9.00	10.00	8.50	10.50	9.00		
		102	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		110	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		118	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		126	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		134	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		142	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50		
		151	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00		
		159	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00		
	80 MHz Bandwidth	42	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		58	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		106	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		122	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50
		138	8.00	6.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50
		155	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00

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1.3 IEEE 802.11ax Measured Powers

Table 1
Maximum 2.4 GHz 802.11ax RU Output Power – Ant 2a

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)	Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	26T	0	11.72	2412	1	52T	37	11.54
			4	12.12				38	12.12
			8	12.50				40	12.98
2417	2	26T	0	12.16	2417	2	52T	37	11.55
			4	12.30				38	12.02
			8	12.50				40	12.36
2437	6	26T	0	12.36	2437	6	52T	37	12.97
			4	12.50				38	12.38
			8	12.16				40	12.29
2462	11	26T	0	12.39	2462	11	52T	37	12.34
			4	12.37				38	12.46
			8	12.50				40	12.33
2467	12	26T	0	10.36	2467	12	52T	37	10.67
			4	10.94				38	10.98
			8	9.83				40	9.14

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)	Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	106T	53	11.78	2412	1	242T	61	13.00
			54	12.78					
2417	2	106T	53	11.65	2417	2	242T	61	13.00
			54	12.47					
2437	6	106T	53	12.53	2437	6	242T	61	12.95
			54	12.13					
2462	11	106T	53	12.49	2462	11	242T	61	12.87
			54	12.23					
2467	12	106T	53	10.98	2467	12	242T	61	10.92
			54	9.66					

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Table 2
Maximum 2.4 GHz 802.11ax RU Output Power – Ant 4a

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)	Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	26T	0	12.05	2412	1	52T	37	12.23
			4	12.36				38	12.46
			8	12.93				40	12.92
2417	2	26T	0	11.76	2417	2	52T	37	12.41
			4	12.32				38	12.39
			8	12.77				40	12.73
2437	6	26T	0	12.53	2437	6	52T	37	12.66
			4	12.70				38	12.58
			8	12.85				40	12.68
2462	11	26T	0	13.00	2462	11	52T	37	12.70
			4	12.60				38	12.57
			8	12.30				40	12.45
2467	12	26T	0	10.74	2467	12	52T	37	10.75
			4	10.97				38	10.90
			8	9.55				40	9.01

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)		Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	106T	53	12.02						
			54	12.55						
2417	2	106T	53	11.96						
			54	12.19						
2437	6	106T	53	12.32						
			54	12.44						
2462	11	106T	53	12.35						
			54	12.17						
2467	12	106T	53	10.63						
			54	9.19						
						2412	1	242T	61	12.81
						2417	2	242T	61	13.00
						2437	6	242T	61	12.89
						2462	11	242T	61	12.95
						2467	12	242T	61	10.95

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Table 3
Maximum 5 GHz 802.11ax RU Output Power – 5GHz ANTlower

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	4	8						37	39	40
	1	5180	36	26T	10.91	11.00	11.00		1	5180	36	52T	13.27	13.81	13.71
5200		40	26T	10.86	11.00	11.00	5200	40		52T	13.86	13.92	13.84		
5240		48	26T	10.81	11.00	11.00	5240	48		52T	13.35	13.71	13.57		
2A	5260	52	26T	10.75	11.00	11.00	2A	5260	52	52T	13.25	13.67	13.61		
	5300	60	26T	10.85	11.00	11.00		5300	60	52T	13.40	13.79	13.72		
	5320	64	26T	10.91	11.00	11.00		5320	64	52T	13.45	13.91	13.85		
2C	5500	100	26T	10.80	11.00	11.00	2C	5500	100	52T	13.23	13.47	13.40		
	5520	104	26T	11.00	11.00	11.00		5520	104	52T	13.07	13.59	13.52		
	5580	116	26T	10.97	11.00	11.00		5580	116	52T	13.49	13.65	13.38		
	5660	132	26T	11.00	11.00	11.00		5660	132	52T	13.24	13.41	13.26		
	5680	136	26T	10.98	11.00	11.00		5680	136	52T	13.14	13.39	13.43		
	5700	140	26T	10.92	11.00	11.00		5700	140	52T	12.84	13.14	13.00		
	5720	144	26T	10.80	11.00	11.00		5720	144	52T	12.97	13.22	13.27		
	5745	149	26T	14.91	15.21	15.19		5745	149	52T	14.53	14.92	14.91		
3	5785	157	26T	14.93	15.32	15.22	3	5785	157	52T	14.53	14.80	14.72		
	5825	165	26T	14.86	15.30	15.23		5825	165	52T	14.84	15.22	15.11		

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					53	54	N/A						61	N/A	N/A
	1	5180	36	106T	15.00	15.00			1	5180	36	242T	15.00		
	5200	40	106T	16.00	16.00			5200	40	242T	16.00				
	5240	48	106T	16.00	16.00			5240	48	242T	16.00				
2A	5260	52	106T	16.31	16.50		2A	5260	52	242T	16.47				
	5300	60	106T	16.33	16.50			5300	60	242T	16.50				
	5320	64	106T	14.41	14.50			5320	64	242T	14.50				
2C	5500	100	106T	13.96	14.00		2C	5500	100	242T	14.00				
	5520	104	106T	16.31	16.50			5520	104	242T	16.50				
	5580	116	106T	15.50	16.50			5580	116	242T	16.49				
	5660	132	106T	16.44	16.50			5660	132	242T	16.46				
	5680	136	106T	16.35	16.50			5680	136	242T	16.34				
	5700	140	106T	13.38	13.50			5700	140	242T	13.50				
	5720	144	106T	16.17	16.32			5720	144	242T	16.50				
	5745	149	106T	15.50	15.50			5745	149	242T	15.50				
3	5785	157	106T	15.50	15.50		3	5785	157	242T	15.50				
	5825	165	106T	15.50	15.50			5825	165	242T	15.50				

40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	8	17						37	40	44
	1	5190	38	26T	10.50	11.00	10.78		1	5190	38	52T	11.19	11.91	11.41
		5230	46	26T	10.88	11.00	11.00			5230	46	52T	13.19	13.29	13.07
	2A	5270	54	26T	10.75	11.00	11.00		2A	5270	54	52T	13.34	13.76	13.46
		5310	62	26T	10.50	10.96	11.00			5310	62	52T	11.08	11.25	11.08
	2C	5510	102	26T	10.74	10.82	11.00		2C	5510	102	52T	10.64	10.71	10.61
		5550	110	26T	10.93	11.00	11.00			5550	110	52T	13.41	13.17	13.37
		5590	118	26T	10.97	10.96	11.00			5590	118	52T	13.64	13.19	13.35
		5670	134	26T	11.00	11.00	11.00			5670	134	52T	13.53	13.51	13.44
		5710	142	26T	10.99	11.00	11.00			5710	142	52T	13.34	13.49	13.22
	3	5755	151	26T	15.20	15.49	15.50		3	5755	151	52T	14.90	15.09	15.03
		5795	159	26T	15.50	15.50	15.50			5795	159	52T	15.05	15.13	15.09

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40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					53	54	56						61	62	N/A
1	2A	5190	38	106T	11.43	11.92	11.62	1	2A	5190	38	242T	12.00	12.00	
		5230	46	106T	15.25	15.81	15.91			5230	46	242T	15.99	16.00	
		5270	54	106T	16.07	16.25	16.33			5270	54	242T	16.50	16.50	
2C	2C	5310	62	106T	10.95	11.27	11.28	2C	2C	5310	62	242T	11.42	11.50	
		5510	102	106T	10.58	10.72	10.75			5510	102	242T	11.50	11.50	
		5550	110	106T	16.19	16.28	16.18			5550	110	242T	16.50	16.50	
		5590	118	106T	16.25	16.15	16.11			5590	118	242T	16.41	16.50	
		5670	134	106T	13.92	13.87	14.03			5670	134	242T	14.50	14.50	
		5710	142	106T	15.93	15.82	16.11			5710	142	242T	13.37	13.50	
3	3	5755	151	106T	14.82	15.04	15.10	3	3	5755	151	242T	15.48	15.43	
		5795	159	106T	14.92	15.09	15.22			5795	159	242T	15.50	15.50	

40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					65	N/A	N/A
1	2A	5190	38	484T	12.00		
		5230	46	484T	16.00		
		5270	54	484T	16.50		
2C	2C	5310	62	484T	11.46		
		5510	102	484T	11.50		
		5550	110	484T	16.50		
		5590	118	484T	16.45		
		5670	134	484T	14.50		
		5710	142	484T	16.50		
3	3	5755	151	484T	15.50		
		5795	159	484T	15.50		

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	18	36						37	44	52
	1	5210	42	26T	10.79	11.00	10.89		1	5210	42	52T	10.29	10.50	10.33
	2A	5290	58	26T	10.47	10.50	10.50		2A	5290	58	52T	10.03	10.43	10.15
		5530	106	26T	10.24	10.50	10.23			2A	5530	106	52T	10.08	10.50
	2C	5610	122	26T	10.95	11.00	11.00		2C		5610	122	52T	13.76	13.86
		5690	138	26T	11.00	11.00	11.00			2C	5690	138	52T	13.90	14.00
	3	5775	155	26T	15.34	15.50	15.50		3		5775	155	52T	15.45	15.50

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					53	56	60						61	62	64
	1	5210	42	106T	10.41	10.50	10.36		1	5210	42	242T	10.50	10.50	10.30
2C	2A	5290	58	106T	10.50	10.48	10.50	2A	5290	58	242T	10.42	10.50	10.22	
		5530	106	106T	10.19	10.50	10.46		5530	106	242T	10.13	10.47	10.03	
		5610	122	106T	16.41	16.44	16.23		5610	122	242T	16.15	16.26	16.15	
		5690	138	106T	16.50	16.50	16.47		5690	138	242T	13.32	13.50	13.09	
	3	5775	155	106T	15.45	15.50	15.31		3	5775	155	242T	15.33	15.50	15.23

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					65	66	N/A						67	N/A	N/A
	1	5210	42	484T	10.50	10.27			1	5210	42	996T	10.50		
2A	5290	58	484T	10.50	10.50		2A	5290	58	996T	10.50				
	5530	106	484T	10.50	10.50			5530	106	996T	10.48				
2C	5610	122	484T	16.42	16.50		2C	5610	122	996T	16.46				
	5690	138	484T	14.50	14.50			5690	138	996T	16.46				
	5775	155	484T	15.50	15.50		3	5775	155	996T	15.16				

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Table 4
Maximum 5 GHz 802.11ax RU Output Power – 5GHz ANTupper

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	4	8						37	39	40
	1	5180	36	26T	10.46	10.86	10.78		1	5180	36	52T	13.19	13.73	13.75
		5200	40	26T	10.56	10.97	10.91			5200	40	52T	13.33	13.90	13.91
		5240	48	26T	10.81	11.00	10.96			5240	48	52T	13.31	13.78	13.73
	2A	5260	52	26T	10.87	11.00	11.00		2A	5260	52	52T	13.38	13.82	13.80
		5300	60	26T	10.92	11.00	11.00			5300	60	52T	13.18	13.63	13.27
		5320	64	26T	10.97	11.00	11.00			5320	64	52T	12.92	13.26	13.17
	2C	5500	100	26T	10.73	11.00	10.72		2C	5500	100	52T	13.18	13.44	13.24
5520		104	26T	11.00	11.00	10.99	5520	104		52T	13.08	13.43	13.31		
5580		116	26T	10.84	11.00	11.00	5580	116		52T	13.29	13.45	13.35		
5660		132	26T	10.81	11.00	11.00	5660	132		52T	13.22	13.53	13.39		
5680		136	26T	10.82	11.00	11.10	5680	136		52T	13.18	13.56	13.64		
5700		140	26T	10.79	11.00	11.00	5700	140		52T	12.96	13.28	13.27		
5720		144	26T	10.90	11.00	11.00	5720	144		52T	12.97	13.25	13.19		
3	5745	149	26T	15.28	15.50	15.50	3	5745	149	52T	14.56	14.92	14.92		
	5785	157	26T	15.29	15.50	15.50		5785	157	52T	15.24	15.45	15.50		
	5825	165	26T	15.27	15.50	15.50		5825	165	52T	14.75	15.05	15.08		

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					53	54	N/A						61	N/A	N/A
	1	5180	36	106T	14.79	15.00		1	5180	36	242T	14.60			
		5200	40	106T	15.56	15.92			5200	40	242T	15.99			
		5240	48	106T	15.87	15.98			5240	48	242T	16.00			
	2A	5260	52	106T	16.17	16.25		2A	5260	52	242T	16.25			
		5300	60	106T	16.25	16.25			5300	60	242T	16.25			
		5320	64	106T	14.50	14.50			5320	64	242T	14.50			
	2C	5500	100	106T	14.00	14.00		2C	5500	100	242T	14.00			
		5520	104	106T	15.00	15.00			5520	104	242T	14.95			
		5580	116	106T	14.89	15.00			5580	116	242T	15.00			
		5660	132	106T	14.95	15.00			5660	132	242T	14.92			
		5680	136	106T	15.00	15.00			5680	136	242T	15.00			
		5700	140	106T	13.47	13.50			5700	140	242T	13.50			
		5720	144	106T	14.00	14.00			5720	144	242T	15.00			
	3	5745	149	106T	15.37	15.50		3	5745	149	242T	15.50			
		5785	157	106T	15.46	15.50			5785	157	242T	15.50			
5825		165	106T	15.50	15.50		5825		165	242T	15.50				

40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	8	17						37	40	44
	1	5190	38	26T	9.78	10.91	10.10		1	5190	38	52T	10.88	11.65	11.47
5230		46	26T	10.43	11.00	10.94	5230	46		52T	13.23	13.70	13.94		
2A	5270	54	26T	11.00	11.00	11.00	2A	5270	54	52T	13.22	13.45	13.52		
	5310	62	26T	10.75	11.00	11.00		5310	62	52T	11.00	11.20	11.36		
2C	5510	102	26T	10.92	11.00	11.00	2C	5510	102	52T	11.11	11.06	11.17		
	5550	110	26T	10.95	11.00	11.00		5550	110	52T	13.33	13.40	13.60		
	5590	118	26T	10.98	10.93	11.00		5590	118	52T	13.39	13.47	13.59		
	5670	134	26T	11.00	11.00	11.00		5670	134	52T	13.28	13.27	13.54		
	5710	142	26T	10.93	11.00	11.00		5710	142	52T	13.40	13.07	13.75		
3	5755	151	26T	15.09	15.31	15.50	3	5755	151	52T	15.08	15.27	15.49		
	5795	159	26T	15.25	15.28	15.50		5795	159	52T	15.18	15.33	15.50		

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40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					53	54	56						61	62	N/A
	1	5190	38	106T	11.25	11.97	11.47		1	5190	38	242T	11.90	11.95	
5230		46	106T	14.89	15.27	15.06	5230	46		242T	16.00	16.00			
2A	5270	54	106T	15.74	16.10	15.79	2A	5270	54	242T	16.07	15.99			
	5310	62	106T	11.17	11.41	11.26		5310	62	242T	11.48	11.50			
2C	5510	102	106T	11.32	11.24	11.15	2C	5510	102	242T	11.50	11.50			
	5550	110	106T	14.86	14.96	14.64		5550	110	242T	15.00	14.98			
	5590	118	106T	14.84	14.83	14.76		5590	118	242T	14.93	14.94			
	5670	134	106T	14.40	14.46	14.21		5670	134	242T	14.49	14.50			
	5710	142	106T	14.84	14.91	14.79		5710	142	242T	13.30	13.46			
	5755	151	106T	15.33	15.43	15.19		5755	151	242T	15.31	15.41			
3	5795	159	106T	15.01	15.37	15.18	3	5795	159	242T	15.50	15.50			

40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					65	N/A	N/A
	1	5190	38	484T	11.90		
		5230	46	484T	16.00		
	2A	5270	54	484T	16.25		
		5310	62	484T	11.50		
	2C	5510	102	484T	11.50		
		5550	110	484T	15.00		
		5590	118	484T	15.00		
		5670	134	484T	14.50		
		5710	142	484T	15.00		
		5755	151	484T	15.50		
	3	5795	159	484T	15.50		

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	18	36						37	44	52
	1	5210	42	26T	10.63	11.00	10.50		1	5210	42	52T	9.72	10.32	10.10
2A	5290	58	26T	10.24	10.40	9.97	2A	5290	58	52T	9.84	10.25	10.17		
	5530	106	26T	10.28	10.45	10.23	5530	106	52T	10.08	10.33	10.21			
2C	5610	122	26T	11.00	10.88	11.00	2C	5610	122	52T	13.44	13.54	13.33		
	5690	138	26T	10.92	11.00	10.93	5690	138	52T	13.67	13.99	13.66			
3	5775	155	26T	15.20	15.39	15.01	3	5775	155	52T	14.94	15.24	15.18		

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					53	56	60						61	62	64
	1	5210	42	106T	9.96	10.30	10.19		1	5210	42	242T	10.12	10.46	9.98
	2A	5290	58	106T	10.02	10.30	10.26		2A	5290	58	242T	10.07	10.50	9.95
		5530	106	106T	10.22	10.43	10.31			5530	106	242T	10.07	10.44	10.01
	2C	5610	122	106T	14.54	14.61	14.43		2C	5610	122	242T	14.36	14.71	14.24
		5690	138	106T	14.78	14.98	14.77			5690	138	242T	13.15	13.44	13.03
	3	5775	155	106T	15.06	15.30	15.25		3	5775	155	242T	15.01	15.04	14.87

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					65	66	N/A
	1	5210	42	484T	10.49	10.50	
2A	5290	58	484T	10.45	10.50		
	5530	106	484T	10.31	10.49		
2C	5610	122	484T	14.88	14.91		
	5690	138	484T	14.46	14.50		
	5775	155	484T	15.47	15.46		

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					67	N/A	N/A
	1	5210	42	996T	10.42		
2A	5290	58	996T	10.50			
	5530	106	996T	10.50			
2C	5610	122	996T	14.96			
	5690	138	996T	15.00			
	5775	155	996T	15.48			

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APPENDIX I: DIPOLE CALIBRATION

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



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
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: **PG-Test**

Certificate No.: **D750V3-1097_Sep17**

CALIBRATION CERTIFICATE

Object: **D750V3 - SN:1097**

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

Calibration date: **September 08, 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 $(22 \pm 3)^\circ\text{C}$ 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	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292763	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

Calibrated by: **Claudio Leubler** Function: **Laboratory Technician**

Approved by: **Katja Pokóvic** Technical Manager

Signature:

Issued: September 8, 2017

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



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**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- 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	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.2 $\pm$ 6 %	0.90 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.22 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.39 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	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.5 $\pm$ 6 %	0.96 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.56 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.68 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	54.4 Ω - 0.6 j Ω
Return Loss	- 27.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.0 Ω - 3.6 j Ω
Return Loss	- 28.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.034 ns
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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	July 05, 2013

DASY5 Validation Report for Head TSL

Date: 08.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1097

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.9 \text{ S/m}$; $\epsilon_r = 41.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.49, 10.49, 10.49); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

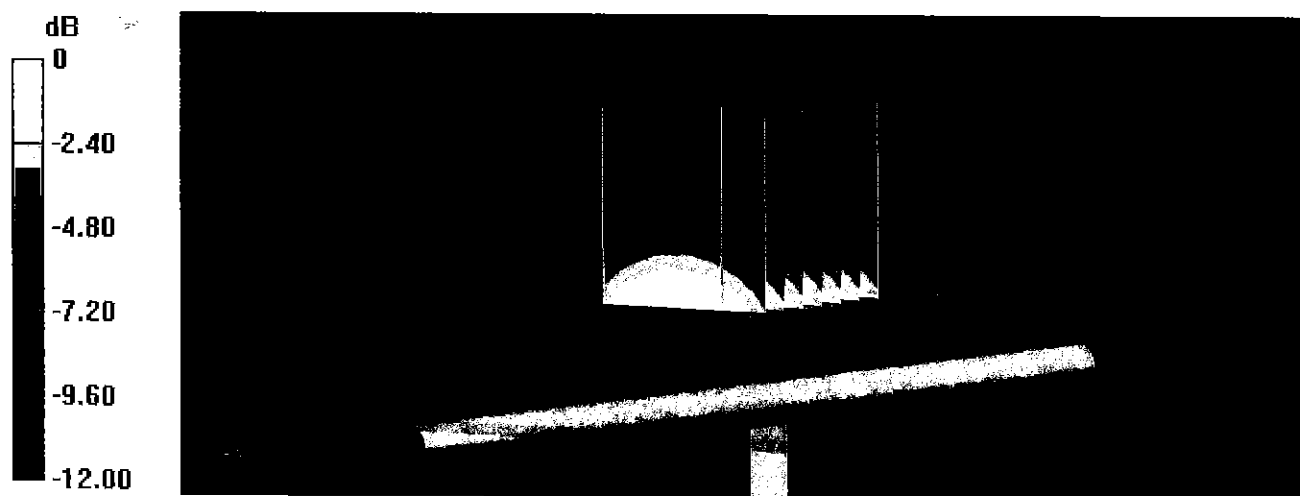
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 58.59 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.19 W/kg

SAR(1 g) = 2.08 W/kg; SAR(10 g) = 1.36 W/kg

Maximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg

Impedance Measurement Plot for Head TSL

8 Sep 2017 13:09:24
 CH1 S11 1 U FS 1: 54.383 Ω -552.73 m Ω 383.92 pF 750.000 000 MHz

*

De1

CA

Avg
16

H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-27.463 dB 750.000 000 MHz

CA

Avg
16

H1d

START 550.000 000 MHz

STOP 950.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 08.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1097

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: $f = 750$ MHz; $\sigma = 0.96$ S/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.35, 10.35, 10.35); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

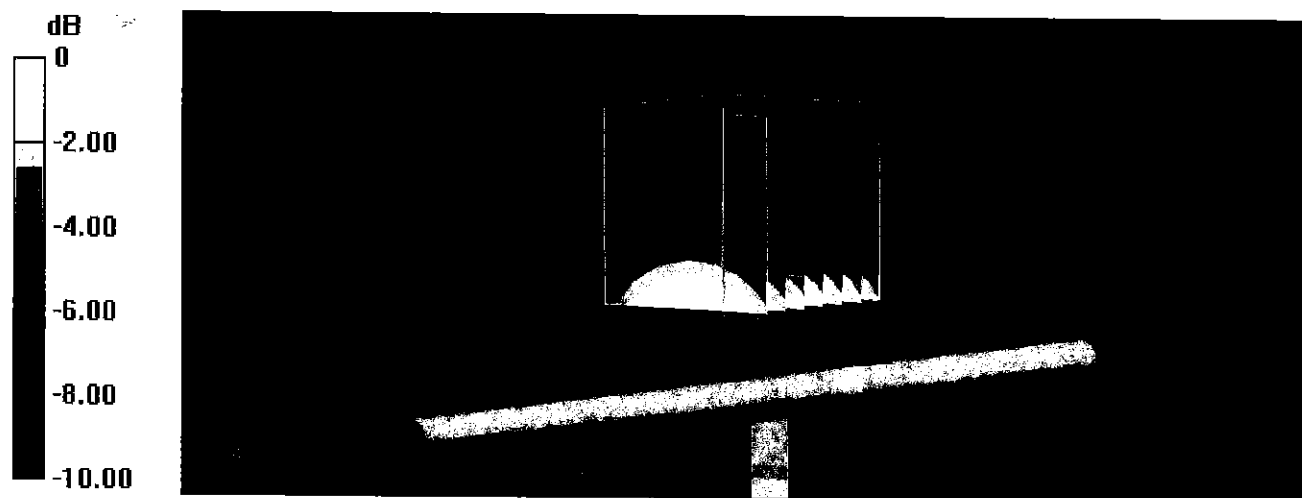
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.96 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 3.16 W/kg

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

Maximum value of SAR (measured) = 2.81 W/kg



0 dB = 2.81 W/kg = 4.49 dBW/kg

Impedance Measurement Plot for Body TSL

8 Sep 2017 13:08:43
 CH1 S11 1 U FS 1: 49.951 Ω -3.6172 Ω 58.666 pF 750.000 000 MHz

*
 De1
 CA

Avg
 15

H1d

CH2 S11 LOG 5 dB/REF -20 dB 1: -28.833 dB 750.000 000 MHz

CA

Avg
 16

H1d

START 550.000 000 MHz

STOP 950.000 000 MHz

Certification of Calibration

Object: D750V3 – SN: 1097

Calibration procedure(s): Procedure for Calibration Extension for SAR Dipoles.

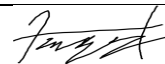
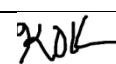
Extended Calibration date: September 08, 2018

Description: SAR Validation Dipole at 750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	9/14/2017	Annual	9/14/2018	US39170118
Agilent	N5182A	MXG Vector Signal Generator	3/19/2018	Annual	3/19/2019	US46240505
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2496A	Power Meter	10/9/2017	Annual	10/9/2018	1138001
Anritsu	MA2411B	Pulse Power Sensor	11/15/2017	Annual	11/15/2018	1339007
Anritsu	MA2411B	Pulse Power Sensor	11/22/2017	Annual	11/22/2018	1339008
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/14/2017	Biennial	2/14/2019	170112507
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	ES3DV3	SAR Probe	9/18/2017	Annual	9/18/2018	3287
SPEAG	DAE4	Data Acquisition Electronics	1/26/2018	Annual	1/26/2019	1533
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7416
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/18/2018	Annual	1/18/2019	793

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Sangmin Cha	Team Lead Engineer	
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	

DIPOLE CALIBRATION EXTENSION

Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

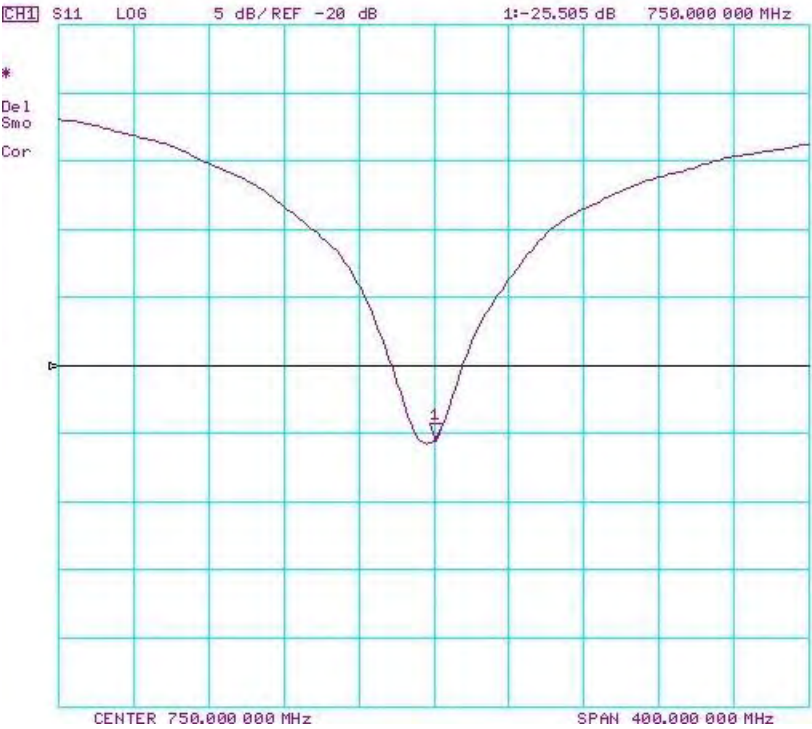
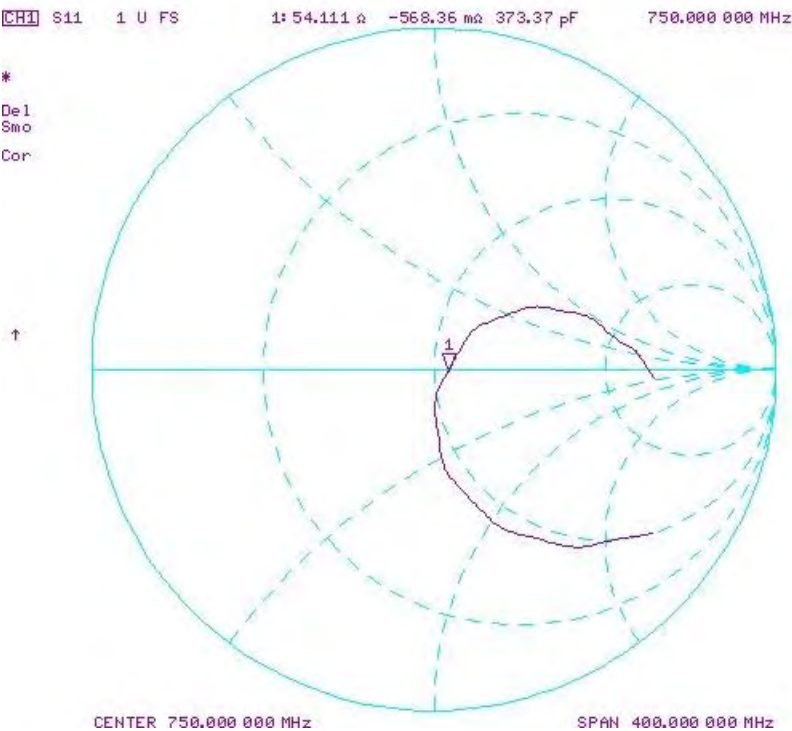
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

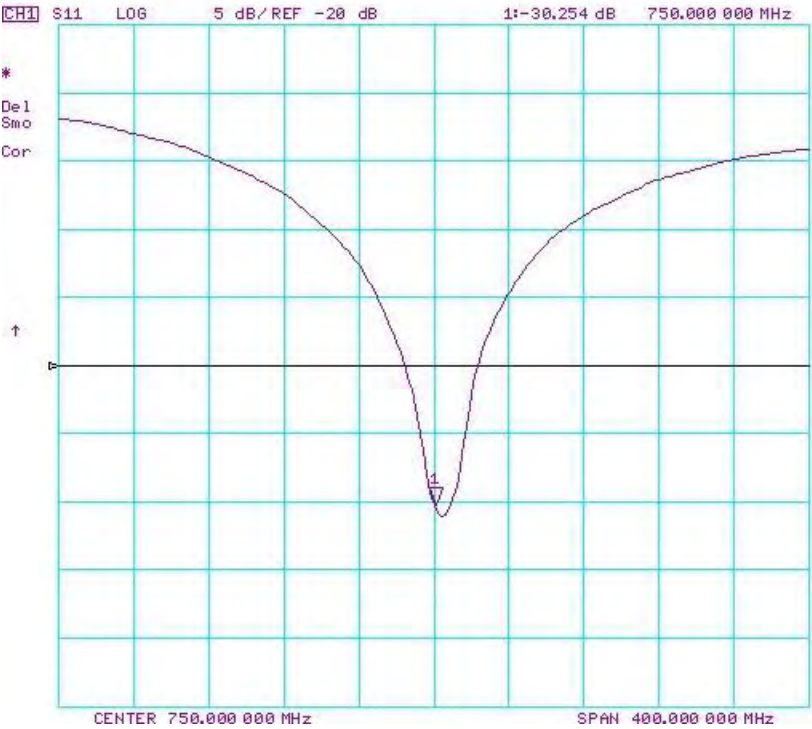
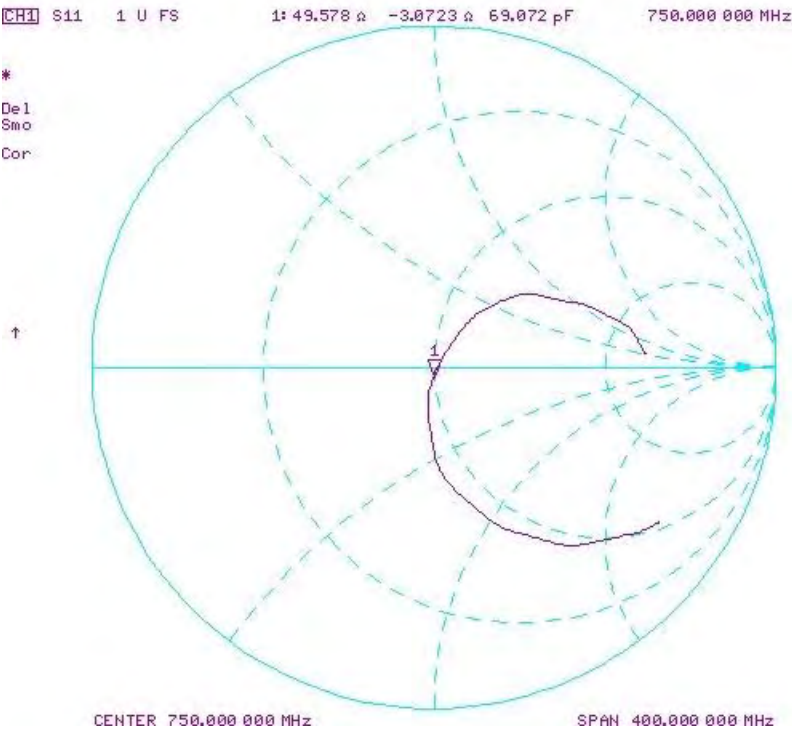
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2018	1.034	1.644	1.7	3.41%	1.078	1.12	3.90%	54.4	54.1	0.3	-0.6	-0.6	0	-27.5	-25.5	7.30%	PASS

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2018	1.034	1.712	1.78	3.97%	1.136	1.17	2.99%	50	49.6	0.4	-3.6	-3.1	0.5	-28.8	-30.3	-5.20%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object D750V3 – SN: 1097

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: September 8, 2019

Description: SAR Validation Dipole at 750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	E4438C	ESG Vector Signal Generator	6/27/2019	Annual	6/27/2020	MY45093852
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	11/1/2017	Biennial	11/1/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/7/2019	Annual	5/7/2020	1070
SPEAG	EX3DV4	SAR Probe	1/24/2019	Annual	1/24/2020	7490
SPEAG	DAE4	Data Acquisition Electronics	1/15/2019	Annual	1/15/2020	1532

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

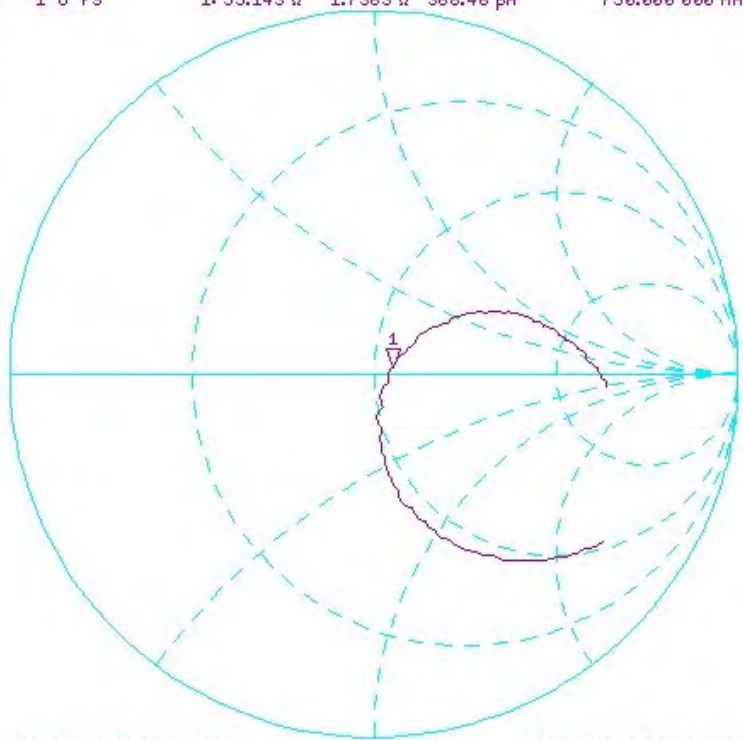
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2019	1.034	1.644	1.55	-5.11%	1.078	1.03	-4.45%	54.4	55.1	0.7	-0.6	1.7	2.3	-27.5	-25	5.50%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2019	1.034	1.712	1.65	-3.62%	1.136	1.1	-3.17%	50	51	1	-3.6	-1.3	2.3	-28.8	-31.9	-10.80%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL

CH1 S11 1 U FS 1: 55.143 Ω 1.7363 Ω 368.46 pF 750.000 000 MHz

*
De1
Cor

↑

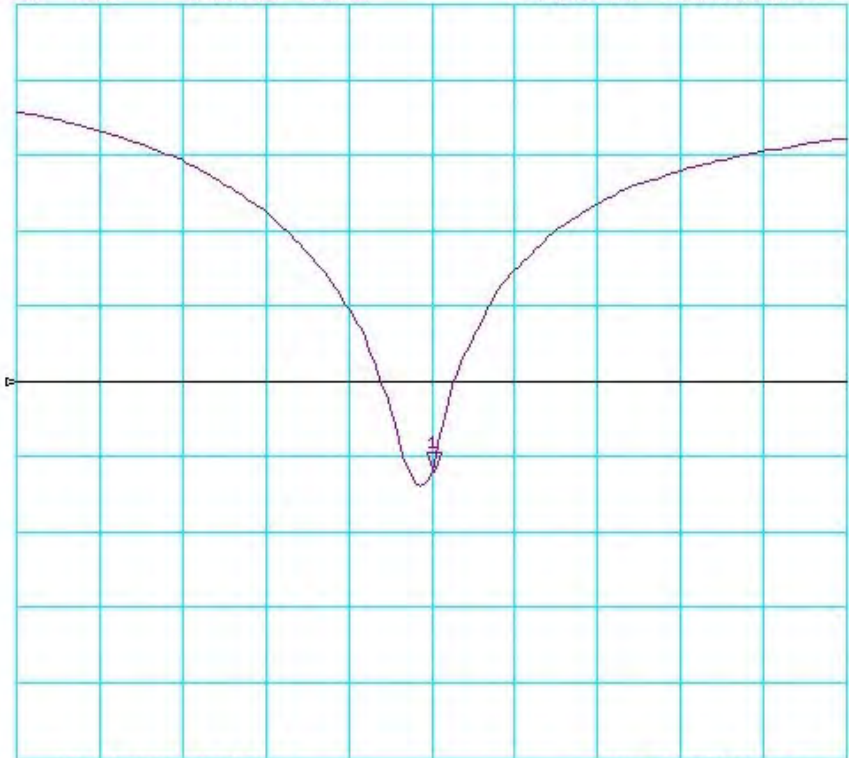


CENTER 750.000 000 MHz SPAN 400.000 000 MHz

CH1 S11 LOG 5 dB/REF -20 dB 1:-26.011 dB 750.000 000 MHz

*
De1
Smo
Cor

↑



CENTER 750.000 000 MHz SPAN 400.000 000 MHz

Object:

D750V3 – SN: 1097

Date Issued:

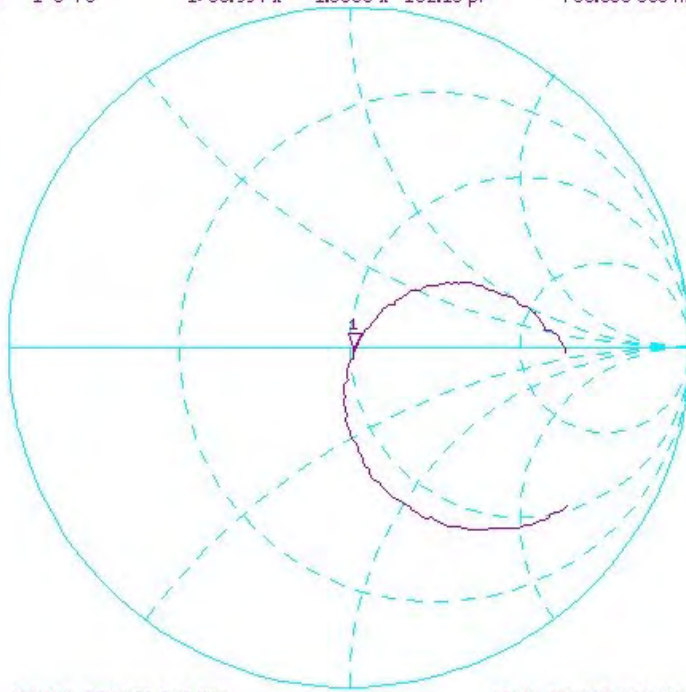
09/08/2019

Impedance & Return-Loss Measurement Plot for Body TSL

CH1 S11 1 U FS 1: 50.994 Ω -1.3086 Ω 162.16 pF 750.000 000 MHz

*
De1
Cor

↑



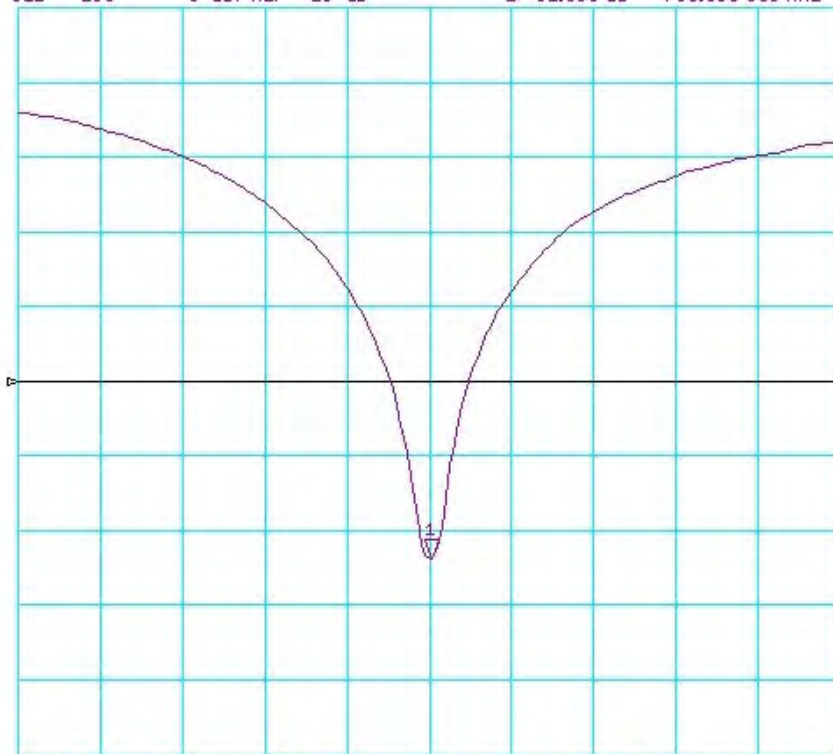
CENTER 750.000 000 MHz

SPAN 400.000 000 MHz

CH1 S11 LOG 5 dB/REF -20 dB 1: -31.866 dB 750.000 000 MHz

*
De1
Smo
Cor

↑



CENTER 750.000 000 MHz

SPAN 400.000 000 MHz



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 **PC Test**

Certificate No: **D835V2-4d040_Jun19**

CALIBRATION CERTIFICATE

Object **D835V2 - SN:4d040**

Calibration procedure(s) **QA CAL-05.v11**
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

✓
 ATM
 6/28/19

Calibration date: **June 20, 2019**

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	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	29-May-19 (No. EX3-7349_May19)	May-20
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

Calibrated by: **Manu Seitz** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Signature

Issued: June 21, 2019

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Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- 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	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.8 $\pm$ 6 %	0.91 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.39 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.50 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.13 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	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.4 $\pm$ 6 %	0.98 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.40 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.53 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.57 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.24 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	49.6 Ω - 4.1 j Ω
Return Loss	- 27.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω - 6.5 j Ω
Return Loss	- 22.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.393 ns
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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: 20.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d040

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.91 \text{ S/m}$; $\epsilon_r = 41.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.89, 9.89, 9.89) @ 835 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

Dipole Calibration for Head Tissue/ $P_{in}=250 \text{ mW}$, $d=15\text{mm}$ /Zoom Scan (7x7x7)/Cube 0:

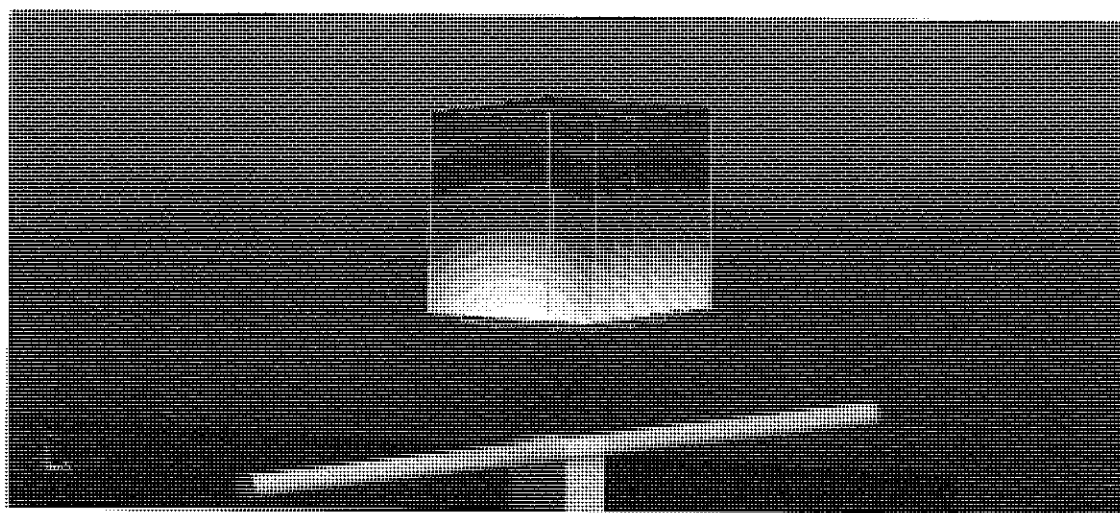
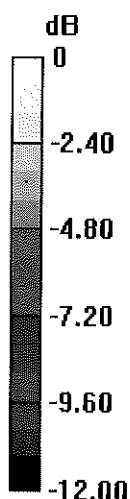
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 63.05 V/m ; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 3.60 W/kg

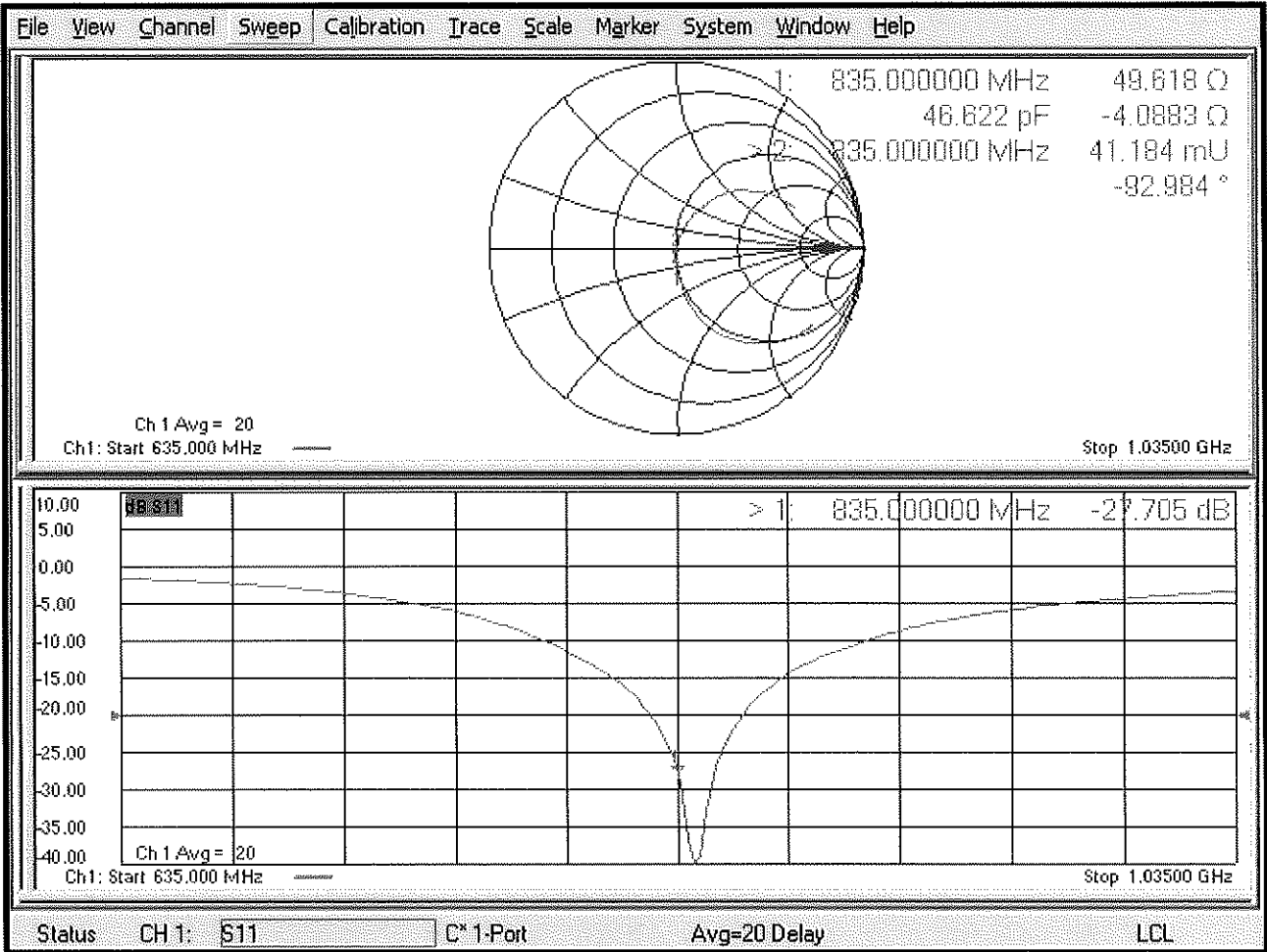
SAR(1 g) = 2.39 W/kg ; SAR(10 g) = 1.54 W/kg

Maximum value of SAR (measured) = 3.19 W/kg



0 dB = 3.19 W/kg = 5.04 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d040

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.98 \text{ S/m}$; $\epsilon_r = 55.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.16, 10.16, 10.16) @ 835 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

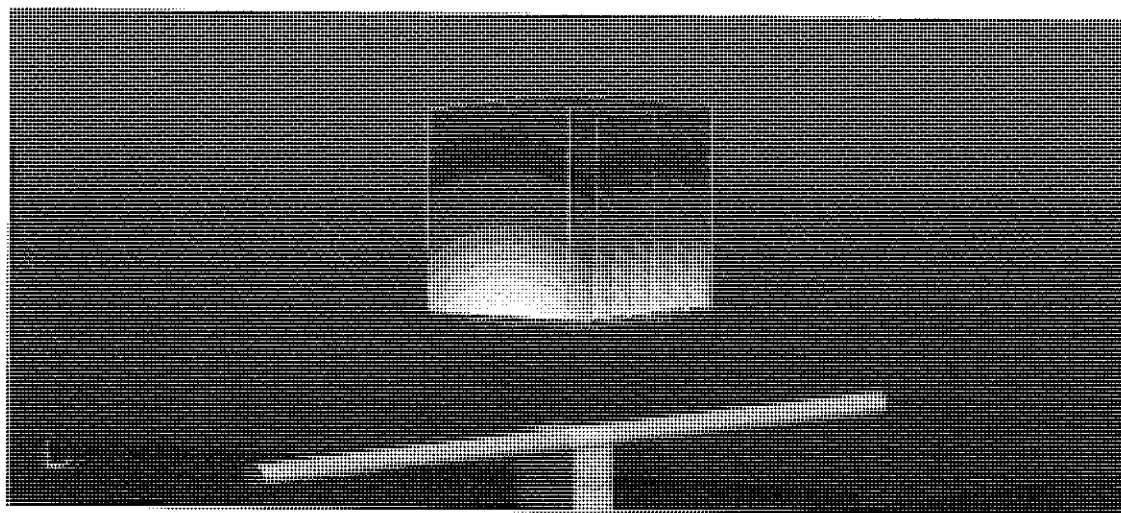
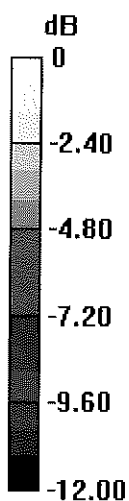
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 57.73 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 3.59 W/kg

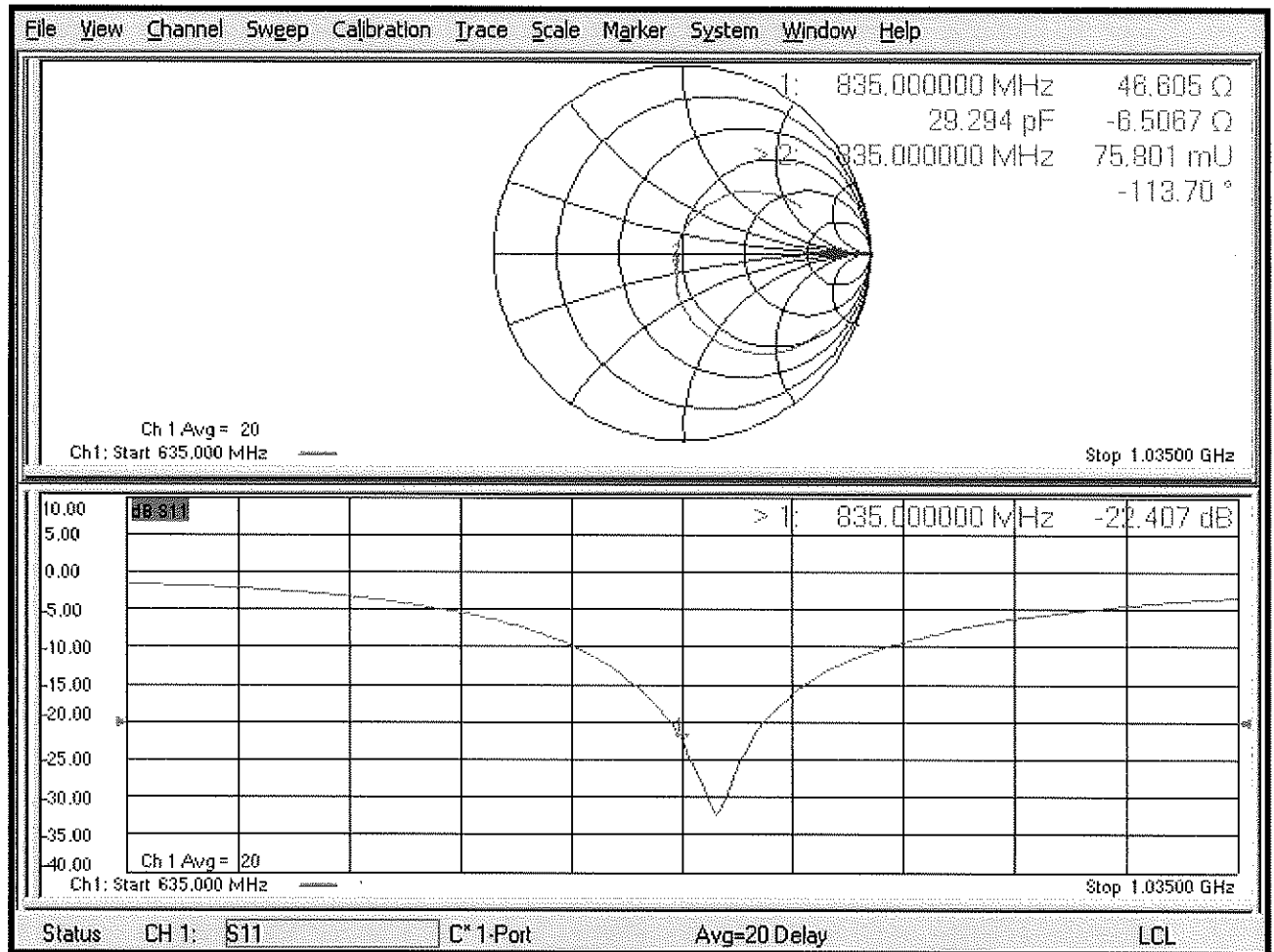
SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.57 W/kg

Maximum value of SAR (measured) = 3.21 W/kg



0 dB = 3.21 W/kg = 5.07 dBW/kg

Impedance Measurement Plot for Body TSL





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Client **PC Test**

Certificate No: **D1750V2-1083_Jun19**

CALIBRATION CERTIFICATE

Object **D1750V2 - SN:1083**

Calibration procedure(s) **QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **June 19, 2019**

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
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	29-May-19 (No. EX3-7349_May19)	May-20
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** **Technical Manager**

Issued: June 20, 2019

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Accreditation No.: **SCS 0108**

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Multilateral Agreement for the recognition of calibration certificates

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- 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	V52.10.2
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	40.0 $\pm$ 6 %	1.34 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	8.91 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.1 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.70 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.0 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	53.9 $\pm$ 6 %	1.46 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	37.1 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.88 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	50.6 Ω - 1.1 j Ω
Return Loss	- 38.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.1 Ω - 2.4 j Ω
Return Loss	- 28.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.220 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: 19.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1083

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

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.34$ S/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.67, 8.67, 8.67) @ 1750 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

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 = 105.8 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 16.7 W/kg

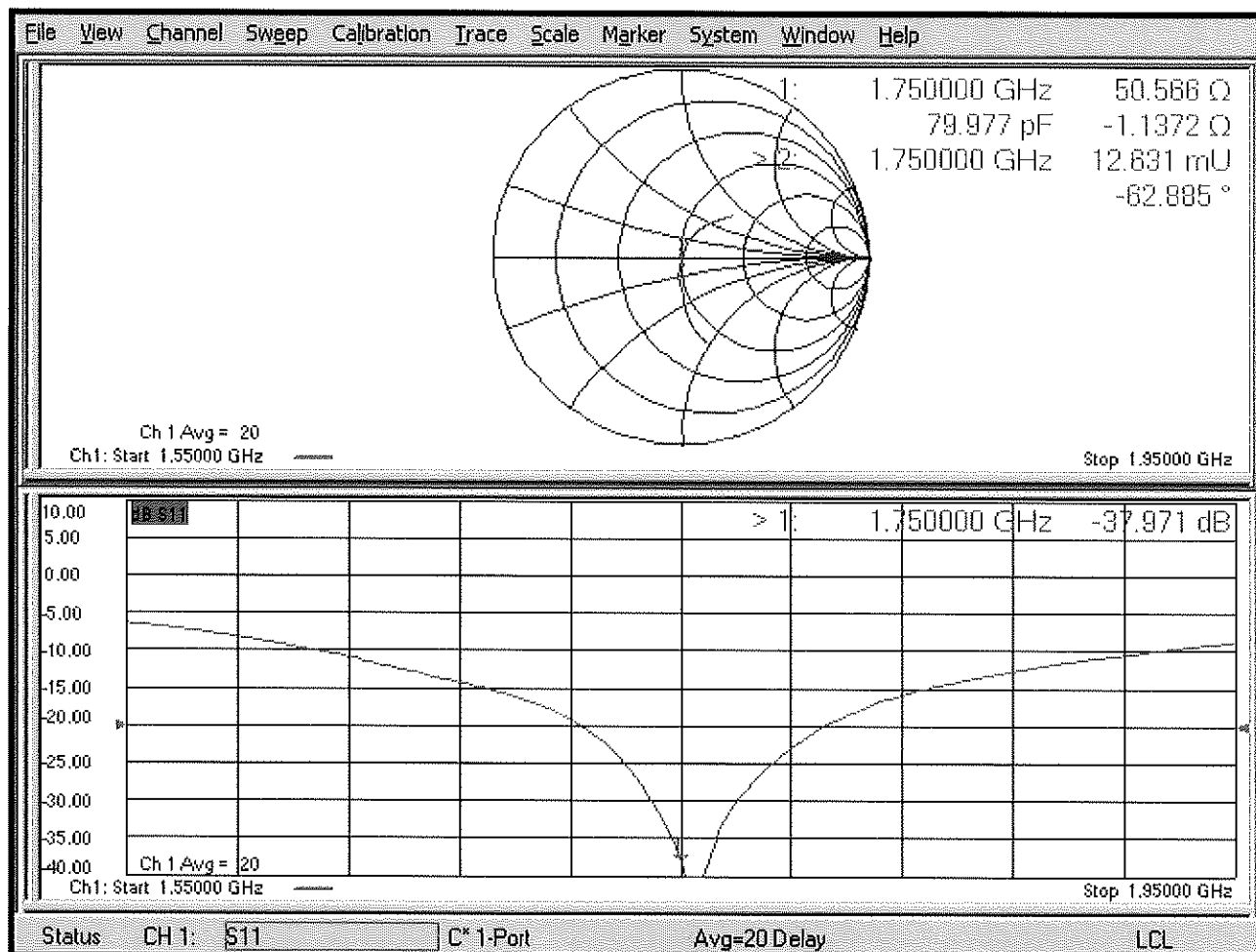
SAR(1 g) = 8.91 W/kg; SAR(10 g) = 4.7 W/kg

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



DASY5 Validation Report for Body TSL

Date: 13.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1083

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

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.46$ S/m; $\epsilon_r = 53.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.45, 8.45, 8.45) @ 1750 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

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

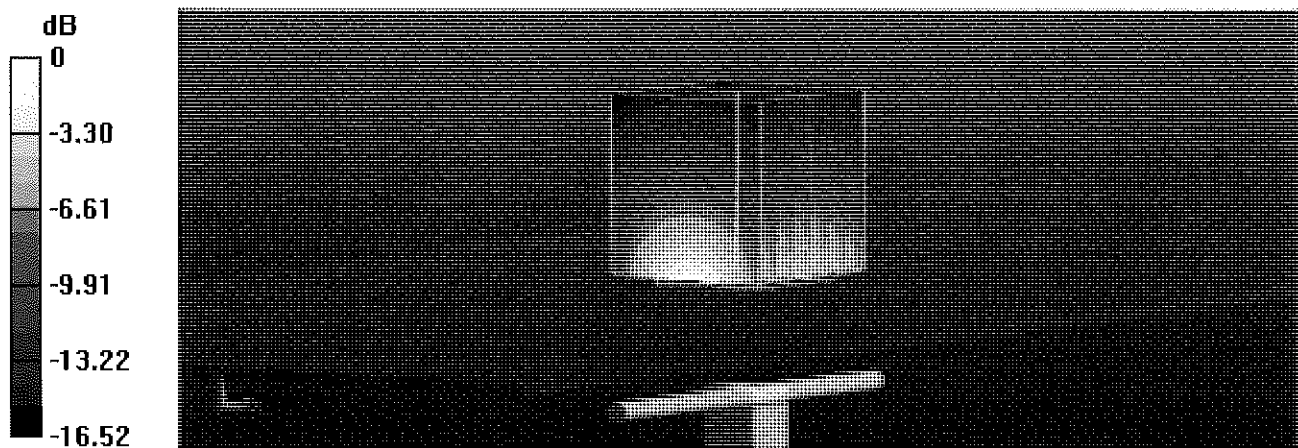
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.8 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 16.2 W/kg

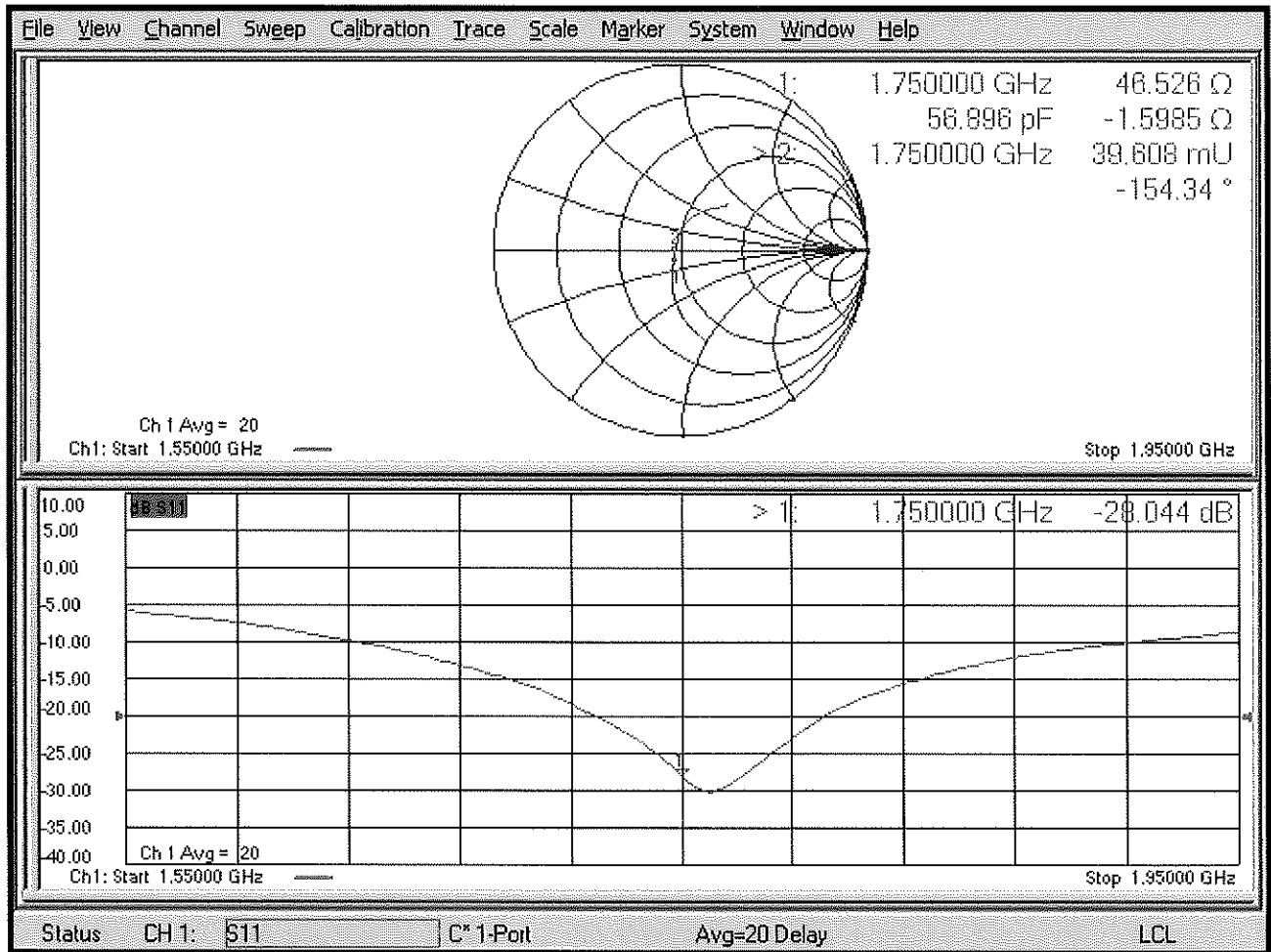
SAR(1 g) = 9.14 W/kg; SAR(10 g) = 4.88 W/kg

Maximum value of SAR (measured) = 13.7 W/kg



0 dB = 13.7 W/kg = 11.37 dBW/kg

Impedance Measurement Plot for Body TSL





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Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No.: **D1750V2-1092_May18**

CALIBRATION CERTIFICATE

Object **D1750V2 - SN:1092**

Calibration procedure(s) **CA CAL 05 V10**
 Calibration procedure for double verification with known test items

Calibration date: **May 15, 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 $(22 \pm 3)^\circ\text{C}$ 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	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-05	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Manu Seltz	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 17, 2018

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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, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- 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	V52.10.1
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	39.0 $\pm$ 6 %	1.34 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	8.95 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.1 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.73 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.0 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	53.2 $\pm$ 6 %	1.46 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	8.99 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	36.4 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.81 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	19.4 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	49.2 Ω - 1.0 j Ω
Return Loss	- 37.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.8 Ω - 0.6 j Ω
Return Loss	- 25.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.217 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	November 07, 2012

DASY5 Validation Report for Head TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1092

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

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.34$ S/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.5, 8.5, 8.5) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

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

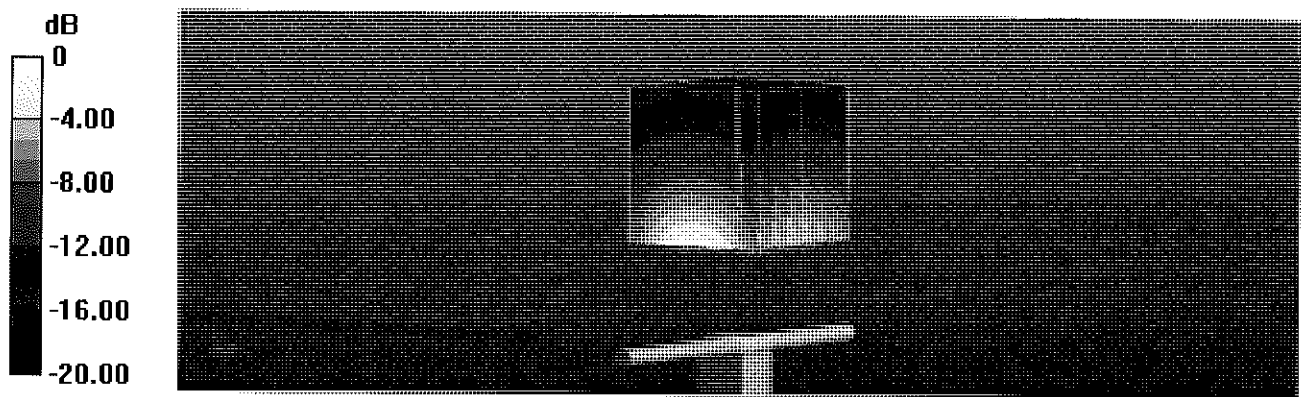
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.8 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 16.3 W/kg

SAR(1 g) = 8.95 W/kg; SAR(10 g) = 4.73 W/kg

Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg = 11.40 dBW/kg

Impedance Measurement Plot for Head TSL

15 May 2018 11:09:26
 [CH1] S11 1 U FS 1: 49.203 Ω -1.0117 Ω 89.892 pF 1 750.000 000 MHz

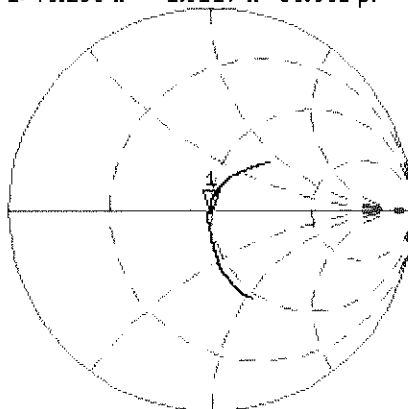
*

Del

CA

Avg
16

H1d

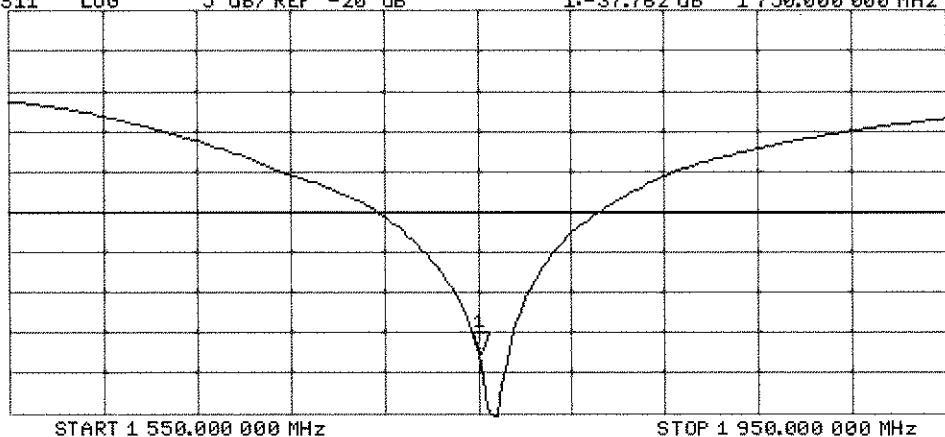


CH2 S11 LOG 5 dB/REF -20 dB 1:-37.762 dB 1 750.000 000 MHz

CA

Avg
16

H1d



DASY5 Validation Report for Body TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1092

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

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.46$ S/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.35, 8.35, 8.35) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

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

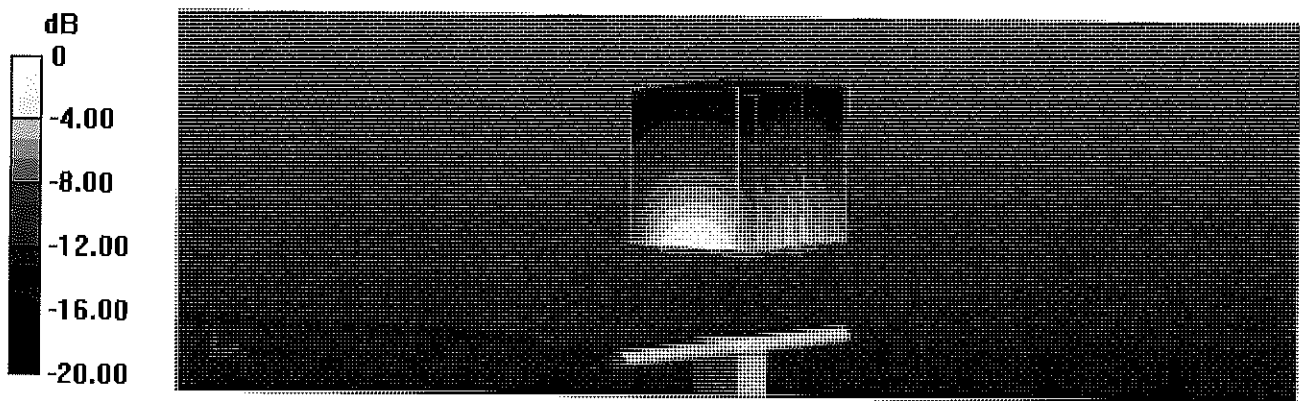
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.4 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 15.8 W/kg

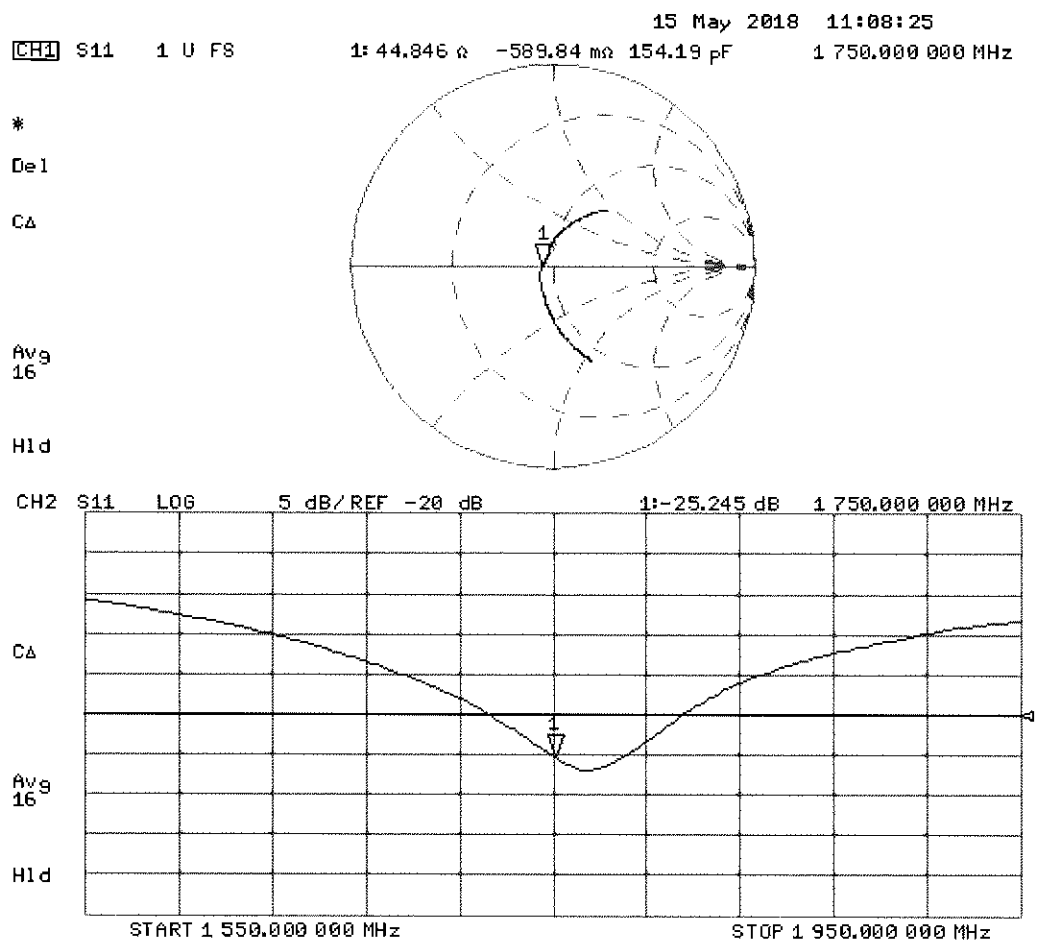
SAR(1 g) = 8.99 W/kg; SAR(10 g) = 4.81 W/kg

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



0 dB = 13.4 W/kg = 11.27 dBW/kg

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D1750V2 – SN: 1092

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: May 15, 2019

Description: SAR Validation Dipole at 1750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	N5182A	MXG Vector Signal Generator	6/15/2018	Annual	6/15/2019	MY47420837
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAKS-3.5	Portable DAK	9/11/2018	Annual	9/11/2019	1045
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7416
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/10/2018	Annual	7/10/2019	1402

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

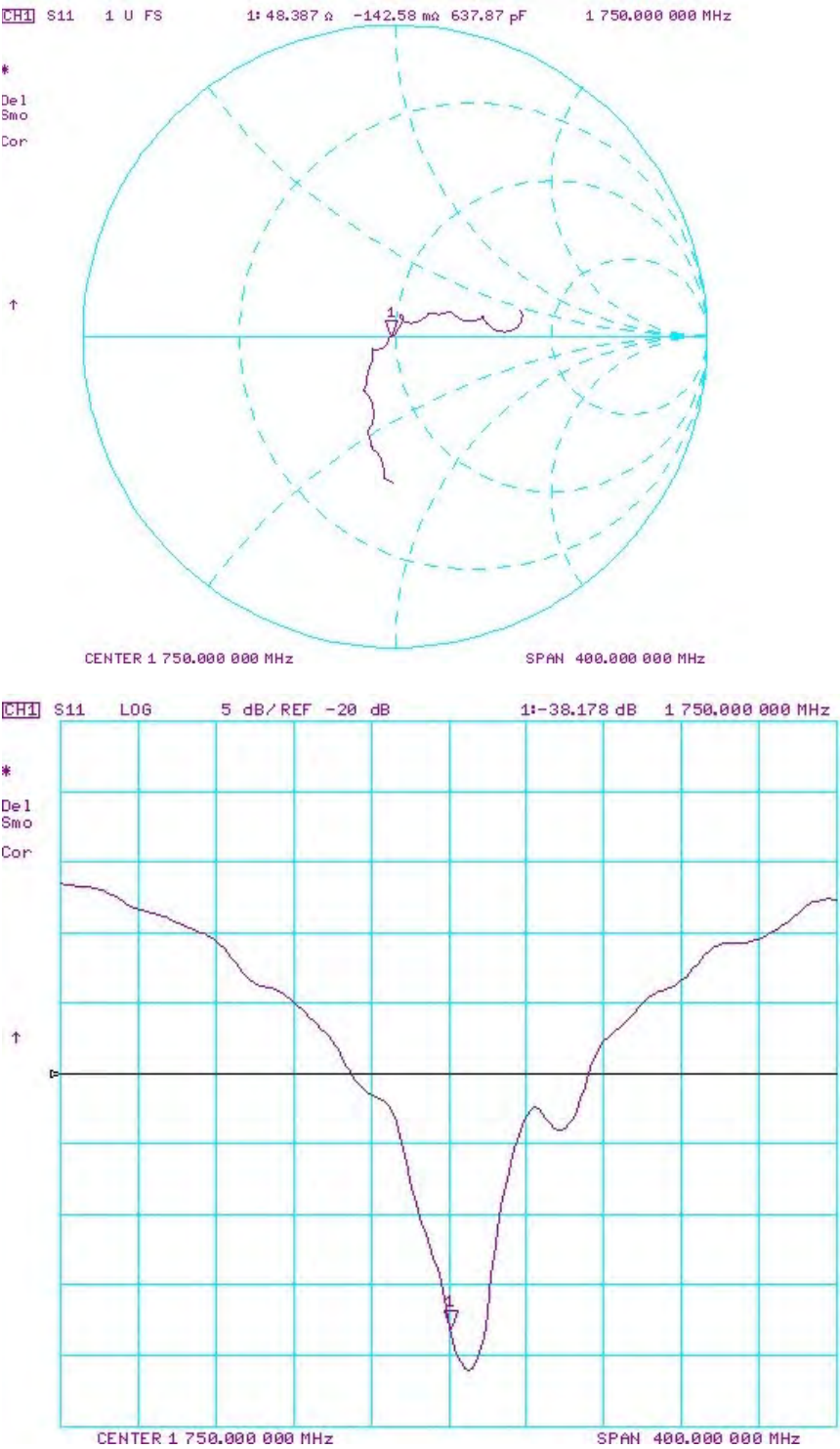
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

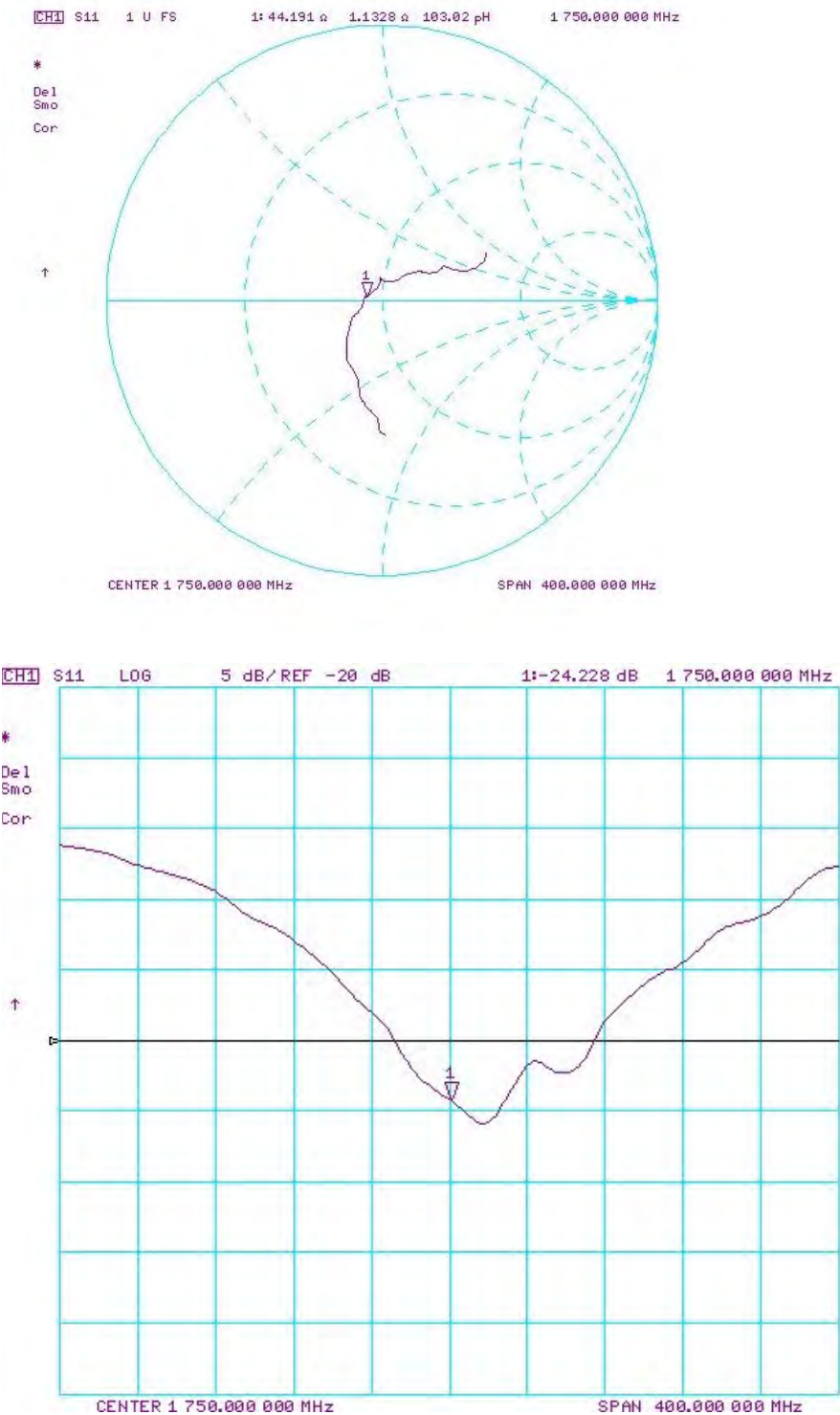
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5/15/2018	5/15/2019	1.217	3.61	3.59	-0.55%	1.9	1.89	-0.53%	49.2	48.4	0.8	-1	-0.1	0.9	-37.8	-38.2	-1.00%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5/15/2018	5/15/2019	1.217	3.64	3.62	-0.55%	1.94	1.91	-1.59%	44.8	44.2	0.6	-0.6	1.1	1.7	-25.2	-24.2	3.90%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL





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 **PC Test**

Certificate No: **D1900V2-5d026_May18**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d026**

Calibration procedure(s) **Cal. Cal-15 v10
 Calibration procedure for cable validation with above 700 MHz**

Calibration date: **May 14, 2018**

SC ✓
 7/31/2018

BN ✓
 06/01/2019

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
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

Calibrated by: **Jeton Kastrati** Name **Laboratory Technician** Function

Signature

Approved by: **Katja Pokovic** Technical Manager

Signature

Issued: May 14, 2018

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



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**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- 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	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	41.2 $\pm$ 6 %	1.35 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	9.78 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.2 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	5.19 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.1 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	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.3 $\pm$ 6 %	1.46 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	9.65 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.9 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	5.19 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.2 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	$53.0 \Omega + 8.0 j\Omega$
Return Loss	- 21.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$47.1 \Omega + 7.4 j\Omega$
Return Loss	- 21.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns
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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	December 17, 2002

DASY5 Validation Report for Head TSL

Date: 14.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d026

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.35$ S/m; $\epsilon_r = 41.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.18, 8.18, 8.18) @ 1900 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

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

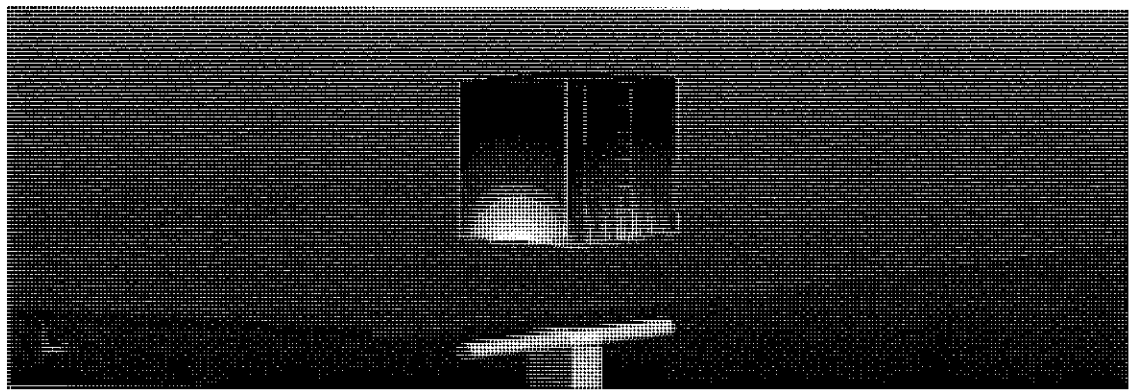
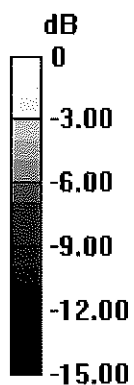
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 109.9 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 9.78 W/kg; SAR(10 g) = 5.19 W/kg

Maximum value of SAR (measured) = 15.0 W/kg

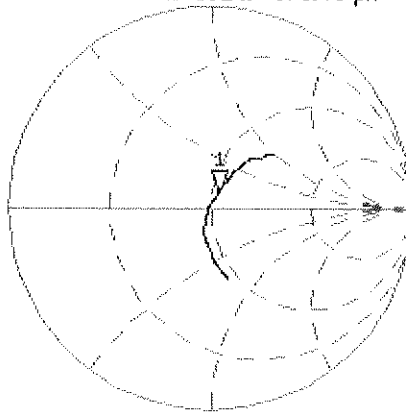


0 dB = 15.0 W/kg = 11.76 dBW/kg

Impedance Measurement Plot for Head TSL

14 May 2018 09:14:41
 [CH1] S11 1 U FS 1: 52.955 Ω 8.0391 Ω 673.40 μ H 1 900.000 000 MHz

*
 Del
 CA



Avg
 16

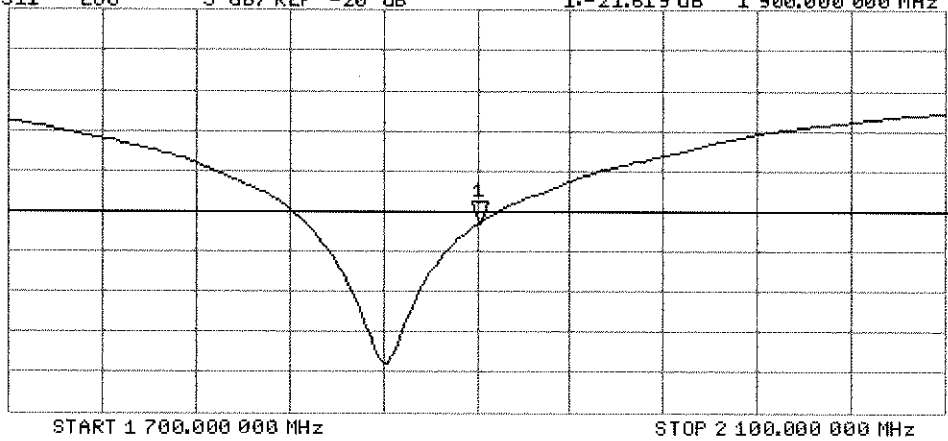
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-21.619 dB 1 900.000 000 MHz

CA

Avg
 16

H1d



DASY5 Validation Report for Body TSL

Date: 14.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d026

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.46$ S/m; $\epsilon_r = 55.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.15, 8.15, 8.15) @ 1900 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

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

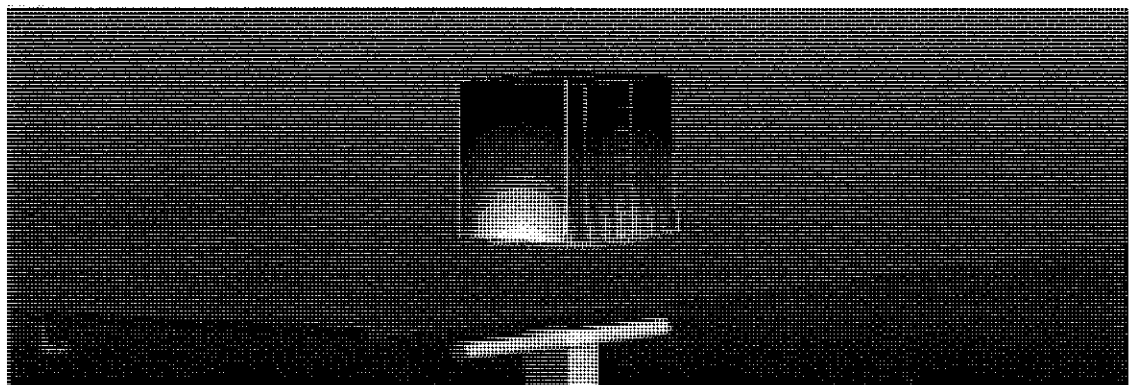
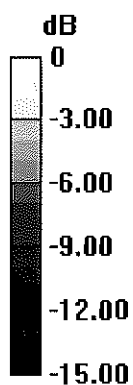
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.5 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 16.7 W/kg

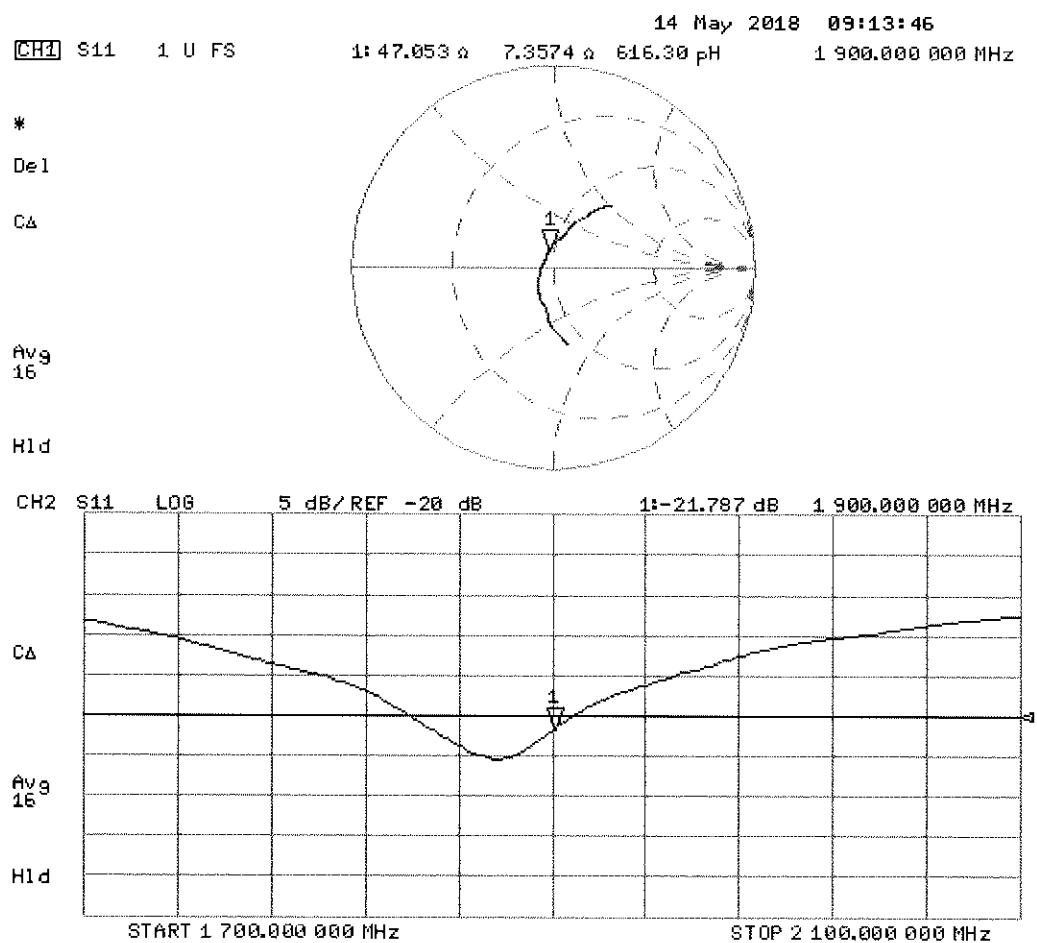
SAR(1 g) = 9.65 W/kg; SAR(10 g) = 5.19 W/kg

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



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

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D1900V2 – SN: 5d026

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: May 14, 2019

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	N5182A	MXG Vector Signal Generator	6/15/2018	Annual	6/15/2019	MY47420837
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAKS-3.5	Portable DAK	9/11/2018	Annual	9/11/2019	1045
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7416
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/10/2018	Annual	7/10/2019	1402

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

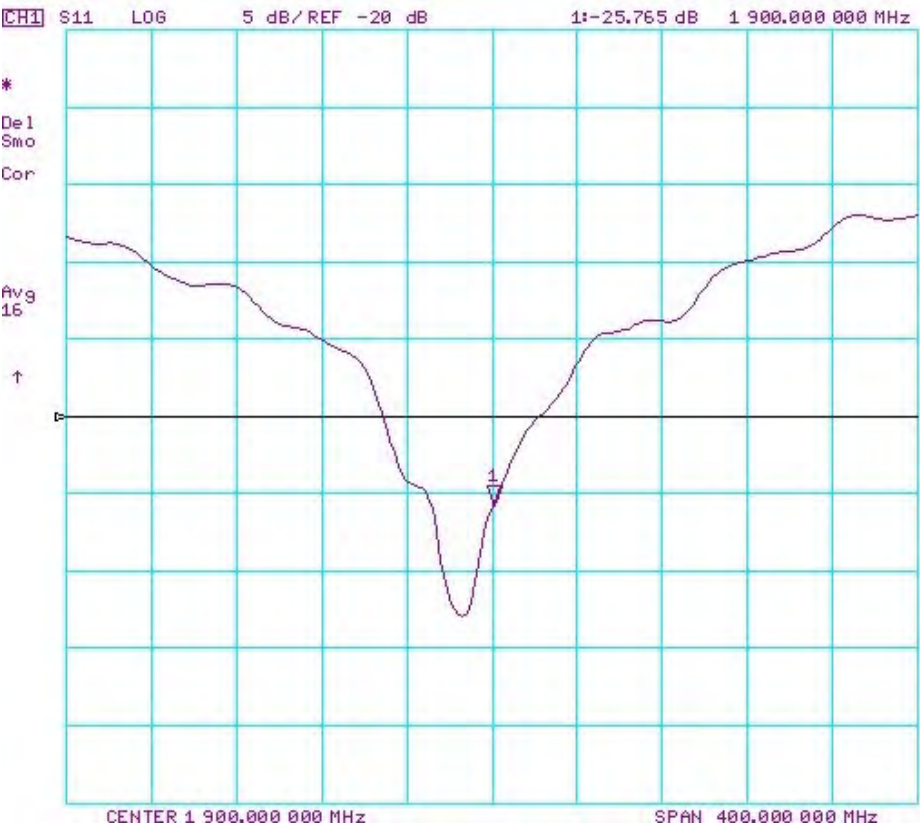
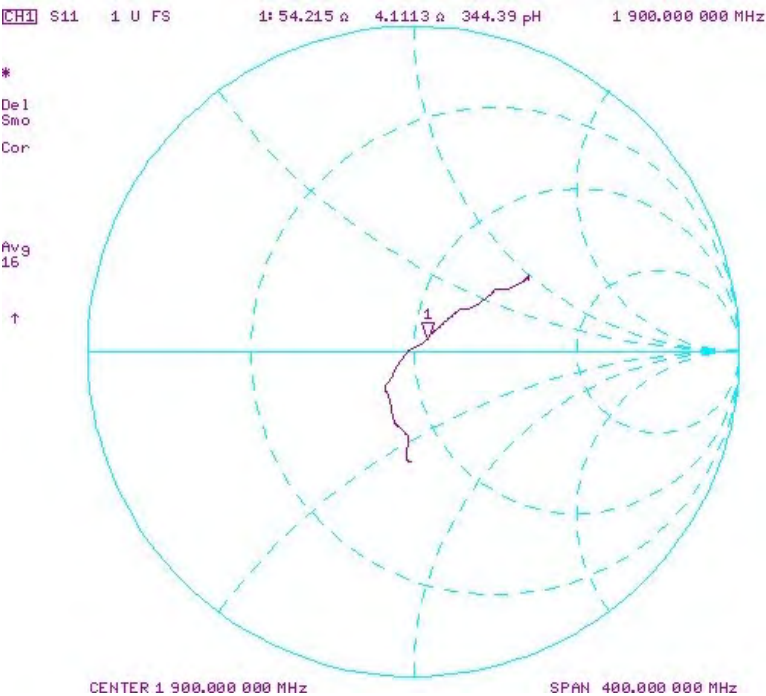
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

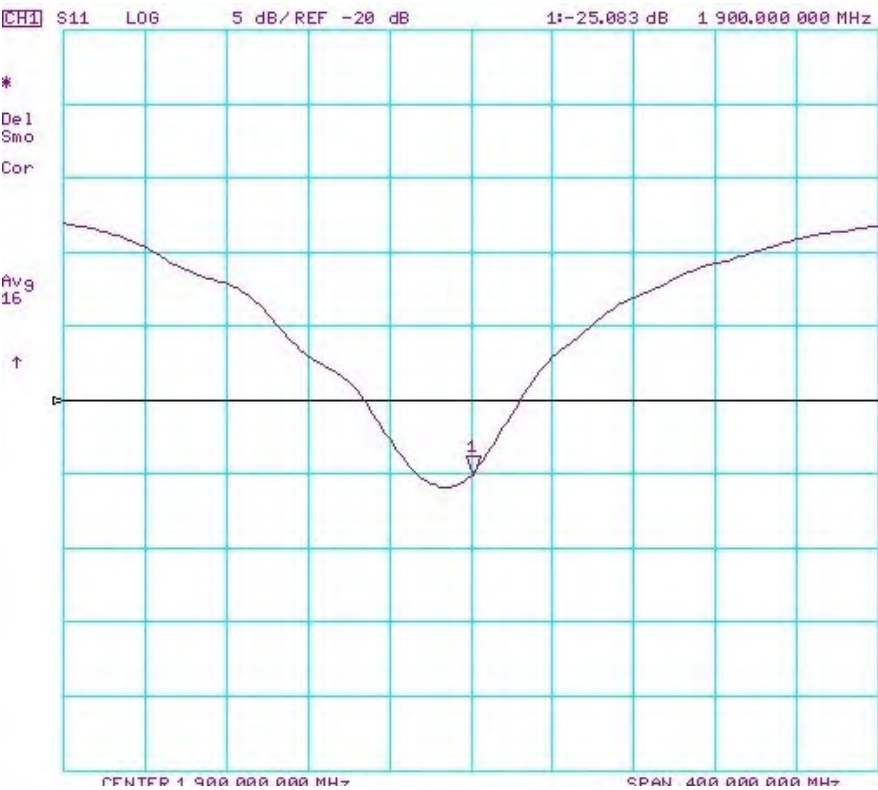
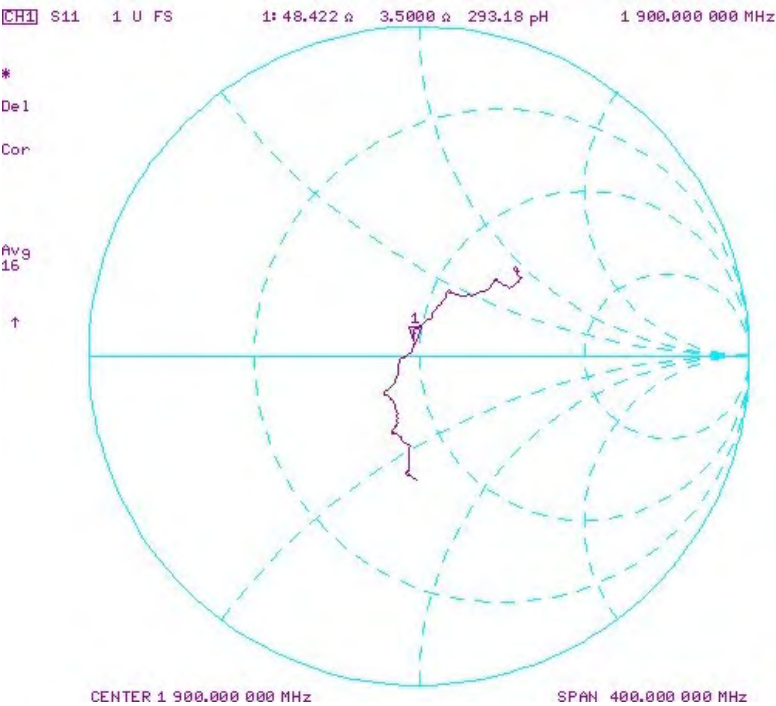
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5/14/2018	5/14/2019	1.199	4.02	3.98	-1.00%	2.11	2.05	-2.84%	53	54.2	1.2	8	4.1	3.9	-21.6	-25.8	-19.30%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5/14/2018	5/14/2019	1.199	3.99	3.97	-0.50%	2.12	2.04	-3.77%	47.1	46.4	1.3	7.4	3.5	3.9	-21.8	-25.1	-15.10%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



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



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
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 **PC Test**

Certificate No: **D1900V2-5d181_Sep17**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d181**

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

SC ✓
10/03/2017

Calibration date: **September 07, 2017**

SC ✓
9/7/2018

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.

BN ✓
10/10/2019

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	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02526)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

Calibrated by: **Jeton Kastrali** Function: **Laboratory Technician**

Signature: *[Handwritten Signature]*

Approved by: **Katja Pokovic** Technical Manager

Issued: September 7, 2017

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Glossary:

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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- c) 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
- d) KDB 865664, "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%.

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.0 $\pm$ 6 %	1.38 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.85 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.5 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.6 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	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	54.3 $\pm$ 6 %	1.47 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.65 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.5 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.9 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	$53.7 \Omega + 4.6 j\Omega$
Return Loss	- 24.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$49.2 \Omega + 5.6 j\Omega$
Return Loss	- 24.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.200 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	August 23, 2013

DASY5 Validation Report for Head TSL

Date: 07.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d181

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.38$ S/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.43, 8.43, 8.43); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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 = 106.8 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 18.5 W/kg

SAR(1 g) = 9.85 W/kg; SAR(10 g) = 5.15 W/kg

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

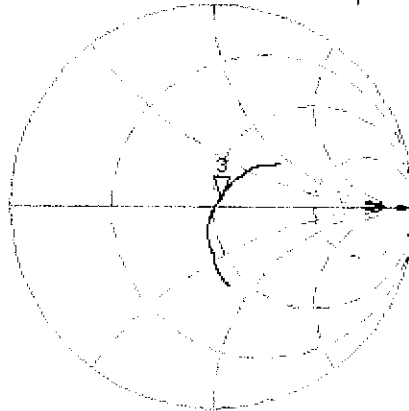


0 dB = 14.8 W/kg = 11.70 dBW/kg

Impedance Measurement Plot for Head TSL

7 Sep 2017 09:10:32
 CH1 S11 1 U FS 3: 53.668 Ω 4.5957 Ω 384.96 μH 1 900.000 000 MHz

*
 Del
 CA



Avg
 16

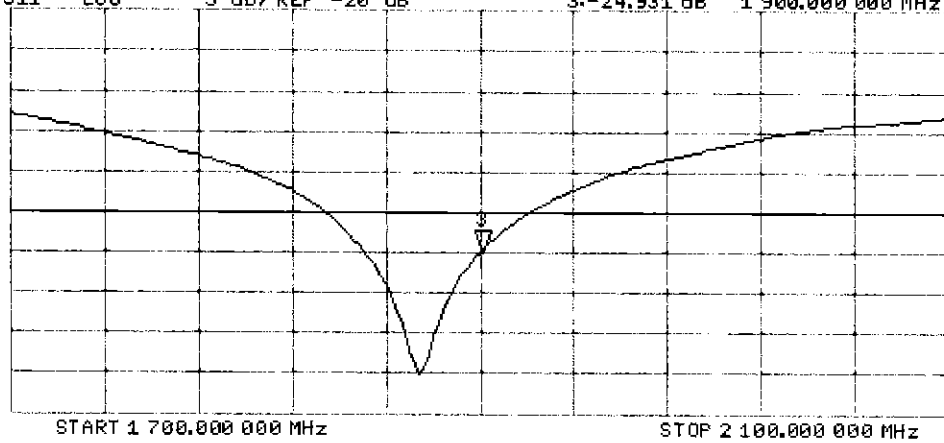
H1d

CH2 S11 LOG 5 dB/REF -20 dB 3:-24.931 dB 1 900.000 000 MHz

CA

Avg
 16

H1d



DASY5 Validation Report for Body TSL

Date: 07.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d181

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.47$ S/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.2, 8.2, 8.2); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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

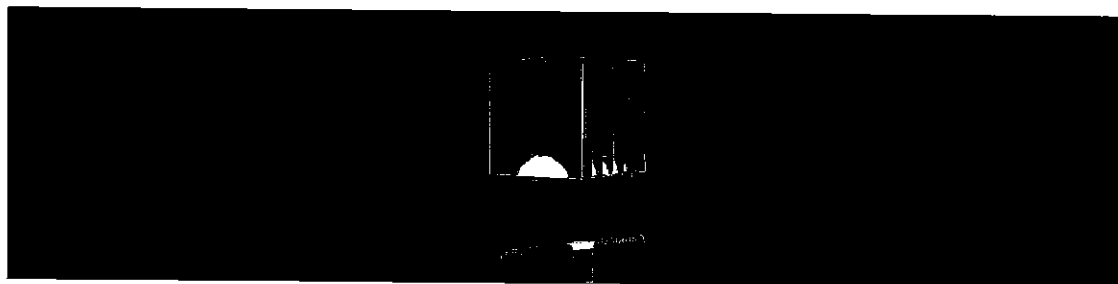
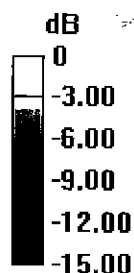
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.4 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 17.0 W/kg

SAR(1 g) = 9.65 W/kg; SAR(10 g) = 5.14 W/kg

Maximum value of SAR (measured) = 13.8 W/kg

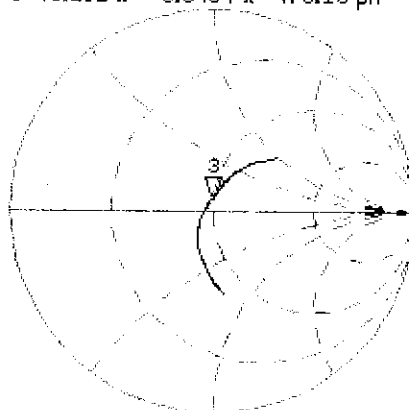


0 dB = 13.8 W/kg = 11.40 dBW/kg

Impedance Measurement Plot for Body TSL

7 Sep 2017 09:09:41
 CH1 S11 1 U FS 3: 49.201 Ω 5.6484 Ω 473.15 pF 1 900.000 000 MHz

*
 Del
 CA



Avg
 16

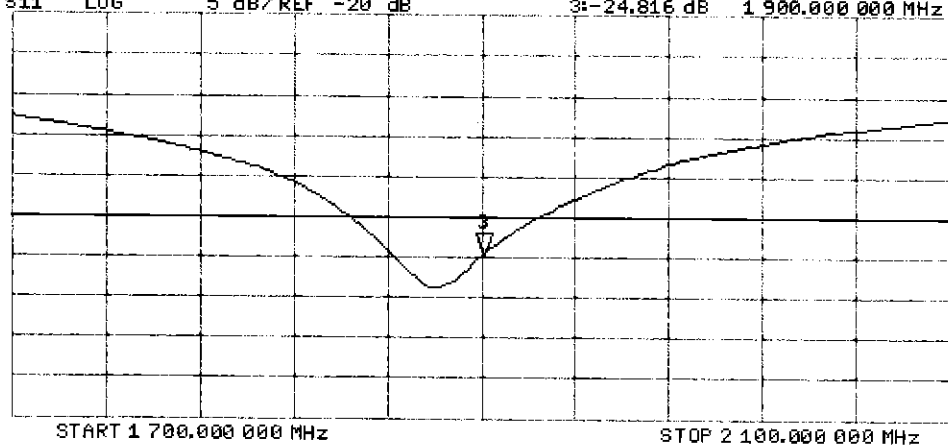
H1d

CH2 S11 LOG 5 dB/REF -20 dB 3: -24.816 dB 1 900.000 000 MHz

CA

Avg
 16

H1d



Certification of Calibration

Object D1900V2 – SN: 5d181

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

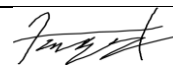
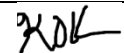
Extended Calibration date: September 07, 2018

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	9/14/2017	Annual	9/14/2018	US39170118
Agilent	N5182A	MXG Vector Signal Generator	3/19/2018	Annual	3/19/2019	US46240505
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2496A	Power Meter	10/9/2017	Annual	10/9/2018	1138001
Anritsu	MA2411B	Pulse Power Sensor	11/15/2017	Annual	11/15/2018	1339007
Anritsu	MA2411B	Pulse Power Sensor	11/22/2017	Annual	11/22/2018	1339008
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/14/2017	Biennial	2/14/2019	170112507
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	ES3DV3	SAR Probe	9/18/2017	Annual	9/18/2018	3287
SPEAG	DAE4	Data Acquisition Electronics	1/26/2018	Annual	1/26/2019	1533
SPEAG	ES3DV3	SAR Probe	3/13/2018	Annual	3/13/2019	3131
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/7/2018	Annual	3/7/2019	604

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Sangmin Cha	Team Lead Engineer	
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	

DIPOLE CALIBRATION EXTENSION

Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

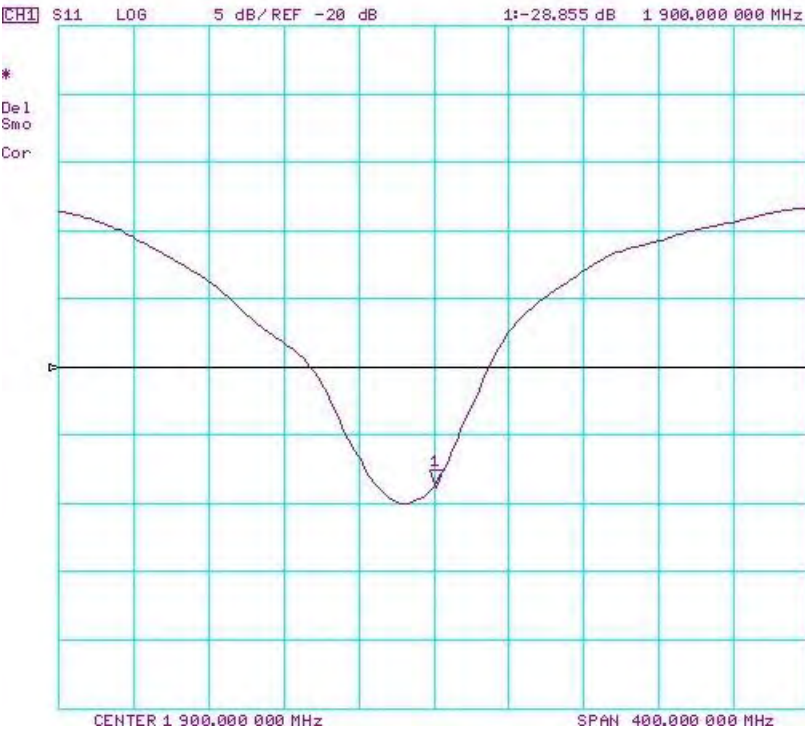
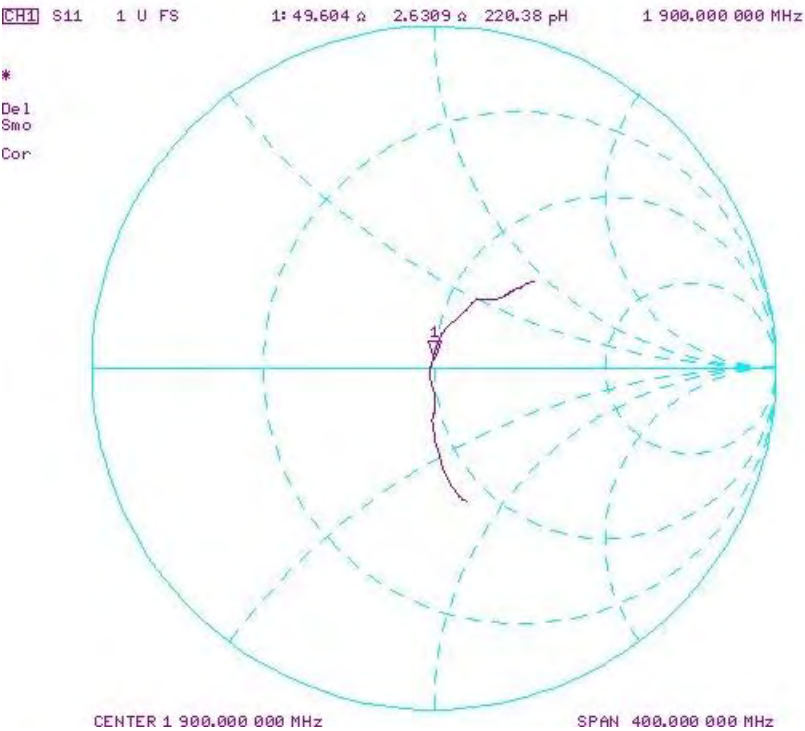
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

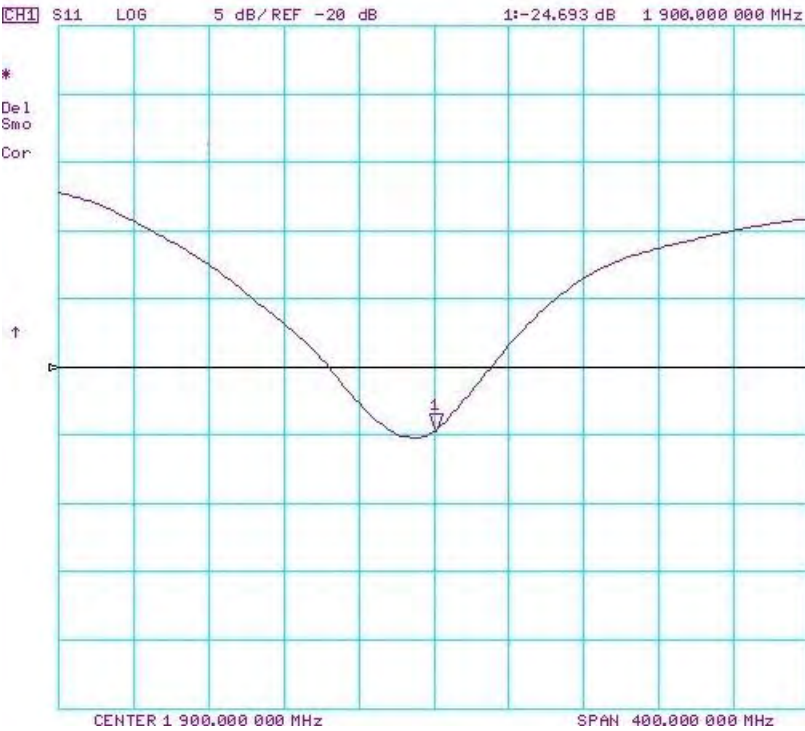
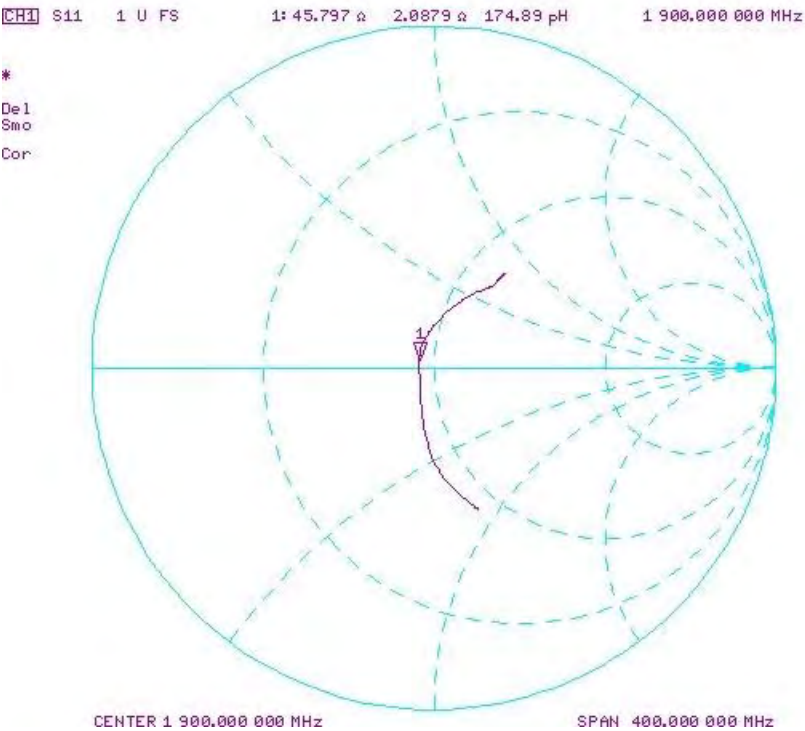
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2018	1.2	3.95	3.99	1.01%	2.06	2.07	0.49%	53.7	49.6	4.1	4.6	2.6	2	-24.9	-28.9	-16.10%	PASS

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2018	1.2	3.95	4.13	4.56%	2.09	2.14	2.39%	49.2	45.8	3.4	5.6	2.1	3.5	-24.8	-24.7	0.40%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object D1900V2 – SN: 5d181

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: September 7, 2019

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	E4438C	ESG Vector Signal Generator	6/27/2019	Annual	6/27/2020	MY45093852
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	11/1/2017	Biennial	11/1/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/7/2019	Annual	5/7/2020	1070
SPEAG	EX3DV4	SAR Probe	1/24/2019	Annual	1/24/2020	7490
SPEAG	DAE4	Data Acquisition Electronics	1/15/2019	Annual	1/15/2020	1532

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

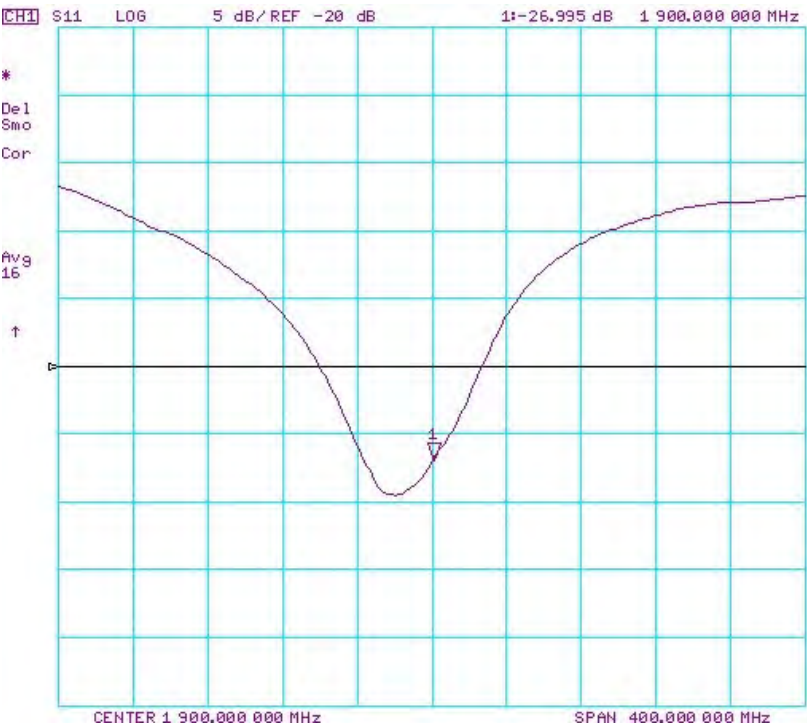
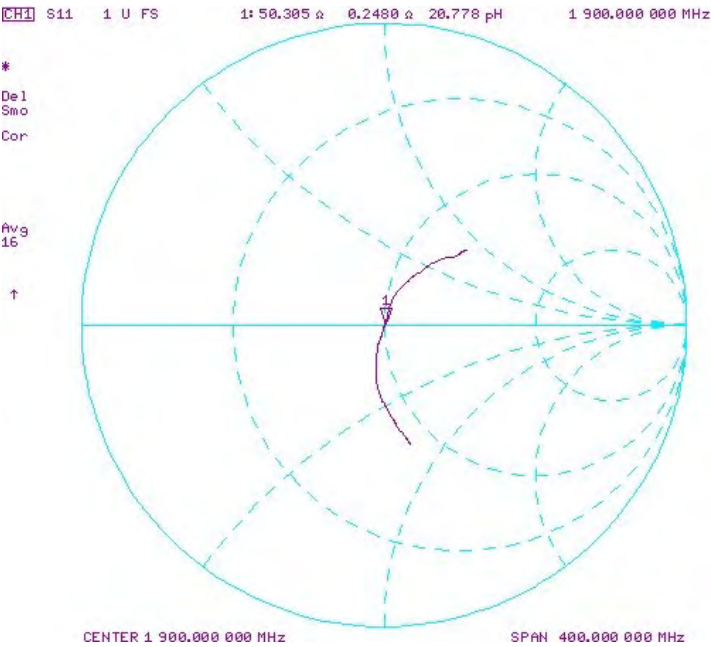
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

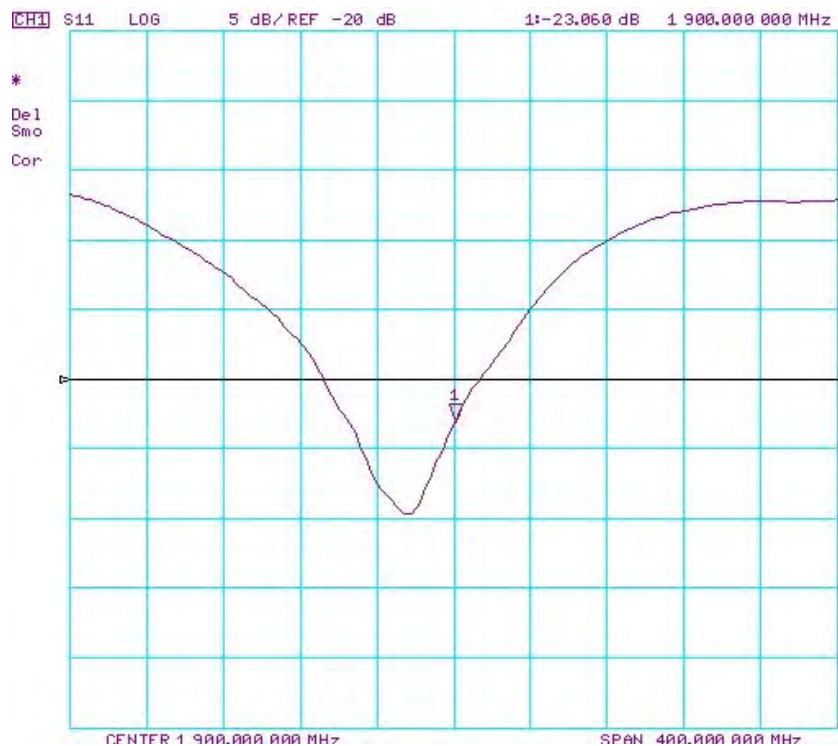
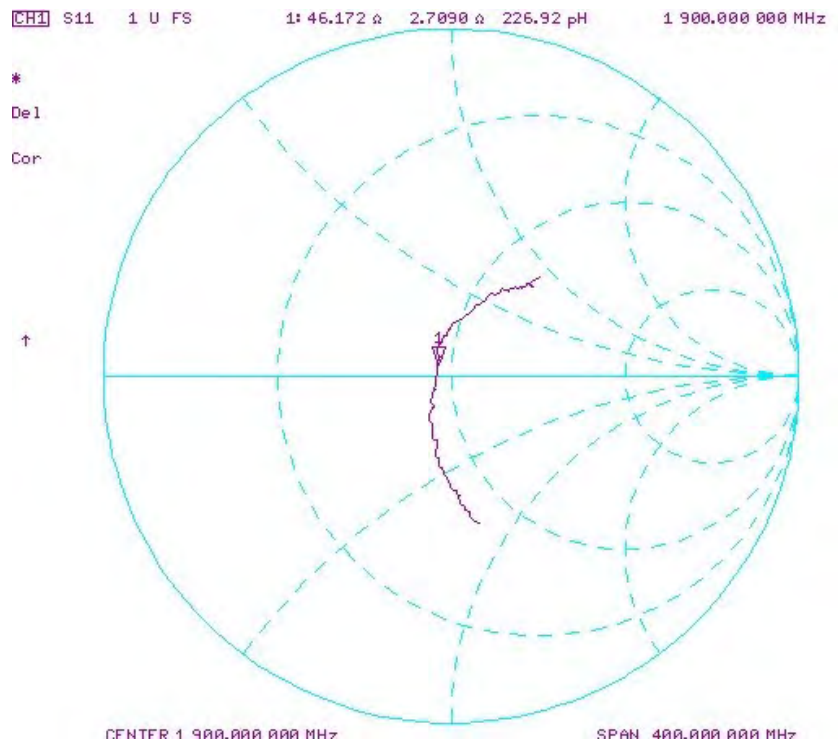
The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2019	1.2	3.95	3.92	-0.76%	2.06	2.04	-0.97%	53.7	50.3	-3.4	4.6	0.2	-4.4	-24.9	-27	-8.40%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2019	1.2	3.95	4.05	2.53%	2.09	2.1	0.48%	49.2	46.2	-3	5.6	2.7	-2.9	-24.8	-23.1	6.90%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL





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 **PC Test**

Certificate No: **D2300V2-1038_Mar18**

CALIBRATION CERTIFICATE

Object **D2300V2 - SN:1038**

Calibration procedure(s) **QA CAL-05.v10
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **March 07, 2018**

SC ✓
3/21/18
SC ✓
4/25/19

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
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** **Technical Manager**

Issued: March 9, 2018

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



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**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- 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	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2300 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.5	1.67 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.6 $\pm$ 6 %	1.70 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	12.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	49.3 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	5.94 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.6 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	52.9	1.81 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.6 $\pm$ 6 %	1.86 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	11.9 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	46.7 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	5.69 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	22.5 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	47.8 Ω - 4.9 j Ω
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.9 Ω - 3.4 j Ω
Return Loss	- 25.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.170 ns
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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	July 02, 2013

DASY5 Validation Report for Head TSL

Date: 07.03.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2300 MHz; Type: D2300V2; Serial: D2300V2 - SN:1038

Communication System: UID 0 - CW; Frequency: 2300 MHz

Medium parameters used: $f = 2300$ MHz; $\sigma = 1.7$ S/m; $\epsilon_r = 38.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.08, 8.08, 8.08); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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

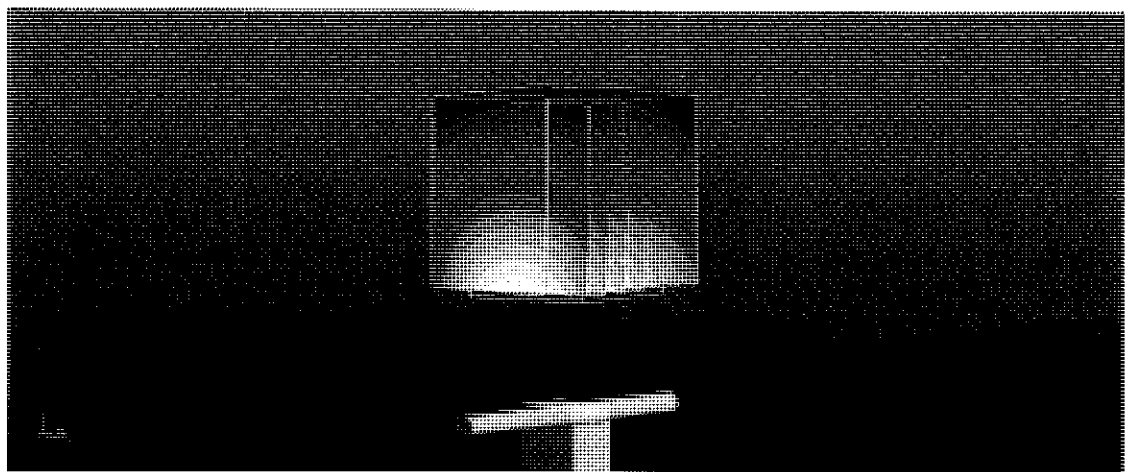
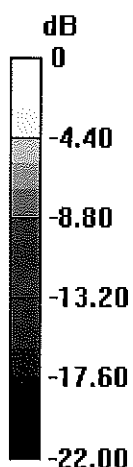
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 112.4 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 24.5 W/kg

SAR(1 g) = 12.5 W/kg; SAR(10 g) = 5.94 W/kg

Maximum value of SAR (measured) = 19.6 W/kg



0 dB = 19.6 W/kg = 12.92 dBW/kg

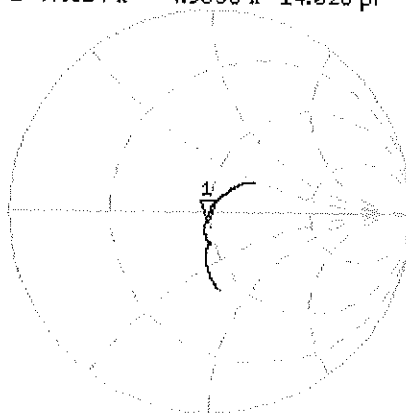
Impedance Measurement Plot for Head TSL

7 Mar 2018 13:16:07
 CH1 S11 1 U FS 1: 47.824 Ω -4.9336 Ω 14.026 pF 2 300.000 000 MHz

*
 Del
 Cor

Avg
 16

H1d

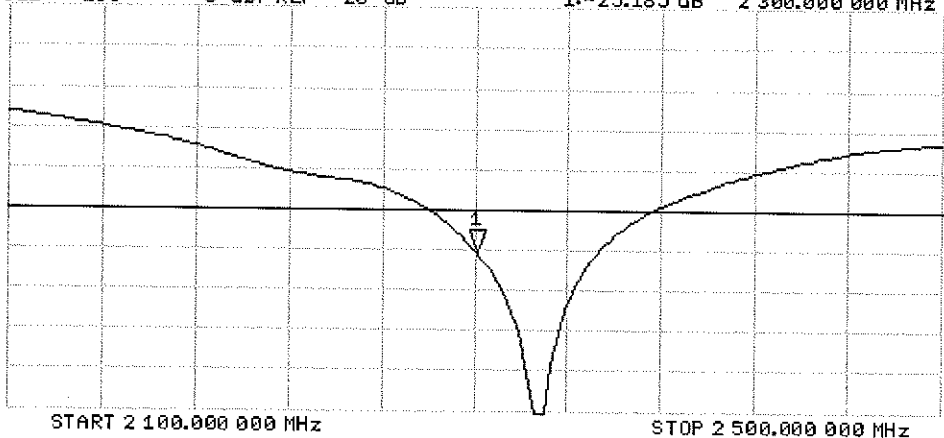


CH2 S11 LOG 5 dB/REF -20 dB 1:-25.185 dB 2 300.000 000 MHz

Cor

Avg
 16

H1d



DASY5 Validation Report for Body TSL

Date: 07.03.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2300 MHz; Type: D2300V2; Serial: D2300V2 - SN:1038

Communication System: UID 0 - CW; Frequency: 2300 MHz

Medium parameters used: $f = 2300$ MHz; $\sigma = 1.86$ S/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.08, 8.08, 8.08); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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

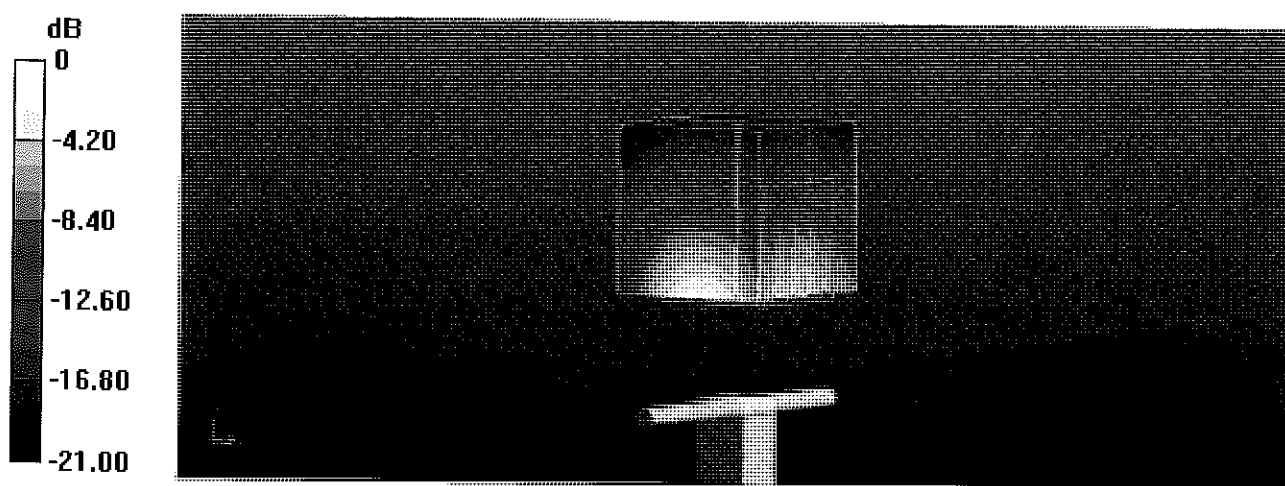
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.5 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 23.0 W/kg

SAR(1 g) = 11.9 W/kg; SAR(10 g) = 5.69 W/kg

Maximum value of SAR (measured) = 18.2 W/kg

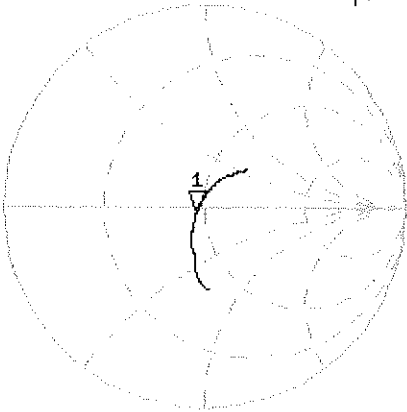


0 dB = 18.2 W/kg = 12.60 dBW/kg

Impedance Measurement Plot for Body TSL

7 Mar 2018 13:11:08
CH1 S11 1 U FS 1: 45.861 Ω -3.4160 Ω 20.257 pF 2 300.000 000 MHz

*
De1
Cor



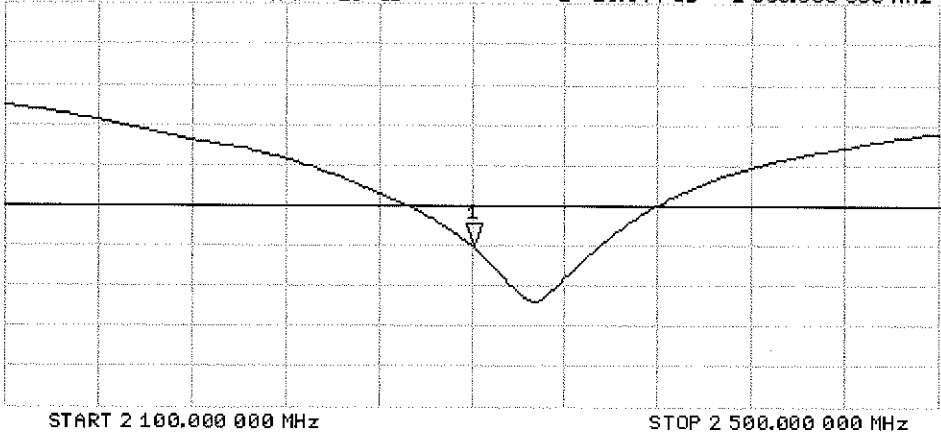
Avg
16
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-25.044 dB 2 300.000 000 MHz

Cor

Avg
16

H1d



Certification of Calibration

Object D2300V2 – SN: 1038

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

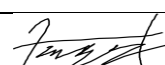
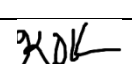
Extended Calibration date: February 25, 2019

Description: SAR Validation Dipole at 2300 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	N5182A	MXG Vector Signal Generator	6/15/2018	Annual	6/15/2019	MY47420837
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Anritsu	ML2496A	Power Meter	10/21/2018	Annual	10/21/2019	1138001
Control Company	4040	Therm./Clock/Humidity Monitor	3/31/2017	Biennial	3/31/2019	170232394
Control Company	4352	Ultra Long Stem Thermometer	5/2/2017	Biennial	5/2/2019	170330156
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Agilent	85033E	3.5mm Standard Calibration Kit	8/13/2018	Annual	8/13/2019	MY53402352
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Seekonk	NC-100	Torque Wrench	7/11/2018	Annual	7/11/2019	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/12/2018	Annual	4/12/2019	501
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/18/2018	Annual	10/18/2019	1364
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	ES3DV3	SAR Probe	4/12/2018	Annual	4/12/2019	3275
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7491

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Sangmin Cha	Team Lead Engineer	
Approved By:	Kaitlin O'Keefe	Managing Director	

DIPOLE CALIBRATION EXTENSION

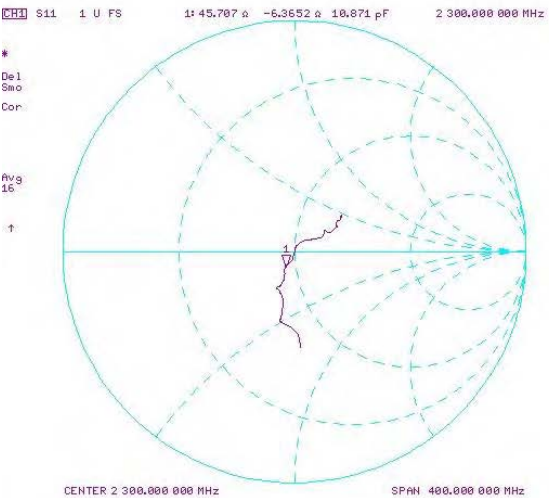
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

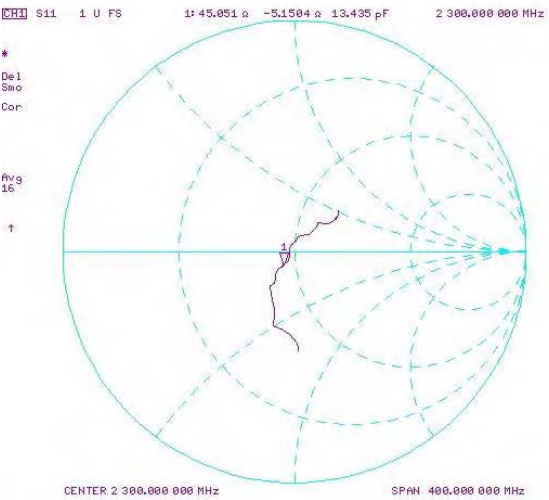
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
3/7/2018	2/25/2019	1.17	4.93	4.77	-3.25%	2.36	2.29	-2.97%	47.8	45.7	2.1	-4.9	-6.4	1.5	-25.2	-22.1	12.30%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
3/7/2018	2/25/2019	1.17	4.67	4.82	3.21%	2.25	2.27	0.89%	45.9	45.1	0.8	-3.4	-5.2	1.8	-25	-22.7	9.20%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL





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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D2450V2-921 Nov18**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN:921**

Calibration procedure(s) **QA CAL-05.v10**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **November 12, 2018**

SC ✓
 12/11/2018
 BNV ✓
 12/31/2019

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	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

Calibrated by: **Manu Seitz** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Signature

Issued: November 12, 2018

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



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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- 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	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	37.9 $\pm$ 6 %	1.86 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.6 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.1 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.8 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	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.4 $\pm$ 6 %	2.02 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	50.8 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.03 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.8 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	$54.7 \Omega + 6.5 j\Omega$
Return Loss	- 22.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$50.7 \Omega + 7.8 j\Omega$
Return Loss	- 22.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.157 ns
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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	September 26, 2013

DASY5 Validation Report for Head TSL

Date: 12.11.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:921

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.86$ S/m; $\epsilon_r = 37.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.88, 7.88, 7.88) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

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

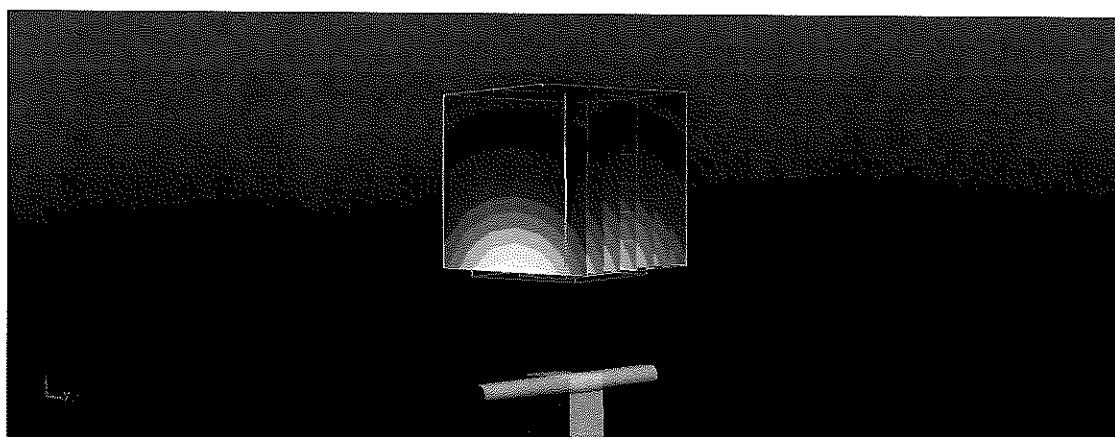
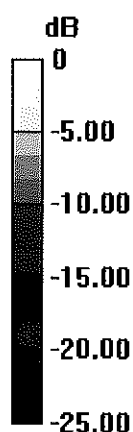
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 117.7 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 27.4 W/kg

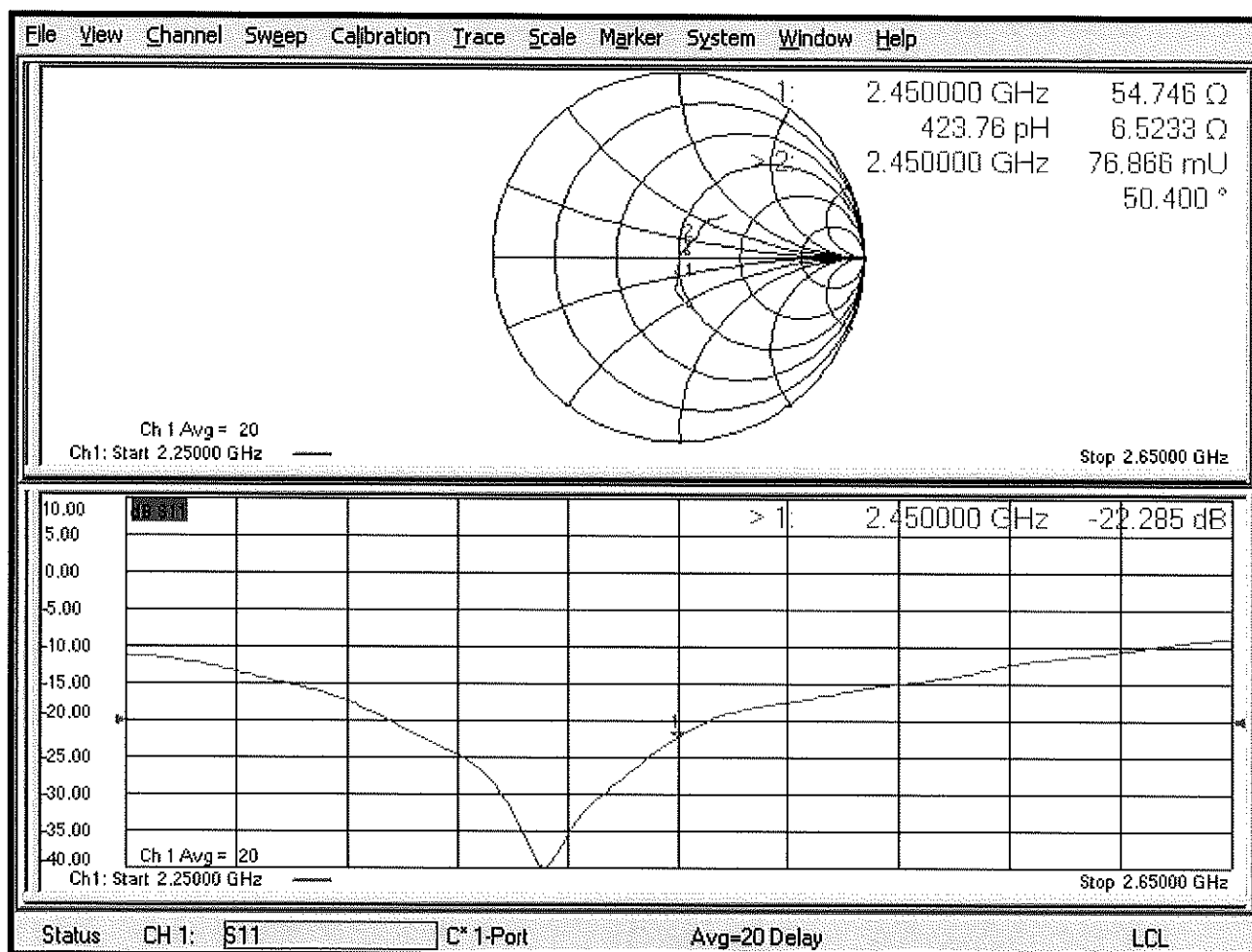
SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.28 W/kg

Maximum value of SAR (measured) = 22.4 W/kg



0 dB = 22.4 W/kg = 13.50 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 12.11.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:921

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.02$ S/m; $\epsilon_r = 51.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.01, 8.01, 8.01) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

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

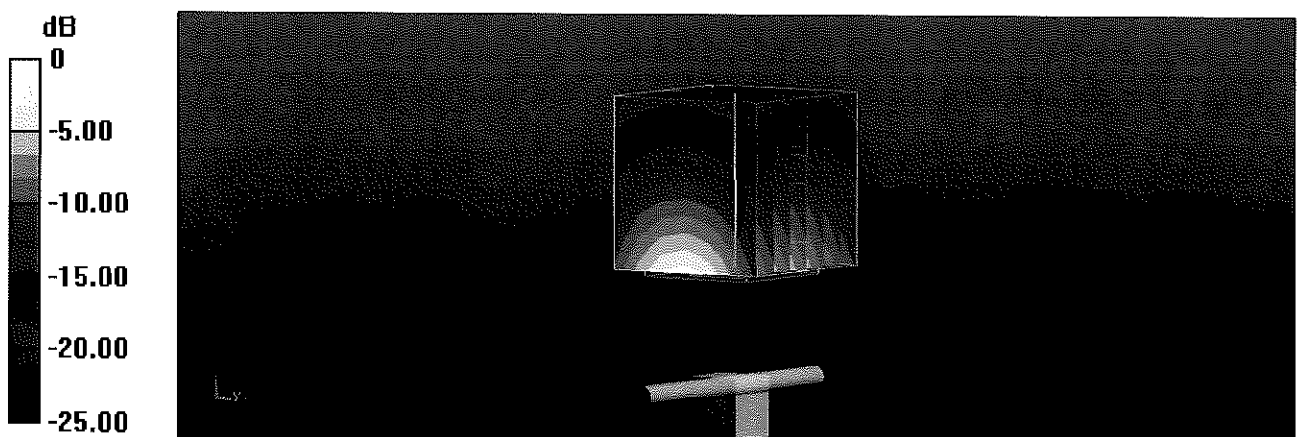
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 108.6 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 26.1 W/kg

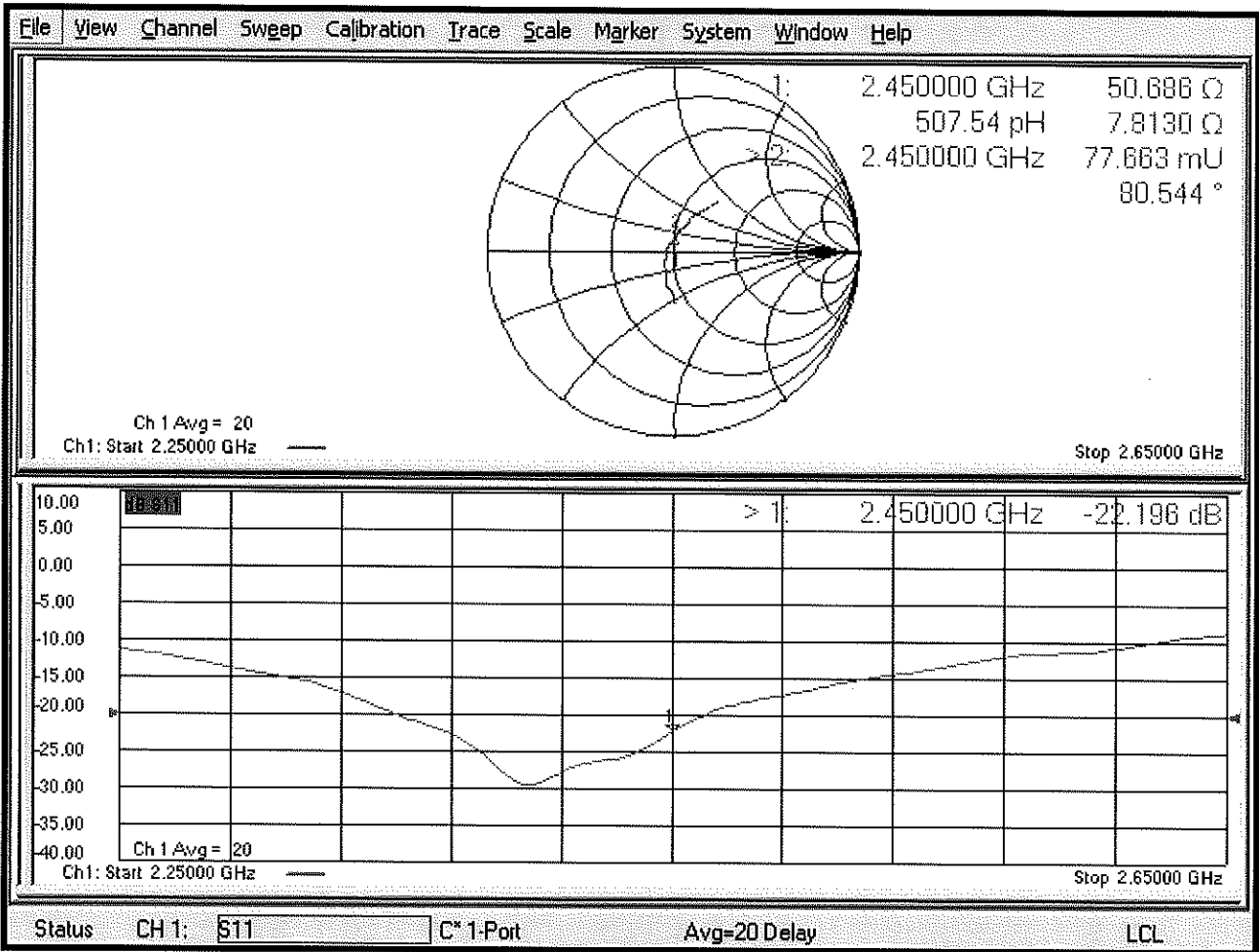
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.03 W/kg

Maximum value of SAR (measured) = 21.3 W/kg



0 dB = 21.3 W/kg = 13.28 dBW/kg

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D2450V2 – SN: 921

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: November 11, 2019

Description: SAR Validation Dipole at 2450 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	8/26/2019	Annual	8/26/2020	MY40000670
Agilent	E4438C	ESG Vector Signal Generator	6/27/2019	Annual	6/27/2020	MY45093852
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	11/20/2018	Annual	11/20/2019	1039008
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1027293
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Seekonk	NC-100	Torque Wrench	5/4/2018	Biennial	5/4/2020	22216
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/7/2019	Annual	5/7/2020	1070
SPEAG	EX3DV4	SAR Probe	1/24/2019	Annual	1/24/2020	7490
SPEAG	DAE4	Data Acquisition Electronics	1/15/2019	Annual	1/15/2020	1532

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOL</i>

DIPOLE CALIBRATION EXTENSION

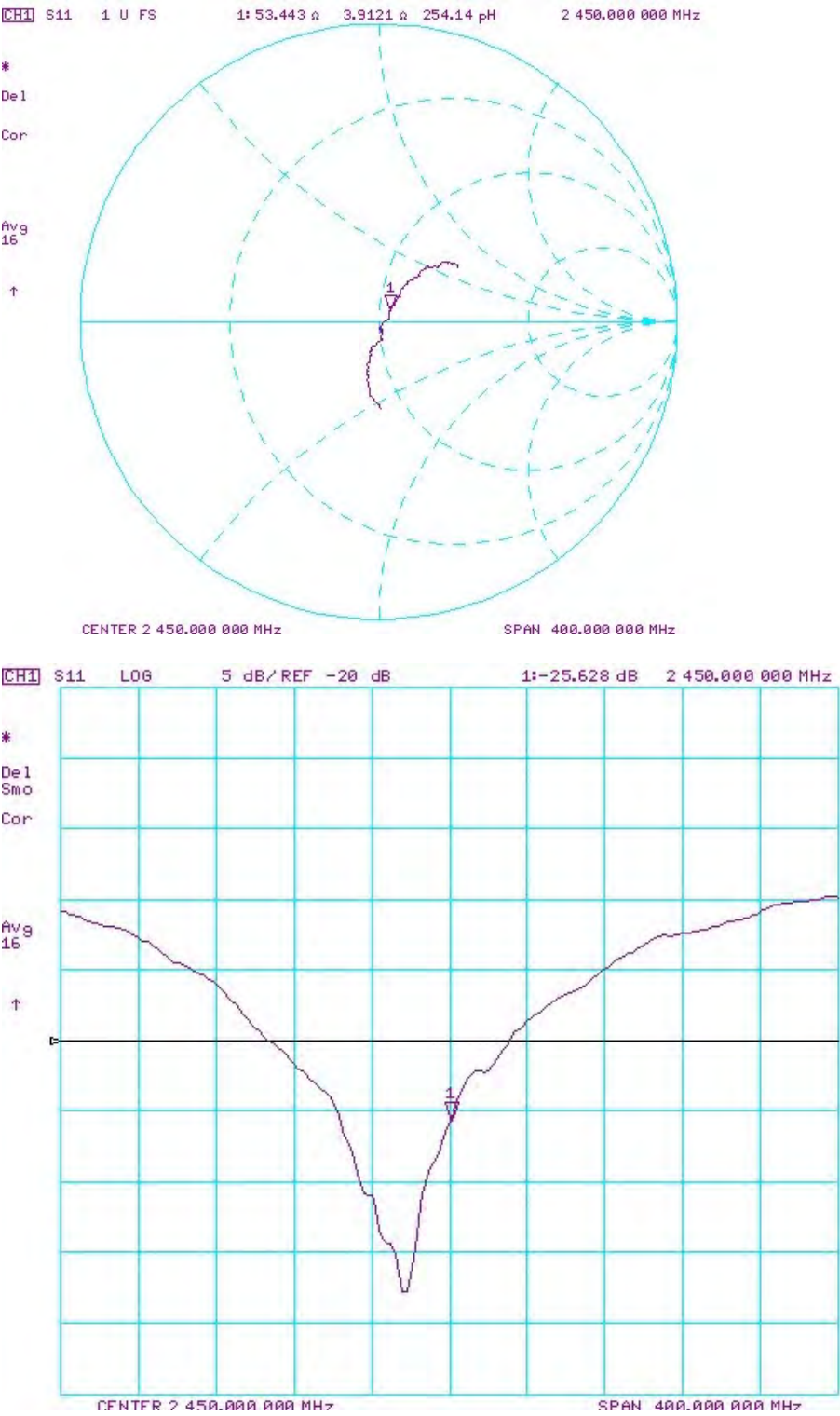
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

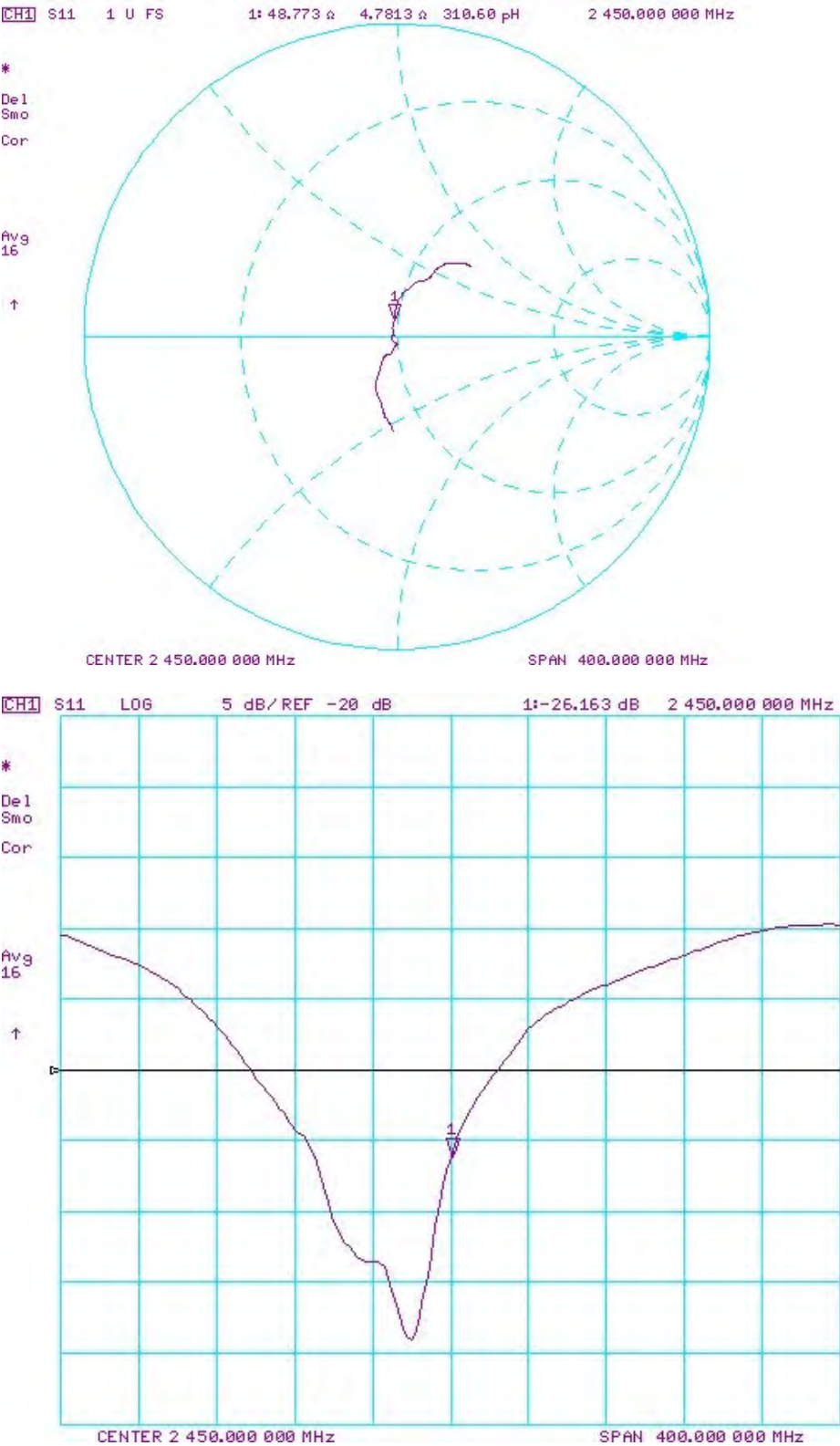
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
11/12/2018	11/11/2019	1.157	5.31	5.28	-0.56%	2.48	2.38	-4.03%	54.7	53.4	1.3	6.5	3.9	2.6	-22.3	-25.6	-14.80%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
11/12/2018	11/11/2019	1.157	5.08	5.41	6.50%	2.38	2.47	3.78%	50.7	48.8	1.9	7.8	4.8	3	-22.2	-26.2	-18.00%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL





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Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D2450V2-945_May18**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN:945**

Calibration procedure(s) **QA CAL-05.v10**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **May 16, 2018**

SCV
5/31/2018
BNV
06/01/2019

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
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Manu Seltz	Laboratory Technician	<i>[Signature]</i>
Approved by:	Katja Pokovic	Technical Manager	<i>[Signature]</i>

Issued: May 17, 2018

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



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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- 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	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.2 $\pm$ 6 %	1.85 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	51.0 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.8 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	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.3 $\pm$ 6 %	1.99 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.5 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	49.4 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.83 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.2 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	$56.1 \Omega + 3.7 j\Omega$
Return Loss	- 23.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$51.9 \Omega + 5.0 j\Omega$
Return Loss	- 25.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.157 ns
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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	March 15, 2014

DASY5 Validation Report for Head TSL

Date: 16.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:945

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.85$ S/m; $\epsilon_r = 38.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.88, 7.88, 7.88) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

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

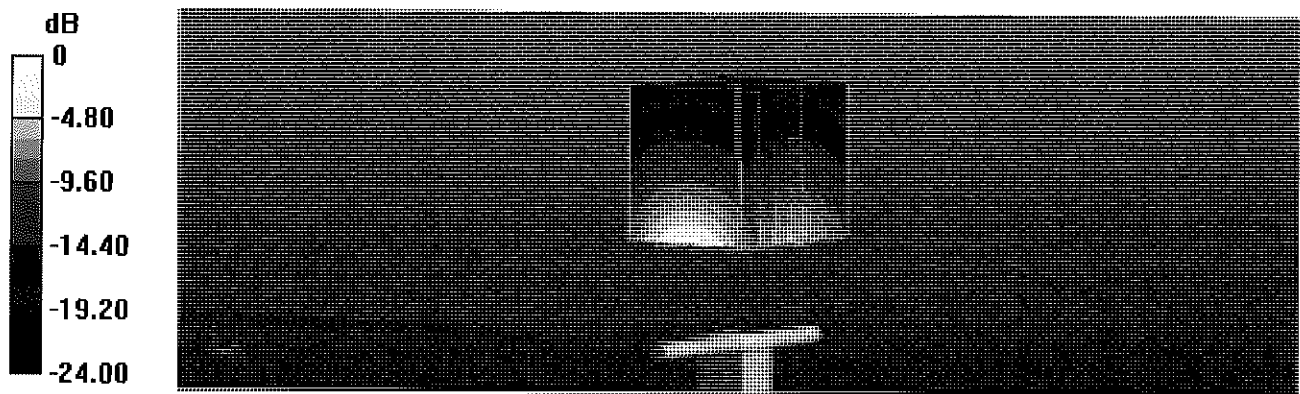
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 114.8 V/m; Power Drift = -0.01 dB

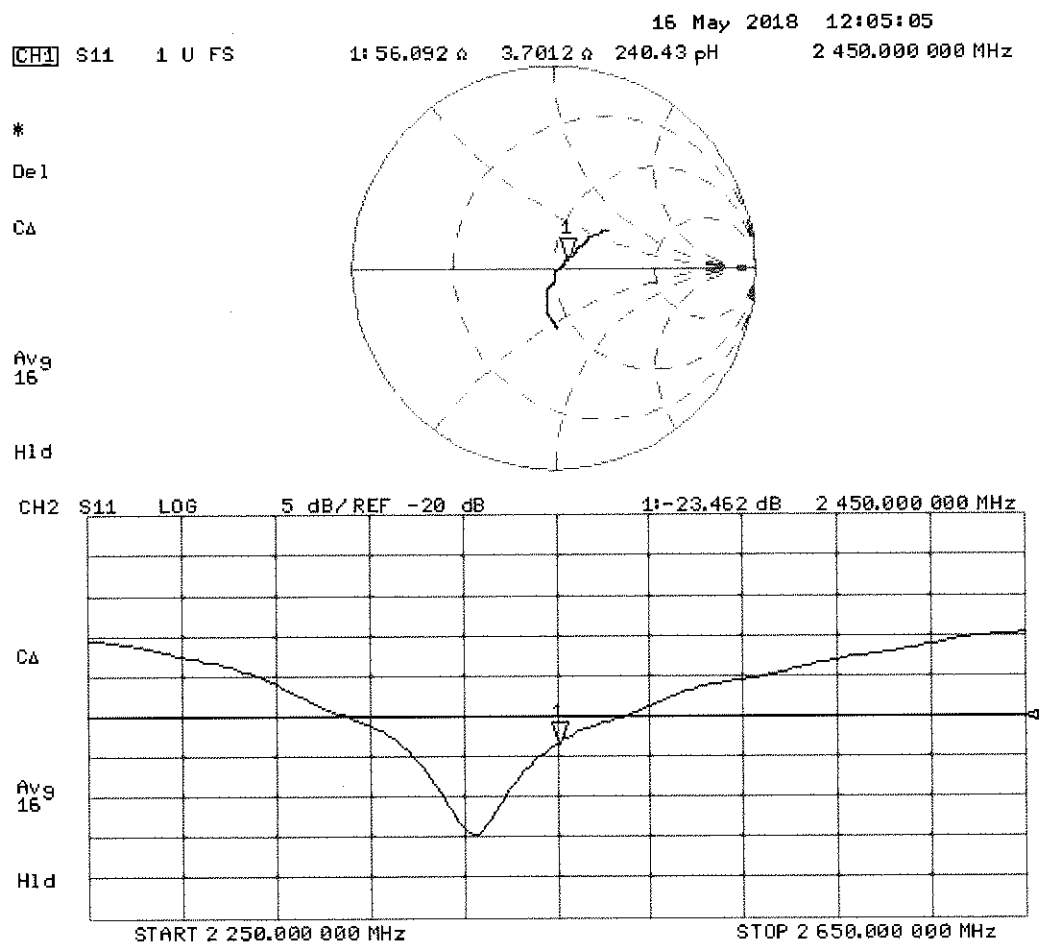
Peak SAR (extrapolated) = 25.9 W/kg

SAR(1 g) = 13 W/kg; SAR(10 g) = 6.02 W/kg

Maximum value of SAR (measured) = 21.4 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:945

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.99$ S/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.01, 8.01, 8.01) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

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

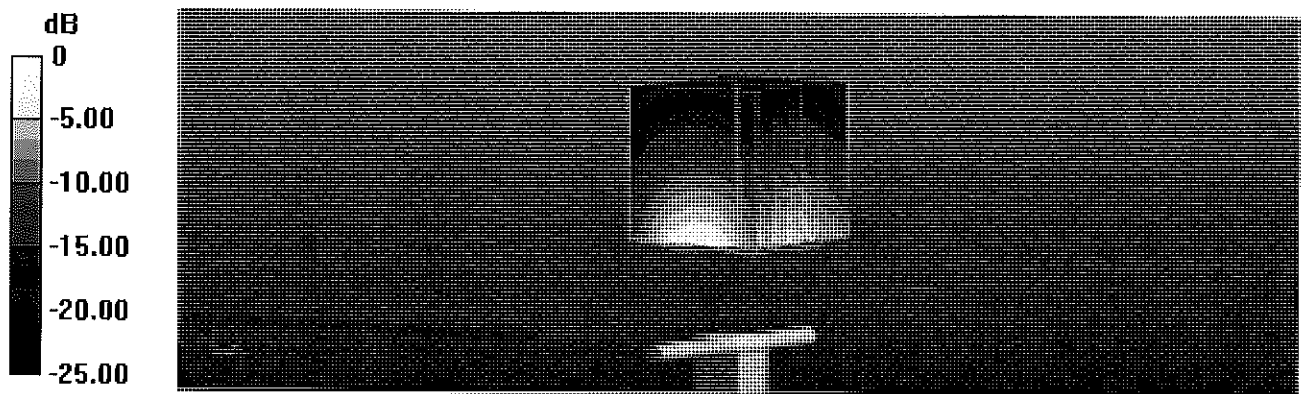
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.8 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 25.0 W/kg

SAR(1 g) = 12.5 W/kg; SAR(10 g) = 5.83 W/kg

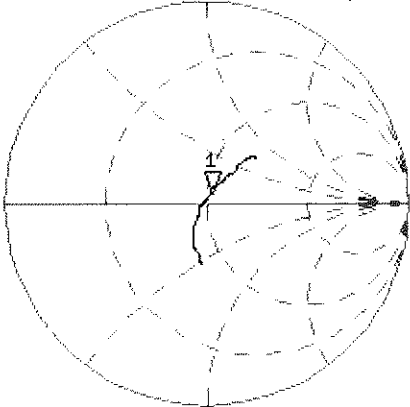
Maximum value of SAR (measured) = 20.2 W/kg



Impedance Measurement Plot for Body TSL

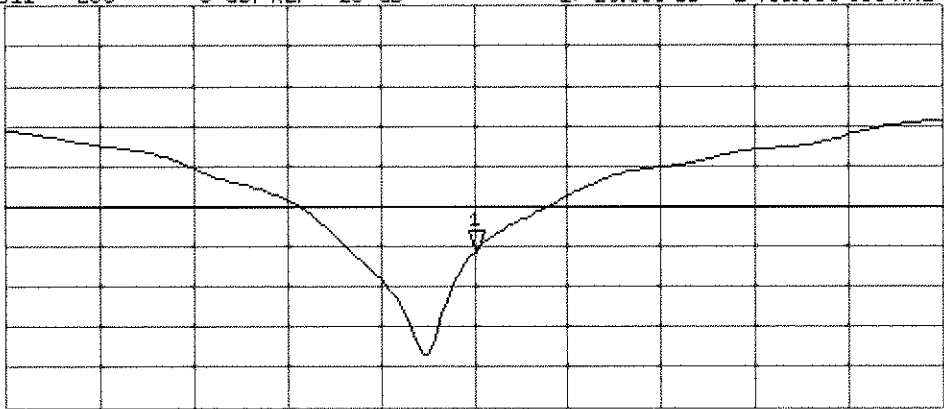
16 May 2018 12:03:43
[CH1] S11 1 U FS 1: 51.910 Ω 4.9629 Ω 322.40 μ H 2 450.000 000 MHz

*
De1
CA
Avg
16
H1d



CH2 S11 LOG 5 dB/REF -20 dB 1:-25.659 dB 2 450.000 000 MHz

CA
Avg
16
H1d



START 2 250.000 000 MHz STOP 2 650.000 000 MHz

Certification of Calibration

Object D2450V2 – SN: 945

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: May 16, 2019

Description: SAR Validation Dipole at 2450 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	N5182A	MXG Vector Signal Generator	6/15/2018	Annual	6/15/2019	MY47420837
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAKS-3.5	Portable DAK	9/11/2018	Annual	9/11/2019	1045
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7416
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/10/2018	Annual	7/10/2019	1402

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Parker Jones	Team Lead Engineer	<i>Parker Jones</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

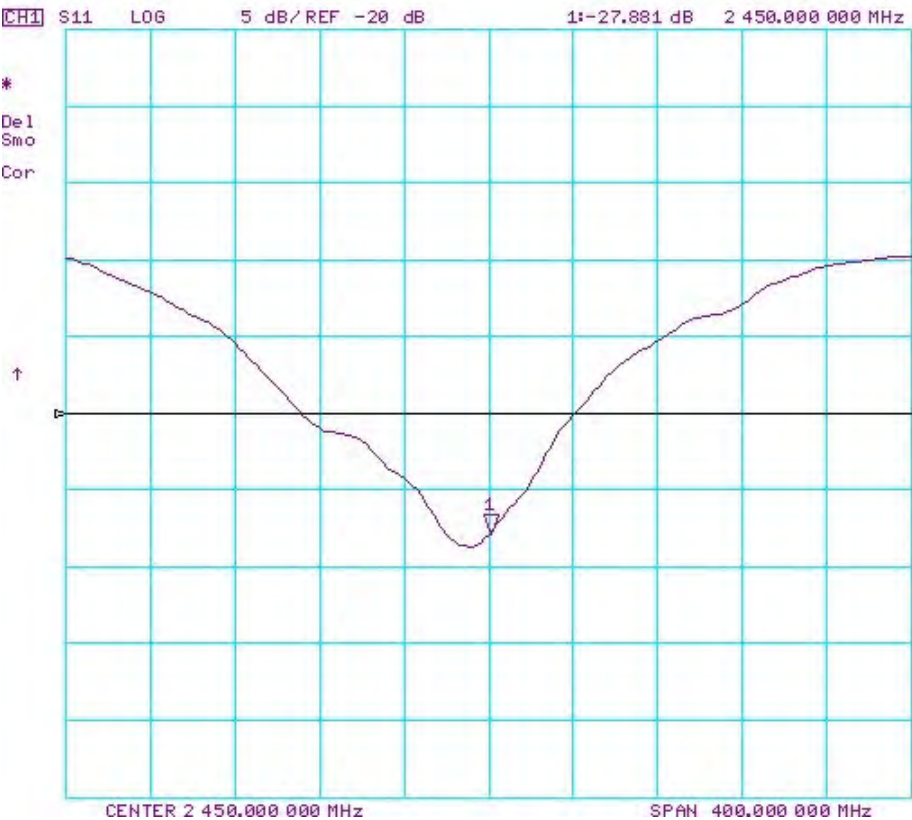
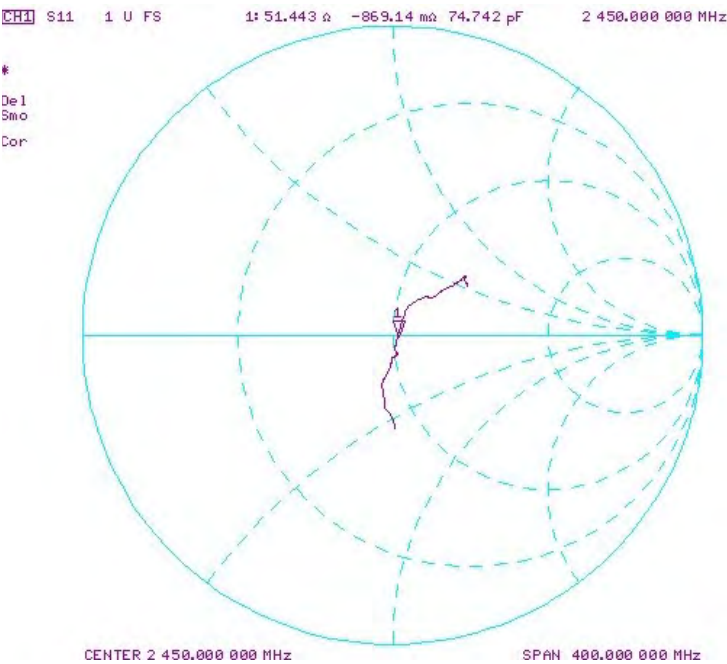
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

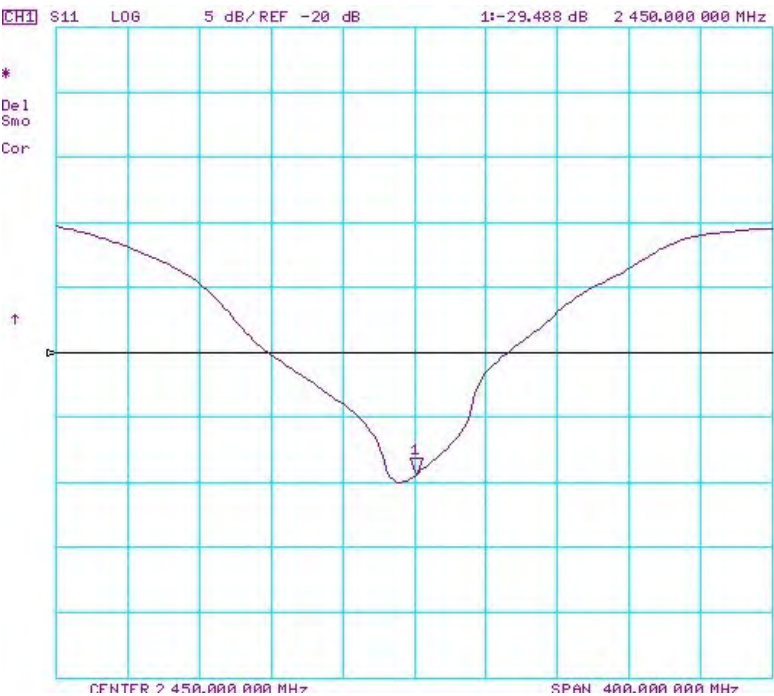
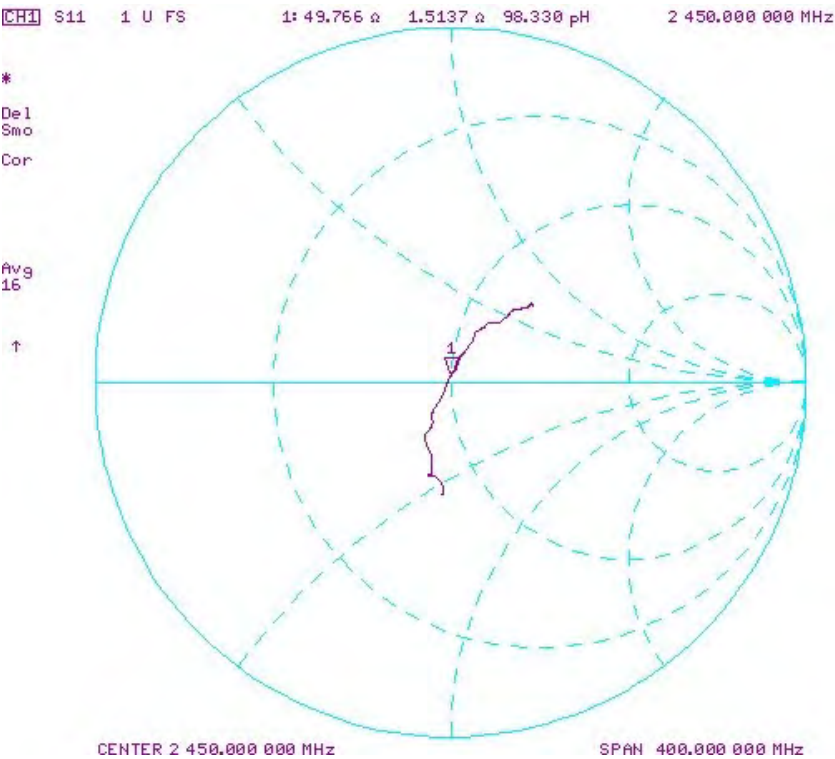
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5/16/2018	5/16/2019	1.157	5.1	5.23	3.73%	2.38	2.44	2.52%	56.1	51.4	4.7	3.7	-0.9	4.6	-23.5	-27.9	-18.60%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5/16/2018	5/16/2019	1.157	4.94	5.21	5.47%	2.32	2.38	2.59%	51.9	49.8	2.1	5	1.5	3.5	-25.7	-29.5	-14.70%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL





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 **PC Test**

Certificate No: **D2600V2-1009 Jun18**

CALIBRATION CERTIFICATE

Object **D2600V2 - SN:1009**

Calibration procedure(s) **QA CAL-05.v10**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **June 19, 2018**

SC ✓
 6/28/18

BN ✓
 7/01/18

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
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Signature

Issued: June 21, 2018

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



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**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- 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%.