

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

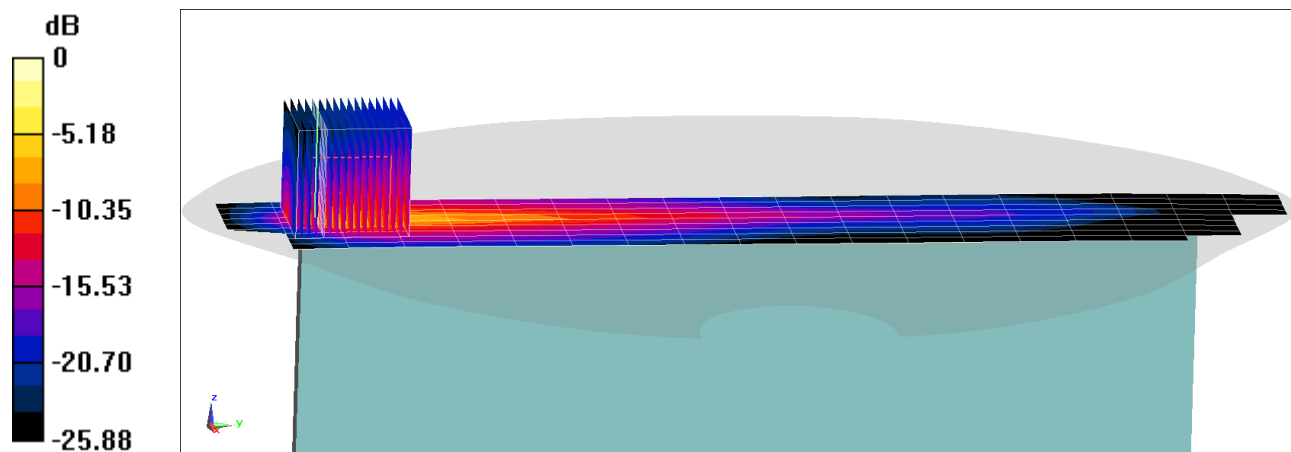
Area Scan (10x20x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

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 = 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

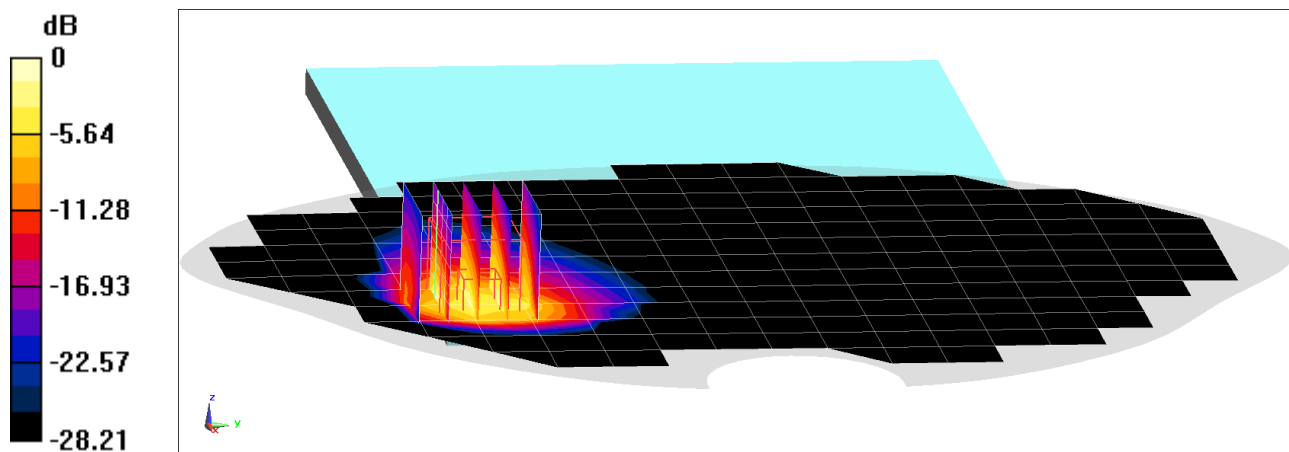
Area Scan (15x19x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

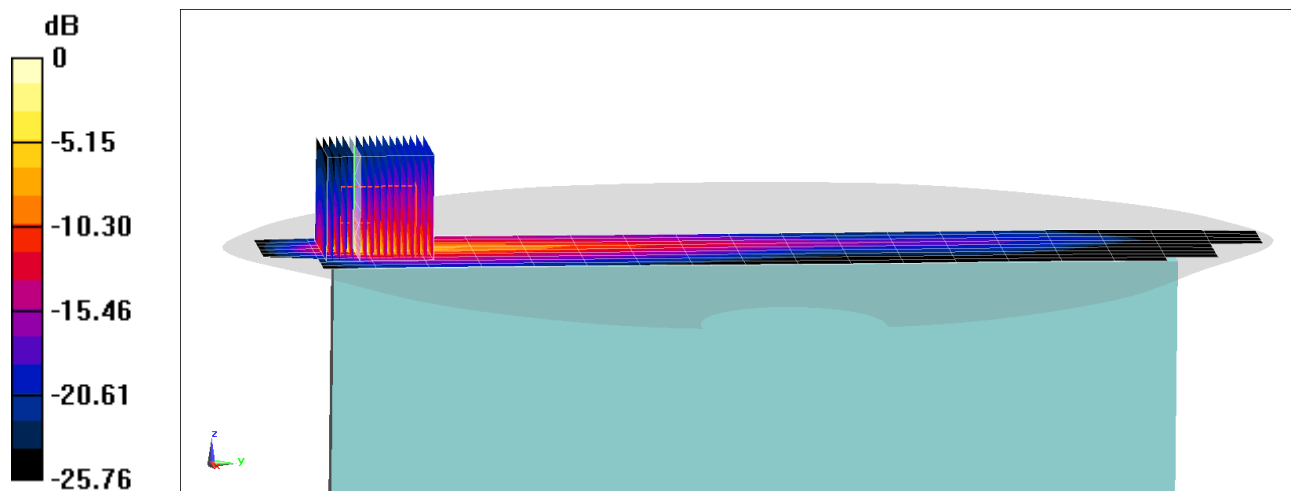
Area Scan (10x20x1): Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 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):

$f = 1752.6 \text{ MHz}$; $\sigma = 1.528 \text{ S/m}$; $\epsilon_r = 52.671$; $\rho = 1000 \text{ kg/m}^3$

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

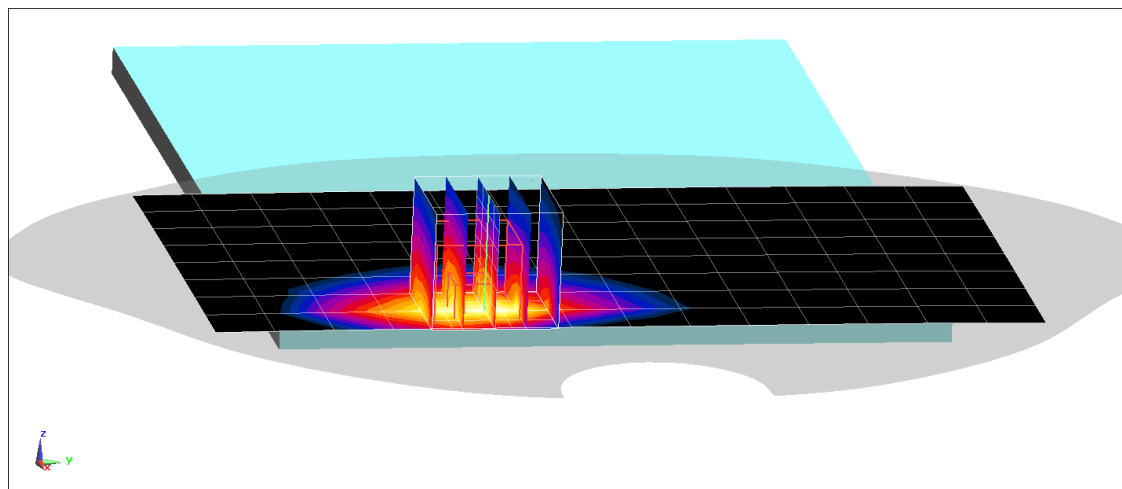
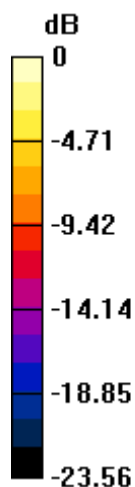
Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm

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

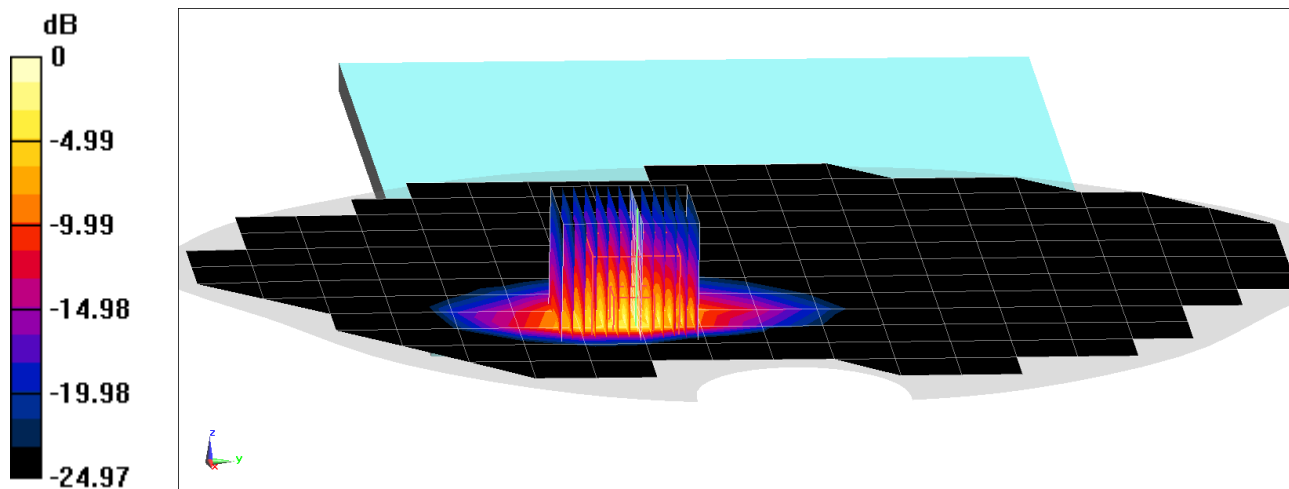
Area Scan (15x19x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (13x13x8)/Cube 0: Measurement grid: dx=2.8mm, dy=2.8mm, dz=1.4mm; 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**

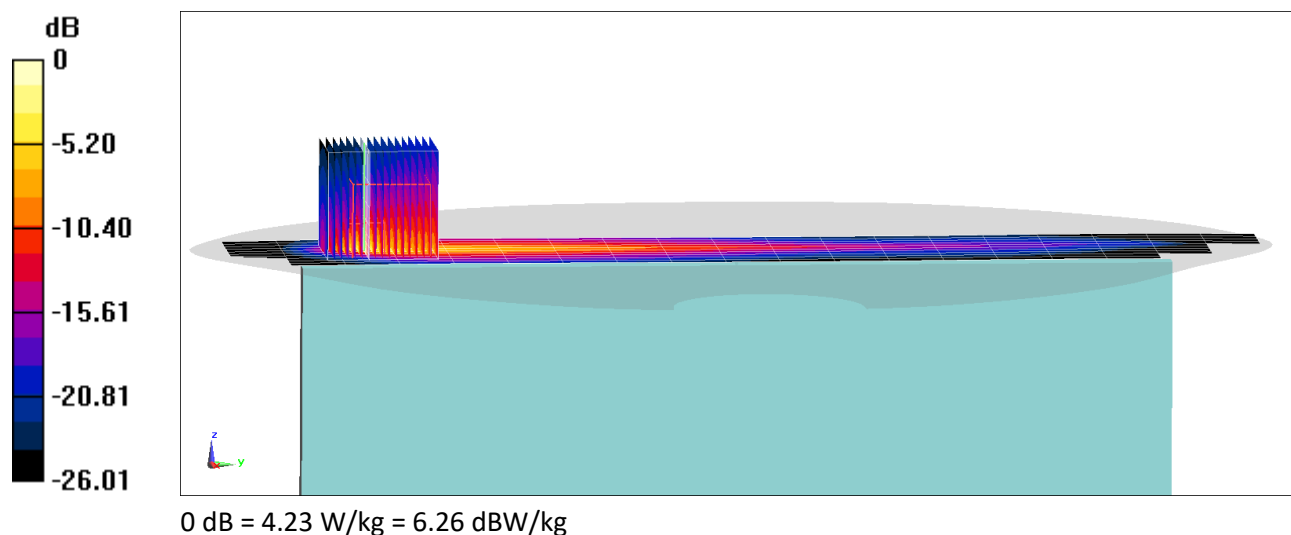
Area Scan (11x20x1): Measurement grid: dx=5mm, dy=15mm

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**

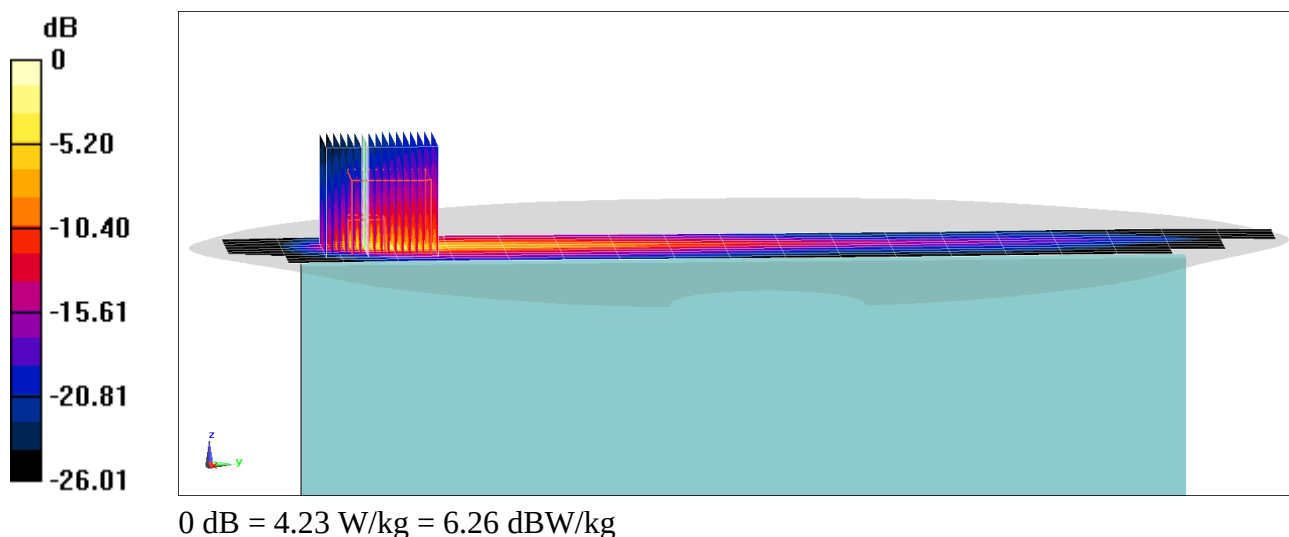
Area Scan (11x20x1): Measurement grid: dx=5mm, dy=15mm

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**

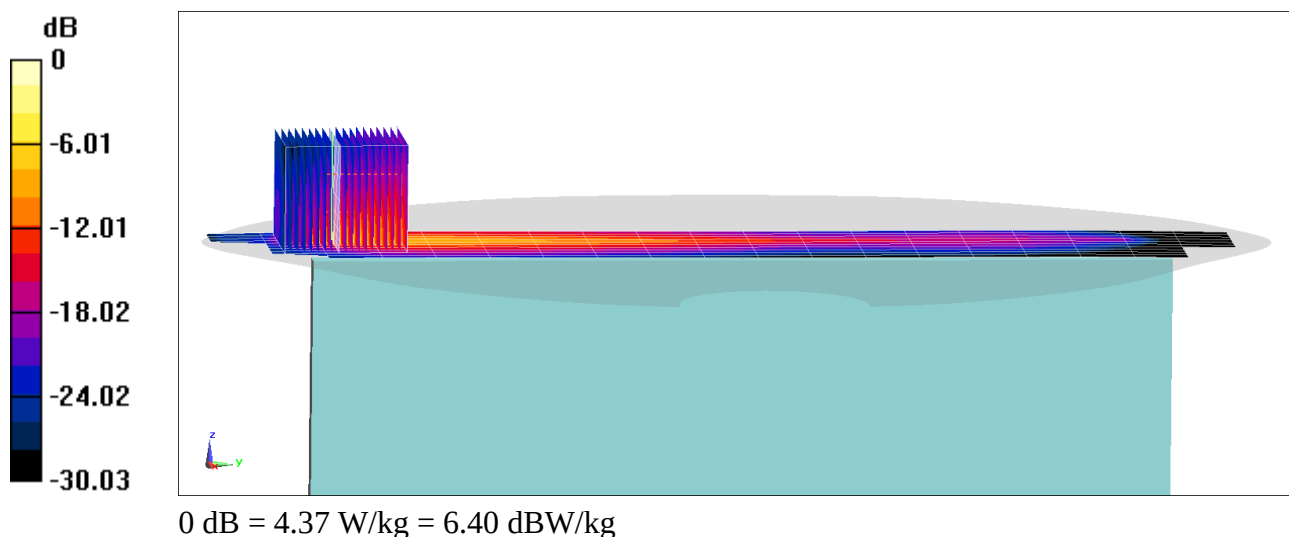
Area Scan (11x20x1): Measurement grid: dx=5mm, dy=15mm

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**

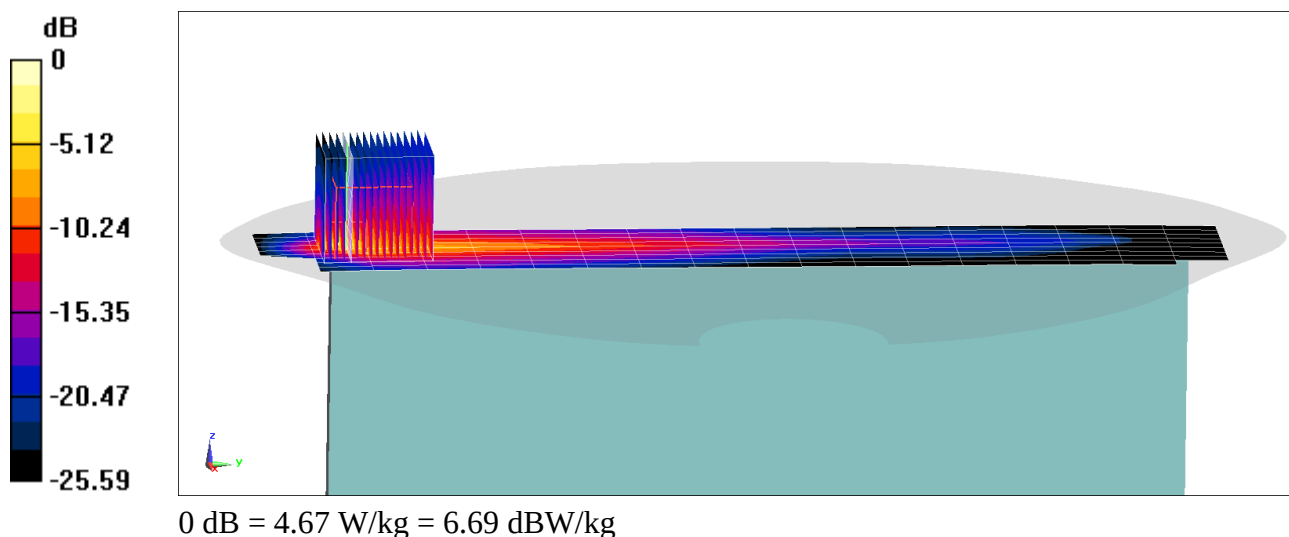
Area Scan (10x19x1): Measurement grid: dx=5mm, dy=15mm

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**

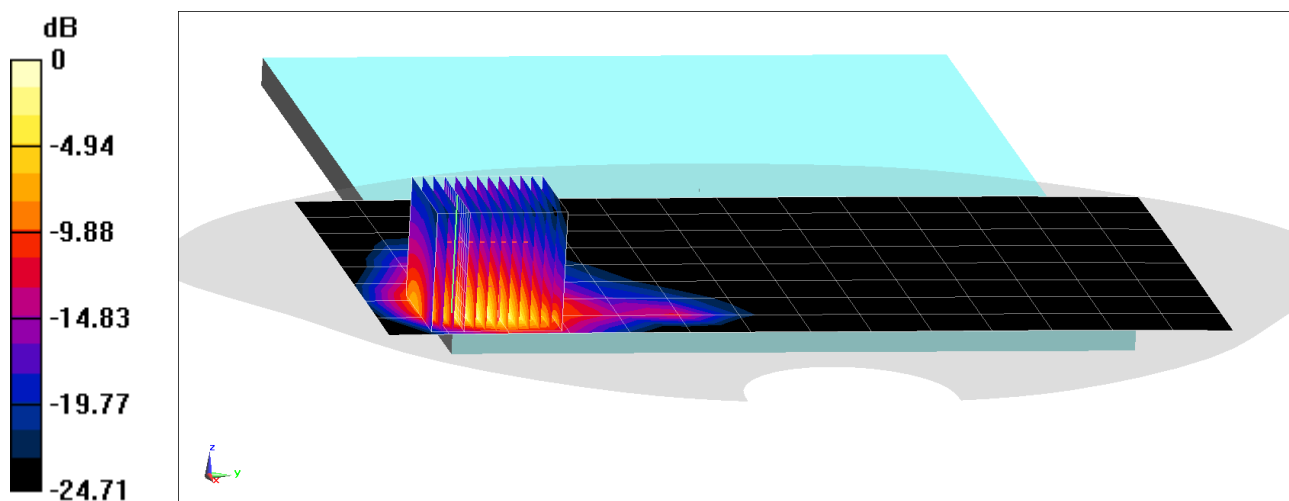
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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**

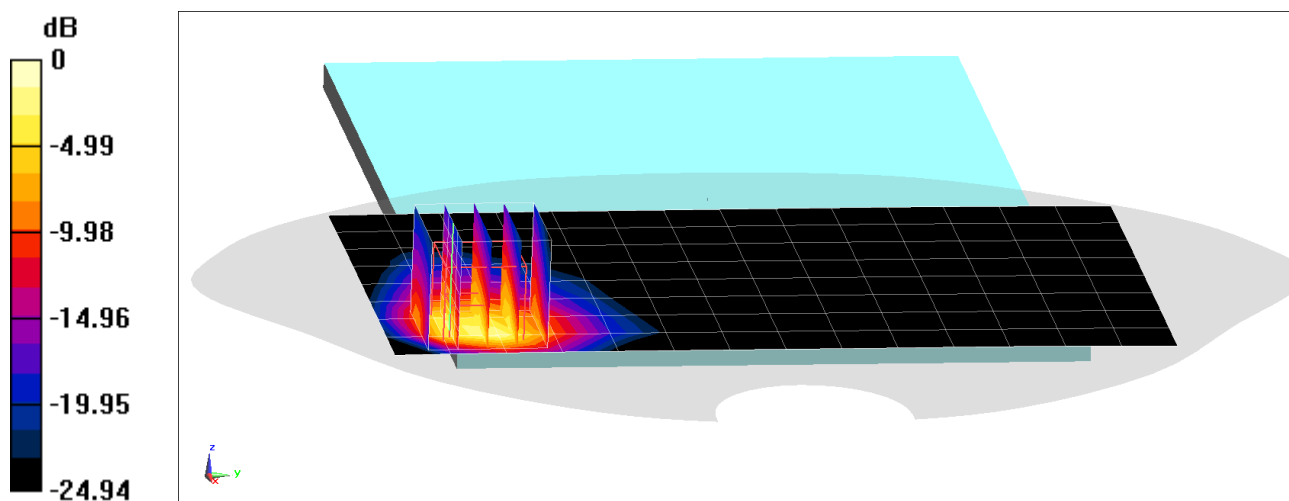
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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**

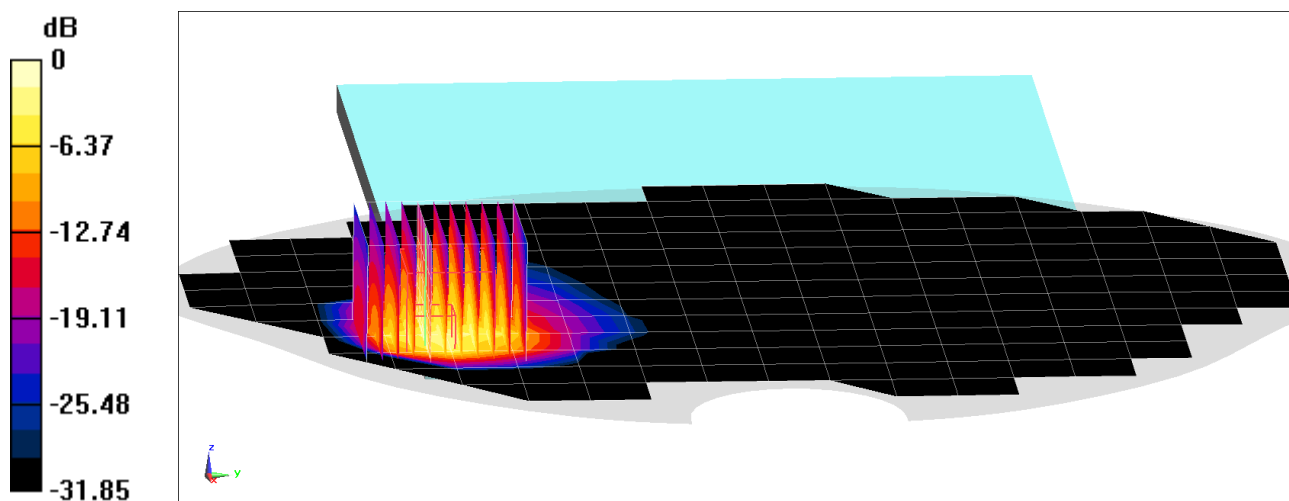
Area Scan (15x19x1): Measurement grid: dx=15mm, dy=15mm

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**

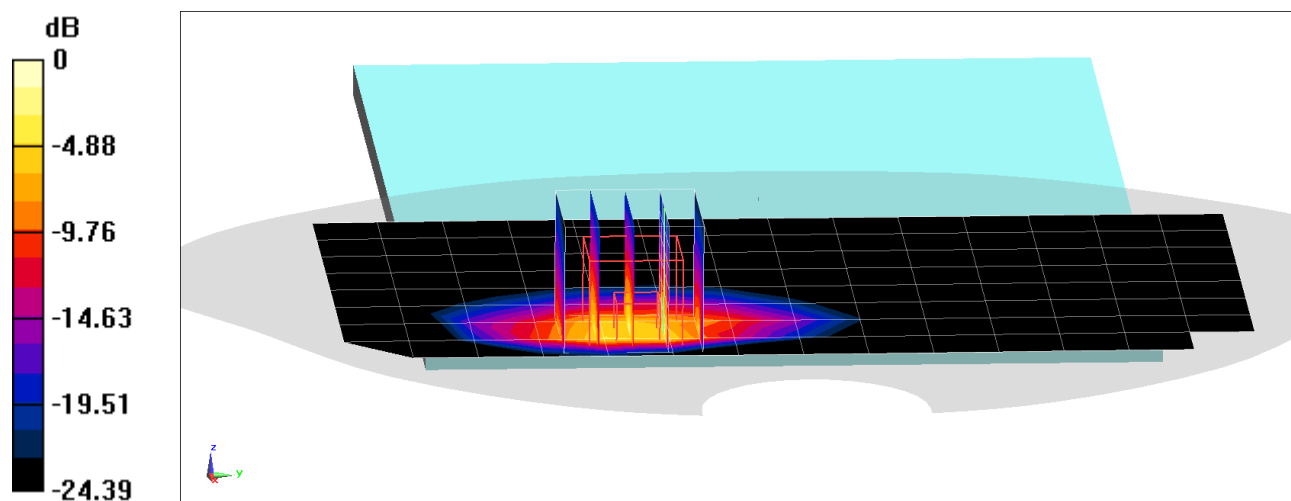
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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**

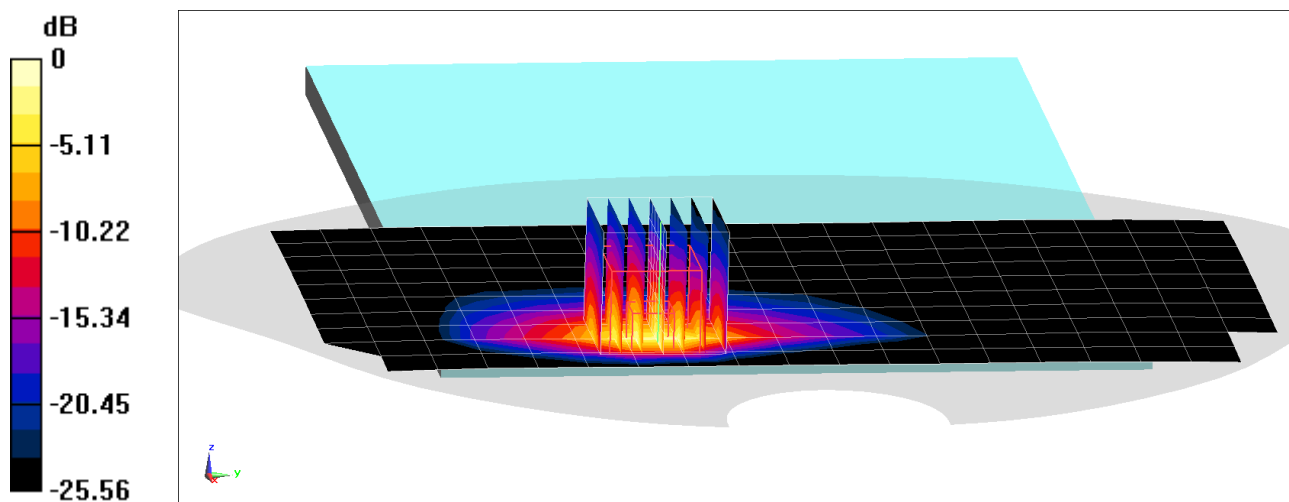
Area Scan (11x20x1): Measurement grid: dx=12mm, dy=12mm

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

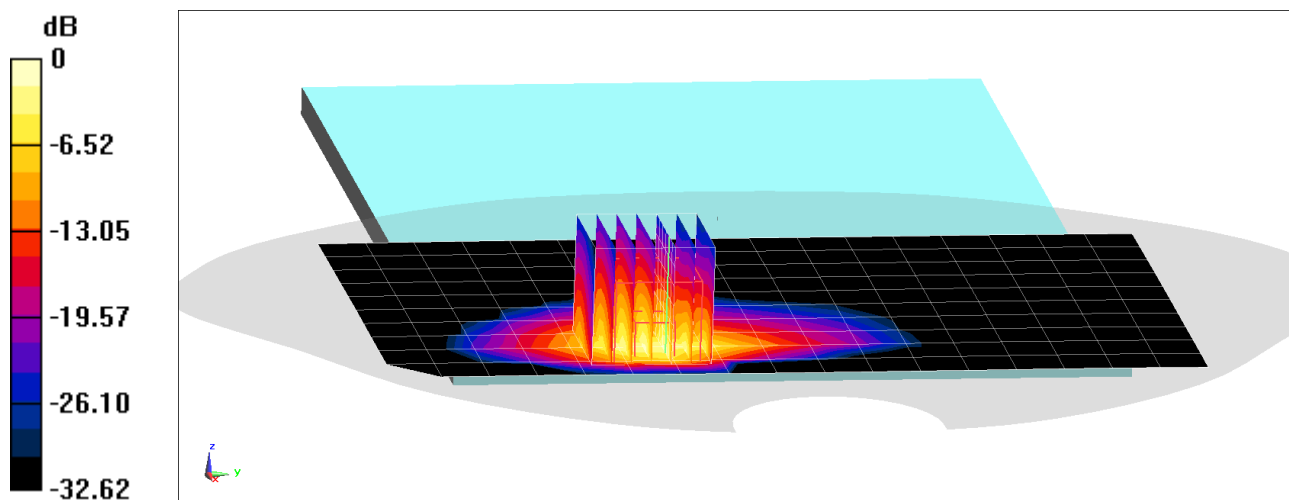
Area Scan (11x18x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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

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**

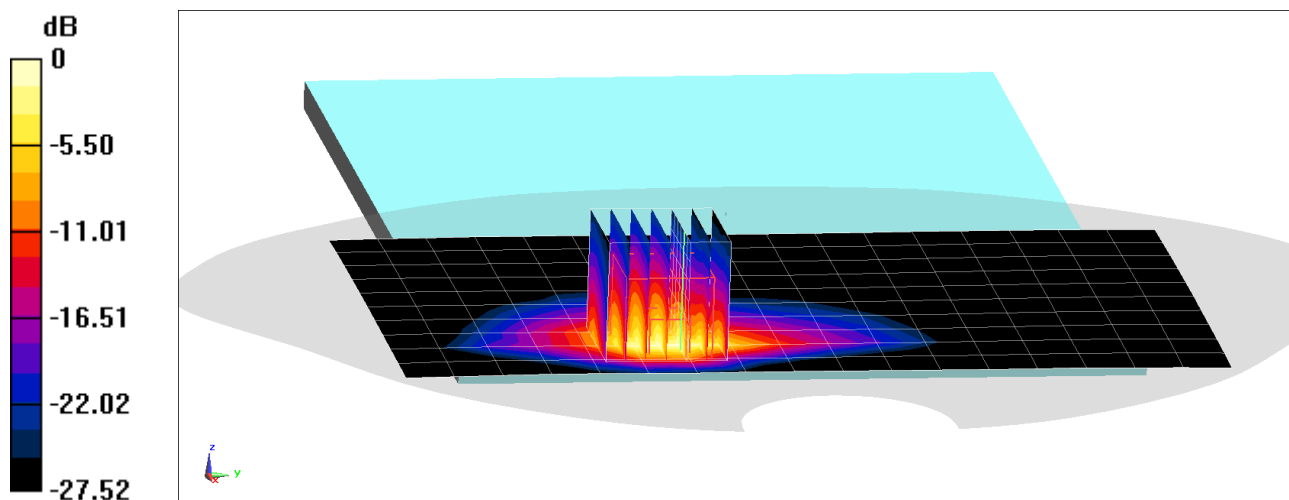
Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm

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**

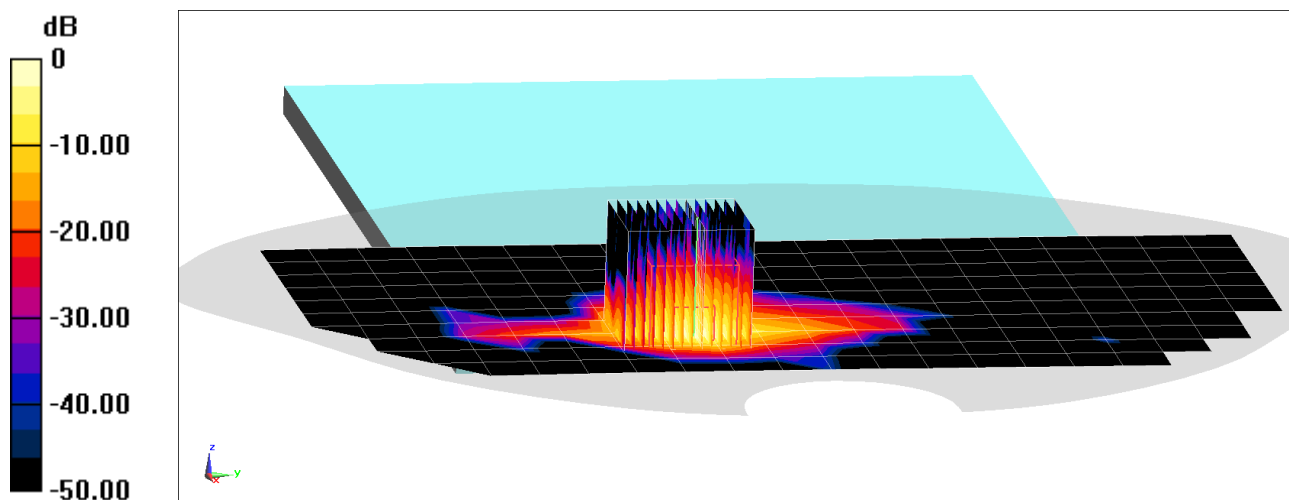
Area Scan (11x21x1): Measurement grid: dx=12mm, dy=12mm

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



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**

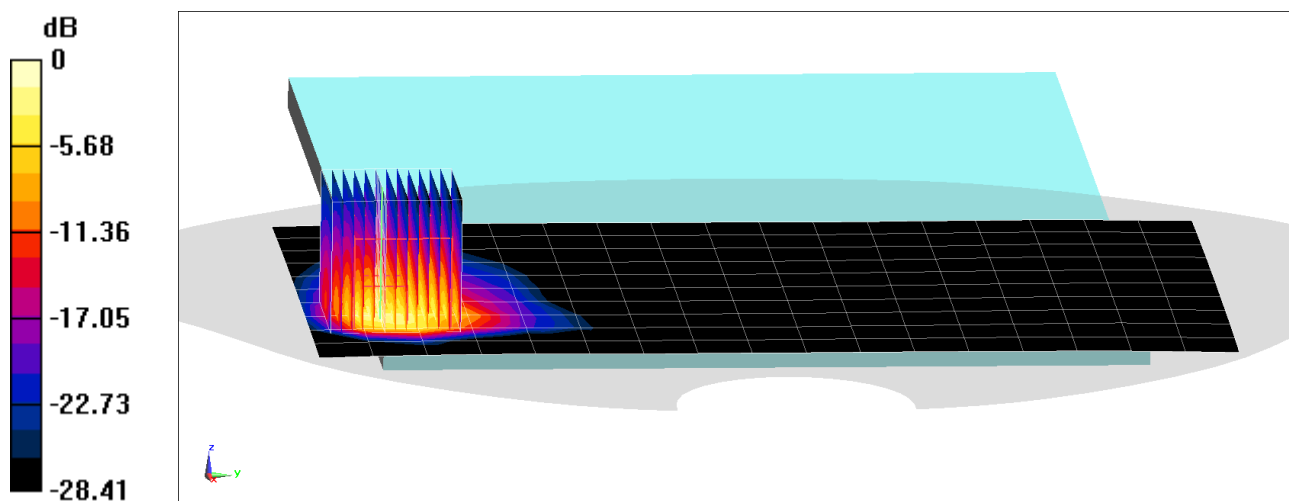
Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm

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**

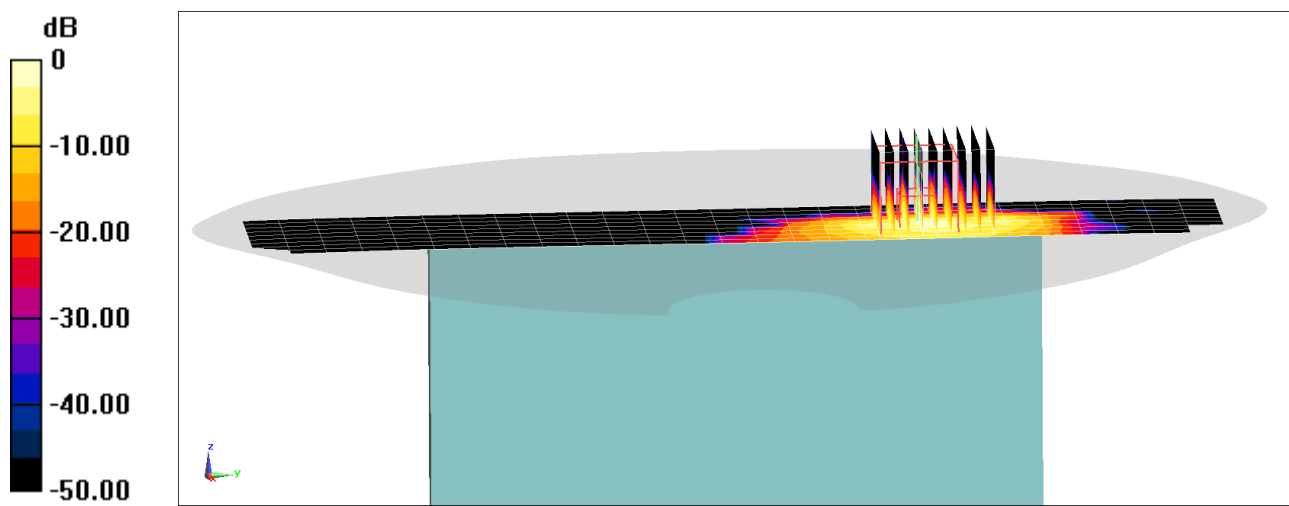
Area Scan (10x28x1): Measurement grid: dx=5mm, dy=10mm

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

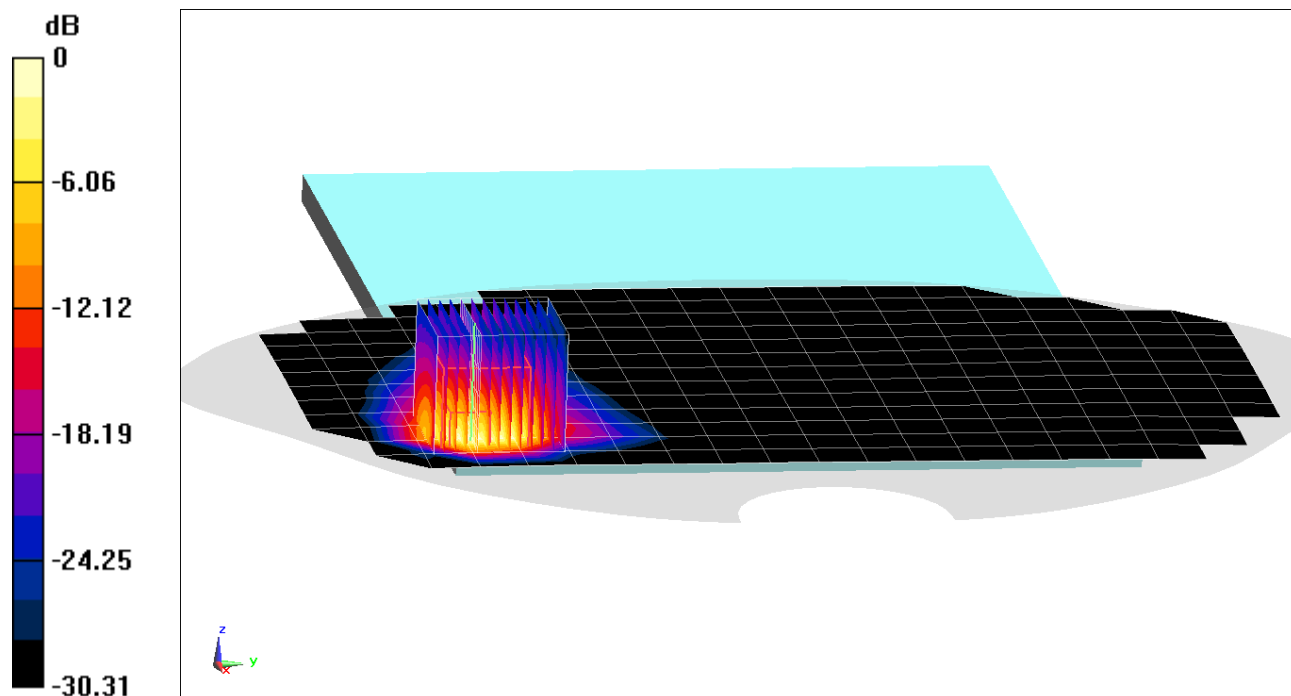
Area Scan (14x21x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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)

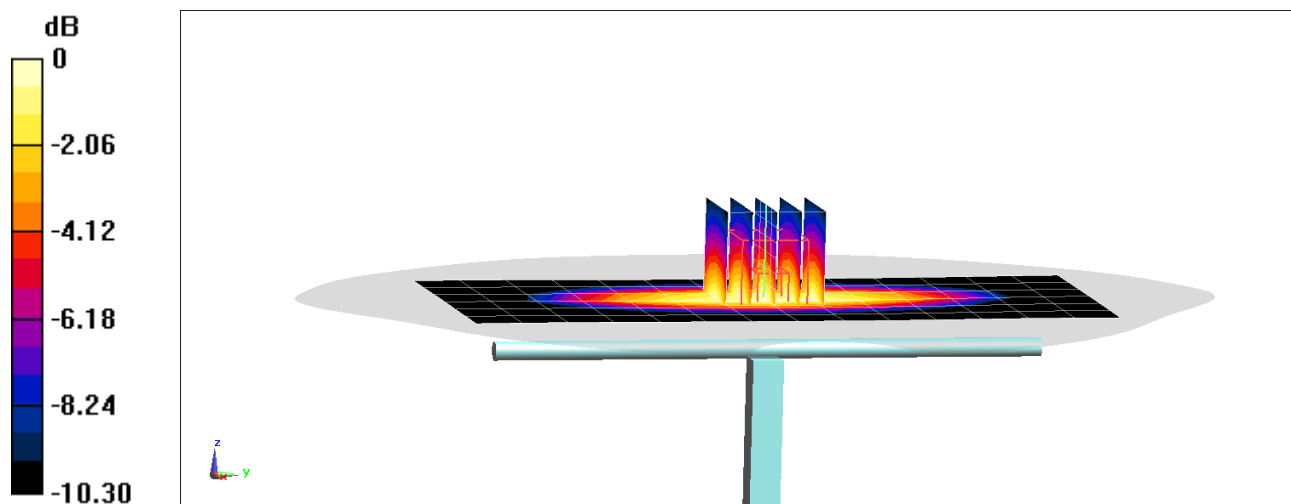
Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm

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

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)

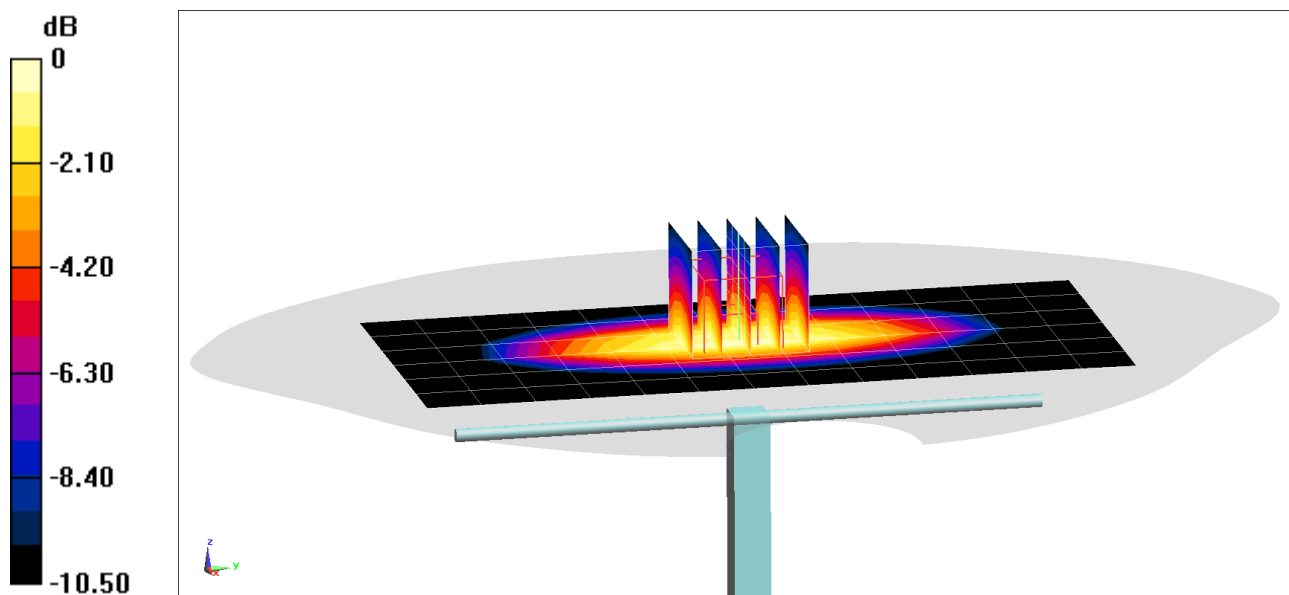
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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)

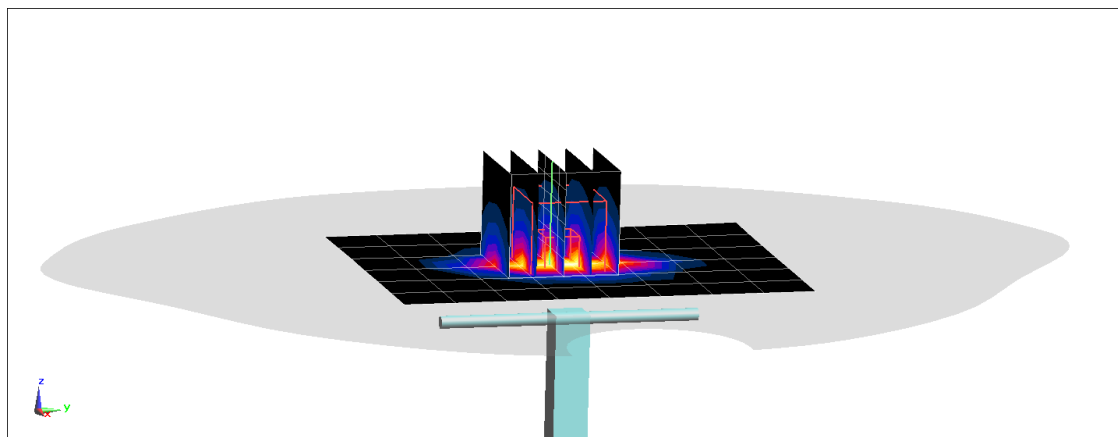
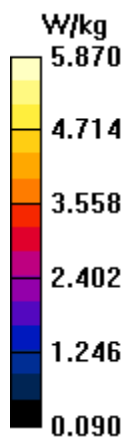
Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

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)

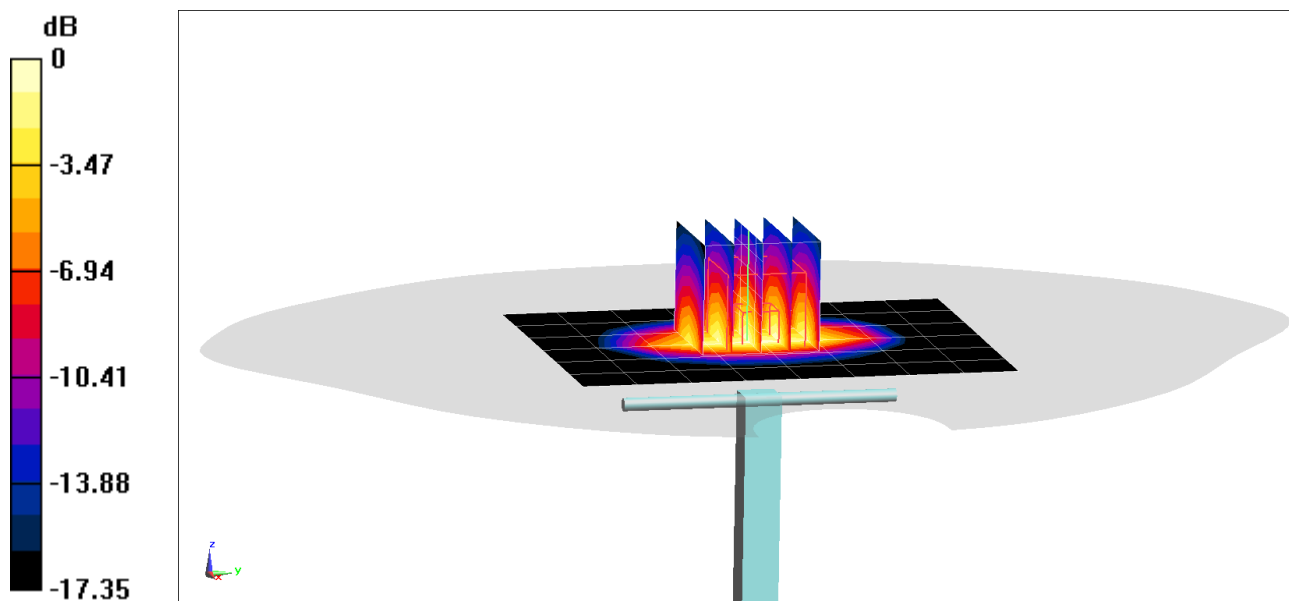
Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

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

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)

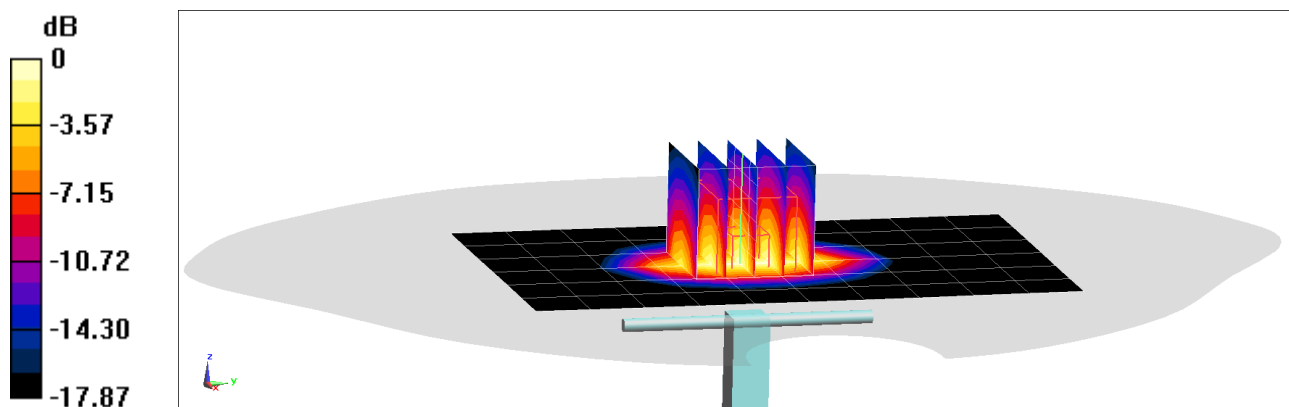
Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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)

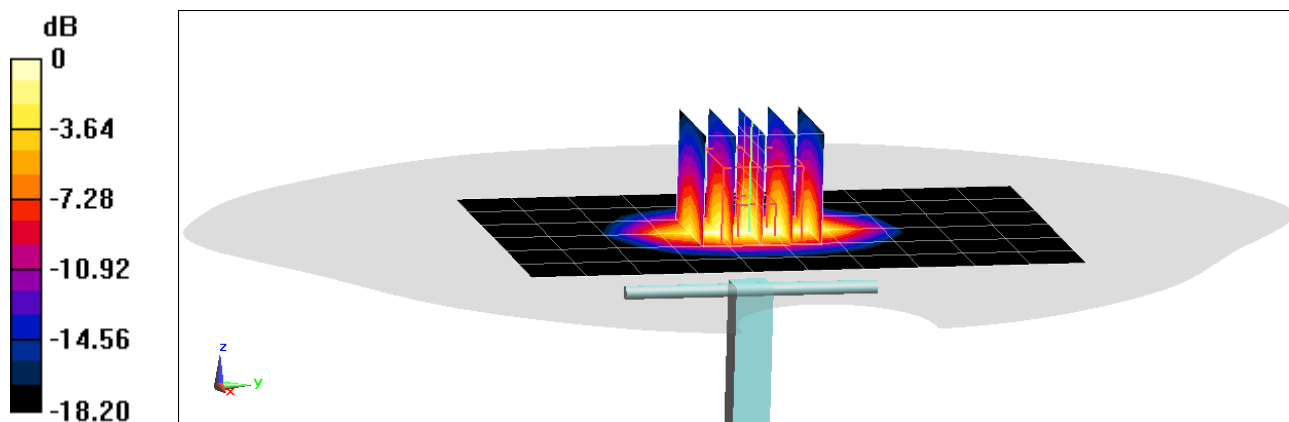
Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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)

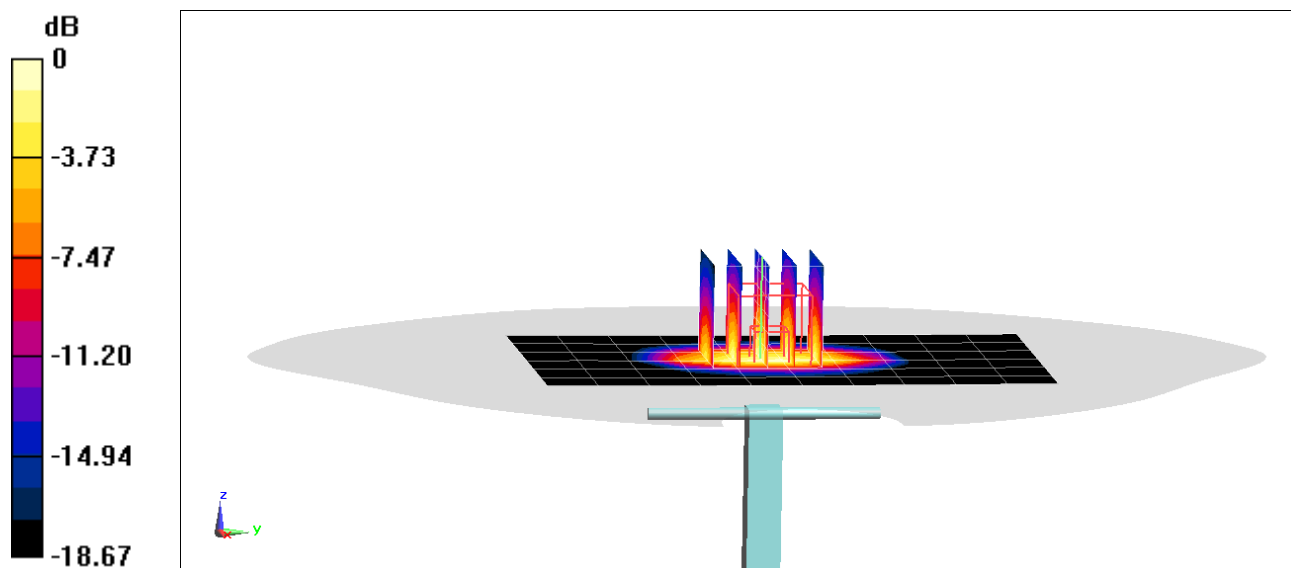
Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Peak SAR (extrapolated) = 7.51 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)

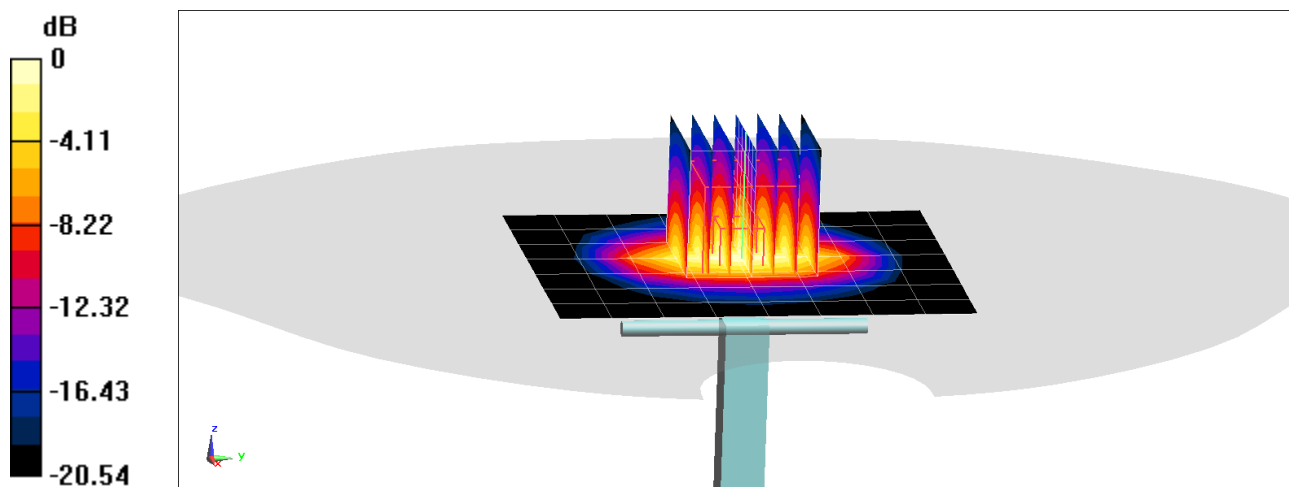
Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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%



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)

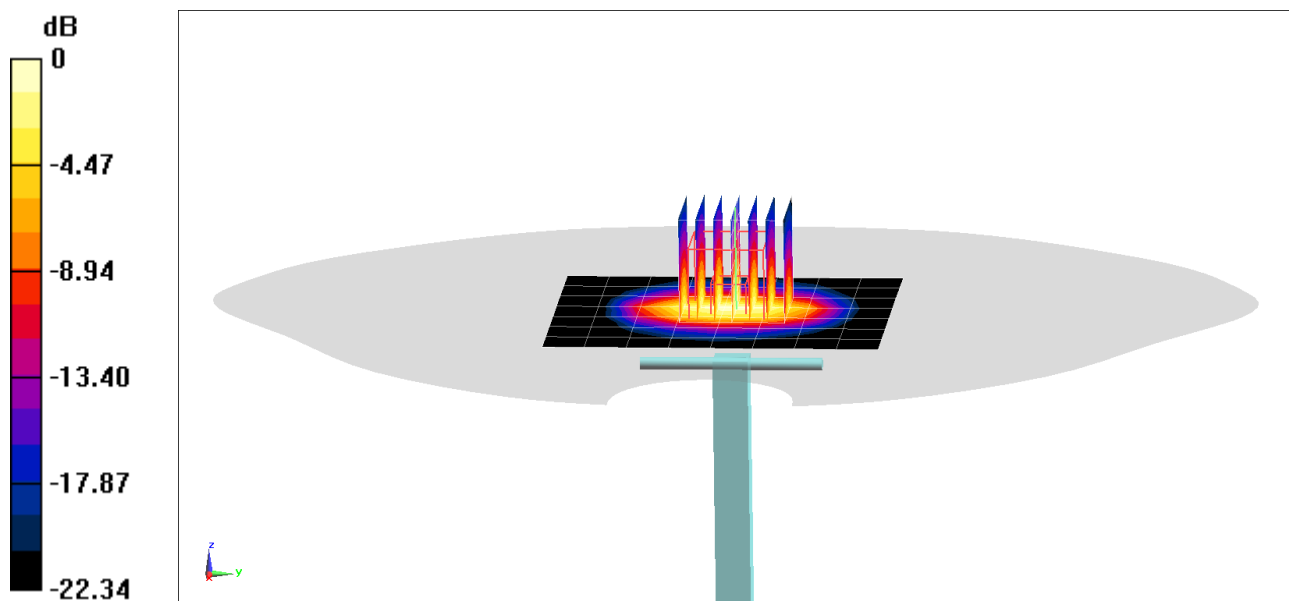
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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)

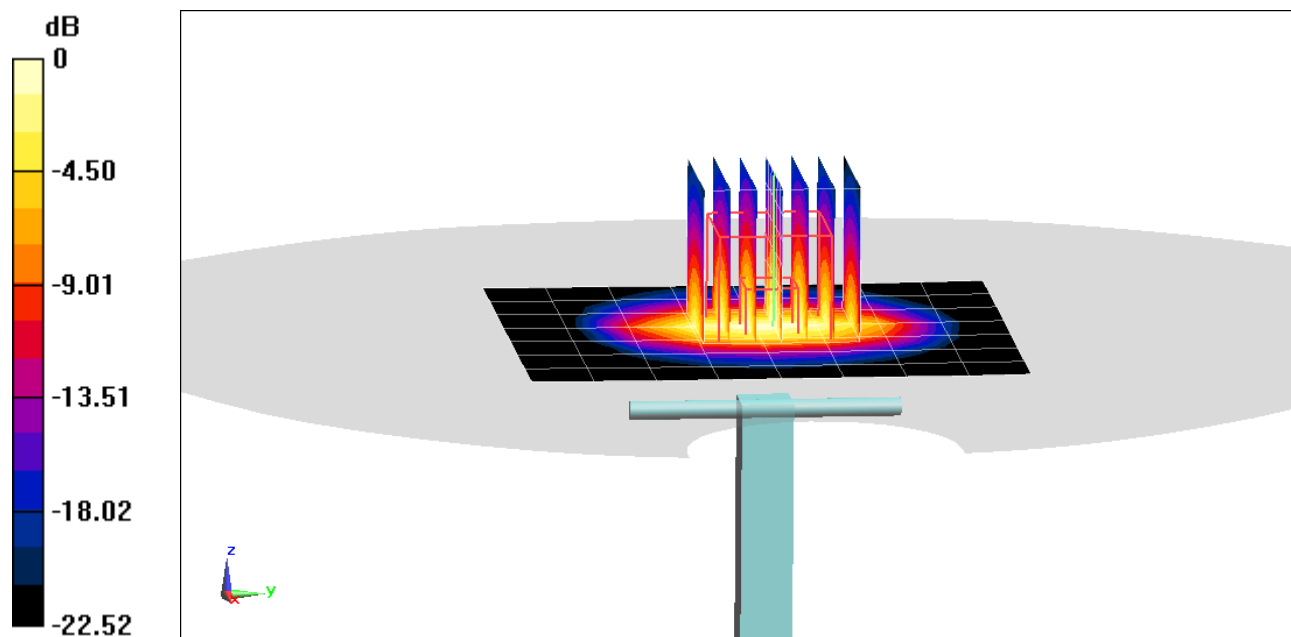
Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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)

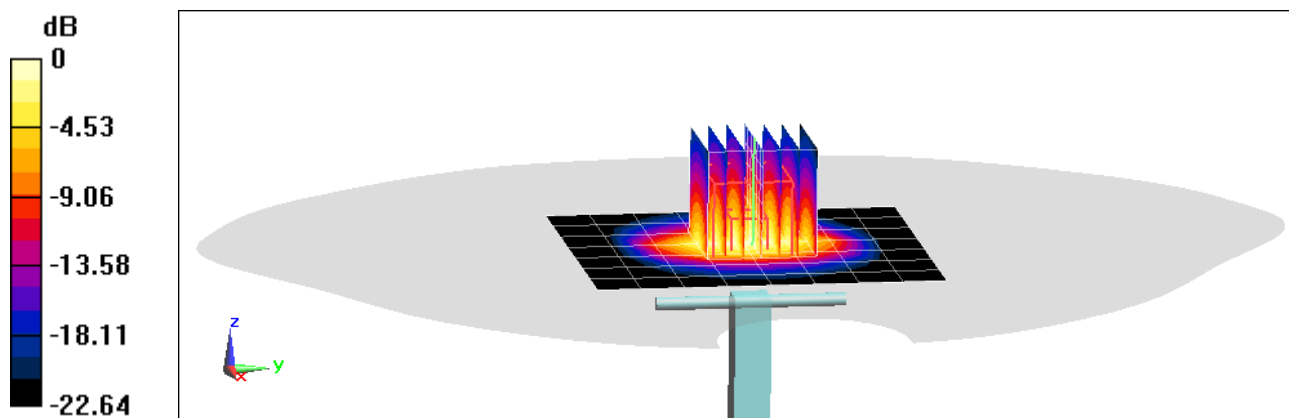
Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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)

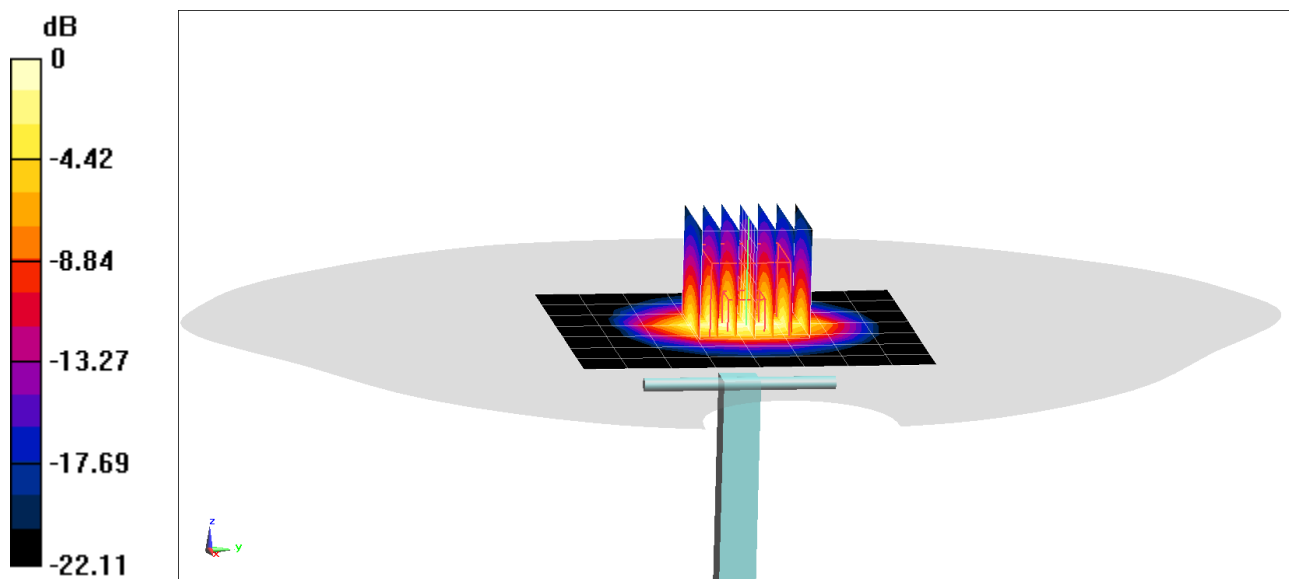
Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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

Peak SAR (extrapolated) = 10.5 W/kg

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

Deviation(1 g) = 0.79%



0 dB = 8.54 W/kg = 9.31 dBW/kg

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)

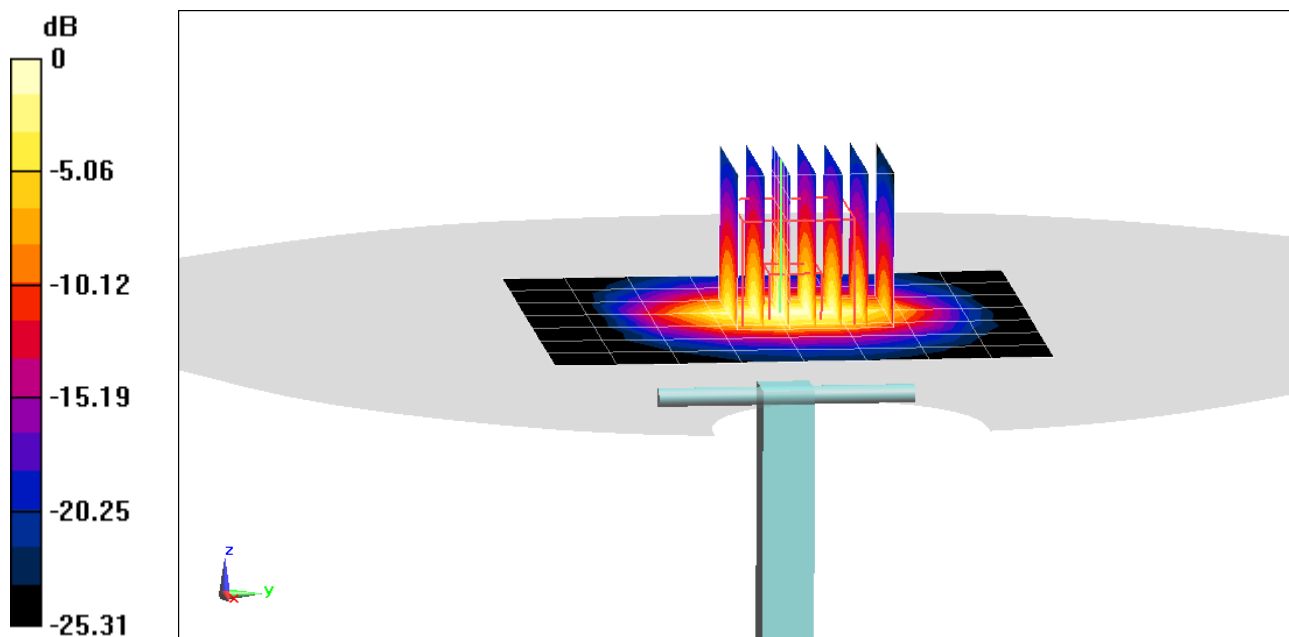
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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)

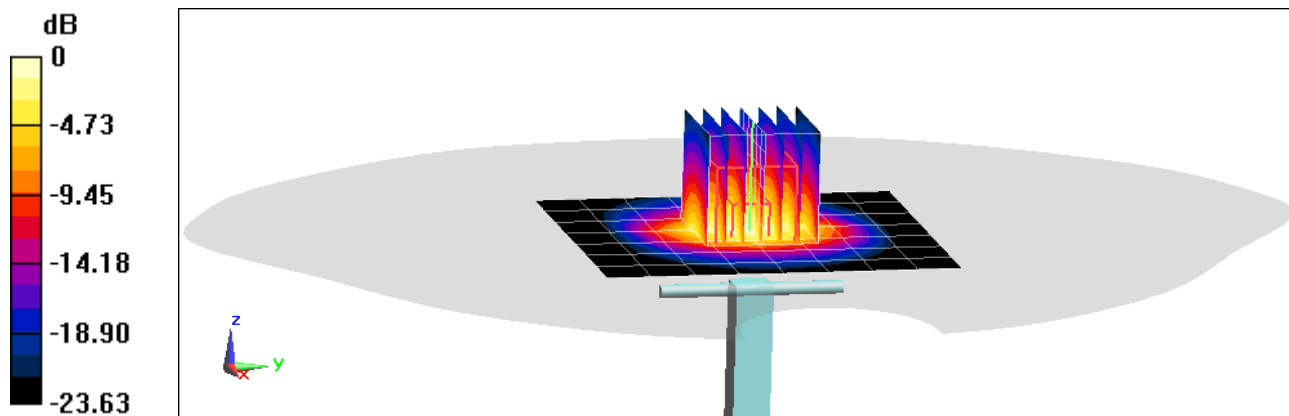
Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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

Peak SAR (extrapolated) = 11.9 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)

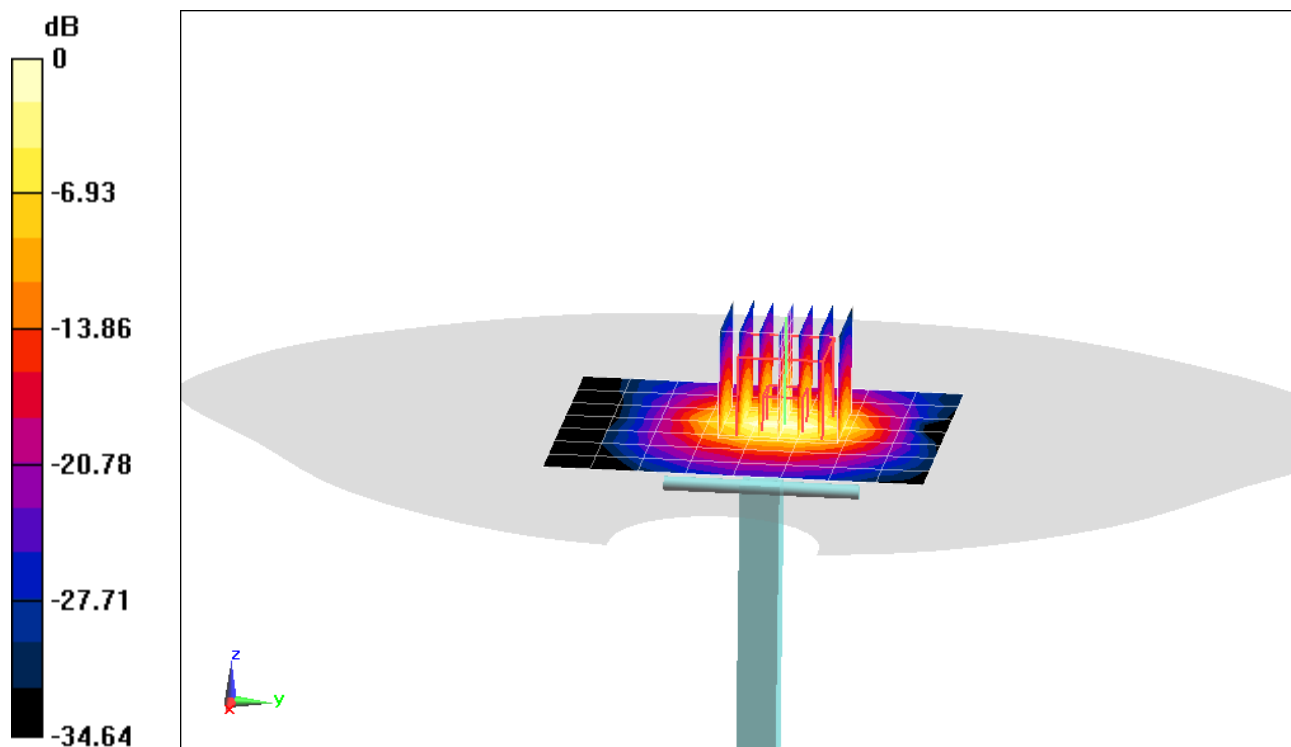
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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%



0 dB = 12.7 W/kg = 11.04 dBW/kg

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)

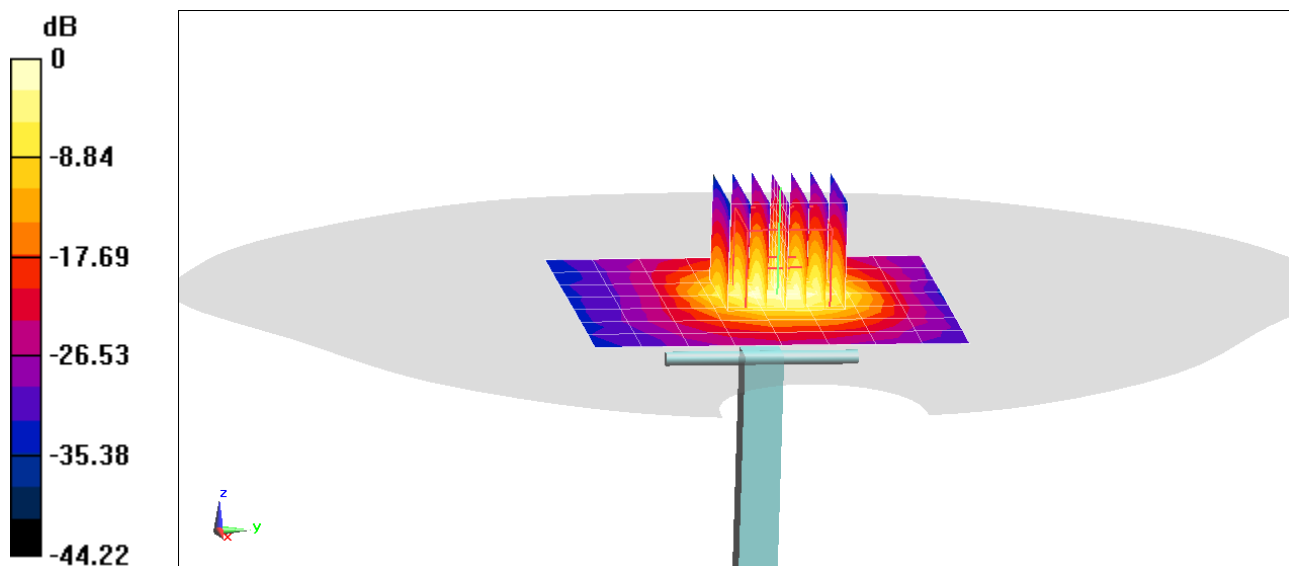
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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)

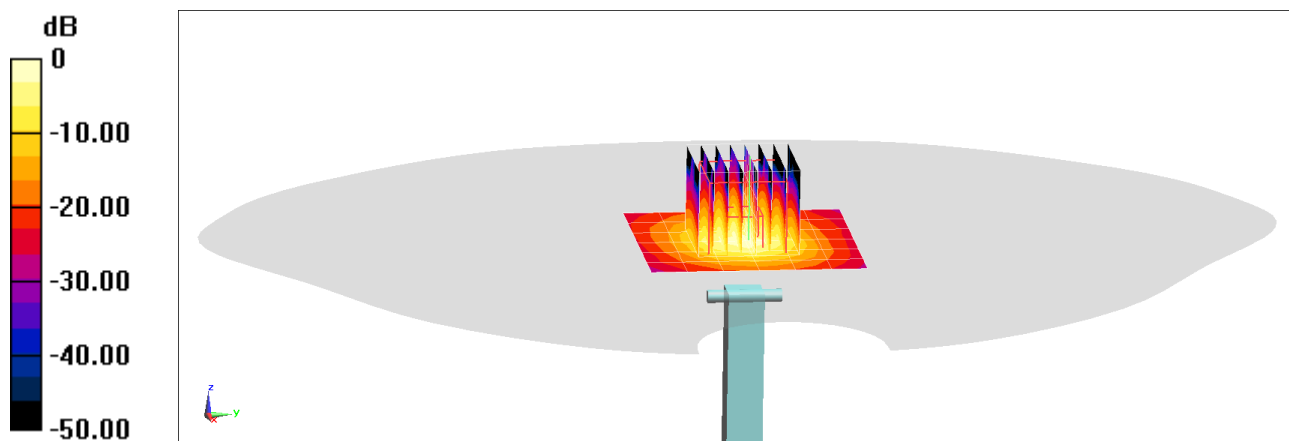
Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

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)

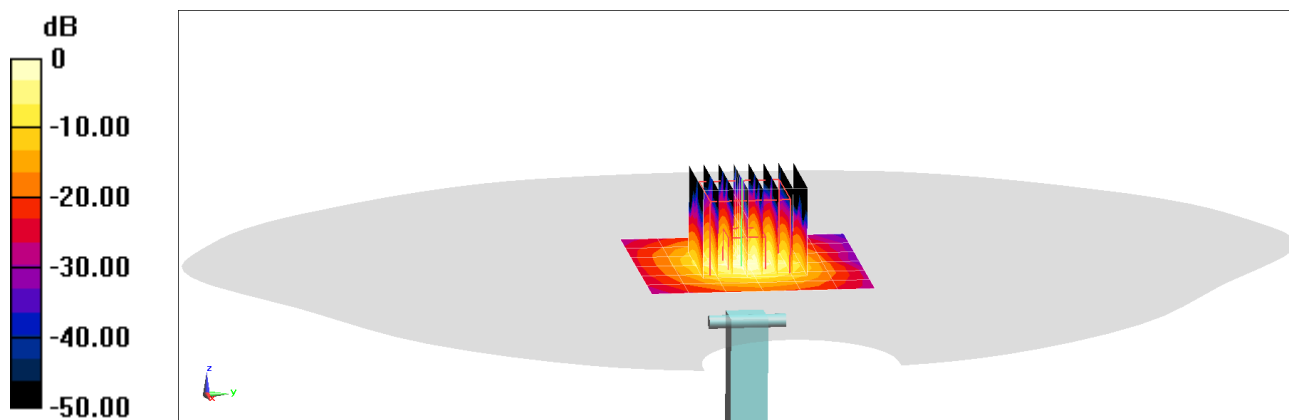
Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

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)

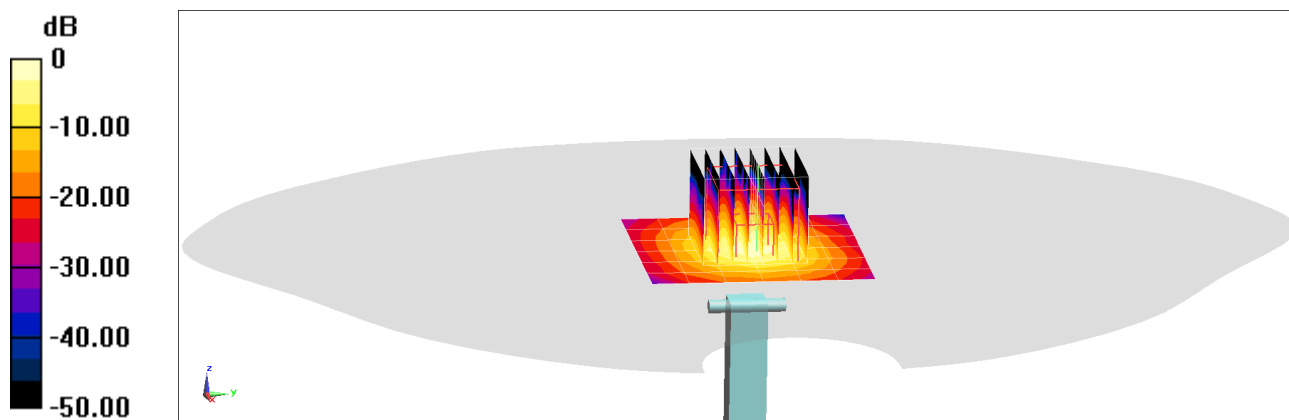
Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

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%



0 dB = 8.95 W/kg = 9.52 dBW/kg

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	Alkoxylated 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 865664 compliance standard.

Test Condition

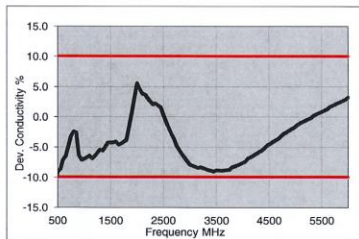
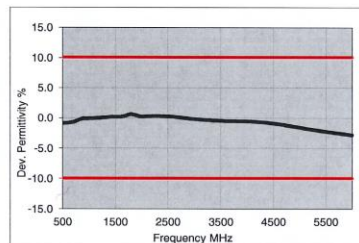
Ambient Condition 22°C ; 30% humidity
 TSL Temperature 22°C
 Test Date 30-Oct-18
 Operator CL

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

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APPENDIX D: SAR SYSTEM VALIDATION

FCC ID: BCGA2230	 PCTEST	SAR EVALUATION REPORT	Approved by: Quality Manager
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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

Supported Channel Bandwidth (MHz)										Restriction	Completely Covered by Measurement Superset
Index	ACC	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8		
222-41	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-41	No
222-42	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-42	No
222-43	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-43	No
222-44	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-44	No
222-45	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-45	No
222-46	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-46	No
222-47	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-47	No
222-48	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-48	No
222-49	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-49	No
222-50	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-50	No
222-51	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-51	No
222-52	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-52	No
222-53	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-53	No
222-54	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-54	No
222-55	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-55	No
222-56	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-56	No
222-57	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-57	No
222-58	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-58	No
222-59	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-59	No
222-60	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-60	No
222-61	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-61	No
222-62	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-62	No
222-63	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-63	No
222-64	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-64	No
222-65	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-65	No
222-66	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-66	No
222-67	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-67	No
222-68	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-68	No
222-69	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-69	No
222-70	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-70	No
222-71	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-71	No
222-72	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-72	No
222-73	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-73	No
222-74	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-74	No
222-75	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-75	No
222-76	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-76	No
222-77	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-77	No
222-78	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-78	No
222-79	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-79	No
222-80	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-80	No
222-81	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-81	No
222-82	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-82	No
222-83	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-83	No
222-84	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-84	No
222-85	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-85	No
222-86	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-86	No
222-87	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-87	No
222-88	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-88	No
222-89	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-89	No
222-90	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-90	No
222-91	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-91	No
222-92	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-92	No
222-93	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-93	No
222-94	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-94	No
222-95	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-95	No
222-96	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-96	No
222-97	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-97	No
222-98	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-98	No
222-99	CA_2A	5, 10, 15, 20	5, 10, 15, 20							222-99	No
223-00	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-00	No
223-01	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-01	No
223-02	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-02	No
223-03	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-03	No
223-04	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-04	No
223-05	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-05	No
223-06	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-06	No
223-07	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-07	No
223-08	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-08	No
223-09	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-09	No
223-10	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-10	No
223-11	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-11	No
223-12	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-12	No
223-13	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-13	No
223-14	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-14	No
223-15	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-15	No
223-16	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-16	No
223-17	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-17	No
223-18	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-18	No
223-19	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-19	No
223-20	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-20	No
223-21	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-21	No
223-22	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-22	No
223-23	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-23	No
223-24	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-24	No
223-25	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-25	No
223-26	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-26	No
223-27	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-27	No
223-28	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-28	No
223-29	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-29	No
223-30	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-30	No
223-31	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-31	No
223-32	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-32	No
223-33	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-33	No
223-34	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-34	No
223-35	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-35	No
223-36	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-36	No
223-37	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-37	No
223-38	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-38	No
223-39	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-39	No
223-40	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-40	No
223-41	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-41	No
223-42	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-42	No
223-43	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-43	No
223-44	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-44	No
223-45	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-45	No
223-46	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-46	No
223-47	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-47	No
223-48	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-48	No
223-49	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-49	No
223-50	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-50	No
223-51	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-51	No
223-52	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-52	No
223-53	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-53	No
223-54	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-54	No
223-55	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-55	No
223-56	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-56	No
223-57	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-57	No
223-58	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-58	No
223-59	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-59	No
223-60	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-60	No
223-61	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-61	No
223-62	CA_2A	5, 10, 15, 20	5, 10, 15, 20							223-62	No
223-63	CA_2A	5, 10, 15, 20	5, 10, 15, 20								

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.

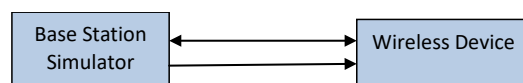


Figure 1
DL CA Power Measurement Setup

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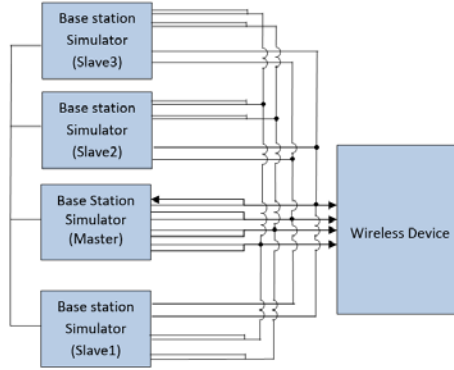


Figure 2
DL CA with DL 4x4 MIMO Power Measurement Setup

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) 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 2A-12A (1)	LTE B12	5	23025	700.5	16QAM	1	7	5035	730.5	LTE B2	20	900	1960	-	-	-	-	-	-	-	-	-	-	-	21.46	21.44	
CA 4A-12A (1)	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	-	-	21.44	21.44	
CA 4A-12A (2)	LTE B12	5	23025	700.5	16QAM	1	7	5035	730.5	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	-	-	21.49	21.49	
CA 12A-12A	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B25	20	5065	5037.5	-	-	-	-	-	-	-	-	-	-	-	21.44	21.44	
CA 12A-66A	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B46	20	5065	5037.5	-	-	-	-	-	-	-	-	-	-	-	21.44	21.44	
CA 12A-66A (1)	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B55	20	66786	2145	-	-	-	-	-	-	-	-	-	-	-	21.44	21.44	
CA 12A-66A (2)	LTE B12	5	23025	700.5	16QAM	1	7	5035	730.5	LTE B55	20	66786	2145	-	-	-	-	-	-	-	-	-	-	-	21.49	21.49	
CA 2C-12A	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B2	20	702	1940.2	-	-	-	-	-	-	-	21.39	21.44	
CA 2A-2A-12B	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B12	10	5107	738.7	LTE B2	20	900	1960	LTE B2	20	702	1940	-	-	-	21.37	21.44	
CA 4A-4A-12B	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B12	10	5107	738.7	LTE B4	20	2175	2132.5	LTE B4	10	2190	2190	-	-	-	21.16	21.44	
CA 2A-2A-4A-12A	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B2	20	702	1940	LTE B4	20	2175	2132.5	-	-	-	21.24	21.44	
CA 2A-2A-4A-12A	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	LTE B4	15	2190	2190	-	-	-	21.21	21.44	
CA 2A-4A-12B	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B12	10	5107	738.7	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	-	-	-	21.23	21.44	
CA 2A-12A-66C	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B55	20	66786	2145	LTE B55	20	66884	2144.8	-	-	-	21.27	21.44	
CA 4A-4A-12A-30A	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B4	20	2175	2132.5	LTE B4	20	2250	2150	LTE B30	10	9620	2395	-	-	-	21.26	21.44	
CA 2A-4A-7A-12A	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	LTE B7	20	5100	2695	-	-	-	21.27	21.44	
CA 2A-4A-12A-30A	LTE B12	5	23025	701.5	16QAM	1	24	5035	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	701.5	16QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B7	20	1000	2655	LTE B6	20	66786	2145	LTE B55	20	67238	2190	21.28	21.44
CA 2A-2A-12A-66A-66A	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B2	20	702	1940	LTE B30	10	9620	2355	LTE B55	20	66786	2145	21.27	21.44
CA 2A-2A-12A-30A-66A	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B2	20	702	1940	LTE B30	10	9620	2355	LTE B55	20	66786	2145	21.27	21.44
CA 2A-12A-30A-66A-66A	LTE B12	5	23025	701.5	16QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B30	10	9620	2355	LTE B55	20	66786	2145	LTE B55	20	66786	2145	21.26	21.44

1.3.2 LTE Band 13 as PCC

Table 2
Output Powers – Ant 1

PCC										SCC 1				SCC 2				SCC 3				SCC 4				Power		
Combination	PCC Band	PCC BW [MHz]	PCC (UL) Ch. Freq. [MHz]	PCC (DL) 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 4A-4A-13A	LTE B13	10	23230	752	QPSK	1	0	5230	751	LTE B4	20	2175	2132.5	LTE B4	20	2250	2150	-	-	-	-	-	-	-	-	-	21.07	21.14
CA 2A-4A-13A	LTE B13	10	23230	752	QPSK	1	0	5230	751	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	21.11	21.14
CA 2A-13A-46A	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B2	20	900	1960	LTE B46	20	50665	5037.5	-	-	-	-	-	-	-	-	-	20.86	21.14
CA 13A-66A-66A	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B46	20	50665	5037.5	LTE B46	20	50665	5037.5	-	-	-	-	-	-	-	-	-	20.90	21.14
CA 13A-46A-66A	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B46	20	50665	5037.5	LTE B46	20	50665	5037.5	-	-	-	-	-	-	-	-	-	21.00	21.14
CA 13A-66A-66B	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B55	20	66785	2145	LTE B55	20	67188	2143.2	LTE B55	15	67235	2150.5	-	-	-	-	-	20.94	21.16
CA 13A-66A-66C	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B55	20	66785	2145	LTE B55	20	67188	2143.2	LTE B55	20	67235	2150	-	-	-	-	-	20.84	21.16
CA 2A-2A-13A-66A	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B2	20	900	1960	LTE B2	20	702	1940	LTE B55	20	66785	2145	-	-	-	-	-	20.93	21.16
CA 2A-13A-46C	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B2	20	900	1960	LTE B46	20	50665	5037.5	LTE B46	20	50665	5037.5	-	-	-	-	-	20.93	21.16
CA 2A-13A-66A-66A	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B2	20	900	1960	LTE B55	20	66785	2145	LTE B55	20	67235	2150	-	-	-	-	-	20.91	21.16
CA 2A-13A-66B	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B2	20	900	1960	LTE B55	20	66785	2145	LTE B55	5	66875	2154.3	-	-	-	-	-	20.88	21.16
CA 2A-13A-66C	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B2	20	900	1960	LTE B55	20	66785	2145	LTE B55	20	66884	2144.8	-	-	-	-	-	20.97	21.16
CA 13A-46C-66A	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B46	20	50665	5037.5	LTE B46	20	50665	5037.5	LTE B55	20	66785	2145	-	-	-	-	-	20.93	21.16
CA 13A-46C-66B	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B46	20	50665	5037.5	LTE B46	20	50665	5037.5	LTE B55	20	66785	2145	-	-	-	-	-	21.23	21.16
CA 13A-46C	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B46	20	50665	5037.5	LTE B46	20	50665	5037.5	LTE B46	20	50665	5037.5	-	-	-	-	-	20.93	21.16
CA 2A-12A-46D	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B2	20	900	1960	LTE B46	20	50665	5037.5	LTE B46	20	50665	5037.5	LTE B46	20	50665	5037.5	21.02	21.16	
CA 13A-46D-66A	LTE B13	5	23230	752	16QAM	1	24	5230	751	LTE B46	20	50665	5037.5	LTE B46	20	50665	5037.5	LTE B46	20	50665	5037.5	LTE B55	20	66785	2145	20.96	21.16	

FCC ID: BCGA2230	 PCTEST Ready to test in a second	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 12/16/2019-1/14/2020	DUT Type: Tablet Device		APPENDIX F: Page 3 of 16

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.	PCC (UL) Freq. [MHz]	PCC (UL) Freq. [MHz]	PCC (UL) Freq. [MHz]				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 5A-7A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B7	20	3100	2655	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60		
CA 5A-25A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B25	20	8365	1962.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60		
CA 5A-41A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B41	20	40620	2593	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60		
CA 5A-46A (1)	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B46	20	50065	5537.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60		
CA 5A-46A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B46	20	50065	5537.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60		
CA 2C-5A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B2	20	600	1960	LTE B2	20	702	1940	LTE B4	20	2550	2150	-	-	-	-	-	-	-	20.35	20.60	
CA 4A-5B (1)	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B5	5	2577	886.7	LTE B4	20	2175	2132.5	LTE B4	10	2550	2150	-	-	-	-	-	-	-	20.39	20.60	
CA 5A-7A-7A	LTE B5	5	26025	B4E.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	B4E.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	B4E.5	16QAM	1	0	2625	891.5	LTE B40	20	50065	5537.5	LTE B40	20	50467	5517.7	-	-	-	-	-	-	-	-	-	-	-	20.42	20.60	
CA 2A-5A-46A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B2	20	600	1960	LTE B46	20	50065	5537.5	-	-	-	-	-	-	-	-	-	-	-	20.39	20.60	
CA 5A-46A-66A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B46	20	50065	5537.5	LTE B66	20	66786	2145	-	-	-	-	-	-	-	-	-	-	-	20.34	20.60	
CA 4A-5B	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B5	10	2553	884.3	LTE B4	20	2175	2132.5	LTE B4	10	2550	2150	-	-	-	-	-	-	-	-	20.47	20.60
CA 5A-46B (1)	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B46	20	50065	5537.5	LTE B46	20	50467	5517.7	LTE B46	20	66962	2145	-	-	-	-	-	-	-	20.40	20.60	
CA 5A-66A-66B	LTE B5	5	26025	B4E.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	B4E.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	B4E.5	16QAM	1	0	2625	891.5	LTE B2	20	600	1960	LTE B2	20	702	1940	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	20.31	20.60
CA 2A-4A-5A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B2	20	600	1960	LTE B4	20	2175	2132.5	LTE B4	20	2350	2150	-	-	-	-	-	-	-	-	20.48	20.60
CA 2A-5A	LTE B5	5	26025	B4E.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-5A-66C	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B2	20	600	1960	LTE B46	20	50065	5537.5	LTE B46	20	50467	5517.7	-	-	-	-	-	-	-	-	20.37	20.60
CA 4A-4A-5A-30A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B4	20	2175	2132.5	LTE B4	30	2350	2150	LTE B30	10	9820	2350	-	-	-	-	-	-	-	-	20.36	20.60
CA 5A-46C-66A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B46	20	50065	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	B4E.5	16QAM	1	0	2625	891.5	LTE B2	20	600	1960	LTE B4	20	2175	2132.5	LTE B30	10	9820	2350	-	-	-	-	-	-	-	-	20.27	20.60
CA 2A-2A-5A-66A-66A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B2	20	600	1960	LTE B2	20	702	1940	LTE B66	20	66786	2145	LTE B66	20	67236	2190	-	-	-	-	20.43	20.60
CA 2A-2A-5A-66B	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B2	20	600	1960	LTE B2	20	702	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	B4E.5	16QAM	1	0	2625	891.5	LTE B2	20	600	1960	LTE B2	20	702	1940	LTE B66	20	66786	2145	LTE B66	20	66962	2145.3	-	-	-	-	20.34	20.60
CA 2A-5A-46D	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B2	20	600	1960	LTE B46	20	50065	5537.5	LTE B46	20	50467	5517.7	LTE B46	20	50863	5557.3	-	-	-	-	20.43	20.60
CA 2A-5B-66B	LTE B5	5	26025	B4E.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	B4E.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	66962	2145.3	-	-	-	-	20.38	20.60
CA 2A-5B-66A-66A	LTE B5	5	26025	B4E.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	B4E.5	16QAM	1	0	2625	891.5	LTE B46	20	50065	5537.5	LTE B46	20	50467	5517.7	LTE B46	20	50863	5557.3	LTE B66	20	66786	2145	-	-	-	-	20.49	20.60
CA 5B-30A-66A-66A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B5	10	2553	884.3	LTE B30	10	9820	2350	LTE B66	20	66786	2145	LTE B66	20	67236	2190	-	-	-	-	20.36	20.60
CA 2A-2A-5A-30A-66A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B2	20	600	1960	LTE B2	20	702	1940	LTE B30	10	9820	2350	LTE B66	20	66786	2145	-	-	-	-	20.47	20.60
CA 2A-5B-30A-66A-66A	LTE B5	5	26025	B4E.5	16QAM	1	0	2625	891.5	LTE B5	10	2553	884.3	LTE B30	10	9820	2350	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 is our business	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 Enabled (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 B12	10	5095	737.5	-	-	-	-	-	-	-	-	-	-	-	-	-	15.10	15.10	
CA 25A-25A	LTE B25	20	26590	1905	16QAM	1	99	8590	1985	LTE B25	10	8895	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	8895	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-46D	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 Band	PCC BW [MHz]	PCC [UL] Ch.	PCC					SCC 1				SCC 2				SCC 3				SCC 4				Power				
				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 B3	10	900	1980	LTE B3	10	900	1980	-	-	-	-	-	-	-	-	-	13.98	13.98	
CA 2A-2A-30A-30A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B3	10	900	1980	LTE B3	10	900	1980	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-10A-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-30A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B3	10	900	1980	LTE B4	20	2175	2132.5	LTE B5	10	2525	881.5	-	-	-	-	-	-	13.48	13.50
CA 1E B30	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B3	10	900	1980	LTE B4	20	2175	2132.5	LTE B12	10	5095	737.5	-	-	-	-	-	-	13.47	13.50
CA 2A-4A-30A-30A-65A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B3	10	900	1980	LTE B4	20	2175	2132.5	LTE B29	10	9715	722.5	-	-	-	-	-	-	13.49	13.50
CA 5B-30A-65A-65A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B5	10	2525	881.5	LTE B5	5	2403	874.3	LTE B56	20	62785	2145	LTE B56	20	62785	2145	-	-	13.48	13.50
CA 2A-2A-30A-30A-65A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B3	10	900	1980	LTE B2	10	700	1940	LTE B12	10	5095	737.5	-	-	-	-	-	-	13.50	13.50
CA 2A-2A-12A-30A-65A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B3	10	900	1980	LTE B5	10	2525	881.5	LTE B56	20	62785	2145	LTE B56	20	62785	2145	-	-	13.50	13.50
CA 2A-5A-30A-65A-65A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B3	10	900	1980	LTE B5	10	2525	881.5	LTE B56	20	62785	2145	LTE B56	20	62785	2145	-	-	13.48	13.50
CA 2A-5B-30A-65A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B3	10	900	1980	LTE B5	10	2525	881.5	LTE B56	20	62785	2145	LTE B56	20	62785	2145	-	-	13.48	13.50
CA 2A-12A-30A-65A-65A	LTE B30	10	27710	2310	16QAM	1	25	9820	2365	LTE B3	10	900	1980	LTE B12	10	5095	737.5	LTE B56	20	62785	2145	LTE B56	20	62785	2145	-	-	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	8895	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	2650	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	2650	2630	LTE B26	10	8895	876.5	-	-	-	-	-	-	-	-	-	-	13.25	13.24	
CA 7A-26A-26A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2650	2630	LTE B46	20	50067	5017.7	-	-	-	-	-	-	-	-	-	-	13.26	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	2650	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	50065	5037.5	-	-	-	-	-	-	13.23	13.24	
CA 7C-46C	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2650	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	2650	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	2650	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 B7	20	2650	2630	LTE B12	10	5095	737.5	LTE B12	10	5095	737.5	-	-	-	-	-	-	-	13.16	13.24
CA 2A-7A-7A-65A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2650	2630	LTE B4	20	900	1960	LTE B56	20	62785	2147	-	-	-	-	-	-	13.17	13.24	
CA 2A-7A-12A-65A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2650	2630	LTE B12	10	5095	737.5	LTE B56	20	62785	2147	-	-	-	-	-	-	13.20	13.24	
CA 7C-46D	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	LTE B7	20	2650	2630	LTE B46	20	50065	5037.5	-	-	-	-	-	-	-	-	-	-	13.17	13.24	

1.3.9

LTE Band 41 as PCC

Table 9
Output Powers – Ant 4B

Combination	PCC Band	PCC BW [MHz]	PCC [UL] Ch.	PCC				PCC [DL] Channel	PCC [DL] Freq. [MHz]	SCC 1		SCC 2		SCC 3		SCC 4		Power			
				Mod.	PCC UL RB	PCC UL RB Offset	PCC [UL] 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]
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	-	-	-	-	-	15.89	15.90	
CA 26A-41A	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B35	10	8865	876.5	-	-	-	-	-	15.89	15.90	
CA 41A-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	41502	2060.2	LTE B41	20	41490	2080	-	15.87	15.90	
CA 41C-41A	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40818	2012.8	LTE B41	20	41490	2080	-	15.89	15.90	
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	-	15.88	15.90	
CA 26A-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40818	2012.8	LTE B25	20	8865	1862.5	-	15.89	15.90	
CA 41C-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40818	2012.8	LTE B25	20	8865	1875.5	-	15.89	15.90	
CA 41E	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	40818	2012.8	LTE B41	20	41055	2032.6
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
CA 41D-41A	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	40818	2012.8	LTE B41	20	41490	2080
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
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
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	41490	2080
CA 41D-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	40818	2012.8	LTE B41	20	41292	2660.2
CA 26A-26A-41D	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	40818	2012.8	LTE B25	20	8865	1865

1.3.10

LTE Band 41 PC2 as PCC

Table 10
Output Powers – Ant 4B

Combination	PCC Band	PCC BW [MHz]	PCC [UL] Ch.	PCC				PCC [DL] Channel	PCC [DL] Freq. [MHz]	SCC 1		SCC 2		SCC 3		SCC 4		Power									
				Mod.	PCC UL RB	PCC UL RB Offset	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 CA Carrier Tx 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	-	15.90	15.90							
CA 41C-41A	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40818	2012.8	LTE B41 PC2	20	41490	2080	-	15.89	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	-	15.88	15.90							
CA 26A-41C	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40818	2012.8	LTE B25	20	8865	1862.5	-	15.89	15.90							
CA 41C-41C	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40818	2012.8	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	2012.8	LTE B41 PC2	20	41055	2032.6	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	2012.8	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	15.87	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	41292	2660.2	LTE B41 PC2	20	41490	2080	15.87	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	2012.8	LTE B41 PC2	20	41292	2660.2	LTE B41 PC2	20	41490	2080	15.88	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	2012.8	LTE B25	20	8865	1862.5	LTE B25	20	8865	1865	15.88	15.90

1.3.11

LTE Band 48 as PCC

Table 11
Output Powers – Ant 3

Combination	PCC Band	PCC BW [MHz]	PCC				PCC UL RB Offset	PCC [UL] Channel	PCC [UL] Freq. [MHz]	SCC Band	SCC 1		SCC 2		SCC 3		SCC 4		Power				
			Mod.	PCC [UL] Ch.	PCC [UL] Freq. [MHz]	SCC [DL] Channel					SCC [DL] Freq. [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	LTE Tx Power with CA Carrier Tx Power (dBm)	LTE Single Carrier Tx Power (dBm)						
CA 5A-66A	LTE B66	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B66	10	7226	881.5	-	-	-	-	-	-	16.49	16.50		
CA 2A-24A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B2	20	800	1860	-	-	16.49	16.50		
CA 2A-24A-66A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B2	20	800	1860	-	-	16.49	16.50		
CA 48A-48A-66A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B66	20	66766	2145	-	-	16.49	16.50		
CA 48A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B66	20	66766	2145	-	-	16.49	16.50		
CA 48C-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B66	20	66766	2145	-	-	16.49	16.50		
CA 48C-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B66	20	66766	2145	-	-	16.49	16.50		
CA 48C-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B66	20	66766	2145	-	-	16.49	16.50		
CA 48C-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B66	20	66766	2145	-	-	16.49	16.50		
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20	59207	3646.7	64QAM	1	0	59207	3646.7	LTE B48	20	59240	3660	LTE B13	10	5236	751	LTE B66	20	66766	2145	16.49	16.50
CA 2A-48A-66A	LTE B48	20</																					

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

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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

[illegible]

1.4.3

LTE Band 13 as PCC

Table 17
Output Powers – Ant 1

Combination	PCC Band	PCC BW [MHz]	PCC [DL/UL] Ch.	PCC [DL/UL] Freq. [MHz]	Mod.	PCC UAR RB	PCC UL RB Offset	PCC [DL/UL]	PCC [DL/UL] Freq. [MHz]	DL Ant. Config.	S1 C				S2 C				S3 C				S4 C				Power	
											SCC Band	SCC BW [MHz]	SCC [DL/UL] Ch.	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL/UL] Ch.	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL/UL] Ch.	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL/UL] Ch.	DL Ant. Config.	LTE Tx Power [dBm]	LTE Single Carrier Power (dBm)
CA [4A]-[4A]-[13A]	LTE B13	10	21320	782	QPSK	1	0	5230	751	2x2	LTE B4	20	21375	21323.5	4x4	LTE B4	20	2310	2150	4x4							21.14	21.14
CA [2A]-[4A]-[13A]	LTE B13	10	21320	782	QPSK	1	0	5230	751	2x2	LTE B2	20	900	1380	4x4	LTE B4	20	21375	21323.5	4x4							21.13	21.14
CA [2A]-[4A]-[6A]	LTE B13	10	21320	782	QPSK	1	0	5230	751	2x2	LTE B2	20	900	1380	4x4	LTE B4	20	5000	5210.5	2x2							21.13	21.14
CA [2A]-[4A]-[6A]	LTE B13	10	21320	782	QPSK	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2												21.13	21.14
CA [3A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [3A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [3A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2	LTE B4	20	5000	5210.5	2x2	LTE B4	20	6678	2145	4x4							21.16	21.16
CA [2A]-[2A]-[4A]-[6A]	LTE B13	10	21320	782	16QAM	1	24	5230	751	2x2																		

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	1310	2635	4x4	LTE B7	20	1310	2635	4x4	LTE B7	20	1310	2635	4x4	LTE B7	20	1310	2635	4x4	20.18	20.60
CA 2A(2)	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B7	20	1310	2635	4x4	LTE B7	20	1310	2635	4x4	LTE B7	20	1310	2635	4x4	LTE B7	20	1310	2635	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	2330	4x4	LTE B4	20	8020	2330	4x4	LTE B4	20	8020	2330	4x4	LTE B4	20	8020	2330	4x4	20.43	20.85
CA 2A(3B)	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B4	20	8020	2330	4x4	LTE B4	20	8020	2330	4x4	LTE B4	20	8020	2330	4x4	LTE B4	20	8020	2330	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(18B, 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(7A/7A)	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B7	20	3100	2635	4x4	LTE B7	20	2850	2630	4x4	-	-	-	-	-	-	-	-	-	-	20.43	20.60
CA 5A(7B/7B)	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B7	20	3100	2635	4x4	LTE B7	20	2850	2630	4x4	-	-	-	-	-	-	-	-	-	-	20.43	20.60
CA 2A(1A)-66A	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6	20	1960	1960	4x4	LTE B6	20	50665	5337.5	2x2	-	-	-	-	-	-	-	-	-	-	20.26	20.60
CA 5A-5A(66A)	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B4B	20	50665	5337.5	2x2	LTE B6B	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 B6	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66C	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66D	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66E	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66F	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66G	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66H	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66I	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66J	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66K	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66L	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66M	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66N	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66O	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66P	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66Q	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66R	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66S	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66T	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66U	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66V	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66W	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66X	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66Y	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66Z	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66AA	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66AB	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66AC	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66AD	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	20.25	20.60
CA 2A(2A)-66AE	LTE BB	5	2625	846.5	16QAM	1	0	2625	891.5	2x2	LTE B6B	20	66786	2145	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308	2190.7	4x4	LTE B6B	20	67308				

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		Mod										DC1				DC2				DC3				DC4				DC5				DC6				DC7				DC8				DC9				DC10				DC11				DC12				DC13				DC14				DC15				DC16				DC17				DC18				DC19				DC20				DC21				DC22				DC23				DC24				DC25				DC26				DC27				DC28				DC29				DC30				DC31				DC32				DC33				DC34				DC35				DC36				DC37				DC38				DC39				DC40				DC41				DC42				DC43				DC44				DC45				DC46				DC47				DC48				DC49				DC50				DC51				DC52				DC53				DC54				DC55				DC56				DC57				DC58				DC59				DC60				DC61				DC62				DC63				DC64				DC65				DC66				DC67				DC68				DC69				DC70				DC71				DC72				DC73				DC74				DC75				DC76				DC77				DC78				DC79				DC80				DC81				DC82				DC83				DC84				DC85				DC86				DC87				DC88				DC89				DC90				DC91				DC92				DC93				DC94				DC95				DC96				DC97				DC98				DC99				DC100				DC101				DC102				DC103				DC104				DC105				DC106				DC107				DC108				DC109				DC110				DC111				DC112				DC113				DC114				DC115				DC116				DC117				DC118				DC119				DC120				DC121				DC122				DC123				DC124				DC125				DC126				DC127				DC128				DC129				DC130				DC131				DC132				DC133				DC134				DC135				DC136				DC137				DC138				DC139				DC140				DC141				DC142				DC143				DC144				DC145				DC146				DC147				DC148				DC149				DC150				DC151				DC152				DC153				DC154				DC155				DC156				DC157				DC158				DC159				DC160				DC161				DC162				DC163				DC164				DC165				DC166				DC167				DC168				DC169				DC170				DC171				DC172				DC173				DC174				DC175				DC176				DC177				DC178				DC179				DC180				DC181				DC182				DC183				DC184				DC185				DC186				DC187				DC188				DC189				DC190				DC191				DC192				DC193				DC194				DC195				DC196				DC197				DC198				DC199				DC200				DC201				DC202				DC203				DC204				DC205				DC206				DC207				DC208				DC209				DC210				DC211				DC212				DC213				DC214				DC215				DC216				DC217				DC218				DC219				DC220				DC221				DC222				DC223				DC224				DC225				DC226				DC227				DC228				DC229				DC230				DC231				DC232				DC233				DC234				DC235				DC236				DC237				DC238				DC239				DC240				DC241				DC242				DC243				DC244				DC245				DC246				DC247				DC248				DC249				DC250				DC251				DC252				DC253				DC254				DC255				DC256				DC257				DC258				DC259				DC260				DC261				DC262				DC263				DC264				DC265				DC266				DC267				DC268				DC269				DC270				DC271				DC272				DC273				DC274				DC275				DC276				DC277				DC278				DC279				DC280				DC281				DC282				DC283				DC284				DC285				DC286				DC287				DC288				DC289				DC290				DC291				DC292				DC293				DC294				DC295				DC296				DC297				DC298				DC299				DC300				DC301				DC302				DC303				DC304				DC305				DC306				DC307				DC308				DC309				DC310				DC311				DC312				DC313				DC314				DC315				DC316				DC317				DC318				DC319				DC320				DC321				DC322				DC323				DC324				DC325				DC326				DC327				DC328				DC329				DC330				DC331				DC332				DC333				DC334				DC335				DC336				DC337				DC338				DC339				DC340				DC341				DC342				DC343				DC344				DC345				DC346				DC347				DC348				DC349				DC350				DC351				DC352				DC353				DC354				DC355				DC356				DC357				DC358				DC359				DC360				DC361				DC362				DC363				DC364				DC365				DC366				DC367				DC368				DC369				DC370				DC371				DC372				DC373				DC374				DC375				DC376				DC377				DC378				DC379				DC380				DC381				DC382				DC383				DC384				DC385				DC386				DC387				DC388				DC389				DC390				DC391				DC392				DC393				DC394				DC395				DC396				DC397				DC398				DC399				DC400				DC401				DC402				DC403				DC404				DC405				DC406				DC407				DC408				DC409				DC410				DC411				DC412				DC413				DC414				DC415				DC416				DC417				DC418				DC419				DC420				DC421				DC422				DC423				DC424				DC425				DC426				DC427				DC428				DC429				DC430				DC431				DC432				DC433				DC434				DC435				DC436				DC437				DC438				DC439				DC440				DC441				DC442				DC443				DC444				DC445				DC446				DC447				DC448				DC449				DC450				DC451				DC452				DC453				DC454				DC455				DC456				DC457				DC458				DC459				DC460				DC461				DC462				DC463				DC464				DC465				DC466				DC467				DC468				DC469				DC470				DC471				DC472				DC473				DC474				DC475				DC476				DC477				DC478				DC479				DC480				DC481				DC482				DC483				DC484				DC485				DC486				DC487				DC488				DC489				DC490				DC491				DC492				DC493				DC494				DC495				DC496				DC497				DC498				DC499				DC500				DC501				DC502				DC503				DC504				DC505				DC506				DC507				DC508				DC509				DC510				DC511				DC512				DC513				DC514				DC515				DC516				DC517				DC518				DC519				DC520				DC521				DC522				DC523				DC524				DC525				DC526				DC527				DC528				DC529				DC530				DC531				DC532				DC533				DC534				DC535				DC536				DC537				DC538				DC539				DC540				DC541				DC542				DC543				DC544				DC545				DC546				DC547				DC548				DC549				DC550				DC551				DC552				DC553				DC554				DC555				DC556				DC557				DC558				DC559				DC560				DC561				DC562				DC563				DC564				DC565	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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 12 of 16

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							
		PCB 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	2607	2682.5	4x4											13.21	13.24
CA SA/TA	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B5	10	2525	881.5	2x2											13.18	13.24
CA [TA] 26A	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B26	10	8805	876.5	2x2											13.18	13.24
CA [TA] 26A (1)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B46	20	50665	5557.7	2x2											13.23	13.24
CA [TA] 26A (2)	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	13.19
CA [AA] 26A (1)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B4	20	2175	2122.5	4x4	LTE B4	10	2310	2310	4x4						13.16	13.24
CA SA/TA (2A)	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 [TA] 26A (2A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2832.5	4x4	LTE B5	10	2525	881.5	2x2						13.16	13.24
CA [TA] 26A (2A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	2850	2830	4x4	LTE B26	10	8805	876.5	2x2						13.18	13.24
CA [TA] 40C (1)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B46	20	50665	5557.5	2x2	LTE B46	20	50667	5557.7	2x2						13.23	13.24
CA [TA] 40C (2)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (2A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE B46	20	50665	5557.5	2x2	LTE B46	20	50667	5557.7	2x2						13.23	13.24
CA [TA] 40C (3)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.13	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.13	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665	5557.5	2x2						13.23	13.24
CA [TA] 40C (3A)	LTE BT	20	21100	2535	QPSK	50	0	1100	2655	4x4	LTE BT	20	252	2632.5	4x4	LTE B46	20	50665									

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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										SCC 1				SCC 2				SCC 3				SCC 4				Power							
	PCC Band	PCC BW [MHz]	PCC [DL] [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.	SCC Band	SCC BW [MHz]	SCC [DL] [Ch.]	SCC [DL] [Freq. [MHz]]	DL Ant. Config.	LTE Tx Power [dBm]	LTE Sigs Tx Power [dBm]		
CA (414) (41)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BA PCC	20	41490	2690	4aa																	18.9	18.9	
CA (414) (42)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (43)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (44)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BA PCC	20	41210	2690.2	4aa	LTE BA PCC	20	41490	2690	4aa													18.9	18.9
CA (414) (45)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (46)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (47)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (48)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (49)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (50)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (51)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (52)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (53)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (54)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (55)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (56)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (57)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (58)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (59)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (60)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (61)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (62)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (63)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (64)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (65)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (66)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (67)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (68)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (69)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (70)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (71)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (72)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (73)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (74)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (75)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (76)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (77)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (78)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (79)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (80)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (81)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (82)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (83)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (84)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (85)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (86)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (87)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (88)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (89)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (90)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (91)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (92)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (93)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa	LTE BS	15	2125	181.5	222																	18.9	18.9	
CA (414) (94)	LTE BA PCC	20	40620	2593	64QAM	1	0	40620	2593	4aa																								

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
Test Dates: 12/16/2019-1/14/2020	DUT Type: Tablet Device	APPENDIX F: Page 14 of 16

1.5 Downlink Carrier Aggregation with Uplink Carrier Aggregation enabled

This device supports uplink carrier aggregation (ULCA) with additional Carrier Aggregation configurations active in the downlink. Power measurements were performed with ULCA active and additional CA configurations active in the downlink for the configuration per Fall 2017 TCB Workshop Notes.

Per FCC Guidance, additional SAR measurements for these configurations were not required since their maximum output power was not more than 0.25 dB higher than the maximum output power for with only ULCA active.

1.5.1 DL Carrier Aggregation RF Conducted Powers

1.5.1.1 LTE Band 41

Table 27
Output Powers – Ant 4B

Combination	PCC Band	PCC				SCC1				SCC2				SCC3				SCC4				Frame				
		PCC BW [MHz]	PCC [DL] Ch.	PCC [UL] Freq. [MHz]	Mod.	PCC UL RB Offset	PCC [DL] Channel	PCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [UL] Freq. [MHz]	Mod.	SCC UL RB Offset	SCC [DL] Channel	SCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [UL] Freq. [MHz]	ULCA Tx Power with add'l CA config. active on UL (dBm)	ULCA Tx Power (dBm)
CA 41C-41A	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41	20	40620	2020.2	1.7E B41	20	40620	2020.2	14.40	14.40
CA 41D-41A	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41	20	40620	2020.2	1.7E B41	20	40620	2020.2	14.40	14.40
CA 41D-41D	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41	20	40620	2020.2	1.7E B41	20	40620	2020.2	14.40	14.40
CA 41E-41E	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41	20	40620	2020.2	1.7E B41	20	40620	2020.2	14.40	14.40
CA 41E	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41	20	40620	2020.2	1.7E B41	20	40620	2020.2	14.40	14.40
CA 41E-41E	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41	20	40620	2020.2	1.7E B41	20	40620	2020.2	14.40	14.40
CA 41E-41C	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41	20	40620	2020.2	1.7E B41	20	40620	2020.2	14.40	14.40

1.5.1.2 LTE Band 41 PC2

Table 28
Output Powers – Ant 4B

Combination	PCC Band	PCC				SCC 1				SCC 2				SCC 3				SCC 4				ULCA Tx Power with add'l CA config. active on UL (dBm)	ULCA Tx Power (dBm)	
		PCC BW [MHz]	PCC [DL] Ch.	PCC [UL] Freq. [MHz]	Mod.	PCC UL RB Offset	PCC [DL] Channel	PCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [UL] Freq. [MHz]	Mod.	SCC UL RB Offset	SCC [DL] Channel	SCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [UL] Freq. [MHz]				
CA 41E-41A	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41 PC2	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41 PC2	20	40620	2020.2	1.7E B41 PC2	20	40620	2020.2
CA 41E-41A	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41 PC2	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41 PC2	20	40620	2020.2	1.7E B41 PC2	20	40620	2020.2
CA 41E-41E	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41 PC2	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41 PC2	20	40620	2020.2	1.7E B41 PC2	20	40620	2020.2
CA 41E	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41 PC2	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41 PC2	20	40620	2020.2	1.7E B41 PC2	20	40620	2020.2
CA 41E-41E	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41 PC2	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41 PC2	20	40620	2020.2	1.7E B41 PC2	20	40620	2020.2
CA 41E-41E	1.7E B41	20	40620	2020	QPSK	0	40620	2020	1.7E B41 PC2	20	40620	2020.2	QPSK	0	40620	2020.2	1.7E B41 PC2	20	40620	2020.2	1.7E B41 PC2	20	40620	2020.2

1.5.2 DL Carrier Aggregation with DL 4x4 MIMO RF Conducted Powers

Note: 4x4 DL MIMO is only operating in the downlink. Uplink transmission is limited to a single output stream for each component carrier of ULCA.

1.5.2.1 LTE Band 41

Table 29
Output Powers – Ant 4B

Combination	PCC Band	PCC										SCC 1										SCC 2										SCC 3										SCC 4										Power	
		PCC BW [MHz]	PCC [DL] Freq. [MHz]	Mod.	PCC UL RB Offset	PCC [DL] Ch.	PCC [UL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [UL] Freq. [MHz]	Mod.	SCC UL RB Offset	SCC [DL] Ch.	SCC [UL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Freq. [MHz]	Mod.	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [UL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [UL] Freq. [MHz]	DL Ant. Config.	ULCA Tx Power with add'l CA config. active on UL (dBm)	ULCA Tx Power (dBm)																			
CA 41E2 (41A)	1.7E B41	20	40620	2020	QPSK	0	40620	2020	4x4	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	15.13	15.13														
CA 41E1	1.7E B41	20	40620	2020	QPSK	0	40620	2020	4x4	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	15.13	15.13														
CA 41E2 (41A)	1.7E B41	20	40620	2020	QPSK	0	40620	2020	4x4	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	15.13	15.13														
CA 41E1 (41C)	1.7E B41	20	40620	2020	QPSK	0	40620	2020	4x4	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	15.13	15.13														
CA 41E1 (41C)	1.7E B41	20	40620	2020	QPSK	0	40620	2020	4x4	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	15.13	15.13														
CA 41E1 (41C)	1.7E B41	20	40620	2020	QPSK	0	40620	2020	4x4	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	15.13	15.13														
CA 41E1 (41C)	1.7E B41	20	40620	2020	QPSK	0	40620	2020	4x4	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	15.13	15.13														
CA 41E1 (41C)	1.7E B41	20	40620	2020	QPSK	0	40620	2020	4x4	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	15.13	15.13														
CA 41E1 (41C)	1.7E B41	20	40620	2020	QPSK	0	40620	2020	4x4	1.7E B41	20	40620	2020.2	QPSK	0	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	4x4	1.7E B41	20	40620	2020.2	15.13	15.13														

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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 UL1R 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	2523.8	QPSK	50	0	3048	2649.8	4x4		13.09	13.12

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APPENDIX G: POWER REDUCTION VERIFICATION

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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					
		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	
		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	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	
		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	

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	16.00	14.50						
		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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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
		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
		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

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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	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				
	40 MHz Bandwidth	144	11.00	9.50	12.50	11.00	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				
		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		
	80 MHz Bandwidth	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		
		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

FCC ID: BCGA2230	 PCTEST	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 12/16/2019 – 01/14/2020	DUT Type: Tablet Device		APPENDIX H: Page 8 of 19

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	12.00	10.50	12.00	10.50				
		56	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		60	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		64	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		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

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

FCC ID: BCGA2230	 PCTEST	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 12/16/2019 – 01/14/2020	DUT Type: Tablet Device		APPENDIX H: Page 10 of 19

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		

FCC ID: BCGA2230	 PCTEST	SAR EVALUATION REPORT	Reviewed by: Quality Manager
Test Dates: 12/16/2019 – 01/14/2020	DUT Type: Tablet Device		APPENDIX H: Page 11 of 19

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		2412	1	242T	61	12.81
			54	12.55						
2417	2	106T	53	11.96		2417	2	242T	61	13.00
			54	12.19						
2437	6	106T	53	12.32		2437	6	242T	61	12.89
			54	12.44						
2462	11	106T	53	12.35		2462	11	242T	61	12.95
			54	12.17						
2467	12	106T	53	10.63		2467	12	242T	61	10.95
			54	9.19						

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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	3	5745		149	52T	14.53	14.92	14.91	
5785	157	26T	14.93	15.32	15.22	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	
	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			2C	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				
2C		5530	106	484T	10.50	10.50		2C		5530	106	996T	10.48		
		5610	122	484T	16.42	16.50				5610	122	996T	16.46		
		5690	138	484T	14.50	14.50				5690	138	996T	16.46		
	3	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)		
					RU Index		
					53	54	N/A
	1	5180	36	106T	14.79	15.00	
		5200	40	106T	15.56	15.92	
		5240	48	106T	15.87	15.98	
	2A	5260	52	106T	16.17	16.25	
		5300	60	106T	16.25	16.25	
		5320	64	106T	14.50	14.50	
	2C	5500	100	106T	14.00	14.00	
5520		104	106T	15.00	15.00		
5580		116	106T	14.89	15.00		
5660		132	106T	14.95	15.00		
5680		136	106T	15.00	15.00		
5700		140	106T	13.47	13.50		
5720		144	106T	14.00	14.00		
3	5745	149	106T	15.37	15.50		
	5785	157	106T	15.46	15.50		
	5825	165	106T	15.50	15.50		

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					61	N/A	N/A
	1	5180	36	242T	14.60		
		5200	40	242T	15.99		
		5240	48	242T	16.00		
	2A	5260	52	242T	16.25		
		5300	60	242T	16.25		
		5320	64	242T	14.50		
	2C	5500	100	242T	14.00		
5520		104	242T	14.95			
5580		116	242T	15.00			
5660		132	242T	14.92			
5680		136	242T	15.00			
5700		140	242T	13.50			
5720		144	242T	15.00			
3	5745	149	242T	15.50			
	5785	157	242T	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			
3	5755	151	106T	15.33	15.43	15.19	3	5755	151	242T	15.31	15.41			
	5795	159	106T	15.01	15.37	15.18		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
		5775	155	106T	15.06	15.30	15.25			5775	155	242T	15.01	15.04	14.87

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	10.49	10.50			1	5210	42	996T	10.42		
2A	5290	58	484T	10.45	10.50		2A	5290	58	996T	10.50				
		5530	106	484T	10.31	10.49				5530	106	996T	10.50		
	5610	122	484T	14.88	14.91		2C	5610	122	996T	14.96				
		5690	138	484T	14.46	14.50				5690	138	996T	15.00		
		5775	155	484T	15.47	15.46				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:

- 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	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:

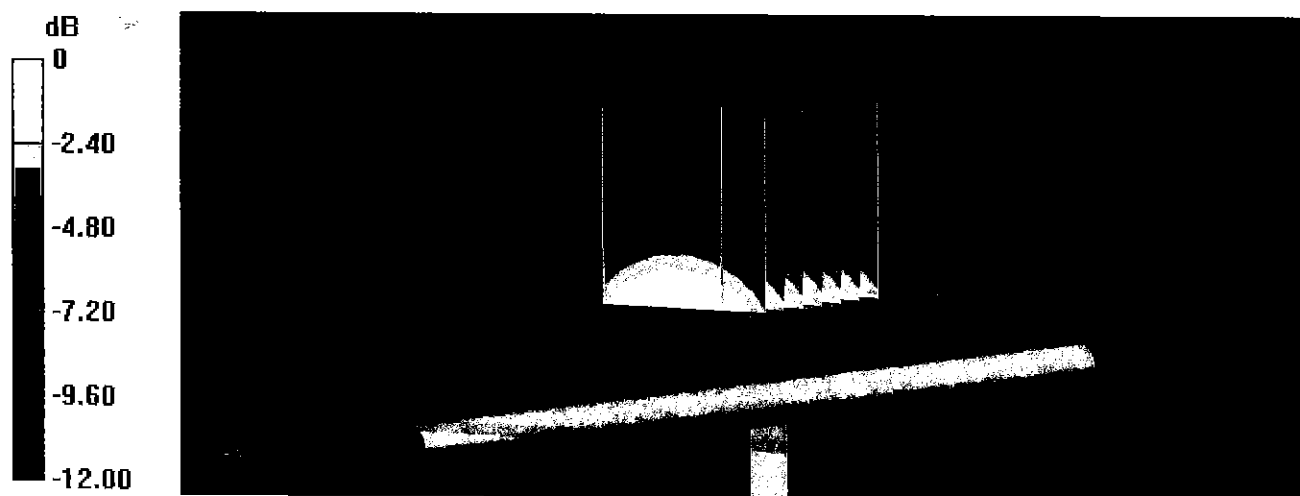
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

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: $f = 750 \text{ MHz}$; $\sigma = 0.96 \text{ S/m}$; $\epsilon_r = 55.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.35, 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:

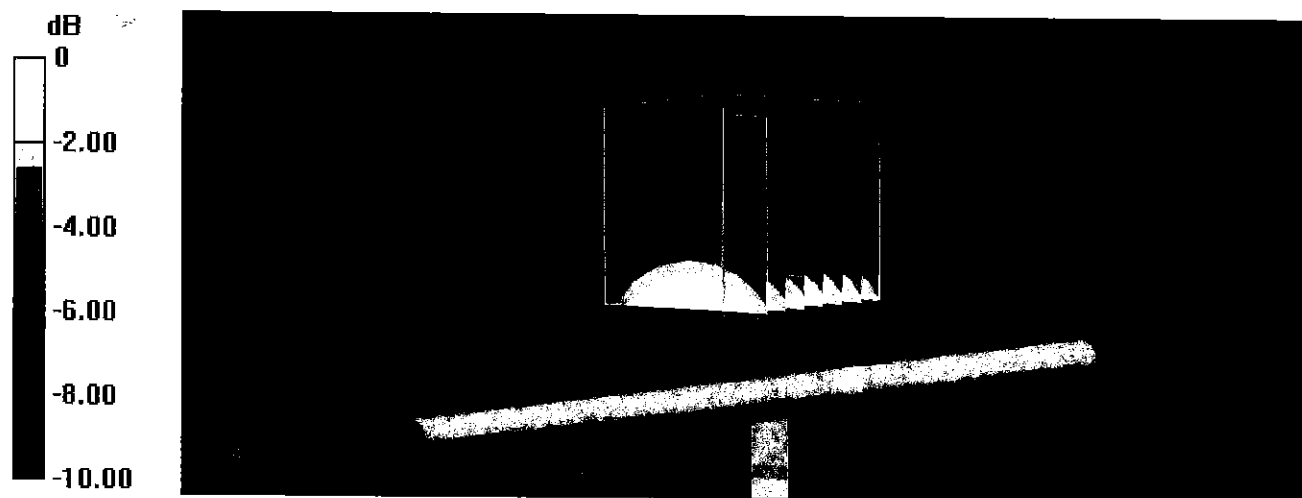
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

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.

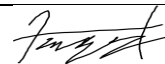
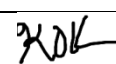
Extended Calibration date: September 08, 2018

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

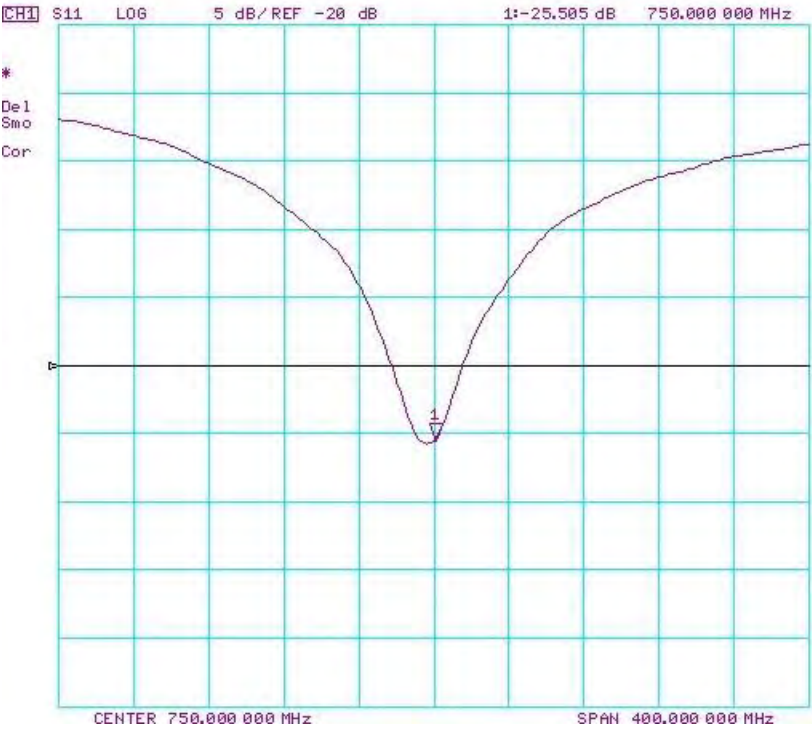
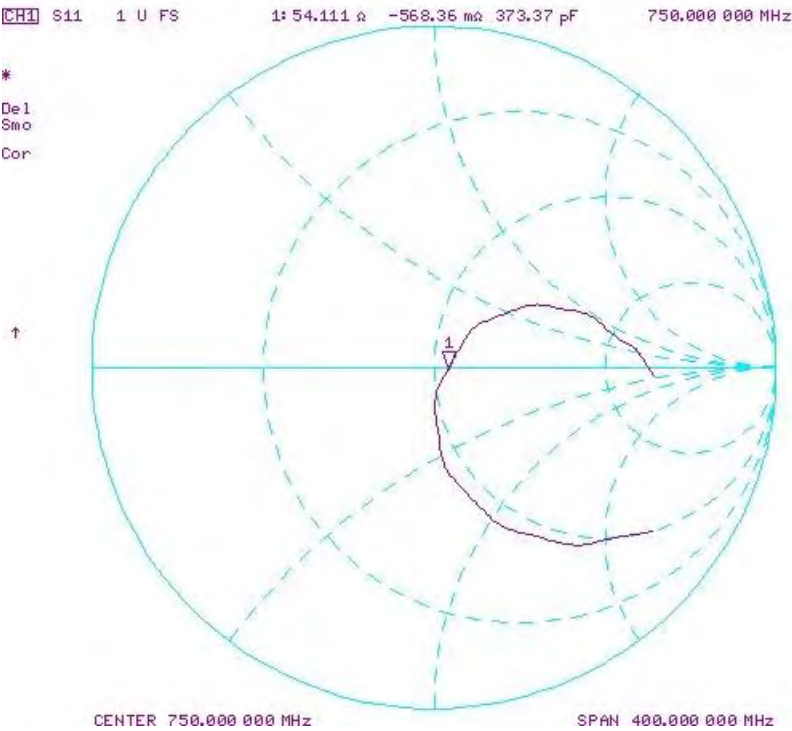
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

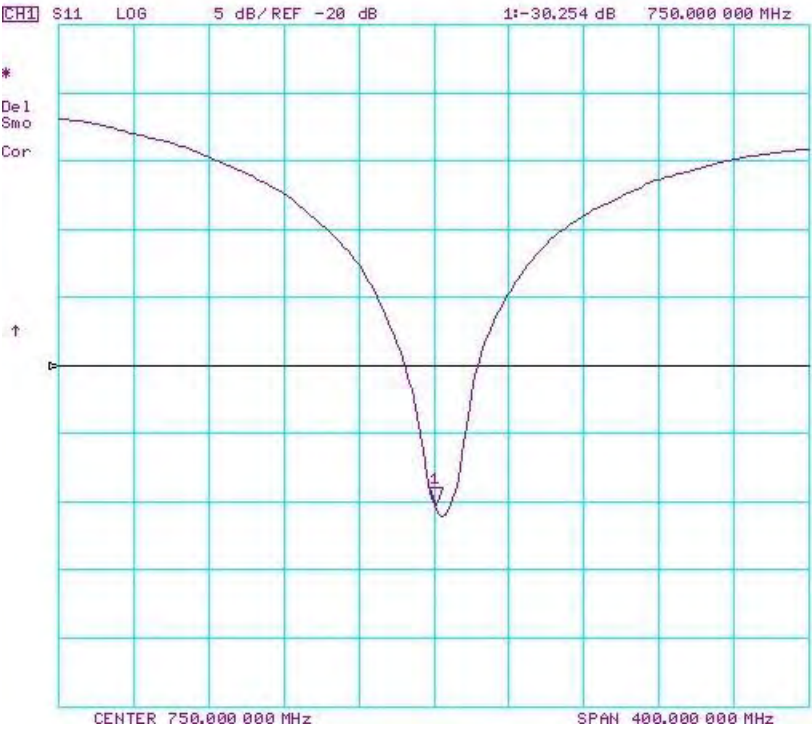
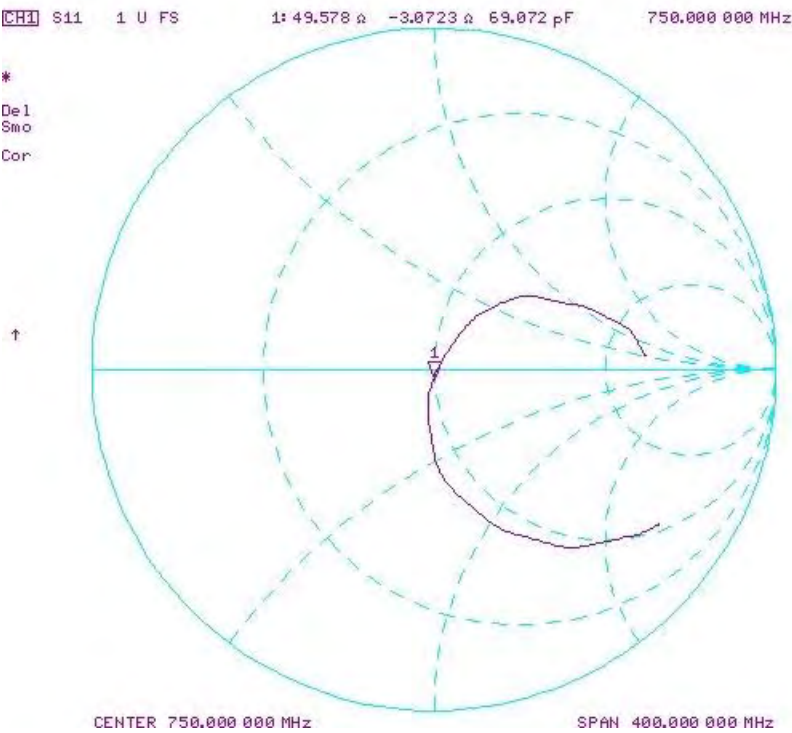
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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:

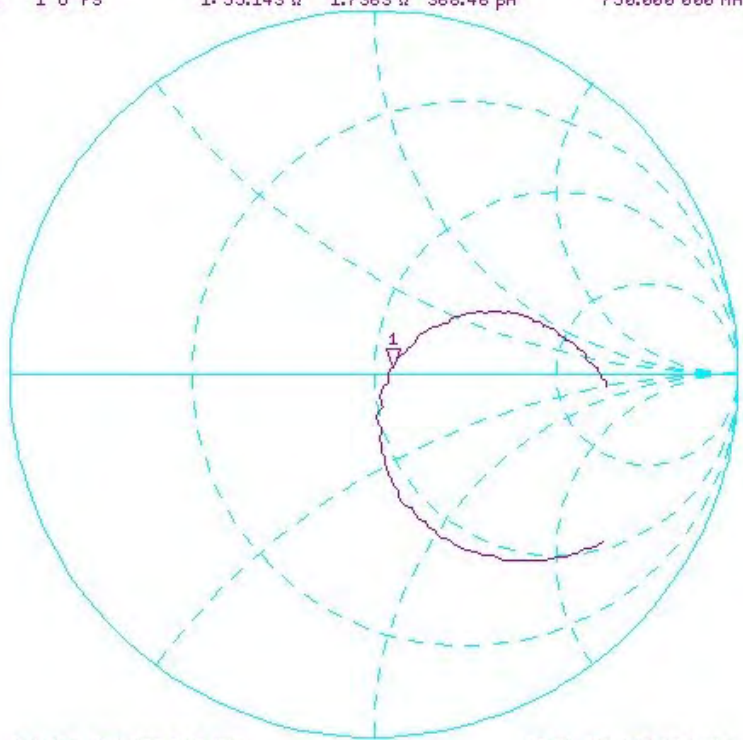
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 23.0 dBm	Measured Head SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance 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

↑

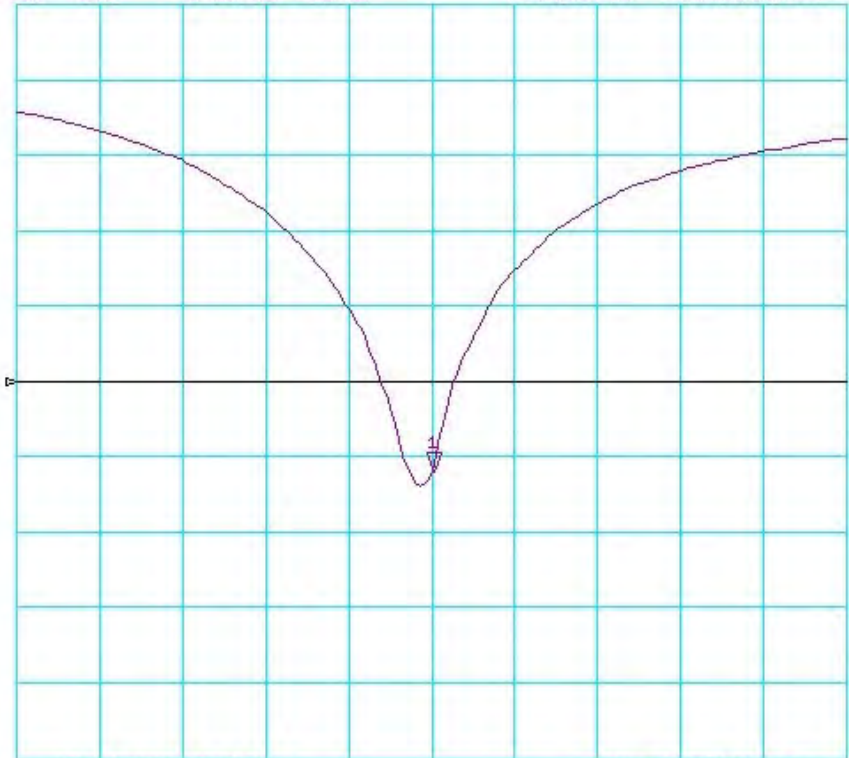


CENTER 750.000 000 MHz SPAN 400.000 000 MHz

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

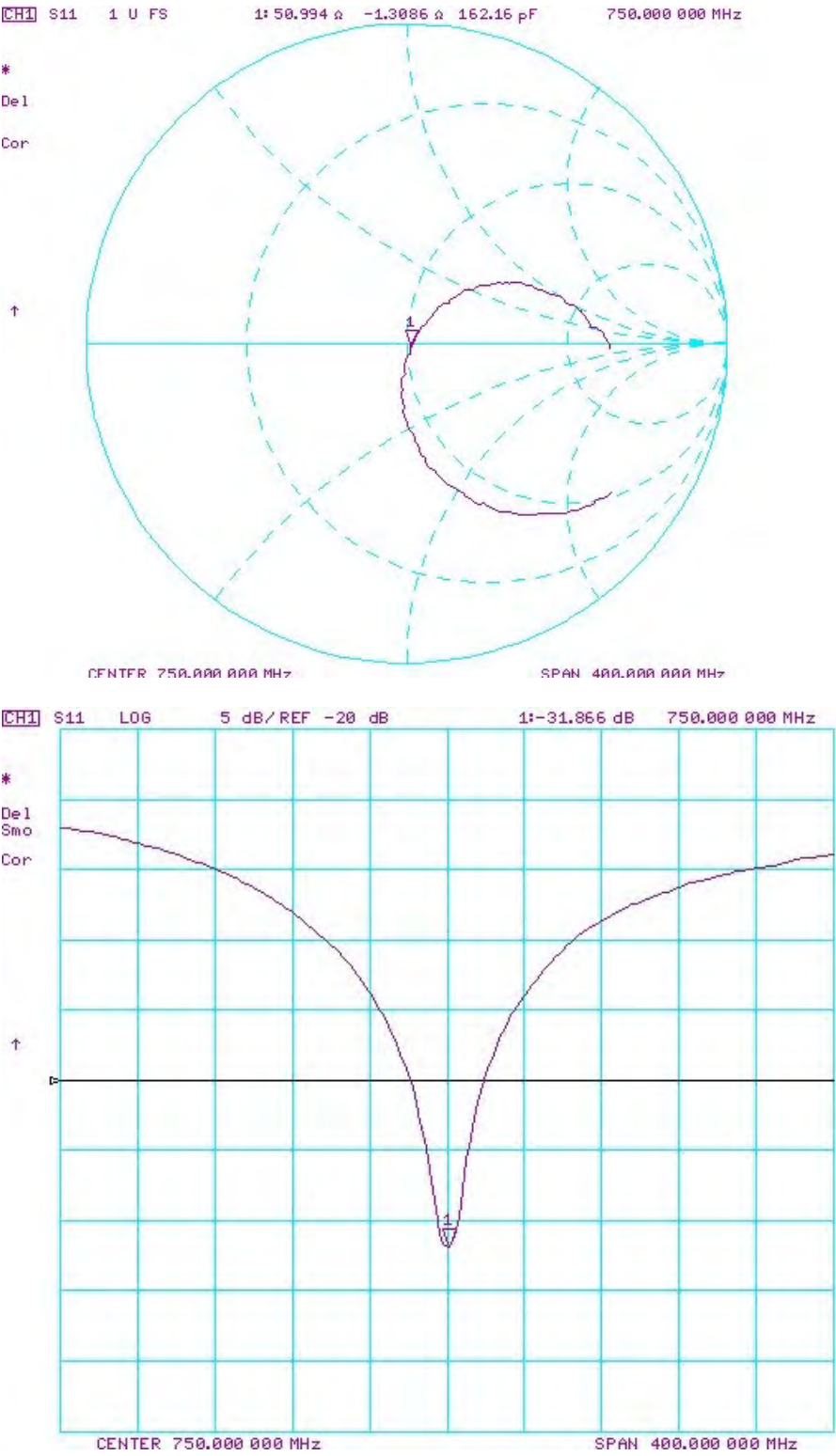
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CENTER 750.000 000 MHz SPAN 400.000 000 MHz

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: **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

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:

- 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
----------------------------------	----------

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:

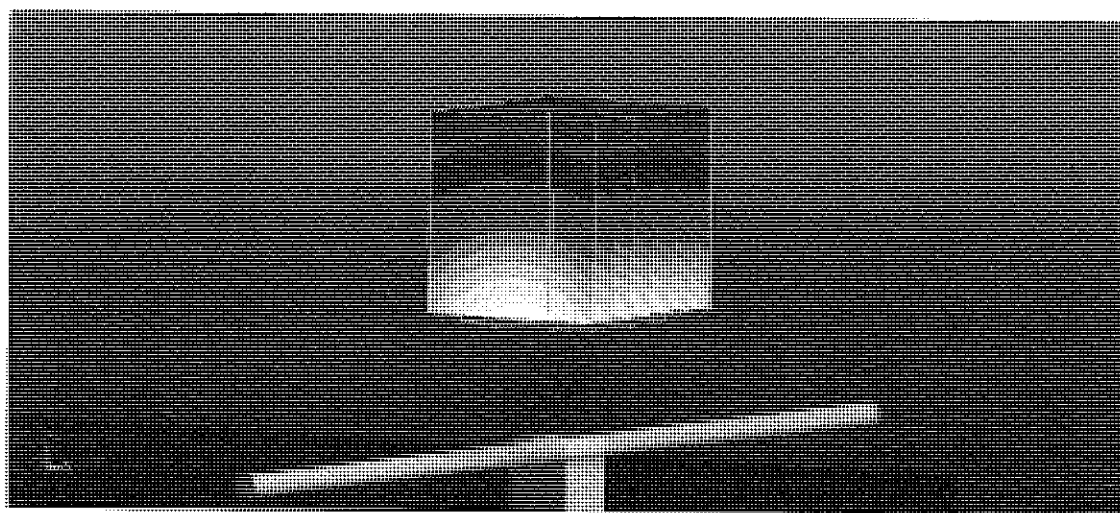
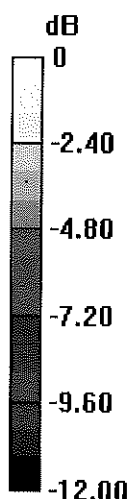
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

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

Peak SAR (extrapolated) = 3.60 W/kg

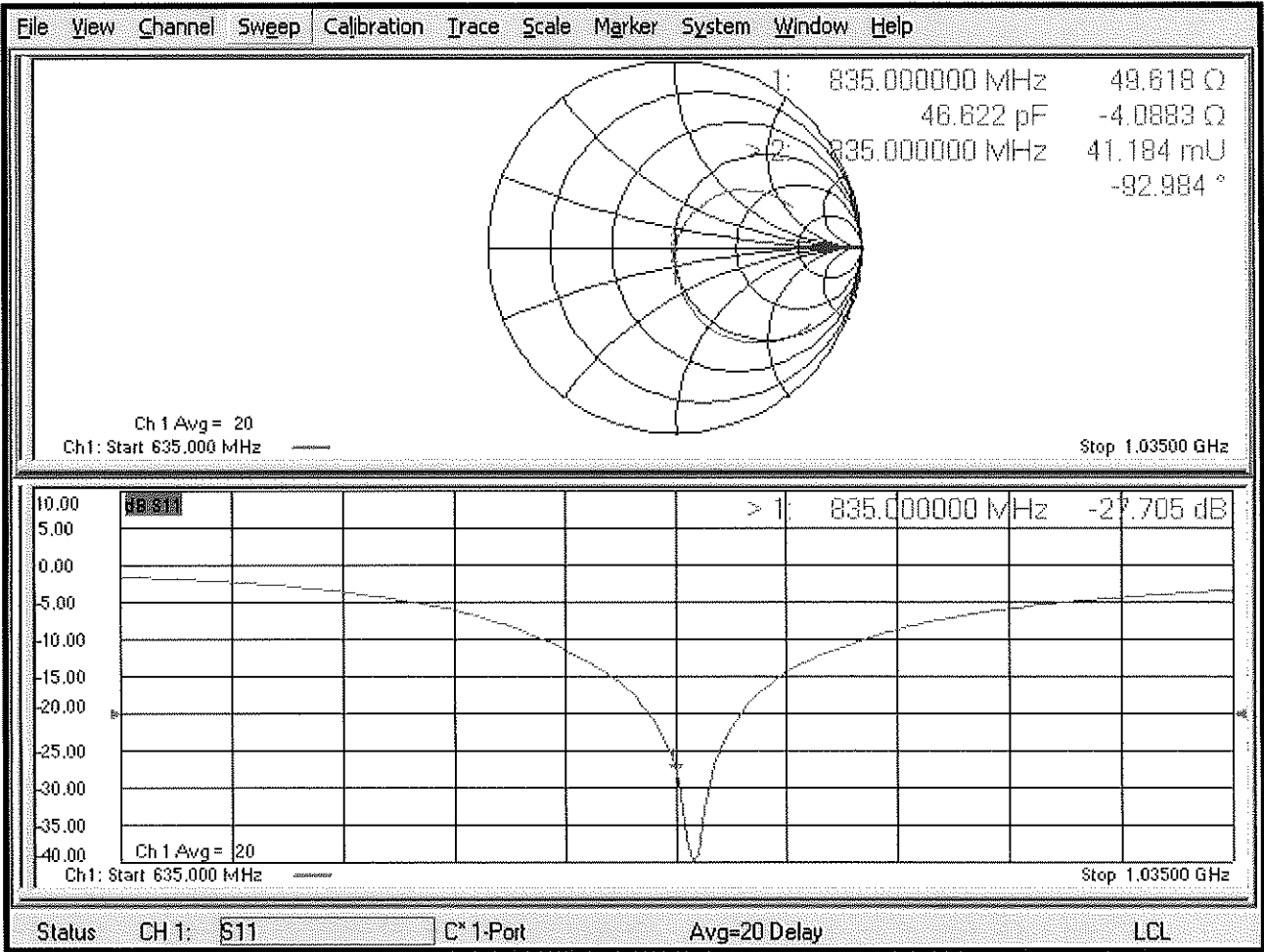
SAR(1 g) = 2.39 W/kg ; SAR(10 g) = 1.54 W/kg

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:

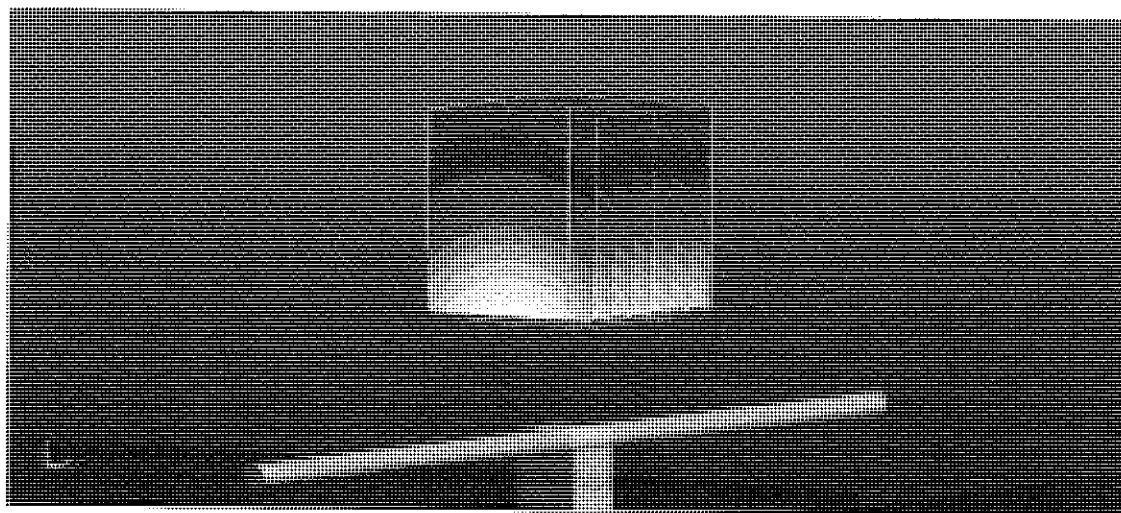
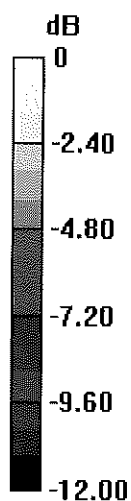
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

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

Peak SAR (extrapolated) = 3.59 W/kg

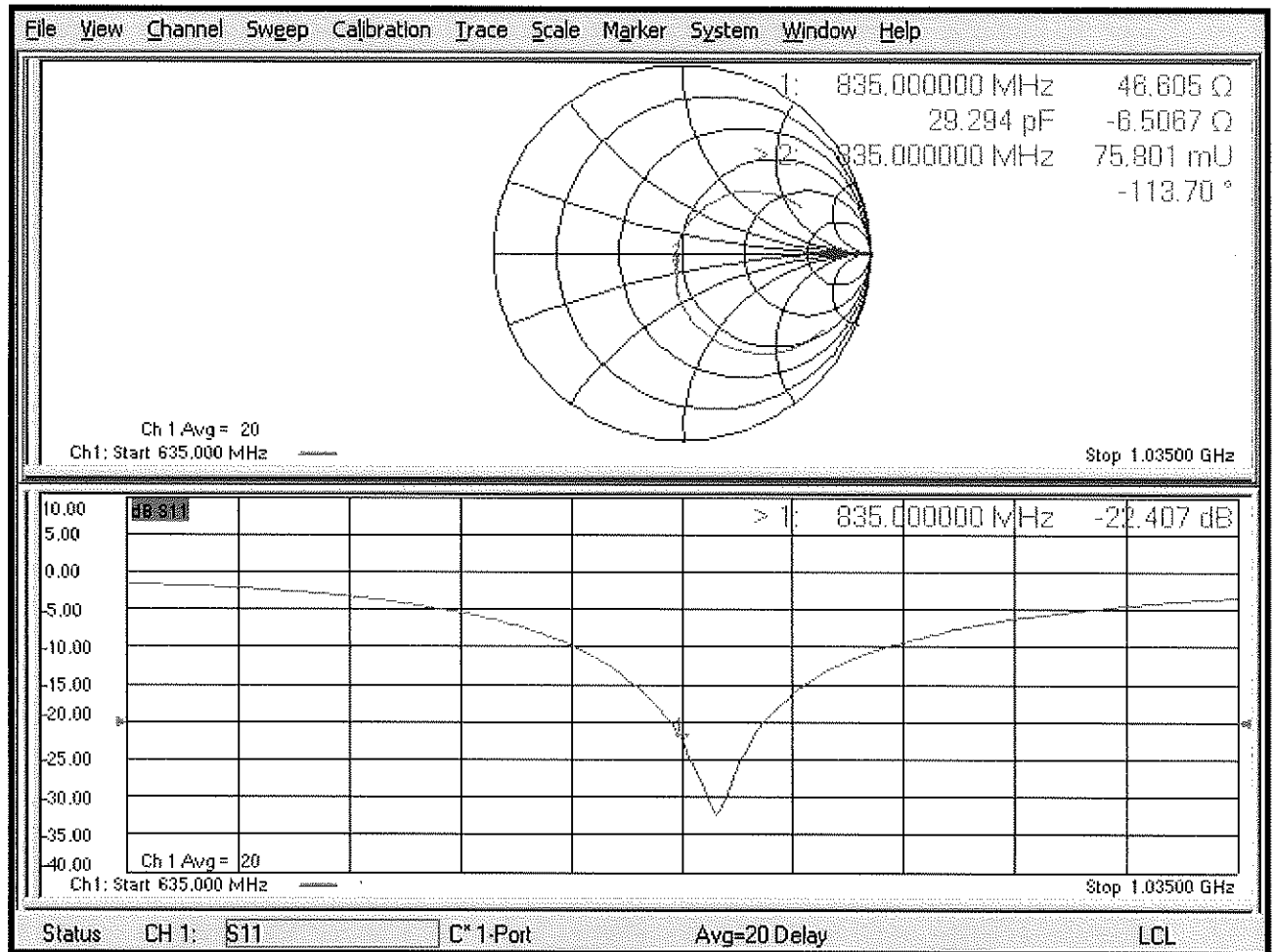
SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.57 W/kg

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





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

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

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:

- 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
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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: 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

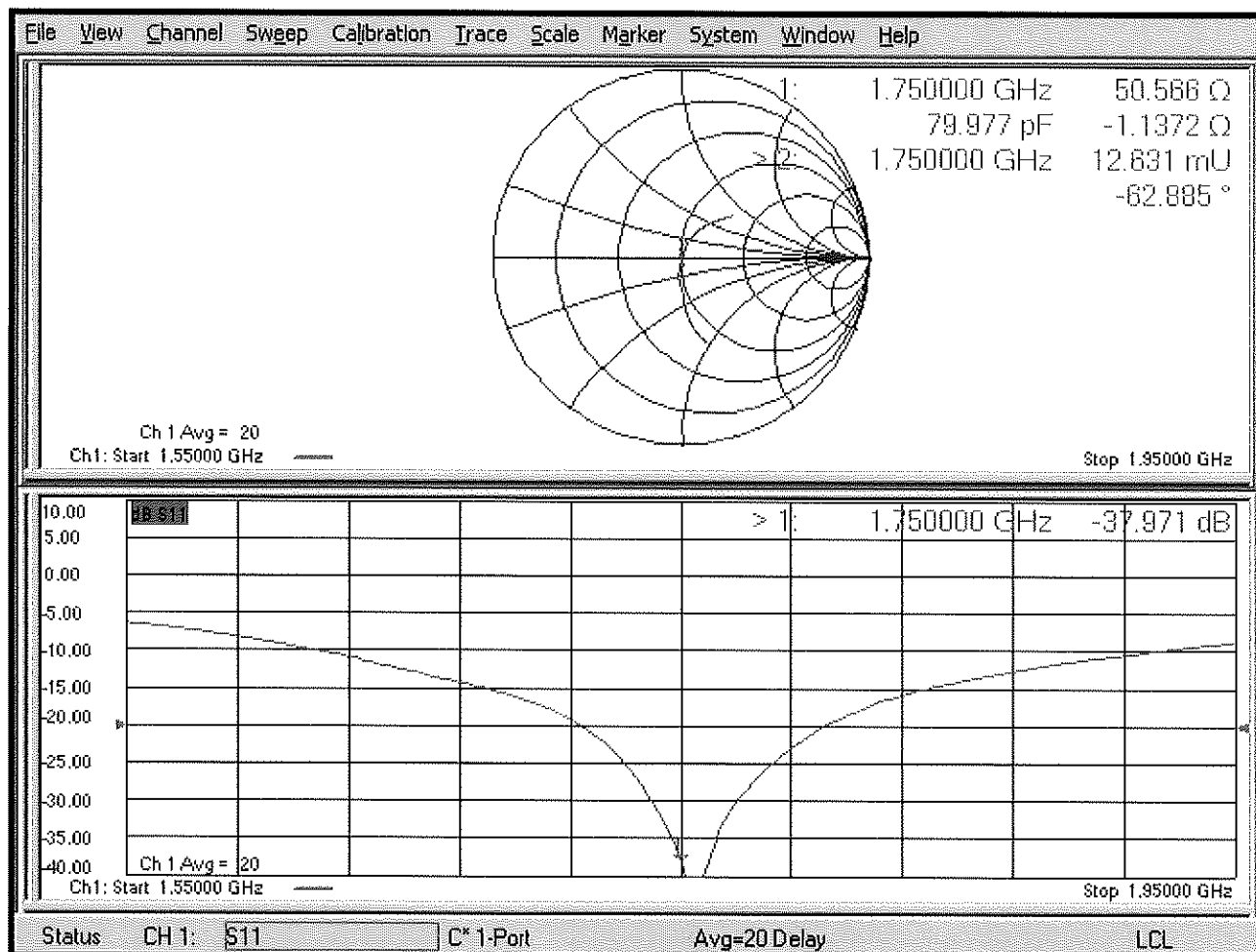
Peak SAR (extrapolated) = 16.7 W/kg

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

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



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:

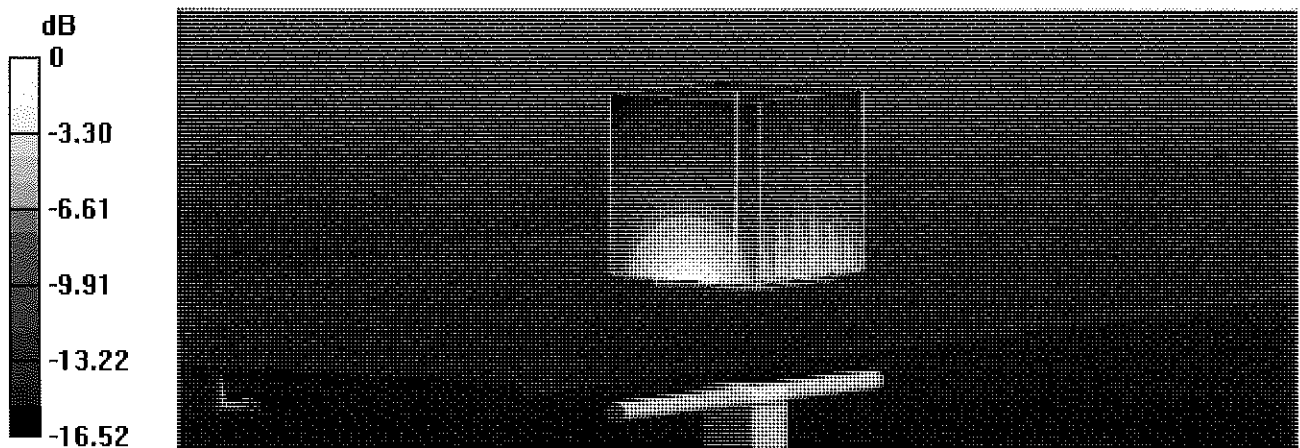
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 16.2 W/kg

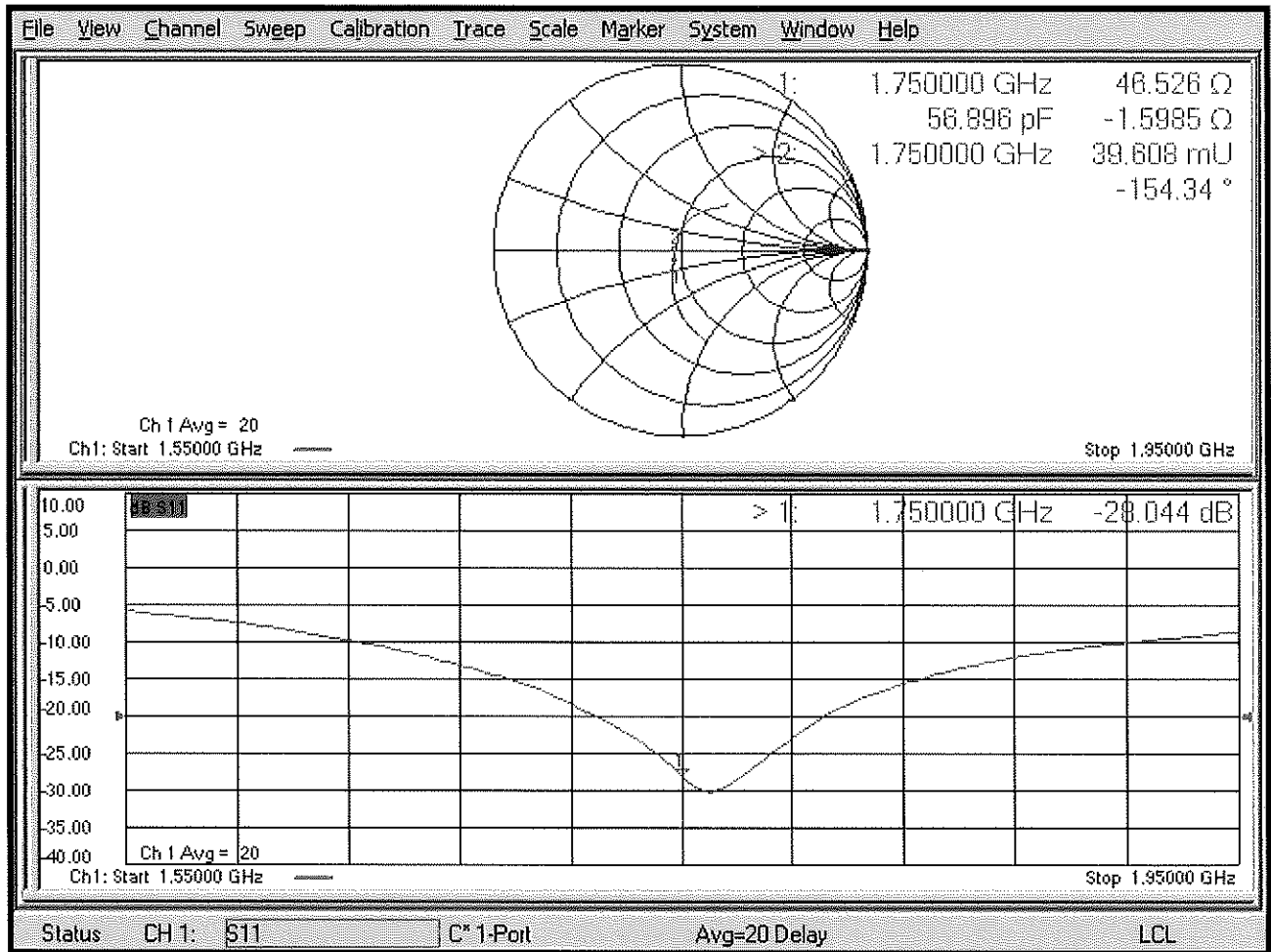
SAR(1 g) = 9.14 W/kg; SAR(10 g) = 4.88 W/kg

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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 Multilateral Agreement for the recognition of calibration certificates

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 and target

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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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	V52.10.1
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
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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	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:

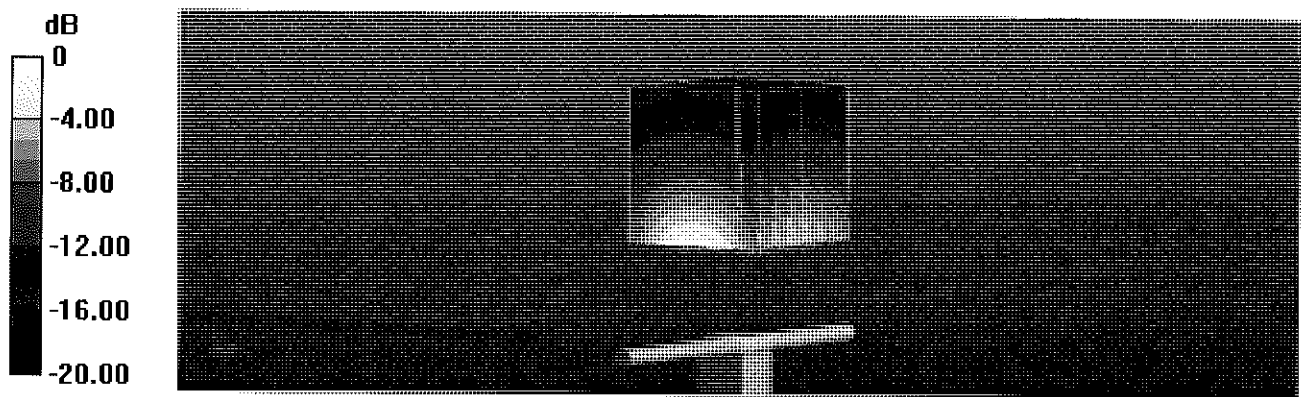
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

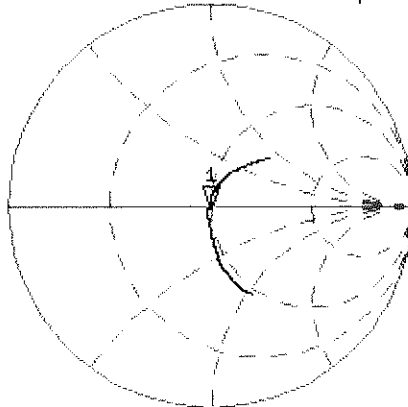
*

Del

CA

Avg
16

H1d

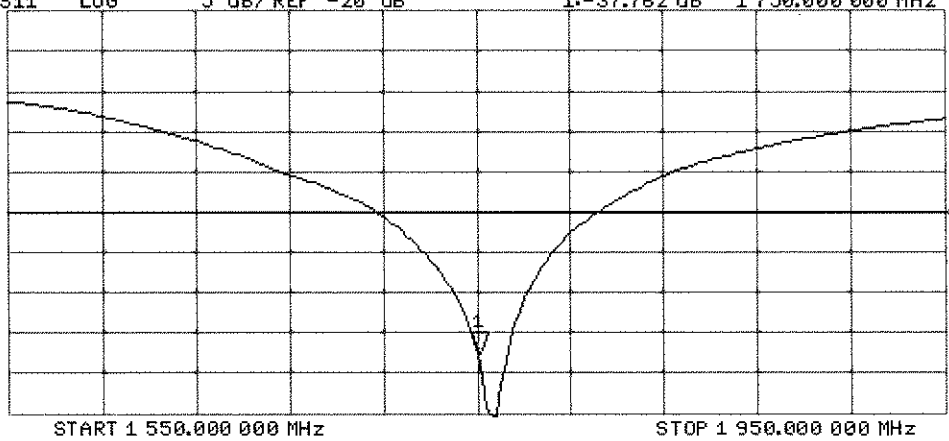


CH2 S11 LOG 5 dB/REF -20 dB 1: -37.762 dB 1 750.000 000 MHz

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:

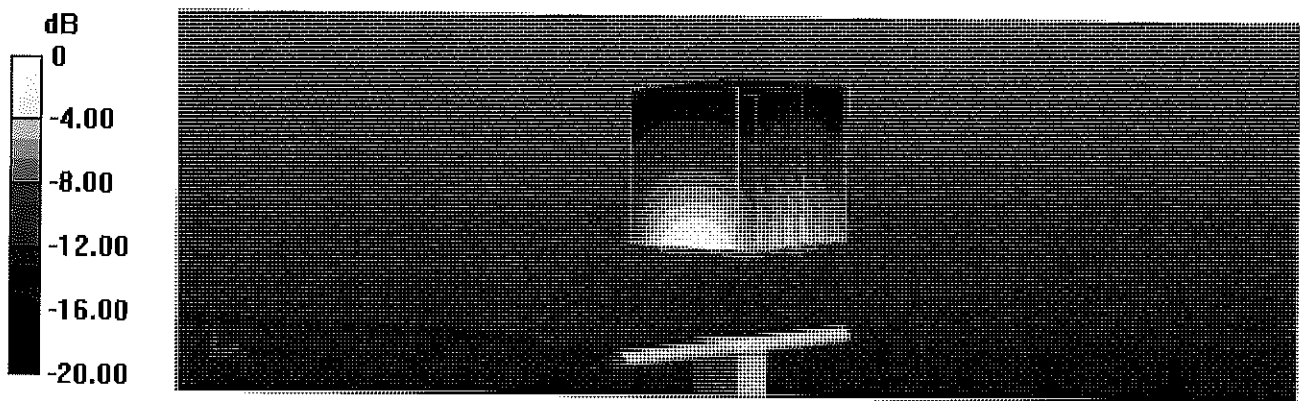
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.4 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 15.8 W/kg

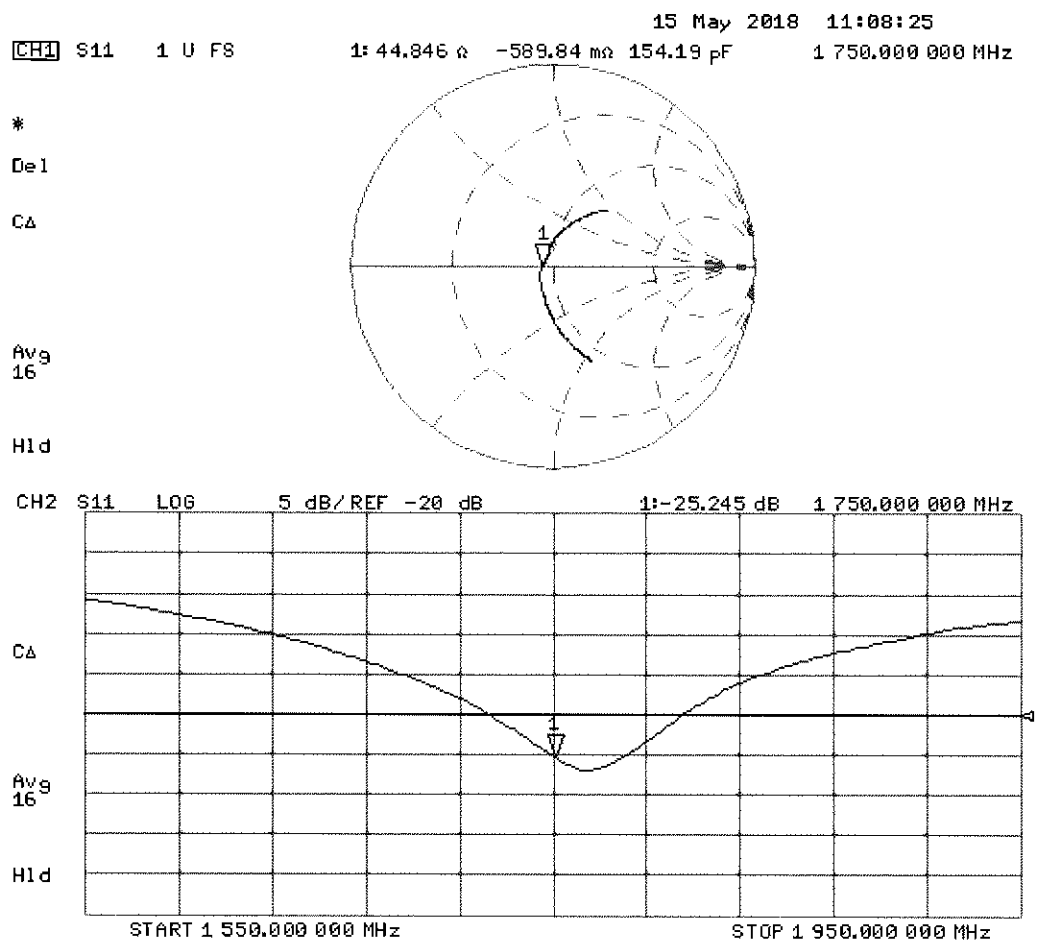
SAR(1 g) = 8.99 W/kg; SAR(10 g) = 4.81 W/kg

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

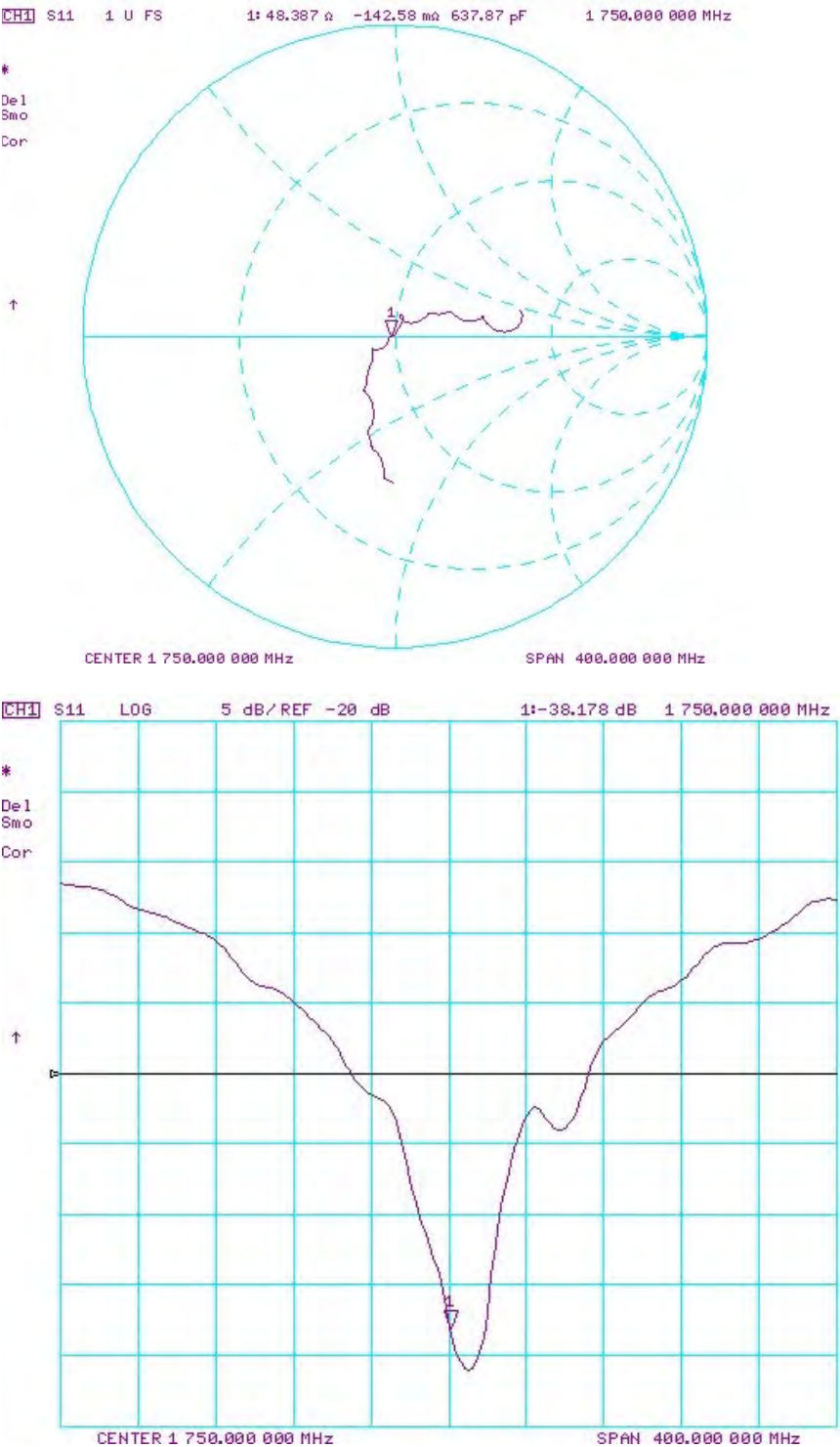
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

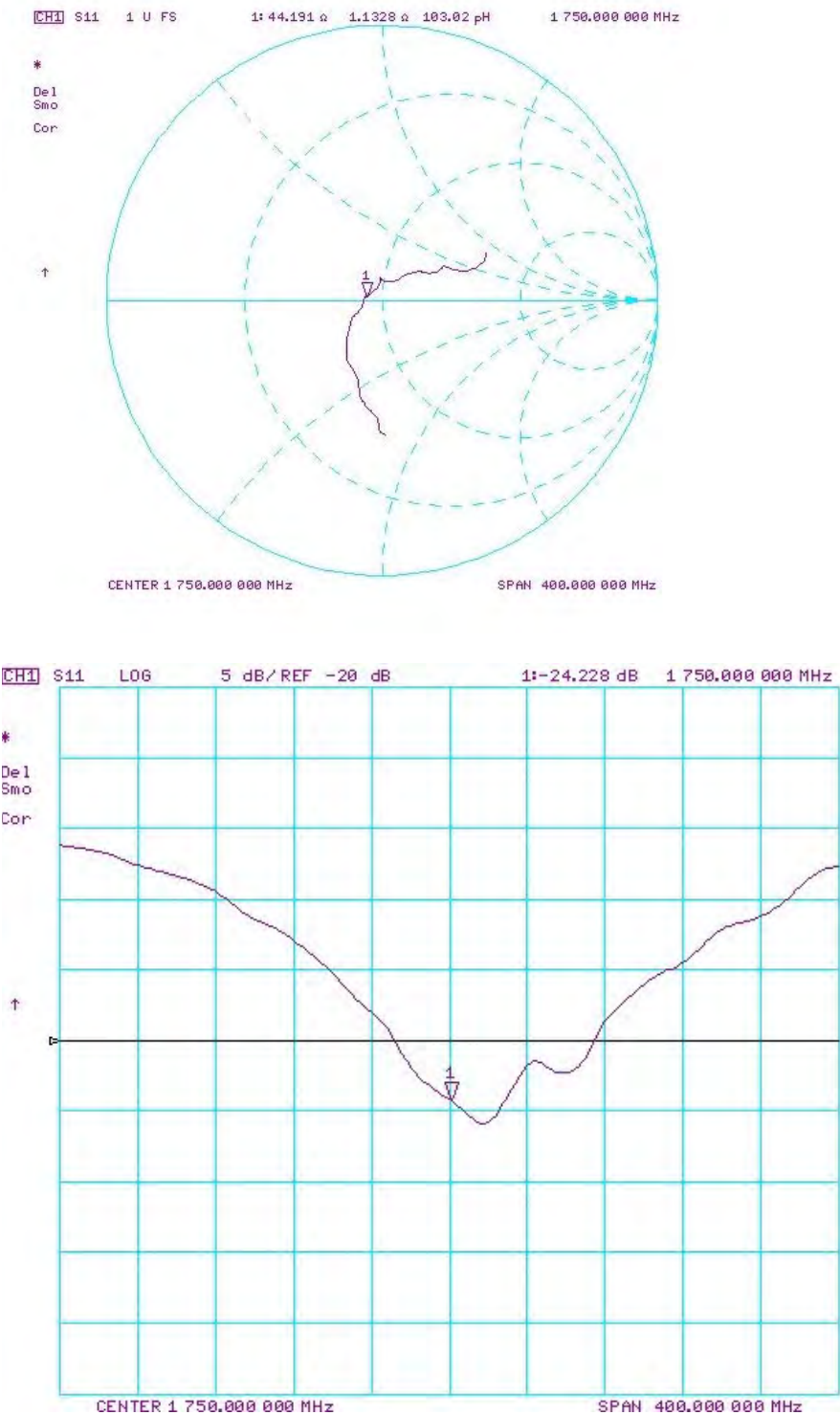
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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**

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-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

Approved by: **Katja Pokovic** Technical Manager

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)

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	V52.10.1
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
----------------------------------	----------

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:

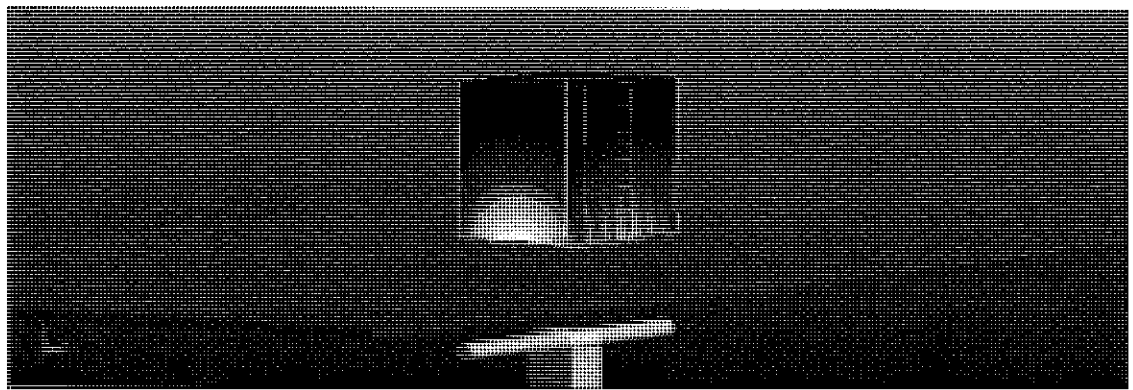
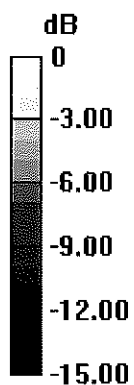
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

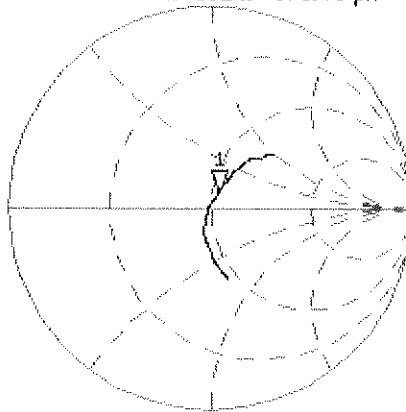


0 dB = 15.0 W/kg = 11.76 dBW/kg

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

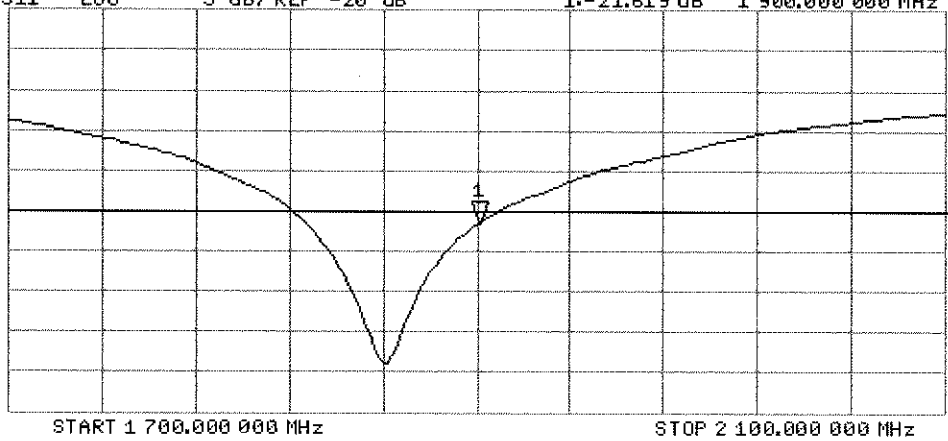
H1d

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:

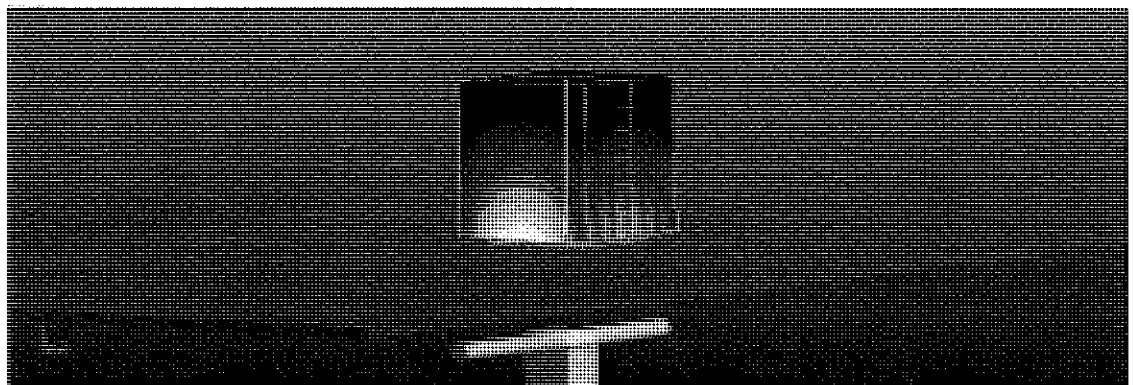
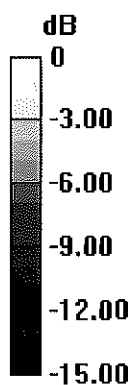
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

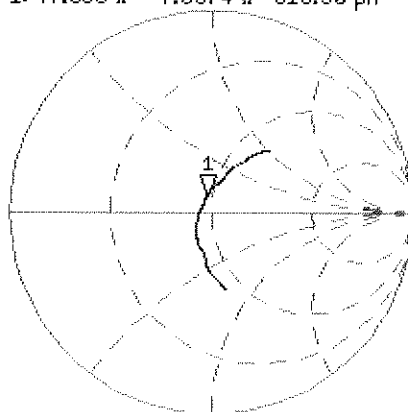


0 dB = 14.4 W/kg = 11.58 dBW/kg

Impedance Measurement Plot for Body TSL

14 May 2018 09:13:46
 [CH1] S11 1 U FS 1: 47.053 Ω 7.3574 Ω 616.30 pH 1 900.000 000 MHz

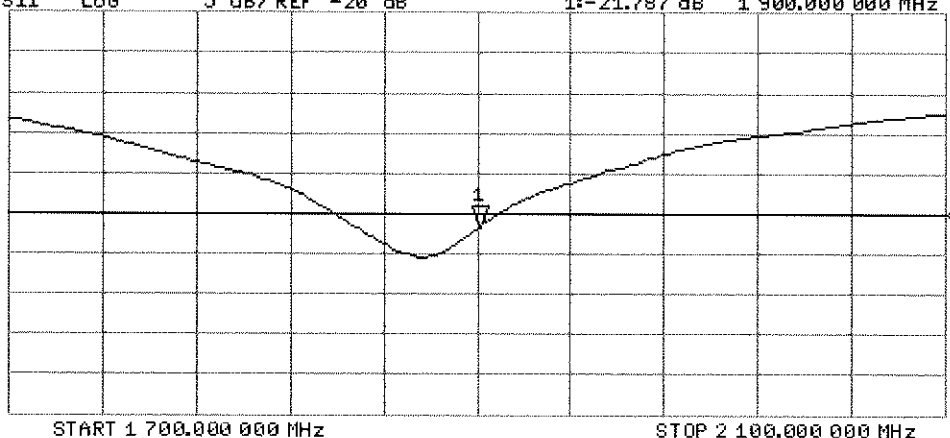
*
 Del
 CA



Avg
 16
 H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-21.787 dB 1 900.000 000 MHz

CA
 Avg
 16
 H1d



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

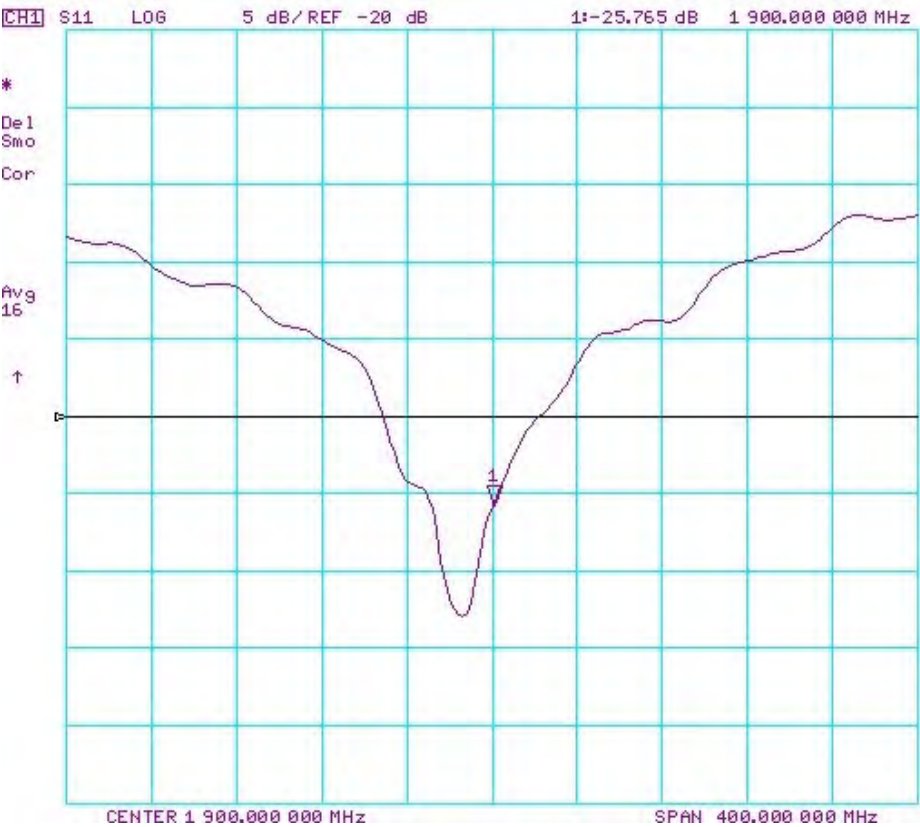
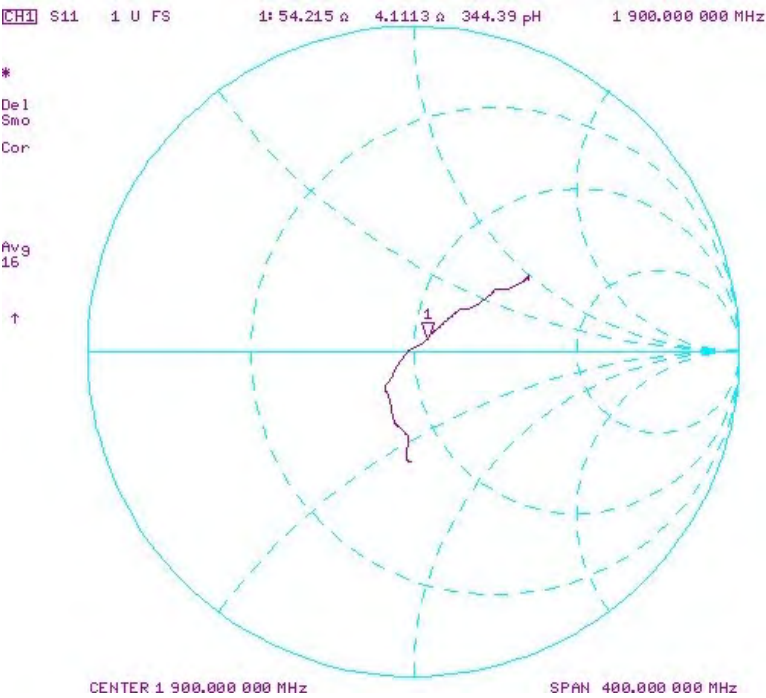
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

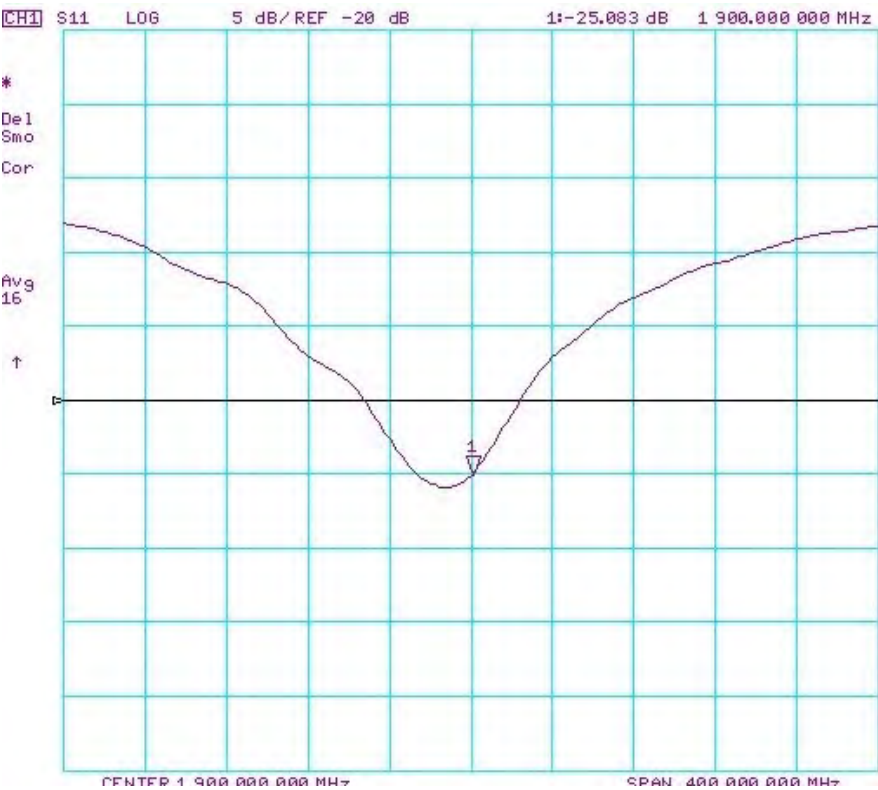
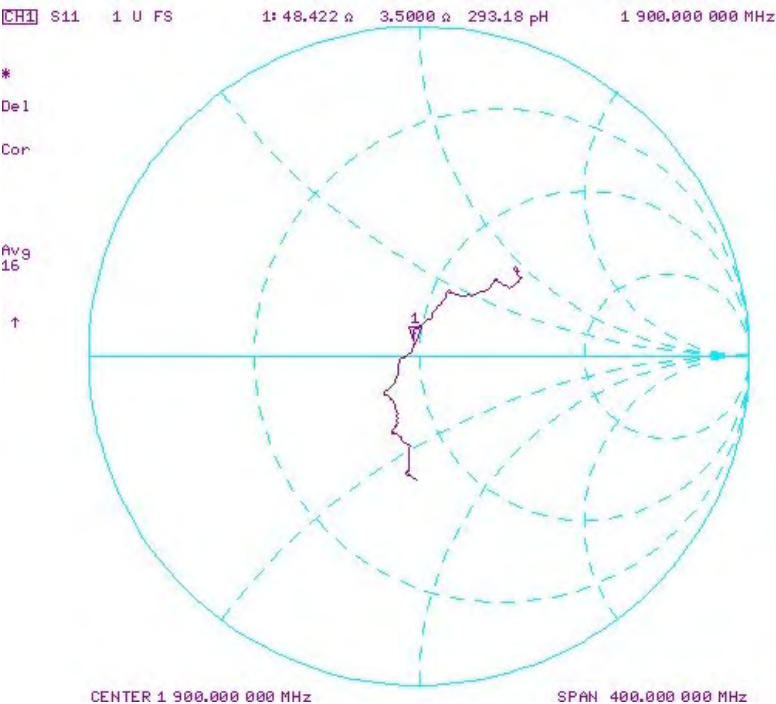
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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

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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

Calibration date: **September 07, 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. 217-02526)	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**

Approved by: **Katja Pokovic** Technical Manager

Signature

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**

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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	V52.10.0
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
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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	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

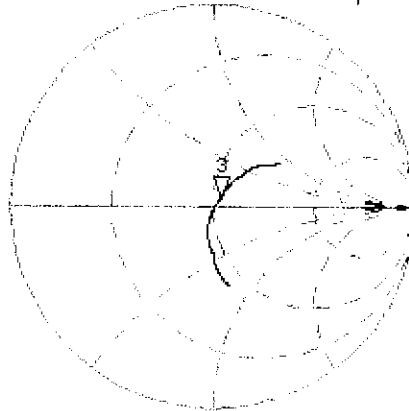
*

De1

CΔ

Avg
16

H1d

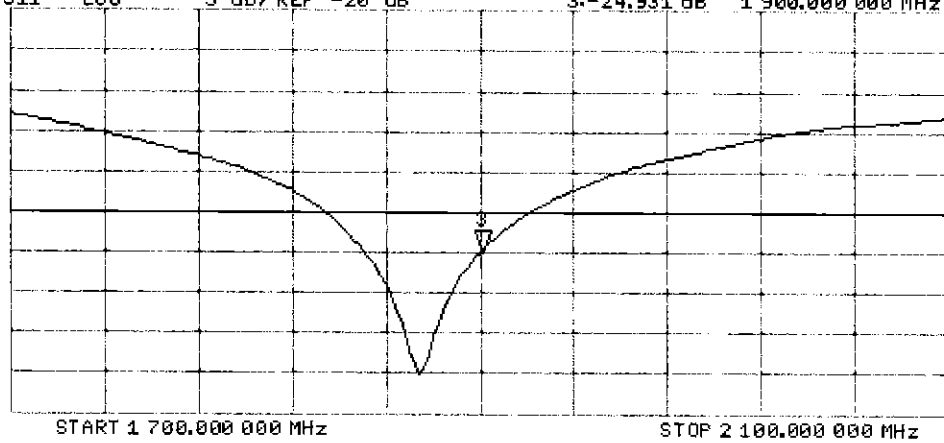


CH2 S11 LOG 5 dB/REF -20 dB 3:-24.931 dB 1 900.000 000 MHz

CΔ

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:

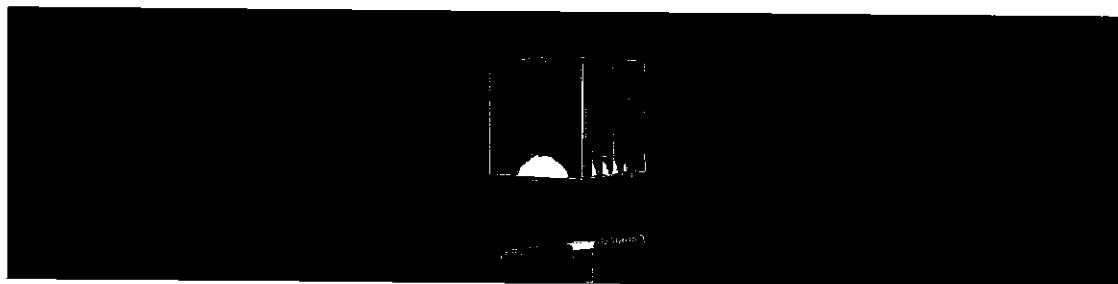
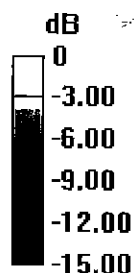
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

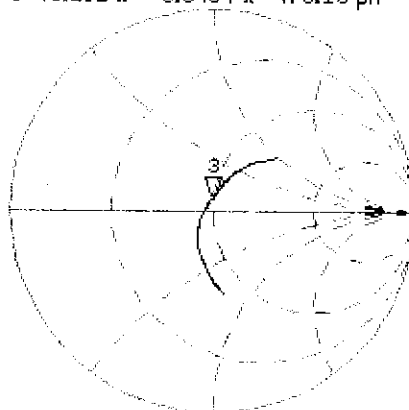


0 dB = 13.8 W/kg = 11.40 dBW/kg

Impedance Measurement Plot for Body TSL

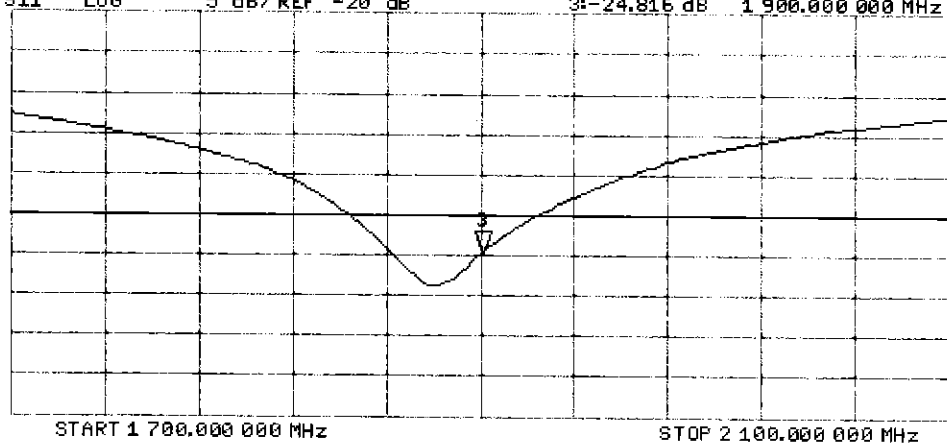
7 Sep 2017 09:09:41
 CH1 S11 1 U FS 3: 49.201 Ω 5.6484 Ω 473.15 pF 1 900.000 000 MHz

*
 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.

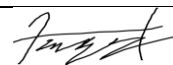
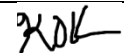
Extended Calibration date: September 07, 2018

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:

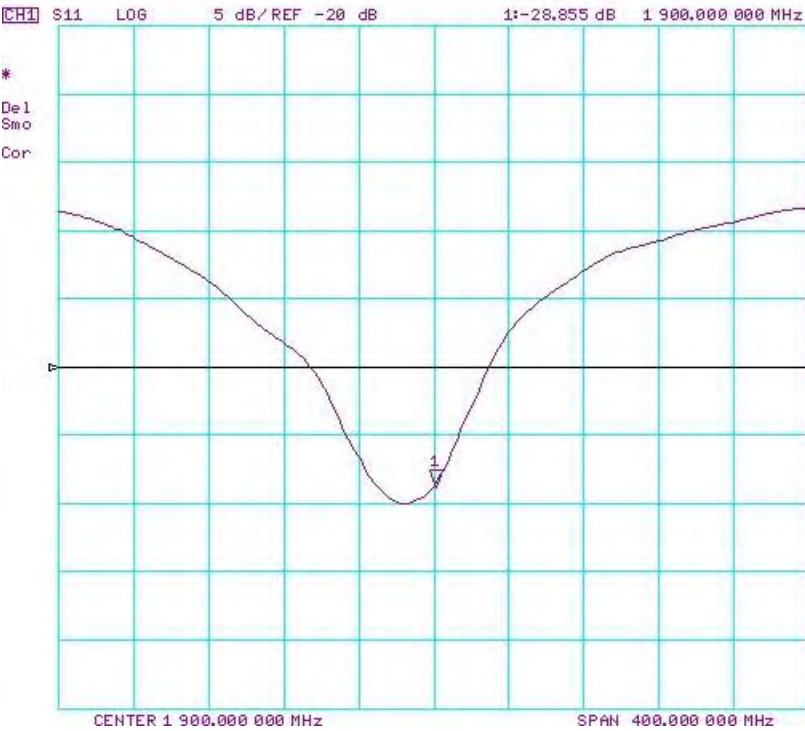
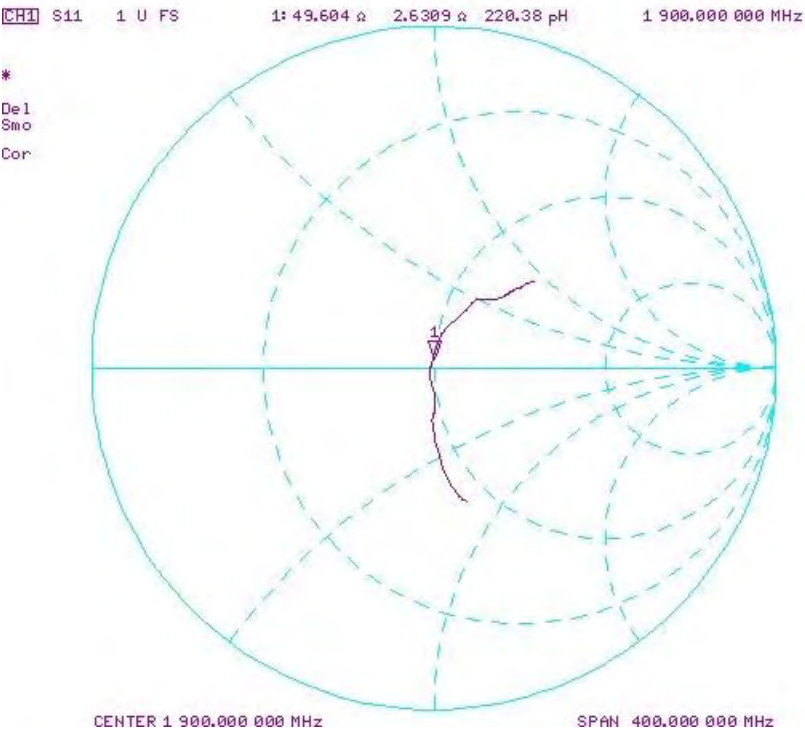
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does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

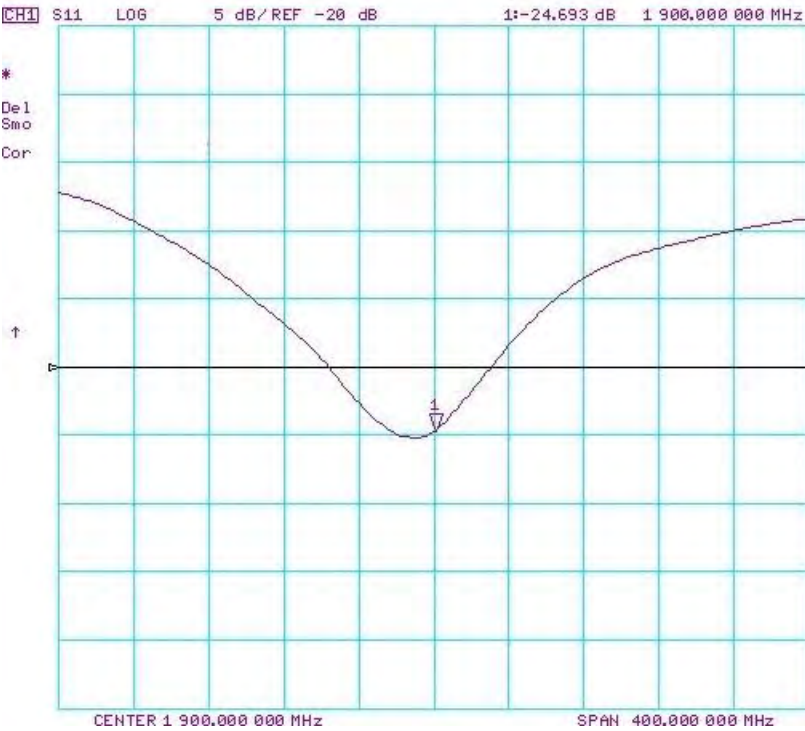
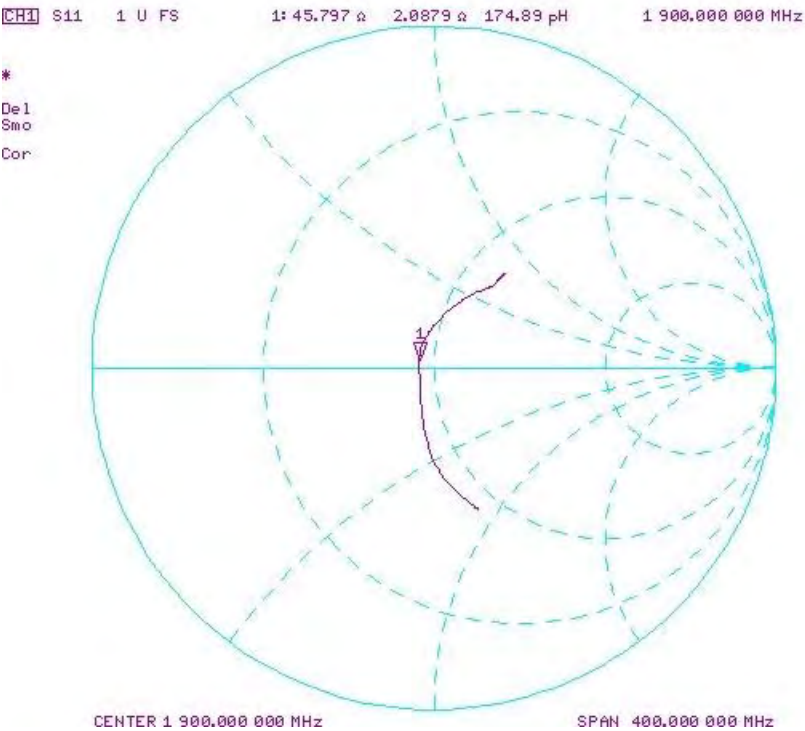
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance 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

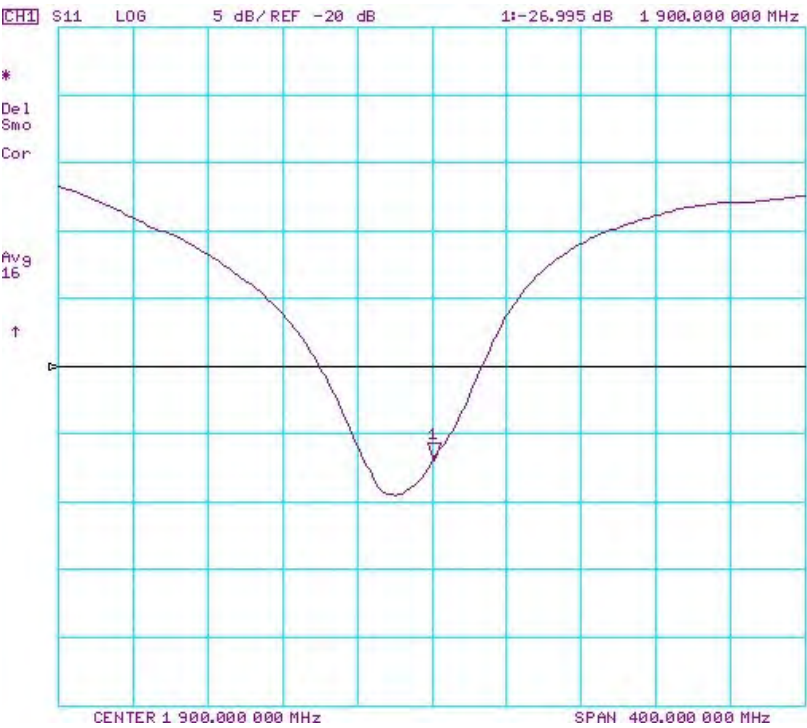
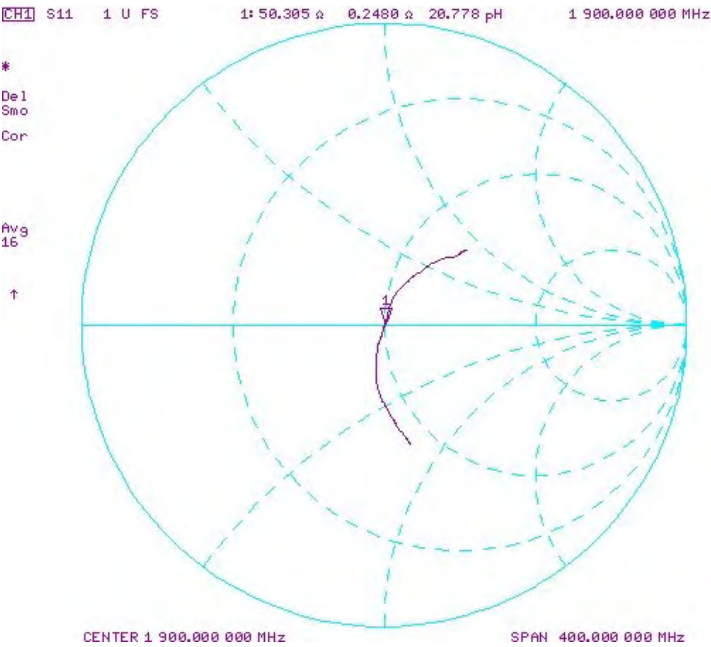
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

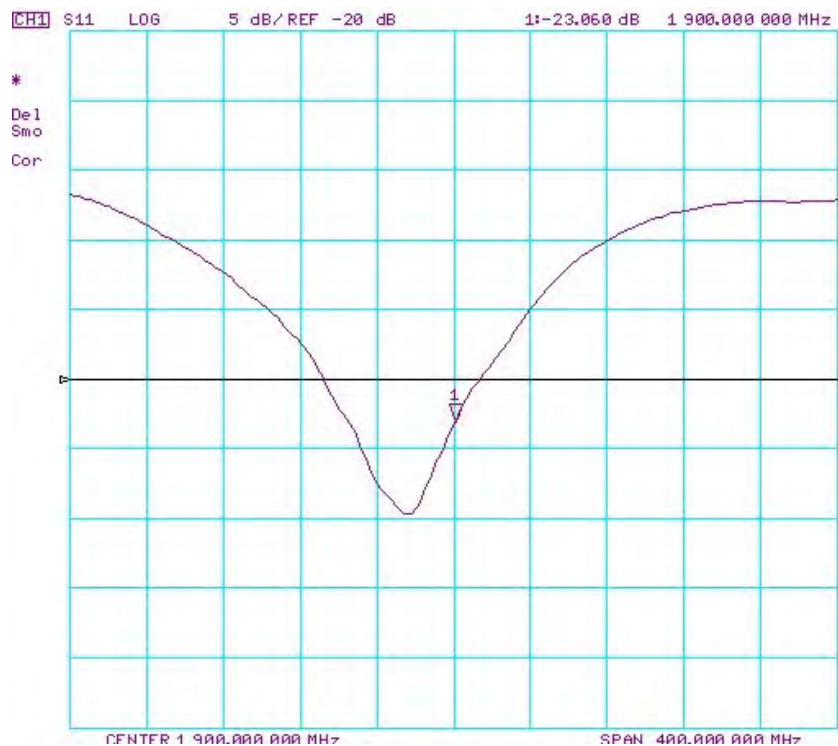
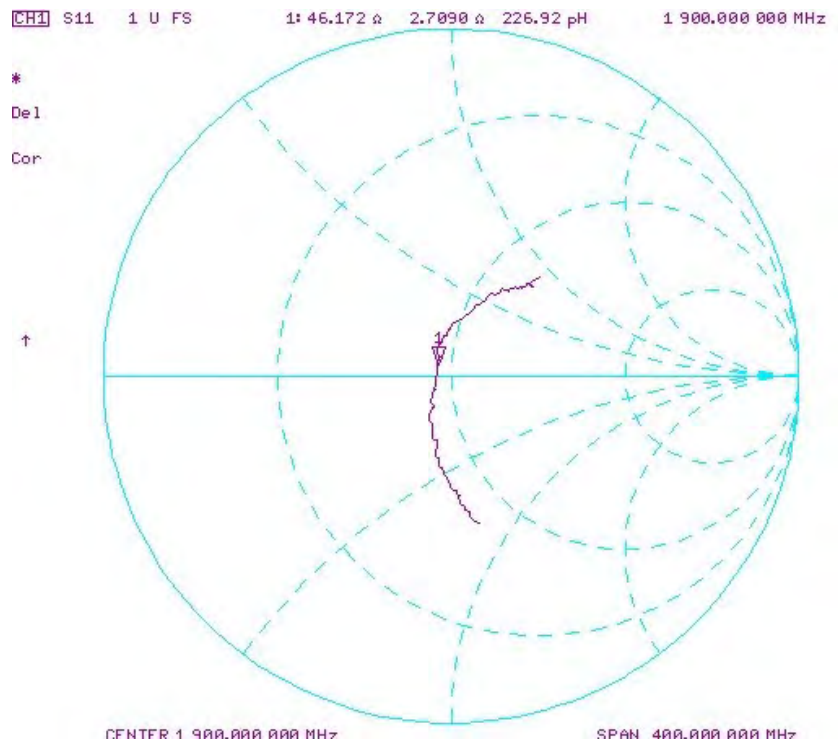
The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

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 $(22 \pm 3)^{\circ}\text{C}$ 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	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

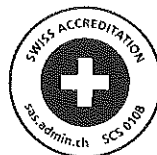
Calibrated by: **Claudio Leubler** **Laboratory Technician**

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
----------------------------------	----------

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:

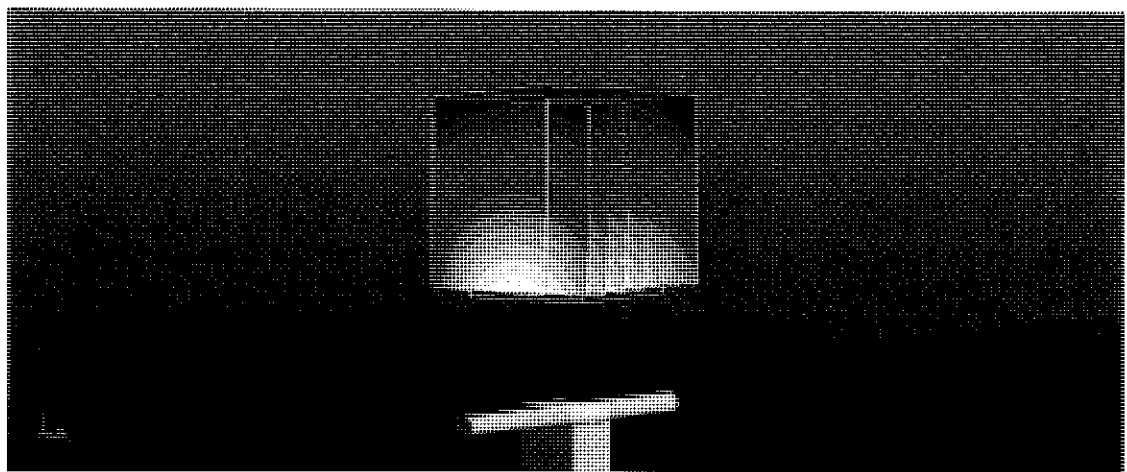
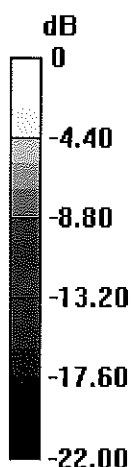
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

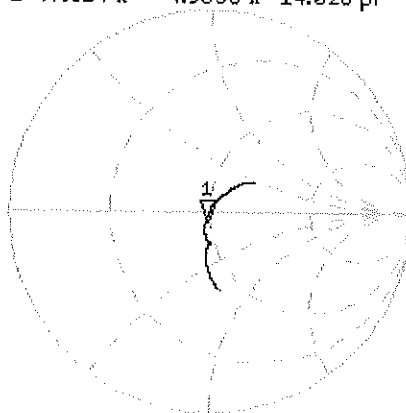
Impedance Measurement Plot for Head TSL

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

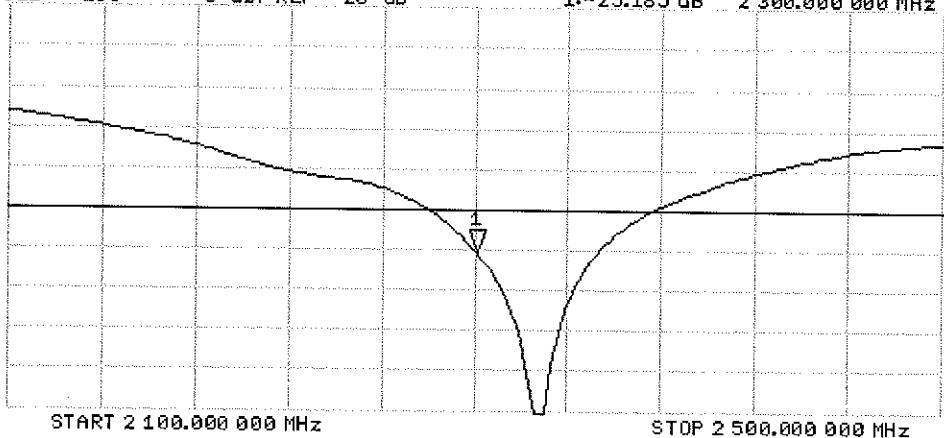


CH2 S11 LOG 5 dB/REF -20 dB 1:-25.185 dB 2 300.000 000 MHz

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:

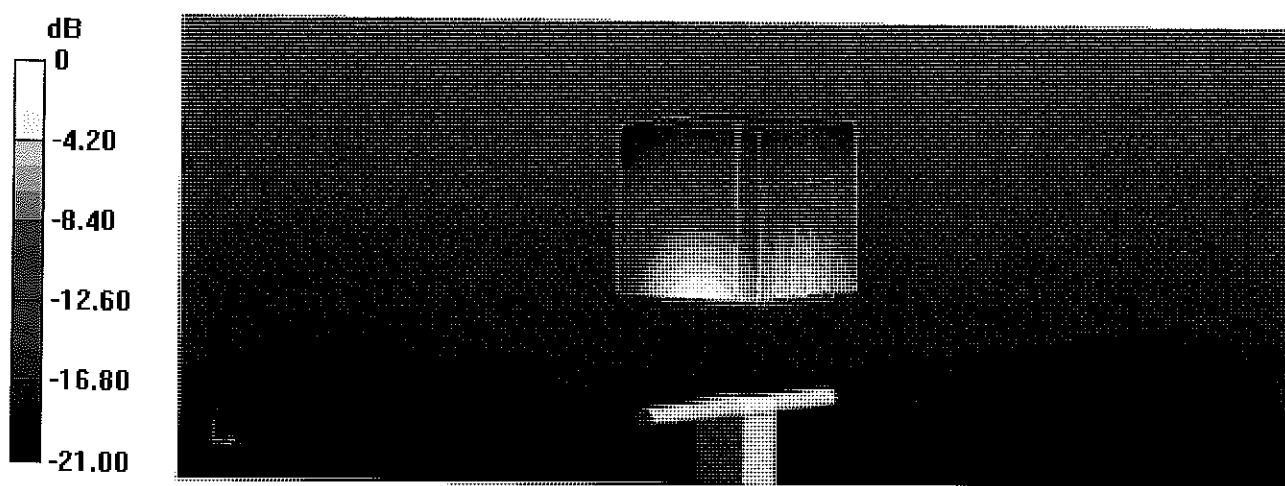
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

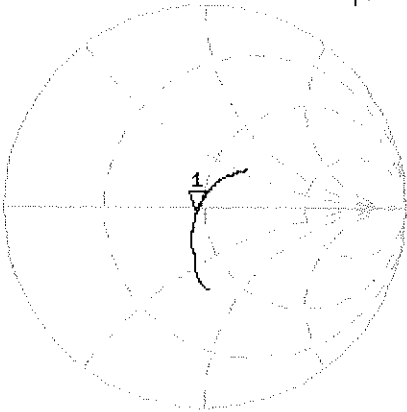


0 dB = 18.2 W/kg = 12.60 dBW/kg

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



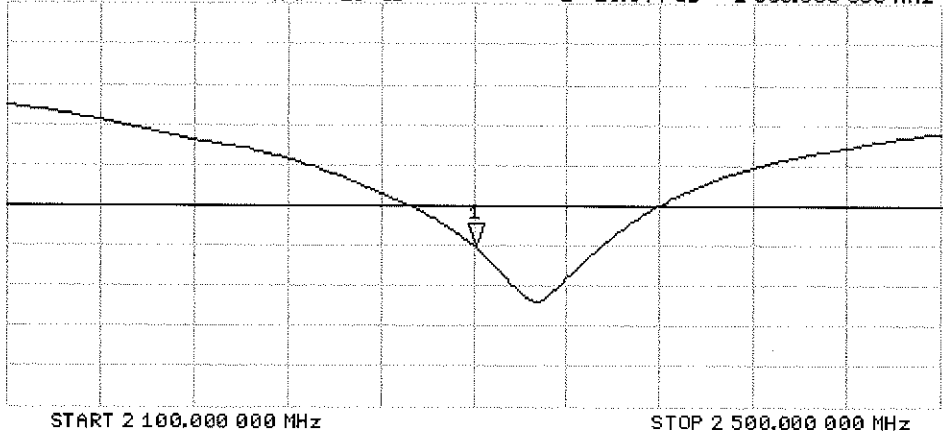
Avg
16
H1d

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.

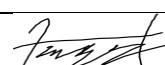
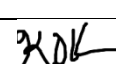
Extended Calibration date: February 25, 2019

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

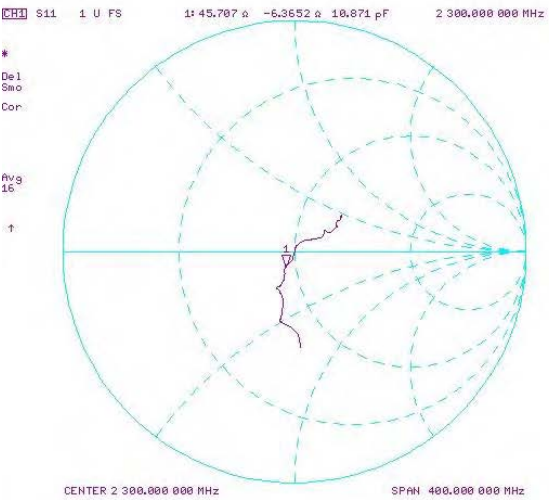
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

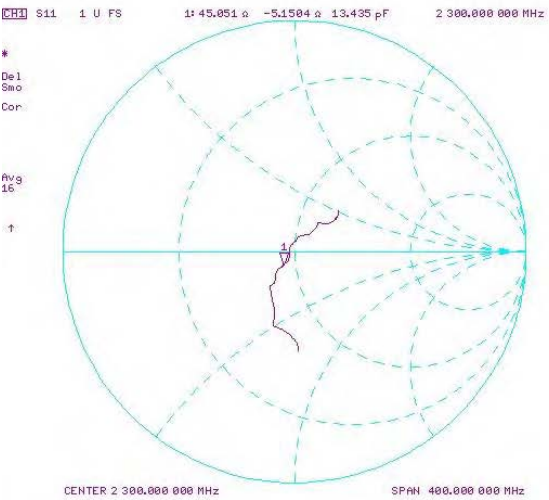
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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





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: **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.



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	V52.10.2
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
----------------------------------	----------

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:

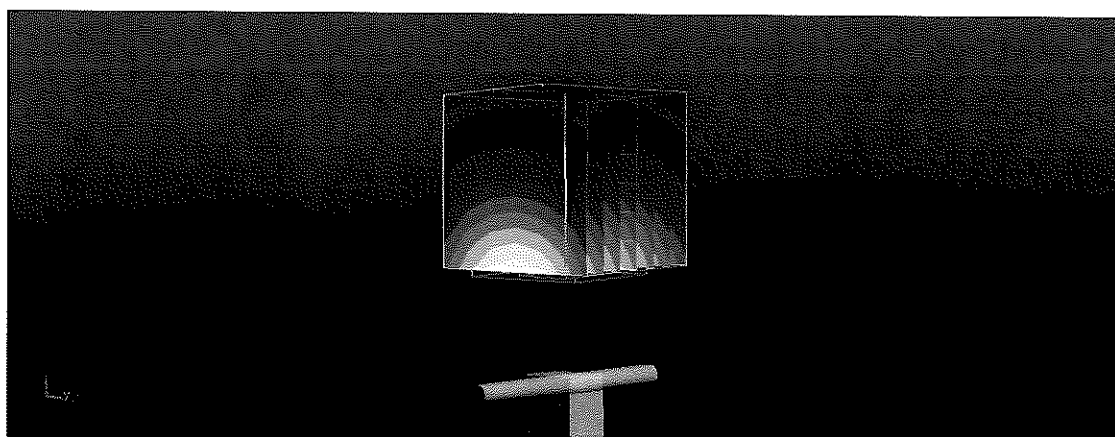
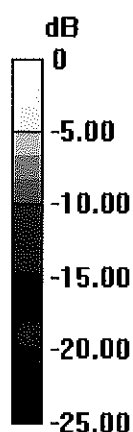
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 117.7 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 27.4 W/kg

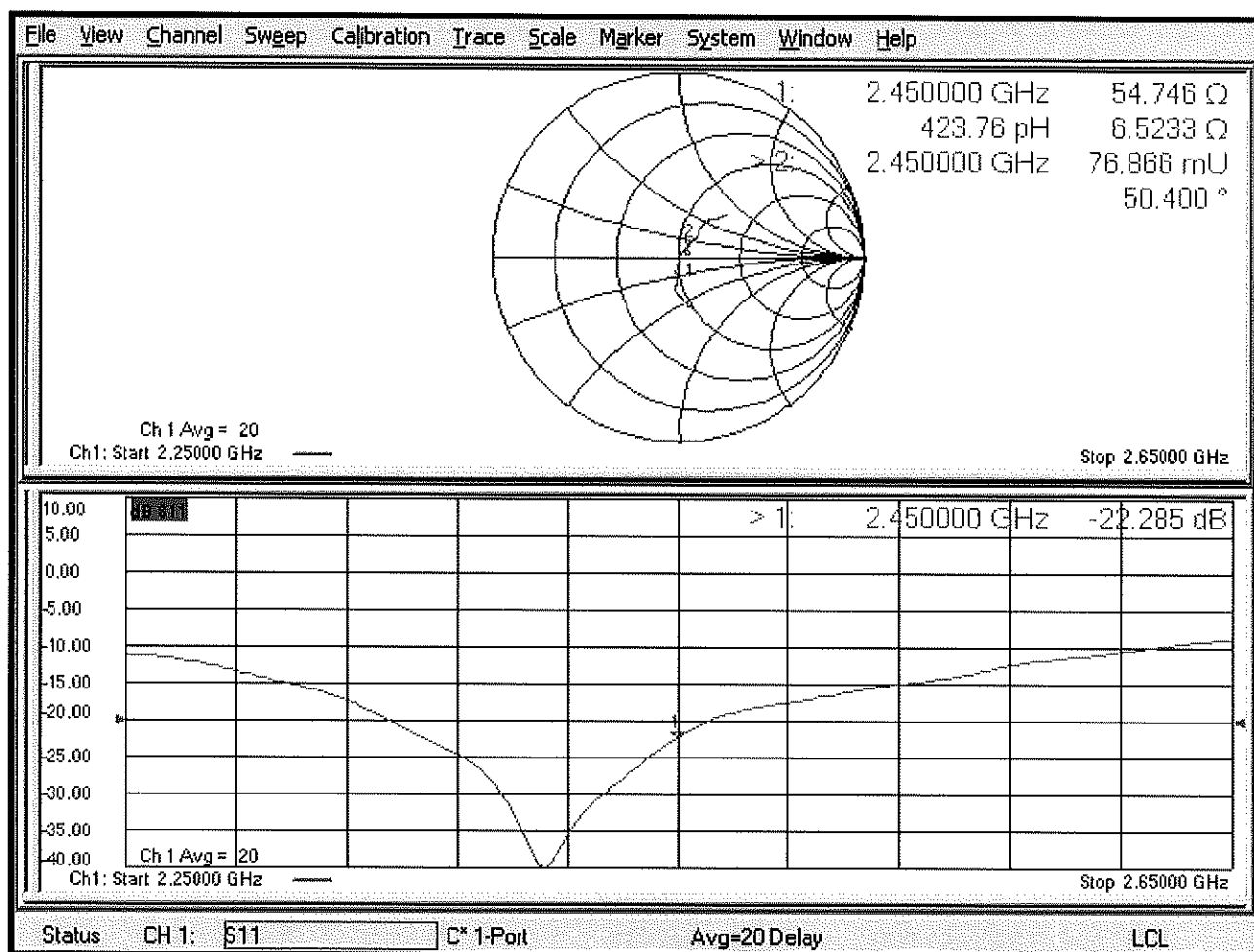
SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.28 W/kg

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:

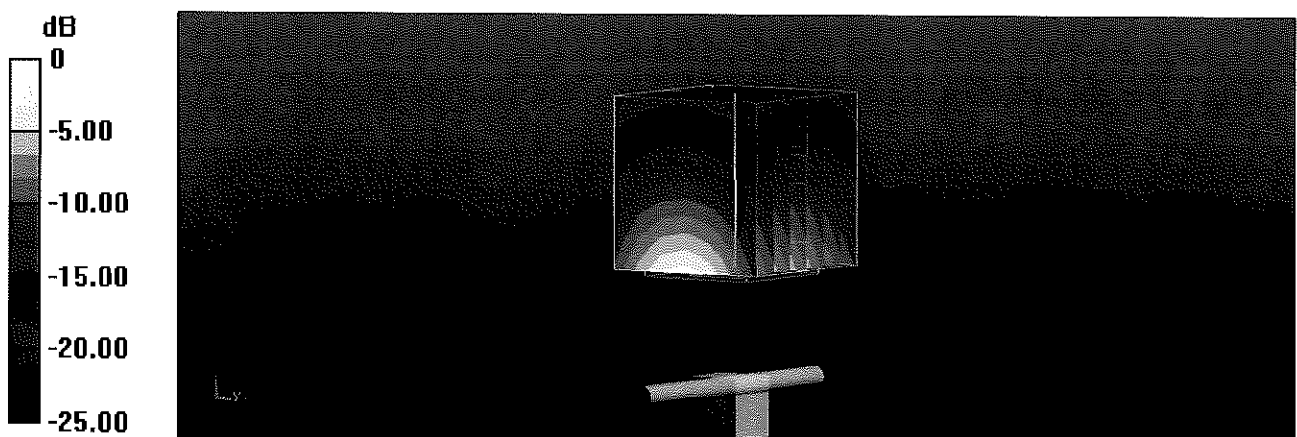
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 108.6 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 26.1 W/kg

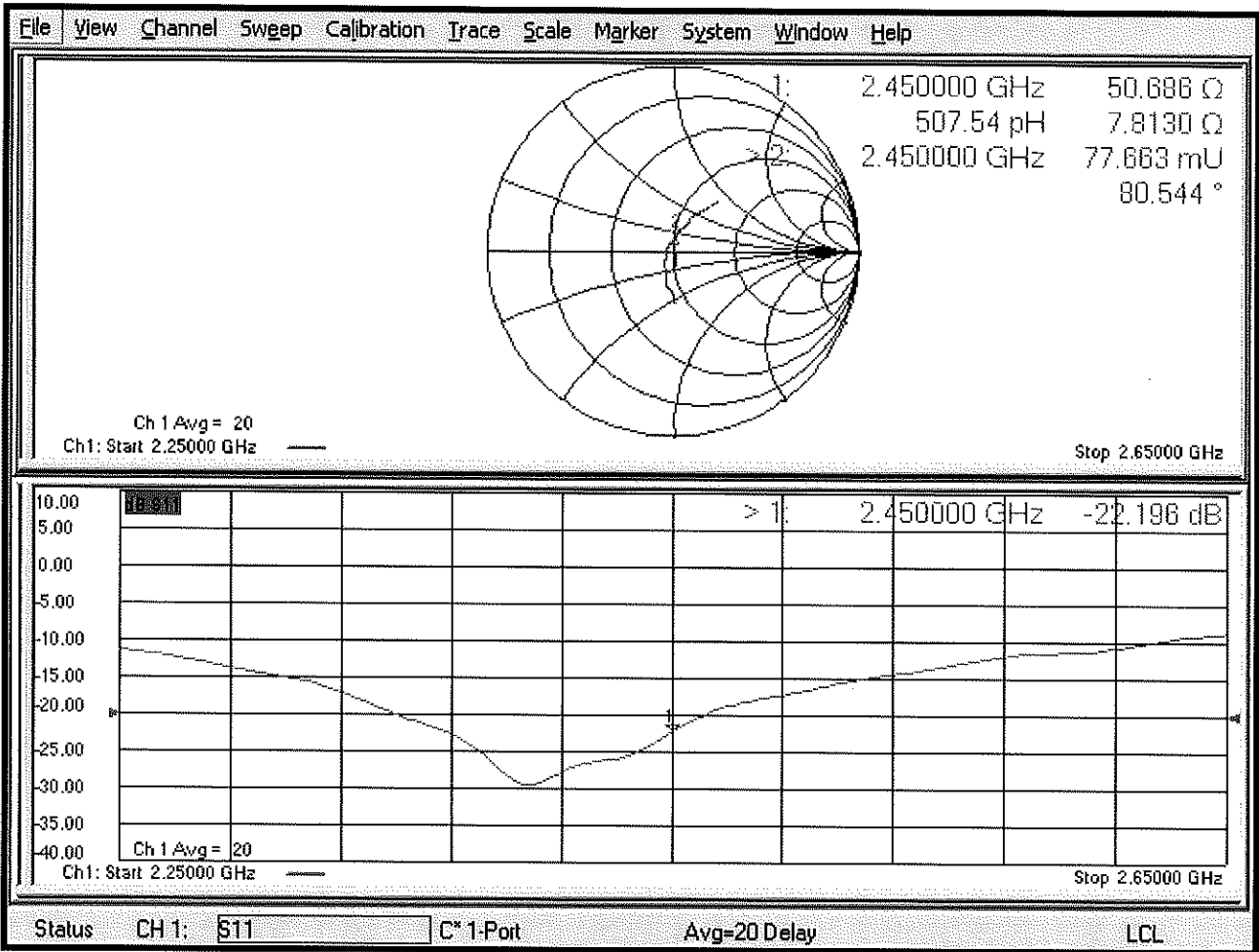
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.03 W/kg

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>KOK</i>

DIPOLE CALIBRATION EXTENSION

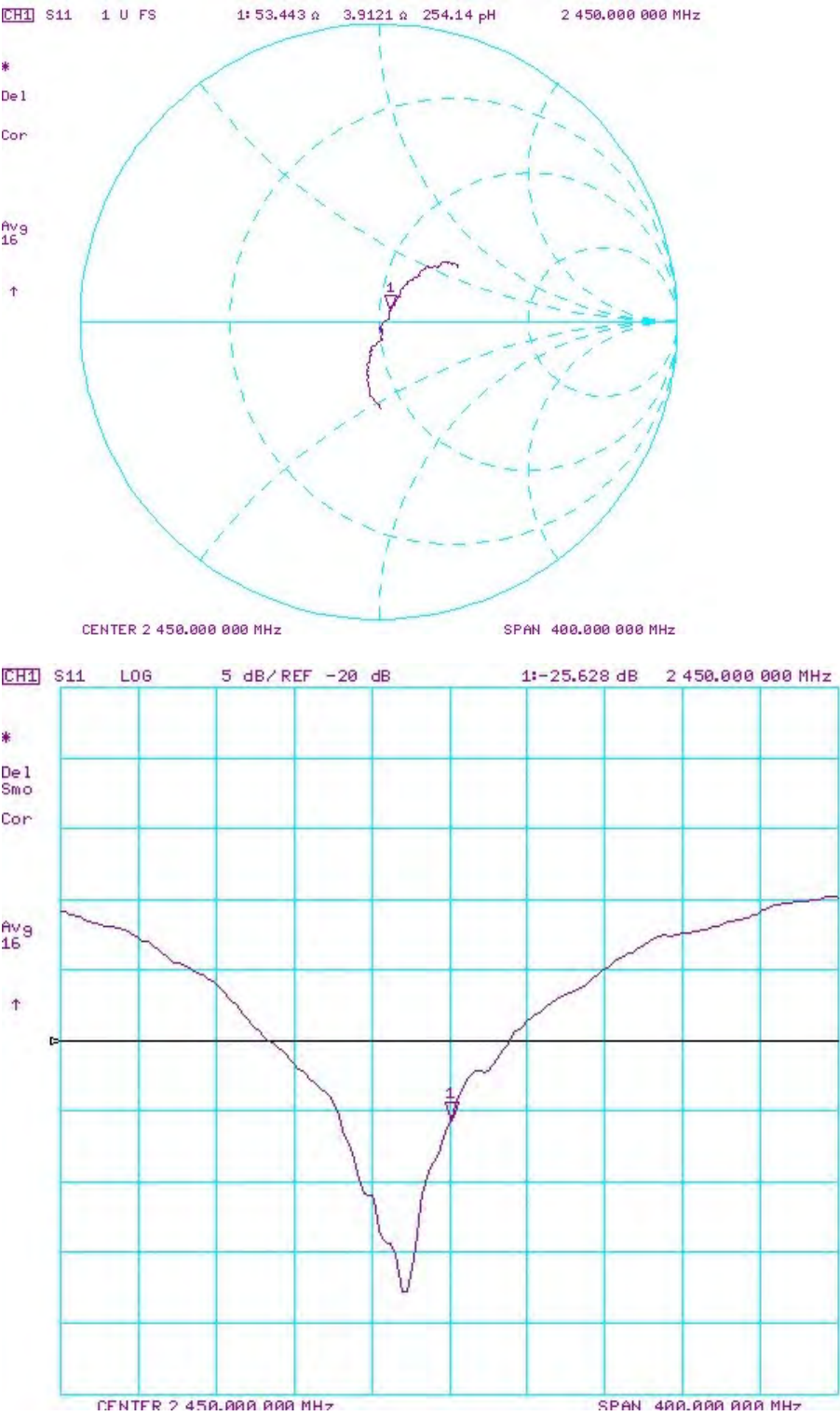
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

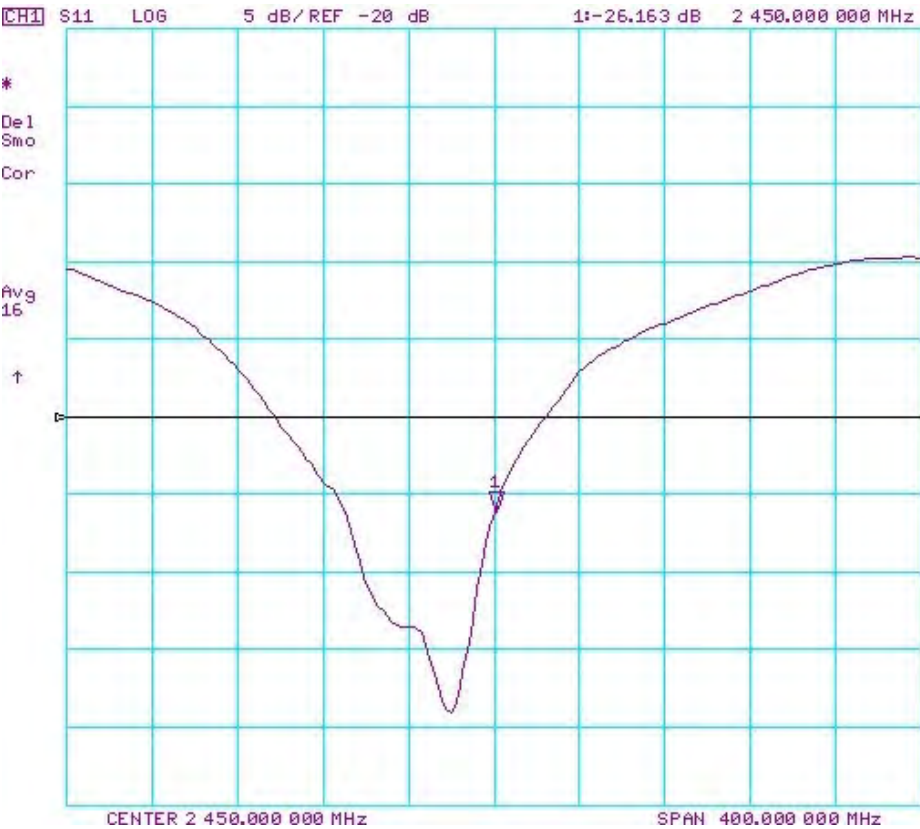
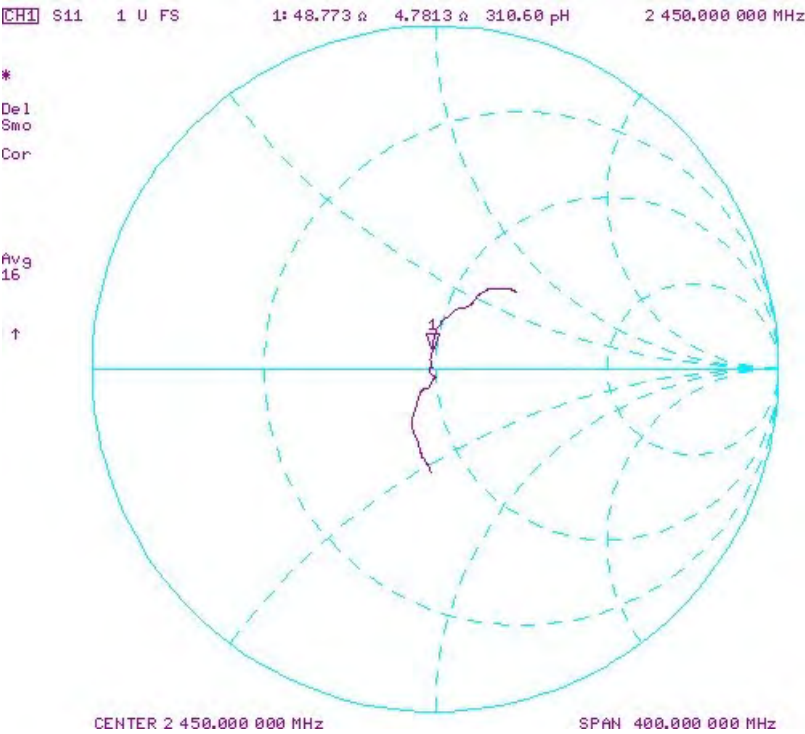
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
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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 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: **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**

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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	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
----------------------------------	----------

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:

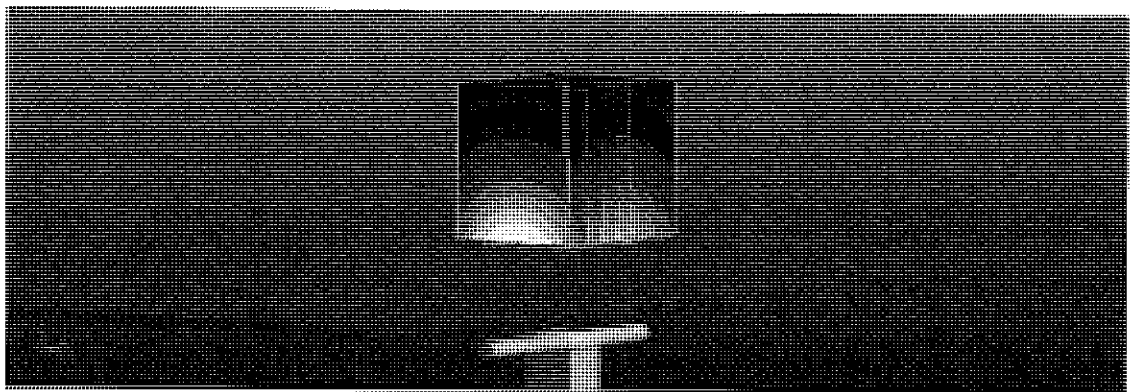
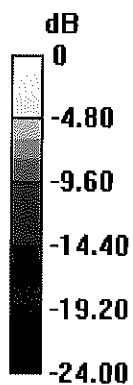
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 114.8 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 25.9 W/kg

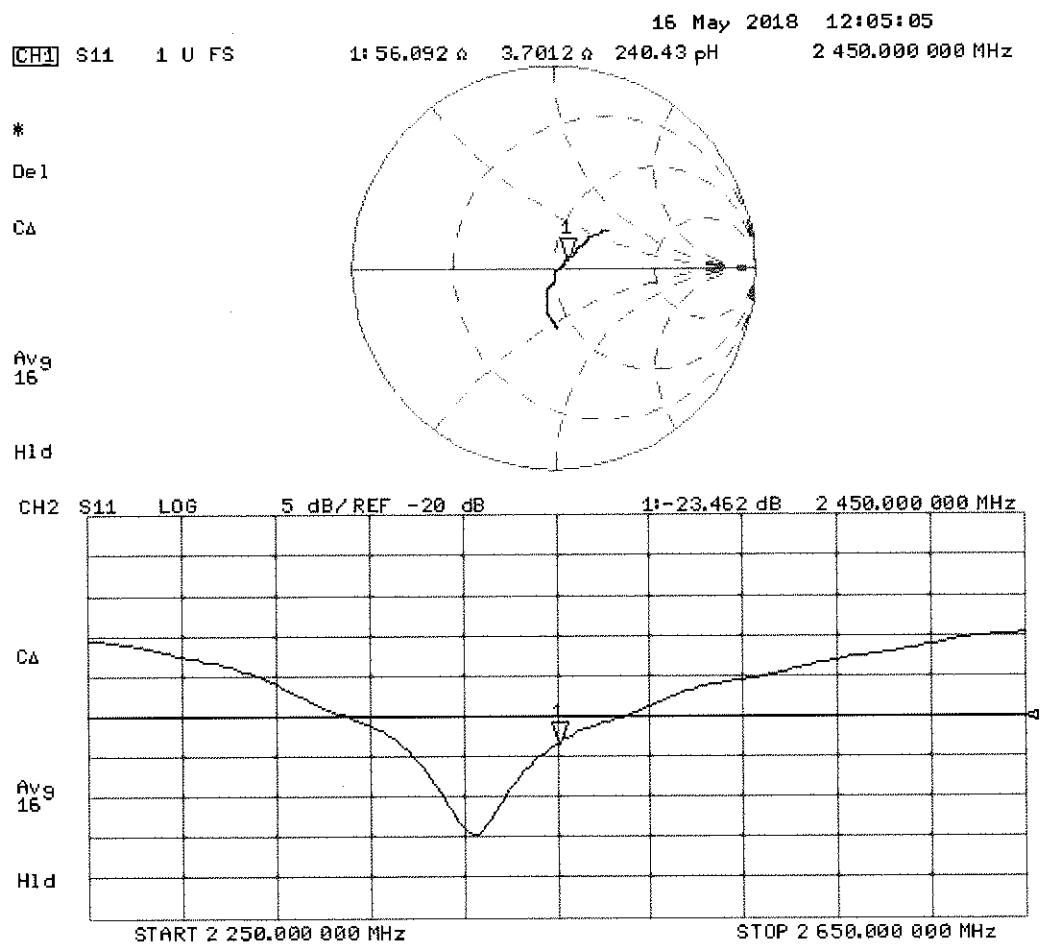
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.02 W/kg

Maximum value of SAR (measured) = 21.4 W/kg



0 dB = 21.4 W/kg = 13.30 dBW/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:

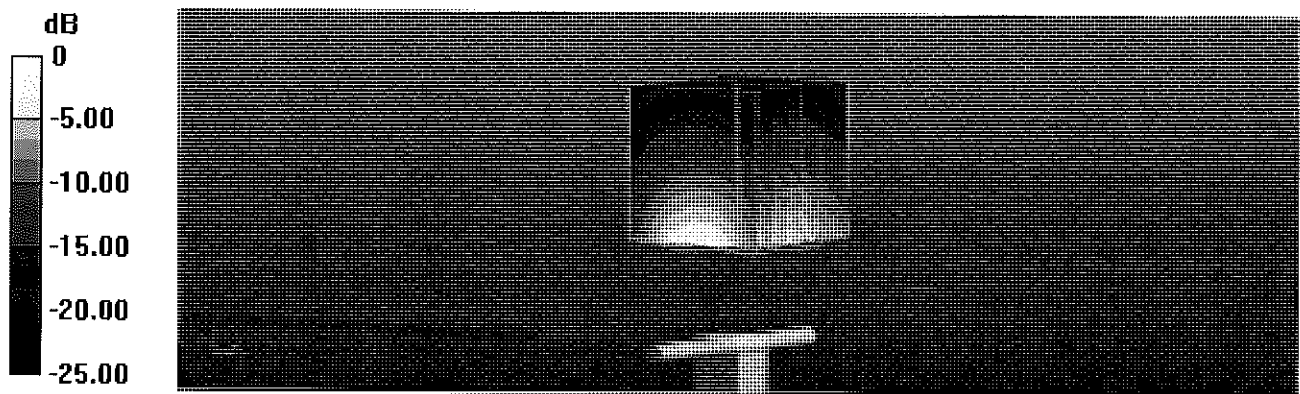
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

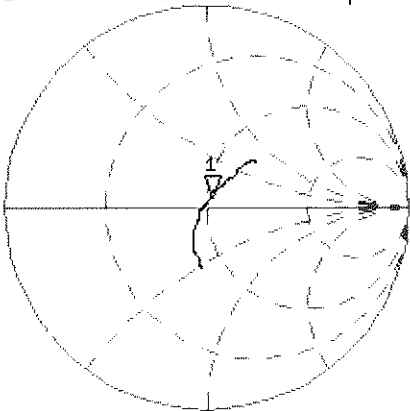


0 dB = 20.2 W/kg = 13.05 dBW/kg

Impedance Measurement Plot for Body TSL

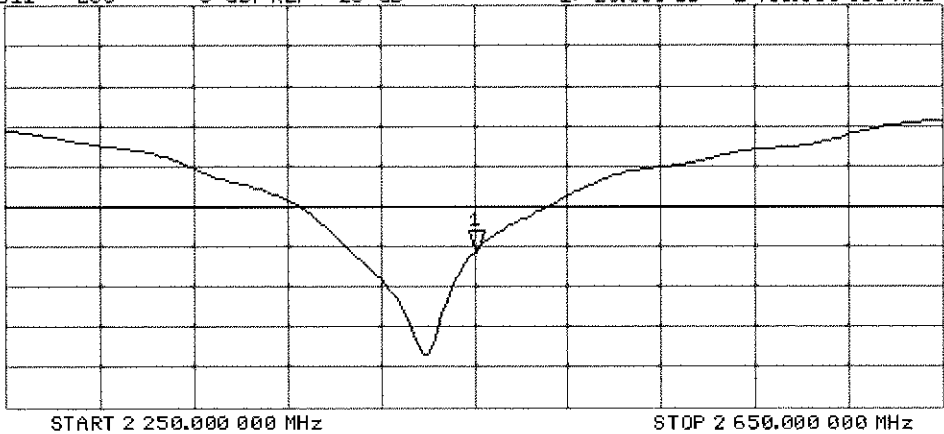
16 May 2018 12:03:43
[CH1] S11 1 U FS 1: 51.910 Ω 4.9629 Ω 322.40 μ H 2 450.000 000 MHz

*
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



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

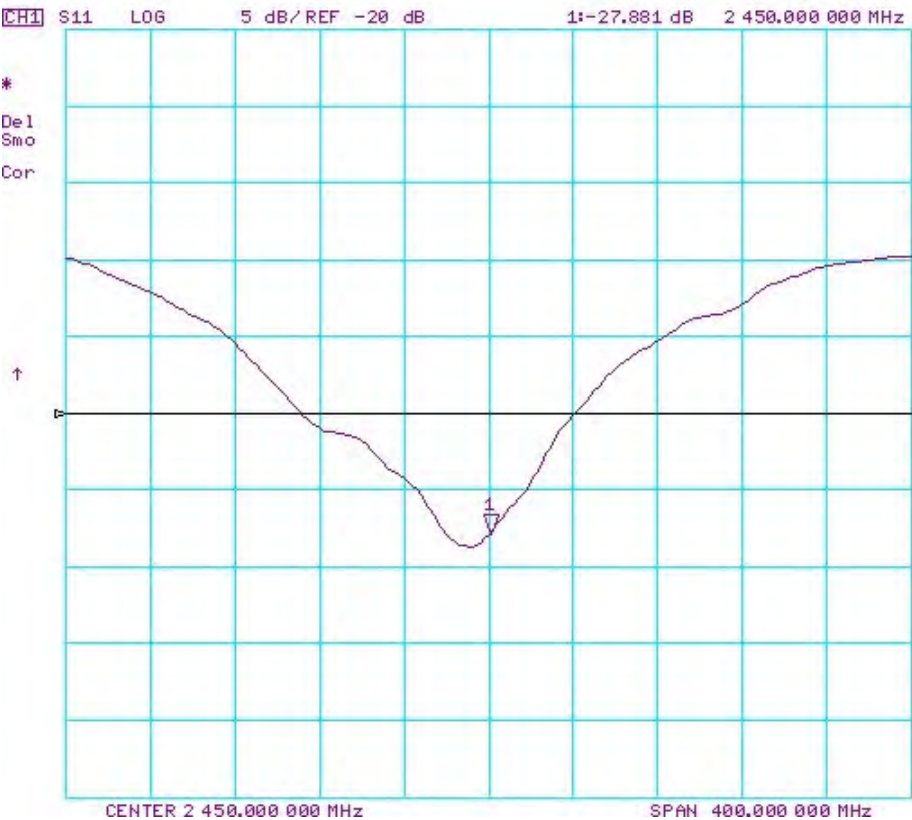
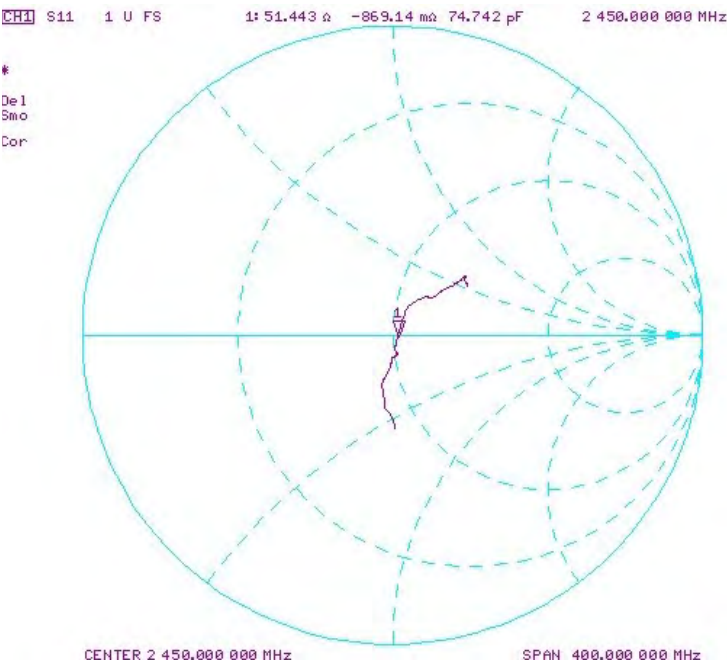
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

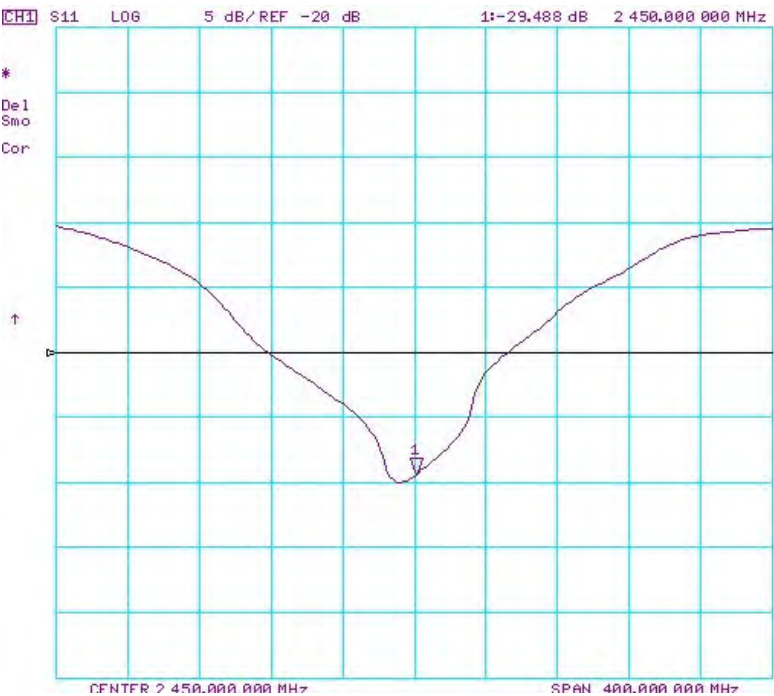
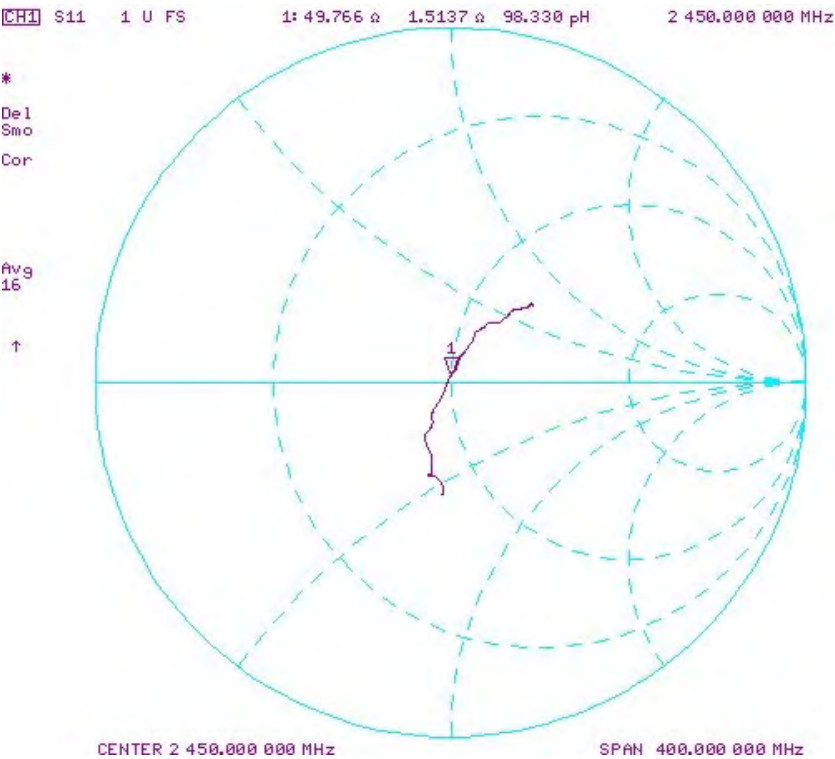
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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





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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PG 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%.