

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

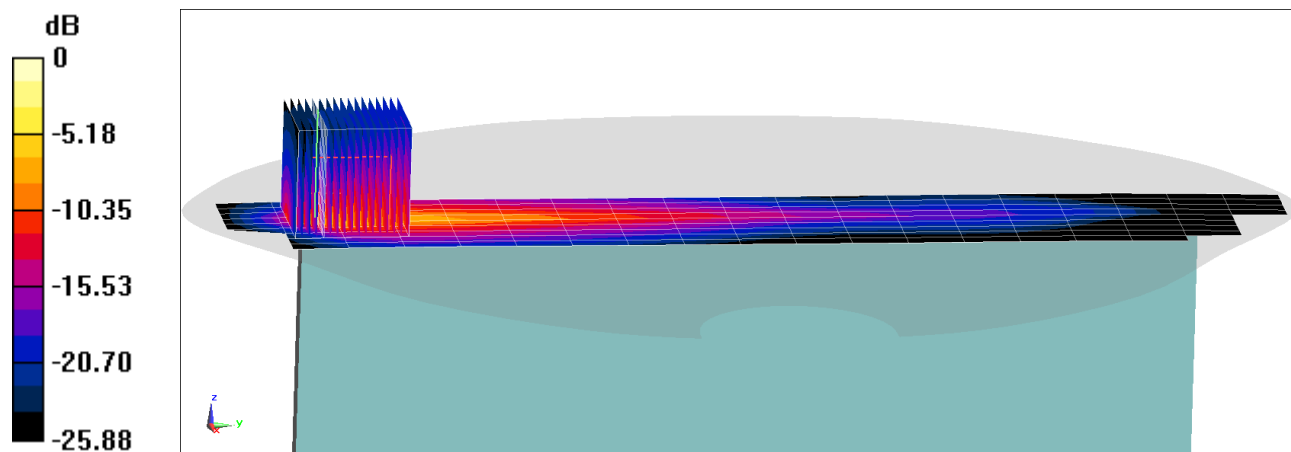
Area Scan (10x20x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

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

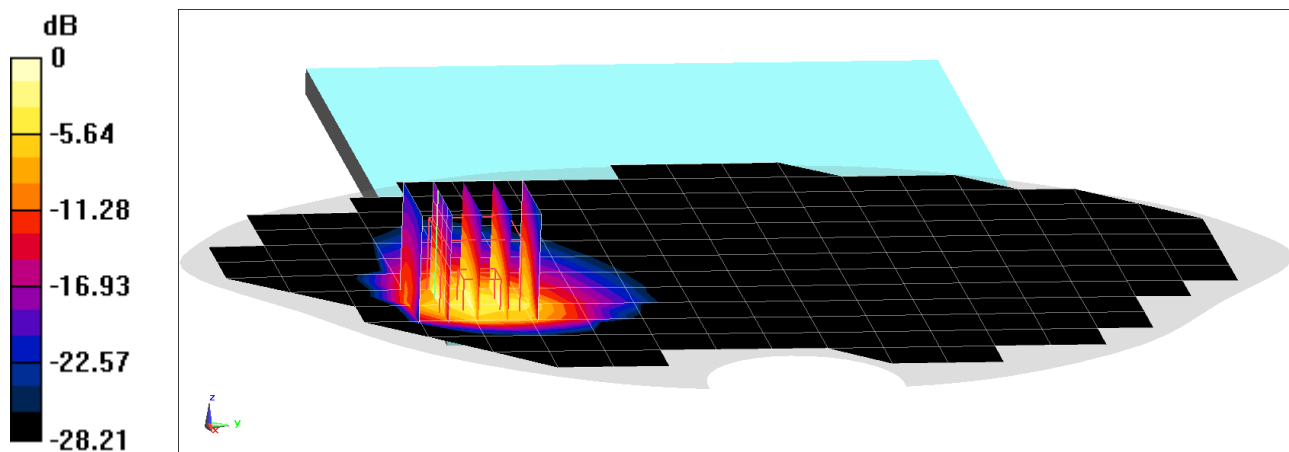
Area Scan (15x19x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

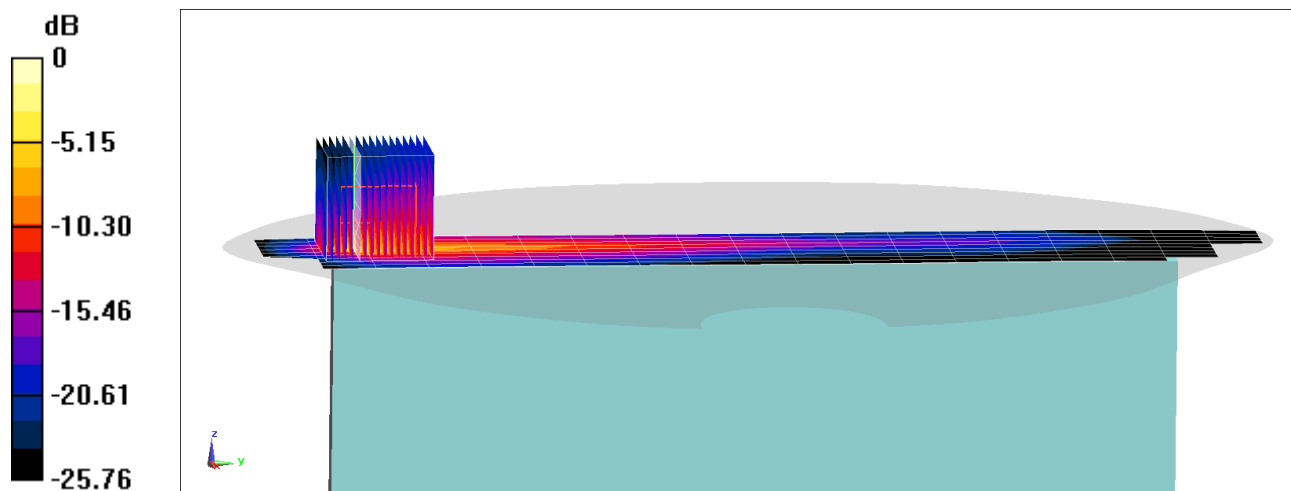
Area Scan (10x20x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

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

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

Peak SAR (extrapolated) = 24.3 W/kg

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



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

PCTEST

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

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

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

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

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

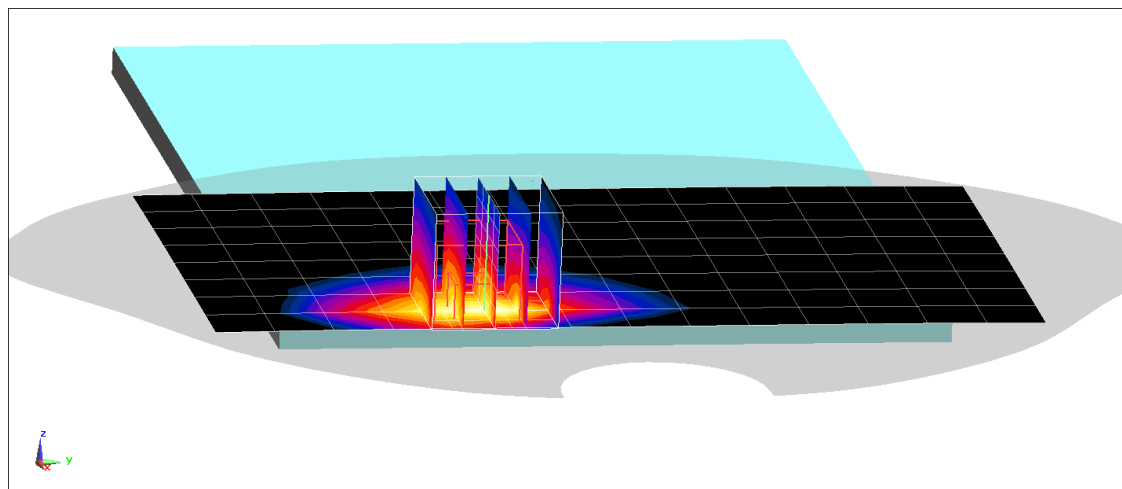
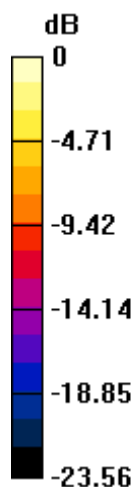
Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm

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

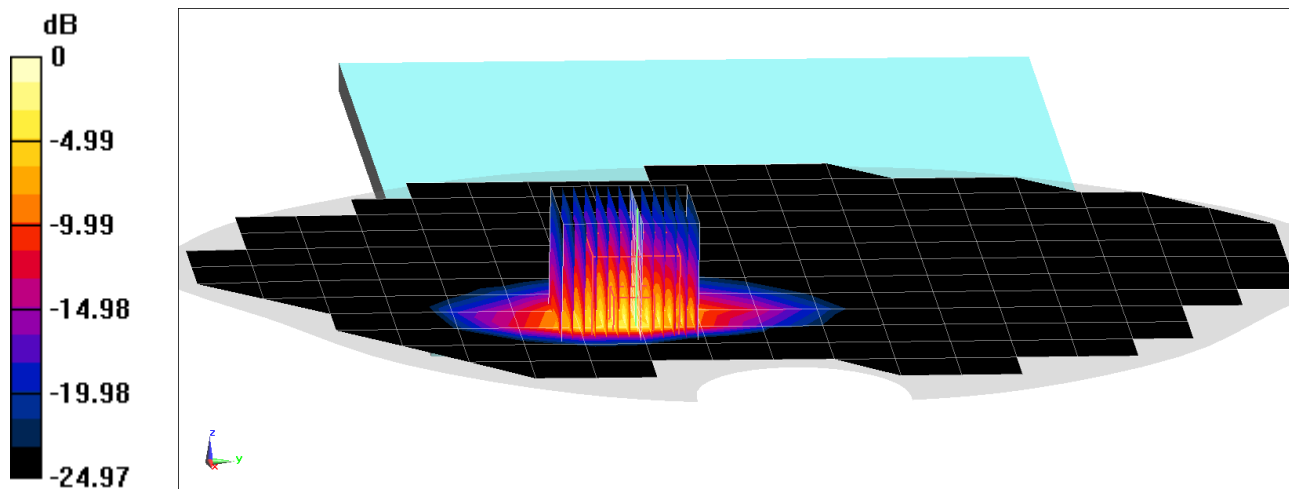
Area Scan (15x19x1): Measurement grid: dx=15mm, dy=15mm

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**

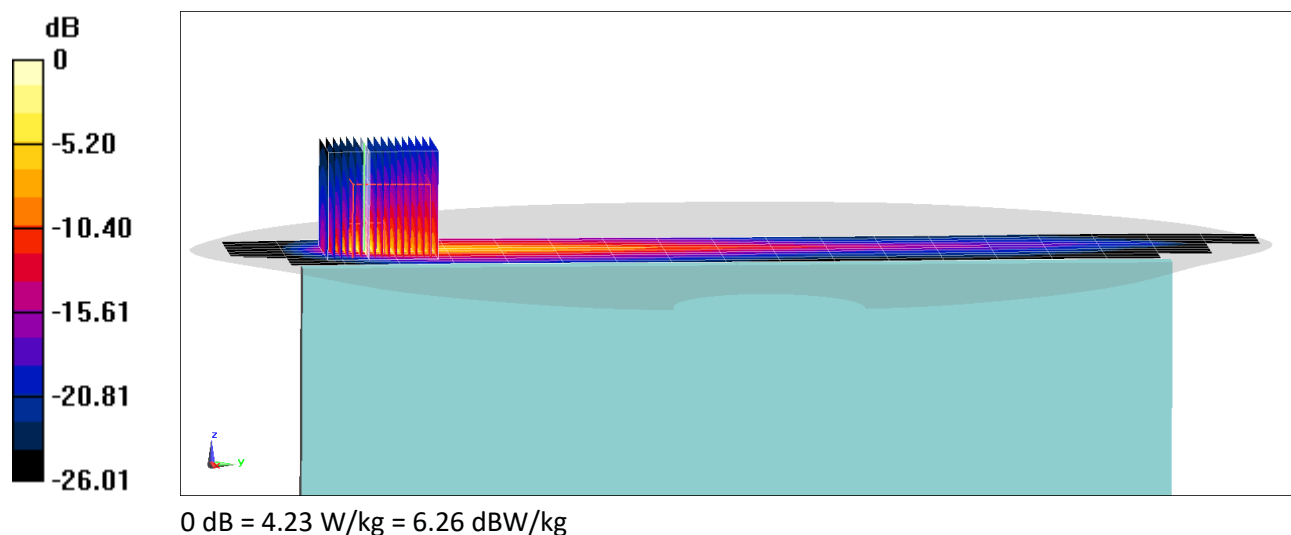
Area Scan (11x20x1): Measurement grid: dx=5mm, dy=15mm

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**

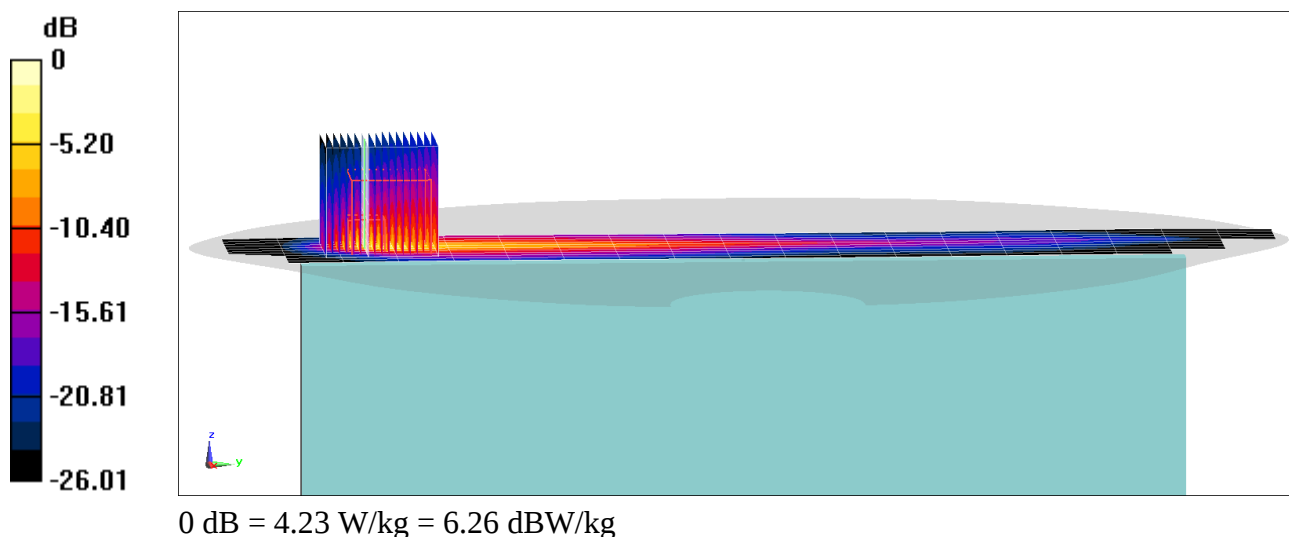
Area Scan (11x20x1): Measurement grid: dx=5mm, dy=15mm

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**

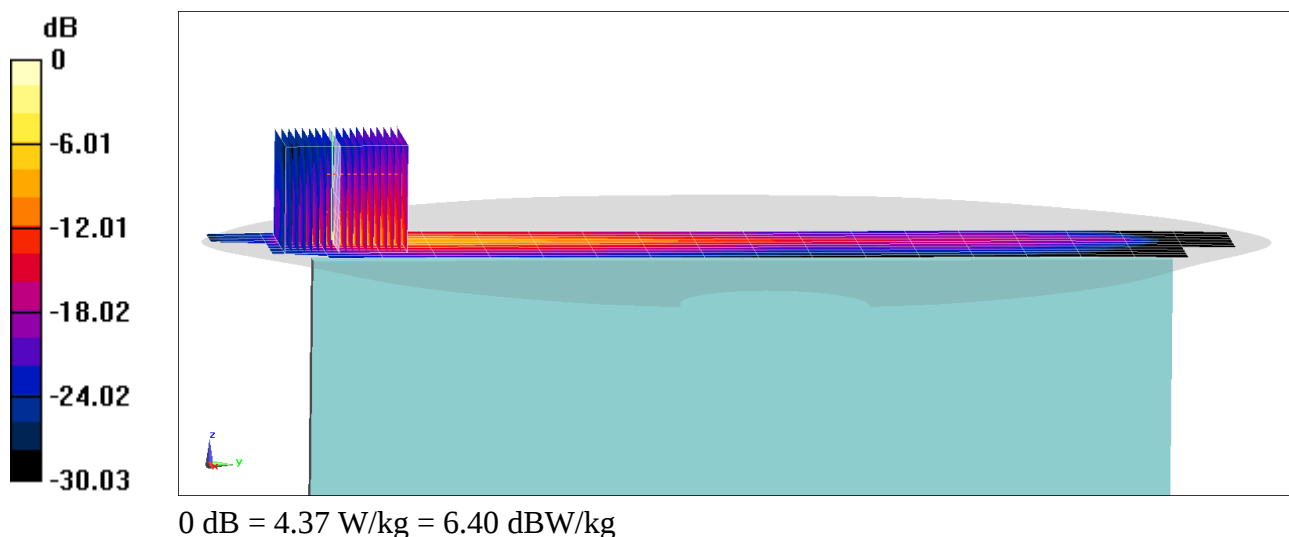
Area Scan (11x20x1): Measurement grid: dx=5mm, dy=15mm

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**

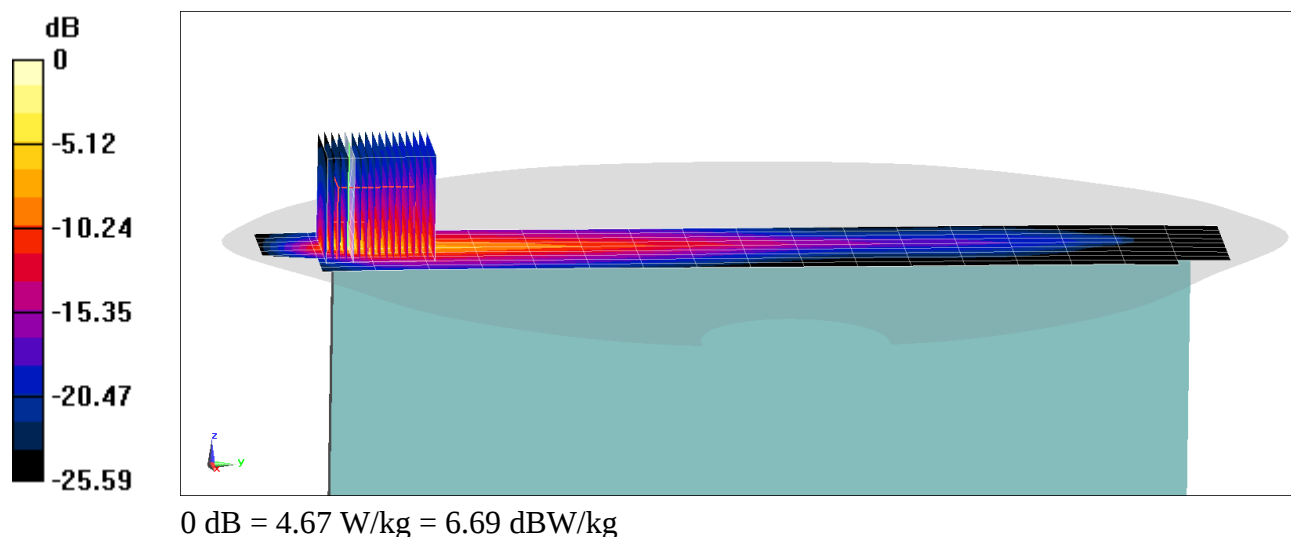
Area Scan (10x19x1): Measurement grid: dx=5mm, dy=15mm

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**

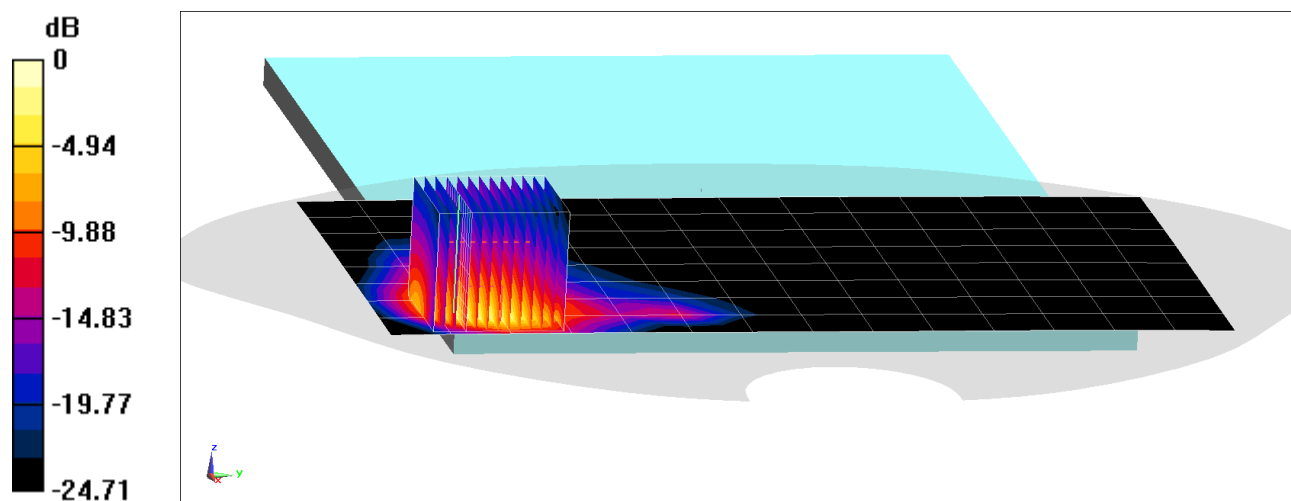
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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**

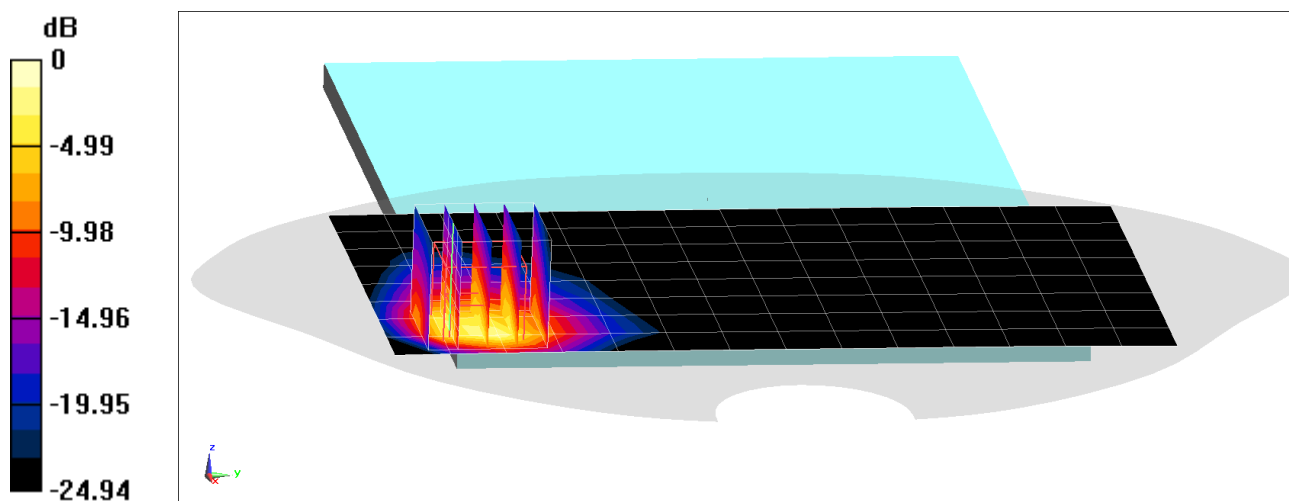
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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



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**

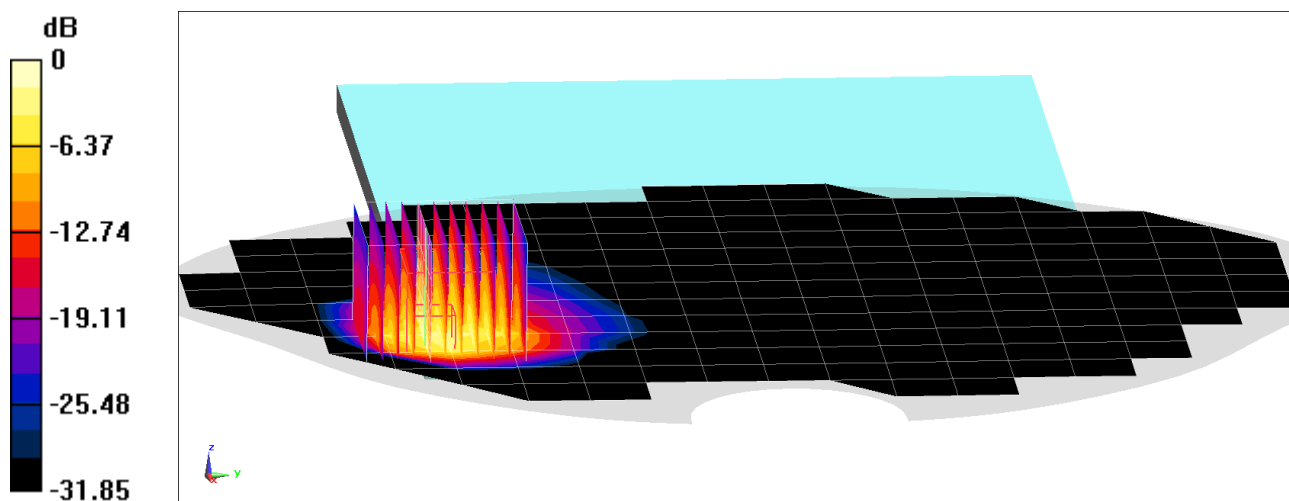
Area Scan (15x19x1): Measurement grid: dx=15mm, dy=15mm

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**

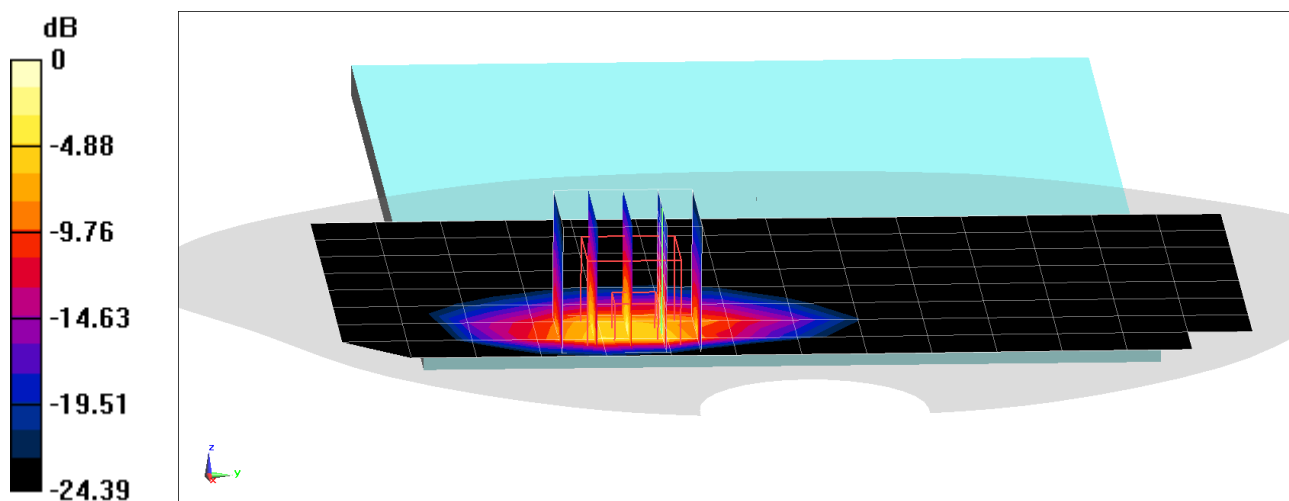
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

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:

$f = 2310 \text{ MHz}$; $\sigma = 1.845 \text{ S/m}$; $\epsilon_r = 52.193$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

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

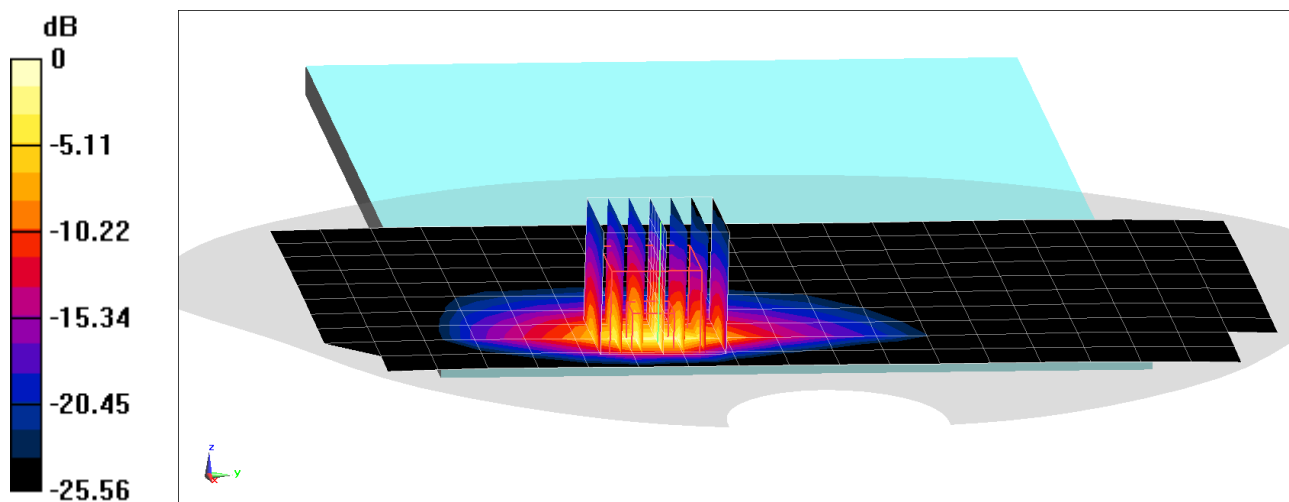
Area Scan (11x20x1): Measurement grid: dx=12mm, dy=12mm

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

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

Peak SAR (extrapolated) = 3.44 W/kg

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



PCTEST

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

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

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

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

Phantom section: Flat Section; Space: 0.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

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

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

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

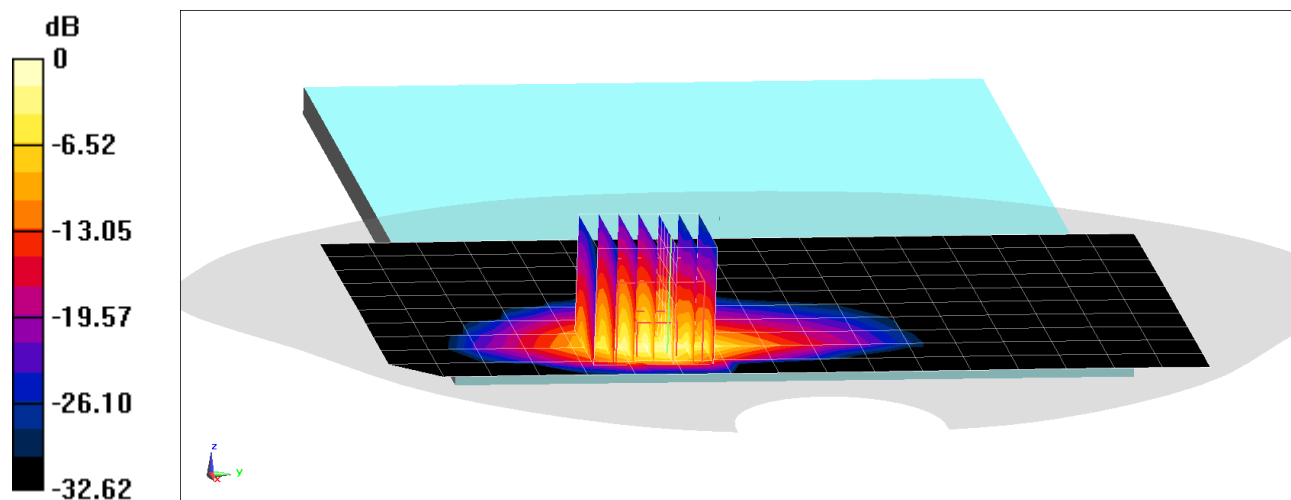
Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm

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

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

Peak SAR (extrapolated) = 3.41 W/kg

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



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

PCTEST

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

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

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

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

Phantom section: Flat Section; Space: 0.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

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

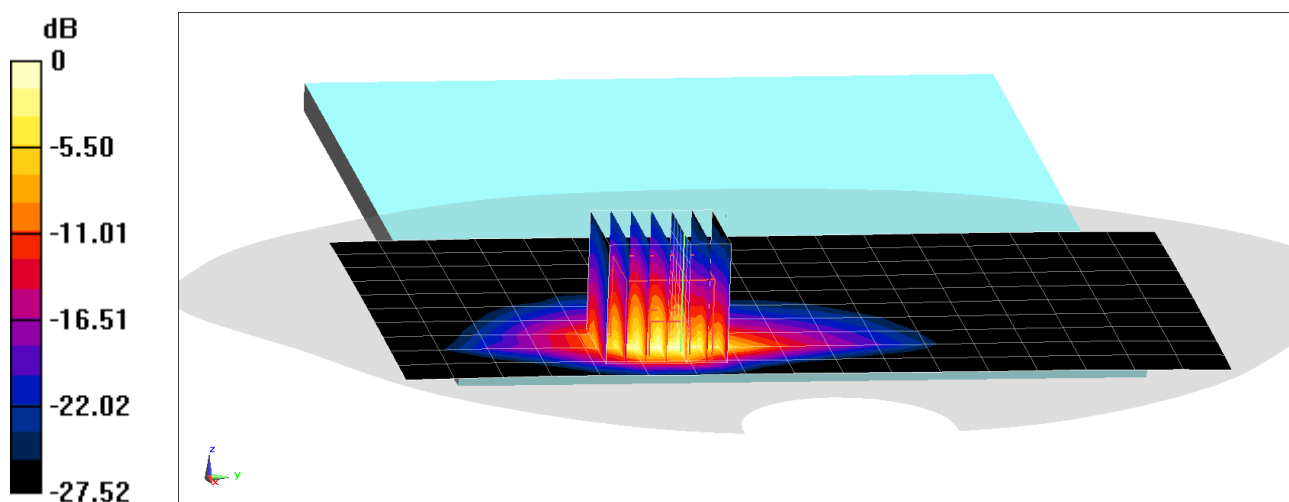
Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm

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

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

Peak SAR (extrapolated) = 4.03 W/kg

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



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

PCTEST

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

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

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

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

Phantom section: Flat Section; Space: 0.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

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

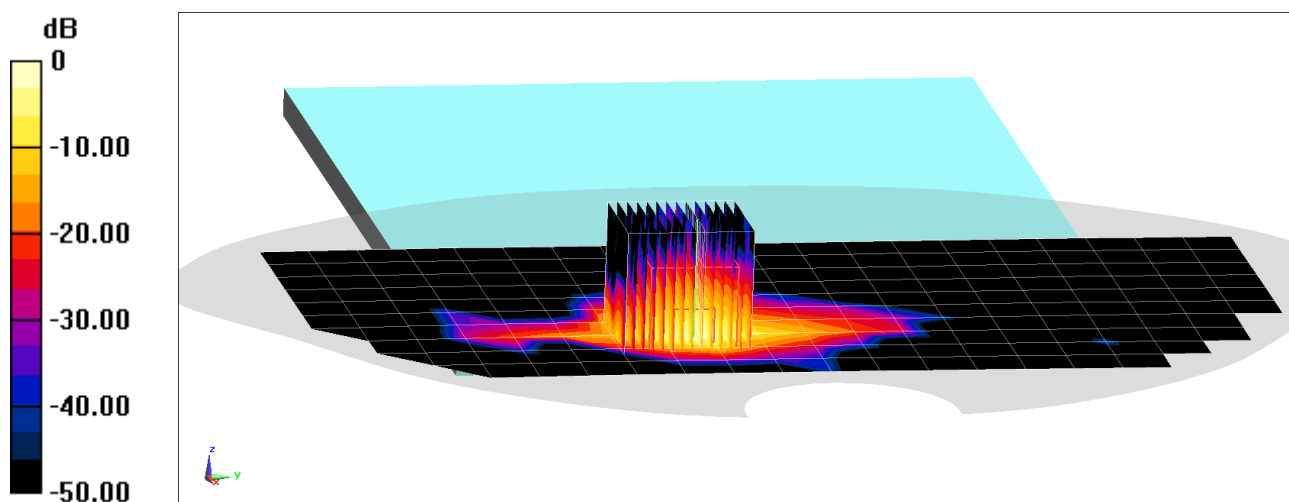
Area Scan (11x21x1): Measurement grid: dx=12mm, dy=12mm

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

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

Peak SAR (extrapolated) = 4.93 W/kg

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



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

PCTEST

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

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

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

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

Phantom section: Flat Section; Space: 0.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

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

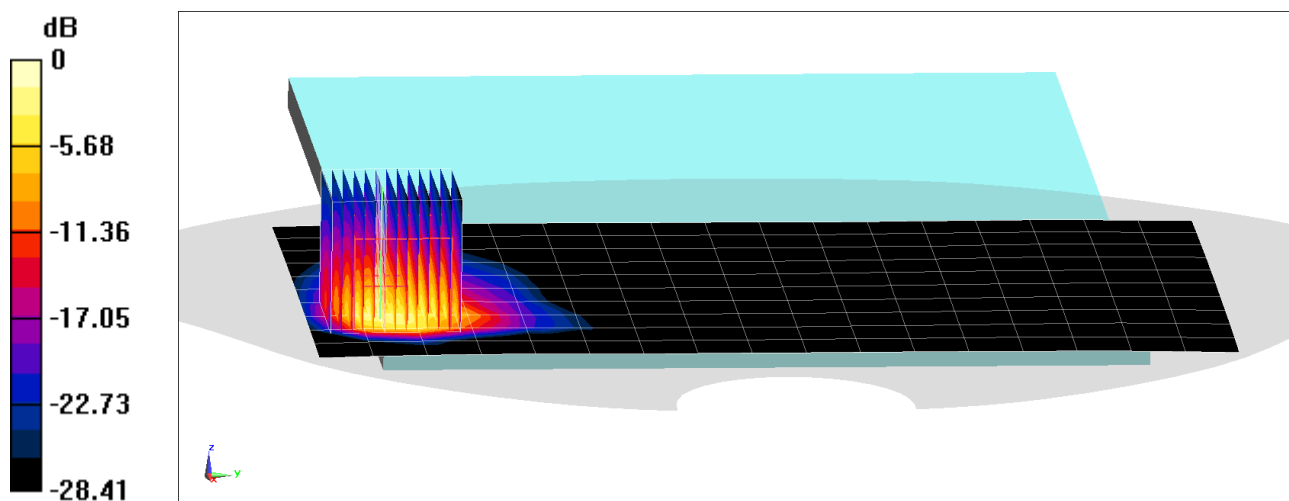
Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm

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

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

Peak SAR (extrapolated) = 4.30 W/kg

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



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

PCTEST

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

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

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

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

Phantom section: Flat Section; Space: 0.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

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

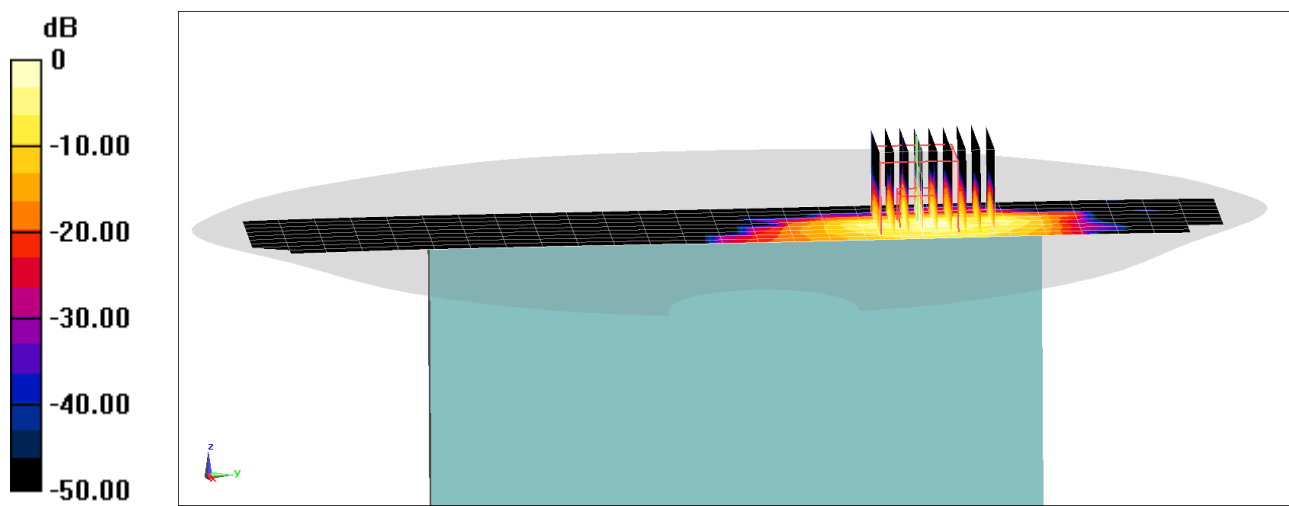
Area Scan (10x28x1): Measurement grid: dx=5mm, dy=10mm

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

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

Peak SAR (extrapolated) = 5.00 W/kg

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



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

PCTEST

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

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

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

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

Phantom section: Flat Section; Space: 0.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

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

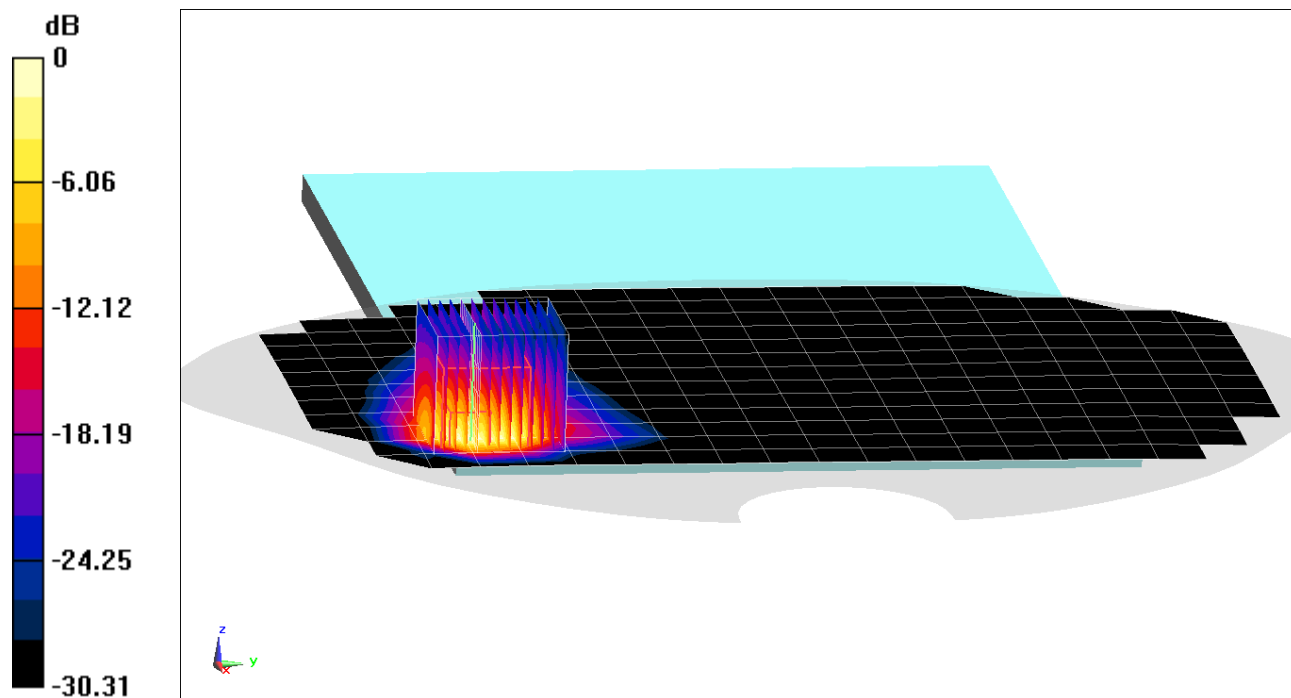
Area Scan (14x21x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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

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

Peak SAR (extrapolated) = 4.68 W/kg

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



0 dB = 2.67 W/kg = 4.27 dBW/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)

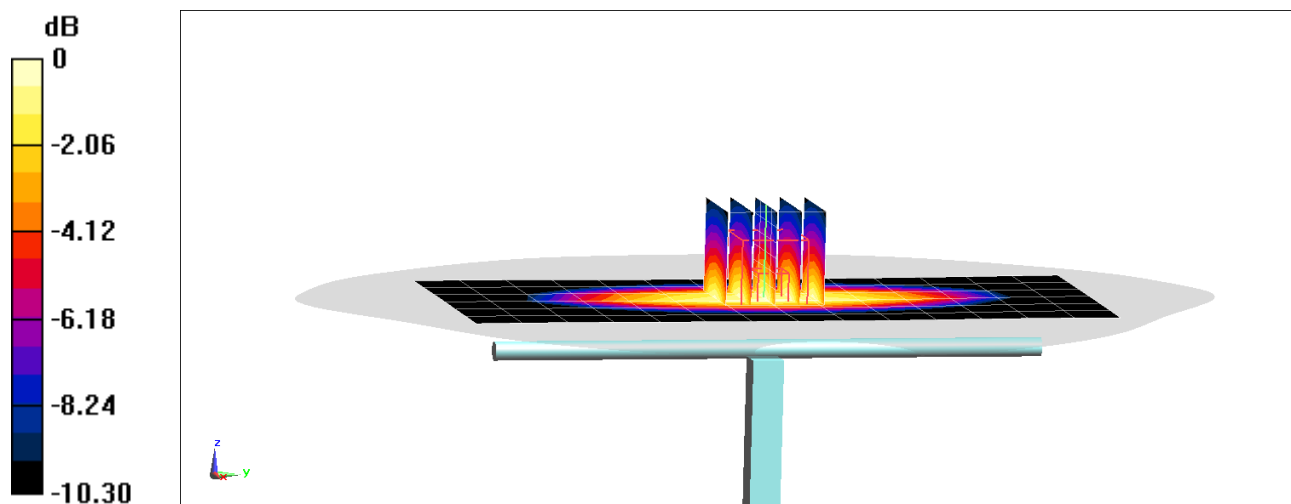
Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm

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)

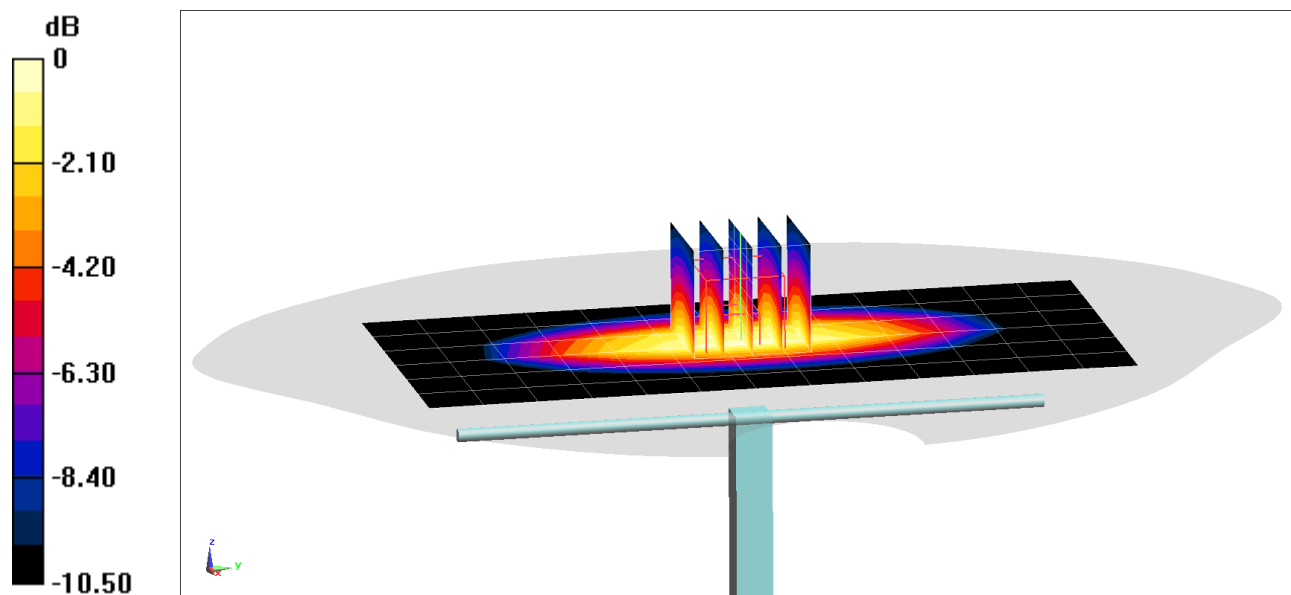
Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm

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

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)

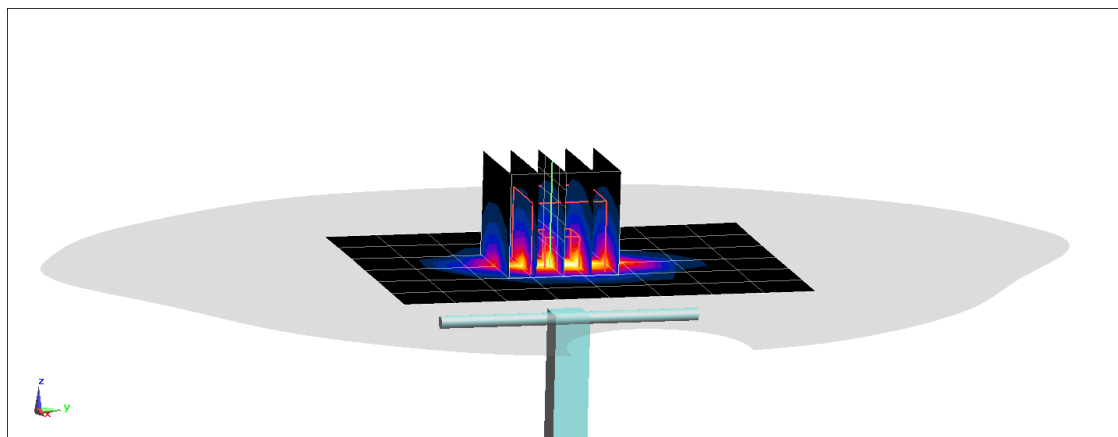
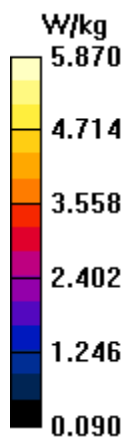
Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

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)

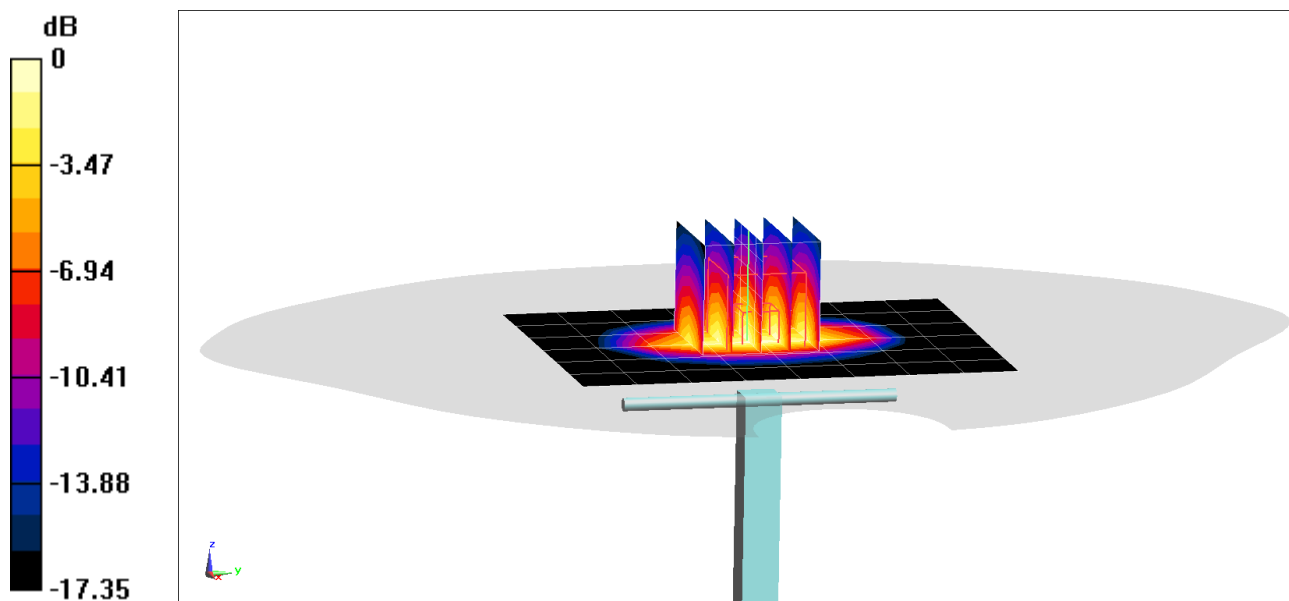
Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

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)

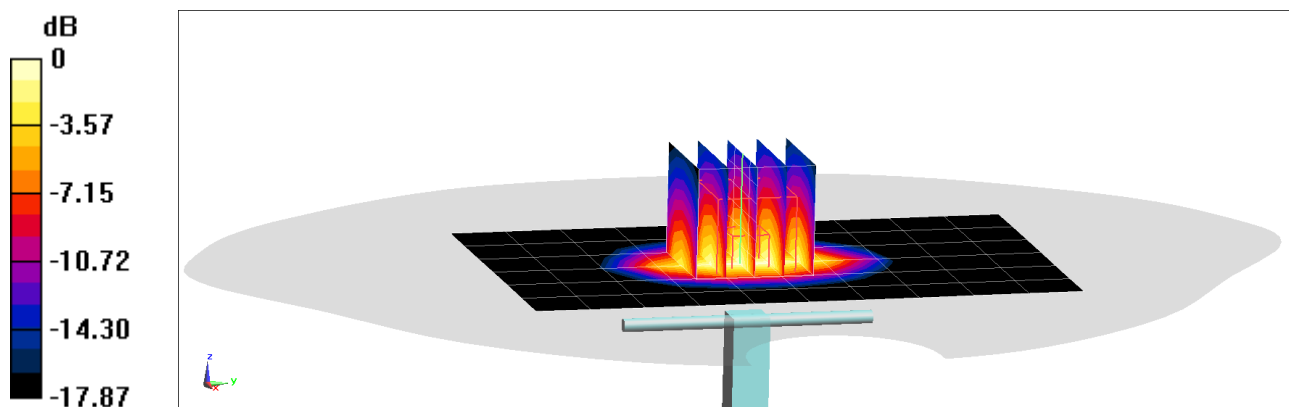
Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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)

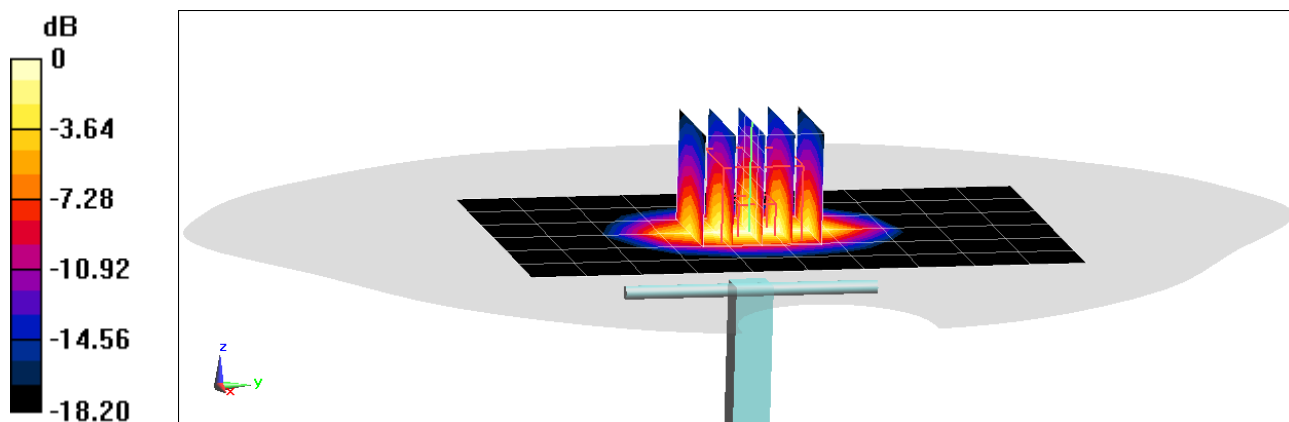
Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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)

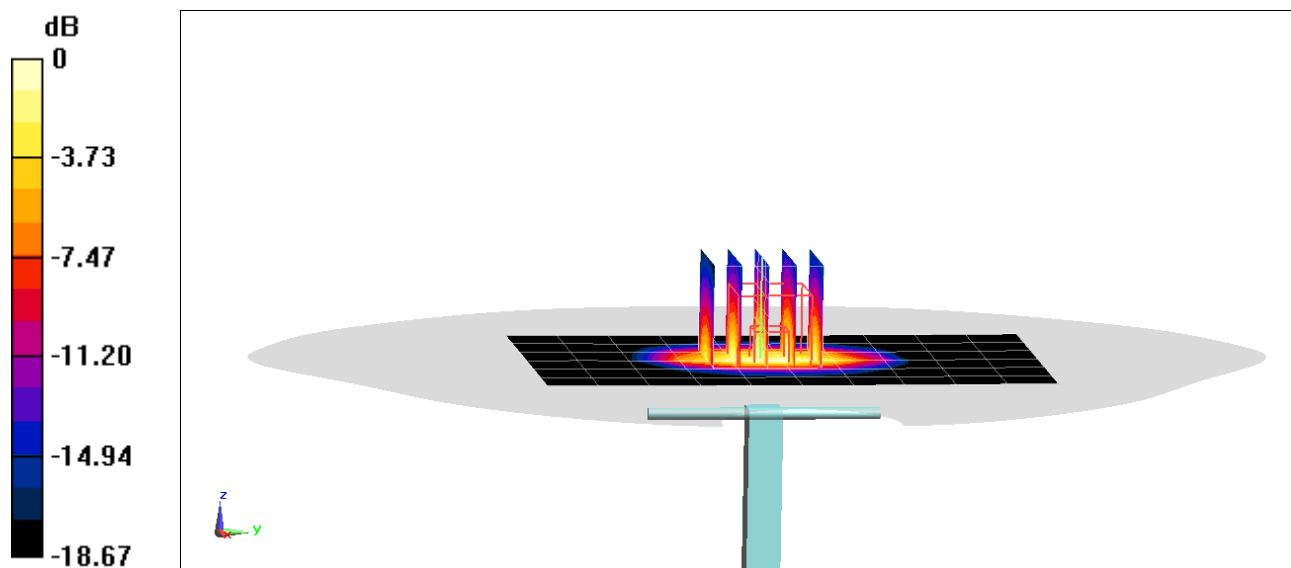
Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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)

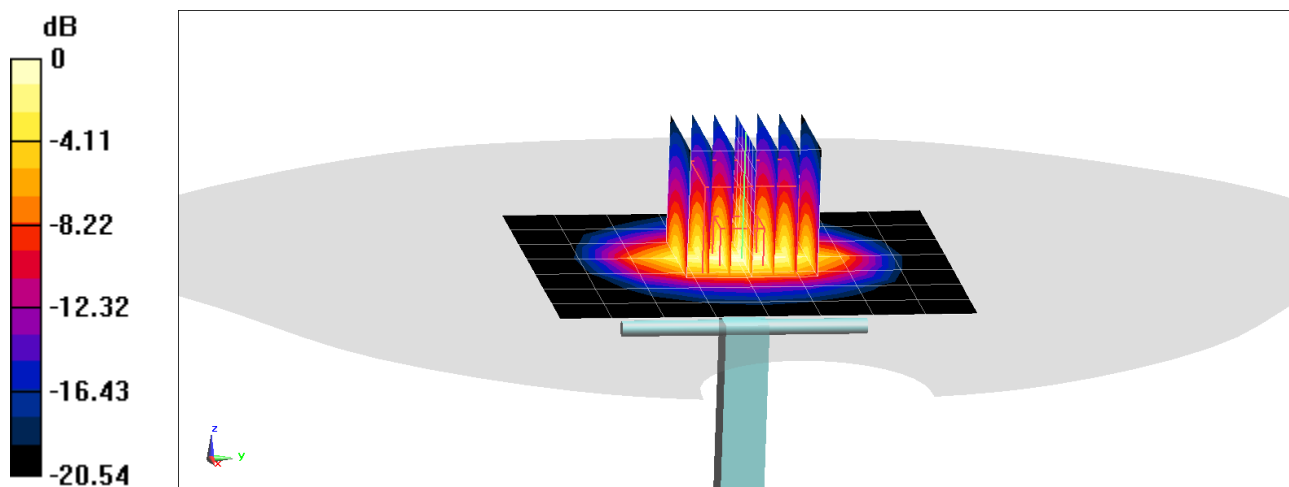
Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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%



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

PCTEST

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

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

Medium: 2450 MHz Body Medium parameters used:

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

Phantom section: Flat Section; Space: 1.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

2450 MHz System Verification at 20.0 dBm (100 mW)

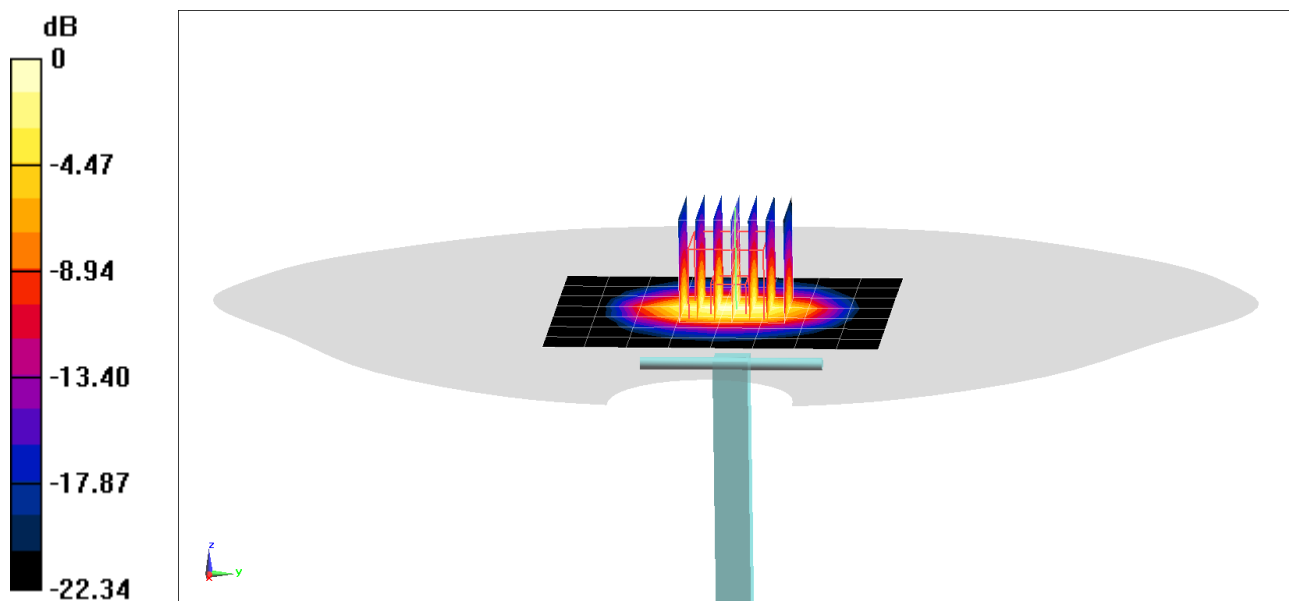
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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

Peak SAR (extrapolated) = 10.9 W/kg

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

Deviation(1 g) = 4.72%



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

PCTEST

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

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

Medium: 2450 MHz Body Medium parameters used:

$f = 2450$ MHz; $\sigma = 2.045$ S/m; $\epsilon_r = 53.045$; $\rho = 1000$ 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(7.66, 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)

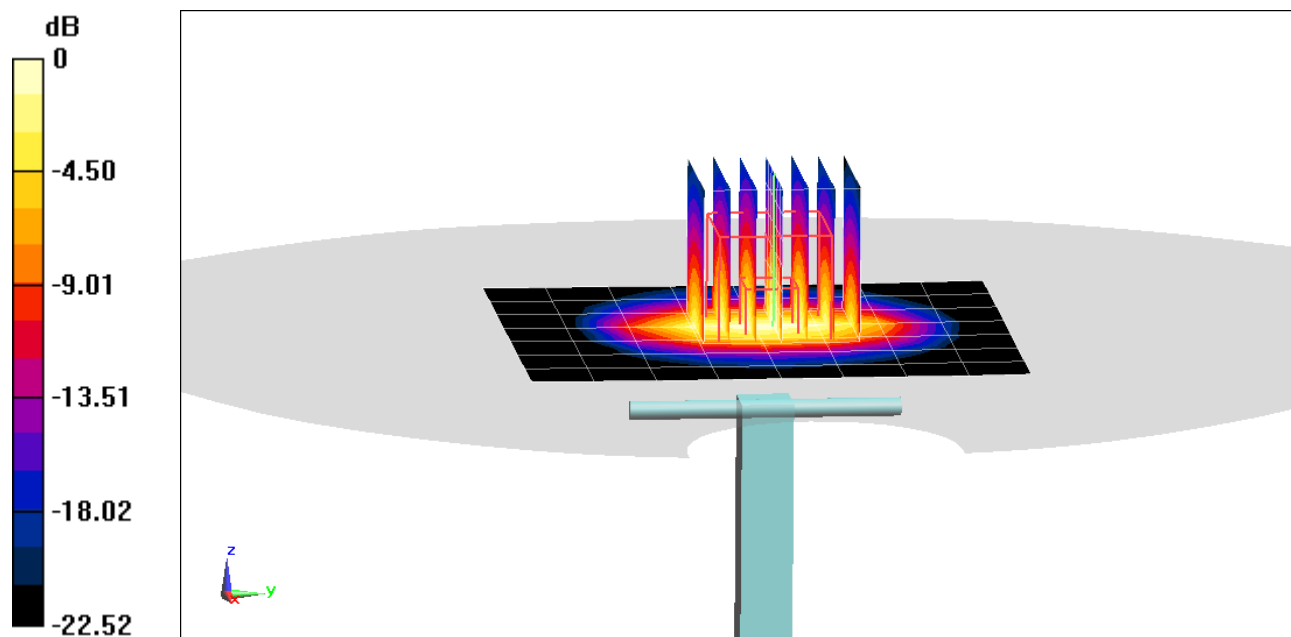
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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

Peak SAR (extrapolated) = 11.0 W/kg

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

Deviation(1 g) = 6.48%



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

PCTEST

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

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

Medium: 2450 MHz Body Medium parameters used:

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

Phantom section: Flat Section; Space: 1.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

2450 MHz System Verification at 20.0 dBm (100 mW)

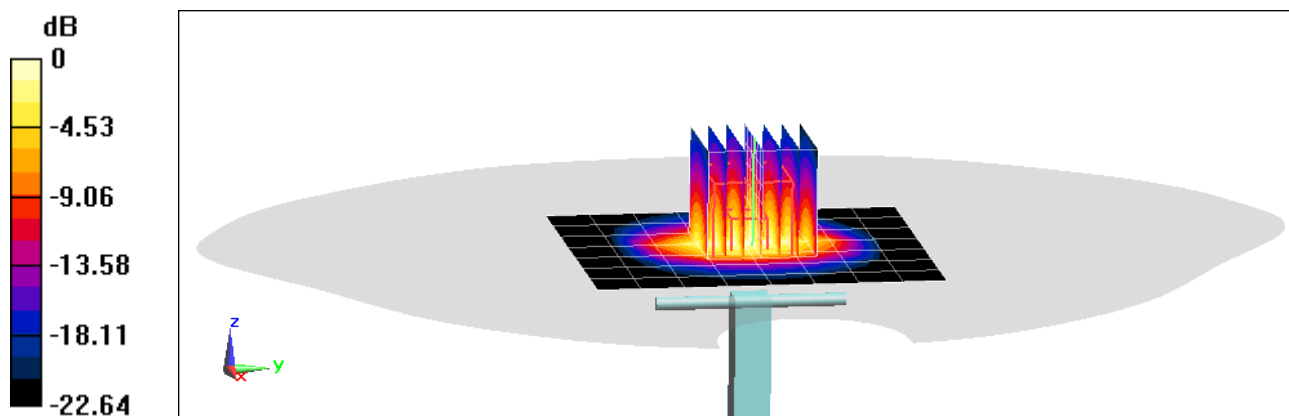
Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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

Peak SAR (extrapolated) = 10.7 W/kg

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

Deviation(1 g) = 1.57%



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

PCTEST

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

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

Medium: 2450 MHz Body Medium parameters used:

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

Phantom section: Flat Section; Space: 1.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

2450 MHz System Verification at 20.0 dBm (100 mW)

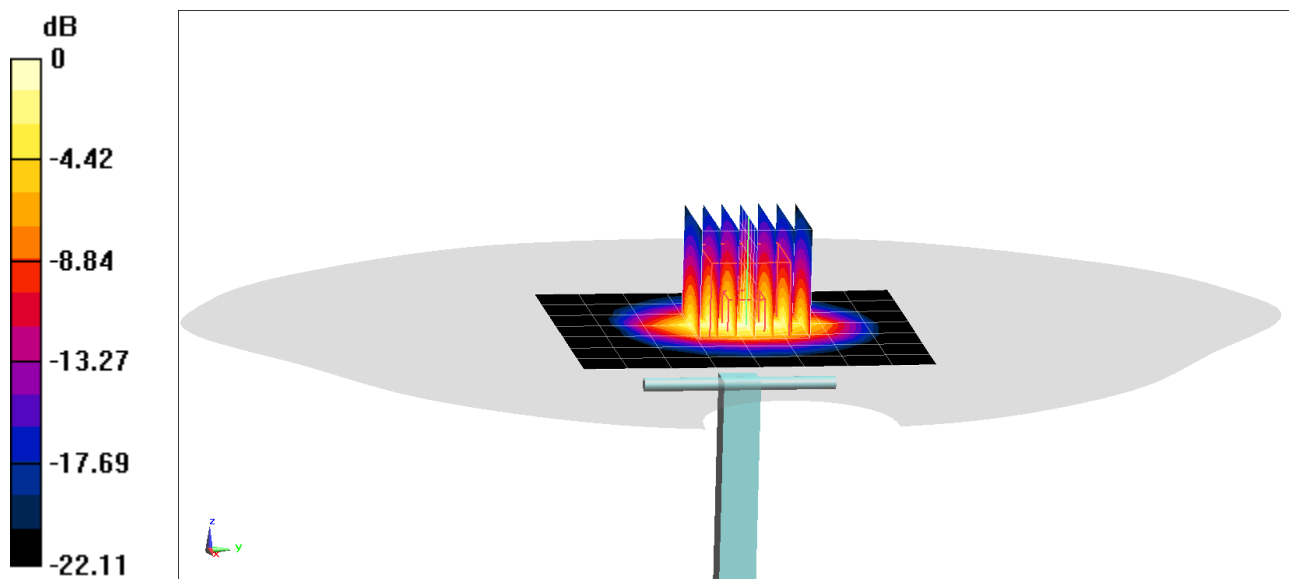
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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

Peak SAR (extrapolated) = 10.5 W/kg

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

Deviation(1 g) = 0.79%



PCTEST

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

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

Medium: 2450 MHz Body Medium parameters used:

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

Phantom section: Flat Section; Space: 1.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

2600 MHz System Verification at 20.0 dBm (100 mW)

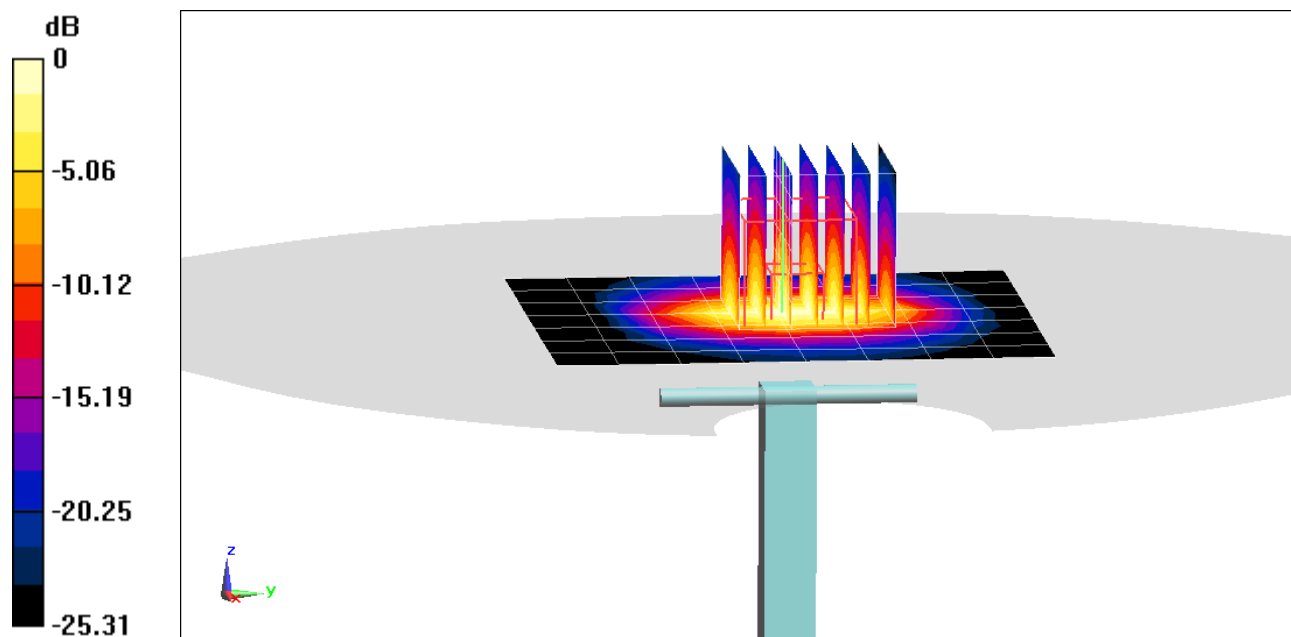
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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

Peak SAR (extrapolated) = 12.6 W/kg

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

Deviation(1 g) = -0.36%



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

PCTEST

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

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

Medium: 2450 MHz Body Medium parameters used:

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

Phantom section: Flat Section; Space: 1.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

2600 MHz System Verification at 20.0 dBm (100 mW)

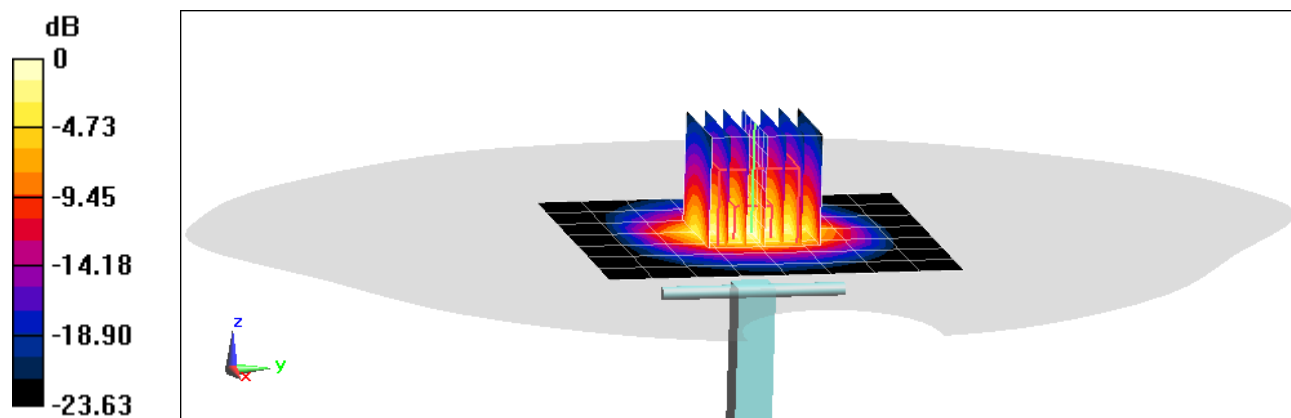
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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

Peak SAR (extrapolated) = 11.9 W/kg

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

Deviation(1 g) = -1.63%



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

PCTEST

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

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

Medium: 3500 MHz Body Medium parameters used:

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

Phantom section: Flat Section; Space: 1.0 cm

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

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

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

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

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

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

3500 MHz System Verification at 20.0 dBm (100 mW)

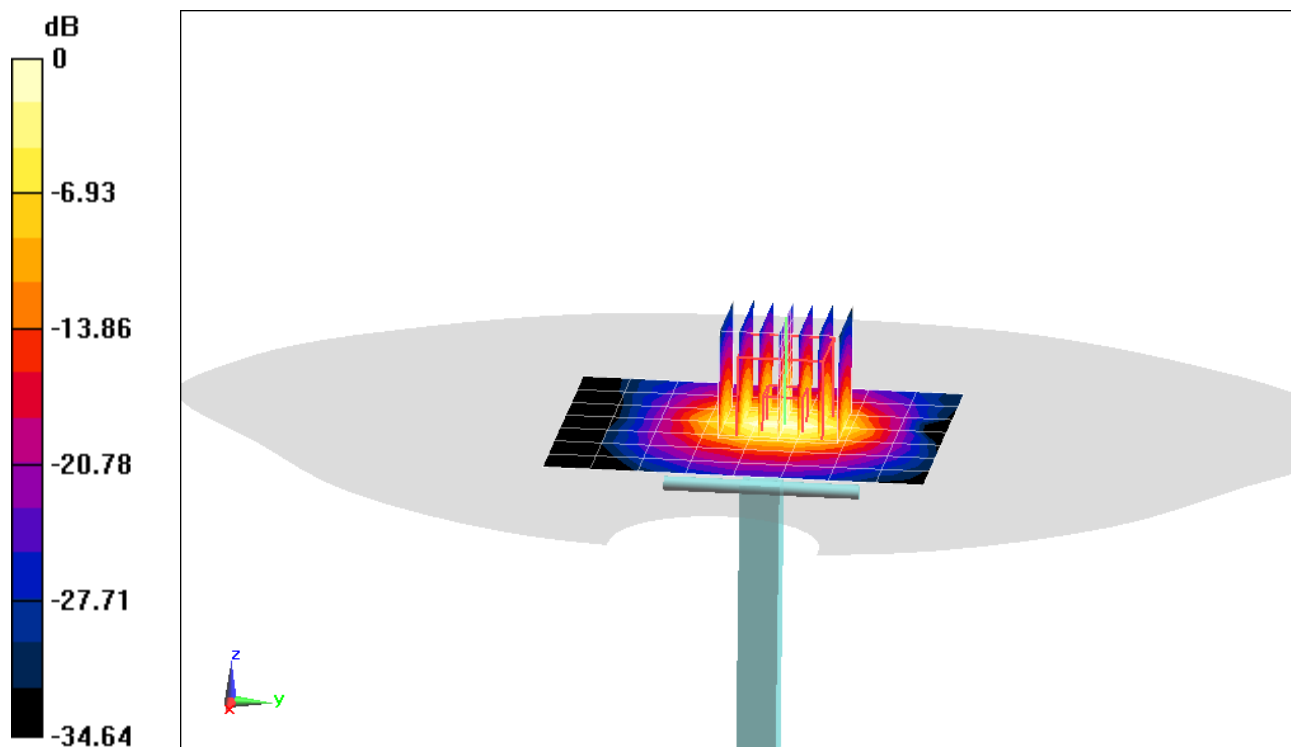
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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

Peak SAR (extrapolated) = 16.7 W/kg

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

Deviation(1 g) = -1.38%



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)

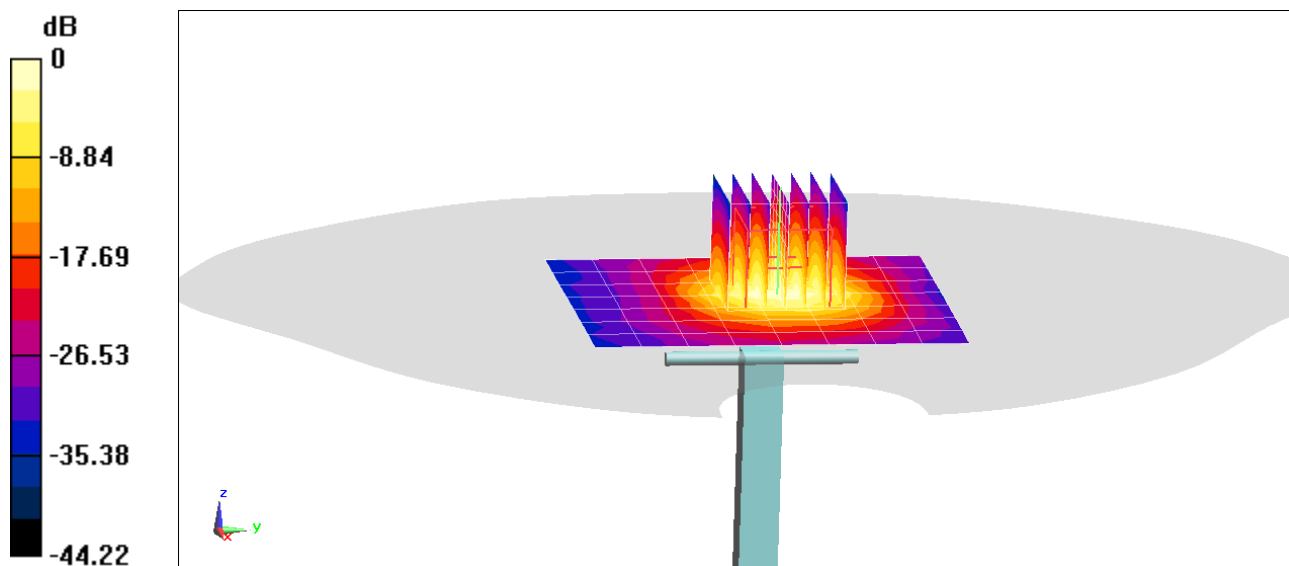
Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

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)

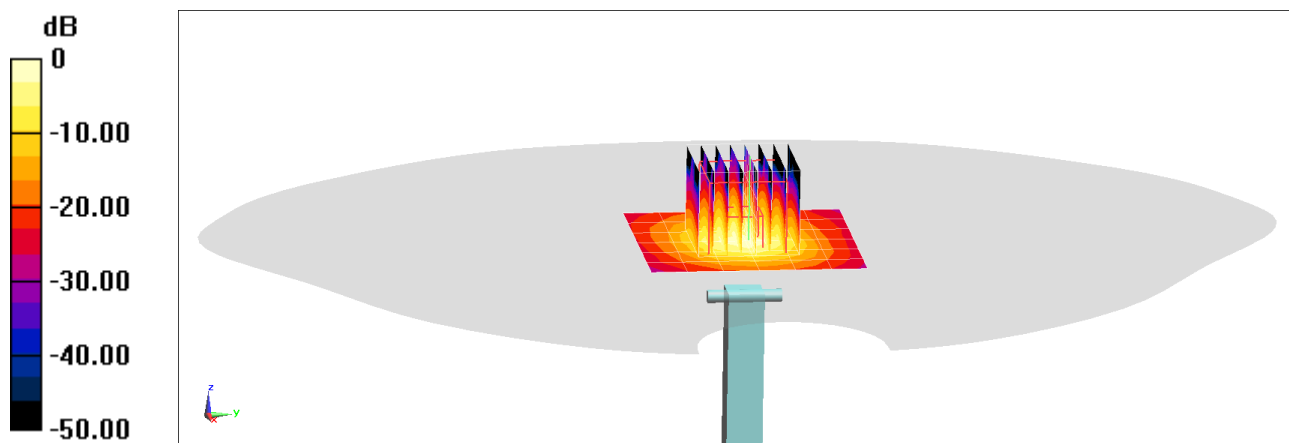
Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

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%



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)

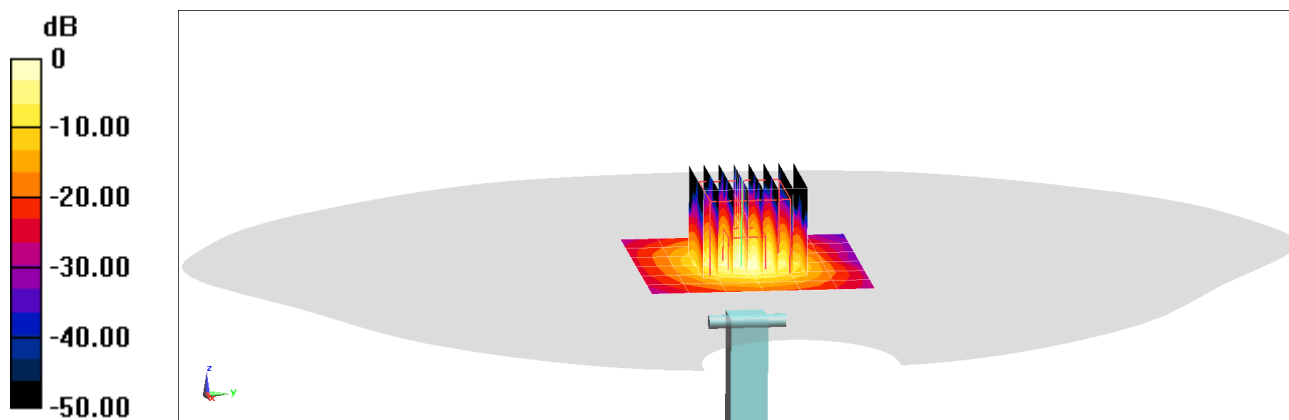
Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

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)

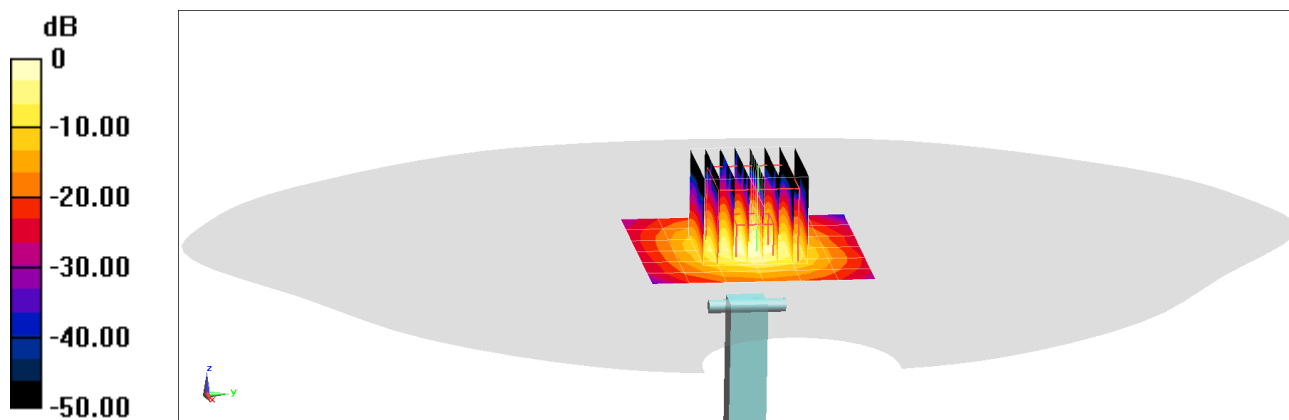
Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

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	Alkoxyated alcohol, > C₁₆ Aquatic Chronic 2, H411; Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.0%

Additional information:

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

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

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

Figure C-1

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

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

Measurement Certificate / Material Test

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

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters

Target parameters as defined in the KDB 865864 compliance standard.

Test Condition

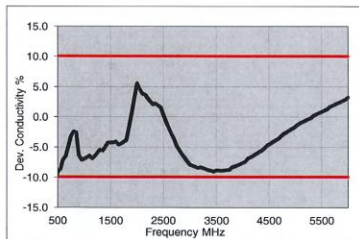
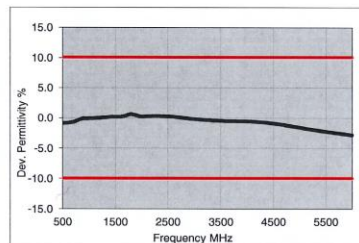
Ambient Condition 22°C ; 30% humidity
 TSL Temperature 22°C
 Test Date 30-Oct-18
 Operator CL

Additional Information

TSL Density
 TSL Heat-capacity

Results

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



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

TSL Dielectric Parameters

1

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

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

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

Index	ZCC	Supported Channel Bandwidth (MHz)				Restriction	Completely Covered by Measurement Superset
		CC1	CC2	CC3	CC4		
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			222-41	No
222-43	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-44	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-45	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-46	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-47	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-48	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-49	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-50	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-51	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-52	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-53	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-54	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-55	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-56	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-57	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-58	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-59	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-60	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-61	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-62	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-63	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-64	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-65	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-66	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-67	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-68	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-69	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-70	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-71	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-72	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-73	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-74	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-75	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-76	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-77	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-78	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-79	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-80	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-81	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-82	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-83	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-84	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-85	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-86	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-87	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-88	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-89	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-90	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-91	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-92	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-93	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-94	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-95	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-96	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-97	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-98	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-99	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-100	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-101	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-102	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-103	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-104	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-105	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-106	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-107	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-108	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-109	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-110	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-111	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-112	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-113	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-114	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-115	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-116	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-117	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-118	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-119	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-120	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-121	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-122	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-123	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-124	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-125	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-126	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-127	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-128	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-129	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-130	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-131	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-132	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-133	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-134	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-135	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-136	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-137	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-138	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-139	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-140	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-141	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-142	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-143	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-144	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-145	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-146	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-147	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-148	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-149	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-150	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-151	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-152	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-153	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-154	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-155	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-156	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-157	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-158	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-159	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-160	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-161	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-162	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-163	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-164	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-165	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-166	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-167	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-168	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-169	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-170	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-171	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-172	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-173	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-174	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-175	CA_2A	5, 10, 15, 20	5, 10, 15, 20			222-41	No
222-176							

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.

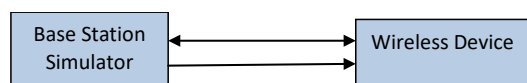


Figure 1
DL CA Power Measurement Setup

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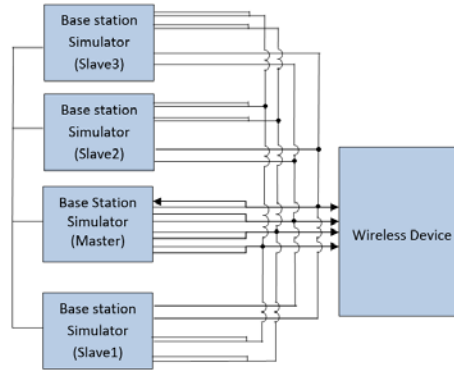


Figure 2
DL CA with DL 4x4 MIMO Power Measurement Setup

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.	PCC				SCC 1				SCC 2				SCC 3				SCC 4				Power			
				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 CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)	
CA 2A-12A (1)	LTE B12	5	23025	700.5	64QAM	1	7	5035	730.5	LTE B2	20	900	1960	-	-	-	-	-	-	-	-	-	-	-	-	21.44	21.44
CA 4A-12A (1)	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.0	LTE B4	20	2175	2122.5	-	-	-	-	-	-	-	-	-	-	-	-	21.44	21.44
CA 4A-12A (2)	LTE B12	5	23025	700.5	64QAM	1	7	5035	730.5	LTE B4	20	2175	2122.5	-	-	-	-	-	-	-	-	-	-	-	-	21.44	21.44
CA 12A-12A	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B2	20	900	1960.5	-	-	-	-	-	-	-	-	-	-	-	-	21.44	21.44
CA 12A-66A	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B6	20	5065	5537.5	-	-	-	-	-	-	-	-	-	-	-	-	21.44	21.44
CA 12A-66A (1)	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B6	20	5076	2145	-	-	-	-	-	-	-	-	-	-	-	-	21.44	21.44
CA 12A-66A (2)	LTE B12	5	23025	700.5	64QAM	1	7	5035	730.5	LTE B6	20	5076	2145	-	-	-	-	-	-	-	-	-	-	-	-	21.44	21.44
CA 2C-12A	LTE B12	5	23025	700.5	64QAM	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	700.5	64QAM	1	24	5035	731.5	LTE B2	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	700.5	64QAM	1	24	5035	731.5	LTE B2	10	5107	738.7	LTE B4	20	2175	2132.5	LTE B4	20	2175	2132.5	-	-	-	-	21.35	21.44
CA 2A-2A-4A-12A	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B2	20	702	1940	LTE B4	20	2175	2132.5	-	-	-	-	21.34	21.44
CA 2A-2A-4A-12A	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	LTE B4	20	2175	2132.5	-	-	-	-	21.34	21.44
CA 2A-4A-12B	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B2	10	5107	738.7	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	-	-	-	-	21.33	21.44
CA 2A-12A-66C	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B6	20	5076	2145	LTE B6	20	5076	2145	-	-	-	-	21.32	21.44
CA 4A-4A-12A-30A	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B4	20	2175	2132.5	LTE B4	20	2250	2150	LTE B30	10	9020	2395	-	-	-	-	21.35	21.44
CA 2A-4A-7A-12A	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	LTE B7	20	5000	2605	-	-	-	-	21.27	21.44
CA 2A-4A-12A-30A	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	LTE B30	10	9020	2355	LTE B6	20	5076	2145	21.44	21.44
CA 2A-7A-12A-66A	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B7	20	5000	2605	LTE B6	20	5076	2145	-	-	-	-	21.18	21.44
CA 2A-2A-12A-66A-66A	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B2	20	702	1940	LTE B6	20	5076	2145	LTE B6	20	5076	2145	21.28	21.44
CA 2A-2A-12A-30A-66A	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B2	20	702	1940	LTE B30	10	9020	2315	LTE B6	20	5076	2145	21.27	21.44
CA 2A-12A-30A-66A-66A	LTE B12	5	23025	700.5	64QAM	1	24	5035	731.5	LTE B2	20	900	1960	LTE B30	10	9020	2355	LTE B6	20	5076	2145	LTE B6	20	5076	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.	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	LTE Single Carrier Tx Power (dBm)		
CA 4A-4A-13A	LTE B13	5	23230	782	QPSK	1	0	5230	753	LTE B4	20	2175	2132.5	LTE B4	20	2250	2150	-	-	-	-	-	-	-	-	-	21.07	21.16	
CA 2A-4A-13A	LTE B13	5	23230	782	QPSK	1	0	5230	753	LTE B2	20	900	1960	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	21.11	21.16	
CA 2A-13A-46A	LTE B13	5	23230	782	16QAM	1	24	5230	753	LTE B2	20	900	1960	LTE B4	20	5065	5537.5	-	-	-	-	-	-	-	-	-	20.86	21.16	
CA 13A-66A-66A	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	-	-	-	-	-	-	-	-	-	20.90	21.16	
CA 13A-66A-66B	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	-	-	-	-	-	-	-	-	-	21.00	21.16	
CA 13A-66A-66C	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	-	-	-	-	-	-	-	-	-	20.94	21.16	
CA 2A-2A-13A-66A	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B2	20	900	1960	LTE B2	20	702	1940	LTE B6	20	5065	5537.5	-	-	-	-	-	-	20.93	21.16
CA 2A-13A-46C	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B2	20	900	1960	LTE B4	20	5065	5537.5	LTE B4	20	5065	5537.5	-	-	-	-	-	-	20.93	21.16
CA 2A-13A-66A-66A	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B2	20	900	1960	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	-	-	-	-	-	-	20.91	21.16
CA 2A-13A-66B	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B2	20	900	1960	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	-	-	-	-	-	-	20.88	21.16
CA 2A-13A-66C	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B2	20	900	1960	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	-	-	-	-	-	-	20.97	21.16
CA 13A-66C-66A	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	-	-	-	-	-	-	20.93	21.16
CA 13A-66C-66A	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	-	-	-	-	-	-	21.23	21.16
CA 13A-46C	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	-	-	-	-	-	-	20.93	21.16
CA 2A-12A-46D	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B2	20	900	1960	LTE B4	20	5065	5537.5	LTE B4	20	5065	5537.5	-	-	-	-	-	-	21.02	21.16
CA 13A-46D-66A	LTE B13	5	23230	782	64QAM	1	24	5230	753	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	LTE B6	20	5065	5537.5	-	-	-	-	-	-	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 (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]	SCC Band	SCC BW [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	LTC Power with DC CA Enabled [dBm]	Power	
																															LTE Single Carrier Tx Power [dBm]	
CA 5A-7A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B7	20	3100	2655	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60	
CA 5A-25A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B25	20	8365	1962.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60	
CA 5A-41A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B41	20	40620	2593	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60	
CA 5A-46A (1)	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B46	20	50065	5537.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60	
CA 5A-46A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B46	20	50065	5537.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.60	20.60	
CA 2C-5A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B2	20	800	1960	LTE B2	20	792	1940	-	-	-	-	-	-	-	-	-	-	-	-	-	20.35	20.60
CA 4A-5B (1)	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B5	5	2577	886.7	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	-	-	-	-	20.39	20.60
CA 5A-7A-7A	LTE B5	5	26025	846.5	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	846.5	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	846.5	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	846.5	16QAM	1	0	2625	891.5	LTE B2	20	800	1960	LTE B46	20	50065	5537.5	-	-	-	-	-	-	-	-	-	-	-	-	-	20.35	20.60
CA 5A-46A-66A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B46	20	50065	5537.5	LTE B66	20	66786	2145	-	-	-	-	-	-	-	-	-	-	-	-	-	20.34	20.60
CA 4A-5A-5B	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B5	10	2553	884.3	LTE B4	20	2175	2132.5	LTE B4	10	2390	2150	-	-	-	-	-	-	-	-	-	20.47	20.60
CA 5A-6B (1)	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B6	20	66786	2145	LTE B46	20	50467	5517.7	LTE B46	20	66984	2164.8	-	-	-	-	-	-	-	-	-	20.40	20.60
CA 5A-6A-6B	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B6	20	66786	2145	LTE B66	5	67169	2183.2	LTE B66	15	67261	2192.9	-	-	-	-	-	-	-	-	-	20.35	20.60
CA 2A-2A-4A-5A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B2	20	800	1960	LTE B2	20	792	1940	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	20.31	20.60
CA 2A-4A-4A-5A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B2	20	800	1960	LTE B4	20	2175	2132.5	LTE B4	20	2350	2150	-	-	-	-	-	-	-	-	-	20.48	20.60
CA 2A-5A-5B	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B5	10	2553	884.3	LTE B2	20	800	1960	LTE B4	20	2175	2132.5	-	-	-	-	-	-	-	-	-	20.45	20.60
CA 2A-5B-6B	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B6	20	66786	2145	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	846.5	16QAM	1	0	2625	891.5	LTE B4	20	2175	2132.5	LTE B4	30	2350	2150	LTE B30	10	8620	2395	-	-	-	-	-	-	-	-	-	20.36	20.60
CA 5A-46C-66A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B46	20	50065	5537.5	LTE B46	20	50467	5517.7	LTE B66	20	66786	2145	-	-	-	-	-	-	-	-	-	20.49	20.60
CA 2A-4A-5A-30A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B2	20	800	1960	LTE B4	20	2175	2132.5	LTE B30	10	8620	2395	-	-	-	-	-	-	-	-	-	20.27	20.60
CA 2A-2A-5A-66A-66A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B2	20	800	1960	LTE B2	20	792	1940	LTE B60	20	66786	2145	LTE B60	20	67236	2190	-	-	-	-	-	20.43	20.60
CA 2A-2A-5A-66B	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B2	20	800	1960	LTE B2	20	792	1940	LTE B60	15	66786	2145	LTE B60	5	66879	2154.3	-	-	-	-	-	20.51	20.60
CA 2A-2A-5A-66C	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B2	20	800	1960	LTE B2	20	792	1940	LTE B60	20	66786	2145	LTE B60	20	66984	2164.8	-	-	-	-	-	20.38	20.60
CA 5A-46D-66A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B46	20	50065	5537.5	LTE B46	20	50467	5517.7	LTE B60	20	66786	2145	LTE B60	20	66786	2145	-	-	-	-	-	20.49	20.60
CA 5B-30A-66A-66A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B6	10	2553	884.3	LTE B30	20	8620	2355	LTE B60	20	66786	2145	LTE B60	20	67236	2190	-	-	-	-	-	20.35	20.60
CA 2A-2A-5A-30A-66A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B2	20	800	1960	LTE B2	20	792	1940	LTE B30	10	8620	2355	LTE B60	20	66786	2145	-	-	-	-	-	20.47	20.60
CA 2A-5A-30A-66A-66A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B2	20	800	1960	LTE B30	10	8620	2355	LTE B60	20	66786	2145	LTE B60	20	67236	2190	-	-	-	-	-	20.42	20.60
CA 2A-5B-30A-66A	LTE B5	5	26025	846.5	16QAM	1	0	2625	891.5	LTE B6	10	2553	884.3	LTE B2	20	800	1960	LTE B30	10	8620	2355	LTE B60	20	66786	2145	-	-	-	-	-	20.34	20.60

1.3.4

LTE Band 26 as PCC

Table 4
Output Powers – Ant 1

Combination	PCC Band	PCC BW [MHz]	PCC [UL] Ch.	PCC				PCC [DL] Channel	PCC [DL] Freq. [MHz]	SCC Band	SCC 1			SCC 2			Power		
				PCC [UL] Freq. [MHz]	Mod.	PCC UL# RB	PCC UL RB Offset				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	 PCTEST Ready for your next test	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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LTE Band 66 as PCC

Table 5
Output Powers – Ant 2B

[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 5 of 16

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]	LTE Tx Power with CA Carrier Tx Power (dBm)	LTE Single Carrier Tx Power (dBm)				
CA 41A-41A (1)	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	2620	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	41292	2602.2	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	2612.8	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	2612.8	LTE B25	20	8865	1862.5	-	15.89	15.90							
CA 26A-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40818	2612.8	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	2612.8	LTE B41	20	41055	2632.6	15.89	15.90				
CA 41A-41D	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	41094	2640.4	LTE B41	20	41292	2602.2	LTE B41	20	41490	2080	15.89	15.90				
CA 41D-41A	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	40818	2612.8	LTE B41	20	41490	2080	15.89	15.90				
CA 41C-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	41292	2602.2	LTE B41	20	41490	2080	15.88	15.90				
CA 26A-26A-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B25	20	8865	1862.5	LTE B25	20	8865	1865	15.89	15.90				
CA 41C-41D	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	41094	2640.4	LTE B41	20	41292	2602.2	LTE B41	20	41490	2080	15.89	15.90
CA 41D-41C	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	40818	2612.8	LTE B41	20	41292	2602.2	LTE B41	20	41490	2080	15.89	15.90
CA 26A-26A-41D	LTE B41	20	40620	2593	15QAM	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	40818	2612.8	LTE B25	20	8865	1862.5	LTE B25	20	8865	1865	15.89	15.90

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	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]	LTE Tx Power with CA Enabled [dBm]	LTE Single Carrier Tx Power [dBm]				
CA 41A-41A (1)	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	2525	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	41292	2602.2	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	2612.8	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	2612.8	LTE B25	20	8865	1862.5	-	15.89	15.90							
CA 26A-41C	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40818	2612.8	LTE B25	20	8865	1875.5	-	15.89	15.90							
CA 41E	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40422	2573.2	LTE B41 PC2	20	40818	2612.8	LTE B41 PC2	20	41055	2632.6	15.89	15.90				
CA 41A-41D	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	41094	2640.4	LTE B41 PC2	20	41292	2602.2	LTE B41 PC2	20	41490	2080	15.89	15.90				
CA 41D-41A	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40422	2573.2	LTE B41 PC2	20	40818	2612.8	LTE B41 PC2	20	41490	2080	15.87	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	41292	2602.2	LTE B41 PC2	20	41490	2080	15.88	15.90				
CA 26A-26A-41C	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40422	2573.2	LTE B25	20	8865	1862.5	LTE B25	20	8865	1865	15.89	15.90				
CA 41C-41D	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40422	2573.2	LTE B41 PC2	20	41094	2640.4	LTE B41 PC2	20	41292	2602.2	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	2612.8	LTE B41 PC2	20	41292	2602.2	LTE B41 PC2	20	41490	2080	15.89	15.90
CA 26A-26A-41D	LTE B41 PC2	20	40620	2593	64QAM	1	0	40620	2593	LTE B41 PC2	20	40422	2573.2	LTE B41 PC2	20	40818	2612.8	LTE B25	20	8865	1862.5	LTE B25	20	8865	1865	15.88	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] Ch.	PCC [UL] Freq. [MHz]	Mod.	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]	SCC Band	SCC BW [MHz]	SCC [DL] Channel	SCC [DL] Freq. [MHz]	L1E Tx Power with CA Carrier Tx Power (dBm)	L1E Single Carrier Tx Power (dBm)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
CA 3A-48A	LTE B48	20	56207	3646.7	64QAM	1	0	56207	3646.7	LTE B8	10	7205	881.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FCC ID: BCGA2230	 PCTEST Result for test part 1 of 1	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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1.4 DL CA with DL 4x4 MIMO RF Conduction Powers

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

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

1.4.1 LTE 4x4 MIMO DL Standalone Powers

Table 12
Output Powers – Ant 3

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

Table 13
Output Powers – Ant 2A

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

Table 14
Output Powers – Ant 2B

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

FCC ID: BCGA2230	 PCTEST Ready to test your product	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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Table 15
Output Powers – Ant 4B

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

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

LTE Band 12 as PCC

Table 16
Output Powers – Ant 1

[illegible]

LTE Band 13 as PCC

Table 17
Output Powers – Ant 1

Combination	PCC Band	PCC BW [MHz]	PCC [UL] Freq. [MHz]	Mod.	PCC				DL Ant. Config.	SCS 1				DL Ant. Config.	SCS 2				DL Ant. Config.	SCS 3				DL Ant. Config.	SCS 4				Power	
					PCC UL RB	PCC UL RB Offset	PCC [DL] Ch.	PCC [UL] Freq. [MHz]		SCC [DL] Ch.	SCC [DL] Freq. [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]		SCC [DL] Ch.	SCC [DL] Freq. [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]		SCC [DL] Ch.	SCC [DL] Freq. [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]		SCC [DL] Ch.	SCC [DL] Freq. [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	LTE Tx Power with SC-FDMA (dBm)	LTE Single Carrier Tx Power (dBm)
CA 14A/44A-13A	LTE B13	10	23230	782	QPSK	1	0	5230	751	2x2	LTE B4	20	2175	2132.5	4x4	LTE B4	20	2330	2150	4x4	-	-	-	-	-	-	-	-	21.14	21.14
CA 12A/44A-13A	LTE B12	10	23230	782	QPSK	1	0	5230	751	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2175	2132.5	4x4	-	-	-	-	-	-	-	-	21.18	21.14
CA 12A/13A-49A	LTE B12	5	23230	782	QPSK	1	24	5230	751	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2060.5	2037.5	2x2	-	-	-	-	-	-	-	-	20.62	21.05
CA 13A/44A/49A	LTE B13	5	23230	782	QPSK	1	24	5230	751	2x2	LTE B4	20	2060.5	2037.5	2x2	LTE B4	20	2060.5	2037.5	2x2	-	-	-	-	-	-	-	-	21.18	21.18
CA 13A/48A/49A	LTE B13	5	23230	782	16QAM	1	24	5230	751	2x2	LTE B4	20	2060.5	2037.5	2x2	LTE B4	20	2060.5	2037.5	2x2	-	-	-	-	-	-	-	-	21.18	21.18
CA 13A/56A/68B	LTE B13	5	23230	782	16QAM	1	24	5230	751	2x2	LTE B4	20	2060.5	2037.5	2x2	LTE B4	20	2060.5	2037.5	2x2	-	-	-	-	-	-	-	-	21.18	21.18
CA 13A/56A/68C	LTE B13	5	23230	782	16QAM	1	24	5230	751	2x2	LTE B4	20	2060.5	2037.5	2x2	LTE B4	20	2060.5	2037.5	2x2	-	-	-	-	-	-	-	-	21.18	21.18
CA 12A/13A/44A/49A	LTE B13	5	23230	782	16QAM	1	24	5230	751	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2060.5	2037.5	2x2	-	-	-	-	-	-	-	-	21.18	21.18
CA 12A/13A/44A/49A	LTE B13	5	23230	782	16QAM	1	24	5230	751	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2060.5	2037.5	2x2	-	-	-	-	-	-	-	-	21.18	21.18
CA 12A/13A/44A/49A	LTE B13	5	23230	782	16QAM	1	24	5230	751	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2060.5	2037.5	2x2	-	-	-	-	-	-	-	-	21.18	21.18
CA 12A/13A/44A/49A	LTE B13	5	23230	782	16QAM	1	24	5230	751	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2060.5	2037.5	2x2	-	-	-	-	-	-	-	-	21.18	21.18
CA 12A/13A/44A/49A	LTE B13	5	23230	782	16QAM	1	24	5230	751	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2060.5	2037.5	2x2	-	-	-	-	-	-	-	-	21.18	21.18
CA 12A/13A/44A/49A	LTE B13	5	23230	782	16QAM	1	24	5230	751	2x2	LTE B2	20	900	1960	4x4	LTE B4	20	2060.5	2037.5	2x2	-	-	-	-	-	-	-	-	21.18	21.18
CA 12A/13A/44A/49A	LTE B13																													

FCC ID: BCGA2230	 SAR EVALUATION REPORT	Reviewed by: Quality Manager
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Table 20
Output Powers – Ant 2B

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

Combination	PCC										SCC 1				SCC 2				SCC 3				SCC 4				Power	
	PCC Band	PCC BW [MHz]	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] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Freq. [MHz]	DL Ant. Config.	LTE Tx Power (Enb) [dBm]	LTE Single Carrier Tx Power [dBm]	
CA SA [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B5	10	2325	881.5	2x2											14.79	15.10	
CA SA [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B12	10	5095	727.5	2x2											14.62	15.10	
CA SA [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B25	20	26300	881.5	2x2											14.79	15.10	
CA SA [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B25	20	26300	881.5	2x2											14.65	15.10	
CA SA [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B25	20	26300	881.5	2x2											14.65	15.10	
CA [25A] [25A] 20A	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B25	20	8340	1940	4x4	LTE B26	5	8895	876.5	2x2						14.69	15.10	
CA [25A] [25A] 40A	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B25	20	8340	1940	4x4	LTE B41	20	40620	2593	4x4						14.56	15.10	
CA [25A] [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B41	20	40620	2593	4x4	LTE B41	20	40620	2593	4x4						14.56	15.10	
CA [25A] [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B41	20	40620	2593	4x4	LTE B41	20	40620	2593	4x4						14.56	15.10	
CA [25A] [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B41	20	40620	2593	4x4	LTE B41	20	40620	2593	4x4						14.56	15.10	
CA [25A] [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B41	20	40620	2593	4x4	LTE B41	20	40620	2593	4x4						14.56	15.10	
CA [25A] [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B41	20	40620	2593	4x4	LTE B41	20	40620	2593	4x4						14.56	15.10	
CA [25A] [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B41	20	40620	2593	4x4	LTE B41	20	40620	2593	4x4						14.56	15.10	
CA [25A] [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B41	20	40620	2593	4x4	LTE B41	20	40620	2593	4x4						14.56	15.10	
CA [25A] [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B41	20	40620	2593	4x4	LTE B41	20	40620	2593	4x4						14.56	15.10	
CA [25A] [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B41	20	40620	2593	4x4	LTE B41	20	40620	2593	4x4						14.56	15.10	
CA [25A] [25A]	LTE B25	20	26300	1905	16QAM	1	99	E300	1985	4x4	LTE B41	20	40620	2593	4x4	LTE B41	20	40620										

LTE Band 30 as PCC

Table 22
Output Powers – Ant 4B

Combination	PCB Band	PCB BW [MHz]	FCC [kHz]	PCC					SFC Band	SCC 1				SFC Band	SCC 2				SFC Band	SCC 3				SFC Band	SCC 4				Power		
				FCC [kHz]	Mod.	PCC UHF RB	PCC UL RB Offset	PCC [kHz]		DL Ant. Config.	SCC [kHz]	DL Ant. Config.	SCC [kHz]		DL Ant. Config.	SCC [kHz]	DL Ant. Config.	SCC [kHz]		DL Ant. Config.	SCC [kHz]	DL Ant. Config.	SCC [kHz]		DL Ant. Config.	SCC [kHz]	DL Ant. Config.	SCC [kHz]	DL Ant. Config.	SCC [kHz]	DL Ant. Config.
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10	27730	2310	16QAM	1	25	1820	2355	444	LTE E30	25	900	1860	444	LTE E30	25	700	1860	444	LTE E30	10	2535	1881	2x2	-	-	-	-	13.95	13.95
CA [24.24-24.34] 24.24	LTE E30	10																													

LTE Band 7 as PCC

Table 23
Output Powers – Ant 4B

Combination	PCB Band	PCC										SC1		SC2		SC3		SC4		Power								
		PCC BW [MHz]	PCC [UL] Ch.	PCC [UL] Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC [DL] Ch.	PCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	LTE Tx Power with CLC Enabled (dBm)	LTE Single Carrier Tx Power (dBm)	
CA [T8]	LTE B7	15	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B87	5	2007	2685.2	4x4											13.21	13.24	
CA SA [7A]	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B85	10	2525	881.5	2x2											13.18	13.24	
CA [7A]-26A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B20	10	8905	876.5	2x2											13.18	13.24	
CA [7A]-44A (1)	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B46	20	50665	5537.2	2x2											13.23	13.24	
CA [7A]-72A (2A)	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B12	20	5095	773.5	2x2	LTE B82	20	900	1960	4x4						13.13	13.19	
CA [4A]-[4A]-[7A]-26A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B4	20	2175	2122.5	4x4	LTE B4	10	2310	2310	2x2						13.16	13.24	
CA SA [7A]-26A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B7	20	2850	2830	4x4	LTE B85	10	2525	881.5	2x2						13.16	13.24	
CA [7A]-26A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B7	20	2850	2832.5	2x2	LTE B85	10	2525	881.5	2x2						13.16	13.24	
CA [7A]-72A (2A)	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B7	20	2850	2830	4x4	LTE B26	10	8855	876.5	2x2						13.18	13.24	
CA [7A]-40C (1)	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B46	20	50665	5537.5	2x2	LTE B46	20	50667	5537.2	2x2						13.23	13.24	
CA [7C]-44A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B7	20	2902	2632.5	4x4	LTE B46	20	50665	5537.5	2x2						13.23	13.24	
CA [2A]-[7A]-26A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B87	10	2525	881.5	2x2	LTE B86	10	60786	2445	4x4						13.23	13.24	
CA [7A]-40D (1)	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B46	20	50668	5537.5	2x2	LTE B46	20	50667	5537.2	2x2						13.23	13.24	
CA [7C]-44C	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B7	20	2902	2638.2	4x4	LTE B46	20	50665	5537.5	2x2						13.13	13.24	
CA [2A]-[4A]-[7A]-26A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B7	20	2850	2830	2x2	LTE B12	20	2310	2310	2x2						13.15	13.19	
CA [2A]-[4A]-[7A]-26A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B7	20	2902	2632.5	4x4	LTE B4	20	2375	2322.5	4x4						13.15	13.19	
CA [2A]-[4A]-[7A]-42A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B82	20	900	1960	4x4	LTE B4	20	2175	2122.5	4x4	LTE B12	10	5095	773.5	2x2		13.18	13.24
CA [2A]-[7A]-26A	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B7	20	2850	2840	4x4	LTE B2	10	900	1960	2x2	LTE B86	20	60786	2445	4x4		13.20	13.24
CA [2A]-[7A]-42A (1)	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B12	20	5095	773.5	2x2	LTE B86	20	60786	2445	4x4						13.18	13.24	
CA [7C]-44D	LTE B7	20	21100	2535	QPSK	50	0	3100	2655	4x4	LTE B7	20	2902	2638.2	4x4	LTE B46	20	50665	5537.5	2x2	LTE B46	20	50667	5537.2	2x2		13.17	13.24

FCC ID: BCGA2230	 PCTEST Portable Computer Test Equipment	SAR EVALUATION REPORT	Reviewed by: Quality Manager
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LTE Band 41 as PCC

Table 24
Output Powers – Ant 4B

Combination	PCB Band	PCB BW [MHz]	PCB CH [Ch.]	Mod.	PCB Upl. RB	PCB Upl. NB Offset	PCB CH [Ch.]	PCB Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC 1			SCC Band	SCC BW [MHz]	SCC 2			SCC Band	SCC BW [MHz]	SCC 3			SCC Band	SCC BW [MHz]	SCC 4			LTE Tx Power [dBm]	LTE Rx Power [dBm]	LTE Single Carrier Power [dBm]	
												SCC 1 Freq. [MHz]	SCC 1 Ch. [Ch.]	DL Ant. Config.			SCC 2 Freq. [MHz]	SCC 2 Ch. [Ch.]	DL Ant. Config.			SCC 3 Freq. [MHz]	SCC 3 Ch. [Ch.]	DL Ant. Config.			SCC 4 Freq. [MHz]	SCC 4 Ch. [Ch.]	DL Ant. Config.				
CA 4A(4A)4A(4A) 1	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B41	20	41460	2680	44x																		
CA 3A(4A)1A	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B36	10	41261	2611	22x																		
CA 3A(4A)1A	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B36	10	41261	2611	22x																		
CA 4A(4A)4A	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B37	10	41261	2660.2	44x	LTE B41	20	41460	2680	44x													
CA 4A(4A)4A(4A)	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B37	10	41261	2660.2	44x	LTE B41	20	41460	2680	44x													
CA 3A(4A)3A(4A)4A	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B37	10	41261	2660.2	44x	LTE B41	20	41460	2680	44x													
CA 3A(4A)3A(4A)4A	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B25	20	40818	2562.8	44x	LTE B25	20	40818	2562.8	44x													
CA 3A(4A)4A	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B25	20	40818	2562.8	44x	LTE B25	20	40818	2562.8	44x													
CA 3A(4A)4A	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B25	20	40818	2562.8	44x	LTE B25	20	40818	2562.8	44x													
CA 4A(4A)4A	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B41	20	41460	2680	44x	LTE B41	20	41460	2680	44x													
CA 4A(4A)4A	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B41	20	41460	2680	44x	LTE B41	20	41460	2680	44x													
CA 4A(4A)4A(4A)	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B41	20	41460	2680	44x	LTE B41	20	41460	2680	44x													
CA 4A(4A)4A(4A)	LTE B41	20	40620	2593	16QAM	1	0	40620	2593	44x	LTE B41	20	41460	2680	44x	LTE B41	20	41460	2680	44x													
CA 4A(4A)4A(4A)	LTE B41	20	40620	2593	16QAM	1	0	40620	2593																								

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] [Freq. [MHz]]	DL Ant. Config.	SCC Band	SCC BW [MHz]	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 To Power [dBm]	LTE Single Carrier Power [dBm]		
CA (4A) (4A) (4A) (4A)	LTE B4 PC2	20	40620	2593	64QAM	1	0	40620	2593	4AA	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	18.80	18.80
CA (4A) (4A)	LTE B4 PC1	20	40620	2593	64QAM	1	0	40620	2593	4AA	LTE B5	15	2125	181.5	222	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	18.80	18.80
CA (4A) (4A) (4A)	LTE B4 PC2	20	40620	2593	64QAM	1	0	40620	2593	4AA	LTE B5	15	2125	181.5	222	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	18.80	18.80
CA (4A) (4A)	LTE B4 PC2	20	40620	2593	64QAM	1	0	40620	2593	4AA	LTE B4 PC2	20	41210	2660.2	4AA	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	18.80	18.80
CA (4A) (4A) (4A)	LTE B4 PC1	20	40620	2593	64QAM	1	0	40620	2593	4AA	LTE B4 PC2	20	40818	2612.8	4AA	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	18.80	18.80
CA (4A) (4A) (4A) (4A)	LTE B4 PC1	20	40620	2593	64QAM	1	0	40620	2593	4AA	LTE B5	15	2125	181.5	222	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	18.80	18.80
CA (4A) (4A)	LTE B4 PC2	20	40620	2593	64QAM	1	0	40620	2593	4AA	LTE B4 PC2	20	40818	2612.8	4AA	LTE B5	15	2125	181.5	222	LTE B4 PC2	20	41490	2690	4AA	LTE B4 PC2	20	41490	2690	4AA	18.80	18.80
CA (4A) (4A) (4A) (4A)	LTE B4 PC2	20	40620	2593	64QAM	1	0	40620	2593	4AA	LTE B5	15	2125	181.5	222	LTE B5	15	2125	181.5	222	LTE B5	15	2125	181.5	222	LTE B5	15	2125	181.5	222	18.80	18.80
CA (4A) (4A)	LTE B4 PC2	20	40620	2593	64QAM	1	0	40620	2593	4AA	LTE B5	15	2125	181.5	222	LTE B5	15	2125	181.5	222	LTE B5	15	2125	181.5	222	LTE B5	15	2125	181.5	222	18.80	18.80
CA (4A) (4A)	LTE B4 PC2	20	40620	2593	64QAM	1	0	40620	2593	4AA	LTE B4 PC2	20	40818	2612.8	4AA	LTE B5	15	2125	181.5	222	LTE B5	15	2125	181.5	222	LTE B5	15	2125	181.5	222	18.80	18.80
CA (4A) (4A)	LTE B4 PC2	20	40620	2593	64QAM	1	0	40620	2593	4AA	LTE B4 PC2	20	40818	2612.8	4AA	LTE B5	15	2125	181.5	222	LTE B5	15	2125	181.5	222	LTE B5	15	2125	181.5	222	18.80	18.8

1.4.12

LTE Band 48 as PCC

Table 26
Output Powers – Ant 3

[illegible]

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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				SCS1												SCS2				SCS4				ULCA Tx Power (dBm)	ULCA Tx Power (dBm)							
		PCC BW [MHz]	PCC [DL] Freq. [MHz]	PCC [UL] Ch.	Mod.	PCC UL RB Offset	PCC [DL] Freq. [MHz]	PCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [UL] Ch.	Mod.	SCC UL RB Offset	SCC [DL] Freq. [MHz]	SCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [UL] Ch.	Mod.	SCC UL RB Offset	SCC [DL] Freq. [MHz]	SCC [UL] Freq. [MHz]										
CA 41C-41A	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	15.17	15.17
CA 41D-41A	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	15.18	15.18
CA 41D-41D	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	15.18	15.18
CA 41E	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	15.18	15.18
CA 41E-41E	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	15.18	15.18
CA 41E-41E	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	15.18	15.18

1.5.1.2 LTE Band 41 PC2

Table 28
Output Powers – Ant 4B

Combination	PCC Band	PCC				SCS 1												SCS 2				SCS 3				SCS 4				Power				
		PCC BW [MHz]	PCC [DL] Ch.	PCC [UL] Ch.	Mod.	PCC UL RB Offset	PCC [DL] Freq. [MHz]	PCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [UL] Ch.	Mod.	SCC UL RB Offset	SCC [DL] Freq. [MHz]	SCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [UL] Ch.	Mod.	SCC UL RB Offset	SCC [DL] Freq. [MHz]	SCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [UL] Ch.	Mod.	SCC UL RB Offset	SCC [DL] Freq. [MHz]	SCC [UL] Freq. [MHz]	ULCA Tx Power (dBm)	ULCA Tx Power (dBm)
CA 41E-41A	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	15.17	15.17
CA 41E-41A	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	15.17	15.17
CA 41E-41E	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	15.17	15.17
CA 41E	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	15.17	15.17
CA 41E-41E	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	15.17	15.17
CA 41E-41E	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	1.8E B41	20	40620	2000	QPSK	0	40620	2000	15.17	15.17

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										SCS1										SCS2										SCS3										SCS4										Power	
		PCC BW [MHz]	PCC [DL] Ch.	PCC [UL] Ch.	Mod.	PCC UL RB Offset	PCC [DL] Freq. [MHz]	PCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [UL] Ch.	Mod.	SCC UL RB Offset	SCC [DL] Freq. [MHz]	SCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [UL] Ch.	Mod.	SCC UL RB Offset	SCC [DL] Freq. [MHz]	SCC [UL] Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC [DL] Ch.	SCC [UL] Ch.	Mod.	SCC UL RB Offset	SCC [DL] Freq. [MHz]	SCC [UL] Freq. [MHz]	ULCA Tx Power with subCA Tx Power (dBm)	ULCA Tx Power (dBm)																			
CA 41E1-41A1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41C1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E2-41A1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E2-41C1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41D1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41E1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41F1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41G1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41H1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41I1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41J1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41K1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41L1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41M1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41N1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41O1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41P1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41Q1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41R1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41S1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41T1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41U1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41V1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41W1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41X1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41Y1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E1-41Z1	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E2-41A2	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E2-41C2	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E2-41E2	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E2-41G2	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E2-41I2	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E2-41K2	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E2-41M2	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E2-41O2	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	15.17	15.17	15.17	15.17																		
CA 41E2-41P2	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	40620	2000	QPSK	0	40620	2000	4x4	1.8E B41	20	4062																																

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1.5.2.2 LTE Band 41 PC2

Table 30
Output Powers – Ant 4B

[illegible]

1.5.2.3 LTE Band 7

Table 31
Output Powers – Ant 4B

	PCC										SCC 1										Power	
Combination	PCC Band	PCC BW [MHz]	PCC [UL] Ch.	PCC [UL] Freq. [MHz]	Mod.	PCC UL RB	PCC UL RB Offset	PCC [DL] Ch.	PCC [DL] Freq. [MHz]	DL Ant. Config.	SCC Band	SCC BW [MHz]	SCC [UL] Ch.	SCC [UL] Freq. [MHz]	Mod	SCC UL # RB	SCC UL RB Offset	SCC [DL] Ch.	SCC [DL] Freq. [MHz]	DL Ant. Config.	ULCA Tx Power with add'l CA config. active on [DL dBm]	ULCA Tx Power (dBm)
CA [7C]	LTE B7	20	20850	2510	QPSK	50	50	2850	2630	4x4	LTE B7	20	21048	2529.8	QPSK	50	0	3048	2648	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	28.50 (± 0.75)	20.15 (± 0.75)	28.85	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	19.88	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	13.82	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	22.50 (± 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	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	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	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	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	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	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	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	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	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	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	16.50	15.00					
		56	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		60	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00					
		64	8.00	6.50	11.00	9.50	13.50	12.00	13.50	12.00					
		100	7.75	6.25	10.75	9.25	13.50	12.00	13.50	12.00					
		104	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		108	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		112	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		116	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		120	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		124	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		128	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		132	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		136	7.75	6.25	10.75	9.25	13.50	12.00	13.50	12.00					
		140	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50					
		144	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00					
		149	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		153	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		157	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		161	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
		165	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00					
	40 MHz Bandwidth	38	8.00	6.50	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50			
		46	8.00	6.50	11.00	9.50	14.00	12.50	16.00	14.50	16.00	14.50			
		54	8.00	6.50	11.00	9.50	14.00	12.50	16.50	15.00	16.50	15.00			
		62	8.00	6.50	10.50	9.00	10.50	9.00	10.00	8.50	10.50	9.00			
		102	7.75	6.25	10.00	8.50	10.00	8.50	10.00	8.50	10.00	8.50			
		110	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00	16.50	15.00			
		118	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00	16.50	15.00			
		126	7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00	16.50	15.00			
		134	7.75	6.25	10.75	9.25	13.00	11.50	13.00	11.50	13.00	11.50			
		142	7.75	6.25	10.75	9.25	13.75	12.25	10.00	8.50	16.50	15.00			
		151	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00			
		159	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00	15.50	14.00			
		80 MHz Bandwidth	42	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
			58	8.00	6.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
			106	7.75	6.25	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
	122		7.75	6.25	10.75	9.25	13.75	12.25	16.50	15.00	16.50	15.00	16.50	15.00	
	138		7.75	6.25	10.75	9.25	13.75	12.25	10.00	8.50	13.00	11.50	16.50	15.00	
	155		14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	14.50	13.00	

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 4 of 19

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

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 5 of 19

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

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

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1.2.2 Reduced 802.11ax RU WLAN Output Power

E. Ant 2a

Below table is applicable in the following conditions:

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

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

Below table is applicable in the following conditions:

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

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

F. Ant 4a

Below table is applicable in the following conditions:

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

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

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Below table is applicable in the following conditions:

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

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

G. 5GHz ANTlower

Below table is applicable in the following conditions:

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

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

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Below table is applicable in the following conditions:

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

Mode/ Band		Tones	26T		52T		106T		242T		484T		996T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) CDD - 5GHz ANTower	20 MHz Bandwidth	36	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		40	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		44	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		48	8.00	6.50	11.00	9.50	12.00	10.50	12.00	10.50				
		52	8.00	6.50	11.00	9.50	12.00	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

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Below table is applicable in the following conditions:

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

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

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H. 5GHz ANTupper

Below table is applicable in the following conditions:

-Simultaneous conditions with Licensed Bands Antenna 3

-Simultaneous conditions with LTE Inter-band ULCA

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

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Below table is applicable in the following conditions:

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

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

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Below table is applicable in the following conditions:

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

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

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1.3 IEEE 802.11ax Measured Powers

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

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

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

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

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

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

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

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

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

40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)			40MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index								RU Index		
					0	8	17						37	40	44
	1	5190	38	26T	10.50	11.00	10.78		1	5190	38	52T	11.19	11.91	11.41
		5230	46	26T	10.88	11.00	11.00			5230	46	52T	13.19	13.29	13.07
	2A	5270	54	26T	10.75	11.00	11.00		2A	5270	54	52T	13.34	13.76	13.46
		5310	62	26T	10.50	10.96	11.00			5310	62	52T	11.08	11.25	11.08
	2C	5510	102	26T	10.74	10.82	11.00		2C	5510	102	52T	10.64	10.71	10.61
		5550	110	26T	10.93	11.00	11.00			5550	110	52T	13.41	13.17	13.37
		5590	118	26T	10.97	10.96	11.00			5590	118	52T	13.64	13.19	13.35
		5670	134	26T	11.00	11.00	11.00			5670	134	52T	13.53	13.51	13.44
		5710	142	26T	10.99	11.00	11.00			5710	142	52T	13.34	13.49	13.22
		5755	151	26T	15.20	15.49	15.50			3	5755	151	52T	14.90	15.09
	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	10.21
	2C	5610	122	26T	10.95	11.00	11.00		2C		5610	122	52T	13.76	13.86	13.73
		5690	138	26T	11.00	11.00	11.00			2C	5690	138	52T	13.90	14.00	13.98
		5775	155	26T	15.34	15.50	15.50				3	5775	155	52T	15.45	15.50

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

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

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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		
	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	10.63	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		5610	122	996T	14.96														
													5690											
	5775	155	484T	15.47	15.46		5775	155	996T	15.48														

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 19 of 19

APPENDIX I: DIPOLE CALIBRATION



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

Accreditation No.: **SCS 0108**

Client: **PG-Test**

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

CALIBRATION CERTIFICATE

Object: **D750V3 - SN:1097**

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

Calibration date: **September 08, 2017**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292763	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

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

Approved by: **Katja Pokóvic** Technical Manager

Signature:

Issued: September 8, 2017

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



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

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:* SAR measured at the stated antenna input power.
- SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

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

SAR result with Head TSL

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

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.39 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.5 $\pm$ 6 %	0.96 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

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

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.68 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.4 Ω - 0.6 j Ω
Return Loss	- 27.5 dB

Antenna Parameters with Body TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.034 ns
----------------------------------	----------

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:

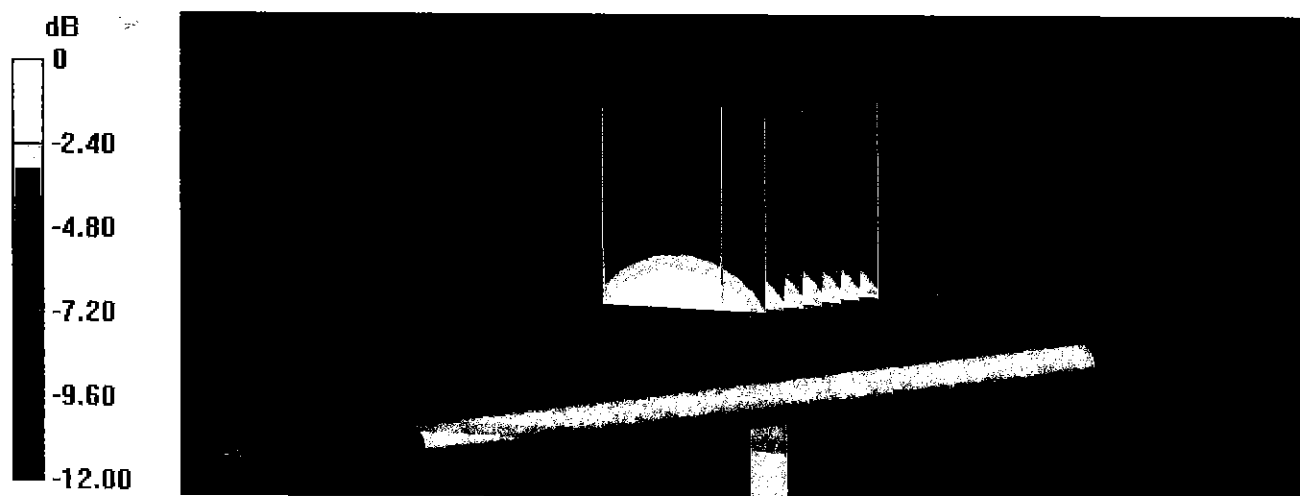
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

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:

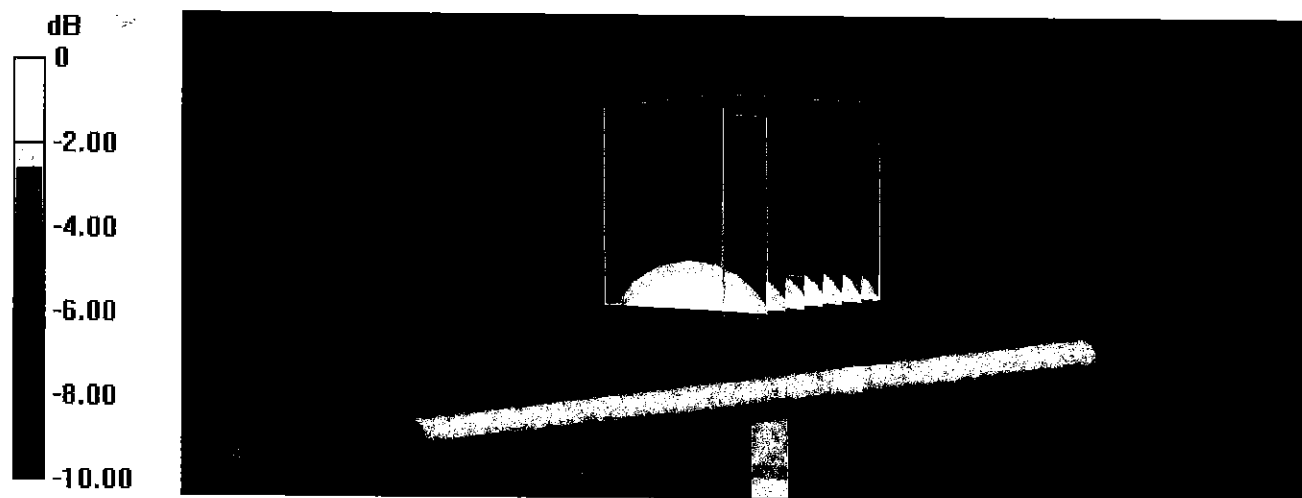
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

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.

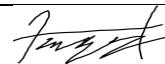
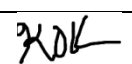
Extended Calibration date: September 08, 2018

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

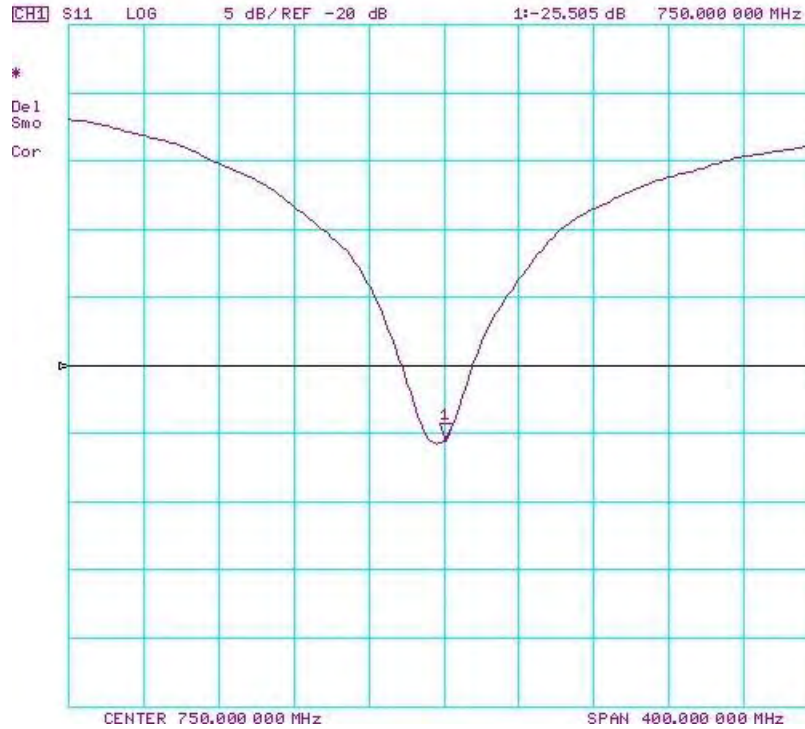
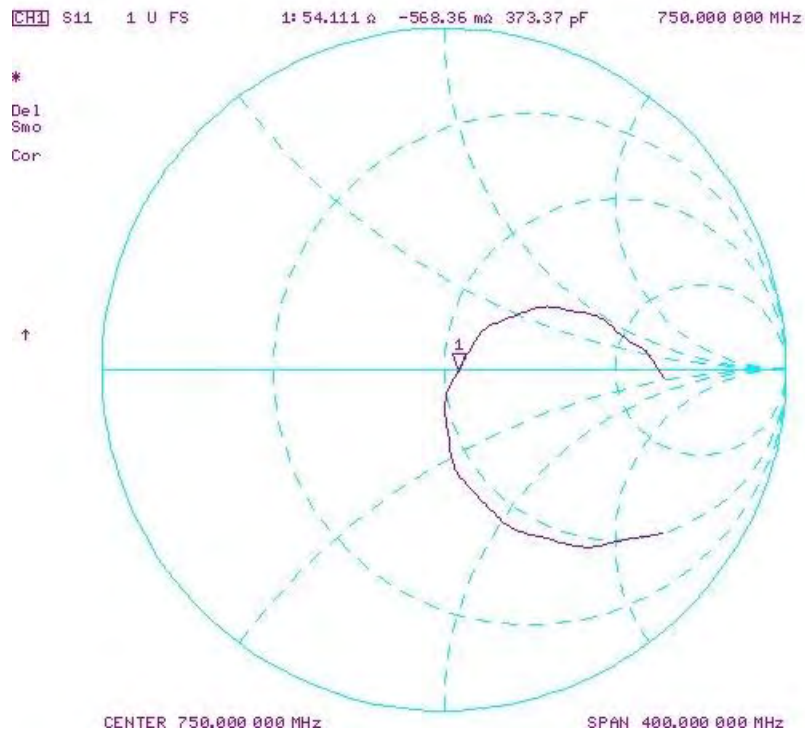
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

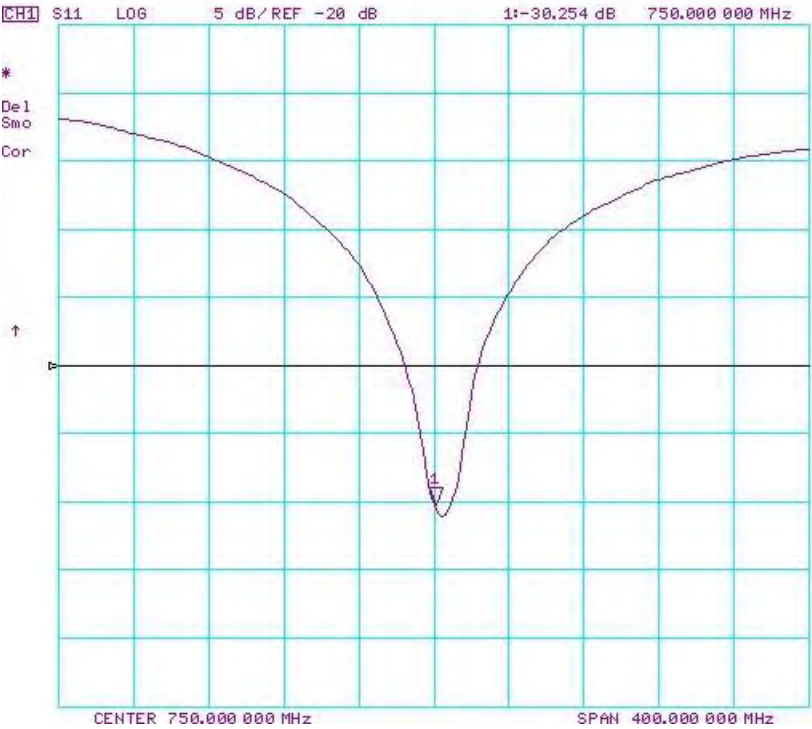
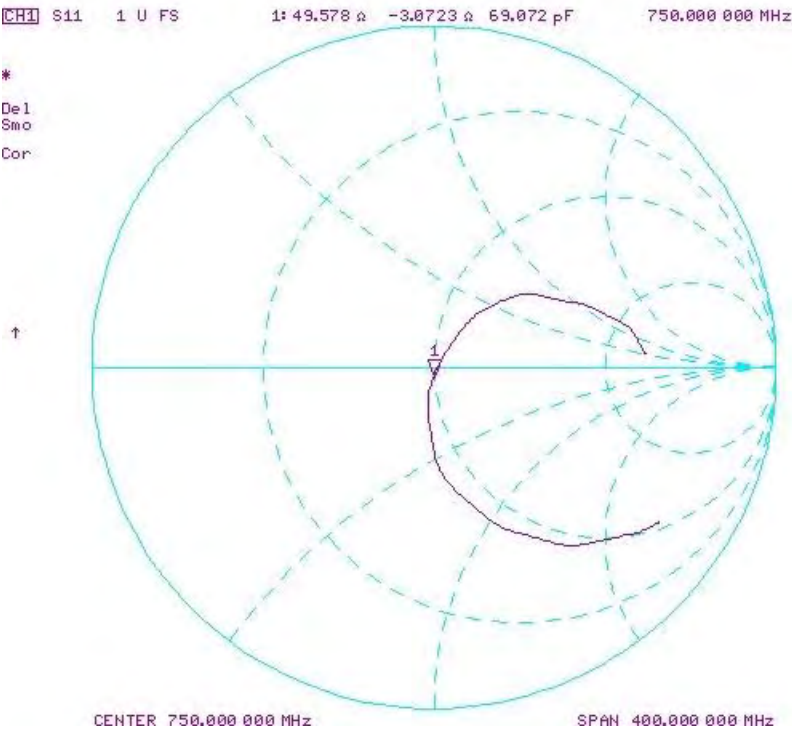
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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 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	9/8/2018	1.034	1.644	1.7	3.41%	1.078	1.12	3.90%	54.4	54.1	0.3	-0.6	-0.6	0	-27.5	-25.5	7.30%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/8/2017	9/8/2018	1.034	1.712	1.78	3.97%	1.136	1.17	2.99%	50	49.6	0.4	-3.6	-3.1	0.5	-28.8	-30.3	-5.20%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object D750V3 – SN: 1097

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

Extended Calibration date: September 8, 2019

Description: SAR Validation Dipole at 750 MHz.

Calibration Equipment used:

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

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

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

DIPOLE CALIBRATION EXTENSION

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

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

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

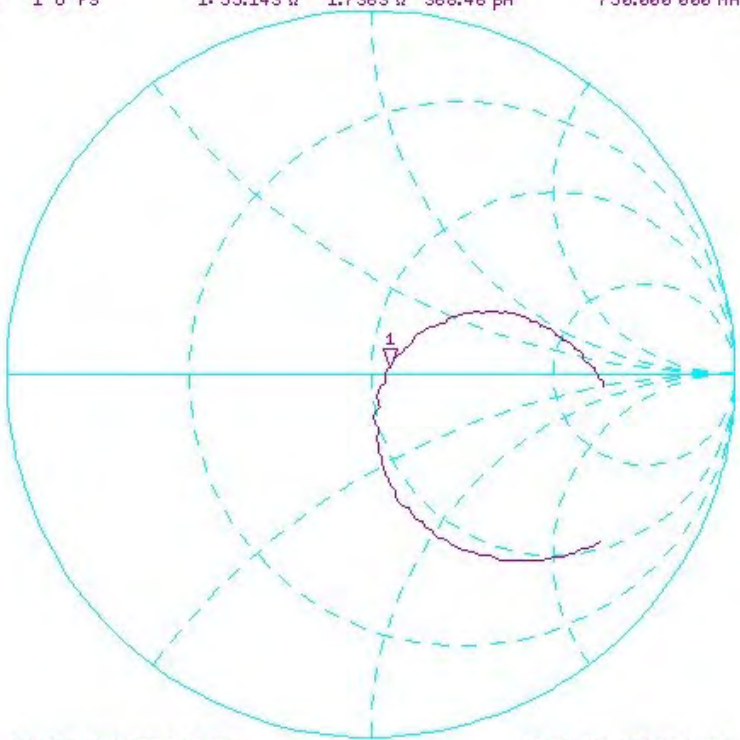
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance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

Impedance & Return-Loss Measurement Plot for Head TSL

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

*
De1
Cor

↑



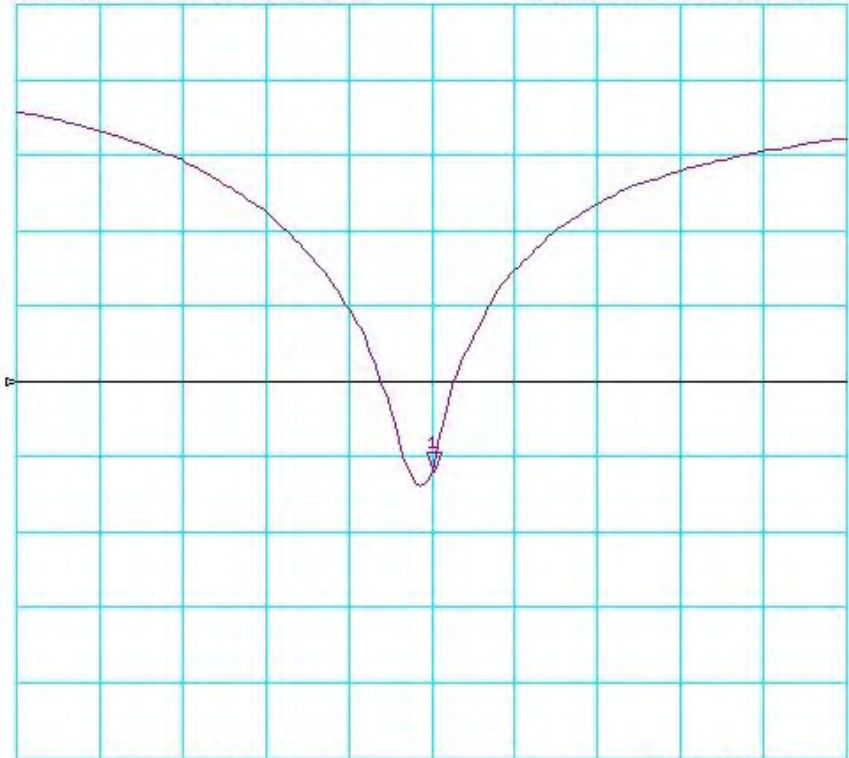
CENTER 750.000 000 MHz

SPAN 400.000 000 MHz

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

*
De1
Smo
Cor

↑



CENTER 750.000 000 MHz

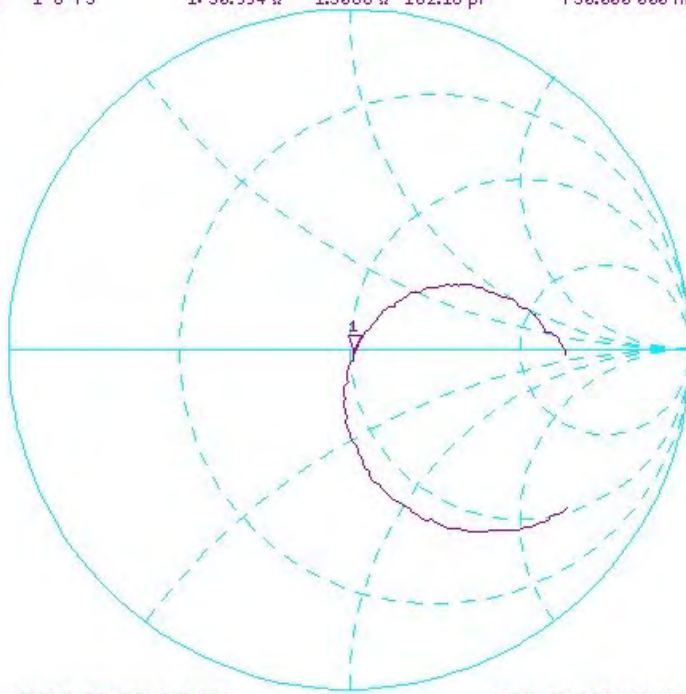
SPAN 400.000 000 MHz

Impedance & Return-Loss Measurement Plot for Body TSL

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

*
De1
Cor

↑



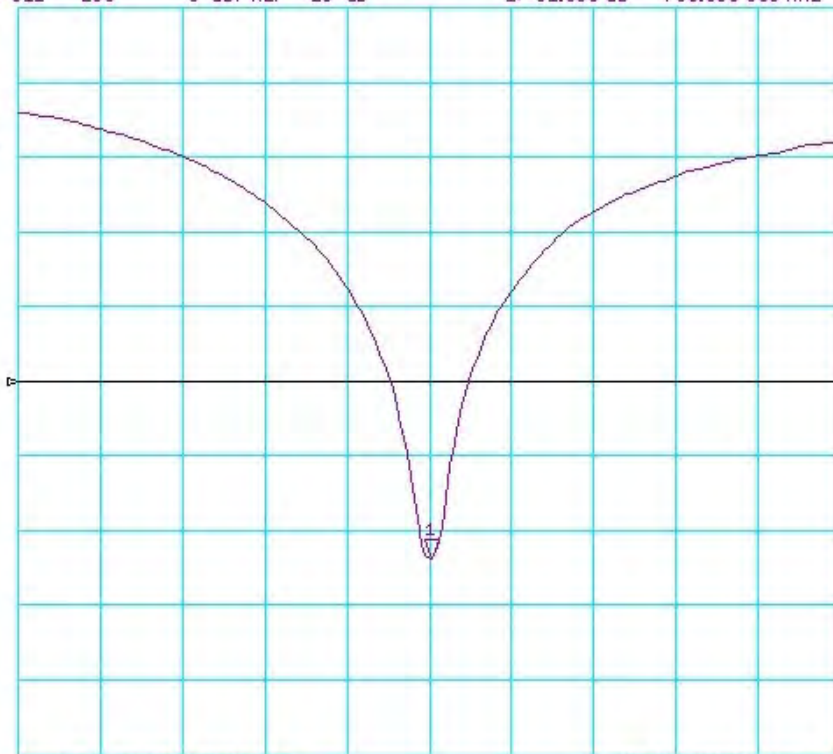
CENTER 750.000 000 MHz

SPAN 400.000 000 MHz

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

*
De1
Smo
Cor

↑



CENTER 750.000 000 MHz

SPAN 400.000 000 MHz



Accredited by the Swiss Accreditation Service (SAS)
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 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:

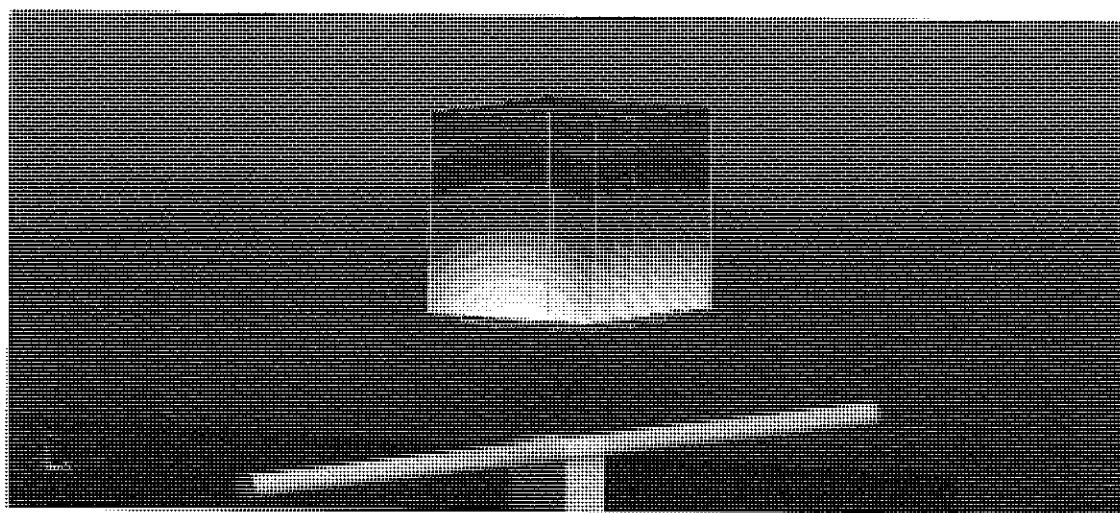
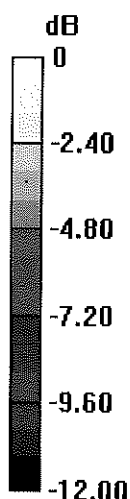
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

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

Peak SAR (extrapolated) = 3.60 W/kg

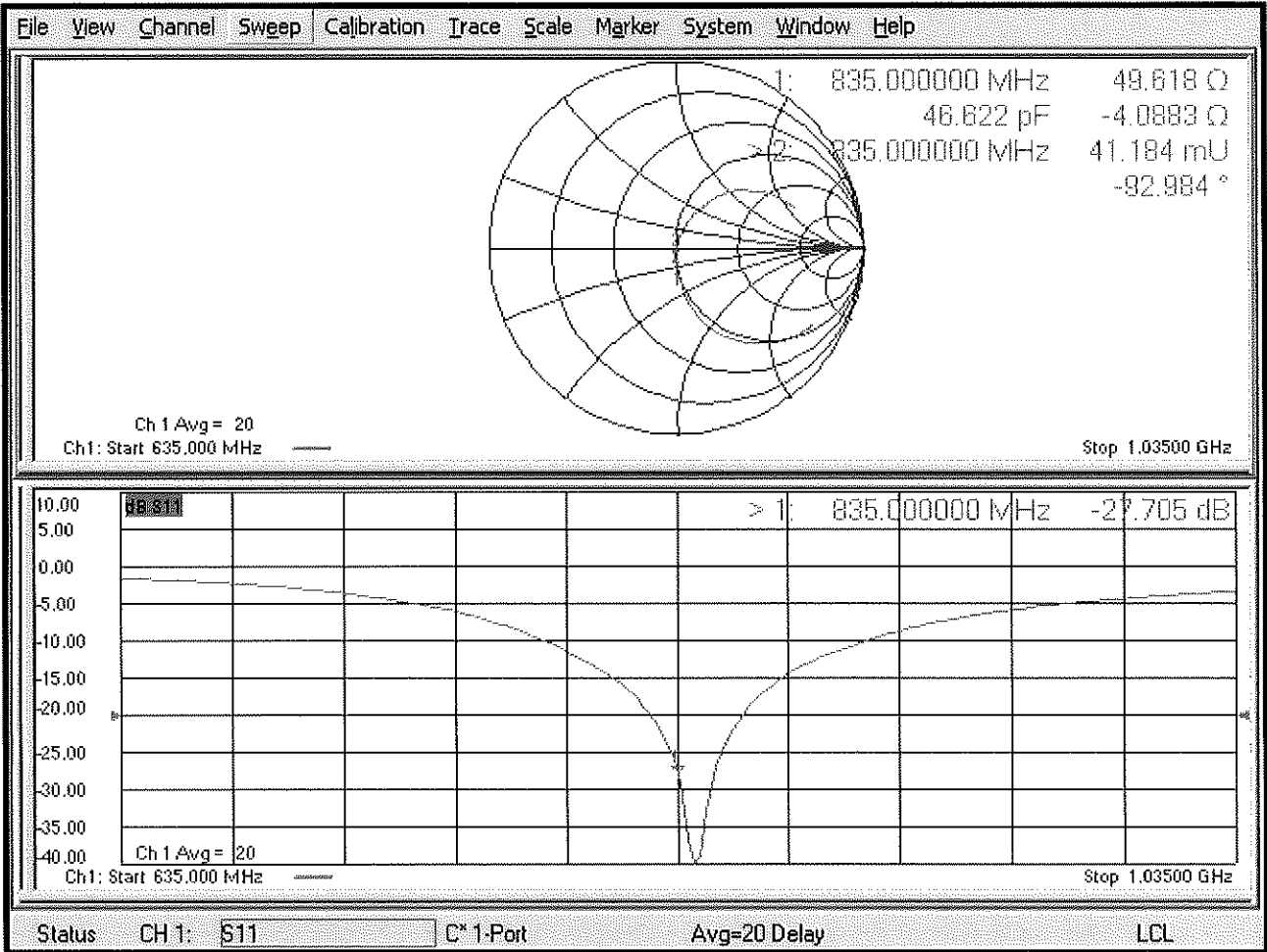
SAR(1 g) = 2.39 W/kg ; SAR(10 g) = 1.54 W/kg

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:

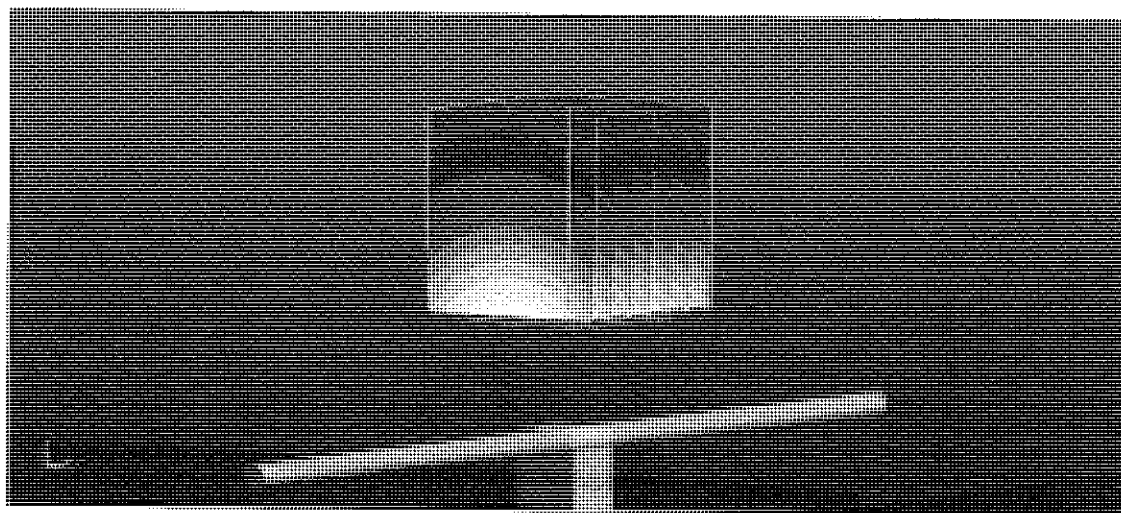
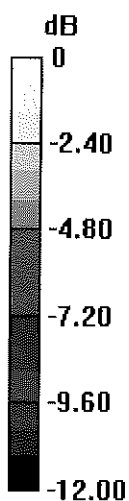
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

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

Peak SAR (extrapolated) = 3.59 W/kg

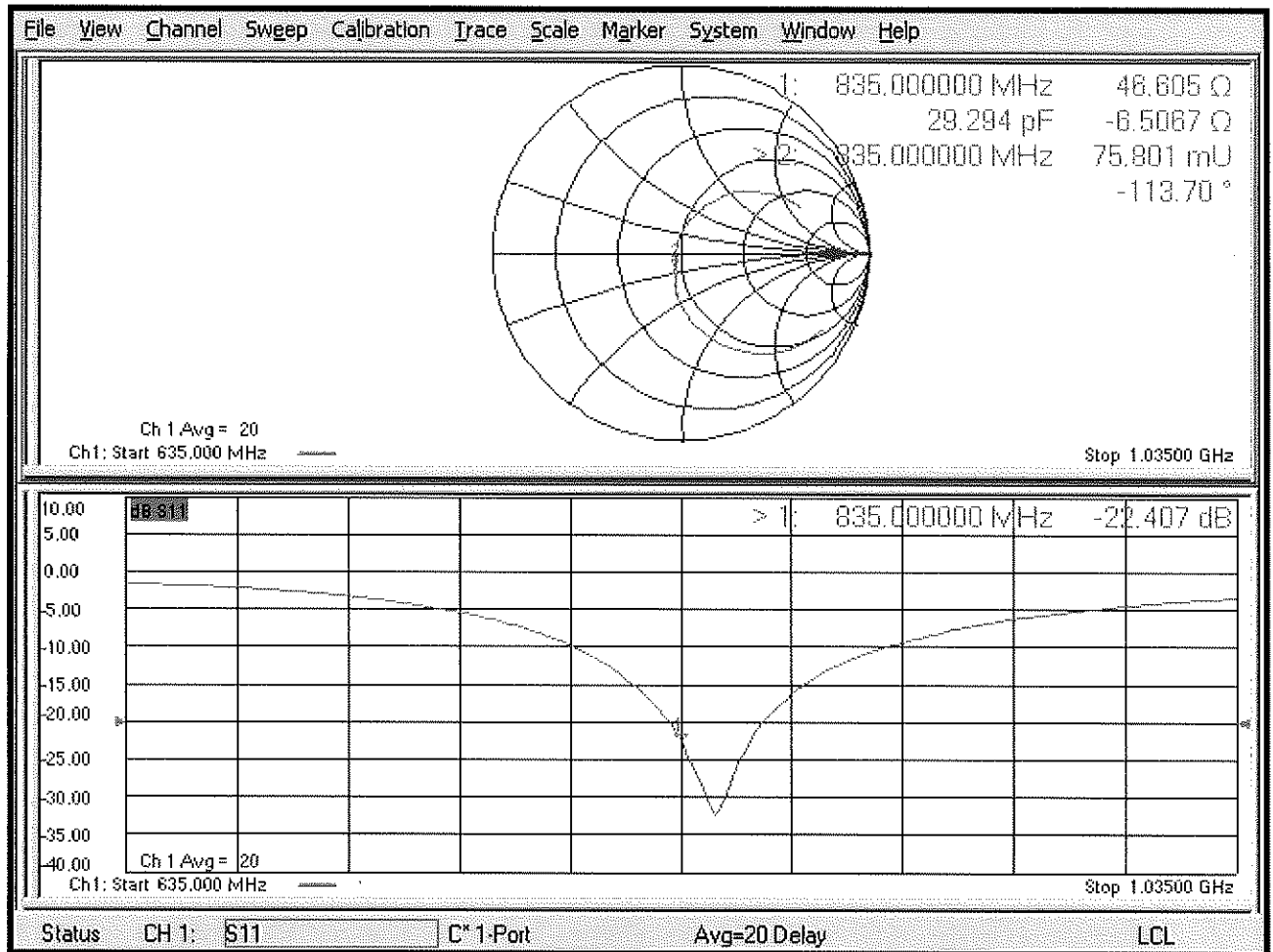
SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.57 W/kg

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

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 19.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

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

Phantom section: Flat Section

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

DASY52 Configuration:

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

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

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

Reference Value = 105.8 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 16.7 W/kg

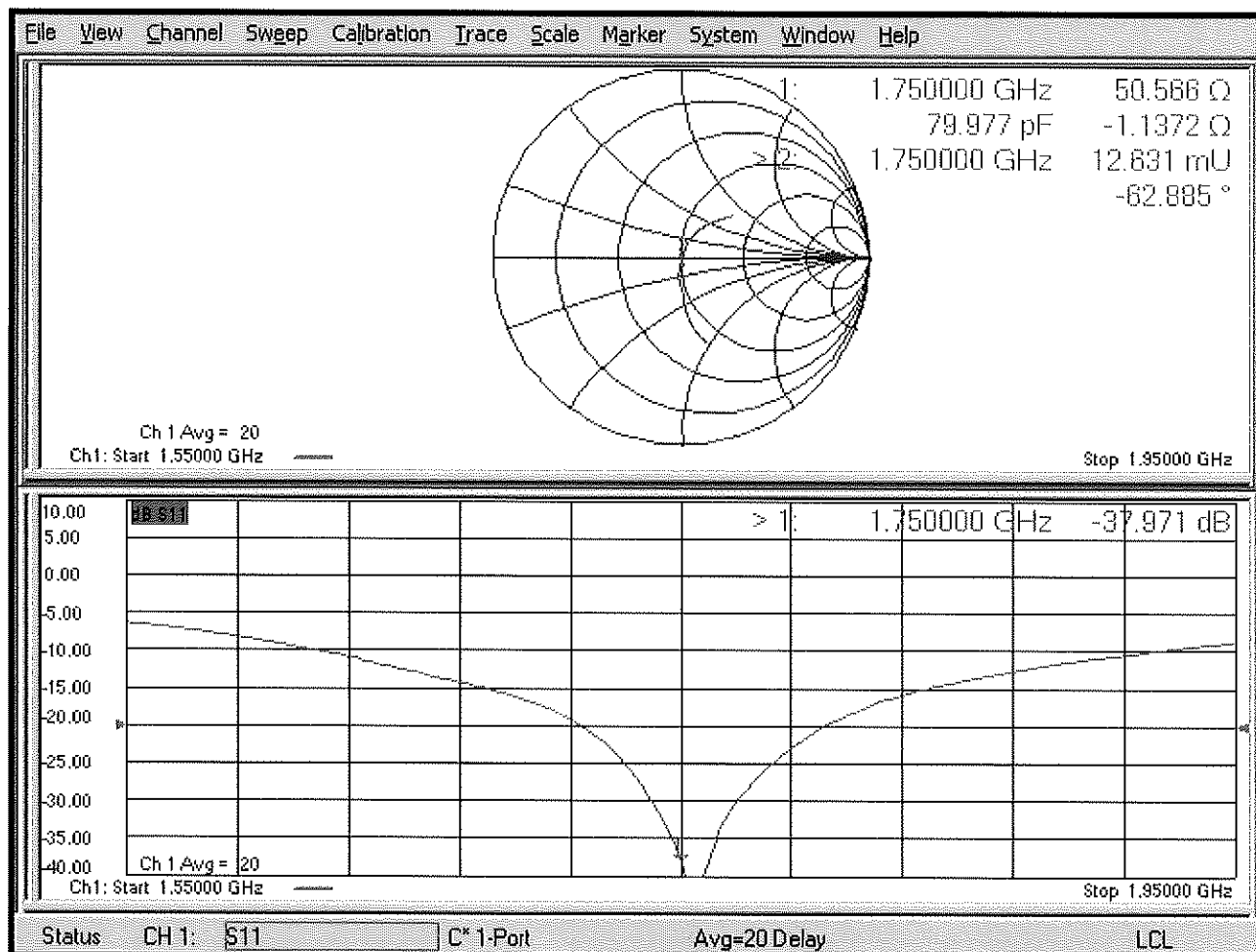
SAR(1 g) = 8.91 W/kg; SAR(10 g) = 4.7 W/kg

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



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

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

Phantom section: Flat Section

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

DASY52 Configuration:

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

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

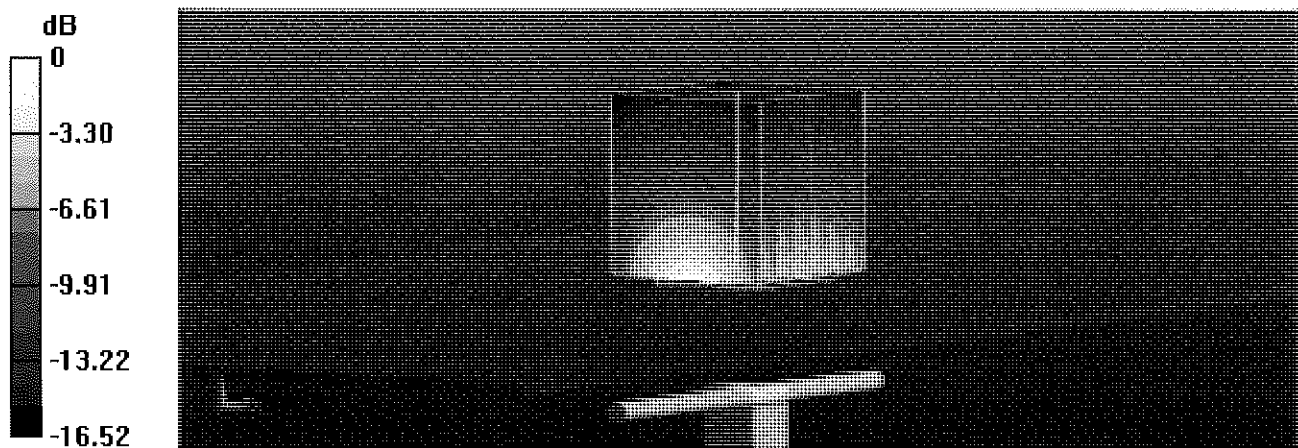
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 16.2 W/kg

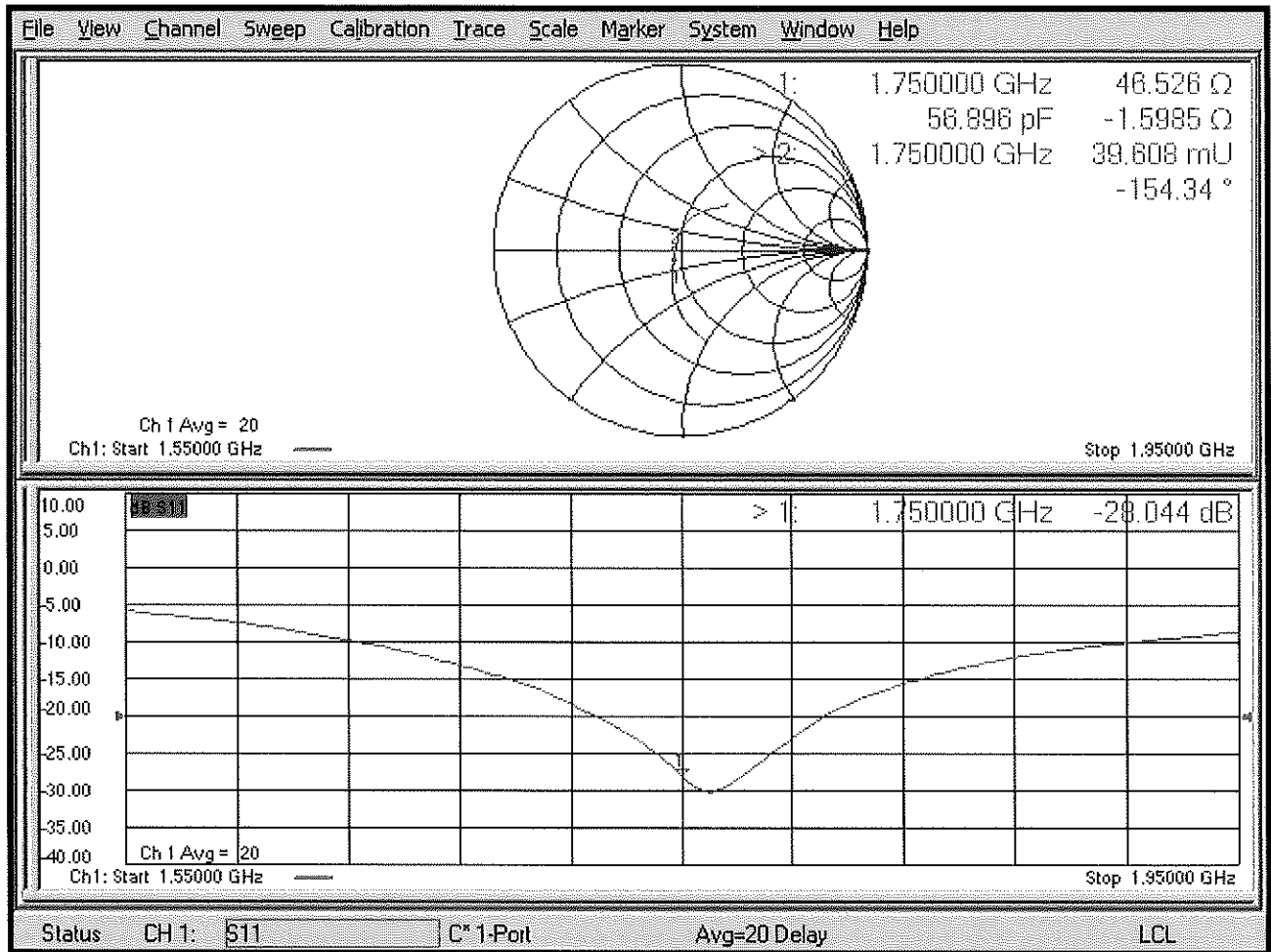
SAR(1 g) = 9.14 W/kg; SAR(10 g) = 4.88 W/kg

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



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

Impedance Measurement Plot for Body TSL





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: **D1750V2-1092_May18**

CALIBRATION CERTIFICATE

Object **D1750V2 - SN:1092**

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

Calibration date: **May 15, 2018**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

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

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

Issued: May 17, 2018

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	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 cm ³ (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 cm ³ (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 cm ³ (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 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.81 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	19.4 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.2 Ω - 1.0 j Ω
Return Loss	- 37.8 dB

Antenna Parameters with Body TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.217 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 07, 2012

DASY5 Validation Report for Head TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

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

Phantom section: Flat Section

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

DASY52 Configuration:

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

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

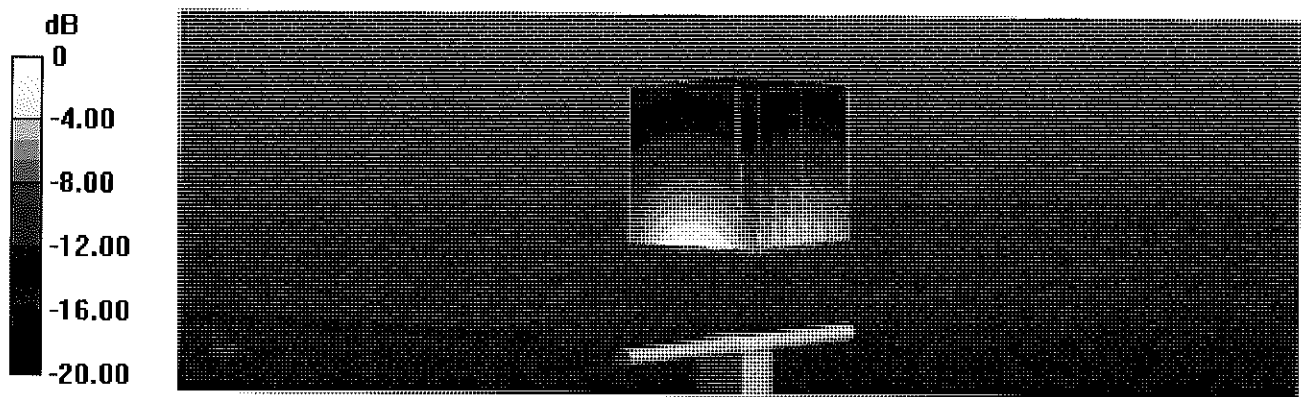
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 16.3 W/kg

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

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



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

Impedance Measurement Plot for Head TSL

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

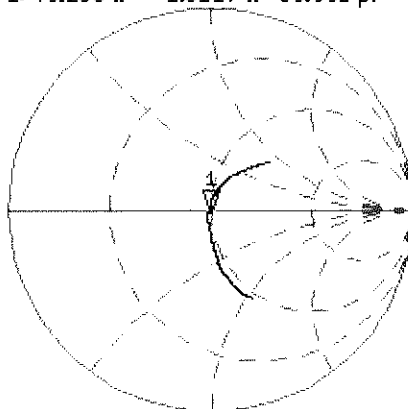
*

Del

CA

Avg
16

H1d

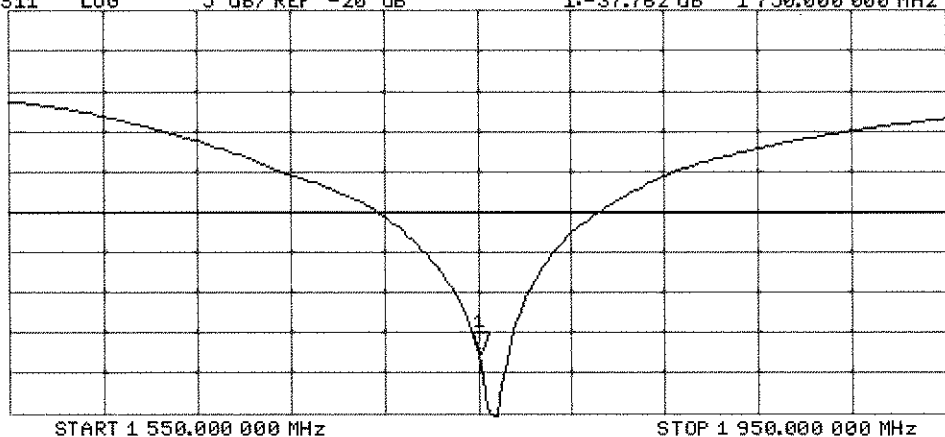


CH2 S11 LOG 5 dB/REF -20 dB 1: -37.762 dB 1 750.000 000 MHz

CA

Avg
16

H1d



DASY5 Validation Report for Body TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.46$ S/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.35, 8.35, 8.35) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

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

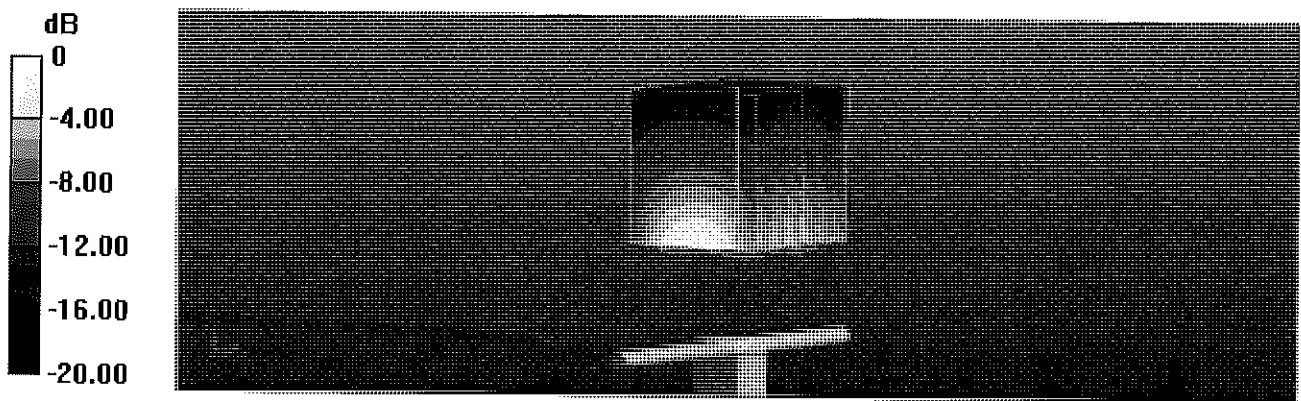
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 15.8 W/kg

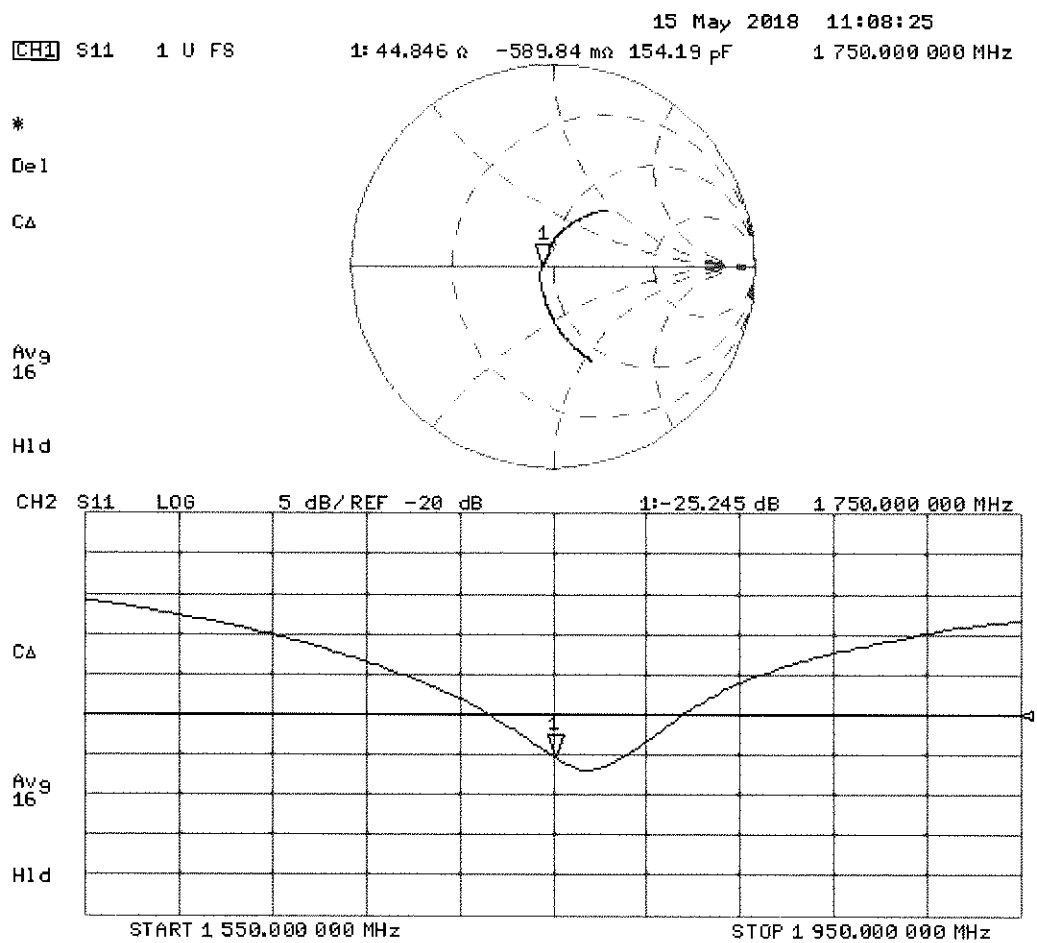
SAR(1 g) = 8.99 W/kg; SAR(10 g) = 4.81 W/kg

Maximum value of SAR (measured) = 13.4 W/kg



0 dB = 13.4 W/kg = 11.27 dBW/kg

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D1750V2 – SN: 1092

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

Extended Calibration date: May 15, 2019

Description: SAR Validation Dipole at 1750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	N5182A	MXG Vector Signal Generator	6/15/2018	Annual	6/15/2019	MY47420837
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAKS-3.5	Portable DAK	9/11/2018	Annual	9/11/2019	1045
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7416
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/10/2018	Annual	7/10/2019	1402

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

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

DIPOLE CALIBRATION EXTENSION

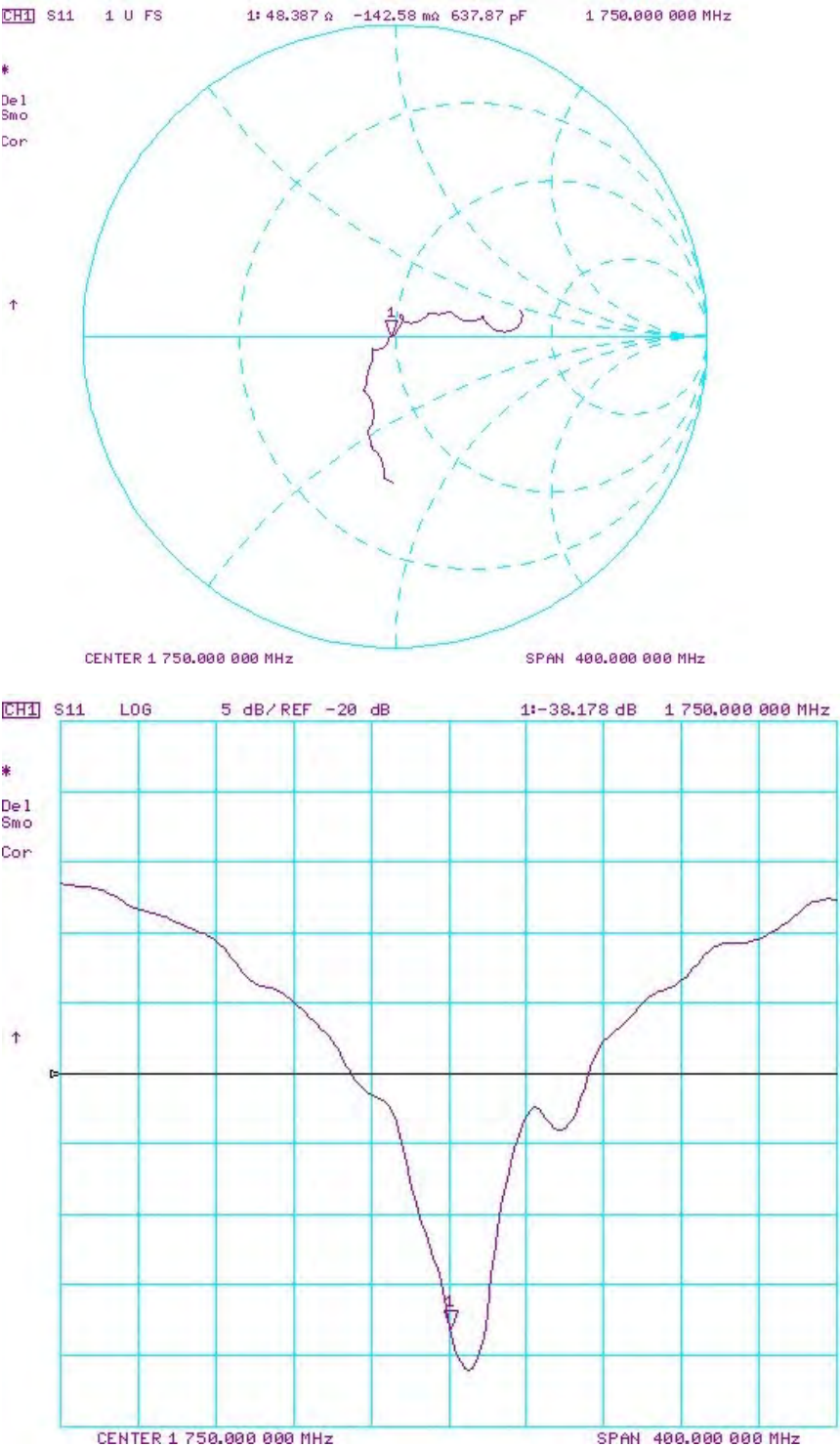
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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

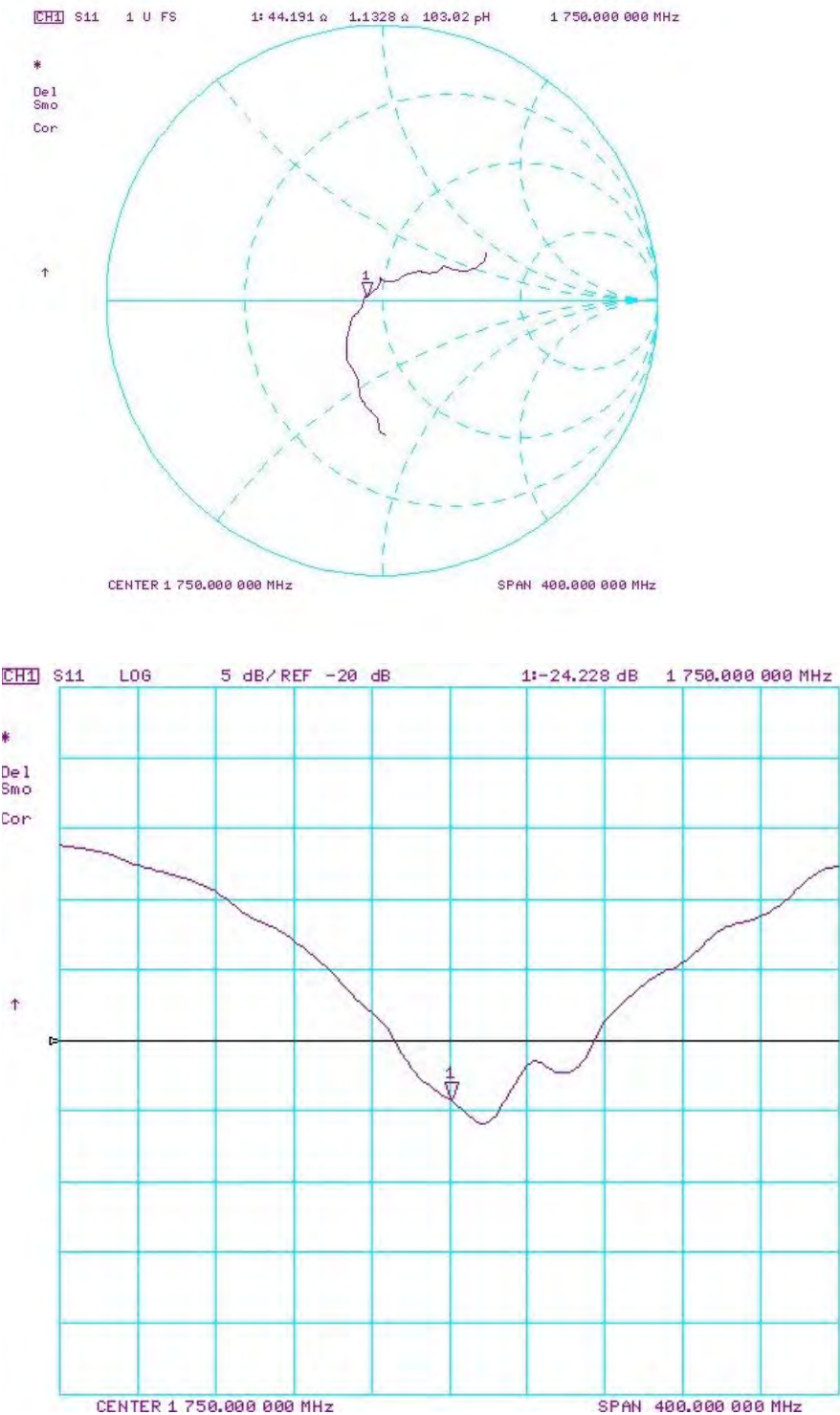
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5/15/2018	5/15/2019	1.217	3.61	3.59	-0.55%	1.9	1.89	-0.53%	49.2	49.4	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





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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D1900V2-5d026_May18**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d026**

Calibration procedure(s) **Cal. Cal-15 v10
 Calibration procedure for cable validation with above 700 MHz**

Calibration date: **May 14, 2018**

SC ✓
 7/31/2018

BN ✓
 06/01/2019

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

Calibrated by: **Jeton Kastrati** Name **Laboratory Technician** Function

Signature

Approved by: **Katja Pokovic** Technical Manager

Signature

Issued: May 14, 2018

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



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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**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:* SAR measured at the stated antenna input power.
- SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

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

DASY Version	DASY5	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.2 $\pm$ 6 %	1.35 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.78 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.2 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.19 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.1 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.3 $\pm$ 6 %	1.46 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.65 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.9 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.19 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.2 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$53.0 \Omega + 8.0 j\Omega$
Return Loss	- 21.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$47.1 \Omega + 7.4 j\Omega$
Return Loss	- 21.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 17, 2002

DASY5 Validation Report for Head TSL

Date: 14.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.35 \text{ S/m}$; $\epsilon_r = 41.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(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:

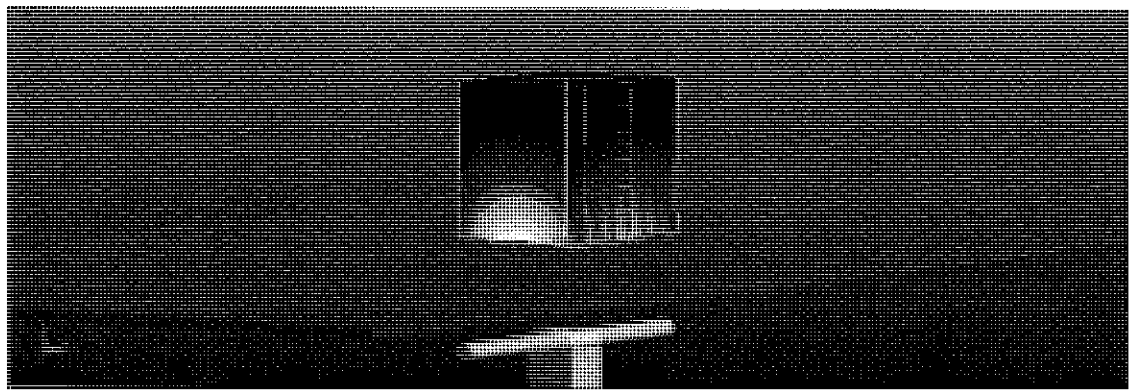
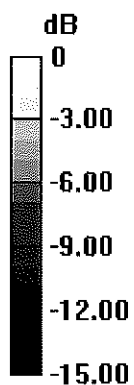
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

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

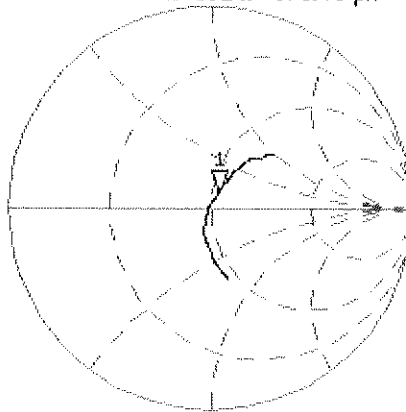


0 dB = 15.0 W/kg = 11.76 dBW/kg

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

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 Del
 CA



Avg
 16

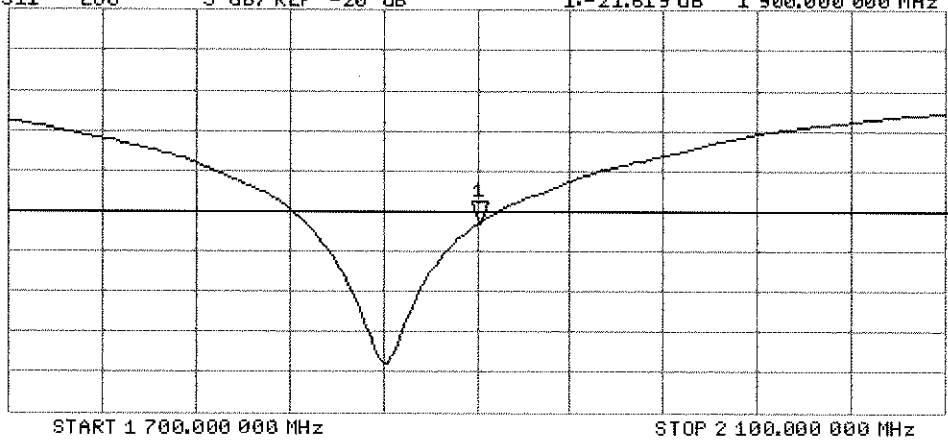
H1d

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:

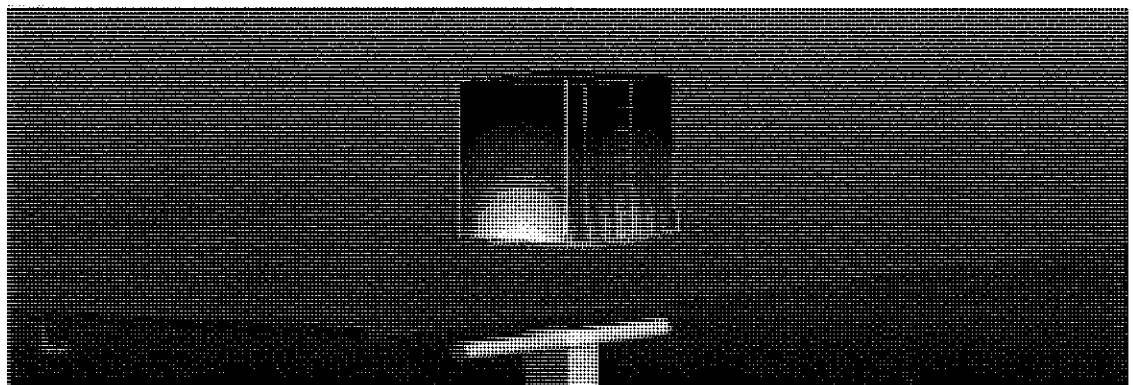
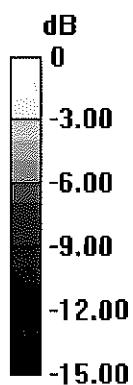
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

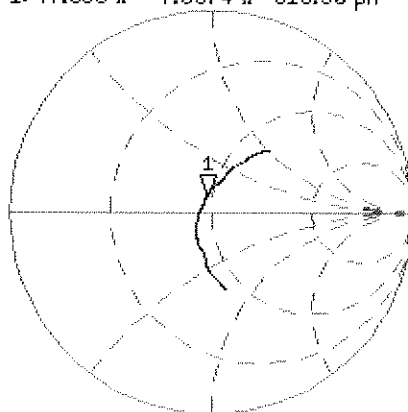


0 dB = 14.4 W/kg = 11.58 dBW/kg

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 pF 1 900.000 000 MHz

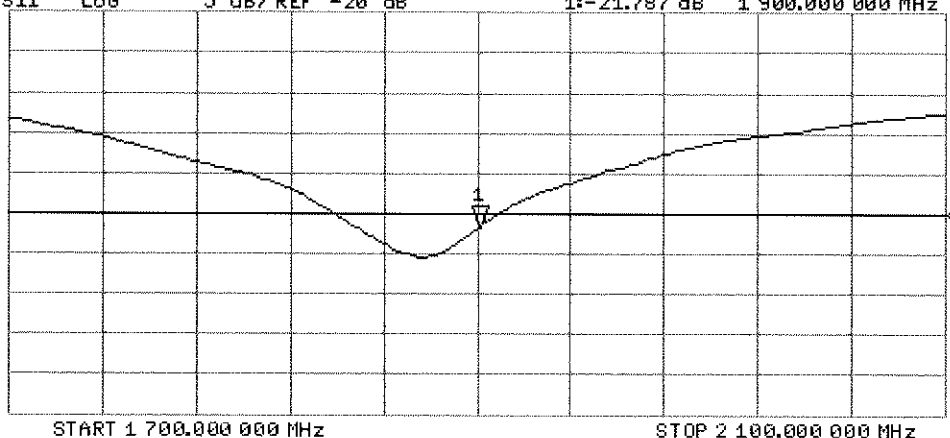
*
 Del
 CA



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

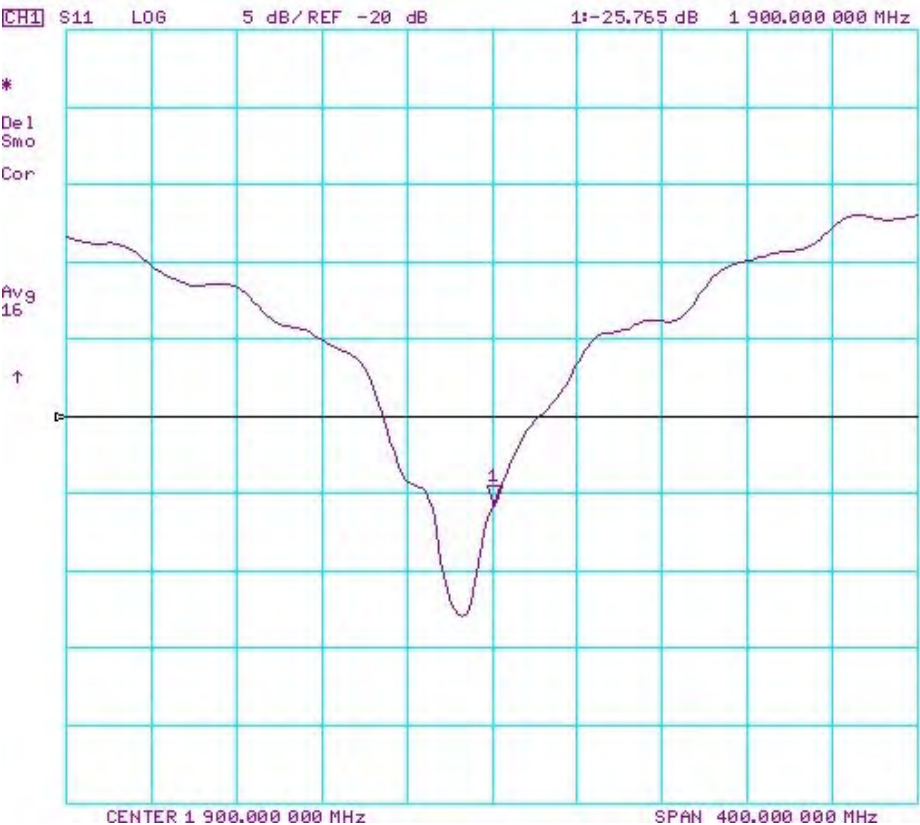
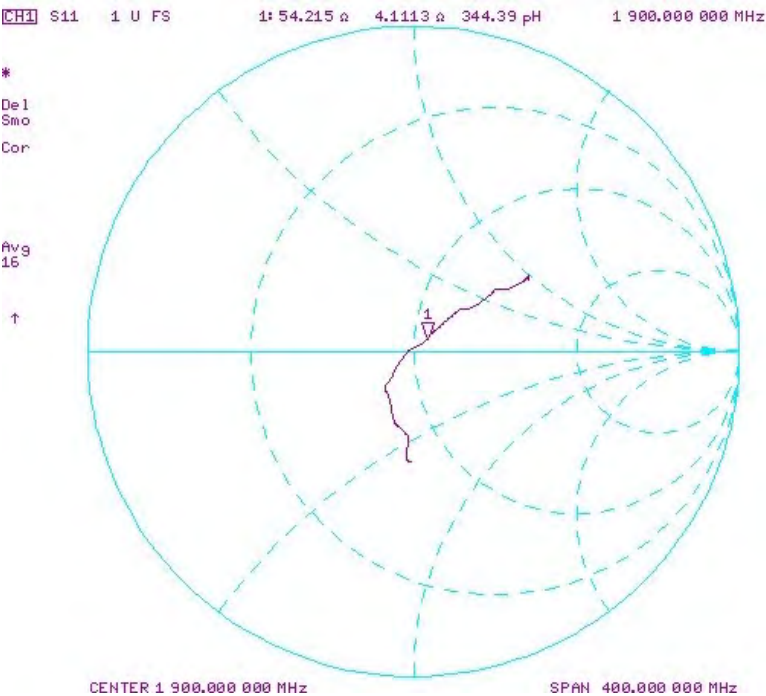
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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 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
5/14/2018	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

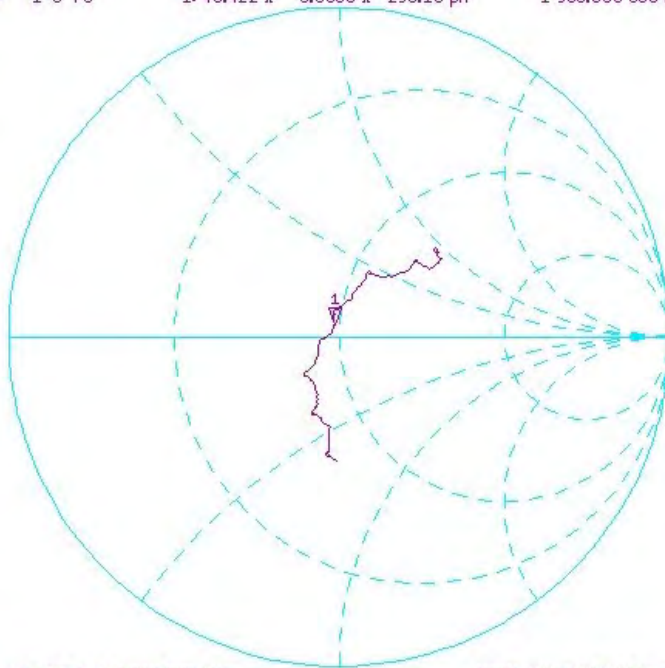
Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL

[CH1] S11 1 U FS 1: 48.422 Ω 3.5000 Ω 293.18 pF 1 900.000 000 MHz

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Avg
16
↑

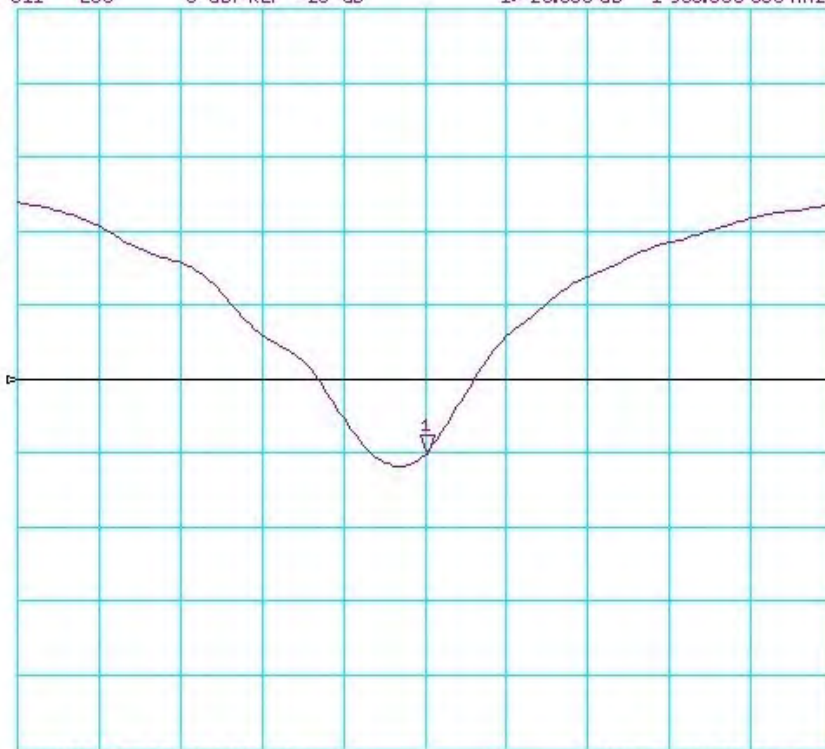


CENTER 1 900.000 000 MHz

SPAN 400.000 000 MHz

[CH1] S11 LOG 5 dB/REF -20 dB 1:-25.083 dB 1 900.000 000 MHz

*
De1
Smo
Cor
Avg
16
↑



CENTER 1 900.000 000 MHz

SPAN 400.000 000 MHz

Object:

D1900V2 – SN: 5d026

Date Issued:

05/14/2019

Page 4 of 4

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



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: **D1900V2-5d181_Sep17**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d181**

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

SC ✓
10/03/2017

Calibration date: **September 07, 2017**

SC ✓
9/7/2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

BN ✓
10/10/2019

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02526)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

Calibrated by: **Jeton Kastrali** Function: **Laboratory Technician**

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)
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	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.0 $\pm$ 6 %	1.38 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.85 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.5 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.6 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	54.3 $\pm$ 6 %	1.47 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.65 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.5 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.9 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$53.7 \Omega + 4.6 j\Omega$
Return Loss	- 24.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$49.2 \Omega + 5.6 j\Omega$
Return Loss	- 24.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.200 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 23, 2013

DASY5 Validation Report for Head TSL

Date: 07.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.38$ S/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.43, 8.43, 8.43); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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

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

Reference Value = 106.8 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 18.5 W/kg

SAR(1 g) = 9.85 W/kg; SAR(10 g) = 5.15 W/kg

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

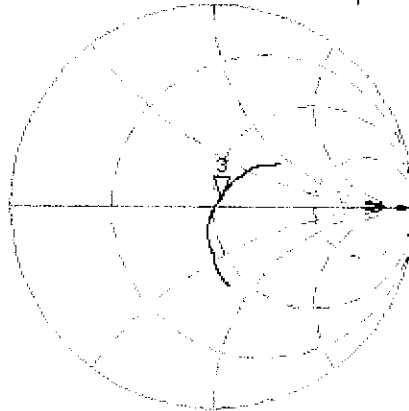


0 dB = 14.8 W/kg = 11.70 dBW/kg

Impedance Measurement Plot for Head TSL

7 Sep 2017 09:10:32
 CH1 S11 1 U FS 3: 53.668 Ω 4.5957 Ω 384.96 μH 1 900.000 000 MHz

*
 Del
 CA



Avg
 16

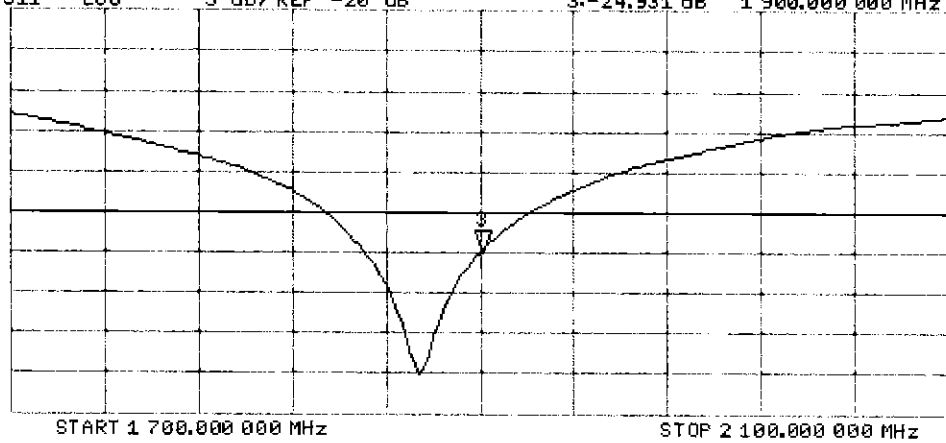
H1d

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

CA

Avg
 16

H1d



DASY5 Validation Report for Body TSL

Date: 07.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.47$ S/m; $\epsilon_r = 54.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.2, 8.2, 8.2); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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

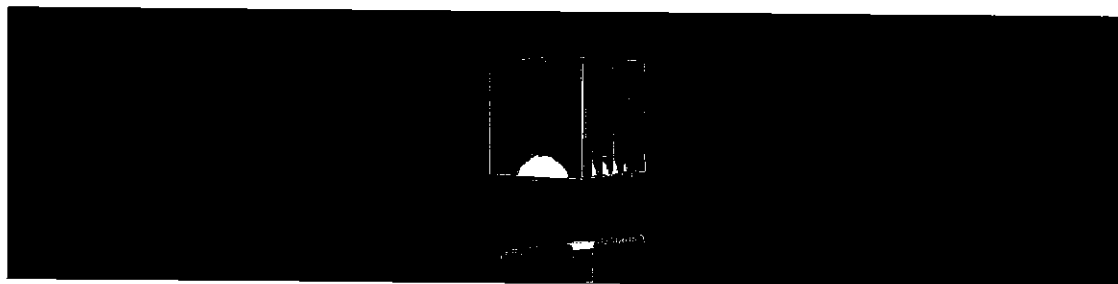
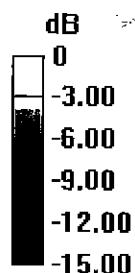
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.4 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 17.0 W/kg

SAR(1 g) = 9.65 W/kg; SAR(10 g) = 5.14 W/kg

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

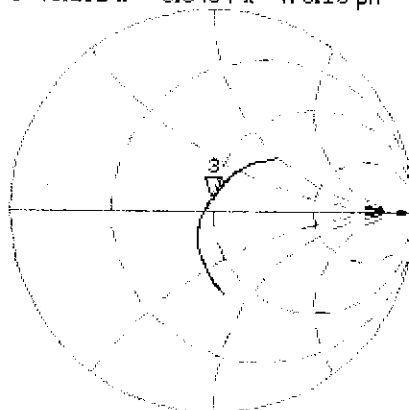


0 dB = 13.8 W/kg = 11.40 dBW/kg

Impedance Measurement Plot for Body TSL

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

*
 Del
 CA



Avg
 15

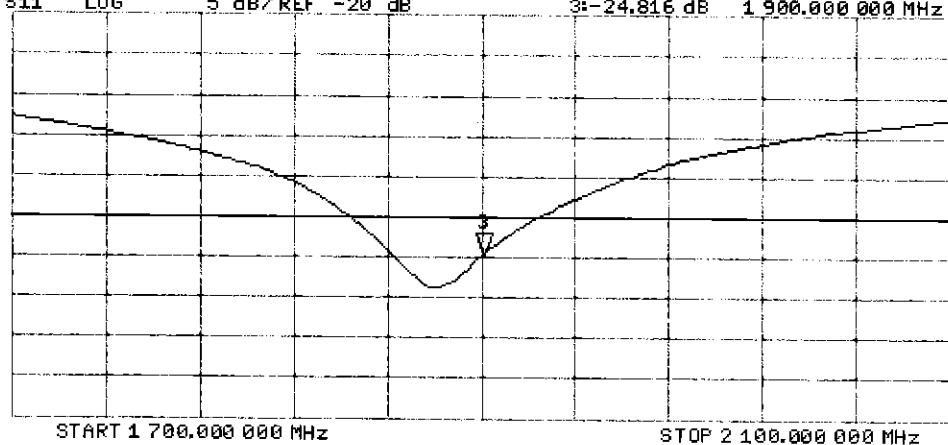
H1d

CH2 S11 LOG 5 dB/REF -20 dB 3: -24.816 dB 1 900.000 000 MHz

CA

Avg
 15

H1d



START 1 700.000 000 MHz

STOP 2 100.000 000 MHz

Certification of Calibration

Object D1900V2 – SN: 5d181

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

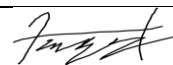
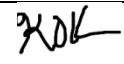
Extended Calibration date: September 07, 2018

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	9/14/2017	Annual	9/14/2018	US39170118
Agilent	N5182A	MXG Vector Signal Generator	3/19/2018	Annual	3/19/2019	US46240505
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2496A	Power Meter	10/9/2017	Annual	10/9/2018	1138001
Anritsu	MA2411B	Pulse Power Sensor	11/15/2017	Annual	11/15/2018	1339007
Anritsu	MA2411B	Pulse Power Sensor	11/22/2017	Annual	11/22/2018	1339008
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/14/2017	Biennial	2/14/2019	170112507
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/15/2018	Annual	5/15/2019	1070
SPEAG	ES3DV3	SAR Probe	9/18/2017	Annual	9/18/2018	3287
SPEAG	DAE4	Data Acquisition Electronics	1/26/2018	Annual	1/26/2019	1533
SPEAG	ES3DV3	SAR Probe	3/13/2018	Annual	3/13/2019	3131
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/7/2018	Annual	3/7/2019	604

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

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

DIPOLE CALIBRATION EXTENSION

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

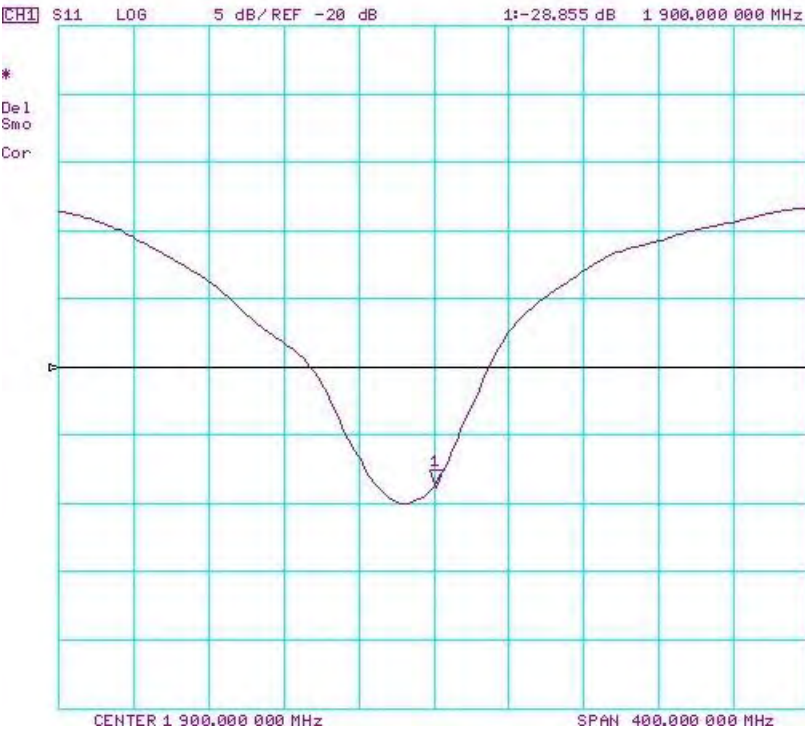
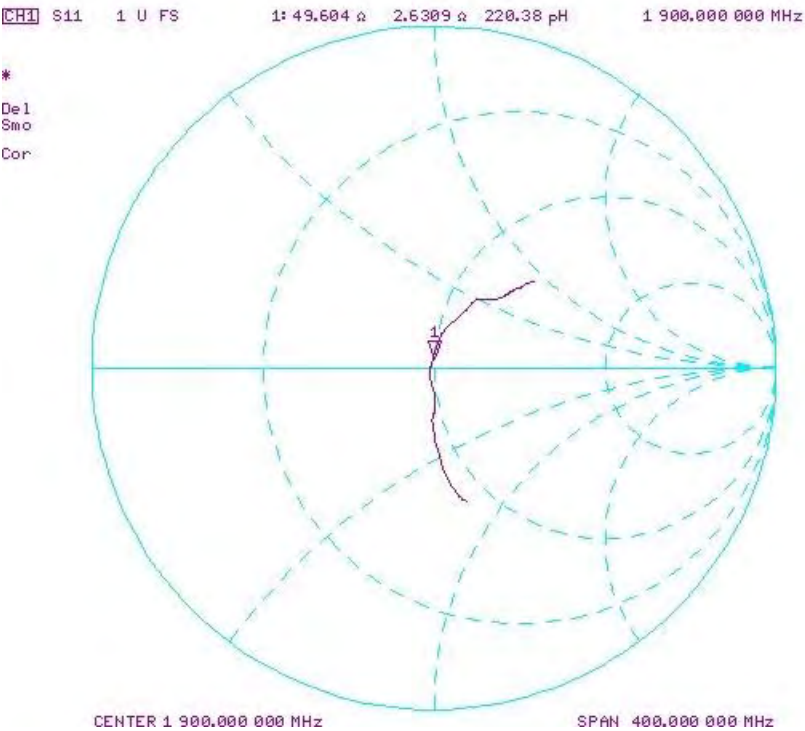
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does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

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

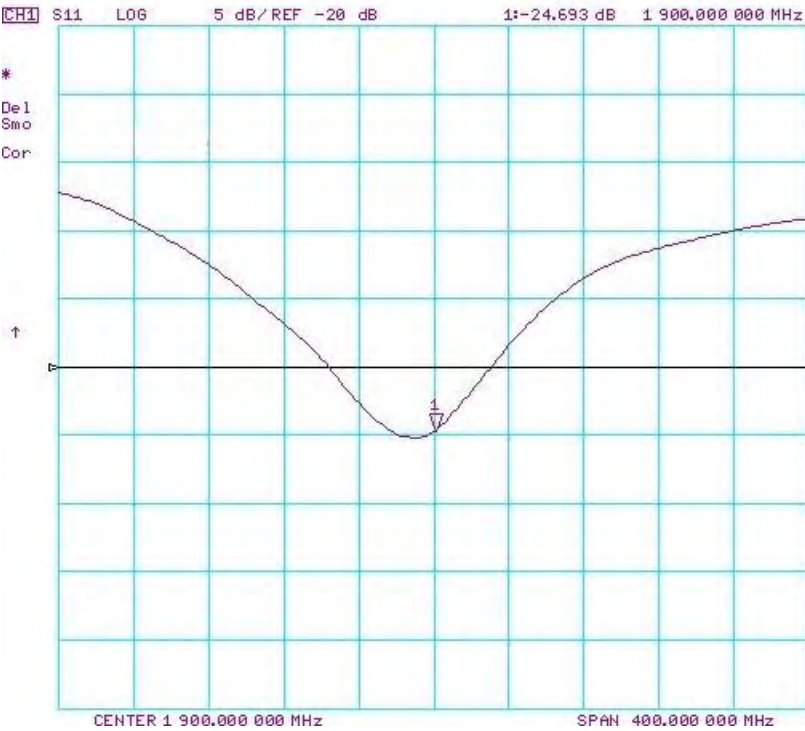
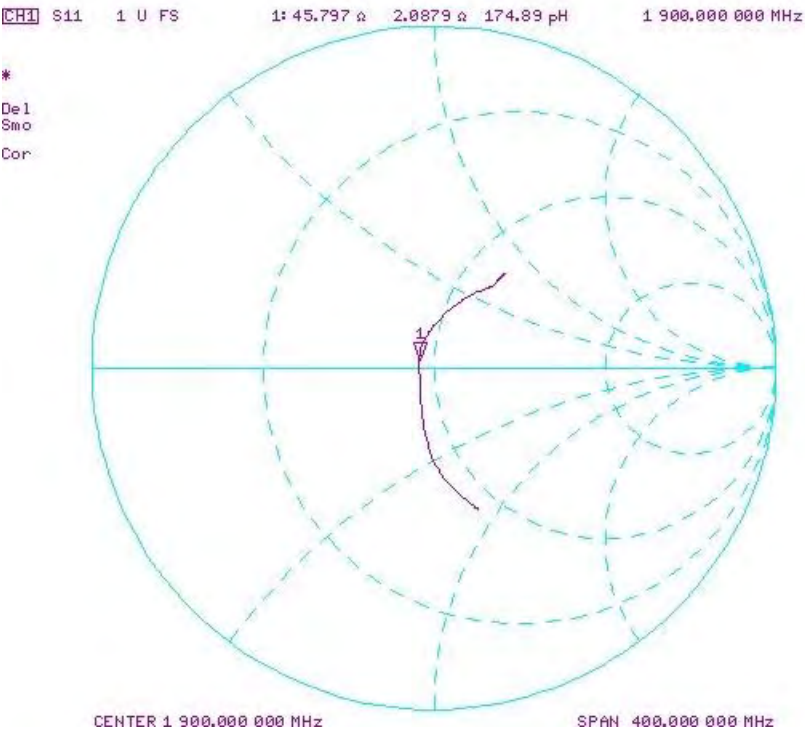
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2018	1.2	3.95	3.99	1.01%	2.06	2.07	0.49%	53.7	49.6	4.1	4.6	2.6	2	-24.9	-28.9	-16.10%	PASS

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2018	1.2	3.95	4.13	4.56%	2.09	2.14	2.39%	49.2	45.8	3.4	5.6	2.1	3.5	-24.8	-24.7	0.40%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object D1900V2 – SN: 5d181

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

Extended Calibration date: September 7, 2019

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

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

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

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

DIPOLE CALIBRATION EXTENSION

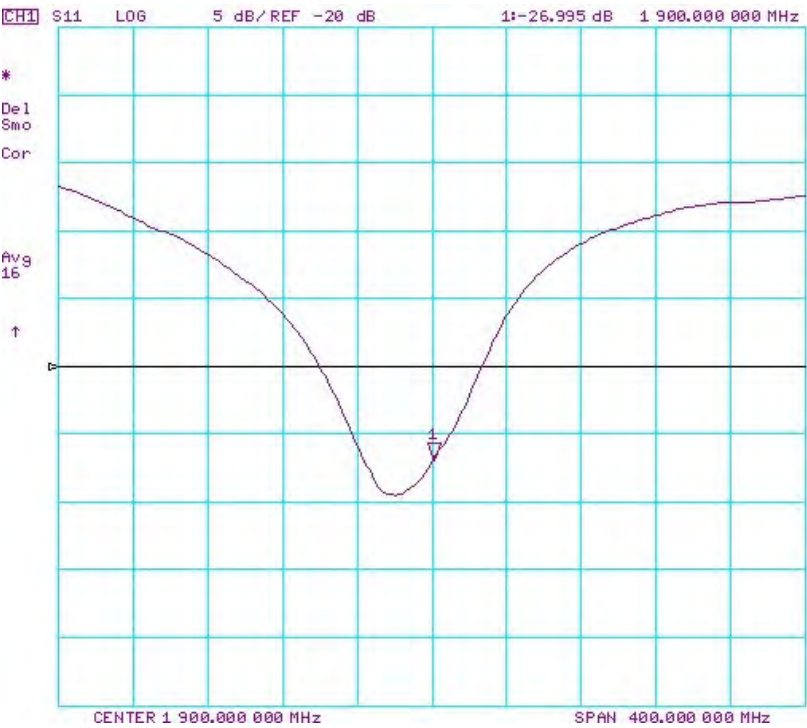
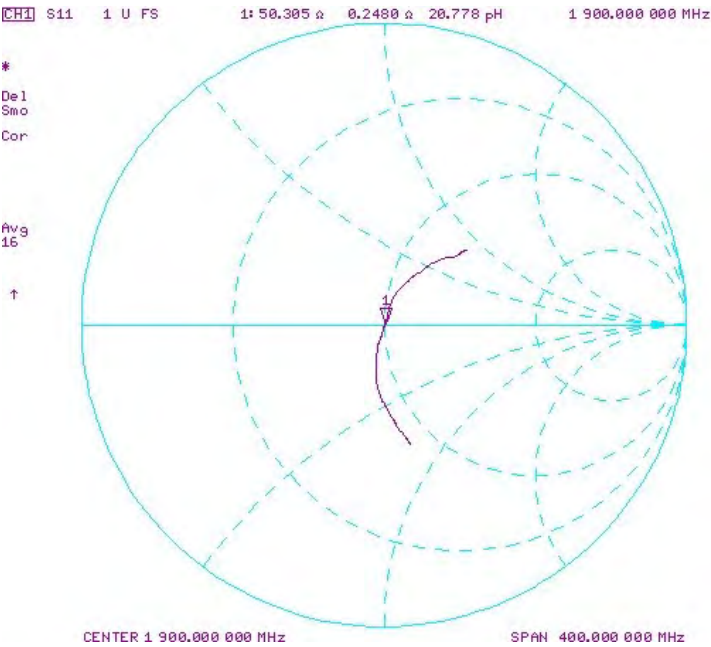
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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

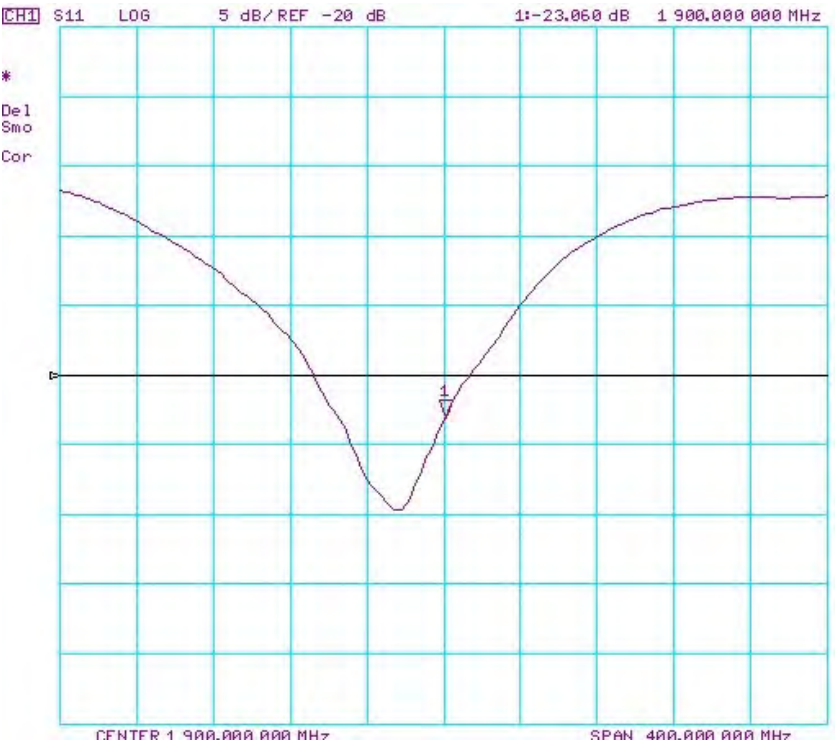
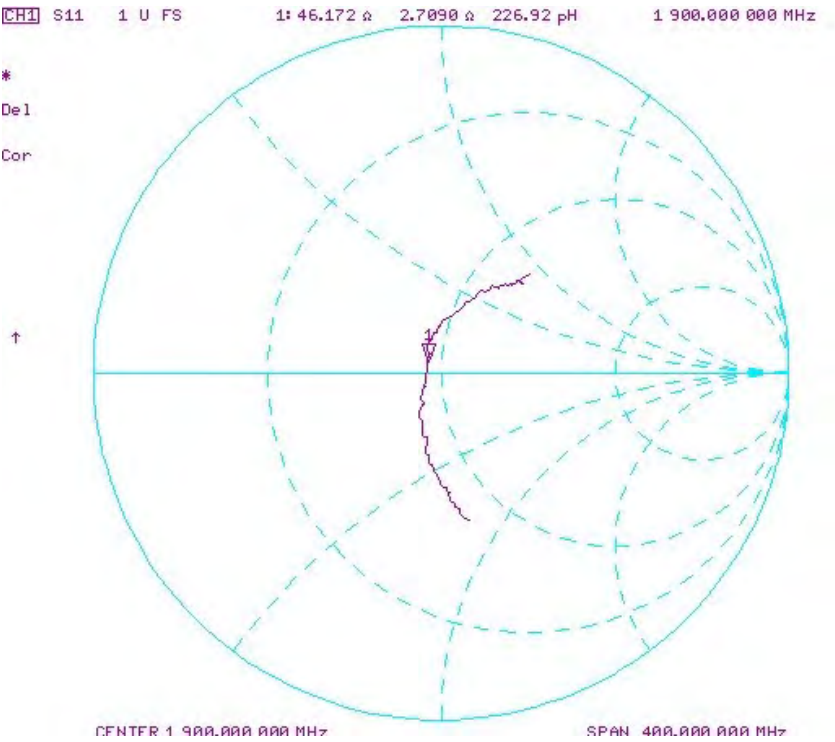
The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2019	1.2	3.95	3.92	-0.76%	2.06	2.04	-0.97%	53.7	50.3	-3.4	4.6	0.2	-4.4	-24.9	-27	-8.40%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
9/7/2017	9/7/2019	1.2	3.95	4.05	2.53%	2.09	2.1	0.48%	49.2	46.2	-3	5.6	2.7	-2.9	-24.8	-23.1	6.90%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL





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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D2300V2-1038_Mar18**

CALIBRATION CERTIFICATE

Object **D2300V2 - SN:1038**

Calibration procedure(s) **QA CAL-05.v10
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **March 07, 2018**

SC ✓
3/21/18
SC ✓
4/25/19

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

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

Signature

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

Issued: March 9, 2018

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



Accredited by the Swiss Accreditation Service (SAS)

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

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2300 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.5	1.67 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.6 $\pm$ 6 %	1.70 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	12.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	49.3 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.94 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.6 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.9	1.81 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.6 $\pm$ 6 %	1.86 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	11.9 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	46.7 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.69 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	22.5 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.8 Ω - 4.9 j Ω
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.9 Ω - 3.4 j Ω
Return Loss	- 25.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.170 ns
----------------------------------	----------

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:

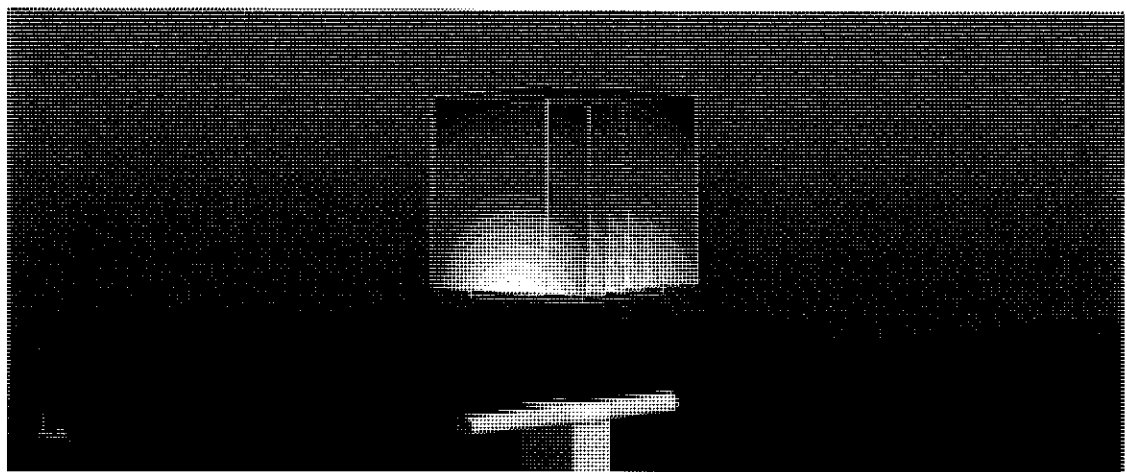
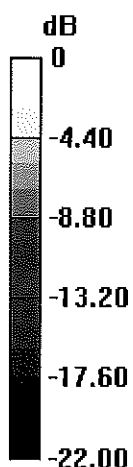
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

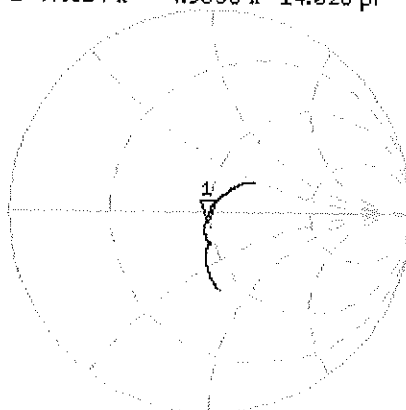


0 dB = 19.6 W/kg = 12.92 dBW/kg

Impedance Measurement Plot for Head TSL

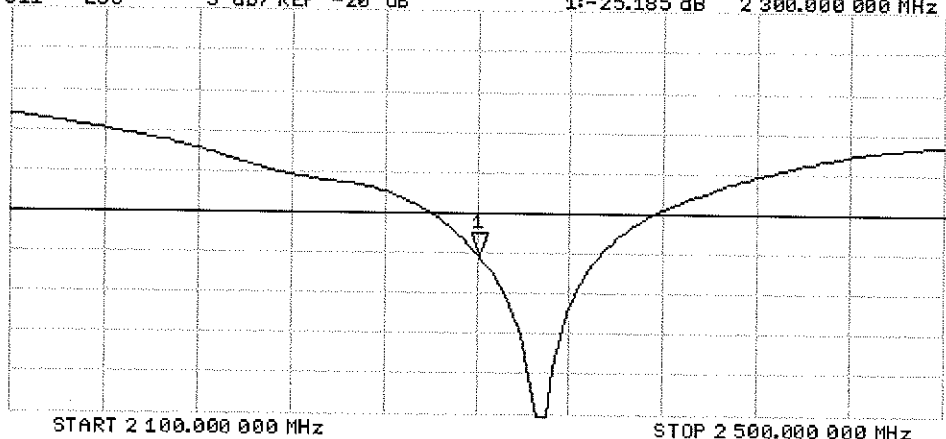
7 Mar 2018 13:16:07
 CH1 S11 1 U FS 1: 47.824 Ω -4.9336 Ω 14.026 pF 2 300.000 000 MHz

*
 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:

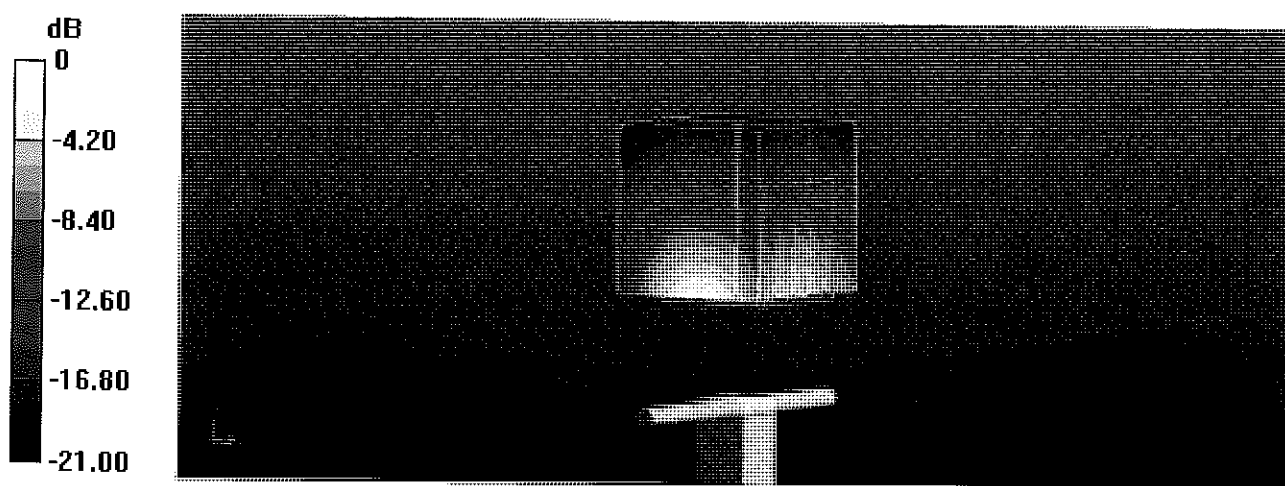
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

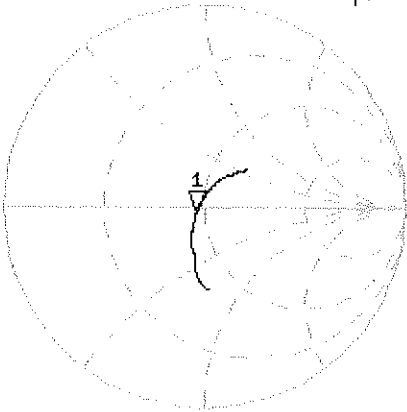


0 dB = 18.2 W/kg = 12.60 dBW/kg

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

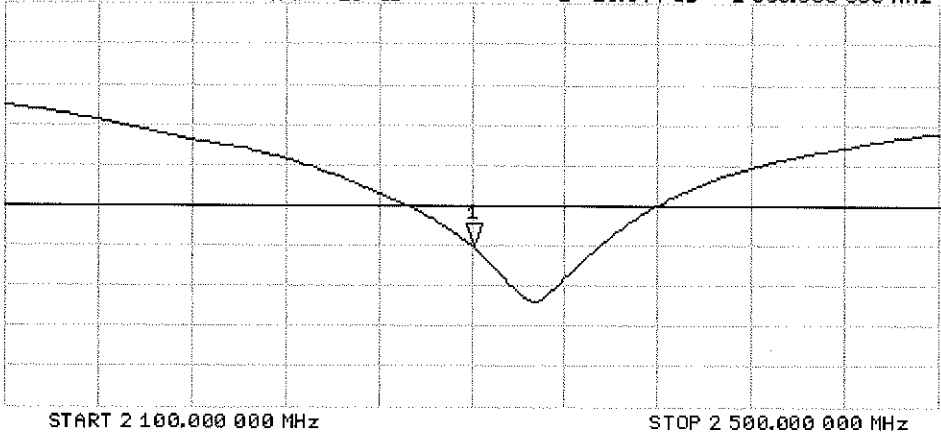


Avg
16
H1d

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.

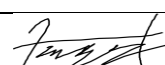
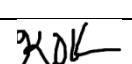
Extended Calibration date: February 25, 2019

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

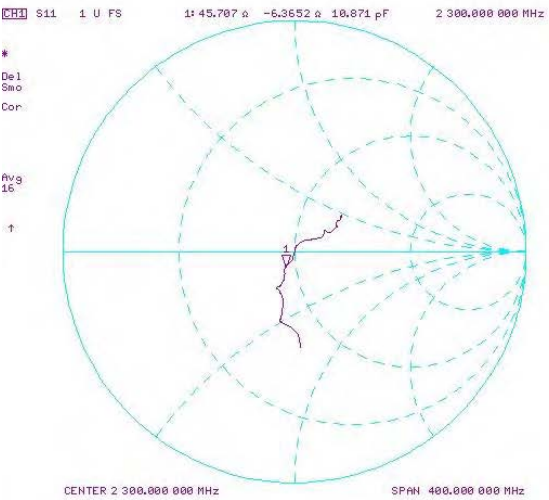
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

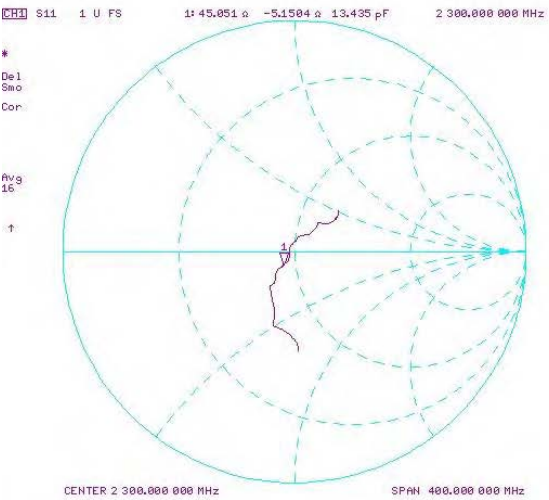
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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 ± 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	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:

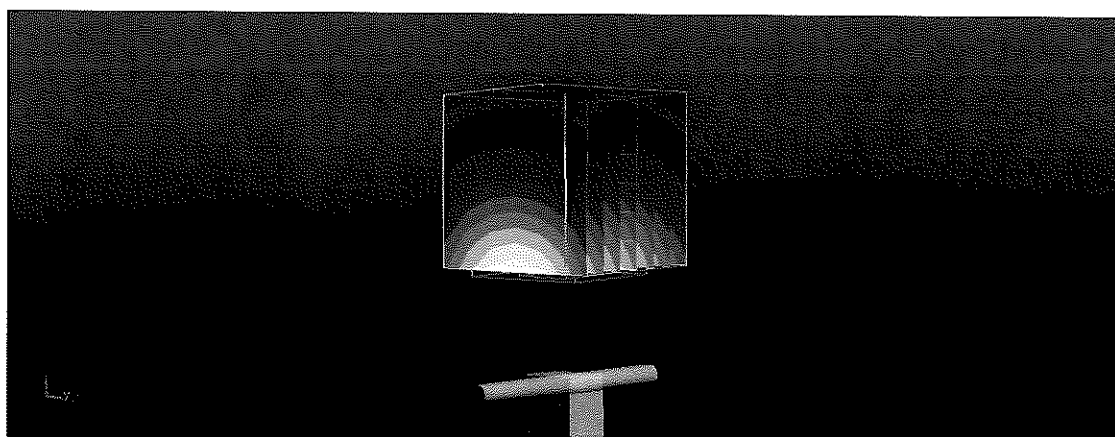
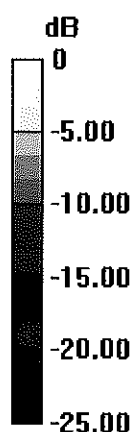
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 27.4 W/kg

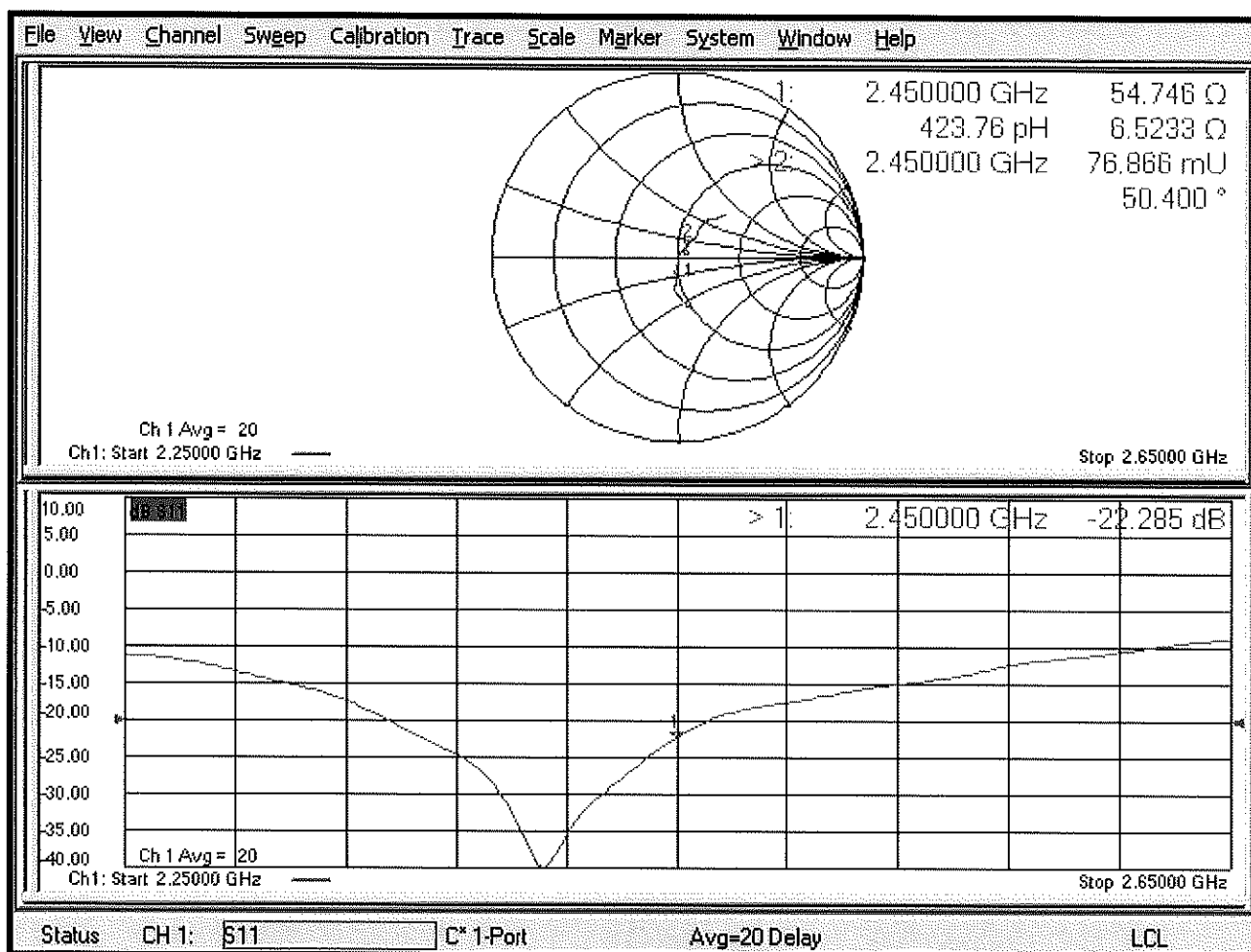
SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.28 W/kg

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:

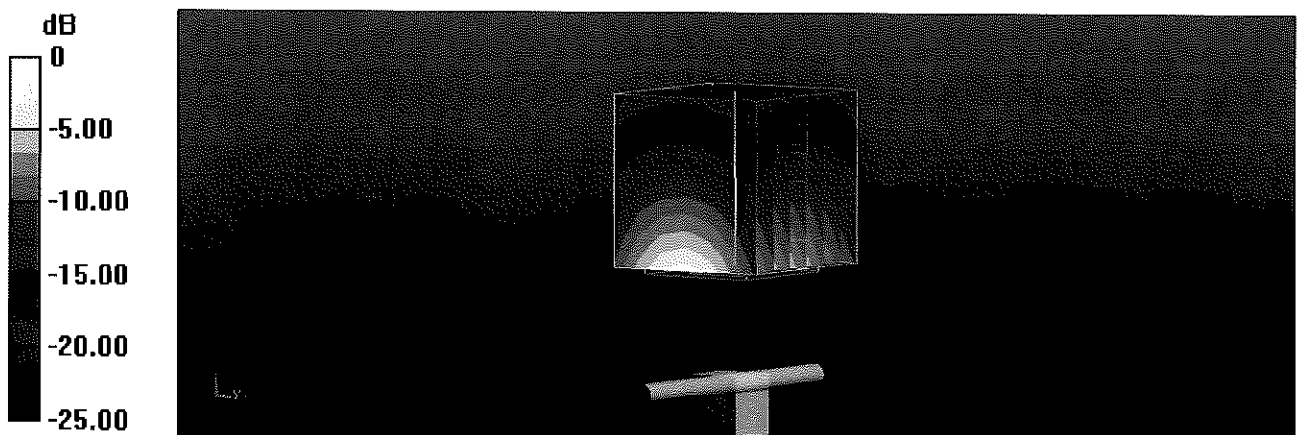
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 26.1 W/kg

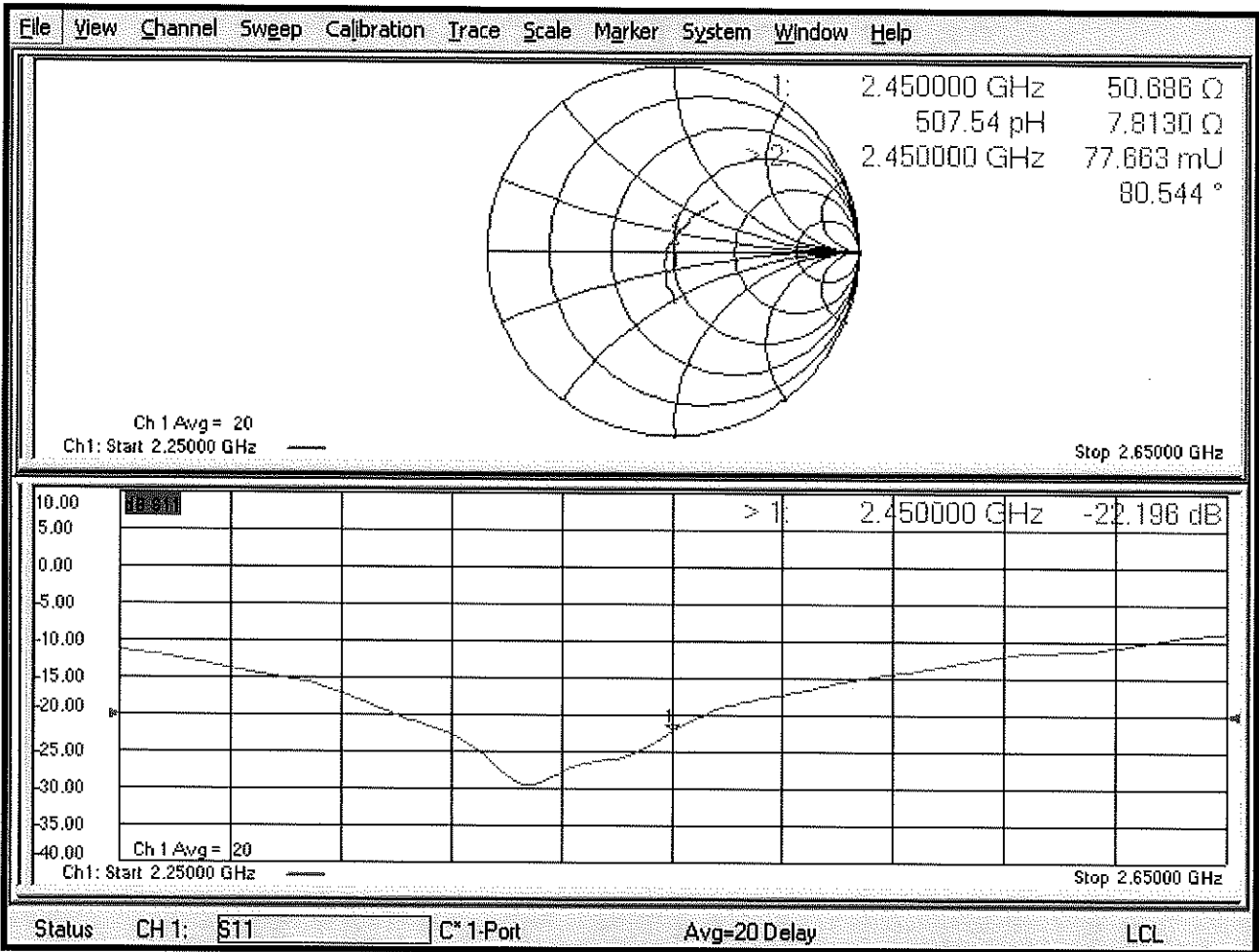
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.03 W/kg

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

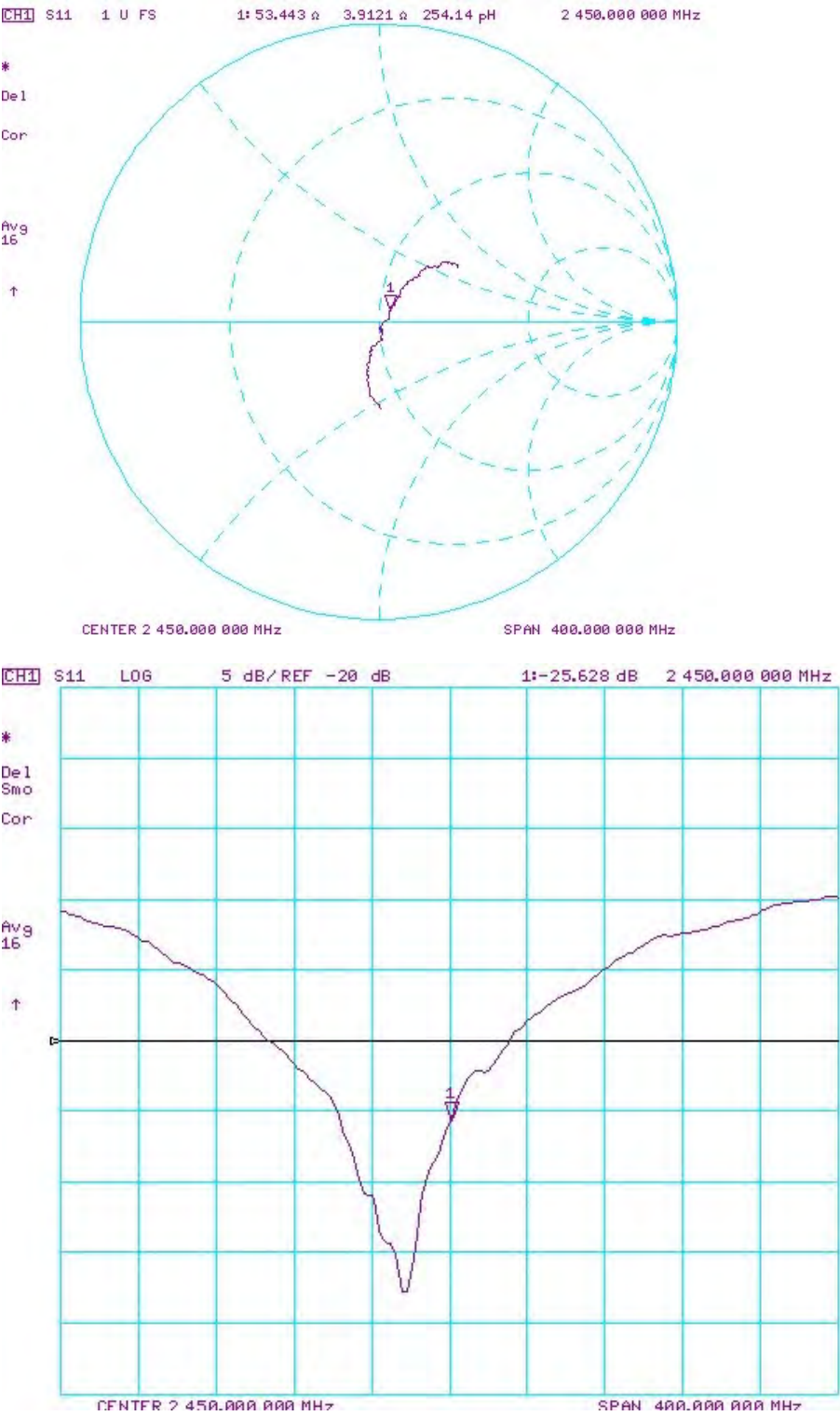
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

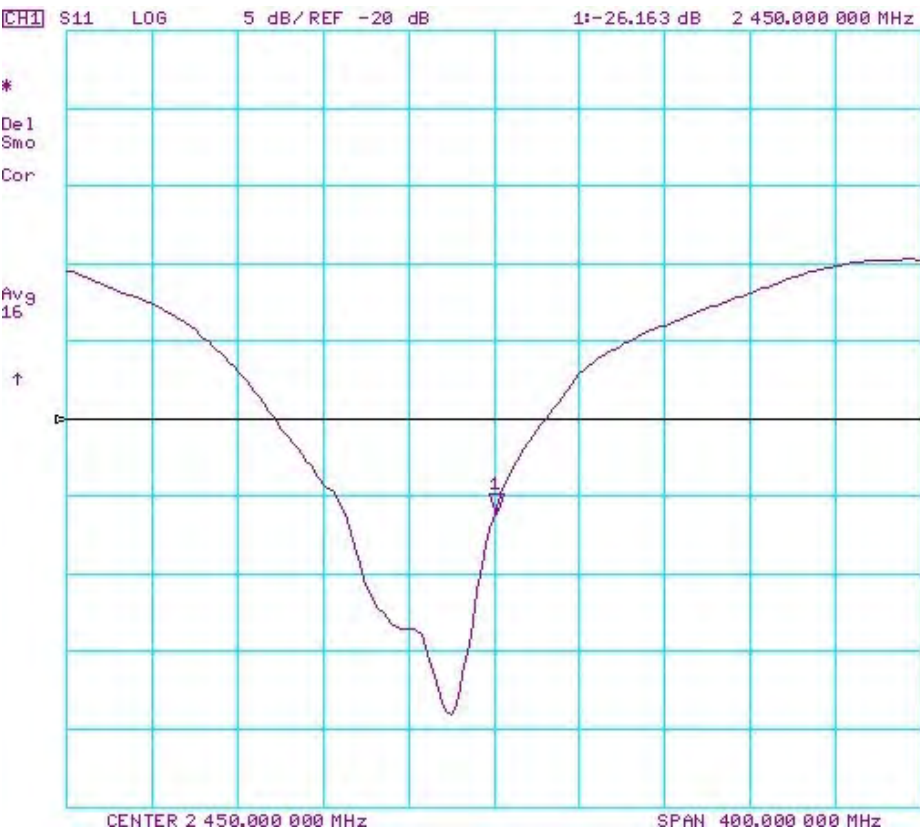
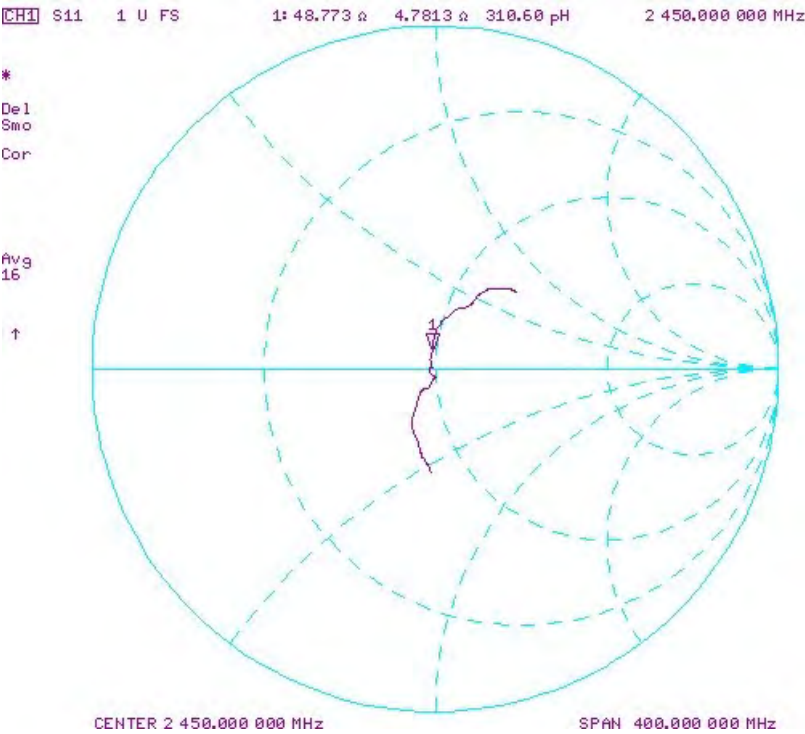
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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 Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
11/12/2018	11/11/2019	1.157	5.31	5.28	-0.56%	2.48	2.38	-4.03%	54.7	53.4	1.3	6.5	3.9	2.6	-22.3	-25.6	-14.80%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
11/12/2018	11/11/2019	1.157	5.08	5.41	6.50%	2.38	2.47	3.78%	50.7	48.8	1.9	7.8	4.8	3	-22.2	-26.2	-18.00%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL





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: **D2450V2-945_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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The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

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

DASY Version	DASY5	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	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:

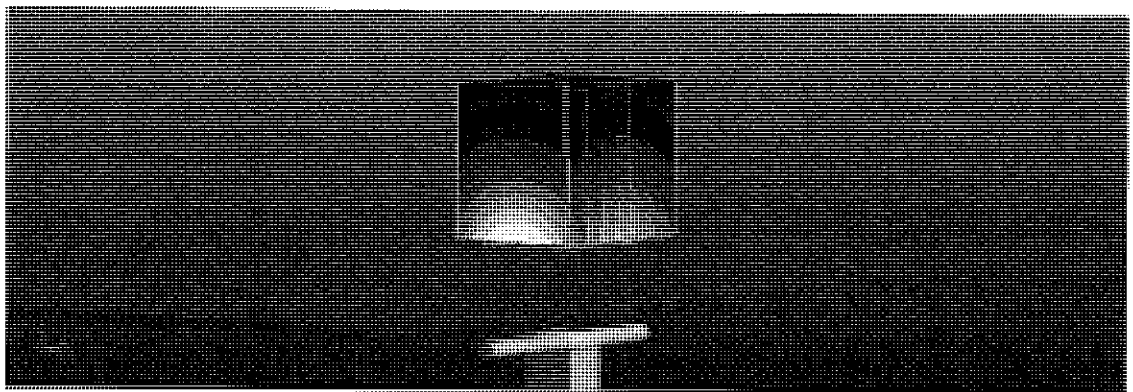
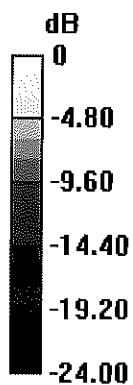
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 25.9 W/kg

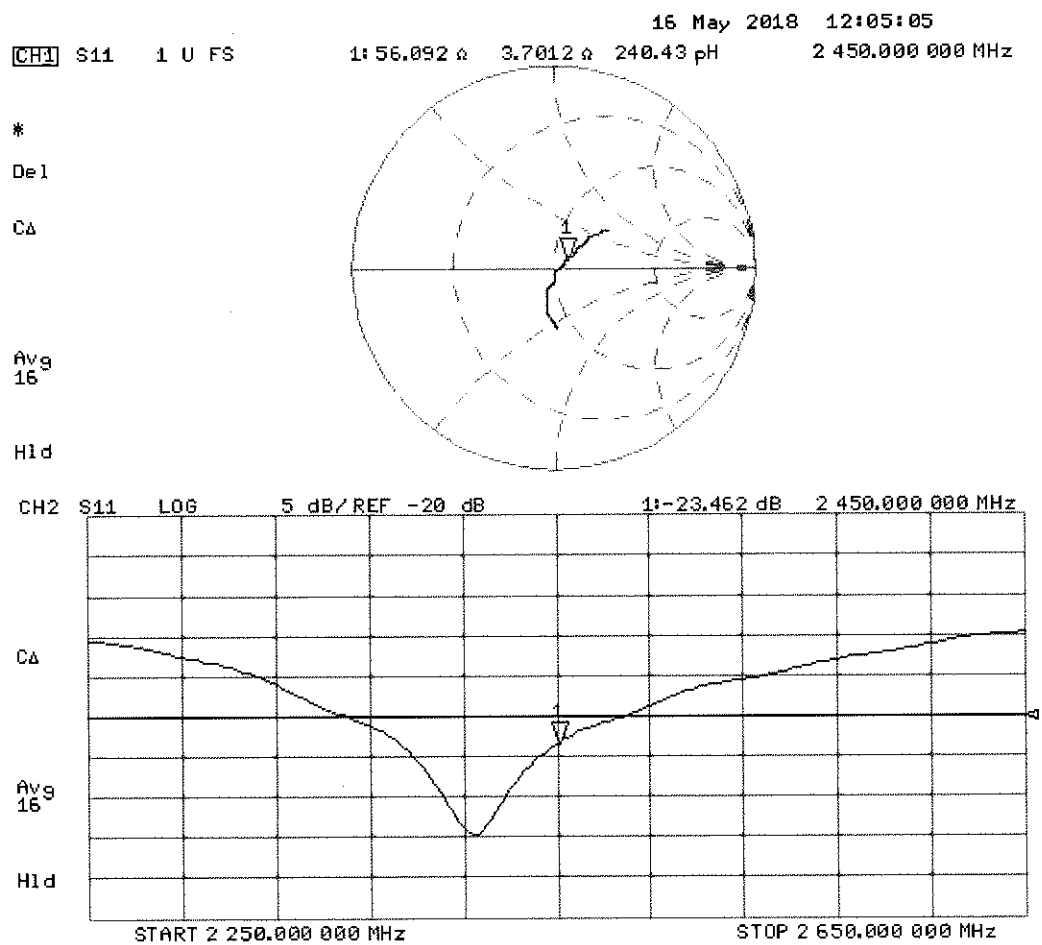
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.02 W/kg

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:

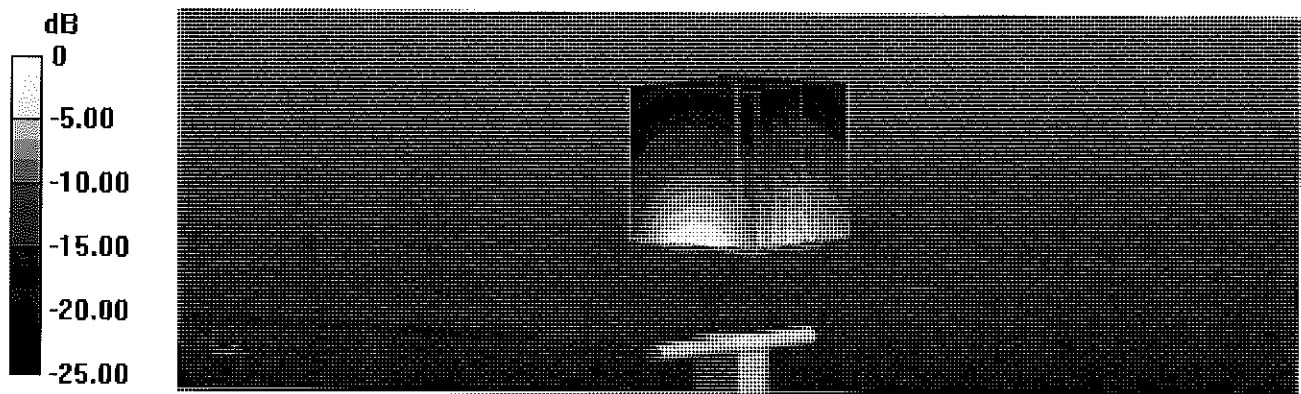
Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

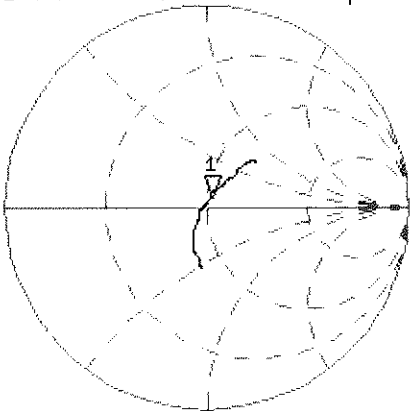


0 dB = 20.2 W/kg = 13.05 dBW/kg

Impedance Measurement Plot for Body TSL

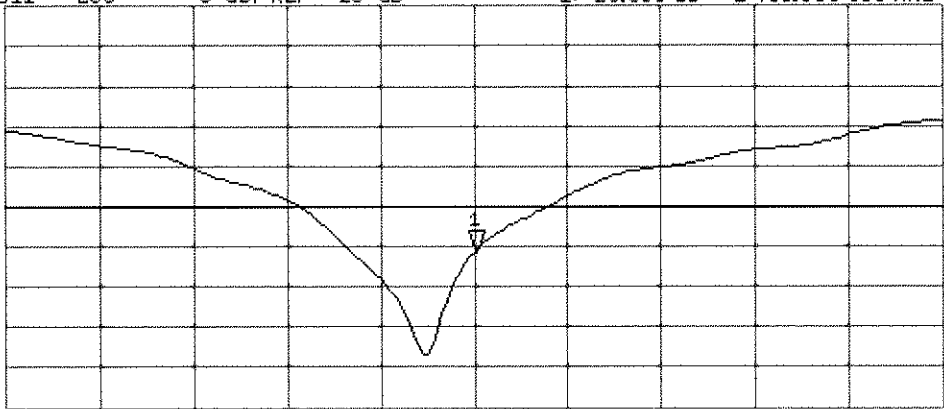
16 May 2018 12:03:43
[CH1] S11 1 U FS 1: 51.910 Ω 4.9629 Ω 322.40 μ H 2 450.000 000 MHz

*
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



START 2 250.000 000 MHz STOP 2 650.000 000 MHz

Certification of Calibration

Object D2450V2 – SN: 945

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

Extended Calibration date: May 16, 2019

Description: SAR Validation Dipole at 2450 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	N5182A	MXG Vector Signal Generator	6/15/2018	Annual	6/15/2019	MY47420837
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
SPEAG	DAKS-3.5	Portable DAK	9/11/2018	Annual	9/11/2019	1045
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7416
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/10/2018	Annual	7/10/2019	1402

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

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

DIPOLE CALIBRATION EXTENSION

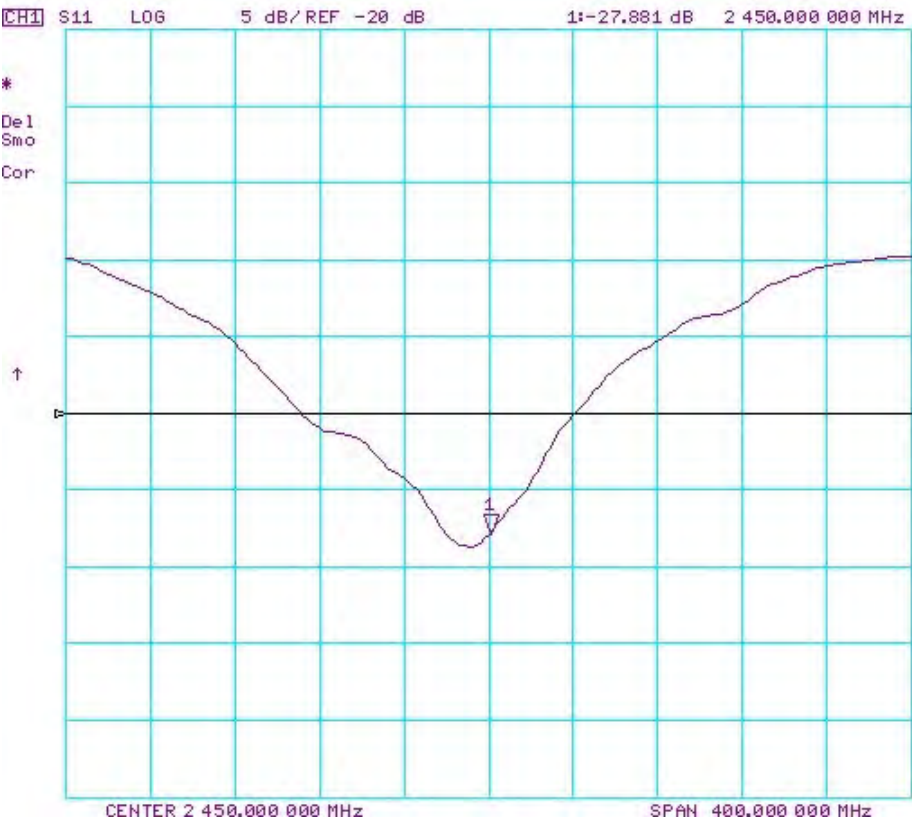
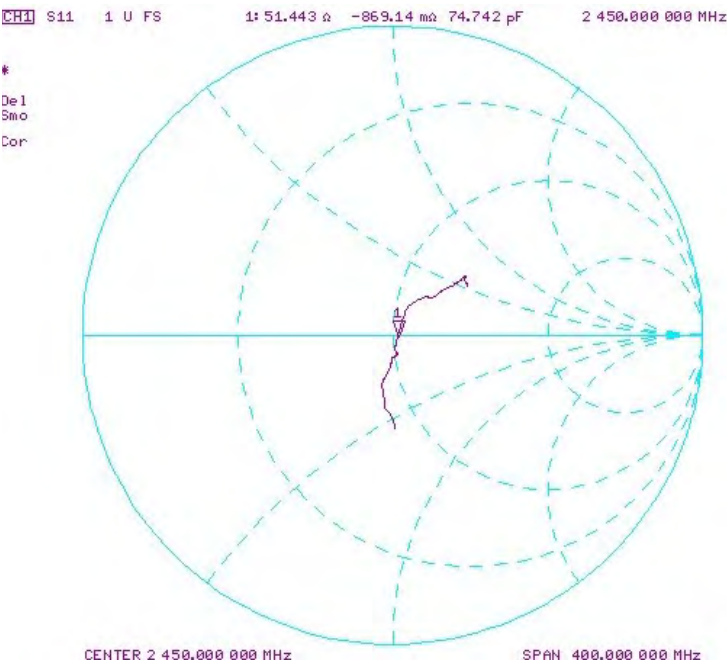
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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

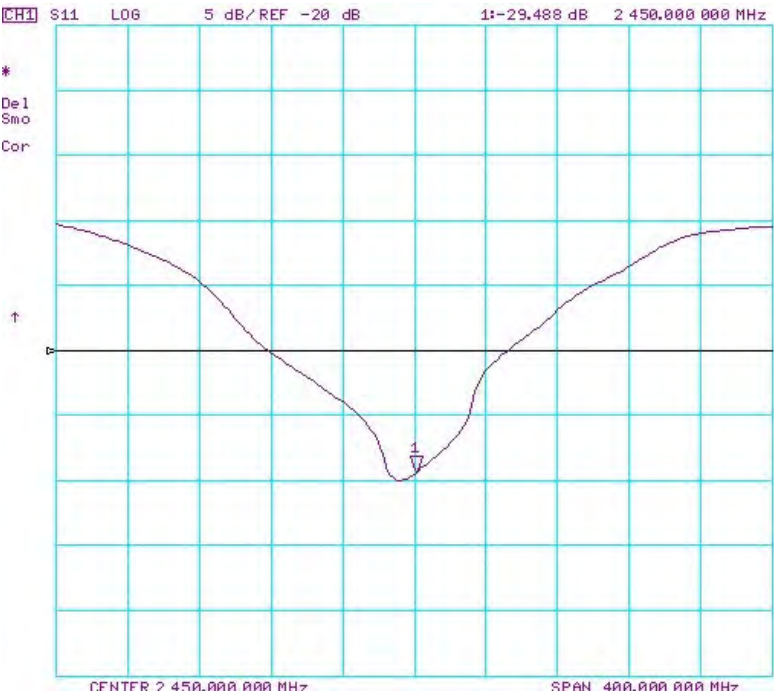
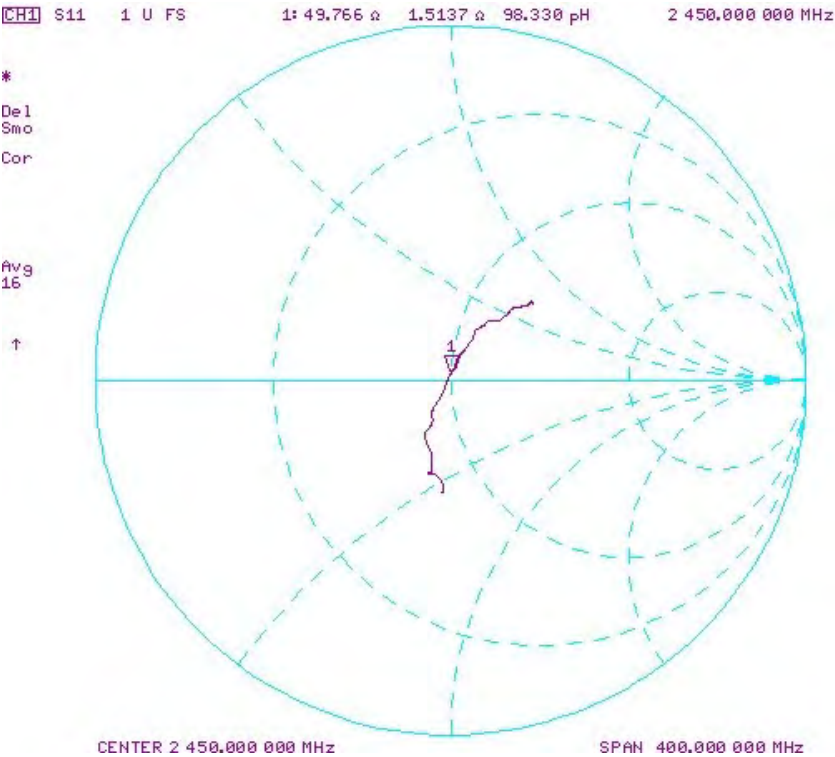
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5/16/2018	5/16/2019	1.157	5.1	5.23	3.73%	2.38	2.44	2.52%	56.1	51.4	4.7	3.7	-0.9	4.6	-23.5	-27.9	-18.60%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5/16/2018	5/16/2019	1.157	4.94	5.21	5.47%	2.32	2.38	2.59%	51.9	49.8	2.1	5	1.5	3.5	-25.7	-29.5	-14.70%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL





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Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D2600V2-1009 Jun18**

CALIBRATION CERTIFICATE

Object **D2600V2 - SN:1009**

Calibration procedure(s) **QA CAL-05.v10**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **June 19, 2018**

SC ✓
 6/28/18

BN ✓
 7/01/18

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
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DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

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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

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Accreditation No.: **SCS 0108**

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- 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
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